FED.RD. DIV.NO.	FEDERAL AID NO.		SHEET NO.
6	BR 2022(263)		1
STATE	DIST.	COUNTY	
TEXAS	SAT	MEDINA	
CONT.	SECT.	JOB	HIGHWAY NO.
0848	04	049	FM 462

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

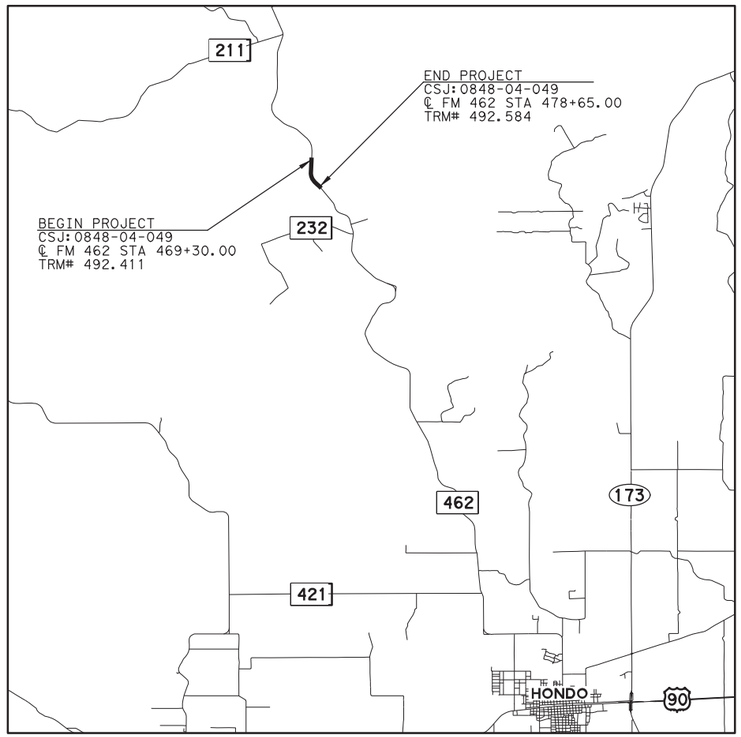
FEDERAL AID PROJECT
PROJECT NO. BR 2022(263)
CSJ: 0848-04-049

MEDINA COUNTY
FM 462

LIMITS: AT HONDO CREEK TO 6.5 MILES SOUTH OF MEDINA/BANDERA COUNTY LINE

NET LENGTH OF ROADWAY: 545.00 FT. = 0.103 MI.
NET LENGTH OF BRIDGE: 390.00 FT. = 0.074 MI.
NET LENGTH OF PROJECT: 935.00 FT. = 0.177 MI.

FOR CONSTRUCTION OF: BRIDGE REPLACEMENT
CONSISTING OF REPLACE BRIDGE AND APPROACHES



NOT TO SCALE

EXCEPTIONS: NONE
RAILROAD: NONE
EQUATIONS: NONE

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

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 60 MPH
AREA OF DISTURBED SOIL = 1.79 ACRES
A.D.T.(2021): 600
A.D.T.(2041): 800

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS.

_____ P.E. _____
AREA ENGINEER DATE

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING 11/4/2021
DocuSigned by:
Angela J. Collat, P.E.
DF7D9915513A45A...
DESIGN SUPPORT DIRECTOR

RECOMMENDED FOR LETTING 11/2/2021
DocuSigned by:
Gregg Granato, P.E.
0D08C713B58C45C...
DESIGN ENGINEER

RECOMMENDED FOR LETTING 11/3/2021
DocuSigned by:
Clayton Kipps
74F59ACB883D4F8...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING 11/2/2021
DocuSigned by:
Gina E. Gallegos, P.E.
1243720CDE604E5...
DISTRICT ENGINEER

PROJ. NO. BR _____ ( )
COUNTY MEDINA
HWY. NO. FM 462 LETTING DATE _____
DATE ACCEPTED _____

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3	FM 462 AT HONDO CREEK PROJECT LAYOUT
4-4F	GENERAL NOTES
5-5	QUANTITY AND ESTIMATE SHEET
6	FM 462 AT HONDO CREEK TYPICAL SECTIONS
7-7A	FM 462 AT HONDO CREEK QUANTITY SUMMARIES
8	FM 462 AT HONDO CREEK SUMMARY OF SMALL SIGNS
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10	FM 462 AT HONDO CREEK ADVANCE WARNING LAYOUT
11	FM 462 AT HONDO CREEK TRAFFIC CONTROL PLAN OVERALL PHASING LAYOUT
12	FM 462 AT HONDO CREEK TRAFFIC CONTROL PLAN TYPICAL SECTIONS
13-14	FM 462 AT HONDO CREEK TRAFFIC CONTROL PLAN PHASE IA LAYOUT
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17	FM 462 AT HONDO CREEK TRAFFIC CONTROL PLAN TEMPORARY WALL/SHORING PROFILES
18	FM 462 AT HONDO CREEK TRAFFIC CONTROL PLAN TEMPORARY ACCESS ROUTE
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STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

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

SIGNATURE OF REGISTRANT , P.E. DATE 10/26/2021

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

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

Cassie Wallof
SIGNATURE OF REGISTRANT , P.E. DATE 10/26/2021

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER

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

SIGNATURE OF REGISTRANT , P.E. DATE 10/22/21

NO.	DATE	REVISION	APPR BY

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

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DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	2

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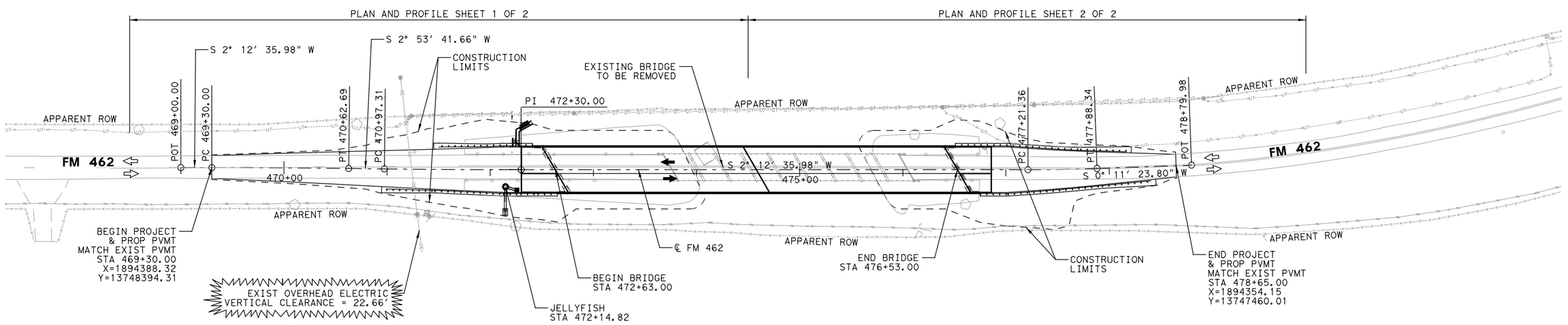

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER
8/20/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

PROJECT LAYOUT

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	3

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**********GENERAL NOTES**********
2014 Specification Book

========== **Basis of Estimate** ==========

Item	Description	Rate/Area	Area	Quant-Unit
168	Veg Watering	15.6 GAL/SY	2,067 SY	33 MG
310	Prime Coat	0.2 GAL/SY	2,121 SY	425 GAL
3084	Bonding Course	0.15 GAL/SY	2,121 SY	319 GAL

========== **Asphalt Concrete Pavement** ==========

Type	Location	Depth	Rate/Area	Quant-Tons
D-GR TY-C SAC-B	FM 462	2”	110LB/SY/IN	235 TON
D-GR TY-C	FM 462	2”	110LB/SY/IN	235 TON

--General--
The following State, District, Local and/or Utility Standards have been modified: IGND(MOD), FD(MOD) and T631(MOD).

To better fit field conditions, the cross sections may be varied when approved.

If there are waste areas or material source areas, follow the Texas Aggregate Quarry and Pit Safety Act requirements.

Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Properly dispose unsalvageable materials in accordance with local, state, and federal regulations. Deface traffic signs so that they will not reappear in public as signs.

Notify the Engineer at least two weeks prior to a proposed traffic pattern change(s) that will require a revision to traffic signals.

Adjust or construct all manholes and valves to final pavement elevations prior to the final mat of ACP. If, between the final elevation adjustment and the final mat of ACP, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the ACP work.

Control: 0848-04-049

County: Medina

Highway: FM 462

Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

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

Christen Longoria, P.E., Area Engineer, Christen.Longoria@txdot.gov, (830) 741-6607
Frances Merecka, P.E., Assistant Area Engineer, Frances.Merecka@txdot.gov, (830) 569-2584

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT’s Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

--Item 5--
Reference all existing striping and other pavement markings to allow these markings to be re-established.

Taper ACP placed at curb inlets, traffic inlets and slotted drains.

Prior to letting, bidders may obtain a free computer diskette or a computerized transfer of files (from the Engineer's office) that contains the earthwork information. If copies of the cross-sections in addition to, or instead of, the CD are requested, they will be available at the Engineer's office for borrowing by copying companies at the bidder's expense.

When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations. A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines in order to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and backfeed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

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

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

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

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

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--
Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

--Item 7--
The project's total disturbed area is 1.79 Acres. The disturbed area in all project locations and Contractor project specific locations (PSL's), within 1/4 mile of the project limits, 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. Obtain any required authorization from the TCEQ for any PSL's on or off the ROW. When the total area disturbed on the project and PSL's within 1/4 mile of the project exceeds 5 acres, provide a copy of the Contractor NOI for PSL's to the Engineer (to the appropriate MS4 operator when the project is on an off-state system route).

Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL's for construction support activities on or off ROW.

No significant traffic generators events identified.

--Item 8--
Working days will be computed and charged in accordance with Article 8.3.1.4: Standard work week.

Create and maintain a Critical Path Method (CPM) schedule.

The CPM schedule shall be created and maintained using software fully compatible with version 6.1 of Primavera Project Planner.

--Item 100--
Begin clearing operations after trees and other areas of vegetation to be protected have been identified and approved. Install fencing around features to be protected as shown in the plans or directed. Coordinate all right of way clearing operations with the SW3P.

Trim and remove brush and trees within the stations noted in the plans and as needed for construction operations. Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas to the ROW limits. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 12 ft. vertical clearance under all trees. This work is subsidiary.

Obtain approval for proposed method of tree and brush trimming and removal. Vertical flailing equipment is not allowed. Treat damaged or cut branches, roots and/or stumps of all oak trees with a commercial tree wound dressing. Disinfect all pruning tools with a solution of 70% alcohol before moving from one tree to another. Unless otherwise approved remove all resulting vegetative debris from the ROW within 24 hours. The Engineer can stop all construction operations if the dressing, cut and removal requirements are not followed.

--Item 110--
Where excavation extends beyond a right of way fence, remove and replace the fence to a comparable condition. This work shall be considered subsidiary to the bid item.

--Item 132--
At no time shall the retaining wall backfill material exceed the adjacent embankment operation by more than one embankment lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation.

--Item 160--
Approximately 76 CY of existing topsoil may be windrowed or stockpiled (as approved) for later use under this Item. Place erosion control measures for the stockpile and/or windrow.

--Item 164--
Drill seeding of permanent grasses requires the use of approved grass seeding equipment capable of properly storing and metering the release of small seeds (such as Bermuda grass) separately from fluffy type seeds (such as bluestems). Equipment manufactured for planting grain crops is acceptable for planting temporary cool season seeds, but not for planting the permanent seed mix.

If performing a permanent seeding in an area with established temporary grass cover and mowing is performed instead of tilling, seed and fertilizer may be distributed simultaneously during “Broadcast Seeding” operations, provided each component is applied at the specified rate.

--Item 168--
Apply vegetative watering as needed to supplement natural rainfall during the vegetation establishment period. Plan quantity of irrigation water is based on the application of a total of 1.3 gal of water each week for each sq. yd. of area that is sodded or seeded. Establishment time is estimated to be 12 weeks for both sod and permanent seed mixes. Temporary seeding will require less time for establishment. Provide a schedule and coordinate watering cycles and rates per cycle with the Engineer. Obtain approval if the quantity of water to be applied is expected to exceed the plan quantity. Adjust the amount of water applied with each cycle and the number of cycles each wk. according to actual site conditions. Drought or other conditions, as determined by the Engineer, may require the application of supplemental irrigation during hours other than normal working hours.

--Item 247--
There is no minimum PI requirement for this project.

--Item 310--
Refinish material that does not receive prime coat within one working day following acceptance of flexible base.

--Item 340--
Table 10, in Item 340, Hamburg Wheel Test Requirements tested in accordance with Tex-242-F are changed for PG 64-22 or lower and PG 70-22. Minimum number of passes at 12.55 mm Rut Depth, Tested at 50 degrees C will be 5,000 and 10,000 respectively.

The asphalt plant shall have truck scales as defined in Item 520. Give three weight tickets bearing the date, ticket number, the truck number, the gross, net & tare weights to the truck driver for the State inspector at the spreading and finishing operation. Trucks may be required to weigh on public scales or portable platform scales to verify the weight of the ticket.

Submit a copy of the Tex 233-F production charts on a weekly basis. At the end of the ACP work, provide all originals.

Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed. Stockpile the aggregate until enough material is available for five days of production unless prior approval is provided

Hold a pre-placement meeting one month prior to the placement of the hot mix.

Do not use diesel or solvents as asphalt release agents in production, transportation, or construction. A list of approved asphalt release agents is available from the District Laboratory.

No more than one hot mix lot will be open for any specific type of hot mix, unless authorized. After a lot is open and the Contractor gets approval to change plants, the previous lot will be

closed and a new lot will be opened. The numbering for the lots produced at the new plant will start with No. 1. If allowed to switch back to the original or previous plant, the next lot from that plant will resume numbering sequentially from the last lot produced by that plant.

Binder substitution is not allowed for surface mixtures.

Reference Table 14A and 14B in Item 3076 for Minimum Surface Temperatures.

--Item 403--
The Contractor and/or Contractor's Engineer who selects and designs the temporary shoring is responsible for the overall (global) stability calculations as well as internal stability and sliding calculations (including mat and soil nail pullout) as per the TxDOT Bridge Division Geotechnical Manual. If the Contractor chooses a Temporary Earth Retaining Wall for Temporary Shoring, then the Contractor and/or Contractor's Engineer is required also to provide wire struts as shown on these plans. Designs for any type of Retaining Wall used for Temporary Special Shoring shall conform to the TXDOT Geotechnical Manual Chapter 6: Retaining Walls.

The Contractor is responsible for maintaining positive drainage during construction of temp shoring operations and permanent wall structures.

--Item 420--

Restrict large aggregate size to ¾" maximum for class "C" concrete used in aesthetic details requiring form liners.

Pier and Bent Concrete will be paid for as "Plans Quantity".

--Item 421--
Use an automated ticket that contains the same information as TxDOT's ticket. Submit the ticket for approval prior to use. The concrete producer will contact the District Laboratory or the Engineer's Office (outside the San Antonio area) to inform TxDOT of scheduled structural concrete batching. Structural concrete includes bridge drill shafts, columns, caps, abutments, deck or top slabs of direct traffic culverts.

Entrained air is allowed for Class P and Class HES concrete only. Air content testing is waived for all classes of concrete.

Poly-fiber reinforced concrete may be used as an option, with the approval by the Engineer, for riprap, sidewalk, curb/gutter, and mow strip. Use a TxDOT approved manufacturer or producer for the poly-fiber. The poly-fibers shall be combined with the concrete in proportions as recommended by the manufacturer. A concrete mix design must be approved by the Engineer.

--Item 422--
For construction of approach slabs, longitudinal joints shall be placed on lane lines. Joints may be either a saw-cut crack control joint or a construction joint. Saw cut joints shall terminate 1'-0" before reaching the edge of the slab, must be saw cut as soon as possible after placement of concrete, and will be cut within 12 hours of concrete placement. Once sawing begins, it should be a continuous operation and should only be stopped if raveling occurs. Saw cut will be to a depth of 1.5" and filled with approved joint sealant.

The bridge approach slab will be poured simultaneously with the bridge deck.

--Item 423--
The backfill material for pre cast retaining walls shall be approved before placement. Build stockpile(s) in lifts not to exceed 2 feet and a minimum working face of not less than 10 feet, but not more than 20 feet.

Use the approved Concrete Block Retaining wall systems listed at:
http://www.txdot.gov/business/resources/approved-systems/retaining-system.html

Use the approved Mechanically Stabilized Earth (MSE) wall systems listed at:
http://www.txdot.gov/business/resources/approved-systems/mse-wall.html

TxDOT does not allow the use of experimental systems on projects with over 50,000 square feet walls over 25 ft. tall, or walls supporting or immediately adjacent to interstate highways.

When proprietary wall systems are used, a qualified representative of the retaining wall manufacturer must be available upon request during wall construction. As requested or required the manufacturer's representative must be on site to assist with the initial stages of wall construction, provide training to the Contractor wall crew and ensure proper interpretation of MSE wall shop drawings and details. Specific attention must be given to nonstandard wall installation details. The Contractor's wall crew foreman must be on site for the duration of wall construction. Any change to the wall crew foreman may require additional training by the wall supplier. The Contractor will ensure that the retaining walls are installed per the details presented in the construction drawings and as per the proprietary wall system requirements. The Engineer reserves the right to suspend wall construction activities due to any construction issue encountered.

Horizontal and vertical nail spacing on temp or permanent soil nail walls shall not exceed 4 ft.

Type DS material will be required on MSE walls in the area of the reinforcement mats.

--Item 427--
Provide special surface finish rub to surface area II.

--Item 432--
In all riprap slopes, provide 3 inch diameter weep holes at 10 foot maximum spacing and backed with loose graded gravel or crushed stone and galvanized hardware cloth.

In areas where guard fence posts are to be placed in riprap, the riprap shall have an 18 inch +/- blocked out area (round or square). After the posts are installed, the blocked out area shall be topped off with 4 inches of low strength grout/mortar consisting of about 1 sack of cement per cubic yard of mix.

Match the slope of the Riprap (Mow Strip) to the slope of the adjacent roadway.

--Item 465--
Concrete Class B invert shaping is required at all inlets, manholes and junction boxes in order to insure positive flow. The material and work performed for the placement of the inverts shall be considered subsidiary to this item.

--Item 496--
The Contractor will submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496.

The structure(s) to be removed have surface coatings that contain hazardous materials as follows: None present.

Provide for the safety and health of employees and abide by all OSHA Standards and Regulations. All costs incurred for proper management, shall be subsidiary to this Item.

--Item 500--
"Materials on Hand" payments will not be considered in determining percentages for mobilization payments.

--Item 502--
Place standard markings no later than 14 days after surface treatment operations are completed.

When advanced warning flashing arrow panels and/or changeable message sign is specified, have one standby unit in good condition at the job site. Standby time shall be considered subsidiary to the bid item.

Treat the pavement drop-offs as shown in the TCP.

After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance. Failure to make corrections as noted may result in payment for this item being withheld.

Moving an existing sign to a temporary location is subsidiary to this Item. Installations with permanent supports at permanent locations will be paid for under the applicable bid item (s).

Mount temporary mailboxes on plastic drum in accordance with Compliant Work Zone Traffic Control Devices, Section K. Mounting and moving the mailbox as needed for the various construction phases is subsidiary to this Item.

Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. Unless shown in the TCP, no lane, ramp, connector, etc. closures are allowed during special events. At least one lane has to remain open at all times. Lane closures will not be allowed if this reporting requirement is not met.

Avoid placing stockpiles within the roadway's horizontal clear zone. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets.

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

Temporary Rumble Strips are to be used according to WZ (RS)-16.

Use 4 of rumble strip arrays.

If Nighttime work is required and work is not behind positive barrier then full TY 3 reflective gear is required to be worn by all workers, hard hat halos are required to be worn by the flaggers at flagging stations, TY III barricades are required to be spaced at 500 ft, and a mandatory night work meeting is required.

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.

Moving or adjustment of traffic signal heads, VIVDS, and radar detection for the purpose of alignment with the shifting of lanes in conjunction with the traffic control plan will be subsidiary to various bid items.

--Item 504--
A Type D Structure (Asphalt Mix Control Laboratory) is required for all projects that do not have a previously approved laboratory structure for TxDOT's exclusive use.

--Item 506--
An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.

It is not anticipated that erosion control devices will be needed. However; in the event devices are needed, the SW3P shall consist of the control measures approved. Depending on the type and amount of work, payment will be handled with the Force Account Procedure, or by individual pay items.

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.

--Item 510--
The length of the one-way traffic control section is limited to 0.2 miles.

--Item 512--
Portable traffic barrier manufactured after December 31, 2019 must have been successfully tested to the 2016 edition of MASH and will be manufactured in accordance with the Standard Sheets in the plans. Portable traffic barrier manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives, but must be the same shape type as shown in the plans.

Only one shape type of CTB may be furnished on a project, no mixing of CTB shape types will be permitted along a continuous segment of CTB.

--Item 529--
Class "C" concrete is required for machine extruded curb.

--Item 540--
MBGF posts shall be round with domed tops, and not painted. If 10 or less timber posts are needed, they may be purchased locally and will be accepted by visual inspection.

Guard fence posts placed in proposed and/or existing areas of riprap, sidewalks or other concrete shall have an 18 inch +/- (square or round) block out in the concrete. After the posts are installed, the blocked out area shall be topped off with 4 inches of low strength grout/mortar consisting of about 1 sack of cement per cubic yard of mix.

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

--Item 542--
Salvage all undamaged/acceptable radius guardrail and deliver to the TxDOT maintenance section yard.

--Item 545--
See the Crash Cushion Summary Sheet.

--Item 556--
Coarse Aggregate Grade 3 meeting requirements of Item 421, Table 4, is acceptable for Filter Material.

--Item 658--
CTB reflectors will not be paid for directly but will be considered subsidiary to the barrier.

--Item 662--
Raised reflective pavement markings are required when using work zone reflective pavement markings for lane lines as shown in the standards. The raised reflective pavement markings must be placed during the same operation for installation of the work zone reflective pavement markings and placed before the roadway is open to traffic. These raised reflective pavement markings will be subsidiary to work zone pavement markings.

--Item 666--
Use TY II material (vs. an acrylic or epoxy) as the sealer for the TY I markings, place the TY II a minimum of 14 calendar days (to provide adequate curing) before placing the TY I markings.

Failure to provide the retroreflectometer testing data within the time specified in the specifications will result in non-payment of the bid item.

--Item 672--
Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--
Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 730--
Mow full-width and hand trim the right of way, including newly seeded or sodded areas, when vegetation reaches a height of 16” or when directed. Removal of brush sprouts growing within guardrail, concrete barriers or at other locations where mowing or hand trimming is done within the limits of construction is required and subsidiary to this item. Mowing may be required more often in newly sodded or seeded areas than in other parts of the project because of the supplemental irrigation these areas receive and the resulting weed growth. Coordinate mowing to avoid rutting or compaction of the soil when mowing where supplemental irrigation is being used. Use mowing equipment that will not adversely affect soil retention blankets or mulches that have been applied. Work performed under this item does not replace the mowing required when placing permanent seeding in an area that has established temporary seeding as described in Article 164.3, Construction.

--Item 734 & 738--
Perform Litter Removal and Cleaning and Sweeping Highways once a month or as directed.

--Item 3085--
The minimum application rates are listed in Table UC. The Engineer may adjust the application rates taking into consideration the existing pavement surface conditions.

Table UC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Emulsion (CHFRS-2P, CRS-2P)	0.25
Seal Coat – Asphalt (AC-15P, AC-20-5TR, AC-20XP, AC10-2TR)	0.23
Aggregate for Seal Coat Options TY PB GR 4(AC) or TY B GR 4(Emulsion)	1 CY:120 SY

--Item 4171--
Install bridge identification numbers shown below for each of the following listed bridges in accordance to the special specification and San Antonio District Standard. Install the bridge identification number on two locations as shown on the plans, or as directed. For bridges in a two-way condition, install the bridge identification number on each outside beam on the upstream side of traffic. For bridges in a one-way condition, install the bridge identification number on each side, opposite corners on each outside beam. For culverts less than 5 ft. in height, install the bridge identification number on the headwall on upstream and downstream location. For culverts greater than 5 ft. in height, install the bridge identification number inside the first barrel on the upstream side of traffic and inside the last barrel on the opposite corner in the direction of traffic. Installation of bridge identification numbers is subsidiary to pertinent items.

--Item 6185--
One shadow vehicle with TMA will be required for this project. The TMA’s will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA’s needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0848-04-049 **DISTRICT** San Antonio **COUNTY** Medina
HIGHWAY FM 462

			CONTROL SECTION JOB		**0848-04-049**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00131340**		
			COUNTY		**Medina**		
			HIGHWAY		**FM 462**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	9.350		9.350	
	104-6009	REMOVING CONC (RIPRAP)	SY	1,615.000		1,615.000	
	104-6028	REMOVING CONC (MISC)	SY	31.000		31.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	1,767.000		1,767.000	
	110-6001	EXCAVATION (ROADWAY)	CY	157.000		157.000	
	110-6002	EXCAVATION (CHANNEL)	CY	2,195.000		2,195.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	1,655.000		1,655.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	2,067.000		2,067.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	2,067.000		2,067.000	
	168-6001	VEGETATIVE WATERING	MG	33.000		33.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	2,067.000		2,067.000	
	216-6001	PROOF ROLLING	HR	42.000		42.000	
	247-6475	FL BS (CIP)(TY D GR 1-2, OR 5)FINAL POS	CY	354.000		354.000	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	425.000		425.000	
	340-6048	D-GR HMA(SQ) TY-C SAC-B PG70-22	TON	235.000		235.000	
	340-6050	D-GR HMA(SQ) TY-C PG70-22	TON	235.000		235.000	
	400-6005	CEM STABIL BKFL	CY	129.000		129.000	
	403-6001	TEMPORARY SPL SHORING	SF	920.000		920.000	
	416-6006	DRILL SHAFT (48 IN)	LF	887.000		887.000	
	416-6087	CORE HOLE	EA	30.000		30.000	
	420-6013	CL C CONC (ABUT)	CY	68.100		68.100	
	420-6029	CL C CONC (CAP)	CY	208.500		208.500	
	420-6037	CL C CONC (COLUMN)	CY	110.000		110.000	
	422-6001	REINF CONC SLAB	SF	17,940.000		17,940.000	
	422-6015	APPROACH SLAB	CY	113.500		113.500	
	423-6003	RETAINING WALL (TEMP WALL)	SF	330.000		330.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	2,321.620		2,321.620	
	432-6006	RIPRAP (CONC)(CL B)	CY	2.000		2.000	
	432-6014	RIPRAP (STONE TY R)(DRY)(6 IN)	CY	3.000		3.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	31.000		31.000	
	450-6004	RAIL (TY T221)	LF	820.000		820.000	
	451-6019	RETROFIT RAIL (TY T631)	LF	239.500		239.500	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	155.000		155.000	
	459-6008	GABION MATTRESSES (GALV)(18 IN)	SY	2,204.000		2,204.000	
	459-6011	GABIONS (5'X 3')(GALV)	CY	499.000		499.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	29.000		29.000	
	465-6146	INLET(COMPL)(PSL)(SFG)(3FTX3FT-3FTX3FT)	EA	1.000		1.000	

Estimate & Quantity Sheet

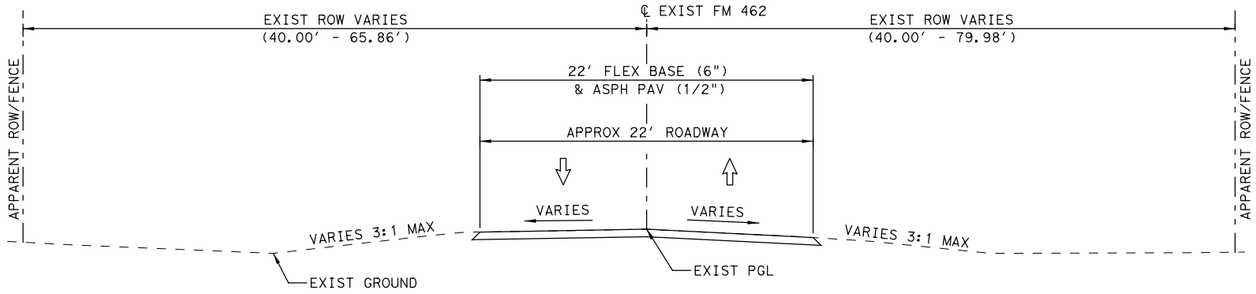
CONTROLLING PROJECT ID 0848-04-049 **DISTRICT** San Antonio **COUNTY** Medina
HIGHWAY FM 462

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0848-04-049**			
		PROJECT ID		**A00131340**			
		COUNTY		**Medina**			
		HIGHWAY		**FM 462**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	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	25.000		25.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	60.000		60.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	60.000		60.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	156.000		156.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	156.000		156.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,926.000		1,926.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,926.000		1,926.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	25.000		25.000	
	512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	940.000		940.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1,780.000		1,780.000	
	512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	940.000		940.000	
	529-6001	CONC CURB (TY I)	LF	40.000		40.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	775.000		775.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	450.000		450.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	6.000		6.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	2.000		2.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	4.000		4.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	6.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	2.000		2.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		6.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	15.000		15.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	2,880.000		2,880.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	72.000		72.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	2,880.000		2,880.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	1,790.000		1,790.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	1,870.000		1,870.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	24.000		24.000	
	3084-6001	BONDING COURSE	GAL	319.000		319.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	2.000		2.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	404.000		404.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0848-04-049 **DISTRICT** San Antonio **COUNTY** Medina
HIGHWAY FM 462

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0848-04-049**			
		PROJECT ID		**A00131340**			
		COUNTY		**Medina**			
		HIGHWAY		**FM 462**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6185-6003	TMA (MOBILE OPERATION)	HR	16.000		16.000	
	7202-6025	STRMWTR TREAT UNIT (54 IN) (3 CART)	EA	1.000		1.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

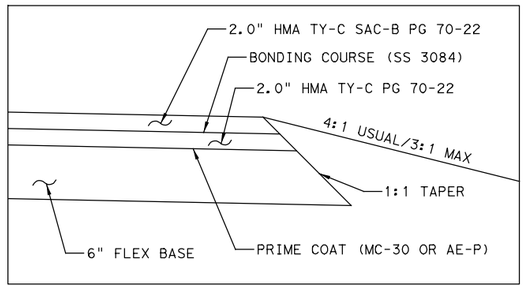


EXISTING TYPICAL SECTION

LEGEND

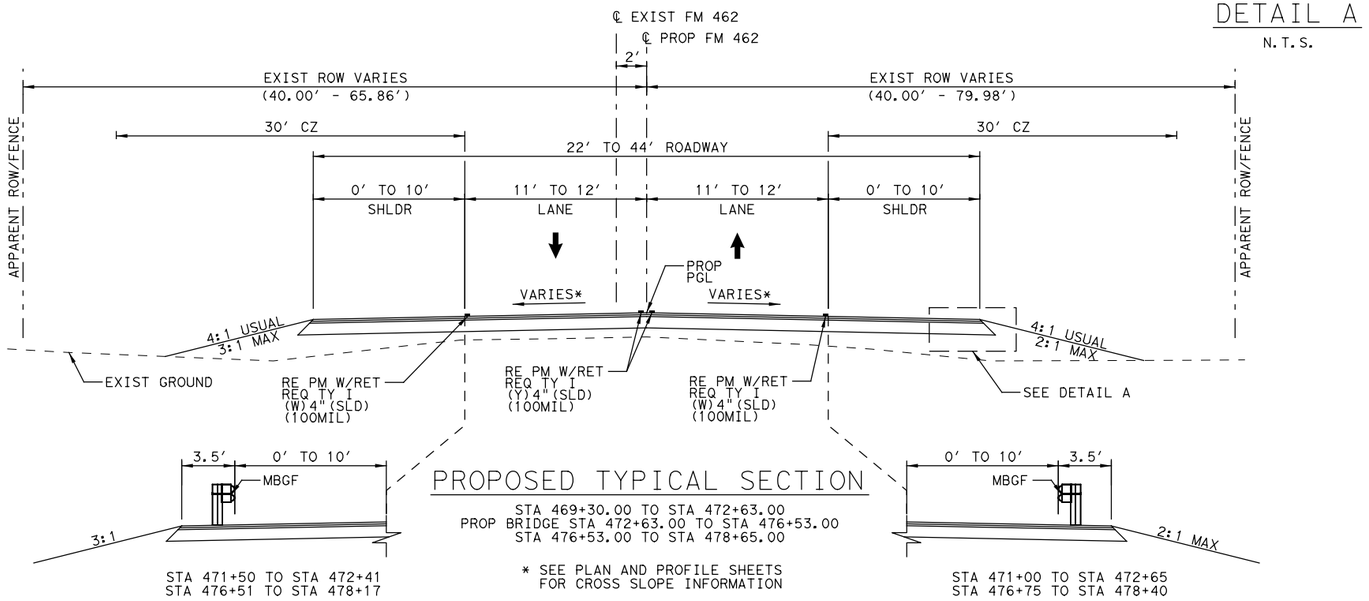
PROP TRAFFIC LANE

EXIST TRAFFIC LANE



DETAIL A

N.T.S.



PROPOSED TYPICAL SECTION

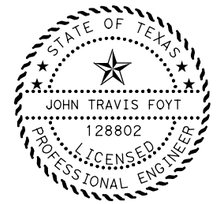
STA 469+30.00 TO STA 472+63.00
PROP BRIDGE STA 472+63.00 TO STA 476+53.00
STA 476+53.00 TO STA 478+65.00

* SEE PLAN AND PROFILE SHEETS
FOR CROSS SLOPE INFORMATION

STA 471+50 TO STA 472+41
STA 476+51 TO STA 478+17

STA 471+00 TO STA 472+65
STA 476+75 TO STA 478+40

NO.	DATE	REVISION	APPR BY



9/17/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

TYPICAL SECTIONS

N.T.S. SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	6

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 9/17/2021
PLOTTING TIME: 11:31:48 AM
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User Name: JFOYT

SUMMARY OF TRAFFIC CONTROL ITEMS

SHEET NO.	ITEM 110 6002	ITEM 403 6001	ITEM 423 6003	ITEM 502 6001	ITEM 510 6003	ITEM 512 6005	ITEM 512 6029	ITEM 512 6053	ITEM 540 6002	ITEM 542 6001	ITEM 544 6001	ITEM 544 6003
	EXCAVATION (CHANNEL)	TEMPORARY SPL SHORING	RETAINING WALL (TEMP WALL)	BARRICADES, SIGNS AND TRAFFIC HANDLING	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST)(F-SHAPE) (TY 1)	PORT CTB (MOVE)(F-SHAPE) (TY 1)	PORT CTB (REMOVE)(F-SHAPE) (TY 1)	MTL W-BEAM GD FEN (STEEL POST)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)
	CY	SF	SF	MO	MO	LF	LF	LF	LF	LF	EA	EA
PHASE 1A	-	-	-	1	1	840	-	-	450	-	2	-
PHASE 1B	878	920	330	12	12	100	840	-	-	-	-	-
PHASE 2	1,317	-	-	12	12	-	940	940	-	450	-	2
PROJECT TOTALS	2,195	920	330	25	25	940	1,780	940	450	450	2	2

SUMMARY OF TRAFFIC CONTROL ITEMS

SHEET NO.	ITEM 545 6003	ITEM 545 6005	ITEM 545 6019	ITEM 662 6063	ITEM 662 6075	ITEM 662 6095	ITEM 6001 6002	ITEM 6185 6002	ITEM 6185 6003
	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N) (TL3)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	EA	EA	LF	LF	LF	EA	DAY	HR
PHASE 1A	-	-	2	-	24	-	-	-	-
PHASE 1B	2	-	-	1,440	24	1,440	-	-	-
PHASE 2	2	2	-	1,440	24	1,440	-	-	16
PROJECT TOTALS	4	2	2	2,880	72	2,880	2	404	16

SUMMARY OF ROADWAY ITEMS

SHEET NO.	STATION LIMITS	ITEM 100 6002	ITEM 110 6001	ITEM 132 6003	ITEM 216 6001	#	ITEM 247 6475	ITEM 310 6027	ITEM 340 6048	ITEM 340 6050
		PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(ORD COMP)(TY B)	PROOF ROLLING	SURF AREA	FL BS (CIP)(TY D GR 1-2, OR 5)FINAL POS	PRIME COAT(MC-30 OR AE-P)	D-GR HMA(SQ) TY-C SAC-B PG70-22	D-GR HMA(SQ) TY-C PG70-22
								0.2 GAL/SY		
		STA	CY	CY	HR	SY	CY	GAL	TON	TON
SHEET 1 OF 2	469+30.00 TO 474+50.00	5.20	122	890	21	1,283	214	257	142	142
SHEET 2 OF 2	474+50.00 TO 478+65.00	4.15	35	765	21	838	140	168	93	93
PROJECT TOTALS		9.35	157	1,655	42	2,121	354	425	235	235

FOR CONTRACTOR INFORMATION ONLY

SUMMARY OF ROADWAY ITEMS

SHEET NO.	STATION LIMITS	ITEM 432 6045	ITEM 529 6001	ITEM 540 6002	ITEM 540 6006	ITEM 544 6001	ITEM 3084 6001
		RIPRAP (MOW STRIP)(4 IN)	CONC CURB (TY I)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	BONDING COURSE
							0.15 GAL/SY
		CY	LF	LF	EA	EA	GAL
SHEET 1 OF 2	469+30.00 TO 474+50.00	14	40	125	2	2	193
SHEET 2 OF 2	474+50.00 TO 478+65.00	17	-	200	2	2	126
PROJECT TOTALS		31	40	325	4	4	319

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FM 462 AT HONDO CREEK

QUANTITY SUMMARIES

SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	7

SUMMARY OF REMOVAL ITEMS

SHEET NO.	STATION LIMITS	ITEM 104 6009	ITEM 104 6028	ITEM 105 6011
		REMOVING CONC (RIPRAP)	REMOVING CONC (MISC)	REMOVING STAB BASE AND ASPH PAV (2"-6")
		SY	SY	SY
SHEET 1 OF 1	470+55.00 TO 478+65.00	1,615	31	1,767
PROJECT TOTALS		1,615	31	1,767

SUMMARY OF EROSION CONTROL ITEMS

SHEET NO.	STATION LIMITS	ITEM 160 6003	ITEM 164 6003	ITEM 168 6001	ITEM 169 6001	ITEM 506 6002	ITEM 506 6011	ITEM 506 6020	ITEM 506 6024	ITEM 506 6038	ITEM 506 6039
		FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
		SY	SY	MG	SY	LF	LF	SY	SY	LF	LF
SHEET 1 OF 1	470+55.00 TO 478+65.00	2,067	2,067	33	2,067	60	60	156	156	1,926	1,926
PROJECT TOTALS		2,067	2,067	33	2,067	60	60	156	156	1,926	1,926

SUMMARY OF SIGNING AND PAVEMENT MARKINGS ITEMS

SHEET NO.	STATION LIMITS	ITEM 644 6001	ITEM 644 6076	ITEM 658 6014	ITEM 658 6062	ITEM 666 6303	ITEM 666 6315	ITEM 672 6009
		IN SM RD SN SUP&AM TY10BWG(1)SA(P)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A
		EA	EA	EA	EA	LF	LF	EA
SHEET 1 OF 2	470+55.00 TO 474+50.00	3	1	4	7	990	1,040	13
SHEET 2 OF 2	474+50.00 TO 478+65.00	3	1	2	8	800	830	11
PROJECT TOTALS		6	2	6	15	1,790	1,870	24

SUMMARY OF DRAINAGE ITEMS

SHEET NO.	STATION LIMITS	ITEM 432 6014	ITEM 464 6003	ITEM 465 6146	ITEM 467 6356	ITEM 7202 6025
		RIPRAP (STONE TY R)(DRY)(6 IN)	RC PIPE (CL III)(18 IN)	INLET(COMPL)(PSL)(SFG)(3FTX3 FT-3FTX3FT)	SET (TY II) (18 IN) (RCP) (3: 1) (C)	STRMWTR TREAT UNIT (54 IN)(3 CART)
		CY	LF	EA	EA	EA
SHEET 1 OF 1	470+55.00 TO 478+65.00	3	29	1	1	1
PROJECT TOTALS	PROJECT TOTALS	3	29	1	1	1

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FM 462 AT HONDO CREEK

QUANTITY SUMMARIES

SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
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CK: JMD	MEDINA	SAT	0848	04	049	7A

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
130	1	W8-18		36"X36"	X		10BWG	1	SA	P		
130	2	W8-13aT		36"X36"	X		10BWG	1	SA	P		
130	3	I-3		24"X18"	X		10BWG	1	SA	P		
131	4	W8-18		36"X36"	X		10BWG	1	SA	P		
131	5	W8-13aT		36"X36"	X		10BWG	1	SA	P		
131	6	I-3		24"X18"	X		10BWG	1	SA	P		

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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FM 462 AT HONDO CREEK
SUMMARY OF SMALL SIGNS

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
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PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:20:19 PM
File Name: FM462SD-01.dgn
User Name: JFOYT

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

1. GENERAL

(1) TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.

(2) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR MUST INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

(3) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

(4) THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING/UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND/OR PERMANENT LANE, RAMP, CONNECTOR, FRONTAGE ROAD, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

(5) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

(6) TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

(7) UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE ENGINEER, DAILY LANE CLOSURES WILL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS:

DAYLIGHT HOUR CLOSURES (DAWN TO DUSK), MONDAY THROUGH FRIDAY OR AS DIRECTED AND APPROVED BY THE ENGINEER.

NIGHTTIME CLOSURES: ONLY IF APPROVED BY THE ENGINEER. (WITH UNIFORMED OFF DUTY LAW ENFORCEMENT OFFICERS)

WEEKEND CLOSURES WHEN APPROVED BY THE ENGINEER.

NO LANES CLOSURES OR ROADWAY CLOSURES WILL BE PERMITTED FOR THE FOLLOWING KEY DATES AND/OR SPECIAL EVENTS:

BETWEEN DECEMBER 15 AND JANUARY 1.

WEDNESDAY BEFORE THANKSGIVING THRU THE SUNDAY AFTER THANKSGIVING.

SATURDAY THROUGH MONDAY ON MEMORIAL DAY AND LABOR DAY WEEKENDS.

JULY 4TH AND IF JULY 4TH FALLS ON A MONDAY OR FRIDAY THEN THE ADJOINING SATURDAY AND SUNDAY.

1. GENERAL (CON'T)

(8) REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION WILL BE PERFORMED UNDER AND CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

(9) COORDINATE WITH ADJACENT PROJECTS.

(10) COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.

(11) EXCAVATION WITHIN 5 FEET OF AN EXISTING ELECTRICAL POLE WILL REQUIRE POLE BRACING. CONTACT UTILITY COMPANY TO REQUEST POLE BRACING. THE ESTIMATED DURATION FOR THE POLE BRACING PROCESS IS APPROXIMATELY 6 TO 8 WEEKS.

(12) COORDINATE WITH TxDOT FOR SIGNAL TIMING REVISIONS, AS NECESSARY.

(13) CRANES WILL BE FULLY LOWERED/RETRACTED AT THE END OF EACH WORK DAY. AT NO TIME SHALL A CRANE BE LEFT UNATTENDED WHILE BEING EXTENDED.

(14) ALL LANE AND SHOULDER CLOSURES WILL USE PLASTIC DRUMS AS CHANNELIZING DEVICES UNLESS OTHERWISE SHOWN.

(15) CONTRACTOR MUST PROTECT ALL EXISTING STRUCTURES (DRAINAGE, BRIDGES, GUARDRAIL, ETC.) FROM DAMAGE DUE TO CONSTRUCTION ACTIVITIES. DAMAGE TO EXISTING STRUCTURES WILL BE REPAIRED AND PAID FOR AT THE CONTRACTOR'S EXPENSE.

(16) THE CONTRACTOR MUST MAKE THE CONSTRUCTION SPEED LIMIT SIGNS INOPERATIVE BY COVERING SIGNS WHEN THE REDUCED SPEED LIMITS ARE NOT NECESSARY (CARE MUST BE TAKEN HOWEVER TO DELINEATE THE SIGN POST SO IT DOES NOT BECOME AN INVISIBLE OBSTACLE AT NIGHT TO THE ADJACENT ROADWAY).

2. SEQUENCE OF WORK

(1) THIS PROJECT WILL BE CONSTRUCTED IN 2 PHASES, BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.

(2) PREPARING ROW/REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE PHASES NOTED BELOW UNLESS APPROVED BY THE ENGINEER.

(3) PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.

(4) ONCE WORK HAS BEGUN AT A REFERENCE LOCATION, THE ENTIRE SEQUENCE MUST BE WORKED ON CONTINUOUSLY TO COMPLETION.

(5) PROVIDE A SMOOTH TRANSITION AT WORK LIMIT ENDS BEFORE OPENING TO TRAFFIC. INSTALL WORK ZONE TABS AND/OR PAVEMENT MARKINGS TO GUIDE TRAFFIC.

(6) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE IA

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT IN FM 462 PHASE IA CONSTRUCTION IS TO INSTALL T631(MOD) RAIL AND MBGF ALONG EXISTING BRIDGE TO PROTECT DRIVERS DURING PHASE IB.

1. MOBILIZATION
2. PLACE DETOUR SIGNS, ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
3. PREPARE ROW FOR ENTIRE PROJECT
4. PLACE STORM WATER POLLUTION PREVENTION MEASURES ALONG CONSTRUCTION ZONE AS SHOWN ON SW3P LAYOUT SHEETS
5. INSTALL TEMPORARY TRAFFIC SIGNAL PER TCP(2-8)-18 STANDARD
6. FM 462 TRAFFIC WILL SHIFT TO 2-WAY 1 LANE MOVEMENT ON EXISTING ROADWAY
7. REMOVE POSTS FROM EXISTING BRIDGE
8. RETROFIT T631(MOD) RAIL TO EXISTING BRIDGE
9. INSTALL MBGF

PHASE IB

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT IN FM 462 PHASE IB CONSTRUCTION IS TO INSTALL TEMPORARY TRAFFIC SIGNALS AND REROUTE TRAFFIC TO A 2-WAY 1 LANE PATTERN ON EXISTING ROADWAY WHILE CONSTRUCTING PARTIAL PROPOSED PAVEMENT AND BRIDGE.

1. PLACE DETOUR SIGNS, ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
2. PLACE STORM WATER POLLUTION PREVENTION MEASURES ALONG CONSTRUCTION ZONE AS SHOWN ON SW3P LAYOUT SHEETS
3. INSTALL TEMPORARY TRAFFIC SIGNAL PER TCP(2-8)-18 STANDARD
4. FM 462 TRAFFIC WILL SHIFT TO 2-WAY 1 LANE MOVEMENT ON EXISTING ROADWAY
5. RIGHT SIDE OF EXISTING BRIDGE TO BE REMOVED. REFER TO BRIDGE TYPICAL SECTION FOR LIMITS
6. CONSTRUCT TEMPORARY SPECIAL SHORING
7. CONSTRUCT TEMPORARY ACCESS ROUTE
8. CONSTRUCT RIGHT PROPOSED BRIDGE DECK AND APPROACHES
9. INSTALL BRIDGE RAILS
10. PLACE FLEXBASE
11. INSTALL MBGF
12. INSTALL PERMANENT ASPHALT BASE
13. INSTALL TEMPORARY PAVEMENT MARKINGS FOR PHASE 2 TRAFFIC

PHASE II

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT IN FM 462 PHASE II CONSTRUCTION IS TO SHIFT TRAFFIC ONTO PARTIAL CONSTRUCTED PAVEMENT AND BRIDGE WHILE CONSTRUCTING REMAINING PAVEMENT AND BRIDGE. TRAFFIC WILL THEN BE SHIFTED ONTO PROPOSED ROADWAY WHILE CONSTRUCTING SURFACE COURSE AND INSTALLING PERMANENT STRIPING AND SIGNING UNDER TRAFFIC.

PHASE II STEP 1

1. PLACE DETOUR SIGNS, ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND/OR DIRECTED/APPROVED BY THE ENGINEER
2. INSTALL TEMPORARY TRAFFIC SIGNAL PER TCP(2-8)-18 STANDARD
3. SHIFT FM 462 TRAFFIC ONTO CONSTRUCTED BRIDGE FROM PHASE 1
4. REMOVE REMAINING PORTION OF EXISTING BRIDGE
5. CONSTRUCT REMAINING LEFT BRIDGE DECK AND APPROACHES
6. INSTALL BRIDGE RAILS
7. PLACE FLEXBASE
8. INSTALL MBGF
9. INSTALL REMAINING PERMANENT ASPHALT BASE

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Texas Department of Transportation

FM 462 AT HONDO CREEK

TCP NARRATIVE

N. T. S

SHEET 1 OF 2

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PHASE II STEP 2

1. PERFORM SURFACE COURSE OVERLAY AND INSTALL PERMANENT PAVEMENT MARKINGS UNDER TRAFFIC. FLAGGER WILL BE REQUIRED TO MAINTAIN TRAFFIC THROUGH THE SITE DURING THIS TASK
2. PLACE PERMANENT SIGNS & EROSION CONTROL MEASURES AS SHOWN IN PLANS
3. REROUTE FM 462 TRAFFIC ONTO PERMANENT LANES
4. REMOVE SW3P DEVICES
5. REMOVE BARRICADES AND ADVANCE WARNING SIGNS
6. PERFORM FINAL CLEANUP
7. PERFORM PUNCH LIST AND REMOVE ALL CONSTRUCTION DEVICES AND ITEMS

3. SAFETY

(1) THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1-12)-14. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS WILL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

(2) BARRICADES AND WARNING SIGNS WILL BE PLACED AS INDICATED ON THE PLANS. THIS WILL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR WILL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.

(3) THE CONTRACTOR WILL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL.

(4) THE CONTRACTOR WILL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY WILL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

4. HAULING EQUIPMENT

(1) THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENT SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT. THEY WILL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED/APPROVED BY THE ENGINEER.

(2) THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

5. FINAL CLEAN UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR WILL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

6. PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIAL WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

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FM 462 AT HONDO CREEK

TCP NARRATIVE

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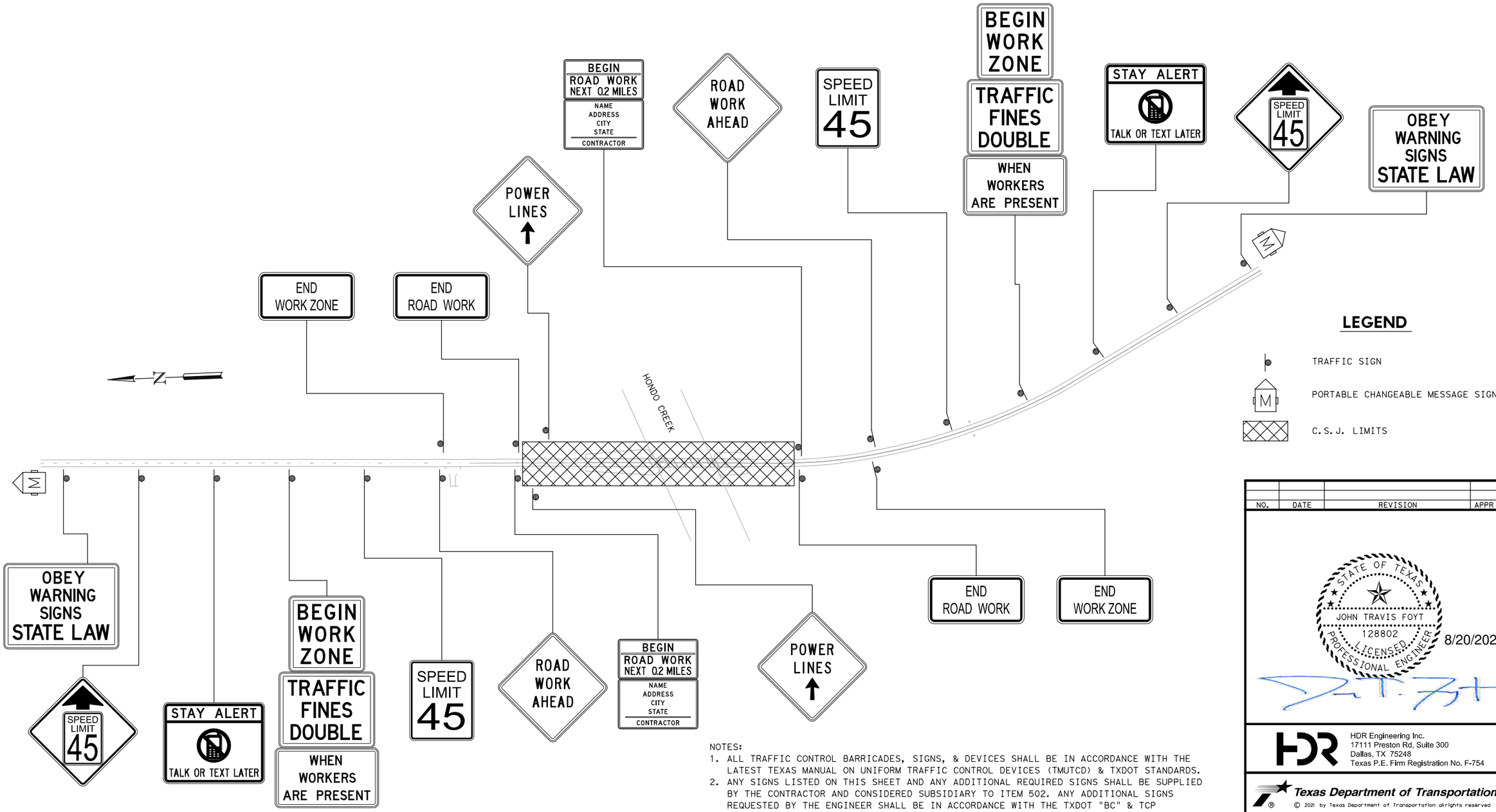

SIGN SCHEDULE NOTES:

1. REFER TO TXDOT STANDARD SHEETS BC(1)-14 THRU BC(12)-14, TCP(2-8)-12, WZ(STPM)-13, CSB(1)-10, CSB(7)-10, ACZ(350)-16, RW(TEW) AND CRASH CUSHION SUMMARY SHEET FOR TRAFFIC CONTROL DEVICES AND WARNING SIGN GUIDANCE.
2. ALL SIGNS SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION UNLESS NOTED OTHERWISE.
3. SIGNS CANNOT BE PLACED DUE TO INADEQUATE SHOULDER WIDTH SHALL BE ADJUSTED IN THE FIELD IN ACCORDANCE TO TMUTCD.
4. NOT ALL WORK ZONE SIGNS ARE SHOWN ON THE PLAN. REFER TO TXDOT STANDARDS FOR ADDITIONAL SIGNAGE.
5. ANY REDUCTION IN SPEED LIMIT GREATER THAN 10 MPH FROM CURRENT POSTED SPEED REQUIRES A COMMISSION MINUTE ORDER APPROVAL FROM TXDOT.

NOTES:

1. ALL TRAFFIC CONTROL BARRICADES, SIGNS, & DEVICES SHALL BE IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) & TXDOT STANDARDS.
2. ANY SIGNS LISTED ON THIS SHEET AND ANY ADDITIONAL REQUIRED SIGNS SHALL BE SUPPLIED BY THE CONTRACTOR AND CONSIDERED SUBSIDIARY TO ITEM 502. ANY ADDITIONAL SIGNS REQUESTED BY THE ENGINEER SHALL BE IN ACCORDANCE WITH THE TXDOT "BC" & TCP STANDARD SHEETS, AND/OR THE TMUTCD.
3. BARRICADES ARE NOT TO BE USED AS A SIGN SUPPORT. SUPPORT FOR SIGNS SHALL BE TEMPORARY, FIXED, OR PORTABLE SIGN SUPPORTS AS DIRECTED BY THE ENGINEER OR IN ACCORDANCE WITH THE "BC" STANDARD SHEETS AND THE TMUTCD.
4. A DISTANCE PLAQUE IN FEET OR MILES MAY BE REQUIRED FOR USE IN CONJUNCTION WITH WARNING SIGNS.
5. UTILIZE EXPERIENCED FLAGGERS AT ALL TIMES.
6. PLASTIC BARRELS OR VERTICAL PANELS ARE TO BE USED AS CHANNELIZING DEVICES. CONES WILL NOT BE PERMITTED.
7. ALL CONSTRUCTION TRAFFIC IS TO BE REGULATED TO INCONVENIENCE THE TRAVELING PUBLIC AS LITTLE AS POSSIBLE. WHEN IT IS NECESSARY FOR CONSTRUCTION EQUIPMENT OR TRUCKS TO STOP, UNLOAD, OR CROSS ROADWAYS UNDER TRAFFIC, WARNING SIGNS AND A FLAGGER SHALL BE PROVIDED AS NECESSARY TO PROTECT THE TRAVELING PUBLIC.
8. REFER TO TCP STANDARDS FOR SIGN SPACING.

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FM 462 AT HONDO CREEK

ADVANCE WARNING LAYOUT

N. T. S.

SHEET 1 OF 1

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DATE: 8/19/2021
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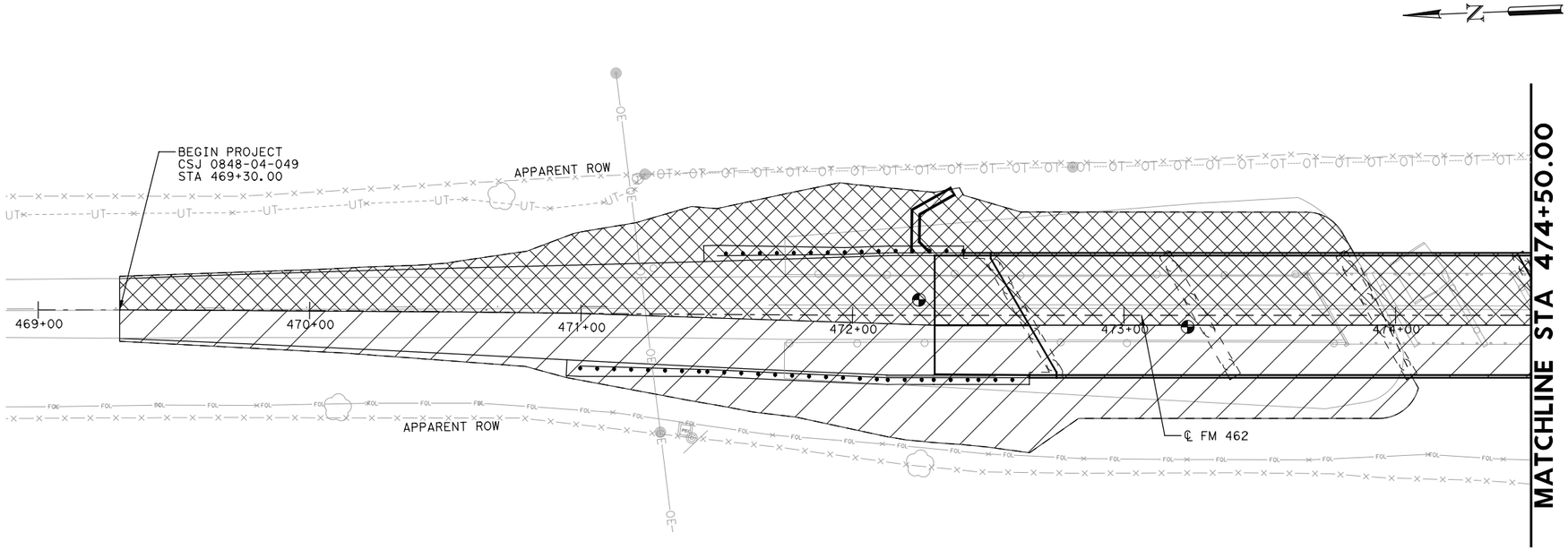
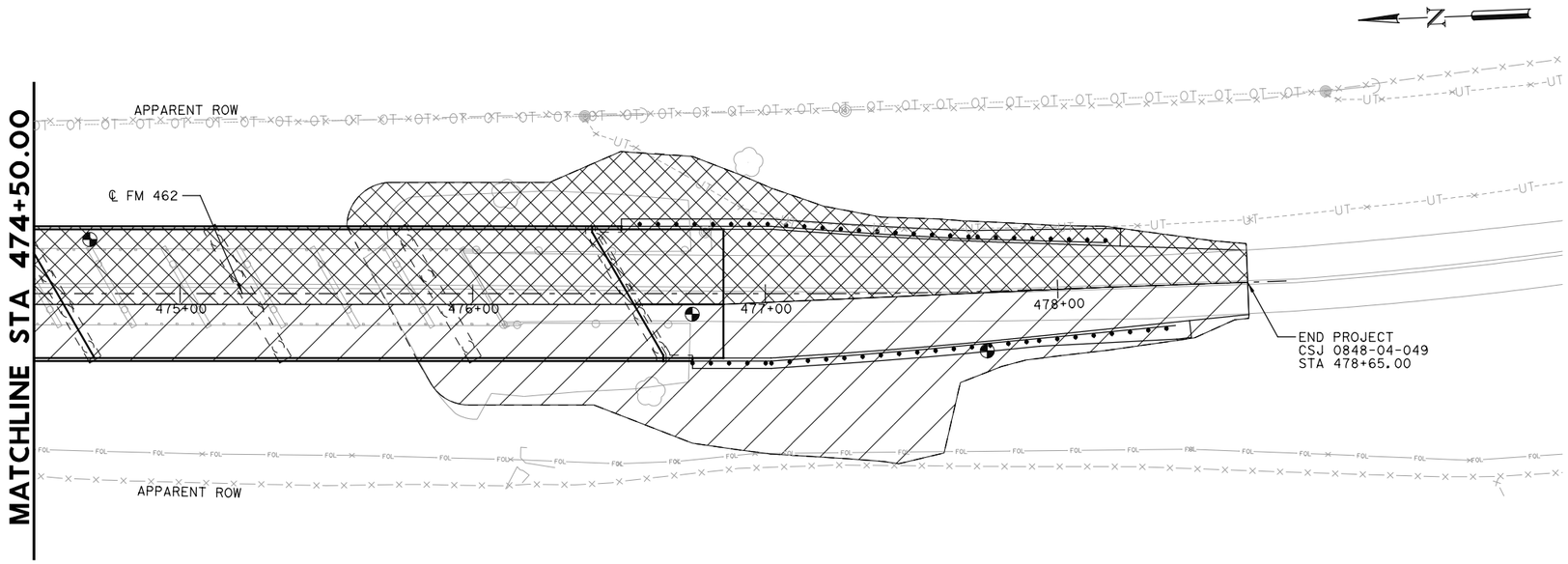
User Name: JFOYT





LEGEND

CONSTRUCTION PHASE 1

CONSTRUCTION PHASE 2

0 25 50 75 100

HORIZ. SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

8/20/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN OVERALL PHASING LAYOUT

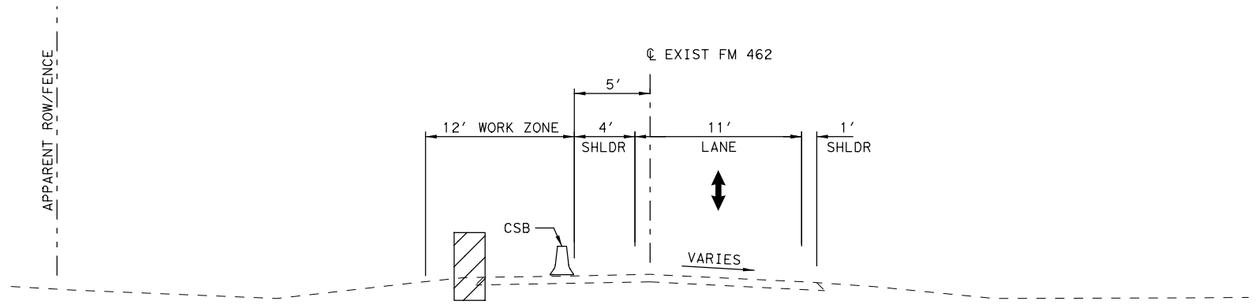
SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	11

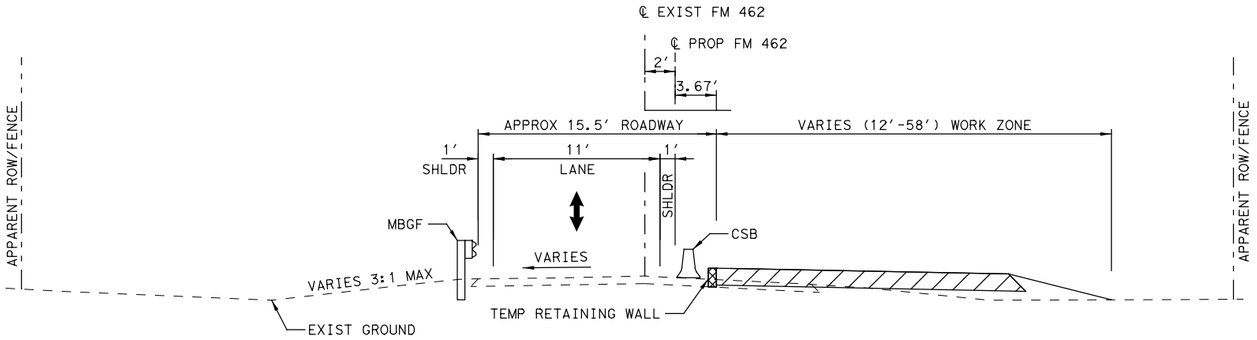
PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl

DATE: 8/19/2021
PLOTTING TIME: 4:10:25 PM

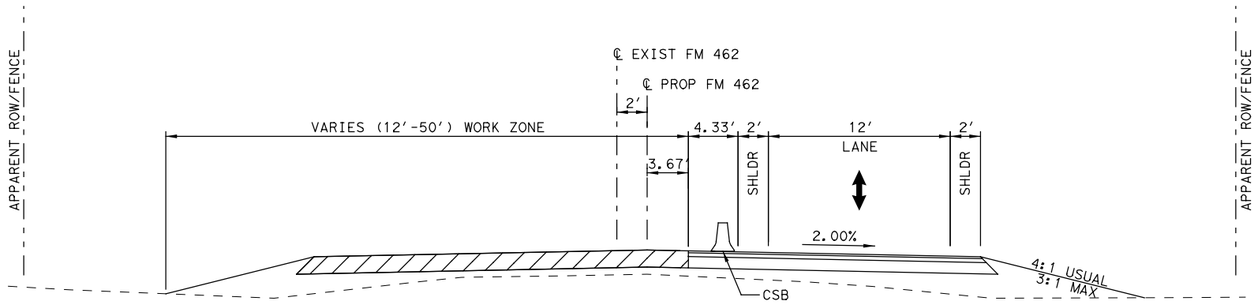
File Name:FM462TCP00.dgn
User Name: JFOYT



PHASE IA TYPICAL SECTION



PHASE IB TYPICAL SECTION



PHASE II TYPICAL SECTION

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION THIS PHASE
- CONSTRUCTED PREVIOUS PHASE

NOTES:

1. SEE TYPICAL SECTIONS AND PLAN AND PROFILE SHEETS FOR MBGF LIMITS.
2. SEE TCP PHASE LAYOUT SHEETS FOR LIMITS OF TEMPORARY AND PERMANENT MARKINGS.
3. SEE TYPICAL SECTIONS FOR PROPOSED PAVEMENT SECTION.
4. SEE TEMPORARY SPECIAL SHORING LAYOUT FOR ADDITIONAL INFORMATION.
5. SURFACE COURSE AND PERMANENT STRIPING TO BE CONSTRUCTED IN PHASE II AFTER TRAFFIC HAS BEEN SHIFTED TO ULTIMATE CONFIGURATION.
6. CONTRACTOR SHALL AVOID IMPACTING EXISTING UTILITIES.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED PROFESSIONAL ENGINEER
8/20/2021

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Dallas, TX 75248
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Texas Department of Transportation

FM 462 AT HONDO CREEK

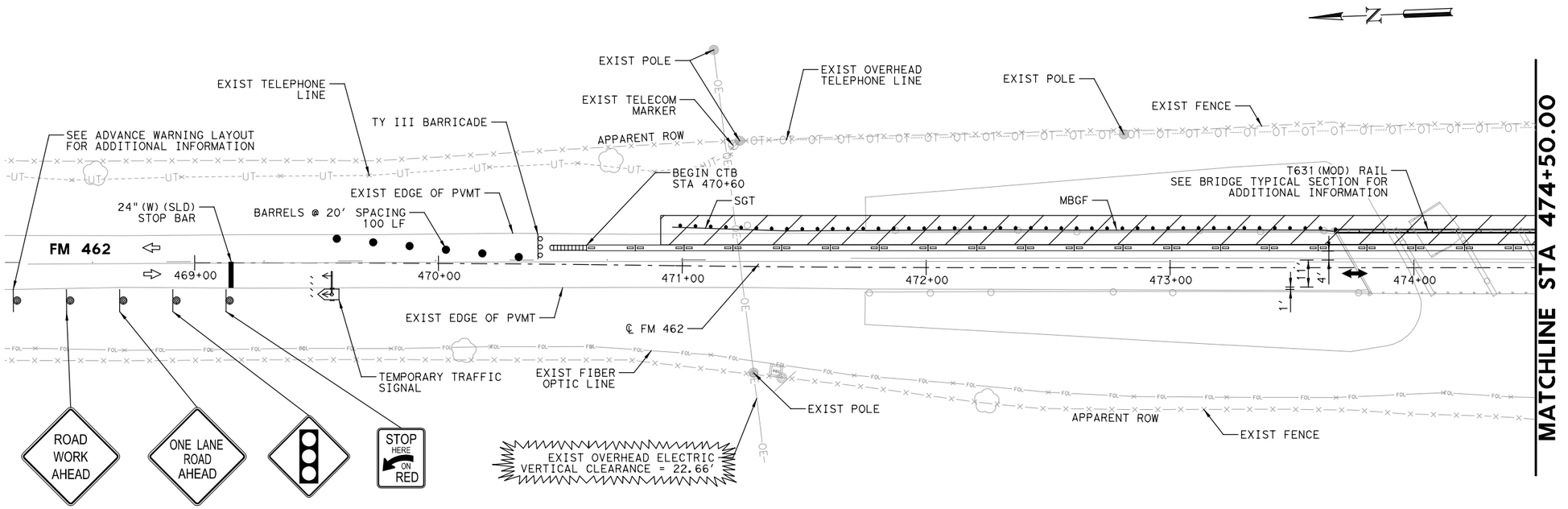
TRAFFIC CONTROL PLAN TYPICAL SECTIONS

N. T. S.

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	12

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	1
512 6094	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	390
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	225
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1
662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1



0 25 50 75 100

HORIZ. SCALE IN FEET

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

NO.	DATE	REVISION	APPR BY

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Texas Department of Transportation

FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN PHASE IA LAYOUT

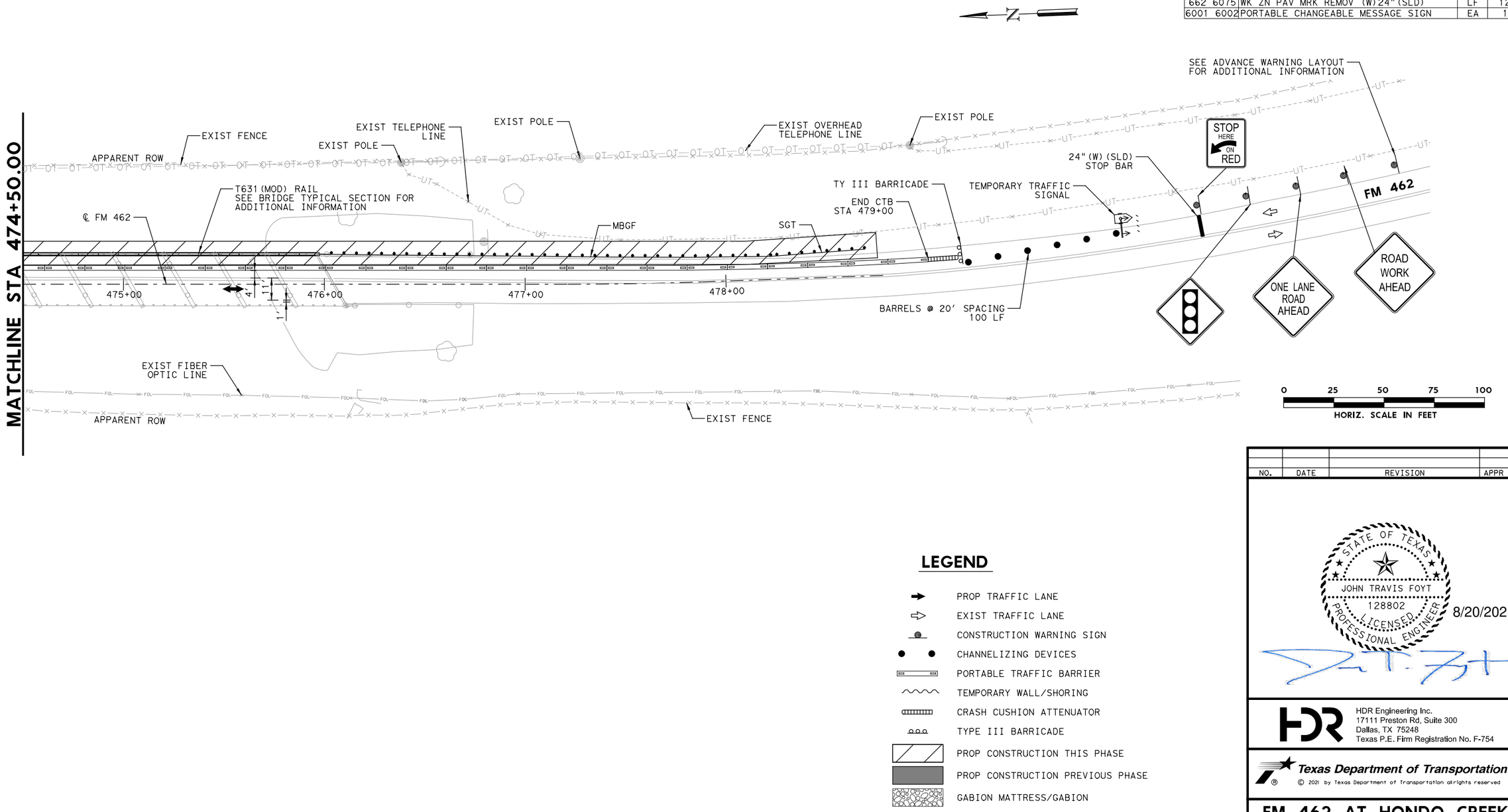
BEGIN TO STA 474+50.00

SCALE: 1"=50' SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	13

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:10:30 PM
File Name: FM462TCP01A.dgn
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	1
512 6094	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	450
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	225
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1
662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1



LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

NO.	DATE	REVISION	APPR BY

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8/20/2021

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FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN PHASE 1A LAYOUT

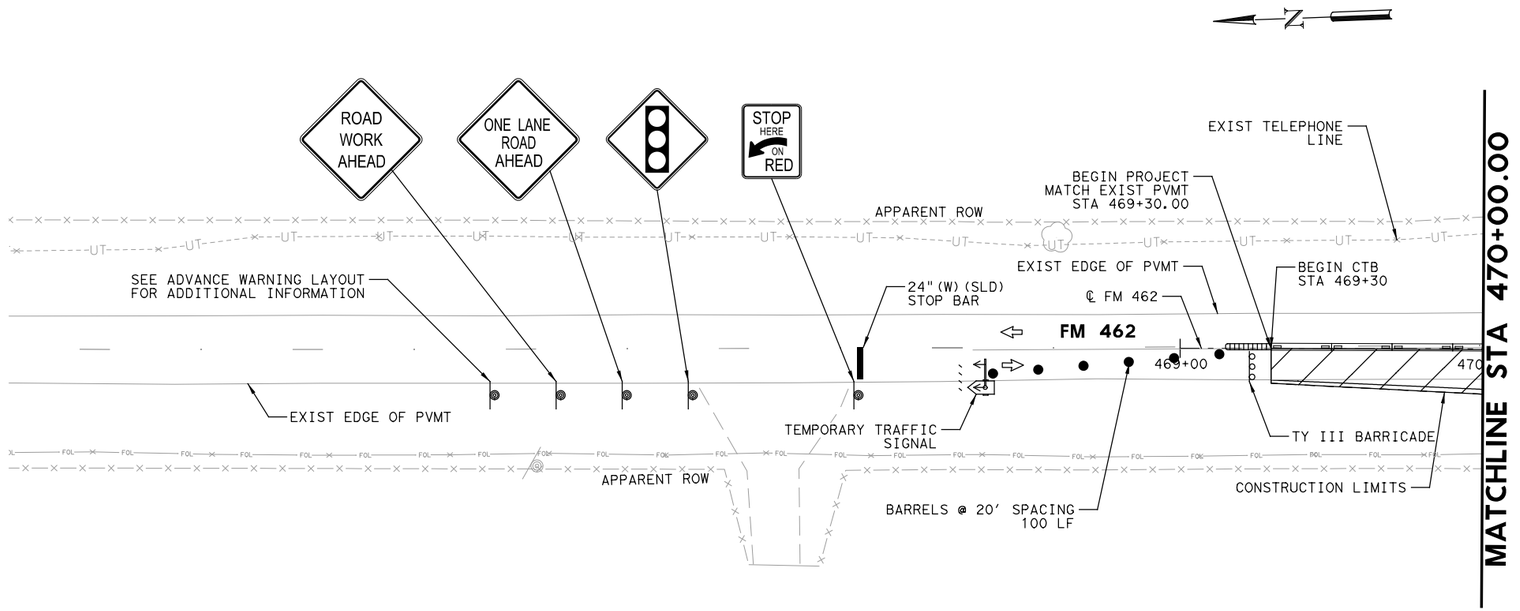
STA 474+50.00 TO END

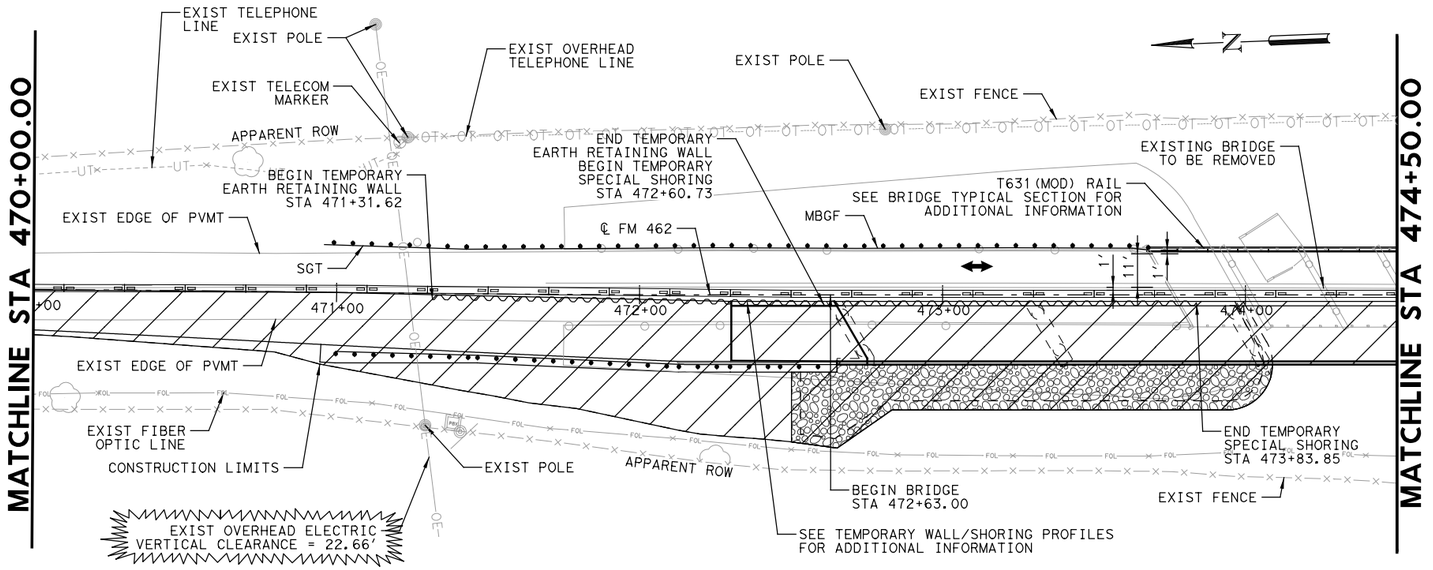
SCALE: 1"=50' SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	14

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:10:33 PM
File Name:FM462TCP02A.dgn
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
110 6002	EXCAVATION (CHANNEL)	CY	439
403 6001	TEMPORARY SPL SHORING	SF	628
423 6003	RETAINING WALL (TEMP WALL)	SF	162
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	12
512 6094	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	100
512 6095	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	420
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	780
662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	780
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1





LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

0 25 50 75 100

HORIZ. SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

9/9/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN PHASE IB LAYOUT

BEGIN TO STA 474+50.00

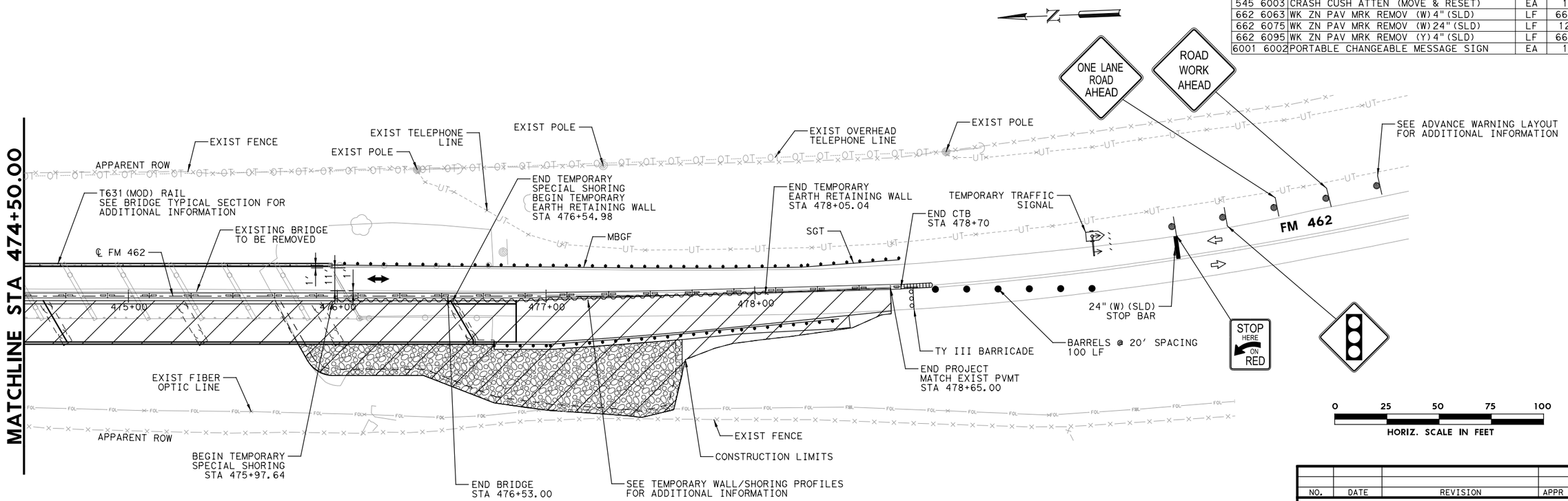
SCALE: 1"=50'

SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	15

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 9/9/2021
PLOTTING TIME: 1:33:36 PM
File Name:FM462TCP01.dgn
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
110 6002	EXCAVATION (CHANNEL)	CY	439
403 6001	TEMPORARY SPL SHORING	SF	292
423 6003	RETAINING WALL (TEMP WALL)	SF	168
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	12
512 6095	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	420
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	660
662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	660
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1



LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

9/9/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

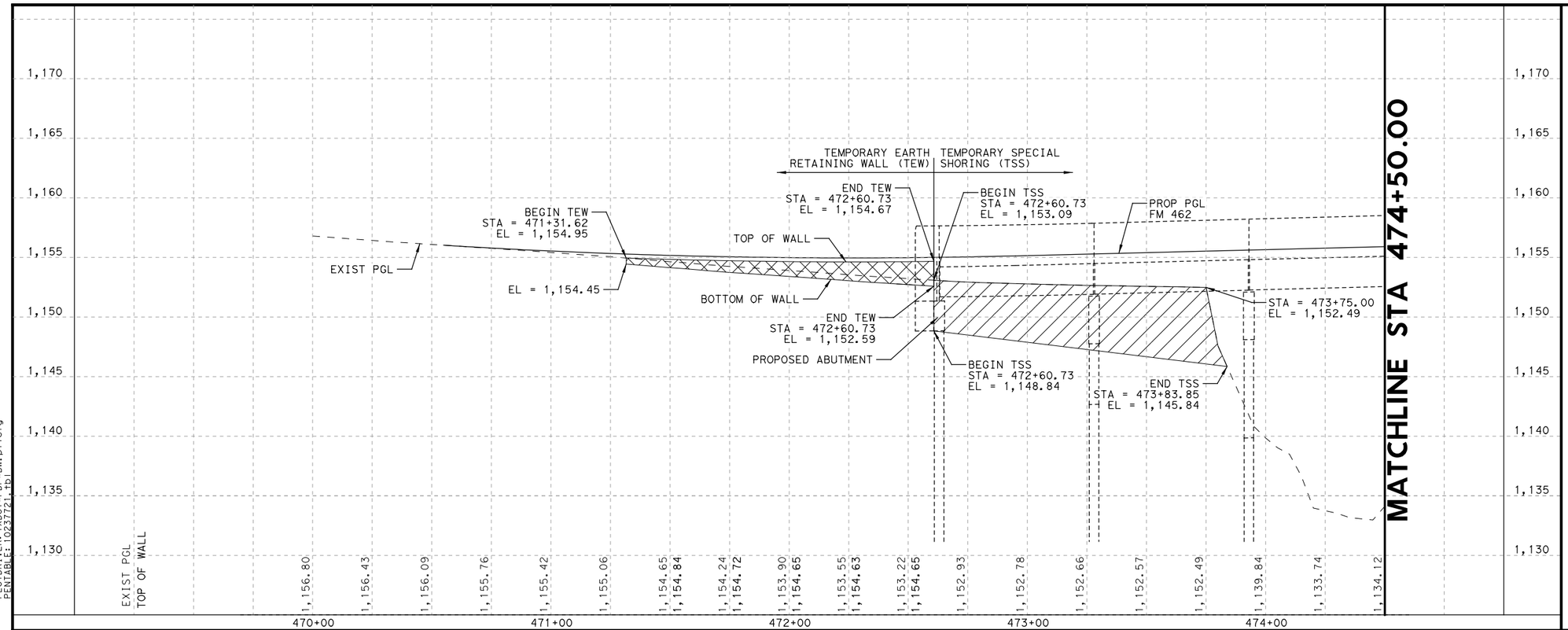
FM 462 AT HONDO CREEK

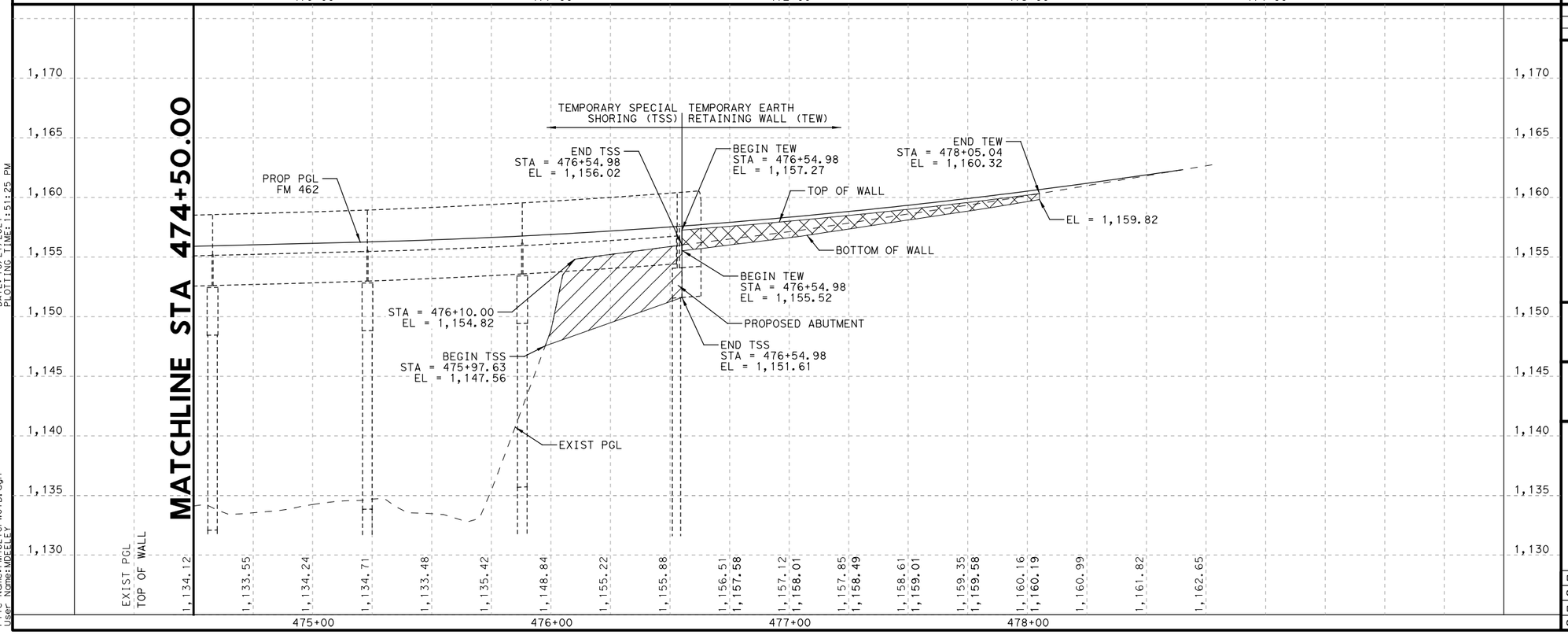
TRAFFIC CONTROL PLAN PHASE IB LAYOUT STA 474+50.00 TO END

SCALE: 1"=50' SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	16

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 9/9/2021
PLOTTING TIME: 1:34:16 PM
File Name: FM462TCP02.dgn
User Name: JFOYT





0 5 10 15 20
VERT. SCALE IN FEET

LEGEND

- TEMPORARY SPECIAL SHORING
- TEMPORARY EARTH RETAINING WALL

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED PROFESSIONAL ENGINEER
10/27/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN TEMPORARY WALL/SHORING PROFILES

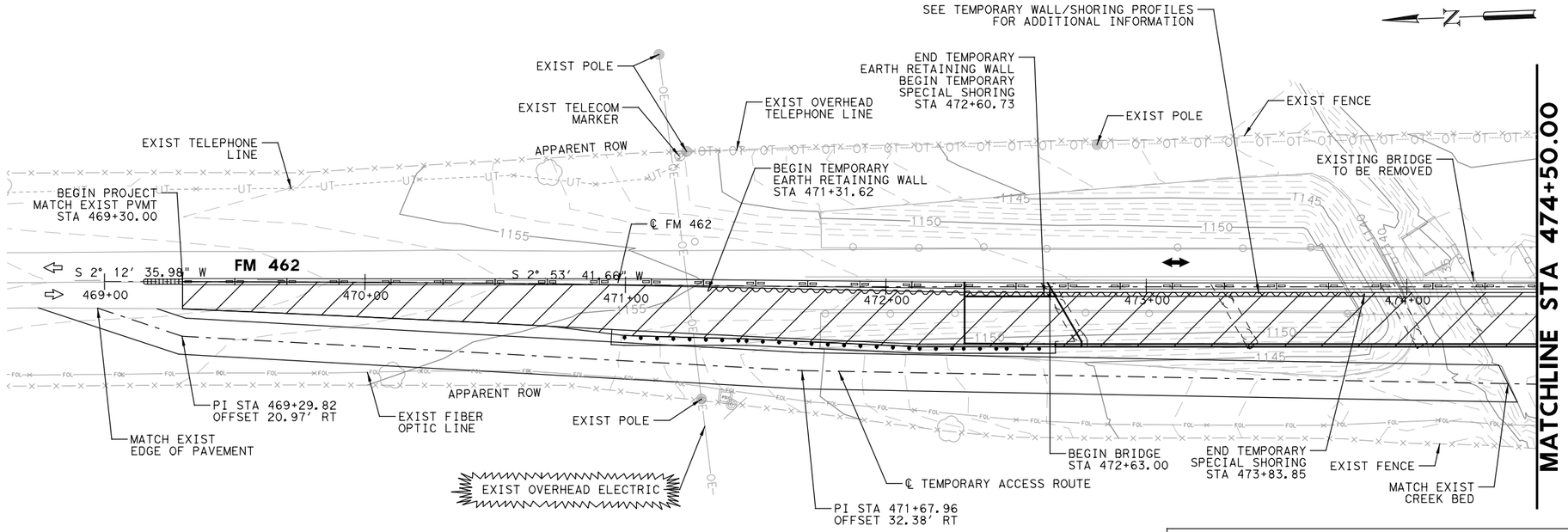
SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	17

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 10/27/2021
PLOTTING TIME: 1:51:25 PM
File Name: FM462TCPW01B.dgn
User Name: MDEELEY

*SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
*110 6002	EXCAVATION (CHANNEL)	CY	2500
*247 6053	FL BS (CMP IN PLC)(TYD GR1-2)(FNAL POS)	CY	243

* FOR CONTRACTOR INFORMATION ONLY



LEGEND

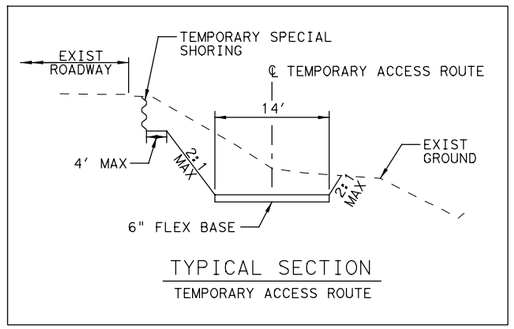
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PORTABLE TRAFFIC BARRIER
- CRASH CUSHION ATTENUATOR
- TEMPORARY WALL/SHORING

0 25 50 75 100

HORIZ. SCALE IN FEET

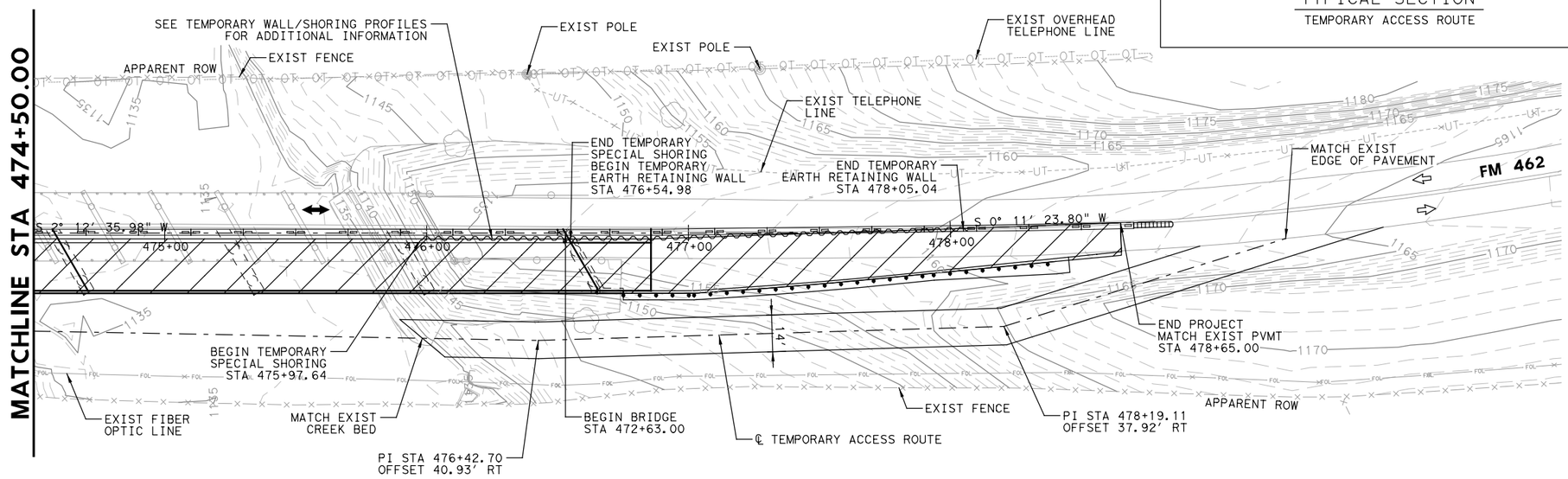
NOTES:

TEMPORARY ACCESS ROUTE IS FOR CONTRACTORS INFORMATION ONLY.



