FINAL SUBMITTAL

FED.ROAD DIV.NO	STATE	FEDERAL AID PROJECT NO	SHEET NO
6	TEXAS	BR 2B23(173)	1
STATE DIST NO	COUNTY	STATE CONTROL NO	HIGHWAY NO
22	DUVAL	0922-23-010	S TOVAR ST

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
REFER TO SHEET 2	

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENTS

FEDERAL AID PROJECT No. BR 2B23(173)

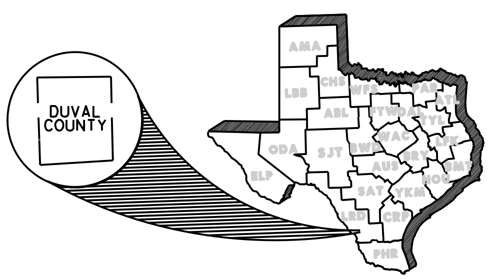
S TOVAR ST @ SAN DIEGO CREEK
DUVAL COUNTY
CSJ:0922-23-010

S TOVAR ST @ SAN DIEGO CREEK

NET LENGTH OF ROADWAY = 70.50 FT = 0.013 MILES
LENGTH OF BRIDGES = 350.00 FT = 0.066 MILES
NET LENGTH OF PROJECT = 420.5 FT = 0.080 MILES
LOCATION: @ SAN DIEGO CREEK

FOR THE CONSTRUCTION OF OFF-SYSTEM BRIDGE REPLACEMENT.

ROADWAY	FUNCTIONAL CLASSIFICATION	DESIGN SPEED
S TOVAR ST.	LOCAL	30 MPH
DESIGN ADT FOR MAINLANES		
YR / CSJ	0922-23-010	
2018	720	
2042	38	



N
N.T.S.

STA 107+20.17
END PROJECT
CSJ:0922-23-010
LAT: 27.7584361
LONG: -98.2454222
MP:0.181

STA 102+99.68
BEGIN PROJECT
CSJ:0922-23-010
LAT: 27.7573222
LONG:-98.2457778
MP:0.261

EQUATIONS:NONE
EXCEPTIONS:NONE
RAILROAD CROSSING:NONE

Texas Department of Transportation

SUBMITTED FOR LETTING: 05/31/2024
CONSULTANT ENGINEER

RECOMMENDED FOR LETTING: 6/21/2024
DocuSigned by:
A54CD9F731724EC...
AREA ENGINEER

APPROVED FOR LETTING: 6/21/2024
DocuSigned by:
Roberto Rodriguez III
B6BEDC41D58848E...
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

NOTES:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273,- OCTOBER 23, 2023).

6/19/2024
OpenRoadsDesigner
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PREPARED BY:
IDCUS
Planners | Engineers | Construction Managers

FINAL SUBMITTAL

GENERAL

TRAFFIC CONTROL PLANS

TRAFFIC CONTROL STANDARDS

ROADWAY

ROADWAY STANDARDS

BORING LOGS

DRAINAGE

BRIDGE

BRIDGE STANDARDS

PAVEMENT MARKINGS

PAVEMENT MARKINGS STANDARDS

ENVIRONMENTAL ISSUES

ENVIRONMENTAL STANDARDS

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

Lloyd M. Wolf — 6/12/2024

LLOYD M. WOLF, P.E. — DATE

STATE OF TEXAS
LLOYD M. WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

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

6/12/2024

CARLOS H. REYES, P.E. — DATE

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		2

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FINAL SUBMITTAL

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
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6/19/2024

NOT TO SCALE

NO.	DATE	REVISION

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S TOVAR ST @ SAN DIEGO CREEK

PROJECT LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		3

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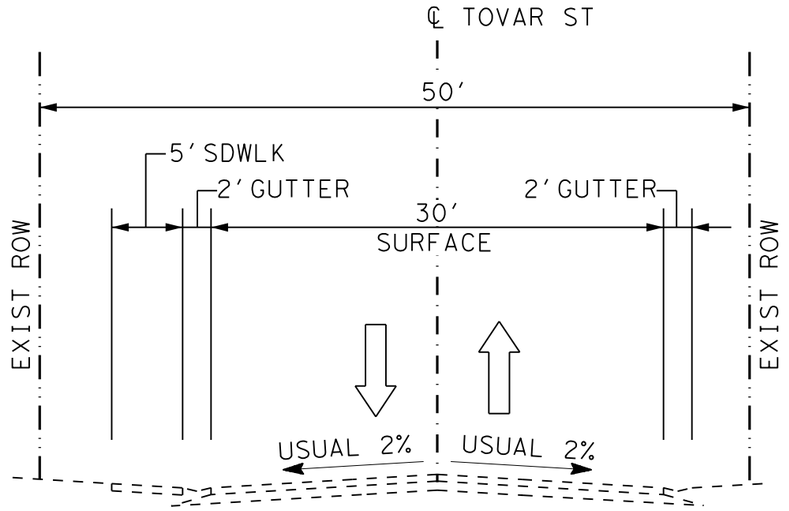
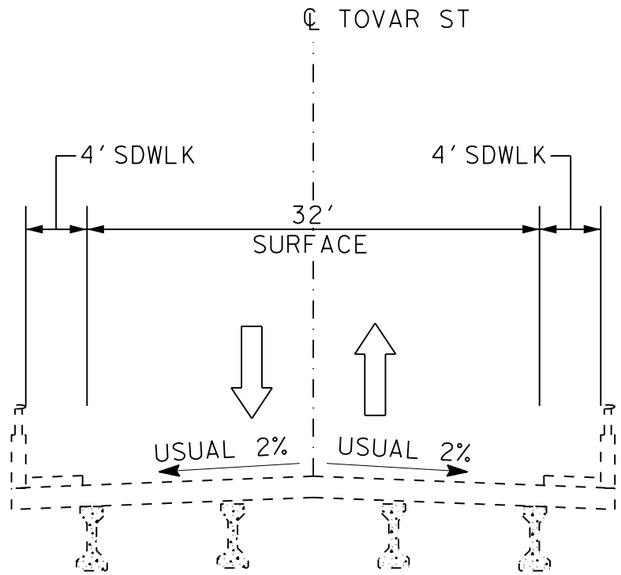
FINAL SUBMITTAL



S TOVAR ST.

EXISTING TYPICAL SECTION
STA 100+00.00 TO STA 103+38.00



S TOVAR ST.

EXISTING TYPICAL SECTION
STA 103+38.00 TO STA 106+70.00

STATE OF TEXAS
CARLOS H. REYES
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TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

EXISTING TYPICAL SECTION

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		4

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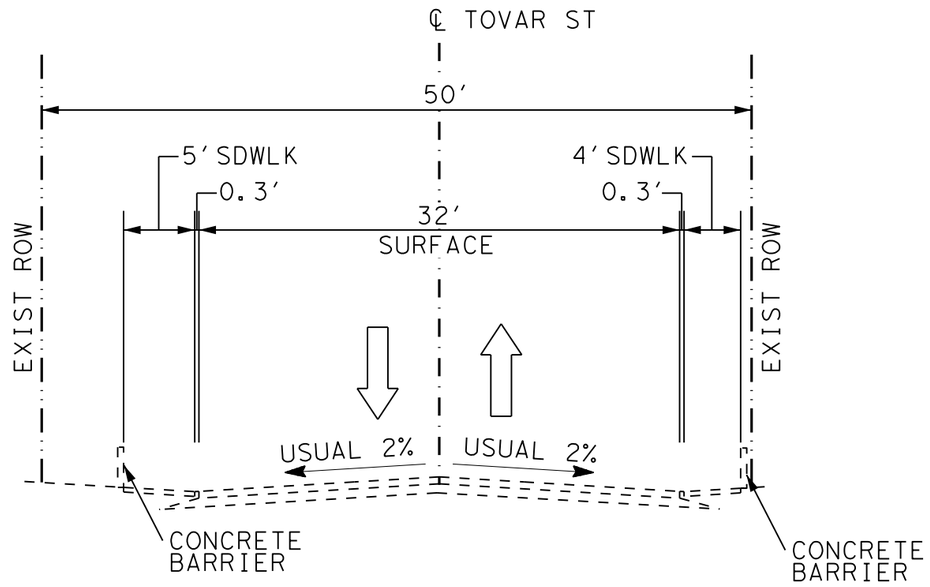

S TOVAR ST.

EXISTING TYPICAL SECTION
STA 106+70.00 TO STA 107+71.00

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

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15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
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TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

EXISTING TYPICAL SECTION

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		5

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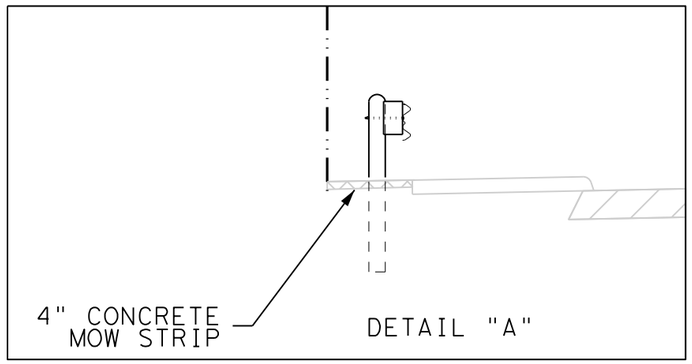

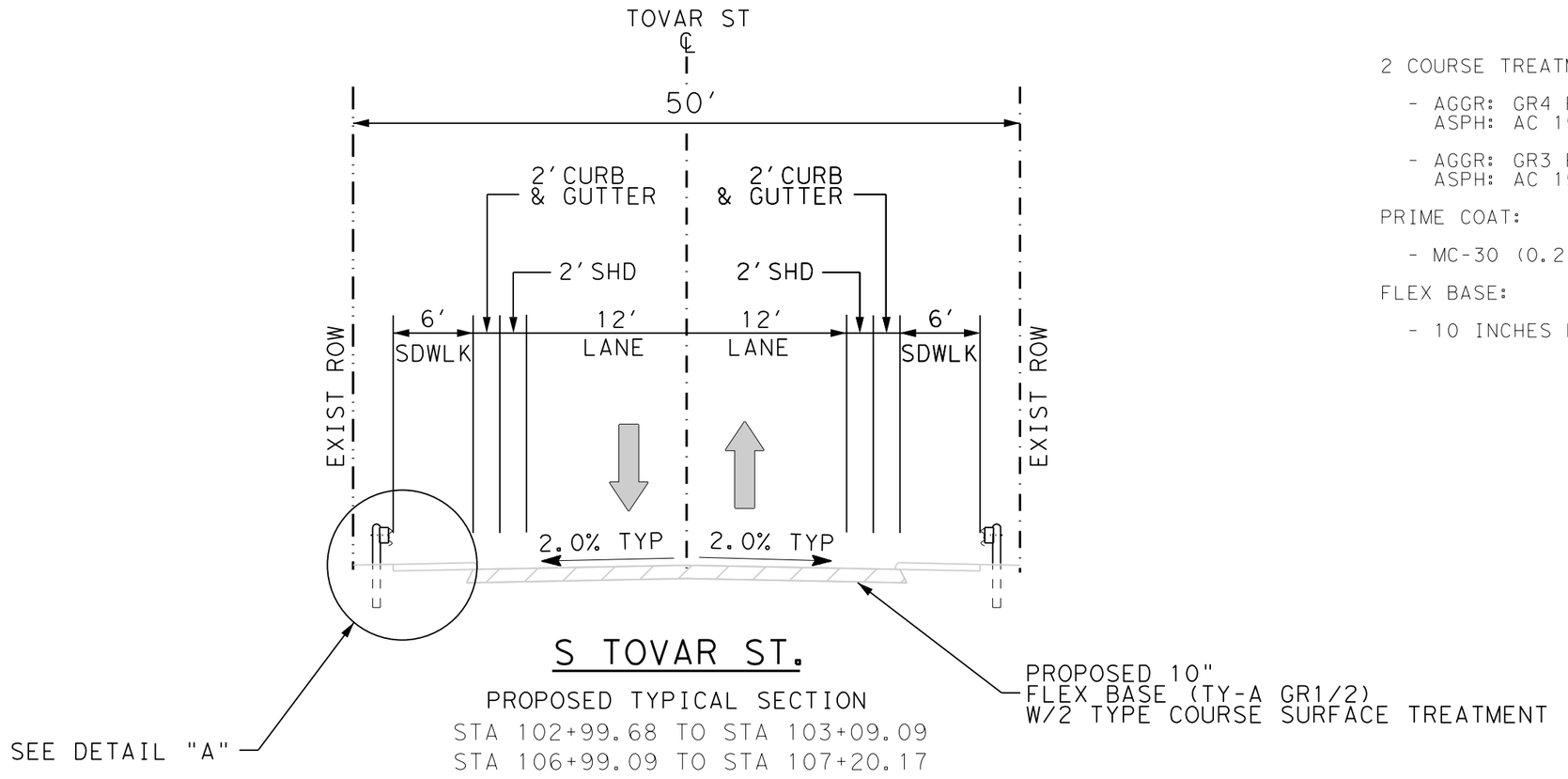

S TOVAR ST.

PROPOSED TYPICAL SECTION

STA 102+99.68 TO STA 103+09.09

STA 106+99.09 TO STA 107+20.17

2 COURSE TREATMENT:

- AGGR: GR4 PD SAC-B (110 SY/CY)
  ASPH: AC 15P (0.35 GAL/SY)
- AGGR: GR3 PD SAC-B (90 SY/CY)
  ASPH: AC 15P (0.40 GAL/SY)

PRIME COAT:

- MC-30 (0.2 GAL/SY)

FLEX BASE:

- 10 INCHES FL BS (TY-A)(GR#1/GR#2)

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NOT TO SCALE

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS

IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST
@ SAN DIEGO CREEK

PROPOSED
TYPICAL SECTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		6

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GENERAL NOTES:

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

Rogelio Chapas – Rogelio.Chapa@txdot.gov

Angel Martinez – Angel.Martinez@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

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

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

Item 5 - Control of the Work

The Contractor shall maintain and preserve the integrity of all “existing survey markers” by avoiding the disturbance of such markers, which include all control points (horizontal and/or vertical), stakes, marks, and right-of-way markers. The Department will repair all Contractor disturbed control points, stakes, marks, and right-of-way markers. The cost for any and all repairs to the “existing survey markers” will be deducted from money due or to become due to the Contractor.
Prior to construction must call 811 to verify any utilities located within project limits. Contractor will also coordinate with utility owners listed below for any adjustments needed to sanitary sewer manholes, water valves, gas valve, telecommunication, television manhole located within project limits. The utility company is responsible for any adjustment when necessary. The work should be performed in a manner as to not delay construction contractor work activity.

Contractor will make necessary arrangements with the utility owner(s) when utility adjustments are required, as a result of construction activities.

Utility Owner	Utility	Contact	Office Phone	Email
AT&T (TXS1)	Comm	Arturo Guerrero	956-489-4176	arturo.i.guerrero@stt.com
San Diego Municipal District #1	Water/ Sanitary/Storm	Rudy Torres Jr.	361-279-3357	rudytorresjr@yahoo.com
AEP Energy (AC3)	Electric	Alan D. Gomez	361-881-5532	adgomez@aep.com
CenterPoint Energy (ENTEX59)	Natural Gas	Jeremy Gonzalez	956-898-1952	jeremy.gonzalez@centerpointenergy.com

There is an existing 8” waterline, shown in the plans, that runs parallel to and east of the proposed bridge. There is an AT&T fiber line that runs parallel to and east of the proposed bridge. This communication line will be relocated to the east of the existing 8” waterline PRIOR to start of construction and will therefore not be in conflict with the proposed construction.
An existing power line is located on the west side of the proposed bridge. The contractor will need to contact AEP Energy to develop a safety and de-energizing plan when using cranes during bridge removal and construction.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with “Standard Operating Procedure for Alternate Precast Proposal Submission” found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design.

Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6 - Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items

classified as construction materials. This form is not required for materials classified as a manufactured product.

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

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

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

for clarification on material categorization.

Item 7 - Legal Relations and Responsibilities

No significant traffic generator events identified.

Roadway closures during the following key dates and/or special events are prohibited (list the dates and events road closures will be prohibited).

Jurisdictional Waters of the United States and Project Specific Locations (PSL) Coordination - This project requires permit(s) with environmental resource agencies. There is a high probability that environmentally sensitive areas will be encountered on contractor designated project specific locations (PSLS) for the project (including but not limited to haul roads, equipment staging areas, parking areas, etc.).

Requirements for Work within Jurisdictional Waters of the United States:
The department has been authorized to perform work within designated areas of the project under U.S. Army Corps of Engineers (USACE) nationwide permit (NWP) #14 and/or #3a and/or #3b.

The contractor will not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area (i.e. an area where the USACE has jurisdiction) that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. and their associated wetlands affected by activities associated with this project. Special restrictions may be required for such work in these USACE jurisdictional areas. The contractor will be responsible for any and all consultations with the USACE regarding activities, including PSLs, which have not been previously evaluated by the USACE. The Contractor will

provide the department with a copy of all consultation(s) or approval(s) from the USACE prior to initiating activities.

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

The disturbed area for all project locations in the Contract, and the Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, the Contractor shall provide a copy of the Contractor Notice of Intent (NOI) for the PSLs to the Engineer and to the local government operating a municipal separate storm sewer system (MS4) if applicable. If the total area of project disturbed areas and PSLs total between 1-acre but less than 5-acres, the Contractor shall post the appropriate Contractor Construction Site Notice for all Contractor PSLs to be in compliance with TCEQ storm water regulations.

In order to expedite the approval process for PSLs or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the U.S.A.C.E. within 30 days from the date of “authorization to begin work” for all PSLs that are in areas where the USACE has jurisdiction (i.e. USACE permit areas). If this is not done, the contractor waives the right to request any contract time considerations if project progress is impacted and PSL’S approval is still pending.

Requests submitted to the area engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request will include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district’s environmental section.

For PSLs that fall within USACE permit areas, the Contractor must document and coordinate with the USACE, if required, before 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. The Contractor will document both the project specific location (PSL) and their authorization, and the Contractor will maintain copies for review by the Department and/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, then:
   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
   b. temporary fill (Item 132, Embankment) within a USACE permit area may be restricted.
   c. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area may be restricted; and,
   d. Unsuitable excavation or excess excavation [“Waste”] (Item 110) that is disposed of at an approved location within a USACE evaluated area may be restricted.

2. Contractor Materials from Areas Other than Previously Evaluated Areas. The Contractor will provide the Department with a copy of all USACE coordination or approvals before 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, including:
   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.

Storm Water Regulations Requirements:
The Contractor shall be responsible for (off ROW) PSLs applicable to the TCEQ Construction General Permit (CGP) requirements and will notify the Engineer of the disturbed acreage within one (1) mile of the project limits. The Contractor shall obtain any required authorization form the TCEQ for any Contractor PSLs for construction support activities on or off ROW.

The total disturbed areas within the ROW are anticipated at less than one (1) acre and/or this project is classified as “surface work” consisting of an asphalt overlay of an existing roadway without shoulder-up disturbances. Due to this type of construction, the project qualifies for exclusion under the *Construction General Permit* (CGP) issued by the Texas Commission on Environmental Quality (TCEQ)

on March 5, 2018 and amended on January 28, 2022. However, should the sum of the Engineer’s anticipated disturbances and all of the Contractor’s (On ROW and off ROW) PSLs equal or exceed the one (1) acre threshold, both TxDOT and the Contractor shall have project responsibilities under the CGP that reverts to non-exclusion status. To ensure project compliance with all applicable water quality regulations, the Contractor shall obtain Engineer approval for all non-depicted areas of disturbance that increases the Engineer’s initial soil and vegetation disturbed area estimates before associated work operations start.

Item 8 - Prosecution and Progress

Before starting work, provide a sequence of work and estimated progress schedule meeting the requirements of Section 8.5.2, “Progress Schedule.”

The Tovar St. bridge will be closed during construction and concrete barrier placed at both ends of the bridge for safety. A detour will be in place for the closure. Refer to Traffic Control Plan Detour, etc shown in the plans for details.

An easement has been acquired on the east side of the bridge (50 ft wide from existing ROW) to facilitate bridge demolition/removal and proposed construction. Refer to Roadway Plan & Profile, etc. shown in the plans for addition al details.

Working days will be computed and charged in accordance with Article 8.3.1.4: Standard Workweek,

Equipment and material may be pre-staged at approved locations.

Item 9 - Measurement and Payment

Submit Material on hand (MOH) payment requests at least 5 working days prior to the end of the month for payment on that month’s estimate. For out-of-town MOH submit requests at least 10 working days prior to the end of the month.

Item 100 - Preparing Right of Way

Burning of brush will not be permitted.

All right of way clearing operations will be coordinated with the project's SW3P and as directed/approved by the Engineer.

Item 105 - Removing Treated and Untreated Base and Asphalt Pavement

Asphalt pavement and base material to be removed under this item will remain the property of the Contractor.

Item 247 - Flexible Base

Conform to the following flexible base (TY A GR 1-2) requirements:

A pre-placement meeting must be conducted at least 48 hrs prior to flex base placing operations.

If the flexible base comes from a stockpile, test the stockpile before delivery to the project. Stockpile must be labeled and designated the contractor and the project. Follow the department guide schedule for testing frequency. The Contractor's attention is called to the fact that the preliminary test will require approximately 30 days and it is the Contractor's responsibility to advise the Engineer of the location of the flexible base source sufficiently in advance to avoid delays. Blade the side slopes to remove all grass from the area of construction before placing flexible base on that portion of the roadway to be widened, level-up, seal coat, or HMAC overlay. Blade the sod back onto the side slopes after the proposed items of work have been completed. This work is subsidiary to pertinent work items.

PI (plasticity index) to be a minimum of 2.
Linear shrinkage to be a minimum of 3.

Density and Moisture Control. Compact to a minimum of 100% of the maximum dry density and within ±2.0% of the optimum moisture content as determined in accordance with Tex-113-E, unless otherwise shown on the plans. Provide the Engineer with the beginning and ending station numbers of the area completed for testing. The Engineer will determine roadway density and moisture content of completed sections in accordance with Tex-115-E, Part I. The Engineer will determine random locations for testing in accordance with Tex-115-E, Part IV. Do not achieve density by drying the material after compaction. When the density is less than 100% of the maximum dry density, the Engineer may perform additional testing to determine the extent of the area to correct. The Engineer may accept the section if no more than one of the five most recent density tests is below the specified density and the failing test is no more than 3 pcf below the specified density.

Item 310 - Prime Coat

Remove all loose and scabbed material from the surface prior to prime coat application. Allow the prime coat to cure for a minimum of 48-72 hours before placing any successive layers, unless otherwise approved by the Engineer. In winter weather, allow the prime to cure for a minimum of 72 hours.

Do not allow any type of traffic including construction vehicles to drive on the curing prime coat. Make necessary adjustments for driveways and accesses that need to be maintained during construction, as approved by the Engineer.

When a prime coat is left open to traffic for more than 14 days or when the application is visually inconsistent such as but not limited to streaking and tracking, then the surface shall be re-primed as directed by the Engineer at no additional cost to the Department.

Item 316 – Seal Coat

A pre-placement meeting must be conducted at least 48 hrs. prior to seal coat placement.

The usual open season for application of asphalt is from: April 1st to September 30th, unless otherwise approved in writing by the Engineer.

The primary asphalt option to be used is AC-15P, the secondary option is CRS-2P, which can only be used during cold weather unless otherwise approved by the Engineer.

In addition to other asphalt distributor requirements, the asphalt distributor shall be capable of providing a transversely varied asphalt rate. The Contractor shall demonstrate that the distributor can apply an asphalt rate outside the wheel path locations between 22 and 32 percent higher than the asphalt rate being applied in the wheel paths. The contractor's calibration of the distributor will include verification of this capability and a description of the spray bar(s) and nozzles to be used. The percentage difference in asphalt rate provided by each tested spray bar and nozzle arrangement shall be provided to the Engineer. The Engineer will select the pavements where transversely varied asphalt rate is to be provided and will provide this information at the pre-construction meeting.

The estimated application rate noted in the plans is for locations outside the wheel paths and is for estimation purposes only.

Remove excess accumulated rock (Windrow) from edge of pavement swept by brooms.
Self-propelled broom sweeper working properly and have an approved bristle size.
Approved thermal probe, gauge method for temperature reading, easy and safe access.

Use vacuum sweeper in curb and gutter sections.

Item 320 – Equipment for Hot Mix Asphalt Materials

For staged construction, all longitudinal ACP joints shall be constructed with a 3:1 to 6:1 taper. For placement of 2 inches or more, the device will provide a maximum ½ inch vertical edge. Outside edges (next to the grass/earth) will also have a taper or will be backfilled the same day.

Final Surface course: all longitudinal ACP joints for the final Hot Mix surface course shall be in widths equal to travel lane widths so that all final course ACP joints will match the proposed lane striping (pavement markings), unless otherwise directed by the engineer.

Item 416 - Drilled Shaft Foundations

After drill shaft installation plan is approved by the Engineer, a pre-placement meeting shall be held at least 48 hours before beginning excavation operations.

Item 420 - Concrete Substructures

Sulfate resistant concrete shall be used in all situations for concrete structures in contact with the natural ground.

Check the sign plans for locations of clearance signs and brackets on structures which will require inserts in the pre-stressed beams. Forward such locations to the beam fabricator.

Mass Concrete will be a plans quantity item.

Item 421 - Hydraulic Cement Concrete

Sulfate resistant cement concrete shall be used in all situations for structural elements in contact with the natural ground. These includes, but is not limited to, all reinforced concrete pipe, concrete box culverts, drill shafts, bridge columns, bridge abutments, wingwalls, approach slabs, inlets, manholes, junction boxes, ground boxes and all concrete riprap.

Air entrainment is not required. If concrete is supplied with air entrainment, the concrete must adhere to the requirements of item 421.4.2.4.

Item 432 - Riprap

Provide Class B Concrete for riprap.

Item 454 - Bridge Expansion Joints

For Header-Type Expansion Joints, the following systems are approved:

SSI-XJS
Richard Waters
4021 Benbrook Highway
Fort Worth, Texas 76116
(817) 731-7890

Watson Bowman-Acme
Ronald Poleon
102 Enfield Trace
Woodstock, Georgia 30189
(770) 592-9021

For Asphalt-Plug Expansion Joints, the following systems are approved:

Wabo-Expandex
BASF
3011 Heatherpark Drive
Kingwood, TX 77345
Attn: Robert Walker
281-414-3114

Matrix 502 Asphalt Plug
D.S. Brown Co.
300 E. Cherry St.
North Baltimore, OH 45872

419-257-3561

Matrix 501, Matrix 502
Crafco, Inc.
420 N. Roosevelt Ave.
Chandler, AZ 85226
Attn: Gus Leal
469-520-4622

Fibrejoint Asphaltic Plug Joint
Marketing Associates, Inc.
131 St. James Way
Mount Airy, NC 27030
Attn: Bart Pharr
336-789-7259, ext. 208

Item 496 - Removing Structures

The structure(s) to be removed have surface coatings which may contain hazardous materials. Provide for the safety and health of employees and abide by all OSHA Standards and Regulations.

Item 500 - Mobilization

"Materials-on-Hand" payments will not be considered in determining percentages used to compute mobilization payments.

Item 502 - Barricades, Signs, and Traffic Handling

Designate, as the Contractor Responsible Person (CRP), an English-speaking employee on-call nights and weekends (or any other time that work is not in progress) with a local address and telephone number for maintenance of signs and barricades. This employee will be located within one (1) hour of traveling time to the project site. Notify the Engineer in writing of the name, address and telephone number of this employee. Furnish this information to local law enforcement officials.

When advanced warning flashing arrow panel(s) is/are specified, maintain one standby unit in good condition at the job site ready for immediate use is required.

The Contractor will post variable message boards at the locations shown in the plans noting Tovar bridge closure two weeks prior to start of construction activities.

Traffic control required for this project will not be paid for directly but will be considered subsidiary to the various bid items.

Ensure equipment not in use, stockpile aggregate, and other working materials are:
A minimum of 30 feet from the edge of the travel lane;
Do not obstruct traffic or sight distance;
Do not interfere with the access from abutting property; or
Do not interfere with roadway drainage.

Erect signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance at intersections and curves.

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

Item 504 - Field Office and Laboratory

Provide a Type D Structure and Asphalt Content by Ignition Method for TxDOT Quality Assurance Testing. Contractor's quality control testing shall be performed in a separate space or facility. If a separate space is utilized within a shared facility, partition the space with a floor to ceiling wall with a door access for indoor use that is lockable with a key. Each separate space shall have an exterior door access.

Ensure that the field lab has an office for TxDOT use along with lockable file cabinet, desk and chair.

The floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer.

Contractor is responsible to transport to and from the field lab TxDOT owned testing equipment required for hot mix operations. Contractor will pick up, deliver, install and set up TxDOT owned equipment required in the field lab. TxDOT owned equipment required in the field lab will be picked up at LRD DST LAB or as determined by the LRD DST LAB Supervisor.

Pick up and deliver TxDOT owned equipment under the supervision of a TxDOT lab technician. A TxDOT lab technician will verify the installation and set-up of the equipment at least 48 hours prior to beginning of hot mix operations (trial batch included).

All equipment will be returned by the Contractor in the same manner and location as it was picked up. Contractor is responsible for any damages incurred to TxDOT equipment.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Concrete washout area(s) shall be installed prior to concrete placement on site. The concrete washout area(s) shall be entirely self-contained. Location must be Approved by the Engineer. Concrete washout area(s) are subsidiary to pertinent Items.

Item 512 - Portable Traffic Barrier

Do not use different types of Portable Traffic Barriers in a single continuous installation.

Item 531 – Sidewalks

Include subsidiary information, dowel cap or dowel gap for expansion space for Expansion joints.

Expansion Joints to be placed at 30’ Max. spacing to avoid Extreme Heat Buckling.

Item 540 – Metal Beam Guard Fence

Install cast-in place concrete curb Type II in the metal beam guard fence transition (Thrie-Beam Transition). Pre-cast concrete curb will not be allowed.

Item 636 - Signs

All signs noted in the plans to be removed will become property of the contractor.

Item 666 – **Reflectorized Pavement Markings**

Reflectivity requirements for Type I will be as per Item 666.

Payment on Type I markings requiring retroreflective testing will be made at a 75% rate until passing test results are received.

Use TY II pavement marking as sealer and TY I as final pavement marking.

Item 6001 - Portable Changeable Message Sign

Provide 4 electronic portable changeable message signs as required by the Engineer. Provide backups and keep operational and available on the jobsite at all times during traffic control operations. The electronic portable changeable message signs will be made available for utilization for the entire duration of the project, including all alternative locations.

Item 6185 – Truck Mounted Attenuator (TMA) and Trailer

Provide 1 Truck Mounted Attenuator as required by the Engineer. Provide backup and always keep operational and available on the jobsite at all times during traffic control operations. The Truck Mounted Attenuator will be made available for utilization for the entire duration of the project, including all alternative locations.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0922-23-010 **DISTRICT** Laredo **COUNTY** Duval
HIGHWAY S TOVAR ST

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0922-23-010**			
		PROJECT ID		**A00135145**			
		COUNTY		**Duval**			
		HIGHWAY		**S TOVAR ST**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	4.200		4.200	
	104-6015	REMOVING CONC (SIDEWALKS)	SY	80.000		80.000	
	104-6022	REMOVING CONC (CURB AND GUTTER)	LF	138.000		138.000	
	105-6062	REMOVING STAB BASE AND ASPH PAV(4"-16")	SY	334.000		334.000	
	216-6001	PROOF ROLLING	HR	2.000		2.000	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	63.000		63.000	
	310-6009	PRIME COAT (MC-30)	GAL	45.000		45.000	
	400-6005	CEM STABIL BKFL	CY	171.600		171.600	
	416-6004	DRILL SHAFT (36 IN)	LF	850.000		850.000	
	420-6013	CL C CONC (ABUT)	CY	51.800		51.800	
	420-6029	CL C CONC (CAP)	CY	121.100		121.100	
	420-6037	CL C CONC (COLUMN)	CY	77.200		77.200	
	422-6001	REINF CONC SLAB	SF	15,400.000		15,400.000	
	422-6013	BRIDGE SIDEWALK	SF	4,550.000		4,550.000	
	422-6015	APPROACH SLAB	CY	71.000		71.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	2,082.100		2,082.100	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	436.500		436.500	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	7.000		7.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	530.800		530.800	
	450-6032	RAIL (TY C223)	LF	748.000		748.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	132.000		132.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	394.000		394.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	394.000		394.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	223.000		223.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	223.000		223.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	420.000		420.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	420.000		420.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	88.000		88.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	88.000		88.000	
	512-6089	PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR(STL)	LF	60.000		60.000	
	512-6091	PTB(REMOVE)(SSCB OR CSB)(TY1)OR(STL)	LF	60.000		60.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	141.000		141.000	
	531-6003	CONC SIDEWALKS (6")	SY	94.000		94.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	45.000		45.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0922-23-010 **DISTRICT** Laredo **COUNTY** Duval
HIGHWAY S TOVAR ST

			CONTROL SECTION JOB		**0922-23-010**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00135145**		
			COUNTY		**Duval**		
			HIGHWAY		**S TOVAR ST**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	843.000		843.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	842.000		842.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	843.000		843.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	842.000		842.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	1,685.000		1,685.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	
	6185-6002	TMA (STATIONARY)	DAY	180.000		180.000	
	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	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

FINAL SUBMITTAL

CK: DW: CK: DW:

SUMMARY OF MOBILIZATION ITEMS

LOCATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	6185 6002 TMA (STATIONARY)	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	512 6089 PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR(STL)	512 6091 PTB(REMOVE)(SSCB OR CSB)(TY1)OR(STL)
	MO	DAY	EA	LF	LF
CSJ: 0922-23-010					
STA 102+99.68 TO STA 107+20.17	8	180	4	60	60
PROJECT TOTALS	**8**	**180**	**4**	**60**	**60**

SUMMARY OF REMOVAL ITEMS

LOCATION	104 6015 REMOVING CONC (SIDEWALKS)	104 6022 REMOVING CONC (CURB AND GUTTER)	105 6062 REMOVING STAB BASE AND ASPH PAV(4"-16")	496 6010 REMOV STR (BRIDGE 100 - 499 FT LENGTH)
	SY	LF	SY	EA
CSJ: 0922-23-010				
STA 102+99.68 TO STA 107+20.17	80	138	334	1
PROJECT TOTALS	**80**	**138**	**334**	**1**

SUMMARY OF ROADWAY ITEMS

					SURFACE TREATMENT					
LOCATION	100 6002 PREPARING ROW	216 6001 PROOF ROLLING	247 6041 FL BS (CMP IN PLC)(TYA GR1&2)(FNAL POS)	310 6009 PRIME COAT (MC-30)	316 6015 * ASPH (AC-15P)	316 6240 * AGGR(TY-PD GR-4 SAC-B)	316 6015 * ASPH (AC-15P)	316 6238 * AGGR(TY-PD GR-3 SAC-B)	529 6008 CONC CURB & GUTTER (TY II)	531 6003 CONC SIDEWALKS (6")
	STA	HR	CY	GAL	GAL	CY	GAL	CY	LF	SY
CSJ: 0922-23-010										
SHEET 1 OF 1 - STA 102+99.68 TO STA 107+20.17	4.20	2	63	45	79	2	91	3	141	94
PROJECT TOTALS	**4.20**	**2**	**63**	**45**	**79**	**2**	**91**	**3**	**141**	**94**

* FOR CONTRACTOR'S INFORMATION ONLY

SUMMARY OF MBGF ITEMS

LOCATION	432 6045 RIPRAP (MOW STRIP)(4 IN)	540 6001 MTL W-BEAM GD FEN (TIM POST)	544 6001 GUARDRAIL END TREATMENT (INSTALL)
	CY	LF	EA
CSJ: 0922-23-010			
STA 102+99.68 TO STA 107+20.17	7	45	1
PROJECT TOTALS	**7**	**45**	**1**

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6174 REFL PAV MRK TY II (W) 6" (SLD)	666 6210 REFL PAV MRK TY II (Y) 6" (SLD)	666 6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	666 6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	678 6002 PAV SURF PREP FOR MRK (6")
	LF	LF	LF	LF	LF
CSJ: 0922-23-010					
STA 102+99.68 TO STA 107+20.17	843	842	843	842	1,685
PROJECT TOTALS	**843**	**842**	**843**	**842**	**1,685**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	432 6031 RIPRAP (STONE PROTECTION)(12 IN)	506 6003 ROCK FILTER DAMS (INSTALL) (TY 3)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	CY	LF	LF	SY	SY	LF	LF	LF	LF
CSJ: 0922-23-010									
STA 102+99.68 TO STA 107+20.17	436.5	394	394	223	223	420	420	88	88
PROJECT TOTALS	**436.5**	**394**	**394**	**223**	**223**	**420**	**420**	**88**	**88**

NO.	DATE	REVISION

Texas Department of Transportation

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IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

SUMMARY OF QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		16

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FINAL SUBMITTAL

TRAFFIC CONTROL PLANS GENERAL NOTES:

1. THIS IS A SUGGESTED TRAFFIC CONTROL PLAN (TCP). THE CONTRACTOR MAY SUBMIT AN ALTERNATE TRAFFIC CONTROL PLAN, SIGNED AND SEALED BY LICENSED PROFESSIONAL ENGINEER
2. CONTROL PLAN AND ARE AGREED UPON BY THE CONTRACTOR AND THE DEPARTMENT, THE PLAN SHEETS MAY BE DEVELOPED AND SIGNED AND SEALED BY THE ENGINEER.
3. REFER TO ITEM 8 "PROSECUTION AND PROGRESS" AND PROJECT GENERAL NOTES FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.
4. FURNISH AND INSTALL ALL TRAFFIC CONTROL PLANS DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, AND WORK ZONE MARKINGS, IN COMPLIANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TxMUTCD), THE STATE STANDARD TRAFFIC CONTROL PLANS
5. (TCP) SHEETS, AND THE BARRICADES AND CONSTRUCTION (BC) SHEETS. REFER TO PROJECT GENERAL NOTES FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.
6. VERIFY THE LOCATION AND SPACING OF SIGNS, BARRICADES, AND CHANNELIZING DEVICES PRIOR TO THEIR PLACEMENT ALONG VERTICAL CURVES, HORIZONTAL CURVES, AND OTHER GEOMETRIC CONSTRAINTS TO ENSURE VISIBILITY TO ALL MOTORISTS.
7. COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN AND UNCOVER DURING NON-WORKING HOURS ORAS DIRECTED BY THE ENGINEER. PARTIAL COVERAGE OF THE SIGN OR COVERAGE BY MATERIAL THAT WILL NOT COVER THE ENTIRE SIGN ALL THE TIME IS NOT PERMITTED.
8. VARY THE SPACING OF SIGNS TO MEET TRAFFIC CONDITIONS ORAS DIRECTED BY THE ENGINEER AND ENSURE THAT ALL TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS ARE KEPT IN A HIGHLY VISIBLE CONDITION (CLEAN, UPRIGHT AND AT PROPER LOCATION).
9. PROVIDE FOR SAFE AND CONVENIENT ACCESS TO ABUTTING PROPERTY, HIGHWAYS, PUBLIC ROADS, AND STREET CROSSINGS EXCEPT AS OTHERWISE SHOWN ON THE SEQUENCE OF CONSTRUCTION.
10. PLACE ALL STOCKPILED MATERIAL, WASTE MATERIAL, SIGNS, BARRICADES, CHANNELIZING DEVICES, AND WORK VEHICLES NOT IN USE, AT A MINIMUM OF 30 FEET FROM THE OUTER EDGE OF THE NEAREST TRAVEL LANE.
11. MAINTAIN ALL EXISTING DRAINAGE CONDITIONS DURING ALL CONSTRUCTION PHASES UNTIL THE PERMANENT DRAINAGE FACILITIES ARE CONSTRUCTED AND READY TO USE. HANDLE EXCAVATED AND STOCKPILED MATERIAL IN SUCH A WAY THAT IT WILL NOT BLOCK DRAINAGE.
12. REGULATE ALL CONSTRUCTION TRAFFIC TO MINIMAL INCONVENIENCE TO THE TRAVELING PUBLIC. AT THE TIMES WHEN IT IS NECESSARY FOR TRUCK TO STOP, UNLOAD OR CROSS ROADWAYS UNDER TRAFFIC. PROVIDE WARNING SIGNS AND FLAGGERS AS NEEDED TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.
13. REMOVE FROM THE WORK AREA ALL LOOSE MATERIALS AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS AT THE END OF EACH WORKDAY.
14. IMPLEMENT ALL REQUIRED EROSION CONTROL MEASURES AS SHOWN IN THE PLANS DURING VARIOUS STAGES OF CONSTRUCTION.
15. MOVING AN EXISTING SIGN TO A TEMPORARY LOCATION IS SUBSIDIARY TO THIS ITEM 502. INSTALLATIONS WITH PERMANENT SUPPORTS AT PERMANENT LOCATIONS WILL BE PAID FOR UNDER THE APPLICABLE BID ITEMS 502.
16. ADDITIONAL SIGNS, BARRICADES AND CHANNELIZING DEVICES MAY BE REQUIRED TO MAINTAIN TRAFFIC DURING CONSTRUCTION, AS SHOWN ON TCP STANDARDS. ADDITIONAL SIGNS, BARRICADES, ETC. (IF ANY), WILL BE SUBSIDIARY TO ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".
17. IF OVERHEAD POWERLINE ON THE WEST SIDE OF THE EXISTING BRIDGE IS IN CONFLICT WITH THE CONSTRUCTION, WILL NEED TO BE DE-ENERGIZED WITH APPROVAL OF THE AREA ENGINEER.

SEQUENCE OF CONSTRUCTION (UNLESS OTHERWISE APPROVED BY THE ENGINEER)

THE PROPOSED PROJECT WILL BE CONSTRUCTED IN 1 PHASE. FULL CLOSURE OF THE BRIDGE DURING CONSTRUCTION AND DETOUR IS PROVIDED IN THE PLANS

PERFORM FINAL CLEAN UP. REMOVE TEMP ASPHALT PAVEMENT, REMOVE AND STOCKPILE PCTB. REMOVE WORK ZONE PAVEMENT MARKINGS AND SIGNS. PLACE PERMANENT PAVEMENT MARKINGS AND SIGNS, PLACE SSTR AS NEEDED. BRING TRAFFIC TO THE NORMAL OPERATIONS.

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

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IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST
@ SAN DIEGO CREEK

TRAFFIC CONTROL PLAN
GENERAL NOTES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		17

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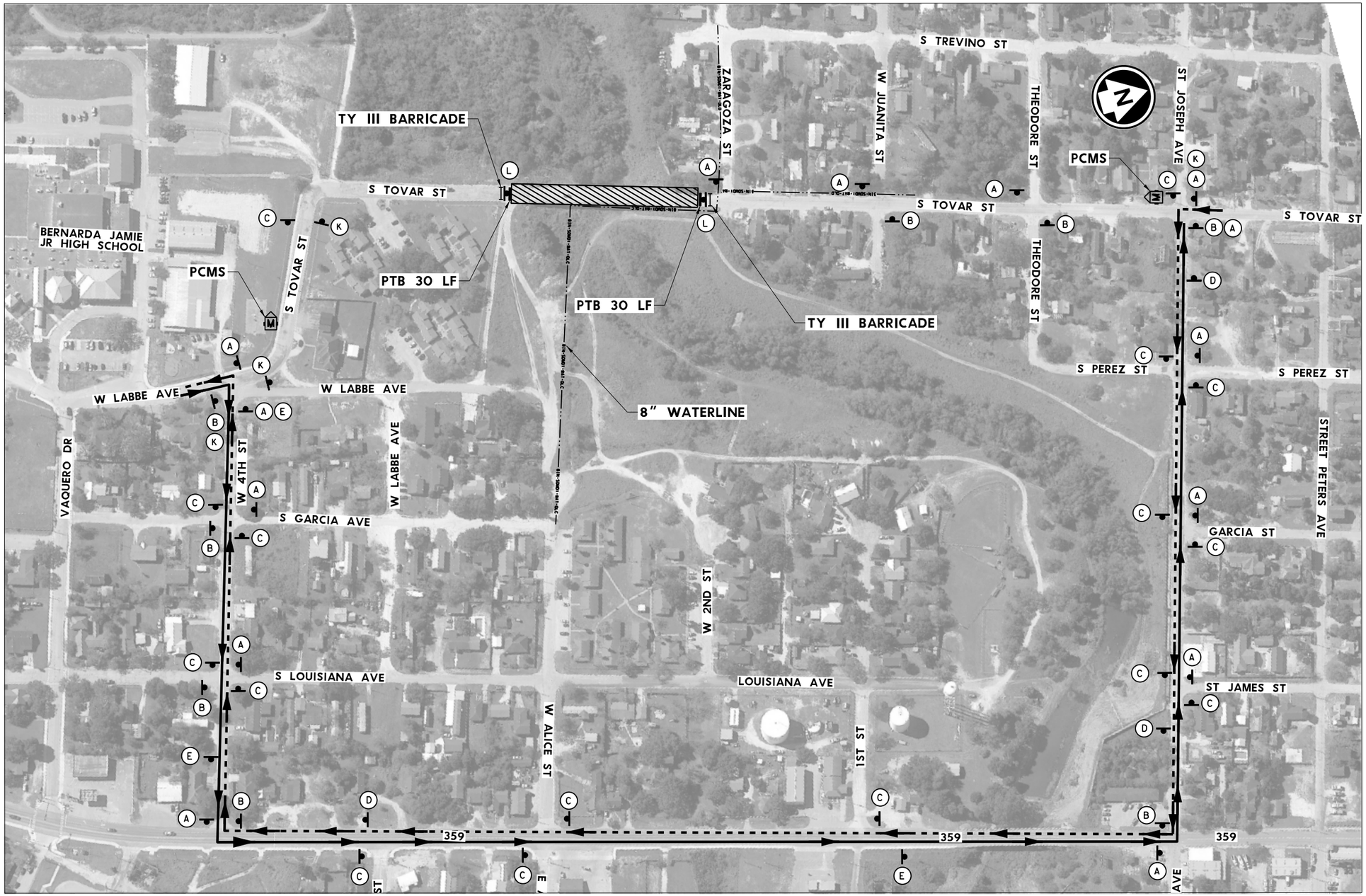

LEGEND

- CONSTRUCTION THIS PHASE/STEP
- DETOUR ROUTE
- SIGN
- TY III BARRICADE
- PORTABLE CHANGEABLE MEASSGE SIGN (PCMS)
- PORTABLE TRAFFIC BARRIER (PTB)

NOTES:

1. TCP DEVICES SHALL BE PLACED IN ACCORDANCE WITH APPLICABLE BC AND TCP STANDARDS.
2. CONTRACTOR SHALL LOCATE SIGNS, BARRICADES & CHANNELIZATION DEVICES AS APPROVED BY THE ENGINNER.

(A) M4-12T S TOVAR ST / M4-9L DETOUR

(B) M4-12T S TOVAR ST / M4-9R DETOUR

(C) M4-12T S TOVAR ST / M4-9S DETOUR

(D) M4-12T S TOVAR ST / M4-9TR DETOUR

(E) M4-12T S TOVAR ST / M4-9TL DETOUR

(K) ROAD CLOSED TO THRU TRAFFIC R11-4

(L) ROAD CLOSED R11-2

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NOT TO SCALE

NO.	DATE	REVISION

Texas Department of Transportation

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IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
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S TOVAR ST @ SAN DIEGO CREEK TRAFFIC CONTROL PLAN DETOUR

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		18

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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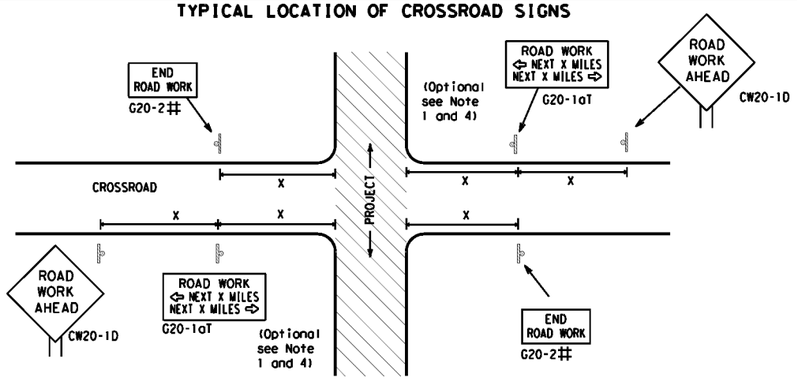
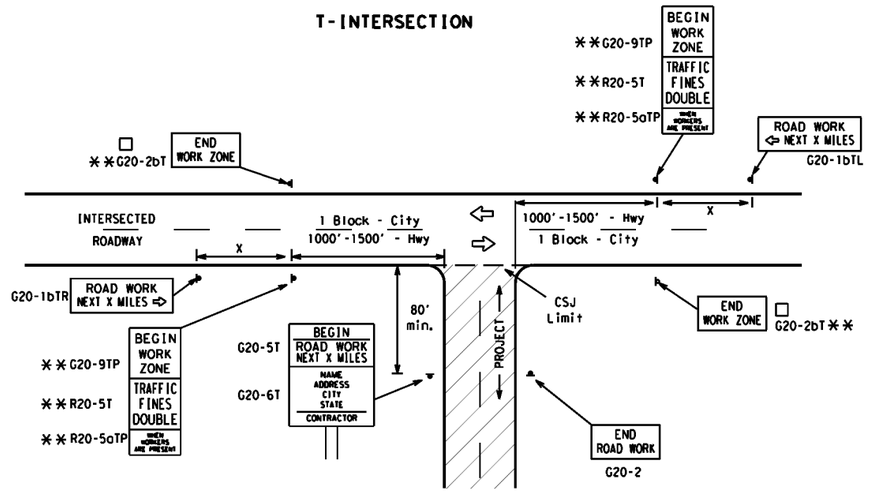
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

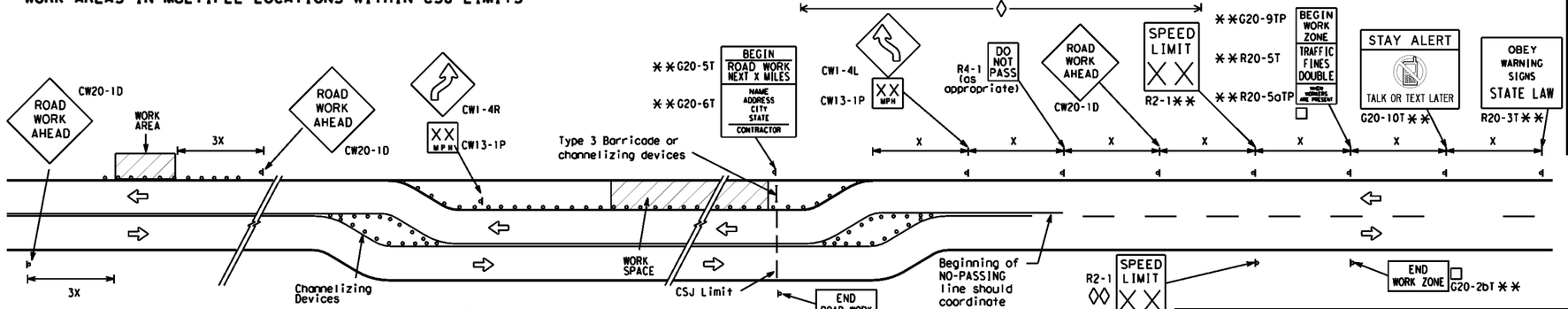
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

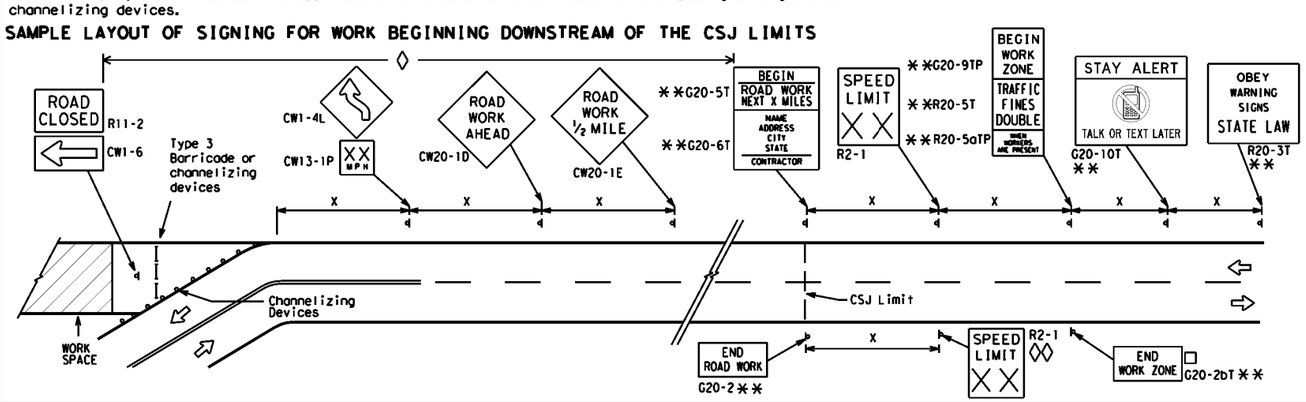
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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

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.

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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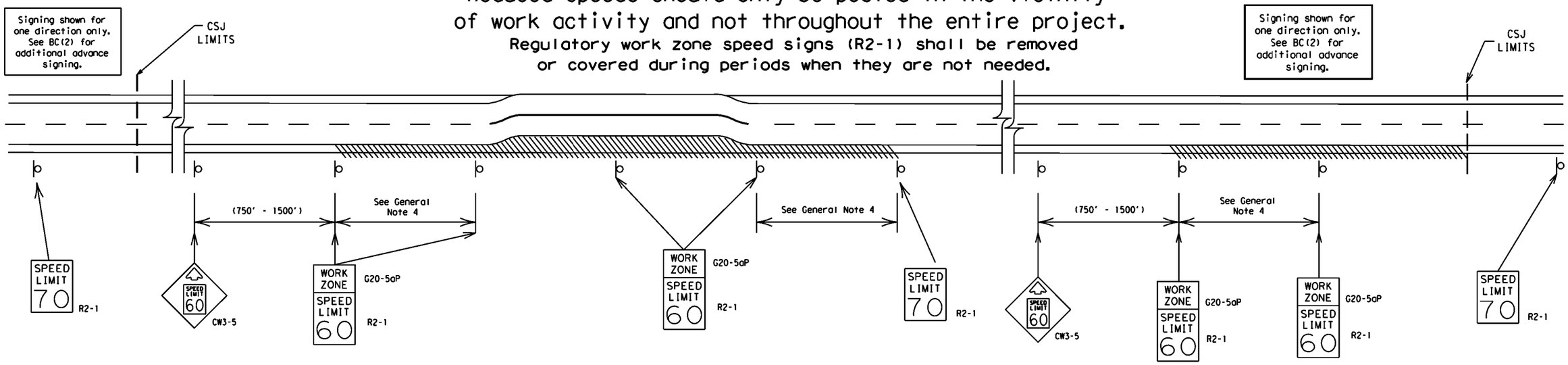
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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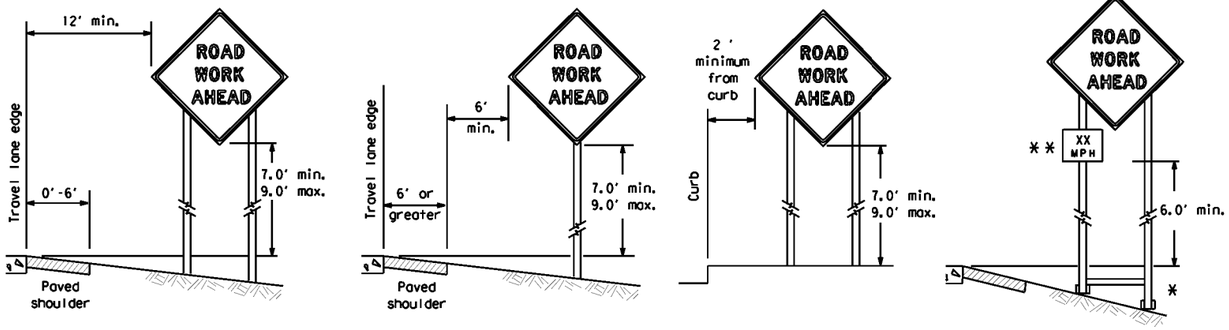
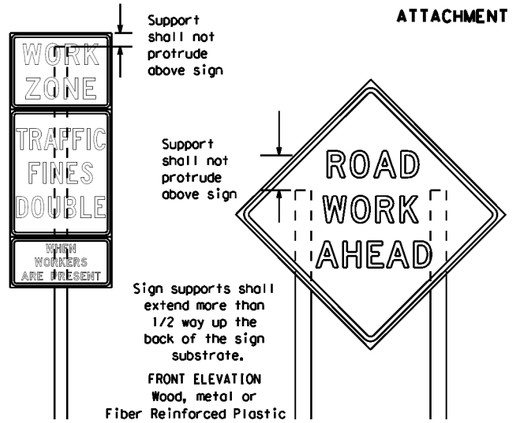
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

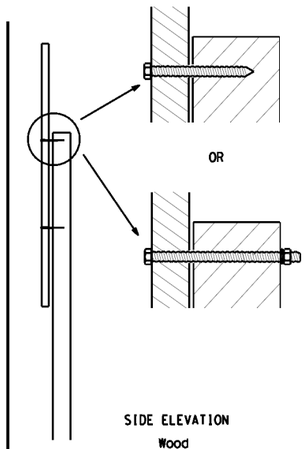


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





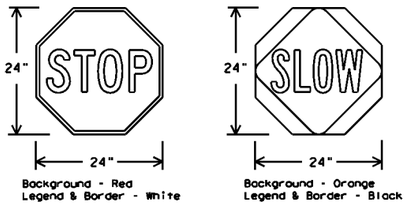
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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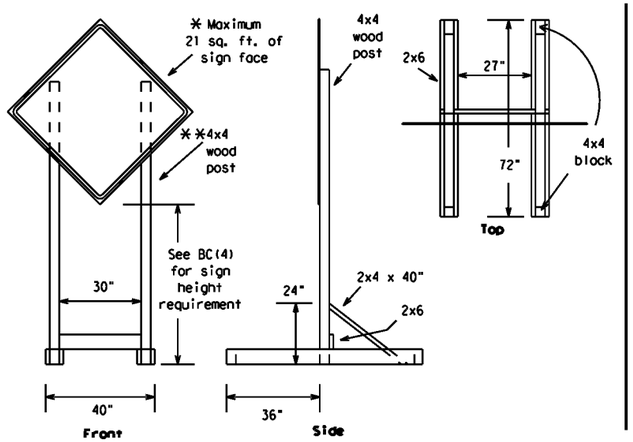
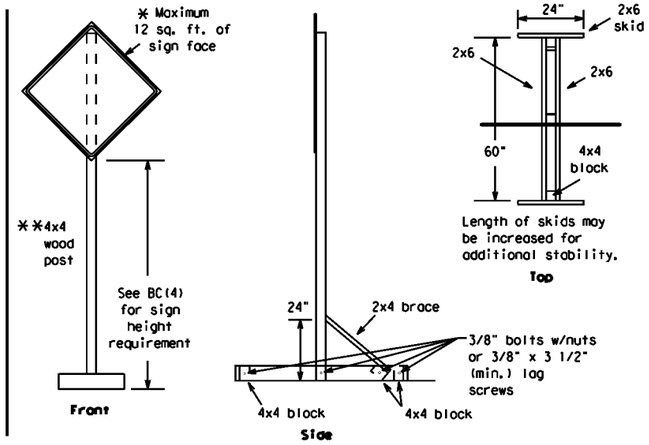
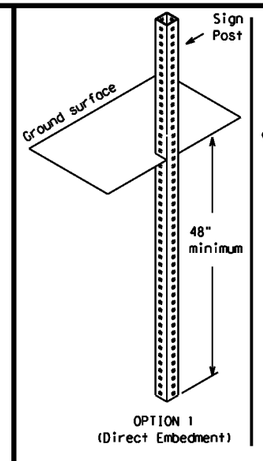


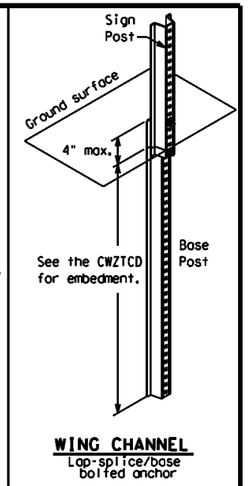


SKID MOUNTED WOOD SIGN SUPPORTS

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



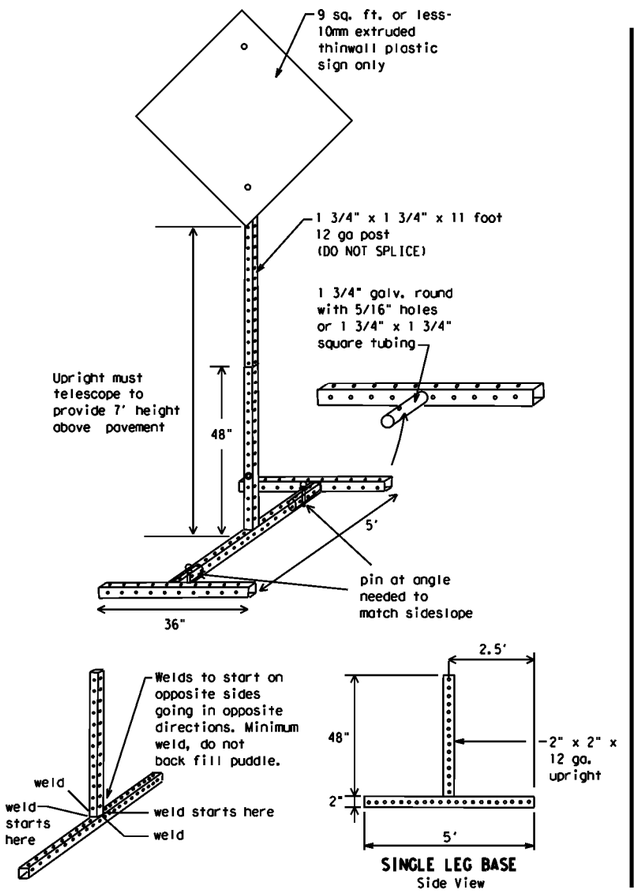
PERFORATED SQUARE METAL TUBING

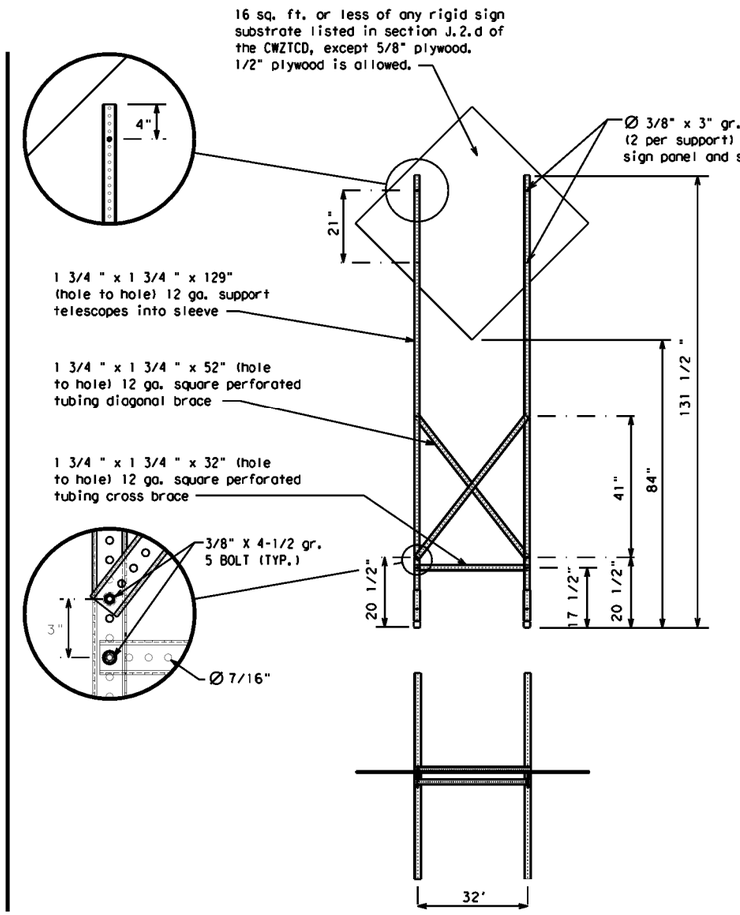


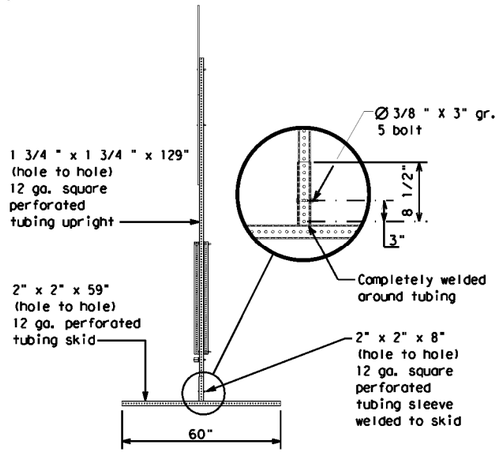
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







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
REVISIONS	0922	23	010	S TOVAR ST
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	DUVAL		23

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0922	23	010	S TOVAR ST
9-07	8-14	DIST	COUNTY		SHEET NO.
7-13	5-21	LRD	DUVAL		24

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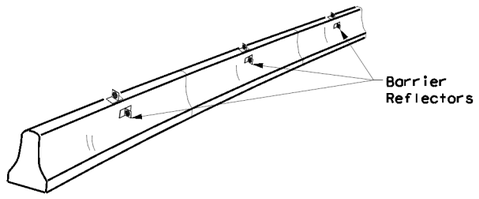
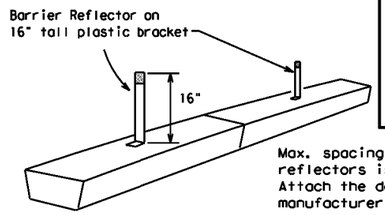
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

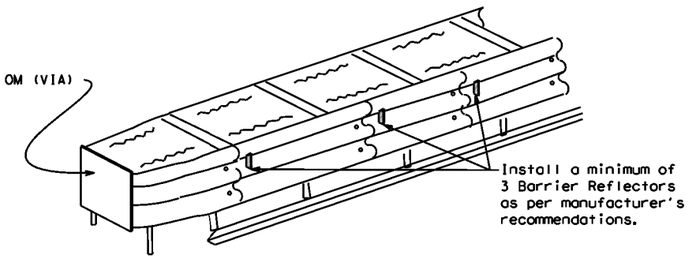


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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.

LOW PROFILE CONCRETE BARRIER (LPCB)

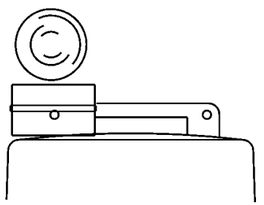


DELINEATION OF END TREATMENTS

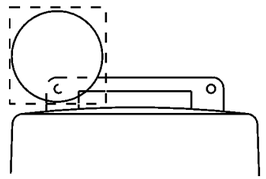
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the 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

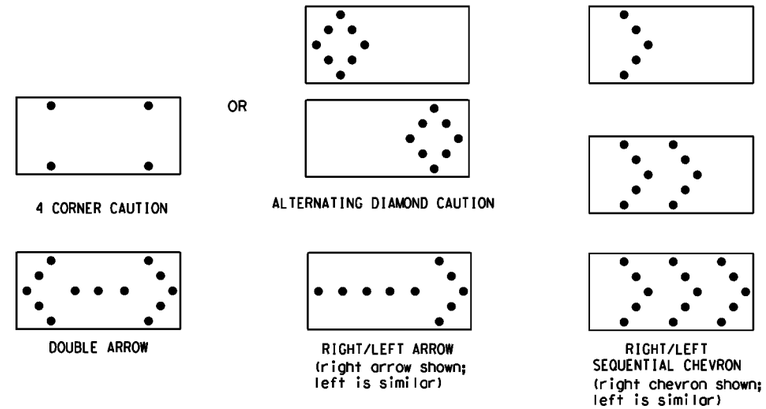
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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 on an extended distance from the TMA.

SHEET 7 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	DUVAL		25

101

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:

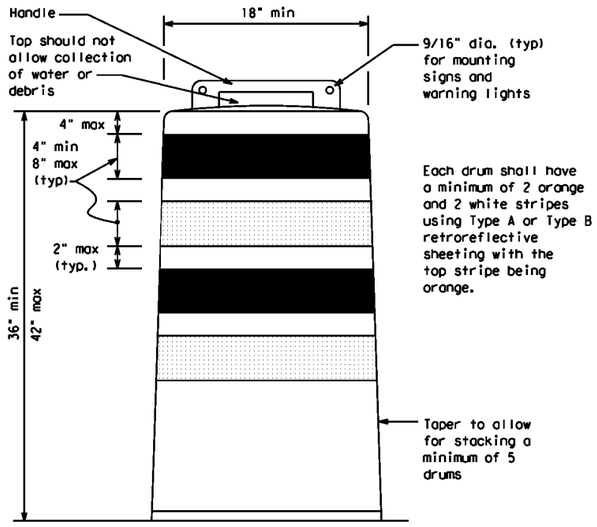
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

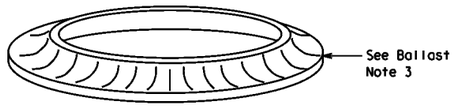
RETROREFLECTIVE SHEETING

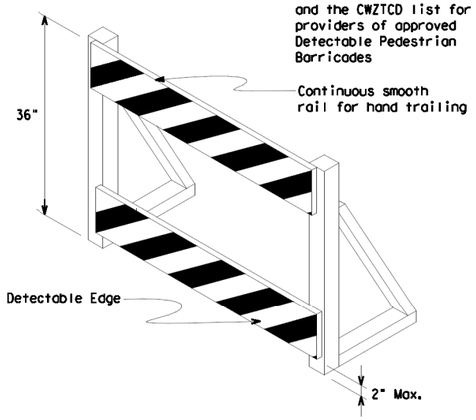
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

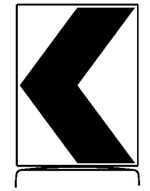




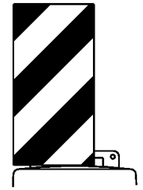


DETECTABLE PEDESTRIAN BARRICADES

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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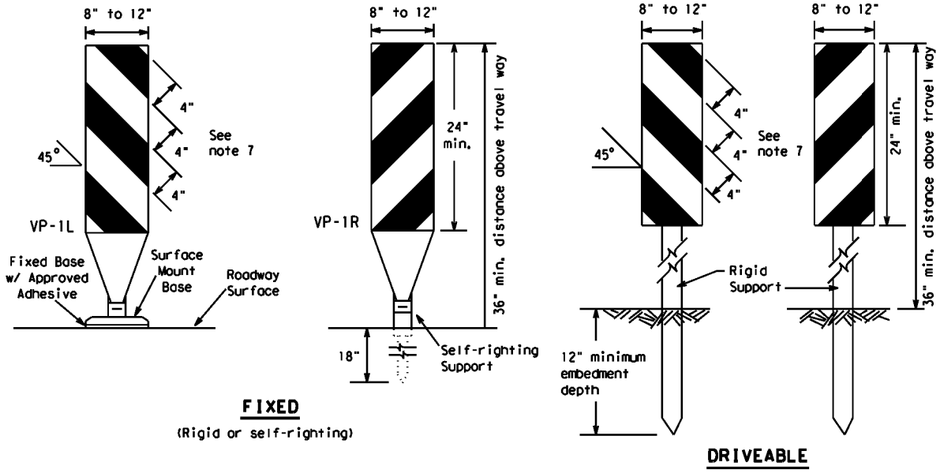
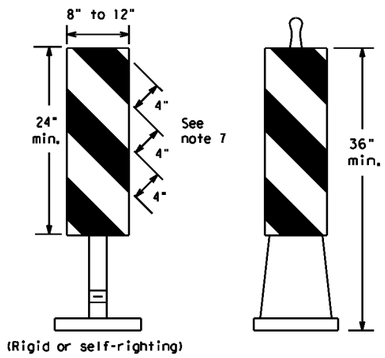


FIXED
(Rigid or self-righting)

DRIVEABLE

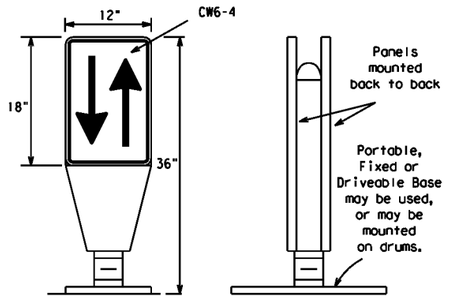


(Rigid or self-righting)

PORTABLE

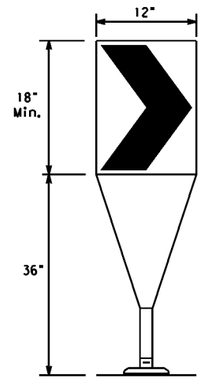
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



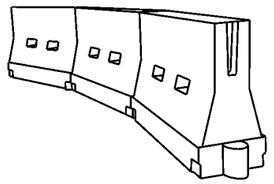
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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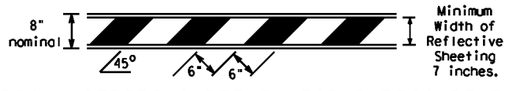
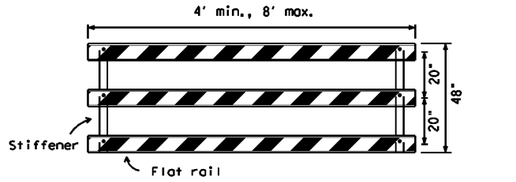
TYPE 3 BARRICADES

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 stocked 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.



