CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NUMBER
BR 2020(733), ETC.
CSJ: 0914-05-204, ETC.

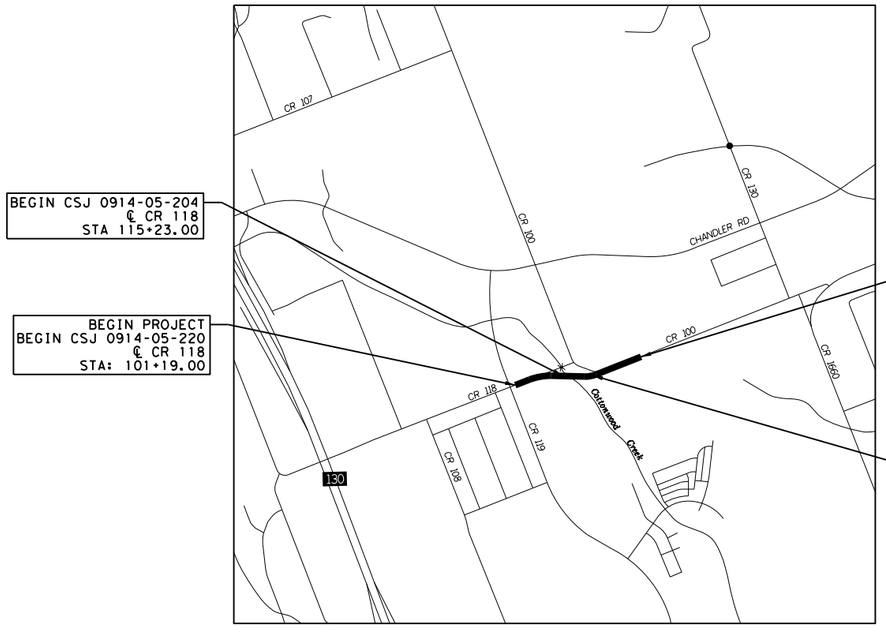
	ROADWAY LENGTH		BRIDGE LENGTH		TOTAL LENGTH	
CSJ	(FT)	(MI)	(FT)	(MI)	(FT)	(MI)
0914-05-220	2470.00	0.468	0.00	0.000	2470.00	0.468
0914-05-204	0.00	0.000	250.00	0.047	250.00	0.047
TOTAL	2470.00	0.468	250.00	0.047	2720.00	0.515

WILLIAMSON COUNTY
CR 118

FROM: CR 118 AT COTTONWOOD CREEK
TO: ., ETC

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT AND NEW ROAD

CONSISTING OF REPLACING BRIDGE AND APPROACHES,
REALIGNMENT OF CR 118 ON BOTH SIDES OF NEW BRIDGE



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

DESIGN SPEED

60 MPH

A.D.T.

2023: 600 VPD
2043: 800 VPD

FINAL PLANS

NAME OF CONTRACTOR: _____

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED: _____

DATE WORK ACCEPTED: _____

FINAL CONTRACT COST: _____

LIST OF APPROVED CHANGE ORDERS:

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER DATE

11/15/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

TDLR INSPECTION NOT REQUIRED

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

Texas Department of Transportation

CORRECT: _____

CONSULTING ENG. (TBPE FIRM REG. F-928)

RECOMMENDED FOR LETTING: 1/5/2023

DocuSigned by: Susana Ceballos P.E.
E1816167B5C74...
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 1/5/2023

DocuSigned by: [illegible] P.E., P.E.
089654558998492...
AREA ENGINEER

APPROVED FOR LETTING: 1/5/2023

DocuSigned by: Heather Ashley-Nguyen
8912AF18F454476...
DIRECTOR OF TRANSPORTATION, PLANNING & DEVELOPMENT

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\1. General\CR118_GEN_TITLE.dgn
PLOTTED: 11/15/2022 1:21:01 PM

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

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

1/27/2023

DESIGN ENGINEER — DATE

Kimley»Horn F-928

Texas Department of Transportation

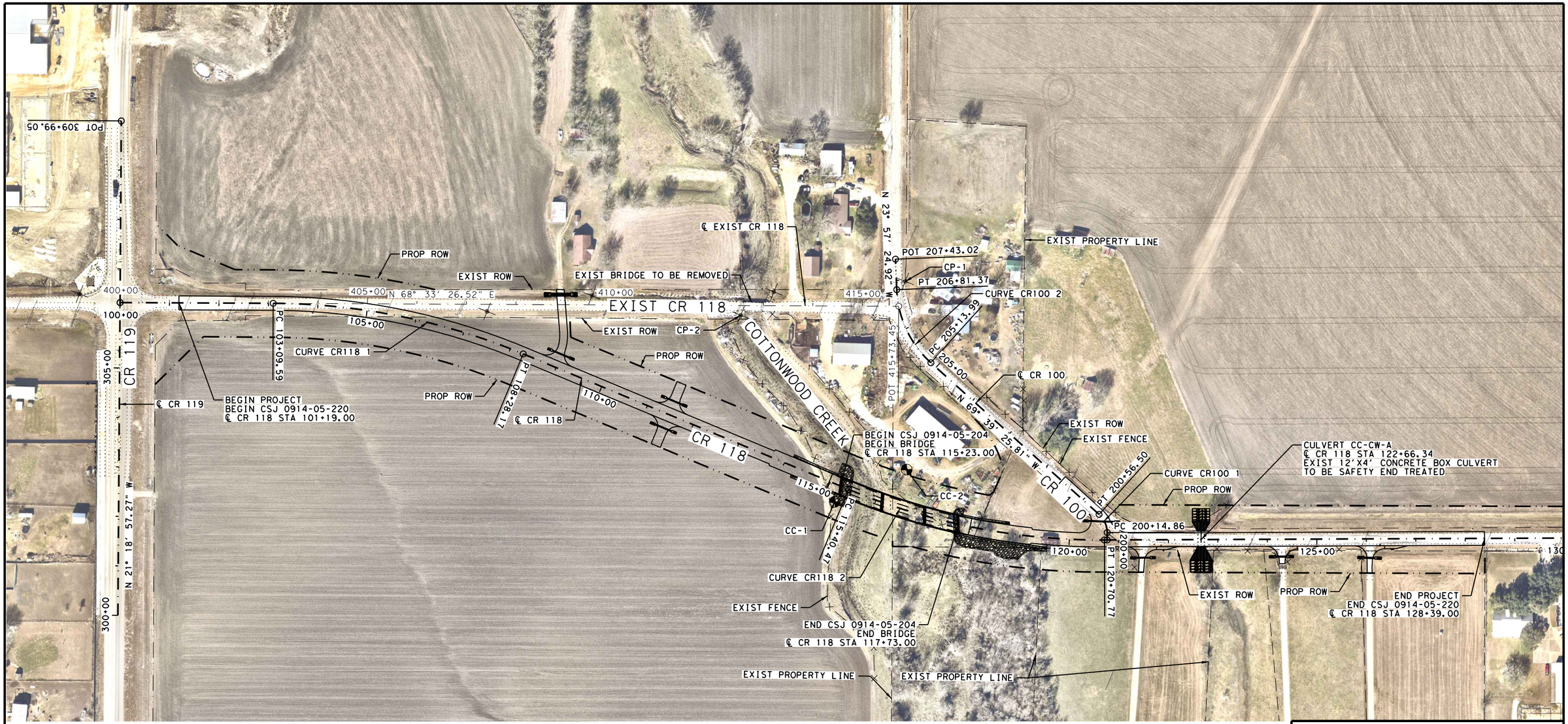
CR 118 AT COTTONWOOD CREEK

INDEX OF SHEETS

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		2

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\1. General\CR118_GEN_INDEX.dgn
PLOTTED: 1/27/2023 3:17:17 PM



LEGEND

- SURVEY CONTROL POINT
- BORING LOCATION

N

0' 100' 200'

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

© 2022 Texas Department of Transportation

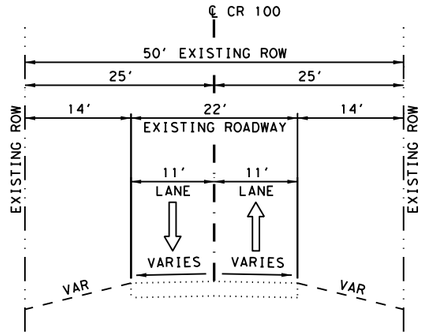
CR 118 AT COTTONWOOD CREEK

PROJECT LAYOUT

SHEET 1 OF 1

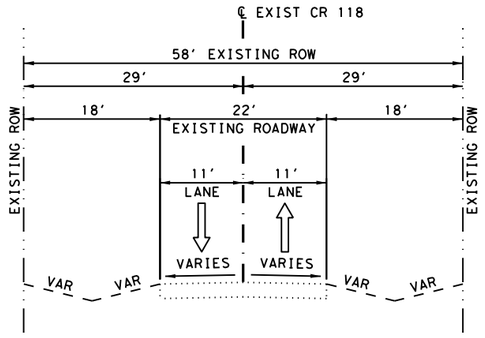
©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		3

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\1. General\CR118_GEN_PLAY.dgn
PLOTTED: 11/3/2022 12:45:33 PM



EXISTING CR 100 TYPICAL SECTION

℄ CR 100 STA 200+00.00 TO STA 201+58.00



EXISTING CR 118 TYPICAL SECTION

℄ EXIST CR 118 STA 400+00.00 TO STA 417+73.45

NOTES:

1. EXISTING ROADWAYS TO BE OBLITERATED AND REALIGNED.

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

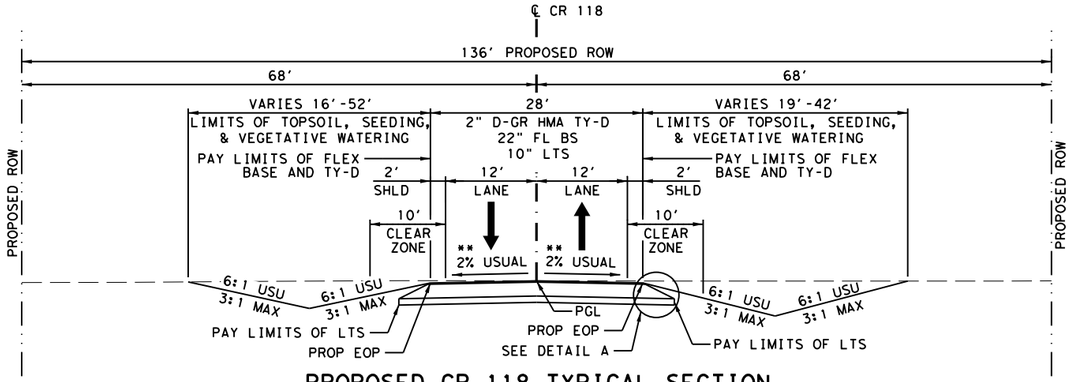
CR 118 AT COTTONWOOD CREEK

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		4

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\1. General\CR118_GEN_TYP01.dgn
PLOTTED: 11/3/2022 12:45:45 PM



PROPOSED CR 118 TYPICAL SECTION

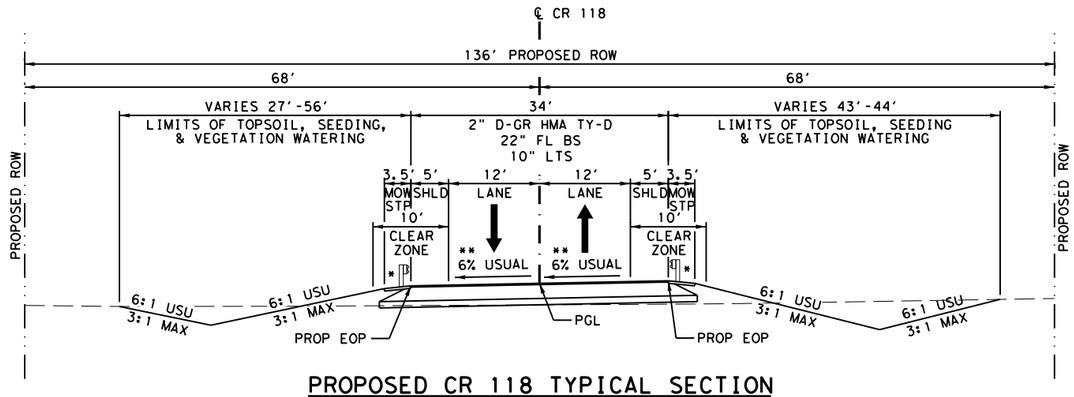
℄ CR 118 STA 101+19.00 TO STA 113+73.00
℄ CR 118 STA 119+56.00 TO STA 128+39.00

**SEE SUPERELEVATION TABLE THIS SHEET AND TRANSITION DIAGRAMS ON ROADWAY PLAN AND PROFILE SHEETS FOR MORE INFORMATION

CR 118 SUPERELEVATION TABLE			
STATION	WB LANE	EB LANE	COMMENTS
101+19.00	-1.93%	-3.45%	MATCH EXIST / BEGIN CROSS SLOPE TRANSITION
104+37.00	6.00%	-6.00%	END CROSS SLOPE TRANSITION
FULL SUPERELEVATION			
107+65.00	6.00%	-6.00%	BEGIN SUPERELEVATION TRANSITION
110+85.00	-2.00%	-2.00%	END SUPERELEVATION TRANSITION
NORMAL CROWN			
112+48.00	-2.00%	-2.00%	BEGIN CROSS SLOPE TRANSITION
115+68.00	-6.00%	6.00%	END CROSS SLOPE TRANSITION
FULL SUPERELEVATION			
120+03.00	-6.00%	6.00%	BEGIN SUPERELEVATION TRANSITION
123+23.00	-2.00%	-2.00%	END SUPERELEVATION TRANSITION
NORMAL CROWN			
127+76.00	-2.00%	-2.00%	BEGIN CROSS SLOPE TRANSITION
128+39.00	-0.44%	-2.86%	END CROSS SLOPE TRANSITION/MATCH EXIST

NOTES:

1. PROPOSED BRIDGE FROM ℄ CR 118 STATION 115+23.00 TO STATION 117+73.00. SEE BRIDGE TYPICAL SECTION FOR MORE INFORMATION.

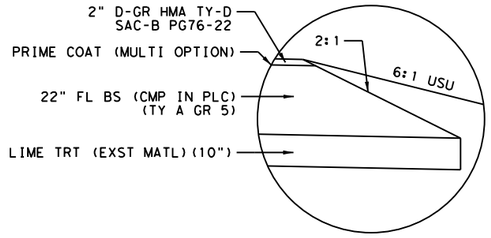


PROPOSED CR 118 TYPICAL SECTION

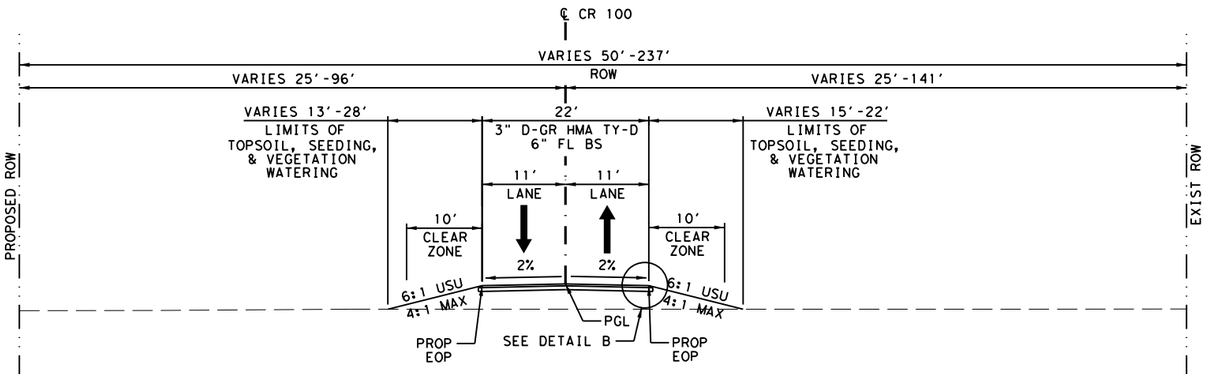
℄ CR 118 STA 113+73.00 TO STA 115+23.00
℄ CR 118 STA 117+73.00 TO STA 119+56.00

*SEE PLAN AND PROFILE FOR LIMITS OF MBGF

**SEE SUPERELEVATION TABLE THIS SHEET AND TRANSITION DIAGRAMS ON ROADWAY PLAN AND PROFILE SHEETS FOR MORE INFORMATION

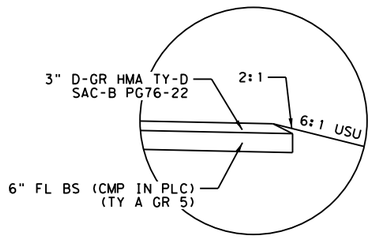


DETAIL A



PROPOSED CR 100 TYPICAL SECTION

℄ CR 100 STA 200+00.00 TO STA 201+58.00



DETAIL B

TJN
11/28/2022

TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		5

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\1. General\CR118_GEN_TYP02.dgn
PLOTTED: 11/28/2022 8:02:51 AM

GENERAL NOTES: Version: November 4, 2022

Item	Description	**Rate
**204	**Sprinkling**	
	(Dust)	30 GAL/CY
	(Item 132)	30 GAL/CY
	(Item 247)	30 GAL/CY
**210	**Rolling (Flat Wheel)**	
	(Item 247)	1 HR/200 TON
	(Item 316)	1 HR/6000 SY
**210	**Rolling (Tamping and Heavy Tamping)**	1 HR/200 CY
**210	**Rolling (Lt Pneumatic Tire)**	
	(Item 132)	1 HR/500 CY
	(Item 247)	1 HR/200 TON
	(Item 316 - Seal Coat)	1 HR/6000 SY
	(Item 316 - Two Course)	1 HR/3000 SY
247	**Flexible Base (CMP IN PLC)**	132 LB/CF
310	**Prime Coat**	0.20 GAL/SY
314	**Emulsified Asphalt Treatment (SS-1 or MS-2)**	0.30 GAL/SY
316	**Underseals Asphalts (Multi Option)**	0.20 GAL/SY
	Surface Treatments	
	Seal Coat	
	Grade 4	
	Asphalt	0.38 GAL/SY
	Aggregate	1 CY/120 SY
	Grade 5	
	Asphalt	0.32 GAL/SY
	Aggregate	1 CY/150 SY
	Two Course Surface Treatment	
	Asphalt 1st Application	0.28 GAL/SY
	Asphalt 2nd Application	0.24 GAL/SY
	Aggregate 1st Application Grade 4	1 CY/110 SY
	Aggregate 2nd Application Grade 4	1 CY/130 SY
341/3076, 344/3077	**Dense-Graded Hot-Mix Asphalt and Superpave**	110 LB/SY/IN
342/3079	**Permeable Friction Course (PFC)**	90.0 LB/SY/IN
346/3080	**Stone-Matrix Asphalt**	113 LB/SY/IN
347/3081	**Thin Overlay Mixtures (TOM)**	
	SAC B	113.0 LB/SY/IN
	SAC A	116.0LB/SY/IN
350	**Microsurfacing**	25 LB/SY
3084	**Bonding Course**	0.09 GAL/SY
3085	**UnderSeal Course**	0.20 GAL/SY
	Tack Coat	0.08 GAL/SY

** For Informational Purposes Only

County: Williamson
Highway: CR 118

Sheet: 6
Control: 0914-05-204, ETC.

GENERAL

Contractor questions on this project are to be addressed to the following individual(s):
Georgetown Jason.Hudson@txdot.gov
Georgetown John.Peters@txdot.gov

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same 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

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.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Use a self-contained vacuum broom to sweep the roadway and keep it free of sediment as directed. The contractor will be responsible for any sweeping above and beyond the normal maintenance required to keep fugitive sediment off the roadway as directed by the Engineer.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Coordinate and obtain approval for all bridgework over existing roadways.

Bridge Vertical Clearance and Traffic Handling.
Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

During evacuation periods for Hurricane events the Contractor will cooperate with Department for the restricting of Lane Closures and arranging for Traffic Control to facilitate Coastal Evacuation Efforts.

ITEM 5 – CONTROL OF THE WORK

Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal https://www.txdot.gov/business/resources/specifications/shop-drawings.html (TxDOT.gov Business > Resources - General > Shop Drawings). Pre-approved producers can be found online at TxDOT.gov > Business > Resources - Material Producer List. Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

Submittal Contact List

Georgetown	Jason.Hudson@txdot.gov	AUS_GE-ShopReview@txdot.gov

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

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

For structures with paint containing hazardous materials, provide locations of material removal 60 days prior to begin removal. For metal elements to be removed, mechanical shear or unbolting for removal and disposal does not require paint abatement but requires 60 day advance notice.

For Federally Funded Contracts, comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, by submitting a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product. Refer to the Buy America Material Classification Sheet, located at the following link, for clarification on material categorization. https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
TxDOT will coordinate with TDLR regarding pedestrian elements and sidewalks. The contractor will procure and provide all permits, licenses, and inspections; pay all charges, fees, and taxes regarding TDLR rules governing industrialized housing and buildings.

Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.
Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic

control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

Obtain written approval from the Engineer for temporary fill or crossings not specifically addressed in the plans. Provide a signed sketch of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Unapproved work is not a compensable impact.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to the Engineer and email to AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation for each phase or step of work. Notify the Engineer via email of any changes to the work start and end dates.
Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.
Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat, and tree/brush requirements.

Back Up Alarm.
For hours 9 P to 5 A, utilize a non-intrusive, self-adjusting noise level reverse signal alarm. This is not applicable to hotmix or seal coat operations. This is subsidiary.

Vegetation BMP

• Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided.
• The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
• The use of seed mix that contains seeds from only regional ecotype native species is recommended.

Water Quality BMP

In addition to BMP required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 Water Quality Certification:
• Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
• When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

Aquatic Amphibian and Reptile BMP

• Minimize impacts to wetlands, temporary and permanent open water features, including depressions, and riverine habitats.
• Maintain the existing hydrologic regime and any connections between wetlands and other aquatic features.
• Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
• Apply hydro mulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas around wetlands and in riparian areas. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.
• Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.

Terrestrial Amphibian and Reptile BMP

• For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling
• Avoid or minimize disturbing or removing cover objects, such as downed trees, rotting stumps, brush piles, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion.
• Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.
• Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.

ITEM 8 – PROSECUTION AND PROGRESS
The sequence of work shown on the plans demonstrates a volume of work available in each phase of construction that will ensure the Contractor is not impacted by the unclear ROW, railroad, and utilities. A deviation from the sequence of work shown on the plans must be approved by the Engineer.

Special Provision 008-003 has been included to amend Standard Article 8.1 to extend the begin work date due to Materials manufacturing.

A CPM schedule in Primavera format and a PSSR is required. Use software fully compatible with Primavera P6.

ITEM 100 - PREPARING RIGHT OF WAY
Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.
Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas within 30 ft. of edge of pavement under construction. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 14 ft. vertical clearance under all trees. This work is subsidiary.

ITEM 105 – REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT
Existing typical is based on information available. This typical may not account for all maintenance work such as overlays or pavement repairs. A change in material type or thickness does not warrant additional payment. Payment is full compensation for removing all material to the depth specified.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation. Embankment placed over the area of MSE backfill must meet the same backfill requirements for the type specified under Item 423.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., “Compaction Methods.” The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium-based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 160 - TOPSOIL
Off-site topsoil will have a minimum PI of 25.

No Sandy Loam allowed.

Obtain approval of the actual depth of the topsoil sources for both on-site and off-site sources.
Construct topsoil stockpiles of no more than five (5) feet in height.
It is permissible to use topsoil dikes for erosion control berms within the right of way, as directed.
Seed or track slopes within 14 days of placement.

Salvage topsoil from sites of excavation and embankment. Maximum salvage depth is 6 inches.

Windrowing of topsoil obtained from the Right of Way (ROW) is not allowed.

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer’s specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 169 – SOIL RETENTION BLANKETS
Type A blankets containing straw fibers are not allowed. Type B and D blankets shall be a spray type blanket.

ITEM 247 - FLEXIBLE BASE

The layer thickness will be 4 in. to 6 in. unless shown on the plans. Placing in a single layer is allowed when total thickness of base is 8 in. or less. When placed in multiple layers, compact the bottom and middle layers to at least 95% and 98% of the maximum dry density, respectively. When placed in a single layer or the final layer, compact to at least 100%.

Correction of subgrade soft spots is subsidiary.

Complete per plans the subgrade, ditches, slopes, and drainage structures prior to the placement of base.

Do not use a vibratory roller to compact base placed directly on top of a drainage structure.

Grade 4 will have the same material requirements as Grade 5 except minimum compressive strength at lateral pressure 3 psi will be **70** psi and at lateral pressure 15 psi will be 150 psi. Grade 4 does not have a minimum compressive strength at lateral pressure 0 psi.

Flex base may use ordinary compaction. Proof rolling of the base is required and subsidiary.

ITEMS 260 THRU 276 – SUBGRADE TREATMENTS AND BASE
Use ordinary compaction for subgrade treatment.

Three weeks prior to treatment, provide a sample of soil or flexible base to be treated.

ITEM 260 - LIME TREATMENT (ROAD-MIXED)
Apply **45** pounds per square yard.

For sulfate content greater than 3000 ppm, mix in an additional 4.0% points above optimum moisture after initial mixing and prior to mellow.
If the sulfate content is greater than 7000 ppm, do not treat. Undercut the unsuitable material to the depth per bid item for lime treatment and replace unsuitable material in accordance with Item 110. Payment will be made in accordance with Item 110.

ITEMS 341, 344, & 3076 THRU 348/3082 - HOT-MIX ASPHALT PAVEMENT
Core holes may be filled with an Asphaltic patching material meeting the requirements of DMS-9203 or with SCM meeting requirements of DMS-9202.

Install transverse butt joints with 50 ft. H: 1 in. V transition from the new ACP to the existing surface. Install a butt joint with 24 in. H: 1 in. V transition from the new ACP to a driveway, pullout or intersection. Saw cut the existing pavement at the butt joints. This work is subsidiary.

Use a device to create a maximum 3H:1V notched wedge joint on all longitudinal joints of 2 in. or greater. This work is subsidiary.

Prior to milling, core the existing pavement to verify thickness. This work is subsidiary.

Ensure placement sequence to avoid excess distance of longitudinal joint lap back not to exceed one day's production rates.

Submit any proposed adjustments or changes to a JMF before production of the new JMF.

Tack every layer. Do not dilute tack coat. Apply it evenly through a distributor spray bar.

Provide a minimum transition of 10' for intersections, 10' for commercial driveways, and 6' for residential driveways unless otherwise shown on the plans.

Irregularities will require the replacement of a full lane width using an asphalt paver. Replace the entire sublot if the irregularities are greater than 40% of the sublot area.

Lime or an approved anti-stripping agent must be used when crushed gravel is utilized to meet a SAC "A" requirement.

When using RAP or RAS, include the management methods of processing, stockpiling, and testing the material in the QCP submitted for the project. If RAP and RAS are used in the same mix, the QCP must document that both of these materials have dedicated feeder bins for each recycled material. Blending of RAP and RAS in one feeder bin or in a stockpile is not permitted.

Asphalt content and binder properties of RAP and RAS stockpiles must be documented when recycled asphalt content greater than 20% is utilized.

No RAS is allowed in surface courses.

Department approved warm-mix additives is required for all surface mix application when RAP is used. Dosage rates will be approved during JMF approval.

The Hamburg Wheel Test will have a minimum rut depth of 3mm except for SMA with HPG or PG 76.

ITEMS 341/3076 - DENSE-GRADED HOT-MIX ASPHALT
Use the SGC for design and production testing of all mixtures. Design all Type D mixtures as a surface mix, maximum 15% RAP and no RAS. Contractor may not use a substitute PG binder for 76-22. When using substitute binders, mold specimens for mix design and production at the temperature required for the substitute binder used to produce the HMA.

The Hamburg Wheel minimum number of passes for PG 64 or lower is reduced to 7,000. The Engineer may accept Hamburg Wheel test results for production and placement if no more than 1 of the 5 most recent tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Unless shown on the plans, the following backfill will apply to cutting and restoring flexible pavement. Backfill with cement-stabilized backfill. The cement-stabilized backfill is subsidiary.

Cap the backfill with Type B hot-mix to a depth equal to the adjacent hot-mix. At locations where the backfill surface is final, place 1-1/2 in. Type D for the surface. The minimum hot-mix depth will be 4 in.

Unless shown on the plans, flowable fill option 1 item will be used for pavement widening.

Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT "CSAB" Standard. Use material in accordance with "CSAB" or Item 423, Type BS. The "CSAB" optional bond breaker materials are allowed. This work is subsidiary.

ITEM 416 - DRILLED SHAFT FOUNDATIONS
Stake all Foundations, for approval, before beginning drilling operations.

Calculate the vertical signal head clearance before placing any signal pole foundation.

For mast-arm signal and strain pole anchor bolts, set two in tension and two in compression.

Obtain approval of placement prior to placing concrete.

Remove spoils from a flood plain at the end of each workday.

ITEMS 420, 425, 441, & 462 - STRUCTURES
Bridge Vertical Clearance and Traffic Handling.
Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

ITEM 420 – CONCRETE SUBSTRUCTURES
Do not use PMDF in areas where a "Free Joint" is indicated in the plans.
Check the sign plans for locations of clearance signs and brackets on structures, which will require inserts in the pre-stressed beams.
Where Retaining Walls are integral parts of the abutment header, do not place the abutment cap prior to backfilling the wall and the abutment area up to the elevation of the bottom of the abutment cap.

Mass placements are defined as placements with a least dimension greater than or equal to 5 ft., or designated elsewhere on the plans.

The "H" values shown on Bridge Layouts are estimated column heights. Calculate the actual column heights based on field conditions.

Perform work during good weather unless otherwise directed. If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by the weather, the Contractor is responsible for all costs associated with repairs/replacement.

Upon completion of the structure, stencil the National Bridge Inventory (NBI) number (structure number) using black paint and 4 in. tall numbers at 4 locations designated by TxDOT. This work is subsidiary.

Bonding agents are required at construction joints. Do not use membrane curing for structural concrete as defined in Item 421, Table 8.
Remove all loose Formwork and other Materials from the floodplain or drainage areas daily.

ITEM 425 - PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS
Conduct a pre-placement meeting for the erection of structural members.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically. GFRP is allowed reinforcement for all applications.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.
Provide Type A Grade 3 or 5 flexible base for cement stabilized riprap. Compressive strengths for flexible base are waived.

SGT approach taper, paid for using mow strip item, will be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement will be ordinary compaction and does not require placement using an asphalt paver.

ITEM 450 - RAILING
Use the elliptical tube option for rails T401, T402, and C402.

ITEM 454 - BRIDGE EXPANSION JOINTS
Apply protection System II in accordance with Item 446 to armor joint.

ITEM 496 - REMOVING STRUCTURES
Submit a demolition plan to the Engineer. Have the plan signed and sealed by a licensed professional engineer when the structure will continue to accommodate traffic after removal has begun and the removal impacts any part of the structure below the deck or riding surface. If applicable, the plan must detail requirements for meeting the U.S. Army Corps of Engineers'

Section 404 Permit. The demolition plan must detail handling of roadway and waterway traffic. Waterway traffic must be maintained at all times unless a closure is approved by the Engineer.

No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1

Roadway	Limits	Allowable Closure Time
IH 35	All (1 lane closed)	9 P to 5 A
IH 35	All (2 lanes closed, see allowable work below)	9 P to 5 A
IH 35	All (2 lanes closed, all work)	11 P to 5 A
SH 45	US 183 to SH130	8 P to 5 A
LP 1	William Cannon to Parmer Lane	8 P to 5 A
US 183	SH 29 to FM 1327	8 P to 5 A
SH 71	SH 130 to IH 35	8 P to 5 A
SH 71	SH 304 to Tahitian Drive	8 P to 5 A
SH 71	US 290 W to RM 3238	8 P to 5 A
US 290 W	IH 35 to Nutty Brown Rd	8 P to 5 A
US 290 E	IH 35 to SH 95	8 P to 5 A
FM 734	FM 1431 to US 290 E	8 P to 5 A
US 79	IH 35 to Bus 79 in Taylor	8 P to 5 A
RM 1431	Lohmans Ford Rd to IH 35	8 P to 5 A
SH 29	LP 332 western terminus to SH 130	8 P to 5 A
SH 80	Charles Austin to River Road	8 P to 5 A
RM 2222	All	8 P to 5 A
RM 620	All	8 P to 5 A
RM 2244	All	8 P to 5 A
SPUR 69	All	8 P to 5 A
LP 360	All	8 P to 5 A
LP 343	All	8 P to 5 A
LP 275	All	8 P to 5 A
FM 1325	All	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

Table 2

Roadway	Limits	Allowable Closure Time
CR 118	CR 118 at Cottonwood Creek to ., ETC??	8 P to 6 A

Table 3 (Mobile Operations)

Roadway	Allowable Sun Night thru Fri Noon	Allowable Sat thru Sun Morn
Within Austin City Limits	10 A to 2 P and 7 P to 6 A	7 P to 10 A
Outside Austin City Limits	9 A to 3 P and 7 P to 7 A	6 P to 11 A

IH 35 main lanes	10 P to 5 A	9 P to 9 A
AADT over 50,000	8 P to 6 A	8 P to 10 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 8 P to 6 A. Unless stated, daytime or Friday night lane closures will not be allowed and one lane in each direction will remain open at all times for all roadways.

Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.
No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend. Closures the Sunday of the Super Bowl will not be allowed from 1 P to 11 P. No closures will be allowed on Friday and the weekends for projects within 20 miles of Formula 1 at COTA, ACL Fest, SXSW, ROT Rally, UT home football games (includes games not on a Friday or weekend), sales tax holiday, Dell Match Play (includes Thursday), Rodeo Austin, or other special events that could be impacted by the construction. All lanes will be open by noon of the day before these special events.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2 hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday. For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify current and future traffic control, if at any time the queue becomes greater than 20 minutes.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Cover, relocate, or remove existing small, large, and overhead signs that conflict with traffic control. Cover large and overhead signs to remain using latest standard TS-CD. This work is subsidiary.

Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch cone, meeting requirements of BC (10), on top of foundations that have protruding studs. This work is subsidiary.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

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

ITEM 504 - FIELD OFFICE AND LABORATORY

Projects with HMAC, furnish a Type D structure for the Engineer’s exclusive use. The structure will include high speed internet service with WIFI signal, one desk, two chairs, and one file cabinet. Provide a minimum of three 120-volt circuits with 20-amp breakers and at most two grounded convenience outlets per circuit.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

ITEMS 528, 529, 530, 531, & 536 – MISCELLANEOUS CONSTRUCTION
Reinforcement will be in accordance with Section 432.3.1 unless shown on the plans. Fiber reinforcement is not allowed. GFRP is allowed reinforcement for all applications. Class A and B Concrete are allowed to use Coarse Aggregate Grades 1-8.

Unless shown on the plans, all concrete will be 5 in. thick and have 2 in. sand, base, or RAP bedding. Furnish base meeting the requirement for any type or grade in accordance with Item 247. Compressive strengths for flexible base are waived. RAP must be 100% passing a 1 in. sieve. Bedding and flexible base must be placed using ordinary compaction.

Expansion joints will be placed every 40 ft. Expansion joints must be 1 in. wide asphalt board and flush with the surface. The bottom of the asphalt board will be at half the depth of the concrete. The reinforcement will be continuous thru the expansion joint.

If roots are encountered verify with the Engineer before accommodating or removing 2 in. diameter or larger roots. Root removal must be in accordance with Section 752.4.2. Roots may remain in the bedding or base. For improvements within 6 in. of a root, the concrete thickness may be reduced by 1 in. and the bedding increased by 1 in. to minimize impacts to the roots. Adjust bedding and surface profile to provide a 1 in. bedding cushion around the roots. The surface profile may be adjusted to the extent allowed by ADA. This work is subsidiary.

ITEM 530 – INTERSECTIONS, DRIVEWAYS, AND TURNOUTS
Notify property owners at least 48 hr. before beginning work on their driveway. Provide a list of each notification and contact before each closure. Only close driveways for reconstruction if duration and alternate access are approved. Install and maintain material across a work zone as temporary access. This work is subsidiary.

For ACP or SURF TREAT, the pavement structure will match the adjacent roadway unless detailed on the plans. HMA, including surface, may use a maximum allowable quantity of 40%

RAP and 5% RAS for private driveways, public driveways for 2-lane roadways or smaller, and turnouts. Blending of 2 or more sources is allowed.

For CONC, the pavement structure will be 6 in. thick and have 3 in. flexible base bedding unless detailed on the plans.

ITEMS 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

Furnish round timber posts for guard fence. Steel posts for low fill culvert applications is subsidiary including use of low fill culvert application due to other concrete structures such as inlets. Long span application at inlets may be used as an alternate to low fill culvert. Unless otherwise specified on the plans, use of low fill culvert or long span at inlets will be subsidiary to pertinent items. Stake the locations for approval before installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Existing materials that are structurally sound and dent free may be reused. All reused material will be from this project and in compliance with current standards. Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with Section 540.3.5. Punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. Space the field holes in accordance with the latest standard but no closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES

Triangular slip base that use set screws to secure the post will require 1 of the set screws to penetrate the post by drilling a hole in the post at the location of the screw. All set screws shall be treated with anti-seize compound.

ITEM 658 – DELINEATOR AND OBJECT MARKER ASSEMBLIES

Installation and maintenance of portable CTB reflectors will be subsidiary to the barrier.

Flexible posts YFLX and WFLX must be tubular in shape. The “flat” flexible posts are not allowed.

ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS

Notify the Engineer at least 24 hr. before beginning work.

Place longitudinal markings nightly for IH 35 main lanes or roadways with AADT greater than 100,000. Use of temporary flexible reflective roadway marker tabs is subsidiary and at the Contractor’s option. Replace missing or damaged tabs nightly. If using tabs, place longitudinal markings weekly by 5 AM Friday for all weekday work and by 5 AM Monday for all weekend work. Failure to maintain tabs or place longitudinal markings by deadline will require nightly placement of longitudinal markings.

When the raised portion of a profile marking is placed as a separate operation from the pavement marking, the raised portion must be placed first then covered with TY I.

When using black shadow to cover existing stripe apply a non-retroreflective angular abrasive bead drop. The marking color shall be adjusted to resemble the pavement color. If Item 677 is not used prior to placement of black shadow, scrape the top of the marking with a blade or large piece of equipment unless surface is a seal coat. The scraping of the marking is subsidiary.

ITEM 677 - ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

Dispose of removed materials and debris at locations off the right of way.
Elimination using a pavement marking will not be allowed in lieu of methods listed in specification.