TYPICAL SECTION

TEMPORARY ACCESS ROUTE



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER
8/20/2021

HDR Engineering Inc.
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

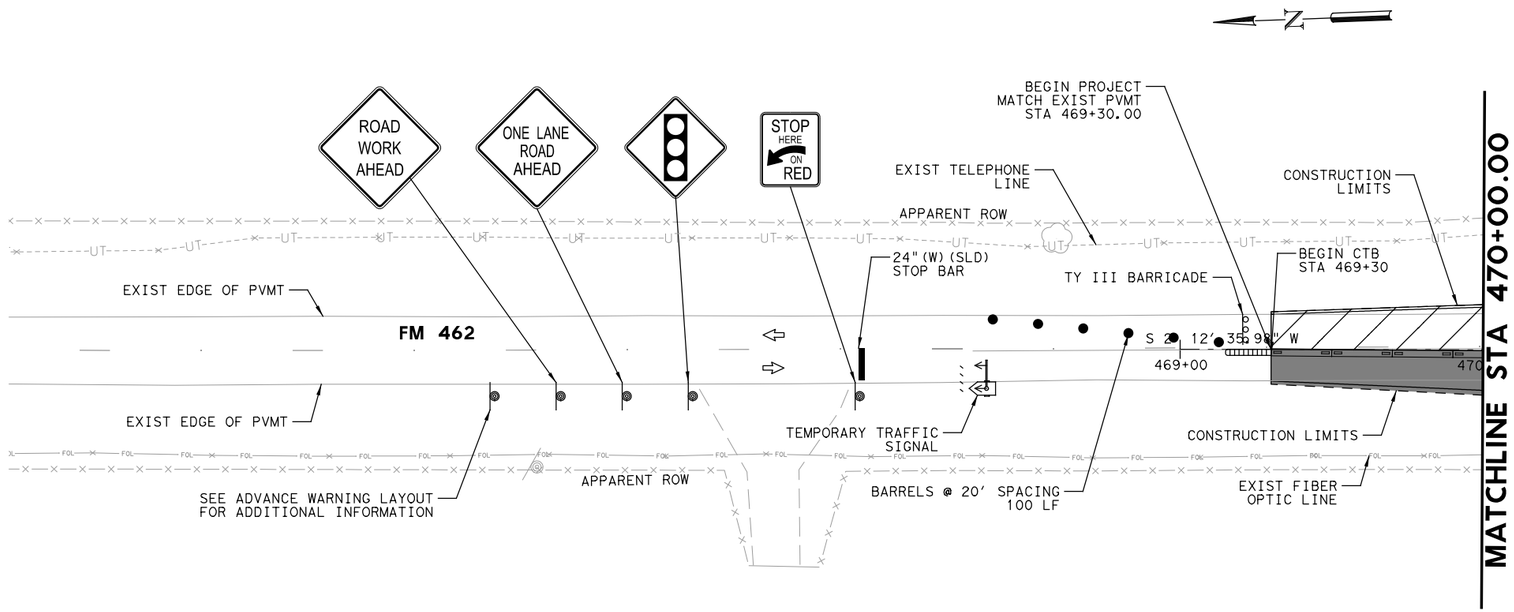
FM 462 AT HONDO CREEK

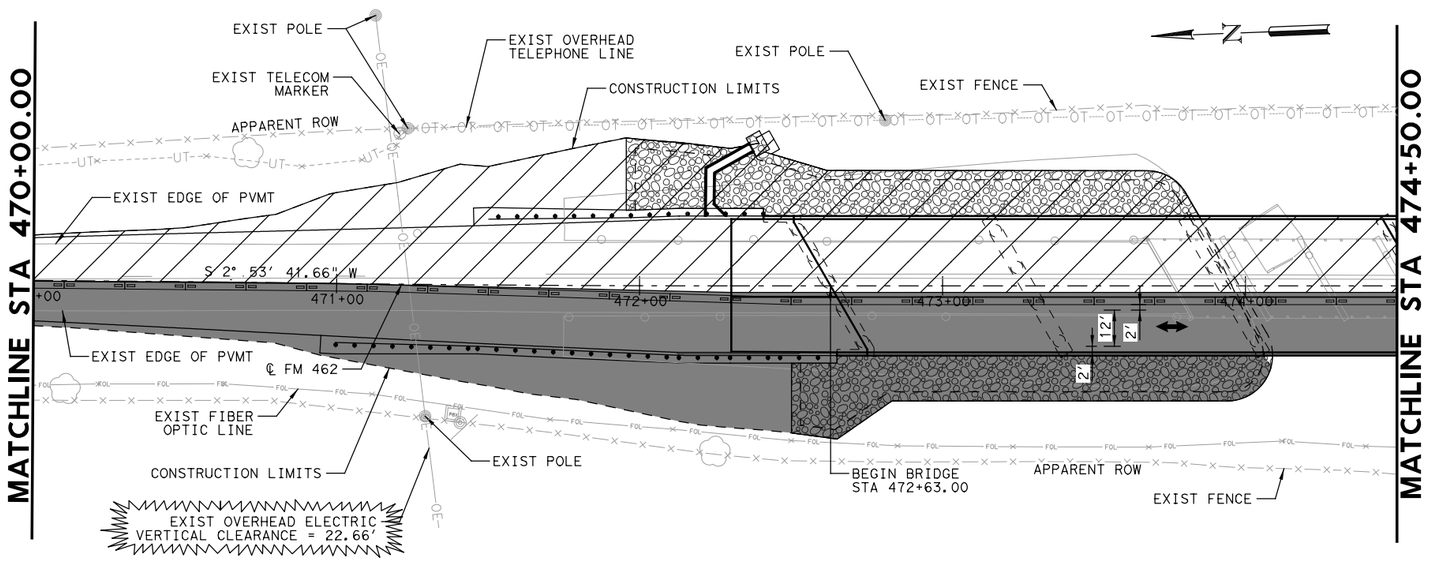
TRAFFIC CONTROL PLAN TEMPORARY ACCESS ROUTE

SCALE: 1"=50′ SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	18

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:10:44 PM
File Name: FM462TDP01.dgn
User Name: JFOYT





SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
110 6002	EXCAVATION (CHANNEL)	CY	659
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	12
512 6095	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	520
512 6096	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	520
542 6001	REMOVE METAL BEAM GUARD FENCE	LF	225
544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545 6005	CRASH CUSH ATTEN (REMOVE)	EA	1
662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	780
662 6095	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	780
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1
6185 6003	TMA (MOBILE OPERATION)	DAY	8

LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

0 25 50 75 100
HORIZ. SCALE IN FEET

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
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LICENSED
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9/9/2021

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Texas Department of Transportation

FM 462 AT HONDO CREEK

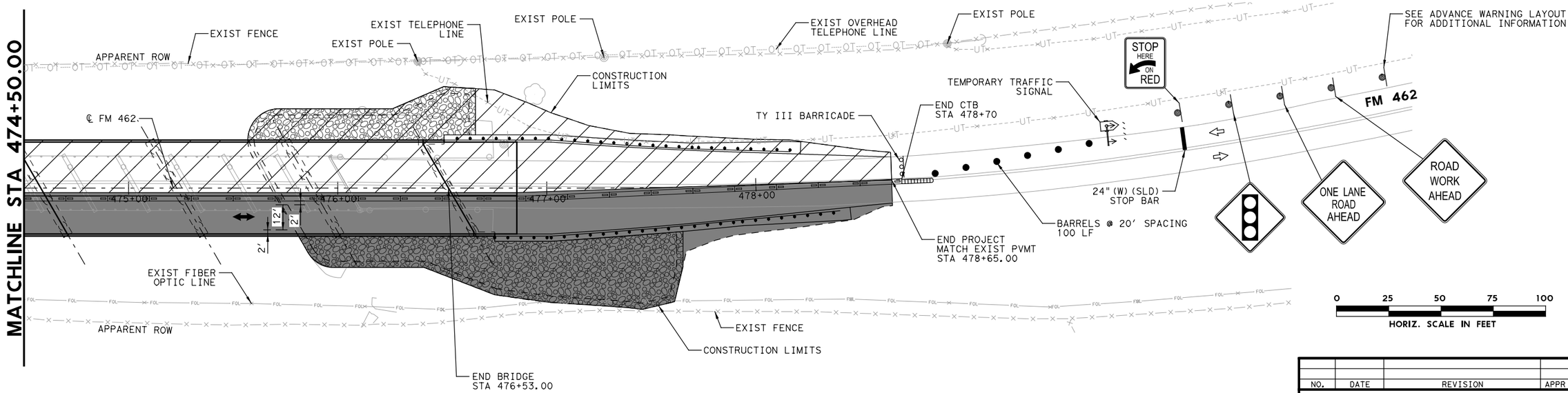
TRAFFIC CONTROL PLAN PHASE II LAYOUT
BEGIN TO STA 474+50.00

SCALE: 1"=50' SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	19

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 9/9/2021
PLOTTING TIME: 1:35:03 PM
File Name: FM462TCP03.dgn
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
110 6002	EXCAVATION (CHANNEL)	CY	658
510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	12
512 6095	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	420
512 6096	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	420
542 6001	REMOVE METAL BEAM GUARD FENCE	LF	225
544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545 6005	CRASH CUSH ATTEN (REMOVE)	EA	1
662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	660
662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	660
6001 6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1
6185 6003	TMA (MOBILE OPERATION)	DAY	8



LEGEND

- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- CONSTRUCTION WARNING SIGN
- CHANNELIZING DEVICES
- PORTABLE TRAFFIC BARRIER
- TEMPORARY WALL/SHORING
- CRASH CUSHION ATTENUATOR
- TYPE III BARRICADE
- PROP CONSTRUCTION THIS PHASE
- PROP CONSTRUCTION PREVIOUS PHASE
- GABION MATTRESS/GABION

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

9/9/2021

HDR Engineering Inc.
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FM 462 AT HONDO CREEK

TRAFFIC CONTROL PLAN PHASE II LAYOUT

STA 474+50.00 TO END

SCALE: 1"=50' SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	20

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

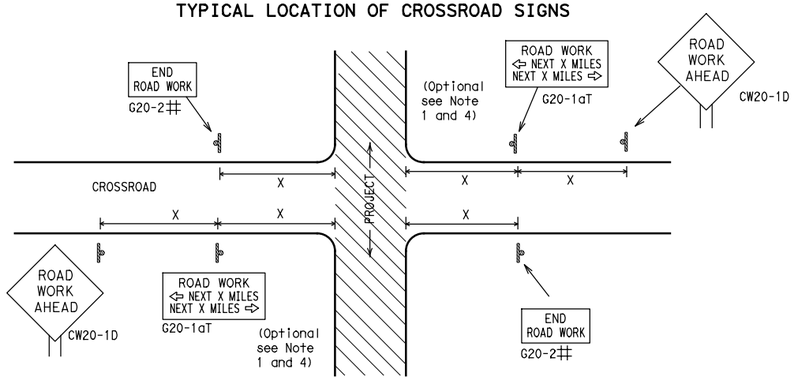
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0848	04	049	FM 462
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	SAT	MEDINA		21

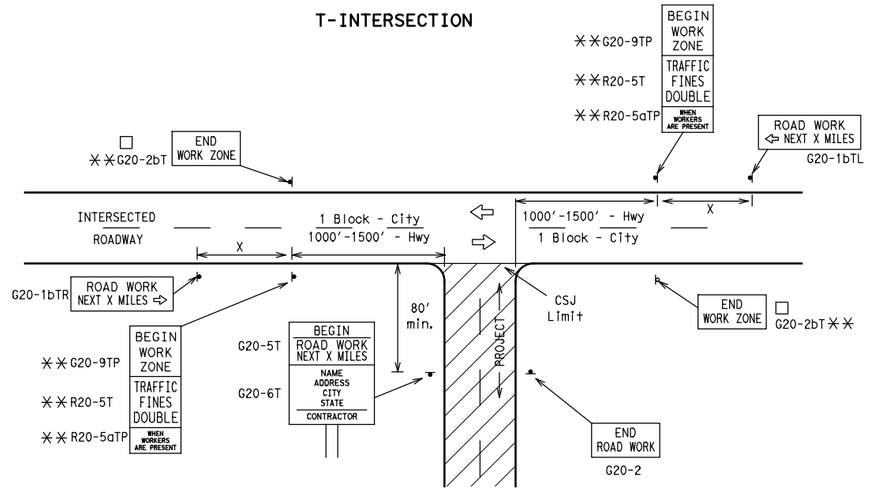
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

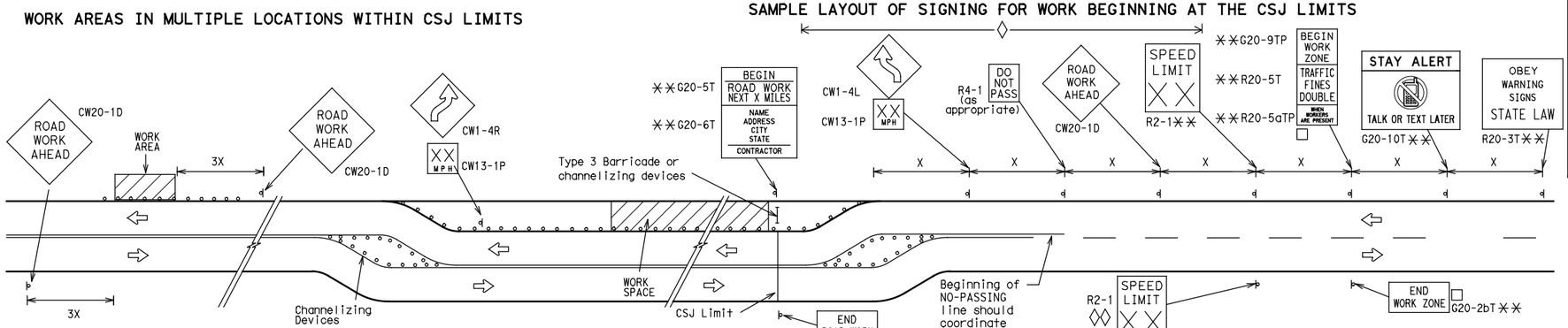
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

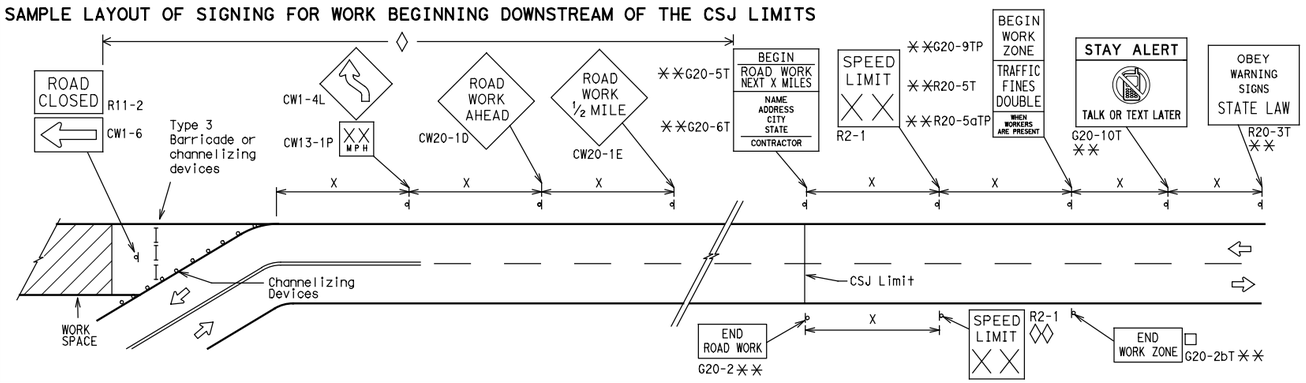
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0848	04	049	FM 462
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	MEDINA		22

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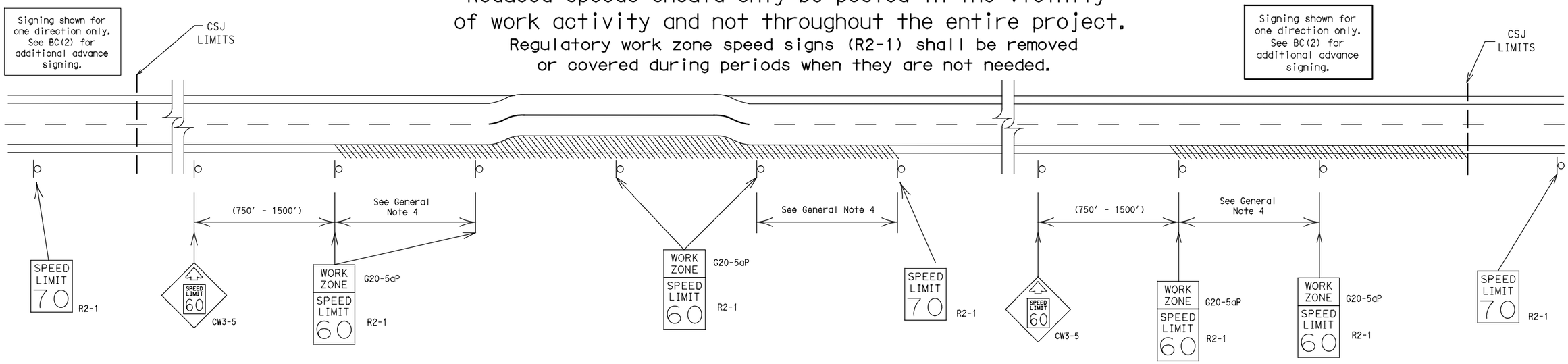
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 9-07 8-14 7-13 5-21	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		23

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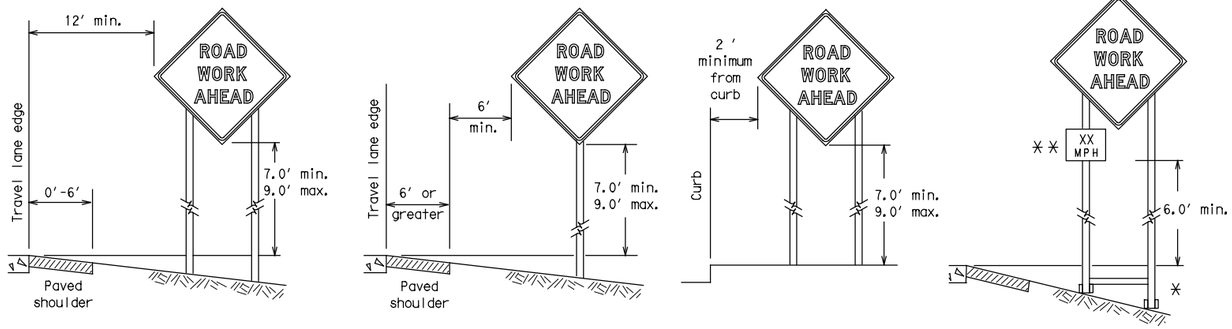
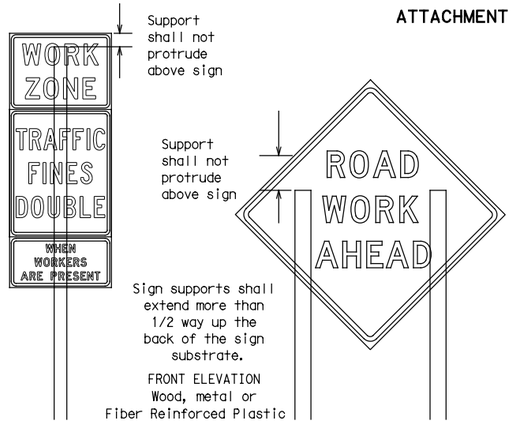
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

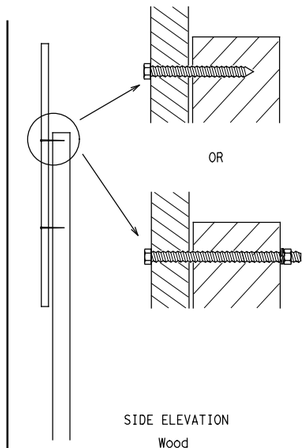


⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





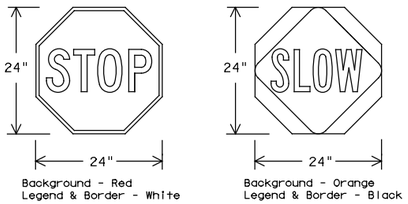
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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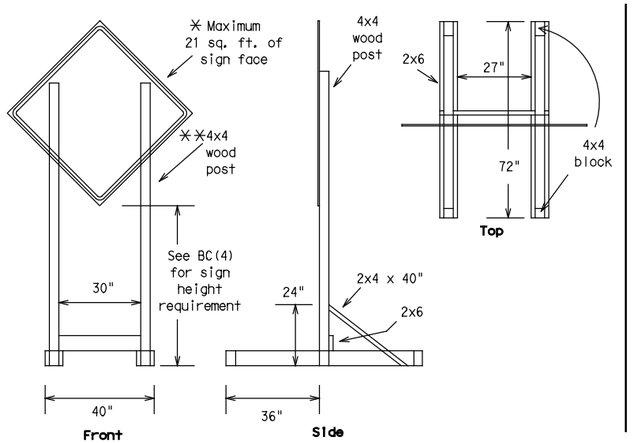
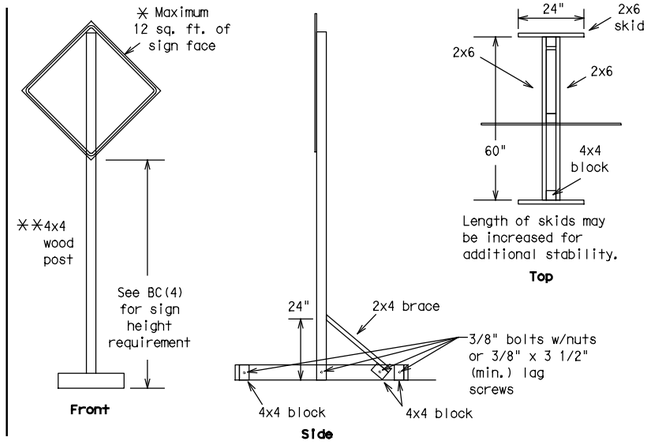
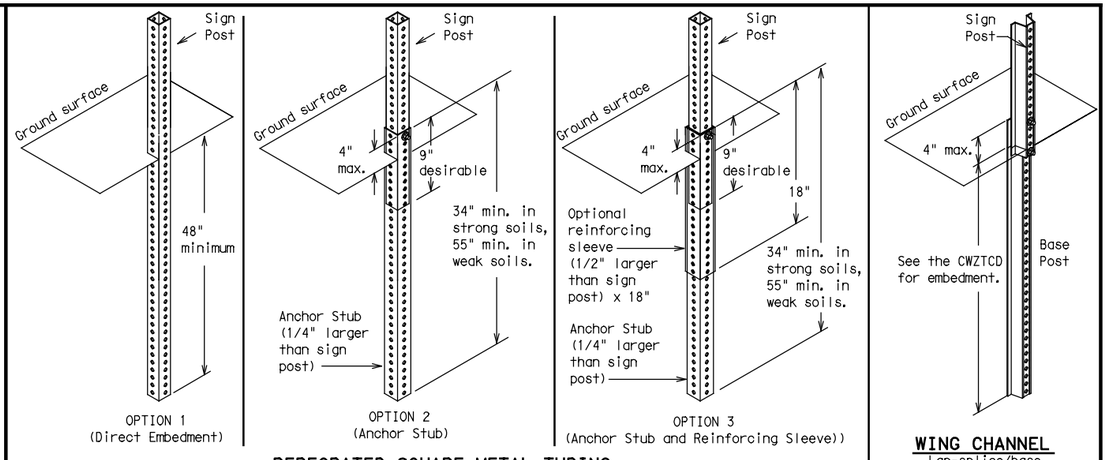




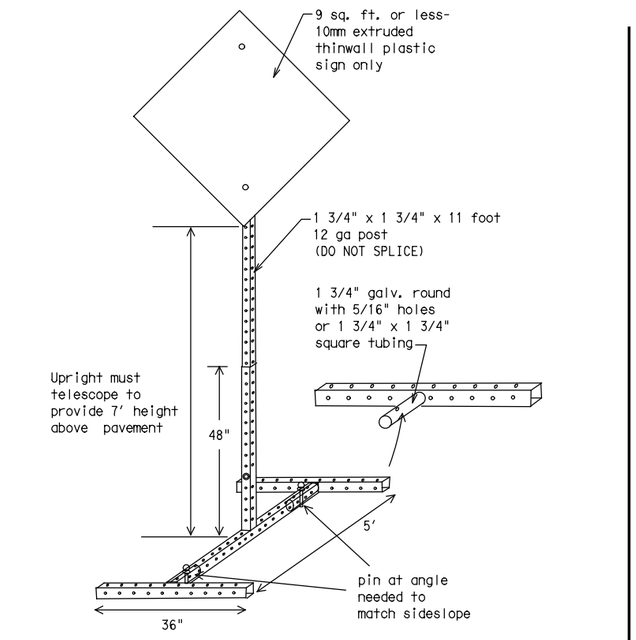
SKID MOUNTED WOOD SIGN SUPPORTS

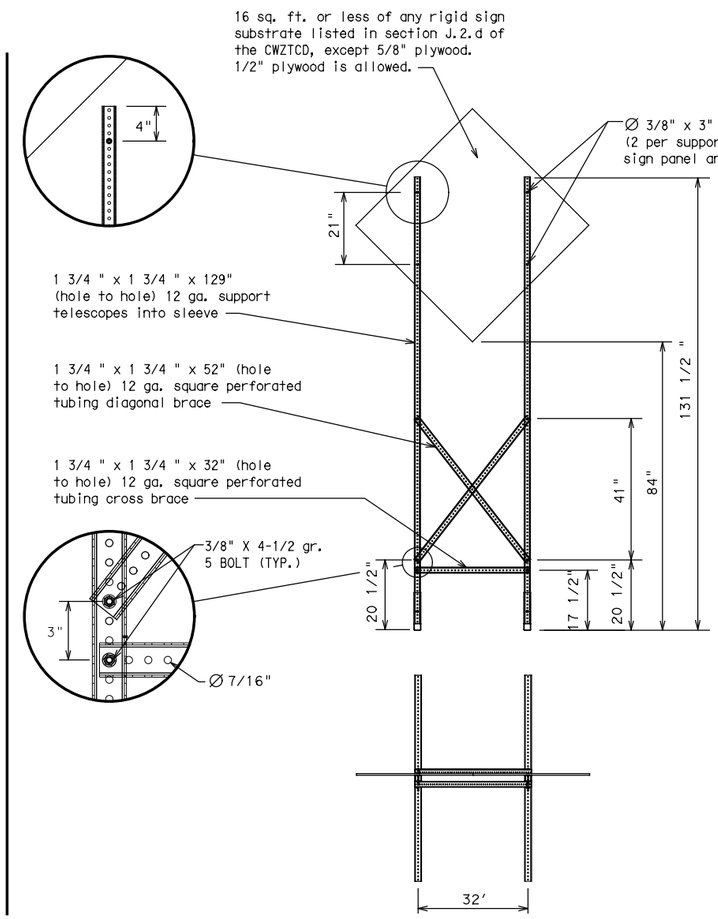
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

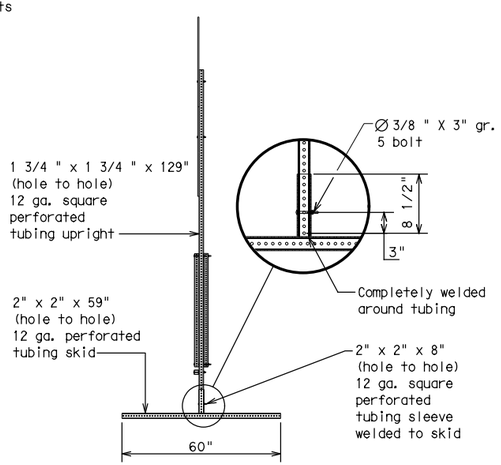


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

✳✳ Advance Notice List

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

✳✳ See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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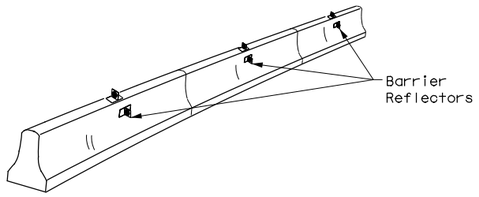
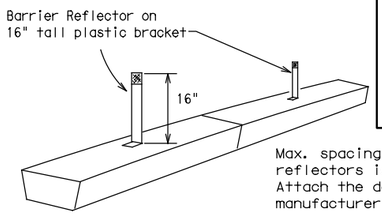
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



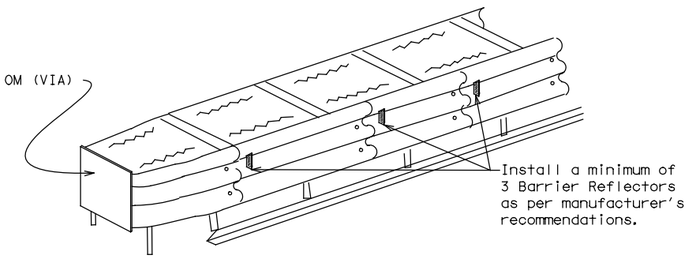
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

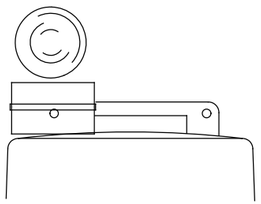
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

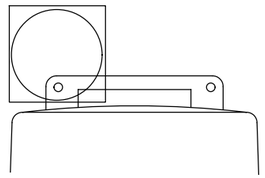
1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this 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.



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

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.



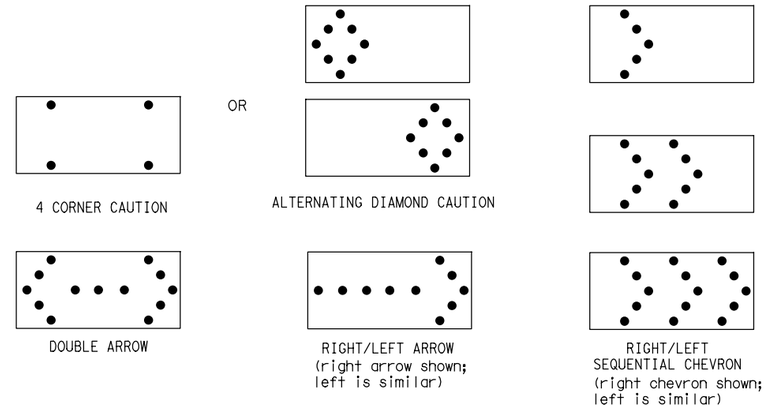
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

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

BC(7)-21

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

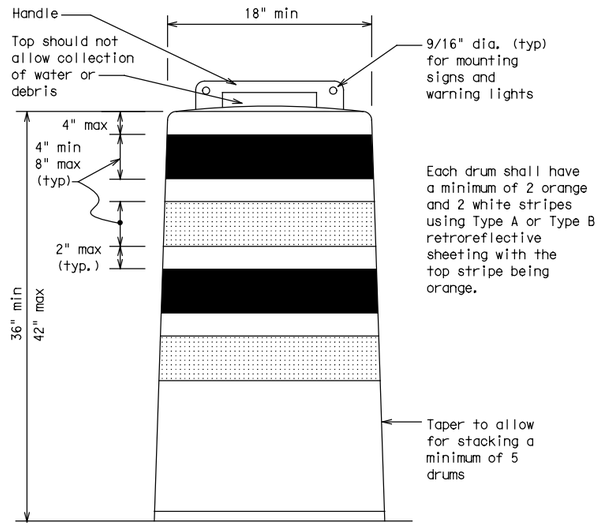
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

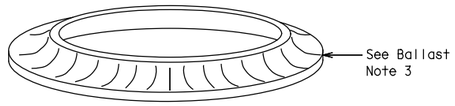
RETROREFLECTIVE SHEETING

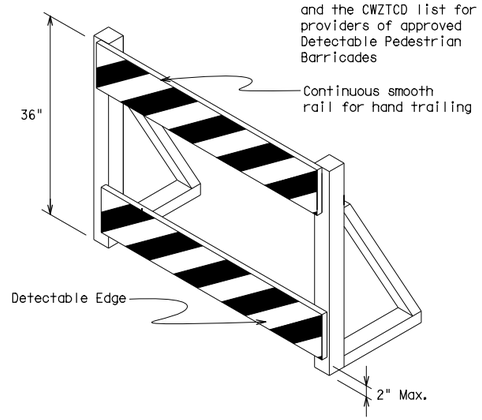
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

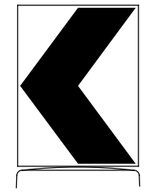




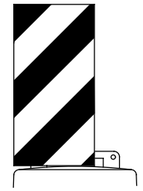


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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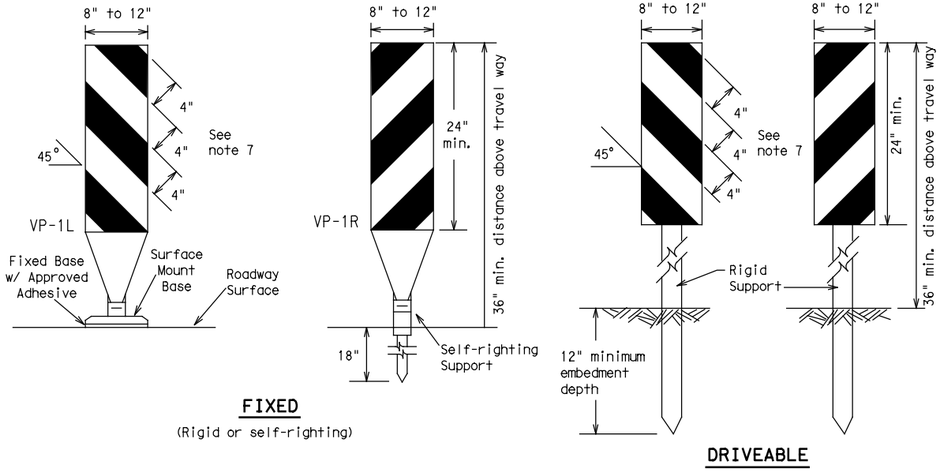
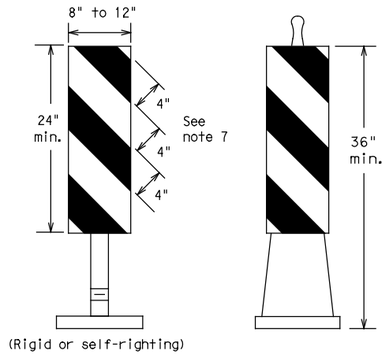


FIXED
(Rigid or self-righting)

DRIVEABLE

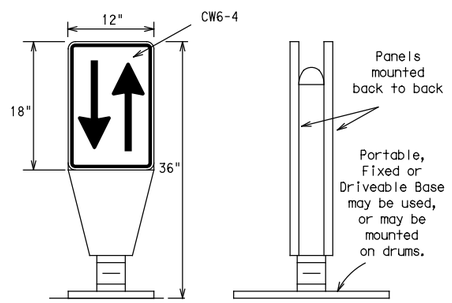


(Rigid or self-righting)

PORTABLE

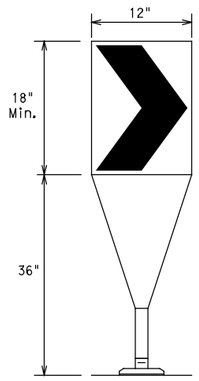
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



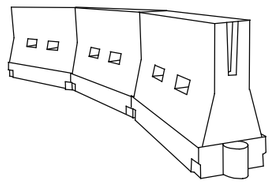
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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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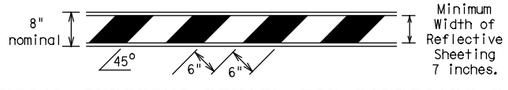
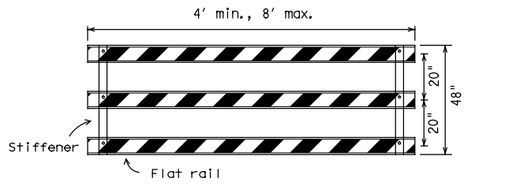
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



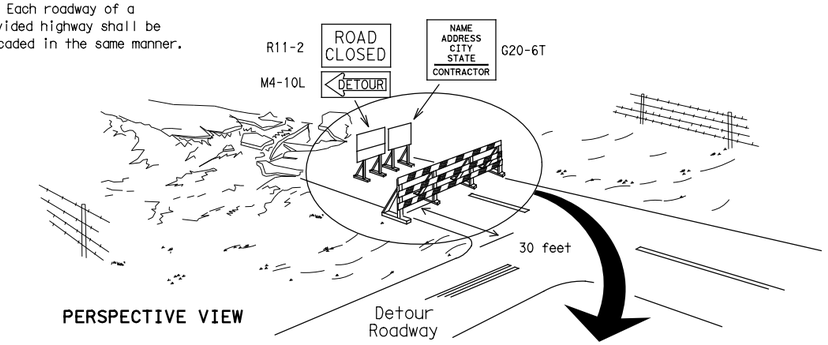
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

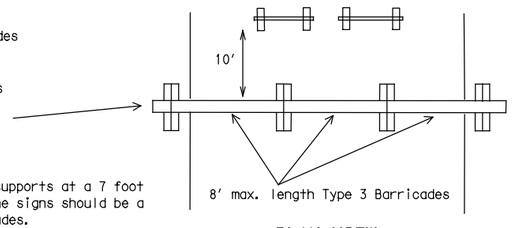
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

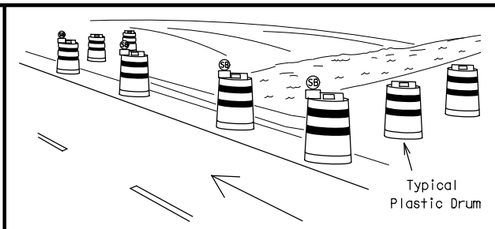
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

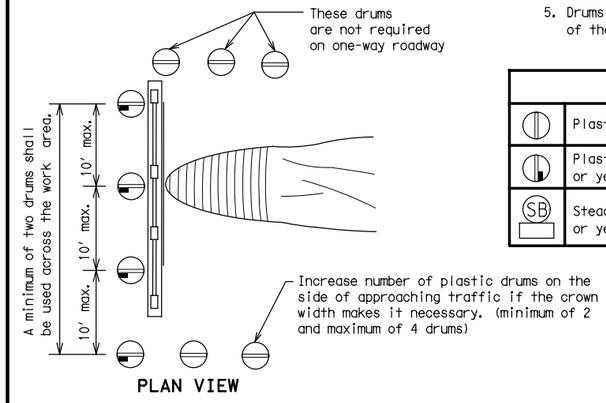
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

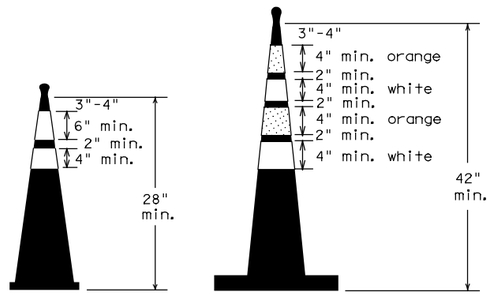
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

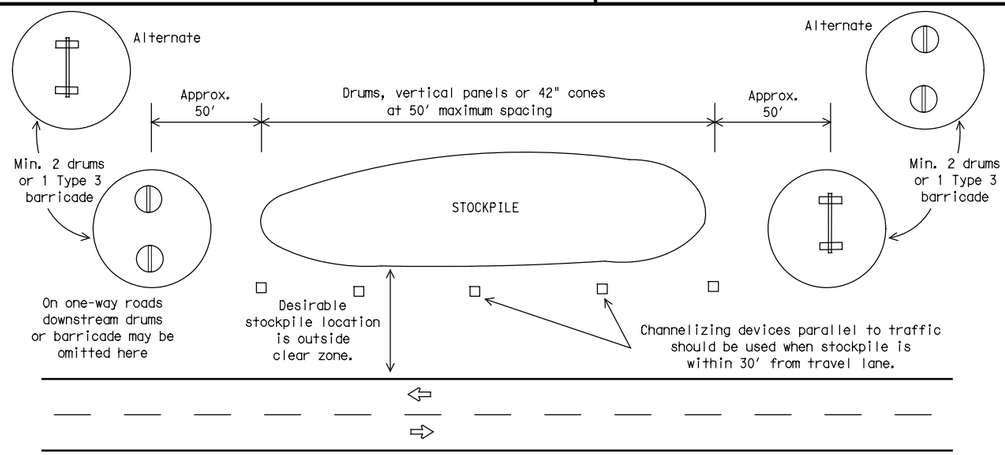
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0848	04	049	FM 462
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	MEDINA		30

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

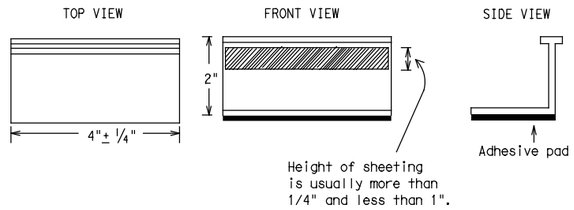
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0848	04	049	FM 462
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	SAT	MEDINA		31
11-02 8-14				

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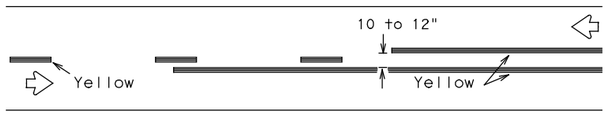
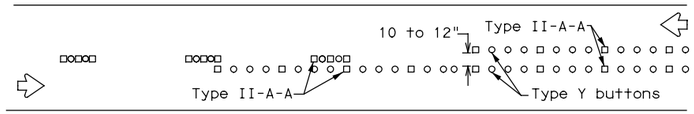
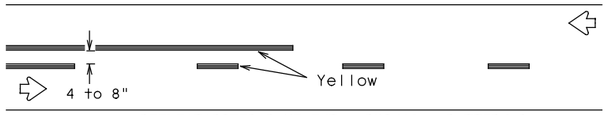
PAVEMENT MARKING PATTERNS



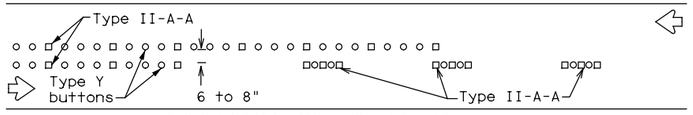
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



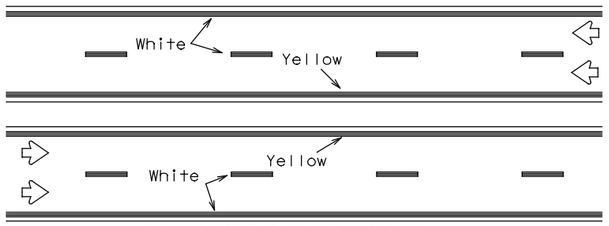
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



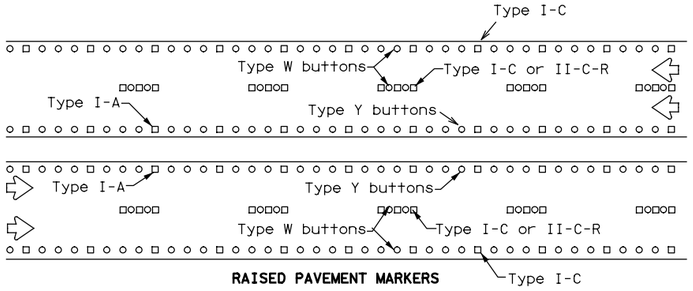
RAISED PAVEMENT MARKERS - PATTERN B

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

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



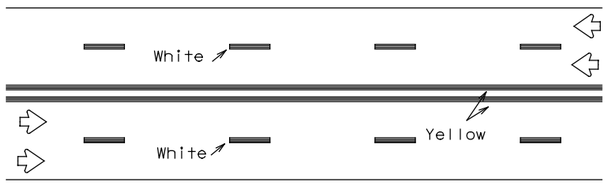
REFLECTORIZED PAVEMENT MARKINGS



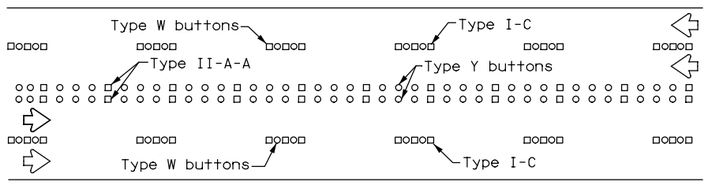
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



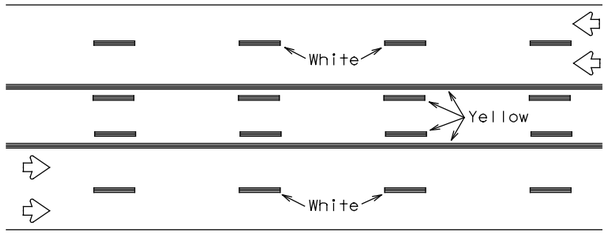
REFLECTORIZED PAVEMENT MARKINGS



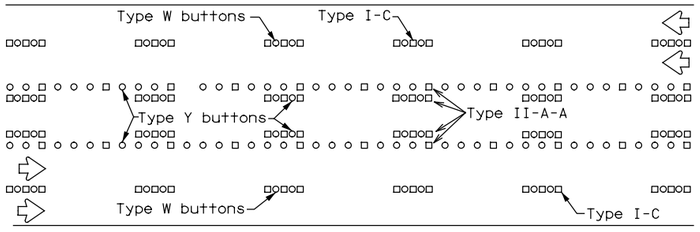
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

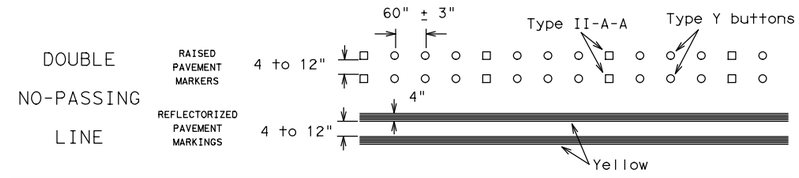
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

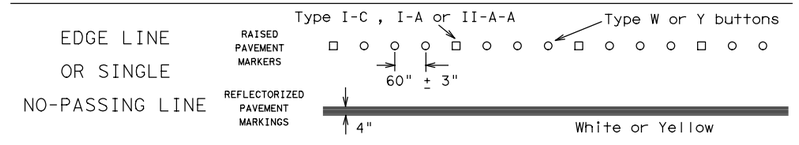
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

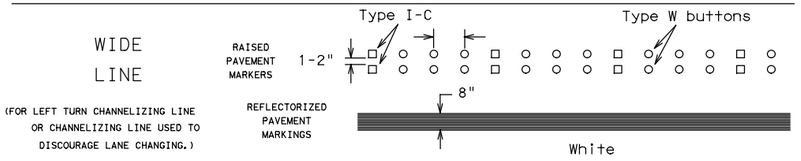


EDGE LINE OR SINGLE NO-PASSING LINE



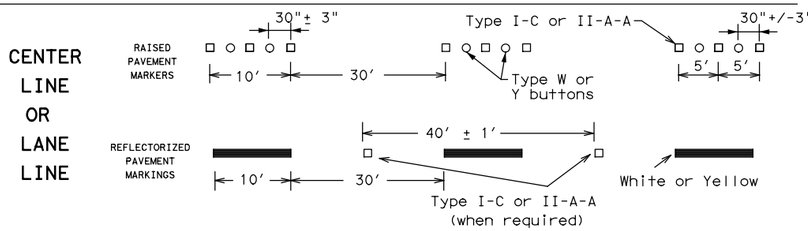
WIDE LINE

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

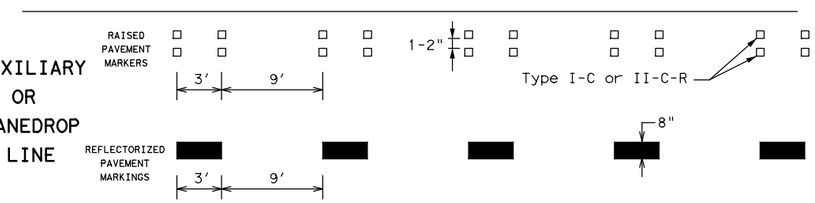


BROKEN LINES

CENTER LINE OR LANE LINE

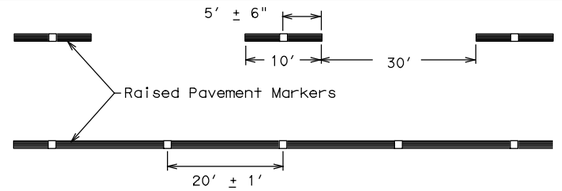


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

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
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REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		32

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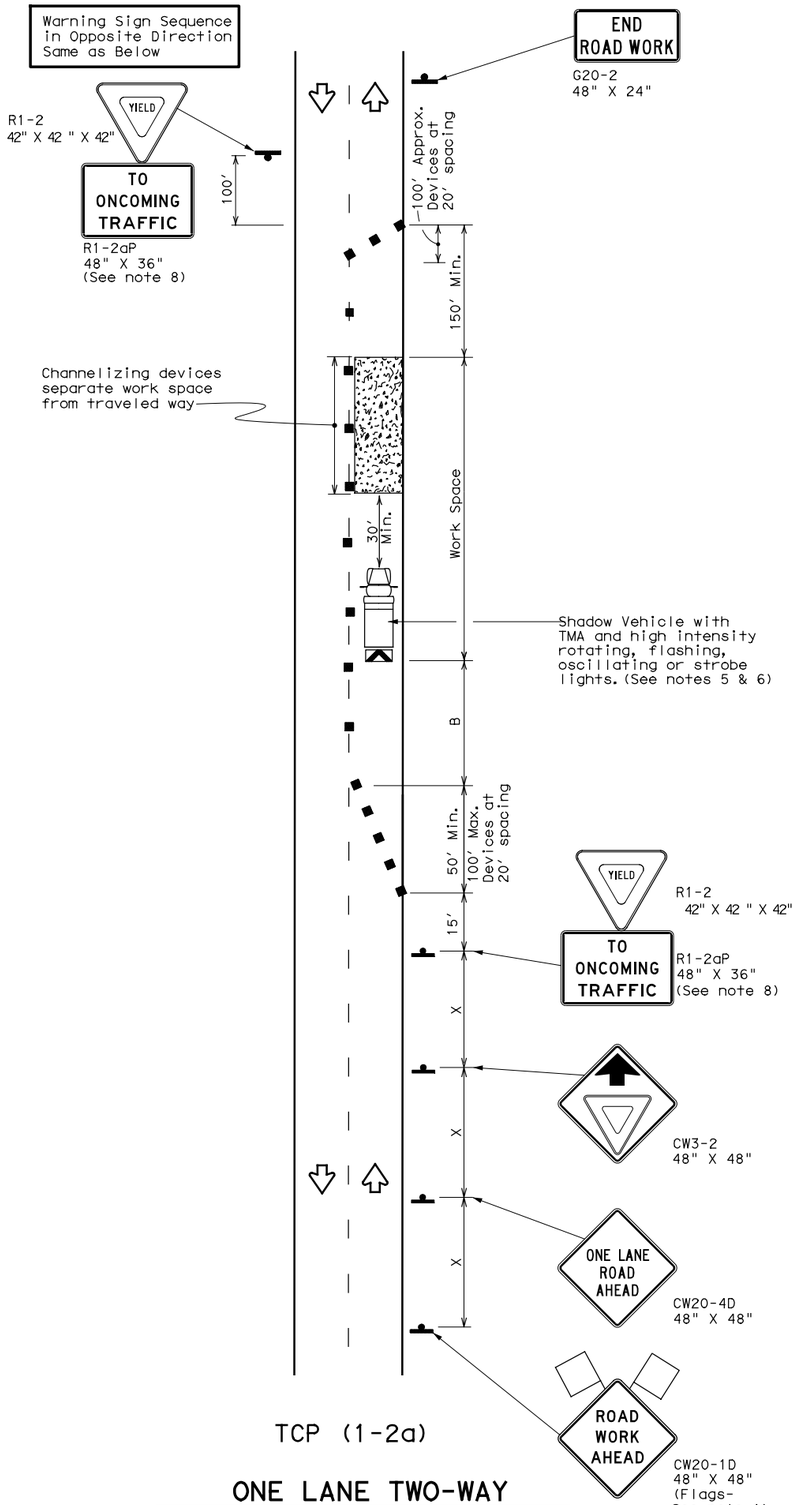
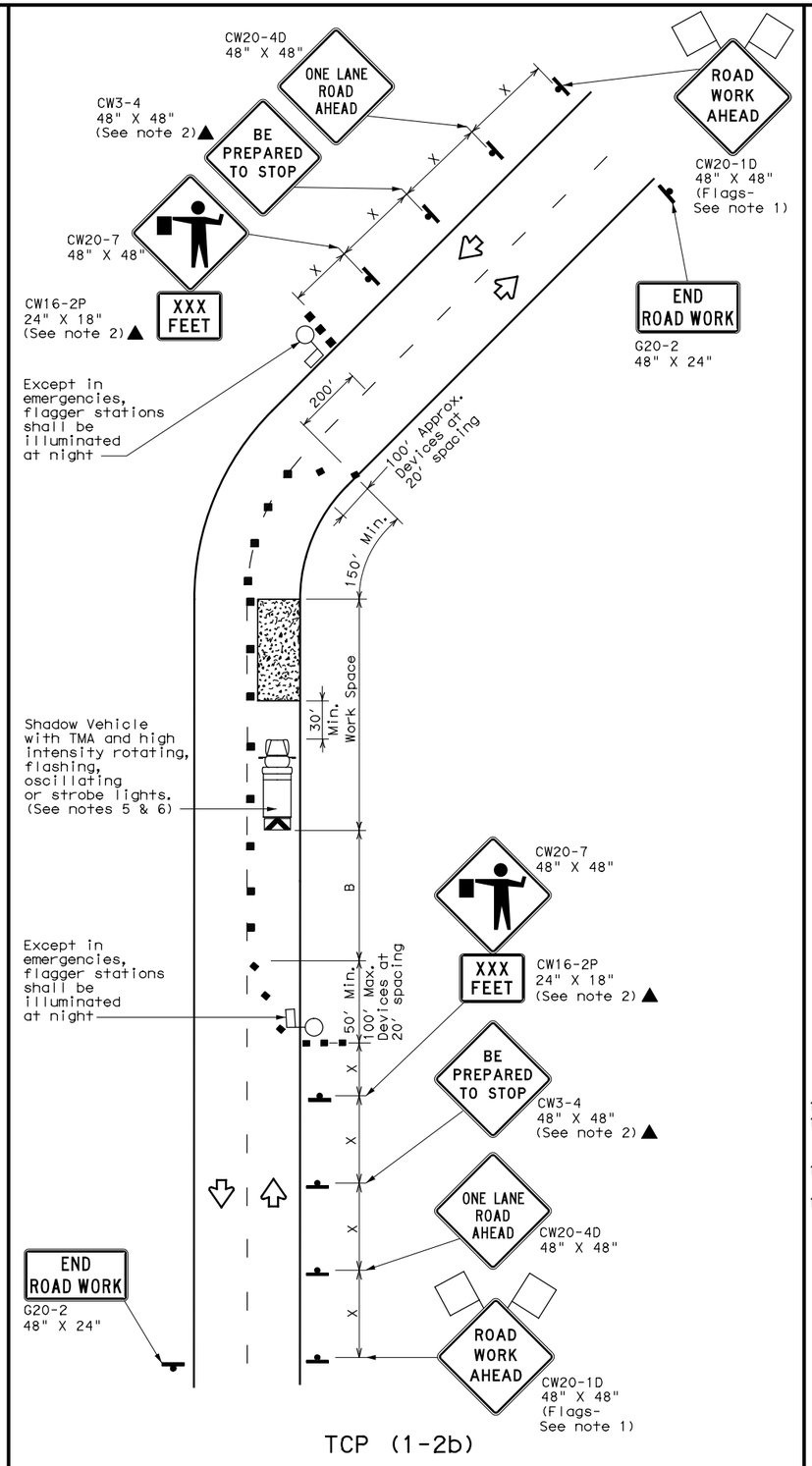


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150′	165′	180′	30′	60′	120′	90′	200′
35		205′	225′	245′	35′	70′	160′	120′	250′
40		265′	295′	320′	40′	80′	240′	155′	305′
45	L=WS	450′	495′	540′	45′	90′	320′	195′	360′
50		500′	550′	600′	50′	100′	400′	240′	425′
55		550′	605′	660′	55′	110′	500′	295′	495′
60		600′	660′	720′	60′	120′	600′	350′	570′
65		650′	715′	780′	65′	130′	700′	410′	645′
70		700′	770′	840′	70′	140′	800′	475′	730′
75		750′	825′	900′	75′	150′	900′	540′	820′

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

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0848	04	049	FM 462
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	SAT	MEDINA		33

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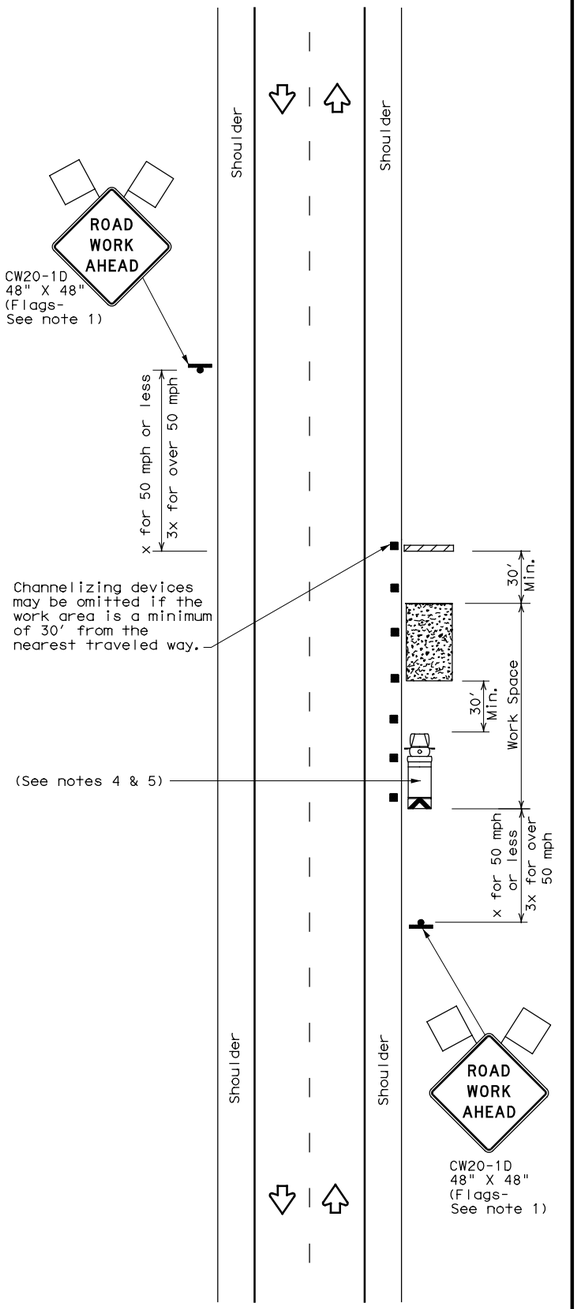
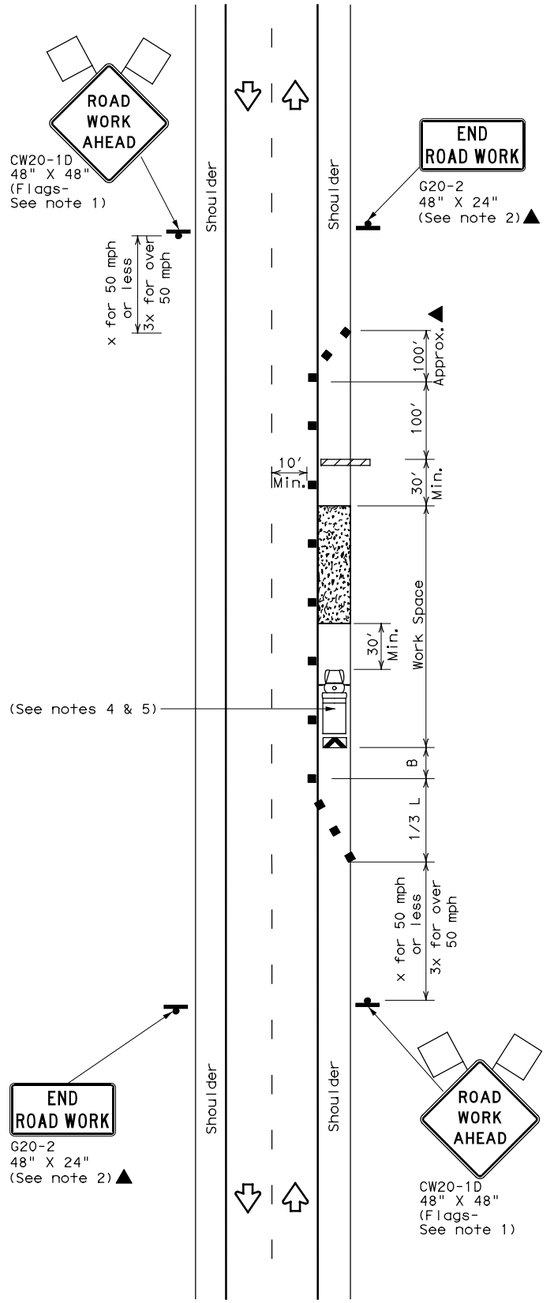


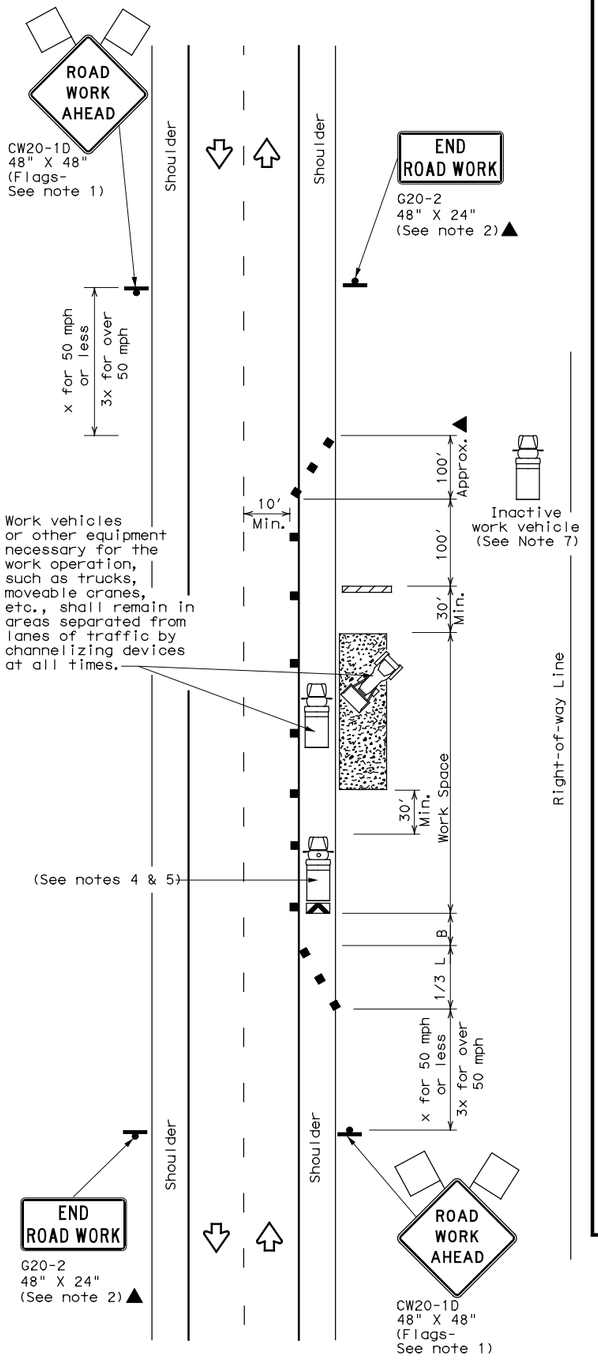
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

✳ Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
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8-95 2-12	SAT	MEDINA		34
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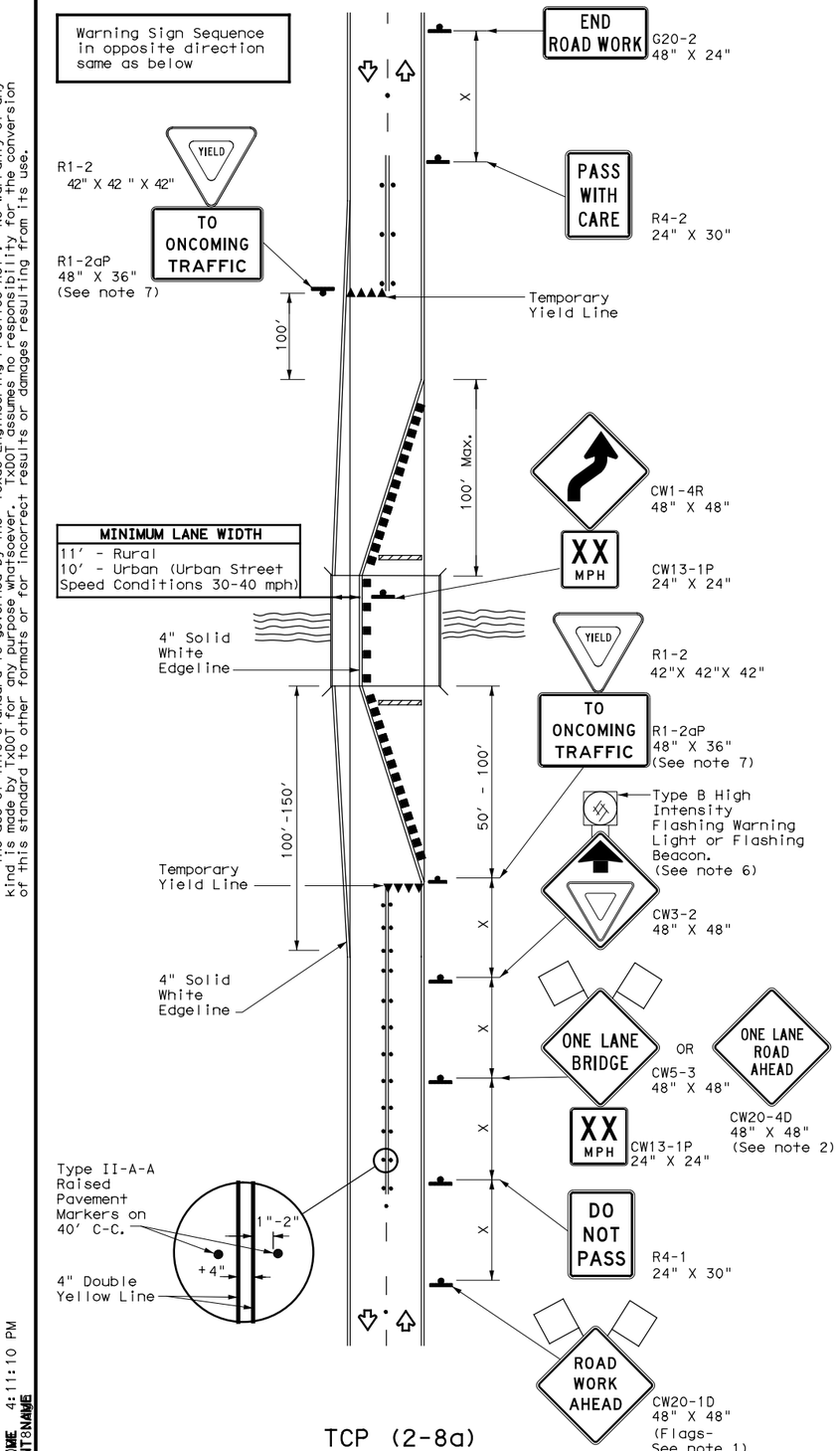
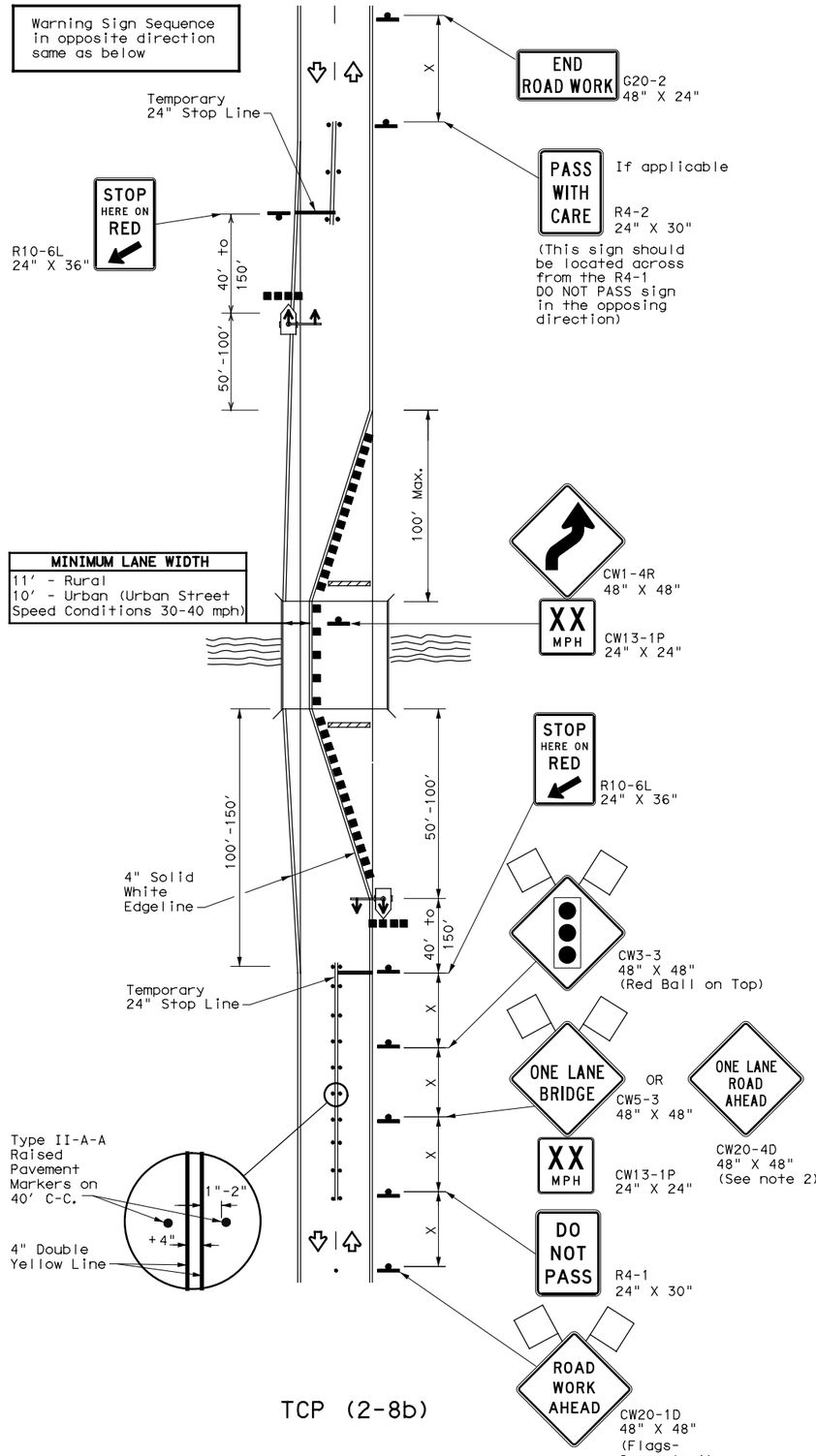


TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-8a)

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

TCP (2-8b)

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

Texas Department of Transportation

Traffic Operations Division Standard

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

TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
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1-97 2-12	SAT	MEDINA		35
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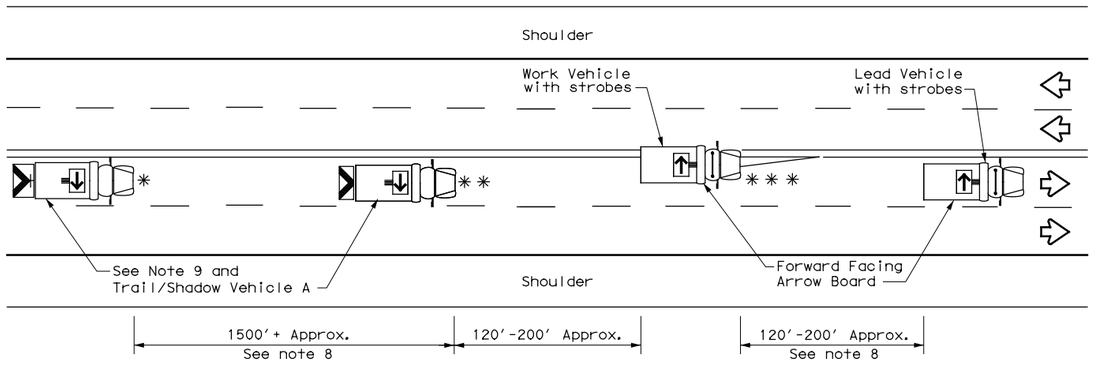
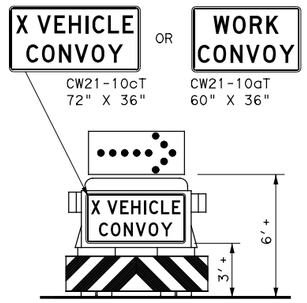


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

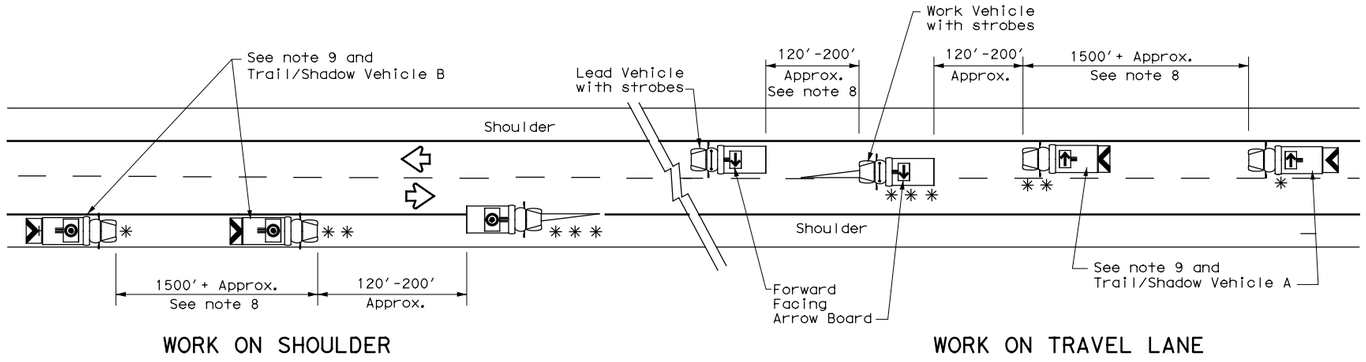
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

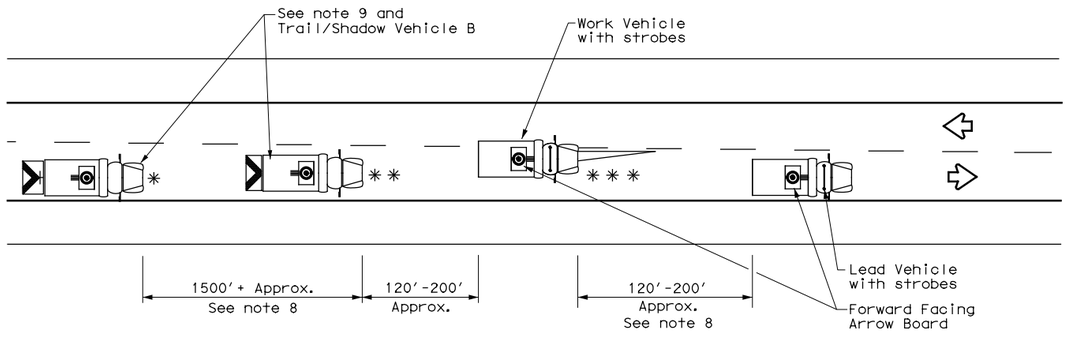


WORK ON SHOULDER

WORK ON TRAVEL LANE

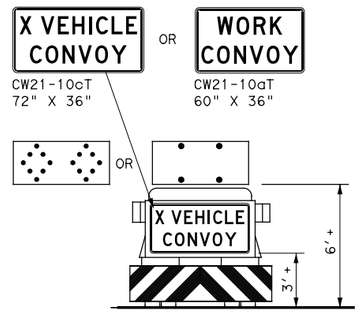
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



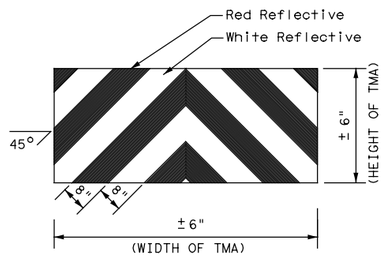
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0848	04	049	FM 462
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	SAT	MEDINA		36

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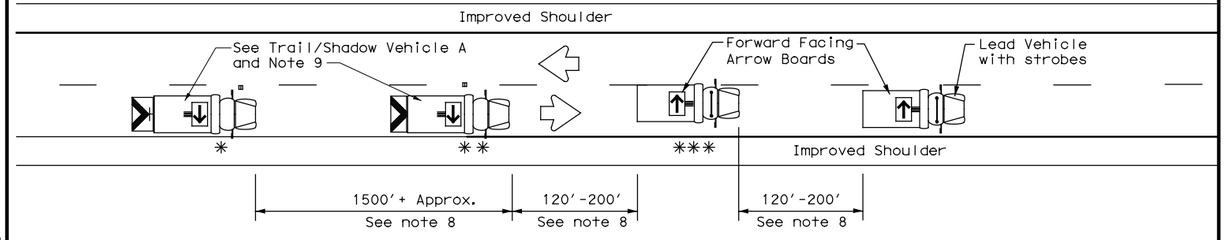
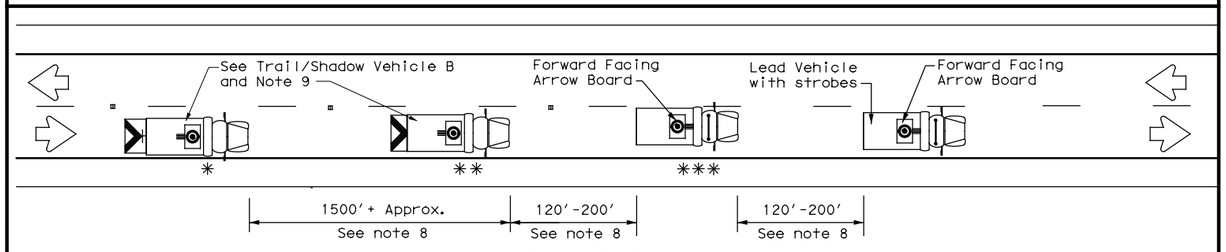


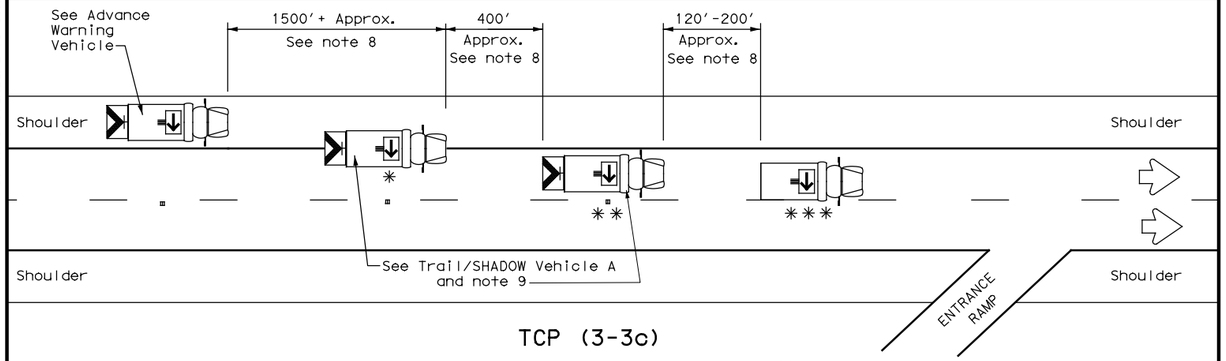
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



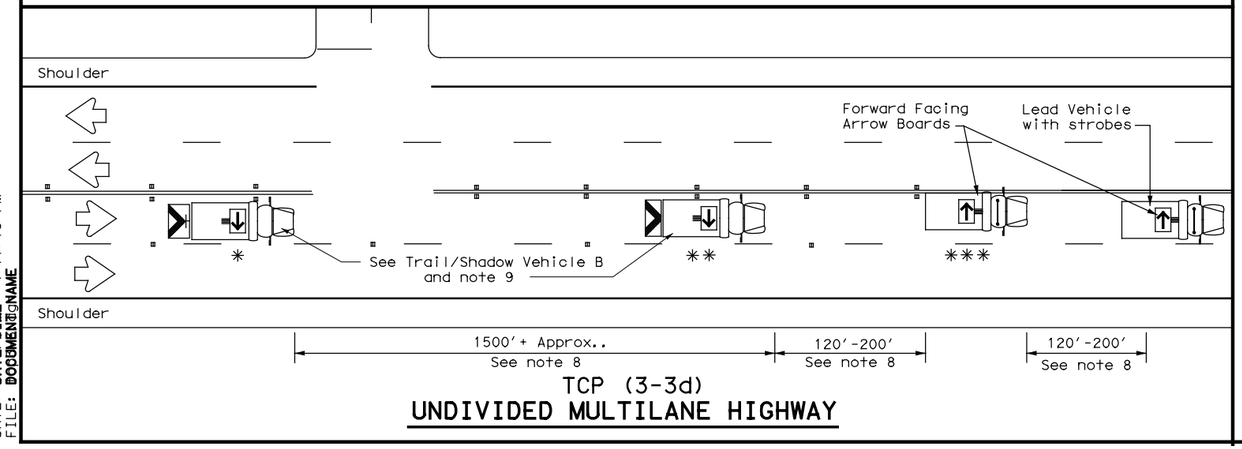
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



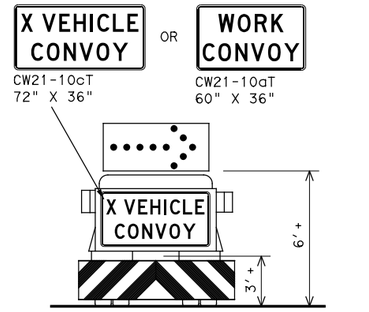
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



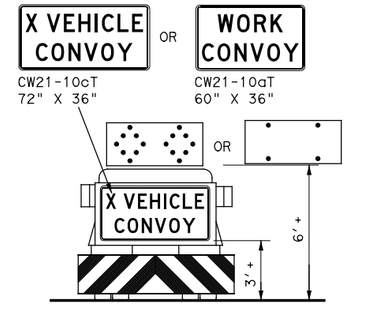
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



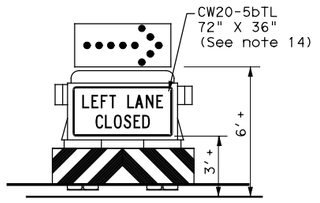
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

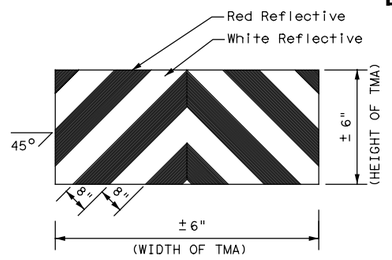


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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8-95 7-13	SAT	MEDINA		37
1-97 7-14				

177

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FILE: DOCUMENTNAME

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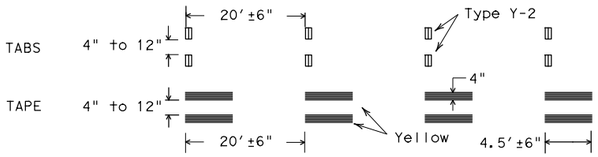
FILE: DOCUMENTNAME

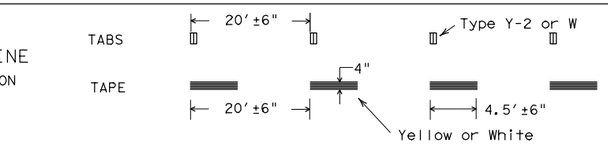
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

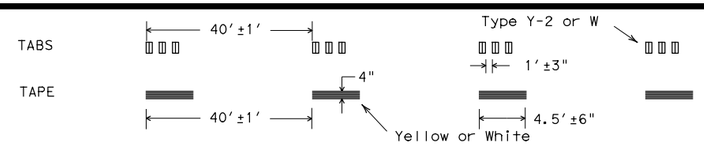


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



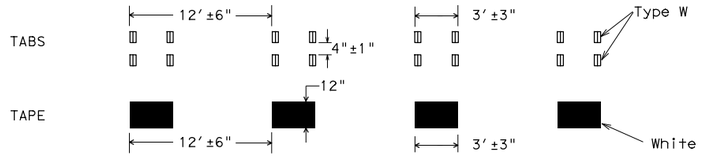
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

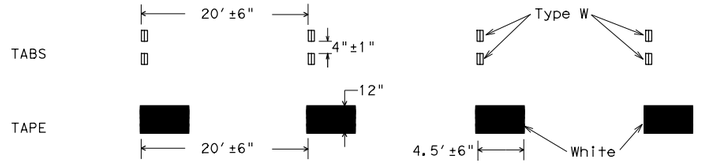


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



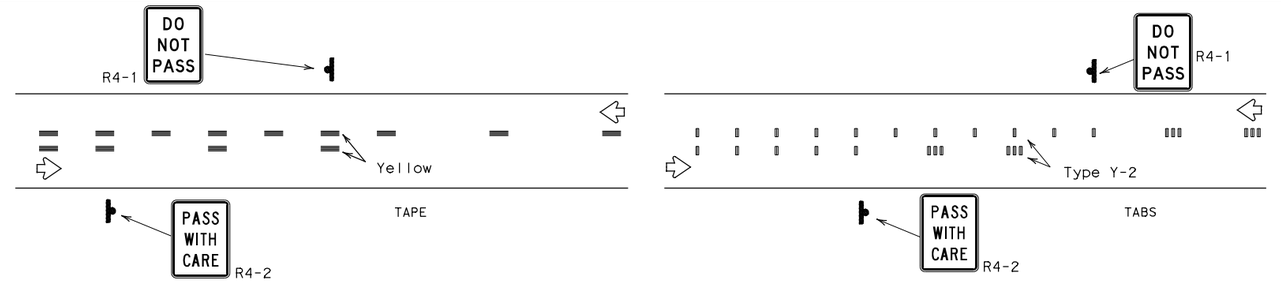
NOTES:

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

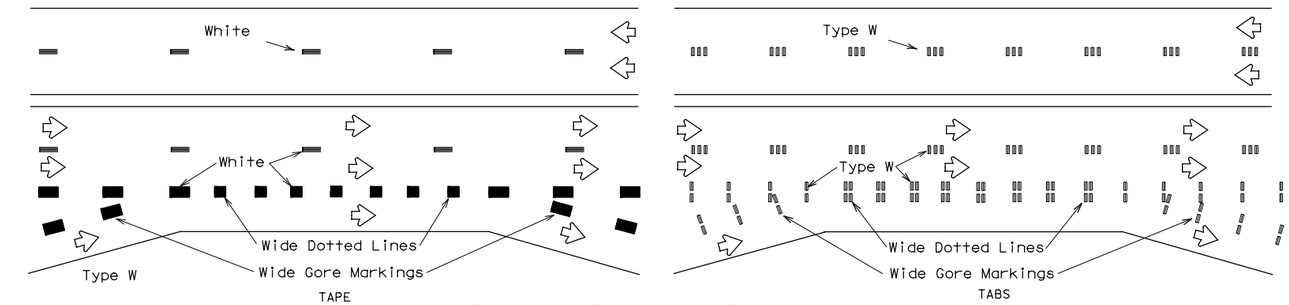
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

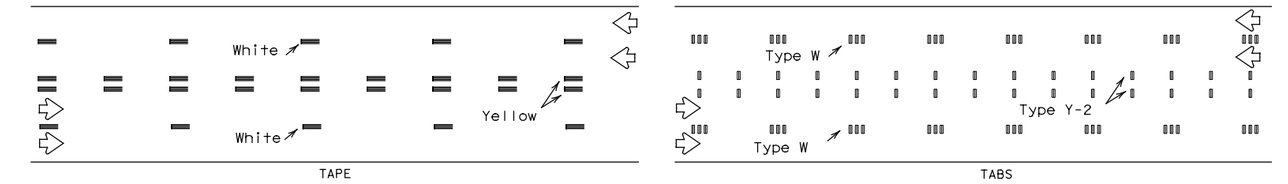
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



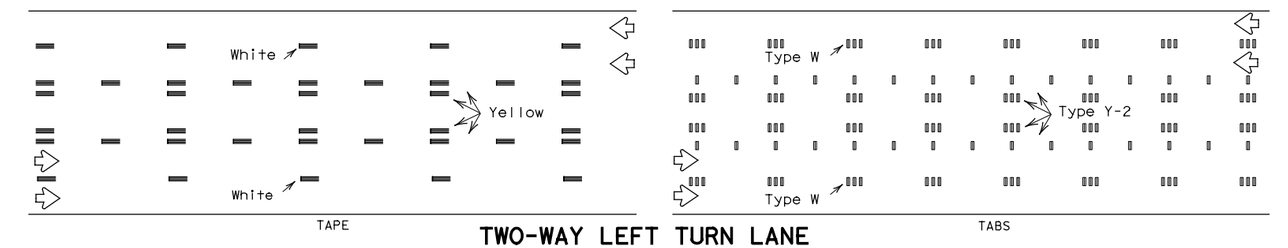
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



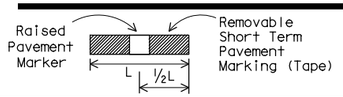
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
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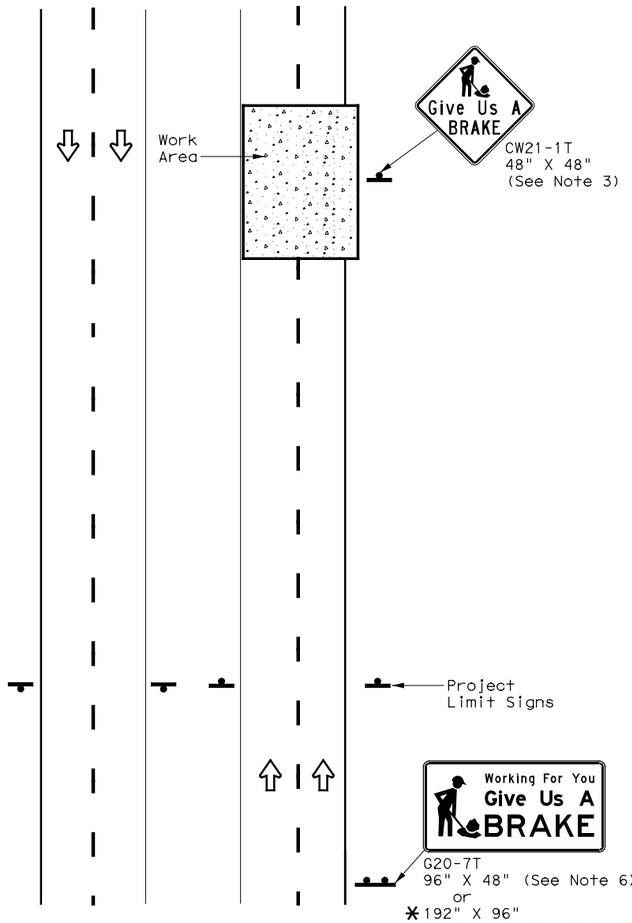
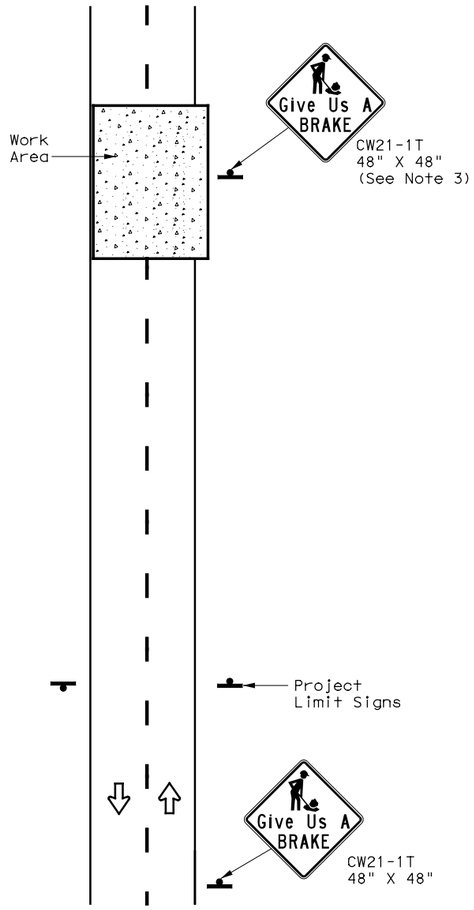
1-97		DIST	COUNTY		SHEET NO.
3-03		SAT	MEDINA		38
7-13					

111



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

DATE: DATE/ZONE 4:11:17 PM
FILE: DOCUMENT NAME

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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116

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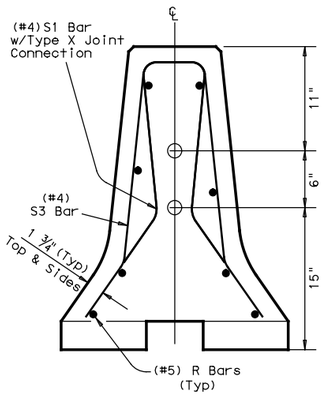
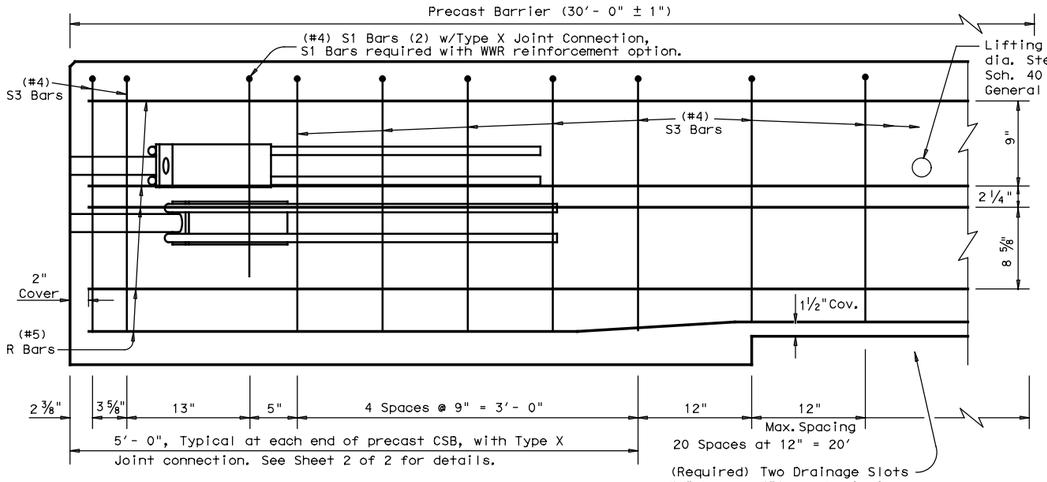


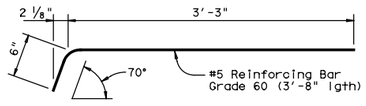
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



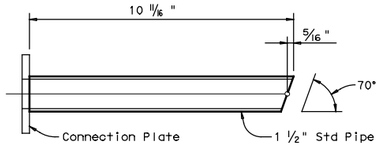
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



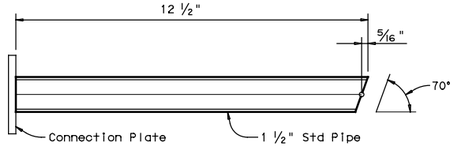
DEFORMED BAR ANCHOR DETAILS

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



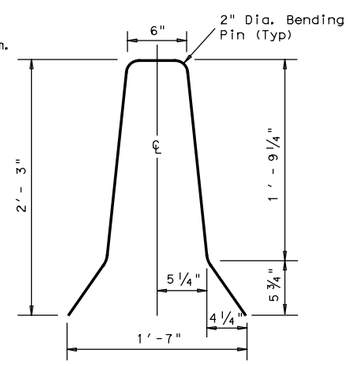
UPPER CONNECTION PIPE DETAILS

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



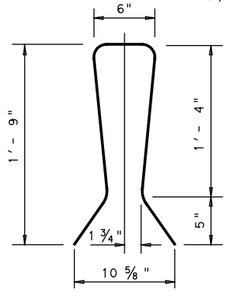
LOWER CONNECTION PIPE DETAILS

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



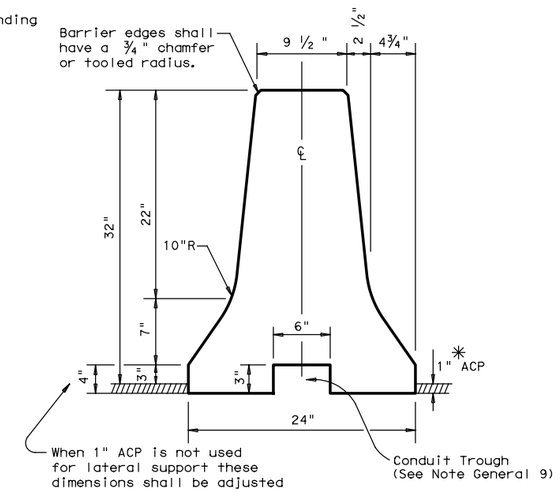
S3 Bar

#4 Bar



S1 Bar

#4 Bar (2)
(Joint Type X)

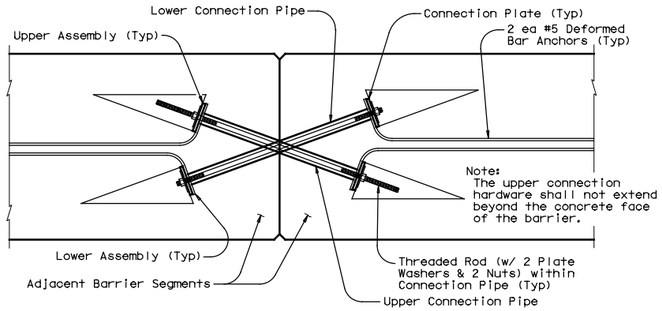


Concrete Safety Barrier

✳ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

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 tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
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 involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.



TYPE X JOINT INSTALLATION DETAIL

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

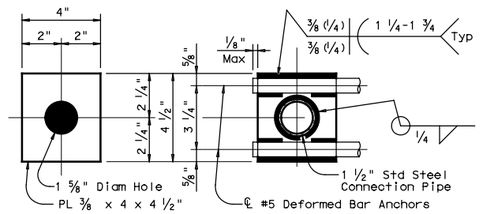
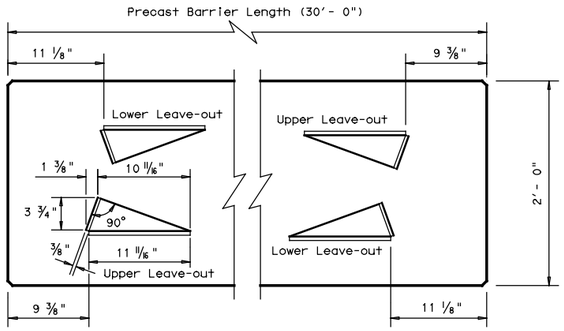


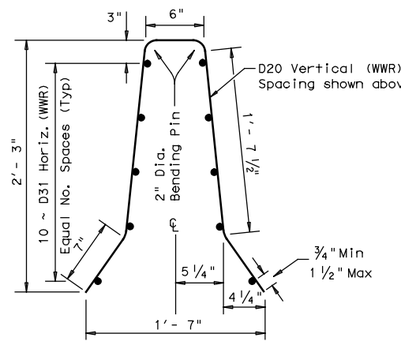
PLATE DIMENSIONS WELDING DETAILS

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.



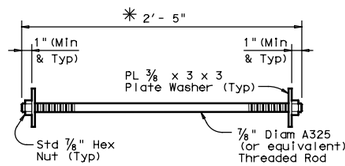
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

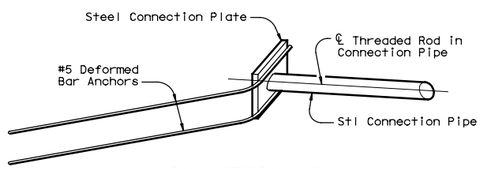
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing 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".



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.

✳ 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.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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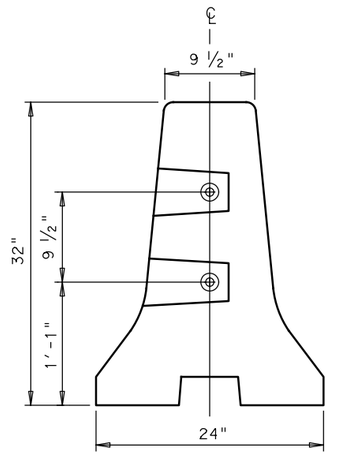
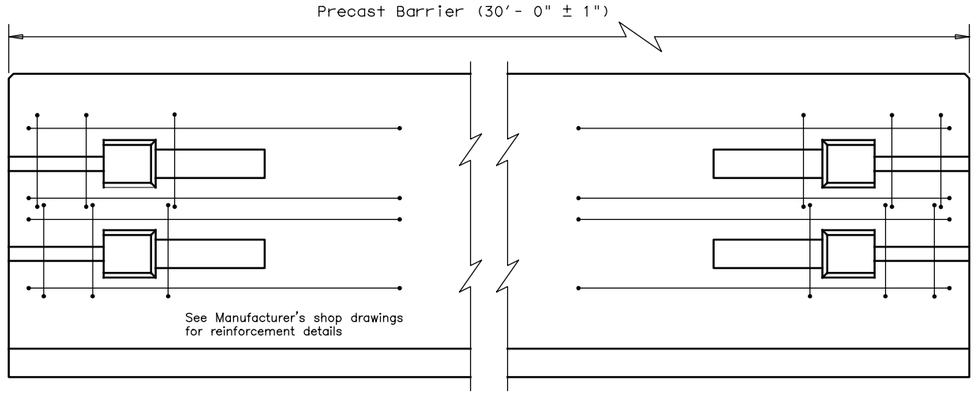
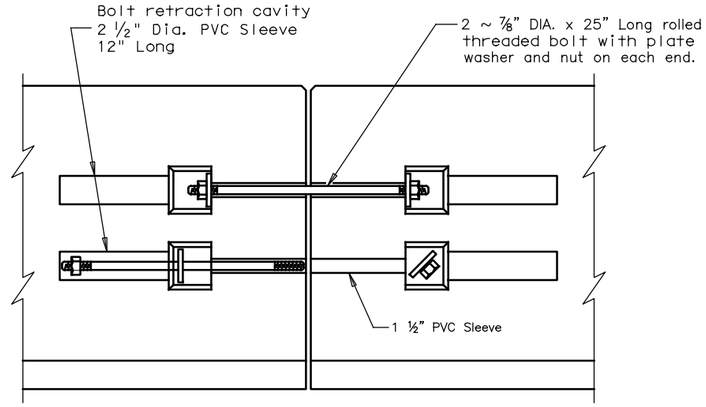


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

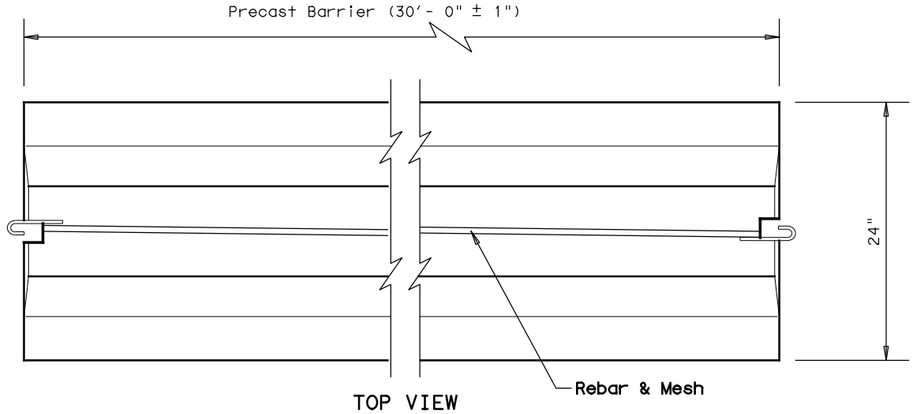


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

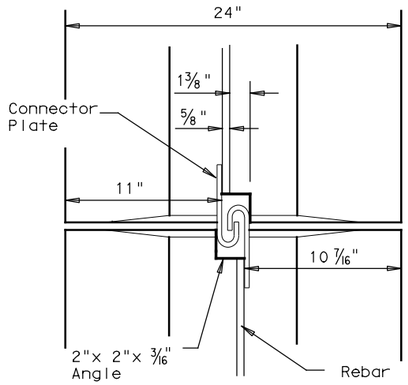


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

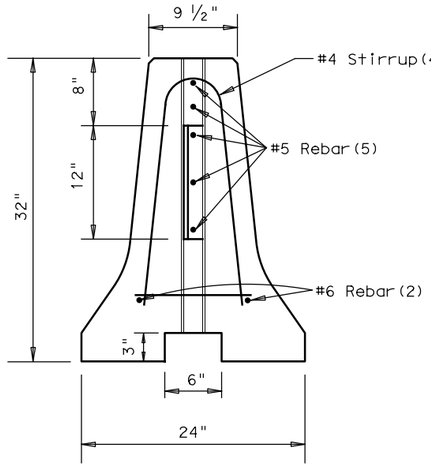
Joint Connection (Type Q)



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



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

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.

Texas Department of Transportation
Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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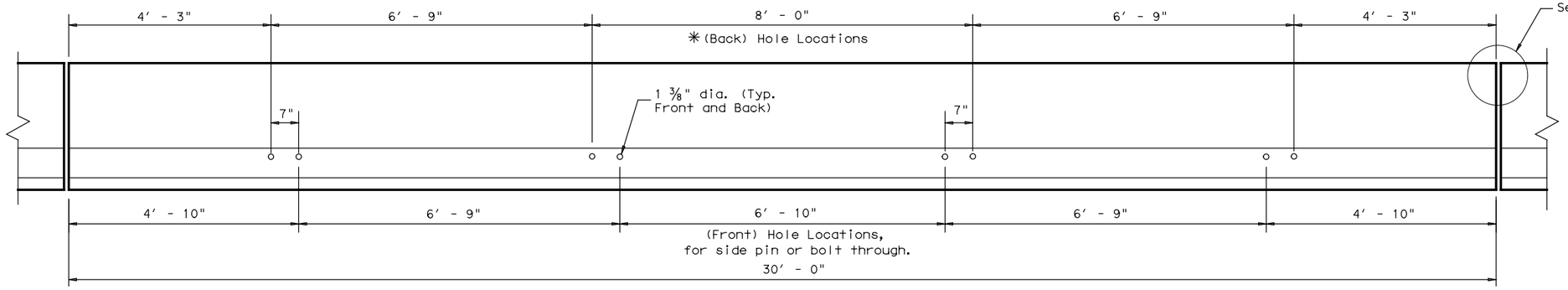
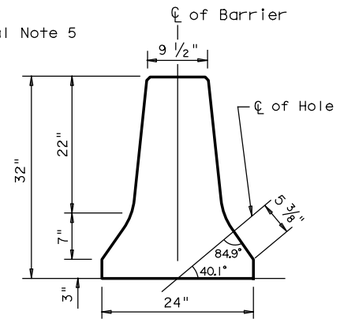
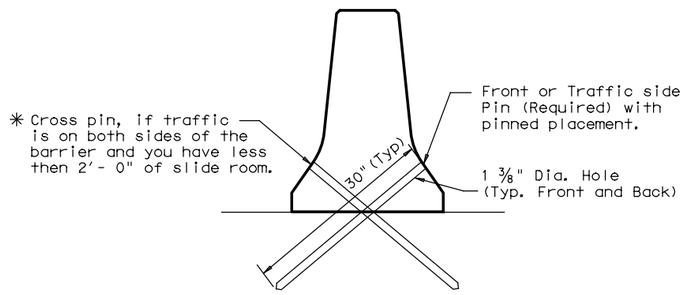


DETAIL 1

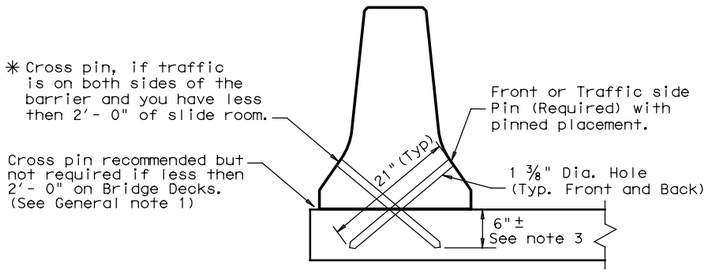


HOLE LOCATION DETAIL



DETAIL 2

Placement on (ACP) Asphalt Concete Pavement or Treated Base Material (30" Pin required)

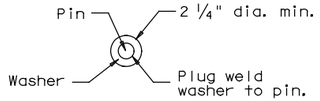


DETAIL 3

Bridge Deck or CRCP (21" pin required)

GENERAL NOTES

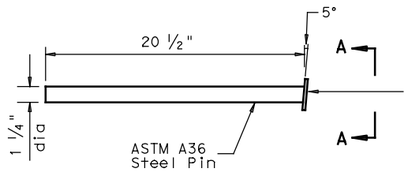
1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.