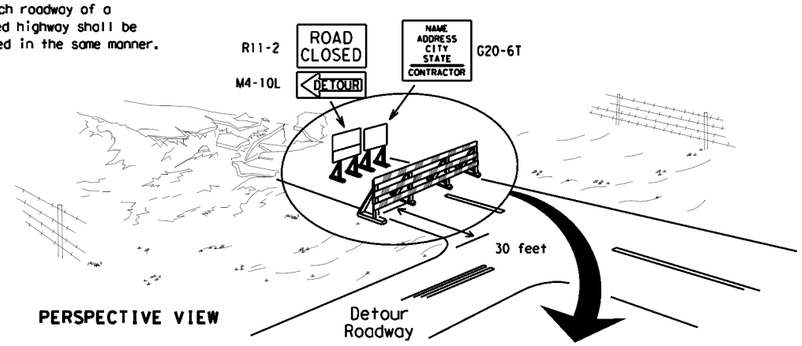
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

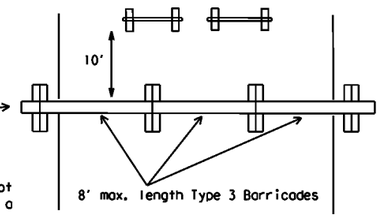
Each roadway of a divided highway shall be barricaded in the same manner.



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.

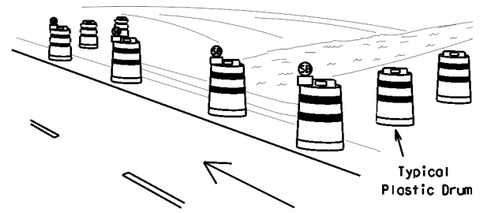
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

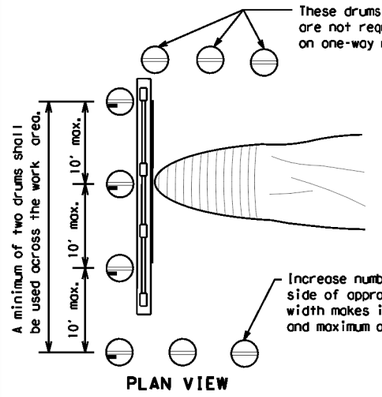
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

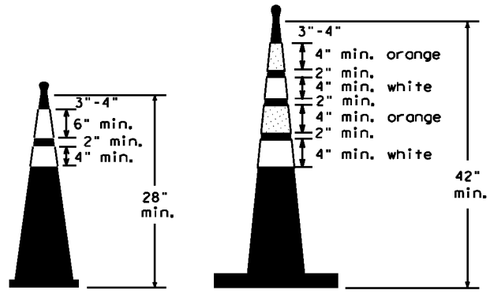
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

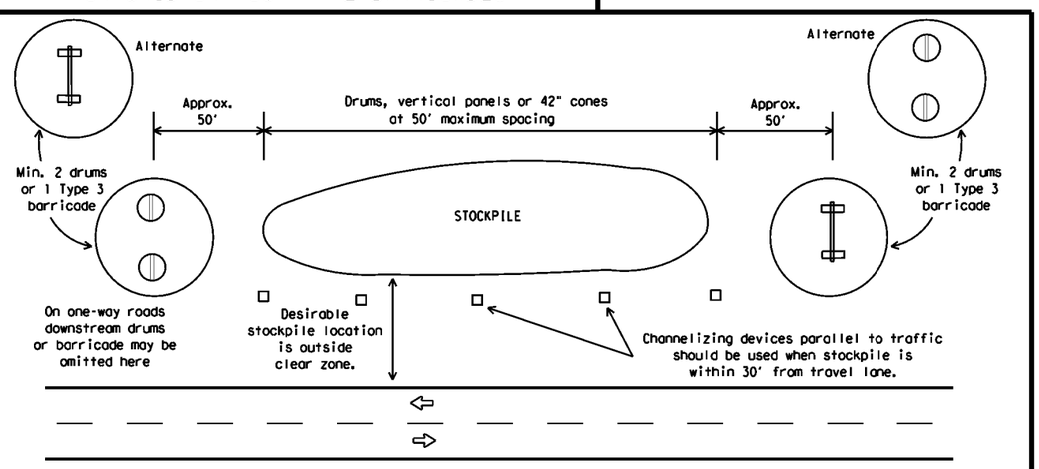
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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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.

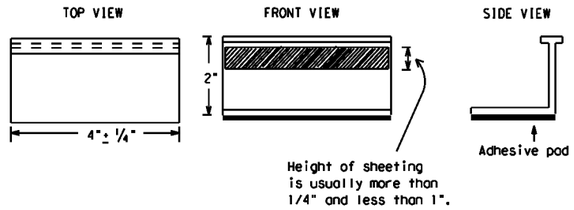
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		29

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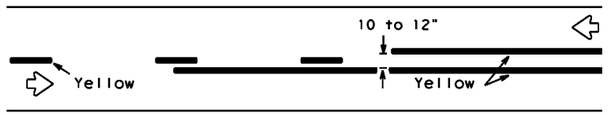
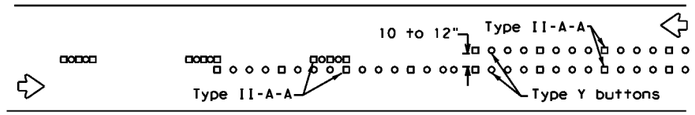
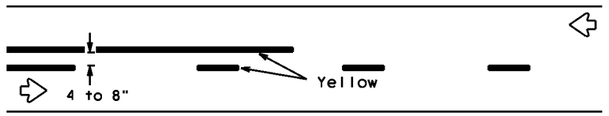
PAVEMENT MARKING PATTERNS



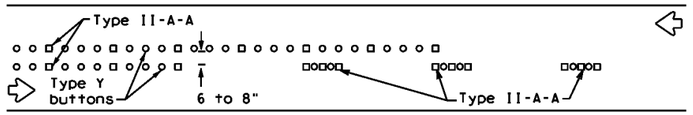
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



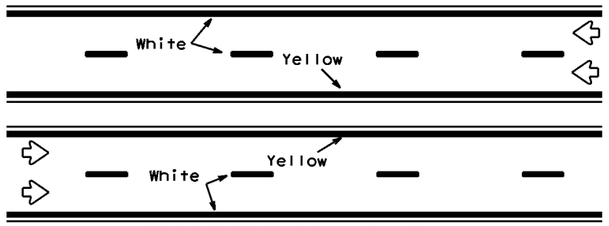
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



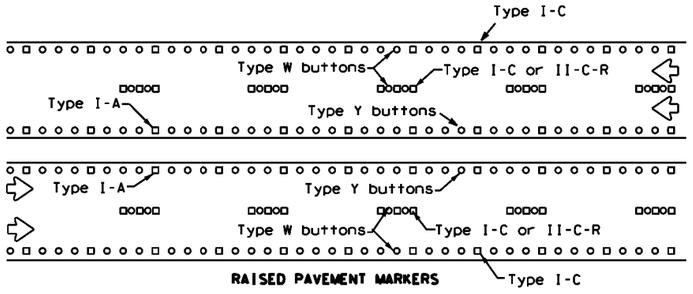
RAISED PAVEMENT MARKERS - PATTERN B

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



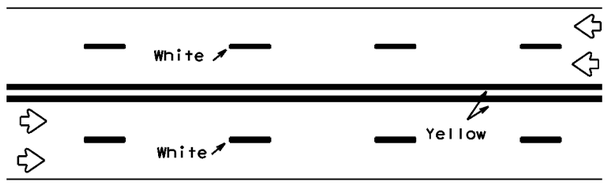
REFLECTORIZED PAVEMENT MARKINGS



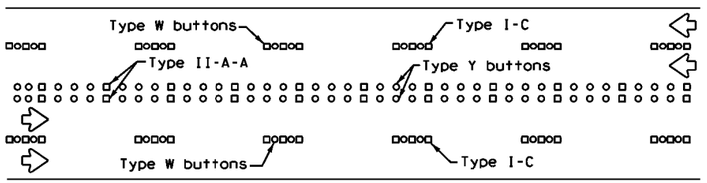
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



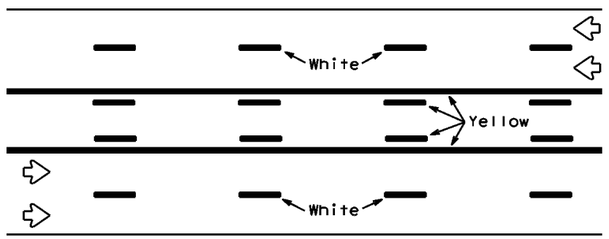
REFLECTORIZED PAVEMENT MARKINGS



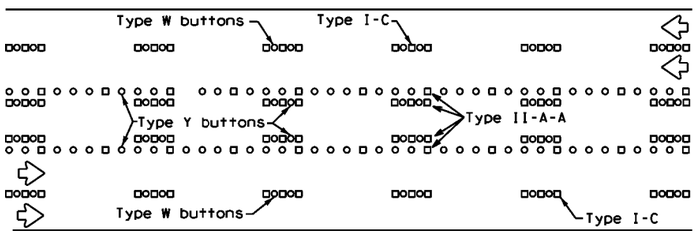
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

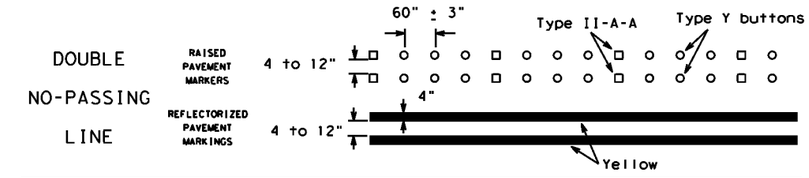
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

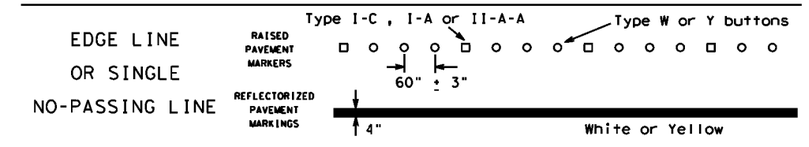
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

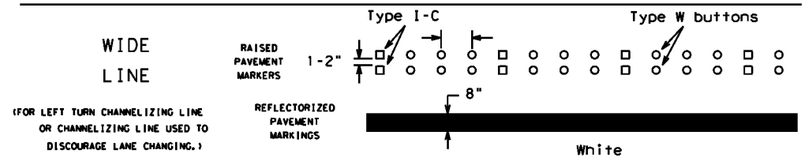


EDGE LINE OR SINGLE NO-PASSING LINE



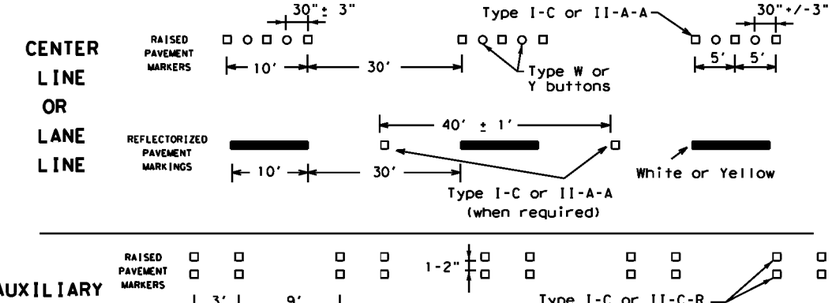
WIDE LINE

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

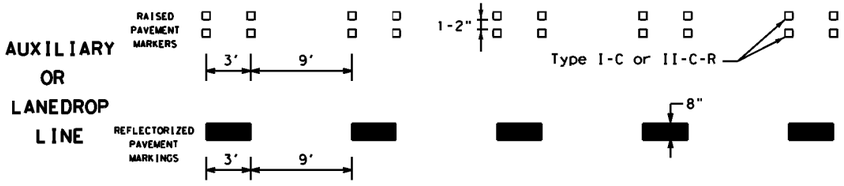


BROKEN LINES

CENTER LINE OR LANE LINE

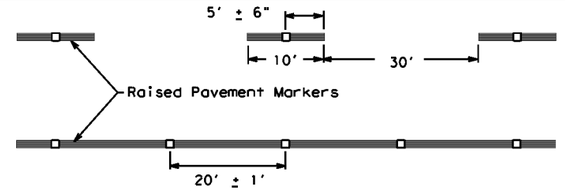


AUXILIARY OR LANEDROP LINE



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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	LRD	DUVAL		30
11-02 8-14				

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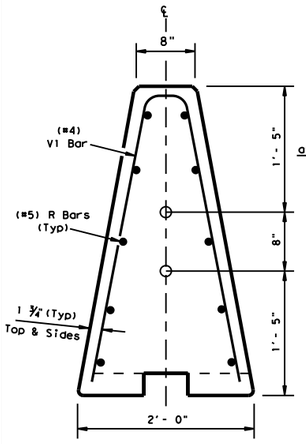
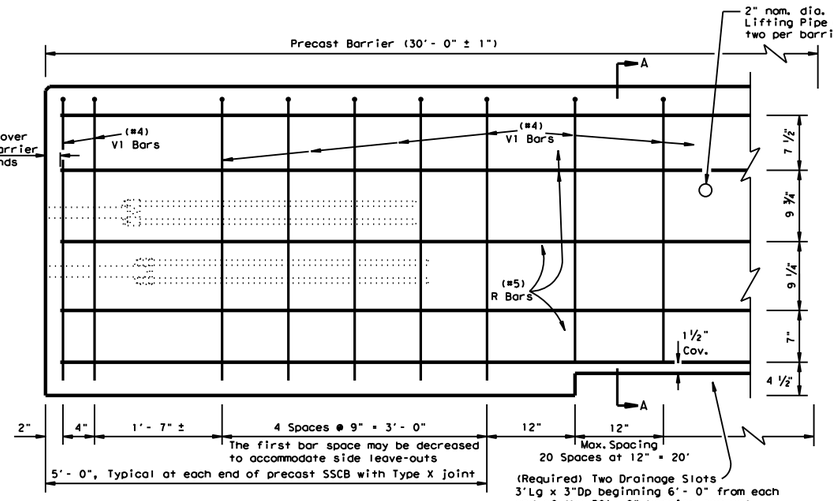


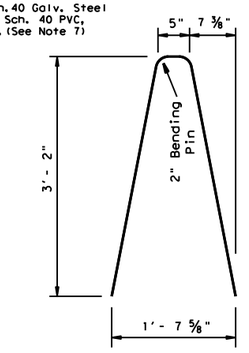
End View
Precast Barrier

Pipe locations for Joint Type X connection



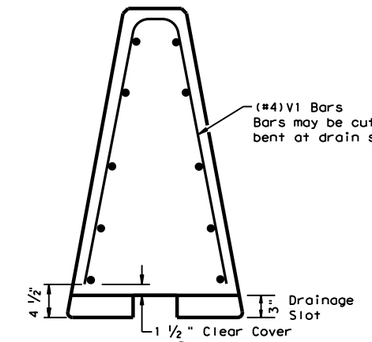
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



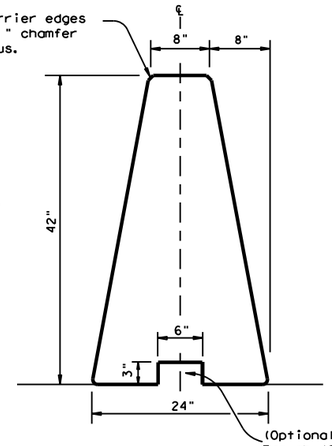
V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



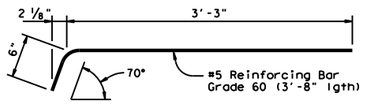
Section A-A
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



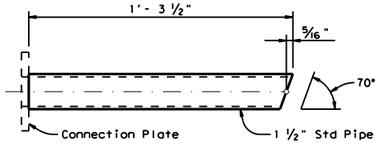
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



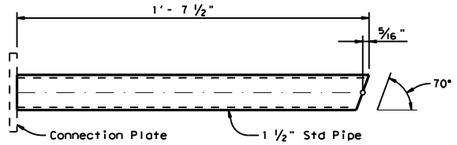
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



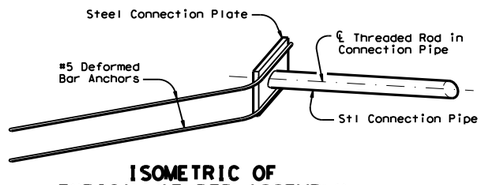
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

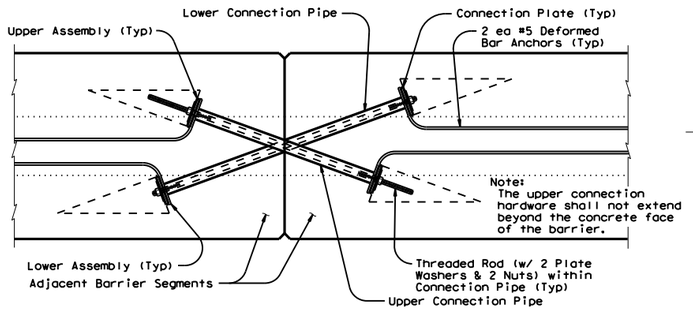


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

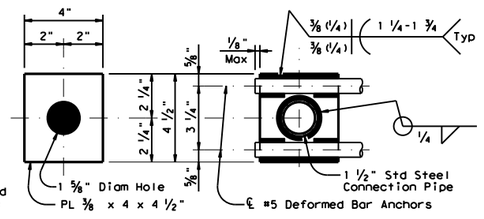
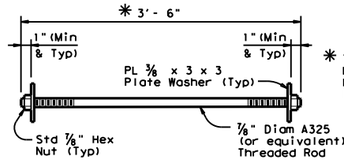


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

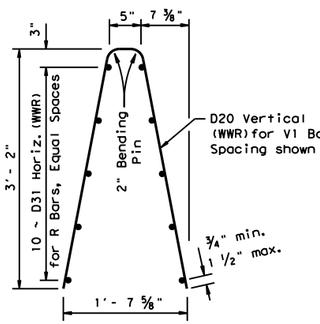


* The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

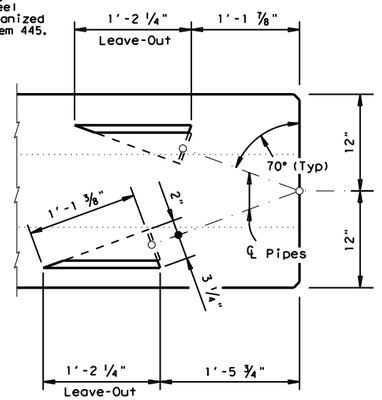
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



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

(WWR) General Notes

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



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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DATE: 5/31/2024
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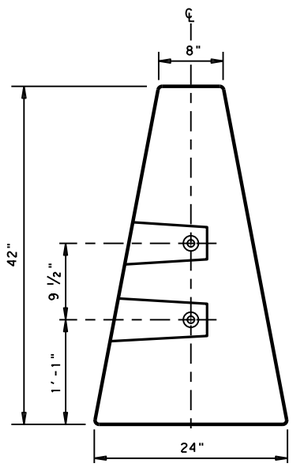
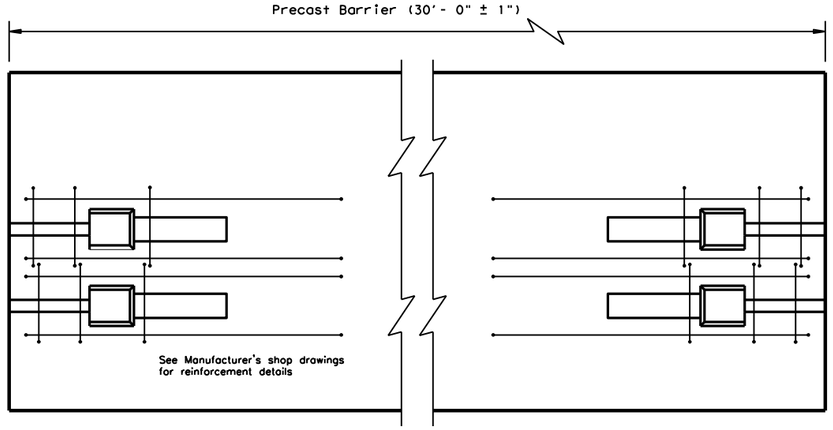
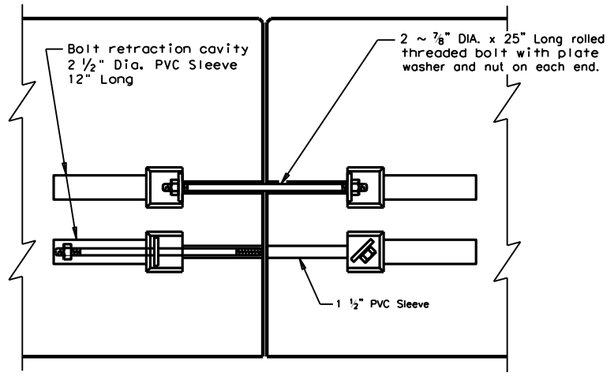


END VIEW
"QUICK-BOLT" POCKET LOCATIONS



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



ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)

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

VIEW FROM ABOVE
J-J HOOK CONNECTION

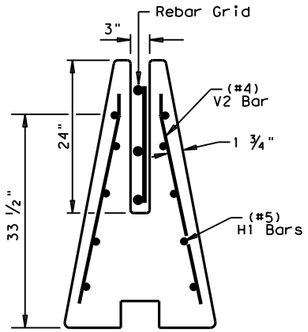
END VIEW

Proprietary Joint Connections (SSCB)

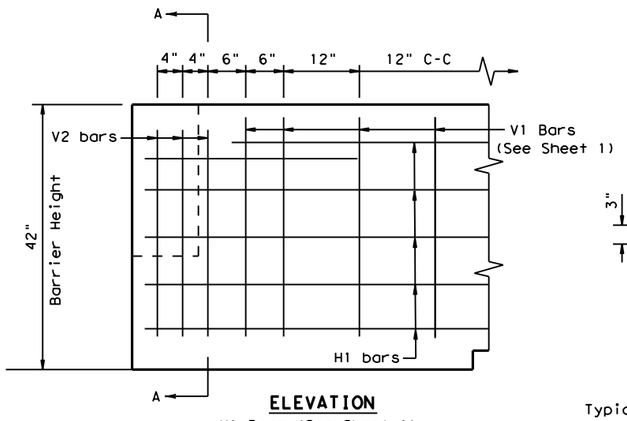
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

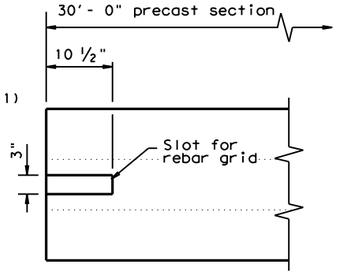
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



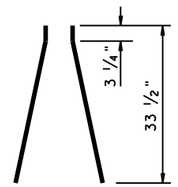
SECTION A-A
Showing (Type R) Rebar Grid



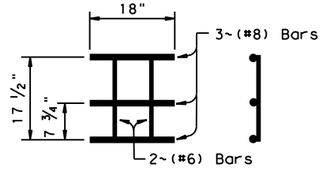
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



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



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

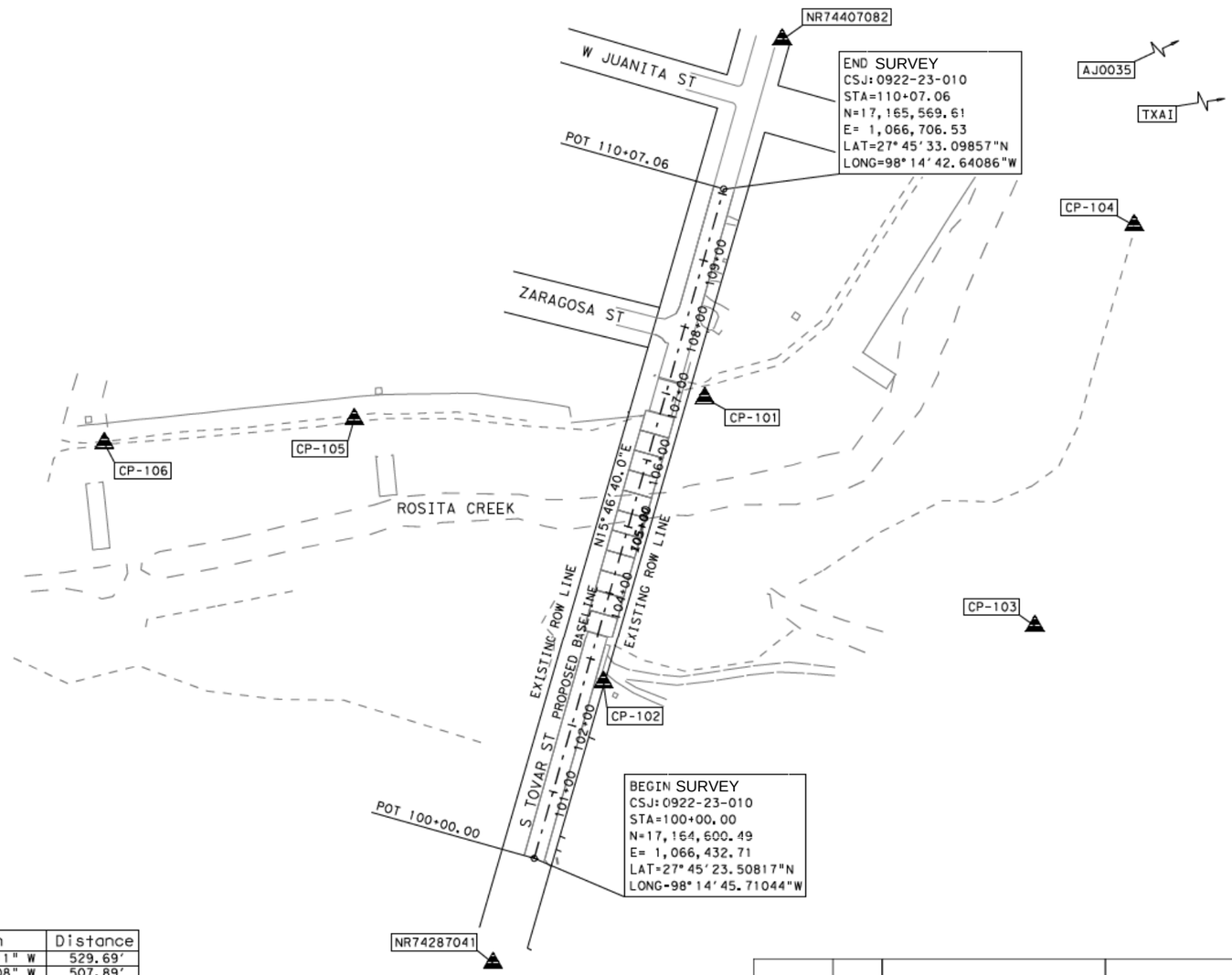
Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		32



From	To	Direction	Distance
NR74407082	CP-101	S 12° 12' 11" W	529.69'
CP-101	CP-105	S 86° 31' 08" W	507.89'
CP-105	CP-106	S 84° 32' 30" W	362.94'
CP-101	CP-102	S 19° 34' 06" W	437.97'
CP-102	CP-103	N 82° 26' 10" E	629.47'
CP-103	CP-104	N 13° 55' 34" E	596.67'
CP-102	NR74287041	S 21° 27' 40" W	436.09'
NR74407082	NR74287041	S 17° 22' 43" W	1,400.17'

Point	North	East	Elevation	Station	Offset	Description
NR74287041	17,164,449.10	1,066,373.13	307.69'	OFF CHAIN	OFF CHAIN	SET TYPE II W/3.25" ALUM CTRL CAP
CP-102	17,164,854.95	1,066,532.68	300.77'	102+72.06	27.02' RT	SET 5/8" IR W/RODS CAP
CP-106	17,165,202.27	1,065,811.12	304.85'	104+10.09	761.79' LT	SET 5/8" IR W/RODS CAP
CP-103	17,164,937.81	1,067,156.68	300.72'	105+21.47	604.98' RT	SET 5/8" IR W/RODS CAP
CP-105	17,165,236.79	1,066,172.42	304.74'	105+41.55	423.50' LT	SET 5/8" IR W/RODS CAP
CP-101	17,165,267.63	1,066,679.37	302.09'	107+09.08	55.97' RT	SET 5/8" IR W/RODS CAP
CP-104	17,165,516.94	1,067,300.28	296.71'	OFF CHAIN	OFF CHAIN	SET 5/8" IR W/RODS CAP
NR74407082	17,165,785.36	1,066,791.34	300.17'	OFF CHAIN	OFF CHAIN	SET TYPE II W/3.25" ALUM CTRL CAP
AJ0035	17,166,946.44	1,069,844.49	311.96'	OFF CHAIN	OFF CHAIN	FND USGS BRASS DISK IN CONC STEP (H50 1923)
TXAI	17,172,891.43	1,114,573.27	230.60'	OFF CHAIN	OFF CHAIN	CORS TXAI

LEGEND

▲ - CONTROL POINT

✕ - AERIAL TARGET

Control Name	Held		Published Coordinate Information			Measured Coordinate Information			Residuals (Published - Measured)		
	H	V	North	East	Elev.	North	East	Elev.	North	East	Elev.
AJ0035		✓	17,166,948.65	1,069,837.79	311.96	17,166,946.44	1,069,844.49	311.89	2.2	-6.7	0.07
TXAI	✓	✓	17,172,891.43	1,114,573.27	230.60						

Notes:

1. Measured values shown hereon were established during December 2023 with redundant GPS VRS observations constrained to CORS TXAI and are based on NAD83 (2011), TXS (4205), NAVD88 (Geoid 18) and an applied project surface adjustment factor for Duval County of 1.00004.

2. AJ0035 is a first vertical order, class II NGS Benchmark; published values are based on NAD83(1986 Adj), NAVD88; Published horizontal values are scaled and approximate; Orthometric height (elevation) was determined by differential leveling in June 1991.

Unit of Measure: U.S. Survey Feet

0 100' 200' 300'

SCALE 1"=200'

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (GEOID 18).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO GRID VALUES BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR FOR DUVAL COUNTY OF 1.00004.

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXAI DURING DECEMBER 2023.

5. ELEVATIONS ARE BASED ON DIGITAL LEVELING CONSTRAINED TO THE STATIC GPS-DERIVED (LEVEL 2) ELEVATIONS OF PRIMARY MONUMENT NAMES NR74407082 (300.17') AND NR74287041 (307.69').

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

STATE OF TEXAS REGISTERED JIMMY D. WALTON 5889 PROFESSIONAL LAND SURVEYOR

5-15-2024

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Sheet 1 of 1
Survey Date: DECEMBER, 2023

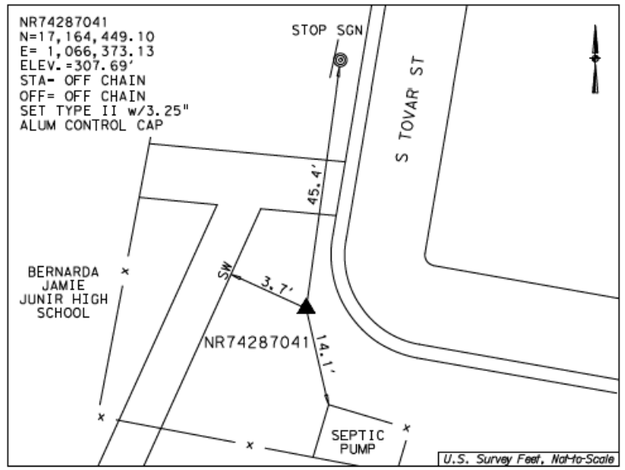
RODS Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Texas Department of Transportation

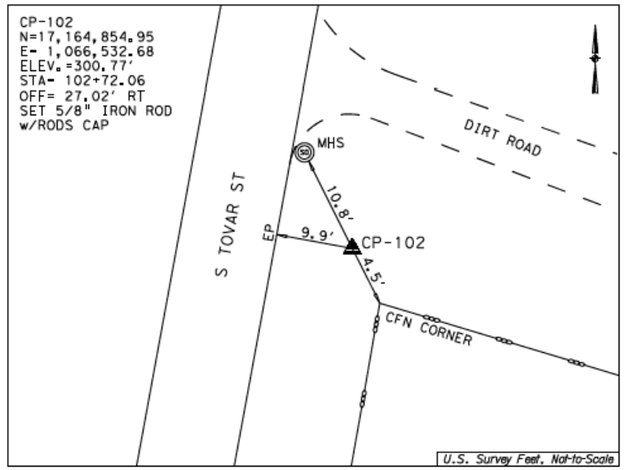
S TOVAR ST SURVEY CONTROL INDEX SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				33
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	LRD		DUVAL
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
22	0922	23	010	S TOVAR ST

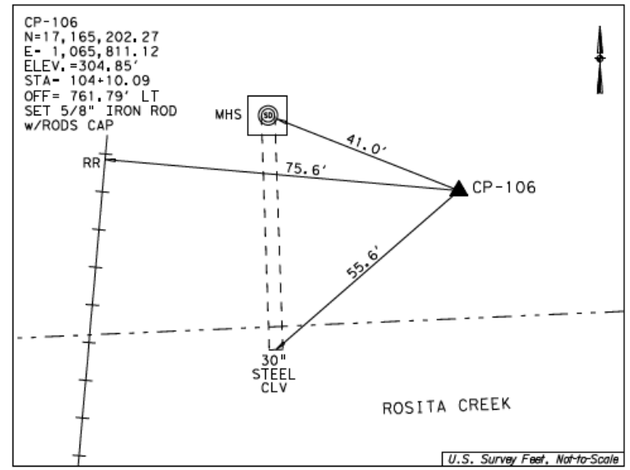
N:\IDC 382*34005\CAD\H&V Control\H&V Index Sheet_ORD.dgn



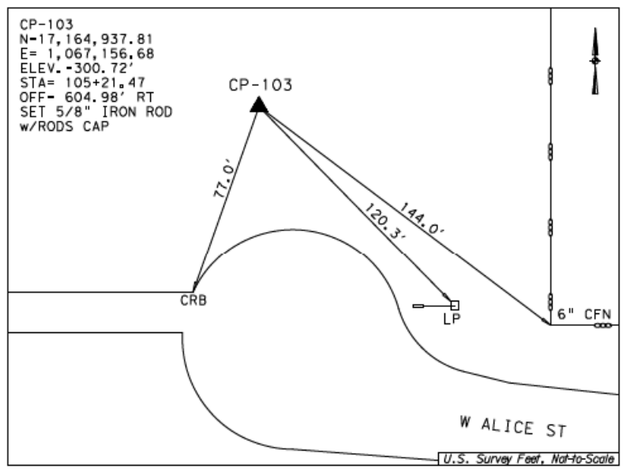
STATION IS LOCATED ON THE WEST SIDE OF S TOVAR ST, AND LYING 0.18 MILE SOUTH OF ZARAGOZA ST.



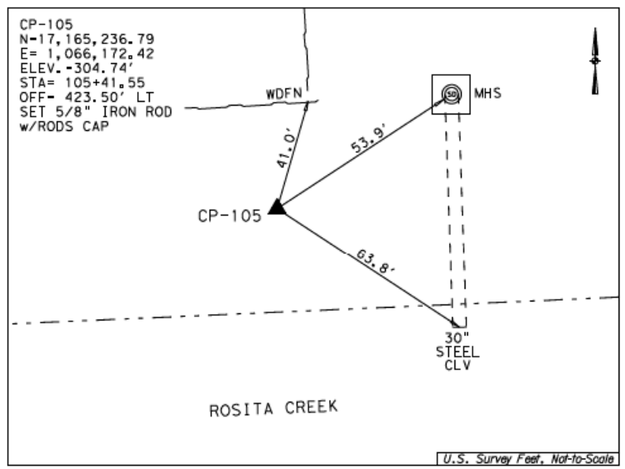
STATION IS LOCATED ON THE EAST SIDE OF S TOVAR ST, AND LYING 0.10 MILE SOUTH OF ZARAGOZA ST.



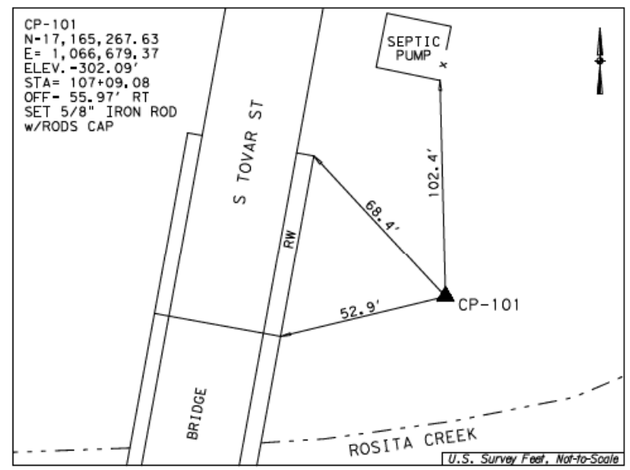
STATION IS LOCATED ON THE NORTH SIDE OF ROSITA CREEK, AND LYING 0.15 MILE WEST OF S TOVAR ST.



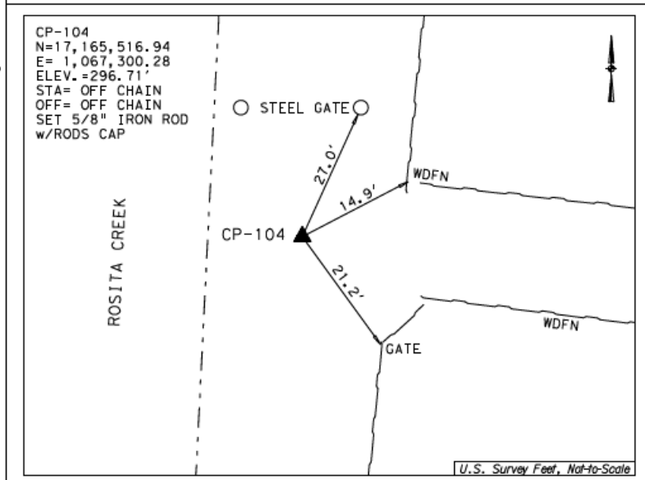
STATION IS LOCATED ON THE NORTH SIDE OF THE CUL DE SAC OF W ALICE ST, AND LYING 100' WEST OF S GARCIA AVE.



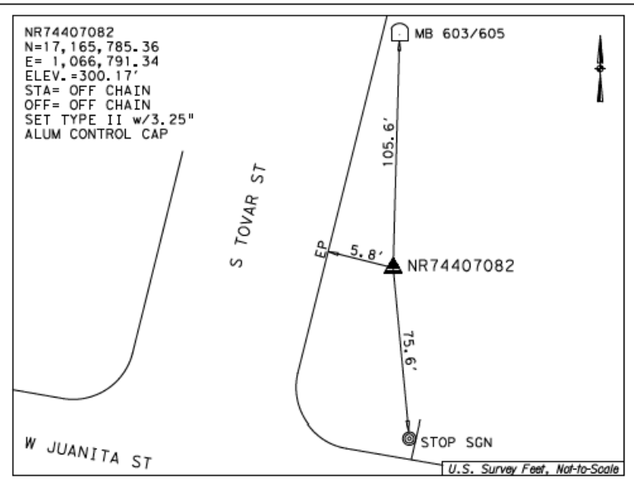
STATION IS LOCATED ON THE NORTH SIDE OF ROSITA CREEK, AND LYING 430' WEST OF S TOVAR ST.



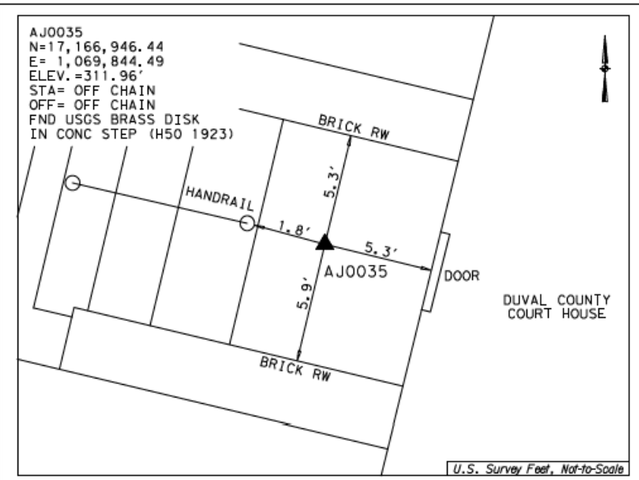
STATION IS LOCATED ON THE NORTHEAST CORNER OF THE S TOVAR ST BRIDGE OVER ROSITA CREEK.



STATION IS LOCATED ON THE EAST SIDE OF ROSITA CREEK, AND LYING 0.12 MILE NORTH OF S TOVAR ST.



STATION IS LOCATED ON THE NORTHEAST CORNER OF THE INTERSECTION OF S TOVAR ST AND W JUANITA ST.



STATION IS LOCATED ON THE WEST SIDE OF DUVAL COUNTY COURT HOUSE.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.); EPOCH 2010.00).

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LEGEND
▲ - CONTROL POINT ✂ - AERIAL TARGET

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

STATE OF TEXAS REGISTERED JIMMY D. WALTON 5889 PROFESSIONAL LAND SURVEYOR
5-15-2024

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Sheet 1 of 1
Survey Date: DECEMBER, 2023

RODS Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Control Infrastructure Transportation Land Development

S TOVAR ST HORIZONTAL & VERTICAL CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				34
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	LRD		DUVAL
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
22	0922	23	010	S TOVAR ST

N:\IDC 382\2234005\CAD\H&V Control\H&V Sketches.dgn

FINAL SUBMITTAL

Horizontal Alignment: CL-TOVAR
Horizontal Description:
Horizontal Style: Alignment\Baseline

		Station	Northing	Easting
Element: Linear				
POT	( )	100+00.000 R1	17164600.49	1066432.707
POT	( )	110+07.061 R1	17165569.61	1066706.534
	Tangential Direction:	N15.778°E		
	Tangential Length:	1007.061		

Vertical Alignment: CL-TOVAR-P2
Vertical Description:
Vertical Style: Alignment\Baseline

		Station	Elevation
Element: Linear			
	POT	102+99.682 R1	299.986
	VPI	103+23.349 R1	300.16
	Tangent Grade:	0.007	
	Tangent Length:	23.667	
Element: Linear			
	VPI	103+23.346 R1	300.16
	VPC	103+32.104 R1	300.309
	Tangent Grade:	0.017	
	Tangent Length:	8.758	
Element: Symmetrical Parabola			
	VPC	103+32.104 R1	300.309
	VPI	105+19.104 R1	303.488
	VPT	107+06.104 R1	300.309
	VHP	105+19.104 R1	301.899
	Length:	374	
	Entrance Grade:	0.017	
	Exit Grade:	-0.017	
	r = 100 * (g2 - g1) / L:	-0.909	
	K = l / (g2 - g1):	110	
	Middle Ordinate:	-1.59	
Element: Linear			
	VPT	107+06.104 R1	300.309
	POT	107+20.171 R1	300.07
	Tangent Grade:	-0.017	
	Tangent Length:	14.067	

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

ALIGNMENT DATA SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		35

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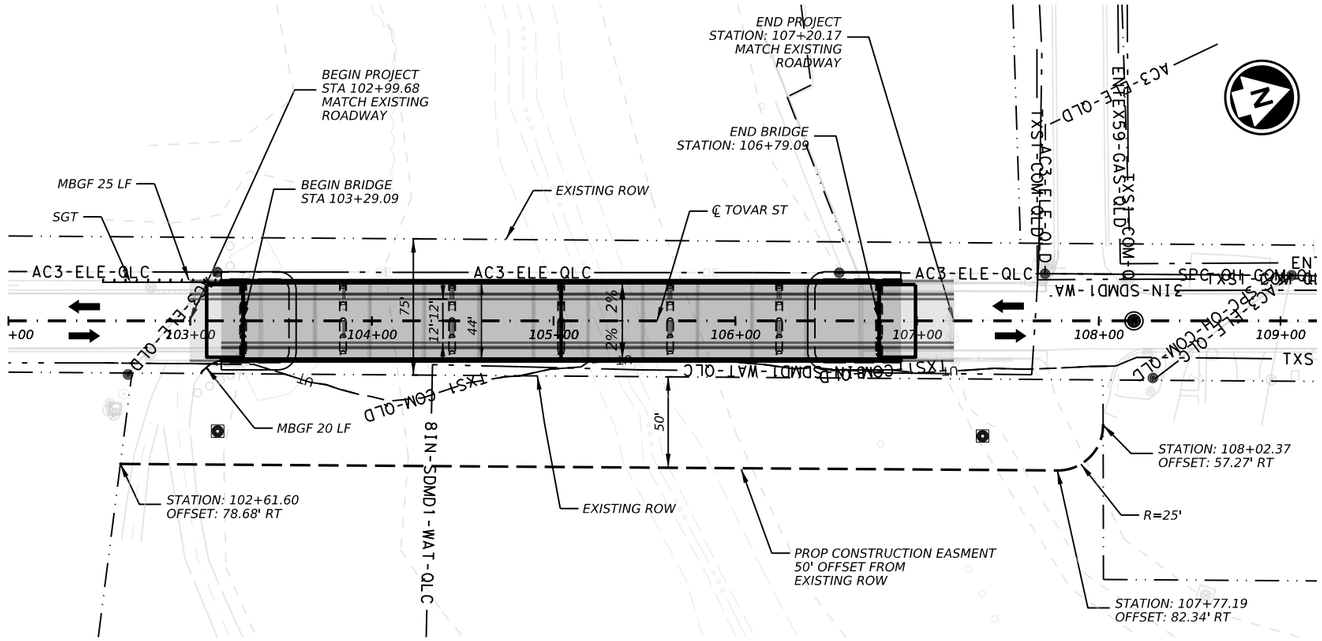
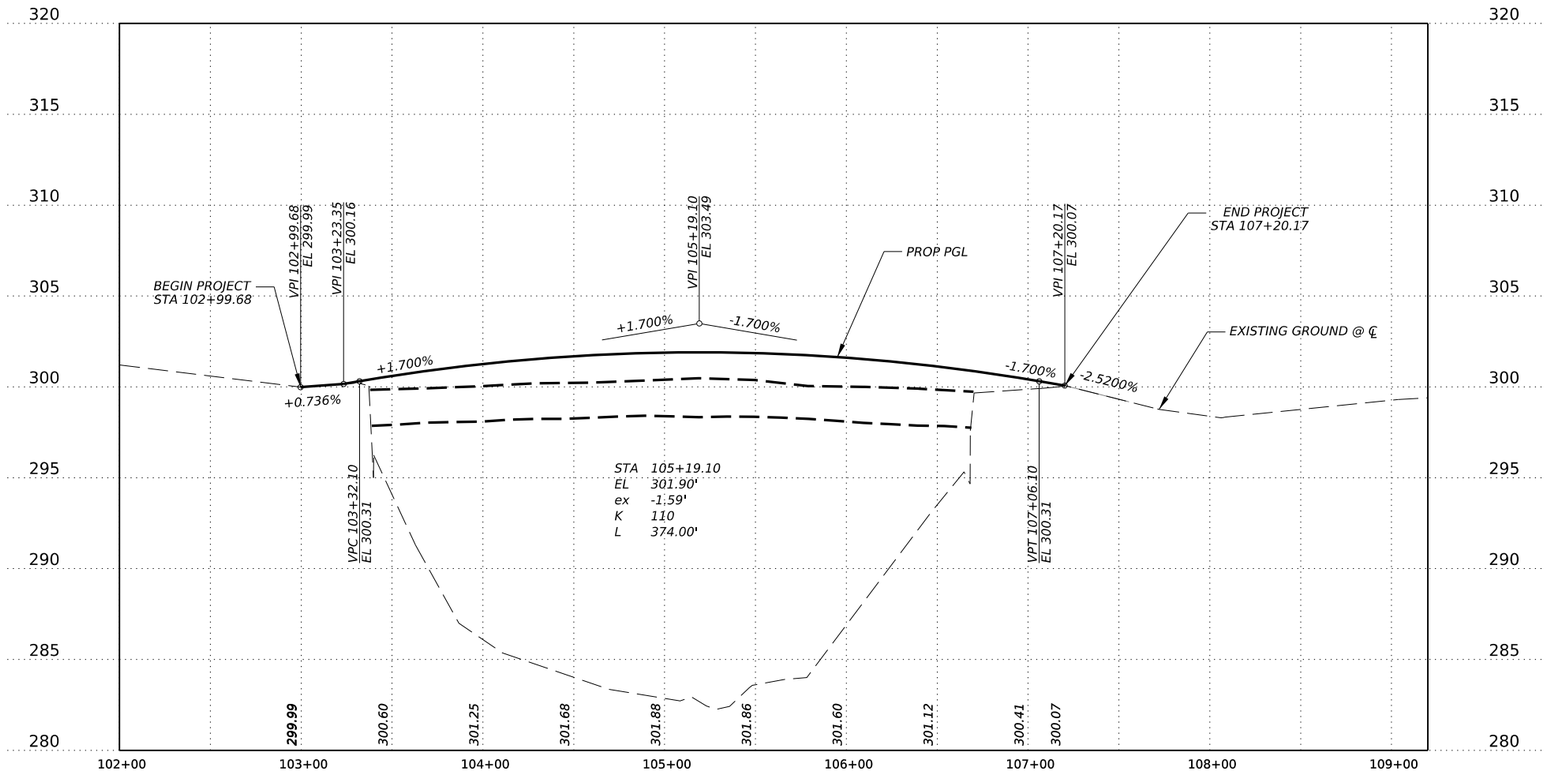


NOTES:

1. AT&T LINE WILL BE RELOCATED BY OTHERS, 2' EAST OF EXISTING EASTERN ROW LINE BEFORE CONSTRUCTION STARTS.



0' 50' 100'

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

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

ROADWAY PLAN & PROFILE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		36

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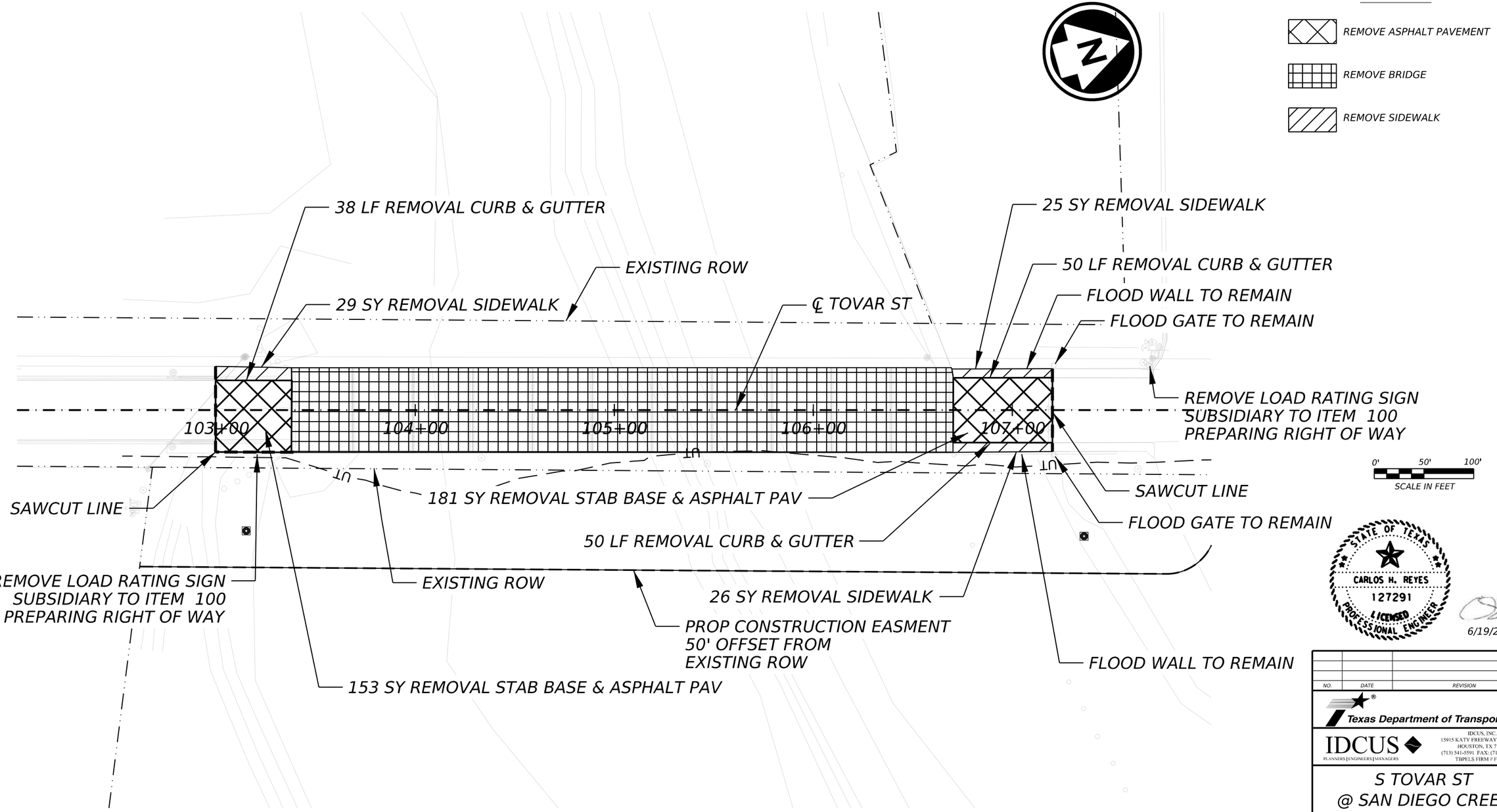

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

REMOVAL LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		37

DATE: 6/19/2024 1:14:55 PM
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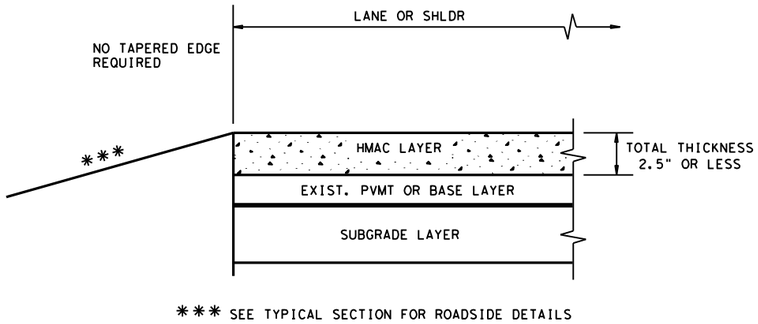
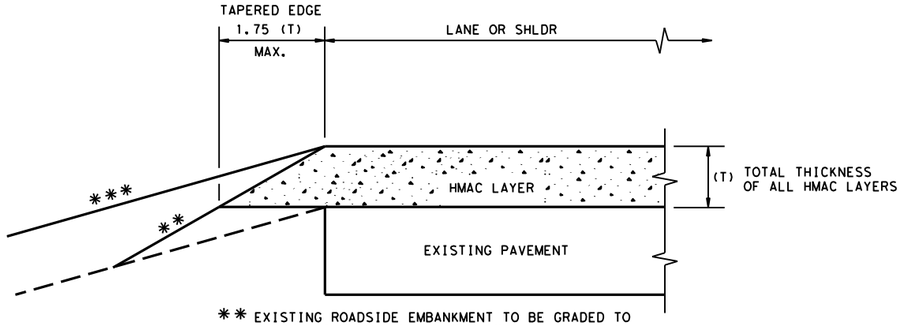


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

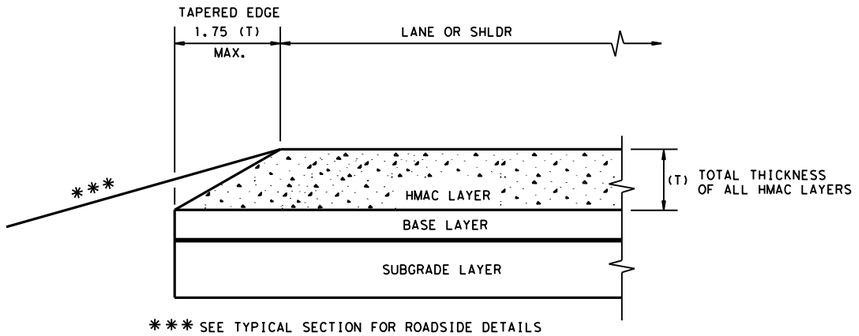
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

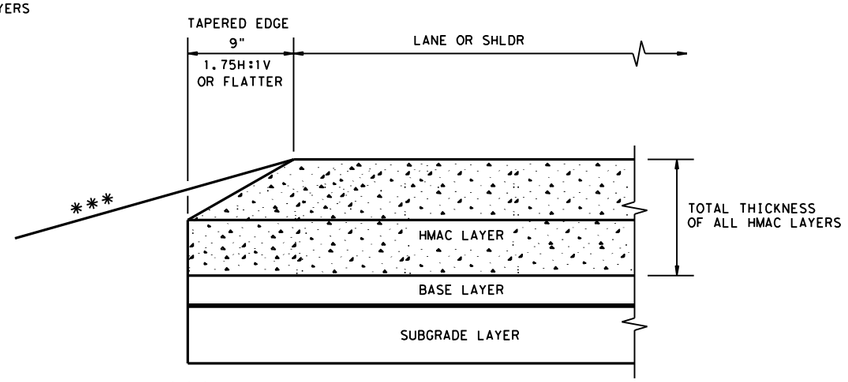
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

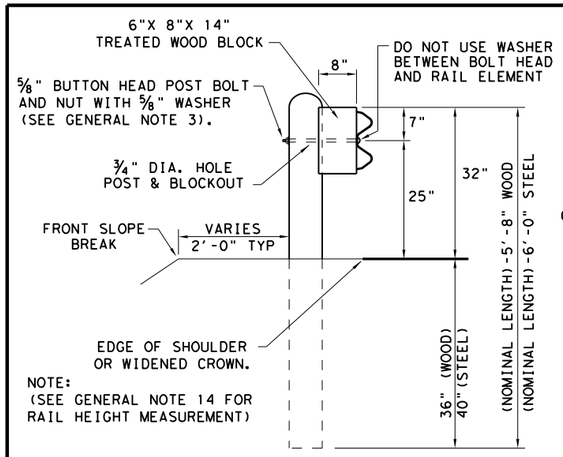
Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

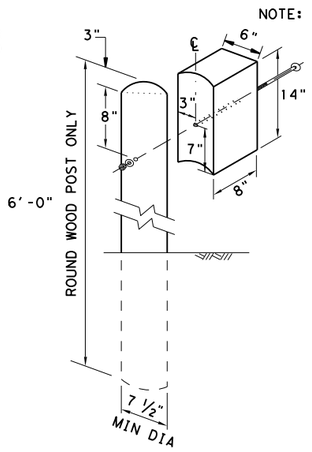
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		38

DATE:
FILE:

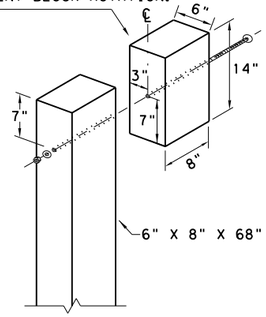


TYPICAL POST PLACEMENT

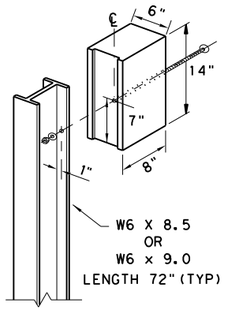


WOOD BLOCK TO ROUND WOOD POST

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

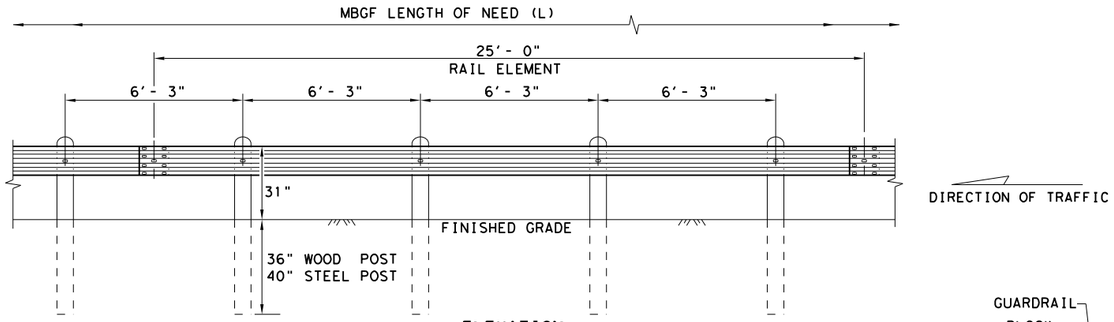


WOOD BLOCK TO RECTANGULAR WOOD POST



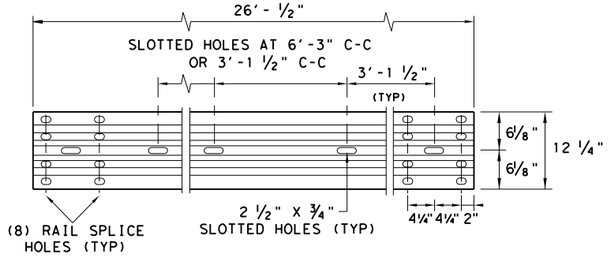
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



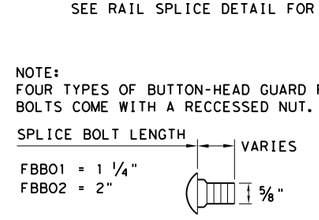
ELEVATION
MID-SPAN RAIL SPLICE

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



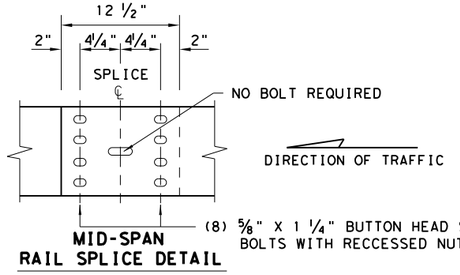
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



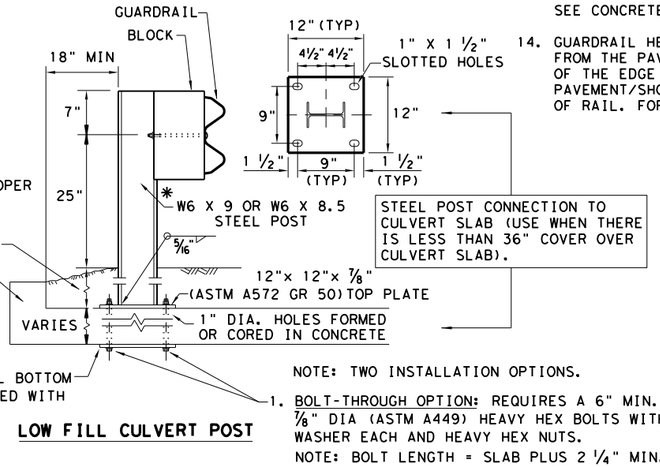
BUTTON HEAD BOLT

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
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	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		39

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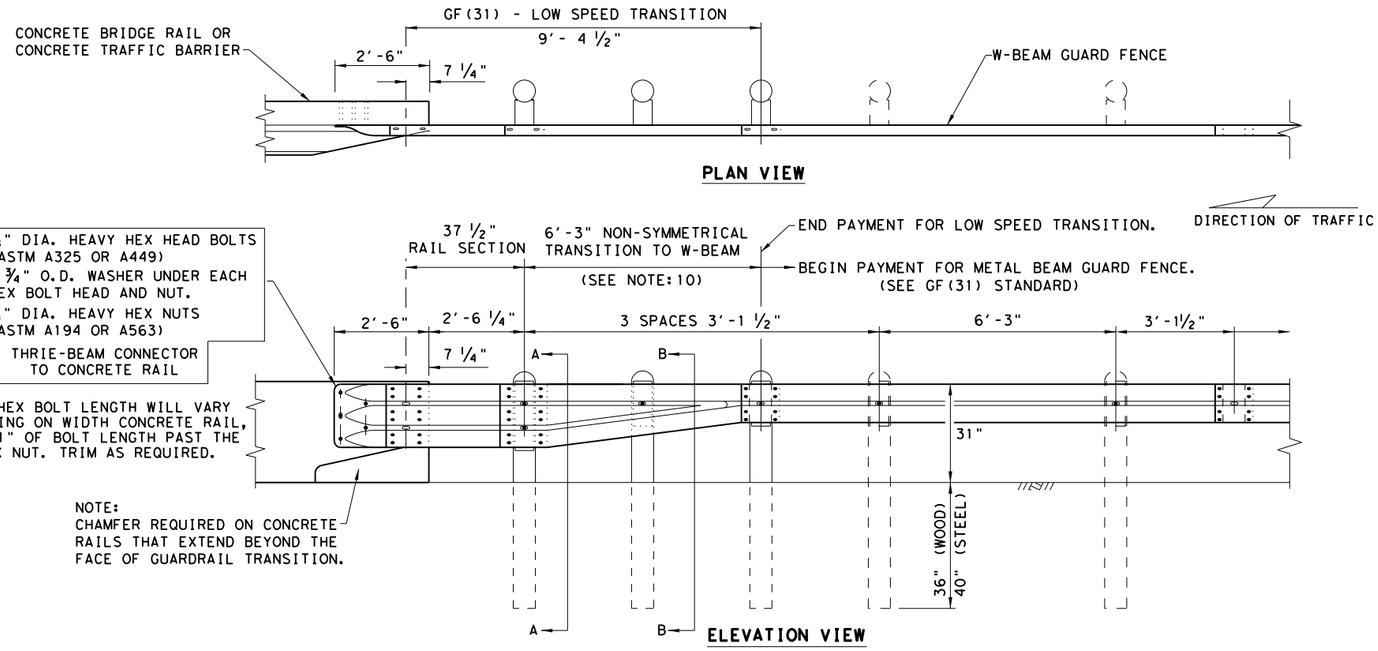
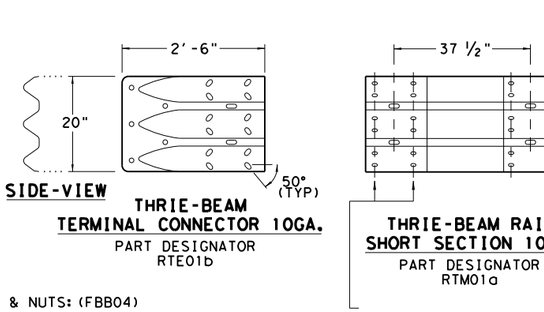
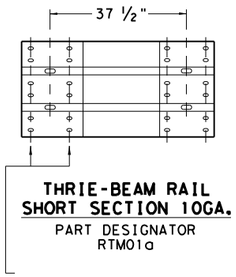
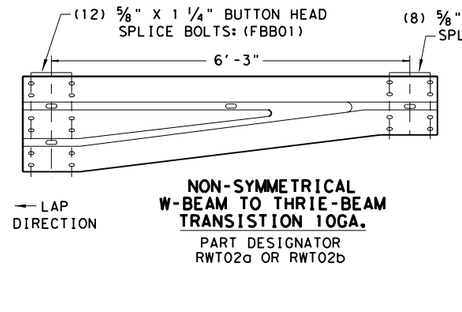


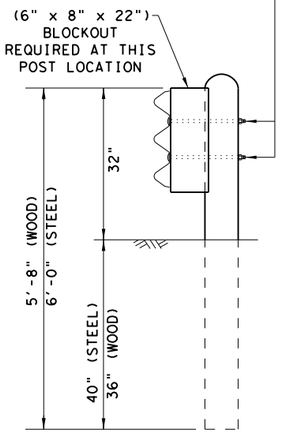
GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT, MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.