Remove pavement markings on concrete surfaces by a blasting method. Flail milling will be allowed when total quantity of removal on concrete surfaces is less than 1000 ft.

Strip seal is only method allowed on seal coat surface unless project includes placement of a new surface. If total quantity of removal on a seal coat surface is less than 2000 ft., elimination using a pavement marking is allowed if a test section is approved by the Engineer. Test section shall demonstrate the thermo marking color matches the existing pavement color.

Remove pavement markings outside the limits of the new surface by a blasting method.
Use a TRAIL or a non-retroreflective paint to cover stripe remnants that remain after elimination. The test requirements for these materials are waived. The paint color shall be adjusted to resemble the existing pavement color. Installation and maintenance is subsidiary.

ITEM 752 – TREE AND BRUSH REMOVAL

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush even if Item 752 is not included as a pay item.

Flailing equipment is not allowed. Burning brush is not allowed in urban areas or on ROW. Use hand methods or other means of removal if doing work by mechanical methods is impractical.

Prior to begin tree pruning, send email confirmation to the Engineer that training and demonstration of work methods has been provided to the employees. This work is subsidiary.

Shredded vegetation may be blended, at a rate not to exceed 15 percent by volume, with Item 160 if the maximum dimension is not greater than 2 in.

ITEM 3085 – UNDERSEAL COURSE
No emulsified asphalt material allowed under PFC or SMA, except for use with Item 316, on roadways with ADT greater than 100,000.

The minimum application rates are listed in Table UC. The target shear bond strengths are listed in Table UCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table UC

Material	Minimum Application Rate (mat >1" gal. per square yard)	Minimum Application Rate (mat <= 1" gal. per square yard)
TRAIL – Hot Asphalt	0.15	0.10
Spray Applied Underseal Membrane	0.15	0.15
Seal Coat – Tier II emulsion	0.25	0.25
Seal Coat – Tier II asphalt	0.23	0.23

Table UCS

Material	Minimum Shear Strength (psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	40.0
All Other Materials	40.0

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Provide 3 PCMS. Provide a replacement within 12 hours. PCMS will be available for traffic control, event notices, roadway conditions, service announcements, etc.

Place PCMS 10 calendar days prior to begin work stating "Road Work Begin Soon, Contact 832-7000 For Info".

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as "RIGHT LN CLOSED XXX FT".

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0914-05-204 **DISTRICT** Austin **COUNTY** Williamson
HIGHWAY CR 118

			CONTROL SECTION JOB		**0914-05-204**		**0914-05-220**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129347**		**A00188371**			
			COUNTY		**Williamson**		**Williamson**			
			HIGHWAY		**CR 118**		**CR 118**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA			28.700		28.700	
	104-6010	REMOVING CONC (RIPRAP)		CY			2.000		2.000	
	105-6037	REMOVING STAB BASE AND ASPH PAV(0"-16")		SY			4,935.000		4,935.000	
	106-6002	OBLITERATING ABANDONED ROAD		SY			1,989.000		1,989.000	
	110-6001	EXCAVATION (ROADWAY)		CY			3,900.000		3,900.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)		CY			4,602.000		4,602.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")		SY			14,713.000		14,713.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)		SY			14,713.000		14,713.000	
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)		SY			14,713.000		14,713.000	
	168-6001	VEGETATIVE WATERING		MG			24.800		24.800	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)		SY			14,713.000		14,713.000	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)		CY			4,785.000		4,785.000	
	260-6009	LIME TRT (EXST MATL)(10")		SY			9,951.000		9,951.000	
	260-6043	LIME (HYD, COM OR QK)(SLURRY)		TON			224.000		224.000	
	310-6001	PRIME COAT (MULTI OPTION)		GAL			1,544.000		1,544.000	
	400-6005	CEM STABIL BKFL		CY	141.000				141.000	
	402-6001	TRENCH EXCAVATION PROTECTION		LF			32.000		32.000	
	416-6004	DRILL SHAFT (36 IN)		LF	261.000				261.000	
	420-6013	CL C CONC (ABUT)		CY	47.400				47.400	
	420-6029	CL C CONC (CAP)		CY	32.000				32.000	
	420-6037	CL C CONC (COLUMN)		CY	5.600				5.600	
	422-6001	REINF CONC SLAB		SF	9,000.000				9,000.000	
	422-6015	APPROACH SLAB		CY	67.000				67.000	
	425-6037	PRESTR CONC GIRDER (TX40)		LF	1,236.700				1,236.700	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)		CY	459.000		339.000		798.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY			23.300		23.300	
	450-6006	RAIL (TY T223)		LF	540.000				540.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)		LF	73.000				73.000	
	464-6003	RC PIPE (CL III)(18 IN)		LF			192.000		192.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF			125.000		125.000	
	467-6084	SET (TY I)(S=12 FT)(HW=6FT)(4:1)(C)		EA			1.000		1.000	
	467-6086	SET (TY I)(S=12 FT)(HW=7FT)(4:1)(C)		EA			1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)		EA			10.000		10.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)		EA			8.000		8.000	
	496-6005	REMOV STR (WINGWALL)		EA			2.000		2.000	
	496-6007	REMOV STR (PIPE)		LF			89.000		89.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)		EA	1.000				1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0914-05-204 **DISTRICT** Austin **COUNTY** Williamson
HIGHWAY CR 118

			CONTROL SECTION JOB		**0914-05-204**		**0914-05-220**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129347**		**A00188371**			
			COUNTY		**Williamson**		**Williamson**			
			HIGHWAY		**CR 118**		**CR 118**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO			13.000		13.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)		LF			226.000		226.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)		LF			348.000		348.000	
	506-6004	ROCK FILTER DAMS (INSTALL) (TY 4)		LF			320.000		320.000	
	506-6011	ROCK FILTER DAMS (REMOVE)		LF			1,120.000		1,120.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF			445.000		445.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF			445.000		445.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")		LF			100.000		100.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF			100.000		100.000	
	506-6053	ROCK FILTER DAMS (INSTALL) (TY 2) (6:1)		LF			226.000		226.000	
	530-6005	DRIVEWAYS (ACP)		SY			903.000		903.000	
	530-6008	TURNOUTS (ACP)		SY			66.000		66.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF			175.000		175.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA			4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA			4.000		4.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4		EA			4.000		4.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA			5.000		5.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA			1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA			14.000		14.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)		EA			8.000		8.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND		EA			4.000		4.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS		EA			6.000		6.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)		EA			13.000		13.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)		LF			26.000		26.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)		LF			5,660.000		5,660.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)		LF			5,478.000		5,478.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA			67.000		67.000	
	3076-6070	D-GR HMA TY-D PG 76-22 SAC-B (EXEMPT)		TON			925.000		925.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA			3.000		3.000	
	6120-6001	DEAD END ROADWAY BARRICADE		LF			20.000		20.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)		LS			1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)		LS			1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)		LS			1.000		1.000	

SUMMARY OF EROSION CONTROL ITEMS																	
SHEET NO.	STATION	0160 6003 FURNISHING AND PLACING TOPSOIL (4")	0164 6035 DRILL SEEDING (PERM) (RURAL) (CLAY)	0164 6071 BROADCAST SEED (TEMP) (WARM OR COOL)	0168 6001 VEGETATIVE WATERING	0169 6002 SOIL RETENTION BLANKETS (CL 1) (TY B)	0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	0506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	0506 6003 ROCK FILTER DAMS (INSTALL) (TY 3)	0506 6004 ROCK FILTER DAMS (INSTALL) (TY 4)	0506 6011 ROCK FILTER DAMS (REMOVE)	0506 6038 TEMP SDMT CONT FENCE (INSTALL)	0506 6039 TEMP SDMT CONT FENCE (REMOVE)	0506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	0506 6043 BIODEG EROSN CONT LOGS (REMOVE)	0506 6053 ROCK FILTER DAMS (INSTL) (TY 2) (6:1)	6120 6001 DEAD END ROADWAY BARRICADE
CR 118		SY	SY	SY	MG	SY	CY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
1 OF 3	BEGIN TO 112+00	6421	6421	6421	10.8	6421		30		160	220	361	361			30	
2 OF 3	112+00 TO 124+00	5714	5714	5714	9.6	5714		127	250	80	584	84	84			127	
3 OF 3	124+00 TO END	2578	2578	2578	4.4	2578	294	69	98	80	316					69	20
														100	100		
TOTAL		14713	14713	14713	24.8	14713	294	226	348	320	1120	445	445	100	100	226	20

SUMMARY OF ROADWAY ITEMS														
SHEET NO.	STATION	0100 6002 PREPARING ROW	0247 6366 FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS)	0260 6009 LIME TRT (EXST MATL) (10")	0260 6043 LIME (HYD, COM OR QK) (SLURRY)	0310 6001 PRIME COAT (MULTI OPTION)	0432 6045 RIPRAP (MOW STRIP) (4 IN)	0530 6005 DRIVEWAYS (ACP)	0530 6008 TURNOUTS (ACP)	0540 6001 MTL W-BEAM GD FEN (TIM POST)	0540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	0544 6001 GUARDRAIL END TREATMENT (INSTALL)	0560 6011 MAILBOX INSTALL-S (TWW-POST) TY 4	3076 6070 D-GR HMA TY-D SAC-B PG76-22 (EXEMPT)
CR 118		STA	CY	SY	TON	GAL	CY	SY	SY	LF	EA	EA	EA	TON
1 OF 5	BEGIN TO 106+00	4.81	917	1945	43.8	300								165
2 OF 5	106+00 TO 112+00	6.00	1141	2423	54.5	374		590						206
3 OF 5	112+00 TO 118+00	6.00	624	1300	29.3	205	11.6			50	4	2		113
4 OF 5	118+00 TO 124+00	7.44	1268	2510	56.5	391	11.7	106	22	125		2	1	290
5 OF 5	124+00 TO END	4.39	835	1773	39.9	274		207	44				3	151
TOTAL		28.7	4785	9951	224	1544	23.3	903	66	175	4	4	4	925

SUMMARY OF PARALLEL DRAINAGE QUANTITIES									
SHEET NO.	STATION	0402 6001 TRENCH EXCAVATION PROTECTION	0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	0464 6003 RC PIPE (CL III) (18 IN)	0464 6005 RC PIPE (CL III) (24 IN)	0467 6084 SET (TY I) (S=12 FT) (HW=6 FT) (4:1) (C)	0467 6086 SET (TY I) (S=12 FT) (HW=7 FT) (4:1) (C)	0467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P)	0467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P)
CR 118		LF	CY	LF	LF	EA	EA	EA	EA
1 OF 5	BEGIN TO 106+00								
2 OF 5	106+00 TO 112+00			108	80			6	4
3 OF 5	112+00 TO 118+00								
4 OF 5	118+00 TO 124+00	32	45	84		1	1	4	
5 OF 5	124+00 TO END				45				4
TOTAL		32	45	192	125	1	1	10	8

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS										
SHEET NO.	STATION	0644 6001 IN SM RD SN SUP&AM TY10BWG (1)SA(P)	0644 6004 IN SM RD SN SUP&AM TY10BWG (1)SA(T)	0658 6014 INSTL DEL ASSM (D-SW) SZ (BRF)CTB(BI)	0658 6047 INSTL OM ASSM (OM-2Y) (WC)GND	0658 6062 INSTL DEL ASSM (D-SW)SZ1 (BRF)GF2(BI)	0666 6048 REFL PAV MRK TY I (W)24"(SLD) (100MIL)	0666 6342 REFL PROF PAV MRK TY I (W)4"(SLD) (100 MIL)	0666 6345 REFL PROF PAV MRK TY I (Y)4"(SLD) (100 MIL)	0672 6009 REFL PAV MRKR TY II-A-A
CR 118		EA	EA	EA	EA	EA	LF	LF	LF	EA
1 OF 3	BEGIN TO 112+00	1						2162	2162	27
2 OF 3	112+00 TO 124+00	4	1	8	4	13	26	2620	2438	30
3 OF 3	124+00 TO END							878	878	10
TOTAL		5	1	8	4	13	26	5660	5478	67

NOTES:

1. ALL QUANTITIES ON THIS SHEET PERTAIN TO CSJ 0914-05-220.

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

QUANTITY SUMMARY

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		8

SUMMARY OF REMOVAL ITEMS									
SHEET NO.	STATION	0104 6010	0105 6037	0106 6002	0496 6005	0496 6007	0496 6009	0644 6076	0658 6060
		REMOVING CONC (RIPRAP)	REMOVING STAB BASE AND ASPH PAV (0"-16")	OBLITERATING ABANDONED ROAD	REMOV STR (WINGWALL)	REMOV STR (PIPE)	REMOV STR (BRIDGE 0-99 FT LENGTH)	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS
CR 118		CY	SY	SY	EA	LF	EA	EA	EA
1 OF 3	BEGIN TO 411+00		2316	1384		35		1	
2 OF 3	411+00 TO 122+00	2	1057	605			1	12	4
3 OF 3	122+00 TO END		1562		2	54		1	2
TOTAL		2	4935	1989	2	89	1	14	6

SUMMARY OF EARTHWORK ITEMS		
STATION TO STATION CL CR 118	0110 6001 EXCAVATION (ROADWAY)	0132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)
	CY	CY
101+19.00 TO 102+00.00	0.0	12.1
102+00.00 TO 103+00.00	29.5	48.8
103+00.00 TO 104+00.00	51.7	34.6
104+00.00 TO 105+00.00	79.3	26.3
105+00.00 TO 106+00.00	208.8	27.0
106+00.00 TO 107+00.00	290.3	3.2
107+00.00 TO 108+00.00	338.0	1.9
108+00.00 TO 109+00.00	329.6	22.2
109+00.00 TO 110+00.00	346.1	22.2
110+00.00 TO 111+00.00	369.0	0.0
111+00.00 TO 112+00.00	196.9	7.6
112+00.00 TO 113+00.00	68.0	95.7
113+00.00 TO 114+00.00	39.5	440.5
114+00.00 TO 115+00.00	40.8	934.9
115+00.00 TO 116+00.00	25.5	582.6
116+00.00 TO 117+00.00	BRIDGE	
117+00.00 TO 118+00.00	107.8	720.8
118+00.00 TO 118+25.00	58.4	310.5
118+25.00 TO 118+50.00	75.8	223.1
118+50.00 TO 118+75.00	86.0	177.6
118+75.00 TO 119+00.00	72.7	136.7
119+00.00 TO 119+25.00	56.7	73.8
119+25.00 TO 119+50.00	49.0	38.3
119+50.00 TO 120+00.00	84.2	73.0
120+00.00 TO 121+00.00	197.7	112.1
121+00.00 TO 122+00.00	153.5	79.4
122+00.00 TO 123+00.00	57.1	95.5
123+00.00 TO 124+00.00	31.8	65.7
124+00.00 TO 125+00.00	24.5	41.7
125+00.00 TO 126+00.00	18.8	26.9
126+00.00 TO 127+00.00	60.9	42.6
127+00.00 TO 128+00.00	92.7	77.8
128+00.00 TO 128+39.00	28.1	26.5
TOTAL	3669	4582

SUMMARY OF EARTHWORK ITEMS		
STATION TO STATION CL CR 100	0110 6001 EXCAVATION (ROADWAY)	0132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)
	CY	CY
200+14.00 TO 200+50.00	87.2	14.1
200+50.00 TO 201+00.00	100.3	0.0
201+00.00 TO 201+50.00	41.6	0.5
201+50.00 TO 201+58.00	0.0	3.7
TOTAL	231	20

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS		
DESCRIPTION	0502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN
	MO	EA
CR 118	13	3
TOTAL	13	3

NOTES:

1. ALL QUANTITIES ON THIS SHEET PERTAIN TO CSJ 0914-05-220.

Kimley»Horn F-928

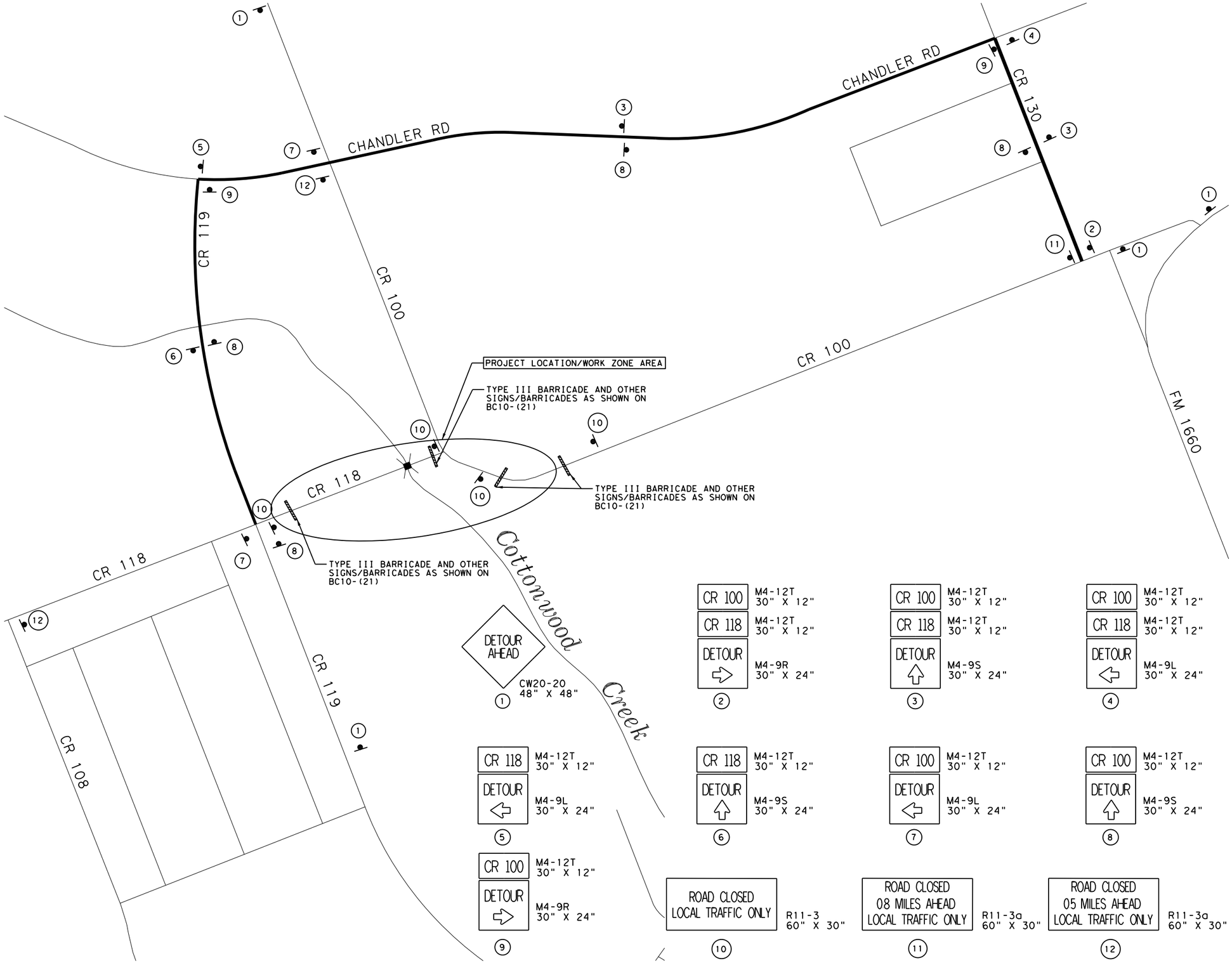
Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

QUANTITY SUMMARY

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		9



N

0' 375' 750'

SCALE

TCP NARRATIVE

PHASE 1
1. PLACE WORK ZONE APPROACH SIGNAGE IN ACCORDANCE WITH BC STANDARD SHEETS.
2. PLACE EROSION CONTROL MEASURES AS NOTED ON SW3P SHEETS.
3. CONSTRUCT PROPOSED COUNTY ROAD 118 BRIDGE OVER COTTONWOOD CREEK AS SHOWN IN PLANS.
4. CONSTRUCT PERMANENT PAVEMENT FROM ℄ CR 118 STA 107+50 TO ℄ CR 118 STA 120+00.

PHASE 2
1. PLACE DETOUR SIGNAGE AND BARRICADES AS NOTED ON DETOUR LAYOUT.
2. PLACE EROSION CONTROL MEASURES AS NOTED ON SW3P SHEETS.
3. CONSTRUCT PROPOSED COUNTY ROAD 118 CONNECTION TO EXISTING COUNTY ROAD 118 AS SHOWN IN THE PLANS.

PHASE 3
1. SAFETY END TREAT EXISTING CULVERT AT ℄ CR 118 STA 122+66 AS SHOWN ON CULVERT LAYOUT.
2. CONSTRUCT PROPOSED COUNTY ROAD 118 CONNECTION TO COUNTY ROAD 100 AS SHOWN IN THE PLANS.
3. REMOVE EXISTING COUNTY ROAD 118 BRIDGE.
4. OBLITERATE EXISTING COUNTY ROAD 118 AND COUNTY ROAD 100 AS SHOWN IN THE PLANS.
5. REOPEN ROAD UPON COMPLETION OF CONSTRUCTION.

SIGNS MAY BE ADJUSTED TO FIT EXISTING DRIVEWAYS WITH PERMISSION OF ENGINEER.

ACCESS TO ADJOINING DRIVEWAYS MUST BE MAINTAINED AT ALL TIMES.

GENERAL NOTES

THE CONTRACTOR SHALL NOTIFY THE PROPER CITY, COUNTY, EMERGENCY MEDICAL SERVICES, FIRE DEPARTMENT, POLICE DEPARTMENT, TEXAS DEPARTMENT OF PUBLIC SAFETY AND THE ENGINEER WHEN MAJOR TRAFFIC CHANGES ARE TO BE PERFORMED. THE NOTIFICATION MUST BE PROVIDED AT LEAST FOURTEEN (14) DAYS PRIOR TO THE CHANGE.

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

11/3/2022

Kimley»Horn F-928

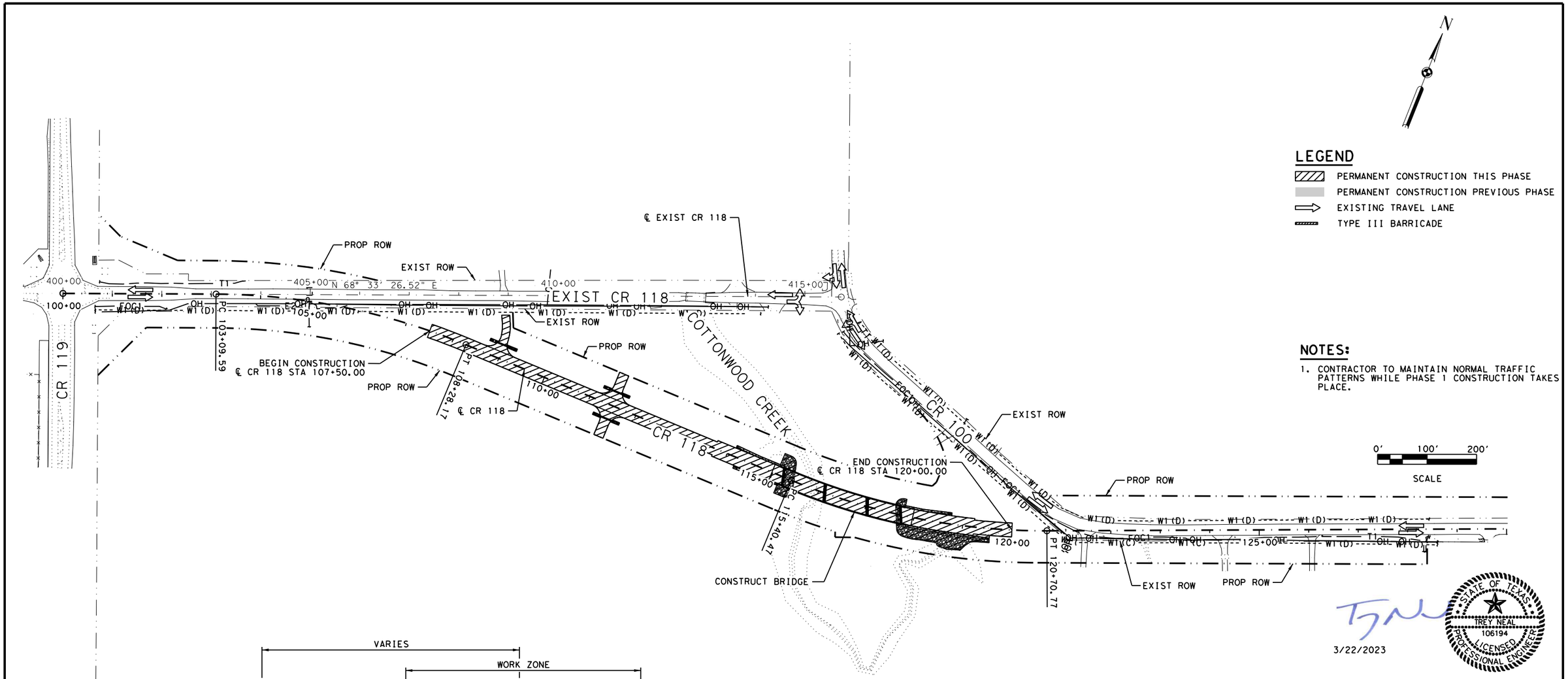
Texas Department of Transportation

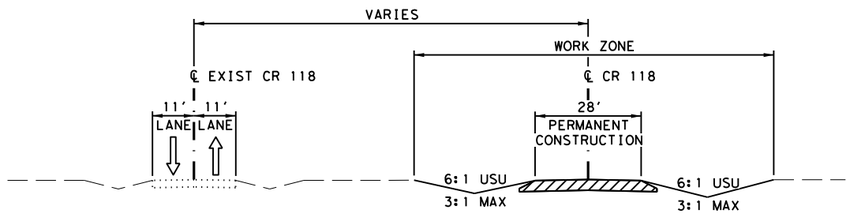
CR 118 AT COTTONWOOD CREEK

TRAFFIC CONTROL PLAN DETOUR LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		10





PHASE 1 TYPICAL SECTION

Kimley»Horn F-928

Texas Department of Transportation

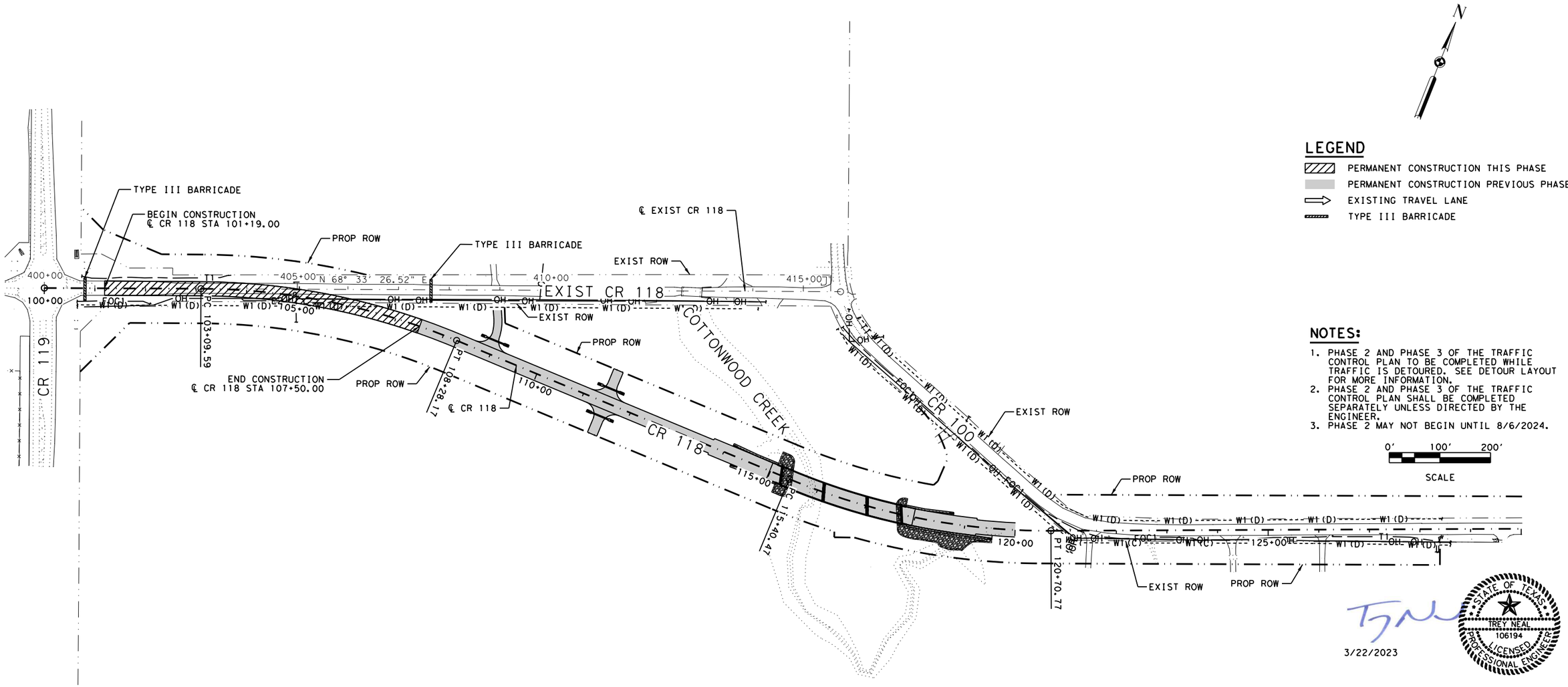
CR 118 AT COTTONWOOD CREEK

TRAFFIC CONTROL PLAN
PHASE 1

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		11

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\2. Traffic Control Plan\CR118_TCP_PH1.dgn
PLOTTED: 3/22/2023 10:38:07 AM



N

LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- EXISTING TRAVEL LANE
- TYPE III BARRICADE

NOTES:

1. PHASE 2 AND PHASE 3 OF THE TRAFFIC CONTROL PLAN TO BE COMPLETED WHILE TRAFFIC IS DETOURED. SEE DETOUR LAYOUT FOR MORE INFORMATION.
2. PHASE 2 AND PHASE 3 OF THE TRAFFIC CONTROL PLAN SHALL BE COMPLETED SEPARATELY UNLESS DIRECTED BY THE ENGINEER.
3. PHASE 2 MAY NOT BEGIN UNTIL 8/6/2024.

0' 100' 200'

SCALE

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

3/22/2023

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

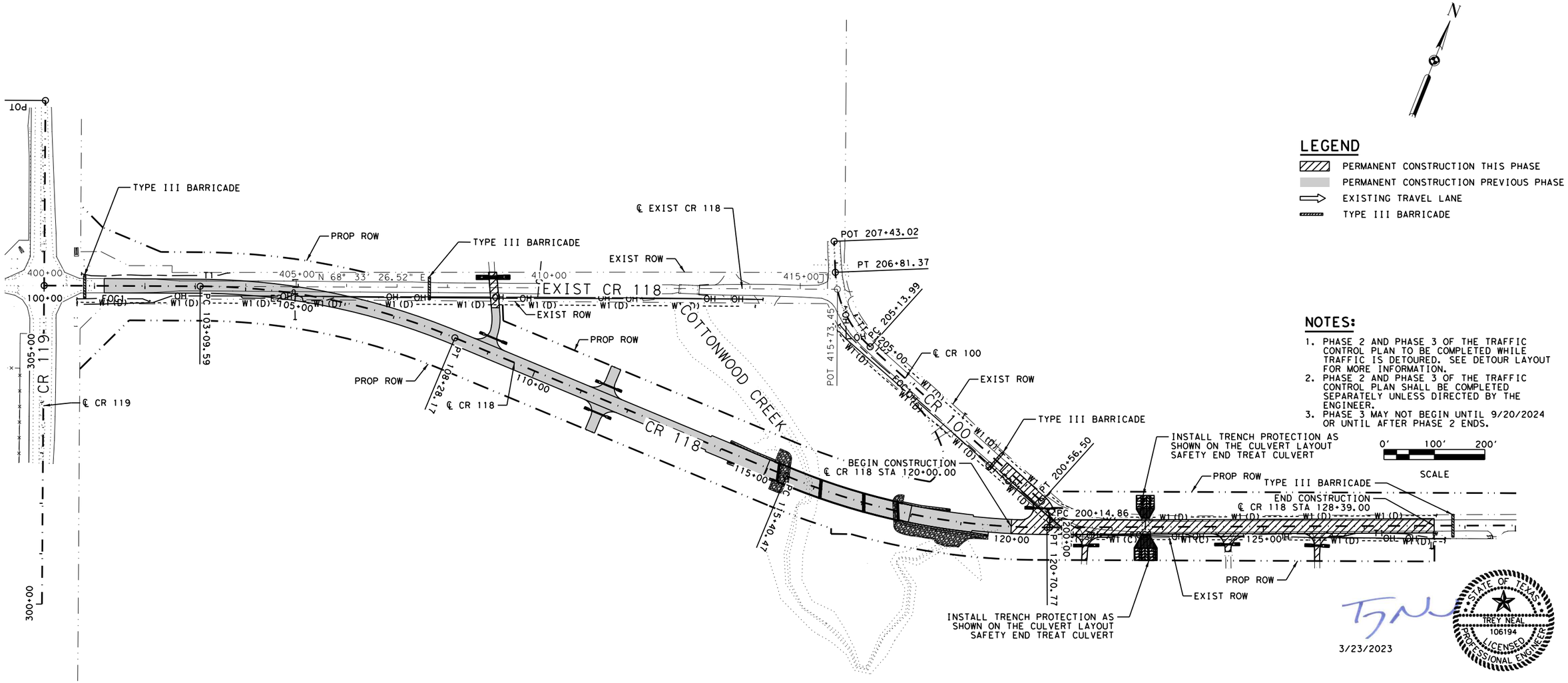
TRAFFIC CONTROL PLAN PHASE 2

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		12

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\2. Traffic Control Plan\CR118_TCP_PH2.dgn
PLOTTED: 3/22/2023 10:35:18 AM

EXHIBIT C



TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

3/23/2023

Kimley»Horn F-928

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

TRAFFIC CONTROL PLAN
PHASE 3

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		13

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\2. Traffic Control Plan\CR118_TCP_PH3.dgn
PLOTTED: 3/23/2023 1:23:42 PM

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

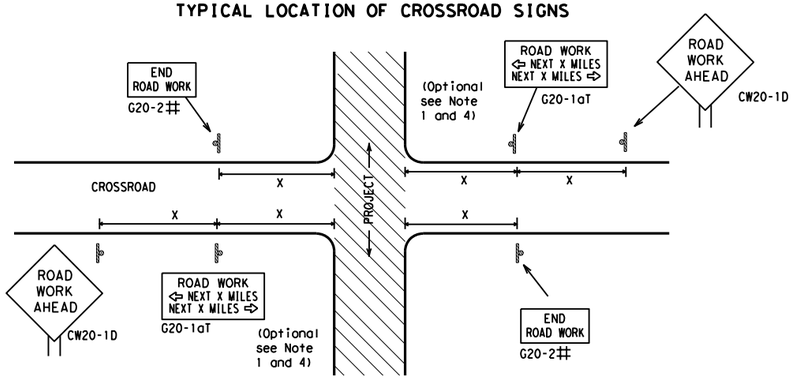
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	AUS	WILLIAMSON		14
5-10 5-21				

DATE: 11/3/2022 12:47:07 PM
FILE: c:\pw\khl\d0221669\bc-21 (3).dgn

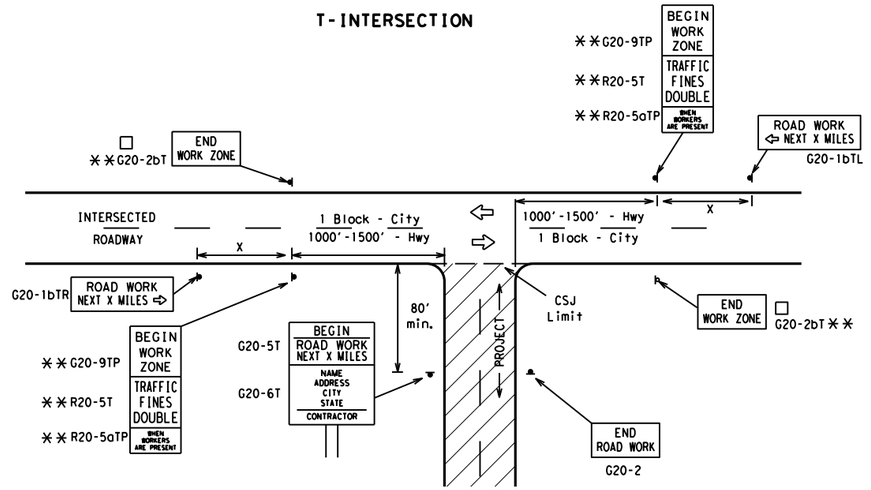
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

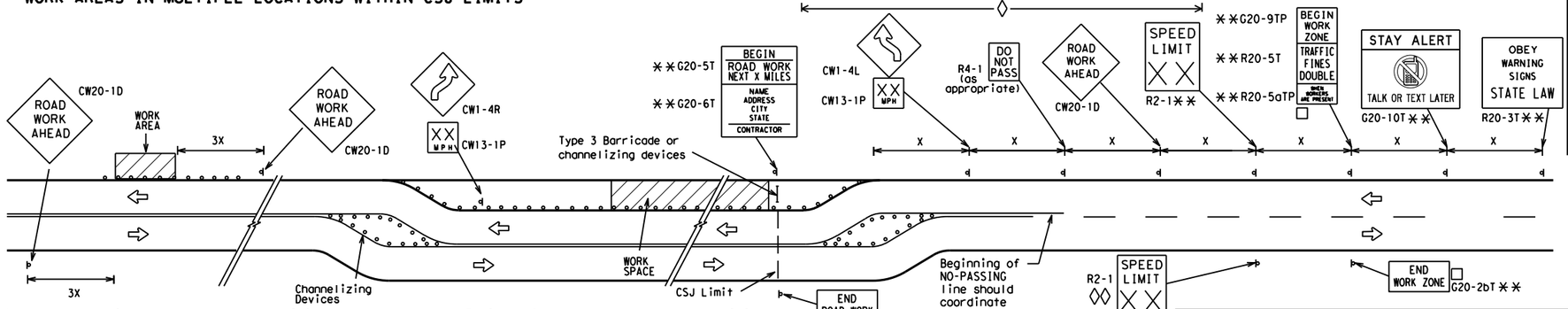
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