VIEW A-A

CORE DRILLING EXISTING BARRIER

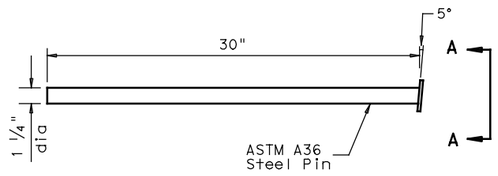
Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

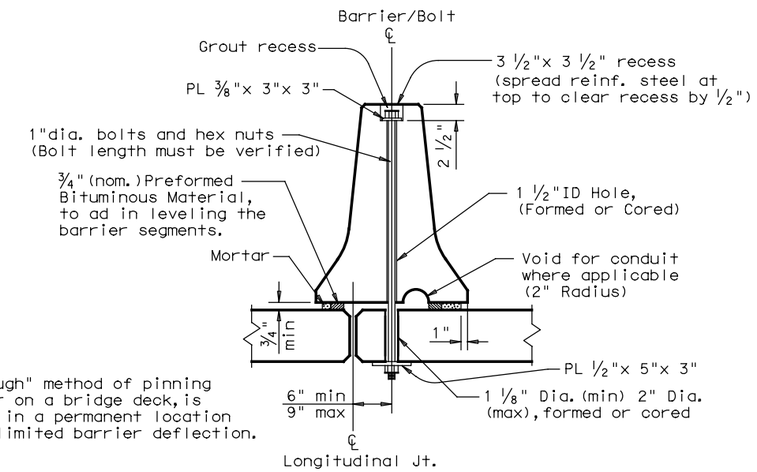
(21") PIN DETAIL

See Detail 3



(30") PIN DETAIL

See Detail 2



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

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

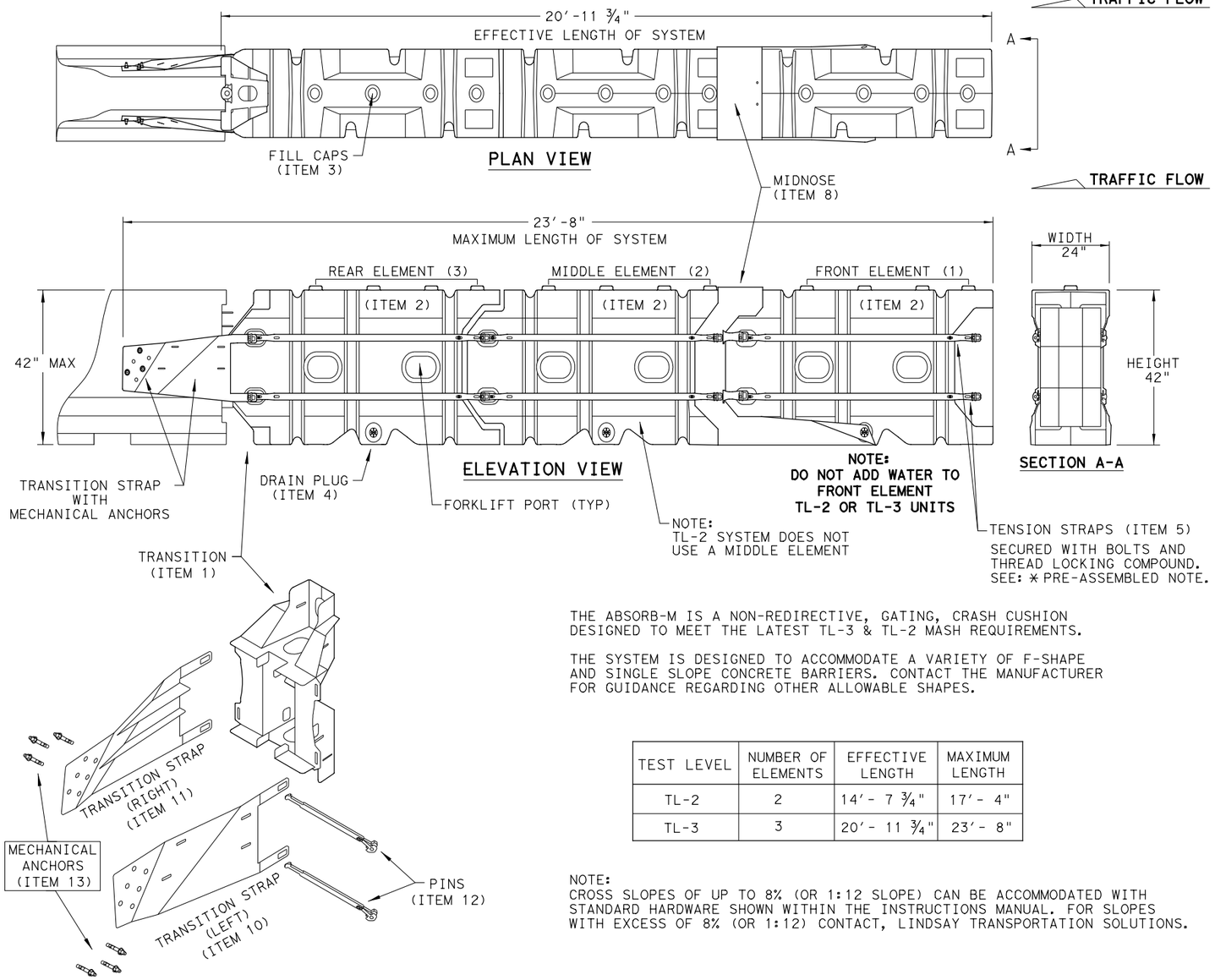
PRECAST BARRIER (TYPE 1) PINNED PLACEMENT

CSB(7)-10

FILE: csb710.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		42

DATE: 8/19/2021
FILE: csb710.dgn

SYSTEM SHOWN - ABSORB-M TL-3



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

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

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

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

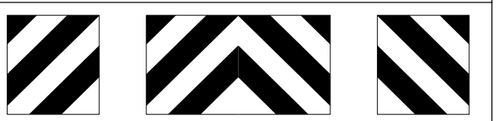
GENERAL NOTES

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

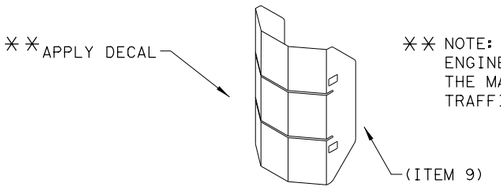
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE



TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER



NOSE PLATE

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

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

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

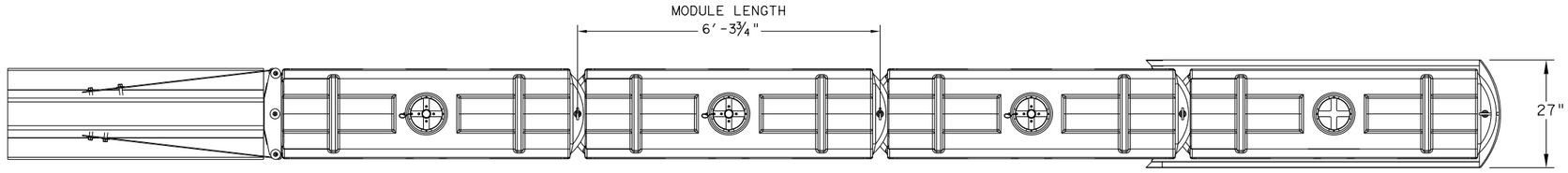
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

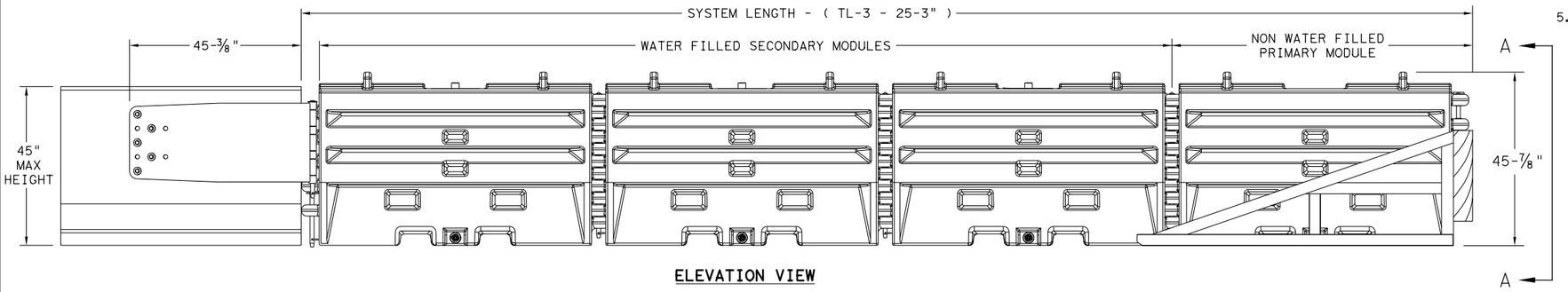
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
REVISIONS	CONT	SECT	JOB	HIGHWAY
	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		43

DATE: 8/19/2021
FILE: absorbm19.dgn



PLAN VIEW



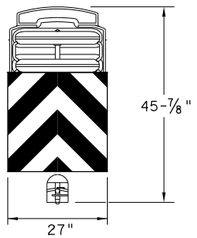
ELEVATION VIEW

GENERAL NOTES

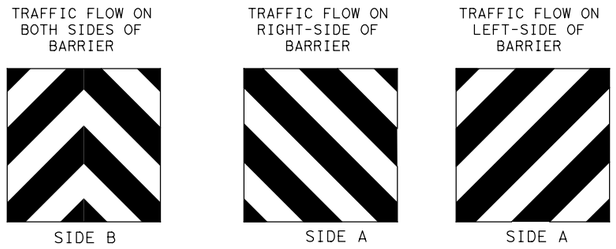
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

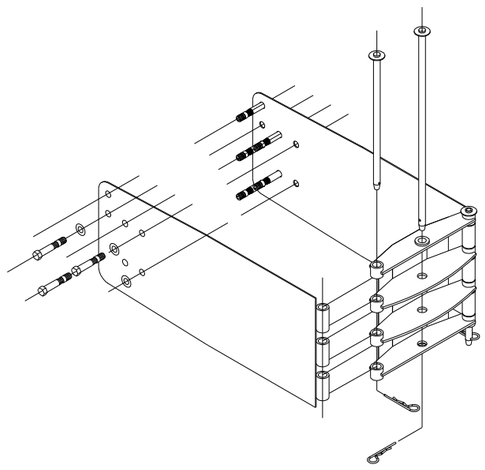


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

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

Texas Department of Transportation

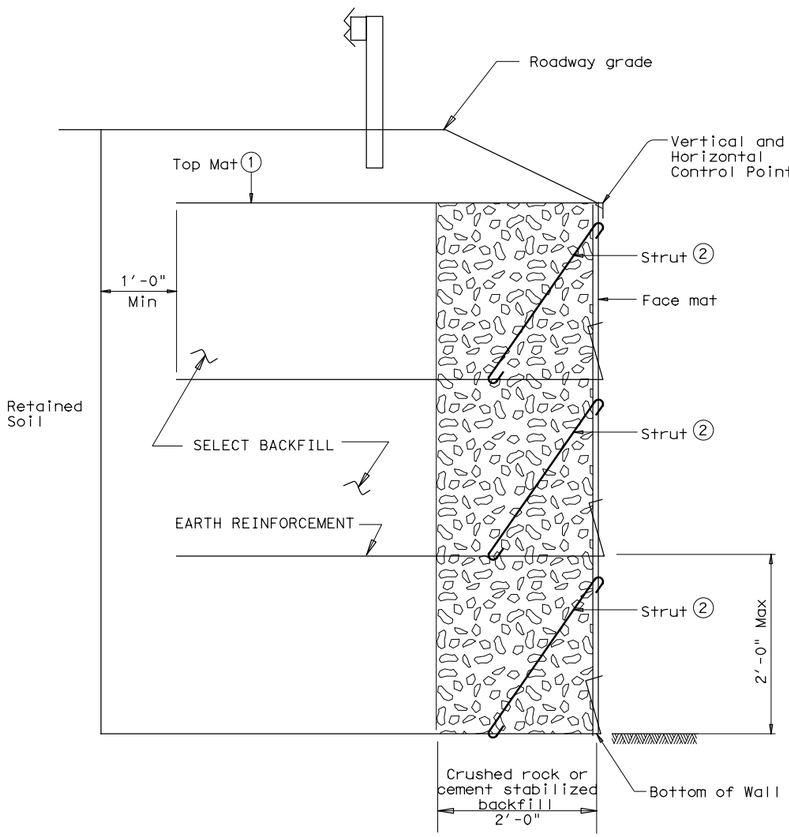
Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		44

DATE: 8/19/2021
FILE: sled19.dgn

DATE: DATE/TIME 4:11:32 PM
FILE: DOCUMENT NAME

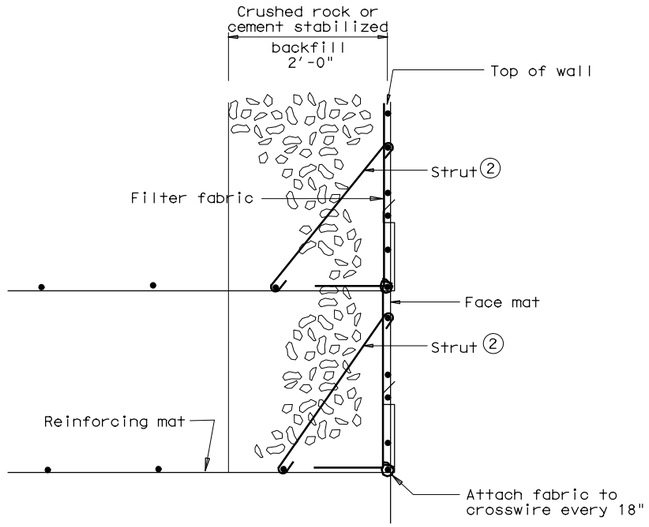


(1) Provide top mat to stabilize top of wall. Contractor may propose alternate method to stabilize top of wall.

(2) Provide intermediate stuts as required to stabilize face.

TYPICAL SECTION

(SHOWING TOP MAT OPTION)



DETAIL OF WALL FACE

(SHOWING STRUT OPTION)

SPECIAL NOTE - FACE CONSTRUCTION

When constructing wire faced walls, it is critical that the area immediately behind the face mat be completely filled. Failure to fill and compact this area will result in bulging of the face mats and settlement of the top of wall. The filter fabric shall closely follow the contours of the face unit, with particular attention paid to the lower corner of the basket. The fabric shall be pulled into the corner and attached to the basket with hog rings or tie wire. The coarse rock or cement stabilized backfill in the two foot zone behind the face shall extend completely to the top of the face mat. Particular care shall be taken not to leave a gap or void below the next layer of earth reinforcement.

EARTH REINFORCEMENTS:

The maximum vertical spacing of earth reinforcements shall be 24 inches.

The minimum length of earth reinforcements shall be 6 feet for walls 6 feet and shorter, and 8 feet for walls over 6 feet tall.

Minimum wire size for welded wire earth reinforcements shall be W4.5. Longitudinal wire spacing shall not exceed 12 inches. Transverse wire spacing shall not exceed 24 inches.

Earth reinforcement allowable stresses and pullout shall be calculated with current AASHTO Standard and Interim Specifications.

Factor of safety in pullout of the earth reinforcements shall be greater than 1.5 at each reinforcement level.

Temporary Earth Wall reinforcements that will be placed in the reinforced volume of a permanent MSE wall shall either be non-metallic or galvanized.

WALL FACE:

Minimum wire size for welded wire material used for all facing shall be W4.5. Spacing of the wire shall not exceed 6 inches in either the horizontal or vertical direction. The facing shall be designed to maintain a vertical position during wall backfilling. This may be accomplished with wire struts, external bracing, or other means which provide acceptable performance. If the face does not remain vertical during wall backfilling, work shall be stopped until the system is modified to meet this requirement.

Angled struts or a top mat shall be provided to stabilize the top basket face. Strut spacing shall not exceed 24 inches.

STABILITY CRITERIA:

Factor of safety in sliding along the base of the structure shall be greater than or equal to 1.5.

Factor of safety in overturning shall be greater than or equal to 2.0.

The base pressure resultant shall fall within the middle third of the retaining wall.

DESIGN PARAMETERS:

Structure shall be based on the following design parameters:

Random Backfill: Unit weight = 120 pcf.
(Embankment or Existing Soils) ø = 30° c = 0 psf
Select Backfill: Unit weight = 120 pcf
ø = 30° c = 0 psf

GENERAL NOTES:

Sections shown are for informational purposes only. Specific geometry is to be determined based on wall layouts and other plan information.

The select backfill specified for use within the Temporary Earth Wall Select Volume shall extend horizontally from the back of the 2' backfill zone to a minimum of 1' beyond the end of the earth reinforcements.

Texas Department of Transportation

Bridge Division Standard

TEMPORARY EARTH RETAINING WALL

RW(TEW)

FILE: rwstde04.dgn	DN: TxDOT	CK: TxDOT	DW: GHO	CK: MPM
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
01-13: Added Struts.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		45

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT				MOVE / RESET		L	L	R	R	S	S
													INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	PHASE 1A	13	FM 462	470+60	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"		1								1	
2	PHASE 1A	14	FM 462	479+01	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"		1								1	
3	PHASE 1B	15	FM 462	469+30	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"				1	1					1	
4	PHASE 1B	16	FM 462	478+70	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"				1	2					1	
5	PHASE 2	19	FM 462	469+30	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"			1	1	3					1	
6	PHASE 2	20	FM 462	478+70	3	BI	ASPHALT	2"	CONCRETE SAFETY BARRIER	24"	19"			1	1	4					1	
													TOTALS	2	2	4						

LEGEND:

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

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

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		
	SAT	MEDINA		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			46

Chain FM462 contains:

Point FM462100 N 13,748,424.2914 E 1,894,389.4739 Sta 469+00.00

Course from FM462100 to PC FM4621 S 2° 12′ 35.98" W Dist 30.00

	Curve Data
Curve FM4621	
P.I. Station	469+96.35 N 13,748,328.02 E 1,894,385.76
Delta =	0° 41′ 05.69" (RT)
Degree =	0° 30′ 58.24"
Tangent =	66.35
Length =	132.69
Radius =	11,100.00
External =	0.20
Long Chord =	132.69
Mid. Ord. =	0.20
P.C. Station	469+30.00 N 13,748,394.31 E 1,894,388.32
P.T. Station	470+62.69 N 13,748,261.76 E 1,894,382.41
C.C.	N 13,748,822.35 E 1,883,296.57
Back = S	2° 12′ 35.98" W
Ahead = S	2° 53′ 41.66" W
Chord Bear = S	2° 33′ 08.82" W

Course from PT FM4621 to PC FM4622 S 2° 53′ 41.66" W Dist 34.62

	Curve Data
Curve FM4622	
P.I. Station	471+63.66 N 13,748,160.92 E 1,894,377.31
Delta =	0° 41′ 05.69" (LT)
Degree =	0° 30′ 58.24"
Tangent =	66.35
Length =	132.69
Radius =	11,100.00
External =	0.20
Long Chord =	132.69
Mid. Ord. =	0.20
P.C. Station	470+97.31 N 13,748,227.18 E 1,894,380.66
P.T. Station	472+30.00 N 13,748,094.62 E 1,894,374.75
C.C.	N 13,747,666.58 E 1,905,466.49
Back = S	2° 53′ 41.66" W
Ahead = S	2° 12′ 35.98" W
Chord Bear = S	2° 33′ 08.82" W

Course from PT FM4622 to PC FM4623 S 2° 12′ 35.98" W Dist 491.3573

	Curve Data
Curve FM4623	
P.I. Station	477+54.85 N 13,747,570.16 E 1,894,354.51
Delta =	2° 01′ 12.18" (LT)
Degree =	3° 00′ 56.04"
Tangent =	33.50
Length =	66.99
Radius =	1,900.00
External =	0.30
Long Chord =	66.98
Mid. Ord. =	0.30
P.C. Station	477+21.36 N 13,747,603.63 E 1,894,355.80
P.T. Station	477+88.34 N 13,747,536.66 E 1,894,354.40
C.C.	N 13,747,530.36 E 1,896,254.39
Back = S	2° 12′ 35.98" W
Ahead = S	0° 11′ 23.80" W
Chord Bear = S	1° 11′ 59.89" W

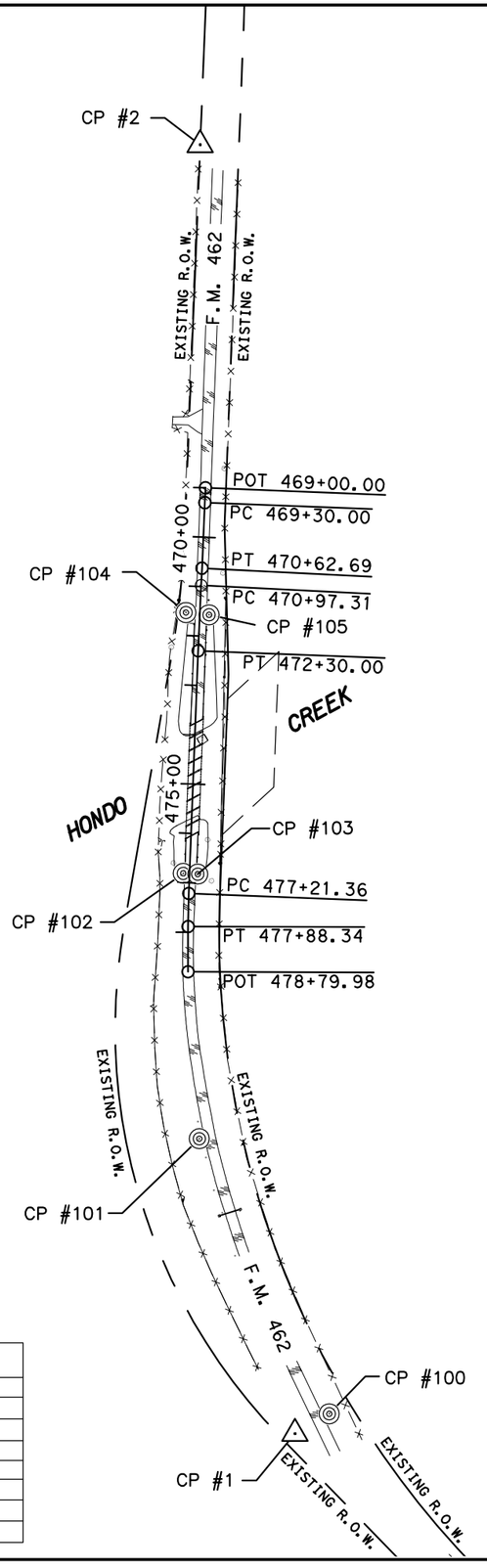
Course from PT FM4623 to FM462101 S 0° 11′ 23.80" W Dist 91.63

Point FM462101 N 13,747,445.03 E 1,894,354.10 Sta 478+79.98

==========

Ending chain FM462 description

POINT No.	NORTHING	EASTING	ELEV	DESCRIPTION	STATION	OFFSET
1	13,746,510.494	1,894,570.754	1167.93	TYPE II CONCRETE MONUMENT SET	N/A	
2	13,749,118.617	1,894,378.771	1163.12	TYPE II CONCRETE MONUMENT SET	N/A	
100	13,746,550.546	1,894,640.067	1168.71	5/8" IRON ROD "REFERENCE" SET	N/A	
101	13,747,107.163	1,894,377.036	1170.64	5/8" IRON ROD "REFERENCE" SET	N/A	
102	13,747,644.240	1,894,344.473	1156.47	5/8" IRON ROD "REFERENCE" SET	476+81.22	12.89′RT
103	13,747,642.639	1,894,373.885	1156.11	5/8" IRON ROD "REFERENCE" SET	476+81.68	16.56′LT
104	13,748,172.018	1,894,350.074	1150.40	5/8" IRON ROD "REFERENCE" SET	471+53.81	27.90′RT
105	13,748,167.420	1,894,396.721	1153.67	5/8" IRON ROD "REFERENCE" SET	471+56.28	18.90′LT



NOTES:

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00018.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NAD83(2011) (EPOCH2010.00) SOUTH CENTRAL ZONE (4204).
3. ALL ELEVATIONS ARE BASED ON GPS DERIVED ELLIPSOID HEIGHTS UTILIZING NAVD 88, GEOID 12A.

THIS SURVEY WAS PERFORMED UNDER MY SUPERVISION AND REPRESENTS A CONTROL SURVEY PERFORMED ON THE GROUND UNDER MY SUPERVISION DATED OCTOBER 2020.

STATE OF TEXAS
REGISTERED
JON L. COOPER
5254
PROFESSIONAL
LAND SURVEYOR

JON L. COOPER
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5254 TEXAS FIRM No. 10106900

AUGUST 4, 2021

GORRONDONA & ASSOCIATES, INC.
4201 W. PARMER LANE, BUILDING A, SUITE 150
AUSTIN, TEXAS 78727
TEXAS REGISTERED LAND SURVEYING FIRM 10106901

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

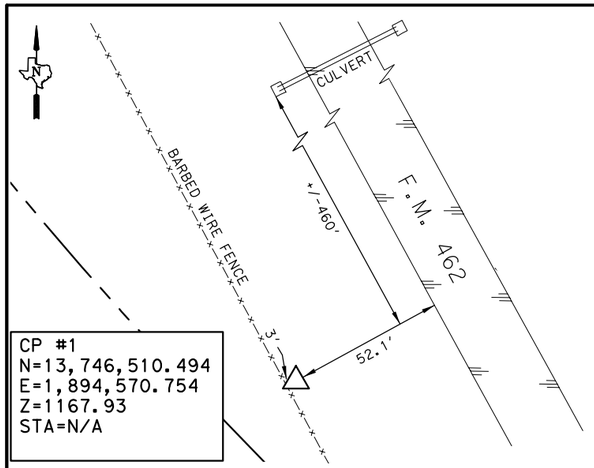
FM 462 AT HONDO CREEK

HORIZONTAL AND VERTICAL CONTROL

INDEX SHEET

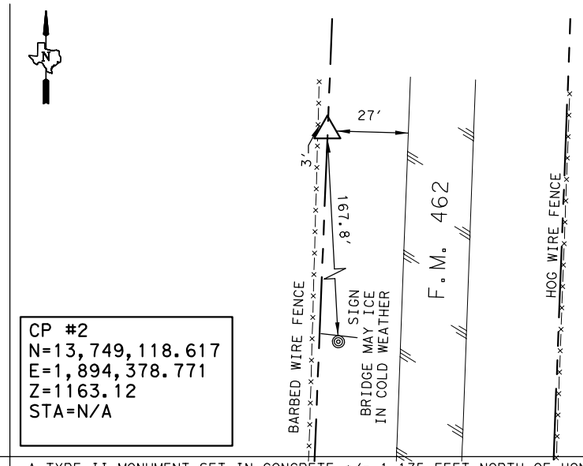
SCALE: 1"=300′ SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	47



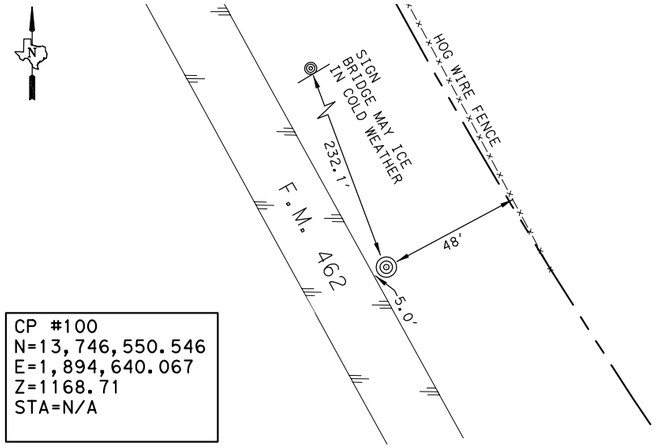
CP #1
N=13,746,510.494
E=1,894,570.754
Z=1167.93
STA=N/A

A TYPE II MONUMENT SET IN CONCRETE +/- 1,240 FEET SOUTH OF HONDO CREEK BRIDGE, 460 FEET SOUTH OF DRAINAGE CULVERT UNDER F.M. 462, 52.1 FEET FROM SOUTHWEST EDGE OF PAVEMENT F.M. 462, 3 FEET FROM BARBED WIRE FENCE.



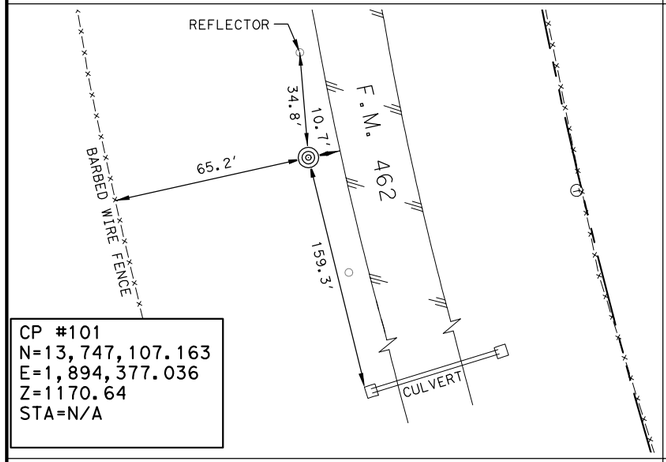
CP #2
N=13,749,118.617
E=1,894,378.771
Z=1163.12
STA=N/A

A TYPE II MONUMENT SET IN CONCRETE +/- 1,175 FEET NORTH OF HONDO CREEK BRIDGE, 167.8 FEET NORTH OF BRIDGE MAY ICE IN COLD WEATHER SIGN, 27 FEET FROM WEST EDGE OF PAVEMENT F.M. 462, 3 FEET FROM BARBED WIRE FENCE.



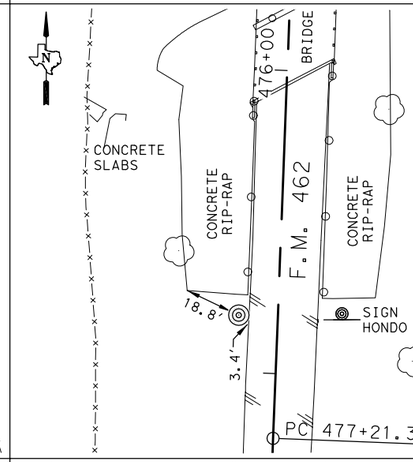
CP #100
N=13,746,550.546
E=1,894,640.067
Z=1168.71
STA=N/A

5/8" IRON ROD SET WITH "REFERENCE" CAP +/- 1,230 FEET SOUTH OF HONDO CREEK BRIDGE, 232.1 FEET SOUTH OF BRIDGE MAY ICE IN COLD WEATHER SIGN, 5 FEET FROM EAST EDGE OF PAVEMENT F.M. 462, 48 FEET FROM HOG WIRE FENCE.



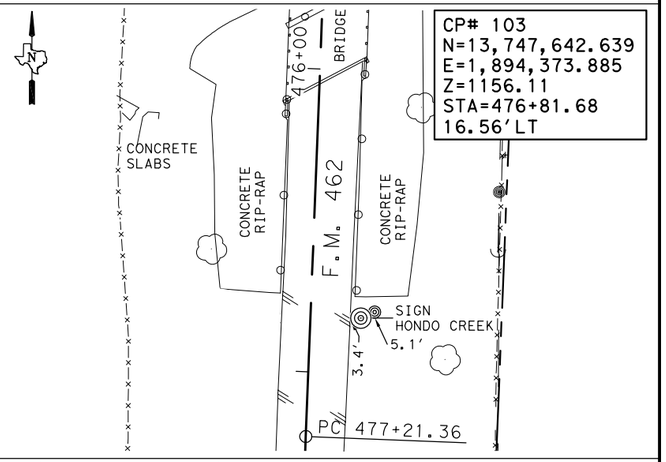
CP #101
N=13,747,107.163
E=1,894,377.036
Z=1170.64
STA=N/A

5/8" IRON ROD SET WITH "REFERENCE" CAP +/- 610 FEET SOUTH OF HONDO CREEK BRIDGE, 159.3 FEET NORTH OF DRAINAGE CULVERT UNDER F.M. 462, 10.7 FEET FROM WEST EDGE OF PAVEMENT F.M. 462, 65.2 FEET FROM BARBED WIRE FENCE.



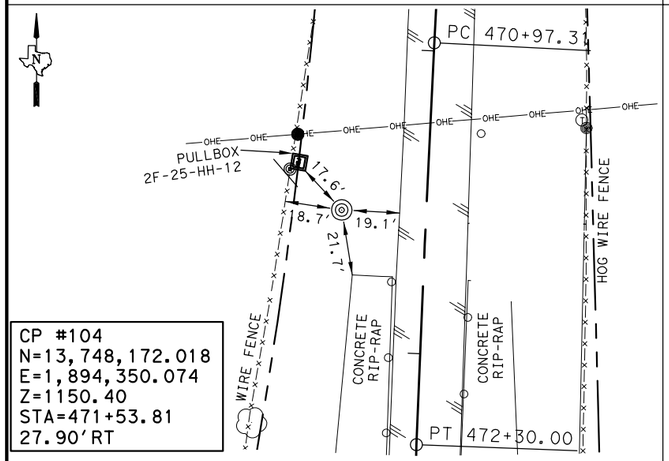
CP# 102
N=13,747,644.240
E=1,894,344.473
Z=1156.47
STA=476+81.22
12.89'RT

5/8" IRON ROD SET WITH "REFERENCE" CAP 70 FEET SOUTH OF HONDO CREEK BRIDGE, 18.8 FEET FROM SOUTHWEST CORNER RIP-RAP, 3.4 FEET FROM WEST EDGE OF PAVEMENT F.M. 462.



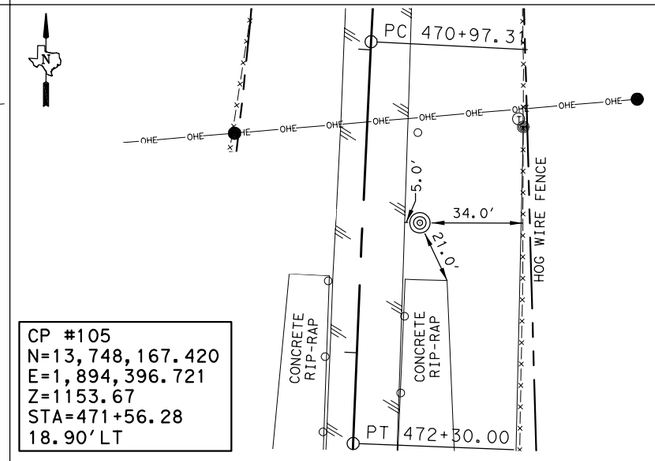
CP# 103
N=13,747,642.639
E=1,894,373.885
Z=1156.11
STA=476+81.68
16.56'LT

5/8" IRON ROD SET WITH "REFERENCE" CAP 85 FEET SOUTH OF HONDO CREEK BRIDGE, 5.1 FEET FROM HONDO CREEK SIGN, 3.4 FEET FROM EAST EDGE OF PAVEMENT F.M. 462.



CP #104
N=13,748,172.018
E=1,894,350.074
Z=1150.40
STA=471+53.81
27.90'RT

5/8" IRON ROD SET WITH "REFERENCE" CAP NORTH OF HONDO CREEK BRIDGE, 21.7 FEET FROM NORTHWEST CORNER RIP-RAP, 19.1 FEET FROM WEST EDGE OF PAVEMENT F.M. 462, 17.6 FEET FROM PULLBOX AND 18.7 FEET FROM WIRE FENCE.



CP #105
N=13,748,167.420
E=1,894,396.721
Z=1153.67
STA=471+56.28
18.90'LT

5/8" IRON ROD SET WITH "REFERENCE" CAP NORTH OF HONDO CREEK BRIDGE, 21.0 FEET FROM NORTHEAST CORNER RIP-RAP, 5.0 FEET FROM EAST EDGE OF PAVEMENT F.M. 462, 34.0 FEET FROM HOG WIRE FENCE.

NOTES:

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00018.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NAD83(2011) (EPOCH2010.00) SOUTH CENTRAL ZONE (4204).
3. ALL ELEVATIONS ARE BASED ON GPS DERIVED ELLIPSOID HEIGHTS UTILIZING NAVD 88, GEOID 12A.

THIS SURVEY WAS PERFORMED UNDER MY SUPERVISION AND REPRESENTS A CONTROL SURVEY PERFORMED ON THE GROUND UNDER MY SUPERVISION DATED OCTOBER 2020.

STATE OF TEXAS
REGISTERED
JON L. COOPER
5254
PROFESSIONAL
LAND SURVEYOR

JON L. COOPER
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5254 TEXAS FIRM No. 10106900

AUGUST 4, 2021

GORRONDONA & ASSOCIATES, INC.
4201 W. PARMER LANE, BUILDING A, SUITE 150
AUSTIN, TEXAS 78727
TEXAS REGISTERED LAND SURVEYING FIRM 10106901

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

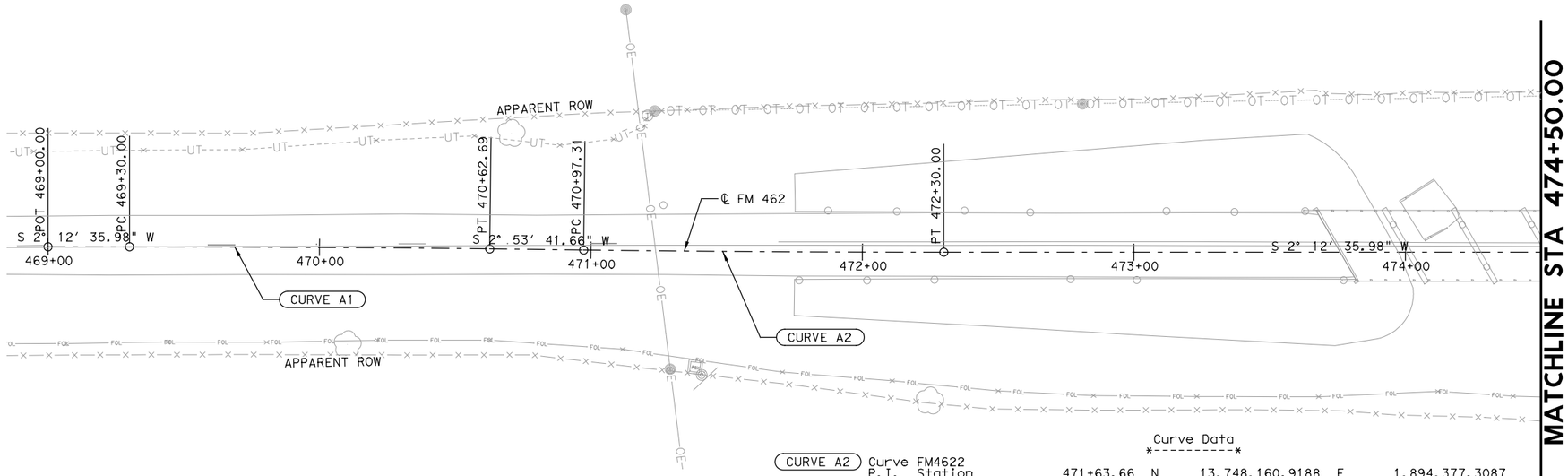
FM 462 AT HONDO CREEK

HORIZONTAL AND VERTICAL CONTROL

DETAIL SHEET

SCALE: 1"=50' SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	48



MATCHLINE STA 474+50.00

0 25 50 75 100
SCALE IN FEET

℄ FM 462 (HONDO CREEK)

Beginning chain FM462 description

Point FM462100 N 13,748,424.2914 E 1,894,389.4739 Sta 469+00.00

Course from FM462100 to PC FM4621 S 2° 12′ 35.98" W Dist 30.0001

CURVE A1

Curve Data					
Curve FM4621					
P.I. Station	469+96.35	N	13,748,328.0176	E	1,894,385.7586
Delta =	0° 41′ 05.69" (RT)				
Degree =	0° 30′ 58.24"				
Tangent =	66.3454				
Length =	132.6892				
Radius =	11,100.0000				
External =	0.1983				
Long Chord =	132.6884				
Mid. Ord. =	0.1983				
P.C. Station	469+30.00	N	13,748,394.3136	E	1,894,388.3171
P.T. Station	470+62.69	N	13,748,261.7569	E	1,894,382.4079
C.C.		N	13,748,822.3530	E	1,883,296.5732
Back = S	2° 12′ 35.98" W				
Ahead = S	2° 53′ 41.66" W				
Chord Bear = S	2° 33′ 08.82" W				

Course from PT FM4621 to PC FM4622 S 2° 53′ 41.66" W Dist 34.6216

CURVE A2

Curve Data					
Curve FM4622					
P.I. Station	471+63.66	N	13,748,160.9188	E	1,894,377.3087
Delta =	0° 41′ 05.69" (LT)				
Degree =	0° 30′ 58.24"				
Tangent =	66.3454				
Length =	132.6892				
Radius =	11,100.0000				
External =	0.1983				
Long Chord =	132.6884				
Mid. Ord. =	0.1983				
P.C. Station	470+97.31	N	13,748,227.1795	E	1,894,380.6594
P.T. Station	472+30.00	N	13,748,094.6228	E	1,894,374.7503
C.C.		N	13,747,666.5834	E	1,905,466.4941
Back = S	2° 53′ 41.66" W				
Ahead = S	2° 12′ 35.98" W				
Chord Bear = S	2° 33′ 08.82" W				

Course from PT FM4622 to PC FM4623 S 2° 12′ 35.98" W Dist 491.3573

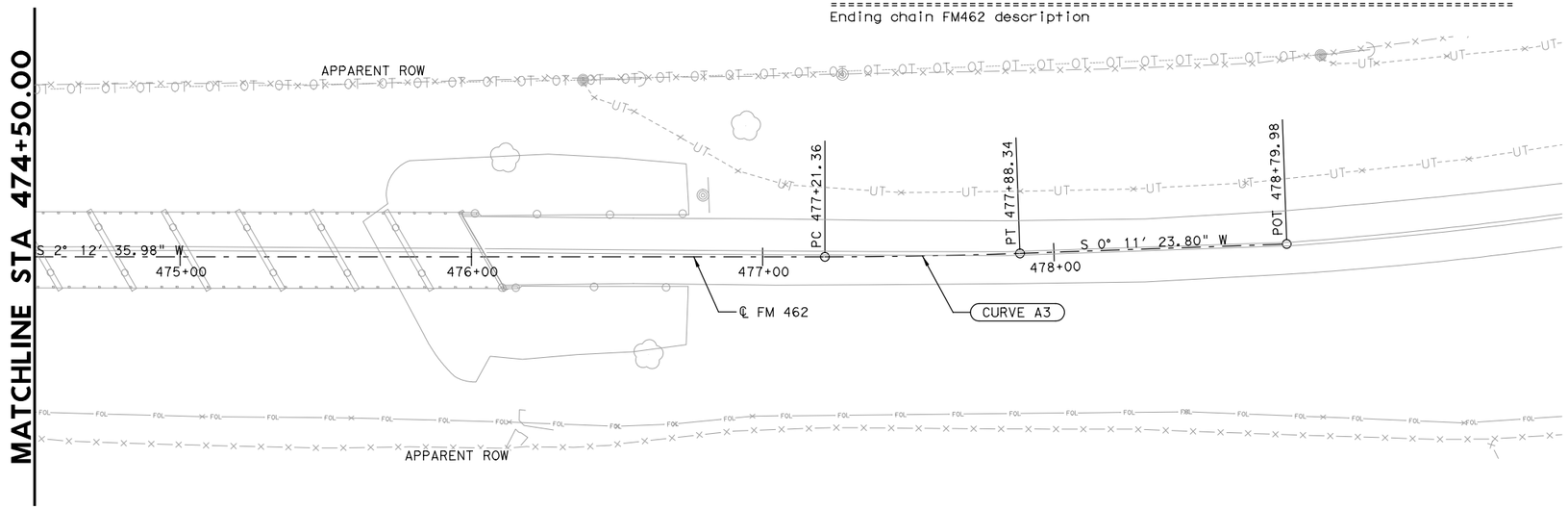
CURVE A3

Curve Data					
Curve FM4623					
P.I. Station	477+54.85	N	13,747,570.1587	E	1,894,354.5108
Delta =	2° 01′ 12.18" (LT)				
Degree =	3° 00′ 56.04"				
Tangent =	33.4972				
Length =	66.9874				
Radius =	1,900.0000				
External =	0.2953				
Long Chord =	66.9839				
Mid. Ord. =	0.2952				
P.C. Station	477+21.36	N	13,747,603.6309	E	1,894,355.8025
P.T. Station	477+88.34	N	13,747,536.6617	E	1,894,354.3997
C.C.		N	13,747,530.3629	E	1,896,254.3893
Back = S	2° 12′ 35.98" W				
Ahead = S	0° 11′ 23.80" W				
Chord Bear = S	1° 11′ 59.89" W				

Course from PT FM4623 to FM462101 S 0° 11′ 23.80" W Dist 91.6341

Point FM462101 N 13,747,445.0281 E 1,894,354.0959 Sta 478+79.98

Ending chain FM462 description



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER
8/20/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

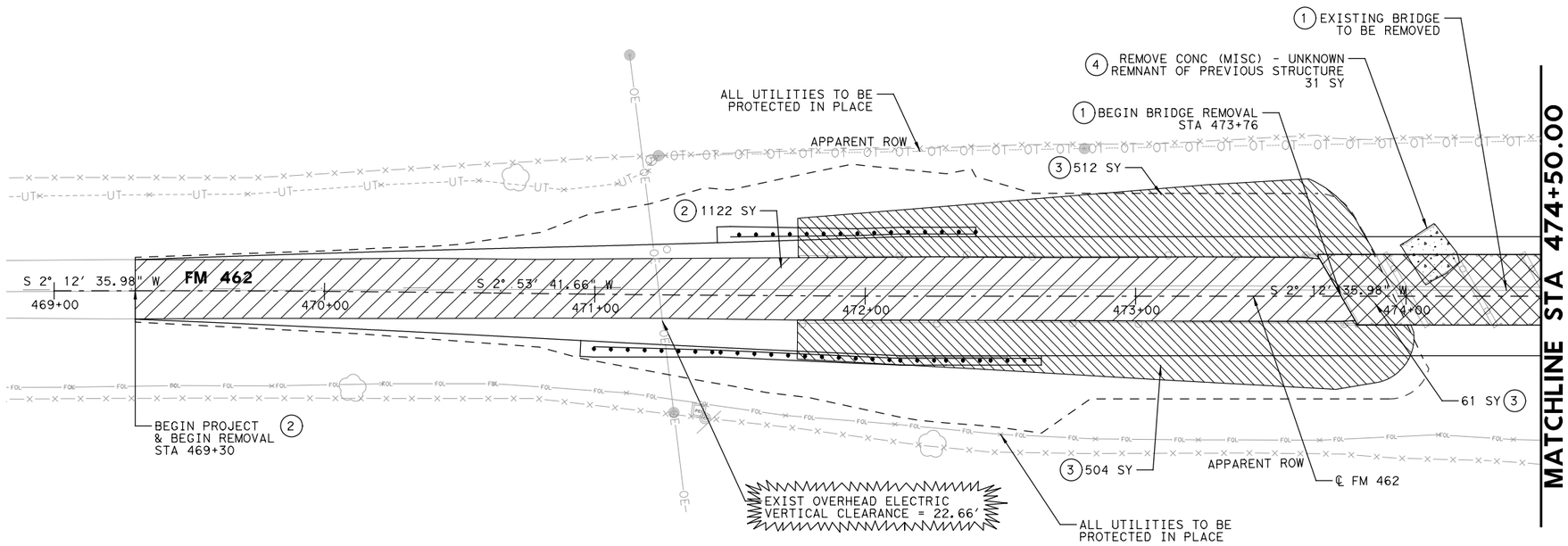
HORIZONTAL ALIGNMENT DATA & LAYOUT

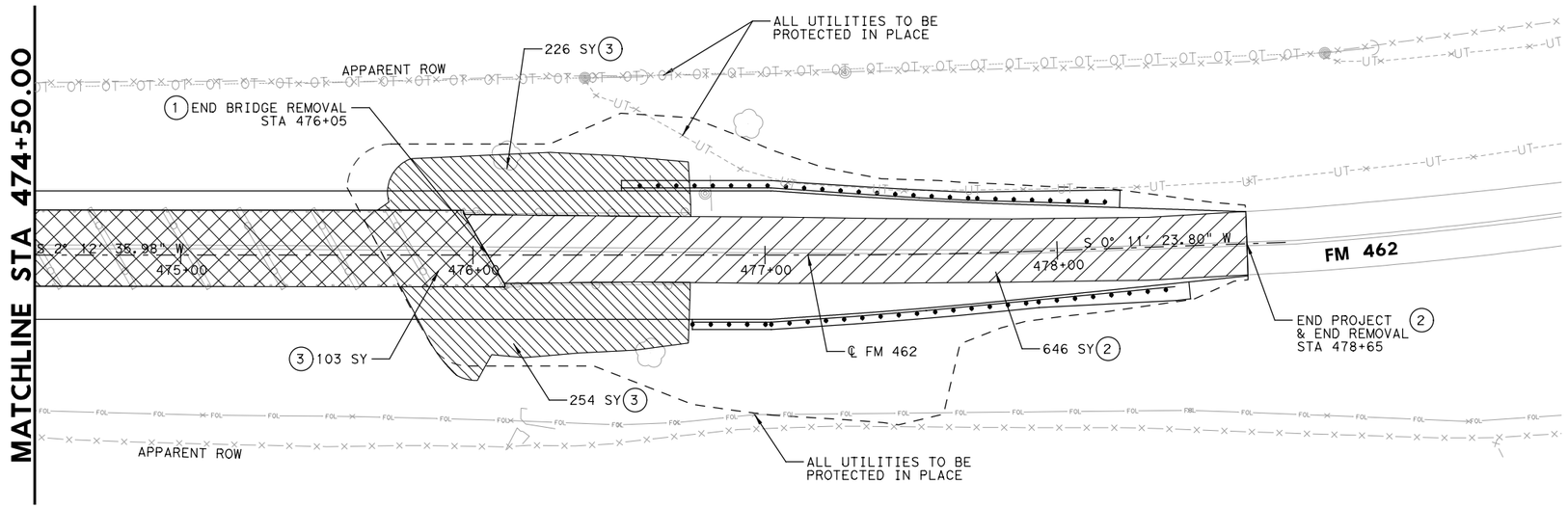
SCALE: 1"=50′ SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	49

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10237721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:11:40 PM
File Name: FM462PL02.dgn
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
104 6009	REMOVING CONC (RIPRAP)	SY	1615
104 6028	REMOVING CONC (MISC)	SY	31
105 6011	REMOVE STA BASE & ASPH PAV (2"-6")	SY	1767
469 6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1





0 25 50 75 100

SCALE IN FEET

LEGEND

1 REMOV STR (BRIDGE 100 - 499 FT LENGTH)
2 REMOVING STAB BASE & ASPH PAV (7"-12")
3 REMOVE CONC (RIPRAP)
4 REMOVE CONC (MISC)

NO.	DATE	REVISION	APPR BY

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Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

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FM 462 AT HONDO CREEK

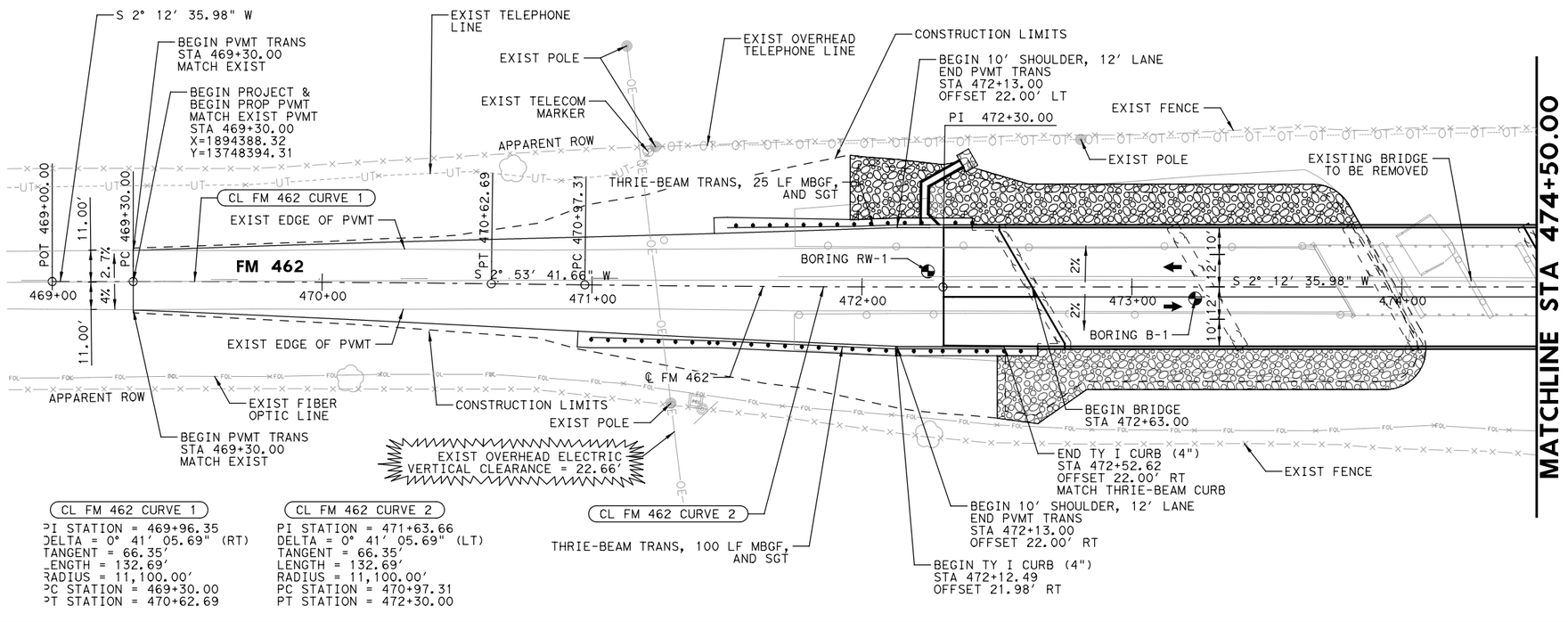
REMOVAL LAYOUT

SCALE: 1"=50'

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	50

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:11:45 PM
File Name: FM462RM01.dgn
User Name: JFOYT



CL FM 462 CURVE 1

PI STATION = 469+96.35
DELTA = 0° 41' 05.69" (RT)
TANGENT = 66.35'
LENGTH = 132.69'
RADIUS = 11,100.00'
PC STATION = 469+30.00
PT STATION = 470+62.69

CL FM 462 CURVE 2

PI STATION = 471+63.66
DELTA = 0° 41' 05.69" (LT)
TANGENT = 66.35'
LENGTH = 132.69'
RADIUS = 11,100.00'
PC STATION = 470+97.31
PT STATION = 472+30.00

SHEET SUMMARY OF ESTIMATED QUANTITIES

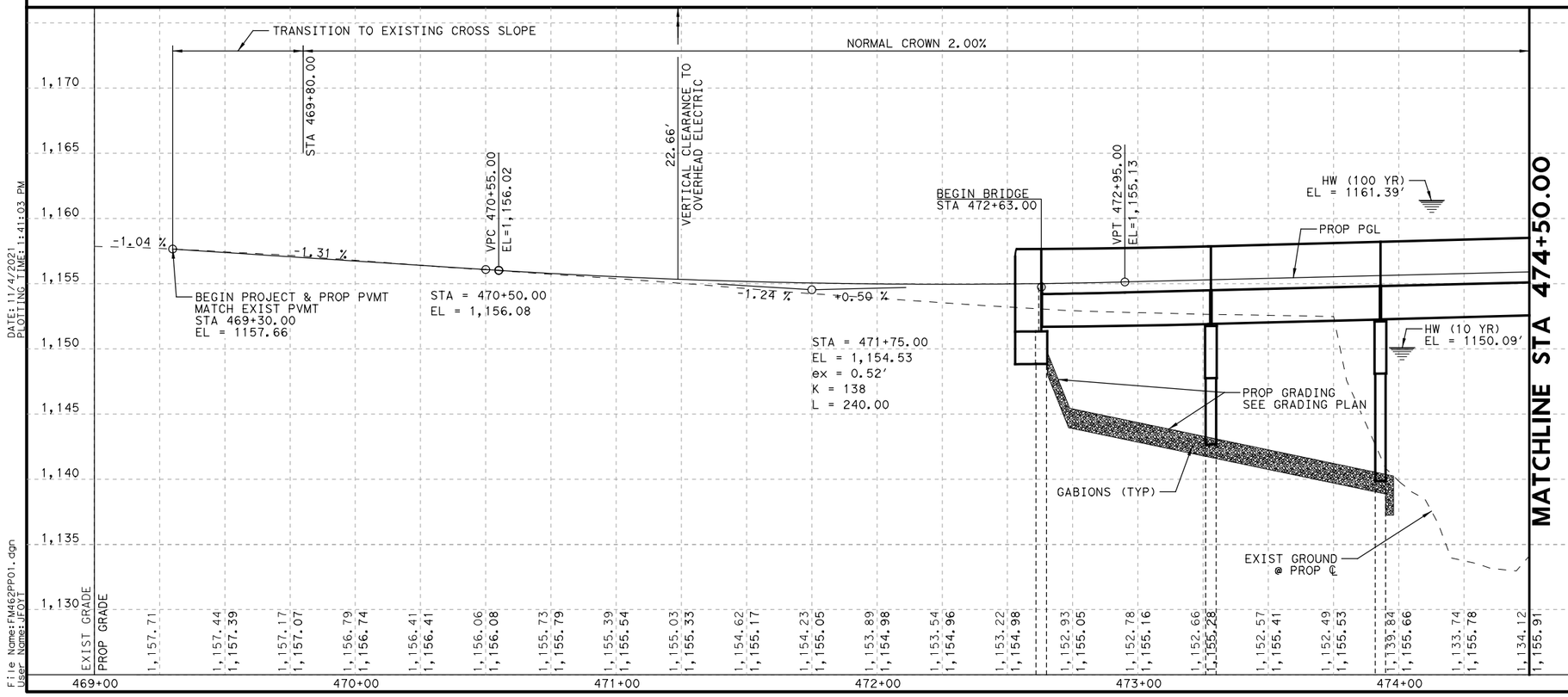
ITEM#	DESCRIPTION	UNIT	QTY
100 6002	PREPARING ROW	STA	5.20
110 6001	EXCAVATION (ROADWAY)	CY	122
132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	890
216 6001	PROOF ROLLING	HR	21
247 6475	FL BS (CIP)(TY D GR 1-2, OR 5)FINAL POS	CY	214
310 6027	PRIME COAT(MC-30 OR AE-P)	GAL	257
340 6048	D-GR HMA(SQ) TY-C SAC-B PG70-22	TON	142
340 6050	D-GR HMA(SQ) TY-C PG 70-22	TON	142
432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	13
529 6001	CONC CURB (TY I)	LF	40
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	125
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
3084 6001	BONDING COURSE	GAL	124

LEGEND

- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- FLOW ARROW
- BORING

HORIZ. SCALE IN FEET: 0 25 50 75 100

VERT. SCALE IN FEET: 0 5 10 15 20



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED PROFESSIONAL ENGINEER
11/4/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

PLAN & PROFILE

BEGIN TO STA 474+50.00

SCALE: 1"=50'-H
1"=10'-V

SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	51

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PENTABLE: 1023721.tbl
DATE: 11/4/2021
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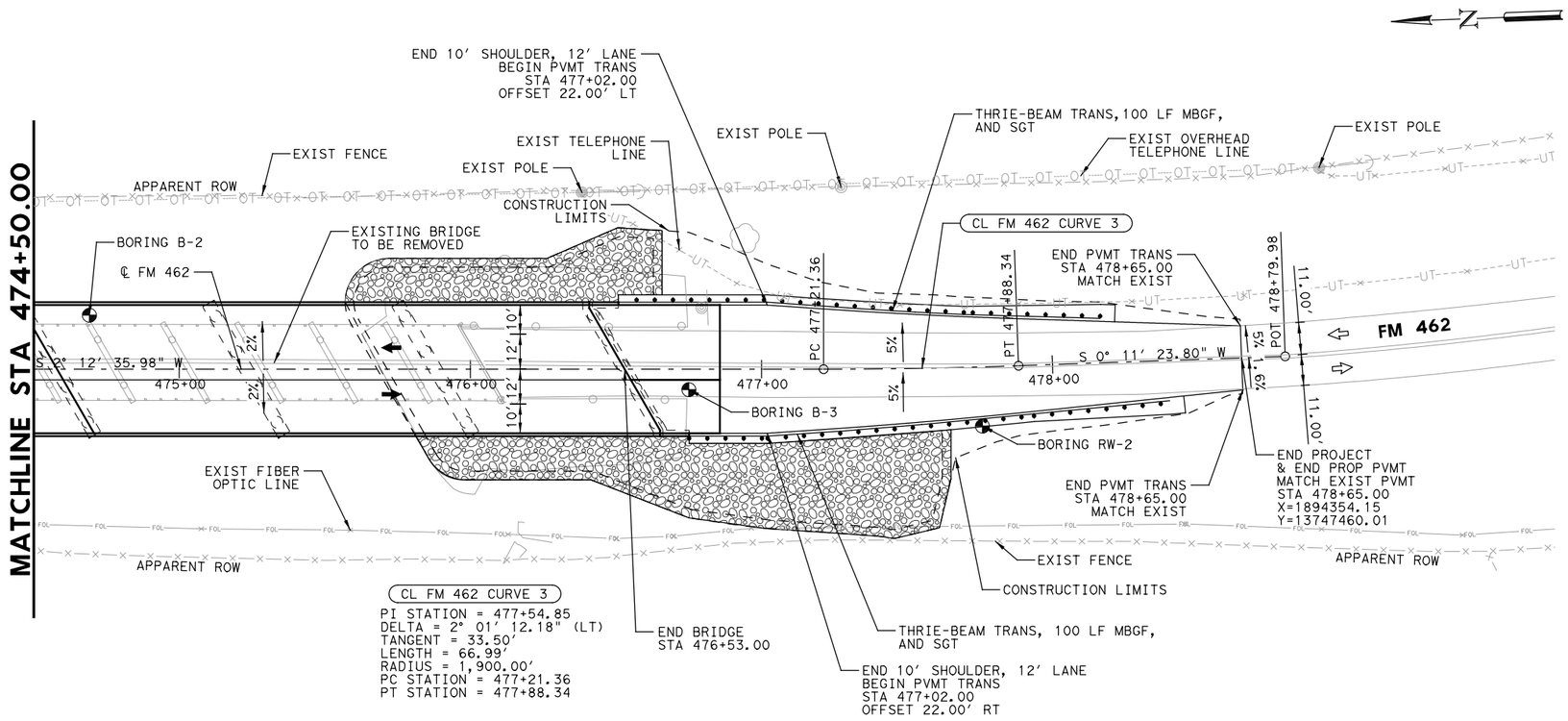


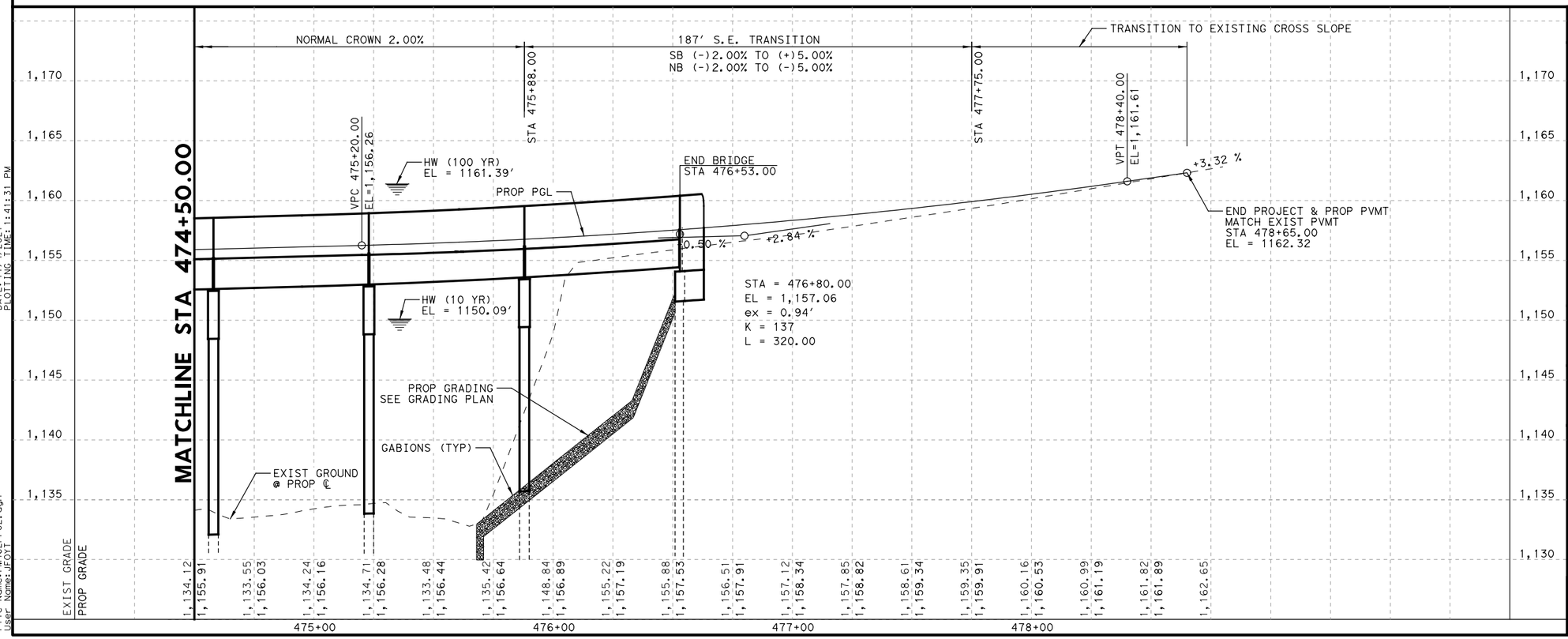
SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
100 6002	PREPARING ROW	STA	4.15
110 6001	EXCAVATION (ROADWAY)	CY	35
132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	765
216 6001	PROOF ROLLING	HR	21
247 6475	FL BS (CIP)(TY D GR 1-2, OR 5)FINAL POS	CY	140
310 6027	PRIME COAT(MC-30 OR AE-P)	GAL	168
340 6048	D-GR HMA(SQ) TY-C SAC-B PG70-22	TON	93
340 6050	D-GR HMA(SQ) TY-C PG 70-22	TON	93
432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	17
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	200
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
3084 6001	BONDING COURSE	GAL	126

LEGEND

- EXIST FENCE
- METAL BEAM GUARD FENCE
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- FLOW ARROW
- BORING

0 25 50 75 100
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET



NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED PROFESSIONAL ENGINEER
11/4/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

PLAN & PROFILE

STA 474+50.00 TO END

SCALE: 1"=50'-H
1"=10'-V

SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	52

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DATE: 11/4/2021
PLOTTING TIME: 1:41:31 PM
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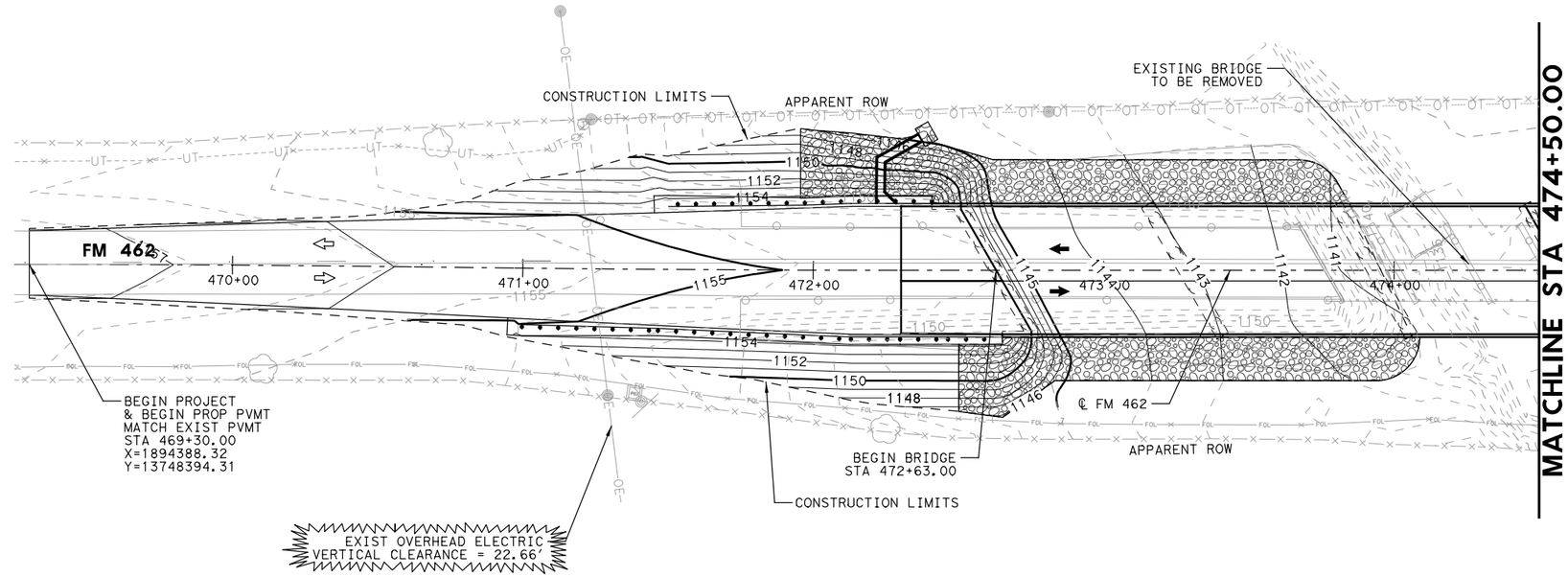

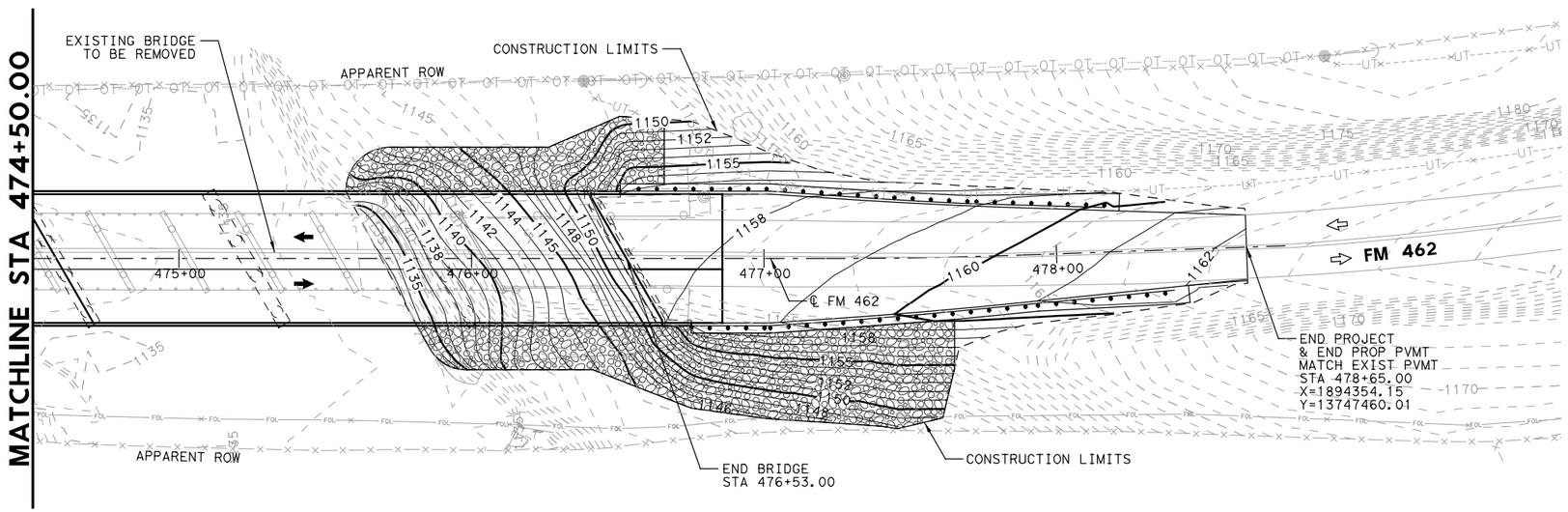

0 25 50 75 100

SCALE IN FEET

LEGEND

- EXIST FENCE
- METAL BEAM GUARD FENCE
- MAJOR CONTOUR (5')
- MINOR CONTOUR (1')
- FLOW ARROW
- GABION MATTRESS/GABION

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

9/9/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

GRADING PLAN

SCALE: 1"=50'

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	53

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 9/9/2021
PLOTTING TIME: 1:38:31 PM
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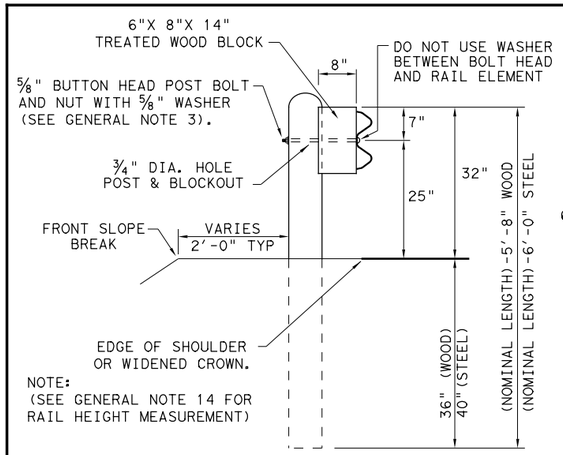
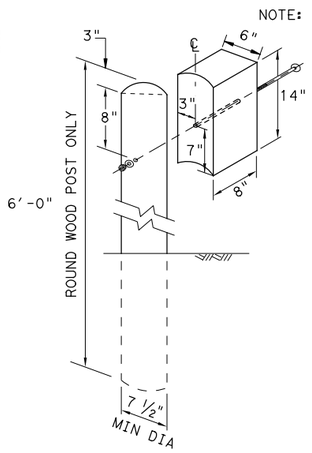
User Name: JFOYT

DATE: 8/19/2021
FILE: gf3119.dgn

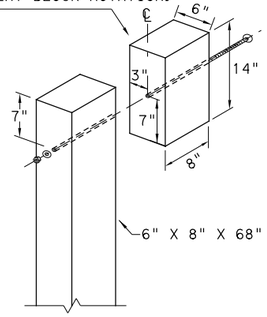


TYPICAL POST PLACEMENT

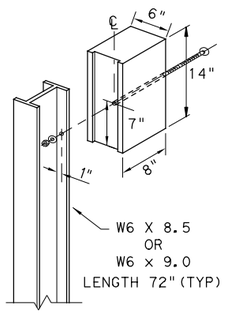


WOOD BLOCK TO ROUND WOOD POST

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

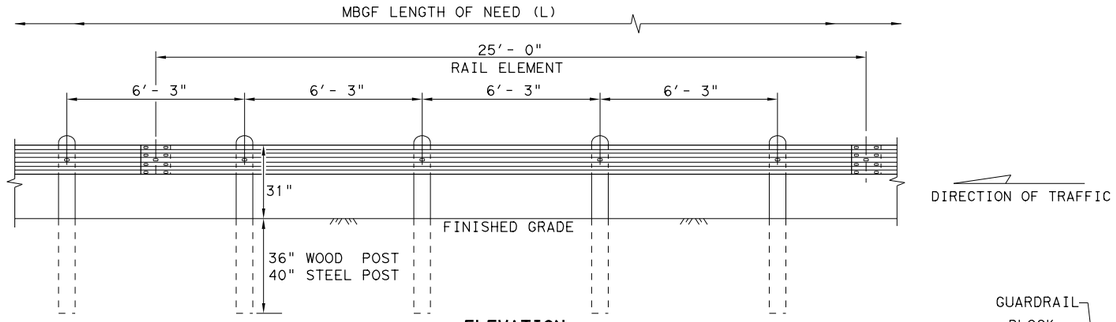


WOOD BLOCK TO RECTANGULAR WOOD POST



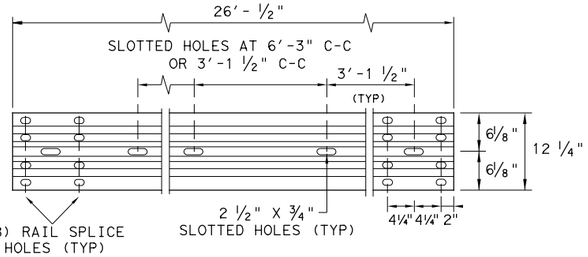
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



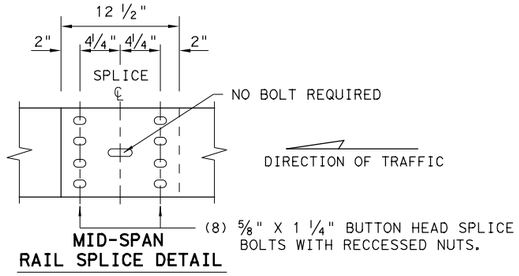
ELEVATION
MID-SPAN RAIL SPLICE

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



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

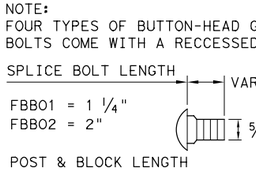
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



MID-SPAN
RAIL SPLICE DETAIL

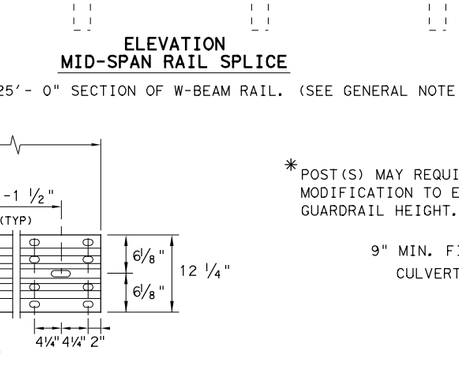
NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

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



BUTTON HEAD BOLT

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

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

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

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

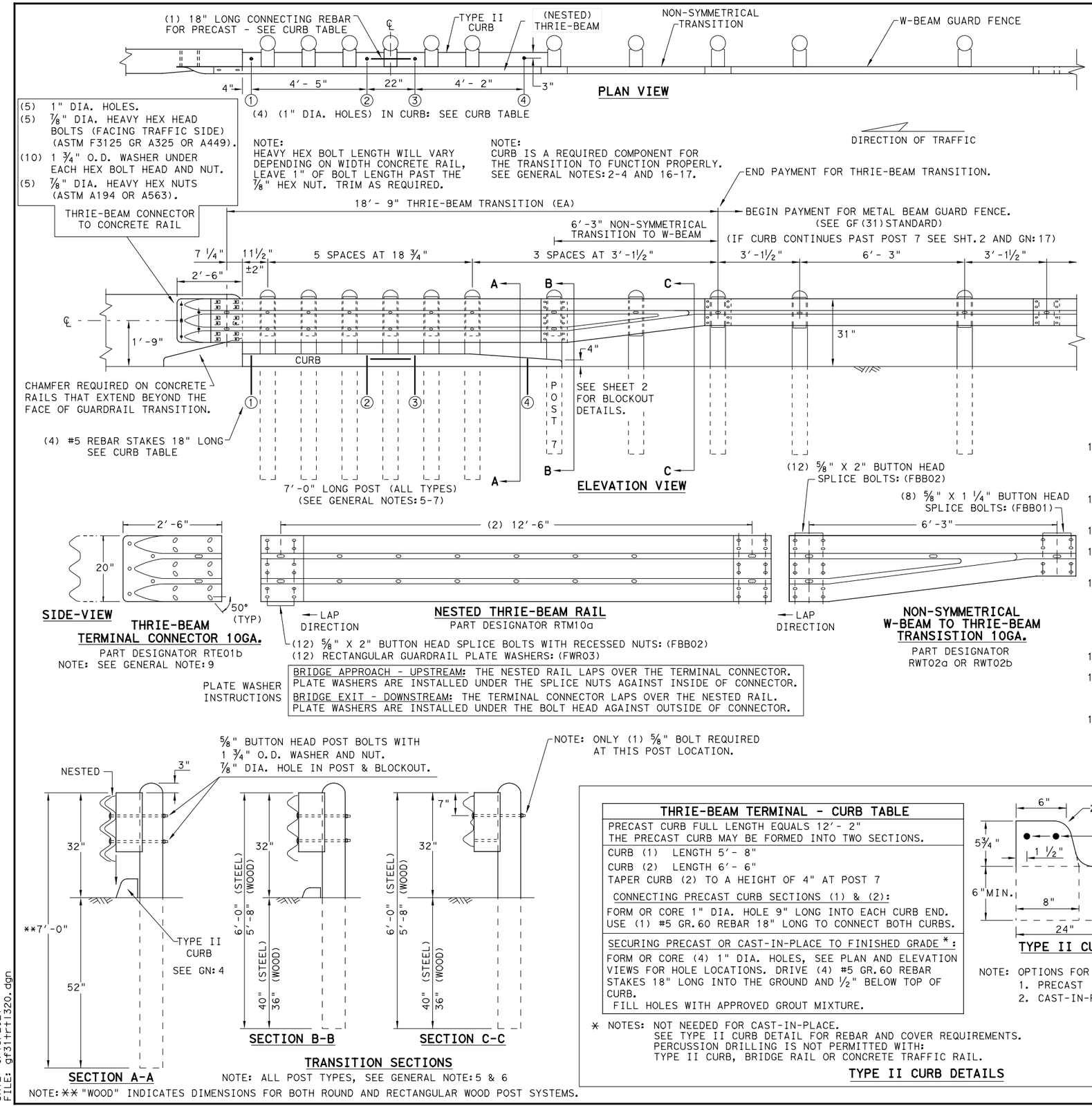
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		54



GENERAL NOTES

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

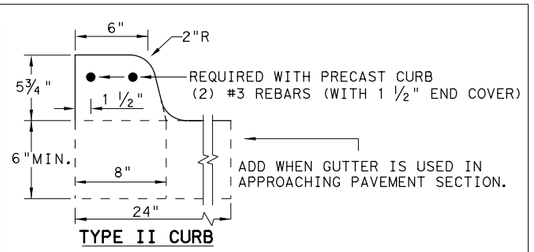
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

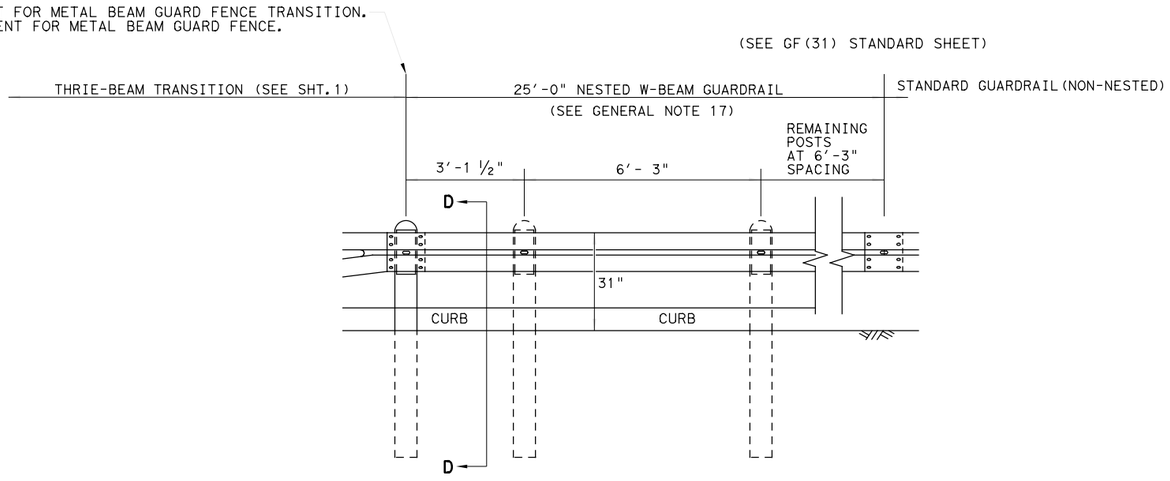
GF(31)TR TL3-20

FILE: gf31tr-tl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		55

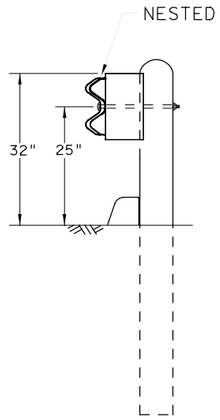
DATE: 8/19/2021
FILE: gf31tr-tl320.dgn

DATE: 8/19/2021
FILE: gf31tr1320.dgn

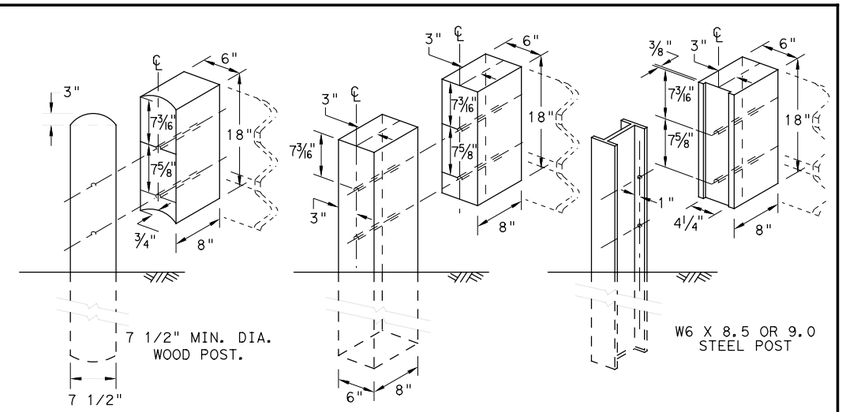
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
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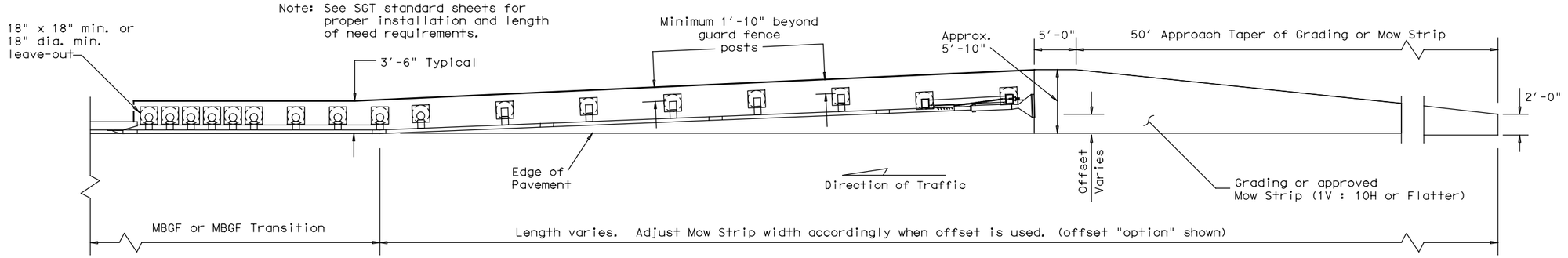
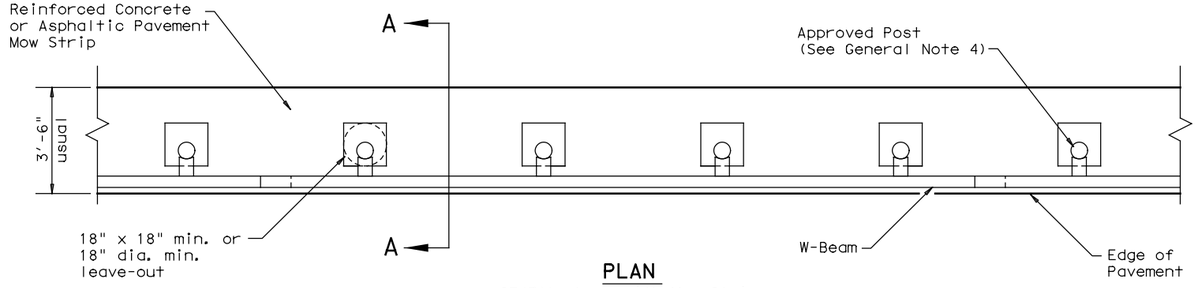
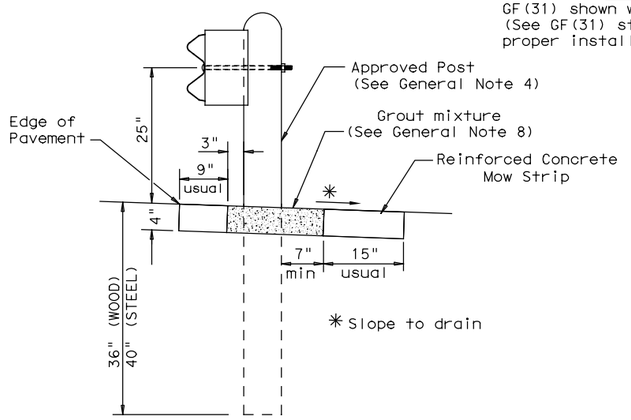


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



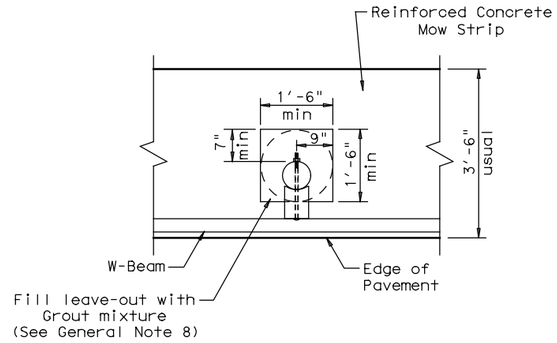
PLAN

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



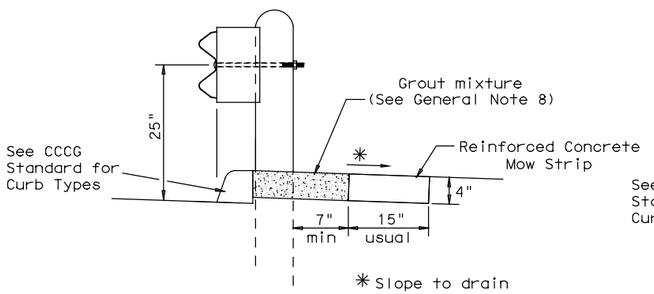
SECTION A-A

Typical



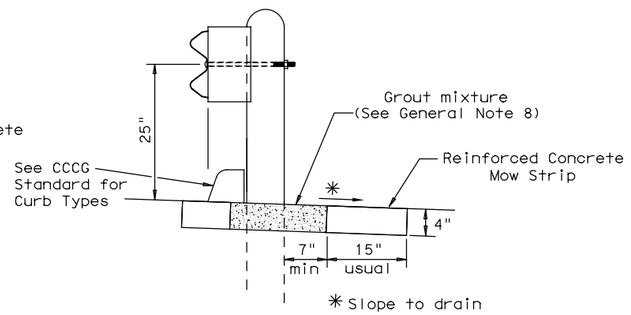
MOW STRIP DETAIL

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



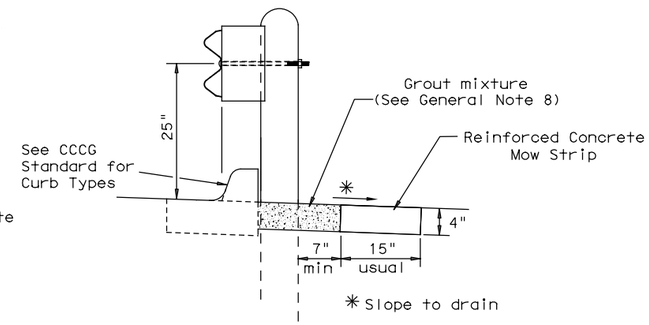
CURB OPTION (1)

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	
REVISIONS	0848	04	049	FM 462	
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	SAT	MEDINA		57	

DATE: 8/19/2021
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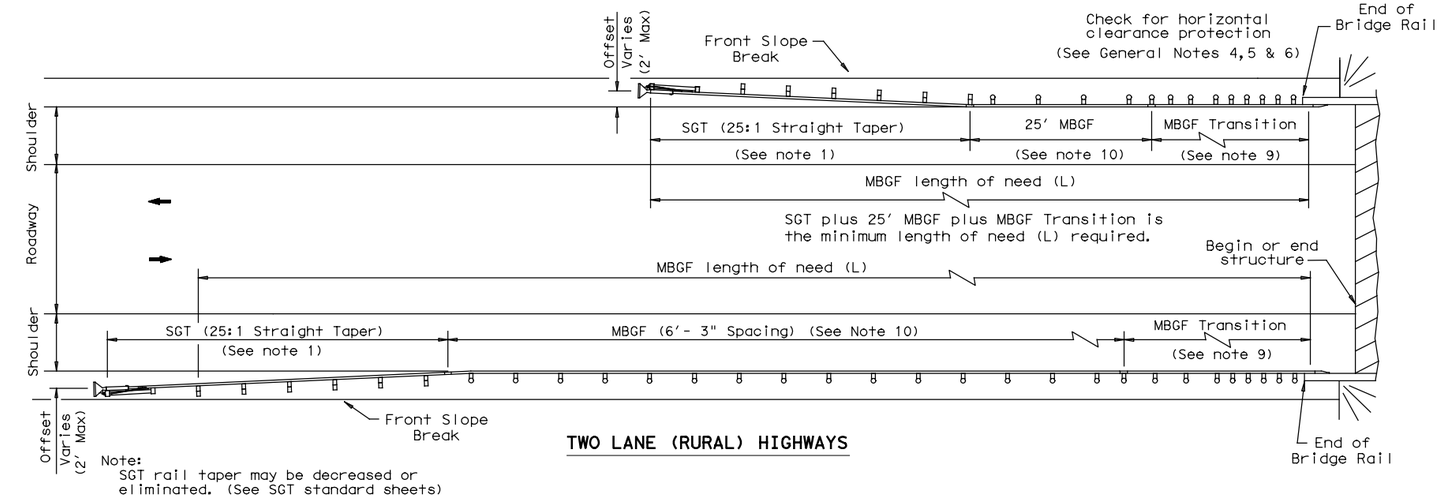
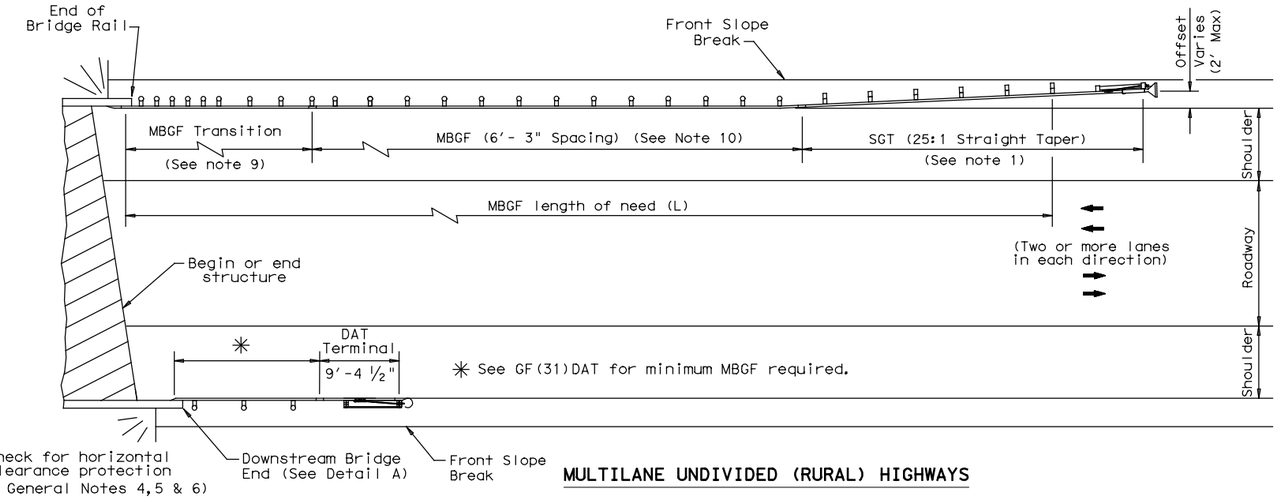
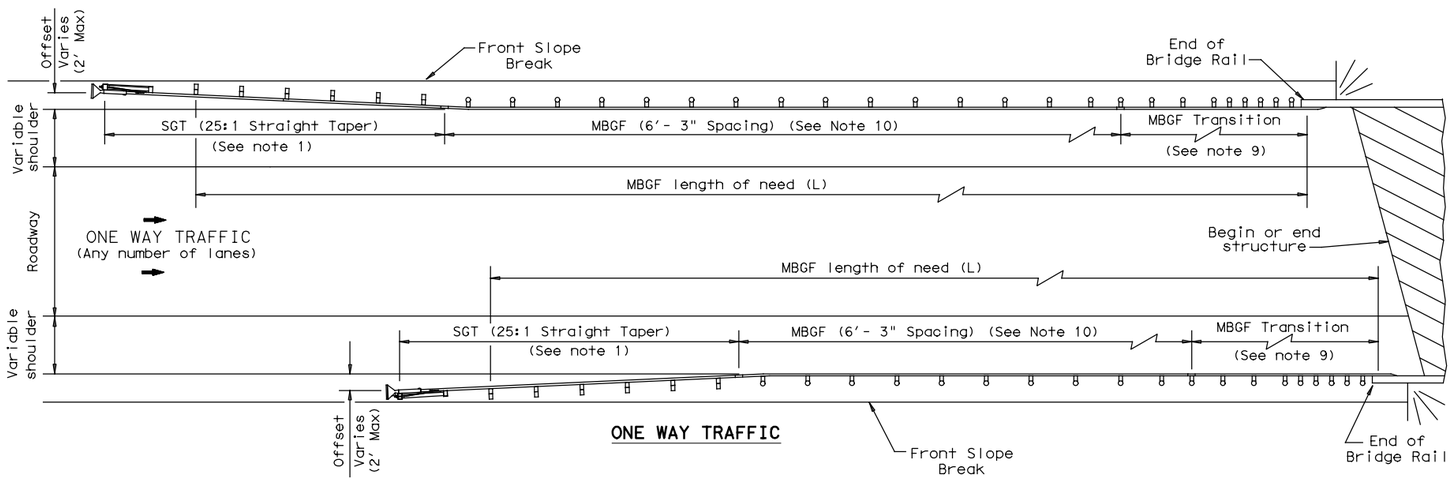


TWO LANE (RURAL) HIGHWAYS

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



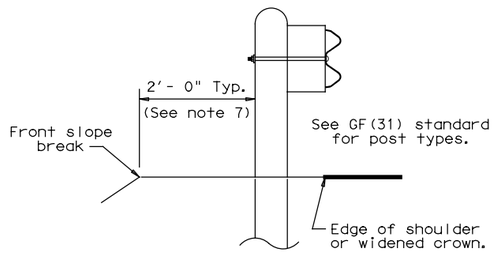
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		58

DATE: 8/19/2021 4:12:07 PM
FILE: bed14.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'- 1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

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

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

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

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

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	0848	04	049	FM 462		
	DIST	COUNTY		SHEET NO.		
	SAT	MEDINA		59		

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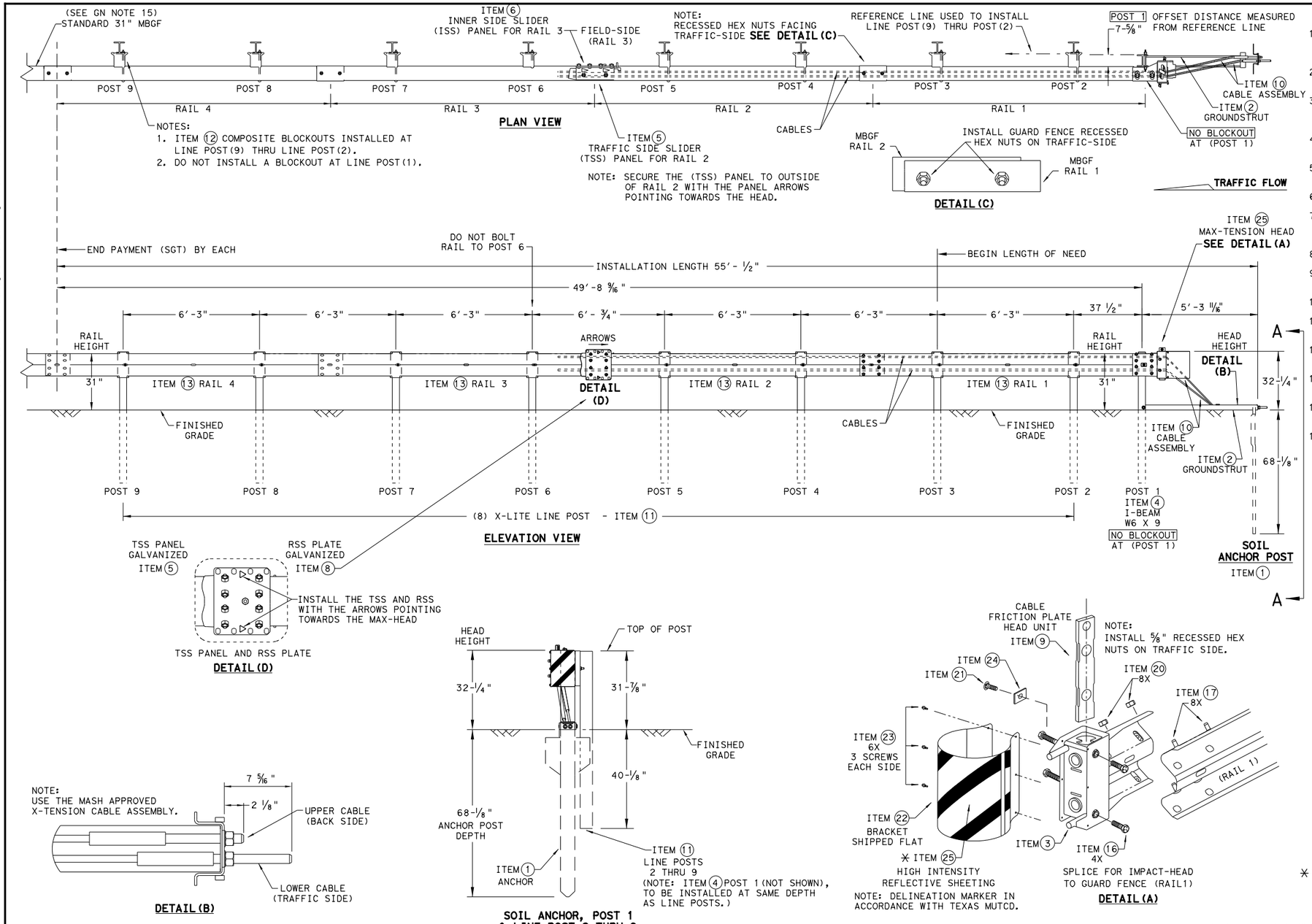

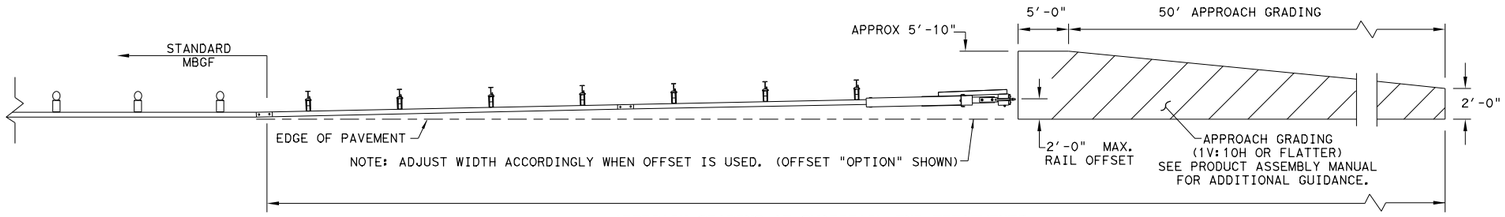

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	SAT	MEDINA		60

DATE: 8/19/2021
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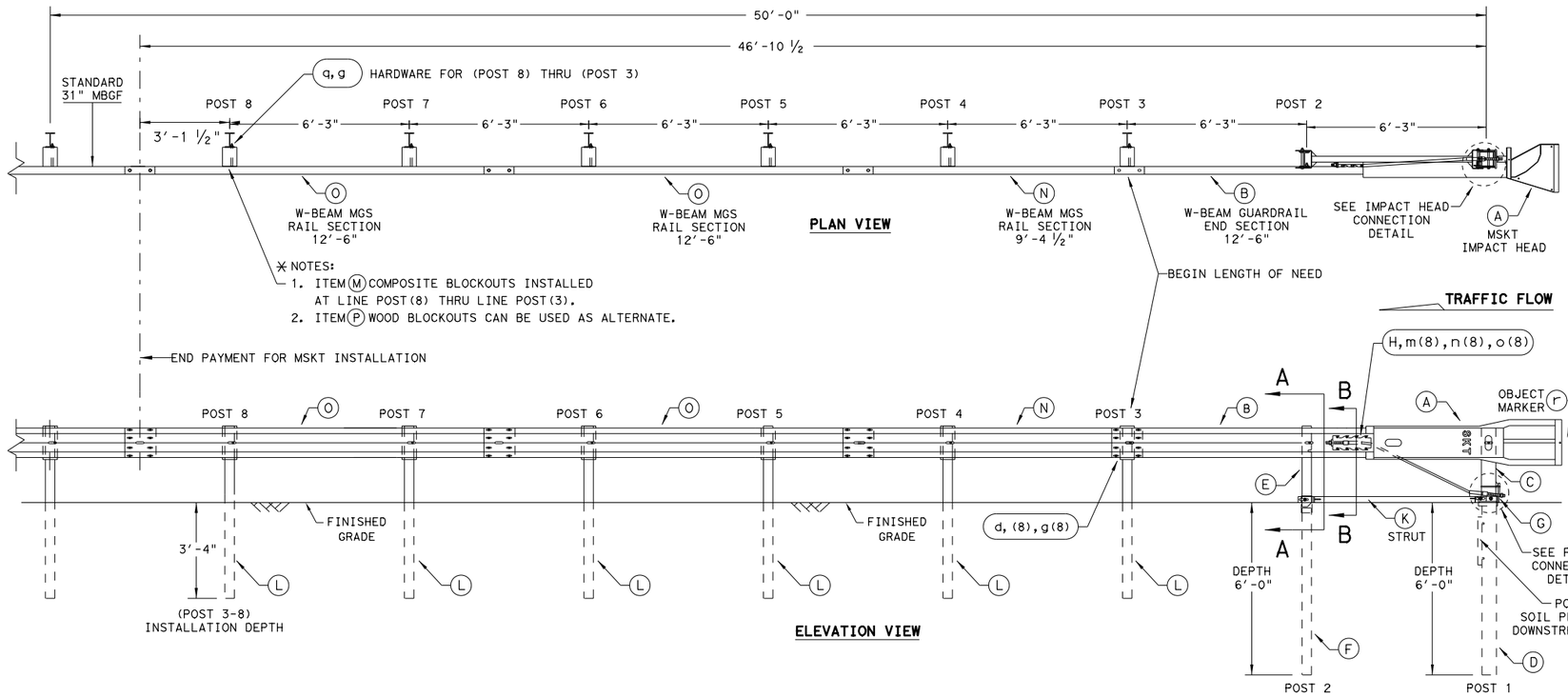


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

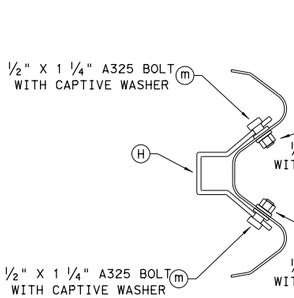
GENERAL NOTES

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.