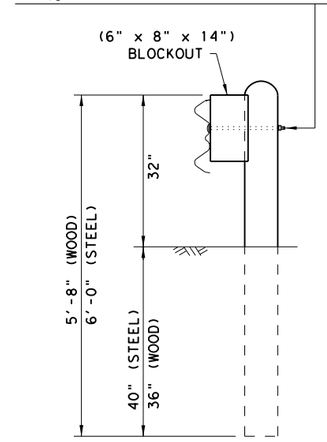
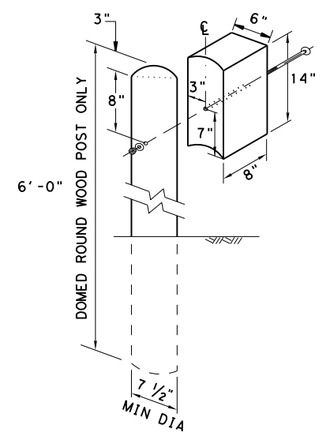
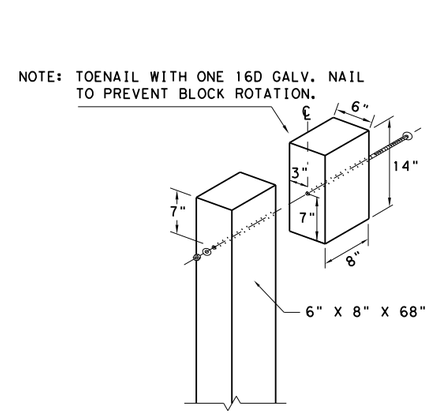
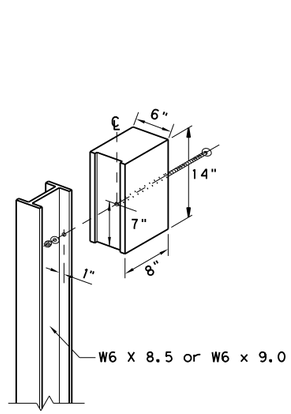


PLATE WASHER INSTRUCTIONS

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







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

LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
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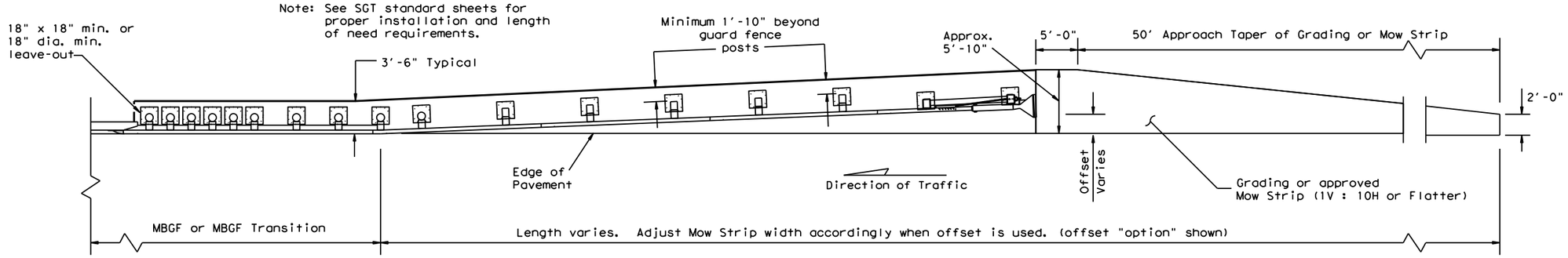
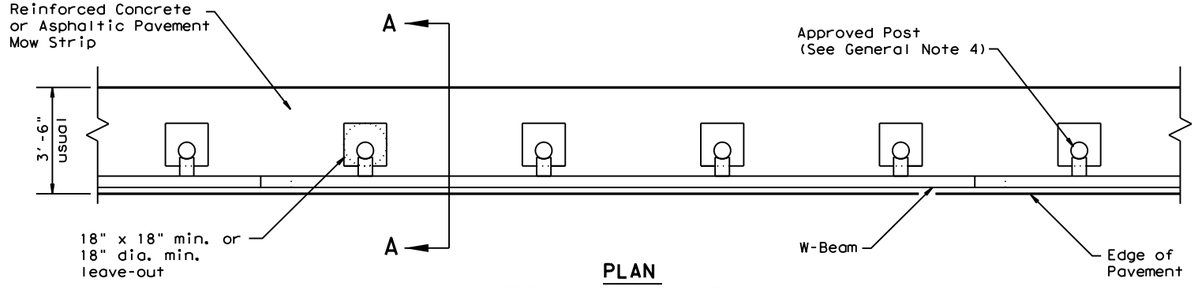
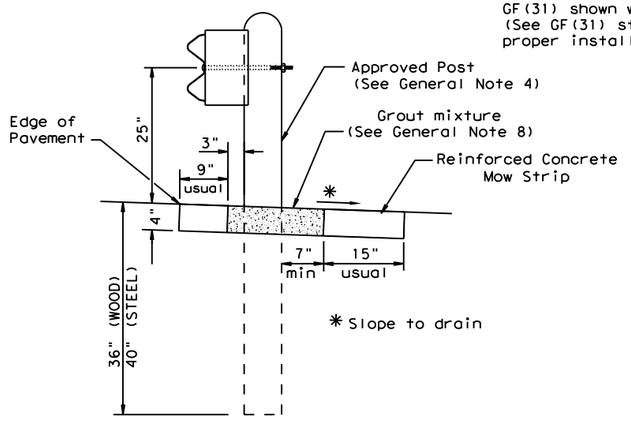


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



PLAN

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

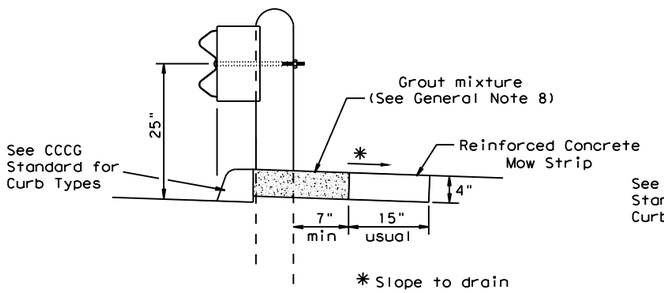


SECTION A-A

Typical

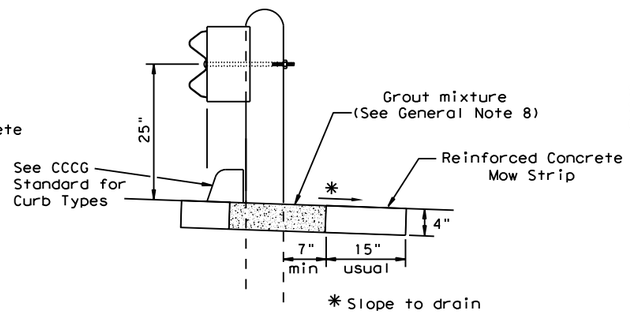
MOW STRIP DETAIL

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



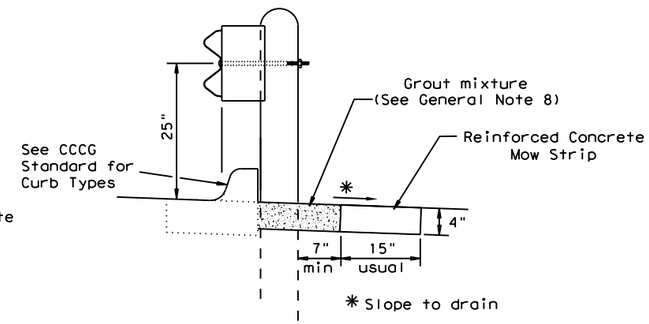
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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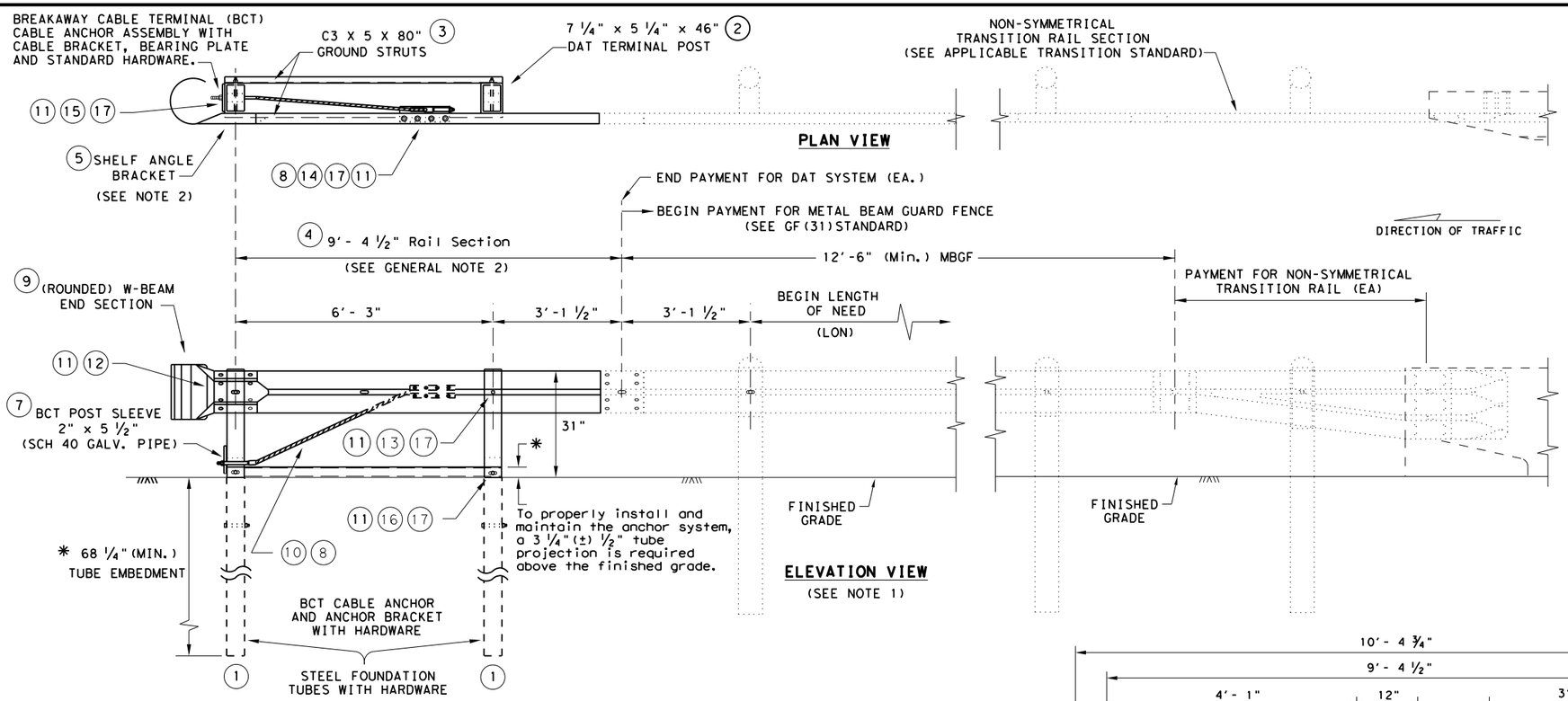


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

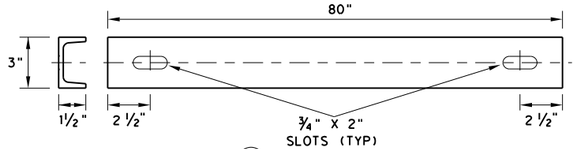
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

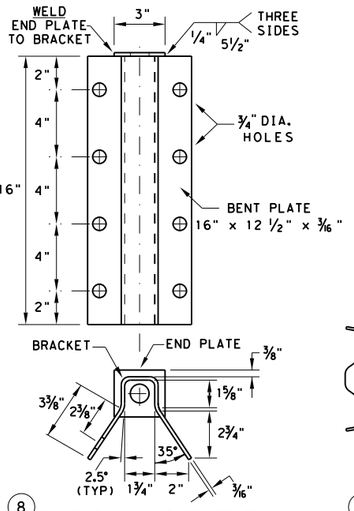
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

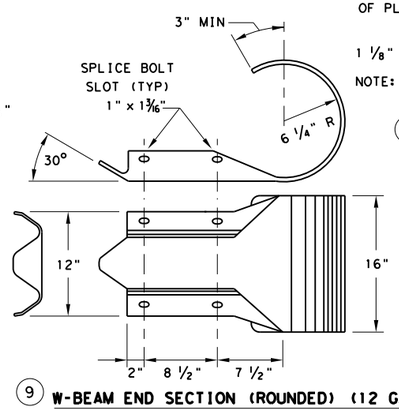
(4) TERMINAL RAIL ELEMENT FOR DAT



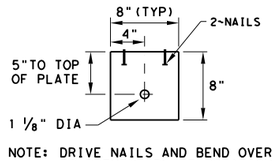
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

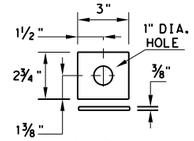


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

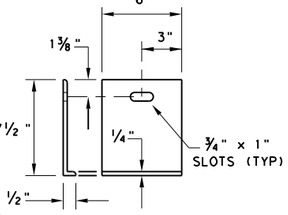


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

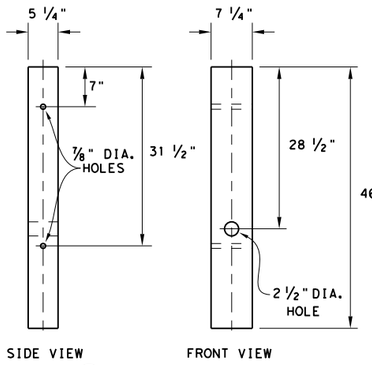
(6) BEARING PLATE
8"x 8"x 5/8" R



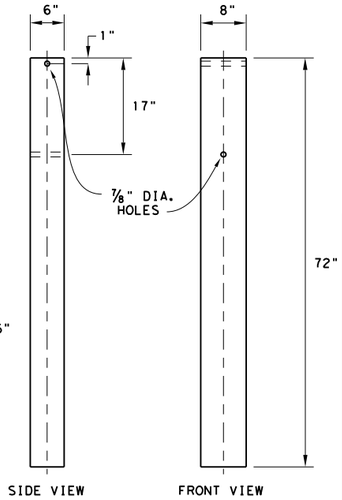
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

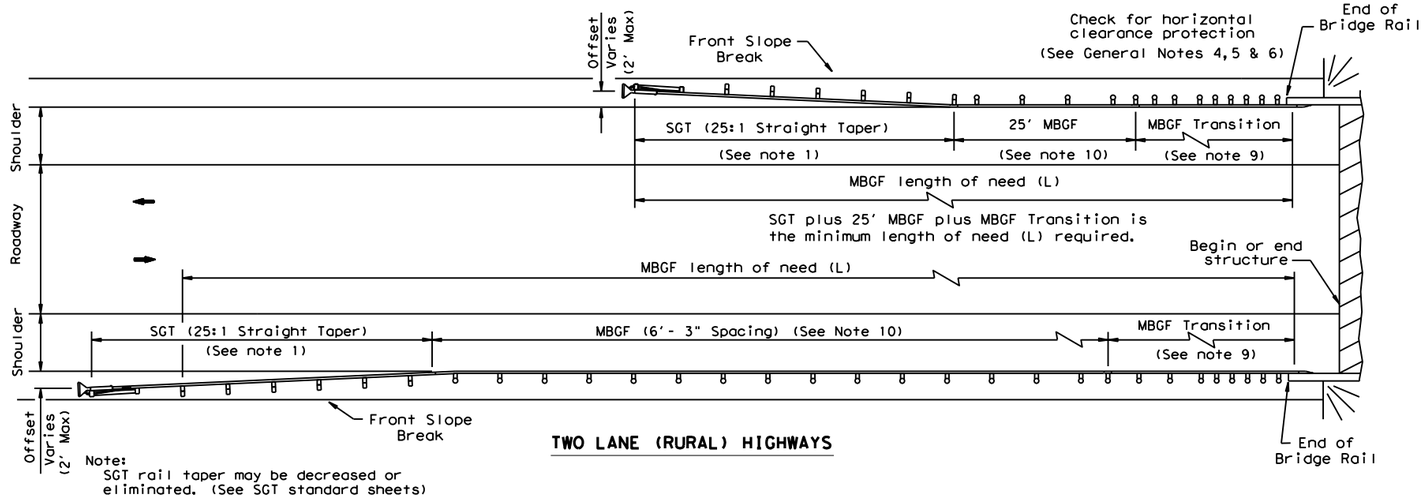
Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

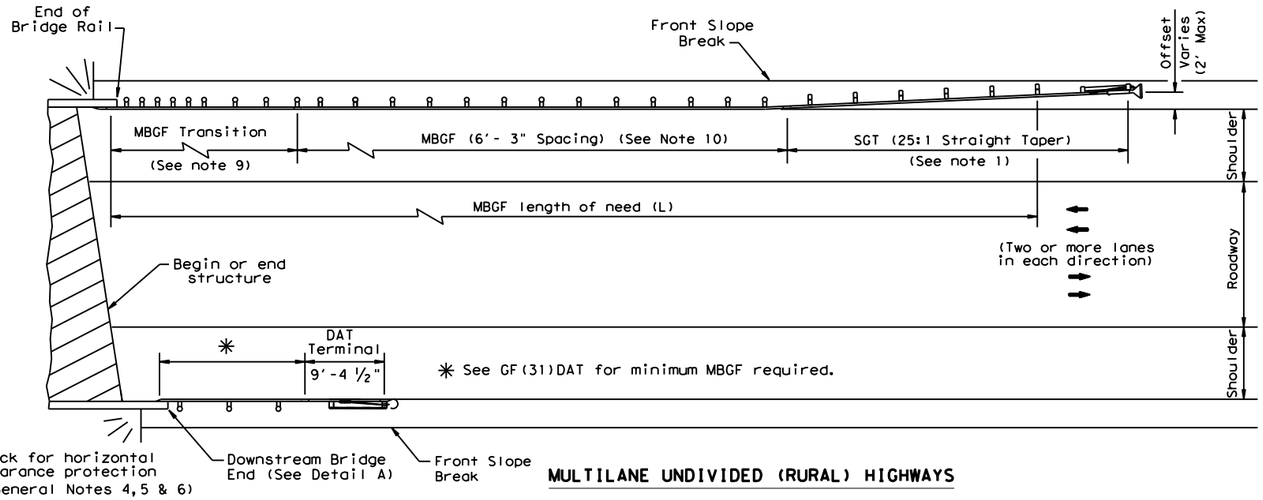
FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0922	23	010	S TOVAR ST	
	DIST	COUNTY		SHEET NO.	
	LRD	DUVAL		42	

DATE: 5/31/2024 1:19:12 PM
FILE: c:\bms\dcus-pw-01\craig.janak\dms07712\bed14.dgn

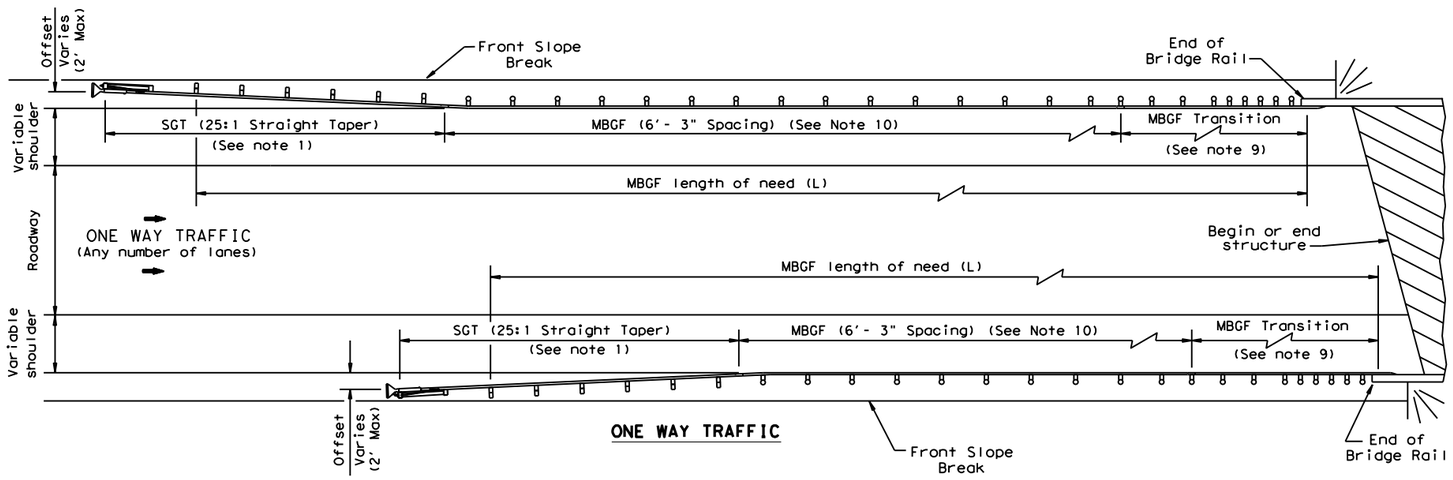


TWO LANE (RURAL) HIGHWAYS

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



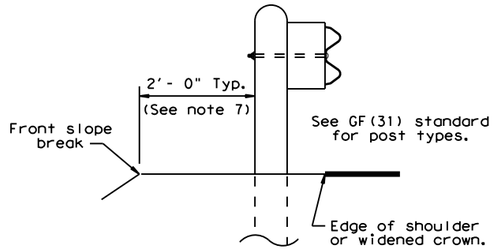
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		43

DATE: 5/31/2024
FILE: c:\dms\tdcus-pw-01\craig.janak\dms07712\sgt10s3116.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)1½" 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

31" RAIL HEIGHT

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

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"

FINISHED GRADE

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

SECTION VIEW B-B

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

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"

FINISHED GRADE

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 ⅜")
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	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		44

(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

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

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

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

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

PLAN VIEW

MBGF
RAIL 2

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

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

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 5/16"

6'-3" | 6'-3" | 6'-3" | 6'-3/4" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL HEIGHT 31"

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

ARROWS

DETAIL (D)

RAIL HEIGHT 31"

HEAD HEIGHT

DETAIL (B)

32-¼"

68-⅛"

FINISHED GRADE

CABLES

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

SOIL ANCHOR POST
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD HEIGHT 32-¼"

TOP OF POST

31-⅞"

FINISHED GRADE

40-⅛"

68-⅛" ANCHOR POST DEPTH

ITEM (1) ANCHOR

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

SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

SECTION VIEW A-A

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

7 5/16"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

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

ITEM (24)
ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

(RAIL 1)

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

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	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		45

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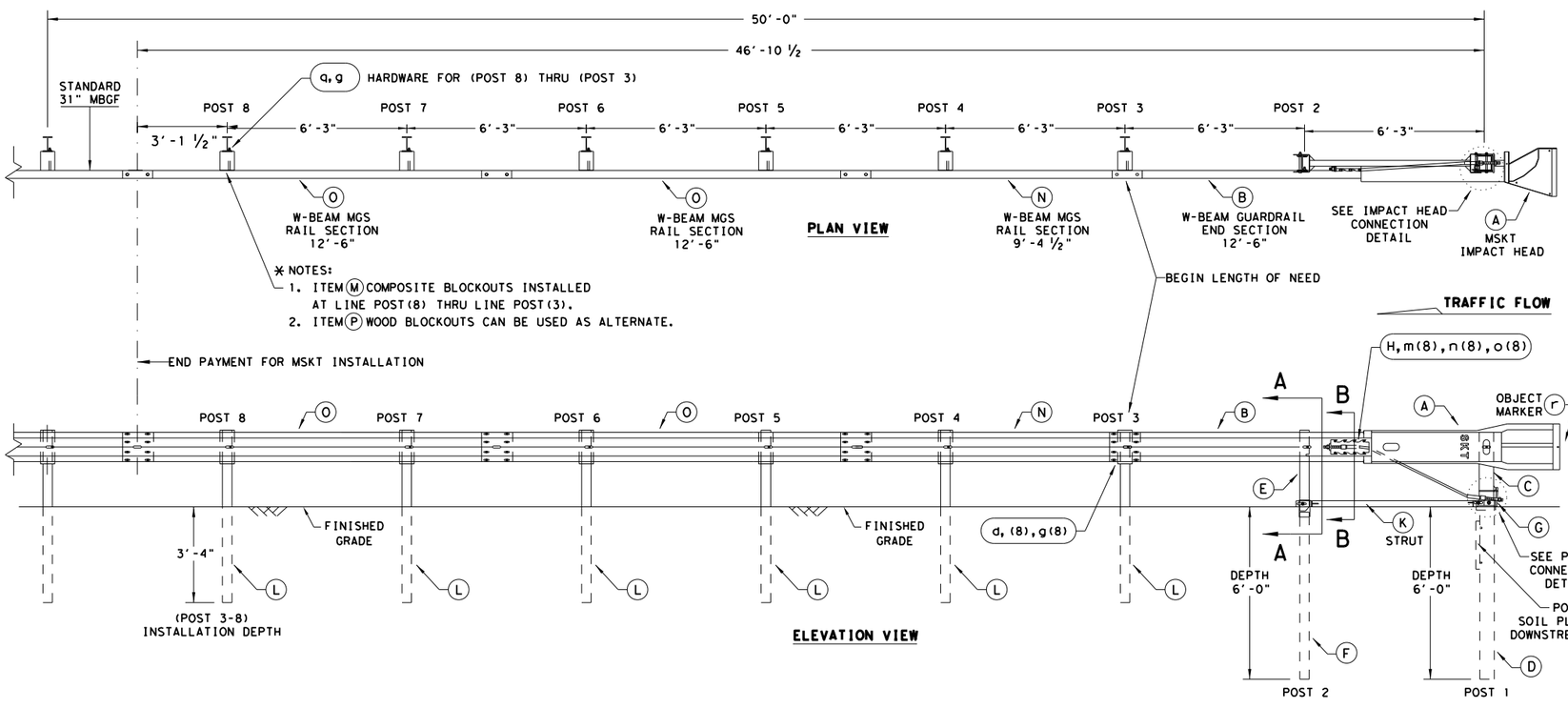
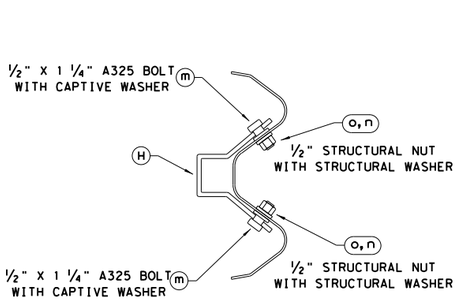
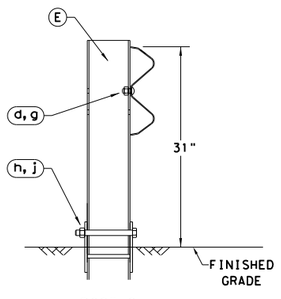
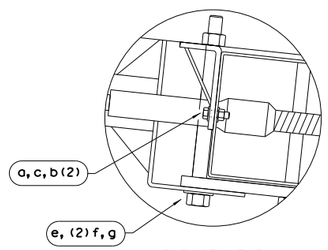
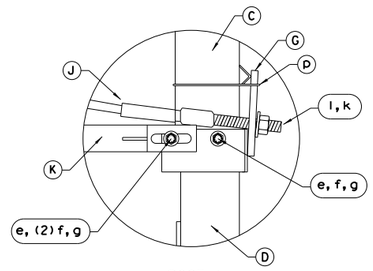


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









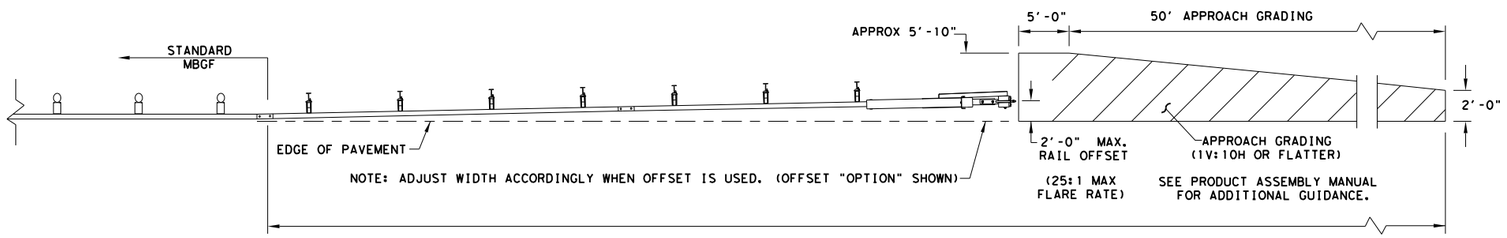
GENERAL NOTES

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

SEE NOTES: *

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



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

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

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© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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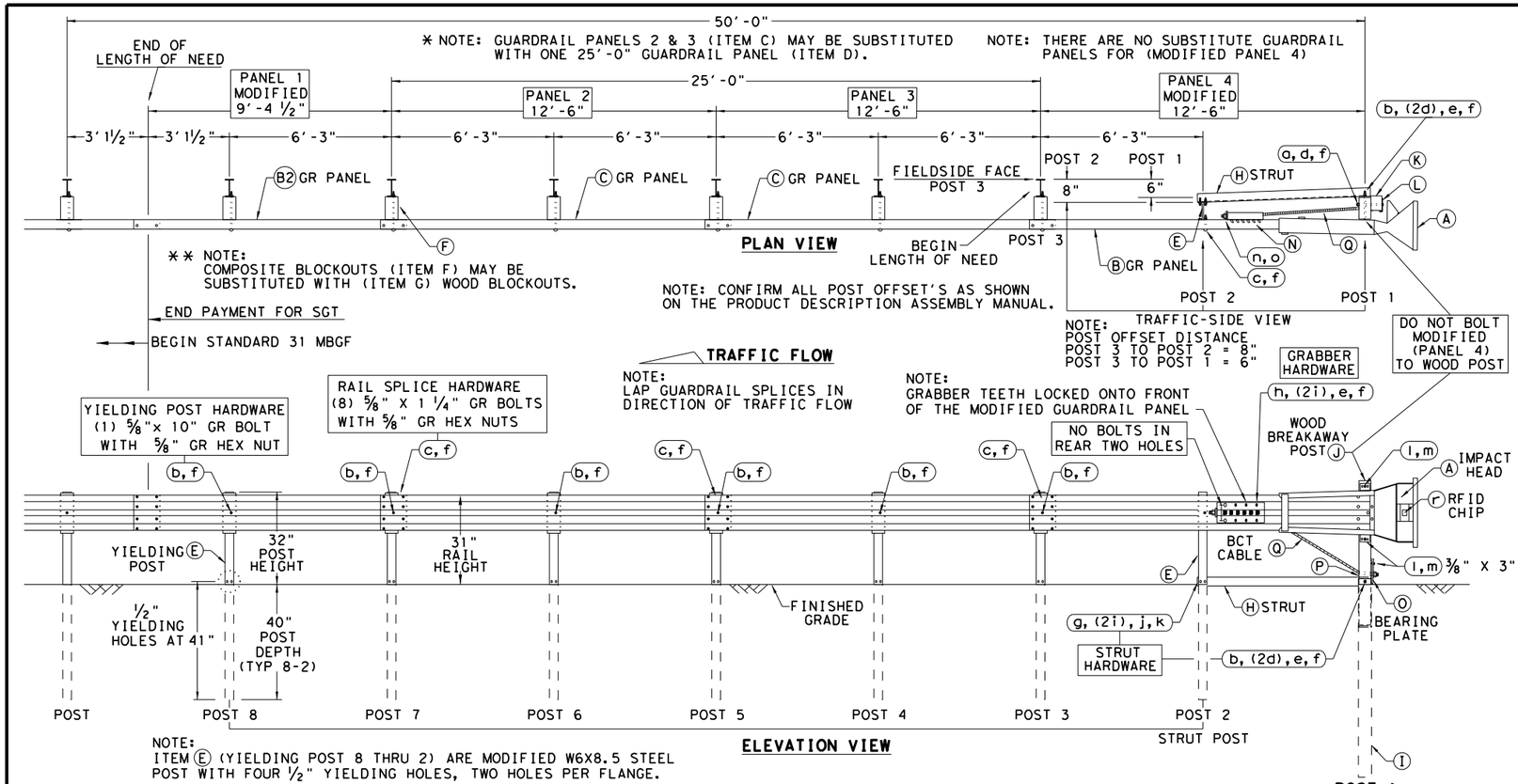
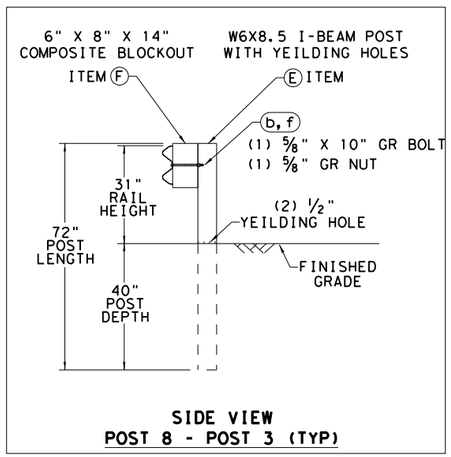


GENERAL NOTES

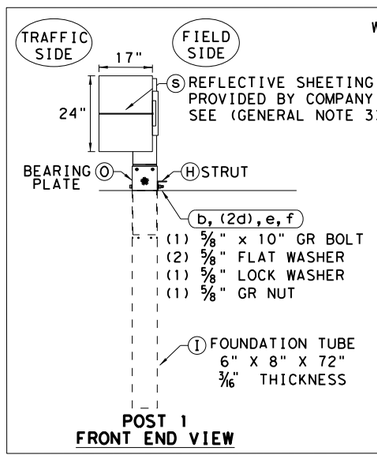
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D *	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

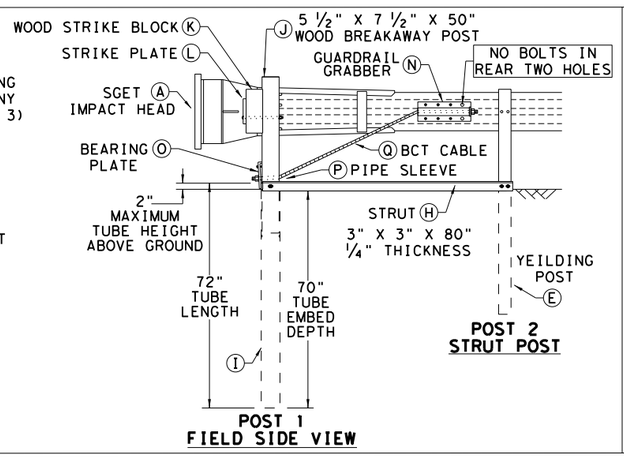
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



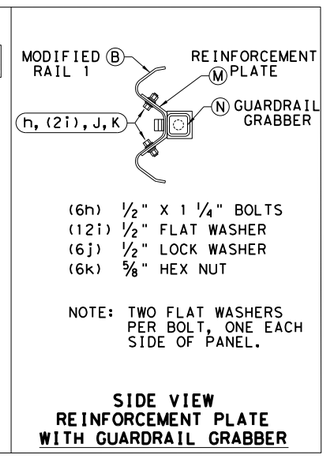
SIDE VIEW
POST 8 - POST 3 (TYP)



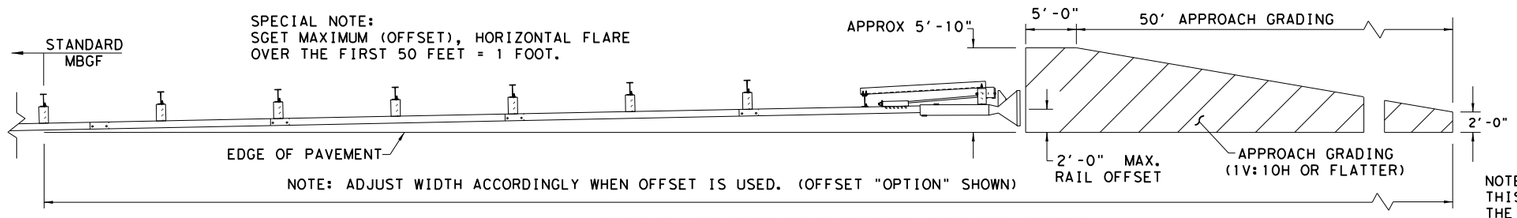
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation — Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
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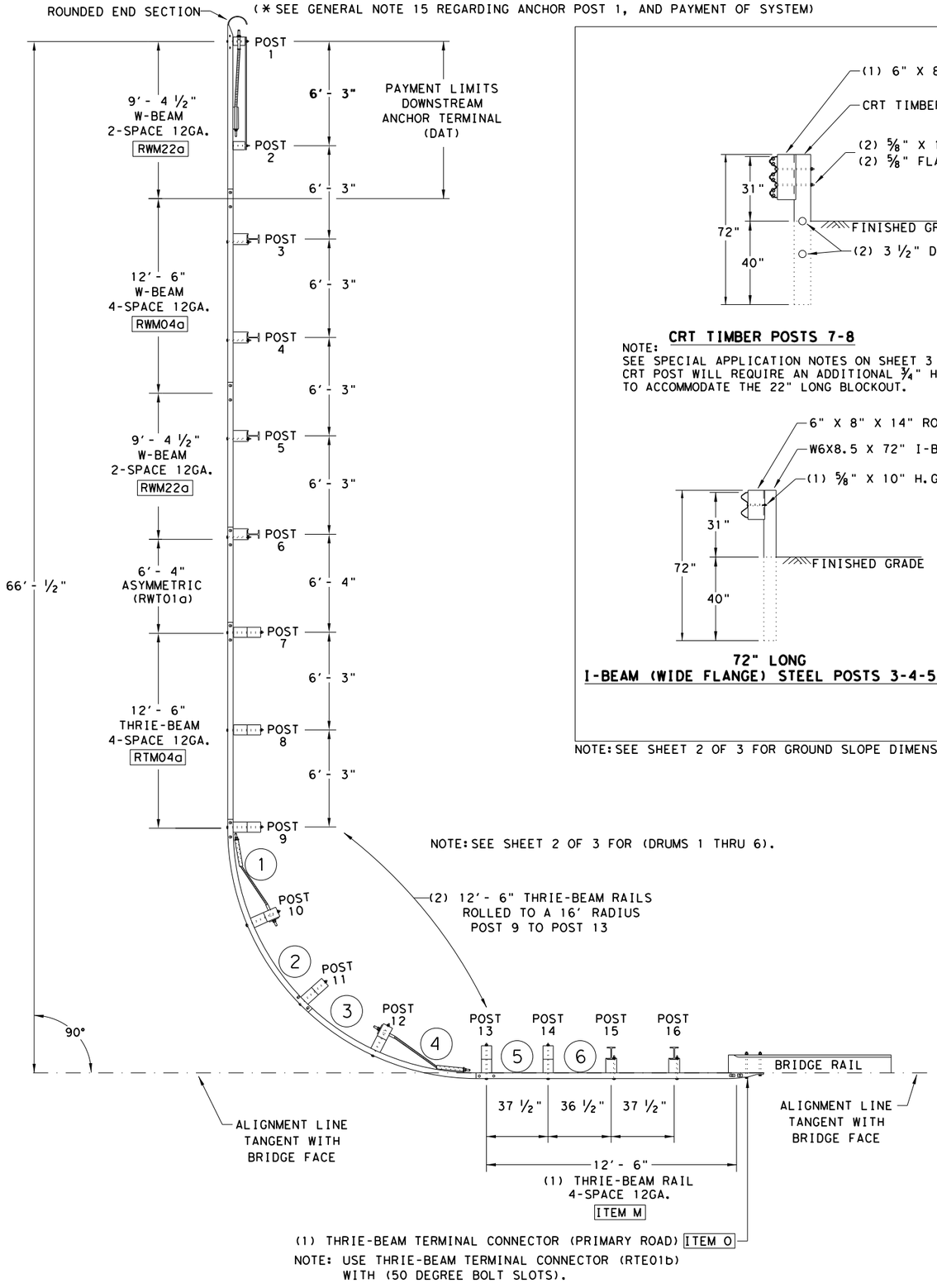
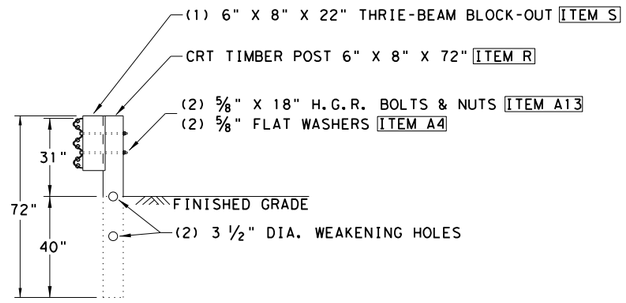
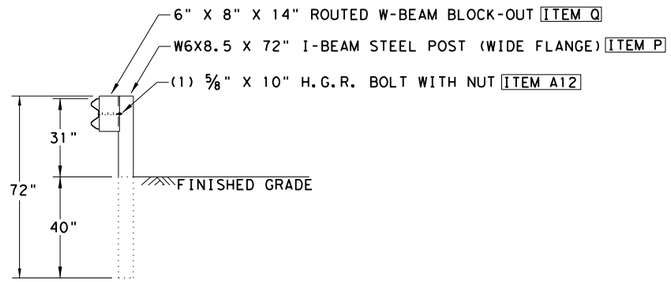


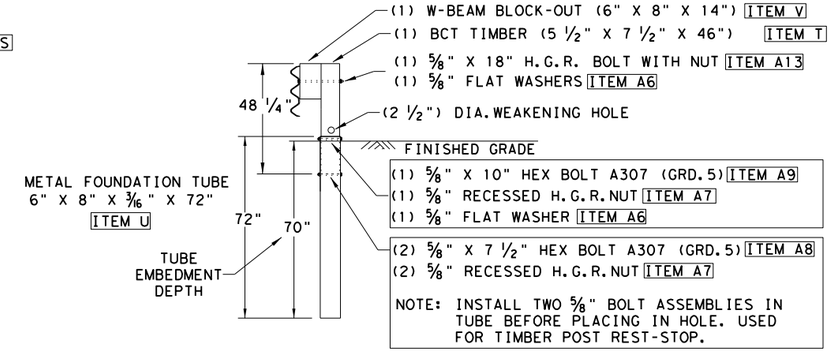


CRT TIMBER POSTS 7-8

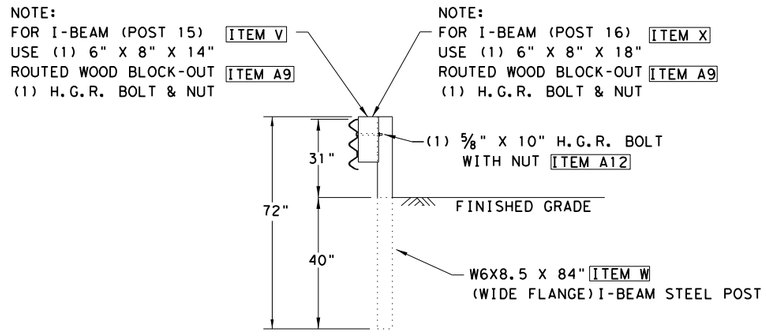
NOTE:
SEE SPECIAL APPLICATION NOTES ON SHEET 3 OF 3.
CRT POST WILL REQUIRE AN ADDITIONAL 3/4" HOLE TO ACCOMMODATE THE 22" LONG BLOCKOUT.



72" LONG
I-BEAM (WIDE FLANGE) STEEL POSTS 3-4-5-6

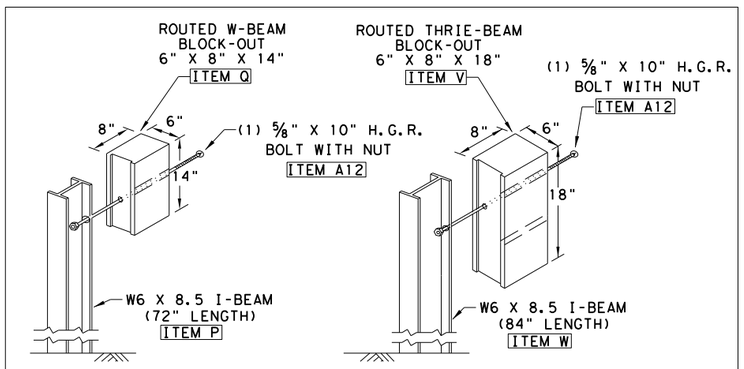


BCT TIMBER POSTS WITH METAL FOUNDATION TUBES
9-10-11-12-13-14



84" LONG
I-BEAM WIDE FLANGE STEEL POSTS 15-16

NOTE: SEE SHEET 2 OF 3 FOR GROUND SLOPE DIMENSIONS.



POST 3-4-5-6-15 **POST 16**

INSTALLATION DETAIL
ROUTED WOOD BLOCK-OUT WITH WIDE FLANGE STEEL POST

NOTE:
POST SYSTEM USES TWO TYPES OF 14" WOOD BLOCK-OUTS.
FOR CRT & BCT WOOD POSTS USE: (PDB01a)
FOR I-BEAM STEEL POSTS USE: (PDB01b)

POST (3-4-5-6)	USE: 14" BLOCK-OUT (PDB01b)
POST (7-8)	USE: 22" BLOCK-OUT (PDB02)
POST (9 THRU 14)	USE: 14" BLOCK-OUT (PDB01a)
POST (15)	USE: 14" BLOCK-OUT (PDB01b)
POST (16)	USE: 18" BLOCK-OUT (PDB01)

(MASH TL-2 COMPLIANT)
TESTED TO MASH TL-2 WITH A 3:1 SLOPE

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

FILE: srgt1221	TxDOT	CK:KM	DN:VP	CK:CGL
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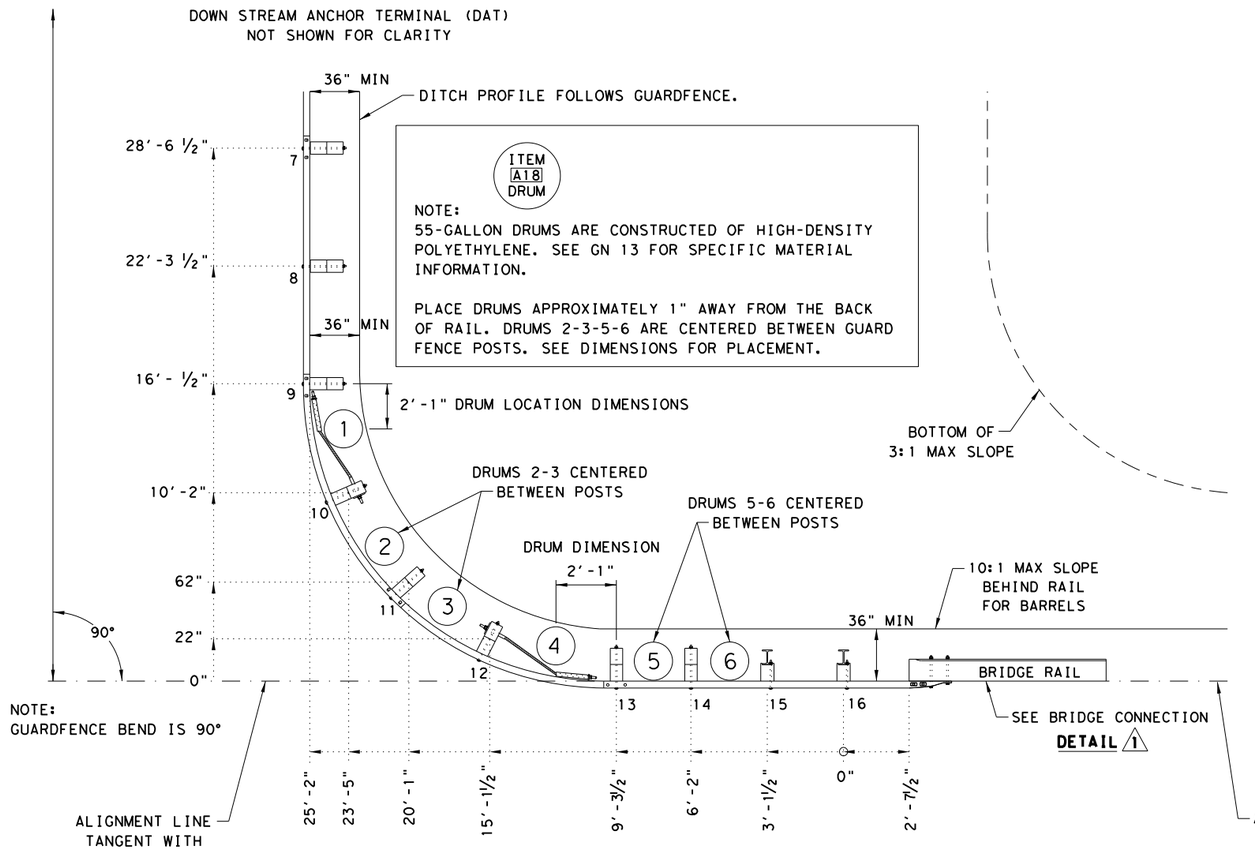
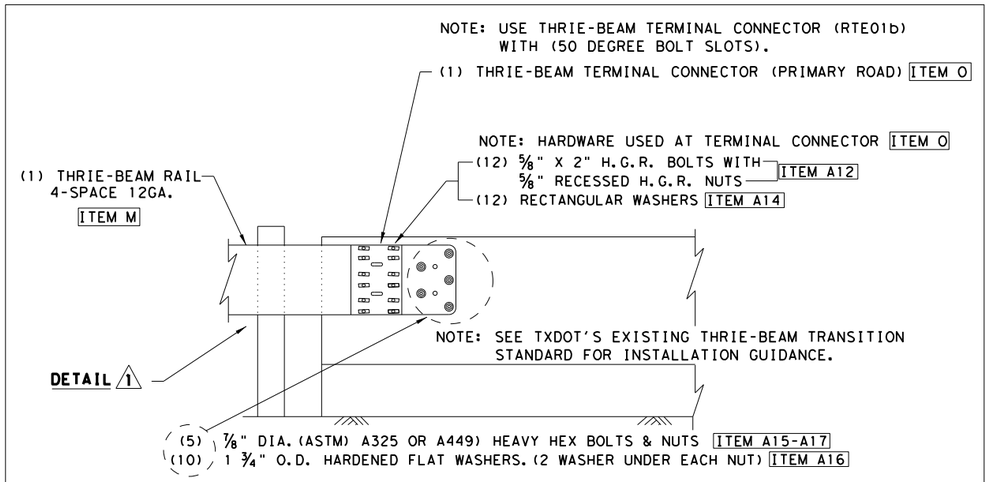


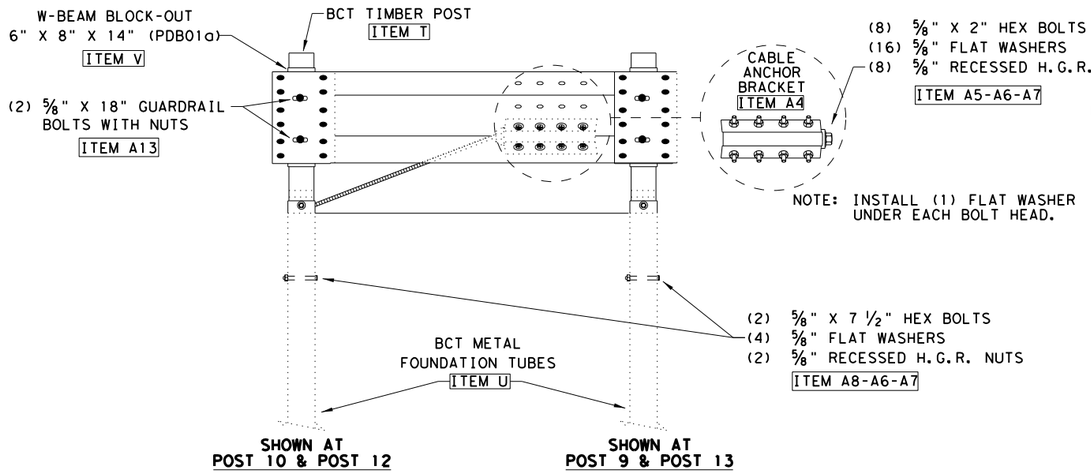
POST PLACEMENT DETAILS

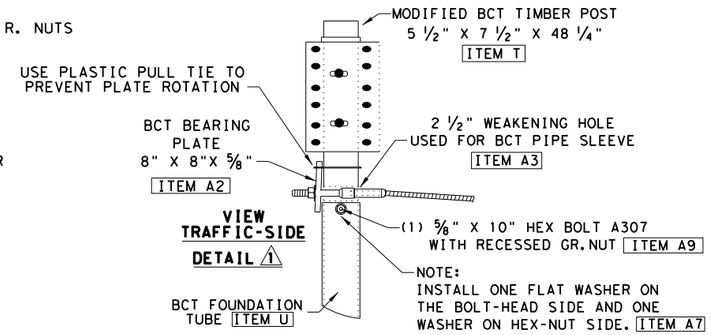


NOTE: TO ACCOMMODATE THE THRIE-BEAM TERMINAL CONNECTOR AT THE ROADWAY BRIDGE RAIL. DRILL (5) 1" DIA. HOLES. USE CONNECTOR PLATE FOR HOLE LOCATION TEMPLATE.

NOTE: BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE BRIDGE-RAIL, WASHER & HEX NUT. INSTALL WITH BOLT HEADS ON TRAFFIC-SIDE. (LENGTH OF THE BOLTS SHALL BE VERIFIED BY CONTRACTOR PRIOR TO ORDERING.)

PRIMARY ROADWAY BRIDGE-RAIL DETAIL





SHOWN AT POST 10 & POST 12

BCT TIMBER POST WITH METAL FOUNDATION TUBE

(MASH TL-2 COMPLIANT)
TESTED TO MASH TL-2 WITH A 3:1 SLOPE

Texas Department of Transportation | Design Division Standard

TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

FILE: srgt1221	TxDOT	CK:KM	DN:VP	CK:CGL
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	LRD	DUVAL		49

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ITEM	ALL LARGE & SMALL COMPONENT DESCRIPTIONS	TL-2 DOWNSTREAM ANCHOR TERMINAL (DAT) ☐ (PAYABLE BY EA.) ITEM	QTY	TL-2 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM (INCL DAT) △ (ALL PAY ITEMS) ITEM	TOTAL QTY
A	POST 1 & 2 BCT TIMBER (5 ½" X 7 ½" X 48 ¼") (PDF01)	A	2	A	2
B	POST 1 & 2 BCT TUBE (6" X 8" X 3/16" X 72" LENGTH) (PTE05)	B	2	B	2
C	POST 1 & 2 CHANNEL STRUTS (C3 X 5 X 80") A36	C	2	C	2
D	POST 1 SHELF ANGLE BRACKET (6" X 7 ½" X ¼") SEE DAT DETAIL	D	1	D	1
E	POST 1 BCT POST SLEEVE (FMM02a)	E	1	E	1
F	POST 1 BCT CABLE BEARING PLATE (⅝" X 8" X 8") (FPB01)	F	1	F	1
G	BCT CABLE ANCHOR ASSEMBLIES (¾" X 6'-6 ¾" LENGTH) (FCA01)	G	1	G	1
H	W-BEAM RAIL (ROUNDED END ANCHOR-TYPE) 12GA. (RWE03a)	H	1	H	1
I	W-BEAM RAIL (LENGTH 9'-4 ½") 12GA. (RWM22a)	I	2	I	2
J	W-BEAM RAIL (LENGTH 12'-6") 12GA.(4 SPACE) (RWM04a)			J	1
K	W-BEAM RAIL (LENGTH 9'-4 ½") 12GA. (RWM22a)			K	1
L	W-BEAM TO THRIE-BEAM ASYMMETRIC RAIL (RWT01a). (LENGTH 6'-4")			L	1
M	THRIE-BEAM RAIL (LENGTH 12'-6") 12GA. (4 SPACE) (RTM04a)			M	1
N	THRIE-BEAM RAIL (LENGTH 12'-6") 12GA. (16' RADIUS) (RTM02a)			N	2
O	THRIE BEAM RAIL (TERMINAL CONNECTOR) (BRIDGE-RAIL) (RTE01b)			O	1
P	POSTS 3,4,5,6 I-BEAM POSTS (LENGTH W6X8.5 X 72") (PWE01)			P	4
Q	POSTS 3,4,5,6,15 ROUTED W-BEAM BLOCK-OUTS (6" X 8" X 14") (PDB01b)			Q	5
R	POSTS 7,8 CRT TIMBER POSTS (LENGTH 6" X 8" X 72") (PDE09)			R	2
S	POSTS 7,8 THRIE-BEAM BLOCK-OUTS (6" X 8" X 22") (PDB02a)			S	2
T	POSTS 9,10,11,12,13,14 BCT TIMBER (5 ½" X 7 ½" X 46") (PDF04)			T	6
U	POSTS 9,10,11,12,13,14 BCT TUBE (6" X 8" X 3/16" X 72") (PTE05)			U	6
V	POSTS 9,10,11,12,13,14, W-BEAM BLOCK-OUTS (6" X 8" X 14") (PDB01a)			V	6
W	POSTS 15,16 I-BEAM POSTS (LENGTH W6X8.5 X 84") (PWE07)			W	2
X	POSTS 16 ROUTED THRIE-BEAM BLOCK-OUT (6" X 8" X 18") (PDB01)			X	1
A1	MODIFIED BCT CABLE ANCHOR ASSEMBLIES (¾" X LENGTH 5'-5")			A1	2
A2	BCT CABLE BEARING PLATE (⅝" X 8" X 8") (POST 10 & POST 12) (FPB01)			A2	2
A3	BCT CABLE POST SLEEVE (POST 10 & POST 12) (FMM02)			A3	2
A4	BCT CABLE ANCHOR BRACKET (AT POST 9 & POST 13) (FPA01)			A4	2
A5	⅝" X 2" HEX BOLTS A307 GRD.5 (FOR CABLE ANCHOR BRACKETS)	A5	8	A5	24
A6	⅝" FLAT WASHER A307 GRD.5 (1 WASHER UNDER BOLT & 1 WASHER UNDER NUT)	A6	18	A6	48
A7	⅝" RECESSED H.G.R. NUTS (FOR ALL ⅝" BOLTS)	A7	20	A7	152
A8	⅝" X 7 ½" HEX BOLTS A307 GRD.5 BCT POSTS (9-10-11-12-13-14)	A8	4	A8	12
A9	⅝" X 10" HEX BOLTS A307 GRD.5 BCT POSTS (9-10-11-12-13-14)	A9	2	A9	6
A10	⅝" X 1 ¼" H.G.R. BOLTS SPLICES AT POST (2-3-4-5-6-7-9-11-13) (FBB01)	A10	4	A10	72
A11	⅝" X 2" H.G.R. BOLTS (ROUND TERM-POST 10-END SPLICE) (FBB02)			A11	18
A12	⅝" X 10" H.G.R. BOLTS (I-BEAM POSTS RAIL & BLOCKOUT) (FBB03)	A12	2	A12	10
A13	⅝" X 18" H.G.R. BOLTS (POSTS 9,10,11,12,13,14) (FBB04)			A13	10
A14	RECTANGULAR WASHERS (FWR03) (FOR TERMINAL CONNECTOR RTE01b)			A14	12
A15	⅞" X (LENGTH VARIES) HEX BOLTS A325 OR A449 GR.5			A15	5
A16	1 ¾" O.D. HARDENED FLAT WASHER A325			A16	10
A17	⅞" HEX NUT GR.5 A325			A17	5
A18	55 GALLON DRUM - FILLED WITH SAND 700-715lbs.			A18	6

GENERAL NOTES

1. FOR ADDITIONAL INSTALLATION INFORMATION AND GUIDANCE CONTACT: TEXAS DEPARTMENT OF TRANSPORTATION, (TXDOT'S DESIGN DIVISION). (512) 416-2678. THE EXACT POSITION OF MBGF SHALL BE SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE SIGHT DISTANCE OF THE INSTALLATION WILL NEED TO BE VERIFIED WITH RESPECT TO THE SPECIFIC SITE PLACEMENT.

2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT 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 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. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.

9. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.

10. SPECIAL RAIL FABRICATION WILL BE REQUIRED FOR THRIE BEAM RAIL RADIUS (ITEM J).

11. ALL MATERIAL AND WORK INVOLVED IS SUBSIDIARY TO SHORT RADIUS BID ITEM, INCLUDING, BUT NOT LIMITED TO FOUNDATIONS, GRADING, THRIE BEAM RAIL, SAND DRUMS, AND OTHER PARTS.

12. ALL CABLE ASSEMBLIES SHOULD BE TAUT AFTER INSTALLATION. WHEN CABLES ARE MANIPULATED BY HAND THE CABLES SHOULD NOT MOVE MORE THAN 1" IN ANY DIRECTION PERPENDICULAR TO THE CABLE.

13. THE DRUMS ARE EAGLE MODEL 1656 FILLED WITH 715 LB (+/-15) SAND WITH THE PLASTIC LEVER-LOCK; OR AN APPROVED EQUIVALENT. THE APPROXIMATE HEIGHT OF THE DRUM IS 37" (+/-).

14. WHEN THE SHORT RADIUS SYSTEM IS TERMINATED BY A DAT, REFER TO THE LATEST DAT STANDARD FOR INSTALLATION OF THE DAT SYSTEM. IF THE SYSTEM IS TERMINATED BY ANOTHER END TERMINAL SYSTEM, REFER TO THE CORRESPONDING END TERMINAL STANDARD.

* 15. WHEN THE PLANNED LOCATION OF POST (1) IS WITHIN THE RIGHT-OF-WAY AND WITHIN THE CLEAR ZONE OF THE DIRECTION OF THE OPPOSING TRAFFIC, AN APPROPRIATE CRASHWORTHY END TERMINAL SHALL BE INSTALLED IN PLACE OF THE DOWNSTREAM ANCHOR TERMINAL (DAT). THE PAYMENT OF THE COMPLETE SHORT RADIUS SYSTEM WITH A DAT AT THE TERMINUS WILL BE WITH BID ITEMS: 540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION, AND 540 6046 TL-2 31" SHORT RADIUS (W/O DAT). THE PAYMENT OF THE SYSTEM TERMINATED BY A CRASHWORTHY END TERMINAL (IN LIEU OF THE DAT) WILL BE WITH BID ITEMS: 540 6046 TL-2 31" SHORT RADIUS (W/O DAT), AND 544 6001 GUARDRAIL END TREATMENT (INSTALL).

16. TESTED TO MASH WITH A 3:1 SLOPE OR SHALLOWER IS PREFERABLE IN THE LIMITS OF THE TOP AND BOTTOM OF THE SLOPE AS SHOWN IN THE PLAN VIEW. IF FIELD CONDITIONS REQUIRE A STEEPER SLOPE,THIS MAY BE ALLOWABLE UP TO A 2:1 SLOPE. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE.

NOTE: SEE SHEET 1 OF 3.

SPECIAL APPLICATION NOTES.

1. THIS IS A MASH COMPLIANT TL-2 SHORT RADIUS GUARDRAIL SYSTEM 31 INCHES TALL. THE SYSTEM REQUIRES A MINIMUM PLACEMENT FOOTPRINT OF 35' ALONG THE PRIMARY ROAD AND 30' ALONG THE SECONDARY DRIVEWAY.

2. THE SYSTEM ALSO REQUIRES A MINIMUM 3' WIDE (WORK ZONE) DIRECTLY BEHIND THE GUARDRAIL SYSTEM, WITH A SLOPE AT 1V:10H, FROM THERE A 3:1 SLOPE IS RECOMMENDED. SEE SHEET 2 OF 3 FOR SLOPE DETAILS.

3. NOTE FOR INSTALLER: THE TWO (2) CRT POSTS ITEM (R), AT POST LOCATIONS 7 & 8.), WILL REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A ¾" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-⅞" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

   OPTION FOR ADDITIONAL ¾" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO ¾" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM ¾" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM ¾" HOLE.

(MASH TL-2 COMPLIANT)
TESTED TO MASH TL-2 WITH A 3:1 SLOPE

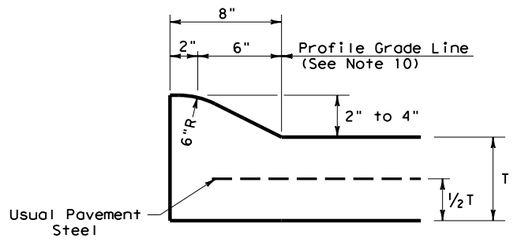
SHEET 3 OF 3

Texas Department of Transportation — Design Division Standard

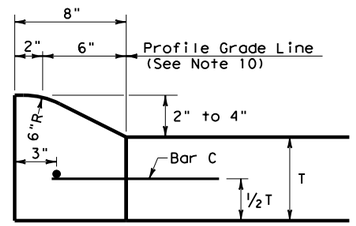
TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

FILE: srgt1221	TxDOT	CK:KM	DN:VP	CK:CGL
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		50



TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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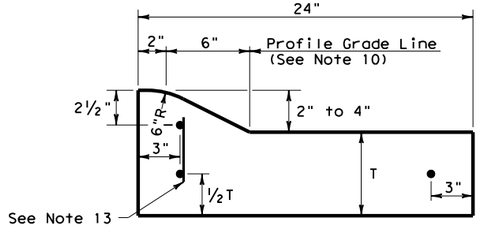
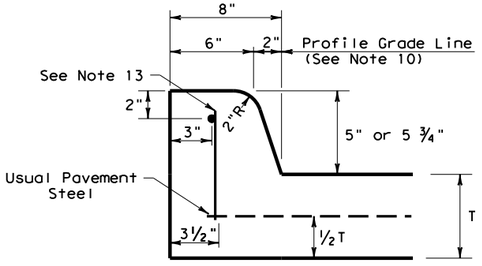
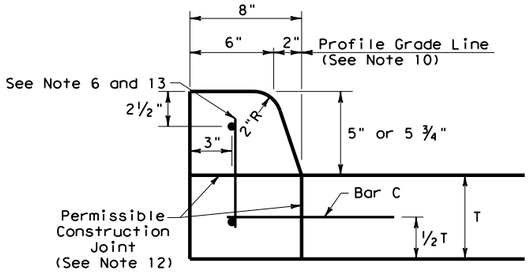


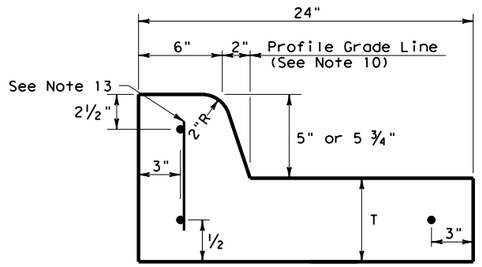
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



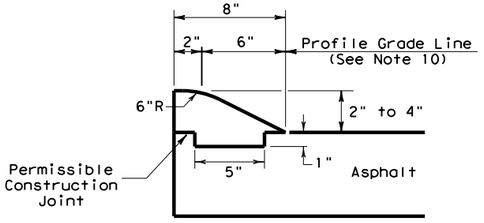
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



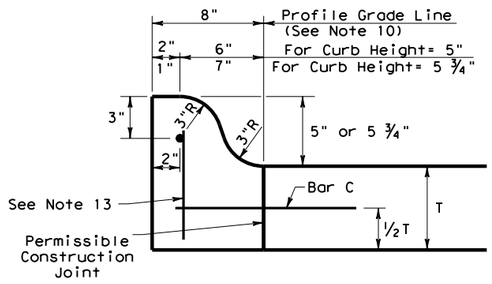
TYPE II CURB
5" - 5 ¾" HEIGHT



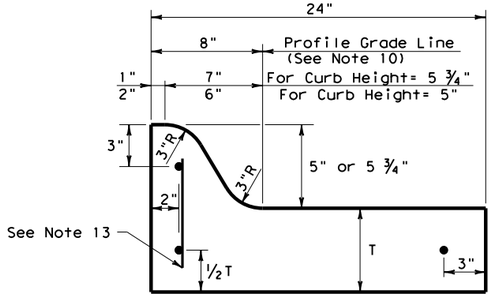
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



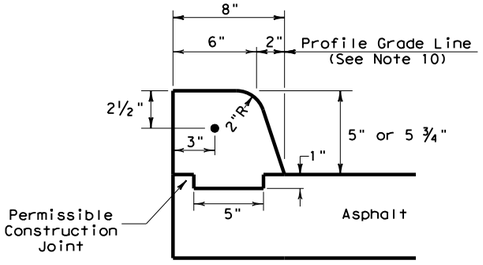
TYPE III CURB (KEYED)
2" - 4" HEIGHT



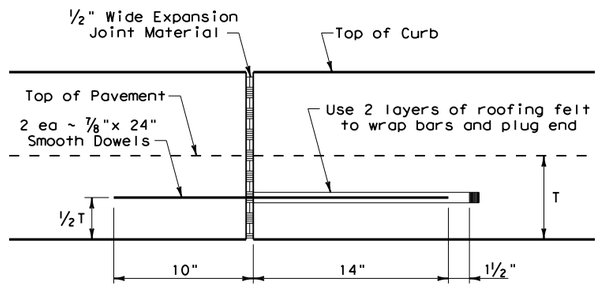
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

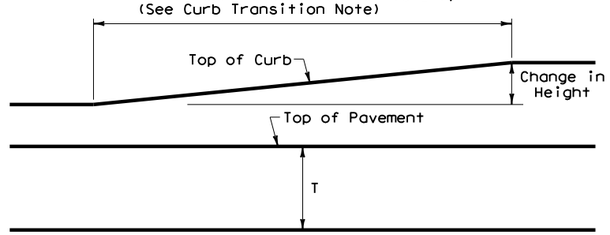


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

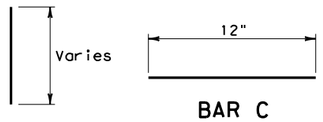
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-22

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© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		51

DATE: 5/31/2024
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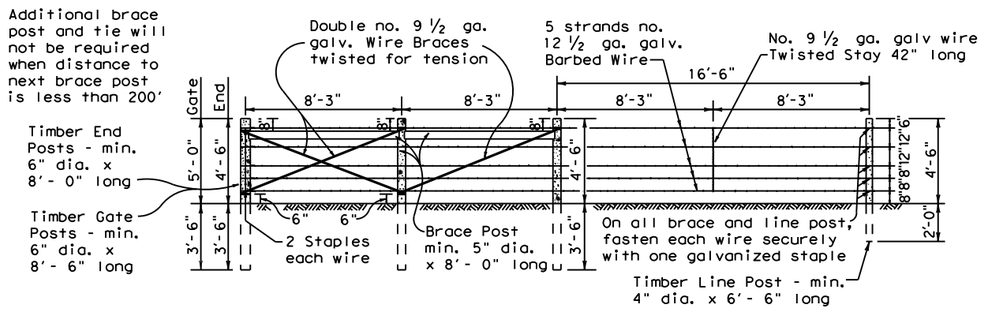
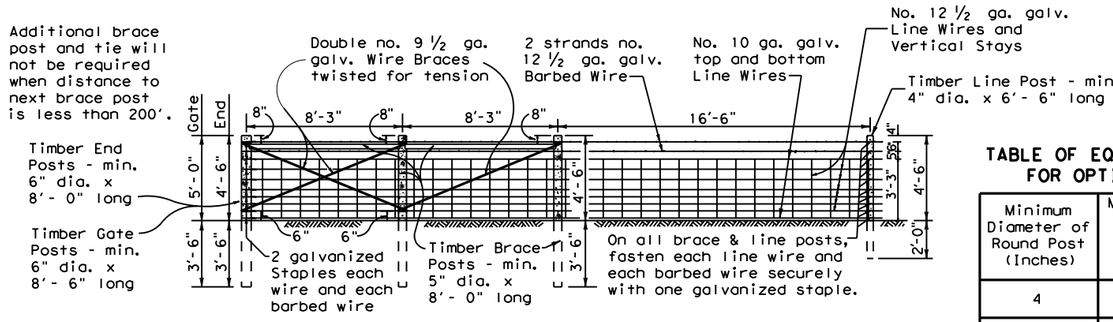


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

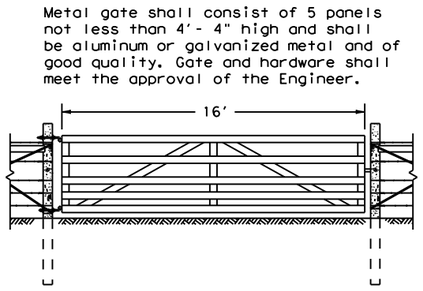
Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

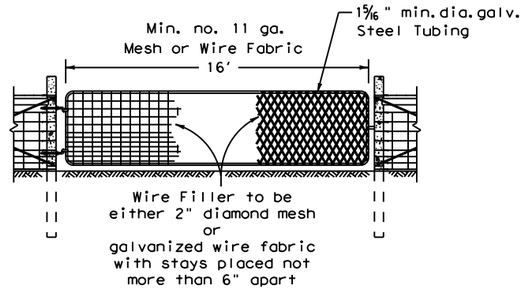
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

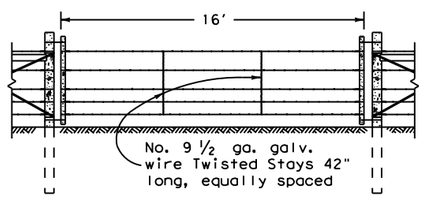
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

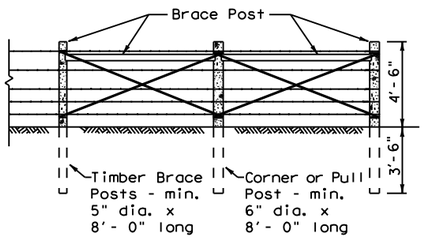


DETAIL TYPE 3 GATE

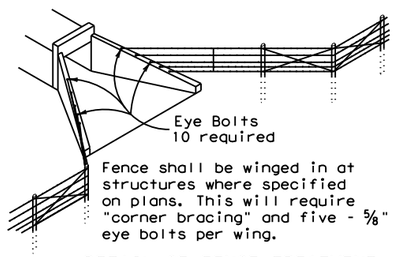
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be 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. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1' - 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1' - 6" below the ground surface, the holes shall be drilled a minimum of 2' - 0" into the rock or to the depth whichever is the lesser depth.
6. 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.

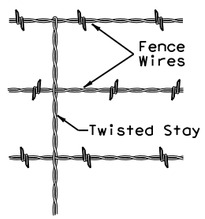
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



CORNER OR PULL POST ASSEMBLY

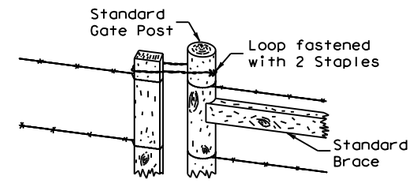


DETAIL OF FENCE TREATMENT AT STRUCTURES

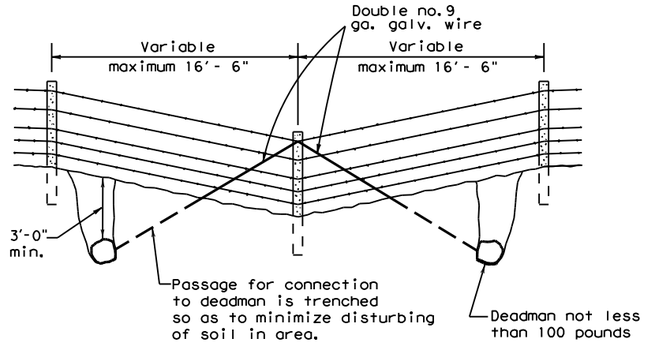


DETAIL OF STAY

(Barbed wire fence)

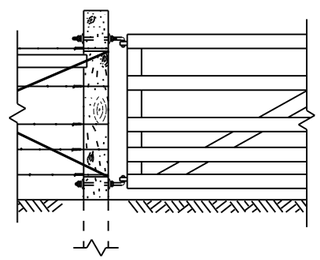


DETAIL FASTENER TYPE 3 GATE

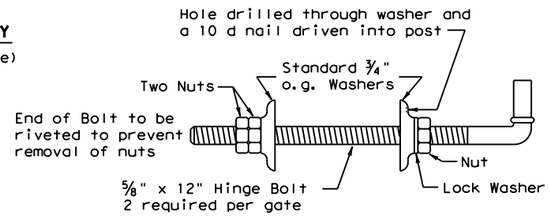


DETAIL OF FENCE SAG

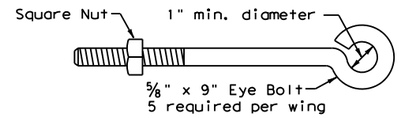
(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF EYE BOLT

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE

(WOOD POSTS)

WF (1) - 10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		52

DATE: 5/31/2024
FILE: c:\Dms\Idcus-pw-01\craig.janak\dms07712\wf110.dgn

FINAL SUBMITTAL

DRILLING LOG

WinCore Version 3.3

County	Duval	Hole	B-1	District	Laredo
Highway	S. Tovar Street	Structure	Bridge	Date	2/27/24
CSJ	0922-23-010	Station		Grnd. Elev.	309.00 ft
		Offset		GW Elev.	N/A

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
		20 (6) 22 (6)	CLAY, Sandy; Lean; very stiff; dark gray; moist to dry (CL)			13	47	31		SPT Data =30 (Blows/Ft.) Minus #200 Sieve =59% +40 Sieve =3%, +4 Sieve =2%
5		21 (6) 24 (6)				16.9			112	SPT Data =22 (Blows/Ft.)
10		25 (6) 28 (6)				11	41	28		SPT Data =23 (Blows/Ft.) Minus #200 Sieve =50% +40 Sieve =0%, +4 Sieve =0%
296.			CLAY, Sandy; Lean; very stiff; dark gray; dry; with calcareous nodules (CL)							
15		30 (6) 50 (6)				17	31	11		Hand Penetrometer = 4.5+ (tsf) Minus #200 Sieve =48% +40 Sieve =0%, +4 Sieve =0%
291.			SAND, Clayey; very dense; gray; dry (SC)							
20		20 (6) 20 (6)				19				SPT Data =16 (Blows/Ft.) Minus #200 Sieve =33% +40 Sieve =4%, +4 Sieve =3%
286.			SAND, Silty; medium dense becoming dense @ 33' and very dense @ 38'; gray; moist (SM)							
25		15 (6) 17 (6)				18			135	SPT Data =14 (Blows/Ft.)
30										

Remarks: GPS Coordinates: N27.7584573°, W98.2452372°.

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

Driller: Roman - Envirocore Logger: Ryan Hirdes Organization: ETTL

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DRILLING LOG

WinCore Version 3.3

County	Duval	Hole	B-1	District	Laredo
Highway	S. Tovar Street	Structure	Bridge	Date	2/27/24
CSJ	0922-23-010	Station		Grnd. Elev.	309.00 ft
		Offset		GW Elev.	N/A

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
		30 (6) 32 (6)	SAND, Silty; medium dense becoming dense @ 33' and very dense @ 38'; gray; moist (SM)			17				SPT Data =51 (Blows/Ft.) Minus #200 Sieve =18% +40 Sieve =43%, +4 Sieve =23%
35		31 (6) 50 (1)								SPT Data =50/4" (Blows/In.)
269. 40		50 (2) 50 (1)	CLAY, Fat; hard becoming very hard @ 48'; gray with brown; dry (CH)			59	31			SPT Data =50/3" (Blows/In.)
45		50 (2) 50 (0.25)								SPT Data =50/5" (Blows/In.)
50		50 (0.125) 50 (0)								SPT Data =50/5" (Blows/In.)
55		50 (0) 50 (0.125)								SPT Data =50/3" (Blows/In.)
249. 60										

Remarks: GPS Coordinates: N27.7584573°, W98.2452372°.

