

FINAL PLANS

NAME OF CONTRACTOR: _____
 DATE OF LETTING: _____
 DATE WORK BEGAN: _____
 DATE WORK COMPLETED: _____
 DATE WORK ACCEPTED: _____
 SUMMARY OF CHANGE ORDERS: _____

STATE OF TEXAS
 DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
 STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
 F 2024(319)
 CSJ: 0091-04-069

SH 289
 COLLIN COUNTY

LIMITS: FROM PANTHER CREEK RELIEF
 TO PANTHER CREEK

TOTAL LENGTH OF PROJECT =
 ROADWAY = 1392.68 FT. = 0.264 MI.
 BRIDGE = 232.32 FT. = 0.044 MI.
 TOTAL = 1625.00 FT. = 0.308 MI.

FOR THE CONSTRUCTION OF RESTORATION
 CONSISTING OF CITY OF FRISCO PRESTON ROAD TRAIL CONNECTION

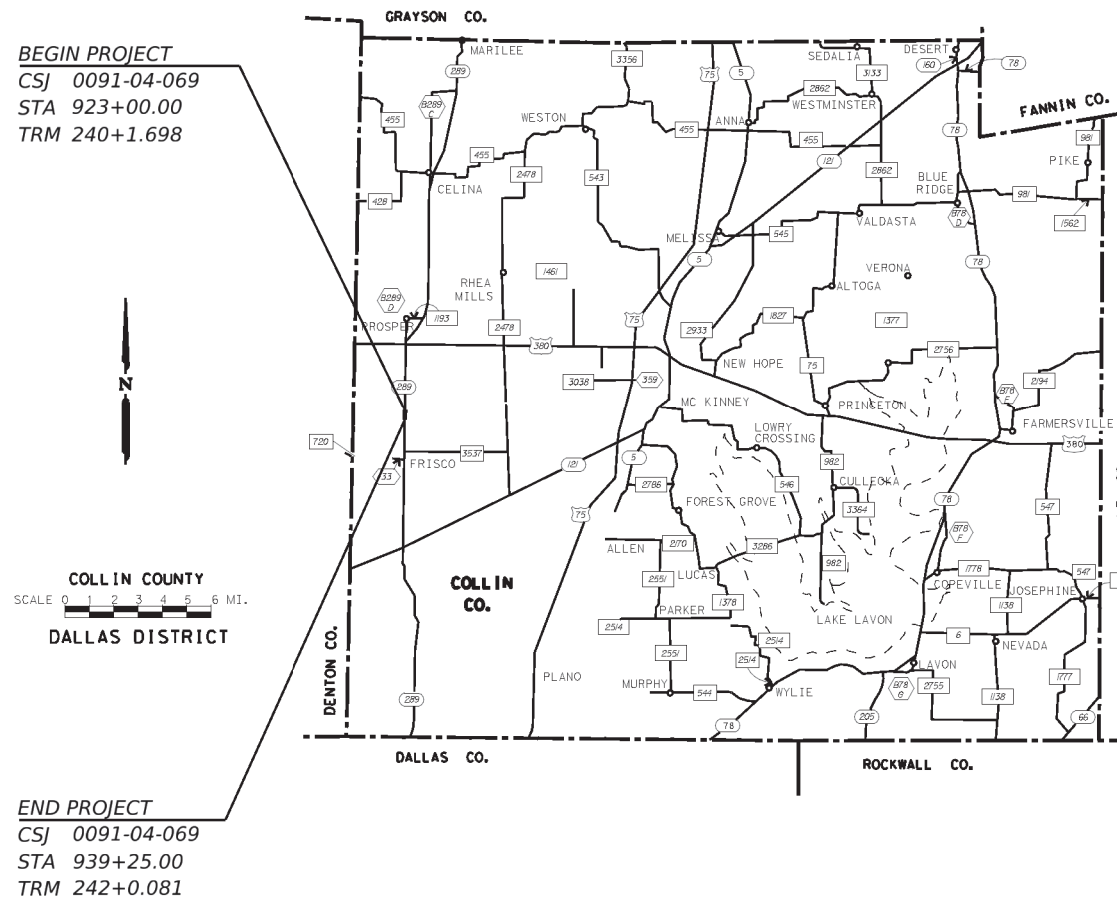
DESIGN SPEEDS = N/A MPH (MAINLANES)

ADT (2022) = N/A VPD
 ADT (2042) = N/A VPD

NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, July 5, 2022)

Registered Accessibility Specialist (RAS) inspection required. TDLR No. TABS2023021289



EQUATIONS: NONE
 EXCEPTIONS: NONE
 RAILROAD CROSSINGS: NONE

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED
 DocuSigned by: *[Signature]* 8/2/2023
 D5C7171DB1584E7... SINEER, P.E.

RECOMMENDED
 DocuSigned by: *[Signature]* 8/2/2023
 98671C109B6A4C3... TRATION, PLANNING & DEVELOPMENT, P.E.

RECOMMENDED
 DocuSigned by: *[Signature]* 8/2/2023
 4DB68ED9336D4F7... , P.E.

APPROVED
 DocuSigned by: *[Signature]* 8/2/2023
 A879E0D10CD6464... EER

WORK WAS COMPLETED ACCORDING
 TO THE PLANS AND CONTRACT.

_____, P.E.
 Signature of Registrant & Date

2023/07/26
 DOCUMENT NAME

INDEX OF SHEETS

DW: CK: DW: CK: DW: CK:

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 NONE

VII. BRIDGE
 NONE

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 NONE

VIII. TRAFFIC ITEMS
 NONE

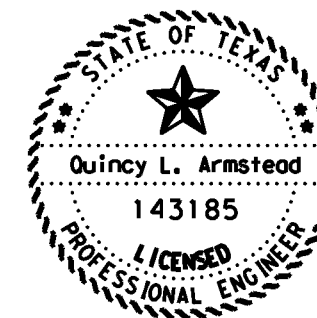
TRAFFIC STANDARDS
 NONE

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X. MISCELLANEOUS ITEMS
 NONE

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

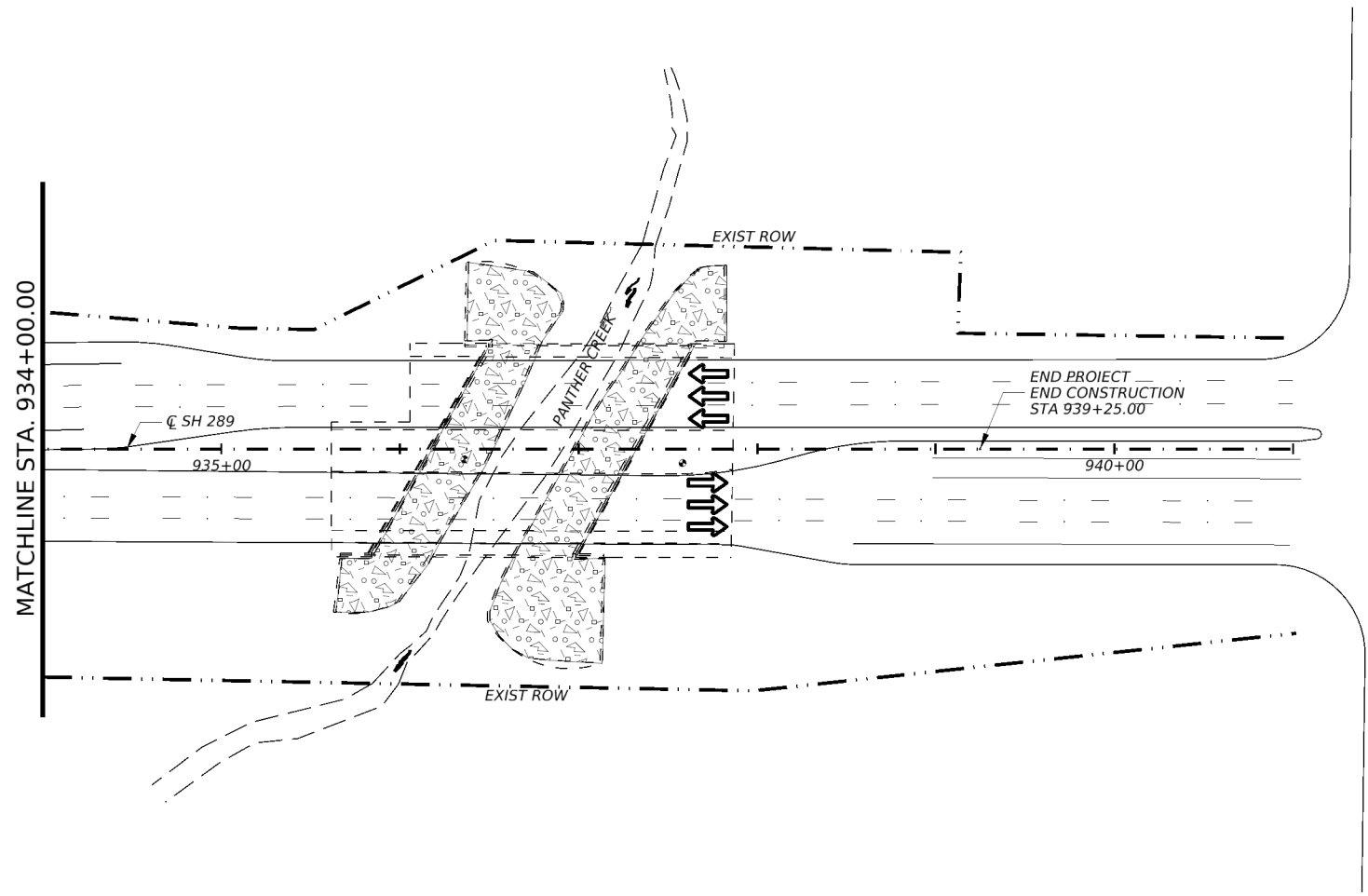
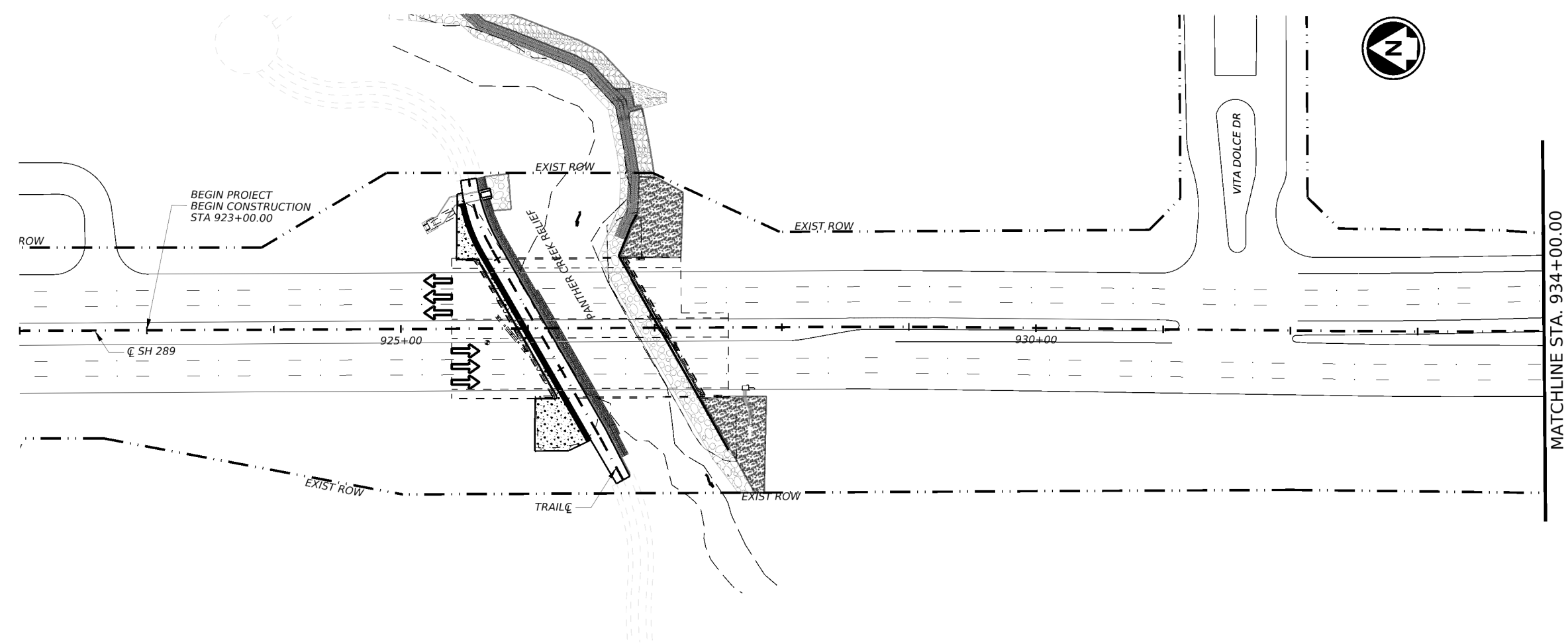


Quincy L. Armstead, P.E.

08.03.23

SH 289			
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DAL	Collin		2

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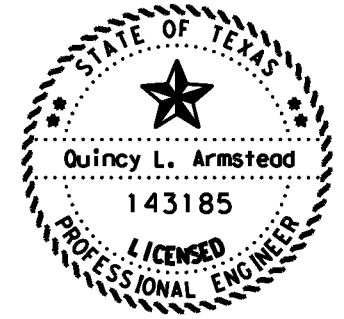


0 50 100
 SCALE IN FEET

LEGEND

← TRAFFIC FLOW

NOTES:
 PLACE ADVANCE WARNING SIGNS IN ACCORDANCE WITH BC, TCP, WZ STANDARDS AND MUTCD, AND AS DIRECTED BY THE ENGINEER.



Quincy L. Armstead, P.E.
 08.03.23

Texas Department of Transportation

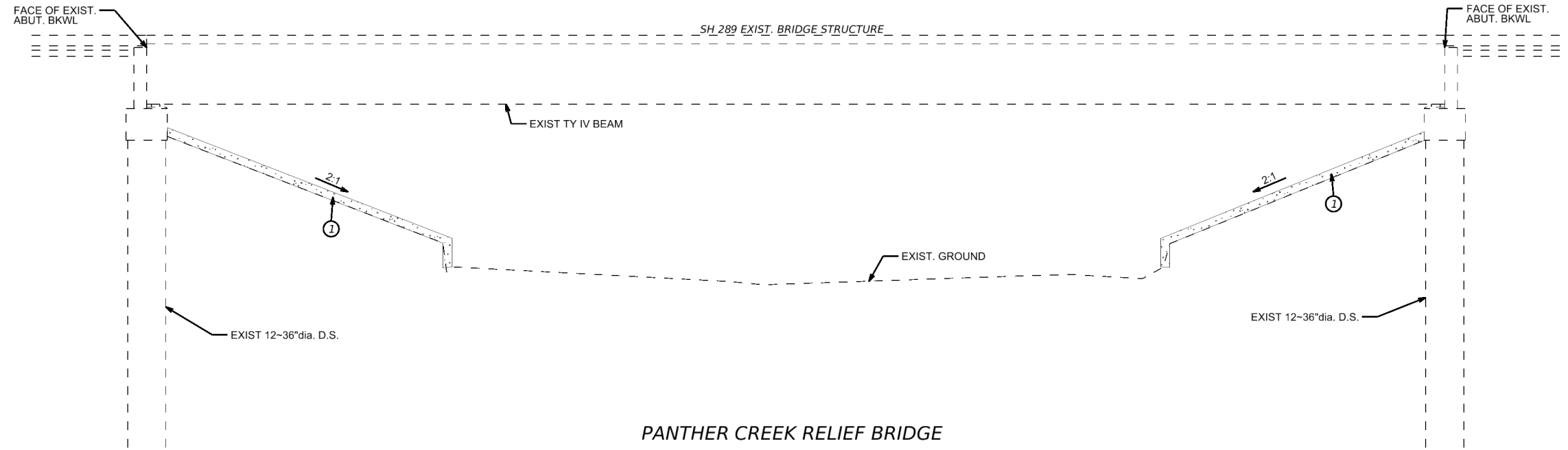
SH 289
 PROJECT LAYOUT

SHEET 1 OF 1

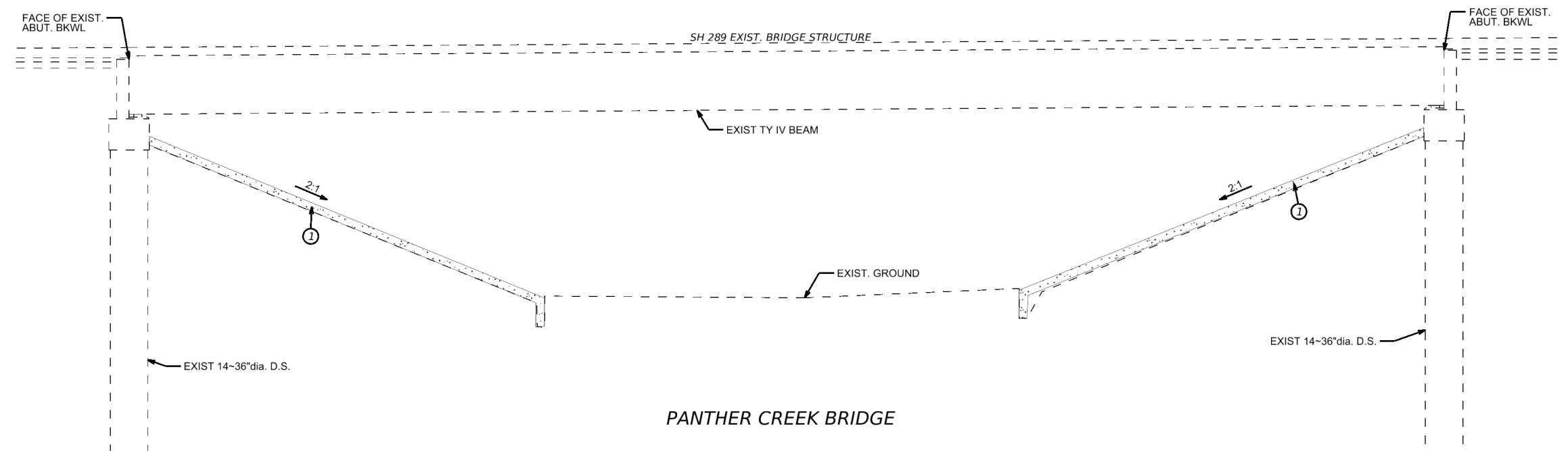
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DAL		Collin	SHEET NO. 3

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PANTHER CREEK RELIEF BRIDGE



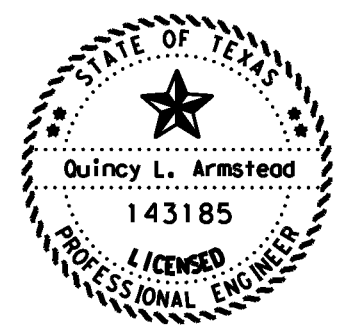
PANTHER CREEK BRIDGE

TYPICAL SECTION LEGEND:

- ① EXIST. CONC. RIPRAP TY. RR8
- ② PROP. GABION MATTRESS (GALV)(12 IN)
- ③ PROP. GABIONS (GALV)
- ④ STONE PROTECTION (12") (THICKNESS 24")
- ⑤ STONE PROTECTION (18") (THICKNESS 36")
- ⑥ RIPRAP (CONC)(5")
- ⑦ REINF CONC. SIDEWALKS (5")
- ⑧ 2" COMPACTED SAND TO 98% STANDARD PROCTOR DENSITY

NOTE:

1. 2" COMPACTED SAND WILL BE SUBSIDIARY TO ITEM 531-6002



Quincy L. Armstead, P.E.

08.03.23



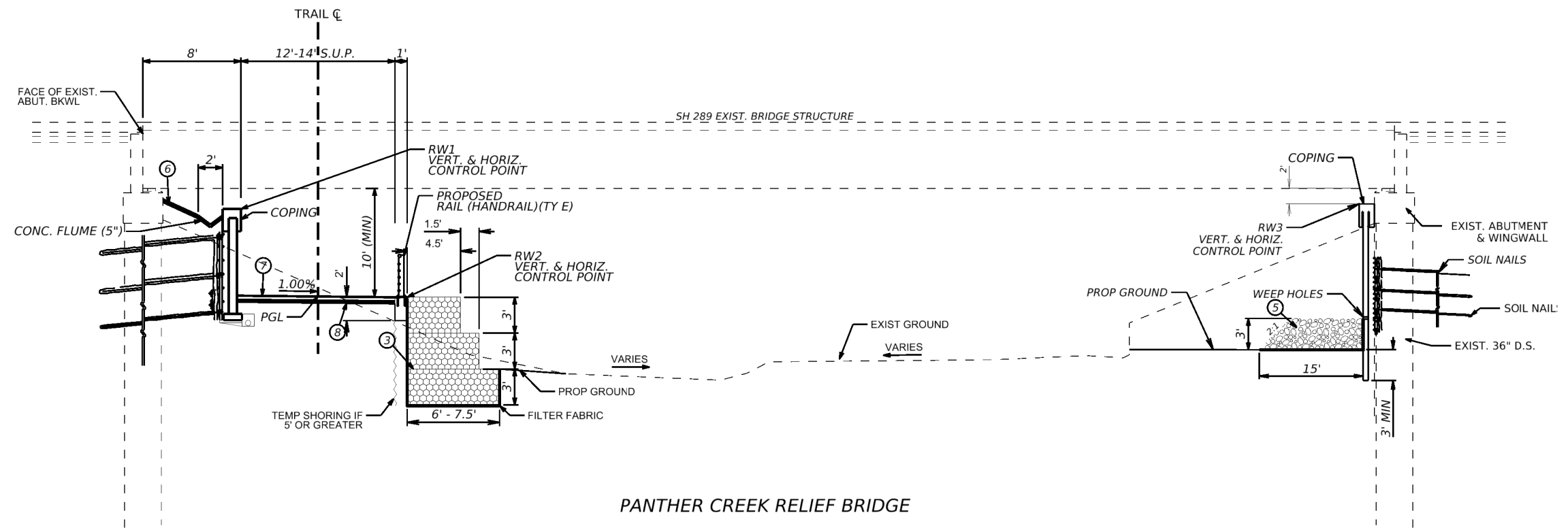
SH 289

TYPICAL SECTIONS
 EXISTING

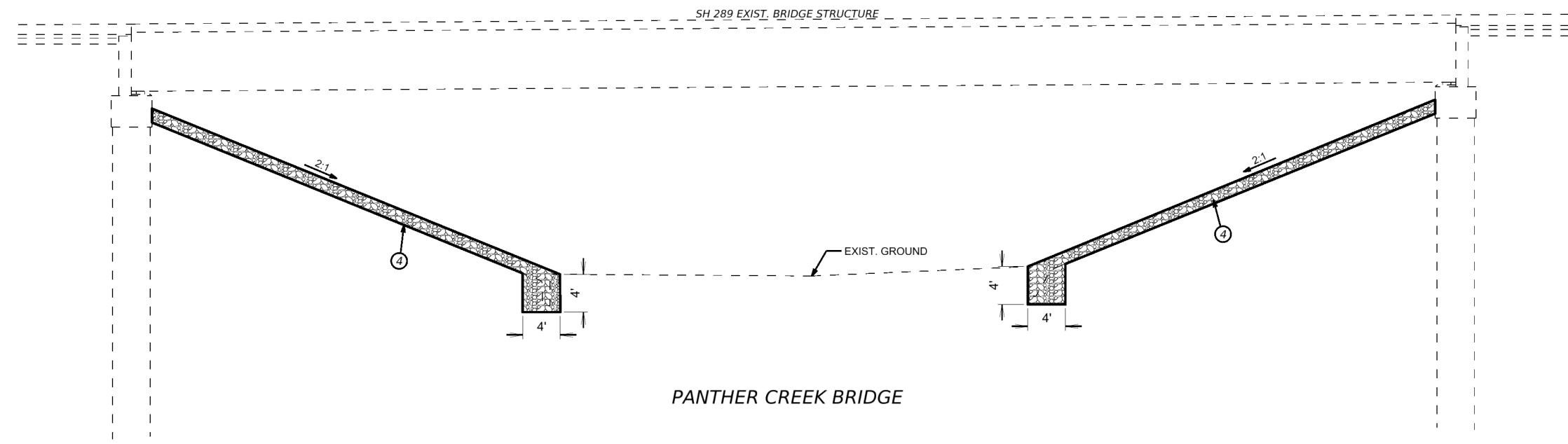
NTS		SHEET 1 OF 2	
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	4	

DATE: 2023/08/02
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 DW/JR



PANTHER CREEK RELIEF BRIDGE

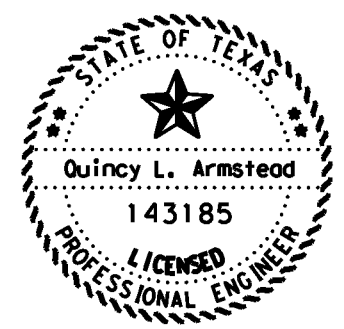


PANTHER CREEK BRIDGE

TYPICAL SECTION LEGEND:

- ① EXIST. CONC. RIPRAP TY. RR8
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 1. 2" COMPACTED SAND WILL BE SUBSIDIARY TO ITEM 531-6002



Quincy L. Armstead, P.E.
 08.03.23



SH 289
 TYPICAL SECTIONS
 PROPOSED

NTS		SHEET 2 OF 2	
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
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DAL		Collin	5

SPECIFICATION DATA

Table 1: Soil Constants Requirements				
Item	Description	Plasticity Index		Note
		Max	Min	
132	EMBANKMENT (FINAL)(DENS CONT) (TY C2)	25	8	2

Note 1: Use as a non-select embankment backfill as defined under Item 423.2.4.1. Use as an embankment to backfill behind abutments to the extent of the approach slab or to backfill areas enclosed by an abutment and / or retaining walls or other locations as shown in the plans.

Table 2: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
164	Block Sod	N/A	See Specifications		11348 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	0.59 Ton
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	1688 MG

*For contractor's information only
 **Use Summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Plan Sheet for estimated daily rates.

Table 3: Basis of Estimate for Temporary Erosion Control Items					
Item	Description	Rate		Quantity	
164	Drill Seeding (Temp) (Warm or Cool)	See Specifications		5674 SY	
166*	Fertilizer (12-6-6)	500	Lb/Ac	0.29 Ton	
168	Vegetative Watering (Warm)**	12	MG/Ac/Day	844 MG	

*For Contractor's Information Only.
 **Use Summer rate for calculation, adjust for Actual Field Conditions/Temperatures as Necessary. See Vegetation Establishment Sheet for estimated daily rates.

GENERAL

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 2.11 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

This project required permits with environmental resources agencies. There is a high probability that an environmentally sensitive area could be encountered on the contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 "Project-Specific Locations", provides a listing of regulatory agencies that may need to be contacted regarding this project.

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address: <https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors> or Contractor questions on this project are to be addressed to the following individual(s):

Area Engineer: Jennifer Vorster Jennifer.Vorster@txdot.gov
 Assistant Area Engineer: Gerald Waltman Gerald.Waltman@txdot.gov

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

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

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

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Cross sections may be requested by posting a question to the above Letting Pre-Bid Q&A web page. This data is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the enclosed data with appropriate plans, specifications and estimate for the project(s).

Item 5:

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (214-320-6682) for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (214-320-6205) for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.

Place construction stakes/station markings at intervals of no more than 100 feet or as directed by the Engineer. Place stakes and markings so as not to interfere with normal construction operations.

Submit all shop drawings, working drawings, or other documents which require review sufficiently in advance of scheduled construction to allow no less than thirty (30) calendar days for review and response.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 7:

Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility locates performed.

Holiday restrictions – The Engineer may decide that no lane closures or construction operations shall be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

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- New Year's Eve and Day (5 am on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (5 am on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (5 am on Friday thru 10:00pm Monday)
- Independence Day (5 am on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (5 am on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (5 am on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (5 am on December 23 thru 10:00 pm December 26)

No significant traffic generator events identified.

Item 8:

This Project will be a Standard Workweek.

Meet weekly with the engineer to notify him or her of planned work for the upcoming week.

Provide the engineer with a daily work schedule of planned work.

On this project, work will need to be ceased as determined by the engineer to accommodate Fair activities. The project will be left in a condition that will have the least impact on the traveling public as practicable as determined by the engineer. No additional time or compensation will be allowed for these actions.

Critical Path Method (CPM) schedule in P6 format will be required for this project. Submit baseline schedule and obtain approval prior to beginning construction. The Estimate will be held if monthly schedule update is not submitted.

Item 100:

The limits of preparing right of way will be measured from SH 289 Sta 925+16.38 to 927+63.64 & Sta 935+62.99 to Sta. 937+88.62 along the centerline of construction.

Item 104:

Sawing of concrete is not paid for directly, but is considered subsidiary to this item.

Item 110:

Excavated shale is not an acceptable material for embankment.

Items 110 and 132:

Scarify and loosen the excavated areas, unpaved surface areas, except rock, to a depth of at least 8 inches and compact in accordance with the specifications.

Item 132:

Excavated material from the project site has not been determined to be suitable for embankment. The bidder assumes all risk for the use of excavated materials for embankment and is expected to meet all material requirements for embankment regardless of the source.

Perform Tex-106-E (Plasticity Index) by an approved laboratory on excavated soils from sources outside right of way when used in roadway embankment. Provide the test results at no expense

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to the department. The engineer will sample and test soils produced by the construction project for specification requirements or material sources specified in the plans.

Earth embankment Type C2, is mainly composed of material other than shale. Furnish material that is free from vegetation or other objectionable material and that conforms to the requirements of Table 1 (Sheet A). If necessary, treat material with lime slurry in accordance with Item 260, "Lime Treatment (Road-Mixed)" in order to meet these requirements. Use Tex-121-E, figure 1, page 4 to calculate the amount of lime required. When lime treated subgrade is specified, 3000 PPM is the maximum allowed sulfate content in the top 3 feet when material comes from borrow source. Follow recommendations of 260.4.4 for mixing and mellowing. The engineer will test material placed or excavated to a depth of one foot below and laterally to one foot outside the proposed treatment limit. Lime treatment of this material will not be paid for directly, but will be considered subsidiary to this item.

Do not use shaley clays in embankment unless approved in writing.

Use embankment material Type C2 described in Table 1 "Soil Constants Requirements" for embankments behind bridge abutments to the extent of the bridge approach slabs, and other embankments enclosed by an abutment and / or retaining walls.

Item 160:

Sequence construction operations to salvage topsoil from one location and spread on areas ready to receive topsoil. Keep stockpiling of topsoil to a minimum.

Item 161:

Provide tickets representing quantity of compost delivered to site.

Item 400:

Structural Excavation is not paid for directly but is considered subsidiary to pertinent Items.

Item 420:

Apply an ordinary surface finish to all concrete surfaces within 30 days after form removal.

Item 421:

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Provide sulfate resistant concrete for box culverts and all drilled shafts.

Strength evaluation using maturity testing, Tex-426-A, may be used for all concrete elements except drilled shafts and mass concrete pours.

Provide a digital hydraulic compression testing Machine and accessories. The machine shall have a minimum testing range of 2500 pounds force to 250,000 pounds force with a hydraulic switching valve to allow for rapid advancing, hold, controlled advancing and rapid retracting. The machine shall have a load cell to measure compressive forces within the testing range and shall be

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calibrated and verified in accordance with ASTM latest version. The Machine can meet or exceed the following when approved by the Engineer:

ELE International ACCU-TEK250 Digital Compression Tester including accessories or Forney F-250EX Standard Compression Machine including accessories or TxDOT approved equal.

Supply the Engineer with a list of certified personnel and copies of their current ACI certificates before beginning production and when personnel changes are made. Supply hard copies of calibration reports for testing equipment when required by the Engineer.

Item 423:

Unless otherwise noted in the plans, the top of the leveling pad is located 2 feet below the proposed ground.

Square foot surface area of retaining wall is measured from the top of retaining wall to the top of the leveling pad. Footing adjustments made to accommodate the available optional retaining walls are not measured.

Supply drainage aggregate meeting the requirements of this item for use as filter material with the retaining wall.

Cement-Stabilized Backfill (CSB) is not permitted.

Unless otherwise noted on the plans, provide flowable backfill meeting the requirements of Item 401 between the back of panels and inlets or drainage pipes where the required compaction can not be achieved. Flowable backfill used for this purpose is subsidiary to this item.

Submit design calculations supporting the details necessary to incorporate coping, railing, inlets, drainage, electrical conduits and any additional necessary features.

The contractor has the option of constructing any of the types of retaining walls for which details and specifications are included in the plans. Footing adjustments made to accommodate the available optional retaining walls are not measured. Regardless of option or options chosen, use the same fascia pattern throughout the entire project, including cast in place full height retaining walls or retaining wall type abutments.

Submit detailed drawings depicting the patterns and matching of precast with cast-in-place for approval.

At contractor's expense, repair all damage to the precast units (such as chips) as required to match the fascia pattern.

Use Embankment Type C2 as non-select embankment backfill as defined under Item 423.2.4.1. For non-select embankment fill behind retaining walls provide and install fill in accordance with Item 132, Type C2.

For cut walls, the backfill between the select fill zone and the existing ground shall be either select material as required for the select fill zone or backfill meeting or exceeding the requirements of

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Item 132, type C2. Place material in accordance with Item 132, Type C2 requirements. If existing ground is laid back (i.e. not vertical), the lay back shall be done as a series of equal height benches so as to prevent the formation of a smooth surface at the material interface.

Avoid distinct vertical joints between select backfill and embankment (Non-Select) backfill as required by Section 423.3.4. This may be conveniently done by providing a zone of material behind the strap zone (1' min width) in which alternating lifts of select and non-select materials are interlaced.

Items 423 and 427:

Unless otherwise noted on the plans, provide a striated finish on all retaining walls and retaining wall type bridge abutments. Supply form liners providing a finish similar to that derived from Ashlar Stone Formliner on all retaining walls and retaining wall type bridge abutments. Supply form liners providing a finish similar to that derived from Pattern No. 16986 "Georgetown Ashlar", by Fitzgerald Formliners 1.5" deep, Pattern No.460 "Ashlar Cut Stone", by Greenstreak, Pattern "Ashlar Stone" 1.5" Deep, by Scott System or equal. Maximum depth of the striations is 1.5 inches.

For cast in place walls, cast the top two feet smooth.

Item 427:

Ensure that surfaces are free of weak surface material, curing compounds and other surfacecontaminants prior to coating.

FORM LINER FINISHES: Place architectural concrete treatments as shown. Placement is subsidiary to this item.

Where used, provide fractured fin/ribs/striations that are continuous with no apparent curves or discontinuities. Variations of the fractured ribs from true vertical exceeding ¼" for each 4'-0" of panel height are not acceptable.

Provide form liners that release without leaving pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. Provide form release agents as recommended by the manufacturer. Replace form liners as directed that have become damaged or worn. Replacement of form liners is considered incidental to the work and no additional compensation is provided.

No horizontal splices in the form liner are permitted. Vertical splices may occur only in valleysbetween fractured ribs.

Provide sample panels a minimum of ten days in advance of starting construction of the textured concrete surfaces. Construct sample panel(s) in accordance with Item 427.4.3.5 "FormLiner Finish" using each type of approved form liner. Sample panels must meet the requirements of the plans and specifications and be approved before any construction form liners may be ordered, obtained or used. Provide panels having a textured portion at least 5'-0"by 5'-0" with a representative un-textured surrounding surface. If directed, construct and finishadditional test panels until a satisfactory concrete surface texture is obtained.

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The approved sample panel is the standard of comparison for the production concrete surfacetexture. If directed, build a new test panel to demonstrate acceptability of any proposed changein construction method.

Tool or replace areas requiring surface treatment that do not match their associated sample panels. Upon completion, tooled or replaced panels must match the associated sample panel.Tooling or replacement is at the contractor's expense.

Item 440:

Fiber Reinforced Concrete (FRC) can be used as a substitute for Non-Structural Class Reinforced Concrete in Mow-Strip and Rip Rap Items as approved. FRC may also be used for other Non-Structural Class Reinforced Concrete Items as approved.

Item 442:

Use temperature Zone 1 for CVN testing.

Item 464:

The concrete collars and the connections of pipes to existing or proposed concrete boxes or pipe will not be paid for directly but will be considered subsidiary to the various bid items.

Item 465:

All manholes, junction boxes and inlets will require inverts unless otherwise directed.

Item 500:

Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

Item 502:

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.

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.

Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

County: Collin

Highway: SH 289

Do not commence work on the road before sunrise. Do not operate or park any equipment/machinery closer than 30 feet from the traveled roadway after sunset unless authorized by the engineer.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

Limit lane closures along SH 289 to the hours between 9:00 am and 3:30 pm. Work in other areas of the project is not restricted to this time frame.

Traffic Control Plans with Lane Closures causing backups of 20 minutes or greater in duration will be modified by the Engineer up to and including removal of the lane closure and adjustment of lane closure times.

Additional lanes may be closed, started earlier, or extended later with written permission of the Engineer.

Item 506:

Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas, before the next rain event or within 24 hours of the discharge.

If temporary construction stream crossings are allowed under a Nationwide Permit, submit in writing for approval the type and location of each temporary stream crossing. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for temporary stream crossings. A temporary culvert crossing will consist of storm sewer pipes and 4- to 8-inch nominal size rock. Temporary stream crossings must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or cause more than minimal degradation of water quality. Remove the temporary stream crossings in their entirety and return the affected areas to their pre-existing elevation. All work and materials use for temporary construction stream crossings will not be paid for directly but are subsidiary to pertinent Items.

Provide SW3P Signs. Obtain from the Engineer a copy of the project's completed TPDES Storm Water Program Construction Site Notice and Contractor Site Notice. Laminate the sheets and bond with adhesive to 36" X 36" plywood sign blanks. Ensure the sheets remain dry. Apply Type C Blue reflective sheeting as the background and add the text "SW3P" in 5" white lettering, centered at the top. Attach the signs to approved temporary mounts and locate at each of the project limits just inside the right of way line at a readable height or as directed by the Engineer. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. SW3P signs, maintenance, and reposting (for replacement or as needed to ensure readability) will be subsidiary to Item 502.

Concrete Washouts are required per the CGP. The Concrete Washout Area(s) structural controls must consist of temporary berms, temporary shallow pits, and/or temporary storage tanks to prevent contaminated runoff and must be lined as to prevent contamination of underlying

County: Collin

Highway: SH 289

soil. Ensure pits properly maintained including removal of concrete as not to allow over flow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls."

Item 531:

Joint sealant is required when shown in the plans. This work will not be paid for directly but will be considered subsidiary to this Item.

Item 6185:

The total number of truck mounted attenuators (TMAs) or trailer attenuators (TAs) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario	Required TMA/TA
(1-5)-18		1

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed for the project. Additional TMAs/TAs used that are not specified in the plans in which the contractor expects compensation will require prior approval from the Engineer.

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0091-04-069

DISTRICT Dallas
HIGHWAY SH 289

COUNTY Collin

CONTROL SECTION JOB				0091-04-069		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00188997			
COUNTY				Collin			
HIGHWAY				SH 289			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	4.730		4.730	
	104-6009	REMOVING CONC (RIPRAP)	SY	2,907.000		2,907.000	
	110-6001	EXCAVATION (ROADWAY)	CY	4,809.000		4,809.000	
	110-6002	EXCAVATION (CHANNEL)	CY	180.000		180.000	
	132-6026	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	CY	147.000		147.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	11,348.000		11,348.000	
	162-6002	BLOCK SODDING	SY	11,348.000		11,348.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	5,674.000		5,674.000	
	168-6001	VEGETATIVE WATERING	MG	2,532.000		2,532.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	31.000		31.000	
	403-6001	TEMPORARY SPL SHORING	SF	4,984.000		4,984.000	
	410-6001	SOIL NAIL ANCHORS	LF	9,841.000		9,841.000	
	420-6011	CL B CONC (FLUME)	CY	8.000		8.000	
	423-6022	RETAINING WALL (SOIL NAIL)(FACIA)	SF	5,094.000		5,094.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	33.000		33.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	1,366.000		1,366.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	783.000		783.000	
	450-6051	RAIL (HANDRAIL)(TY E)	LF	267.000		267.000	
	459-6001	GABIONS (GALV)	CY	1,160.000		1,160.000	
	459-6007	GABION MATTRESSES (GALV)(12 IN)	SY	264.000		264.000	
	462-6099	CONC BOX CULV (6 FT X 2 FT)	LF	50.000		50.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	32.000		32.000	
	465-6012	JCTBOX(COMPL)(PJB)(8FTX8FT)	EA	1.000		1.000	
	467-6203	SET (TY I)(S= 6 FT)(HW= 3 FT)(2:1) (P)	EA	1.000		1.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6389	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	1.000		1.000	
	467-6473	SET (TY II) (48 IN) (RCP) (2: 1) (P)	EA	1.000		1.000	
	496-6004	REMOV STR (SET)	EA	4.000		4.000	
	496-6007	REMOV STR (PIPE)	LF	44.000		44.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	204.000		204.000	
	506-6004	ROCK FILTER DAMS (INSTALL) (TY 4)	LF	91.000		91.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	295.000		295.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	1,462.000		1,462.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	1,462.000		1,462.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,014.000		3,014.000	



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0091-04-069

DISTRICT Dallas
HIGHWAY SH 289

COUNTY Collin

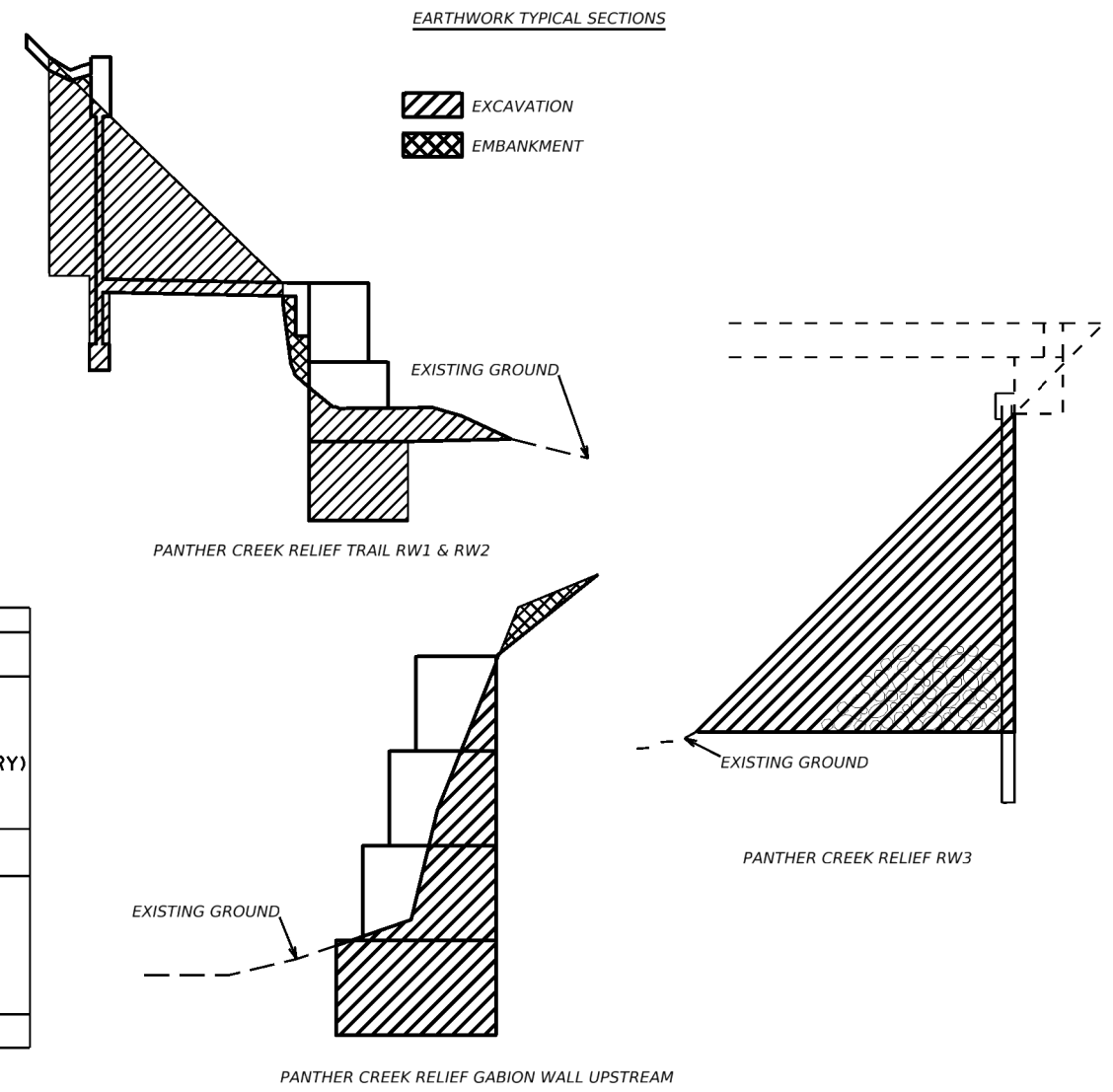
CONTROL SECTION JOB				0091-04-069		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00188997			
COUNTY				Collin			
HIGHWAY				SH 289			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,014.000		3,014.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	737.000		737.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	737.000		737.000	
	531-6002	CONC SIDEWALKS (5")	SY	446.000		446.000	
	740-6004	ANTI - GRAFFITI COATING(PERMNENT-TY II)	SF	4,083.000		4,083.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	484.000		484.000	
	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	

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SUMMARY OF REMOVAL ITEMS			
LOCATION	104 6009	496 6004	496 6007
	REMOVING CONC (RIPRAP)	REMOV STR (SET)	REMOV STR (PIPE)
	SY	EA	LF
PANTHER CREEK RELIEF	1134	2	38
PANTHER CREEK	1773	2	6
PROJECT TOTALS	2907	4	44

SUMMARY OF ROADWAY ITEMS						
LOCATION	100 6002	110 6001	110 6002	531 6002	6001 6002	6185 6002
	PREPARING ROW	EXCAVATION (ROADWAY) *	EXCAVATION (CHANNEL)	CONC SIDEWALKS (5")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	STA	CY	CY	SY	EA	DAY
PANTHER CREEK RELIEF	2.47		180	446		484
PANTHER CREEK	2.26	1269			2	
PROJECT TOTALS	4.73	1269	180	446	2	484

SUMMARY OF RETAINING WALL ITEMS													
LOCATION	110 6001	132 6026	403 6001	410 6001	420 6011	423 6022	432 6002	432 6031	432 6033	450 6051	459 6001	459 6007	740 6004
	EXCAVATION (ROADWAY) *	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	TEMPORARY SPL SHORING	SOIL NAIL ANCHORS	CL B CONC (FLUME)	RETAINING WALL (SOIL NAIL)(FACIA)	RIPRAP (CONC)(5 IN)	RIPRAP (STONE PROTECTION *	RIPRAP (STONE PROTECTION *	RAIL (HANDRAIL) (TY E)	GABIONS (GALV)	GABION MATTRESSES (GALV)(12 IN)	ANTI - GRAFFITI COATING(PE RMNENT-TY II)
	CY	CY	SF	LF	CY	SF	CY	CY	CY	LF	CY	SY	SF
PANTHER CREEK RELIEF													
RW1	448			3724	8	1844	33						1378
RW2	424	34	1496							267	390		
RW3	1461			6117		3250	335	331					2705
GABION WALL	1207	113	3488				32	399		770	264		
PROJECT TOTALS	3540	147	4984	9841	8	5094	33	367	730	267	1160	264	4083



NOTE:
 * BID ITEM IS SHOWN IN MULTIPLE SUMMARY BOXES.
 ** QUANTITIES HAVE BEEN INCREASED BY 10% TO ACCOUNT FOR REPLACEMENTS NEEDED DUE TO NORMAL WEAR OR DIFFERING SITE CONDITIONS.



SH 289
SUMMARY SHEET

SHEET 1 OF 2			
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	9	

DATE: 2023/08/02
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SUMMARY OF DRAINAGE ITEMS

LOCATION	402 6001	432 6031	432 6033	462 6099	464 6003	465 6012	467 6203	467 6356	467 6389	467 6473
	TRENCH EXCAVATION PROTECTION	RIPRAP (STONE PROTECTION (12 IN) *	RIPRAP (STONE PROTECTION (18 IN) *	CONC BOX CULV (6 FT X 2 FT)	RC PIPE (CL III)(18 IN)	JCTBOX(COMP L)(PJB)(8FT X8FT)	SET (TY I) (S= 6 FT)(HW= 3 FT)(2*1)(P)	SET (TY II) (18 IN) (RCP)(3*1 (C)	SET (TY II) (24 IN) (RCP)(3*1 (P)	SET (TY II) (48 IN) (RCP)(2*1 (P)
	LF	CY	CY	LF	LF	EA	EA	EA	EA	EA
PANTHER CREEK RELIEF	31		53	50	32	1	1	1		
PANTHER CREEK		999							1	1
PROJECT TOTALS	31	999	53	50	32	1	1	1	1	1

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	161 6017	162 6002	164 6051	168 6001	506 6003	506 6004	506 6011	506 6020	506 6024	506 6038	506 6039	506 6041	506 6043
	COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	DRILL SEED (TEMP)(WARM OR COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (INSTALL) (TY 4)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTIO N EXITS (INSTALL) (TY 1)	CONSTRUCTIO N EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	LF	LF	LF	SY	SY	LF	LF	LF	LF
PANTHER CREEK RELIEF	7190	7190	3595	1604	94	83	177	688	688	1646	1646	535	535
PANTHER CREEK	4158	4158	2079	928	91		91	641	641	1094	1094	135	135
**BMP 10% INCREASE					19	8	27	133	133	274	274	67	67
PROJECT TOTALS	11348	11348	5674	2532	204	91	295	1462	1462	3014	3014	737	737

NOTE
 * BID ITEM IS SHOWN IN MULTIPLE SUMMARY BOXES.
 ** QUANTITIES HAVE BEEN INCREASED BY 10% TO ACCOUNT FOR REPLACEMENTS NEEDED DUE TO NORMAL WEAR OR DIFFERING SITE CONDITIONS.



SH 289

SUMMARY SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST		COUNTY	SHEET NO.
DAL		Collin	10

CK: DW: CK: DW:

PHASE 1:

1. INSTALL PROJECT SIGNS & ADVANCE WARNING SIGNS AS NEEDED IN BC STANDARDS, TCP STANDARDS OR AS DIRECTED BY THE ENGINEER.
2. PLACE SW3P DEVICES AS PER STANDARD AND DIRECTED BY THE ENGINEER.

PHASE 2 (PANTHER CREEK RELIEF):

1. REMOVE EXISTING RIPRAP & EXISTING CULVERT W/ SET.
2. PLACE NEW CULVERT.
2. CONSTRUCT RETAINING WALL.
3. BUILD SIDEWALK AND PEDESTRIAN RAIL.
4. PLACE GABION WALLS.
4. PLACE STONE PROTECTION.
5. PLACE PERMANENT SEEDING.

PHASE 3 (PANTHER CREEK):

1. REMOVE EXISTING RIPRAP.
2. CONSTRUCT STONE PROTECTION IN EXISTING CONFIGURATION.
3. PLACE PERMANENT SEEDING.

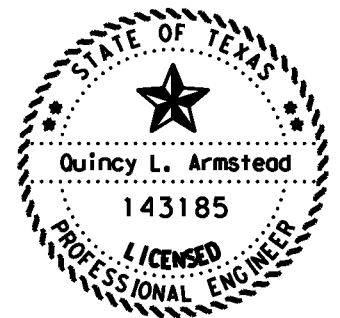
PHASE 4:

1. ESTABLISH FINAL VEGETATIVE COVER AND REMOVE SW3P DEVICES UPON AUTHORIZATION OR AS DIRECTED BY THE ENGINEER.
2. PERFORM FINAL CLEANUP AS DIRECTED BY THE ENGINEER ONCE SCOPE OF WORK IS COMPLETE.

TCP GENERAL NOTES:


1. INSTALL STORM WATER POLLUTION PREVENTION (SW3P) DEVICES PRIOR TO START OF PHASES AS PER STANDARDS AND DIRECTED BY THE ENGINEER.
2. MAINTAIN TEMPORARY SIGNS WITHIN THE PROJECT LIMITS AND COVER OR REMOVE ANY EXISTING SIGN OR PAVEMENT MARKING THAT CONFLICTS WITH TCP TO AVOID CONFUSION FOR THE TRAVELING PUBLIC. TEMPORARY SIGNING SHALL BE PLACED AS NEEDED DURING ALL PHASES. PAYMENT FOR THIS WORK SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES.
3. THE CONTRACTOR WILL PROVIDE AND MAINTAIN TRAFFIC CONTROL DEVICES TO HANDLE TRAFFIC THROUGH THE WORK AREAS FOR THE SAFETY AND CONVENIENCE OF THE TRAVELING PUBLIC AND CONTRACTOR PERSONNEL.
4. PAY ATTENTION FOR OVERHEAD UTILITIES.
5. MAINTAIN TEMPORARY DRAINAGE THROUGHOUT ALL PHASES OF CONSTRUCTION. THIS WORK WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.
6. THE CONTRACTOR MAY SUBMIT AN ALTERNATE SEQUENCE OF WORK FOR THE TRAFFIC CONTROL PLAN TO THE ENGINEER FOR APPROVAL. IF THE ALTERNATE TCP IS ACCEPTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLANS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON REVISED PHASE/STAGE UNTIL WRITTEN APPROVAL IS OBTAINED BY THE ENGINEER.
7. OVERNIGHT LANE CLOSURES ARE NOT PERMITTED.
8. THE CONTRACTOR WILL PROVIDE WRITTEN NOTICE TO THE ENGINEER BEFORE 1:00 PM ON THE BUSINESS DAY PRECEEDING PROPOSED LANE CLOSURES. LANE CLOSURES WILL NOT BE PERMITTED WITHOUT THIS NOTIFICATION.

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Quincy L. Armstead, P.E.

08.03.23

 Texas Department of Transportation			
SH 289			
TRAFFIC CONTROL PLAN NARRATIVE			
SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY		SHEET NO.
DAL	Collin		11

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

SHEET 1 OF 12



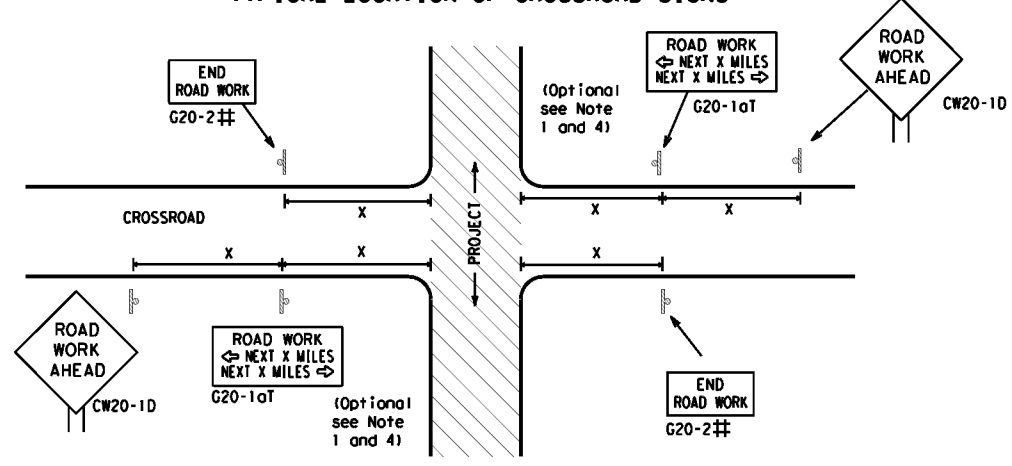
**BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS**

BC (1) -21

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© TxDOT	November 2002	CONT:	0091	SECT:	04	JOB:	069	HIGHWAY:	SH 289
REVISIONS		DIST:	COUNTY:		SHEET NO.:				
4-03	7-13	DAL	COLLIN		12				
9-07	8-14								
5-10	5-21								

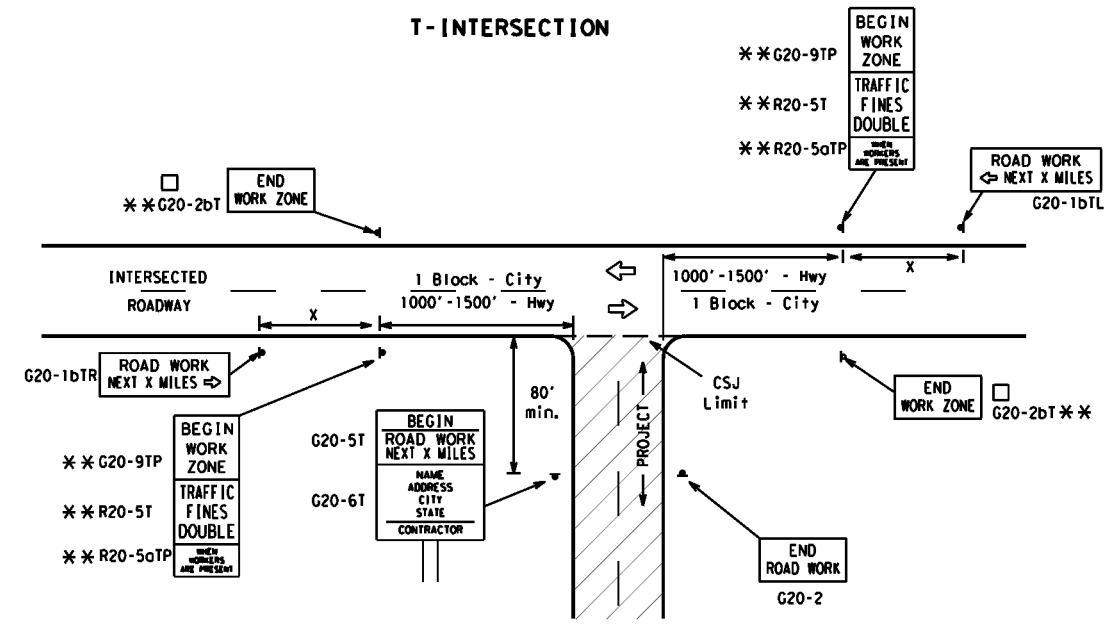
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TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

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

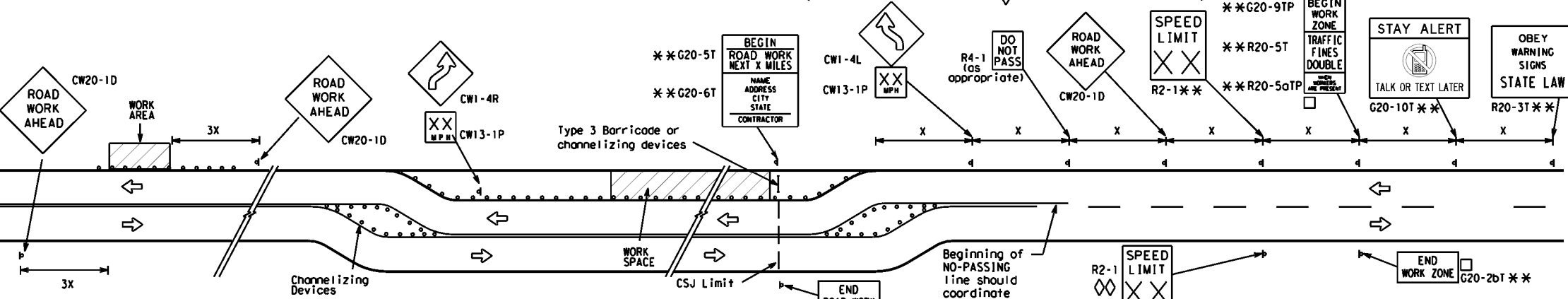
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

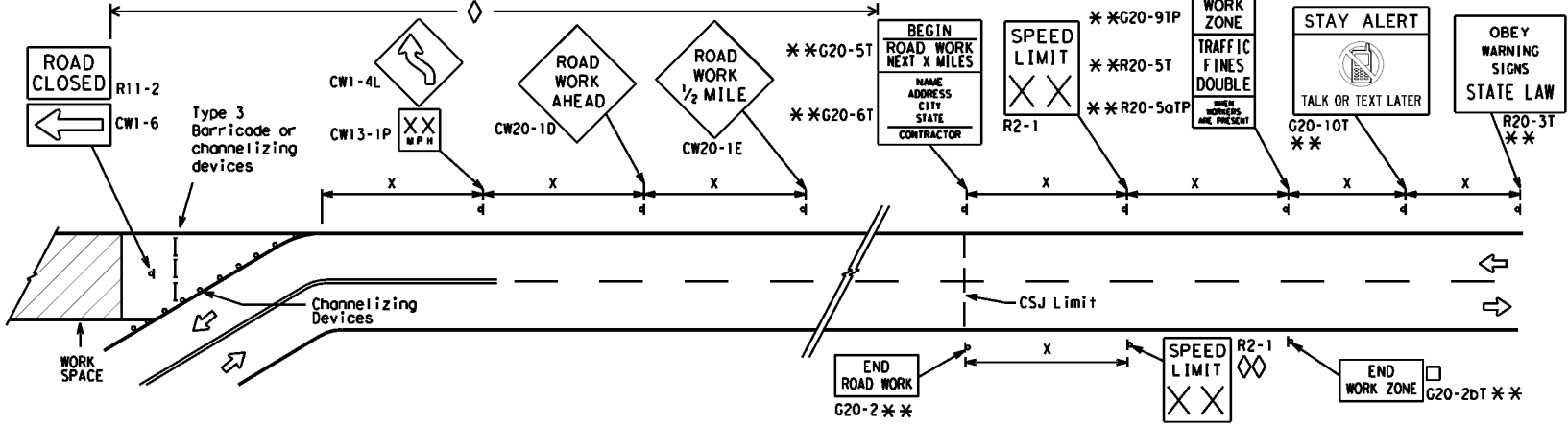
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-1aT) 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.

BARRICADE AND CONSTRUCTION PROJECT LIMIT

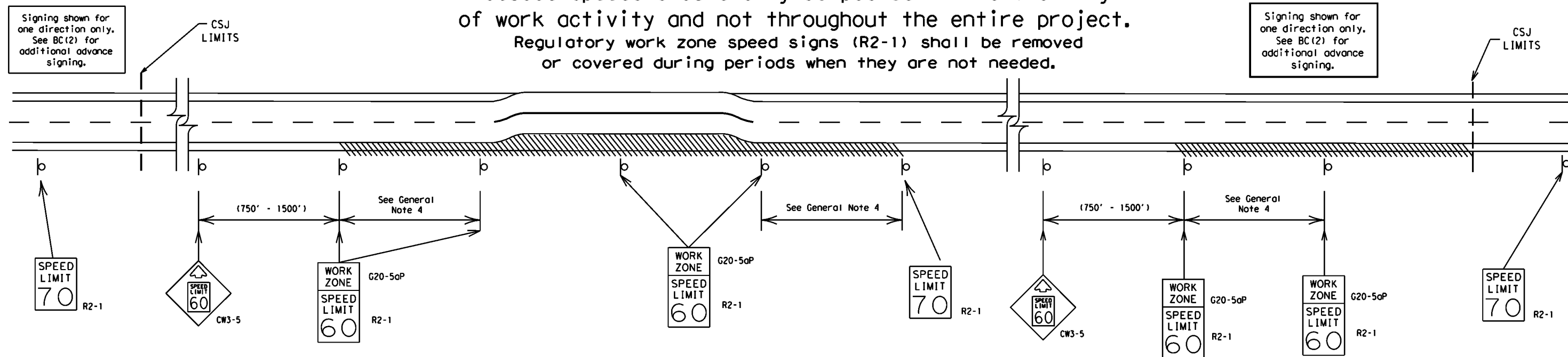
BC (2) - 21

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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present.

Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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SHEET 3 OF 12



BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

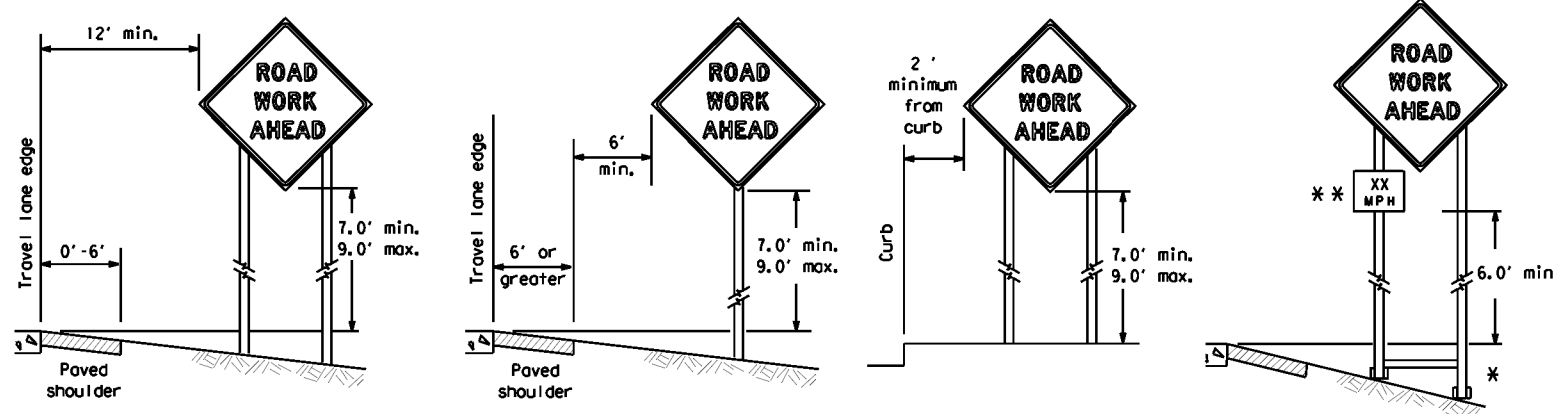
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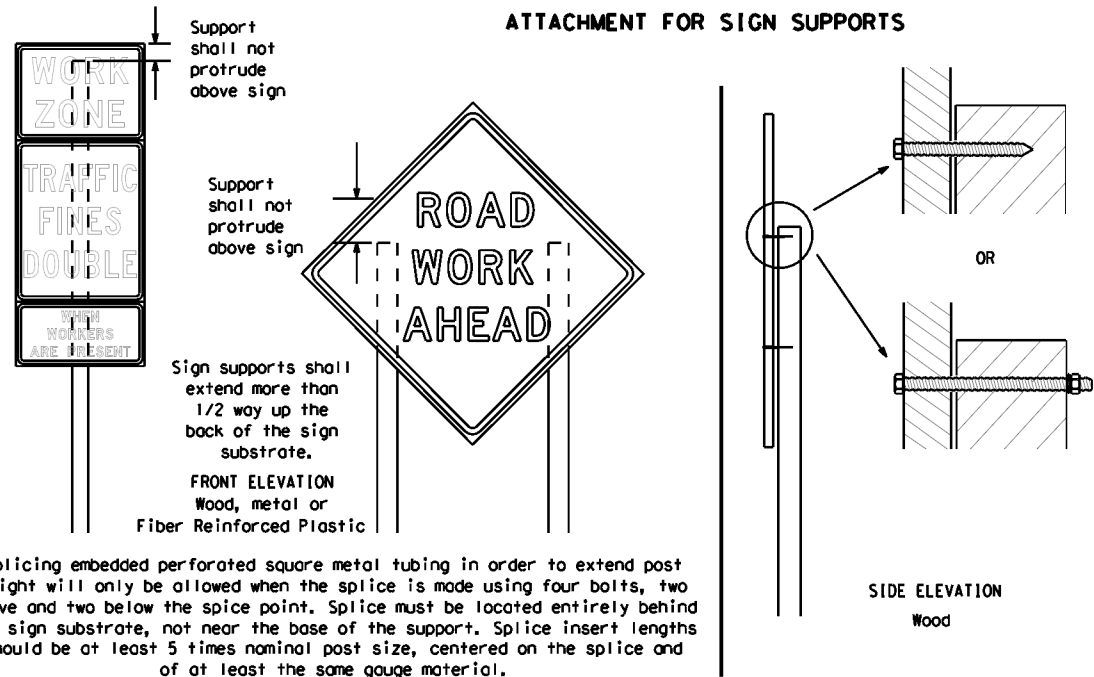
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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

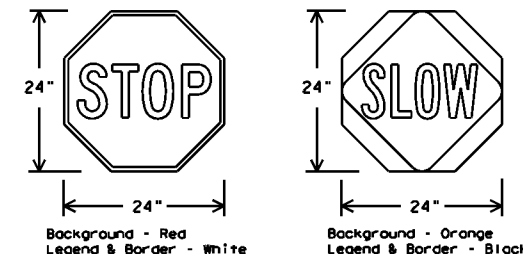


Nails shall NOT be allowed.
 Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

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 splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

SHEET 4 OF 12

Texas Department of Transportation Traffic Safety Division Standard

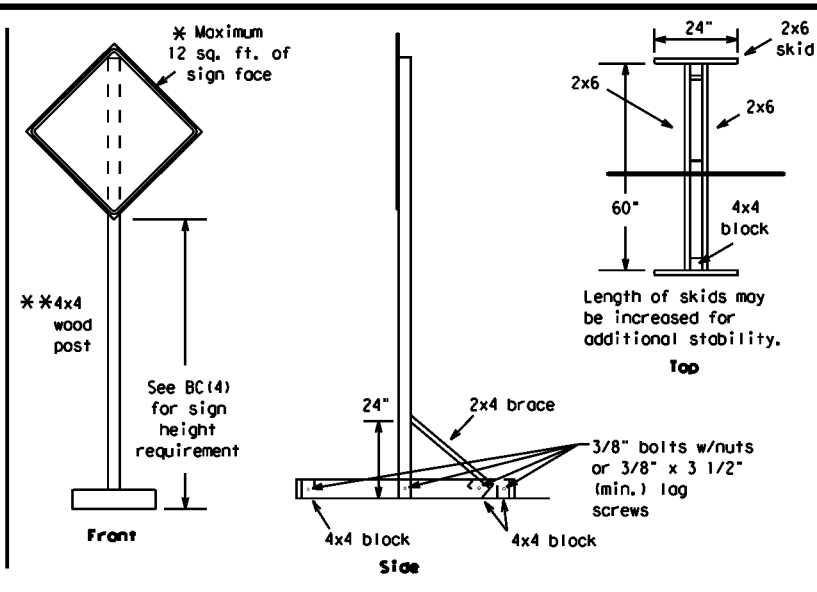
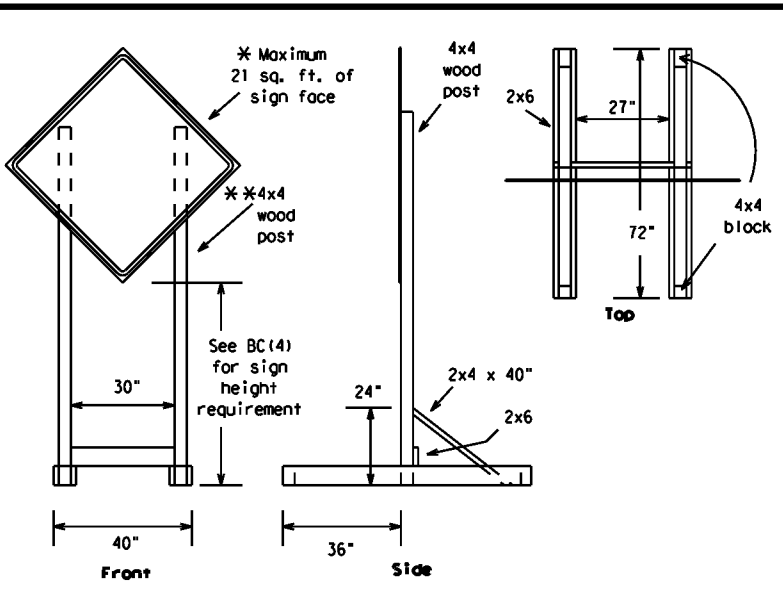
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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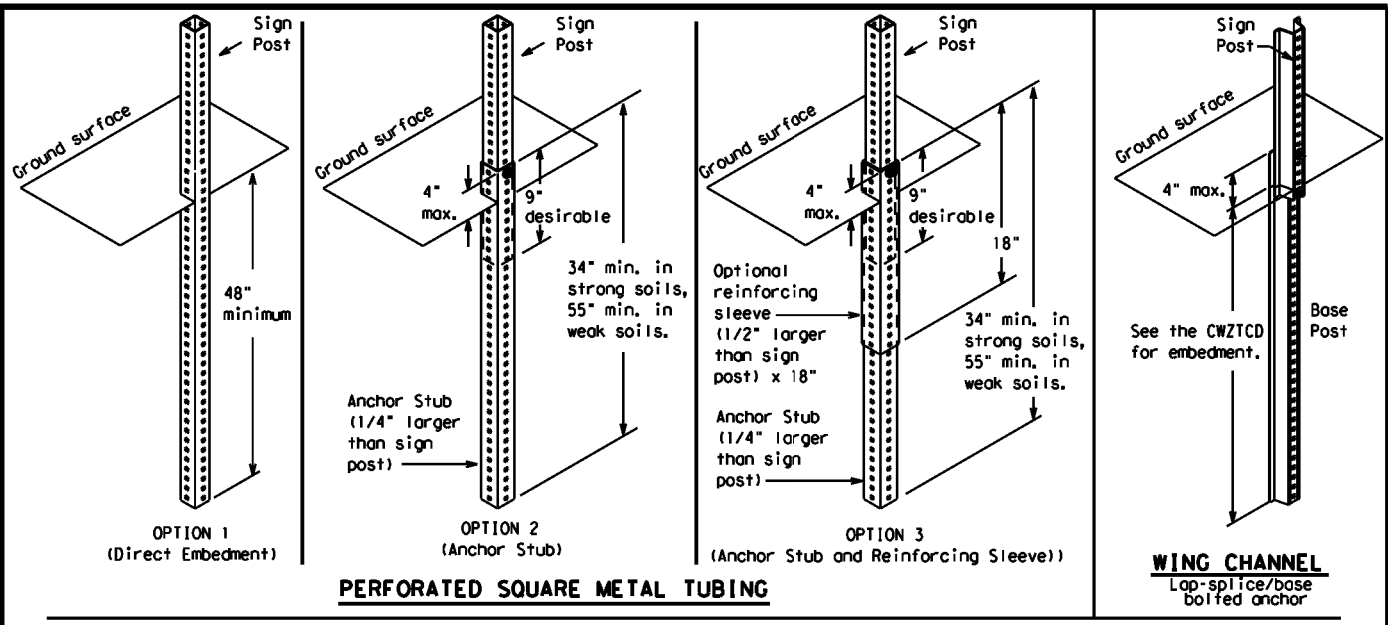
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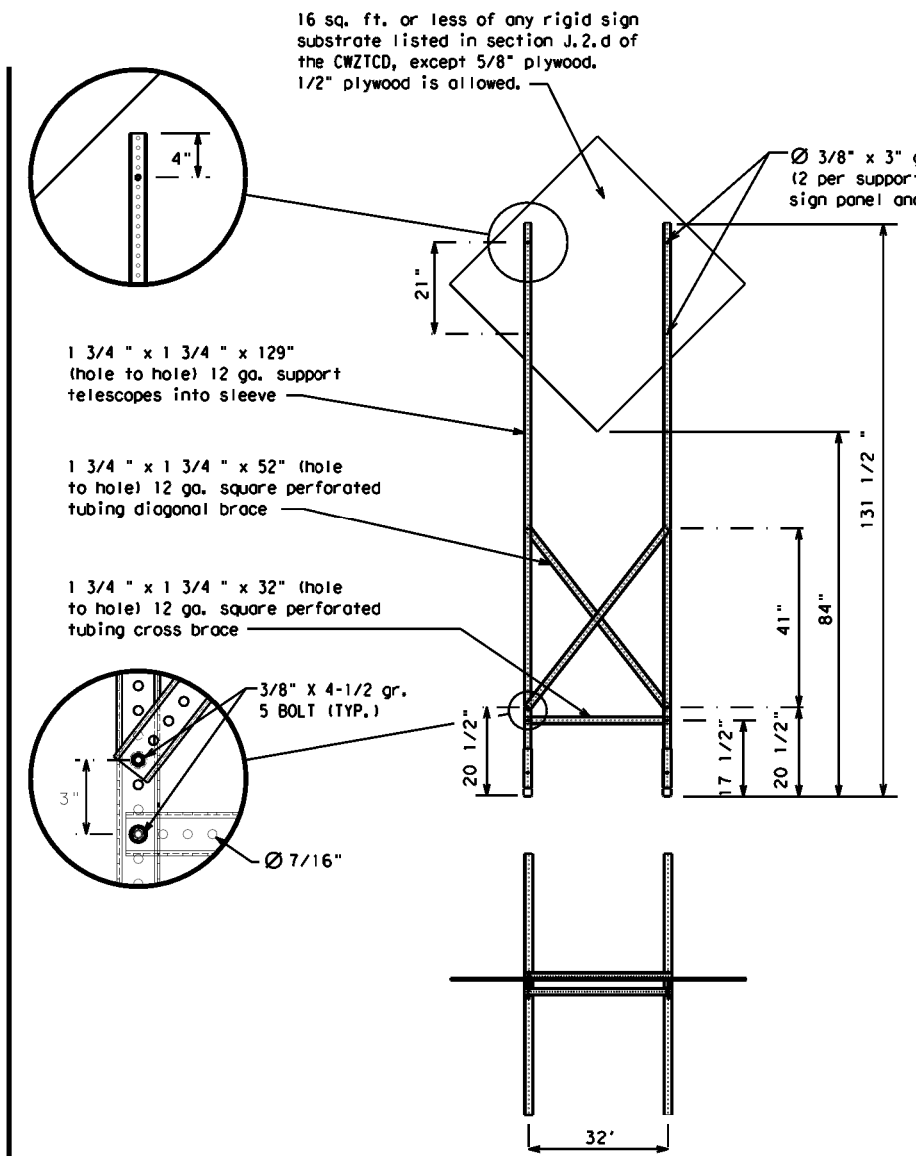
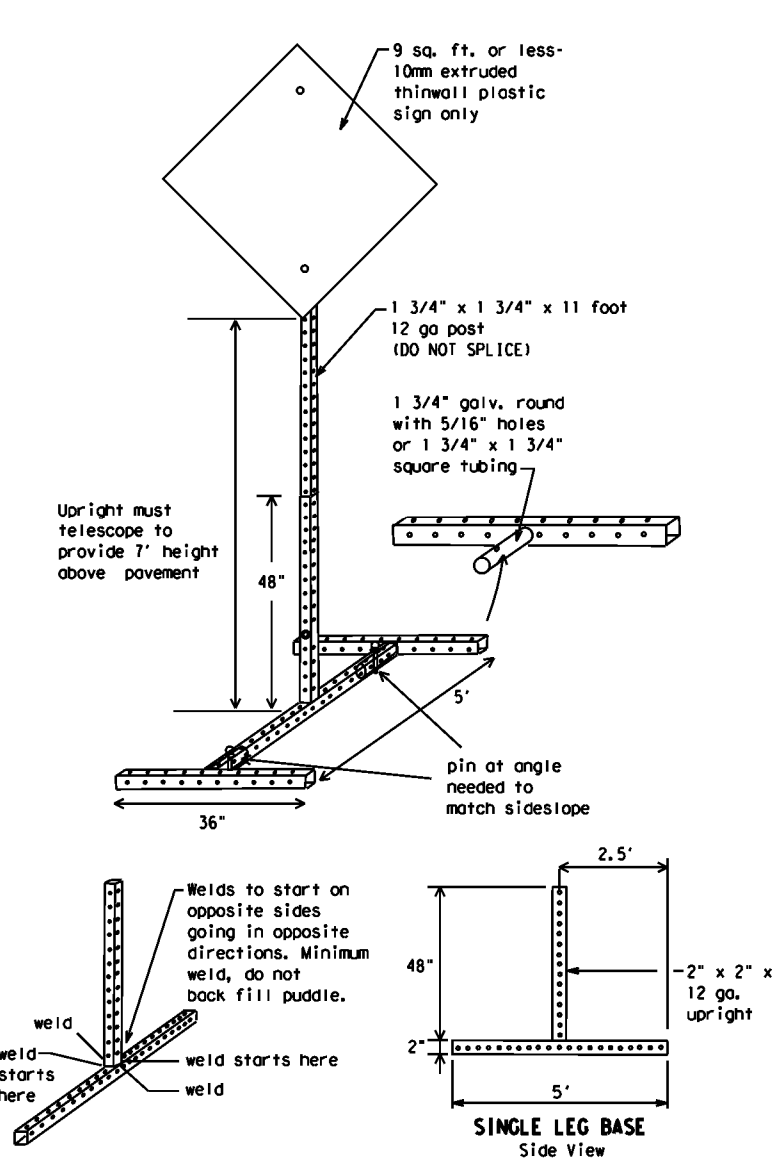
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

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

SHEET 5 OF 12
 Texas Department of Transportation
 Traffic Safety Division Standard

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	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
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

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

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



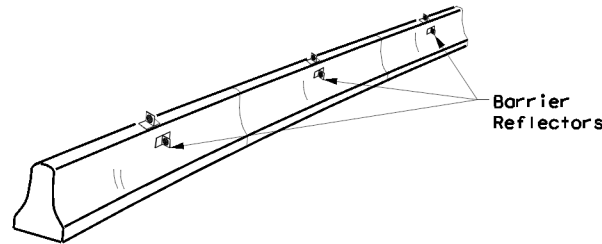
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

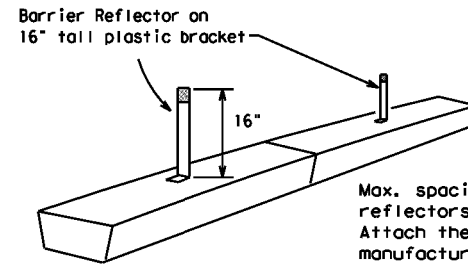
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)



LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

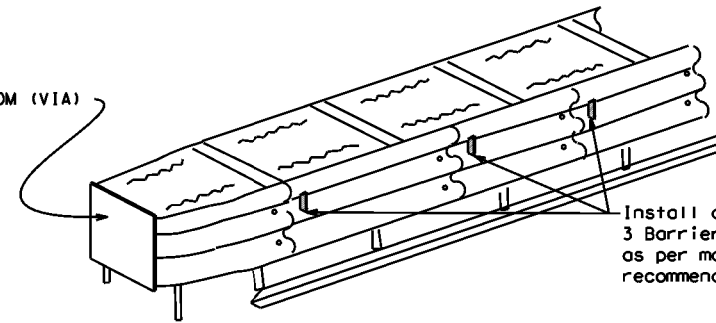
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

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

LOW PROFILE CONCRETE BARRIER (LPCB)

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

See D & OM (VIA)



Install a minimum of 3 Barrier Reflectors as per manufacturer's recommendations.

DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

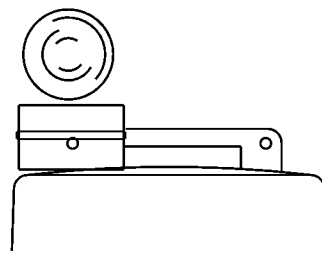
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

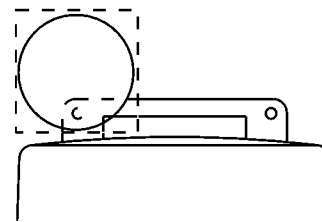
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



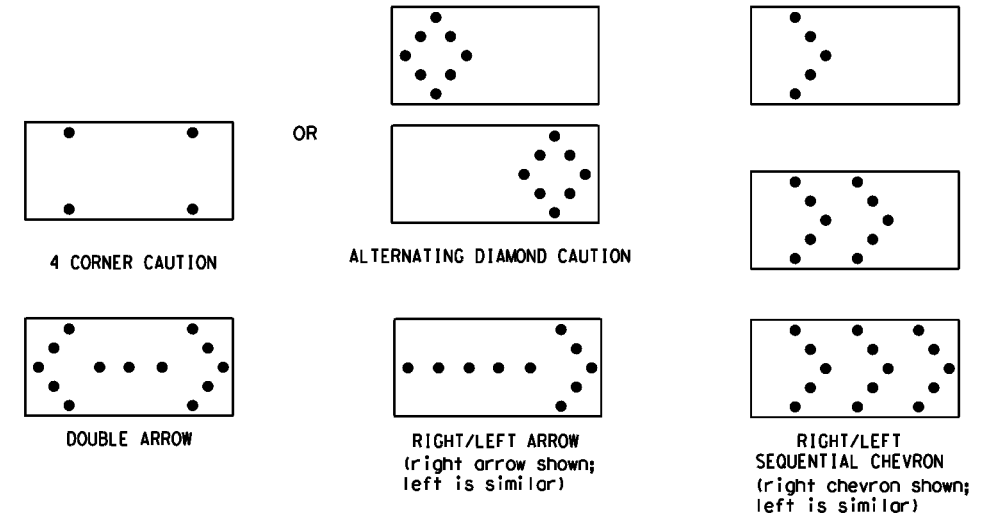
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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



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

BC (7) - 21

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

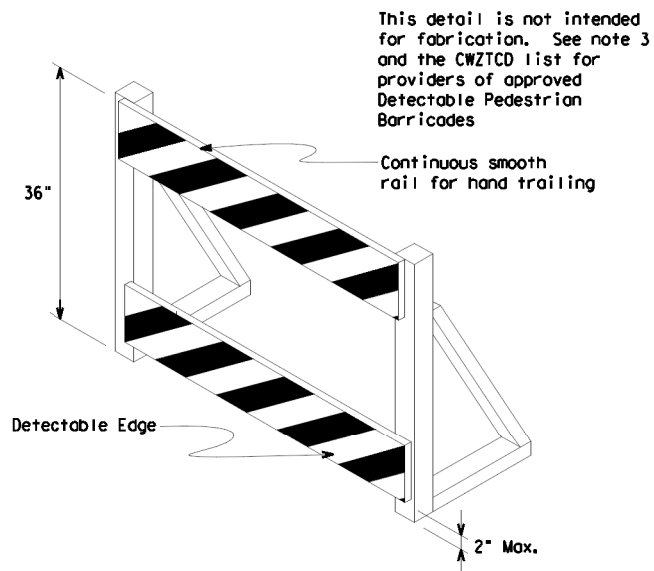
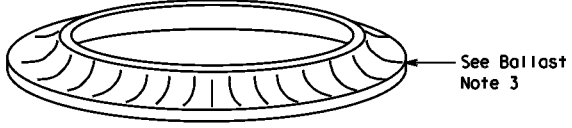
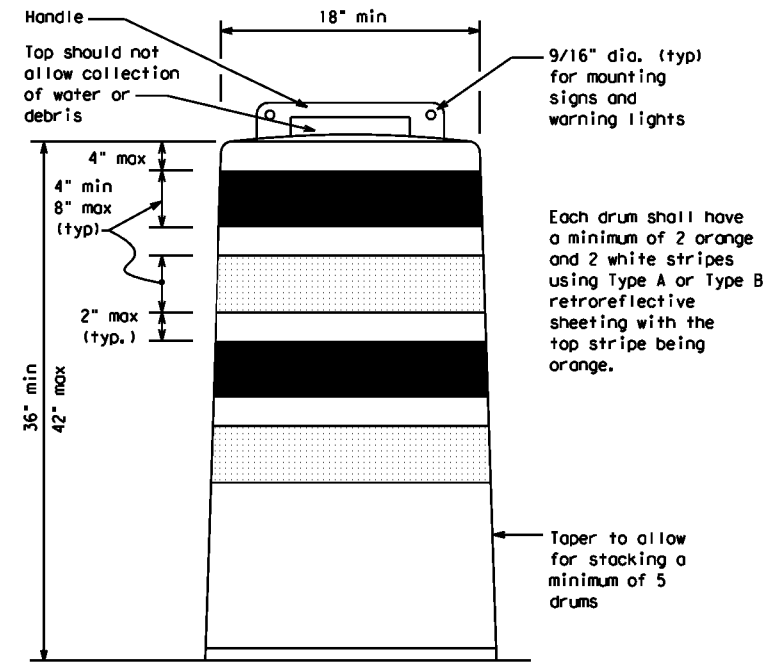
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
 - The body and base shall lock together in such a manner that the body separates from the base when impacted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

RETROREFLECTIVE SHEETING

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

BALLAST

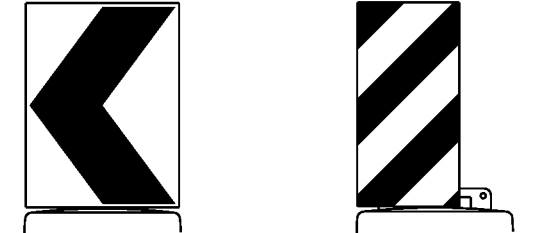
- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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



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

DETECTABLE PEDESTRIAN BARRICADES

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



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12



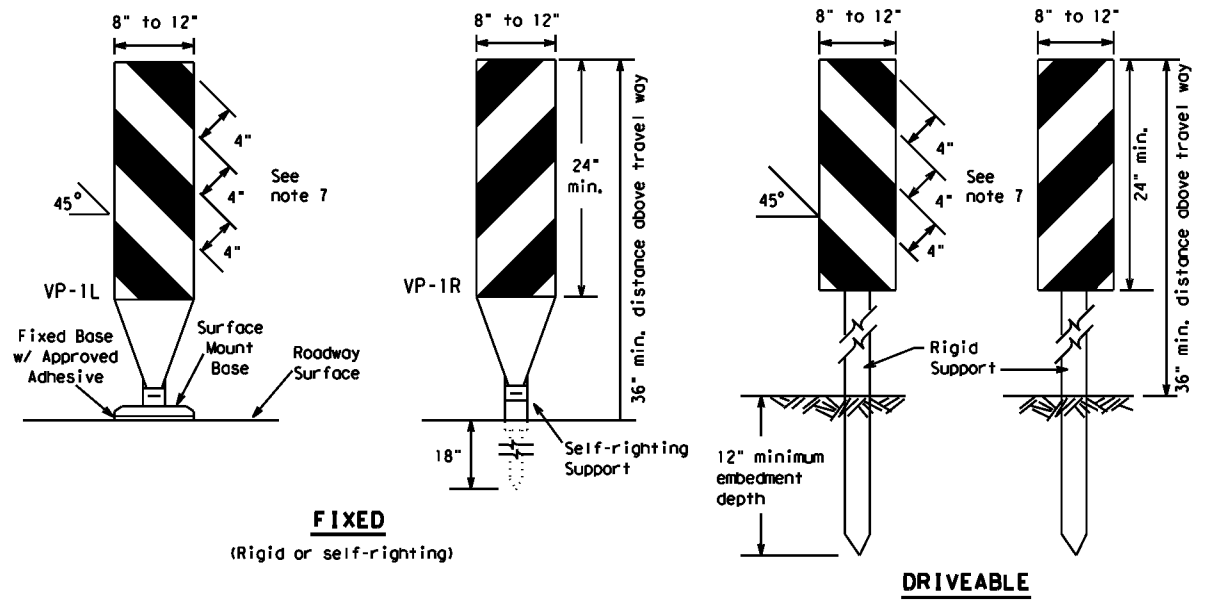
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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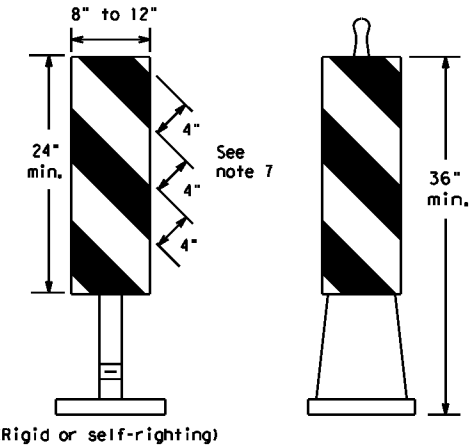
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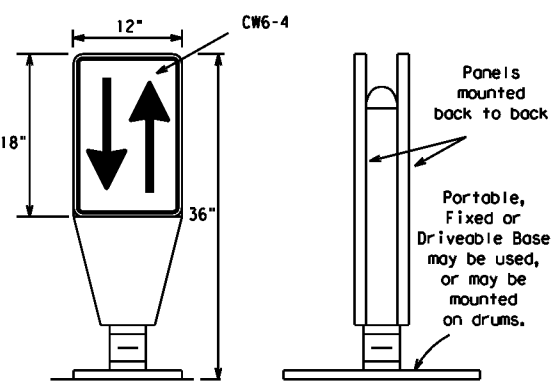
DRIVEABLE



PORTABLE

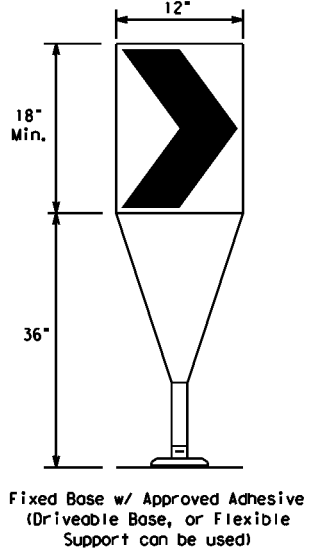
VERTICAL PANELS (VPs)

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



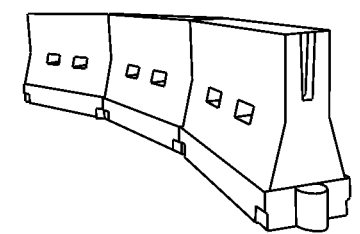
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- 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.



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

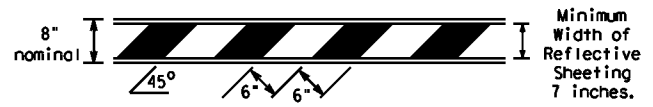
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© TxDOT November 2002	CONT: 0091	SECT: 04	JOB: 069	HIGHWAY: SH 289
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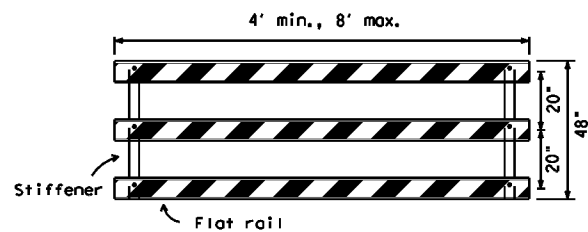
TYPE 3 BARRICADES

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.

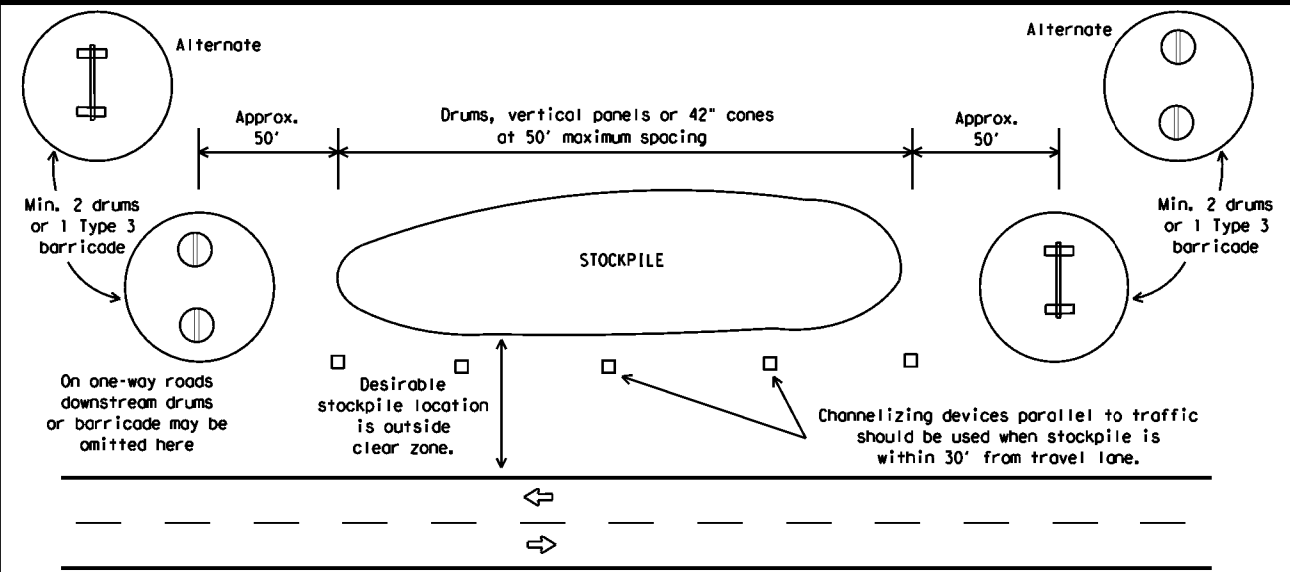


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



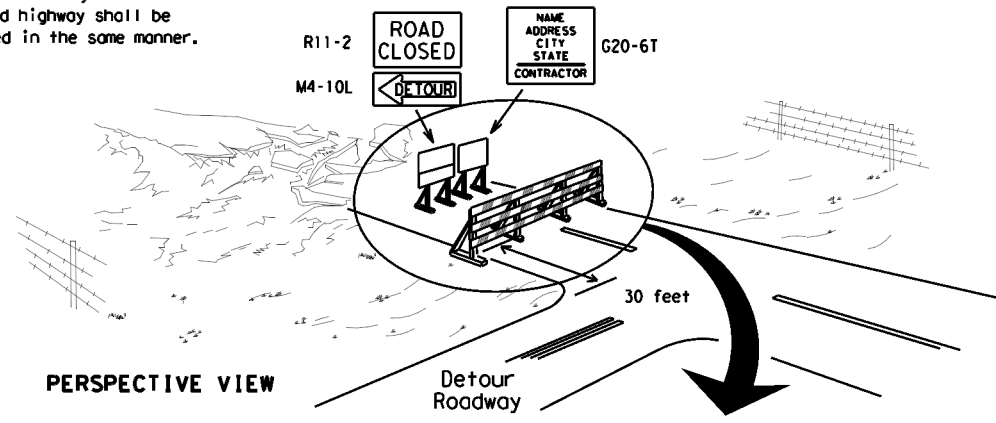
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



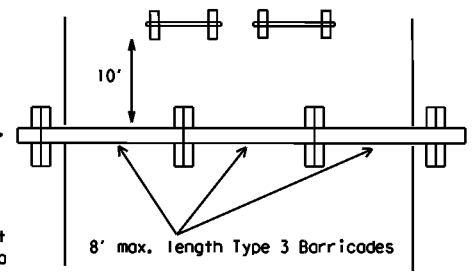
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



PERSPECTIVE VIEW

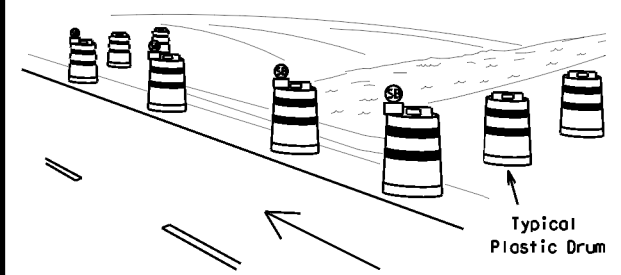
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



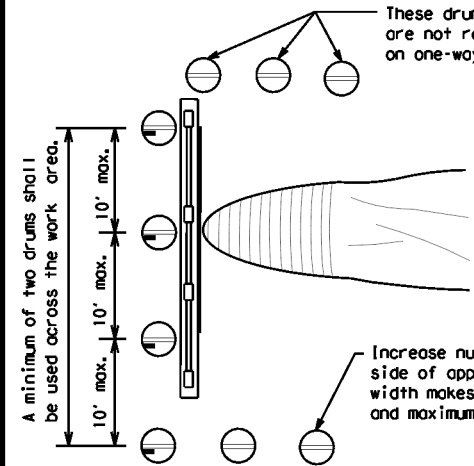
PLAN VIEW

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

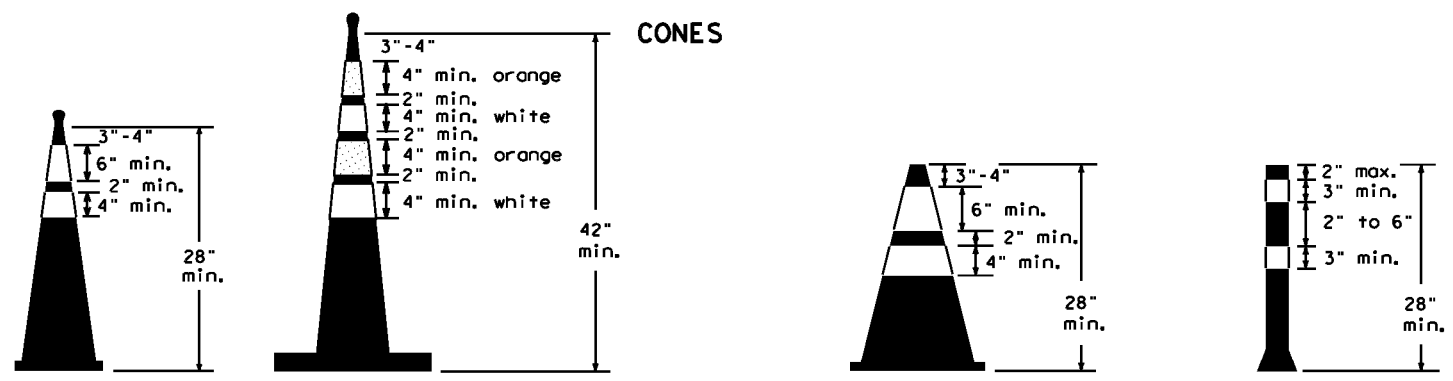


PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

1. Where positive redirection 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.

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



Two-Piece cones

One-Piece cones

Tubular Marker

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

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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

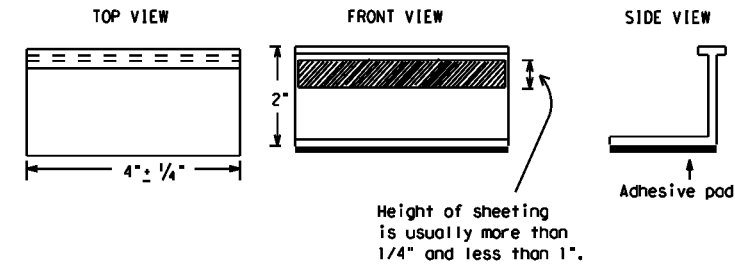
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

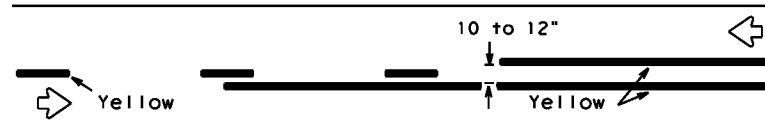
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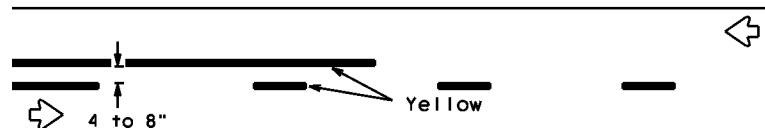
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PAVEMENT MARKING PATTERNS

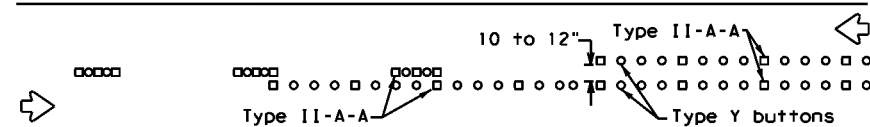


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

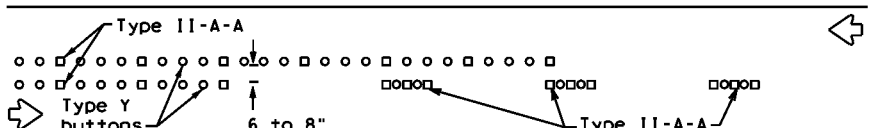


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

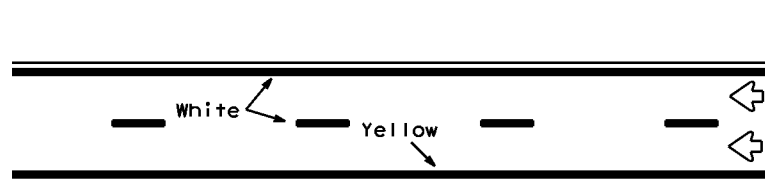


RAISED PAVEMENT MARKERS - PATTERN A



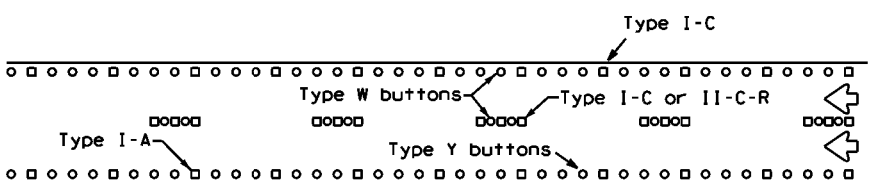
RAISED PAVEMENT MARKERS - PATTERN B

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



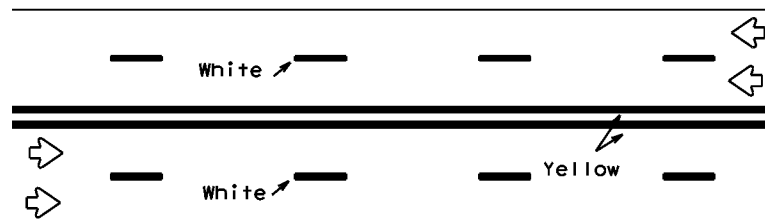
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



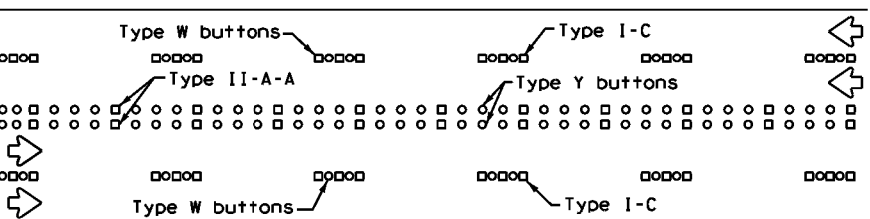
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



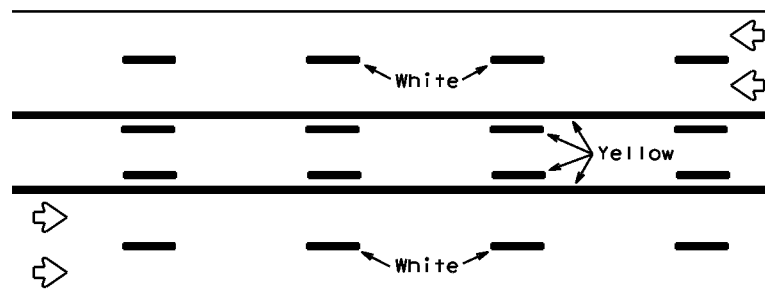
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



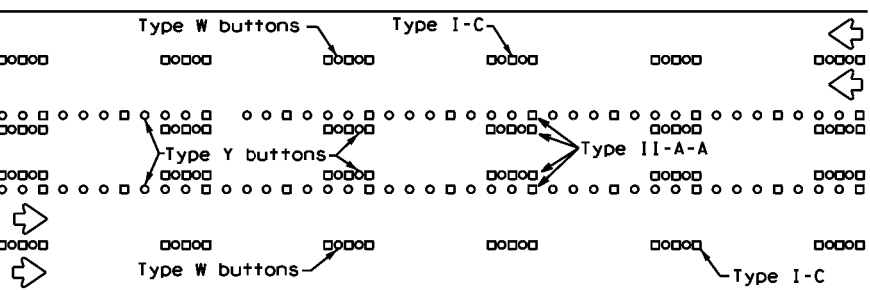
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

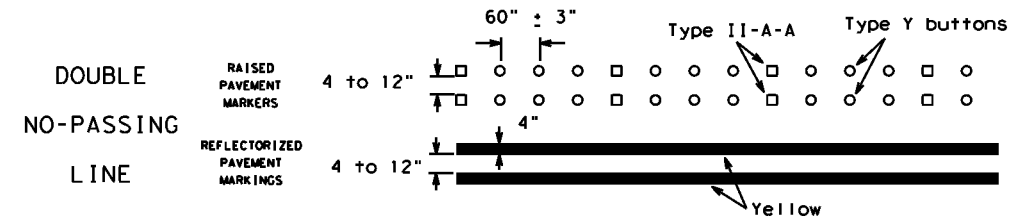
Prefabricated markings may be substituted for reflectORIZED pavement markings.



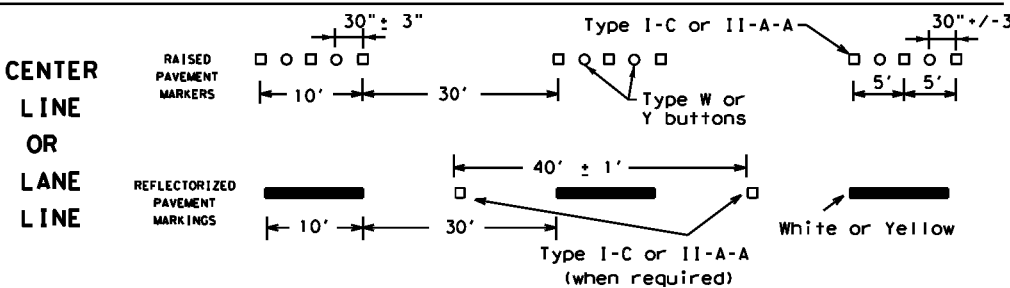
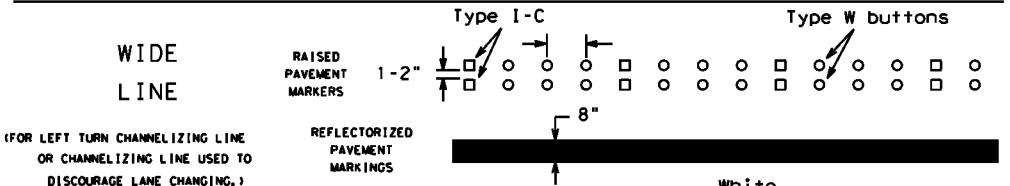
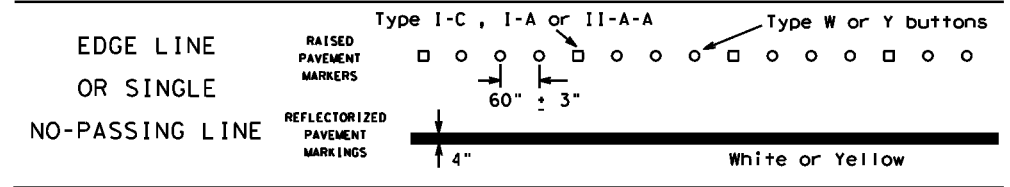
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

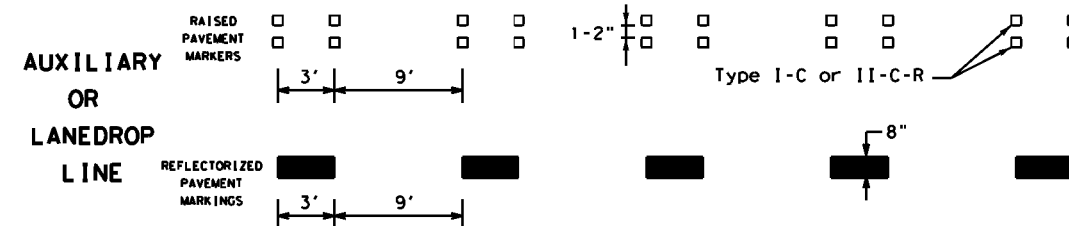
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

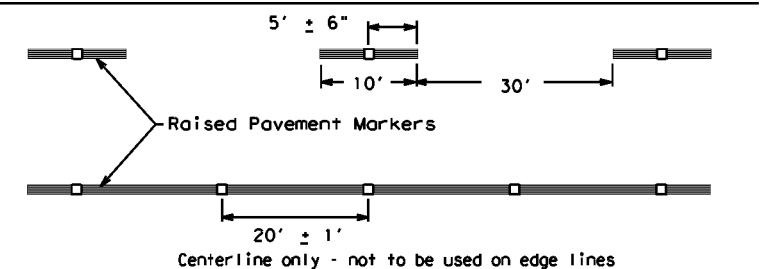


BROKEN LINES



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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

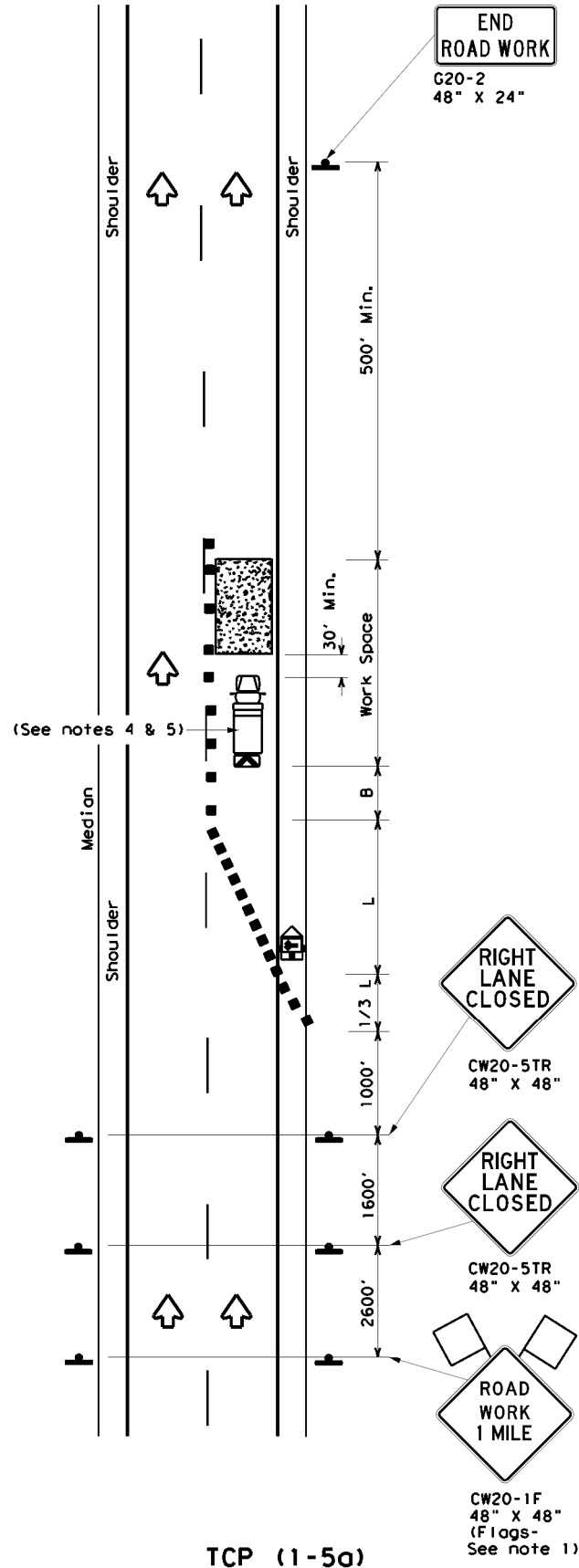
FILE: bc-21.dgn	DWG: TxDOT	CHK: TxDOT	DRW: TxDOT	CR: TxDOT
© TxDOT February 1998				
REVISIONS	CONT	SECT	JOB	HIGHWAY
1-97 9-07 5-21	0091	04	069	SH 289
2-98 7-13	DIST	COUNTY	SHEET NO.	
11-02 8-14	DAL	COLLIN	23	

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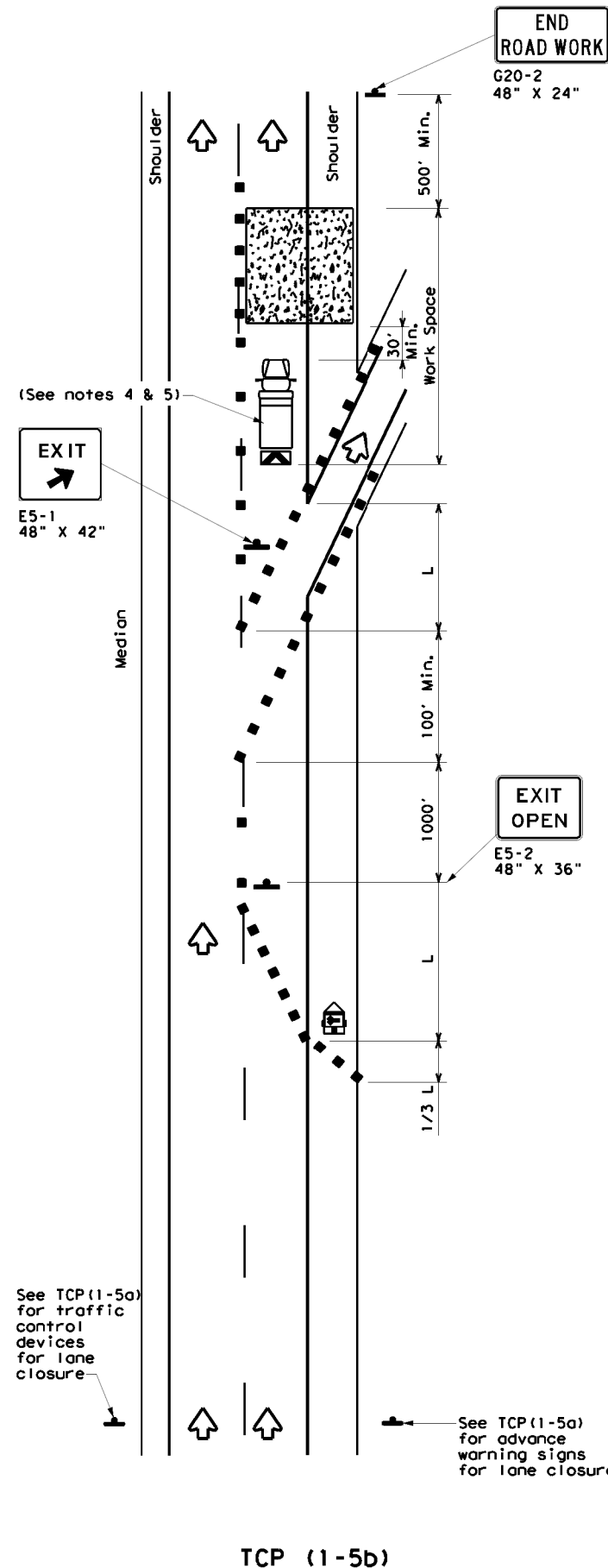
DATE: 8/2/2023 6:10:03 PM
FILE: c:\txdot\pw_online\txdot5\pwnonline_jonathan_rich\0955407\bc-21.dgn

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

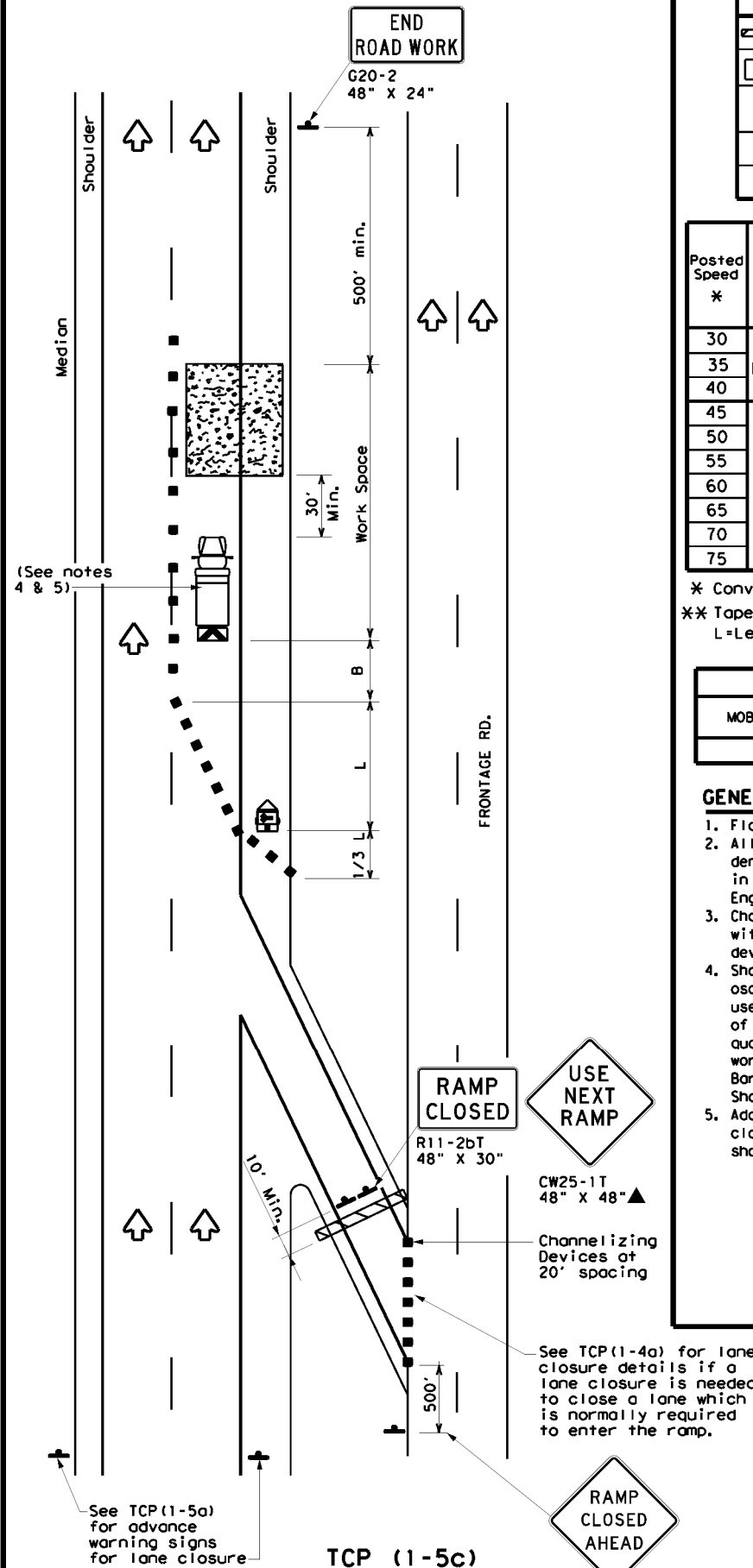
DATE:
FILE:



ONE LANE CLOSURE



LANE CLOSURE NEAR EXIT RAMP



LANE CLOSURE NEAR ENTRANCE RAMP

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

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

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

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

GENERAL NOTES

- Flags attached to signs where shown, are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

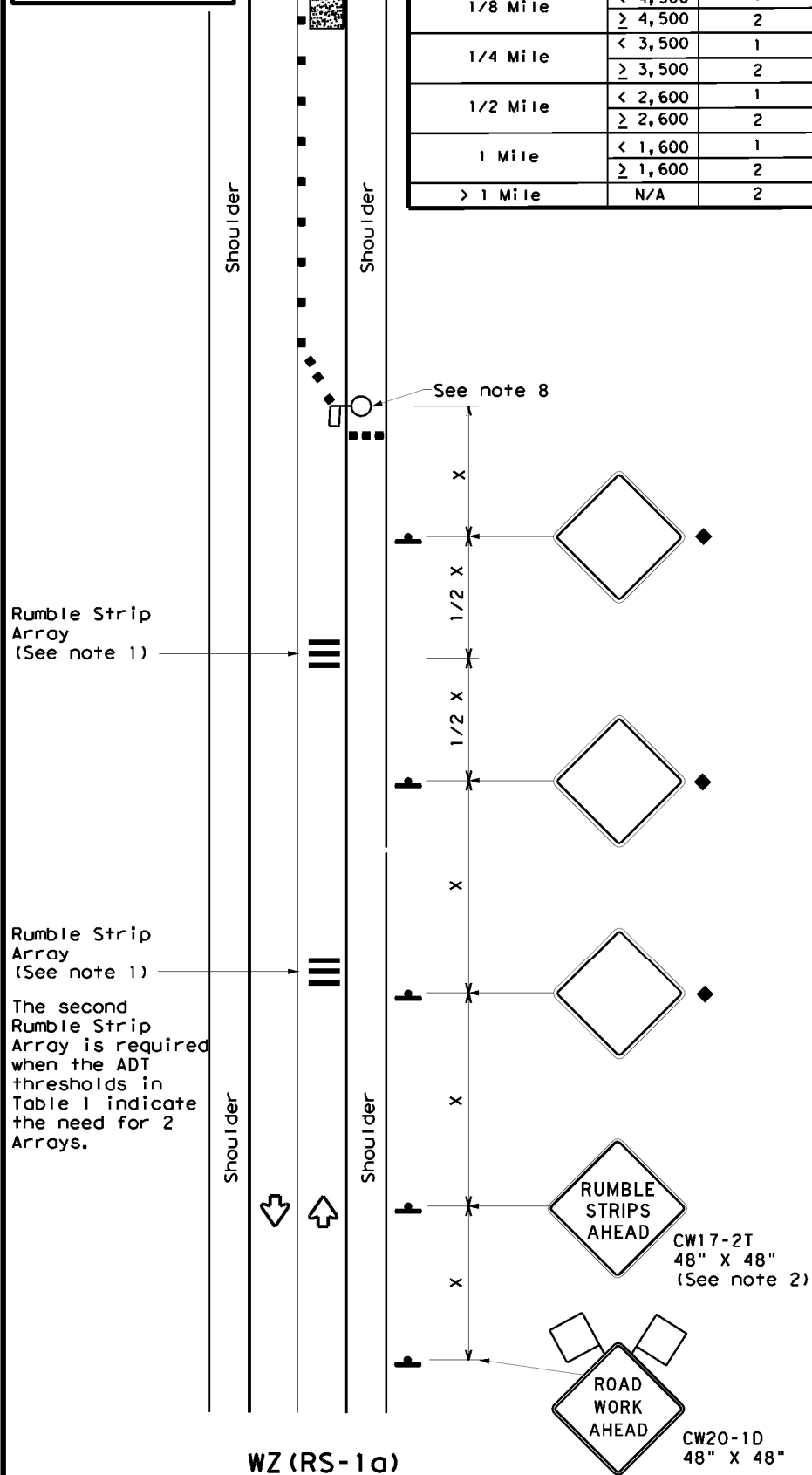
TCP (1-5) - 18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT: 0091	SECT: 04	JOB: 069	HIGHWAY: SH 289
2-18	DIST: DALLAS	COUNTY: COLLIN	SHEET NO. 24	

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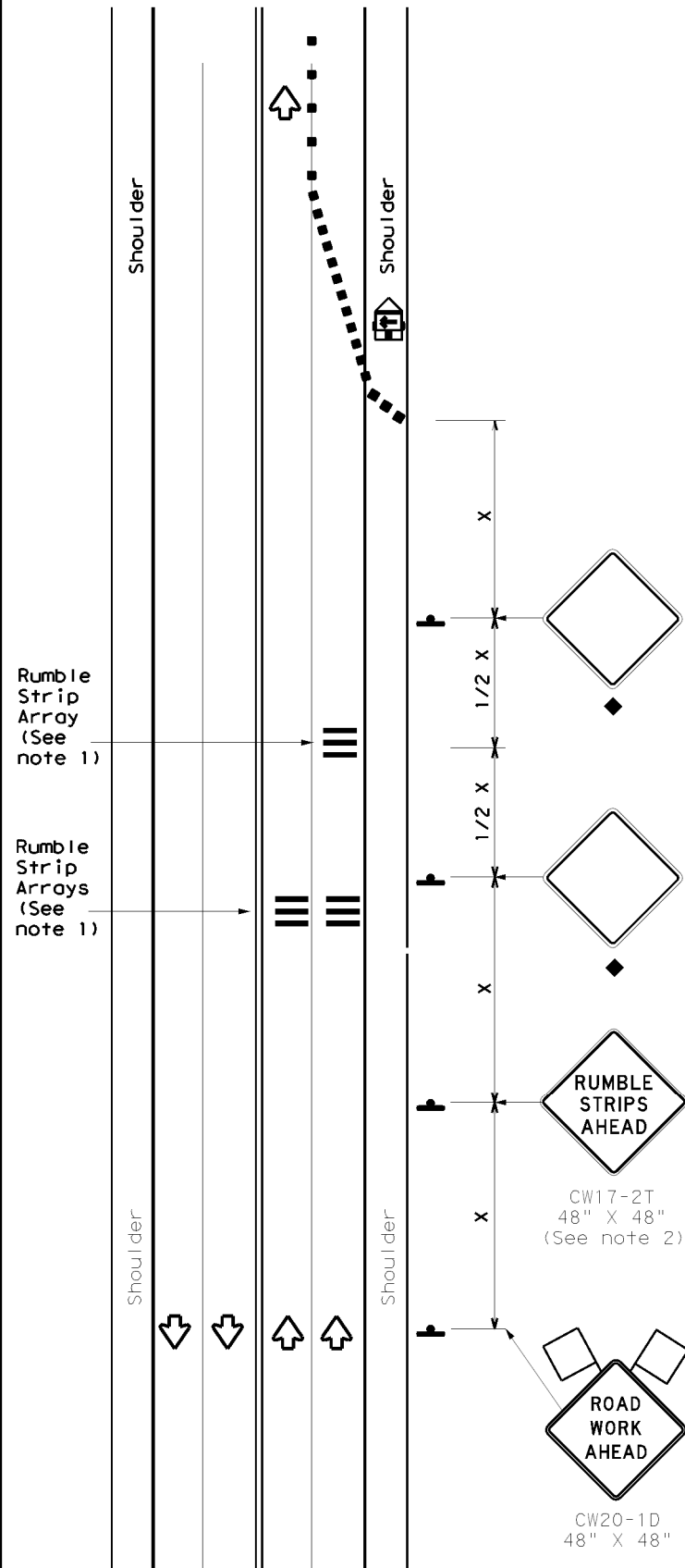
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ (RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ (RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = 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)

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.
 * For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

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

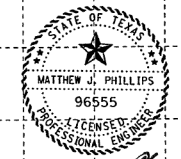
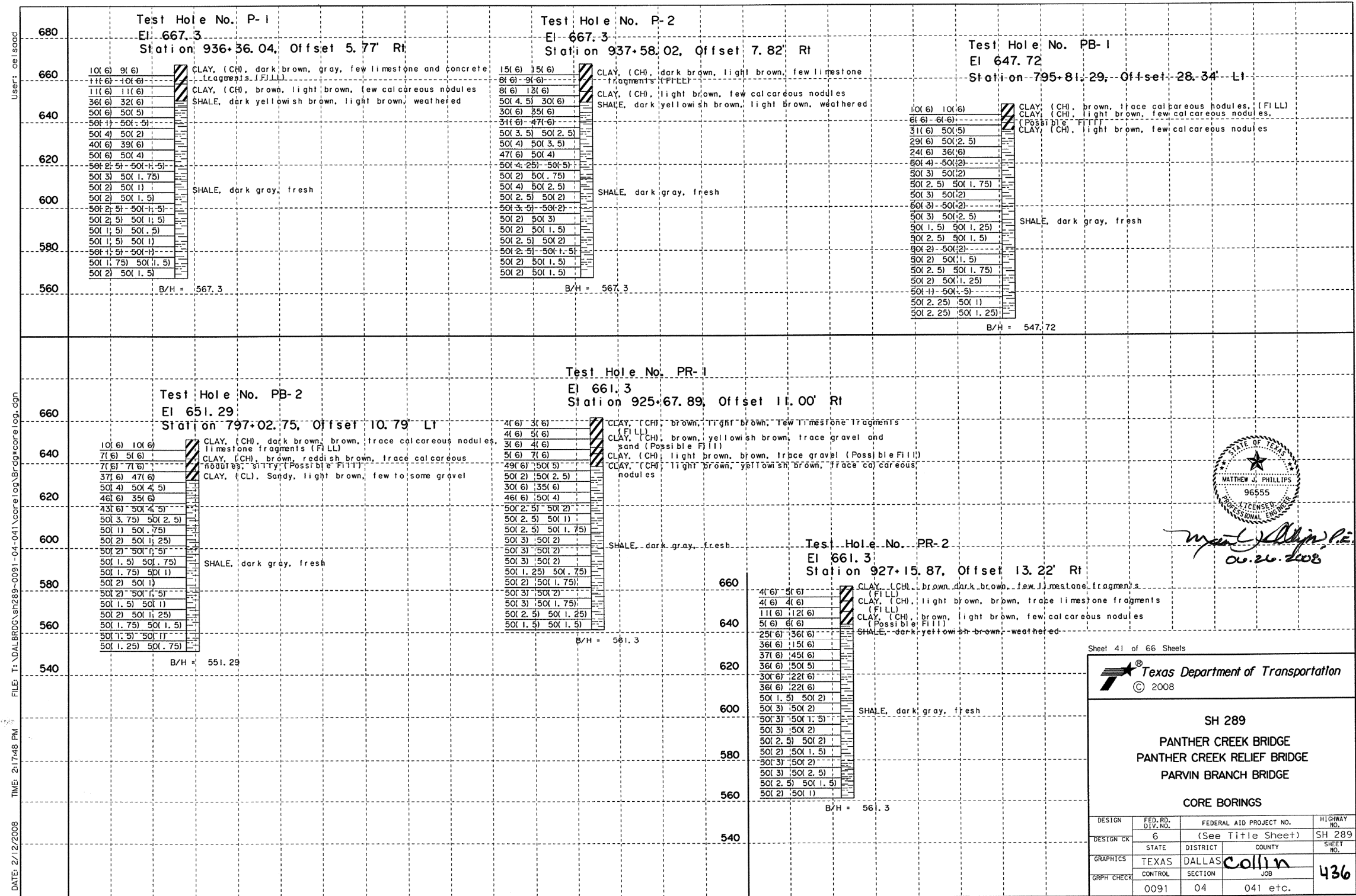
Texas Department of Transportation
 Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ (RS) - 22

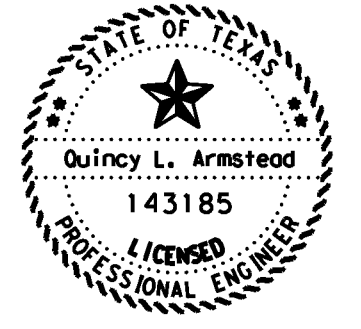
FILE: wzrs22.dgn DWN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
 © TxDOT November 2012 CONT: 0091 SECT: 04 JOB: 069 HIGHWAY: SH 289
 REVISIONS: 2-14 1-22 DIST: COUNTY: SHEET NO.: 25
 4-16 DALLAS COLLIN 25

DATE: FILE:



Matthew J. Phillips, P.E.
06.26.2008

NOTE:
AS-BUILT "FOR CONTRACTOR'S INFO ONLY"



Quincy L. Armstead, P.E.
08.03.23

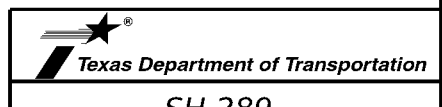
Sheet 41 of 66 Sheets

Texas Department of Transportation
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SH 289
PANTHER CREEK BRIDGE
PANTHER CREEK RELIEF BRIDGE
PARVIN BRANCH BRIDGE

CORE BORINGS

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
DESIGN CR	6	(See Title Sheet)	SH 289
GRAPHICS	STATE	DISTRICT	COUNTY
GRAPH CHECK	TEXAS	DALLAS	Collin
	CONTROL	SECTION	JOB
	0091	04	041 etc.



SH 289
BRIDGE CORE BORINGS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	26	

DATE: 2023/07/24 FILE: DOCUMENT NAME

HORIZONTAL ALIGNMENT REPORT

Alignment name: Trail CL
 Alignment description:
 Report Created: Monday, April 3, 2023
 Time: 9:35:17 AM

	STATION	X	Y
POT	10+00.000 R1	2487929.122	7117051.849
PI	10+40.073 R1	2487964.144	7117071.325
Tangential Direction: N60°55'14.760"E			
Tangential Length: 40.073			
PI	10+40.073 R1	2487964.144	7117071.325
PC	12+09.087 R1	2488109.758	7117157.130
Tangential Direction: N59°29'26.954"E			
Tangential Length: 169.015			
PC	12+09.087 R1	2488109.758	7117157.130
PI	12+38.472 R1	2488135.060	7117172.073
CC		2488181.158	7117036.234
PT	12+67.020 R1	2488164.230	7117175.616
Radius:	140.406		
Delta:	23°38'27.209" Right		
Degree of Curvature(Arc):	40°48'26.082"		
Length:	57.933		
Tangent:	29.385		
Chord:	57.523		
Middle Ordinate:	2.977		
External:	3.042		
Tangent Back Direction:	N59°26'03.416"E		
Radial Direction:	S30°33'56.584"E		
Chord Direction:	N71°15'17.021"E		
Radial Direction:	S06°55'29.374"E		
Tangent Ahead Direction:	N83°04'30.626"E		

HORIZONTAL ALIGNMENT REPORT

Alignment name: SH 289
 Alignment description:
 Report Created: Thursday, April 6, 2023
 Time: 1:03:07 PM

	STATION	X	Y
POT	921+96.504 R1	2488041.433	7117531.274
PC	928+50.398 R1	2488051.235	7116877.454
Tangential Direction: S00°51'32.384"E			
Tangential Length: 653.893			
PC	928+50.398 R1	2488051.235	7116877.454
PI	928+84.592 R1	2488051.748	7116843.263
CC		2482322.301	7116791.558
PT	929+18.786 R1	2488051.853	7116809.068
Radius:	5729.578		
Delta:	00°41'01.997" Right		
Degree of Curvature(Arc):	01°00'00.000"		
Length:	68.389		
Tangent:	34.195		
Chord:	68.388		
Middle Ordinate:	0.102		
External:	0.102		
Tangent Back Direction:	S00°51'32.384"E		
Radial Direction:	S89°08'27.616"W		
Chord Direction:	S00°31'01.386"E		
Radial Direction:	S89°49'29.613"W		
Tangent Ahead Direction:	S00°10'30.387"E		
PTBL CL-1	929+18.786 R1	2488051.853	7116809.068
PC	932+52.866 R1	2488051.853	7116474.988
Tangential Direction: S00°00'00.000"W			
Tangential Length: 334.080			
PC	932+52.866 R1	2488051.853	7116474.988
PI	932+92.518 R1	2488051.853	7116435.337
CC		2493781.431	7116474.988
PT	933+32.168 R1	2488052.401	7116395.689
Radius:	5729.578		
Delta:	00°47'34.862" Left		
Degree of Curvature(Arc):	01°00'00.000"		
Length:	79.302		
Tangent:	39.651		
Chord:	79.301		
Middle Ordinate:	0.137		
External:	0.137		
Tangent Back Direction:	S00°00'00.000"W		
Radial Direction:	S90°00'00.000"W		
Chord Direction:	S00°23'47.431"E		
Radial Direction:	S89°12'25.138"W		
Tangent Ahead Direction:	S00°47'34.862"E		
PTBL CL-3	933+32.168 R1	2488052.401	7116395.689
POT	941+00.000 R1	2488066.011	7115627.978
Tangential Direction: S01°00'56.293"E			
Tangential Length: 767.832			

HORIZONTAL ALIGNMENT REPORT

Alignment name: RW1
 Alignment description:
 Report Created: Wednesday, April 5, 2023
 Time: 11:11:58 AM

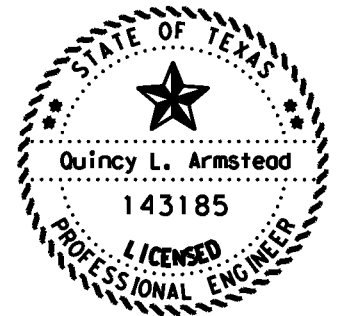
	STATION	X	Y
POT	1+60.096 R1	2487925.714	7117057.963
PI	2+01.7598 R1	2487962.106	7117078.249
Tangential Direction: N60°51'48.187"E			
Tangential Length: 41.664			
PI	2+01.760 R1	2487962.106	7117078.249
PC	3+69.015 R1	2488106.204	7117163.161
Tangential Direction: N59°29'26.954"E			
Tangential Length: 167.255			
PC	3+69.015 R1	2488106.204	7117163.161
PI	3+89.457 R1	2488123.816	7117173.539
CC		2488173.218	7117049.437
PT	4+09.577 R1	2488143.742	7117178.103
Radius:	132.000		
Delta:	17°36'21.847" Right		
Degree of Curvature(Arc):	43°24'21.217"		
Length:	40.561		
Tangent:	20.442		
Chord:	40.402		
Middle Ordinate:	1.555		
External:	1.573		
Tangent Back Direction:	N59°29'26.954"E		
Radial Direction:	S30°30'33.046"E		
Chord Direction:	N68°17'37.878"E		
Radial Direction:	S12°54'11.199"E		
Tangent Ahead Direction:	N77°05'48.801"E		

PT	4+09.577 R1	2488143.742	7117178.103
POT	4+28.9797 R1	2488162.655	7117182.436
Tangential Direction: N77°05'48.8"E			
Tangential Length: 19.403			

HORIZONTAL ALIGNMENT REPORT

Alignment name: RW2
 Alignment description:
 Report Created: Thursday, April 6, 2023
 Time: 12:56:29 PM

	STATION	X	Y
POT	10+00.000 R1	2487929.122	7117051.849
PI	10+40.073 R1	2487964.144	7117071.325
Tangential Direction: N60°55'14.760"E			
Tangential Length: 40.073			
PI	10+40.073 R1	2487964.144	7117071.325
PC	12+09.087 R1	2488109.758	7117157.130
Tangential Direction: N59°29'26.954"E			
Tangential Length: 169.015			
PC	12+09.087 R1	2488109.758	7117157.130
PI	12+38.472 R1	2488135.060	7117172.073
CC		2488181.158	7117036.234
PT	12+67.020 R1	2488164.230	7117175.616
Radius:	140.406		
Delta:	23°38'27.209" Right		
Degree of Curvature(Arc):	40°48'26.082"		
Length:	57.933		
Tangent:	29.385		
Chord:	57.523		
Middle Ordinate:	2.977		
External:	3.042		
Tangent Back Direction:	N59°26'03.416"E		
Radial Direction:	S30°33'56.584"E		
Chord Direction:	N71°15'17.021"E		
Radial Direction:	S06°55'29.374"E		
Tangent Ahead Direction:	N83°04'30.626"E		



Quincy L. Armstead, P.E.