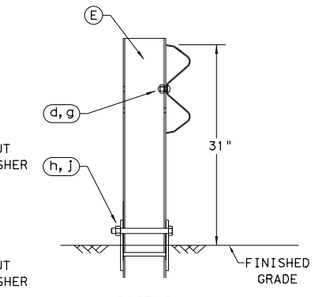
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6′ W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6′ W6X9)	HP2B
G	1	BEARING PLATE	E750
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 9/16" 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



SECTION B-B
ANCHOR BRACKET



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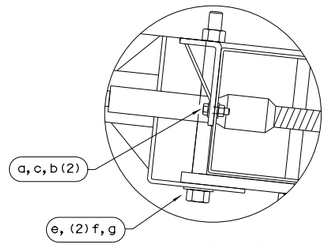
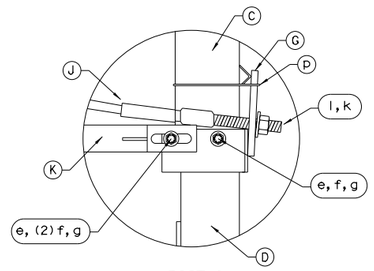
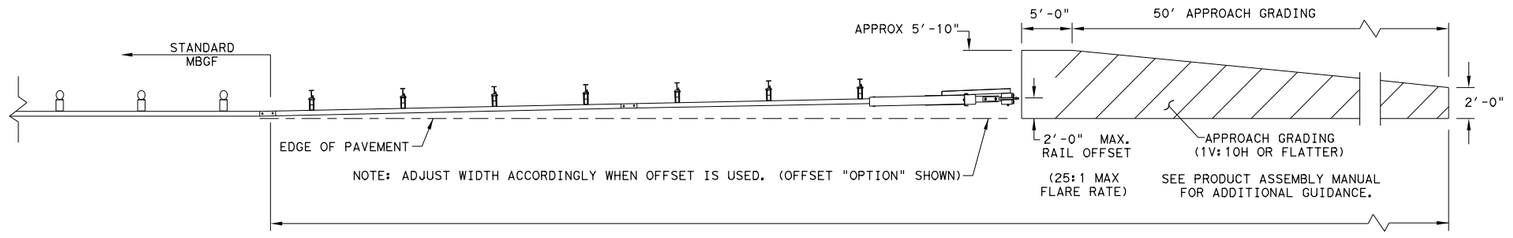
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

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

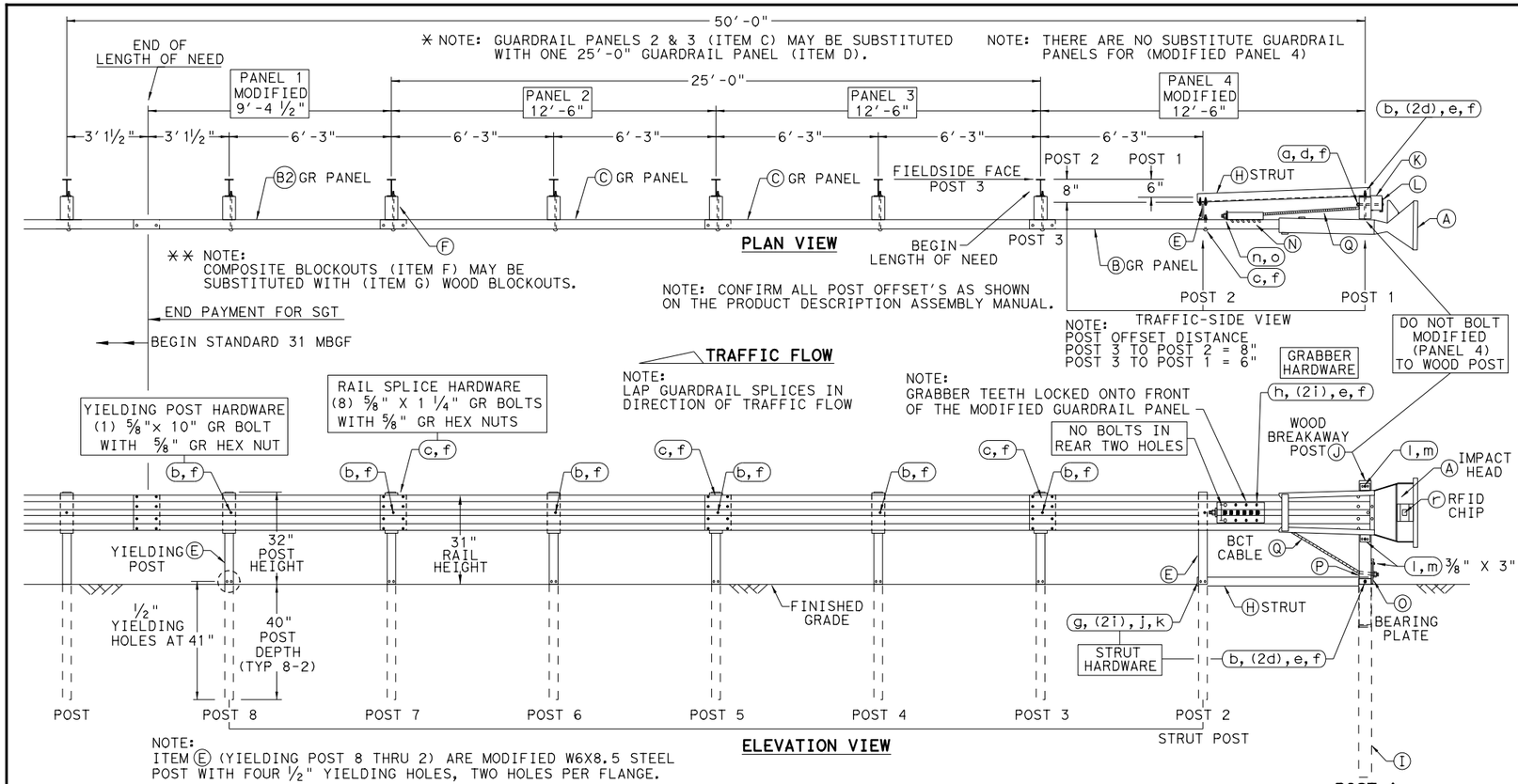
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0848	04	049	FM 462	
	DIST	COUNTY		SHEET NO.	
	SAT	MEDINA		61	

DATE: 8/19/2021
FILE: sgt12s3118.dgn

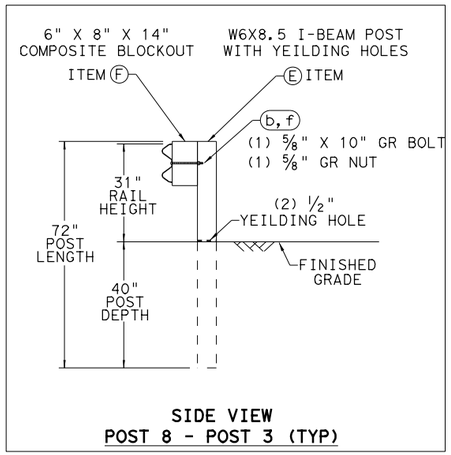


GENERAL NOTES

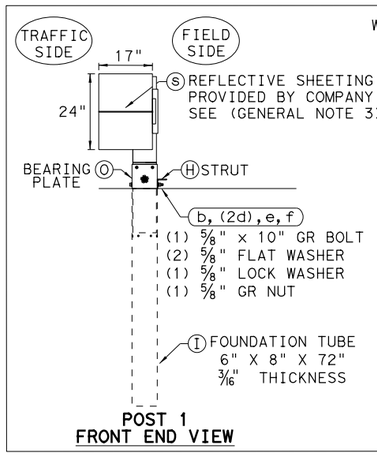
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

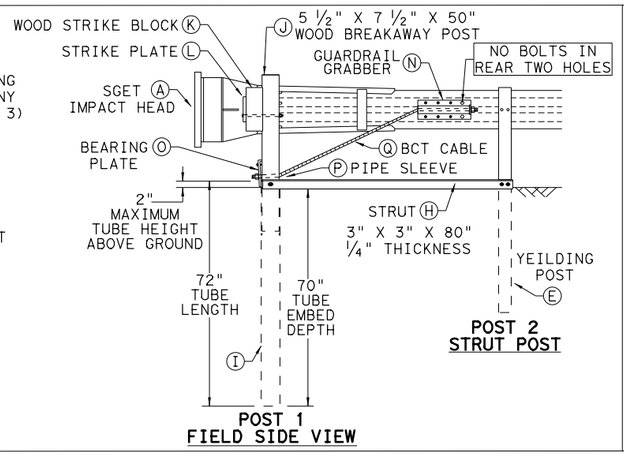
ALTERNATIVE ITEMS
* D
** G
NOTE: SEE PLAN VIEW



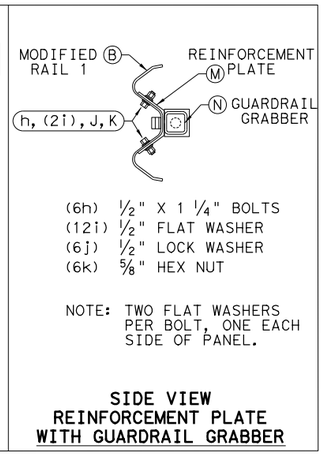
SIDE VIEW
POST 8 - POST 3 (TYP)



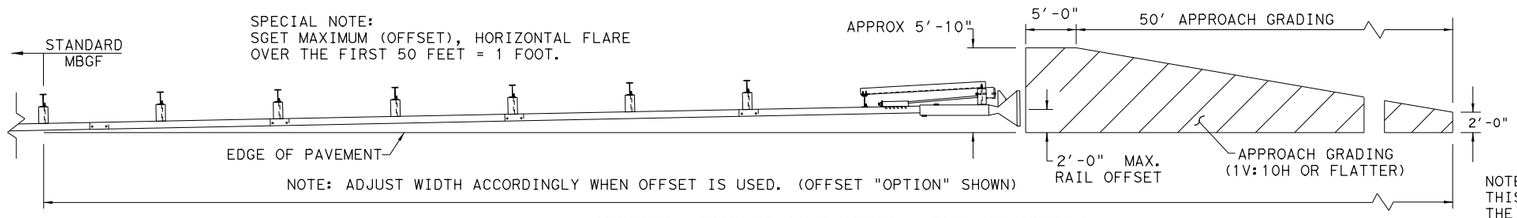
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

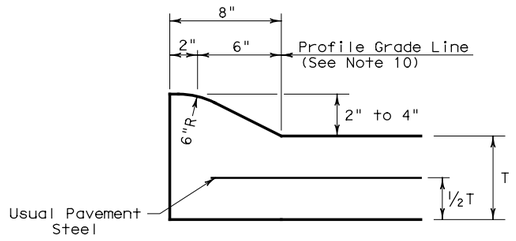
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation — Design Division Standard

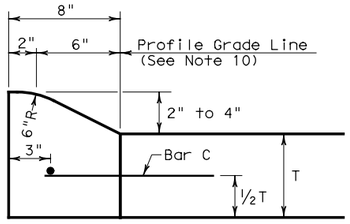
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0848	04	049	FM 462		
	DIST	COUNTY		SHEET NO.		
	SAT	MEDINA		62		

DATE: 8/19/2021
FILE: sgt153120.dgn



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



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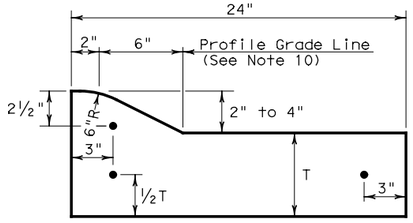
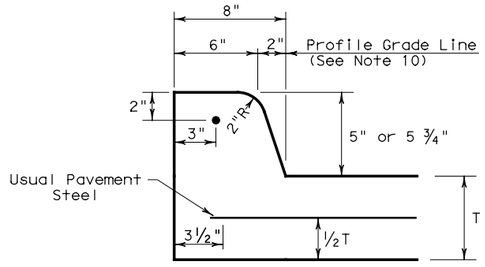


TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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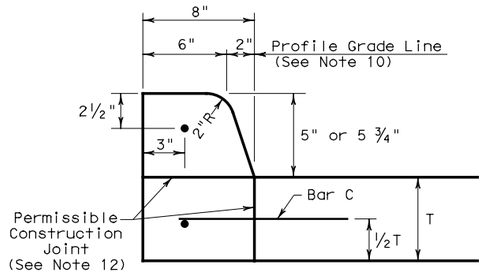
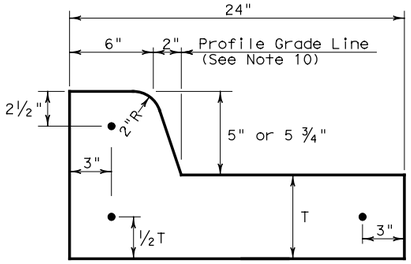
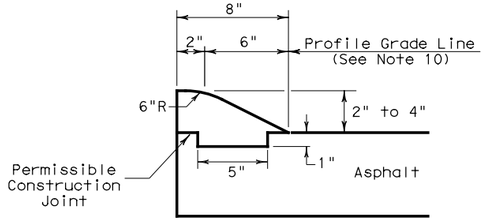


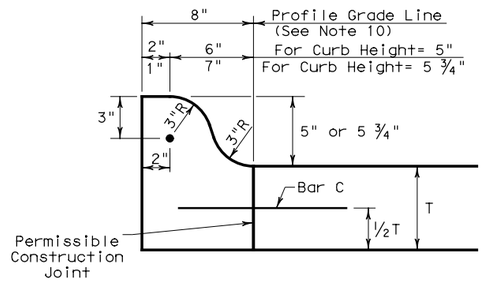
TYPE II CURB
5" - 5 ¾" HEIGHT



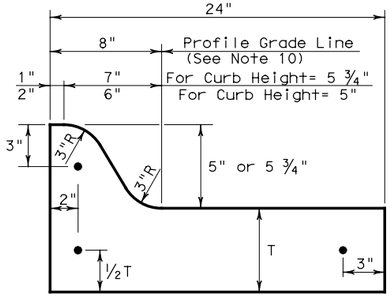
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



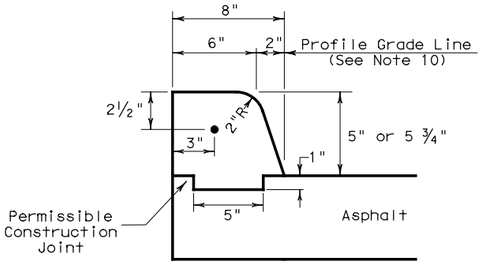
TYPE III CURB (KEYED)
2" - 4" HEIGHT



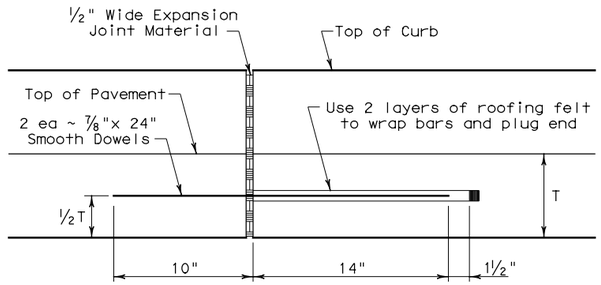
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

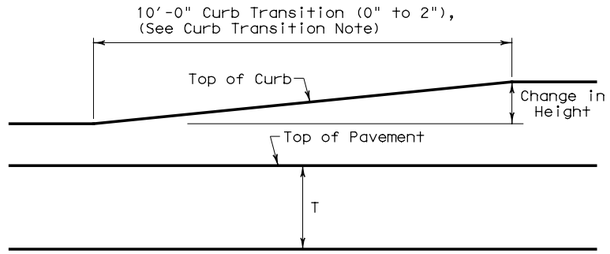


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

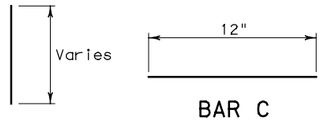
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



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 the 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 used as needed 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-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		63

DATE: 8/19/2021
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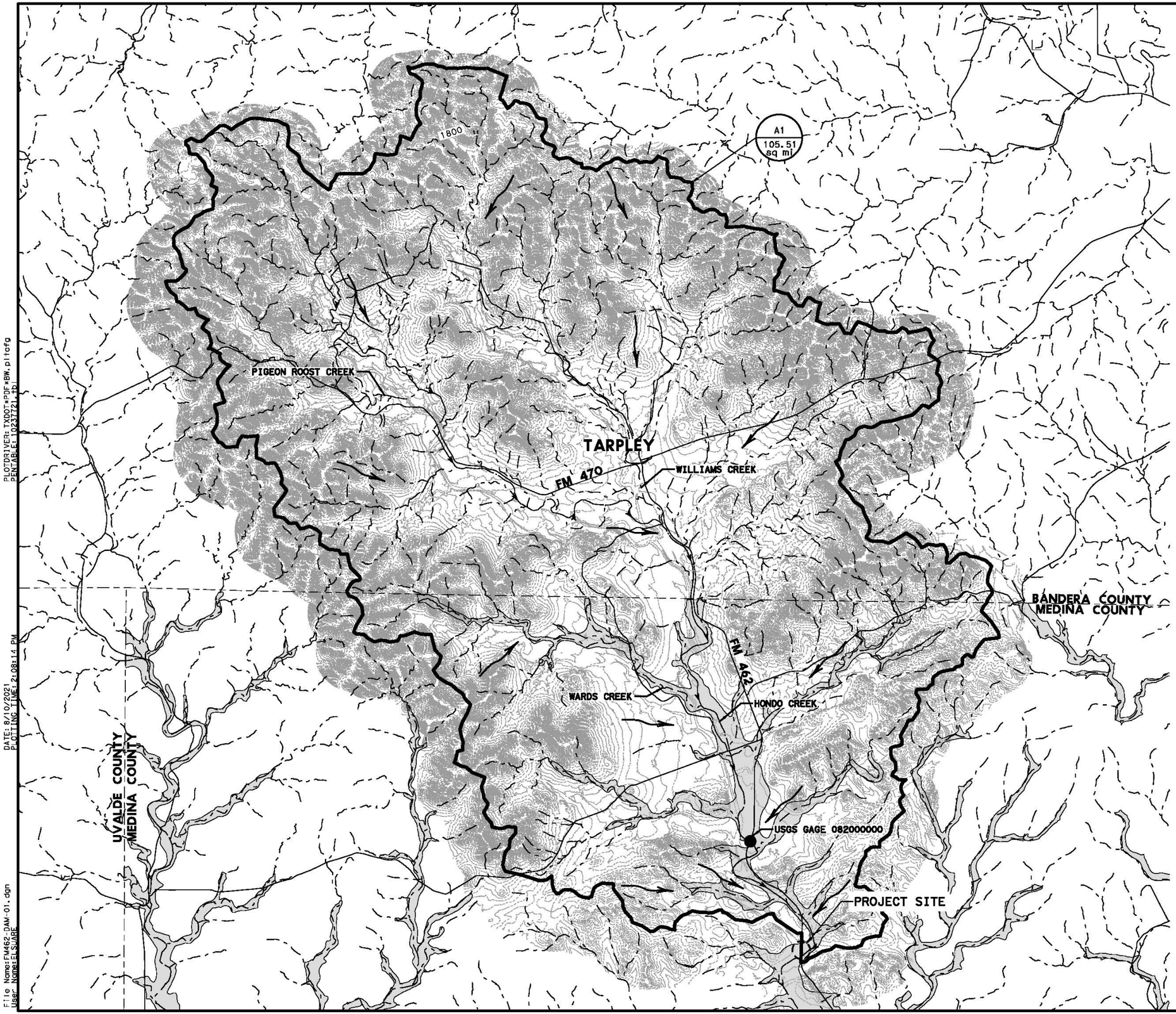

N

0 4000 8000 12000 16000

SCALE: 1"=8000'

DRAINAGE LEGEND

- XX / X.X sq mi — DRAINAGE AREA
- EFFECTIVE ZONE A SFHA
- FLOW DIRECTION
- FLOW PATH
- STREAM CL
- 20-FT CONTOUR
- USGS GAGE
- EXTERNAL DA BOUNDARY

1. FOR DRAINAGE AREA CALCULATIONS REFER TO THE DRAINAGE AREA HYDROLOGIC DATA SHEET.
2. EFFECTIVE ZONE A FLOODPLAIN SOURCE FEMA FIRM PANEL 48325C0175C EFFECTIVE APRIL 3, 2012.
3. INITIAL COORDINATION TO INFORM THE MEDINA COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED ON AUGUST 27, 2020.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
08/10/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK
DRAINAGE
OVERALL DRAINAGE AREA MAP

SCALE: 1"=8000' SHEET 1 OF 1

DSN=	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK=	TEXAS	6	SEE TITLE SHEET			FM 462
DRN=	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK=	MEDINA	SAT	0848	04	049	64

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DATE: 8/10/2021
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CN Loss and Snyder Unit Hydrograph Method Hydrologic Computations (External Drainage)

Contributing Subbasin(s)	Area (ACRE)	Area (SQ. MI)	Composite CN	Snyder Parameters Ct	Snyder Parameters Cp	Tlag (HR)	Q5 (CFS)	Q10* (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
A1	67526	105.51	57.1	1.40	0.71	4.42	12,108	19,659	33,009	46,043	61,423

Composite CN: Composite curve number values developed using SSURGO hydrologic soil groups and landuse including various undeveloped and impervious areas.
Snyder Ct: Based on percent development per COSA DCM Equation 5.6.1.2.2c
Snyder Cp: 0.71 per SARB Modeling Standards for Snyder method

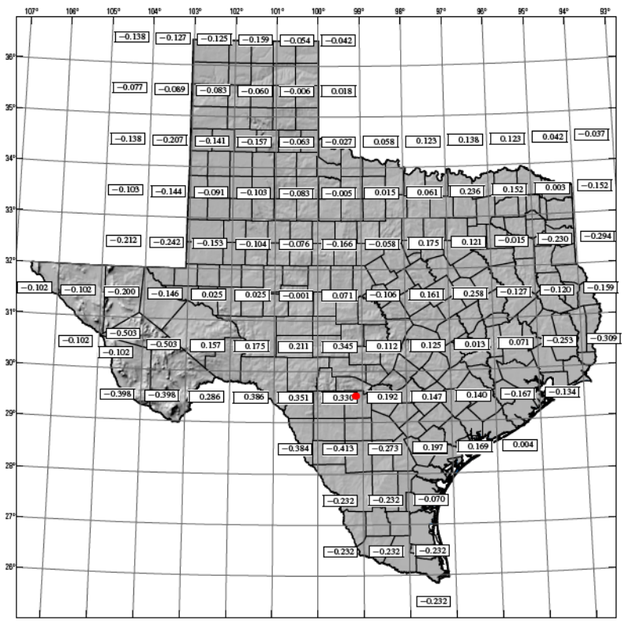
Regional Regression Computations

Contributing Subbasin(s)	Area (ACRE)	Area (SQ. MI)	MEAN ANNUAL PRECIP. (IN)	MAIN CHANNEL SLOPE (FT/FT)	OmegaEm PARAMETER	DESIGN YEAR	a	b	c	d	e	f	Q (cfs)
A1	67526	105.51	29	0.00848	0.330	5-YR	16.62	-15.32	1.308	0.372	0.885	-0.0215	15,649
						10-YR*	13.62	-11.97	1.203	0	0.918	-0.0289	24,282
						25-YR	11.79	-9.819	1.14	0.446	0.945	-0.0374	39,467
						50-YR	11.17	-8.997	1.105	0.476	0.961	-0.0424	54,048
						100-YR	10.82	-8.448	1.071	0.507	0.969	-0.0467	72,377

Stream Gage Frequency Analysis

Contributing Subbasin(s)	USGS Gauge	Area (SQ. MI)	Q5	Q10*	Q25	Q50	Q100
-	8200000	95.6	15,619	32,542	60,064	82,166	103,715
A1	-	105.5	16,400	34,200	63,100	86,300	109,000

*Design Storm Event



HILL-SHADE RELIEF IN TEXAS WITH SUPERIMPOSED VALUES OF OmegaEM PARAMETER THAT REPRESENTS A GENERALIZED TERRAIN AND CLIMATE INDEX FOR REGIONALIZATION OF PEAK-STREAMFLOW FREQUENCY

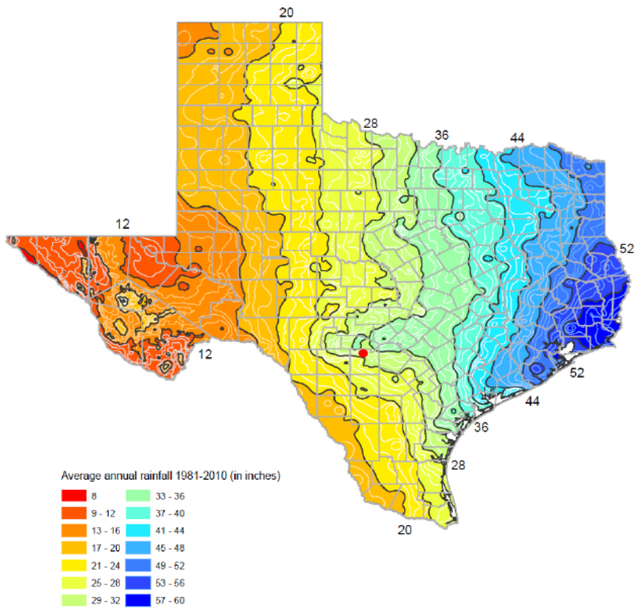


Figure 4-6. Mean annual precipitation, in inches (Source: Texas Water Development Board 2017)

MEAN ANNUAL PRECIPITATION (P) MAP OF TEXAS

DESIGN REQUIREMENTS:

1. 10-YEAR DESIGN STORM EVENT CAPACITY.
2. LESS THAN 1-FOOT RISE IN 100-YEAR WSE OUTSIDE TXDOT ROW PER FEMA GUIDELINES.
3. NO SIGNIFICANT ADVERSE IMPACTS TO EXISTING HABITABLE STRUCTURES.

HYDROLOGIC ANALYSIS DESIGN METHOD:

- STREAM GAGE FREQUENCY ANALYSIS.
- APPROACH SELECTED BASED ON HISTORICAL RECORD DATA AND VALIDATED WITH TXDOT AREA OFFICE OBSERVATIONS.

NOTES:

1. TXDOT HYDRAULIC DESIGN MANUAL (HDM), SEPTEMBER 2019, WAS USED TO DETERMINE HYDROLOGIC DATA.
2. BASE CN DEVELOPED USING SSURGO HYDROLOGIC SOIL GROUPS AND LAND USE CURVE NUMBERS WITH ANTECEDENT MOISTURE CONDITION (AMC) II. CN CLIMATIC ADJUSTMENT FACTOR OF -20 APPLIED PER HDM FIGURE 4-22, WITH A BASE CN LOWER LIMIT OF ACM I.
3. LAG TIME DEVELOPED USING CITY OF SAN ANTONIO DRAINAGE CRITERIA MANUAL (DCM) AND SAN ANTONIO RIVER BASIN (SARB) REGIONAL MODELING STANDARDS.
4. PEAK FLOWS (HEC-HMS v4.5) DEVELOPED USING ATLAS 14 DDF INFORMATION NEAR LOCATION AT TARPLEY, TEXAS (LAT: 29.6415°, LONG: -99.2690°).
5. STATISTICAL GAGE FREQUENCY ANALYSIS (HEC-SSP v2.1.1) DEVELOPED AT USGS GAGE 08200000 HONDO CREAK NEAR TARPLEY, TX PER BULLETIN 17C AND TRANSPOSED TO PROJECT SITE PER HDM.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
08/10/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

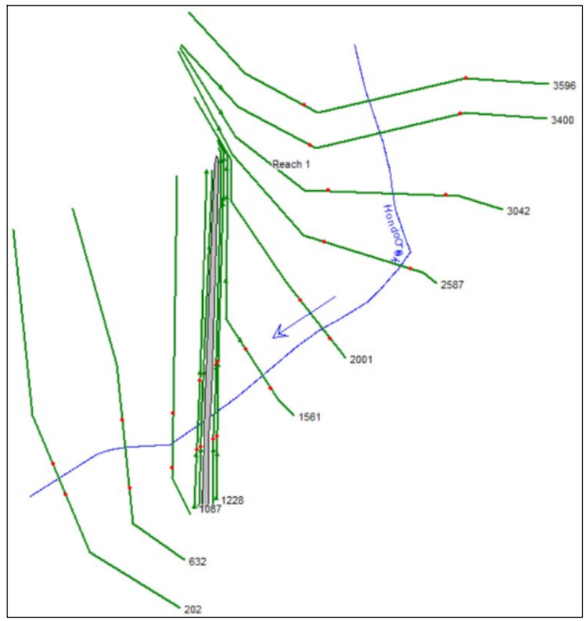
FM 462 AT HONDO CREEK
DRAINAGE HYDROLOGIC DATA SHEET

SHEET 1 OF 1

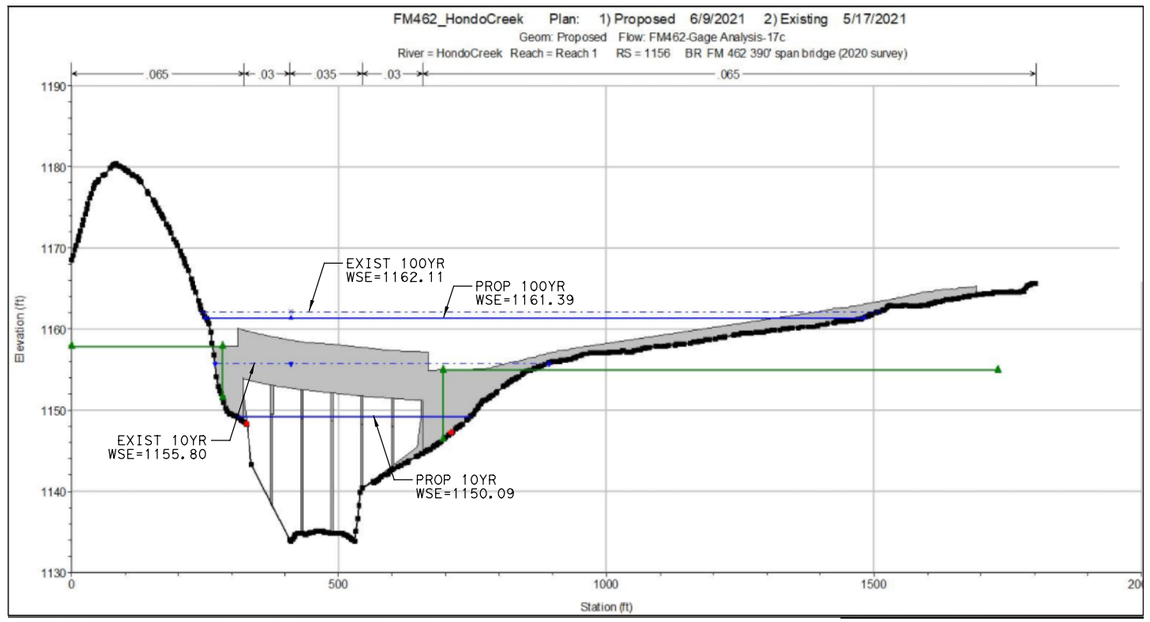
DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	65

STRUCUTURE A1

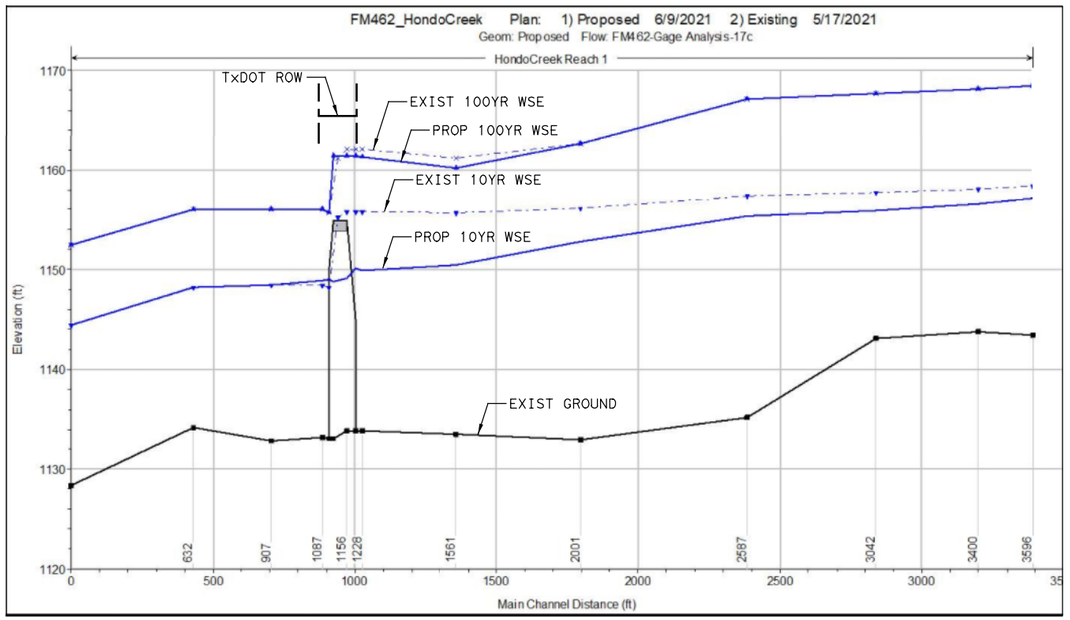
HEC-RAS CROSS SECTION LAYOUT



HEC-RAS STRUCTURE UPSTREAM SECTION



HEC-RAS PROFILE



NOTES:

1. HEC-RAS 5.0.7 USED FOR HYDRAULIC ANALYSIS.
2. A NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION WITH A SLOPE OF 0.013 FT/FT TO DETERMINE STARTING WATER SURFACE ELEVATIONS. SLOPE DERIVED FROM USGS 1 METER LIDAR(2018).
3. VERTICAL DATUM IS NAVD 88.
4. STRUCTURE WITHIN MEDINA COUNTY FEMA SPECIAL FLOOD HAZARD AREA ZONE A (APPROXIMATE).SEE FEMA FIRM PANEL 48325C0175C. EFFECTIVE 4/3/2012.
5. INITIAL COORDINATION TO INFORM THE MEDINA COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED AUGUST 27, 2020.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
08/10/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK
HYDRAULIC CALCULATION
DATA SHEET 1
STRUCTURE A1

SHEET 1 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	66

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/10/2021
PLOTTING TIME: 2:09:12 PM
File Name:FM462-HYDRA-01.dgn
User Name:ELSQUARE

SUMMARY TABLE

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	3596	10%	Proposed	34200	1143.45	1157.18		1157.85	0.002046	6.54	5231.53	809.61	0.45
Reach 1	3596	10%	Existing	34200	1143.45	1158.41		1158.88	0.001254	5.47	6249.21	843.7	0.35
Reach 1	3596	1%	Proposed	109000	1143.45	1168.42		1169.06	0.000836	6.59	19268.48	2060.23	0.29
Reach 1	3596	1%	Existing	109000	1143.45	1168.42		1169.06	0.000836	6.58	19270.74	2060.33	0.29
Reach 1	3400	10%	Proposed	34200	1143.76	1156.58	1153.2	1157.43	0.002034	7.39	4628.39	674.95	0.5
Reach 1	3400	10%	Existing	34200	1143.76	1158.07	1153.2	1158.63	0.001189	6.01	5687.13	744.57	0.38
Reach 1	3400	1%	Proposed	109000	1143.76	1168.13	1159.39	1168.89	0.000879	7.14	18036.02	1923.29	0.31
Reach 1	3400	1%	Existing	109000	1143.76	1168.13	1159.39	1168.89	0.000879	7.14	18038.37	1923.35	0.31
Reach 1	3042	10%	Proposed	34200	1143.05	1155.96	1152.06	1156.76	0.001654	7.17	4768.79	592.5	0.45
Reach 1	3042	10%	Existing	34200	1143.05	1157.73	1152.06	1158.26	0.000882	5.83	5861.68	644.5	0.34
Reach 1	3042	1%	Proposed	109000	1143.05	1167.66	1158.34	1168.58	0.000751	7.97	17622.48	1846.65	0.33
Reach 1	3042	1%	Existing	109000	1143.05	1167.67	1158.34	1168.58	0.000751	7.97	17625.19	1846.7	0.33
Reach 1	2587	10%	Proposed	34200	1135.2	1155.42	1149.84	1156.11	0.001118	6.67	5129.31	499.46	0.37
Reach 1	2587	10%	Existing	34200	1135.2	1157.42	1149.84	1157.9	0.000654	5.55	6183.47	578.25	0.29
Reach 1	2587	1%	Proposed	109000	1135.2	1167.11	1156.71	1168.21	0.000845	8.81	16822.37	1754.7	0.34
Reach 1	2587	1%	Existing	109000	1135.2	1167.11	1156.71	1168.21	0.000845	8.81	16825.15	1754.76	0.33
Reach 1	2001	10%	Proposed	34200	1132.96	1152.79	1150.05	1154.92	0.003351	11.72	2976.7	336.91	0.64
Reach 1	2001	10%	Existing	34200	1132.96	1156.14	1150.05	1157.3	0.001348	8.72	4251.48	413.65	0.41
Reach 1	2001	1%	Proposed	109000	1132.96	1162.6	1160.05	1167.02	0.003467	17.63	8658.03	1109.09	0.69
Reach 1	2001	1%	Existing	109000	1132.96	1162.65	1160.05	1167.03	0.003435	17.57	8706.14	1113.29	0.69
Reach 1	1561	10%	Proposed	34200	1133.46	1150.52	1148.62	1153.04	0.00535	12.78	2751.06	337.63	0.72
Reach 1	1561	10%	Existing	34200	1133.46	1155.72	1148.61	1156.68	0.001201	8.04	4836.39	475.33	0.37
Reach 1	1561	1%	Proposed	109000	1133.46	1160.17	1158.05	1165.21	0.004662	18.83	7863.84	999.59	0.75
Reach 1	1561	1%	Existing	109000	1133.46	1161.17	1157.93	1165.42	0.003757	17.48	8924.32	1132.29	0.68
Reach 1	1228	10%	Proposed	34200	1133.81	1149.93	1146.98	1151.51	0.002772	10.08	3446.06	448.77	0.58
Reach 1	1228	10%	Existing	34200	1133.81	1155.8	1147.05	1156.3	0.00051	5.75	6592.91	600.32	0.26
Reach 1	1228	1%	Proposed	109000	1133.81	1161.34	1154.75	1163.54	0.001617	12.54	11506.45	1233.38	0.49
Reach 1	1228	1%	Existing	109000	1133.81	1162.12	1154.77	1164.06	0.001384	11.89	12473.91	1322.51	0.45
Reach 1	1204	10%	Proposed	34200	1133.84	1150.09	1145.74	1151.26	0.001437	8.7	3966.87	468.73	0.47
Reach 1	1204	10%	Existing	34200	1133.84	1155.8	1146.65	1156.28	0.000472	5.68	6811.74	625.3	0.25
Reach 1	1204	1%	Proposed	109000	1133.84	1161.39	1153.51	1163.43	0.001193	11.96	12293.15	1230.02	0.45
Reach 1	1204	1%	Existing	109000	1133.84	1162.11	1154.55	1164.01	0.001288	11.79	12839.53	1263.84	0.45
Reach 1	1156			Bridge									
Reach 1	1113	10%	Proposed	34200	1133.02	1149.02	1145.71	1150.49	0.002598	9.73	3538.61	426.49	0.55
Reach 1	1113	10%	Existing	34200	1133.02	1148.24	1145.94	1151.08	0.00405	13.5	2534.09	411.15	0.71
Reach 1	1113	1%	Proposed	109000	1133.02	1155.71	1153.49	1160.44	0.004258	17.71	6916.02	694.02	0.77
Reach 1	1113	1%	Existing	109000	1133.02	1155.74	1153.99	1160.42	0.004601	17.79	7027.74	695.38	0.79
Reach 1	1087	10%	Proposed	34200	1133.13	1148.91	1145.92	1150.41	0.002648	9.94	3570.88	467.9	0.56
Reach 1	1087	10%	Existing	34200	1133.13	1148.41	1145.71	1150.72	0.00347	12.18	2807.78	455.04	0.65
Reach 1	1087	1%	Proposed	109000	1133.13	1156	1153.85	1159.94	0.003646	16.76	7810.27	754.75	0.72
Reach 1	1087	1%	Existing	109000	1133.13	1156	1153.84	1159.94	0.003646	16.76	7810.27	754.75	0.72
Reach 1	907	10%	Proposed	34200	1132.78	1148.49		1149.93	0.002514	9.95	3852.83	536.88	0.55
Reach 1	907	10%	Existing	34200	1132.78	1148.49		1149.93	0.002514	9.95	3852.83	536.88	0.55
Reach 1	907	1%	Proposed	109000	1132.78	1156.05		1159.1	0.002881	15.42	9348.84	875.78	0.65
Reach 1	907	1%	Existing	109000	1132.78	1156.05		1159.1	0.002881	15.42	9348.84	875.78	0.65
Reach 1	632	10%	Proposed	34200	1134.16	1148.25		1149.22	0.001701	8.09	4499.18	600.72	0.45
Reach 1	632	10%	Existing	34200	1134.16	1148.25		1149.22	0.001701	8.09	4499.18	600.72	0.45
Reach 1	632	1%	Proposed	109000	1134.16	1156.02		1158.15	0.001978	12.71	11405.26	1103.72	0.53
Reach 1	632	1%	Existing	109000	1134.16	1156.02		1158.15	0.001978	12.71	11405.26	1103.72	0.53
Reach 1	202	10%	Proposed	34200	1128.32	1144.41	1144.41	1147.77	0.005749	15.36	2555.47	407.09	0.83
Reach 1	202	10%	Existing	34200	1128.32	1144.41	1144.41	1147.77	0.005749	15.36	2555.47	407.09	0.83
Reach 1	202	1%	Proposed	109000	1128.32	1152.44	1152.44	1156.76	0.004408	19.61	8030.72	1046.68	0.8
Reach 1	202	1%	Existing	109000	1128.32	1152.44	1152.44	1156.76	0.004408	19.61	8030.72	1046.68	0.8

DETAILED BRIDGE SUMMARY
Plan: Existing-17c HondoCreek Reach 1 RS: 1156
Profile: 10%

E.G. US. (ft)	1156.28	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1155.8	E.G. Elev (ft)	1156.28	1156.08
Q Total (cfs)	34200	W.S. Elev (ft)	1155.8	1155.23
Q Bridge (cfs)	28848.71	Crit W.S. (ft)	1147.84	1147.63
Q Weir (cfs)	5351.29	Max Chl Dpth (ft)	21.96	21.51
Weir Sta Lft (ft)	306.11	Vel Total (ft/s)	9.68	10.35
Weir Sta Rgt (ft)	849.47	Flow Area (sq ft)	3533.89	3303.58
Weir Submerg	0	Froude # Chl	0.37	0.4
Weir Max Depth (ft)	3.73	Specif Force (cu ft)	41585.89	40847.71
Min El Weir Flow (ft)	1152.56	Hydr Depth (ft)	7.18	7.59
Min El Prs (ft)	1152.13	W.P. Total (ft)	1225.13	1164.26
Delta EG (ft)	5.2	Conv. Total (cfs)		
Delta WS (ft)	7.55	Top Width (ft)	491.97	435.51
BR Open Area (sq ft)	2542.75	Frctn Loss (ft)		
BR Open Vel (ft/s)	11.35	C & E Loss (ft)		
BR Sluice Coef	0.43	Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

DETAILED BRIDGE SUMMARY
Plan: Prop_60pct HondoCreek Reach 1 RS: 1156
Profile: 10%

E.G. US. (ft)	1151.26	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1150.09	E.G. Elev (ft)	1150.99	1150.78
Q Total (cfs)	34200	W.S. Elev (ft)	1149.15	1148.83
Q Bridge (cfs)	34200	Crit W.S. (ft)	1146.09	1146.05
Q Weir (cfs)		Max Chl Dpth (ft)	15.31	15.2
Weir Sta Lft (ft)		Vel Total (ft/s)	10.9	11.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	3138.16	3053.88
Weir Submerg		Froude # Chl	0.49	0.51
Weir Max Depth (ft)		Specif Force (cu ft)	30326.51	29817.79
Min El Weir Flow (ft)	1154.98	Hydr Depth (ft)	10.26	10.01
Min El Prs (ft)	1153.92	W.P. Total (ft)	423.27	421.43
Delta EG (ft)	0.77	Conv. Total (cfs)	557627.4	523531.2
Delta WS (ft)	1.07	Top Width (ft)	305.8	305.2
BR Open Area (sq ft)	4094.17	Frctn Loss (ft)	0.18	0.05
BR Open Vel (ft/s)	11.2	C & E Loss (ft)	0.03	0.24
BR Sluice Coef		Shear Total (lb/sq ft)	1.74	1.93
BR Sel Method	Energy only	Power Total (lb/ft s)	18.97	21.62

NOTES:

1. HEC-RAS 5.0.7 WAS USED TO MODEL RIVERINE FLOWS AT THIS STRUCTURE FOR EXISTING AND PROPOSED CONDITIONS.
2. A NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION WITH A SLOPE OF 0.013 FT/FT TO DETERMINE STARTING WATER SURFACE ELEVATIONS. SLOPE DERIVED FROM USGS 1 METER LIDAR(2018).
3. VERTICAL DATUM IS NAVD 88.
4. INITIAL COORDINATION TO INFORM THE MEDINA COUNTY FLOODPLAIN ADMINISTRATOR OF THE PROJECT COMPLETED AUGUST 27, 2020.

DETAILED BRIDGE SUMMARY
Plan: Existing-17c HondoCreek Reach 1 RS: 1156
Profile: 1%

E.G. US. (ft)	1164.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1162.11	E.G. Elev (ft)	1164.01	1164.01
Q Total (cfs)	109000	W.S. Elev (ft)	1162.11	1161.15
Q Bridge (cfs)	46934.65	Crit W.S. (ft)	1161.1	1161.15
Q Weir (cfs)	62065.35	Max Chl Dpth (ft)	28.27	27.43
Weir Sta Lft (ft)	234.2	Vel Total (ft/s)	12.57	13.99
Weir Sta Rgt (ft)	1556.82	Flow Area (sq ft)	8670	7791.61
Weir Submerg	0.13	Froude # Chl	0.47	0.52
Weir Max Depth (ft)	11.46	Specif Force (cu ft)	114067.6	112094.9
Min El Weir Flow (ft)	1152.56	Hydr Depth (ft)	7.57	7.14
Min El Prs (ft)	1152.13	W.P. Total (ft)	1879.63	1827.09
Delta EG (ft)	3.59	Conv. Total (cfs)		
Delta WS (ft)	6.37	Top Width (ft)	1145.2	1090.85
BR Open Area (sq ft)	2542.75	Frctn Loss (ft)		
BR Open Vel (ft/s)	18.46	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

DETAILED BRIDGE SUMMARY
Plan: Prop_60pct HondoCreek Reach 1 RS: 1156
Profile: 1%

E.G. US. (ft)	1163.43	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1161.39	E.G. Elev (ft)	1163.43	1163.43
Q Total (cfs)	109000	W.S. Elev (ft)	1161.39	1161.39
Q Bridge (cfs)	73004.48	Crit W.S. (ft)	1152.03	1152.01
Q Weir (cfs)	35995.52	Max Chl Dpth (ft)	27.55	27.76
Weir Sta Lft (ft)	237.29	Vel Total (ft/s)	14.28	13.99
Weir Sta Rgt (ft)	1514.12	Flow Area (sq ft)	7630.88	7788.6
Weir Submerg	0.02	Froude # Chl	0.55	0.54
Weir Max Depth (ft)	8.46	Specif Force (cu ft)	128487.5	128389.3
Min El Weir Flow (ft)	1154.98	Hydr Depth (ft)	7.15	6.98
Min El Prs (ft)	1153.92	W.P. Total (ft)	1848.78	1900.19
Delta EG (ft)	2.99	Conv. Total (cfs)		
Delta WS (ft)	5.68	Top Width (ft)	1067.26	1115.89
BR Open Area (sq ft)	4094.17	Frctn Loss (ft)		
BR Open Vel (ft/s)	17.83	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

NO.	DATE	REVISION	APPR BY

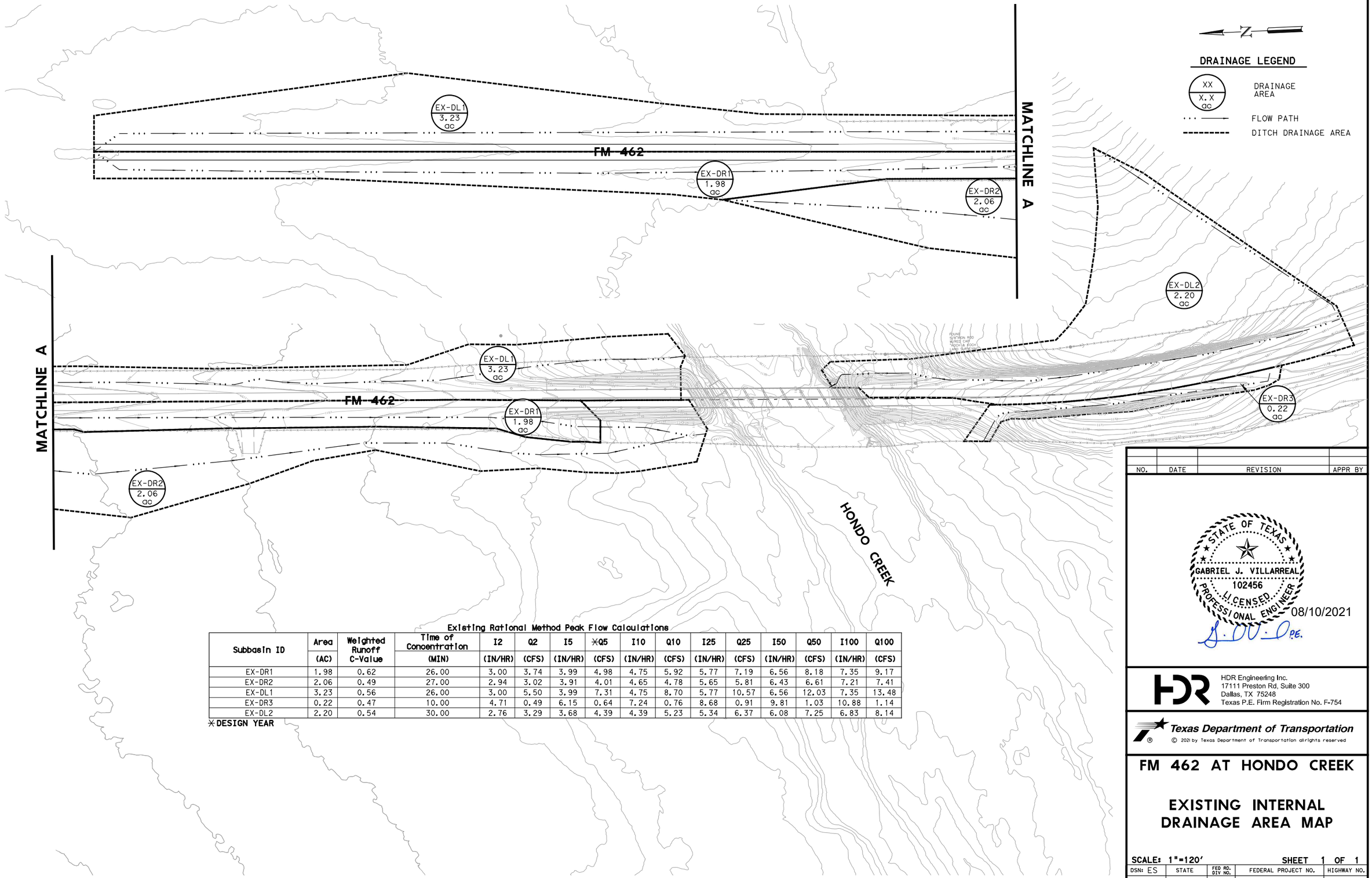
STATE OF TEXAS
BRANDON E. HILBRICH
112938
LICENSED
PROFESSIONAL ENGINEER
08/10/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

FM 462 AT HONDO CREEK
HYDRAULIC CALCULATION
DATA SHEET 2
STRUCTURE A1

SHEET 2 OF 2

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	67



Existing Rational Method Peak Flow Calculations

Subbasin ID	Area	Weighted Runoff C-Value	Time of Concentration	I2	Q2	I5	✳Q5	I10	Q10	I25	Q25	I50	Q50	I100	Q100
	(AC)		(MIN)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)
EX-DR1	1.98	0.62	26.00	3.00	3.74	3.99	4.98	4.75	5.92	5.77	7.19	6.56	8.18	7.35	9.17
EX-DR2	2.06	0.49	27.00	2.94	3.02	3.91	4.01	4.65	4.78	5.65	5.81	6.43	6.61	7.21	7.41
EX-DL1	3.23	0.56	26.00	3.00	5.50	3.99	7.31	4.75	8.70	5.77	10.57	6.56	12.03	7.35	13.48
EX-DR3	0.22	0.47	10.00	4.71	0.49	6.15	0.64	7.24	0.76	8.68	0.91	9.81	1.03	10.88	1.14
EX-DL2	2.20	0.54	30.00	2.76	3.29	3.68	4.39	4.39	5.23	5.34	6.37	6.08	7.25	6.83	8.14

✳DESIGN YEAR

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
08/10/2021
P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

EXISTING INTERNAL DRAINAGE AREA MAP

SCALE: 1"=120' SHEET 1 OF 1

DSN: ES	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: GV	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: ES	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: GV	MEDINA	SAT	0848	04	049	68

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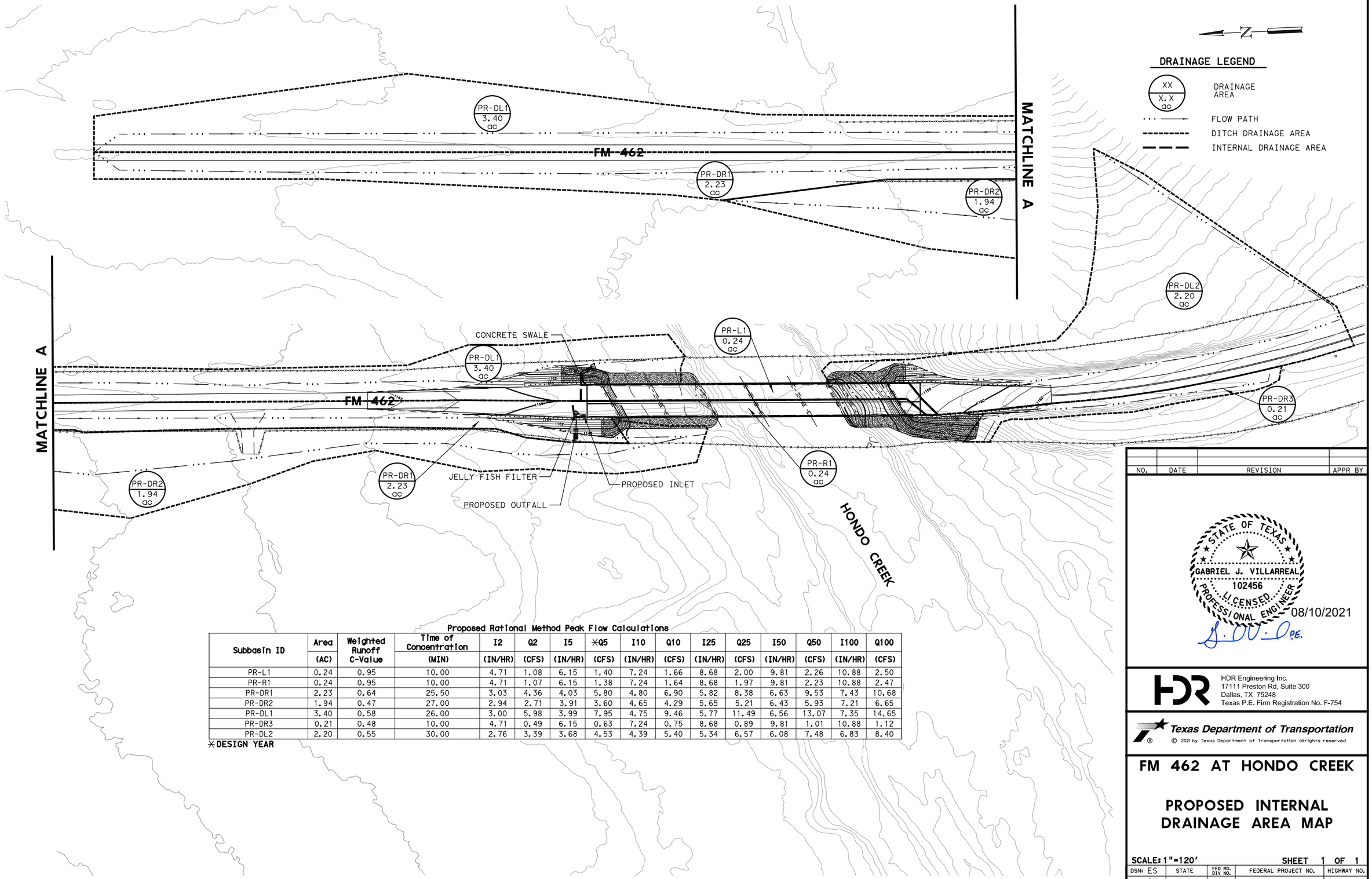
User Name:ELSUAREZ



Proposed Rational Method Peak Flow Calculations

Subbasin ID	Area (AC)	Weighted Runoff C-Value	Time of Concentration (MIN)	I2 (IN/HR)	Q2 (CFS)	I5 (IN/HR)	⚹Q5 (CFS)	I10 (IN/HR)	Q10 (CFS)	I25 (IN/HR)	Q25 (CFS)	I50 (IN/HR)	Q50 (CFS)	I100 (IN/HR)	Q100 (CFS)
PR-L1	0.24	0.95	10.00	4.71	1.08	6.15	1.40	7.24	1.66	8.68	2.00	9.81	2.26	10.88	2.50
PR-R1	0.24	0.95	10.00	4.71	1.07	6.15	1.38	7.24	1.64	8.68	1.97	9.81	2.23	10.88	2.47
PR-DR1	2.23	0.64	25.50	3.03	4.36	4.03	5.80	4.80	6.90	5.82	8.38	6.63	9.53	7.43	10.68
PR-DR2	1.94	0.47	27.00	2.94	2.71	3.91	3.60	4.65	4.29	5.65	5.21	6.43	5.93	7.21	6.65
PR-DL1	3.40	0.58	26.00	3.00	5.98	3.99	7.95	4.75	9.46	5.77	11.49	6.56	13.07	7.35	14.65
PR-DR3	0.21	0.48	10.00	4.71	0.49	6.15	0.63	7.24	0.75	8.68	0.89	9.81	1.01	10.88	1.12
PR-DL2	2.20	0.55	30.00	2.76	3.39	3.68	4.53	4.39	5.40	5.34	6.57	6.08	7.48	6.83	8.40

⚹DESIGN YEAR

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
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P.E.

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Texas Department of Transportation

FM 462 AT HONDO CREEK

PROPOSED INTERNAL DRAINAGE AREA MAP

SCALE: 1"=120' SHEET 1 OF 1

DSN: ES	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: GV	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: ES	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: GV	MEDINA	SAT	0848	04	049	69

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
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User Name: ES SHARE

STORM DRAIN
SUBBASIN (PR-R1)

DRAINAGE AREA

Area - ID	Area - Composite C Value	Area - Composite Area	Area - Tc Used	Area - Intensity	Area - Discharge (5-YR)
		(AC)	(MIN)	(IN/HR)	(CFS)
R-1	0.95	0.24	10	6.15	1.38

INLET CONFIGURATION

Inlet - ID	Inlet - Type	Inlet - Profile Type	Inlet - Curb Depression	Inlet - Curb Opening	Inlet - Curb Depression Width	Inlet - Curb Length
			(FT)	(FT)	(FT)	(FT)
R-1	Grate	Sag	n/a	n/a	n/a	n/a

INLET HYDRAULICS

Inlet - ID	Inlet - Type	Inlet - Profile Type	Inlet - Capacity	Inlet - By Pass Flow	Inlet - By Pass Flow Into	Inlet - Computed Ponded Depth	Inlet - Total Ponded Width
			(CFS)	(CFS)		(FT)	(FT)
R-1	Grate	Sag	3.76	0	n/a	0.169	8.54

LINK CONFIGURATION

Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	Link - Shape	Link - Material	Link - Number of Barrels	Link - Actual Length	Link - Hydraulic Length	Link - Manning's N Value	Link - Slope	Link - Rise	Link - Soffit Upstream	Link - Soffit Downstream	Link - Invert Upstream	Link - Invert Downstream
							(FT)	(FT)		(%)	(FT)	(FT)	(FT)	(FT)	(FT)
R-1	Pipe	R-1	RMH-1	Circular	Concrete	1	7.96	11.46	0.012	3.93	1.50	1151.50	1151.05	1150.00	1149.55
RMH-1	Pipe	RMH-1	OUTLET-1	Circular	Concrete	1	21.00	23.00	0.012	5.02	1.50	1150.55	1149.17	1149.05	1147.67

LINK HYDRAULIC

Link - ID	Link - Discharge	Link - Capacity	Link - Uniform Depth	Link - Uniform Velocity	Link - Critical Depth	Link - Critical Velocity	Link - Critical Slope	Link - Friction Slope	Link - Actual Velocity Downstream	Link - Actual Velocity Upstream	Link - Actual Depth Downstream	Link - Actual Depth Upstream	Link - HGL Downstream	Link - HGL Upstream	Link - EGL Downstream	Link - EGL Upstream
	(CFS)	(CFS)	(FT)	(FT/S)	(FT)	(FT/S)	(%)	(%)	(FT/S)	(FT/S)	(FT)	(FT)	(FT)	(FT)	(FT)	(FT)
R-1	1.38	24.26	0.25	7.06	0.44	3.20	0.00	0.04	6.04	2.10	0.28	0.60	1149.83	1150.60	1150.40	1150.76
RMH-1	1.38	27.42	0.24	7.69	0.44	3.20	0.00	0.05	7.41	1.88	0.24	0.65	1147.91	1149.70	1148.78	1149.86

DESIGN YEAR = 5-YR

*** PER 2019 TXDOT HYDRAULIC DESIGN MANUAL, A 10 MINUTE MINIMUM TIME OF CONCENTRATION WAS USED FOR RATIONAL METHOD CALCULATIONS.**
**** PEAK FLOWS DEVELOPED USING ATLAS 14 IDF INFORMATION.**

DITCH CALCULATIONS
SUBBASINS (PR-DR1,PR-L1,PR-DR3,PR-DL2)

DR1		
D =	0.31	DEPTH FLOW (FT)
BW =	3.5	BOTTOM WIDTH (FT)
L.S.S. =	3	LEFT SIDE SLOPE
R.S.S. =	6	RIGHT SIDE SLOPE
SFL =	0.0407	FL SLOPE IN FT/FT
N =	0.03	MANNING'S N - VALUE
Q5 =	5.80	DISCHARGE, CFS
V =	3.84	FPS

DR3		
D =	0.33	DEPTH FLOW (FT)
BW =	0	BOTTOM WIDTH (FT)
L.S.S. =	3	LEFT SIDE SLOPE
R.S.S. =	2	RIGHT SIDE SLOPE
SFL =	0.0329	FL SLOPE IN FT/FT
N =	0.03	MANNING'S N - VALUE
Q5 =	0.63	DISCHARGE, CFS
V =	2.57	FPS

DL1		
D =	0.66	DEPTH FLOW (FT)
BW =	0	BOTTOM WIDTH (FT)
L.S.S. =	2	LEFT SIDE SLOPE
R.S.S. =	2	RIGHT SIDE SLOPE
SFL =	0.0332	FL SLOPE IN FT/FT
N =	0.013	MANNING'S N - VALUE
Q5=	7.95	DISCHARGE, CFS
V =	9.23	FPS

DL2		
D =	0.68	DEPTH FLOW (FT)
BW =	0	BOTTOM WIDTH (FT)
L.S.S. =	1	LEFT SIDE SLOPE
R.S.S. =	3	RIGHT SIDE SLOPE
SFL =	0.056	FL SLOPE IN FT/FT
N =	0.03	MANNING'S N - VALUE
Q5 =	4.53	DISCHARGE, CFS
V =	5.22	FPS

CONCRETE FLUME
SUBBASIN (PR-L1)

CONCRETE FLUME		
D =	0.05	DEPTH FLOW (FT)
BW =	3.16	BOTTOM WIDTH (FT)
L.S.S. =	0	LEFT SIDE SLOPE
R.S.S. =	0	RIGHT SIDE SLOPE
SFL =	0.5	FL SLOPE IN FT/FT
N =	0.013	MANNING'S N - VALUE
Q5 =	1.40	DISCHARGE, CFS
V =	10.74	FPS

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
08/10/2021
P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

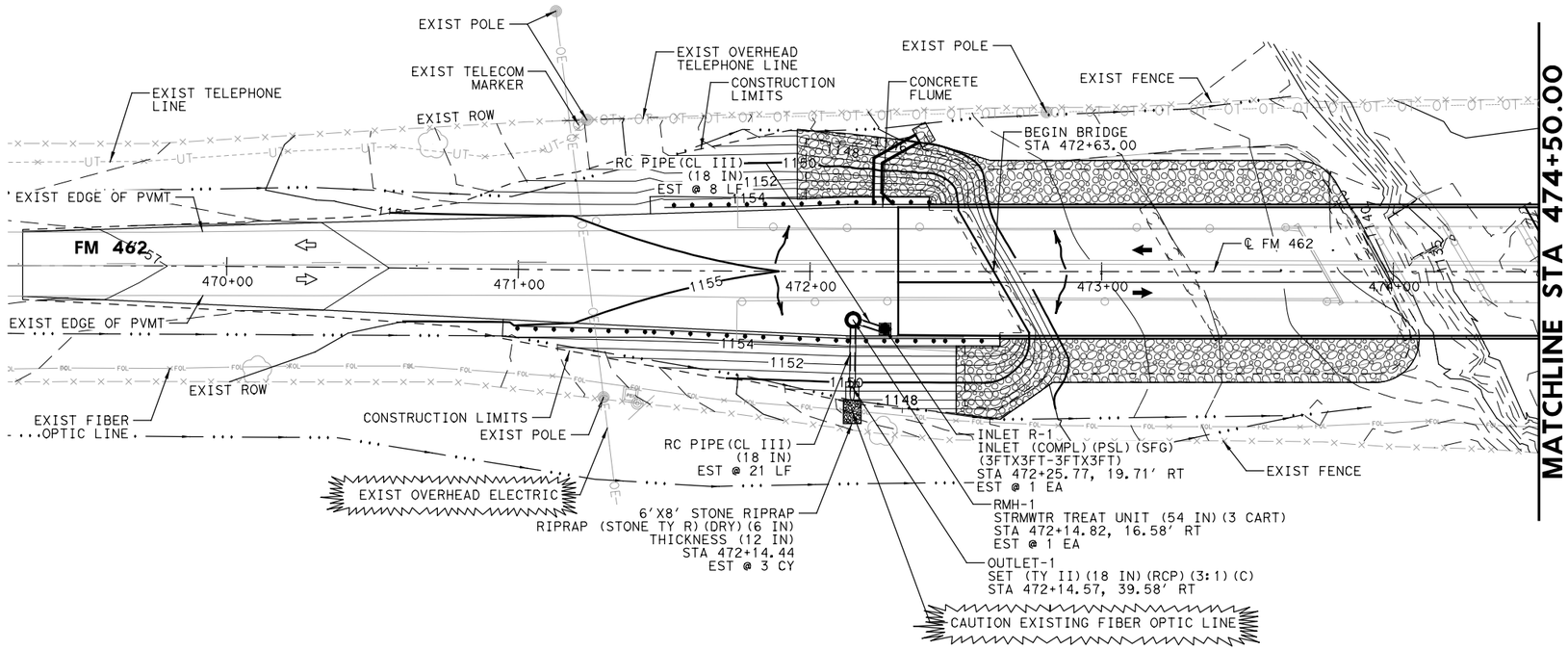
FM 462 AT HONDO CREEK

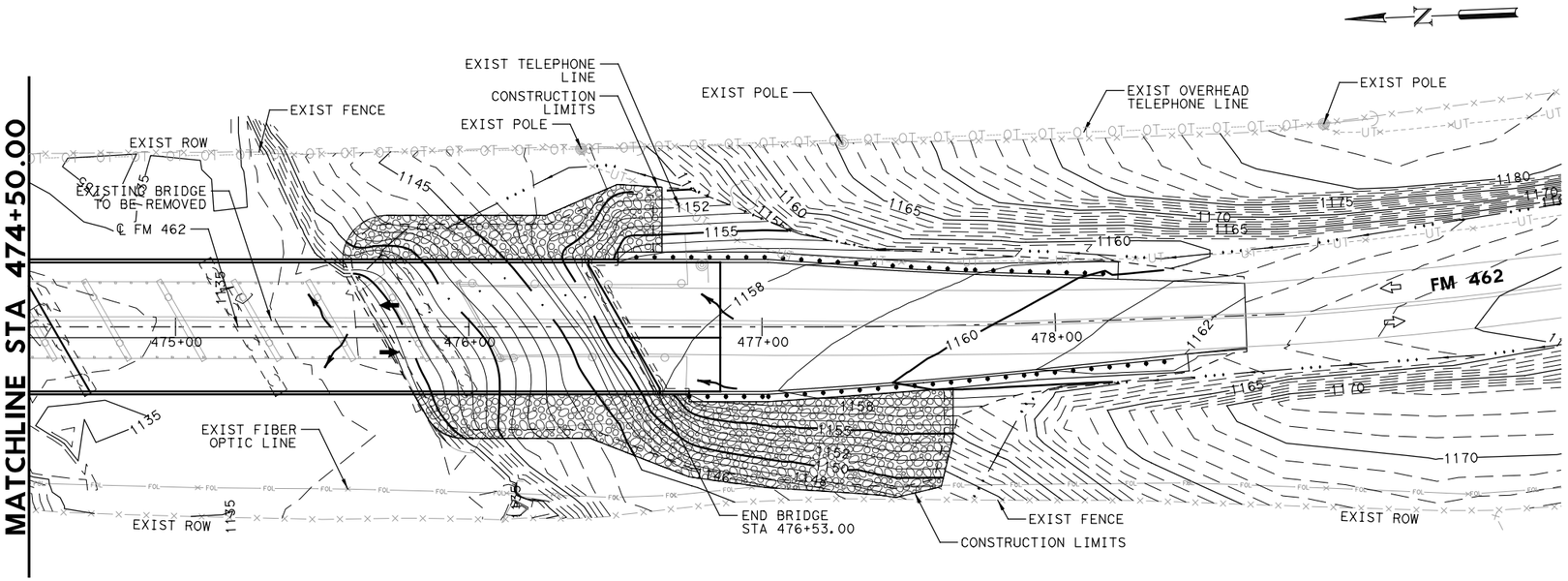
INTERNAL HYDRAULIC SUMMARIES

SHEET 1 OF 1

DSN: QL	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: QL	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	70

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
432 6014	RIPRAP (STONE TY R)(DRY)(6 IN)	CY	3
464 6003	RC PIPE (CL III)(18 IN)	LF	29
465 6146	INLET(COMPL)(PSL)(SFG)(3FTX3FT-3FTX3FT)	EA	1
467 6356	SET (TY II) (18 IN) (RCP) (3:1) (C)	EA	1
7202 6025	STRMWTR TREAT UNIT (54 IN)(3 CART)	EA	1





DRAINAGE LEGEND

- DRAINAGE LINK
- EXIST FENCE
- METAL BEAM GUARD FENCE
- STONE RIPRAP
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- FLOW PATH
- FLOW DIRECTION

1. ALL RC PIPES ARE CLASS III UNLESS NOTED OTHERWISE.
2. STA AND OFFSET CALLOUT FOR GRATE INLET IS TO THE CENTER OF THE INLET. ELEVATION FOR GRATE INLET IS TO TOP OF GRATE.
3. STA AND OFFSET CALLOUTS FOR MANHOLE IS TO THE CENTER OF MANHOLE COVER. ELEVATION IS TO TOP OF COVER.
4. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
5. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN.
6. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
10/21/2021
P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

STORM DRAIN LAYOUT

SCALE: 1"=50'

SHEET 1 OF 1

DSN: ES	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: GV	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: ES	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: GV	MEDINA	SAT	0848	04	049	71

0 25 50 75 100
SCALE IN FEET

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DATE: 10/21/2021
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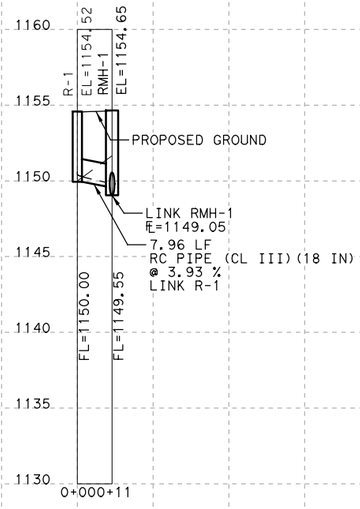
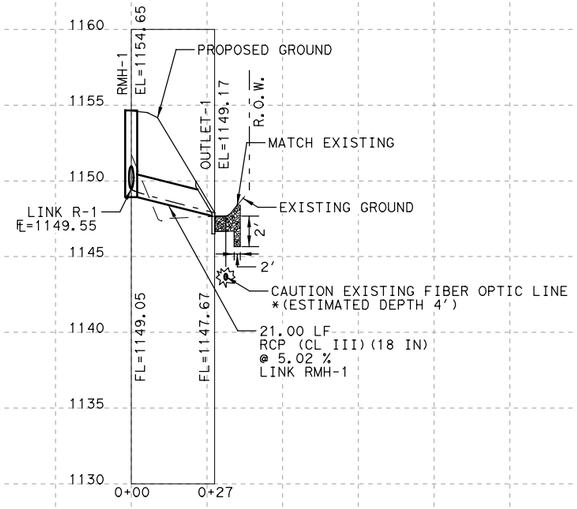
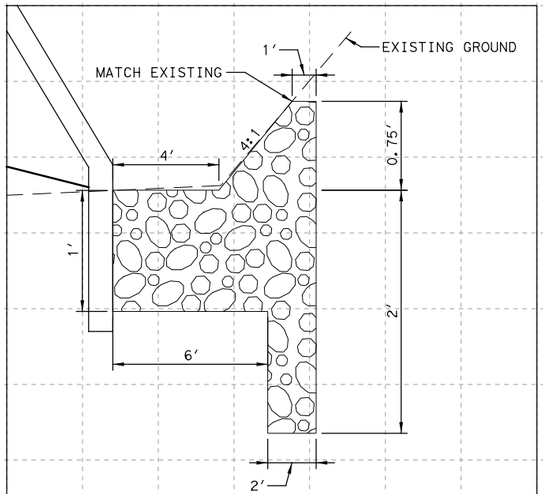
User Name: EISUARE







STONE RIPRAP DETAIL N.T.S.

* IF NECESSARY PLACE STONE RIPRAP AROUND FIBER OPTIC LINE.

0 25 50 75 100
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

DRAINAGE LEGEND

— — — EXIST GROUND

— - — - 5-YR HYDRAULIC GRADE LINE

——— PROPOSED PIPE/INLET

1. ALL RC PIPES ARE CLASS III UNLESS NOTED OTHERWISE.
2. STA AND OFFSET CALLOUT FOR GRATE INLET IS TO THE CENTER OF THE INLET. ELEVATION FOR GRATE INLET IS TO TOP OF GRATE.
3. STA AND OFFSET CALLOUTS FOR MANHOLE IS TO THE CENTER OF MANHOLE COVER. ELEVATION IS TO TOP OF COVER.
4. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT.
5. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS PRIOR TO CONSTRUCTION OF STORM DRAIN.
6. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING FOR STORM DRAIN.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
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10/21/2021
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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

STORM DRAIN PROFILE

SCALE: 1"=50'-H
1"=10'-V

SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	72

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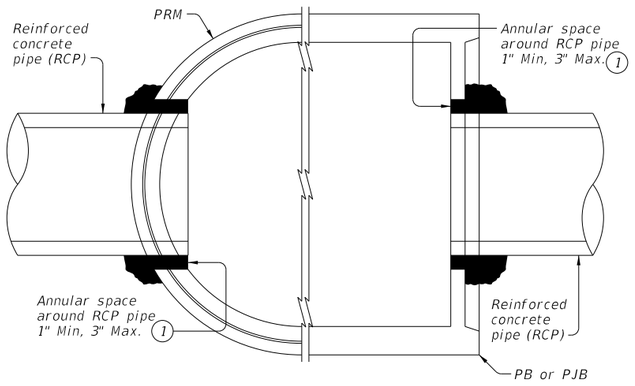
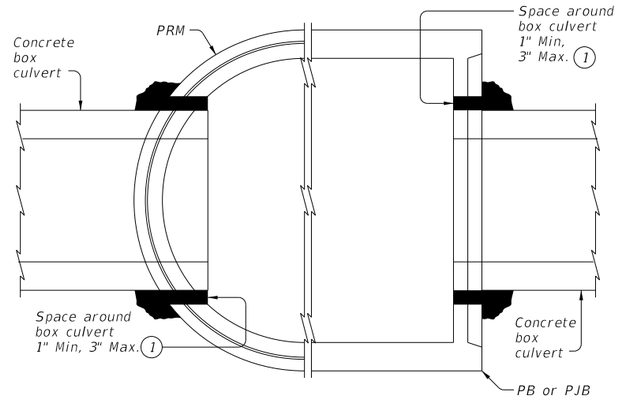


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

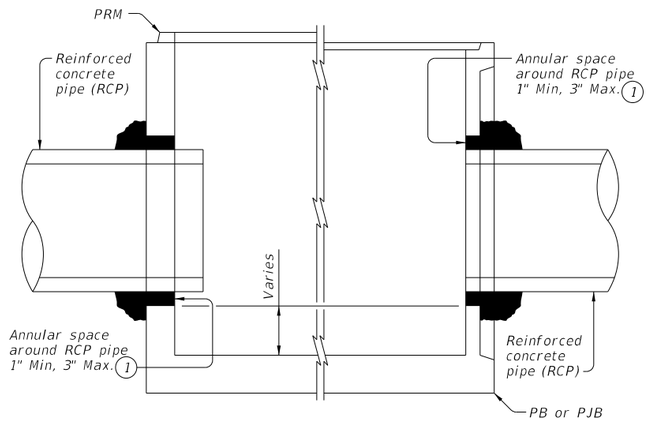
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

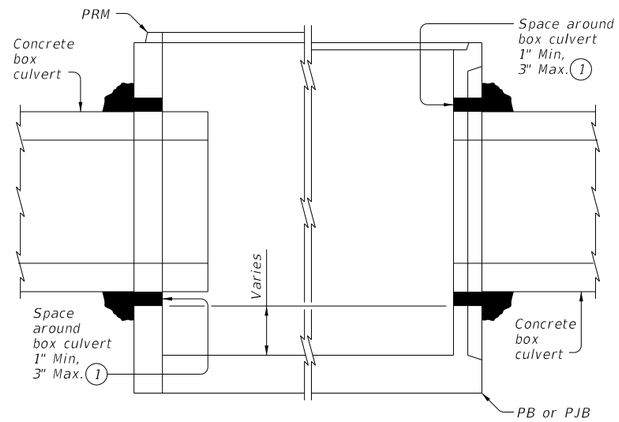
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

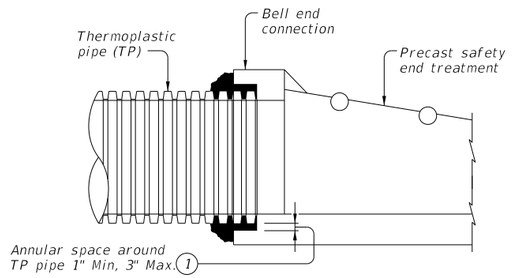
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

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

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

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

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

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

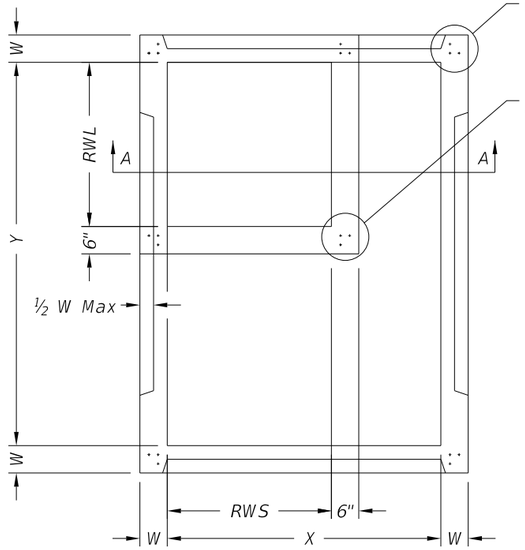
Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

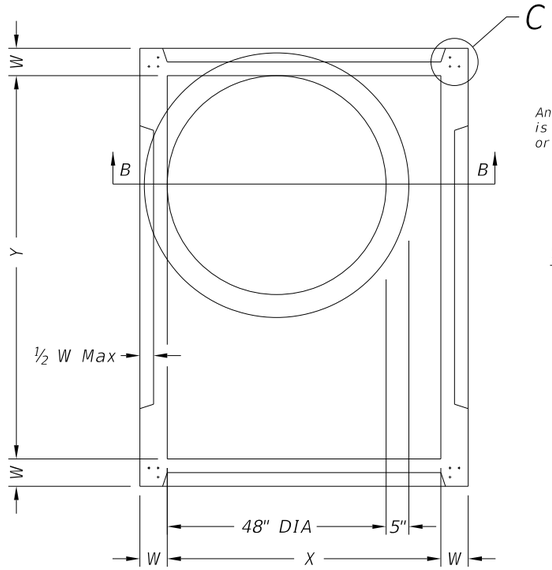
FILE: 73	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		73

DATE:
FILE:



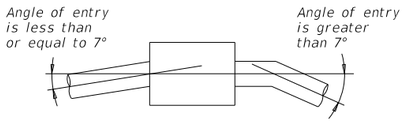
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



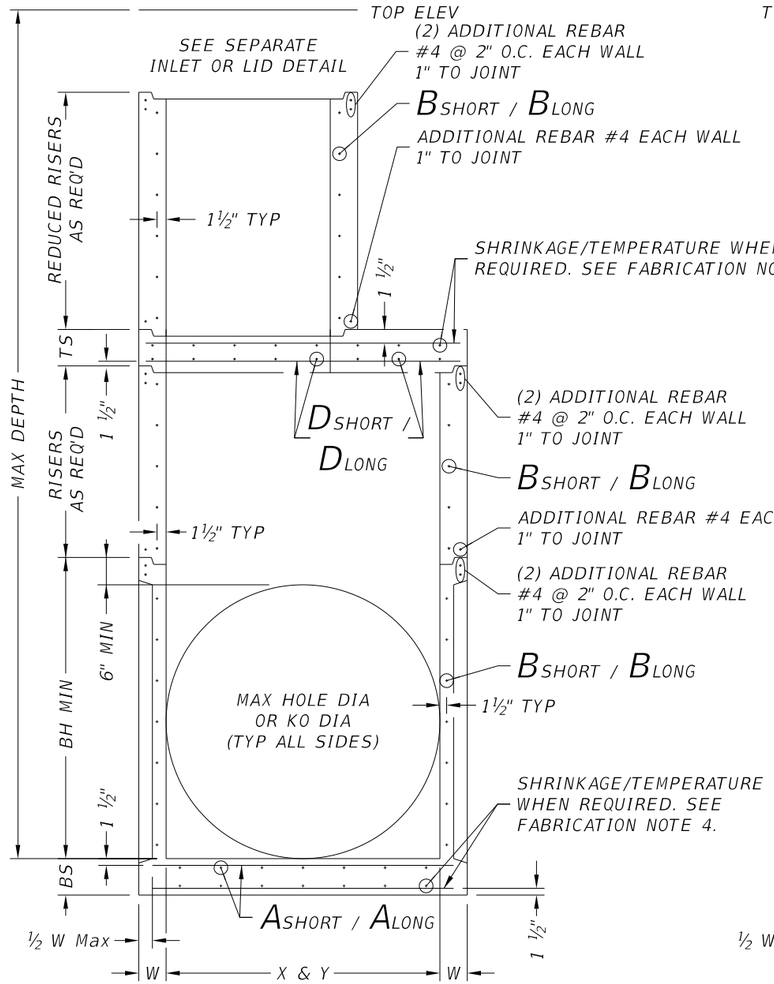
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



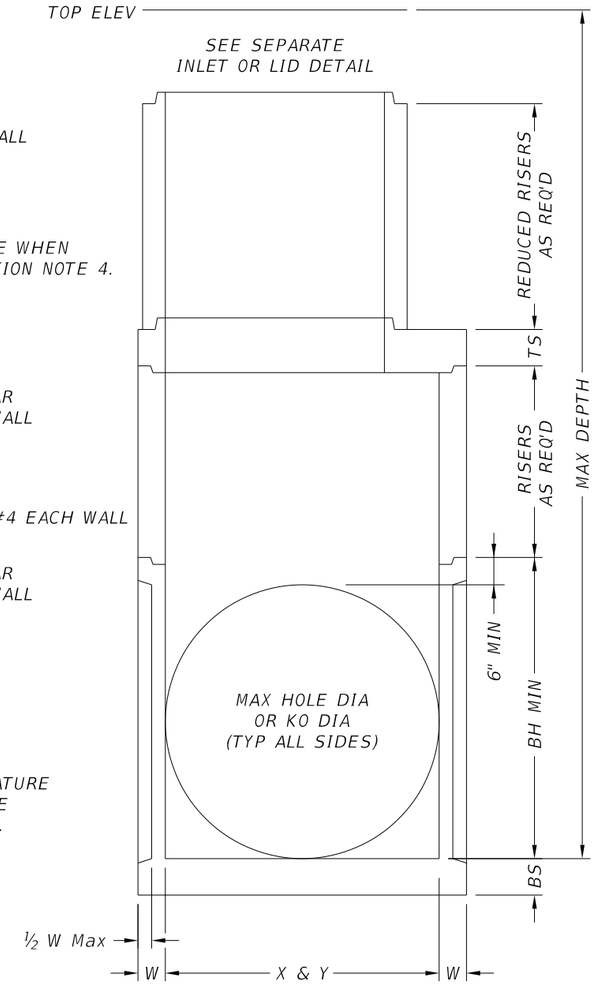
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in^2/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

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

HL93 LOADING

Texas Department of Transportation

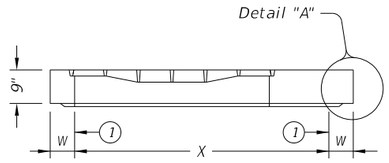
Bridge Division Standard

PRECAST BASE

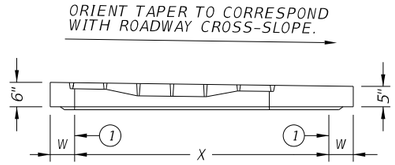
PB

FILE: 74	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		74

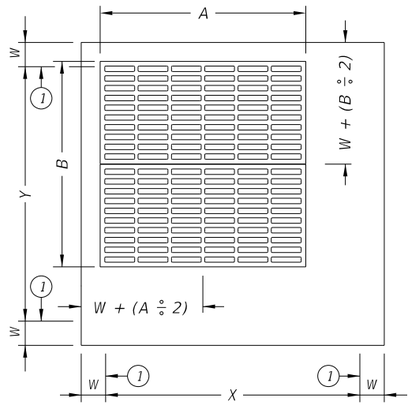
DATE:
FILE:



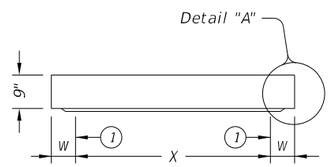
STYLE 'FG'



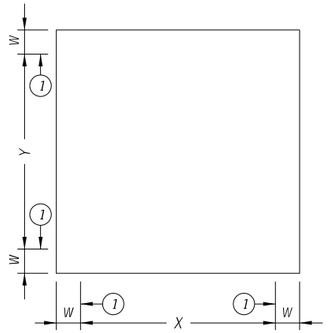
STYLE 'SFG'
ELEVATION VIEW



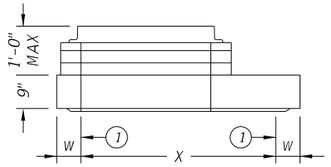
PLAN VIEW
CAST-IN FRAME & GRATE
STYLES 'FG' & 'SFG'



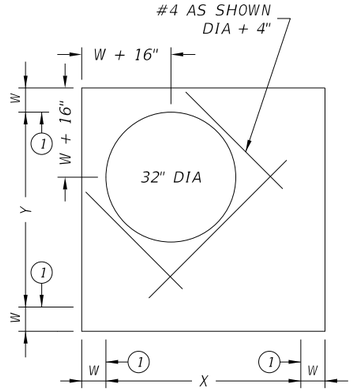
ELEVATION VIEW



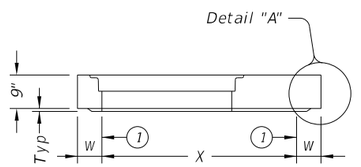
PLAN VIEW
NO OPENINGS
STYLE 'SL'



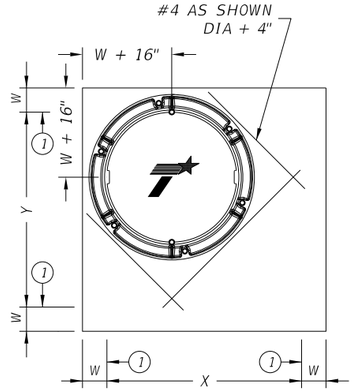
ELEVATION VIEW



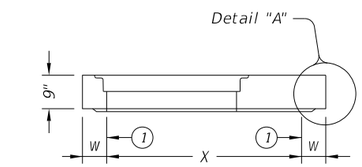
PLAN VIEW
SHIP LOOSE RING & COVER
STYLE 'RH'



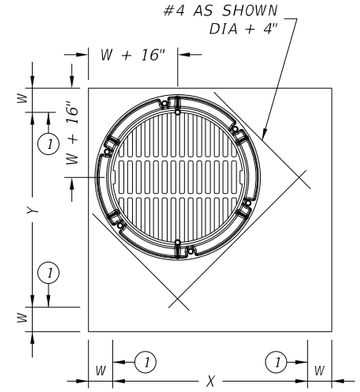
ELEVATION VIEW



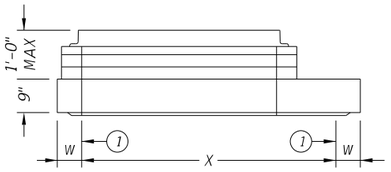
PLAN VIEW
32" DIA CAST-IN RING & COVER
STYLE 'RC'



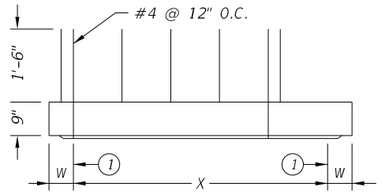
ELEVATION VIEW



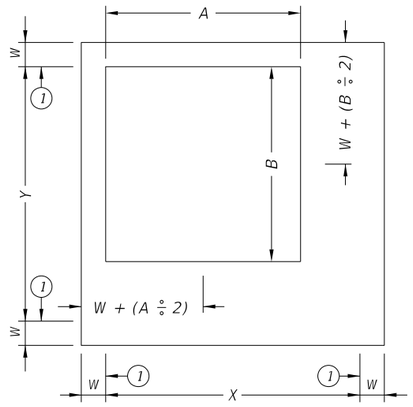
PLAN VIEW
32" DIA CAST-IN RING & GRATE
STYLE 'RG'



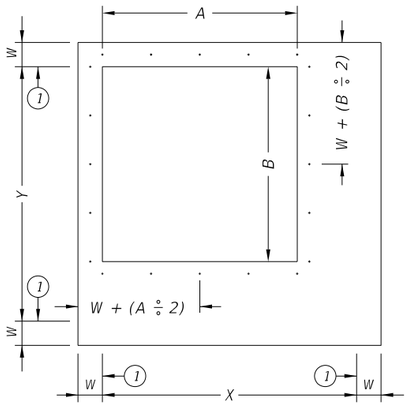
ELEVATION VIEW



ELEVATION VIEW



PLAN VIEW
SHIP LOOSE FRAME & GRATE
STYLE 'SH'



PLAN VIEW
EXPOSED REBAR
STYLE 'S1'

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

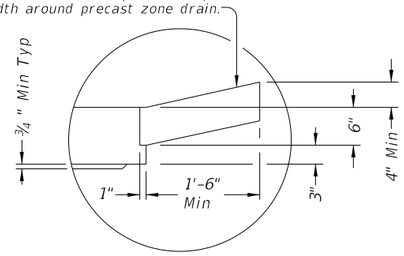
FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		75

DATE:
FILE:

Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in²/ft	0.37 in²/ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in²/ft	0.37 in²/ft
SFG	3'x3'	6"	3'x3'	0.32 in²/ft	0.32 in²/ft
SL	4'x4'	6"	n/a	0.34 in²/ft	0.34 in²/ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in²/ft	0.41 in²/ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in²/ft	0.41 in²/ft
SFG	4'x4'	6"	4'x4'	0.32 in²/ft	0.32 in²/ft
SL	3'x5'	6"	n/a	0.39 in²/ft	0.39 in²/ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in²/ft	0.48 in²/ft
SFG	3'x5'	6"	3'x5'	0.32 in²/ft	0.32 in²/ft
SL	4'x5'	6"	n/a	0.42 in²/ft	0.42 in²/ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in²/ft	0.42 in²/ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in²/ft	0.66 in²/ft
SL	5'x5'	6"	n/a	0.36 in²/ft	0.36 in²/ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in²/ft	0.43 in²/ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in²/ft	0.63 in²/ft
SL	5'x6'	6"/8"	n/a	0.48 in²/ft	0.48 in²/ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in²/ft	0.60 in²/ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in²/ft	0.60 in²/ft
SL	6'x6'	6"/8"	n/a	0.43 in²/ft	0.43 in²/ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in²/ft	0.59 in²/ft
SL	8'x8'	8"/10"	n/a	0.45 in²/ft	0.45 in²/ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in²/ft	0.45 in²/ft

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

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



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of ¾" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct traffic and may be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans

GENERAL NOTES:

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

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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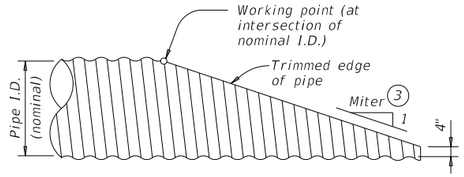
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		76

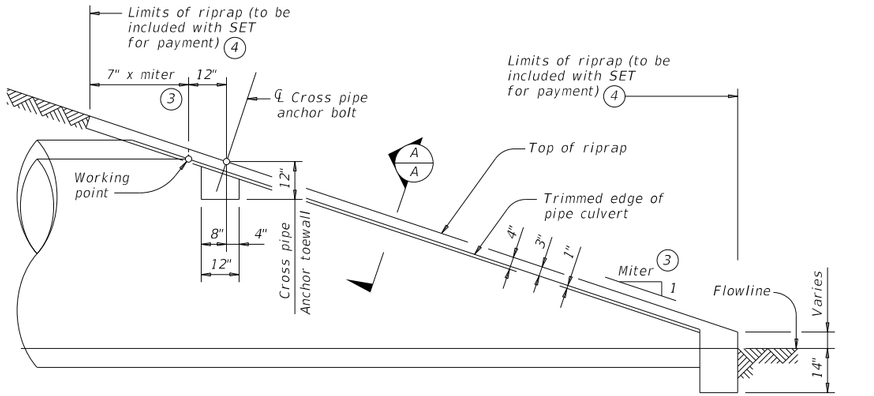
DATE:
FILE:



NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

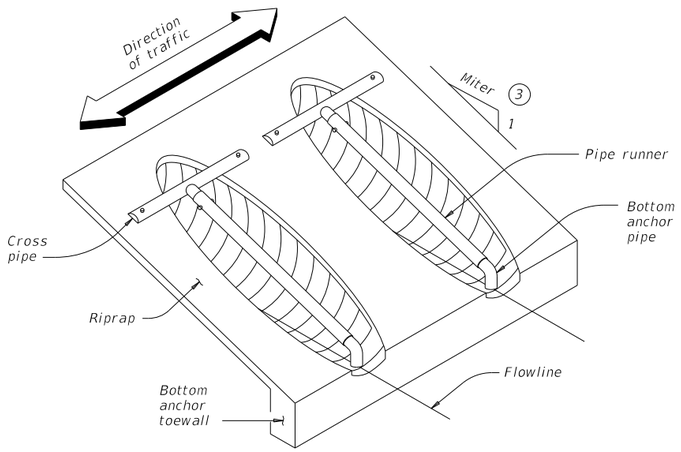
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert.
Details of reinforced concrete pipe (RCP) culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert.
Details of corrugated metal pipe (CMP) culvert
are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' – 7"	3' – 5"	N/A	N/A	N/A	5' – 10"	N/A	N/A	N/A	8' – 1"	N/A	N/A	N/A	12' – 9"
27"	1' – 8"	3' – 8"	N/A	N/A	5' – 5"	6' – 11"	N/A	N/A	7' – 7"	9' – 7"	N/A	N/A	11' – 11"	14' – 11"
30"	1' – 10"	3' – 11"	N/A	N/A	6' – 4"	8' – 0"	N/A	N/A	8' – 9"	11' – 0"	N/A	N/A	13' – 8"	17' – 0"
33"	1' – 11"	4' – 2"	6' – 2"	6' – 5"	7' – 3"	9' – 1"	8' – 6"	8' – 10"	10' – 0"	12' – 5"	13' – 3"	13' – 9"	15' – 5"	19' – 2"
36"	2' – 1"	4' – 5"	6' – 11"	7' – 3"	8' – 2"	10' – 2"	9' – 6"	9' – 11"	11' – 2"	13' – 10"	14' – 9"	15' – 3"	17' – 2"	21' – 3"
42"	2' – 4"	4' – 11"	8' – 6"	8' – 10"	9' – 11"	12' – 4"	11' – 7"	12' – 0"	13' – 6"	16' – 8"	17' – 9"	18' – 5"	20' – 8"	25' – 7"
48"	2' – 7"	5' – 5"	10' – 1"	10' – 5"	11' – 9"	N/A	13' – 7"	14' – 2"	15' – 10"	N/A	20' – 9"	21' – 6"	24' – 2"	N/A
54"	3' – 0"	5' – 11"	11' – 8"	12' – 1"	N/A	N/A	15' – 8"	16' – 3"	N/A	N/A	23' – 10"	24' – 8"	N/A	N/A
60"	3' – 3"	6' – 5"	13' – 3"	N/A	N/A	N/A	17' – 9"	N/A	N/A	N/A	26' – 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

Texas Department of Transportation

Bridge Division Standard

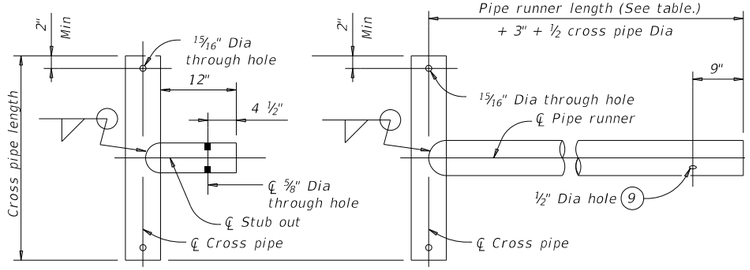
SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

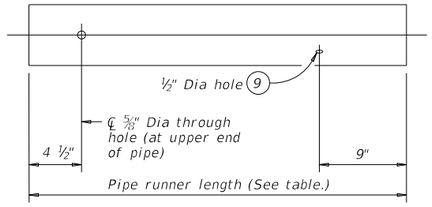
FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		77

DATE:
FILE:



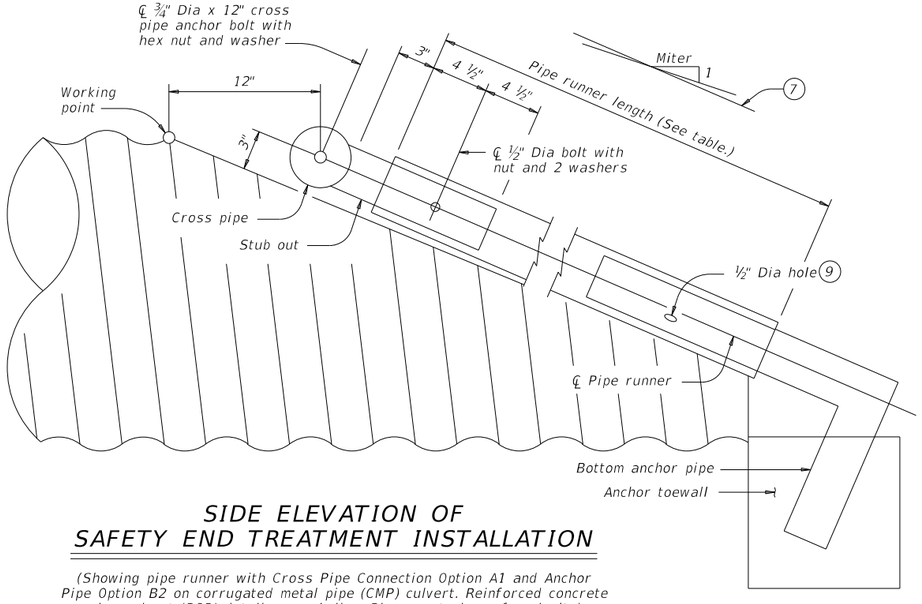
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



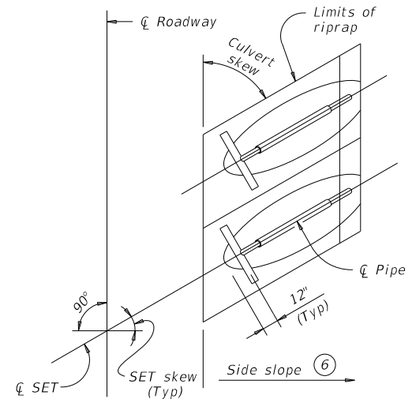
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

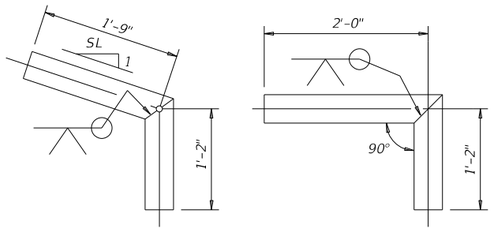


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

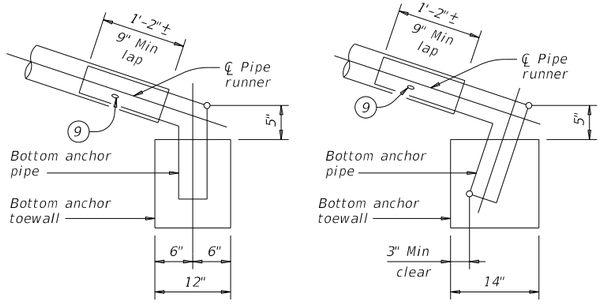


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

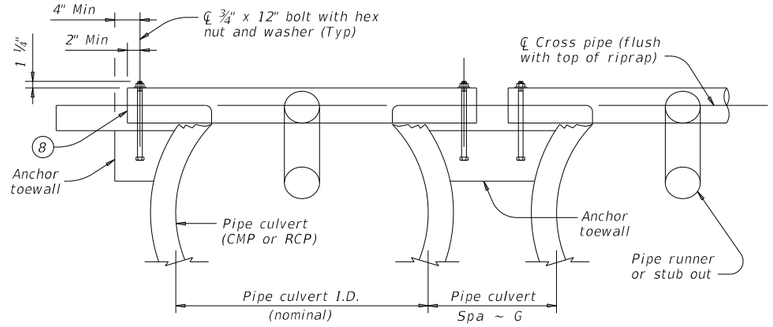
BOTTOM ANCHOR PIPE DETAILS (10)



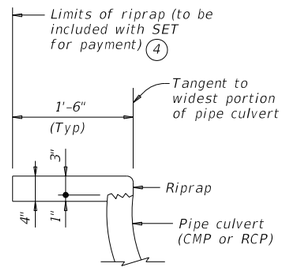
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

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

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

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

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		78

SPECIAL NOTES

1. ALL PIPE SIZES WERE TAKEN FROM UTILITY RECORDS WHERE POSSIBLE. THE UTILITIES DEPICTED WERE INVESTIGATED BY THE RIOS GROUP,INC.. ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION, WAS PROVIDED BY OTHERS AND THE RIOS GROUP, INC. DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 07/23/2020. THE RIOS GROUP, INC. EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR NEW UTILITY INSTALLATIONS, MODIFICATIONS, AND/OR ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME OF FIELD INVESTIGATION. CALL TEXAS ONE CALL SYSTEM (800)245-4545 FOR UTILITY LOCATIONS 48 HOURS PRIOR TO ANY WORK.

4. WHERE POSSIBLE, WATER, GAS, AND COMMUNICATION SERVICE LINES WERE DESIGNATED. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS MAY NOT SHOW SERVICE LINE LOCATIONS. THEREFORE ALL SERVICE LINES MAY NOT BE SHOWN.

QUALITY LEVELS

Quality Level "D" - Information derived from existing records and/or oral collection.

Quality Level "C" - Information obtained by surveying and plotting visible above ground utility features and by using professional judgment in correlating information to Quality Level "D" information.

Quality Level "B" - Designate: Two-dimensional horizontal mapping. This information is obtained through the application and interpretation of appropriate non-destructive surface geophysical methods. Utility indications are referenced to established survey control. Incorporates Quality Levels "C" and "D" information to produce Quality Level "B" information.

Quality Level "A" - Locate: Precise horizontal and vertical location of utilities obtained by the actual exposure and subsequent measurement of subsurface utilities at a specific point. Diameters shown are verified visually and may not be exact.