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

Driller: Roman - Envirocore Logger: Ryan Hirdes Organization: ETTL

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STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

CARLOS H. REYES
73649
6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

BORING LOGS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		53

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FINAL SUBMITTAL

DRILLING LOG

WinCore Version 3.3

County	Duval	Hole	B-2	District	Laredo
Highway	S. Tovar Street	Structure	Bridge	Date	2/26/24
CSJ	0922-23-010	Station		Grnd. Elev.	302.00 ft
		Offset		GW Elev.	N/A

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
		4 (6) 4 (6)	SAND, Clayey; medium stiff becoming very stiff @ 8'; dark gray; moist; with calcareous nodules @ 8' (SC)			8	30	15		SPT Data =7 (Blows/Ft.) Minus #200 Sieve =40% +40 Sieve =9%, +4 Sieve =3%
5		11 (6) 12 (6)								SPT Data =20 (Blows/Ft.)
292. 10		50 (3) 50 (0.5)	SAND, Silty; very dense; light gray; moist (SM)							SPT Data =50/4" (Blows/In.)
15		50 (1) 50 (1)				25				SPT Data =50/5" (Blows/In.) Minus #200 Sieve =25% +40 Sieve =6%, +4 Sieve =2%
20		50 (1) 50 (0.125)								SPT Data =50/0.5" (Blows/In.)
25		50 (1) 50 (0.5)								
274. 30			CLAY, Fat; with Sand; very hard; brown with gray; dry (CH)			51	71	41		SPT Data =50/5.5" (Blows/In.) Minus #200 Sieve =77% +40 Sieve =0%, +4 Sieve =0%

Remarks: GPS Coordinates: N27.757451°, W98.245590°

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

Driller: Roman - Envirocore Logger: Ryan Hirdes Organization: ETTL

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DRILLING LOG

WinCore Version 3.3

County	Duval	Hole	B-2	District	Laredo
Highway	S. Tovar Street	Structure	Bridge	Date	2/26/24
CSJ	0922-23-010	Station		Grnd. Elev.	302.00 ft
		Offset		GW Elev.	N/A

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
		50 (1) 50 (1)	CLAY, Fat; with Sand; very hard; brown with gray; dry (CH)			29	65	36		SPT Data =50/3" (Blows/In.) Minus #200 Sieve =67% +40 Sieve =1%, +4 Sieve =0%
269. 35		50 (0.5) 50 (0.5)	CLAY, Sandy; Fat; very hard; gray; dry (CH)							SPT Data =50/3" (Blows/In.)
264. 40		50 (1) 50 (0.125)	CLAY, Fat; very hard; gray with brown; dry (CH)							SPT Data =50/5.5" (Blows/In.)
45		50 (0.25) 50 (0)								SPT Data =50/2" (Blows/In.)
50		50 (1) 50 (0.5)								SPT Data =50/5" (Blows/In.)
55		50 (0.25) 50 (0)								SPT Data =50/4" (Blows/In.)
242. 60										

Remarks: GPS Coordinates: N27.757451°, W98.245590°

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

Driller: Roman - Envirocore Logger: Ryan Hirdes Organization: ETTL

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15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
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S TOVAR ST @ SAN DIEGO CREEK

BORING LOGS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		54

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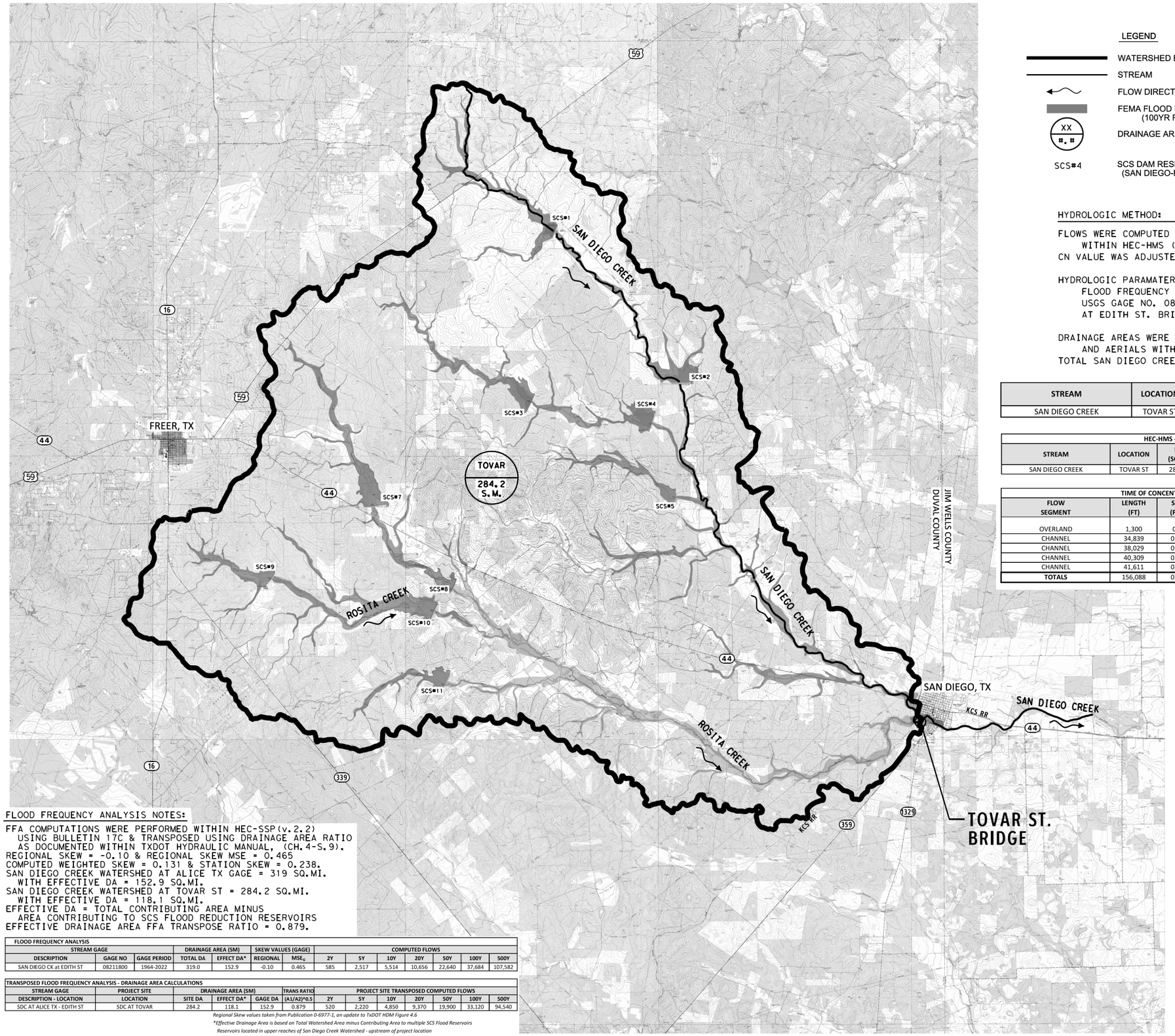

HYDROLOGIC METHOD:

FLOWS WERE COMPUTED USING NRCS HYDROGRAPH METHOD
WITHIN HEC-HMS (V.4.9).
CN VALUE WAS ADJUSTED FOR CLIMATIC (AMC I) CONDITIONS

HYDROLOGIC PARAMATERS WERE ADJUSTED BASED ON
FLOOD FREQUENCY ANALYSIS (BULLETIN 17C) OF
USGS GAGE NO. 08211800 LOCATED ALONG SAN DIEGO CREEK
AT EDITH ST. BRIDGE IN ALICE, TX - DOWNSTREAM OF BU 281.

DRAINAGE AREAS WERE DELINEATED USING USGS NED & LIDAR TOPOGRAPHY
AND AERIALS WITHIN ARCGIS v10.8 USING ARCHYDRO TOOLS.
TOTAL SAN DIEGO CREEK WATERSHED AT TOVAR ST = 284.2 SQ.MI.

STREAM	LOCATION	COMPUTED RUNOFF (CFS)					
		Q 2Y	Q 5Y	Q 10Y	Q 25Y	Q 50Y	Q 100Y
SAN DIEGO CREEK	TOVAR ST	1,578	4,309	7,325	12,655	17,854	24,258

HEC-HMS - NRCS HYDROGRAPH METHOD PARAMETERS & FLOWS

STREAM	LOCATION	D.A. (SQ.MI.)	D.A. (AC)	SCS PRF	Tc (MIN)	T_{LAG} (MIN)	Ia (IN)	CN (ADJ)	IMP%
SAN DIEGO CREEK	TOVAR ST	284.183	181,877	300	1251	751	1.17	42	0

TIME OF CONCENTRATION/ LAG TIME - PARAMETERS (KERBY-KIRPICH METHOD)

FLOW SEGMENT	LENGTH (FT)	SLOPE (FT/FT)	SURFACE DESCRIPTION	ROUGHNESS N	VEL COEFF	2YR/ 24HR RAINFALL	VEL (FPS)	TIME (HR)	TIME (MIN)	LAG TIME (MIN)
OVERLAND	1,300	0.035	PASTURE/ LT BRUSH	0.3		3.9		1.60	96.1	
CHANNEL	34,839	0.0042			0.0078		0.35	3.36	201.6	
CHANNEL	38,029	0.0018			0.0078		0.47	4.98	298.9	
CHANNEL	40,309	0.0016			0.0078		0.49	5.45	327.1	
CHANNEL	41,611	0.0017			0.0078		0.47	5.46	327.5	
TOTALS	156,088	0.0025							1251	751

FLOOD FREQUENCY ANALYSIS NOTES:

FFA COMPUTATIONS WERE PERFORMED WITHIN HEC-SSP(v.2.2)
USING BULLETIN 17C & TRANSPOSED USING DRAINAGE AREA RATIO
AS DOCUMENTED WITHIN TXDOT HYDRAULIC MANUAL, (CH.4-S.9).
REGIONAL SKEW = -0.10 & REGIONAL SKEW MSE = 0.465
COMPUTED WEIGHTED SKEW = 0.131 & STATION SKEW = 0.238.
SAN DIEGO CREEK WATERSHED AT ALICE TX GAGE = 319 SQ.MI.
WITH EFFECTIVE DA = 152.9 SQ.MI.
SAN DIEGO CREEK WATERSHED AT TOVAR ST = 284.2 SQ.MI.
WITH EFFECTIVE DA = 118.1 SQ.MI.
EFFECTIVE DA = TOTAL CONTRIBUTING AREA MINUS
AREA CONTRIBUTING TO SCS FLOOD REDUCTION RESERVOIRS
EFFECTIVE DRAINAGE AREA FFA TRANSPOSE RATIO = 0.879.

FLOOD FREQUENCY ANALYSIS

STREAM GAGE			DRAINAGE AREA (SM)		SKEW VALUES (GAGE)		COMPUTED FLOWS						
DESCRIPTION	GAGE NO	GAGE PERIOD	TOTAL DA	EFFECT DA*	REGIONAL	MSE_G	2Y	5Y	10Y	20Y	50Y	100Y	500Y
SAN DIEGO CK at EDITH ST	08211800	1964-2022	319.0	152.9	-0.10	0.465	585	2,517	5,514	10,656	22,640	37,684	107,582

TRANSPOSED FLOOD FREQUENCY ANALYSIS - DRAINAGE AREA CALCULATIONS

STREAM GAGE	PROJECT SITE	DRAINAGE AREA (SM)			TRANS RATIO	PROJECT SITE TRANSPOSED COMPUTED FLOWS						
DESCRIPTION - LOCATION	LOCATION	SITE DA	EFFECT DA*	GAGE DA	(A1/A2)^0.5	2Y	5Y	10Y	20Y	50Y	100Y	500Y
SDC AT ALICE TX - EDITH ST	SDC AT TOVAR	284.2	118.1	152.9	0.879	520	2,220	4,850	9,370	19,900	33,120	94,540

Regional Skew values taken from Publication 0-6977-1, an update to TxDOT HDM Figure 4.6
**Effective Drainage Area is based on Total Watershed Area minus Contributing Area to multiple SCS Flood Reservoirs*
Reservoirs located in upper reaches of San Diego Creek Watershed - upstream of project location

STATE OF TEXAS
KURT E. KILLIAN
95742
LICENSED
PROFESSIONAL ENGINEER

5/30/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
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IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246
1202 LAKE POINTE PKWY
SUGAR LAND, TX 77478
713-782-3811

TOVAR ST BRIDGE

DRAINAGE AREA MAP

TOVAR ST AT
SAN DIEGO CREEK

CONT	SECT	JOB	HIGHWAY
0922	23	010	TOVAR
DIST	COUNTY		SHEET NO.
LRD	DUVAL		55

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CK
DWG
CK
DN:

NOTES:

1. STREAM MODELING & WATERSHED DATA DETAILED WITHIN "TOVAR ST AT SAN DIEGO CREEK BRIDGE HYDRAULIC STUDY, SAN DIEGO, TX", DATED MAY 2024 BY CIVIL SYSTEMS ENGINEERING, INC.
2. PROPOSED BRIDGE IS LOCATED AT PROJECT STA. 103+29.09 - STA. 106+79.09
3. PROPOSED BRIDGE CONSISTS OF 2-55' & 4-60' SPANS WITH PRESTRESSED CONCRETE I-GIRDER (TX28).
4. BRIDGE TOTAL LENGTH = 350 FEET.
5. PROPOSED BRIDGE IS SUPPORTED BY 36" CIRCULAR PIERS & DRILLED SHAFTS.
6. PROPOSED BRIDGE IS SKEWED 15~ TO STREAM W/ BRIDGE WIDTH IS 44 FT ALONG STREAM ALIGNMENT
7. BOUNDARY CONDITION SET TO DOWNSTREAM NORMAL DEPTH SLOPE.
8. ELEVATIONS PRESENTED ARE REFERENCED TO NAVD88 DATUM.
9. BRIDGE DESIGNED FOR 10YR STORM EVENT W/ 100YR CHECK FREQUENCY.
10. ROADWAY OVERTOPPED DURING STORM EVENTS GREATER THAN 25YR STORM EVENT.

FEMA:

PROJECT IS LOCATED WITHIN THE INCORPORATED AREAS OF SAN DIEGO, DUVAL COUNTY, TX, A PARTICIPATING COMMUNITY WITHIN THE NATIONAL FLOOD INSURANCE PROGRAM.
BRIDGE IS LOCATED WITHIN A FEMA EFFECTIVE ZONE AE FLOOD HAZARD AREA WITH ESTABLISHED BASE FLOOD ELEVATIONS AND REGULATORY FLOODWAY DELINEATION.

FLOODPLAIN NOTIFICATION WITH SAN DIEGO, TX FLOODPLAIN ADMINISTRATION WAS PERFORMED ON 03/27/2024.

HYDROLOGIC METHOD:

FLOWS WERE COMPUTED USING NRCS HYDROGRAPH METHOD WITHIN HEC-HMS (V.4.9).
CN VALUE WAS ADJUSTED FOR CLIMATIC (AMC) CONDITIONS

HYDROLOGIC PARAMATERS (SCS PEAK RATE FACTOR) WERE ADJUSTED BASED ON FLOOD FREQUENCY ANALYSIS OF USGS GAGE NO. 08211800 LOCATED ALONG SAN DIEGO CREEK AT EDITH ST. BRIDGE IN ALICE, TX -- DOWNSTREAM OF BU 281.

FFA COMPUTATIONS WERE PERFORMED WITHIN HEC-SSP(v.2.2) USING BULLETIN 17C & TRANSPOSED USING DRAINAGE AREA RATIO AS DOCUMENTED WITHIN TXDOT HYDRAULIC MANUAL, (CH.4-S.9).
DRAINAGE AREAS WERE DELINEATED USING USGS NED & LIDAR TOPOGRAPHY AND AERIALS WITHIN ARCGIS v10.8 USING ARCHYDRO TOOLS.
SAN DIEGO CREEK WATERSHED AT ALICE TX GAGE = 319 SQ.MI. (EFF DA= 152.9 SQ.MI.)
SAN DIEGO CREEK WATERSHED AT TOVAR ST = 284.2 SQ.MI. (EFF DA= 118.1 SQ.MI.)
EFFECTIVE DRAINAGE AREA TRANSPOSE RATIO = 0.879.

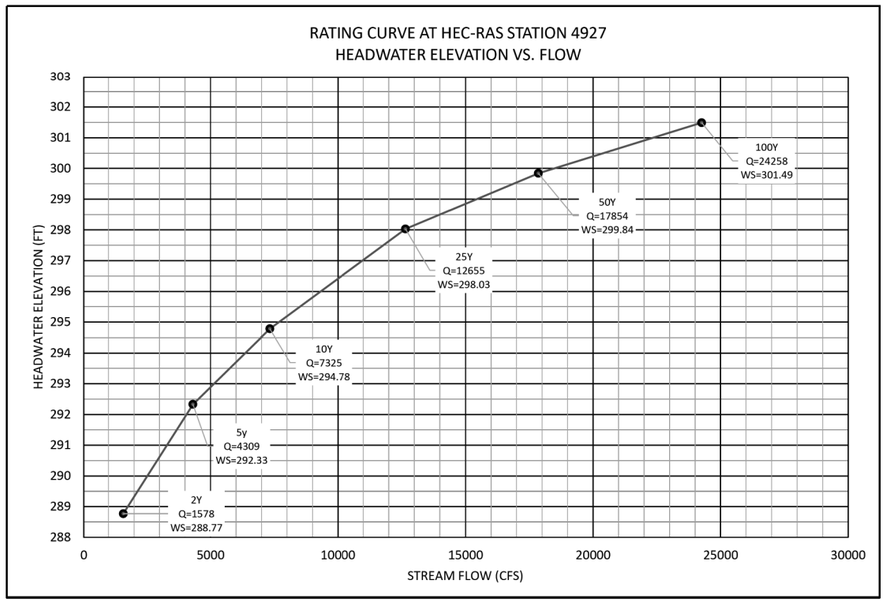
HYDRAULIC METHOD:

WATER SURFACE ELEVATIONS COMPUTED USING HEC-RAS (V.6.4.1).
HEC-RAS MODEL WAS GENERATED FROM PROJECT FIELD SURVEY, LIDAR TOPO, AND PRELIMINARY BRIDGE LAYOUTS.
DOWNSTREAM BOUNDARY CONDITIONS SET TO NORMAL DEPTH SLOPE OF 0.0011 FT/FT
BRIDGE MODELED WITH AN APPLIED SKEW ANGLE OF 15-DEGREES TO BRIDGE DECK AND FACE CROSS-SECTIONS.
LEVEE ROUTINE USED FOR EARTHEN LEVEE AND FLOODWALL ALONG LEFT BANK.

HEC-RAS FILENAME: SANDIEGO_CK.PRJ
EXISTING (PRE-PROJECT) CONDITION WATER SURFACE ELEVATIONS ARE FROM:
PLAN: "EXIST-TOVAR", "*.P01"
GEOMETRY:"EXIST-TOVAR_2024", "*.G01"
FLOW:"FLOWS-HMS", "*.F03"
PROPOSED (POST PROJECT) CONDITION WATER SURFACE ELEVATIONS ARE FROM:
PLAN: "PROP-TOVAR", "*.P02"
GEOMETRY:"PROP-TOVAR_2024", "*.G02"
FLOW:"FLOWS-HMS", "*.F03"
STREAM MODELED WITH REPRESENTATIVE MANNING'S VALUES OF:
CHANNEL AREA: 0.040 - 0.060
OVERBANK AREA: 0.040 - 0.120

HEC-RAS STATION	D/S REACH LENGTH (FT)	CHANNEL INVERT EL (FT)	FLOWS (CFS)	10-YEAR DESIGN FREQUENCY COMPUTED WATER SURFACE ELEVATIONS (NAVD 1988) (FT)			10-YEAR DESIGN VELOCITIES (FPS)	
				EXISTING	PROPOSED	DIFFERENCE (PROP-EX)	EXISTING	PROPOSED
4098	929	278.9	7325	293.95	293.95	0.00	2.6	2.6
4710	651	280.2	7325	294.12	294.12	0.00	3.0	3.0
4789	78	283.1	7325	294.14	294.14	0.00	3.2	3.2
4868	EXISTING - TOVAR ROAD BRIDGE							
4927	76.8	283.3	7325	294.80	294.78	-0.02	3.5	3.5
5066	176	278.3	7325	294.93	294.91	-0.02	3.0	3.0
5324	244	279.1	7325	295.00	294.98	-0.02	3.5	3.6
5683	397	283.4	7325	295.26	295.24	-0.02	4.6	4.6
5774	KANSAS CITY SOUTHERN RAIL ROAD BRIDGE							
5823	140	282.1	7325	295.63	295.61	-0.02	3.3	3.3

HEC-RAS STATION	D/S REACH LENGTH (FT)	CHANNEL INVERT EL (FT)	FLOWS (CFS)	100-YEAR DESIGN FREQUENCY COMPUTED WATER SURFACE ELEVATIONS (NAVD 1988) (FT)			100-YEAR DESIGN VELOCITIES (FPS)	
				EXISTING	PROPOSED	DIFFERENCE (PROP-EX)	EXISTING	PROPOSED
4098	929	278.9	24258	300.66	300.66	0.00	5.1	5.1
4710	651	280.2	24258	300.97	300.97	0.00	5.3	5.3
4789	78	283.1	24258	300.98	300.98	0.00	5.6	5.6
4868	PROPOSED - TOVAR ROAD BRIDGE							
4927	76.8	283.3	24258	301.87	301.49	-0.38	6.2	6.4
5066	176	278.3	24258	302.20	301.84	-0.36	5.2	5.3
5324	244	279.1	24258	302.27	301.91	-0.36	5.7	5.8
5683	397	283.4	24258	302.46	302.13	-0.33	7.0	7.2
5774	KANSAS CITY SOUTHERN RAIL ROAD BRIDGE							
5823	102.4	282.1	24258	303.04	302.75	-0.29	6.0	6.1



STATE OF TEXAS
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5/30/2024

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IDCUS
PLANNERS | ENGINEERS | MANAGERS
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15915 KATY FREEWAY, SUITE 300
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TOVAR ST BRIDGE

HYDRAULIC DATA SHEET

TOVAR ST AT
SAN DIEGO CREEK

CONT	SECT	JOB	HIGHWAY
0922	23	010	TOVAR
DIST	COUNTY		SHEET NO.
LRD	DUVAL		56

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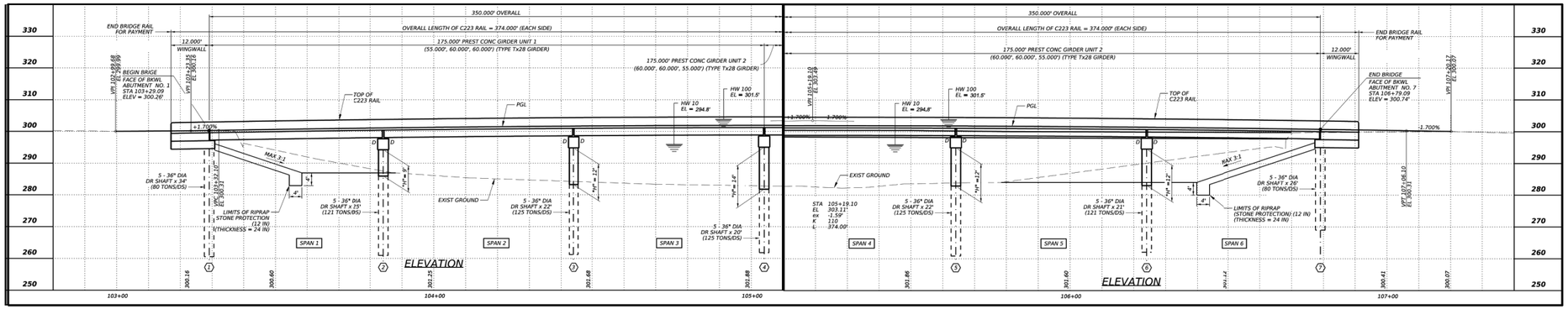
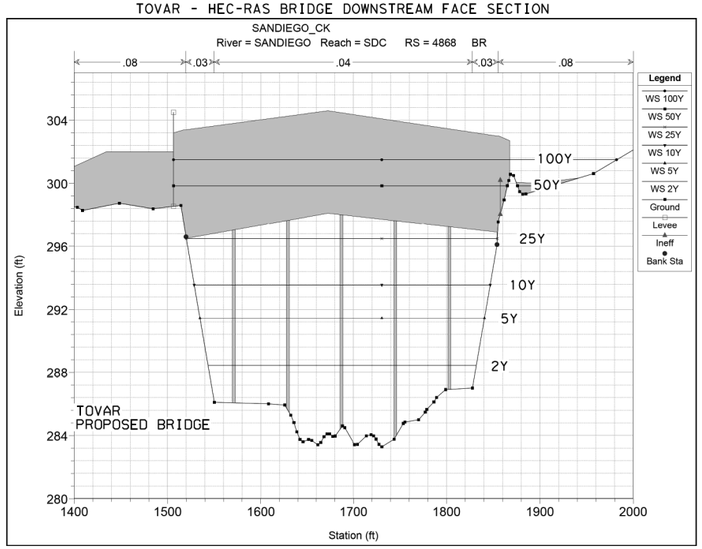
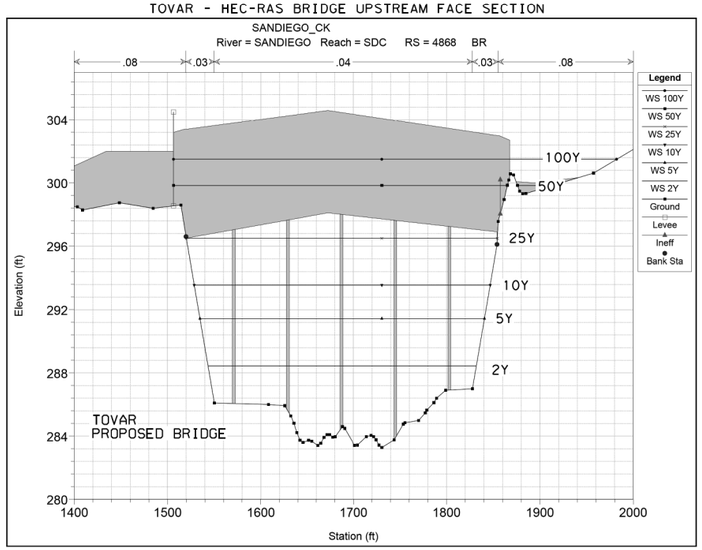


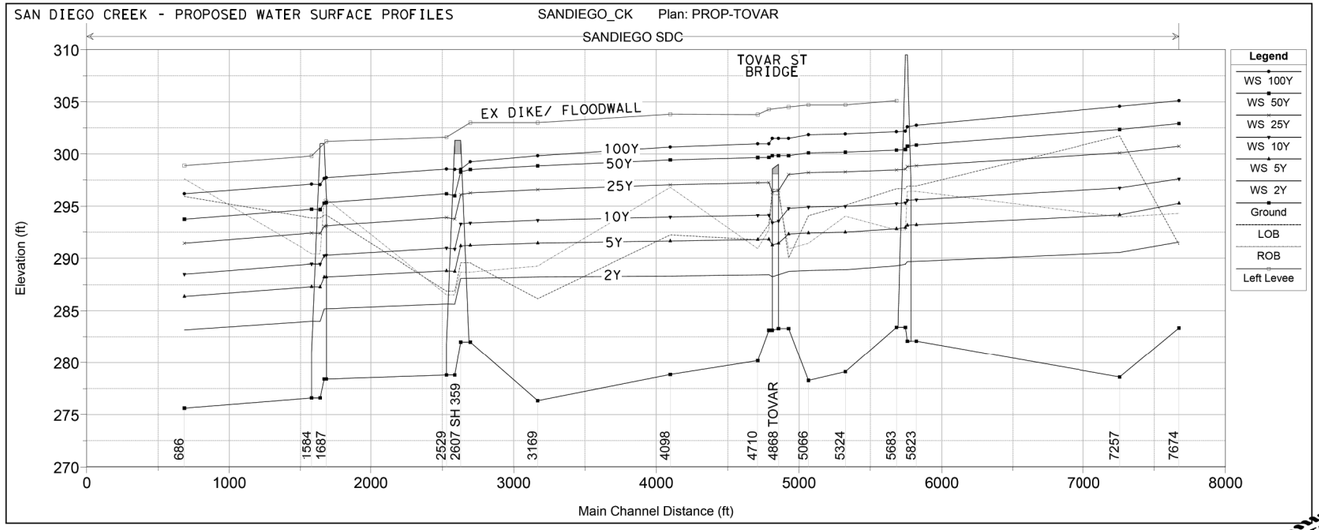
TOVAR - HEC-RAS BRIDGE DOWNSTREAM FACE SECTION

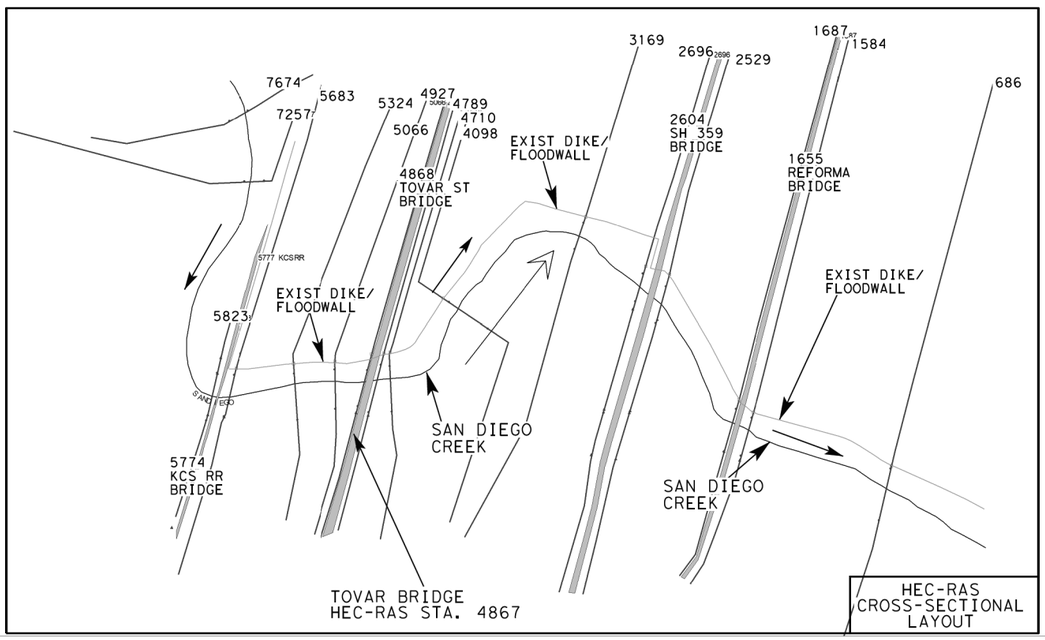


TOVAR - HEC-RAS BRIDGE UPSTREAM FACE SECTION



SAN DIEGO CREEK - PROPOSED WATER SURFACE PROFILES SANDIEGO_CK Plan: PROP-TOVAR





STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER
5/30/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

CSE CIVIL SYSTEMS ENGINEERING, INC.
1202 LAKE POINTE PKWY
SUGAR LAND, TX 77478
713-782-3811
TBPE REGISTRATION NO. F-5246

TOVAR ST BRIDGE

HYDRAULIC DATA SHEET

TOVAR ST AT
SAN DIEGO CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	TOVAR
DIST	COUNTY		SHEET NO.
LRD	DUVAL		57

DATE: 5/30/2024 2:45:23 PM
FILE: P:\2423301A_IDC_SANDIEGO\CAD\DRG\HDS\TOVAR SHT-HDS.DGN

HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX          XXXX        XX       XXXX
X     X  X        X    X         X   X      X  X     X
X     X  X        X              X   X     X    X    X
XXXXXXX  XXXX     X       XXX    XXXX      XXXXXX     XXXX
X     X  X        X              X  X      X    X         X
X     X  X        X    X         X   X     X    X         X
X     X  XXXXXX    XXXX          X    X    X    X    XXXXX
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PROJECT DATA
Project Title: SANDIEGO_CK
Project File : SANDIEGO_CK.prj

Project in English units

PLAN DATA

Plan Title: PROP-TOVAR
Plan File : \RAS_SDC\SANDIEGO_CK.p02

Geometry Title: PROP-TOVAR_2024
Geometry File : \MODEL\RAS_SDC\SANDIEGO_CK.g02

Flow Title : FLOWS-HMS
Flow File : \RAS_SDC\SANDIEGO_CK.f03

Plan Summary Information:

Number of:			
Cross Sections =	14	Multiple Openings =	0
Culverts =	0	Inline Structures =	0
Bridges =	4	Lateral Structures =	0

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

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

FLOW DATA

Flow Title: FLOWS-HMS
Flow File : \RAS_SDC\SANDIEGO_CK.f03

Flow Data (cfs)

River	Reach	RS	2Y	5Y	10Y
SANDIEGO	SDC	7674	1578	4309	7325

25Y	50Y	100Y	FEMA100Y
12655	17854	24258	28885

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
SANDIEGO	SDC	2Y - 100Y		Normal S = 0.0011

Profile Output Table - Table 1

Reach	River Sta		Profile	Q Total (cfs)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Min El (ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Volume (acre-ft)	Length Chnl (ft)
SDC	686		10Y	7325.0	288.50	288.81	0.001101	275.61	4.5	1643.6	248.9		
SDC	686		100Y	24258.0	296.19	296.81	0.001101	275.61	6.3	3833.4	314.7		
SDC	1584		10Y	7325.0	289.48	289.83	0.001134	276.60	4.7	1555.4	209.9	33.0	897.6
SDC	1584		100Y	24258.0	297.10	297.89	0.001113	276.60	7.2	3463.7	314.9	75.9	897.6
SDC	1657	REFORMA		Bridge									
SDC	1687		10Y	7325.0	290.29	290.60	0.000984	278.41	4.4	1653.1	220.7	36.7	15.8
SDC	1687		100Y	24258.0	297.72	298.47	0.001114	278.41	7.0	3515.7	295.2	84.1	15.8
SDC	2529		10Y	7325.0	290.99	291.22	0.000532	278.80	3.8	2012.9	365.0	75.1	841.6
SDC	2529		100Y	24258.0	298.55	299.26	0.000779	278.80	6.9	3872.8	922.6	180.7	841.6
SDC	2607	SH 359		Bridge									
SDC	2696		10Y	7325.0	293.37	293.62	0.000589	281.98	4.1	1914.5	358.8	82.4	67.5
SDC	2696		100Y	24258.0	299.24	300.09	0.001120	281.98	7.7	3424.8	1014.8	197.5	67.5
SDC	3169		10Y	7325.0	293.64	293.82	0.000286	276.33	3.4	2261.9	217.0	106.1	473.0
SDC	3169		100Y	24258.0	299.83	300.52	0.000717	276.33	7.0	4546.4	797.4	252.6	473.0
SDC	4098		10Y	7325.0	293.95	294.06	0.000232	278.85	2.6	2783.2	277.3	159.9	929.0
SDC	4098		100Y	24258.0	300.66	301.06	0.000459	278.85	5.1	5125.3	645.8	345.4	929.0
SDC	4710		10Y	7325.0	294.12	294.26	0.000356	280.19	3.0	2501.5	317.2	199.2	650.9
SDC	4710		100Y	24258.0	300.97	301.38	0.000518	280.19	5.3	4919.3	394.8	418.5	650.9
SDC	4789		10Y	7325.0	294.14	294.30	0.000450	283.12	3.2	2308.9	293.1	203.6	78.0
SDC	4789		100Y	24258.0	300.98	301.46	0.000628	283.12	5.6	4496.4	401.1	427.4	78.0
SDC	4868	TOVAR		Bridge									
SDC	4927		10Y	7325.0	294.78	294.96	0.000442	283.28	3.5	2176.1	268.0	207.7	9.5
SDC	4927		100Y	24258.0	301.49	302.07	0.000719	283.28	6.4	4515.7	475.7	434.2	9.5
SDC	5066		10Y	7325.0	294.91	295.05	0.000344	278.29	3.0	2590.6	331.3	217.1	175.6
SDC	5066		100Y	24258.0	301.84	302.24	0.000512	278.29	5.3	5227.6	435.9	452.7	175.6
SDC	5324		10Y	7325.0	294.98	295.18	0.000621	279.12	3.6	2079.5	306.0	230.1	244.0
SDC	5324		100Y	24258.0	301.91	302.42	0.000716	279.12	5.8	4684.9	445.0	480.1	244.0
SDC	5683		10Y	7325.0	295.24	295.57	0.001144	283.39	4.6	1585.7	251.3	246.9	397.0
SDC	5683		100Y	24258.0	302.13	302.93	0.001183	283.39	7.2	3420.7	427.5	519.7	397.0
SDC	5777	KCSRR		Bridge									
SDC	5823		10Y	7325.0	295.61	295.78	0.000417	282.07	3.3	2222.2	273.3	251.0	26.0
SDC	5823		100Y	24258.0	302.75	303.32	0.000665	282.07	6.1	4004.7	815.1	528.6	26.0
SDC	7257		10Y	7325.0	296.75	297.07	0.002380	278.61	5.3	2350.9	447.3	334.8	1433.9
SDC	7257		100Y	24258.0	304.56	305.01	0.002107	278.61	6.9	6119.3	548.4	743.2	1433.9
SDC	7674		10Y	7325.0	297.62	298.07	0.002334	283.35	5.5	1506.7	219.4	352.1	417.0
SDC	7674		100Y	24258.0	305.10	306.21	0.003059	283.35	9.1	3918.8	427.1	786.8	417.0

BRIDGE DETAIL OUTPUT - TOVAR ST. PROPOSED BRIDGE
RIVER: SANDIEGO
REACH: SDC RS: 4868

BRIDGE OUTPUT Profile #10Y

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	294.96	E.G. Elev (ft)	293.72	293.56
W.S. US. (ft)	294.78	W.S. Elev (ft)	293.57	293.41
Q Total (cfs)	7325.00	Crit W.S. (ft)	287.99	287.82
Q Bridge (cfs)	7325.00	Max Chl Dpth (ft)	10.29	10.29
Q Weir (cfs)		Vel Total (ft/s)	3.09	3.10
Weir Sta Lft (ft)		Flow Area (sq ft)	2366.90	2360.75
Weir Sta Rgt (ft)		Froude # Chl	0.20	0.20
Weir Submerg		Specif Force (cu ft)	10653.66	10653.55
Weir Max Depth (ft)		Hydr Depth (ft)	7.81	7.81
Min El Weir Flow (ft)	300.26	W.P. Total (ft)	387.61	388.02
Min El Prs (ft)	298.10	Conv. Total (cfs)	301631.7	299924.2
Delta EG (ft)	0.67	Top Width (ft)	303.06	302.13
Delta WS (ft)	0.64	Frctn Loss (ft)		
BR Open Area (sq ft)	3568.60	C & E Loss (ft)		
BR Open Vel (ft/s)	3.10	Shear Total (lb/sq ft)	0.22	0.23
BR Sluice Coef		Power Total (lb/ft s)	0.70	0.70
BR Sel Method	Momentum			

BRIDGE OUTPUT Profile #100Y

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	302.07	E.G. Elev (ft)	302.08	301.96
W.S. US. (ft)	301.49	W.S. Elev (ft)	301.49	301.49
Q Total (cfs)	24258.00	Crit W.S. (ft)	291.48	291.32
Q Bridge (cfs)	23996.68	Max Chl Dpth (ft)	18.21	18.37
Q Weir (cfs)	261.32	Vel Total (ft/s)	6.57	6.63
Weir Sta Lft (ft)	1877.30	Flow Area (sq ft)	3693.97	3659.17
Weir Sta Rgt (ft)	1941.49	Froude # Chl	0.28	0.28
Weir Submerg	0.22	Specif Force (cu ft)	41008.18	41641.07
Weir Max Depth (ft)	1.83	Hydr Depth (ft)	32.26	62.07
Min El Weir Flow (ft)	300.26	W.P. Total (ft)	878.35	825.54
Min El Prs (ft)	298.10	Conv. Total (cfs)		
Delta EG (ft)	0.60	Top Width (ft)	114.50	58.95
Delta WS (ft)	0.51	Frctn Loss (ft)		
BR Open Area (sq ft)	3568.60	C & E Loss (ft)		
BR Open Vel (ft/s)	6.72	Shear Total (lb/sq ft)		
BR Sluice Coef		Power Total (lb/ft s)		
BR Sel Method	Press/Weir			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.

NOTES:

1. BRIDGE HYDRAULICS PERFORMED USING HEC-RAS (V.6.4.1) STEADY STATE MODEL.
2. CHANNEL GEOMETRY EXTRACTED FROM PROJECT FIELD SURVEY, LIDAR TOPO, AND PRELIMINARY BRIDGE LAYOUTS.
3. ELEVATIONS REFERENCE TO NAVD88 DATUM.
4. SEE "DRAINAGE AREA MAP" SHEET FOR CONTRIBUTING DRAINAGE AREAS AND FLOWS COMPUTATIONS.
5. FLOWS COMPUTED BASED ON NRCS HYDROGRAPH METHOD WITHIN HEC-HMS (V.4.9), VALIDATED USING USGS STREAM GAGE (08211800) FLOOD FREQUENCY ANALYSIS (BULLETIN 17C).
6. STREAM MODELING & WATERSHED DATA DETAILED IN "TOVAR ST AT SAN DIEGO CREEK BRIDGE HYDRAULIC REPORT, DUVAL COUNTY, TX," DATED MAY 2024 BY CIVIL SYSTEMS ENGINEERING, INC.

STATE OF TEXAS
KURT E KILLIAN
95742
LICENSED PROFESSIONAL ENGINEER
5/30/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

CSE CIVIL SYSTEMS ENGINEERING, INC.
TBPE REGISTRATION NO. F-5246
1202 LAKE POINTE PKWY
SUGAR LAND, TX 77478
713-782-3811

TOVAR ST BRIDGE

HEC-RAS COMPUTATIONS

TOVAR ST AT
SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	TOVAR
DIST		COUNTY	SHEET NO.
LRD		DUVAL	58

DN: DW: CK: CK:

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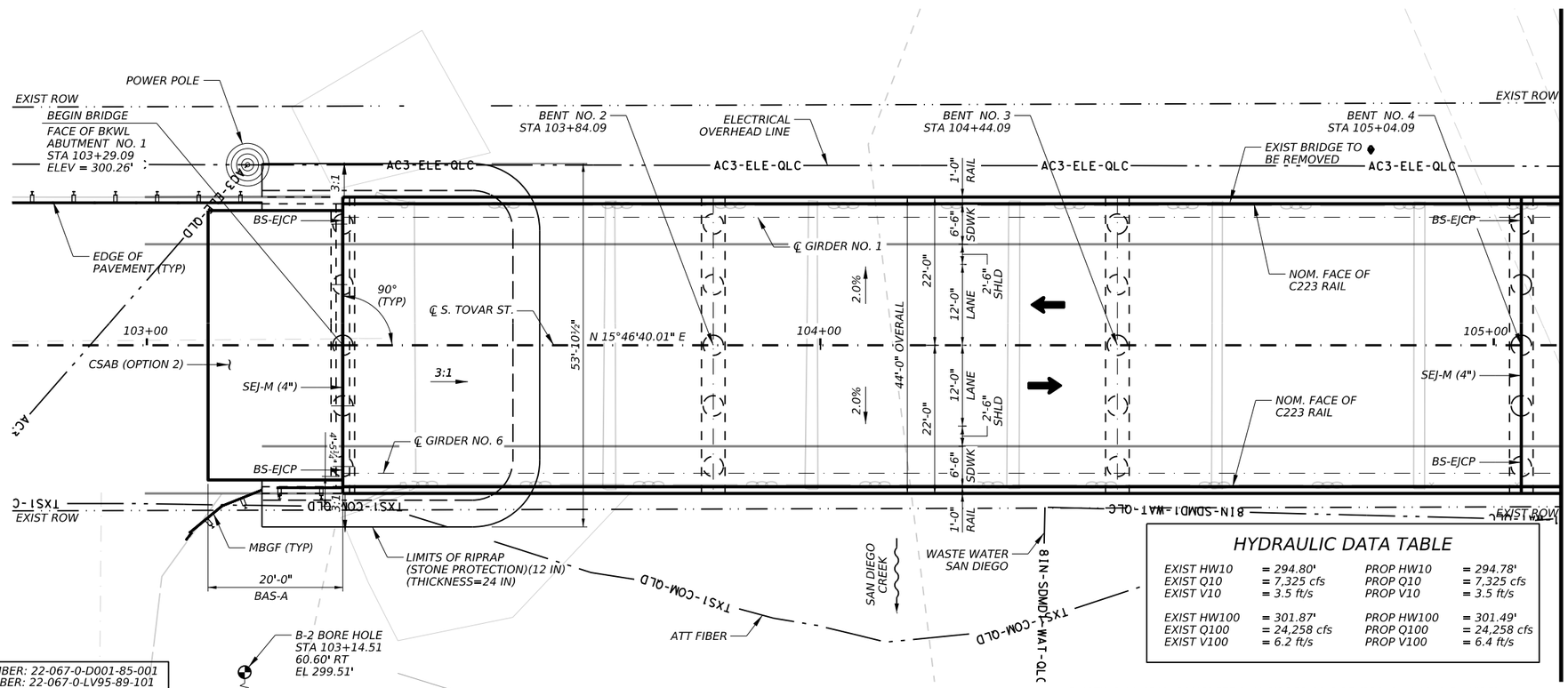


PLAN

EXIST NBI NUMBER: 22-067-0-D001-85-001
PROP NBI NUMBER: 22-067-0-LV95-89-101
FUNCTIONAL CLASSIFICATION: LOCAL RD
DESIGN SPEED: 30 MPH
EXISTING ADT: <400 (2024)
FUTURE ADT: 38 (2042)

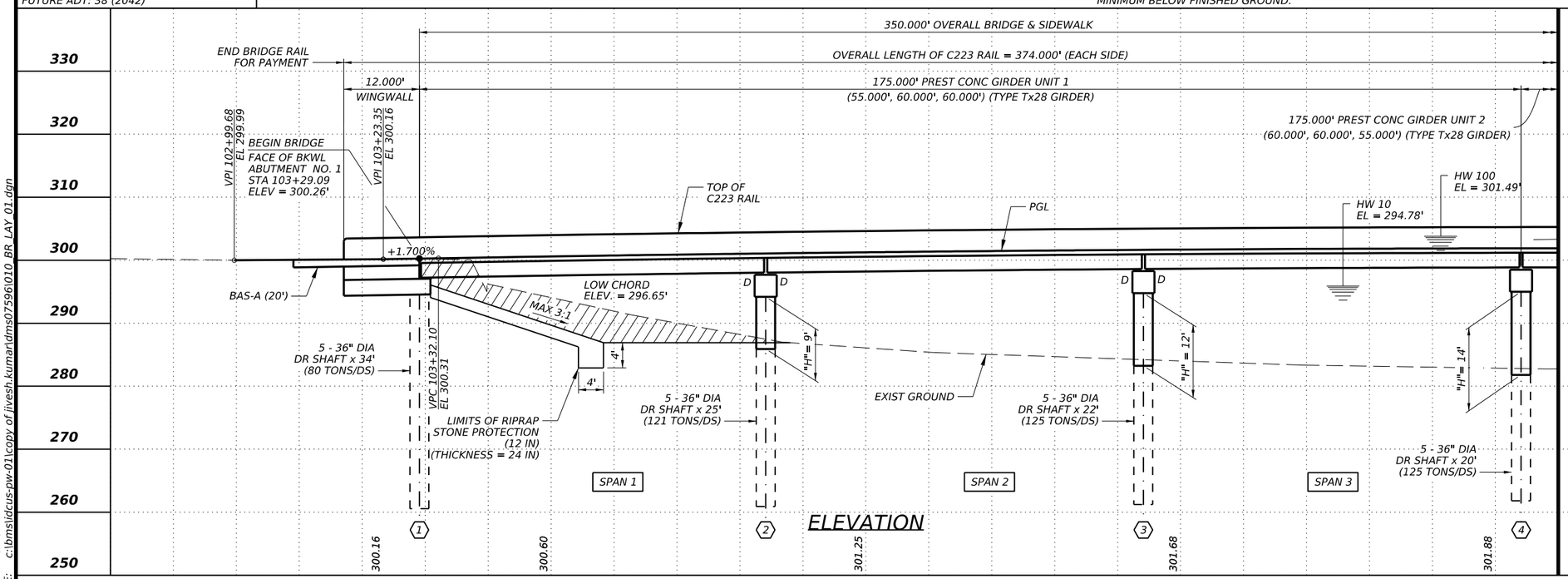
HYDRAULIC DATA TABLE

EXIST HW10	= 294.80'	PROP HW10	= 294.78'
EXIST Q10	= 7,325 cfs	PROP Q10	= 7,325 cfs
EXIST V10	= 3.5 ft/s	PROP V10	= 3.5 ft/s
EXIST HW100	= 301.87'	PROP HW100	= 301.49'
EXIST Q100	= 24,258 cfs	PROP Q100	= 24,258 cfs
EXIST V100	= 6.2 ft/s	PROP V100	= 6.4 ft/s

♦ EXISTING 11-SPAN CONCRETE PAN GIRDER BRIDGE (333'-0" X 42'-9.5" WIDE). TO BE REMOVED. EXISTING CONCRETE ABUTMENTS, BENTS, AND DRILLED SHAFTS TO BE REMOVED. EXISTING FOUNDATIONS TO BE REMOVED TO 2'-0" MINIMUM BELOW FINISHED GROUND.

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL 93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL AND DETAILING GUIDE.
2. BORING LOG LOCATIONS ARE APPROXIMATE.
3. SEE CSAB STANDARD FOR CEMENT STABILIZED BACKFILL BEHIND ABUTMENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING THE LOCATIONS OF ALL UTILITIES PRIOR TO ORDERING MATERIALS AND EXCATION
5. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPOSIBLE FOR CALCULATING ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
6. THE "D" DENOTES SLOTTED HOLE AT BEAM END. SEE BENT DETAILS FOR LOCATION OF DOWELS D.
7. DRILLED SHAFT LENGTHS TO BE LENGTH SHOWN OR 1 DIAMETER INTO HARD CLAY LAYER BELOW SAND AT ALL LOCATIONS, WHICHEVER IS DEEPER.
8. ALL ABUTMENT AND BENTS ON BEARING S74°13'19.99"E
9. SEE SRR STANDARD FOR ADDITIONAL DETAILS.



ELEVATION

Scale
H: 1"=20'
V: 1"=20'

STATE OF TEXAS · LLOYD M. WOLF · 73649 · REGISTERED · PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS 1.51/1.96

NO.	DATE	REVISION

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas 77094
281-945-0089 Ph
281-945-0081 Fx

IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825
IDCUS PLANNERS | ENGINEERS | MANAGERS

S TOVAR ST @ SAN DIEGO CREEK

BRIDGE LAYOUT S TOVAR ST. AT SAN DIEGO CREEK

22-067-0-LV95-89-101

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		59

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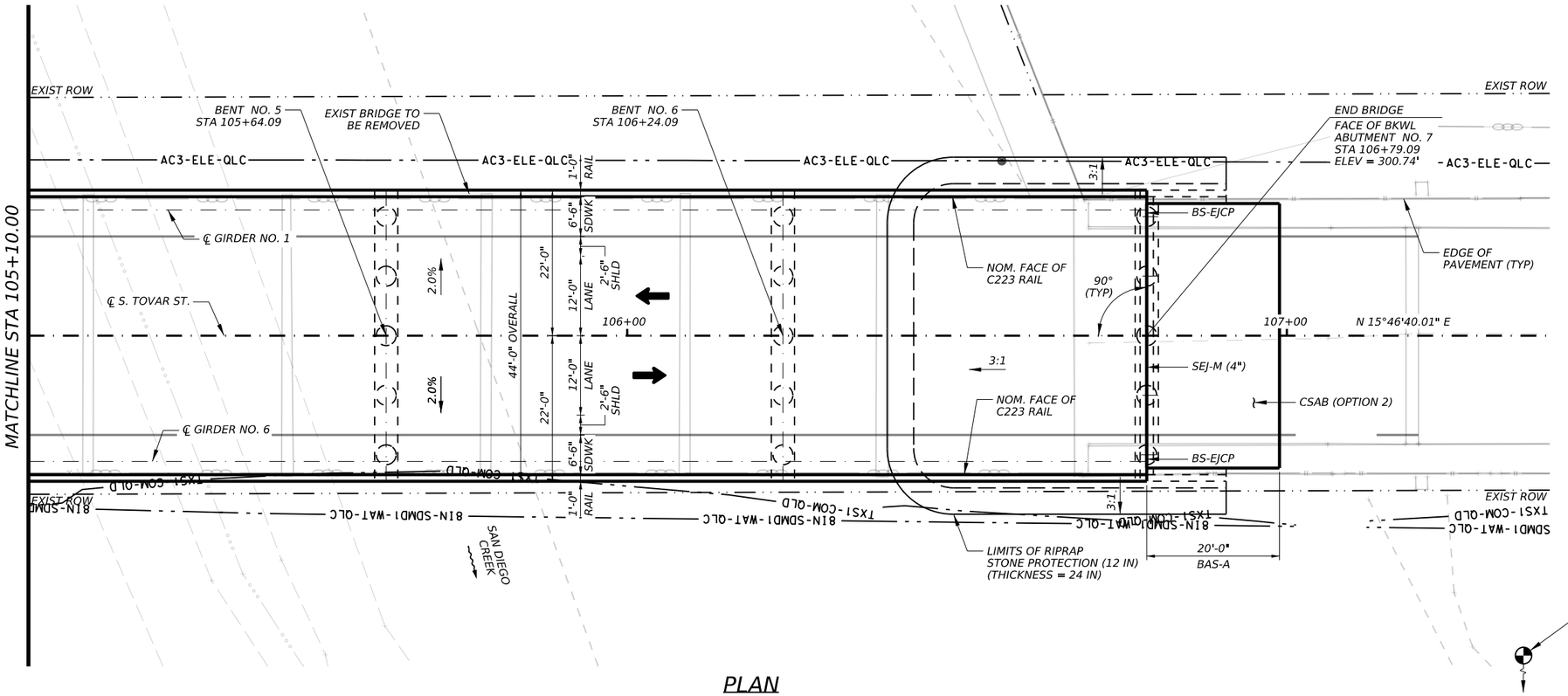

PLAN

GENERAL NOTES

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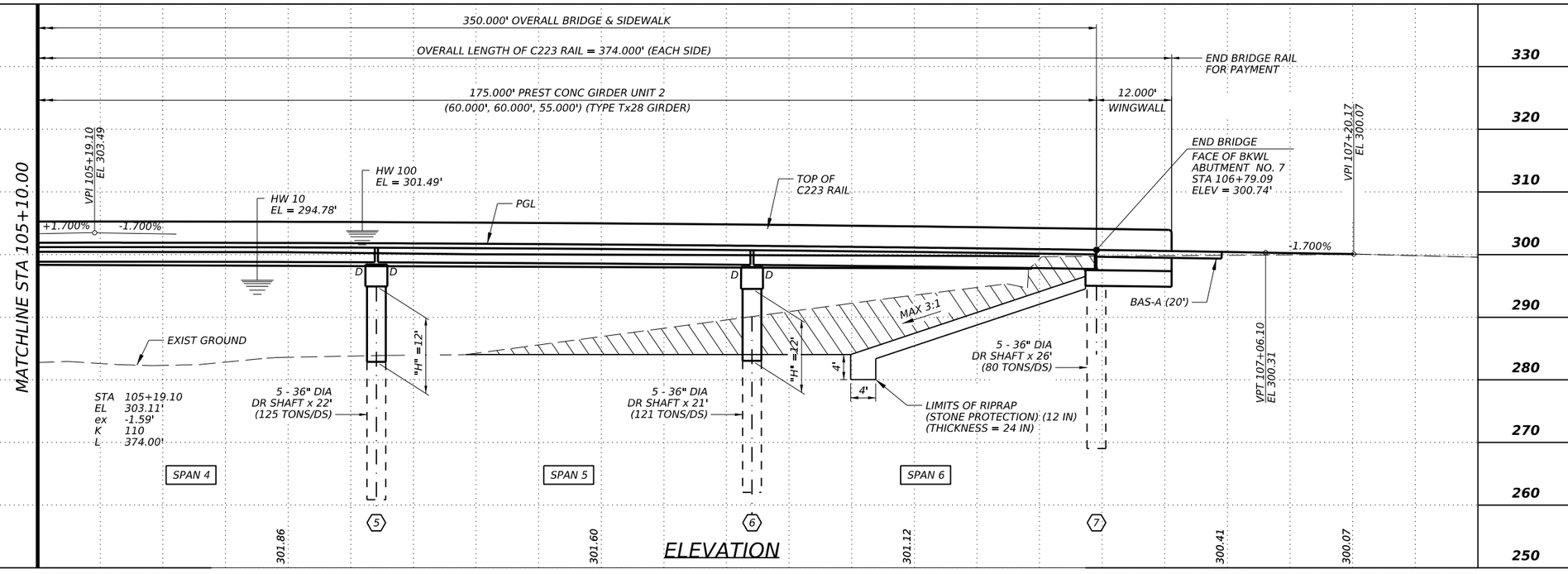

ELEVATION

Scale
H: 1"=20'
V: 1"=20'

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS 1.51/1.96

NO.	DATE	REVISION

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500,
Houston, Texas, 77094
281-945-0089 Ph
281-945-0081 Fx

IDCUS, INC.
PLANNERS | ENGINEERS | MANAGERS
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

BRIDGE LAYOUT S TOVAR ST. AT SAN DIEGO CREEK

22-067-0-LV95-89-101

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		60

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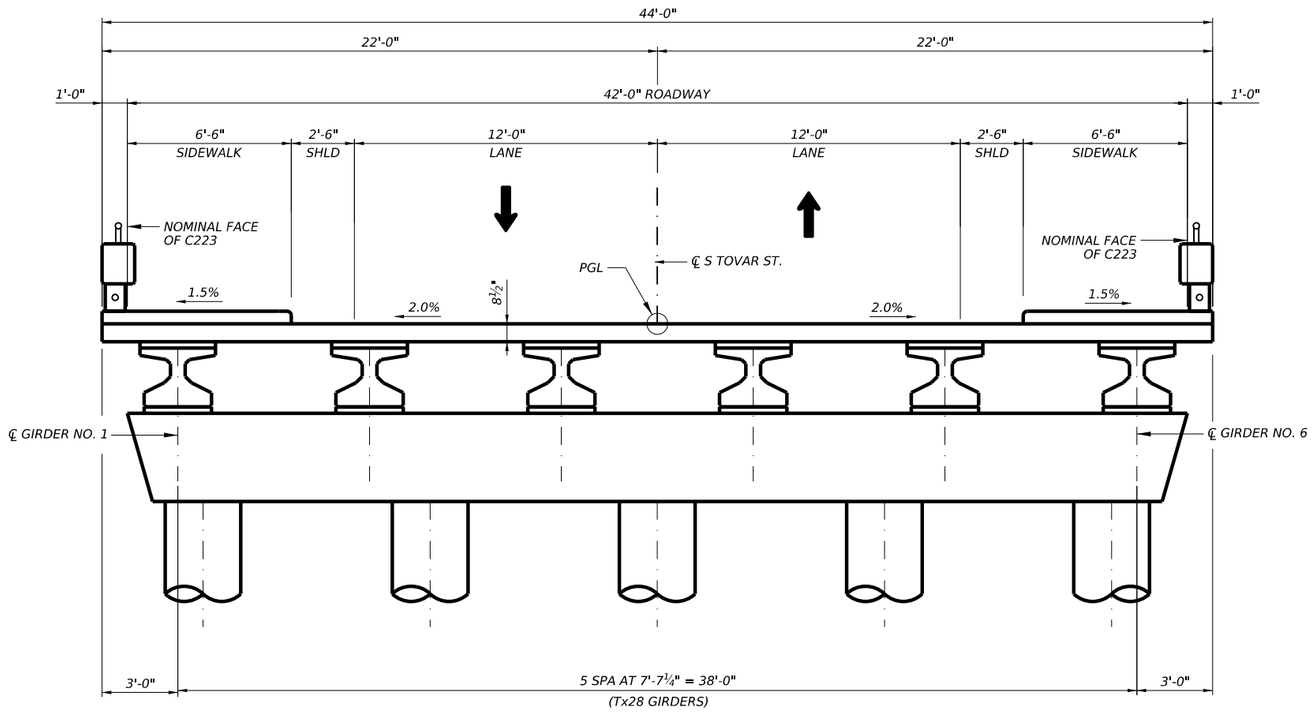

TYPICAL SECTION

SCALE : 1" = 6'

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

NO.	DATE	REVISION

Texas Department of Transportation

F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 Ph
281-945-0081 Fx

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IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
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TBPELS FIRM # F-6825

IDCUS
PLANNERS | ENGINEERS | MANAGERS

S TOVAR ST
@ SAN DIEGO CREEK

TYPICAL SECTION
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		61

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SUMMARY OF ESTIMATED QUANTITIES

DESCRIPTION/ITEM	400 6005 CEM STABIL BKFL	416 6004 DRILL SHAFT (36 IN)	420 6013 CL C CONC (ABUT) (1)	420 6029 CL C CONC (CAP) (2)	420 6037 CL C CONC (COLUMN)	422 6001 REINF CONC SLAB	422 6013 BRIDGE SIDEWALK	422 6015 APPROACH SLAB	425 6035 PRESTR CONC GIRDER (TX 28)	442 6007 STR STEEL(MISC NON -BRIDGE)	450 6032 RAIL (TY C223)	454 6018 SEALED EXPANSION JOINT (4 IN) (SEJ-M)
UNIT	CY	LF	CY	CY	CY	SF	SF	CY	LF	LB	LF	LF
2 - ABUTMENTS		300	51.8								748	132
5 - INTERIOR BENTS		550		121.1	77.2							
UNIT 01 (175.000')	85.8					7,700	2,275	35	1,041.1	265.4		
UNIT 02 (175.000')	85.8					7,700	2,275	35	1,041.0	265.4		
TOTAL	171.6	850	51.8	121.1	77.2	15,400	4,550	71	2,082.1	530.8	748	132

(1) QUANTITY INCLUDES SHEAR KEYS. SEE ABUTMENT DETAIL SHEET AND SHEAR KEY LOCATION, DETAILS AND NOTES.

(2) QUANTITY INCLUDES SHEAR KEYS. SEE BENT DETAIL SHEETS AND SHEAR KEY DETAILS FOR SHEAR KEY LOCATION, DETAILS AND NOTES.

BEARING SEAT ELEVATIONS

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 1 (FWD)	296.437	296.589	296.741	296.741	296.589	296.437
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 2 (BK)	297.221	297.373	297.525	297.525	297.373	297.221
(FWD)	297.245	297.397	297.549	297.549	297.397	297.245
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 3 (BK)	297.799	297.951	298.103	298.103	297.951	297.799
(FWD)	297.813	297.965	298.117	298.117	297.965	297.813
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 4 (BK)	298.050	298.202	298.354	298.354	298.202	298.050
(FWD)	298.053	298.205	298.357	298.357	298.205	298.053
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 5 (BK)	297.974	298.126	298.278	298.278	298.126	297.974
(FWD)	297.966	298.118	298.270	298.270	298.118	297.966
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 6 (BK)	297.570	297.722	297.874	297.874	297.722	297.570
(FWD)	297.551	297.703	297.855	297.855	297.703	297.551
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 7 (BK)	296.912	297.064	97.216	297.216	297.064	296.912

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/25/2024

NO.	DATE	REVISION

Texas Department of Transportation

F-6932
ENTECH CIVIL ENGINEERS, INC
15021 Katy Freeway, Suite 550
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

IDCUS PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS S TOVAR ST. AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		62

DATE: 6/25/2024 1:49:57 PM
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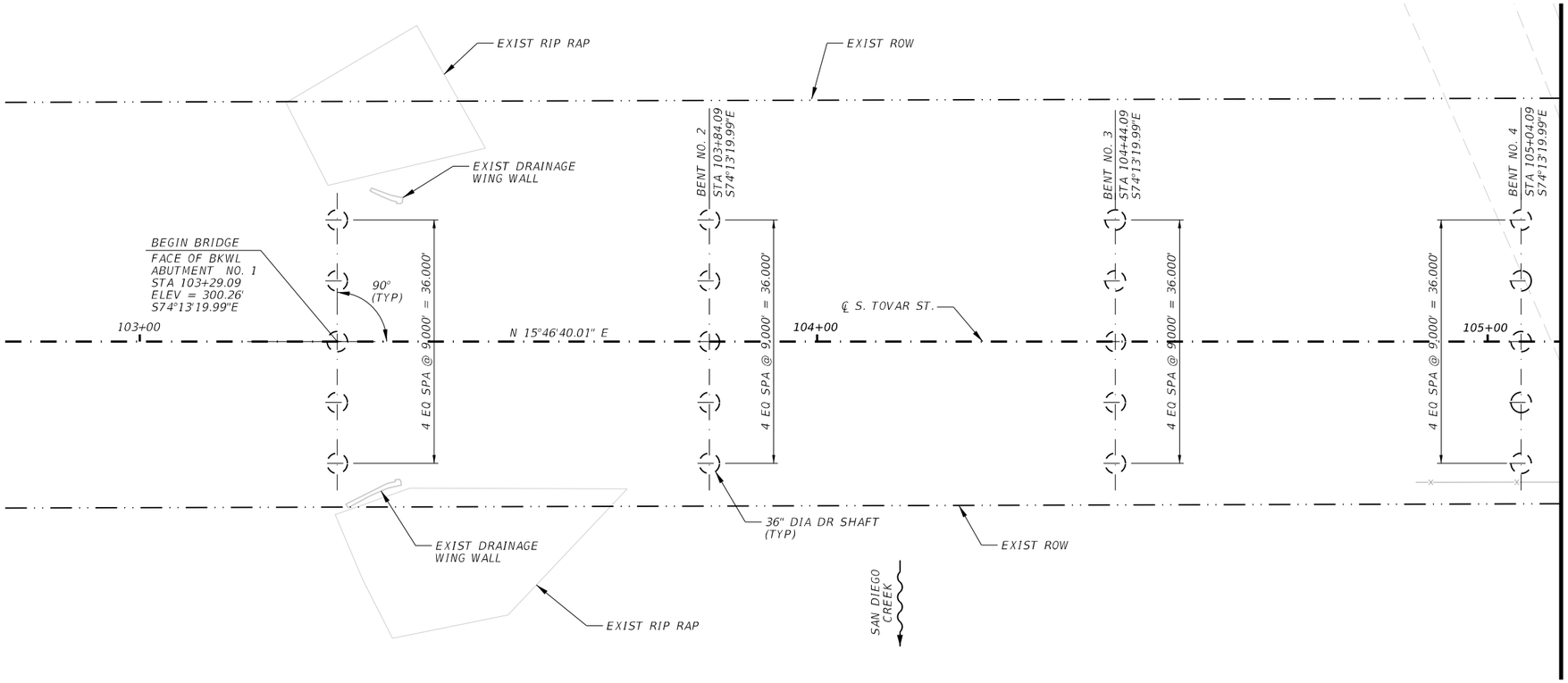
GENERAL NOTES

1. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL ABUTMENT AND BENT FOUNDATION DETAILS AND NOTES NOT SHOWN.
2. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.



B-2 BORE HOLE
STA 103+14.51
60.60' RT
EL 299.51'

FOUNDATION LAYOUT

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

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F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 Ph
281-945-0081 FX

IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

FOUNDATION LAYOUT
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		63

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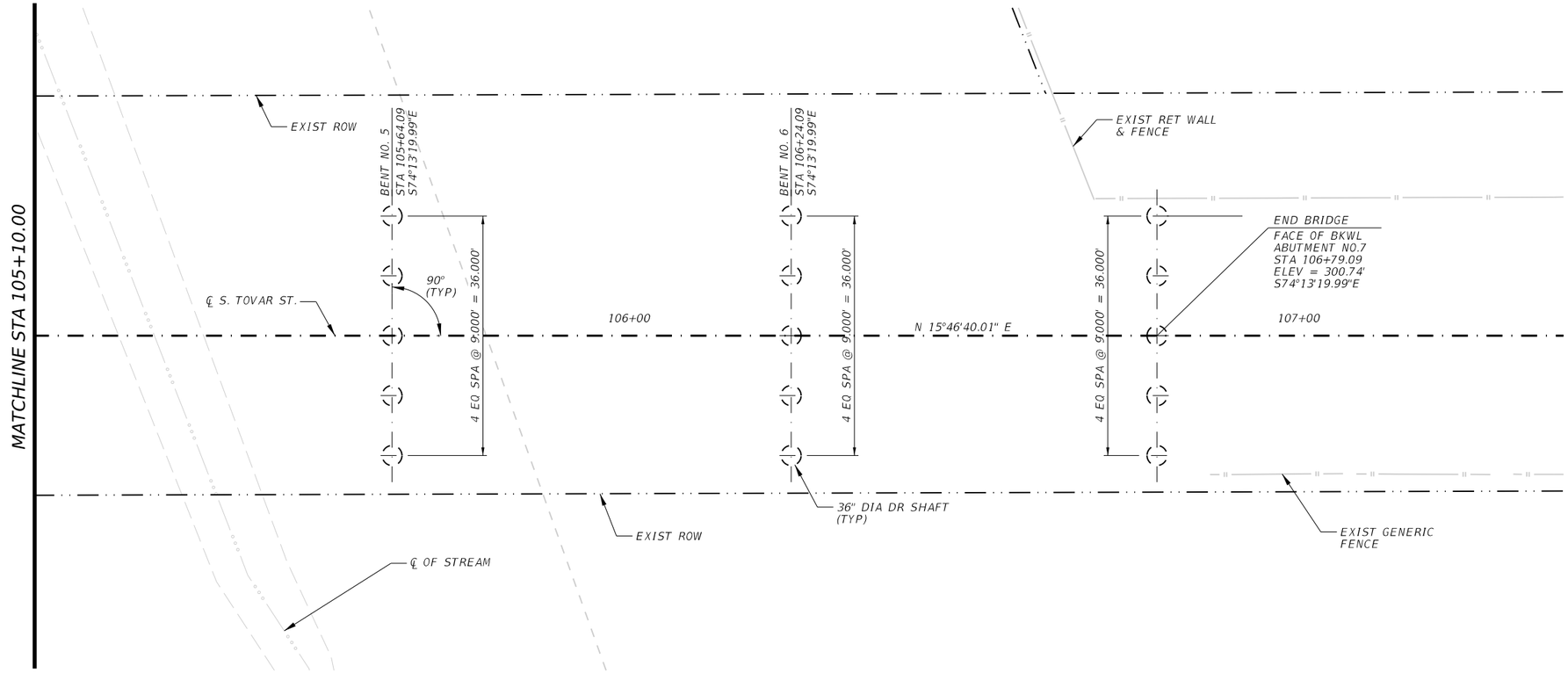
GENERAL NOTES

1. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL ABUTMENT AND BENT FOUNDATION DETAILS AND NOTES NOT SHOWN.
2. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.