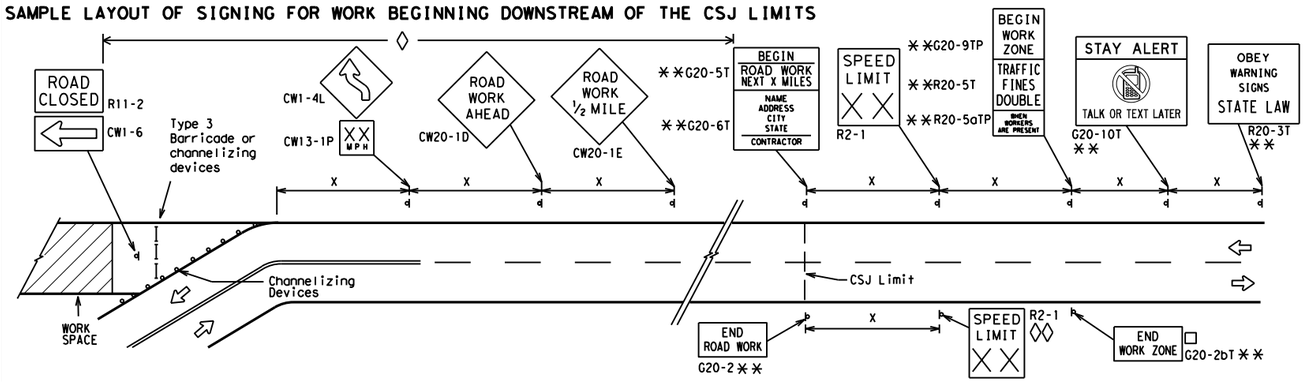
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		15

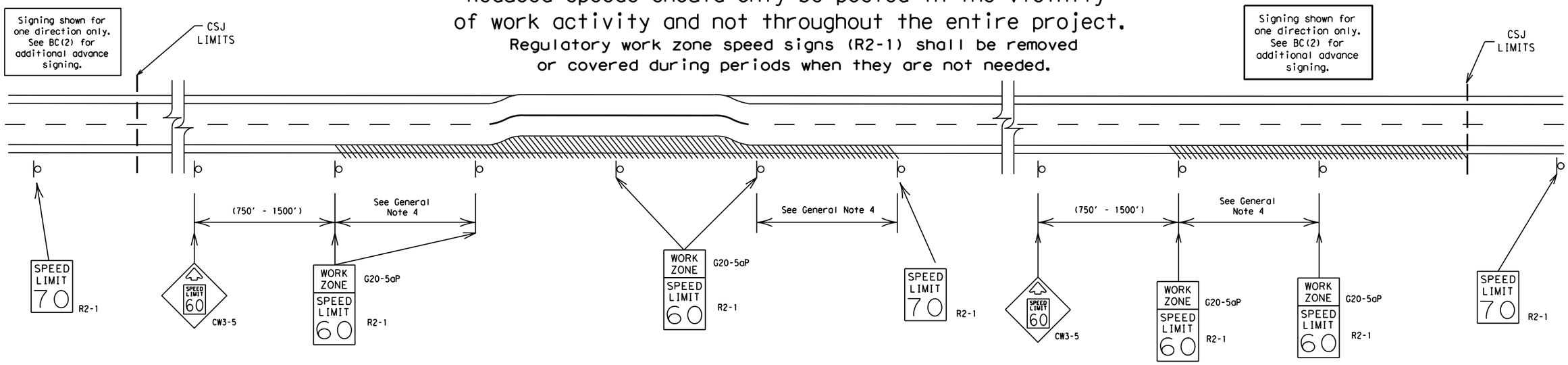
DATE: 11/3/2022 12:47:07 PM
FILE: c:\pw\kn1\d0221669\bc-21 (3).dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

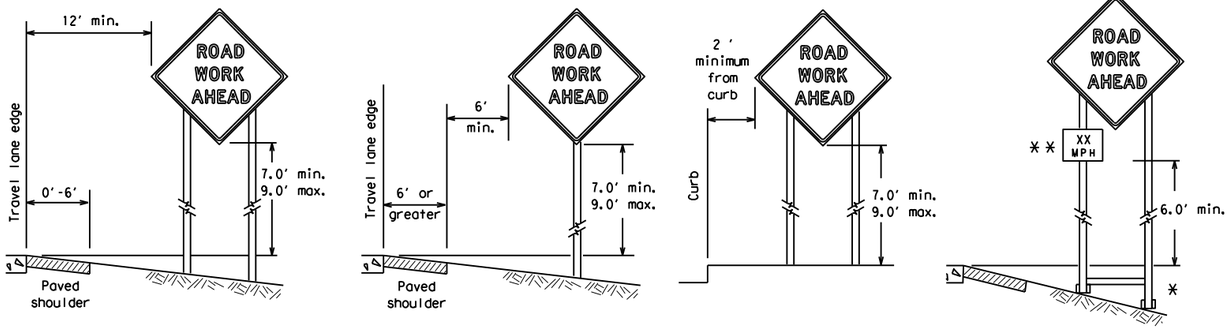
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		16

DATE: 11/3/2022 12:47:08 PM
FILE: c:\pw\kh1\d0221669\bc-21 (3).dgn

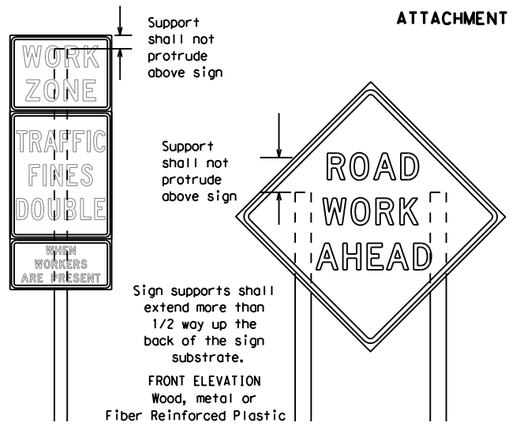
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

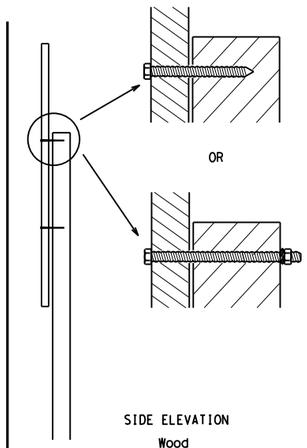


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





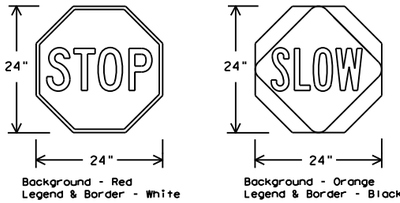
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

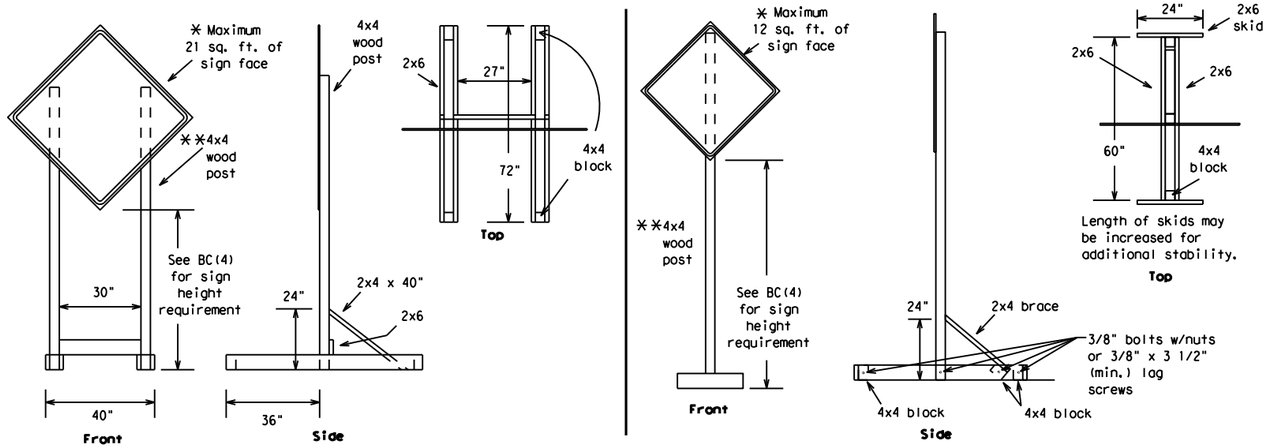
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

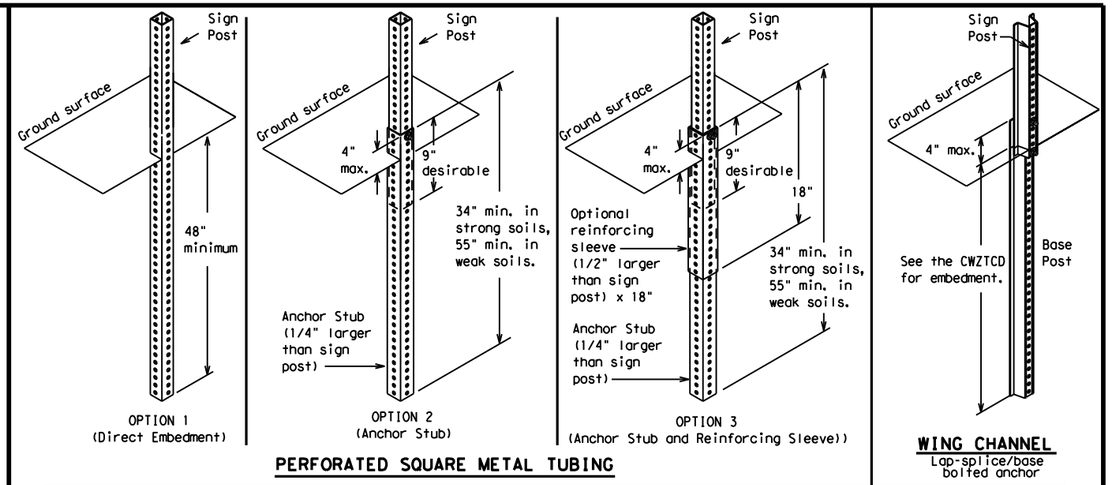
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		17

DATE: 11/3/2022 12:47:09 PM
FILE: c:\pw\khl\d0221669\bc-21 (3).dgn



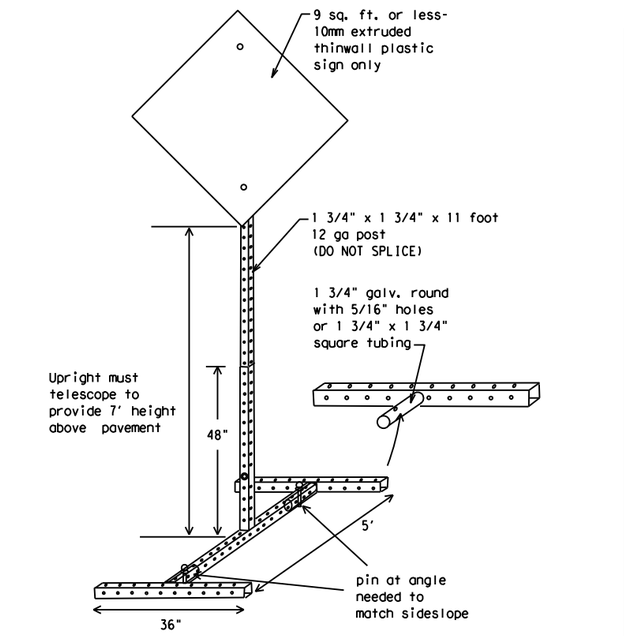
SKID MOUNTED WOOD SIGN SUPPORTS

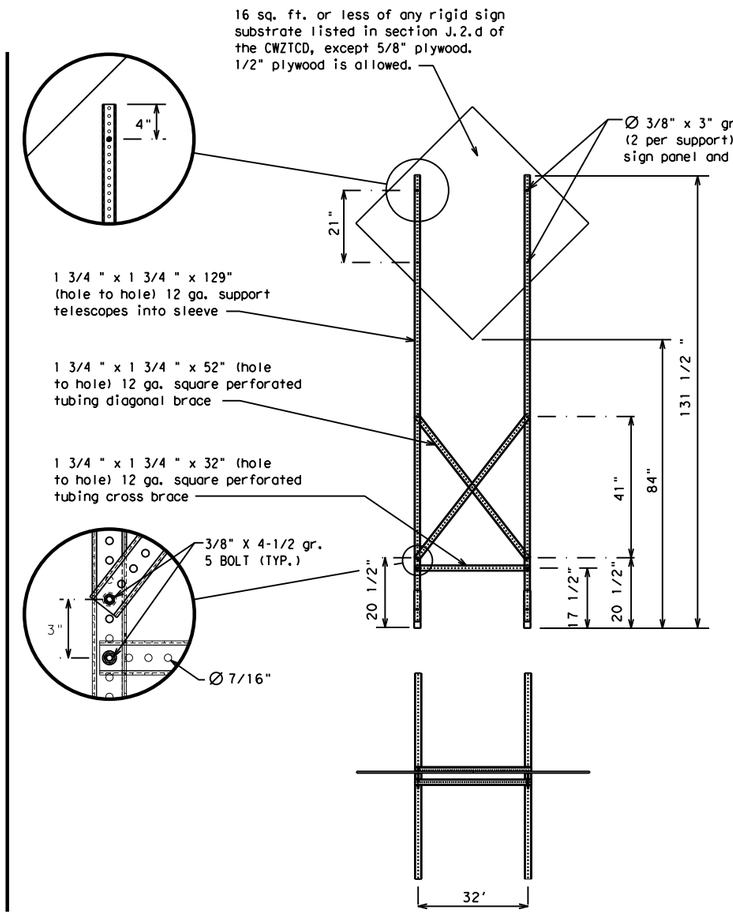
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

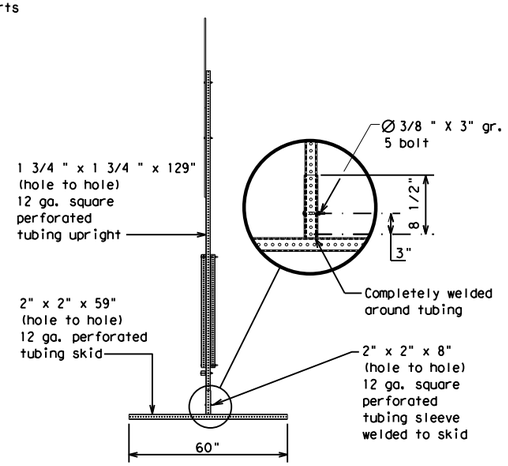


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		18

DATE: 11/3/2022 12:47:10 PM
FILE: c:\pw\kni\d0221669\bc-21 (3).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: 11/3/2022 12:47:10 PM
FILE: c:\pw\kn\a0221669\bc-21 (3).dgn

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

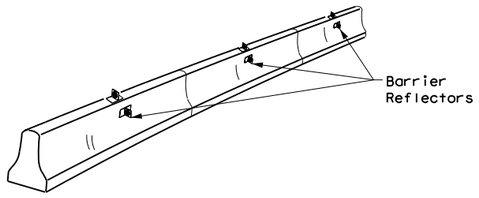
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		19

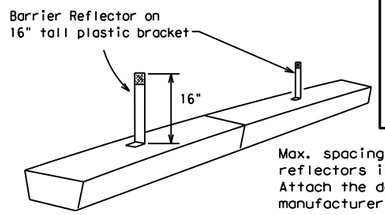
100

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



CONCRETE TRAFFIC BARRIER (CTB)

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

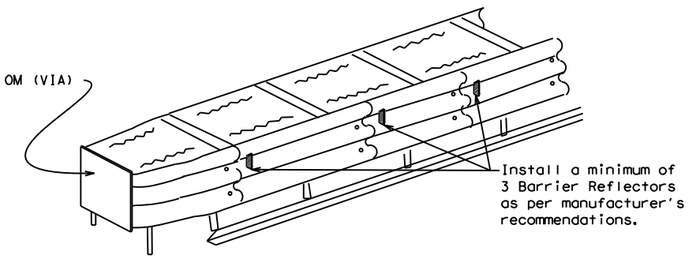


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

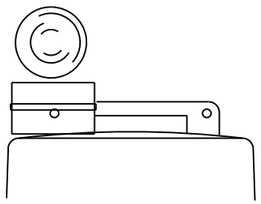


DELINEATION OF END TREATMENTS

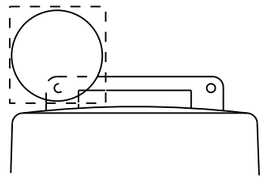
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

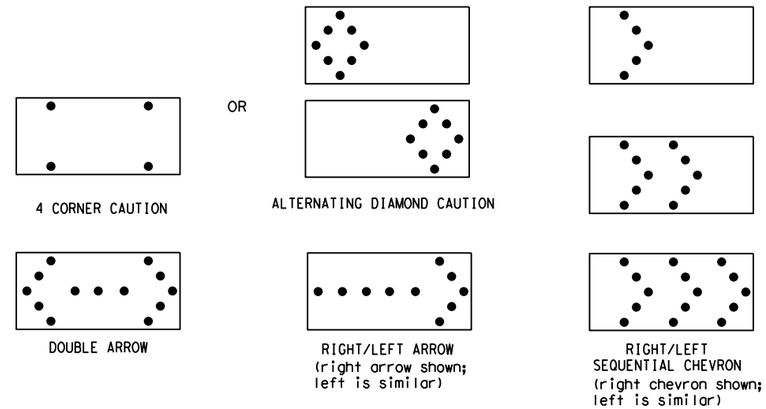
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

SHEET 7 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		20

101

DATE: 11/3/2022 12:47:11 PM
FILE: c:\pw\khl\d0221669\bc-21 (3).dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

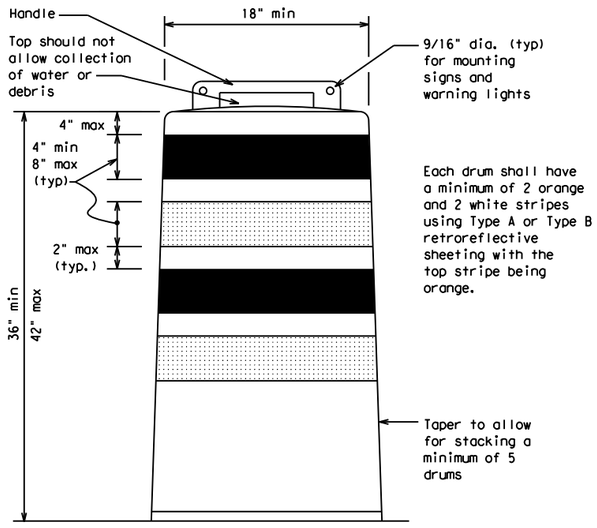
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

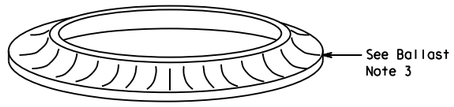
RETROREFLECTIVE SHEETING

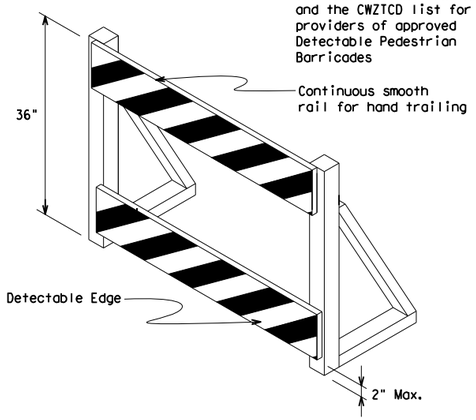
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

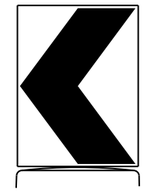




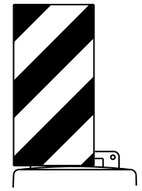


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

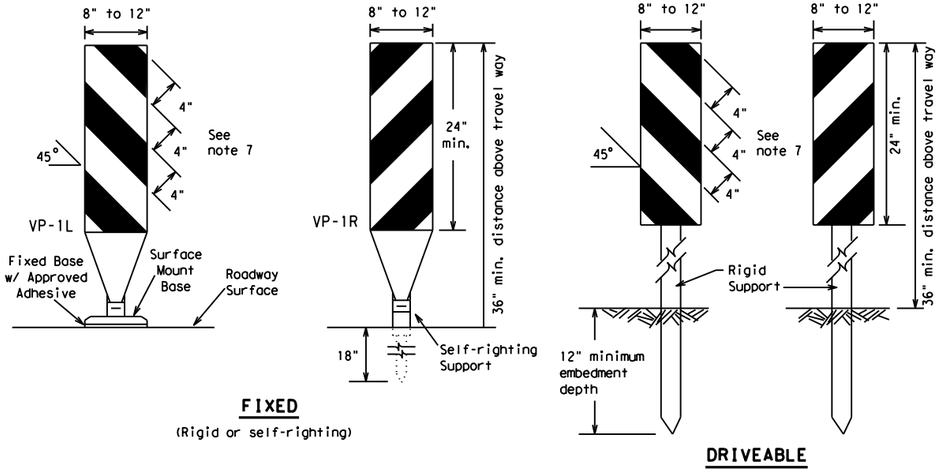
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	AUS	WILLIAMSON		21
7-13				

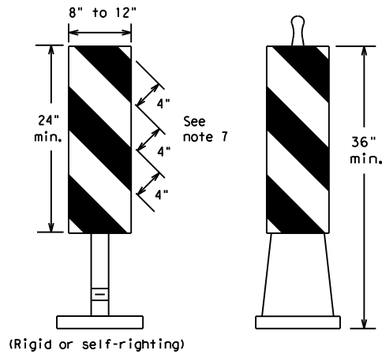
102

DATE: 11/3/2022 12:47:12 PM
FILE: c:\pw\kni\d0221669\bc-21 (3).dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

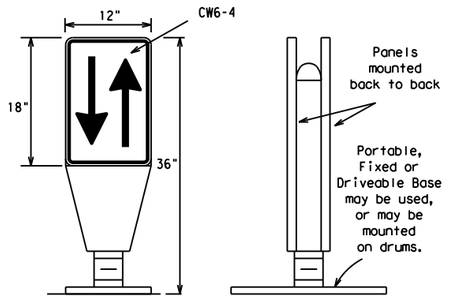


(Rigid or self-righting)

PORTABLE

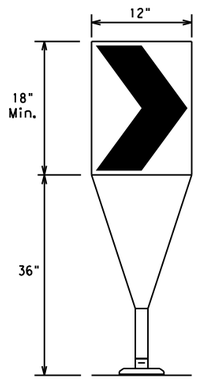
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



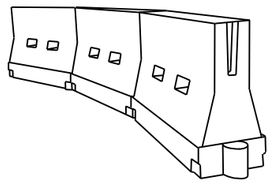
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

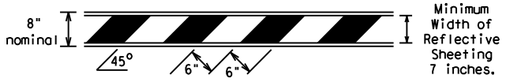
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		22

DATE: 11/3/2022 12:47:13 PM
FILE: c:\pw\kni\d0221669\bc-21 (3).dgn

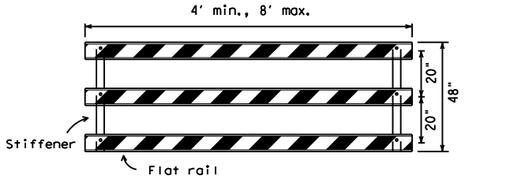
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



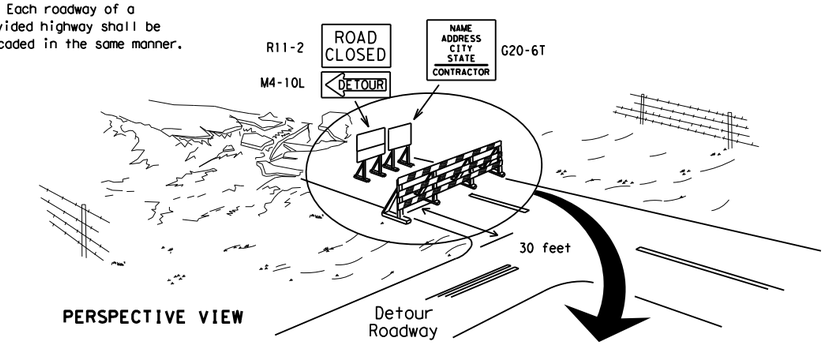
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

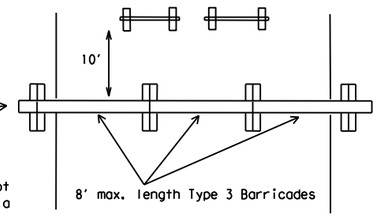
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

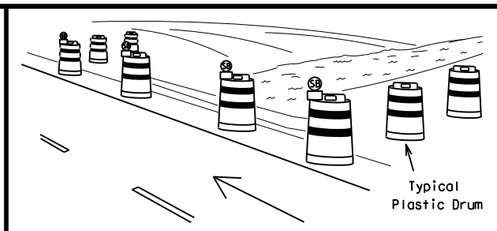
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

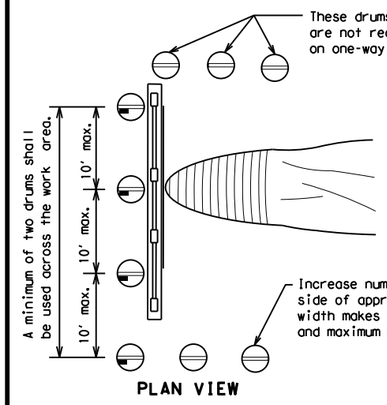
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

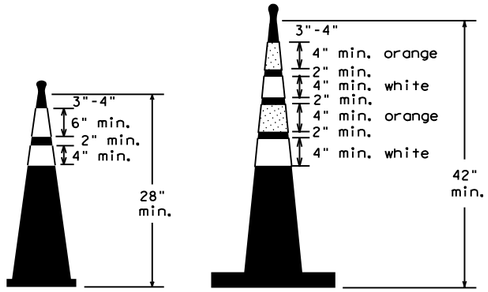
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

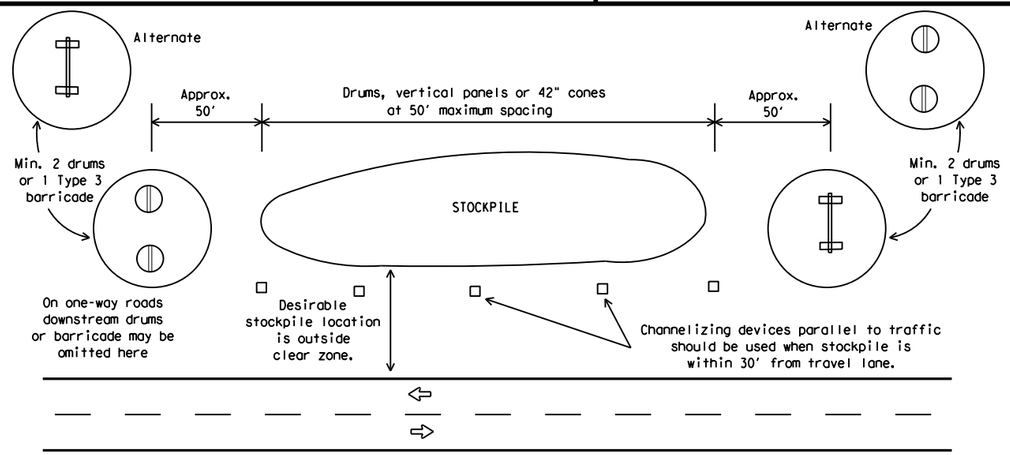
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE: 11/3/2022 12:47:13 PM
FILE: c:\pw\kh1\d0221669\bc-21 (3).dgn

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	WILLIAMSON		23

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

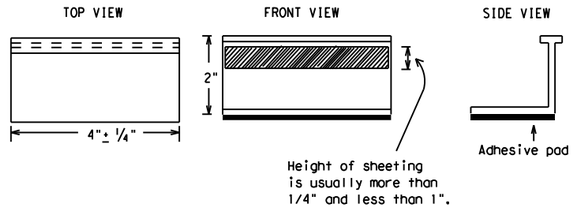
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

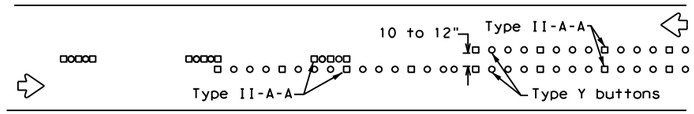
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		24

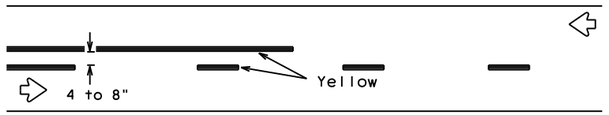
105

PAVEMENT MARKING PATTERNS

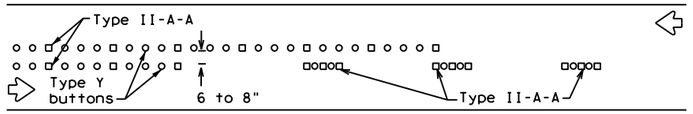
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



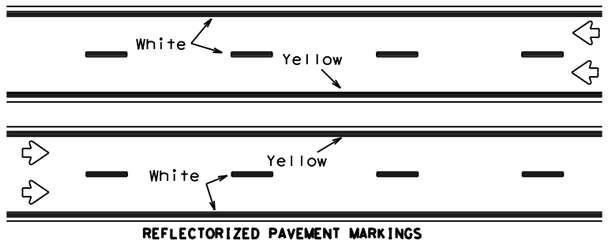
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



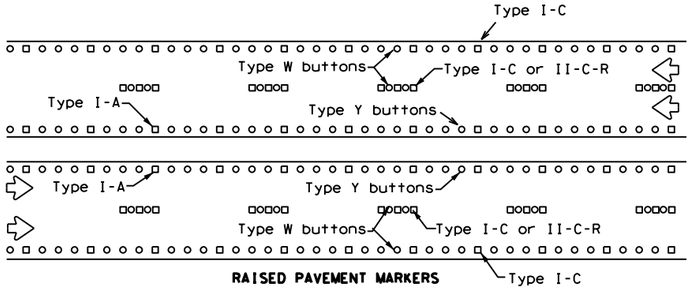
RAISED PAVEMENT MARKERS - PATTERN B

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

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



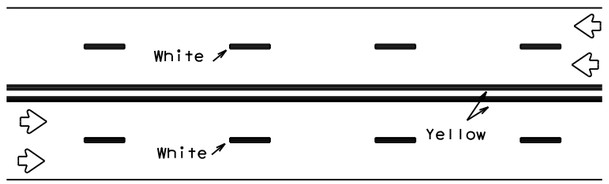
REFLECTORIZED PAVEMENT MARKINGS



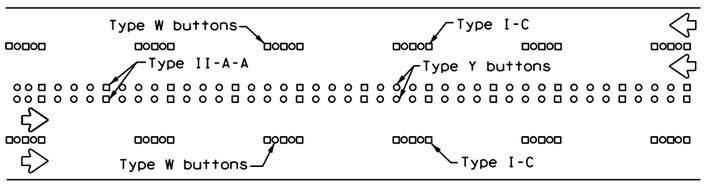
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



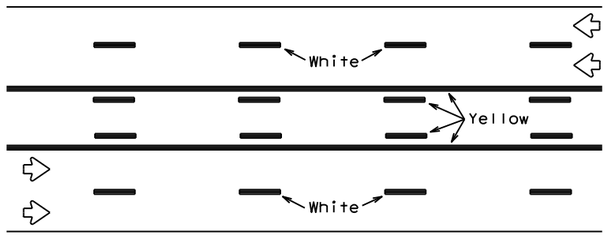
REFLECTORIZED PAVEMENT MARKINGS



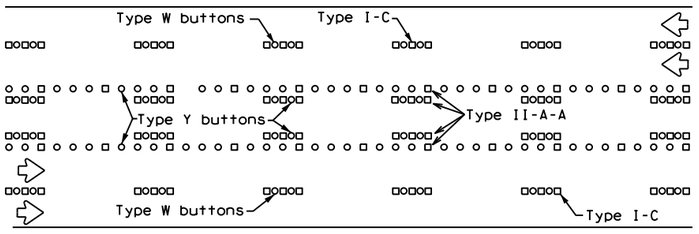
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

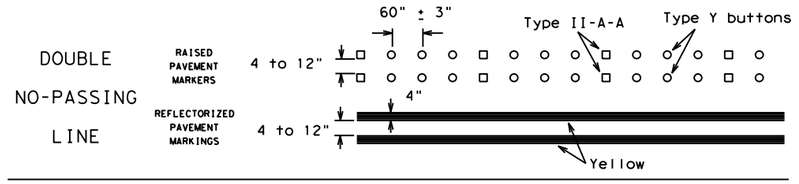
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

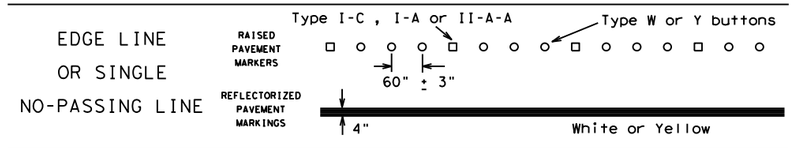
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

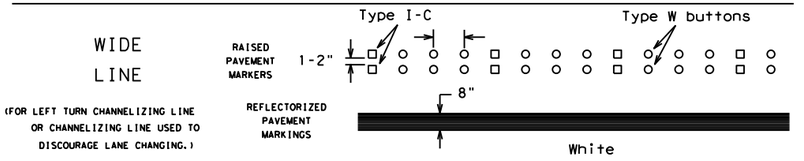


EDGE LINE OR SINGLE NO-PASSING LINE



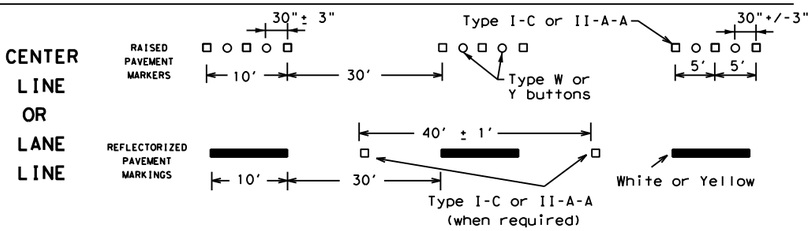
WIDE LINE

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

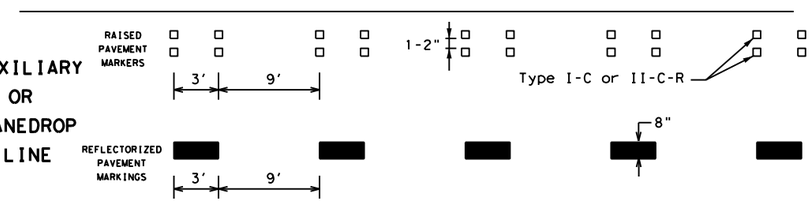


BROKEN LINES

CENTER LINE OR LANE LINE

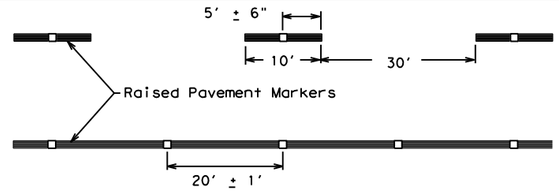


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

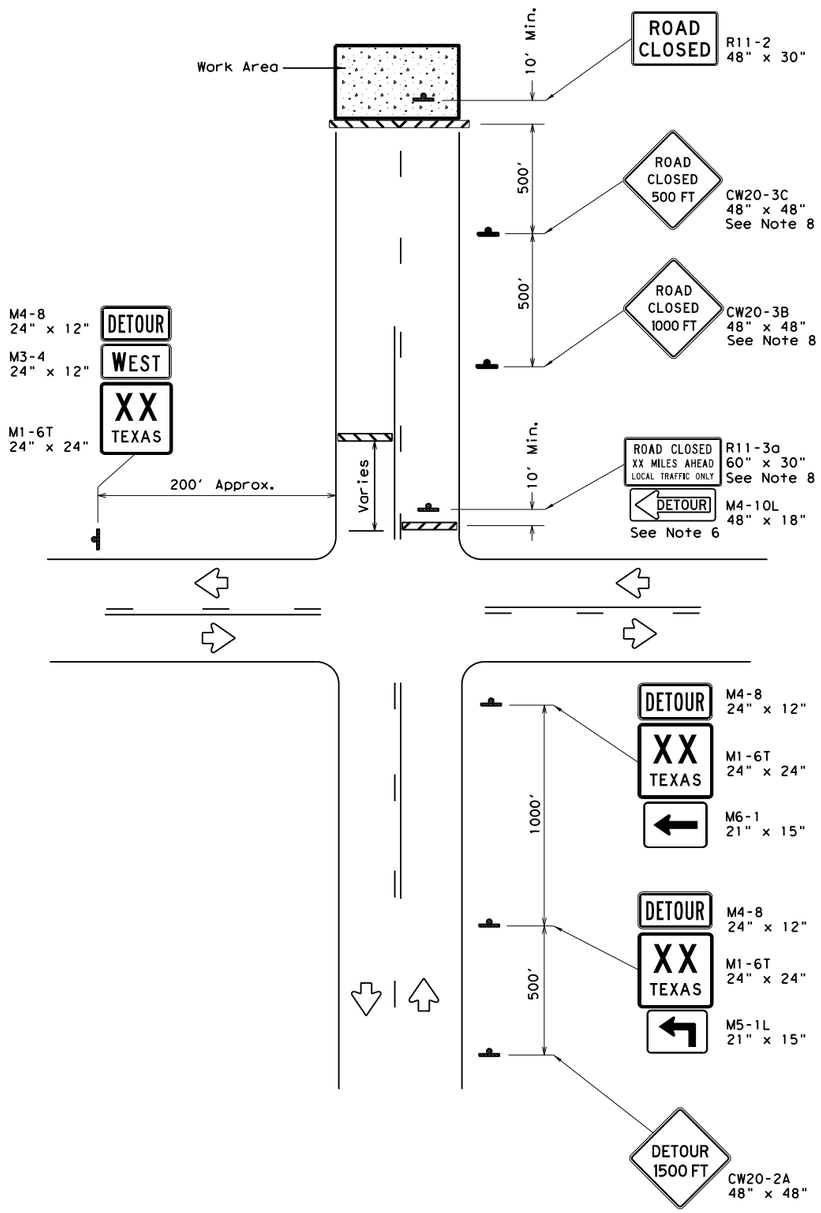
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