MATERIAL ABBREVIATIONS

STL - STEEL
PE - POLYETHYLENE
AC - TRANSITE
CI - CAST IRON
PVC - POLYVINYL CHLORIDE
RCP - REINFORCED CONCRETE PIPE
VC - VITRIFIED CLAY
CSC - CONCRETE/STEEL CYLINDER
CONC - CONCRETE

DI - DUCTILE IRON
BS - BARE STEEL
GALV - GALVANIZED
WI - WROUGHT IRON
HDPE - HIGH DENSITY POLYETHYLENE
COP - COPPER
FRPM - FIBER GLASS REINFORCED PLASTIC MORTAR
UNK - UNKNOWN
CS - CARBON STEEL

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

The Rios Group, Inc.
TBPE Firm # F-14595

TRAVIS S. ISAACSON
100094

08-06-2021

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
1740 Universal City Blvd., Ste 200
Universal City, Texas 78148

TEXAS DEPARTMENT OF TRANSPORTATION

FM 462 - Hondo Creek

S.U.E. PLAN SHEET

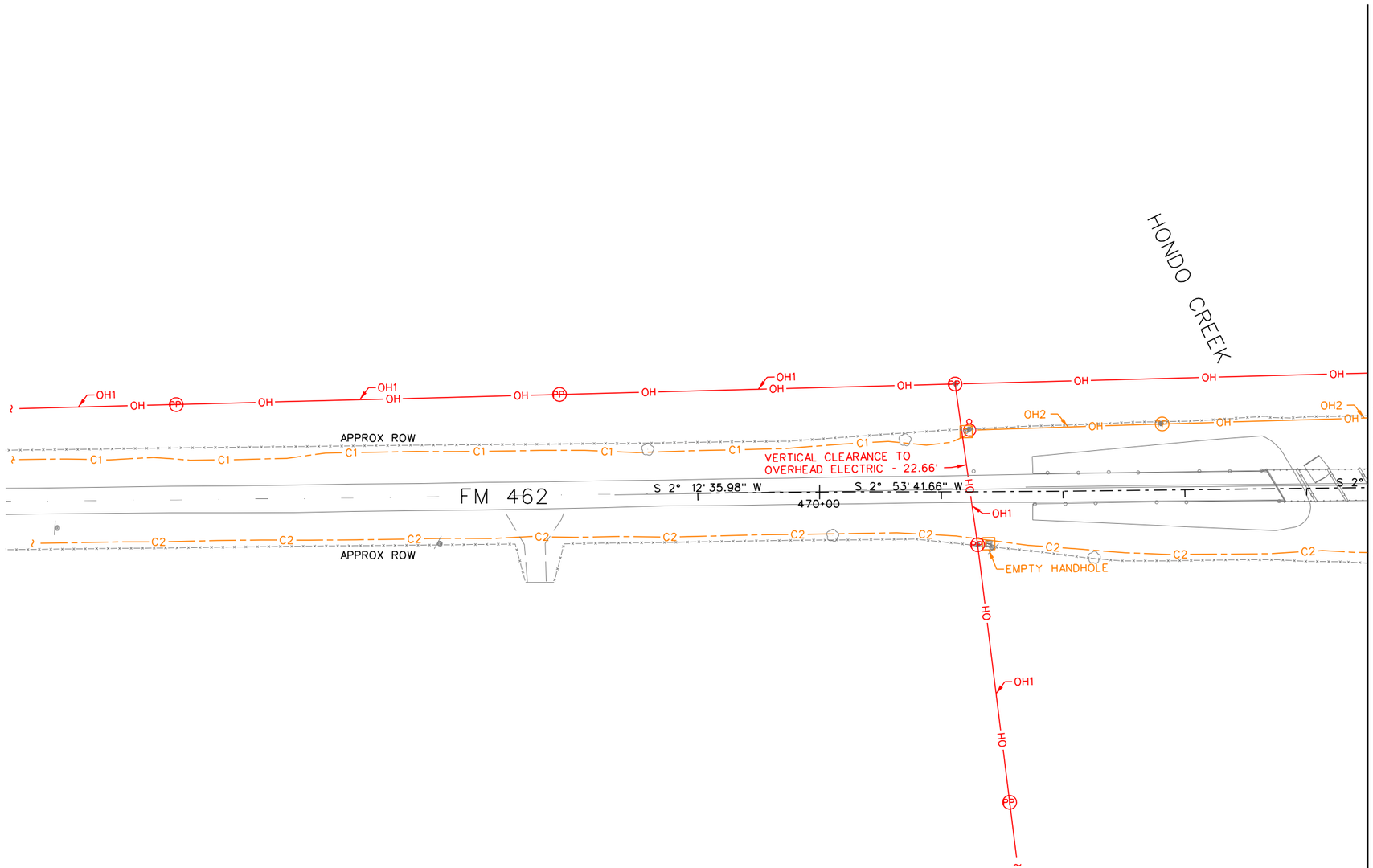
LAYOUT INDEX

DESIGNED BY: D.W.	CHECKED BY: T.I.	DATE: 08-06-2021
APPROVED BY:	CHECKED BY:	DATE:

TRG PROJECT NUMBER	SUE SHEET NO.	DATE
HDR1808.04	01 OF 03	08-06-2021

CSJ NUMBER	PLAN SHEET NO.
0848-04-049	79

STATE	DISTRICT	COUNTY
TX	SAT	MEDINA



0 50 100 200

GRAPHIC SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS

AT&T (TELE) — QL "B" — C1
HILL COUNTRY TELEPHONE CO-OP(FO/DUCT) — QL "B" — C2
AT&T (TELE) — QL "C"/QL "D" — C1
HILL COUNTRY TELEPHONE CO-OP(FO/DUCT) — QL "C"/QL "D" — C2

OVERHEAD UTILITY — QL "C"/QL "D" — OH

OH1 - BANDERA ELECTRIC (ELEC)
OH2 - AT&T (TELE)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

FIBER HANDHOLE
TELEPHONE CABINET
TELEPHONE HANDHOLE (VAULT)
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER

ELECTRIC HANDHOLE
ELECTRIC JUNCTION BOX (CABINET)
ELECTRIC MANHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
1740 Universal City Blvd., Ste 200
Universal City, Texas 78148

FM 462 - Hondo Creek

S.U.E. PLAN SHEET

BEGIN PROJECT TO STA. 474+50

DESIGNED BY: D.W.	CHECKED BY: T.I.	DATE: 08-06-2021
APPROVED BY:	CHECKED BY:	DATE:

TRG PROJECT NUMBER	SUE SHEET NO.	DATE
HDR1808.04	02 OF 03	08-06-2021
CSJ NUMBER	PLAN SHEET NO.	
0848-04-049	80	
STATE / DISTRICT	COUNTY	
TX / SAT	MEDINA	

Subsurface Utility Engineering (SUE) Certification

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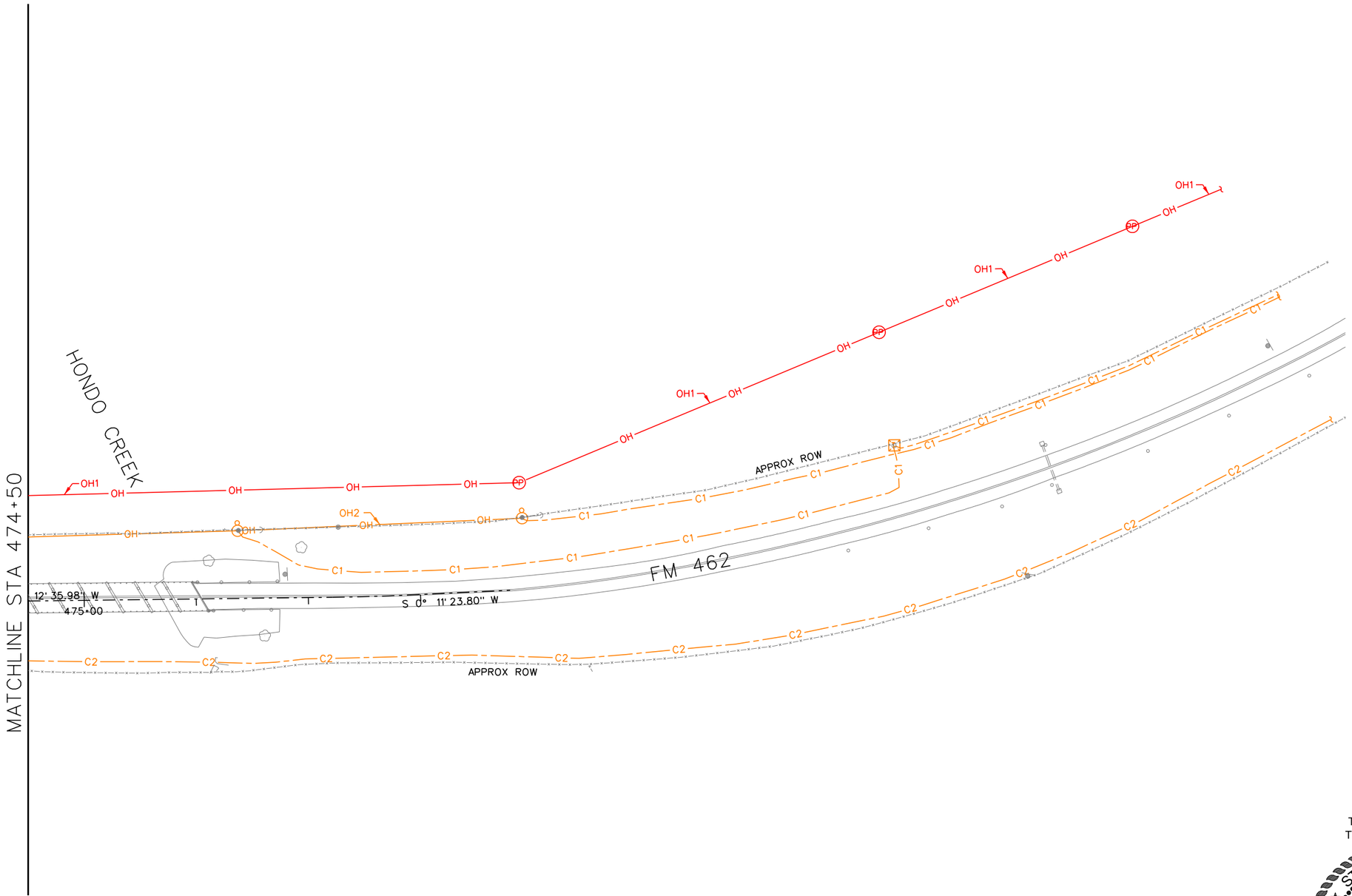
The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED
PROFESSIONAL ENGINEER

08-06-2021



0 50 100 200

GRAPHIC SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS

QL "B"
AT&T (TELE) — C1
HILL COUNTRY TELEPHONE — C2
CO-OP(FO/DUCT)

QL "C"/QL "D"
AT&T (TELE) — C1
HILL COUNTRY TELEPHONE — C2
CO-OP(FO/DUCT)

OVERHEAD UTILITY

QL "C"/QL "D" — OH
OH1 - BANDERA ELECTRIC (ELEC)
OH2 - AT&T (TELE)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

FIBER HANDHOLE — F
TELEPHONE CABINET
TELEPHONE HANDHOLE (VAULT) — T
TELEPHONE MANHOLE
TELEPHONE PEDESTAL — T
TELEPHONE POLE — FP
TELEPHONE POLE W/RISER

ELECTRIC HANDHOLE — E
ELECTRIC JUNCTION BOX (CABINET)
ELECTRIC MANHOLE
ELECTRIC POLE (POWER) — PP
ELECTRIC POLE W/RISER

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
1740 Universal City Blvd., Ste 200
Universal City, Texas 78148

FM 462 - Hondo Creek

S.U.E. PLAN SHEET

STA. 474+50 TO END PROJECT

DESIGNED BY: D.W.	CHECKED BY: T.I.	DATE: 08-06-2021
APPROVED BY:	CHECKED BY:	DATE:

TRG PROJECT NUMBER	SUE SHEET NO.	DATE
HDR1808.04	03 OF 03	08-06-2021

CSJ NUMBER	PLAN SHEET NO.
0848-04-049	81

STATE	DISTRICT	COUNTY
TX	SAT	MEDINA

Subsurface Utility Engineering (SUE) Certification

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The Rios Group, Inc.
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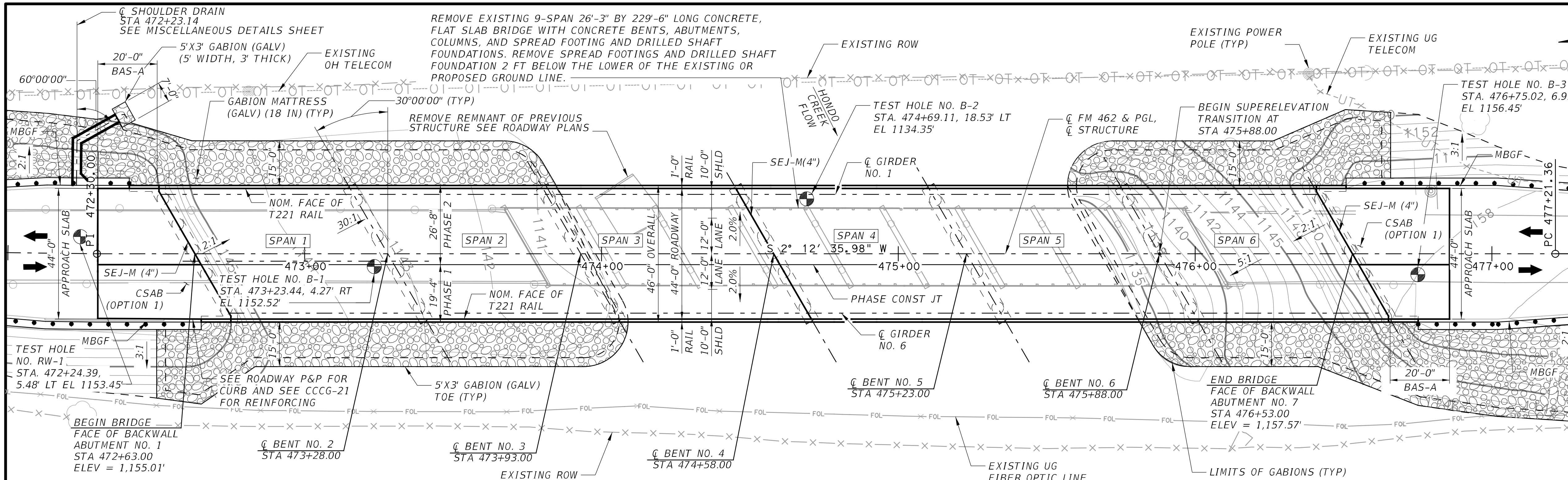
STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED
PROFESSIONAL ENGINEER

08-06-2021



℄ SHOULDER DRAIN
STA 472+23.14
SEE MISCELLANEOUS DETAILS SHEET
5'X3' GABION (GALV) (5' WIDTH, 3' THICK)
20'-0"
BAS-A
60°00'00"
EXISTING OH TELECOM
GABION MATTRESS (GALV) (18 IN) (TYP)
30°00'00" (TYP)
REMOVE EXISTING 9-SPAN 26'-3" BY 229'-6" LONG CONCRETE, FLAT SLAB BRIDGE WITH CONCRETE BENTS, ABUTMENTS, COLUMNS, AND SPREAD FOOTING AND DRILLED SHAFT FOUNDATIONS. REMOVE SPREAD FOOTINGS AND DRILLED SHAFT FOUNDATION 2 FT BELOW THE LOWER OF THE EXISTING OR PROPOSED GROUND LINE.
REMOVE REMNANT OF PREVIOUS STRUCTURE SEE ROADWAY PLANS
EXISTING ROW
HONDO CREEK FLOW
TEST HOLE NO. B-2
STA. 474+69.11, 18.53' LT
EL 1134.35'
℄ FM 462 & PGL, ℄ STRUCTURE
BEGIN SUPERELEVATION TRANSITION AT STA 475+88.00
EXISTING POWER POLE (TYP)
EXISTING UG TELECOM
TEST HOLE NO. B-3
STA. 476+75.02, 6.99' RT
EL 1156.45'
SCALE IN FEET
0 20 40 60 80
MBGF
SEJ-M(4")
℄ GIRDER NO. 1
NOM. FACE OF T221 RAIL
SPAN 1
SPAN 2
SPAN 3
SPAN 4
SPAN 5
SPAN 6
APPROACH SLAB
PHASE 1
PHASE 2
1'-0" RAIL
10'-0" SHLD
12'-0" LANE
46'-0" OVERALL
44'-0" ROADWAY
S 2° 12' 35.98" W
474+00
475+00
476+00
477+00
PC 477+21.36
PI 472+50.00
SEJ-M (4")
CSAB (OPTION 1)
TEST HOLE NO. B-1
STA. 473+23.44, 4.27' RT
EL 1152.52'
PHASE CONST JT
℄ GIRDER NO. 6
END SUPERELEVATION TRANSITION AT STA 477+75.00
TEST HOLE NO. RW-2
STA. 477+75.34, 20.31' RT
EL 1158.58'
TEST HOLE NO. RW-1
STA. 472+24.39, 5.48' LT EL 1153.45'
SEE ROADWAY P&P FOR CURB AND SEE CCCG-21 FOR REINFORCING
5'X3' GABION (GALV) TOE (TYP)
BEGIN BRIDGE
FACE OF BACKWALL ABUTMENT NO. 1
STA 472+63.00
ELEV = 1,155.01'
℄ BENT NO. 2
STA 473+28.00
℄ BENT NO. 3
STA 473+93.00
℄ BENT NO. 4
STA 474+58.00
℄ BENT NO. 5
STA 475+23.00
℄ BENT NO. 6
STA 475+88.00
END BRIDGE
FACE OF BACKWALL ABUTMENT NO. 7
STA 476+53.00
ELEV = 1,157.57'
EXISTING ROW
EXISTING UG FIBER OPTIC LINE
LIMITS OF GABIONS (TYP)

DESIGN SPEED: 60 MPH
ADT (2021): 600
ADT (2041): 800
FUNCT CLASS: RURAL MAJOR COLLECTOR
EXISTING NBI: 15-163-0-0848-04-021
PROPOSED NBI: 15-163-0-0848-04-226

PLAN

FOUNDATION NOTES:

1. FOUND 48" DRILLED SHAFTS AT THE LENGTHS SHOWN OR LONGER AS NECESSARY TO OBTAIN A MINIMUM OF TWO SHAFT DIAMETERS PENETRATION INTO LIMESTONE.
2. SEE DRILLED SHAFT CONSTRUCTION NOTES ON BORING LOGS SHEET.
3. THE CONTRACTOR SHALL BE ADVISED THAT GROUND WATER AND INUNDATION DUE TO FLOODING MAY BE EXPERIENCED DURING DRILLED SHAFT CONSTRUCTION. TEMPORARY CASING AND/OR SLURRY METHODS, IN ACCORDANCE WITH TXDOT ITEM 416, MAY BE NECESSARY. USE OF CLASS SS CONCRETE MAY BE REQUIRED.
4. DRILL CORE HOLES 5 FT PAST ANTICIPATED SHAFT TIP TO CONFIRM BEARING STRATUM AND VERIFY ABSENCE OF KARST FEATURES AND VOIDS.

ALL BENTS AND ABUTMENTS ARE ON BEARING N 62° 12' 35.98" E

HYDRAULIC DATA TABLE (UPSTREAM)

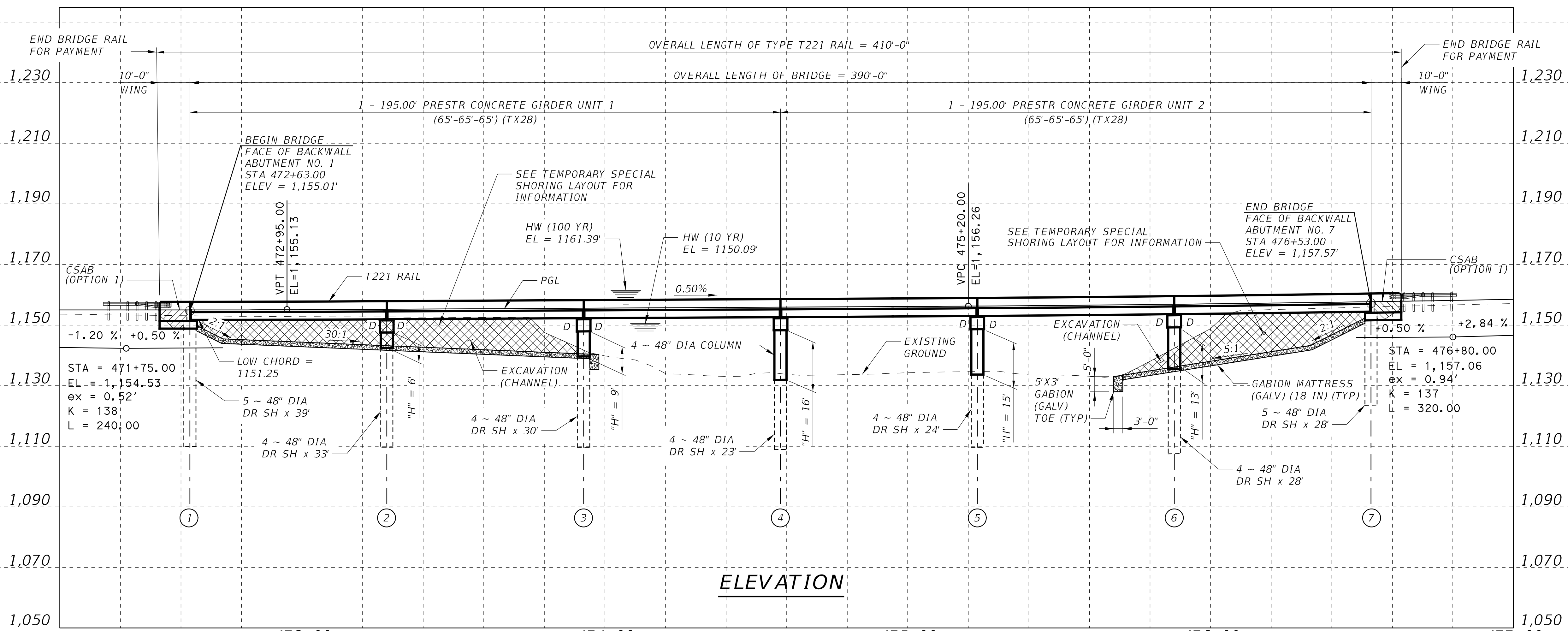
HW_{10} = 1150.09'	HW_{100} = 1161.39'
Q_{10} = 34,200 CFS	Q_{100} = 109,000 CFS
V_{10} = 10.91 FT/S	V_{100} = 14.28 FT/S
DRAINAGE AREA = 106 SQ. MI.	

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE SPECIFICATIONS, 8TH EDITION (2017) AND CURRENT INTERIMS.
2. SEE ROADWAY PLAN AND PROFILE SHEETS FOR MBGF AND CURB DETAILS.
3. TEST HOLES ARE AT APPROXIMATE LOCATIONS. SEE "BORING LOGS" SHEET FOR TEST HOLE INFORMATION.
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
5. REMOVE EXISTING STRUCTURE IN ACCORDANCE WITH ITEM 496.
6. VERIFY UTILITY LOCATIONS PRIOR TO BEGINNING CONSTRUCTION.

HL93 LOADING

NO.	DATE	REVISION	APPR BY



END BRIDGE RAIL FOR PAYMENT
OVERALL LENGTH OF TYPE T221 RAIL = 410'-0"
OVERALL LENGTH OF BRIDGE = 390'-0"
10'-0" WING
1 - 195.00' PRESTR CONCRETE GIRDER UNIT 1
(65'-65'-65') (TX28)
1 - 195.00' PRESTR CONCRETE GIRDER UNIT 2
(65'-65'-65') (TX28)
BEGIN BRIDGE
FACE OF BACKWALL ABUTMENT NO. 1
STA 472+63.00
ELEV = 1,155.01'
SEE TEMPORARY SPECIAL SHORING LAYOUT FOR INFORMATION
VPT 472+95.00
EL=1,155.13
HW (100 YR)
EL = 1161.39'
HW (10 YR)
EL = 1150.09'
VPC 475+20.00
EL=1,156.26
SEE TEMPORARY SPECIAL SHORING LAYOUT FOR INFORMATION
END BRIDGE
FACE OF BACKWALL ABUTMENT NO. 7
STA 476+53.00
ELEV = 1,157.57'
CSAB (OPTION 1)
T221 RAIL
PGL
0.50%
-1.20 %
+0.50 %
+2.84 %
30:1
2:1
5:1
LOW CHORD = 1151.25
STA = 471+75.00
EL = 1,154.53
ex = 0.52'
K = 138
L = 240.00
STA = 476+80.00
EL = 1,157.06
ex = 0.94'
K = 137
L = 320.00
EXCAVATION (CHANNEL)
4 ~ 48" DIA COLUMN
EXISTING GROUND
5'X3' GABION (GALV) TOE (TYP)
GABION MATTRESS (GALV) (18 IN) (TYP)
5 ~ 48" DIA DR SH x 39'
4 ~ 48" DIA DR SH x 33'
4 ~ 48" DIA DR SH x 30'
4 ~ 48" DIA DR SH x 23'
4 ~ 48" DIA DR SH x 24'
4 ~ 48" DIA DR SH x 28'
5 ~ 48" DIA DR SH x 28'
"H" = 6'
"H" = 9'
"H" = 16'
"H" = 15'
"H" = 13'
5'-0"
3'-0"
1,230
1,210
1,190
1,170
1,150
1,130
1,110
1,090
1,070
1,050
1
2
3
4
5
6
7
473+00
474+00
475+00
476+00
477+00

ELEVATION

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE LAYOUT

SCALE: 1"=40'

SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: STH	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	82

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DATE: 7/30/2021
PLOTTING TIME: 3:37:19 PM
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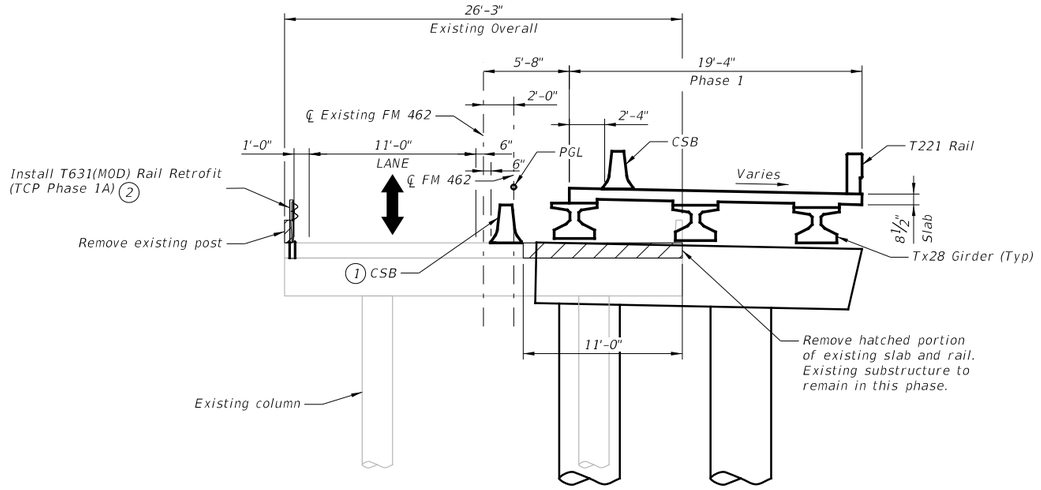
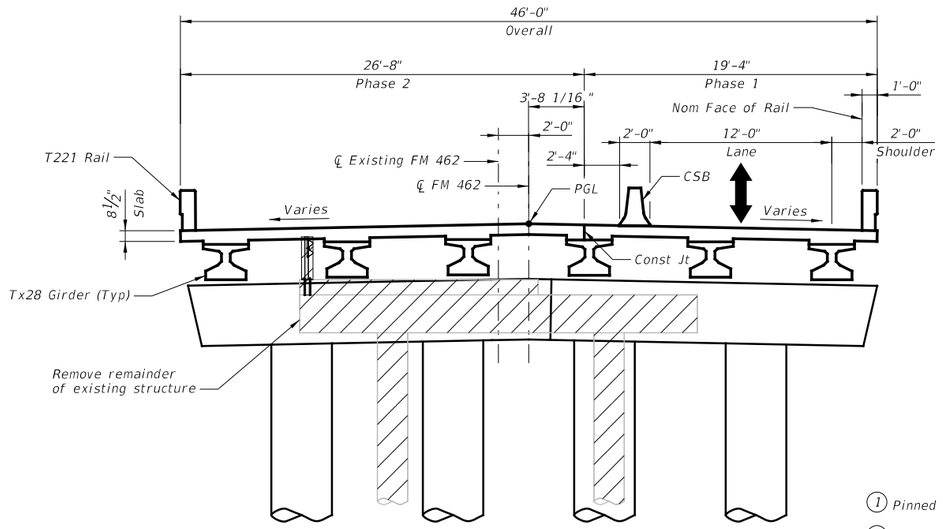
User Name: SHILTON



PHASE 1 TYPICAL SECTION

Interior bent shown, abutment similar



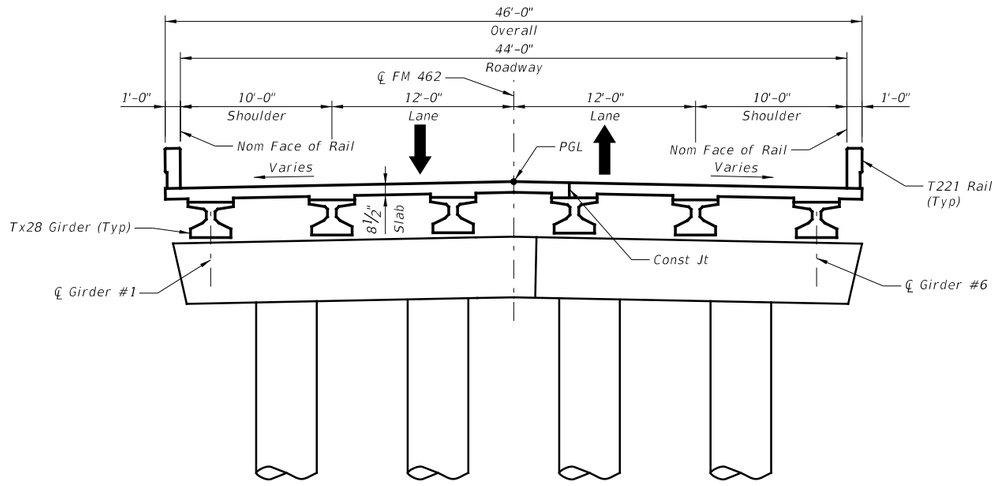
PHASE 2 TYPICAL SECTION

Interior bent shown, abutment similar

(1) Pinned

(2) Use of CSB in lieu of T631 (MOD) Rail Retrofit is not permitted.

Structure to be removed



PROPOSED TYPICAL SECTION

Interior bent shown, abutment similar

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
PHASED
TYPICAL SECTIONS

N. T. S.

SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: STH	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	83

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DATE: 7/30/2021
PLOTTING TIME: 3:37:23 PM
File Name:Bridge Typical Sections - Phased
User Name:SHILTON

SUMMARY OF ESTIMATED QUANTITIES

	BID CODES	400 6005	416 6006	416 6087	420 6013	420 6029	420 6037	422 6001	422 6015	425 6035	432 6006	450 6004	451 6019	454 6018	459 6008	459 6011	496 6010
	BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (48 IN)	CORE HOLE	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (CONC) (CL B)	RAIL (TY T221)	RETROFIT RAIL (TY T631)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	GABION MATTRESSES (GALV) (18 IN)	GABIONS (5'X3') (GALV)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)
		CY	LF	EA	CY	CY	CY	SF	CY	LF	CY	LF	LF	LF	SY	CY	EA
PHASE 1	2 ~ ABUTMENTS	60	134	4	32.1				47.3								
PHASE 1	5 ~ INTERIOR BENTS		276	10		98.0	55.0										
PHASE 1	2 ~ 195.00' TX28 PRESTR CONC GIRDER UNITS									1,160.81							
PHASE 1	PHASE 1 TOTAL	60	410	14	32.1	98.0	55.0	7,542	47.3	1,160.81		410.0		64.8			0.4
PHASE 2	2 ~ ABUTMENTS	69	201	6	36.0				66.2								
PHASE 2	5 ~ INTERIOR BENTS		276	10		110.5	55.0										
PHASE 2	2 ~ 195.00' TX28 PRESTR CONC GIRDER UNITS									1,160.81							
PHASE 2	PHASE 2 TOTAL	69	477	16	36.0	110.5	55.0	10,398	66.2	1,160.81		410.0		90.2			0.6
	TOTAL	129	887	30	68.1	208.5	110.0	17,940	113.5	2,321.62	2.0	820.0	239.5 (1)	155.0	2,204	499	1.0

(1) Retrofit railing on existing bridge during Phase 1A. See Traffic Control Plans for lane shifts. Retrofit requires modification of existing wingwalls. See T631 (MOD) for details.

BEARING SEAT ELEVATIONS

		GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
ABUT	1 (FWD)	1151.021	1151.191	1151.363	1151.375	1151.230	1151.086
BENT	2 (BK)	1151.271	1151.454	1151.637	1151.661	1151.524	1151.387
	(FWD)	1151.302	1151.485	1151.668	1151.691	1151.555	1151.418
BENT	3 (BK)	1151.618	1151.801	1151.984	1152.007	1151.870	1151.733
	(FWD)	1151.628	1151.811	1151.994	1152.017	1151.880	1151.743
BENT	4 (BK)	1151.943	1152.126	1152.310	1152.333	1152.196	1152.059
	(FWD)	1151.953	1152.136	1152.320	1152.343	1152.206	1152.069
BENT	5 (BK)	1152.269	1152.452	1152.635	1152.659	1152.524	1152.391
	(FWD)	1152.216	1152.400	1152.583	1152.607	1152.473	1152.341
BENT	6 (BK)	1152.645	1152.848	1153.052	1153.098	1153.008	1152.946
	(FWD)	1152.684	1152.888	1153.093	1153.143	1153.059	1153.004
ABUT	7 (BK)	1153.244	1153.526	1153.821	1154.026	1154.153	1154.308

NO.	DATE	REVISION	APPR BY

For Bearing Seat Elevations Only

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

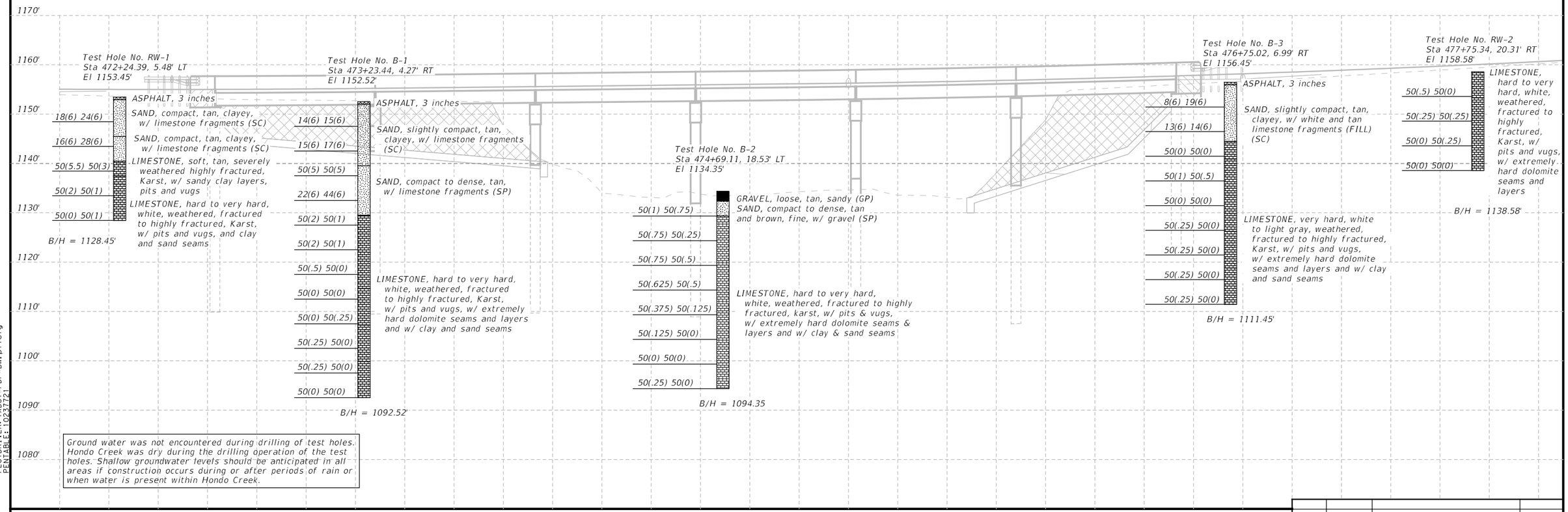
Texas Department of Transportation

FM 462

HONDO CREEK BRIDGE ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: HOT	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: DJK	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: HOT	MEDINA	SAT	0848	04	049	84



Ground water was not encountered during drilling of test holes. Hondo Creek was dry during the drilling operation of the test holes. Shallow groundwater levels should be anticipated in all areas if construction occurs during or after periods of rain or when water is present within Hondo Creek.

DRILLED SHAFT CONSTRUCTION NOTES:

Temporary casing will possibly be required for all piers due to the presence of potentially caving clayey sands above the bearing stratum. Temporary casing should be properly seated and sealed within the hard to very hard weathered limestone to prevent caving into the drilled shaft excavation. Care must be taken that a sufficient head of plastic concrete is maintained within the casing during extraction. Casing that is slightly larger than the design shaft diameter should be used in order for the pier penetrations to be made using the correct design shaft diameter. Design penetrations should not be counted on within the cased length.

For temporary casing, the concrete slump should range from 6 to 8 inches. If casing is not required and the shafts are dry, the concrete slump should be reduced to 4 to 6 inches. Complete installation of individual shafts should be accomplished within an 8-hour period in order to help prevent deterioration of bearing surfaces. the drilling of individual shafts should be excavated in a continuous operation and concrete planced as soon as practical after completion of drilling. No shaft should be left open for more than 8 hours.

Drilled shaft construction and installation should follow Item 416, "Drilled Shaft Foundations". The ACI 336.1-89 Standard Specifications for End Bearing Drilled Piers document should also be used. Presented below are specific recommendations of drilled shaft for this project.

1. Drilled shaft excavations should be inspected for plumbness and side sloughing. Plumbness is specified at one inch in ten feet of the shaft length, and should be checked to the full depth of dry hole prior to introducing drilling mud where possible.
2. Slurry should contain four to eight percent by weight of bentonite additive and should satisfy the slurry specification set forth in Item 416 Table 3 or ACI 336.1-89 Section 2.3.5.2.e. Note that the ACI requirements are more stringent than TxDOT Standard Specification. Stricter slurry specifications are required to assure suspension of detritus from drilling operations, and to assure adequate cleaning of the slurry prior to concreting. Cleaning of the slurry is important to prevent deposition of detritus on reinforcement cages and ensure that inclusions of detritus will not be formed within the concrete mass.
3. Before placing concrete, the shaft bottoms should be cleaned out with a drilling bucket in order to remove any sediments which may not be displaced by the concrete. The shaft bottoms should be cleaned with a "clean-out" bucket until rotation on the bottom without crowd (i.e. penetration under force) produces little spoil. Probing after clean-out is essential to verify the condition of the base of the shaft.
4. Concrete should conform to the requirements of Item 421, "Hydraulic Cement Concrete", or ACI 336.1-89 Section 2.3.5.5.
5. Concrete placement should be accomplished as directed in Item 416 "Drilled Shaft Foundations". The tremie pipe diameter should be at least eight times as large as the largest concrete aggregate size.
6. A computation of the final concrete volume for each shaft should be made. Shaft taking an unreasonably high or low volume of concrete should be cored to check their integrity.
7. If casing is used, it should be extracted slowly and smoothly.
8. The casing should always remain well below the level of the concrete during placement.
9. Shaft excavations should not be made within a clear spacing of two and a half (2.5) shaft diameters (edge to edge) of which have been concreted within the last 24 hours.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
SAMUEL TRAN
119030
LICENSED
PROFESSIONAL ENGINEER
8-9-21

ALLIANCE GEOTECHNICAL GROUP Texas Registered Engineering Firm F-1970

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
BORING LOGS

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: HOT	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: DJK	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: HOT	MEDINA	SAT	0848	04	049	85

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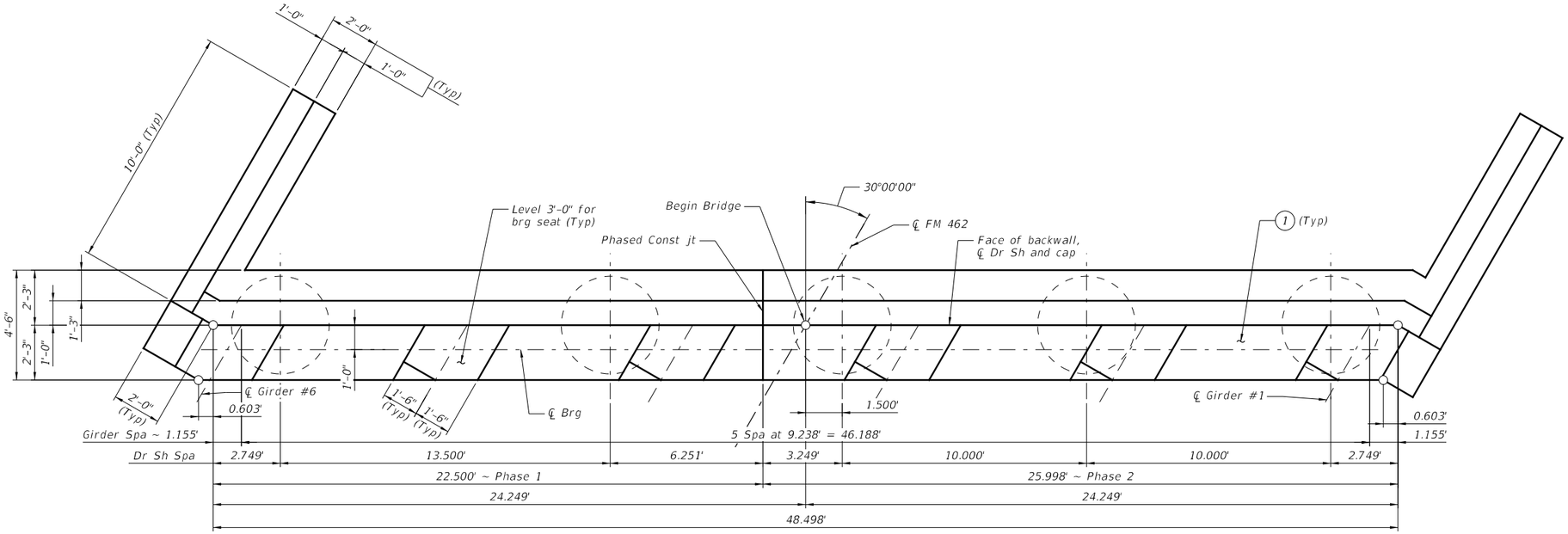
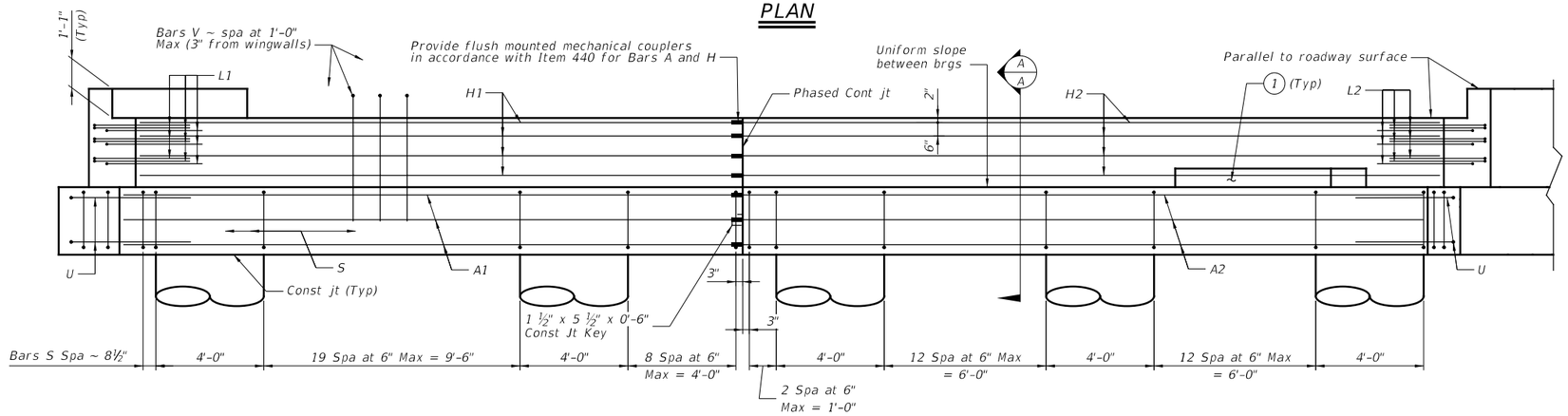
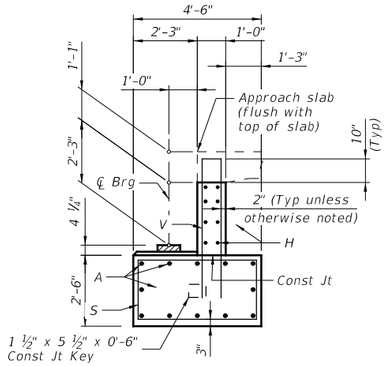


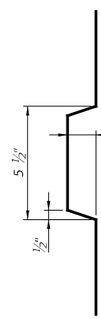
PLAN



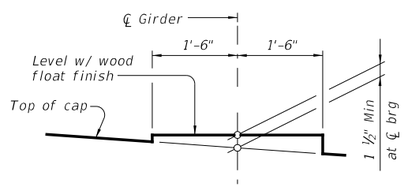
ELEVATION



SECTION A-A



CONST JT KEY DETAIL



BEARING SEAT DETAIL

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

(1) *Refer to "Shear Key Details" sheet for required shear keys. Shear keys shall bracket both sides of every girder end. Provide the required reinforcement. Concrete for shear key is included in the Class "C" Concrete (Abut) quantity.*

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
ABUTMENT NO. 1

SCALE: 3/8"=1'-0" SHEET 1 OF 2

DSN: TGG	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	86

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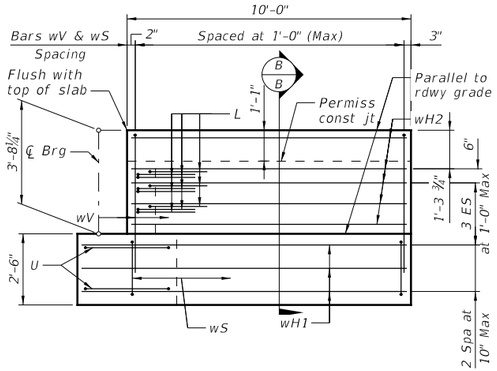
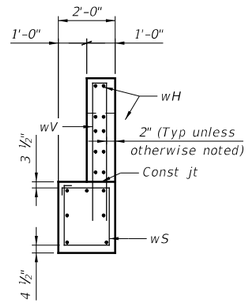
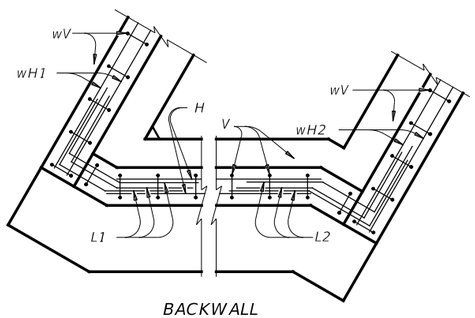


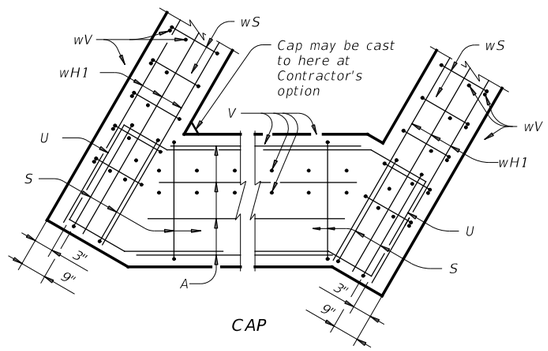
WINGWALL ELEVATION



SECTION B-B

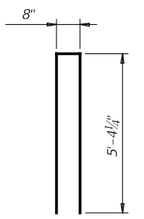


BACKWALL

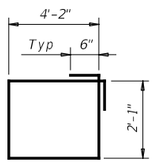


CAP

CORNER DETAILS



BARS V & wV



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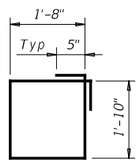

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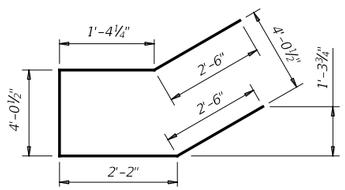

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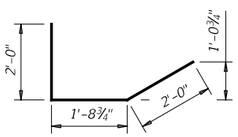
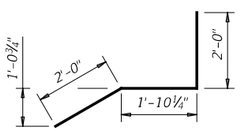


BARS L1



BARS L2

TABLE OF ESTIMATED QUANTITIES

Phase 1				
Bar	No.	Size	Length	Weight
A1	12	#11	22'-6"	1435
H1	8	#6	22'-4"	268
L1	9	#6	5'-9"	78
S	33	#5	13'-6"	465
U	2	#6	12'-7"	38
V	23	#5	11'-5"	274
wH1	7	#6	11'-11"	125
wH2	10	#6	9'-8"	145
wS	11	#4	7'-10"	58
wV	11	#5	11'-5"	131
Reinforcing Steel			Lb	3017
Class C Concrete (Abut)			CY	16.0

Phase 2				
Bar	No.	Size	Length	Weight
A2	12	#11	25'-11"	1653
H2	8	#6	25'-10"	310
L2	9	#6	5'-11"	80
S	32	#5	13'-6"	451
U	2	#6	12'-7"	38
V	27	#5	11'-5"	322
wH1	7	#6	11'-11"	125
wH2	10	#6	9'-8"	145
wS	11	#4	7'-10"	58
wV	11	#5	11'-5"	131
Reinforcing Steel			Lb	3313
Class C Concrete (Abut)			CY	18.0

GENERAL NOTES:

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

See Bridge Layout for header slope and foundation type, size and length.

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

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

See applicable rail details for rail anchorage in wingwalls.

Calculated foundation loads = 90 tons/ dr sh.

Cover dimensions are clear dimensions, unless noted otherwise.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).

Provide Grade 60 reinforcing steel.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

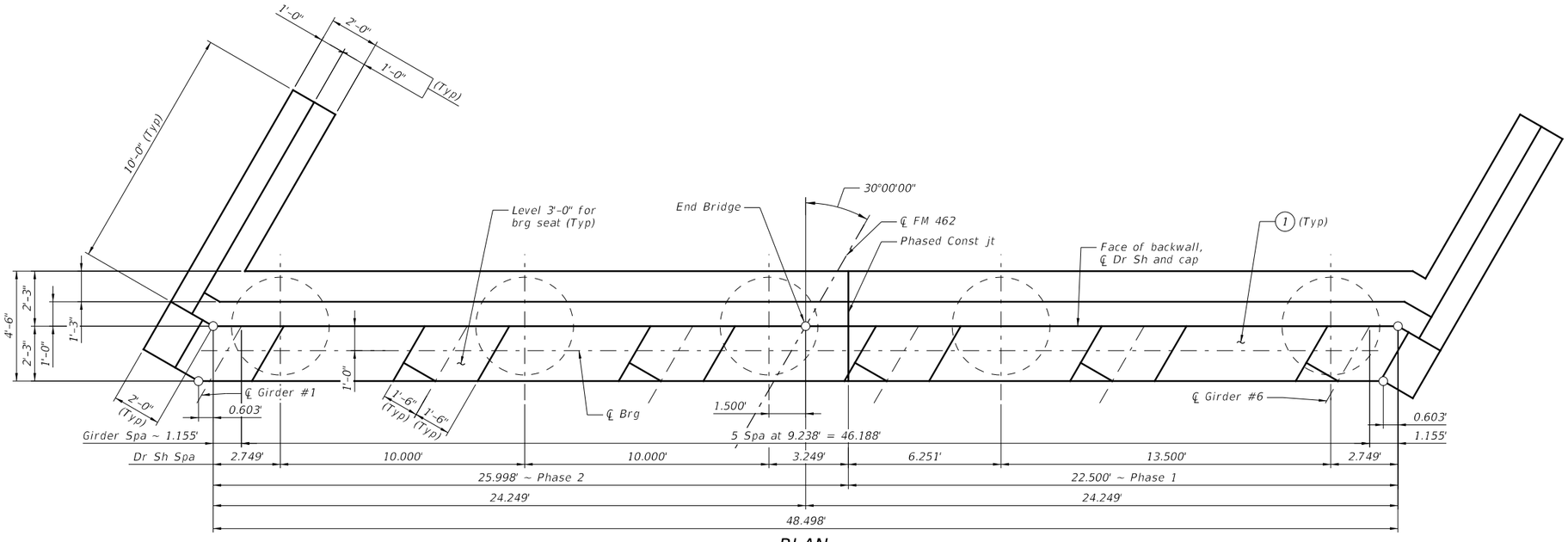
HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

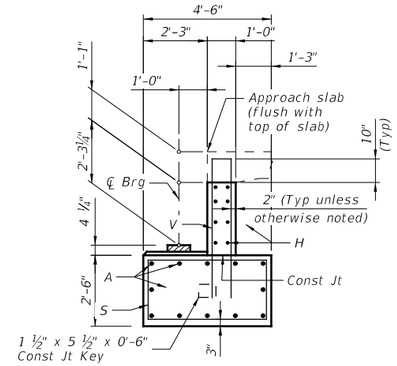
FM 462
HONDO CREEK BRIDGE ABUTMENT NO. 1

SCALE: NTS — SHEET 2 OF 2

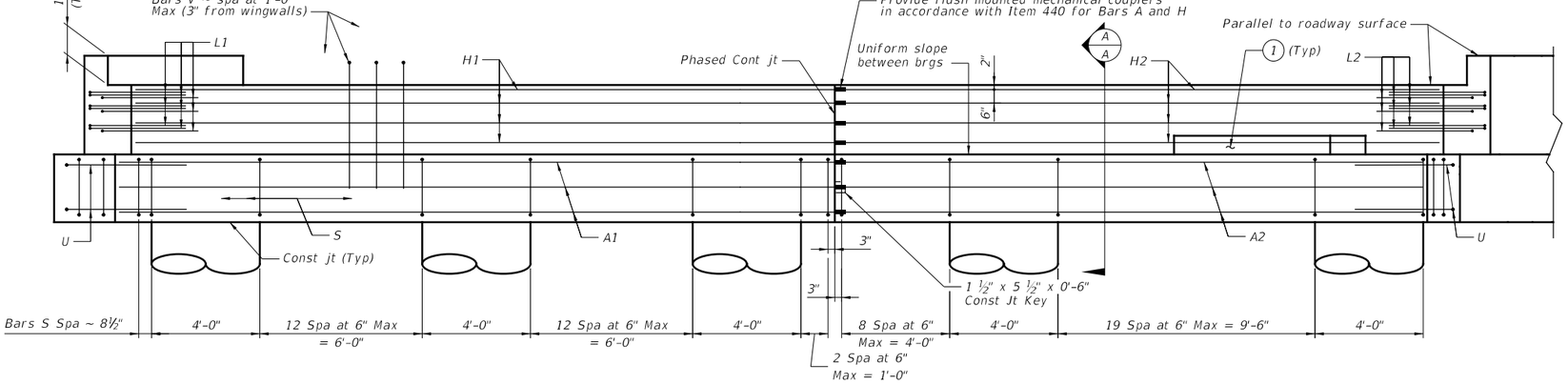
DSN: TGG	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	87



PLAN



SECTION A-A



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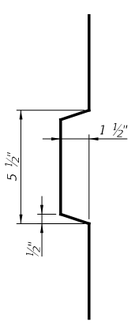
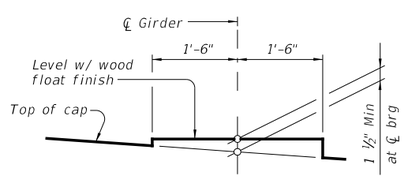


CONST JT KEY DETAIL



BEARING SEAT DETAIL

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

(1) Refer to "Shear Key Details" sheet for required shear keys. Shear keys shall bracket both sides of every girder end. Provide the required reinforcement. Concrete for shear key is included in the Class "C" Concrete (Abut) quantity.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

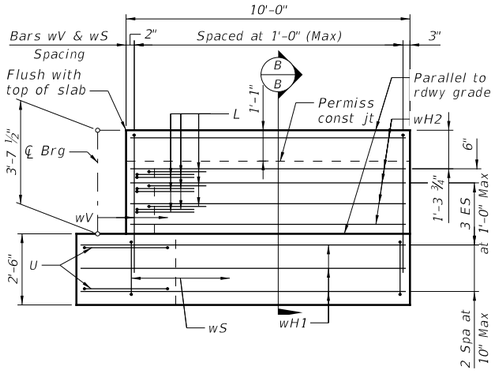
HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

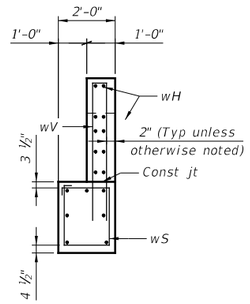
FM 462
HONDO CREEK BRIDGE
ABUTMENT NO. 7

SCALE: 3/8"=1'-0" **SHEET 1 OF 2**

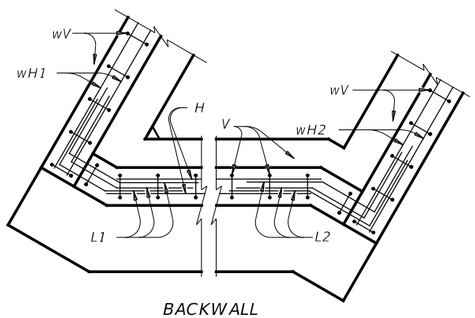
DSN: TGG	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	88



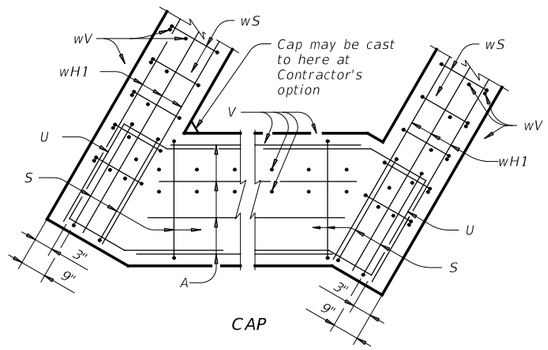
WINGWALL ELEVATION



SECTION B-B

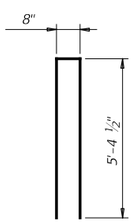


BACKWALL

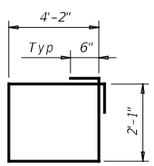


CAP

CORNER DETAILS



BARS V & wV



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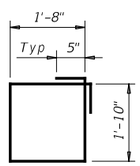

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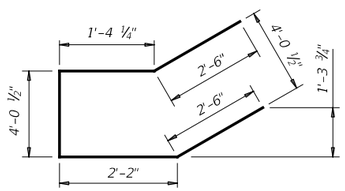

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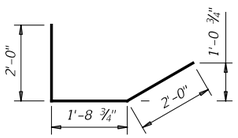
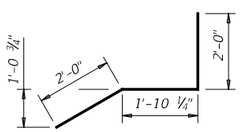


BARS L1



BARS L2

TABLE OF ESTIMATED QUANTITIES

Phase 1				
Bar	No.	Size	Length	Weight
A1	12	#11	22'-6"	1435
H1	8	#6	22'-4"	268
L1	9	#6	5'-9"	78
S	33	#5	13'-6"	465
U	2	#6	12'-7"	38
V	23	#5	11'-5"	274
wH1	7	#6	11'-11"	125
wH2	10	#6	9'-8"	145
wS	11	#4	7'-10"	58
wV	11	#5	11'-5"	131
Reinforcing Steel			Lb	3017
Class C Concrete (Abut)			CY	16.0

Phase 2				
Bar	No.	Size	Length	Weight
A2	12	#11	25'-11"	1653
H2	8	#6	25'-10"	310
L2	9	#6	5'-11"	80
S	32	#5	13'-6"	451
U	2	#6	12'-7"	38
V	27	#5	11'-5"	322
wH1	7	#6	11'-11"	125
wH2	10	#6	9'-8"	145
wS	11	#4	7'-10"	58
wV	11	#5	11'-5"	131
Reinforcing Steel			Lb	3313
Class C Concrete (Abut)			CY	17.9

GENERAL NOTES:

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

See Bridge Layout for header slope and foundation type, size and length.

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

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

See applicable rail details for rail anchorage in wingwalls.

Calculated foundation loads = 90 tons/ dr sh.

Cover dimensions are clear dimensions, unless noted otherwise.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Grade 60 reinforcing steel.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

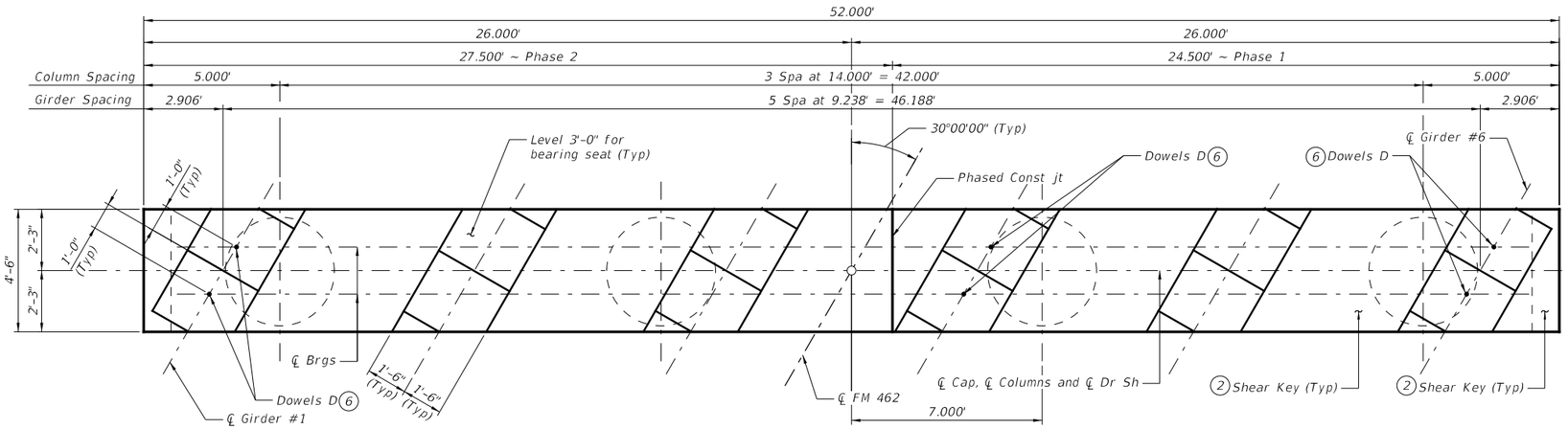
HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE ABUTMENT NO. 7

SCALE: NTS — SHEET 2 OF 2

DSN: TGG	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	89



PLAN

TABLE OF ESTIMATED QUANTITIES (1)

Phase 1				
Bar	No.	Size	Length	Weight
A1	5	#11	24'-3"	644
B1	5	#11	23'-3"	618
D	4	#9	1'-8"	22
S	25	#5	17'-8"	461
T1	10	#5	23'-4"	243
U	1	#5	12'-8"	13
(4) V	40	#9	19'-3"	2,618
(4) Z	2	#4	737'-0"	985
Reinforcing Steel			Lb	5604
Class "C" Concrete (Cap)			CY	19.6

Phase 2				
Bar	No.	Size	Length	Weight
A2	5	#11	27'-3"	724
B2	5	#11	26'-3"	697
D	2	#9	1'-8"	11
S	25	#5	17'-8"	461
T2	10	#5	26'-4"	275
U	1	#5	12'-8"	13
(4) V	40	#9	19'-3"	2,618
(4) Z	2	#4	737'-0"	985
Reinforcing Steel			Lb	5,784
Class "C" Concrete (Cap)			CY	22.1

Bent	Class "C" Concrete (Col) (5)
2	11.2
3	16.8
4	29.8
5	28.0
6	24.2

(1) Quantities shown are for one bent only.

(2) Refer to "Shear Key Details" Sheets for required shear keys. Shear Keys shall bracket both sides of every girder end. Provide the required reinforcement. Concrete for shear key is included in the Class C Concrete (Cap) quantity.

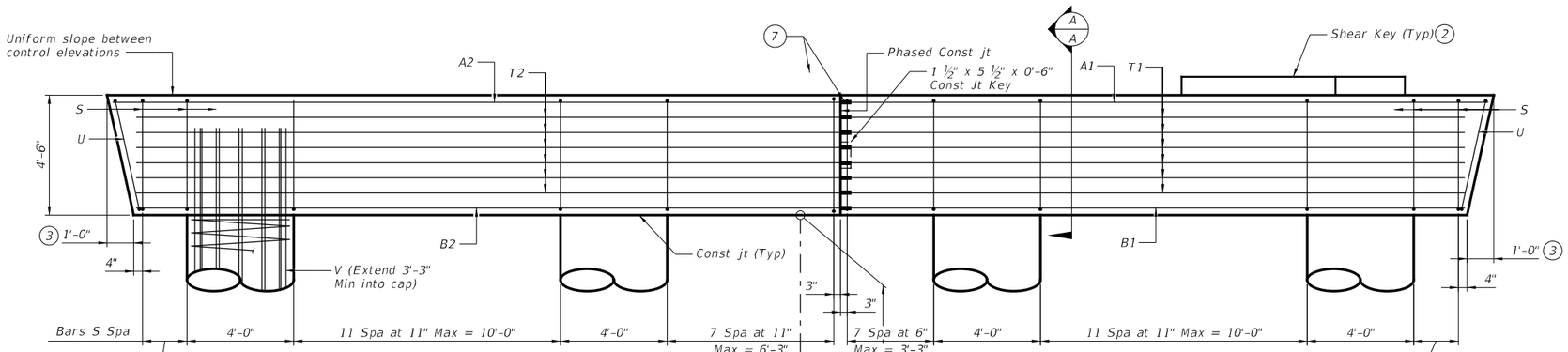
(3) Measured parallel to Top of Cap slope.

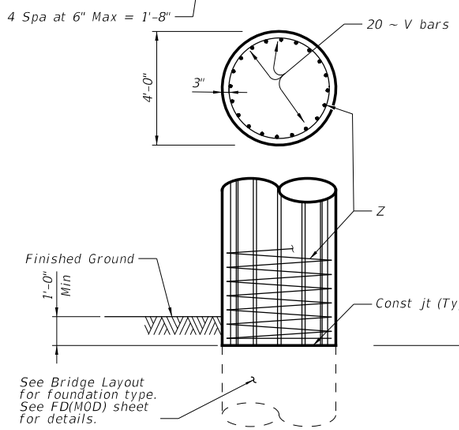
(4) Quantities shown are based on an "H" value of 16'. For each linear foot variation in "H" value, make the following adjustments per phase:
Bars V length, 1'-0"
Bars Z length, 44'-0"
Reinforcing steel, 195 lbs.

(5) Quantity based on "H" value shown on Bridge Layout. For each linear foot variation in "H" value, adjust Class C Conc (Col) by 1.86 CY.

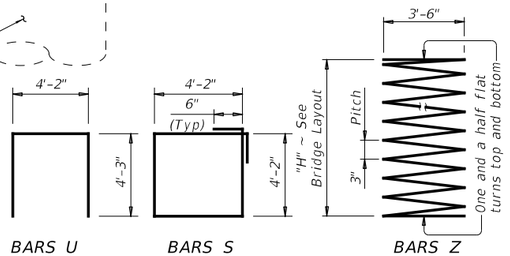
(6) Omit Dowels D at Bent No. 4, reduce reinforcing total by 33 lbs.

(7) Provide flush mounted mechanical couplers (in accordance with Item 440) for Bars A, B and T.

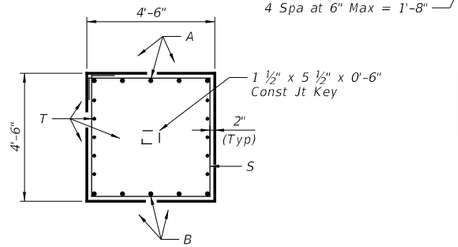




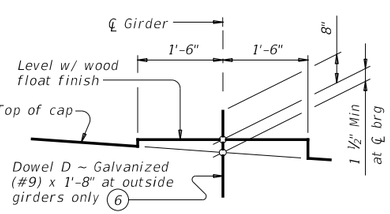
ELEVATION



BARS U BARS S BARS Z

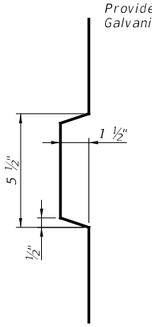


SECTION A-A



BEARING SEAT DETAIL

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



CONST JT KEY DETAIL

GENERAL NOTES:

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

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

See Common Foundation Details FD(MOD) standard sheet for all foundation details and notes.
Calculated Foundation Loads = 154 tons/ dr sh.

MATERIAL NOTES:

Provide Class C concrete (f'c = 3600 psi).
Provide Grade 60 reinforcing steel.
Galvanize dowel Bars D.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
INTERIOR BENT
NOS. 2-6

SCALE: 3/8"=1'-0" SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	90

PLOTDRIVER: TXDOT-PDF-BW.pltcfg
PENTABLE: 10237721
DATE: 7/30/2021
PLOTTING TIME: 3:37:41 PM
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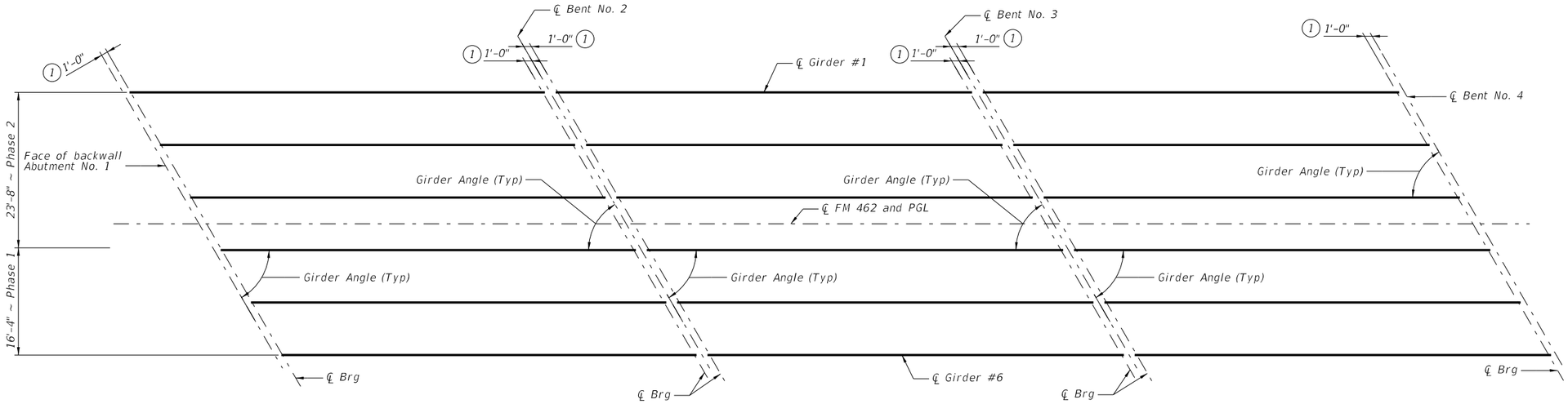
User Name: SHILTON



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

BENT REPORT

ABUTMENT NO. 1 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 1	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

BENT NO. 2 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 1	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

BENT NO. 2 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 2	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

BENT NO. 3 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 2	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

BENT NO. 3 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 3	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

BENT NO. 4 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 3	GIRDER 1	0.000	60 0 0
	GIRDER 2	9.238	60 0 0
	GIRDER 3	9.238	60 0 0
	GIRDER 4	9.238	60 0 0
	GIRDER 5	9.238	60 0 0
	GIRDER 6	9.238	60 0 0
	TOTAL	46.190	

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	62.845	64.46	0.0040
GIRDER 2	65.000	62.845	64.46	0.0042
GIRDER 3	65.000	62.845	64.46	0.0044
GIRDER 4	65.000	62.845	64.46	0.0045
GIRDER 5	65.000	62.845	64.46	0.0047
GIRDER 6	65.000	62.845	64.46	0.0048

GIRDER REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	63.000	64.50	0.0050
GIRDER 2	65.000	63.000	64.50	0.0050
GIRDER 3	65.000	63.000	64.50	0.0050
GIRDER 4	65.000	63.000	64.50	0.0050
GIRDER 5	65.000	63.000	64.50	0.0050
GIRDER 6	65.000	63.000	64.50	0.0050

GIRDER REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	63.000	64.50	0.0050
GIRDER 2	65.000	63.000	64.50	0.0050
GIRDER 3	65.000	63.000	64.50	0.0050
GIRDER 4	65.000	63.000	64.50	0.0050
GIRDER 5	65.000	63.000	64.50	0.0050
GIRDER 6	65.000	63.000	64.50	0.0050

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
FRAMING PLAN
(SPANS 1-3)

SCALE: NTS SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	91

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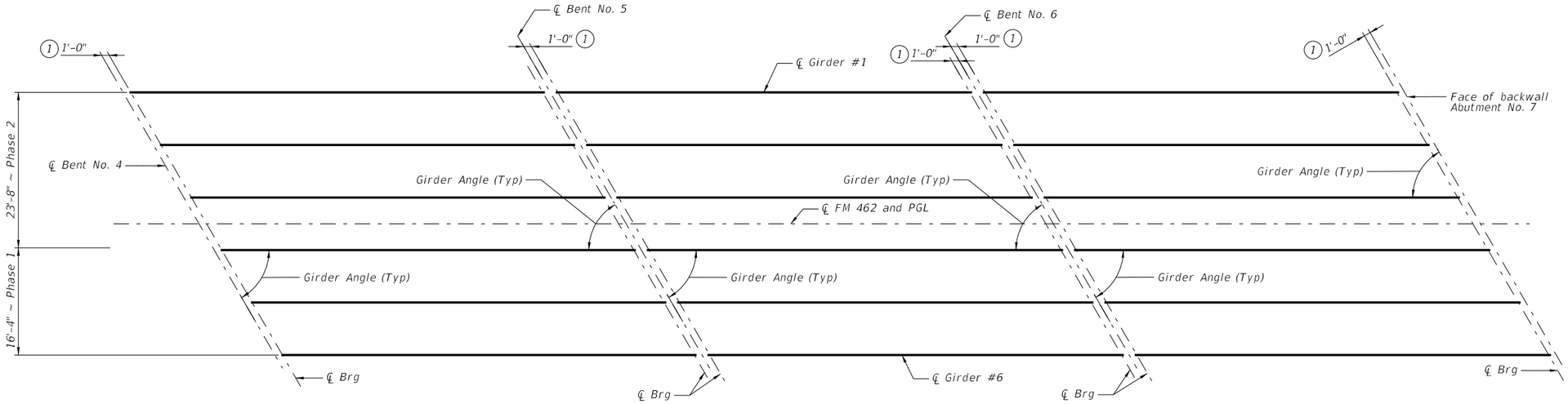

SPAN 4
(Tx28 Girders)

SPAN 5
(Tx28 Girders)

SPAN 6
(Tx28 Girders)

(1) See Elastomeric Bearing & Girder End Details (IGEB) standard sheet for orientation of dimension.

(2) Lengths shown are bottom Girder flange lengths with adjustments made for Girder slope.

BENT REPORT

BENT NO. 4 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

BENT NO. 5 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

BENT NO. 5 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 5	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

BENT NO. 6 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 5	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

BENT NO. 6 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 6	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

ABUTMENT NO. 7 (S 62 12' 35.98" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 23.094 L

		GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 6	GIRDER 1	0.000	60	0	0
	GIRDER 2	9.238	60	0	0
	GIRDER 3	9.238	60	0	0
	GIRDER 4	9.238	60	0	0
	GIRDER 5	9.238	60	0	0
	GIRDER 6	9.238	60	0	0
	TOTAL	46.190			

GIRDER REPORT

GIRDER REPORT, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	63.000	64.50	0.0050
GIRDER 2	65.000	63.000	64.50	0.0050
GIRDER 3	65.000	63.000	64.50	0.0050
GIRDER 4	65.000	63.000	64.50	0.0050
GIRDER 5	65.000	63.000	64.50	0.0051
GIRDER 6	65.000	63.000	64.50	0.0051

GIRDER REPORT, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	63.000	64.50	0.0068
GIRDER 2	65.000	63.000	64.50	0.0071
GIRDER 3	65.000	63.000	64.50	0.0074
GIRDER 4	65.000	63.000	64.50	0.0078
GIRDER 5	65.000	63.000	64.50	0.0085
GIRDER 6	65.000	63.000	64.50	0.0097

GIRDER REPORT, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	65.000	62.845	64.47	0.0088
GIRDER 2	65.000	62.845	64.47	0.0101
GIRDER 3	65.000	62.845	64.47	0.0116
GIRDER 4	65.000	62.845	64.47	0.0141
GIRDER 5	65.000	62.845	64.47	0.0176
GIRDER 6	65.000	62.845	64.47	0.0211

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
FRAMING PLAN
(SPANS 4-6)

SCALE: NTS SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	92

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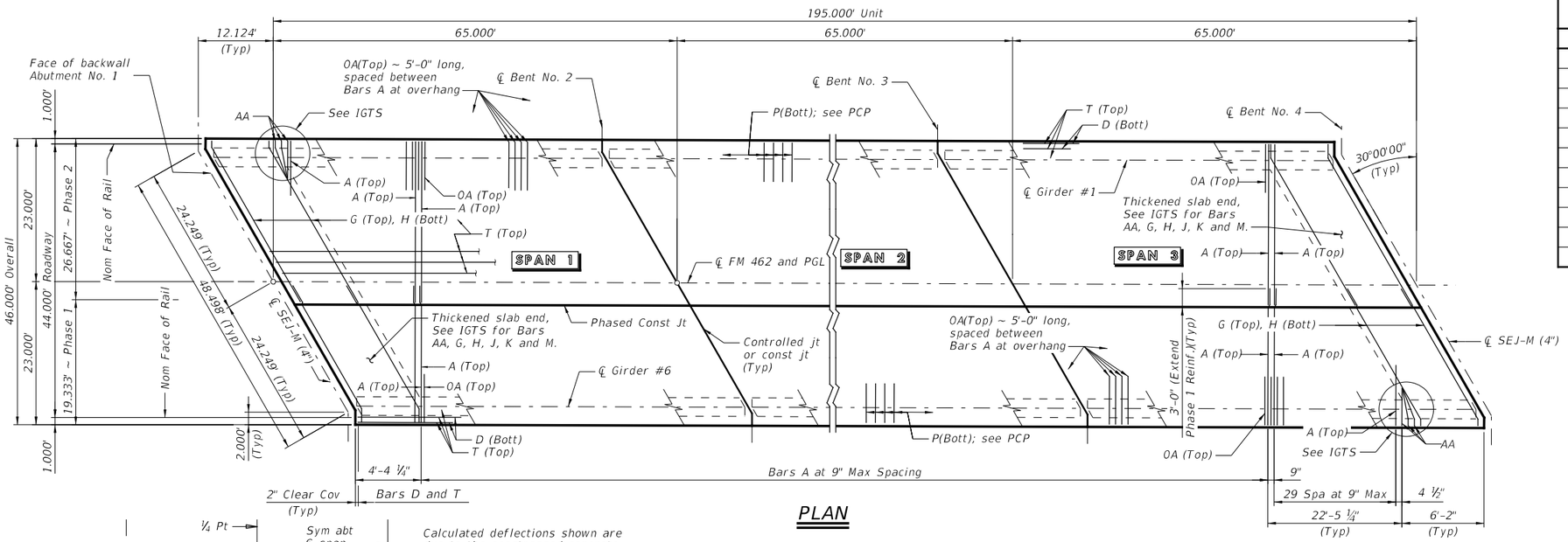

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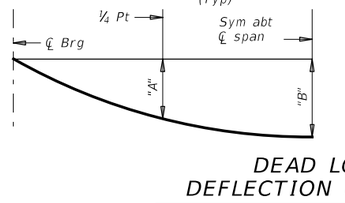


Calculated deflections shown are due to the prestressed concrete panels and cast-in-place concrete slab on interior girders only (Ec = 5000 ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require field verification.

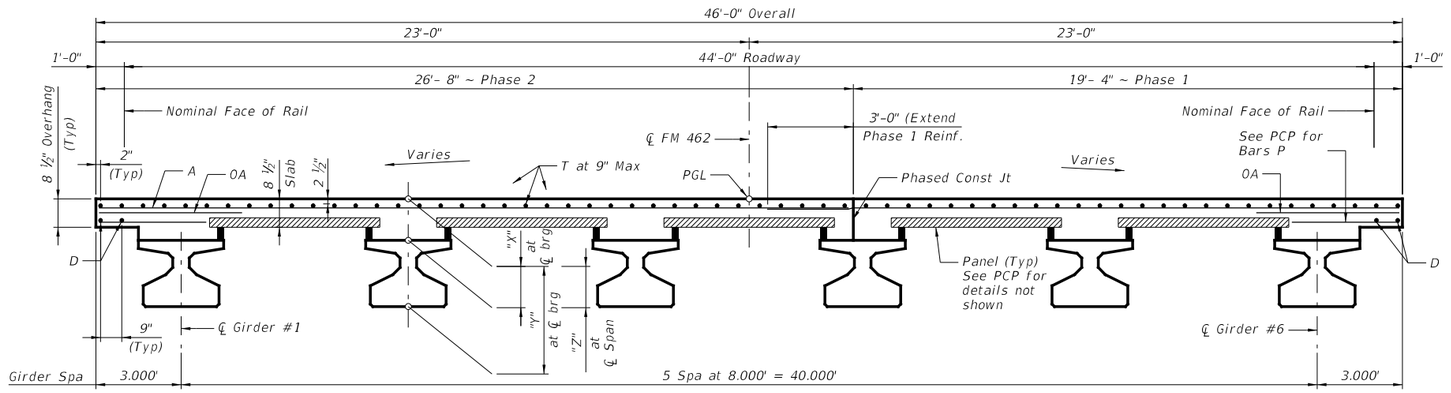
DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS

Span #	Girder #	"A"	"B"
		Ft	Ft
1-3	1,6	-0.058	-0.082
1-3	2-5	-0.066	-0.094

TABLE OF SECTION DEPTHS

Span #	Girder #	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span
		Ft/In	Ft/In	Ft/In
1	1	12"	3'-4"	9¾"
1	2	12"	3'-4"	9⅞"
1	3-6	12"	3'-4"	10"
2	All	11¾"	3'-3¾"	9⅞"
3	All	11¾"	3'-3¾"	9⅞"



TYPICAL TRANSVERSE SECTION

BAR TABLE

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

TABLE OF ESTIMATED QUANTITIES

Phase 1

Span #	Reinf Concrete Slab	Prestressed Concrete Girders (Ty Tx28) (2)	Total Reinf Steel (1)
	SF	LF	LB
1	1,257	193.38	2,891
2	1,257	193.50	2,891
3	1,257	193.50	2,891
TOTAL	3,771	580.38	8,673

TABLE OF ESTIMATED QUANTITIES

Phase 2

Span #	Reinf Concrete Slab	Prestressed Concrete Girders (Ty Tx28) (2)	Total Reinf Steel (1)
	SF	LF	LB
1	1,733	193.38	3,986
2	1,733	193.50	3,986
3	1,733	193.50	3,986
TOTAL	5,199	580.38	11,958

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

(2) Lengths shown are bottom Girder flange lengths with adjustments made for Girder slope. See FRAMING PLAN for Girder lengths.

GENERAL NOTES:

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

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

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

See IGMS standard for miscellaneous details.

See applicable rail details for rail anchorage in slab.

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

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4000 psi).

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, AA, D, OA, P or T unless noted otherwise.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
195.00' PRESTRESSED CONC GIRDER UNIT
(SPANS 1-3)

SCALE: NTS — SHEET 1 OF 1

DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	93

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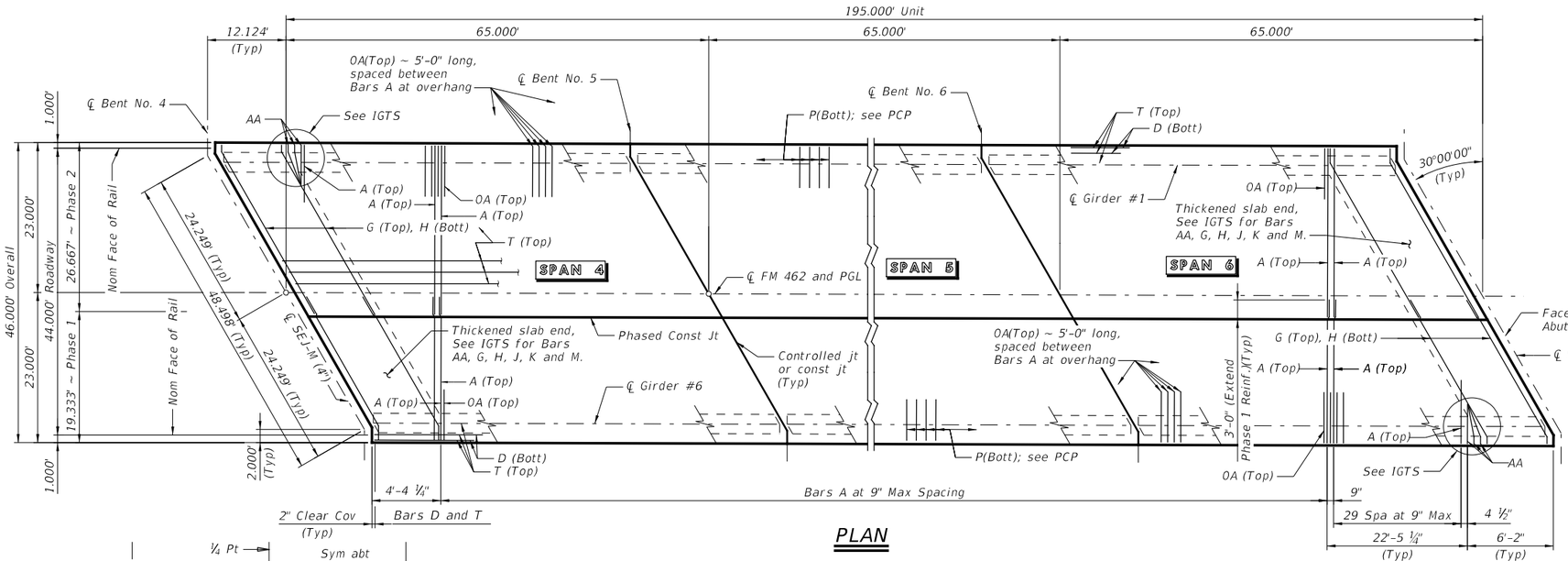
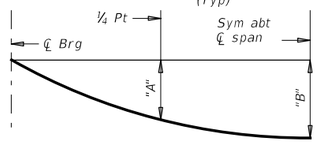
User Name:SHILTON



PLAN



Calculated deflections shown are due to the prestressed concrete panels and cast-in-place concrete slab on interior girders only (Ec = 5000 ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require field verification.

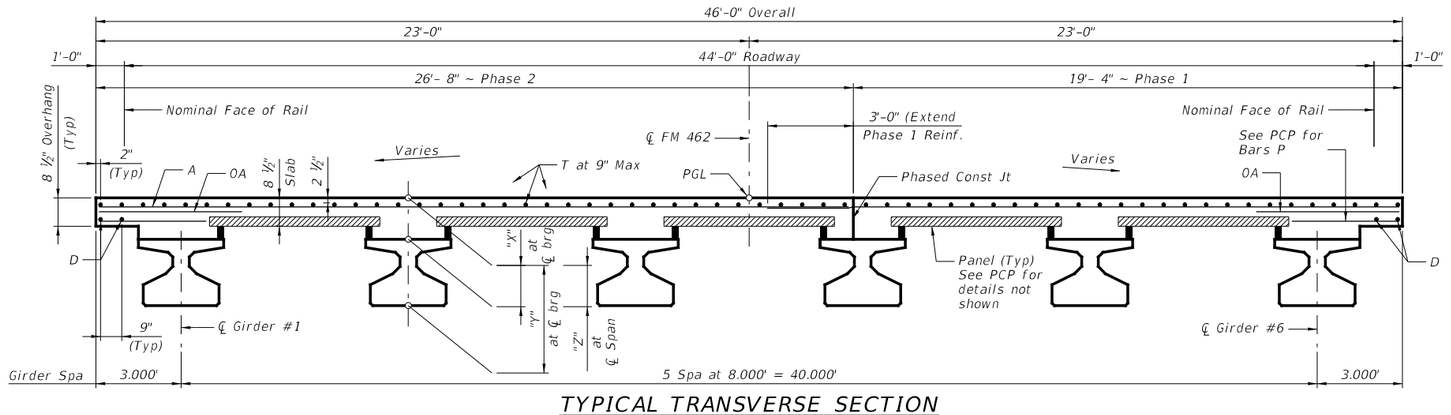
DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS

Span #	Girder #	"A"	"B"
		Ft	Ft
4-6	1,6	-0.059	-0.083
4-6	2-5	-0.067	-0.095

TABLE OF SECTION DEPTHS

Span #	Girder #	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span
		Ft/In	Ft/In	Ft/In
4	1-5	11¾"	3'-3¾"	9⅞"
4	6	11¾"	3'-3¾"	9¾"
5	1,5	12½"	3'-4½"	10⅛"
5	2-4	12½"	3'-4½"	10¼"
5	6	12½"	3'-4½"	9⅝"
6	1,2	12¼"	3'-4¼"	10⅛"
6	3-5	12¼"	3'-4¼"	10"
6	6	12¼"	3'-4¼"	9⅞"



TYPICAL TRANSVERSE SECTION

BAR TABLE

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

TABLE OF ESTIMATED QUANTITIES

Phase 1

Span #	Reinf Concrete Slab	Prestressed Concrete Girders (Ty Tx28) (2)	Total Reinf Steel (1)
	SF	LF	LB
4	1,257	193.50	2,891
5	1,257	193.50	2,891
6	1,257	193.41	2,891
TOTAL	3,771	580.41	8,673

TABLE OF ESTIMATED QUANTITIES

Phase 2

Span #	Reinf Concrete Slab	Prestressed Concrete Girders (Ty Tx28) (2)	Total Reinf Steel (1)
	SF	LF	LB
4	1,733	193.50	3,986
5	1,733	193.50	3,986
6	1,733	193.41	3,986
TOTAL	5,199	580.41	11,958

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

(2) Lengths shown are bottom Girder flange lengths with adjustments made for Girder slope. See FRAMING PLAN for Girder lengths.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 8th Edition (2017) and current Interims.
See IGTS standard for Thickened Slab End details and quantity adjustments.
See PCP and PCP-FAB for panel details not shown.
See IGMS standard for miscellaneous details.
See applicable rail details for rail anchorage in slab.
See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4000 psi).
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, AA, D, OA, P or T unless noted otherwise.

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

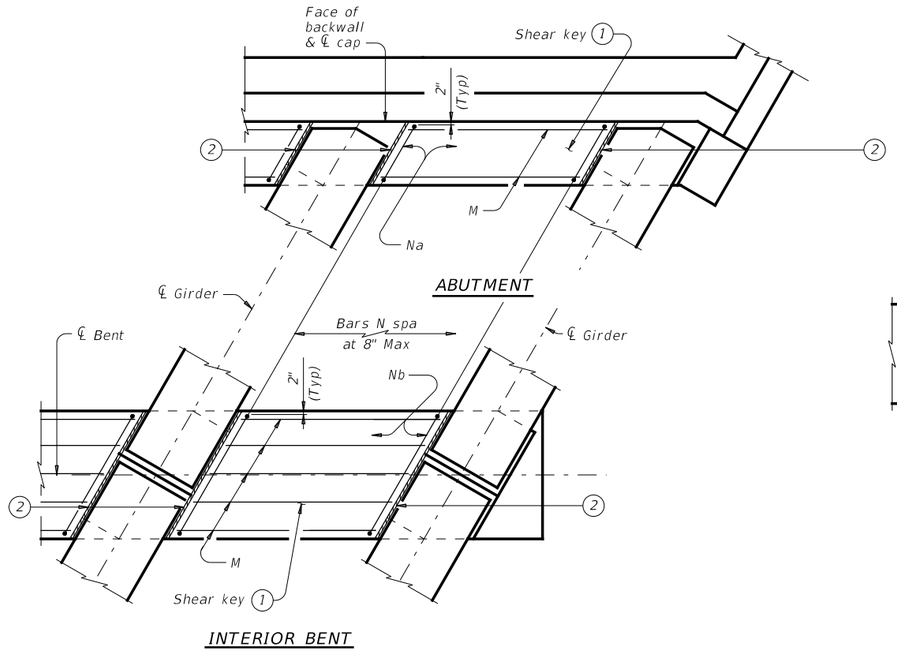
HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
195.00' PRESTRESSED CONC GIRDER UNIT
(SPAN 4-6)

SCALE: NTS SHEET 1 OF 1

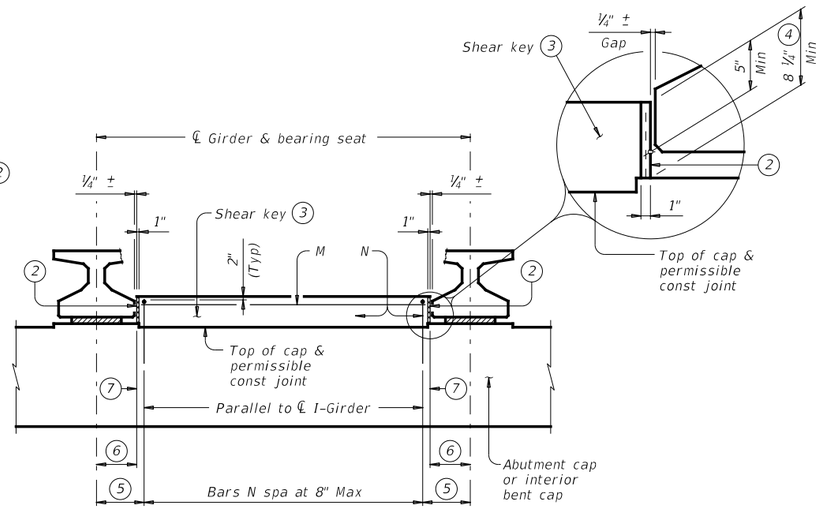
DSN: STH	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: CJW	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: CJW	MEDINA	SAT	0848	04	049	94



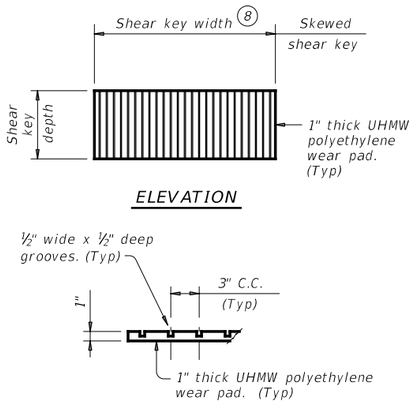
INTERIOR BENT

PARTIAL PLAN

Precast caps per PPBC-RC (MOD) Standard.
Showing shear key reinforcement.



PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)



ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS

(1) Place shear keys between every girder.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast shear key with wear pad, 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."

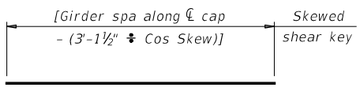
(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

(5) With Skew = 1'-8 ¼" ± Cos Skew, measured along ℄ cap.

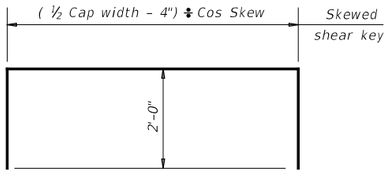
(6) With Skew = 1'-4 ¼" ± Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

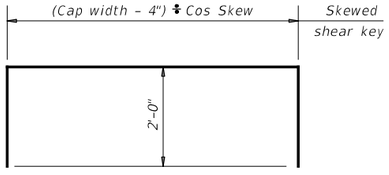
(8) Abutments = ½ Cap width ± Cos Skew.
Interior bents = Cap width ± Cos Skew.



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 Grade 60 reinforcing steel.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

UHMW polyethylene wear pads are subsidiary to Class "C" concrete.
Shear key concrete included in abutment or bent cap concrete for payment.
Designed according to AASHTO LRFD Bridge Design Specifications, 8th Edition (2017) and current Interims.

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

HL93 LOADING

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
SHEAR KEY DETAILS

SCALE: N. T. S.			SHEET 1 OF 1			
DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: STH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: TGG	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: STH	MEDINA	SAT	0848	04	049	95

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DATE: 7/30/2021
PLOTTING TIME: 3:37:53 PM
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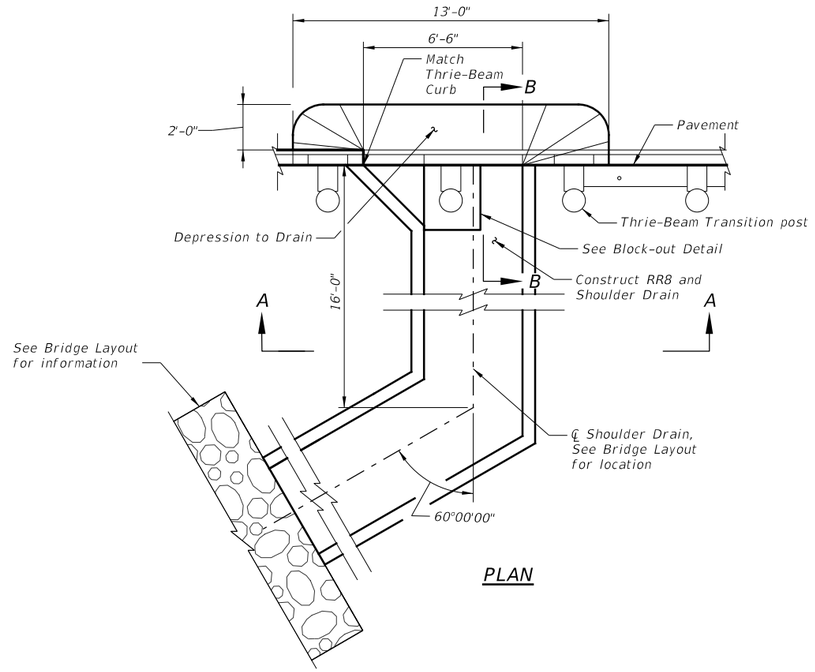
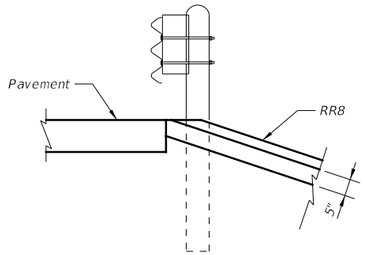
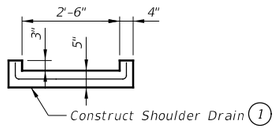
User Name:SHILTON



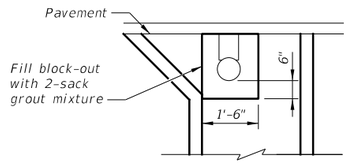
PLAN



SECTION B-B



SECTION A-A



BLOCK-OUT DETAIL

SHOULDER DRAIN INSTALLATION DETAIL

NOT TO SCALE

(1) See section D-D on CRR Standard. See CRR Standard for Riprap Details not shown.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
CASSANDRA WALLOF
120398
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PROFESSIONAL ENGINEER

08.02.21

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462
HONDO CREEK BRIDGE
MISCELLANEOUS DETAILS

N. T. S.

SHEET 1 OF 1

DSN: CJW	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: STH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: CJW	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: STH	MEDINA	SAT	0848	04	049	96

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
HONDO CREEK BRIDGE	All	All	Tx28		24	0.6	270	9.65	6.31	4	24.5	4.700	6.200	2.874	-3.518	2623	0.619	0.925

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

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

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

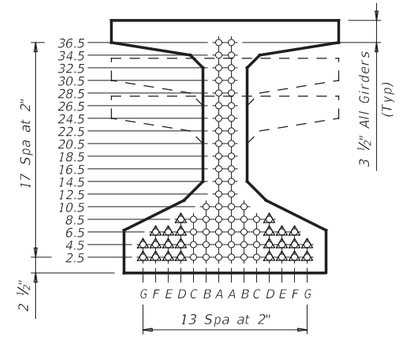
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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

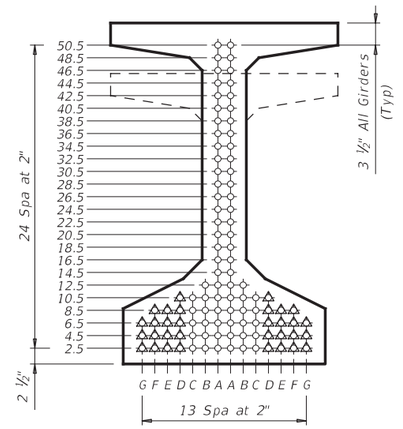
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must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

DEPRESSED STRAND DESIGNS:

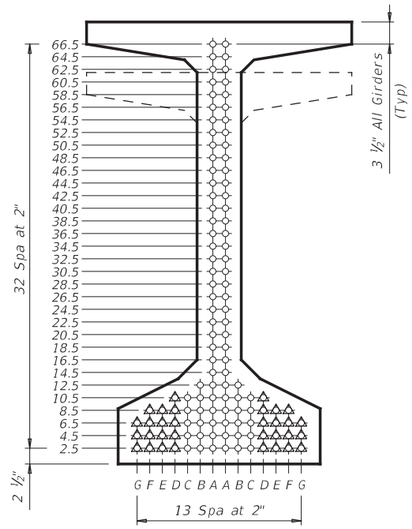
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands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



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HDR Engineering Inc.
Texas P.E. Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

08.02.21

Cassie Walloff

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND (MOD)

FILE: igndsts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only.	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		97

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

DATE: 7/30/2021 3:37:58 PM
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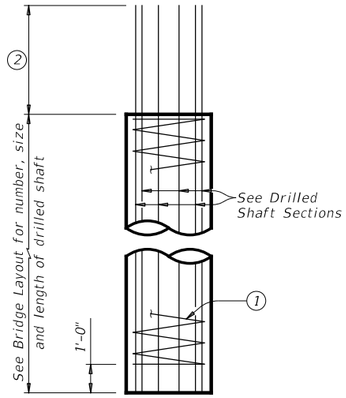
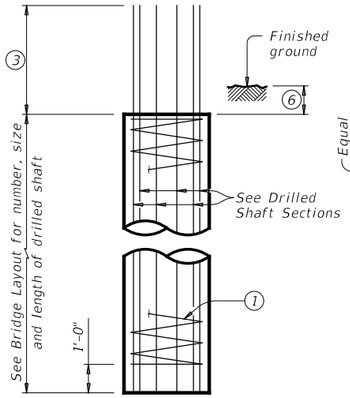
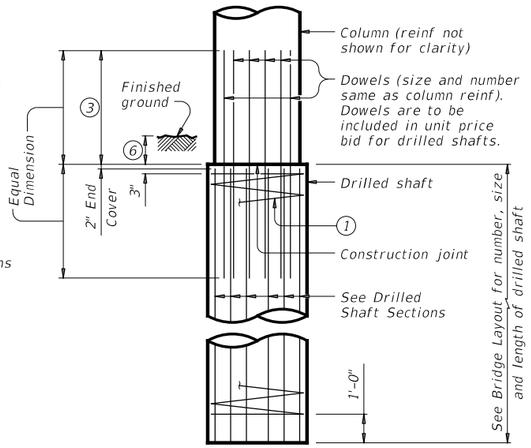


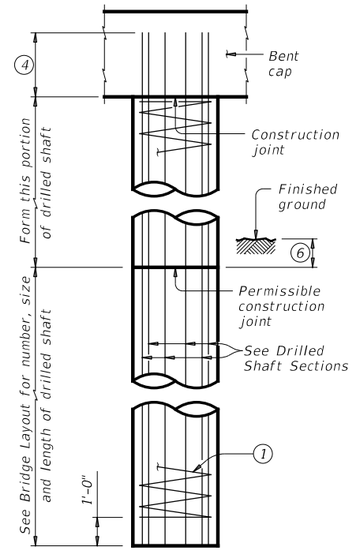
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



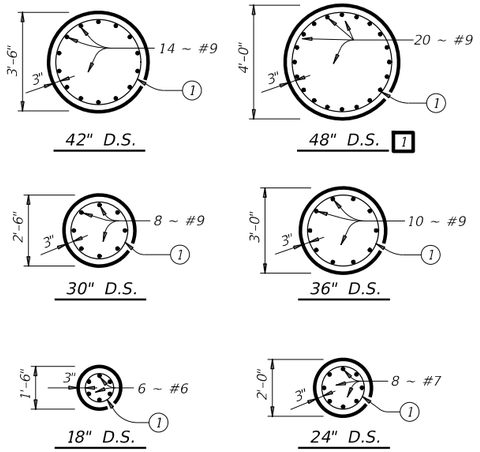
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

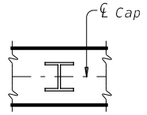


DRILLED SHAFT SECTIONS

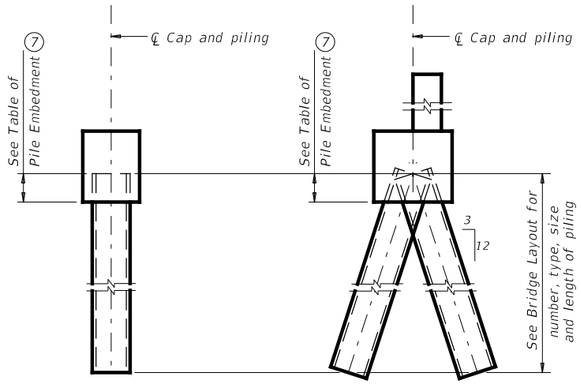
DRILLED SHAFT DETAILS

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

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



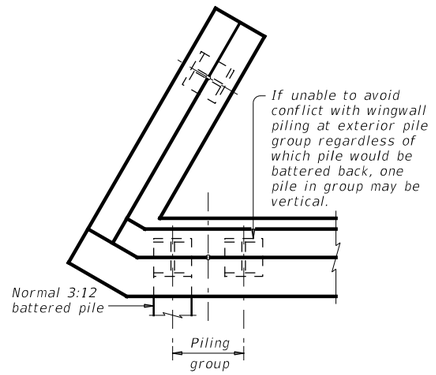
ORIENTATION OF STEEL H-PILING



VERTICAL PILE BATTERED PILE

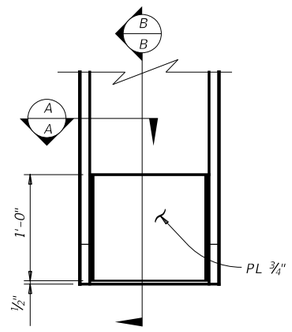
PILING DETAILS

(Concrete or steel H)

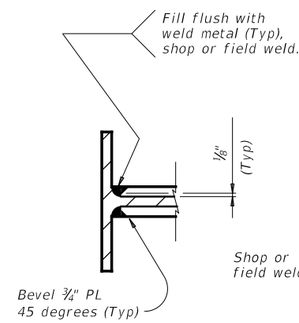


DETAIL "A"

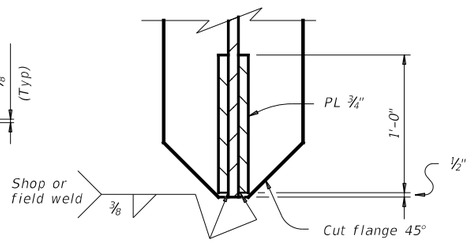
(Showing plan view of a 30° skewed abutment)



ELEVATION



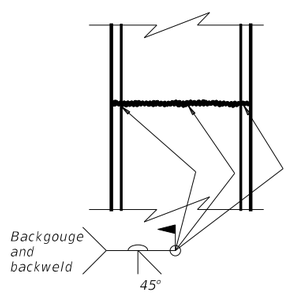
SECTION A-A



SECTION B-B

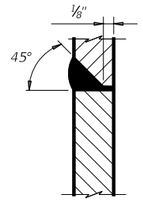
STEEL H-PILE TIP REINFORCEMENT

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



STEEL H-PILE SPLICE DETAIL

Use when required.