B-1 BORE HOLE
STA 167+36.04
63.40' RT
EL 303.02'

FOUNDATION LAYOUT

STATE OF TEXAS
LLOYD M. WOLF
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PROFESSIONAL ENGINEER

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6/20/2024

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15021 Katy Freeway,
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15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
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S TOVAR ST
@ SAN DIEGO CREEK

FOUNDATION LAYOUT
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		64

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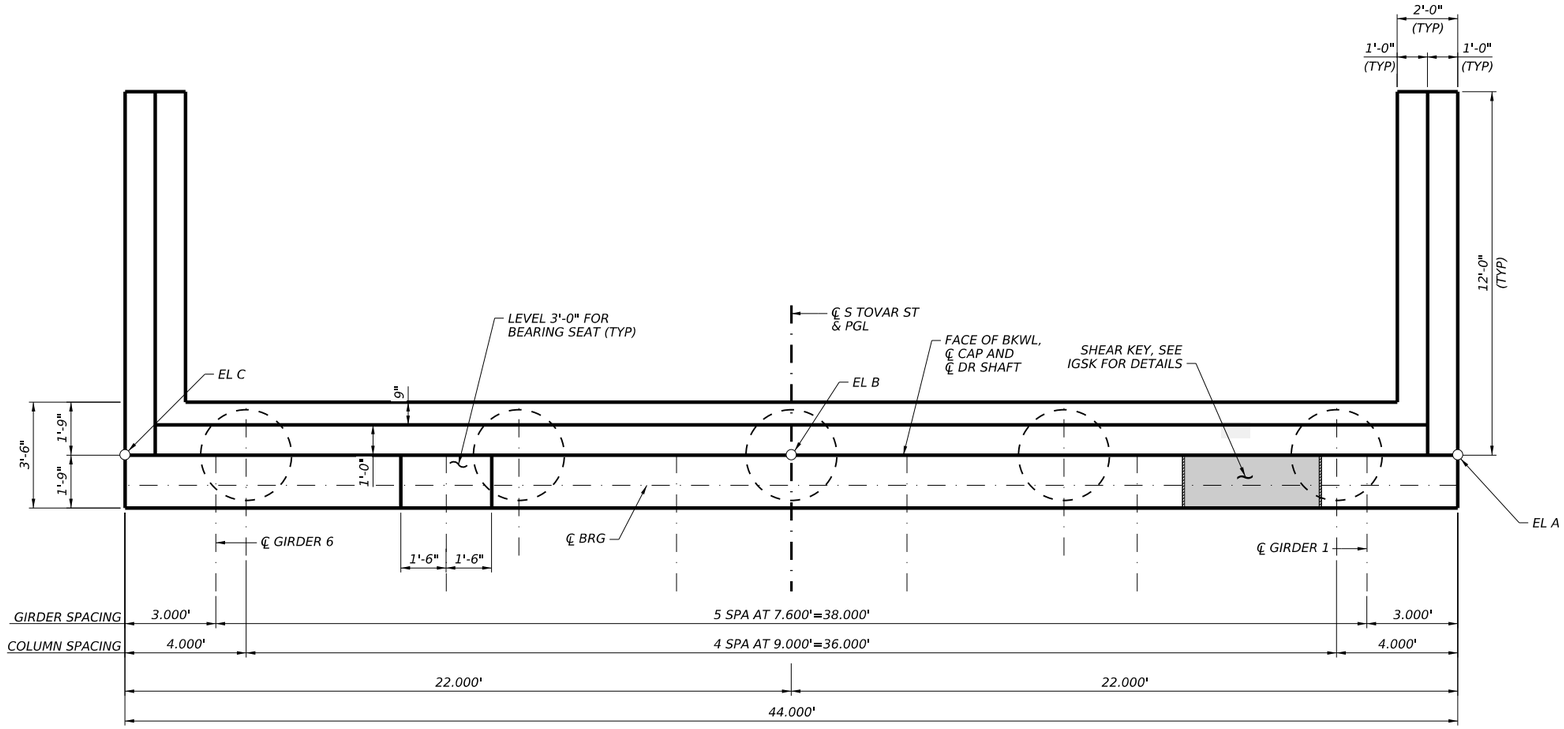

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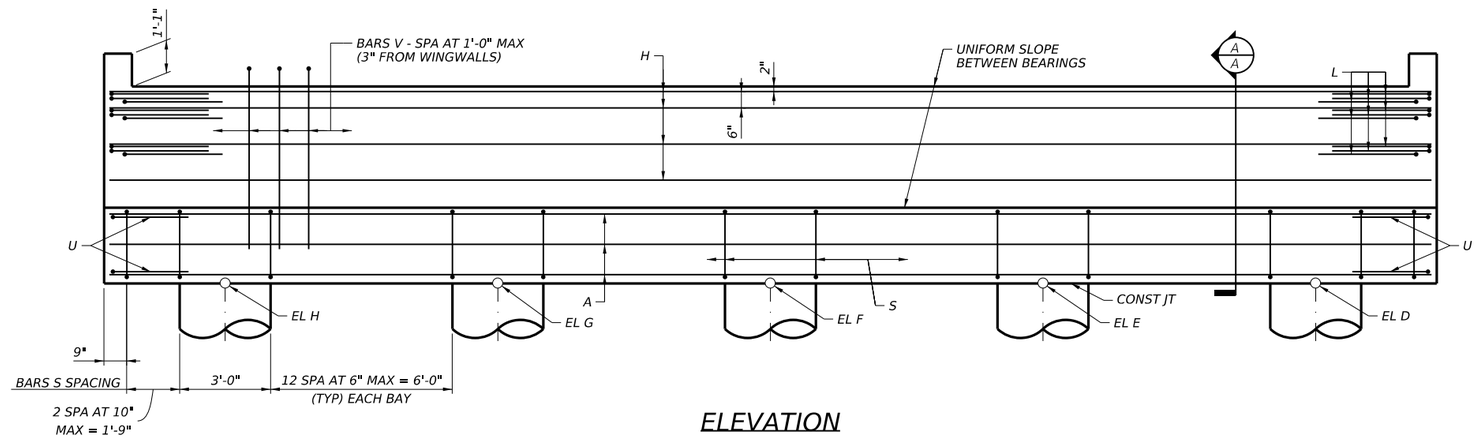

ELEVATION

TOP OF CAP ELEVATIONS ABUTMENT NO. 1		
"A"	"B"	"C"
296.236	296.676	296.236

TOP OF CAP ELEVATIONS ABUTMENT NO. 7		
"A"	"B"	"C"
296.714	297.154	296.714

TOP OF DS ELEVATIONS ABUTMENT NO. 1	
DS NO.	ELEV.
D	293.816
E	293.996
F	294.176
G	293.996
H	293.816

TOP OF DS ELEVATIONS ABUTMENT NO. 7	
DS NO.	ELEV.
D	294.294
E	294.474
F	294.654
G	294.474
H	294.294

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL 93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL.
2. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3 CALCULATED FOUNDATION LOADS:

   ABUT 1 = 80 TONS/DRILLED SHAFT
   ABUT 7 = 80 TONS/DRILLED SHAFT

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

MATERIAL NOTES

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

STATE OF TEXAS
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15915 KATY FREEWAY, SUITE 300
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(713) 541-5591 FAX: (713) 541-3591
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

ABUTMENT 1 & 7 S TOVAR ST. AT SAN DIEGO CREEK

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		65

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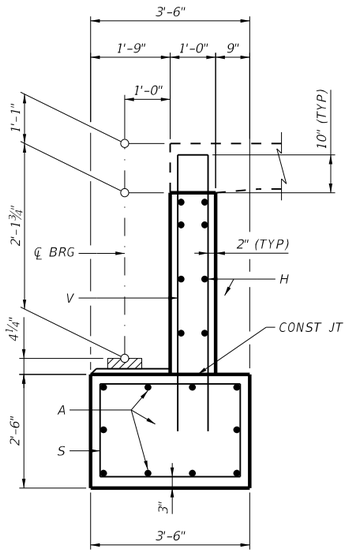
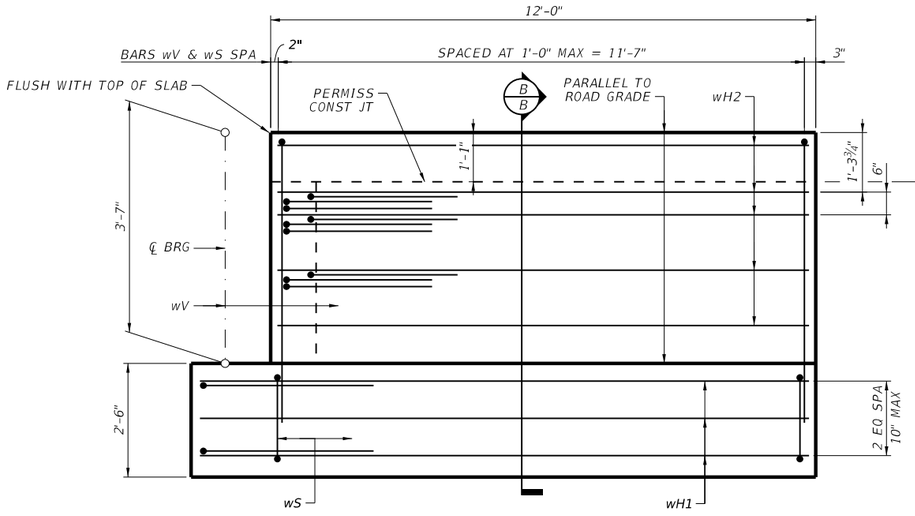
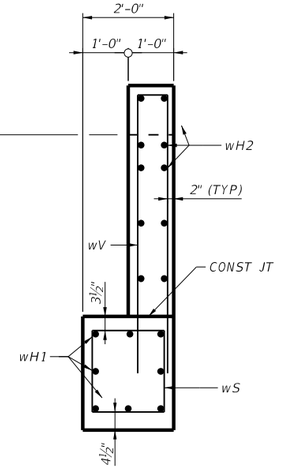


SECTION A-A
(WITH APPROACH SLAB)



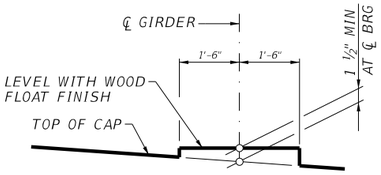
WINGWALL ELEVATION



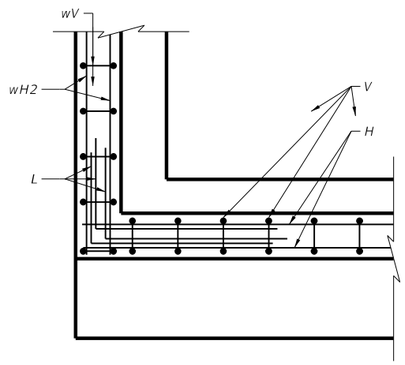
SECTION B-B

TABLE OF ESTIMATED QUANTITIES
ABUTMENT 1 & 7

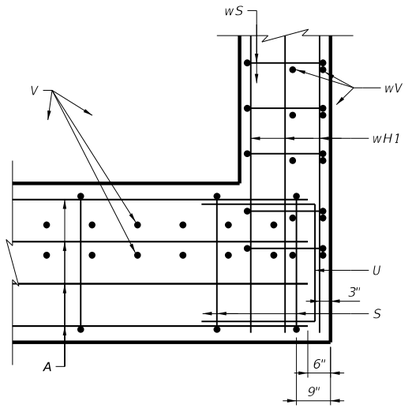
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	43'-0"	2,285
H	8	#6	43'-8"	525
L	18	#6	4'-0"	109
M	2	#5	4'-5"	10
Na	8	#5	5'-5"	46
S	58	#5	11'-6"	696
U	4	#6	9'-8"	59
V	43	#5	11'-0"	494
wH1	16	#6	13'-5"	323
wH2	20	#6	11'-8"	351
wS	26	#4	8'-0"	139
wV	26	#5	11'-0"	299
REINFORCING STEEL			LB	5,336
CLASS "C" CONC (ABUT)			CY	25.9



BEARING SEAT DETAIL
(BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD)

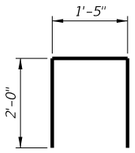


BACKWALL

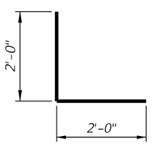


CAP

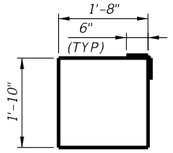
CORNER DETAILS



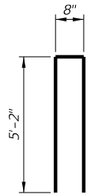
BARS Na



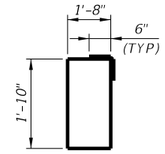
BARS L



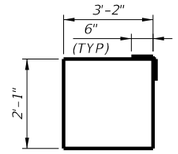
BARS wS



BARS V & wV



BARS wS



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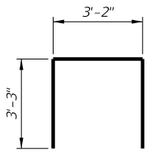

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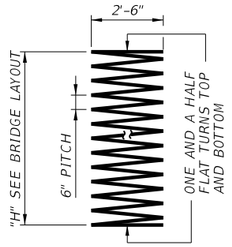

BARS Z

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

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F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 Ph
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15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3591
TBPELS FIRM # F-6825

S TOVAR ST
@ SAN DIEGO CREEK

ABUTMENT 1 & 7
S TOVAR ST.
AT SAN DIEGO CREEK

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		66

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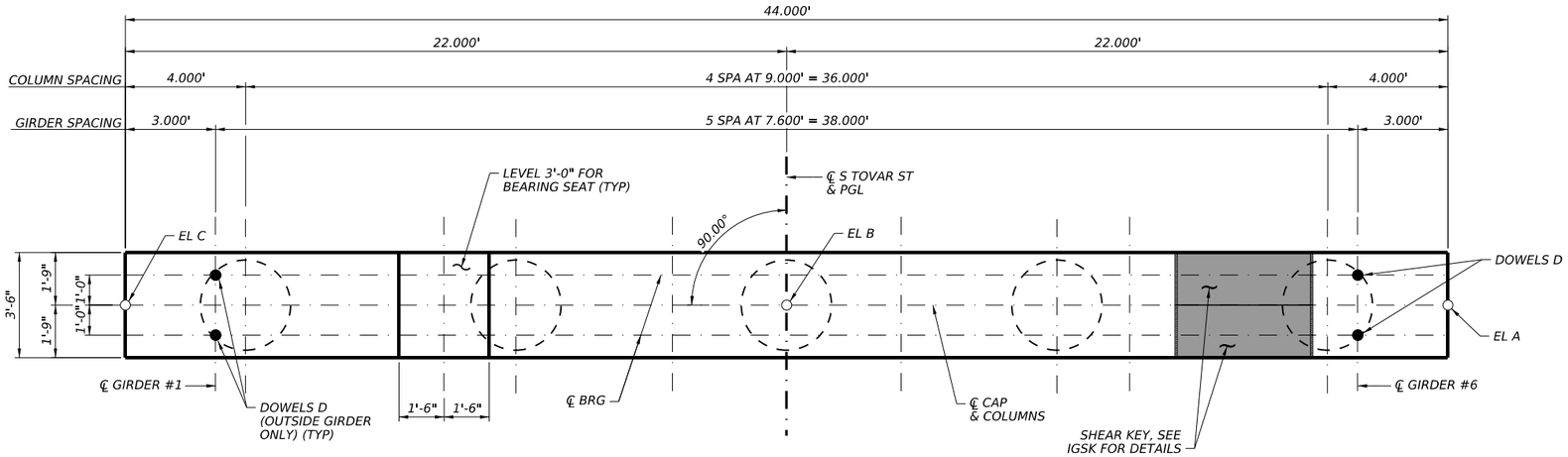
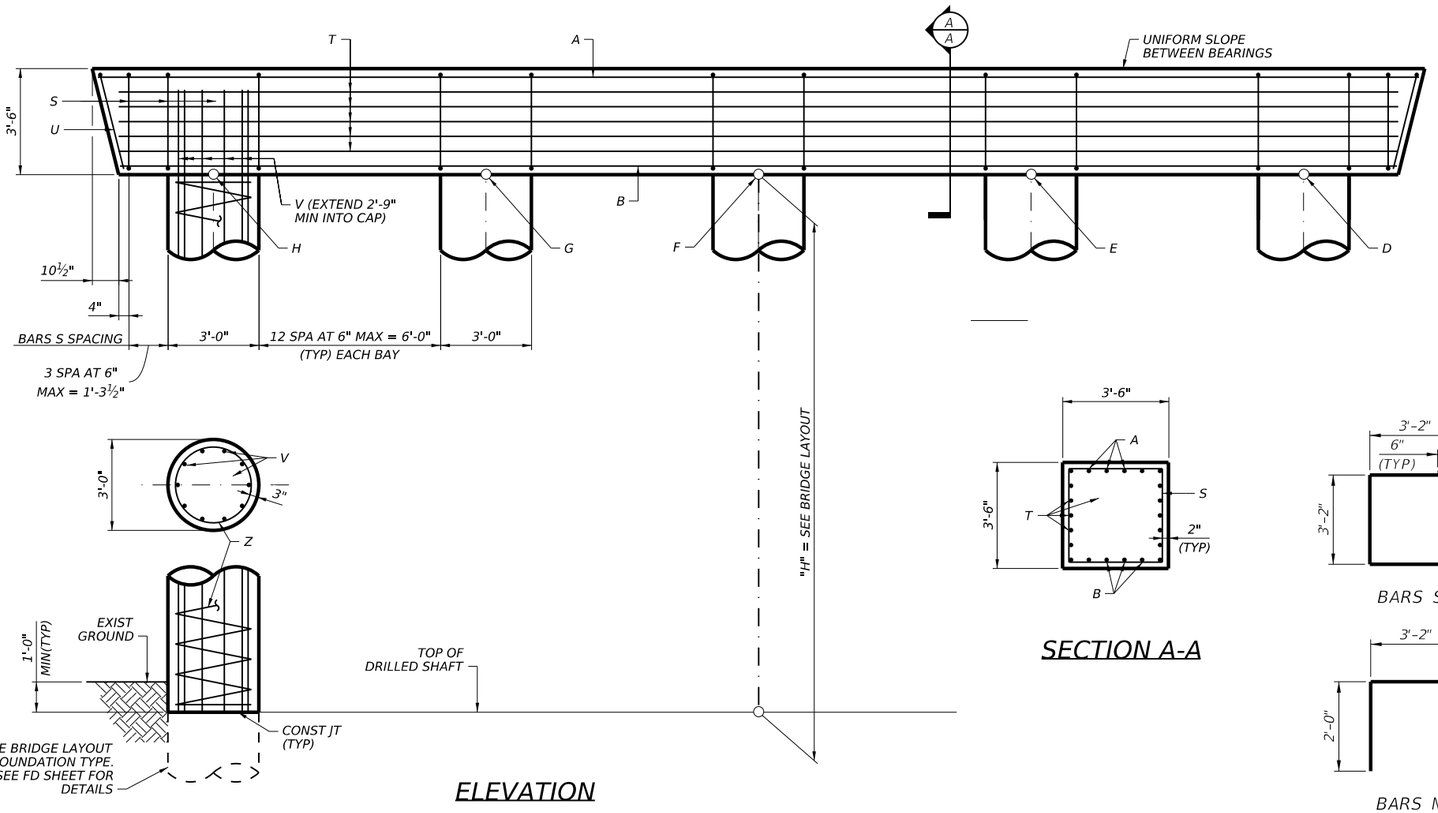


PLAN



ELEVATION

TABLE OF ESTIMATED QTYS (BENTS 2, 3, 5, & 6)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	43'-8"	1393
B	6	#11	41'-11"	1337
D	4	#9	1'-8"	23
M	4	#5	4'-5"	19
Nb	8	#5	7'-2"	60
S	60	#6	13'-8"	1232
T	10	#6	41'-11"	630
U	2	#6	9'-8"	30
REINFORCING STEEL			LB	4,724
CLASS "C" CONC (CAP)			CY	20.2

TABLE OF ESTIMATED QUANTITIES (BENT 4)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	43'-8"	1393
B	6	#11	41'-11"	1337
M	4	#5	4'-5"	19
Nb	8	#5	7'-2"	60
S	60	#6	13'-8"	1232
T	10	#6	41'-11"	630
U	2	#6	9'-8"	30
REINFORCING STEEL			LB	4,701
CLASS "C" CONC (CAP)			CY	20.2

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL 93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL.
2. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. CALCULATED FOUNDATION LOADS:

   BENT 2 = 121 TONS/DRILLED SHAFT
   BENT 3 = 125 TONS/DRILLED SHAFT
   BENT 4 = 125 TONS/DRILLED SHAFT
   BENT 5 = 125 TONS/DRILLED SHAFT
   BENT 6 = 121 TONS/DRILLED SHAFT

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

MATERIAL NOTES

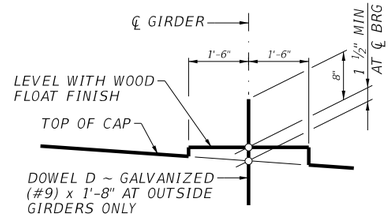
1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi).
2. PROVIDE GRADE 60 REINFORCING STEEL.

(1) QUANTITIES SHOWN ARE FOR BENT CAP ONLY.

(2) QUANTITIES SHOWN ARE BASED ON AN 'H' VALUE OF 24 FEET. FOR EACH LINEAR FOOT VARIATION IN 'H' VALUE, MAKE THE FOLLOWING ADJUSTMENTS:

BARS V LENGTH, REFER TO COLUMN SCHEDULE
BARS Z LENGTH, REFER TO COLUMN SCHEDULE
REINFORCING STEEL, 60LB
CLASS 'C' CONC (COLUMN), 0.35 CY

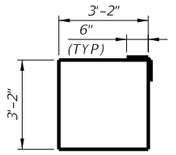
QUANTITIES SHOWN ARE BASED ON AN 'H' VALUE. PLEASE SEE BRIDGE LAYOUT. THE QUANTITIES ONLY SHOW COLUMNS.



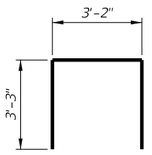
BEARING SEAT DETAIL

(BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD)
DOWELS 'D' ON BENT NO.s 2,3,5,6 ONLY

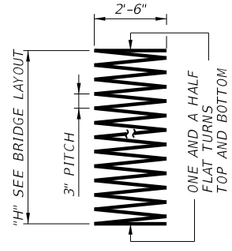
SECTION A-A



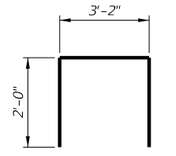
BARS S



BARS U



BARS Z



BARS Nb

TOP OF CAP ELEVATIONS

	"A"	"B"	"C"
BENT 2	297.049	297.489	297.049
BENT 3	297.621	298.061	297.621
BENT 4	297.867	298.307	297.867
BENT 5	297.785	298.225	297.785
BENT 6	297.376	297.816	297.376

(2) TOP OF COLUMN ELEVATIONS

COL.	BENT 2	BENT 3	BENT 4	BENT 5	BENT 6
D	293.629	294.201	294.447	294.365	293.956
E	293.809	294.381	294.627	294.545	294.136
F	293.989	294.561	294.807	294.725	294.316
G	293.809	294.381	294.627	294.545	294.136
H	293.629	294.201	294.447	294.365	293.956

COLUMN SCHEDULE

BENT NO.	BAR	NO.	SIZE	LENGTH	WEIGHT
2	V	50	#9	11'-9"	1998
2	Z	5	#4	306'-6"	1024
3	V	50	#9	14'-9"	2508
3	Z	5	#4	400'-10"	1339
4	V	50	#9	16'-9"	2848
4	Z	5	#4	463'-8"	1549
5	V	50	#9	14'-9"	2508
5	Z	5	#4	400'-10"	1339
6	V	50	#9	14'-9"	2508
6	Z	5	#4	400'-10"	1339
REINFORCING STEEL					18,960
CLASS "C" CONC (COL) BENT 2					11.8
CLASS "C" CONC (COL) BENT 3					15.7
CLASS "C" CONC (COL) BENT 4					18.3
CLASS "C" CONC (COL) BENT 5					15.7
CLASS "C" CONC (COL) BENT 6					15.7

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

NO.	DATE	REVISION

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0083 Ph
281-945-0081 Fx

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

BENT 2 - 6
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		67

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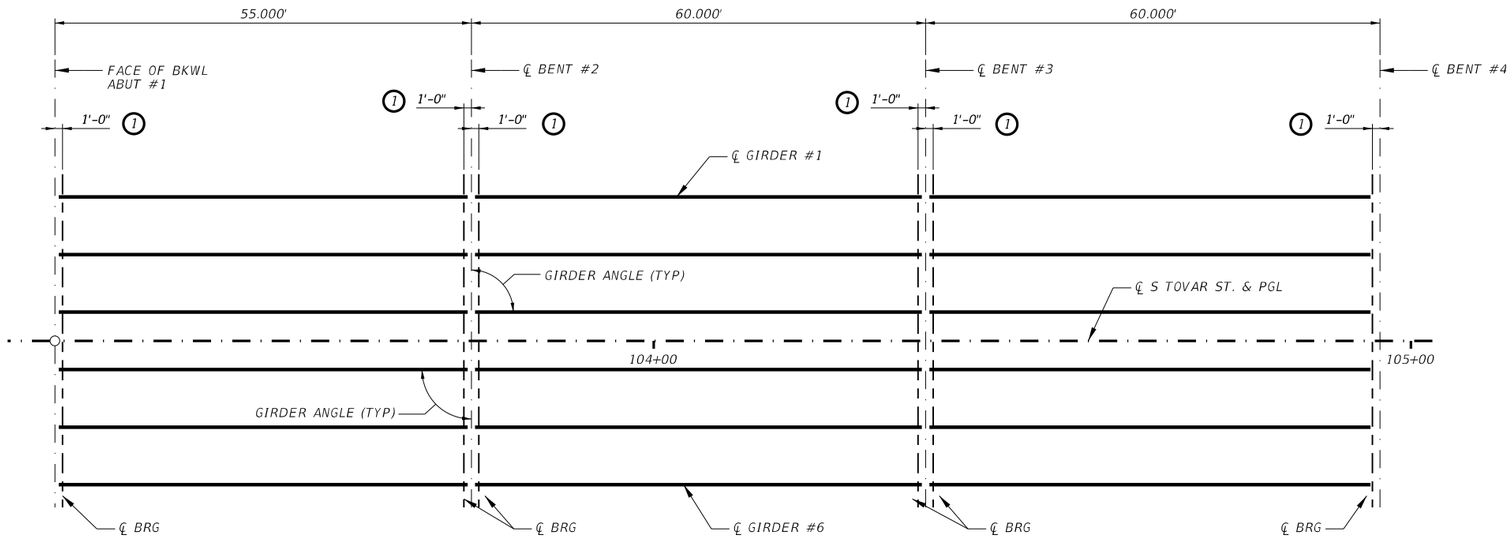

SPAN 1
(Tx28 GIRDERS)

SPAN 2
(Tx28 GIRDERS)

SPAN 3
(Tx28 GIRDERS)

1. SEE ELASTOMERIC BEARING & GIRDER END DETAILS (IGEB) STANDARD SHEET FOR ORIENTATION OF DIMENSIONS.
2. GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 1 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 2 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			
SPAN 2	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 3 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			
SPAN 3	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 4 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM 1	0.000	90	0	0
	BEAM 2	7.600	90	0	0
	BEAM 3	7.600	90	0	0
	BEAM 4	7.600	90	0	0
	BEAM 5	7.600	90	0	0
	BEAM 6	7.600	90	0	0
	TOTAL	38.000			

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	GIRDER BOT. BM. FLG. (2)	SLOPE
GIRDER 1	55.000	53.000	54.51	0.0148
GIRDER 2	55.000	53.000	54.51	0.0148
GIRDER 3	55.000	53.000	54.51	0.0148
GIRDER 4	55.000	53.000	54.51	0.0148
GIRDER 5	55.000	53.000	54.51	0.0148
GIRDER 6	55.000	53.000	54.51	0.0148

GIRDER REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	GIRDER BOT. BM. FLG. (2)	SLOPE
GIRDER 1	60.000	58.000	59.50	0.0095
GIRDER 2	60.000	58.000	59.50	0.0095
GIRDER 3	60.000	58.000	59.50	0.0095
GIRDER 4	60.000	58.000	59.50	0.0095
GIRDER 5	60.000	58.000	59.50	0.0095
GIRDER 6	60.000	58.000	59.50	0.0095

GIRDER REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	GIRDER BOT. BM. FLG. (2)	SLOPE
GIRDER 1	60.000	58.000	59.50	0.0041
GIRDER 2	60.000	58.000	59.50	0.0041
GIRDER 3	60.000	58.000	59.50	0.0041
GIRDER 4	60.000	58.000	59.50	0.0041
GIRDER 5	60.000	58.000	59.50	0.0041
GIRDER 6	60.000	58.000	59.50	0.0041

STATE OF TEXAS
LLOYD M. WOLF
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Lloyd M. Wolf, P.E.
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TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

BRIDGE FRAMING PLAN
UNIT 1 (SPANS 1-3)
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		68

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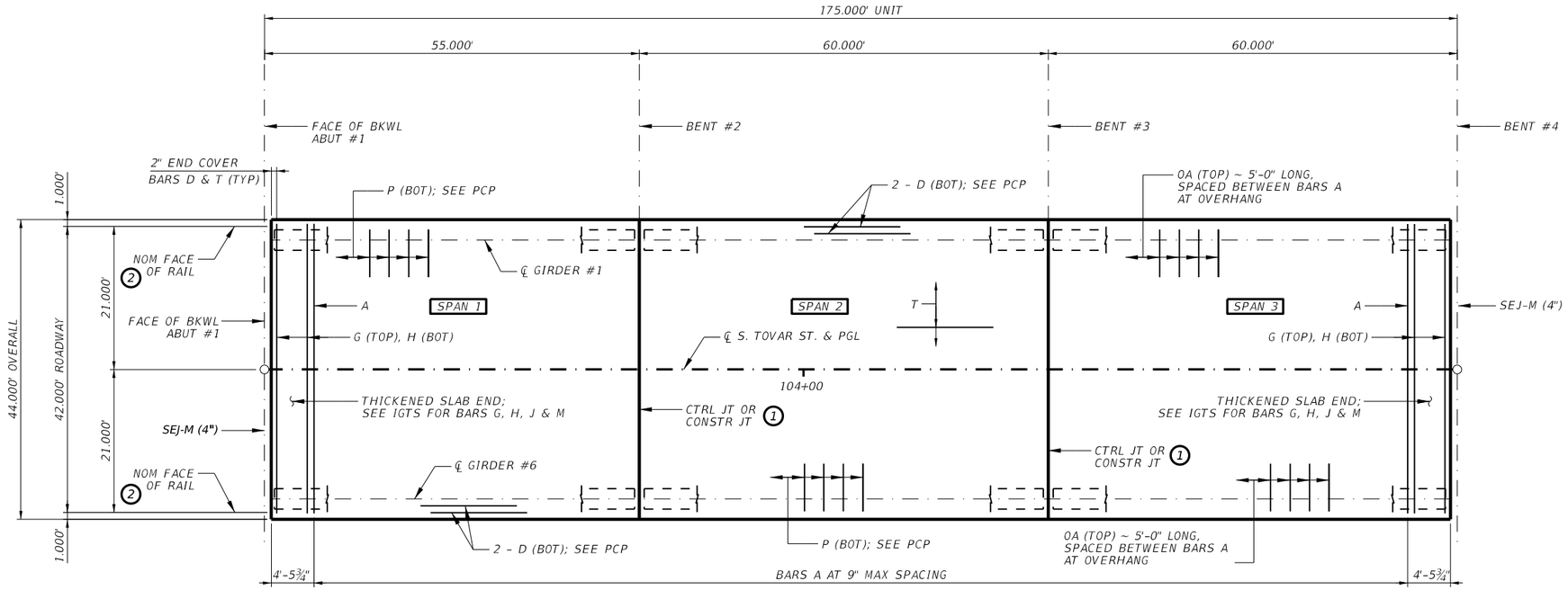

PLAN

GENERAL NOTES

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS, 9TH EDITION, 2020 AND TxDOT BRIDGE DESIGN MANUAL, JAN 2023.
2. SEE PCP AND PCP-FAB FOR PANEL DETAILS NOT SHOWN.
3. SEE IGTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.
4. SEE IGMS STANDARD FOR MISCELLANEOUS DETAILS.
5. SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.
6. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
7. SEE RAILING STANDARD SHEETS FOR RAIL ANCHORAGE IN SLAB.

(1) SEE STANDARD IGEB FOR ORIENTATION OF DIMENSIONS TO CENTERLINE BEARING

(2) TOE OF RAIL

MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 psi).
2. PROVIDE GRADE 60 UNCOATED REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS: UNCOATED ~ #4 = 1'-7"
4. DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, 0A, P OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

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S TOVAR ST @ SAN DIEGO CREEK

175.00' PRESTRESSED CONC GIRDER UNIT 1 (SPANS 1-3)
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		69

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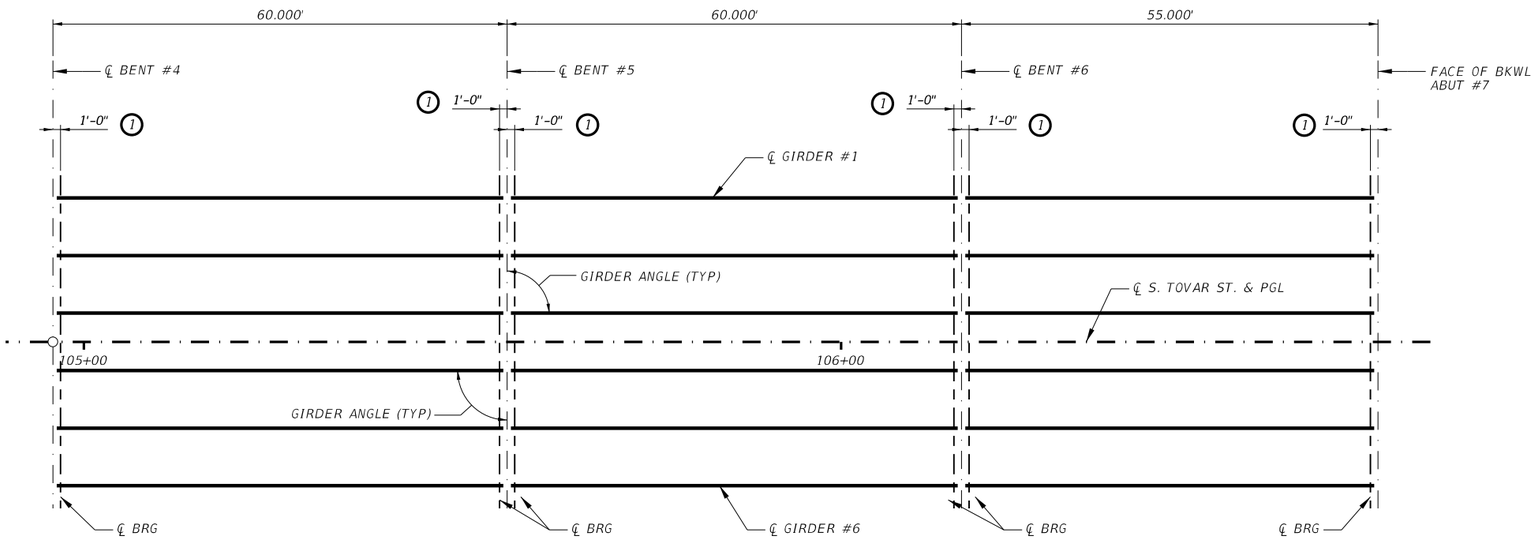

SPAN 4
(Tx28 GIRDERS)

SPAN 5
(Tx28 GIRDERS)

SPAN 6
(Tx28 GIRDERS)

1. SEE ELASTOMERIC BEARING & GIRDER END DETAILS (IGEB) STANDARD SHEET FOR ORIENTATION OF DIMENSIONS.
2. GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 4 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 5 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			
SPAN 5	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 6 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 5	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			
SPAN 6	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			

BENT NO. 7 (S 74 13 19.99 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 19.000 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 6	GIRDER 1	0.000	90	0	0
	GIRDER 2	7.600	90	0	0
	GIRDER 3	7.600	90	0	0
	GIRDER 4	7.600	90	0	0
	GIRDER 5	7.600	90	0	0
	GIRDER 6	7.600	90	0	0
	TOTAL	38.000			

GIRDER REPORT

GIRDER REPORT, SPAN 4

	C-C BENT	C-C BRG.	HORIZONTAL DISTANCE BOT. BM. FLG.	TRUE DISTANCE (2)	GIRDER SLOPE
GIRDER 1	60.000	58.000	59.50		-0.0014
GIRDER 2	60.000	58.000	59.50		-0.0014
GIRDER 3	60.000	58.000	59.50		-0.0014
GIRDER 4	60.000	58.000	59.50		-0.0014
GIRDER 5	60.000	58.000	59.50		-0.0014
GIRDER 6	60.000	58.000	59.50		-0.0014

GIRDER REPORT, SPAN 5

	C-C BENT	C-C BRG.	HORIZONTAL DISTANCE BOT. BM. FLG.	TRUE DISTANCE (2)	GIRDER SLOPE
GIRDER 1	60.000	58.000	59.50		-0.0068
GIRDER 2	60.000	58.000	59.50		-0.0068
GIRDER 3	60.000	58.000	59.50		-0.0068
GIRDER 4	60.000	58.000	59.50		-0.0068
GIRDER 5	60.000	58.000	59.50		-0.0068
GIRDER 6	60.000	58.000	59.50		-0.0068

GIRDER REPORT, SPAN 6

	C-C BENT	C-C BRG.	HORIZONTAL DISTANCE BOT. BM. FLG.	TRUE DISTANCE (2)	GIRDER SLOPE
GIRDER 1	55.000	53.000	54.50		-0.0120
GIRDER 2	55.000	53.000	54.50		-0.0120
GIRDER 3	55.000	53.000	54.50		-0.0120
GIRDER 4	55.000	53.000	54.50		-0.0120
GIRDER 5	55.000	53.000	54.50		-0.0120
GIRDER 6	55.000	53.000	54.50		-0.0120

STATE OF TEXAS
LLOYD M. WOLF
73649
REGISTERED PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
6/20/2024

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(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

BRIDGE FRAMING PLAN UNIT 2 (SPANS 4-6) S TOVAR ST. AT SAN DIEGO CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		70

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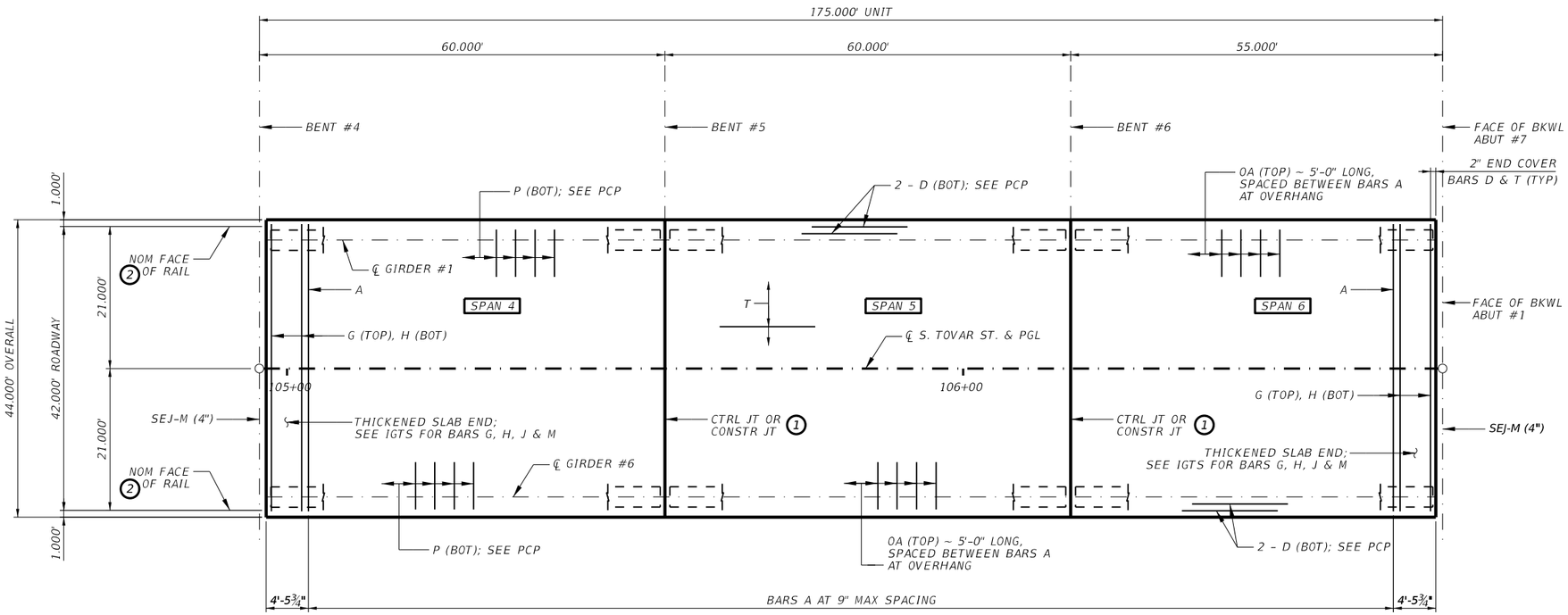

PLAN

GENERAL NOTES

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2. SEE PCP AND PCP-FAB FOR PANEL DETAILS NOT SHOWN.
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(1) SEE STANDARD IGEB FOR ORIENTATION OF DIMENSIONS TO CENTERLINE BEARING

(2) TOE OF RAIL

MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 psi).
2. PROVIDE GRADE 60 UNCOATED REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS: UNCOATED ~ #4 = 1'-7"
4. DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

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15021 Katy Freeway, Suite 550
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281-945-0069 PH
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S TOVAR ST @ SAN DIEGO CREEK

175.00' PRESTRESSED CONC GIRDER UNIT 2 (SPANS 4-6)
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		71

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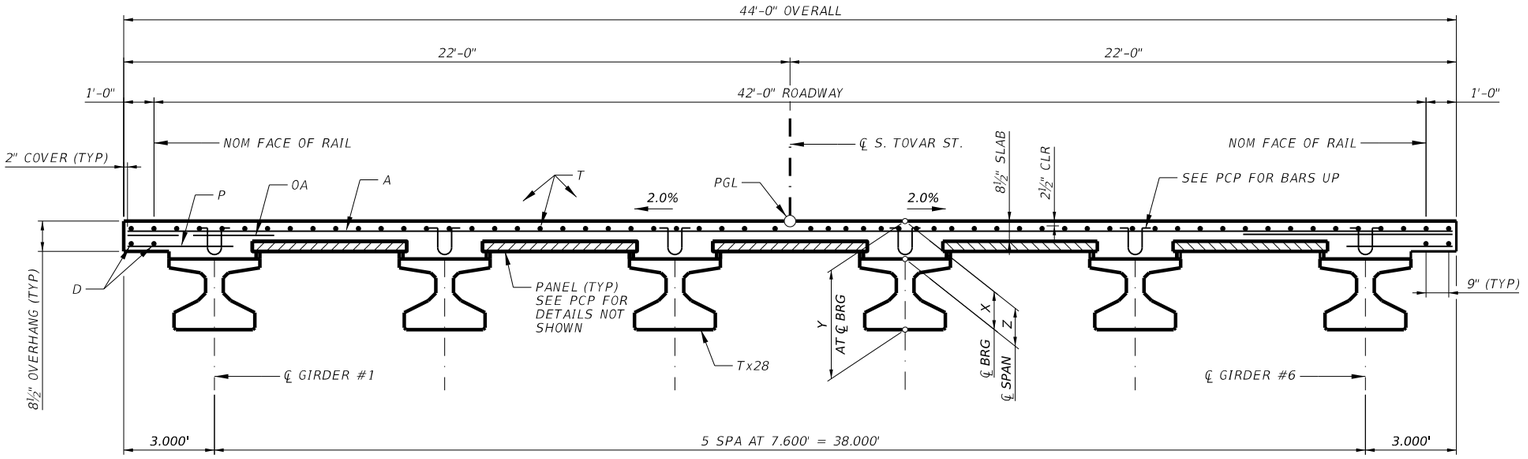
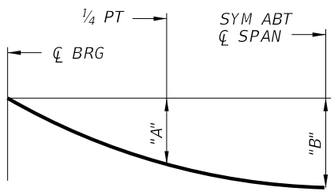


TYPICAL TRANSVERSE SECTION



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (Ec = $5x10^6$PSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSION MAY BE LESS. DEFLECTIONS TO BE ADJUSTED BASED ON FIELD OBSERVATIONS.

SPAN NO.	BEAM NO.	"A"	"B"
		FT	FT
1	1 & 6	0.029	0.041
1	2 - 5	0.032	0.045
2 - 5	1 & 6	0.041	0.058
2 - 5	2 - 5	0.046	0.065
6	1 & 6	0.029	0.041
6	2 - 5	0.032	0.045

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT CL OF BRG	"Y" AT CL OF BRG	"Z" AT CL OF BRG
1 & 6	1 & 6	$10\frac{3}{4}$"	3'-$2\frac{3}{4}$"	$9\frac{5}{8}$"
1 & 6	2 - 5	$10\frac{3}{4}$"	3'-$2\frac{3}{4}$"	$9\frac{3}{4}$"
2 - 5	1 - 6	$10\frac{3}{4}$"	3'-$2\frac{3}{4}$"	$9\frac{3}{4}$"

BAR TABLE

BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB	PRESTR CONC BEAMS (TYPE TX28)	REINF STEEL
NO.	SF	LF	LB
1	2,420	327.06	8,228
2	2,640	357.00	8,976
3	2,640	357.00	8,976
4	2,640	357.00	8,976
5	2,640	357.00	8,976
6	2,420	327.00	8,228
TOTAL	15,400	2,082.1	52,360

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TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

PRESTRESSED CONC GIRDER UNIT 1 & 2 (SPANS 1-6)
S TOVAR ST.
AT SAN DIEGO CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		72

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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (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)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
S Tovar St. @ San Diego	1	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.005	-2.624	2050	0.647	0.786	1.71	2.22	1.64
	2	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.389	-3.074	2357	0.631	0.786	1.51	1.96	1.18
	3	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.389	-3.074	2357	0.631	0.786	1.51	1.96	1.18
	4	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.389	-3.074	2357	0.631	0.786	1.51	1.96	1.18
	5	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.389	-3.074	2357	0.631	0.786	1.51	1.96	1.18
	6	1-6	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.500	5.500	2.005	-2.624	2050	0.647	0.786	1.71	2.22	1.64

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. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

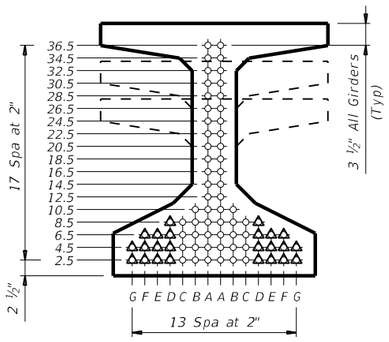
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.

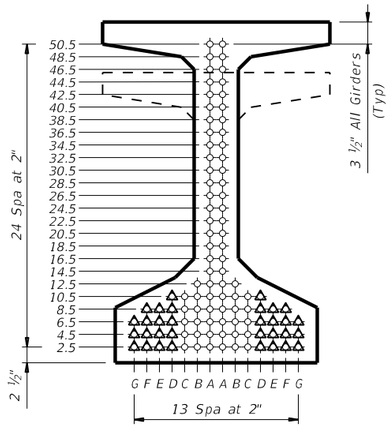
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must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

DEPRESSED STRAND DESIGNS:

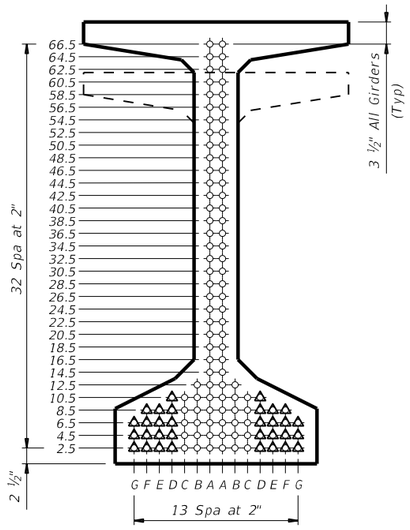
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands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

Lloyd M. Wolf, P.E.
6/20/2024

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
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only. 3-22: Added Load Rating.	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		73

DATE: 5/30/2024 2:51:19 PM
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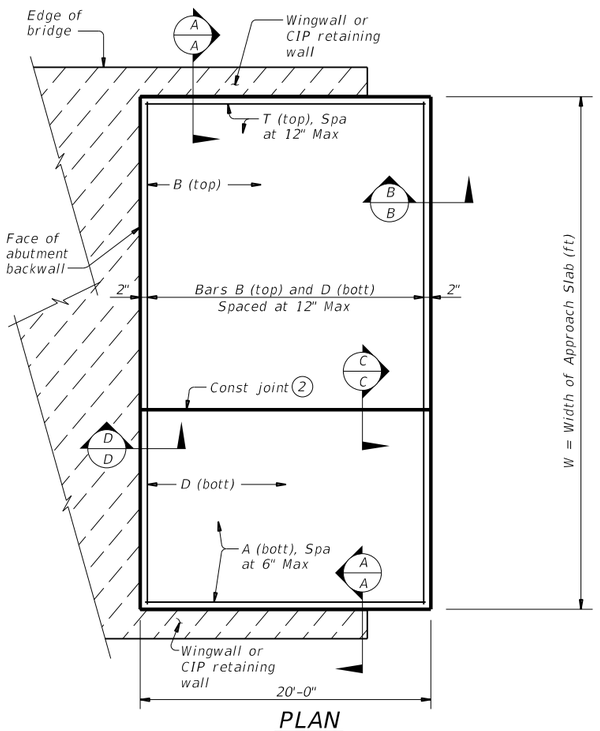
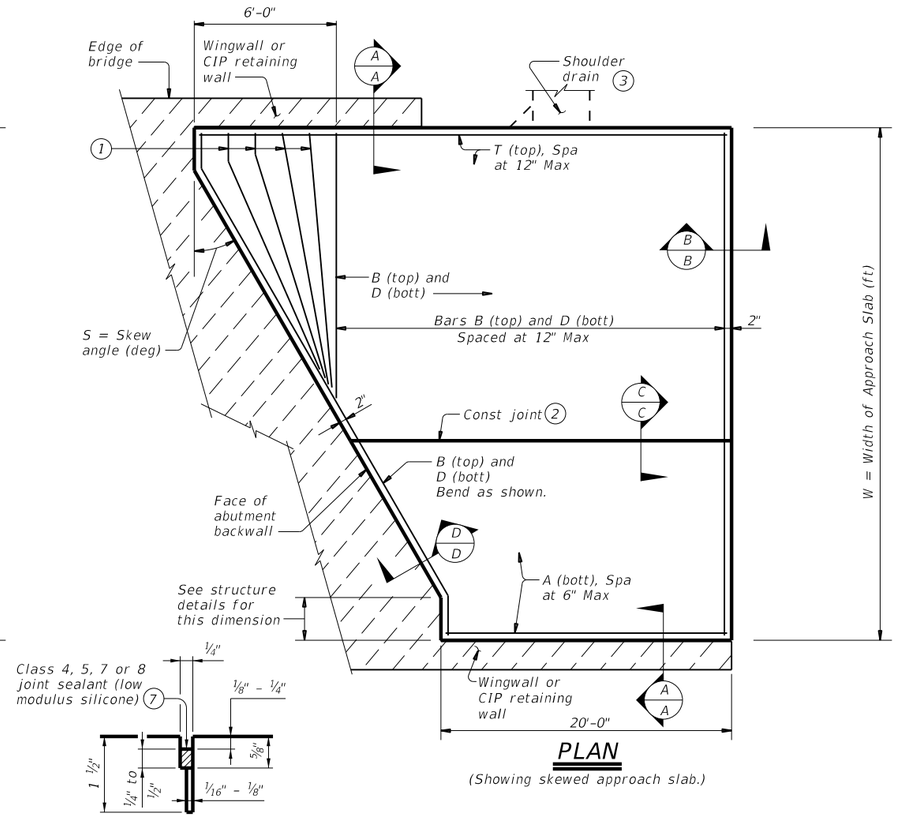


PLAN

(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."

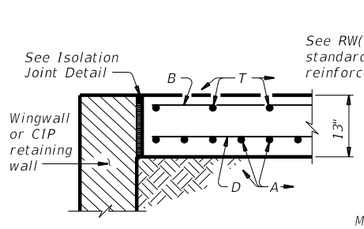
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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.

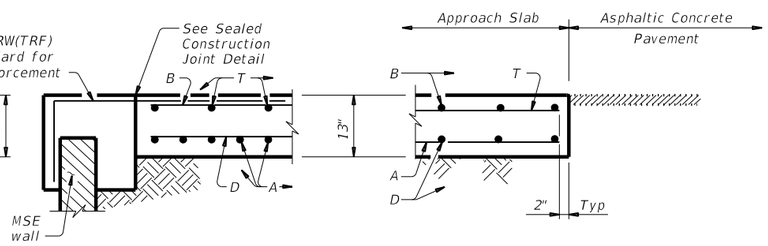
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

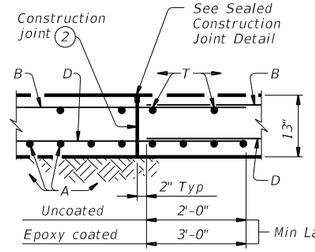
Cover dimensions are clear dimensions, unless noted otherwise.

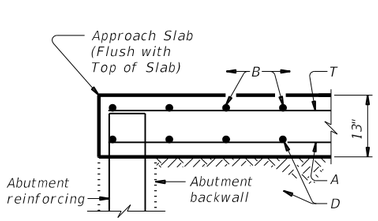


SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



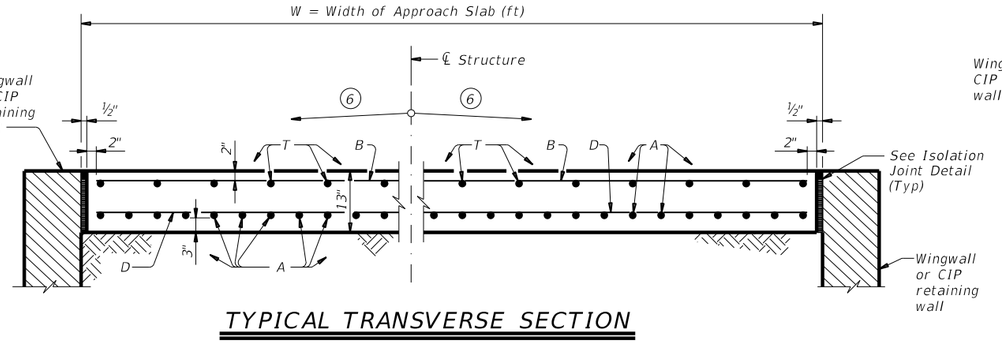


SECTION A-A

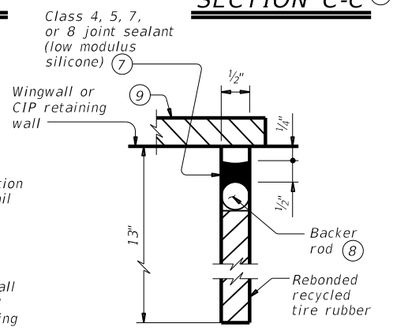
SECTION B-B

SECTION C-C (5)

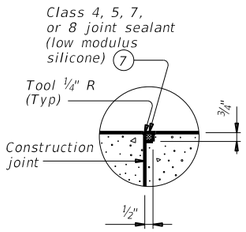
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

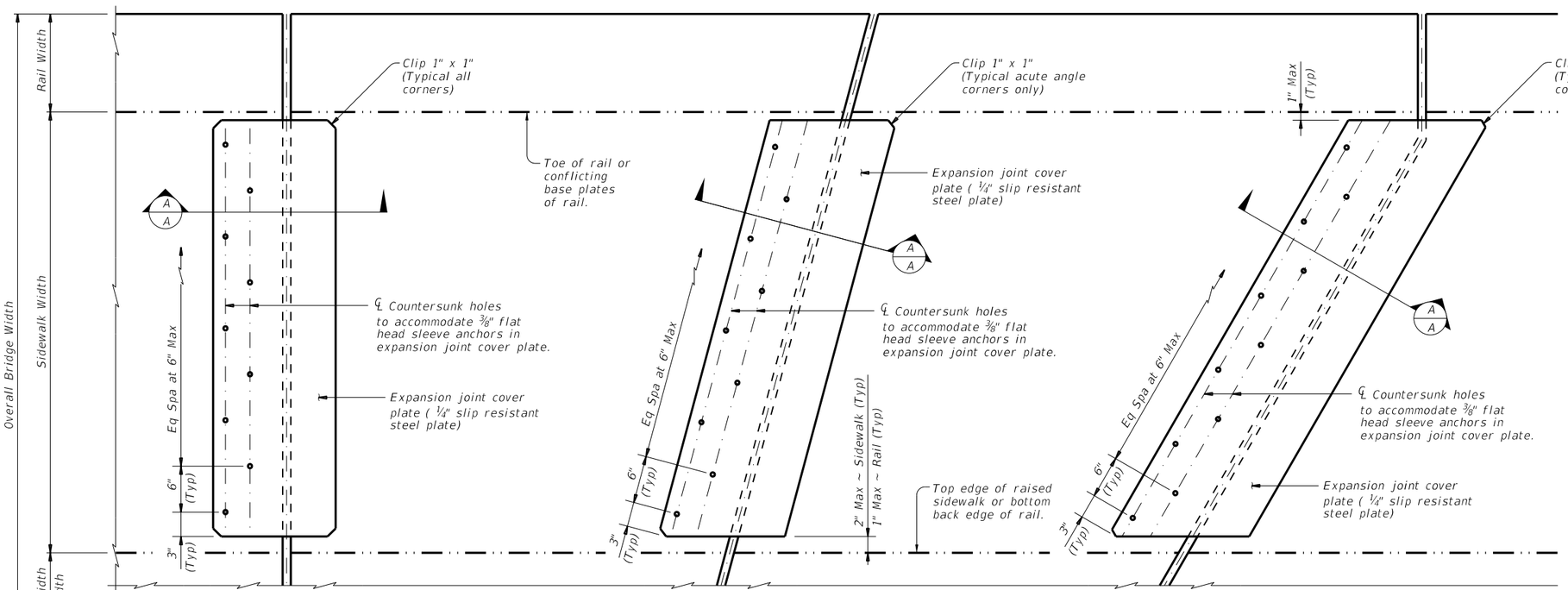
Bridge Division Standard

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT

BAS-A

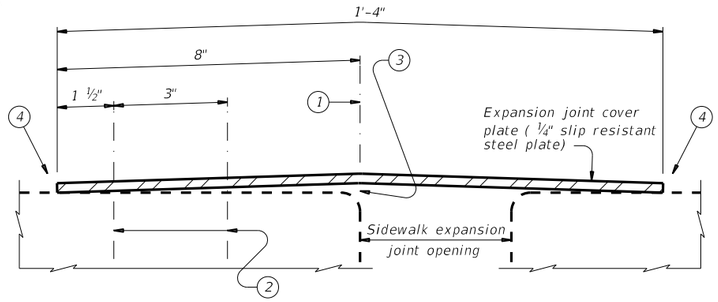
FILE: MS-BAS-A-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		74

DATE:
FILE:

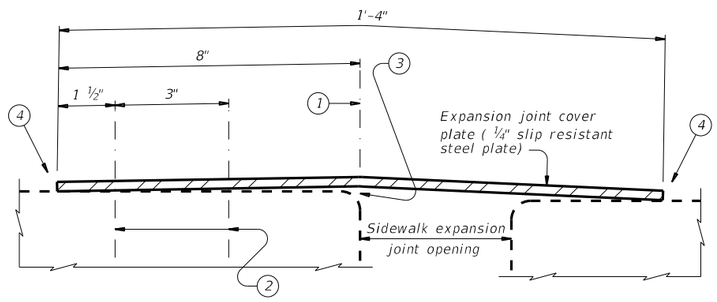


NO SKEW | SKEW WITHOUT SLAB BREAKBACK | SKEW WITH SLAB BREAKBACK

PLAN



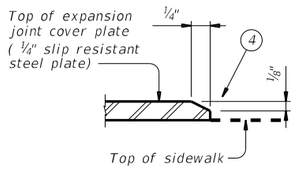
SHOWING LEVEL EXP JOINT



SHOWING UNLEVEL EXP JOINT
(Install sleeve anchors on high side of expansion joint)

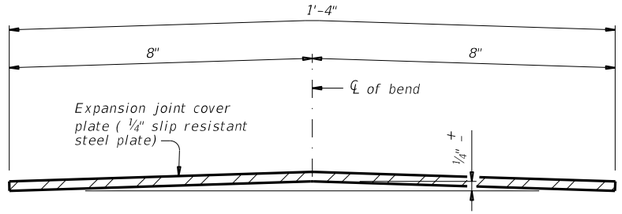
SECTION A-A

1. ℄ Expansion joint cover plate and edge of expansion joint.
2. ℄ ⅜" x 2 ½" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in ¼" Slip Resistant Steel Plate.
3. It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
4. Transverse edges must be in contact with sidewalk surface after installation.



EXP JOINT COVER PLATE BEVEL DETAIL

Bevel all plate edges as shown.



BENDING DIAGRAM OF EXP JOINT COVER PLATE

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide cover plates fabricated with a product from this list. No exceptions are permitted.

FABRICATION NOTES:

Shop drawings for the fabrication of Bridge Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.

Sidewalk expansion joint cover plates must be hot-dipped galvanized ¼" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and non-metallic coatings.

Minimum required yield strength of steel plate is 36 ksi.

Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Provide stainless steel flat head sleeve anchors meeting the requirements of ASTM F 593, Group I, Alloy 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

GENERAL NOTES:

Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint opening.

Details provided are applicable to concrete walkway surfaces only.

Payment for sidewalk expansion joint cover plates are by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures".

Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

Texas Department of Transportation

Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

BS-EJCP

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
8-20: Closer tolerances on cover plate.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		75

DATE: 6/20/2024 1:38:44 PM
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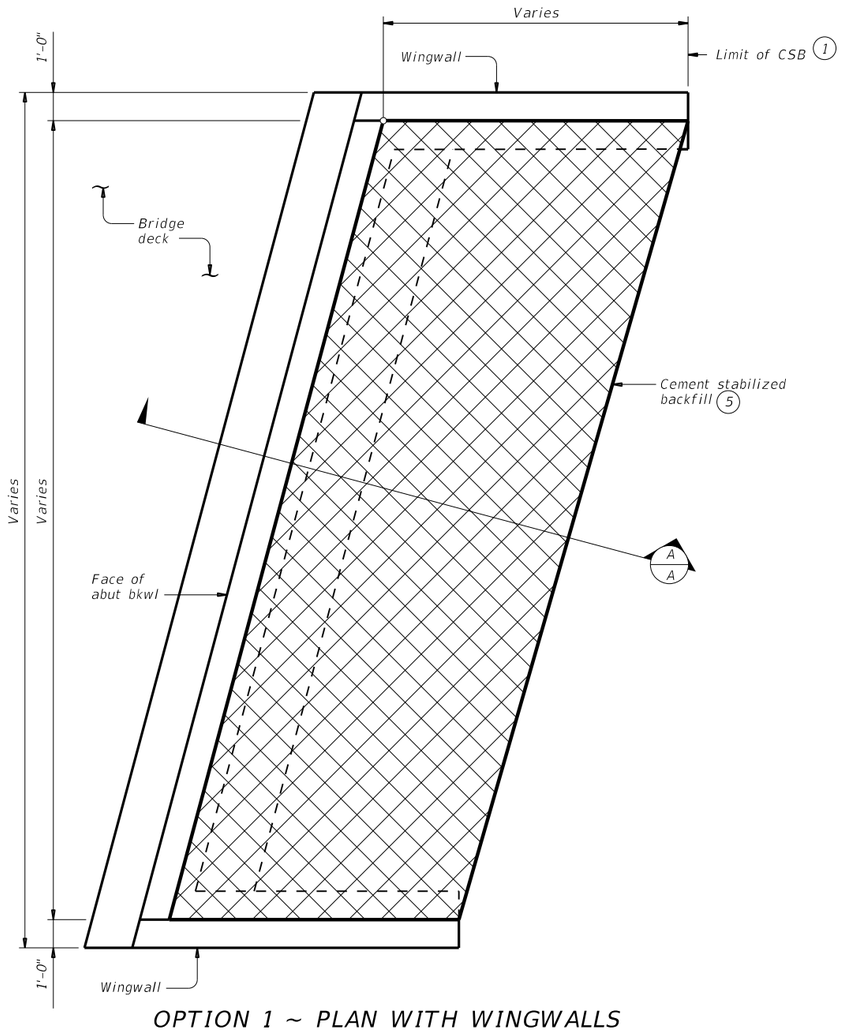
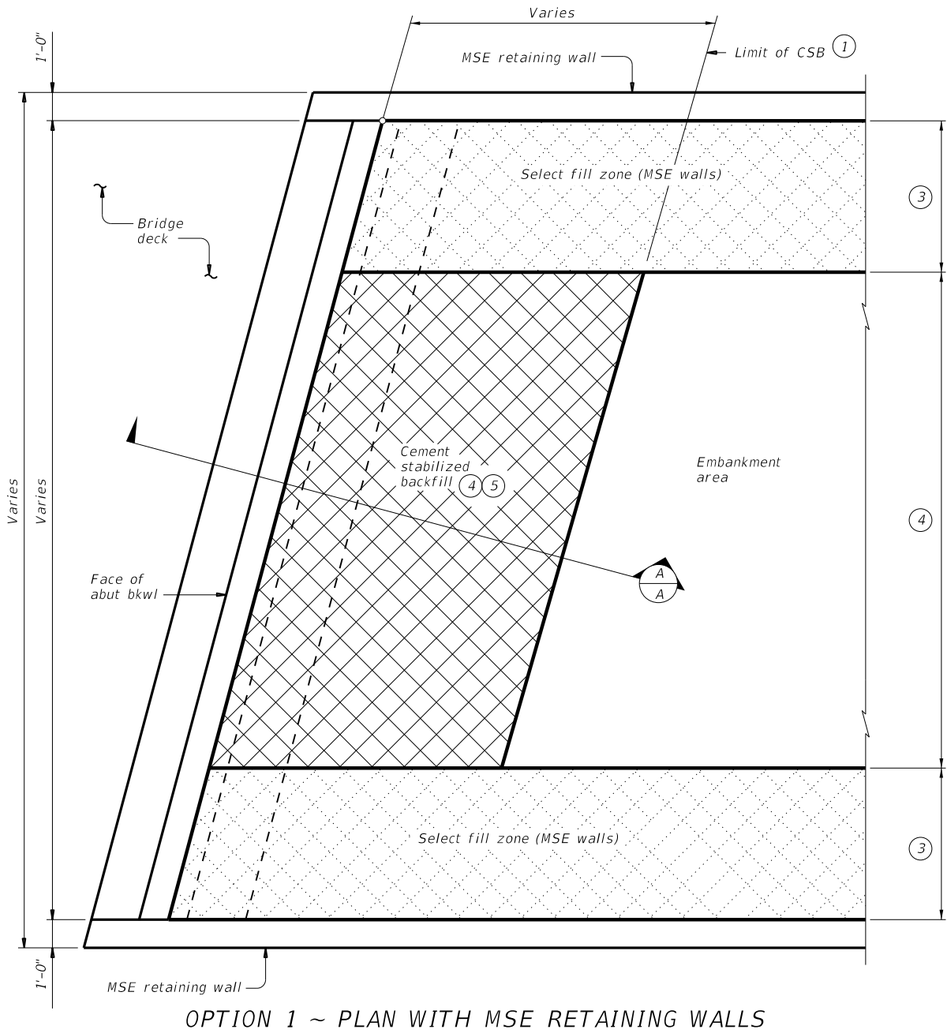
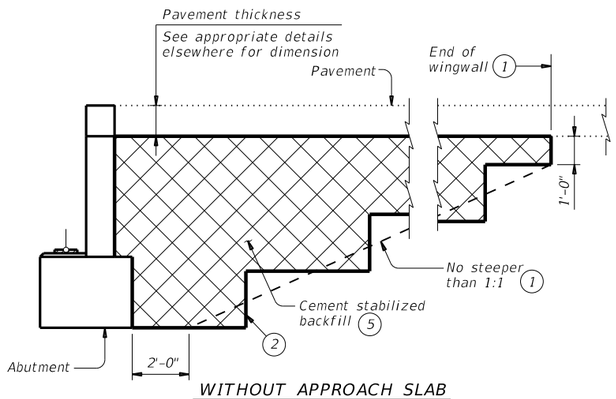


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



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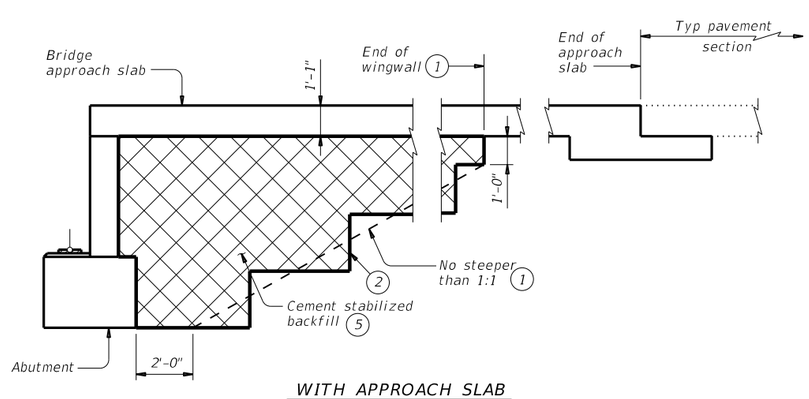

WITH APPROACH SLAB

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

SECTION A-A

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		76

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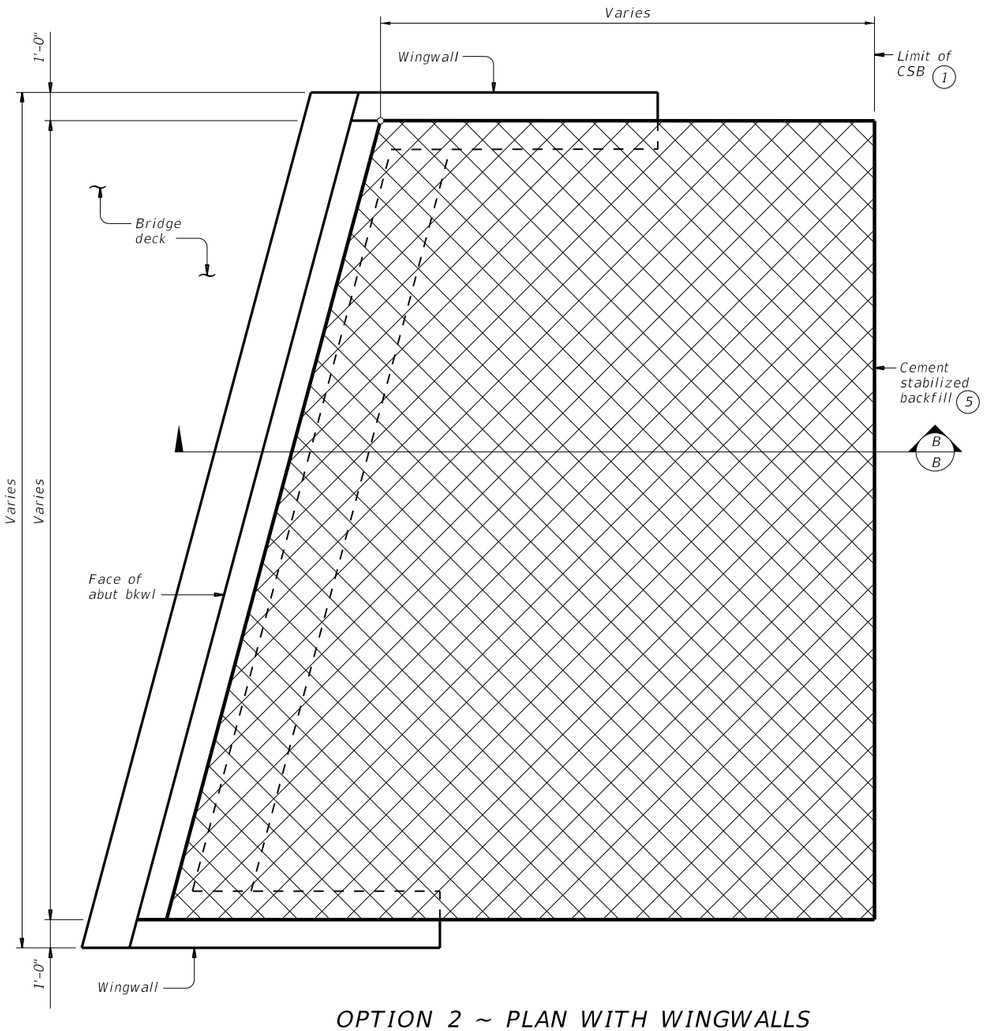
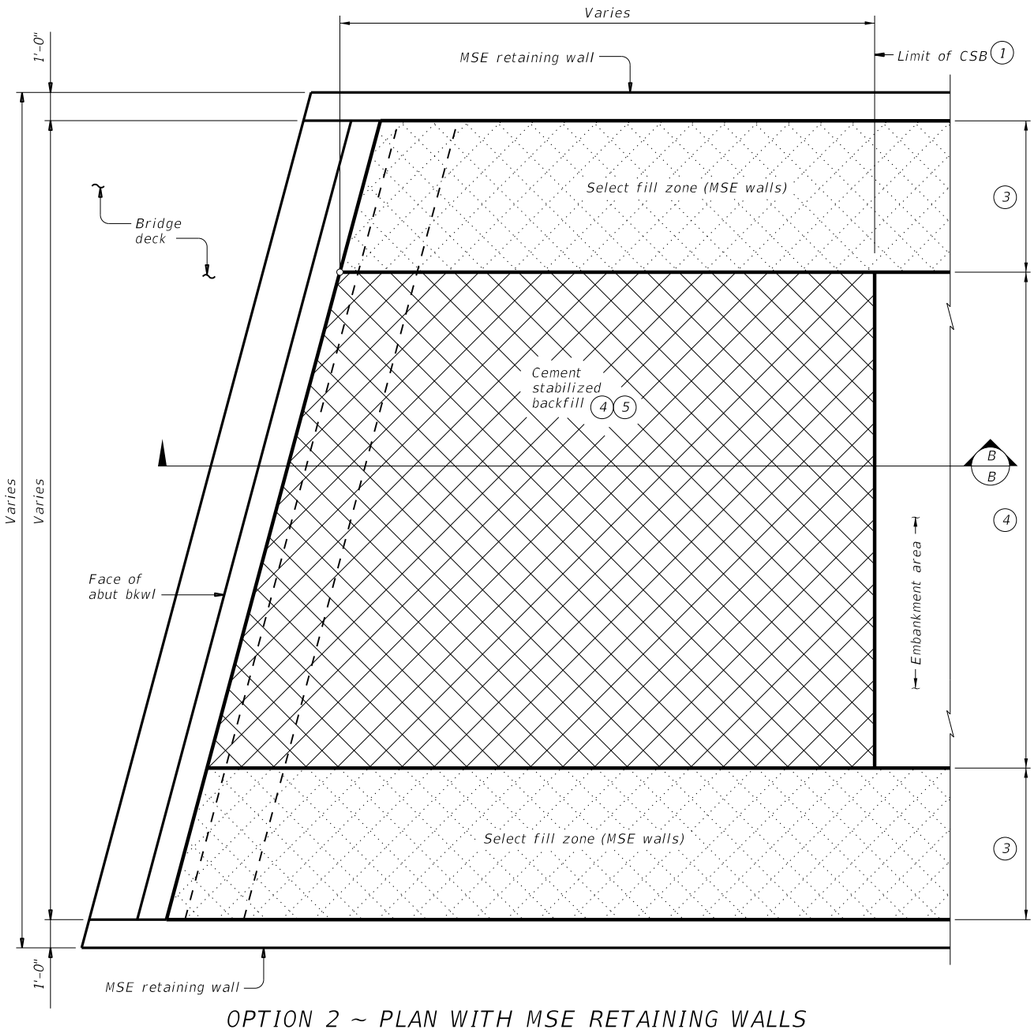


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

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

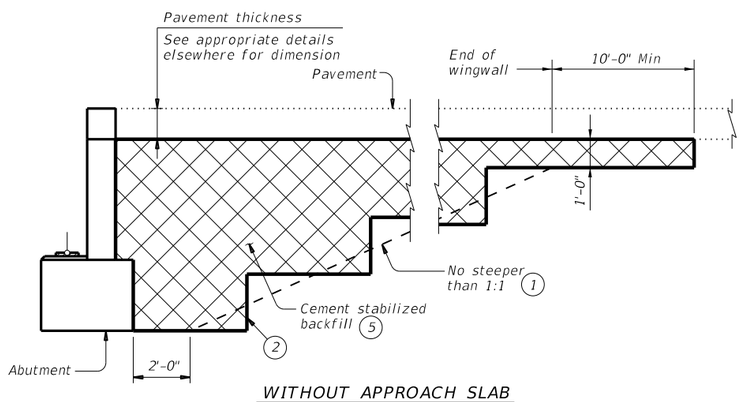
2 Bench backfill as shown with 12" (approximate) bench depths.

