FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	BR 1502(024)		1
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	WISE	
CONT.	SECT.	JOB	HIGHWAY NO.
0902	20	102	CR 1590

INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
BR 1502(024)

WISE COUNTY
CR 1590

LIMITS: AT BIG SANDY CREEK
FOR THE CONSTRUCTION OF REPLACEMENT OF THE EXISTING BRIDGE AND APPROACHES
CONSISTING OF: REPLACING BRIDGES AND APPROACHES

			BRIDGE LENGTH		ROADWAY LENGTH		TOTAL LENGTH	
ROAD NO.	LOCATION	CSJ	FEET	MILES	FEET	MILES	FEET	MILES
CR 1590	AT BIG SANDY CREEK	0902-20-102	70.00	0.013	300.00	0.057	370.00	0.070

DESIGN SPEED = MEETS OR EXCEEDS EXISTING CONDITIONS
FUNCTION CLASS = LOCAL ROAD
ADT:
(2019) 136
(2039) 190

FINAL PLANS

DATE CONTRACT LETTING:_____
DATE CONTRACTOR BEGAN WORK:_____
DATE WORK COMPLETED & ACCEPTED:_____
CONTRACTOR:_____
USED____OF____ALLOTTED DAYS_____
FINAL CONTRACT COST: $_____

FINAL AS BUILT PLANS

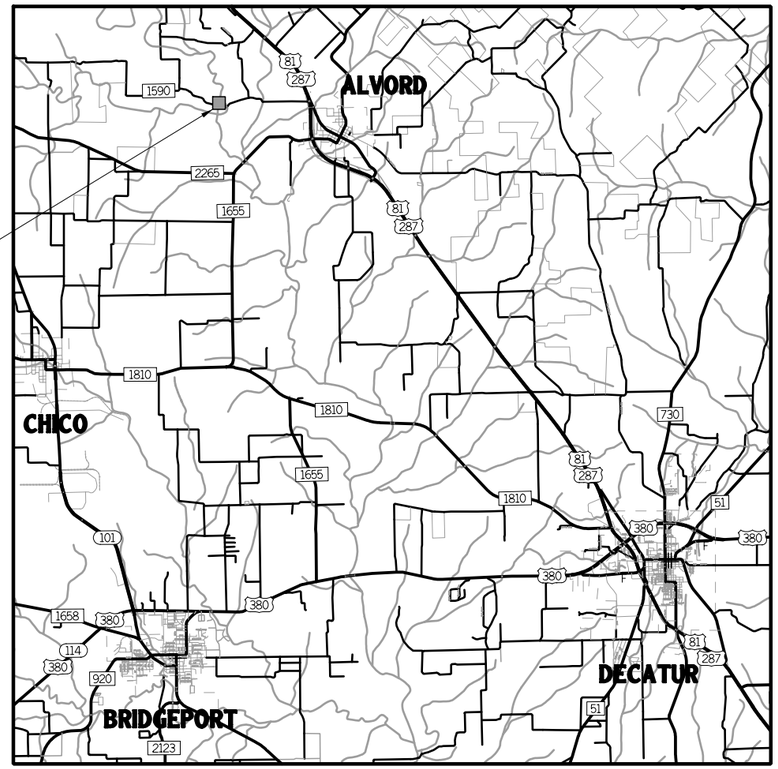
THE CONSTRUCTION WAS PERFORMED UNDER MY SUPERVISION IN ACCORDANCE WITH THE PLANS AND CONTRACT

_____ DATE

_____ AREA ENGINEER

STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER

PROJECT NO. BR 1502(024)
CSJ: 0902-20-102
CR 1590 AT BIG SANDY CREEK
BEGIN PROJECT: 8+25.00
END PROJECT: 11+95.00
EXISTING STRUCTURE NO.:
02-249-0-AA01-13-003
PROPOSED STRUCTURE NO.:
02-249-0-AA01-13-007



SCALE: 1" = 3 MILES

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD GRADE CROSSINGS: NONE

WISE COUNTY
FORT WORTH DISTRICT

AECOM Technical Services Inc.
13355 NOEL RD, STE 400
DALLAS, TEXAS 75240
214.741.7777 TBPE REG #3580

SUBMITTED FOR LETTING 6/8/2022

PROJECT MANAGER, AECOM

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 6/9/2022
DocuSigned by:
PE
AREA ENGINEER
1C2C4AEE88A847B...

SUBMITTED FOR LETTING 6/9/2022
DocuSigned by:
Carl L. Johnson, PE
DISTRICT ENGINEER
2FE36139F0614C3...

RECOMMENDED FOR LETTING 6/9/2022
DocuSigned by:
DIRECTOR OF TRANSPORTATION, PLANNING & DEVELOPMENT
7879B0B92E5D403...

COUNTY: WISE PROJ. NO. BR 1502(024)
HWY. NO. CR 1590 LETTING DATE: 08/03/22
DATE ACCEPTED: _____

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 1, 2012)

DATE: 6/10/2022 2:20:48 PM
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STATE OF TEXAS ALFREDO VALLES 76497 REGISTERED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH A ## HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

Alfredo Valles, P.E.
ALFREDO VALLES

06/13/2022
DATE

STATE OF TEXAS SEAN K. YOUNG 96504 LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH A >> HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

SEAN K. YOUNG P.E.

6/10/2022
DATE

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK

INDEX OF SHEETS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		2

BIG SANDY CREEK

PROJECT LOCATION
CR 1590 @
BIG SANDY CREEK
CSJ# 0902-20-102

CR 1590

ALVORD

CHICO

BRIDGEPORT

LAKE
BRIDGEPORT

RUNAWAY BAY

DECATUR

PARADISE

N

0' 5000' 10000'
SCALE IN FEET

STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK

LOCATION MAP

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		3

DATE: 6/6/2022 9:59:45 AM
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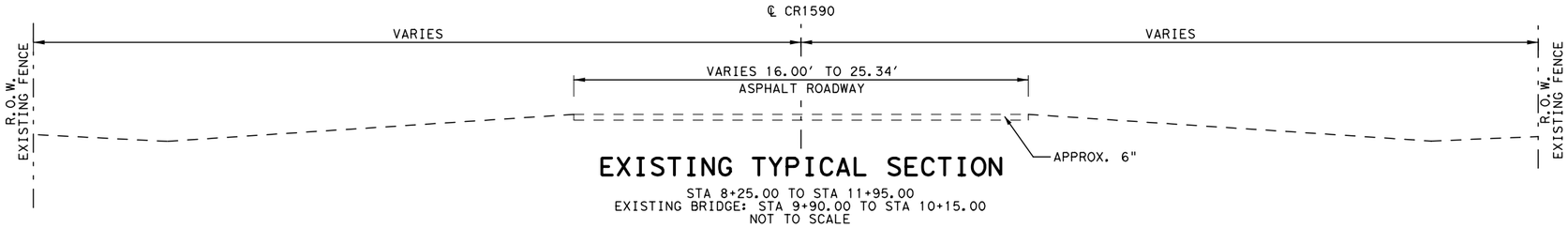
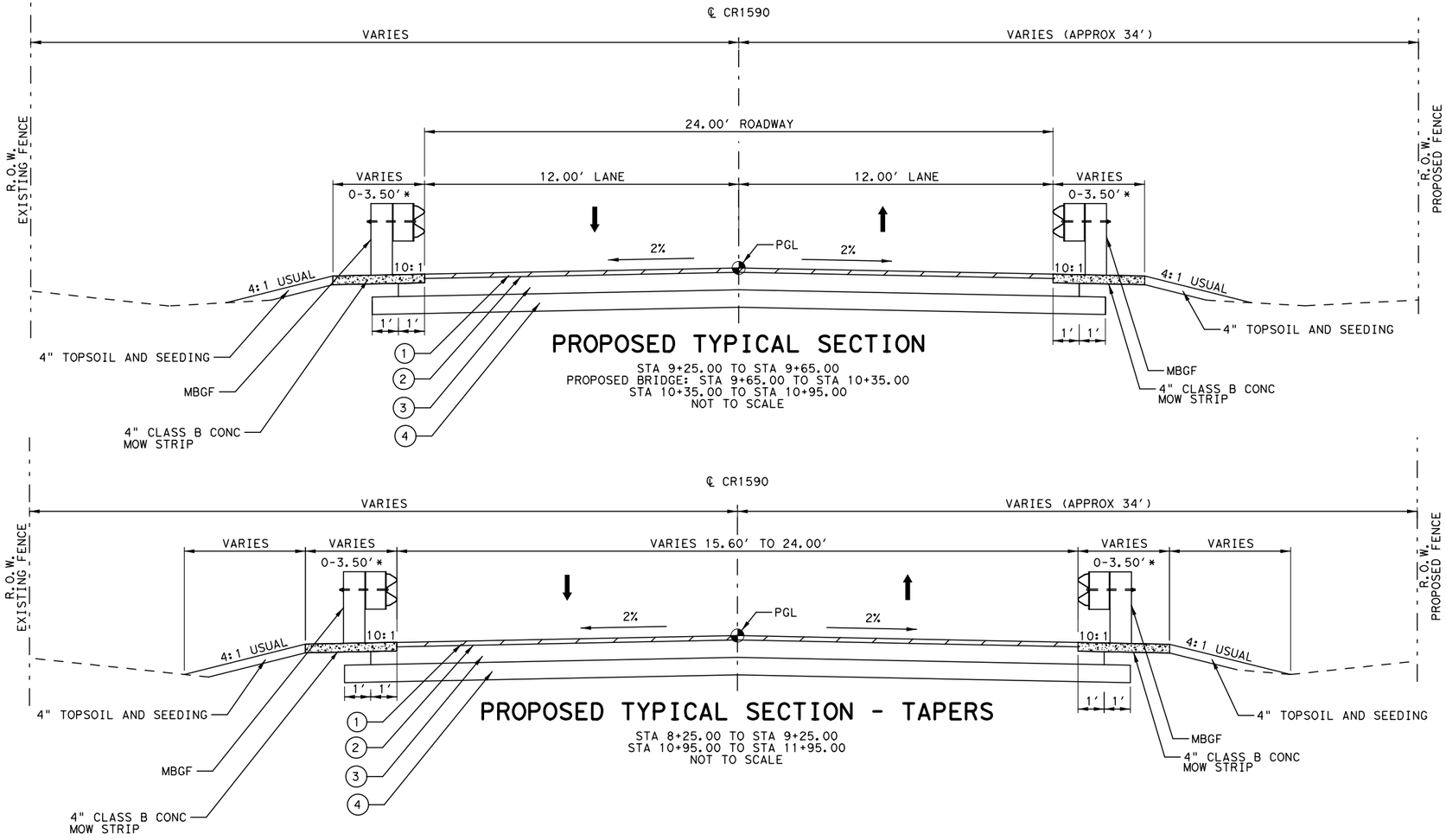


EXISTING TYPICAL SECTION

STA 8+25.00 TO STA 11+95.00
EXISTING BRIDGE: STA 9+90.00 TO STA 10+15.00
NOT TO SCALE



PROPOSED TYPICAL SECTION

STA 9+25.00 TO STA 9+65.00
PROPOSED BRIDGE: STA 9+65.00 TO STA 10+35.00
STA 10+35.00 TO STA 10+95.00
NOT TO SCALE

PROPOSED TYPICAL SECTION - TAPERS

STA 8+25.00 TO STA 9+25.00
STA 10+95.00 TO STA 11+95.00
NOT TO SCALE

* AT GUARD FENCE LOCATIONS SEE STD. ROADWAY SHEET GF(31)MS-19

LEGEND

1. 2" HMAC, D-GR TY D PG 70-28 SURFACE COURSE
2. PRIME COAT (MC-30 OR EC-30)
3. 8" FLEX BASE (CMP IN PLACE) TY A GR 1-2 (95 % COMPACTED)
4. 8" (MIN) 95% COMPACTED EX. MATERIALS / EMBANKMENT

NOTES:

1. SEE BRIDGE LAYOUT SHEETS FOR BRIDGE TYPICAL SECTIONS.
2. SEE PLAN & PROFILE SHEET FOR TAPER LOCATIONS AND LIMITS OF GUARD FENCE.
3. STOCKPILE AND REUSE EXISTING TOPSOIL INSIDE ROW.

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK

TYPICAL SECTIONS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		4

DATE: 6/6/2022 9:59:45 AM
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Project Number: BR 1502(024)

County: WISE **Control:** 0902-20-102

Highway: CR

Specification Data

Basis of Estimate

Item	Description	Rate	Unit
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
310	Asph Mat'l (MC-30 or EC-30) (Flex Base)	0.30 gal./sq. yd.*	gal.
3076	Hot Mix (TY D)	115 lb./sq. yd.-in.	ton

* Based On 50% Asphalt Residue.

Compaction Requirements for Base Courses

Item	Material	Course	Min. Density
247	Flex Base	All	95 %

(Minimum Density is the percentage of density required based on results of Tex-113-E, Tex-114-E, Tex-120-E, and/or Tex-121-E)

Special Notes

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

Project Number: BR 1502(024)

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To obtain a copy of the project plans free of charge, submit a request from the following site: http://www.txdot.gov/business/letting-bids/plans-online.html

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

Edrean Cheng, P.E ,Area Engineer's Email: Edrean.Cheng@txdot.gov
Oscar Chavez, P.E., Assistant Area Engineer's Email: Oscar.R.Chavez@txdot.gov

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

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

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

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

The Contractor's attention is directed to the following list of temporary easements and their expiration dates:

Parcel Number	Expiration Date
3 TCE	December 2023
4 TCE	December 2023

Complete all work in these easement areas prior to the expiration dates shown. In the event that work is done after these expiration dates, all costs for extending these dates will be paid by the Contractor.

Remove all existing fences within the right of way and remove and replace all existing fences within easements where such fences conflict with the work. Protect the remaining fence from damage due to slacking. Erect temporary fencing in the easement areas as necessary to secure

the property. Provide at least one week notice to the property owner prior to removing or relocating the fence. Restore permanent fencing to an equal or better condition.

Mail box manipulation made necessary because of construction will be in accordance with Item 560 "Mailbox Assemblies," except that this work will not be paid for directly but will subsidiary to the pertinent bid items.

Replacement of mailboxes that are damaged as a result of manipulation will need to be replaced to equal or better conditions. This work will not be paid for directly but will be subsidiary to pertinent bid items.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly, but will be subsidiary to the various items of the contract.

Plugging of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

Item 5. Control of the Work

Project Number: BR 1502(024)

County: WISE **Control:** 0902-20-102

Highway: CR

When supplementary bridge plans, shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, prepare and submit drawings on sheets 8-1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, prepare and submit on sheets 22 by 34 inches, with a 1-1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 7. Legal Relations and Responsibilities

No significant local traffic generator events identified.

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

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

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

(1) **Restricted Use of Materials for Previously Evaluated Permit Areas.** Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
   b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
   c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:
   a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
   b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is _1.01__ 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 right of way. 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 right of way to the Engineer and to the local government that operates a separate storm sewer system.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction

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Highway: CR

operations outside of the preferred nesting season. Otherwise, avoid nests containing migratory birds and perform no work in the nesting areas until the young birds have fledged.

Structures

Do not begin bridge and culvert construction operations until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

Item 8. Prosecution and Progress

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

Prepare the progress schedule as a bar chart, include all planned work activities and sequences and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Item 100. Preparing Right of Way

Measurement for this item will be along the centerline of the project with the limits of measurements as shown on the plans.

Removal of existing concrete pavement will be in accordance with Item 104, "Removing Concrete" except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way."

Item 105. Removing Treated and Untreated Base and Asphalt Pavement

Cement, lime, and/or lime fly-ash treated base material removed on this project will become the property of the Contractor.

All RAP material from this project will become the property of the contractor.

Item 110. Excavation

Review proposed waste sites to determine if any site is located in a "Base Floodplain" or "Floodway" as defined by the Federal Emergency Management Agency (FEMA).

If waste material from this project is placed in a base floodplain as defined by FEMA, obtain a permit from the local community responsible for enforcing National Flood Insurance Program (NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

Item 132. Embankment

Do not provide Type B embankment material with a Plasticity Index (PI) higher than _35__.

Furnish test results per Test Procedures Tex-104, 105, and 106-E (Pls), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I.

When embankment is placed as a bridge header bank, test each lift for compliance with density requirements, near the center of each travel lane at the following locations:

Project Number: BR 1502(024)

County: WISE **Control:** 0902-20-102

Highway: CR

1. At the "beginning of bridge" or "end of bridge" station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)
2. At 25-foot intervals for a distance of 150 feet in advance of the "beginning of bridge" station.
3. At 25-foot intervals for a distance of 150 feet after the "end of bridge" station.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor's entire expense. Testing and reporting of test results will not be paid for directly but will be subsidiary to this item.

Construct embankments for bridge header banks to final subgrade elevation prior to excavation for abutment caps and placement of foundation course at approach slabs. Payment for structural excavation and/or excavation for placement of foundation course will not be paid for directly but will be subsidiary to the pertinent bid items.

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

Item 161. Compost

Where "blended on-site" CMT is specified, produce the compost manufactured topsoil by incorporating 1" of compost with 3" of furnished topsoil as shown on the plans.

Item 164. Seeding for Erosion Control

Apply seeding required between December 1 and January 31 using seed types and mixtures as shown in Item 164.2.1, Table 3. If, in the opinion of the Engineer, this does not provide an effective vegetative cover, apply "straw or hay mulch" as specified in Article 164.3.2, "Straw or Hay Mulch Seeding" as soon as possible. After February 1, apply warm season seeding in order to establish a permanent protective vegetative cover.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly, but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-consecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 247. Flexible Base

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

Build and maintain a 5,000 cu. yd. stockpile of approved material before and during hauling operations.

Item 301. Asphalt Antistripping Agent

Furnish a liquid antistripping agent unless otherwise directed. The Engineer will verify the requirement prior to approval of the design.

Item 310. Prime Coat

Provide an MC-30 or EC-30, for this Item.

Item 421. Hydraulic Cement Concrete

For Class P (Item 360) and S (Item 421) Concrete Only: For concrete plants equipped with 2 aggregate bins or no calibrated metering system, blend manufactured and natural sand at the aggregate source only. For concrete plants equipped with a minimum of 3 bins and a calibrated

Project Number: BR 1502(024)

County: WISE **Control:** 0902-20-102

Highway: CR

metering system, blending of the separate sands on-site is permitted to meet gradation and AIR requirements.

Strength/cylinder testing equipment must be equipped with a printer for an electronic print out of all test results.

Air entrainment requirements are waived for all classes of concrete except all Class S and all Class P concrete.

Concrete will not be rejected for low air content. Adjustment to the dosage of air entrainment will be as directed or allowed by the Engineer.

Include the approved mix design number on each delivery ticket.

Ensure that Contractor personnel performing job-control (QC) testing on concrete are ACI certified and maintain certification with annual proficiency/split tests performed with TxDOT. Provide a copy of all personnel certification papers to the Engineer at the preconstruction meeting. The Engineer may require the Contractor's testers to provide the certification papers upon arrival and before testing at the job site. Certified testers will be required to participate with certified TxDOT personnel annually for compression testing (Tex-418-A) and capping cylinders (Tex-450-A) to retain their certification on TxDOT projects.

Furnish a hard copy of all testing equipment calibration reports at the preconstruction meeting when non-TxDOT equipment is used to test concrete. Furnish updated reports as equipment is calibrated through the project contract. The calibration frequency will match TxDOT's and will apply for each piece of equipment as follows:

Slump Cone - Annual
Air Meter - Every 3 months
Compression Tester - Annual
Beam breaker - Annual

The Engineer may allow the use of local commercial laboratories under contract to provide these services. The Commercial Laboratory must fulfill requirements listed above prior to performing any work.

Item 427. Surface Finishes for Concrete

Unless otherwise noted, provide a surface area (II) with a slurry coat finish on the bridge(s).

Item 432. Riprap

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the purpose intended.

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

Locations and lengths of riprap flumes shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

Item 440. Reinforcement for Concrete

Top and bottom layers of slab reinforcing steel shall be epoxy coated.

Item 496. Removing Structures

When required by the plans, partial or complete removal of a structure for staged construction shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members. The Contractor shall submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496. Submit the procedure for removal of superstructure or substructure in writing or plan drawing for approval prior to implementation.

The Contractor shall submit a detailed demolition plan for removal of existing structure in accordance with Item 496 at least 60 days prior to starting demolition unless otherwise directed. The demolition plan needs to include dimensions (width, length) for both sides of the locations where the removal will have impacts to lead paint and the need for abatement prior to removal. The dimensions need to be details to provide actual quantities of the areas to receive lead paint removal for demolition.

Notify the Texas Department of State Health Services (DSHS) prior to demolition or renovation of bridges or other structures, using DSHS Form APB#5, "Demolition/Renovation Notification Form". The form and instructions may be found on the DSHS Asbestos Programs Branch web page at http://www.dshs.state.tx.us/asbestos/notification.shtm. The DSHS notification form must be hand-delivered or mailed to (received at) the DSHS Austin office at least ten working days (10) days prior to commencing demolition or renovation. Fax or e-mail notifications will not be accepted. For projects with multiple bridges, a single notification, with a listing of all bridges or structures to be demolished or renovated and the expected start dates of their demolition or renovation (the start date is defined as the first date of visible demolition activities). Notify the

Project Number: BR 1502(024)

County: WISE **Control:** 0902-20-102

Highway: CR

DSHS Regional or Local inspector of all start date changes. The expected project completion date may be used as the "end" date.

Removal of riprap as required, approach slabs and shoulder drains to be included in the unit price bid.

The structure(s) to be removed have surface coatings which may contain hazardous materials.

To allow for disassembly, the Department will remove paint containing hazardous materials off the steel during the Contract in accordance with the following:

- For simple steel I-beam spans less than 80' in length, a four inch wide strip around the perimeter of the diaphragm member or members at each attachment location to the beams.
- For continuous I-beam units or simple spans more than 80' in length, a six inch wide strip around the perimeter of the beam cross-section for each beam at each cut location. A four inch wide strip around the perimeter of the diaphragm member or members at each attachment location to the beams.
- A four inch wide strip around bearing attachments and at the anchor bolts.
- As requested elsewhere and approved by the Engineer. Paint removal requested beyond that listed herein will be at the Contractor's expense.

Provide for the safety and health of employees and abide by all OSHA standards and regulations.

Provide to the Engineer a detailed plan of the locations of paint removal at least 60 days prior to start of steel structure removal.

Do not cut simple I-beams less than 80' in length.
Salvage the following items and store on the construction site so that Wise County can pick up the steel beam members. Area office will co-ordinate day and time with the Wise County Engineer, Mr Chad Davis at 940-627-9332.

STEEL I-BEAMS

The contractor shall take care not to damage the steel members during the removal process. All steel members shall be reused on other structures and must not be damaged.

Item 502. Barricades, Signs, and Traffic Handling

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 typically 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.

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.

Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

Erect Changeable Message Signs indicating planned road closure 7 days prior to implementing proposed detour.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Items 530 And 531. Intersections, Driveways and Turnouts, and Sidewalks

The furnishing and installation of the sand cushion in proposed sidewalks, sidewalk ramps, and driveways will not be paid for directly but will be subsidiary to this bid item.

Item 540. Metal Beam Guard Fence

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The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

No RAP shall be used as embankment under the mow strip.

Mow strip shall be reinforced with wire mesh or conventional steel.

No fiber reinforced concrete will be allowed in mow strip construction.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, CTB, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole.

ITEM 552. WIRE FENCE

Use galvanized barbed wire fence Type "C" with metal posts.

Attach the permanent fence to the end of the proposed structures designated on the plans and as shown on standard sheet WF(2) - 10.

Any temporary fencing required during construction of the proposed structure extensions or bridge replacements will not be paid for directly, but will be subsidiary to the various bid items.

Construct and maintain temporary fencing and gates at the locations and limits shown on the plans. Furnish temporary fencing and gates with material and design equal to or better than the present fencing, and adequate to properly control livestock for the duration of the project.

ITEM 658. DELINEATOR AND OBJECT MARKER ASSEMBLIES

Accept ownership of unsalvageable delineator and object marker assemblies and remove from the right of way.

Removal of existing delineators and object marker assemblies shall be considered subsidiary to various bid items.

Contractor to provide delineators that are "SHUR-TITE" or approved equal by the Engineer.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 3076. Dense-Graded Hot-Mix Asphalt

Provide aggregate with a Surface Aggregate Classification (SAC) value of __B___ for the travel lanes and shoulders.

Natural (field) sands are not allowed.

Provide a PG 70-28 asphalt for the surface course.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface mixes on this project.

Grade substitution per Table 5 is not allowed.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Temporary detours are subject to in-place air void determination for this project.

Ride quality is not required on this project.

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Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

2 electronic portable changeable message sign units will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

Estimate & Quantity Sheet

Texas Department of Transportation

CONTROLLING PROJECT ID 0902-20-102 **DISTRICT** Fort Worth **COUNTY** Wise
HIGHWAY CR

				CONTROL SECTION JOB		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00032674		
				COUNTY	Wise		
				HIGHWAY	CR		
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	4.000		4.000	
	106-6002	OBLITERATING ABANDONED ROAD	SY	956.000		956.000	
	110-6001	EXCAVATION (ROADWAY)	CY	35.000		35.000	
	110-6002	EXCAVATION (CHANNEL)	CY	928.000		928.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	1,560.000		1,560.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	2,677.000		2,677.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	2,677.000		2,677.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	1,388.500		1,388.500	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)	SY	1,388.500		1,388.500	
	168-6001	VEGETATIVE WATERING	MG	21.000		21.000	
	247-6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	900.000		900.000	
	310-6028	PRIME COAT (MC-30 OR EC-30)	GAL	270.000		270.000	
	400-6005	CEM STABIL BKFL	CY	66.000		66.000	
	416-6004	DRILL SHAFT (36 IN)	LF	300.000		300.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	31.000		31.000	
	422-6002	REINF CONC SLAB (HPC)	SF	1,820.000		1,820.000	
	422-6016	APPROACH SLAB (HPC)	CY	38.500		38.500	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	278.000		278.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY	320.000		320.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	24.000		24.000	
	450-6018	RAIL (TY T631)	LF	172.000		172.000	
	454-6004	ARMOR JOINT (SEALED)	LF	48.000		48.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000		5.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	100.000		100.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	100.000		100.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,864.000		1,864.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,864.000		1,864.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	100.000		100.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	100.000		100.000	
	508-6001	CONSTRUCTING DETOURS	SY	1,094.000		1,094.000	
	530-6005	DRIVEWAYS (ACP)	SY	131.000		131.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	225.000		225.000	
	540-6009	MTL BEAM GD FEN TRANS (T6)	EA	4.000		4.000	
	540-6010	MTL W-BEAM GD FEN ADJUSTMENT	LF	25.000		25.000	
	540-6014	SHORT RADIUS	LF	43.750		43.750	

Estimate & Quantity Sheet

Texas Department of Transportation

CONTROLLING PROJECT ID 0902-20-102 **DISTRICT** Fort Worth **COUNTY** Wise
HIGHWAY CR

							TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0902-20-102**				
		PROJECT ID		**A00032674**				
		COUNTY		**Wise**				
		HIGHWAY		**CR**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	**EST.**		**FINAL**		
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA	1.000			1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	3.000			3.000	
	550-6006	GATE (REMOVE)	EA	1.000			1.000	
	552-6003	WIRE FENCE (TY C)	LF	96.000			96.000	
	552-6005	GATE (TY 1)	EA	1.000			1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	4.000			4.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	19.000			19.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA	6.000			6.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	2,684.000			2,684.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	6,210.000			6,210.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	140.000			140.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	740.000			740.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	140.000			140.000	
	772-6001	POST AND CABLE FENCE (REMOVAL)	LF	123.000			123.000	
	3076-6044	D-GR HMA TY-D PG70-28	TON	95.500			95.500	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000			2.000	
	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	

SUMMARY OF REMOVAL ITEMS					
LOCATION	106 6002	496 6009	550 6006	644 6076	772 6001
	OBLITERATING ABANDONED ROAD	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	GATE (REMOVE)	REMOVE SM RD SN SUP&AM	POST AND CABLE FENCE (REMOVAL)
	SY	EA	EA	EA	LF
SHEET 1 OF 1	956	1	1	4	123
PROJECT TOTALS	956	1	1	4	123

SUMMARY OF ROADWAY ITEMS														
LOCATION	100 6002	110 6001	110 6002	132 6005	247 6230	310 6028	432 6045	530 6005	540 6001	540 6009	540 6010	540 6014	540 6015	544 6001
	PREPARING ROW	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	FL BS (CMP IN PLACE) (TY A GR 1&2) (8")	PRIME COAT (MC-30 OR EC-30)	RIPRAP (MOW STRIP) (4 IN)	DRIVEWAYS (ACP)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (T6)	MTL W-BEAM GD FEN ADJUSTMENT	SHORT RADIUS	DRIVEWAY TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)
	STA	CY	CY	CY	SY	GAL	CY	SY	LF	EA	LF	LF	EA	EA
SHEET 1 OF 1	4	35	928	1560	900	270	24	131	225	4	25	43.75	1	3
PROJECT TOTALS	4	35	928	1560	900	270	24	131	225	4	25	43.75	1	3

SUMMARY OF ROADWAY ITEMS			
LOCATION	552 6003	552 6005	3076 6044
	WIRE FENCE (TY C)	GATE (TY 1)	D-GR HMA TY-D PG70-28
	LF	EA	TON
SHEET 1 OF 1	96	1	95.5
PROJECT TOTALS	96	1	95.5

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS					
LOCATION	658 6016	658 6081	666 6207	666 6315	678 6001
	INSTL DEL ASSM (D-SW) SZ (BR) GF1 (BI)	INSTL DEL ASSM (D-SW) SZ 1 (WFLX) GND (BI)	REFL PAV MRK TY II (Y) 4" (SLD)	RE PM W/RET REQ TY I (Y) 4" (SLD) (10 OMIL)	PAV SURF PREP FOR MRK (4")
	EA	EA	LF	LF	LF
SHEET 1 OF 1	19	6	140	740	140
PROJECT TOTALS	19	6	140	740	140

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS					
LOCATION	502 6001	508 6001	662 6004	662 6034	6001 6002
	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	PORTABLE CHANGEABLE MESSAGE SIGN
	MO	SY	LF	LF	EA
CR 1590 CSJ 0902-20-102	5	1094	2684	6210	2
PROJECT TOTALS	5	1094	2684	6210	2

SUMMARY OF EROSION CONTROL ITEMS											
LOCATION	161 6017	164 6021	164 6029	164 6031	168 6001	506 6002	506 6011	506 6038	506 6039	506 6042 *	506 6043 *
	COMPOST MANUF TOPSOIL (4")	CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)	CELL FBR MLCH SEED (TEMP) (WARM)	CELL FBR MLCH SEED (TEMP) (COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	SY	MG	LF	LF	LF	LF	LF	LF
SHEET 1 OF 1	2677	2677	1339	1339	21	100	100	1864	1864	100	100
PROJECT TOTALS	2677	2677	1339	1339	21	100	100	1864	1864	100	100

* QUANTITY APPROXIMATED. NOT SHOWN IN PLANS.
PLACEMENT AS DIRECTED IN THE FIELD BY THE ENGINEER.

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK

QUANTITY SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		7

DATE: 6/6/2022 9:59:46 AM
FILE: L:\DCS\Projects\2198-TRANS\TxDOT\31-431P5080\NRB2014\60485815-Wise_Jack_Brdgs\03-DSGN\0302-CAD\CR 1590\SHEETS\CR1590-SU_01.dgn
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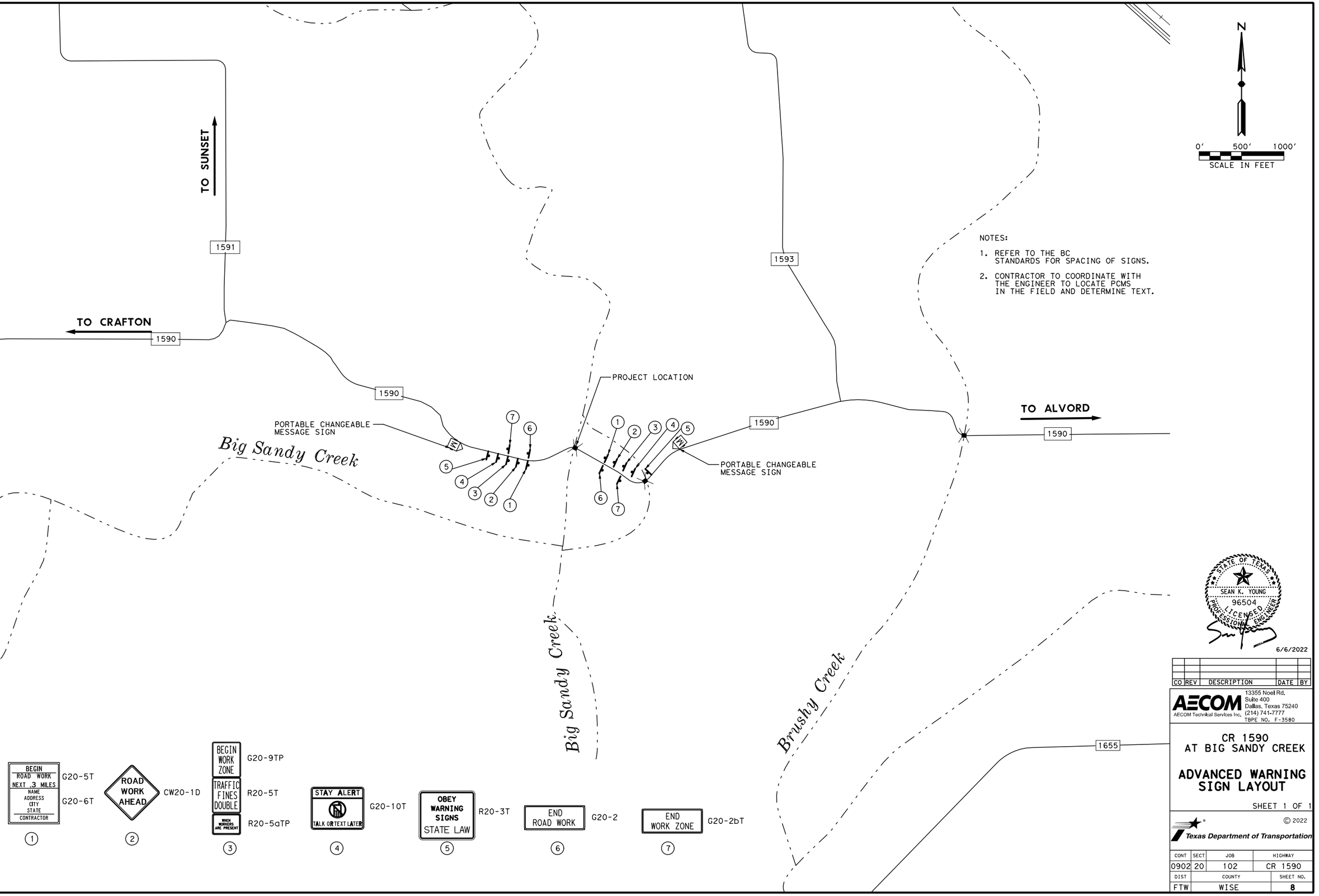


NOTES:

1. REFER TO THE BC STANDARDS FOR SPACING OF SIGNS.
2. CONTRACTOR TO COORDINATE WITH THE ENGINEER TO LOCATE PCMS IN THE FIELD AND DETERMINE TEXT.

STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK

ADVANCED WARNING SIGN LAYOUT

SHEET 1 OF 1

Texas Department of Transportation

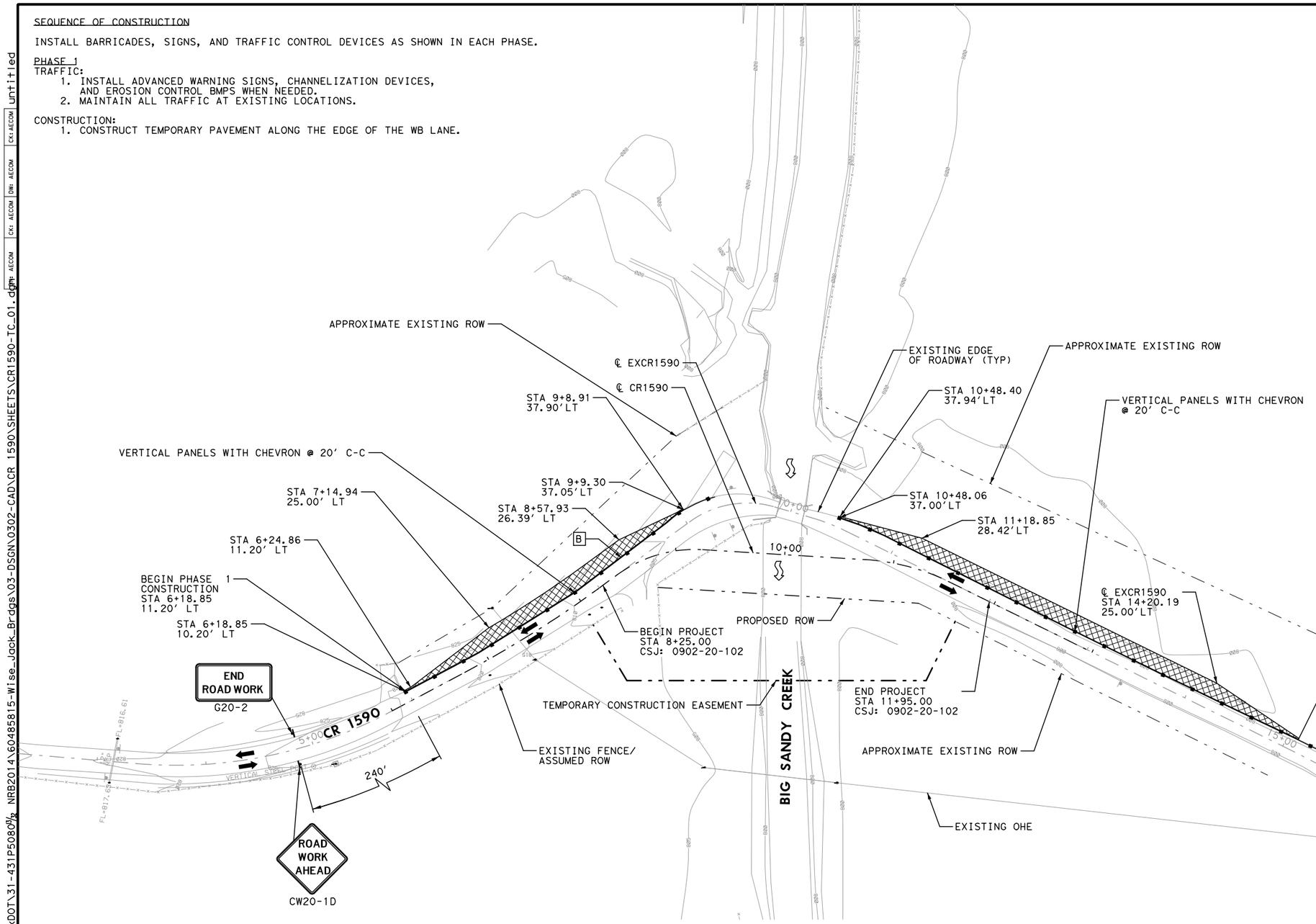
CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		8

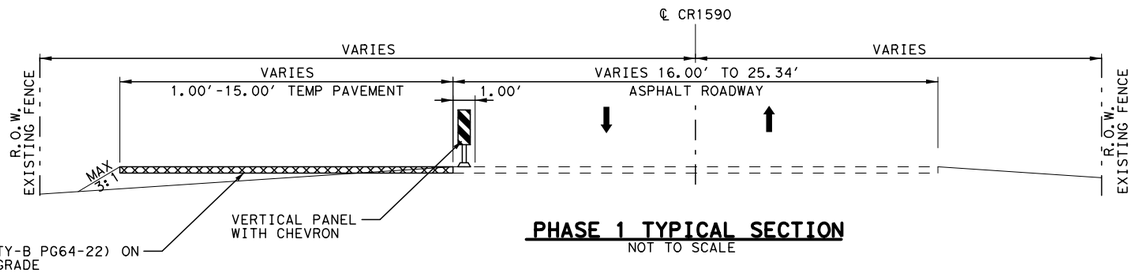
SEQUENCE OF CONSTRUCTION

INSTALL BARRICADES, SIGNS, AND TRAFFIC CONTROL DEVICES AS SHOWN IN EACH PHASE.

PHASE 1
TRAFFIC:
1. INSTALL ADVANCED WARNING SIGNS, CHANNELIZATION DEVICES, AND EROSION CONTROL BMPS WHEN NEEDED.
2. MAINTAIN ALL TRAFFIC AT EXISTING LOCATIONS.

CONSTRUCTION:
1. CONSTRUCT TEMPORARY PAVEMENT ALONG THE EDGE OF THE WB LANE.





PHASE 1 TYPICAL SECTION
NOT TO SCALE

N

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- PERMANENT BRIDGE CONSTRUCTION IN THIS PHASE
- TEMPORARY CONSTRUCTION IN THIS PHASE
- PERMANENT PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TEMPORARY PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TRAFFIC FLOW
- VERTICAL PANELS
- TYPE III BARRICADE
- [A] WRK ZN PAV MRK (REM)(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (REM)(W)(4")(SLD)

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION.
2. ALL STATION/OFFSET ARE FROM ℄ CR1590 UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO PLACE TRAFFIC CONTROL DEVICES PER PLANS OVERNIGHT UNTIL NEXT PHASE OF CONSTRUCTION.
4. CONTRACTOR TO MAINTAIN TEMPORARY FENCING DURING CONSTRUCTION.
5. ALL TRAFFIC CONTROL DEVICES NEEDED FOR THE DETOUR WILL BE SUBSIDIARY TO ITEM 502.

STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK

TRAFFIC CONTROL PLAN - PHASE 1

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		9

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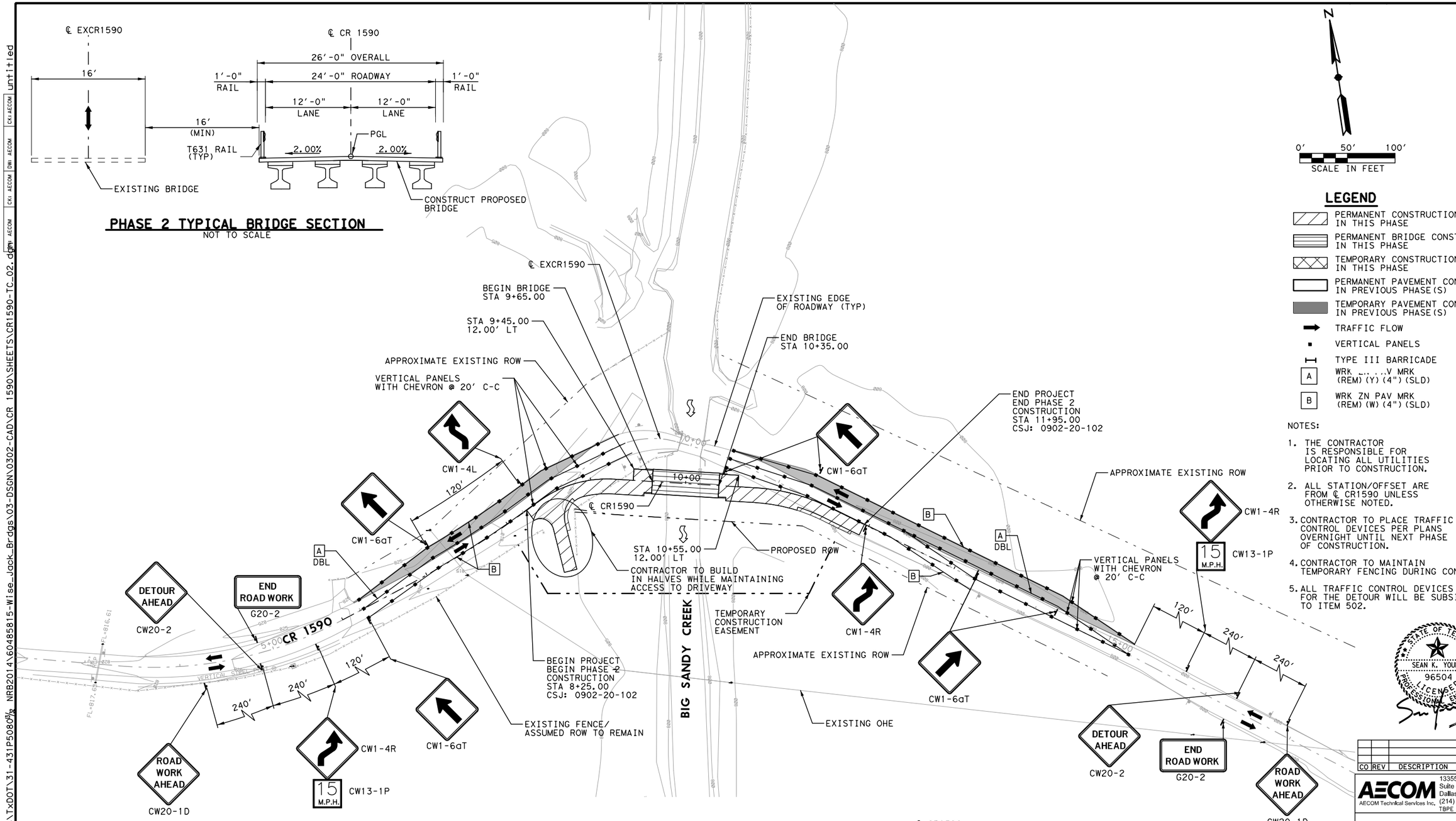
PHASE 2 TYPICAL BRIDGE SECTION
NOT TO SCALE

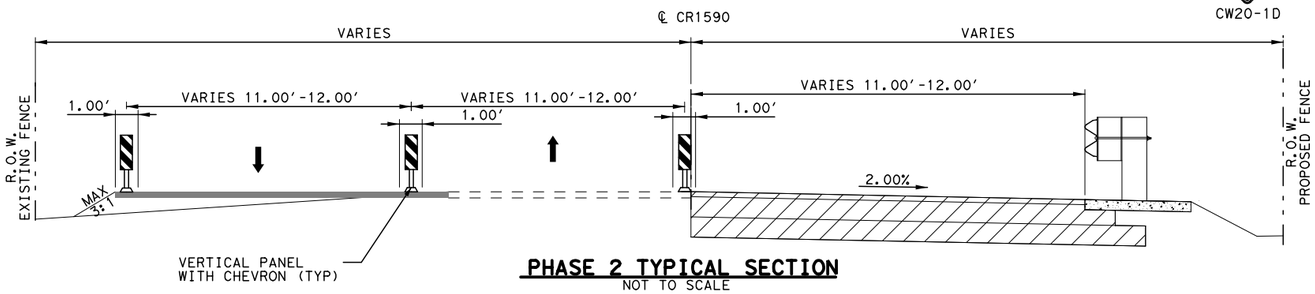


SEQUENCE OF CONSTRUCTION

INSTALL BARRICADES, SIGNS, AND TRAFFIC CONTROL DEVICES AS SHOWN IN EACH PHASE.

PHASE 2
TRAFFIC:
1. SHIFT WB TRAFFIC TO TEMPORARY PAVEMENT CONSTRUCTED DURING PHASE 1.
2. MAINTAIN EB TRAFFIC AT EXISTING LOCATION.

CONSTRUCTION:
1. CONSTRUCT THE PROPOSED BRIDGE OVER BIG SANDY CREEK.
2. CONSTRUCT THE SOUTHERN HALF OF THE PROPOSED ROADWAY.
3. CONSTRUCT THE DRIVEWAY IN STAGES.
4. CONSTRUCT THE MOW STRIP AND THE PROPOSED GUARDRAIL.



PHASE 2 TYPICAL SECTION
NOT TO SCALE

LEGEND
- PERMANENT CONSTRUCTION IN THIS PHASE
- PERMANENT BRIDGE CONSTRUCTION IN THIS PHASE
- TEMPORARY CONSTRUCTION IN THIS PHASE
- PERMANENT PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TEMPORARY PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TRAFFIC FLOW
- VERTICAL PANELS
- TYPE III BARRICADE
- A — WRK [illegible]V MRK (REM)(Y)(4")(SLD)
- B — WRK ZN PAV MRK (REM)(W)(4")(SLD)

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION.
2. ALL STATION/OFFSET ARE FROM ℄ CR1590 UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO PLACE TRAFFIC CONTROL DEVICES PER PLANS OVERNIGHT UNTIL NEXT PHASE OF CONSTRUCTION.
4. CONTRACTOR TO MAINTAIN TEMPORARY FENCING DURING CONSTRUCTION.
5. ALL TRAFFIC CONTROL DEVICES NEEDED FOR THE DETOUR WILL BE SUBSIDIARY TO ITEM 502.

STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK

TRAFFIC CONTROL PLAN - PHASE 2

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		10

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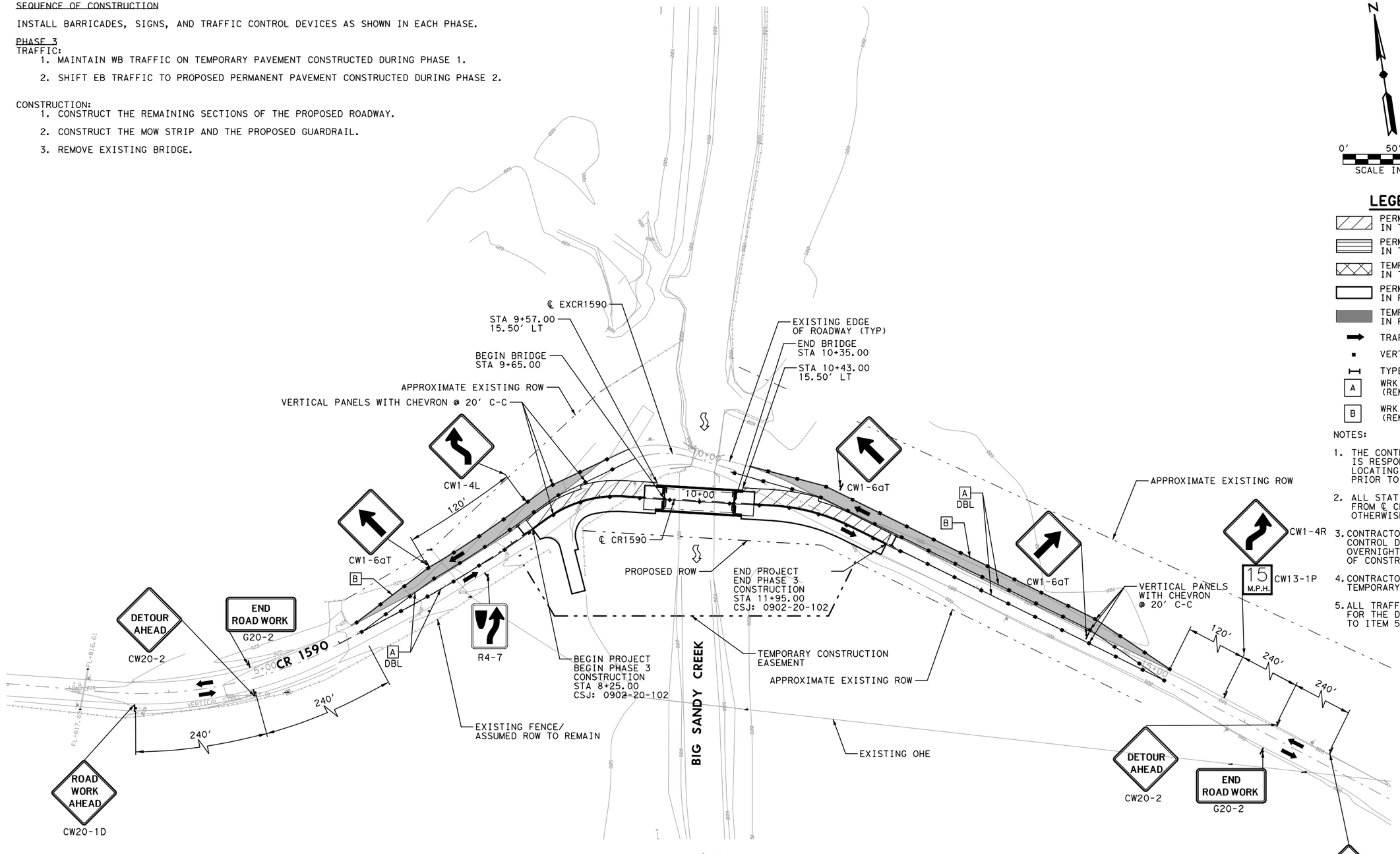
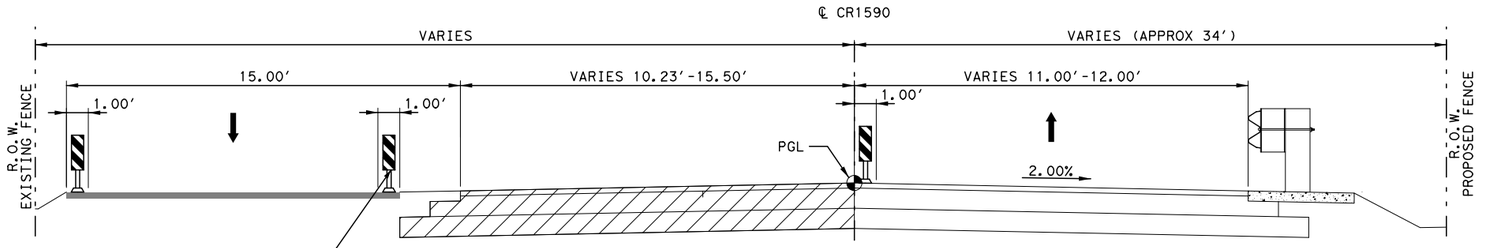
SEQUENCE OF CONSTRUCTION

INSTALL BARRICADES, SIGNS, AND TRAFFIC CONTROL DEVICES AS SHOWN IN EACH PHASE.

PHASE 3
TRAFFIC:
1. MAINTAIN WB TRAFFIC ON TEMPORARY PAVEMENT CONSTRUCTED DURING PHASE 1.
2. SHIFT EB TRAFFIC TO PROPOSED PERMANENT PAVEMENT CONSTRUCTED DURING PHASE 2.

CONSTRUCTION:
1. CONSTRUCT THE REMAINING SECTIONS OF THE PROPOSED ROADWAY.
2. CONSTRUCT THE MOW STRIP AND THE PROPOSED GUARDRAIL.
3. REMOVE EXISTING BRIDGE.





PHASE 3 TYPICAL SECTION
NOT TO SCALE

N

0' 50' 100'
SCALE IN FEET

LEGEND
- PERMANENT CONSTRUCTION IN THIS PHASE
- PERMANENT BRIDGE CONSTRUCTION IN THIS PHASE
- TEMPORARY CONSTRUCTION IN THIS PHASE
- PERMANENT PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TEMPORARY PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- TRAFFIC FLOW
- VERTICAL PANELS
- TYPE III BARRICADE
- A — WRK ZN PAV MRK (REM)(Y)(4")(SLD)
- B — WRK ZN PAV MRK (REM)(W)(4")(SLD)

NOTES:
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3. CONTRACTOR TO PLACE TRAFFIC CONTROL DEVICES PER PLANS OVERNIGHT UNTIL NEXT PHASE OF CONSTRUCTION.
4. CONTRACTOR TO MAINTAIN TEMPORARY FENCING DURING CONSTRUCTION.
5. ALL TRAFFIC CONTROL DEVICES NEEDED FOR THE DETOUR WILL BE SUBSIDIARY TO ITEM 502.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

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AECOM
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Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK

TRAFFIC CONTROL PLAN - PHASE 3

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		11

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		12

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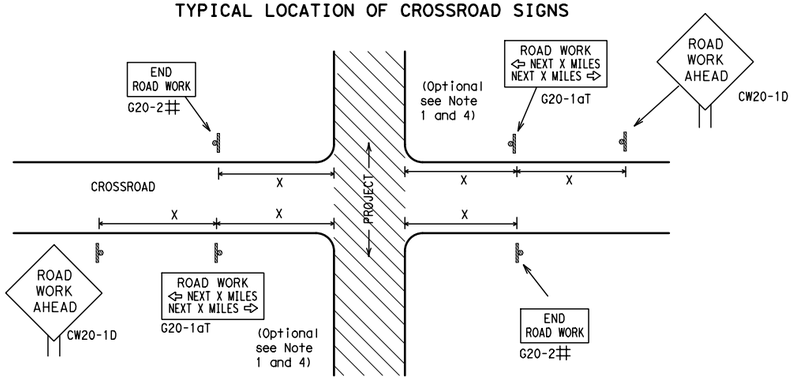
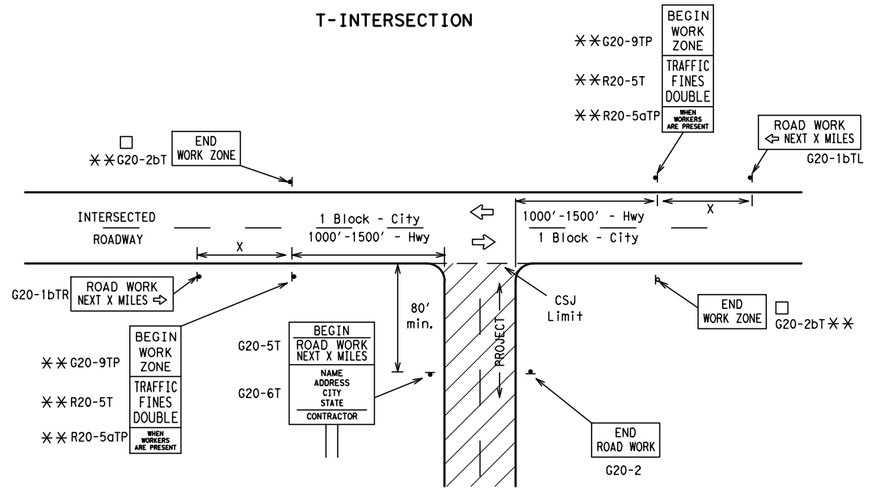
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

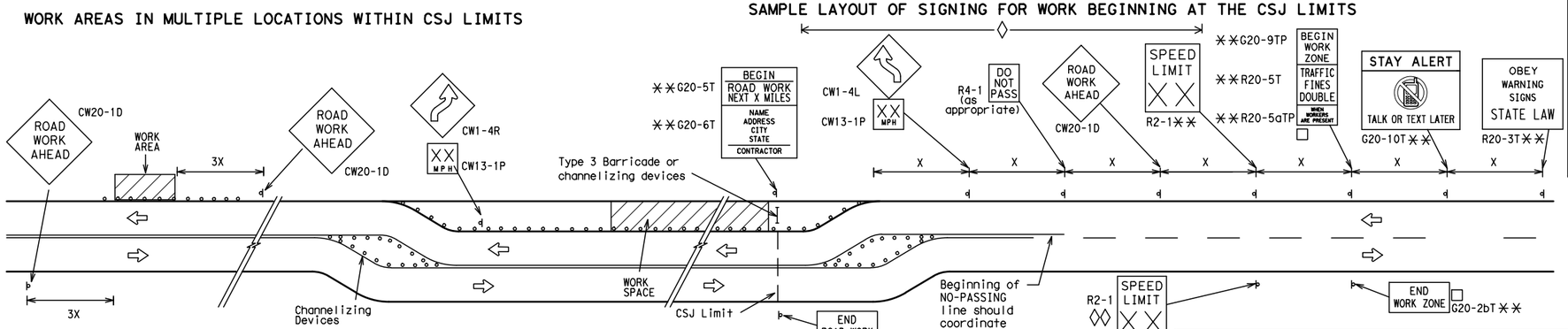
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

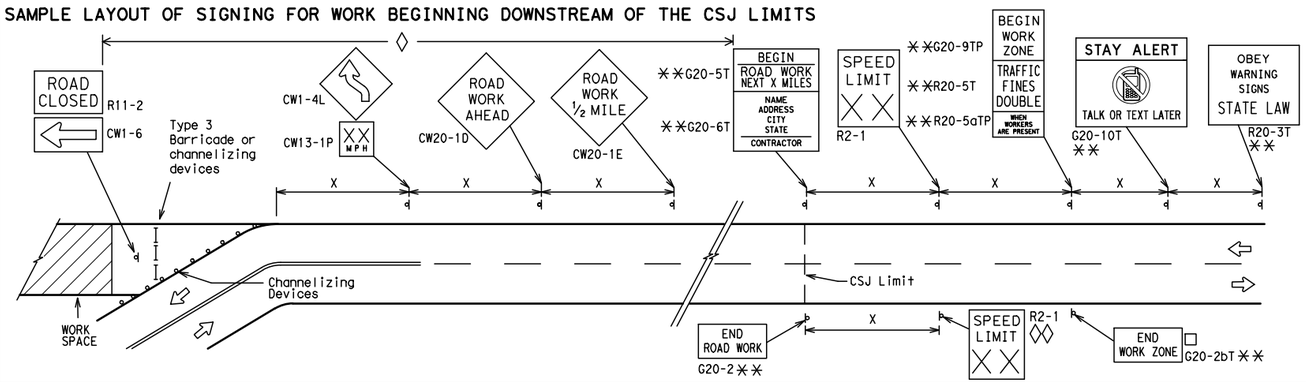
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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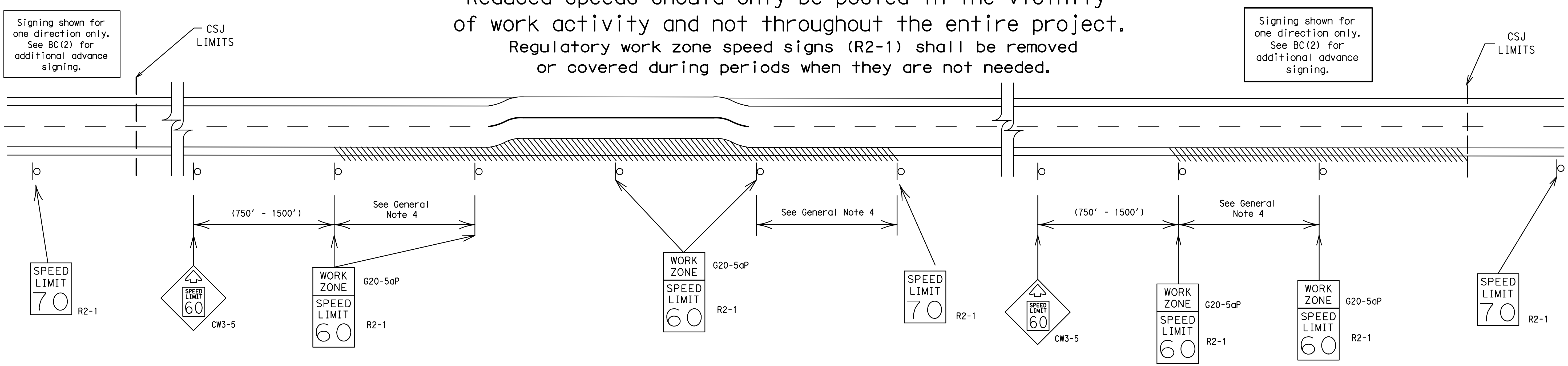
REVISIONS	0902	20	102	CR 1590
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	WISE		13

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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© TxDOT November 2002	CONT 0902	SECT 20	JOB 102	HIGHWAY CR 1590
REVISIONS 9-07 8-14 7-13 5-21	DIST FTW		COUNTY WISE	SHEET NO. 14

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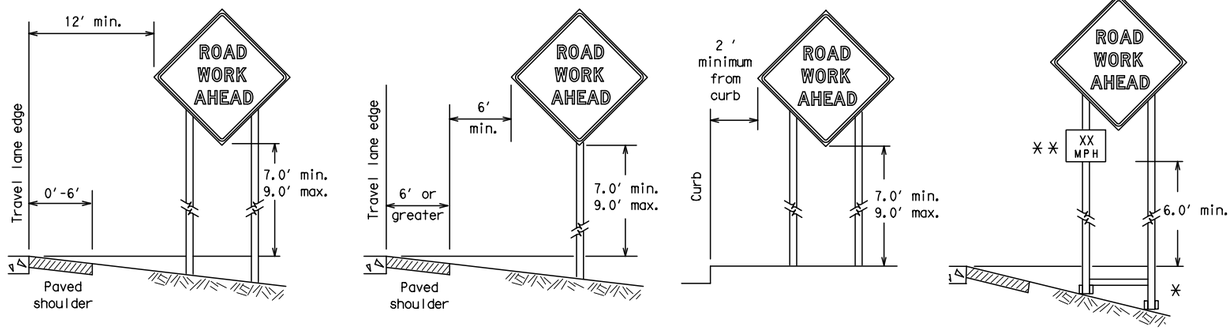
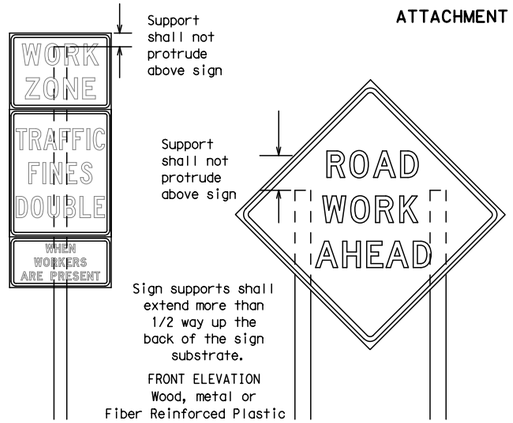
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

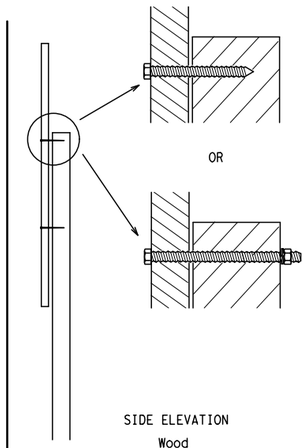


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





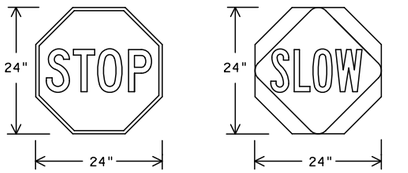
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	WISE		15

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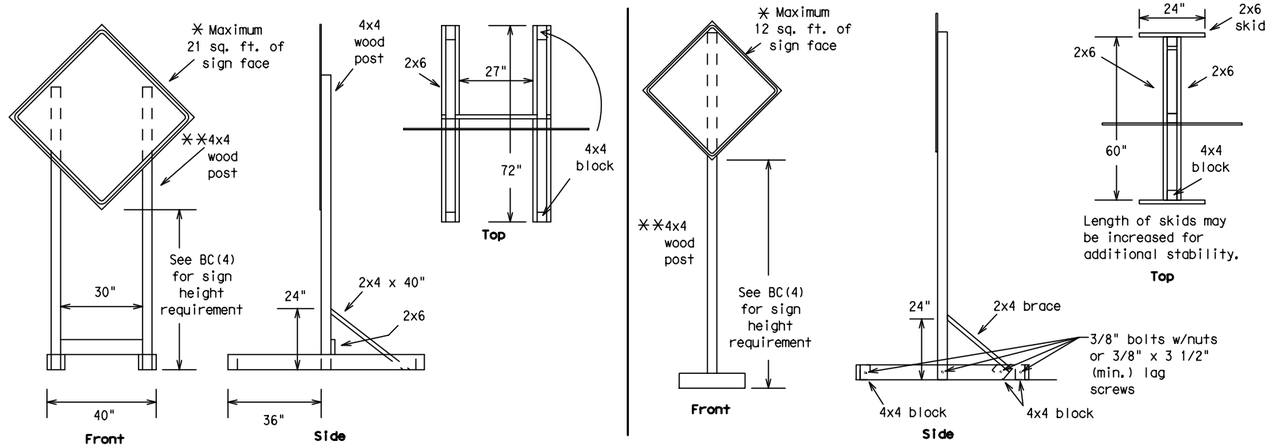
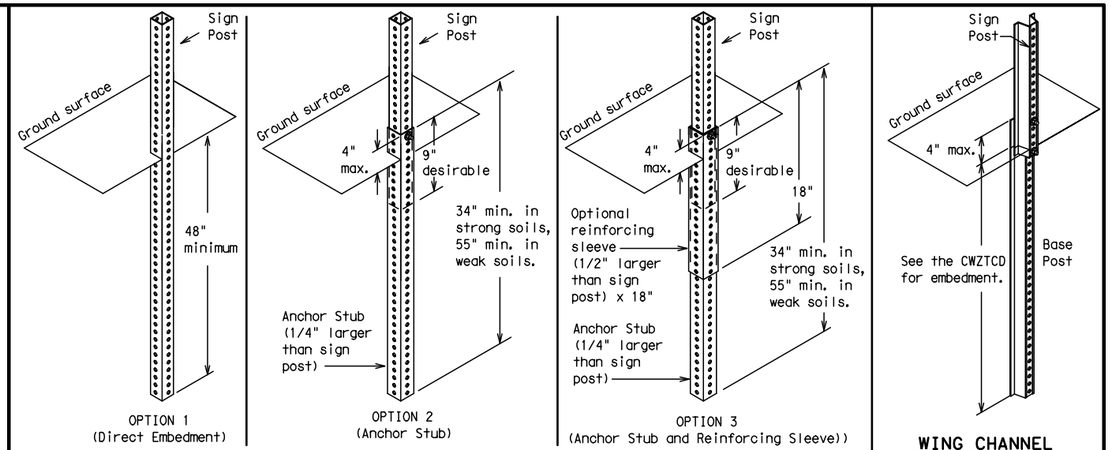


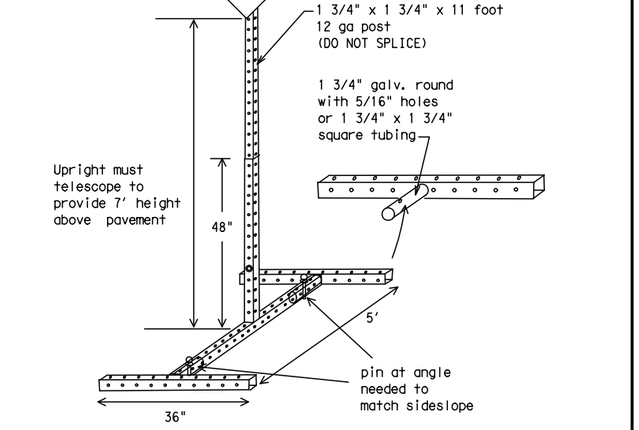
SKID MOUNTED WOOD SIGN SUPPORTS

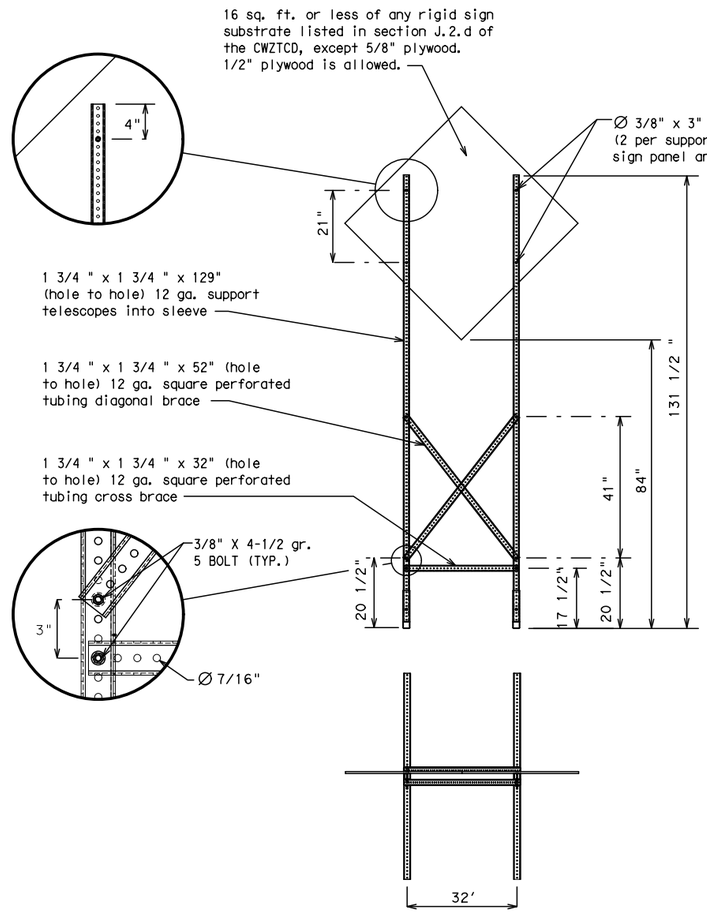
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

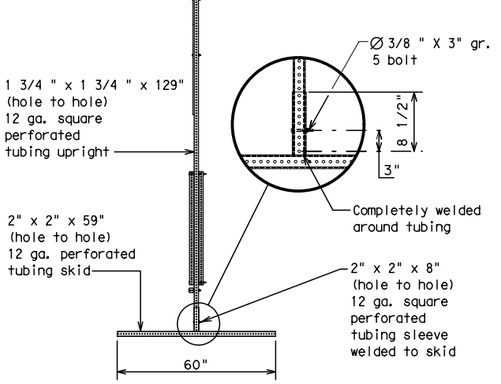


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	FTW	WISE		16

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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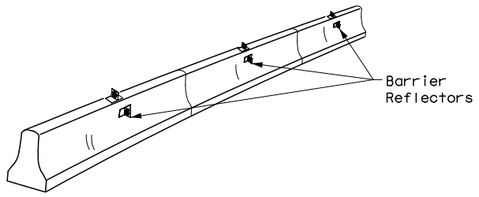
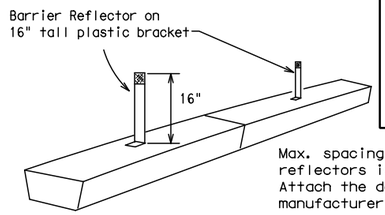
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



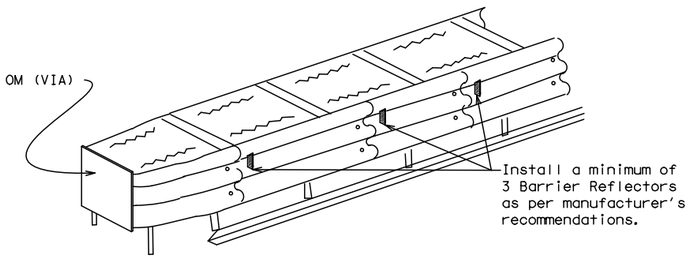
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

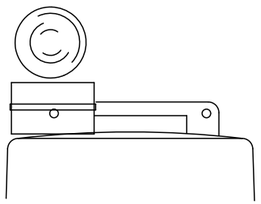
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

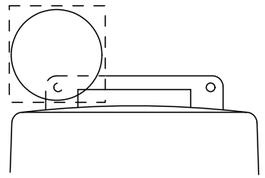
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

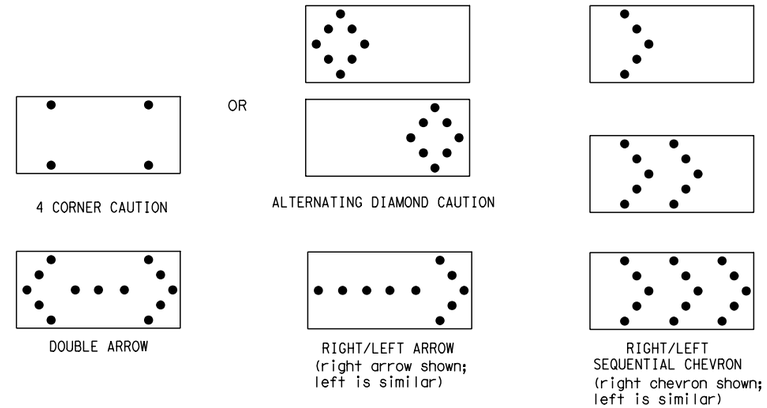
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	FTW	WISE		18

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

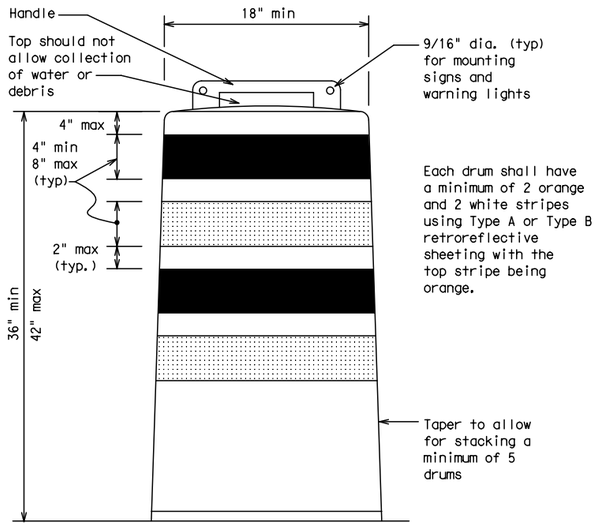
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

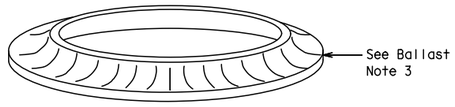
RETROREFLECTIVE SHEETING

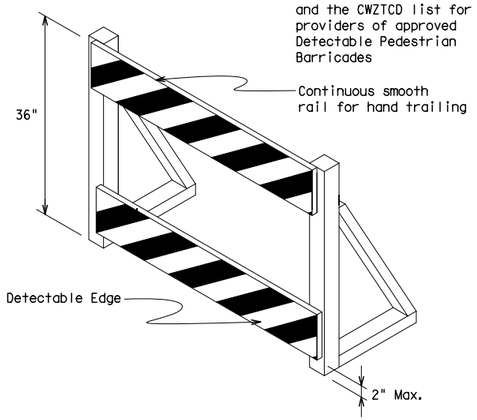
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

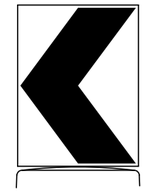




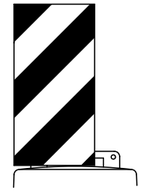


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

.