08.03.23



SH 289

PANTHER CREEK RELIEF TRAIL ALIGNMENT DATA

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	27	

CK: DW: CK: DW:

HORIZONTAL ALIGNMENT REPORT

Alignment name: RW2 TSS
 Alignment description:
 Report Created: Monday, July 24, 2023
 Time: 2:10:37 PM

STATION	X	Y
POT 0+00.000	2487948.686	7117042.994
PI 0+10.959	2487943.384	7117052.585
Tangential Direction: N28°56'13.333"W		
Tangential Length: 10.959		
PI 0+10.959	2487943.384	7117052.585
PI 0+38.289	2487967.269	7117065.868
Tangential Direction: N60°55'09.525"E		
Tangential Length: 27.330		
PICn_TempShor3 0+38.289	2487967.269	7117065.868
PCCn_TempShor3 2+07.388	2488112.954	7117151.719
Tangential Direction: N59°29'21.716"E		
Tangential Length: 169.099		
PCCn_TempShor3 2+07.388	2488112.954	7117151.719
PI 2+26.537	2488129.457	7117161.431
CC 2488182.394	7117033.712	
PTCn_TempShor3 2+45.439	2488147.991	7117166.242
Radius: 136.923		
Delta: 15°55'20.844" Right		
Degree of Curvature(Arc): 41°50'43.457"		
Length: 38.051		
Tangent: 19.149		
Chord: 37.928		
Middle Ordinate: 1.320		
External: 1.332		
Tangent Back Direction: N59°31'33.253"E		
Radial Direction: S30°28'26.747"E		
Chord Direction: N67°29'13.675"E		
Radial Direction: S14°33'05.903"E		
Tangent Ahead Direction: N75°26'54.097"E		

HORIZONTAL ALIGNMENT REPORT

Alignment name: RW3
 Alignment description:
 Report Created: Monday, July 24, 2023
 Time: 1:19:19 PM

STATION	X	Y
POT 9+65.924 R1	2488167.896	7117026.625
PI 10+10.881 R1	2488128.262	7117047.844
Tangential Direction: N61°50'12.267"W		
Tangential Length: 44.957		
PI 10+10.881 R1	2488128.262	7117047.844
PI 10+35.607 R1	2488105.256	7117056.906
Tangential Direction: N68°29'57.763"W		
Tangential Length: 24.726		
PI 10+35.607 R1	2488105.256	7117056.906
PI 11+65.363 R1	2487993.168	7116991.537
Tangential Direction: S59°44'57.880"W		
Tangential Length: 129.757		
PIWALL CL-2 11+65.363 R1	2487993.168	7116991.537
POT 12+52.350 R1	2487917.732	7116948.224
Tangential Direction: S60°08'13.475"W		
Tangential Length: 86.986		

HORIZONTAL ALIGNMENT REPORT

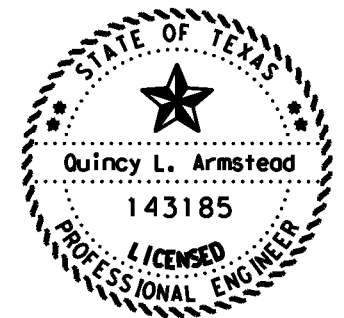
Alignment name: GEOM_GABION_WALL
 Alignment description:
 Report Created: Monday, July 24, 2023
 Time: 7:59:30 AM

STATION	X	Y
POT 10+00.000 R1	2488315.843	7117208.728
PI 10+52.744 R1	2488281.302	7117168.867
Tangential Direction: S40°54'36.536"W		
Tangential Length: 52.744		
PI 10+52.744 R1	2488281.302	7117168.867
PI 10+82.742 R1	2488271.157	7117140.636
Tangential Direction: S19°45'55.395"W		
Tangential Length: 29.999		
PI 10+82.742 R1	2488271.157	7117140.636
PI 11+16.969 R1	2488258.978	7117108.649
Tangential Direction: S20°50'41.074"W		
Tangential Length: 34.227		
PI 11+16.969 R1	2488258.978	7117108.649
PI 11+28.969 R1	2488254.893	7117097.366
Tangential Direction: S19°54'10.637"W		
Tangential Length: 12.000		
PI 11+28.969 R1	2488254.893	7117097.366
PI 11+42.733 R1	2488248.586	7117085.132
Tangential Direction: S27°16'20.948"W		
Tangential Length: 13.764		
PI 11+42.733 R1	2488248.586	7117085.132
PI 11+78.198 R1	2488222.801	7117060.783
Tangential Direction: S46°38'26.477"W		
Tangential Length: 35.465		
PI 11+78.198 R1	2488222.801	7117060.783
PI 12+11.139 R1	2488190.541	7117054.118
Tangential Direction: S78°19'37.462"W		
Tangential Length: 32.941		
PI 12+11.139 R1	2488190.541	7117054.118
PI 12+35.139 R1	2488166.892	7117050.029
Tangential Direction: S80°11'27.062"W		
Tangential Length: 24.000		
PI 12+35.139 R1	2488166.892	7117050.029
PI 12+61.032 R1	2488141.008	7117050.708
Tangential Direction: N88°29'50.186"W		
Tangential Length: 25.893		
PI 12+61.032 R1	2488141.008	7117050.708
PI 12+71.915 R1	2488131.414	7117055.845
Tangential Direction: N61°50'12.267"W		
Tangential Length: 10.883		
PI 12+71.915 R1	2488131.414	7117055.845
POT 12+82.934 R1	2488121.161	7117059.884
Tangential Direction: N68°29'57.763"W		
Tangential Length: 11.019		

HORIZONTAL ALIGNMENT REPORT

Alignment name: GABION WALL TSS
 Alignment description:
 Report Created: Monday, July 24, 2023
 Time: 8:00:31 AM

STATION	X	Y
POT 10+00.000 R1	2488285.039	7117196.522
PI 10+24.290 R1	2488303.691	7117180.962
Tangential Direction: S50°09'47.262"E		
Tangential Length: 24.290		
PI 10+24.290 R1	2488303.691	7117180.962
PI 10+46.413 R1	2488289.204	7117164.243
Tangential Direction: S40°54'36.536"W		
Tangential Length: 22.123		
PI 10+46.413 R1	2488289.204	7117164.243
PI 10+74.900 R1	2488279.551	7117137.441
Tangential Direction: S19°48'19.287"W		
Tangential Length: 28.487		
PI 10+74.900 R1	2488279.551	7117137.441
PI 11+09.054 R1	2488267.400	7117105.522
Tangential Direction: S20°50'31.478"W		
Tangential Length: 34.154		
PI 11+09.054 R1	2488267.400	7117105.522
PI 11+20.981 R1	2488263.355	7117094.302
Tangential Direction: S19°49'24.363"W		
Tangential Length: 11.927		
PI 11+20.981 R1	2488263.355	7117094.302
PI 11+22.155 R1	2488262.884	7117093.226
Tangential Direction: S23°38'23.689"W		
Tangential Length: 1.174		
PI 11+22.155 R1	2488262.884	7117093.226
PI 11+34.923 R1	2488257.034	7117081.877
Tangential Direction: S27°16'20.918"W		
Tangential Length: 12.768		
PI 11+34.923 R1	2488257.034	7117081.877
PI 11+37.437 R1	2488255.882	7117079.643
Tangential Direction: S27°16'20.918"W		
Tangential Length: 2.514		
PI 11+37.437 R1	2488255.882	7117079.643
PI 11+38.766 R1	2488255.882	7117079.643
PI 11+38.766 R1	2488254.915	7117078.730
Tangential Direction: S46°38'26.480"W		
Tangential Length: 1.330		
PI 11+38.766 R1	2488254.915	7117078.730
PI 11+77.047 R1	2488227.060	7117052.472
Tangential Direction: S46°41'28.565"W		
Tangential Length: 38.280		
PI 11+77.047 R1	2488227.060	7117052.472
PI 12+12.634 R1	2488192.208	7117045.273
Tangential Direction: S78°19'40.517"W		
Tangential Length: 35.588		
PI 12+12.634 R1	2488192.208	7117045.273
PI 12+36.767 R1	2488168.428	7117041.162
Tangential Direction: S80°11'28.849"W		
Tangential Length: 24.132		
PI 12+36.767 R1	2488168.428	7117041.162
PI 12+38.169 R1	2488167.029	7117041.063
Tangential Direction: S85°59'18.223"W		
Tangential Length: 1.402		
PI 12+38.169 R1	2488167.029	7117041.063
PI 12+38.645 R1	2488166.554	7117041.036
Tangential Direction: S86°40'17.758"W		
Tangential Length: 0.476		
PI 12+38.645 R1	2488166.554	7117041.036
PI 12+66.197 R1	2488139.021	7117042.068
Tangential Direction: N87°51'13.558"W		
Tangential Length: 27.552		
PI 12+66.197 R1	2488139.021	7117042.068
POT 12+78.409 R1	2488128.262	7117047.844
Tangential Direction: N61°46'19.704"W		
Tangential Length: 12.212		



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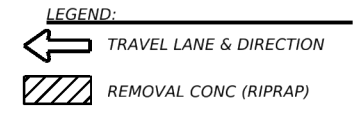
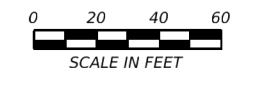
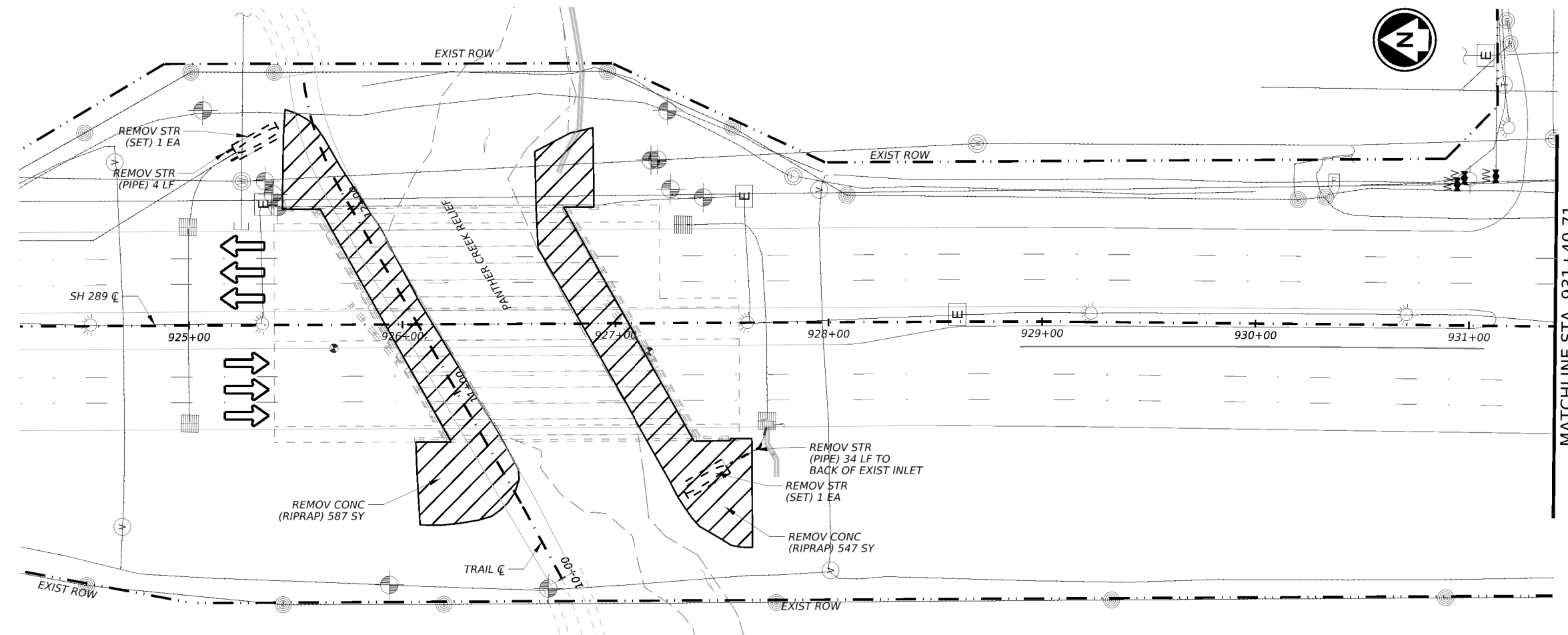
08.03.23

SH 289
PANTHER CREEK RELIEF TRAIL ALIGNMENT DATA
 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY		SHEET NO.
DAL	COLLIN		28

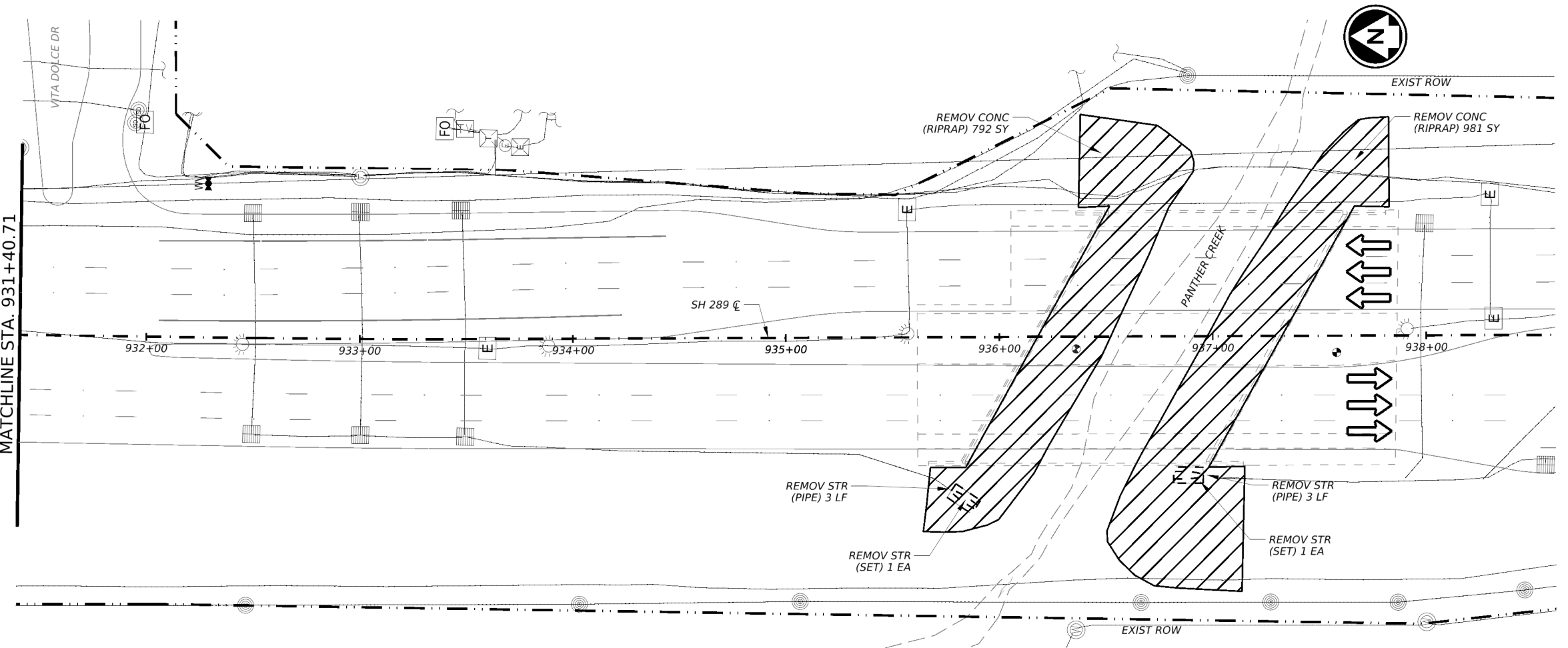
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DW-0A
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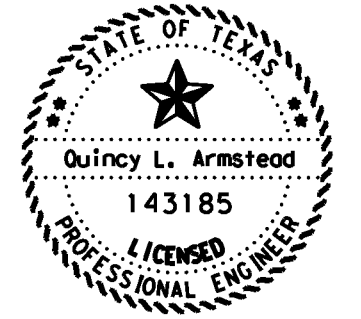


NOTE:
REMOVAL OFFSET/STATION BASED OFF SH 289 CL
SEE ALIGNMENT DATA SHEETS FOR DETAILS.

MATCHLINE STA. 931+40.71



MATCHLINE STA. 931+40.71



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08.03.23



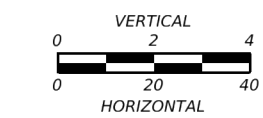
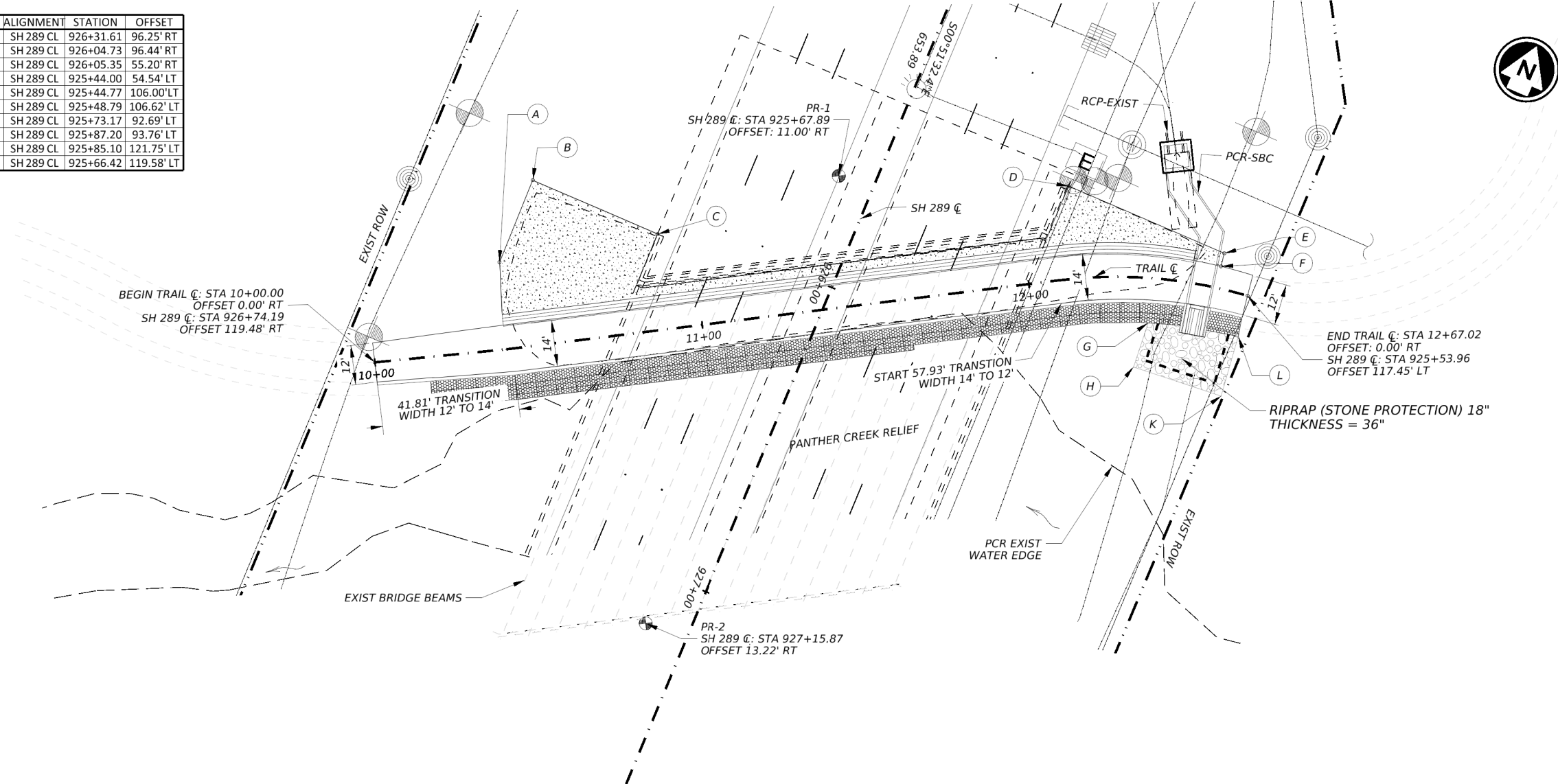
SH 289
PANTHER CREEK RELIEF/
PANTHER CREEK
REMOVAL LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	29	

DATE: 2023/07/28
FILE: \\p:\txdot\projectwiseonline.com\TxDOT\Documents\DAL\Design Projects\009104069\1 - Design\Plan Set\Roadway\Removal Plan

POINT	ALIGNMENT	STATION	OFFSET
A	SH 289 CL	926+31.61	96.25' RT
B	SH 289 CL	926+04.73	96.44' RT
C	SH 289 CL	926+05.35	55.20' RT
D	SH 289 CL	925+44.00	54.54' LT
E	SH 289 CL	925+44.77	106.00' LT
F	SH 289 CL	925+48.79	106.62' LT
G	SH 289 CL	925+73.17	92.69' LT
H	SH 289 CL	925+87.20	93.76' LT
K	SH 289 CL	925+85.10	121.75' LT
L	SH 289 CL	925+66.42	119.58' LT

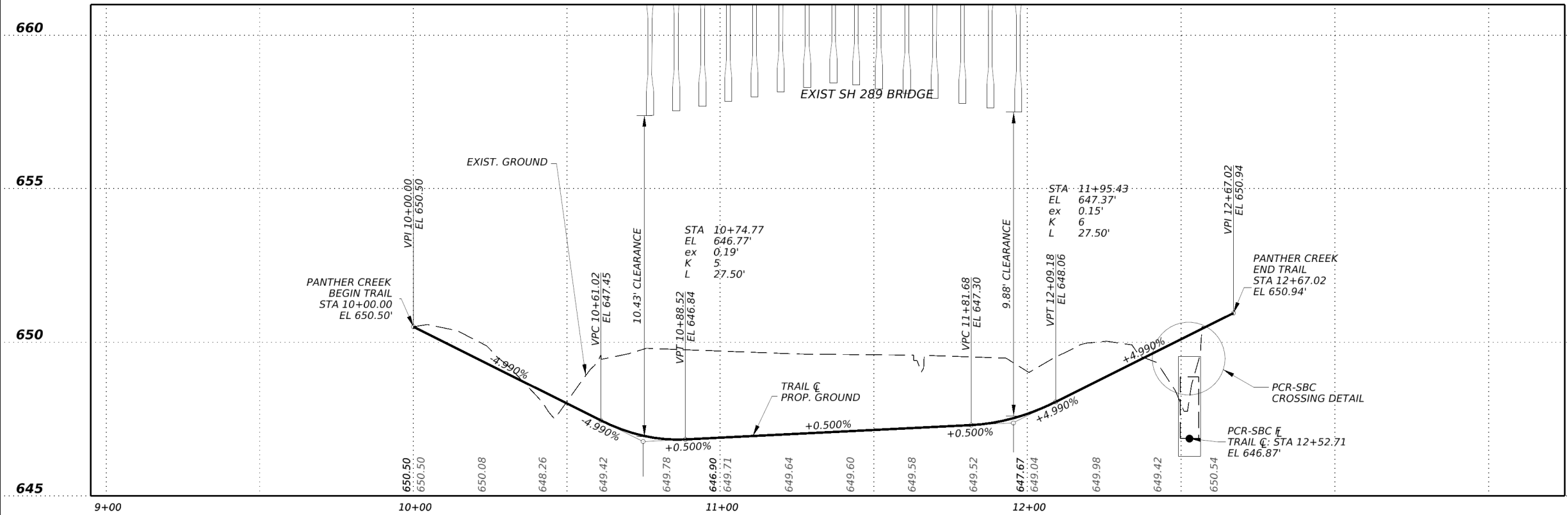
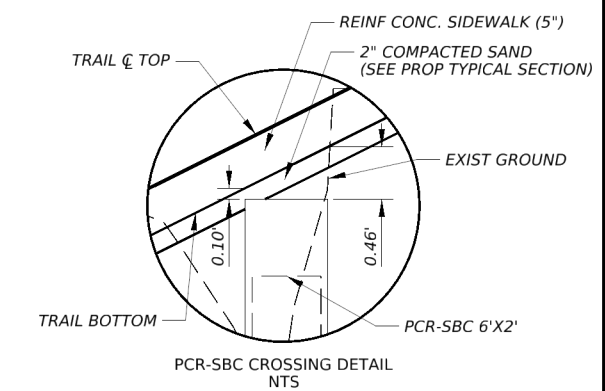


- LEGEND:**
- GABIIONS (GALV) (3'X3')
 - RIPRAP (CONC) (5")
 - RIPRAP (STONE PROTECTION) 18"

NOTES:

SEE CORE BORING SHEET FOR PR-1 AND PR-2 INFORMATION

SEE RW3 AND SOUTH GABIION WALL LAYOUTS FOR OTHER SIDE OF PANTHER CREEK RELIEF



Quincy L. Armstead, P.E. 8.03.23

Texas Department of Transportation

SH 289

**PANTHER CREEK RELIEF
PLAN AND PROFILE**

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	30	

DATE: 2023/07/25
FILE: DOCUMENT NAME

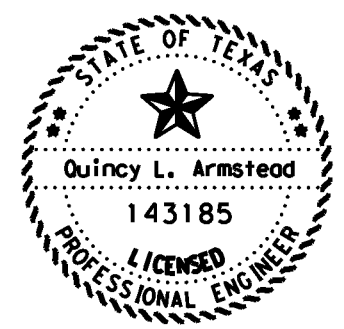
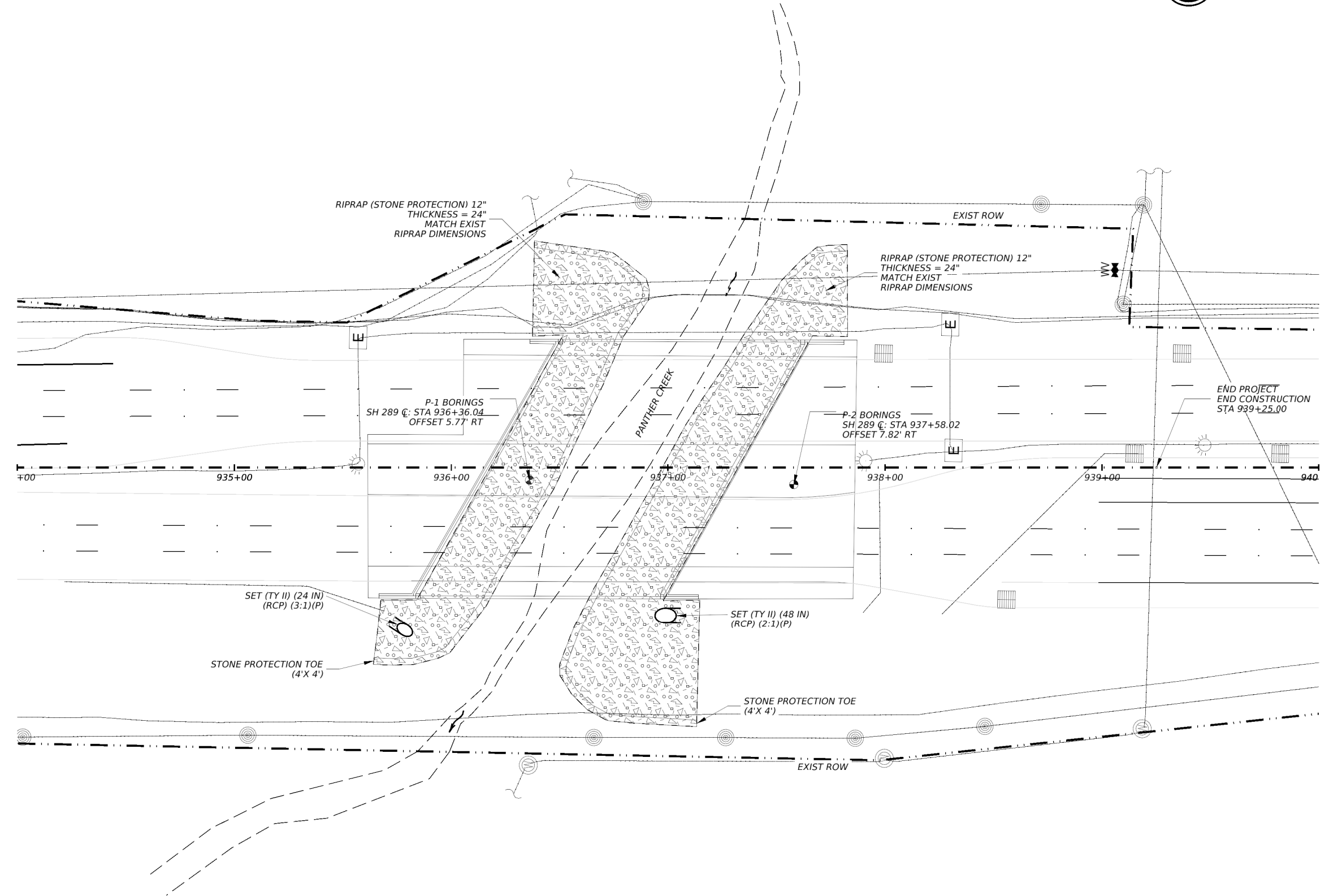
DATE: 2023/07/19
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CK:
 DW:
 CK:
 DW:



LEGEND:
 STONE PROTECTION (12")

SEE CORE BORING SHEET FOR P-1 AND P-2 INFORMATION
 * SET'S TO BE PLACED IN THE SAME LOCATION AS THE ONES REMOVED AFTER EXCAVATION



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 08.03.23

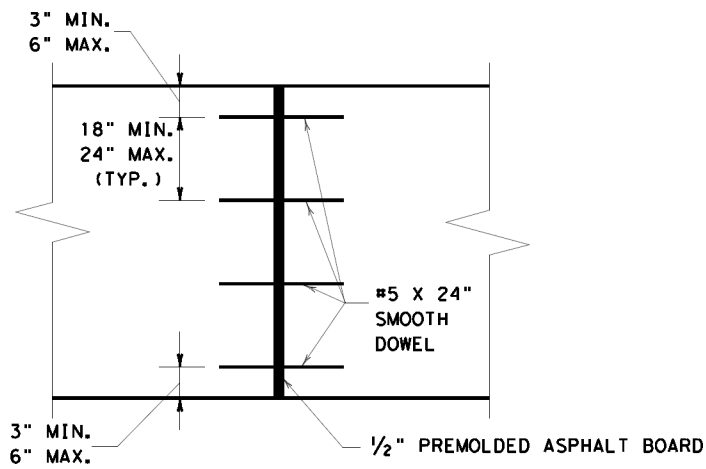
Texas Department of Transportation

SH 289

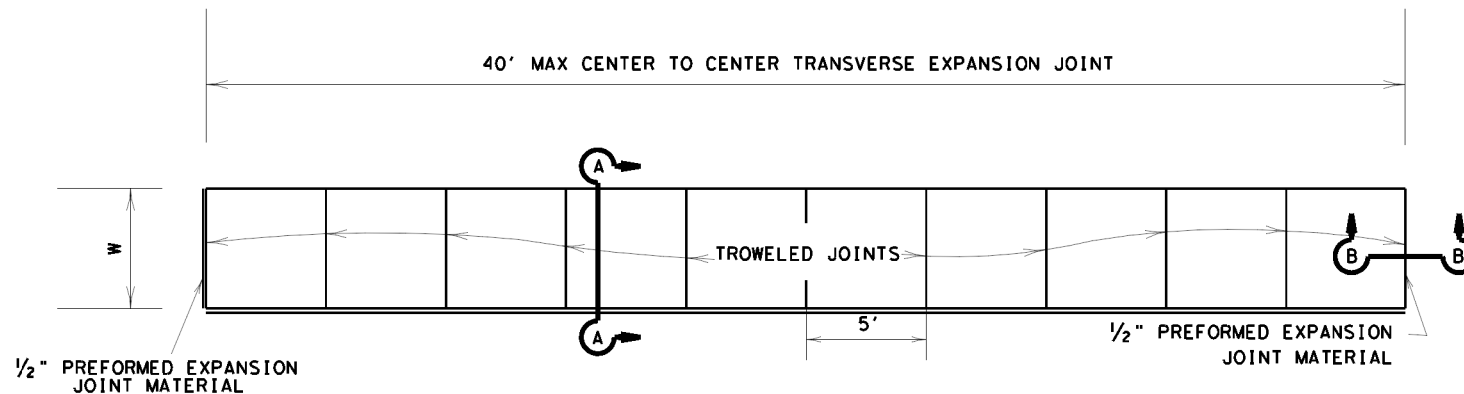
PANTHER CREEK
 PLAN LAYOUT

SHEET 1 OF 1

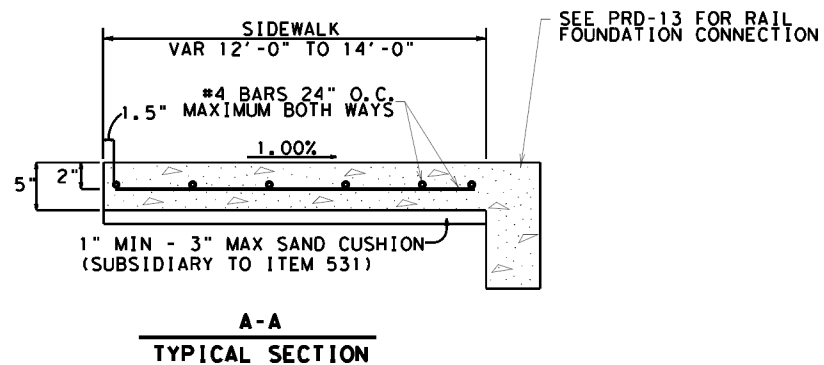
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	31	



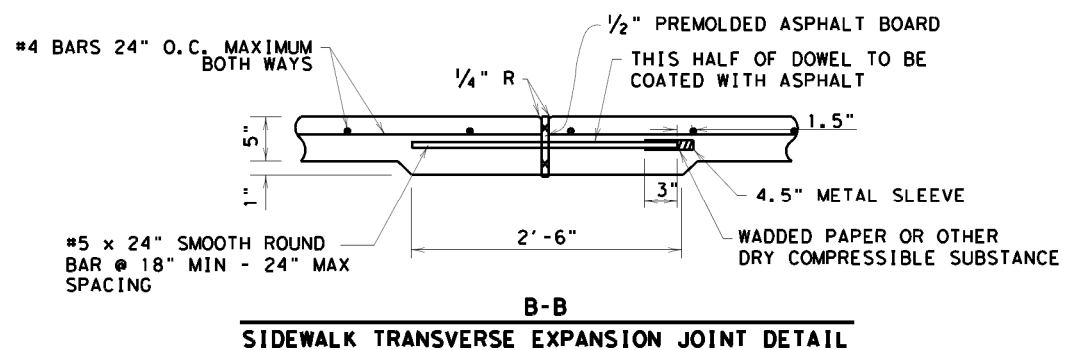
**SIDEWALK TRANSVERSE EXPANSION JOINT
PLAN VIEW**



SIDEWALK PLAN

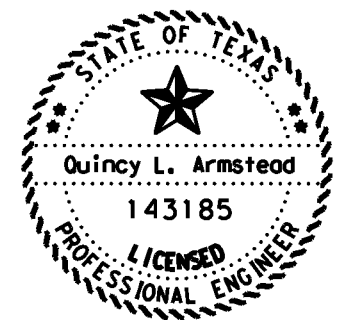


**A-A
TYPICAL SECTION**



**B-B
SIDEWALK TRANSVERSE EXPANSION JOINT DETAIL**

**CONCRETE SIDEWALK DETAILS
NTS**



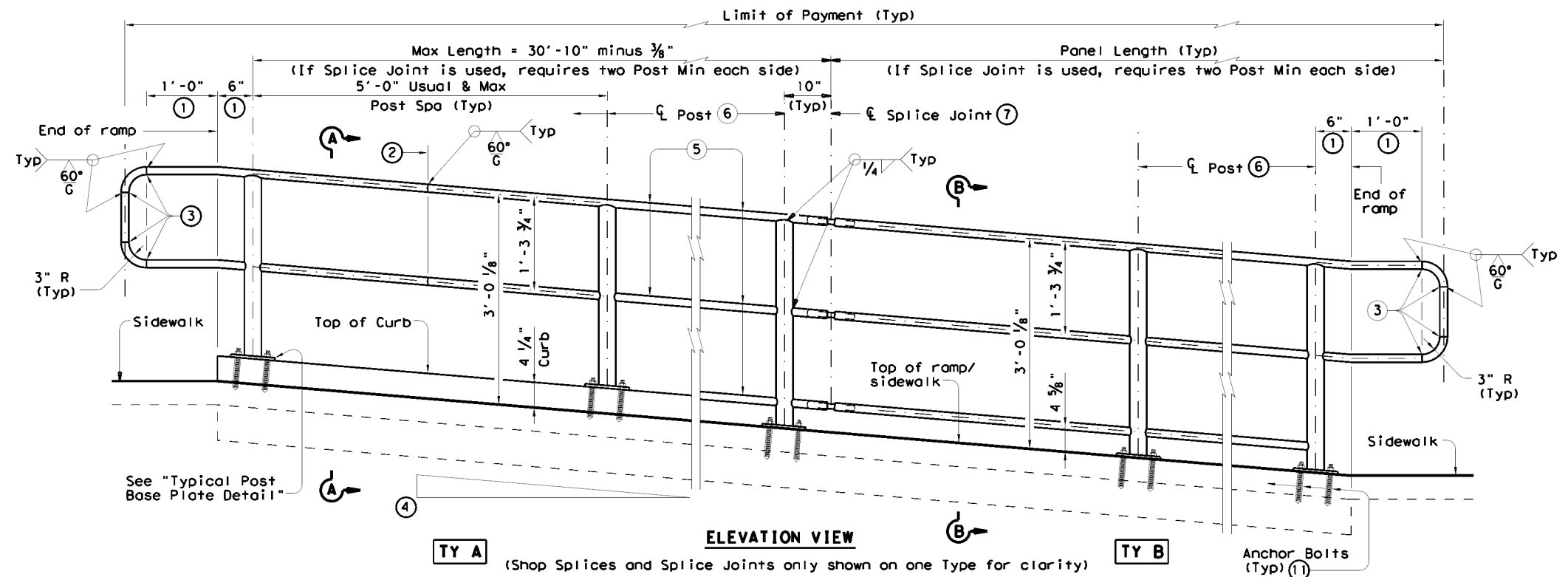
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08.03.23

SH 289			
MISCELLANEOUS SIDEWALK DETAIL			
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY		SHEET NO.
DAL	Collin		32

DATE: 8/27/2009 6:13:37 PM
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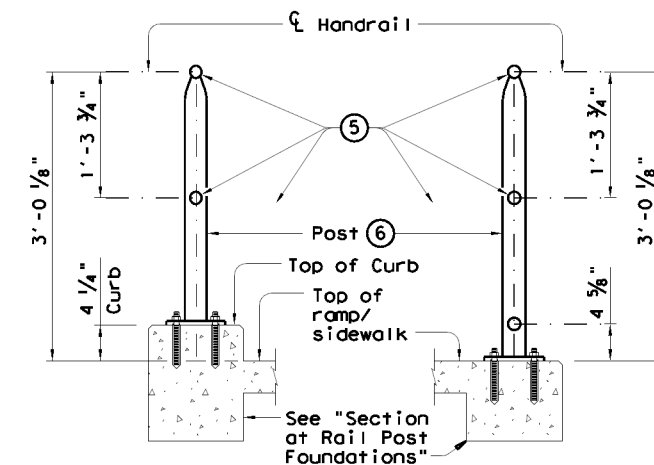
TY A

ELEVATION VIEW

TY B

(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE ⑨ ⑩	
Dropoff Height/Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F

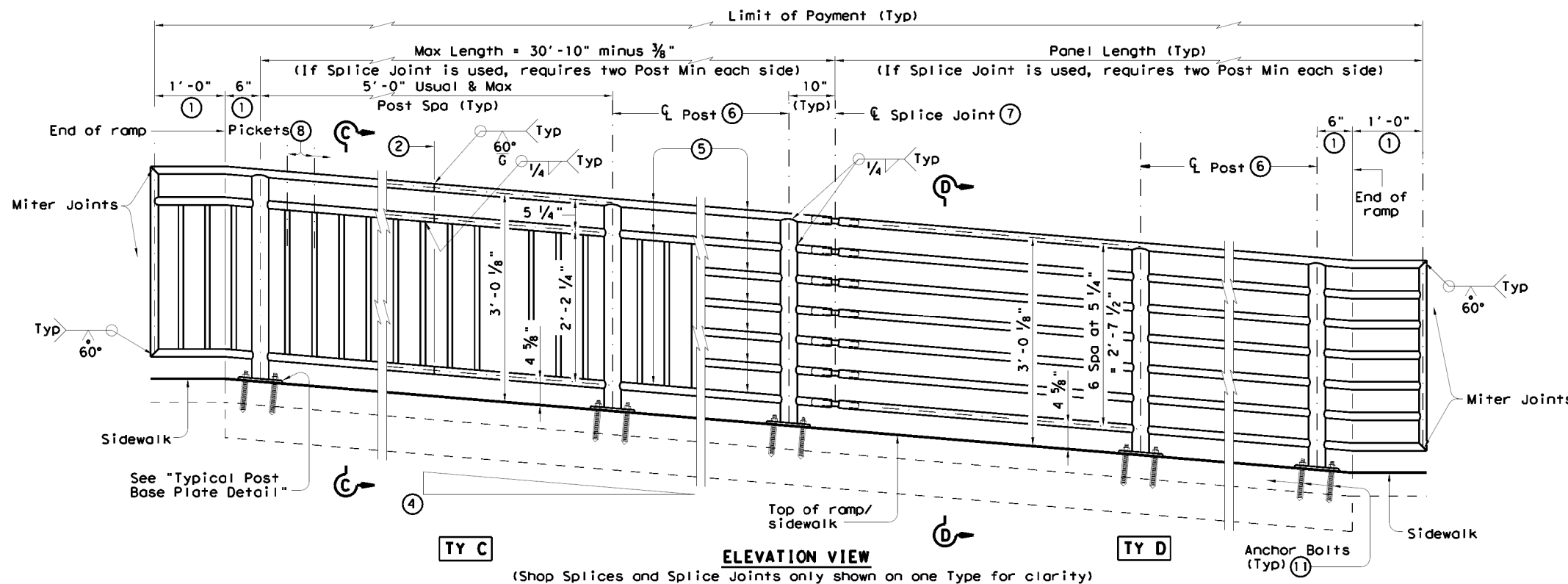


SECTION A-A

(Showing Handrail TY A)

SECTION B-B

(Showing Handrail TY B)

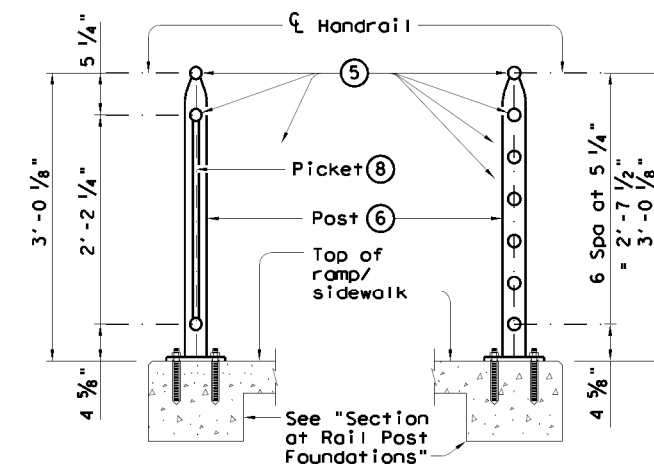


TY C

ELEVATION VIEW

TY D

(Shop Splices and Splice Joints only shown on one Type for clarity)



SECTION C-C

(Showing Handrail TY C)

SECTION D-D

(Showing Handrail TY D)

- ① Parallel to ground.
- ② One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ③ Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ④ See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
- ⑤ 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.

- ⑥ 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
- ⑦ See "Handrail Fabrication Details" for Splice Joints.
- ⑧ 5/8" Dia. Round Bar equal spacing at 4 1/2" Max. Plumb all pickets.
- ⑨ When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
- ⑩ Not to be used on bridges.
- ⑪ See "General Notes" for anchor bolt information.

SHEET 1 OF 3

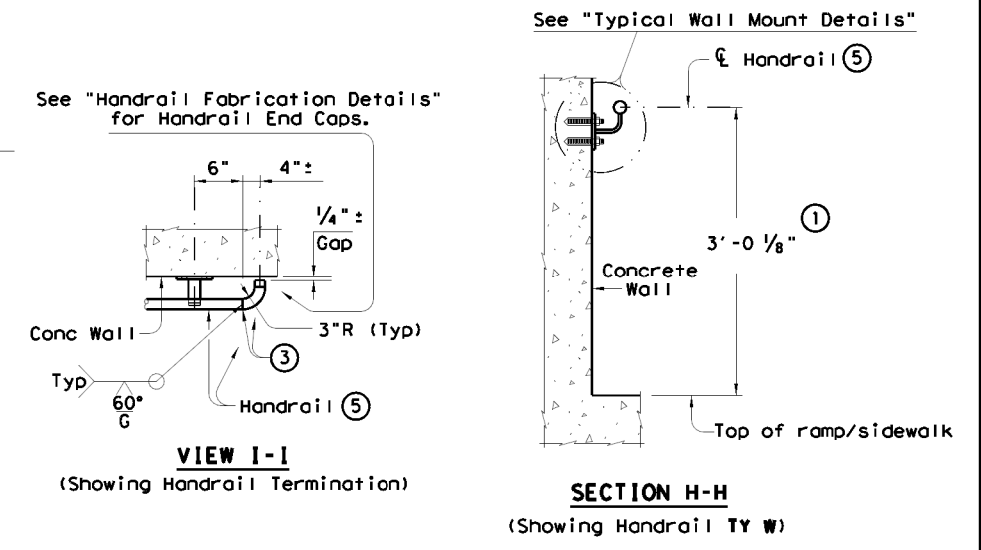
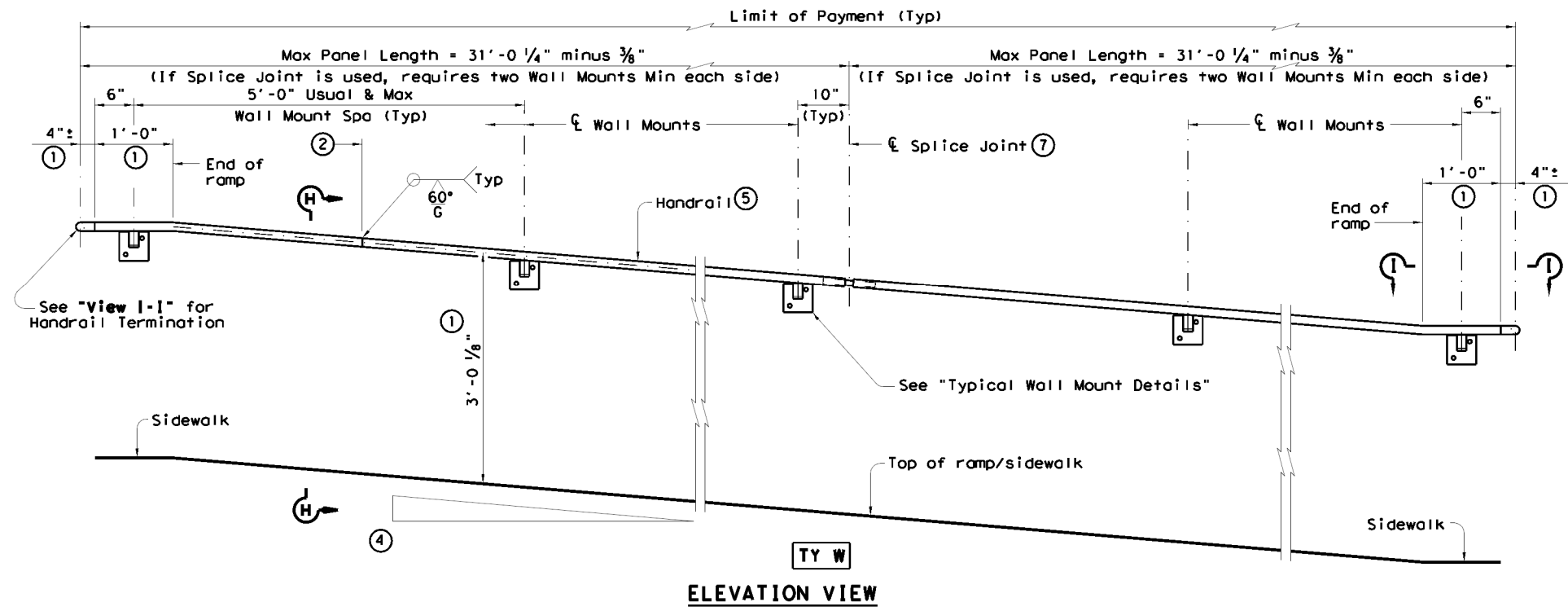
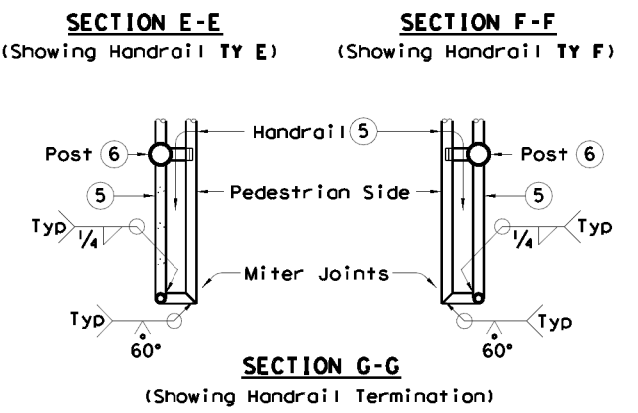
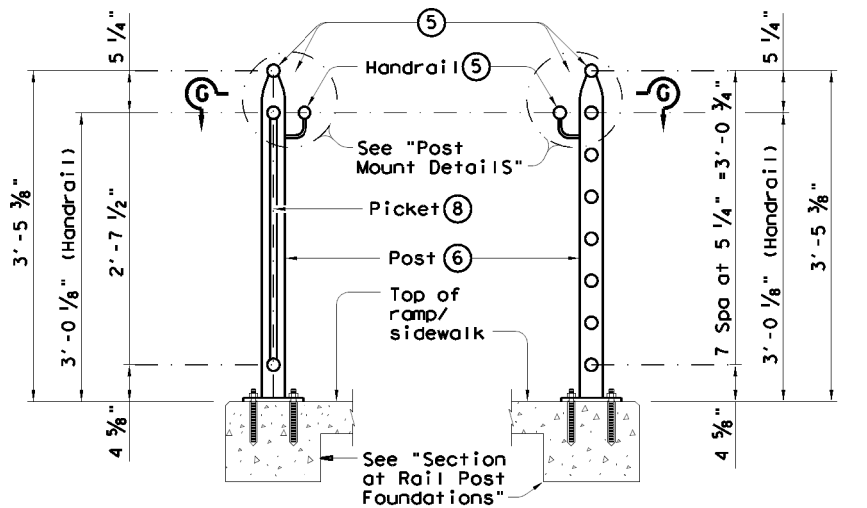
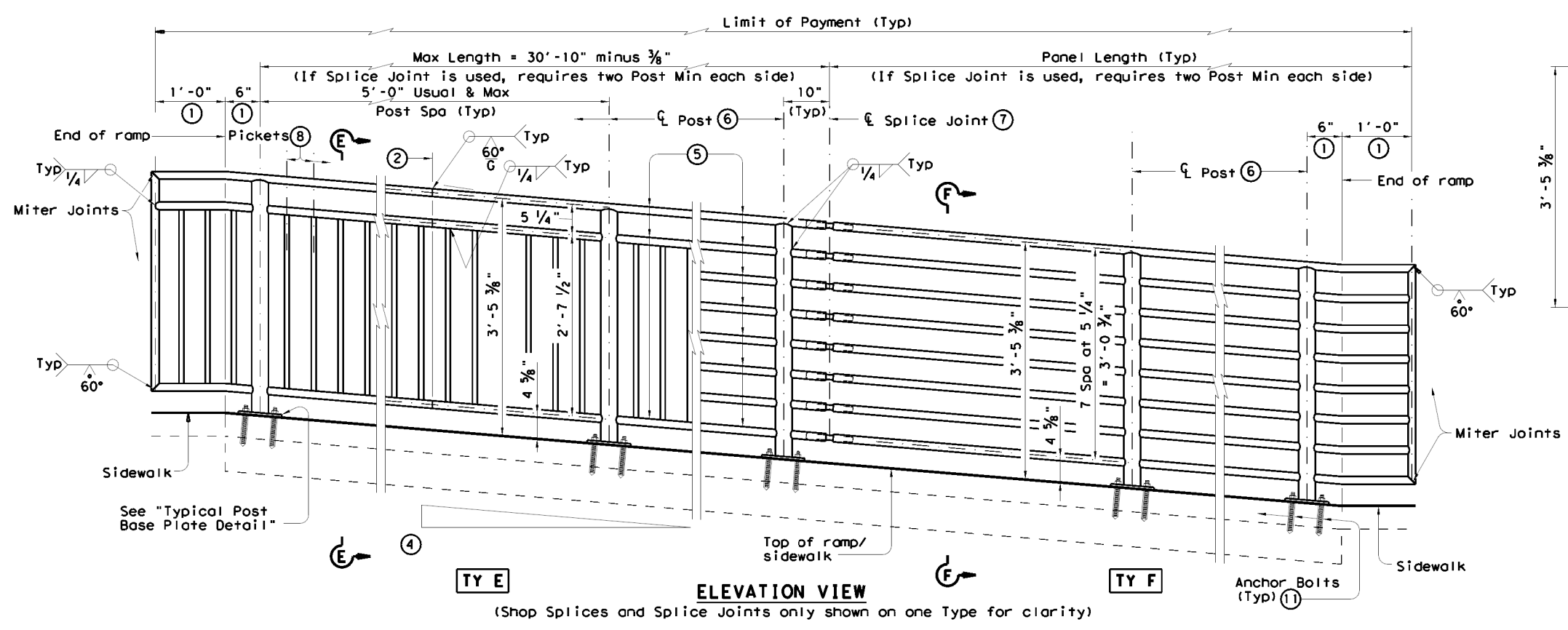


PEDESTRIAN HANDRAIL DETAILS PRD-13

FILE: prdl3.dgn	DNR TxDOT	CR: AM	DWR: JTR	CR: CGL
© TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0091	04	069	SH 289
REVISED MAY, 2013 (VP)	DIST	COUNTY	SHEET NO.	
	DAL	COLLIN	33	

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DATE: 8/2/2023
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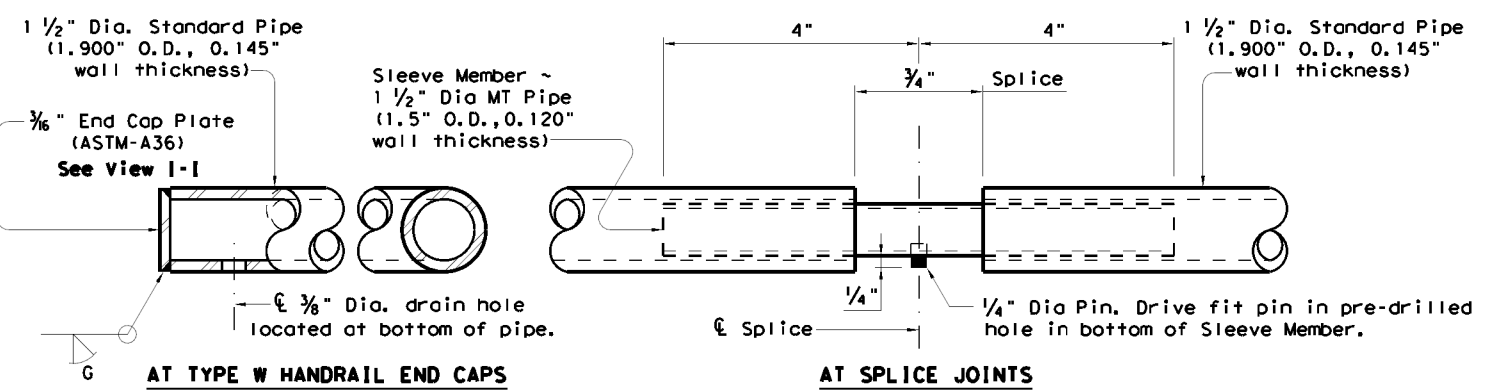


- ① Parallel to ground.
- ② One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ③ Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ④ See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
- ⑤ 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.
- ⑥ 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
- ⑦ See "Handrail Fabrication Details" for Splice Joints.
- ⑧ 3/8" Dia. Round Bar equal spacing at 4 1/2" Max. Plumb all pickets.
- ⑪ See "General Notes" for anchor bolt information.

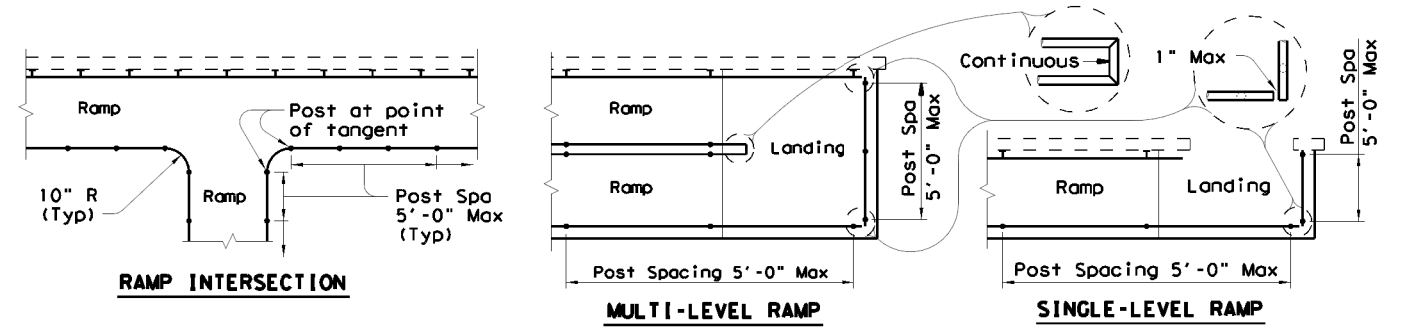
SHEET 2 OF 3

		Design Division Standard	
<h2>PEDESTRIAN HANDRAIL DETAILS</h2> <h3>PRD-13</h3>			
FILE: prdl3.dgn	DNR TxDOT	CR: AM	DWR: JTR
© TxDOT December 2006	CONT	SECT	JOB
REVISIONS	0091	04	069
REVISED MAY, 2013 (VP)	DIST	COUNTY	SHEET NO.
	DAL	COLLIN	34

DATE: 8/2/2023
 FILE: c:\t\dot\p_w\online\t\dot\5\p\w\online_\jonathan_r\ich\1010285\prdl3.dgn
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HANDRAIL FABRICATION DETAILS



PLAN SHOWING RAIL AT RAMP CONDITIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be 3/8" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. 3/8" Dia. threaded rod embedment depth for wall mounts is 3 1/2" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxyes and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be 3/8" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

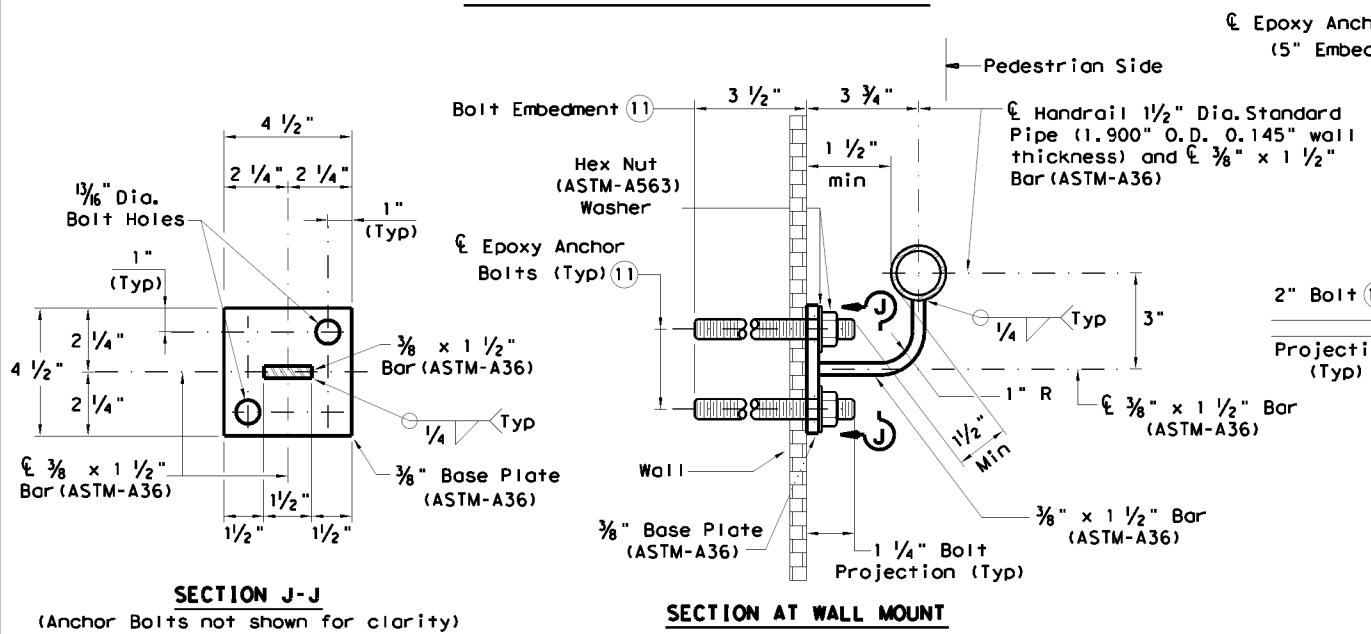
For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

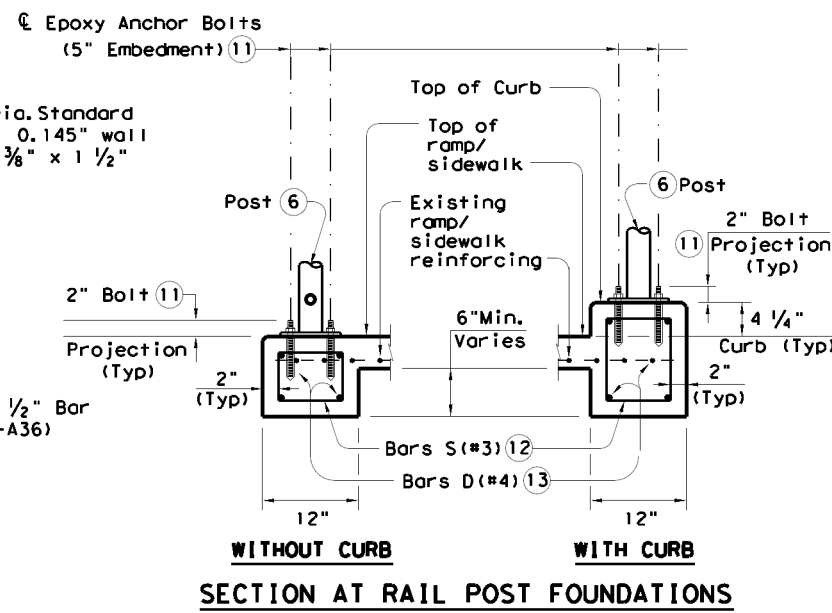
Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

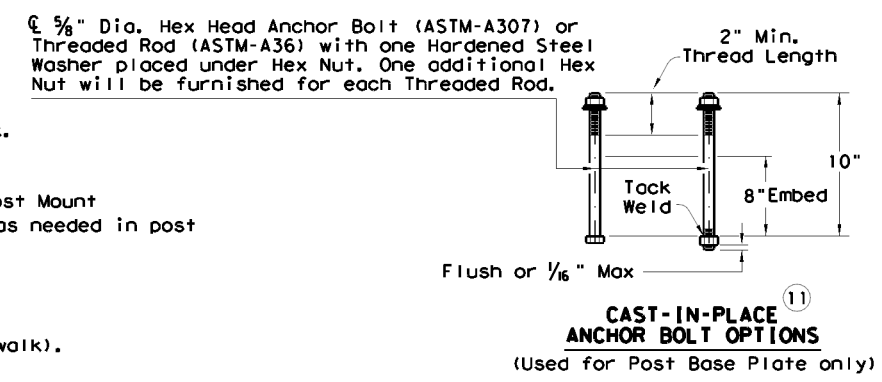
All exposed edges will be rounded or chamfered to approximately 1/8" by grinding.



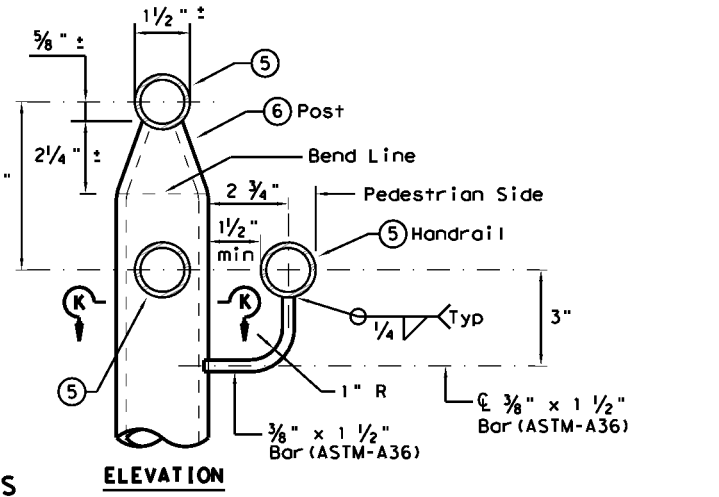
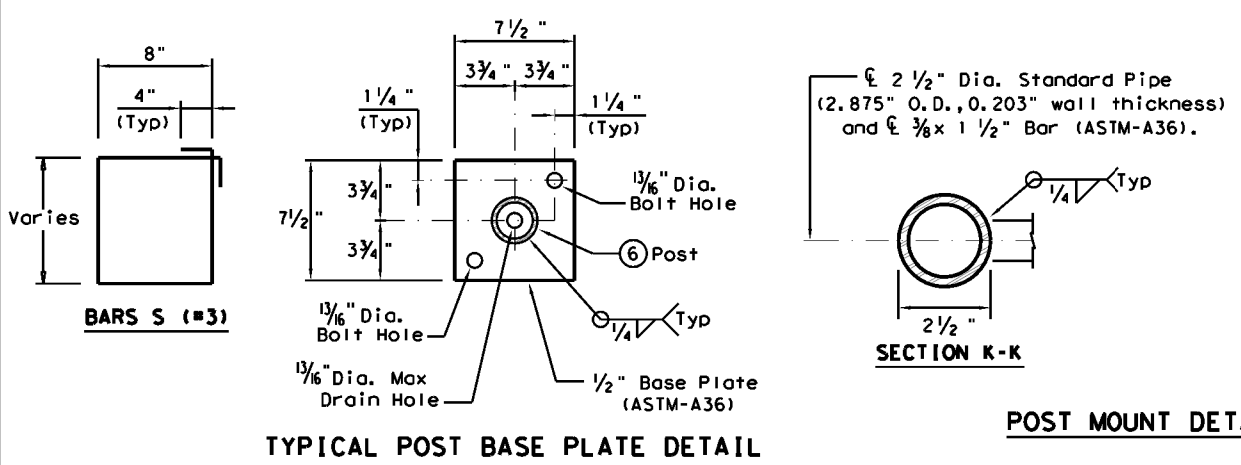
TYPICAL WALL MOUNT DETAILS



SECTION AT RAIL POST FOUNDATIONS

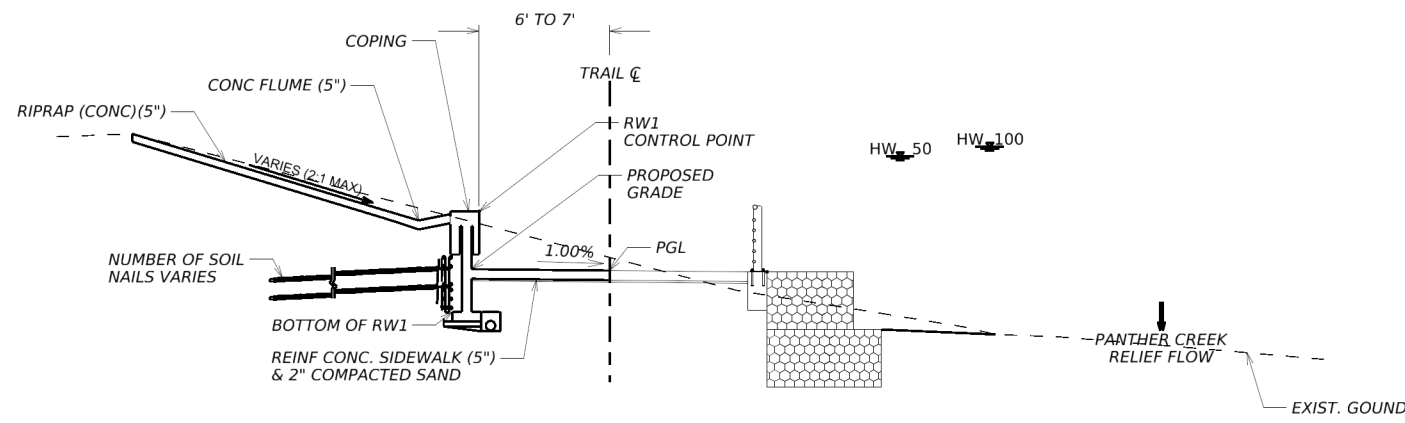


- (5) 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.
- (6) 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diameter of top rail. Provide holes as needed in post for galvanizing drainage and venting.
- (11) See "General Notes" for anchor bolt information.
- (12) Bars S (#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).
- (13) Provide 1 1/2" end cover to Bars D (#4) from outside edge of overall length of Ramp/Sidewalk.