SECTION THRU FLANGE OR WEB

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

1 4/21 HDR: Revised 48" shaft reinforcing

HDR Engineering Inc.
Texas P.E. Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
08.02.21

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD(MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		98

DATE: 7/30/2021 3:38:01 PM
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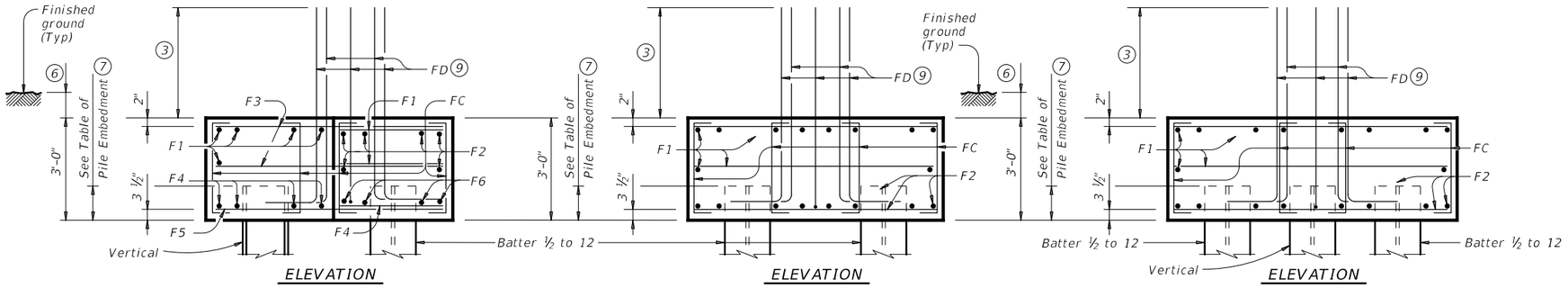
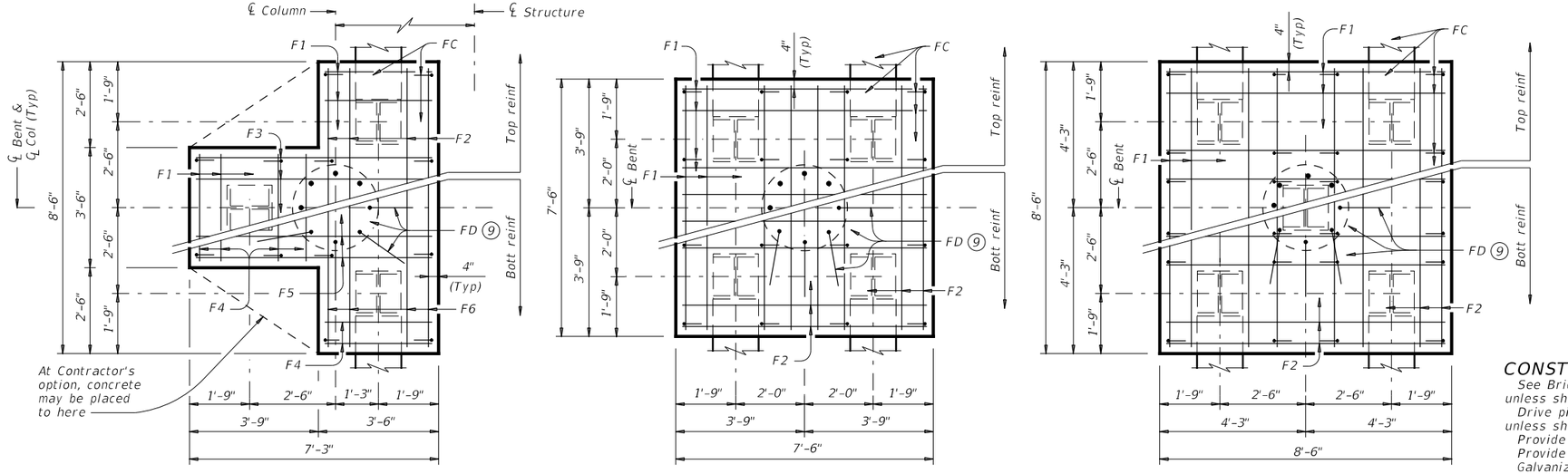




THREE PILE FOOTING (8)

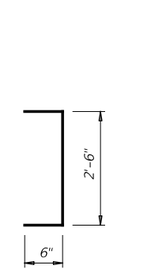
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

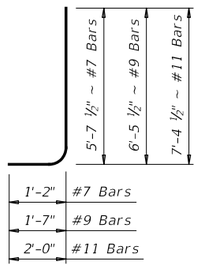
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

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

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

(7) Or as shown on plans.

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

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

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

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

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

ONE 4 PILE FOOTING

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

ONE 5 PILE FOOTING

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

CONSTRUCTION NOTES:

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

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

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

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

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

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

Maximum allowable pile loads for the footings shown are:

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

1 4/21 HDR: No revisions this sheet

HDR Engineering Inc.
Texas P.E. Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

Texas Department of Transportation

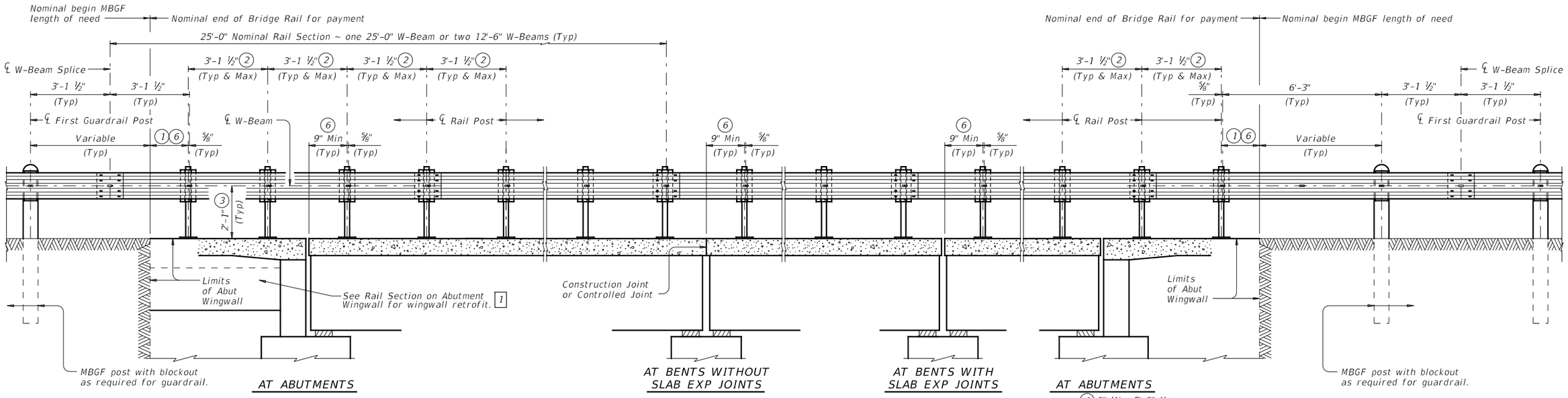
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD(MOD)

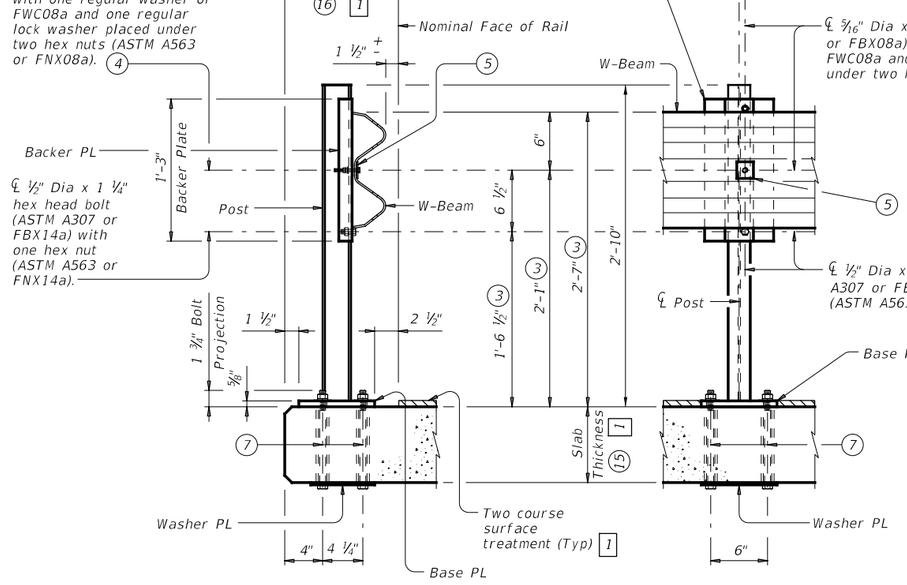
FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		99

DATE: 7/30/2021 3:38:01 PM
FILE: 001-FD(MOD)



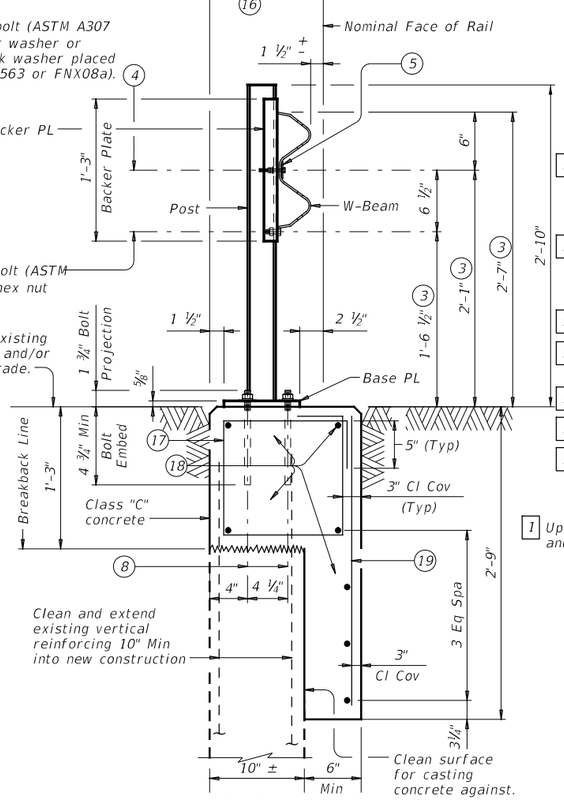
ROADWAY ELEVATION OF RAIL

Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB



RAIL SECTION ON ABUTMENT WINGWALL [1]

(1) 9" Min, 5'-9" Max

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

[1] (7) ℄ ⅛" Dia cored holes for ℄ ⅜" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cored Hole Anchor Bolt".

[1] (8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cored Hole Anchor Bolt".

[1] (15) Field verify as-built slab thickness prior to ordering bolts.

[1] (16) Remove asphalt overlay to top of concrete slab. Removal of asphalt overlay within the limits of the rail is subsidiary to Item 451. Wingwall Retrofit is subsidiary to Item 451.

[1] (17) Space (#4) Stirrups at 8" Max. (Spaced 3 1/4" longitudinally from retrofitted ends of wingwall).

[1] (18) 7 - (#5) bars with 3" end cover.

[1] (19) Space (#4) bars at 8" Max with 3" end cover, spaced with (#4) stirrups.

[1] Updated for retrofit on existing bridge and cored holes.

HDR Engineering Inc.
Texas P.E. Firm Registration No. F-754

08.02.21

SHEET 1 OF 2

Texas Department of Transportation

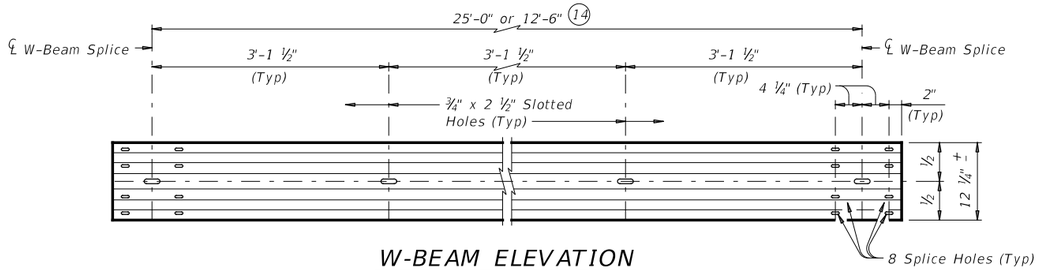
Bridge Division Standard

TRAFFIC RAIL

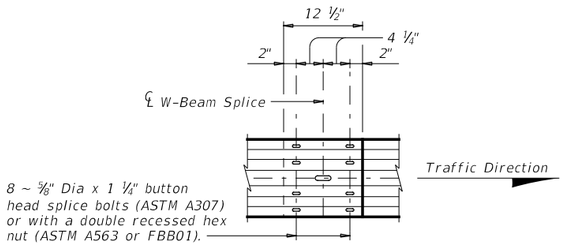
TYPE T631(MOD)

FILE:	rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0848	04	049	FM 462
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
		SAT	MEDINA		100

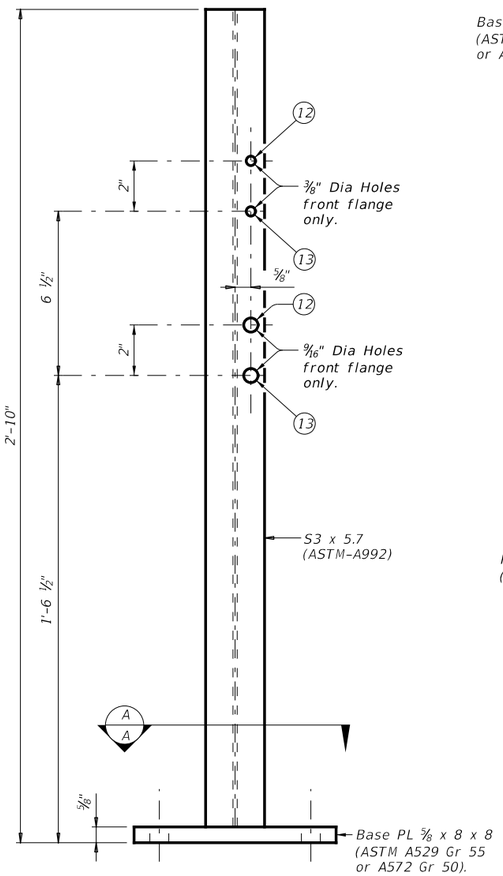
DATE: 7/30/2021 3:38:03 PM
FILE: 018-T631(MOD).dgn



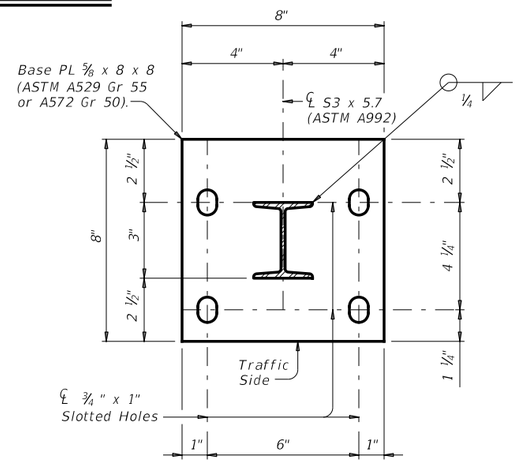
W-BEAM ELEVATION



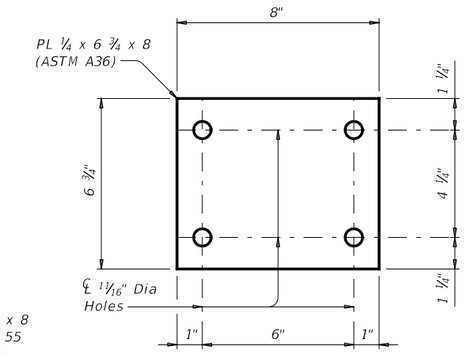
W-BEAM SPLICE ELEVATION



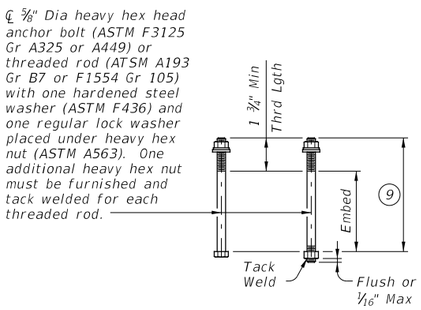
POST ELEVATION



SECTION A-A



WASHER PLATE DETAIL



CORED HOLE ANCHOR BOLT (10) [1]

(9) *See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".*

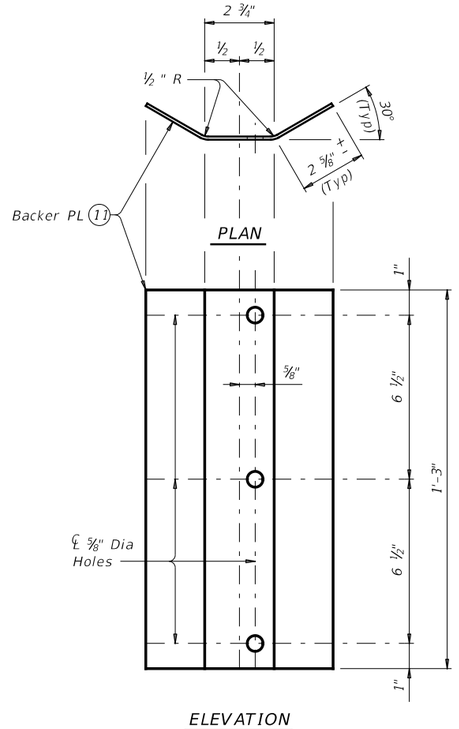
(10) *See "Material Notes" for anchor bolt information.*

(11) *Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).*

(12) *Used for structures with overlay.*

(13) *Used for structures without overlay.*

(14) *At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.*



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment.

[1] CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

Contractor to verify location of existing concrete posts. Fabricator must submit erection drawings, including Rail Layout with rail posts and W-beam splices, to the Engineer for approval.

Holes for anchors shall be cored. Percussion Drilling is not permitted through the bridge slab.

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.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

[1] MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 20 plf total.

[1] *Updated for retrofit on existing bridge and cored holes.*

HDR Engineering Inc.
Texas P.E. Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
08.02.21

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631(MOD)

FILE: rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		101

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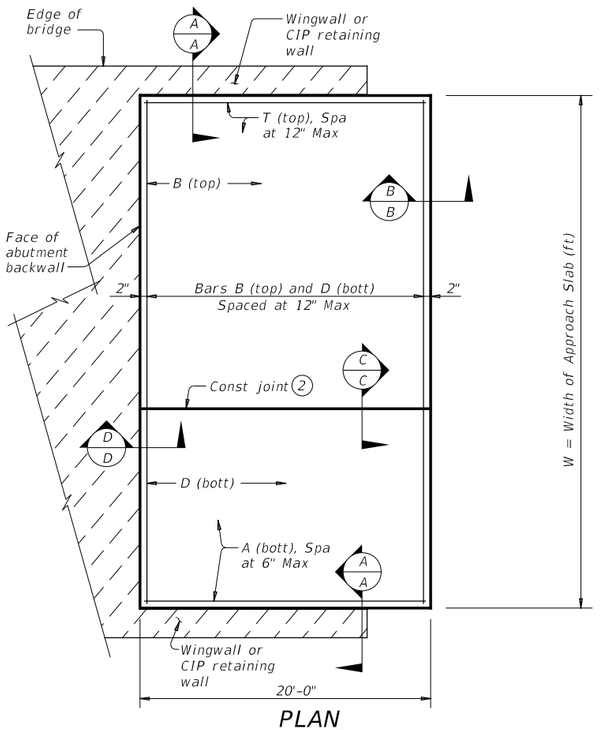
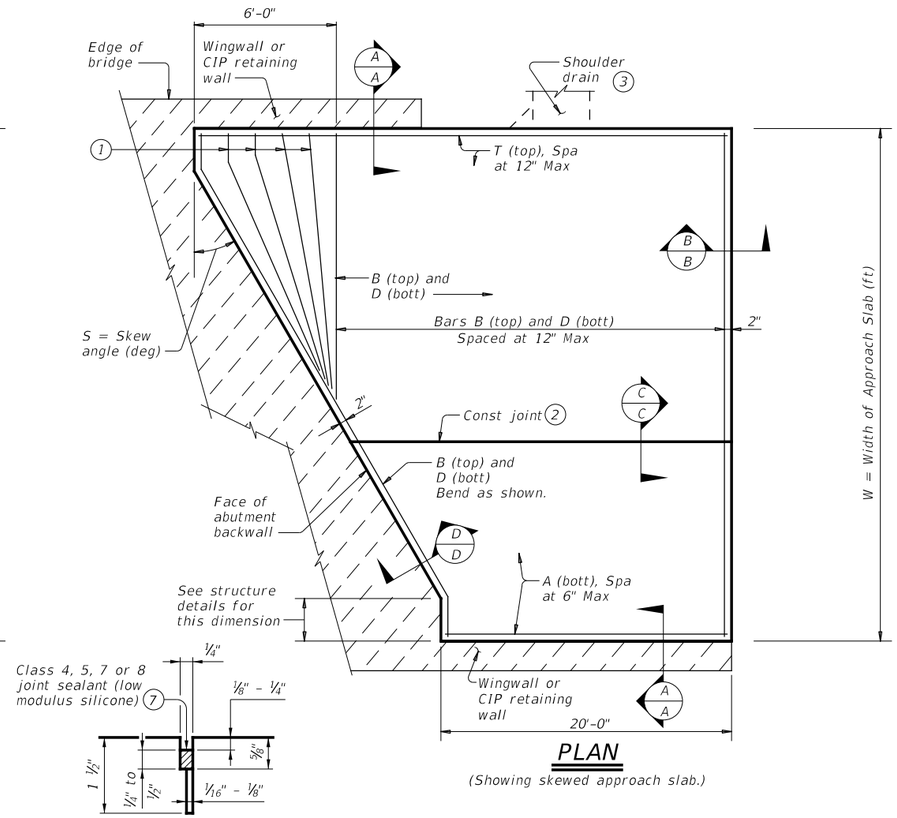


PLAN

(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.

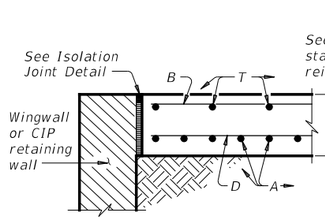
(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

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

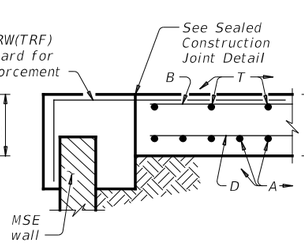
(7) Place in accordance with Item 438.

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

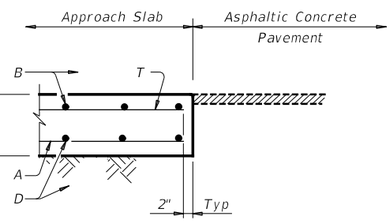
(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

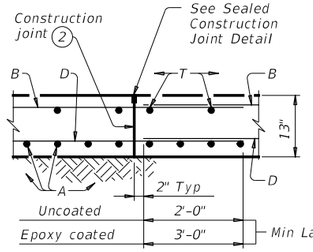


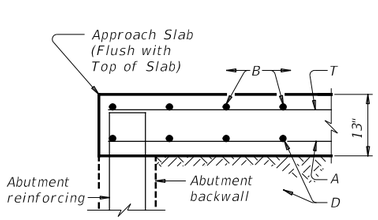
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





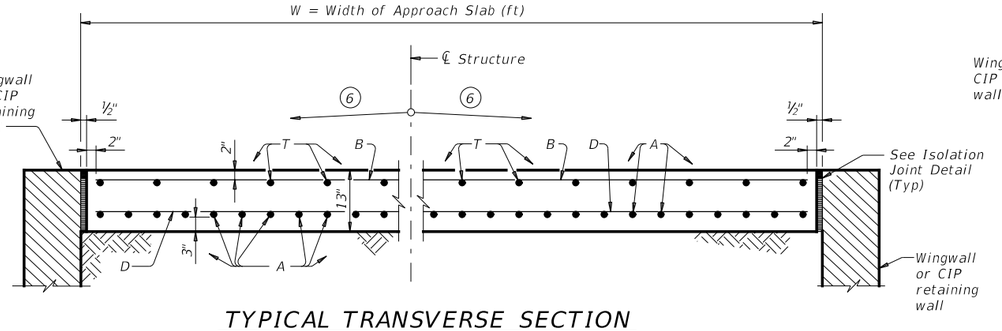


SECTION A-A

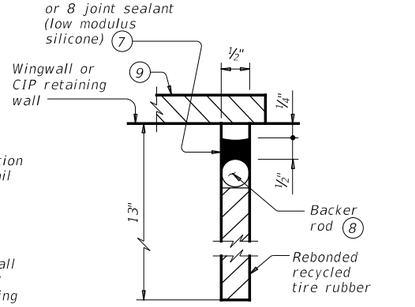
SECTION B-B

SECTION C-C (5)

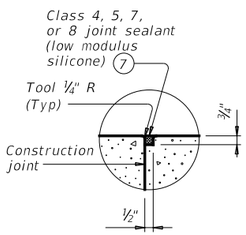
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

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.

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		102

DATE: 7/30/2021 3:38:07 PM
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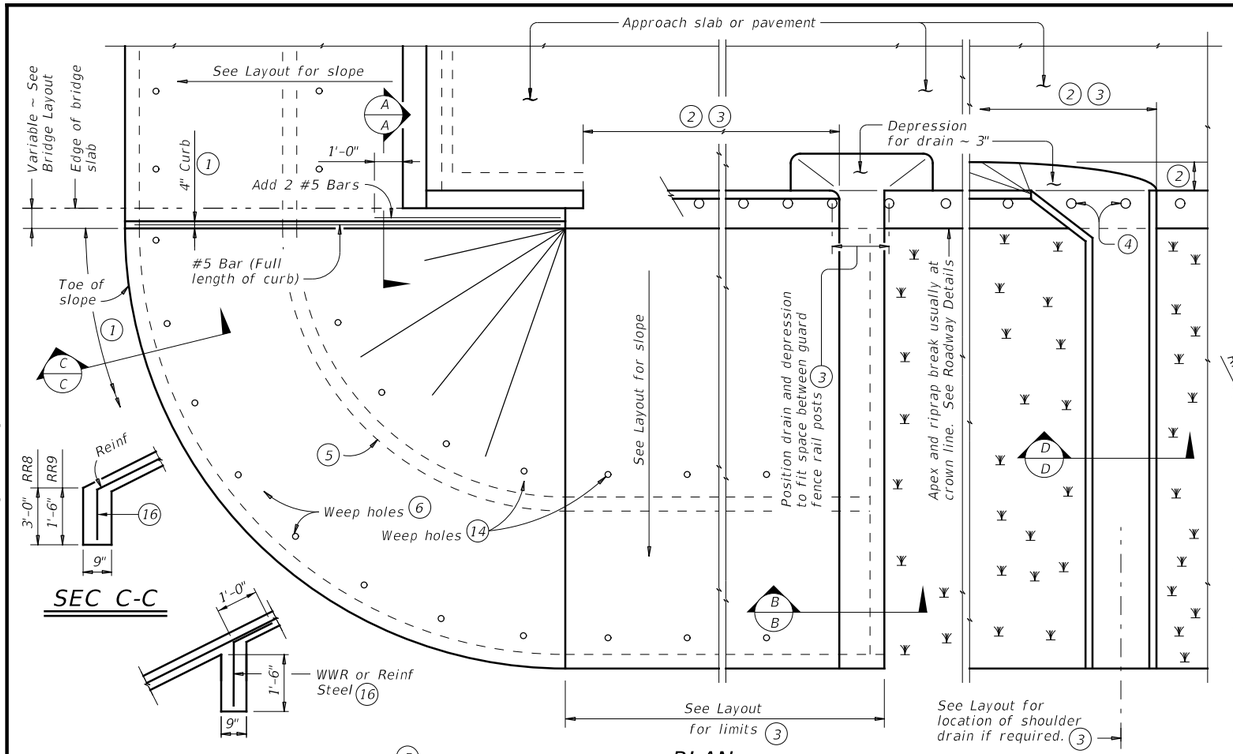
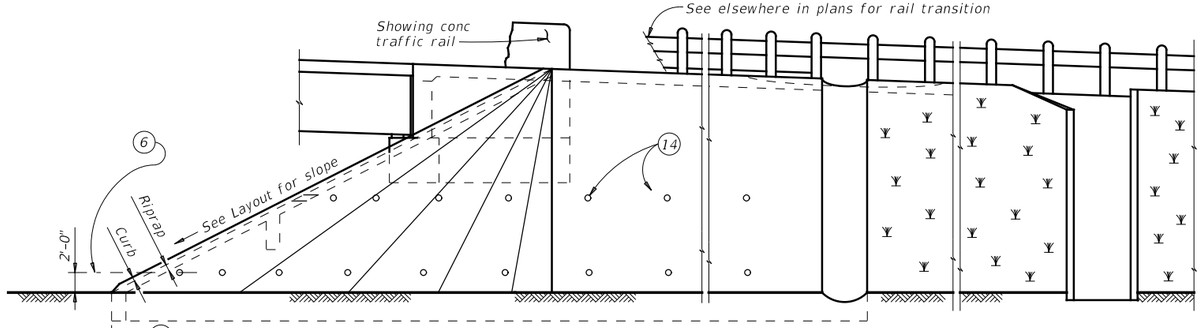


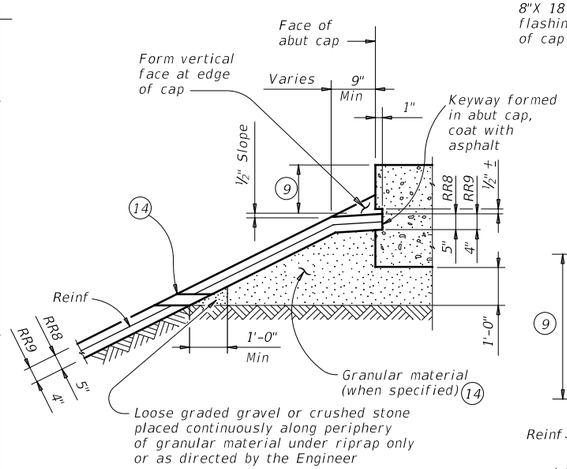
PLAN

SEC C-C

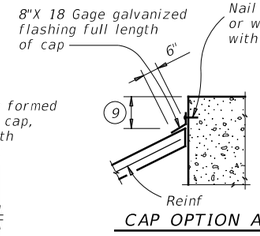
INTERMEDIATE TOEWALL



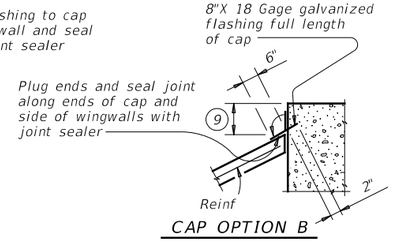
ELEVATION



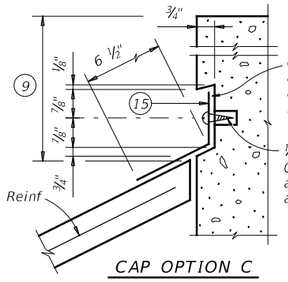
SHOWING KEYWAY OPTION



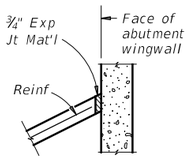
CAP OPTION A



CAP OPTION B

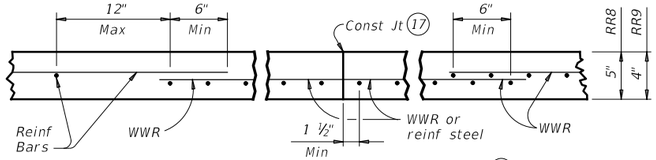


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

(1) When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.

(2) Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.

(3) Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(4) See details elsewhere in plans for installation of guard fence posts through concrete riprap.

(5) Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.

(6) Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.

(7) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.

(8) Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.

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

(10) #5 bars shown are required even when synthetic fiber reinforcing option is selected.

(11) Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.

(12) Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.

(13) Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

(14) If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.

(15) 8" x 18 Gage Galv Sheet Metal

(16) Provide WWR or #3 bars, with 1'-0" extension into slope.

(17) WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

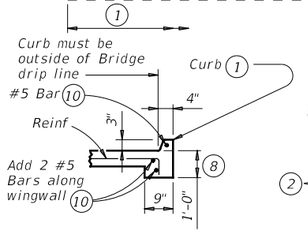
Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

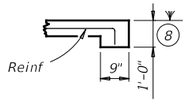
See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

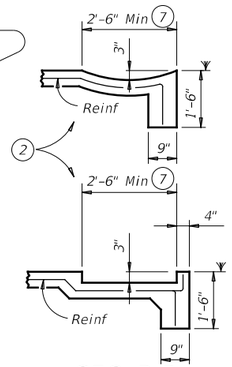


SEC A-A



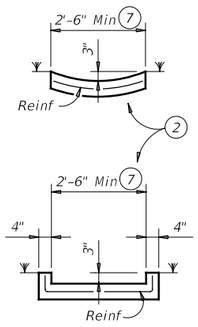
SEC B-B

(No drain)



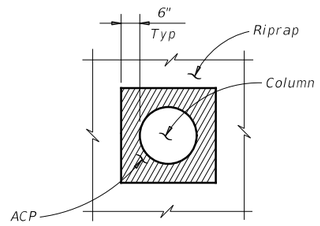
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

(Shoulder drain)



Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

(As directed by the Engineer)

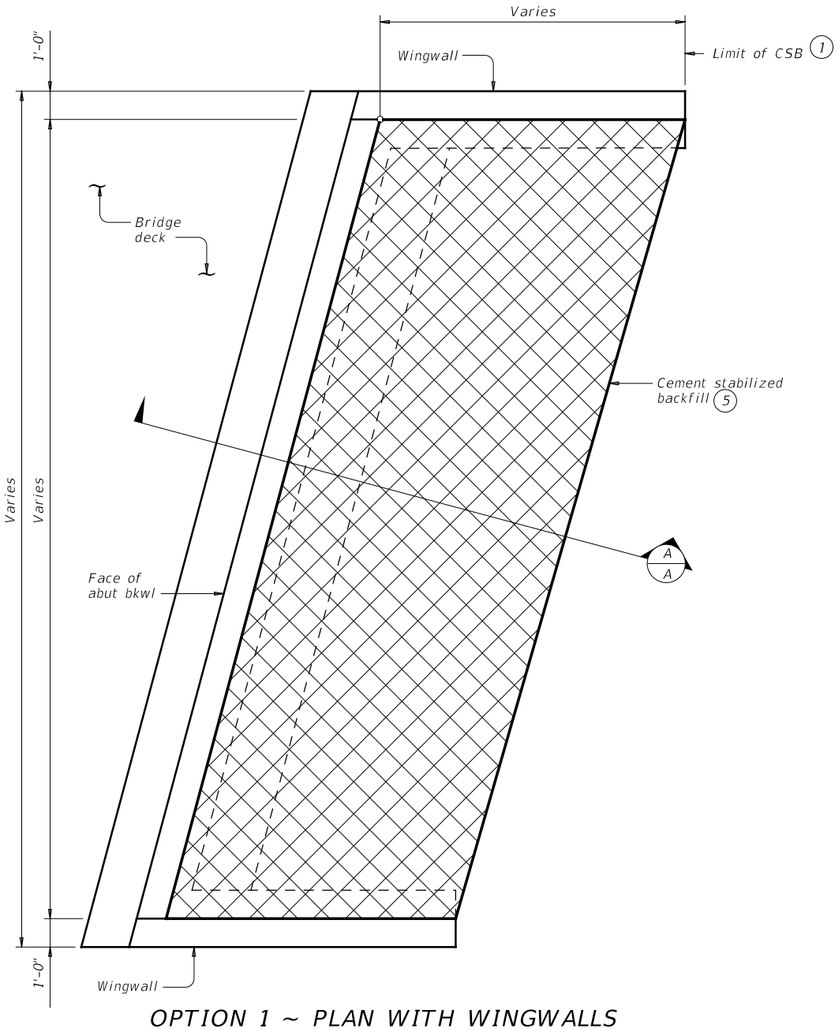
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

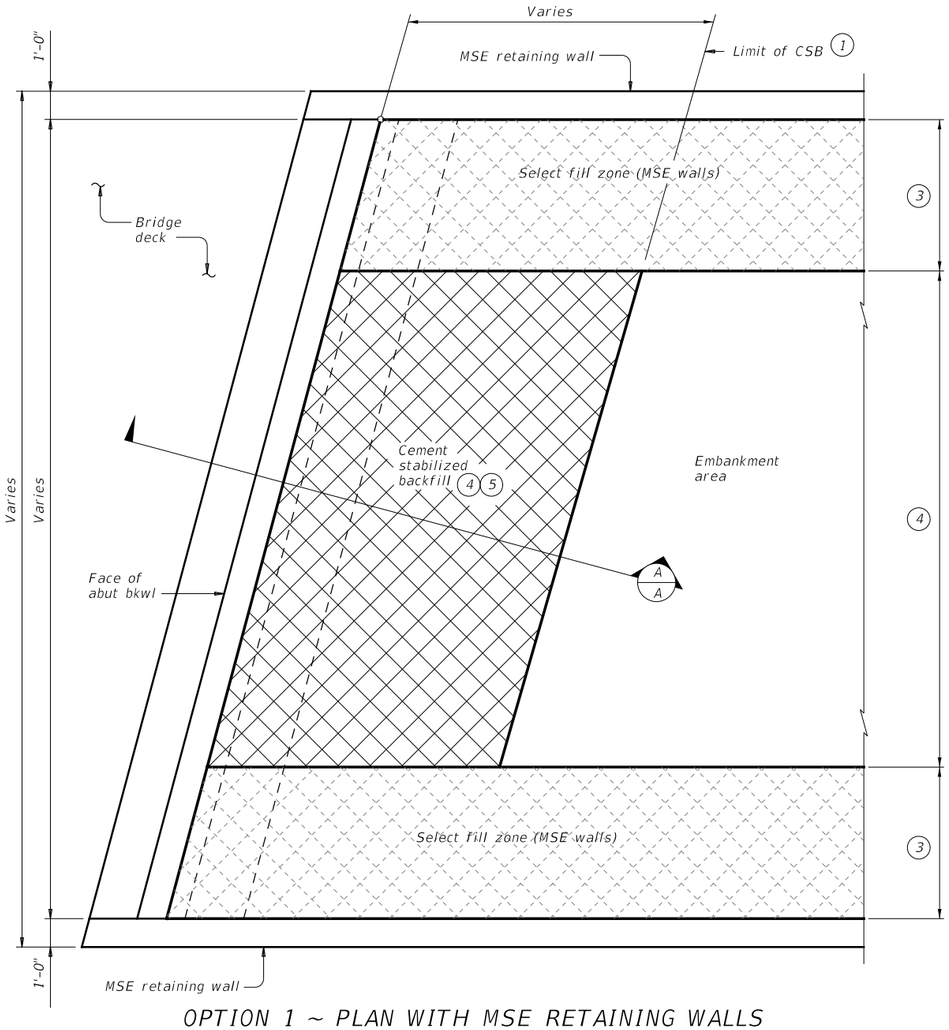
CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		103

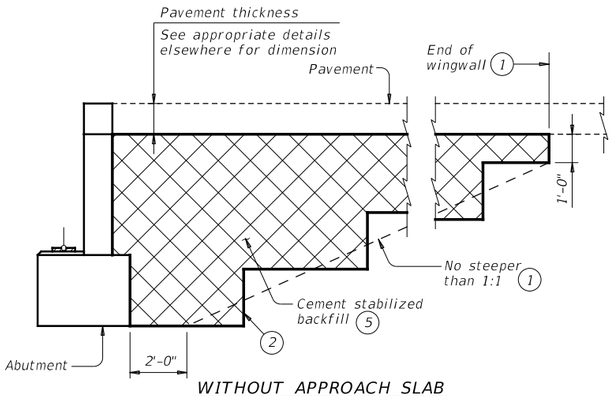


OPTION 1 ~ PLAN WITH WINGWALLS

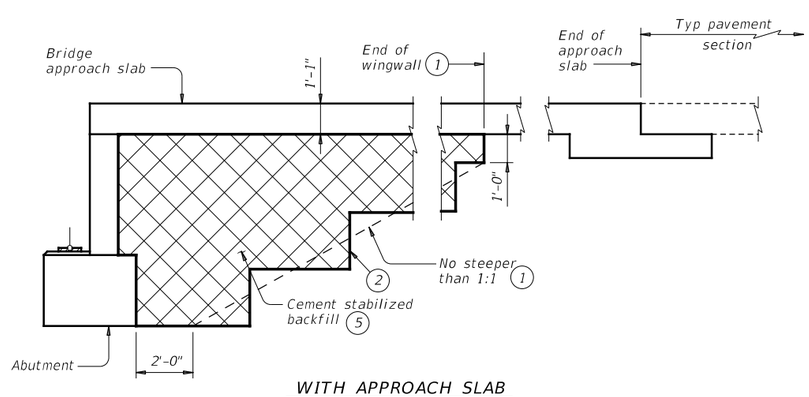
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		104

DATE: 7/30/2021 3:38:09 PM
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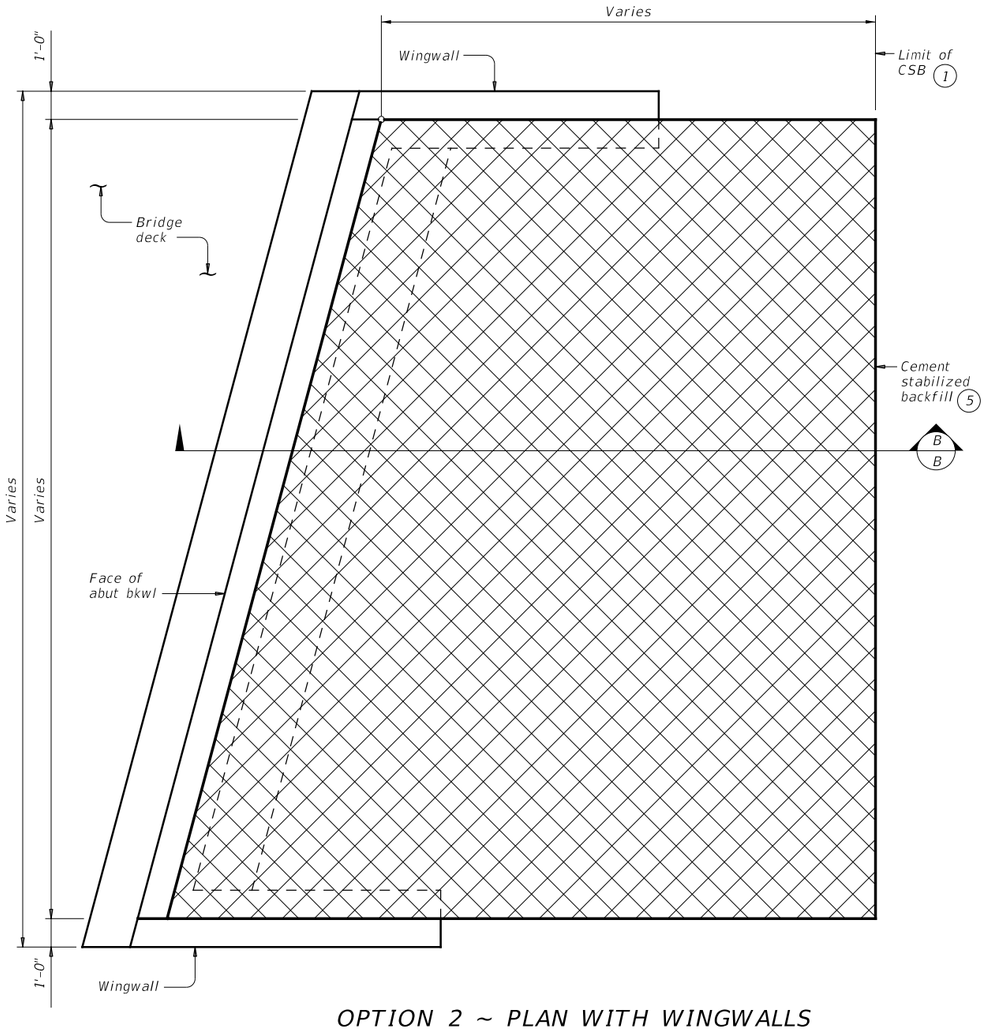
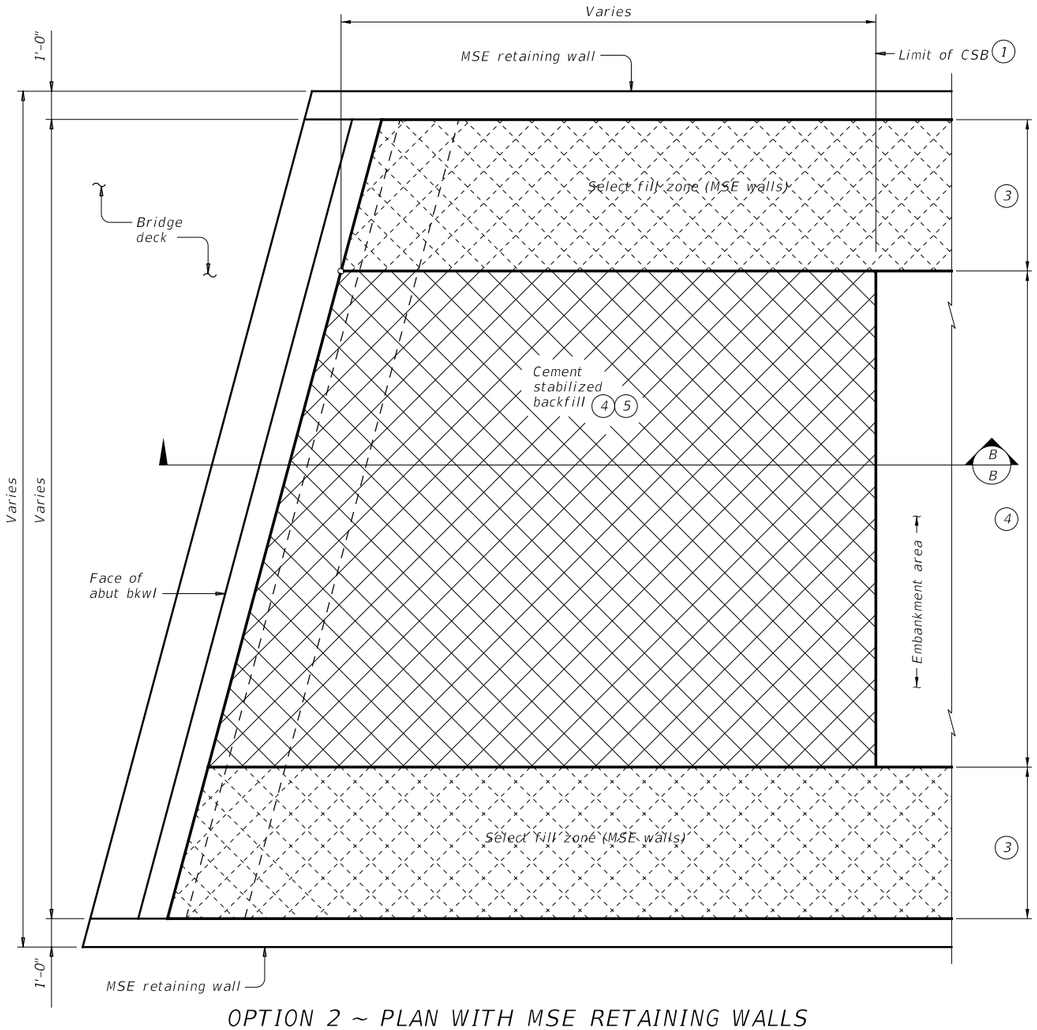
DATE: 7/30/2021 3:38:09 PM
FILE: 005-CSAB



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

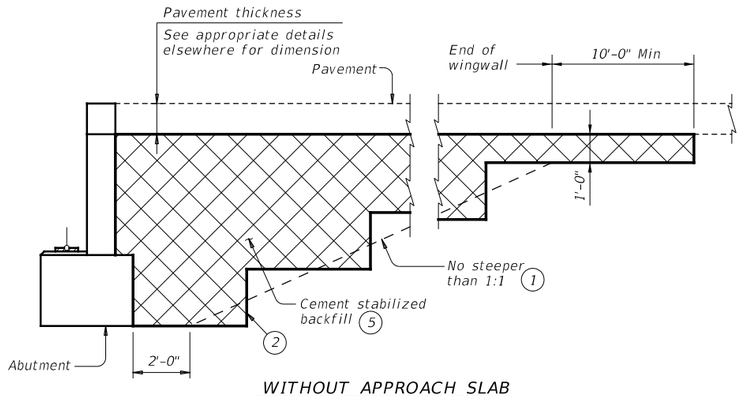
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(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).



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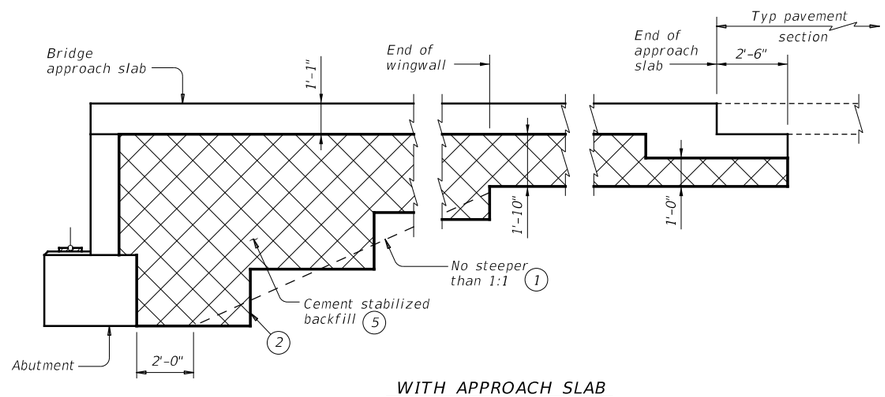


WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

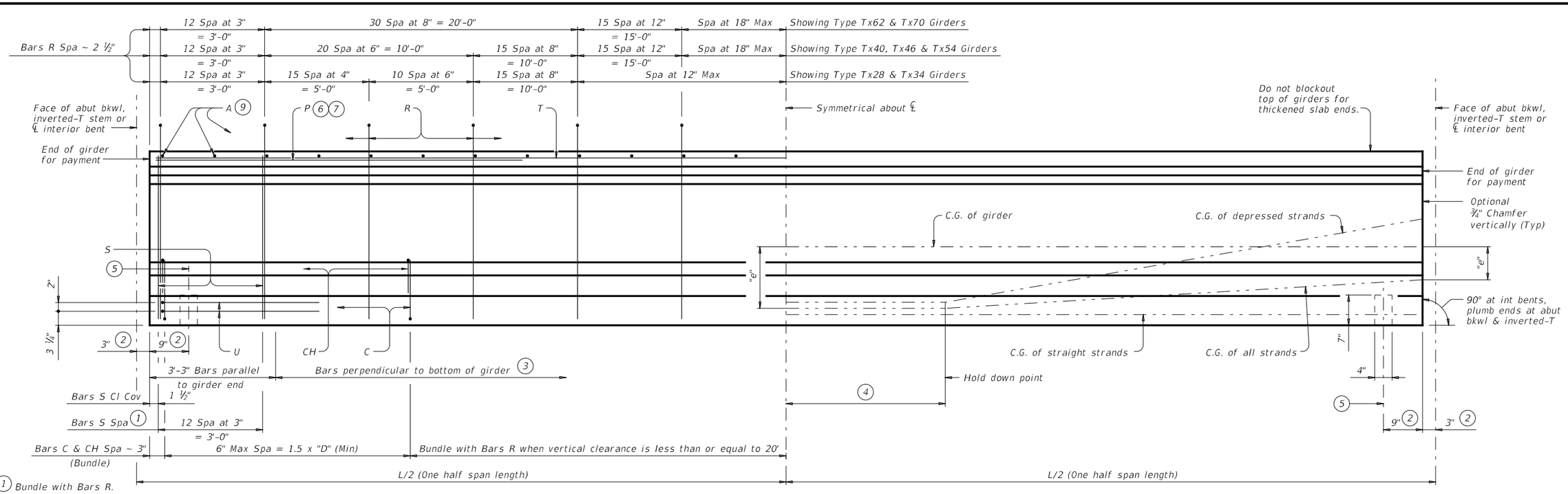
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		105

DATE: 7/30/2021 3:38:10 PM
FILE: 007-IGD



(1) Bundle with Bars R.

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

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

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

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

GIRDER ELEVATION

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

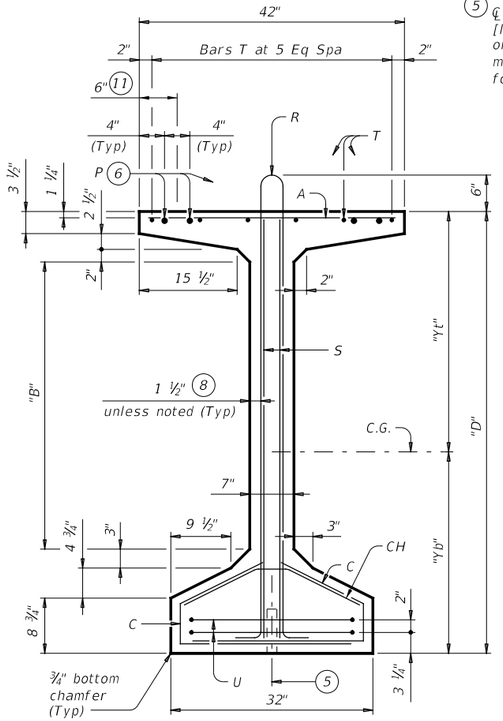
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

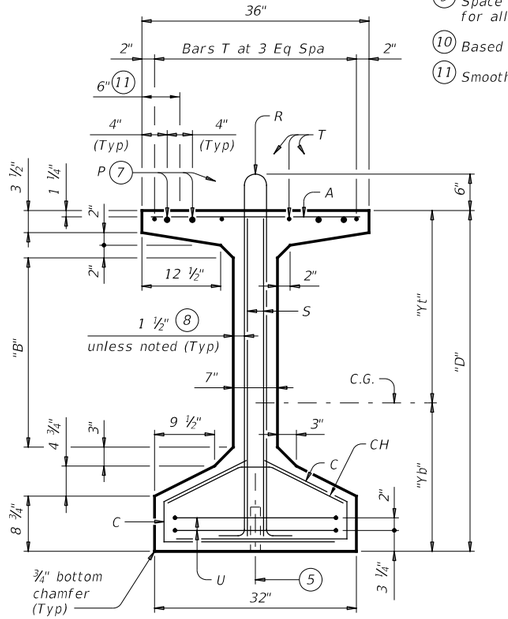
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

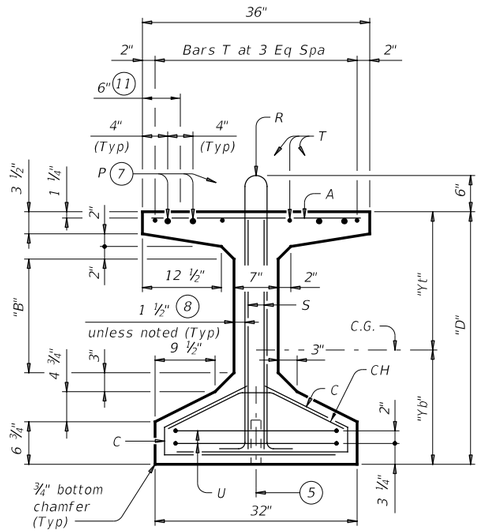
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

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

GENERAL NOTES:

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		106

DATE: 7/30/2021 3:38:11 PM
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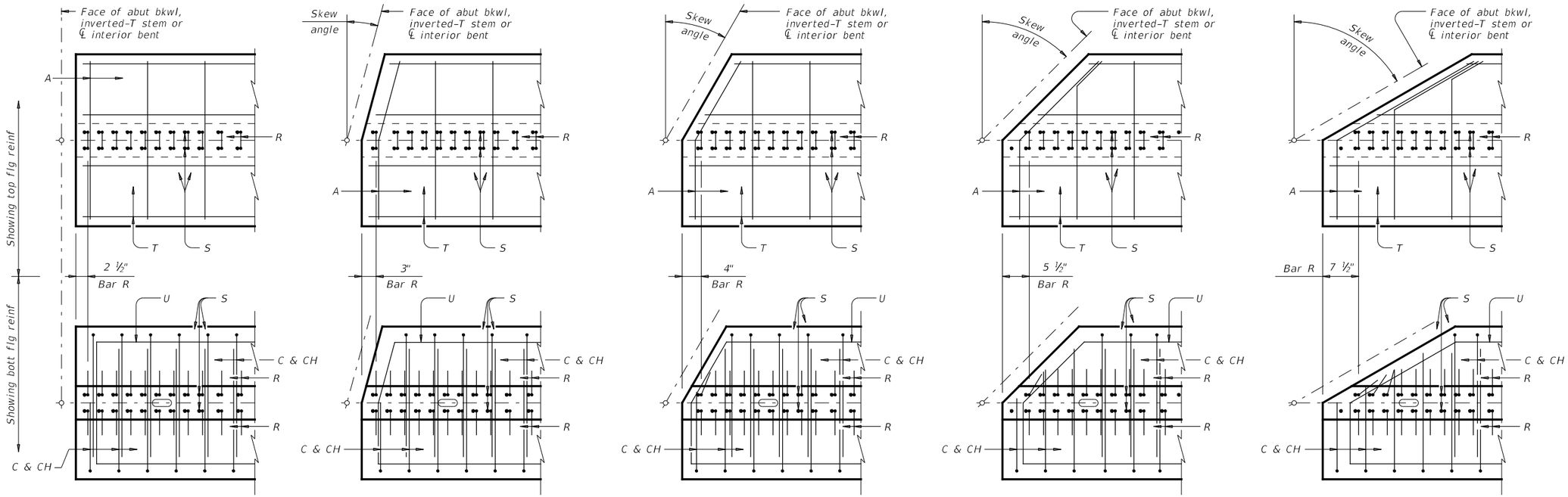
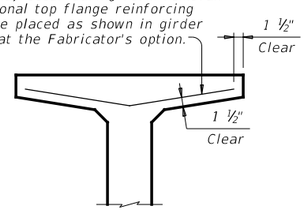
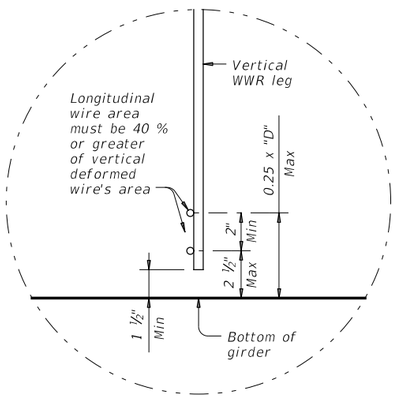


PLAN OF GIRDER ENDS (12)

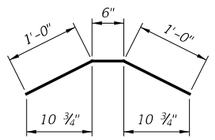
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



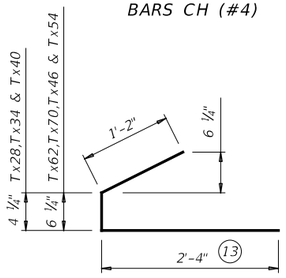
OPTIONAL TOP FLANGE REINFORCING DETAIL



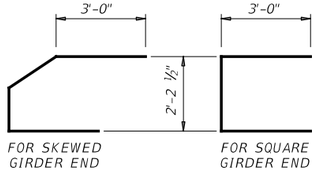
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



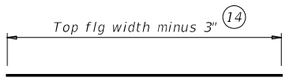
BARS CH (#4)



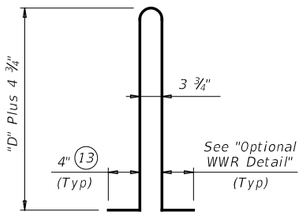
BARS C (#4)



BARS U (#5)

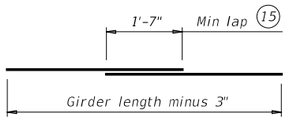


BARS A (#3)



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: igdstds1-19.dgn	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'	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
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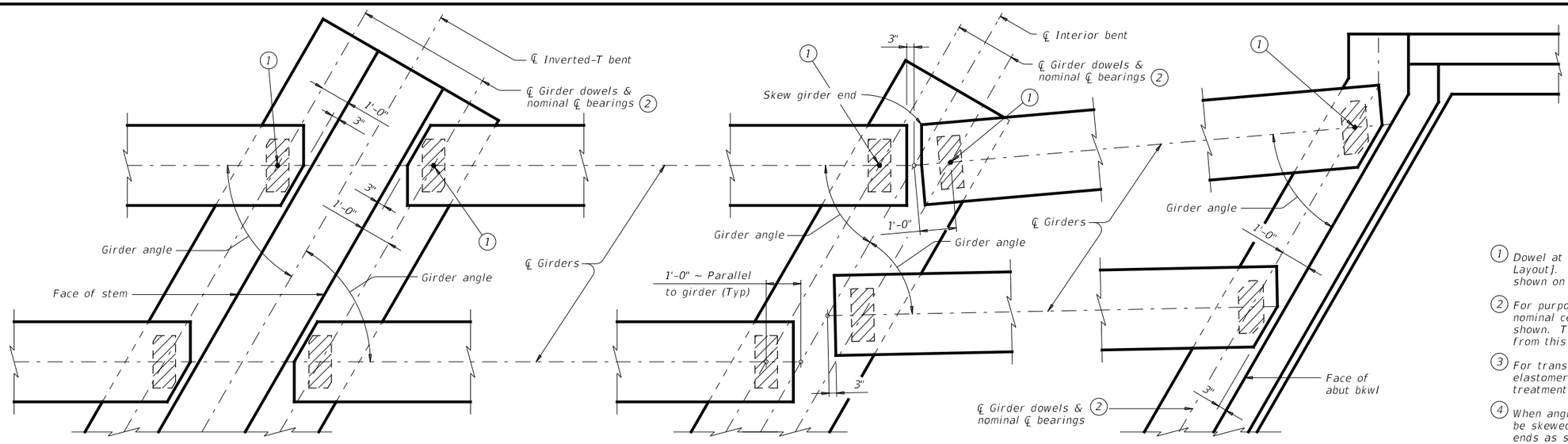


AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

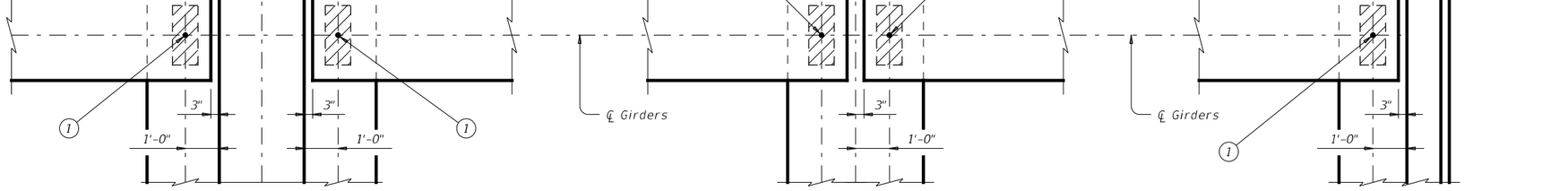
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(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)

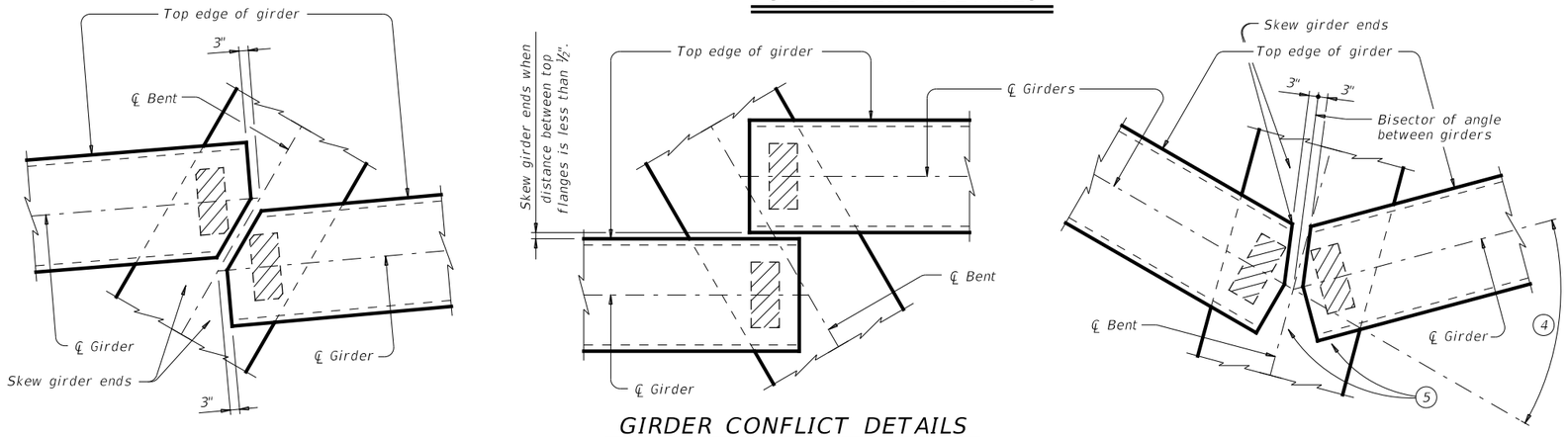
GIRDER END DETAILS

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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REVISIONS	0848	04	049	FM 462
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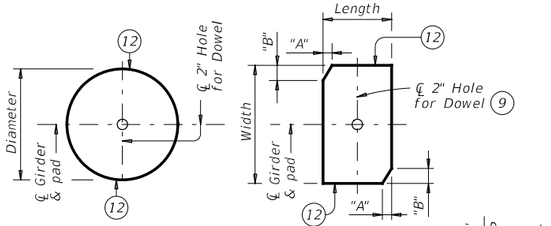
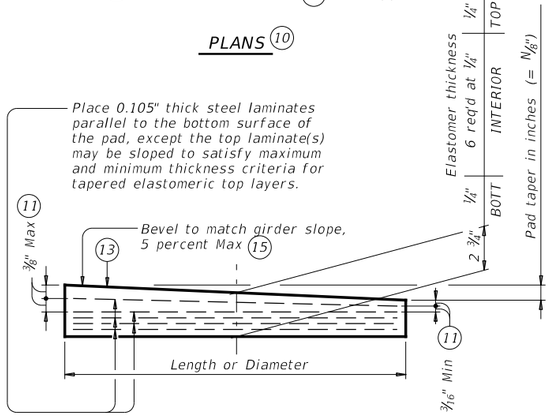


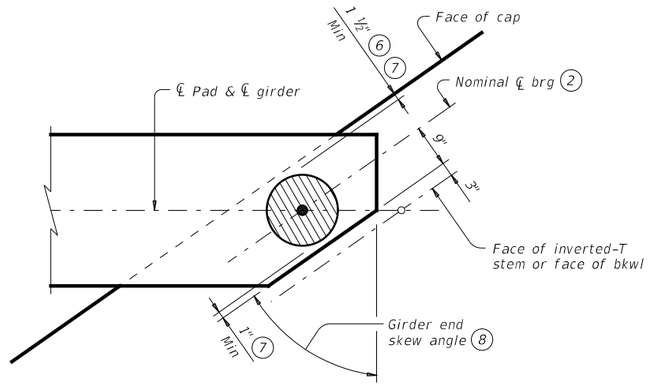
PLANS (10)



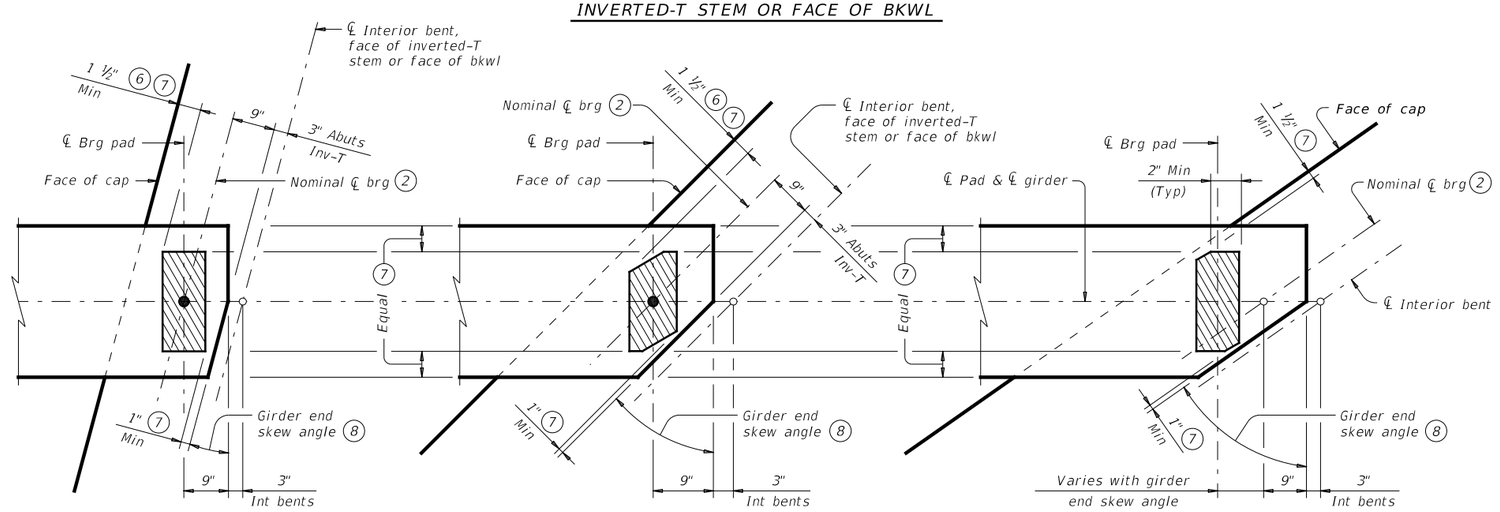
ELEVATION

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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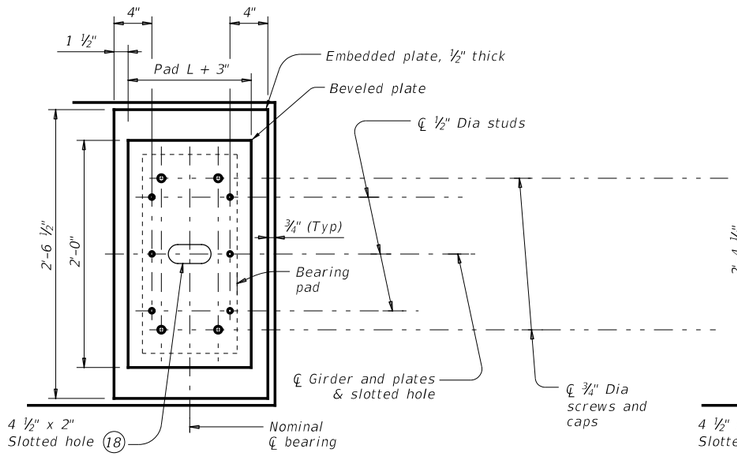
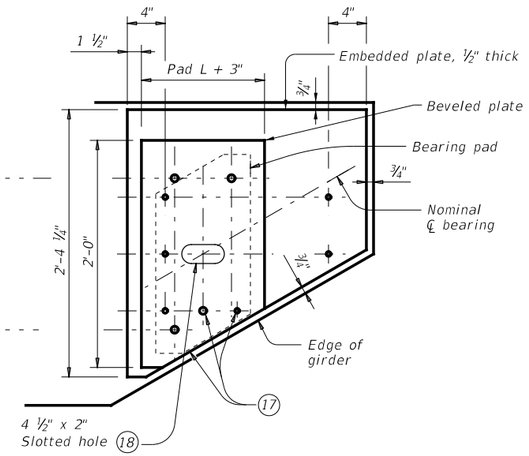
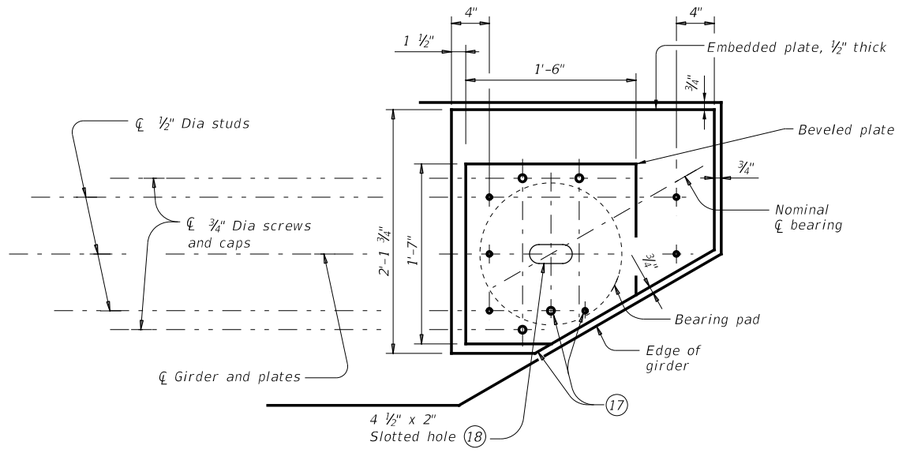


NORMAL GIRDER END
RECTANGULAR BEARING PAD

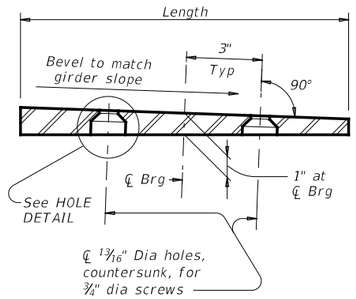


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

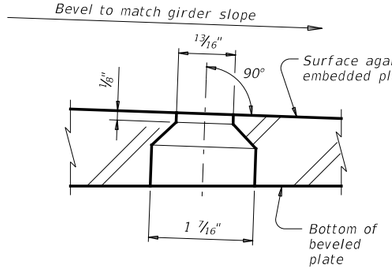


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS

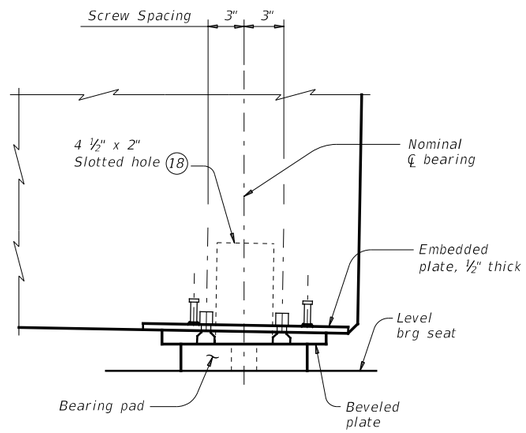


SECTION

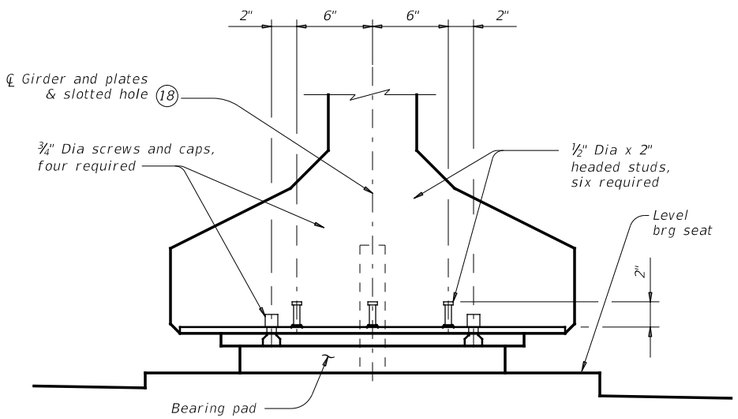


HOLE DETAIL

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

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

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

SOLE PLATE NOTES:

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

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

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

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

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

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

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

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation
Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

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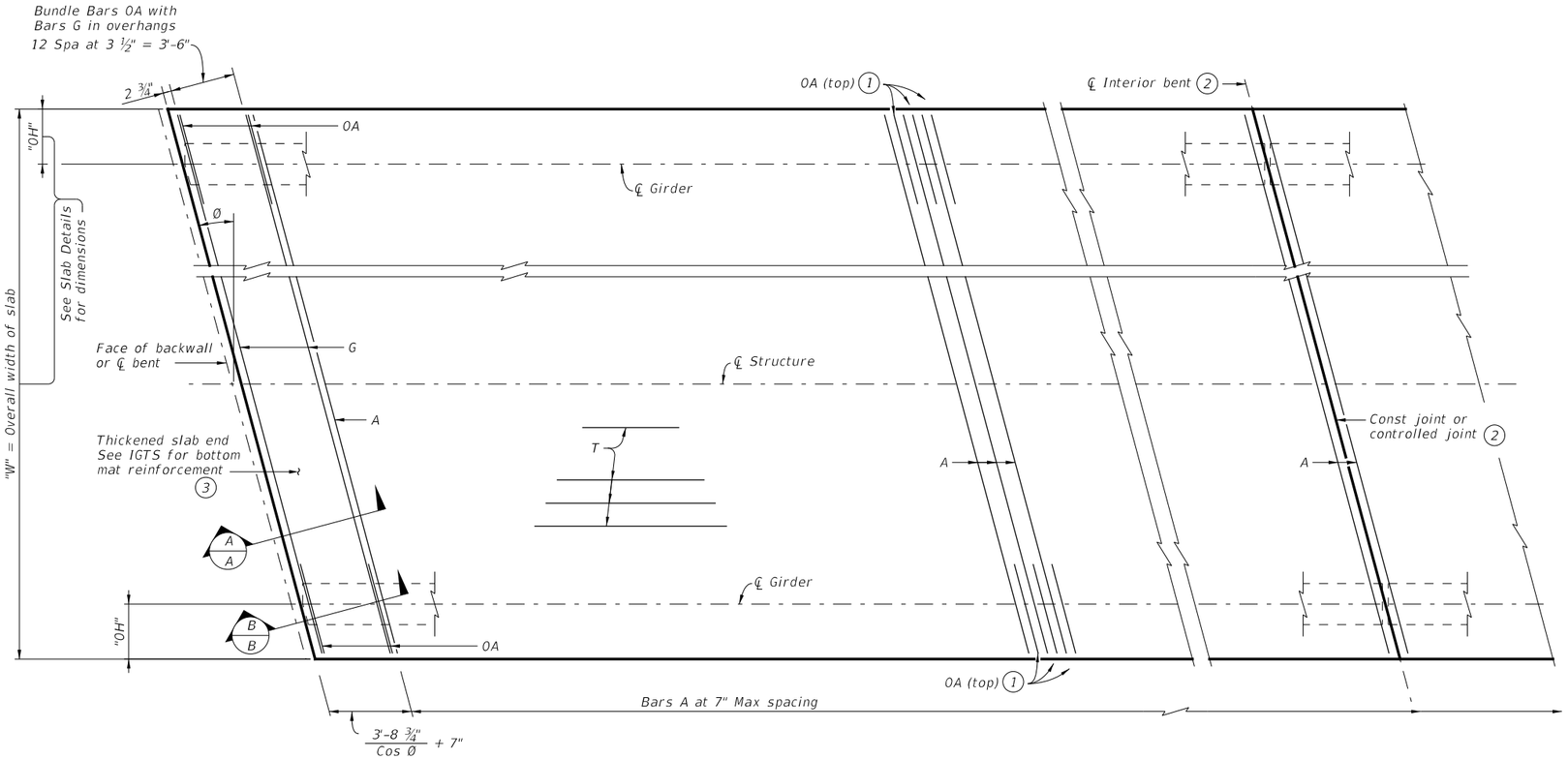
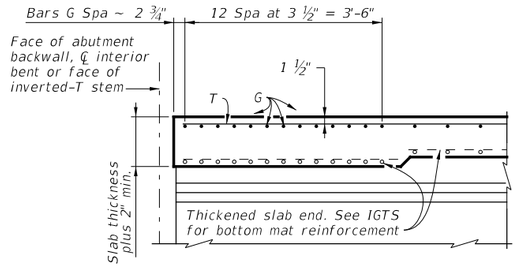


AT THICKENED SLAB END

AT SLAB CONTINUOUS OVER INTERIOR BENTS

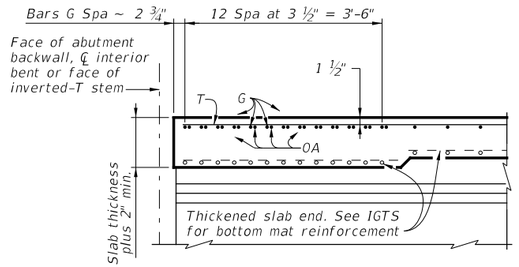
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.



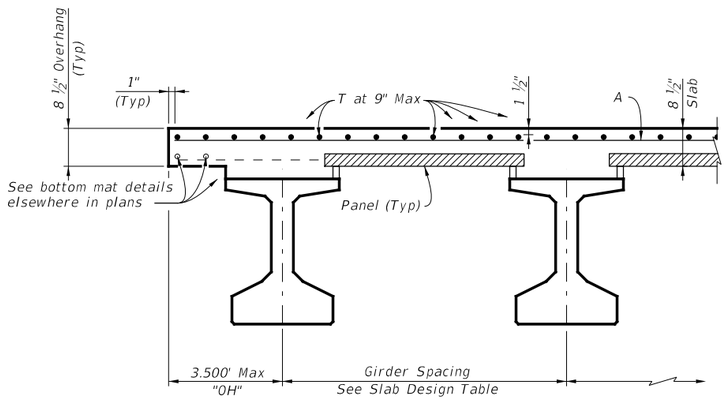
SECTION A-A

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

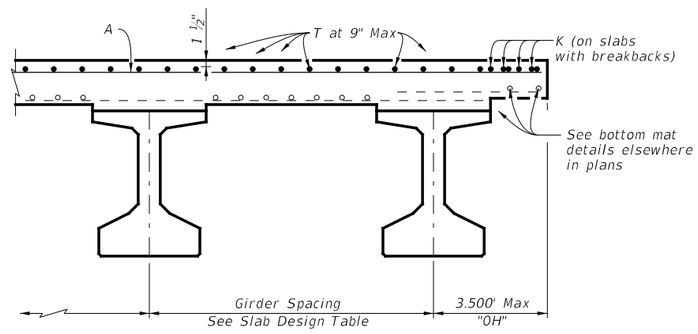


SECTION B-B

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



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

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

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT

PRESTRESSED CONC I-GIRDER SPANS

IGFRP

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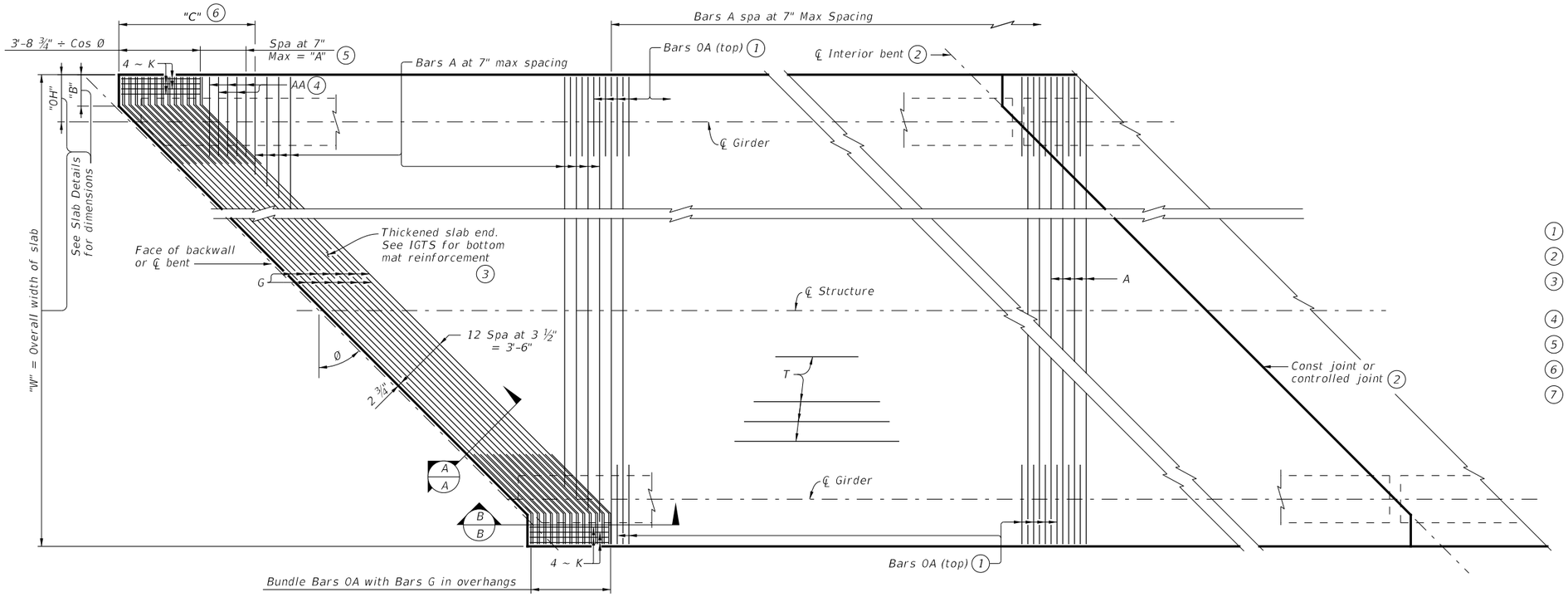


AT THICKENED SLAB END

BAR TABLE

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

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

(2) Bars are continuous through joint.

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

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

(5) A = ("0H" + 2.333' - "B") x Tan Ø

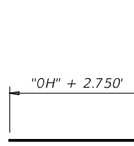
(6) $C = \frac{3.729'}{\text{Cos } Ø} + \text{"A"} + \text{Bar A spacing}$

(7) Only required on slabs with breakbacks.

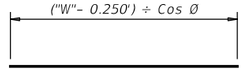
PLAN FOR SLABS WITH BREAKBACKS

Showing top mat reinforcement only.

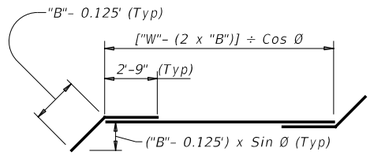
AT SLAB CONTINUOUS OVER INTERIOR BENTS



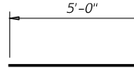
BARS AA (#5) (7)



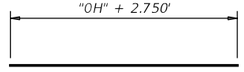
BARS G (#5)
(For slabs without breakbacks)



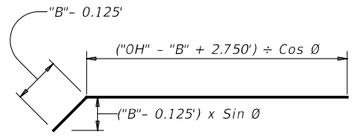
BARS G (#5)
(For slabs with breakbacks)



BARS K (#5) (7)



BARS OA (#5)



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

GENERAL NOTES:

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

These details are restricted to Prestressed Concrete I-Girder spans with an 8 ½" slab and up to a 10'-0" girder spacing.

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

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

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

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

MATERIAL NOTES:

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

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

Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

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

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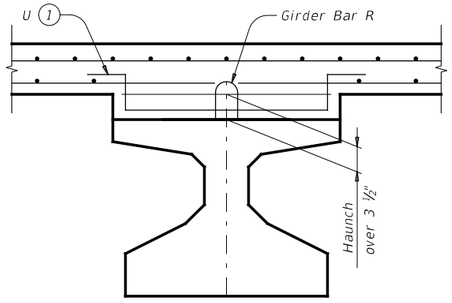
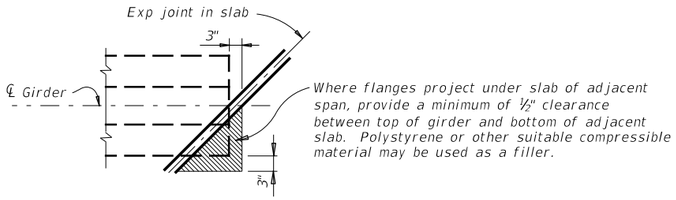
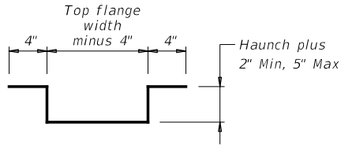


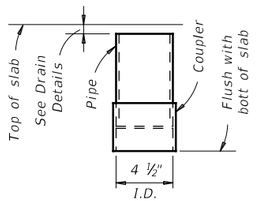
HAUNCH REINFORCING DETAIL



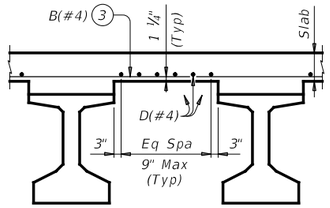
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

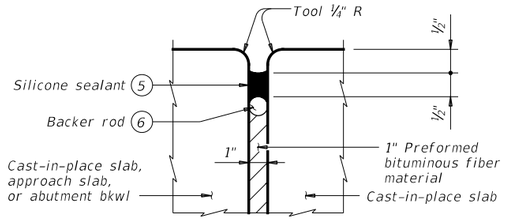


C-I-P DRAIN DETAIL (2)

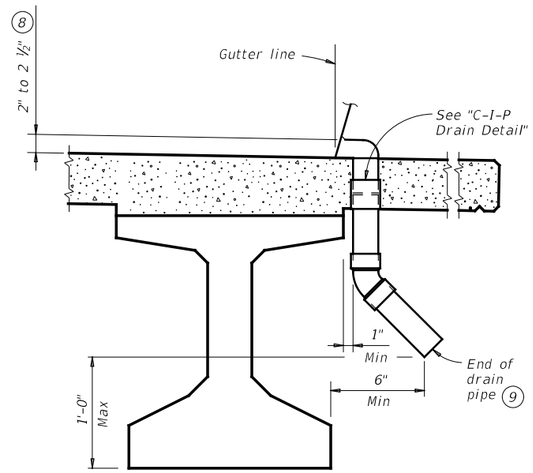


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

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

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

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

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

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

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

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

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

DECK FORMWORK NOTES:

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

Texas Department of Transportation

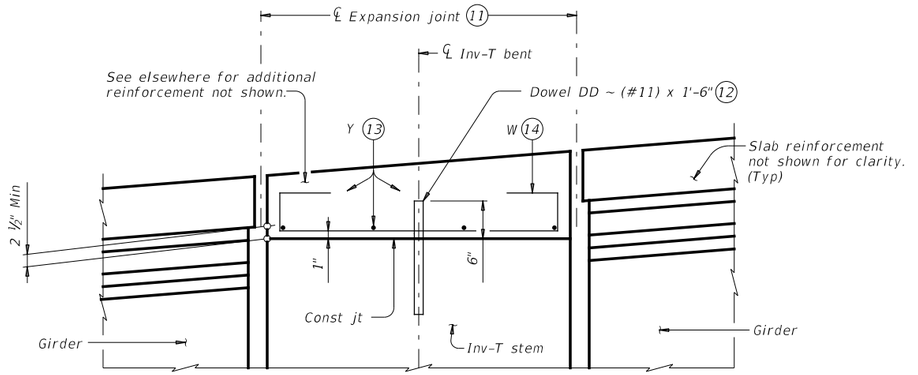
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

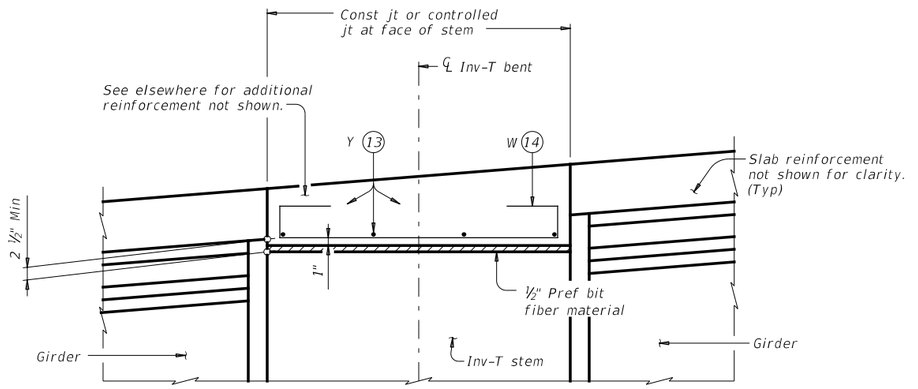
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		113

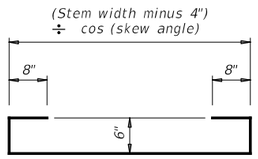


SHOWING EXPANSION JOINTS

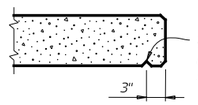


SHOWING CONST JTS OR CONTROLLED JTS

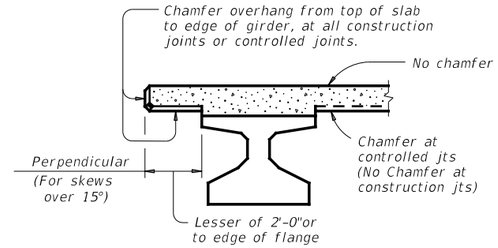
REINFORCEMENT OVER INV-T BENTS



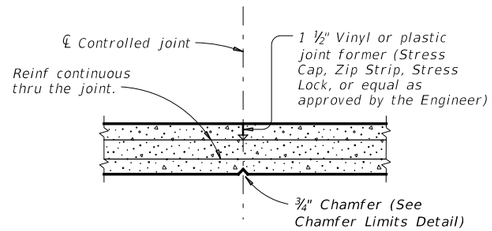
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmsstsl-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
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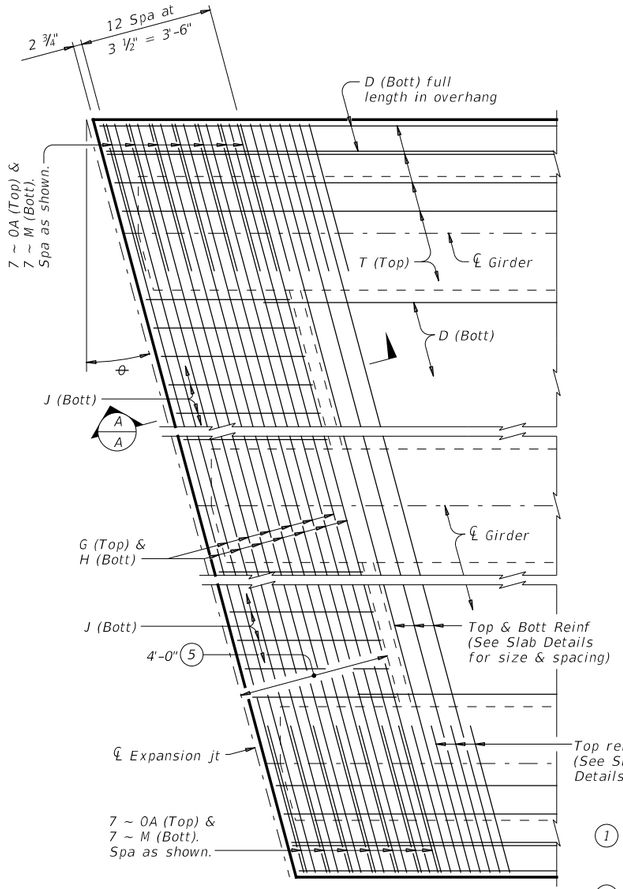
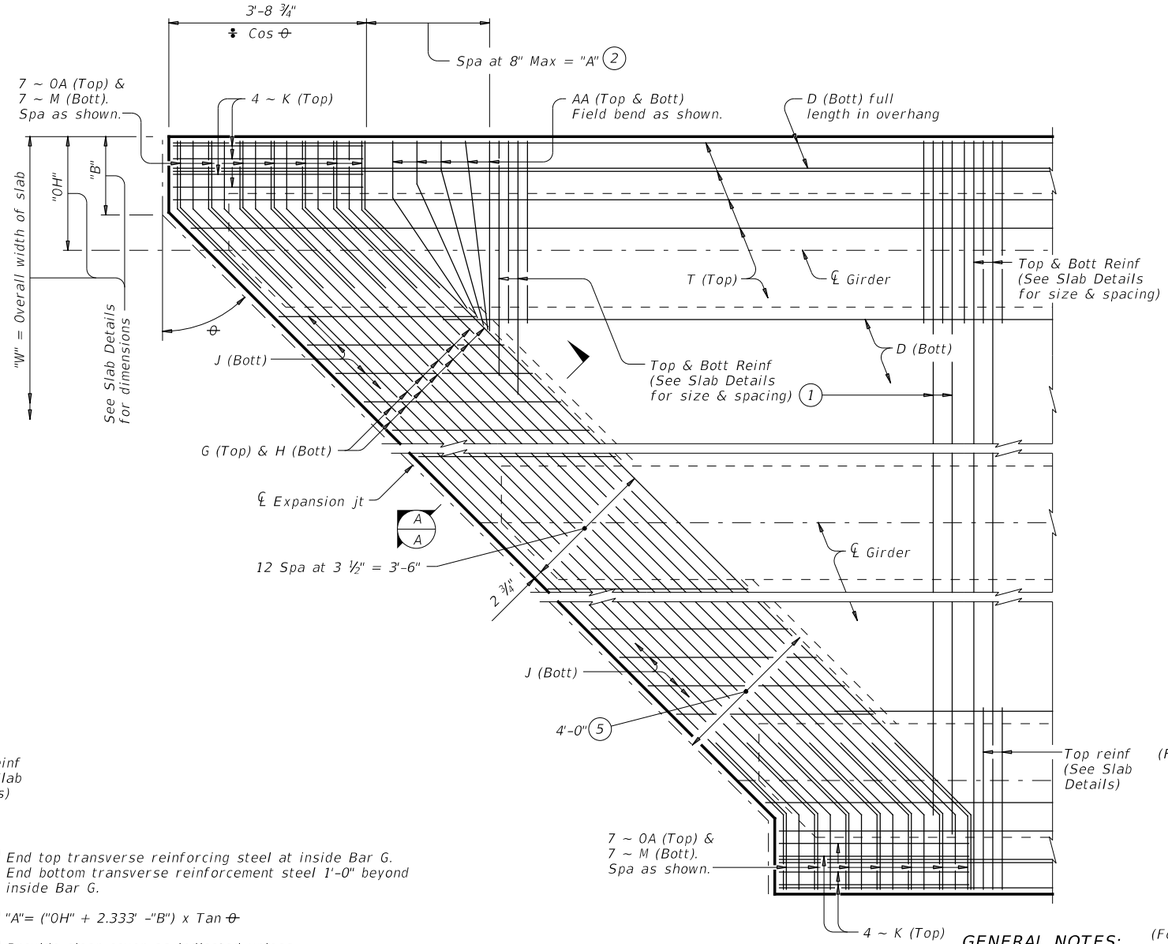
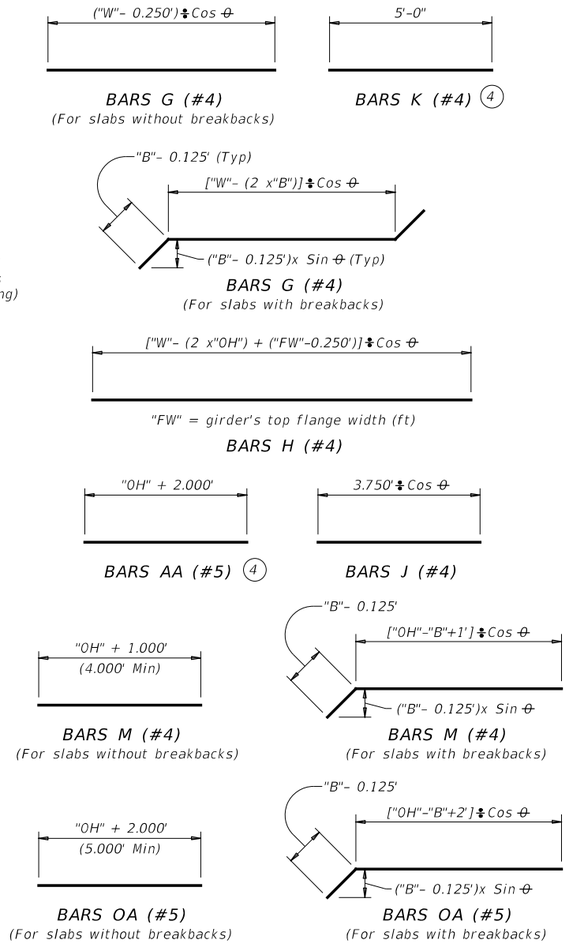


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

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



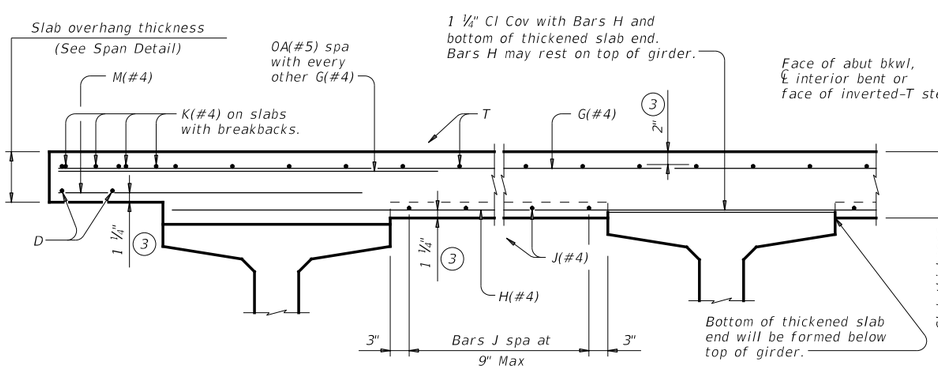
GENERAL NOTES:

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

MATERIAL NOTES:

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

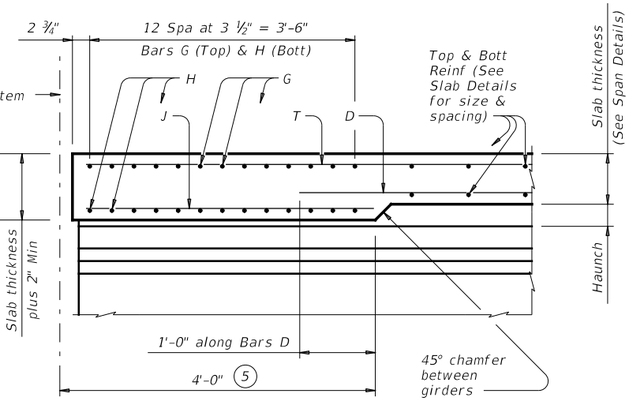
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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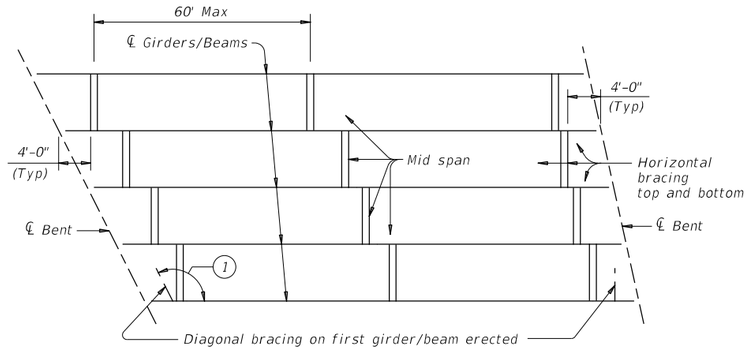
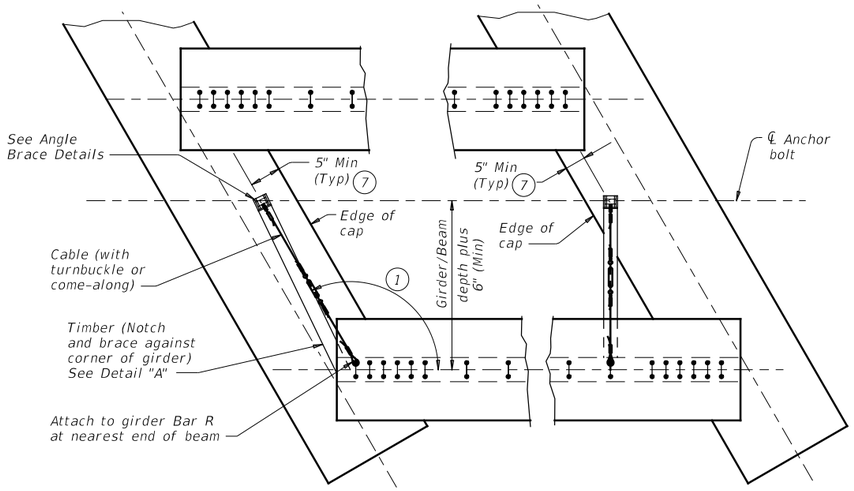
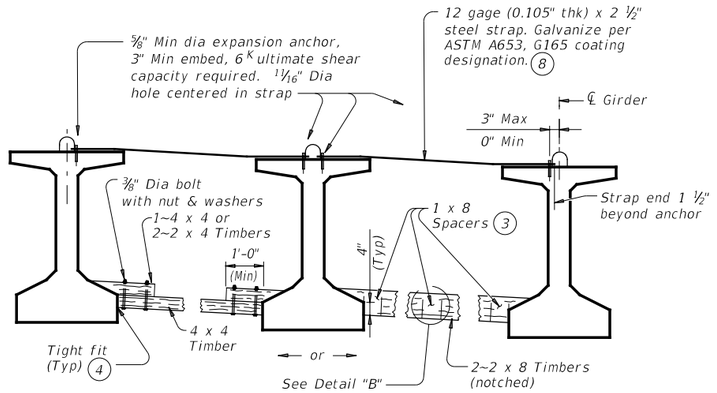


ERECTION BRACING

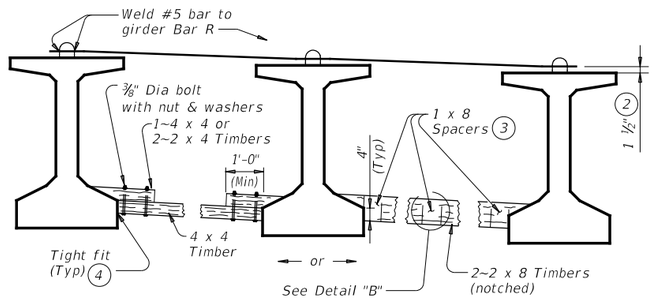


PLAN



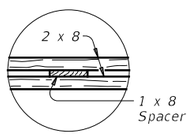
FOR ERECTION BRACING, OPTION 1

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



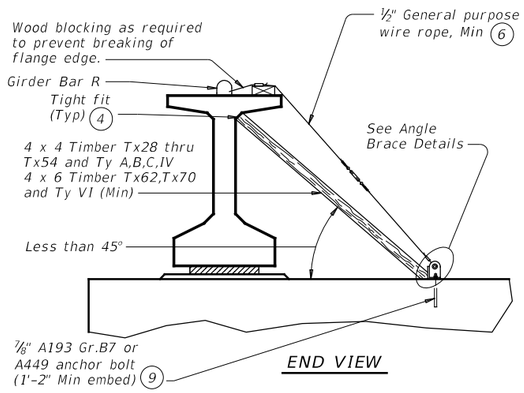
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5



PLAN

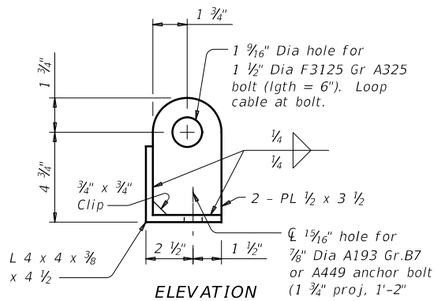
DETAIL "B"



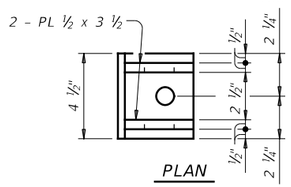
END VIEW

DIAGONAL BRACING DETAILS 5

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



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

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

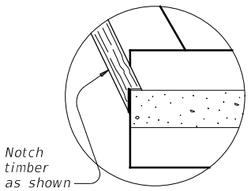
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

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



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

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

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

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

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

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

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

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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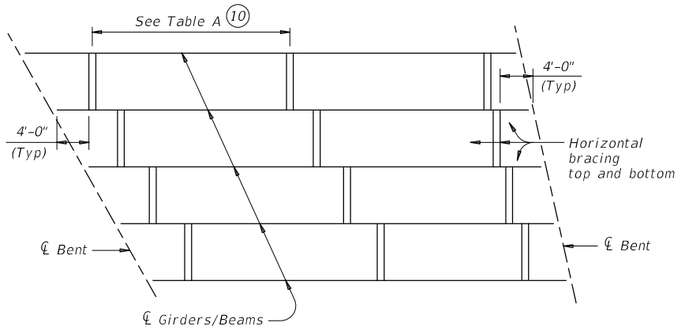
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		116



SLAB PLACEMENT BRACING

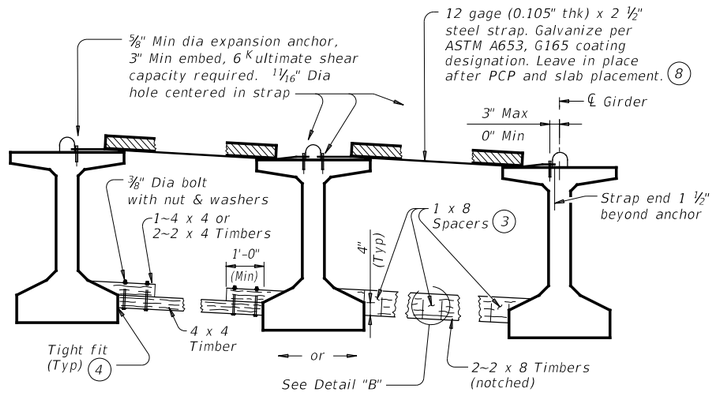
TABLE A

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

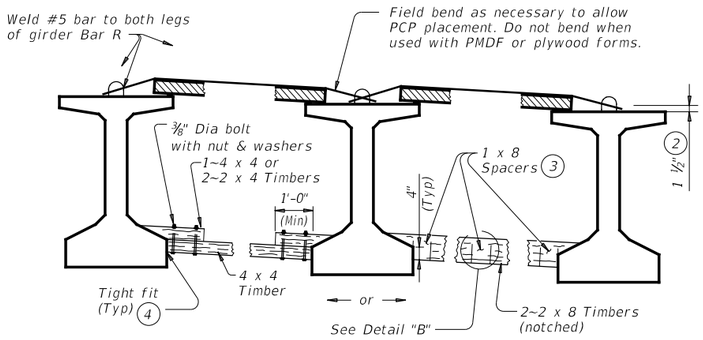
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

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

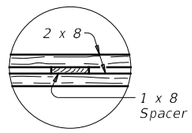
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



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)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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DATE: 7/30/2021 3:38:21 PM
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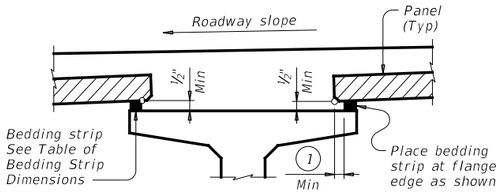
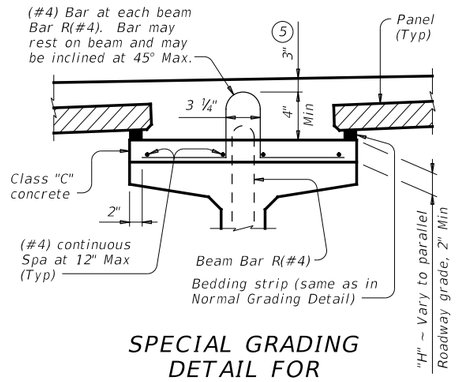


NORMAL GRADING DETAIL (3)

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



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

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

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

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

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

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

(4) Height must not exceed twice the width.