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

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

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

6 1'-0" for BAS-A
1'-10" for BAS-C



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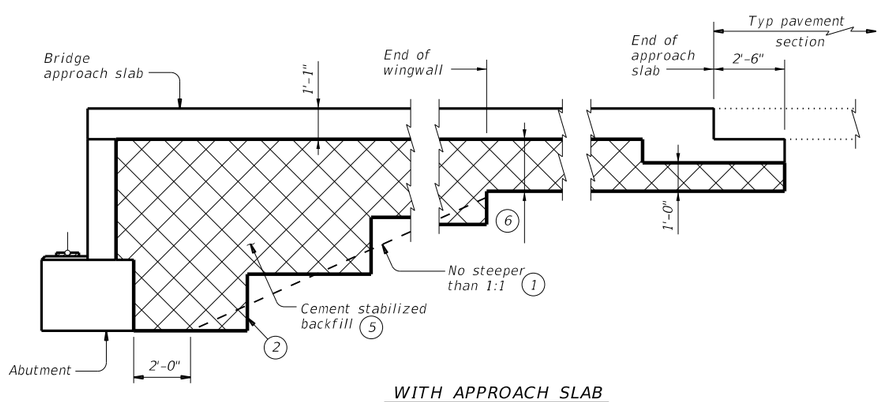

WITH APPROACH SLAB

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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		77

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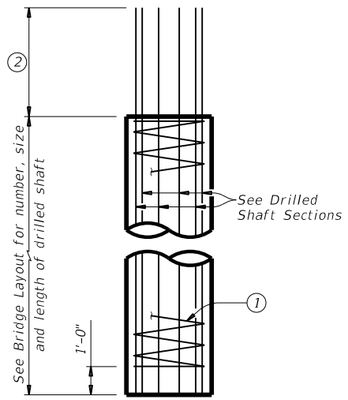
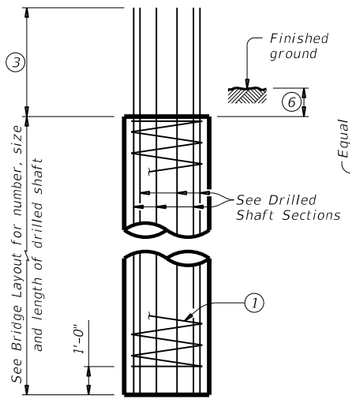
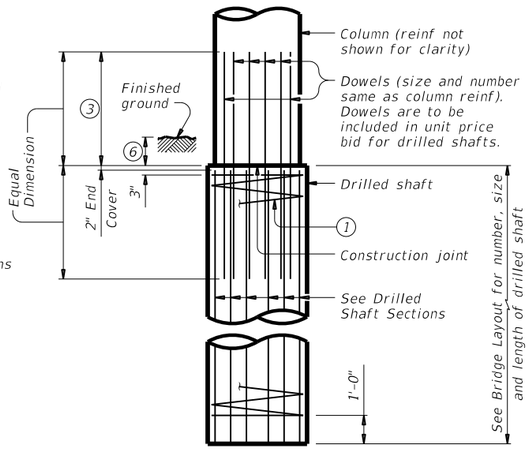


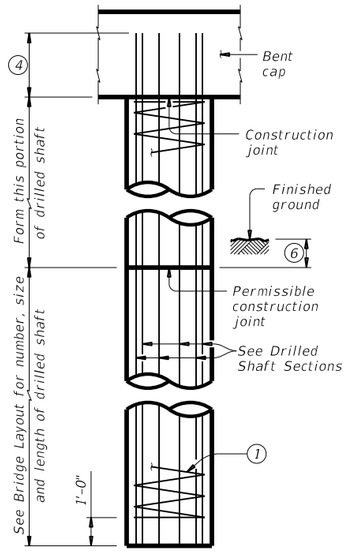
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



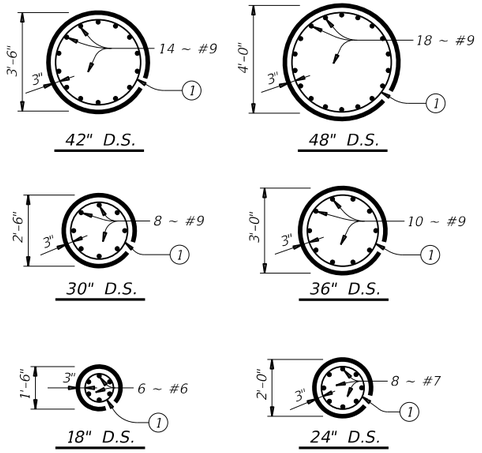
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

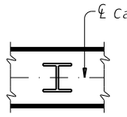


DRILLED SHAFT SECTIONS

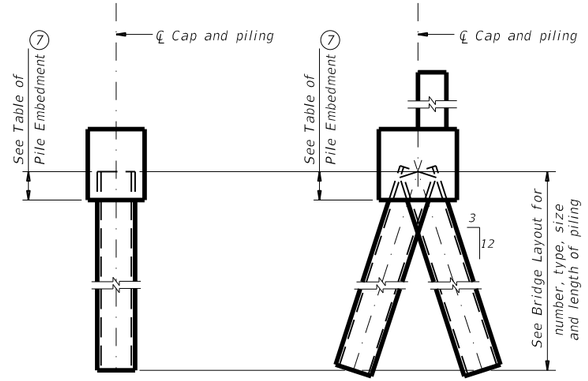
DRILLED SHAFT DETAILS

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

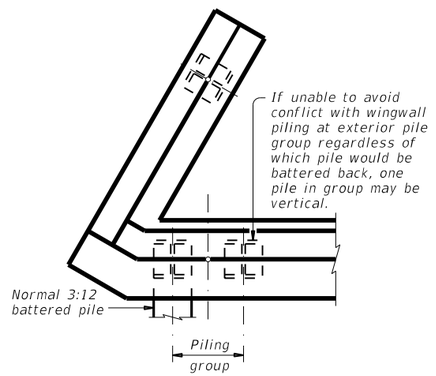
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



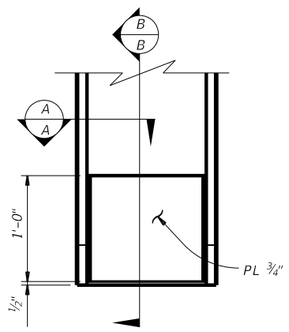
ORIENTATION OF STEEL H-PILING



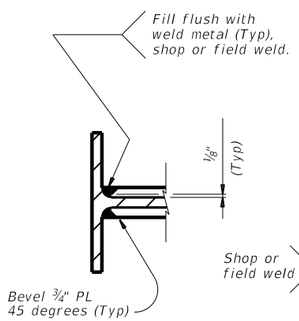
PILING DETAILS
(Concrete or steel H)



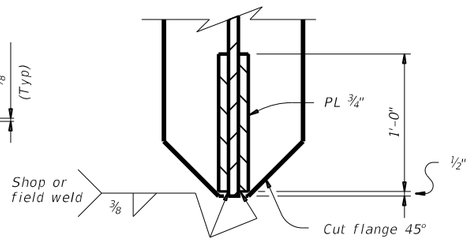
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



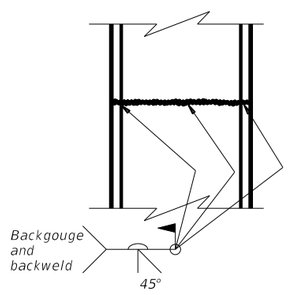
SECTION A-A

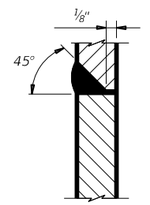


SECTION B-B

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: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		78

DATE: 6/20/2024 1:38:49 PM
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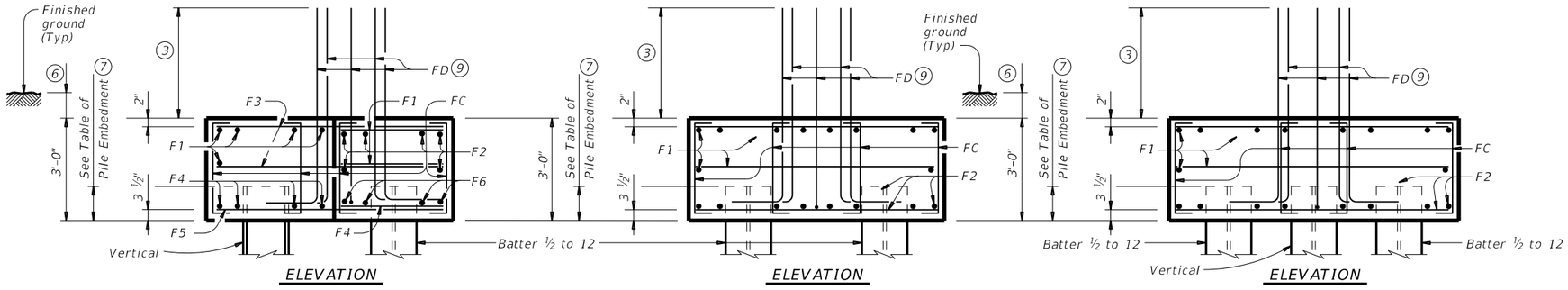
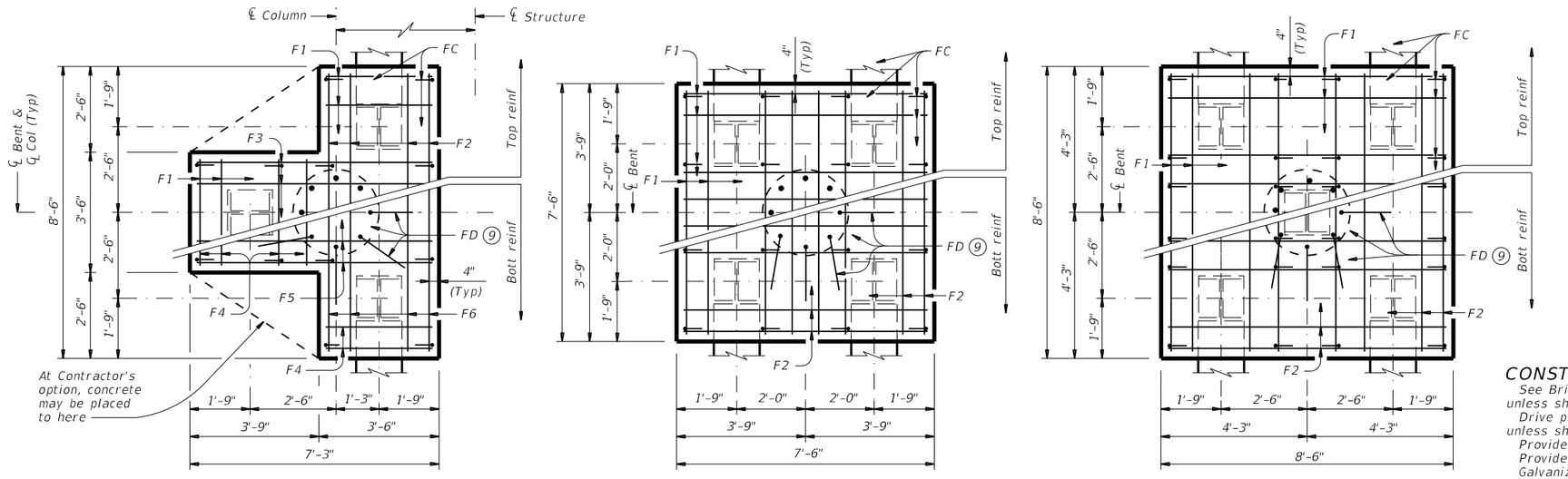




THREE PILE FOOTING (8)

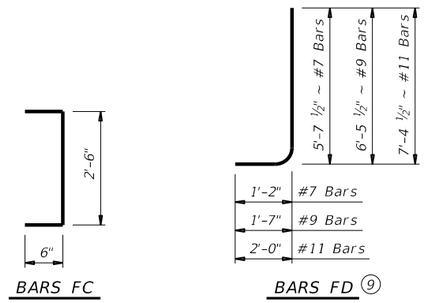
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



(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: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		79

DATE: 6/20/2024 1:38:55 PM
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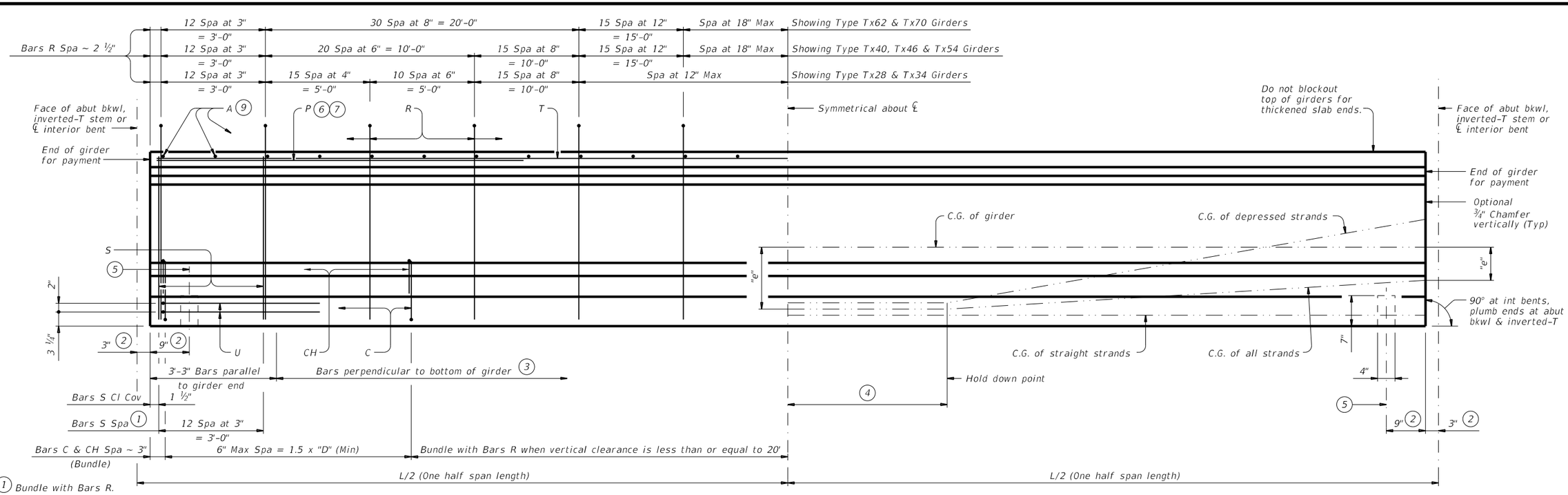


(1) Bundle with Bars R.

(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 5/8") 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.

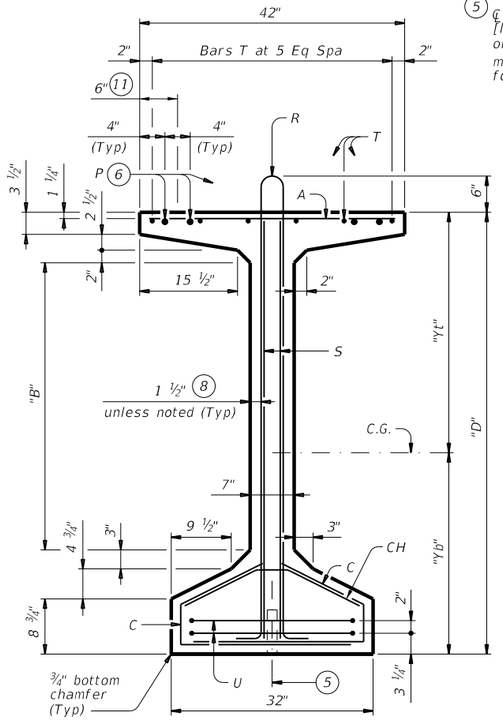
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

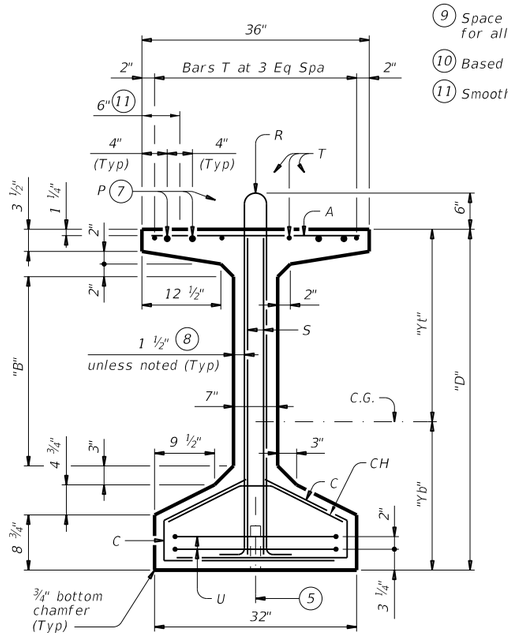
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

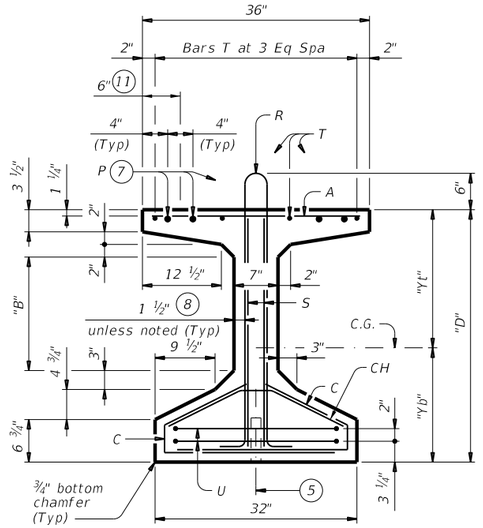
(11) Smooth trowel finish on the slab overhang side of exterior girder.



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.
When vertical clearance of the span is less than or equal to 20', provide additional Bars C and CH in every girder of that span.

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

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE:	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
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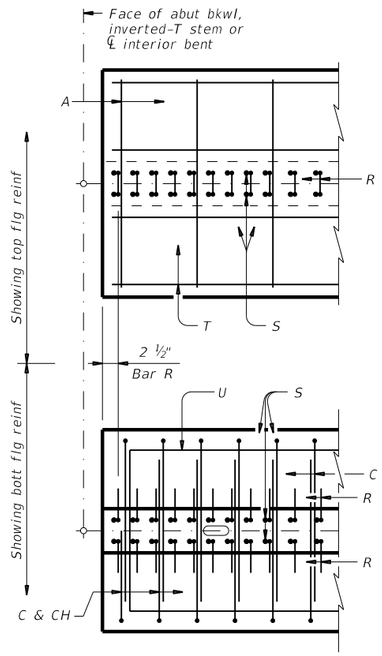
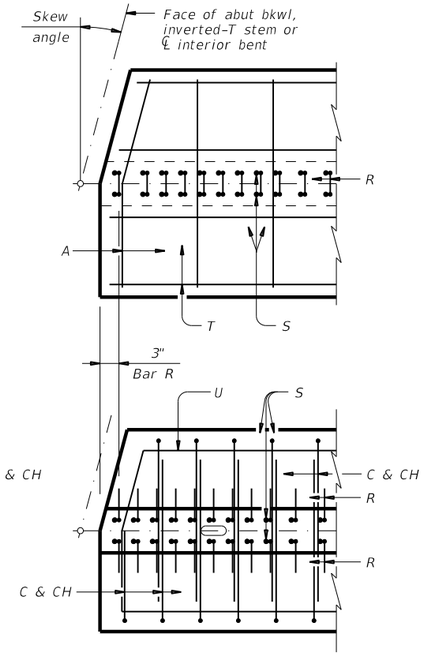
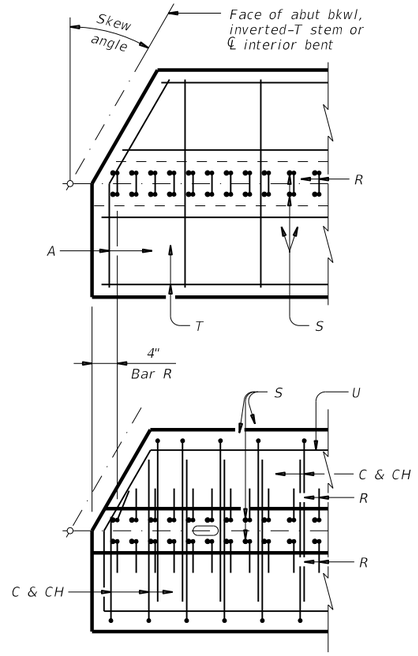


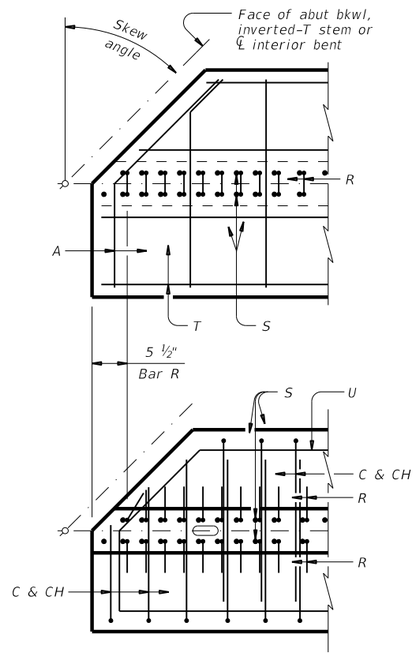
0° SKEW



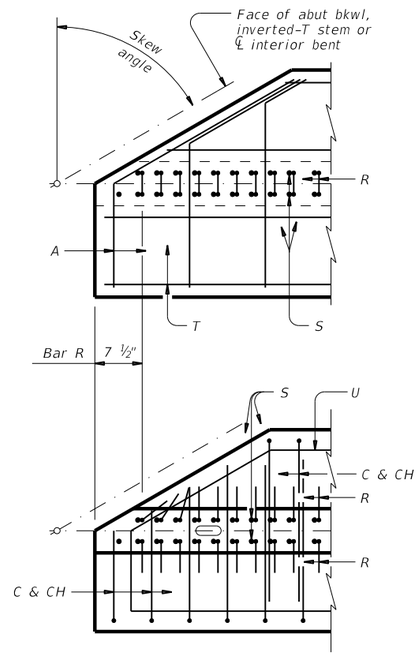
15° SKEW



30° SKEW



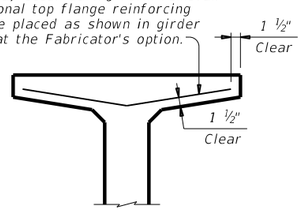
45° SKEW



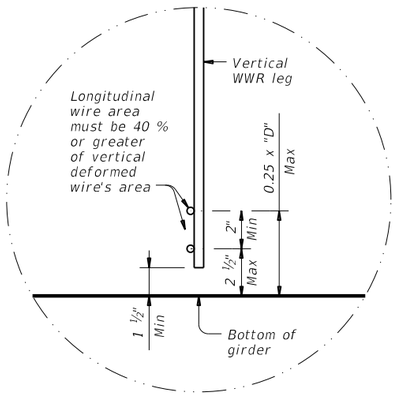
60° SKEW

PLAN OF GIRDER ENDS (12)

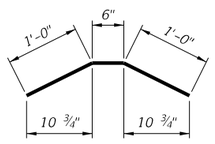
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



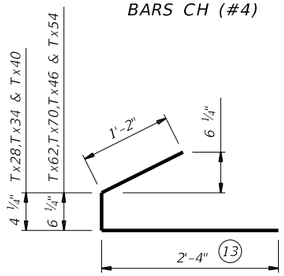
OPTIONAL TOP FLANGE REINFORCING DETAIL



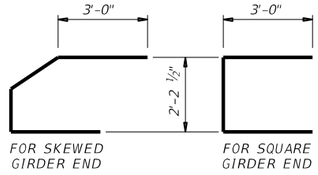
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



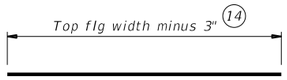
BARS CH (#4)



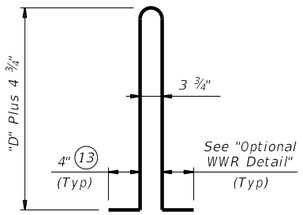
BARS C (#4)



BARS U (#5)

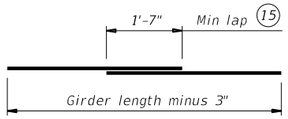


BARS A (#3)



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 SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE:	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
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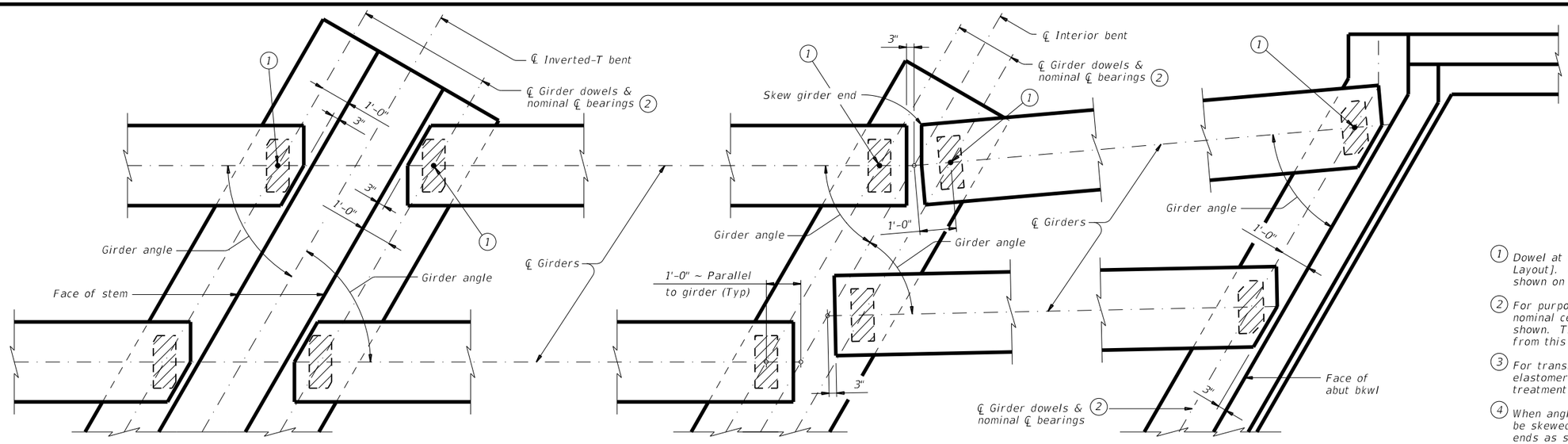


AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

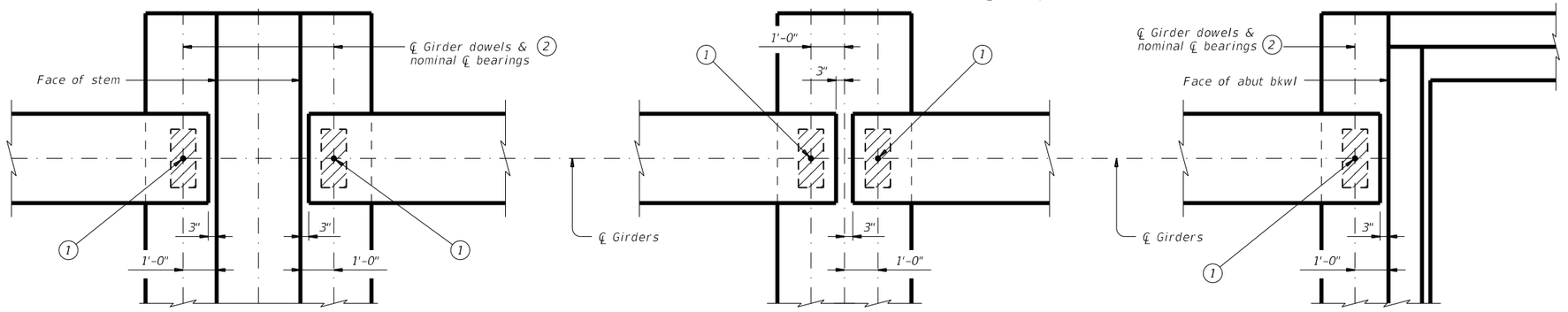
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(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.



AT INVERTED-T BENT

AT CONVENTIONAL INTERIOR BENT

AT ABUTMENT (3)

GIRDER END DETAILS

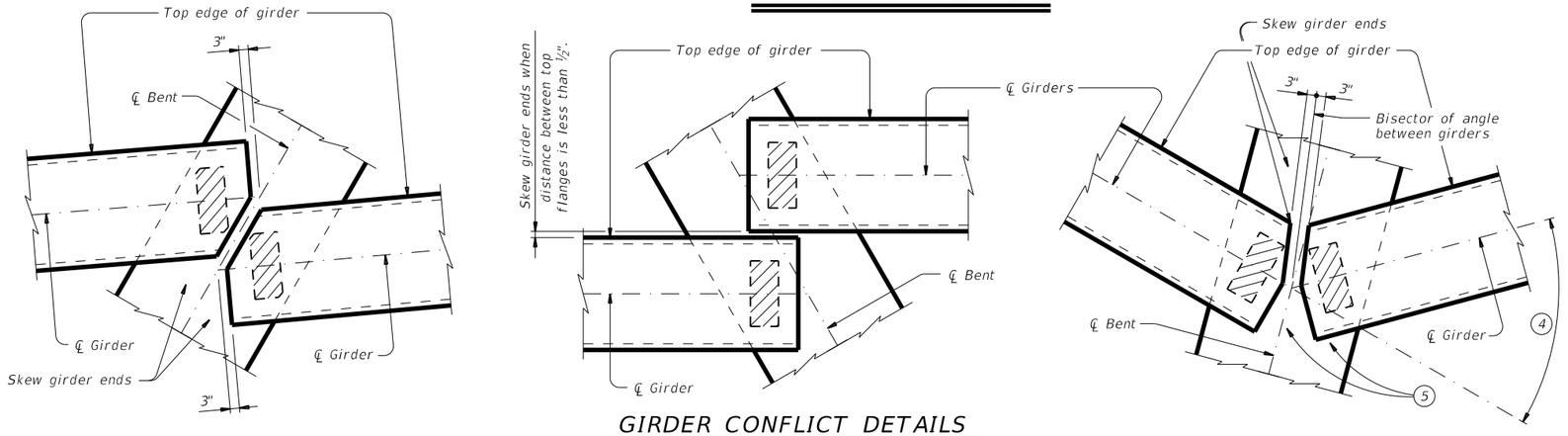
GENERAL NOTES:

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 CONFLICT DETAILS

HL93 LOADING

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB

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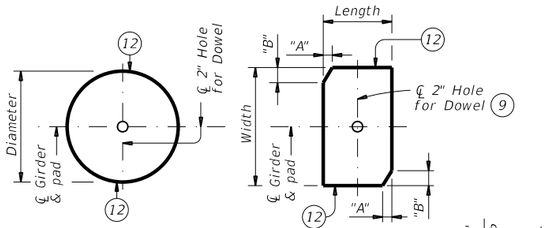
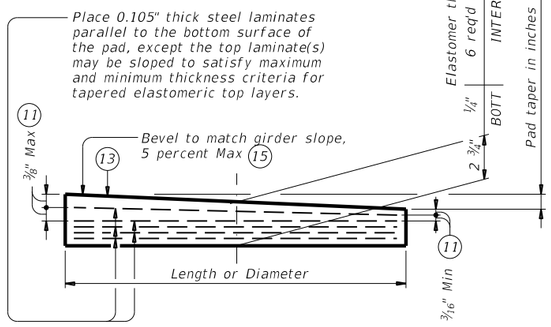


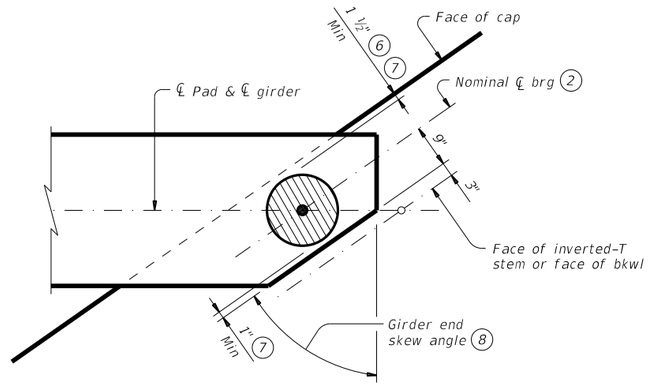
PLANS (10)



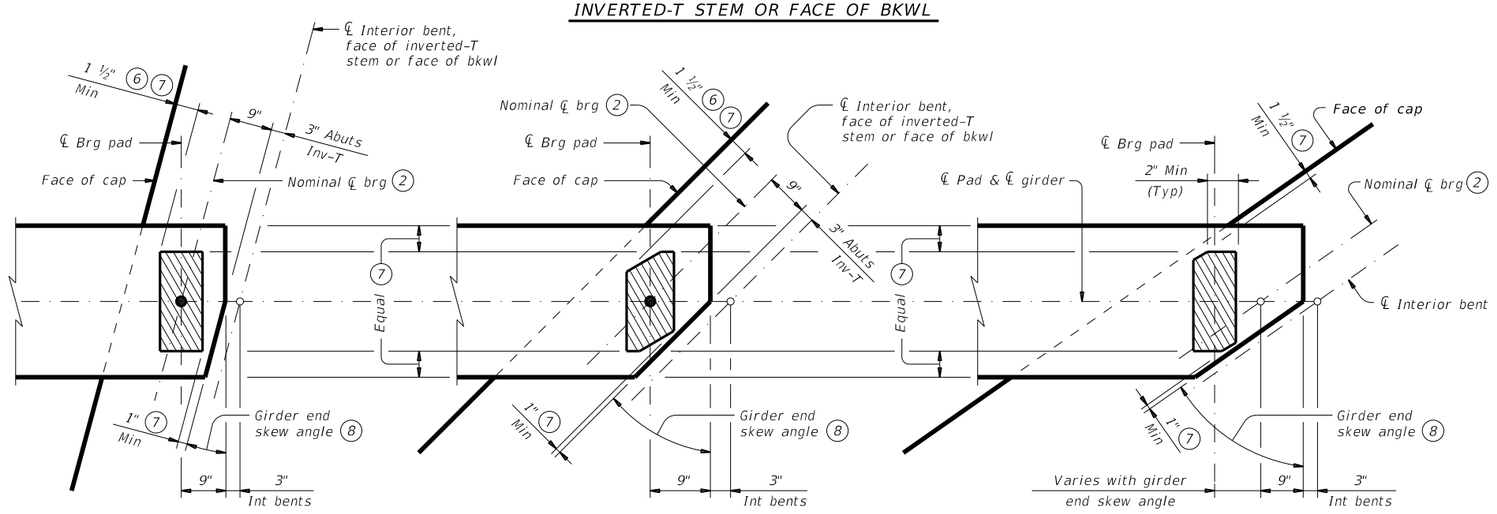
ELEVATION

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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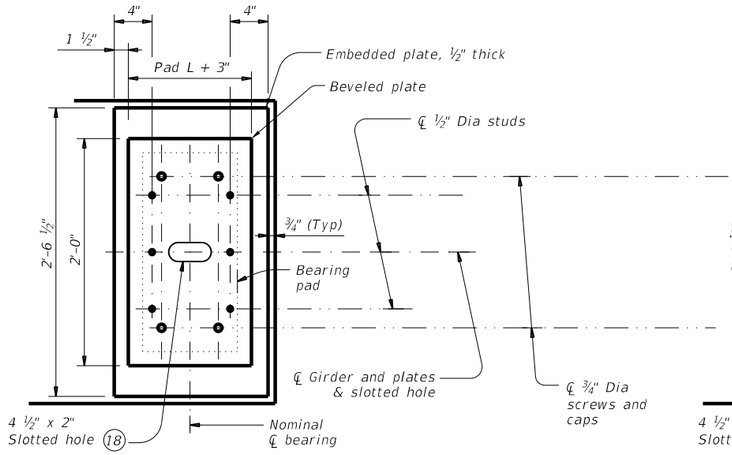
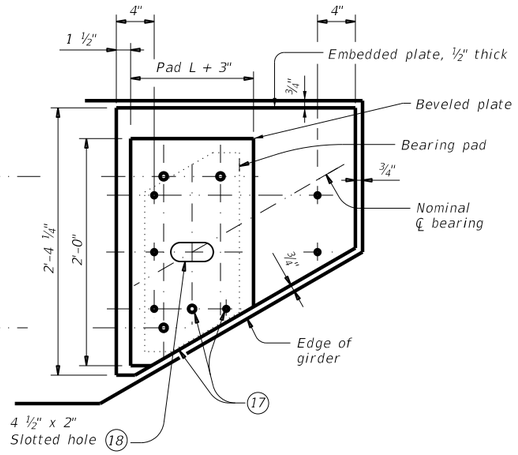
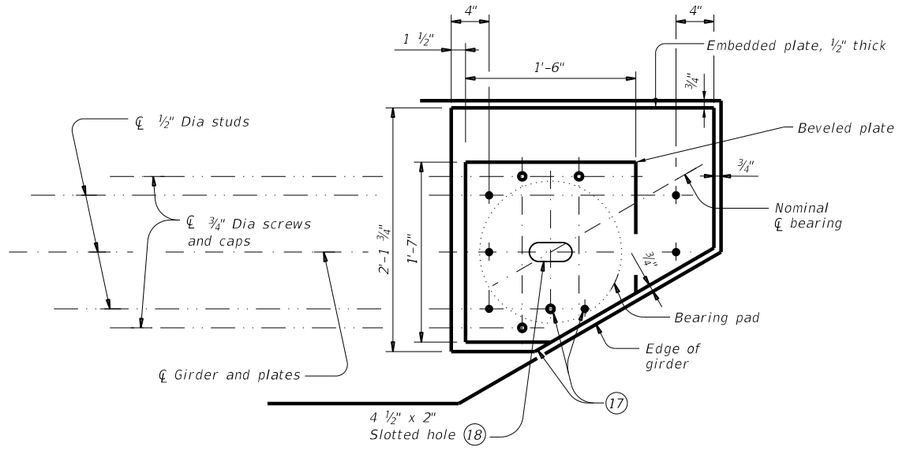


NORMAL GIRDER END
RECTANGULAR BEARING PAD

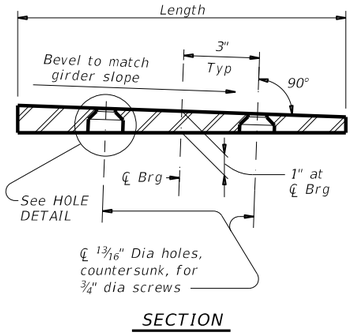


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

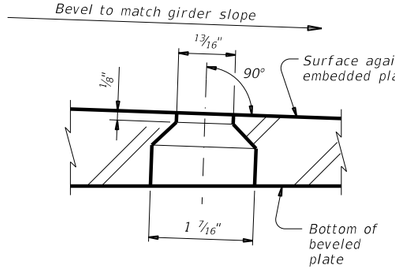


SKEWED GIRDER END
15" DIA BEARING PAD

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.

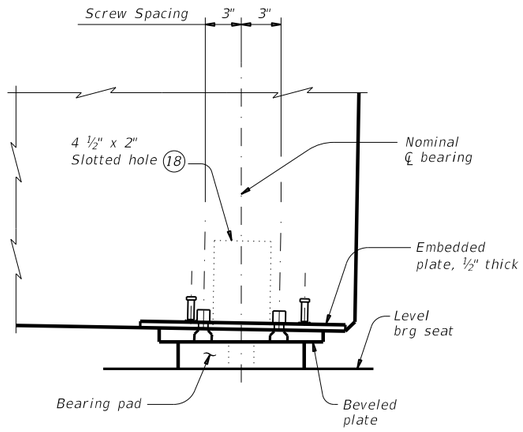
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

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

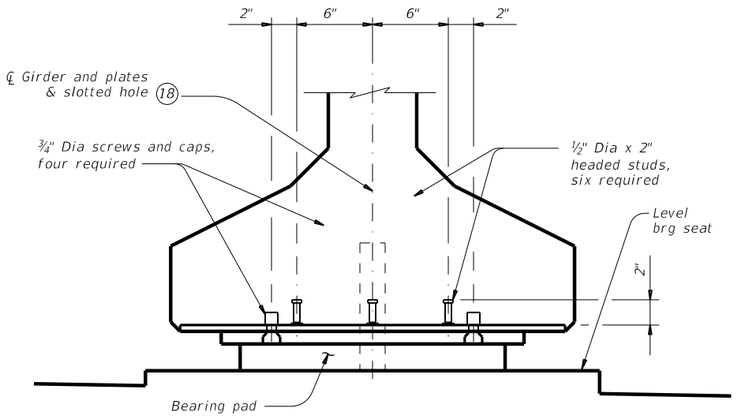
¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga 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

IGEB

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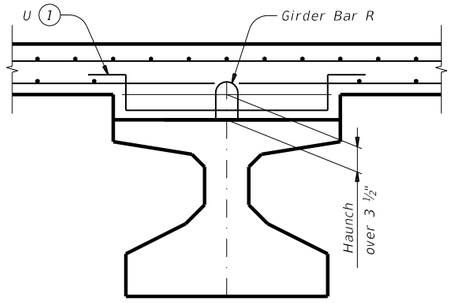
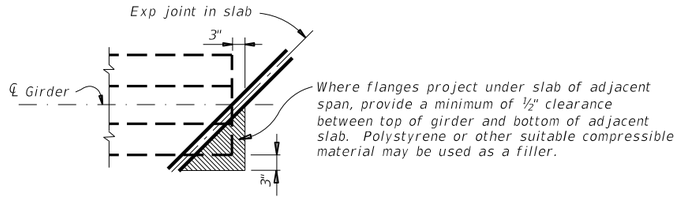
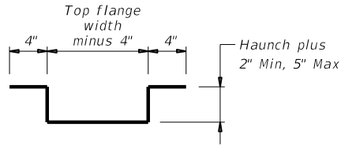


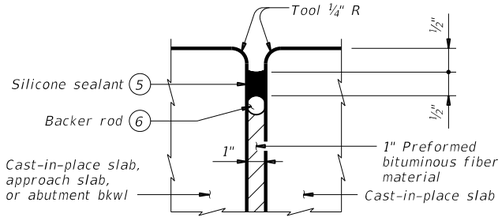
HAUNCH REINFORCING DETAIL



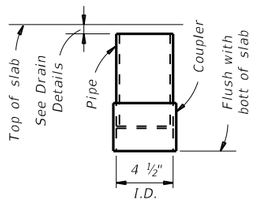
TREATMENT AT GIRDER END FOR SKEWED SPANS



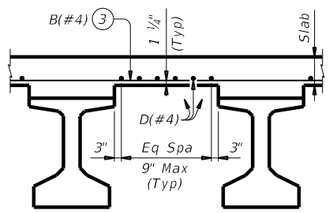
BARS U (#4)



TYPE A JOINT DETAIL (7)

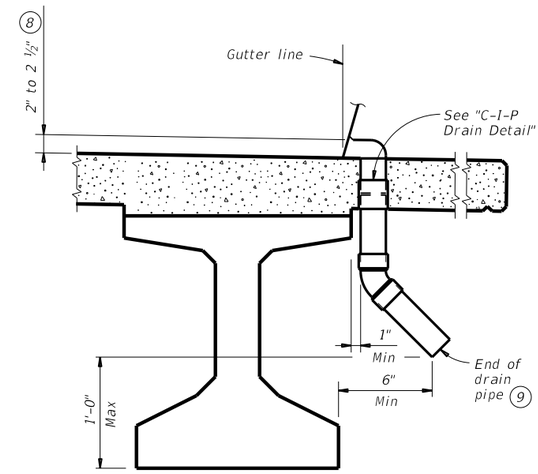


C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

(2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

(4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(5) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(6) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

(10) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

DECK FORMWORK NOTES:

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

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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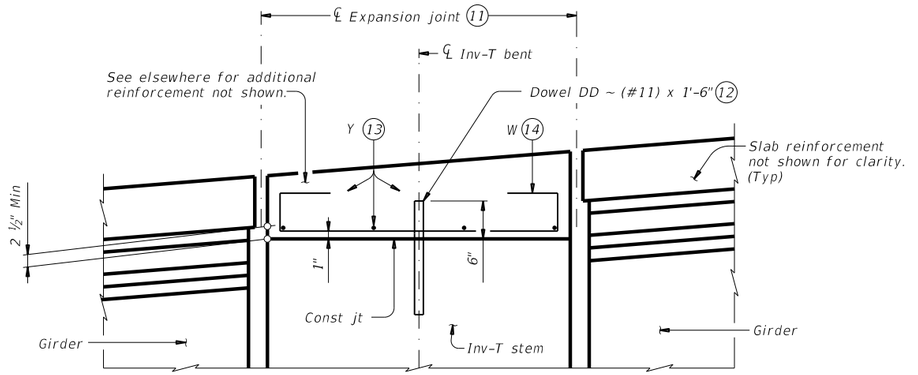
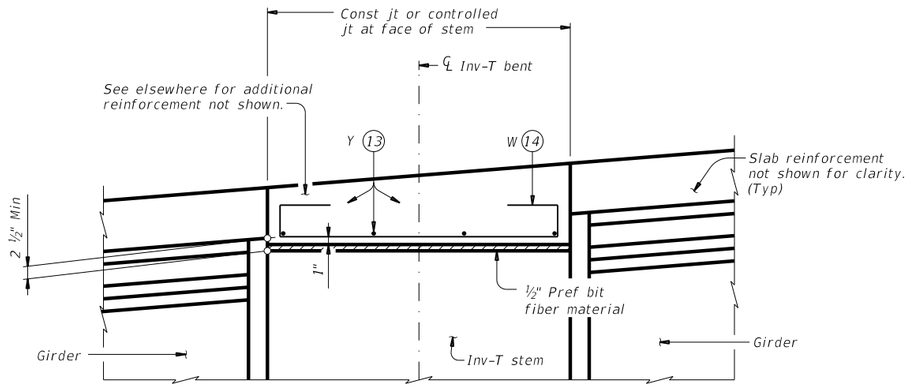
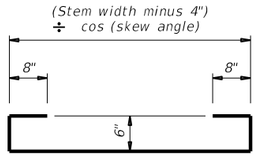


SHOWING EXPANSION JOINTS

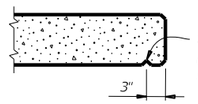


SHOWING CONST JTS OR CONTROLLED JTS

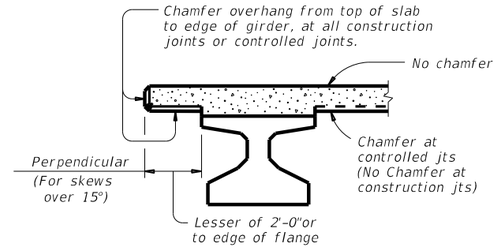
REINFORCEMENT OVER INV-T BENTS



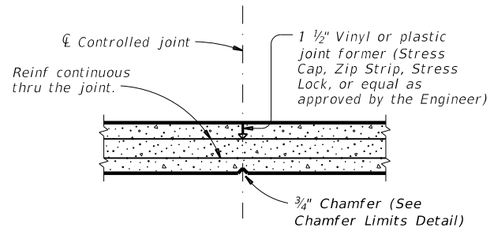
BARS W (#4)



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

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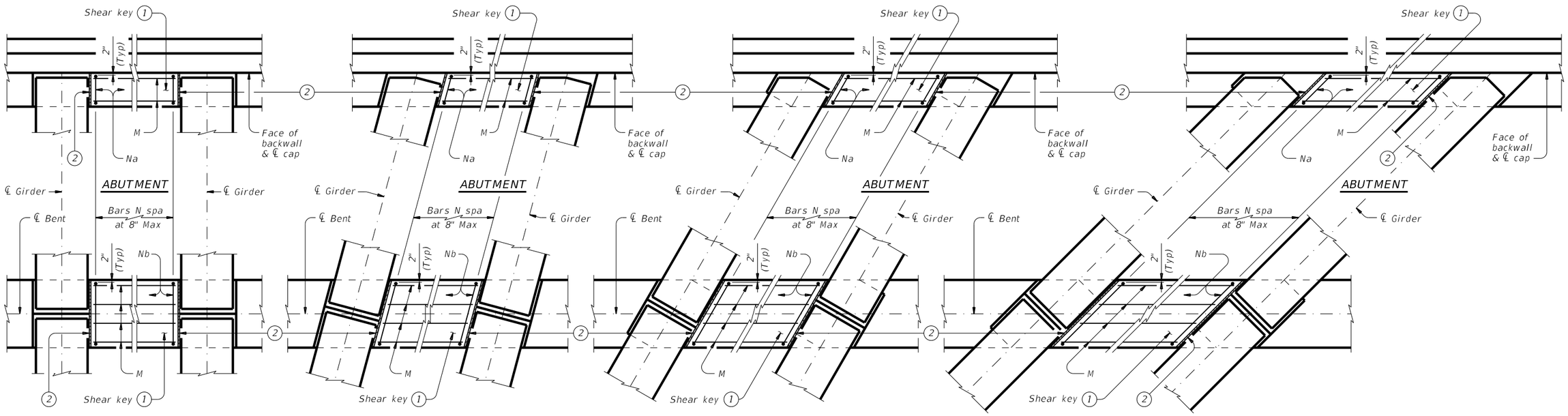


PARTIAL PLANS WITH NO SKEW

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.

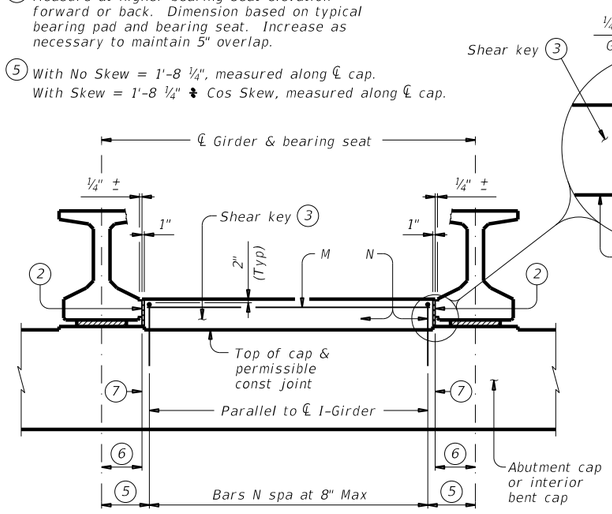
PARTIAL PLANS WITH 30° SKEW

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

PARTIAL PLANS WITH 45° SKEW

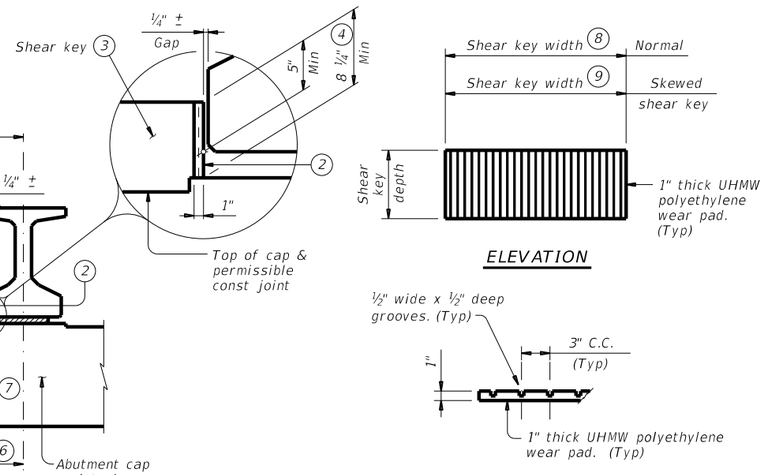
Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

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.

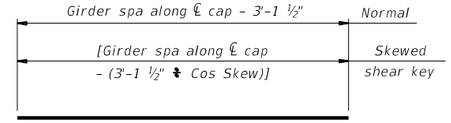


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP 1

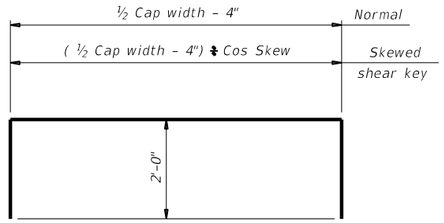
Showing shear key with girder Type Tx46. Other I-Girder types similar.



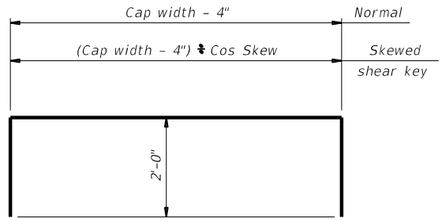
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



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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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
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	LRD	DUVAL		87

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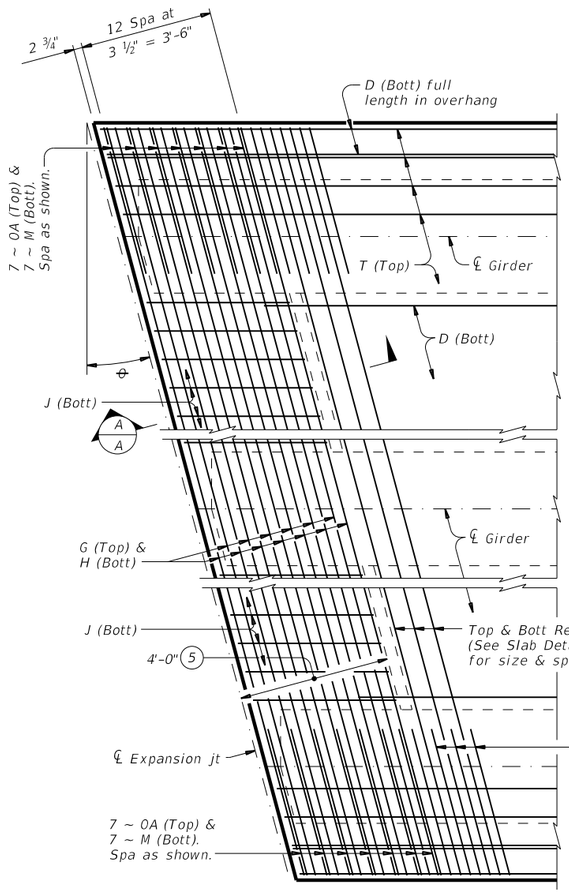
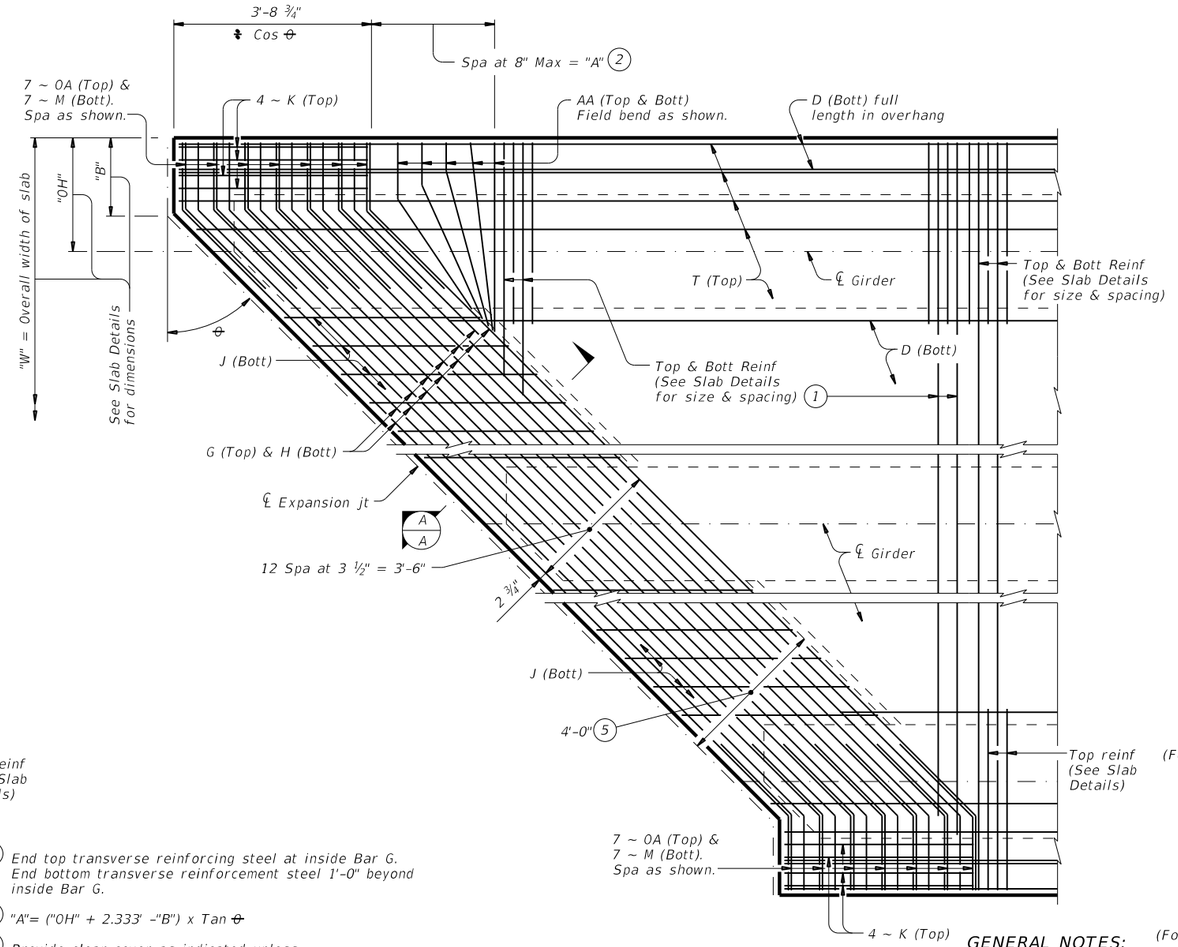
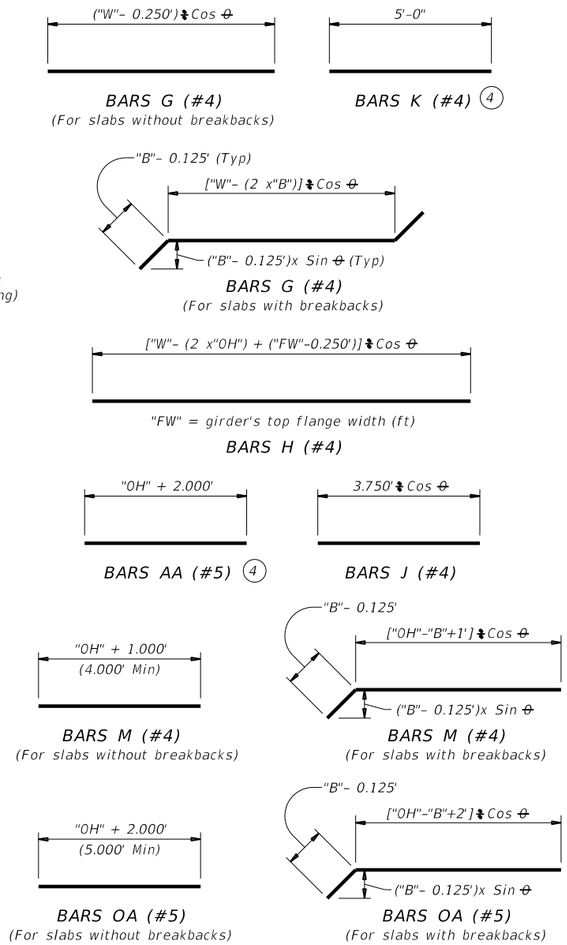


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

1. End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
2. "A"= ("OH" + 2.333' -"B") x Tan 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.



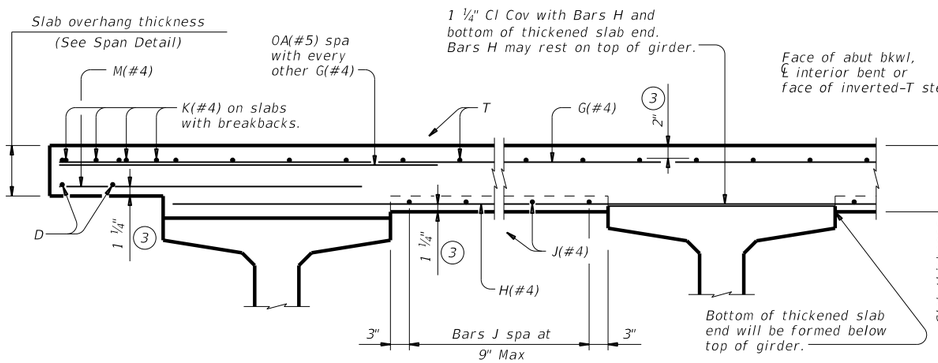
GENERAL NOTES:

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"

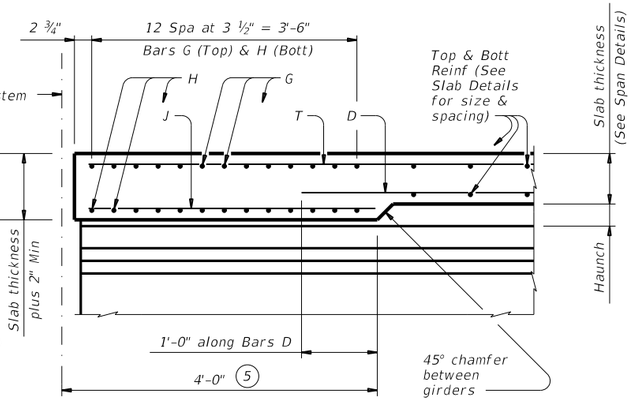
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



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

FILE: IG-IGTS-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
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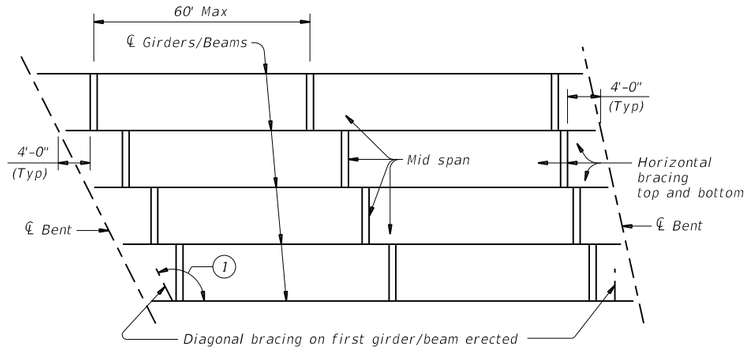
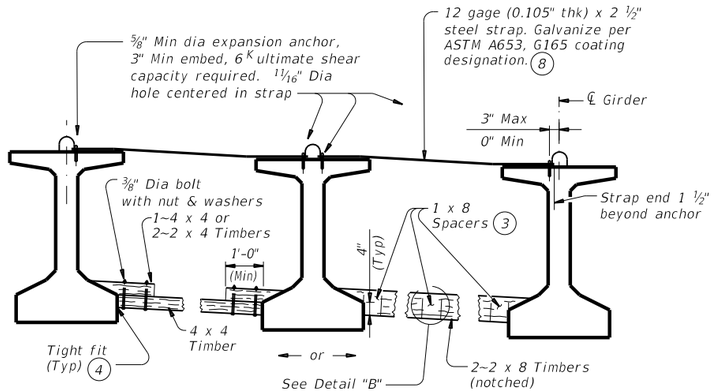
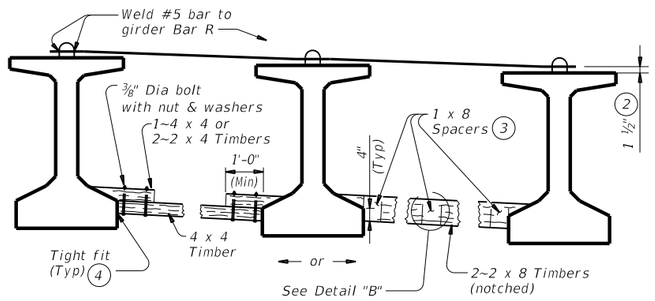


ERECTION BRACING



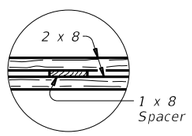
FOR ERECTION BRACING, OPTION 1

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



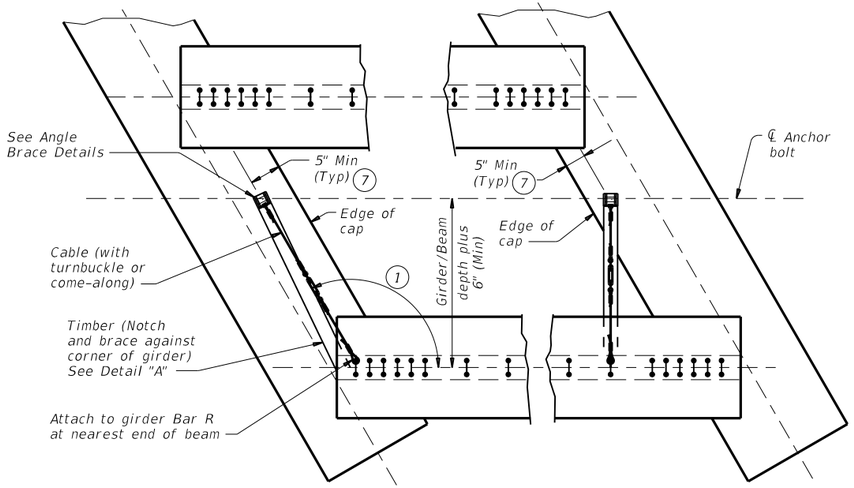
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

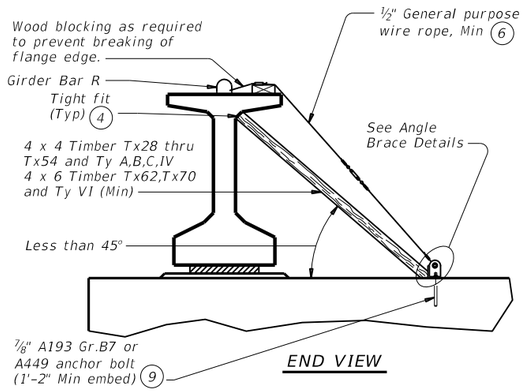


PLAN

DETAIL "B"



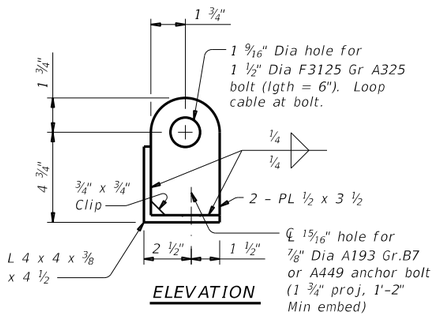
PLAN



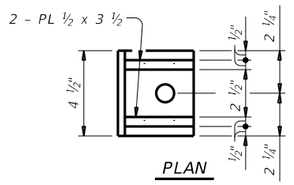
END VIEW

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.

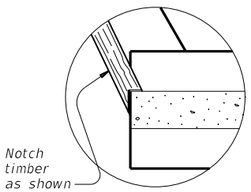
ERECTION BRACING:

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)

FILE: IG-MEBR(C)-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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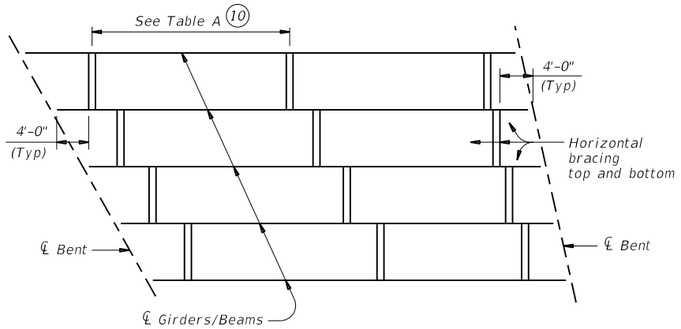


SLAB PLACEMENT BRACING

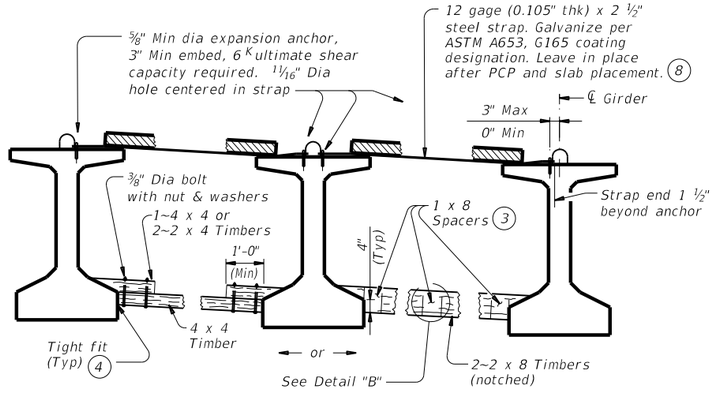
TABLE A

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

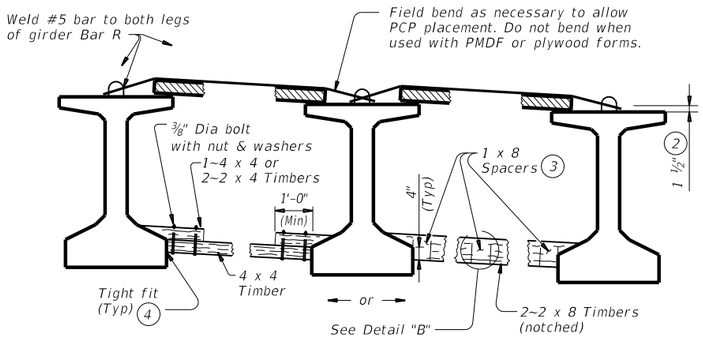
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

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

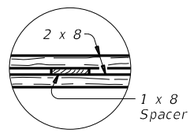
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)



PLAN

DETAIL "B"

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(10) Bracing spacing (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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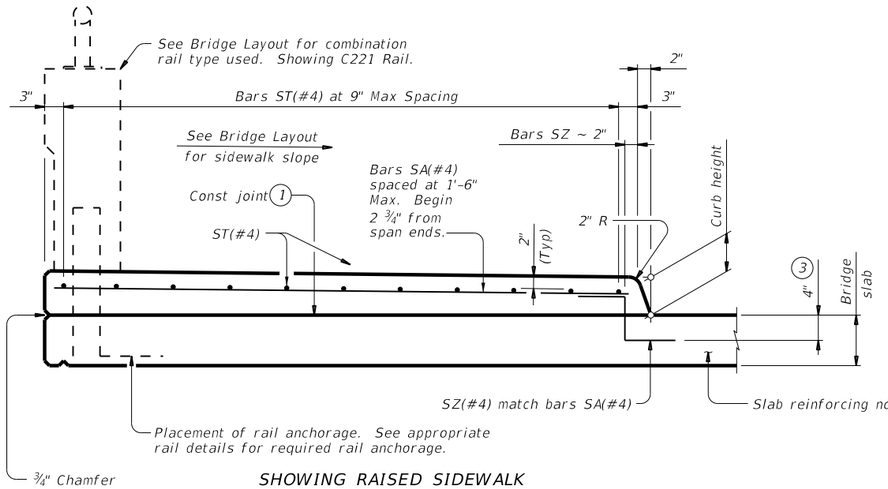
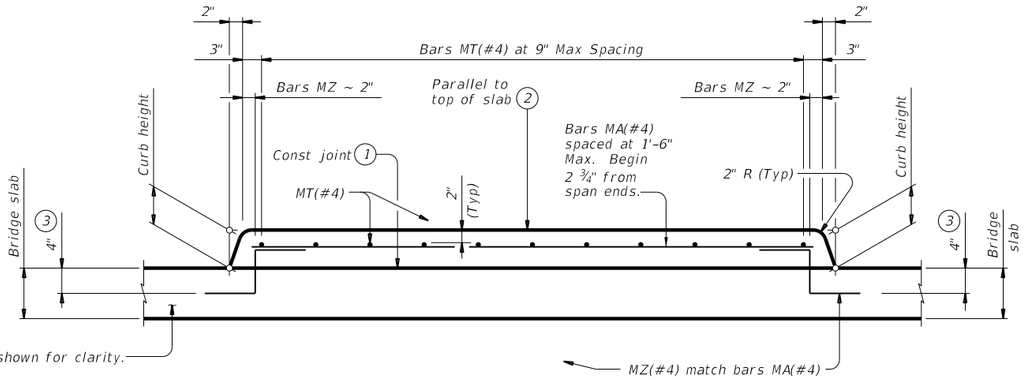


SHOWING RAISED SIDEWALK



SHOWING RAISED MEDIAN

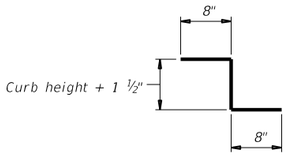
TYPICAL TRANSVERSE SECTIONS

See Span Details for dimensions not shown.

(1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.

(2) Unless noted otherwise on the span details.

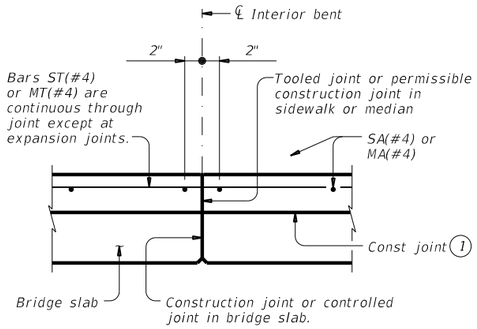
(3) Bars may rest on top of PCPs.



BARS SZ(#4) AND MZ(#4)

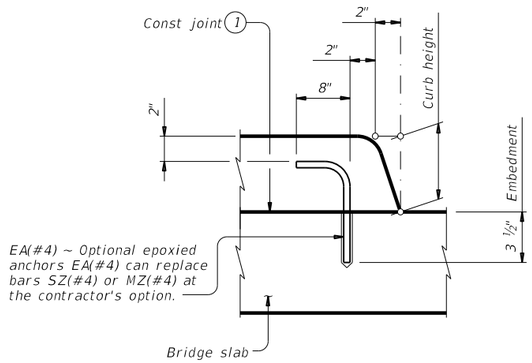
APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide drain cover plates fabricated with a product from this list. No exceptions are permitted.



LONGITUDINAL SECTION AT INTERIOR BENT

At bents with expansion joints, provide an open joint in the sidewalk/median matching the deck's joint width.



OPTIONAL EPOXY ANCHORS

Embed EA(#4) bar into concrete with a Type III (Class C, D, E, or F) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Follow manufacturer's directions for installing the epoxied anchor bars.

MATERIAL NOTES:

Provide the same concrete required for the bridge deck, Class S or Class S (HPC) concrete.

Provide Grade 60 reinforcing steel. Deformed welded wire reinforcement (WWR) meeting ASTM A1064 of equivalent size and spacing may be substituted for bars SA, ST, MA, and MT.

Provide epoxy coat or galvanize reinforcement if bridge deck reinforcement is required to be epoxy coated or galvanized.

Provide hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Chamfer or round edges approximately 1/16" prior to galvanizing.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide the following bar or wire lap lengths when required:
- Uncoated, 1'-7" Min
- Coated, 2'-5" Min

Submittal and approval of drain cover plate shop drawings is not required if fabrication is accordance with these details.