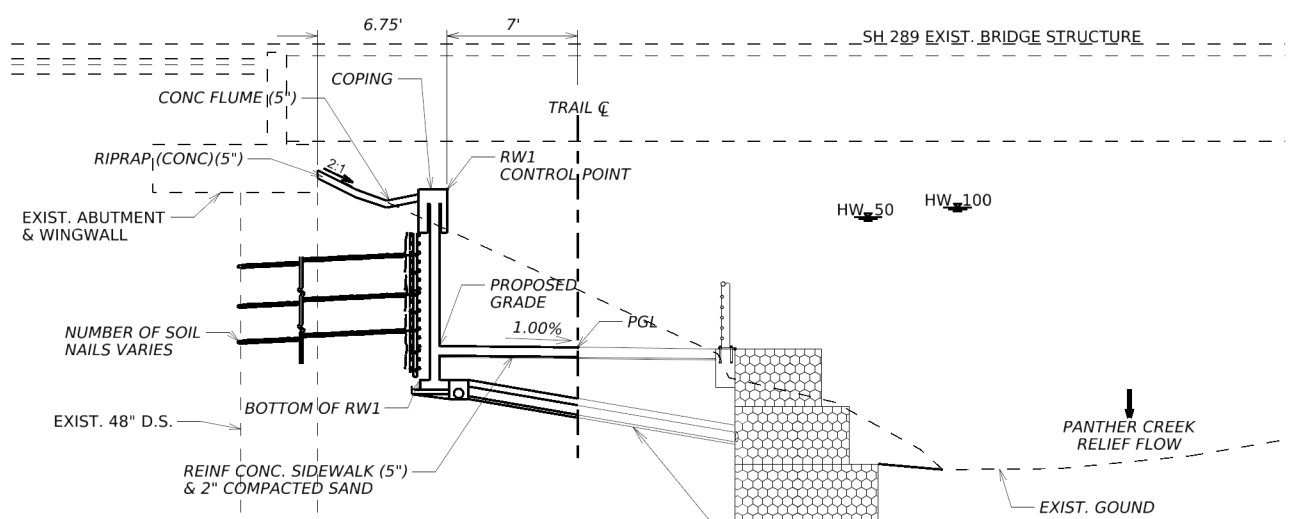


		Design Division Standard	
<h2>PEDESTRIAN HANDRAIL DETAILS</h2> <h3>PRD-13</h3>			
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© TxDOT December 2006	CONT	SECT	JOB
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REVISED MAY, 2013 (VP)	DIST	COUNTY	SHEET NO.
	DAL	COLLIN	35

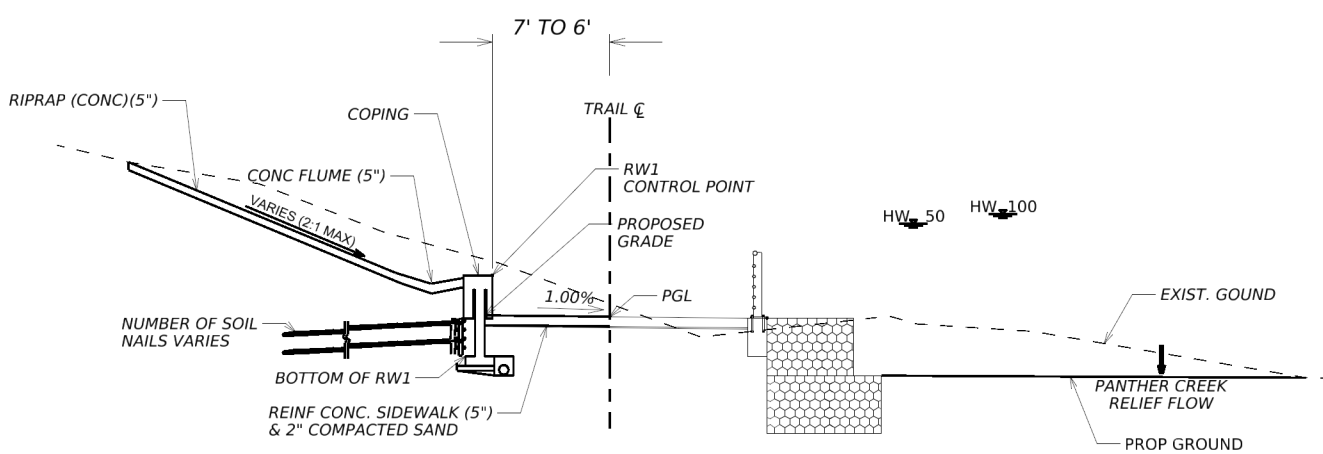
CK: DW: CK: DW:



RETAINING WALL 1 (A-A)
 TRAIL C: STA 10+16.20 TO STA 10+77.41
 RW1 C.P.: STA 2+00.00 TO STA 2+34.37
 NTS

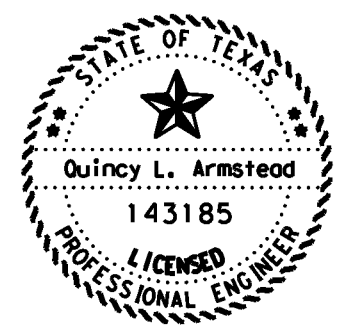


RETAINING WALL 1 (B-B)
 TRAIL C: STA 10+77.41 TO STA 12+03.65
 RW1 C.P.: STA 2+34.37 TO STA 3+60.61
 NTS
 UNDERDRAIN OUTLET
 TRAIL: CL STA 10+86.03
 SEE RETAINING WALL LAYOUTS
 FOR OUTLET ELEVATIONS



RETAINING WALL 1 (C-C)
 TRAIL C: STA 12+03.65 TO STA 12+47.51
 RW1 C.P.: STA 3+60.61 TO STA 4+11.00
 NTS

NOTES
 SEE SOIL NAIL RETAINING WALL MISC. DETAILS FOR DEMINIONS AND PLACEMENT OF THE FLUME.
 * ITEM 132 TY C2 SHALL CONSIST OF MATERIAL WITH PROPERTIES PER ITEM 423 TY DS.
 SEE HYDRAULIC DATA PANTHER CREEK AND PANTHER CREEK RELIEF SHEET FOR HW 50 AND HW 100 ELEVATIONS.



Quincy L. Armstead, P.E.
 08.03.23

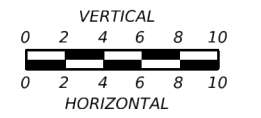
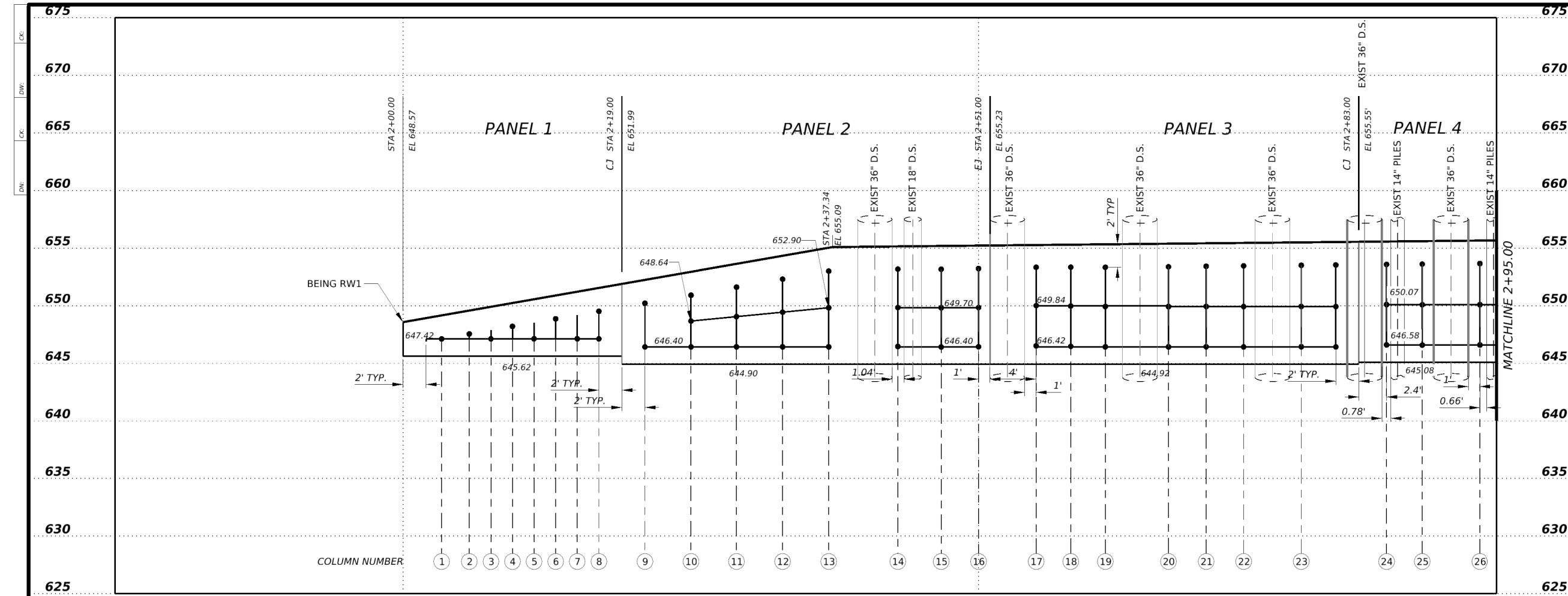


SH 289
 PANTHER CREEK RELIEF
 RETAINING WALL 1
 TYPICAL SECTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	38	

DATE: 2023/08/02
 FILE: DOCUMENT NAME



- LEGEND:**
- - SOIL NAIL LOCATION
 - CJ - CONSTRUCTION JOINT
 - EJ - EXPANSION JOINT
 - [] - EXIST DRILL SHAFTS AND PILES

	PANEL 1	PANEL 2	PANEL 3	PANEL 4	PANEL 5	PANEL 6	PANEL 7
PANEL LENGTH (FT)	19	32	32	32	32	32	32
AREA (SF)	88.54	298.60	335.04	335.00	325.76	282.07	178.08
EST. NO. OF SOIL NAILS	9	23	24	24	24	24	15
SOIL NAIL LENGTH (FT) *	16	20	30	30	30	30	16
TOTAL SOIL NAIL LENGTH (FT)	144	460	720	720	720	720	240

* NAIL LENGTH SHALL BE THE NAIL LENGTH SHOWN ON THE TABLE PLUS 6 INCHES

COLUMN	STATION
1	2+03.35
2	2+05.75
3	2+07.63
4	2+09.50
5	2+11.37
6	2+13.25
7	2+15.12
8	2+17.00
9	2+21.00
10	2+25.00
11	2+29.00
12	2+33.00
13	2+37.00
14	2+43.00
15	2+46.76
16	2+50.00
17	2+55.00
18	2+58.00
19	2+61.00
20	2+66.48

COLUMN	STATION
21	2+69.75
22	2+73.00
23	2+78.00
24	2+85.40
25	2+88.50
26	2+93.50
27	2+96.00
28	3+01.00
29	3+04.70
30	3+07.50
31	3+13.75
32	3+18.75
33	3+22.10
34	3+25.00
35	3+30.08
36	3+33.00
37	3+35.90
38	3+41.00
39	3+45.00
40	3+51.73

COLUMN	STATION
41	3+54.63
42	3+57.56
43	3+62.56
44	3+65.78
45	3+69.00
46	3+73.00
47	3+77.00
48	3+81.00
49	3+85.00
50	3+89.00
51	3+93.00
52	3+95.00
53	3+97.00
54	3+99.00
55	4+01.00
56	4+03.00
57	4+05.00
58	4+08.93

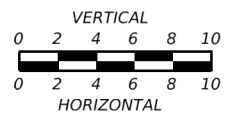
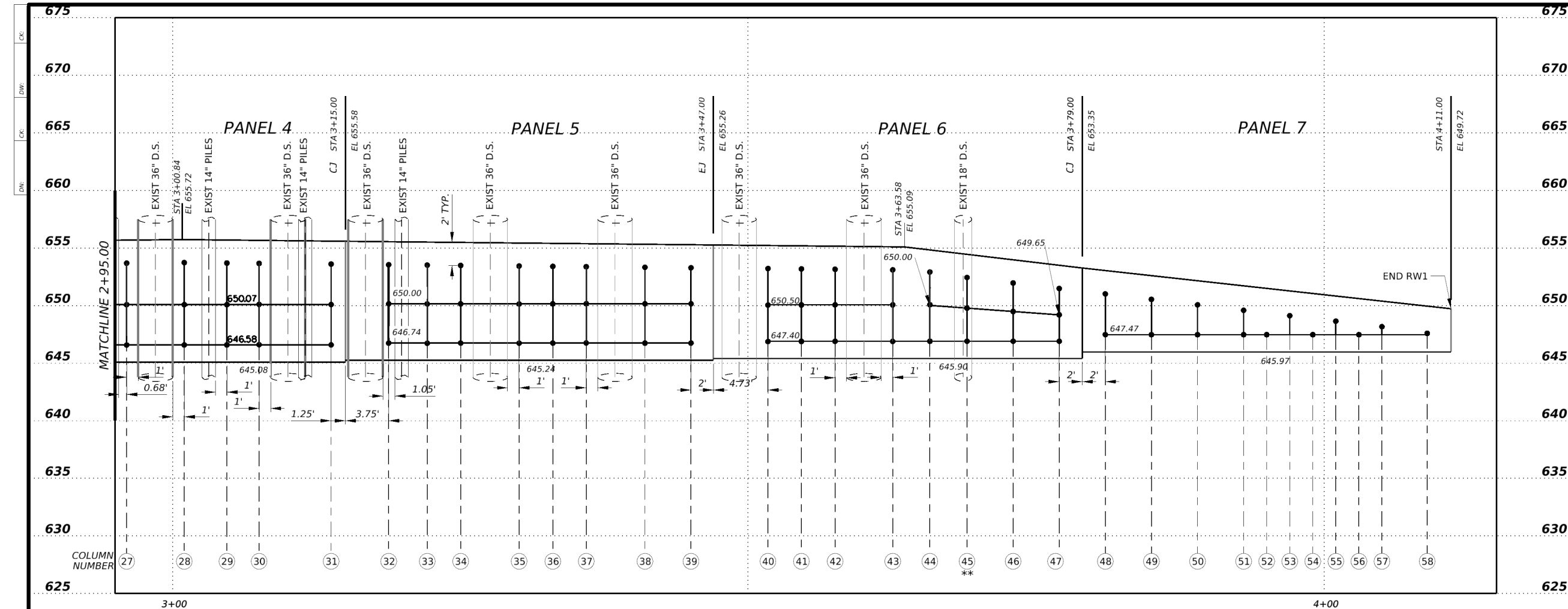


SH 289
PANTHER CREEK RELIEF
RETAINING WALL 1
SOIL NAIL LAYOUT
PANEL 1 - 4

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	39	

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- LEGEND:**
- - SOIL NAIL LOCATION
 - CJ - CONSTRUCTION JOINT
 - EJ - EXPANSION JOINT
 - ⎓ - EXIST DRILL SHAFTS AND PILES

NOTE:
 ** SKEW NAILS 6 DEGREES TO THE RIGHT. SEE SOIL NAIL DETAIL SHEET

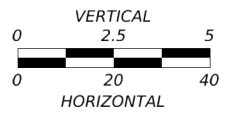
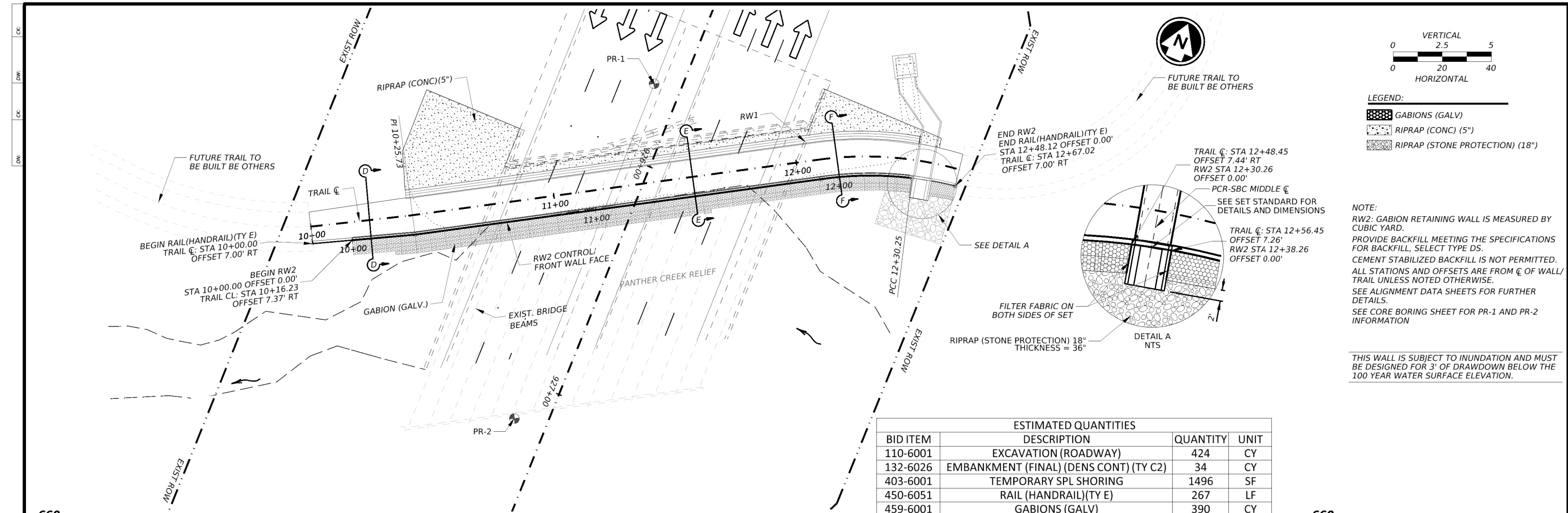
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SH 289
PANTHER CREEK RELIEF
RETAINING WALL 1
SOIL NAIL LAYOUT
PANEL 4 - 7

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	40	

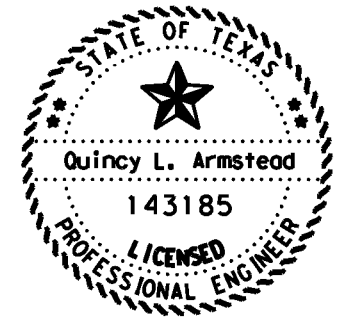
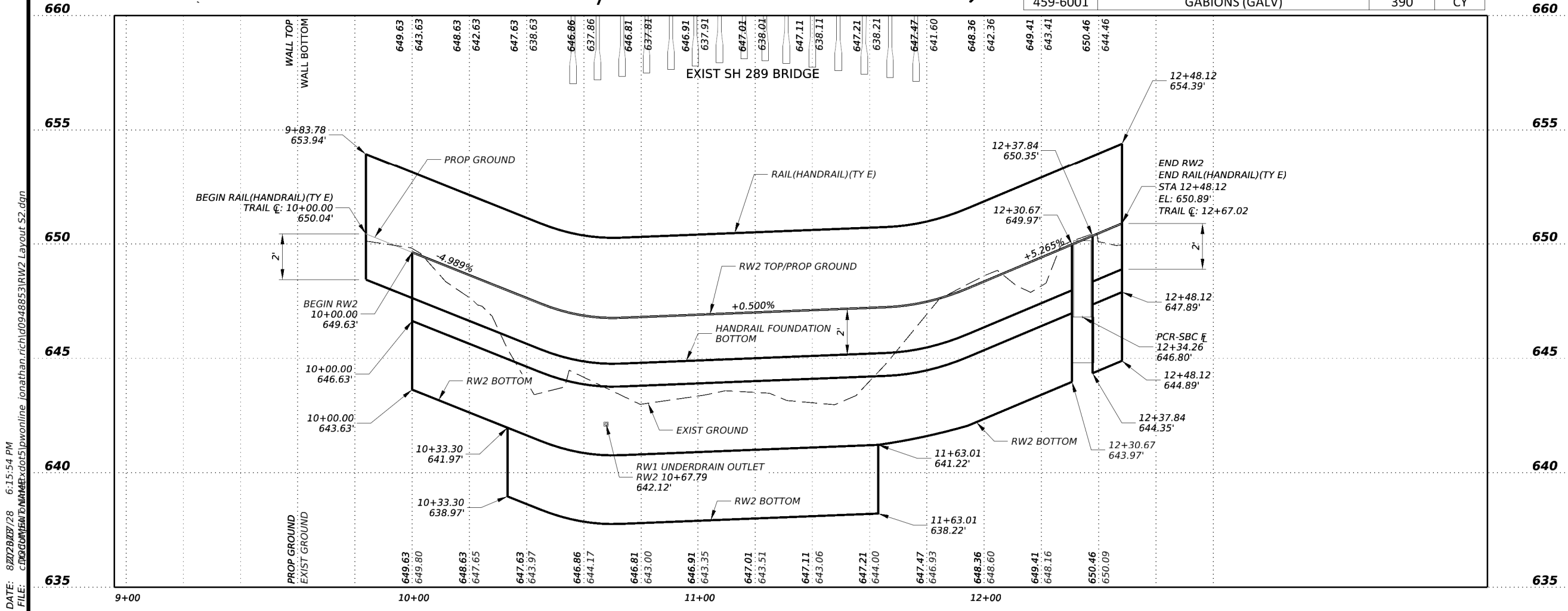


- LEGEND:
- GABIONS (GALV)
 - RIPRAP (CONC) (5")
 - RIPRAP (STONE PROTECTION) (18")

NOTE:
 RW2: GABION RETAINING WALL IS MEASURED BY CUBIC YARD.
 PROVIDE BACKFILL MEETING THE SPECIFICATIONS FOR BACKFILL, SELECT TYPE DS.
 CEMENT STABILIZED BACKFILL IS NOT PERMITTED.
 ALL STATIONS AND OFFSETS ARE FROM C OF WALL/ TRAIL UNLESS NOTED OTHERWISE.
 SEE ALIGNMENT DATA SHEETS FOR FURTHER DETAILS.
 SEE CORE BORING SHEET FOR PR-1 AND PR-2 INFORMATION

THIS WALL IS SUBJECT TO INUNDATION AND MUST BE DESIGNED FOR 3' OF DRAWDOWN BELOW THE 100 YEAR WATER SURFACE ELEVATION.

ESTIMATED QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	UNIT
110-6001	EXCAVATION (ROADWAY)	424	CY
132-6026	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	34	CY
403-6001	TEMPORARY SPL SHORING	1496	SF
450-6051	RAIL (HANDRAIL)(TY E)	267	LF
459-6001	GABIONS (GALV)	390	CY



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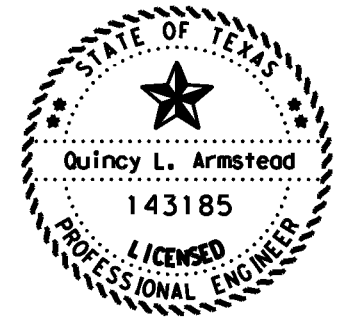
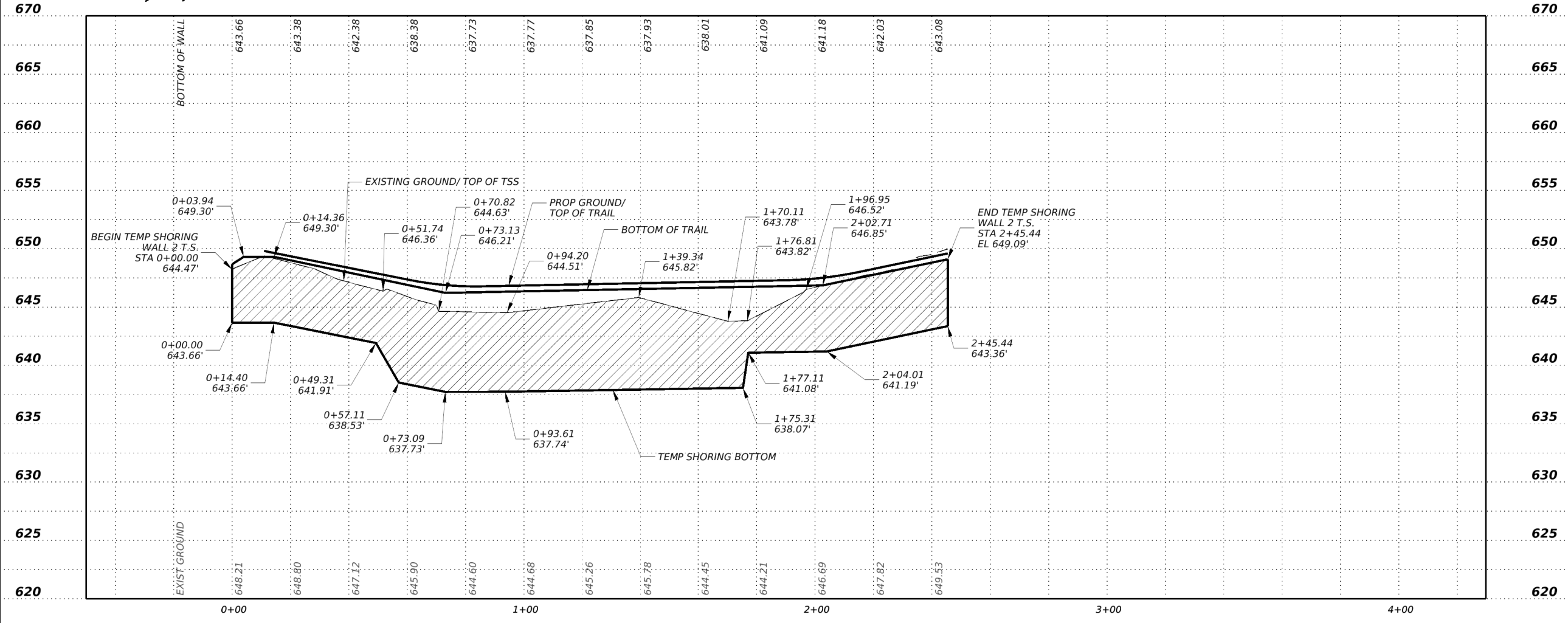
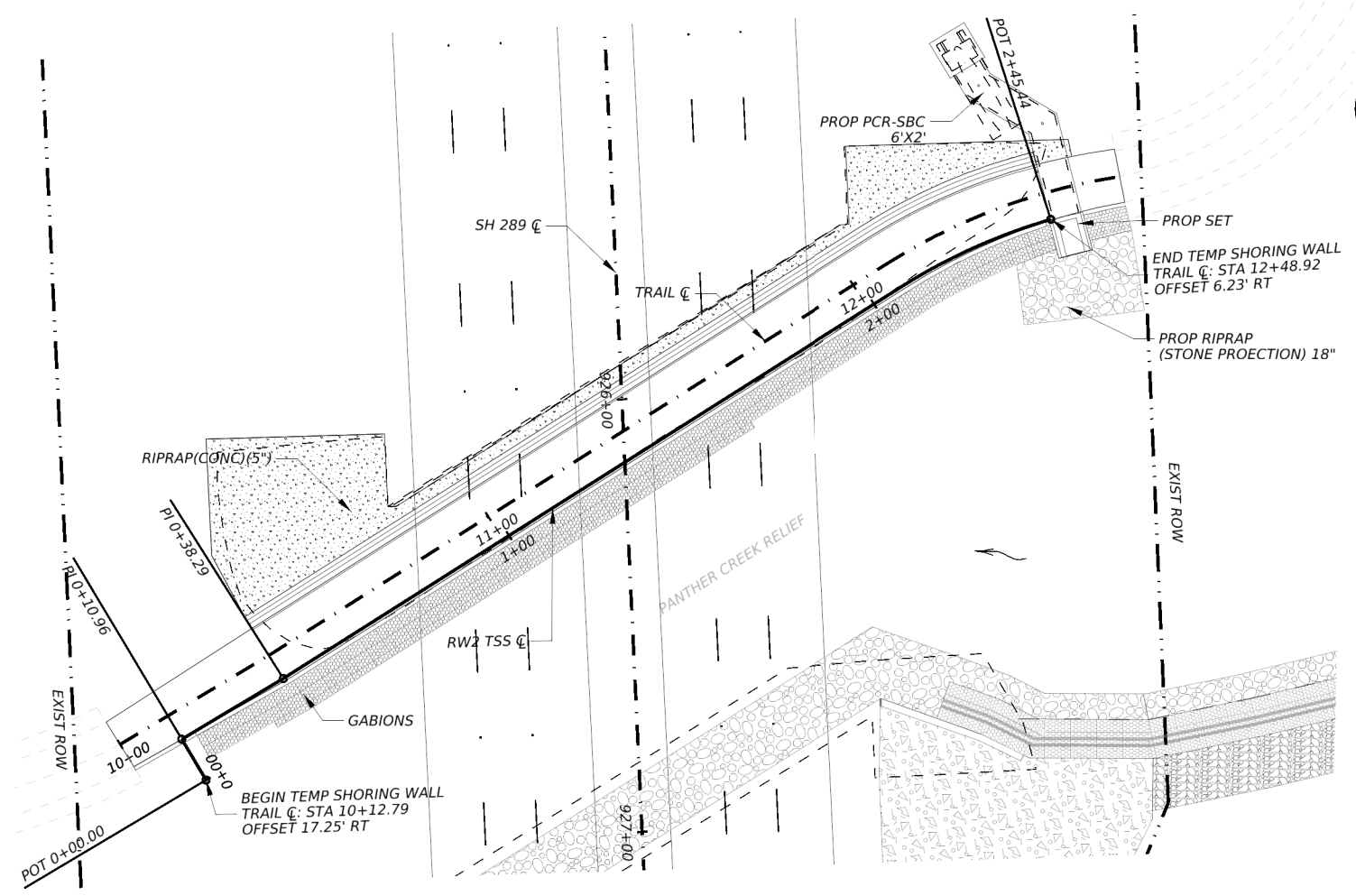
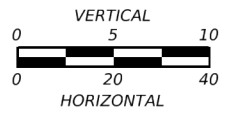
SH 289
 PANTHER CREEK RELIEF
 RETAINING WALL 2
 LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	41	

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Quincy L. Armstead, P.E. 8.03.23



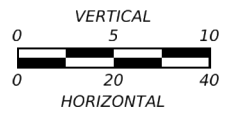
SH 289
PANTHER CREEK RELIEF
RETAINING WALL 2
TEMPORARY SHORING

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	43	

DATE: 2023/07/24
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CK
DW
CK
DW

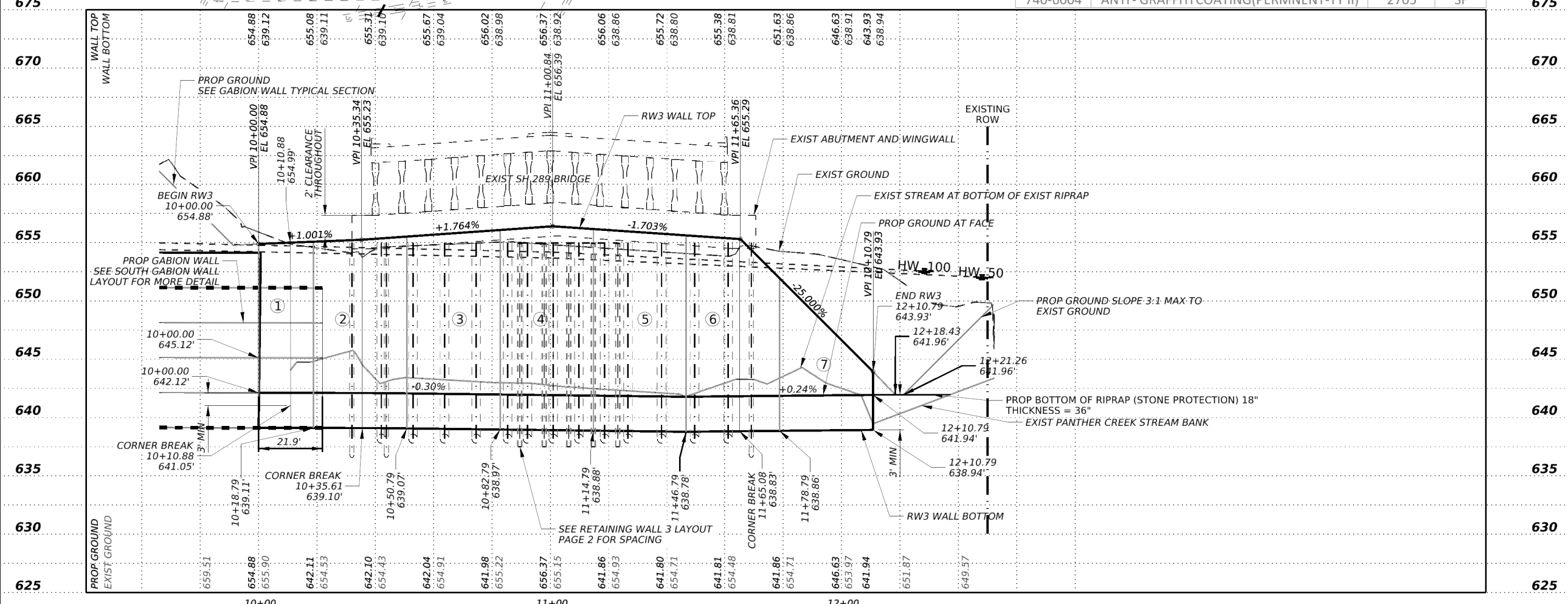
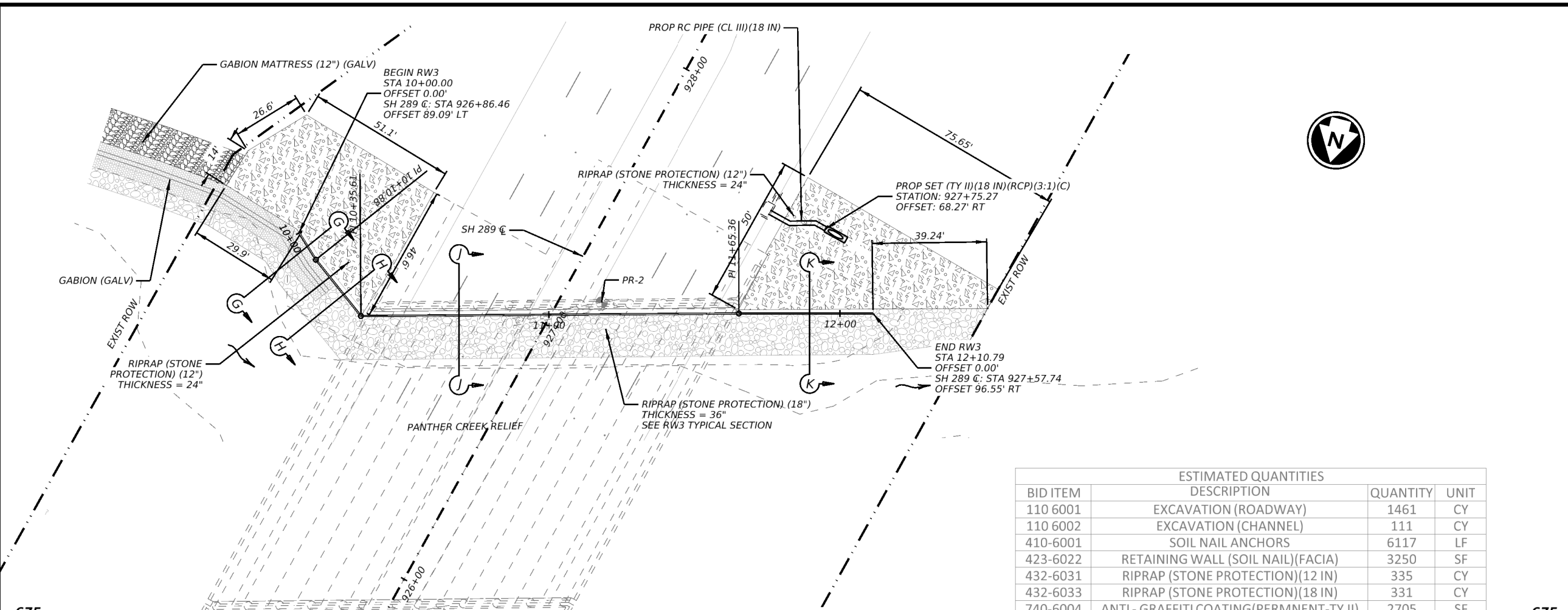


- LEGEND:
- # RETAINING WALL PANEL
 - GABIONS (GALV) (3'X3')
 - GABION MAT. (GALV) (12")
 - RIPRAP (STONE PROTECTION) (12")
 - RIPRAP (STONE PROTECTION) (18")

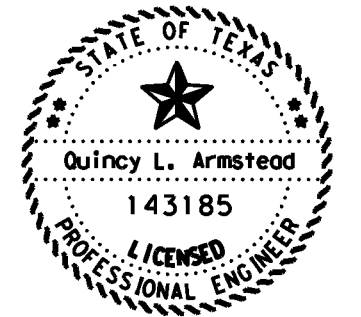
NOTE:
 RW3: UNLESS OTHERWISE NOTED IN THE PLANS, THE BOTTOM OF WALL IS LOCATED 3 FEET BELOW THE PROPOSED GROUND.
 RW3: SQUARE FOOT SURFACE AREA OF RETAINING WALL IS MEASURED FROM THE TOP OF RETAINING WALL TO THE BOTTOM OF WALL.
 ALL STATIONS AND OFFSETS ARE FROM C OF SH 289 UNLESS NOTED OTHERWISE.
 SEE ALIGNMENT DATA SHEETS FOR FURTHER DETAILS.
 SEE CORE BORING SHEET FOR PR-1 AND PR-2 INFORMATION

THIS WALL IS SUBJECT TO INUNDATION AND MUST BE DESIGNED FOR 3' OF DRAWDOWN BELOW THE 100 YEAR WATER SURFACE ELEVATION.

ESTIMATED QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	UNIT
110 6001	EXCAVATION (ROADWAY)	1461	CY
110 6002	EXCAVATION (CHANNEL)	111	CY
410-6001	SOIL NAIL ANCHORS	6117	LF
423-6022	RETAINING WALL (SOIL NAIL)(FACIA)	3250	SF
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	335	CY
432-6033	RIPRAP (STONE PROTECTION)(18 IN)	331	CY
740-6004	ANTI - GRAFFITI COATING(PERMNET-TY II)	2705	SF



EXIST NBI: 18-043-0-0091-04-073



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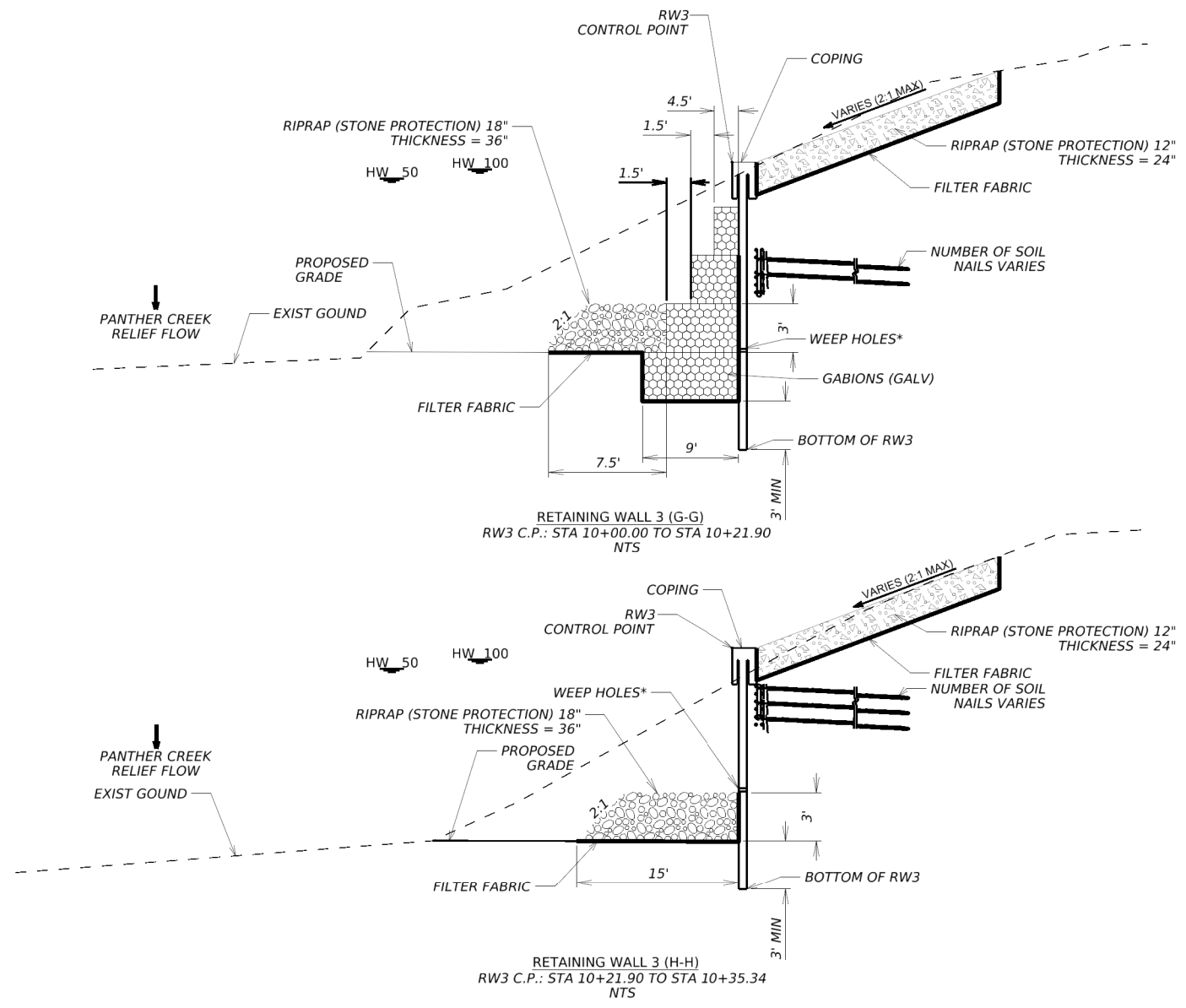
SH 289
 PANTHER CREEK RELIEF
 RETAINING WALL 3
 LAYOUT

SHEET 1 OF 2

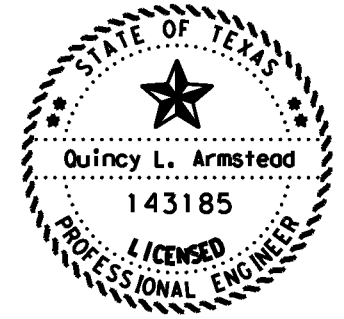
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	44	

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NOTES
 SEE SOIL NAIL RETAINING WALL MISC. DETAILS FOR MORE INFORMATION
 * 4" WEEP HOLES AT 15 FT. MAX (SLOPE TO DRAIN.)
 1 FT HARDWARE CLOTH CENTERED BEHIND THE OPENING. BOTTOM OF WEEP HOLE TO BE 3" MIN. FROM FINISHED GRADE.
 SEE SOIL NAIL RETAINING WALL MISC. DETAIL FOR INFORMATION.
 SEE HYDRAULIC DATA PANTHER CREEK AND PANTHER CREEK RELIEF SHEET FOR HW 50 AND HW 100 ELEVATIONS.



Quincy L. Armstead, P.E.
 08.03.23



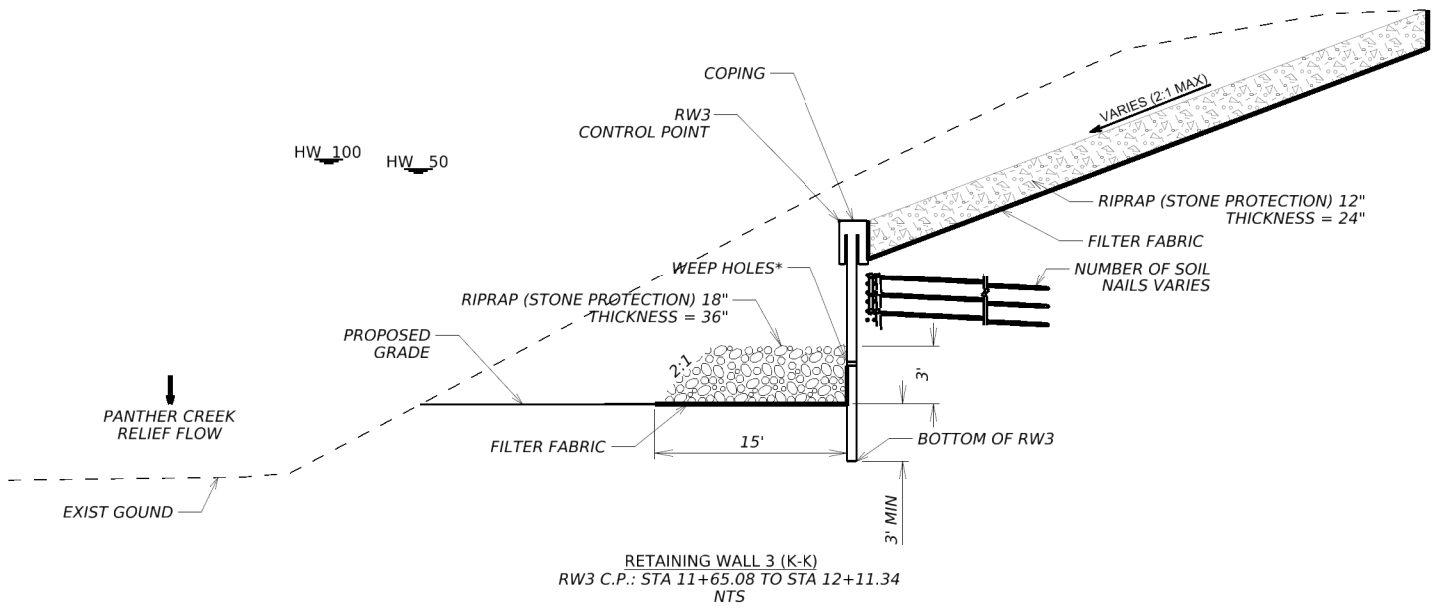
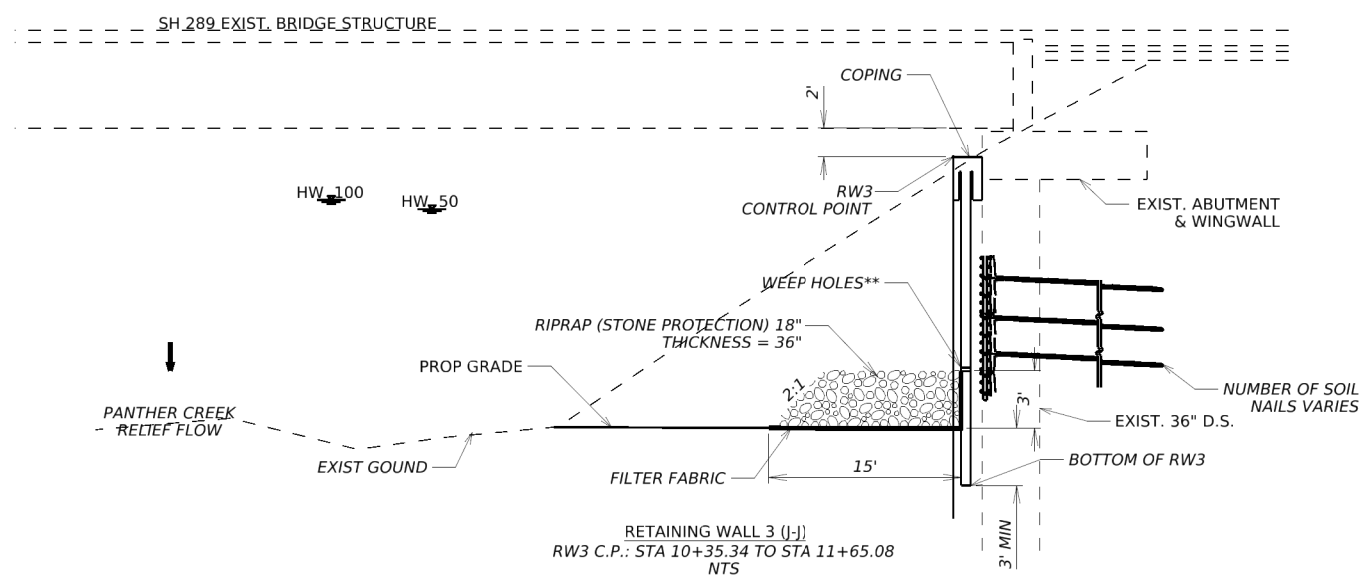
SH 289
 PANTHER CREEK RELIEF
 RETAINING WALL 3
 TYPICAL SECTION

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	46	

DATE: 2023/08/02
 FILE: DOCUMENT NAME

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NOTES

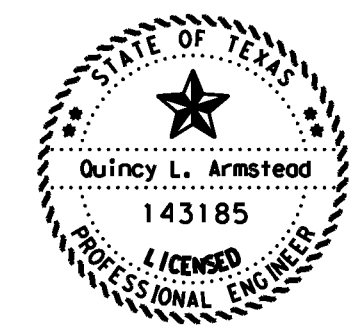
SEE SOIL NAIL RETAINING WALL MISC. DETAILS FOR MORE INFORMATION

* 4" WEEP HOLES AT 15 FT. MAX (SLOPE TO DRAIN.) 1 FT HARDWARE CLOTH CENTERED BEHIND THE OPENING. BOTTOM OF WEEP HOLE TO BE 3" MIN. FROM FINISHED GRADE.

** 4" WEEP HOLES CENTERED BETWEEN EXIST DRILL SHAFTS FROM STA 10+35.34 TO 11+65.08 (SLOPE TO DRAIN.) 1 FT HARDWARE CLOTH CENTERED BEHIND THE OPENING. BOTTOM OF WEEP HOLE TO BE 3" MIN. FROM FINISHED GRADE.

SEE SOIL NAIL RETAINING WALL MISC. DETAIL FOR INFORMATION.

SEE HYDRAULIC DATA PANTHER CREEK AND PANTHER CREEK RELIEF SHEET FOR HW 50 AND HW 100 ELEVATIONS.



Quincy L. Armstead, P.E.
08.03.23

Texas Department of Transportation

SH 289

PANTHER CREEK RELIEF

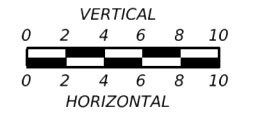
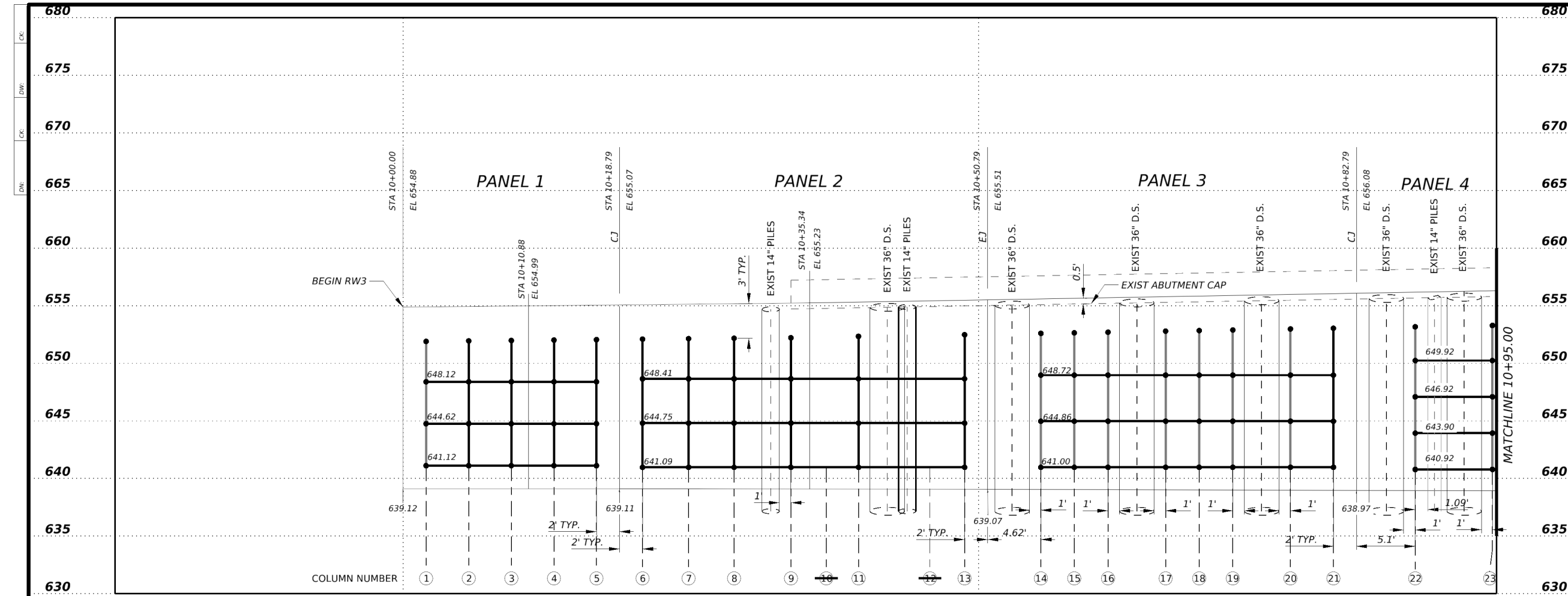
RETAINING WALL 3

TYPICAL SECTION

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	47	

DATE: 2023/08/02
 FILE: DOCUMENT NAME



- LEGEND:**
- - SOIL NAIL LOCATION
 - CJ - CONSTRUCTION JOINT
 - EJ - EXPANSION JOINT
 - [] - EXIST DRILL SHAFTS AND PILES

NOTE:
 *** COLUMN 8 AND 9 NAILS SHALL HAVE A 5 DEGREES STEEPER ANGLE OF INCLINATION THAN THE SURROUNDING NAILS.
 **** SKEW NAILS 15 DEGREES TO THE RIGHT. SEE SOIL NAIL DETAIL SHEET.

	PANEL 1	PANEL 2	PANEL 3	PANEL 4	PANEL 5	PANEL 6	PANEL 7
PANEL LENGTH (FT)	18.79	32	32	32	32	32	32
AREA (SF)	298.01	518.40	536.80	554.25	545.28	507.46	288.96
EST, NO. OF SOIL NAILS	20	24	32	35	40	32	17
SOIL NAIL LENGTH (FT) *	20	20,30,35**	35	35	35	35	16
TOTAL SOIL NAIL LENGTH (FT)	400	580	1120	1225	1400	1120	272

* NAIL LENGTH SHALL BE THE NAIL LENGTH SHOWN ON THE TABLE PLUS 6 INCHES
 ** SEE VARIED LENGTH FOR PANEL 2 ASSOCIATED WITH THE COLUMNS AND STATIONING TABLE

COLUMN	STATION	LENGTH**
1	10+02.00	-
2	10+05.70	-
3	10+09.40	-
4	10+13.10	-
5	10+16.79	-
6	10+20.79	20
7	10+24.79	20
8***	10+28.79	20
9***	10+33.72	20
REMOVED 10	10+36.79	-
REMOVED 11****	10+39.59	30
REMOVED 12	10+45.79	-
13	10+48.79	35
14	10+55.41	-
15	10+58.31	-
16	10+61.23	-
17	10+66.23	-
18	10+69.14	-
19	10+72.06	-
20	10+77.06	-

COLUMN	STATION
21	10+80.79
22	10+87.89
23	10+94.64
24	10+96.35
25	10+99.00
26	11+04.10
27	11+07.60
28	11+12.79
29	11+16.26
30	11+21.14
31	11+24.41
32	11+29.14
33	11+32.39
34	11+35.64
35	11+40.79
36	11+44.79
37	11+52.14
38	11+55.39
39	11+58.64
40	11+63.64

COLUMN	STATION
41	11+67.35
42	11+70.35
43	11+72.79
44	11+76.79
45	11+80.79
46	11+84.79
47	11+88.79
48	11+92.79
49	11+96.79
50	12+00.79
51	12+04.79
52	12+08.79

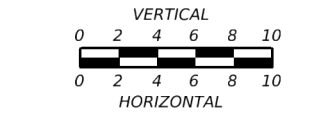
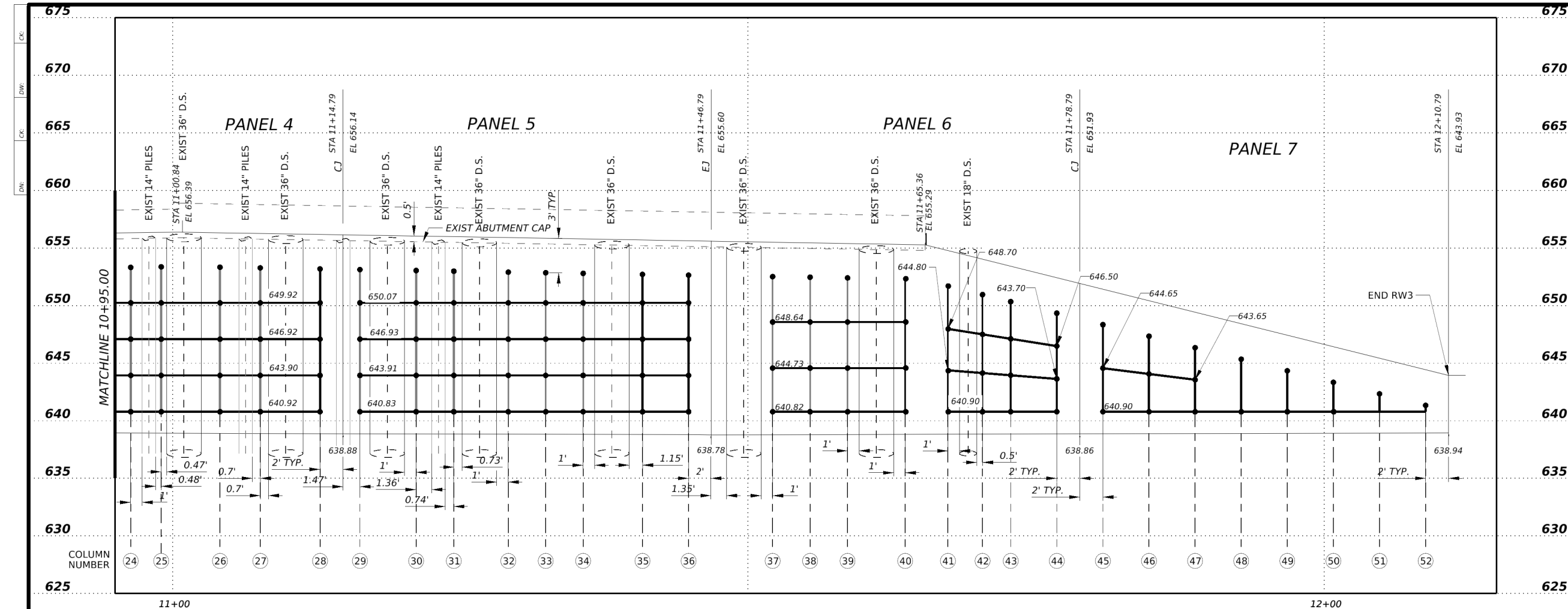
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SH 289
 PANTHER CREEK RELIEF
 RETAINING WALL 3
 SOIL NAIL LAYOUT
 PANEL 1 - 4

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	48	



- LEGEND:**
- - SOIL NAIL LOCATION
 - CJ - CONSTRUCTION JOINT
 - EJ - EXPANSION JOINT
 - ▭ - EXIST DRILL SHAFTS AND PILES

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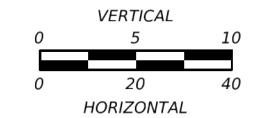


SH 289
PANTHER CREEK RELIEF
RETAINING WALL 3
SOIL NAIL LAYOUT
PANEL 4 - 7

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	49	

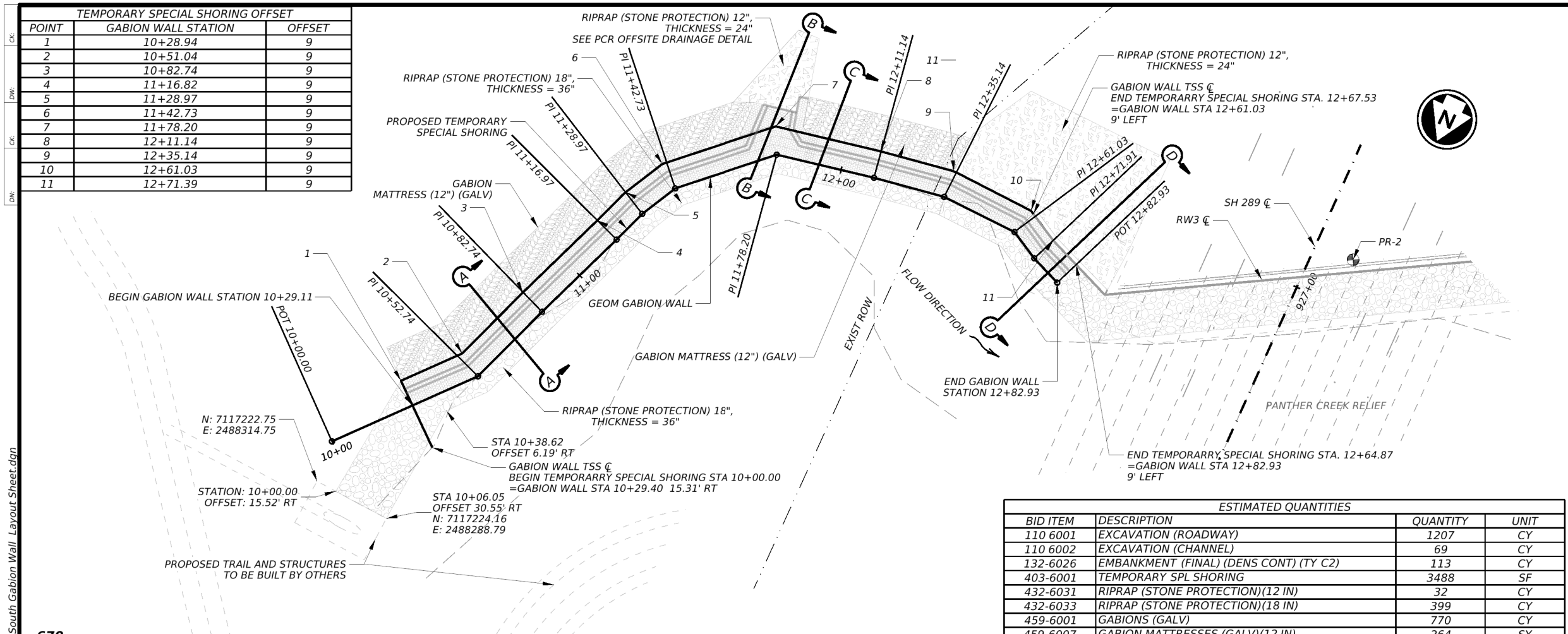
TEMPORARY SPECIAL SHORING OFFSET		
POINT	GABION WALL STATION	OFFSET
1	10+28.94	9
2	10+51.04	9
3	10+82.74	9
4	11+16.82	9
5	11+28.97	9
6	11+42.73	9
7	11+78.20	9
8	12+11.14	9
9	12+35.14	9
10	12+61.03	9
11	12+71.39	9



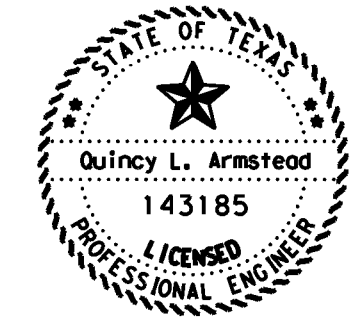
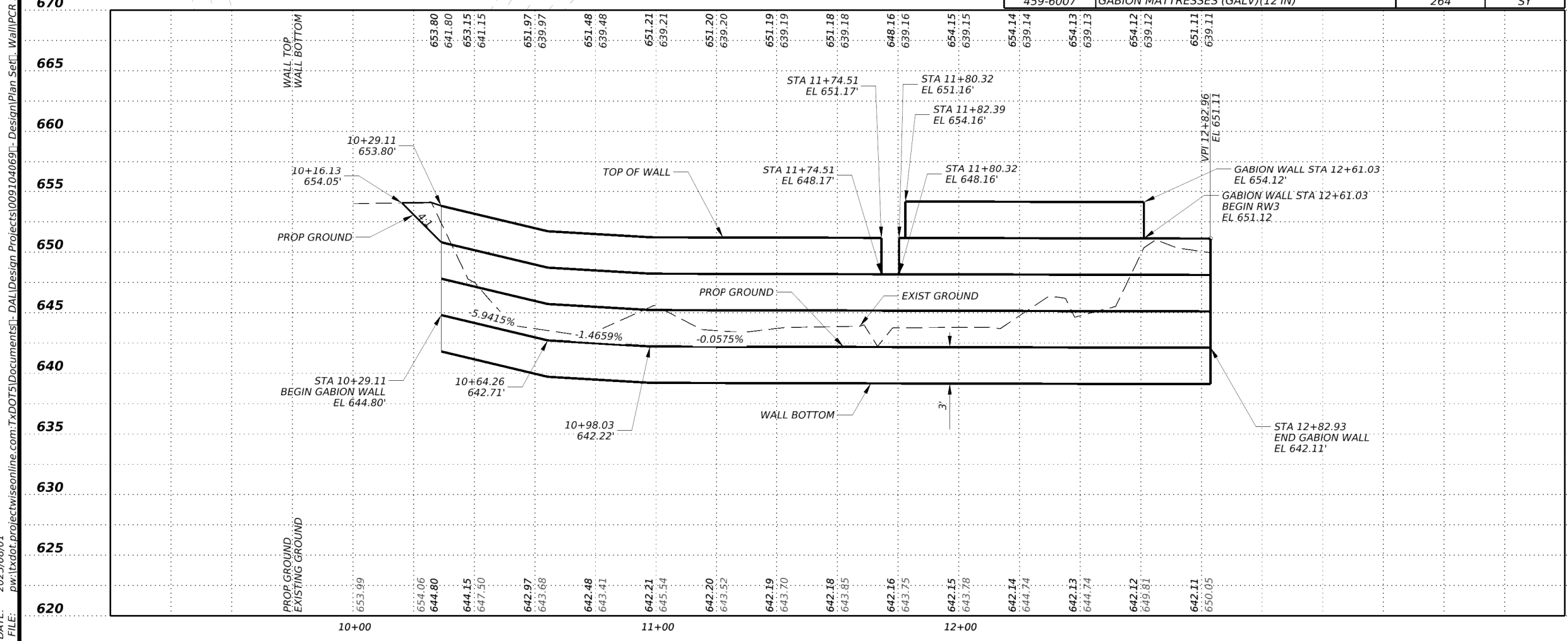
LEGEND

	GABION (GALV)
	RIPRAP (STONE PROTECTION) 12"
	RIPRAP (STONE PROTECTION) 18"
	GABION MATTRESS (12") (GALV)

- NOTE:**
- REFER TO PANTHER CREEK TRAIL ALIGNMENT DATA SHEET FOR GABION WALL ALIGNMENT DATA.
 - REFER TO RW3 LAYOUT FOR STONE RIPRAP LIMITS.
 - REFER TO PANTHER CREEK RELIEF SOUTH TEMPORARY SPECIAL SHORING SHEET FOR DETAILS.