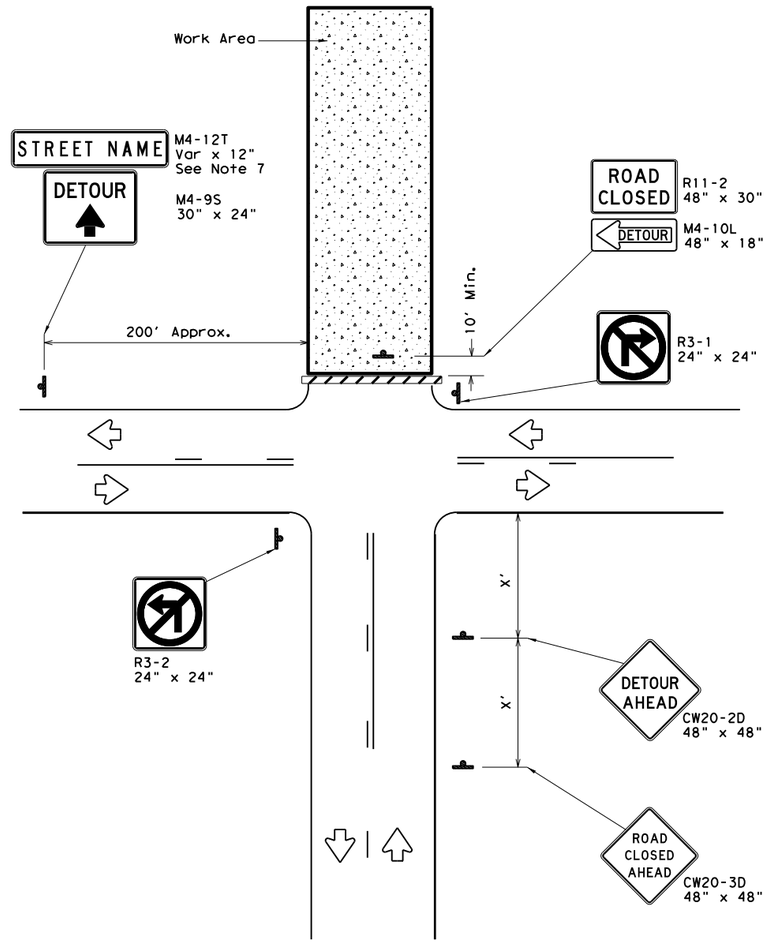
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		25

106



ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	AUS	WILLIAMSON		26

DATE: 11/3/2022 12:47:27 PM
FILE: c:\pw\kh1\d0221669\wzrcd-13 (2).dgn

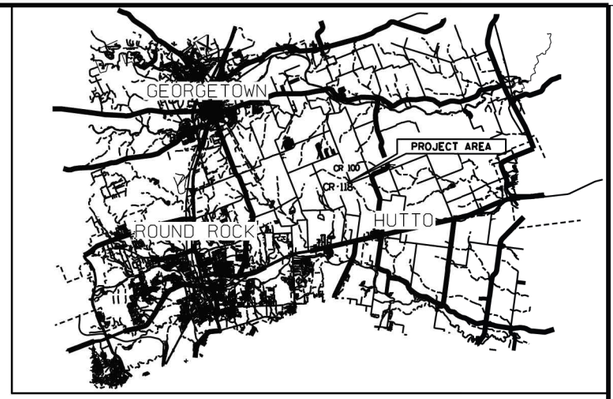
SURVEY CONTROL LAYOUT SHEET

HORIZONTAL AND VERTICAL CONTROL - GRID

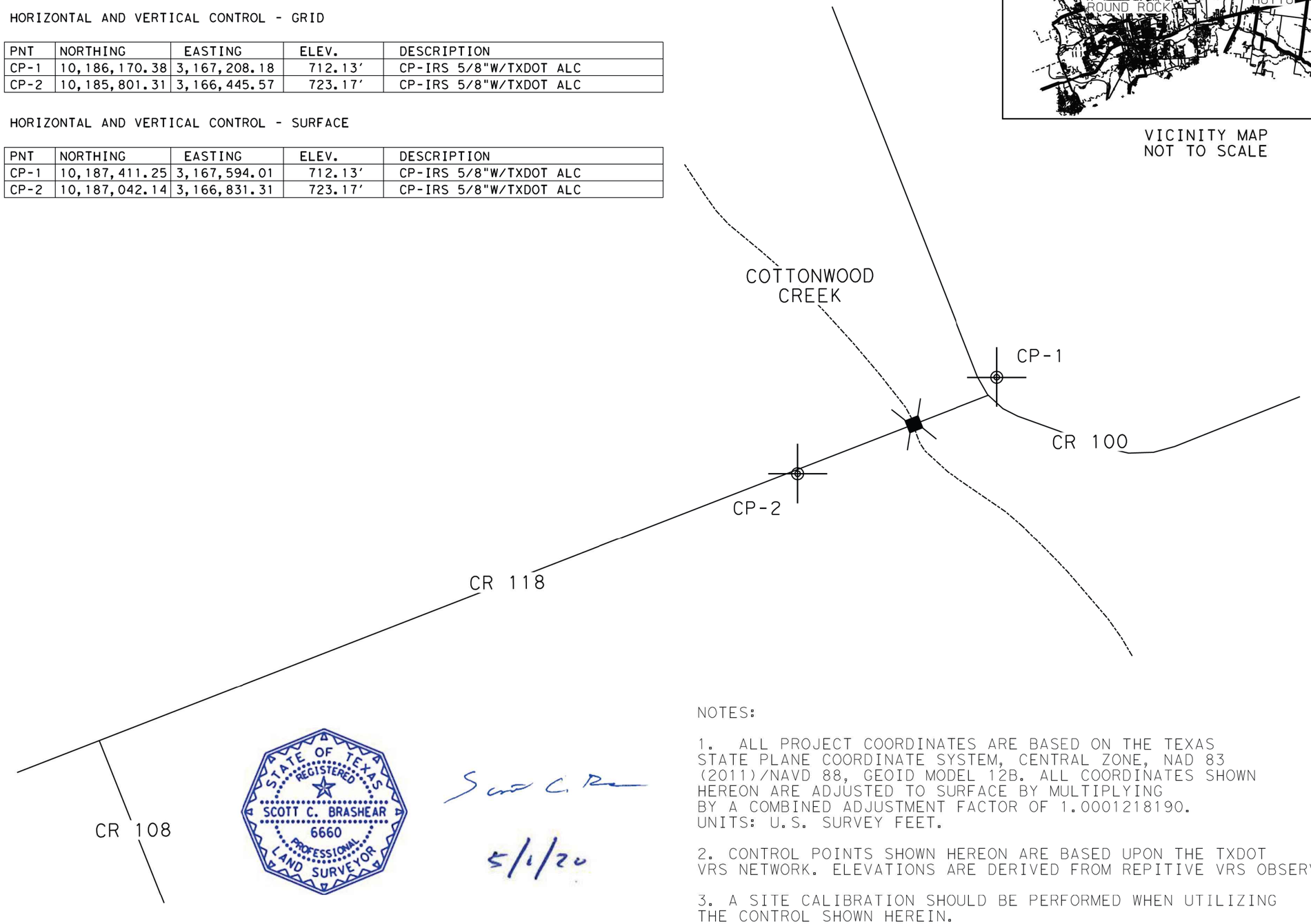
PNT	NORTHING	EASTING	ELEV.	DESCRIPTION
CP-1	10,186,170.38	3,167,208.18	712.13'	CP-IRS 5/8"W/TXDOT ALC
CP-2	10,185,801.31	3,166,445.57	723.17'	CP-IRS 5/8"W/TXDOT ALC

HORIZONTAL AND VERTICAL CONTROL - SURFACE

PNT	NORTHING	EASTING	ELEV.	DESCRIPTION
CP-1	10,187,411.25	3,167,594.01	712.13'	CP-IRS 5/8"W/TXDOT ALC
CP-2	10,187,042.14	3,166,831.31	723.17'	CP-IRS 5/8"W/TXDOT ALC



VICINITY MAP
NOT TO SCALE



N

200 0 100 200 400

GRAPHIC SCALE
SCALE: 1" = 400' (11" x 17")
SCALE: 1" = 200' (22" x 34")
WILLIAMSON COUNTY, TEXAS

STATE OF TEXAS
REGISTERED
SCOTT C. BRASHEAR
6660
PROFESSIONAL
LAND SURVEYOR

Scott C. Brashear
5/1/20

NOTES:

1. ALL PROJECT COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 83 (2011)/NAVD 88, GEOID MODEL 12B. ALL COORDINATES SHOWN HEREON ARE ADJUSTED TO SURFACE BY MULTIPLYING BY A COMBINED ADJUSTMENT FACTOR OF 1.0001218190. UNITS: U.S. SURVEY FEET.

2. CONTROL POINTS SHOWN HEREON ARE BASED UPON THE TXDOT VRS NETWORK. ELEVATIONS ARE DERIVED FROM REPITIVE VRS OBSERVATIONS.

3. A SITE CALIBRATION SHOULD BE PERFORMED WHEN UTILIZING THE CONTROL SHOWN HEREIN.

Survey Date: APRIL, 2020

SAM®
4801 Southwest Parkway
Building Two, Suite 100
Austin, Texas 78735
(512) 447-0575
Fax (512) 326-3029
Texas Firm Registration No. 10064300

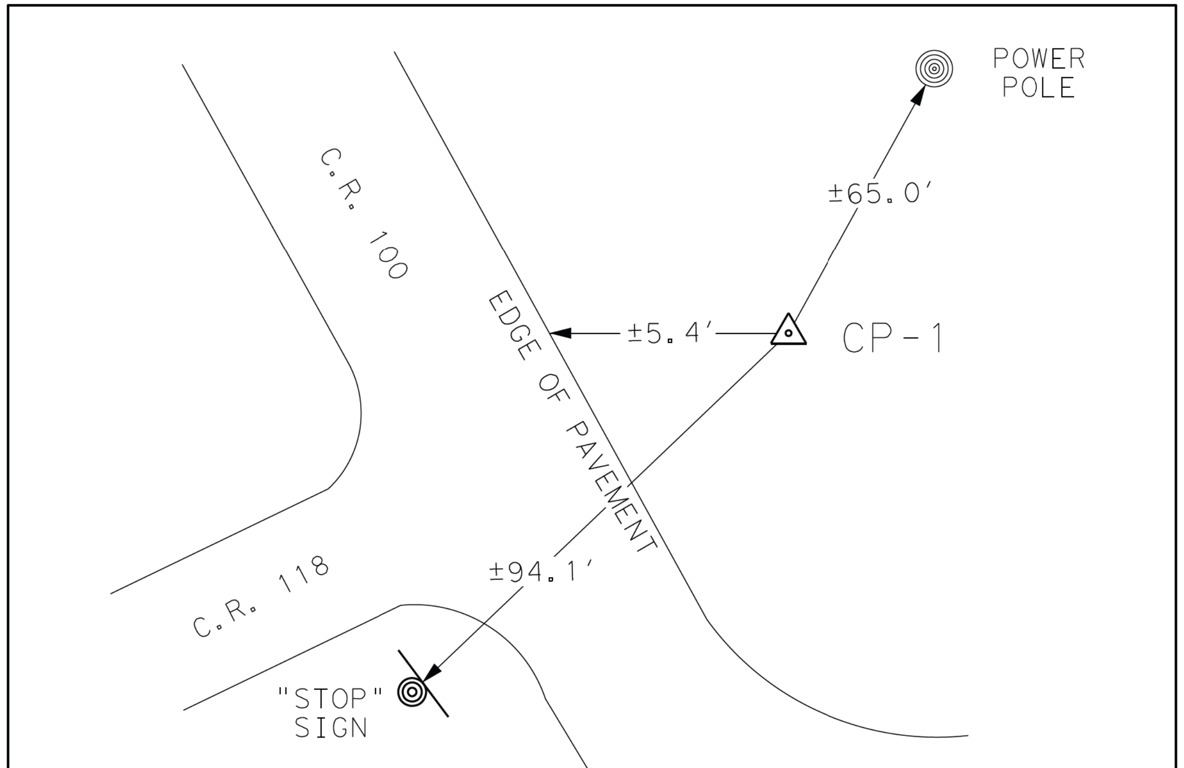
Texas Department of Transportation

SURVEY CONTROL LAYOUT SHEET

27

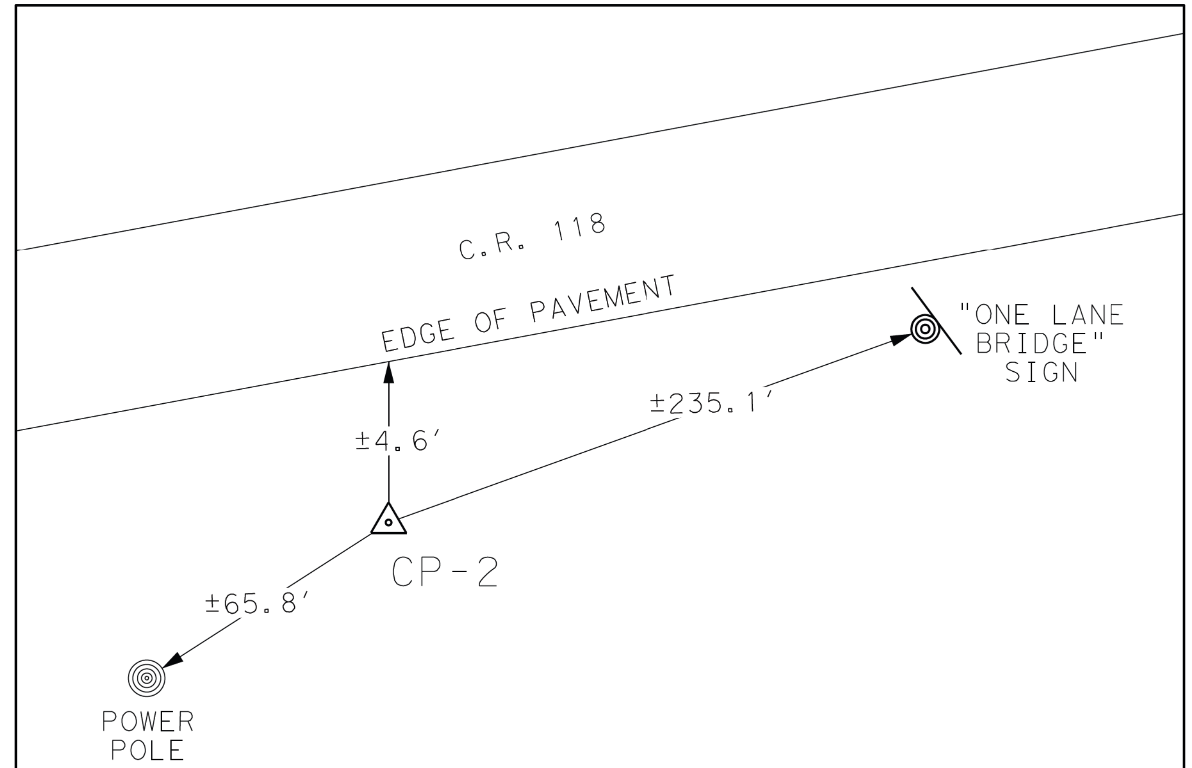
FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
	BR2020(733), ETC.		1 OF 2
STATE	DISTRICT	COUNTY	
TEXAS	AUS	WILLIAMSON	
CONTROL	SECTION	JOB	HIGHWAY NO.
0914	05	204, ETC.	CR 118

FILE:\\samfnc\AUS\PROJECTS\101905224SA\100\Survey\02Base\CR 118\Control Sheets\CR_118_CONTROL LAYOUT SHEETS_SURFACE_1.0001218190.dgn



CP-1 IS A 5/8" IRON ROD WITH A TXDOT ALUMINUM CAP SET IN CONCRETE LOCATED IN THE EAST RIGHT-OF-WAY OF C.R. 100 ±65.0 FEET SOUTHWEST OF A POWER POLE, ±5.4 FEET EAST OF THE EDGE OF PAVEMENT OF C.R. 100 AND ±94.1 FEET NORTHEAST OF A "STOP" SIGN.

SURFACE COORDINATES	GRID COORDINATES
N = 10,187,411.25	N = 10,186,170.38
E = 3,167,594.01	E = 3,167,208.18
ELEV = 712.13'	ELEV = 712.13'



CP-2 IS A 5/8" IRON ROD WITH A TXDOT ALUMINUM CAP SET IN CONCRETE LOCATED IN THE SOUTH RIGHT-OF-WAY OF C.R. 118 ±65.8 FEET NORTHEAST OF A POWER POLE, ±4.6 FEET SOUTH OF THE EDGE OF PAVEMENT OF C.R. 118 AND ±235.1 FEET SOUTHWEST OF A "ONE LANE BRIDGE" SIGN.

SURFACE COORDINATES	GRID COORDINATES
N = 10,187,042.14	N = 10,185,801.31
E = 3,166,831.31	E = 3,166,445.57
ELEV = 723.17'	ELEV = 723.17'

N

NOT TO SCALE

NOTES:

1. ALL PROJECT COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 83 (2011)/NAVD 88, GEOID MODEL 12B. ALL COORDINATES SHOWN HEREON ARE ADJUSTED TO SURFACE BY MULTIPLYING BY A COMBINED ADJUSTMENT FACTOR OF 1.0001218190. UNITS: U.S. SURVEY FEET.

2. CONTROL POINTS SHOWN HEREON ARE BASED UPON THE TXDOT VRS NETWORK. ELEVATIONS ARE DERIVED FROM REPITIVE VRS OBSERVATIONS.

3. A SITE CALIBRATION SHOULD BE PERFORMED WHEN UTILIZING THE CONTROL SHOWN HEREIN.

STATE OF TEXAS REGISTERED SCOTT C. BRASHEAR 6660 PROFESSIONAL LAND SURVEYOR

Scott C. Brashear
5/1/20

Survey Date: APRIL, 2020

SAM
4801 Southwest Parkway
Building Two, Suite 100
Austin, Texas 78735
(512) 447-0575
Fax: (512) 326-3029
Texas Firm Registration No. 10064300

 Texas Department of Transportation

SURVEY CONTROL INDEX SHEET

28

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
	BR2020(733), ETC.		2 OF 2
STATE	DISTRICT	COUNTY	
TEXAS	AUS	WILLIAMSON	
CONTROL	SECTION	JOB	HIGHWAY NO.
0914	05	204, ETC.	CR 118

℄ CR 118

Beginning chain CL CR 118 description
Feature: Road_Centerline

Point 23 N 10,186,784.4058 E 3,166,135.6762 Sta 100+00.00

Course from 23 to PC CR118 1 N 68° 33′ 26.52" E Dist 309.5913

Curve Data					
Curve CR118 1					
P.I. Station	105+72.22	N	10,186,993.5904	E	3,166,668.2855
Delta =	22° 20′ 24.32"	(RT)			
Degree =	4° 18′ 28.63"				
Tangent =	262.6245				
Length =	518.5778				
Radius =	1,330.0000				
External =	25.6812				
Long Chord =	515.2991				
Mid. Ord. =	25.1948				
P.C. Station	103+09.59	N	10,186,897.5829	E	3,166,423.8388
P.T. Station	108+28.17	N	10,186,989.4769	E	3,166,930.8778
C.C.		N	10,185,659.6401	E	3,166,910.0462
Back = N	68° 33′ 26.52" E				
Ahead = S	89° 06′ 09.16" E				
Chord Bear = N	79° 43′ 38.68" E				

Course from PT CR118 1 to PC CR118 2 S 89° 06′ 09.16" E Dist 712.3016

Curve Data					
Curve CR118 2					
P.I. Station	118+09.19	N	10,186,974.1113	E	3,167,911.7773
Delta =	22° 50′ 41.88"	(LT)			
Degree =	4° 18′ 28.63"				
Tangent =	268.7182				
Length =	530.2974				
Radius =	1,330.0000				
External =	26.8749				
Long Chord =	526.7917				
Mid. Ord. =	26.3426				
P.C. Station	115+40.47	N	10,186,978.3202	E	3,167,643.0920
P.T. Station	120+70.77	N	10,187,074.5466	E	3,168,161.0206
C.C.		N	10,188,308.1570	E	3,167,663.9237
Back = S	89° 06′ 09.16" E				
Ahead = N	68° 03′ 08.96" E				
Chord Bear = N	79° 28′ 29.90" E				

Course from PT CR118 2 to 24 N 68° 03′ 08.96" E Dist 1,038.7625

Point 24 N 10,187,462.7914 E 3,169,124.5005 Sta 131+09.53

Ending chain CL CR 118 description

℄ EXIST CR 118

Beginning chain CL EXIST CR118 description

Point 81 N 10,186,784.4058 E 3,166,135.6762 Sta 400+00.00

Course from 81 to 82 N 68° 33′ 26.52" E Dist 1,573.4452

Point 82 N 10,187,359.6093 E 3,167,600.2139 Sta 415+73.45

Ending chain CL EXIST CR118 description

℄ CR 100

Beginning chain CL CR 100 description
Feature: Road_Centerline

Point 67 N 10,187,076.6916 E 3,168,166.3438 Sta 200+00.00

Course from 67 to PC CL CR100 1 N 21° 56′ 51.04" W Dist 14.8614

Curve Data					
Curve CR 100 1					
P.I. Station	200+36.97	N	10,187,110.9834	E	3,168,152.5255
Delta =	47° 42′ 34.78"	(LT)			
Degree =	114° 35′ 29.61"				
Tangent =	22.1098				
Length =	41.6345				
Radius =	50.0000				
External =	4.6703				
Long Chord =	40.4421				
Mid. Ord. =	4.2713				
P.C. Station	200+14.86	N	10,187,090.4760	E	3,168,160.7892
P.T. Station	200+56.50	N	10,187,118.6696	E	3,168,131.7947
C.C.		N	10,187,071.7881	E	3,168,114.4129
Back = N	21° 56′ 51.04" W				
Ahead = N	69° 39′ 25.81" W				
Chord Bear = N	45° 48′ 08.43" W				

Course from PT CL CR100 1 to PC CL CR100 2 N 69° 39′ 25.81" W Dist 457.4966

Curve Data					
Curve CR 100 2					
P.I. Station	206+02.41	N	10,187,308.4987	E	3,167,619.9455
Delta =	45° 40′ 00.17"	(RT)			
Degree =	27° 17′ 01.34"				
Tangent =	88.4198				
Length =	167.3772				
Radius =	210.0000				
External =	17.8553				
Long Chord =	162.9819				
Mid. Ord. =	16.4561				
P.C. Station	205+13.99	N	10,187,277.7122	E	3,167,702.8325
P.T. Station	206+81.37	N	10,187,389.3011	E	3,167,584.0427
C.C.		N	10,187,474.5716	E	3,167,775.9514
Back = N	69° 39′ 25.81" W				
Ahead = N	23° 57′ 24.92" W				
Chord Bear = N	46° 47′ 25.00" W				

Course from PT CL CR100 2 to 68 N 23° 57′ 24.92" W Dist 61.6543

Point 68 N 10,187,445.6440 E 3,167,559.0080 Sta 207+43.02

Ending chain CL CR 100 description

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

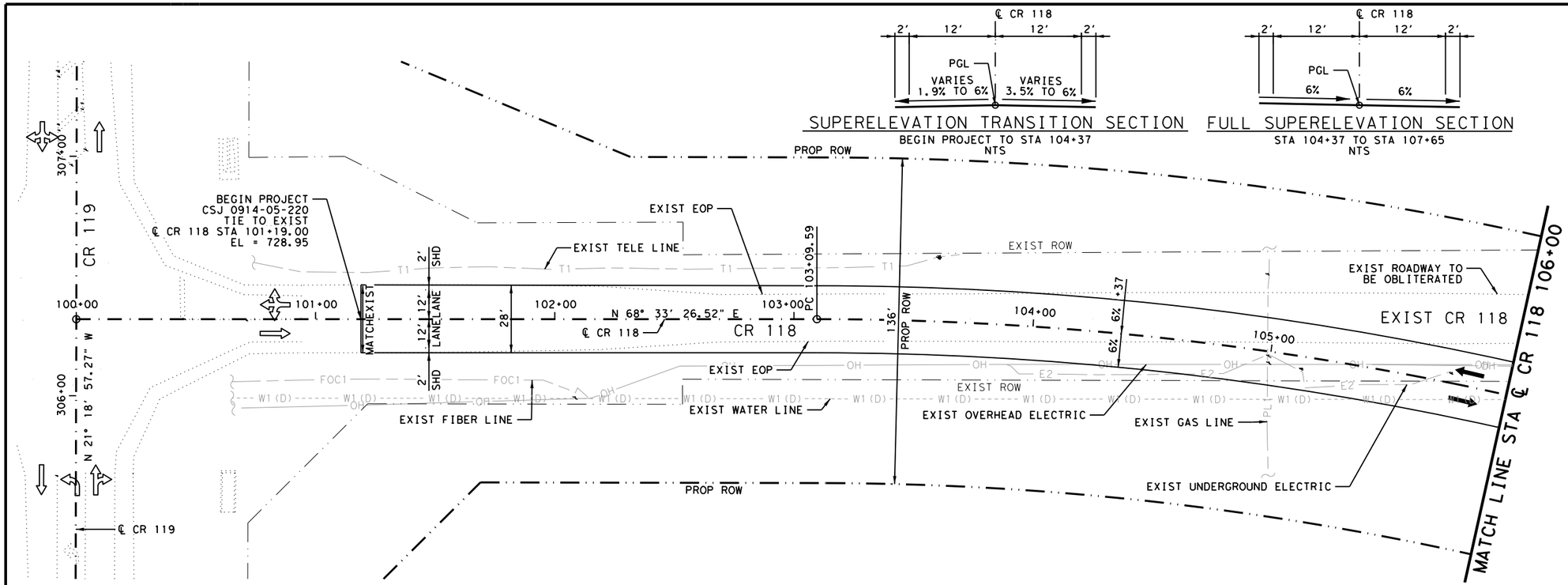
Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

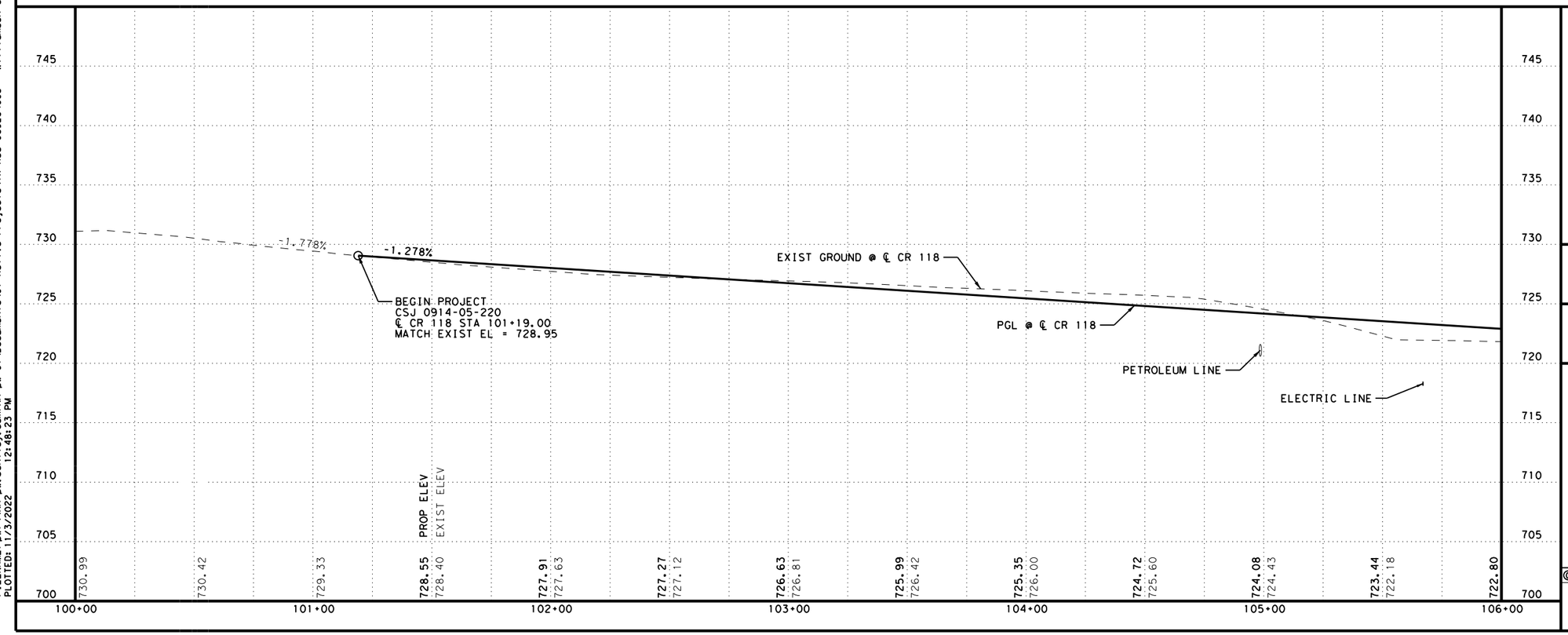
CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		29



NOTES:

1. REFER TO EROSION CONTROL LAYOUT AND REMOVAL LAYOUT FOR MORE INFORMATION ON GRADING OBLITERATED ROAD.

0' 25' 50' HORZ
0' 5' 10' VERT
SCALE



11/3/2022

TREY NEAL
106194
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

© 2022 Texas Department of Transportation

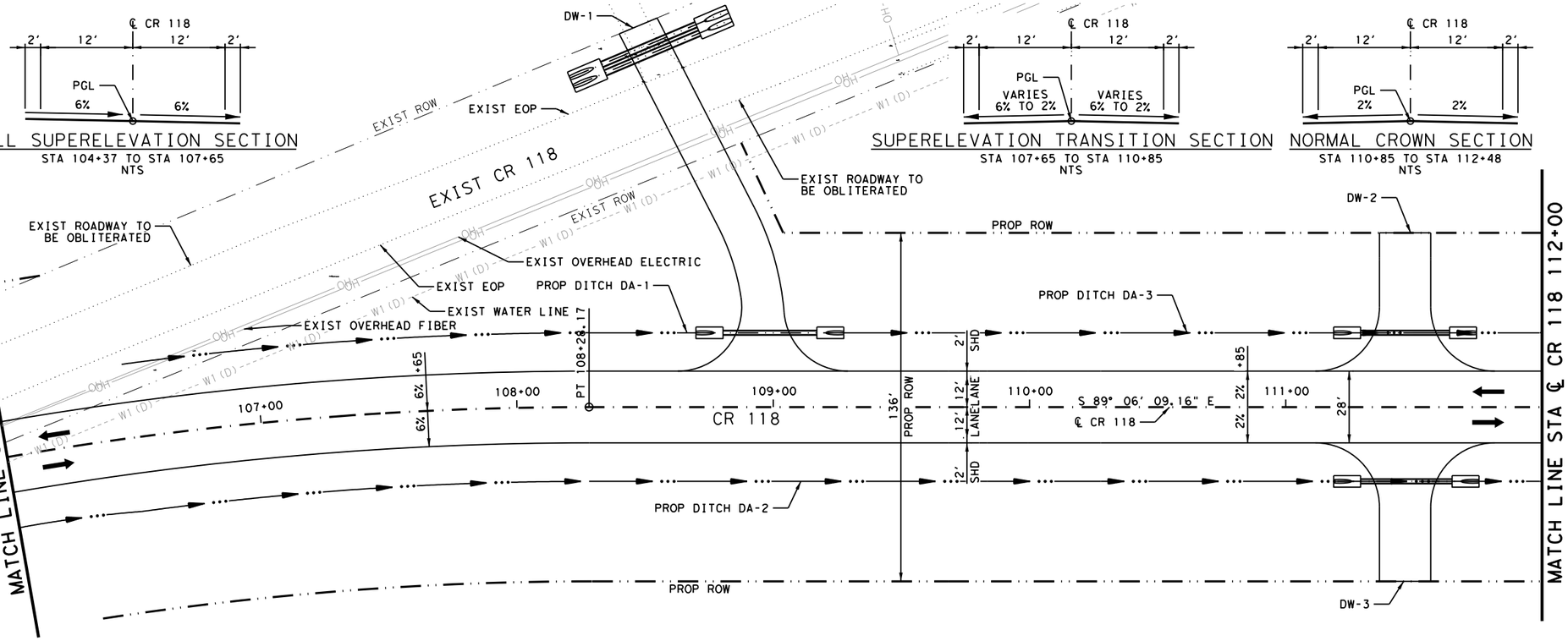
CR 118 AT COTTONWOOD CREEK

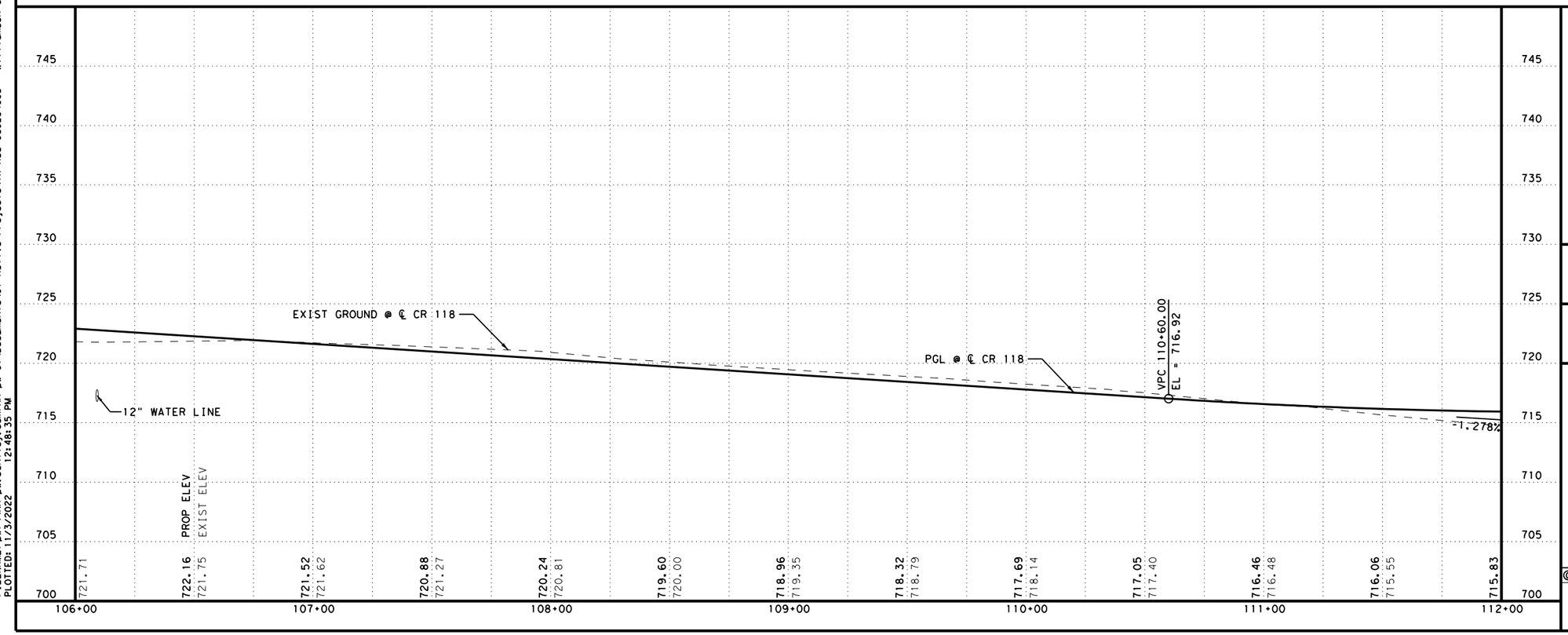
PLAN AND PROFILE

SHEET 1 OF 5

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		30

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\3. Roadway\CR118_RDW_PP01.dgn
PLOTTED: 11/3/2022 12:48:23 PM





11/3/2022

TREY NEAL 106194 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

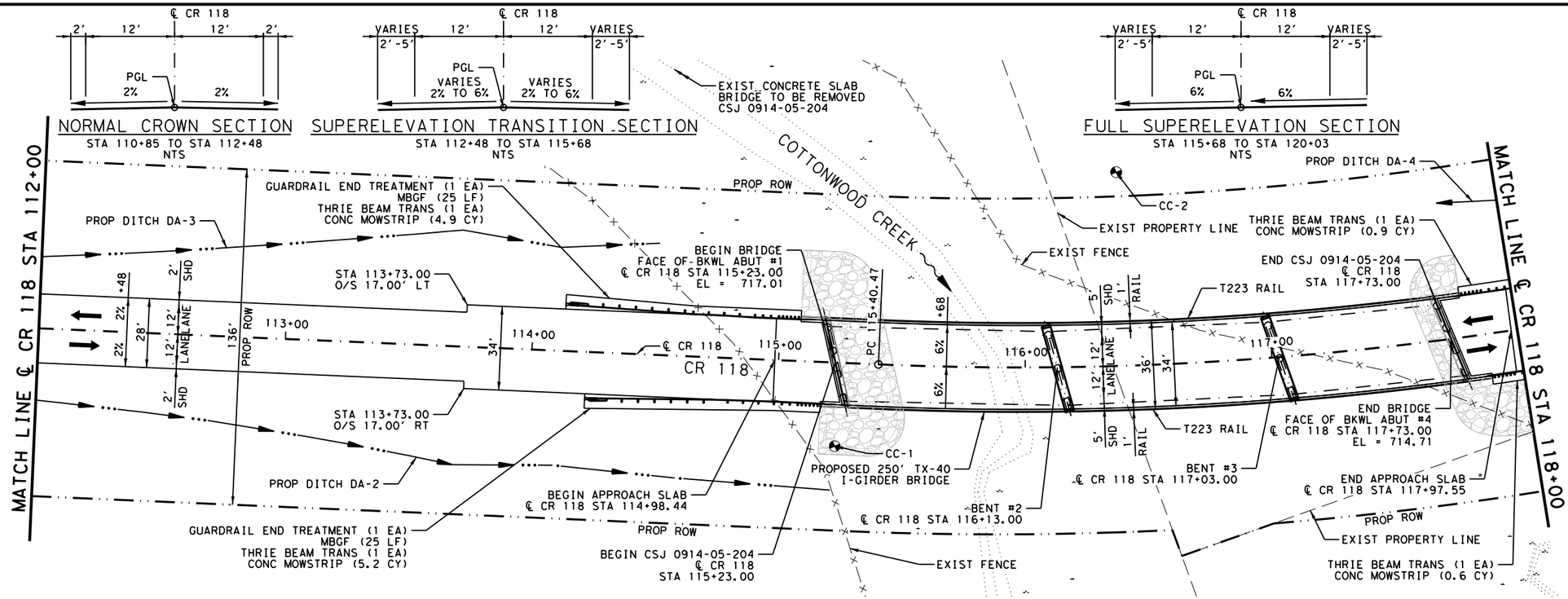
CR 118 AT COTTONWOOD CREEK

PLAN AND PROFILE

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		31

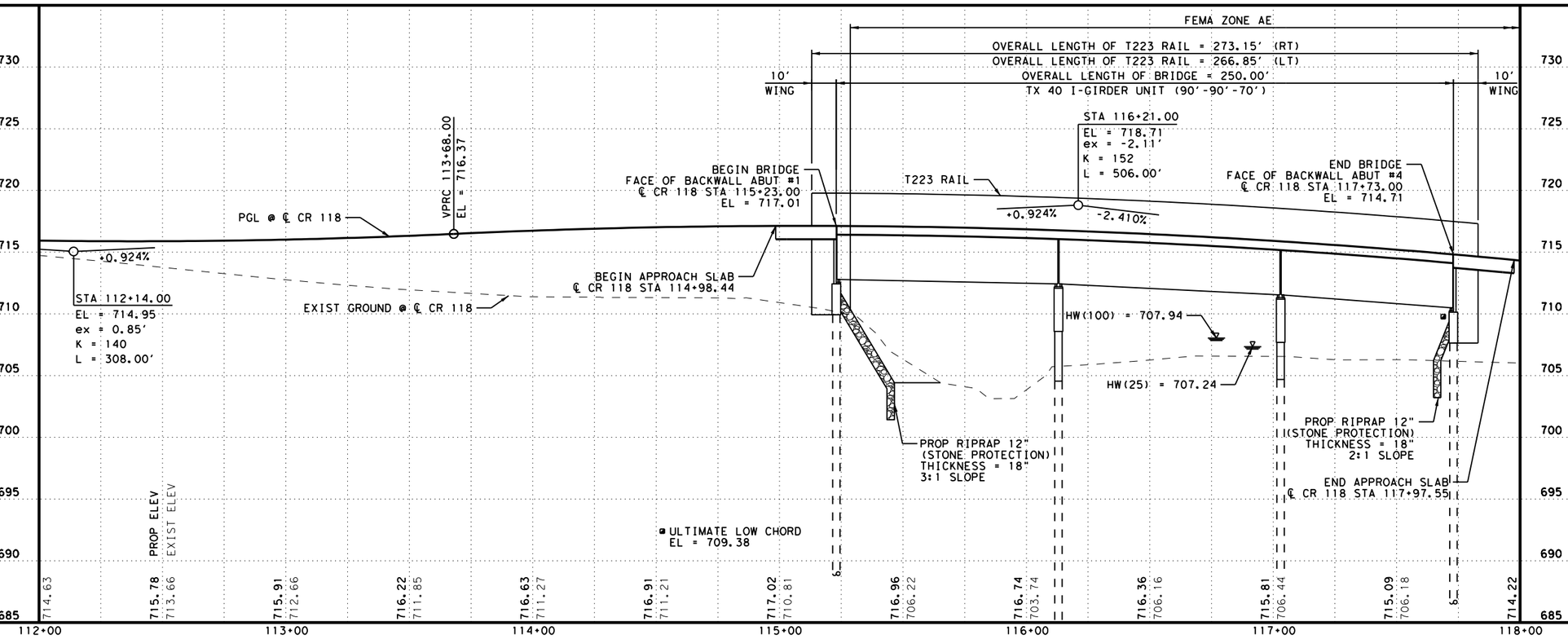
FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_PP02.dgn
PLOTTED: 11/3/2022 12:48:35 PM



NOTES:

1. ALL EXISTING FENCE WITHIN THE 136' WIDE PROPOSED RIGHT OF WAY CORRIDOR TO BE REMOVED, SUBSIDIARY TO ITEM 100 PREPARING ROW.
2. REFER TO EROSION CONTROL LAYOUT AND REMOVAL LAYOUT FOR MORE INFORMATION ON REMOVING THE EXISTING BRIDGE STRUCTURE.