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 5-21	FTW	WISE		19
7-13				

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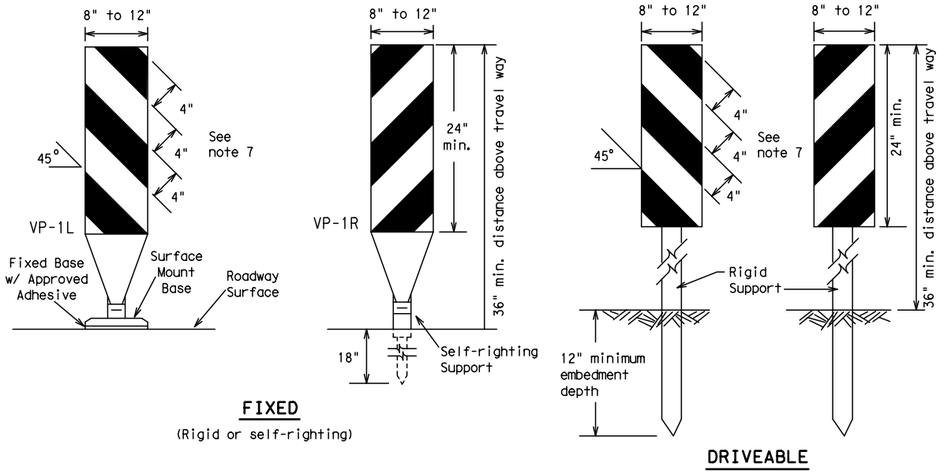
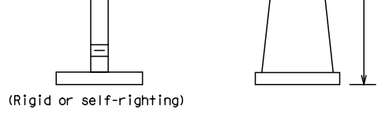


FIXED
(Rigid or self-righting)

DRIVEABLE

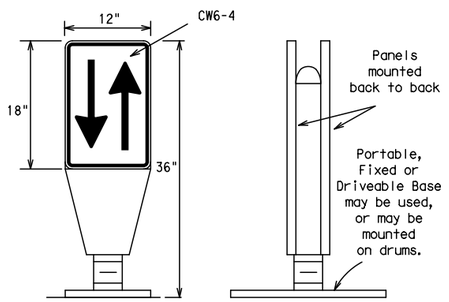


(Rigid or self-righting)

PORTABLE

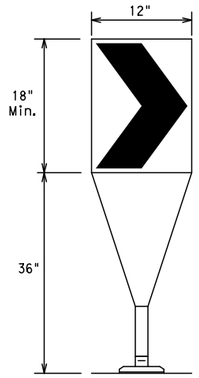
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



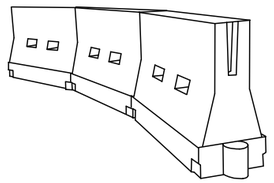
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	WISE		20

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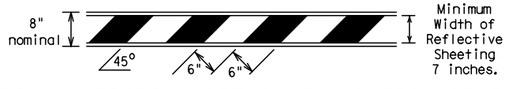
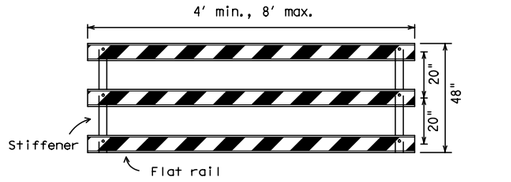
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



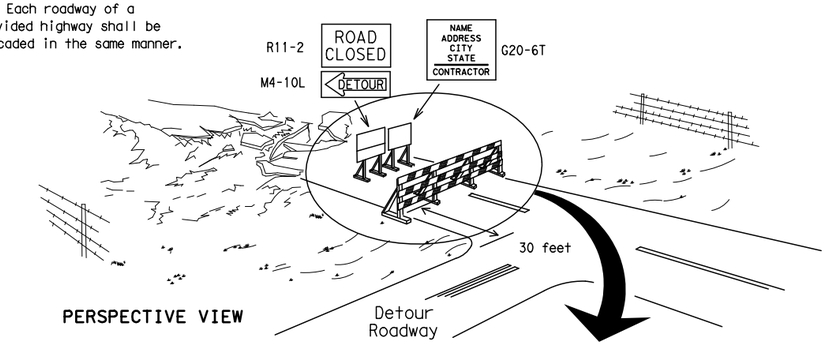
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

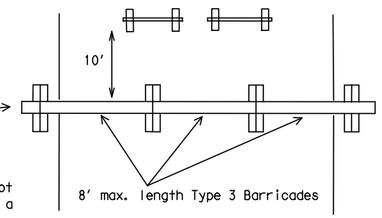
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

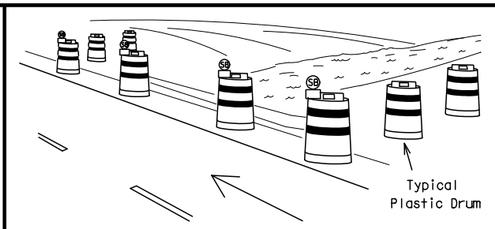
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

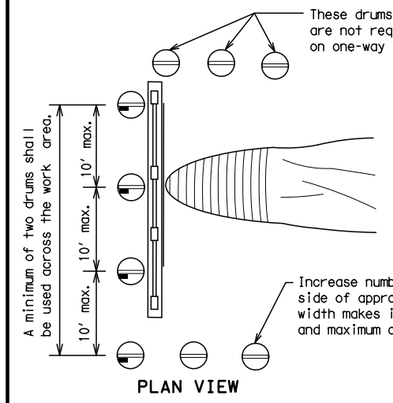
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

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



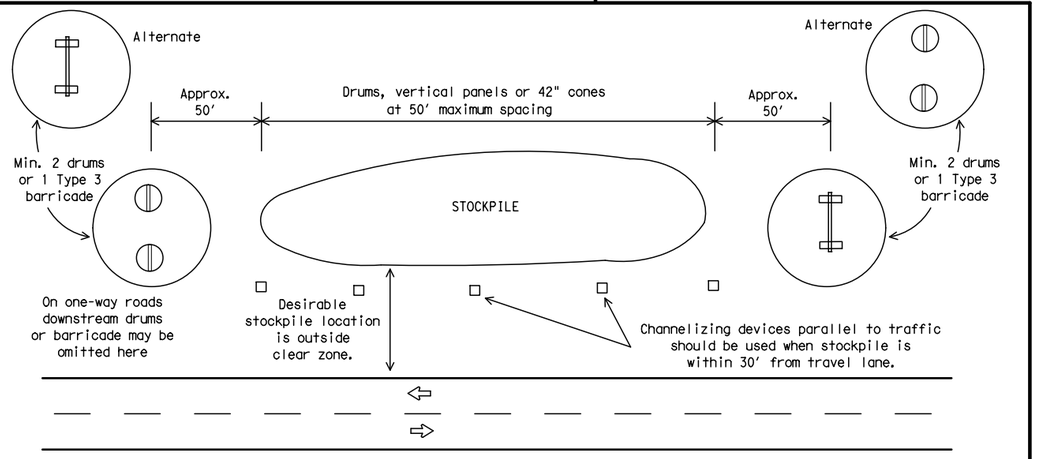
PLAN VIEW

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0902	20	102	CR 1590
9-07 8-14	DIST	COUNTY		SHEET NO.
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

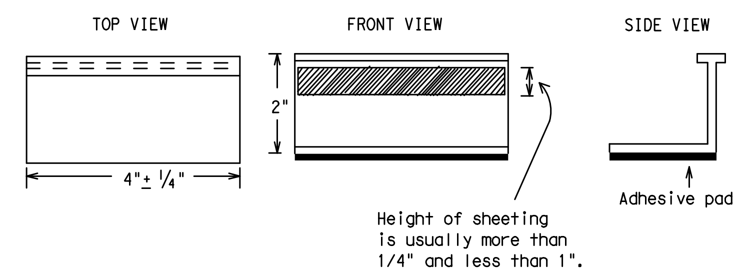
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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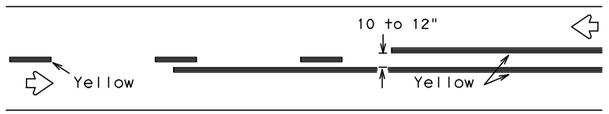
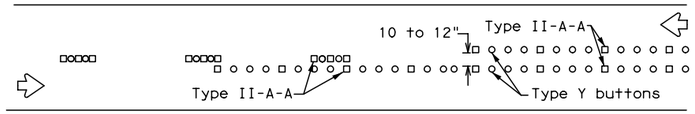
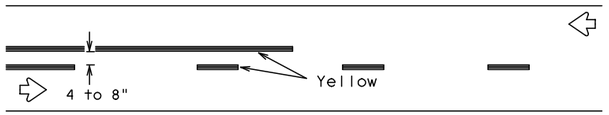
PAVEMENT MARKING PATTERNS



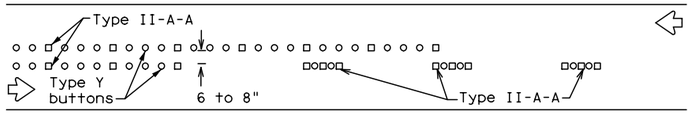
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



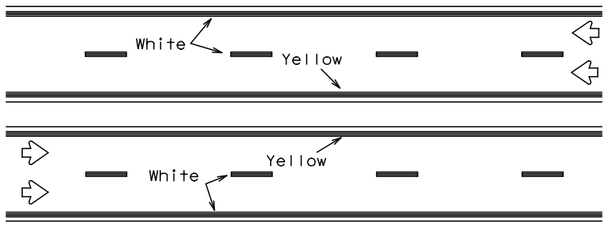
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



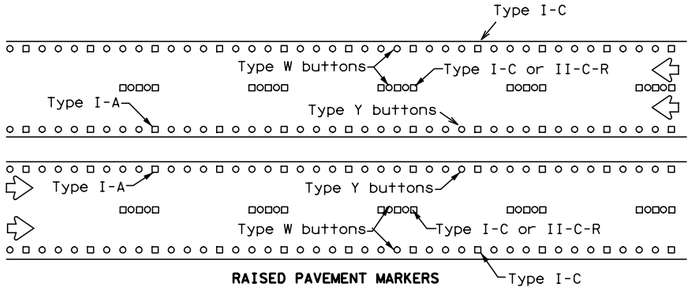
RAISED PAVEMENT MARKERS - PATTERN B

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

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



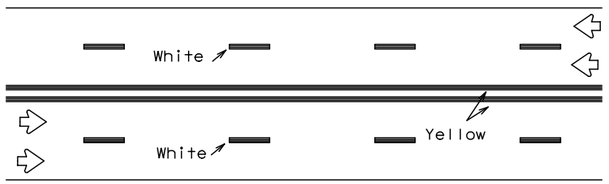
REFLECTORIZED PAVEMENT MARKINGS



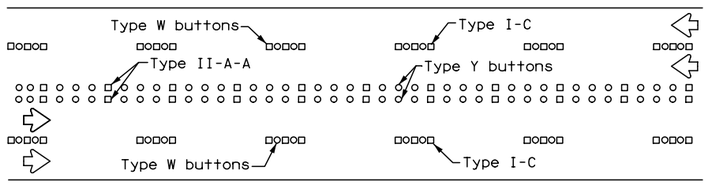
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



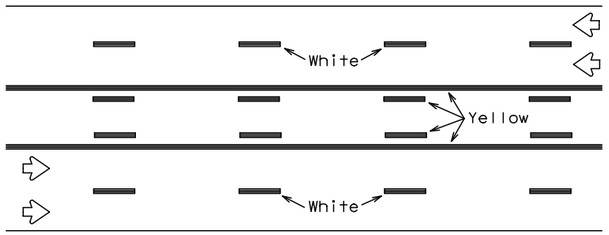
REFLECTORIZED PAVEMENT MARKINGS



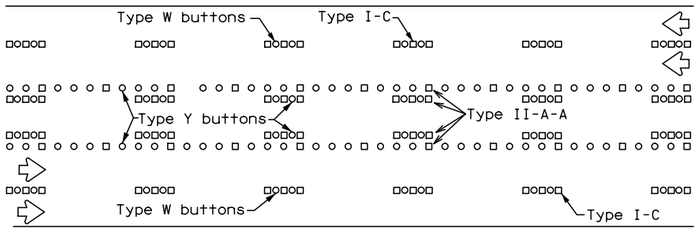
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

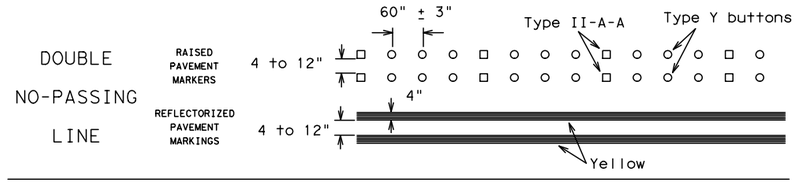
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

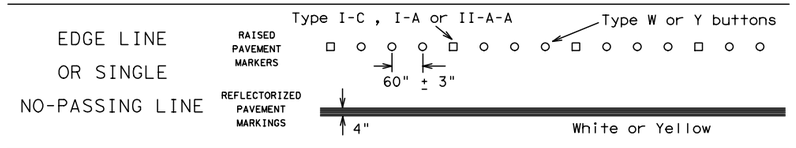
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

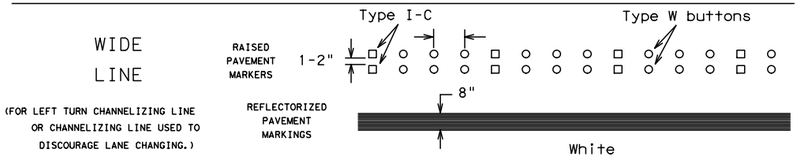


EDGE LINE OR SINGLE NO-PASSING LINE



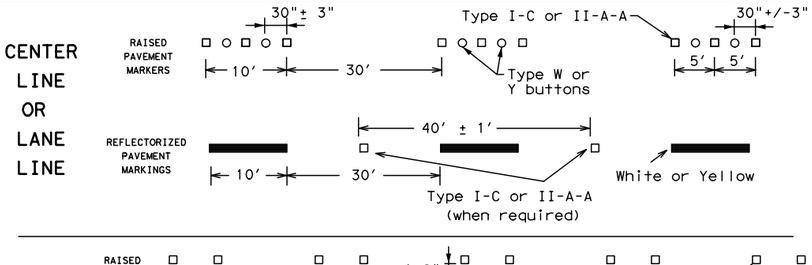
WIDE LINE

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

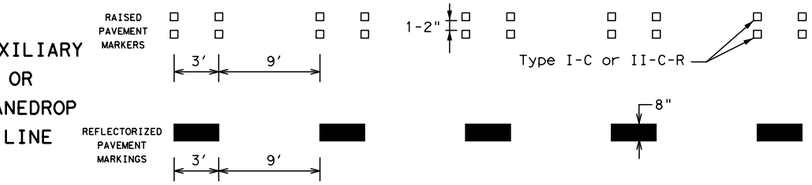


BROKEN LINES

CENTER LINE OR LANE LINE

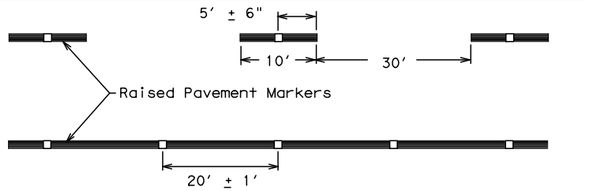


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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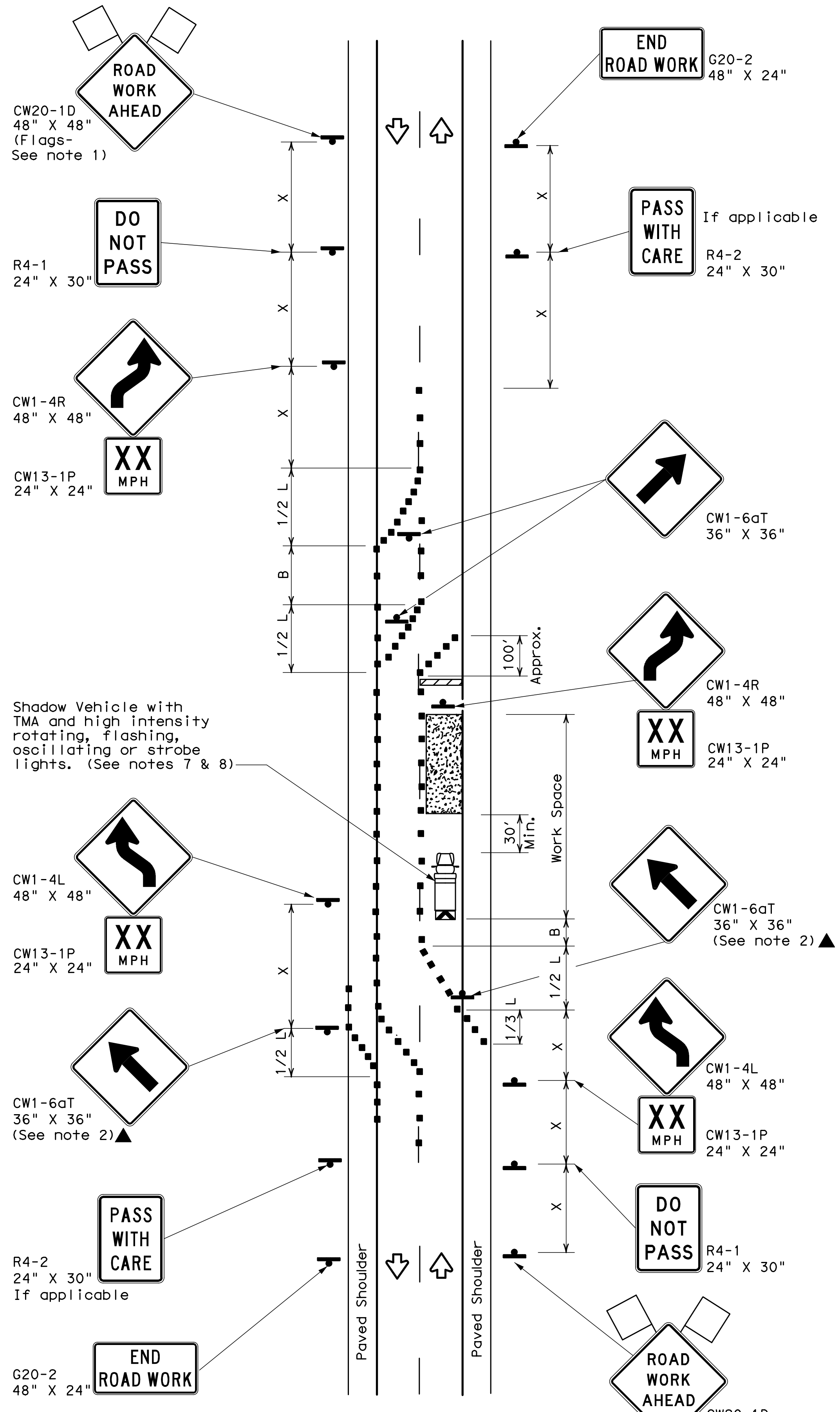
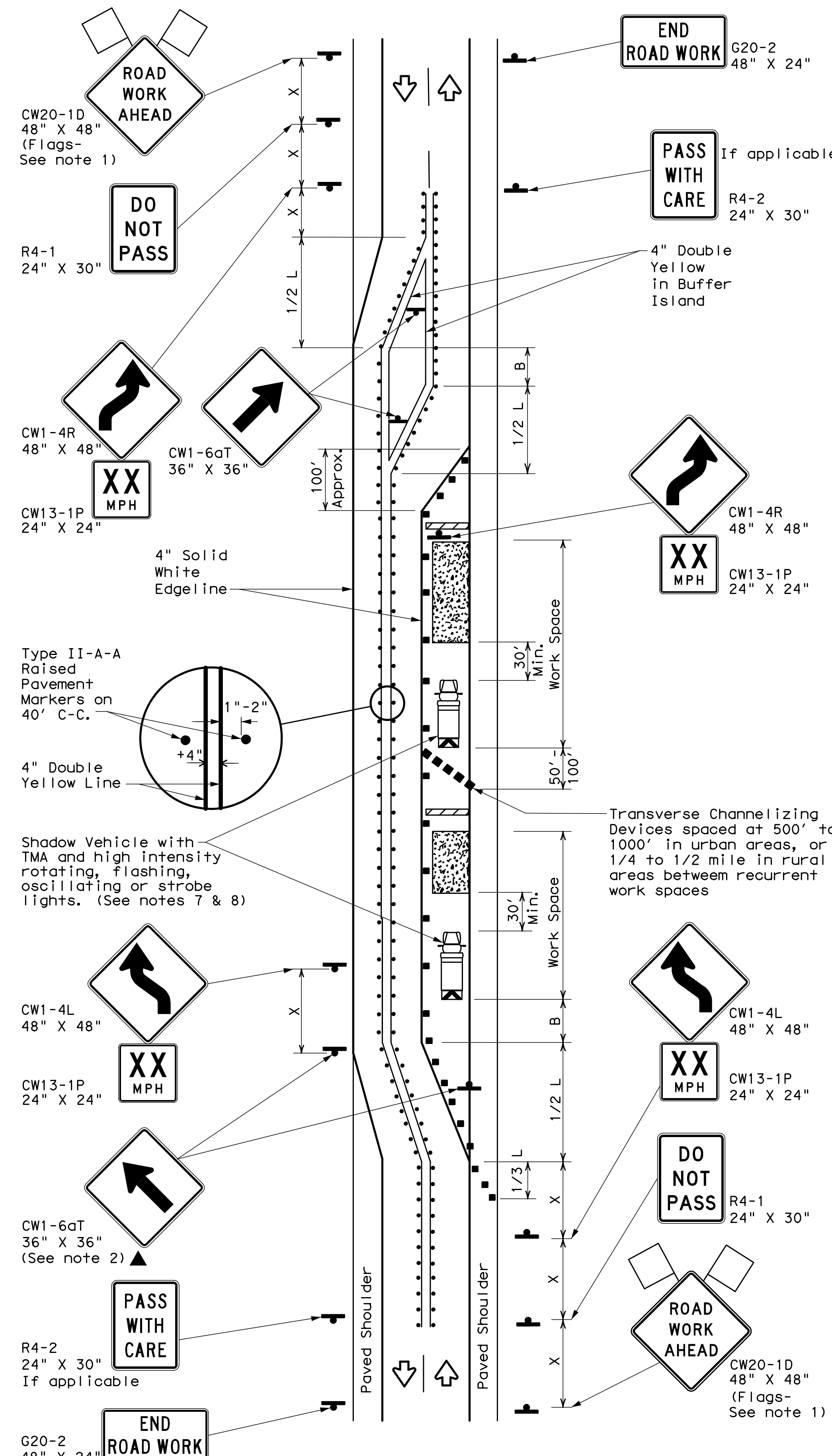


TCP (2-3a)

2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED

ADEQUATE FIELD OF VIEW



TCP (2-3b)

2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED

INADEQUATE FIELD OF VIEW

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

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

TCP (2-3a)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

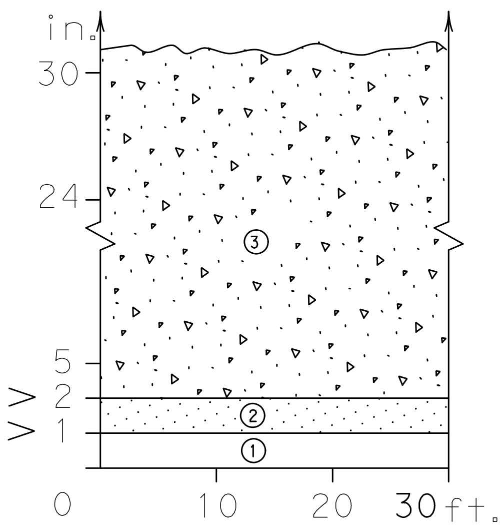
TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0902	20	102	CR 1590
	DIST		COUNTY	SHEET NO.
	FTW		WISE	24

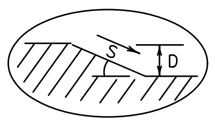
163

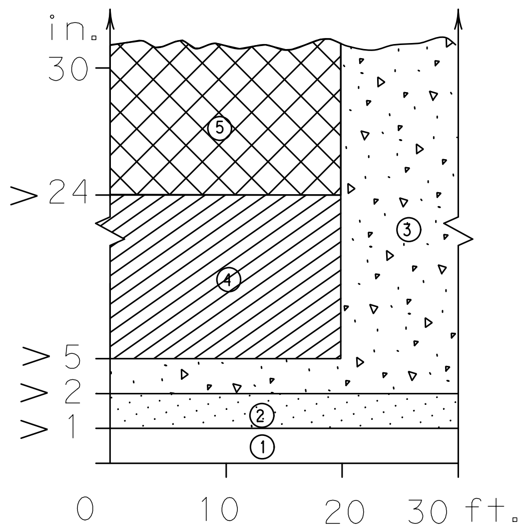
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

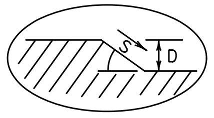


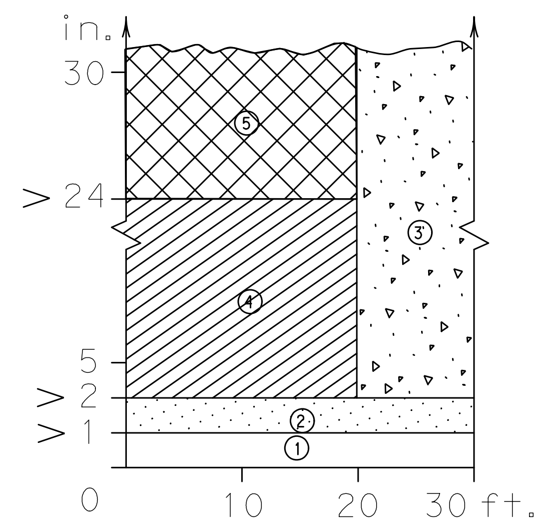
Edge Condition I
S = (3:1) (or flatter)



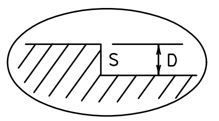


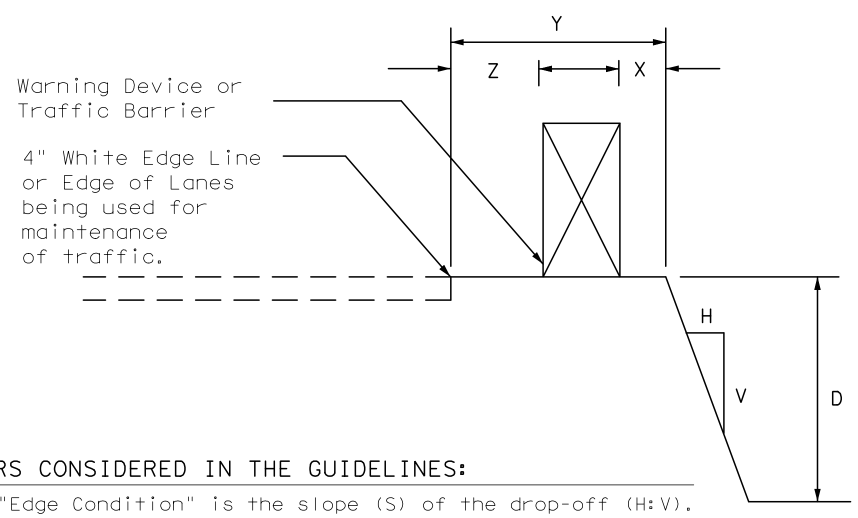
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

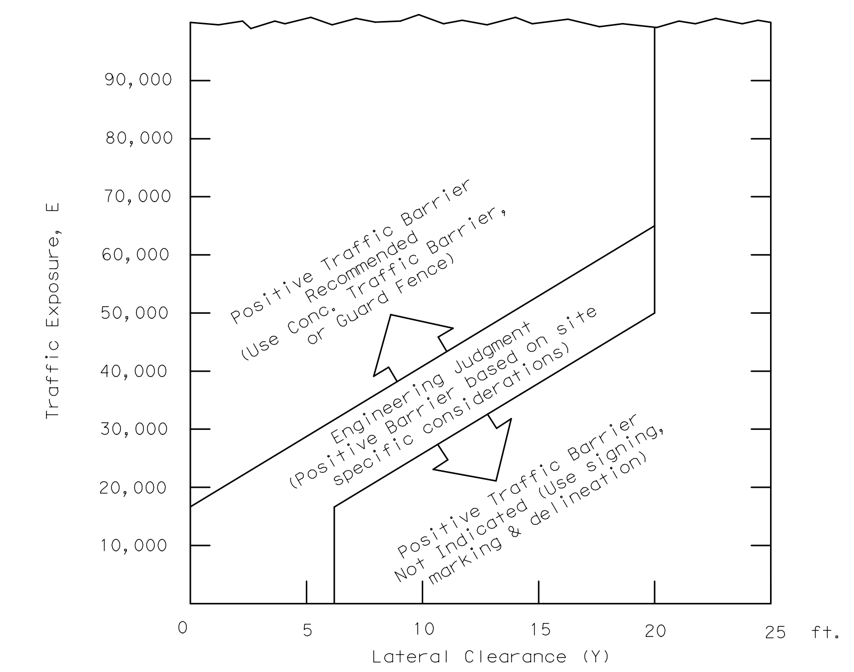
1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".
2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
1	No treatment
2	CW 8-11 "Uneven Lanes" signs.
3	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
4	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
5	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.
3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularily those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

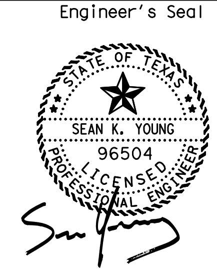
FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▩)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal



Date 6/6/2022

Texas Department of Transportation

Traffic Safety Division Standard

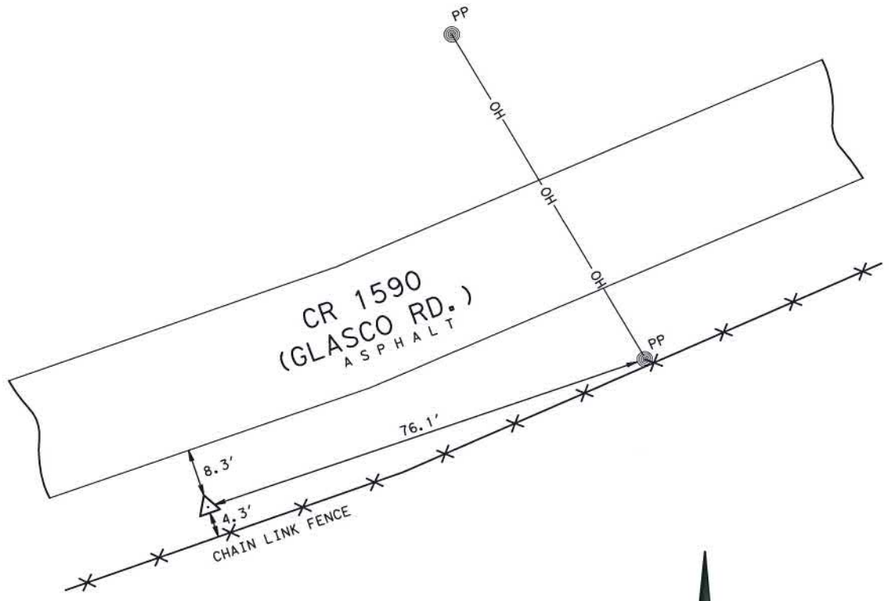
TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT 0902	SECT 20	JOB 102	HIGHWAY CR 1590
REVISIONS 03-01 08-01 9-21	DIST FTW		COUNTY WISE	SHEET NO. 25

DATE: 6/6/2022 9:59:54 AM
FILE: L:\DCS\Projects\2198-TRANS\TxDOT\31-431P5080\NRB2014\60485815-Wise\edgecon-21.dgn

CONTROL MONUMENT DESCRIPTION:

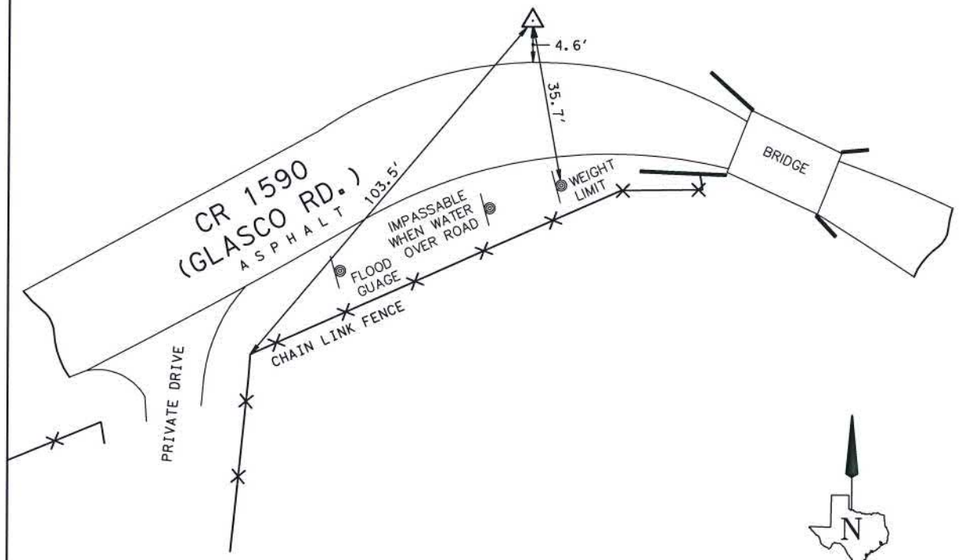
A 3 1/2" ALUMINUM DISK ON IRON ROD STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-001".



NOT TO SCALE

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK ON IRON ROD STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-002".



NOT TO SCALE

NOTES:

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM OF NAD83 (2010), TEXAS NORTH CENTRAL ZONE 4202, GEOID 12A (CONUS), WITH A GRID TO SURFACE ADJUSTMENT FACTOR OF 1.00012 (WISE COUNTY).
ALL VALUES ARE DERIVED FROM GPS OBSERVATIONS USING TXDOT VRS NETWORK.
ELEVATIONS ARE IN U.S. SURVEY FEET BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BY GPS RTK OBSERVATIONS.

I, THE UNDERSIGNED, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THE COORDINATE AND ELEVATION INFORMATION SHOWN WERE DERIVED FROM A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
CALVIN EARNEST COCK, III
5622
PROFESSIONAL
LAND SURVEYOR

11/21/16

CALVIN E. COCK III
RPLS NO. 5622

DATE

CONTROL POINT 0902-20-001

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-001" SET APPROXIMATELY 0.8 MILES WEST OF CR 1593 AND 2.8 MILES WEST OF SH 287, 8.3' SOUTH OF THE SOUTH EDGE OF ASPHALT, 4.3' NORTH OF A CHAIN LINK FENCE AND 76.1 FEET SOUTHWESTERLY FROM A POWER POLE.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF NAD83 (2010)
GEOID 12A (CONUS)
DATE SET: SEPTEMBER 16, 2016
WISE COUNTY SCALE FACTOR: 1.00012

GRID NORTHING: 7,181,648.833
GRID EASTING: 2,201,388.441
SURFACE NORTHING: 7,182,510.631
SURFACE EASTING: 2,201,652.608
NAVD88 ELEVATION: 824.021

CONTROL POINT 0902-20-002

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-002" SET APPROXIMATELY 0.7 MILES WEST OF CR 1593 AND 1.9 MILES WEST OF SH 287, 4.6' NORTH OF EDGE OF ASPHALT, 35.7' NORTH OF A WEIGHT LIMIT SIGN AND 103.5 FEET NORTHEASTERLY FROM A CHAIN LINK FENCE CORNER.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF NAD83 (2010)
GEOID 12A (CONUS)
DATE SET: SEPTEMBER 16, 2016
WISE COUNTY SCALE FACTOR: 1.00012

GRID NORTHING: 7,181,802.632
GRID EASTING: 2,201,650.083
SURFACE NORTHING: 7,182,664.448
SURFACE EASTING: 2,201,914.281
NAVD88 ELEVATION: 802.449

NO.	REVISIONS	BY	DATE

Texas Department of Transportation

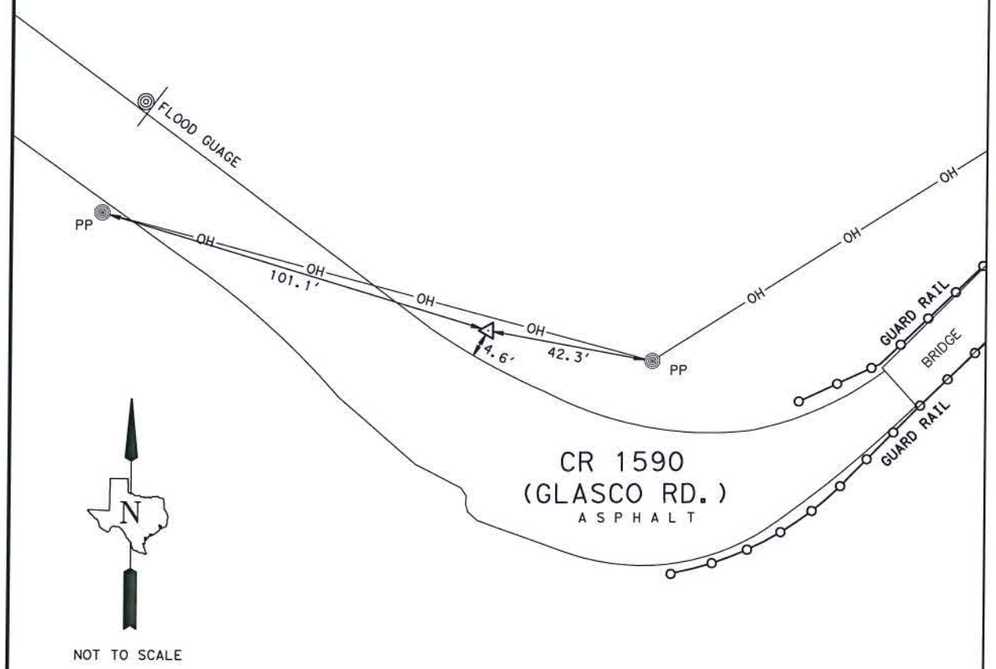
SURVEY CONTROL

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
			26
STATE	DISTRICT	COUNTY	
TEXAS	FORTWORTH	WISE	
CONTROL	SECTION	JOB	HIGHWAY NO.
0902	20	102	CR 1590

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK ON IRON ROD STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-003".



NOT TO SCALE

CONTROL POINT 0902-20-003

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-20-003" SET APPROXIMATELY 1.9 MILES WEST OF THE INTERSECTION OF CR 1593 AND SH 287, 4.6' NORTH OF THE NORTH EDGE OF ASPHALT, 42.3' WEST OF A POWER POLLE AND 101.1 FEET EAST ACROSS CR 1590 TO ANOTHER POWER POLE.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF NAD83 (2010)
GEOID 12A (CONUS)
DATE SET: SEPTEMBER 16, 2016
WISE COUNTY SCALE FACTOR: 1.00012

GRID NORTHING: 7,181,345.059
GRID EASTING: 2,202,357.622
SURFACE NORTHING: 7,182,206.820
SURFACE EASTING: 2,202,621.905
NAVD88 ELEVATION: 799.259

NOTES:

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM OF NAD83 (2010), TEXAS NORTH CENTRAL ZONE 4202, GEOID 12A (CONUS), WITH A GRID TO SURFACE ADJUSTMENT FACTOR OF 1.00012 (WISE COUNTY).
ALL VALUES ARE DERIVED FROM GPS OBSERVATIONS USING TXDOT VRS NETWORK.
ELEVATIONS ARE IN U.S. SURVEY FEET BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BY GPS RTK OBSERVATIONS.

I, THE UNDERSIGNED, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THE COORDINATE AND ELEVATION INFORMATION SHOWN WERE DERIVED FROM A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
CALVIN EARNEST COCK, III
5622
PROFESSIONAL
LAND SURVEYOR

11/21/15

CALVIN E. COCK III
RPLS NO. 5622
DATE

NO.	REVISIONS	BY	DATE

Texas Department of Transportation

SURVEY CONTROL

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
			27
STATE	DISTRICT	COUNTY	
TEXAS	FORTWORTH	WISE	
CONTROL	SECTION	JOB	HIGHWAY NO.
0902	20	102	CR 1590

CR 1590 HORIZONTAL ALIGNMENT (℄ CR1590)

Beginning chain CR1590 description

Point CR1590001 N 7,182,509.11 E 2,201,587.54 Sta 6+00.00

Course from CR1590001 to PC CR1590-1 N 70° 37′ 45.46" E Dist 75.13

Curve Data

Curve CR1590-1					
P.I. Station	7+47.18	N	7,182,557.92	E	2,201,726.39
Delta =	8° 14′ 30.24" (LT)				
Degree =	5° 43′ 46.48"				
Tangent =	72.05				
Length =	143.85				
Radius =	1,000.00				
External =	2.59				
Long Chord =	143.72				
Mid. Ord. =	2.59				
P.C. Station	6+75.13	N	7,182,534.03	E	2,201,658.42
P.T. Station	8+18.98	N	7,182,591.32	E	2,201,790.23
C.C.		N	7,183,477.42	E	2,201,326.74
Back = N	70° 37′ 45.46" E				
Ahead = N	62° 23′ 15.22" E				
Chord Bear = N	66° 30′ 30.34" E				

Course from PT CR1590-1 to PC CR1590-2 N 62° 23′ 15.22" E Dist 22.43

Curve Data

Curve CR1590-2					
P.I. Station	8+84.68	N	7,182,621.77	E	2,201,848.45
Delta =	39° 39′ 44.36" (RT)				
Degree =	47° 44′ 47.34"				
Tangent =	43.28				
Length =	83.07				
Radius =	120.00				
External =	7.57				
Long Chord =	81.42				
Mid. Ord. =	7.12				
P.C. Station	8+41.41	N	7,182,601.71	E	2,201,810.10
P.T. Station	9+24.47	N	7,182,612.74	E	2,201,890.77
C.C.		N	7,182,495.38	E	2,201,865.72
Back = N	62° 23′ 15.22" E				
Ahead = S	77° 57′ 00.41" E				
Chord Bear = N	82° 13′ 07.41" E				

Course from PT CR1590-2 to PC CR1590-3 S 77° 57′ 00.41" E Dist 149.72

Curve Data

Curve CR1590-3					
P.I. Station	11+14.37	N	7,182,573.09	E	2,202,076.48
Delta =	22° 42′ 57.75" (RT)				
Degree =	28° 38′ 52.40"				
Tangent =	40.17				
Length =	79.29				
Radius =	200.00				
External =	4.00				
Long Chord =	78.78				
Mid. Ord. =	3.92				
P.C. Station	10+74.19	N	7,182,581.48	E	2,202,037.19
P.T. Station	11+53.49	N	7,182,550.18	E	2,202,109.48
C.C.		N	7,182,385.89	E	2,201,995.44
Back = S	77° 57′ 00.41" E				
Ahead = S	55° 14′ 02.66" E				
Chord Bear = S	66° 35′ 31.54" E				

Course from PT CR1590-3 to CR1590002 S 55° 14′ 02.66" E Dist 146.51

Point CR1590002 N 7,182,466.64 E 2,202,229.84 Sta 13+00.00

Ending chain CR1590 description

℄ EXCR 1590 HORIZONTAL ALIGNMENT (℄ EXCR1590)

Beginning chain EXCR1590 description

Point EXCR1590001 N 7,182,527.8217 E 2,201,215.8303 Sta 2+00.0000

Course from EXCR1590001 to PC EXCR1590-1 S 76° 35′ 49.1473" E Dist 136.8598

Curve Data

Curve EXCR1590-1					
P.I. Station	4+60.3679	N	7,182,467.4686	E	2,201,469.1067
Delta =	32° 46′ 25.3899" (LT)				
Degree =	13° 38′ 30.6682"				
Tangent =	123.5081				
Length =	240.2439				
Radius =	420.0000				
External =	17.7833				
Long Chord =	236.9820				
Mid. Ord. =	17.0609				
P.C. Station	3+36.8598	N	7,182,496.0977	E	2,201,348.9625
P.T. Station	5+77.1037	N	7,182,508.4337	E	2,201,585.6233
C.C.		N	7,182,904.6584	E	2,201,446.3182
Back = S	76° 35′ 49.1472" E				
Ahead = N	70° 37′ 45.4630" E				
Chord Bear = N	87° 00′ 58.1579" E				

Course from PT EXCR1590-1 to PC EXCR1590-2 N 70° 37′ 45.4630" E Dist 77.1633

Curve Data

Curve EXCR1590-2					
P.I. Station	7+26.3139	N	7,182,557.9235	E	2,201,726.3871
Delta =	8° 14′ 30.2392" (LT)				
Degree =	5° 43′ 46.4806"				
Tangent =	72.0470				
Length =	143.8454				
Radius =	1,000.0000				
External =	2.5920				
Long Chord =	143.7214				
Mid. Ord. =	2.5853				
P.C. Station	6+54.2670	N	7,182,534.0271	E	2,201,658.4185
P.T. Station	7+98.1124	N	7,182,591.3165	E	2,201,790.2281
C.C.		N	7,183,477.4194	E	2,201,326.7397
Back = N	70° 37′ 45.4630" E				
Ahead = N	62° 23′ 15.2238" E				
Chord Bear = N	66° 30′ 30.3434" E				

Course from PT EXCR1590-2 to PC EXCR1590-3 N 62° 23′ 15.2238" E Dist 104.2757

Curve Data

Curve EXCR1590-3					
P.I. Station	9+46.7545	N	7,182,660.2104	E	2,201,921.9404
Delta =	52° 28′ 58.9775" (RT)				
Degree =	63° 39′ 43.1181"				
Tangent =	44.3665				
Length =	82.4402				
Radius =	90.0000				
External =	10.3414				
Long Chord =	79.5881				
Mid. Ord. =	9.2756				
P.C. Station	9+02.3880	N	7,182,639.6470	E	2,201,882.6271
P.T. Station	9+84.8282	N	7,182,641.5511	E	2,201,962.1924
C.C.		N	7,182,559.8977	E	2,201,924.3410
Back = N	62° 23′ 15.2238" E				
Ahead = S	65° 07′ 45.7987" E				
Chord Bear = N	88° 37′ 44.7126" E				

Course from PT EXCR1590-3 to PC EXCR1590-4 S 65° 07′ 45.7987" E Dist 34.6677

Curve Data

Curve EXCR1590-4					
P.I. Station	10+36.8095	N	7,182,619.6893	E	2,202,009.3530
Delta =	9° 53′ 43.1376" (RT)				
Degree =	28° 38′ 52.4031"				
Tangent =	17.3136				
Length =	34.5412				
Radius =	200.0000				
External =	0.7480				
Long Chord =	34.4983				
Mid. Ord. =	0.7452				
P.C. Station	10+19.4959	N	7,182,626.9709	E	2,201,993.6450
P.T. Station	10+54.0371	N	7,182,609.8166	E	2,202,023.5759
C.C.		N	7,182,445.5189	E	2,201,909.5309
Back = S	65° 07′ 45.7987" E				
Ahead = S	55° 14′ 02.6610" E				
Chord Bear = S	60° 10′ 54.2298" E				

Course from PT EXCR1590-4 to PC EXCR1590-5 S 55° 14′ 02.6610" E Dist 445.2781

Curve Data

Curve EXCR1590-5					
P.I. Station	15+17.5266	N	7,182,345.5232	E	2,202,404.3272
Delta =	1° 36′ 18.6804" (RT)				
Degree =	4° 24′ 26.5236"				
Tangent =	18.2115				
Length =	36.4206				
Radius =	1,300.0000				
External =	0.1276				
Long Chord =	36.4194				
Mid. Ord. =	0.1275				
P.C. Station	14+99.3151	N	7,182,355.9079	E	2,202,389.3667
P.T. Station	15+35.7357	N	7,182,334.7236	E	2,202,418.9910
C.C.		N	7,181,287.9729	E	2,201,648.0740
Back = S	55° 14′ 02.6610" E				
Ahead = S	53° 37′ 43.9806" E				
Chord Bear = S	54° 25′ 53.3208" E				

Course from PT EXCR1590-5 to PC EXCR1590-6 S 53° 37′ 43.9806" E Dist 260.7665

Curve Data

Curve EXCR1590-6					
P.I. Station	18+55.9697	N	7,182,144.8207	E	2,202,676.8411
Delta =	80° 41′ 53.2533" (LT)				
Degree =	81° 51′ 04.0089"				
Tangent =	59.4674				
Length =	98.5914				
Radius =	70.0000				
External =	21.8498				
Long Chord =	90.6420				
Mid. Ord. =	16.6520				
P.C. Station	17+96.5022	N	7,182,180.0856	E	2,202,628.9583
P.T. Station	18+95.0936	N	7,182,186.3737	E	2,202,719.3819
C.C.		N	7,182,236.4491	E	2,202,670.4692
Back = S	53° 37′ 43.9806" E				
Ahead = N	45° 40′ 22.7661" E				
Chord Bear = N	86° 01′ 19.3928" E				

Course from PT EXCR1590-6 to PC EXCR1590-7 N 45° 40′ 22.7661" E Dist 452.0852

Curve Data

Curve EXCR1590-7					
P.I. Station	23+75.3417	N	7,182,521.9483	E	2,203,062.9338
Delta =	6° 26′ 51.5490" (RT)				
Degree =	11° 27′ 32.9612"				
Tangent =	28.1629				
Length =	56.2664				
Radius =	500.0000				
External =	0.7925				
Long Chord =	56.2367				
Mid. Ord. =	0.7913				
P.C. Station	23+47.1788	N	7,182,502.2694	E	2,203,042.7871
P.T. Station	24+03.4452	N	7,182,539.2404	E	2,203,085.1630
C.C.		N	7,182,144.5877	E	2,203,392.1634
Back = N	45° 40′ 22.7661" E				
Ahead = N	52° 07′ 14.3151" E				
Chord Bear = N	48° 53′ 48.5406" E				

Course from PT EXCR1590-7 to EXCR1590002 N 52° 07′ 14.3159" E Dist 30.2037

Point EXCR1590002 N 7,182,557.7855 E 2,203,109.0029 Sta 24+33.6489

Ending chain EXCR1590 description

LEGEND

HORIZ-1 CURVE NUMBER

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

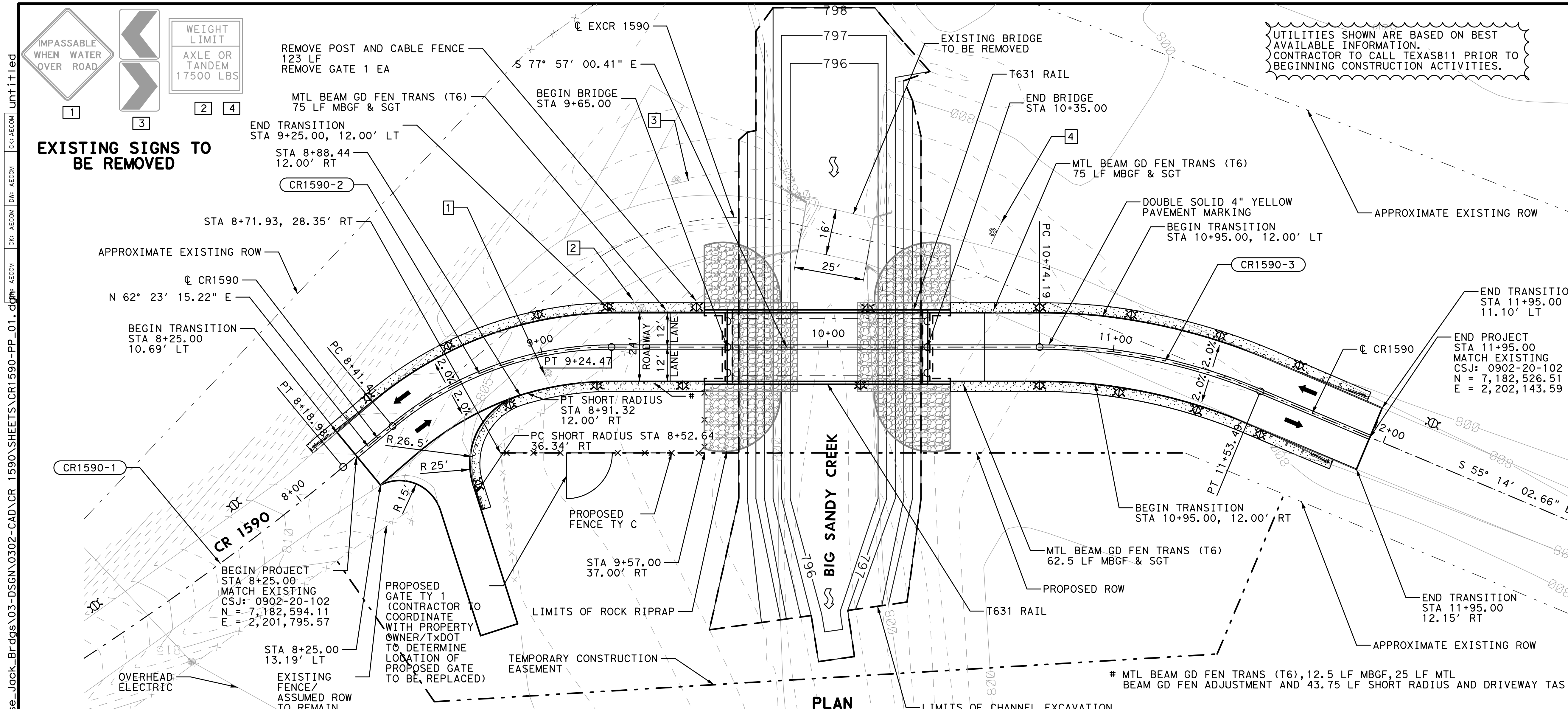
CR 1590
AT BIG SANDY CREEK

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		28



IMPASSABLE WHEN WATER OVER ROAD
WEIGHT LIMIT
AXLE OR TANDEM 17500 LBS
EXISTING SIGNS TO BE REMOVED
REMOVE POST AND CABLE FENCE 123 LF
REMOVE GATE 1 EA
MTL BEAM GD FEN TRANS (T6) 75 LF MBGF & SGT
END TRANSITION STA 9+25.00, 12.00' LT
STA 8+88.44 12.00' RT
CR1590-2
STA 8+71.93, 28.35' RT
APPROXIMATE EXISTING ROW
℄ CR1590
N 62° 23' 15.22" E
BEGIN TRANSITION STA 8+25.00 10.69' LT
CR1590-1
CR 1590
BEGIN PROJECT
STA 8+25.00
MATCH EXISTING
CSJ: 0902-20-102
N = 7,182,594.11
E = 2,201,795.57
STA 8+25.00 13.19' LT
OVERHEAD ELECTRIC
EXISTING FENCE/ ASSUMED ROW TO REMAIN
PROPOSED GATE TY 1 (CONTRACTOR TO COORDINATE WITH PROPERTY OWNER/TxDOT TO DETERMINE LOCATION OF PROPOSED GATE TO BE REPLACED)
℄ EXCR 1590
S 77° 57' 00.41" E
BEGIN BRIDGE STA 9+65.00
PT SHORT RADIUS STA 8+91.32 12.00' RT
PC SHORT RADIUS STA 8+52.64 36.34' RT
PROPOSED FENCE TY C
STA 9+57.00 37.00' RT
LIMITS OF ROCK RIPRAP
TEMPORARY CONSTRUCTION EASEMENT
PLAN
BIG SANDY CREEK
EXISTING BRIDGE TO BE REMOVED
T631 RAIL
END BRIDGE STA 10+35.00
MTL BEAM GD FEN TRANS (T6) 75 LF MBGF & SGT
DOUBLE SOLID 4" YELLOW PAVEMENT MARKING
BEGIN TRANSITION STA 10+95.00, 12.00' LT
CR1590-3
APPROXIMATE EXISTING ROW
END TRANSITION STA 11+95.00 11.10' LT
END PROJECT
STA 11+95.00
MATCH EXISTING
CSJ: 0902-20-102
N = 7,182,526.51
E = 2,202,143.59
S 55° 14' 02.66" E
BEGIN TRANSITION STA 10+95.00, 12.00' RT
MTL BEAM GD FEN TRANS (T6) 62.5 LF MBGF & SGT
PROPOSED ROW
T631 RAIL
END TRANSITION STA 11+95.00 12.15' RT
APPROXIMATE EXISTING ROW
LIMITS OF CHANNEL EXCAVATION
MTL BEAM GD FEN TRANS (T6),12.5 LF MBGF,25 LF MTL BEAM GD FEN ADJUSTMENT AND 43.75 LF SHORT RADIUS AND DRIVEWAY TAS

UTILITIES SHOWN ARE BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR TO CALL TEXAS811 PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES.

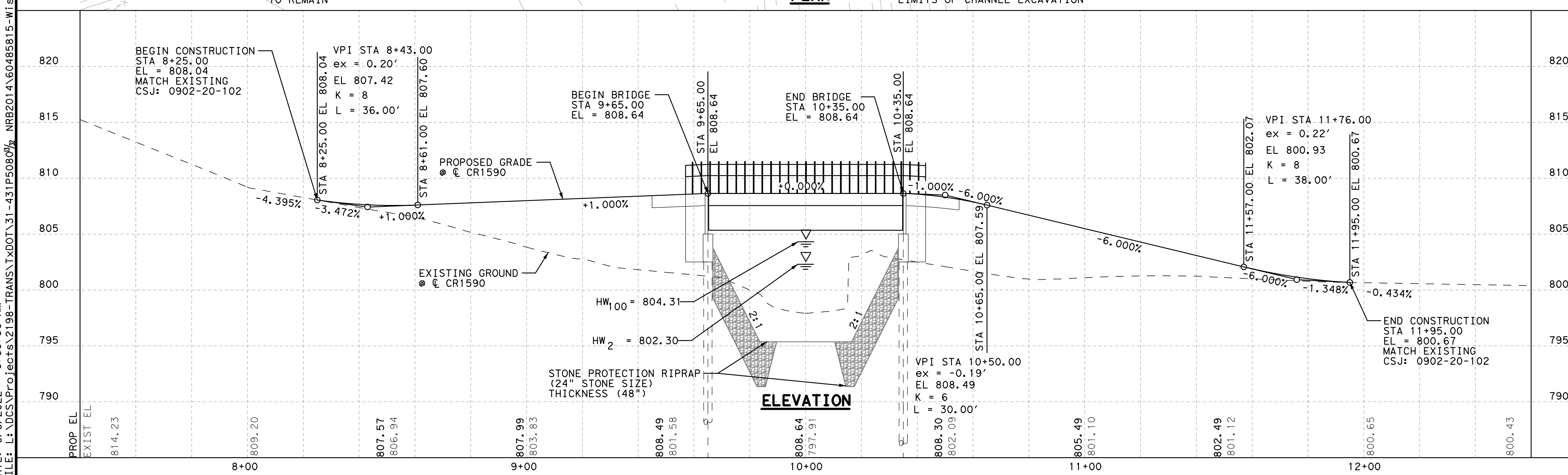
HORZ 0' 20' 40'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- TRAFFIC LANES
- FLOW
- HORIZ-1 — CURVE NUMBER
- MBGF MOWSTRIP
- MBGF
- SGT
- INSTL DEL ASSM (D-SW) SZ(BRF)(GF1)(BI)
- INSTL DEL ASSM (D-SW) SZ1(WFLX)(GND)(BI)

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO PROVIDE DELINEATORS THAT ARE "SHUR-TITE" OR APPROVED EQUAL BY THE ENGINEER.
3. REMOVAL OF EXISTING DELINEATORS AND OBJECT MARKER ASSEMBLIES SHALL BE CONSIDERED SUBSIDIARY TO VARIOUS BID ITEMS.
4. NO RAP SHALL BE USED AS EMBANKMENT UNDER THE MOW STRIP.
5. MOW STRIP SHALL BE REINFORCED WITH WIRE MESH OR CONVENTIONAL STEEL.
6. NO FIBER REINFORCED CONCRETE WILL BE USED.