ESTIMATED QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	UNIT
110 6001	EXCAVATION (ROADWAY)	1207	CY
110 6002	EXCAVATION (CHANNEL)	69	CY
132-6026	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	113	CY
403-6001	TEMPORARY SPL SHORING	3488	SF
432-6031	RIPRAP (STONE PROTECTION)(12 IN)	32	CY
432-6033	RIPRAP (STONE PROTECTION)(18 IN)	399	CY
459-6001	GABIONS (GALV)	770	CY
459-6007	GABION MATTRESSES (GALV)(12 IN)	264	SY



Quincy L. Armstead, P.E. 8.03.23



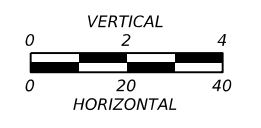
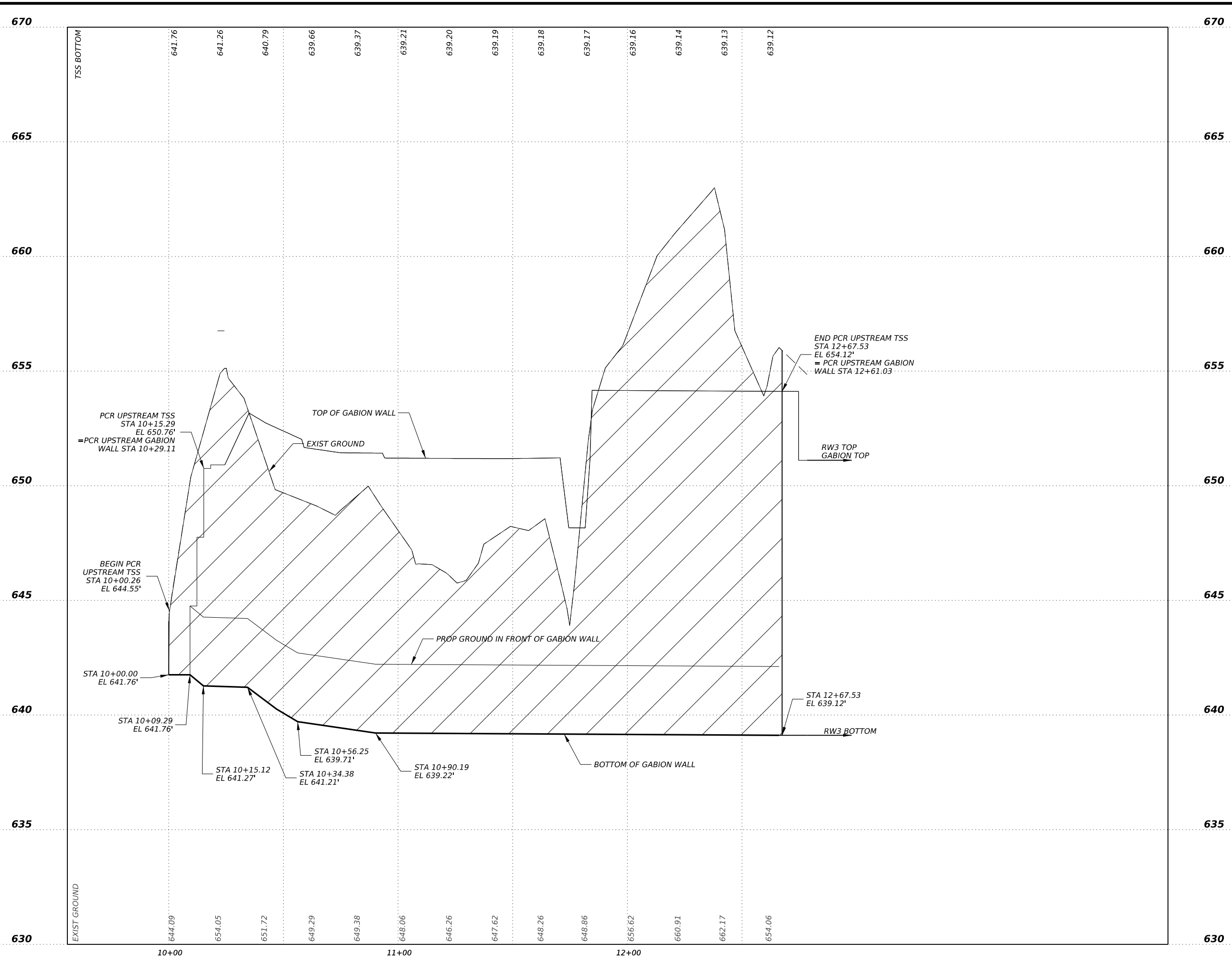
SH 289
PANTHER CREEK RELIEF
SOUTH GABION WALL
LAYOUT

SHEET 1 OF 1

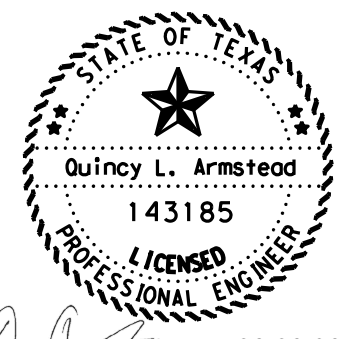
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	50	

DATE: 2023/08/01 FILE: \\p:\tdot\projectwiseonline.com\TxDOT\Documents\DAL\Design Projects\09104069\Wall\PCR South Gabion Wall Layout Sheet.dgn

DATE: 2023/08/02
 FILE: \\p:\tdot\projectwiseonline.com\TXDOT\5\Documents\DAL\Design Projects\009104069\Design\Plan Set\Wall\PCR Upstream Temporary Shoring.dgn



NOTE:
 SEE RETAINING WALL LAYOUT FOR NOTES ASSOCIATED WITH THIS WALL



Quincy L. Armstead P.E. 08.03.23

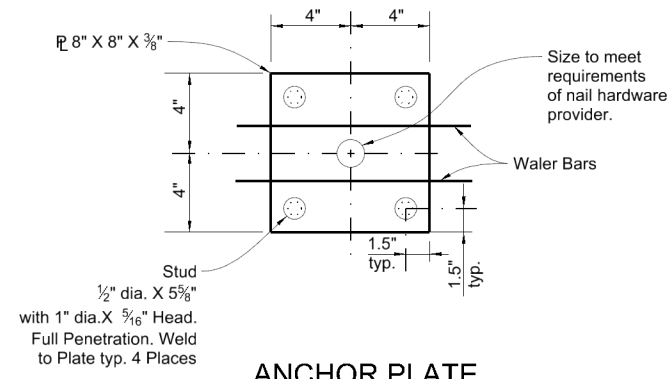
Texas Department of Transportation

SH 289
 PANTHER CREEK RELIEF
 SOUTH
 TEMPORARY SPECIAL
 SHORING

SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	52	

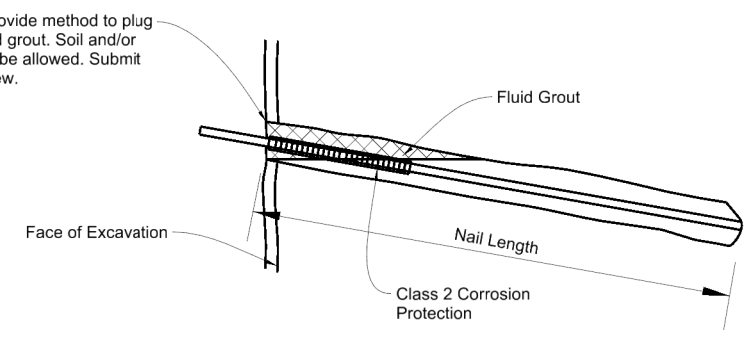
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2023/8/02
FILE: RW-SN-23-FINAL.dgn

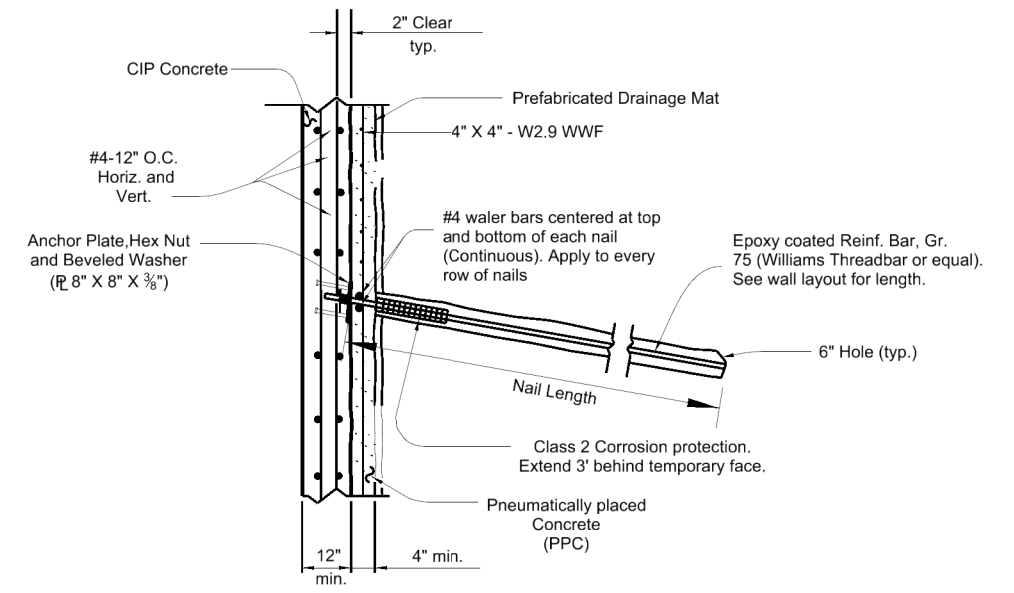


ANCHOR PLATE

Contractor to provide method to plug and contain fluid grout. Soil and/or cuttings will not be allowed. Submit method for review.

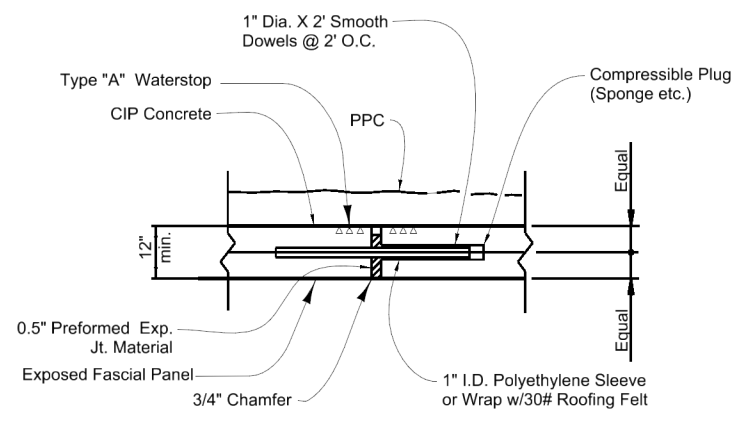


BIRD'S MOUTH BUILD-UP



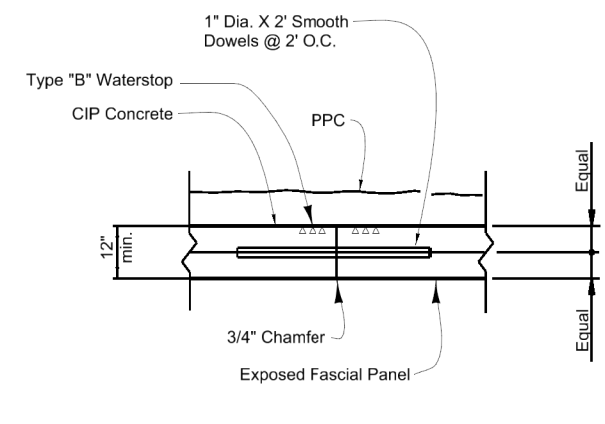
DETAIL A

NAIL REINFORCEMENT LENGTH WILL BE THE LENGTH SHOWN IN THE SOIL NAIL LAYOUT SHEETS PLUS 6 INCHES.

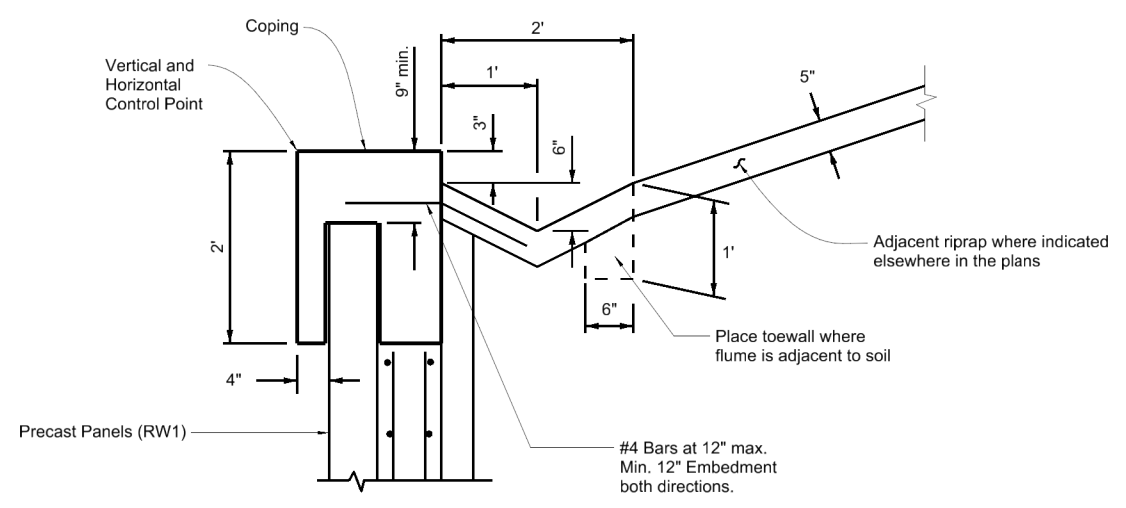


EXPANSION JOINT

Expansion joint shall be placed at distances not to exceed 96 feet

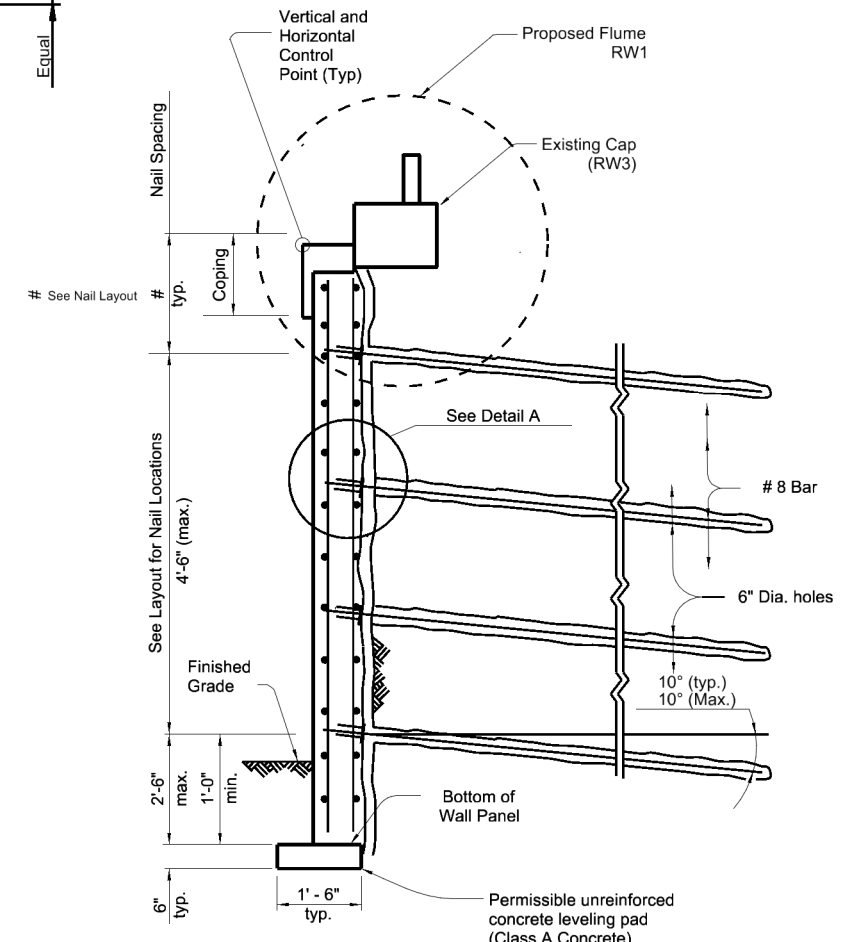


CONSTRUCTION JOINT



FLUME DETAIL

If specified in plans



TYPICAL SECTION THROUGH WALL

See wall layout for specific nail locations



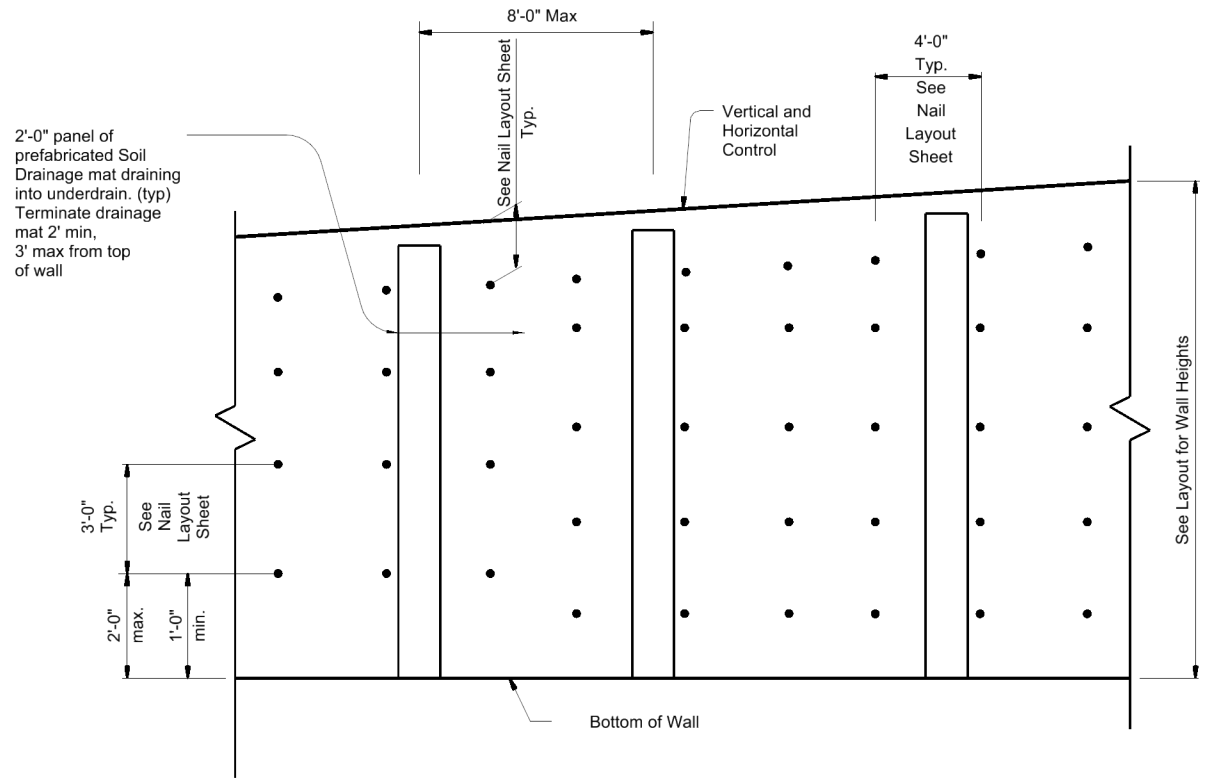
Nicasio Lozano
8/2/2023

SHEET 1 OF 3

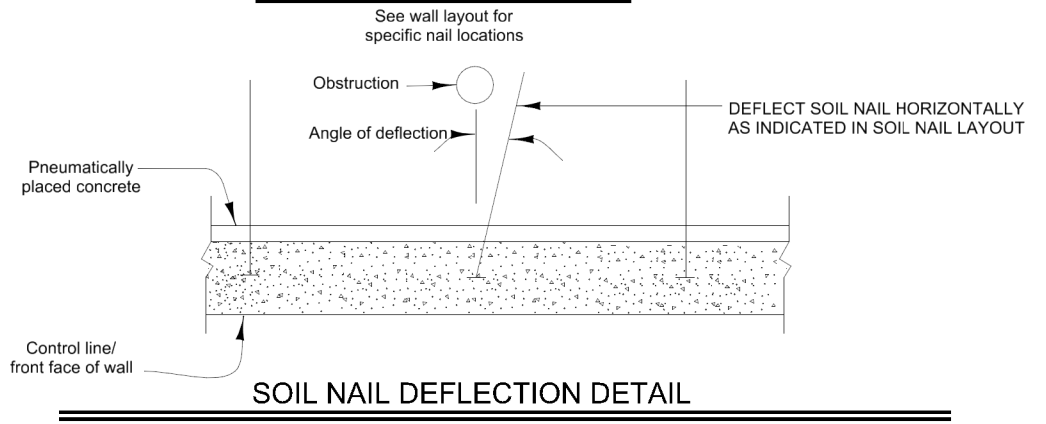
Texas Department of Transportation		Bridge Division	
SOIL NAIL RETAINING WALL MISCELLANEOUS DETAILS			
RW(SN)			
FILE: RW-SN-23.dgn	DN: NL	CK: RLE	DW: AB
REVISIONS	CONT: 0091	SECT: 04	JOB: 069
	DIST: DAL	COUNTY: Collin	SHEET NO.: 54

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DATE: 2023/8/02
 FILE: RW-SN-23-FINAL.dgn

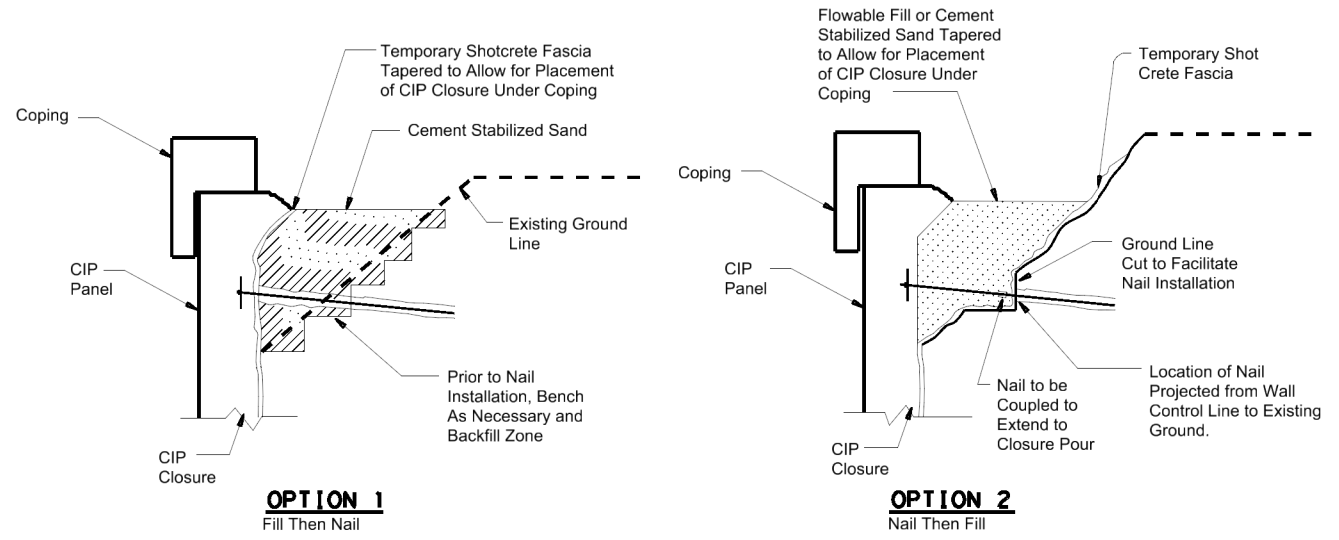


TYPICAL WALL PROFILE



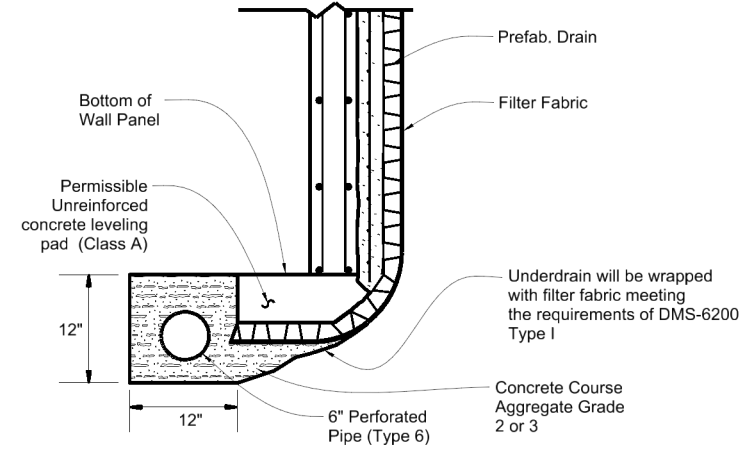
SOIL NAIL DEFLECTION DETAIL

NTS



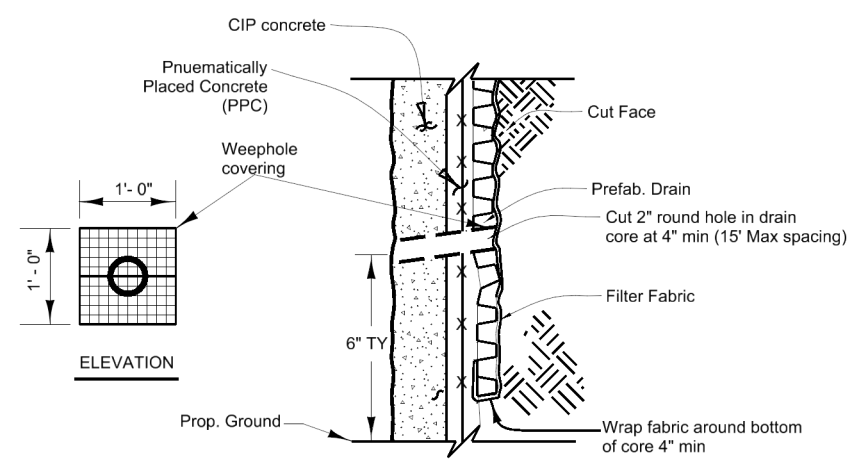
TOP OF SLOPE BUILD-UP OPTIONS

NTS

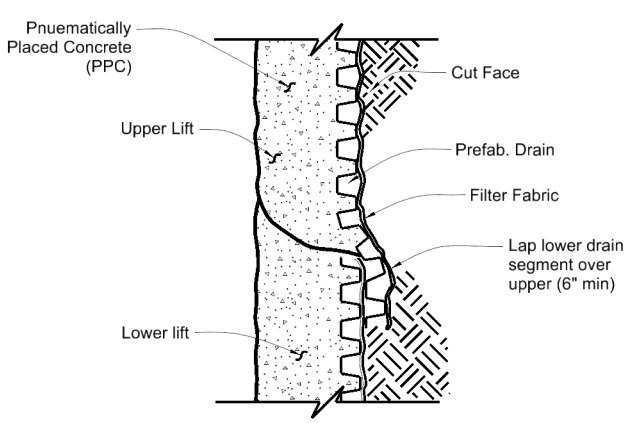


UNDERDRAIN DETAIL (RW1)

The location of the underdrain outfall will be determined by the Engineer



WEEPHOLE DETAIL (RW3)



PREFABRICATED DRAINAGE DETAIL

GENERAL NOTES:

All Concrete shall be Class "C" unless otherwise noted.
 All reinforcing steel shall be Grade 60.
 Chamfer all exposed corners 3/4".
 Test nails will be required for each wall. Nail testing shall be in accordance with the requirements shown on this sheet, and in the Soil Nail Anchor Specifications. If widely varying soil conditions are encountered the Engineer may require additional test nail anchors. Test anchors will not be paid for directly but will be considered subsidiary to the item "Retaining Walls" and can not be used as production nails.
 Pneumatically placed concrete shall comply with requirements of Item 431 "Pneumatically Placed Concrete" (Class II), except that it will not be paid for directly and strength testing will not be required. Membrane curing will be allowed in place of water curing.
 Drainage system shall consist of 2'-0" panels of Prefabricated Soil Drainage Mats emptying into an underdrain. Filter Fabric shall meet the requirements of DMS-6200. Pneumatically placed concrete shall be placed over the drains, with the Drainage Mats placed against the soil. The underdrain outfall shall be as directed by the engineer. The drainage system will not be paid for directly but will be considered subsidiary to the item "Retaining Walls."
 The price bid per square foot of Retaining Wall (Facia) shall include all concrete, reinforcing steel, pneumatically placed concrete, precast panels, drainage material, underdrain and any other materials necessary to complete the wall.
 The price bid per linear foot of Soil Nail shall include all drilling, nail reinforcement, grout, Class 2 corrosion protection, and test nails.

NAIL TESTING NOTES:

Testing to be coordinated with TxDOT a minimum of one week prior to the desired testing date. TxDOT personnel may be present during testing, and may choose to monitor the applied test load using their own equipment.
 Project Test anchors from the face of the cut enough to accommodate the Contractor's loading and measurement devices, as well as an additional 1 ft for the Department's load cell.
 Perform testing as specified in the Standard Specification Item 410 "Soil Nail Anchors" to the maximum test load stated.
 The location of the test nails will be approved by the Engineer. If widely varying soil conditions are encountered, the Engineer may require additional test nails.

CONSTRUCTION PROCEDURE:

The slope in front of the retaining wall shall be removed in lifts. The depth of each lift shall be limited to the amount necessary to install a single horizontal row of Soil Nails. At no time shall more than 5'-0" of un nailed vertical cut be exposed. The length of each lift removed shall be limited to the amount that can be nailed in one day. At no time shall any unnailed cut face be exposed for over 48 hours.
 Upon completion of each day's installation of nails, pneumatically placed concrete shall be applied to the cut face. The concrete shall be reinforced with a single layer of Welded Wire Reinforcing Fabric, 4" X 4" - W2.9. and #4 waler bars as shown. Anchor Plate, beveled washer, and nuts shall be tightened up to the face of the PPC.
 When all rows of nails have been placed, the permanent Concrete Fascia Wall shall be installed. The permanent concrete fascia wall shall be completed within 45 working days of the completion of nail placement.

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



Nicasio Lozano
 8/2/2023

SHEET 2 OF 3

		Bridge Division	
SOIL NAIL RETAINING WALL MISCELLANEOUS DETAILS			
RW(SN)			
FILE: RW-SN-23.dgn	DN: NL	CK: RLE	DW: AB
CONTRACT: 0091 04	SECTION: 069	HIGHWAY: SH 289	
DIST: DAL	COUNTY: Collin	SHEET NO.: 55	

TABLE OF ESTIMATED QUANTITIES FOR RETAINING WALL RW1		
DESCRIPTION	UNIT	QUANTITY
RETAINING WALL (SOIL NAILED) (FASCIA)	SQ FT	1,844
SOIL NAIL ANCHORS (16 FT EMBEDMENT) (24 Nails)	LF	384
SOIL NAIL ANCHORS (20 FT EMBEDMENT) (23 Nails)	LF	460
SOIL NAIL ANCHORS (30 FT EMBEDMENT) (96 Nails)	LF	2,880
TOTAL SOIL NAIL ANCHORS	LF	3,724

TABLE OF ESTIMATED QUANTITIES FOR RETAINING WALL RW3		
DESCRIPTION	UNIT	QUANTITY
RETAINING WALL (SOIL NAILED) (FASCIA)	SQ FT	3,250
SOIL NAIL ANCHORS (16 FT EMBEDMENT) (17 Nails)	LF	272
SOIL NAIL ANCHORS (20 FT EMBEDMENT) (36 Nails)	LF	720
SOIL NAIL ANCHORS (30 FT EMBEDMENT) (4 Nails)	LF	120
SOIL NAIL ANCHORS (35 FT EMBEDMENT) (143 Nails)	LF	5,005
TOTAL SOIL NAIL ANCHORS	LF	6,117

SUMMARY OF ESTIMATED QUANTITIES (WALLS RW1 AND RW3)	
Number of 16' Soil Nails	41
Number of 20' Soil Nails	59
Number of 30' Soil Nails	100
Number of 35' Soil Nails	143
Total Soil Nail Length (ft)	9841

Nail reinforcement length shall be the nail length shown in the table plus 6 inches, except at inlet locations.

All nails shall have the embedment as shown. The length of the nails for measurement and payment only include this portion of the nail, not the portion extending through the shotcrete and into the cast-in-place closure.

Testing Notes:

Testing shall be coordinated with TxDOT a minimum of one week prior to the desired testing date. TxDOT personnel shall be present during testing, and may choose to monitor the applied test load using their own equipment.

Test anchors shall project from the face of the cut enough to accommodate the Contractor's loading and measurement devices, as well as an additional 1 ft for the Department's load cell.

Testing shall be performed as specified in the Anchors* Special Specification, to the maximum test load stated.

The location of the test nails shall be approved by the Engineer. If widely varying soil conditions are encountered, the Engineer may require additional test nails.

VERIFICATION TEST LOADING SCHEDULE	
Load	Hold Time (minutes)(2)
AL(1)	1
0.13 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.25 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.38 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.50 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.63 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.75 VTL (Creep Test)	60 (recorded at 1, 2, 4, 5, 6, 10, 20, 30, 50, 60)
0.88 VTL	10
1.00 VTL	10
AL	1(3)

TABLE OF PROOF TEST SCHEDULE FOR RETAINING WALL RW1			
MATERIAL	BEGIN STA	END STA	MAXIMUM PROOF TEST LOAD PER FOOT OF BONDED ANCHOR
SOIL	ALL STATIONS		1.2 KIPS

TABLE OF PROOF TEST SCHEDULE FOR RETAINING WALL RW3			
MATERIAL	BEGIN STA	END STA	MAXIMUM PROOF TEST LOAD PER FOOT OF BONDED ANCHOR
SOIL	ALL STATIONS		1.2 KIPS

† SOIL NAIL VERIFICATION TEST ANCHORS				
RETAINING WALL	TEST NO.	TEST LOCATION	LENGTH (FT.)	MINIMUM DEVELOPMENT (KIP)
RW1	1 (S)	PANEL # 4	10	16
	1 (S)	PANEL # 1	10	16
RW3	2 (S)	PANEL # 4	10	16

(S) - Nail Test in Soil

Soil nail test anchors shall be #8 Gr. 75 Dywidag threadbar or equal.

†

Proof tests are intended to verify that the contractor's construction procedure has remained constant and that the nails have not been drilled and grouted in a soil zone not tested by the verification stage testing.

Proof tests are conducted during construction on a specified percentage, typically five (5) percent, of the total production nails installed.

Soil nails are proof tested to a load typically equal to the design load.

Production proof test nails have both bonded and (temporary) unbonded lengths. Specifications require that the temporary unbonded length of the test nail must be at least 3 ft. The maximum bonded length is based on the nail bar grade and size such that the allowable bar tensile force is not exceeded during testing. The typical minimum bonded length is 10 ft. Production proof test nails shorter than 12 ft may be tested with less than the minimum 10 ft bond length.

The acceptance criteria require that no pullout failure occurs and that the total movement at the maximum test load of design load must exceed 80 percent of the theoretical elastic movement of the unbonded length.

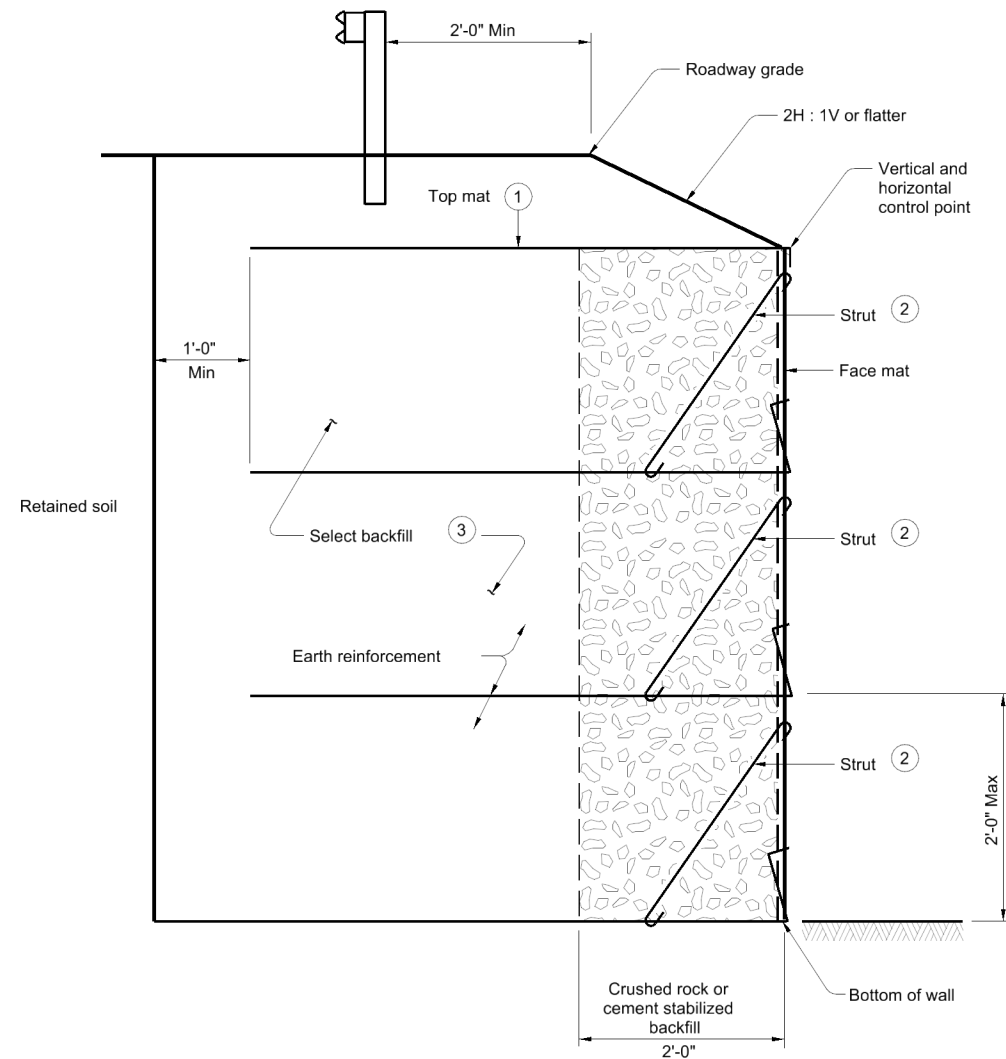


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8/2/2023

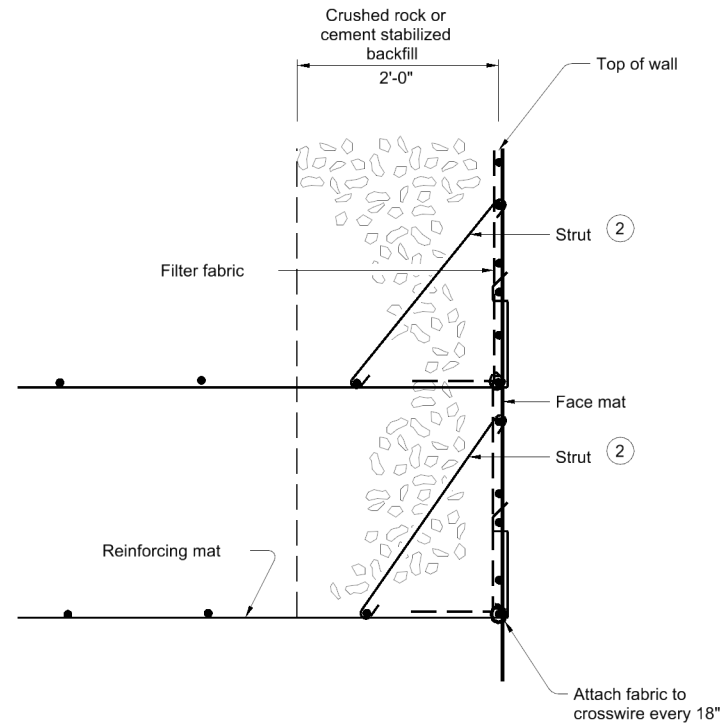
		Dallas District Bridge	
SH 289 SOIL NAIL RETAINING WALL MISCELLANEOUS DETAILS ESTIMATED QUANTITIES			
FILE: SEE PATH	DN: NL	CK: YC	DW: NT
2018	CONT	SECT	JOB
REVISIONS	0091	04	069
	DIST	COUNTY	SHEET NO.
	DAL	COLLIN	56

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TYPICAL SECTION
 (Showing top mat option.)



DETAIL OF WALL FACE
 (Showing strut option.)

- 1 Provide top mat to stabilize top of wall. Contractor may propose alternate method to stabilize top of wall for review.
- 2 Provide intermediate struts to stabilize face. Wall supplier may propose alternate methods of face stabilization for review.
- 3 Shop drawings must include drainage provisions and details for backfill composed of:
 Cement stabilized sand,
 Crushed concrete, or
 Type CS fill with a fines content greater than 15%.

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. Pull the fabric into the corner and attach to the basket with hog rings or tie wire. Extend the coarse rock or cement stabilized backfill in the 2-foot zone behind the face completely to the top of the face mat. Take particular care not to leave a gap or void below the next layer of earth reinforcement.

DESIGN CRITERIA NOTES:

Design Parameters:
 Base design of retaining walls on the following design parameters unless stated elsewhere in the plans:

Random Backfill (Embankment or Existing Soils)	Unit Weight = 120 pcf $\phi = 30^\circ$ C = 0 psf
Select Backfill	Unit Weight = 120 pcf $\phi = 30^\circ$ C = 0 psf

Limit allowable stresses and pullout of earth reinforcement in accordance with current AASHTO Standard Specifications for Highway Bridges and Interim Specifications.

Stability Criteria:
 Base design on the following factors of safety:

Sliding along the base of the structure	Factor of Safety ≥ 1.5
Overtopping	Factor of Safety ≥ 2.0
Pullout of Earth Reinforcement	Factor of Safety ≥ 1.5

Design the wall such that the base pressure resultant falls within the middle third of the retaining wall.

EARTH REINFORCEMENT:

Space vertical earth reinforcement at 24 inch maximum. Provide earth reinforcement lengths adhering to the following:
 6-foot minimum for walls 6 feet and shorter
 8-foot minimum for walls over 6 feet tall,
 or as shown elsewhere in the plans.
 Utilize a minimum W4.5 wire size for welded wire earth reinforcement. Space longitudinal wire at maximum of 12 inches and transverse wire at a maximum of 24 inches.
 Geogrid earth reinforcement is permissible. If geogrid is to be used, provide a detail showing the connection between the welded wire face basket and the geogrid earth reinforcement.
 Provide non-metallic or galvanized reinforcement for any temporary earth wall reinforcement that will be placed in the reinforced volume of a permanent MSE wall.

WALL FACE:

Provide welded wire in facing with a minimum W4.5 wire size. Space wire at 6 inches maximum in both the horizontal and vertical directions. Design the facing to maintain a vertical position during wall backfilling. Utilize wire struts, external bracing, or other means which provide acceptable performance. Stop construction if the face does not remain vertical during wall backfilling until the system is modified to meet this requirement.
 Provide angled struts or a top mat to stabilize the top basket face. Space struts at 24 inch maximum.

GENERAL NOTES:

Sections shown are for informational purposes only. Determine specific geometry based on wall layouts and other plan information.
 Extend the select backfill specified for use within the temporary earth wall select volume a minimum of 1 foot horizontally beyond the end of the earth reinforcement from the back of the 2-foot backfill zone.

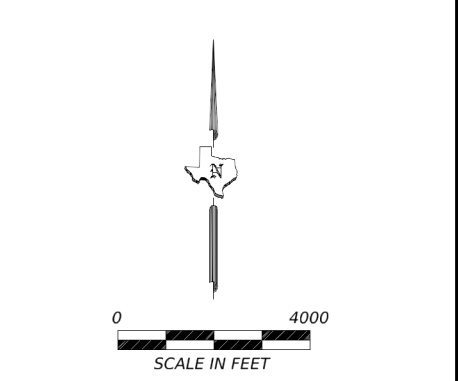
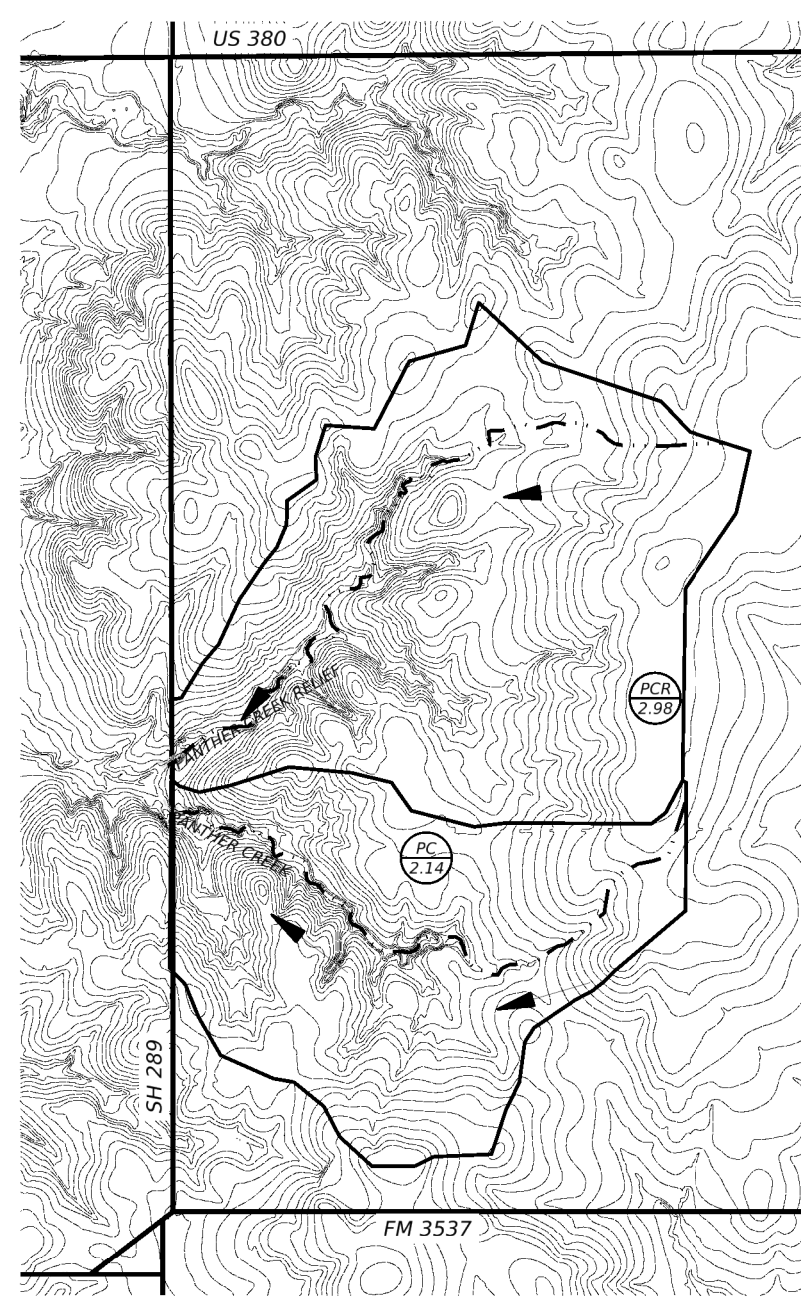
				Bridge Division Standard	
<h2>TEMPORARY EARTH RETAINING WALL</h2>					
<h3>RW(TEW)</h3>					
FILE: RW-TEW-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE	
CONT: June 2022	SECT: 0091	JOB: 04	HIGHWAY: 069	SH 289	
REVISIONS		DIST: DAL	COUNTY: COLLIN	SHEET NO.: 57	

DW: CK: DW: CK: DW: CK:

INFORMATION FOR AREAS	COLLIN COUNTY USDA MAP PANTHER CREEK	COLLIN COUNTY USDA MAP PANTHER CREEK RELIEF
DRAINAGE AREA (AC)	1367.24	1905.8
WEIGHTED CN	79	82
TC (HR)	1.033	1.22
AVERAGE SLOPE (FT/FT)	0.009118	0.009868
TOTAL FLOW LENGTH (LF)	14,477	17,643
Q 50 YR (FT)	3489.43	4683.66
Q 100 YR (FT)	4055.94	5316.95
HW 50 YR (FT)	655.45	653.67
HW 100 YR (FT)	656.01	654.17

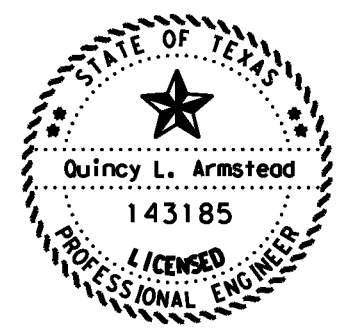
PANTHER CREEK HECRAS HYDRAULIC DATA												
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #
PANTHER CREEK	66712	50-year	3098	653.21	664.03		664.65	0.023301	6.42	502.96	137.6	0.54
PANTHER CREEK	66712	100-year	3840	653.21	664.41		665.19	0.027389	7.23	556.57	144.47	0.59
PANTHER CREEK	66655	50-year	3098	653.95	663.9		663.98	0.004653	2.31	1363.4	447.29	0.23
PANTHER CREEK	66655	100-year	3840	653.95	664.37		664.47	0.004516	2.49	1575.15	457.83	0.23
PANTHER CREEK	66370	50-year	3098	650.42	662.1		662.21	0.008781	2.35	1254.4	399.65	0.23
PANTHER CREEK	66370	100-year	3840	650.42	662.73		662.84	0.007448	2.43	1506.58	409.23	0.21
PANTHER CREEK	65714	50-year	3098	645.53	656.26		656.56	0.008366	4.47	708.44	117.96	0.3
PANTHER CREEK	65714	100-year	3840	645.53	656.79		657.19	0.009944	5.12	772.88	123.19	0.33
PANTHER CREEK	65700	50-year	3489.43	645.35	656.09	652.39	656.46	0.005689	4.94	717.91	138.02	0.34
PANTHER CREEK	65700	100-year	4055.94	645.35	656.66	652.83	657.09	0.005779	5.26	786.53	146.84	0.34
PANTHER CREEK	65686		Bridge									
PANTHER CREEK	65451	50-year	3489.43	642.15	653.15	649.93	653.62	0.019543	5.56	656.05	257.49	0.38
PANTHER CREEK	65451	100-year	4055.94	642.15	653.51	650.43	654.06	0.021899	6.09	697.87	270.13	0.41
PANTHER CREEK	65343	50-year	3489.43	641.16	652.31		652.57	0.005302	4.12	915.66	235.44	0.3
PANTHER CREEK	65343	100-year	4055.94	641.16	652.55		652.86	0.006135	4.55	972.81	250.4	0.33
PANTHER CREEK	65235	50-year	3489.43	640.16	651.83		651.99	0.004928	3.19	1112.14	302.11	0.25
PANTHER CREEK	65235	100-year	4055.94	640.16	651.98		652.17	0.005874	3.56	1158.75	326.92	0.28
PANTHER CREEK	64714	50-year	3489.43	638.07	647.2	647.2	648.09	0.012134	7.54	465.03	278.19	1.01
PANTHER CREEK	64714	100-year	4055.94	638.07	647.84	647.45	648.41	0.008893	6.07	681.81	418.96	0.81
PANTHER CREEK	64303	50-year	6327	630.74	645.95		646.23	0.002654	4.28	1502.28	576.15	0.46
PANTHER CREEK	64303	100-year	7952	630.74	646.54		646.84	0.002575	4.39	1846.18	585.72	0.43

PANTHER CREEK RELIEF HECRAS HYDRAULIC DATA												
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude #
PCR-Lower	999	50-year	4683.66	643.24	654.41	647.59	654.68	0.001593	4.14	1132.65	172.56	0.22
PCR-Lower	999	100-year	5316.95	643.24	655	647.94	655.3	0.001722	4.45	1194.08	175.02	0.23
PCR-Lower	995	50-year	4683.66	643.24	654.14	647.59	654.42	0.001733	4.24	1104.5	171.51	0.23
PCR-Lower	995	100-year	5316.95	643.24	654.7	647.94	655.03	0.001878	4.57	1163.38	173.79	0.24
PCR-Lower	908		Bridge									
PCR-Lower	859	50-year	4683.66	639.97	653.38	644.57	653.54	0.000793	3.21	1460.55	278.88	0.16
PCR-Lower	859	100-year	5316.95	639.97	653.85	644.89	654.04	0.000903	3.51	1515.8	303.32	0.17
PCR-Lower	818	50-year	4683.66	639.68	653.31		653.48	0.002046	3.29	1422.07	243.18	0.24
PCR-Lower	818	100-year	5316.95	639.68	653.8		653.98	0.002159	3.45	1541.39	251.99	0.25
PCR-Lower	777	50-year	4683.66	639.4	651.98		653.02	0.021786	8.33	615.38	148.44	0.54
PCR-Lower	777	100-year	5316.95	639.4	652.24		653.46	0.024417	9.03	656.8	164.51	0.57
PCR-Lower	624	50-year	4683.66	637.75	651.26		651.78	0.003487	6.02	931.8	312.82	0.42
PCR-Lower	624	100-year	5316.95	637.75	651.49		652.07	0.003793	6.43	1006.66	321.02	0.44
PCR-Lower	377	50-year	4683.66	637.87	648.91	648.91	650.32	0.010023	10.5	629.88	280.26	0.72
PCR-Lower	377	100-year	5316.95	637.87	649.43	649.43	650.66	0.008504	10.16	790.63	342.15	0.67
PCR-Lower	144	50-year	4683.66	633.61	647.22	645.15	647.6	0.007106	5.06	1002.94	326	0.41
PCR-Lower	144	100-year	5316.95	633.61	647.54	645.31	647.95	0.007108	5.28	1110.99	349.03	0.41



LEGEND

- BOUNDARY AREA
- AREA NAME
DRAINAGE AREA (Square Miles)
- FLOW DIRECTION
- DRAINAGE PATH



Quincy L. Armstead, P.E.
08.03.23

NOTE:
 1. DESIGN Q AND FLOWS WERE OBTAINED FROM USDA CONTOUR MAP, WINTR-55 AND FEMA HEC-RAS MODEL DATED 02 JUNE 2021 FOR PANTHER CREEK AND PANTHER CREEK TRIBUTARY 1 AND 1A (PANTHER CREEK RELIEF) IN COLLIN COUNTY, TEXAS.
 2. HEC-RAS VERSION 6.3.1 SEPTEMBER 2022 WAS USED FOR THE HYDRAULIC ANALYSIS.

Texas Department of Transportation

SH 289

**HYDRAULIC DATA
PANTHER CREEK AND
PANTHER CREEK RELIEF**

SHEET 1 OF 1

CONTRACT	SECTION	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	COLLIN	58	

DATE: 8/2/2023 6:20:51 PM
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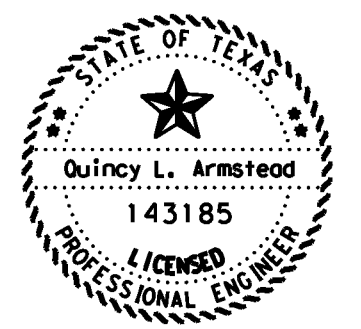
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NODE COMPUTATION

ID	PROFILE TYPE	LIBRARY ITEM NAME	REFERENCE CHAIN	Elevation (Ground) (ft)	STATION	OFFSET	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert in) (ft)	Flow (Total In) (cfs)	Elevation (Invert out) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Depth (In) (ft)
PCRJB	ON GRADE	PJB-8'X8'	TRAIL CL	657.92	12+45.40	37.56' LT	TRUE	657.92	653.41	89.32	651.25	89.32	4.03	651.25	656.87	2.87

CONDUIT COMPUTATION

ID	Conduit Description	Length (Scaled) (ft)	Slope (Calculated) (%)	Flow (cfs)	Capacity (Full Flow) (cfs)	Upstream Structure	Invert (Start) (ft)	Depth (In) (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Velocity (In) (ft/s)	Downstream Structure	Invert (Stop) (ft)	Depth (Out) (ft)	Downstream Structure Hydraulic Grade Line (Out) (ft)	Velocity (Out) (ft/s)
1160	SBC	49.7	0.85	89.32	104.08	PJB-8'x8'	647.22	1.90	651.25	7.82	SET	646.80	1.55	(N/A)	9.60
1616	RCP	32	4.31	4.60	21.80	EX-PCU	658.06	0.82	658.88	9.05	SET	646.68	0.47	658.45	9.05



Quincy L. Armstead, P.E.

08.03.23



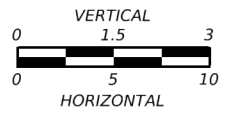
SH 289
PANTHER CREEK RELIEF DRAINAGE COMPUTATIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	59	

DATE: 2023/07/11
 FILE: DOCUMENT NAME

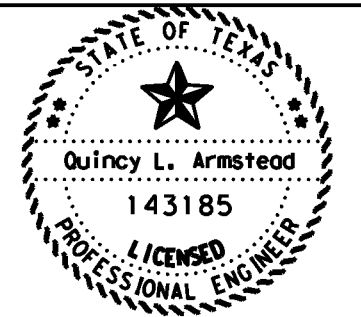
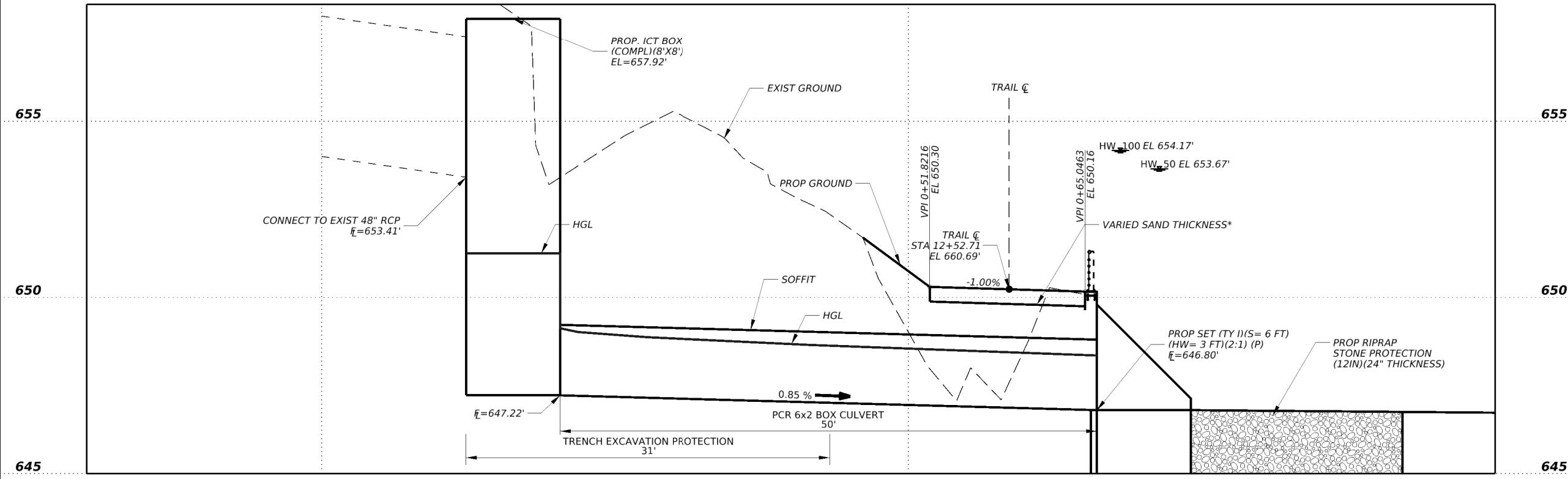
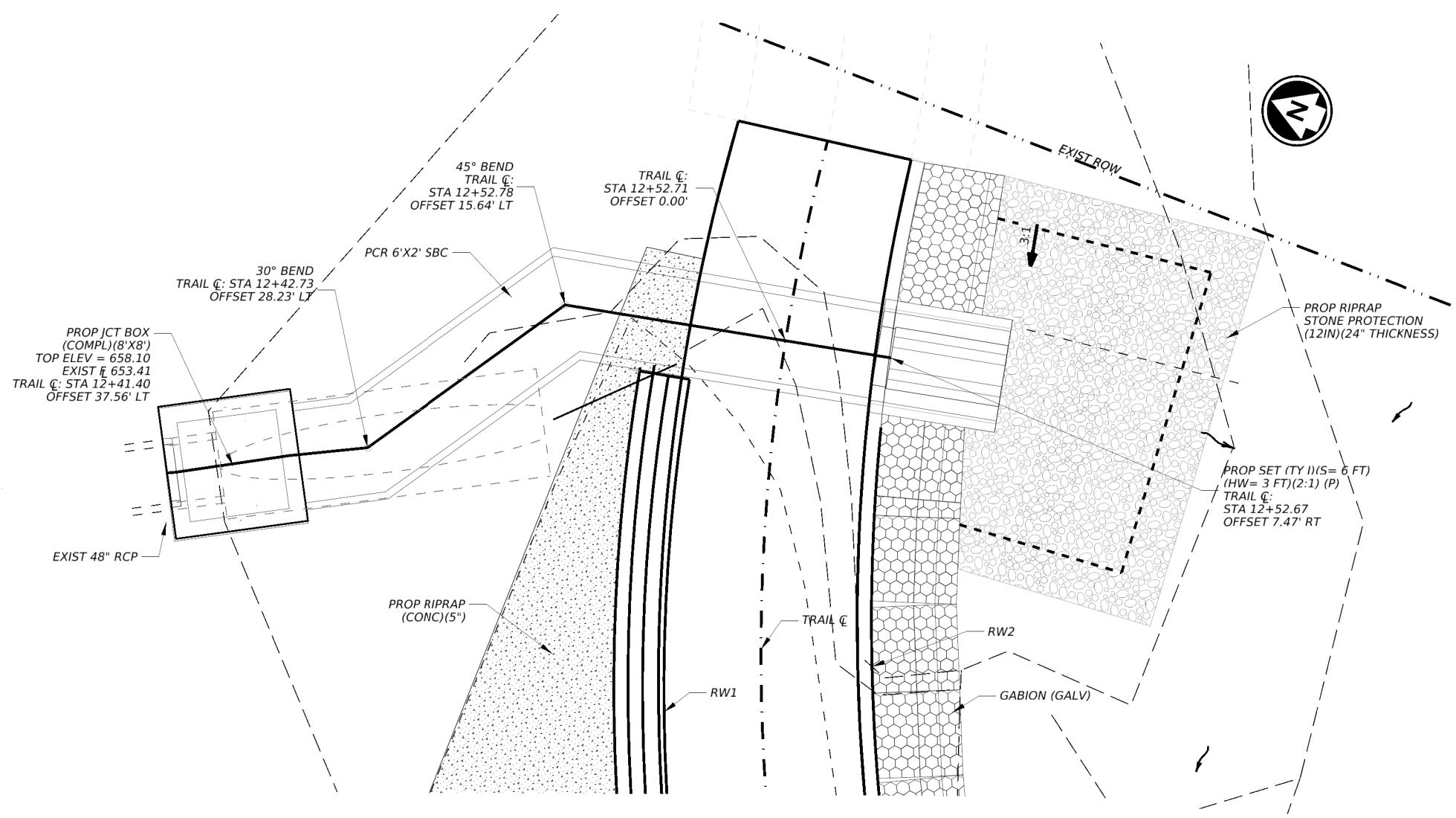
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- LEGEND:**
- GABIONS (GALV) (3'X3')
 - GABION MAT. (GALV) (12'')
 - RIPRAP (CONC) (5'')
 - STONE PROTECTION (12'')

NOTES:

*SEE PANTHER CREEK RELIEF PLAN AND PROFILE FOR VARIED COMPACTED SAND THICKNESS BETWEEN TRAIL AND PCR-SBC 6'X2'



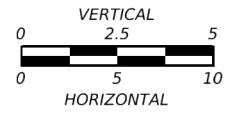
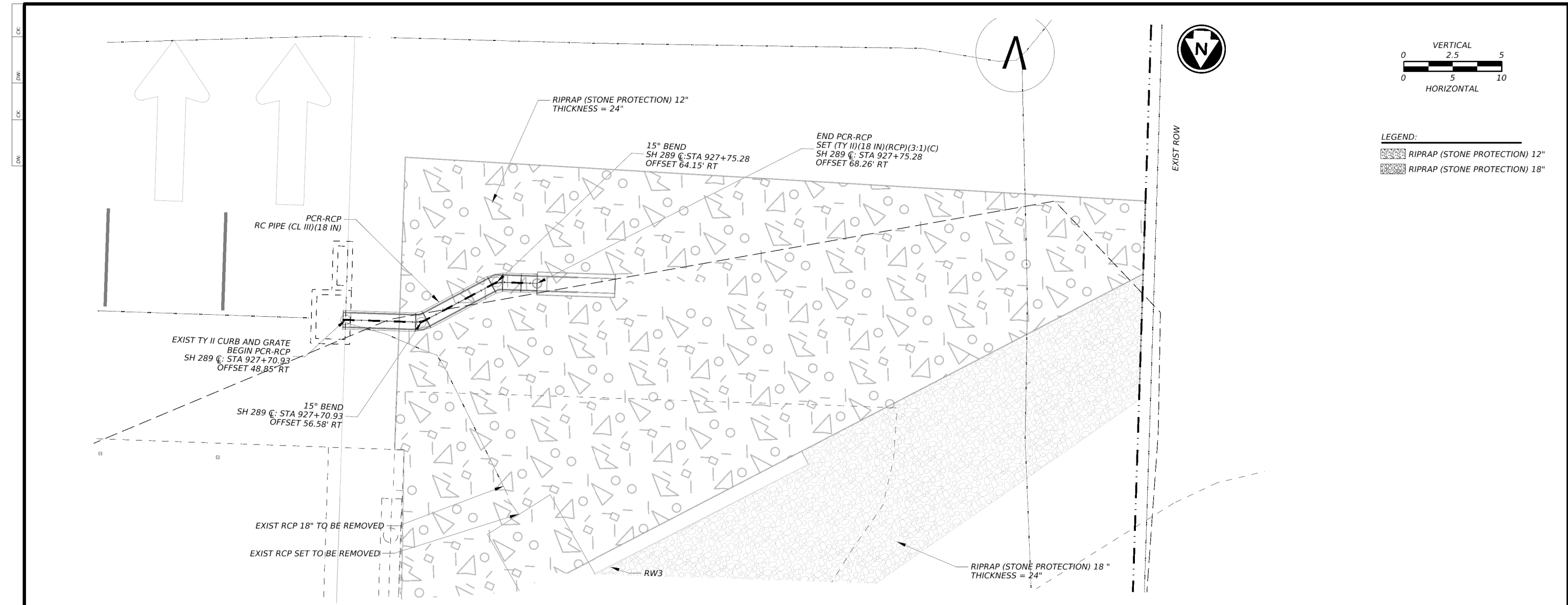
Quincy L. Armstead, P.E. 8.03.23

Texas Department of Transportation

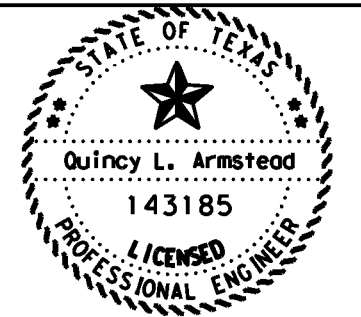
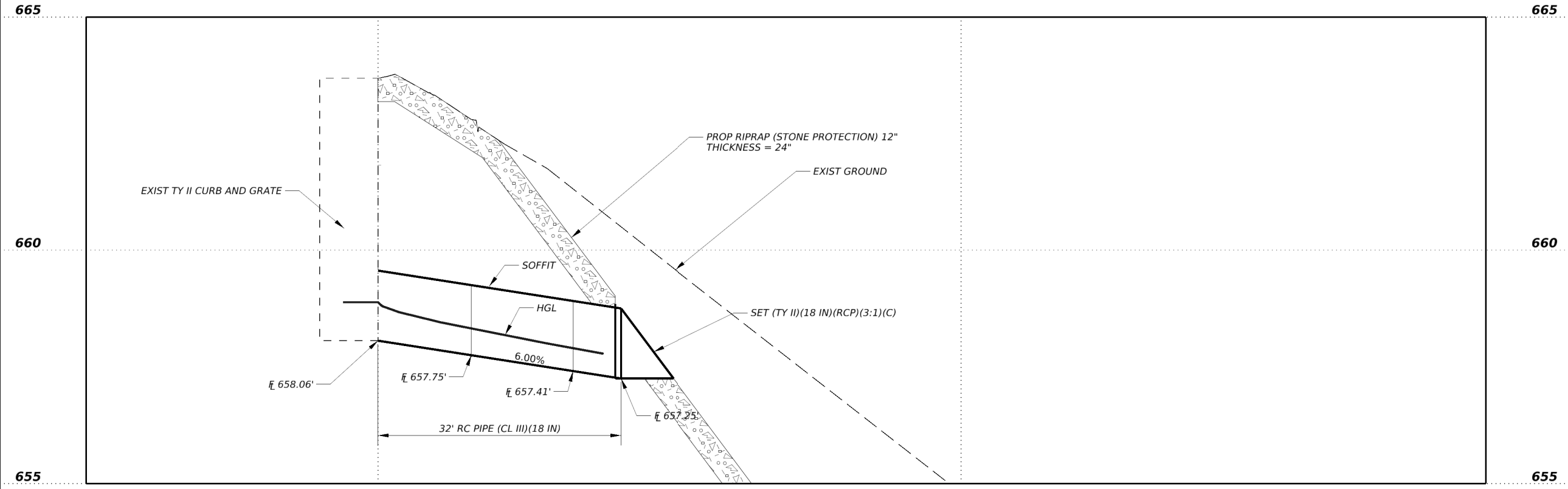
SH 289
 PANTHER CREEK RELIEF
 STORM SEWER LAYOUT

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	60	



LEGEND:
 RIPRAP (STONE PROTECTION) 12"
 RIPRAP (STONE PROTECTION) 18"



Quincy L. Armstead, P.E. 8.03.23



SH 289
 PANTHER CREEK RELIEF
 STORM SEWER LAYOUT

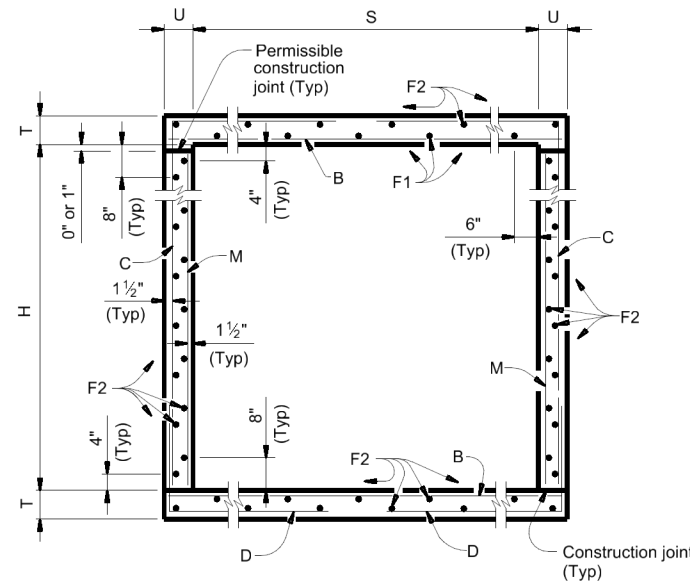
SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	61	

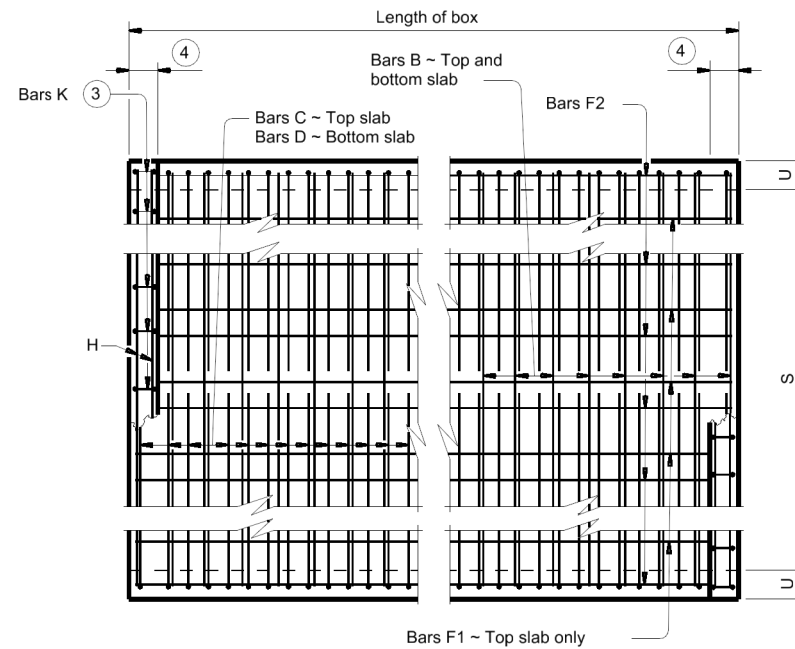
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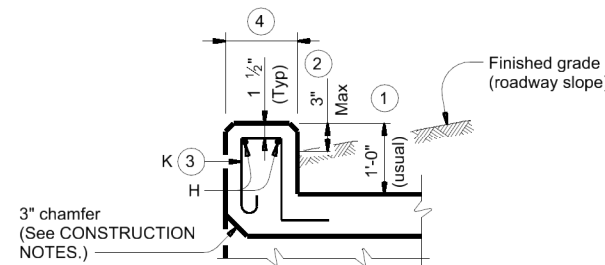
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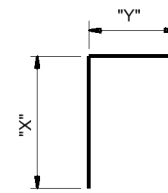
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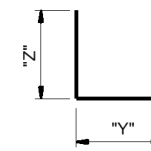
PLAN OF REINF STEEL



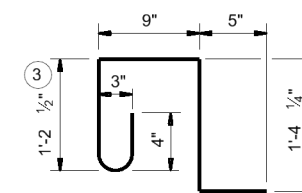
SECTION THRU CURB



BARS C



BARS D



BARS K (#4)
 (Spa = 1'-0" Max)
 (Length = 4'-2")