0' 25' 50' HORZ
0' 5' 10' VERT
SCALE



11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

© 2022 Texas Department of Transportation

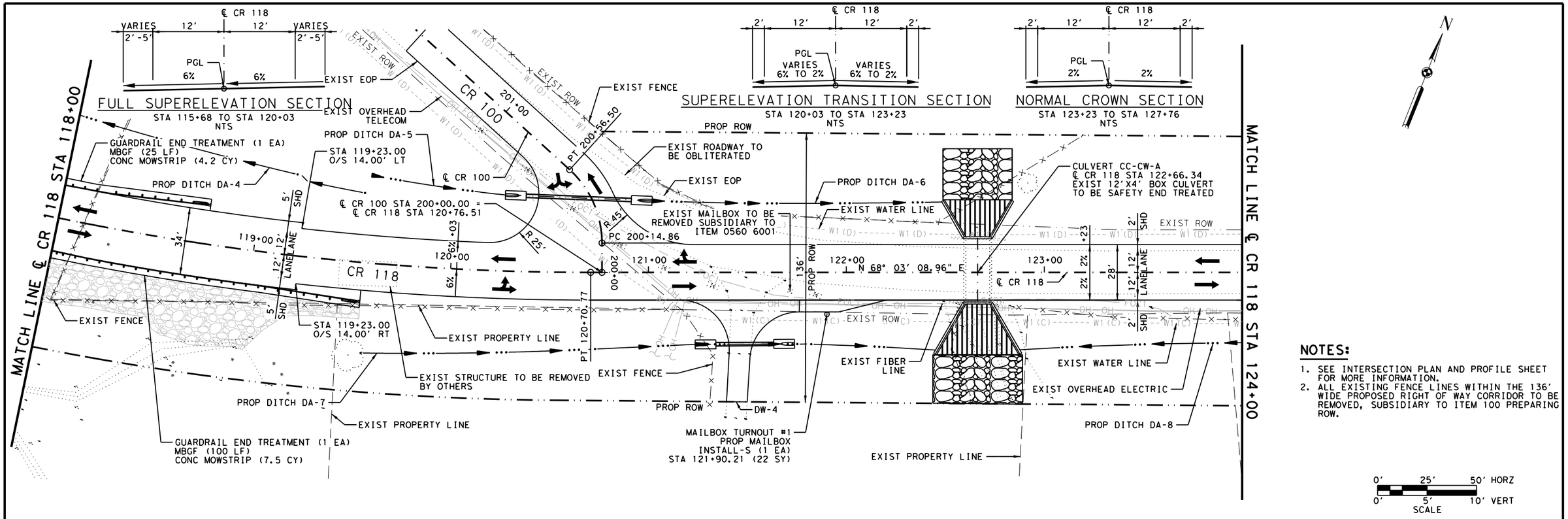
CR 118 AT COTTONWOOD CREEK

PLAN AND PROFILE

SHEET 3 OF 5

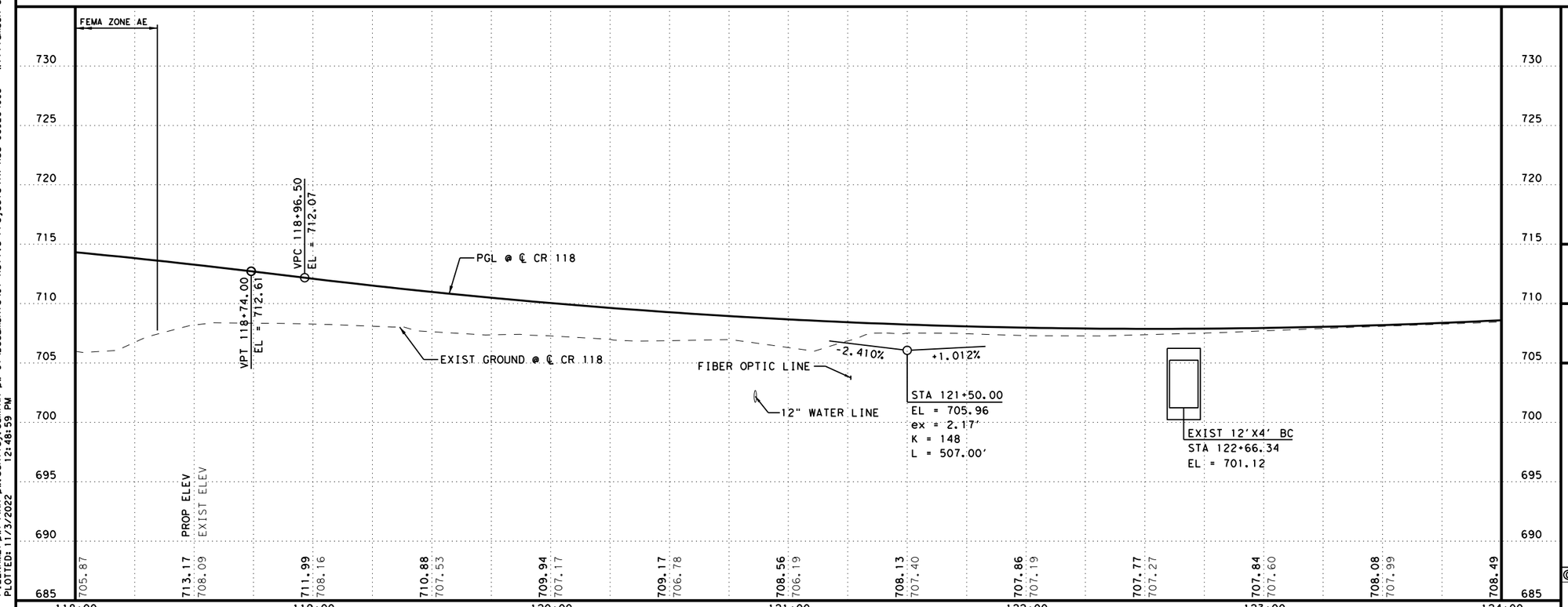
©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		32

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Design Data\4 - Design\Plan Set\3. Roadway\CR118_ROW_PP03.dgn
PLOTTED: 11/3/2022 12:48:47 PM



NOTES:

1. SEE INTERSECTION PLAN AND PROFILE SHEET FOR MORE INFORMATION.
2. ALL EXISTING FENCE LINES WITHIN THE 136' WIDE PROPOSED RIGHT OF WAY CORRIDOR TO BE REMOVED, SUBSIDIARY TO ITEM 100 PREPARING ROW.



11/3/2022

TREY NEAL 106194 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

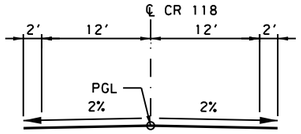
CR 118 AT COTTONWOOD CREEK

PLAN AND PROFILE

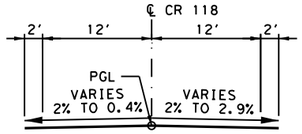
SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		33

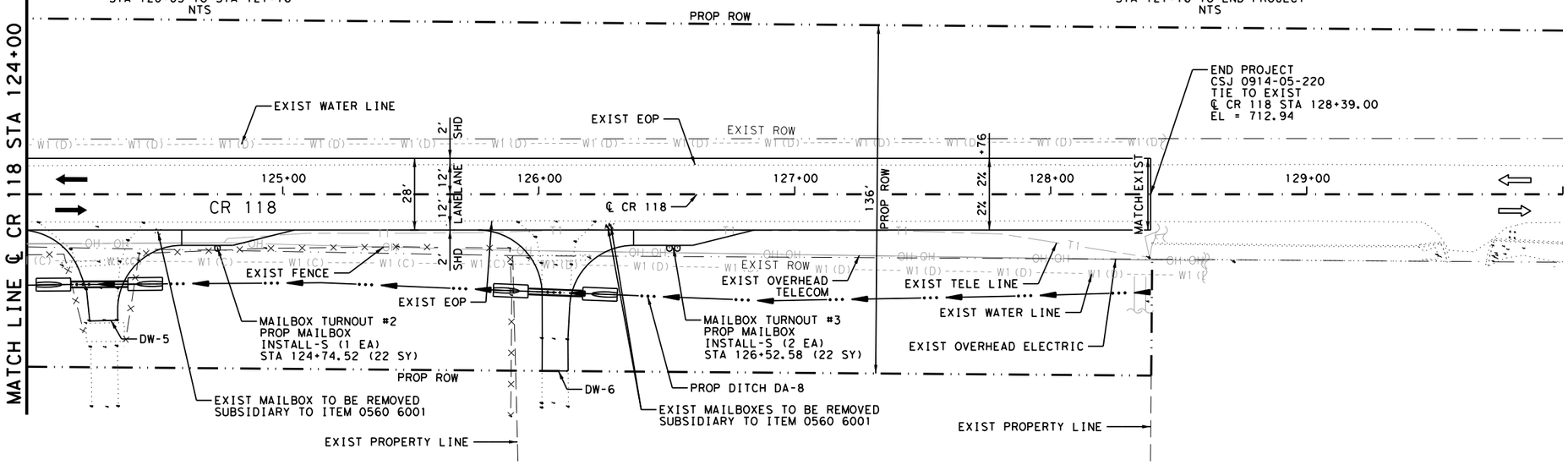
FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_RDW_PP04.dgn
PLOTTED: 11/3/2022 12:48:59 PM



NORMAL CROWN SECTION
STA 120+03 TO STA 127+76
NTS



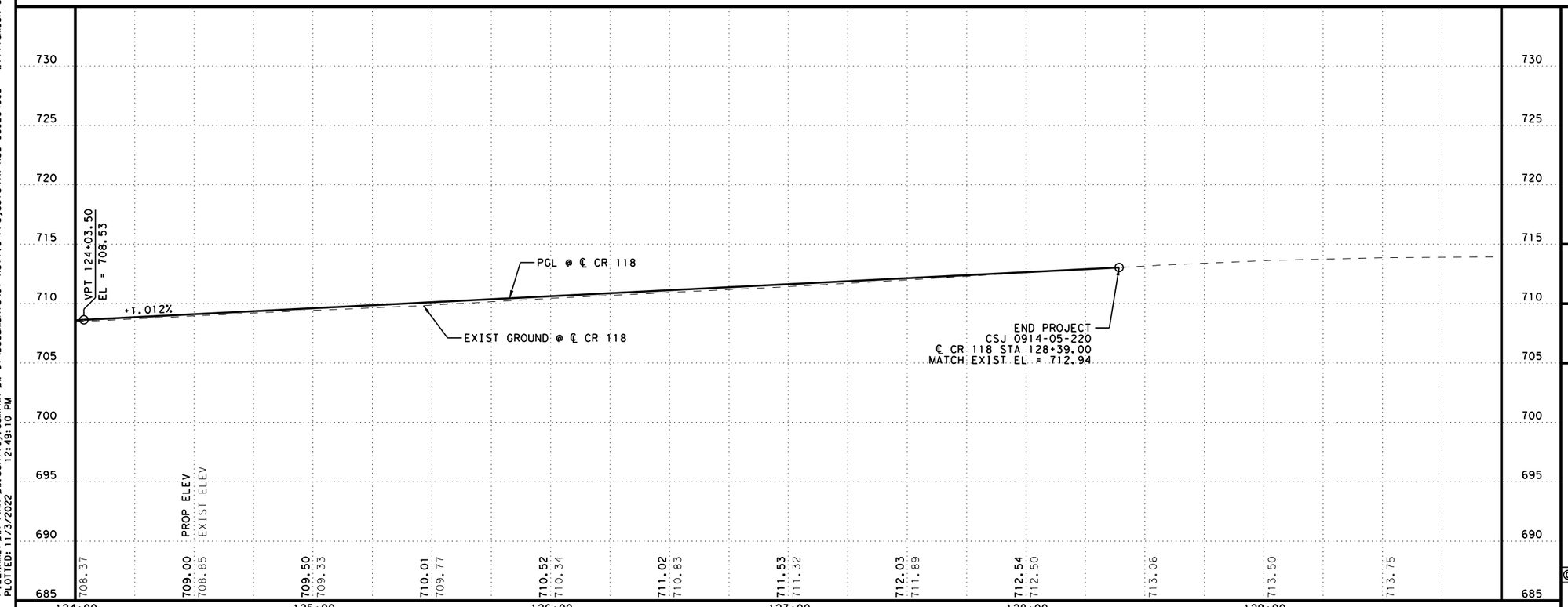
CROSS SLOPE TRANSITION SECTION
STA 127+76 TO END PROJECT
NTS



NOTES:

1. ALL EXISTING FENCE LINES WITHIN THE 136' WIDE PROPOSED RIGHT OF WAY CORRIDOR TO BE REMOVED, SUBSIDIARY TO ITEM 100 PREPARING ROW.

0' 25' 50' HORZ
0' 5' 10' VERT
SCALE



11/3/2022

TREY NEAL
106194
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

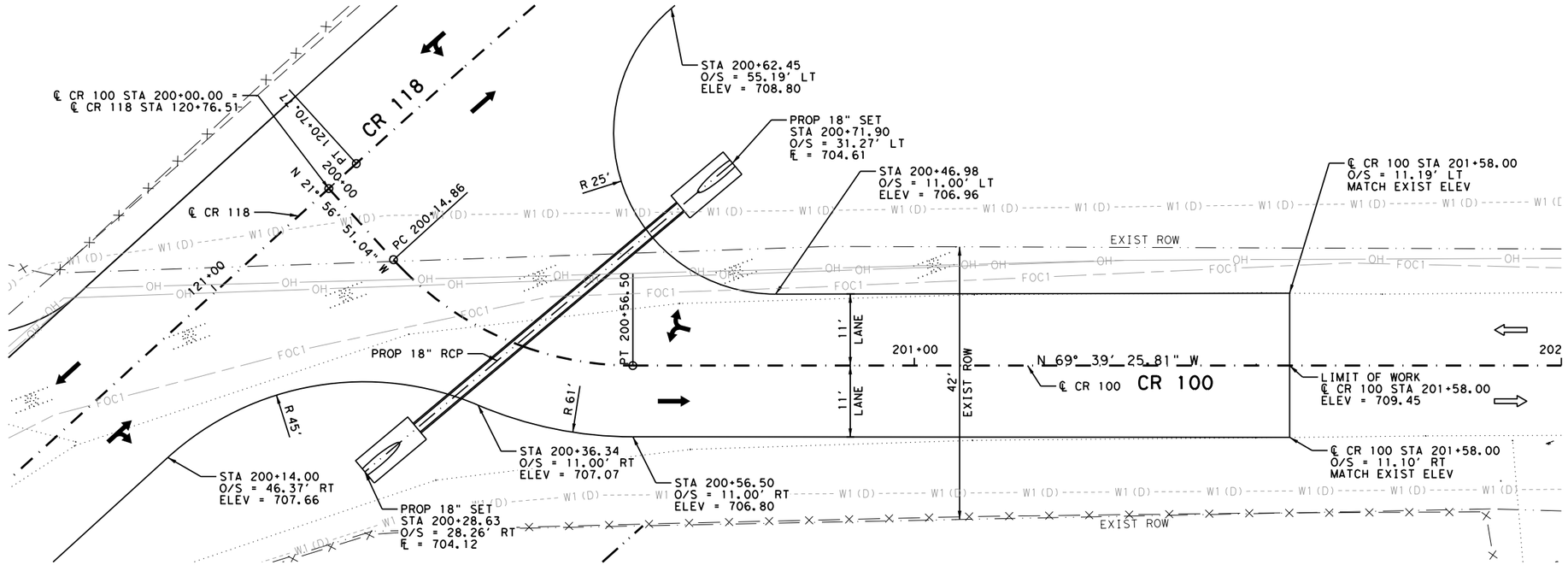
CR 118 AT COTTONWOOD CREEK

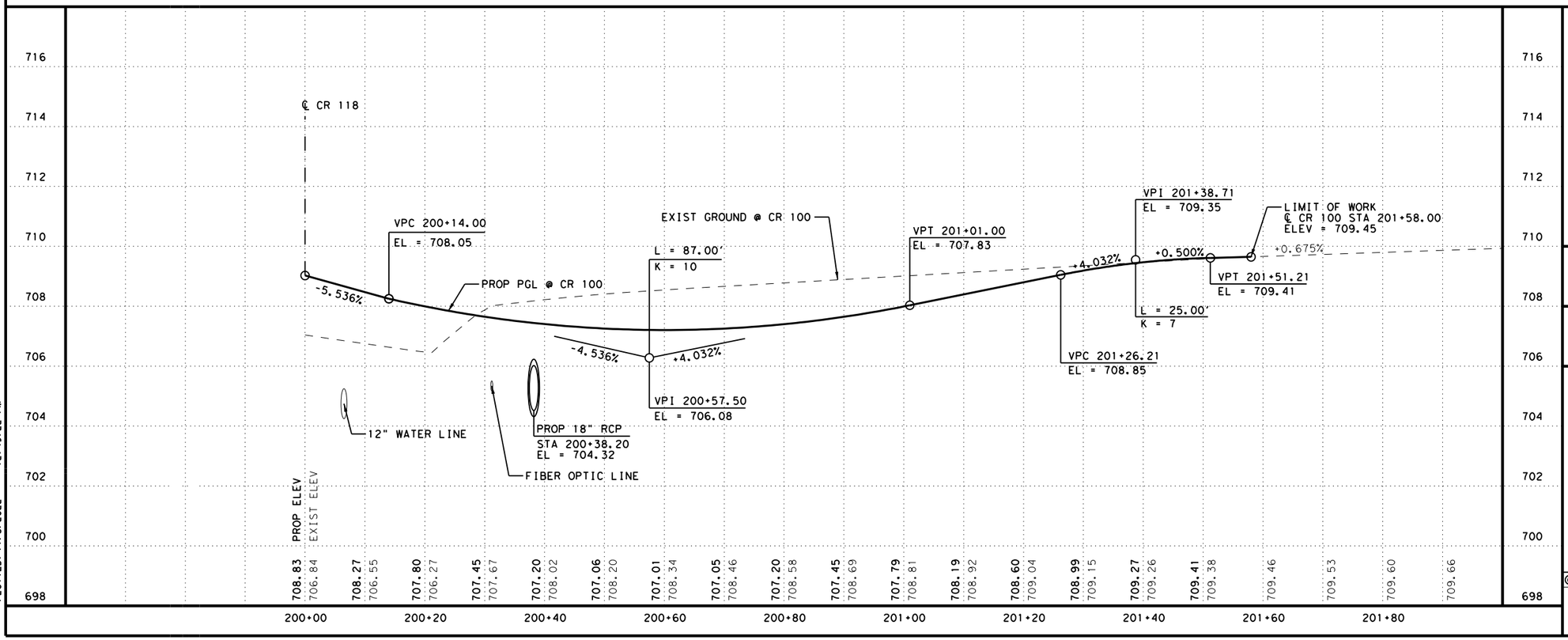
PLAN AND PROFILE

SHEET 5 OF 5

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		34

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\3. Roadway\CR118_RDW_PP05.dgn
PLOTTED: 11/3/2022 12:49:10 PM





11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

© 2022 Texas Department of Transportation

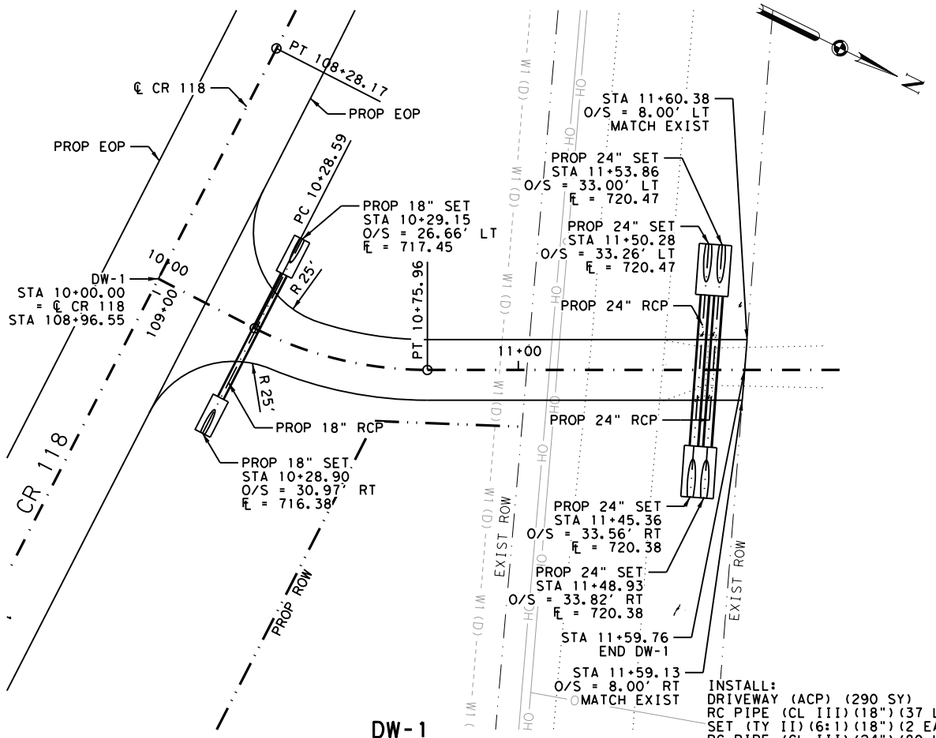
CR 118 AT COTTONWOOD CREEK

INTERSECTION PLAN AND PROFILE

SHEET 1 OF 1

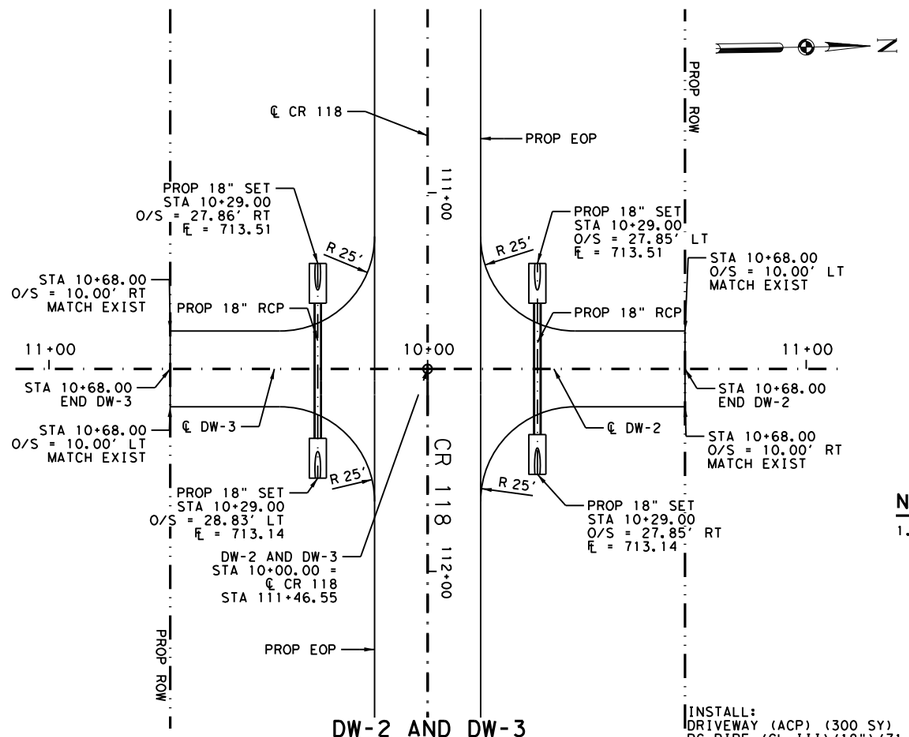
©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		35

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_INT01.dgn
PLOTTED: 11/3/2022 12:49:22 PM



INSTALL:
DRIVEWAY (ACP) (290 SY)
RC PIPE (CL III) (18") (37 LF)
SET (TY II) (6:1) (18") (2 EA)
RC PIPE (CL III) (24") (80 LF)
SET (TY II) (6:1) (24") (4 EA)

DW-1
℄ CR 118 STA 108+97



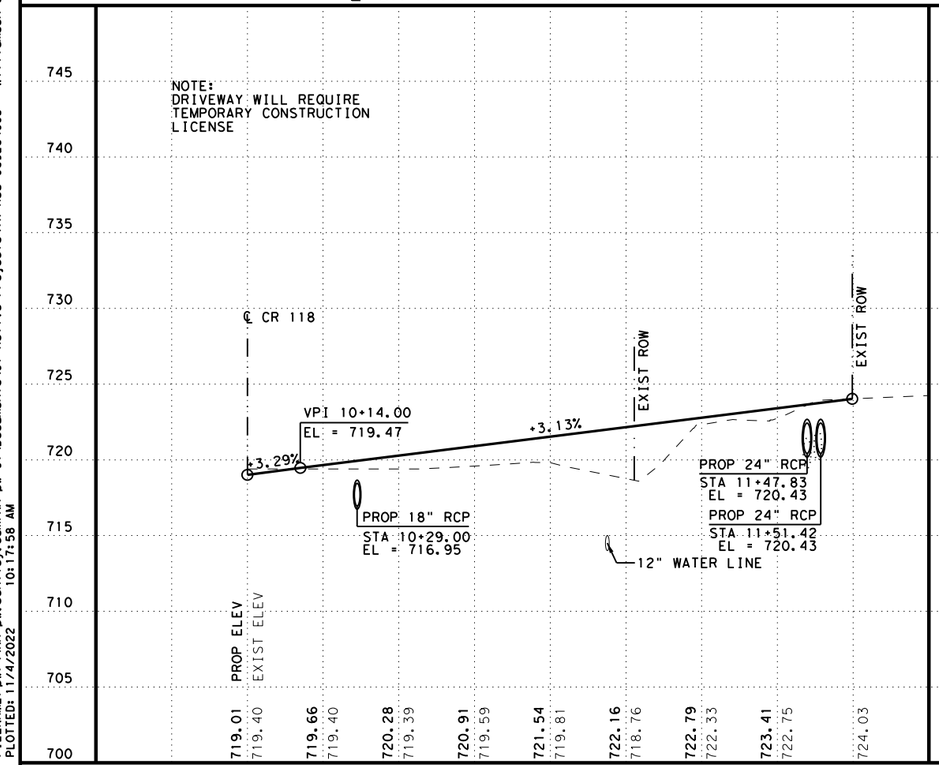
INSTALL:
DRIVEWAY (ACP) (300 SY)
RC PIPE (CL III) (18") (71 LF)
SET (TY II) (6:1) (18") (4 EA)

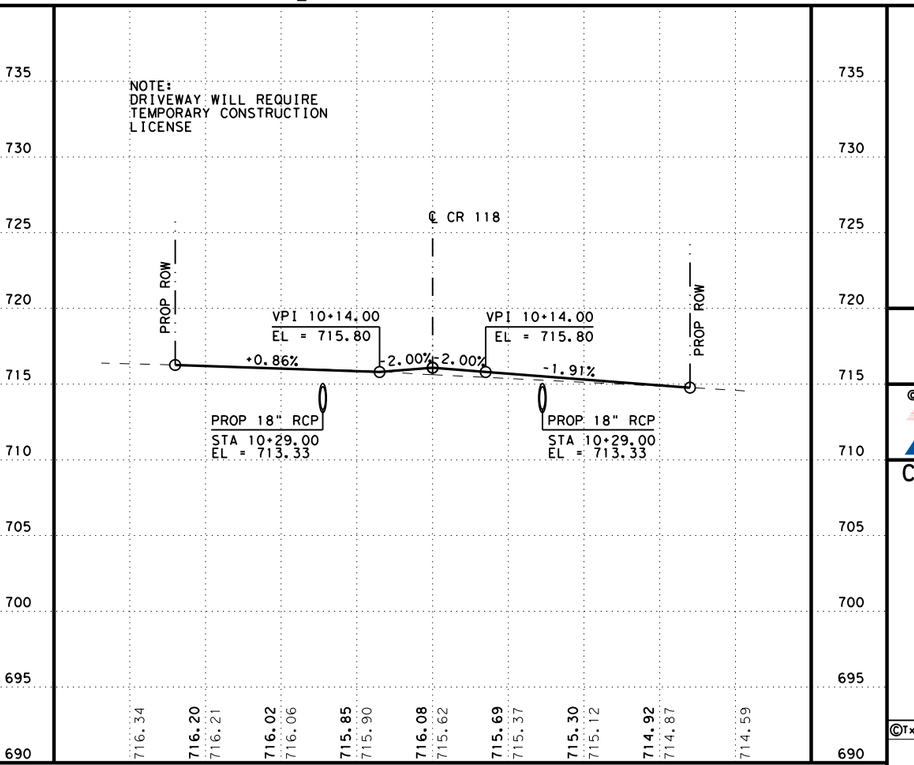
DW-2 AND DW-3
℄ CR 118 STA 111+46

NOTES:

1. REFER TO REMOVAL SHEETS FOR PIPE REMOVAL INFORMATION.

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





11/4/2022

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

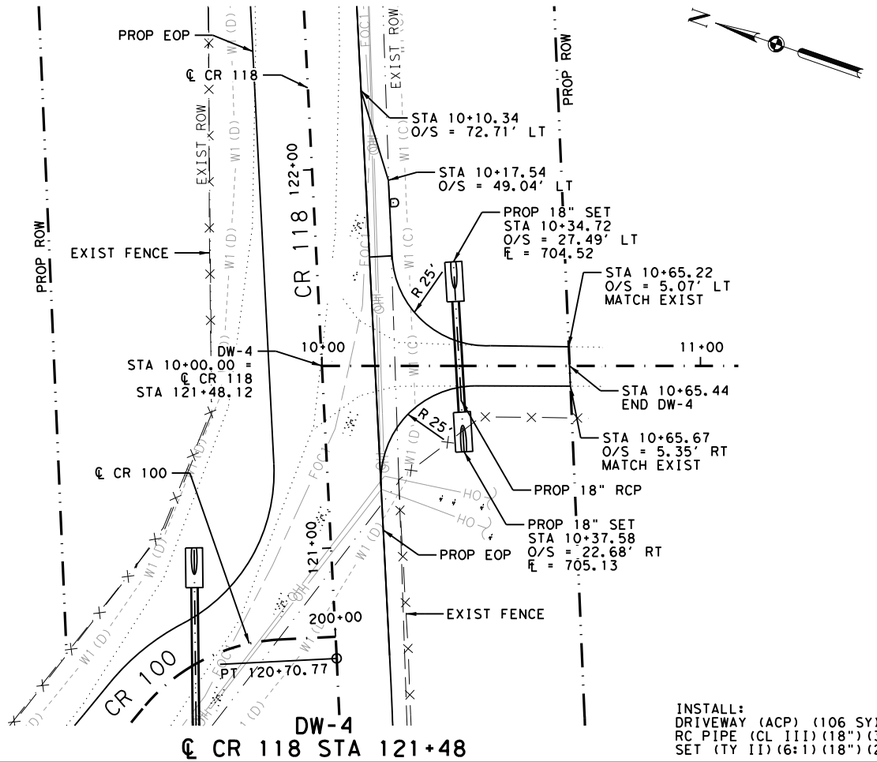
DRIVEWAY
PLAN AND PROFILE

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		36

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_DRW01.dgn
PLOTTED: 11/4/2022 10:17:58 AM

SSEE DRIVEWAY PLAN AND PROFILE SHEET 1 OF 3
FOR MORE INFORMATION ON DRIVEWAY 3



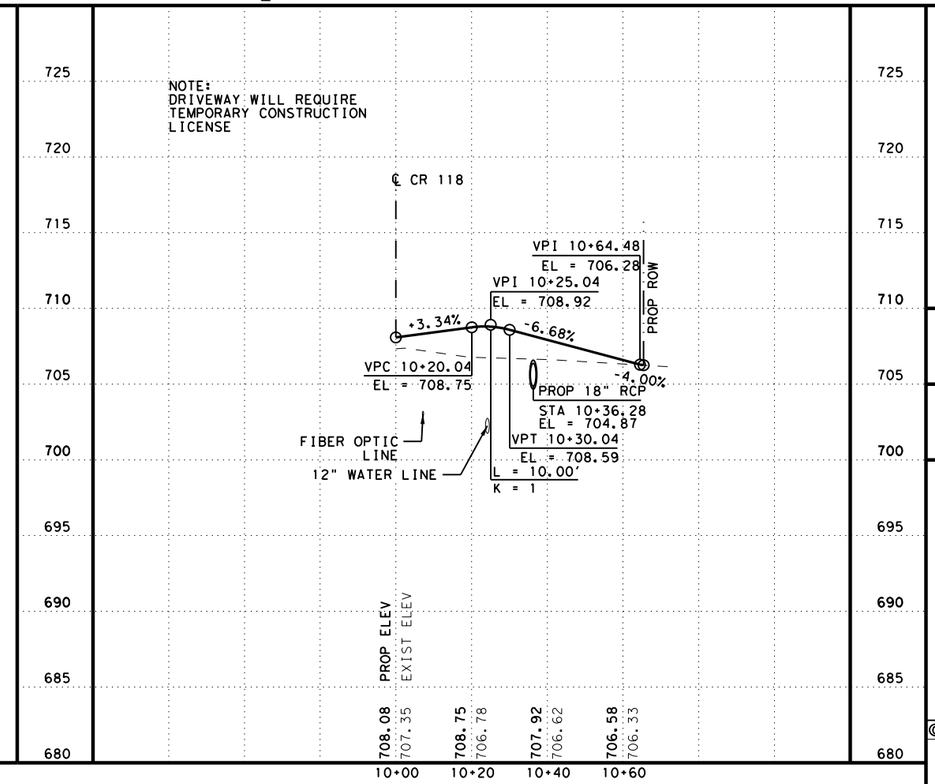
DW-4
℄ CR 118 STA 121+48

INSTALL:
DRIVEWAY (ACP) (106 SY)
RC PIPE (CL III)(18")(30 LF)
SET (TY II)(6:1)(18")(2 EA)