BEGIN CONSTRUCTION STA 8+25.00 EL = 808.04 MATCH EXISTING CSJ: 0902-20-102
VPI STA 8+43.00 ex = 0.20' EL 807.42 K = 8 L = 36.00'
BEGIN BRIDGE STA 9+65.00 EL = 808.64
END BRIDGE STA 10+35.00 EL = 808.64
PROPOSED GRADE @ ℄ CR1590
EXISTING GROUND @ ℄ CR1590
HW100 = 804.31
HW2 = 802.30
STONE PROTECTION RIPRAP (24" STONE SIZE) THICKNESS (48")
ELEVATION
VPI STA 10+50.00 ex = -0.19' EL 808.49 K = 6 L = 30.00'
VPI STA 11+76.00 ex = 0.22' EL 800.93 K = 8 L = 38.00'
END CONSTRUCTION STA 11+95.00 EL = 800.67 MATCH EXISTING CSJ: 0902-20-102
-4.395% -3.472% +1.000% +1.000% +0.000% -1.000% -6.000% -6.000% -6.000% -1.348% -0.434%
PROP EL
EXIST EL
8+00 9+00 10+00 11+00 12+00

STATE OF TEXAS — IRENE ALANIS — 116808 — LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM — AECOM Technical Services Inc. 13355 Noel Rd. Suite 400 Dallas, Texas 75240 (214) 741-7777 TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK

PLAN AND PROFILE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST		COUNTY	SHEET NO.
FTW		WISE	29

DATE: 6/6/2022 9:59:56 AM
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DATE: 6/6/2022
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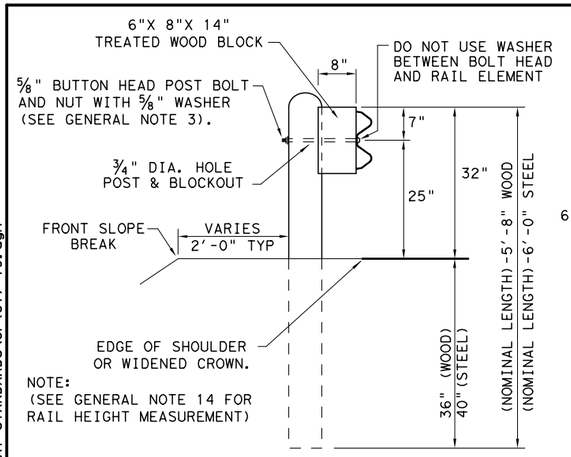
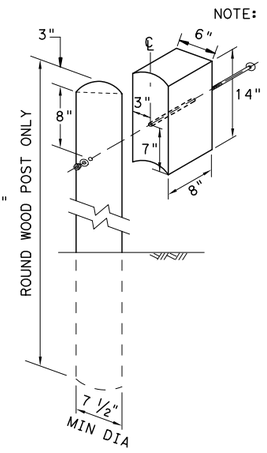
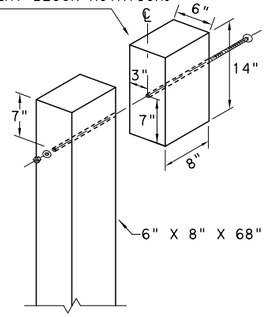


TYPICAL POST PLACEMENT

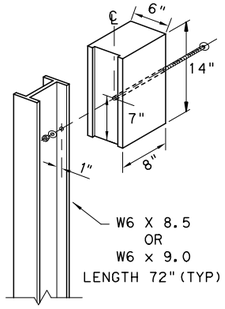


WOOD BLOCK TO ROUND WOOD POST

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

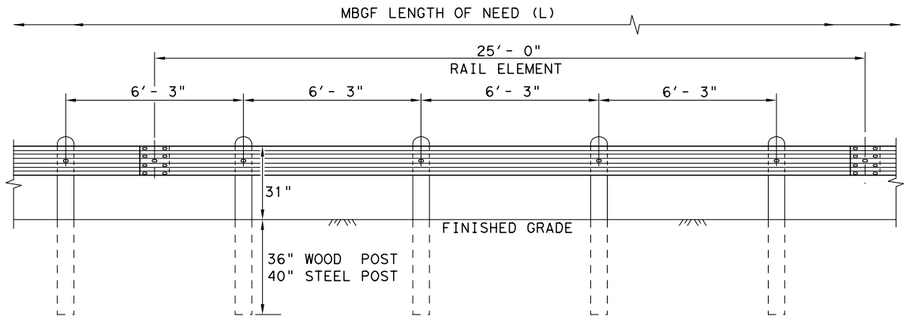


WOOD BLOCK TO RECTANGULAR WOOD POST



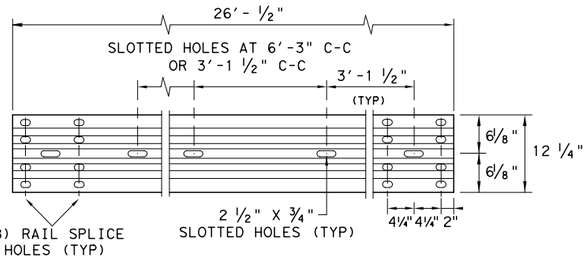
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



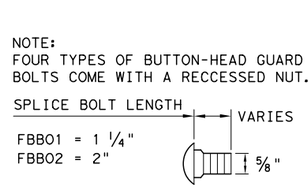
ELEVATION MID-SPAN RAIL SPLICE

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



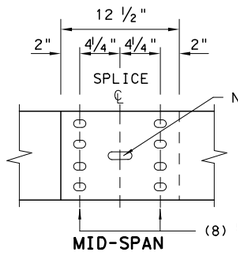
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



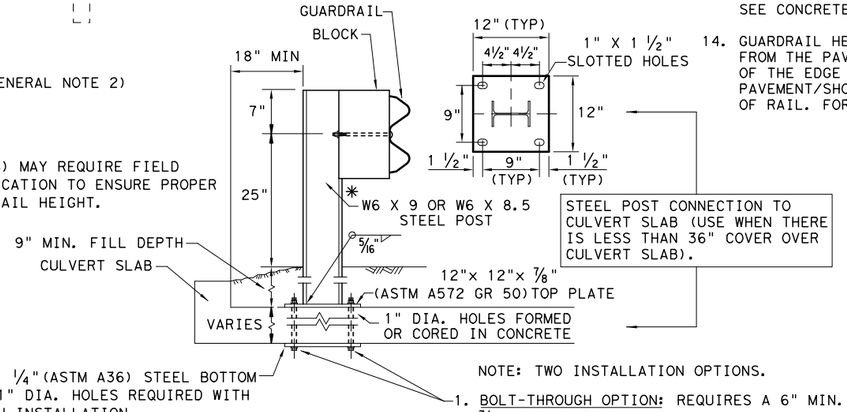
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		30

DATE: 6/6/2022
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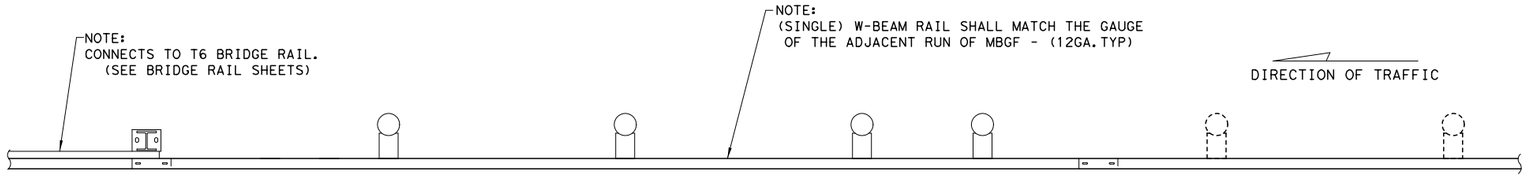
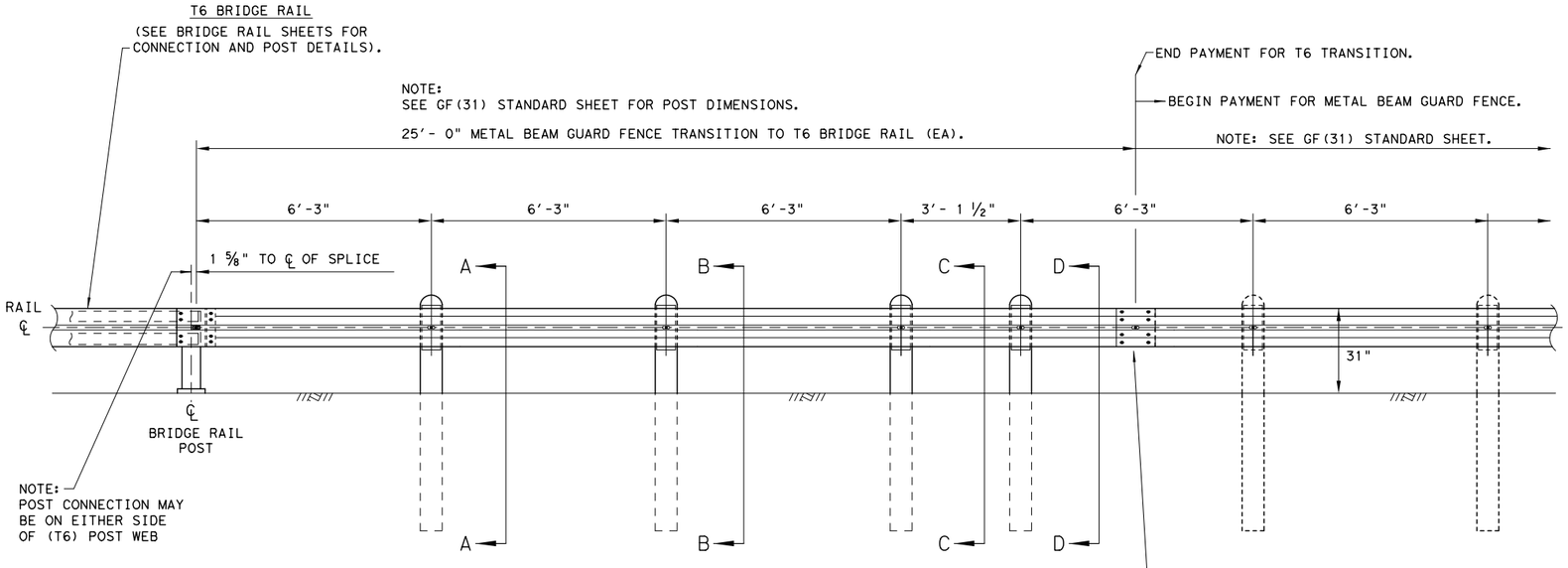


PLAN VIEW

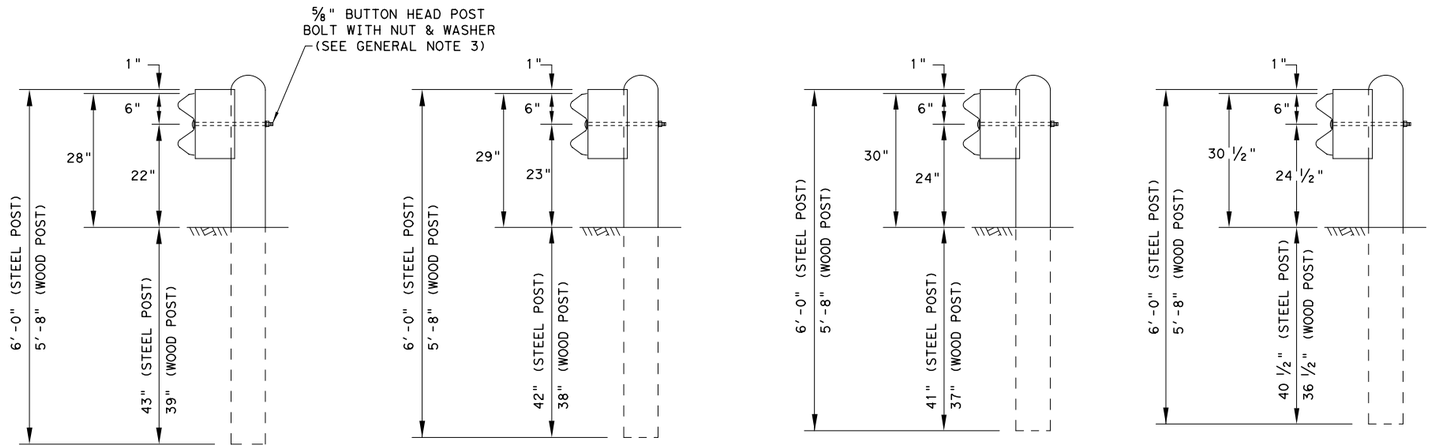


ELEVATION VIEW

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 ELEMENT 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 TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR.A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO STANDARD GF(31) & APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

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



SECTION A-A SECTION B-B SECTION C-C SECTION D-D

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE TRANSITION (T6)

GF(31)T6-19

FILE: gf31t619.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	20	102	CR 1590	
	DIST	COUNTY		SHEET NO.	
	FTW	WISE		31	

DATE: 6/6/2022
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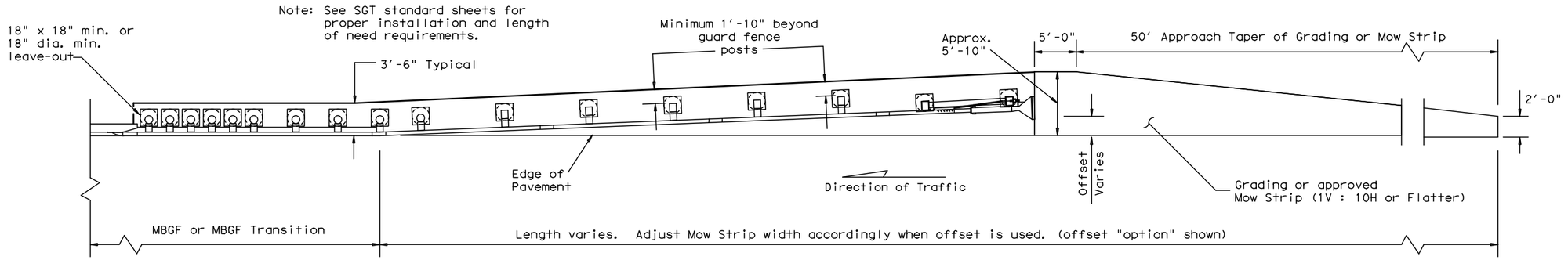
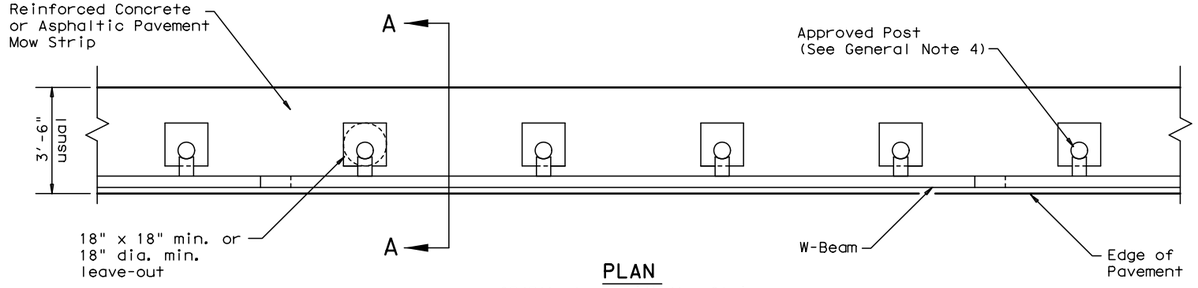
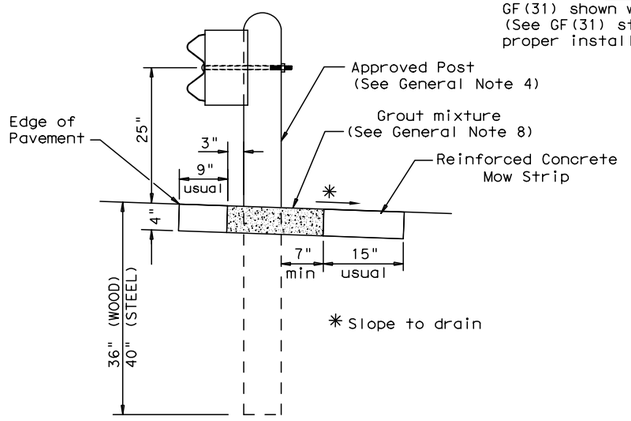


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



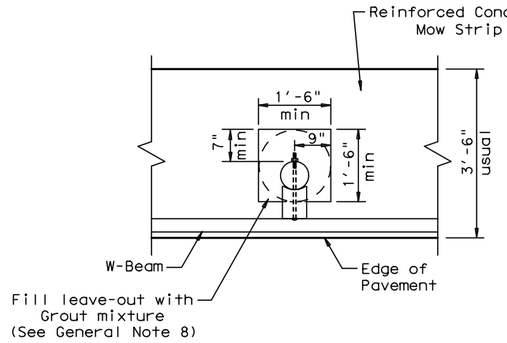
PLAN

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



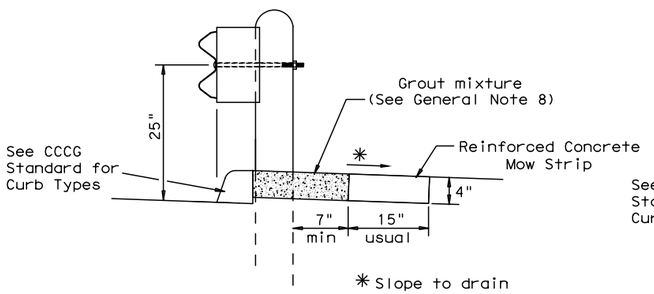
SECTION A-A

Typical



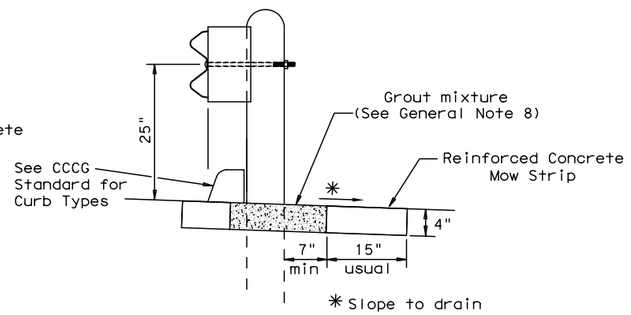
MOW STRIP DETAIL

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



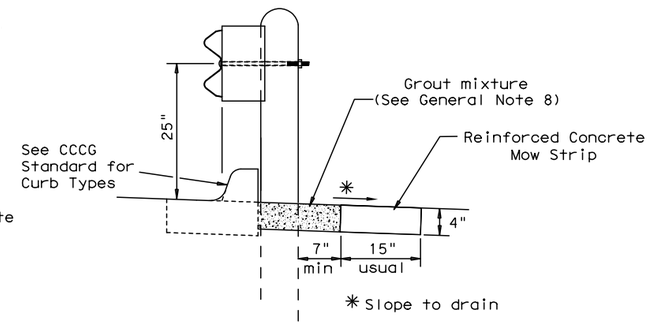
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		32

DATE: 6/6/2022
FILE: L:\DCS\Projects\2198-TRANS\TxDOT\31-431P5080\ NRB2014\60485815-Wise_Jack_Brdgs\03-DSGN\0302-CAD\CR 1590\STANDARDS\ROADWAY STANDARDS\SGT(10S)31-16.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" X 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" X 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'- 1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16"DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

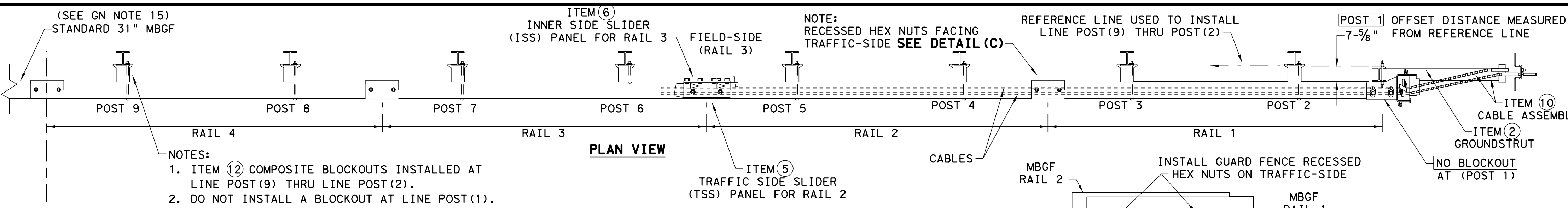
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

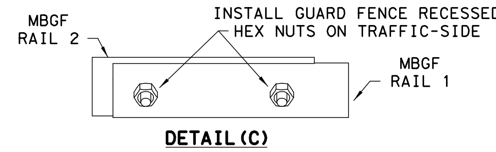
Texas Department of Transportation

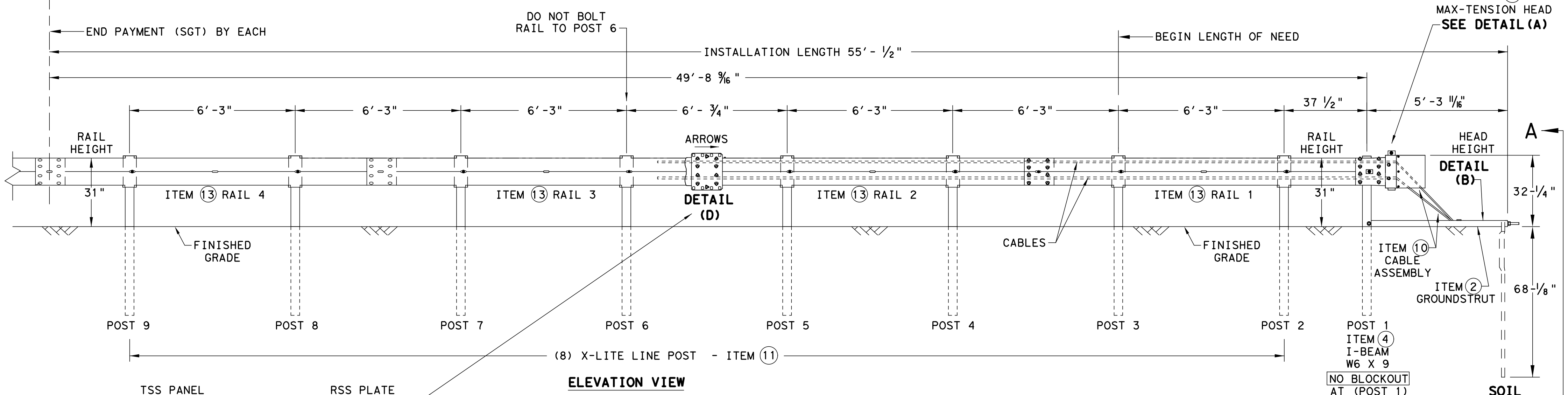
Design Division Standard

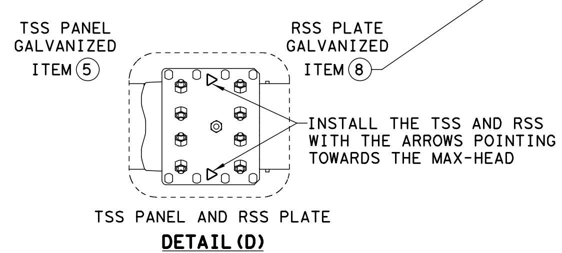
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

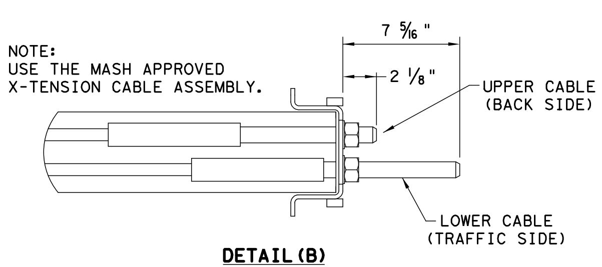
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		33

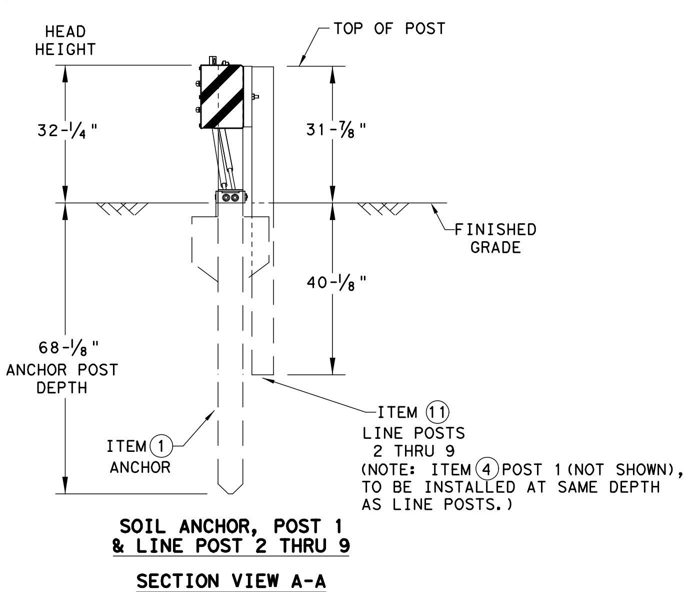


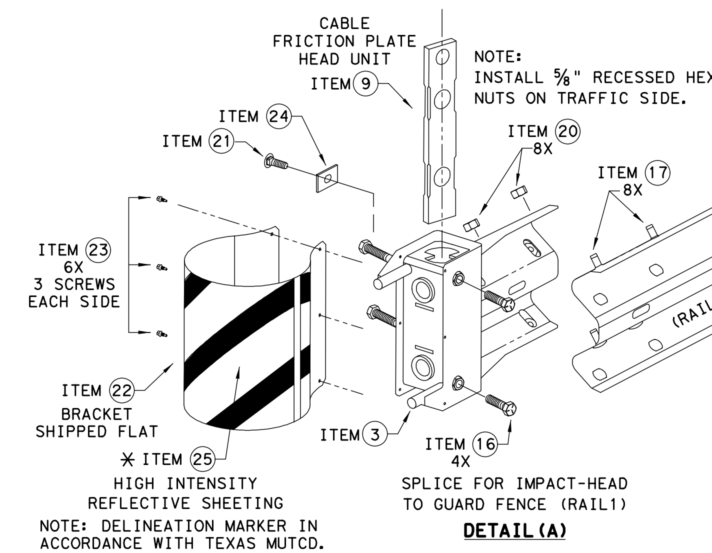












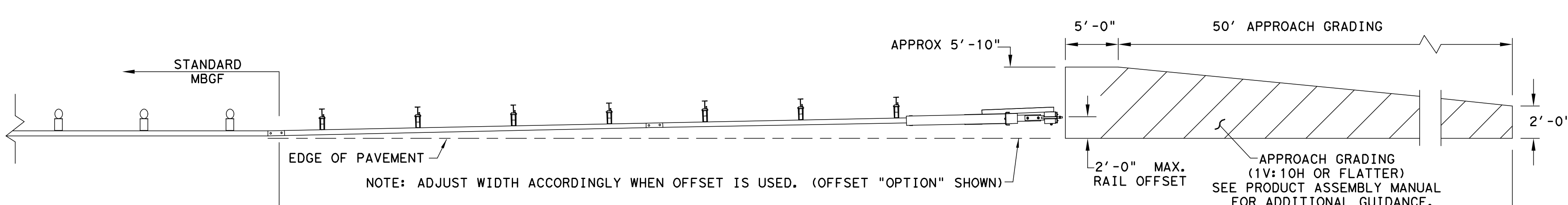
GENERAL NOTES

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

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

✱ TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation — Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST		COUNTY	SHEET NO.
	FTW		WISE	34

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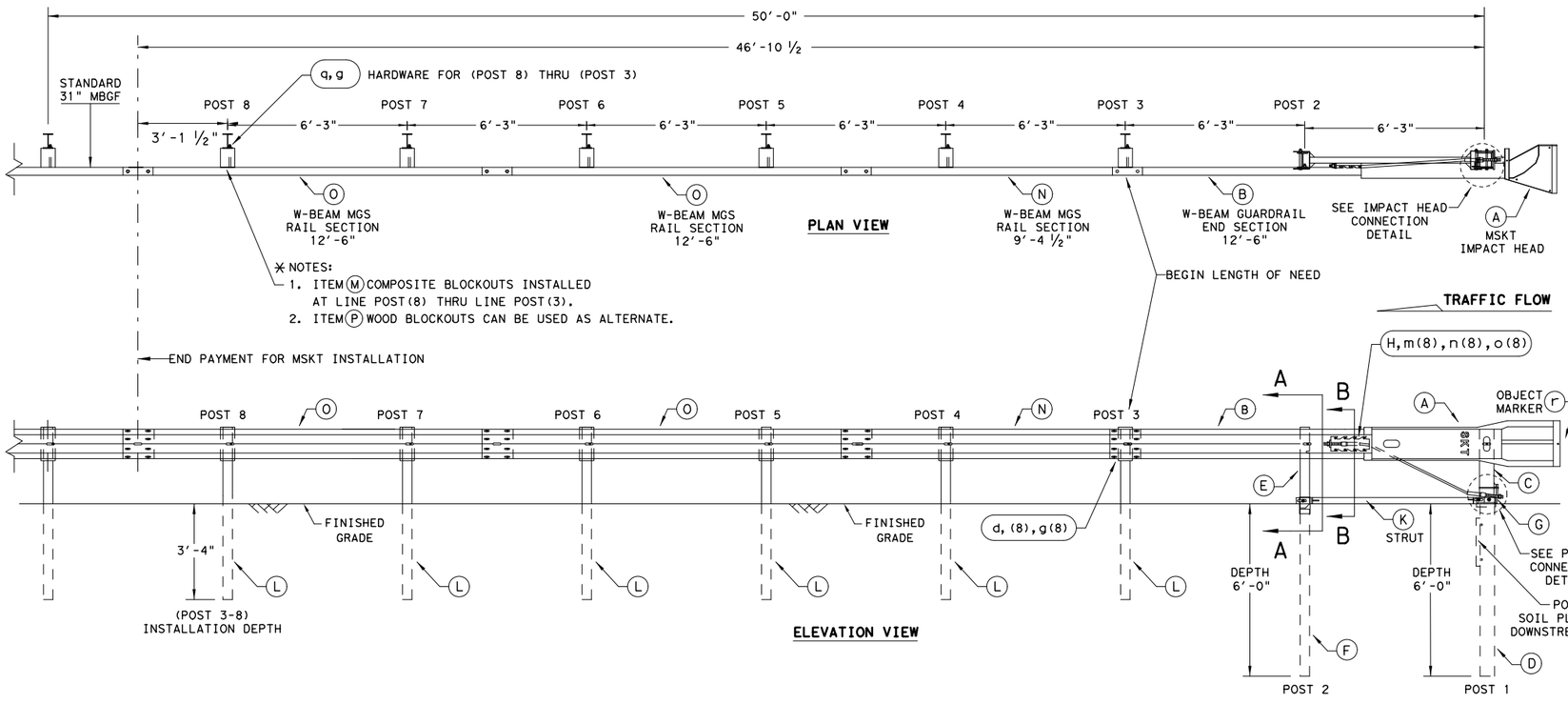
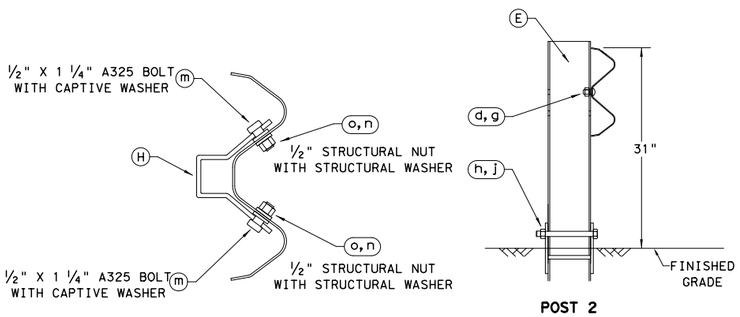
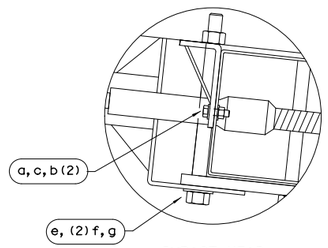


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

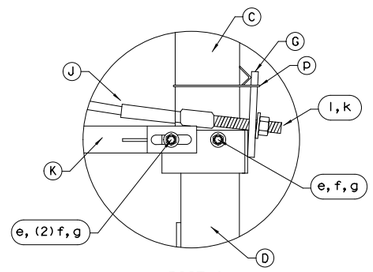


SECTION B-B
ANCHOR BRACKET

POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

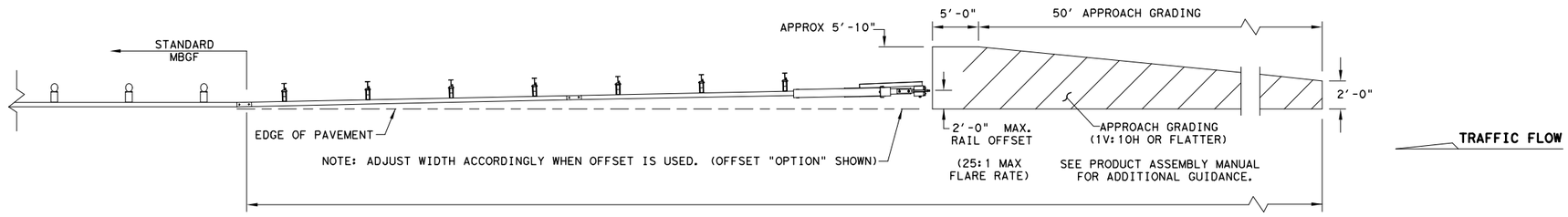
SEE NOTES: ✳

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" 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 ½")	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	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1⁄16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY			SHEET NO.	
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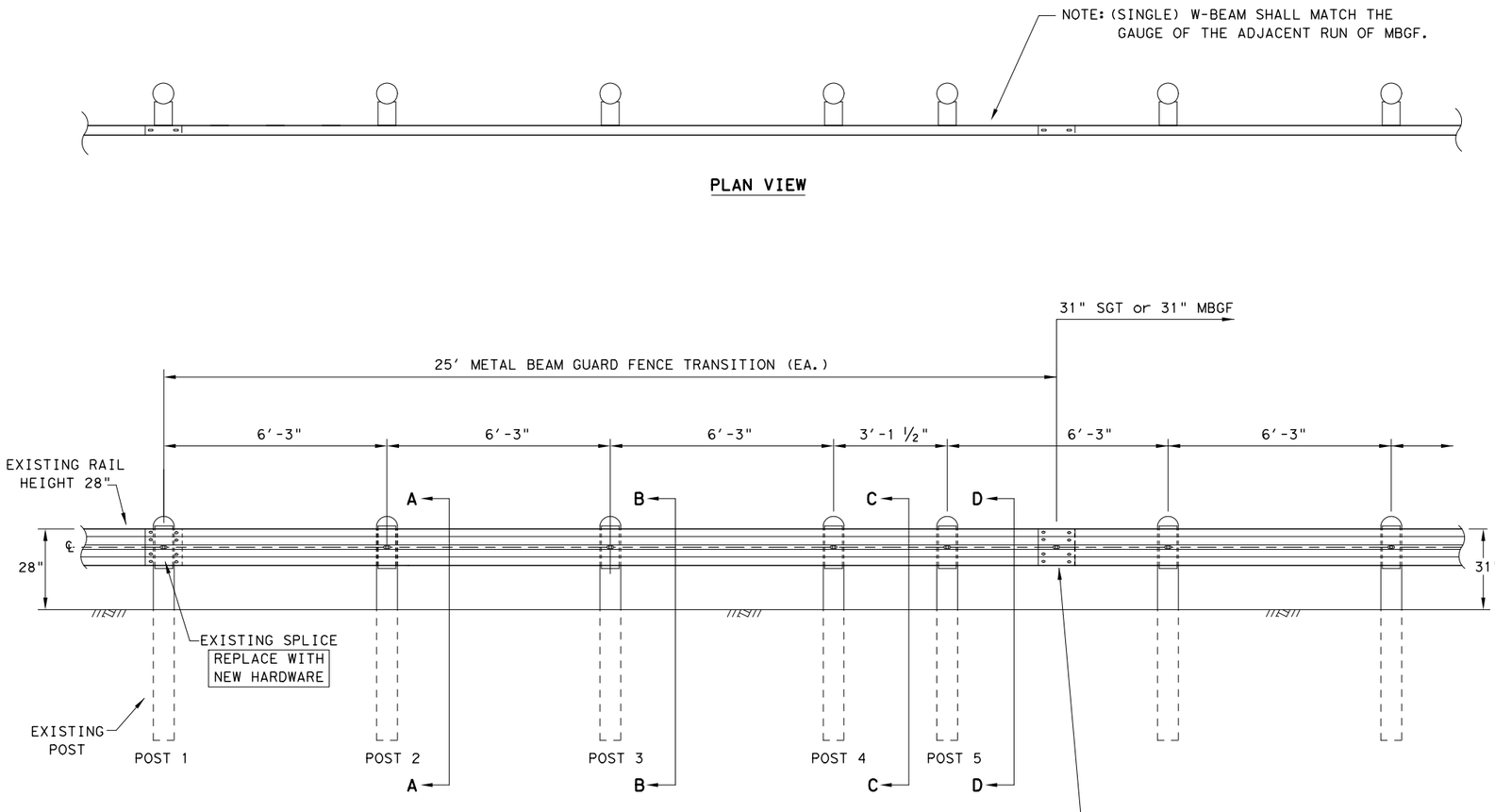
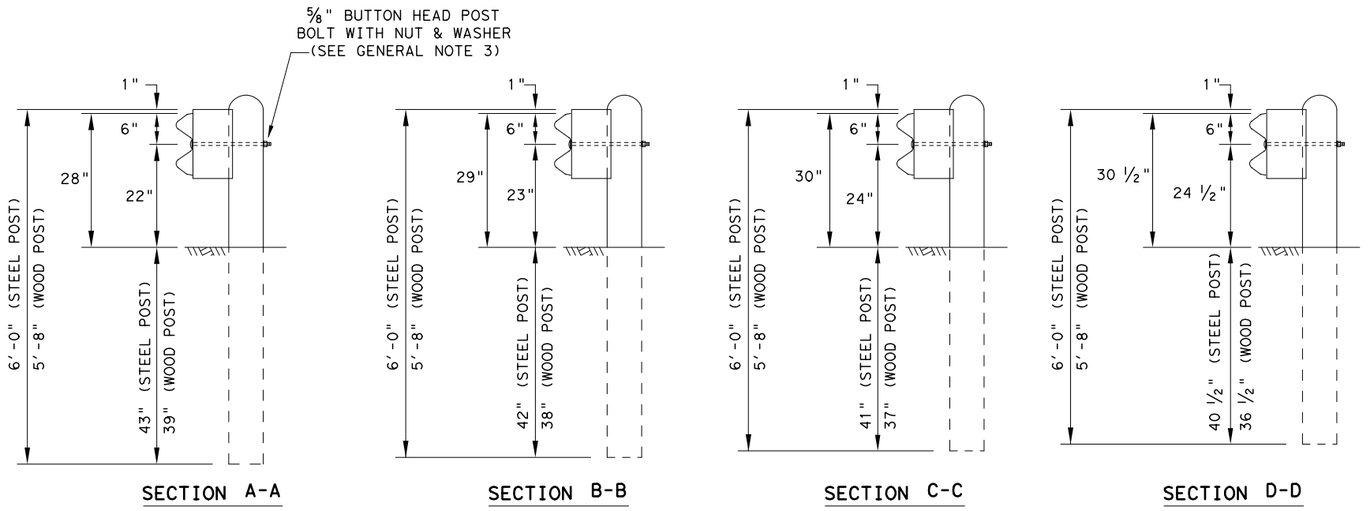


* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT 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 TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. 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.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

HARDWARE LIST

QTY	DESCRIPTION
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
5	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
5	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
5	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
5	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
5	5/8" X 18" GUARDRAIL BOLTS AND NUTS (FBB04)
5	5/8" ROUND WASHERS (ASTM F436) (FWC16a)
5	5/8" X 10" GUARDRAIL BOLTS AND NUTS (FBB03)
16	5/8" X 1- 1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

POST AND BLOCK-OUT TYPES AVAILABLE
FOR WOOD POST
FOR STEEL POST

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT RAIL-ADJ(B)-19

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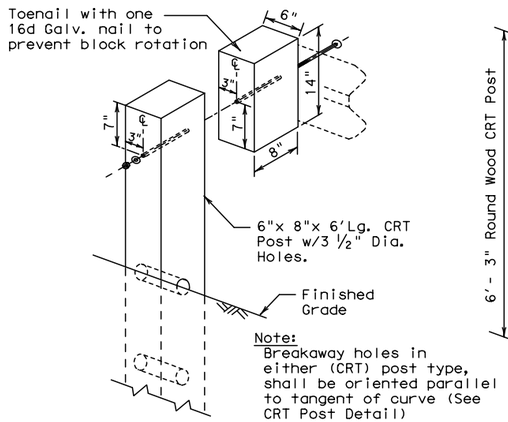
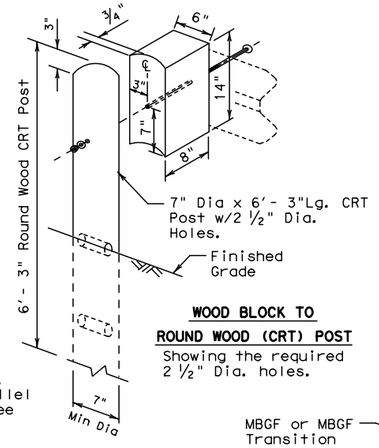
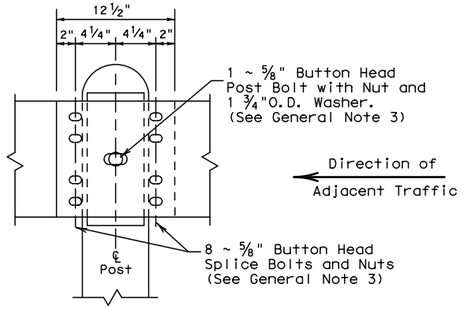


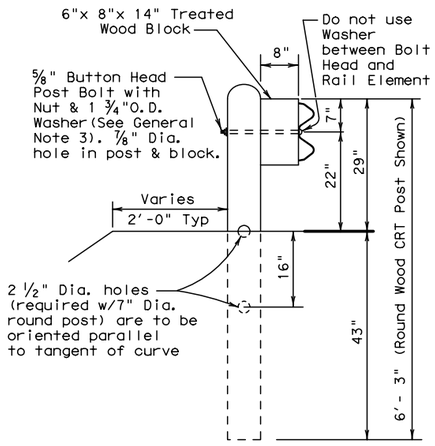
WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3 ½" Dia. holes.



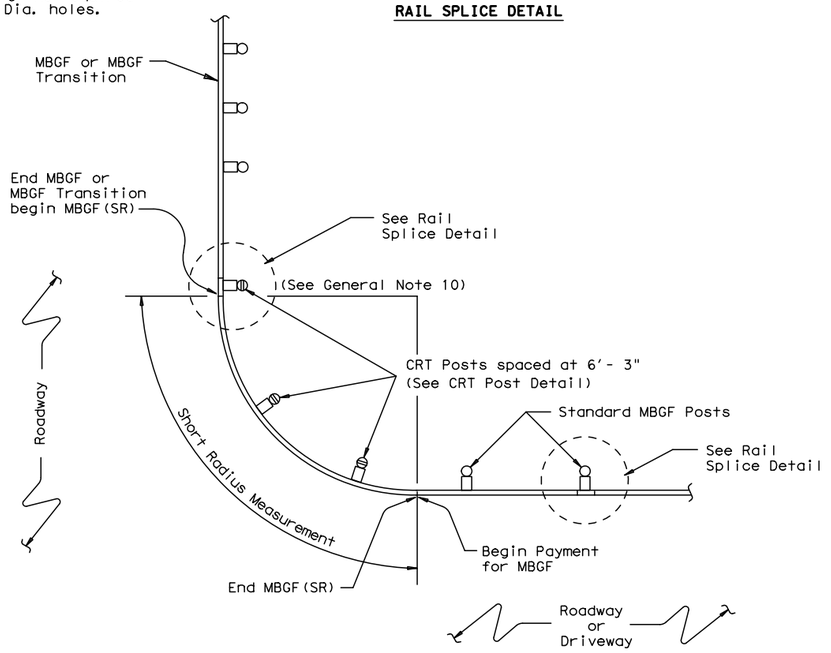
WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 ½" Dia. holes.



RAIL SPLICE DETAIL



(CRT) POST DETAIL
CONTROLLED RELEASE TERMINAL POST
Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



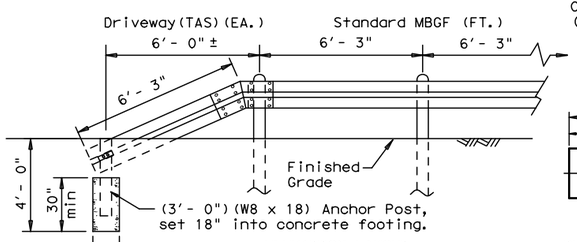
PLAN VIEW
SHOWING TYPICAL RADIUS
The required radius is shown elsewhere on the plans.

GENERAL NOTES

1. The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
2. Steel posts are not permitted at CRT post positions.
3. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
4. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
5. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
6. Crown shall be widened to accommodate the Metal Beam Guard Fence.
7. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
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 block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 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 is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Guardrail posts shall not be set in concrete, of any depth.
11. Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
12. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421,"Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
13. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.

"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



ELEVATION LAYOUT

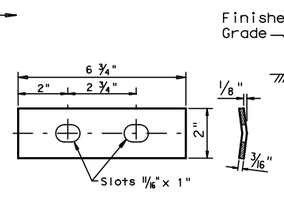
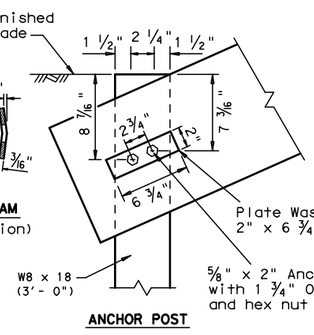
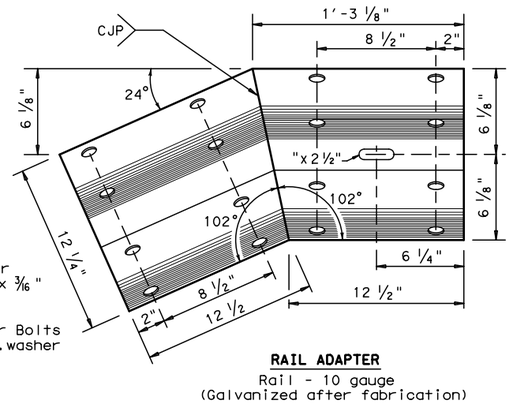


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)



ANCHOR POST



RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

GENERAL NOTES

1. The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft.(TAS)Terminal Anchor Section,is too long.
2. Terminal anchor post shall be set in Class A concrete.
3. All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(SHORT RADIUS)
MBGF(SR)-19

FILE: mbgfsr19.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
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	FTW	WISE		37

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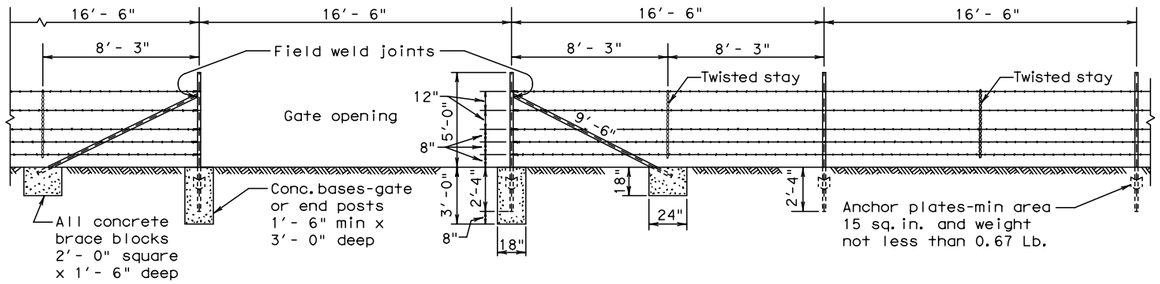
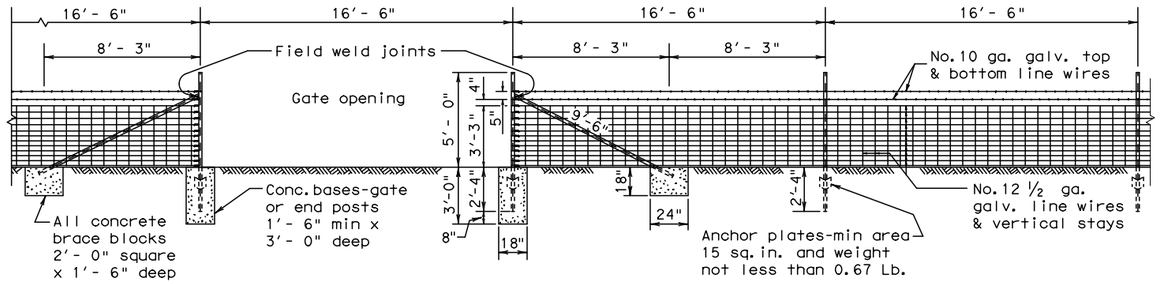


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



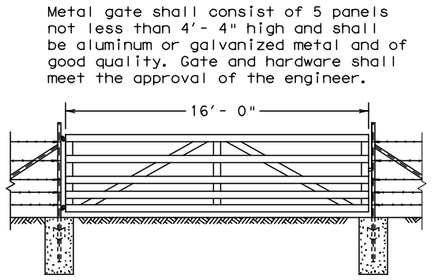
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

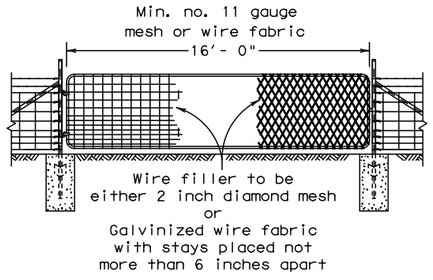
TYPE "D" FENCE

(See General Note 8)

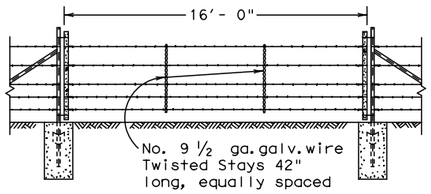
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



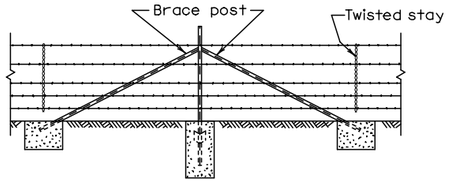
DETAIL TYPE 1 GATE



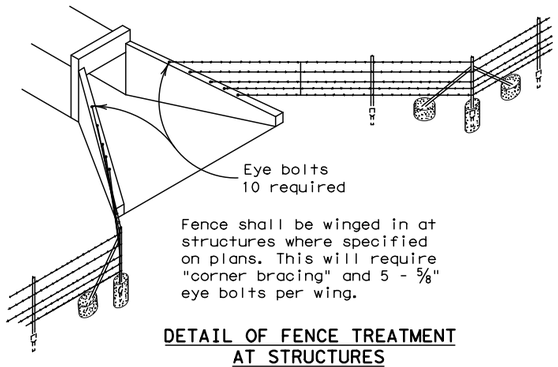
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

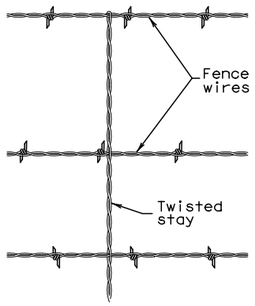


CORNER OR PULL POST ASSEMBLY

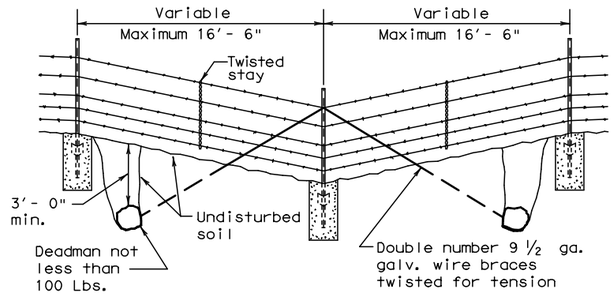


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

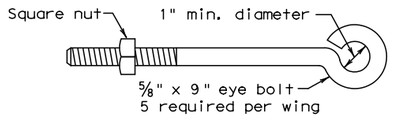
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

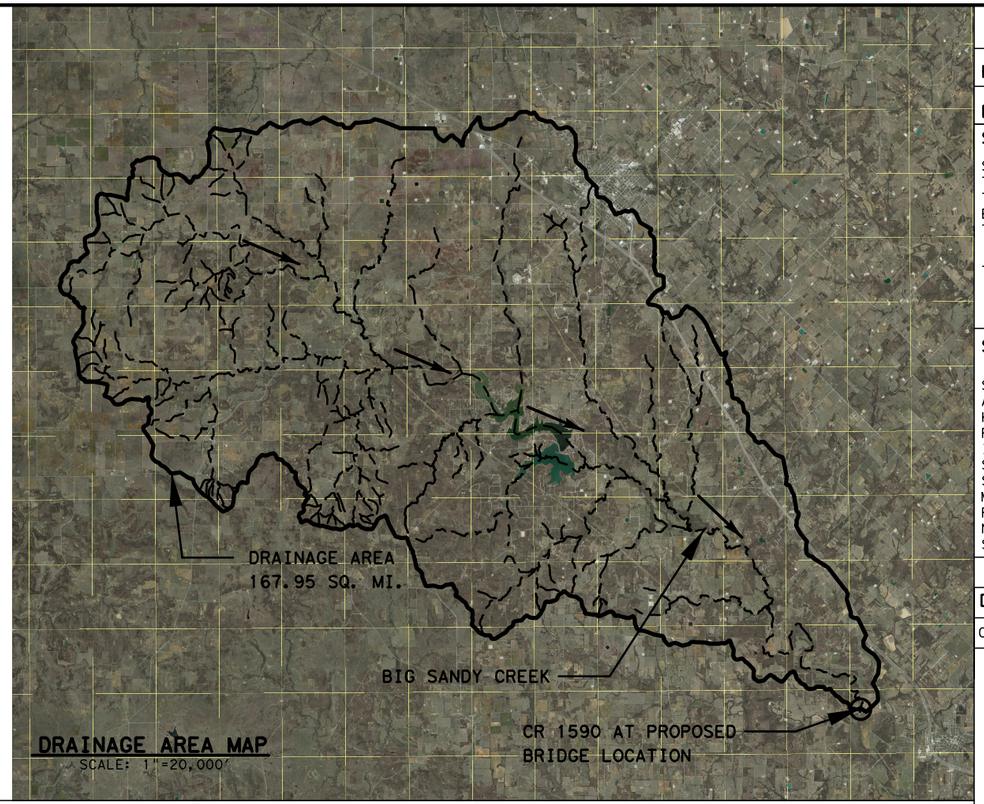
Texas Department of Transportation

Design Division Standard

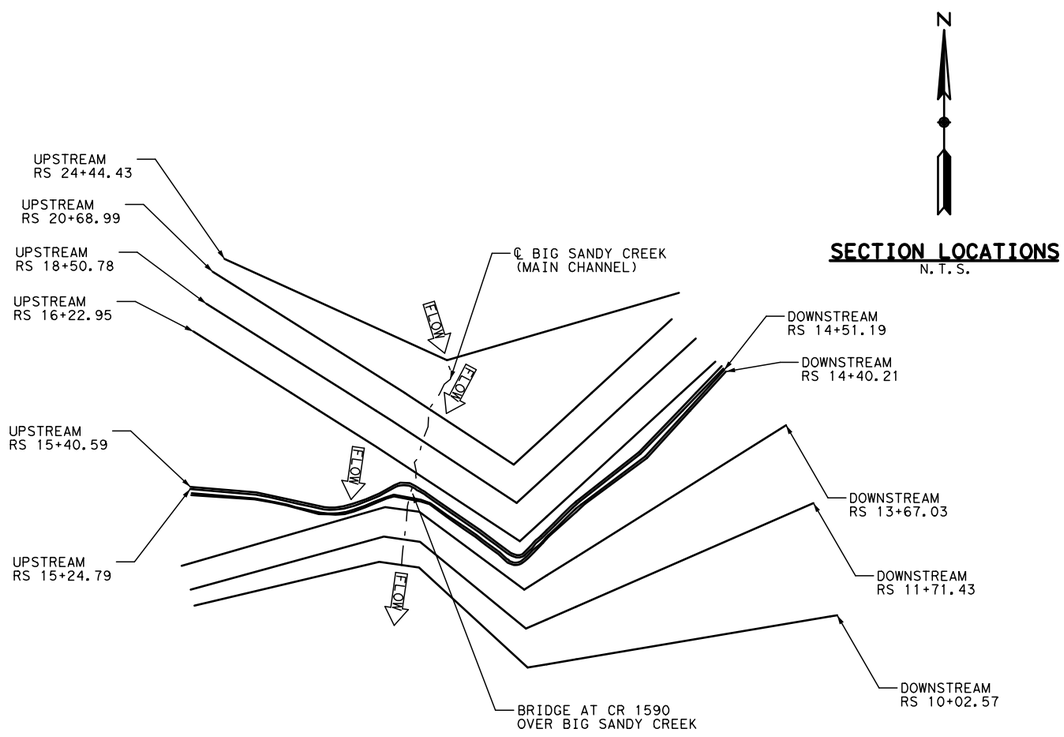
BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)

WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		38



DRAINAGE AREA MAP
SCALE: 1"=20,000'



SECTION LOCATIONS
N.T.S.

HYDROLOGY COMPUTATIONS

HYDROLOGIC METHOD: HEC-HMS (SNYDER'S UNIT HYDROGRAPHY METHODOLOGY)

DRAINAGE AREA: 167.95 SQ MI **DESIGN FREQUENCY:** 2

SUMMARY OF SOIL CONDITION AND LAND USE:

SEVEN PERCENT(7.0%) OF THE SOILS IN THE DRAINAGE AREA ARE OF SOIL GROUP A,CONSISTING OF: PULEXAS FINE SANDY LOAM,OCCASIONALLY FLOODED.
TWENTY SEVEN PERCENT (27.0%) OF THE SOILS IN THE DRAINAGE AREA ARE OF SOIL GROUP B, CONSISTING OF: ANOCON LOAM, 1 TO 3 PERCENT SLOPES.
THIRTY EIGHT PERCENT (38.0%) OF THE SOILS IN THE DRAINAGE AREA ARE OF SOIL GROUP C, CONSISTING OF:
EXRAY-DARNELL COMPLEX, 1 TO 8 PERCENT SLOPES, VERY STONY.
TWENTY EIGHT PERCENT (28.0%) OF THE SOILS IN THE DRAINAGE AREA OF SOIL GROUP D, CONSISTING OF: VERNON CLAY, 3 TO 8 PERCENT SLOPES.

THE DRAINAGE AREA IS PREDOMINANTLY "OTHER AGRICULTURAL LAND" WITH A COVER OF TREES, WEEDS, AND GRASS MIXTURE.

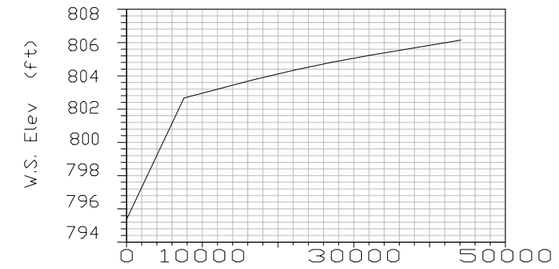
A HYDROLOGIC CONDITION OF "FAIR" IS USED FOR THE ANALYSIS.

SUMMARY OF INPUT PARAMETER:

SOIL CLASSIFICATION = 7.0% GROUP 'A', 27.0% GROUP 'B', 38.0% GROUP 'C', & 28.0% GROUP 'D'
ANTECEDENT SOIL MOISTURE CONDITIONS = AVERAGE II
HYDROLOGIC CONDITION = FAIR
RUNOFF CURVE NUMBER = 82.40
INITIAL ABSTRACTION = 0.43
SNYDER'S COEFFICIENT CP = 0.8
SNYDER'S COEFFICIENT CT = 2.2
MEAN CHANNEL SLOPE SL = 0.00173 FT/FT
RAINFALL DISTRIBUTION TYPE = TYPE II
NRCS METHOD FOR TIME OF CONCENTRATION (Tc)= 674.32 MIN
SNYDER'S METHODOLOGY USED TO COMPUTE HYDROGRAPH LAG TIME.

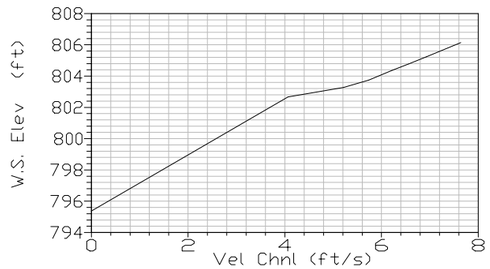
SUMMARY OF DISCHARGES (CFS)

DESCRIPTION OF CROSSING:	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
CR 1590 AT BIG SANDY CREEK	7,581	12,668	16,686	22,341	26,873	31,959	44,151



DISCHARGE - Q IN CU.FT.PER SEC.

CONVEYANCE CURVE



AVERAGE VELOCITY - FT. PER SEC.

VELOCITY CURVE

NOTES:

1. A SOIL SURVEY OF THE DRAINAGE BASIN WAS OBTAINED FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE (NRCS) WEBSITE.
2. ALL HYDROLOGY CALCULATIONS ARE BASED ON TXDOT HYDRAULIC DESIGN MANUAL (REVISED SEPTEMBER 2019) CRITERIA FOR WATERSHEDS AND FEMA ZONE A CROSSINGS.
3. THE OMEGA EM REGRESSION EQUATIONS METHOD WAS USED AS THE INITIAL METHOD OF CALCULATION OF DISCHARGES, BUT THE CHECK SNYDER'S UNIT HYDROGRAPH (HEC-HMS) METHOD DISCHARGES WERE LARGER THAN THE REGRESSION EQUATIONS RESULTS AND WERE THEREFORE USED IN THE HYDRAULIC ANALYSIS FOR CR 1590 AT BIG SANDY CREEK.
4. THE ATLAS OF DEPTH-DURATION FREQUENCY OF PRECIPITATION ANNUAL MAXIMA FOR TEXAS FIGURES WERE USED TO DETERMINE INCHES OF RAINFALL FOR THE NRCS UNIT HYDROGRAPH METHOD IN HEC-HMS.

WISE COUNTY PRECIPITATION IN INCHES OF RAINFALL

2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
3.42	4.75	5.75	7.12	8.20	9.40	12.25

5. HEC-RAS V5.0.3 USED FOR HYDRAULIC ANALYSIS AND DESIGN OF EXISTING AND PROPOSED CONDITIONS.
6. ALL SECTIONS ARE NORMAL TO STREAM FLOW.
7. ABUTMENTS TO BE PROTECTED WITH ROCK RIPRAP TO REDUCE THE POTENTIAL FOR SCOUR FAILURE.
8. FLOODPLAIN COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR OF WISE COUNTY TO BE COMPLETED AFTER REVISIONS ARE MADE AND THE TXDOT PROJECT MANAGER HAS COMPLETED THE COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER
6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK
BRIDGE HYDRAULIC DATA

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		39

DATE: 6/6/2022 10:01:30 AM
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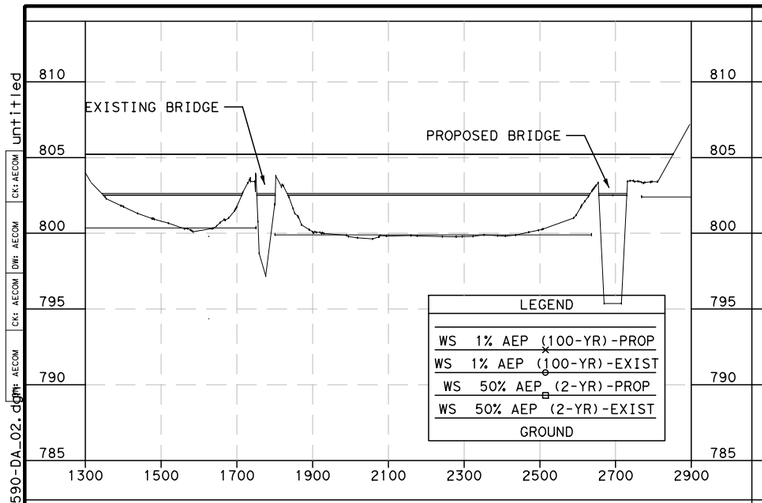
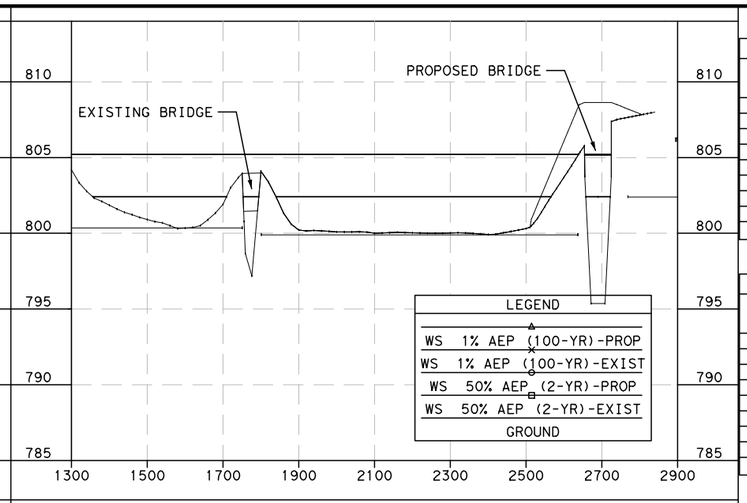
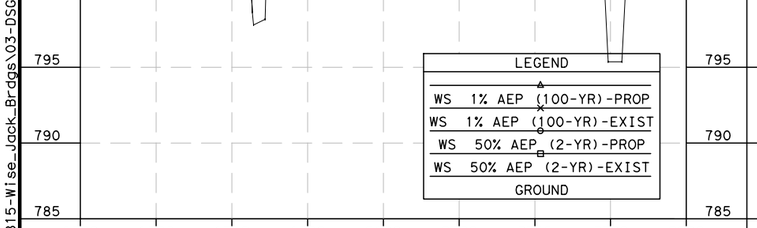


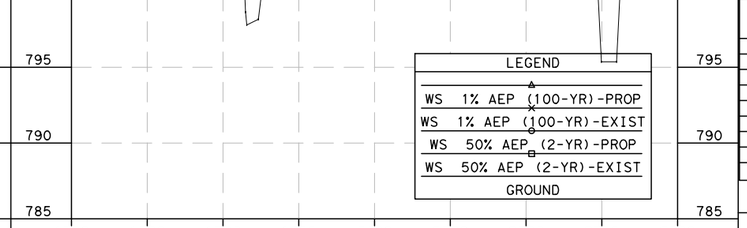
UPSTREAM APPROACH: STATION 15+24.79



DOWNSTREAM AT BRIDGE: STATION 15+09.77

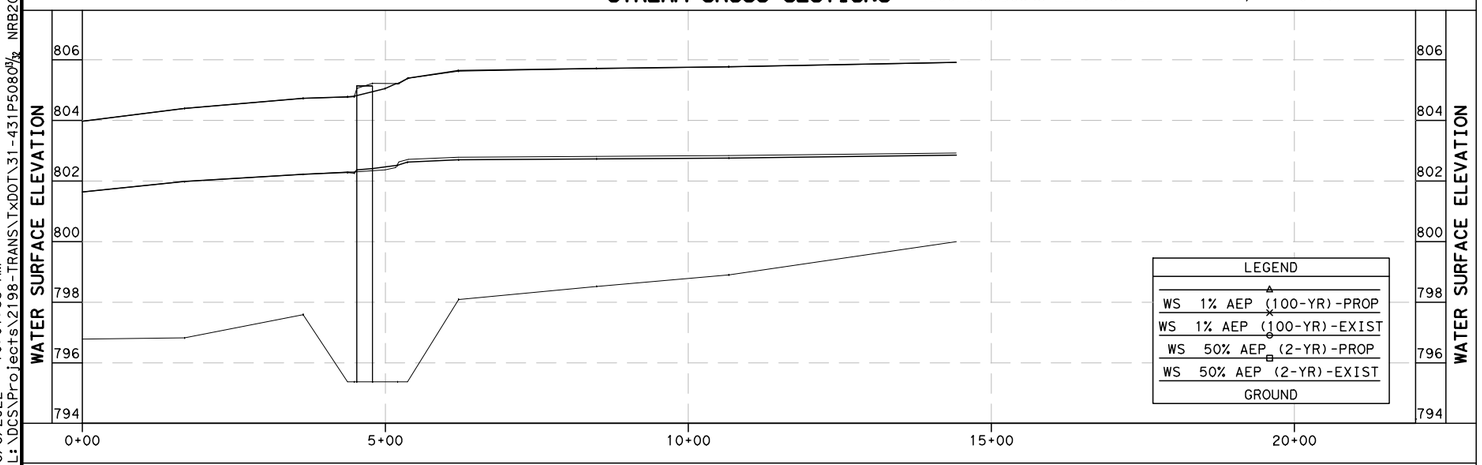


UPSTREAM AT BRIDGE: STATION 15+09.77



DOWNSTREAM (EXIT): STATION 14+51.19

STREAM CROSS SECTIONS (LOOKING DOWNSTREAM) SCALE: 1"=4'(H); 1"=10'(V)



STREAM MAIN CHANNEL STATIONS

STREAM PROFILE SCALE: 1"=2.5'(H); 1"=5'(V)

UPSTREAM APPROACH: STATION 15+24.79

	PROPOSED CONDITIONS						EXISTING CONDITIONS					
	DESIGN FLOW (2-YR) W.S. ELEV.=802.67			100-YR FLOW # W.S. ELEV. =805.22			DESIGN FLOW (2-YR) W.S. ELEV.=802.74			100-YR FLOW # W.S. ELEV. =805.22		
	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B
AREA	2799.46	438.19		6200.58	634.81	181.97	2889.68	135.42		6231.49	239.13	209.68
W.P.	1227.14	78.07		1385.48	81.26	120.51	1234.89	41.93		1405.55	45.01	135.63
R	2.28	5.61		4.48	7.81	1.51	2.34	3.23		4.43	5.31	1.55
S		0.0012		--	0.0022	--	--	0.0017	--	--	0.0021	--
n	0.044	0.04	0.045	0.044	0.04	0.045	0.044	0.04	--	0.044	0.04	0.045
Q	5800	1781		27191	4393	374	7134	447		30056	1418	485
V	2.07	4.06		4.39	6.92	2.06	2.47	3.30		4.82	5.93	2.31
	AVG. VEL. = 2.34			AVG. VEL. = 4.55			AVG. VEL. =2.51			AVG. VEL. = 4.78		

UPSTREAM AT BRIDGE: STATION 15+09.77

	PROPOSED CONDITIONS						EXISTING CONDITIONS					
	DESIGN FLOW (2-YR) W.S. ELEV.=802.30			100-YR FLOW # W.S. ELEV. =804.88			DESIGN FLOW (2-YR) W.S. ELEV.=802.60			100-YR FLOW # W.S. ELEV. =805.21		
	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B
AREA		348.7			485.01			66.68			97.61	
W.P.		67.46			75.07			52.14			79.19	
R		5.17			6.46			1.28			1.23	
S		0.0012			0.0022			0.0017			0.0021	
n		0.04			0.04			0.04			0.04	
Q		1703			3958			231			450	
V		4.89			8.16			3.47			3.16	
	AVG. VEL. = 4.89			AVG. VEL. = 8.16			AVG. VEL. = 3.47			AVG. VEL. = 3.16		

DOWNSTREAM AT BRIDGE: STATION 15+09.77

	PROPOSED CONDITIONS						EXISTING CONDITIONS					
	DESIGN FLOW (2-YR) W.S. ELEV.=802.25			100-YR FLOW # W.S. ELEV. =804.75			DESIGN FLOW (2-YR) W.S. ELEV.=802.54			100-YR FLOW # W.S. ELEV. =805.05		
	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B
AREA		345.74			475.46			78.16			104.69	
W.P.		67.25			74.79			54.51			81.17	
R		5.14			6.36			1.43			1.29	
S		0.0012			0.0022			0.0017			0.0021	
n		0.04			0.04			0.04			0.04	
Q		1703			3958			231			450	
V		4.93			8.32			2.96			2.95	
	AVG. VEL. = 4.93			AVG. VEL. = 8.32			AVG. VEL. = 2.96			AVG. VEL. = 2.95		

DOWNSTREAM (EXIT): STATION 14+51.19

	PROPOSED CONDITIONS						EXISTING CONDITIONS					
	DESIGN FLOW (2-YR) W.S. ELEV.=802.47			100-YR FLOW # W.S. ELEV. =804.77			DESIGN FLOW (2-YR) W.S. ELEV.=802.49			100-YR FLOW # W.S. ELEV. =804.79		
	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B	L.O.B	CHAN.	R.O.B
AREA	2639.54	386.29	19.12	5761.1	539.83	195.37	2661.38	218.67	0.57	5824.71	459.75	54.22
W.P.	1273.68	69.9	58.14	1412.19	69.9	94.17	1279.37	108.25	5.59	1428.71	108.25	40.74
R	2.07	5.53	0.33	4.08	7.72	2.07	2.08	2.02	0.10	4.08	4.25	1.33
S		0.0015		--	0.0029	--	--	0.0021	--	--	0.0033	--
n	0.044	0.04	0.045	0.044	0.04	0.045	0.044	0.04	0.045	0.044	0.04	0.045
Q	5826	1743	12	27171	4223	566	6983	598	0	29260	2575	125
V	2.21	4.51	0.61	4.72	7.82	2.89	2.62	2.73	0.33	5.02	5.60	2.3
	AVG. VEL. = 2.49			AVG. VEL. = 4.92			AVG. VEL. = 2.63			AVG. VEL. = 5.04		

NOTES:

1. ALL SECTIONS ARE NORMAL TO STREAM FLOW.
2. HEC-RAS V5.0.3 USED FOR HYDRAULIC ANALYSIS AND DESIGN OF EXISTING AND PROPOSED CONDITIONS.
3. ABUTMENTS TO BE PROTECTED WITH ROCK RIPRAP (D50 = 24 IN) TO REDUCE THE POTENTIAL FOR SCOUR FAILURE.
4. THE NEW STRUCTURE DOES NOT ADVERSELY RAISE THE HEADWATER ELEVATION ABOVE THE EXISTING HEADWATER ELEVATION FOR THE 100 YEAR EVENT.
5. WATER SURFACE ELEVATION RISE IS CONTAINED WITHIN THE RIGHT OF WAY AND DOES NOT AFFECT THE UPSTREAM WATER SURFACE ELEVATION OR ANY STRUCTURE UPSTREAM OF THE BRIDGE.
6. THE FOLLOWING MANNING ROUGHNESS COEFFICENT VALUES WERE USED FOR THE STREAM RIVER SECTIONS: 0.035 & 0.040

   LEFT & RIGHT OVERBANK AREAS : = BETWEEN 0.035 & 0.040
   CHANNEL LOCATION OUTSIDE OF PROPOSED ROCK RIPRAP APRON = BETWEEN 0.040
   CHANNEL LOCATION INCLUDING PROPOSED ROCK RIPRAP= 0.035
7. DESIGNATED FEMA ZONE A, MAP 48497C0200D, EFF. 12/16/2011.
8. DS WSE FOR 2 YR AND 100 YR ARE 802.25 AND 804.17 RESPECTIVELY.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER
6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK HYDRAULIC DATA SHEET

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		40

DATE: 6/6/2022 10:01:35 AM
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CR1: AECOM DW: AECOM CK1: AECOM DM: AECOM untitled