- ① 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
- ② For vehicle safety, the following requirements must be met:
 - For structures without bridge rail, construct curbs no more than 3" above finished grade.
 - For structures with bridge rail, construct curbs flush with finished grade.
 Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ③ For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- ④ 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
 Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
 If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

- Do not use permanent forms.
- Chamfer the bottom edge of the top slab 3" at the entrance.
- Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

- Provide Grade 60 reinforcing steel.
- Provide galvanized reinforcing steel if required elsewhere in the plans.
- Provide Class C concrete (f_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f_c = 4,000 psi) for top slabs of:
 - culverts with overlay,
 - culverts with 1-to-2 course surface treatment, or
 - culverts with the top slab as the final riding surface.
- Provide bar laps, where required, as follows:
 - Uncoated or galvanized ~ #4 = 1'-8" Min
 - Uncoated or galvanized ~ #5 = 2'-1" Min
 - Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

- Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
- See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING

SHEET 1 OF 2

		Bridge Division Standard	
SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL			
SCC-5 & 6			
FILE: scc56ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT
CONT: February 2020	SECT:	JOB: 069	HIGHWAY: SH 289
REVISIONS		0091 04	069 SH 289
04/2021 Updated X values.		DIST: DAL	COUNTY: COLLIN SHEET NO.: 63

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 units or for the accuracy of the information presented herein. The user is responsible for verifying the accuracy of the information presented herein. **FILE: c:\txdot\pw_online\txdot5\pwnonline_jonathan_rich\0955406\scc56ste-2.dgn**

SECTION DIMENSIONS				FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																								QUANTITIES														
					Bars B					Bars C					Bars D					Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total					
					S	H	T	U	No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)
5' - 0"	2' - 0"	8"	7"	26'	108	#6	9"	5' - 11"	960	108	#5	9"	6' - 3"	704	2' - 6"	3' - 9"	108	#5	9"	6' - 5"	723	3' - 9"	2' - 8"	108	9"	2' - 0"	144	4	39' - 9"	106	22	39' - 9"	584	5' - 11"	16	14	39	0.391	80.5	0.5	55	16.1	3,276
5' - 0"	2' - 0"	9"	7"	30'	108	#6	9"	5' - 11"	960	108	#5	9"	6' - 4"	713	2' - 7"	3' - 9"	108	#5	9"	6' - 6"	732	3' - 9"	2' - 9"	108	9"	2' - 0"	144	4	39' - 9"	106	22	39' - 9"	584	5' - 11"	16	14	39	0.429	81.0	0.5	55	17.6	3,294
5' - 0"	3' - 0"	8"	7"	26'	108	#6	9"	5' - 11"	960	108	#5	9"	7' - 3"	817	3' - 6"	3' - 9"	108	#5	9"	6' - 5"	723	3' - 9"	2' - 8"	108	9"	3' - 0"	216	4	39' - 9"	106	26	39' - 9"	690	5' - 11"	16	14	39	0.434	87.8	0.5	55	17.8	3,567
5' - 0"	3' - 0"	9"	7"	30'	108	#6	9"	5' - 11"	960	108	#5	9"	7' - 4"	826	3' - 7"	3' - 9"	108	#5	9"	6' - 6"	732	3' - 9"	2' - 9"	108	9"	3' - 0"	216	4	39' - 9"	106	26	39' - 9"	690	5' - 11"	16	14	39	0.472	88.3	0.5	55	19.3	3,585
5' - 0"	4' - 0"	8"	7"	26'	108	#6	9"	5' - 11"	960	108	#5	9"	8' - 3"	929	4' - 6"	3' - 9"	108	#5	9"	6' - 5"	723	3' - 9"	2' - 8"	108	9"	4' - 0"	289	4	39' - 9"	106	26	39' - 9"	690	5' - 11"	16	14	39	0.477	92.4	0.5	55	19.5	3,752
5' - 0"	4' - 0"	9"	7"	30'	108	#6	9"	5' - 11"	960	108	#5	9"	8' - 4"	939	4' - 7"	3' - 9"	108	#5	9"	6' - 6"	732	3' - 9"	2' - 9"	108	9"	4' - 0"	289	4	39' - 9"	106	26	39' - 9"	690	5' - 11"	16	14	39	0.515	92.9	0.5	55	21.1	3,771
5' - 0"	5' - 0"	8"	7"	26'	108	#6	9"	5' - 11"	960	108	#5	9"	9' - 3"	1,042	5' - 6"	3' - 9"	108	#5	9"	6' - 5"	723	3' - 9"	2' - 8"	108	9"	5' - 0"	361	4	39' - 9"	106	30	39' - 9"	797	5' - 11"	16	14	39	0.521	99.7	0.5	55	21.3	4,044
5' - 0"	5' - 0"	9"	7"	30'	108	#6	9"	5' - 11"	960	108	#5	9"	9' - 4"	1,051	5' - 7"	3' - 9"	108	#5	9"	6' - 6"	732	3' - 9"	2' - 9"	108	9"	5' - 0"	361	4	39' - 9"	106	30	39' - 9"	797	5' - 11"	16	14	39	0.559	100.2	0.5	55	22.8	4,062
6' - 0"	2' - 0"	8"	7"	20'	108	#6	9"	6' - 11"	1,122	108	#5	9"	6' - 7"	742	2' - 6"	4' - 1"	108	#5	9"	6' - 9"	760	4' - 1"	2' - 8"	108	9"	2' - 0"	144	5	39' - 9"	133	25	39' - 9"	664	6' - 11"	18	16	45	0.440	89.1	0.5	63	18.1	3,628
6' - 0"	2' - 0"	9"	7"	26'	108	#6	9"	6' - 11"	1,122	162	#5	6"	6' - 8"	1,126	2' - 7"	4' - 1"	162	#5	6"	6' - 10"	1,155	4' - 1"	2' - 9"	108	9"	2' - 0"	144	5	39' - 9"	133	25	39' - 9"	664	6' - 11"	18	16	45	0.485	108.6	0.5	63	19.9	4,407
6' - 0"	2' - 0"	10"	8"	30'	108	#6	9"	7' - 1"	1,149	162	#5	6"	6' - 10"	1,155	2' - 8"	4' - 2"	162	#5	6"	7' - 0"	1,183	4' - 2"	2' - 10"	82	12"	2' - 0"	110	5	39' - 9"	133	25	39' - 9"	664	7' - 1"	19	18	50	0.551	109.9	0.5	69	22.6	4,463
6' - 0"	3' - 0"	8"	7"	20'	108	#6	9"	6' - 11"	1,122	108	#5	9"	7' - 7"	854	3' - 6"	4' - 1"	108	#5	9"	6' - 9"	760	4' - 1"	2' - 8"	108	9"	3' - 0"	216	5	39' - 9"	133	29	39' - 9"	770	6' - 11"	18	16	45	0.484	96.4	0.5	63	19.9	3,918
6' - 0"	3' - 0"	9"	7"	26'	108	#6	9"	6' - 11"	1,122	162	#5	6"	7' - 8"	1,295	3' - 7"	4' - 1"	162	#5	6"	6' - 10"	1,155	4' - 1"	2' - 9"	108	9"	3' - 0"	216	5	39' - 9"	133	29	39' - 9"	770	6' - 11"	18	16	45	0.528	117.3	0.5	63	21.6	4,754
6' - 0"	3' - 0"	10"	8"	30'	108	#6	9"	7' - 1"	1,149	162	#5	6"	7' - 10"	1,324	3' - 8"	4' - 2"	162	#5	6"	7' - 0"	1,183	4' - 2"	2' - 10"	82	12"	3' - 0"	164	5	39' - 9"	133	29	39' - 9"	770	7' - 1"	19	18	50	0.601	118.1	0.5	69	24.6	4,792
6' - 0"	4' - 0"	8"	7"	20'	108	#6	9"	6' - 11"	1,122	108	#5	9"	8' - 7"	967	4' - 6"	4' - 1"	108	#5	9"	6' - 9"	760	4' - 1"	2' - 8"	108	9"	4' - 0"	289	5	39' - 9"	133	29	39' - 9"	770	6' - 11"	18	16	45	0.527	101.0	0.5	63	21.6	4,104
6' - 0"	4' - 0"	9"	7"	26'	108	#6	9"	6' - 11"	1,122	162	#5	6"	8' - 8"	1,464	4' - 7"	4' - 1"	162	#5	6"	6' - 10"	1,155	4' - 1"	2' - 9"	108	9"	4' - 0"	289	5	39' - 9"	133	29	39' - 9"	770	6' - 11"	18	16	45	0.571	123.3	0.5	63	23.4	4,996
6' - 0"	4' - 0"	10"	8"	30'	108	#6	9"	7' - 1"	1,149	162	#5	6"	8' - 10"	1,493	4' - 8"	4' - 2"	162	#5	6"	7' - 0"	1,183	4' - 2"	2' - 10"	82	12"	4' - 0"	219	5	39' - 9"	133	29	39' - 9"	770	7' - 1"	19	18	50	0.650	123.7	0.5	69	26.5	5,016
6' - 0"	5' - 0"	8"	7"	20'	108	#6	9"	6' - 11"	1,122	108	#5	9"	9' - 7"	1,080	5' - 6"	4' - 1"	108	#5	9"	6' - 9"	760	4' - 1"	2' - 8"	108	9"	5' - 0"	361	5	39' - 9"	133	33	39' - 9"	876	6' - 11"	18	16	45	0.570	108.3	0.5	63	23.3	4,395
6' - 0"	5' - 0"	9"	7"	26'	108	#6	9"	6' - 11"	1,122	162	#5	6"	9' - 8"	1,633	5' - 7"	4' - 1"	162	#5	6"	6' - 10"	1,155	4' - 1"	2' - 9"	108	9"	5' - 0"	361	5	39' - 9"	133	33	39' - 9"	876	6' - 11"	18	16	45	0.614	132.0	0.5	63	25.1	5,343
6' - 0"	5' - 0"	10"	8"	30'	108	#6	9"	7' - 1"	1,149	162	#5	6"	9' - 10"	1,661	5' - 8"	4' - 2"	162	#5	6"	7' - 0"	1,183	4' - 2"	2' - 10"	82	12"	5' - 0"	274	5	39' - 9"	133	33	39' - 9"	876	7' - 1"	19	18	50	0.700	131.9	0.5	69	28.5	5,345
6' - 0"	6' - 0"	8"	7"	20'	108	#6	9"	6' - 11"	1,122	108	#5	9"	10' - 7"	1,192	6' - 6"	4' - 1"	108	#5	9"	6' - 9"	760	4' - 1"	2' - 8"	108	9"	6' - 0"	433	5	39' - 9"	133	37	39' - 9"	982	6' - 11"	18	16	45	0.613	115.6	0.5	63	25.0	4,685
6' - 0"	6' - 0"	9"	7"	26'	108	#6	9"	6' - 11"	1,122	162	#5	6"	10' - 8"	1,802	6' - 7"	4' - 1"	162	#5	6"	6' - 10"	1,155	4' - 1"	2' - 9"	108	9"	6' - 0"	433	5	39' - 9"	133	37	39' - 9"	982	6' - 11"	18	16	45	0.657	140.7	0.5	63	26.8	5,690
6' - 0"	6' - 0"	10"	8"	30'	108	#6	9"	7' - 1"	1,149	162	#5	6"	10' - 10"	1,830	6' - 8"	4' - 2"	162	#5	6"	7' - 0"	1,183	4' - 2"	2' - 10"	82	12"	6' - 0"	329	5	39' - 9"	133	37	39' - 9"	982	7' - 1"	19	18	50	0.749	140.2	0.5	69	30.5	5,675

5 For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.



**SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL**

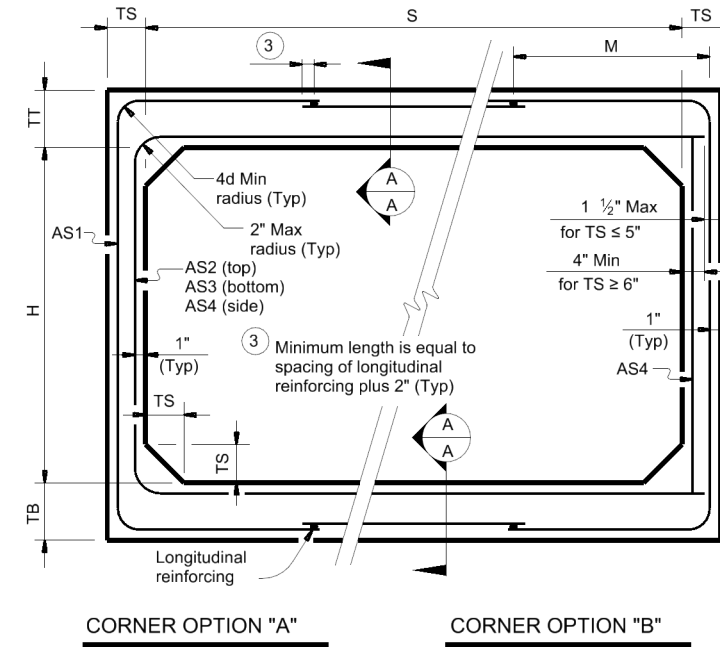
SCC-5 & 6

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04/2021 Updated X values.	0091	04	069	SH 289
DIST	COUNTY		SHEET NO.	
DAL	COLLIN		64	

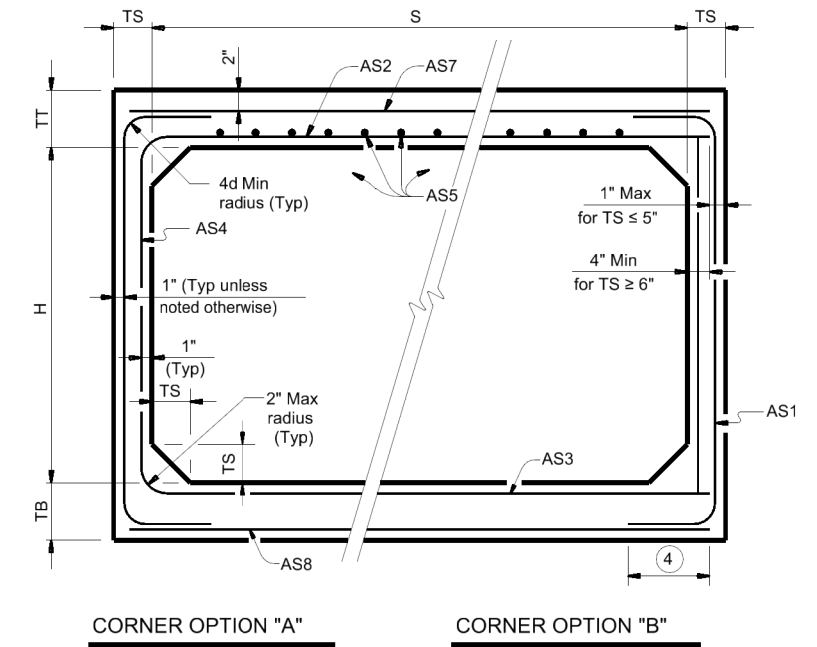
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BOX DATA

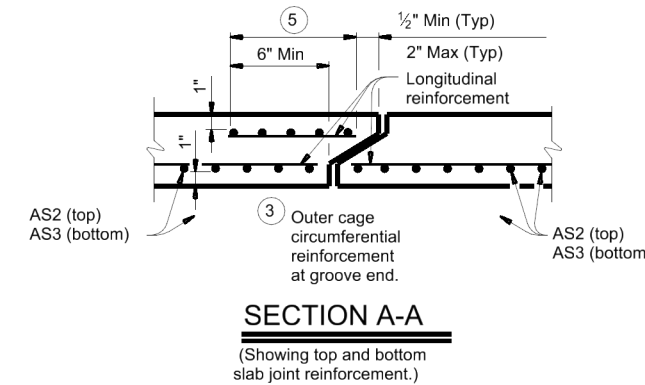
SECTION DIMENSIONS					Fill Height (ft.)	M (Min) (in.)	REINFORCING (sq. in. / ft.) ^②							Lift Weight (tons) ^①
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)			AS1	AS2	AS3	AS4	AS5	AS7	AS8	
6	2	8	7	7	< 2	-	0.23	0.27	0.19	0.17	0.19	0.17	7.2	
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	-	-	6.8	
6	2	7	7	7	3 - 5	43	0.20	0.17	0.17	0.17	-	-	6.8	
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	-	-	6.8	
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	-	-	6.8	
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	-	-	6.8	
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	-	-	6.8	
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	-	-	6.8	
6	3	8	7	7	< 2	-	0.20	0.31	0.22	0.17	0.19	0.19	7.9	
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	-	-	7.5	
6	3	7	7	7	3 - 5	39	0.17	0.18	0.17	0.17	-	-	7.5	
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	7.5	
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	7.5	
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	7.5	
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	7.5	
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	7.5	
6	4	8	7	7	< 2	-	0.19	0.34	0.25	0.17	0.19	0.19	8.6	
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	-	-	8.2	
6	4	7	7	7	3 - 5	39	0.17	0.21	0.19	0.17	-	-	8.2	
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	8.2	
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	8.2	
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	8.2	
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	8.2	
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	8.2	
6	5	8	7	7	< 2	-	0.19	0.37	0.28	0.17	0.19	0.19	9.3	
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	-	-	8.9	
6	5	7	7	7	3 - 5	43	0.17	0.23	0.21	0.17	-	-	8.9	
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	8.9	
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	8.9	
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	8.9	
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	8.9	
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	8.9	
6	6	8	7	7	< 2	-	0.19	0.38	0.30	0.17	0.19	0.19	10	
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	-	-	9.6	
6	6	7	7	7	3 - 5	52	0.17	0.24	0.22	0.17	-	-	9.6	
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	9.6	
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	9.6	
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	9.6	
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	9.6	
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	9.6	



FILL HEIGHT 2 FT AND GREATER



FILL HEIGHT LESS THAN 2 FT



SECTION A-A
(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:
 Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.
 Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:
 Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.
 See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.
 In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

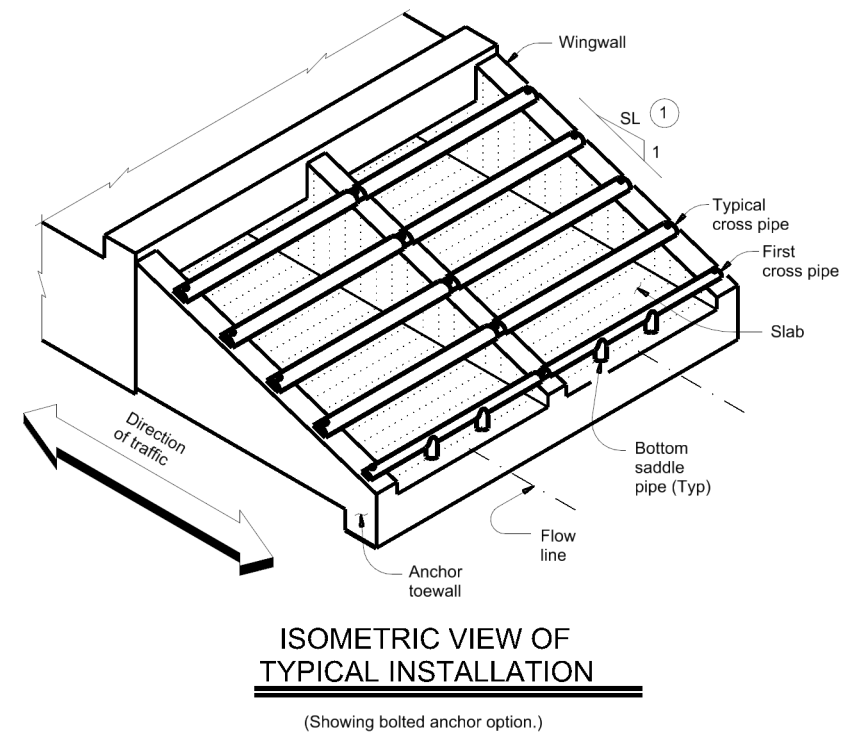
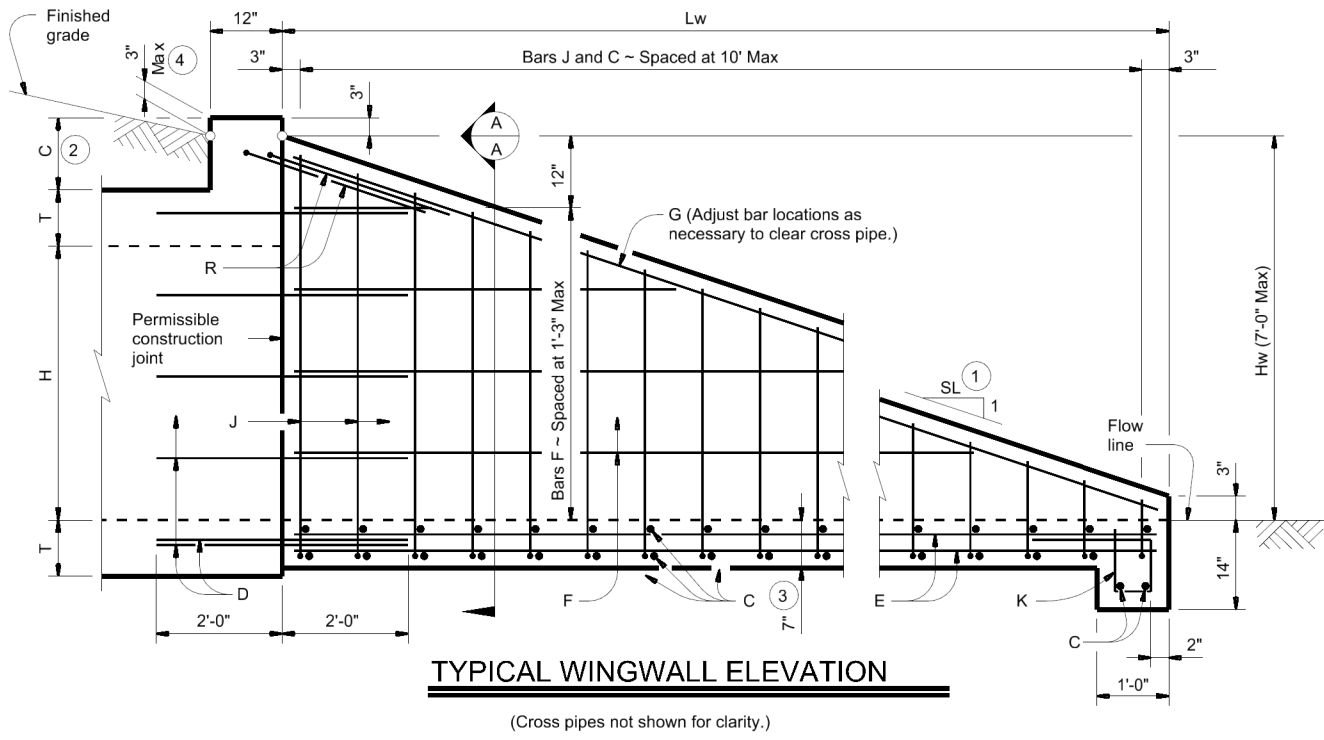
HL93 LOADING

		<i>Bridge Division Standard</i>	
SINGLE BOX CULVERTS PRECAST 6'-0" SPAN			
SCP-6			
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REVISIONS	CONT: 0091	SECT: 04	JOB: 069
	DIST: DAL	COUNTY: COLLIN	HIGHWAY: SH 289
			SHEET NO.: 65

① For box length = 8'-0"
 ② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

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DATE: FILE:



WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$
 $Lw = (Hw - 0.250') (SL)$

For cast-in-place culverts:
 $Atw = (N) (S) + (N + 1) (U)$

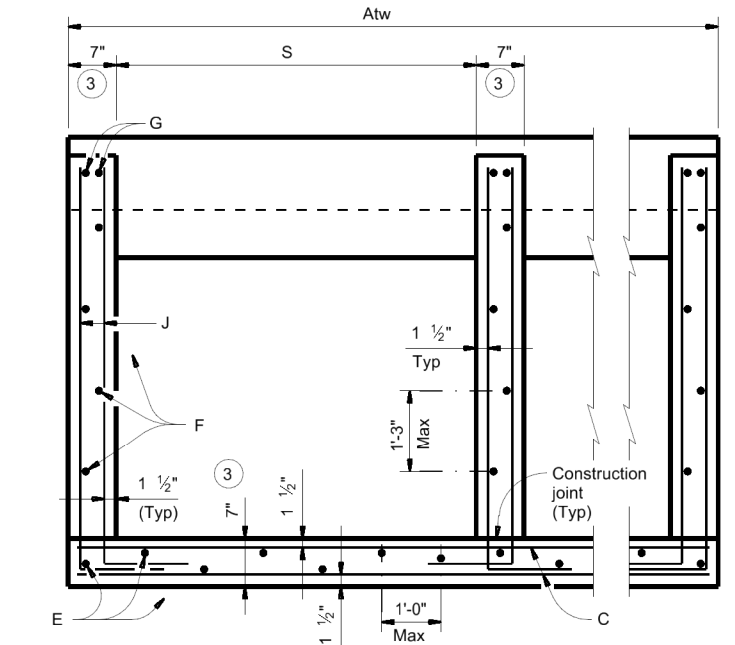
For precast culverts:
 $Atw = (N) (2U + S) + (N - 1) (0.500')$

Total Wingwall Area (SF)
 $= (0.5) (Hw + 0.250') (Lw) (N - 1)$

Total Concrete Volume (CY)
 $= [(Wingwall Area) (0.583') + (Lw) (Atw) (0.583') + (Atw) (1.000') (1.167' - 0.583')] \div (27)$

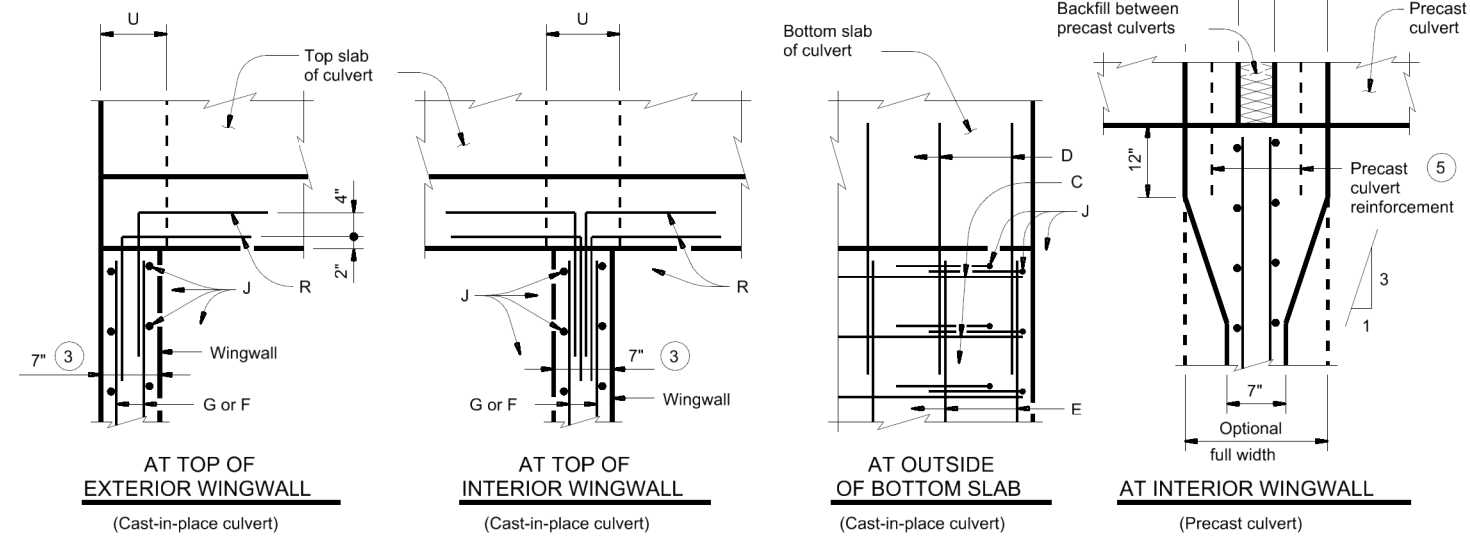
Total Reinforcing (Lb)
 $= (1.55) (Lw) (Atw) + (4.43) (Atw) + (K) (Hw) (N + 1) (Lw)$

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas
Slope SL: 1 K
6:1 ~ 10:4:1
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
See applicable box culvert standard for H, S, T, and U values.



SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



PLAN VIEWS OF CORNER DETAILS

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1 1/2".
Provide Class "C" concrete (f'c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with Item 445, "Galvanizing."

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for concrete, reinforcing steel, and cross pipes resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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

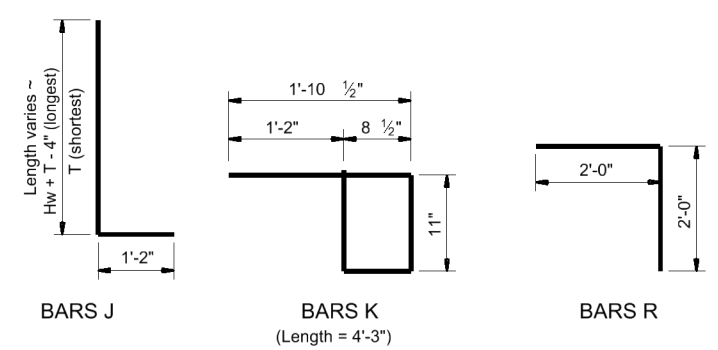


TABLE OF REINFORCING BAR SIZES AND SPACING

Bar	Size	Spacing
C	#4	10' Max
D	#4	Match F and E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#6	As shown
J	#4	10' Max
K	#4	1'-0" Max
R	#4	As shown

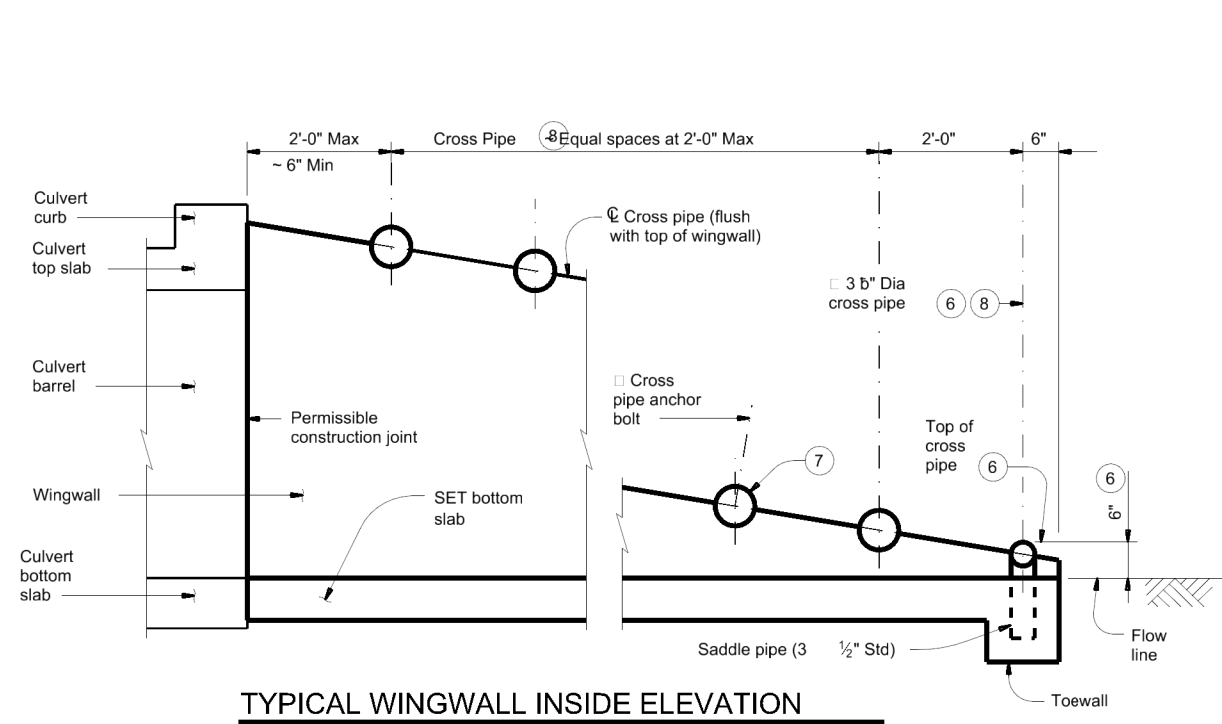
- Provide 6:1 or flatter slope.
- 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details the Extended Curb Details (ECD) standard sheet.
- Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
- For vehicle safety, reduce height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.
- For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

Texas Department of Transportation
SAFETY END TREATMENT FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE
SETB-PD

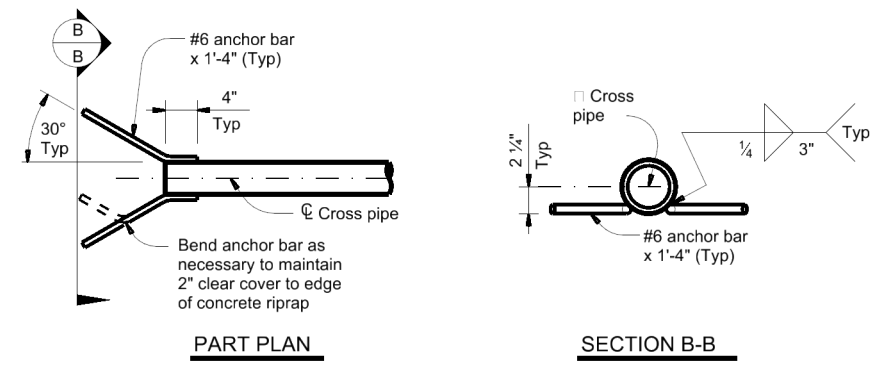
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REVISIONS	CONT	SECT	JOB	HIGHWAY
06-2022 - Wing dimensions	0091	04	069	SH 289
	DIST	COUNTY	SHEET NO.	
	DALLAS	COLLIN	66	

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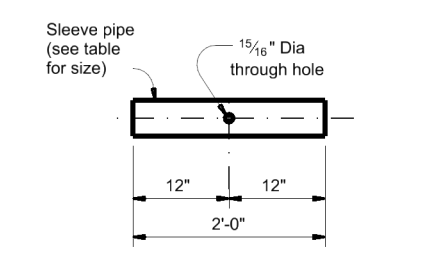
DATE: FILE:



TYPICAL WINGWALL INSIDE ELEVATION
(Showing installation of cross pipes.)



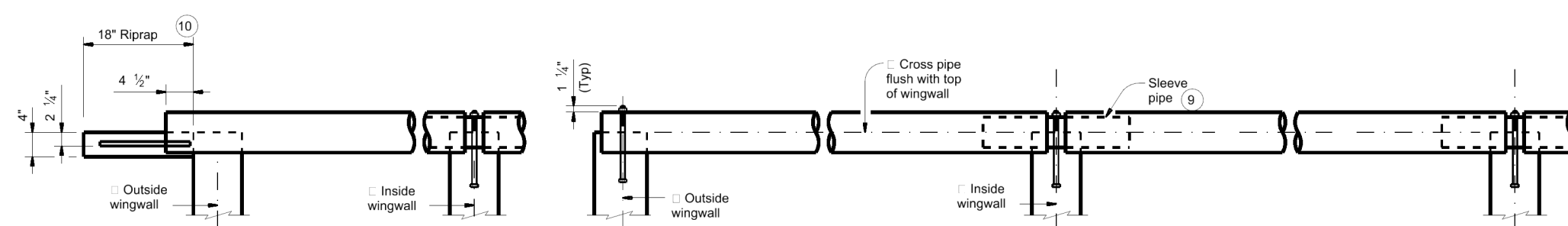
OPTIONAL ANCHOR BAR DETAILS



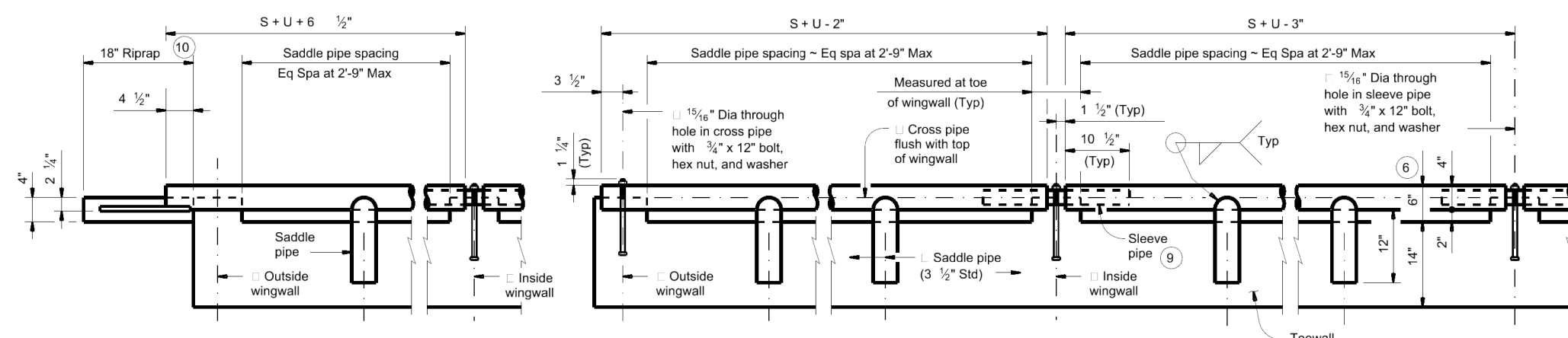
SLEEVE PIPE DETAILS

REQUIRED PIPE SIZES ⁸			STANDARD PIPE SIZES		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size ⁹	Pipe Size	Pipe O.D.	Pipe I.D.
First Pipe	3 1/2" STD	2 1/2" STD	2 1/2" STD	2.875"	2.469"
30" to 42"	4" STD	3" STD	3" STD	3.500"	3.068"
48" to 72"	5" STD	4" STD	3 1/2" STD	4.000"	3.548"
78" to 120"	6" STD	5" STD	4" STD	4.500"	4.026"
			5" STD	5.563"	5.047"
			6" STD	6.625"	6.065"

- 6 The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe at no more than 6" above the flow line.
- 7 Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- 8 Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 1#2" saddle pipes for the 3 1#2" first cross pipe.
- 9 At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.
- 10 Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap".



SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE
(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 b" First Cross Pipe detail.)



CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation
Bridge Division Standard

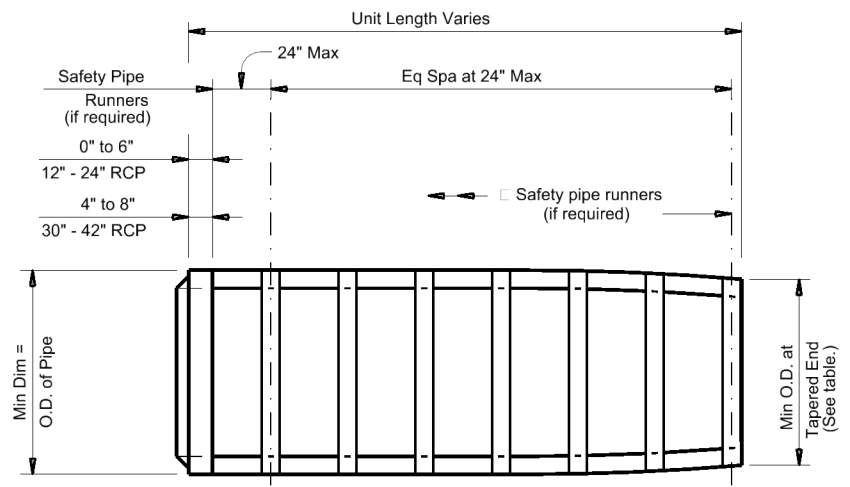
**SAFETY END TREATMENT
FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE**

SETB-PD

FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
06-2022 - Wing dimensions	0091	04	069	SH 289
DIST	COUNTY		SHEET NO.	
DALLAS	COLLIN		67	

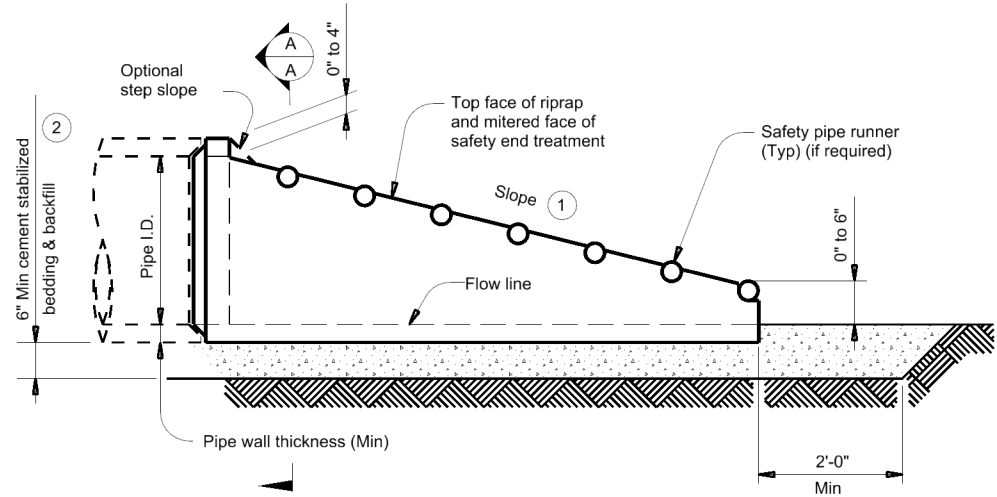
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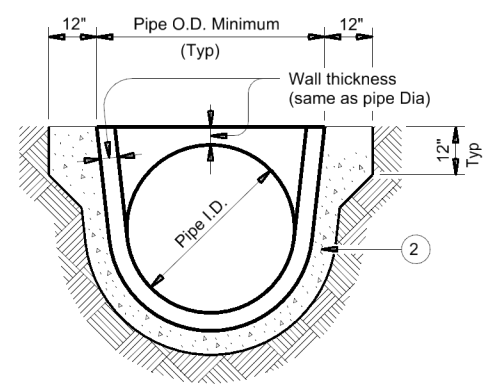
PLAN VIEW - 12" THRU 24"

(Showing spigot end connection.)

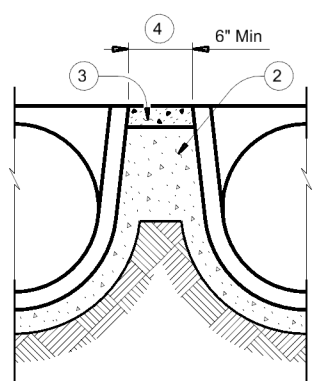


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)

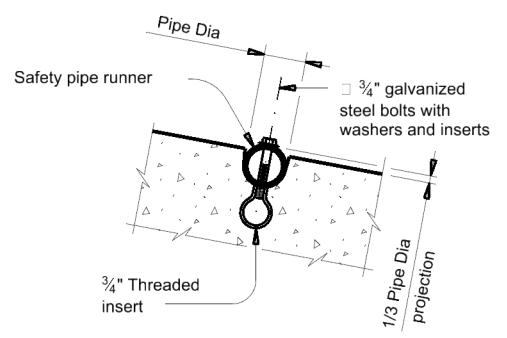


SECTION A-A



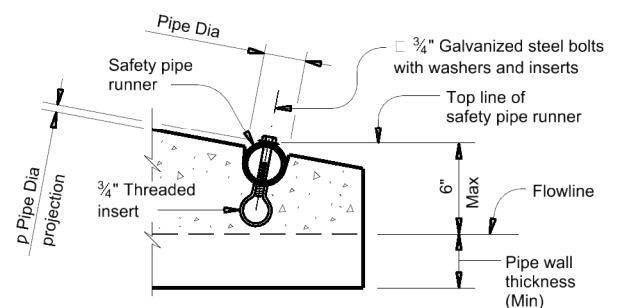
MULTIPLE PIPE INSTALLATION

- 1 Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- 2 Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
- 3 Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".
- 4 Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
- 5 Safety pipe runners are required for multiple pipe culverts with more than two pipes.

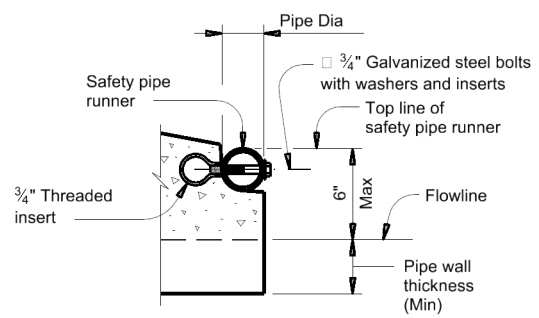


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4' - 0"	No	(5)	3" STD	3.500"	3.068"
15"	2 1/4"	19 1/2"	19"	0.07 Circ.	6:1	5' - 8"	No	(5)	3" STD	3.500"	3.068"
18"	2 1/2"	23"	21 1/2"	0.07 Circ.	6:1	7' - 3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10' - 6"	No	(5)	3" STD	3.500"	3.068"
30"	3 1/2"	37"	31"	0.18 Circ.	6:1	12' - 1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15' - 4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	51"	41 1/2"	0.23 Ellip.	6:1	18' - 7"	Yes	Yes	4" STD	4.500"	4.026"

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 meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
 Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".
 When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.
 Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.
 Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.
 Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.
 Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.



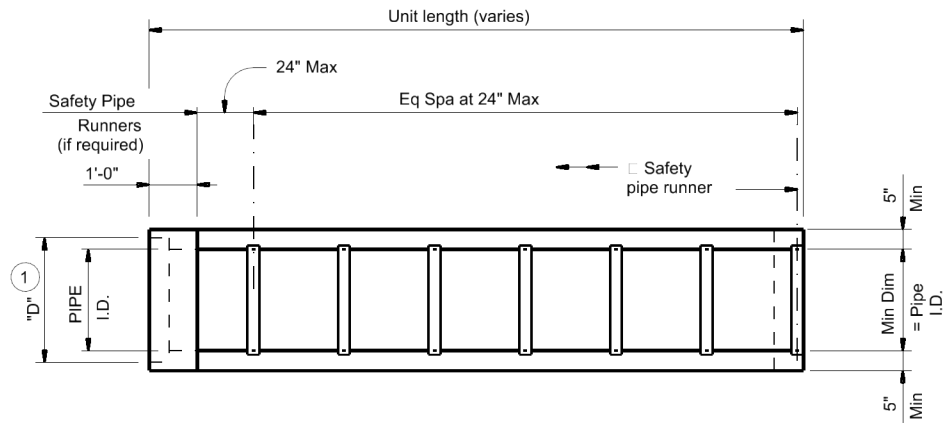
PRECAST SAFETY END TREATMENT TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: psetrps-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
REVISIONS	CONT	SECT	JOB	HIGHWAY
	0091	04	069	SH 289
	DIST	COUNTY	SHEET NO.	
	DALLAS	COLLIN	68	

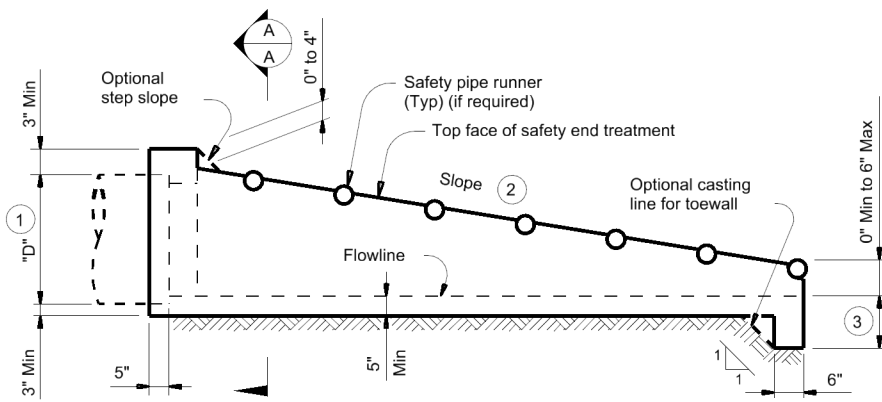
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



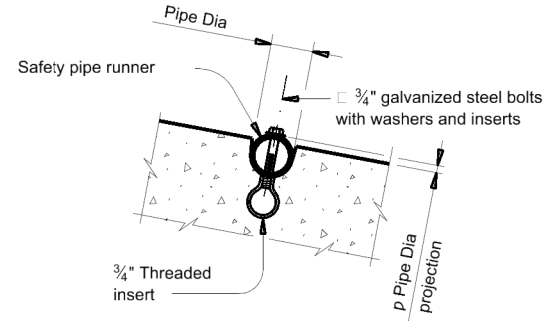
PLAN

(Showing bell end connection.)



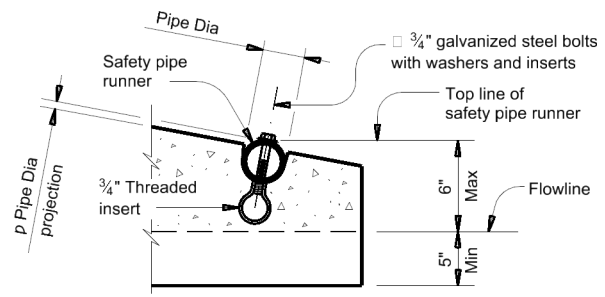
LONGITUDINAL ELEVATION

(Showing bell end connection.)

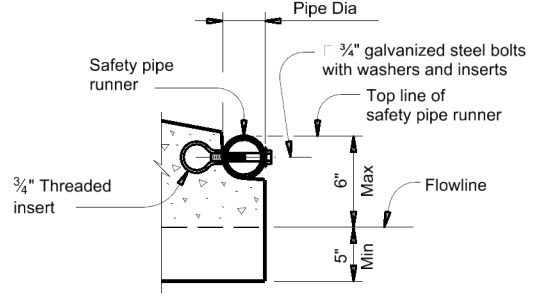


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



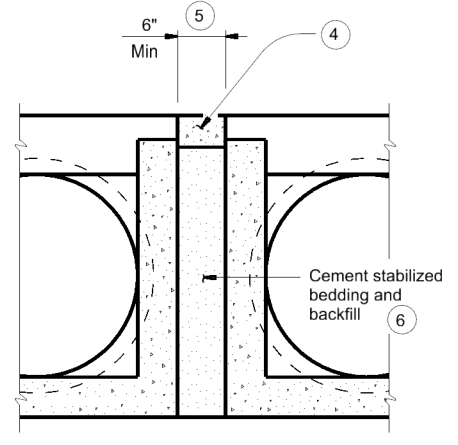
OPTION A



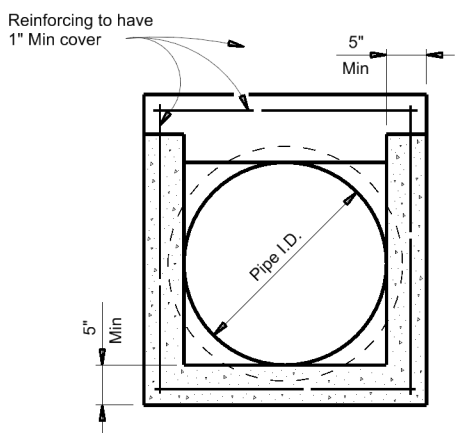
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

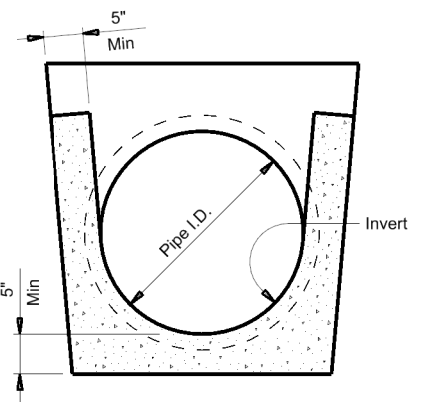


MULTIPLE PIPE INSTALLATION

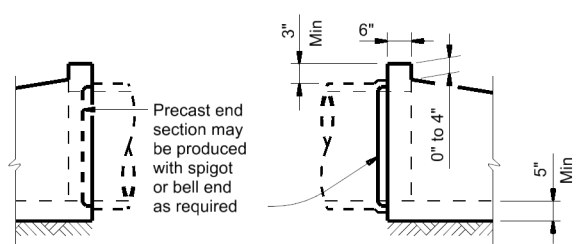


OPTION WITH SQUARE BOTTOM

SECTION A-A



OPTION WITH INVERT BOTTOM



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness ⑦	"D" ①	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 1/4"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 1/2"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 1/2"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 1/2"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".
When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below:
A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f_c = 3,600 psi).
At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.
Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.
Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.
Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation
Bridge Division Standard

PRECAST SAFETY END TREATMENT TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
C:\TxDOT	February 2020	CONTRACT	SECTION	JOB
REVISIONS	0091	04	069	SH 289
12-21: Added 42" TP	DIST	COUNTY	SHEET NO.	
DALLAS	COLLIN	69		

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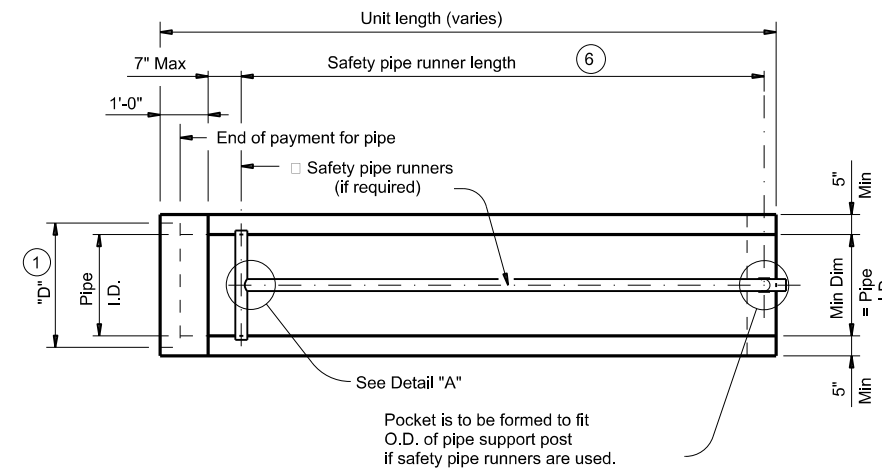
DATE: FILE:

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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

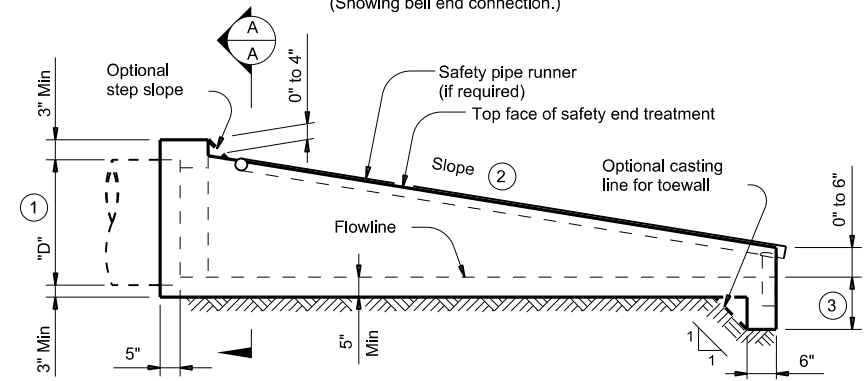
SAFETY PIPE RUNNER DIMENSIONS

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



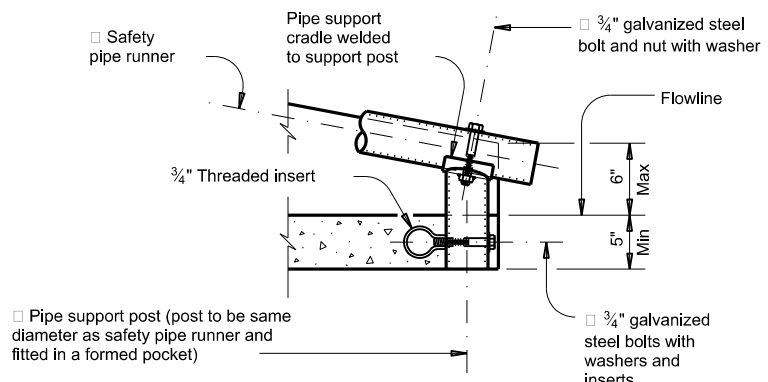
PLAN

(Showing bell end connection.)



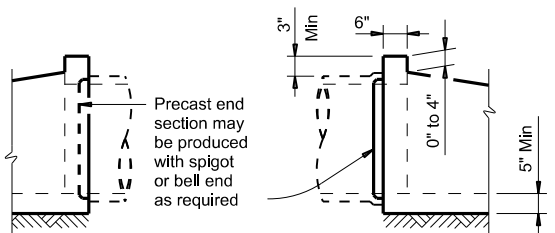
LONGITUDINAL ELEVATION

(Showing bell end connection.)



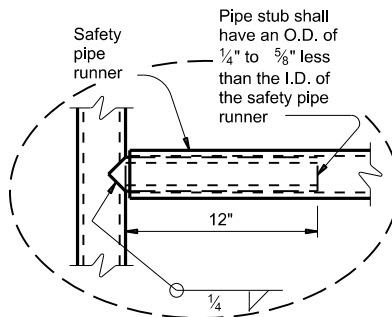
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

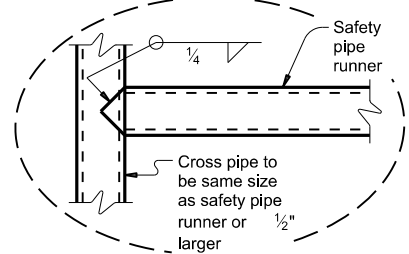


OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



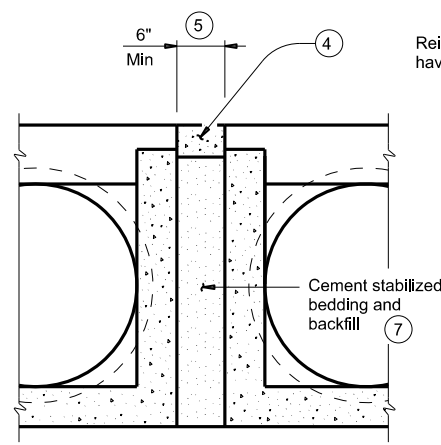
OPTION A



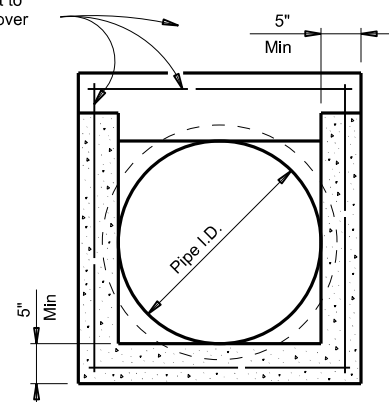
OPTION B

DETAIL A

(If required)

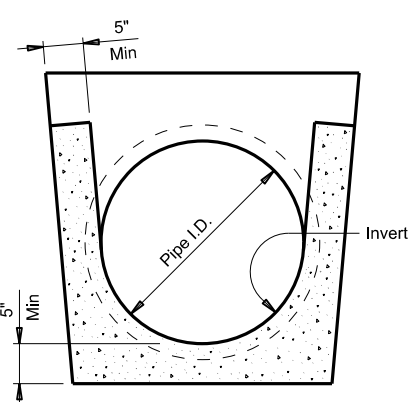


MULTIPLE PIPE INSTALLATION

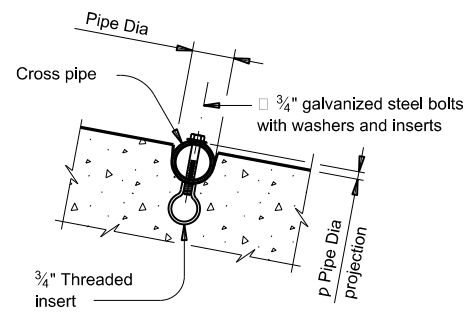


OPTION WITH SQUARE BOTTOM

SECTION A-A



OPTION WITH INVERT BOTTOM



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

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

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f_c = 3,600 psi).

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

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

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

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

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

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: CD-PSET-SC-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0091	04	069	SH 289
12-21; Added 42" TP	DIST	COUNTY	SHEET NO.	
	DAL	COLLIN	70	

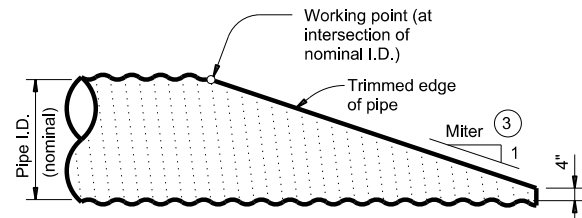
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DATE:
FILE:

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS

① ②

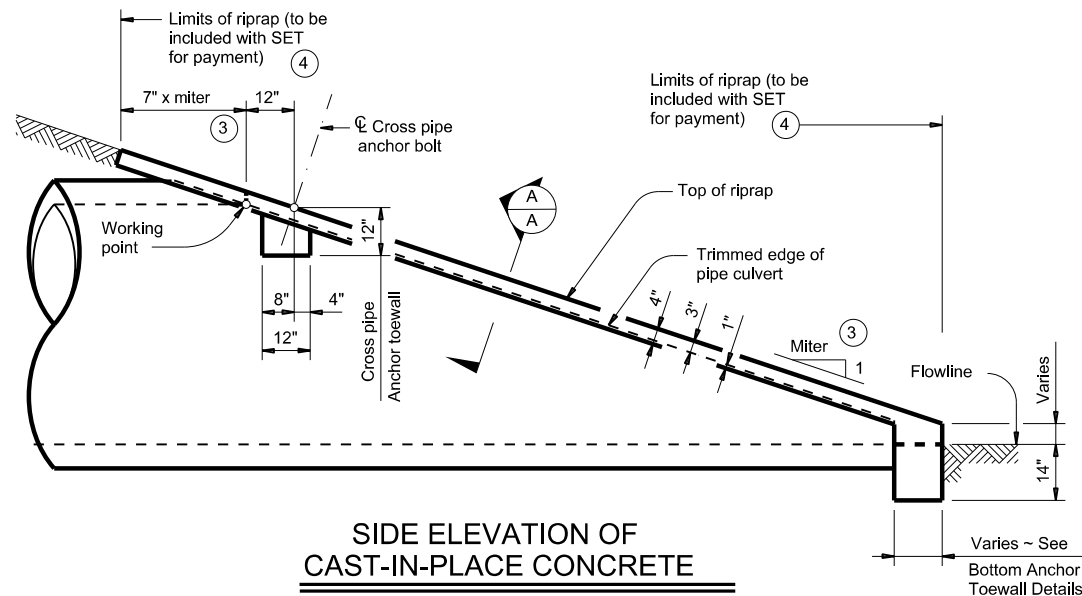
Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	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



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.

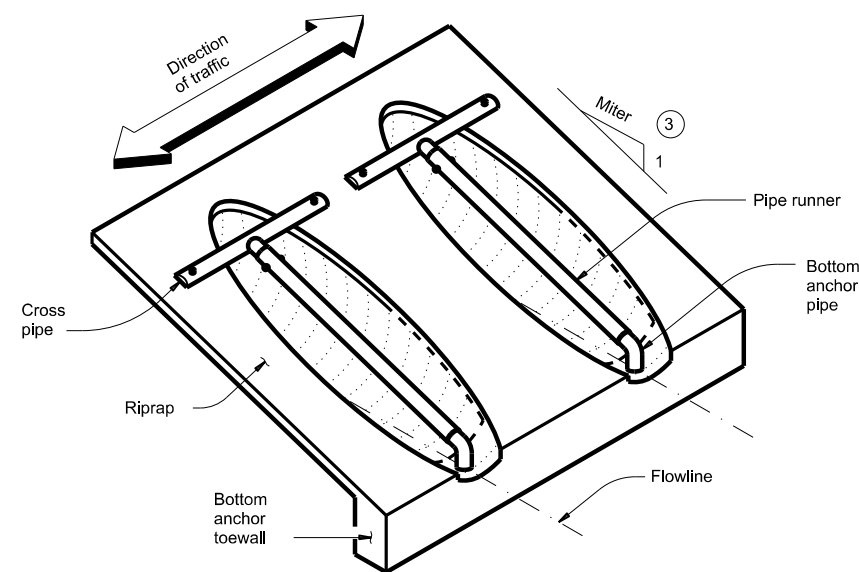
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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.)

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.

SHEET 1 OF 2

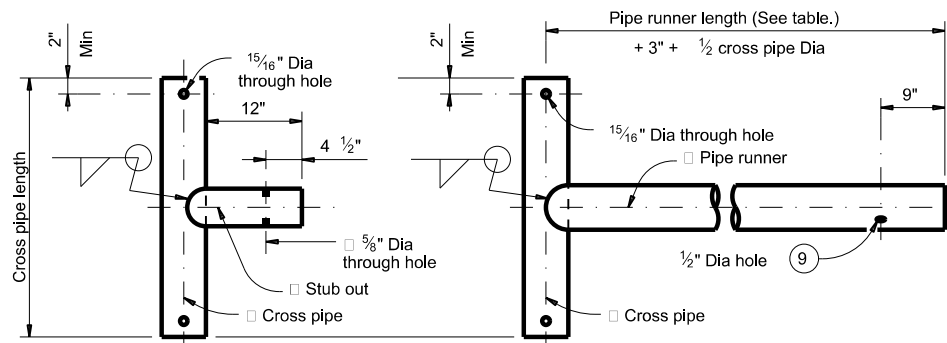


SAFETY END TREATMENT FOR 12" DIA TO 60" DIA PIPE CULVERTS TYPE II ~ CROSS DRAINAGE

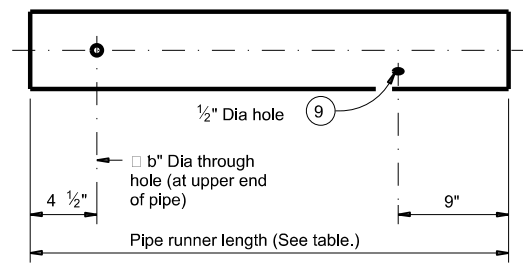
SETP-CD

FILE: CD-SETP-CD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0091	04	069	SH 289
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		71

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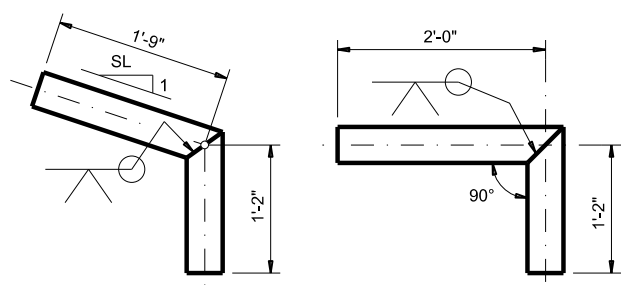


OPTION A1
OPTION A2
CROSS PIPE AND CONNECTIONS DETAILS

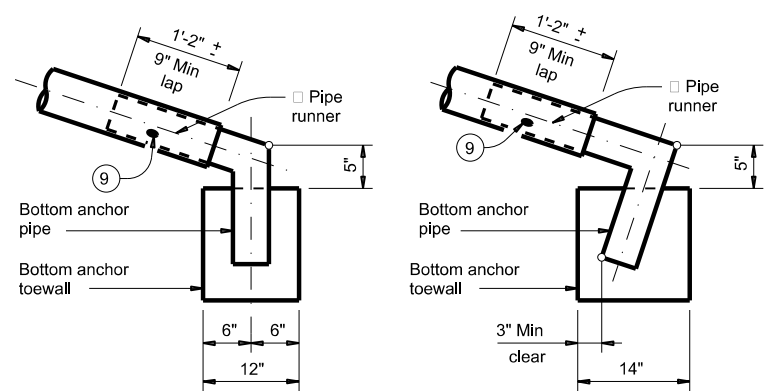


NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS



OPTION B1
OPTION B2
BOTTOM ANCHOR PIPE DETAILS ⑩

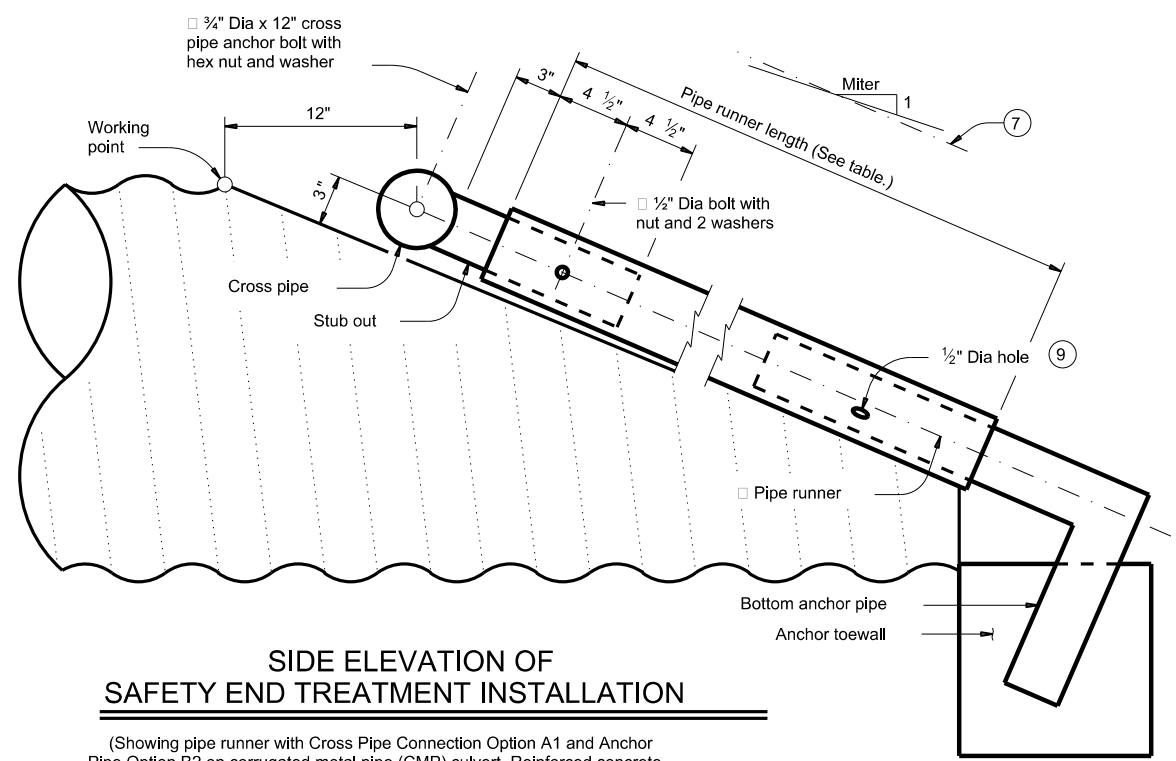


OPTION B1
OPTION B2
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)

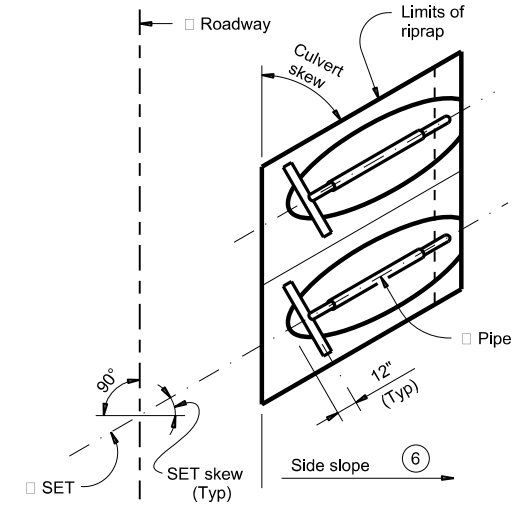
MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM 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."