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

SSEE DRIVEWAY PLAN AND PROFILE SHEET 1 OF 3
FOR MORE INFORMATION ON DRIVEWAY 3

NOTE:
DRIVEWAY WILL REQUIRE
TEMPORARY CONSTRUCTION
LICENSE



11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

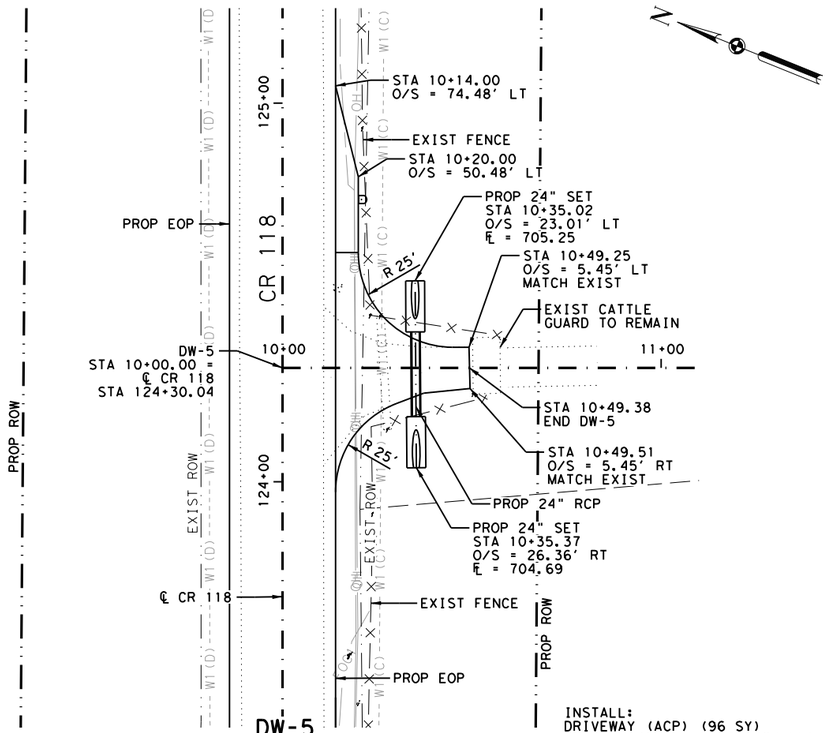
CR 118 AT COTTONWOOD CREEK

DRIVEWAY
PLAN AND PROFILE

SHEET 2 OF 3

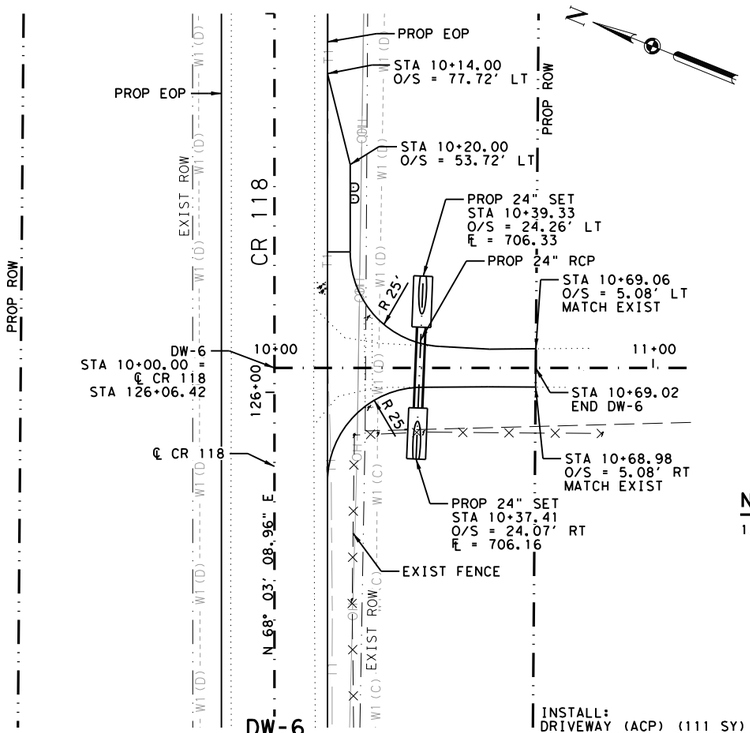
CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		37

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_DRW02.dgn
PLOTTED: 11/3/2022 12:49:46 PM



DW-5
℄ CR 118 STA 124+30

INSTALL:
DRIVEWAY (ACP) (96 SY)
RC PIPE (CL III) (24") (23 LF)
SET (TY II) (6:1) (24") (2 EA)



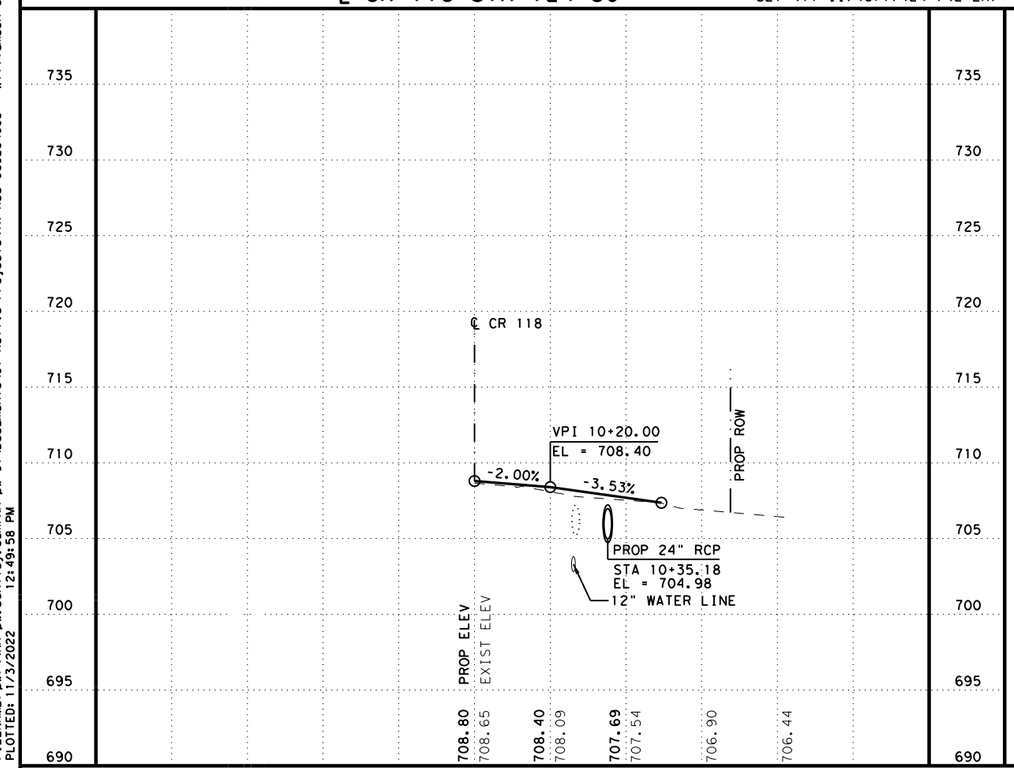
DW-6
℄ CR 118 STA 126+06

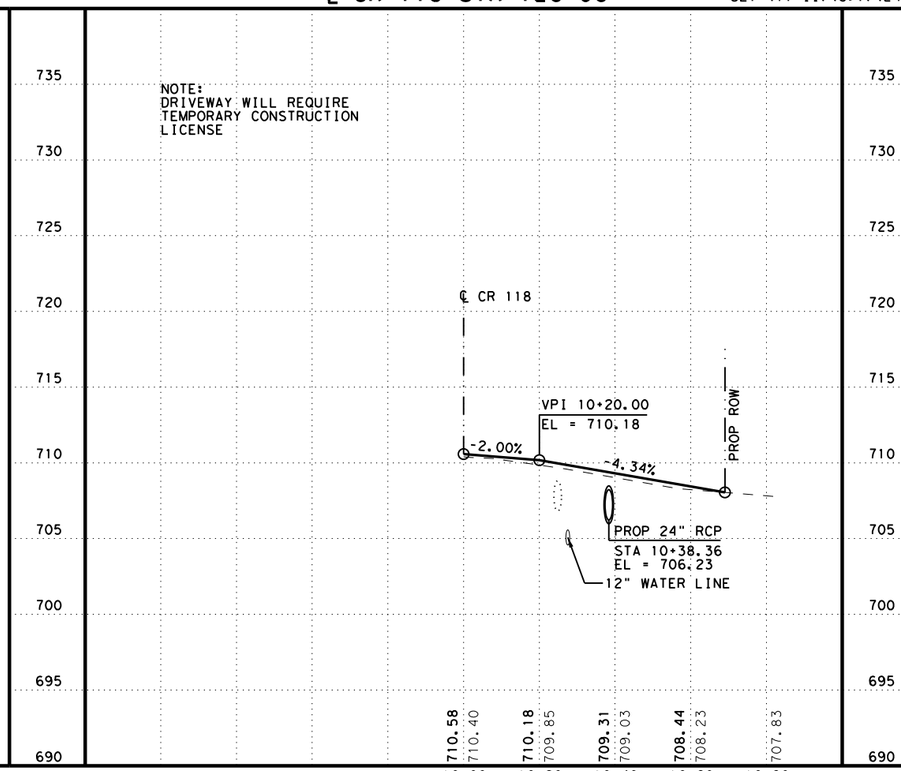
INSTALL:
DRIVEWAY (ACP) (111 SY)
RC PIPE (CL III) (24") (22 LF)
SET (TY II) (6:1) (24") (2 EA)

NOTES:

1. SEE REMOVAL SHEETS FOR PIPE REMOVAL INFORMATION.

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





11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

© 2022 Texas Department of Transportation

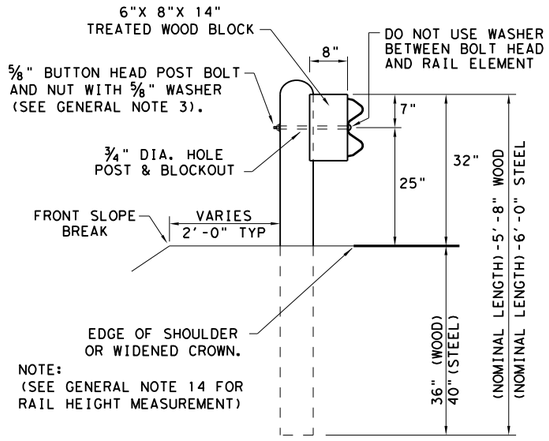
CR 118 AT COTTONWOOD CREEK

DRIVEWAY PLAN AND PROFILE

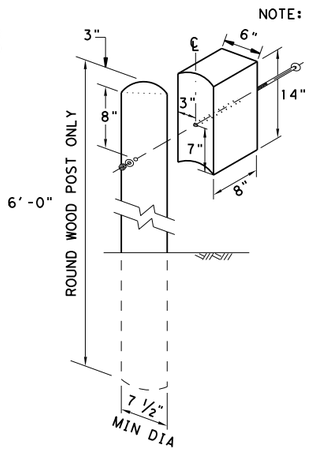
SHEET 3 OF 3

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		38

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_DRW03.dgn
PLOTTED: 11/3/2022 12:49:58 PM

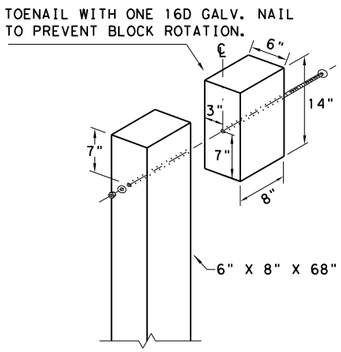


TYPICAL POST PLACEMENT

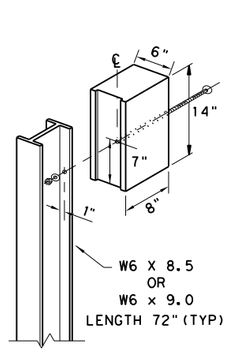


WOOD BLOCK TO ROUND WOOD POST

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

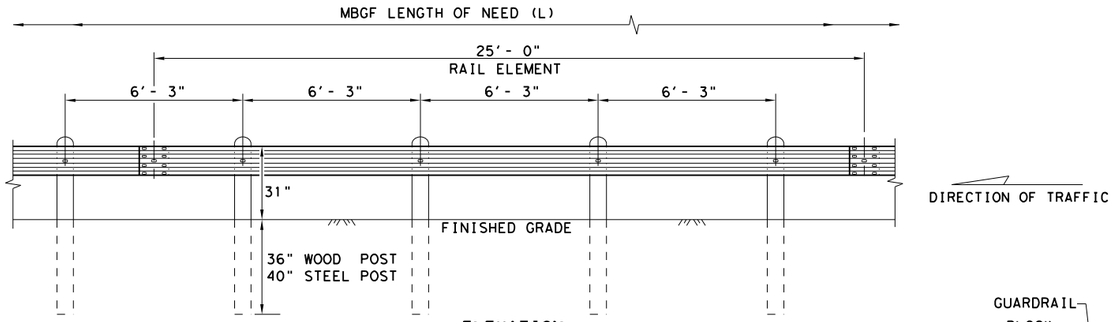


WOOD BLOCK TO RECTANGULAR WOOD POST



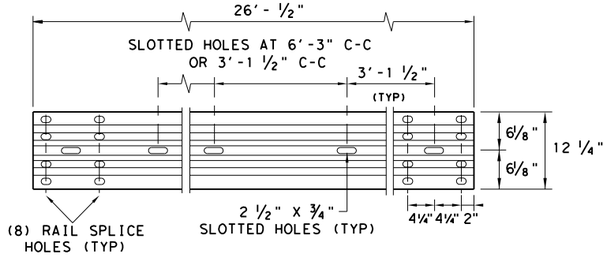
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



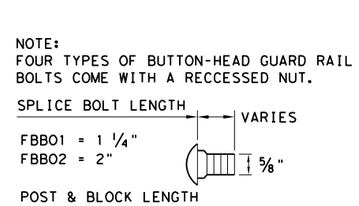
ELEVATION
MID-SPAN RAIL SPLICE

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



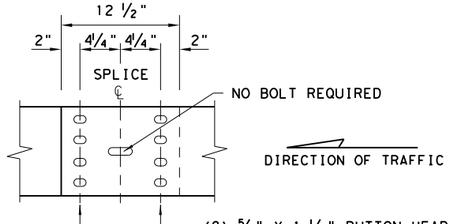
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



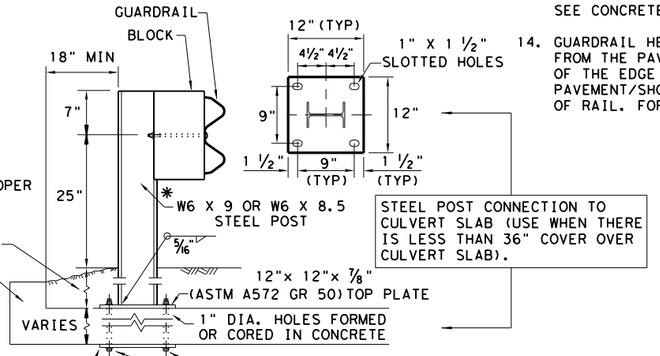
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

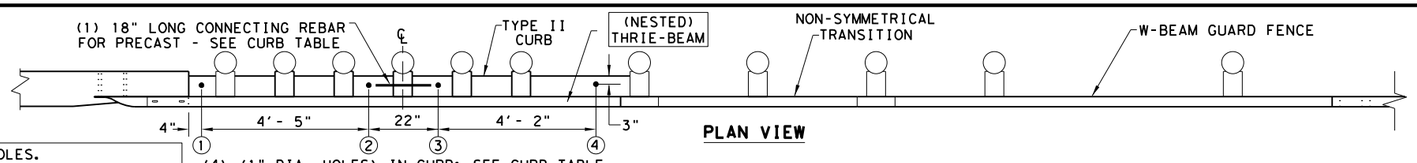
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		39

DATE: 11/3/2022
FILE: c:\pw\kml\d0221691\gf3119.dgn



PLAN VIEW

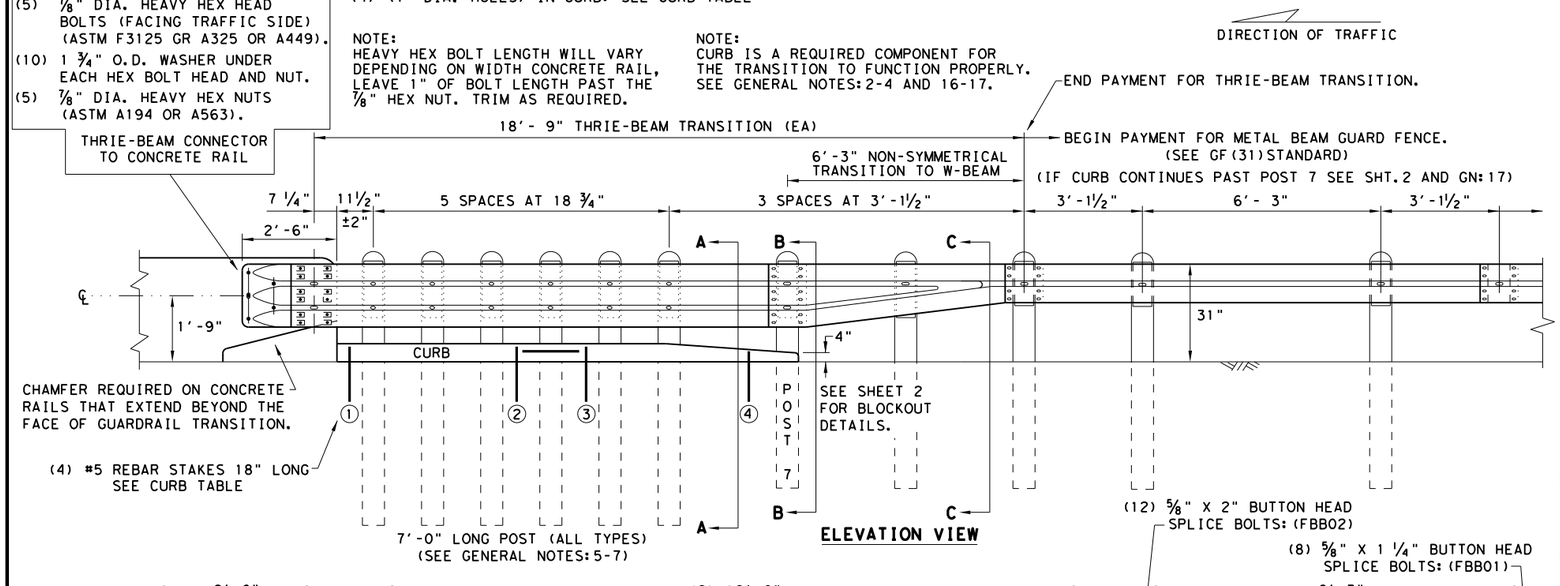
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

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

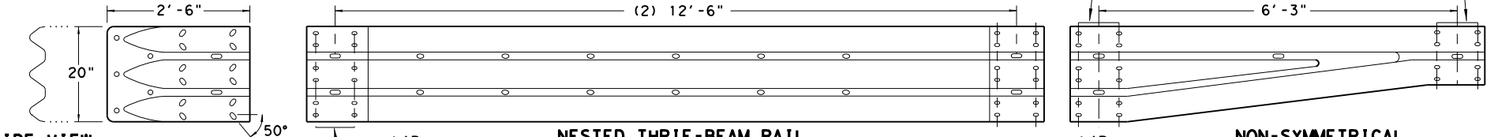
DIRECTION OF TRAFFIC



ELEVATION VIEW

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS: (FBB02)

(8) ⅝" X 1 ¼" BUTTON HEAD SPLICE BOLTS: (FBB01)



SIDE-VIEW

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

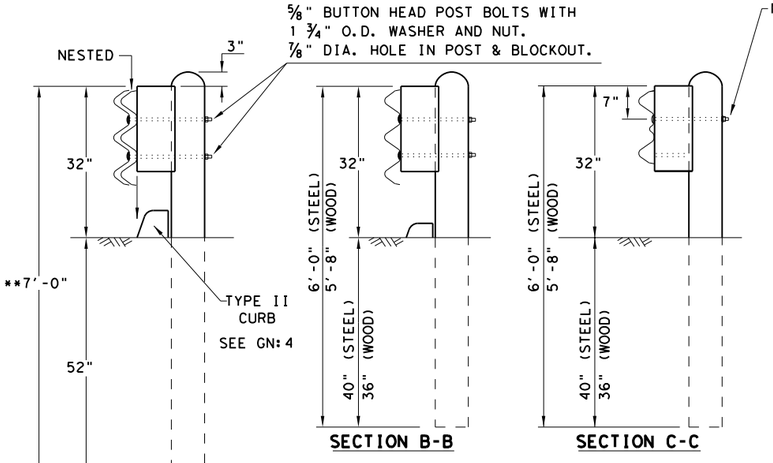
NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

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

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

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



SECTION A-A

SECTION B-B

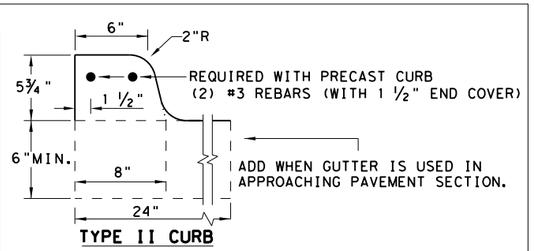
SECTION C-C

TRANSITION SECTIONS

NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

GENERAL NOTES

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

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

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

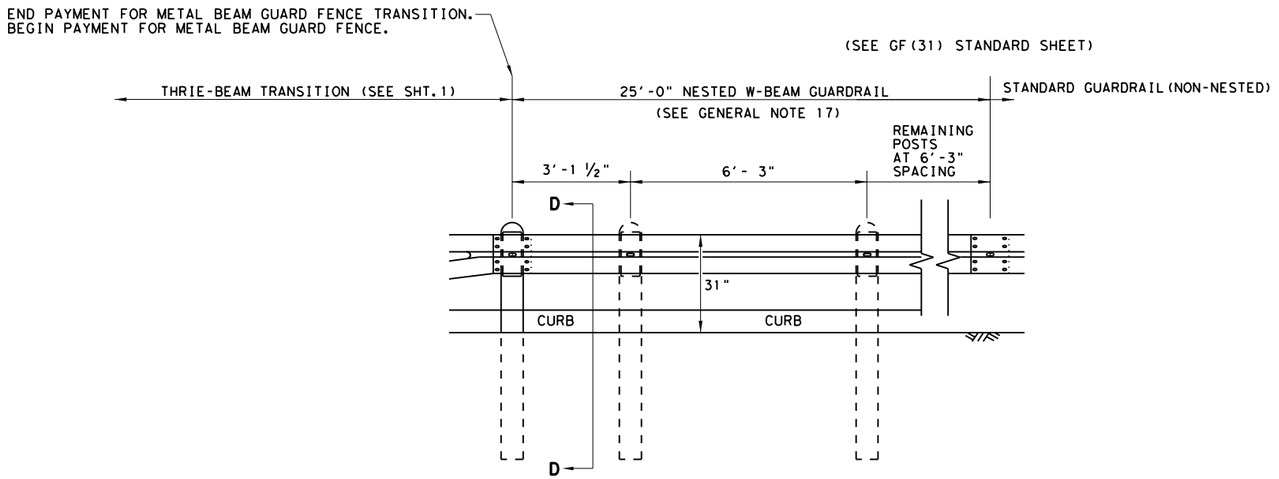
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0914	05	204, ETC.	CR 118	
	DIST	COUNTY		SHEET NO.	
	AUS	WILLIAMSON		40	

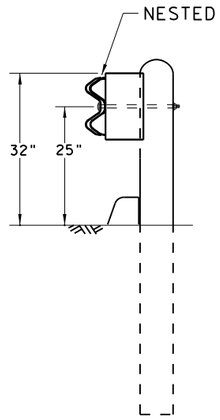
DATE: 11/3/2022
FILE: c:\pw\kn1\d0221691\gf31trt1320 (1).dgn

DATE: 11/3/2022
FILE: c:\pw\kml\d0221691\gf31tr11320 (1).dgn

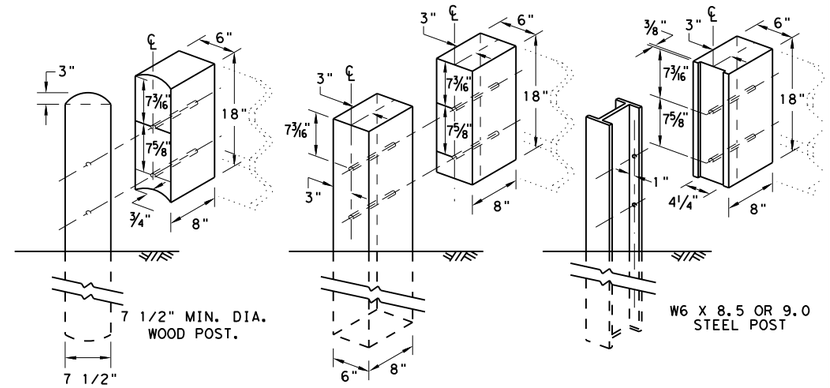
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

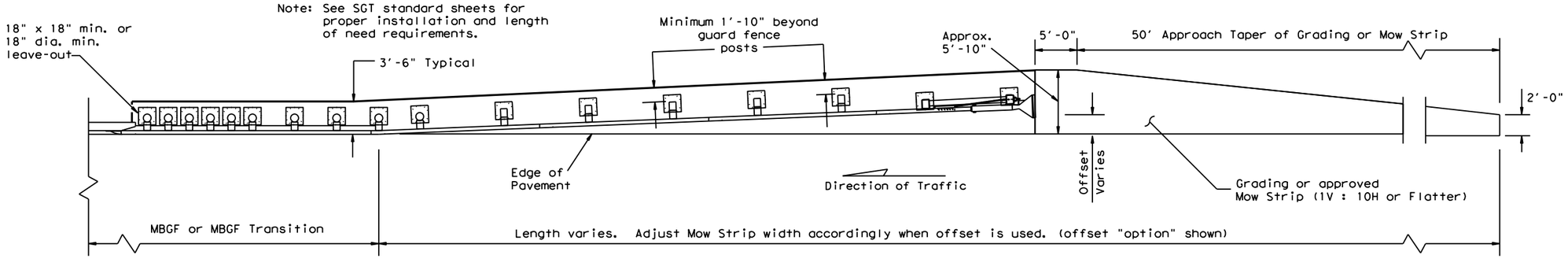
Texas Department of Transportation — Design Division Standard

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

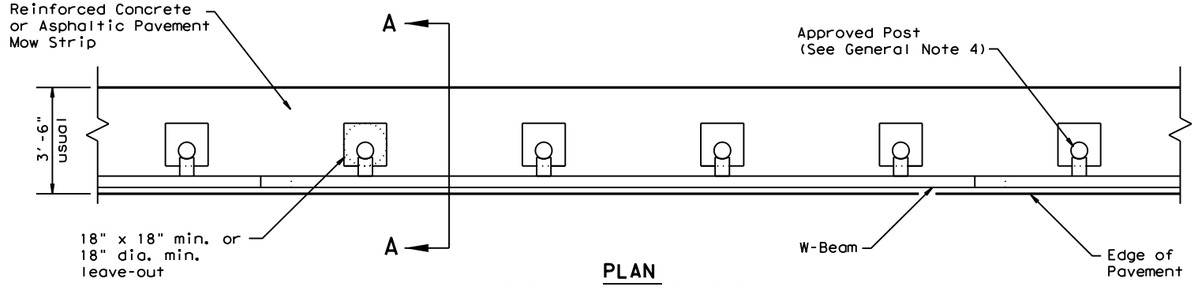
GF(31)TR TL3-20

FILE: gf31tr11320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		41

DATE: 11/3/2022
FILE: c:\pw\kni\d0221691\gf31ms19.dgn

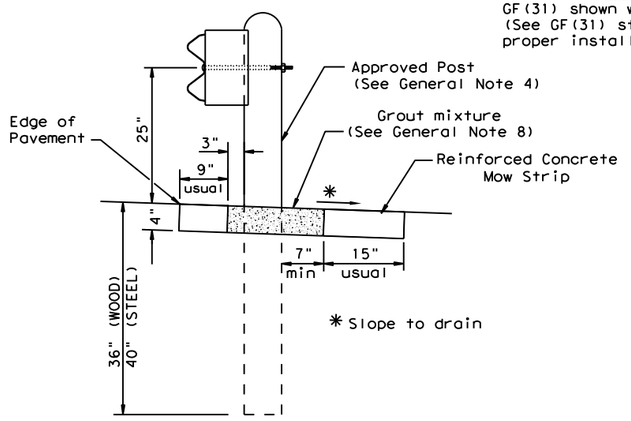


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



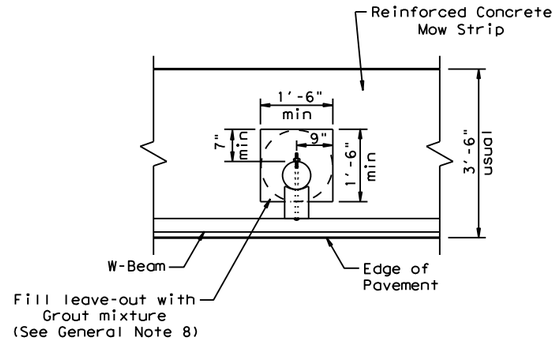
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

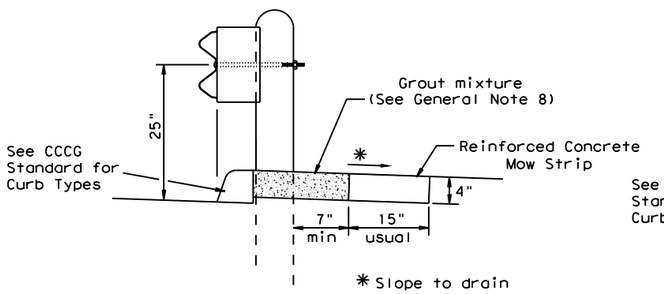
Note: Site Condition(s)

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

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

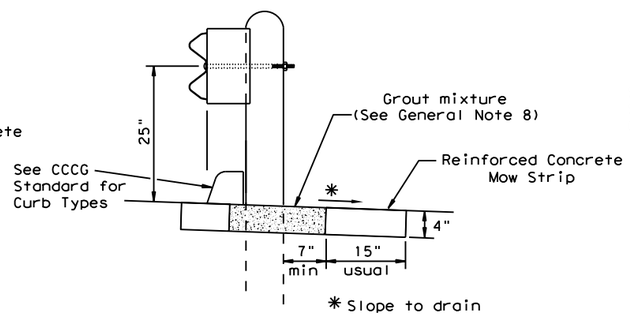
GENERAL NOTES

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



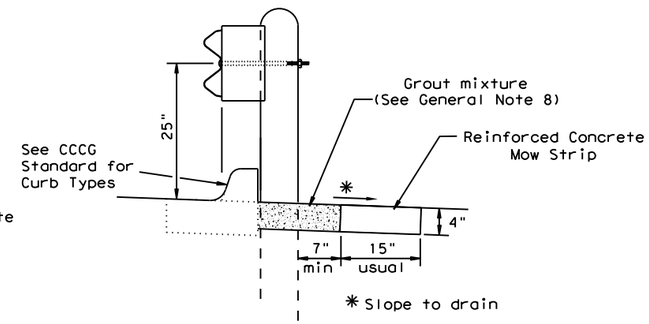
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

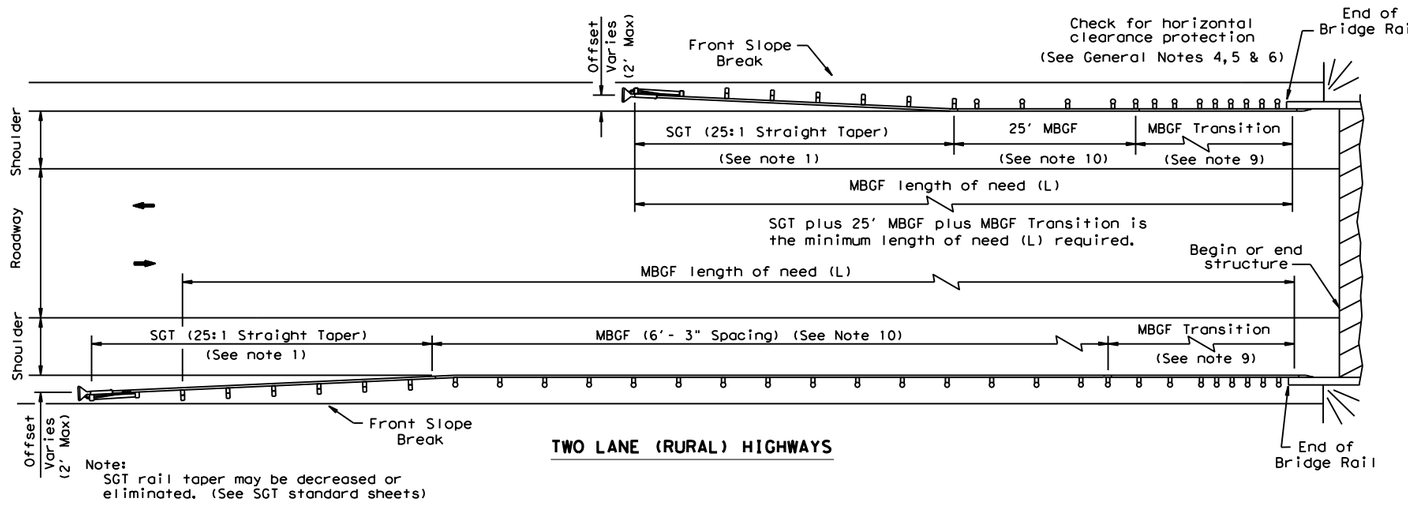
Texas Department of Transportation

Design Division Standard

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

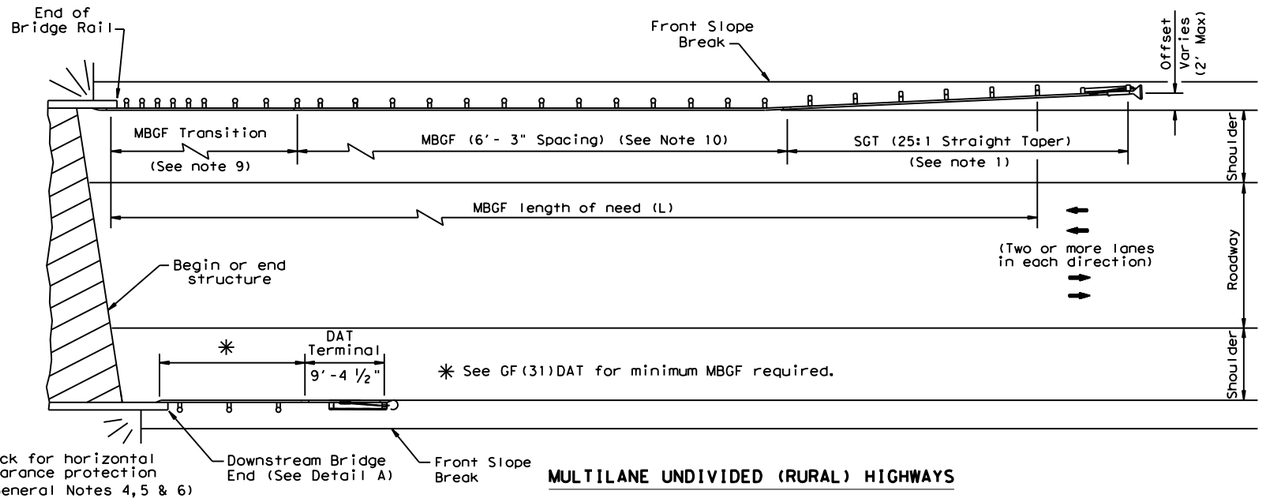
GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		42

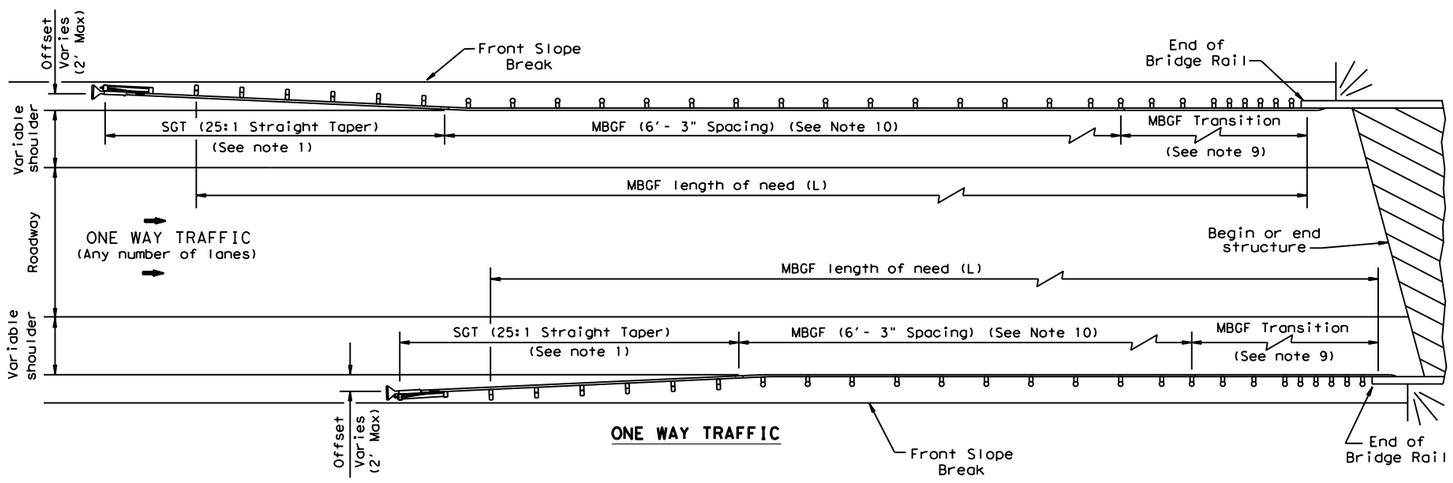


TWO LANE (RURAL) HIGHWAYS

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



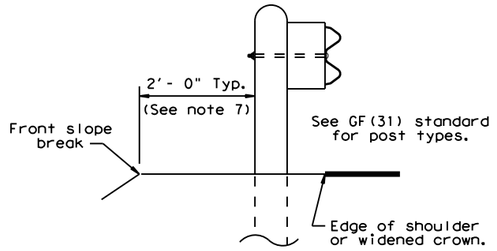
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



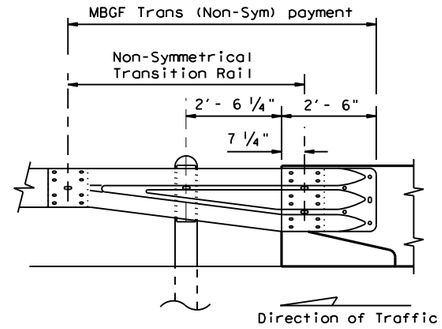
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation — Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		43

DATE: 11/3/2022 12:50:39 PM
FILE: c:\pw\khl\d0221691\bed14.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

PLAN VIEW

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE:B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

POST 40" DEPTH (TYP 1-8)

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

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

6'-1⅜"

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" X 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

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

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		44

DATE: 11/3/2022
FILE: c:\pwkn1\d0221691\sgt10s3116.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

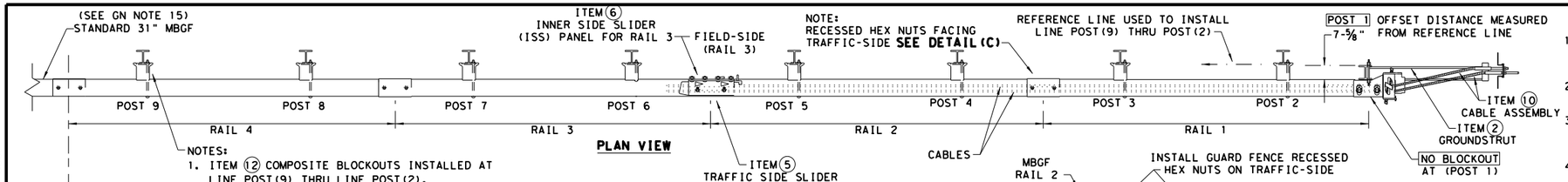
ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