HEC-RAS CROSS SECTION SUMMARY - EXISTING VS PROPOSED

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
BIGSANDYCRK	2444.434	2 YEAR	EXIST	7581	800	803.01		803.11	0.001382	2.57	2991.14	1262.05	0.28
BIGSANDYCRK	2444.434	2 YEAR	PROP	7581	800	802.96		803.06	0.001481	2.63	2922.07	1255.5	0.29
BIGSANDYCRK	2444.434	5 YEAR	EXIST	12668	800	803.77		803.93	0.001658	3.25	3979.58	1352.3	0.32
BIGSANDYCRK	2444.434	5 YEAR	PROP	12668	800	803.71		803.88	0.001759	3.31	3900.3	1345.29	0.33
BIGSANDYCRK	2444.434	10 YEAR	EXIST	16686	800	804.31		804.51	0.001721	3.6	4738.53	1417.71	0.34
BIGSANDYCRK	2444.434	10 YEAR	PROP	16686	800	804.26		804.46	0.001807	3.66	4660.4	1411.12	0.34
BIGSANDYCRK	2444.434	25 YEAR	EXIST	22341	800	804.98		805.23	0.001781	4.01	5715.81	1513.97	0.35
BIGSANDYCRK	2444.434	25 YEAR	PROP	22341	800	804.94		805.19	0.001841	4.05	5655.97	1501.54	0.35
BIGSANDYCRK	2444.434	50 YEAR	EXIST	26873	800	805.45		805.73	0.001784	4.31	6418.3	1535.38	0.36
BIGSANDYCRK	2444.434	50 YEAR	PROP	26873	800	805.42		805.7	0.001818	4.33	6380.17	1534.29	0.36
BIGSANDYCRK	2444.434	100 YEAR	EXIST	31959	800	805.92		806.24	0.001791	4.61	7151.96	1556.24	0.36
BIGSANDYCRK	2444.434	100 YEAR	PROP	31959	800	805.91		806.23	0.001805	4.62	7134.2	1555.74	0.36
BIGSANDYCRK	2444.434	500 YEAR	EXIST	44151	800	806.93		807.34	0.001815	5.24	8739.25	1600.43	0.38
BIGSANDYCRK	2444.434	500 YEAR	PROP	44151	800	806.94		807.35	0.001804	5.23	8755.56	1600.87	0.38
BIGSANDYCRK	2068.993	2 YEAR	EXIST	7581	798.9	802.93	800.07	802.95	0.000167	1.1	6638.58	1810.66	0.1
BIGSANDYCRK	2068.993	2 YEAR	PROP	7581	798.9	802.87	800.06	802.89	0.000176	1.12	6529.88	1809.07	0.11
BIGSANDYCRK	2068.993	5 YEAR	EXIST	12668	798.9	803.66	800.49	803.7	0.000259	1.55	7958.01	1828.81	0.13
BIGSANDYCRK	2068.993	5 YEAR	PROP	12668	798.9	803.59	800.49	803.63	0.000272	1.58	7838.62	1827.38	0.14
BIGSANDYCRK	2068.993	10 YEAR	EXIST	16686	798.9	804.19	800.79	804.25	0.000307	1.83	8940.74	1840.53	0.15
BIGSANDYCRK	2068.993	10 YEAR	PROP	16686	798.9	804.13	800.78	804.19	0.00032	1.86	8827.77	1839.18	0.15
BIGSANDYCRK	2068.993	25 YEAR	EXIST	22341	798.9	804.85	801.14	804.93	0.000364	2.18	10154.87	1854.44	0.17
BIGSANDYCRK	2068.993	25 YEAR	PROP	22341	798.9	804.81	801.11	804.88	0.000373	2.19	10072.82	1853.87	0.17
BIGSANDYCRK	2068.993	50 YEAR	EXIST	26873	798.9	805.31	801.4	805.4	0.000405	2.42	10999.67	1860.61	0.18
BIGSANDYCRK	2068.993	50 YEAR	PROP	26873	798.9	805.28	801.37	805.37	0.000411	2.44	10948.35	1859.97	0.18
BIGSANDYCRK	2068.993	100 YEAR	EXIST	31959	798.9	805.78	801.67	805.89	0.000447	2.68	11876.89	1870.64	0.19
BIGSANDYCRK	2068.993	100 YEAR	PROP	31959	798.9	805.76	801.65	805.88	0.000449	2.69	11853.15	1870.44	0.19
BIGSANDYCRK	2068.993	500 YEAR	EXIST	44151	798.9	806.78	802.2	806.94	0.000528	3.22	13757.17	1886.25	0.21
BIGSANDYCRK	2068.993	500 YEAR	PROP	44151	798.9	806.79	802.25	806.95	0.000525	3.21	13778.36	1886.43	0.21
BIGSANDYCRK	1850.78	2 YEAR	EXIST	7581	798.52	802.91	799.83	802.92	0.000095	0.83	8292.04	2072.13	0.08
BIGSANDYCRK	1850.78	2 YEAR	PROP	7581	798.52	802.85	799.83	802.86	0.0001	0.84	8165.12	2070.18	0.08
BIGSANDYCRK	1850.78	5 YEAR	EXIST	12668	798.52	803.62	800.27	803.65	0.000156	1.2	9777.48	2093.42	0.1
BIGSANDYCRK	1850.78	5 YEAR	PROP	12668	798.52	803.56	800.26	803.58	0.000163	1.22	9637	2091.56	0.11
BIGSANDYCRK	1850.78	10 YEAR	EXIST	16686	798.52	804.15	800.55	804.19	0.000191	1.44	10892.78	2114.49	0.12
BIGSANDYCRK	1850.78	10 YEAR	PROP	16686	798.52	804.09	800.54	804.13	0.000199	1.46	10759.12	2113.11	0.12
BIGSANDYCRK	1850.78	25 YEAR	EXIST	22341	798.52	804.81	800.93	804.86	0.000232	1.74	12273.67	2128.68	0.13
BIGSANDYCRK	1850.78	25 YEAR	PROP	22341	798.52	804.76	800.91	804.81	0.000238	1.75	12176.38	2127.68	0.13
BIGSANDYCRK	1850.78	50 YEAR	EXIST	26873	798.52	805.26	801.19	805.32	0.000263	1.95	13234.86	2138.49	0.14
BIGSANDYCRK	1850.78	50 YEAR	PROP	26873	798.52	805.23	801.18	805.29	0.000267	1.96	13173.91	2137.87	0.14
BIGSANDYCRK	1850.78	100 YEAR	EXIST	31959	798.52	805.72	801.47	805.8	0.000294	2.17	14233.77	2148.65	0.15
BIGSANDYCRK	1850.78	100 YEAR	PROP	31959	798.52	805.71	801.44	805.79	0.000296	2.17	14205.7	2148.36	0.15
BIGSANDYCRK	1850.78	500 YEAR	EXIST	44151	798.52	806.72	802.09	806.83	0.000355	2.63	16379.38	2164.39	0.17
BIGSANDYCRK	1850.78	500 YEAR	PROP	44151	798.52	806.73	802.06	806.84	0.000353	2.62	16404.34	2164.56	0.17
BIGSANDYCRK	1622.953	2 YEAR	EXIST	7581	798.09	802.88	800.28	802.9	0.000156	1.18	7422.29	2049.39	0.1
BIGSANDYCRK	1622.953	2 YEAR	PROP	7581	798.09	802.82	800.27	802.84	0.000165	1.2	7293.94	2045.81	0.11
BIGSANDYCRK	1622.953	5 YEAR	EXIST	12668	798.09	803.58	800.71	803.61	0.000249	1.65	8860.3	2089.1	0.13
BIGSANDYCRK	1622.953	5 YEAR	PROP	12668	798.09	803.51	800.72	803.54	0.000262	1.68	8715.33	2085.12	0.14
BIGSANDYCRK	1622.953	10 YEAR	EXIST	16686	798.09	804.1	801.02	804.14	0.000299	1.94	9952.46	2117.99	0.15
BIGSANDYCRK	1622.953	10 YEAR	PROP	16686	798.09	804.03	801.01	804.08	0.000313	1.97	9813.39	2113.67	0.15
BIGSANDYCRK	1622.953	25 YEAR	EXIST	22341	798.09	804.74	801.41	804.8	0.000358	2.29	11317.86	2156.88	0.17
BIGSANDYCRK	1622.953	25 YEAR	PROP	22341	798.09	804.69	801.41	804.75	0.000368	2.31	11215.23	2154.25	0.17
BIGSANDYCRK	1622.953	50 YEAR	EXIST	26873	798.09	805.18	801.7	805.25	0.000401	2.54	12275.3	2181.27	0.18
BIGSANDYCRK	1622.953	50 YEAR	PROP	26873	798.09	805.15	801.7	805.22	0.000407	2.56	12210.36	2179.62	0.18
BIGSANDYCRK	1622.953	100 YEAR	EXIST	31959	798.09	805.63	802	805.73	0.000445	2.81	13281.75	2248.36	0.19
BIGSANDYCRK	1622.953	100 YEAR	PROP	31959	798.09	805.62	802	805.71	0.000449	2.82	13250.88	2247.83	0.19
BIGSANDYCRK	1622.953	500 YEAR	EXIST	44151	798.09	806.61	802.2	806.74	0.000537	3.37	15489.57	2270.88	0.21
BIGSANDYCRK	1622.953	500 YEAR	PROP	44151	798.09	806.62	802.4	806.75	0.000534	3.37	15517.3	2271.09	0.21
BIGSANDYCRK	1540.594	2 YEAR	EXIST	7581	798.09	802.82	800.77	802.87	0.000666	2.17	4142.58	1470.26	0.2
BIGSANDYCRK	1540.594	2 YEAR	PROP	7581	795.37	802.75	800.87	802.81	0.00056	2.85	4280.06	1469.6	0.2
BIGSANDYCRK	1540.594	5 YEAR	EXIST	12668	798.09	803.47	801.21	803.57	0.000961	2.92	5101.05	1476.82	0.25
BIGSANDYCRK	1540.594	5 YEAR	PROP	12668	795.37	803.4	801.34	803.5	0.000845	3.74	5227.46	1476.09	0.25
BIGSANDYCRK	1540.594	10 YEAR	EXIST	16686	798.09	803.96	801.51	804.09	0.001088	3.35	5827.06	1481.77	0.27
BIGSANDYCRK	1540.594	10 YEAR	PROP	16686	795.37	803.89	801.63	804.03	0.000971	4.21	5959.99	1481.09	0.28
BIGSANDYCRK	1540.594	25 YEAR	EXIST	22341	798.09	804.56	801.88	804.74	0.001233	3.86	6718.45	1487.83	0.3
BIGSANDYCRK	1540.594	25 YEAR	PROP	22341	795.37	804.51	801.99	804.69	0.001104	4.74	6882.19	1487.36	0.3
BIGSANDYCRK	1540.594	50 YEAR	EXIST	26873	798.09	804.97	802.15	805.18	0.001346	4.24	7329.38	1492.34	0.31
BIGSANDYCRK	1540.594	50 YEAR	PROP	26873	795.37	804.94	802.25	805.16	0.001202	5.12	7523.69	1491.95	0.31
BIGSANDYCRK	1540.594	100 YEAR	EXIST	31959	798.09	805.39	802.45	805.65	0.001458	4.63	7960.44	1498.48	0.33
BIGSANDYCRK	1540.594	100 YEAR	PROP	31959	795.37	805.39	802.52	805.64	0.0013	5.51	8183.11	1498.38	0.33
BIGSANDYCRK	1540.594	500 YEAR	EXIST	44151	798.09	806.29	803.05	806.64	0.001678	5.44	9307.63	1511.53	0.36
BIGSANDYCRK	1540.594	500 YEAR	PROP	44151	795.37	806.31	803.1	806.66	0.001498	6.33	9578.93	1511.89	0.36
BIGSANDYCRK	1524.785	2 YEAR	EXIST	7581	798.11	802.74	801.28	802.84	0.001651	3.3	3025.1	1272.4	0.31
BIGSANDYCRK	1524.785	2 YEAR	PROP	7581	795.37	802.67	801.38	802.77	0.0012	4.06	3237.65	1299.61	0.3
BIGSANDYCRK	1524.785	5 YEAR	EXIST	12668	798.11	803.35	801.76	803.52	0.002323	4.21	3820.66	1359.57	0.38
BIGSANDYCRK	1524.785	5 YEAR	PROP	12668	795.37	803.27	801.9	803.45	0.001813	5.22	4038.43	1377.08	0.37
BIGSANDYCRK	1524.785	10 YEAR	EXIST	16686	798.11	803.82	802.09	804.05	0.002521	4.7	4520.57	1514.81	0.4
BIGSANDYCRK	1524.785	10 YEAR	PROP	16686	795.37	803.75	802.23	803.98	0.002004	5.74	4741.12	1511.12	0.39
BIGSANDYCRK	1524.785	25 YEAR	EXIST	22341	798.11	804.41	802.5	804.68	0.002587	5.19	5415.64	1543.25	0.42
BIGSANDYCRK	1524.785	25 YEAR	PROP	22341	795.37	804.36	802.62	804.64	0.002092	6.21	5676.83	1541.17	0.4
BIGSANDYCRK	1524.785	50 YEAR	EXIST	26873	798.11	804.81	802.8	805.12	0.002671	5.56	6033.81	1561.12	0.43
BIGSANDYCRK	1524.785	50 YEAR	PROP	26873	795.37	804.79	802.9	805.1	0.002167	6.57	6334.14	1560.19	0.42
BIGSANDYCRK	1524.785	100 YEAR	EXIST	31959	798.11	805.22	803.11	805.58	0.002748	5.93	6680.3	1579.59	0.44
BIGSANDYCRK	1524.785	100 YEAR	PROP	31959	795.37	805.22	803.19	805.58	0.002239	6.92	7017.36	1579.72	0.43
BIGSANDYCRK	1524.785	500 YEAR	EXIST	44151	798.11	806.1	803.82	806.57	0.00287	6.67	8078.05	1604.26	0.46
BIGSANDYCRK	1524.785	500 YEAR	PROP	44151	795.37	806.14	803.86	806.6	0.002367	7.64	8480.12	1605.45	0.45

NOTES:

1. REFER TO HYDRAULIC DATA SHEET 1 OF 6 FOR CALCULATION NOTES.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK
HYDRAULIC DATA
SHEET

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		41

DATE: 6/6/2022 10:01:36 AM
FILE: L:\DCS\Projects\2198-TRANS\TxDOT\31-431P5080\NRB2014\60485815-Wise_Jack_Brdgs\03-DSGN\0302-CAD\CR 1590\SHEETS\CR1590-DA_03.dgn

CR1: AECOM | DM: AECOM | CK1: AECOM | DM2: AECOM | CK2: AECOM | untitled

HEC-RAS CROSS SECTION SUMMARY - EXISTING VS PROPOSED

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
BIGSANDYCRK	1509.77			Mult Open									
BIGSANDYCRK	1451.187	2 YEAR	EXIST	7581	797.83	802.49	801.26	802.6	0.002122	2.73	2880.62	1387.79	0.33
BIGSANDYCRK	1451.187	2 YEAR	PROP	7581	795.37	802.47	801.4	802.6	0.00151	4.51	3044.95	1396.82	0.33
BIGSANDYCRK	1451.187	5 YEAR	EXIST	12668	797.83	802.98	801.72	803.18	0.003057	3.78	3583.29	1444.95	0.41
BIGSANDYCRK	1451.187	5 YEAR	PROP	12668	795.37	802.95	801.9	803.18	0.00238	5.97	3730.37	1445.75	0.42
BIGSANDYCRK	1451.187	10 YEAR	EXIST	16686	797.83	803.43	802.03	803.68	0.003191	4.3	4244.17	1493.85	0.44
BIGSANDYCRK	1451.187	10 YEAR	PROP	16686	795.37	803.41	802.21	803.68	0.002583	6.52	4392.79	1490.67	0.44
BIGSANDYCRK	1451.187	25 YEAR	EXIST	22341	797.83	803.99	802.42	804.29	0.003259	4.86	5085.54	1539.08	0.45
BIGSANDYCRK	1451.187	25 YEAR	PROP	22341	795.37	803.96	802.61	804.29	0.002753	7.1	5237.4	1538	0.46
BIGSANDYCRK	1451.187	50 YEAR	EXIST	26873	797.83	804.39	802.69	804.73	0.003278	5.23	5699.84	1555.35	0.46
BIGSANDYCRK	1451.187	50 YEAR	PROP	26873	795.37	804.36	802.88	804.74	0.002831	7.46	5854.4	1554.35	0.47
BIGSANDYCRK	1451.187	100 YEAR	EXIST	31959	797.83	804.79	802.98	805.19	0.003304	5.6	6338.68	1571.59	0.47
BIGSANDYCRK	1451.187	100 YEAR	PROP	31959	795.37	804.77	803.17	805.19	0.002905	7.82	6496.3	1570.75	0.49
BIGSANDYCRK	1451.187	500 YEAR	EXIST	44151	797.83	805.67	803.61	806.18	0.003343	6.36	7723.59	1600.82	0.49
BIGSANDYCRK	1451.187	500 YEAR	PROP	44151	795.37	805.65	803.8	806.18	0.003022	8.55	7888.66	1600.17	0.5
BIGSANDYCRK	1440.21	2 YEAR	EXIST	7581	797.8	802.49	800.85	802.56	0.001227	2.27	3445.15	1345.91	0.26
BIGSANDYCRK	1440.21	2 YEAR	PROP	7581	795.37	802.48	801.03	802.57	0.000934	3.55	3620.38	1345.71	0.26
BIGSANDYCRK	1440.21	5 YEAR	EXIST	12668	797.8	802.98	801.28	803.13	0.001914	3.21	4115.21	1366.12	0.34
BIGSANDYCRK	1440.21	5 YEAR	PROP	12668	795.37	802.97	801.5	803.13	0.001556	4.84	4276.25	1365.49	0.34
BIGSANDYCRK	1440.21	10 YEAR	EXIST	16686	797.8	803.43	801.57	803.62	0.002108	3.72	4729.75	1379.81	0.36
BIGSANDYCRK	1440.21	10 YEAR	PROP	16686	795.37	803.42	801.78	803.62	0.001772	5.41	4892.44	1379.39	0.37
BIGSANDYCRK	1440.21	25 YEAR	EXIST	22341	797.8	803.98	801.94	804.24	0.002324	4.33	5493.07	1397.54	0.39
BIGSANDYCRK	1440.21	25 YEAR	PROP	22341	795.37	803.97	802.13	804.23	0.00201	6.07	5657.65	1397.01	0.4
BIGSANDYCRK	1440.21	50 YEAR	EXIST	26873	797.8	804.37	802.24	804.68	0.002465	4.76	6045.79	1412.98	0.41
BIGSANDYCRK	1440.21	50 YEAR	PROP	26873	795.37	804.36	802.39	804.68	0.002165	6.52	6211.25	1409.42	0.42
BIGSANDYCRK	1440.21	100 YEAR	EXIST	31959	797.8	804.78	802.52	805.14	0.0026	5.19	6621.12	1428.81	0.43
BIGSANDYCRK	1440.21	100 YEAR	PROP	31959	795.37	804.77	802.67	805.14	0.002313	6.98	6785.98	1421.76	0.43
BIGSANDYCRK	1440.21	500 YEAR	EXIST	44151	797.8	805.64	803.16	806.14	0.002848	6.09	7869.49	1455.6	0.46
BIGSANDYCRK	1440.21	500 YEAR	PROP	44151	795.37	805.63	803.29	806.13	0.00259	7.9	8029.94	1447.89	0.47
BIGSANDYCRK	1367.027	2 YEAR	EXIST	7581	797.59	802.43	801.27	802.48	0.000817	2.04	4519.33	1940.72	0.22
BIGSANDYCRK	1367.027	2 YEAR	PROP	7581	797.59	802.44	801.27	802.48	0.000808	2.04	4533.91	1941.44	0.22
BIGSANDYCRK	1367.027	5 YEAR	EXIST	12668	797.59	802.9	801.72	802.99	0.001259	2.82	5443.66	1985.57	0.28
BIGSANDYCRK	1367.027	5 YEAR	PROP	12668	797.59	802.9	801.72	802.99	0.001259	2.82	5443.66	1985.57	0.28
BIGSANDYCRK	1367.027	10 YEAR	EXIST	16686	797.59	803.35	802	803.46	0.001343	3.19	6346.69	2027.74	0.29
BIGSANDYCRK	1367.027	10 YEAR	PROP	16686	797.59	803.35	802	803.46	0.001343	3.19	6346.69	2027.74	0.29
BIGSANDYCRK	1367.027	25 YEAR	EXIST	22341	797.59	803.91	802	804.05	0.001432	3.62	7497.04	2100.23	0.31
BIGSANDYCRK	1367.027	25 YEAR	PROP	22341	797.59	803.91	802	804.05	0.001432	3.62	7497.04	2100.23	0.31
BIGSANDYCRK	1367.027	50 YEAR	EXIST	26873	797.59	804.31	802.01	804.47	0.001486	3.92	8347.14	2142.22	0.32
BIGSANDYCRK	1367.027	50 YEAR	PROP	26873	797.59	804.31	802.01	804.47	0.001486	3.92	8347.14	2142.22	0.32
BIGSANDYCRK	1367.027	100 YEAR	EXIST	31959	797.59	804.73	802.12	804.91	0.001535	4.22	9244.27	2182.77	0.33
BIGSANDYCRK	1367.027	100 YEAR	PROP	31959	797.59	804.73	802.12	804.91	0.001535	4.22	9244.27	2182.77	0.33
BIGSANDYCRK	1367.027	500 YEAR	EXIST	44151	797.59	805.62	802.64	805.86	0.001628	4.84	11218.71	2233.49	0.35
BIGSANDYCRK	1367.027	500 YEAR	PROP	44151	797.59	805.62	802.64	805.86	0.001628	4.84	11218.71	2233.49	0.35
BIGSANDYCRK	1171.427	2 YEAR	EXIST	7581	796.82	801.98	801.18	802.16	0.003777	4.82	2252.21	1961.61	0.48
BIGSANDYCRK	1171.427	2 YEAR	PROP	7581	796.82	801.98	801.18	802.17	0.003888	4.9	2217.77	1961.61	0.49
BIGSANDYCRK	1171.427	5 YEAR	EXIST	12668	796.82	802.63	801.63	802.73	0.001425	3.36	5258.39	2002.32	0.3
BIGSANDYCRK	1171.427	5 YEAR	PROP	12668	796.82	802.63	801.64	802.73	0.001425	3.36	5258.39	2002.32	0.3
BIGSANDYCRK	1171.427	10 YEAR	EXIST	16686	796.82	803.07	801.91	803.18	0.001501	3.71	6128.92	2021.6	0.32
BIGSANDYCRK	1171.427	10 YEAR	PROP	16686	796.82	803.07	801.94	803.18	0.001501	3.71	6128.92	2021.6	0.32
BIGSANDYCRK	1171.427	25 YEAR	EXIST	22341	796.82	803.6	802	803.75	0.001578	4.12	7222.19	2045.18	0.33
BIGSANDYCRK	1171.427	25 YEAR	PROP	22341	796.82	803.6	802	803.75	0.001578	4.12	7222.19	2045.18	0.33
BIGSANDYCRK	1171.427	50 YEAR	EXIST	26873	796.82	803.99	802.01	804.17	0.001626	4.41	8019.02	2062.16	0.34
BIGSANDYCRK	1171.427	50 YEAR	PROP	26873	796.82	803.99	802.01	804.17	0.001626	4.41	8019.02	2062.16	0.34
BIGSANDYCRK	1171.427	100 YEAR	EXIST	31959	796.82	804.39	802.03	804.6	0.001671	4.7	8851.23	2079.69	0.35
BIGSANDYCRK	1171.427	100 YEAR	PROP	31959	796.82	804.39	802.03	804.6	0.001671	4.7	8851.23	2079.69	0.35
BIGSANDYCRK	1171.427	500 YEAR	EXIST	44151	796.82	805.26	802.52	805.53	0.001747	5.29	10668.53	2117.43	0.37
BIGSANDYCRK	1171.427	500 YEAR	PROP	44151	796.82	805.26	802.52	805.53	0.001747	5.29	10668.53	2117.43	0.37
BIGSANDYCRK	1002.571	2 YEAR	EXIST	7581	796.78	801.64	800.88	801.74	0.002561	4.4	3122.5	1868.79	0.4
BIGSANDYCRK	1002.571	2 YEAR	PROP	7581	796.78	801.64	800.88	801.74	0.002561	4.4	3122.5	1868.79	0.4
BIGSANDYCRK	1002.571	5 YEAR	EXIST	12668	796.78	802.26	801.2	802.4	0.002561	4.88	4303.66	1916.16	0.41
BIGSANDYCRK	1002.571	5 YEAR	PROP	12668	796.78	802.26	801.2	802.4	0.002561	4.88	4303.66	1916.16	0.41
BIGSANDYCRK	1002.571	10 YEAR	EXIST	16686	796.78	802.68	801.42	802.85	0.002563	5.19	5109.98	1946.44	0.42
BIGSANDYCRK	1002.571	10 YEAR	PROP	16686	796.78	802.68	801.42	802.85	0.002563	5.19	5109.98	1946.44	0.42
BIGSANDYCRK	1002.571	25 YEAR	EXIST	22341	796.78	803.2	801.72	803.41	0.002561	5.57	6135.34	1983.71	0.43
BIGSANDYCRK	1002.571	25 YEAR	PROP	22341	796.78	803.2	801.72	803.41	0.002561	5.57	6135.34	1983.71	0.43
BIGSANDYCRK	1002.571	50 YEAR	EXIST	26873	796.78	803.58	801.91	803.82	0.002561	5.83	6889.9	2010.69	0.43
BIGSANDYCRK	1002.571	50 YEAR	PROP	26873	796.78	803.58	801.91	803.82	0.002561	5.83	6889.9	2010.69	0.43
BIGSANDYCRK	1002.571	100 YEAR	EXIST	31959	796.78	803.97	802.13	804.25	0.002561	6.1	7684.06	2039.03	0.44
BIGSANDYCRK	1002.571	100 YEAR	PROP	31959	796.78	803.97	802.14	804.25	0.002561	6.1	7684.06	2039.03	0.44
BIGSANDYCRK	1002.571	500 YEAR	EXIST	44151	796.78	804.82	802.63	805.17	0.002561	6.65	9451.93	2135.44	0.45
BIGSANDYCRK	1002.571	500 YEAR	PROP	44151	796.78	804.82	802.63	805.17	0.002561	6.65	9451.93	2135.44	0.45

NOTES:

1. REFER TO HYDRAULIC DATA SHEET 1 OF 6 FOR CALCULATION NOTES.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK
HYDRAULIC DATA SHEET

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		42

BRIDGE HYDRAULIC SUMMARY - 2 YR EXISTING

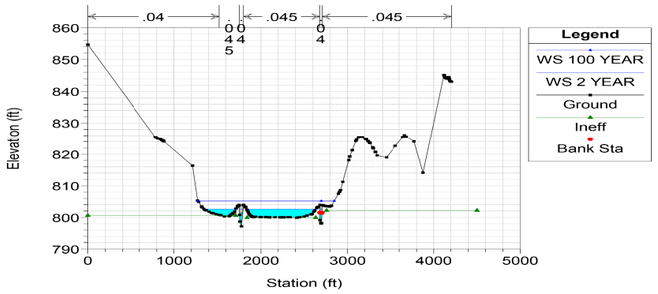
PLAN: EXIST	159	BIGSANDYCRK	RS: 1509.77	OPEN#4:	BRIDGE	PROFILE: 2 YEAR
E.G. US. (FT)	802.83	ELEMENT		Inside BR US		Inside BR DS
W.S. US. (FT)	802.75	E.G. ELEV (FT)		802.79		802.68
Q TOTAL (CFS)	231.18	W.S. ELEV (FT)		802.6		802.54
Q BRIDGE (CFS)	231.18	CRIT W.S. (FT)		800.06		799.64
Q WEIR (CFS)		MAX CHL DPTH (FT)		4.52		4.51
WEIR STA LFT (FT)		VEL TOTAL (FT/S)		3.47		2.96
WEIR STA RGT (FT)		FLOW AREA (SQ FT)		66.68		78.16
WEIR SUBMERG		FROUDE # CHL		0.29		0.25
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)		197.23		233.52
MIN EL WEIR FLOW (FT)	803.96	HYDR DEPTH (FT)				
MIN EL PRS (FT)	801.49	W.P. TOTAL (FT)		52.14		54.51
DELTA EG (FT)	0.24	CONV. TOTAL (CFS)		2918.7		3691.9
DELTA WS (FT)	0.23	TOP WIDTH (FT)				
BR OPEN AREA (SQ FT)	66.68	FRCTN LOSS (FT)		0.09		0.05
BR OPEN VEL (FT/S)	3.47	C & E LOSS (FT)		0.03		0.03
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)		0.5		0.35
BR SEL METHOD	ENERGY ONLY	POWER TOTAL (LB/FT S)		1.74		1.04

BRIDGE HYDRAULIC SUMMARY - 100 YR EXISTING

PLAN: EXIST	159	BIGSANDYCRK	RS: 1509.77	OPEN#4:	BRIDGE	PROFILE: 100 YEAR
E.G. US. (FT)	805.61	ELEMENT		INSIDE BR US		INSIDE BR DS
W.S. US. (FT)	805.5	E.G. ELEV (FT)		805.36		805.18
Q TOTAL (CFS)	450.46	W.S. ELEV (FT)		805.21		805.05
Q BRIDGE (CFS)	308.68	CRIT W.S. (FT)		800.94		800.43
Q WEIR (CFS)		MAX CHL DPTH (FT)		7.13		7.02
WEIR STA LFT (FT)		VEL TOTAL (FT/S)		3.16		2.95
WEIR STA RGT (FT)		FLOW AREA (SQ FT)		97.61		104.69
WEIR SUBMERG		FROUDE # CHL		0.21		0.2
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)		395.72		450.82
MIN EL WEIR FLOW (FT)	803.96	HYDR DEPTH (FT)		3.98		4.27
MIN EL PRS (FT)	801.49	W.P. TOTAL (FT)		79.19		81.17
DELTA EG (FT)	0.42	CONV. TOTAL (CFS)		4259.2		4691.6
DELTA WS (FT)	0.42	TOP WIDTH (FT)		24.53		24.49
BR OPEN AREA (SQ FT)	66.68	FRCTN LOSS (FT)		0.18		0.05
BR OPEN VEL (FT/S)	4.63	C & E LOSS (FT)		0.02		0.09
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)		0.86		0.74
BR SEL METHOD	ENERGY ONLY	POWER TOTAL (LB/FT S)		2.72		2.19

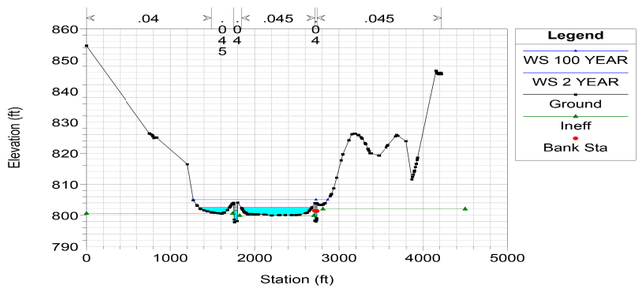
BRIDGE SECTION - EXISTING UPSTREAM

CR1590@BigSandyCrk Plan: EXISTING MODEL 10/9/2020



BRIDGE SECTION - EXISTING DOWNSTREAM

CR1590@BigSandyCrk Plan: EXISTING MODEL 10/9/2020



BRIDGE HYDRAULIC SUMMARY - 2 YR PROPOSED

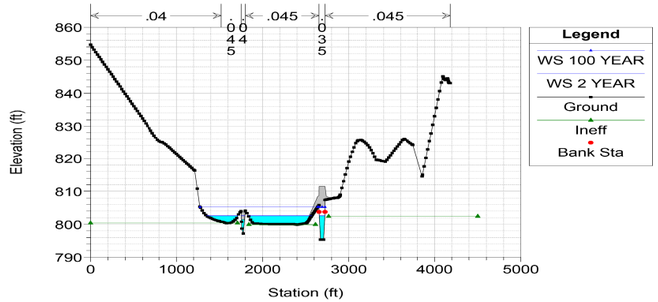
PLAN: PROP	159	BIGSANDYCRK	RS: 1509.77	OPEN#4:	BRIDGE	PROFILE: 2 YEAR
E.G. US. (FT)	802.76	ELEMENT		INSIDE BR US		INSIDE BR DS
W.S. US. (FT)	802.5	E.G. ELEV (FT)		802.67		802.63
Q TOTAL (CFS)	1703.4	W.S. ELEV (FT)		802.3		802.25
Q BRIDGE (CFS)	1703.4	CRIT W.S. (FT)		799.16		799.16
Q WEIR (CFS)		MAX CHL DPTH (FT)		6.93		6.88
WEIR STA LFT (FT)		VEL TOTAL (FT/S)		4.89		4.93
WEIR STA RGT (FT)		FLOW AREA (SQ FT)		348.7		345.74
WEIR SUBMERG		FROUDE # CHL		0.37		0.37
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)		1355.78		1341.94
MIN EL WEIR FLOW (FT)	811.48	HYDR DEPTH (FT)		5.43		5.4
MIN EL PRS (FT)	805.14	W.P. TOTAL (FT)		67.46		67.25
DELTA EG (FT)	0.16	CONV. TOTAL (CFS)		44259		43723.1
DELTA WS (FT)	0.24	TOP WIDTH (FT)		64.18		64
BR OPEN AREA (SQ FT)	543.37	FRCTN LOSS (FT)		0.04		0.01
BR OPEN VEL (FT/S)	4.93	C & E LOSS (FT)		0		0.02
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)		0.48		0.49
BR SEL METHOD	ENERGY ONLY	POWER TOTAL (LB/FT S)		2.34		2.4

BRIDGE HYDRAULIC SUMMARY - 100 YR PROPOSED

PLAN: PROP	159	BIGSANDYCRK	RS: 1509.77	OPEN#4:	BRIDGE	PROFILE: 100 YEAR
E.G. US. (FT)	805.54	ELEMENT		INSIDE BR US		INSIDE BR DS
W.S. US. (FT)	804.83	E.G. ELEV (FT)		805.34		805.25
Q TOTAL (CFS)	3957.6	W.S. ELEV (FT)		804.31		804.17
Q BRIDGE (CFS)	3957.6	CRIT W.S. (FT)		801.71		801.7
Q WEIR (CFS)		MAX CHL DPTH (FT)		8.94		8.8
WEIR STA LFT (FT)		VEL TOTAL (FT/S)		8.16		8.32
WEIR STA RGT (FT)		FLOW AREA (SQ FT)		485.01		475.46
WEIR SUBMERG		FROUDE # CHL		0.55		0.56
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)		2935.61		2890.22
MIN EL WEIR FLOW (FT)	811.48	HYDR DEPTH (FT)		6.93		6.79
MIN EL PRS (FT)	805.14	W.P. TOTAL (FT)		75.07		74.79
DELTA EG (FT)	0.35	CONV. TOTAL (CFS)		71786.2		69270
DELTA WS (FT)	0.64	TOP WIDTH (FT)		70		70
BR OPEN AREA (SQ FT)	543.37	FRCTN LOSS (FT)		0.08		0.02
BR OPEN VEL (FT/S)	8.32	C & E LOSS (FT)		0.01		0.03
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)		1.23		1.3
BR SEL METHOD	ENERGY ONLY	POWER TOTAL (LB/FT S)		10		10.78

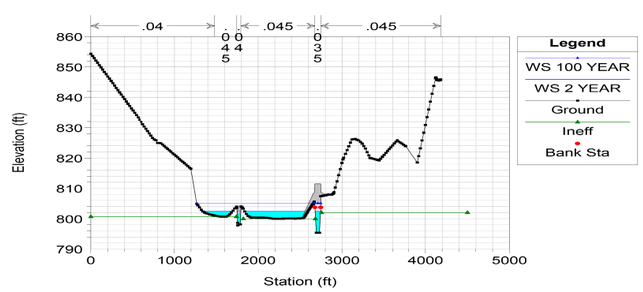
BRIDGE SECTION - PROPOSED UPSTREAM

CR1590@BigSandyCrk Plan: PROPOSED 1/18/2021



BRIDGE SECTION - PROPOSED DOWNSTREAM

CR1590@BigSandyCrk Plan: PROPOSED 1/18/2021



NOTES:

1. REFER TO HYDRAULIC DATA SHEET 1 OF 6 FOR CALCULATION NOTES.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK HYDRAULIC DATA SHEET

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		43

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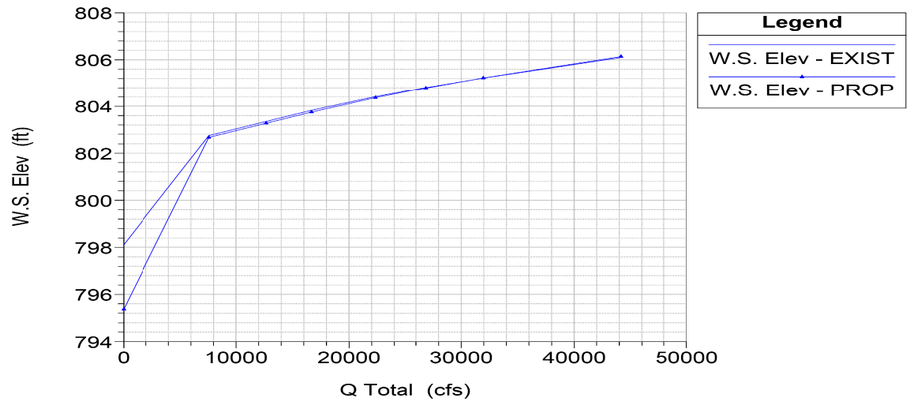
RATING CURVE - EXISTING VS PROPOSED

CR1590@BigSandyCrk Plan: 1) EXIST 10/9/2020 2) PROP 1/18/2021

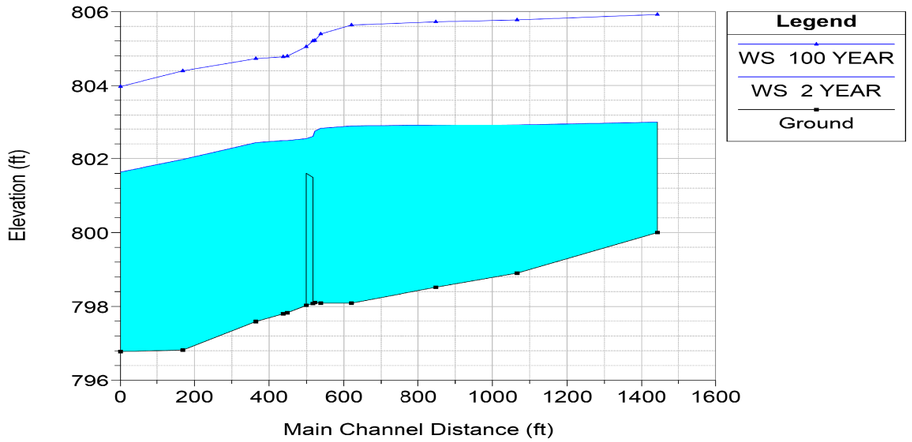


NOTES:

1. REFER TO HYDRAULIC DATA SHEET 1 OF 6 FOR CALCULATION NOTES.

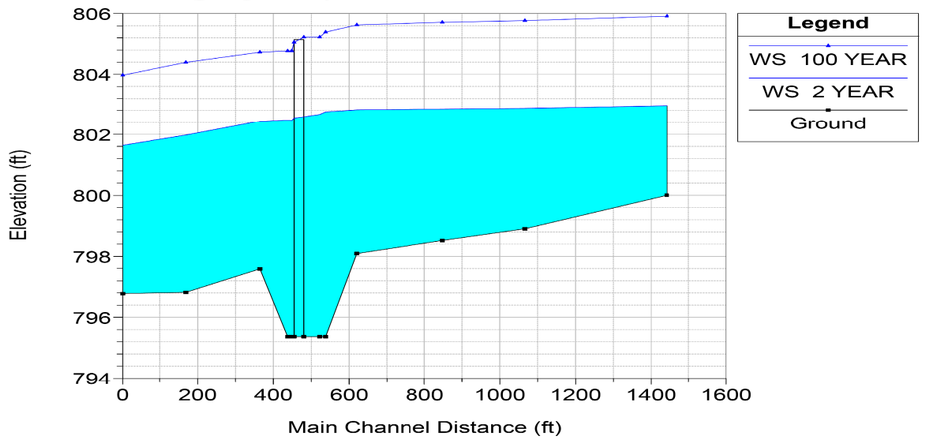
WATER SURFACE PROFILES - EXISTING

CR1590@BigSandyCrk Plan: EXISTING MODEL 10/9/2020



WATER SURFACE PROFILES - PROPOSED

CR1590@BigSandyCrk Plan: PROPOSED 1/18/2021



STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590 AT BIG SANDY CREEK HYDRAULIC DATA SHEET

SHEET 6 OF 6

Texas Department of Transportation

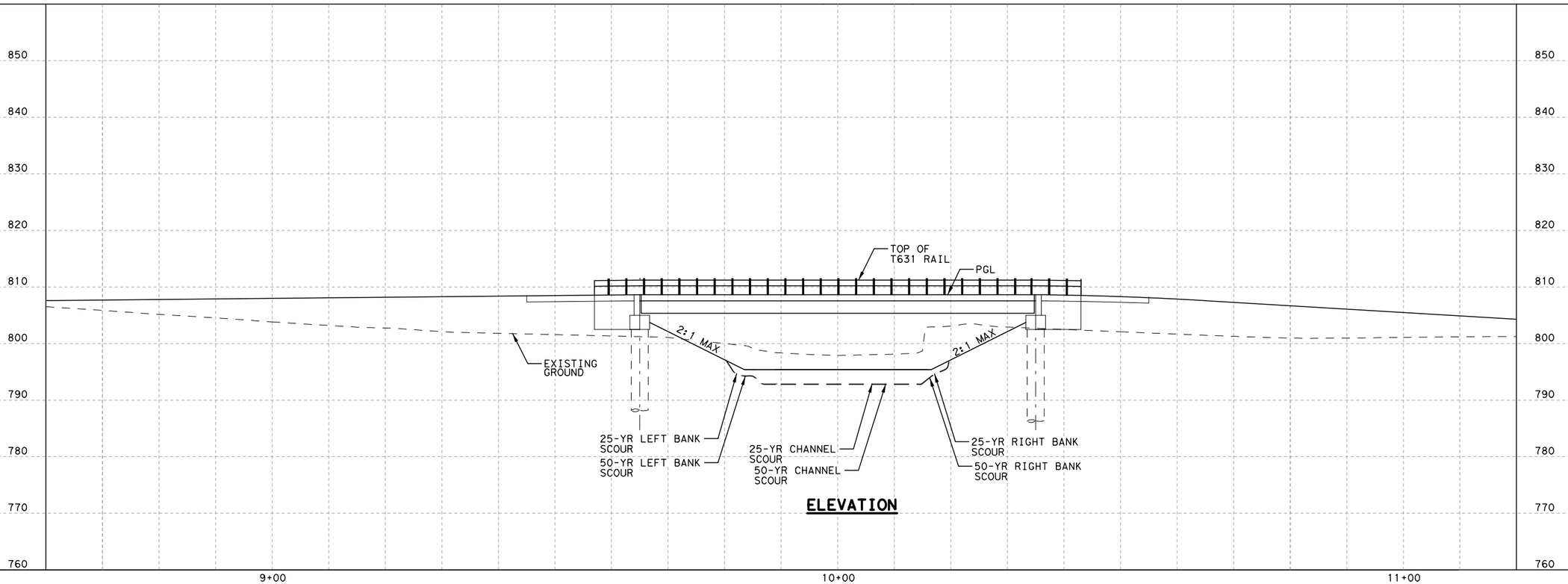
CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		44

HYDRAULIC DESIGN DATA - 25 YR				
CONTRACTION SCOUR		LEFT	CHANNEL	RIGHT
INPUT DATA	AVERAGE DEPTH - CONTRACTED SECTION (FT)	4.90	8.99	4.81
	AVERAGE DEPTH - APPROACH SECTION (FT)	5.88	9.14	5.98
	AVERAGE DEPTH (FT):	5.39	9.06	5.39
	VELOCITY - CONTRACTED SECTION (FPS)	4.11	6.79	4.06
	VELOCITY - APPROACH SECTION (FPS)	3.52	5.14	3.57
	VELOCITY - AVERAGE (FT/S):	3.82	5.96	3.82
	BR OPENING FLOW (CFS):	352.55	2835.11	343.07
	BR TOP WIDTH (FT):	15.50	46.48	15.50
	GRAIN SIZE D50 (MM):	0.20	0.20	0.20
RESULTS	APPROACH FLOW (CFS):	317.94	2010.73	326.36
	APPROACH TOP WD (FT):	14.26	42.79	14.26
	K1 COEFFICIENT:	0.69	0.69	0.69
	SCOUR DEPTH YS (FT):	1.17	2.60	1.08
	CRITICAL VELOCITY (FT/S):	1.30	1.40	1.31
	EQUATION:	LIVE BED	LIVE BED	LIVE BED

HYDRAULIC DESIGN DATA - 50 YR				
CONTRACTION SCOUR		LEFT	CHANNEL	RIGHT
INPUT DATA	AVERAGE DEPTH - CONTRACTED SECTION (FT)	5.32	9.42	5.23
	AVERAGE DEPTH - APPROACH SECTION (FT)	6.31	9.57	6.41
	AVERAGE DEPTH (FT):	5.82	9.49	5.82
	VELOCITY - CONTRACTED SECTION (FPS)	4.48	7.17	4.42
	VELOCITY - APPROACH SECTION (FPS)	3.88	5.55	3.92
	VELOCITY - AVERAGE (FT/S):	4.18	6.36	4.17
	BR OPENING FLOW (CFS):	409.03	3138.68	398.71
	BR TOP WIDTH (FT):	15.50	46.48	15.50
	GRAIN SIZE D50 (MM):	0.20	0.20	0.20
RESULTS	APPROACH FLOW (CFS):	371.94	2275.06	381.23
	APPROACH TOP WD (FT):	14.26	42.79	14.26
	K1 COEFFICIENT:	0.69	0.69	0.69
	SCOUR DEPTH YS (FT):	1.14	2.49	0.97
	CRITICAL VELOCITY (FT/S):	1.32	1.41	1.32
	EQUATION:	LIVE BED	LIVE BED	LIVE BED

NOTES:

1. HYDRAULIC TOOLBOX VERSION 4.4 UTILIZED FOR SCOUR ANALYSIS.
2. 25-YR STORM EVENT UTILIZED AS SCOUR DESIGN FLOOD FREQUENCY AND 50-YR UTILIZED AS SCOUR CHECK FLOOD FREQUENCY, BASED ON TXDOT GEOTECHNICAL MANUAL (JULY 2020).



ELEVATION

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

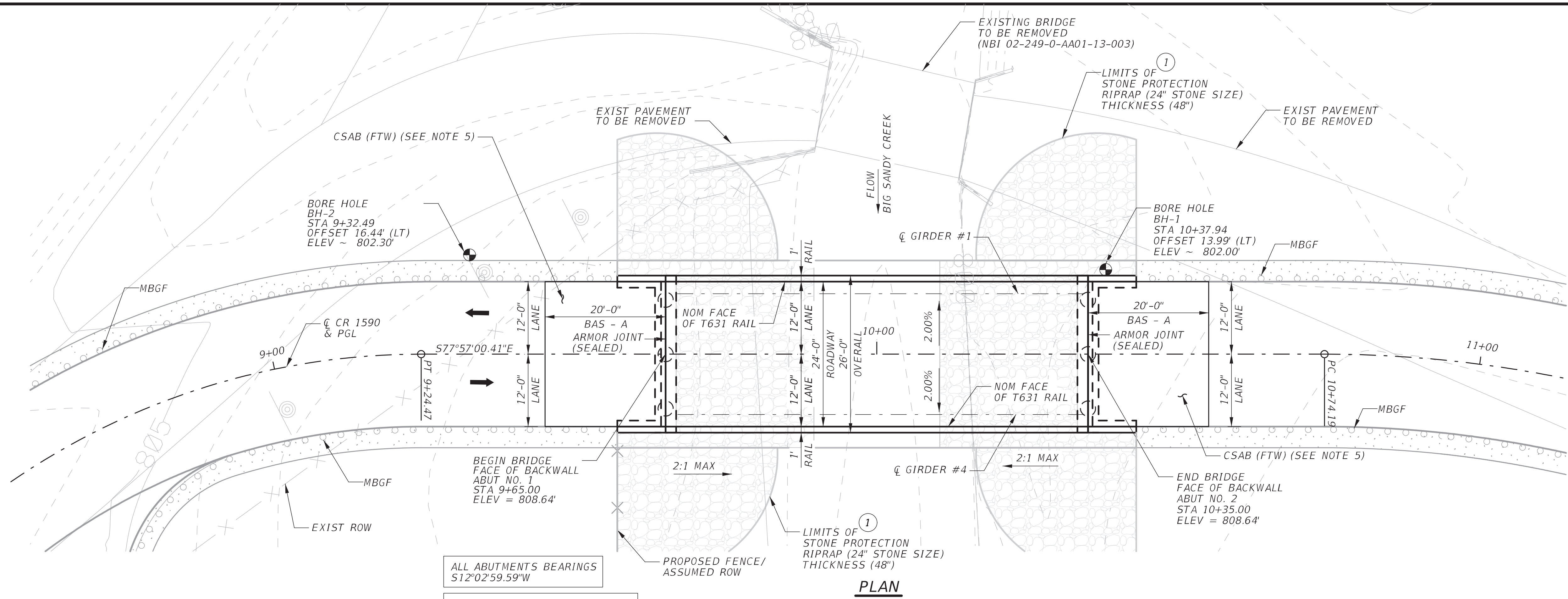
CR 1590 AT BIG SANDY CREEK

SCOUR DATA SHEET

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		45

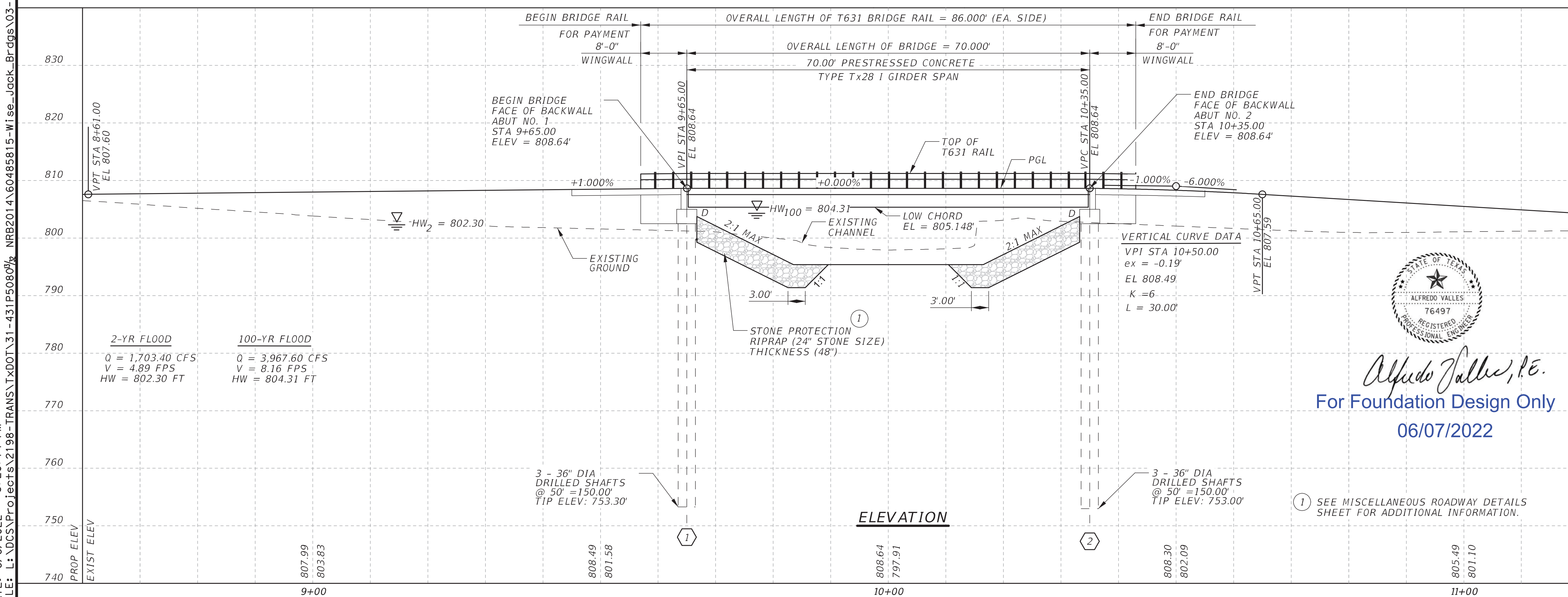


PLAN

NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION, 2017.
2. "D" DENOTES DOWELED GIRDER ENDS AT EXTERIOR GIRDERS.
3. (symbol) DENOTES SOIL BORING LOCATION. SEE BORING LOGS SHEET 1 TO 4 FOR ADDITIONAL GEOTECHNICAL INFORMATION
4. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDERING MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
5. SEE CSAB (FTW)STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL DETAIL.

NBI NO.: 02-249-0-AA01-13-003 (EXIST)
NBI NO.: 02-249-0-AA01-13-007 (PROP)
DESIGN SPEED: 15 MPH
FUNCTIONAL CLASS: LOCAL ROAD
EXIST ADT: 136 (2019)
PROP ADT: 190 (2039)



ELEVATION

(1) SEE MISCELLANEOUS ROADWAY DETAILS SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS — ALFREDO VALLES — 76497 — REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E.

For Foundation Design Only
06/07/2022

STATE OF TEXAS — SEAN K. YOUNG — 96504 — LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

BRIDGE LAYOUT

CR 1590 AT BIG SANDY CREEK

HL93 LOADING — SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST		COUNTY	SHEET NO.
FTW		WISE	46

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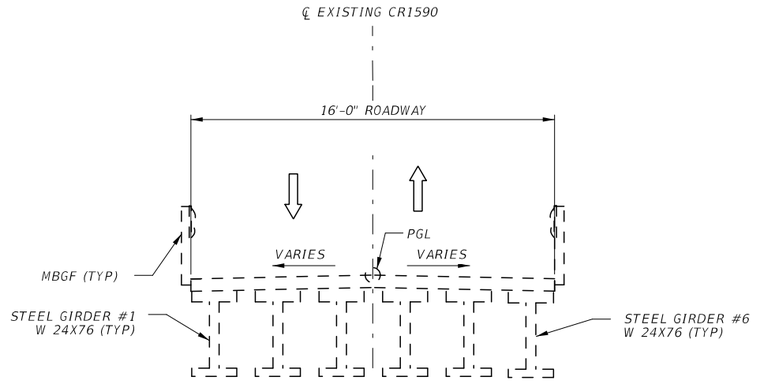

EXISTING TYPICAL TRANSVERSE SECTION

NOT TO SCALE

EXISTING STRUCTURE TO BE REMOVED
NO. OF SPAN =1
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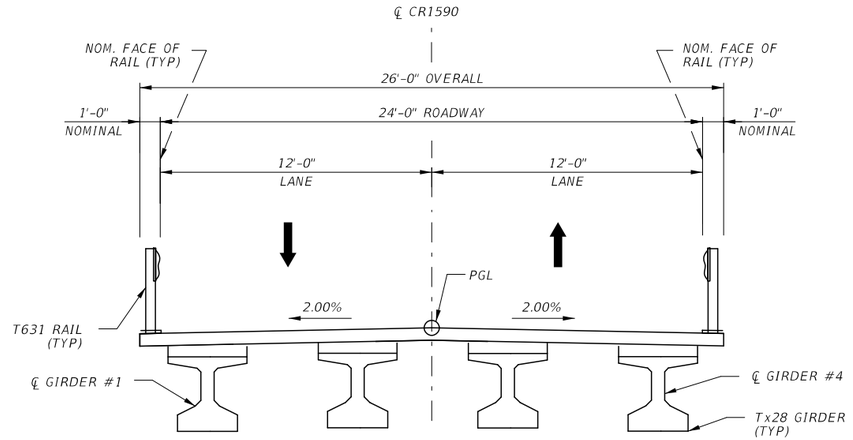
WIDTH = 16 FEET



PROPOSED TYPICAL TRANSVERSE SECTION

NOT TO SCALE

SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
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13355 Noel Rd.
Suite 400
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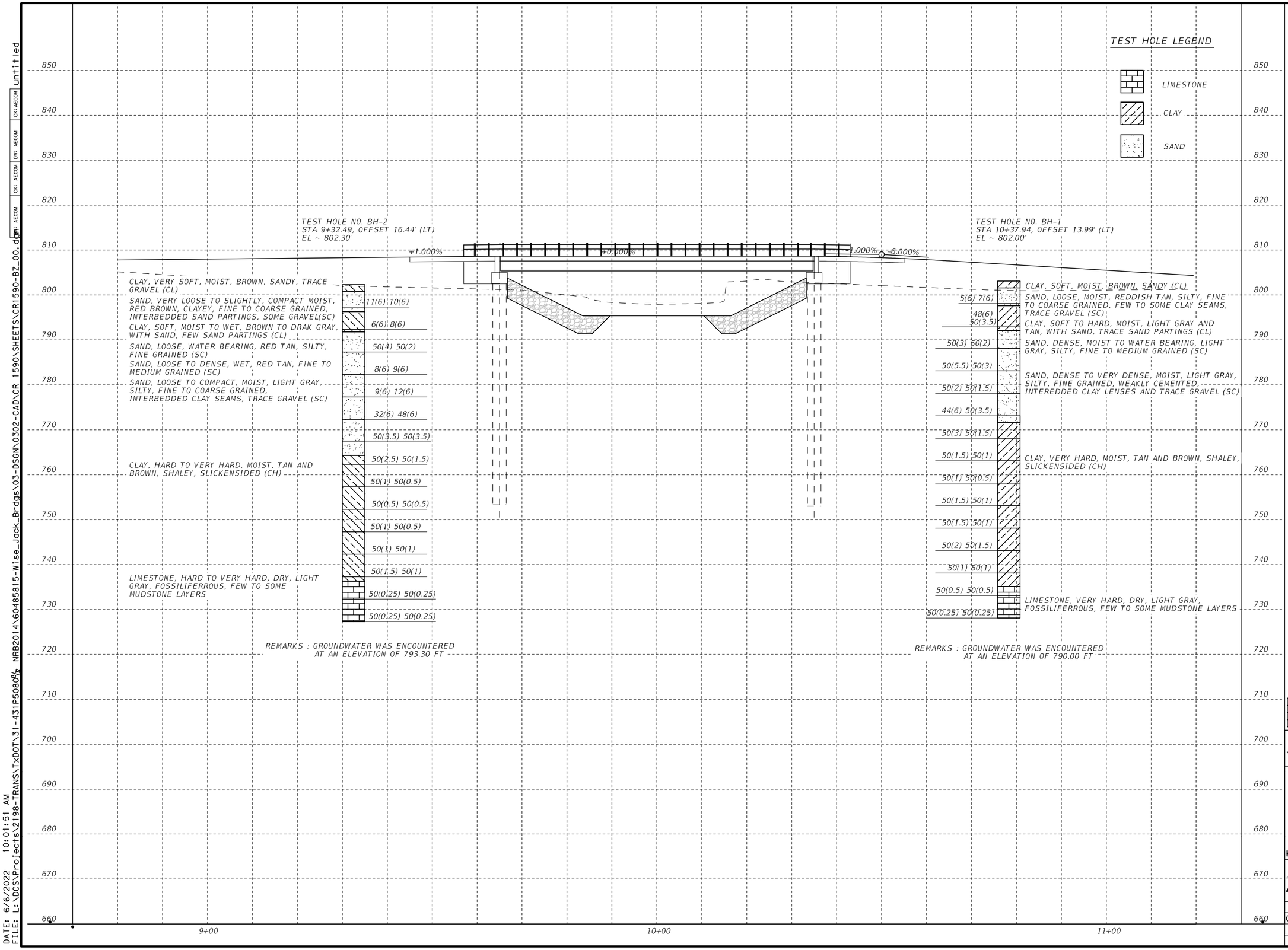
(214) 741-7777
TBPE NO. F-3580

BRIDGE TYPICAL SECTION
CR 1590
AT BIG SANDY CREEK

HL93 LOADING SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		47



STATE OF TEXAS
SEAN K. YOUNG
96504
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
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(214) 741-7777
TBPE NO. F-3580

BORING LOGS

CR 1590
AT BIG SANDY CREEK

HL93 LOADING *SHEET 1 OF 4*

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590

DIST	COUNTY	SHEET NO.
FTW	WISE	48

DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-1	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/19/2020
CSJ	0902-20-102	Station	10+37.94	Grnd. Elev.	802.00 ft
		Offset	13.99' LT	GW Elev.	790.00 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
		CLAY, soft, moist, brown, sandy (CL)							
801.		SAND, loose, moist, reddish tan, silty, fine to corase grained, few to some clay seams, trace gravel (SC)							SPT=16/12in.
									SPT=16/12in.
5	5 (6) 7 (6)								SPT=4/12in.
796.5		CLAY, soft to hard, moist, light gray and tan, with sand, trace sand partings (CL)							
									SPT=7/12in.
10	48 (6) 50 (3.5)				17				#200(%)-91; PP=4.5+
791.		SAND, dense, moist to water bearing, light gray, silty, fine to medium grained (SC)							
787. 15	50 (3) 50 (2)				27				#200(%)-44; SPT=63/12in.
		SAND, dense to very dense, moist, light gray, silty, fine grained, weakly cemented, interedded clay lenses and trace gravel (SC)							
20	50 (5.5) 50 (3)								SPT=50/4in.
25	50 (2) 50 (1.5)								SPT=50/2in.

Remarks: Seepage observed at 13' during drilling. Water at 12' after 15 minutes. Water not measured at completion due to added water for drilling.. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368715 Longitude: -97.735999

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Scott Campbell Logger: Bradford Weddell Organization: Terracon Consultants, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-1	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/19/2020
CSJ	0902-20-102	Station	10+37.94	Grnd. Elev.	802.00 ft
		Offset	13.99' LT	GW Elev.	790.00 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
		SAND, dense to very dense, moist, light gray, silty, fine grained, weakly cemented, interedded clay lenses and trace gravel (SC)							
30	44 (6) 50 (3.5)								
35	50 (3) 50 (1.5)								
764.		CLAY, very hard, moist, tan and brown, shaley, slickensided (CH)							
40	50 (1.5) 50 (1)								SPT=50/5in.
45	50 (1) 50 (0.5)								SPT=50/5in.
50	50 (1.5) 50 (1)								SPT=50/4in.

Remarks: Seepage observed at 13' during drilling. Water at 12' after 15 minutes. Water not measured at completion due to added water for drilling.. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368715 Longitude: -97.735999

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Driller: Scott Campbell Logger: Bradford Weddell Organization: Terracon Consultants, Inc.

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STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

BORING LOGS

CR 1590 AT BIG SANDY CREEK

SHEET 2 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST		COUNTY	SHEET NO.
FTW		WISE	49

DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-1	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/19/2020
CSJ	0902-20-102	Station	10+37.94	Grnd. Elev.	802.00 ft
		Offset	13.99' LT	GW Elev.	790.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, very hard, moist, tan and brown, shaley, slickensided (CH)							
55		50 (1.5) 50 (1)								SPT=50/4in.
60		50 (2) 50 (1.5)								SPT=50/2in.
65		50 (1) 50 (1)								SPT=50/2in.
734.			LIMESTONE, very hard, dry, light gray, fossiliferrous, few to some mudstone layers							
70		50 (0.5) 50 (0.5)								SPT=50/3in.
727. 75		50 (0.25) 50 (0.25)								

Remarks: Seepage observed at 13' during drilling. Water at 12' after 15 minutes. Water not measured at completion due to added water for drilling.. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368715 Longitude: -97.735999

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Driller: Scott Campbell **Logger:** Bradford Weddell **Organization:** Terracon Consultants, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-2	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/20/2020
CSJ	0902-20-102	Station	9+32.49	Grnd. Elev.	802.30 ft
		Offset	16.44'LT	GW Elev.	793.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
800.8			CLAY, very soft, moist, brown, sandy, trace gravel (CL)							SPT=6/12in.
			SAND, very loose to slightly compact, moist, red brown, clayey, fine to coarse grained, interbedded sand partings, some gravel (SC)							SPT=8/12in.
5		11 (6) 10 (6)								SPT=12/12in.
796.3			CLAY, soft, moist to wet, brown to dark gray, with sand, few sand partings (CL)							SPT=11/12in.
10		6 (6) 8 (6)				23				#200(%)-83; SPT=11/12in.
791.8			SAND, loose, water bearing, red tan, silty, fine grained (SC)							
789.8			SAND, loose to dense, wet, red tan, fine to medium grained (SC)							
15		50 (4) 50 (2)				22				#200(%)-45; SPT=47/12'
786.8			SAND, loose to compact, moist, light gray, silty, fine to coarse grained, interbedded clay seams, trace gravel (SC)							
20		8 (6) 9 (6)								SPT=16/12in.
25		9 (6) 12 (6)								SPT=33/12in.

Remarks: Seepage observed at 9' during drilling. Water at 9' after 15 minutes. Water not measured at completion due to added water for drilling. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368773 Longitude: -97.736338

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Scott Campbell **Logger:** Bradford Weddell **Organization:** Terracon Consultants, Inc.

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STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

BORING LOGS

CR 1590
AT BIG SANDY CREEK

HL93 LOADING *SHEET 3 OF 4*

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		50

DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-2	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/20/2020
CSJ	0902-20-102	Station	9+32.49	Grnd. Elev.	802.30 ft
		Offset	16.44'LT	GW Elev.	793.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, loose to compact, moist, light gray, silty, fine to coarse grained, interbedded clay seams, trace gravel (SC)							
30		32 (6) 48 (6)								
770.8			CLAY, hard to very hard, moist, tan and brown, shaley, slickensided (CH)							
35		50 (3.5) 50 (3.5)								SPT=33/12in.
40		50 (2.5) 50 (1.5)								PP=4.5+
45		50 (1) 50 (0.5)								
50		50 (0.5) 50 (0.5)								

Remarks: Seepage observed at 9' during drilling. Water at 9' after 15 minutes. Water not measured at completion due to added water for drilling. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368773 Longitude: -97.736338

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Driller: Scott Campbell **Logger:** Bradford Weddell **Organization:** Terracon Consultants, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Wise	Hole	BH-2	District	Fort Worth
Highway	CR 1590@Big Sandy Creek	Structure	Bridge	Date	11/20/2020
CSJ	0902-20-102	Station	9+32.49	Grnd. Elev.	802.30 ft
		Offset	16.44'LT	GW Elev.	793.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, hard to very hard, moist, tan and brown, shaley, slickensided (CH)							
55		50 (1) 50 (0.5)								
60		50 (1) 50 (1)								
65		50 (1.5) 50 (1)								
736.3			LIMESTONE, hard to very hard, dry, light gray, fossiliferrous, few to some mudstone layers							
70		50 (0.25) 50 (0.25)								CORE RUN 70-75' REC=55%, RQD=43%
727.3 75		50 (0.25) 50 (0.25)								

Remarks: Seepage observed at 9' during drilling. Water at 9' after 15 minutes. Water not measured at completion due to added water for drilling. GPS coordinates were obtained using the WGS-84 coordinate system. Latitude: 33.368773 Longitude: -97.736338

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Driller: Scott Campbell **Logger:** Bradford Weddell **Organization:** Terracon Consultants, Inc.

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STATE OF TEXAS
SEAN K. YOUNG
96504
LICENSED PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
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13355 Noel Rd.
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Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

BORING LOGS

CR 1590 AT BIG SANDY CREEK

HL93 LOADING *SHEET 4 OF 4*

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		51

SUMMARY OF BRIDGE

New PSN	Layout Sheet No	Description	Station Begin	Station End	Length	0400-6005 Cem Stabil Bkfl	0416-6004 Drill Shaft (36 In)	0420-6014 ② CL "C" Conc (Abut) (HPC)	0422-6002 Reinf Conc Slab (HPC)	0422-6016 Approach Slab (HPC)	0425-6035 Prestr Conc Girder (Tx28)	0432-6035 Riprap (Stone Protection) (24 In)	0450-6018 Rail (Ty T631)	0454-6004 Armor Joint (Sealed)
						CY	LF	CY	SF	CY	LF	CY	LF	LF
007		CR 1590 @ Big Sandy Creek	9+65.00	10+35.00	70.00	66.00	300.00	31.0	1,820.00	38.5	278.00	320.00	172.0	48.00
TOTALS						66.00	300.00	31.0	1,820.00	38.5	278.00	320.00	172.0	48.00

② Includes shear key quantity

DESCRIPTIONS:

Summary of Bridges and Index
CR 1590 Creek @ Big Sandy Ck
AJ (Armor Joint with Seal)
BAS-A (Bridge Approach Slab)
CSAB (FTW)(Cement Stabilized Abutment Backfill)
FD (Common Foundation Details)
IGD (Prestressed Concrete I-Girder Details)
IGEB (Elastomeric Bearing & Girder End Details)
IGFRP (Slab Top Mat Reinforcement)
IGMS (Miscellaneous Slab Details)
IGND (Prestressed I-Girder Non-Standard Designs)
IGSK (Shear Key Details for Prestr Concrete I-Girders)
IGTS (Thickened Slab End Details)
MEBR(C) (Minimum Erection & Bracing Requirements)
PCP (Prestressed Concrete Panels)
PCP-FAB Prestressed Concrete Panel Fabrication Details)
PCP(0) (Precast Conc Panels for Overhangs)
PCP(0)FAB (Precast Concrete Panels for Overhangs Fab Details)
PMDF (Permanent Metal Deck Forms)
SRR (Stone Riprap)
T631 (Traffic Rail)

HL93 LOADING

SHEET 1 OF 1

STATE OF TEXAS
ALFREDO VALLES
76497
REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E
06/06/2022

Texas Department of Transportation

Fort Worth Bridge Design

SUMMARY OF BRIDGE

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		52

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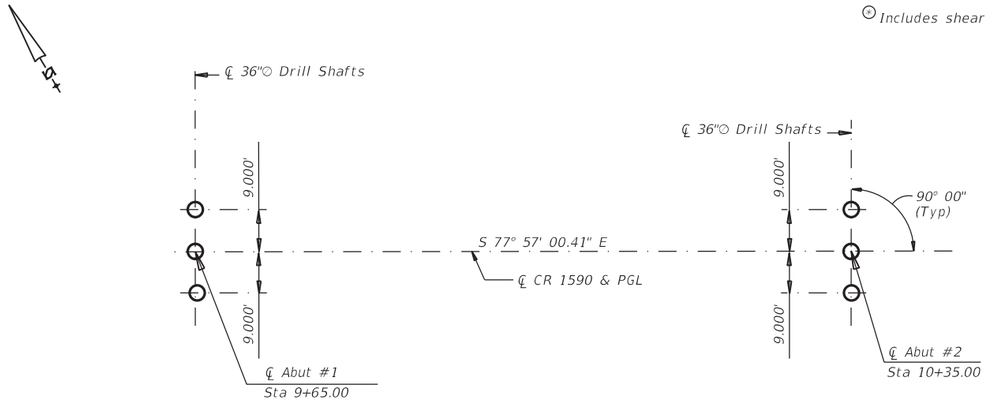
ESTIMATED QUANTITIES

DESCRIPTIONS	0400-6005 CEM STABIL BKFL	0416-6004 Drilled Shaft (36 In)	0420-6014 ⊛CL "C" Conc (Abut) (HPC)	0422-6002 Reinf Conc Slab (HPC)	0422-6016 Approach Slab (HPC)	0425-6035 Prestr Conc Girder (Tx28)	0432-6035 Riprap (Stone Protection) (24 In)	0450-6018 Rail (Ty T631)	0454-6004 Armor Joint (Sealed)
	CY	LF	CY	SF	CY	LF	CY	LF	LF
2 ~ Abutments	~	300.00	31.0	~	~	~	~	32.0	~
70.00' Prestressed Concrete Girder SPAN	~	~	~	1,820.00	~	278.000	~	140.0	48.0
TOTALS	66.00	300.00	31.0	1,820.00	38.5	278.000	320.00	172.0	48.0

⊛ Includes shear key quantity



FOUNDATION LAYOUT

GENERAL NOTES:

Designed according to A.A.S.H.T.O. L.R.F.D. Bridge Design Specificaions. 8th Edition (2017).
See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.
See Abutment Details for top of Drilled Shaft Elevations. Top of shafts shown are to be used as basis of measurement Lengths shown on layout are minimum lengths.
Drilled shafts are designed for point bearing and shall be founded at the elevations shown deeper to provide a minimum penetration of 9' into hard clay.

MATERIAL NOTES:

Provide Class "C" Conrete (fc = 3600 psi)
Provide Grade 60 reinforcing steel.

HL93 LOADING

SHEET 1 OF 1

STATE OF TEXAS
ALFREDO VALLES
76497
REGISTERED
PROFESSIONAL ENGINEER

Alfredo Valles, P.E.

06/06/2022

Texas Department of Transportation

Fort Worth Bridge Design

EST QUANTITIES & FOUNDATION LAYOUT

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		53

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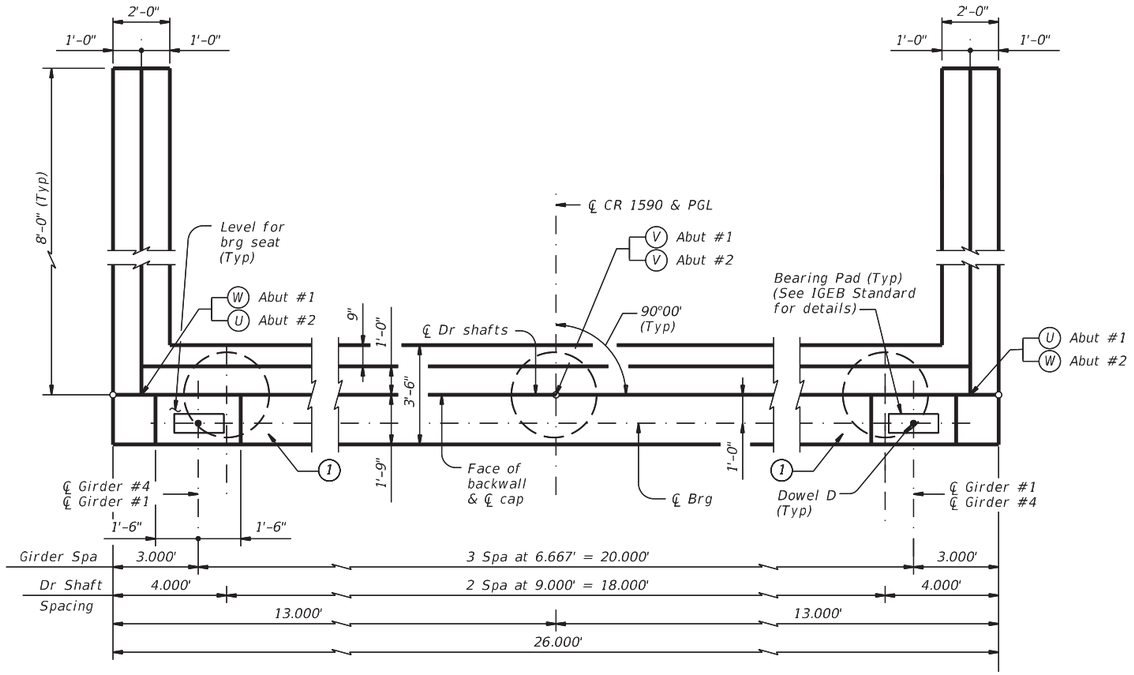
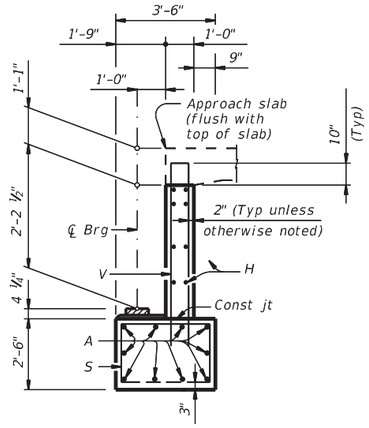
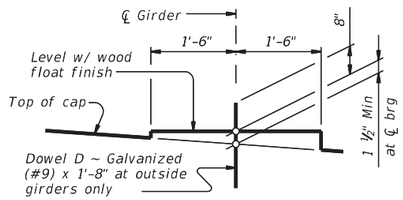


PLAN

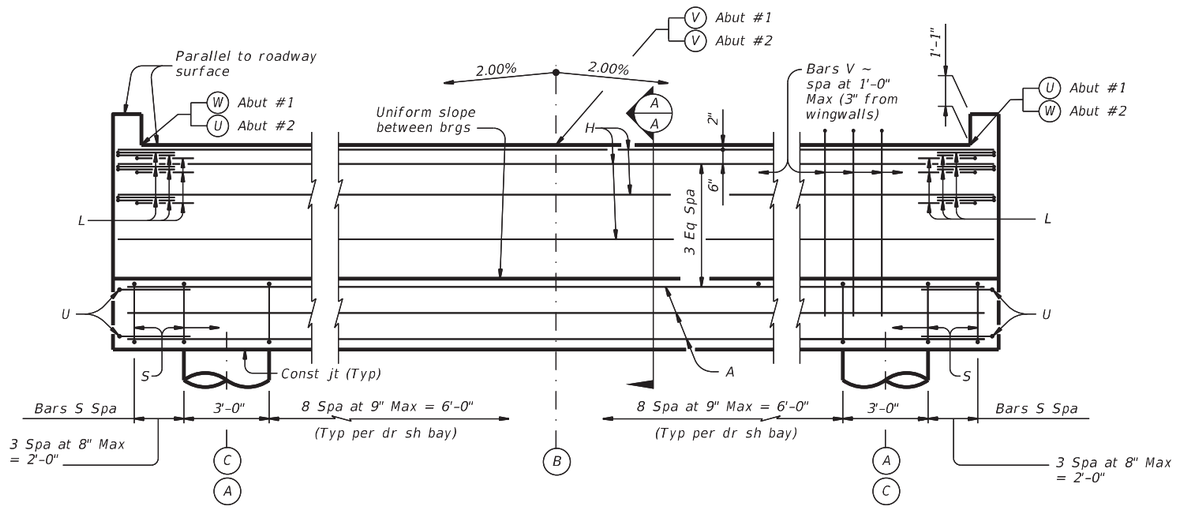


SECTION A-A



BEARING SEAT DETAIL

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



ELEVATION

(Abut #1 ~ Looking Bwd)
(Abut #2 ~ Looking Fwd)

1 Place shear keys on the upstream side of structure between outside girder and next adjacent girder.

See IGSK Standard for shear key details.