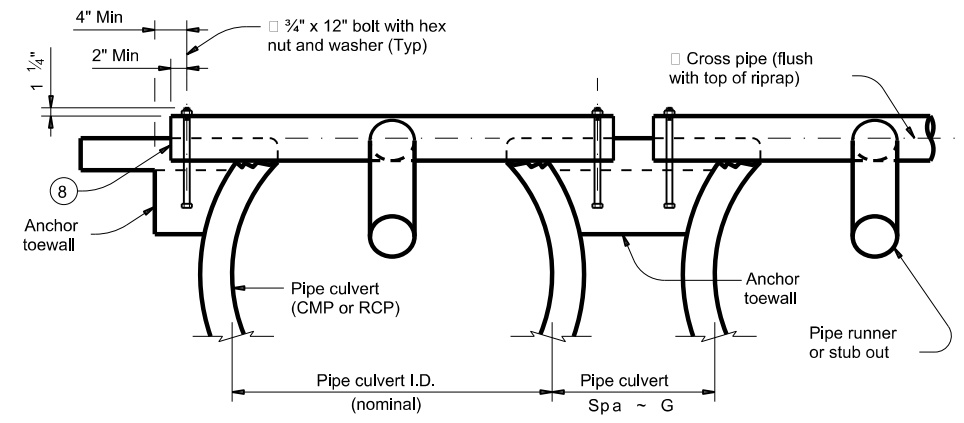


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

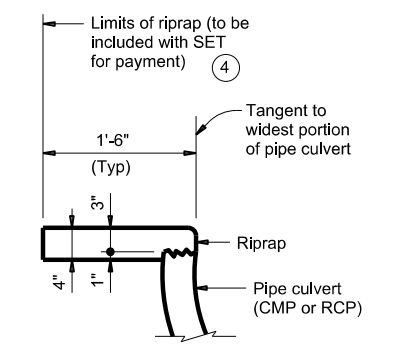
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity.)



PLAN OF SKEWED INSTALLATION



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 inch 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.

SHEET 2 OF 2

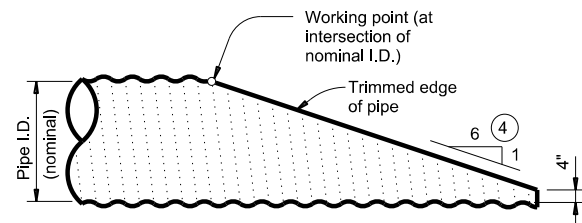


SAFETY END TREATMENT FOR 12" DIA TO 60" DIA PIPE CULVERTS TYPE II ~ CROSS DRAINAGE SETP-CD

FILE: CD-SETP-CD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0091	04	069	SH 289
DIST	COUNTY		SHEET NO.	
DAL	COLLIN		72	

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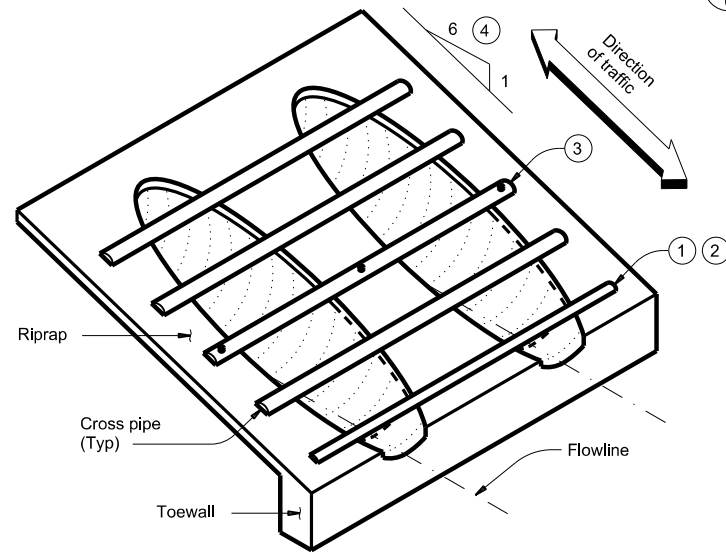
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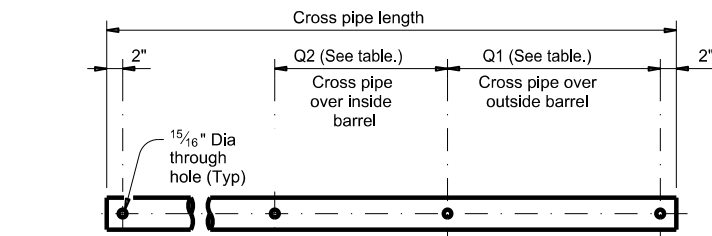
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

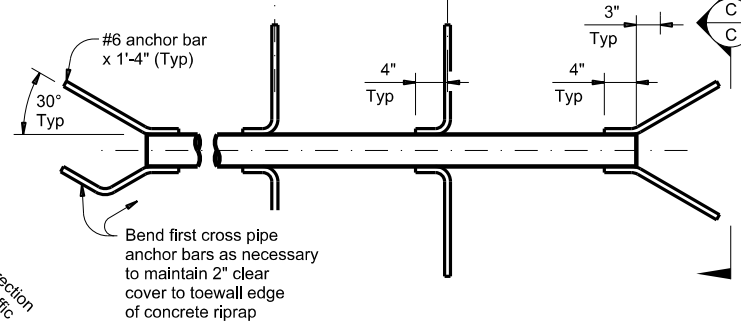
(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)



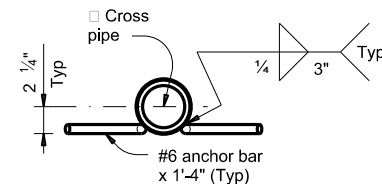
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

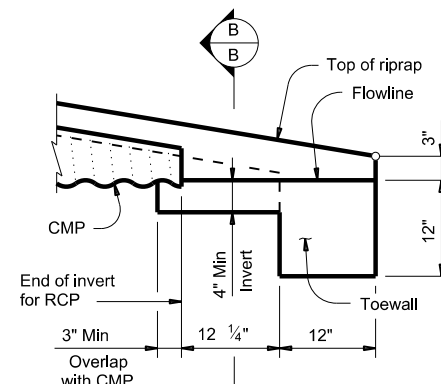


PIPE WITH ANCHOR BARS



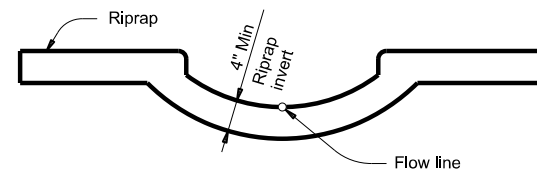
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

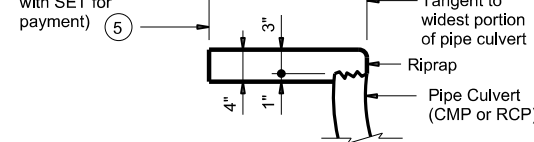
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



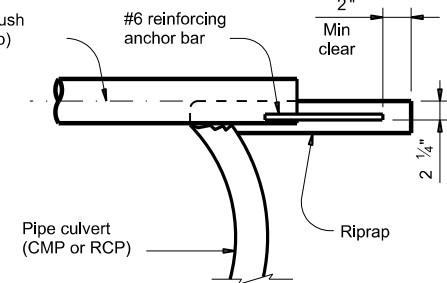
SECTION B-B

(Cross pipes not shown for clarity.)

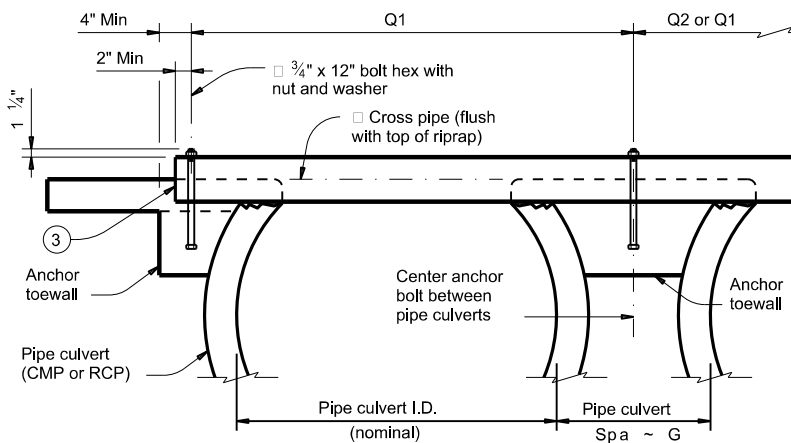
Limits of riprap (to be included with SET for payment)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	2 or more pipe culverts	
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	All pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	4" Std (4.500" O.D.)
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"	All pipe culverts	
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

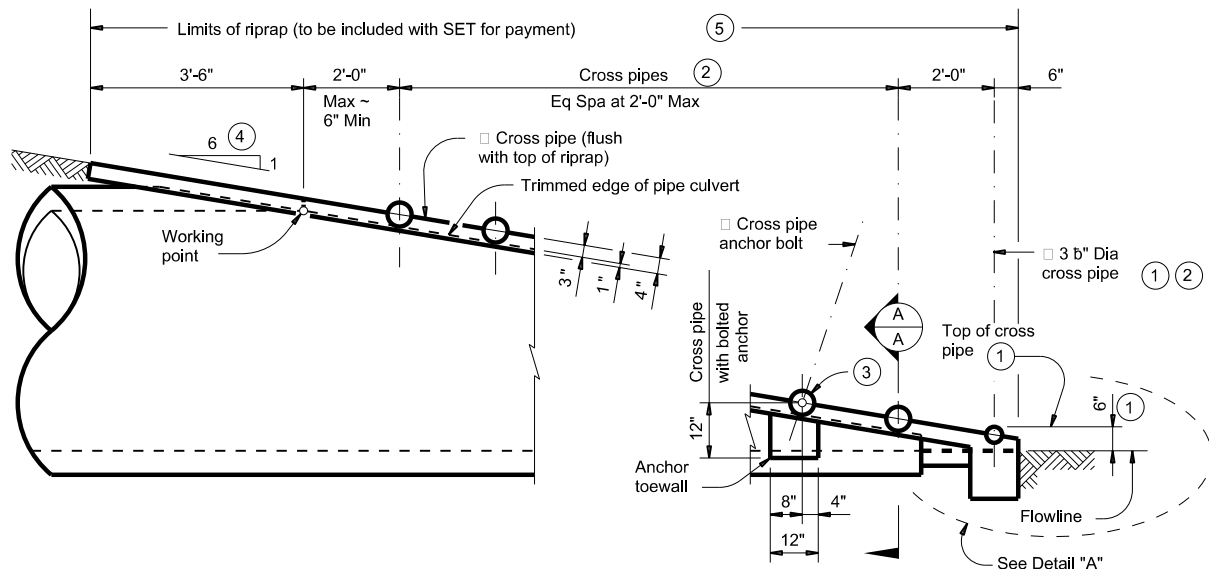
- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."
- 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.

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 cross pipes that meet 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:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-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 cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap." Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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

Texas Department of Transportation
Bridge Division Standard

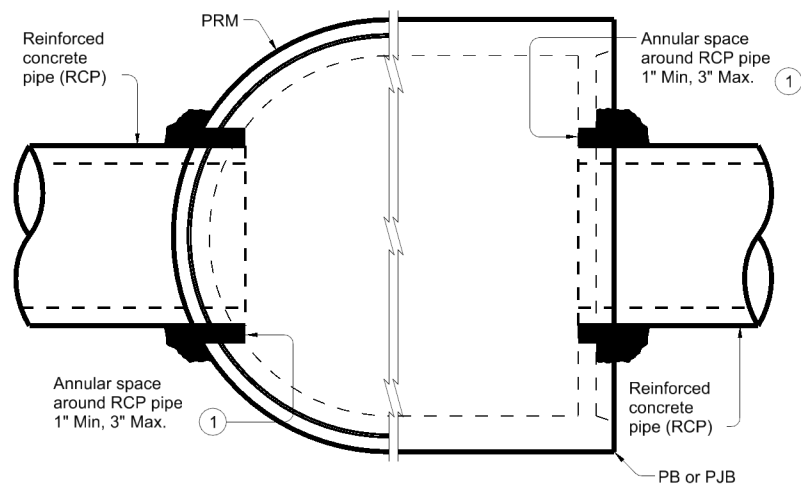
SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE SETP-PD

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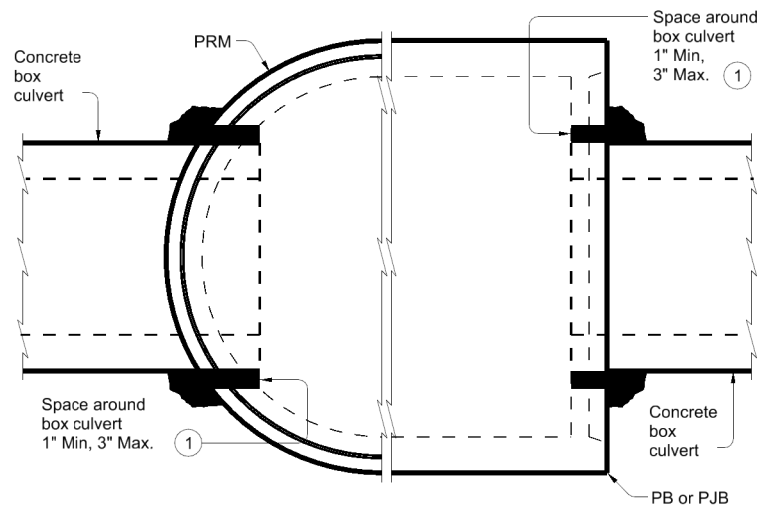
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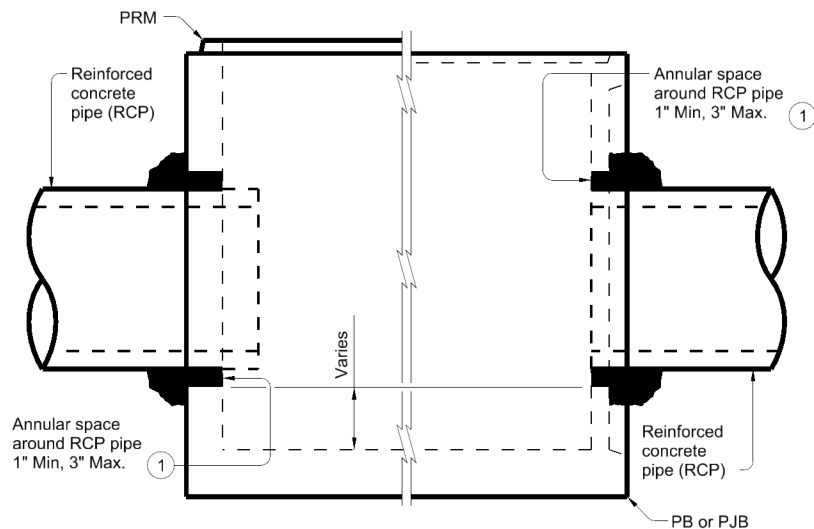
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF PLAN



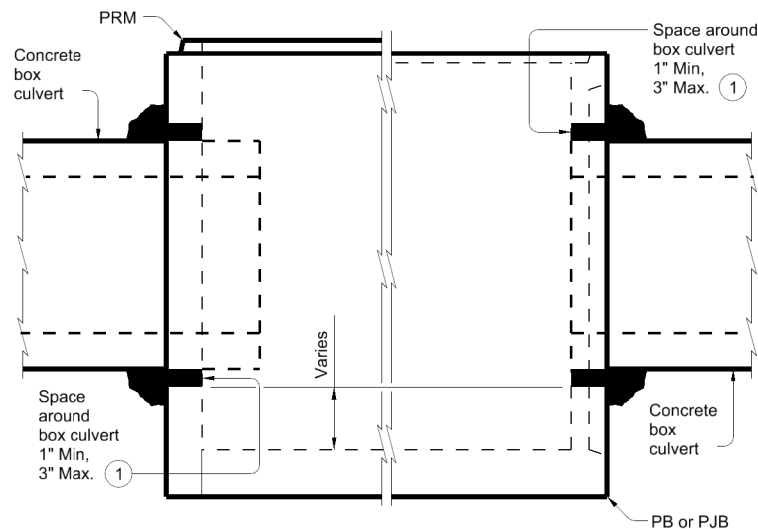
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF PLAN



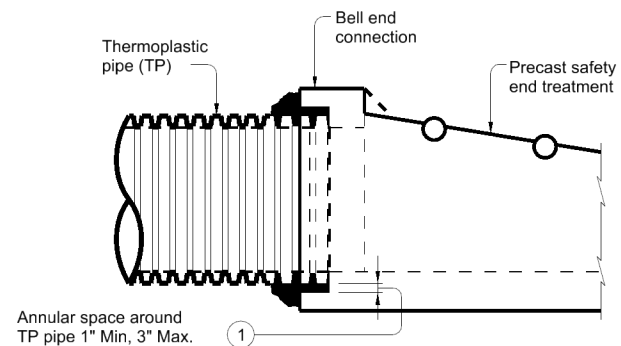
PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE
PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

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.

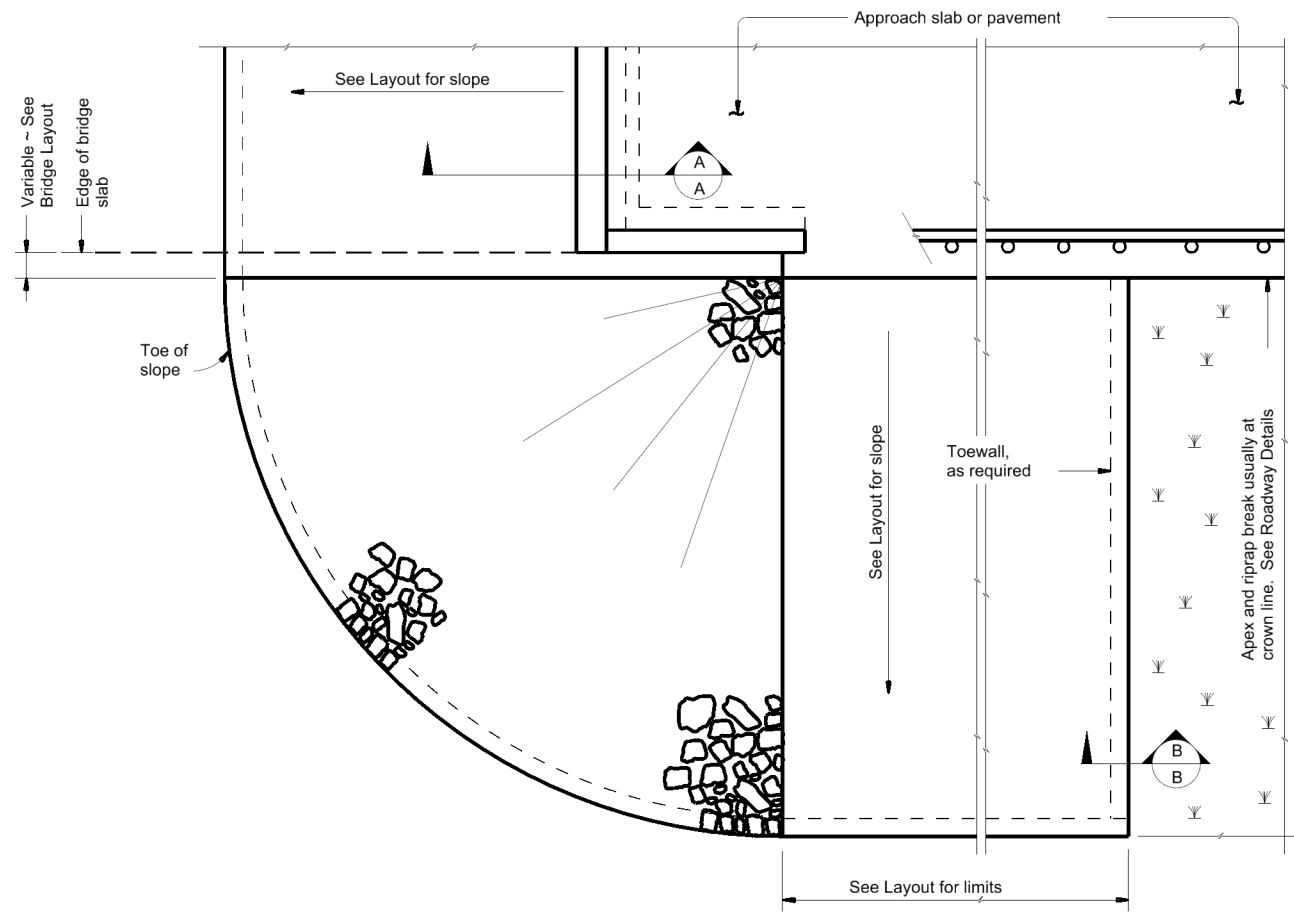
PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

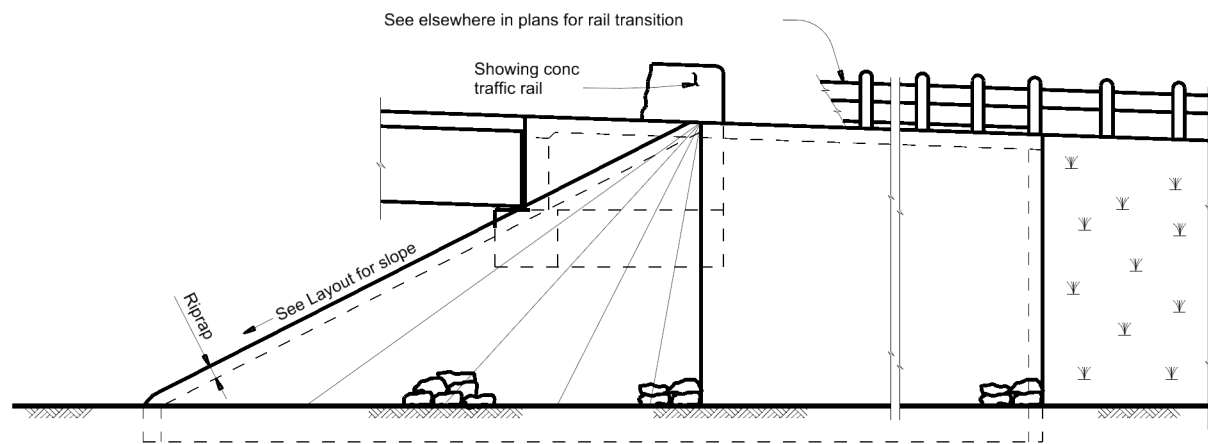
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	DALLAS	COLLIN	75	

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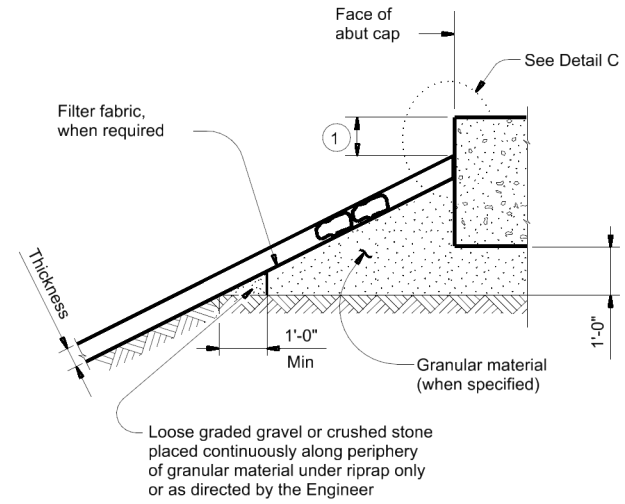
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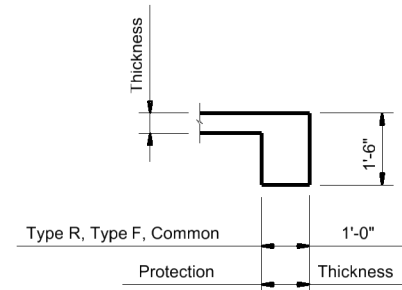
PLAN



ELEVATION



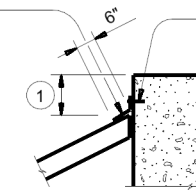
SECTION A-A AT CAP



SECTION B-B

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

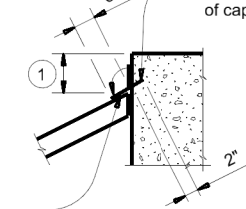
8"X 18 Gage galvanized flashing full length of cap



CAP OPTION A

Nail flashing to cap or wingwall and seal with joint sealer

8"X 18 Gage galvanized flashing full length of cap



CAP OPTION B

DETAIL C

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

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

SHEET 1 OF 2

				Bridge Division Standard	
<h2>STONE RIPRAP</h2>					
<h3>SRR</h3>					
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DIST	COUNTY	SHEET NO.			
DAL	COLL IN	76			

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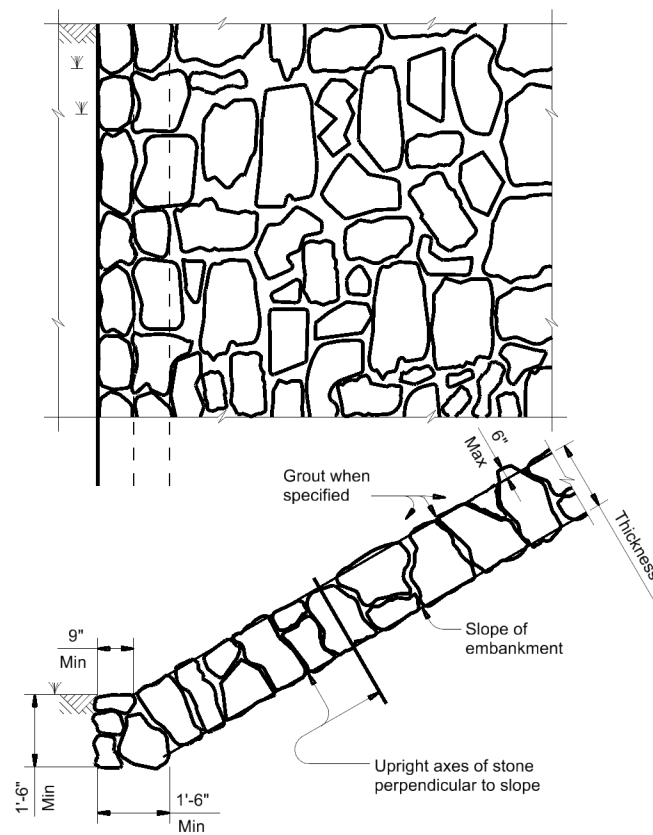


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

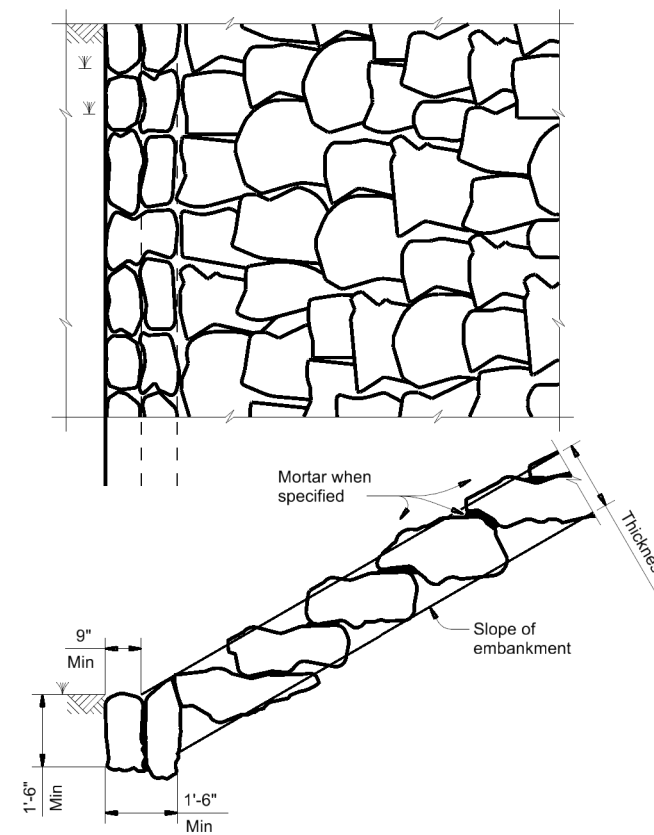


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

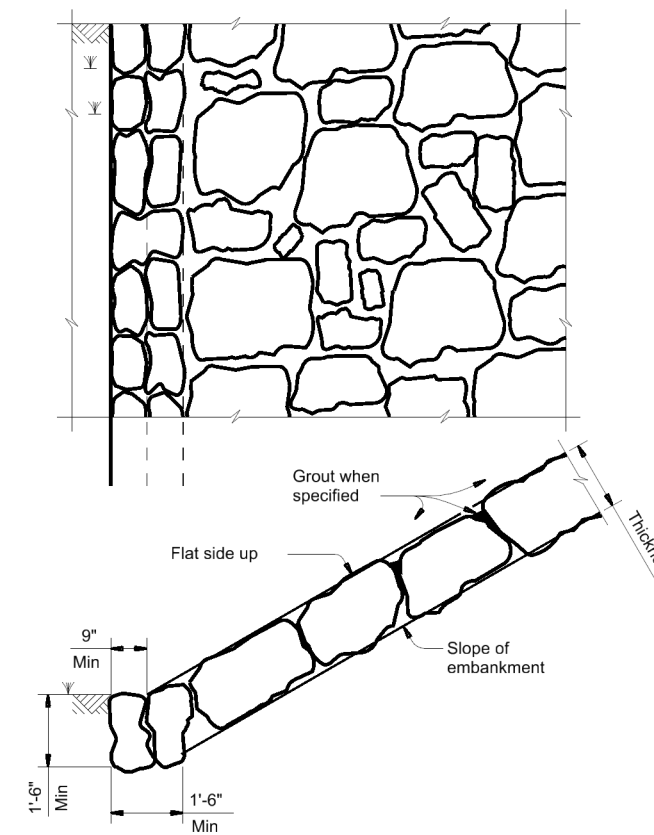


FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

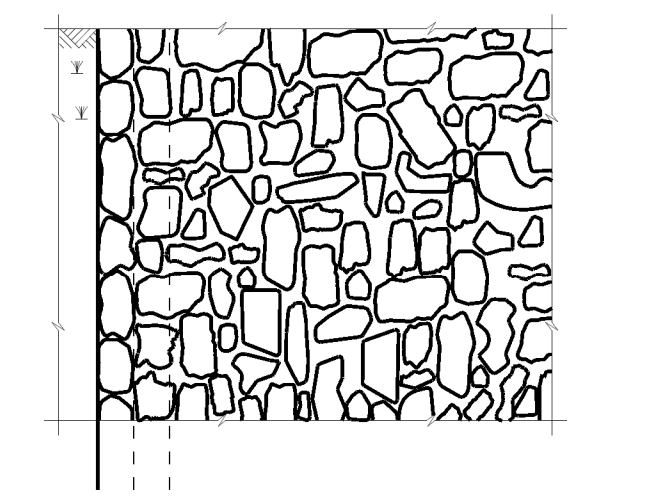


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

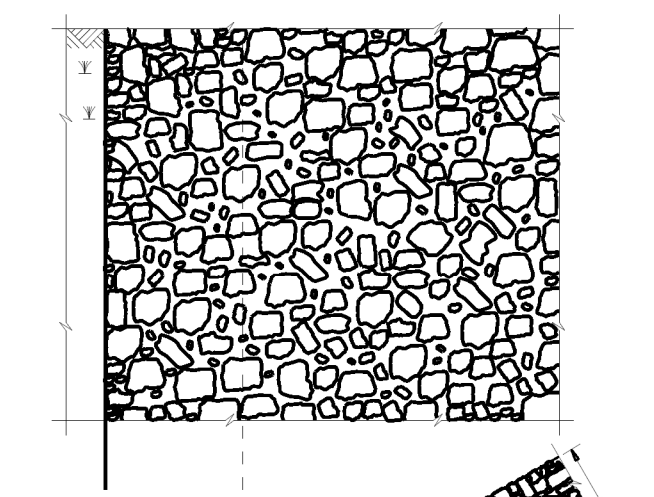
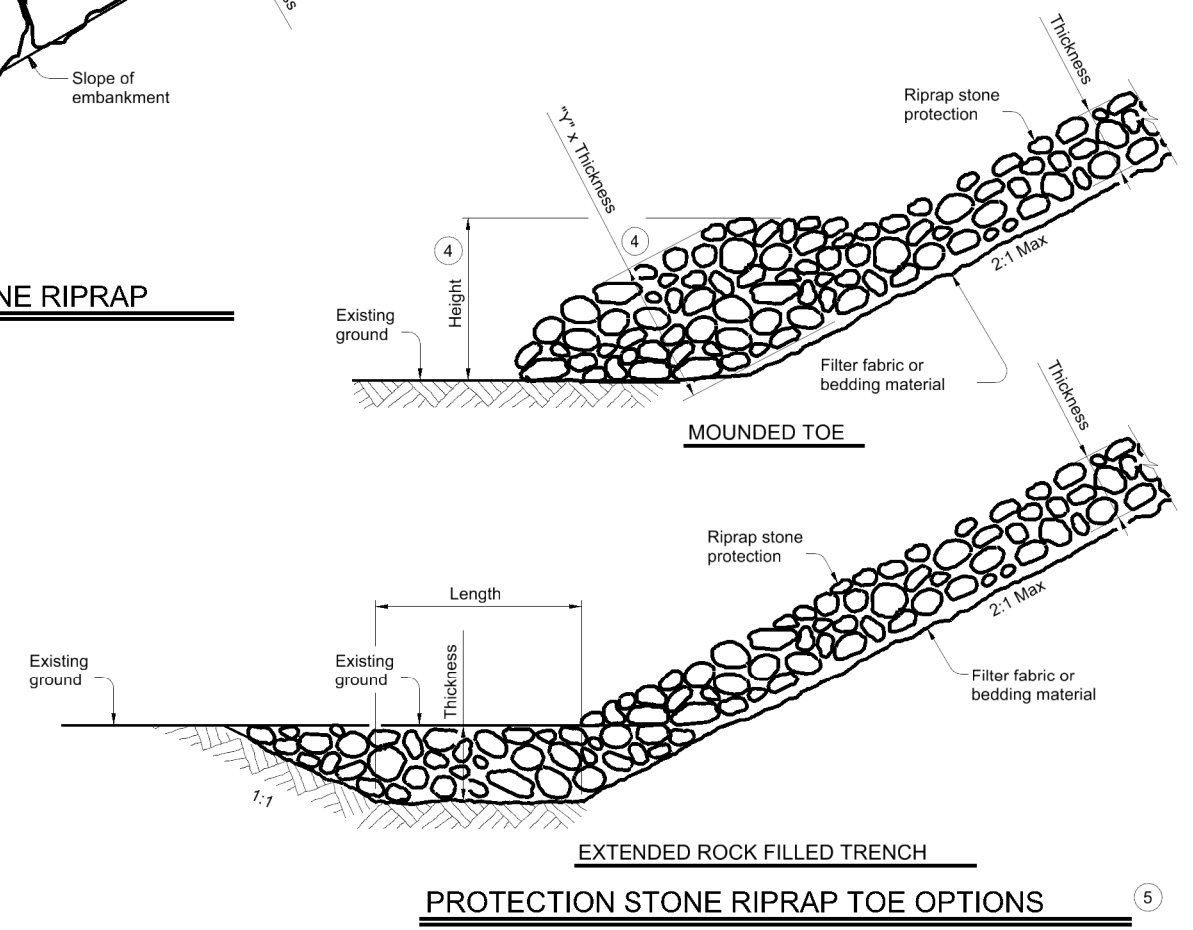


FIGURE 5 ~ PROTECTION STONE RIPRAP

- 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.



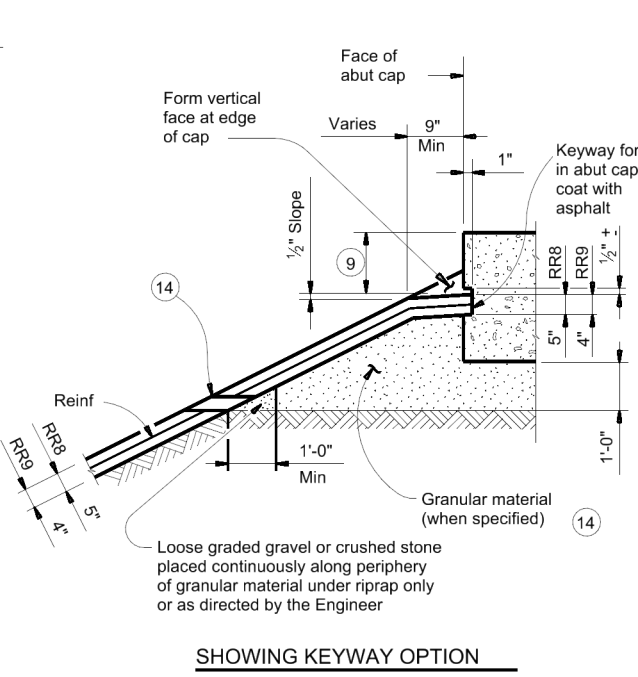
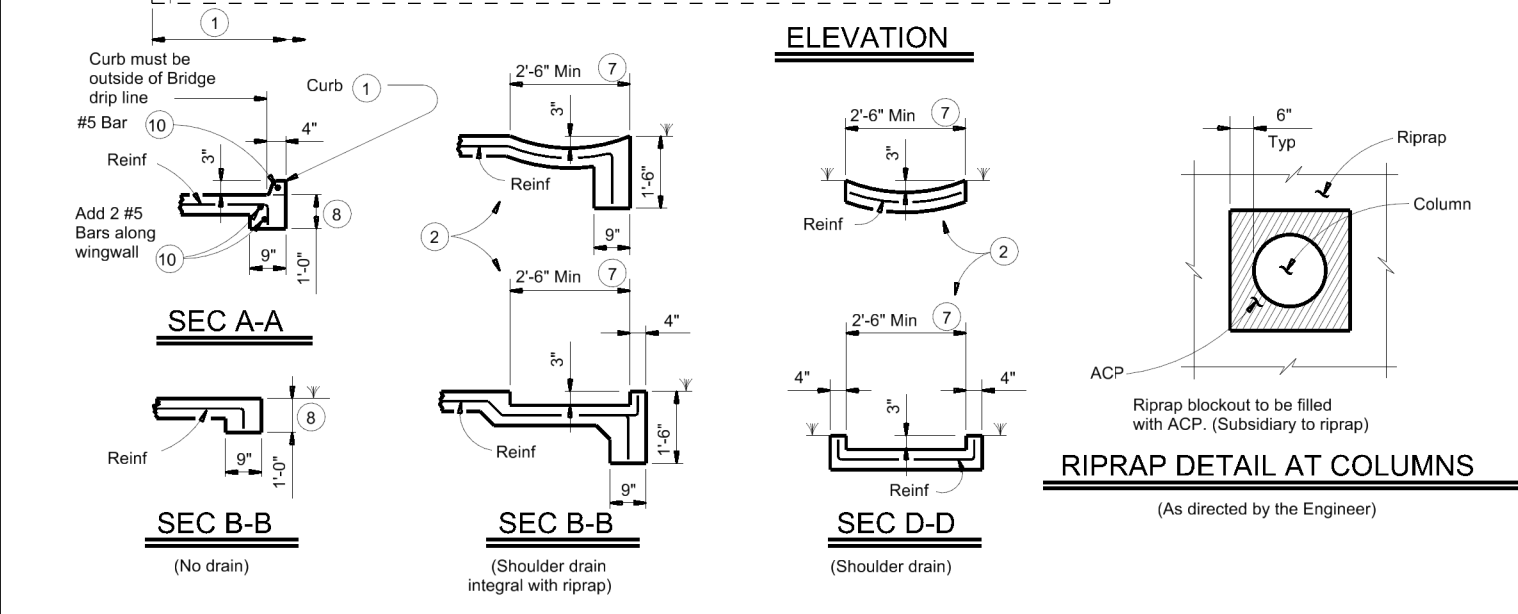
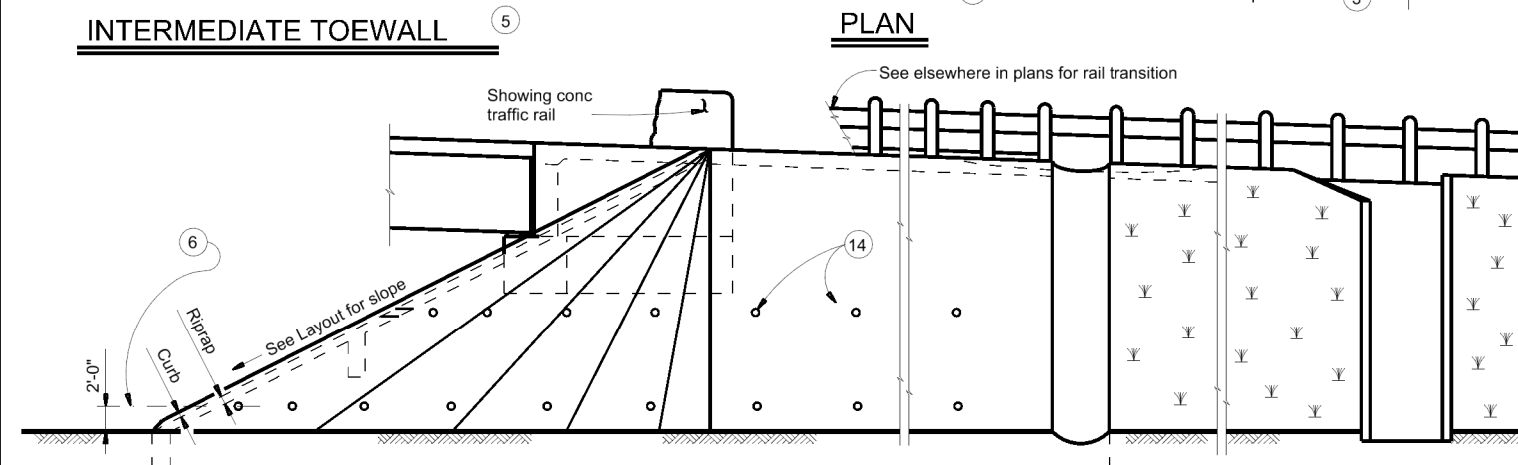
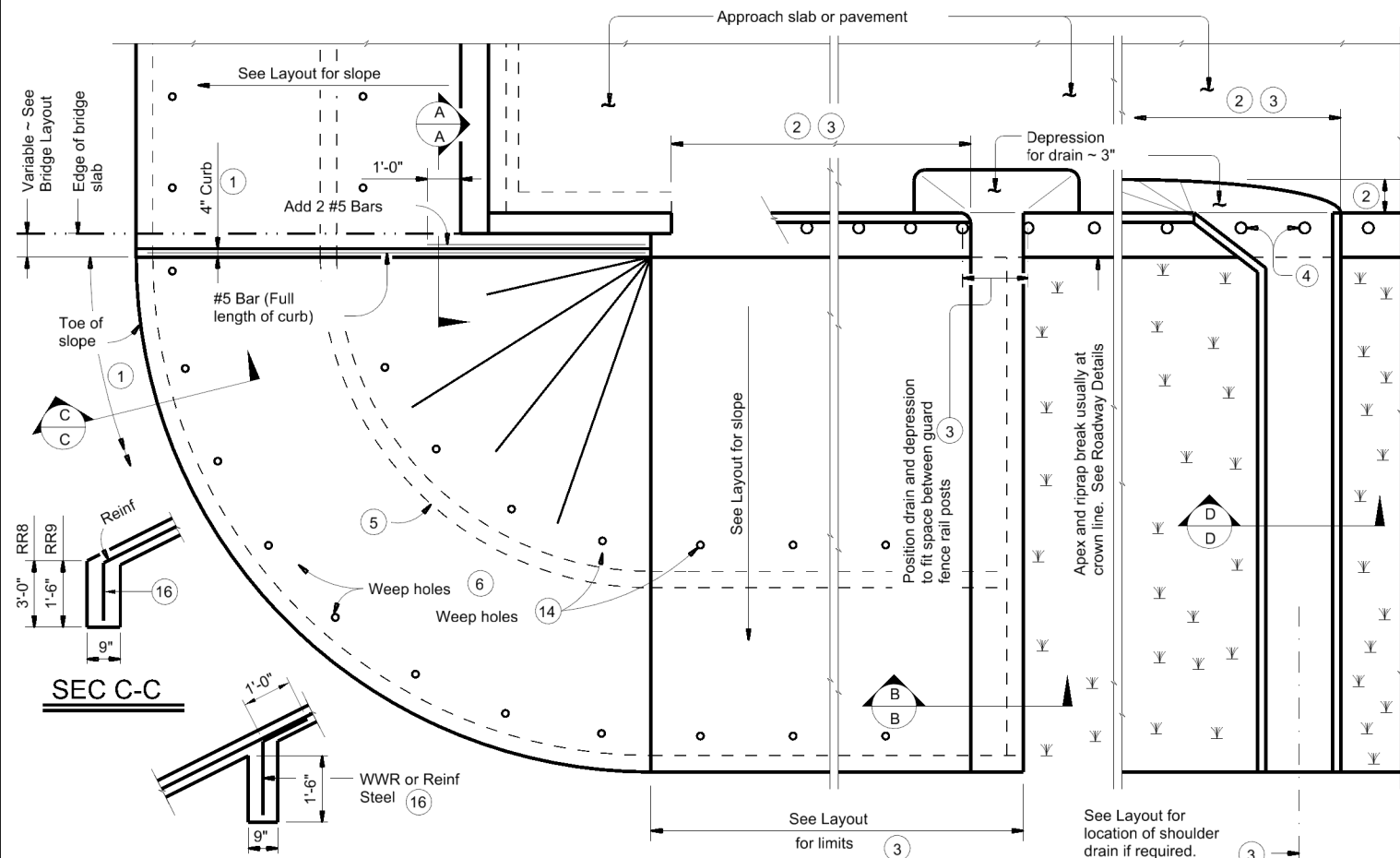
PROTECTION STONE RIPRAP TOE OPTIONS

SHEET 2 OF 2

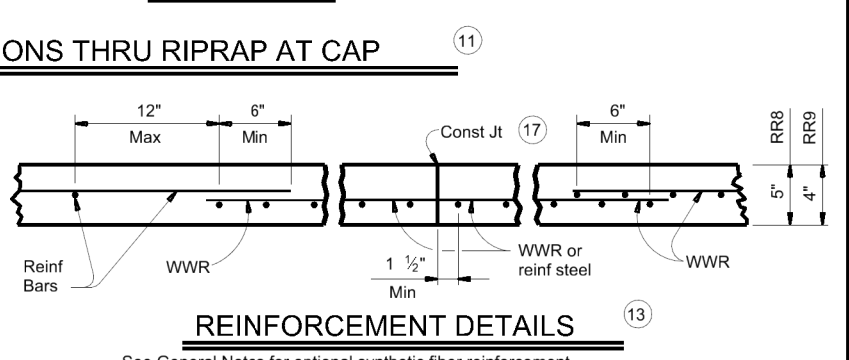
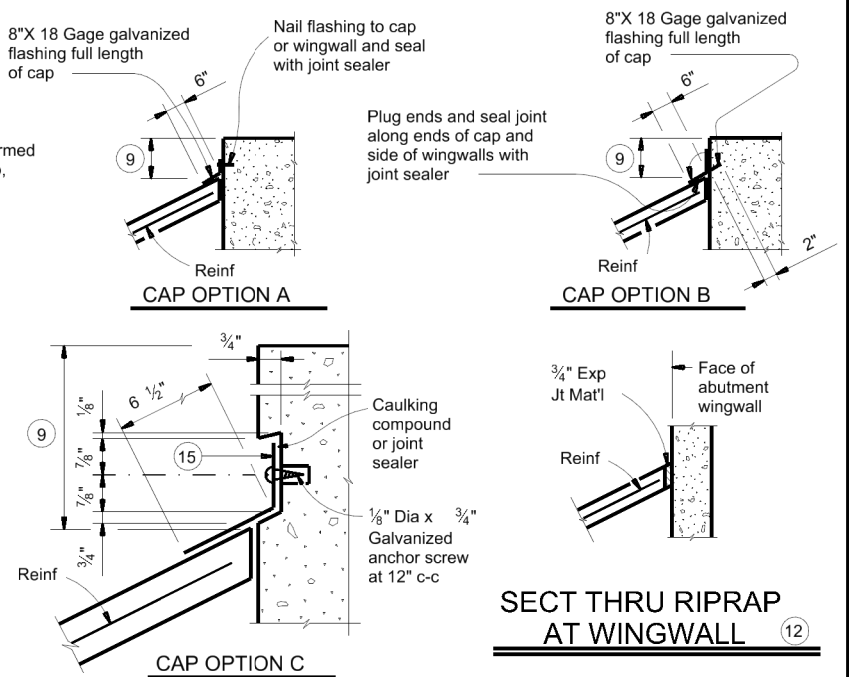
		Bridge Division Standard	
<h2>STONE RIPRAP</h2>			
<h3>SRR</h3>			
FILE: srstde1-19.dgn	DN: AES	CK: JGD	DW: BWH
REVISIONS	CONT	SECT	JOB
	0091	04	069
DIST	COUNTY	SHEET NO.	
DAL	COLLIN	77	

DATE: 8/2/2023 6:26:37 PM
 FILE: c:\t\dot\p_w\online\txdot5\pwn\line_\jonathan_r\ich\0955406\crr\std1-19.dgn

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



See General Notes for optional synthetic fiber reinforcement.

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

FOR CONTRACTOR'S INFORMATION ONLY:
 5" of RR8 = 0.015 CY/SF
 4" of RR9 = 0.012 CY/SF
 #3 Reinf at 18" c-c = 0.501 Lbs/SF
 6x6-D3xD3 = 0.408 Lbs/SF

		Bridge Division Standard	
CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)			
CRR			
FILE: crrstd1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
REV: 0091 04	DATE: April 2019	JOB: 069	HIGHWAY: SH 289
DIST: DAL	COUNTY: COLLIN	SHEET NO. 78	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0091-04-069 (SH 289)

1.2 PROJECT LIMITS:

From: **AT PANTHER CREEK PARKWAY RELIEF**

To: _____

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 33.1801012 , (Long) -96.8029955

END: (Lat) 33.1759777 , (Long) -96.8030114

1.4 TOTAL PROJECT AREA (Acres): 7.62

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.11

1.6 NATURE OF CONSTRUCTION ACTIVITY:

CITY OF FRISCO - PRESTON ROAD TRAIL CONNECTION

1.7 MAJOR SOIL TYPES:

Soil Type	Description
AUSTIN SILTY CLAY 2 TO 5% SLOPES, MODERATELY ERODED	1.2% CLAY, WELL DRAINED HIGH RUNOFF
HOUSTON BLACK CLAY 0 TO 1% SLOPES	71.6% CLAY, MODERATELY WELL DRAINED, HIGH RUNOFF
HOUSTON BLACK CLAY 1 TO 3%	27.2% CLAY, MODERATELY WELL DRAINED, VERY HIGH RUNOFF
HAS MAINTAINED ROW GRASSES, 100% APPROX. DENSITY COVER, GOOD CONDITION.	

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- Mobilization
- Install sediment and erosion controls
 - Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
 - Grading operations, excavation, and embankment
 - Excavate and prepare subgrade for proposed pavement widening
 - Remove existing culverts, safety end treatments (SETs)
 - Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
 - Install culverts, culvert extensions, SETs
 - Install mow strip, MBGF, bridge rail
 - Place flex base
- Rework slopes, grade ditches
 - Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures
- Other: _____
- Other: _____
- Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Other: **CONCRETE WASHOUT**

Other: _____

Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
DRAINAGE TO PANTHER CREEK	LEWISVILLE LAKE (0823)
NO WATER QUALITY IMPAIRMENTS	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

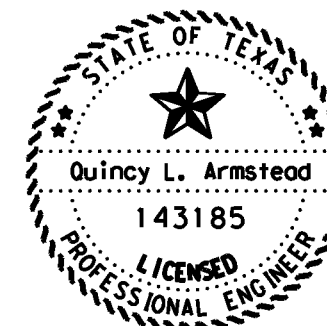
- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: _____
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: _____
- Other: _____
- Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
COLLIN COUNTY PHASE II : TRACY HOMFELD
CITY OF FIRSCO PHASE II : PERY HARTS



Quincy L. Armstead, P.E.
08.02.23

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

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Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6	SEE TITLE SHEET			79
STATE	STATE DIST.	COUNTY		
TEXAS	DALLAS	COLLIN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0091	04	069	SH 289	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: _____
- Other: _____
- Other: _____
- Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- Sediment Trap
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
 - Not required (<10 acres disturbed)
 - Required (>10 acres) and implemented.
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
 - Required (>10 acres), but not feasible due to:
 - Available area/Site geometry
 - Site slope/Drainage patterns
 - Site soils/Geotechnical factors
 - Public safety
 - Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
RIPRAP (STONE PROTECTION) (12IN)	926+73.57 935+64.07	927+87.26 937+82.76
RIPRAP (STONE PROTECTION) (18IN)	625+07.32	927+78.48
GABION MATTRESSES (GALV) (12IN)	925+50.59	927+00.65

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Other: DAMPEN SOIL AREAS FOR DUST CONTROL
- _____
- Other: _____
- _____
- Other: _____
- _____

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: AVOID STORING PORTABLE SANITARY UNITS WITHIN 50 FT UPGRADIENT OF A RECEIVING WATER OR DRAINAGE CONVEYANCE W/O ADEQUATE POLLUTION CONTROLS
- _____
- Other: CAPTURE SAW CUTTING DEBRIS FOR PROPER DISPOSAL
- _____
- Other: _____
- _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
NO SURFACE WATERS WITHIN OR ADJACENT TO PROJECT AREA. VEGETATIVE BUFFERS NOT REQUIRED.		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

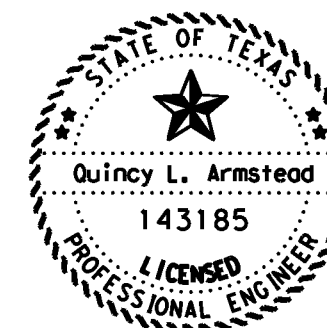
- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.



Quincy L. Armstead, P.E.
08.02.23

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

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Sheet 2 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6	SEE TITLE SHEET			80
STATE	STATE DIST.	COUNTY		
TEXAS	DALLAS	COLLIN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0091	04	069	SH 289	

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 formats or for incorrect results or damage resulting from its use.

Notes 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 its relative position.
 3. All areas should be addressed thoroughly and verify the necessary pay items are set up to
 support actions needed.
 Filled Out: XX/XX/XXXX
 Prepared By: Name/Section

I. STORMWATER POLLUTION PREVENTION PLAN-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.
 List adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
 (Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

- 1. Collin County Phase II MS4-Contact Tracy Homfeld
 - 2. City of Frisco Phase II MS4-Contact Perry Harts
- No Action Required Required Action

Action Number:

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. No equipment is allowed in any stream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# 3(a)

Required Actions: List Waters of the US Permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- Bridge STA 926+00.00 to STA 927+00.00 - Panther Creek Relief - Stream Impacts
- Bridge STA 936+25.00 TO STA 937+50.00 - Panther Creek - Stream Impacts

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices for applicable 401 General Conditions:
 (Note: If CORP Permit not required, do not check boxes.)

Erosion	Sedimentation	Post-Construction TSS
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input checked="" type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required Required Action

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

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

- No Action Required Required Action

Action Number:

- The following species could occur in the project area: Monarch butterfly, American bumblebee, Woodhouse's toad, eastern spotted skunk, long-tailed weasel, swamp rabbit, western hog-nosed skunk, eastern box turtle, Texas garter snake, and timber (canebrake) rattlesnake. Follow the special note on the EPIC sheet and the BMPs listed below to protect these species.
- Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at <https://ftp.txdot.gov/pub/txdot-info/env/tooiki/300-01-bmp.pdf>.
 - a. Section 1.2 Vegetation BMP
 - b. Section 1.4 Water Quality BMP
 - c. Section 2.4.4 Insect Pollinator BMP
 - d. Section 2.6.1 Aquatic Amphibian and Reptile BMP (barrier fencing not required)
 - e. Section 2.6.2 Terrestrial Amphibian and Reptile BMP

Special Notes:

- Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
- 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.
- The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corp of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):
 Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- * Dead or distressed vegetation (not identified as normal)
- * Trash piles, drums, canisters, barrels, etc.
- * Undesirable smells or odors
- * Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (bridge class structures not including box culverts)?

- Yes No

If "No", then no further action is required.
 If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required Required Action

Action Number:

-
-
-

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required Required Action

Action Number:

-



ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH 289
STATE	DISTRICT	COUNTY
TEXAS	DALLAS	Collin
CONTROL	SECTION	JOB
0091	04	069
		SHEET NO.
		81

GENERAL NOTE:

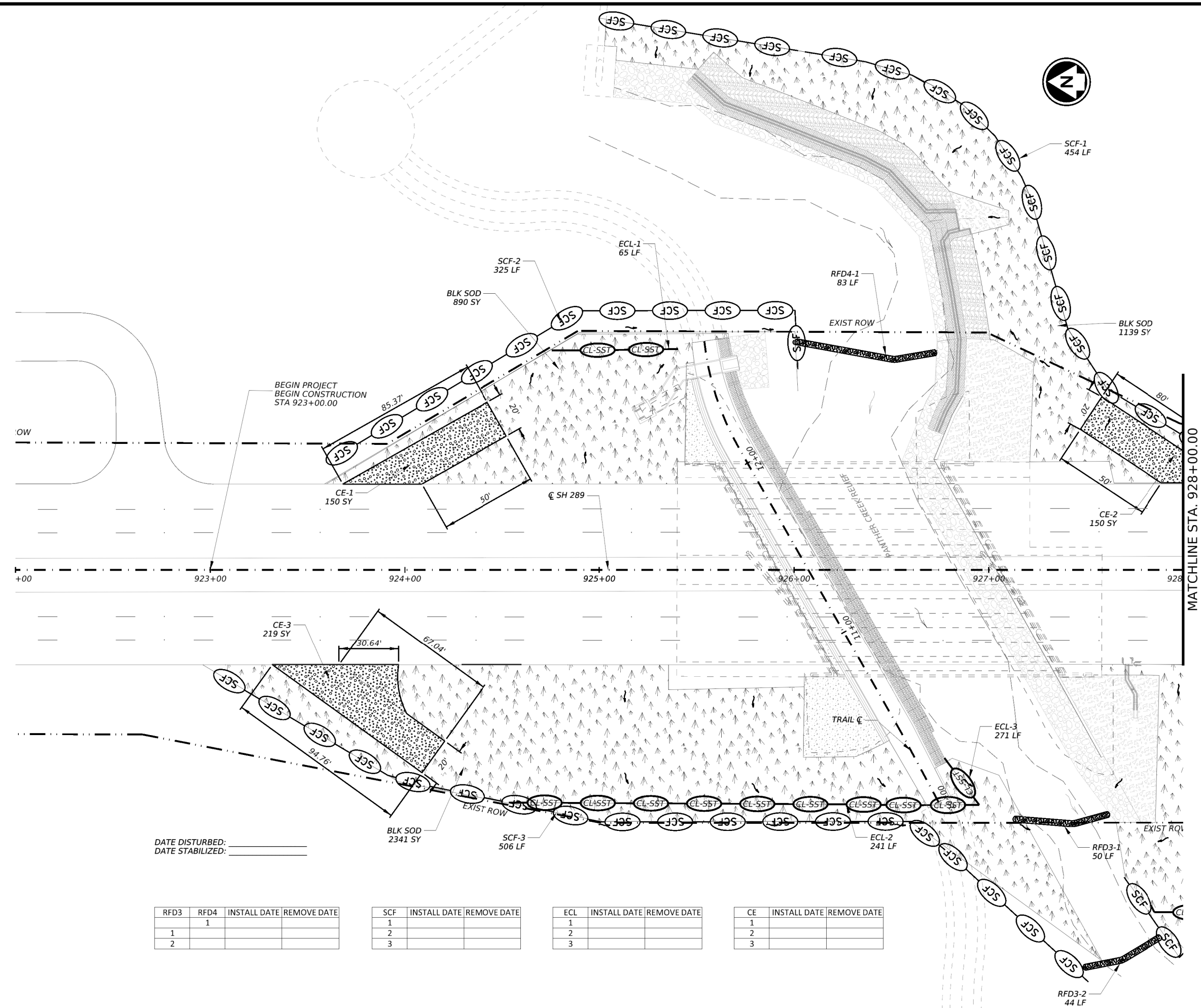
Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

CK: DW: CK: DW:



- LEGEND**
- SILT FENCE
 - EROSION CONTROL LOGS
 - ROCK FILTER DAM
 - DRAINAGE FLOW
 - CONSTRUCTION EXIT TY I
 - BLOCK SOD

- NOTES:**
- 1) BMPs SHALL NOT BE INSTALLED IN THEIR CONTROL AREA ANY SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBING OR POTENTIAL POLLUTANT GENERATING ACTIVITIES.
 - 2) REMOVE LITTER & CONSTRUCTION DEBRIS AS NEEDED OR AS DIRECTED BY THE ENGINEER. THIS WORK IS SUBSIDIARY TO VARIOUS EROSION CONTROL ITEMS (ITEM 506)
 - 3) REMOVE SEDIMENT FROM BMP WHEN IT REDUCES BMP'S CAPACITY BY 40%. ALWAYS PROVIDE CONSISTENT DRAINAGE.
 - 4) CONTRACTOR TO PLACE AND MAINTAIN SWPPP MEASURES APPLICABLE TO EACH PHASE OF CONSTRUCTION.
 - 5) ADJUST BMP CONTROLS AS NEEDED AND AUTHORIZED OR DIRECTED BY THE ENGINEER.
 - 6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.
 - 7) BLOCK SOD QUANTITIES INCLUDE CONSTRUCTION EXIT AREAS AFTER REMOVAL.
- SEE SWP3 SHEETS, SECTION 1.11 FOR RECIEVING WATERS.



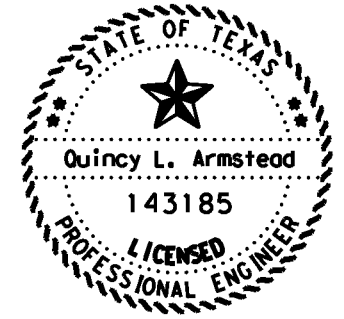
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DATE STABILIZED: _____

RFD3	RFD4	INSTALL DATE	REMOVE DATE
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SCF	INSTALL DATE	REMOVE DATE
1		
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ECL	INSTALL DATE	REMOVE DATE
1		
2		
3		

CE	INSTALL DATE	REMOVE DATE
1		
2		
3		



Quincy L. Armstead, P.E.
08.03.23

Texas Department of Transportation

SH 289

SW3P SITE MAP
PANTHER CREEK RELIEF

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0091	04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	Collin	82	

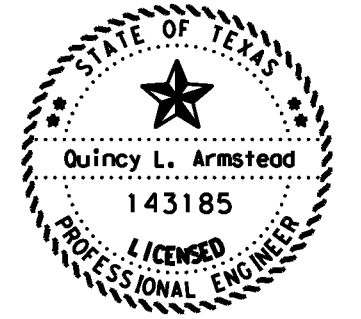
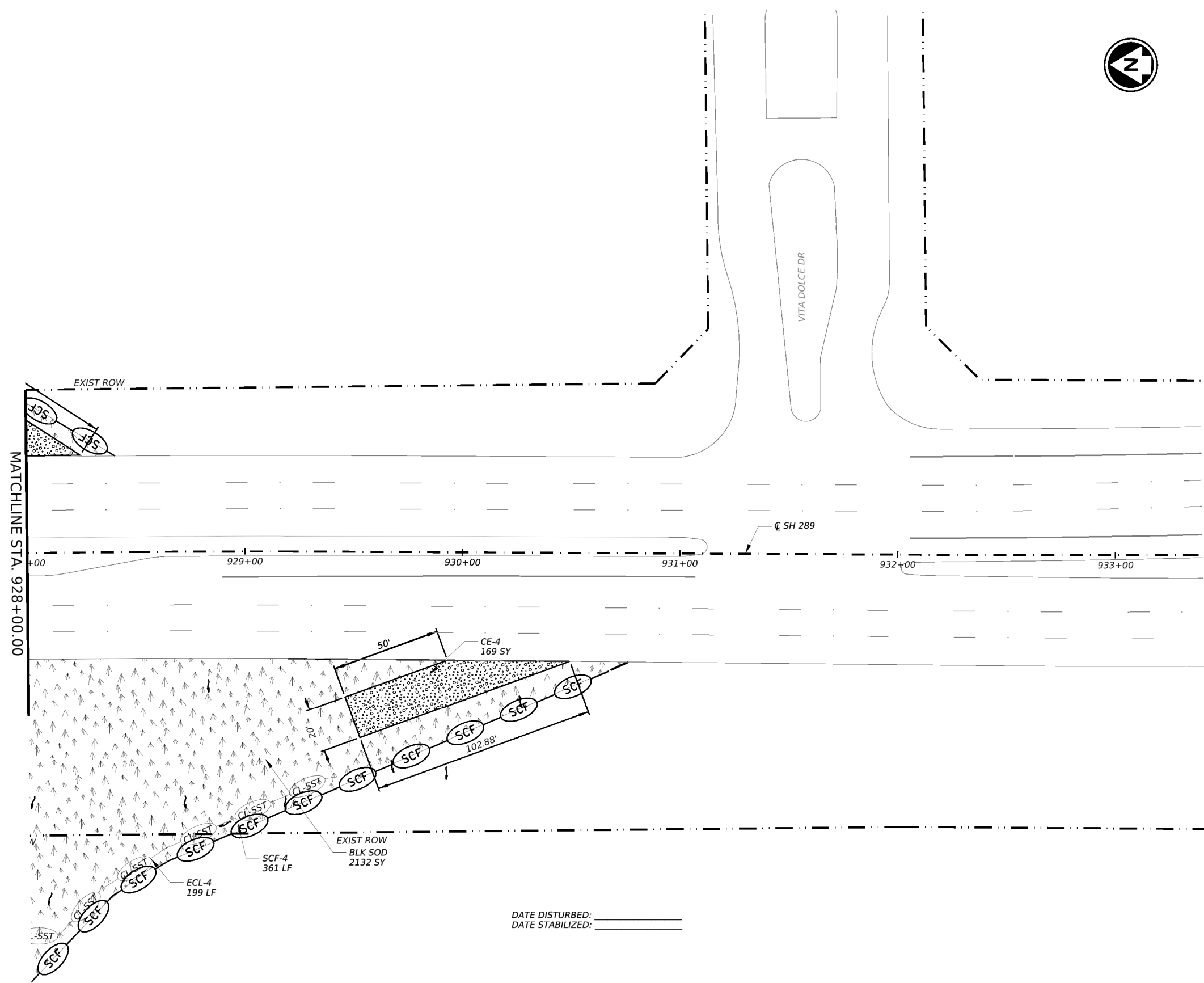
DATE: 2023/08/02
FILE: DOCUMENT NAME

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 DW: _____



- LEGEND**
- SILT FENCE
 - EROSION CONTROL LOGS
 - ROCK FILTER DAM
 - DRAINAGE FLOW
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 - 5) ADJUST BMP CONTROLS AS NEEDED AND AUTHORIZED OR DIRECTED BY THE ENGINEER.
 - 6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.
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- SEE SWP3 SHEETS, SECTION 1.11 FOR RECEIVING WATERS.



Quincy L. Armstead, P.E.
 08.03.23

DATE DISTURBED: _____
 DATE STABILIZED: _____

CE	INSTALL DATE	REMOVE DATE	SCF	INSTALL DATE	REMOVE DATE	ECL	INSTALL DATE	REMOVE DATE
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SH 289
SW3P SITE MAP
PANTHER CREEK RELIEF

SHEET 2 OF 3

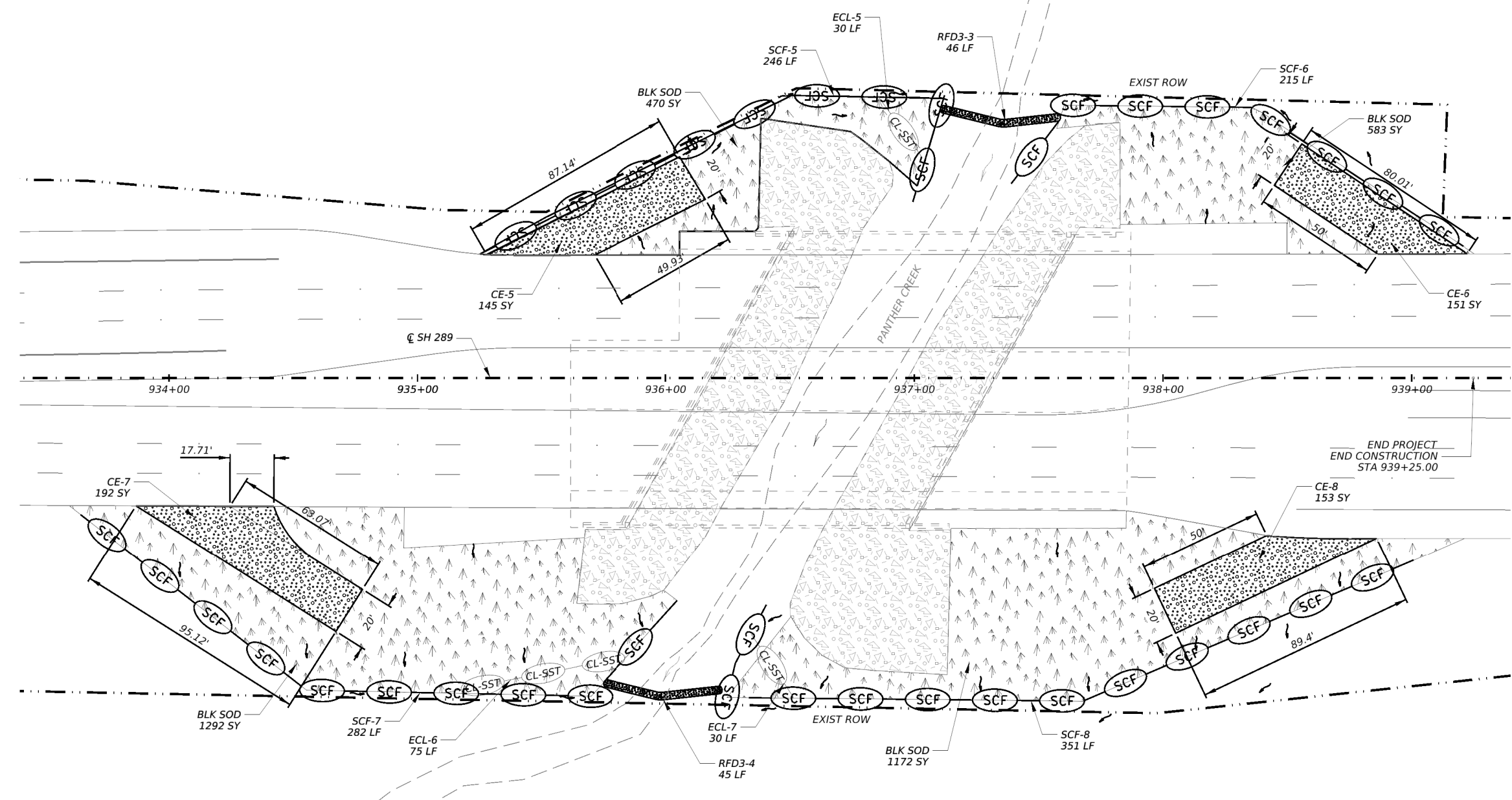
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DIST	COUNTY	SHEET NO.	
DAL	Collin	83	

DATE: 2023/08/02
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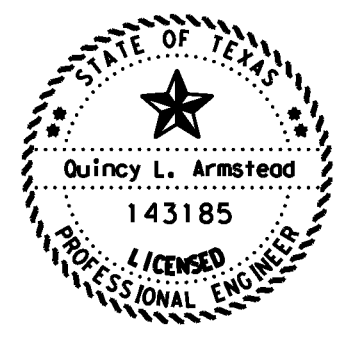
CK
DW
CK
DW



- LEGEND**
- SILT FENCE
 - EROSION CONTROL LOGS
 - ROCK FILTER DAM
 - DRAINAGE FLOW
 - CONSTRUCTION EXIT TY I
 - BLOCK SOD



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- SEE SWP3 SHEETS, SECTION 1.11 FOR RECEIVING WATERS.