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

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

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



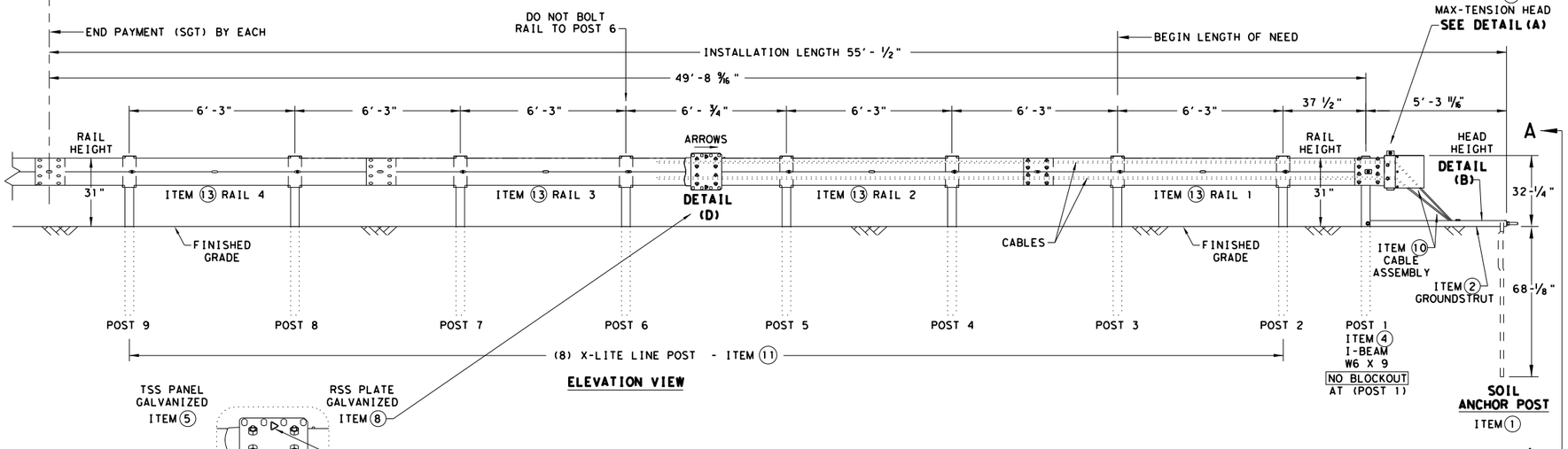
NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

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

DETAIL (C)

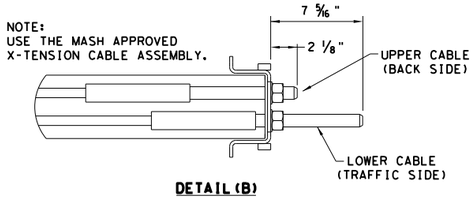
TRAFFIC FLOW



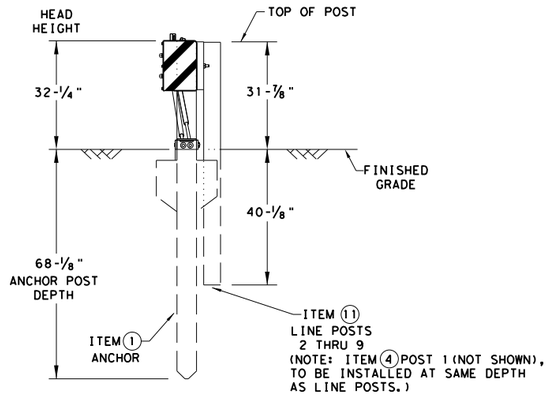
ELEVATION VIEW

TSS PANEL AND RSS PLATE

DETAIL (D)

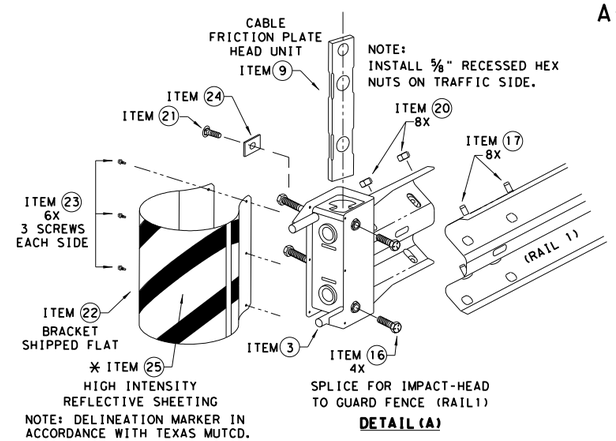


DETAIL (B)



SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

SECTION VIEW A-A



DETAIL (A)

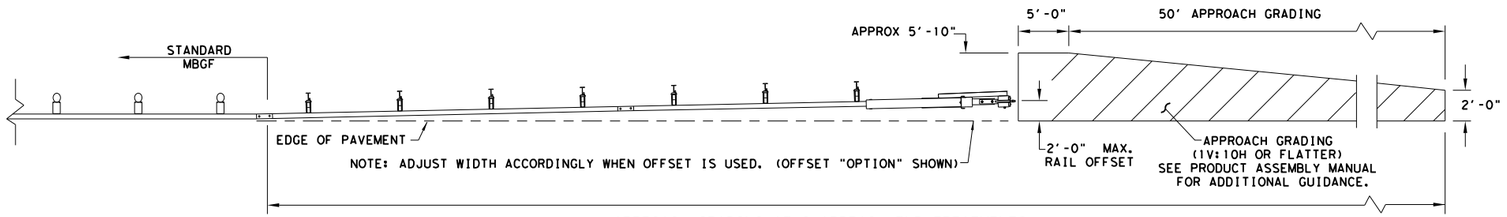
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

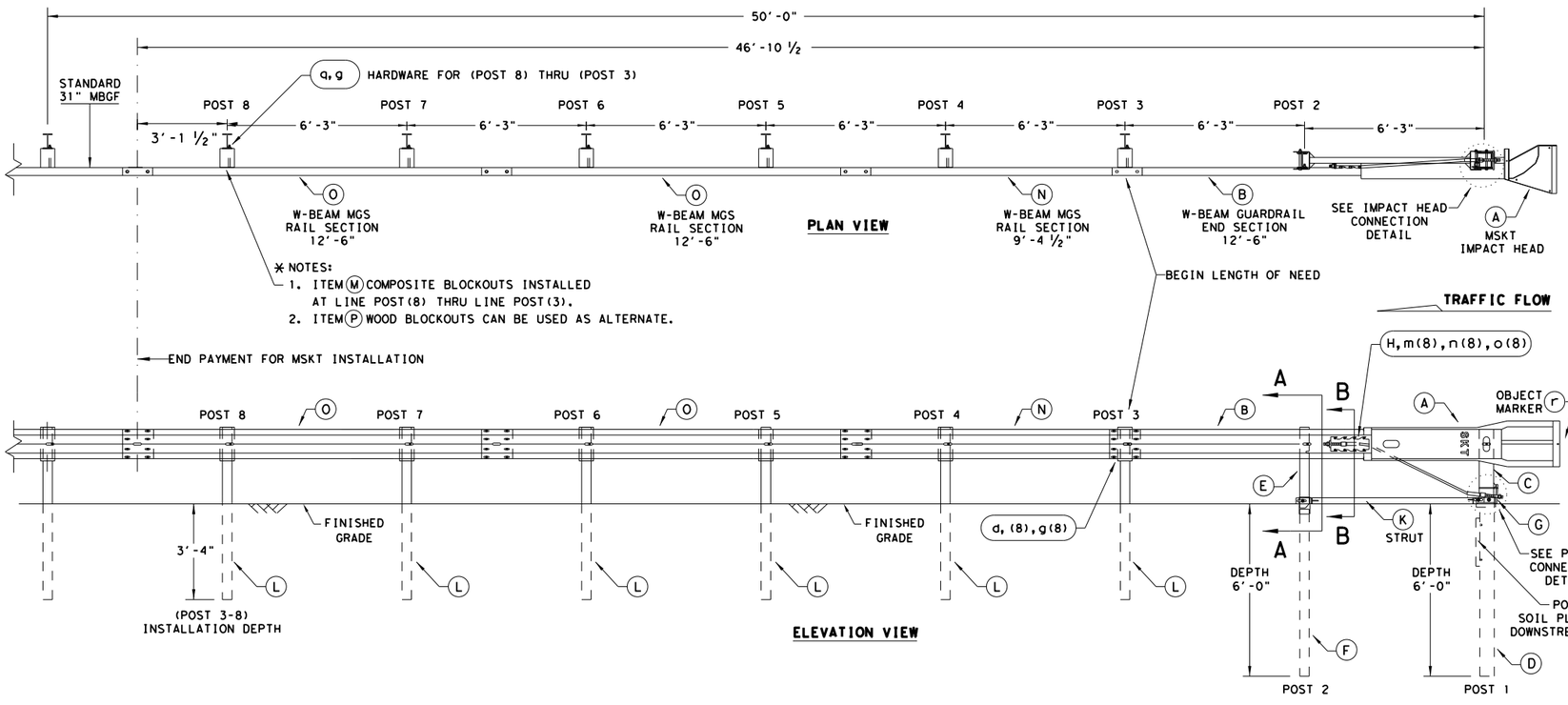
Texas Department of Transportation

Design Division Standard

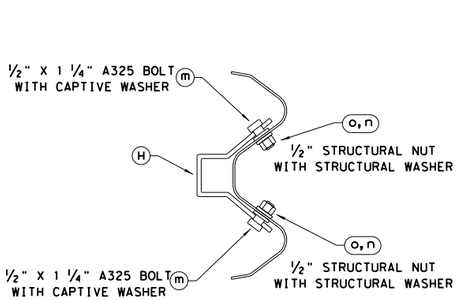
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		45

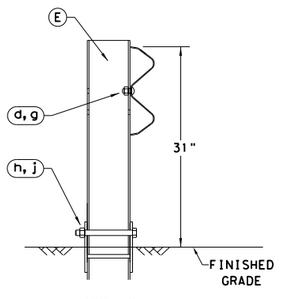
DATE: 11/3/2022
FILE: c:\pw\kn1\d0221691\sgt11s3118.dgn



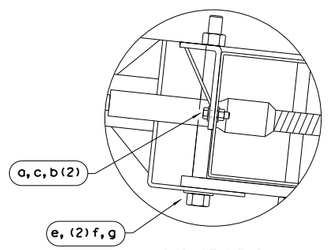
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



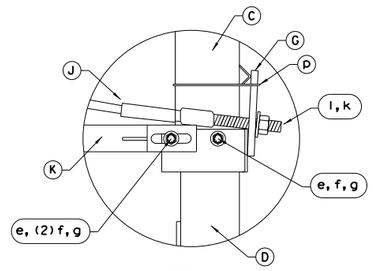
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

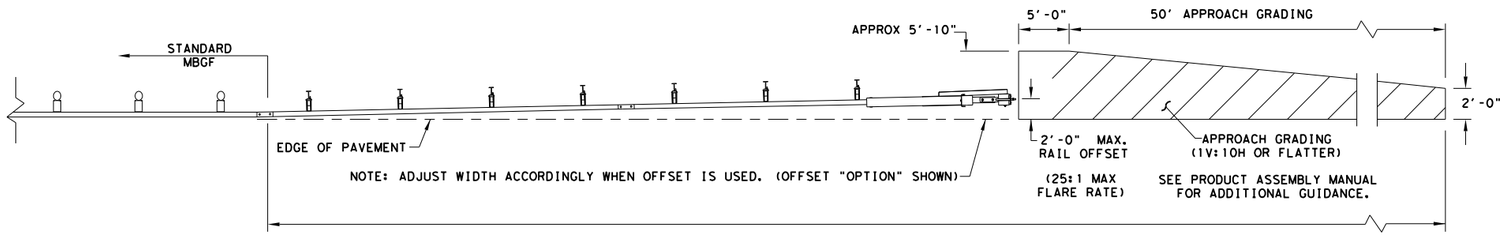
GENERAL NOTES

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

SEE NOTES: *

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

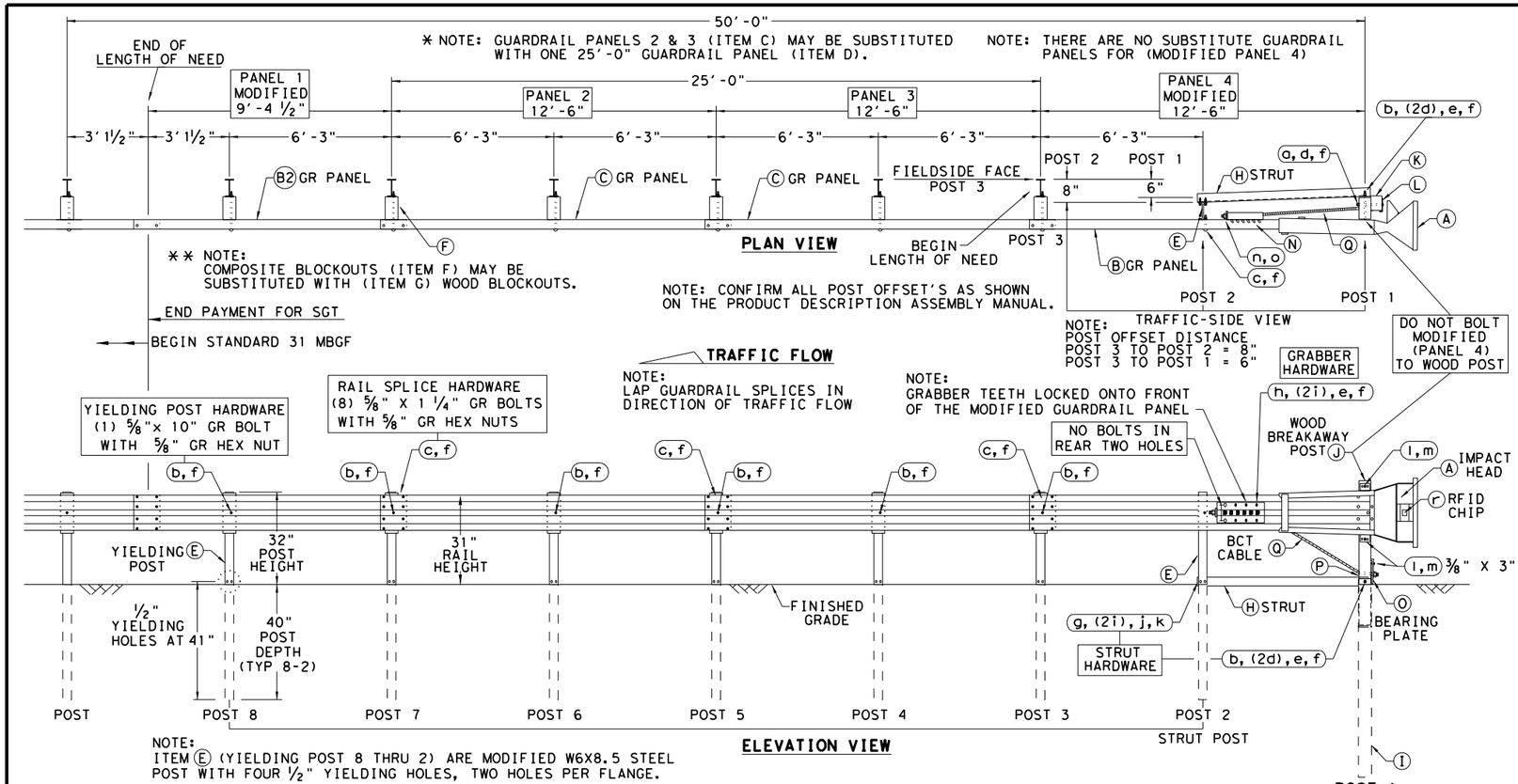
SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0914	05	204, ETC.	CR 118	
	DIST	COUNTY		SHEET NO.	
	AUS	WILLIAMSON		46	

DATE: 11/3/2022
FILE: c:\pw\kni\d0221691\sgt12s3118.dgn

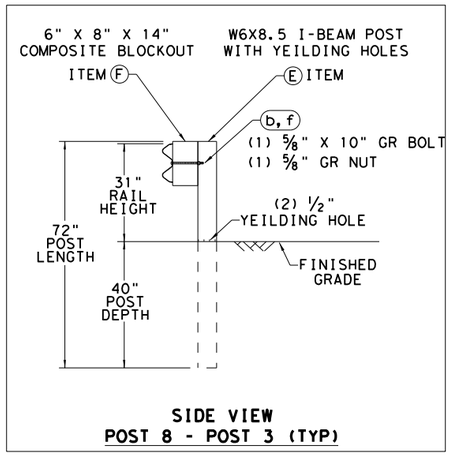


GENERAL NOTES

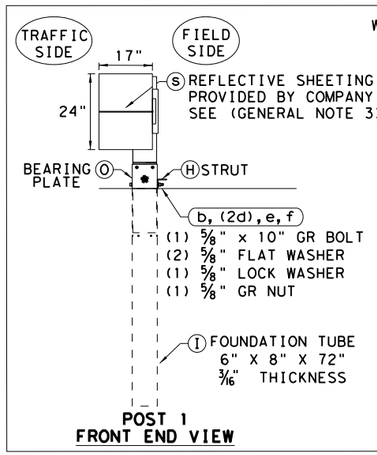
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

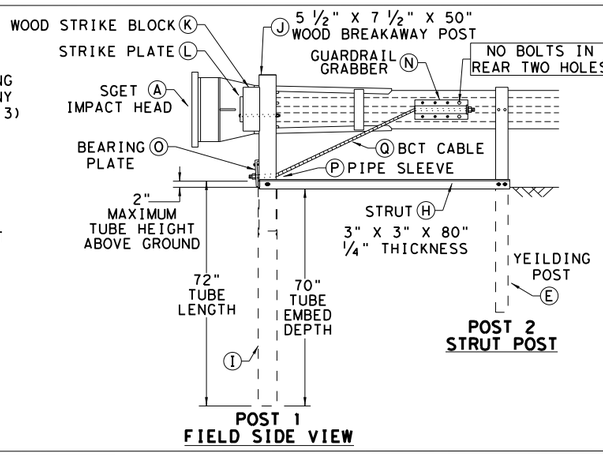
ALTERNATIVE ITEMS * D
NOTE: ** G
SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

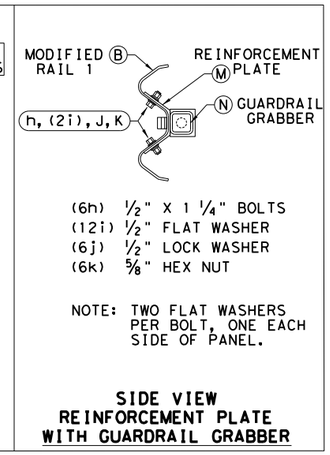


POST 1
FRONT END VIEW

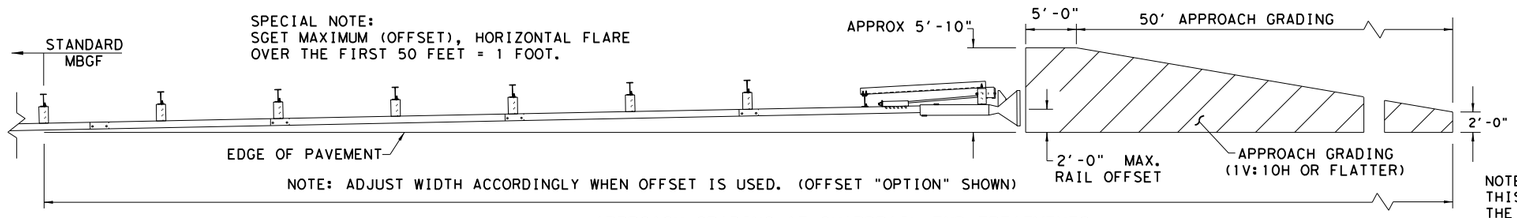


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

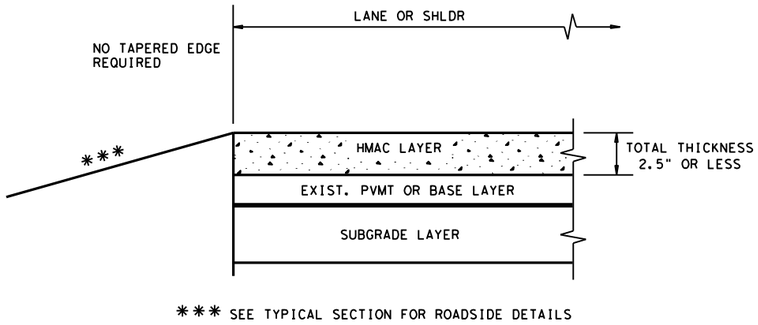
Texas Department of Transportation — Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP	
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0914	05	204, ETC.	CR 118	
	DIST	COUNTY		SHEET NO.	
	AUS	WILLIAMSON		47	

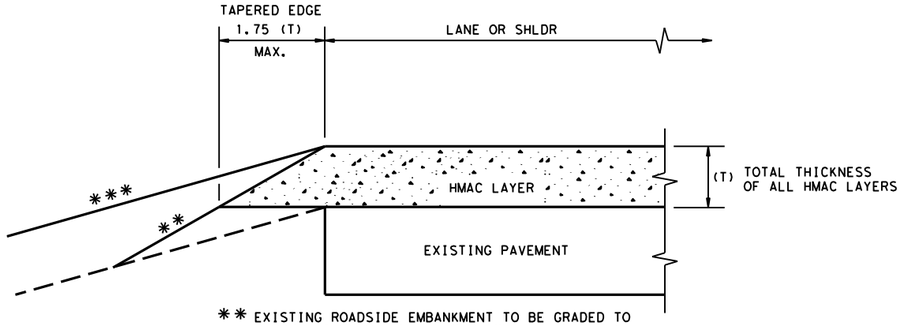
DATE: 11/3/2022
FILE: c:\pw\km\d0221691\sgt153120.dgn

DATE: 11/3/2022
FILE: c:\pw\khl\d0221691\tehmac11 (3).dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

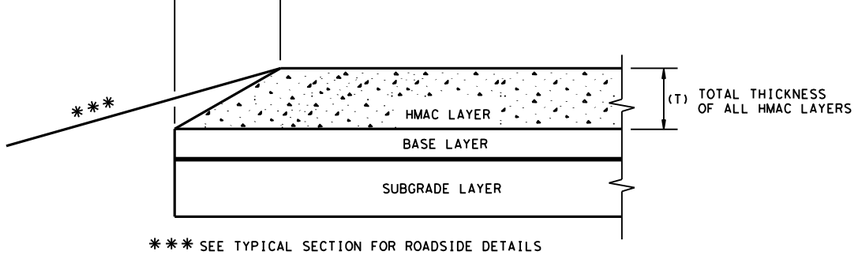
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

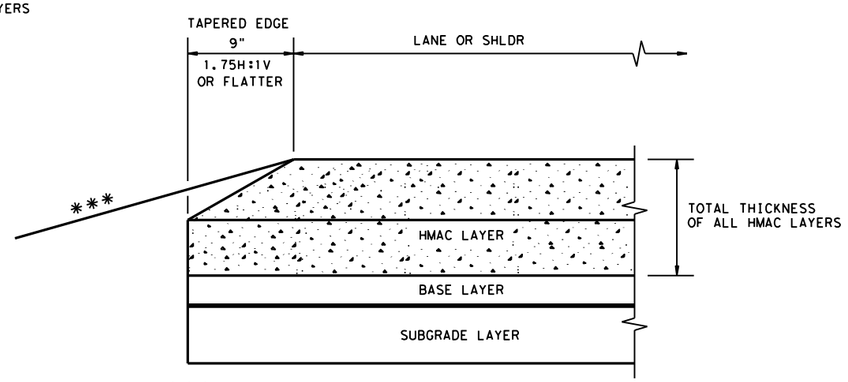
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

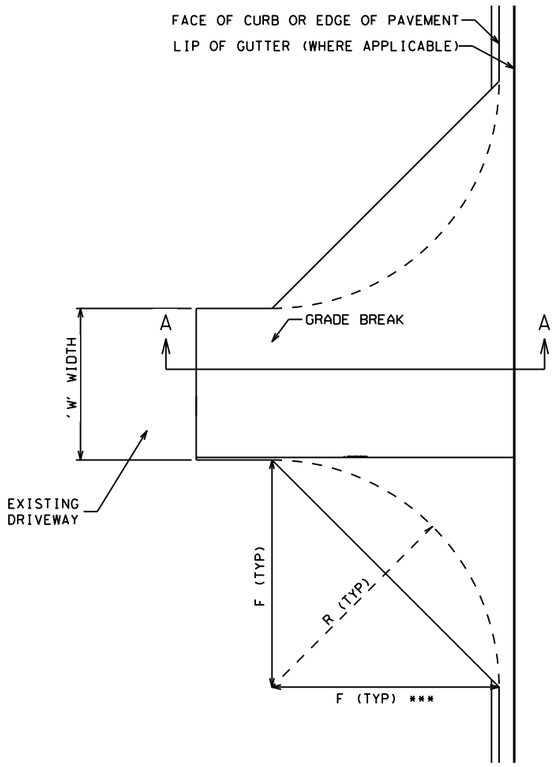
Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:		
© TxDOT January 2011	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0914	05	204, ETC.		CR 118	
	DIST	COUNTY			SHEET NO.	
	AUS	WILLIAMSON			48	



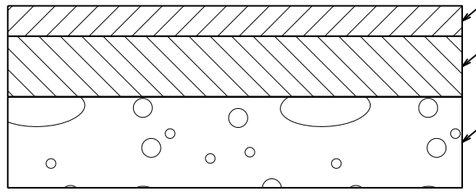
DRIVEWAY PLAN

FLARE OR RADIUS	FARM/RANCH	RESIDENTIAL	COMMERCIAL
"F" OR "R" (FT)	25	25	25

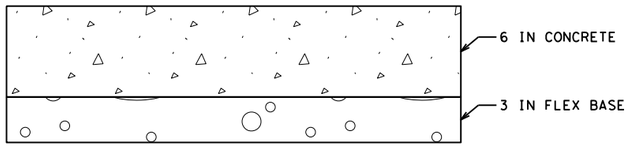
THESE ARE STANDARD DIMENSIONS UNLESS OTHERWISE SHOWN ELSEWHERE ON THE PLANS.

FLARES ARE TYPICALLY USED FOR SUBURBAN/URBAN (CURBED) ROADWAYS. RADII ARE TYPICALLY USED FOR RURAL OR UNCURBED ROADWAYS.

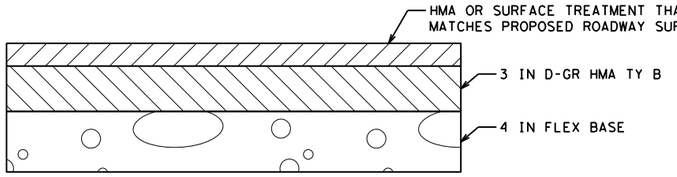
*** THIS 'F' DIMENSION MAY BE REDUCED TO KEEP WORK WITHIN THE ROW.



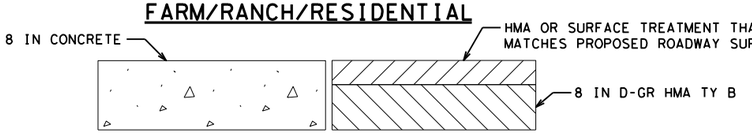
HMA OR SURFACE TREATEMENT - COMMERCIAL



CONCRETE - ALL DRIVEWAY TYPES

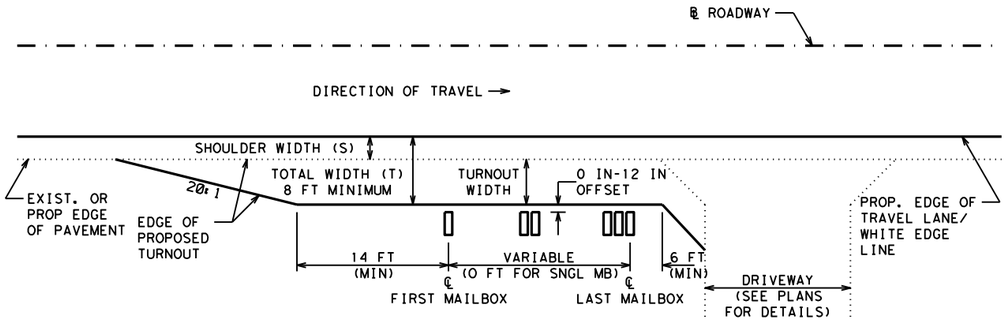


HMA OR SURFACE TREATMENT - FARM/RANCH/RESIDENTIAL

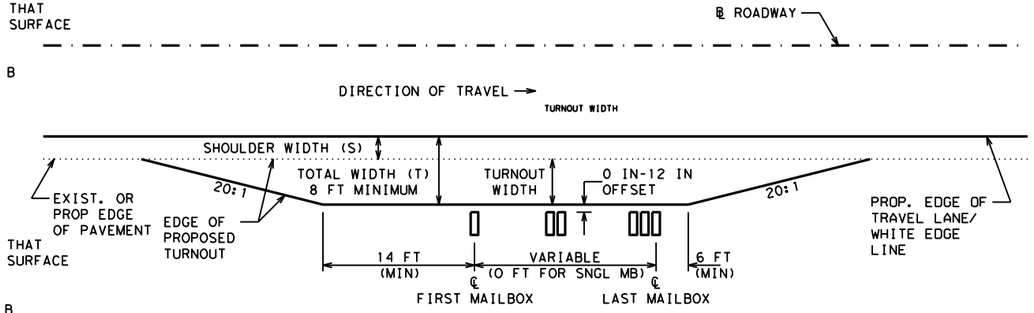


FAST TRACK ACP (TYPE 3) OR CONCRETE

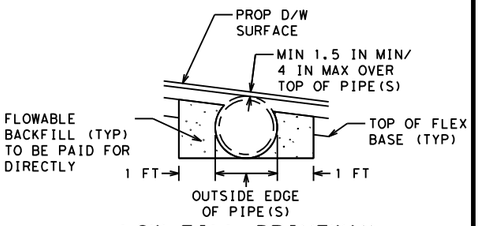
DRIVEWAY AND TURNOUT TYPICAL SECTIONS



MAILBOX TURNOUT PLAN WITH DRIVEWAY

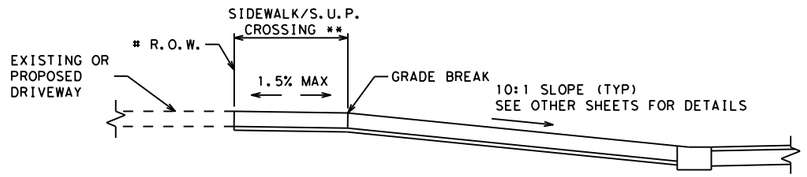


MAILBOX TURNOUT PLAN WITHOUT DRIVEWAY



LOW FILL DRIVEWAY

ONLY ONE PIPE SHOWN
SEE ELSEWHERE ON THE PLANS FOR SPECIFIC DRIVEWAY DETAILS



ACTUAL TIE-IN SHOWN ELSEWHERE IN PLANS OR AS DIRECTED

DRIVEWAY WITH GUTTER SECTION A-A

ENSURE GRADE BREAK DOES NOT EXCEED 8% UNLESS OTHERWISE DIRECTED. PROVIDE ABSOLUTE MINIMUM SIDEWALK CROSSING WIDTH OF 4' FOR DRIVEWAYS WIDTH OF 20' OR LESS

** LOCATE SIDEWALK CROSSING TO ALIGN WITH ADJACENT SIDEWALK; SIDEWALK/S.U.P. WIDTH AND LOCATION SHOWN ELSEWHERE ON THE PLANS.

GENERAL NOTES

PROVIDE EXPANSION 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT. EXPANSION JOINT PER AUS STANDARD FOR SIDEWALK (MCPSWMD).

REINFORCEMENT WILL BE IN ACCORDANCE WITH ITEM 432.3.1 USING NO. 3 OR NO. 4 BARS.

FIBER REINFORCEMENT IS NOT ALLOWED. CLASS A CONCRETE IS ALLOWED TO USE COARSE AGGREGATE GRADES 1-8.

IN LIEU OF PFC OR TOM, SURFACE MUST BE 1.5" D-GR HMA TY D. IF SURFACE IS A MULTIPLE COURSE SURFACE TREATEMENT, ALL COURSES MUST BE PLACED ON DRIVEWAY. SURFACE HMA IS PG 76-22. NON SURFACE HMA IS PG 64-22 AND MAY BE BLADE LAID.

FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OR GRADE IN ACCORDANCE WITH ITEM 247. BASE COMPRESSIVE STRENGTHS ARE WAIVED.

THE BASE UNDER THE CONCRETE MAY BE REPLACED WITH CONCRETE AT A RATIO OF 3 INCHES OF BASE EQUALS 2 INCHES OF CONCRETE.

FAST TRACK DRIVEWAYS MUST BE CLOSED, CONSTRUCTED, AND REOPENED WITHIN 24 HOURS.

IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE IMPACTS TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

Texas Department of Transportation | Austin District Standard

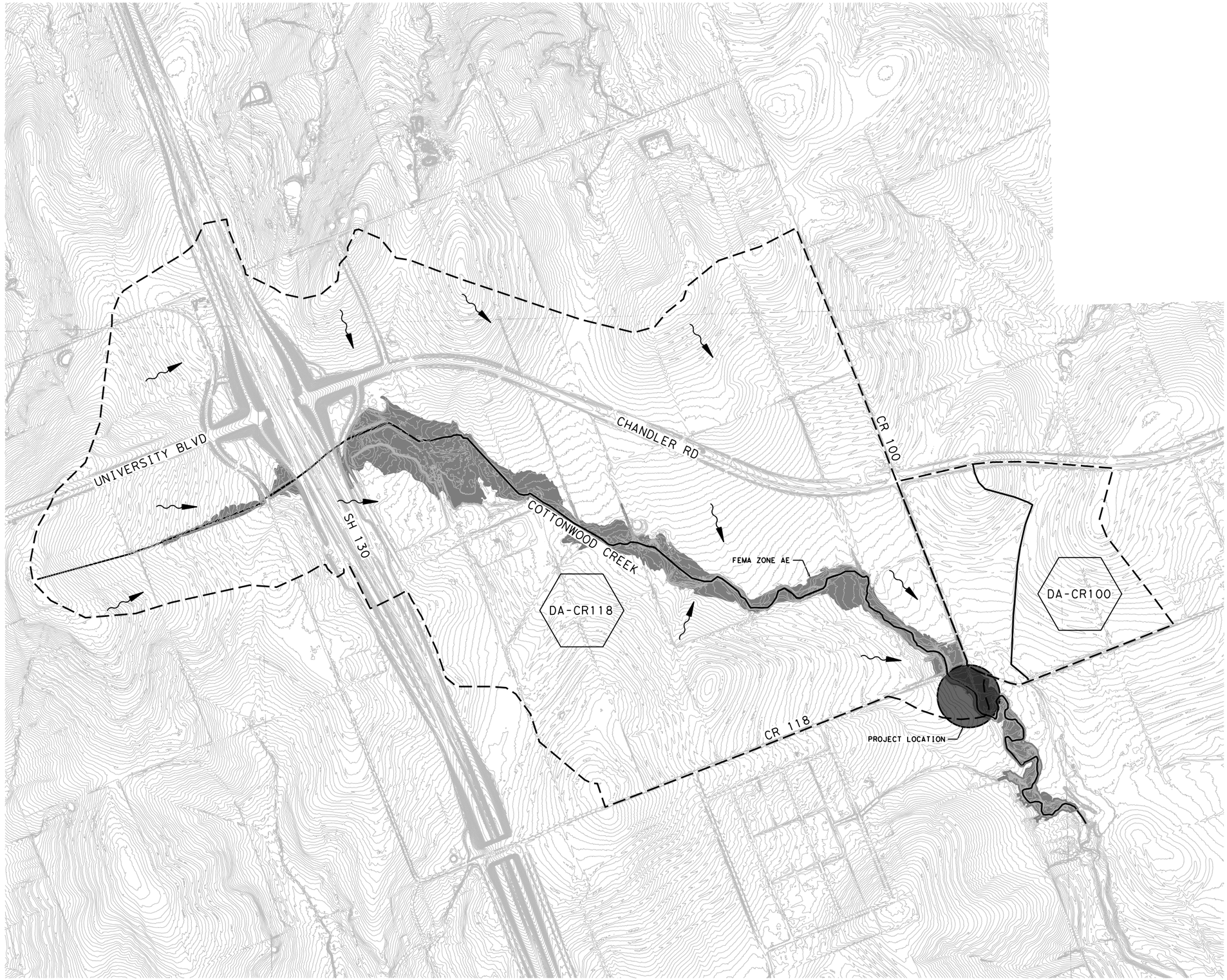
DRIVEWAYS AND MAILBOX TURNOUTS

DWMB-22 (AUS)

REVISIONS
01/16: SHEET CREATED
04/19: APPROVED
11/20: TABLE REVISED, GN ADDED, PLAN & PROFILE MODIFIED
01/22: ADDED TURNOUT INFO

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		49

DATE: 11/3/2022 12:51:27 PM
FILE: c:\pw\kn1\d0221691\dwmb-22 (1).dgn



N

LEGEND

- DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- EXISTING CONTOURS
- FEMA ZONE AE
- FLOW ARROWS

NOTES:

1. REFER TO THE HYDROLOGIC DATA SHEET FOR DETAILED CALCULATIONS.
2. COTTONWOOD CREEK IS LOCATED IN A FEMA ZONE AE FLOODPLAIN PER FIRM PANEL 48491C0505F DATED DECEMBER 20, 2019.
3. DRAINAGE AREA DELINEATED BASED ON TNRIS 2016 LIDAR 1 FT CONTOURS.