HL93 LOADING

SHEET 1 OF 2

STATE OF TEXAS
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Alfredo Valles, P.E.
06/06/2022

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Fort Worth Bridge Design

ABUTMENTS #1 & #2

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		54

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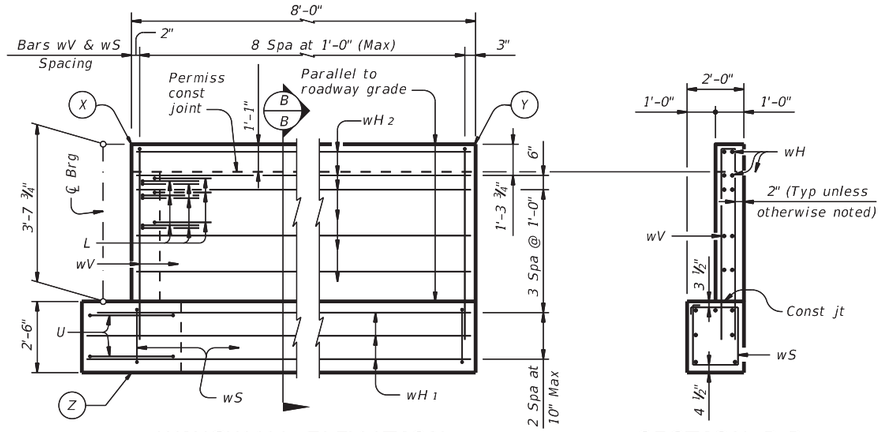
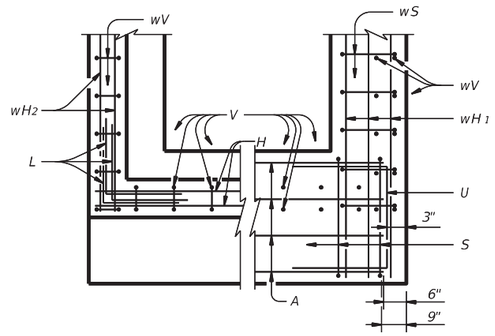


WINGWALL ELEVATION

SECTION B-B



BACKWALL CAP

CORNER DETAILS

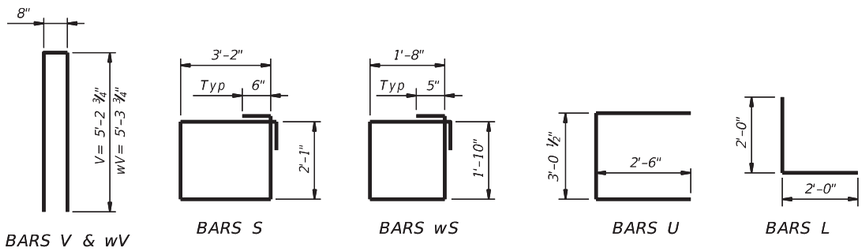
TABLE OF ESTIMATED QUANTITIES

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	26	#5	11'-6"	312
U	4	#6	8'-1"	49
V	25	#5	11'-2"	291
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	212
Reinforcing Steel			Lb	3,141
Class "C" Concrete			CY	15.5

Quantities for one abutment (2 required)

WINGWALL ELEVATIONS

	ABUTMENT #1		ABUTMENT #2	
POINT	LEFT WING	RIGHT WING	RIGHT WING	LEFT WING
X	808.400	808.400	808.400	808.400
Y	808.320	808.320	808.267	808.267
Z	802.254	802.254	802.254	802.254



BARS V & wV BARS S BARS wS BARS U BARS L

TABLE OF ELEVATIONS

	BEARING SEATS					
	1	2	3	4		
Abut #1	804.919	805.053	805.053	804.919		
Abut #2	804.919	805.053	805.053	804.919		
	TOP OF DS					
	A		B		C	
Abut #1	802.314		802.494		802.314	
Abut #2	802.314		802.494		802.314	
	BOTTOM OF DS (AS BUILT)					
	A		B		C	
Abut #1						
Abut #2						
	TOP OF BACKWALL					
	U		V		W	
Abut #1	807.317		807.557		807.317	
Abut #2	807.317		807.557		807.317	

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 8th Edition (2017).

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Stone Riprap (SRR) standard sheet for riprap attachment details if applicable.

See applicable rail details for rail anchorage in wingwalls.

Abutments #1 & #2
Maximum calculated footing load = 129 Tons/shaft.
Point bearing based on penetration test of 2.50"/100 blows
Point bearing at 25.0 TSF = 176 Tons/shaft.
Total Load Resistance = 176 Tons/Shaft.

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

MATERIAL NOTES:

Provide Class C concrete (HPC) (f'c = 3,600 psi).
Provide Grade 60 reinforcing steel.
Galvanize Dowel Bars D.

HL93 LOADING

STATE OF TEXAS
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Alfredo Valles, P.E.
06/06/2022

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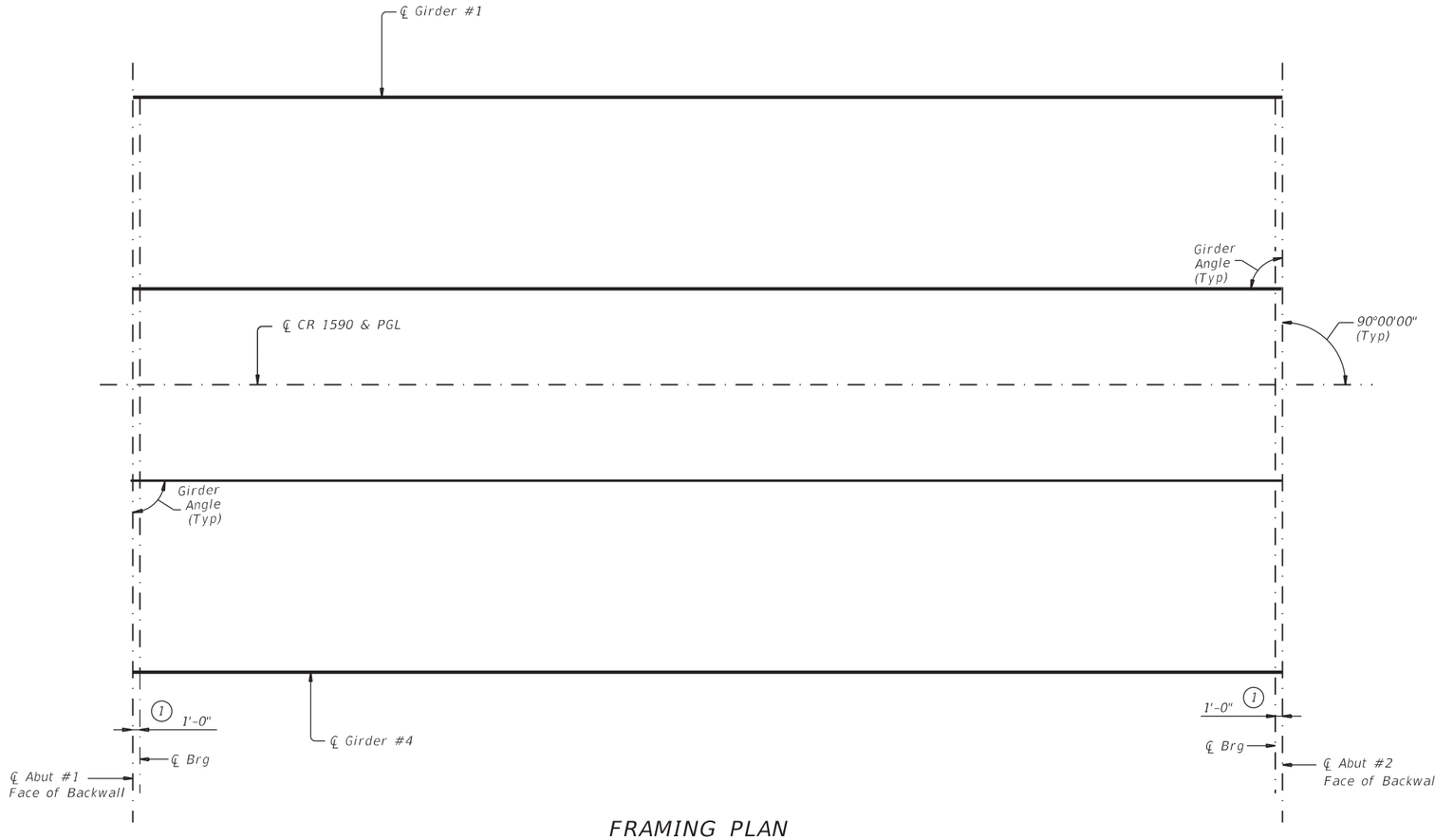
ABUTMENTS #1 & #2

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		55



FRAMING PLAN

(Tx28 Girders)

1 See IGEB Standard for orientation of dimension.

HL93 LOADING

SHEET 1 OF 4

STATE OF TEXAS
ALFREDO VALLES
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Alfredo Valles, P.E.
06/06/2022

Texas Department of Transportation

Fort Worth Bridge Design

70.00' PRESTRESSED CONC I-GIRDER SPAN

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		56

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BENT REPORT

BENT NO. 1 (N 12 2 59.69 E)

DISTANCE BETWEEN STATION LINE AND BEAM 1, 10.0000 L

		BEAM SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	90 0 0.00
	BEAM 2	6.667	90 0 0.00
	BEAM 3	6.667	90 0 0.00
	BEAM 4	6.667	90 0 0.00
	TOTAL	20.000	

BENT NO. 2 (N 12 2 59.69 E)

DISTANCE BETWEEN STATION LINE AND BEAM 1, 10.0000 L

		BEAM SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	90 0 0.00
	BEAM 2	6.667	90 0 0.00
	BEAM 3	6.667	90 0 0.00
	BEAM 4	6.667	90 0 0.00
	TOTAL	20.000	

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE BOT. BM. FLG.	② BEAM SLOPE
BEAM 1	70.000	68.000	69.50	0.0000
BEAM 2	70.000	68.000	69.50	0.0000
BEAM 3	70.000	68.000	69.50	0.0000
BEAM 4	70.000	68.000	69.50	0.0000

② Girder lengths shown are bottom girder flange lengths with adjustments made for girder slope.

HL93 LOADING

STATE OF TEXAS
ALFREDO VALLES
76497
REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E.

06/06/2022

Texas Department of Transportation

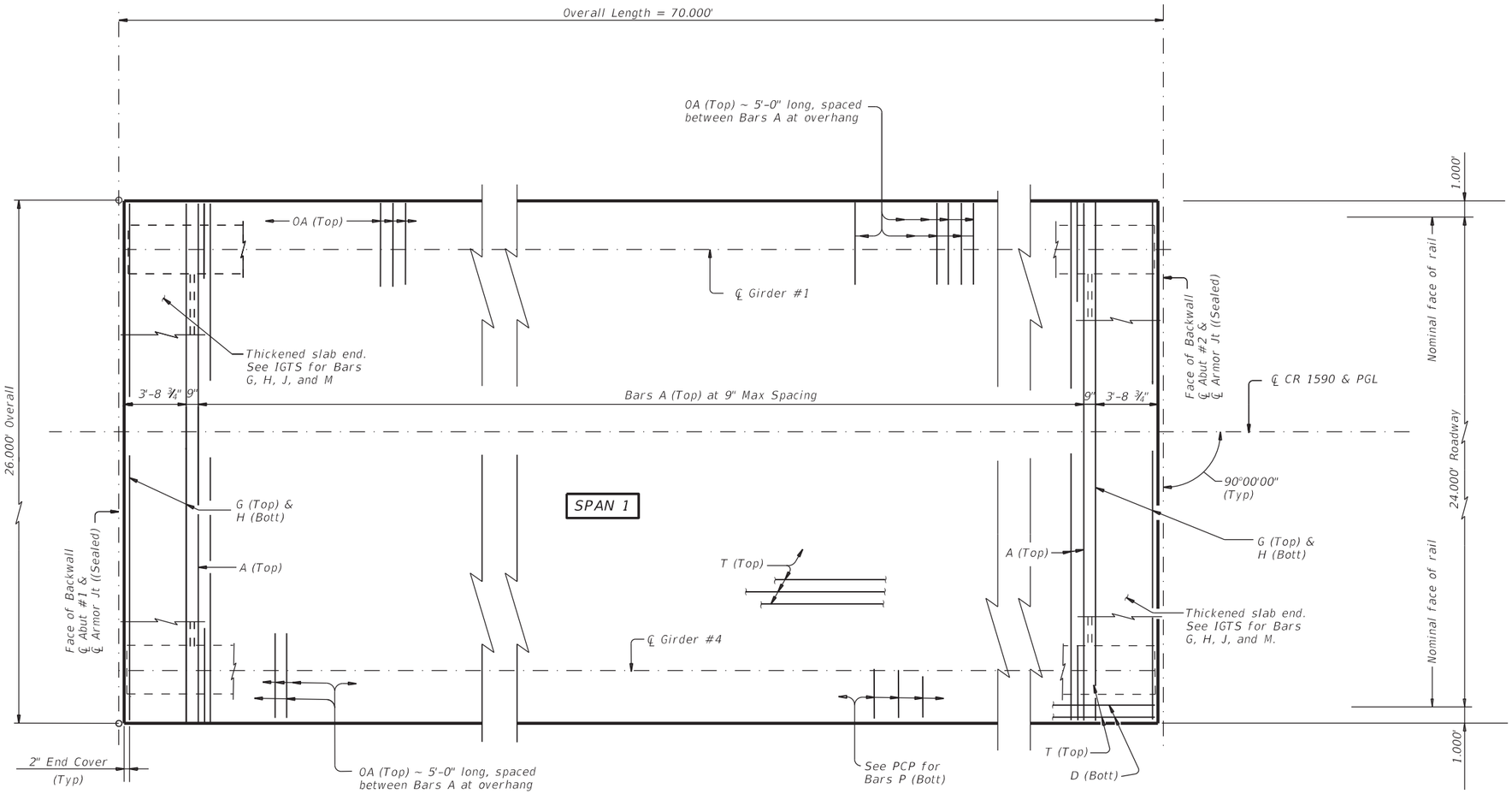
Fort Worth Bridge Design

70.00' PRESTRESSED CONC I-GIRDER SPAN

CR 1590 @ BIG SANDY CK

		DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	20	102	CR 1590	
	DIST	COUNTY		SHEET NO.	
	02	Wise		57	

C:\Shafiq\CSJ-0902-20-102 CR1590 PCT 2 at Big Sandy Creek\CR 1590 @ Big Sandy Creek\100% Submittal from Bridge\sscr1590bigsandyck.dgn



REINFORCEMENT PLAN

HL93 LOADING

SHEET 3 OF 4

STATE OF TEXAS
ALFREDO VALLES
76497
REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E.

06/06/2022

Texas Department of Transportation

Fort Worth Bridge Design

70.00' PRESTRESSED CONC I-GIRDER SPAN

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		58

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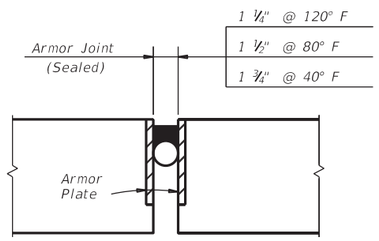


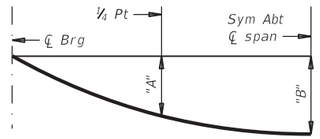
JOINT OPENING DETAIL

(For Additional Information and Details, See Related Standard Sheet "AJ".)

ARMOR JOINT DETAILS

TABLE OF ARMOR JOINT ESTIMATED QUANTITIES	
BENT	LF
1	24.0
2	24.0
TOTAL	48.0

Span No.	Girder No.	"A" FT	"B" FT
1	1–4	0.0769	0.108



DEAD LOAD DEFLECTION DIAGRAM

Deflections shown are due to prestressed concrete panels and cast-in-place concrete slab only. (Ec = 5000 ksi). Adjust deflections based on the field observations as needed.

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

Table of Estimated Quantities

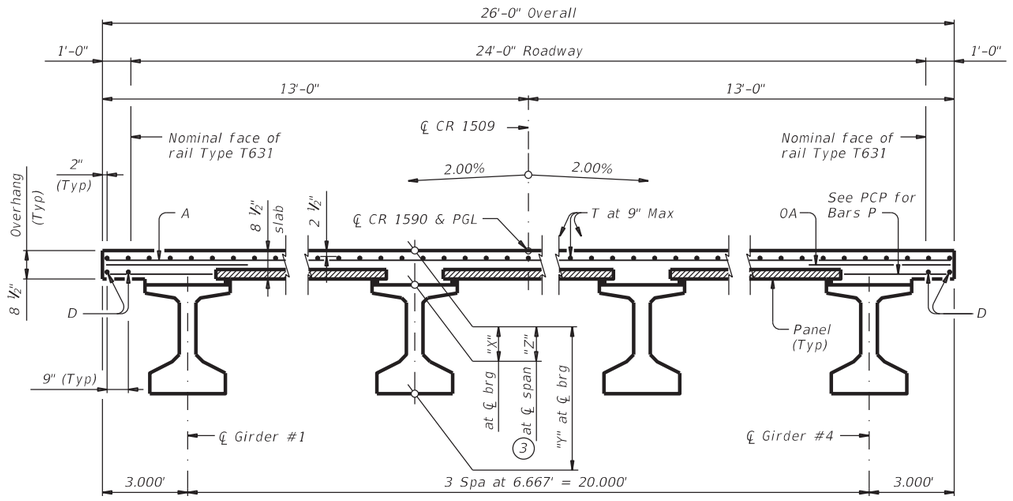
Span	Reinf Conc Slab (HPC)	(4) Reinf Steel	(5) Prest Conc Girder (Tx28)
No.	SF	Lb	LF
1	1,820	4,186	278.00
Total	1,820	4,186	278.00

(4) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

(5) Lengths shown are bottom girder flange lengths with adjustments made for girder slope.

(3) Theoretical dimension

TABLE OF SECTION DEPTHS				
Span No.	Girder	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span (3)
1	All	11 ½"	3'-3 ½"	9 ½"



TYPICAL TRANSVERSE SECTION

(Showing girder Type Tx28)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 2017, 8th Edition.

See IGTS standard for Thickened Slab End details and quantity adjustments.

See PCP and PCP-FAB for panel details not shown.

See PCP(0) and PCP(0)-FAB standards for details and additional information if this option is used.

See IGMS standard for miscellaneous details.

See Traffic Rail Ty T631 standard for rail anchorage in slab.

See PMDF standard for details and quantity adjustments, if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).

Provide Grade 60 epoxy coated reinforcing steel.

Provide Bar laps, where required, as follows:

Epoxy coated ~ #4 = 2'-5"

HL93 LOADING

STATE OF TEXAS
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REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E.

06/06/2022

Texas Department of Transportation

Fort Worth Bridge Design

70.00' PRESTRESSED CONC I-GIRDER SPAN

CR 1590 @ BIG SANDY CK

	DN: SI	CK: AV	DW: KM/SI	CK: AV/SI
©TxDOT 06-06-22 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		59

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DATE:
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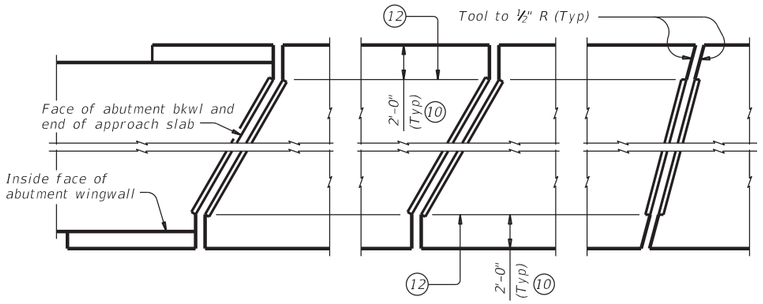
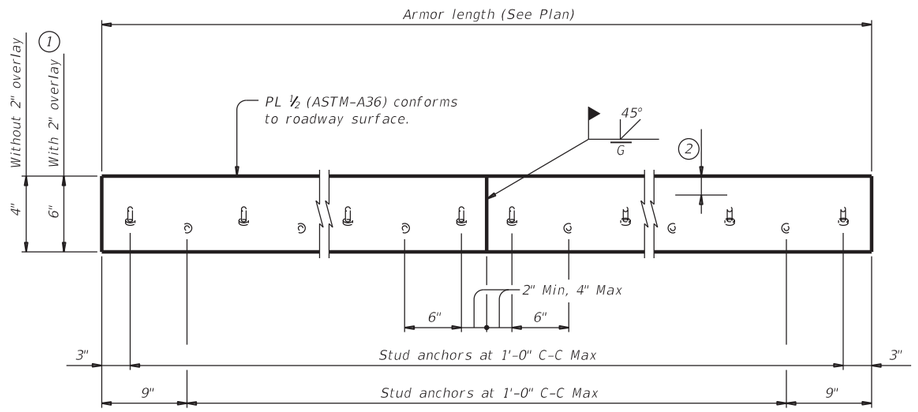


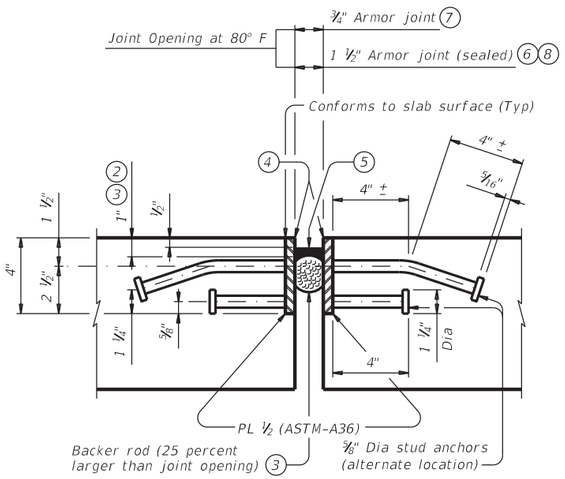
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

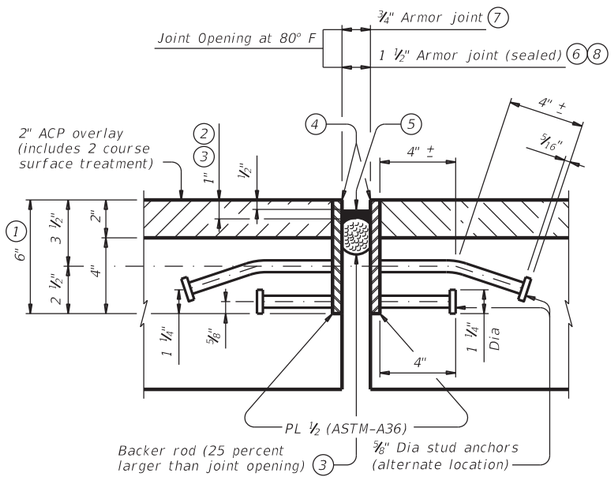


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



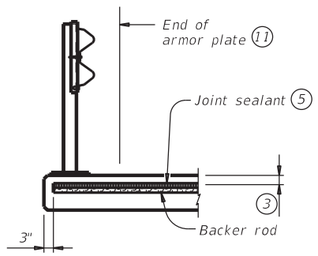
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



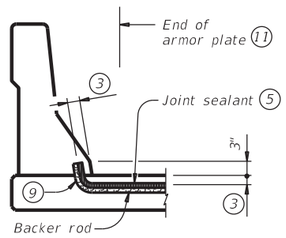
SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

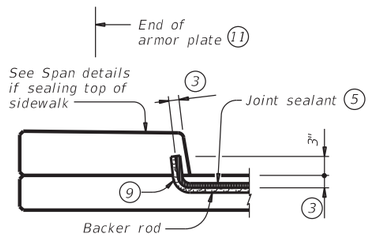
Showing Armor Joint (Sealed)



AT STEEL POST BRIDGE RAIL



AT CONCRETE BRIDGE RAIL



AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

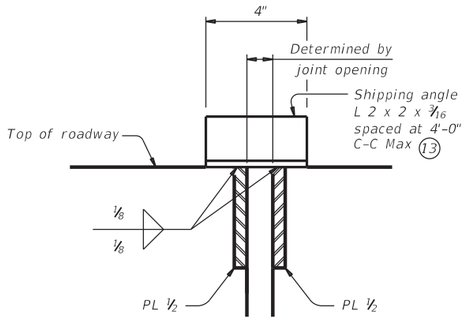
Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 ⅜" (½" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

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

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

Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	02	Wise		60

DATE:
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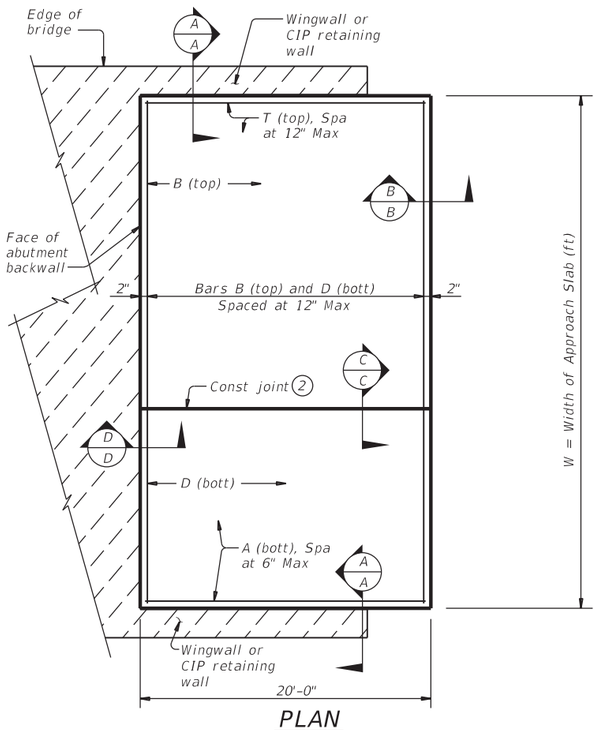
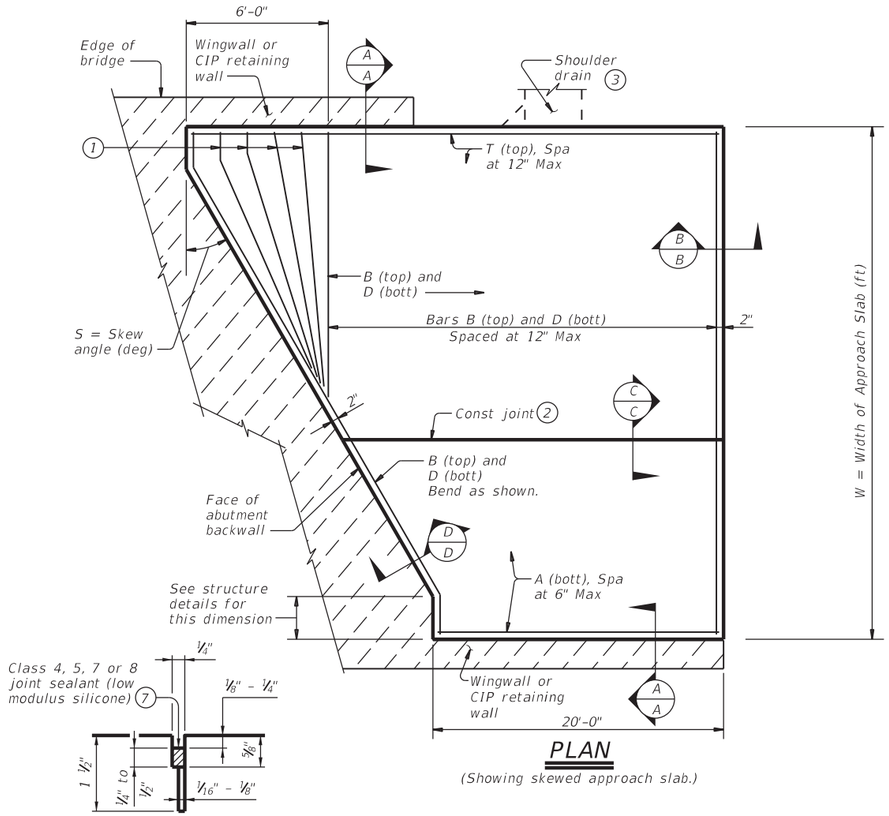


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

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

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

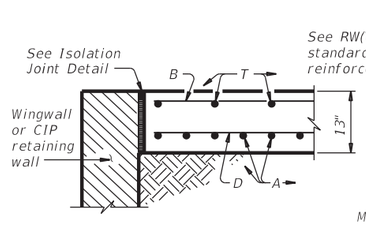
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

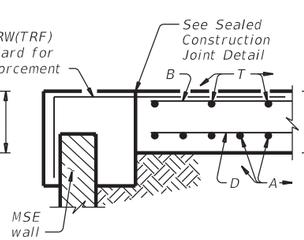
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

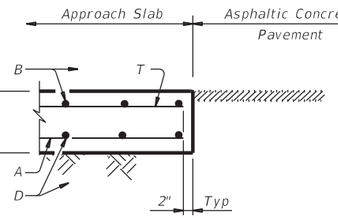
Cover dimensions are clear dimensions, unless noted otherwise.

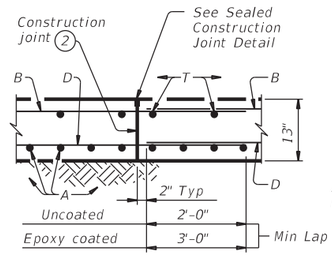


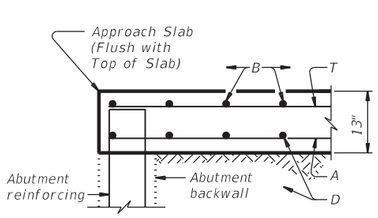
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





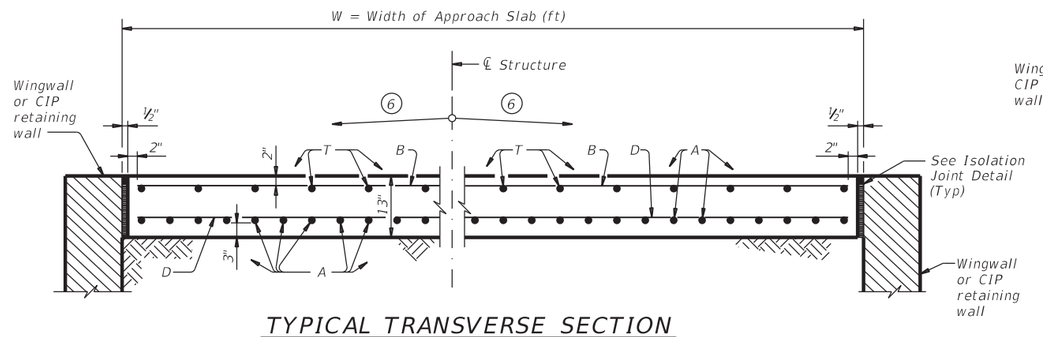


SECTION A-A

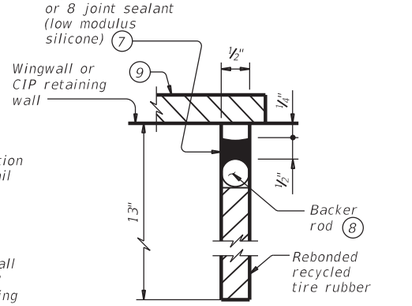
SECTION B-B

SECTION C-C (5)

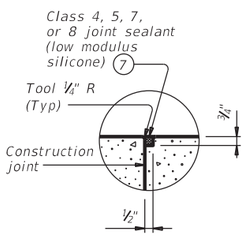
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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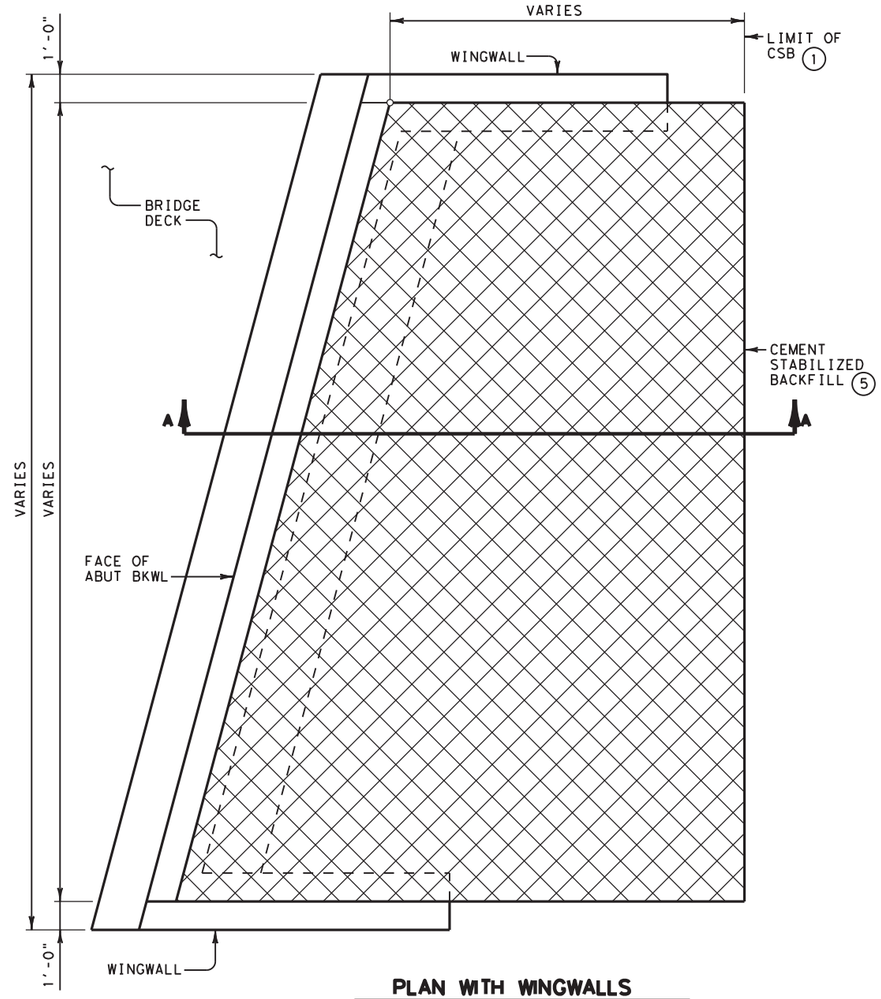
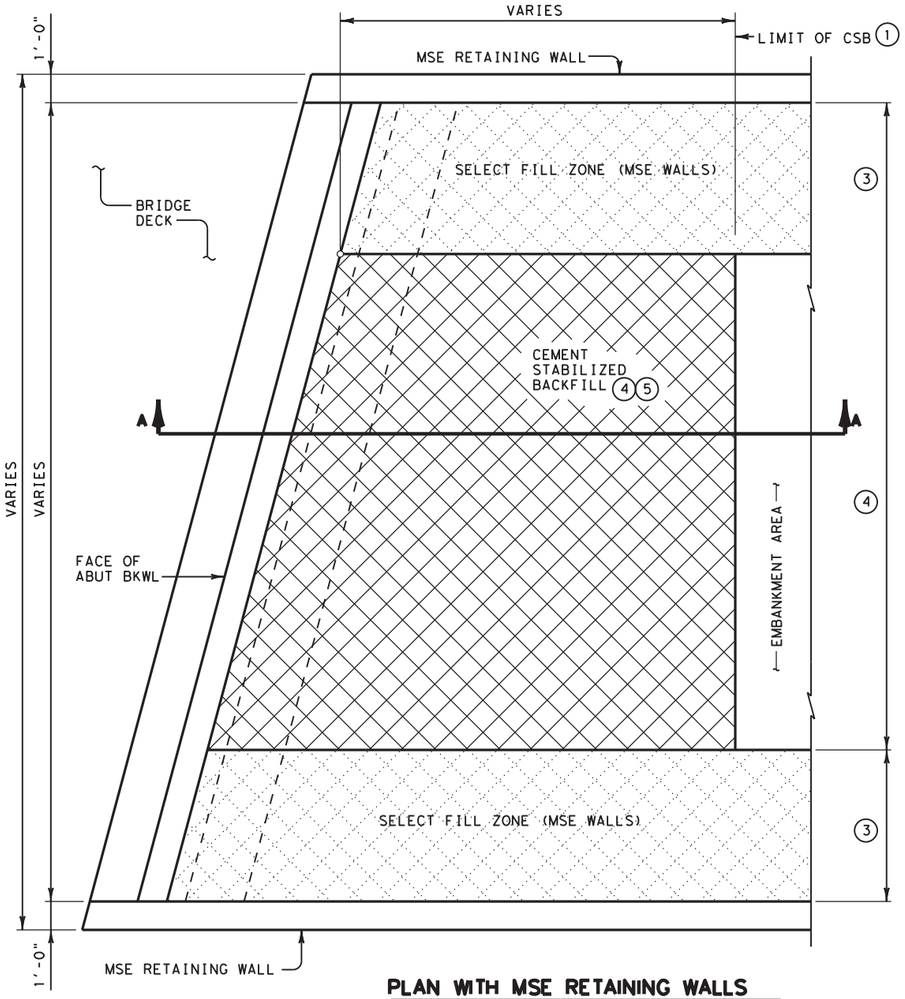
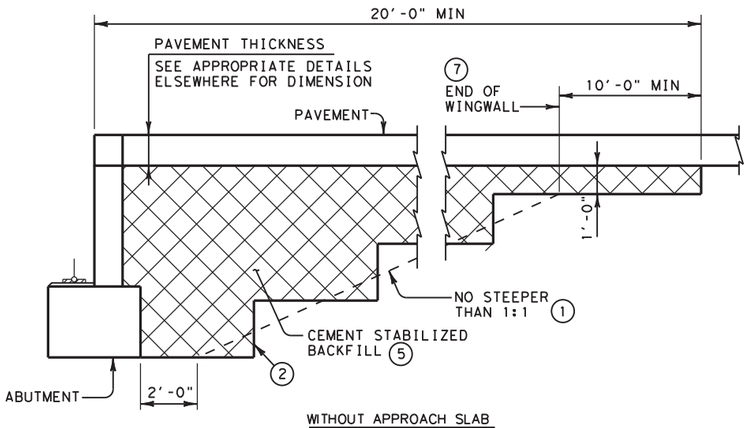
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	02	Wise		61



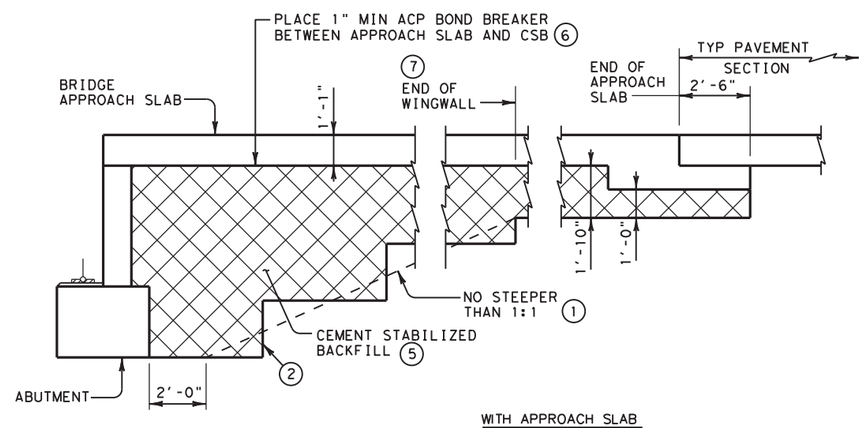
PLAN WITH WINGWALLS
CAST-IN-PLACE RETAINING WALLS SIMILAR



PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB
(SHOWING BAS-C, BAS-A SIMILAR)

SECTION A-A

GENERAL NOTES

1. PROVIDE CEMENT STABILIZED BACKFILL (CSB) MEETING THE REQUIREMENTS OF ITEM 400, "EXCAVATION AND BACKFILL FOR STRUCTURES", TO THE LIMITS SHOWN AT BRIDGE ABUTMENTS. PLACE CSB IN ACCORDANCE WITH ITEM 400.
2. DETAILS ARE DRAWN SHOWING LEFT FORWARD SKEW. SEE BRIDGE LAYOUT FOR ACTUAL SKEW.
3. THESE DETAILS DO NOT APPLY WHEN CONCRETE BLOCK RETAINING WALLS ARE USED IN LIEU OF WINGWALLS. CONTACT THE BRIDGE DIVISION FOR MORE INFORMATION.

(1) USUAL LIMIT OF CEMENT STABILIZED BACKFILL IS AT 20' FROM BACK OF ABUTMENT BACKWALL, IF NO APPROACH SLAB, OR AT END OF SUPPORT SLAB IF APPROACH SLAB IS USED.

(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 APPORVAL FROM THE ENGINEER.

(5) IF APPROVED BY THE ENGINEER, "NON-EXCAVATABLE" FLOWABLE BACKFILL, AS DEFINED BY ITEM 401, TABLE 2, MAY BE USED AS A SUBSTITUTE FOR CEMENT STABILIZED BACKFILL, WITH THE FOLLOWING CONSTRAINTS:
   a. IF FLOWABLE BACKFILL IS TO BE PLACED OVER MSE BACKFILL, PLACE A FILTER FABRIC OVER THE MSE BACKFILL; AND
   b. PLACE FLOWABLE FILL IN LIFTS NOT EXCEEDING 2 FEET IN DEPTH; PLACE EACH SUCCESSIVE LIFT WHEN THE PREVIOUS LIFT HAS STIFFENED/HARDENED (HAS LOST ITS FLOWABILITY).
   c. NO ADJUSTMENT IN PAYMENT WILL BE MADE FOR SUBSTITUTION OF FLOWABLE FILL IN LIEU OF CEMENT STABILIZED BACKFILL.

(6) OTHER MATERIALS MAY BE USED AS A BOND BREAKER IF PERMITTED BY THE ENGINEER. 2 LAYERS OF 30 LB ROOFING FELT OR 2 LAYERS OF HEAVY MIL POLYETHYLENE SHEETING ARE EXAMPLES. BOND BREAKER WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

(7) 10'-0" FROM BACK OF ABUTMENT BACKWALL, IF NO WINGWALLS.

Texas Department of Transportation

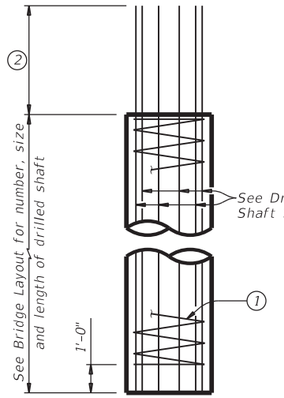
Fort Worth District Standard

CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT

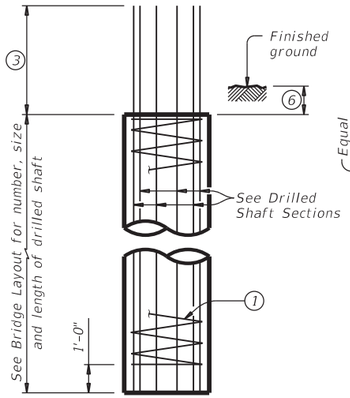
CSAB (FTW)

ORIGINAL DRAWING: 05/2019	csab-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS				62
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
11/2020	REVISE NOTES; ELIMINATE SKEWED END.	TEXAS	02	WISE	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0902	20	102	CR 1590

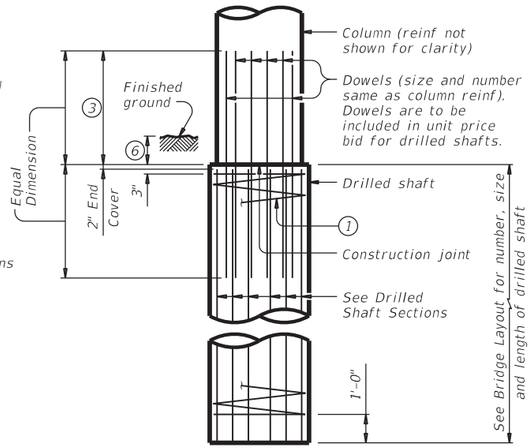
DATE:
FILE:



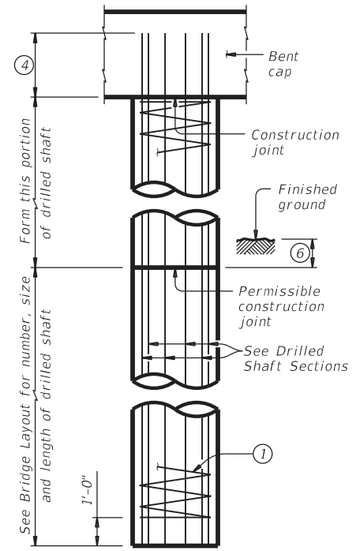
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



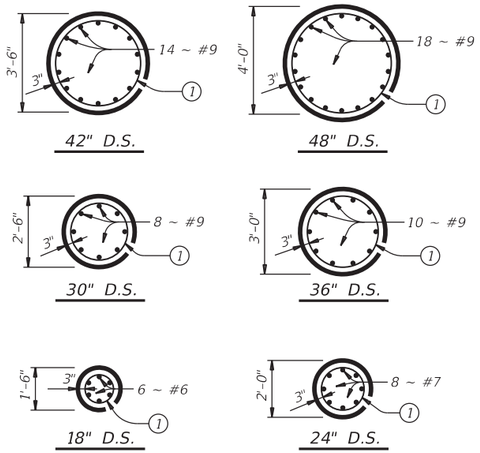
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

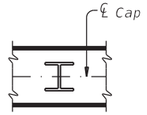


DRILLED SHAFT SECTIONS

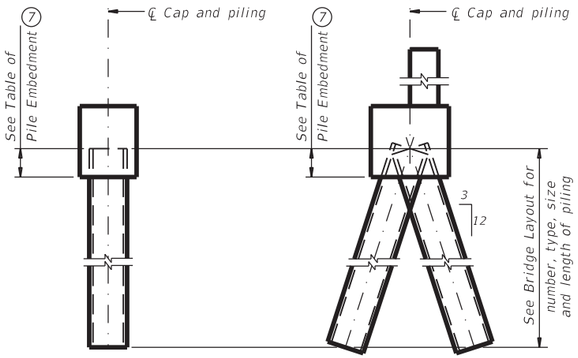
DRILLED SHAFT DETAILS

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

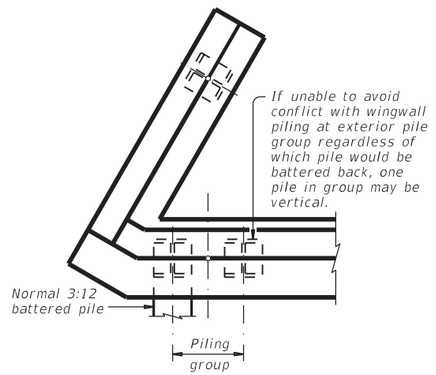
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



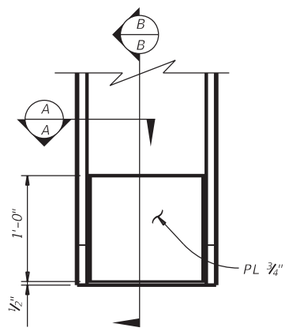
ORIENTATION OF STEEL H-PILING



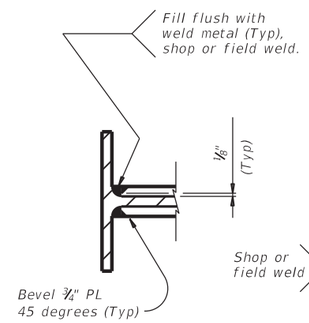
PILING DETAILS
(Concrete or steel H)



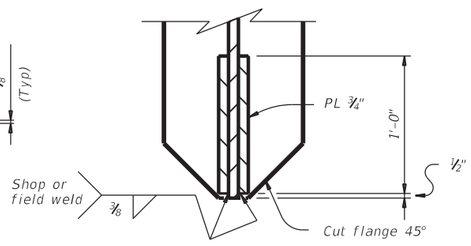
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



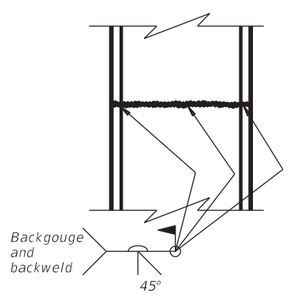
SECTION A-A

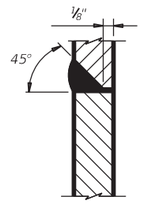


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

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





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

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

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

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

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

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

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

(7) Or as shown on plans.

Texas Department of Transportation

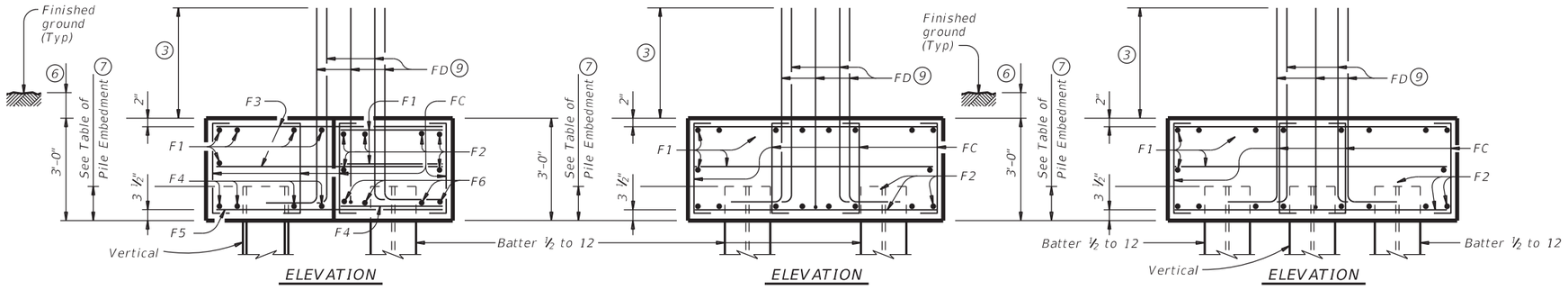
Bridge Division Standard

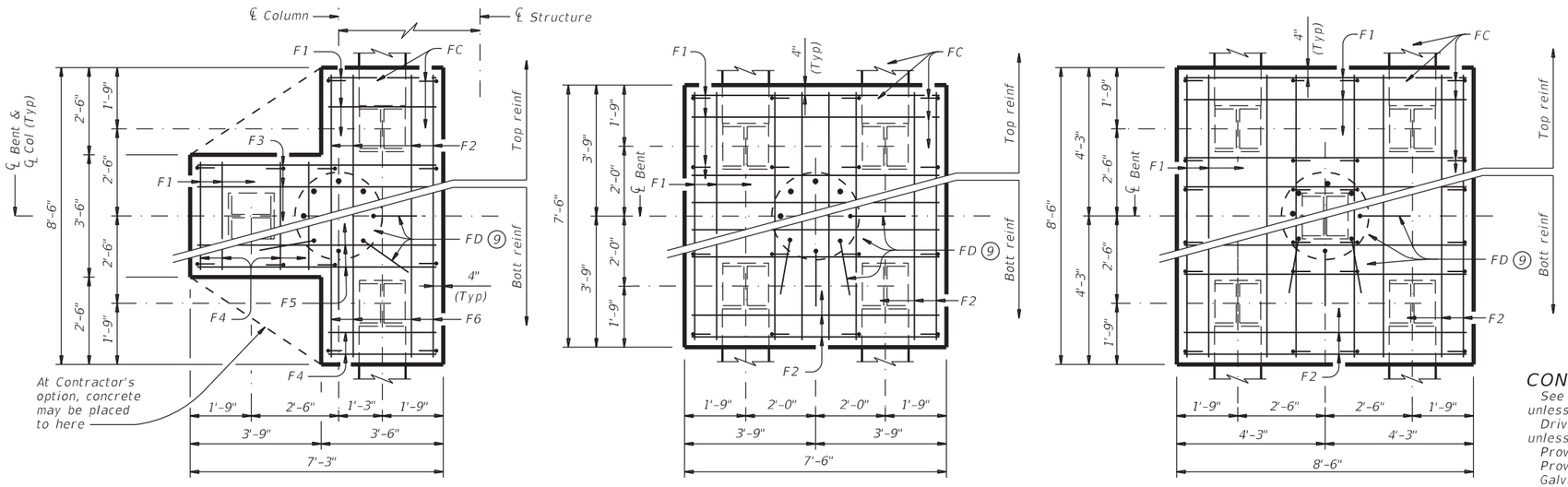
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	02	Wise		63

DATE:
FILE:





THREE PILE FOOTING (8)

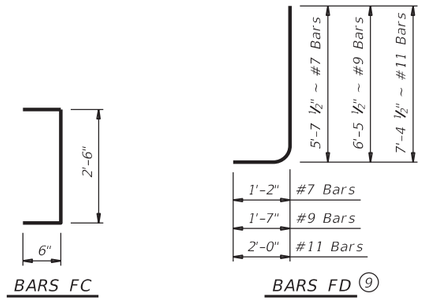
For 36" Dia and smaller columns.

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

Texas Department of Transportation

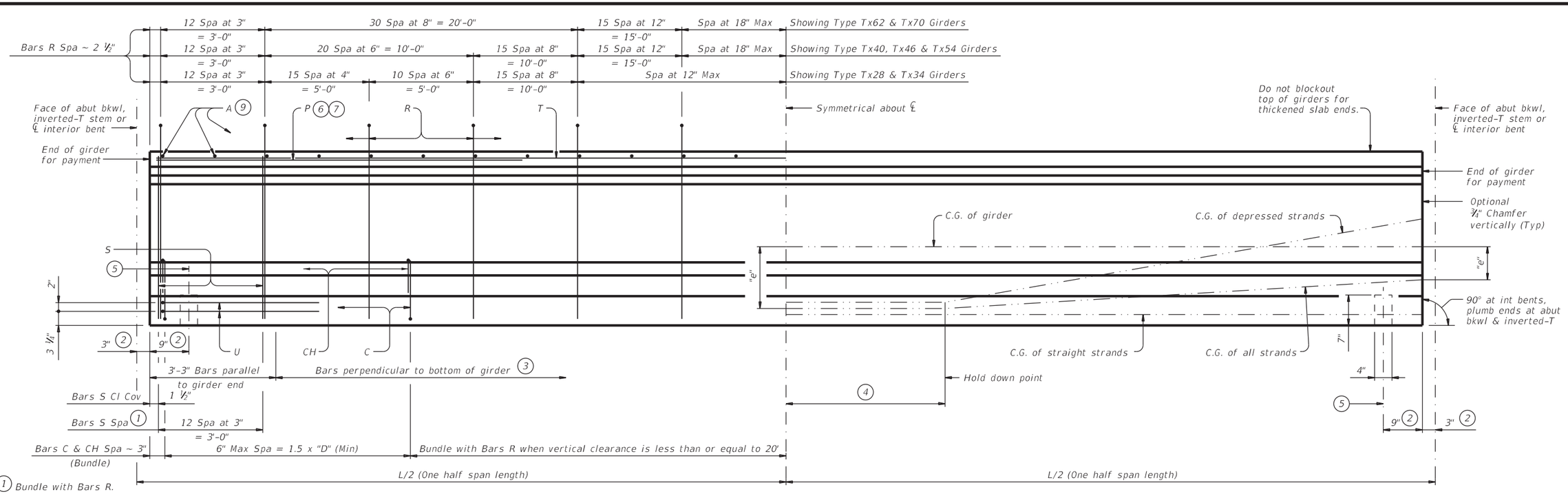
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	02	Wise		64

DATE:
FILE:



(1) Bundle with Bars R.

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

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

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

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

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.

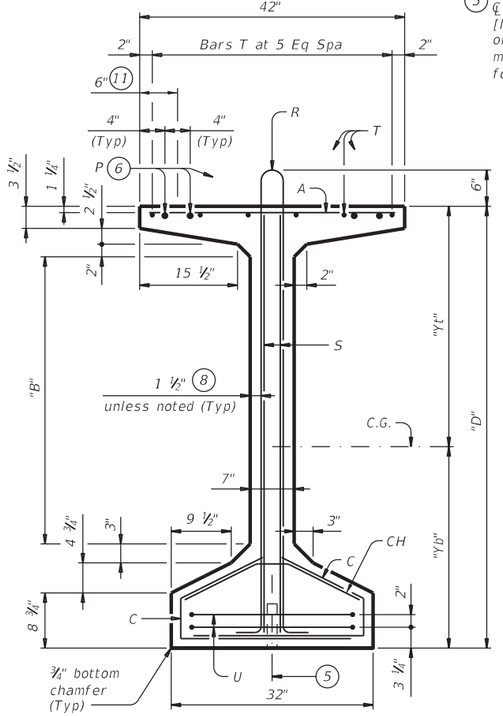
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

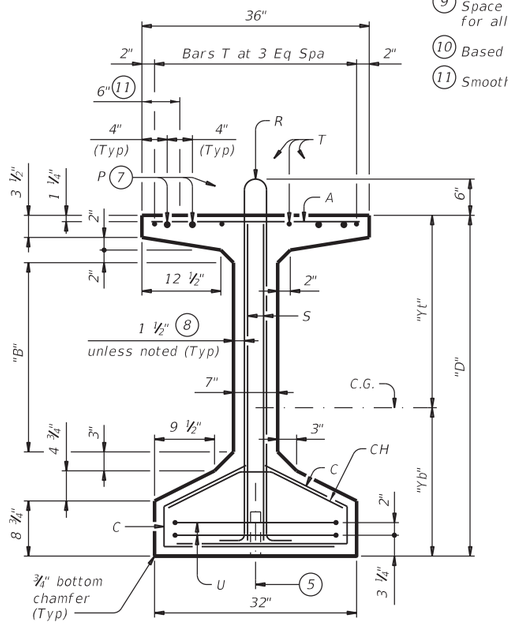
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

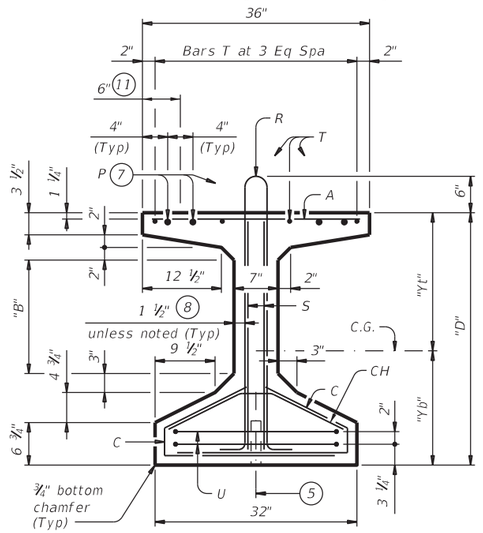
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

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

GENERAL NOTES:

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

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

HL93 LOADING

SHEET 1 OF 2

P.E. SEAL REQUIRED

PRELIMINARY

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Texas Department of Transportation

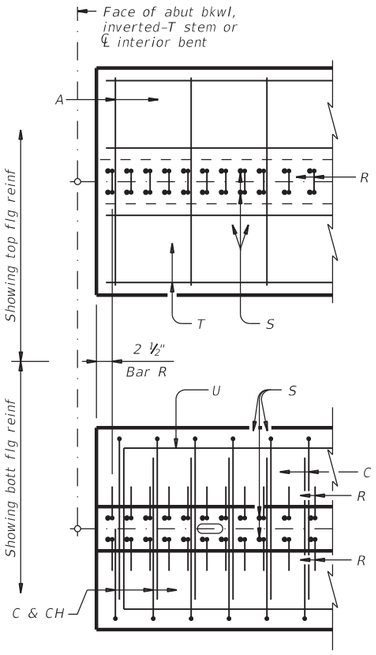
Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

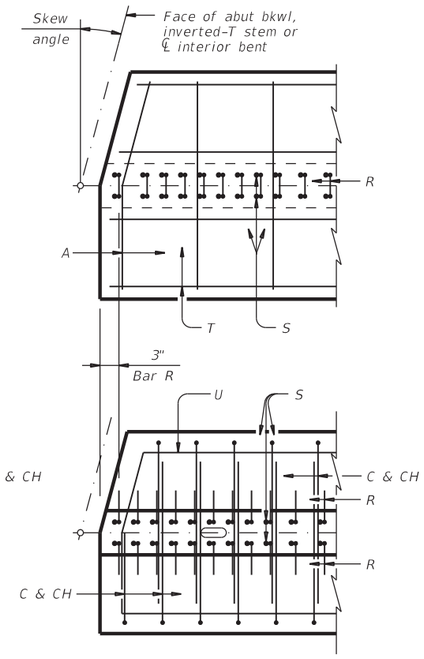
IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	02	Wise		65

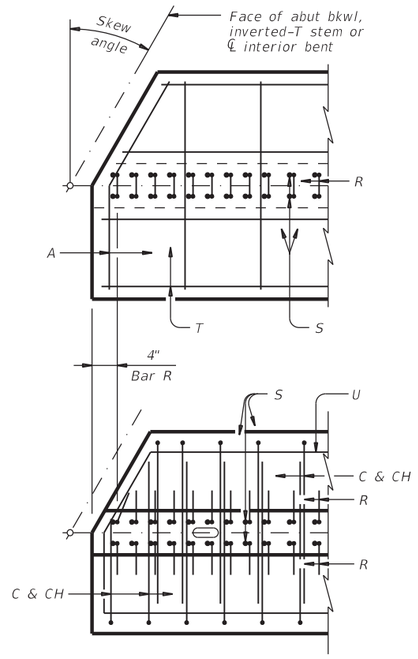
DATE:
FILE:



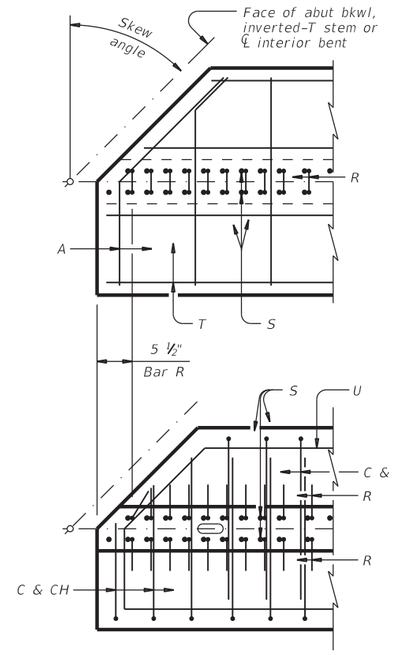
0° SKEW



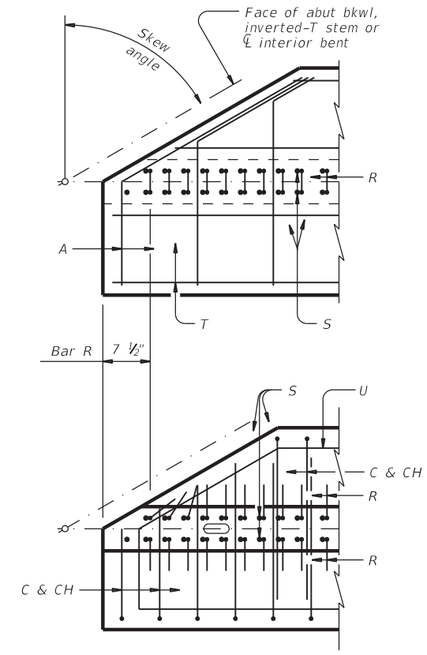
15° SKEW



30° SKEW



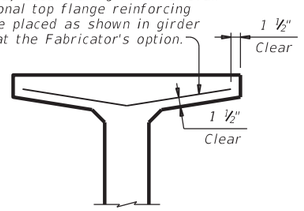
45° SKEW



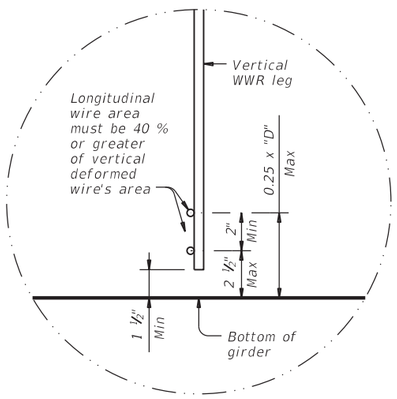
60° SKEW

PLAN OF GIRDER ENDS (12)

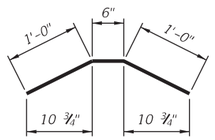
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



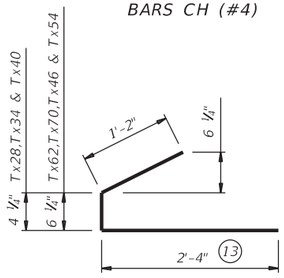
OPTIONAL TOP FLANGE REINFORCING DETAIL



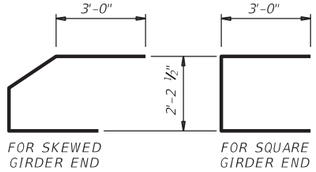
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



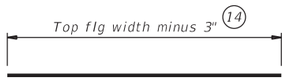
BARS CH (#4)



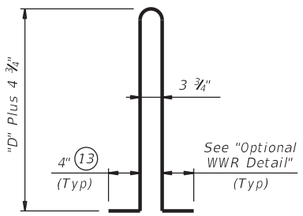
BARS C (#4)



BARS U (#5)

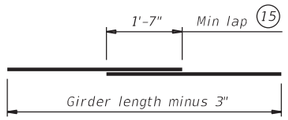


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(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.

HL93 LOADING

P.E. SEAL REQUIRED

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Bridge Division Standard

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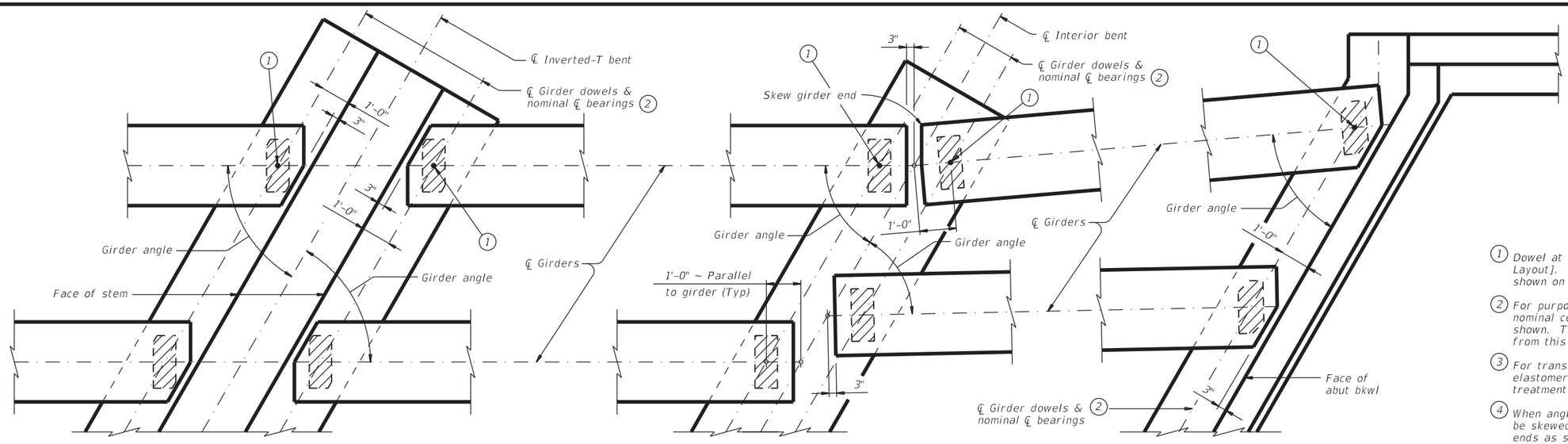
	02	Wise		66

DATE:
FILE:



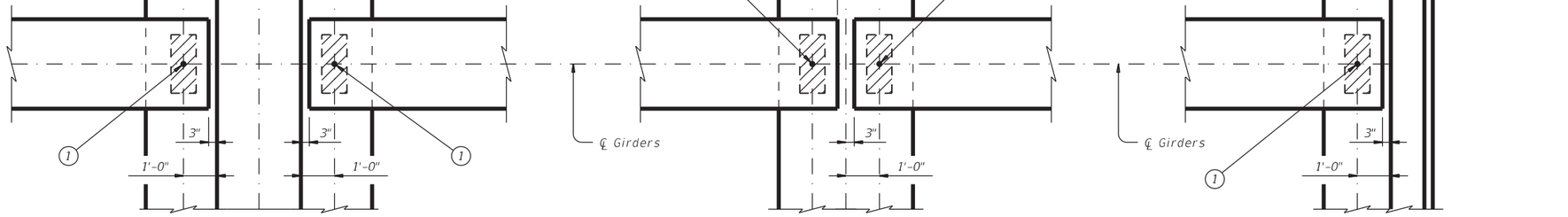
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



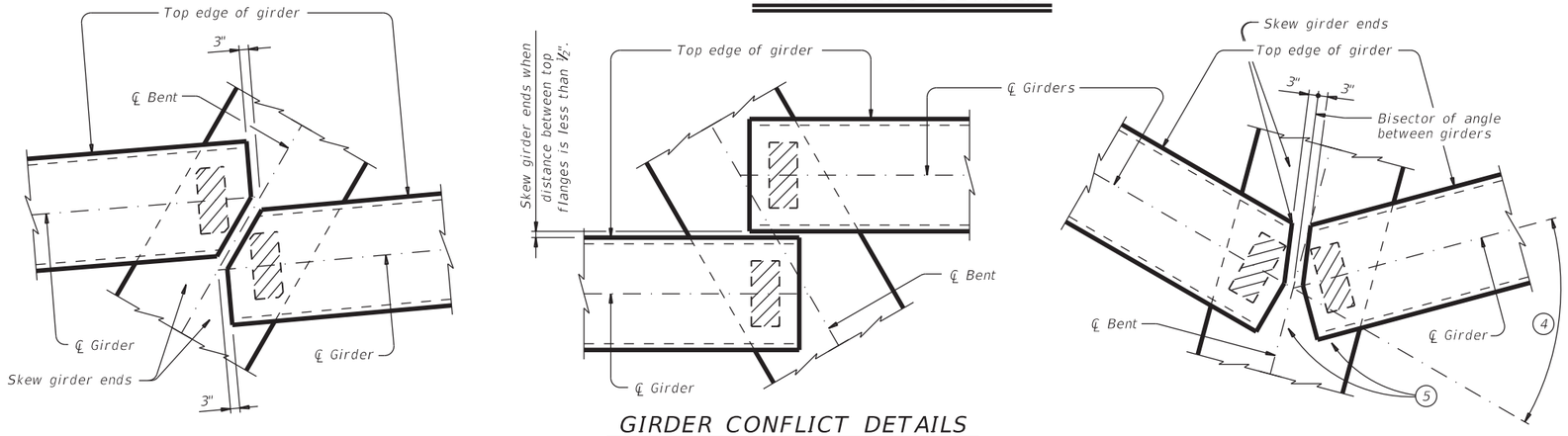
GENERAL NOTES:

These details accommodate skew angles up to 60°. Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

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

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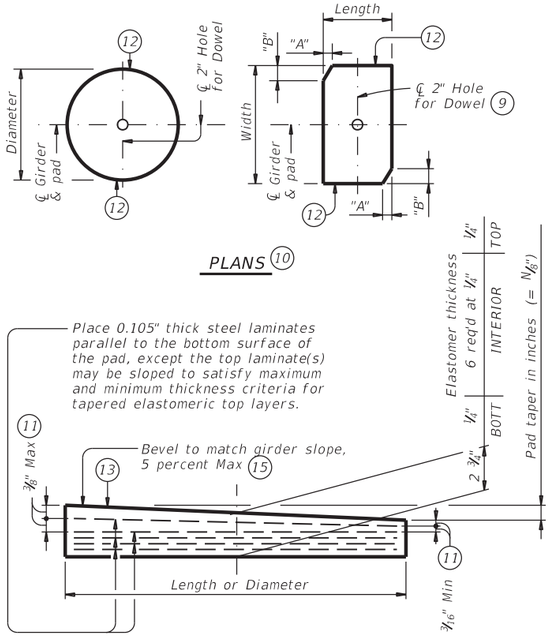
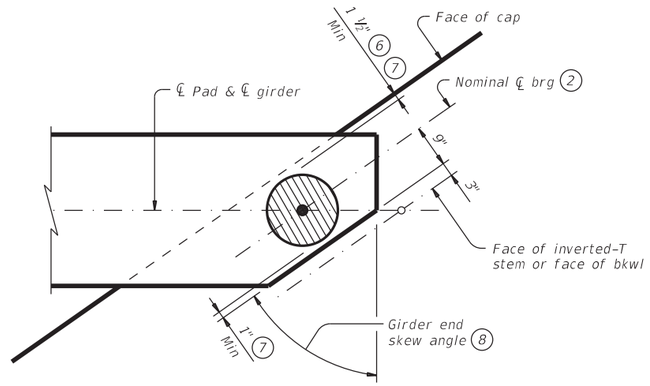
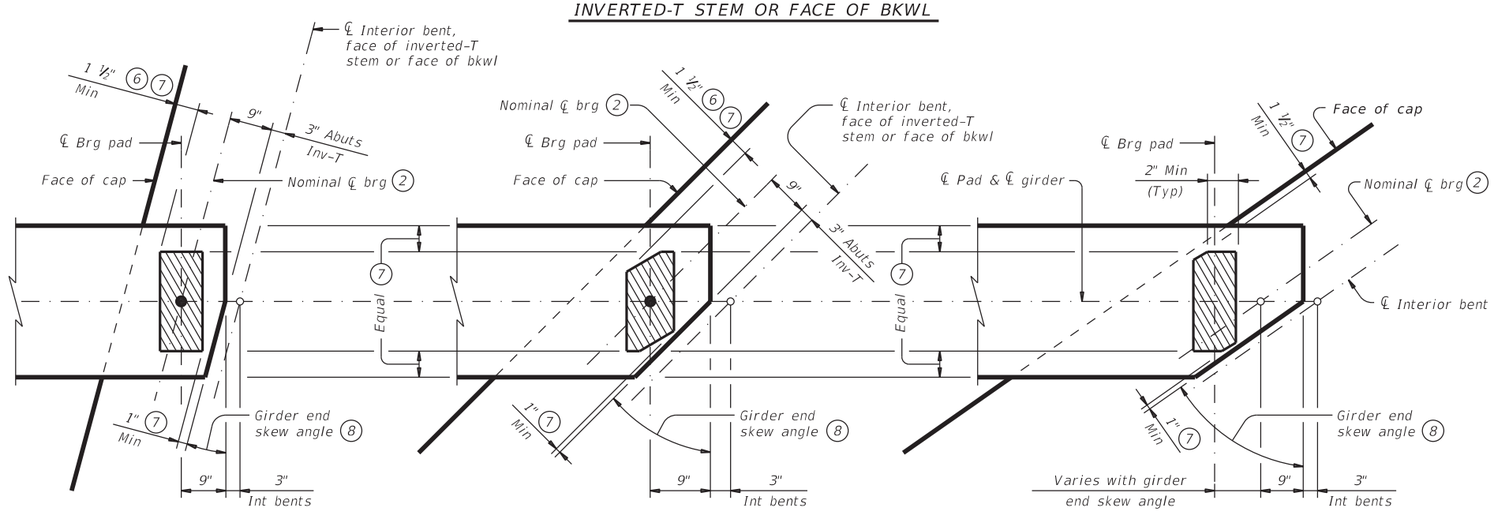


LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



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



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

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

Girder Type	Abutments: Face of Bkwl to Face of Cap	Int Bents: Overall Cap Width	Inv-T Bents: Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

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"	Pad Clip Dimensions "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 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		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 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

(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 ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

(14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.