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

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

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

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

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

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.

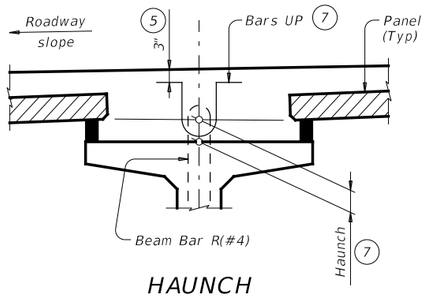
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

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.

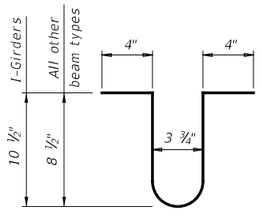
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

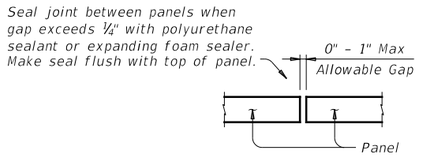


HAUNCH REINFORCING DETAIL

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

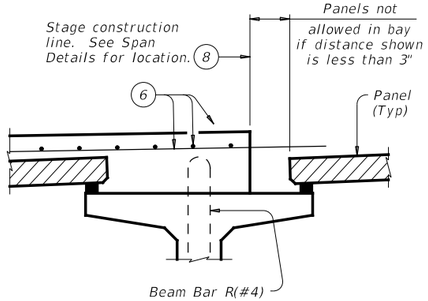


BARS UP (#4) (7)

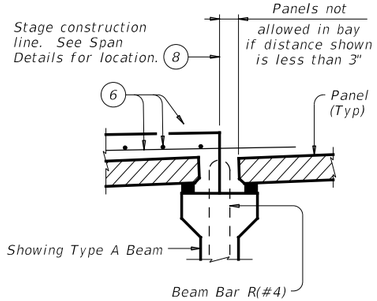


PANEL JOINTS

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



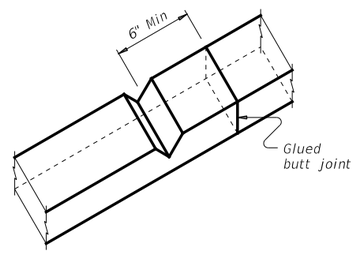
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

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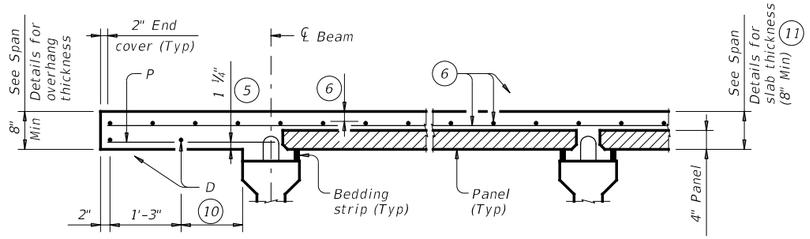
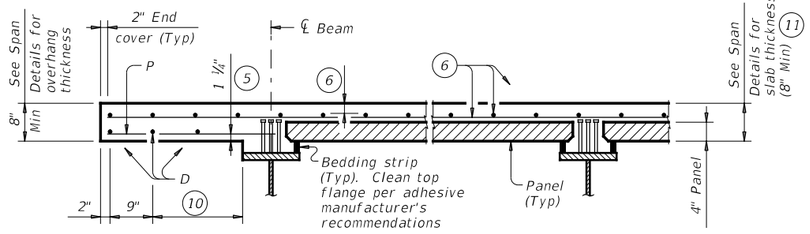
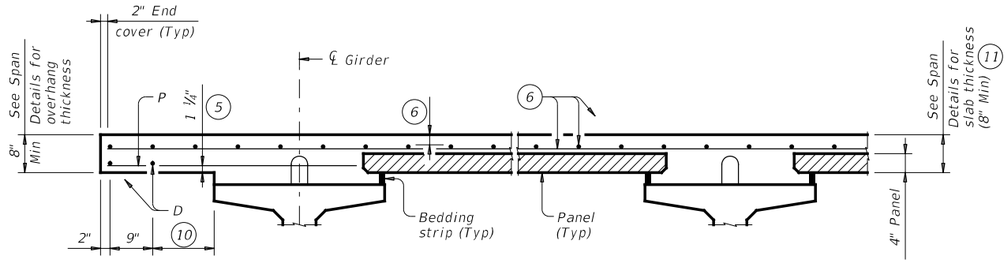


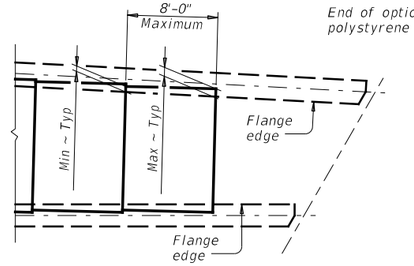
PRESTRESSED CONCRETE I-BEAMS



STEEL BEAMS

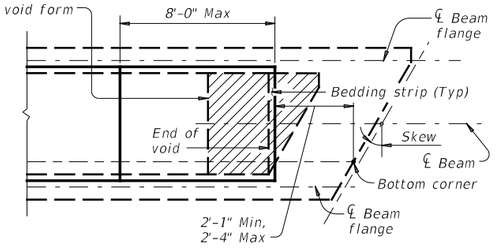


PRESTRESSED CONCRETE I-GIRDERS

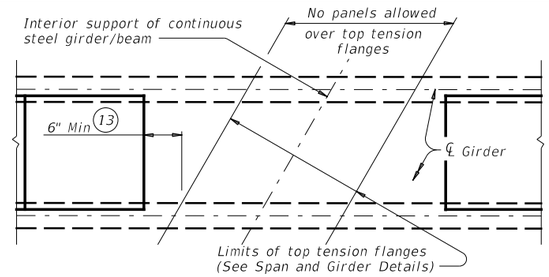


AT FLARED BEAMS OR GIRDERS

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



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

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

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

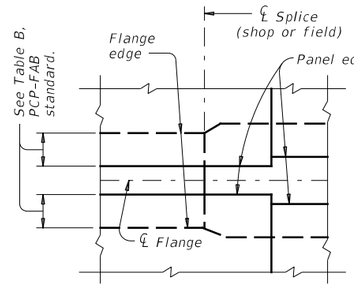
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

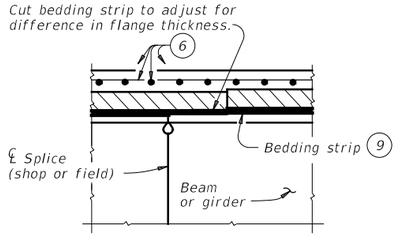
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



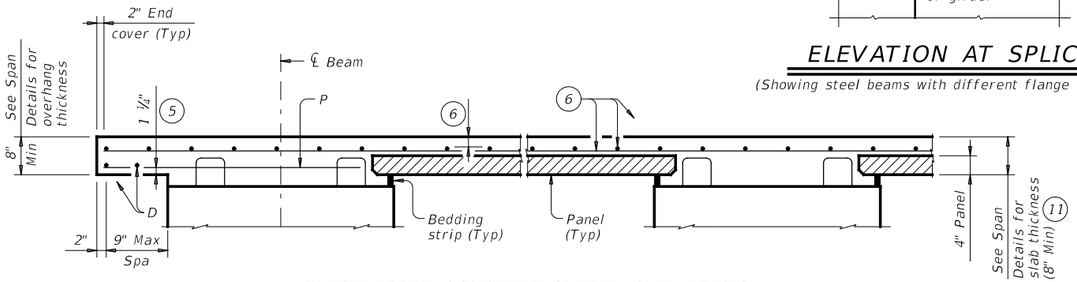
PLAN AT SPLICE

(Showing steel beams with flange width transition)



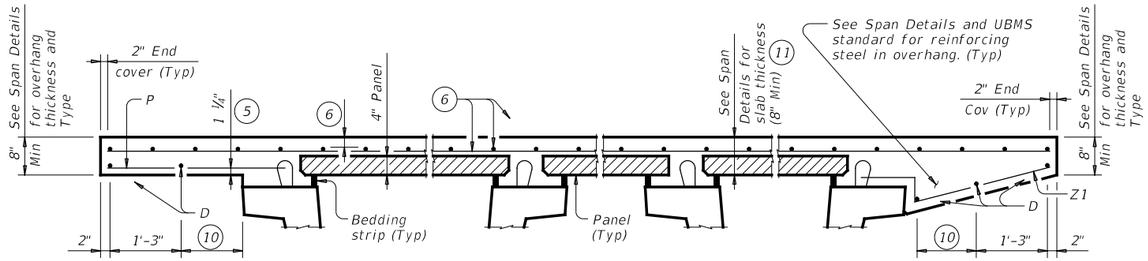
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

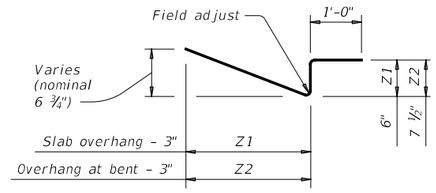
Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



BARS Z (#4) (12)

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Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

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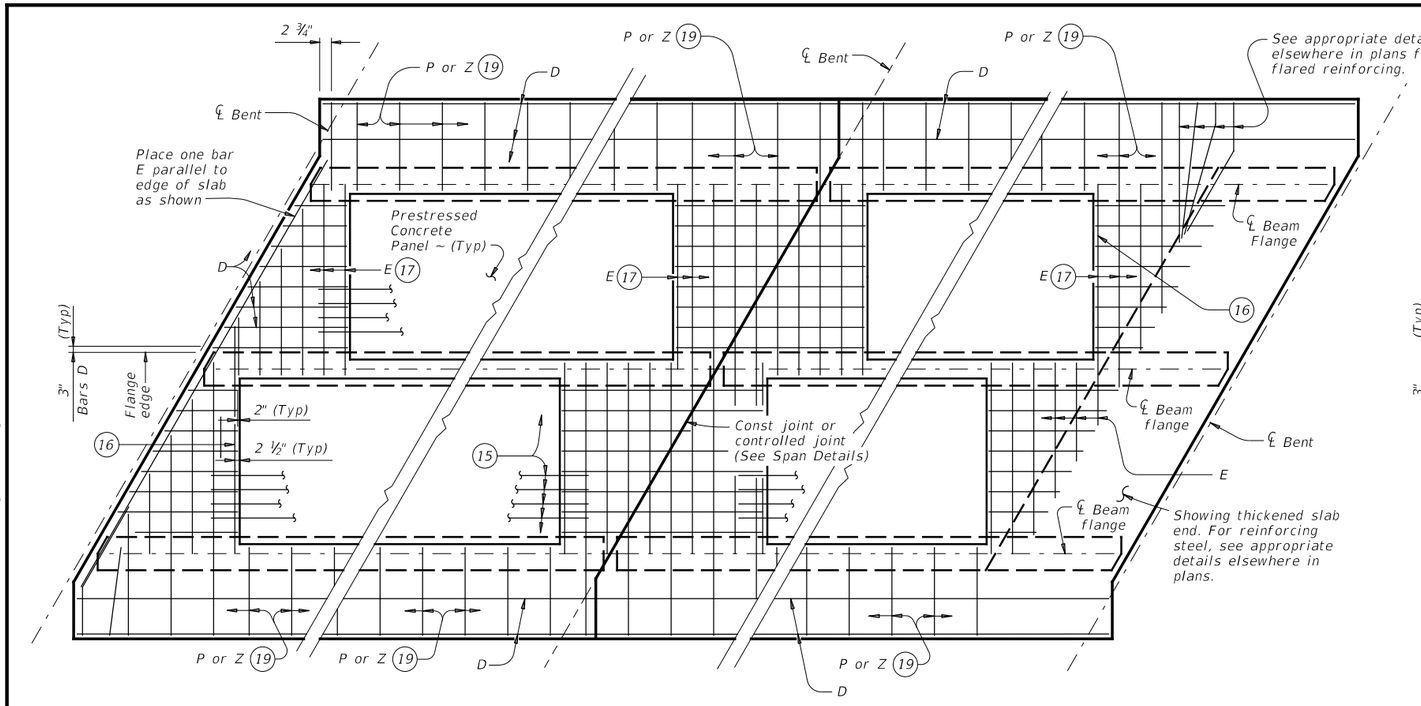
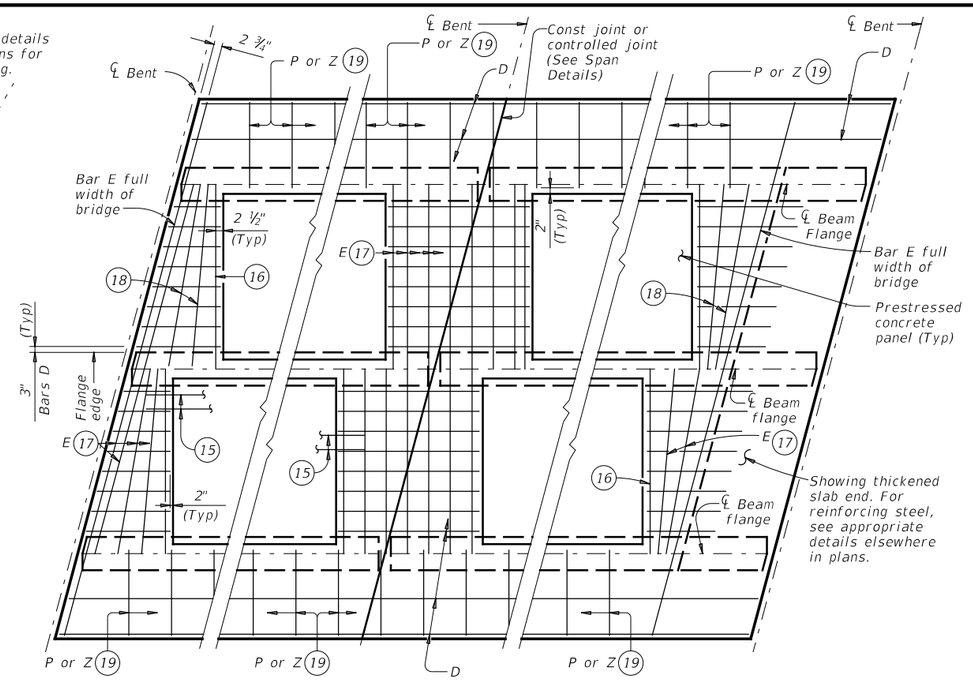


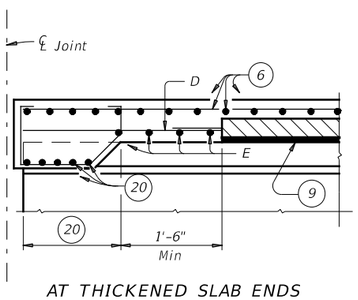
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

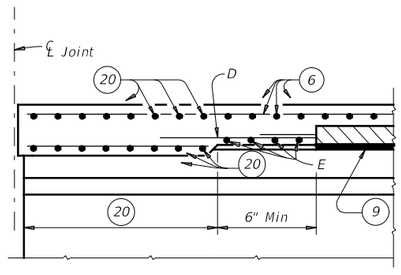


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

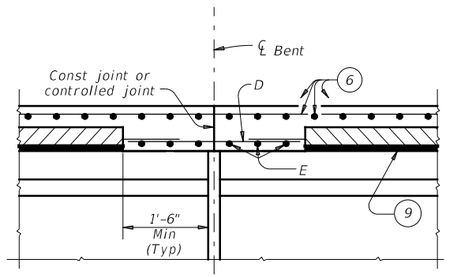
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



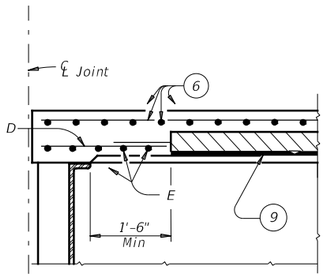
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



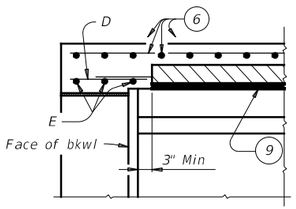
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



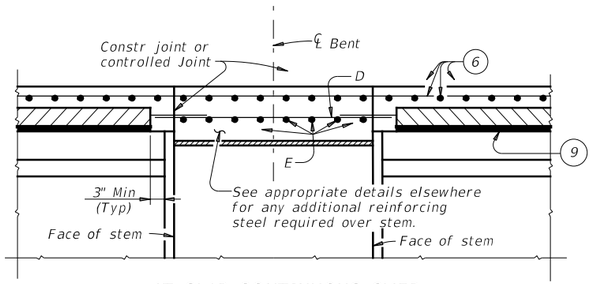
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

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

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

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

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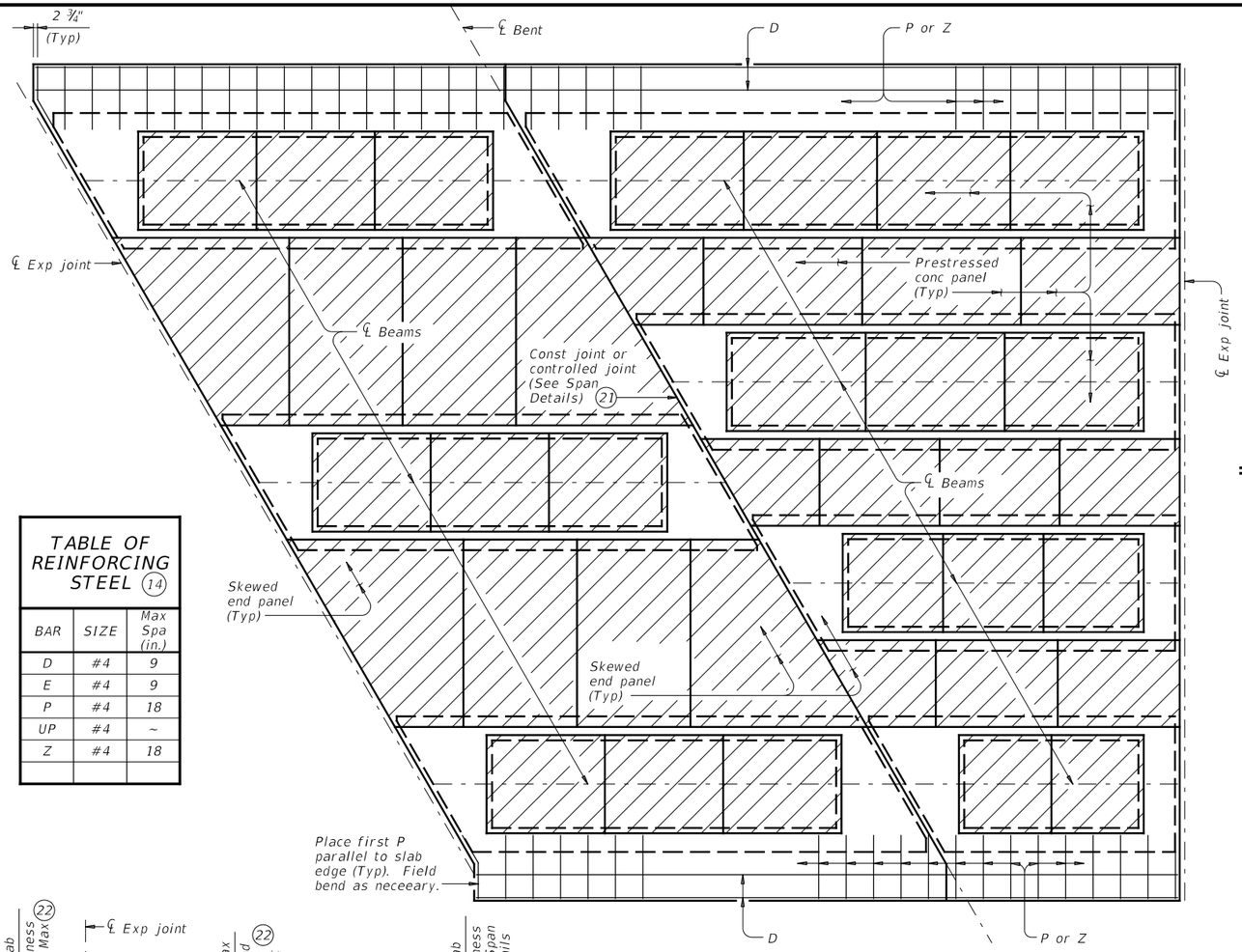
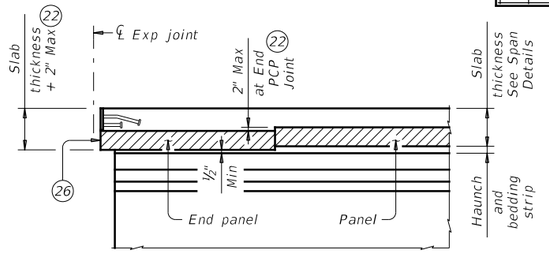


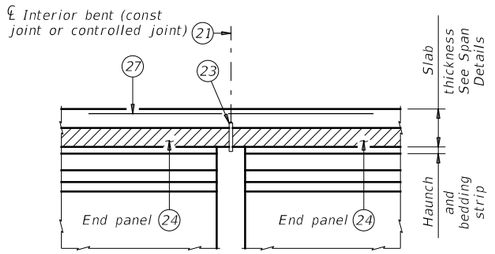
OPTION 2 ~ PLAN OF SLAB

(Showing U-Beams; other beams similar)



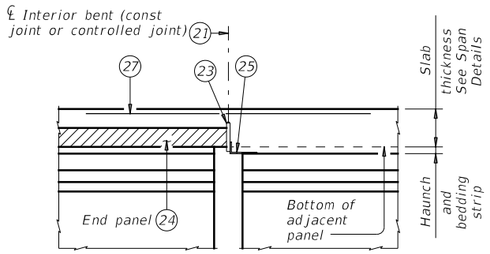
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



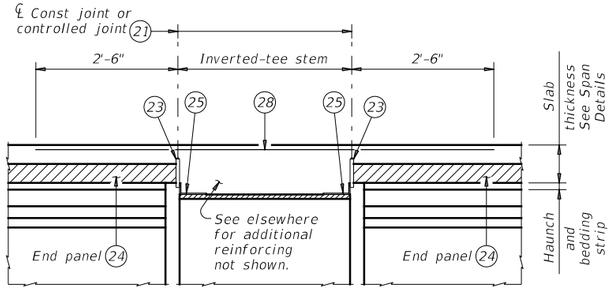
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adacent span.

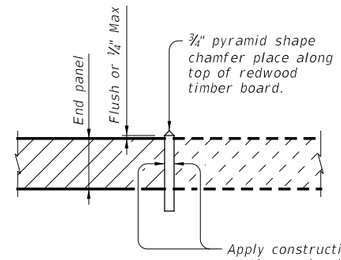


INVERTED-T BENT

Panels against inverted-tee stem

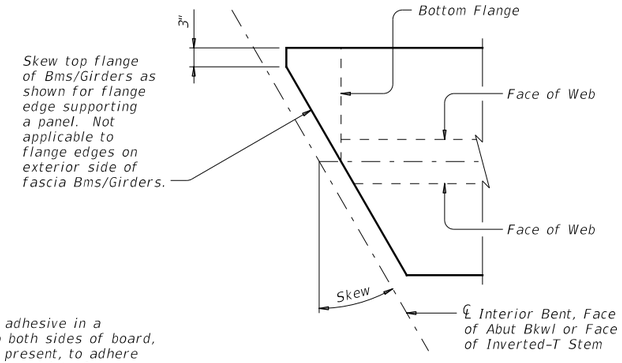
OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)

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



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



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

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

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

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

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PRESTRESSED CONCRETE PANELS
DECK DETAILS

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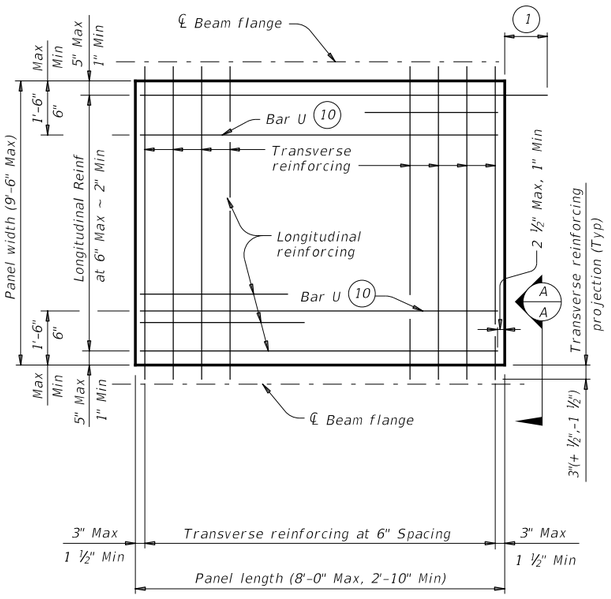
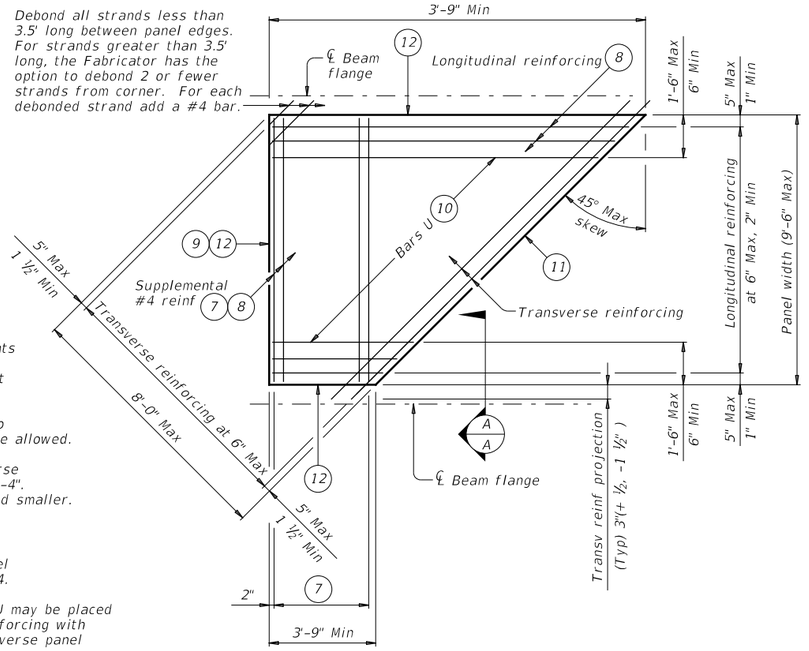


TYPICAL NON-SKEWED PANEL PLAN



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.

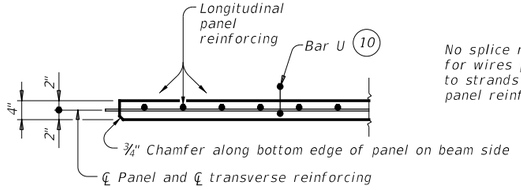
LONGITUDINAL PANEL REINFORCEMENT:

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.

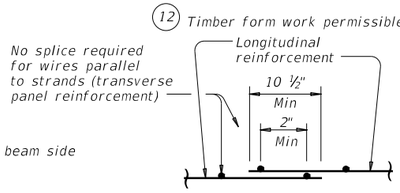
No combination of longitudinal reinforcement options in a panel is allowed.

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.

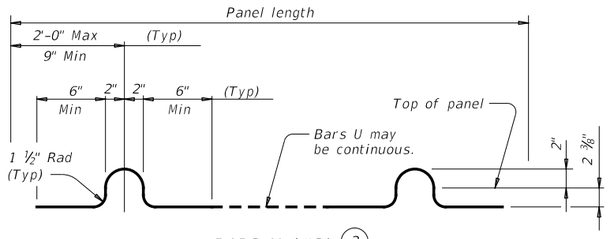


SECTION A-A

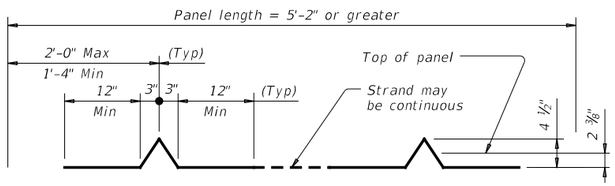
(Not showing supplemental #4 bars for skewed end panels.)



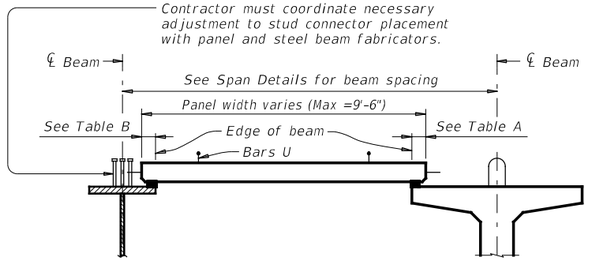
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



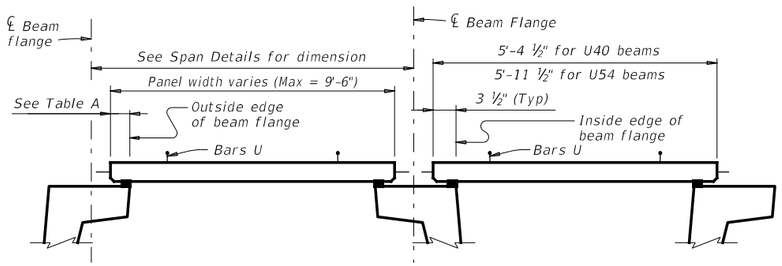
OPTIONAL STRAND FOR BARS U (3)



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

FILE: pcpstde2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		122

DATE: 7/30/2021 3:38:24 PM
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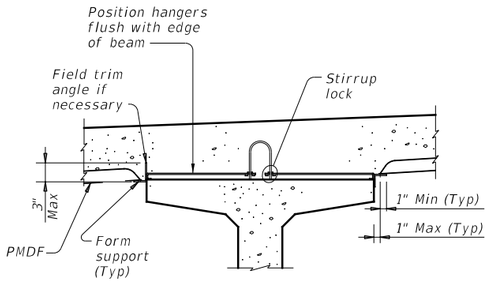
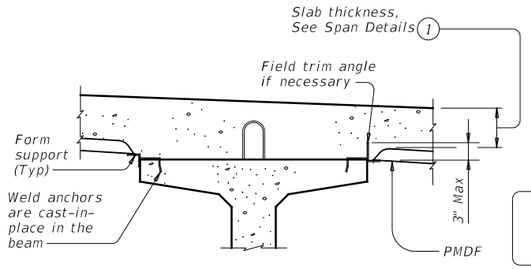
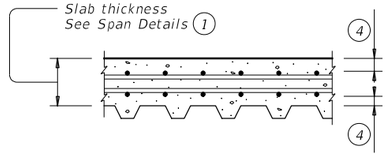


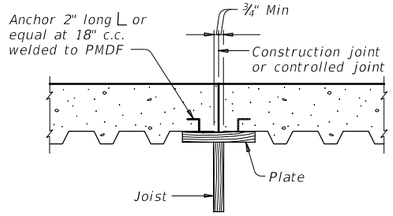
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

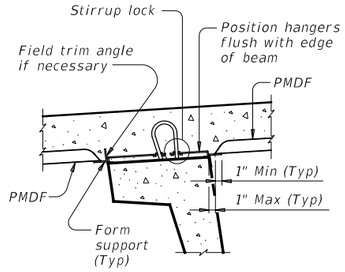


TYP LONGITUDINAL SLAB SECTION

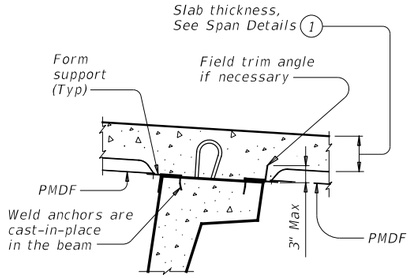


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

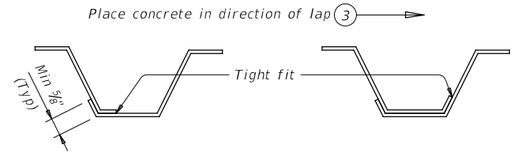
SECTION THRU CONSTRUCTION JOINT



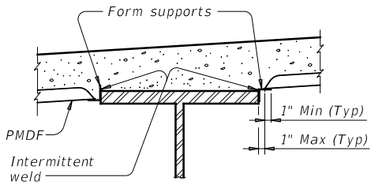
U-BEAMS WITH STIRRUP LOCKS



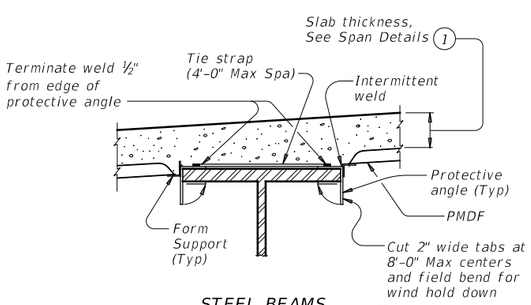
U-BEAMS WITH WELD ANCHORS



SIDE LAP DETAILS

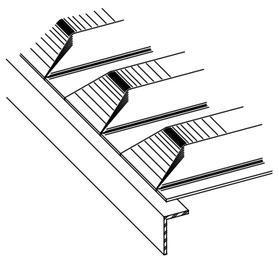


STEEL BEAMS AT COMPRESSION FLANGES

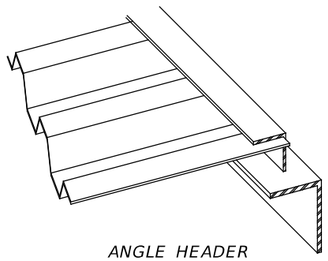


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



PRECLOSED



ANGLE HEADER

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

TYPES OF END CLOSURES

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

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.

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

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

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		123

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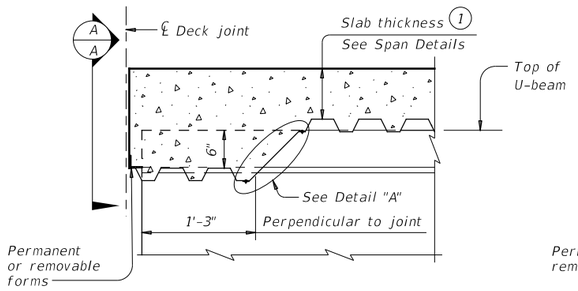
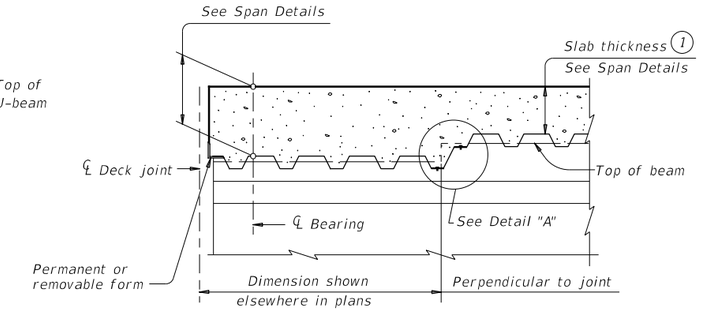
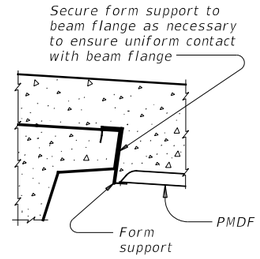


AT THICKENED SLAB END FOR U-BEAMS

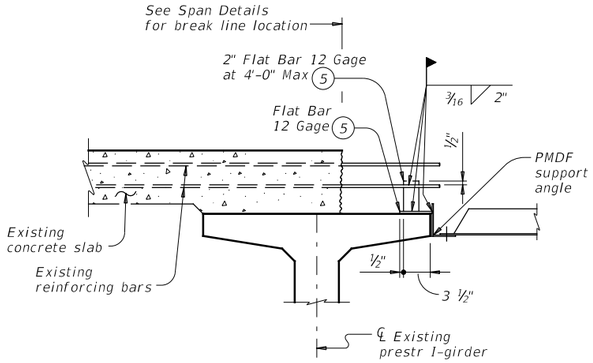


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

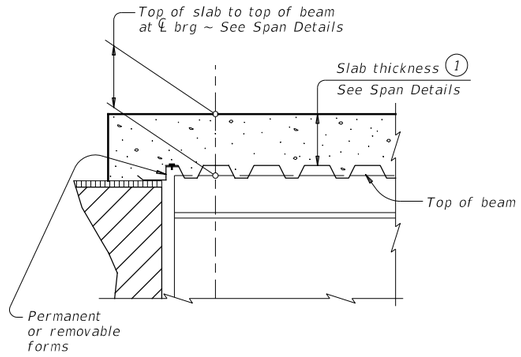
Showing I-beam block-out. No block-out for I-girders or steel beams.



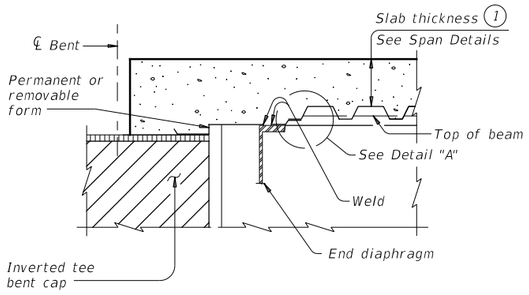
SECTION A-A



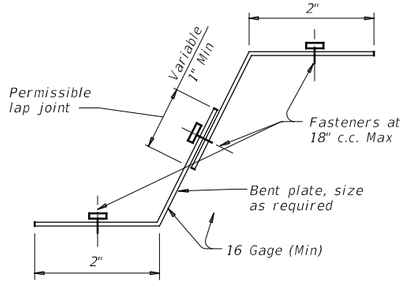
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



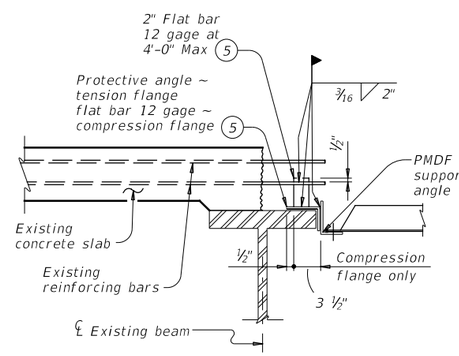
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



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

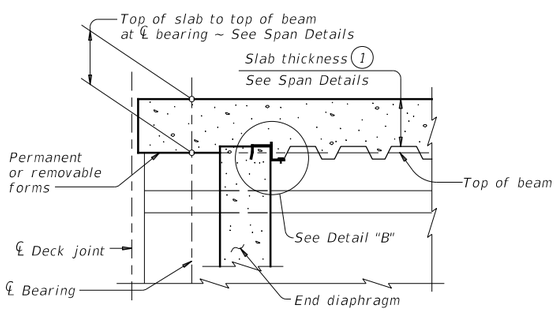


DETAIL "A"

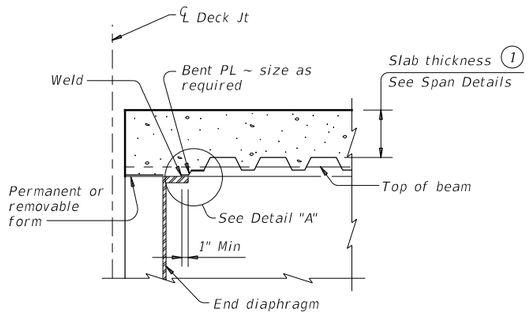


SHOWING STEEL BEAMS

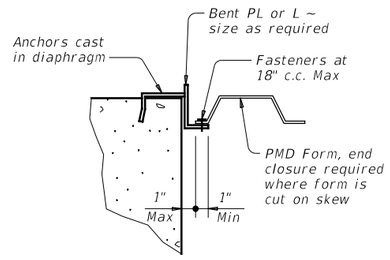
WIDENING DETAILS



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



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 3/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
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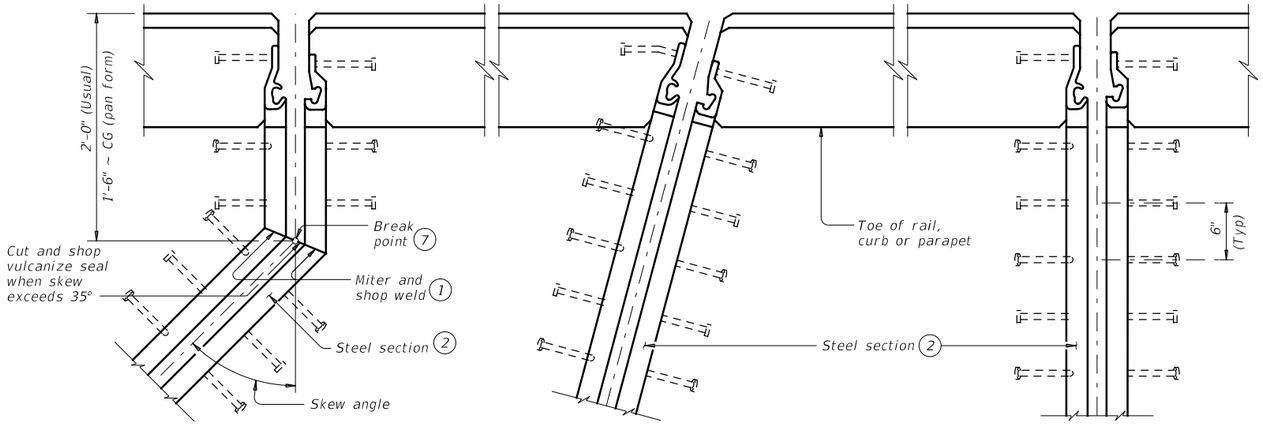
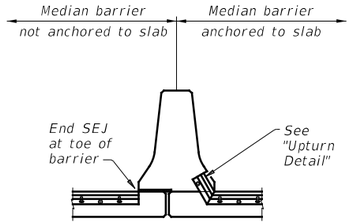
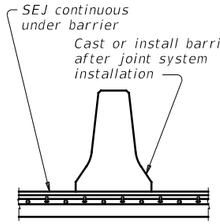


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

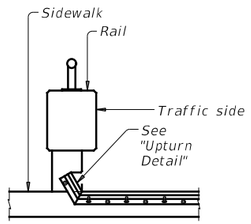
PLANS OF END CONDITIONS



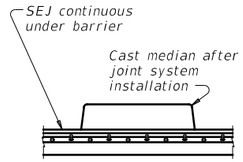
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



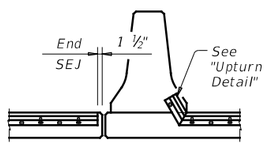
AT MEDIAN BARRIER



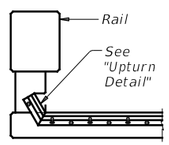
AT SIDEWALK BEHIND BRIDGE RAIL



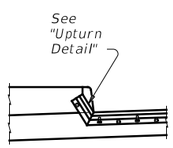
AT RAISED MEDIAN



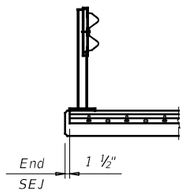
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

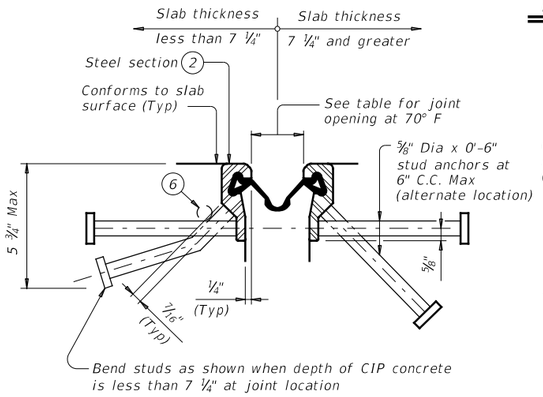


AT SIDEWALK

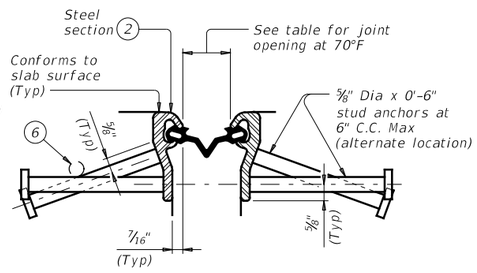


AT STEEL POST BRIDGE RAIL

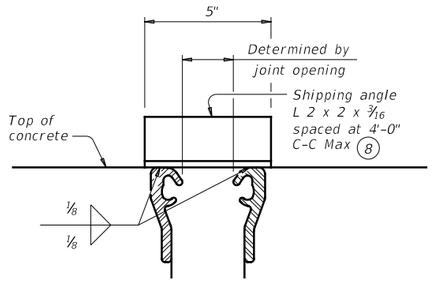
TYPICAL SECTIONS (5)



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.

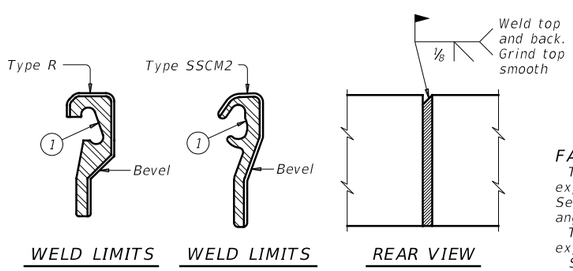
(4) Reduce for sidewalk or parapet heights less than 6".

(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, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

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

CONSTRUCTION NOTES:

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

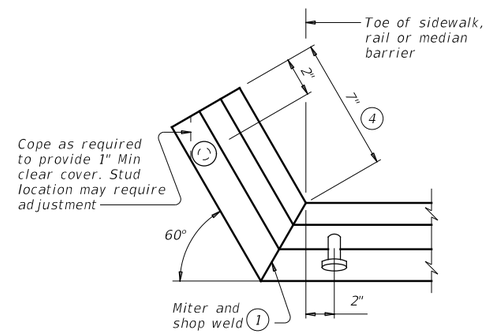
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

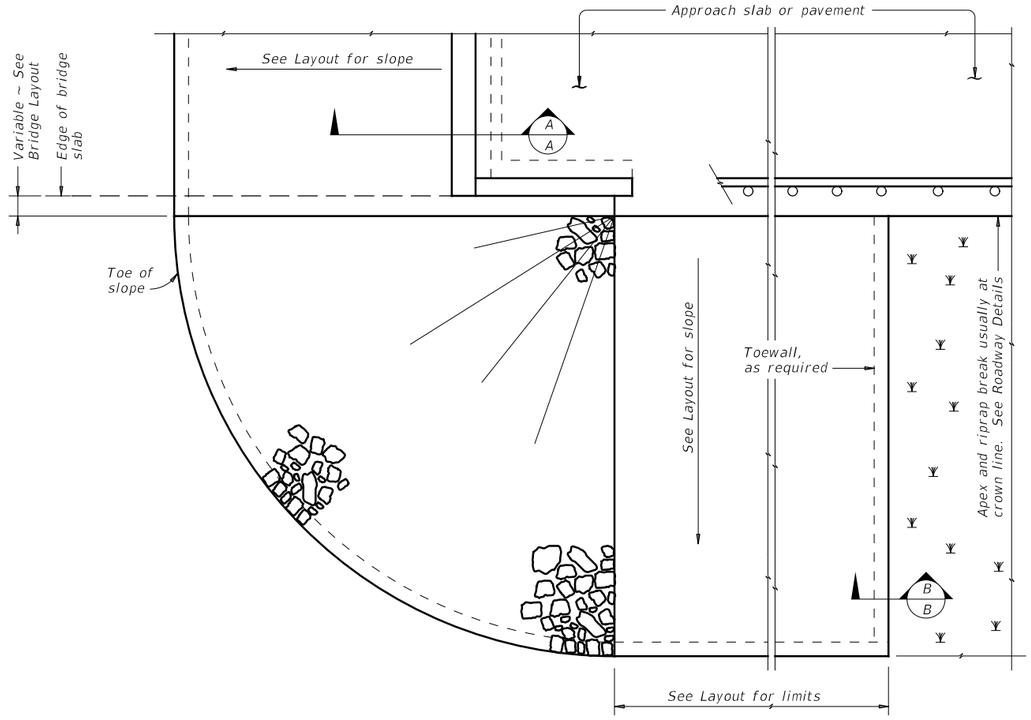
Texas Department of Transportation

Bridge Division Standard

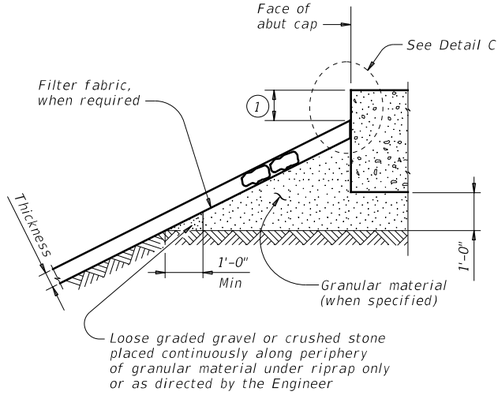
SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

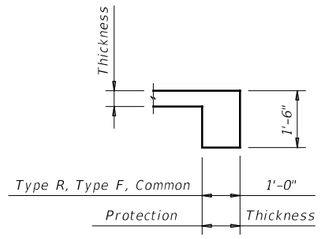
FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		125



PLAN

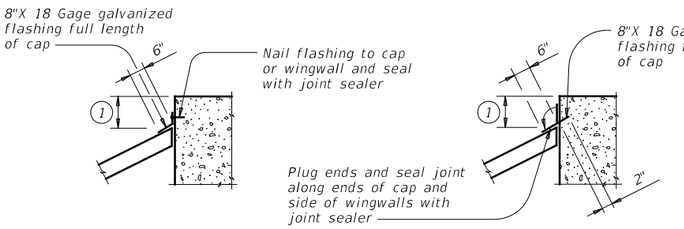


SECTION A-A AT CAP



SECTION B-B

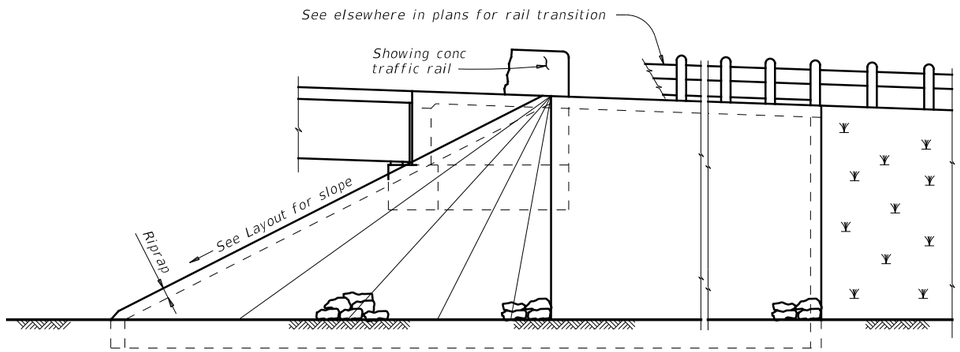
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

GENERAL NOTES:

Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.

See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		126

DATE: 7/30/2021 3:38:29 PM
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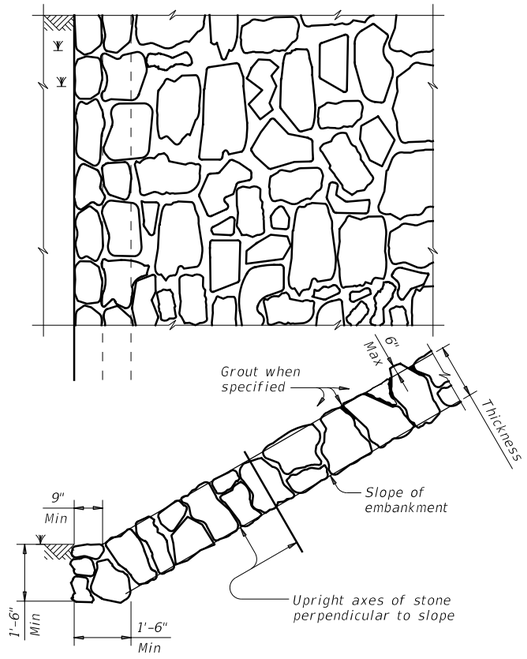


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

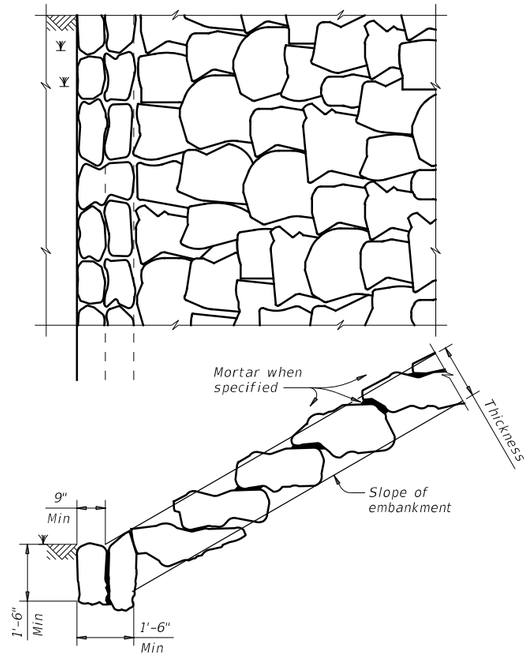


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

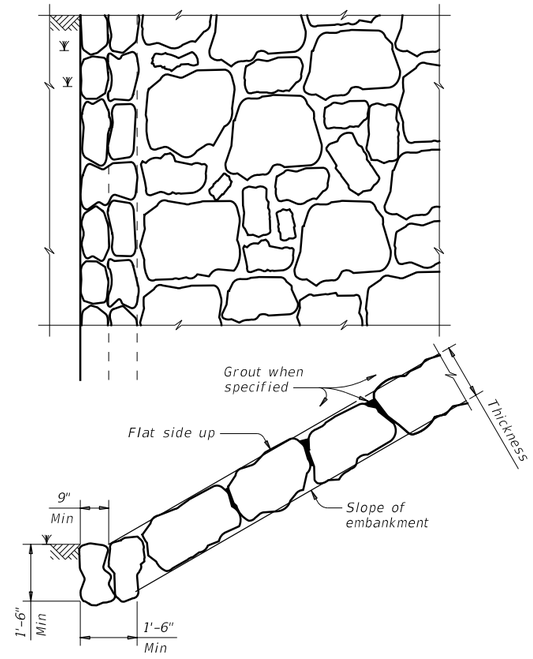


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

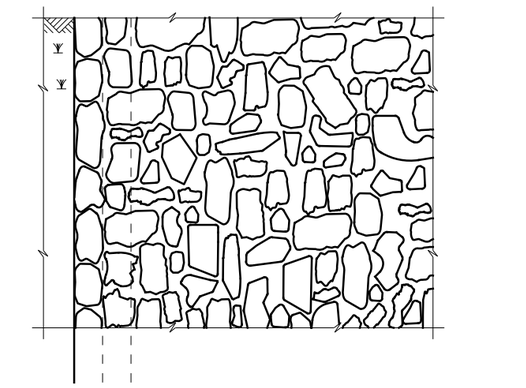


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

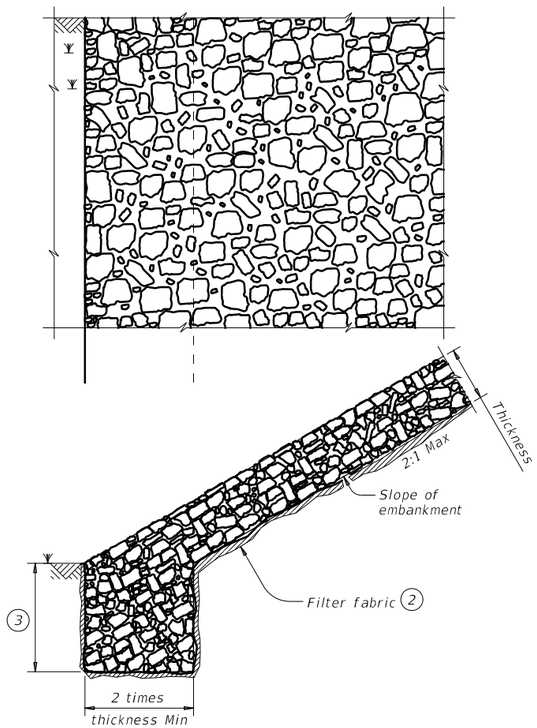


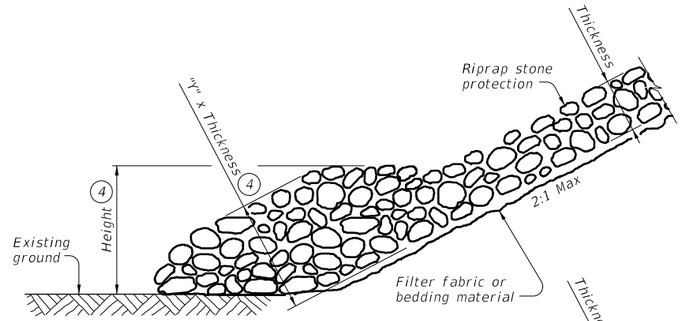
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

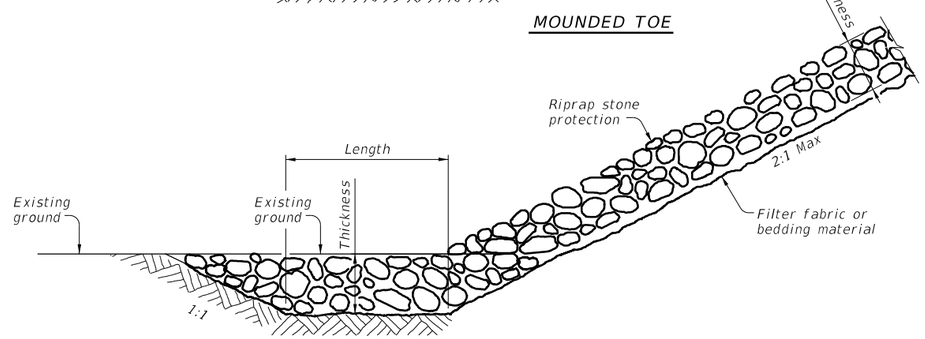
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		127

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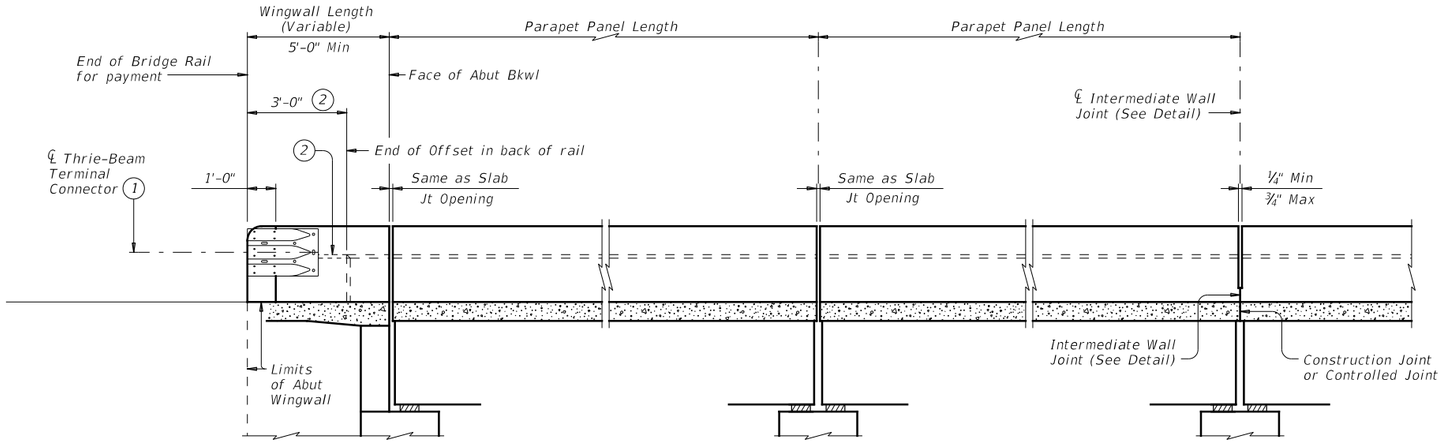
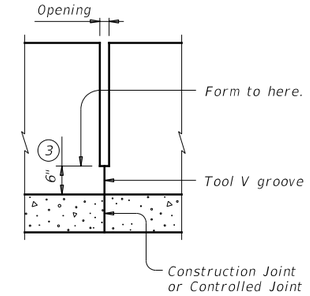
FILE: 017-T221

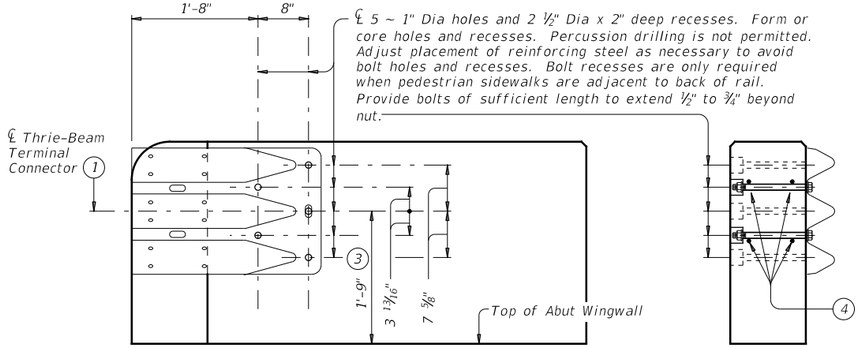


ROADWAY ELEVATION OF RAIL



INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



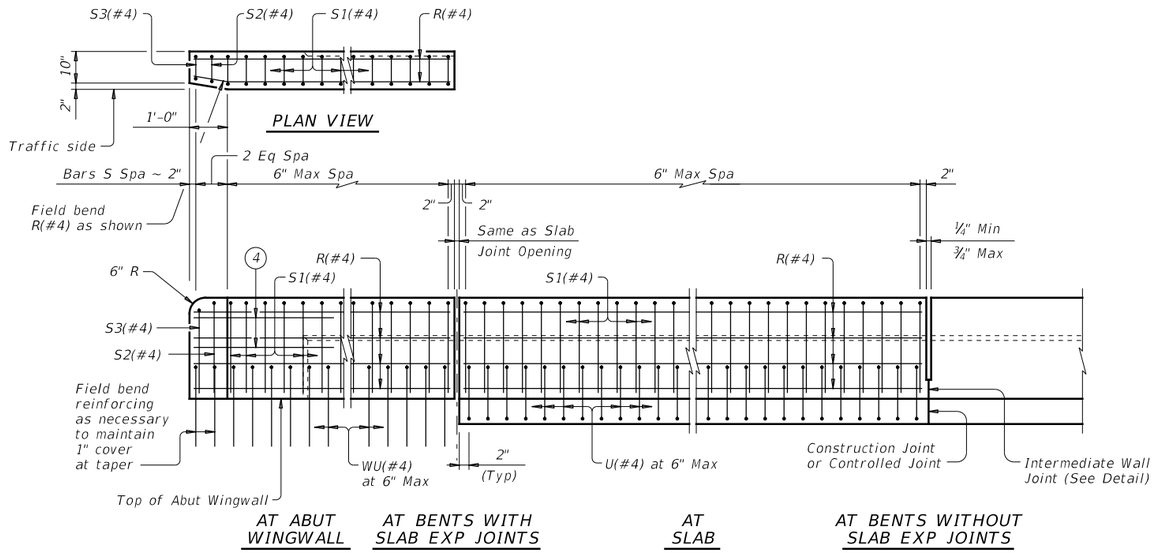
TERMINAL CONNECTION DETAILS

(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.

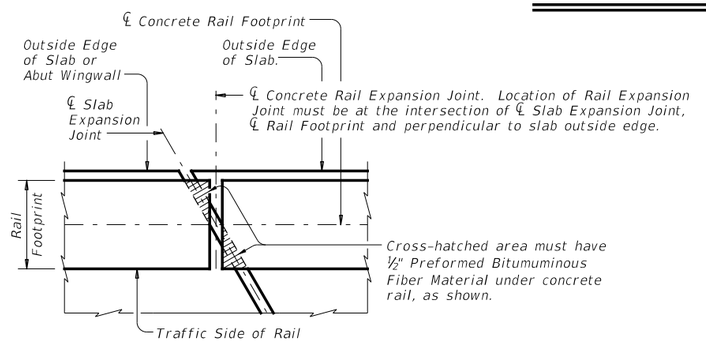
(2) Back of rail offset may, with Engineer's approval, be continued to the end of the railing.

(3) Increase 2" for structures with overlay.

(4) Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T221

FILE: rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		128

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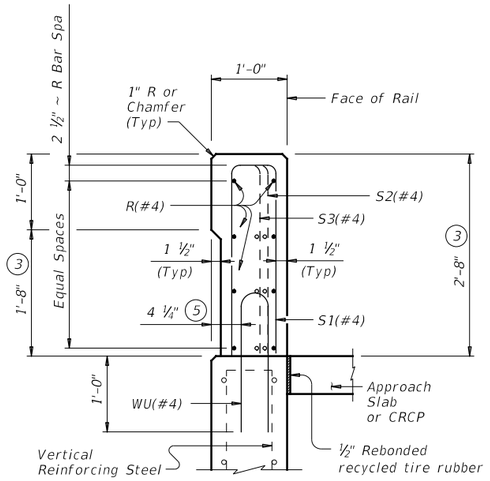
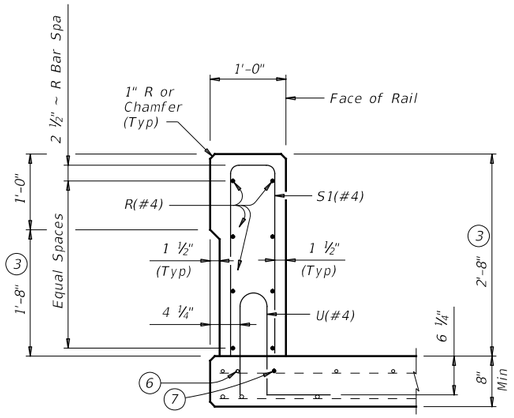


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(3) Increase 2" for structures with overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractors expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) Bend or cut as required to clear drain slots.

(9) No longitudinal wires may be in top center of cage.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM 1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other that shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

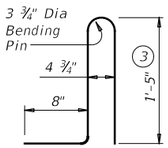
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

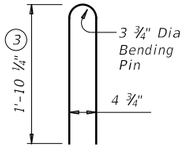
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 370 plf.

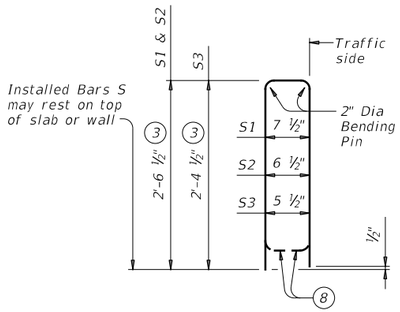
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



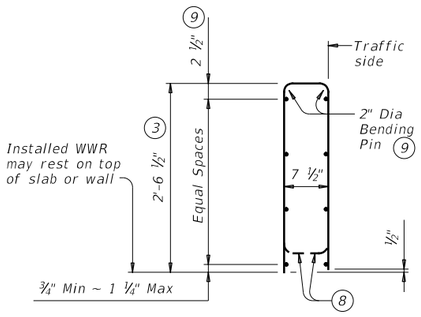
BARS U (#4)



BARS WU (#4)

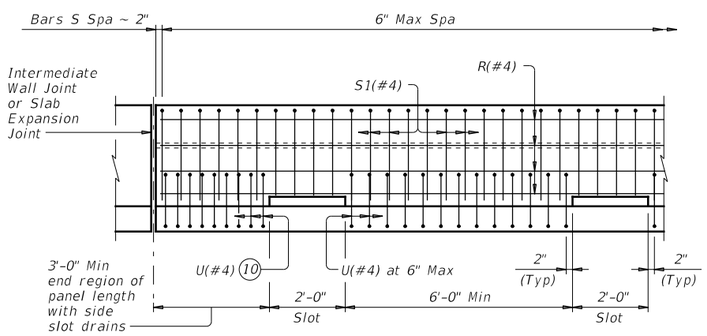


BARS S (#4)



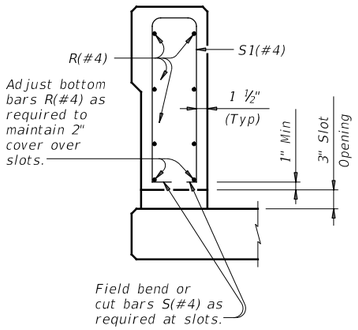
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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



OPTIONAL SIDE SLOT DRAIN DETAIL

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



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

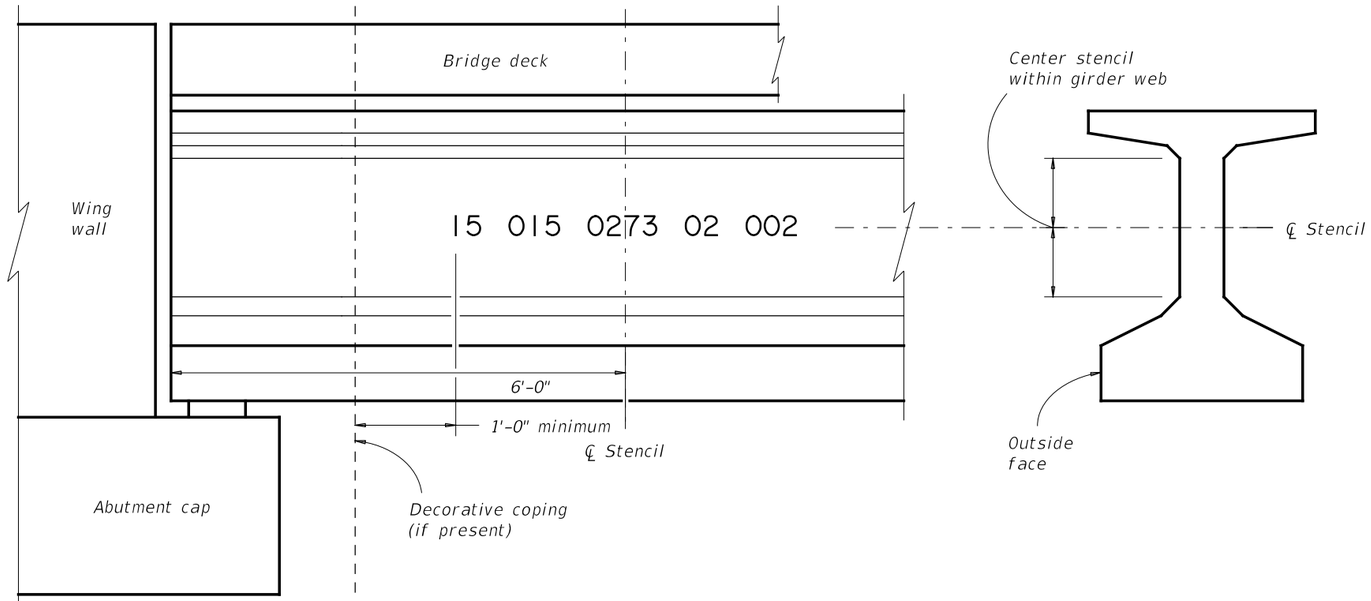
TYPE T221

FILE:	rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019		CONT	SECT	JOB	HIGHWAY
REVISIONS		0848	04	049	FM 462
		DIST	COUNTY		SHEET NO.
		SAT	MEDINA		129

15 015 0273 02 002

San Antonio District designation	County designation	Control number	Section nunber	Structure number

PAINTED STRUCTURE NUMBER DETAIL



TYPICAL BRIDGE CORNER (ELEVATION)

SAN ANTONIO DISTRICT COUNTY DESIGNATIONS

Atascosa 007
Bandera 010
Bexar 015
Comal 046
Frio 083
Guadalupe 095
Kendall 131
Kerr 133
McMullen 162
Medina 163
Uvalde 232
Wilson 247

GENERAL NOTES:
Apply stucture number in accordance with Special Specification for Stenciling Permanent Structure Numbers.

SAN ANTONIO DISTRICT STANDARD

Texas Department of Transportation
San Antonio District (Structural Design)
Prepared by and for the use of TxDOT

BRIDGE NBI NUMBER STENCIL

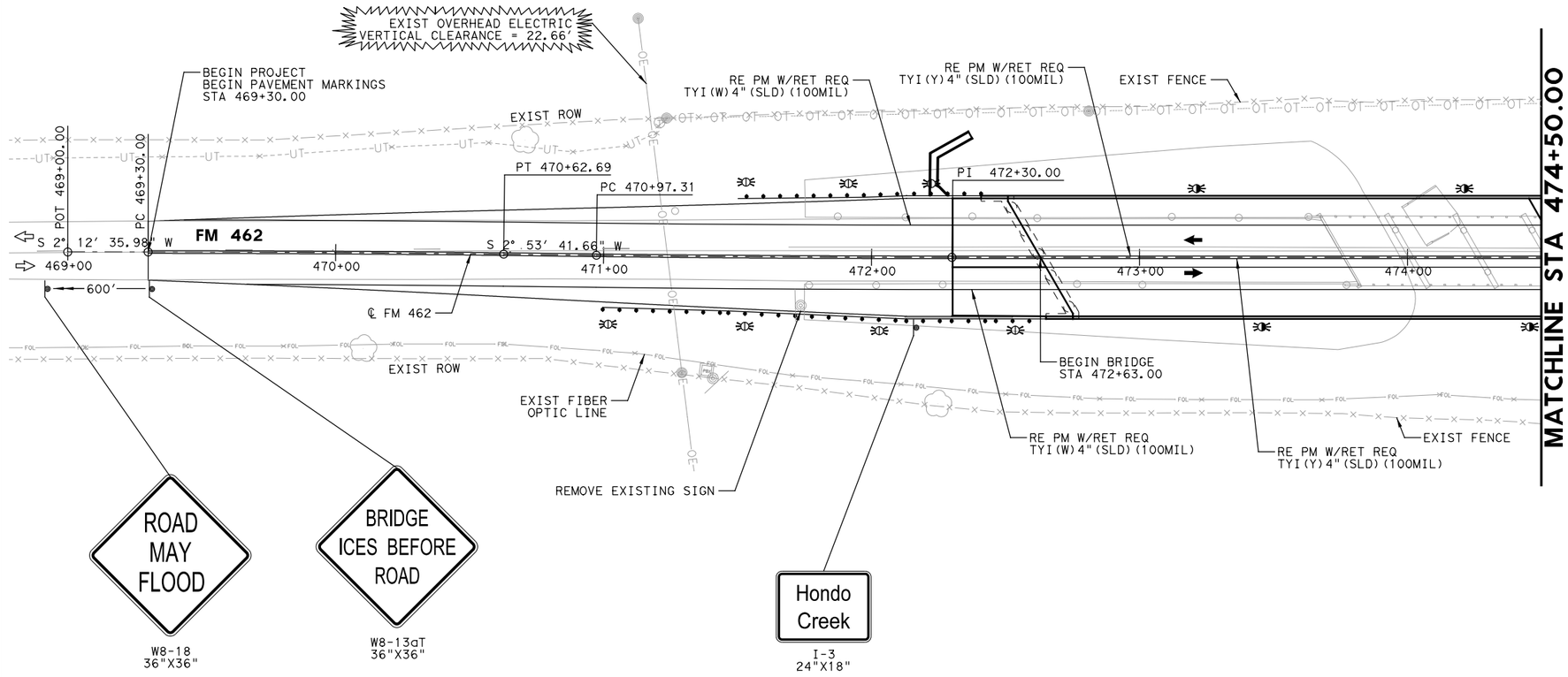
DN: BCL	CK: XXX	FILENAME: 000000000 SA District Stencil.dgn	
DW: SRF	CK: XXX	ORIGINAL DRAWING DATE: August 2019	
DIST	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	COUNTY
SAT	6	BR 2022(263)	MEDINA
CONTROL	SECTION	JOB / SHEET NO.	ROUTE
0848	04	049 / 129A	FM 462

REVISIONS:

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3
644 6076	REMOVE SM RD SN SUP&AM	EA	1
658 6014	INSTL DEL ASSM(D-SW)SZ(BRF)CTB(BI)	EA	4
658 6062	INSTL DEL ASSM(D-SW)SZ1(BRF)GF2(BI)	EA	7
666 6303	RE PM W/RET REQ TYI(W)4"(SLD)(100MIL)	LF	990
666 6315	RE PM W/RET REQ TYI(Y)4"(SLD)(100MIL)	LF	1040
672 6009	REFL PAV MRKR TY II-A-A	EA	13

0 25 50 75 100

HORIZ. SCALE IN FEET



LEGEND

- EXIST FENCE
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROPOSED SIGN
- INSL DEL ASSM (D-SW) SZ1(BRF)GF2(BI)
- INSL DEL ASSM (D-SW) SZ(BRF)CTB(BI)

NOTES:

1. SIGNS SHALL BE PLACED 600' APART.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER
8/20/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=50' SHEET 1 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	130

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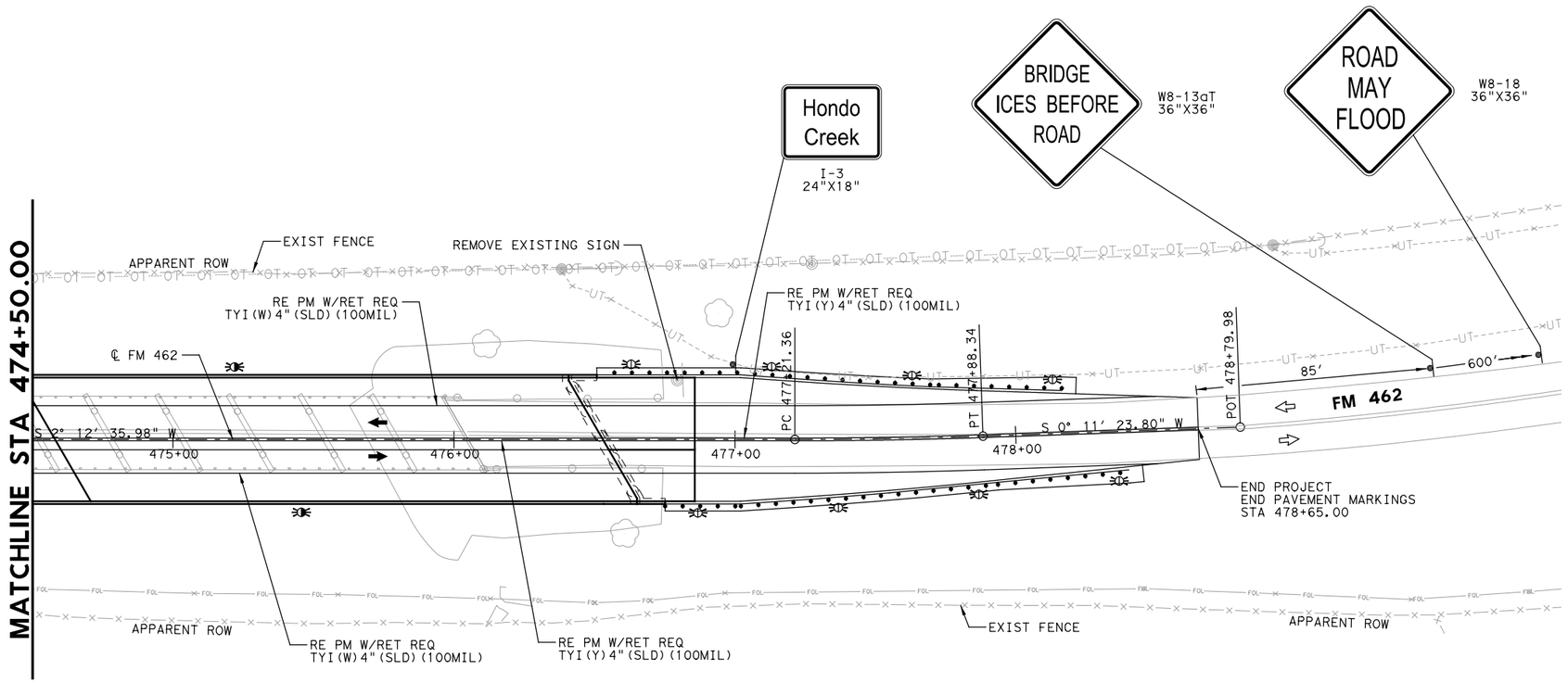
User Name: JFOYT

SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3
644 6076	REMOVE SM RD SN SUP&AM	EA	1
658 6014	INSTL DEL ASSM(D-SW)SZ(BRF)CTB(BI)	EA	2
658 6062	INSTL DEL ASSM(D-SW)SZ1(BRF)GF2(BI)	EA	8
666 6303	RE PM W/RET REQ TYI(W)4"(SLD)(100MIL)	LF	800
666 6315	RE PM W/RET REQ TYI(Y)4"(SLD)(100MIL)	LF	830
672 6009	REFL PAV MRKR TY II-A-A	EA	11

0 25 50 75 100

HORIZ. SCALE IN FEET



LEGEND

- EXIST FENCE
- PROP TRAFFIC LANE
- EXIST TRAFFIC LANE
- PROPOSED SIGN
- INSL DEL ASSM (D-SW) SZ1(BRF)GF2(BI)
- INSL DEL ASSM (D-SW) SZ(BRF)CTB(BI)

NOTES:

1. SIGNS SHALL BE PLACED 600' APART.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

8/20/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

SIGNING & PAVEMENT MARKING LAYOUT

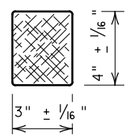
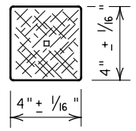
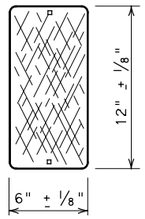
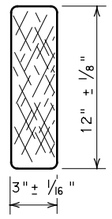
SCALE: 1"=50' SHEET 2 OF 2

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	131

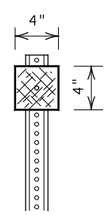
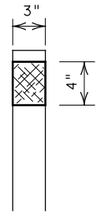
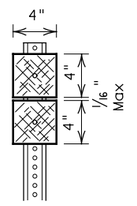
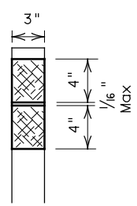
EXIST GRADE
PROP GRADE

PLOTDRIVER: TXDOT*PDF*BW.pltcfg
PENTABLE: 1023721.tbl
DATE: 8/19/2021
PLOTTING TIME: 4:15:09 PM
File Name: FM462SSO2.dgn
User Name: JFOYT

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

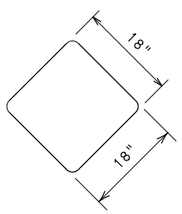
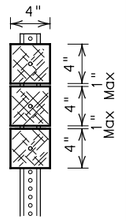
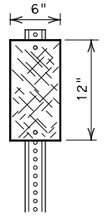
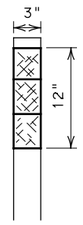
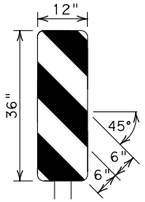
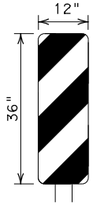
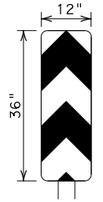
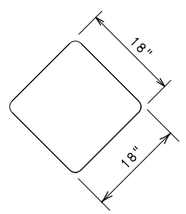
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

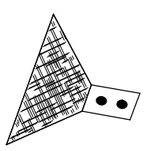
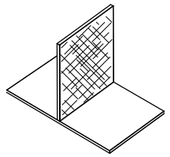
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

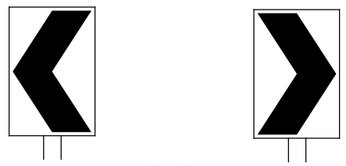
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE: 1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE:  W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE:
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	MEDINA		132

20A

DATE: DATE/TIME 4:15:11 PM
FILE: DOCUMENTdNAME

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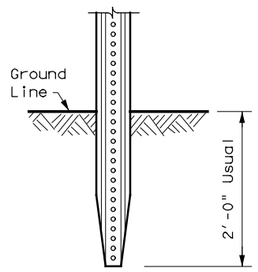
DATE: DATE/TIME 4:15:12 PM
FILE: DOCUMENTNAME

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

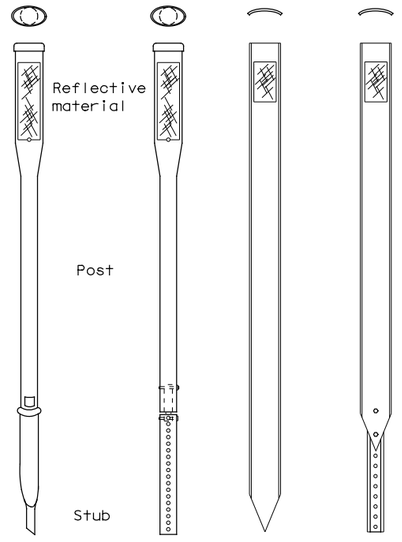


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

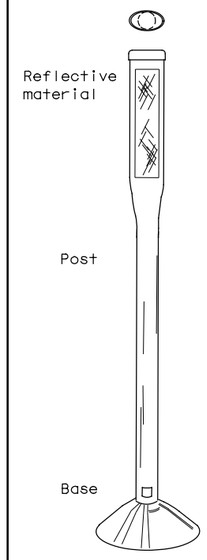
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



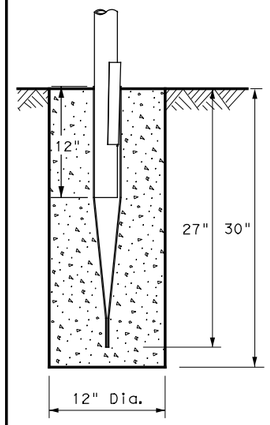
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

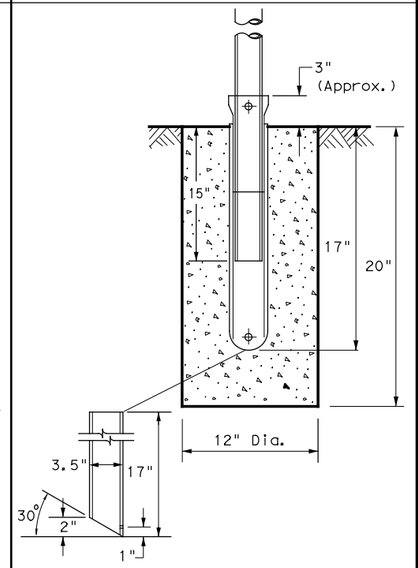
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

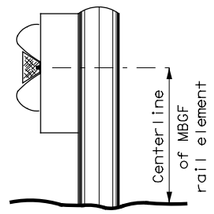
NOTE

1. Install per manufacturer's recommendations.

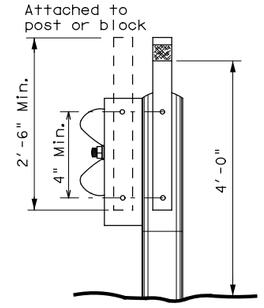
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

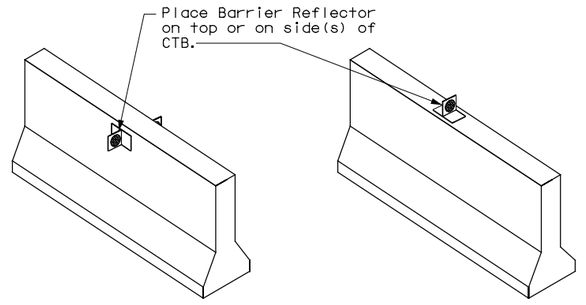
GF1



GF2



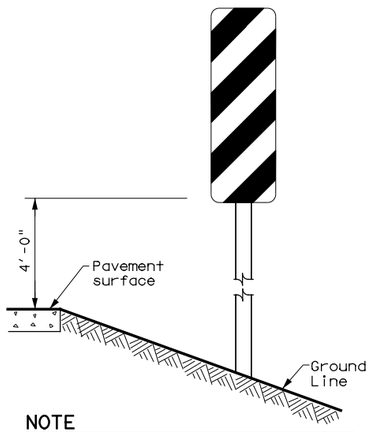
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

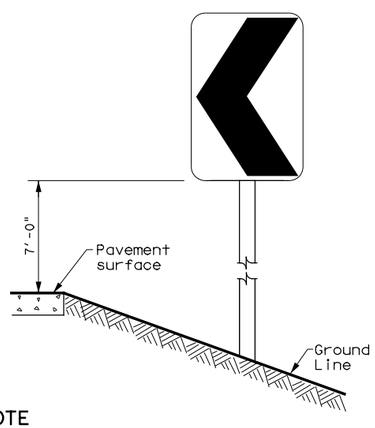
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

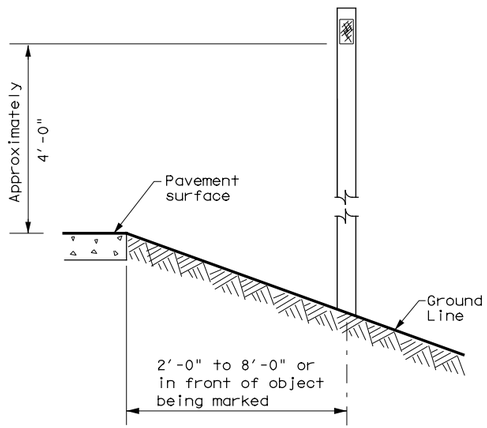
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

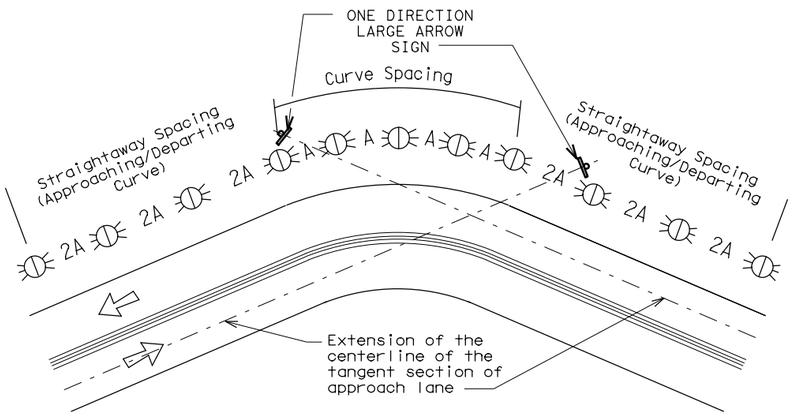
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	MEDINA		133

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

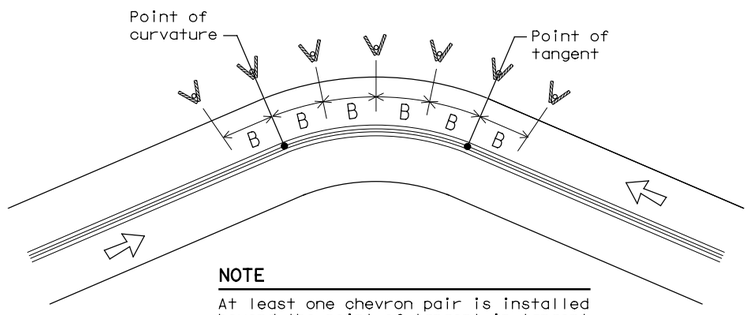
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

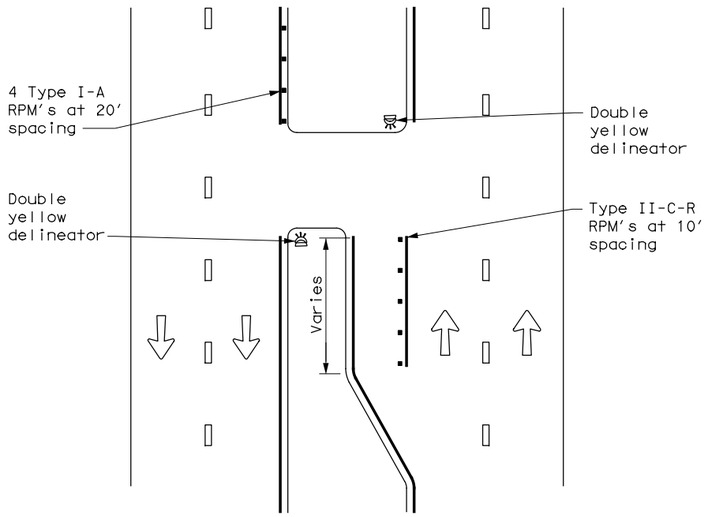
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	SAT	MEDINA		134

20C

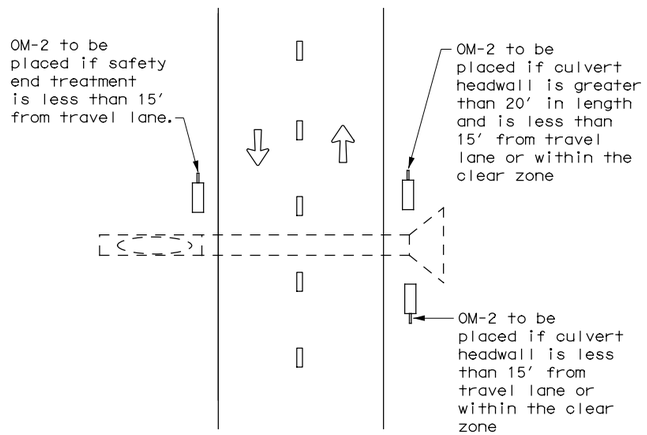
DATE: DATE/TIME 4:15:14 PM
FILE: DOCUMENTdNAME

CROSSOVERS



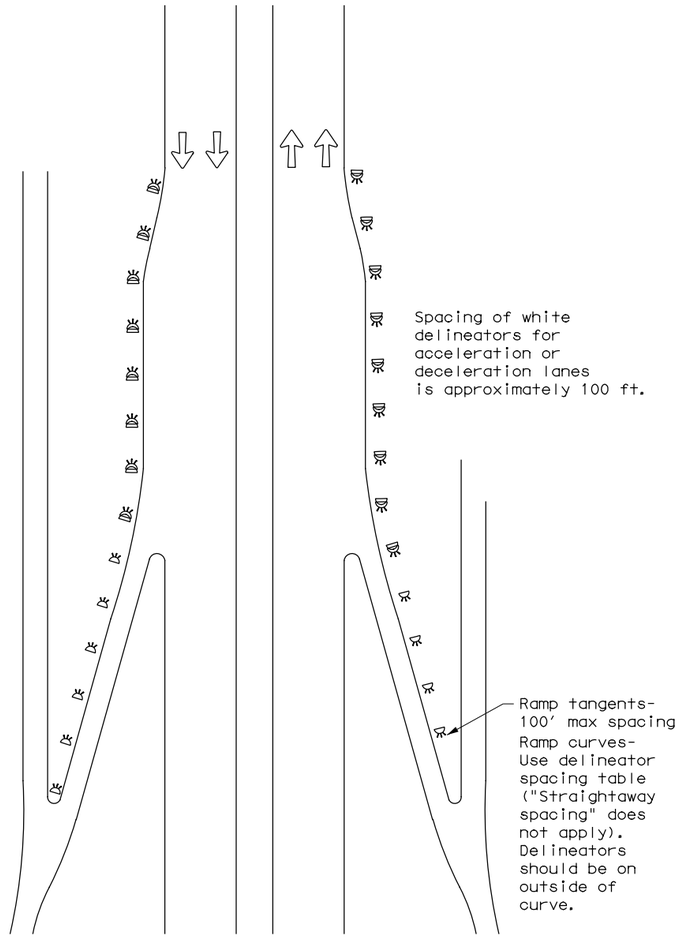
DETAIL 1

FOR CULVERTS WITHOUT MBGF



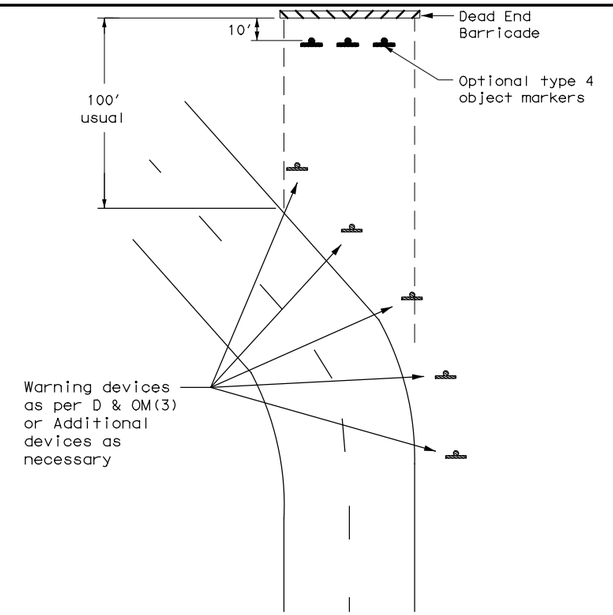
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