Raised sidewalks will be paid under Item 422 by the SF of Bridge Sidewalk or Bridge Sidewalk (HPC). Raised medians will be paid under Item 422 by the SF of Bridge Median or Bridge Median (HPC).

Payment for drain cover plates will be by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures". Weight of one drain cover plate is 48 plf.

DESIGNER NOTES:

These details do not apply for longitudinal grades exceeding 5 percent.

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

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

BRSM

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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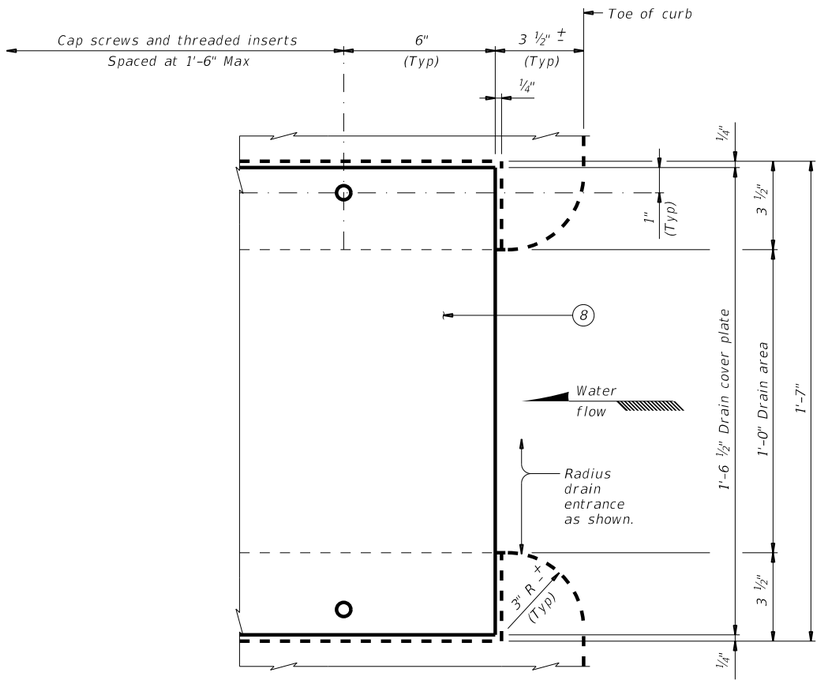
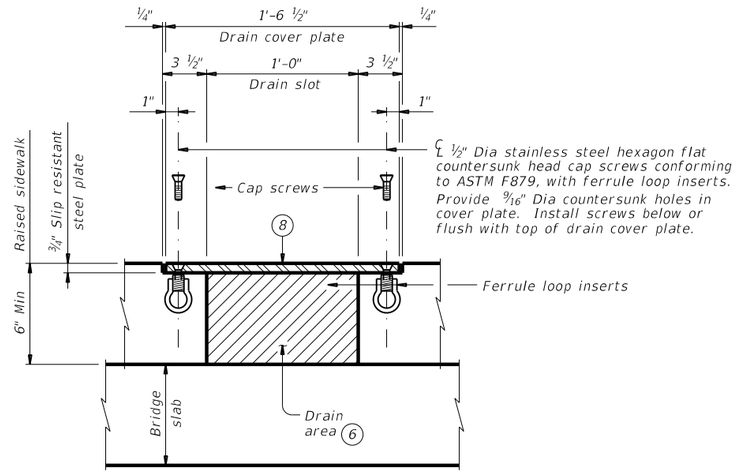
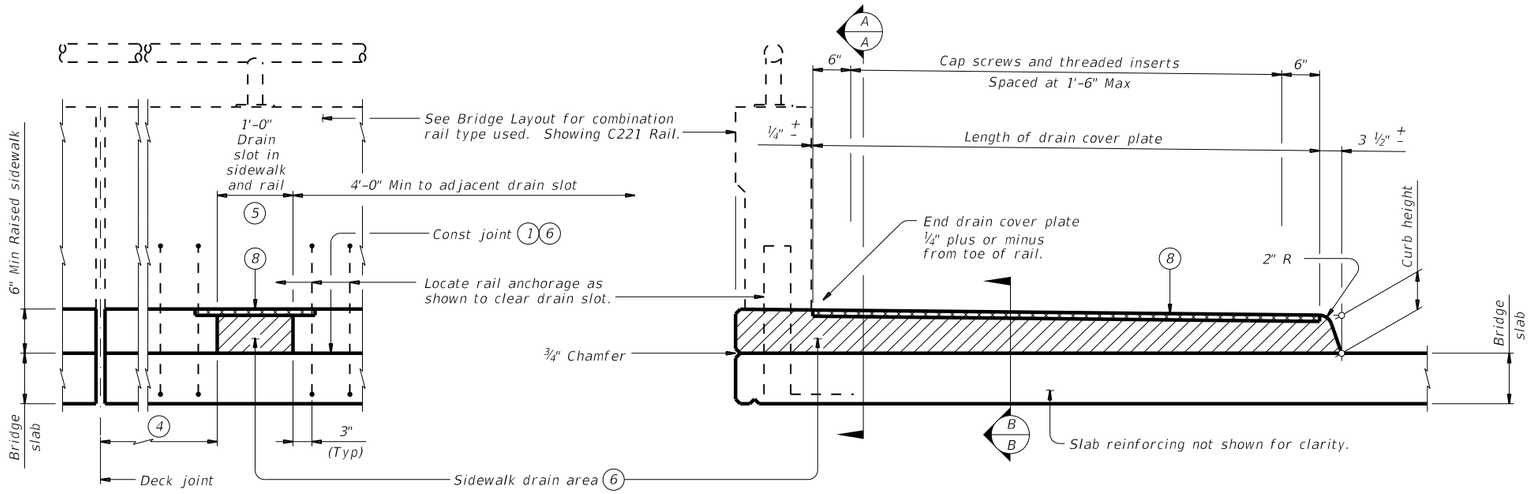


PARTIAL PLAN CURB DRAIN



SECTION B-B

Reinforcing not shown for clarity.



SECTION A-A

SHOWING RAISED SIDEWALK WITH DRAIN SLOT

OPTIONAL DRAIN DETAILS 7

(1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.

(4) 3'-0" Min at deck expansion joints, deck construction joints or controlled joints, rail intermediate wall joints or from face of substructure.

(5) For rail Type C1W, center drain slots between posts.

(6) Steel trowel top surface of bridge deck in drain locations.

(7) Provide sidewalk drains where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. Place drain and cover plate perpendicular to toe of rail.

(8) Drain cover plate (PL ¾ x 18 ½ slip resistant steel plate). Install flush with top of sidewalk.

Texas Department of Transportation

Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

BRSM

FILE: MS-BRSM-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		92

DATE: 6/20/2024 1:39:31 PM
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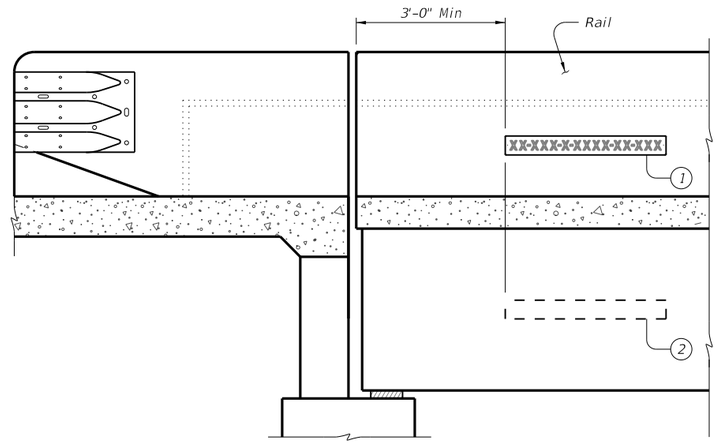
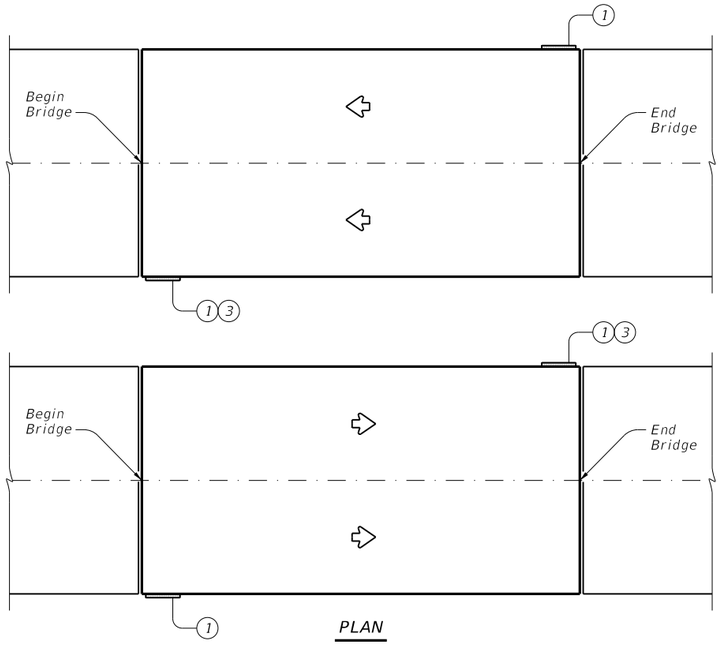
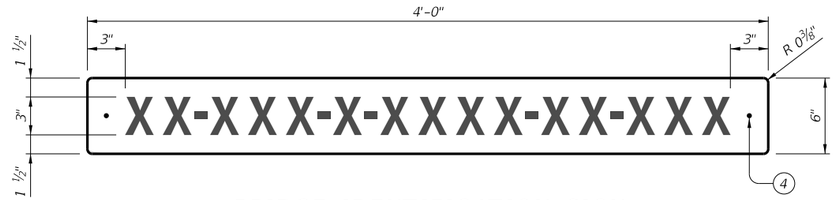


ELEVATION

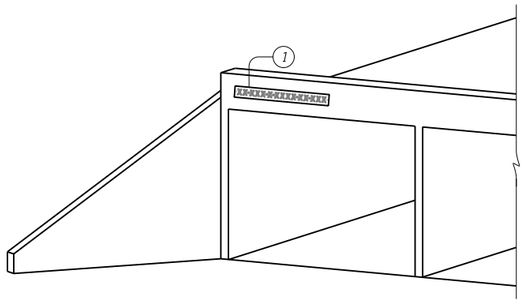


PLAN

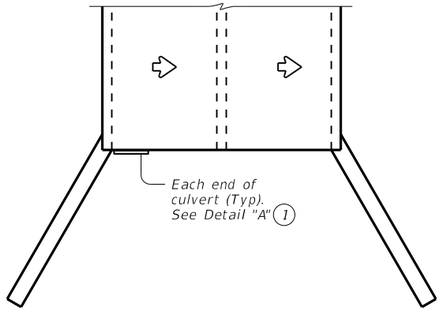
BRIDGE SIGN LOCATIONS



BRIDGE IDENTIFICATION SIGN

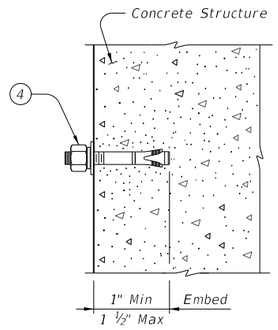


DETAIL "A"



PLAN

BRIDGE CLASS CULVERT SIGN PLACEMENT



ANCHOR DETAIL

SHEETING REQUIREMENTS		
Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

(1) Bridge identification sign location

(2) Alternate sign placement location for exterior concrete beams.

(3) If adjacent bridges are less than 2 feet apart, these signs may be omitted.

(4) ¼" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

SIGN NOTES:

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

MATERIAL NOTES:

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide ¼" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environments, provide both stainless steel anchor bodies and expansion wedges.

GENERAL NOTES:

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

Texas Department of Transportation

Bridge Division Standard

NBIS BRIDGE IDENTIFICATION SIGN STANDARD

NBIS

FILE: MS-NBIS-23.dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		93

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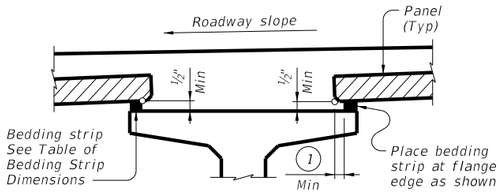
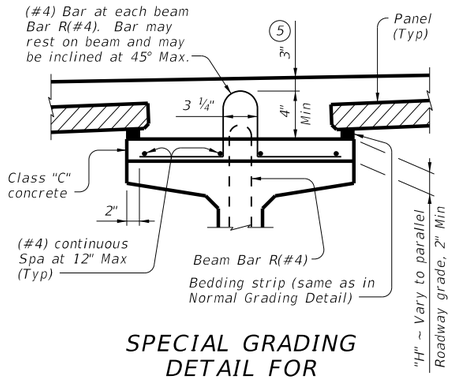


NORMAL GRADING DETAIL (3)

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



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

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

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-girders, 1 ½" Min for all other beam types.

(2) Allowed for prestressed concrete I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

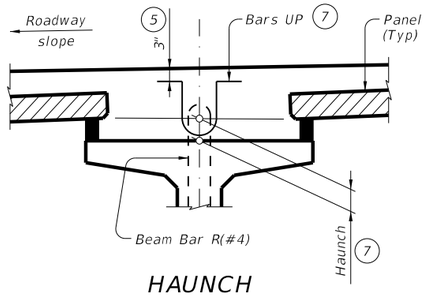
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

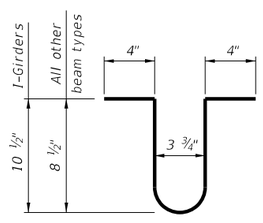
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

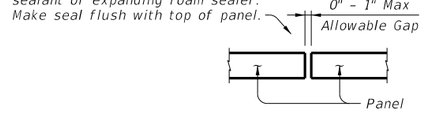


HAUNCH REINFORCING DETAIL

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

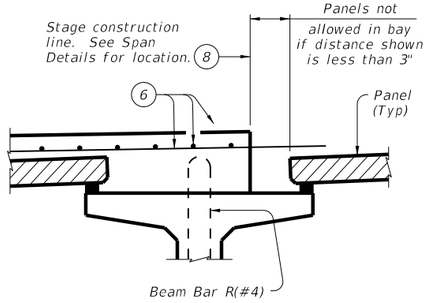


BARS UP (#4) (7)

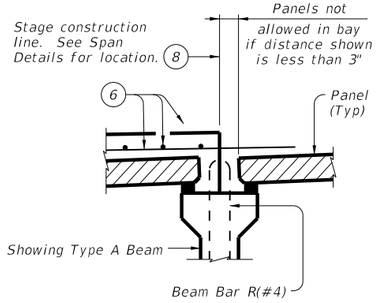


PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



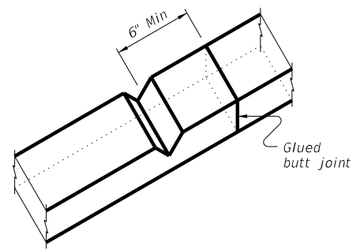
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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3/2023: Removed top flange tension limit.	DIST	COUNTY		SHEET NO.
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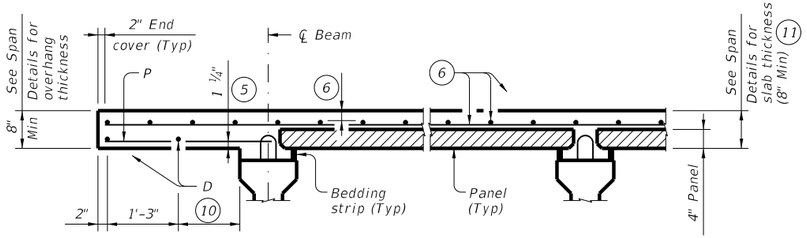
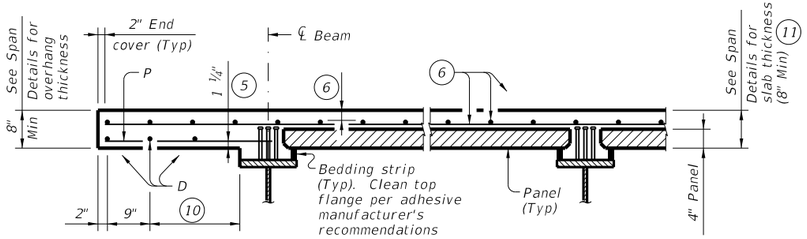
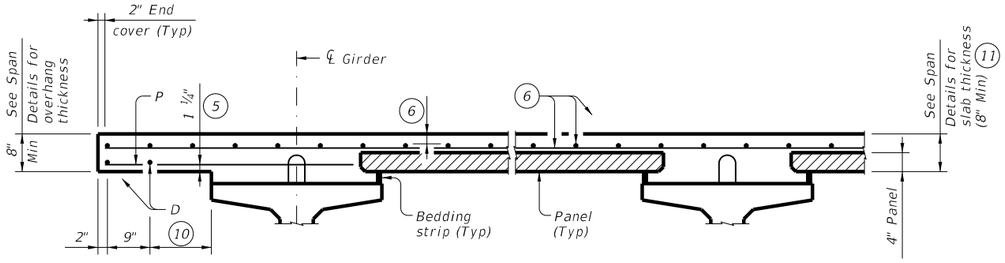


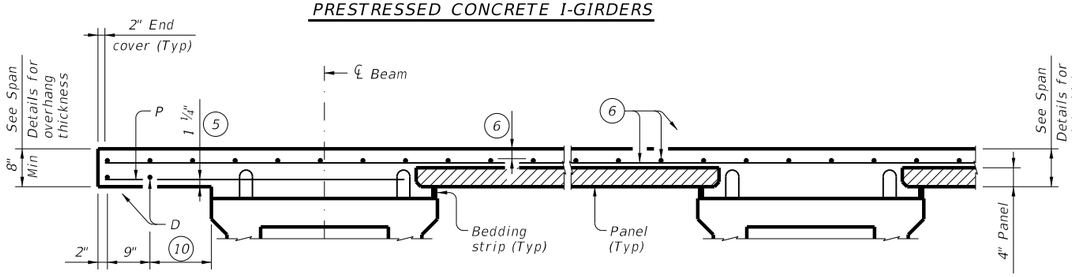
PRESTRESSED CONCRETE I-BEAMS



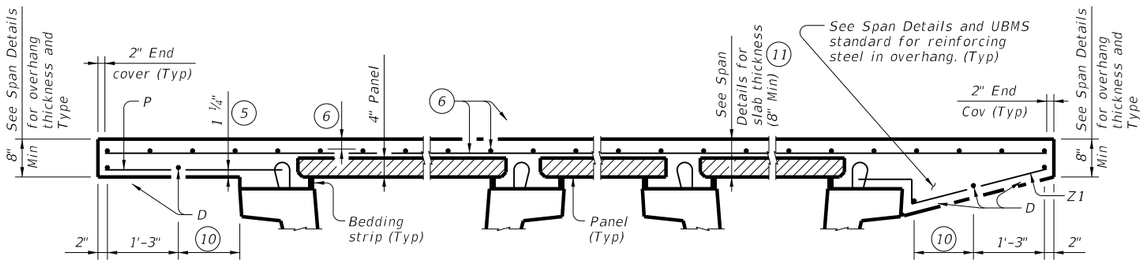
STEEL BEAMS (13)



PRESTRESSED CONCRETE I-GIRDERS



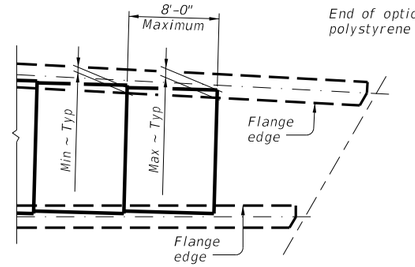
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

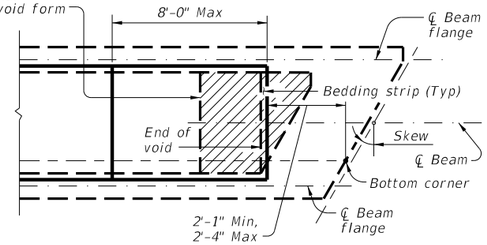
TYPICAL PART TRANSVERSE SECTIONS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS



AT FLARED BEAMS OR GIRDERS

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



OVER CONC U-BEAMS

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.

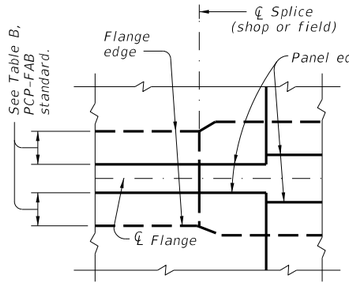
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

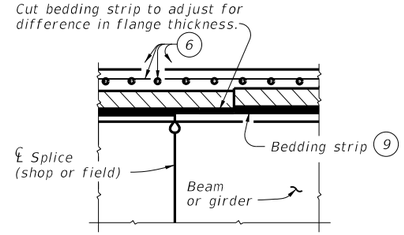
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Panels are allowed over top tension flanges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



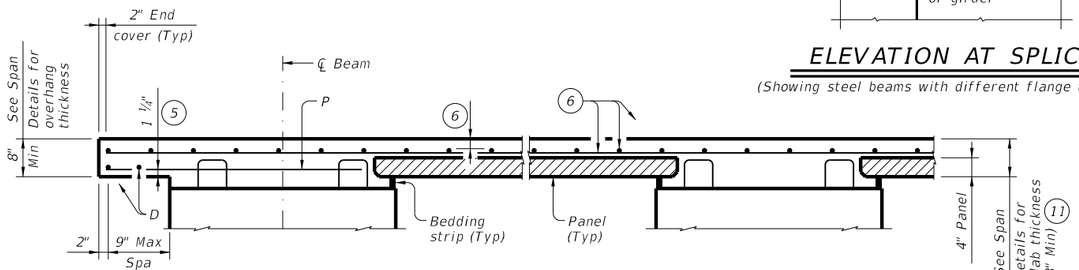
PLAN AT SPLICE

(Showing steel beams with flange width transition)



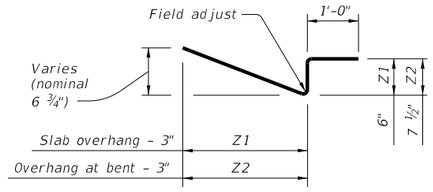
ELEVATION AT SPLICE

(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)

HL93 LOADING SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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3/2023: Removed top flange tension limit.	DIST	COUNTY		SHEET NO.
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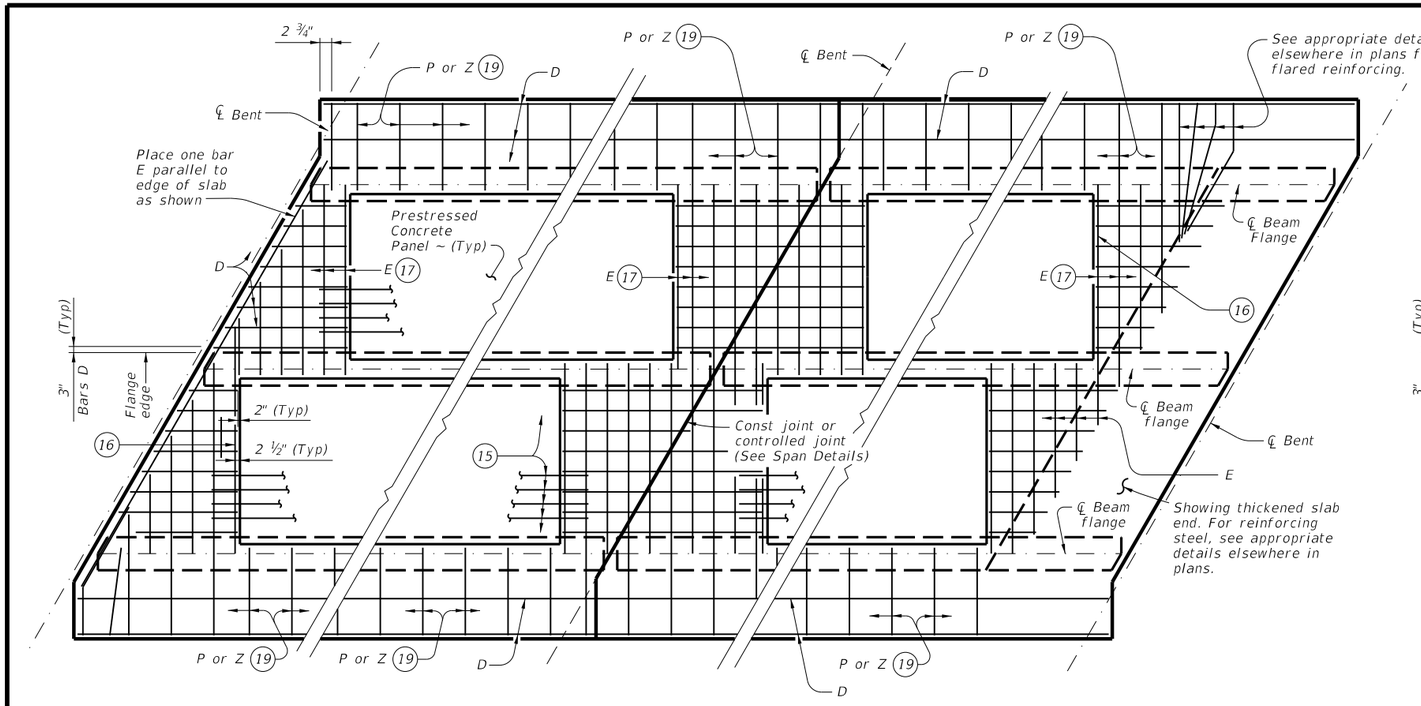
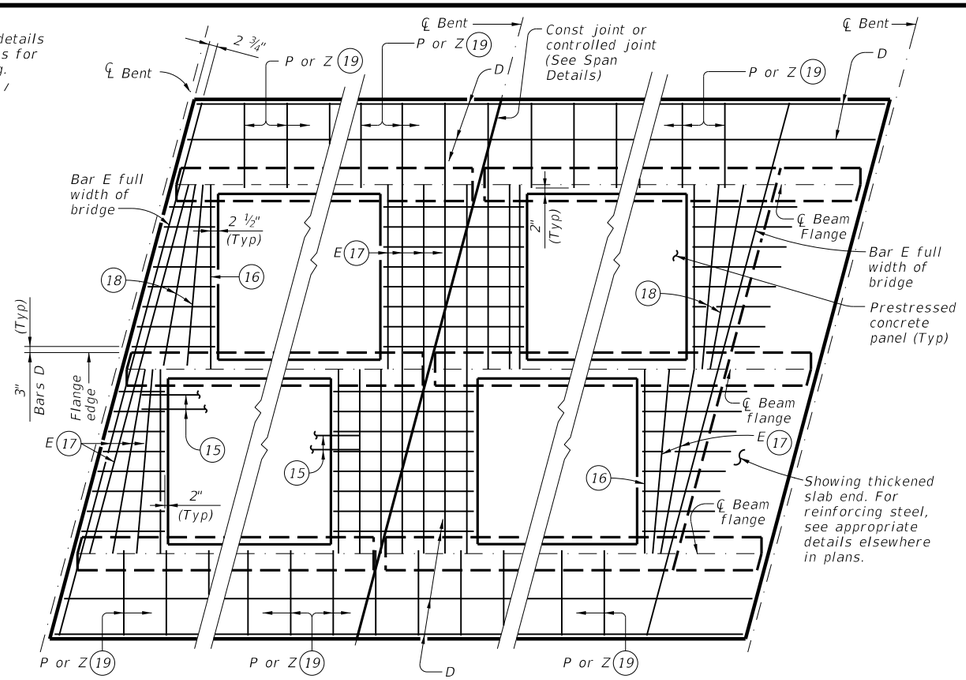


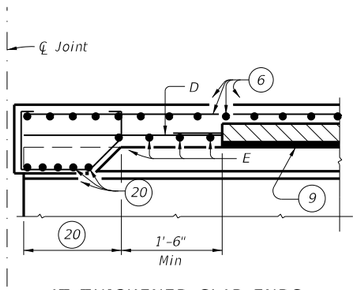
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

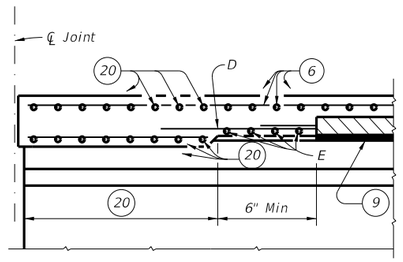


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

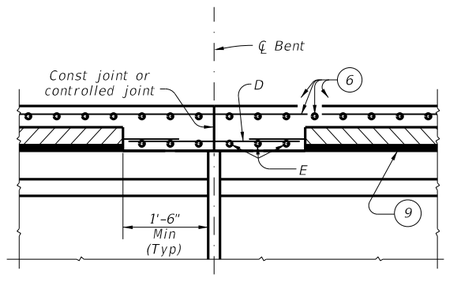
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



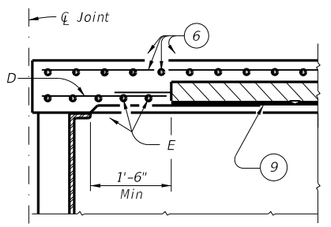
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE U-BEAMS



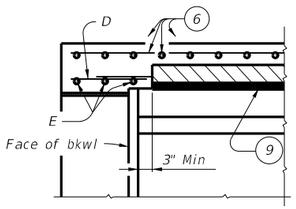
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE I-BEAMS AND STEEL BEAMS



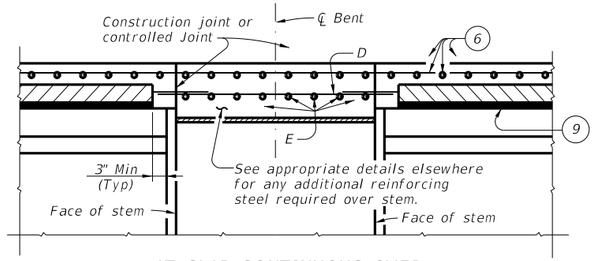
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BEAMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BEAMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BEAMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BEAMS

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

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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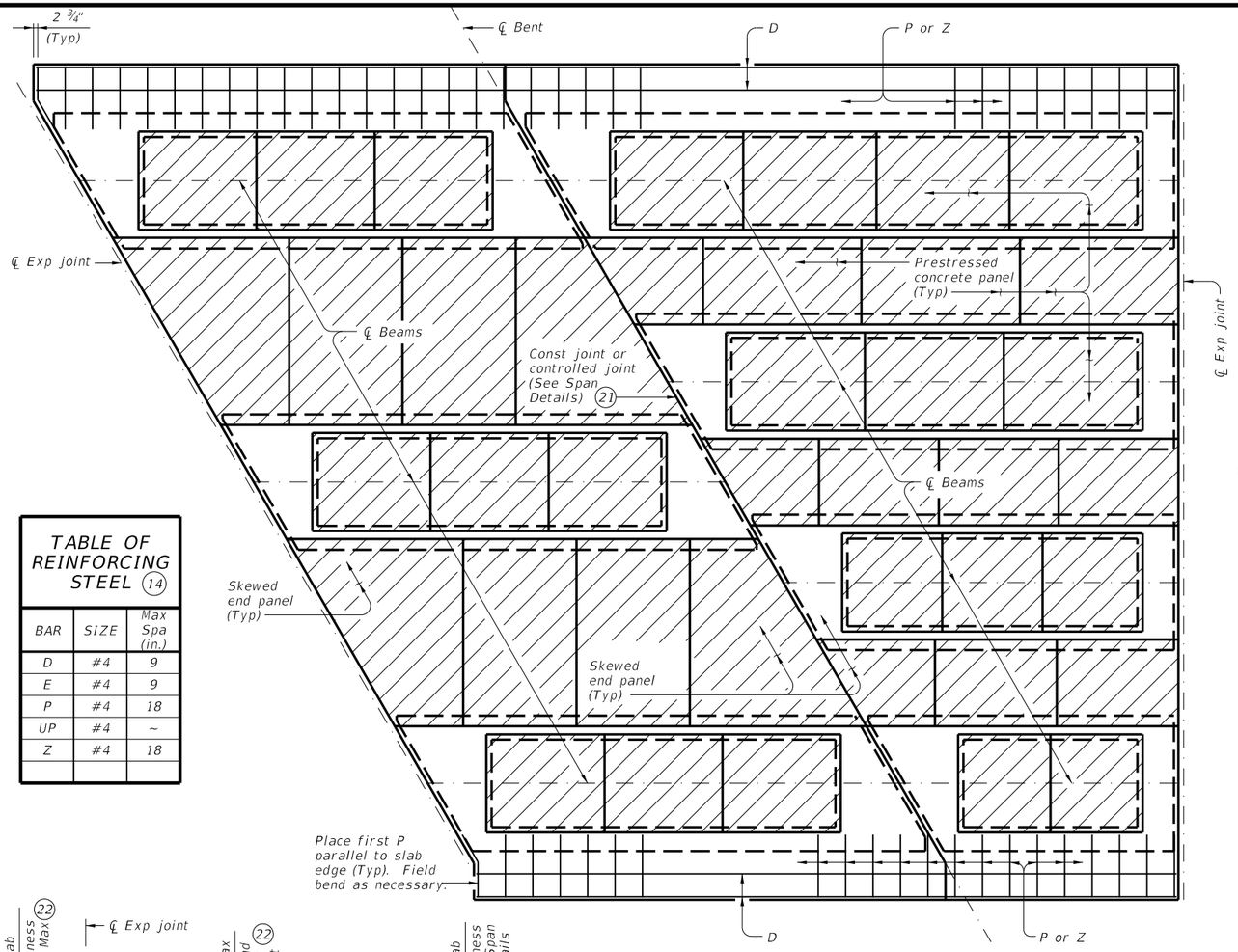
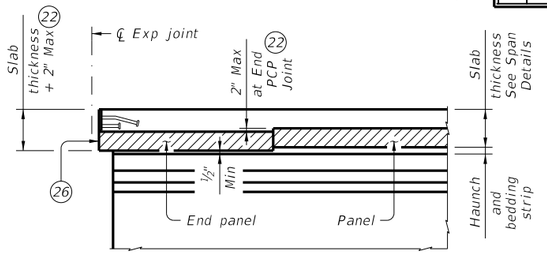


OPTION 2 ~ PLAN OF SLAB

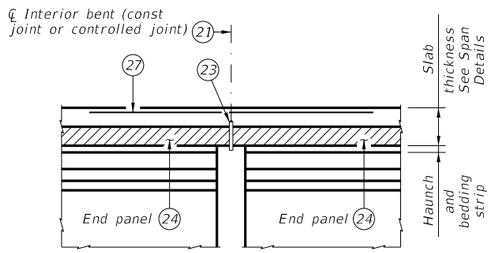
(Showing U-Beams; other beams similar)

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



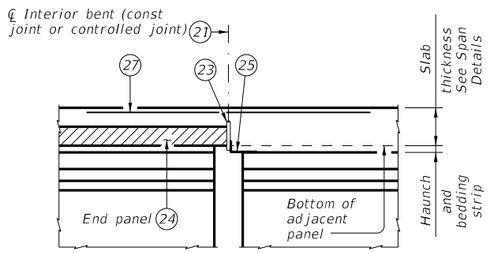
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



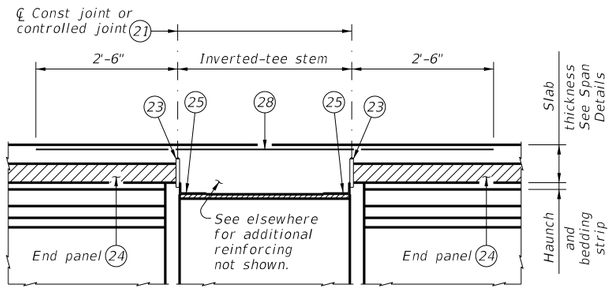
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

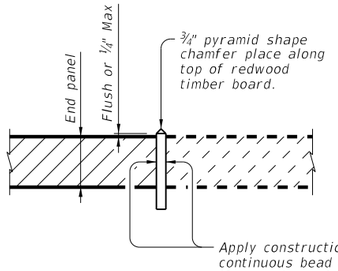
Panel against beam/girder end in adjacent span.



INVERTED-T BENT

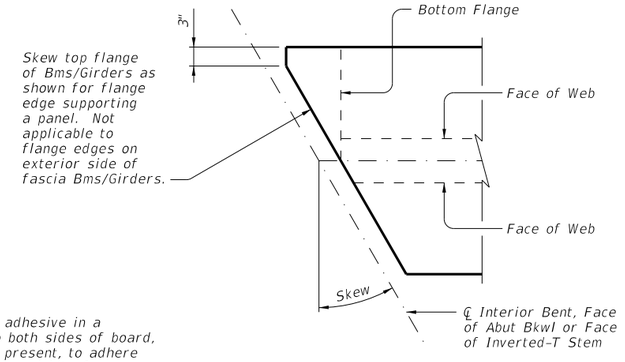
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



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

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab Bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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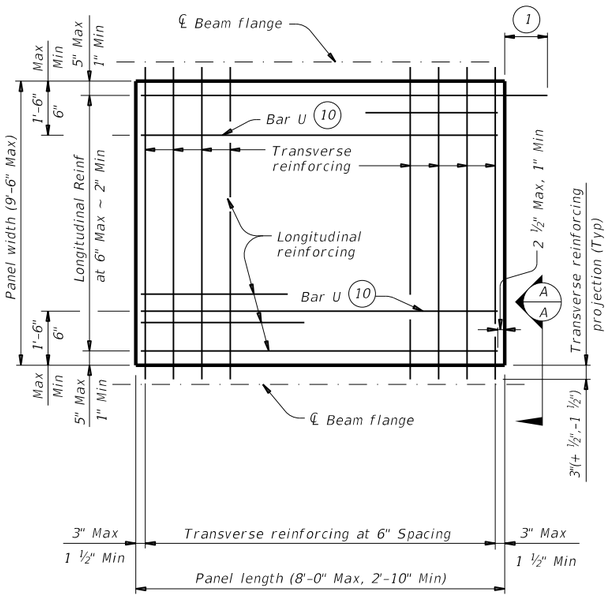
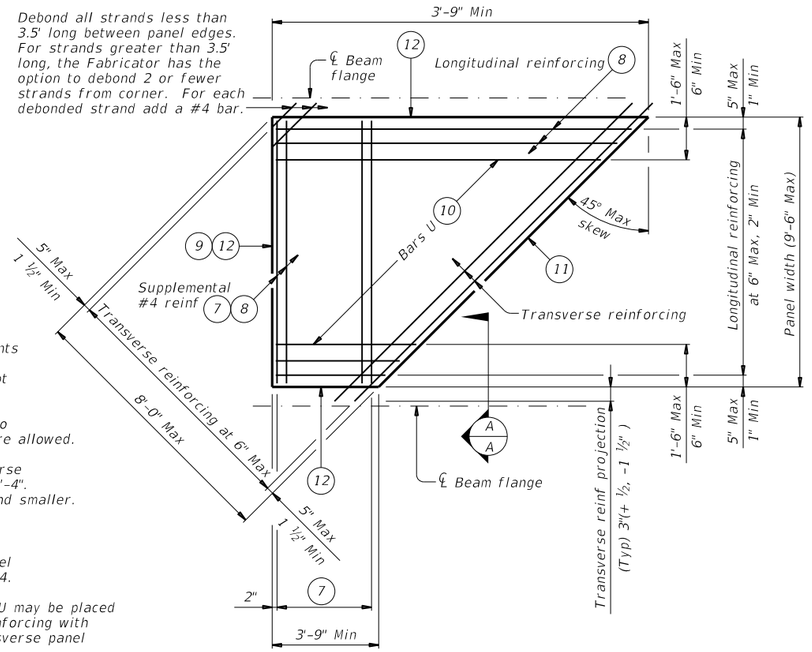


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

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

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. 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.

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.

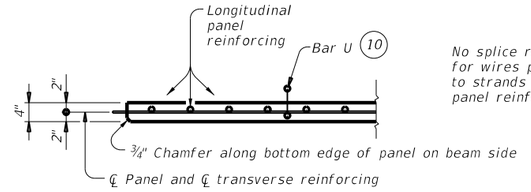
LONGITUDINAL PANEL REINFORCEMENT:

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.

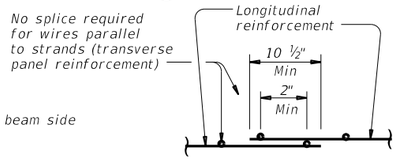
No combination of longitudinal reinforcement options in a panel is allowed.

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.

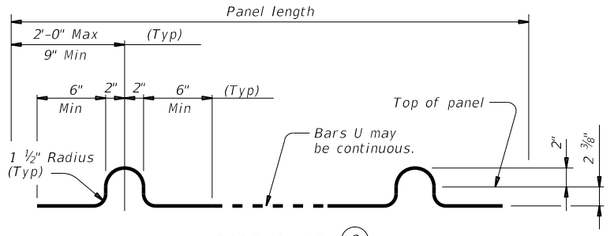


SECTION A-A

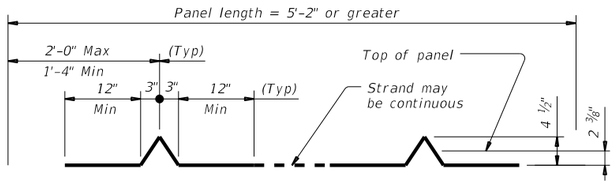
(Not showing supplemental #4 bars for skewed end panels.)



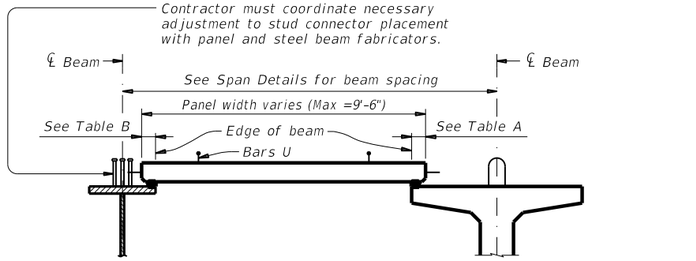
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



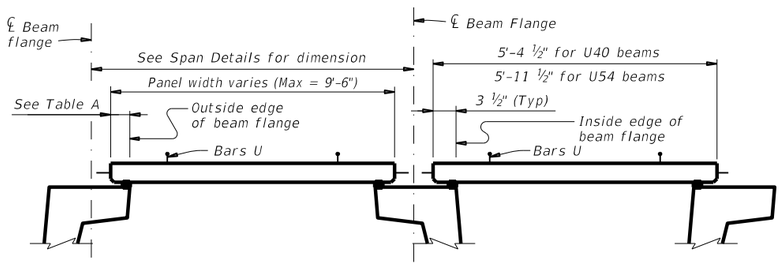
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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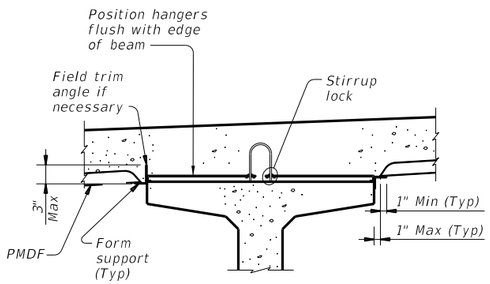
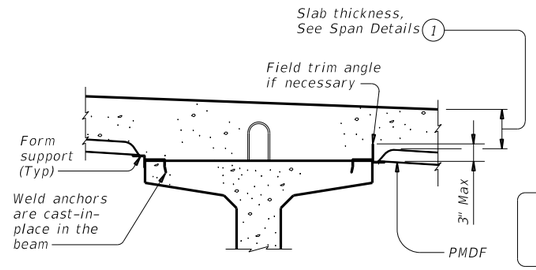
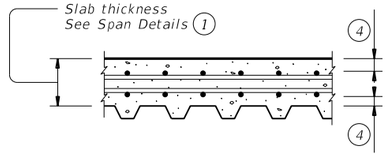


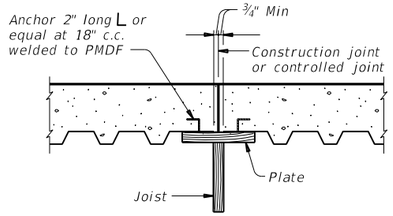
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

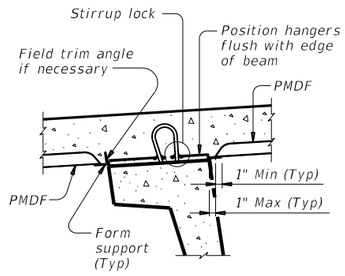


TYP LONGITUDINAL SLAB SECTION

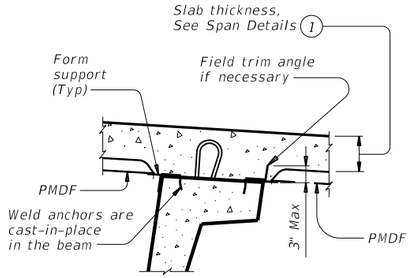


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

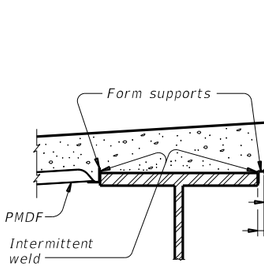
SECTION THRU CONSTRUCTION JOINT



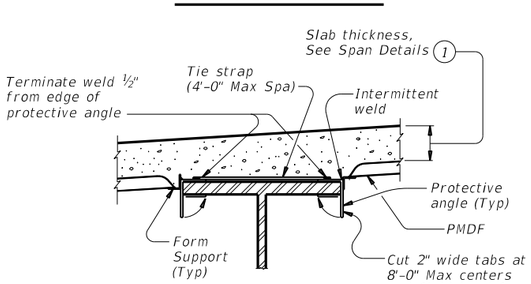
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

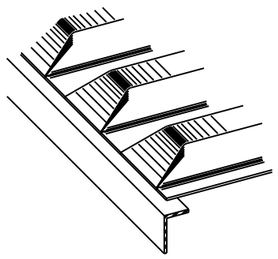


STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



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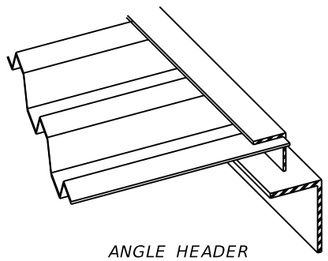
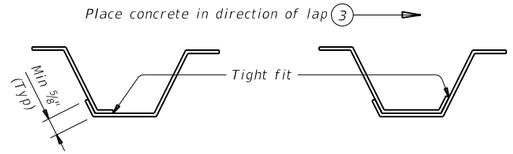


ANGLE HEADER

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'.

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

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

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

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PERMANENT METAL DECK FORMS

PMDF

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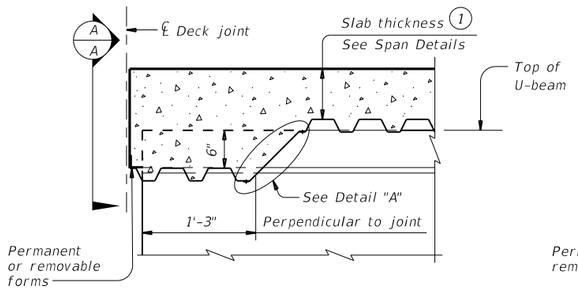
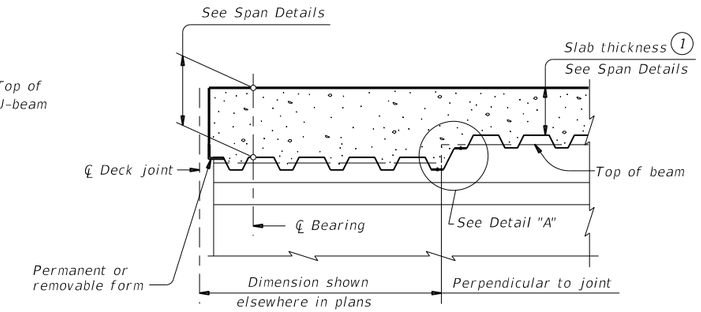
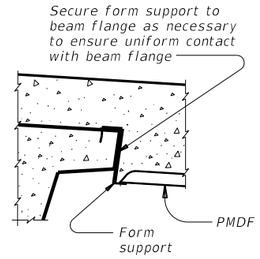


AT THICKENED SLAB END FOR U-BEAMS

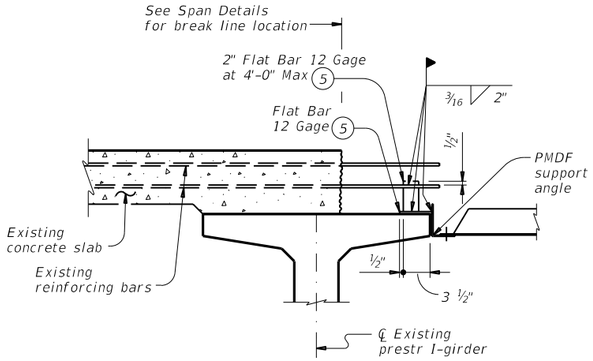


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

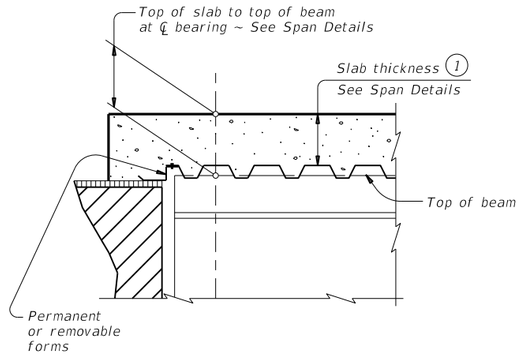
Showing I-beam block-out. No block-out for I-girders or steel beams.



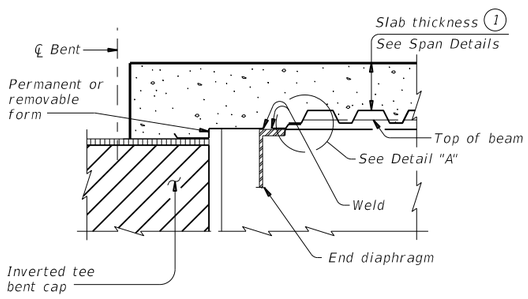
SECTION A-A



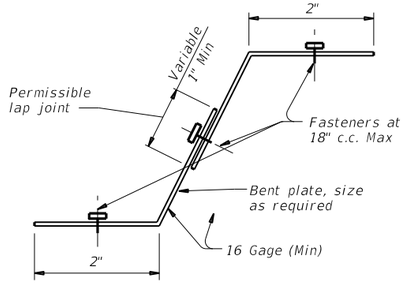
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



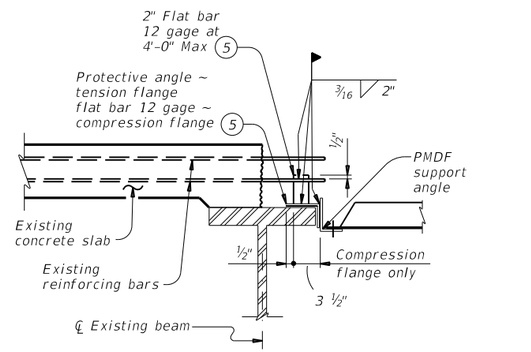
AT SLAB OVER ABUTMENT BACKWALL OR INVERTED-T STEM FOR CONCRETE BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INVERTED-T STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

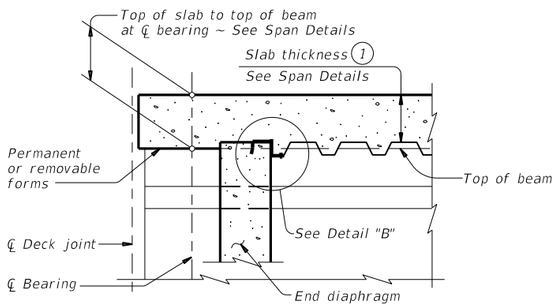


DETAIL "A"

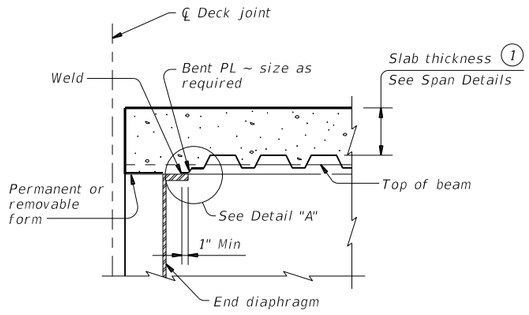


SHOWING STEEL BEAMS

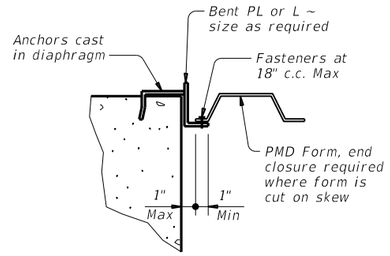
WIDENING DETAILS



AT CONCRETE 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

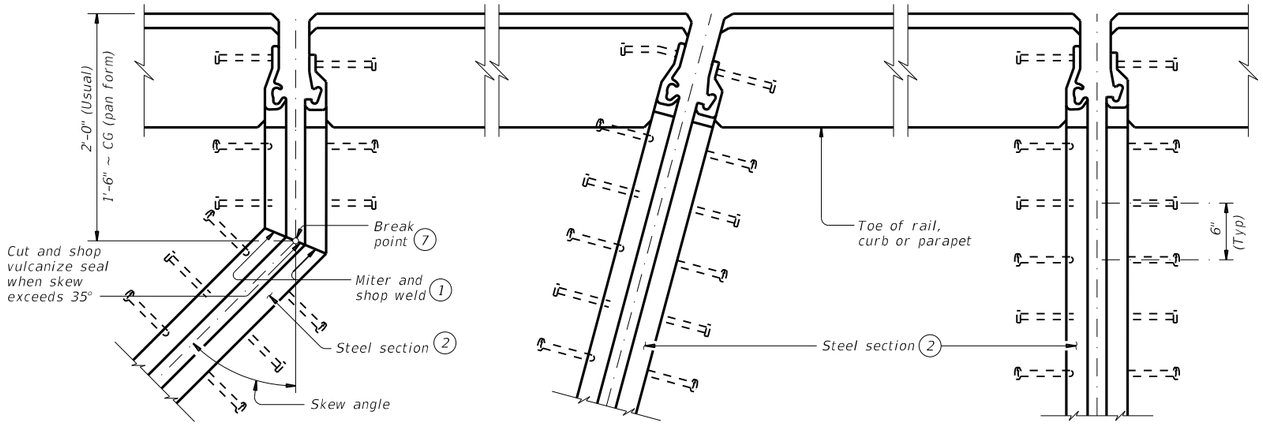
Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	LRD	DUVAL		100

DATE: 6/20/2024 1:39:53 PM
FILE: c:\bms\Vidcus-pw-01\copy of jivesh.kumar\dms07598\MS-SEJ-M-19.dgn

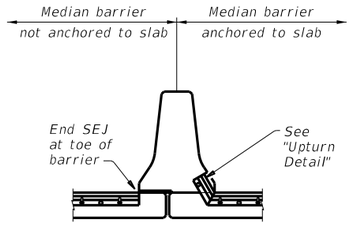


SHOWING SKEWS WITH SLAB BREAKBACKS

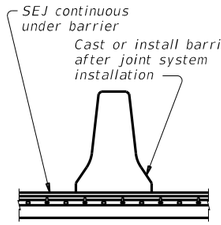
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

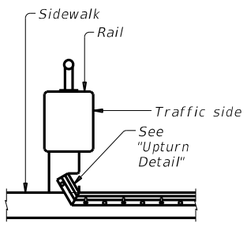
PLANS OF END CONDITIONS



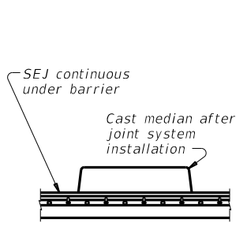
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



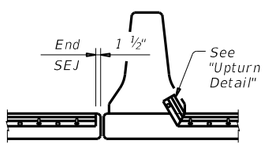
AT MEDIAN BARRIER



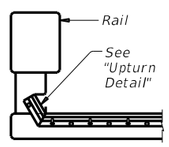
AT SIDEWALK BEHIND BRIDGE RAIL



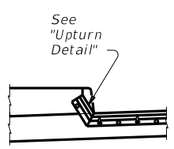
AT RAISED MEDIAN



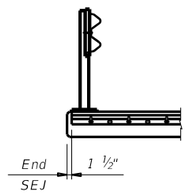
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

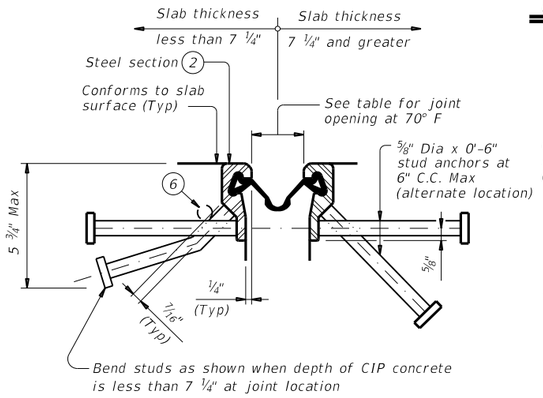


AT SIDEWALK

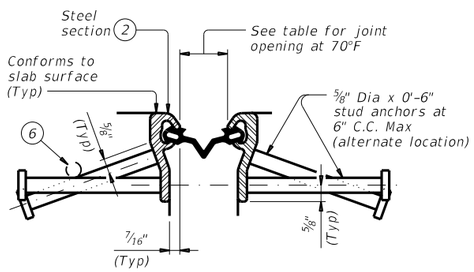


AT STEEL POST BRIDGE RAIL

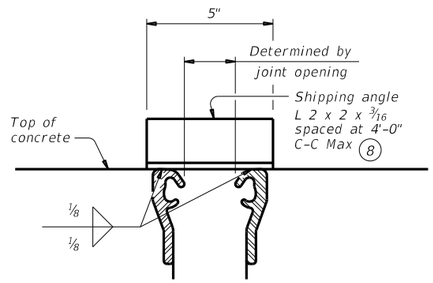
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

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

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

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

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

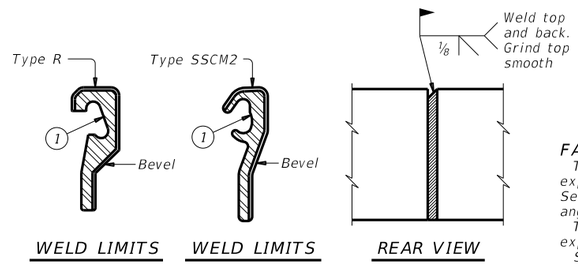
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

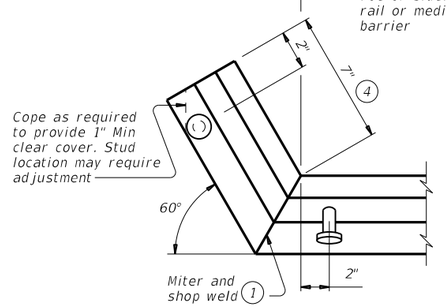
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min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

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

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



UPTURN DETAIL

CONSTRUCTION NOTES:

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

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

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: MS-SEJ-M-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
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	LRD	DUVAL		101

DATE: 6/20/2024 1:39:58 PM
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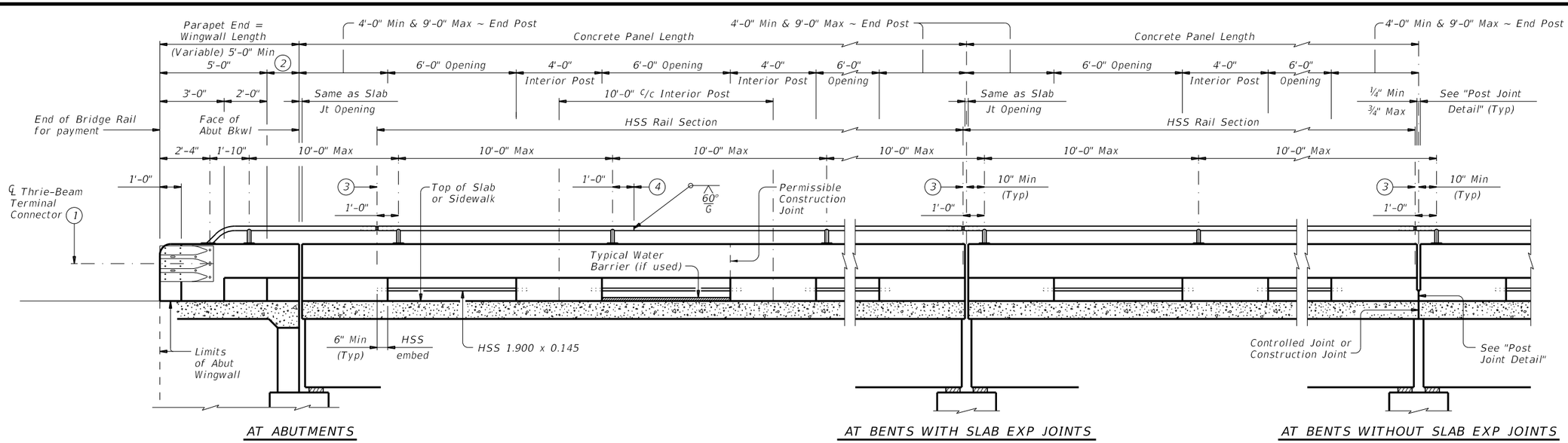

AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE

(Showing without raised sidewalk)

AT STRAIGHT OR FLARED WINGS | AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) ℄ Splice joint or expansion joint

(4) One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single V groove. Grind smooth.

SHEET 1 OF 4

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223

FILE: RL-C223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		102

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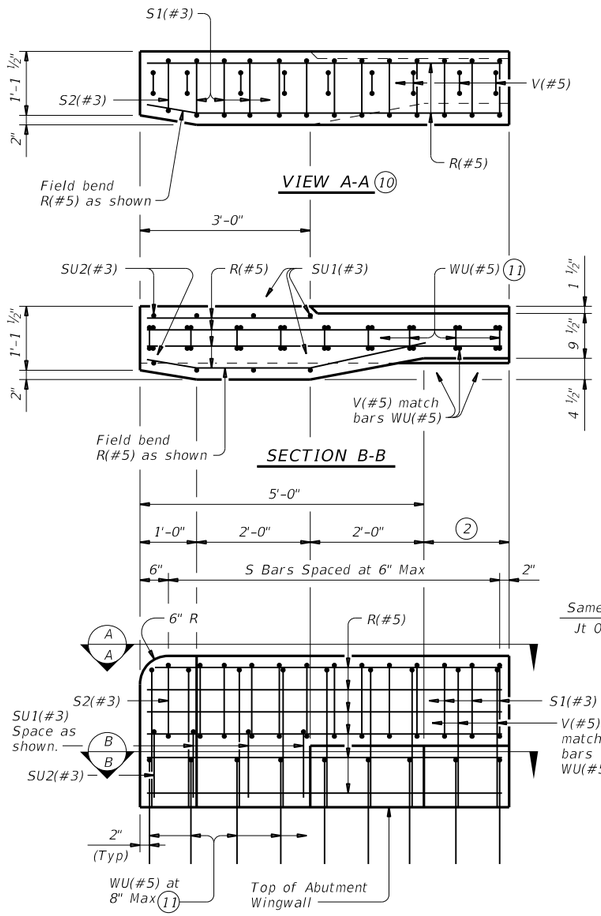
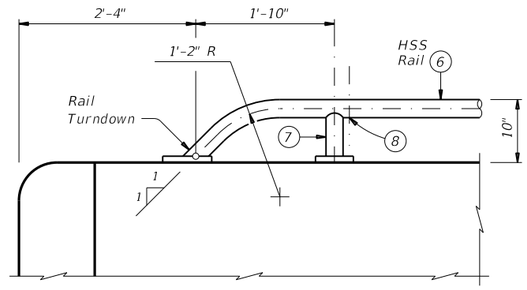
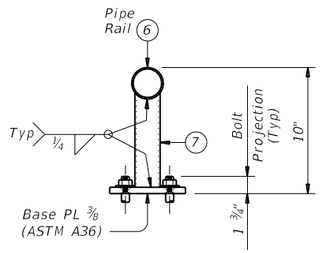


PARAPET END AT ABUT WINGWALL (11)

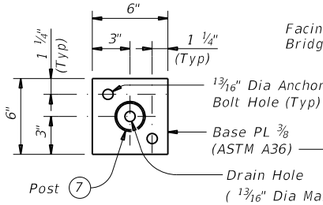


Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

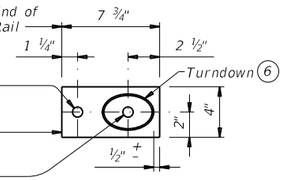
HSS RAIL TERMINAL DETAIL



TRANSVERSE SECTION

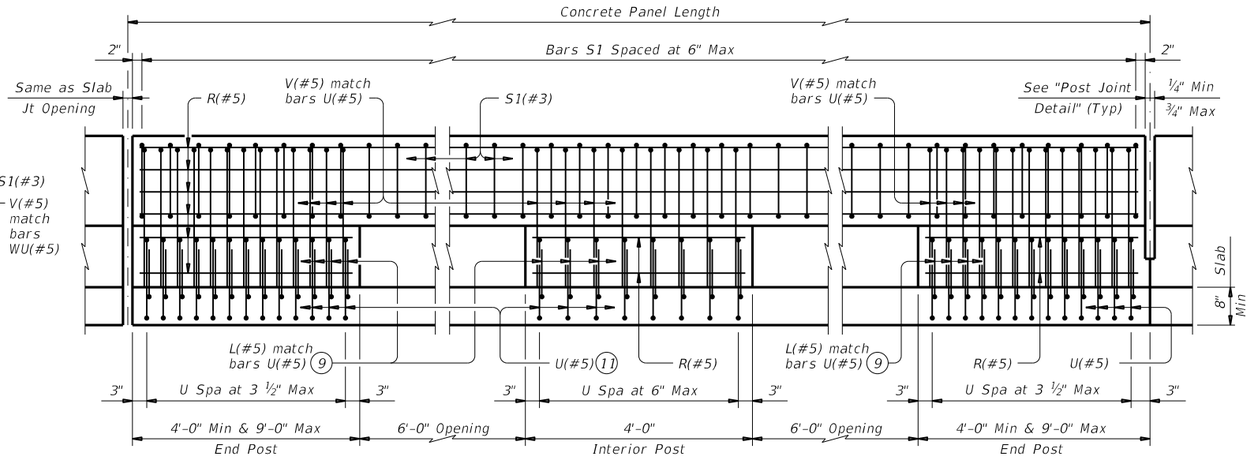


POST BASE PLATE PLAN



RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL DETAILS



AT BENTS WITH SLAB EXP JOINTS | AT 4' INTERIOR POST | AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab and without raised sidewalk. Rail on box culvert similar. HSS not shown for clarity.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(5) Increase 2" for structures with overlay.

(6) HSS 2.875 x 0.203

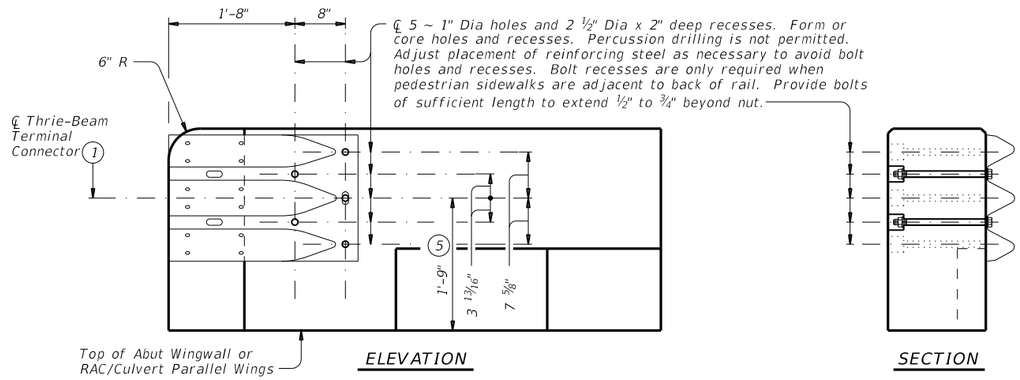
(7) HSS 2.375 x 0.154

(8) 3/8" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

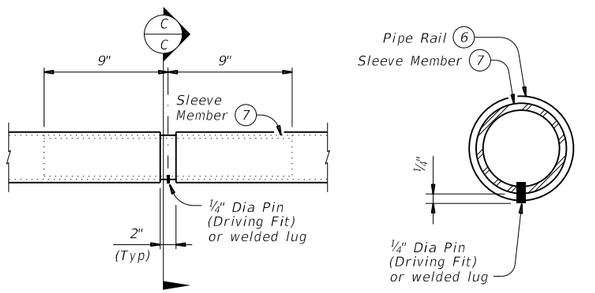
(10) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.



ELEVATION | SECTION

TERMINAL CONNECTION DETAILS



AT SPLICE OR EXP JTS | SECTION C-C

PIPE SPLICE DETAILS

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223

FILE: RL-C223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		103

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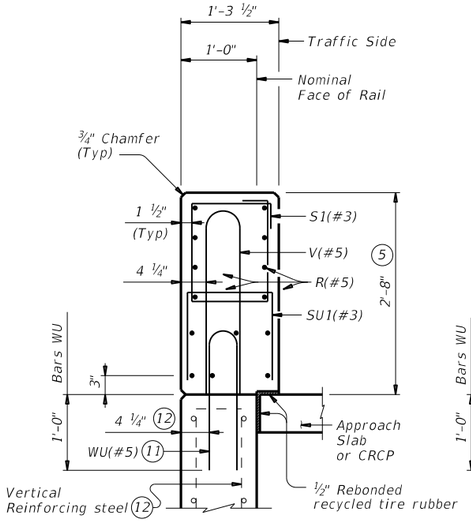
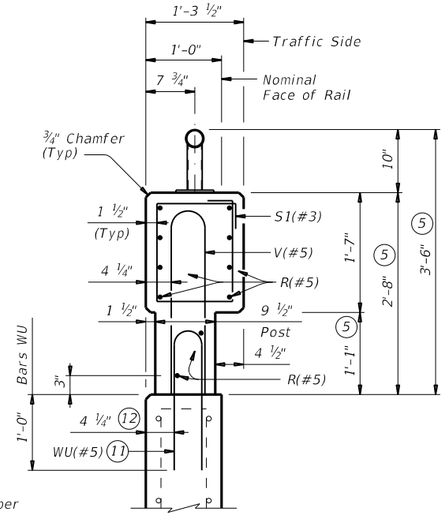
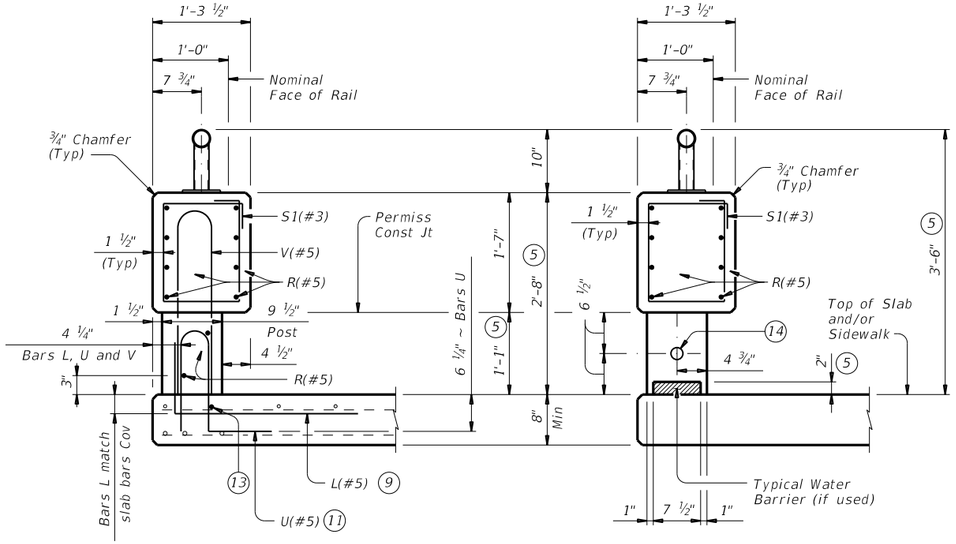


SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

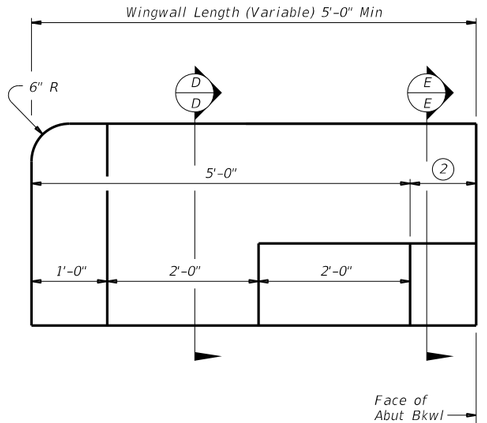


SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

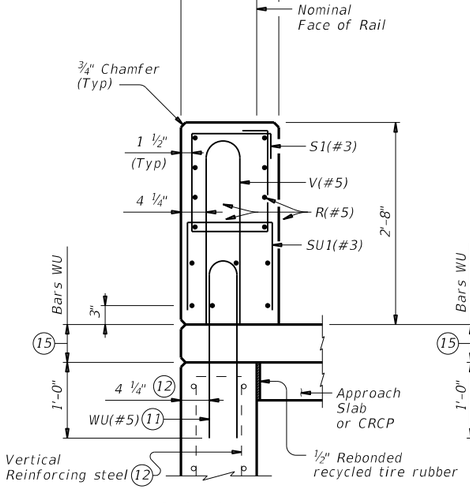


ELEVATION AT
ABUTMENT WINGWALL

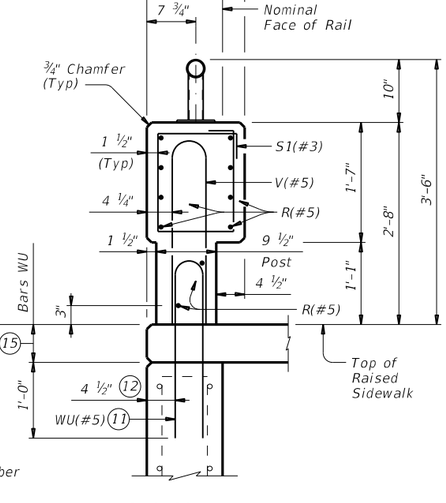
Box culvert parallel wings or rail anchorage curb similar.
HSS rail not shown for clarity.