(15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.

(16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING

SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

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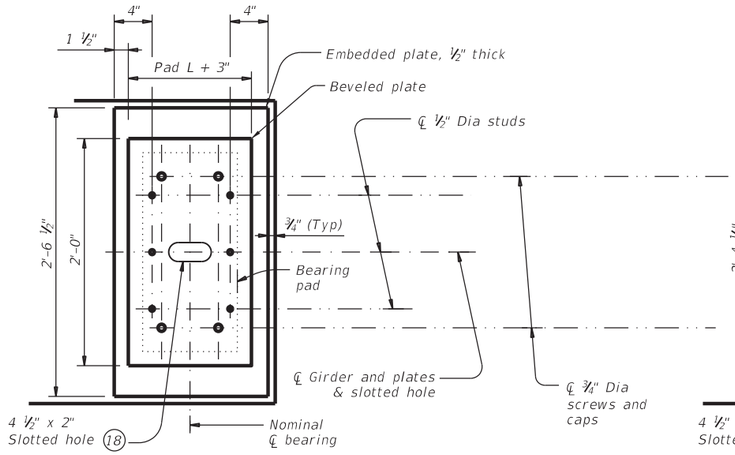
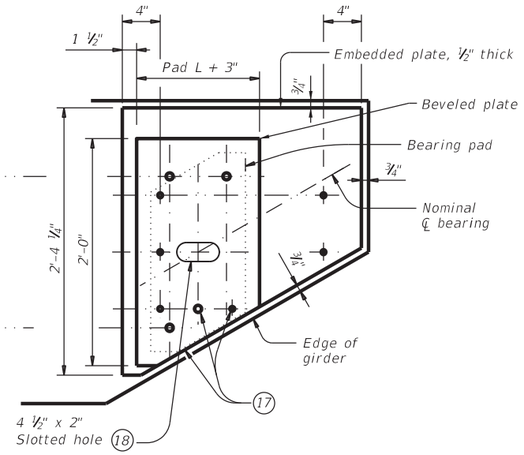
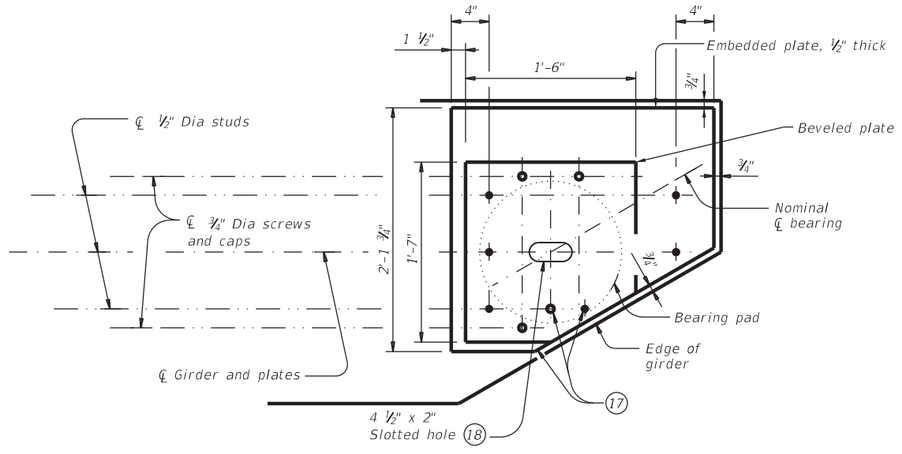


NORMAL GIRDER END
RECTANGULAR BEARING PAD

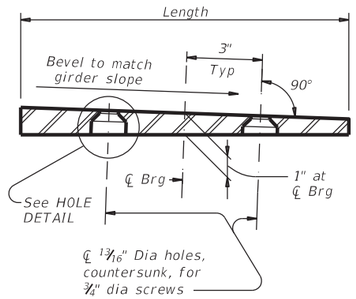


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

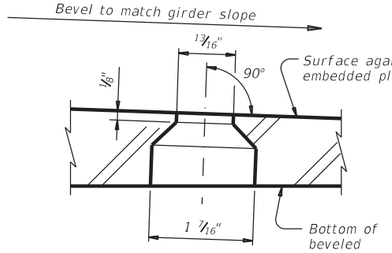


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

(17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.

(18) Slotted hole is required at doweled girder end locations.

SOLE PLATE NOTES:

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

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

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

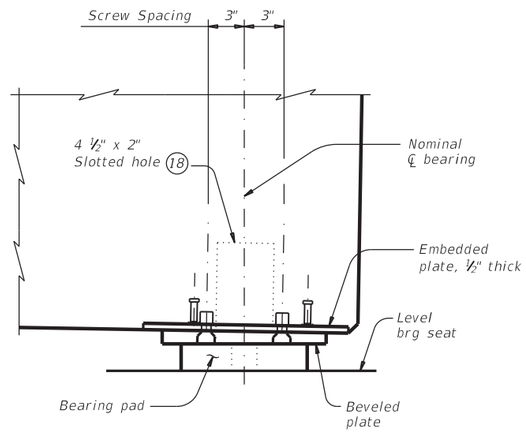
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

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

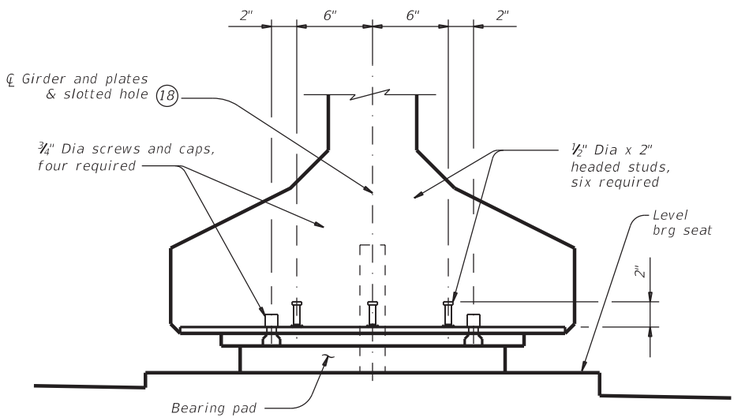
¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" deep or deeper than 1".

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

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation
Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

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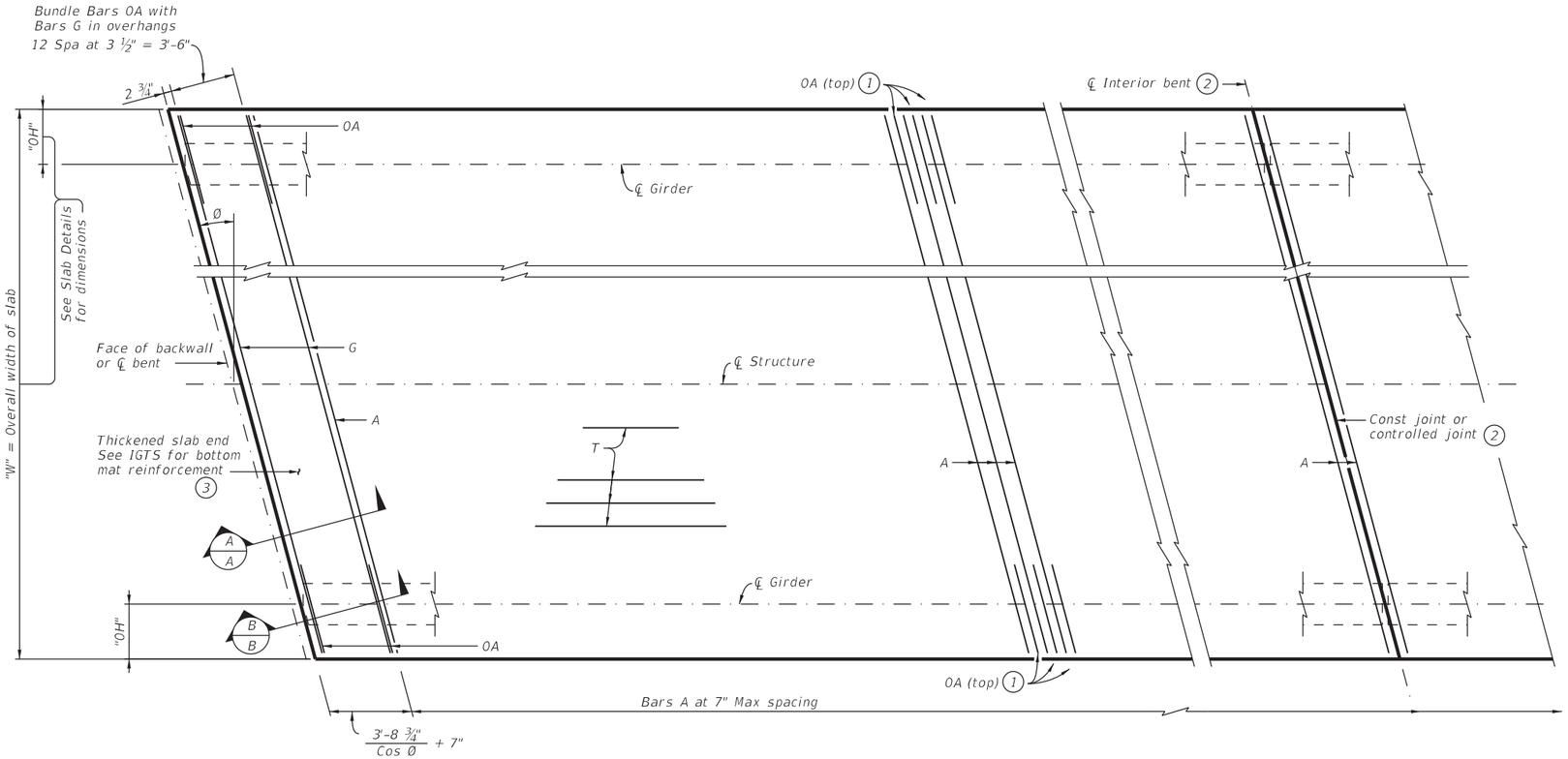
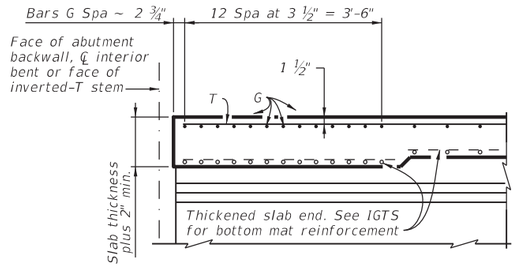


AT THICKENED SLAB END

AT SLAB CONTINUOUS OVER INTERIOR BENTS

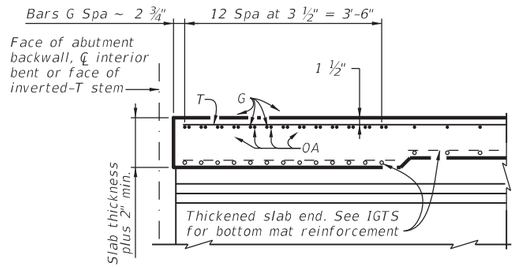
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.



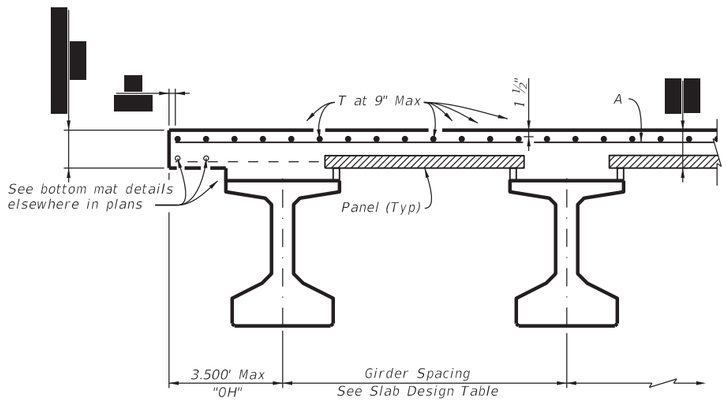
SECTION A-A

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

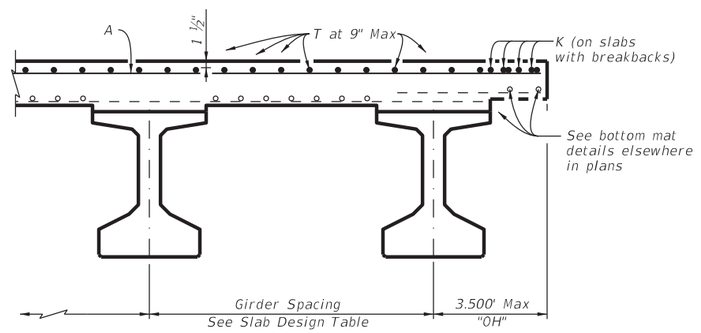


SECTION B-B

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



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT

PRESTRESSED CONC I-GIRDER SPANS

IGFRP

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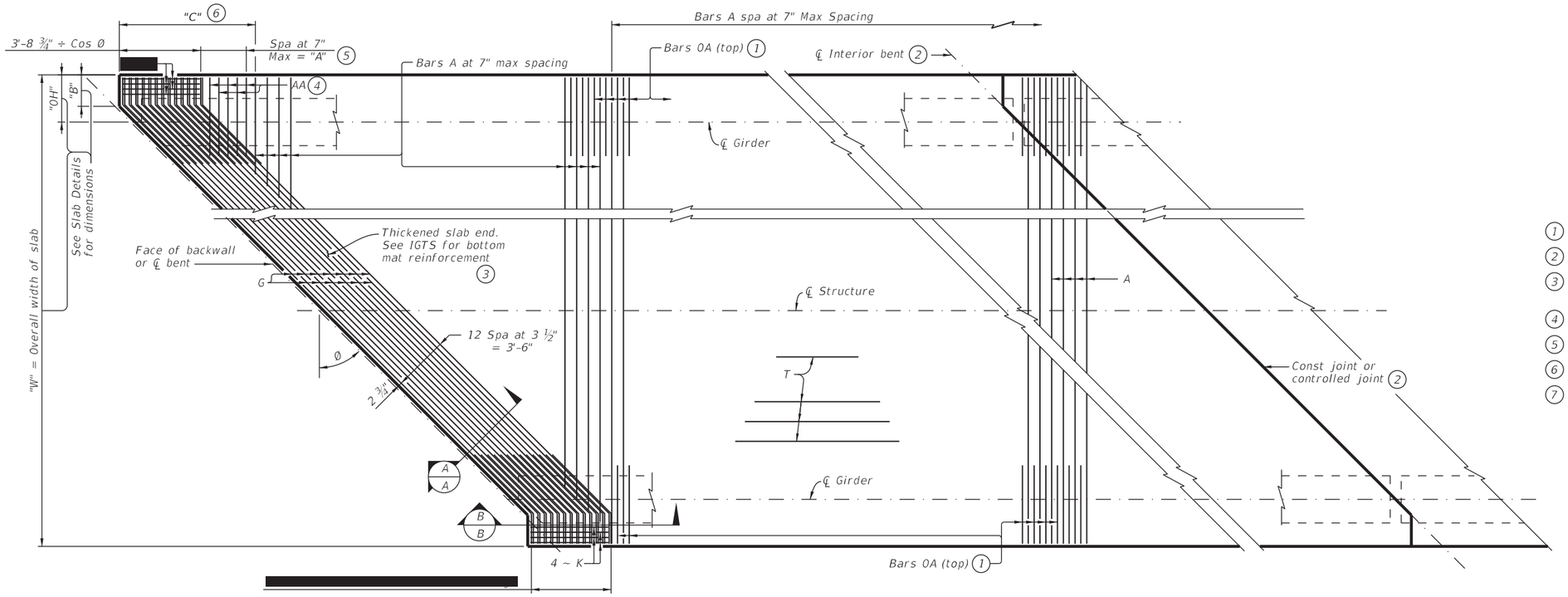
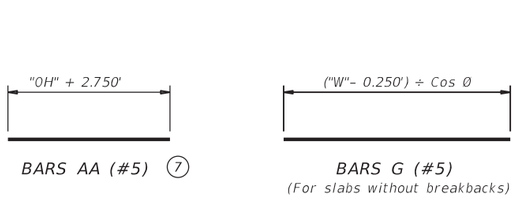


AT THICKENED SLAB END

PLAN FOR SLABS WITH BREAKBACKS

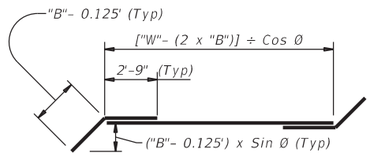
Showing top mat reinforcement only.

AT SLAB CONTINUOUS OVER INTERIOR BENTS

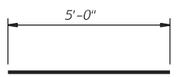


BARS AA (#5) (7)

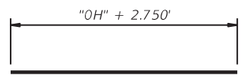
BARS G (#5)
(For slabs without breakbacks)



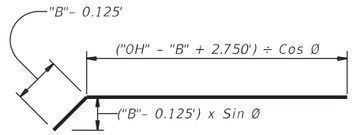
BARS G (#5)
(For slabs with breakbacks)



BARS K (#5) (7)



BARS OA (#5)



BARS OA (#5)
(For slabs with breakbacks)

BAR TABLE

BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
0A	#5
T	#5

(1) Place Bars 0A midway between Bars A at overhang.

(2) Bars are continuous through joint.

(3) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

(4) Tie Bars AA to bottom of Bars G in this location.

(5) A = ("0H" + 2.333' - "B") x Tan Ø

(6) $C = \frac{3.729'}{\text{Cos } Ø} + \text{"A"} + \text{Bar A spacing}$

(7) Only required on slabs with breakbacks.

GENERAL NOTES:

These details are restricted to Prestressed Concrete I-Girder spans with an 8 1/2" slab and up to a 10'-0" girder spacing.

These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).

This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.

The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

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

MATERIAL NOTES:

Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.

Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.

Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

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

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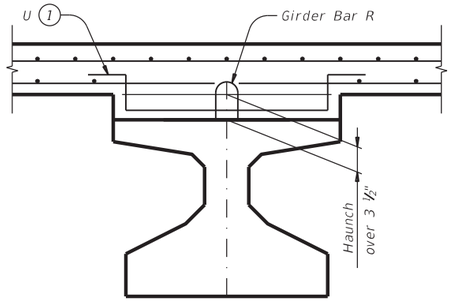
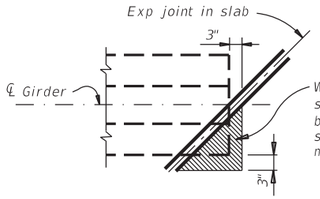
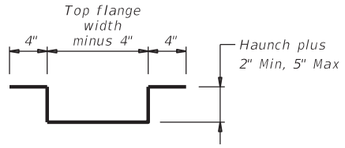


HAUNCH REINFORCING DETAIL

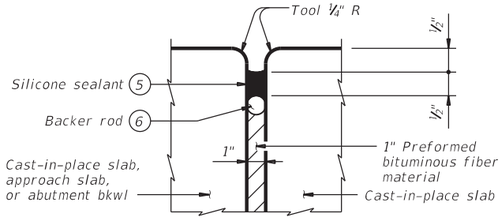


Where flanges project under slab of adjacent span, provide a minimum of ½" clearance between top of girder and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a filler.

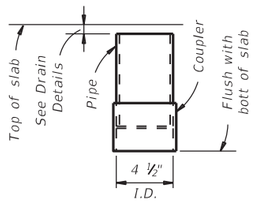
TREATMENT AT GIRDER END FOR SKEWED SPANS



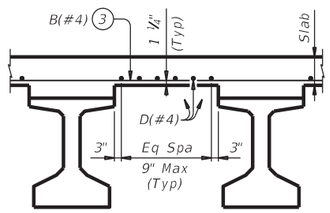
BARS U (#4)



TYPE A JOINT DETAIL (7)

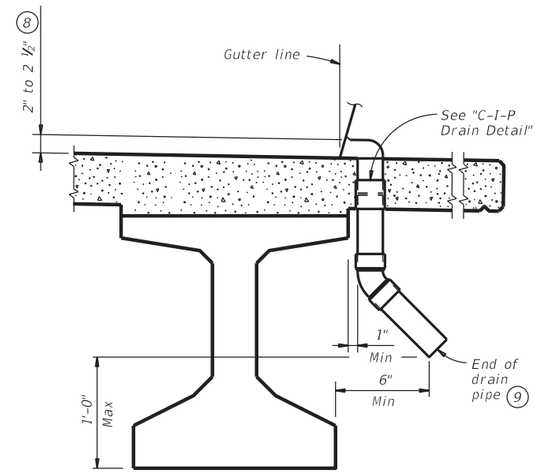


C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



DRAIN DETAIL (10)

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 ½".

(2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

(4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(5) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(6) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

(10) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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REVISIONS	0902	20	102	CR 1590
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
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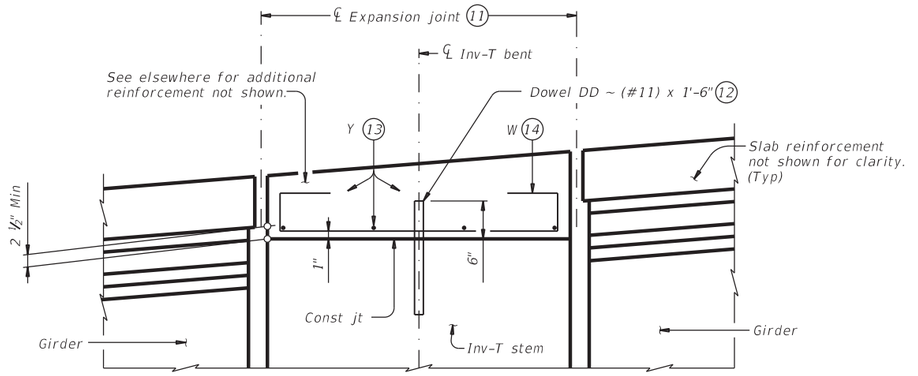
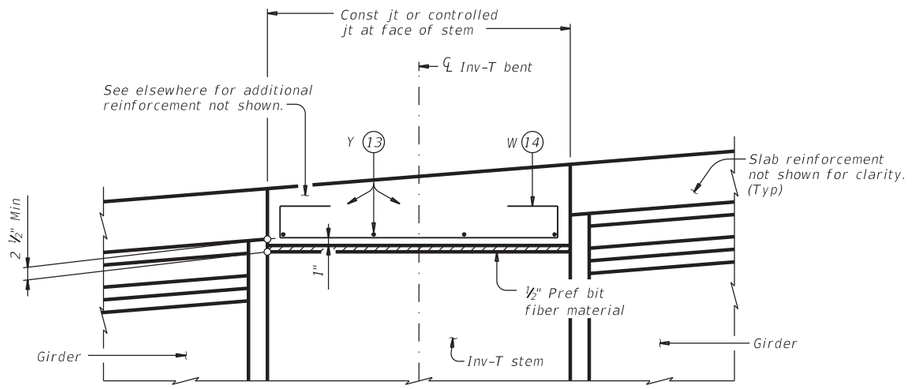
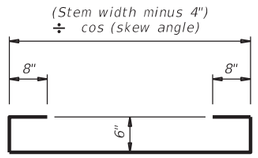


SHOWING EXPANSION JOINTS

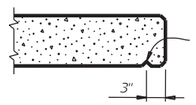


SHOWING CONST JTS OR CONTROLLED JTS

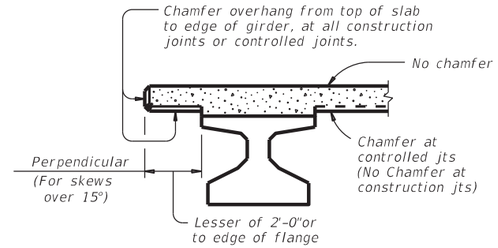
REINFORCEMENT OVER INV-T BENTS



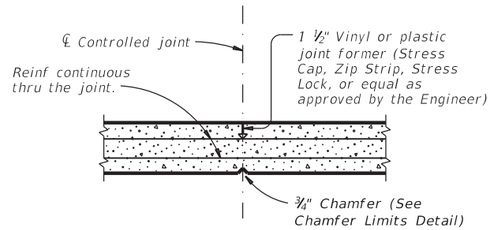
BARS W (#4)



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.

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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmsstsl-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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REVISIONS	0902	20	102	CR 1590
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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
Cr 1590 at Big Sandy Creek	1	1-4	Tx28		26	0.6	270	9.56	6.48	4	24.5	5.600	6.200	3.301	-4.041	2934	0.553	0.719

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

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

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

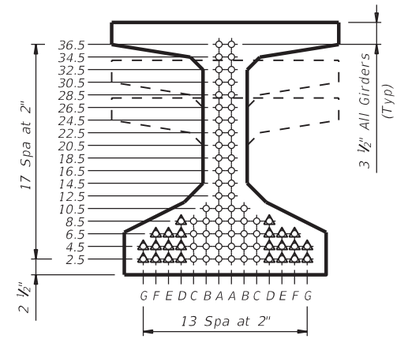
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

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

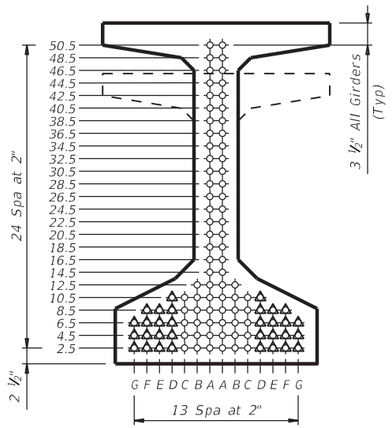
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must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

DEPRESSED STRAND DESIGNS:

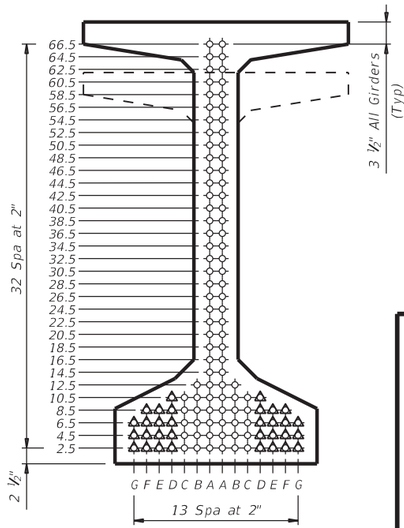
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands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



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

STATE OF TEXAS
ALFREDO VALLES
76497
REGISTERED PROFESSIONAL ENGINEER

Alfredo Valles, P.E.
06/06/2022

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: IGND.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
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REVISIONS: 10-19: Modified for depressed strands only.	0902	20	102	CR 1590
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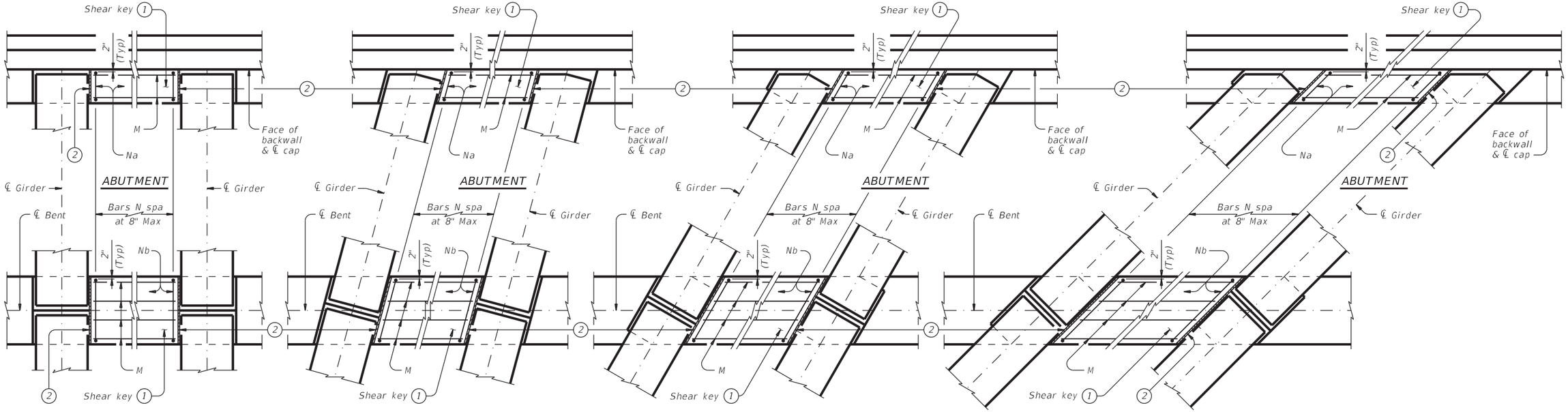


PARTIAL PLANS WITH NO SKEW

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

PARTIAL PLANS WITH 15° SKEW

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

PARTIAL PLANS WITH 30° SKEW

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

PARTIAL PLANS WITH 45° SKEW

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

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

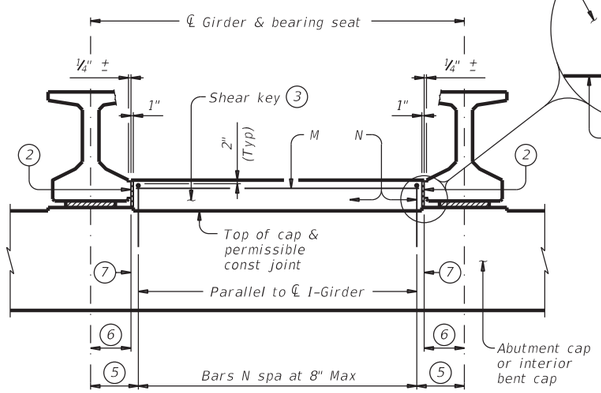
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

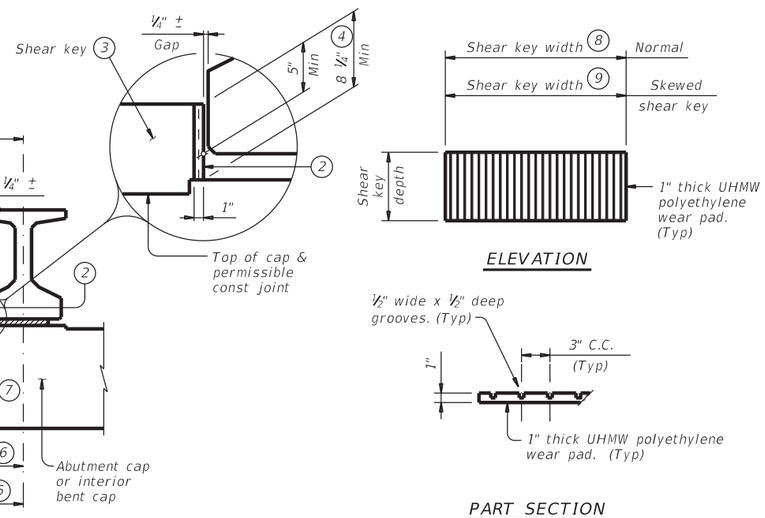
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

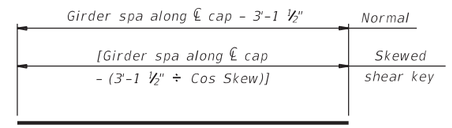


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

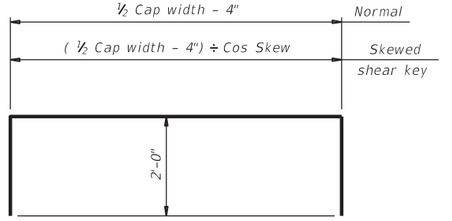
Showing shear key with girder Type Tx46.
Other I-Girder types similar.



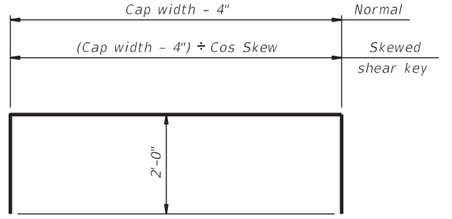
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

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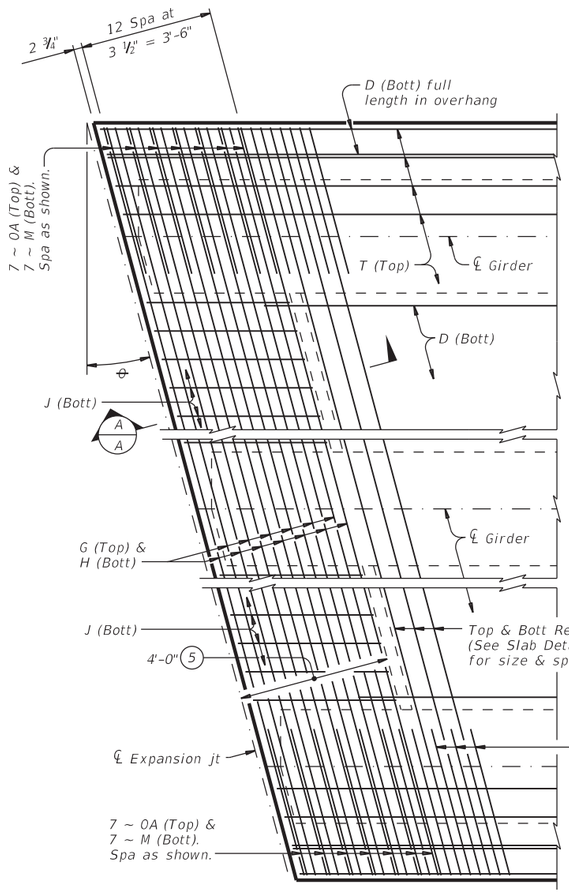
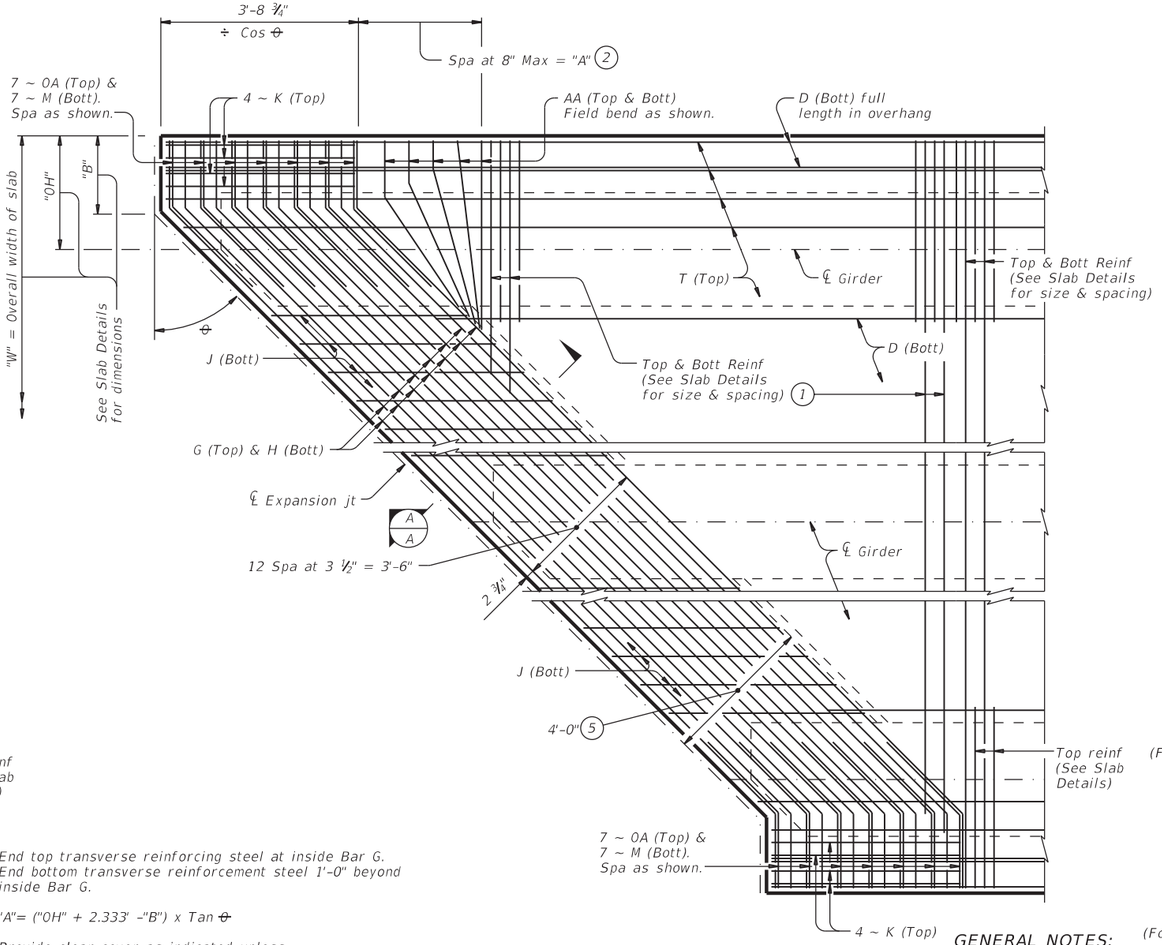


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

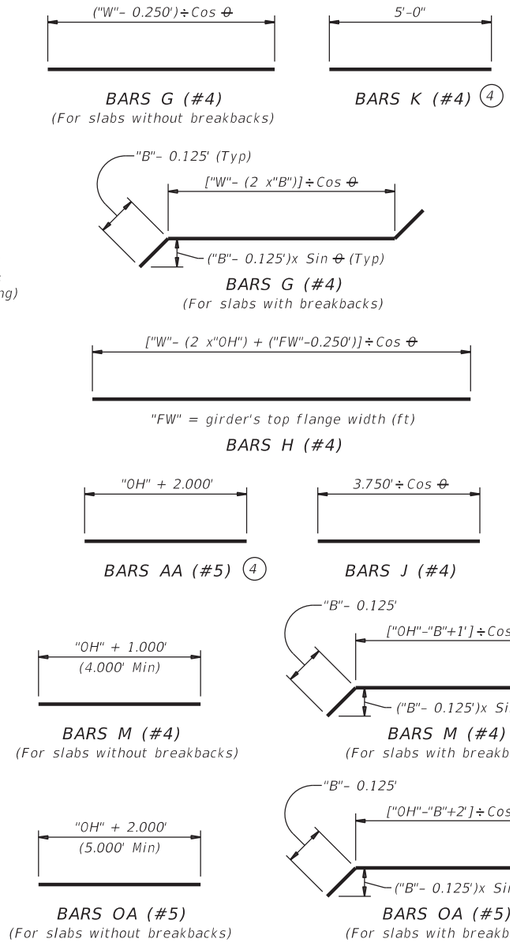
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 2.333' -"B") x Tan θ

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

(5) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



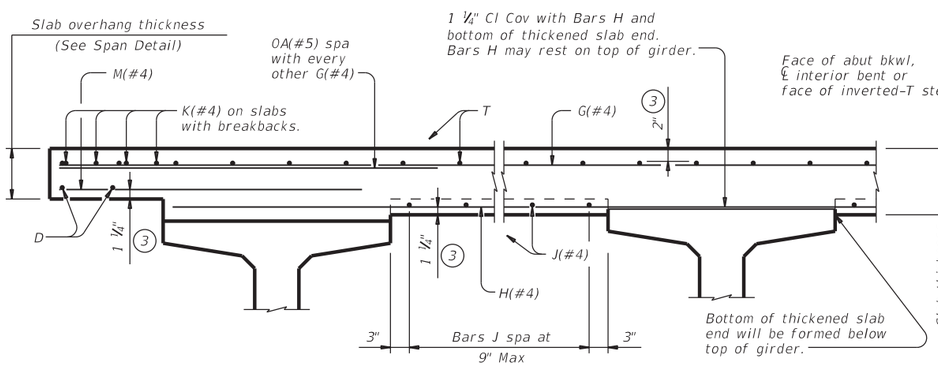
GENERAL NOTES:

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 0A 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 0A must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

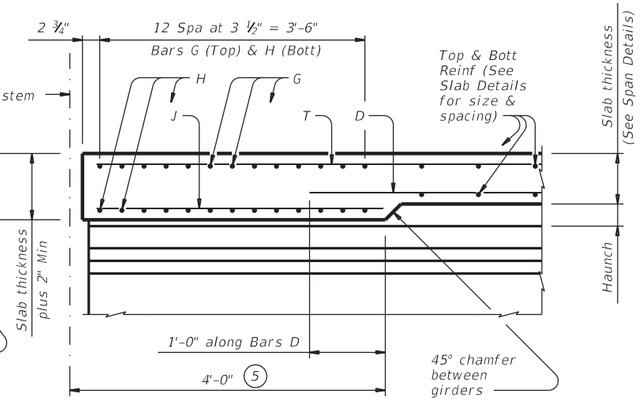
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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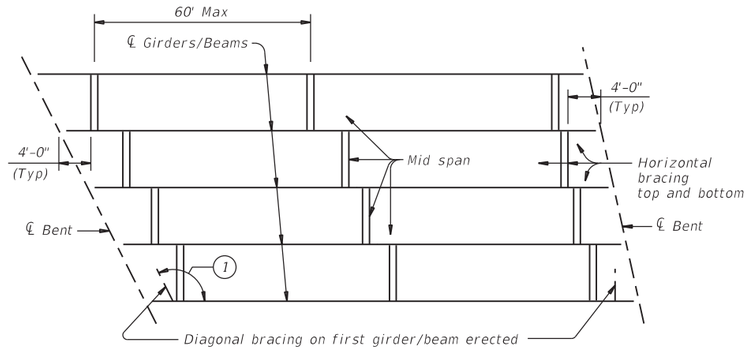
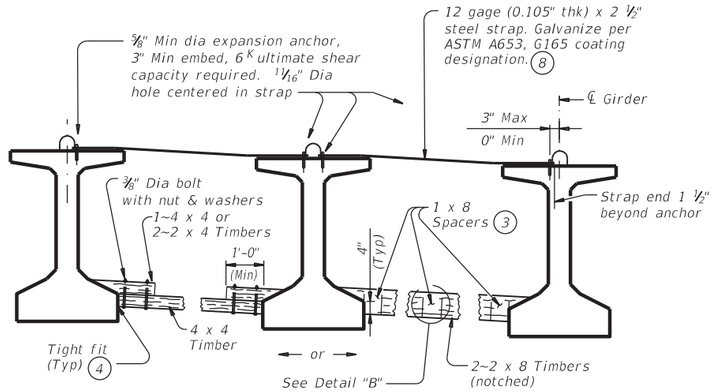
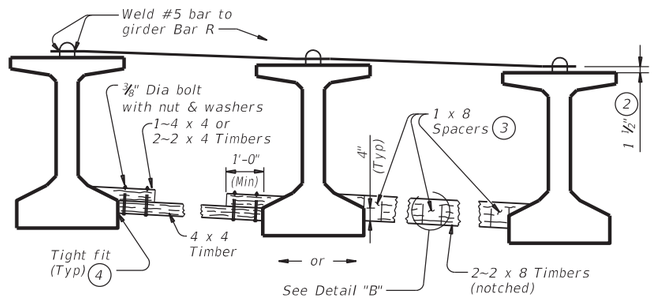


ERECTION BRACING



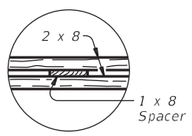
FOR ERECTION BRACING, OPTION 1

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



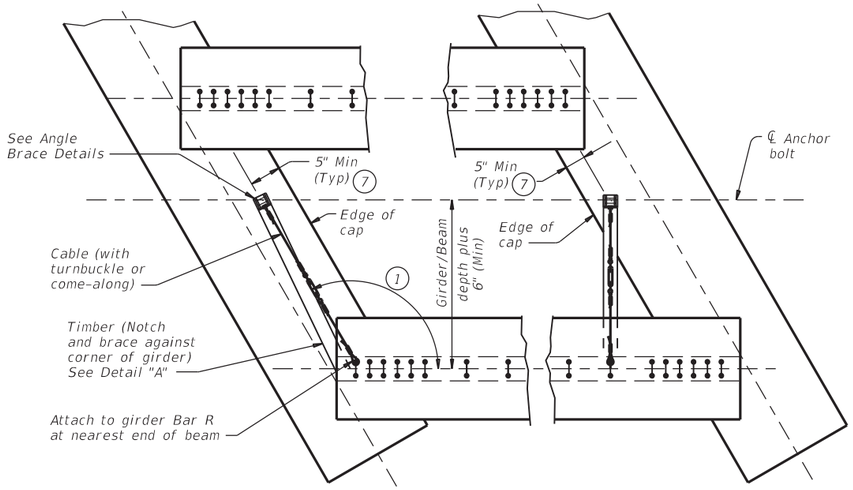
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

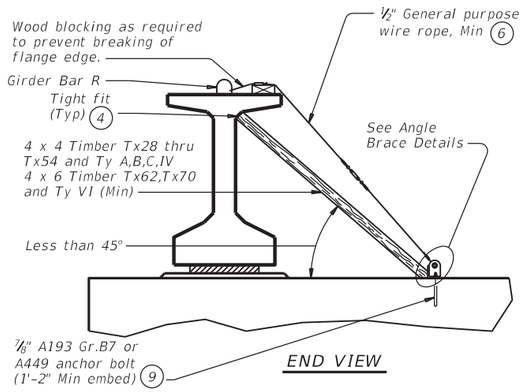


PLAN

DETAIL "B"



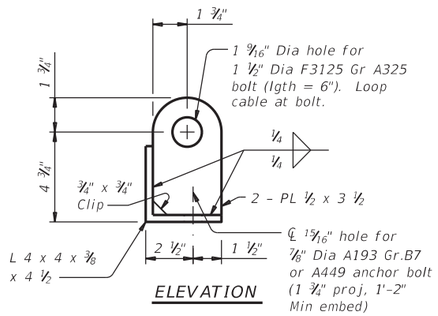
PLAN



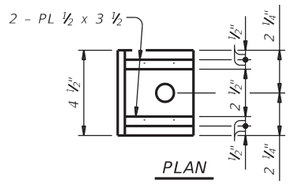
END VIEW

DIAGONAL BRACING DETAILS (5)

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



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

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

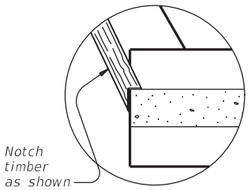
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

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



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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	DIST	COUNTY		SHEET NO.
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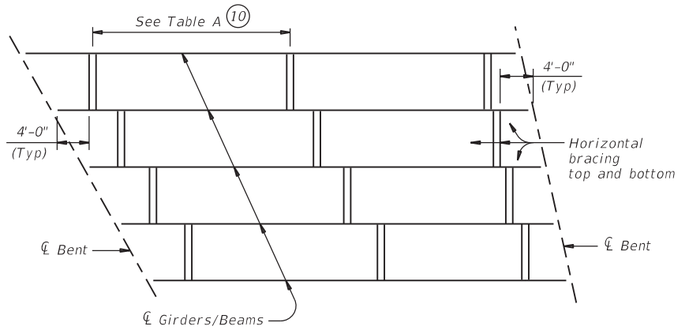


SLAB PLACEMENT BRACING

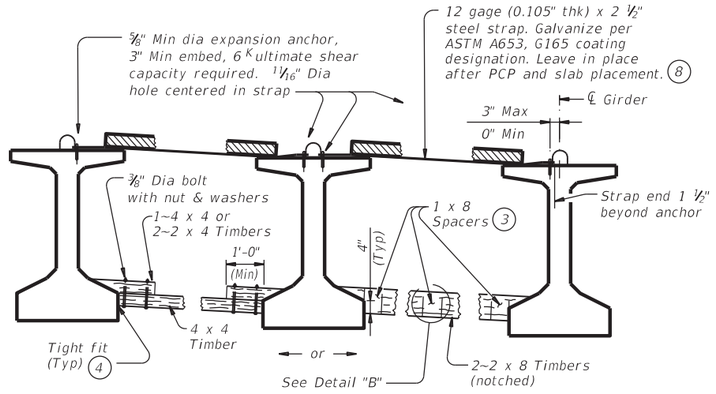
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

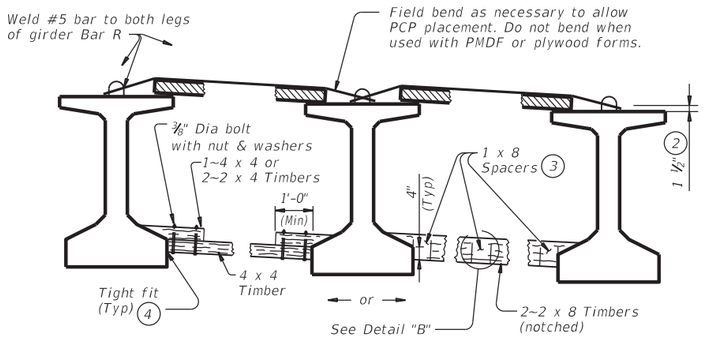
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



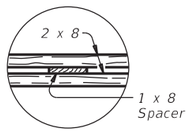
FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

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



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)



PLAN

DETAIL "B"

HORIZONTAL BRACING DETAILS (5)

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(10) Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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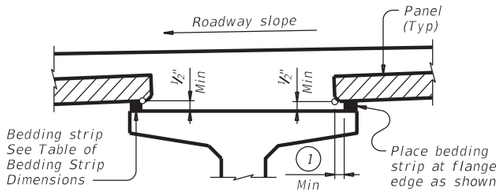
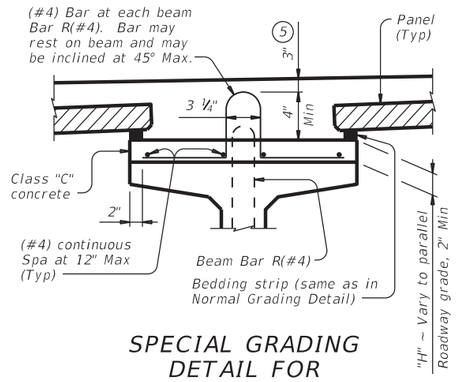


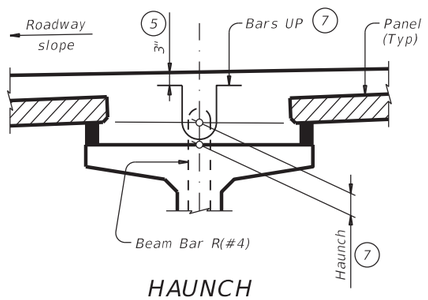
NORMAL GRADING DETAIL (3)

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



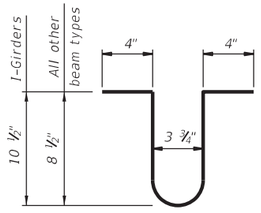
SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

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

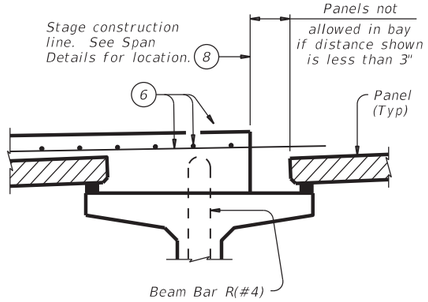


HAUNCH REINFORCING DETAIL

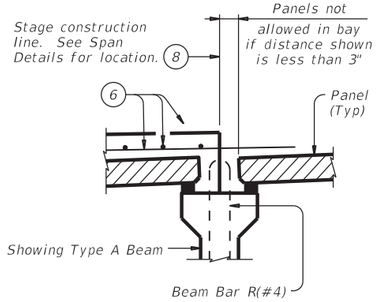
Showing prestressed concrete I-girders.
(Other beam types similar)



BARS UP (#4) (7)



PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS

WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" Min for all other beam types.

(2) Allowed for I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

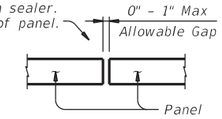
(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

(8) Do not locate construction joints on top of a panel.

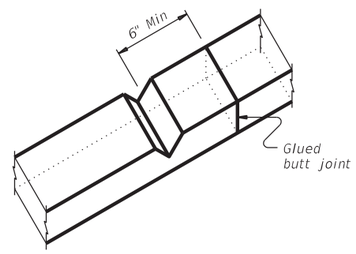
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

Seal joint between panels when gap exceeds ¼" with polyurethane sealant or expanding foam sealer. Make seal flush with top of panel.



PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

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SHEET 1 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

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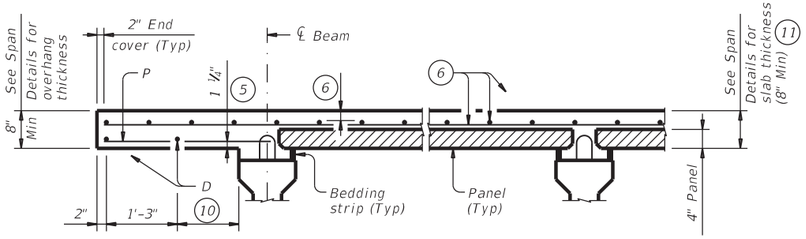
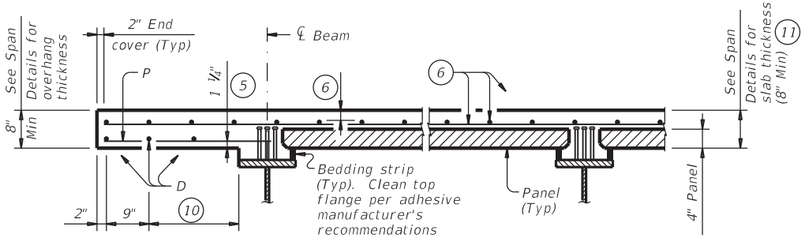
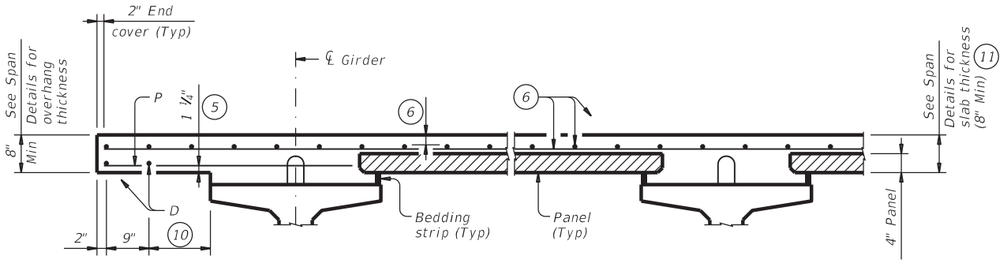


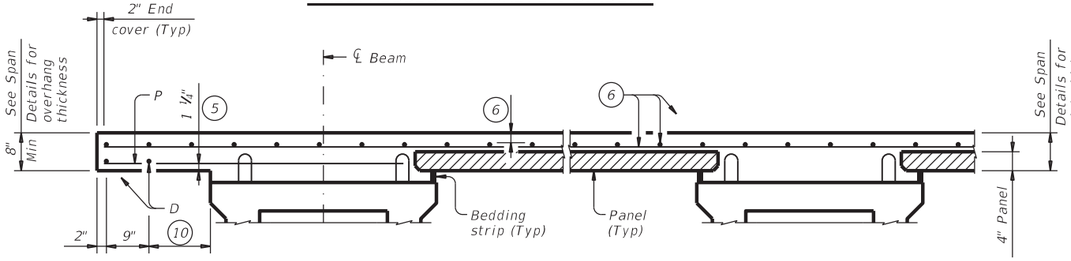
PRESTRESSED CONCRETE I-BEAMS



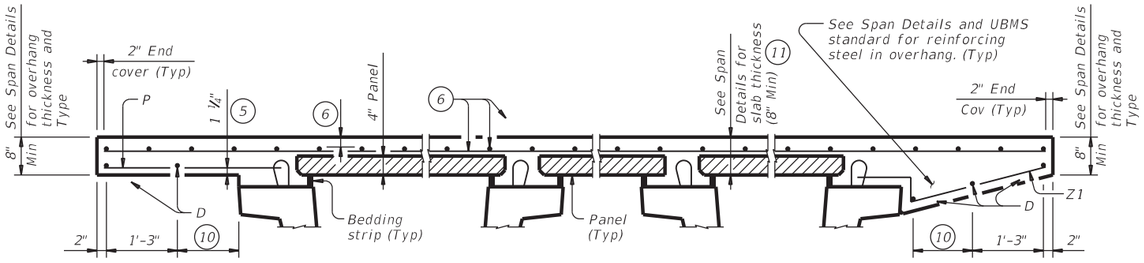
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



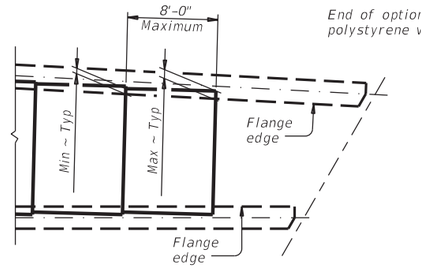
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

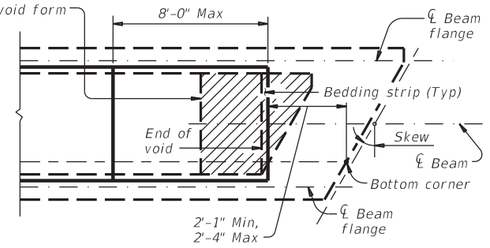
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

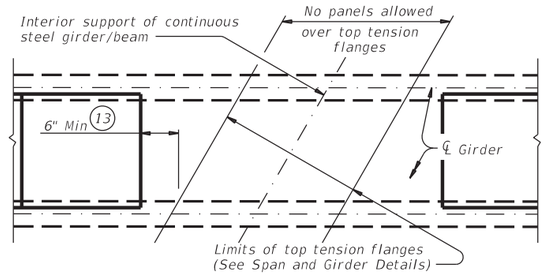


AT FLARED BEAMS OR GIRDERS

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



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

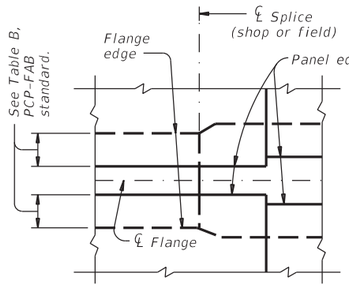
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

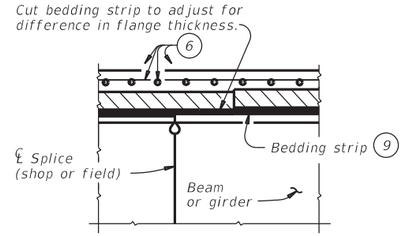
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



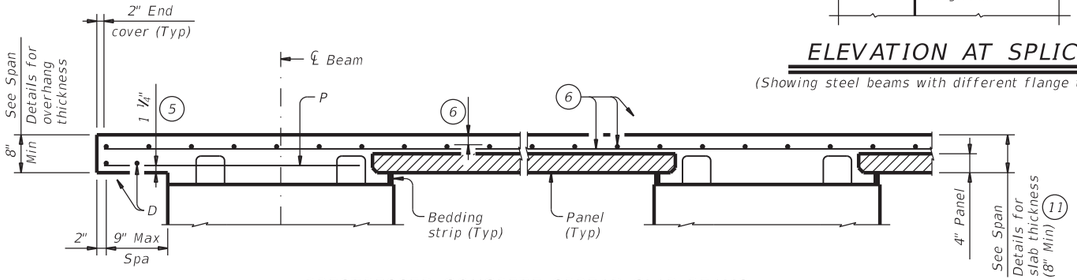
PLAN AT SPLICE

(Showing steel beams with flange width transition)



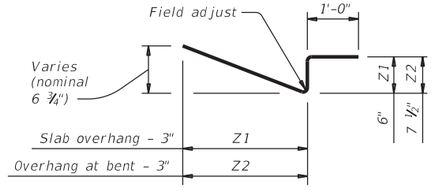
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

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



BARS Z (#4) (12)

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Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

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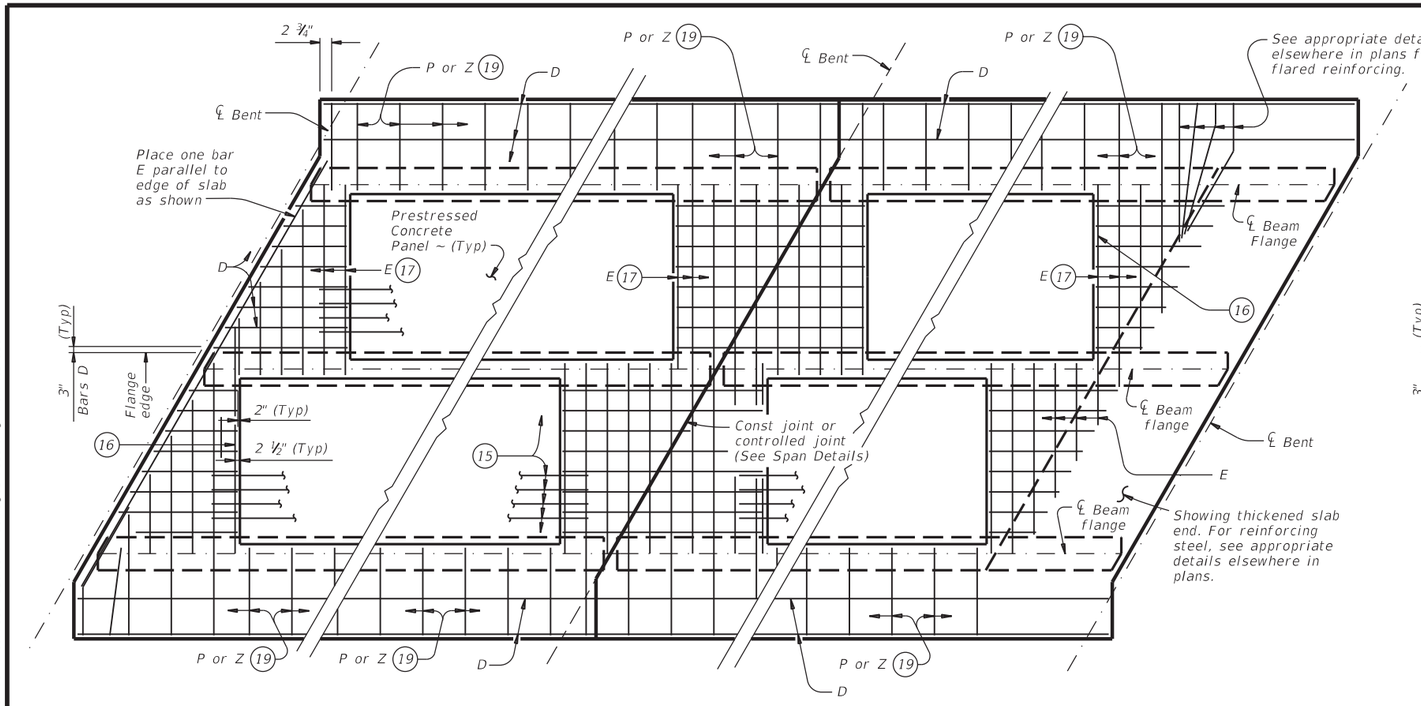
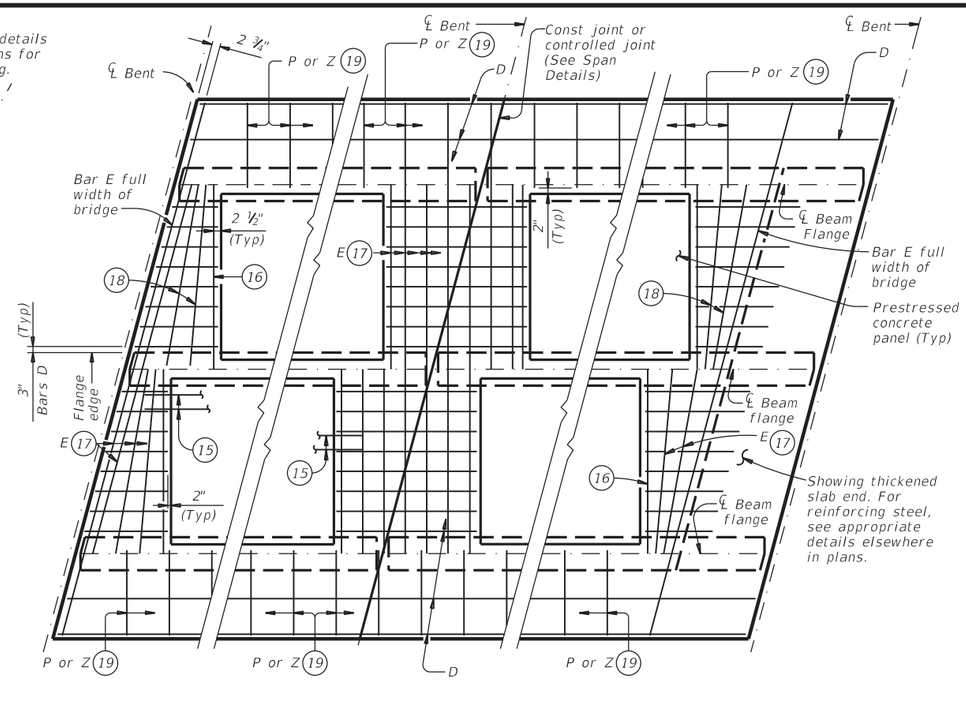


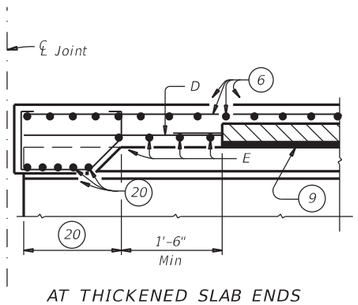
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

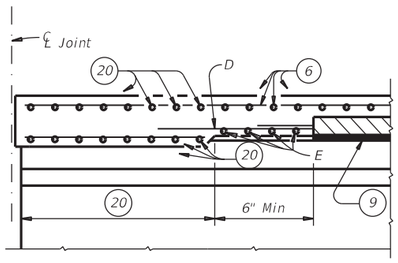


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

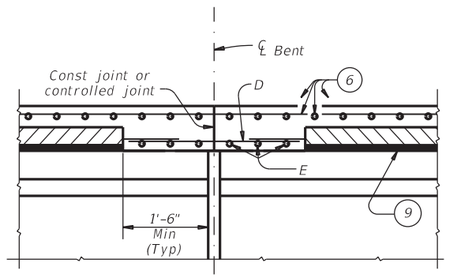
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



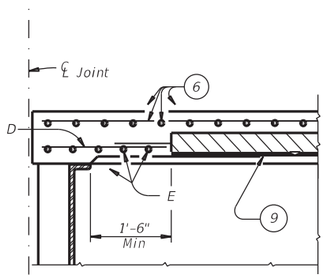
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



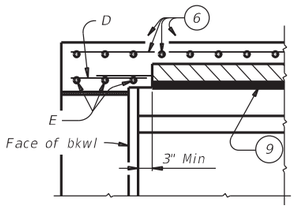
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



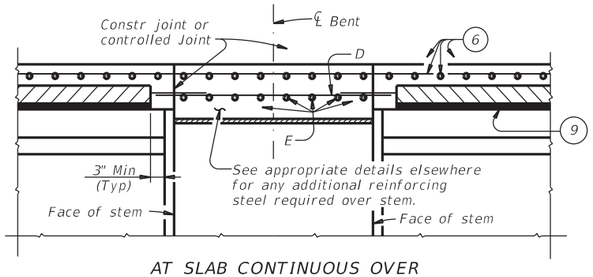
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

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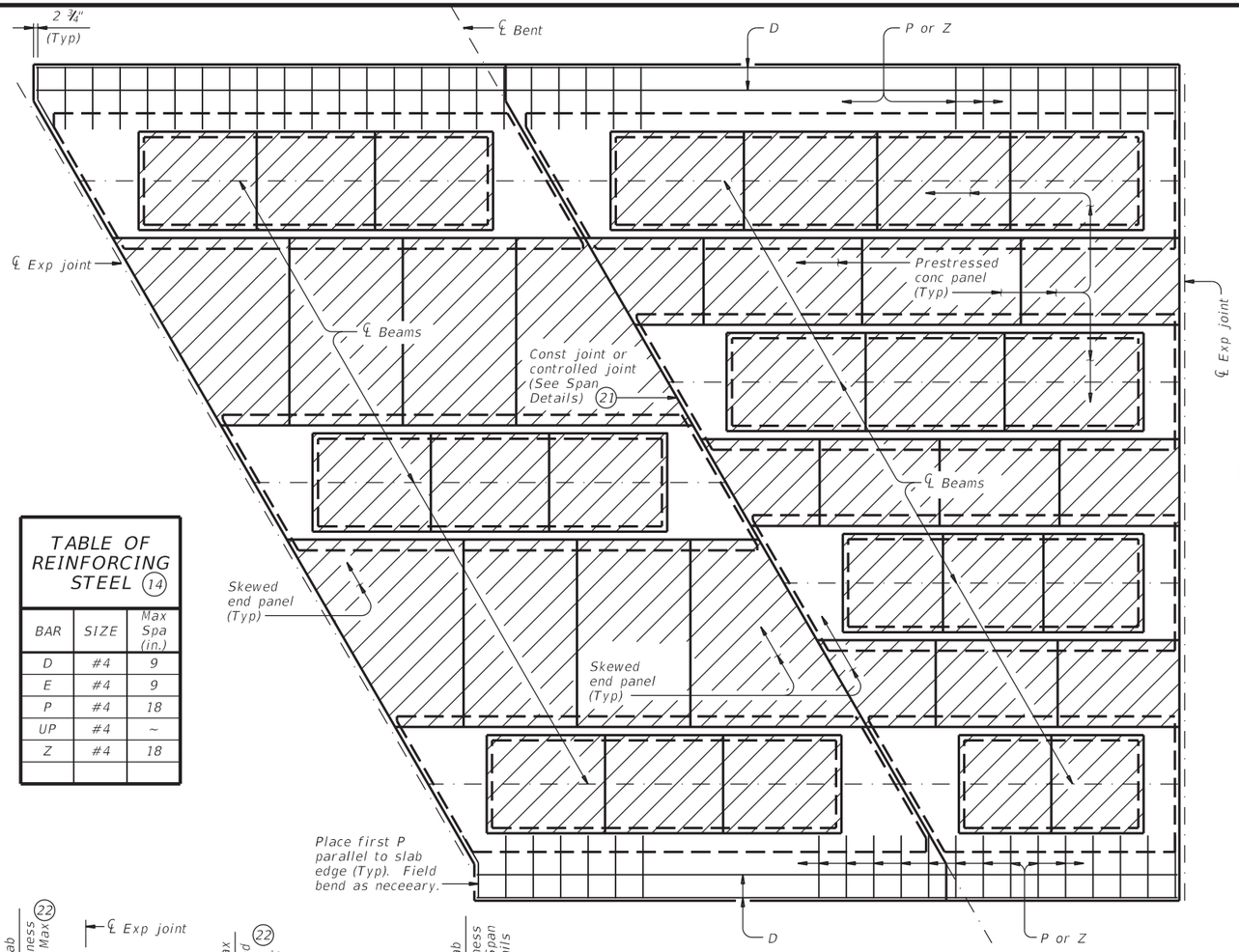
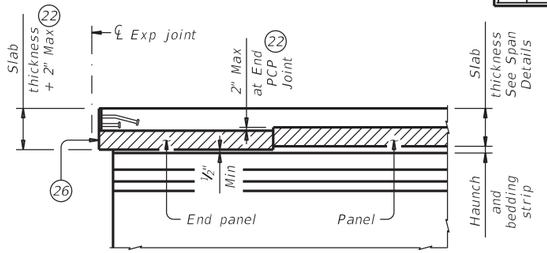


OPTION 2 ~ PLAN OF SLAB

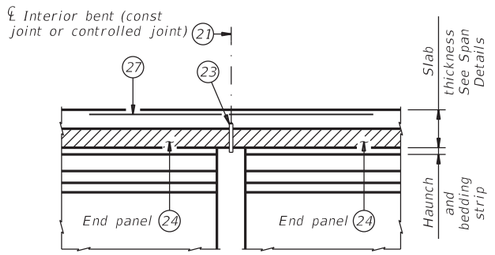
(Showing U-Beams; other beams similar)

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



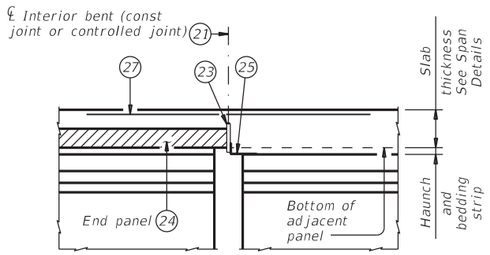
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



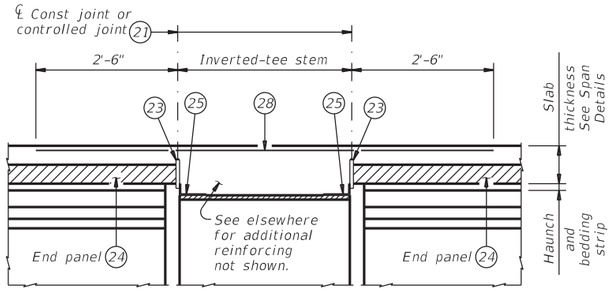
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

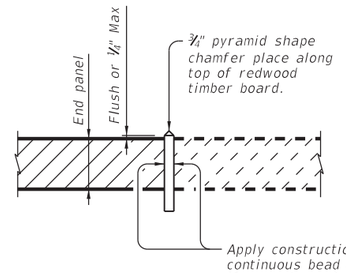
Panel against beam/girder end in adacent span.