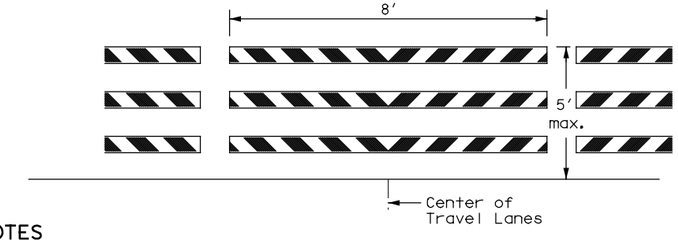
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

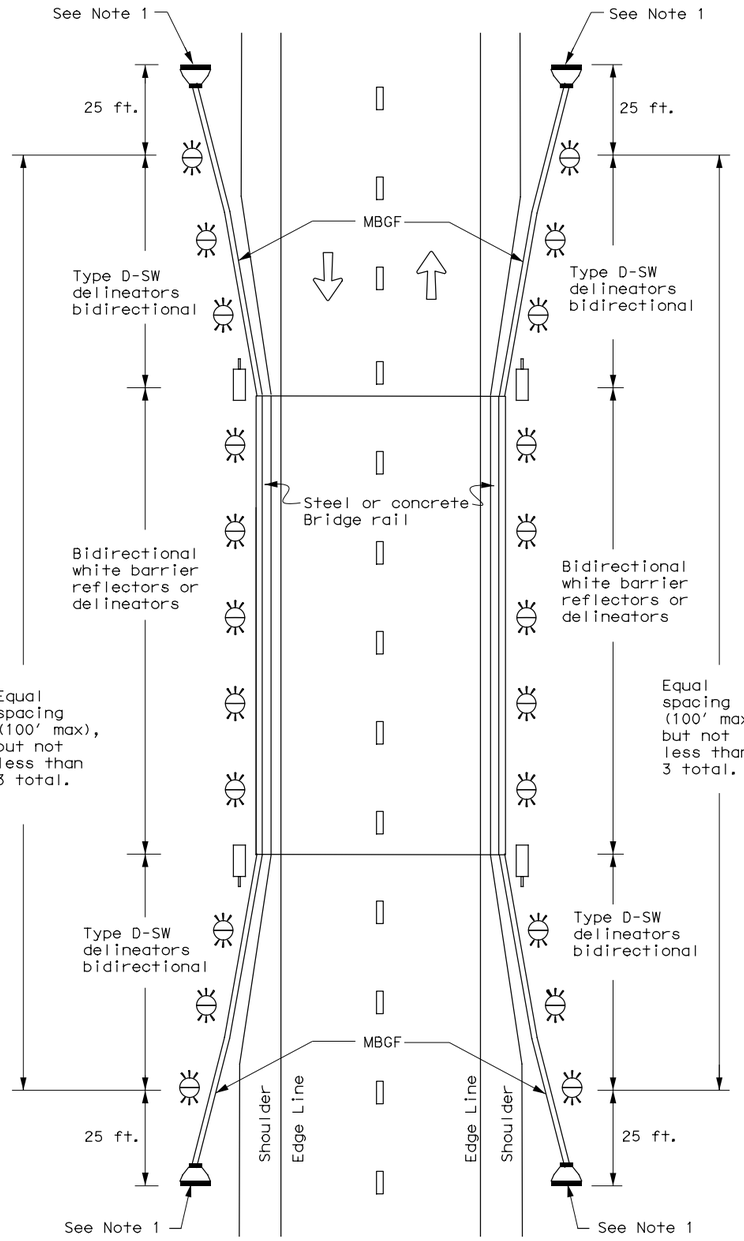
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
3-15	DIST	COUNTY		SHEET NO.
7-20	SAT	MEDINA		135

20D

DATE: DATE/TIME 4:15:17 PM
FILE: DOCUMENT NAME

DATE: DATE/TIME 4:15:20 PM
FILE: DOCUMENT NAME

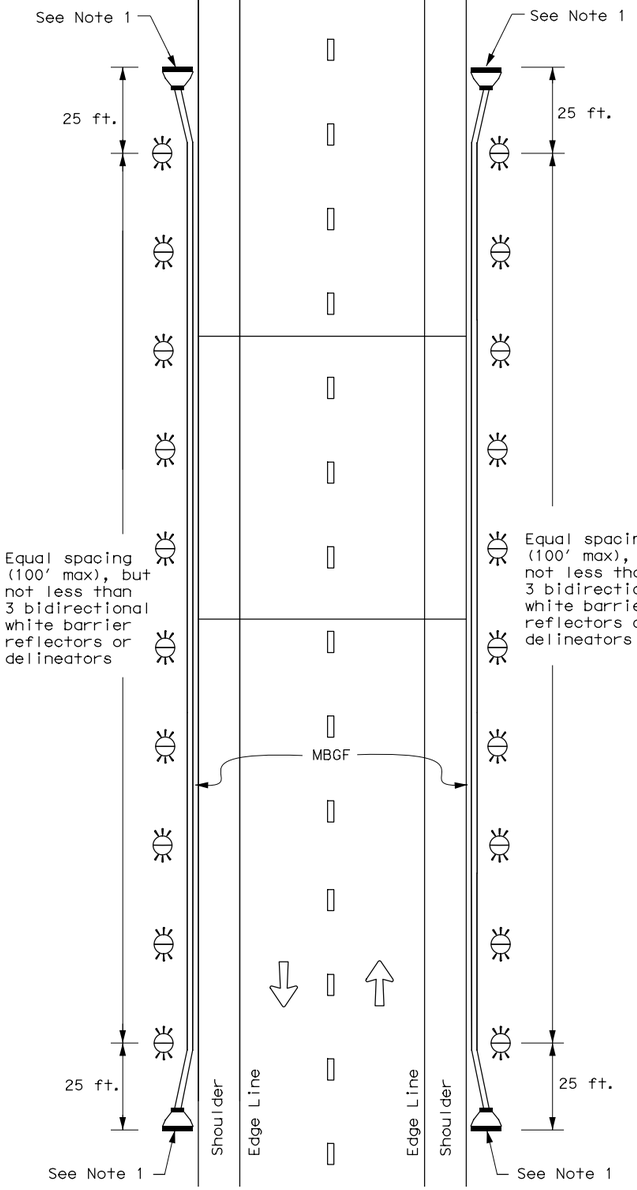
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

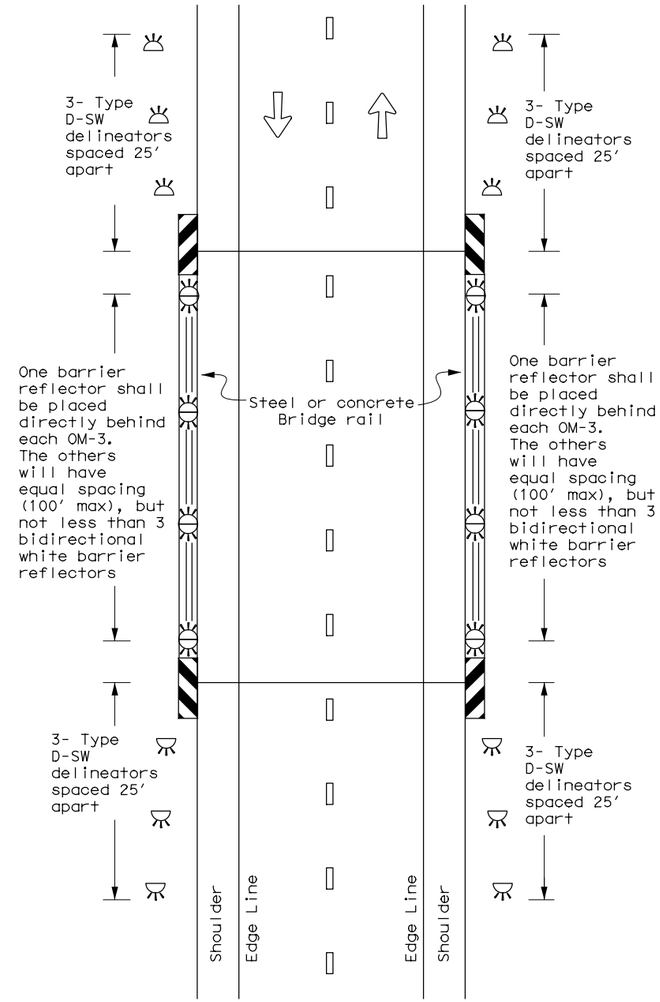
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

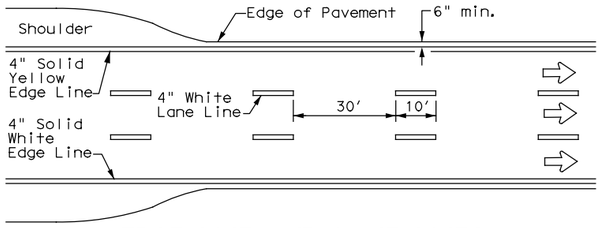
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

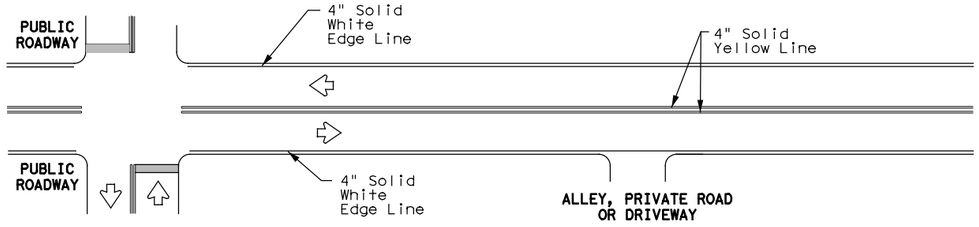
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
7-20	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		136

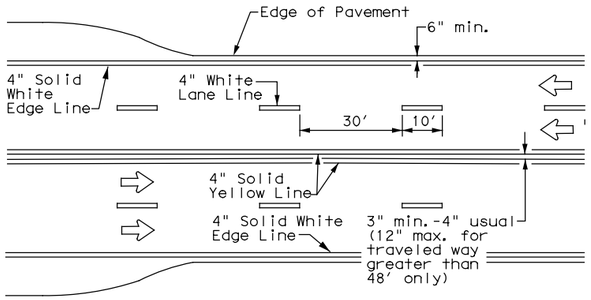
20E



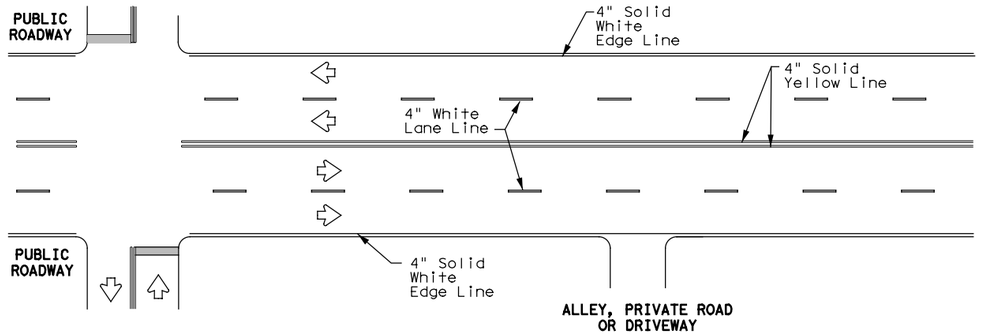
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



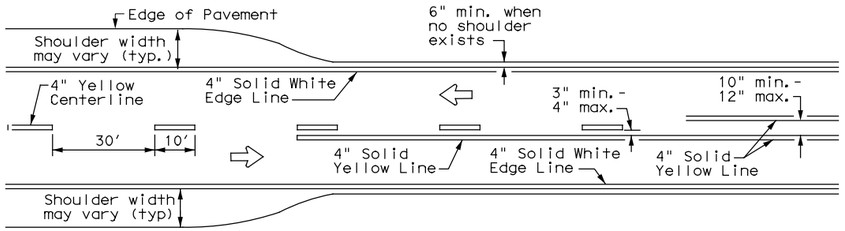
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



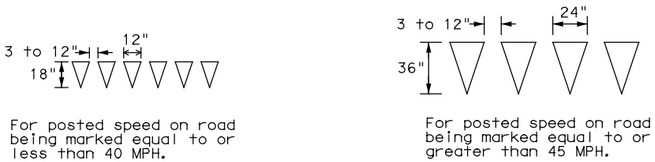
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



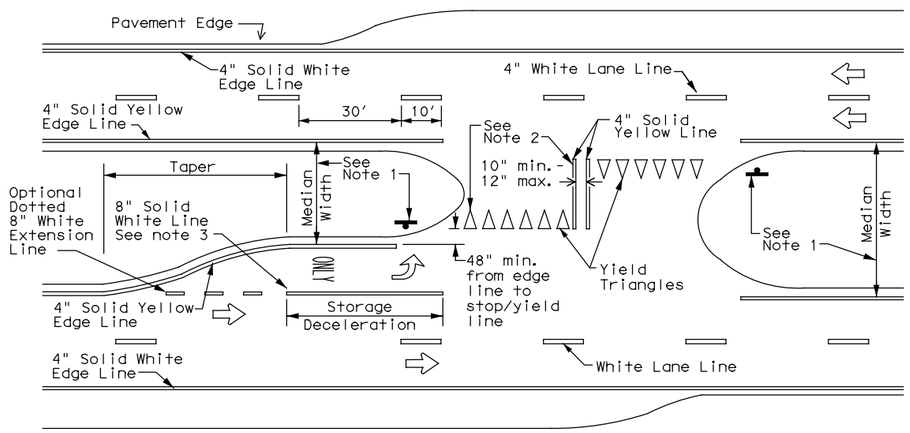
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

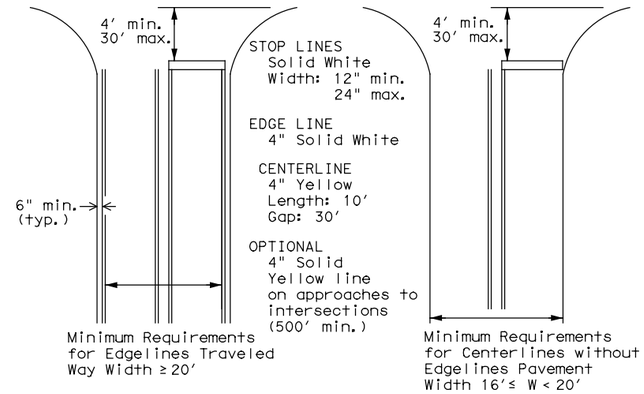
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

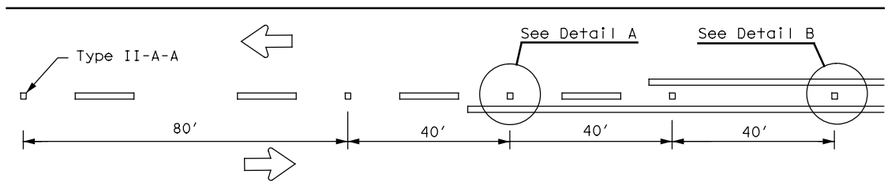
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0848	04	049	FM 462
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	MEDINA		137

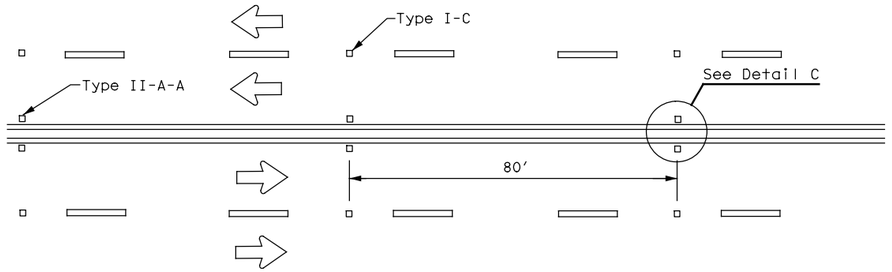
22A

DATE: DATE/TIME 4:15:24 PM
FILE: DOCUMENTNAME

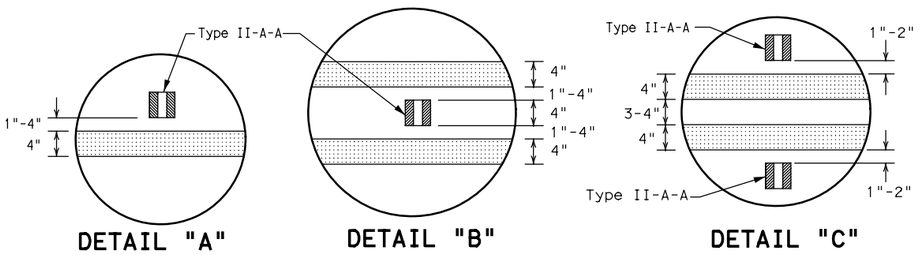
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



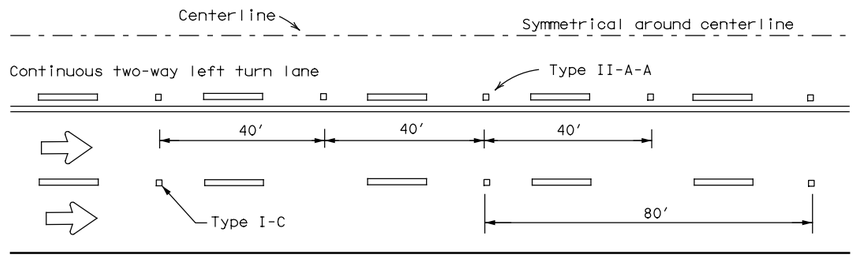
CENTERLINE FOR ALL TWO LANE ROADWAYS



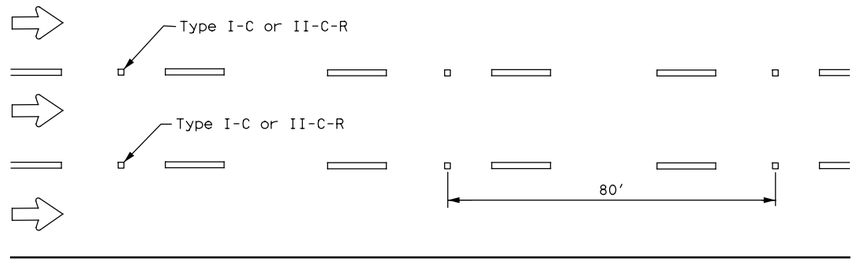
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

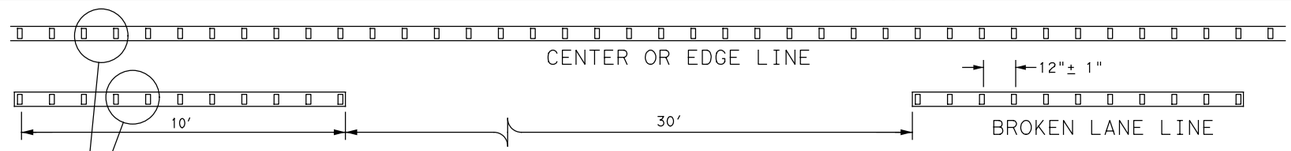


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

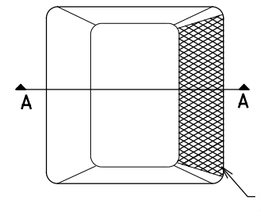
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

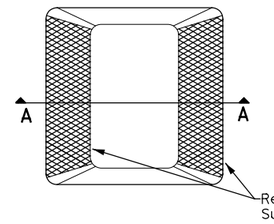
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

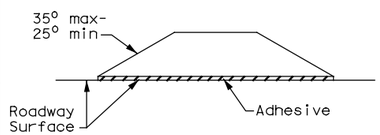
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0848	04	049	FM 462
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	MEDINA		138

22B

DATE: DATE/TIME 4:15:26 PM
FILE: DOCUMENTNAME

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)

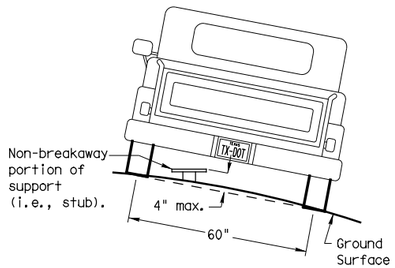
Anchor Type

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))

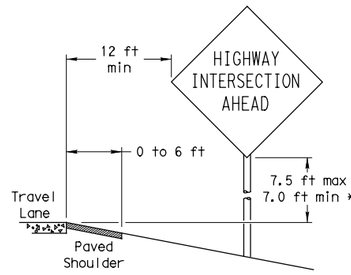
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

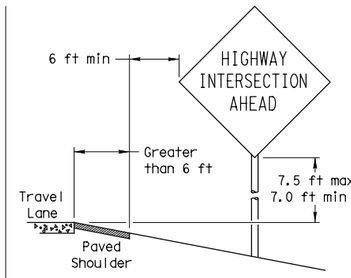
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

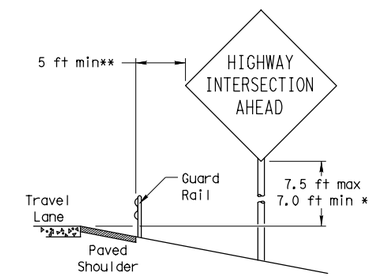
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



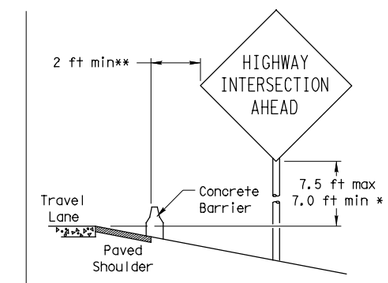
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



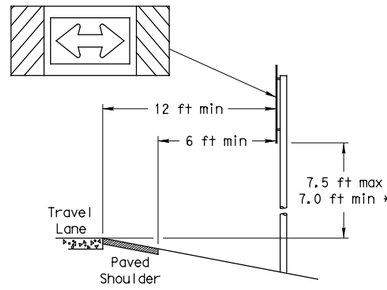
BEHIND GUARDRAIL



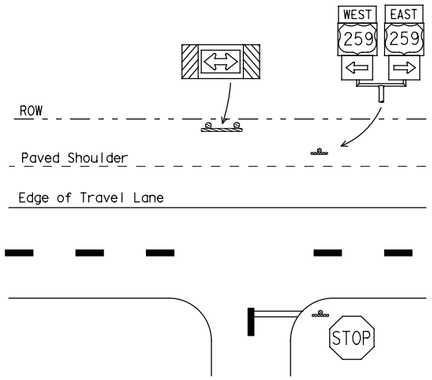
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

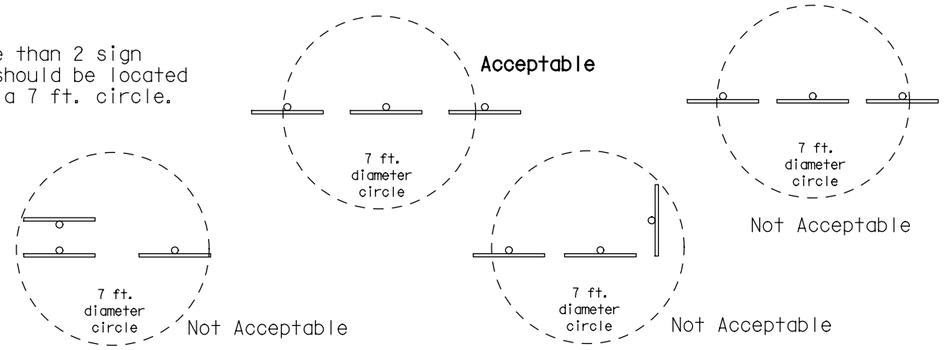
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

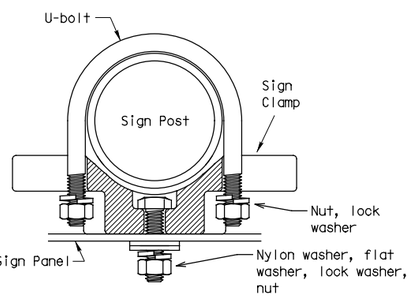
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

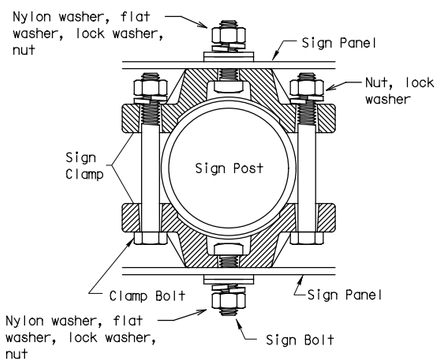


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

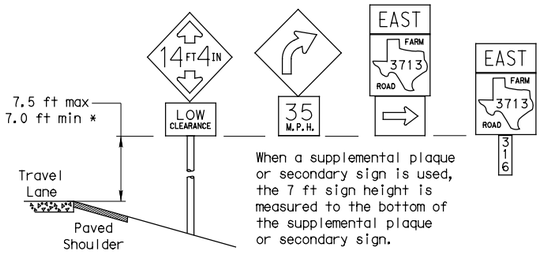
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs

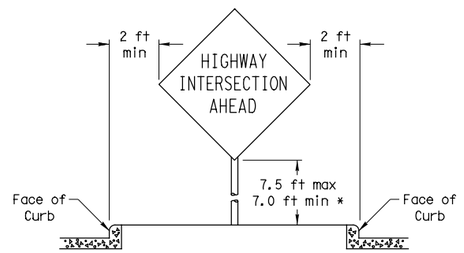


Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

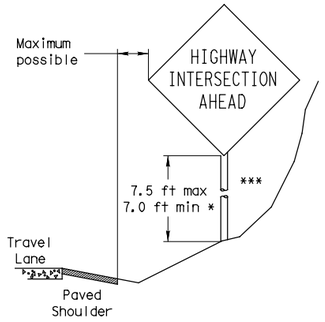


CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

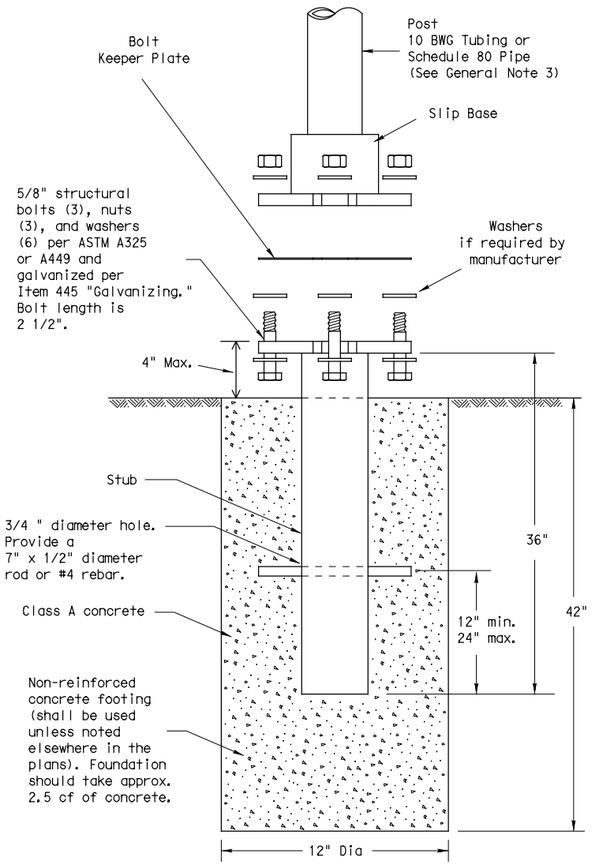
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		139

DATE: 8/19/2021 4:15:27 PM
FILE: smdgen.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

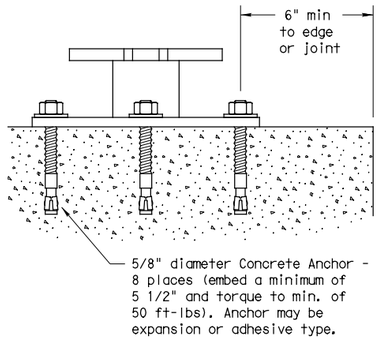
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

CONT	SECT	JOB	HIGHWAY
0848	04	049	FM 462

DIST	COUNTY	SHEET NO.
SAT	MEDINA	140

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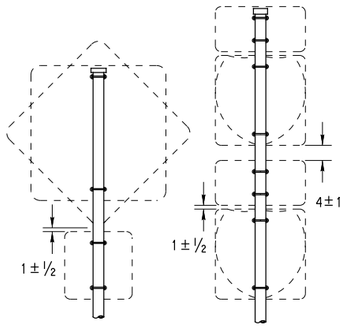

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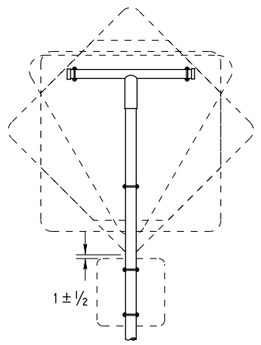

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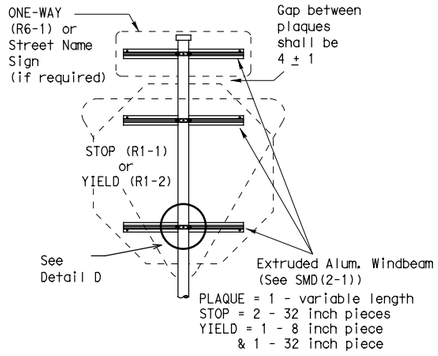

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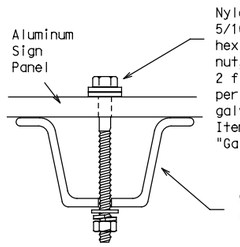
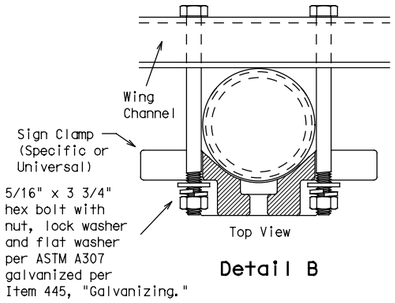
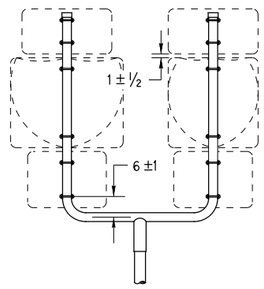


Detail A



Detail B



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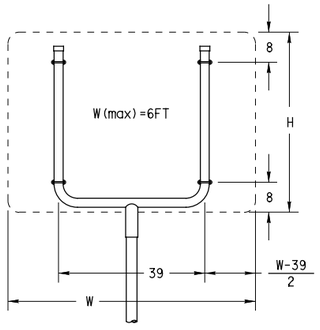

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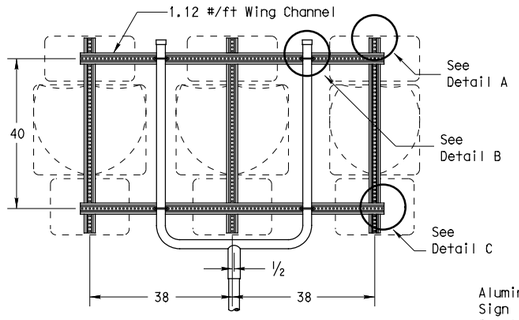
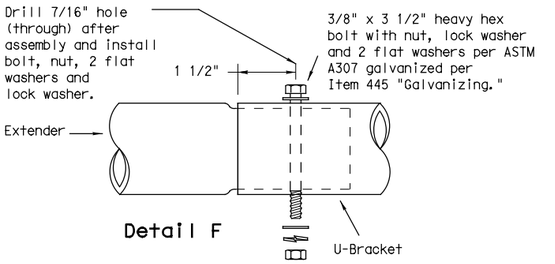
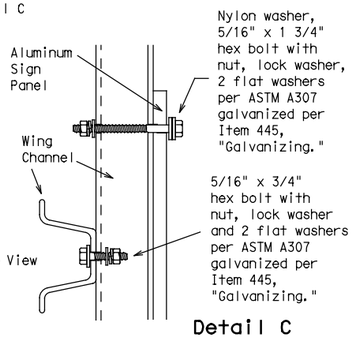


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

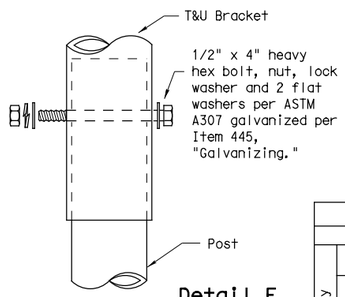


Detail F

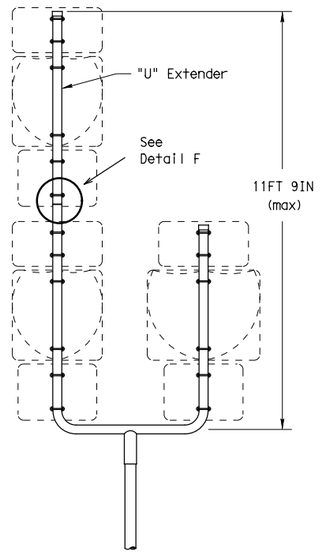
Splices shall only be allowed behind the sign substrate.



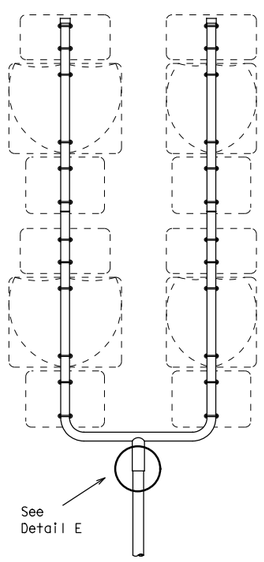
Detail C



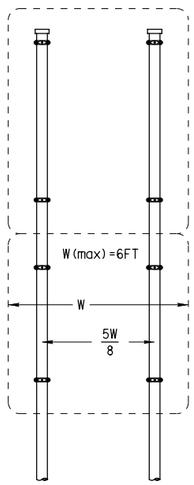
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

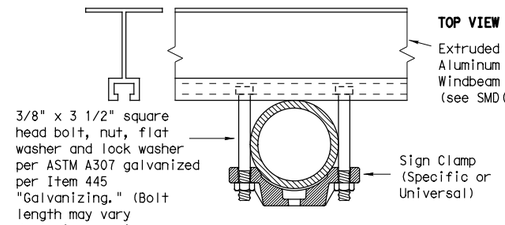


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

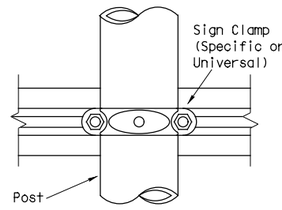


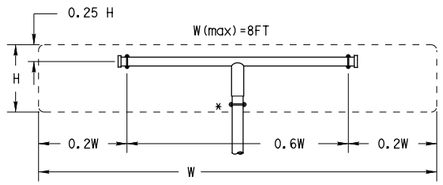
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

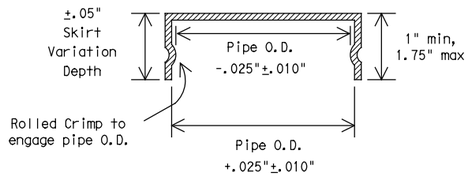




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0848	04	049	FM 462
DIST	COUNTY		SHEET NO.
SAT	MEDINA		141

9-08 REVISIONS

26C

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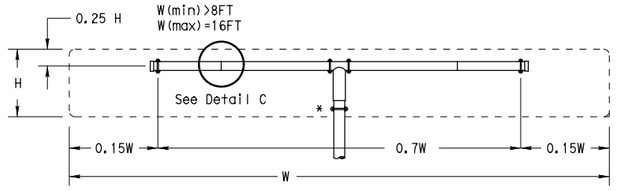
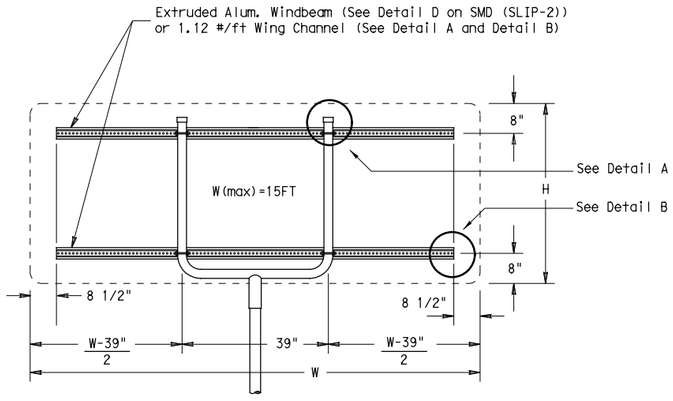
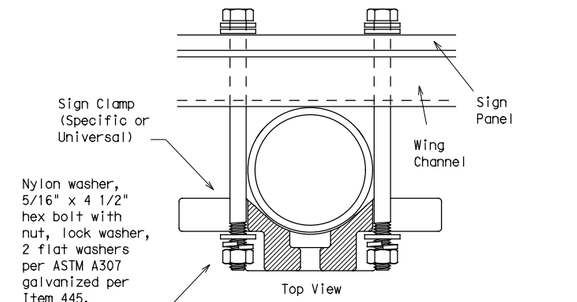


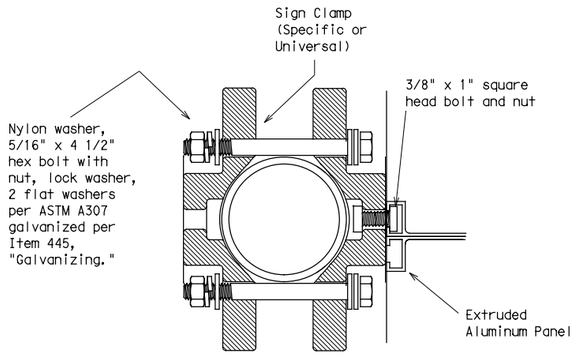
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



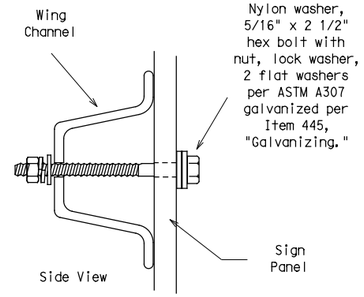
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



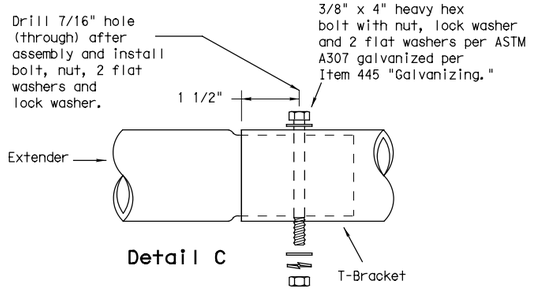
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

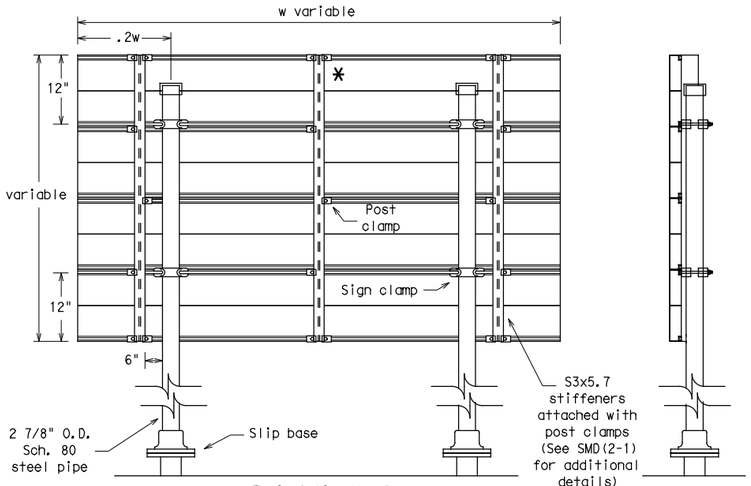


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

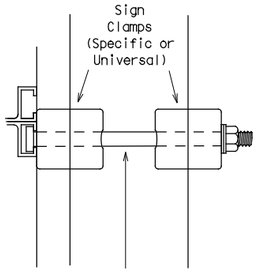


Typical Sign Mount

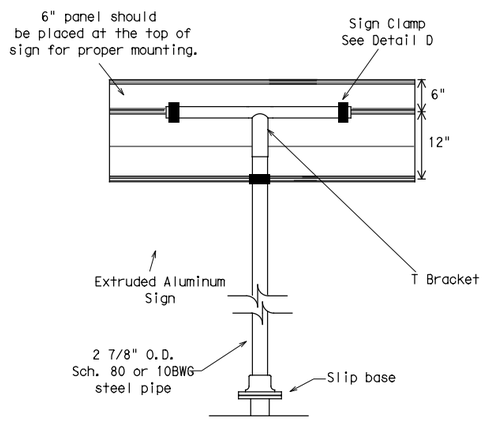
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

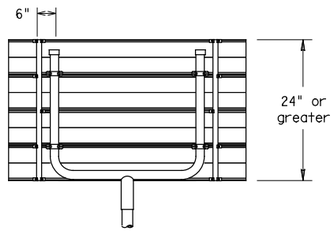
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		142

DATE: 8/19/2021 4:15:32 PM
FILE: smds3.dgn

Texas Commission on Environmental Quality
Water Pollution Abatement Plan
General Construction Notes

1. Written construction notification must be given to the appropriate TCEQ regional office at least 48 hours prior to commencement of the regulated activity. Information must include the date on which the regulated activity, and the name of the prime contractor and the name and telephone number of the contact person.

2. All contractors conducting regulated activities associated with this project must be provided with complete copies of the approved Water Pollution Abatement Plan (WPAP) and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors are required to keep on-site copies of the approved plan and approval letter.

3. If any sensitive feature is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately. The appropriate TCEQ regional office must be immediately notified of any sensitive features encountered during construction. The regulated activities near the sensitive feature may not proceed until the TCEQ has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality.

4. No temporary aboveground hydrocarbon and hazardous substance storage tank system is installed within 150 feet of a domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

5. Prior to commencement of construction, all temporary erosion and sedimentation (E&S) control measures must be properly selected, installed, and maintained in accordance with the approved plans and manufacturer's specification and good engineering practices. Controls specified in the temporary storm water section of the approved Edwards Aquifer Protection Plan are required during construction. If inspections indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations. The controls must remain in place until disturbed areas are revegetated, and the areas have been permanently stabilized.

6. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

7. Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50% of the basin volume.

8. Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented and becoming a pollutant source for stormwater discharges (e.g., screening outfalls, pick up daily).

9. All spoils (excavated material) generated from the project site must be stored on-site with proper E&S controls. For storage or disposal of spoils at another site on the Edwards Aquifer Recharge Zone, the owner of the site must receive approval of a water pollution abatement plan for the placement of fill material or mass grading prior to the placement of spoils at the other site.

10. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by season arid conditions, stabilization measured shall be initiated as soon as practicable.

11. The following records shall be maintained and made available to the TCEQ upon request: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.

12. The holder of any approved Edwards Aquifer protection plan must notify the appropriate regional office in writing and obtain approval from the executive director prior to initiating any of the following:

A. any physical or operational modification of any water pollution abatement structure(s), including but not limited to ponds, dams, berms, sewage treatment plants, and diversionary structures;

B. any change in the nature or character of the regulated activity from that which was originally approved or a change which would significantly impact the ability of the plan to prevent pollution of the Edwards Aquifer;

C. any development of land previously identified as undeveloped in the original water pollution abatement plan.

Austin Regional Office 12100 Park 35 Circle Austin, Texas 78753-1808 Phone (512) 339-2929 Fax (512) 339-3795	San Antonio Regional Office 14250 Judson Road San Antonio, Texas 78233-4480 Phone (210) 490-3096 Fax (210)545-4329

THESE GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON THE CONSTRUCTION PLANS PROVIDED TO THE CONTRACTOR AND ALL SUBCONTRACTORS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
08/10/2021
G. JV. P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK
TCEQ WPAP
GENERAL CONSTRUCTION NOTES

SHEET 1 OF 1

DSN: QL	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: QL	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	143

Texas Commission on Environmental Quality

TSS Removal Calculations 04-20-2009	**Project Name:**	FM 462
	Date Prepared:	8/9/2021

1. The Required Load Reduction for the total project: — Calculations from RG-348 — Pages 3-27 to 3-30

Page 3-29 Equation 3.3: L_M =	27.2(A_N x P)		
where: $L_{M\ TOTAL\ PROJECT}$ =	Required TSS removal resulting from the proposed development = 80% of increased load		
A_N =	Net increase in impervious area for the project		
P =	Average annual precipitation, inches		
Site Data:	Determine Required Load Removal Based on the Entire Project		
County =	Medina		
Total project area included in plan =	2.81	acres	
Predevelopment impervious area within the limits of the plan =	0.85	acres	
Total post-development impervious area within the limits of the plan =	0.91	acres	
Total post-development impervious cover fraction =	0.32		
P =	28	inches	
$L_{M\ TOTAL\ PROJECT}$ =	46	lbs.	

JELLYFISH

Number of drainage basins / outfalls areas leaving the plan area =	1	

2. Drainage Basin Parameters (This information should be provided for each basin):

Drainage Basin/Outfall Area No. =	1	
Total drainage basin/outfall area =	2.81	acres
Predevelopment impervious area within drainage basin/outfall area =	0.85	acres
Post-development impervious area within drainage basin/outfall area =	0.91	acres
Post-development impervious fraction within drainage basin/outfall area =	0.32	
$L_{M\ THIS\ BASIN}$ =	46	lbs.

3. Indicate the proposed BMP Code for this basin.

Proposed BMP =	Jellyfish	
Removal efficiency =	86	percent

4. Calculate Maximum TSS Load Removed (L_R) for this Drainage Basin by the selected BMP Type.

RG-348 Page 3-33 Equation 3.7: L_R = (BMP efficiency) x P x (A x 34.6 + A_P x 0.54)

where:	A_C =	Total On-Site drainage area in the BMP catchment area	
	A_I =	Impervious area proposed in the BMP catchment area	
	A_P =	Pervious area remaining in the BMP catchment area	
	L_R =	TSS Load removed from this catchment area by the proposed BMP	
	A_C =	0.24	acres
	A_I =	0.24	acres
	A_P =	0.00	acres
	L_R =	200	lbs

5. Calculate Fraction of Annual Runoff to Treat the drainage basin / outfall area

Desired $L_{M\ THIS\ BASIN}$ =	46	lbs.
F =	0.23	

6. Calculate Capture Volume required by the BMP Type for this drainage basin / outfall area.

Calculations from RG-348 Pages Section 3.2.22

Off-site area draining to BMP =	0.00	acres
Off-site impervious cover draining to BMP =	0.00	acres
Rainfall Intensity =	0.14	inches per hour
Effective Area (A_I x 0.9) =	0.22	acres
Cartridge Length =	54	inches
Peak Treatment Flow Required =	0.03	cubic feet per second

7. Jellyfish

Designed as Required in RG-348 Section 3.2.22

Flow Through Jellyfish Size

Jellyfish Size for Flow-Based Configuation = JF4-2-1

Jellyfish Treatment Flow Rate = 0.45 cfs

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS — GABRIEL J. VILLARREAL — 102456 — LICENSED PROFESSIONAL ENGINEER

08/10/2021

P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK WATER POLLUTION ABATEMENT PLAN CALCULATIONS

SHEET 1 OF 1

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	144

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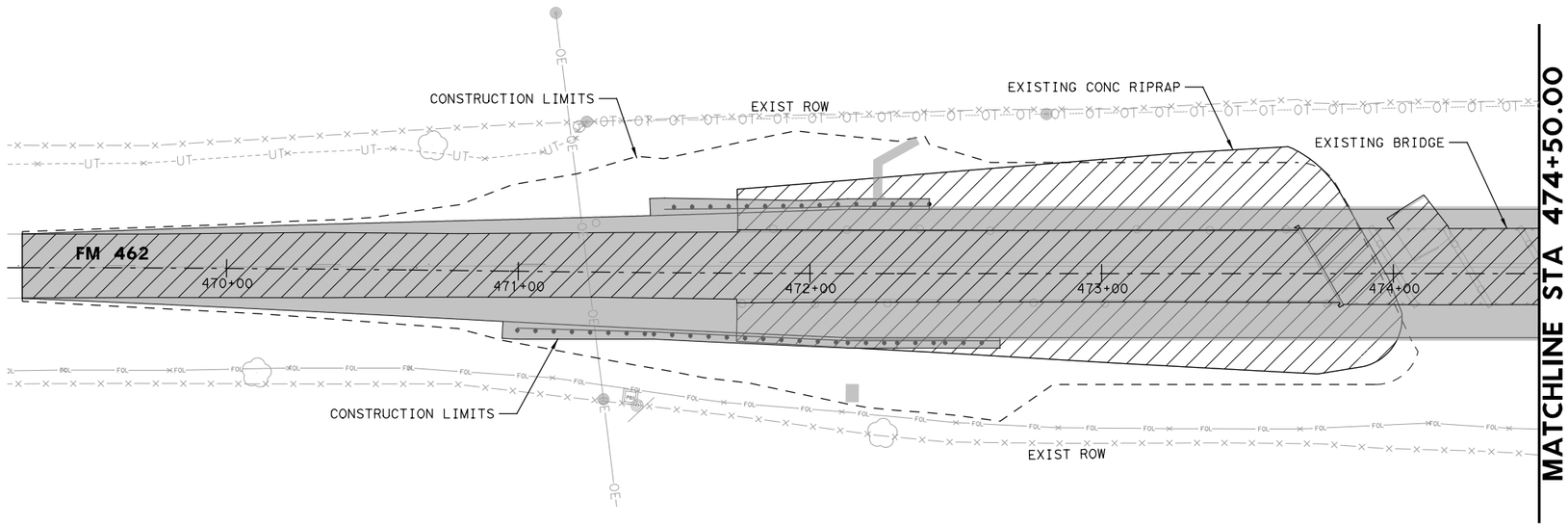

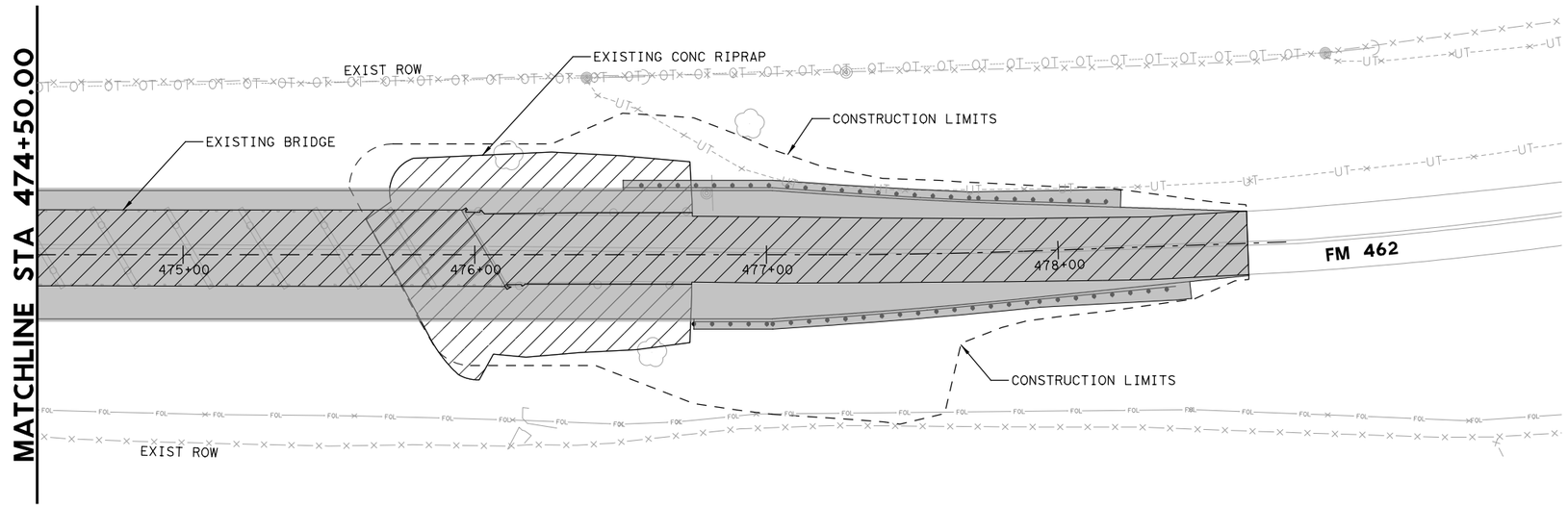

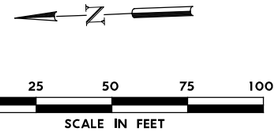

NOTE:
THE PLAN VIEW, IN ITS ENTIRETY, IS LOCATED INSIDE THE 100-YEAR FLOODPLAIN. THE LIMITS OF THE 100-YEAR FLOOD PLAIN ARE OUTSIDE THE PLAN VIEW LIMITS

LEGEND

EXISTING IMPERVIOUS COVER = 0.85 ACRES

PROPOSED IMPERVIOUS COVER = 0.91 ACRES

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
08/10/2021
G. JV. P.E.

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17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

WPAP IMPERVIOUS AREAS EXISTING/PROPOSED

SCALE: 1"=50' SHEET 1 OF 1

DSN: ES	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: GV	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: ES	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: GV	MEDINA	SAT	0848	04	049	145

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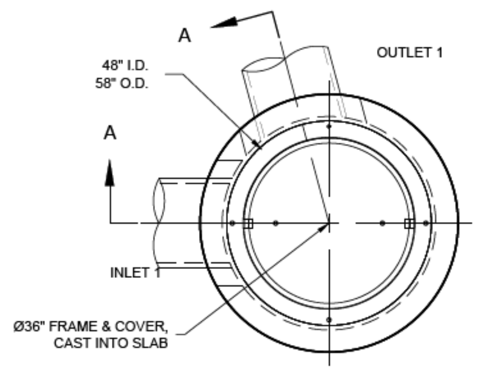
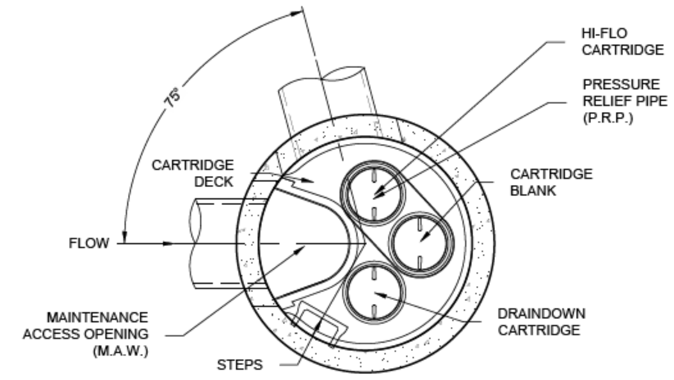
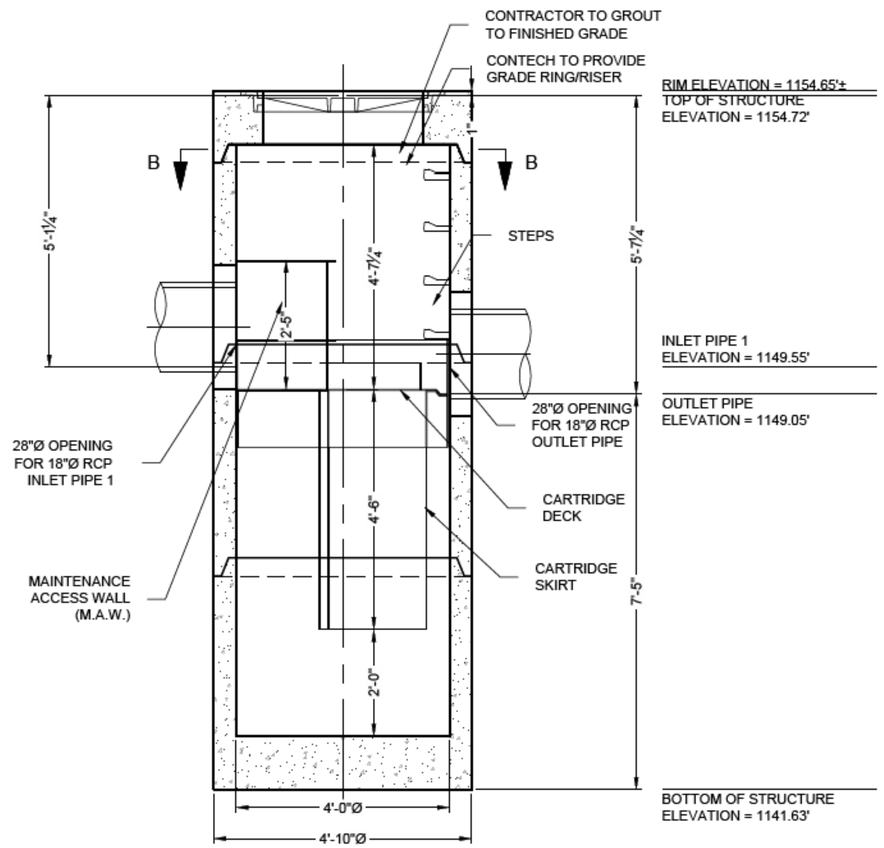


PLAN VIEW



SECTION B-B



MATERIAL LIST - PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
2	54" HI-FLO CARTRIDGE (70 mm ORIFICE)	CONTECH
1	54" DRAINDOWN CARTRIDGE (35 mm ORIFICE)	CONTECH
1	PRESSURE RELIEF PIPE (P.R.P.)	CONTECH
1	OFFLINE MAINTENANCE ACCESS WALL (M.A.W.) EXTENSION	CONTECH
1	JF4 CARTRIDGE DECK WITH 54" SEPARATION SKIRT	CONTECH
1	JOINT SEALANT	CONTRACTOR
1	36"Ø x 4" JF HATCH, EJ#001580008A01	CONTECH
4	STEPS	CONTECH

GENERAL NOTES:
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE. WWW.ContechES.COM
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' - 1', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. WHEN ACTIVATED PRIOR TO SITE STABILIZATION, CONTRACTOR TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ACCORDING TO THE PROVISIONS IN THE ACTIVATION CHECKLIST AND THE QUOTED SCOPE OF WORK. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION AT (866) 740-3318.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK OF 4 PIECES = 6000 LBS.

CONTECH PROPOSAL DRAWING

SLY
LAYOUT 1A

MARK	DATE	REVISION DESCRIPTION	BY

JF4-2-1 (54")-681379-10
TXDOT - MEDINA COUNTY FM 462
HONDO, TX
FOR SYSTEM: RMH-1

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
Jellyfish Filter

DATE: 06/22/21
DESIGNED: SKJ | DRAWN: SKJ
CHECKED: ---- | APPROVED: ----
PROJECT No.: 681379 | SEQUENCE No.: 10
SHEET: 1 OF 1

STANDARD OBTAINED AT https://www.conteches.com/stormwater-management/treatment/jellyfish-filter ON JUNE 21, 2021

NOTES:

1. JELLYFISH AT FM 462 ℄ STA 472+14.82 OFFSET 16.58' RT (CENTER OF STRUCTURE).
2. 4'-0" DIA STRUCTURE WITH 2 HIGH-FLO AND 1 DRAINDOWN 54" CARTRIDGES.
3. DESIGN FLOW RATE = 0.03 CFS
4. THE MANHOLE IS LOCATED WITHIN THE 100-YEAR FLOODPLAIN AND SHALL BE SPECIFIED WITH BOLTED AND GASKETED MANHOLE COVERS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
GABRIEL J. VILLARREAL
102456
LICENSED
PROFESSIONAL ENGINEER
08/10/2021
P.E.

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK
WPAP JELLYFISH JF4-2-1 STANDARD DETAIL
STA 472+15.00

SHEET 1 OF 1

	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
DSN: / CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: / CK:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
	MEDINA	SAT	0848	04	049	146

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres distrubed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☐ 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 Storm Water Pollution Prevention Plan (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 Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: ☐Yes ☒No

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required
☐ Nationwide Permit 14 - PCN Required
☐ 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 (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

1. HONDO CREEK, NWP - NO PCN
2.
3.
4.

401 Best Management Practices: (Not applicable if no USACE permit)

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	☐ Sedimentation Chambers
		☐ 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. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

   A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

   B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.

3. Plain Spotted Skunk BMP - Contractor will be advised of potential occurance in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

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 immediated area, and contact the Engineer immediately.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS CONT.

1. Bird BMPs: In addition to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs:

   Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.

   Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season;

   Avoid the removal of unoccupied, inactive nests, as practicable;

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 appropiate 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 follwing 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

Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

Does the project involve the demolition of a span bridge?

☒ Yes ☐ No (No further action required)

If "Yes", a pre- demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

HDR Engineering Inc.
613 NW Loop 410, Suite 700
San Antonio, TX 78216
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG
© TxDOT OCTOBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		147

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Project is located on the TCEQ Edwards Aquifer Recharge Zone and the EPA Sole Source Aquifer Recharge Zone. The Contractor shall comply with the Texas Comission on Environmental Quality (TCEQ) approved Water Pollution Abatement Plan (WPAP) and conditions in the TCEQ authorization letter for this project. A copy of the project WPAP, TCEQ and EPA approval letters shall be maintained on site. No Regulated Activities Shall Begin until Approval of the WPAP has been received from the TCEQ and EPA.

2. The Contractor must immediately report spills (including sanitary sewer discharge) of reportable quantities to TxDOT and to the following:

    * State Emergency Response Center 800-832-8224
    * TCEQ Regional Office 210-490-3096
    * National Response Center at 800-424-8802
    * Edwards Aquifer Authority at 210-222-2204

3. Hazardous substances (e.g., fuel, oil, asphalt emulsion, concrete curing compounds) shall not be stored on the State ROW or easements.

4. Intentional discharges of sediment laden storm water during construction are not allowed

5. If any sensitive feature (e.g., cave, sinkhole, well) is discovered during construction, all regulated activities near the sensitive feature must be suspended immediately and notify the Engineer. Construction near the sensitive feature may not proceed until the feature has been evaluated and approval to continue construction has been received.

6. Temporary Best Management Practices (BMP's) will be installed as necessary to manage discharges due to dewatering of drill shafts. The type and location of the BMP's will be at the discretion of the Engineer.

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San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG			
OCTOBER 2020	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0848	04	049	FM 462			
	DIST	COUNTY		SHEET NO.			
	SAT	MEDINA		148			

Note To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from it's relative position.

A. GENERAL SITE DATA

1. PROJECT LIMITS: *FM 462 OVER HONDO CREEK*

2. PROJECT SITE MAPS:

- *Project Latitude 29° 32' 38.07" N Project Longitude 99° 14' 03.22" W*
- *Project Location Map: Shown on Title Sheet*
- *Drainage Patterns: Shown on Drainage Area Map*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Shown on Typical Sections*
- *Major Controls and Locations of Stabilization Practices: Shown on SW3P Sheets*
- *Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.*
- *Surface Waters and Discharge Locations: Shown on Drainage and Culvert Layout Sheets*

3. PROJECT DESCRIPTION: *REPLACE BRIDGE AND APPROACHES*

Non-Joint Bld Utilities are not part of this SW3P.

4. FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:

1. *Install controls down-slope of work area and initiate inspection and maintenance activities.*
2. *Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.*
3. *Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (if marked):*

__X__ *Placement of road base*
__X__ *Extensive ditch grading*
__X__ *Upgrading or replacing culverts or bridges*
__X__ *Temporary detour road(s)*
____ *Other:* _____

5. EXISTING AND PROPOSED CONDITIONS:

Description of existing vegetative cover: THIN PATCHES OF GRASSES & WEEDS W/ SOME BUSHES
Percentage of existing vegetative cover: 60%
Existing vegetative cover: (mark one)
____ *Thick or uniformly established*
__X__ *Thin and Patchy*
____ *None or minimal cover*
Description of soils:
Site Acreage: 2.81 ACRE *Acreage disturbed: 1.79 ACRE*
Site runoff coefficient (pre-construction): *Site runoff coefficient (post-construction):*

6. RECEIVING WATERS: *(Mark all that apply)*

____ *A classified stream does not pass through project.*
__X__ *A classified stream passes through project. Name HONDO CREEK Segment Number 2114*
Name of receiving waters that will receive discharges from disturbed areas of the project: HONDO CREEK

Site is in a Municipal Separate Storm Sewer System (MS4).
MS4 Operator (name): _____

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

__P__ SEEDING
____ MULCHING (Hay or Straw)
____ BUFFER ZONES
____ PLANTING
____ COMPOST/MULCH FILTER BERM
____ SODDING
____ PRESERVATION OF NATURAL RESOURCES
____ FLEXIBLE CHANNEL LINER
____ RIGID CHANNEL LINER
__P__ SOIL RETENTION BLANKET
____ COMPOST MANUFACTURED TOPSOIL
__P__ OTHER: GABION MATTRESS/GABIONS

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

__T__ SILT FENCES
____ HAY BALES
__T__ ROCK FILTER DAMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
__P__ PAVED FLUMES
__T__ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
____ CURBS AND GUTTERS
__P__ STORM SEWERS
____ VELOCITY CONTROL DEVICES
__P__ OTHER: *JELLYFISH FILTER*

3. STORM WATER MANAGEMENT:

The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include: (mark all that apply)

__X__ *Existing or new vegetation provides natural filtration.*
____ *The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.*
____ *Project includes permanent sedimentation controls (other than grass).*
__X__ *Velocities do not require dissipation devices.*
____ *Velocity-dissipation devices included in the design.*
____ *Other :* _____

4. NON-STORM WATER DISCHARGES:

Off-site discharges are prohibited except as follows:

1. *Discharges from fire fighting activities and/or fire hydrant flushings.*
2. *Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).*
3. *Plain water used to control dust.*
4. *Plain water originating from potable water sources.*
5. *Uncontaminated groundwater, spring water or accumulated stormwater.*
6. *Foundation or footing drains where flows are not contaminated with process materials such as solvents.*
7. *Other:* _____

Concrete truck wash water discharges on the site should be prohibited or minimized. If allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

Hazardous material spill/leak shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned and disposed properly and reported to the Engineer. Report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.

2. INSPECTION:

For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every seven (7) calendar days. An Inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.

3. WASTE MATERIALS:

All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.

4. OFFSITE VEHICLE TRACKING:

Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.

5. OTHER:

See the EPIC sheet for additional environmental information.

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Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER

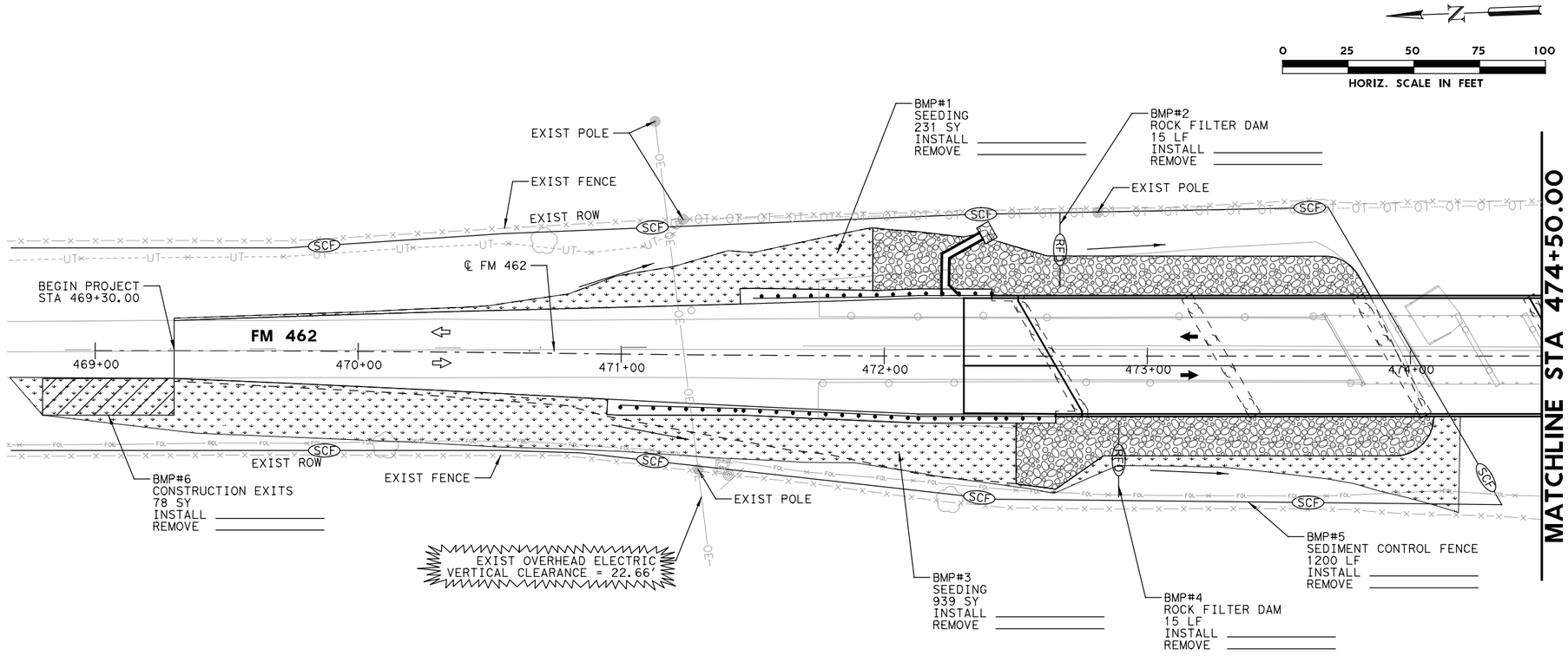
, P.E. 8/20/2021
Signature of Registrant & Date

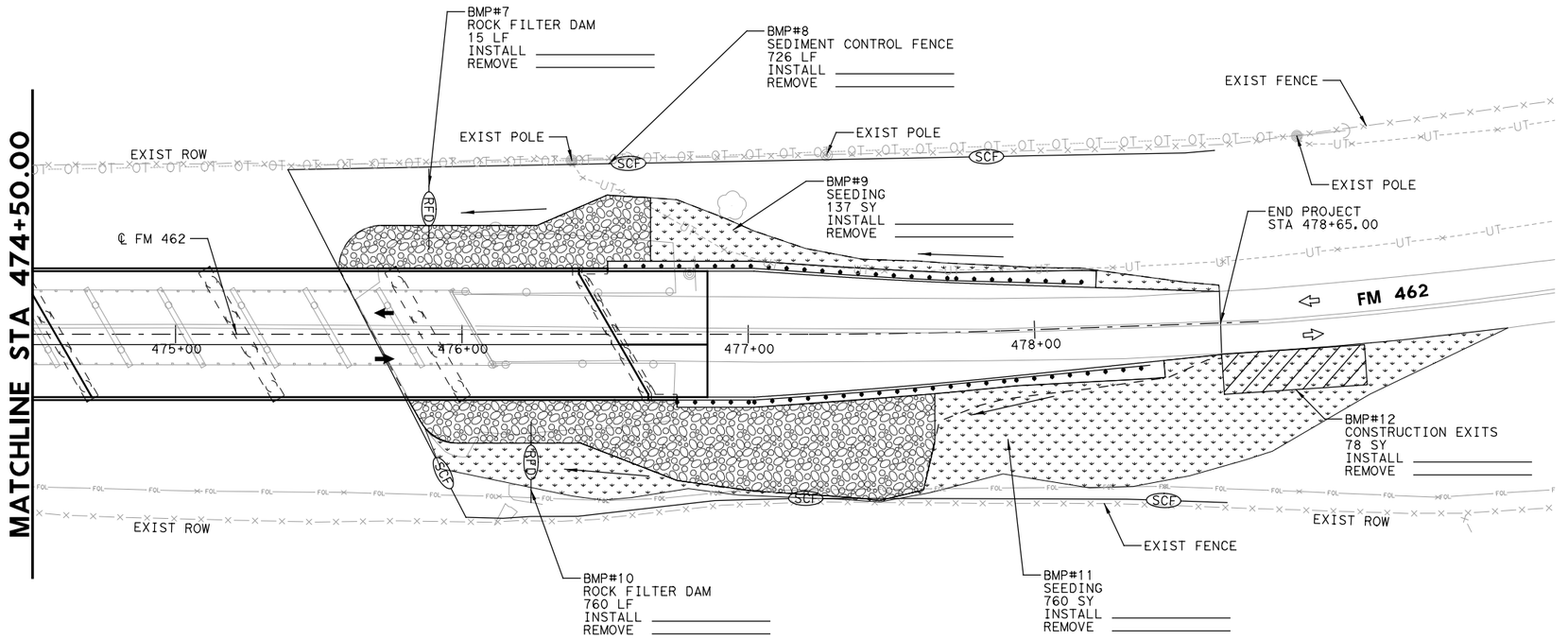
REVISION DATE: 10/12

FM 462 AT HONDO CREEK

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

DSN:	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK:	TEXAS	6	SEE TITLE SHEET			FM 462
DRN:	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK:	MEDINA	SAT	0848	04	049	149





SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	2067
164 6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	2067
168 6001	VEGETATIVE WATERING	MG	33
169 6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	2067
506 6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	60
506 6011	ROCK FILTER DAMS (REMOVE)	LF	60
506 6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	156
506 6024	CONSTRUCTION EXITS (REMOVE)	SY	156
506 6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1926
506 6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1926

LEGEND

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM
- EXIST ROW
- DRAINAGE DITCH
- TOPSOIL & SEEDING
- GABION MATTRESS/GABION

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.

2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.

3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIEDTO ACCOMMODATE ACTUAL FIELD CONDITIONS.

4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 78 SY(50′ X 14′). REFER TO STANDARD EC(3)-16 FOR DETAILS.

5. THE PLAN VIEW, IN ITS ENTIRETY, IS LOCATED INSIDE THE 100-YEAR FLOODPLAIN. THE LIMITS OF THE 100-YEAR FLOODPLAIN ARE OUTSIDE THE PLAN VIEW LIMITS.

NO.	DATE	REVISION	APPR BY

STATE OF TEXAS
JOHN TRAVIS FOYT
128802
LICENSED
PROFESSIONAL ENGINEER
10/26/2021

HDR Engineering Inc.
17111 Preston Rd, Suite 300
Dallas, TX 75248
Texas P.E. Firm Registration No. F-754

Texas Department of Transportation

FM 462 AT HONDO CREEK

SW3P LAYOUT

SCALE: 1"=50′ SHEET 1 OF 1

DSN: JTF	STATE	FED RD. DIV NO.	FEDERAL PROJECT NO.			HIGHWAY NO.
CK: MH	TEXAS	6	SEE TITLE SHEET			FM 462
DRN: JTF	COUNTY	DIST.	CONT.	SECT.	JOB	SHEET NO.
CK: JMD	MEDINA	SAT	0848	04	049	150

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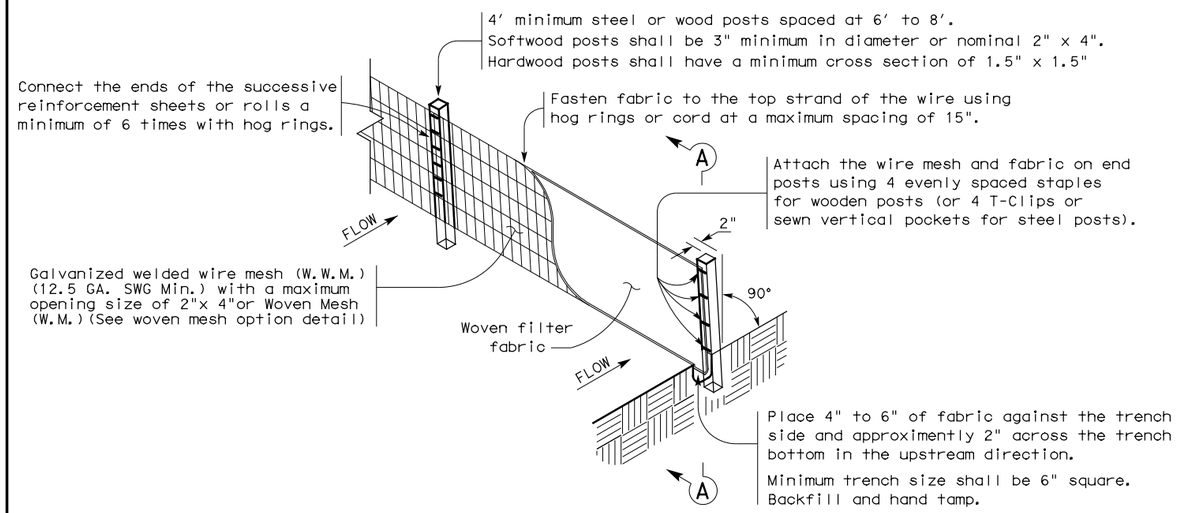
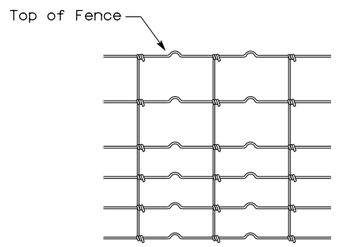
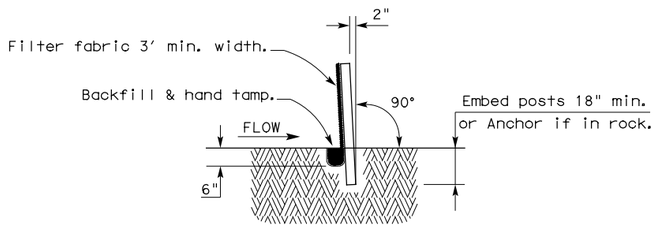


TEMPORARY SEDIMENT CONTROL FENCE

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.

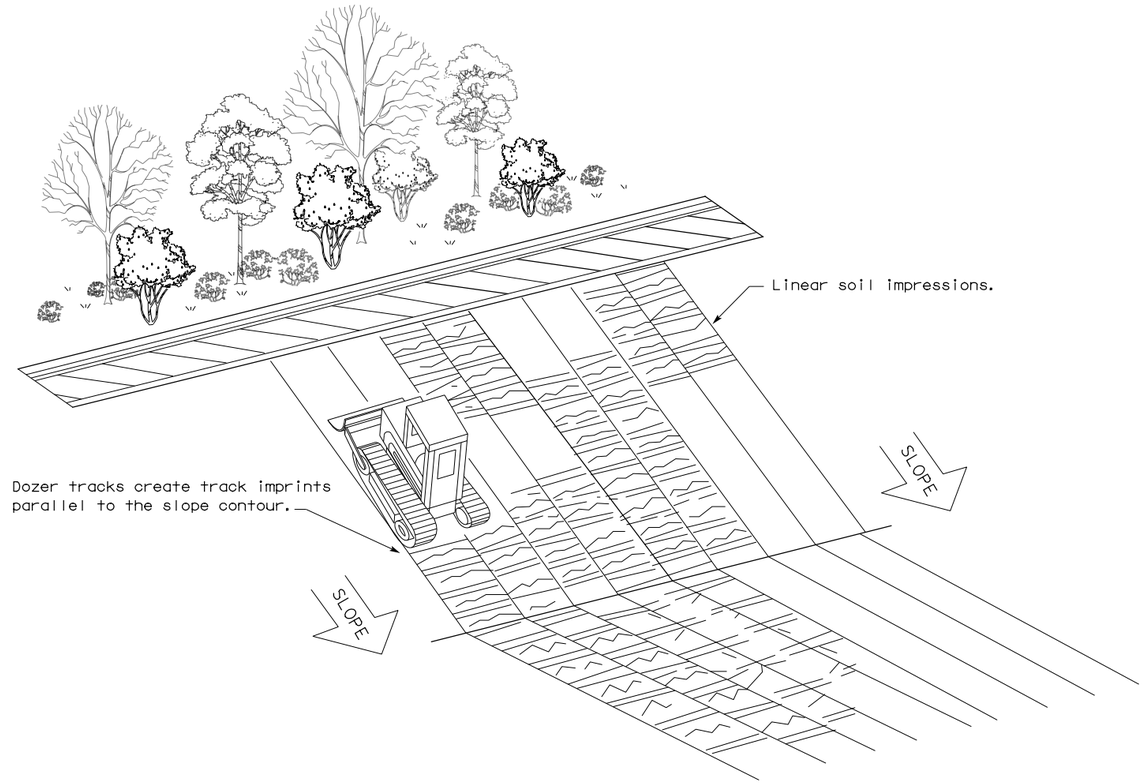
LEGEND

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
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REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		151

8/1/2021
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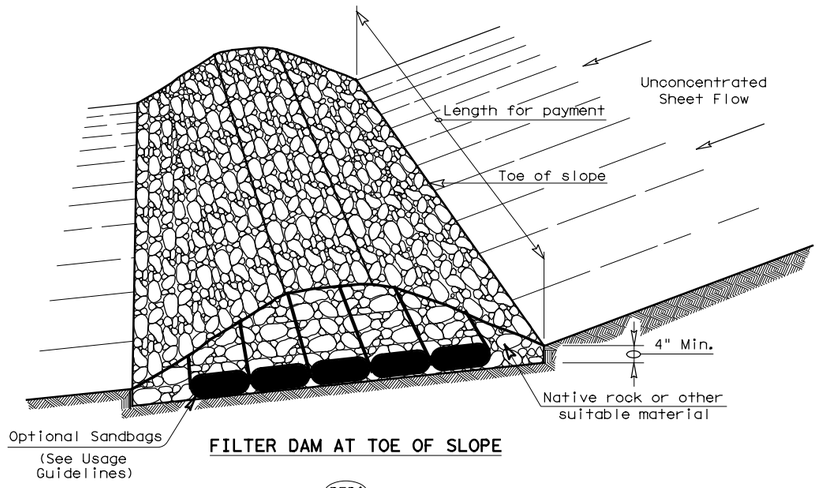
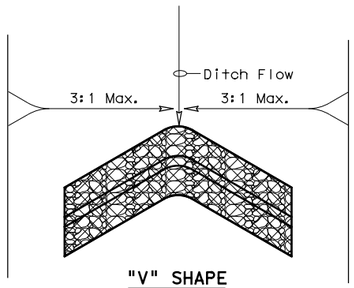
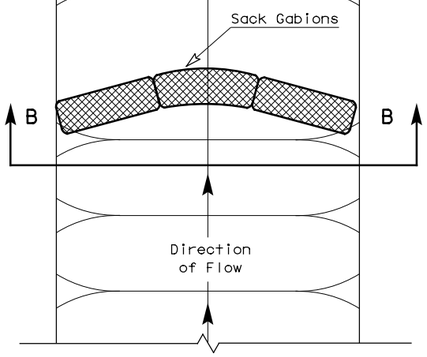


FILTER DAM AT TOE OF SLOPE

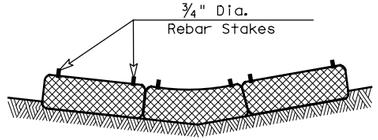
RFD1



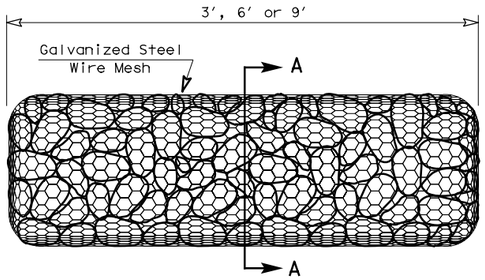
"V" SHAPE
PLAN VIEW



PLAN VIEW

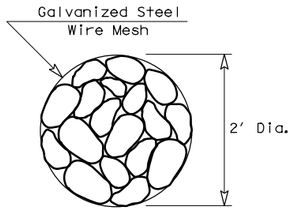


SECTION B-B

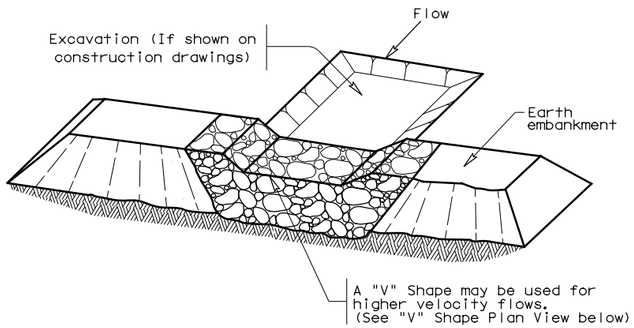


TYPE 4 (SACK GABIONS)

RFD4

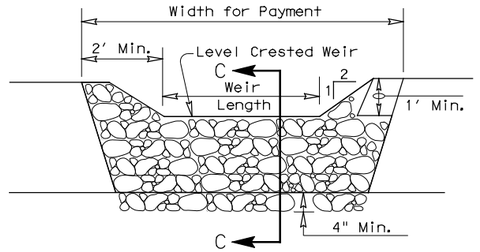


SECTION A-A

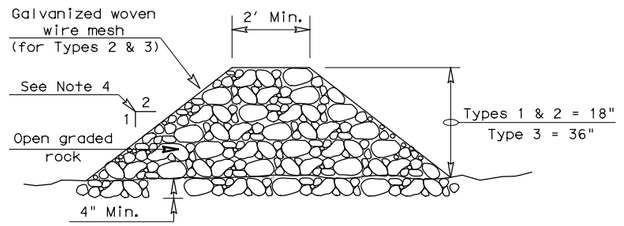


FILTER DAM AT SEDIMENT TRAP

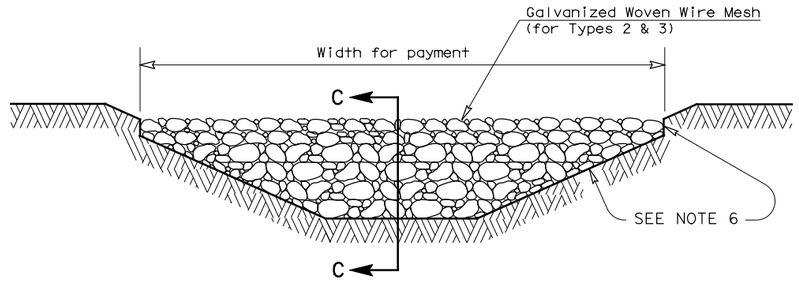
RFD1 — OR — RFD2



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

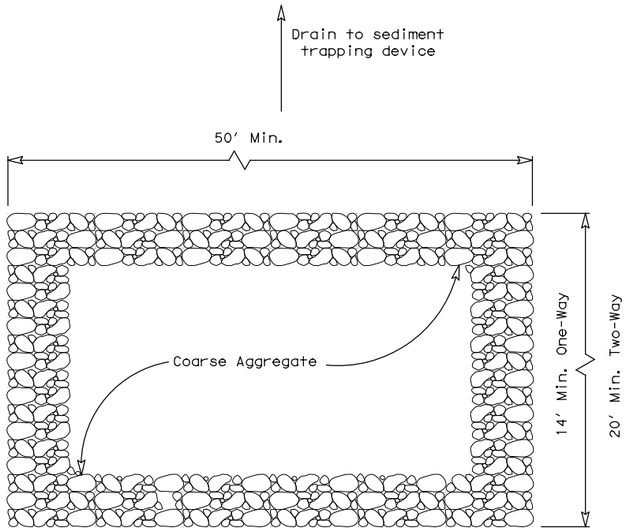
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

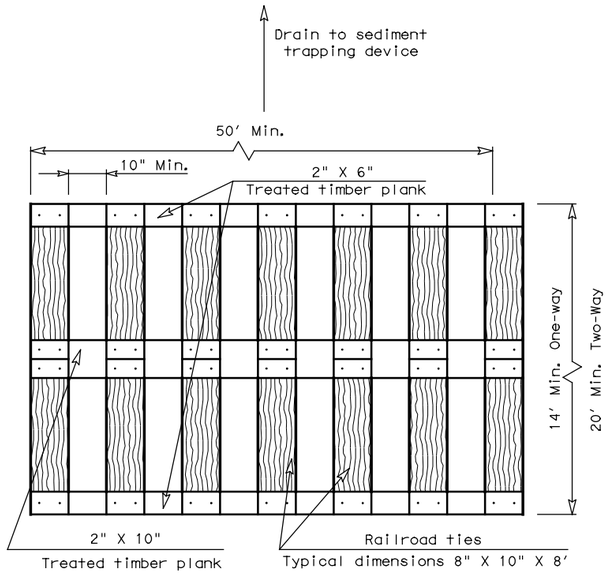
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0848	04	049	FM 462		
	DIST	COUNTY		SHEET NO.		
	SAT	MEDINA		152		

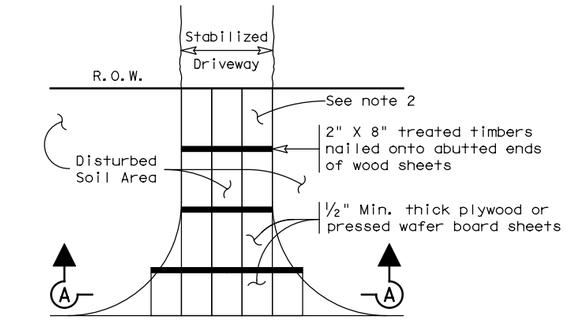
DATE: 8/19/2021
FILE: ec216.dgn



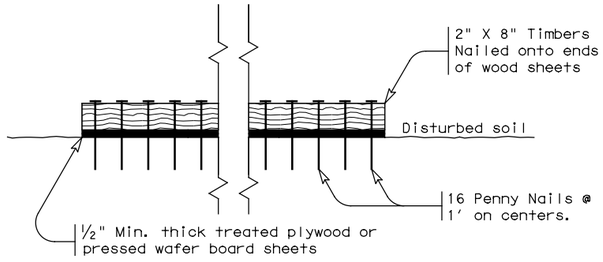
PLAN VIEW



PLAN VIEW



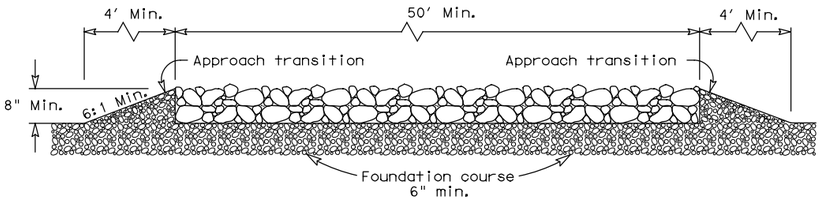
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

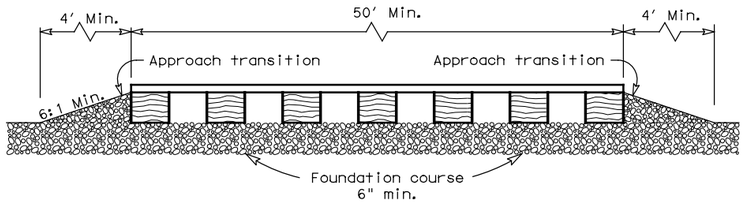
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

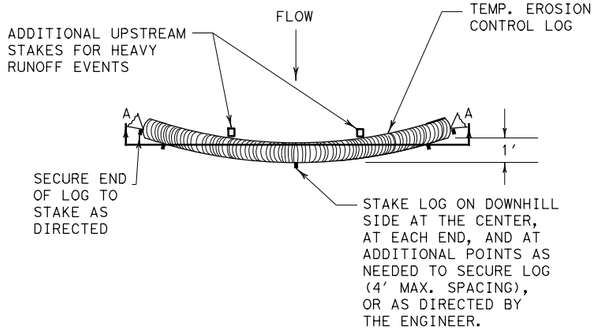
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

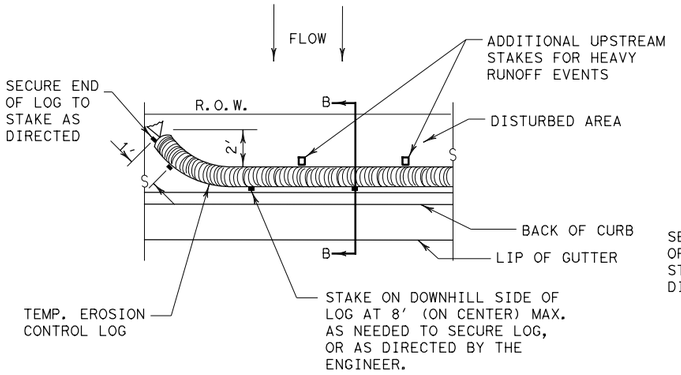
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		153

DATE: 8/19/2021
FILE: ec316.dgn



PLAN VIEW



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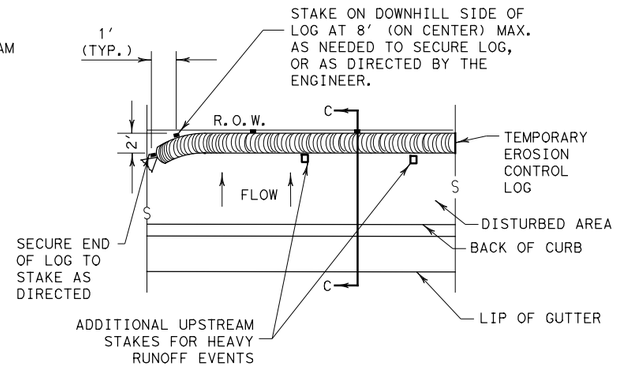
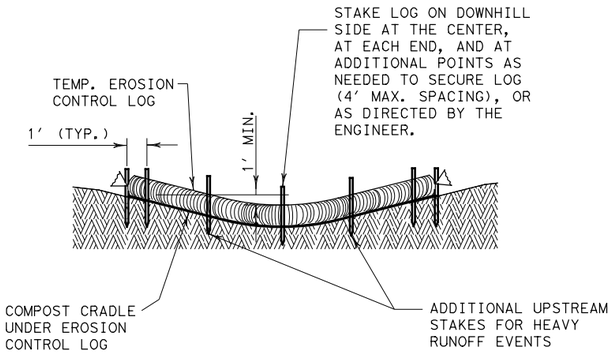


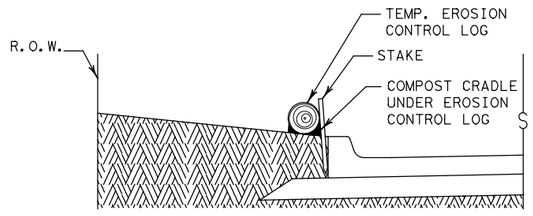
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

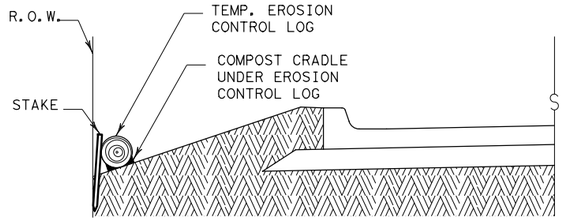
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

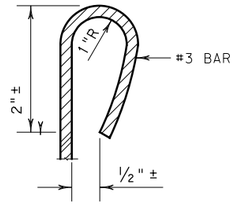
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



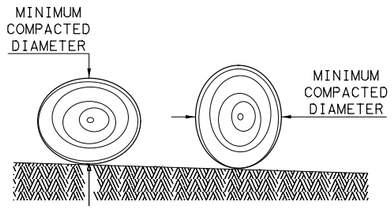
REBAR STAKE DETAIL

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.

DATE: 8/19/2021
FILE: ec916.dgn

Texas Department of Transportation

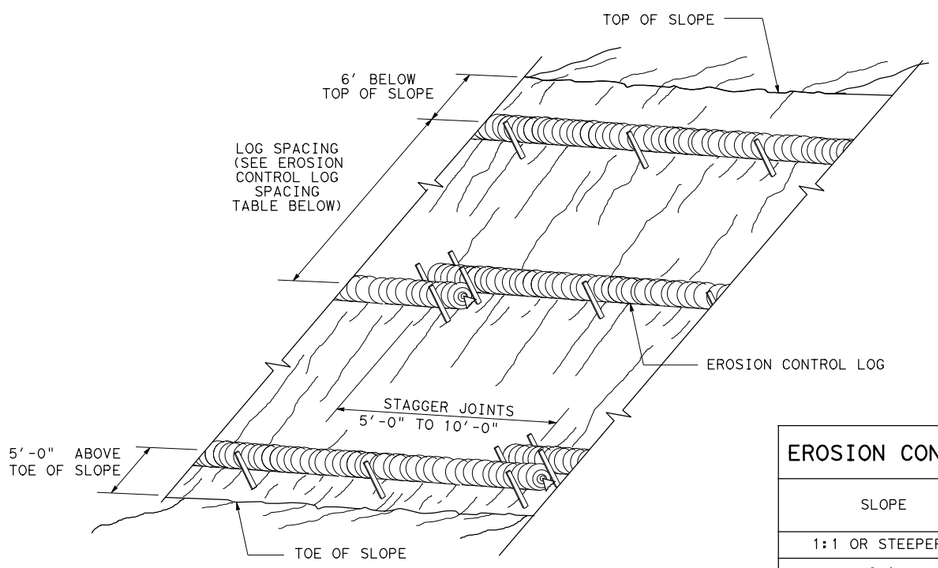
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

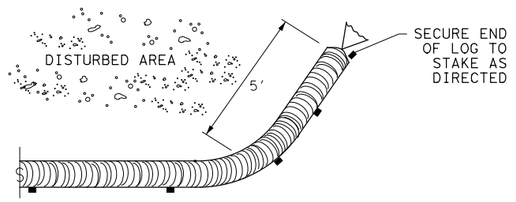
EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0848	04	049		FM 462		
	DIST	COUNTY				SHEET NO.	
	SAT	MEDINA				154	



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

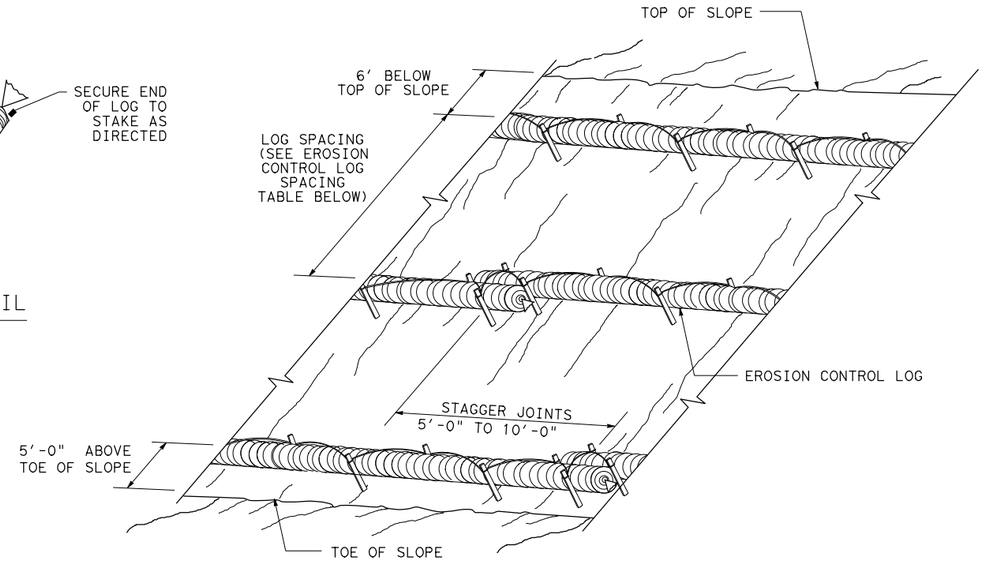
CL-SST



END SECTION RAP DETAIL

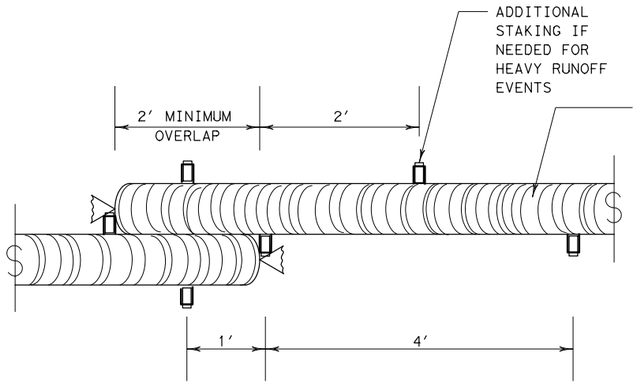
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

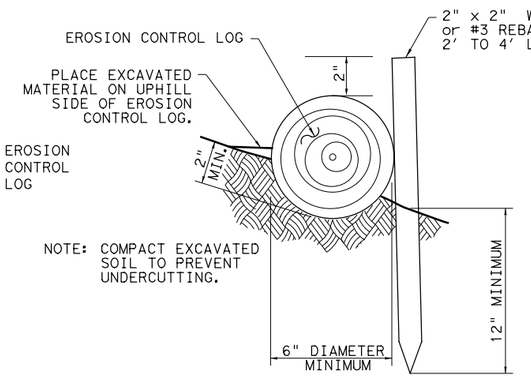
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

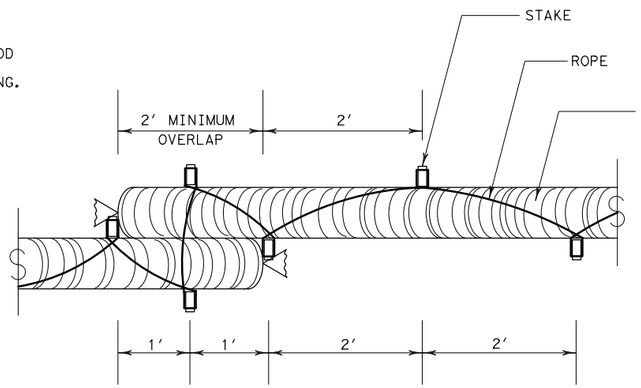


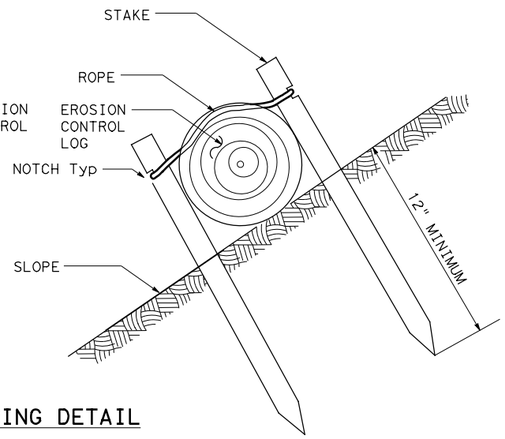


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

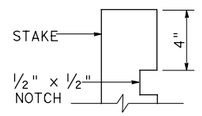
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



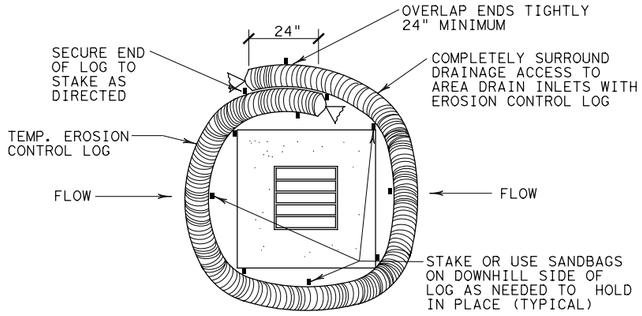
STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

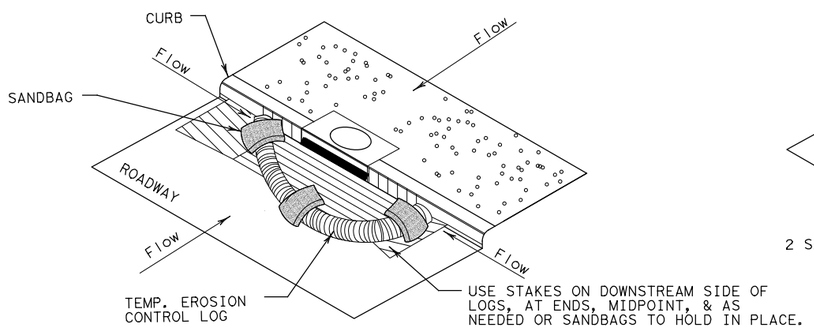
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0848	04	049	FM 462
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		155

DATE: 8/19/2021
FILE: ec916.dgn



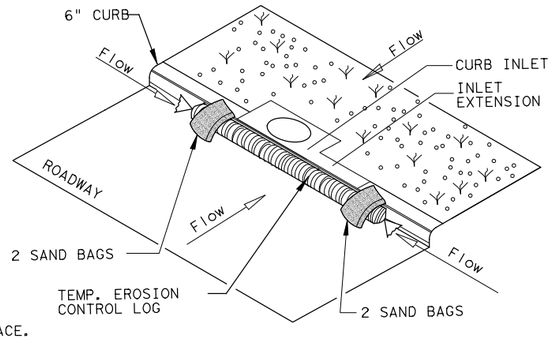
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

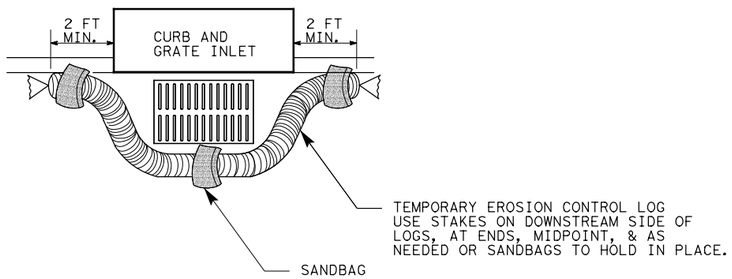
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

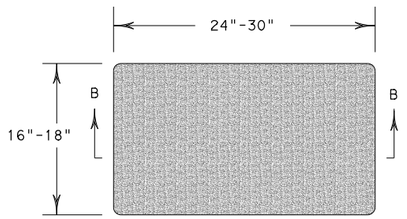
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0848	04	049		FM 462		
	DIST	COUNTY				SHEET NO.	
	SAT	MEDINA				156	

DATE: 8/19/2021
FILE: ec916.dgn