Quincy L. Armstead, P.E.
08.03.23

DATE DISTURBED: _____
DATE STABILIZED: _____

RFD3	INSTALL DATE	REMOVE DATE
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SCF	INSTALL DATE	REMOVE DATE
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ECL	INSTALL DATE	REMOVE DATE
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CE	INSTALL DATE	REMOVE DATE
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SH 289
SW3P SITE MAP
PANTHER CREEK

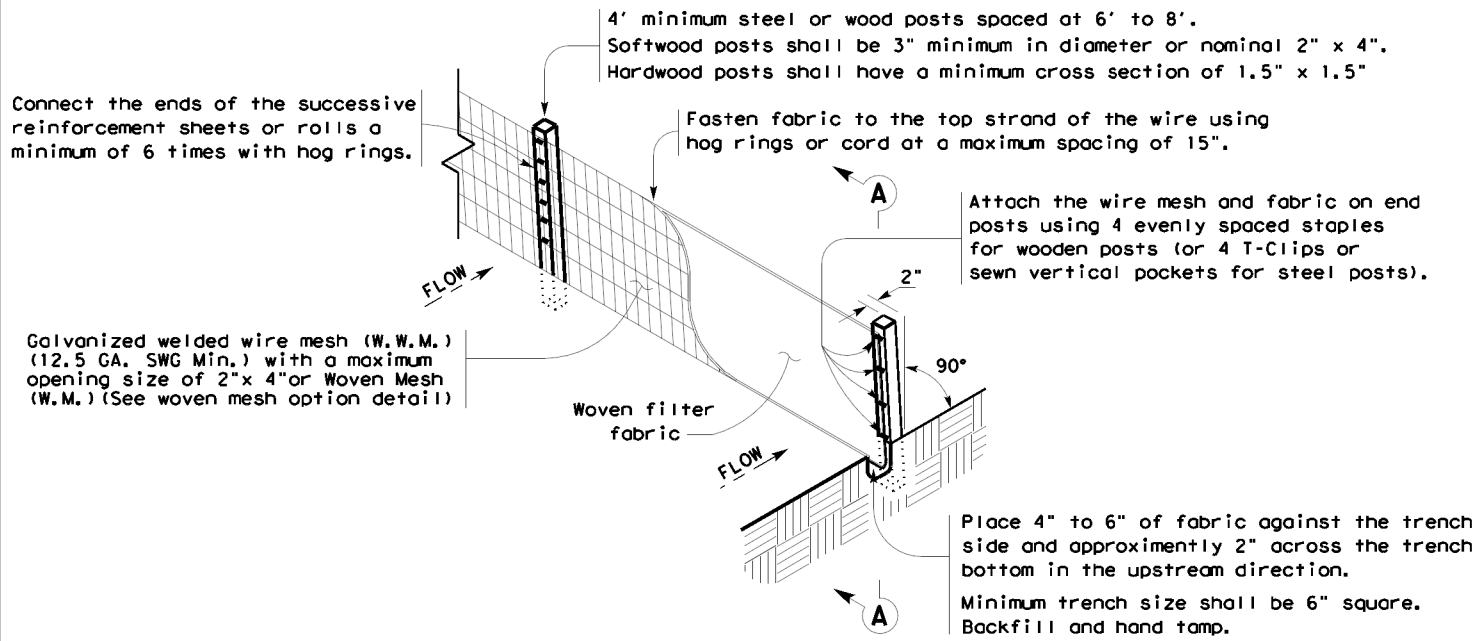
SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY	SHEET NO.	
DAL	Collin	84	

DATE: 2023/07/24
FILE: DOCUMENT NAME

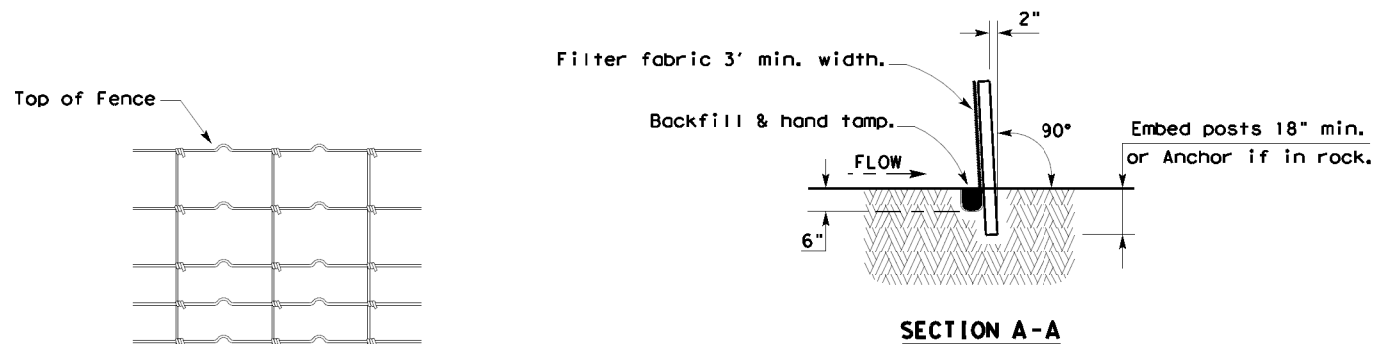
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TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

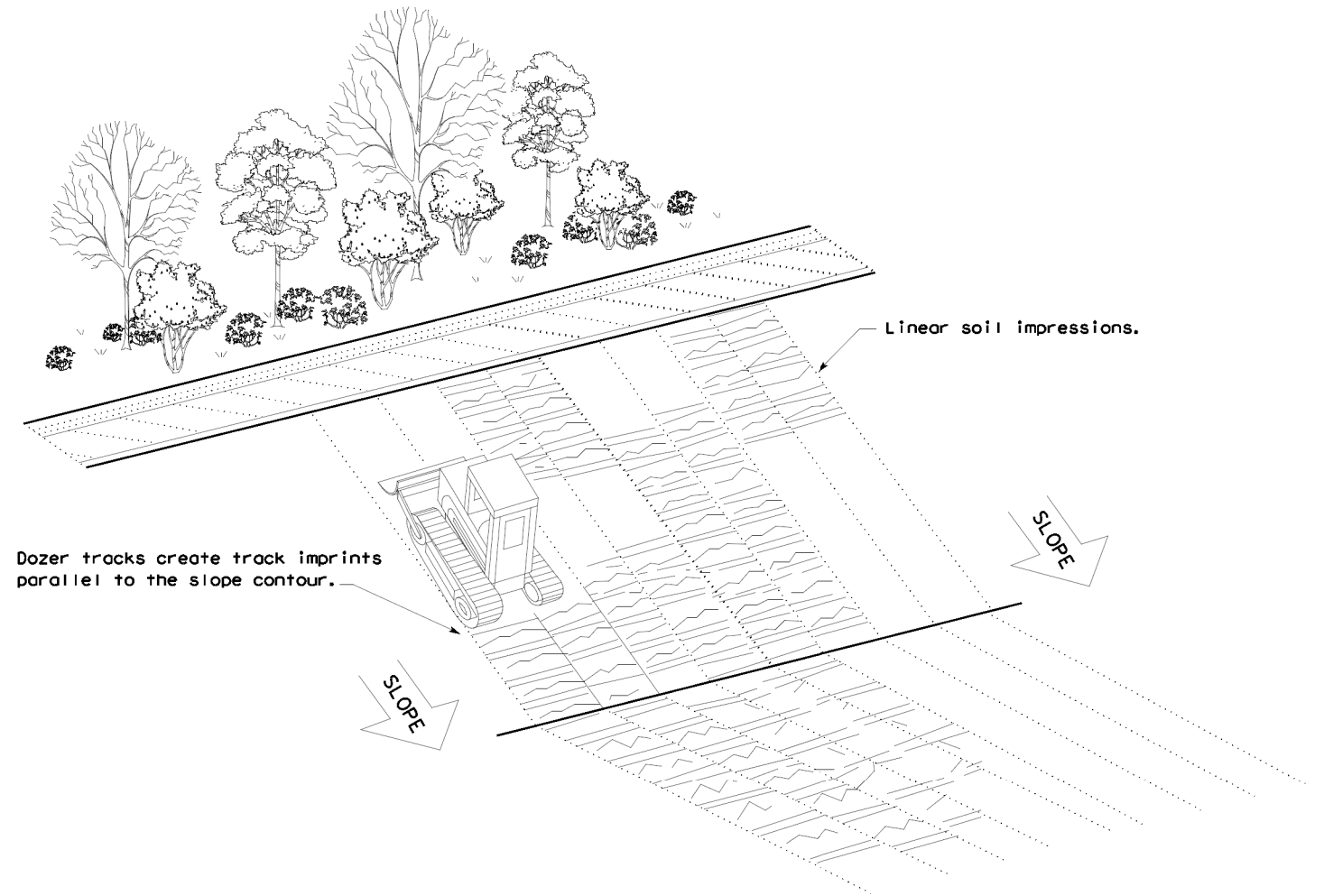
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.

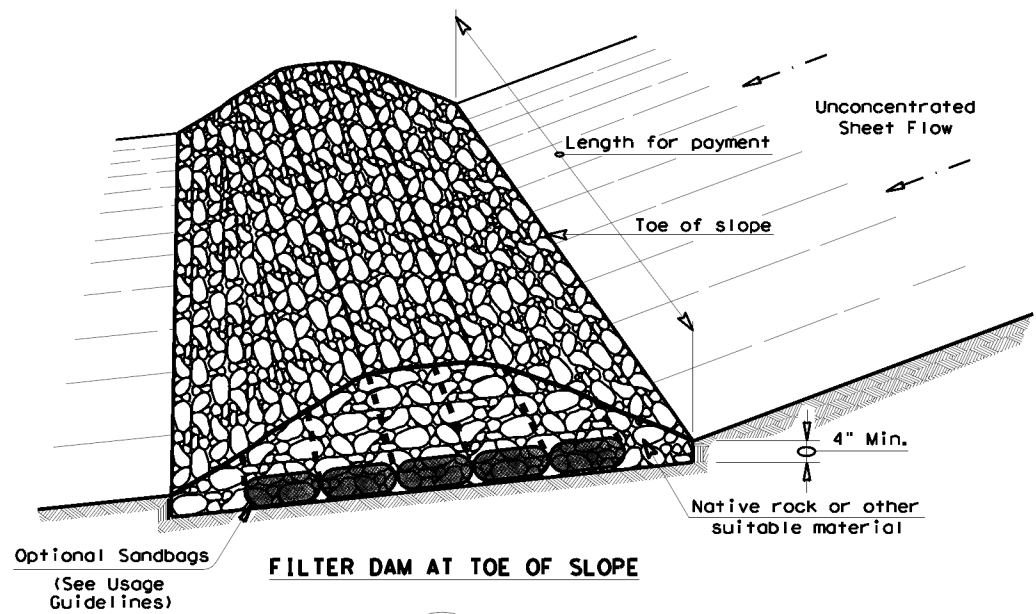


VERTICAL TRACKING

				Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1)-16					
FILE: ec116	DNR TxDOT	CK: KM	DNR VP	DNR/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0091	04	069	SH 289	
	DIST	COUNTY		SHEET NO.	
	DAL	COLLIN		85	

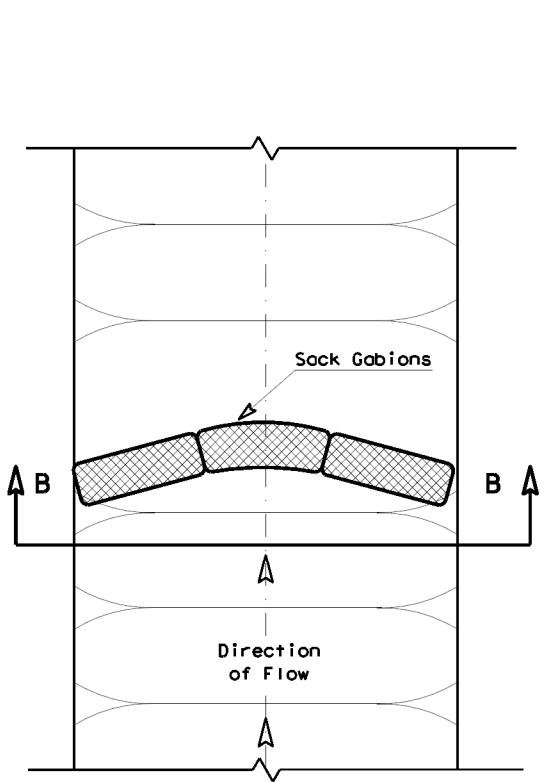
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DATE: 8/2/2023
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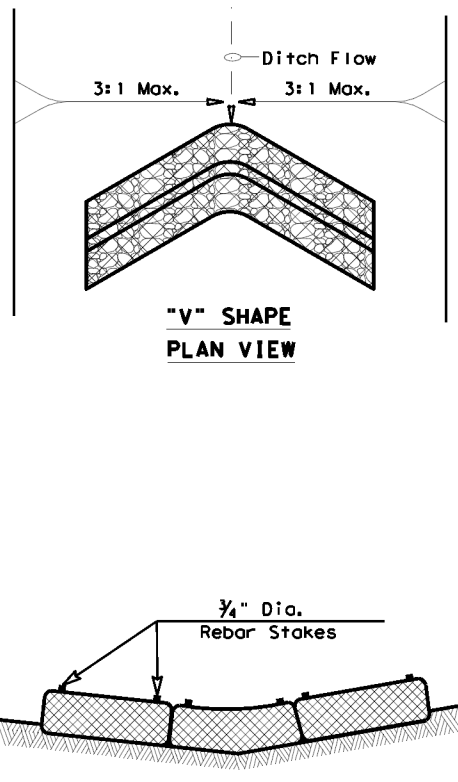


FILTER DAM AT TOE OF SLOPE

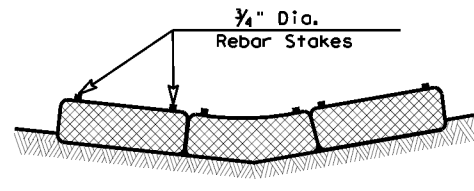
RFD1



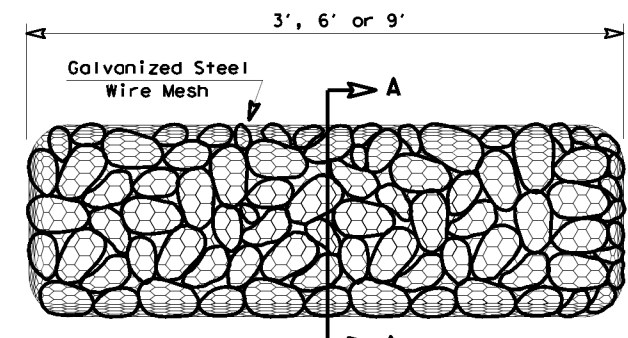
PLAN VIEW



"V" SHAPE PLAN VIEW

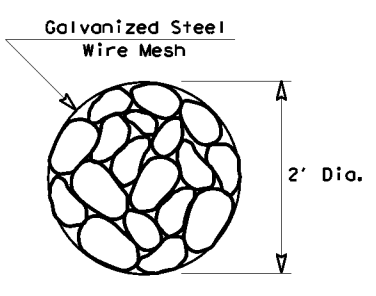


SECTION B-B

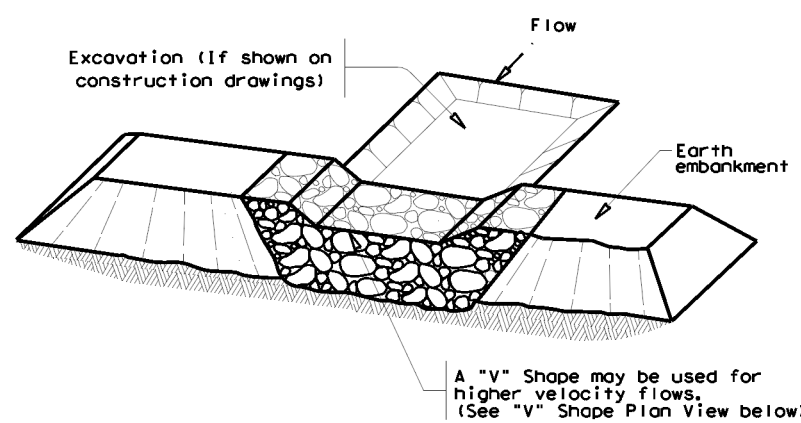


TYPE 4 (SACK GABIONS)

RFD4

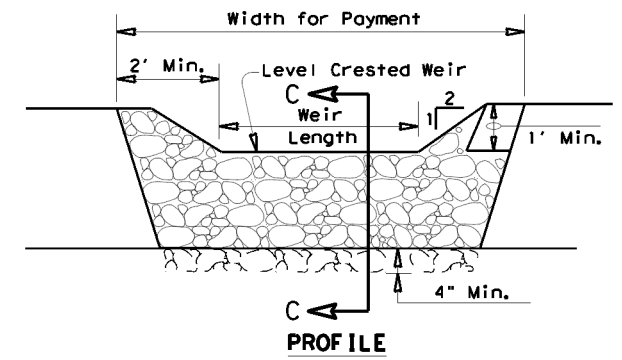


SECTION A-A

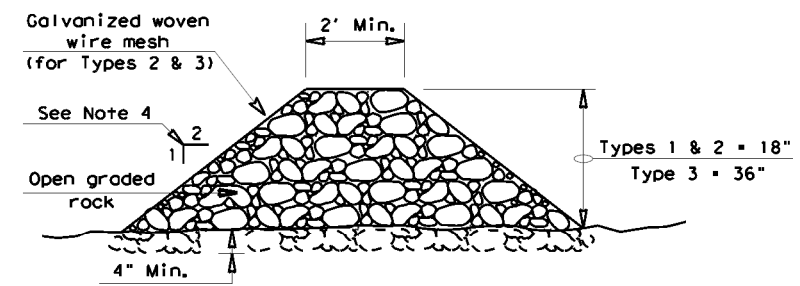


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

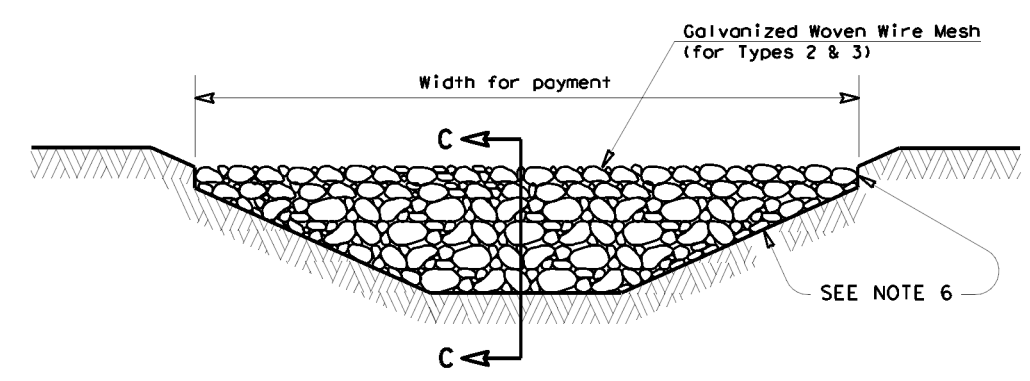
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
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.

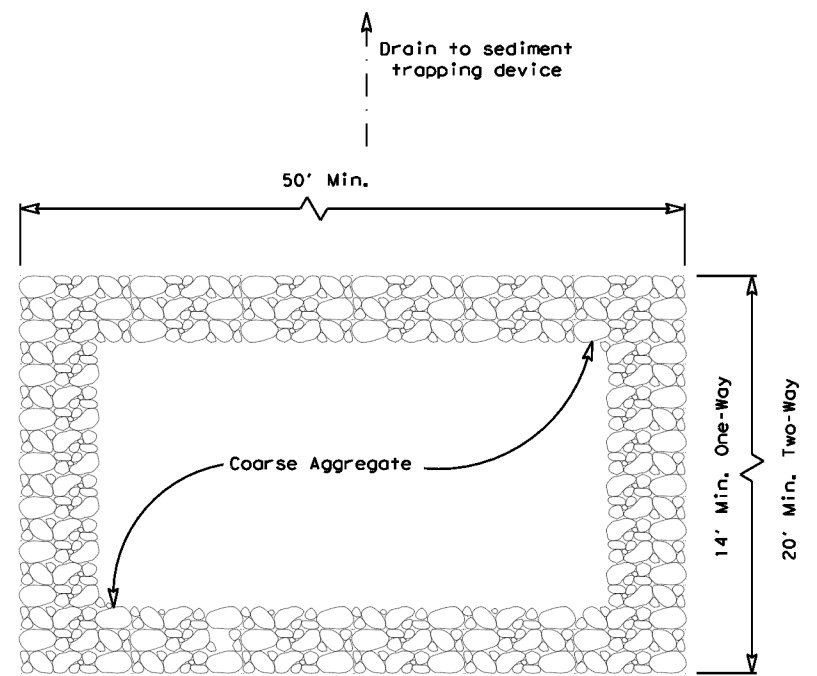
PLAN SHEET LEGEND

- Type 1 Rock Filter Dam — RFD1 —
- Type 2 Rock Filter Dam — RFD2 —
- Type 3 Rock Filter Dam — RFD3 —
- Type 4 Rock Filter Dam — RFD4 —

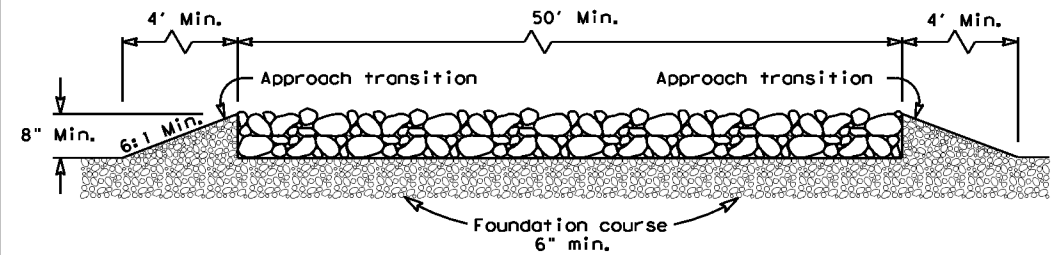
 Texas Department of Transportation		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES ROCK FILTER DAMS EC(2) - 16			
FILE: ec216	DNR TxDOT	CK: KM	DWR: VP
© TxDOT: JULY 2016	CONT: 0091	SECT: 04	JOB: 069
REVISIONS	DIST: DAL		COUNTY: COLLIN
			SHEET NO.: 86

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PLAN VIEW

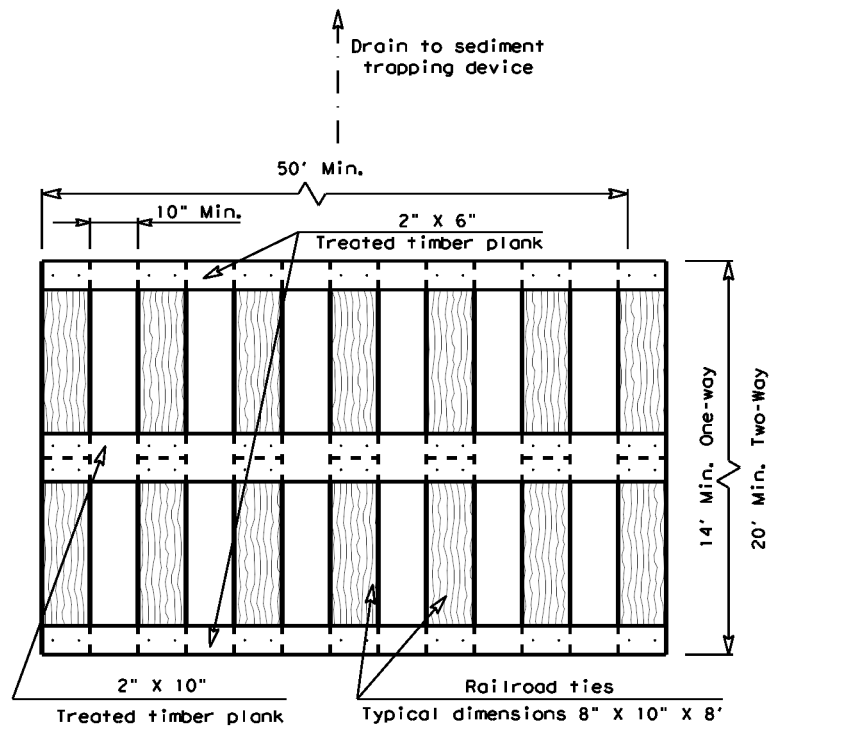


ELEVATION VIEW

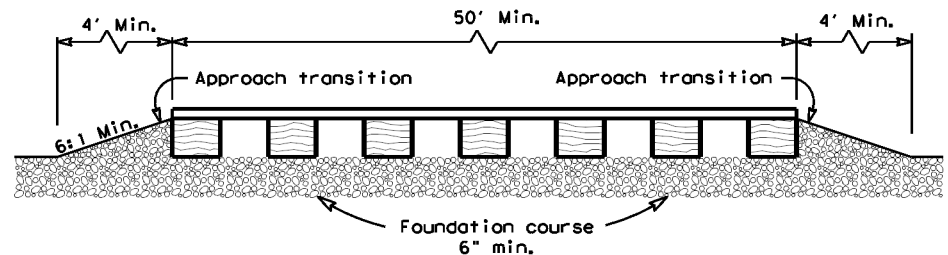
CONSTRUCTION EXIT (TYPE 1)
 ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

- The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- The coarse aggregate should be open graded with a size of 4" to 8".
- The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
- The construction exit shall be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW

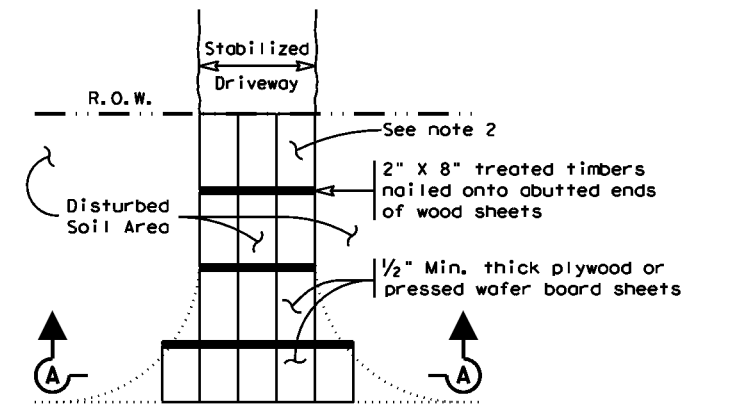


ELEVATION VIEW

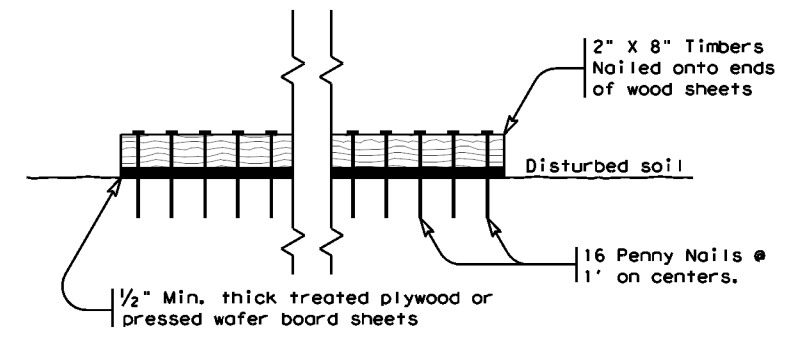
CONSTRUCTION EXIT (TYPE 2)
 TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

- The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with 1/2"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit should be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



SECTION A-A
 CONSTRUCTION EXIT (TYPE 3)
 SHORT TERM

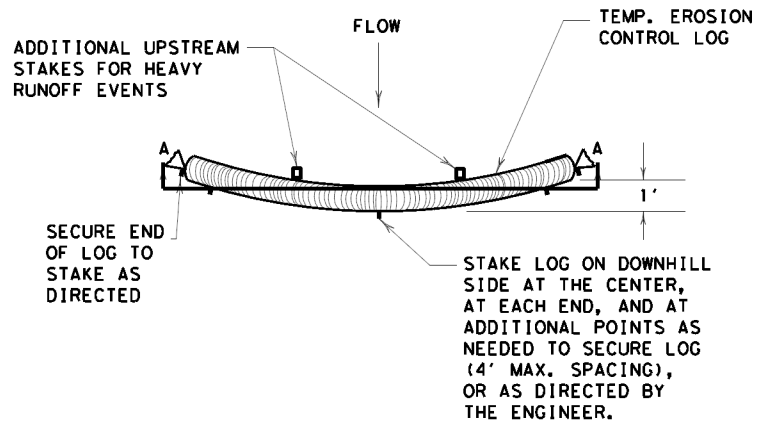
GENERAL NOTES (TYPE 3)

- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

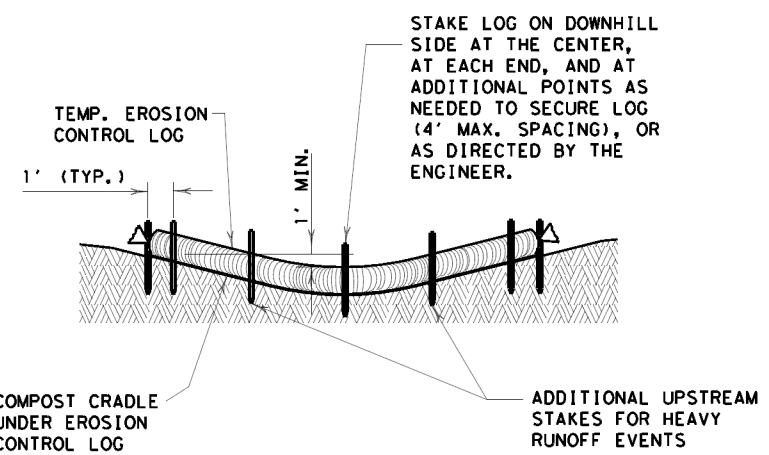
		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC(3)-16			
FILE: ec316	DNR TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0091 04	069	SH 289
DIST	COUNTY	SHEET NO.	
DAL	COLLIN	87	

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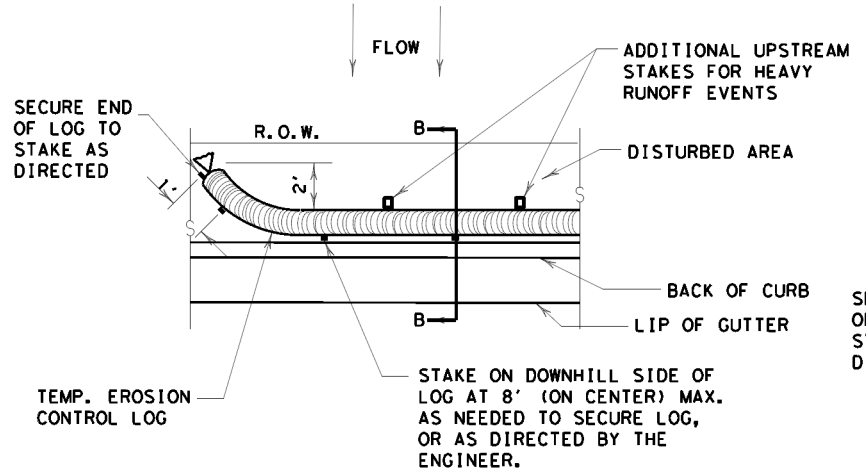


PLAN VIEW

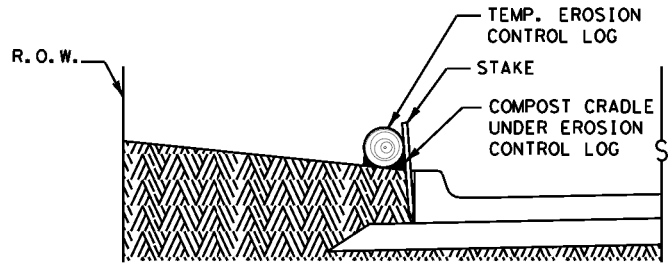


SECTION A-A
 EROSION CONTROL LOG DAM

CL-D

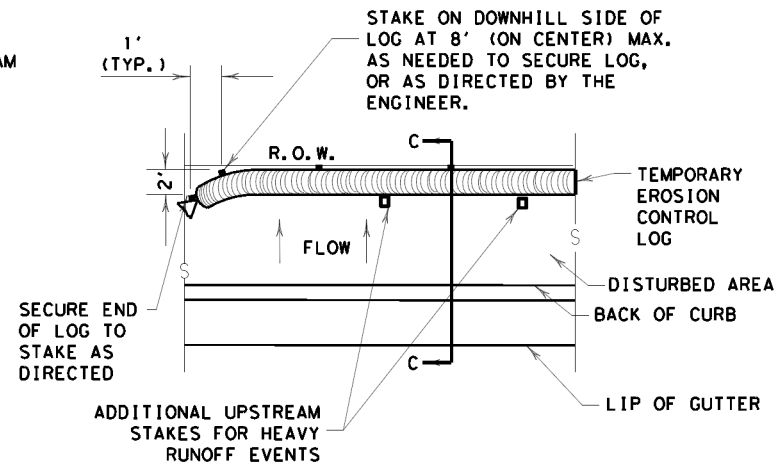


PLAN VIEW

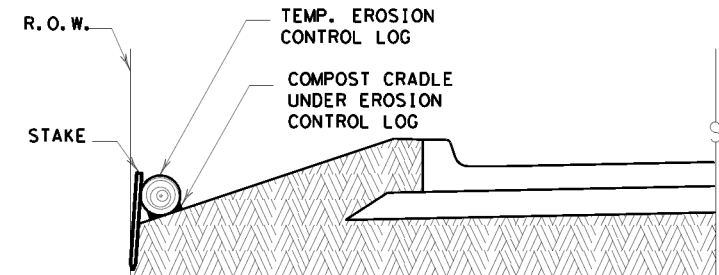


SECTION B-B
 EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



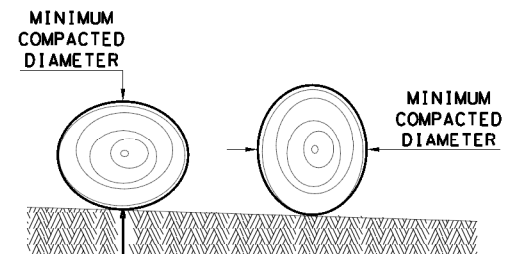
PLAN VIEW



SECTION C-C

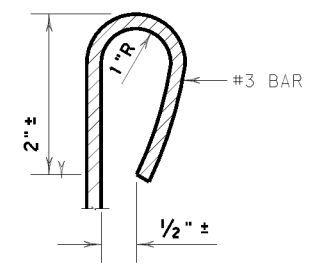
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
 - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
 - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
 - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
 - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
 - CL-DI EROSION CONTROL LOG AT DROP INLET
 - CL-CI EROSION CONTROL LOG AT CURB INLET
 - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

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.

GENERAL NOTES:

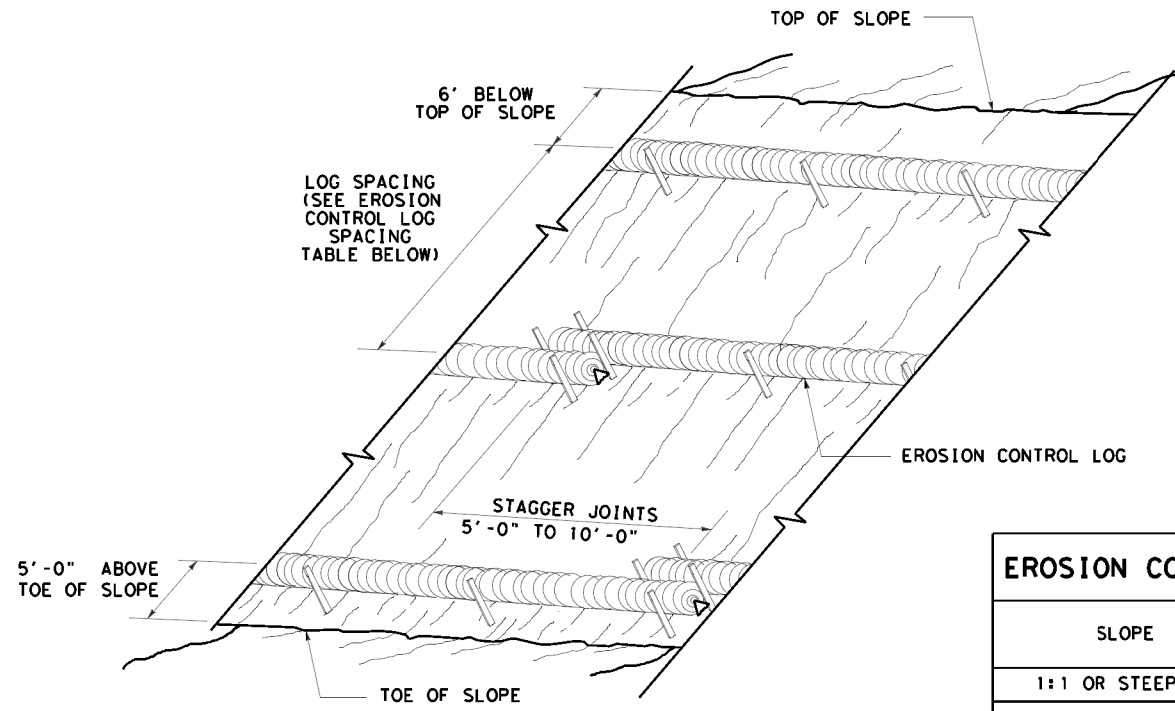
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE 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.

SHEET 1 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DNR TxDOT	CR: KM	DNR LS/PT
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0091 04	069	SH 289
	DIST	COUNTY	SHEET NO.
	DAL	COLLIN	88

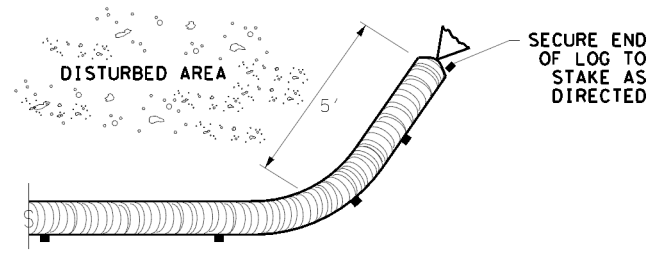
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DATE: 8/2/2023
 FILE: C:\txdot\pw_online\txdot\pw_online\jonathan.jonathan_rich\1001000\ec916.dgn



**EROSION CONTROL LOGS ON SLOPES
 STAKE AND TRENCHING ANCHORING**

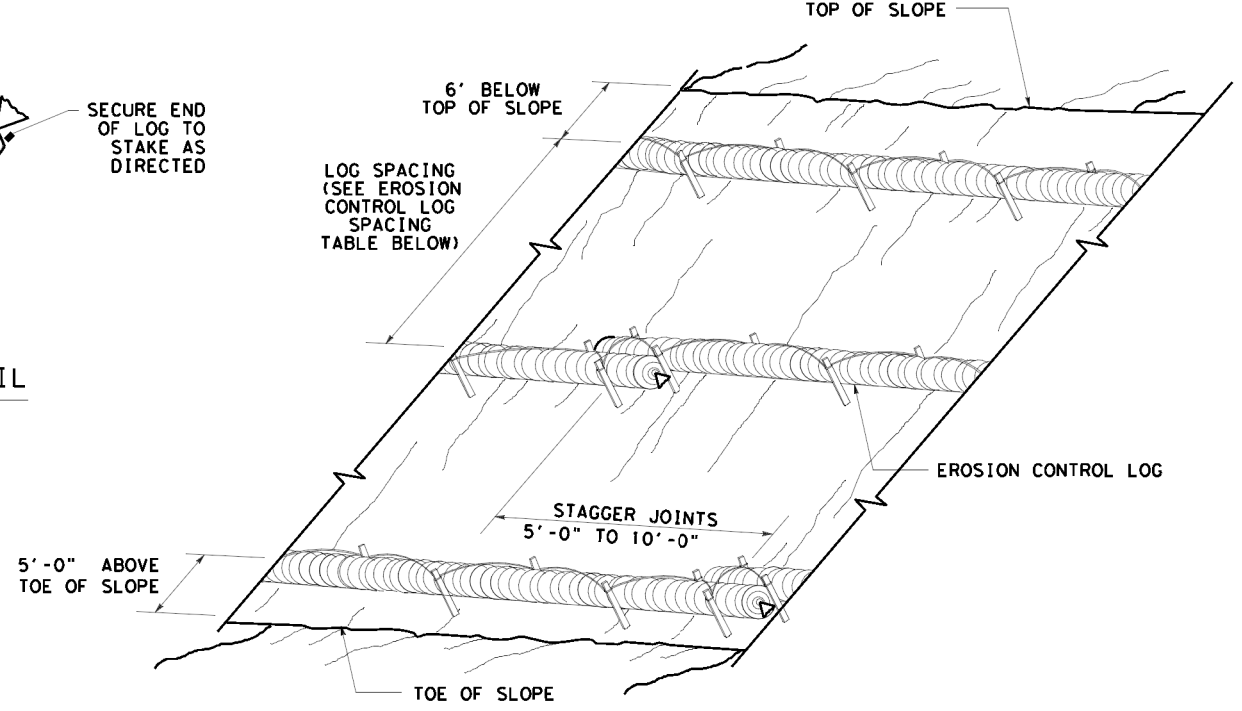
CL-SST



END SECTION RAP DETAIL

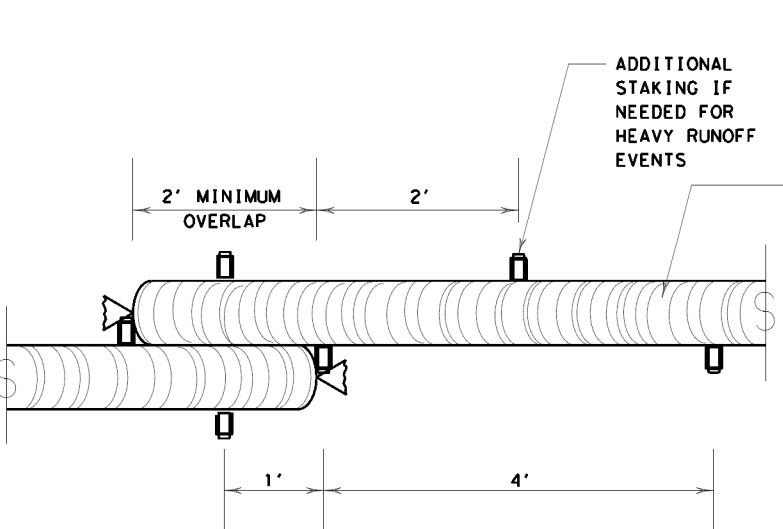
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
 SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
 HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



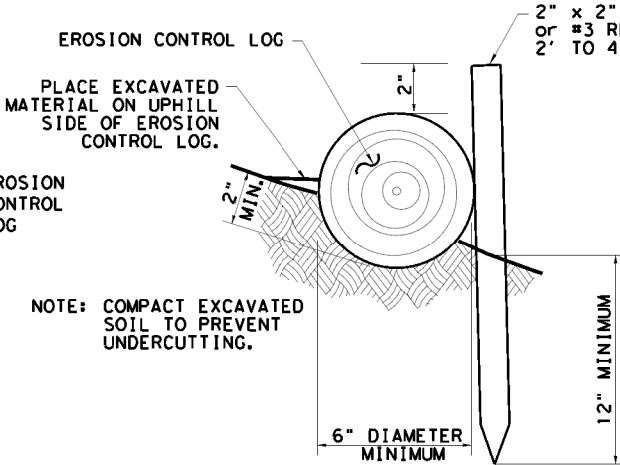
**EROSION CONTROL LOGS ON SLOPES
 STAKE AND LASHING ANCHORING**

CL-SSL

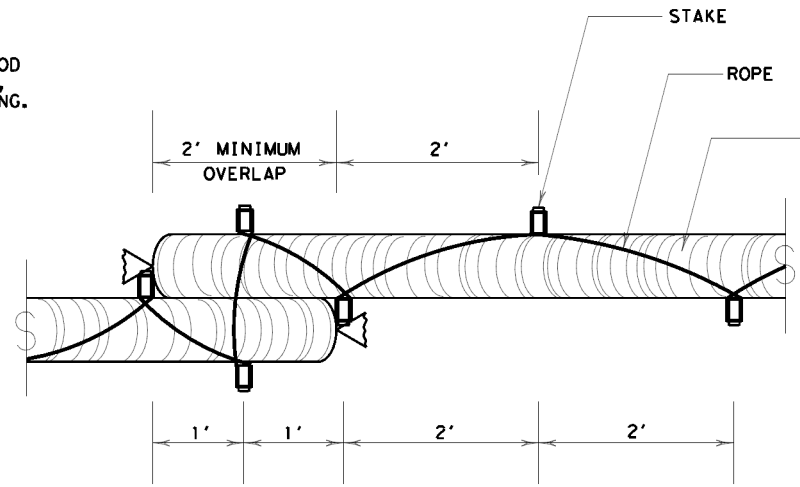


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

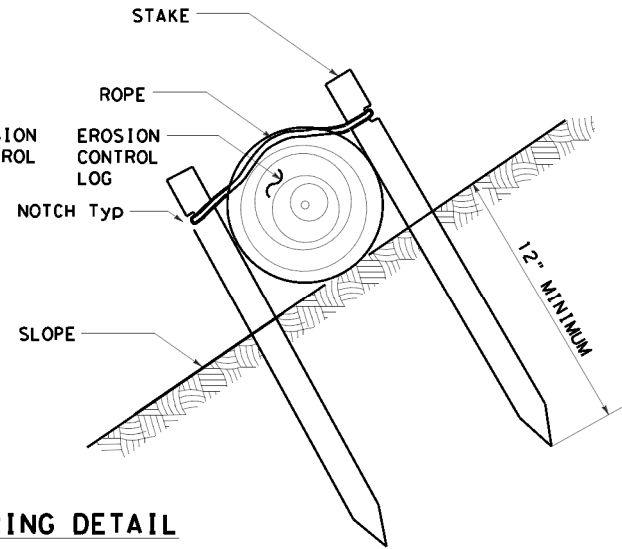


NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.



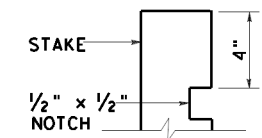
STAKE AND LASHING ANCHORING DETAIL

CL-SSL



LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

TRENCH DEPTH TABLE



STAKE NOTCH DETAIL

SHEET 2 OF 3

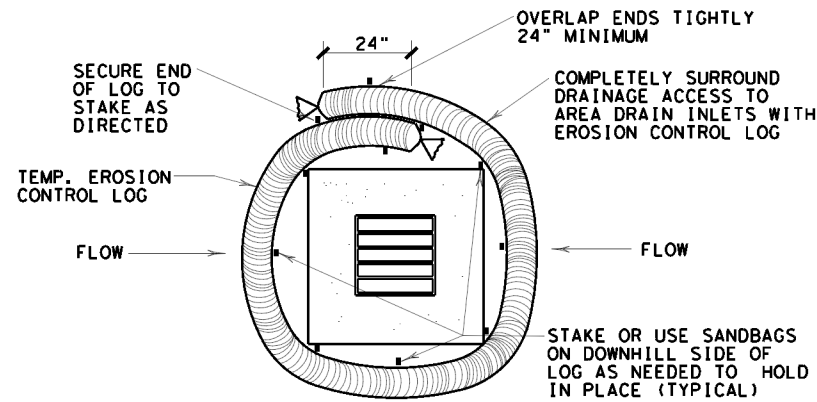
Texas Department of Transportation
 Design Division Standard

**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
 EROSION CONTROL LOG
 EC (9) - 16**

FILE: ec116	DNR TxDOT	CK: KM	DWR LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0091	04	069	SH 289
DIST	COUNTY	SHEET NO.		
DAL	COLLIN	89		

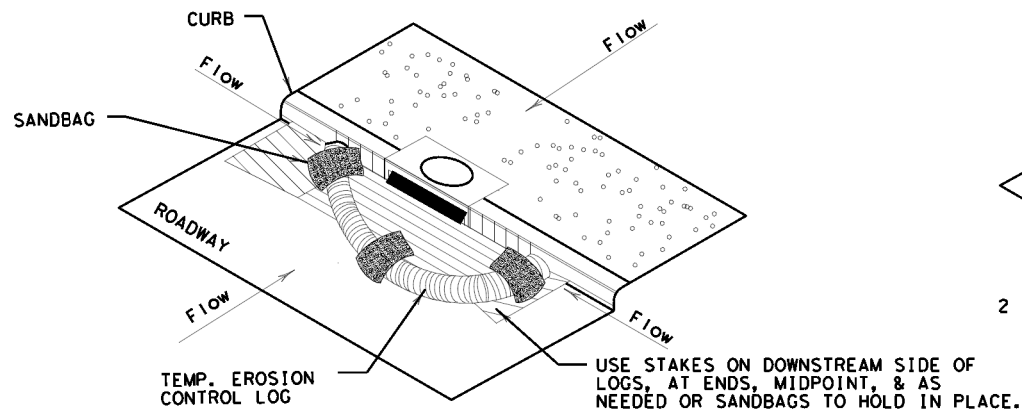
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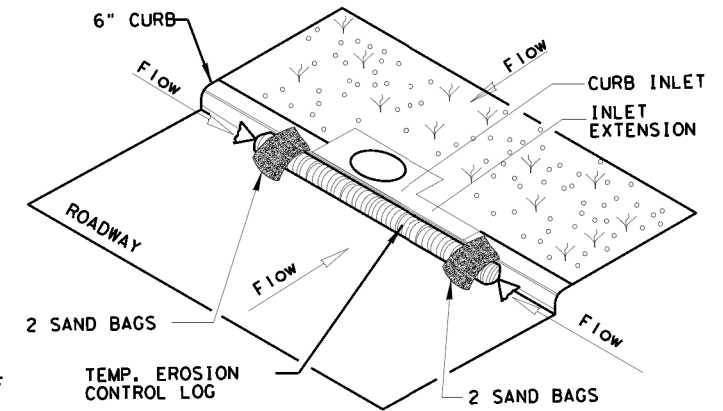
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

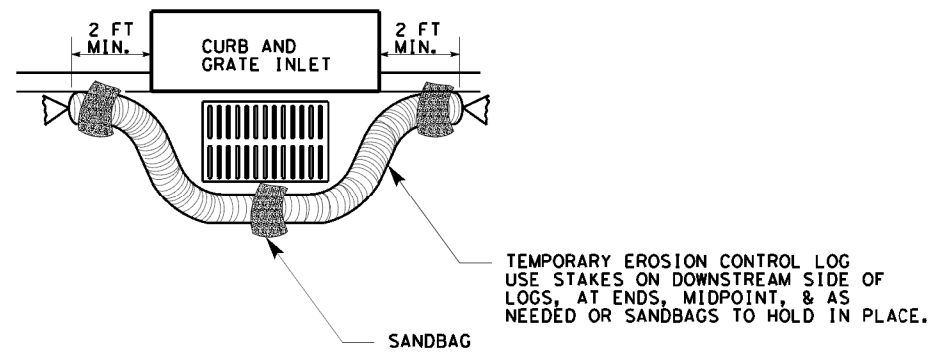
CL-CI



EROSION CONTROL LOG AT CURB INLET

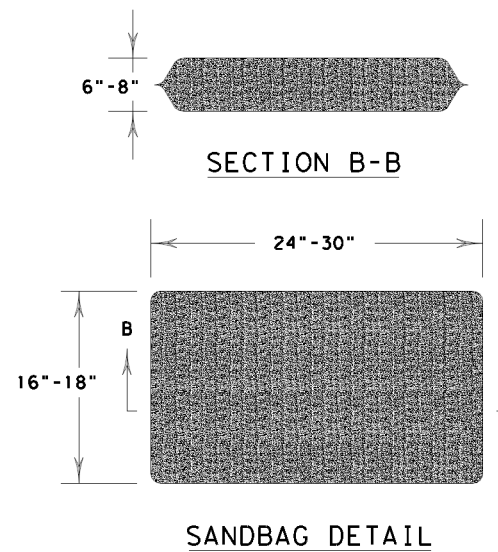
CL-CI

NOTE:
 EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

		<i>Design Division Standard</i>	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DNR TxDOT	CK: KM	DWR: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0091	04	069
DIST	COUNTY		SHEET NO.
DAL	COLLIN		90

USER ID

SURFACE PREPARATION ITEM 160* TOPSOIL SY / ITEM 161* COMPOST MANUF. TOPSOIL (BOS) (4") SY

SURFACE PREPARATION

Prepare planting area surface BEFORE placing Topsoil, Compost, Fertilizer, Seed and/or Sod. Once project area has been completed to final lines, grade and compaction, remove objectionable materials from planting area surface and cultivate existing surface to a depth of 4 inches, unless otherwise specified or directed.

Refer to Items 160 and 161 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.

TOPSOIL NOTES:

- When Topsoil is specified under Item 160, use suitable material salvaged from the project ROW in accordance with Item 160 specifications, and/or secure additional good material from approved sources.
- Topsoil shall include only the top 6 inches of its native surface, and be easily cultivated, fertile, erosion-resistant and free of objectionable materials.
- Topsoil obtained from sites outside of the ROW must come from approved sources and have a pH between 5.5 and 8.5 su.
- Place Topsoil on pre-cultivated surface, spread to a uniform loose cover at thickness specified, and shape per plans. Water and roll the finished surface with a light roller or other suitable equipment per Item 160.3; do not over-compact.

COMPOST NOTES:

- When Compost Manufactured Topsoil (4") is specified under Item 161, use compost meeting all requirements of Item 161.2 and Table 1. Provide quality control (QC) documentation and obtain Engineer approval prior to compost delivery.
- Contractor shall provide tickets/invoices that document material type, quantity and placement for all compost delivered.
- Additional topsoil may be required to be imported to achieve the compost/topsoil mix ratio. Topsoil must meet Item 160 specifications.

APPLICATION OF COMPOST MANUFACTURED TOPSOIL (4")

AFTER Surface Preparation, uniformly spread a 1-inch layer of compost on-grade with 3 inches topsoil over pre-cultivated planting area. (25% compost and 75% topsoil = 1" compost and 3" topsoil.) Then mix compost and topsoil together by cultivating the compost into the topsoil (by till or disk) to a 4-inch (4") depth. Roll the finished surface with a light corrugated drum; do not over-compact.

FERTILIZER ITEM 166* FERTILIZER AC

SOIL ANALYSIS FOR FERTILIZER APPLICATION RATE

Unless otherwise stated in the plans, Contractor shall perform at least one soil analysis on each project before fertilization, and submit results to Engineer with recommended fertilizer rates based on soil analysis. Engineer may direct sample location(s). Soil analysis may be waived if both compost and sod are used on entire project.

FERTILIZER NOTES:

- Refer to Item 166 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
- Apply fertilizer BEFORE seeding, or AFTER placing sod.
- Use fertilizer containing nitrogen (N), phosphoric acid (P) and potash (K) nutrients, unless otherwise specified. At least 50% of the Nitrogen component shall be a slow-release sulfur-coated urea as described in Item 166.3. Do not apply more than 60 lbs Nitrogen per acre without Engineer concurrence.
- Deliver fertilizer in bags, clearly labeled to show contents, unless otherwise specified or approved prior to delivery. When non-bagged, loose fertilizer is approved, provide documentation for each load of material delivered, to validate authenticity of the material.
- Apply fertilizer uniformly, as a dry, granular material, essentially dust-free, and do not mix with water for application as a slurry.
- When both temporary and permanent seeding are specified for the same area, apply half of the required fertilizer before the temporary seeding operation and the other half before the permanent seeding operation.

SEEDING FOR EROSION CONTROL ITEM 164* DRILL SEEDING AC

RECOMMENDED PLANTING SEASON	PERMANENT RURAL SEED MIX ITEM 164 - DRILL SEEDING (PERM) (RURAL) (CLAY)	PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN) (CLAY)	TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)
WARM SEASON Mar. 15th, April, May, June, July, August, Sept. 15th	Green Sprangletop (Van Horn) - 1.0 lbs/AC Sideoats Grama (Haskell) - 1.0 lbs/AC Texas Grama (Atascosa) - 1.0 lbs/AC Hairy Grama (Chaparral) - 0.4 lbs/AC Shortspike Windmillgrass (Welder) - 0.2 lbs/AC Little Bluestem (OK Select) - 0.8 lbs/AC Purple Prairie Clover (Cuero) - 0.6 lbs/AC Engelmann Daisy (Eldorado) - 0.75 lbs/AC Illinois Bundlesflower - 1.3 lbs/AC Awnless Bushsunflower (Plateau) - 0.2 lbs/AC	Green Sprangletop (Leptochloa dubia) - 0.3 lbs/AC Sideoats Grama (El Reno) (Bouteloua curtipendula) - 3.6 lbs/AC Buffalograss (Texoka) (Buchloe dactyloides) - 1.6 lbs/AC Bermudagrass (Cynodon dactylon) - 2.4 lbs/AC	Foxtail Millet (Setaria italica) - 34 lbs/AC
COOL SEASON Sept 16th, Oct, Nov, Dec, Jan, Feb, Mar 14th			Pure Live Seed Rate** Tall Fescue (Festuca arundinaceae) - 4.5 lbs/AC Western Wheatgrass (Agropyron smithii) - 5.6 lbs/AC Red Winter Wheat (Triticum aestivum) - 34 lbs/AC Cereal Rye - 34 lbs/AC

SEEDING NOTES:

- When seeding is specified under Item 164, refer to TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown. Materials and construction shall meet specifications.
- Conduct seeding upon completion of each applicable construction stage (dependent upon planting season requirements), without compensation for additional move-ins.
- Place seed AFTER preparing planting area surface. Refer to Surface Preparation detail in this sheet, as well as Topsoil Item 160 and Compost Manufactured Topsoil Item 161 when specified. Apply fertilizer per Item 166 BEFORE seeding, per specifications and this sheet, to help drill the fertilizer into the soil.
- When temporary grasses are well-established and more than 2 inches tall, mow planting area before seeding permanent grasses; mowing for this purpose will be subsidiary. When vegetation is not already well-established, cultivate planting area to a depth as described in Item 164.3, before temporary seeding and before permanent seeding.
- Seed material must be appropriate to the location, soil type and season. Use the seed mix species and pure live seed rates designated in Tables 1-4 of the TxDOT 2014 Standard Specifications* for Item 164, unless otherwise specified.
- All seed shall meet labeling, delivery, analysis, and testing requirements described in Item 164.2.1. Deliver seed in labeled, unopened bags or containers to Engineer prior to planting.
- Uniformly plant seed over the designated planting area, along the contour of slopes, and drill seed to a depth as described in Item 164.3.4.
- Hydroseeding may be allowed, when specified or Engineer concurs.
- Implement and continue Vegetative Watering per the schedule, rate and volume specified under Item 168.

TxDOT REFERENCE MATERIALS:

- "STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES" 2014
- "A GUIDANCE TO ROADSIDE VEGETATION ESTABLISHMENT" 2004
- ONLINE TRAINING COURSE: MNT415 REVEGETATION DURING CONSTRUCTION
- DALLAS DISTRICT "VEGETATION ESTABLISHMENT GUIDELINES"

SODDING FOR EROSION CONTROL ITEM 162* BLOCK SOD (BERMUDA) SY

BLOCK OR ROLL SOD	COMMON NAME	BOTANICAL NAME
	Common Bermuda Grass	Cynodon dactylon

SODDING NOTES:

- Refer to Item 162 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
- Place sod between the average date of the last freeze in the Spring and 6 weeks before the average date of the first freeze in the Fall, per the Texas Almanac for the project area.
- Place sod only AFTER soil surface preparation is complete as detailed in this sheet. Dry soil may require pre-watering.
- Place all sod (blocks or rolls) within 24 hours of delivery to the site, and keep moist from the time it is dug up until it is planted. Sod with dried roots will not be accepted.
- Place sod with joints alternating on each row to prevent all joints from lining up, and place blocks firmly against adjacent blocks. Roll, tamp and trim sod per Item 162.3.
- Place fertilizer promptly AFTER sodding operation is complete in each area.
- Water sod immediately following placement, and continue Vegetative Watering per Item 168.

VEGETATIVE WATERING FOR ESTABLISHING SEED AND SOD ITEM 168* VEGETATIVE WATERING MG

SEASON (Usual Months)	RATE	TIME SCHEDULE	TOTAL WATER ESTIMATE
SPRING & FALL (March, April, May, October)	7,000 gallons/acre per working day	Vegetative watering for seed shall begin on the day after rainfall described below and continue for 60 consecutive working days; vegetative watering for sod shall begin on the day the sod is placed and continue for a minimum of 15 consecutive working days.	420,000 gallons/acre (60 working days)
SUMMER (June, July, August, September)	12,000 gallons/acre per working day		720,000 gallons/acre (60 working days)
WINTER (November through February)	1,000 gallons/acre per working day	Vegetative watering for seed and/or sod shall begin on the day after placement for 15 consecutive working days	15,000 gallons/acre (15 working days)

Notes: Rate and frequency may be adjusted, with the approval of the Engineer, to meet site conditions (especially with sod). For informational purposes only: 1,000 gallons equals 1 MG

VEGETATIVE WATERING NOTES:

- Refer to Item 168 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
- Use clean water free of industrial waste and other substances harmful to vegetation growth, per Item 168.2.
- Use Vegetative Watering to keep the seed bed moist during germination; not to provide initial watering. After drill seeding, postpone watering operations until site receives at least 1/2-inch of natural rainfall in a single day. Delay watering operations for warm season grasses until soil temperature exceeds 70 degrees F.
- For sod, water immediately.
- All water distribution equipment shall be furnished and operated to provide water at a uniform and controllable rate. Use a metering device on all watering equipment.
- Evenly distribute water over entire area designated for seeding and/or sodding, using even spray patterns that do not disturb seed bed and/or dislodge seed from seed bed.
- Do not water between the hours of 12:00 p.m. and 6:00 p.m. when daytime temperatures exceed 95 degrees F.
- After initial establishment period, continue intermittent watering of newly established seed or sod at a rate of approximately 1-inch water/week, during summer months until end of contract.
- If 1/4-inch or more of rainfall occurs on site on any given working day, no vegetative watering will be needed on that working day. (Note: 1/4-inch rain equals 7,000 gallons of water per acre.)
- Should the Contractor fail to apply the specified amount of water within the time allowed, any seed or sod in poor condition shall be replaced, fertilized, and watered at Contractor's expense.

ROADSIDE MOWING ITEM 730* PROJECT MAINTENANCE AC

MOWING NOTES:

- During project construction, once seed is established, use mowing to promote permanent grasses by mowing any remaining temporary grasses.
- Also mow established turf and ROW grasses in designated areas of project limits as specified or directed by Engineer.
- Remove litter and debris prior to mowing.
- Do not mow on wet ground when soil rutting can occur.
- Hand-trim around obstructions and stormwater control devices as needed.
- Maintain paved surfaces free of tracked soils and clipped vegetation.

SEQUENCE OF WORK:

- CULTIVATE SURFACE SOIL.
- PREPARE / PLACE TOPSOIL, OR
- PREPARE / PLACE COMPOST MANUFACTURED TOPSOIL.
- APPLY FERTILIZER AND THEN PLACE SEEDING, OR
- PLACE SOD AND THEN APPLY FERTILIZER.
- CONDUCT VEGETATIVE WATERING.
- CONDUCT ROADSIDE MOWING, AS DIRECTED.



VEGETATION ESTABLISHMENT SHEET
(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

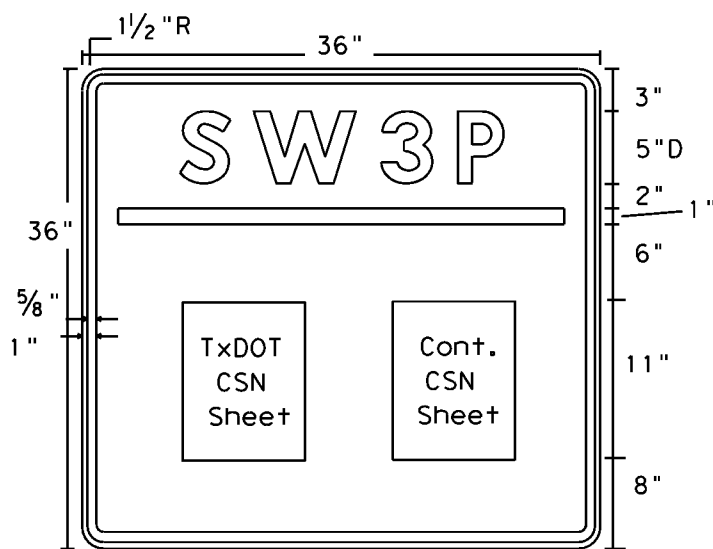
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		SH 289
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DALLAS	COLLIN	91
CHECK	CONTROL	SECTION	JOB	
CHECK	0091	04	069	

DATE

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PATH:

LEVELS DISPLAYED



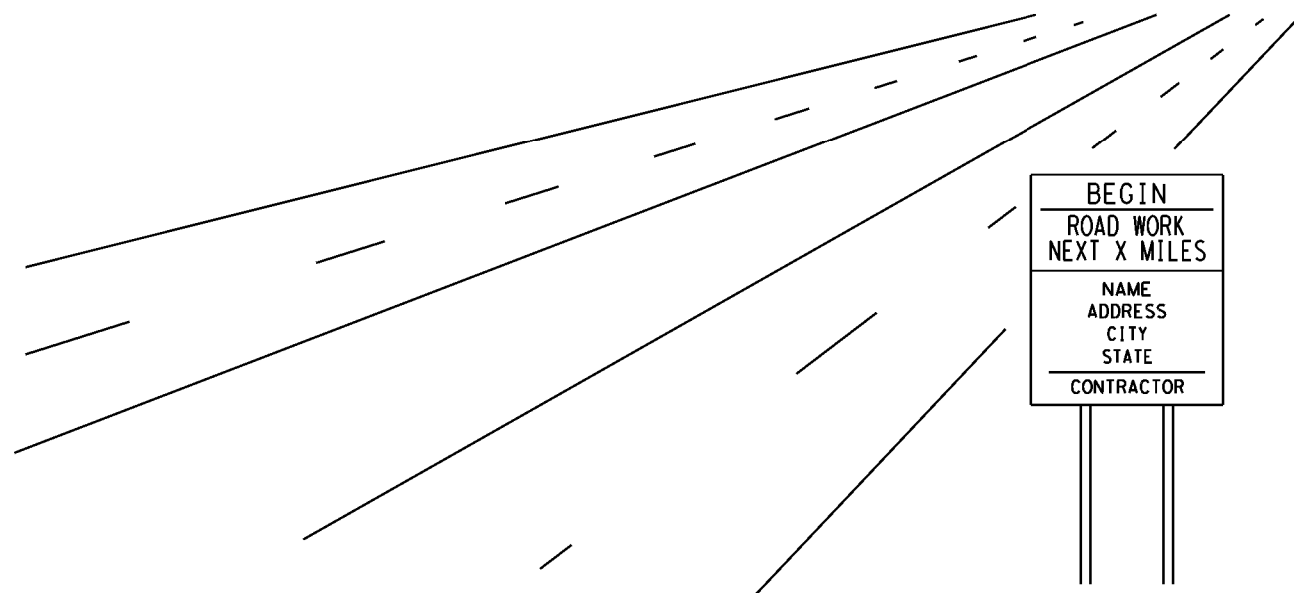
Sign Dimensions

36" X 36"

- Letters - White
- Numbers - White
- Border - White
- Background - Blue

SW3P SIGN

TxDOT & Contractor
Construction Site Note
(CSN)



GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

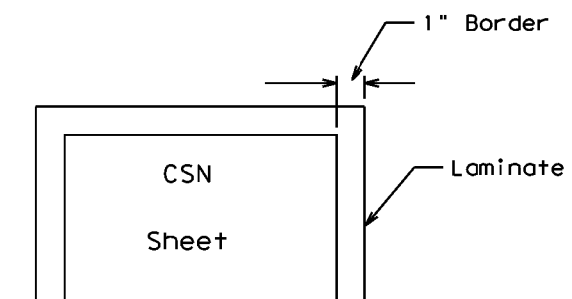


Figure 1

DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

 Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE#	DW: TxDOT	CR:	DW:	CR:
©TxDOT 2016	DISTRICT	FEDERAL AID PROJECT		SHEET
	DAL	SEE TITLE SHEET		92
REVISION DATE: 10-16-15	COUNTY	CONTROL SECT	JOB	HIGHWAY
	COLLIN	0091 04	069	SH 289