INVERTED-T BENT

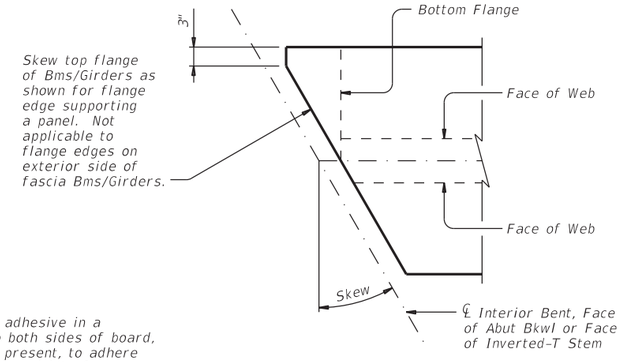
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



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

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ½" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and OA from standard IGTS in the slab.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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DATE:
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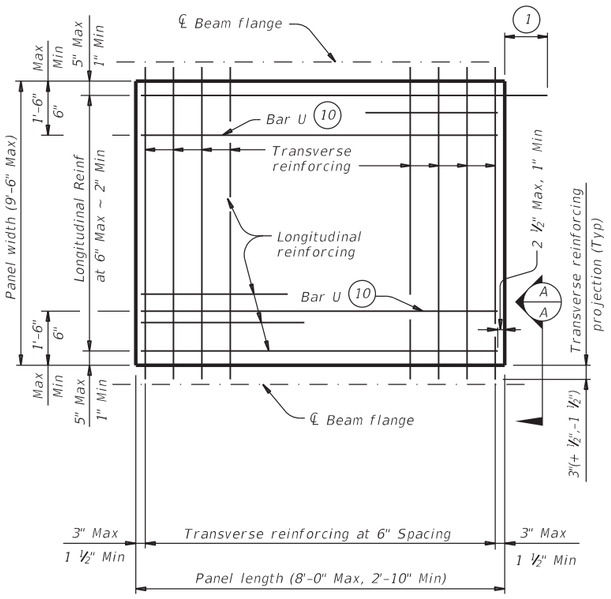
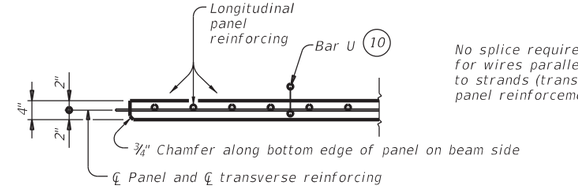
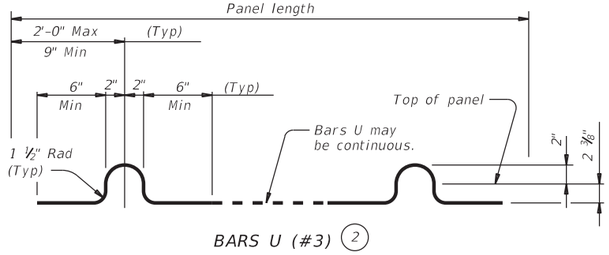


TYPICAL NON-SKEWED PANEL PLAN

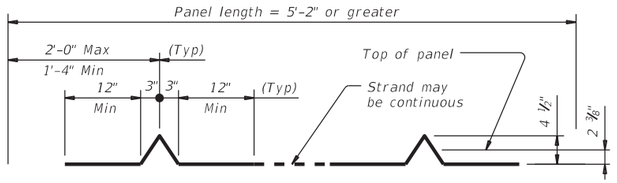


SECTION A-A

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

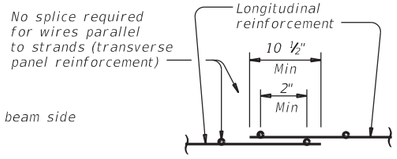


BARS U (#3) 2



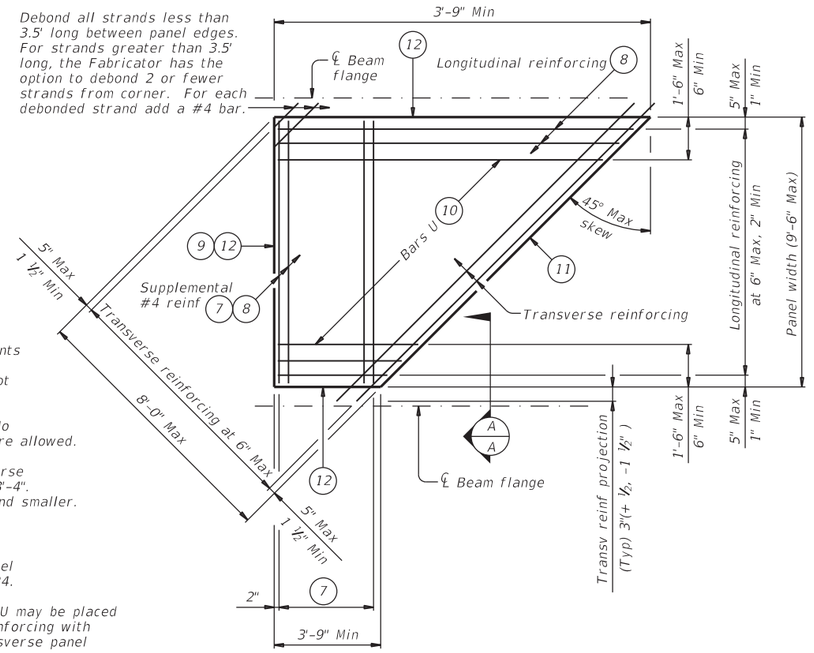
OPTIONAL STRAND FOR BARS U 3

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.



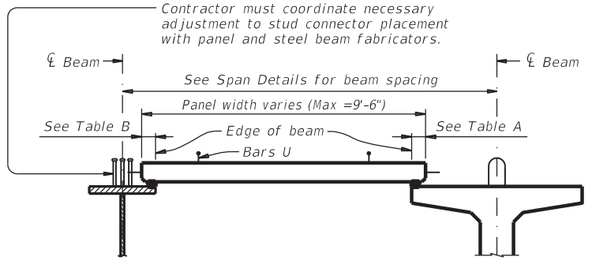
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL 6

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.



TYPICAL SKEWED END PANEL PLAN

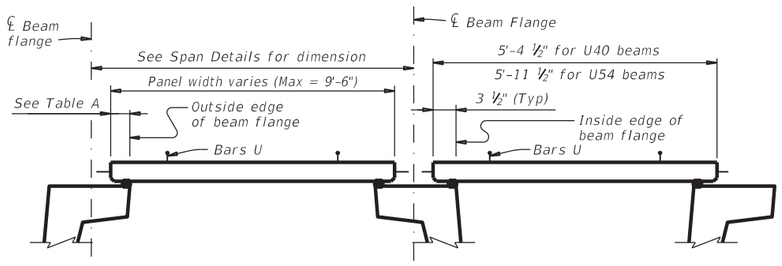
(Only to be used with details shown elsewhere in the plans.)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

FILE: pcpstde2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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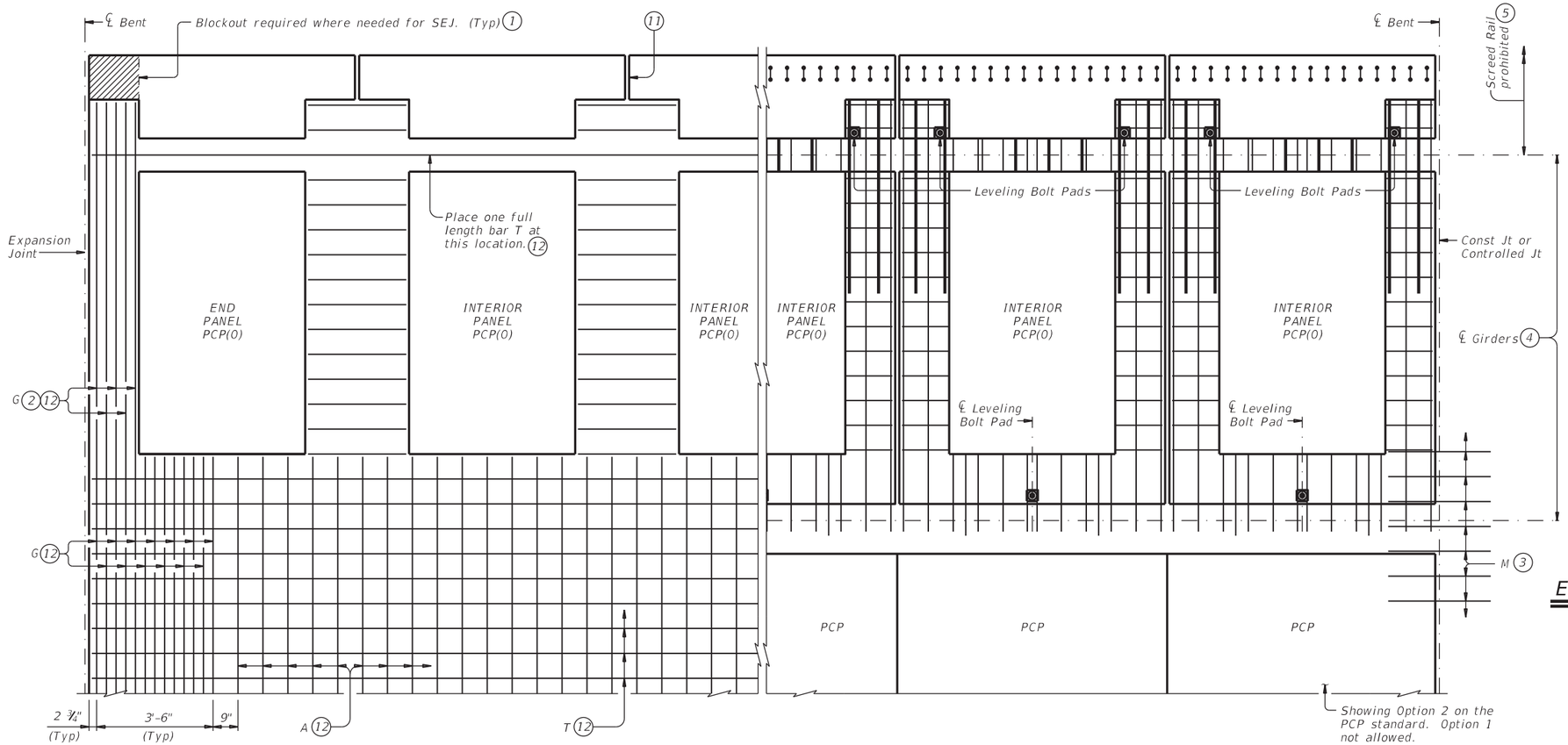


SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

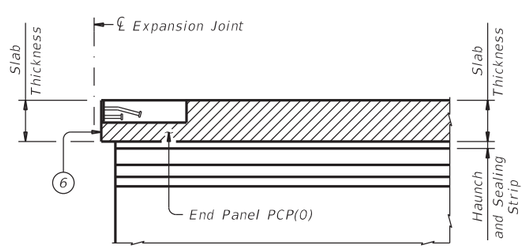
SHOWING PCP(0) EXPOSED REINFORCING STEEL

Field placed bars M shown for clarity.

PANEL LAYOUT

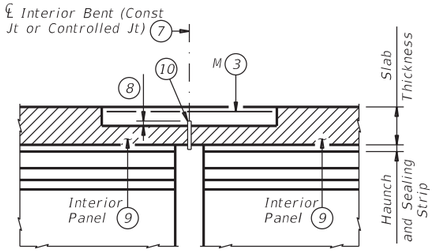
PCP(0) shown with gaps between panels for clarity.
The gap cannot be considered as a panel fabrication tolerance.

1. 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
2. When blockout is required, extend bars G into blockout.
3. Place additional bars M 2'-11" in length on top of bars A and between every bar T. Center bars M at center of bent. Located at bents with construction joints or controlled joints only. Bars M may replace additional (#4) bars 5'-0" in length as shown on PCP standard in Option 2 ~ Elevations At Beam Ends. Option 1 not allowed.
4. It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.
5. Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
6. Place end panel PCP(0) within ½" of expansion joint opening. Do not encroach on required expansion joint opening.
7. Top Plastic Joint Former at Controlled Joints (Stress Cap, Zip Strip, Stress Lock, etc.) is not required with these Details.
8. 0" Min, ¾" Max, support as necessary.
9. Place panel within ½" of ¾" thick board.
10. ¾" thick wood/timber board, leave in place. Place straight, within ¼" of Centerline of Bent, across bridge width and end board at exterior flange edge of fascia girders. Do not extend into overhang.
11. Seal top of panel only, with a Class 4 sealant prior to rail construction. Typical between panels. Do not seal at Expansion Joints.
12. 1 ½" End Cover. (Typ)



EXPANSION JOINT

For SEJ-A, SEJ-S(0), AJ and Type A Expansion Joints only.

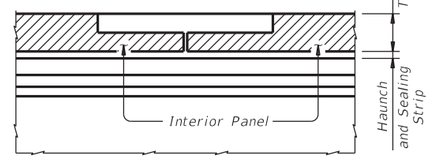


CONST JT OR CONTROLLED JT

Panel against Panel between Bms/Girders.

ELEVATIONS AT GIRDER ENDS WITH PCP(O)

Reinforcing steel not shown for clarity.



ELEVATION BETWEEN PCP(O)

The gap cannot be considered as a panel fabrication tolerance.
Reinforcing steel not shown for clarity.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		84

DATE:
FILE:

BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12)(17)	#4	9"
G (12)(17)	#4	3½"
M	#4	9"
T (12)(17)	#4	9"

(4) It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

(5) Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.

(12) 1 ½" End Cover on bars. (Typ)

(13) Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 ½" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.

(14) 6" plus or minus.

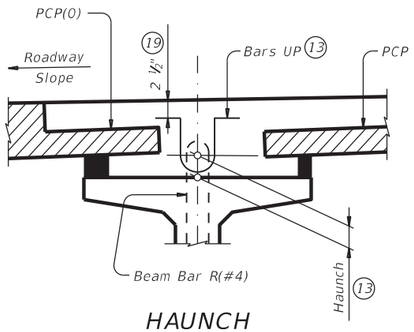
(15) Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and compress to grade.

(16) (#3) Panel bars F must be field bent and welded to the R bars in girder. Two bars F per panel.

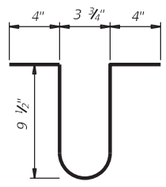
(17) Field placed bars that are allowed to be lapped. Reinforcing steel that protrudes from panels are not considered bars to be lapped. See "Material Notes" for applicable bar laps.

(18) ℄ Leveling Bolt Pad. 1" Dia Coil Rod or 1" Dia Coil Bolt shown, are furnished by the contractor. After grading each PCP(0) panel with the 1" Dia coil rods or coil bolts, secure each panel in its final resting position (plastic shims, welding, etc) and remove all 1" Dia coil rods or coil bolts for the cast-in-place concrete. Coil rods/bolts may be left in place at contractor's option. If coil rods/bolts are left in place, coil rods/bolts must have at least 2 ½" of cover to top of finish grade. Grading bolts are inadequate to carry all conceivable screed/construction loads. Panel support method must be calculated, location identified, and placed on shop drawings. Method chosen to support panels must be adequate for all construction loads. Panel support method must be placed/constructed after final grading and before screed rail placement.

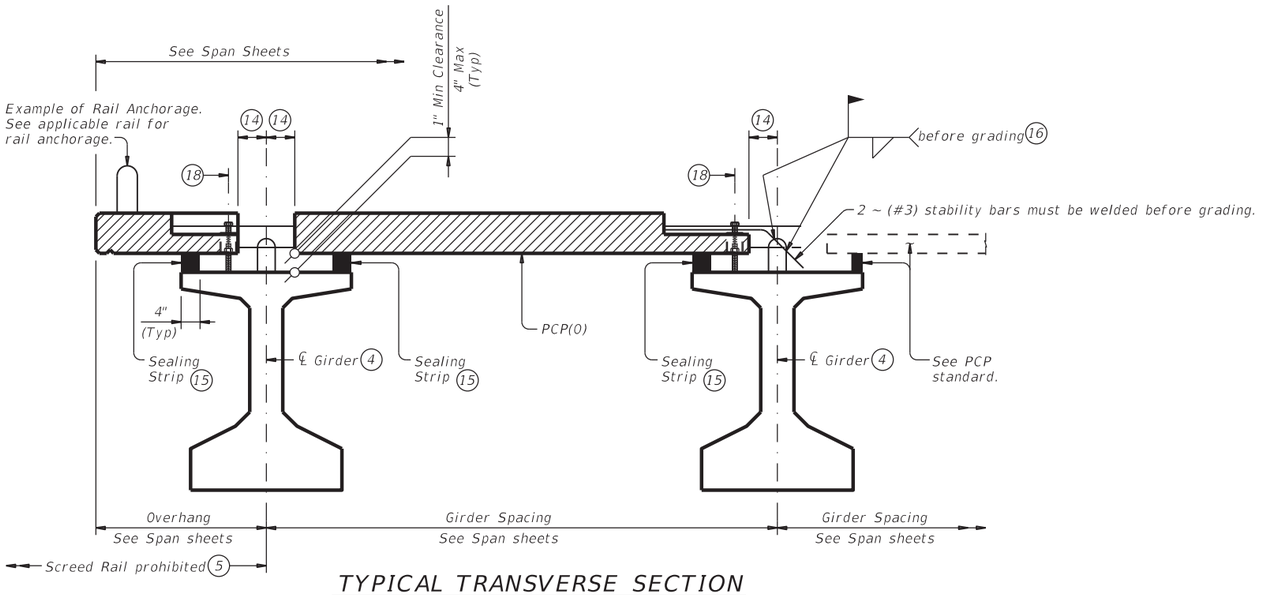
(19) Unless shown otherwise on Span Details.



HAUNCH REINFORCING DETAIL (4)



BARS UP (#4) (13)



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION NOTES:

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended.

Ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Place sealing strips at girder flange edges so that adequate space is provided for the mortar to flow a minimum of 8" transversely under the panels as the slab concrete is placed.

Panel placement with Option 1 on the PCP standard is not allowed.

It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

To allow the proper amount of mortar to flow between girder and panel, maintain a minimum vertical opening of 1". Roadway cross-slope reduces the opening available for entry of the mortar. Sealing strips vary in thickness along girder are therefore required.

Seal the top panel with a Class 4 sealant as shown in the Panel Layout.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the reinforcing steel is shown on the Span Details to be epoxy coated, then epoxy coat bars A, G, M, & T.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

Provide sealing strips comprised of one layer low density polyurethane (1.0 Lbs density) foam sealing strips or equivalent. Oversize the height of sealing strips by 2". Bond sealing strips to the girder with 3M Scotch ® 4693 or equivalent adhesive compatible with sealing strips.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details can be used as an option to construct the deck overhang when noted on the Span details and in conjunction with the PCP(0)-FAB, PCP and applicable Standard sheets.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement or concrete required on these details is subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

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REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		85

DATE:
FILE:

BAR TABLE	
BAR	SIZE
A (2)	#4
B (2)	#4
D (2) (3)	#4
F (3)	#3
G (2)	#4
H (2)	#4
K (2) (3)	#8
T (2) (3)	#4

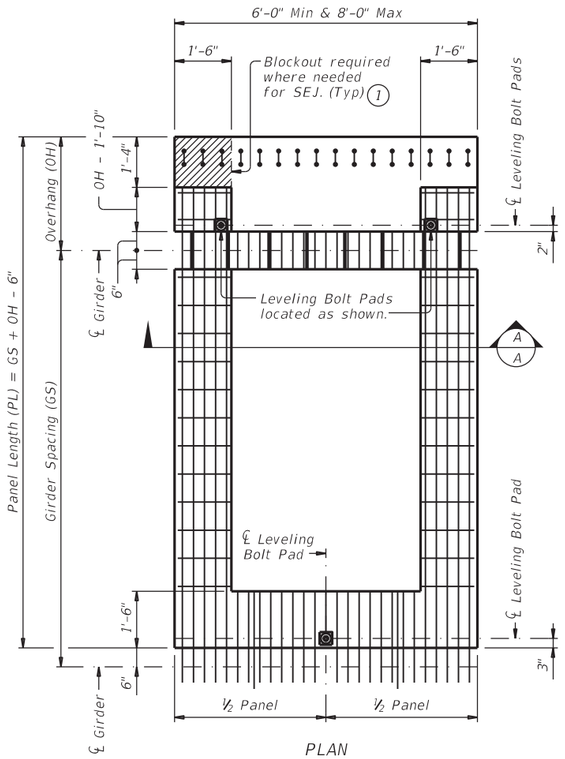
(1) 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.

(2) 1 ½" End Cover on bars. (Typ)

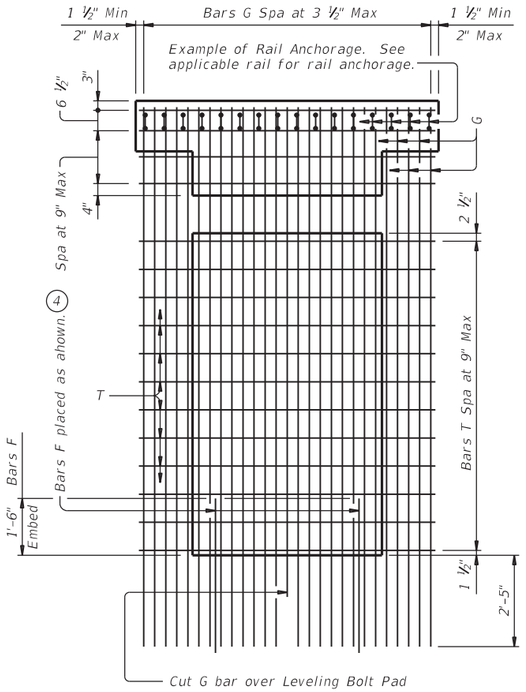
(3) Bars that are not allowed to have lap splices.

(4) Place F bars under bars T and against bars G.

(5) Place F bars under bars T and between bars A.

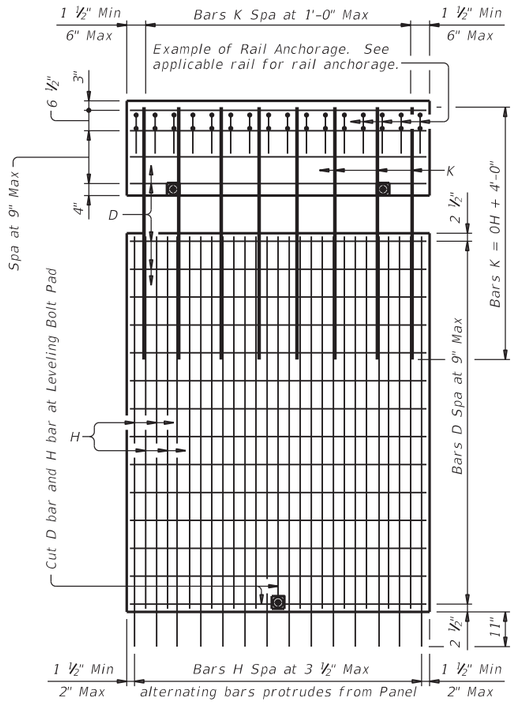


PLAN

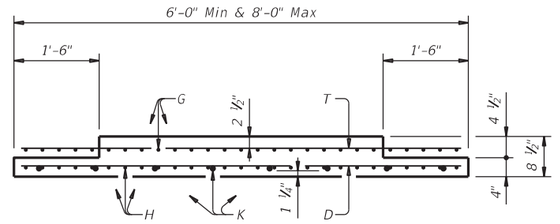


TOP REINFORCING STEEL

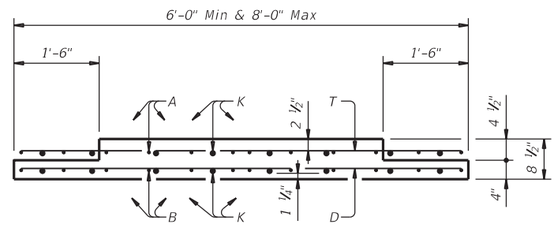
END PANEL



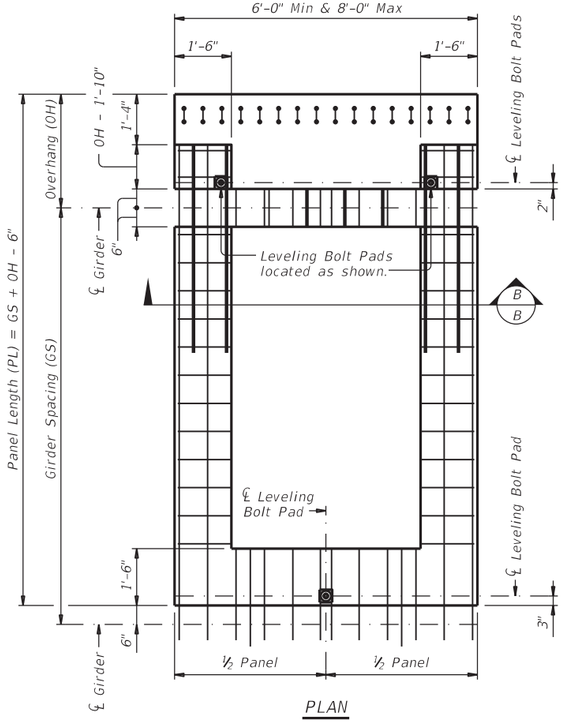
BOTTOM REINFORCING STEEL



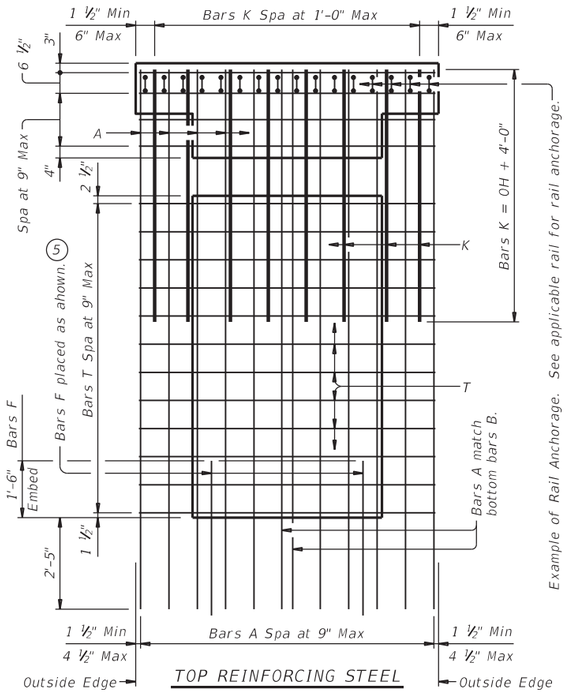
SECTION A-A



SECTION B-B

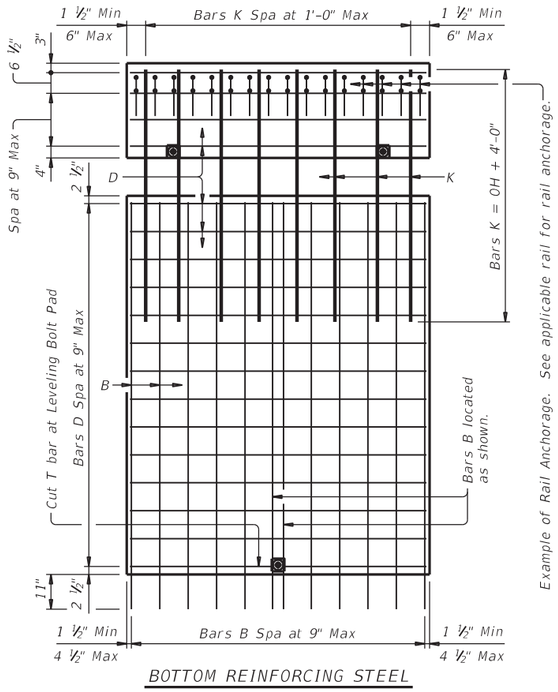


PLAN



TOP REINFORCING STEEL

INTERIOR PANEL



BOTTOM REINFORCING STEEL

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

FILE: pcpostd2-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
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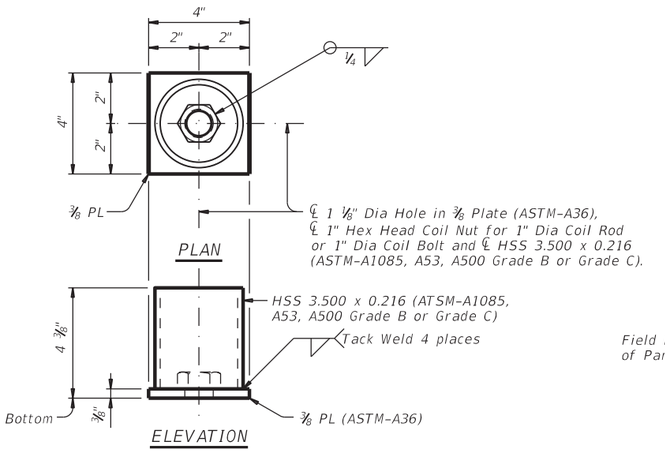
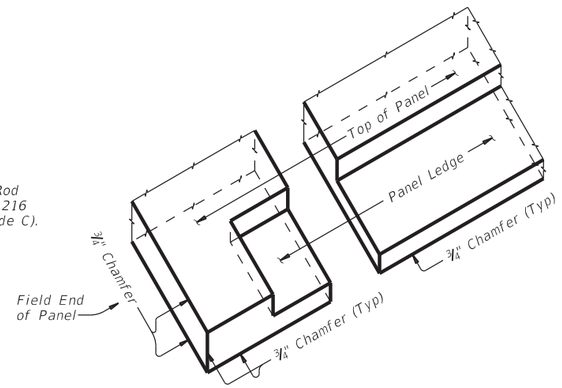


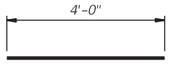
LEVELING BOLT PAD DETAILS

Galvanize if epoxy coated reinforcing steel is used in slab. Do not oil this assembly.

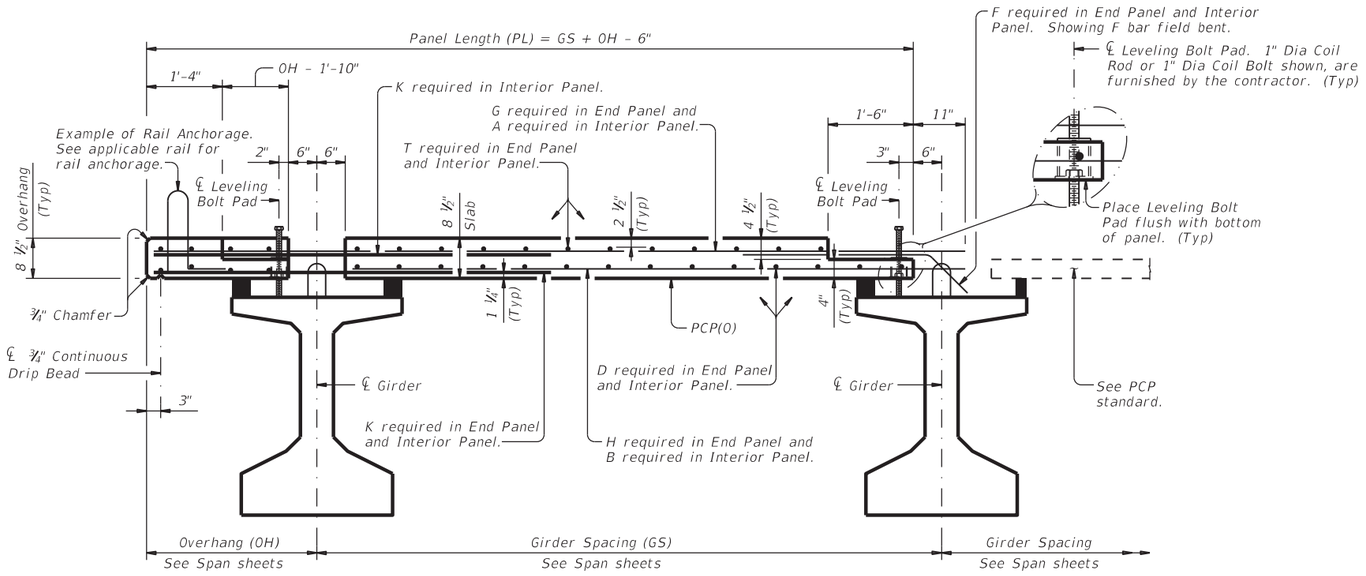


ISOMETRIC VIEW AT CORNER OF PANEL

Showing Typical Chamfers on Panel. Drip Bead and reinforcing steel not shown for clarity.



BARS F



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION/FABRICATION NOTES:

Remove laitance from top panel surface.

Finish top surface area of panel with a broom finish. Finish top ledge of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Provide ½" concrete chamfers as shown on these details.

Do not lap splice bars D, F, K & T. Bars A, B, G & H, may be spliced with only one lap splice allowed on each bar.

Panels must be fabricated by a fabricator meeting the requirements of DMS 7300 for Multi-Project Nonstressed Member Fabrication Plant.

MATERIAL NOTES:

Provide Class H concrete (f'c=4000 psi) in panels. Provide Class H (HPC) concrete for panels if required elsewhere in plans. Maximum large aggregate size is 1".

Provide material as shown on this standard for the Leveling Bolt Pad.

Provide Grade 60 conventional reinforcing steel.

Provide epoxy coated reinforcement for bars A, B, D, G, H, K & T if slab reinforcement is epoxy coated.

An equal area and spacing of deformed Welded Wire Reinforcement (WWR) ASTM-A1064 may be substituted for bars A, B, D, G, H & T, unless otherwise noted. Bars F and K can not be replaced with WWR.

Galvanize leveling bolt pad assembly if epoxy-coated reinforcing steel is used in slab.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement, lifting devices or epoxy coated reinforcement required on these details are subsidiary to the bid Item "Reinforced Concrete Slab".

See railing details for rail anchorage in panel overhang.

A panel layout which identifies location of each panel must be developed by the fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

Submit stable lifting methods and devices to the Engineer for approval.

Shop drawings for the fabrication of panels will require the Engineer's approval.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

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Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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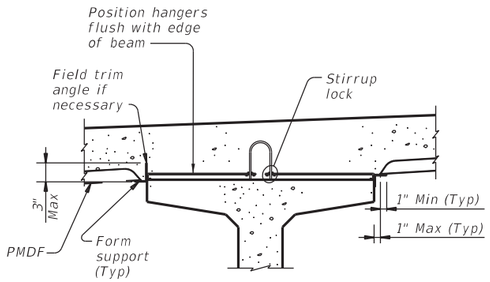
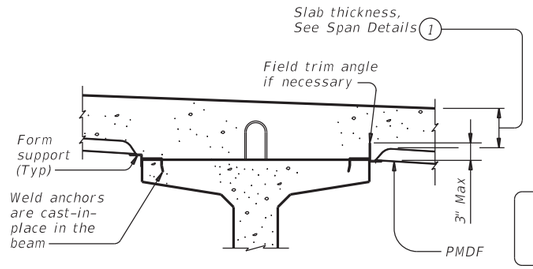
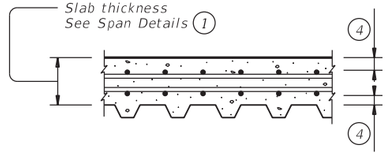


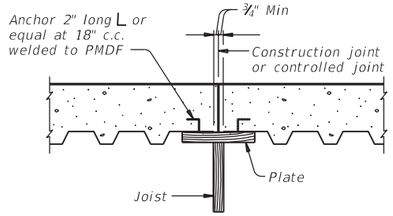
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

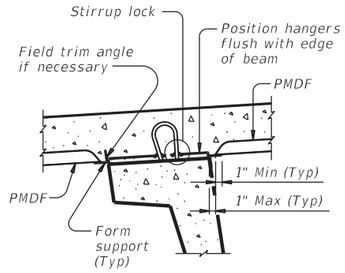


TYP LONGITUDINAL SLAB SECTION

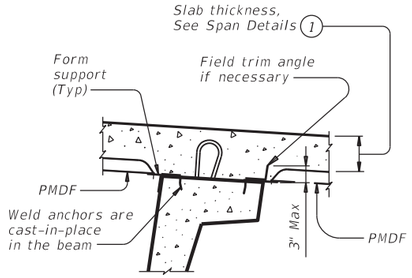


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

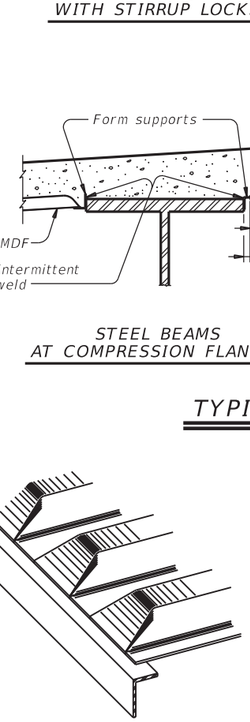
SECTION THRU CONSTRUCTION JOINT



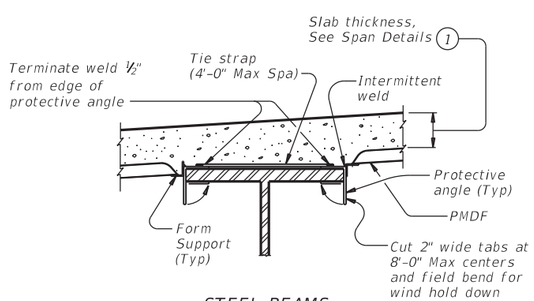
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

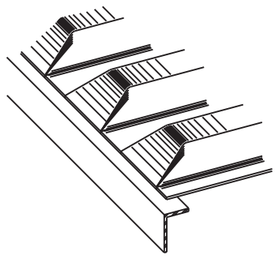


STEEL BEAMS AT COMPRESSION FLANGES

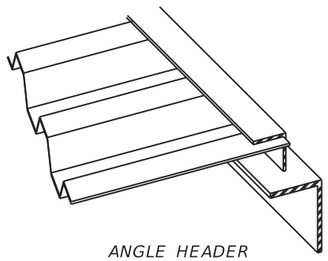


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



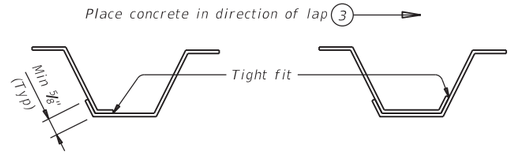
PRECLOSED



ANGLE HEADER

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

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

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

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
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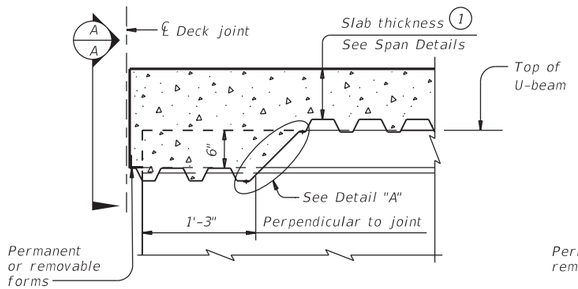
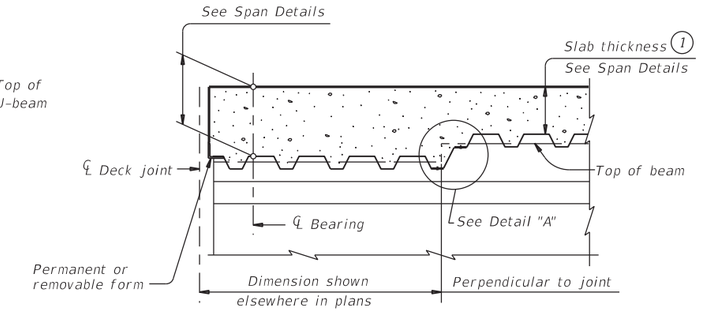
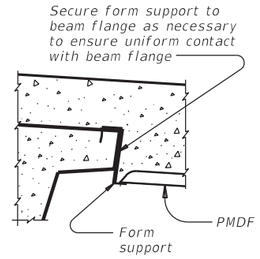


AT THICKENED SLAB END FOR U-BEAMS

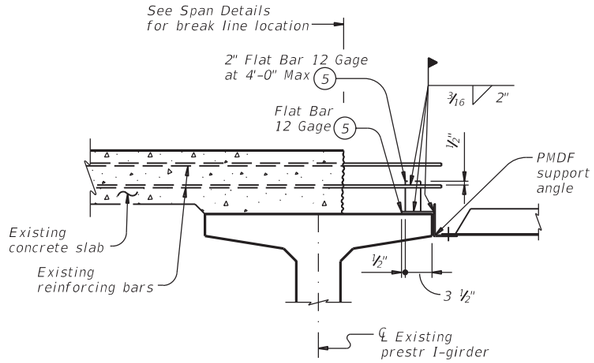


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

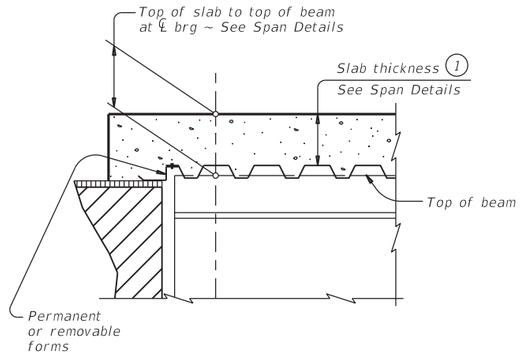
Showing I-beam block-out. No block-out for I-girders or steel beams.



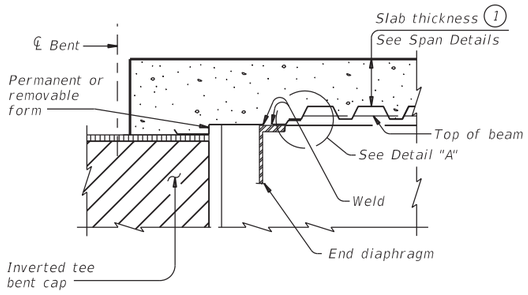
SECTION A-A



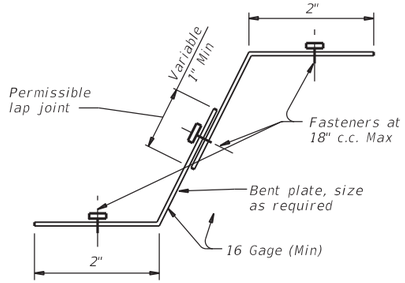
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



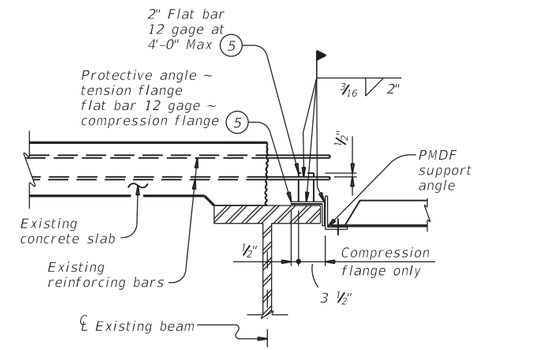
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



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

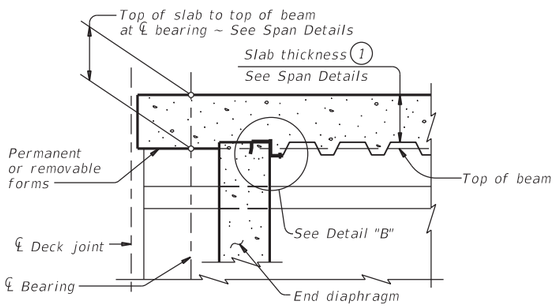


DETAIL "A"

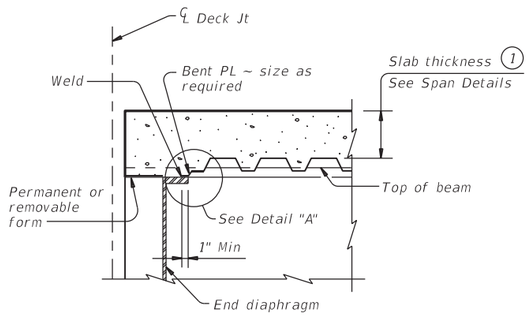


SHOWING STEEL BEAMS

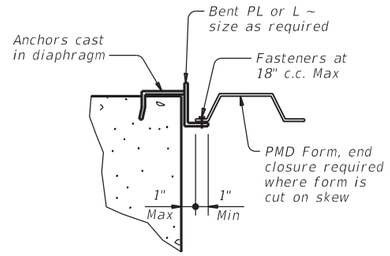
WIDENING DETAILS



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



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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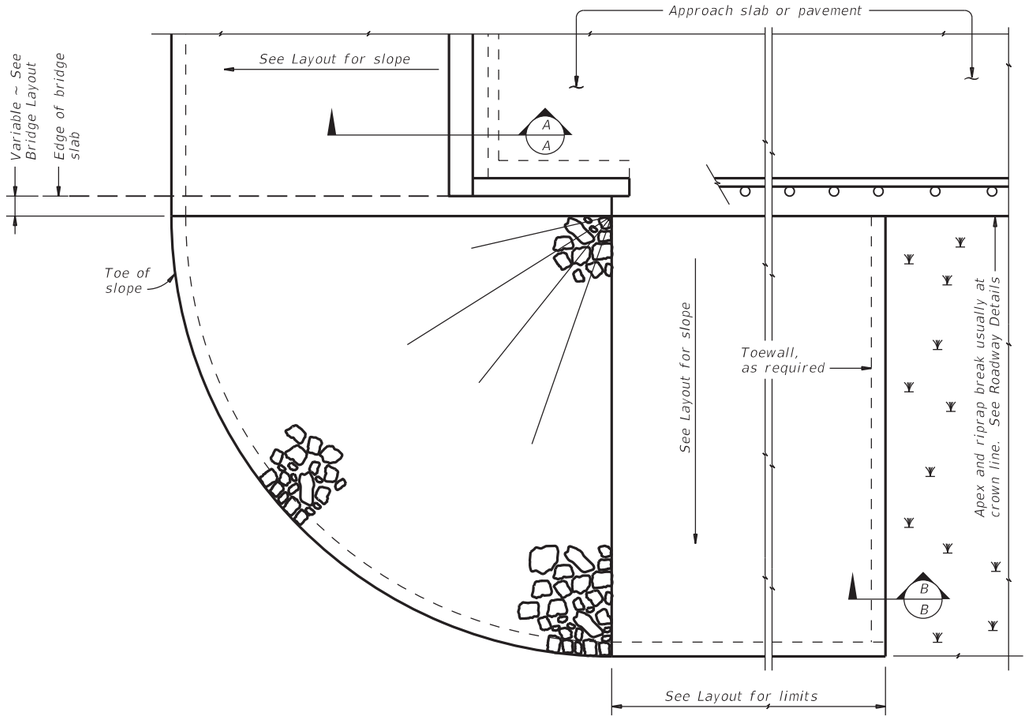
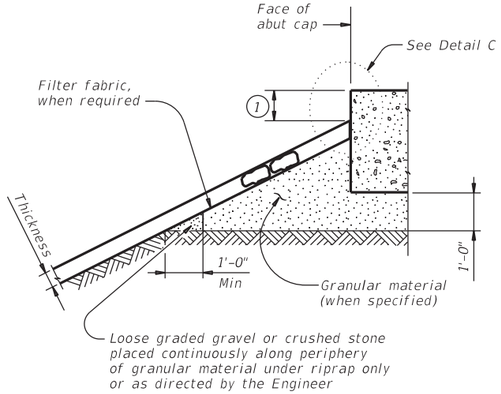
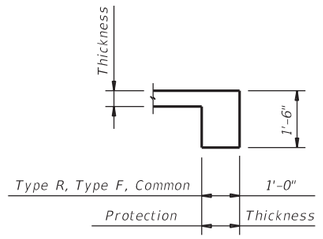


PLAN

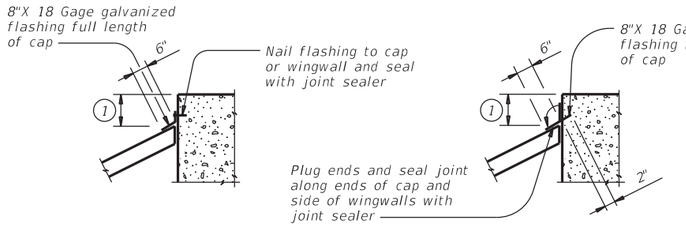


SECTION A-A AT CAP



SECTION B-B

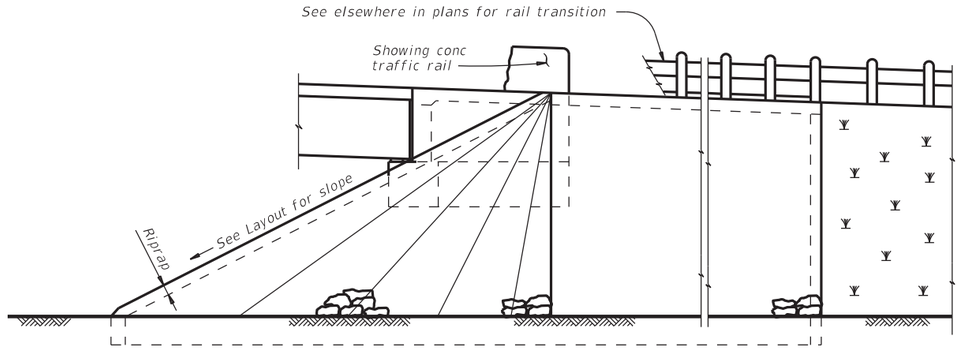
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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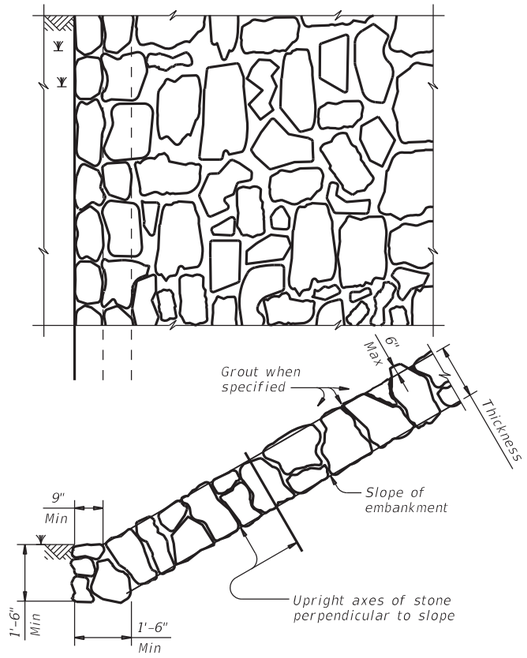


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

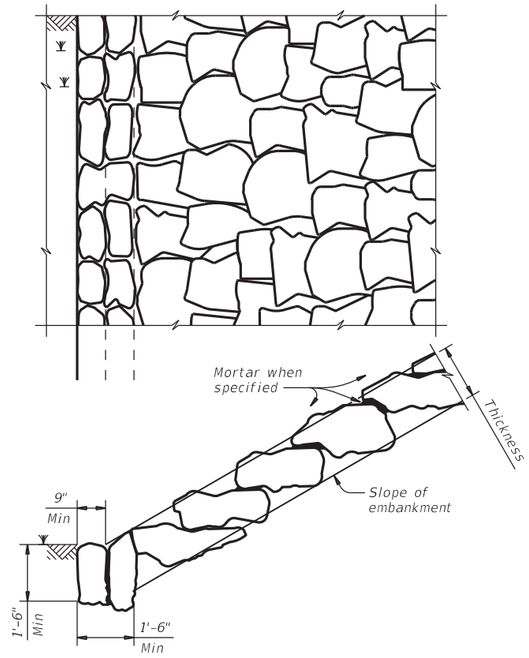


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

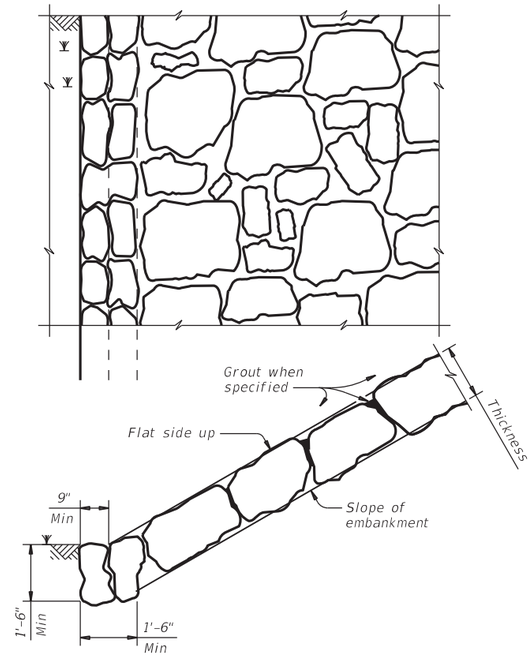


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

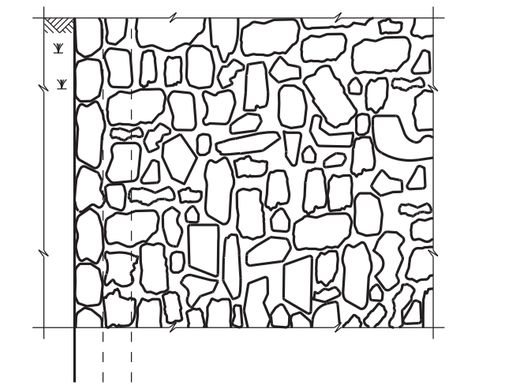


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

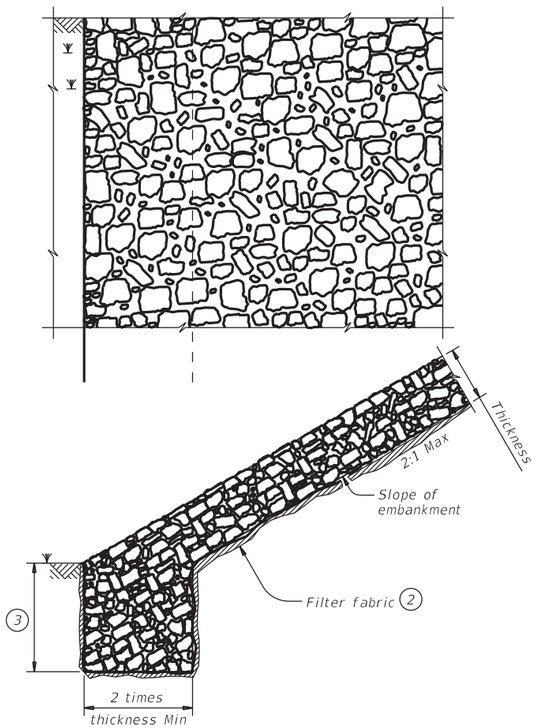


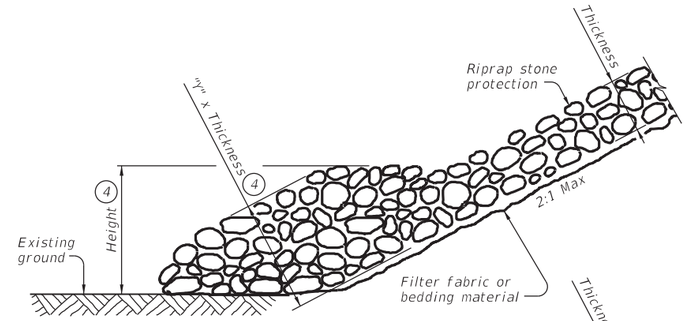
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

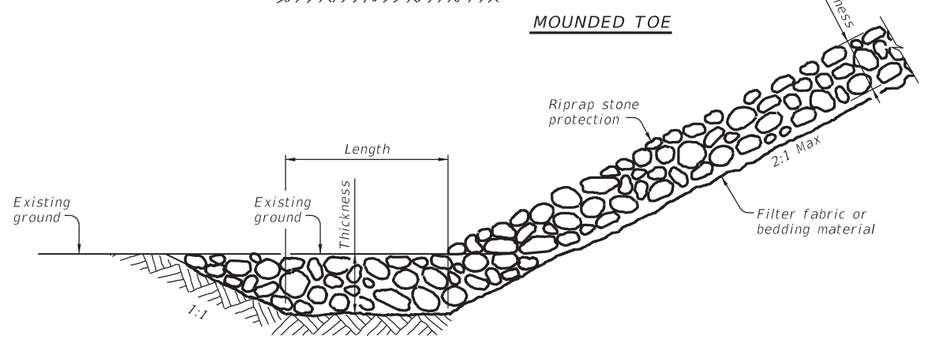
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

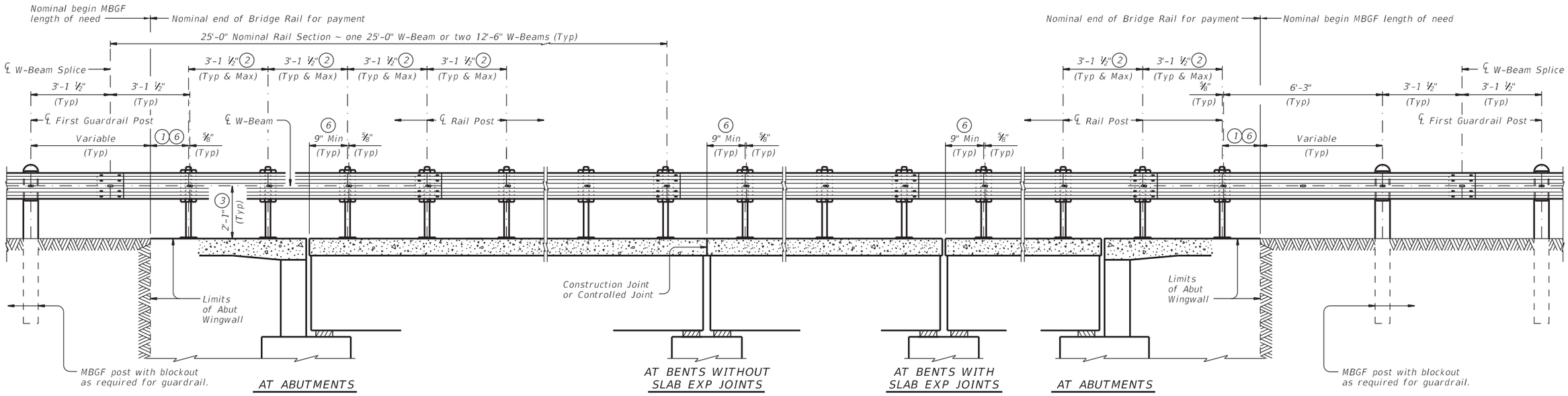
Bridge Division Standard

STONE RIPRAP

SRR

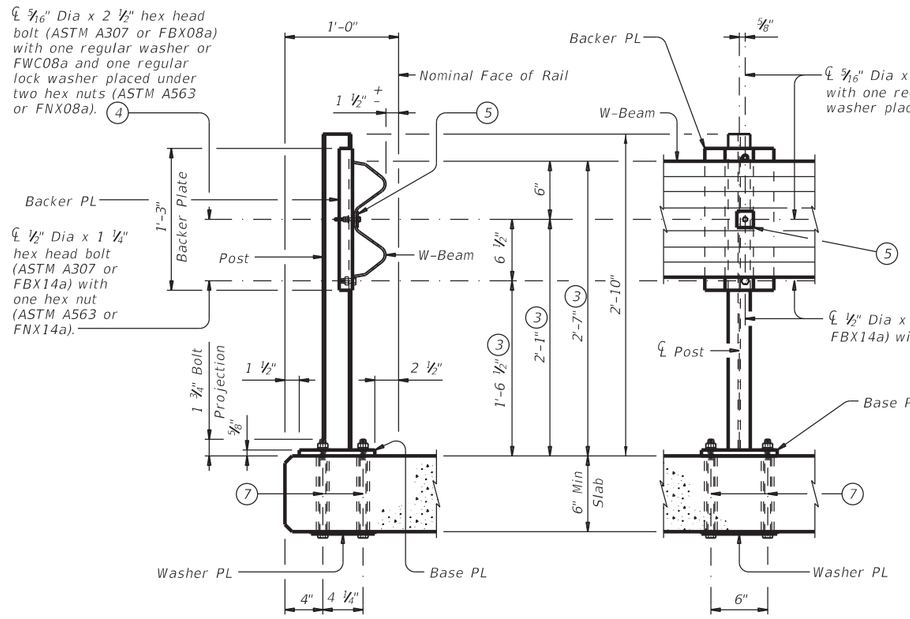
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		91

DATE:
FILE:



ROADWAY ELEVATION OF RAIL

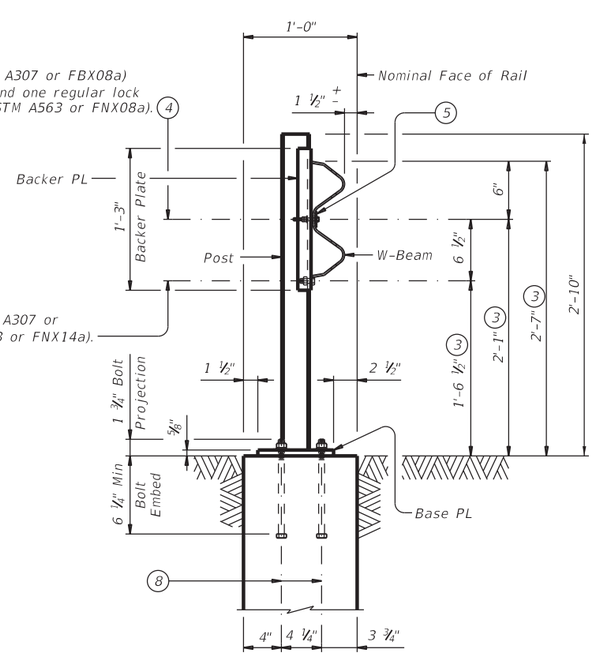
Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

Texas Department of Transportation

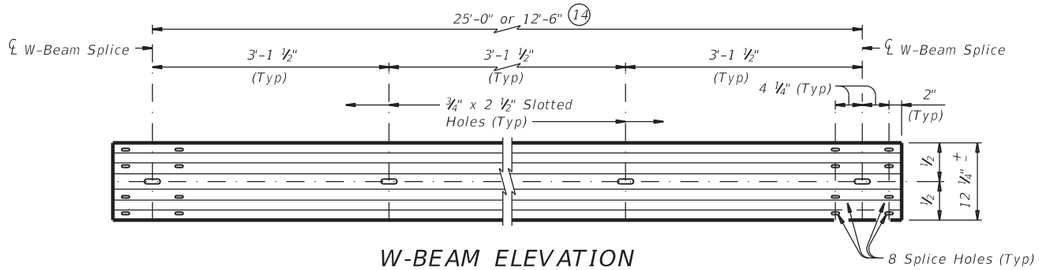
Bridge Division Standard

TRAFFIC RAIL

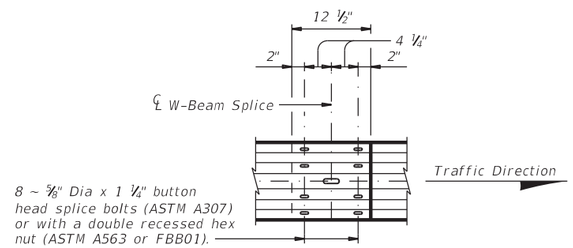
TYPE T631

FILE: rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	02	Wise		92

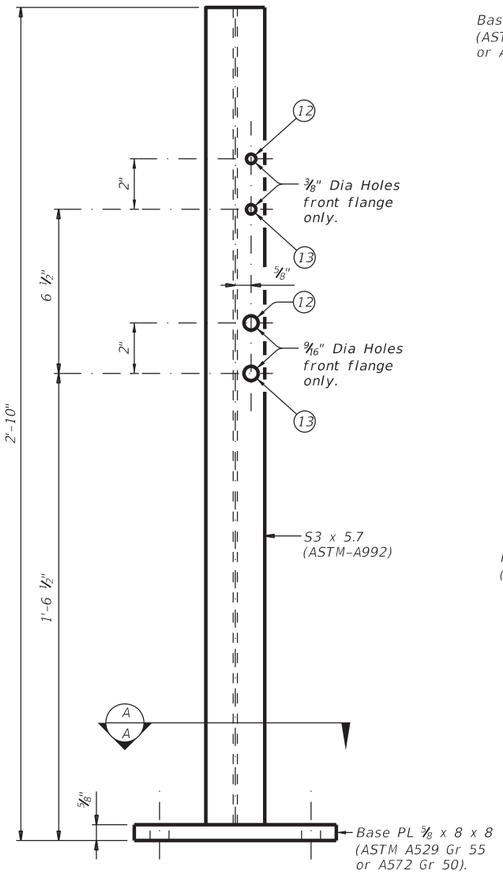
DATE:
FILE:



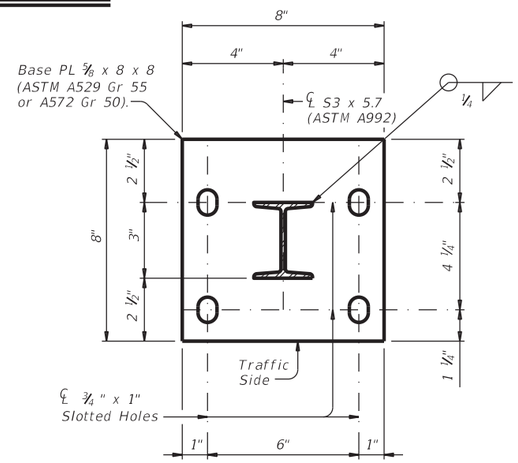
W-BEAM ELEVATION



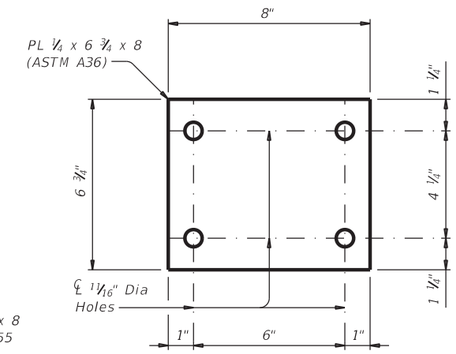
W-BEAM SPLICE ELEVATION



POST ELEVATION

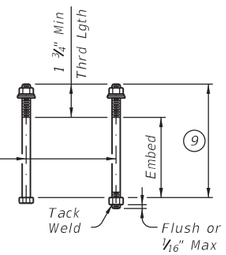


SECTION A-A

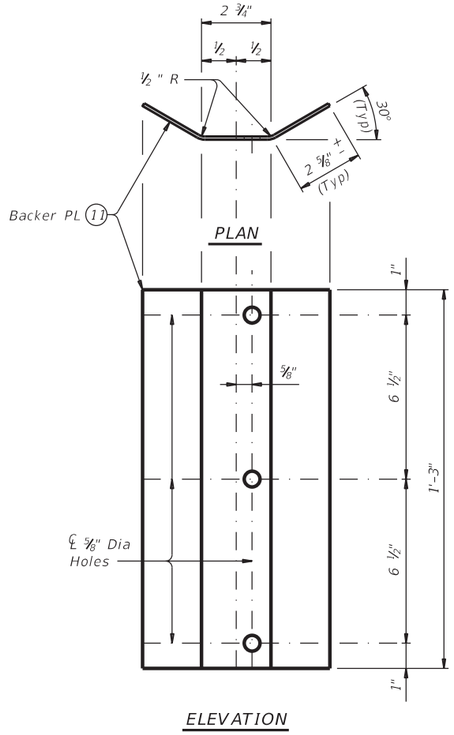


WASHER PLATE DETAIL

℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)



ELEVATION

BACKER PLATE

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment.

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must 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" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 20 plf total.