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

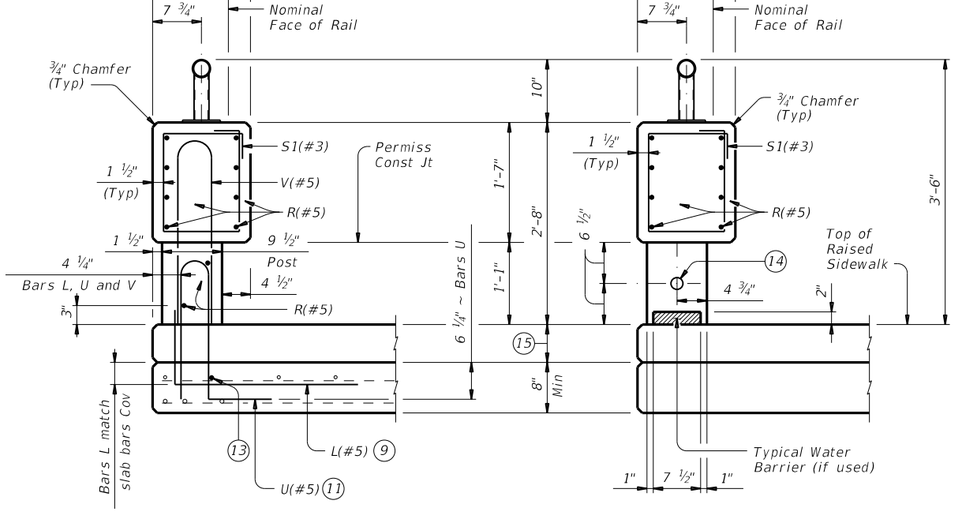
Sections on box culvert similar.



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

POST JOINT DETAIL

(Showing without raised sidewalk)
Provide at all interior bents without slab expansion joints.

SECTIONS THRU RAIL WITH RAISED SIDEWALK

Sections on box culvert similar.

(2) Wingwall Length minus 5'-0" (Varies)

(5) Increase 2" for structures with overlay.

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(12) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(13) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(14) HSS 1.900 x 0.145

(15) Raised Sidewalk.

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

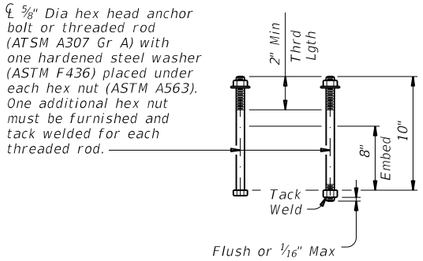
TYPE C223

FILE: RL-C223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		104

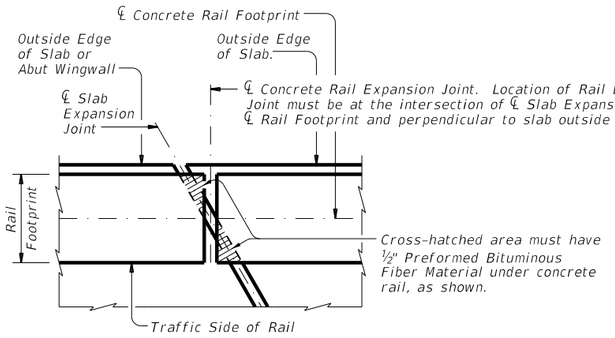
DATE: 6/20/2024 1:39:59 PM
FILE: c:\bms\dcus-pw-01\copy of jivesh.kumar\dms07598\RL-C223-19.dgn

RAIL DATA FOR HORIZONTAL CURVES

	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius



CAST-IN-PLACE ANCHOR BOLT OPTIONS (16)



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

(5) Increase 2" for structures with overlay.

(16) See "Material Notes" for anchor bolt information.

(17) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

(18) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway/sidewalk surface without overlay.

CONSTRUCTION NOTES:

Face of rail, posts and parapet must be vertical transversely unless otherwise approved by the Engineer. HSS rail posts and opening end faces must be perpendicular to top of adjacent concrete parapet grade. Use epoxy mortar under HSS rail post base plates if gaps larger than 1/16" exist.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

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.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes."

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Provide ASTM A1085, A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel." Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 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".

Optional cast-in-place anchor bolts must be ⅝" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

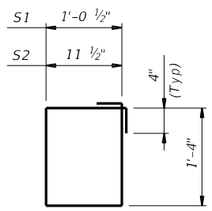
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types.
See appropriate details elsewhere in plans for these modifications.

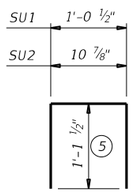
Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay:
370 plf total
358 plf (Conc)
12 plf (Steel)

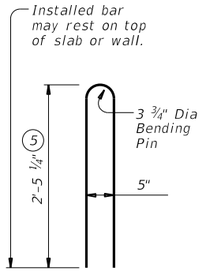
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



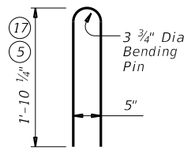
BARS S (#3)



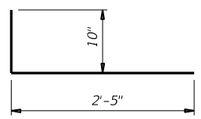
BARS SU (#3)



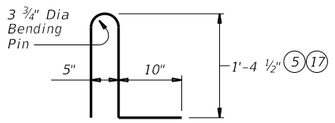
BARS V (#5) (18)



BARS WU (#5)



BARS L (#5)



BARS U (#5) (18)

SHEET 4 OF 4

Texas Department of Transportation — Bridge Division Standard

COMBINATION RAIL

TYPE C223

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		105

DATE: 6/20/2024 1:40:04 PM
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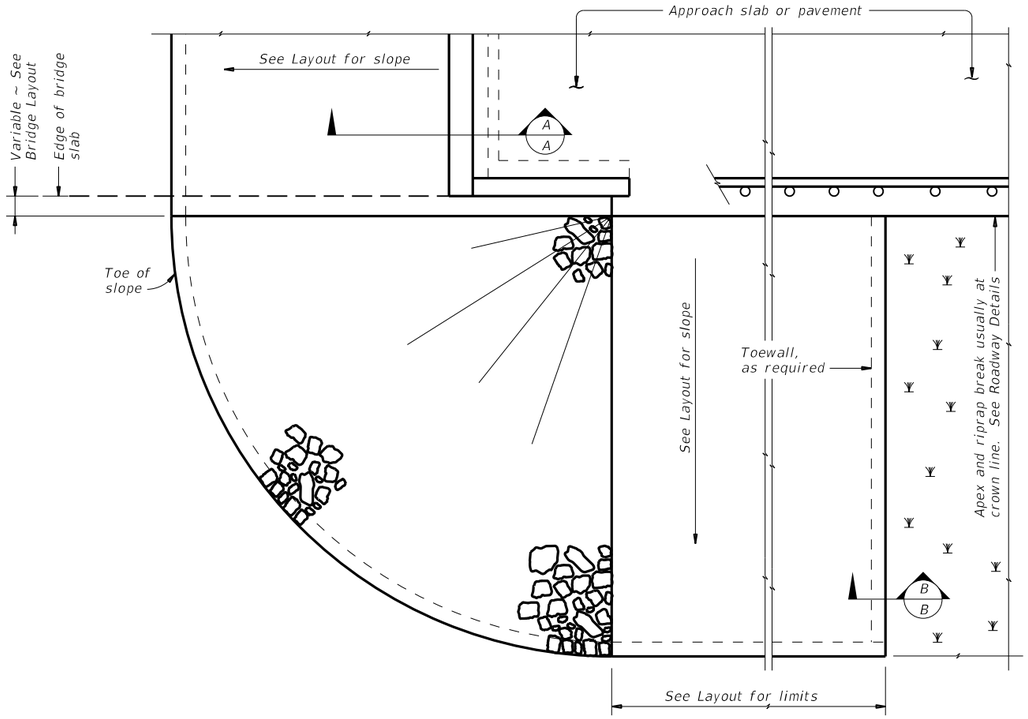
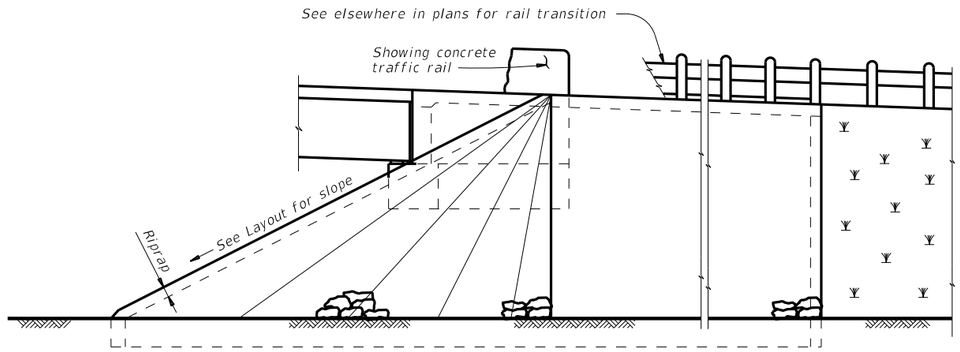
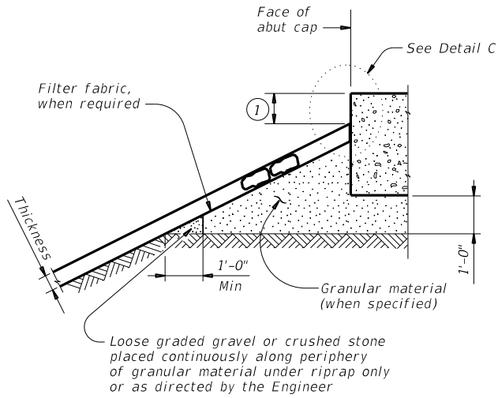


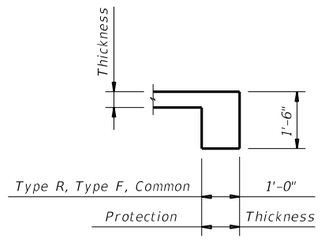
PLAN



ELEVATION

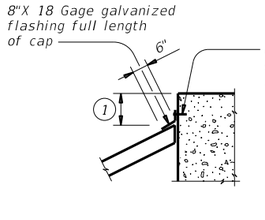


SECTION A-A AT CAP

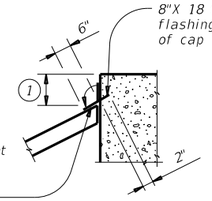


SECTION B-B

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

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE:	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		106

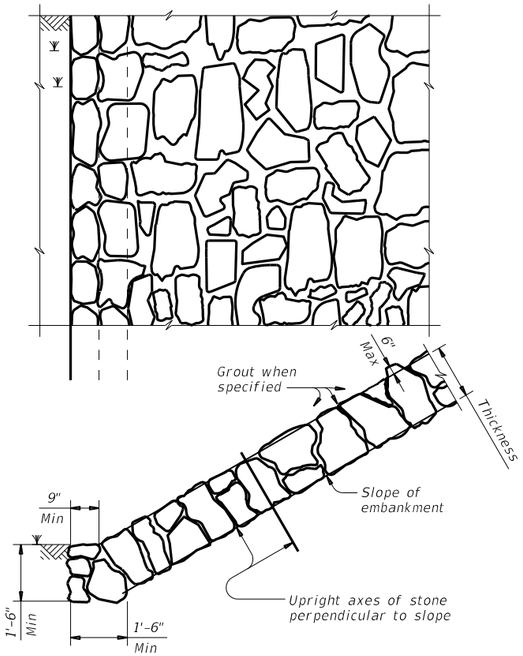


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

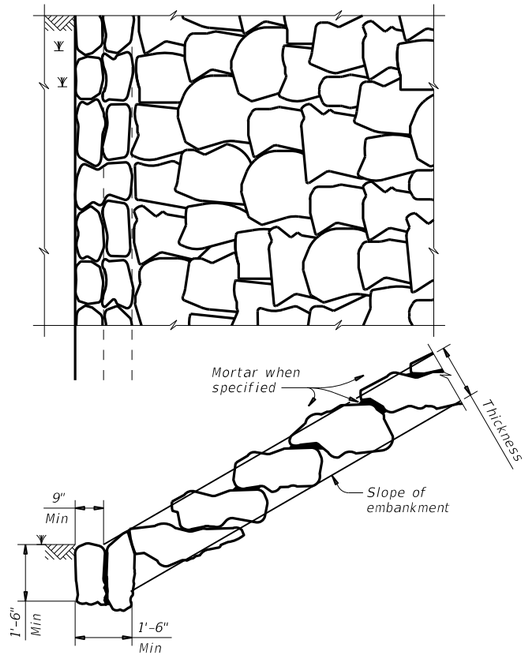


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

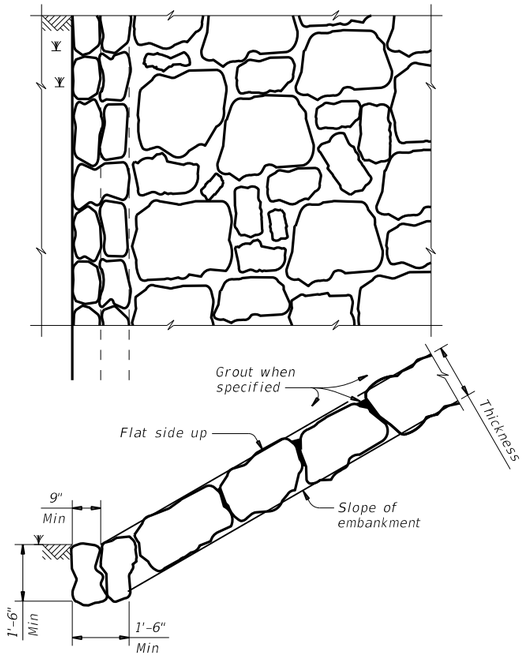


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

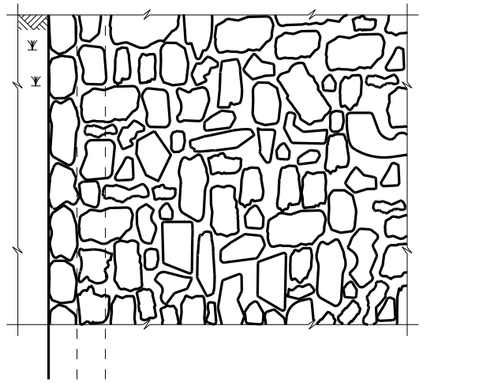


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

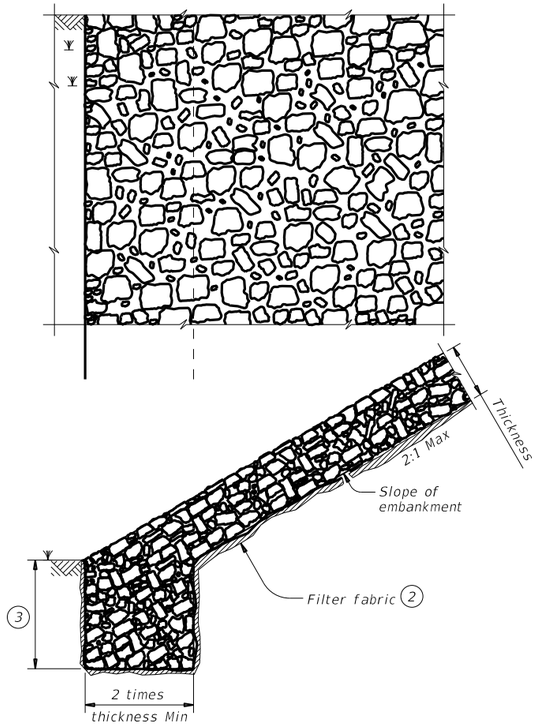


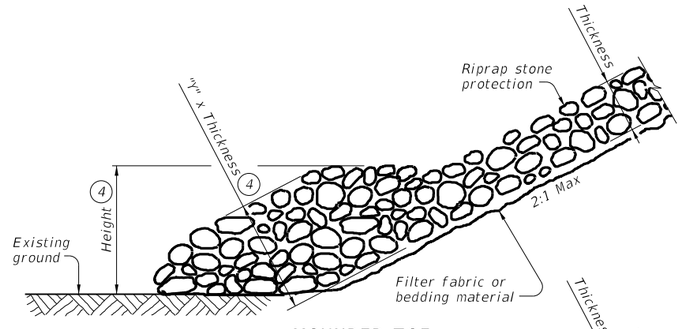
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

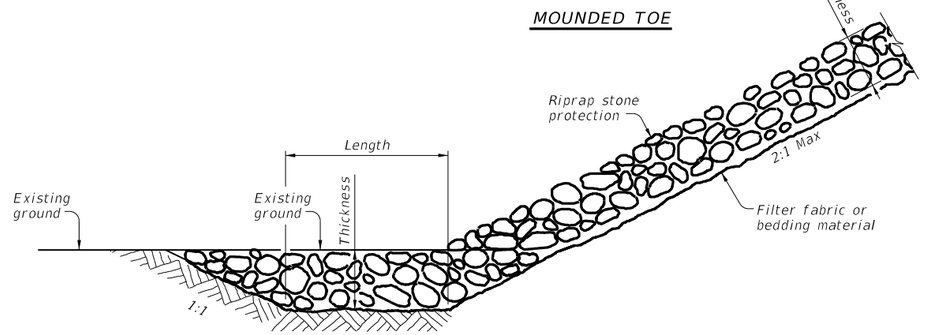
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		107

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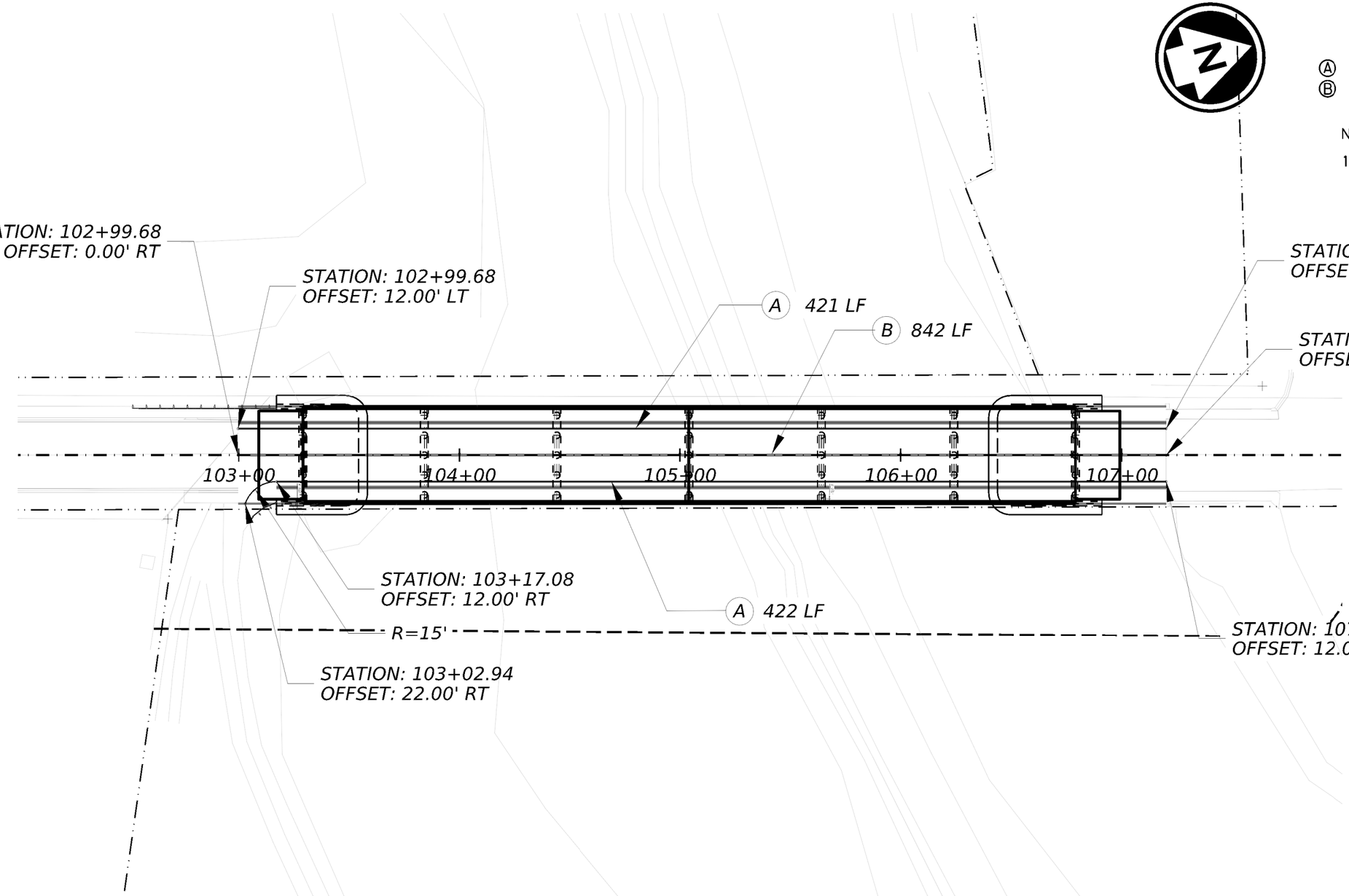
FINAL SUBMITTAL



LEGEND:

Ⓐ RE PM (W)(6")(SLD)
Ⓑ RE PM (Y)(6")(SLD)

NOTES:

1. USE TYPE II AS SEALER AND TYPE I AS FINAL STRIPING

0' 50' 100'
SCALE IN FEET

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		108

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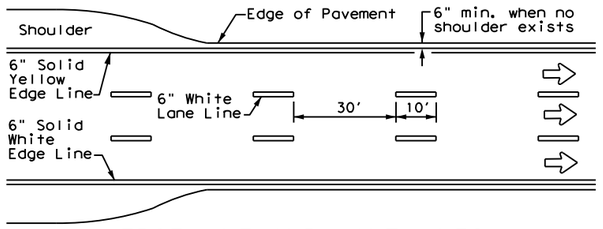
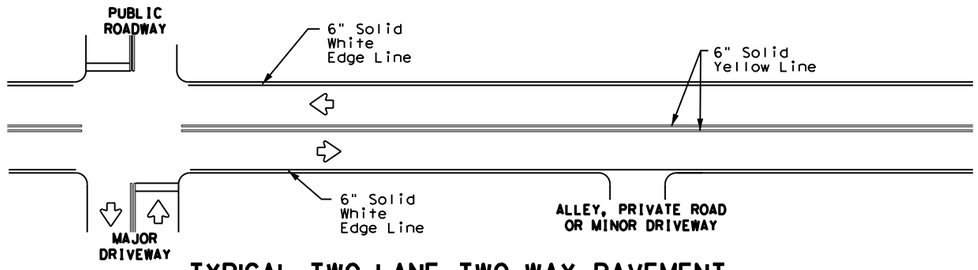
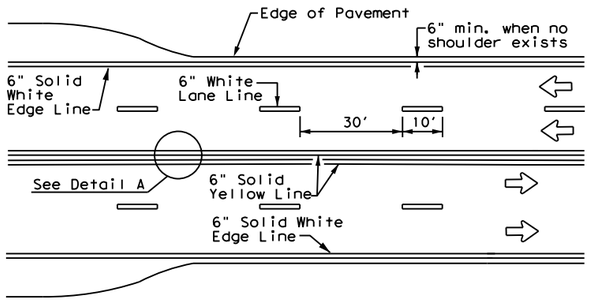
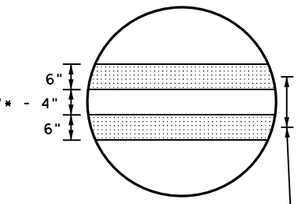


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

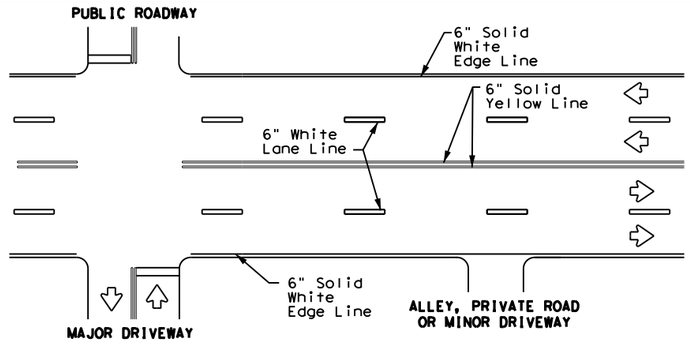




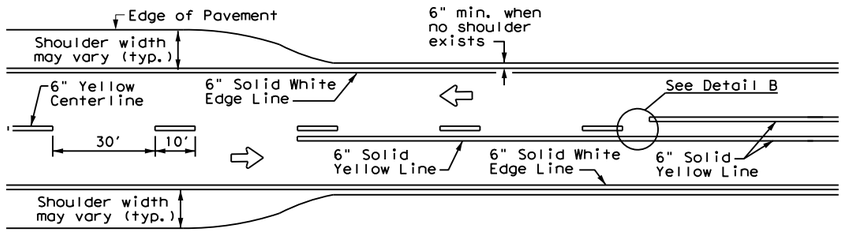
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

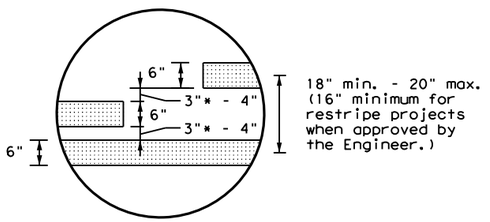
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

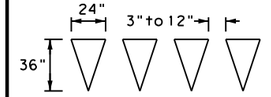


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



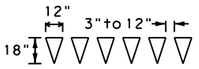
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

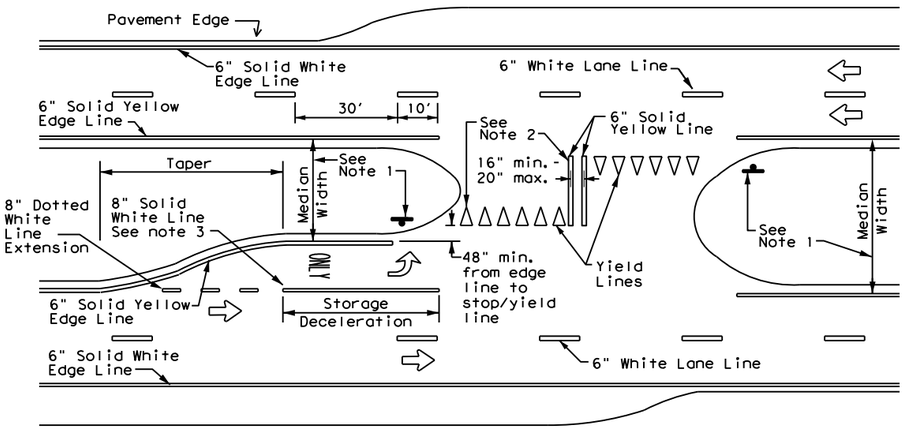


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

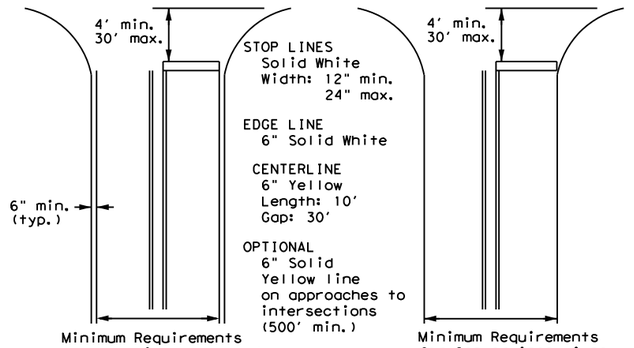
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

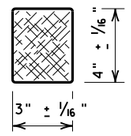
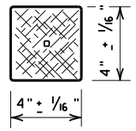
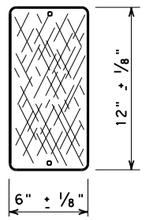
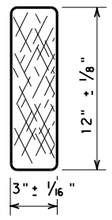
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

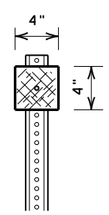
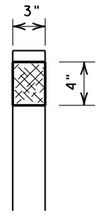
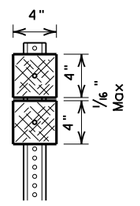
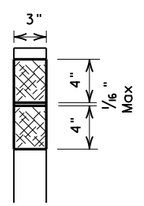
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0922	23	010	S TOVAR ST
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	LRD	DUVAL		109

22A

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

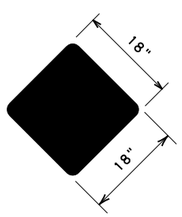
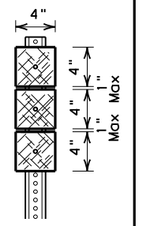
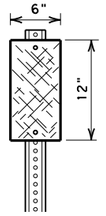
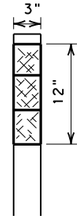
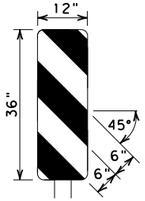
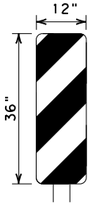
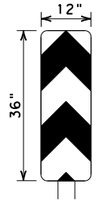
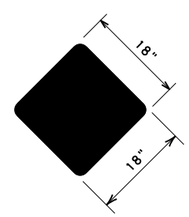
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

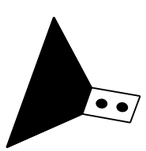
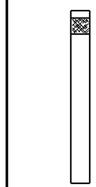
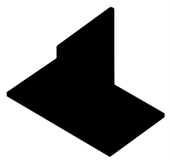
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

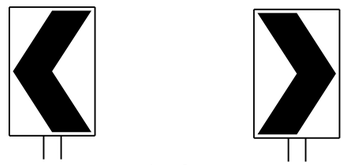
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			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

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



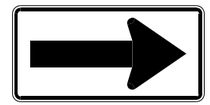
W1-8

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.

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

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	0922	23	010	S TOVAR ST
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LRD	DUVAL		110

20A

DATE: 6/19/2024 1:37:33 PM
FILE: c:\bms\vidcus-pw-01\carlos.reyes\dms07676\dom1-20.dgn

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

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

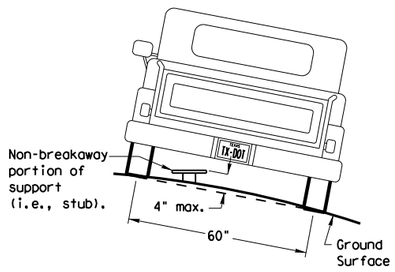
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

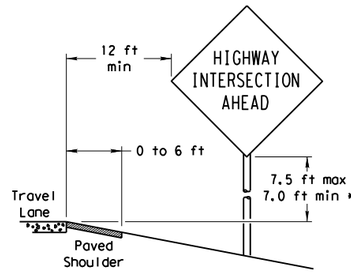
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

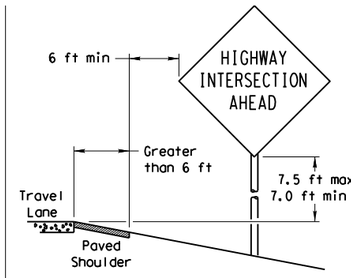
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

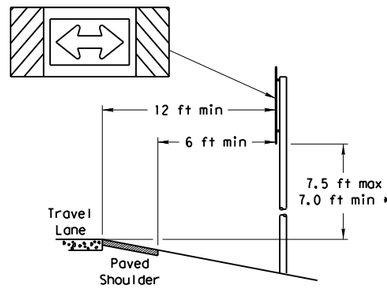
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



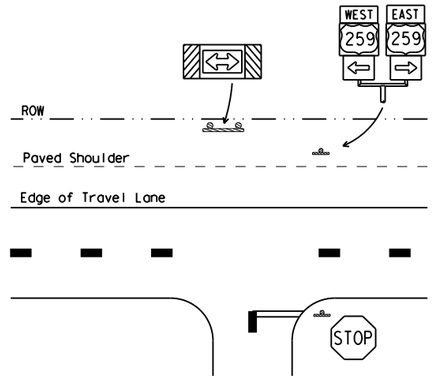
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

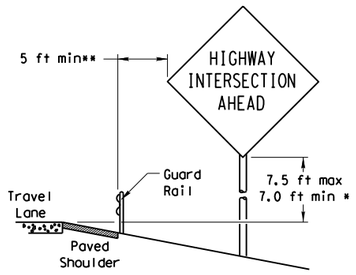
T-INTERSECTION



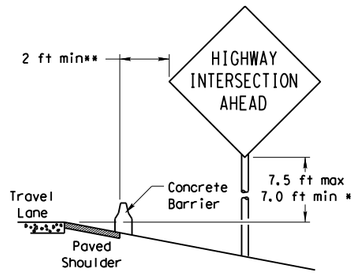
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

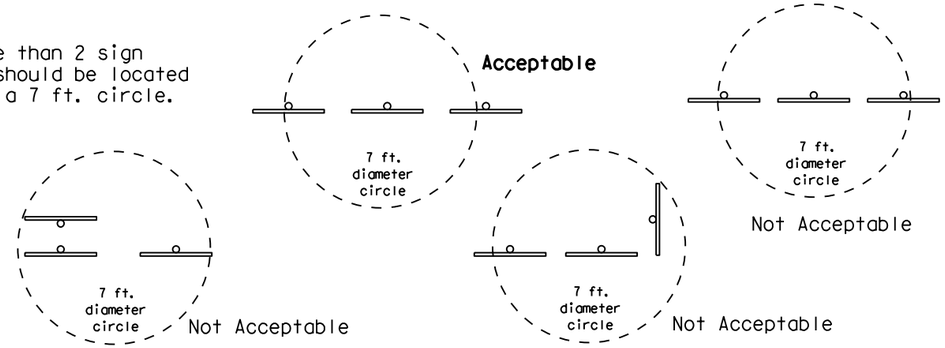
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

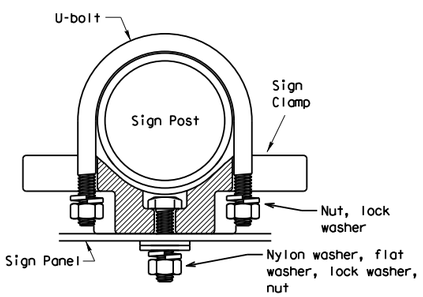
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

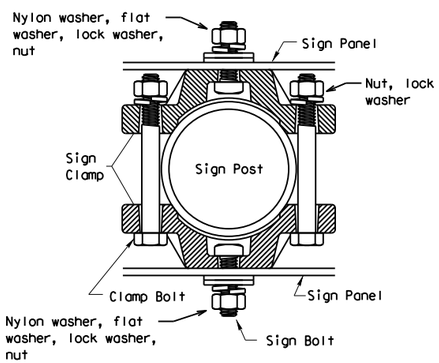


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

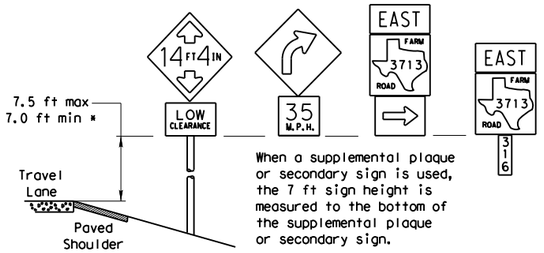
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



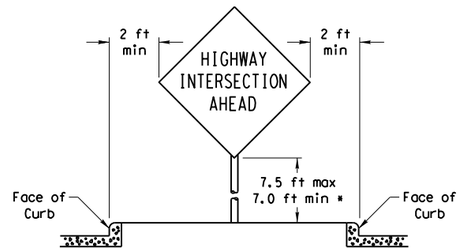
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



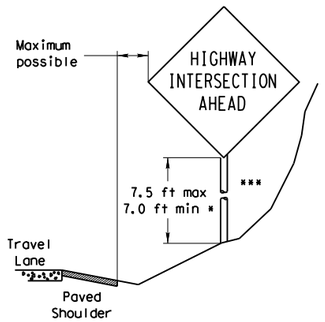
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST

DIST	COUNTY	SHEET NO.
LRD	DUVAL	111

DATE:
FILE:

DATE: 6/19/2024
FILE: c:\bms\vidcus-pw-01\carlos.reyes\dms07623\epic.dgn

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. S TOVAR ST @ SAN DIEGO CREEK

2.

3.

4.

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
	☐ 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.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. Texas Horned Lizard - The contractor will avoid harvester ant mound in the selection of PSLs where feasible
2. Texas Tortoise - The Contractor should cover utility trenches overnight, and should visually inspect all trenches before filling.
3. Reticulated Collared Lizard - This lizard may potentially occur in the project area. The contractor shall avoid harming or handeling this species.
4. Texas Indigo Snake - This snake may potentially occur in the project area. The contractor shall avoid harming or handeling this species.

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.

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

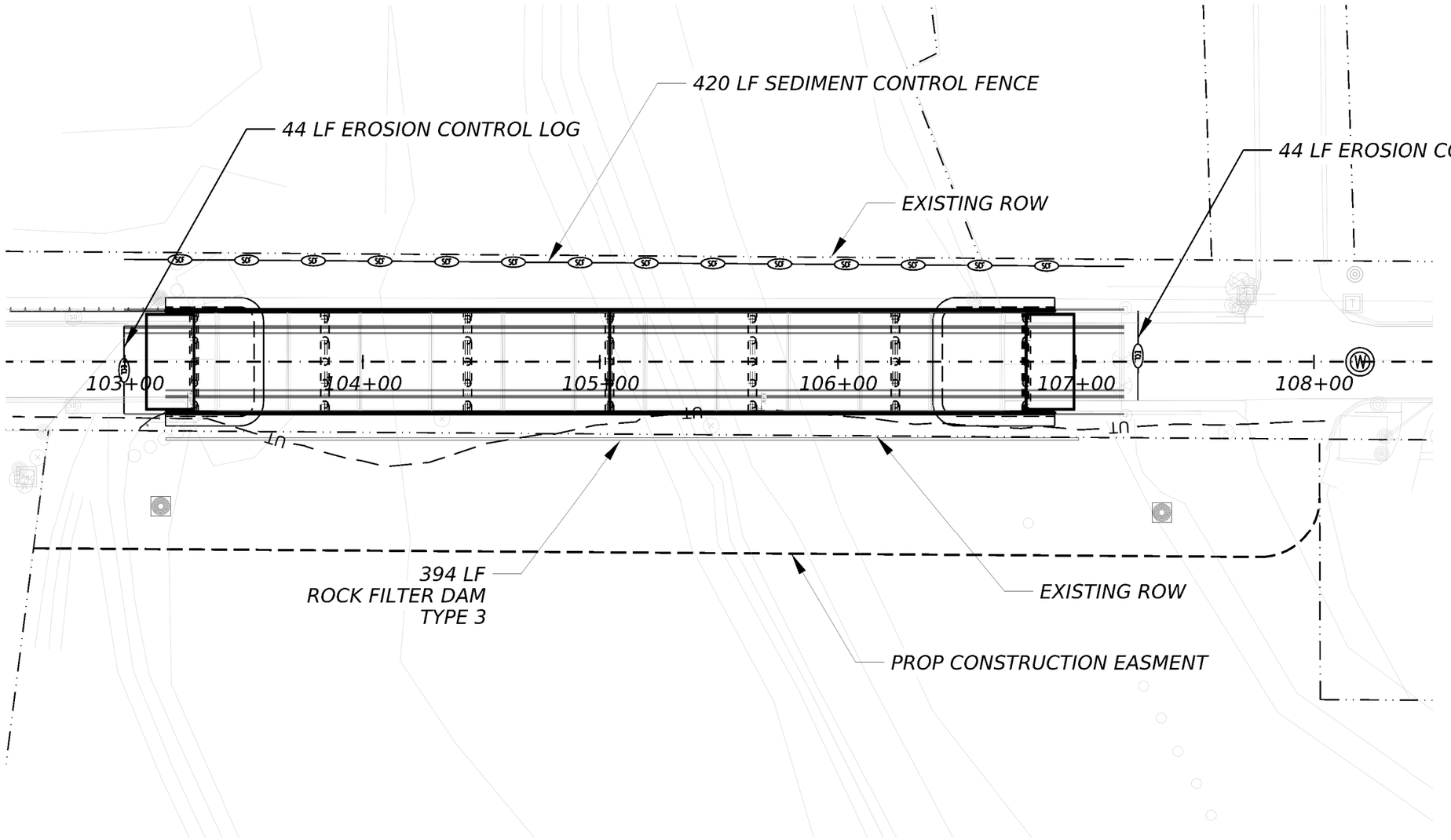
Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0922	23	010	S TOVAR ST	
	DIST	COUNTY		SHEET NO.	
	LRD	DUVAL		112	

FINAL SUBMITTAL



LEGEND:

- ROCK FILTER DAM TYPE 3
- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG

NOTES:

1. CONSTRUCTION EXITS LOCATIONS TO BE DETERMINED BY THE ENGINEER.

0' 50' 100'
SCALE IN FEET

STATE OF TEXAS
CARLOS H. REYES
127291
LICENSED
PROFESSIONAL ENGINEER

6/19/2024

NO.	DATE	REVISION

Texas Department of Transportation

IDCUS
PLANNERS | ENGINEERS | MANAGERS
IDCUS, INC.
15915 KATY FREEWAY, SUITE 300
HOUSTON, TX 77094
(713) 541-5591 FAX: (713) 541-3501
TBPELS FIRM # F-6825

S TOVAR ST @ SAN DIEGO CREEK

SW3P LAYOUT DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	23	010	S TOVAR ST
DIST	COUNTY		SHEET NO.
LRD	DUVAL		113

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STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0922-23-010

1.2 PROJECT LIMITS:
From: S TOVAR ST @ SAN DIEGO CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 27° 45' 26.36" ,(Long) 98° 14' 44.80"

END: (Lat) 27° 45' 30.03" ,(Long) 98° 14' 43.60"

1.4 TOTAL PROJECT AREA (Acres):

1.5 TOTAL AREA TO BE DISTURBED (Acres):

1.6 NATURE OF CONSTRUCTION ACTIVITY:
FOR THE CONSTRUCTION OF OFF-SYSTEM BRIDGE REPLACEMENT.

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☐ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☒ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☒ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☒ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☒ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
SAN DIEGO CREEK	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2B23(173)		114
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	DUVAL	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	23	010	S TOVAR ST

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [X] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [ ] [ ] Temporary Seeding
- [X] [X] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [ ] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [ ] [ ] Inlet Protection
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [X] [ ] Sediment Control Fence
- [ ] [ ] Stabilized Construction Exit
- [ ] [ ] Floating Turbidity Barrier
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Vegetated Filter Strips
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [X] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [ ] Chemical Management
- [ ] Concrete and Materials Waste Management
- [ ] Debris and Trash Management
- [ ] Dust Control
- [ ] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

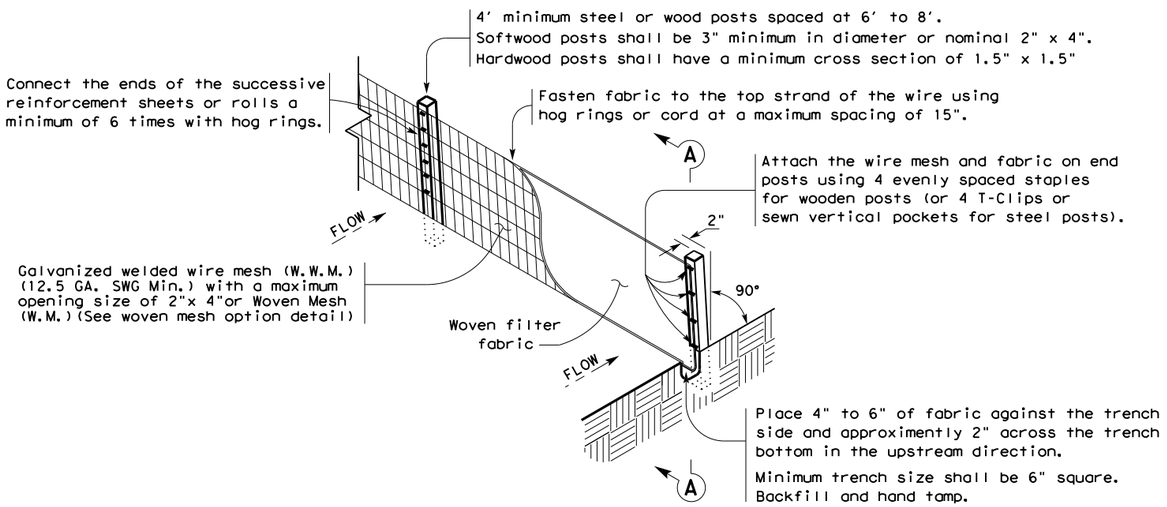
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

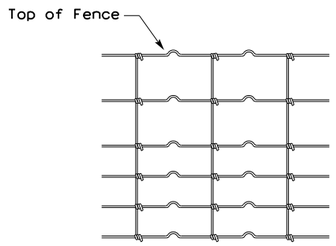
Texas Department of Transportation

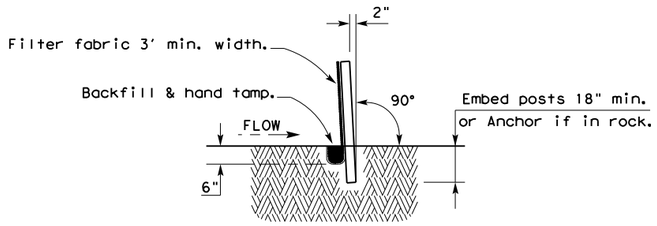
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2B23(173)		115
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	DUVAL	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	23	010	S TOVAR ST



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.

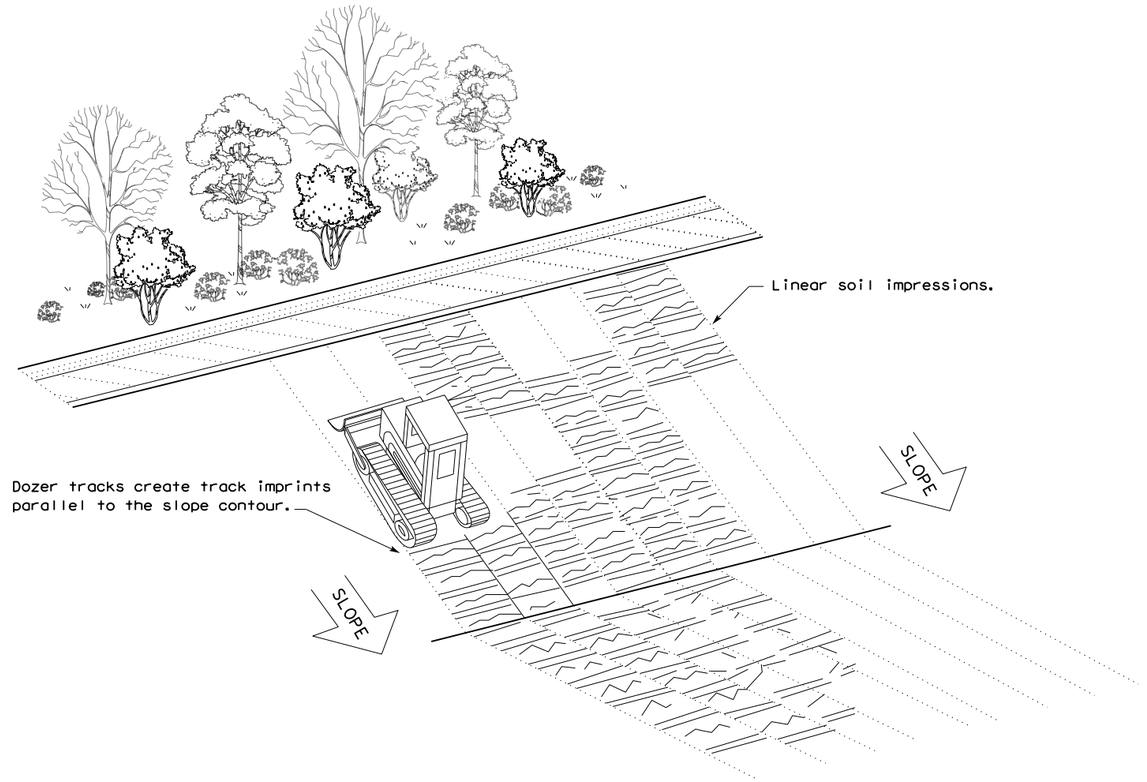
LEGEND

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	0922	23	010		S TOVAR ST	
	DIST	COUNTY			SHEET NO.	
	LRD	DUVAL			116	

6/19/2024
c:\dms\tdcus-pw-01\carlos.reyes\dms07625\ec116.dgn

DATE: 6/19/2024
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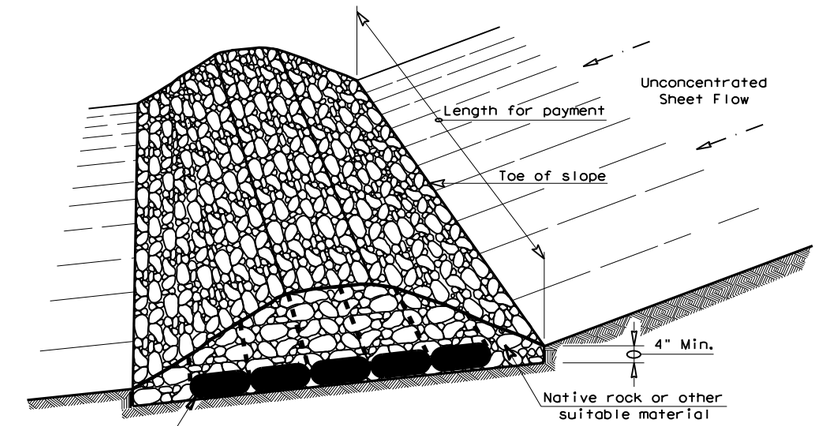
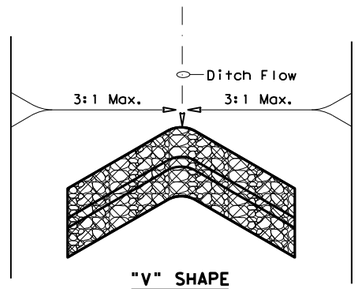
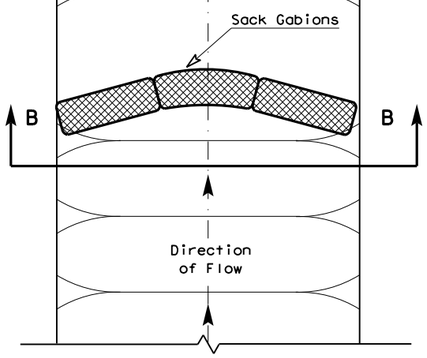


FILTER DAM AT TOE OF SLOPE

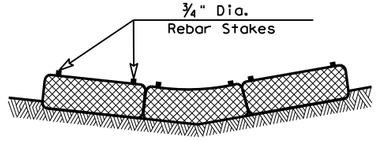
RFD1



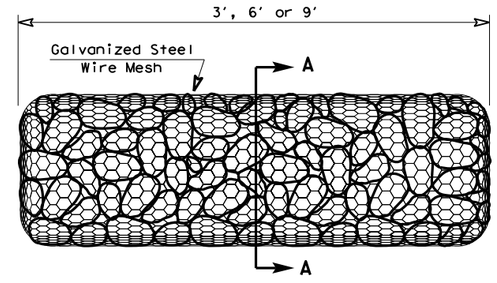
"V" SHAPE PLAN VIEW



PLAN VIEW

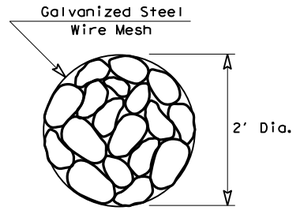


SECTION B-B

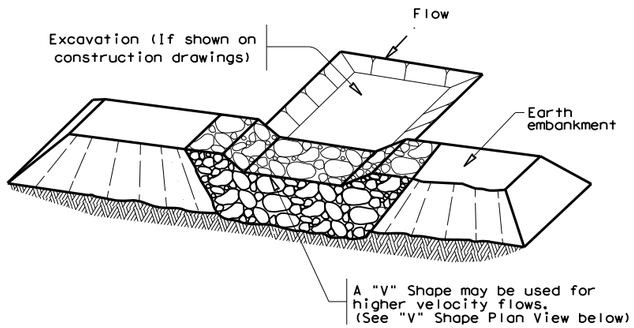


TYPE 4 (SACK GABIONS)

RFD4

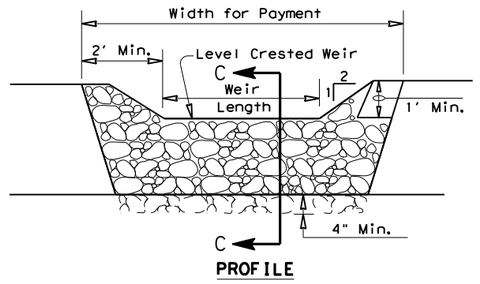


SECTION A-A

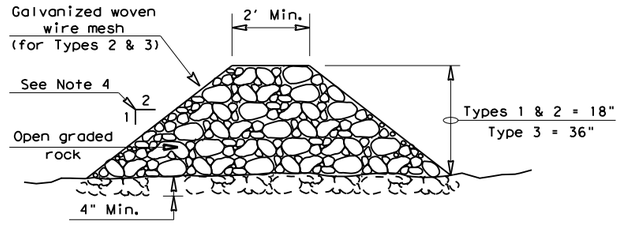


FILTER DAM AT SEDIMENT TRAP

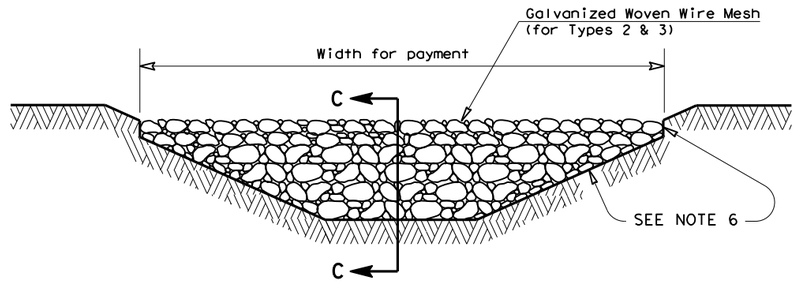
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

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.

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	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		117

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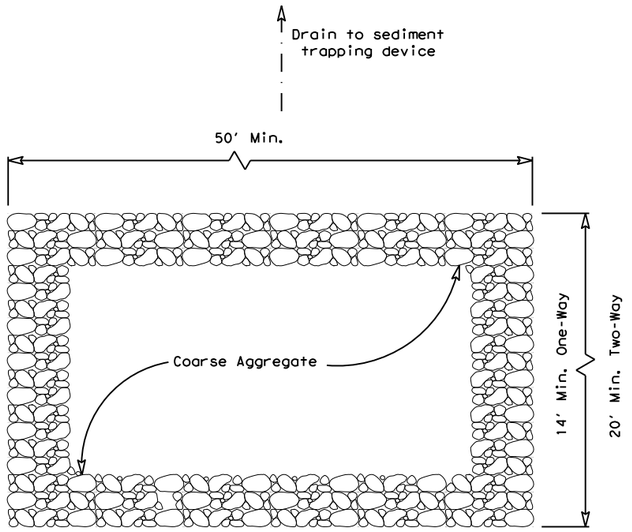
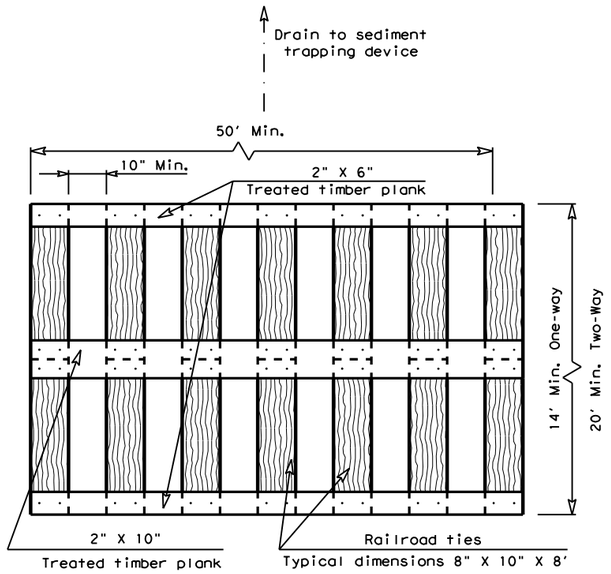
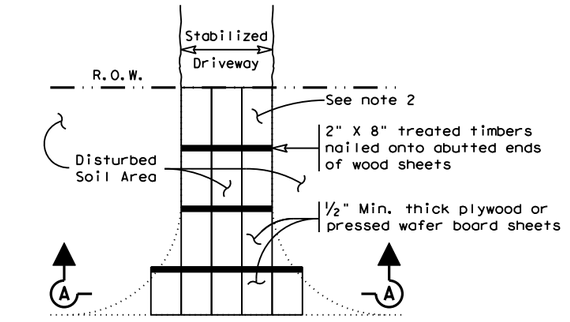


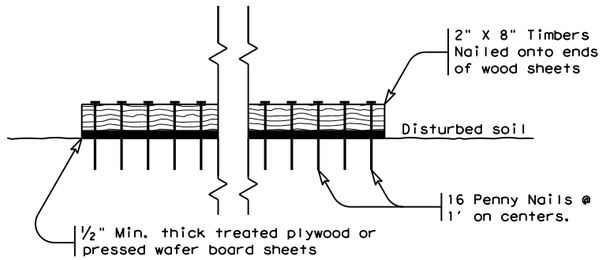
PLAN VIEW



PLAN VIEW



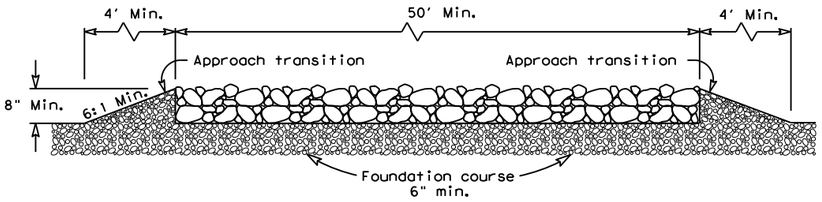
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

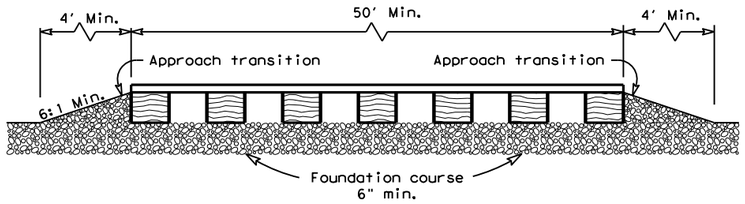
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
	DIST	COUNTY		SHEET NO.
	LRD	DUVAL		118

DATE: 6/19/2024
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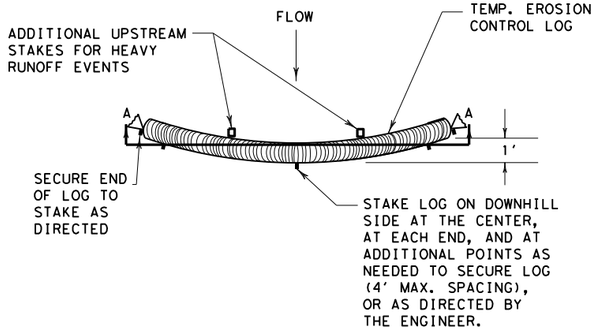
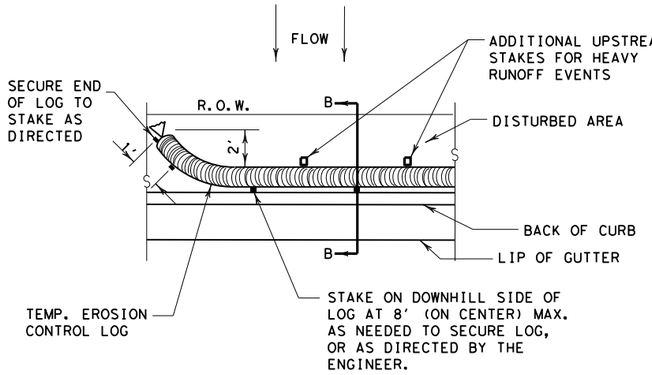


PLAN VIEW



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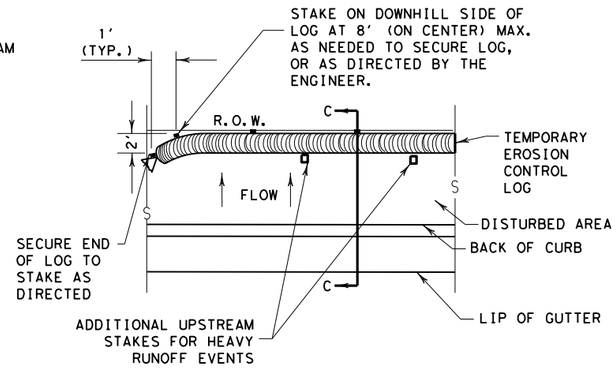
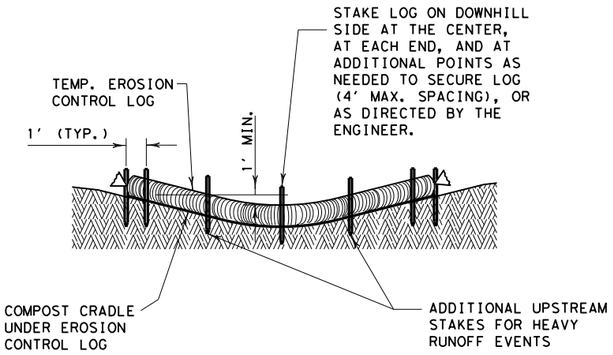


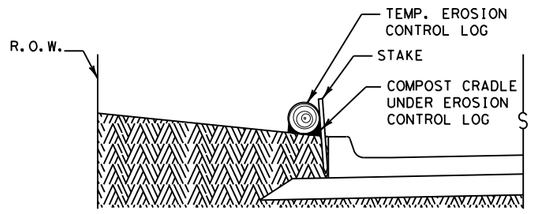
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

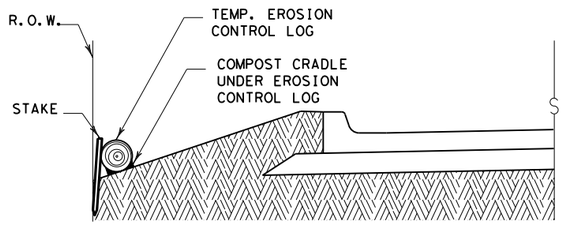
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

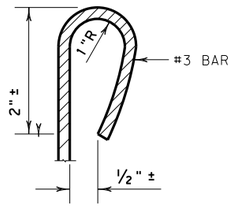
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



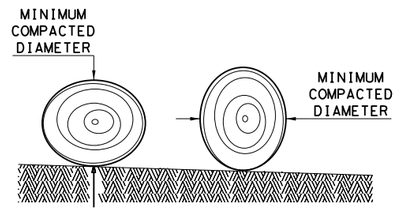
REBAR STAKE DETAIL

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

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	23	010	S TOVAR ST
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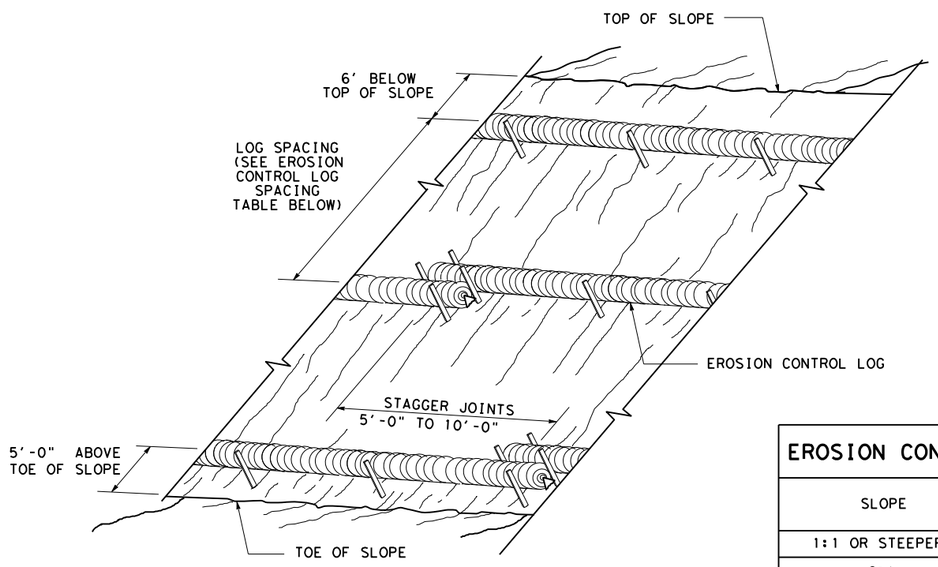
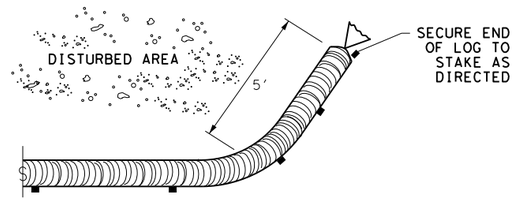


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

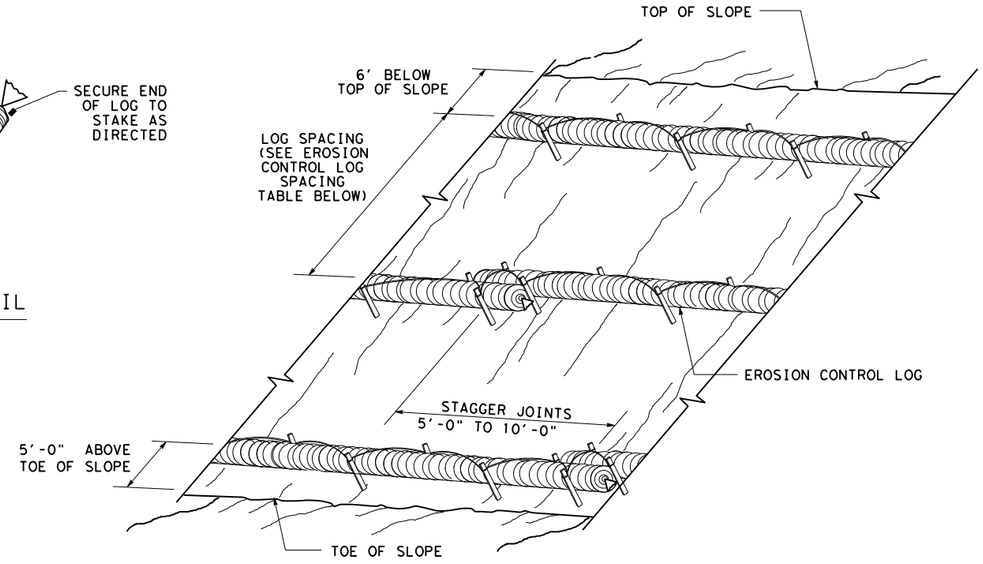
CL-SST



END SECTION RAP DETAIL

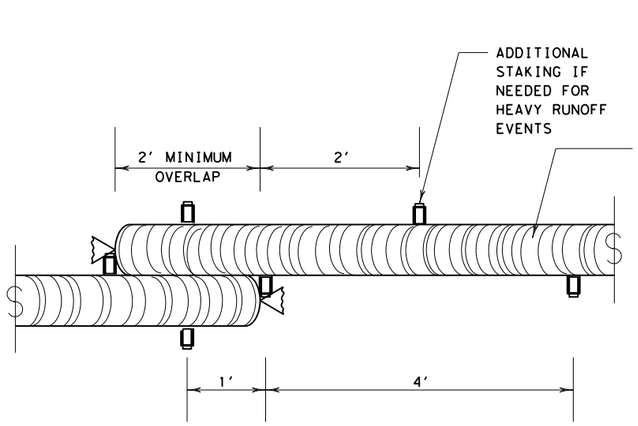
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

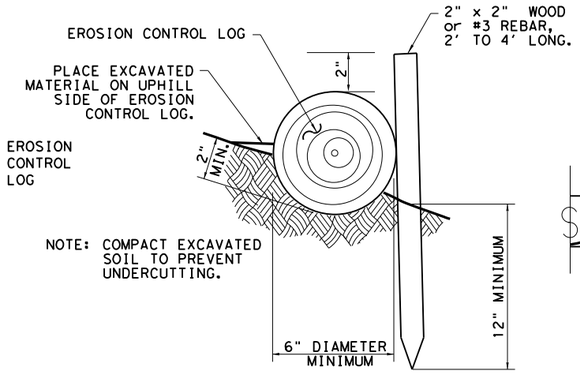
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

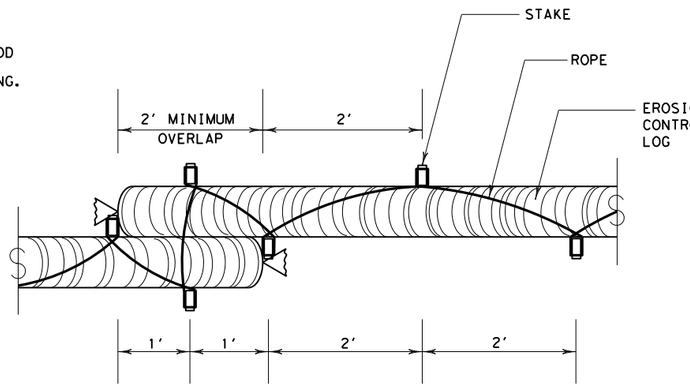


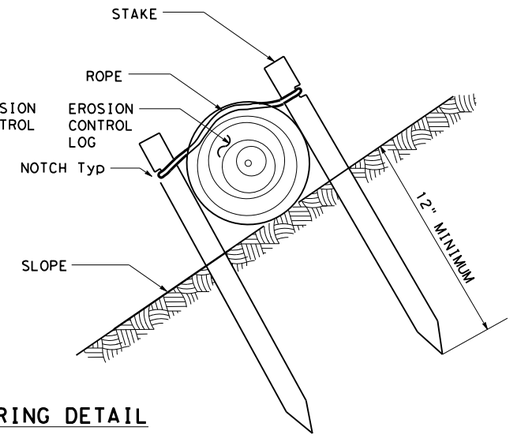


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

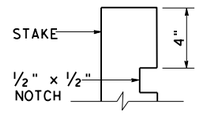
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
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	LRD		DUVAL			120

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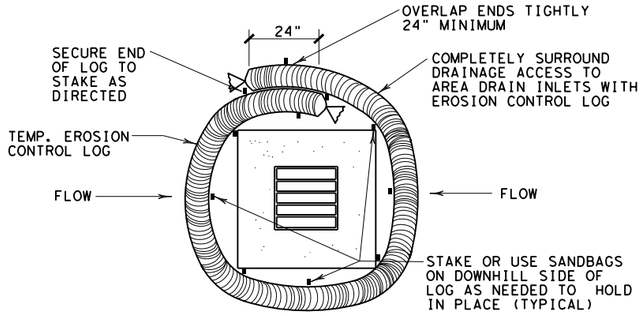
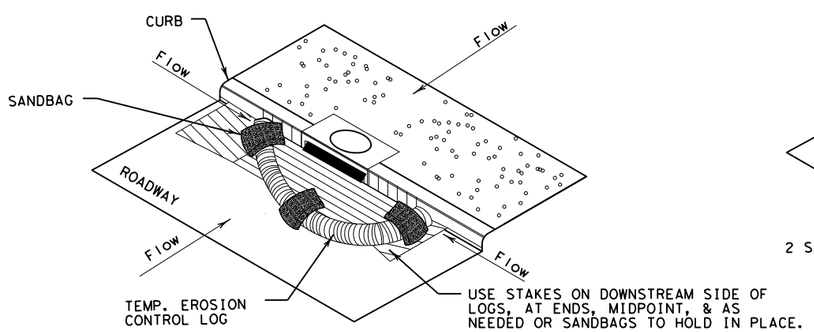


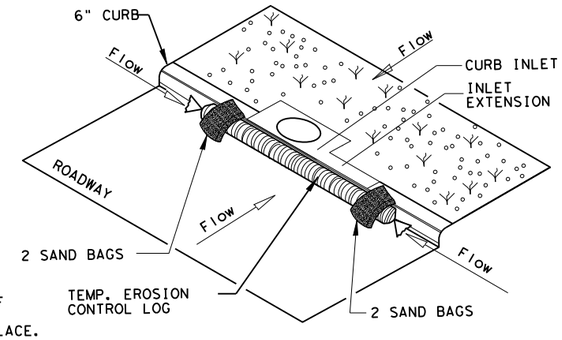
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

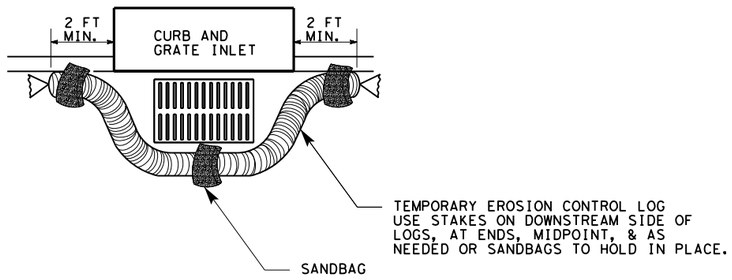
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

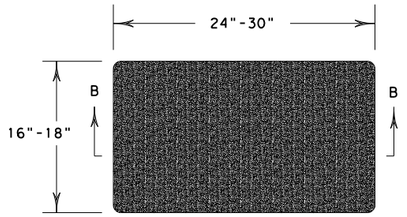
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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

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