Texas Department of Transportation

Bridge Division Standard

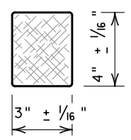
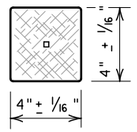
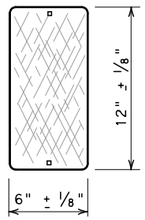
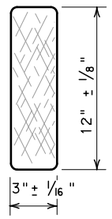
TRAFFIC RAIL

TYPE T631

FILE:	rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	20	102	CR 1590
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
		02	Wise		93

DATE: 6/6/2022 10:02:31 AM
FILE: L:\DGS\Projects\2198-TRANS\TxDOT\31-431P5080\NRB2014\60485815-Wise_2\dgn\D&OM(1)-20.dgn

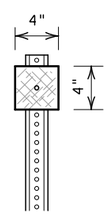
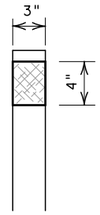
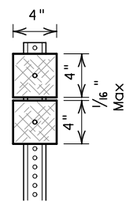
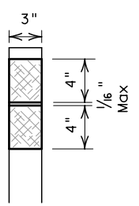
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE

1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

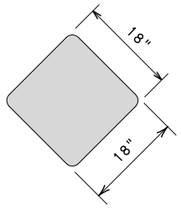
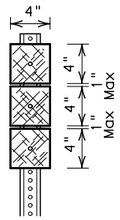
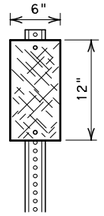
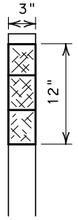
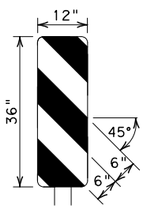
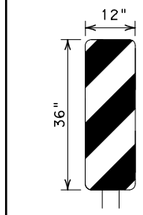
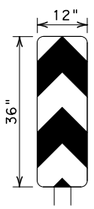
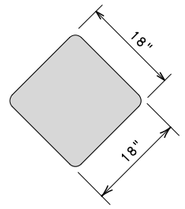
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

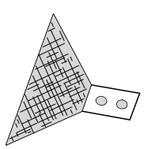
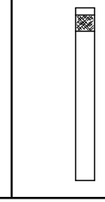
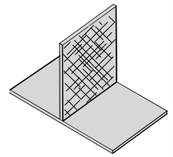
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

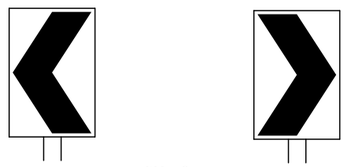
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



W1-8

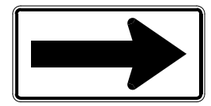
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	WISE		94

20A

DATE: 6/6/2022 10:02:31 AM
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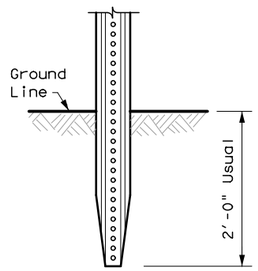
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

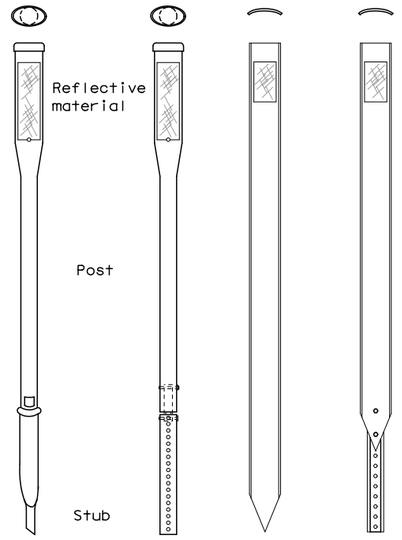


NOTES

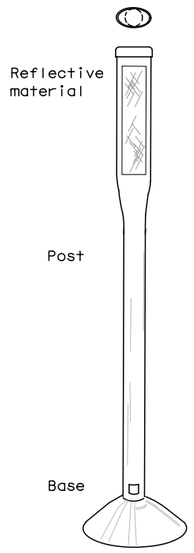
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND



SRF



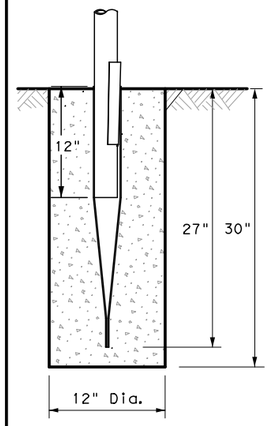
EMBEDDED | SURFACE MOUNT

NOTES

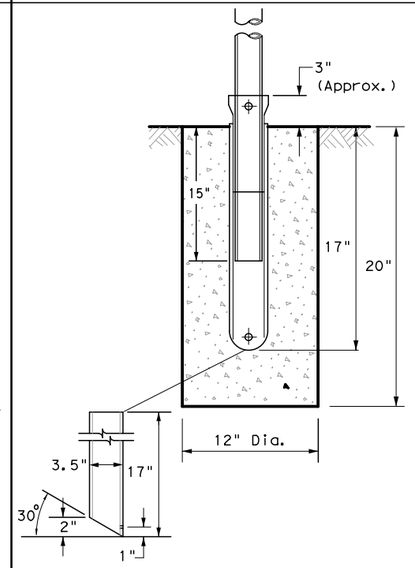
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

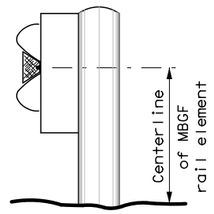
NOTE

1. Install per manufacturer's recommendations.

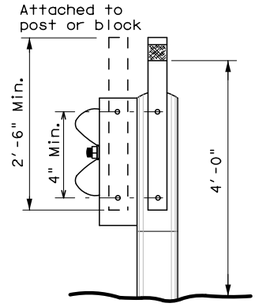
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

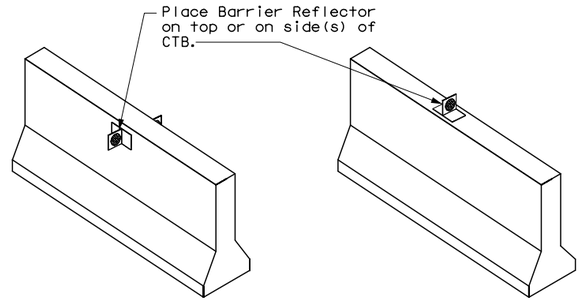
GF1



GF2



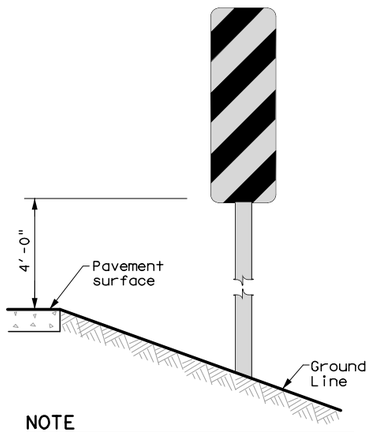
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

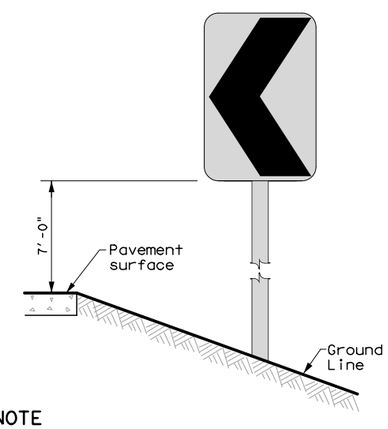
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

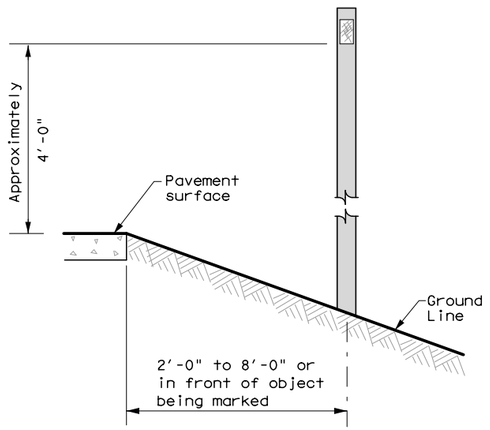
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation | Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	WISE		95

20B

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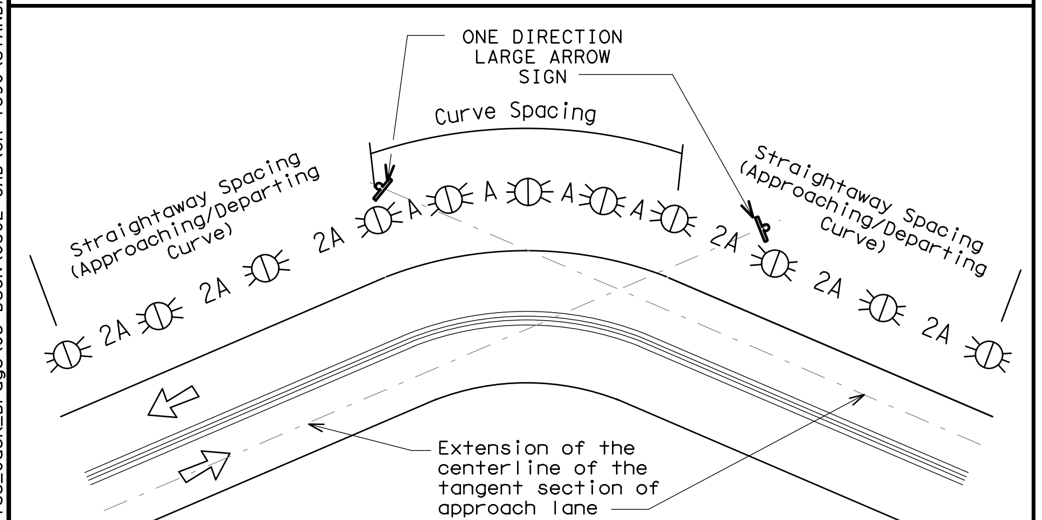
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

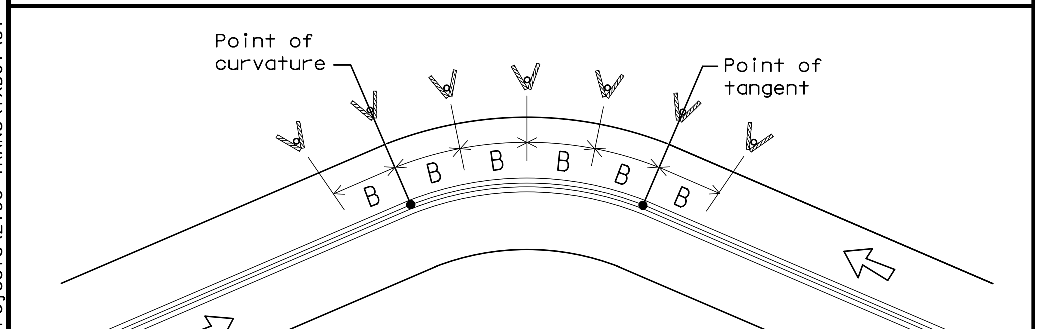
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

Symbol	Meaning
(symbol)	Bi-directional Delineator
(symbol)	Delineator
(symbol)	Sign

Texas Department of Transportation — Traffic Safety Division Standard

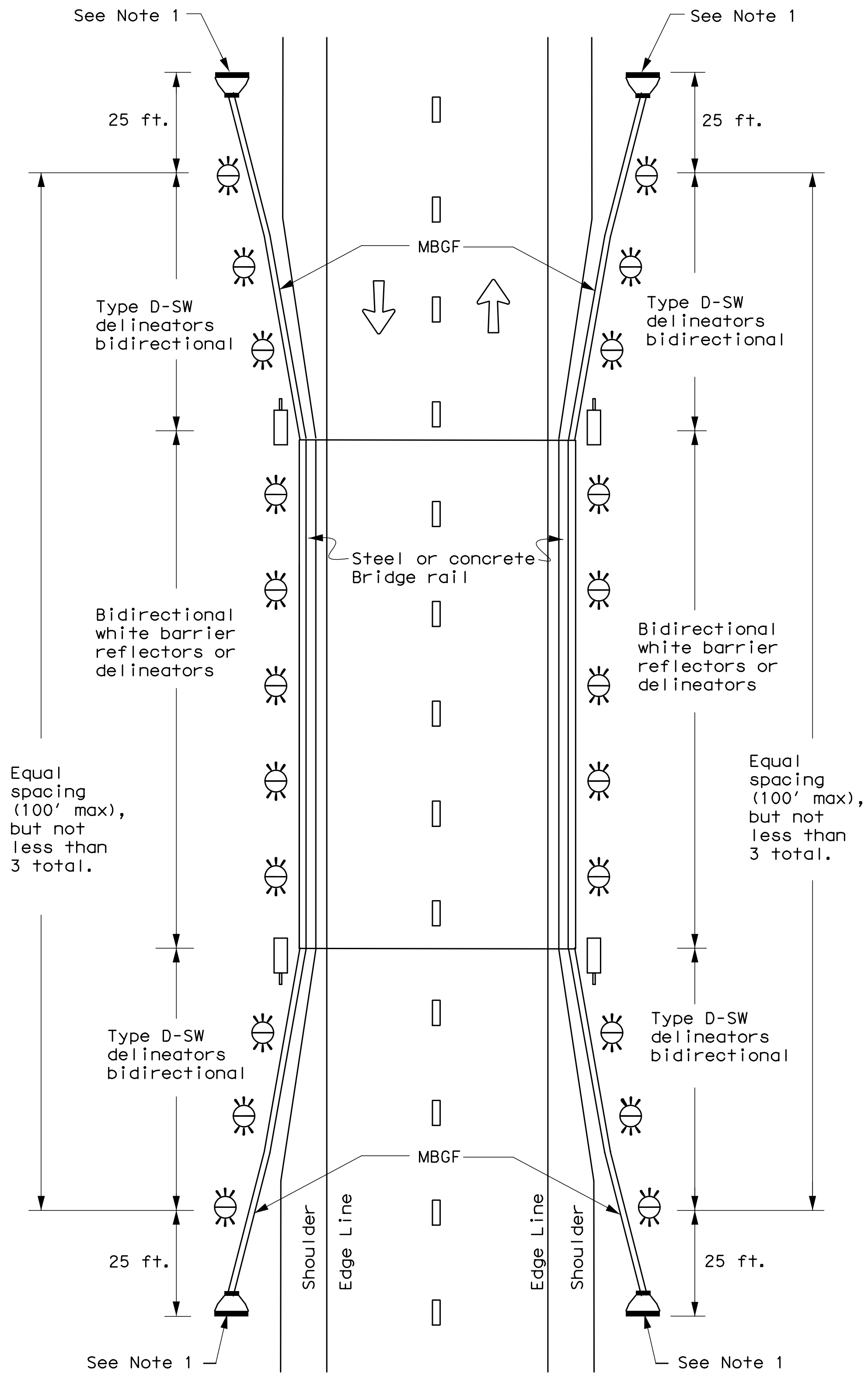
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0902	SECT 20	JOB 102	HIGHWAY CR 1590
REVISIONS 3-15 8-15 8-15 7-20	DIST FTW		COUNTY WISE	SHEET NO. 96

20C

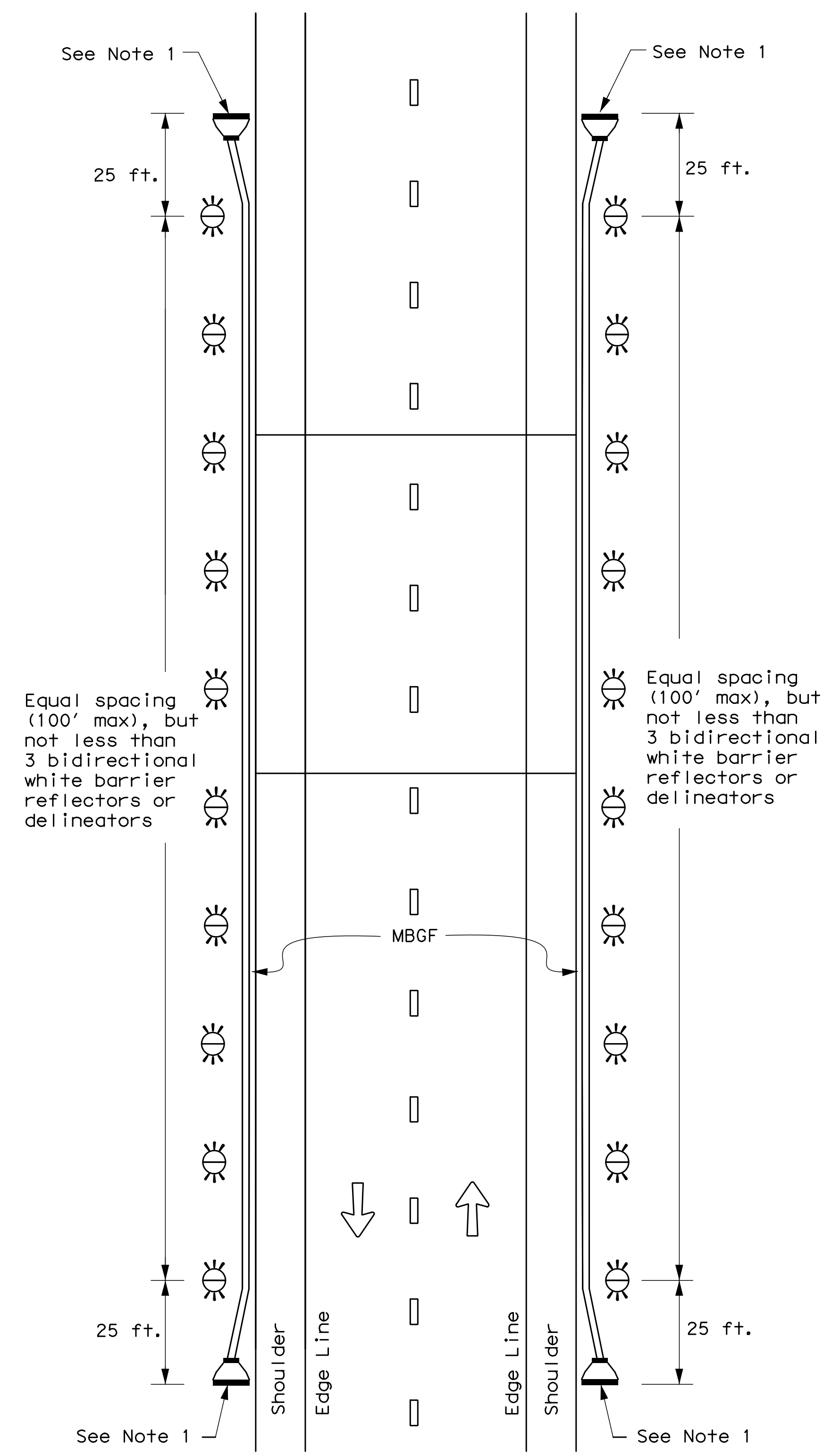
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

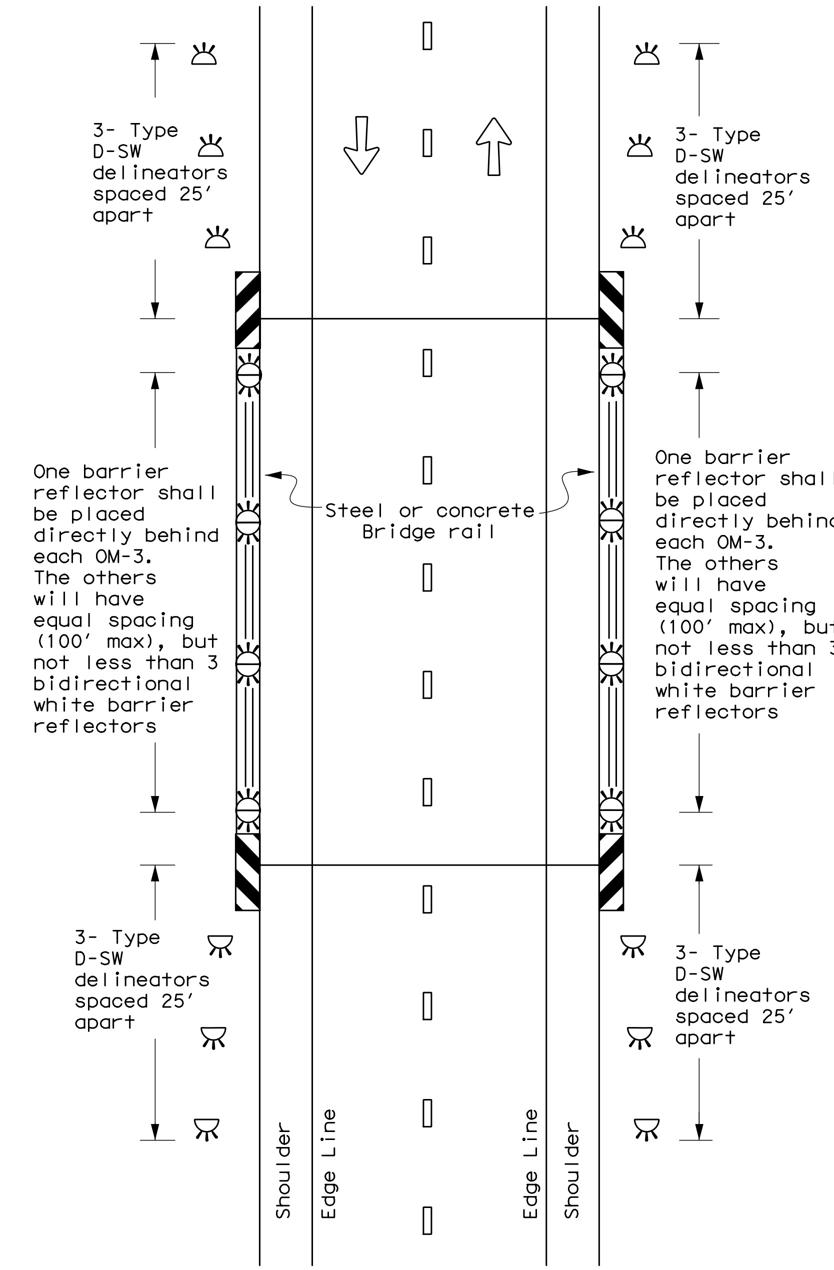
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
7-20	DIST		COUNTY	SHEET NO.
	FTW		WISE	97

20E

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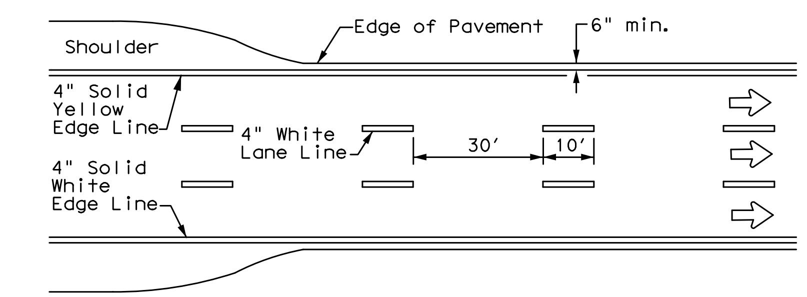
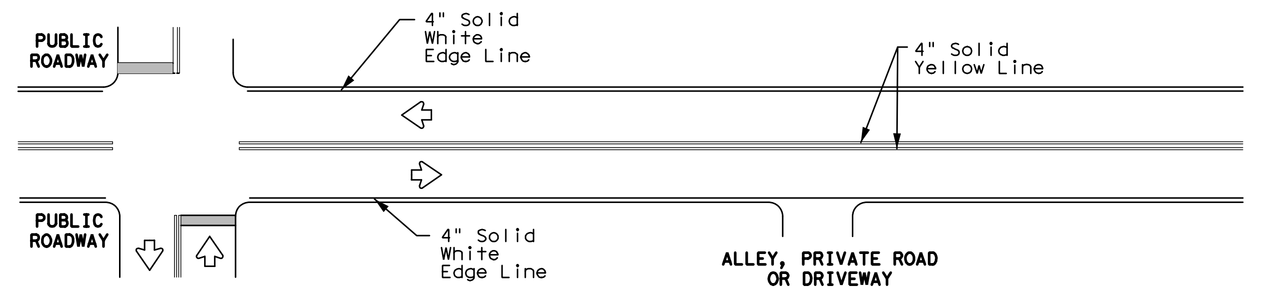
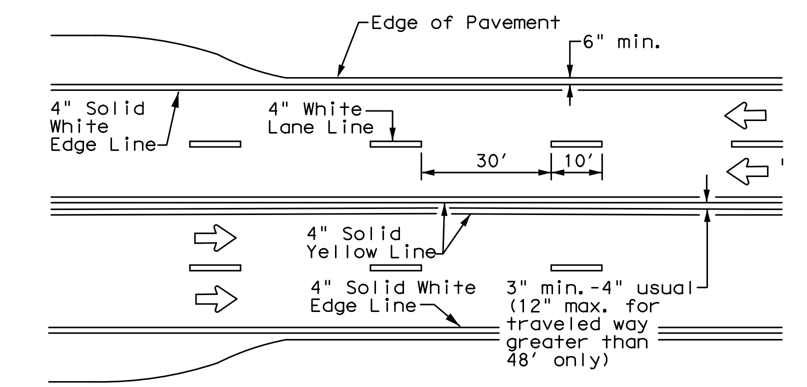


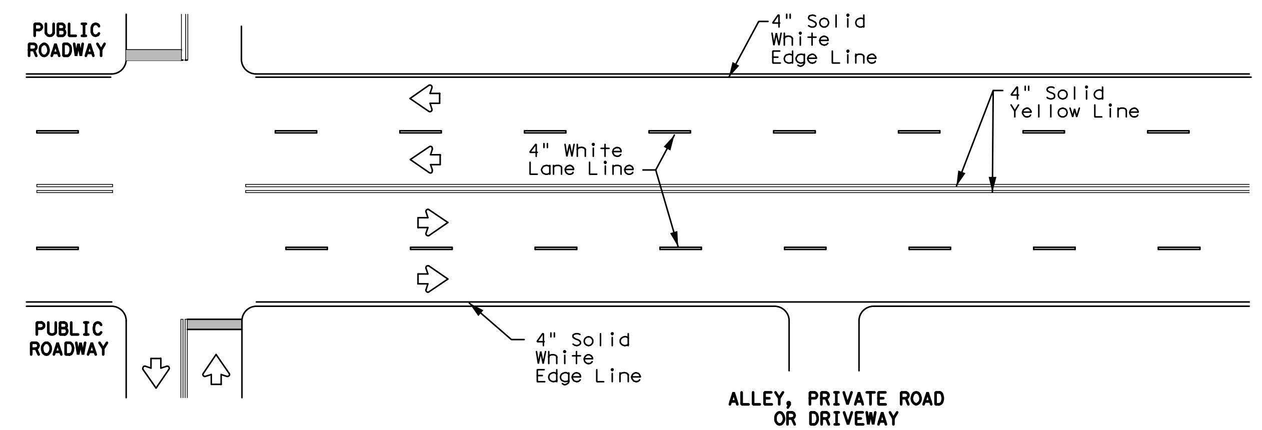
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



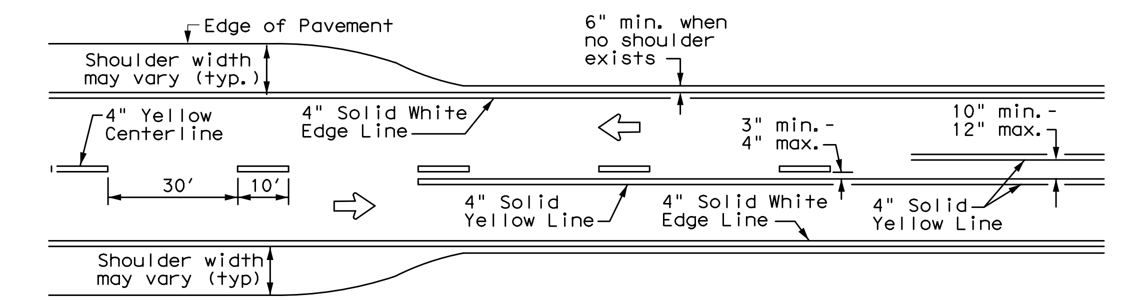
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



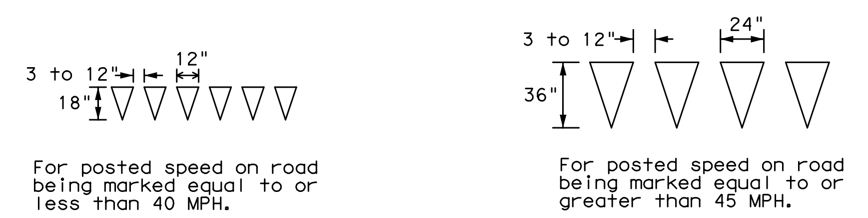
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



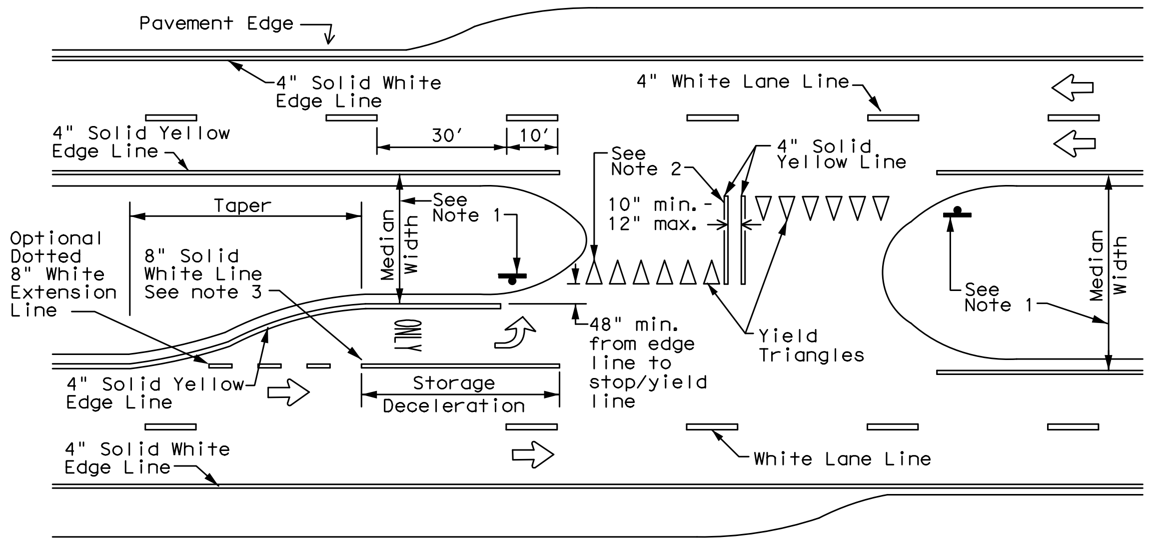
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

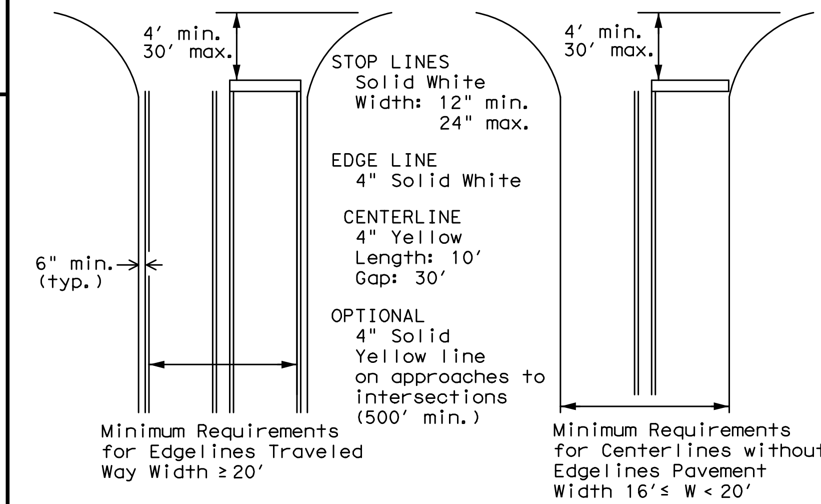
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation
Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT 0902	SECT 20	JOB 102	HIGHWAY CR 1590
REVISIONS 8-95 3-03 5-00 2-12 8-00 6-20	DIST FTW		COUNTY WISE	SHEET NO. 98

22B

DATE: 6/6/2022
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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres 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.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Receiving Waters: Big Sandy Creek
2. Contractor to follow terms and conditions of the NWP#14 during construction.
3. Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks or bridge decks.
4. Protect staging areas, stockpiles, temporary construction easements, and other project related sites situated in previously disturbed areas to avoid or minimize impacts to sensitive or unique habitats including intact native vegetation, floodplains, riparian corridors, wetlands, and habitat for wildlife species.
5. Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
☒ Erosion Control logs	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. Restore and stabilize disturbed areas as soon as the construction schedule permits. Consider temporary seeding where areas of disturbed ground would be left bare for a considerable length of time. The use of seed mix that contains seeds from only regional ecotype native species is recommended.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. Species potentially within the Project Area: BIRDS: Western burrowing owl. INSECTS: Monarch Butterfly. MOLLUSKS: Louisiana Pigtoe and Texas Heelsplitter. REPTILES: Texas garter snake and timber (canebrake) rattlesnake. The Developer shall take all appropriate actions to comply with all state and federal regulations as related to the state and federal listed threatened and endangered species. If it is determined that adverse effects to listed species will occur, the Developer shall prepare any materials needed for coordination or consultation with regulatory agencies, at TxDOT's direction. TxDOT will conduct coordination or consultation with the applicable state and federal agencies for the project. The Developer shall be responsible for any mitigation requirements identified from regulatory agency coordination/consultation.

-Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

-Prior to construction, perform daytime surveys for nests including under the bridge to determine if they are active before removal. Nests that are active should not be disturbed. If active nests are observed during surveys, Texas Parks Wildlife Division (TPWD) recommends a 150-foot buffer of vegetation remain around the nests until the young have fledged or the nest is abandoned.

-Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.

-If occupied, inactive nests will be removed, ensure that nests are not protected under the Endangered Species Act (ESA), MBTA, or BGEPA.

-Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.

-Do not collect, capture, relocate, or transport birds during construction and maintenance activities. Protect sensitive habitat areas with temporary barriers or fencing to limit human foot-traffic and off-road vehicle use to alert and discourage contractors from causing any unintentional impacts.

-Minimize construction noise above ambient levels during general bird nesting season to minimize adverse impacts on birds.

-Minimize construction lighting during the general bird nesting season by scheduling work activities between dawn and dusk.

3. Species Potentially within Project Area w/ Description.

1. Western Burrowing Owl: Small with distinctive long legs, a short tail, characteristic bobbing behavior and bright yellow eyes. Lacks ear tufts. Feathers are sandy brown color above, while breast area is beige with spotted bars. Habitat: Open grasslands and/or structures adjacent to ROW may provide suitable habitat.
2. Eastern spotted skunk: Small, relatively slender mammal with a small head, short legs, and prominent, bushy tail. The long, glossy, black fur has white stripes along the neck, back, and sides to mid-body.
Habitat: Fence row vegetation may provide suitable habitat.

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.

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR			
©TxDOT: February 2015	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0902	20	102		CR 1590		
12-12-2011 (DS)	DIST	COUNTY			SHEET NO.		
05-07-14 ADDED NOTE SECTION IV.							
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	FTW	WISE			99		

DATE: 6/6/2022
FILE: L:\DCS\Projects\2198-TRANS\TxDOT\31-431P5080½ NRB2014\60485815-Wise_Jack_Brdgs\03-DSGN\0302-CAD\CR 1590\SHEETS\CR1590-epic.dgn

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)?

[X] 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 [X] 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 [X] Required Action

Action No.

1. Lead Paint
The area of lead-based paint should be removed before beginning demolition activities. The party responsible for lead based paint removal shall be required to meet OSHA requirements.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

[ ] No Action Required [X] Required Action

Action No.

1. Floodplains: The proposed improvements would permit the conveyance of the design year flood, inundation of the roadway being acceptable, without causing substantial damage to the stream or other properties. The proposed project must not increase the base floodplain elevation to a level that would violate applicable floodplain regulations or ordinances

2. Construction Air Quality: Incorporate measures to control fugitive dust during construction such as covering or treating disturbed areas with dust suppression techniques including sprinkling, covering loaded trucks, and other dust abatement controls as appropriate.

3. Construction Emissions Reduction Plan: The Texas Emissions Reduction Plan (TERP) includes incentive programs to encouragthe development of multi-pollutat approaches to ensure that the air in Texas is both safe to breathe and meets minimum federal standards. TxDOT encourages Developers to utilize the TERP program to the fullest extent possible to minimize diesel emissions. Information about the TERP program can be found at http:www.tceq.state.us/implement/air/terp/.

4. Construction impacts: Developer to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls (i.e., minimization of nighttime construction at residential areas) and proper maintenance of muffler systems. Notify proposed adjacent property owners of proposed road closures or detours. Detours will comply with TxDOT requirements

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.				
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	FTW	WISE		100

A. GENERAL SITE DATA

1. PROJECT LIMITS: *Highway: CR 1590*
From: AT BIG SANDAY CREEK

LATTITUDE: 33.4° LONGITUDE: -97.7°

2. PROJECT SITE MAPS:

- *Project Location Map: Title Sheet*
- *Drainage Patterns: Drainage Area Maps*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Typical Sections*
- *Major Controls and Locations of Stabilization Practices: SW3P Site Map Sheets*
- *Project Specific Locations:*
  To be specified by Project Field Office and located In the Project SW3P File
- *Surface Waters and Discharge Locations: Drainage and Culvert Layout Sheets*

3. PROJECT DESCRIPTION:
FOR THE CONSTRUCTION OF REPLACEMENT OF THE EXISTING BRIDGE AND APPROACHES

4. MAJOR SOIL DISTURBING ACTIVITIES:
Preparing right of way, clearing and grubbing, grading, excavation and embankment for roadway.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
7% Soil Group A, 27% Soil Group B, 38% Soil Group C and 28% Soil Group D
The Drainage area Is Predominantly "Other agricultural land" with a cover of trees, weeds, and grass mixture.

6. TOTAL PROJECT AREA: *2.66* Acres

7. TOTAL AREA TO BE DISTURBED: *1.01* Acres (*38.0%* OF TOTAL PROJECT AREA)

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: *0.81*
AFTER CONSTRUCTION: *0.77*

9. NAME OF RECEIVING WATERS:
Eagle Mountain lake

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:

No Endangered Species, Designated Critical Habitat or Historic Property has been found on this project site.

or

(Statement of What) has been found on this project site.

Note: Designer shall supply applicable statement.

The documentation satisfying TPDES Construction General Permit eligibility pertaining to the existence or of any protective action taken with regards to endangered species or designated critical habitat or historical property In this project area Is contained In the project's Enviromental document (EA or EIS) and can be viewed under the State Open Records Act at the address shown below:

TEXAS DEPARTMENT OF TRANSPORTATION
FORT WORTH DISTRICT HEADQUARTERS
DISTRICT DESIGN SECTION
2501 SW LOOP
FORT WORTH, TX 76133
PHONE: 817-370-6500

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

T	TEMPORARY SEEDING	____	PRESERVATION OF NATURAL RESOURCES
P	MULCHING (Hay or Straw)	____	FLEXIBLE CHANNEL LINER
____	BUFFER ZONES	____	RIGID CHANNEL LINER
____	PLANTING	____	SOIL RETENTION BLANKET
P	SEEDING	____	COMPOST MANUFACTURED TOPSOIL
____	SODDING	____	OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

T	SILT FENCES	____	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____	HAY BALES	____	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
T	ROCK FILTER DAMS	____	DIVERSION DIKE AND SWALE COMBINATIONS
____	PIPE SLOPE DRAINS	____	ROCK BEDDING AT CONSTRUCTION EXIT
____	PAVED FLUMES	____	TIMBER MATTING AT CONSTRUCTION EXIT
____	CHANNEL LINERS	____	STONE OUTLET STRUCTURES
____	SEDIMENT TRAPS	____	VELOCITY CONTROL DEVICES
____	SEDIMENT BASINS	____	CURBS AND GUTTERS
____	STORM SEWERS	____	STORM INLET SEDIMENT TRAP
____	CONSTRUCTION EXIT		
P	EROSION CONTROL LOGS		
____	OTHER: *(Specify Practice)*		
____			
____			
____			

3. STORM WATER MANAGEMENT: *(Example Below - May be used as applicable, revised or expanded)*

1. Storm water drainage will be provided by the ditches, Inlets and storm water systems that will carry drainage within the R.O.W. to the low points within the roadway and project site which drain to natural facilities.

2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)
1. Construct temporary pavement
2. Construct proposed bridge over sandy creek, southern half of proposed roadway,driveway and mow strip and guardrail.
3. Construct remaining sections of roadway,mow strip, guardrail and Remove existing bridge

5. NON-STORM WATER DISCHARGES:
Non-storm water discharges should be filtered, or held In retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water, and water used for dust control, pavement washing and vehicle washwater containing no detergents.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

Signature , P.E. 6/6/2022 Date

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6			101
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY	
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	WISE	
08/2013	ADDED SIGN	CONT.	SECT.	JOB	HIGHWAY NO.
05/2019	2-SHEET FORMAT	0902	20	102	CR 1590

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed at the earliest date possible but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

2. INSPECTION:

An inspection shall be performed by a TxDOT inspector every 14 calendar days as well as within 24 hours after any rainfall of one-half inch or more is recorded on a non-freezing rain gauge to be located at the project site, or every 7 calendar days. An inspection and Maintenance Report shall be filed for each inspection. Based on the inspection results, the controls shall be revised in accordance with the inspection report.

3. WASTE MATERIALS:

Except as noted below, all waste materials shall be collected in a metal dumpster having a secure cover. The dumpster shall meet all state and local solid waste management regulations. All trash and debris from construction shall be deposited in the dumpster. The dumpster shall be emptied, as necessary or as required by local regulation, and hauled to a local approved land fill site. The burying of construction waste on the project site shall not be permitted.

Concrete washout areas shall be required and shall consist of a pit, lined with an impervious material, of sufficient size to contain, until evaporation, all water used and washout material produced during concrete washout operations. The concrete washout locations shall be as directed by the engineer.

Lime slaking tanks shall be surrounded by an earthen berm, capable of containing any overflow.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

As a minimum, any products in the following categories are considered to be hazardous: paints, acids, solvents, asphalt products, chemical additives for soil stabilization, and concrete curing compounds or additives. In the event of a spill which may be hazardous, the spill coordinator shall be contacted immediately.

5. SANITARY WASTE:

All sanitary waste shall be collected from the portable units, as necessary or as required by local regulation, by a licensed sanitary waste management contractor.

6. OFFSITE VEHICLE TRACKING:

The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

7. MANAGEMENT PRACTICES: *(Example Below - May be used as applicable, revised or expanded)*

1. Disposal areas, stockpiles and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.

3. All temporary fills placed in waterways shall be built of erosion resistant material. (NWP 14)

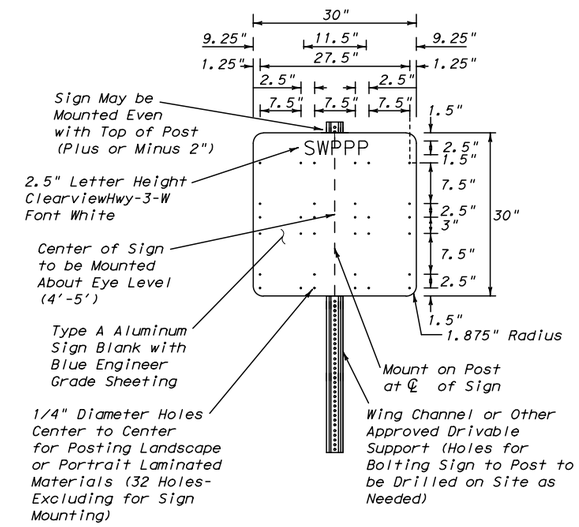
4. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

8. OTHER:

1. Listing of construction materials stored on site to be provided by Project Field Office.

2. The Project SW3P File located at the project field office shall contain the N.O.I., CGP Coverage Notice, TCEQ TPDES Form, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and a copy of the TPDES General Permit No. TXR150000.

STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING



No Permanent Installation Allowed.
Sign to be Removed After Project Completion.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER

Signature , P.E. 6/6/2022 Date

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

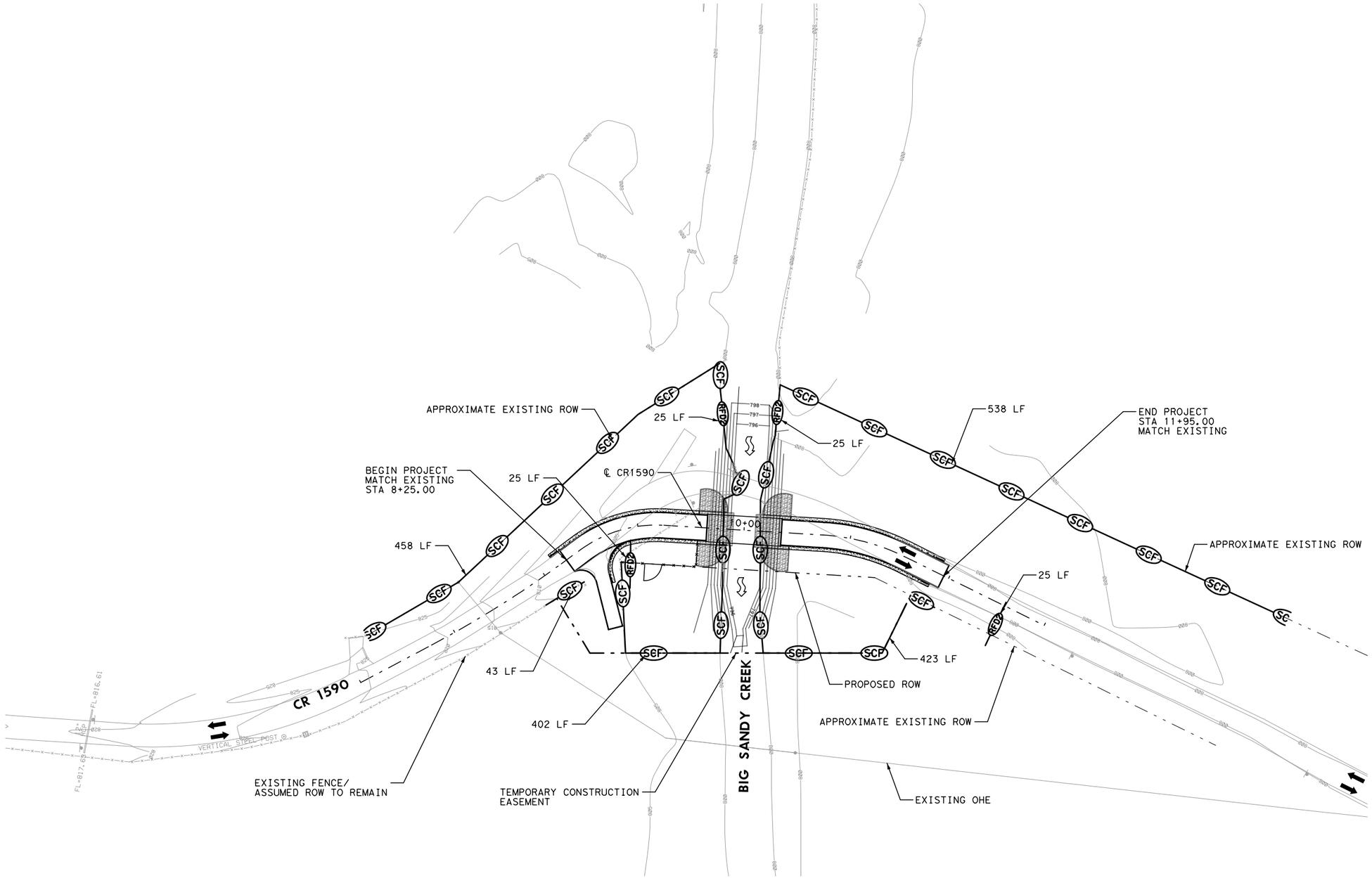
Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 2 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6			102
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY	
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	WISE	
08/2013	ADDED SIGN	CONT.	SECT.	JOB	HIGHWAY NO.
05/2019	2-SHEET FORMAT	0902	20	102	CR 1590



N

0′ 50′ 100′

SCALE IN FEET

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAMS (TY 2)
- TRAFFIC LANES
- CREEK FLOW

NOTES:

1. PERMANENT SEEDING SHALL BE APPLIED TO ALL AREAS DISTURBED AND AS DIRECTED BY THE ENGINEER.
2. MULCH SHALL BE USED AS DIRECTED BY THE ENGINEER.
3. BIODGRD EROSION CONTROL LOGS (18" DIA) TO BE USED AS DIRECTED BY THE ENGINEER.
4. ACTUAL LOCATION OF SEDIMENT CONTROL FENCE TO BE DETERMINED IN THE FIELD.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

6/6/2022

CO	REV	DESCRIPTION	DATE	BY

AECOM
AECOM Technical Services Inc.
13355 Noel Rd.
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

CR 1590
AT BIG SANDY CREEK
SW3P LAYOUT

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0902	20	102	CR 1590
DIST	COUNTY		SHEET NO.
FTW	WISE		103

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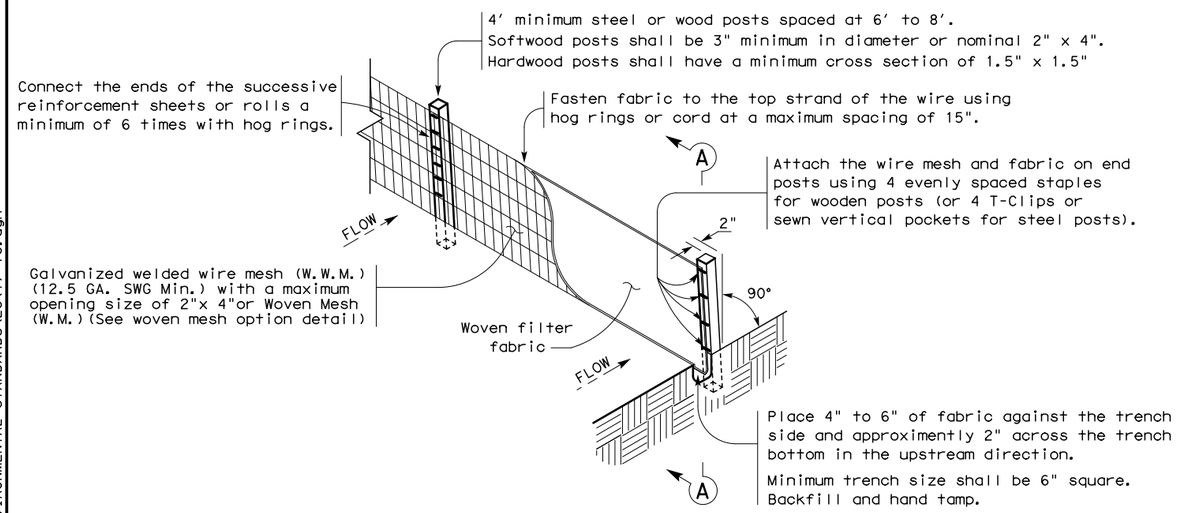
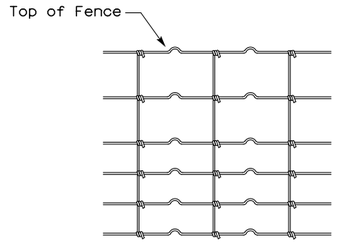
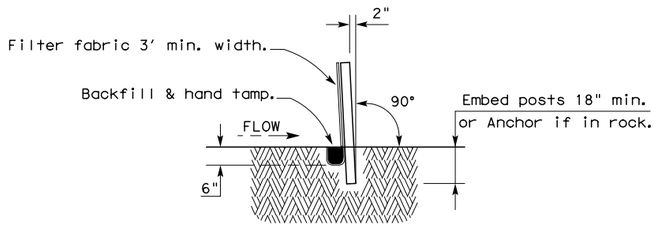
6/17/2022



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

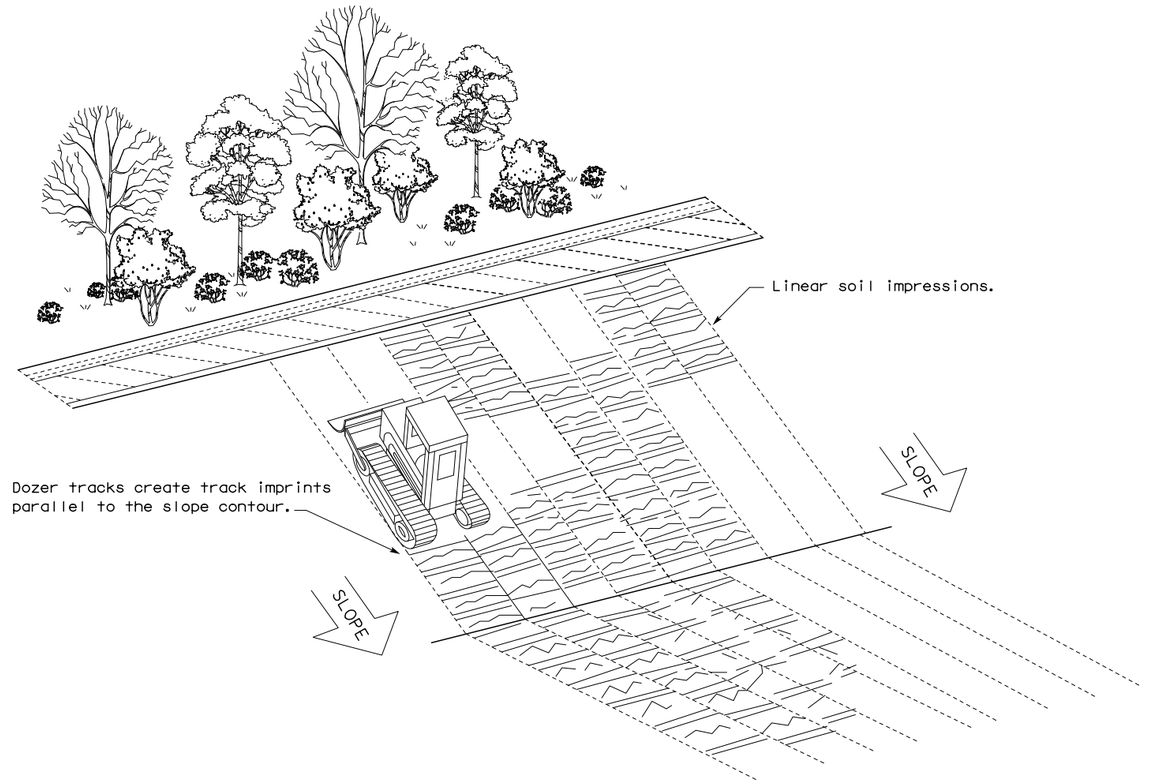
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		104

DATE: 6/6/2022
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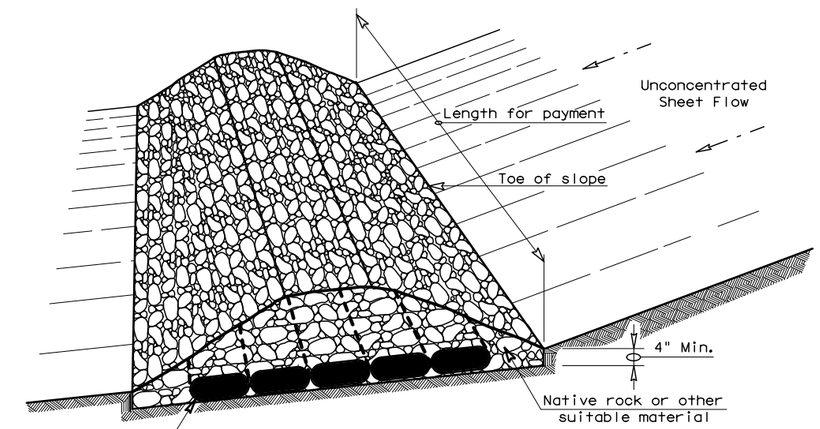
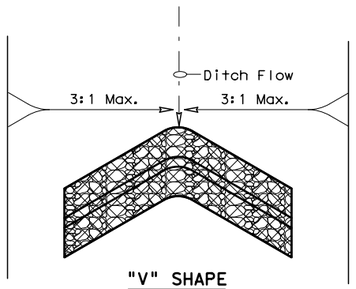
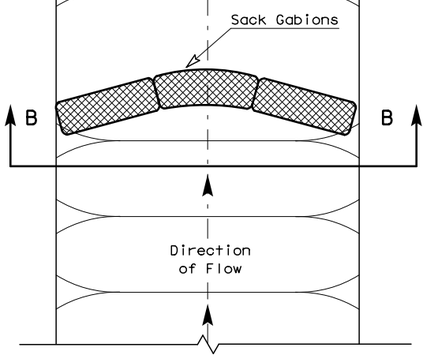


FILTER DAM AT TOE OF SLOPE

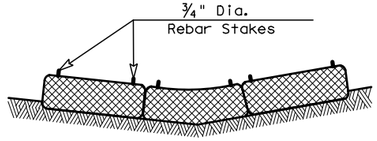
RFD1



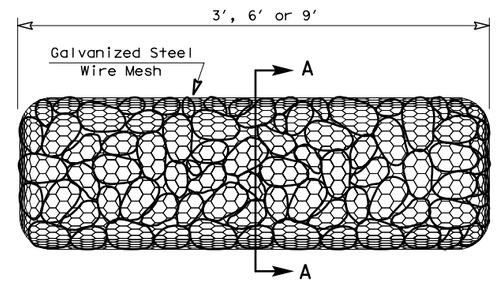
"V" SHAPE
PLAN VIEW



PLAN VIEW

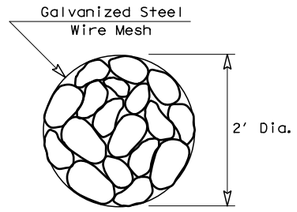


SECTION B-B

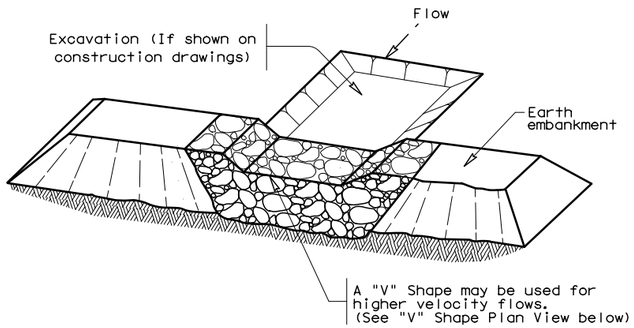


TYPE 4 (SACK GABIONS)

RFD4

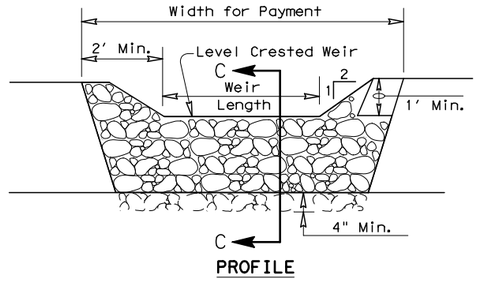


SECTION A-A

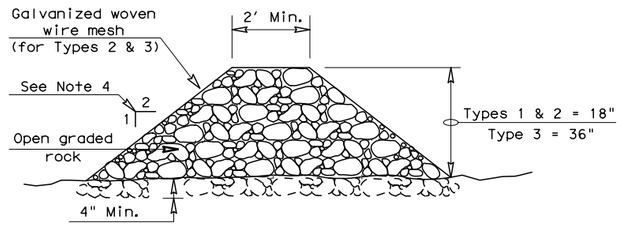


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

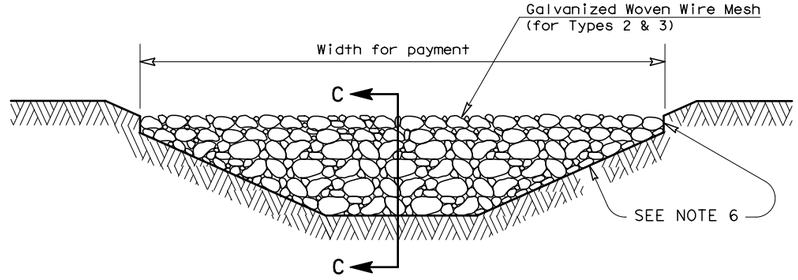
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	20	102	CR 1590
	DIST	COUNTY		SHEET NO.
	FTW	WISE		105

DATE: 6/6/2022
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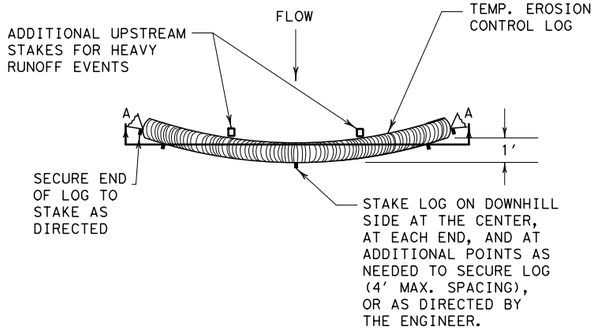
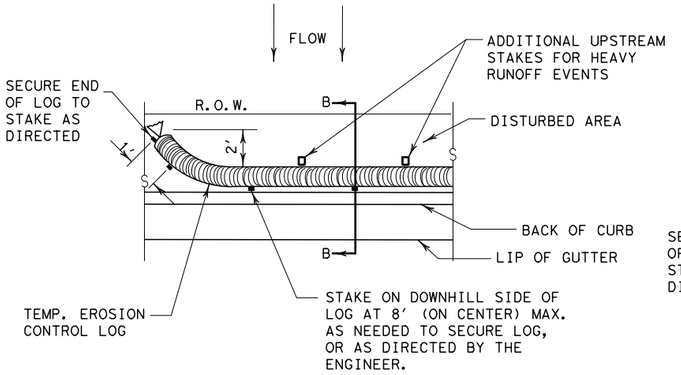
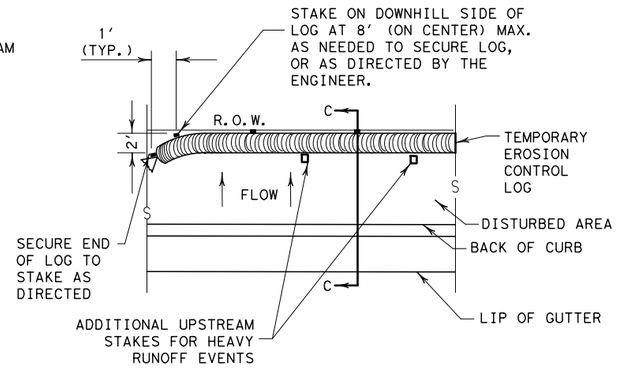


PLAN VIEW



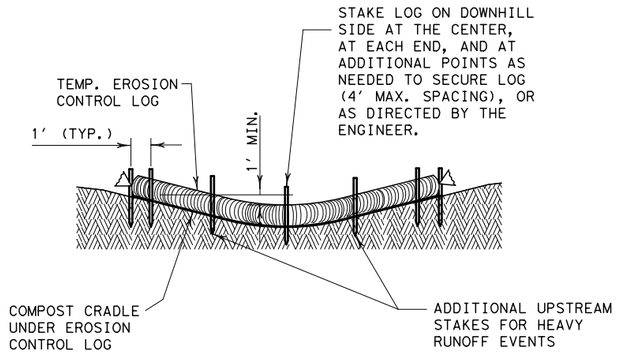
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

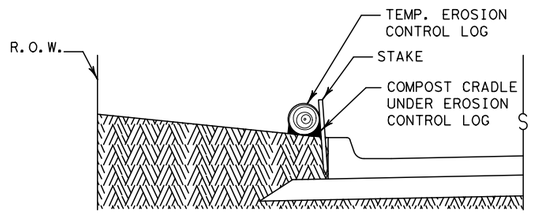
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



SECTION A-A

EROSION CONTROL LOG DAM

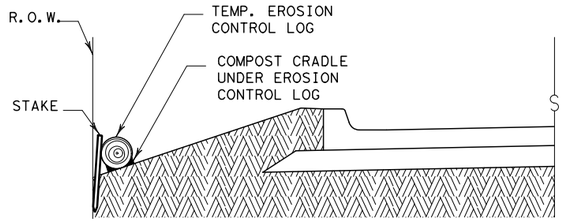
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



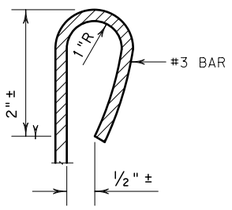
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

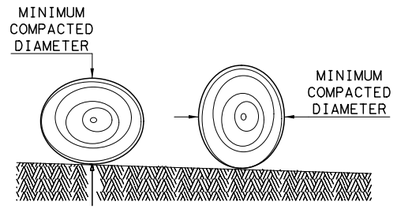
CL-ROW

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0902	20	102		CR 1590		
	DIST	COUNTY				SHEET NO.	
	FTW	WISE				106	

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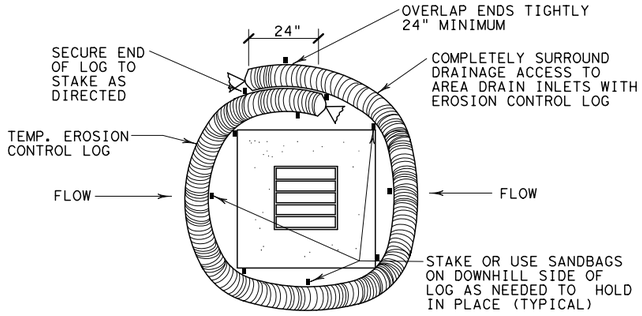
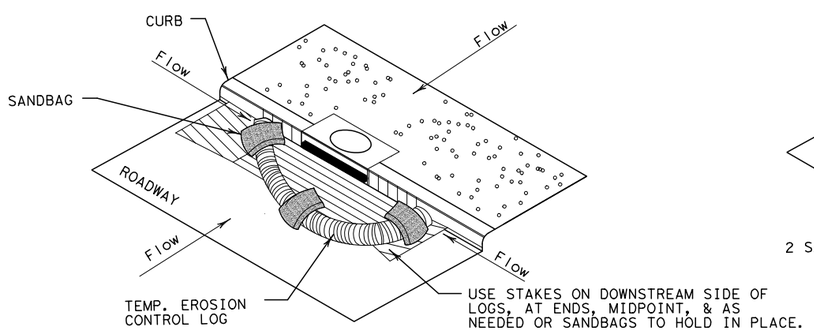


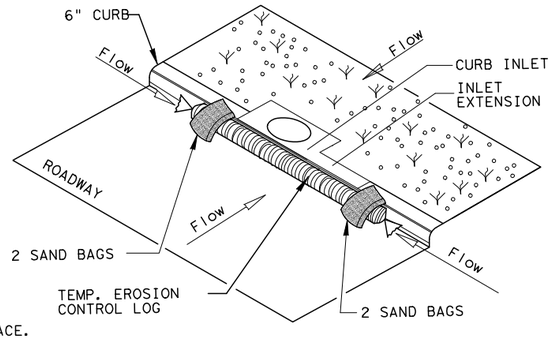
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

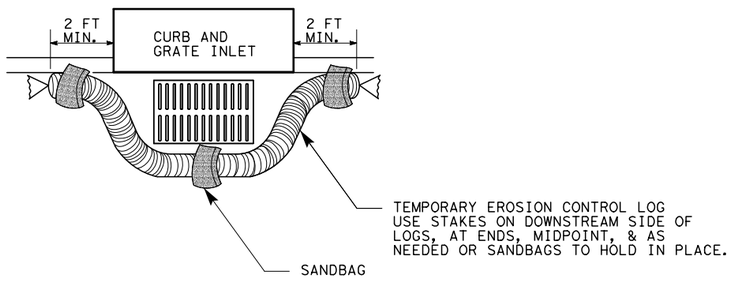
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

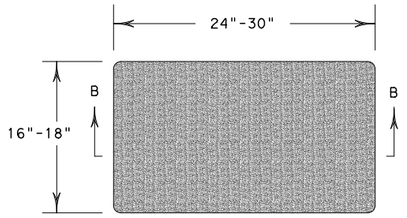
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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DATE: 6/6/2022
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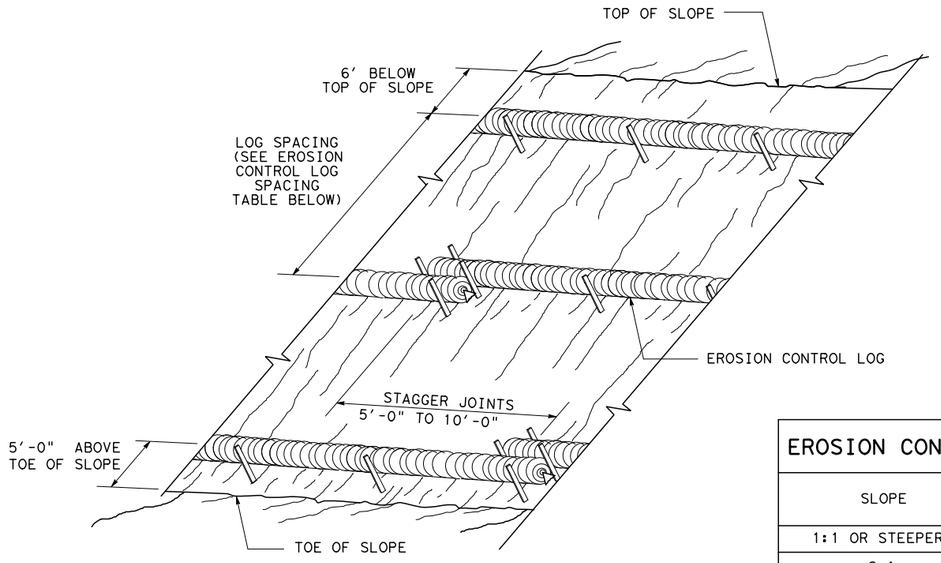
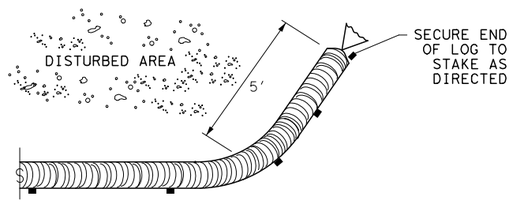


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

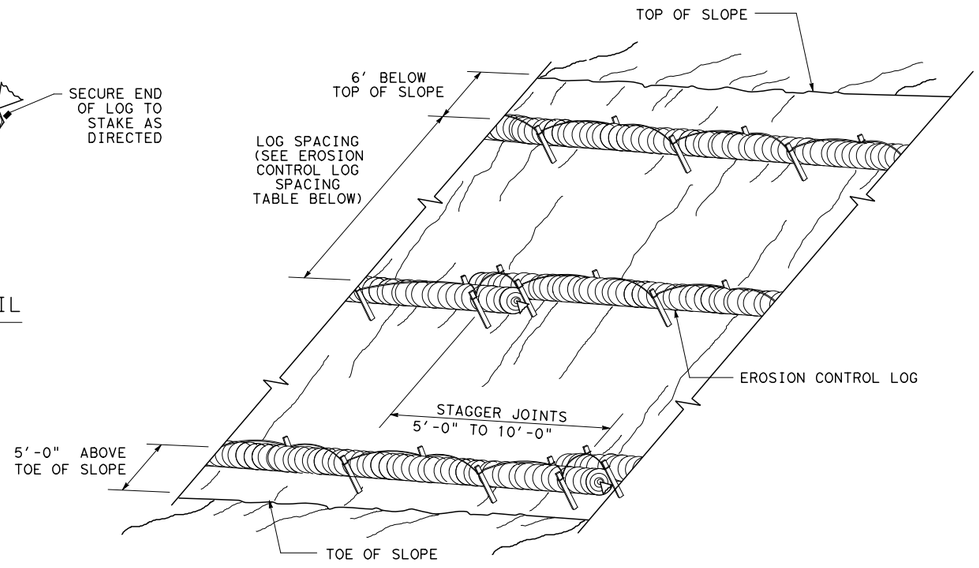
CL-SST



END SECTION RAP DETAIL

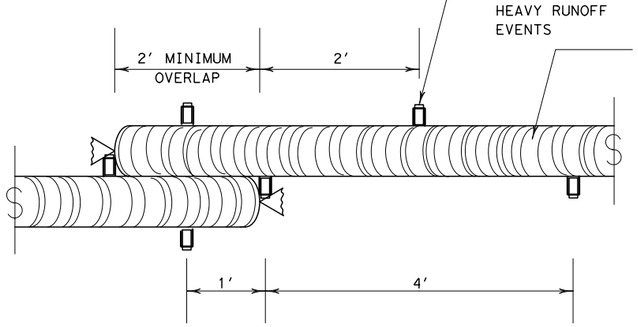
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

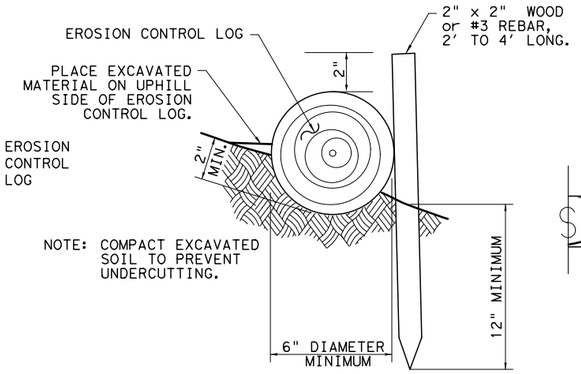
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

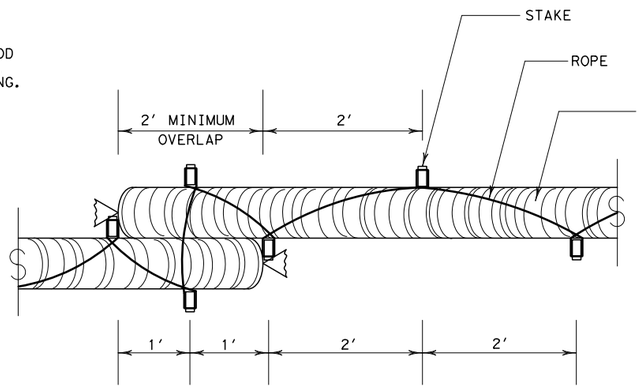


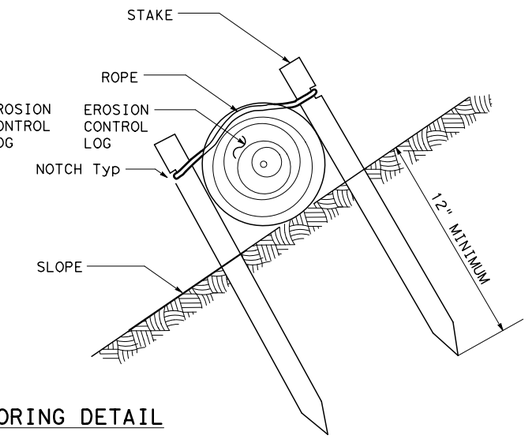


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

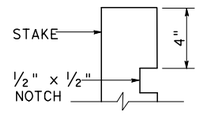
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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