0′ 600′ 1,200′

SCALE

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

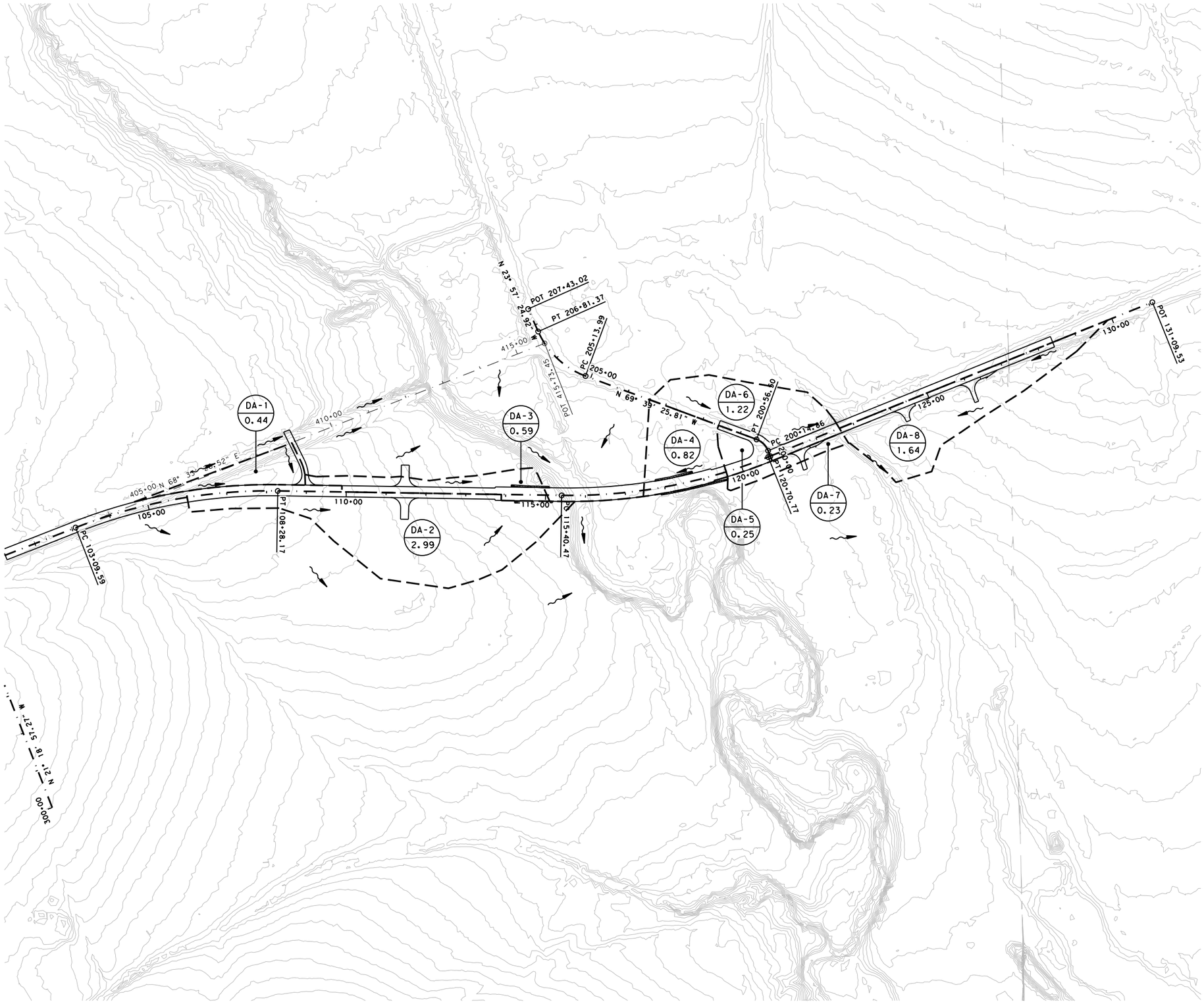
CR 118 AT COTTONWOOD CREEK

EXTERNAL DRAINAGE AREA MAP

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		50

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\5. Drainage\CR118_DRG_DAM.dgn
PLOTTED: 11/3/2022 12:51:33 PM



11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

INTERNAL
DRAINAGE AREA MAP

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		51

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\5. Drainage\CR118_DRG_DAM02.dgn
PLOTTED: 11/3/2022 12:51:43 PM

PROPOSED DITCH ANALYSIS - DITCH DA-1

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
106+50	721.72											
107+00	719.86	3.72%	CLASS C	0	1.28	0.23	6	4	0.03	2.20	0.56	0.52
107+50	719.22	1.28%	CLASS C	0	1.71	0.28	6	4	0.03	1.48	0.56	0.22
108+00	718.55	1.34%	CLASS C	0	2.50	0.27	6	4	0.03	1.50	0.56	0.23
108+50	717.78	1.54%	CLASS C	0	2.44	0.27	6	4	0.03	1.58	0.56	0.26

PROPOSED DITCH ANALYSIS - DITCH DA-2

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
106+00	719.62											
106+50	718.82	1.60%	CLASS C	0	2.34	0.54	6	4	0.03	2.58	3.78	0.54
107+00	718.18	1.28%	CLASS C	0	2.49	0.56	6	4	0.03	2.38	3.78	0.45
107+50	717.54	1.28%	CLASS C	0	2.50	0.56	6	4	0.03	2.38	3.78	0.45
108+00	716.92	1.24%	CLASS C	0	2.50	0.57	6	4	0.03	2.35	3.78	0.44
108+50	716.34	1.16%	CLASS C	0	2.50	0.57	6	4	0.03	2.29	3.78	0.42
109+00	715.82	1.04%	CLASS C	0	2.50	0.59	6	4	0.03	2.20	3.78	0.38
109+50	715.34	0.96%	CLASS C	0	2.50	0.60	6	4	0.03	2.13	3.78	0.36
110+00	714.83	1.02%	CLASS C	0	2.50	0.59	6	4	0.03	2.18	3.78	0.37
110+50	714.25	1.16%	CLASS C	0	2.50	0.57	6	4	0.03	2.29	3.78	0.42
111+00	713.68	1.14%	CLASS C	0	2.50	0.58	6	4	0.03	2.28	3.78	0.41
112+00	713.05	0.63%	CLASS C	0	1.90	0.64	6	4	0.03	1.82	3.78	0.25
112+50	712.38	1.34%	CLASS C	0	1.58	0.56	6	4	0.03	2.42	3.78	0.47
113+00	711.71	1.34%	CLASS C	0	1.41	0.56	6	4	0.03	2.42	3.78	0.47
113+50	711.04	1.34%	CLASS C	0	1.35	0.56	6	4	0.03	2.42	3.78	0.47
114+00	710.69	0.70%	CLASS C	0	1.27	0.66	4.8	4	0.03	1.95	3.78	0.29
114+50	709.56	2.26%	CLASS C	0	1.97	0.55	4	4	0.03	3.10	3.78	0.78
115+00	709.30	0.52%	CLASS C	0	1.85	0.73	4	4	0.03	1.78	3.78	0.24

PROPOSED DITCH ANALYSIS - DITCH DA-3

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
109+50	715.94											
110+00	715.07	1.74%	CLASS C	0	2.50	0.36	6	4	0.03	2.04	1.30	0.39
110+50	714.29	1.56%	CLASS C	0	2.50	0.36	6	4	0.03	1.96	1.30	0.35
111+00	713.68	1.22%	CLASS C	0	2.41	0.38	6	4	0.03	1.79	1.30	0.29
112+00	713.04	0.64%	CLASS C	0	1.08	0.43	6	4	0.03	1.40	1.30	0.17
112+50	712.27	1.54%	CLASS C	0	0.92	0.37	6	4	0.03	1.95	1.30	0.35
113+00	711.50	1.54%	CLASS C	0	0.91	0.37	6	4	0.03	1.95	1.30	0.35
113+50	710.73	1.54%	CLASS C	0	0.91	0.37	6	4	0.03	1.95	1.30	0.35
114+00	710.53	0.40%	CLASS C	0	0.66	0.49	5	4	0.03	1.21	1.30	0.12
114+50	709.00	3.06%	CLASS C	0	1.94	0.35	4	4	0.03	2.66	1.30	0.67

PROPOSED DITCH ANALYSIS - DITCH DA-4

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
118+00	704.15											
118+50	704.39	0.48%	CLASS C	0	4.13	0.42	6	4	0.03	1.19	1.04	0.13
119+00	704.63	0.48%	CLASS C	0	4.30	0.42	6	4	0.03	1.19	1.04	0.13
119+50	704.80	0.34%	CLASS C	0	2.82	0.45	6	4	0.03	1.05	1.04	0.09

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

DITCH TABLES

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		52

PROPOSED DITCH ANALYSIS - DITCH DA-5

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
120+00	704.70											
120+50	704.53	0.34%	CLASS C	0	2.55	0.29	6	4	0.03	0.78	0.32	0.06

PROPOSED DITCH ANALYSIS - DITCH DA-6

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
121+00	704.13											
121+50	704.03	0.20%	CLASS C	0	2.22	0.61	6	4	0.03	0.99	1.86	0.08
122+00	703.93	0.20%	CLASS C	0	1.60	0.61	6	4	0.03	0.99	1.86	0.08

PROPOSED DITCH ANALYSIS - DITCH DA-7

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
120+00	705.98											
120+50	705.63	0.70%	CLASS C	0	1.30	0.24	6	4	0.03	1.00	0.29	0.11
121+00	705.29	0.68%	CLASS C	0	1.26	0.24	6	4	0.03	0.99	0.29	0.10
122+00	704.11	1.18%	CLASS C	0	0.96	0.22	6	4	0.03	1.21	0.29	0.16
122+50	703.34	1.54%	CLASS C	0	0.87	0.21	6	4	0.03	1.34	0.29	0.20

PROPOSED DITCH ANALYSIS - DITCH DA-8

STATION	FLOW LINE ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	DESIGN VELOCITY (FPS)	DESIGN Q(2) (CFS)	DESIGN SHEAR STRESS
123+00	703.51											
123+50	704.08	1.14%	CLASS C	0	0.82	0.46	6	4	0.03	1.96	2.07	0.33
124+00	704.64	1.12%	CLASS C	0	0.97	0.46	6	4	0.03	1.94	2.07	0.32
124+50	705.21	1.14%	CLASS C	0	1.91	0.46	6	4	0.03	1.96	2.07	0.33
125+00	705.78	1.14%	CLASS C	0	1.61	0.46	6	4	0.03	1.96	2.07	0.33
125+50	706.04	0.52%	CLASS C	0	1.78	0.53	6	4	0.03	1.46	2.07	0.17
126+00	706.22	0.36%	CLASS C	0	2.22	0.57	6	4	0.03	1.27	2.07	0.13
126+50	706.39	0.34%	CLASS C	0	2.12	0.58	6	4	0.03	1.24	2.07	0.12
127+00	706.67	0.56%	CLASS C	0	2.53	0.53	6	4	0.03	1.50	2.07	0.18
127+50	707.33	1.32%	CLASS C	0	2.49	0.45	6	4	0.03	2.07	2.07	0.37
128+00	707.98	1.30%	CLASS C	0	1.84	0.45	6	4	0.03	2.06	2.07	0.36

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

DITCH TABLES

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		53

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\5. Drainage\CR118_DRG_DITCH02.dgn
PLOTTED: 11/3/2022 12:51:55 PM

HEC-HMS Input Paramaters													
Name	Area (SQ MI)	Area (AC)	Weighted Curve #	Designated Design Storm	T_c (min)	T_{lag} (min)	Precipitation Depth 2-yr (in)	5-yr (in)	10-yr (in)	25-yr (in)	50-yr (in)	100-yr (in)	500-yr (in)
DA-CR 118	1.79	1145.00	81	25 yr	103	62	3.97	5.20	6.37	8.15	9.68	11.40	16.50

FLOW COMPUTATION (Q)					
2 yr (cfs)	10 yr (cfs)	25 yr (cfs)	50 yr (cfs)	100 yr (cfs)	500 yr (cfs)
567	1448	2168	2815	3524	5762

Loss Method:	SCS Curve Number
Surface Method:	SCS Unit Hydrograph
Precipitation:	SCS Storm - Atlas 14 Depths

CR 118 Time of Concentration	
Calculation Method	Kerby Kirpich Method
Kerby Variables	
Overland Flow Roughness	0.4
Slope (ft/ft)	0.028
Length (ft)	1200
Kerpich Flow Variables	
Slope (ft/ft)	0.009
Length (ft)	12518
Time of Concentration (min)	103

Rational Input Parameters										
Name	AREA (AC)	C	TC (MIN)	I 2-YR (IN/HR)	I 5-YR (IN/HR)	I 10-YR (IN/HR)	I 25-YR (IN/HR)	I 50-YR (IN/HR)	I 100-YR (IN/HR)	I 500-YR (IN/HR)
DA-CR 100 Culvert	142.00	0.33	34	2.51	3.37	4.04	4.98	5.74	6.55	8.63

Rational Flows, Q (cfs)							
Name	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
DA-CR 100 Culvert	118	158	189	233	269	307	404

NOTES:

1. THE HYDROLOGY DATA WAS OBTAINED FROM THE COTTONWOOD CREEK FEMA EXISTING CONDITIONS EFFECTIVE MODEL, DATED MAY 2019 AND PROVIDED BY TXDOT.
2. RAINFALL DATA OBTAINED FROM NOAA ATLAS 14.
3. RUNOFF MODELED IN HECHMS V 3.5 USING SCS LOSS AND TRANSFORM METHODS, AND SCS STORM WITH RAINFALL DEPTHS FROM NOAA ATLAS 14.

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

HYDROLOGIC DATA SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		54

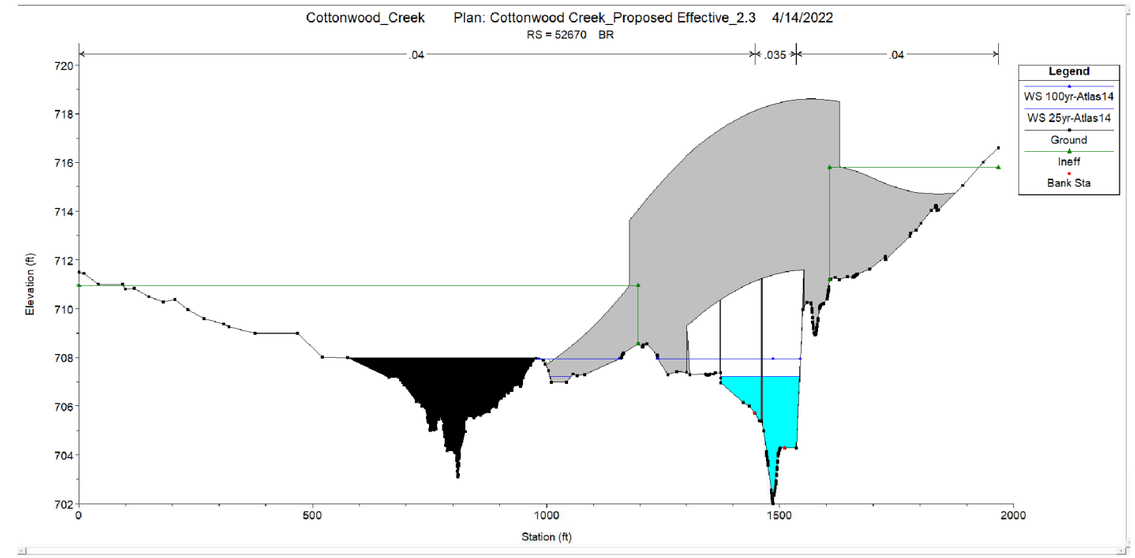
HEC-RAS HYDRAULIC CALCULATIONS

River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
53686	25yr-Atlas14	Revised Effective	2140	706.36	713.84	713.84	714.86	0.005244	9.6	330.54	148.86	0.7
53686	25yr-Atlas14	Proposed	2140	706.36	713.84	713.84	714.86	0.005244	9.6	330.54	148.86	0.7
53686	100yr-Atlas14	Revised Effective	3480	706.36	714.89	714.89	715.93	0.004894	10.37	524.03	257.85	0.7
53686	100yr-Atlas14	Proposed	3480	706.36	714.89	714.89	715.93	0.004894	10.37	524.03	257.85	0.7
53361	25yr-Atlas14	Revised Effective	2160	704.87	712.67	709.74	713.09	0.001322	5.46	465.34	149.25	0.37
53361	25yr-Atlas14	Proposed	2160	704.87	711.49	709.74	712.23	0.002845	7.05	330.03	81.76	0.53
53361	100yr-Atlas14	Revised Effective	3520	704.87	713.7	711.11	714.35	0.00183	7.06	637.28	312.37	0.45
53361	100yr-Atlas14	Proposed	3520	704.87	712.77	711.11	713.83	0.003294	8.71	479.98	151.88	0.59
53230	25yr-Atlas14	Revised Effective	2160	703.95	712.56	709.14	712.91	0.001055	4.94	508.52	481.99	0.33
53230	25yr-Atlas14	Proposed	2160	703.95	711.21	709.14	711.84	0.002402	6.46	356.89	108.65	0.48
53230	100yr-Atlas14	Revised Effective	3520	703.95	713.52	710.69	714.09	0.001551	6.53	686.47	827.26	0.41
53230	100yr-Atlas14	Proposed	3520	703.95	712.34	710.69	713.38	0.003209	8.44	476.65	430.87	0.57
53149	25yr-Atlas14	Revised Effective	2180	703.38	712.65	707.82	712.73	0.00028	2.81	1169.55	417.64	0.17
53149	25yr-Atlas14	Proposed	2180	703.38	711.41	707.81	711.62	0.000707	3.99	684.97	269.86	0.27
53149	100yr-Atlas14	Revised Effective	3550	703.38	713.7	709.02	713.81	0.000342	3.37	2013.43	1073.94	0.2
53149	100yr-Atlas14	Proposed	3550	703.38	712.81	709.14	713.03	0.000658	4.36	1239.66	431.35	0.27
53129			Mult Open									
53114	25yr-Atlas14	Revised Effective	2180	703.15	710.9	708.42	711.62	0.002536	6.92	340.95	96.33	0.49
53114	25yr-Atlas14	Proposed	2180	703.15	710.75	708.42	711.52	0.002769	7.12	327.43	90.94	0.5
53114	100yr-Atlas14	Revised Effective	3550	703.15	711.06	710.26	712.86	0.0061	10.91	358.08	112.91	0.76
53114	100yr-Atlas14	Proposed	3550	703.15	710.71	710.27	712.79	0.007511	11.67	324.09	90.43	0.83
53061	25yr-Atlas14	Revised Effective	2200	702.94	710.86	709.63	711.38	0.002701	6.39	503.13	307.82	0.5
53061	25yr-Atlas14	Proposed	2200	702.94	710.66	709.63	711.33	0.003463	7.05	442.23	304.53	0.56
53061	100yr-Atlas14	Revised Effective	3580	702.94	711.24	711.24	712.13	0.004549	8.7	622.5	319.27	0.66
53061	100yr-Atlas14	Proposed	3580	702.94	711.24	711.24	712.13	0.004549	8.7	622.5	319.27	0.66
52855	25yr-Atlas14	Revised Effective	2220	702.11	708.62	708.58	710.14	0.010287	10.46	255.35	118.18	0.93
52855	25yr-Atlas14	Proposed	2220	702.11	708.63	708.58	710.14	0.010162	10.42	256.94	119	0.92
52855	100yr-Atlas14	Revised Effective	3610	702.11	710.05	710.05	710.98	0.005613	9.19	592.96	272.72	0.71
52855	100yr-Atlas14	Proposed	3610	702.11	710.05	710.05	710.98	0.005613	9.19	592.96	272.72	0.71
52780.*	25yr-Atlas14	Revised Effective	2220	702.06	708.38	708.38	709.19	0.006918	7.81	371.94	242.97	0.71
52780.*	25yr-Atlas14	Proposed	2220	702.06	708.38	708.38	709.19	0.006918	7.81	371.94	242.97	0.71
52780.*	100yr-Atlas14	Revised Effective	3610	702.06	709.15	709.15	709.94	0.006264	8.41	643.59	395.84	0.69
52780.*	100yr-Atlas14	Proposed	3610	702.06	709.15	709.15	709.94	0.006262	8.41	643.67	395.84	0.69
52705	25yr-Atlas14	Revised Effective	2220	702.01	707.3	707.3	708.38	0.010334	8.79	297.09	238.14	0.91
52705	25yr-Atlas14	Proposed	2220	702.01	707.68	707.68	708.43	0.006334	7.47	398.34	413.67	0.72
52705	100yr-Atlas14	Revised Effective	3610	702.01	708.3	708.3	709.21	0.006902	8.74	583.07	979.28	0.78
52705	100yr-Atlas14	Proposed	3610	702.01	708.29	708.29	709.21	0.007041	8.81	578.31	976.38	0.78
52670			Bridge									
52635	25yr-Atlas14	Revised Effective	2220	702.83	707.24		707.38	0.001636	4.14	877.07	537.54	0.38
52635	25yr-Atlas14	Proposed	2220	702.83	707.25	706.59	707.51	0.002616	5.24	627.5	539.03	0.47
52635	100yr-Atlas14	Revised Effective	3610	702.83	707.9		708.08	0.001878	4.93	1257.59	604.23	0.41
52635	100yr-Atlas14	Proposed	3610	702.83	708	707.08	708.34	0.002747	6.06	847.69	604.72	0.5
52428	25yr-Atlas14	Revised Effective	2250	702.83	706.86		707.11	0.004391	5.2	684.87	467.13	0.58
52428	25yr-Atlas14	Proposed	2250	702.83	706.89	706.34	707.15	0.004336	5.2	660.62	471.18	0.57
52428	100yr-Atlas14	Revised Effective	3660	702.83	707.74		707.9	0.002345	4.63	1450.92	1039.64	0.44
52428	100yr-Atlas14	Proposed	3660	702.83	707.75	706.81	708.01	0.003186	5.41	1068.81	1040.76	0.52
51850	25yr-Atlas14	Revised Effective	2310	698.22	705.44	704.44	705.87	0.002544	6.79	500.64	172.95	0.49
51850	25yr-Atlas14	Proposed	2310	698.22	705.44	704.44	705.87	0.002544	6.79	500.64	172.95	0.49
51850	100yr-Atlas14	Revised Effective	3760	698.22	707.02	705.26	707.31	0.001591	6.29	1207.88	841.85	0.41
51850	100yr-Atlas14	Proposed	3760	698.22	707.02	705.26	707.31	0.001591	6.29	1207.88	841.85	0.41

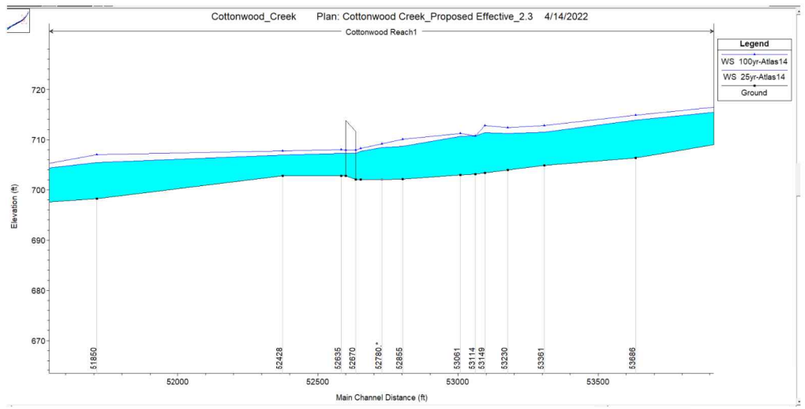
NOTES:

1. HEC-RAS VERSION 4.1.0 WAS USED FOR HYDRAULIC ANALYSIS AND DESIGN.
2. THE TAILWATER BOUNDARY CONDITION USED WAS NORMAL DEPTH WITH A SLOPE OF 0.00318 FT/FT.
3. DESIGN FLOW BASED ON 25-YR FREQUENCY.
4. THERE ARE NO INSURABLE STRUCTURES THAT WOULD BE ADVERSLY AFFECTED FOR THE 25 YR AND 100 YR DESIGN FREQUENCY.
5. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS COMPLETED 9/22/2022.
6. RIVER STATION 53129 WAS MODELED AS A MULTIPLE OPENING CROSSING IN THE EFFECTIVE MODEL.
7. 52780* IS A HEC-RAS INTERPOLATED CROSS SECTION.

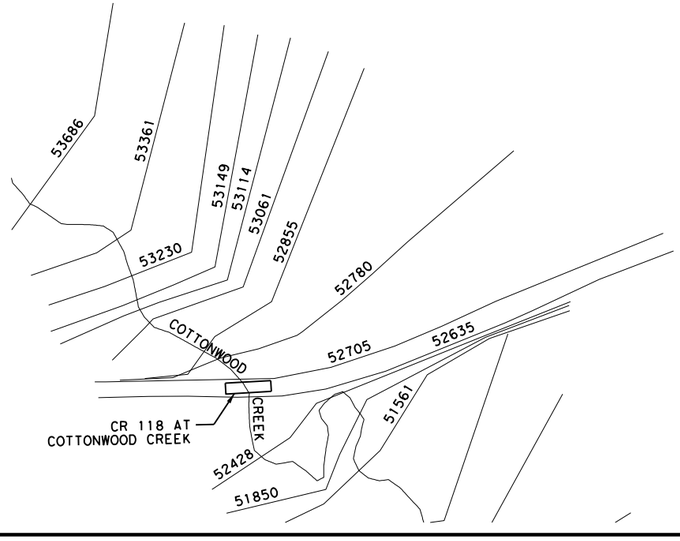
HEC-RAS CROSS SECTION LOCATIONS



PROPOSED CR 118 US BRIDGE FACE



WATER SURACE PROFILE



11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

HYDRAULIC DATA SHEET

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		55

HEC-RAS HYDRAULIC CALCULATION BRIDGE OUTPUT

Plan: Revised Eff	Cottonwood	Reach1 RS: 53129	Open#2: Bridge	Profile: 25yr-Atlas14
E.G. US. (ft)	712.74	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	712.55	E.G. Elev (ft)	712.74	712.61
Q Total (cfs)	2043.04	W.S. Elev (ft)	712.55	712.31
Q Bridge (cfs)	1870.98	Crit W.S. (ft)	708.59	708.39
Q Weir (cfs)	172.06	Max Chl Dpth (ft)	9.17	9.16
Weir Sta Lft (ft)	1032.71	Vel Total (ft/s)	8.5	8.25
Weir Sta Rgt (ft)	1110.96	Flow Area (sq ft)	220.06	226.75
Weir Submerg	0	Froude # Chl	0.49	0.48
Weir Max Depth (ft)	1.17	Specif Force (cu ft)	1716.24	1706.55
Min El Weir Flow (ft)	711.58	Hydr Depth (ft)		
Min El Prs (ft)	710.34	W.P. Total (ft)	92.89	92.98
Delta EG (ft)	1.12	Conv. Total (cfs)	16602.5	17441.5
Delta WS (ft)	1.57	Top Width (ft)		
BR Open Area (sq ft)	220.06	Frctn Loss (ft)		
BR Open Vel (ft/s)	8.5	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.24	2.09
Br Sel Method	Press/Weir	Power Total (lb/ft s)	1032.71	1098.51

Plan: Proposed	Cottonwood	Reach1 RS: 52670	Profile: 25yr-Atlas14	
E.G. US. (ft)	708.43	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	707.68	E.G. Elev (ft)	708.02	707.65
Q Total (cfs)	2220	W.S. Elev (ft)	707.24	707.22
Q Bridge (cfs)	2220	Crit W.S. (ft)	707.02	706.75
Q Weir (cfs)		Max Chl Dpth (ft)	5.23	4.39
Weir Sta Lft (ft)		Vel Total (ft/s)	6.49	4.56
Weir Sta Rgt (ft)		Flow Area (sq ft)	341.95	486.8
Weir Submerg		Froude # Chl	0.74	0.44
Weir Max Depth (ft)		Specif Force (cu ft)	976.69	994.9
Min El Weir Flow (ft)	714.3	Hydr Depth (ft)	2.06	2.17
Min El Prs (ft)	711.6	W.P. Total (ft)	171.51	238.04
Delta EG (ft)	0.92	Conv. Total (cfs)	26087.2	34636.6
Delta WS (ft)	0.43	Top Width (ft)	166.31	224.44
BR Open Area (sq ft)	1178.1	Frctn Loss (ft)	0.19	0.05
BR Open Vel (ft/s)	6.49	C & E Loss (ft)	0.17	0.09
Coef of Q		Shear Total (lb/sq ft)	0.9	0.52
Br Sel Method	Energy only	Power Total (lb/ft s)	0	0

Plan: Revised Eff	Cottonwood	Reach1 RS: 53129	Open#2: Bridge	Profile: 100yr-Atlas14
E.G. US. (ft)	713.82	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	713.64	E.G. Elev (ft)	713.82	713.68
Q Total (cfs)	2254.53	W.S. Elev (ft)	713.64	713.02
Q Bridge (cfs)	1691.39	Crit W.S. (ft)	708.92	708.73
Q Weir (cfs)	563.13	Max Chl Dpth (ft)	10.26	9.87
Weir Sta Lft (ft)	1032.71	Vel Total (ft/s)	7.69	7.46
Weir Sta Rgt (ft)	1110.96	Flow Area (sq ft)	220.06	226.75
Weir Submerg	0.27	Froude # Chl	0.42	0.42
Weir Max Depth (ft)	2.25	Specif Force (cu ft)	1865.52	1780.23
Min El Weir Flow (ft)	711.58	Hydr Depth (ft)		
Min El Prs (ft)	710.34	W.P. Total (ft)	92.89	92.98
Delta EG (ft)	0.97	Conv. Total (cfs)	16602.5	17441.6
Delta WS (ft)	1.26	Top Width (ft)		
BR Open Area (sq ft)	220.06	Frctn Loss (ft)		
BR Open Vel (ft/s)	7.69	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.73	2.54
Br Sel Method	Press/Weir	Power Total (lb/ft s)	1032.71	1098.51

Plan: Proposed	Cottonwood	Reach1 RS: 52670	Profile: 100yr-Atlas14	
E.G. US. (ft)	709.21	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	708.29	E.G. Elev (ft)	708.96	708.53
Q Total (cfs)	3610	W.S. Elev (ft)	707.94	707.93
Q Bridge (cfs)	3610	Crit W.S. (ft)	707.91	707.36
Q Weir (cfs)		Max Chl Dpth (ft)	5.93	5.1
Weir Sta Lft (ft)		Vel Total (ft/s)	7.25	5.58
Weir Sta Rgt (ft)		Flow Area (sq ft)	497.95	647.1
Weir Submerg		Froude # Chl	0.59	0.48
Weir Max Depth (ft)		Specif Force (cu ft)	1677.42	1721.24
Min El Weir Flow (ft)	714.3	Hydr Depth (ft)	2.14	2.85
Min El Prs (ft)	711.6	W.P. Total (ft)	242.17	245.3
Delta EG (ft)	0.87	Conv. Total (cfs)	40104.4	52157.3
Delta WS (ft)	0.29	Top Width (ft)	232.95	227.06
BR Open Area (sq ft)	1178.1	Frctn Loss (ft)	0.22	0.06
BR Open Vel (ft/s)	7.25	C & E Loss (ft)	0.22	0.13
Coef of Q		Shear Total (lb/sq ft)	1.04	0.79
Br Sel Method	Energy only	Power Total (lb/ft s)	0	0

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

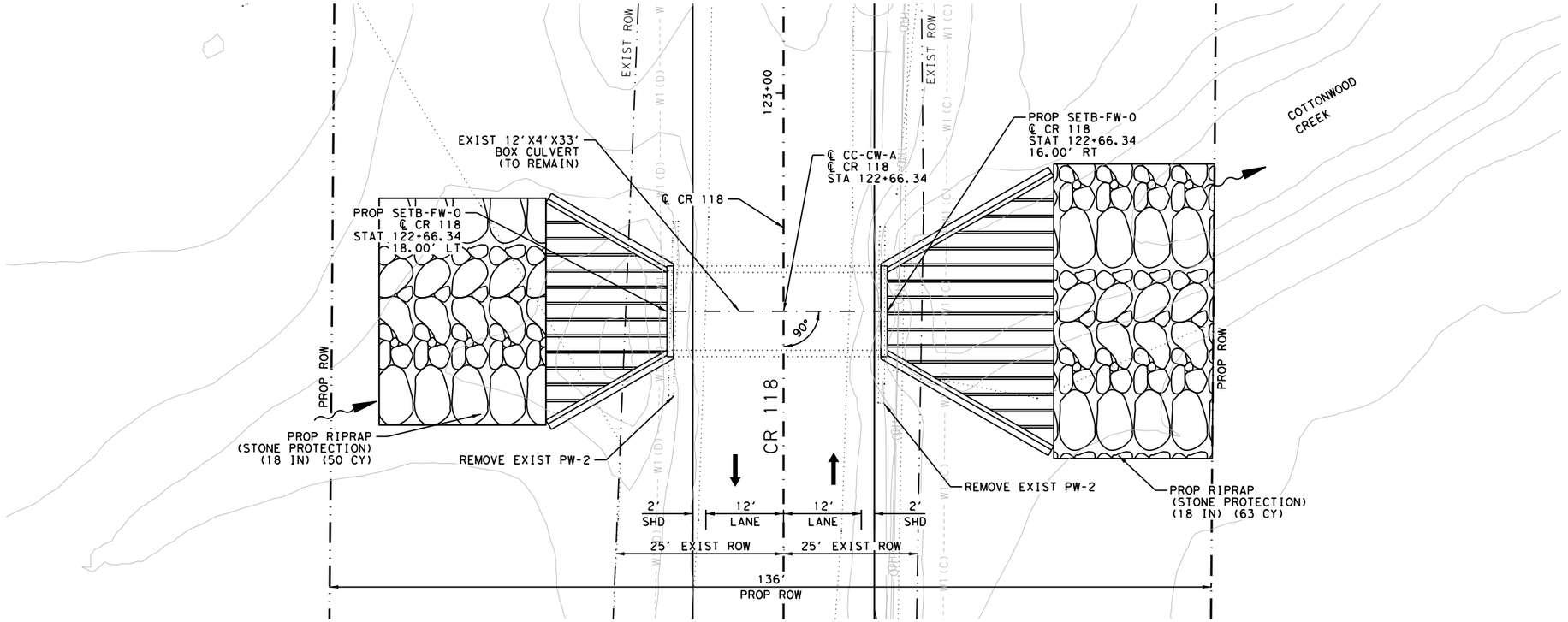
Texas Department of Transportation

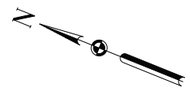
CR 118 AT COTTONWOOD CREEK

HYDRAULIC DATA SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		56





LEGEND

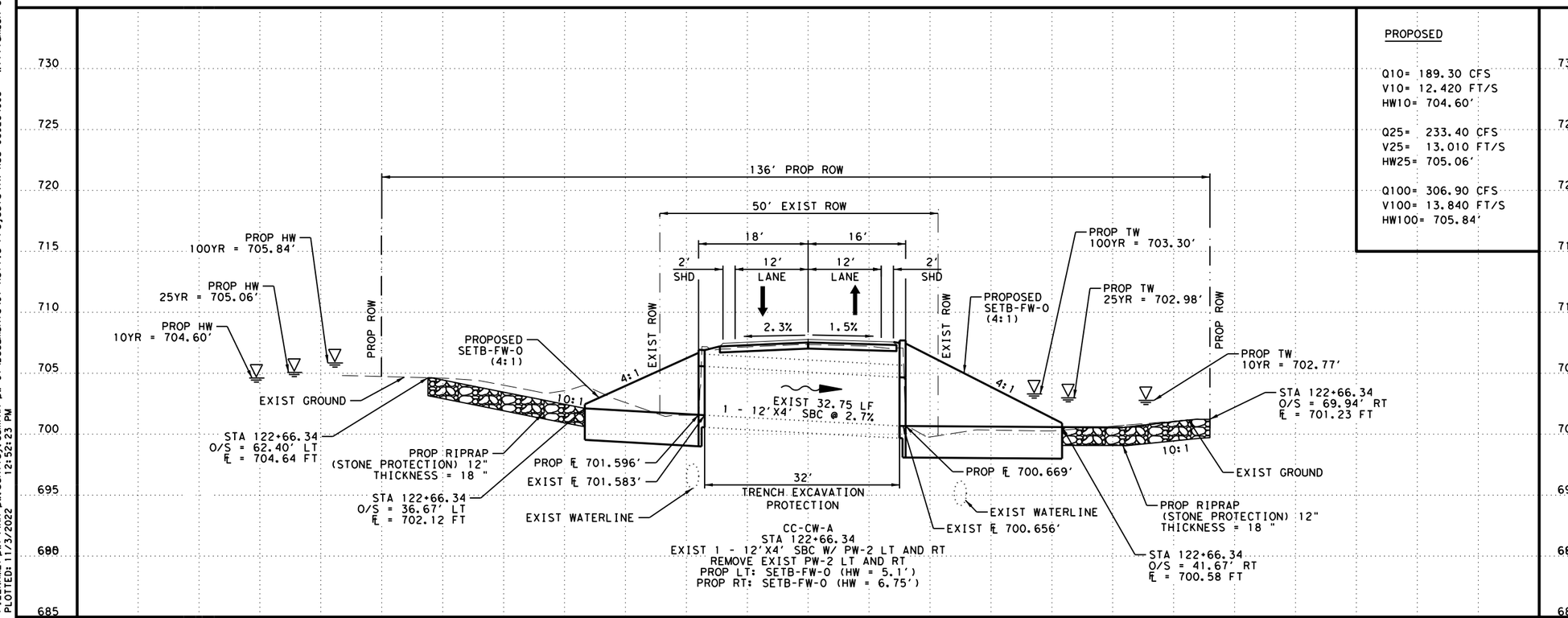
FLOW ARROW

TRAFFIC DIRECTION

NOTES:

1. LOCATION OF EXISTING UTILITES ARE APPROXIMATE. CONTRACTOR TO VERTIFY PRIOR TO CONSTRUCTION.
2. SEE HYDRAULIC CALCULATIONS FOR DETAILED HYDRAULIC ANALYSIS.

0' 10' 20' HORZ
0' 5' 10' VERT
SCALE



PROPOSED

Q10= 189.30 CFS
V10= 12.420 FT/S
HW10= 704.60'

Q25= 233.40 CFS
V25= 13.010 FT/S
HW25= 705.06'

Q100= 306.90 CFS
V100= 13.840 FT/S
HW100= 705.84'

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

CULVERT LAYOUT
CC-CW-A

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		57

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\5. Drainage\CR118_DRG_CULV.dgn
PLOTTED: 11/3/2022 12:52:23 PM

CULVERT CC-CW-A - EXISTING

SITE DATA	
Site Data Option:	Culvert Invert Data
Inlet Station:	82.55 ft
Inlet Elevation:	701.58 ft
Outlet Station:	115.59 ft
Outlet Elevation:	700.66 ft
Number of Barrels:	1

ROADWAY DATA	
Roadway Profile Shape:	Irregular
Roadway Surface:	Paved
Roadway Top Width:	22.00 ft

TAILWATER DATA	
Tailwater Channel Option:	Trapezoidal Channel
Channel Slope:	0.0100
Channel Manning's n:	0.0450
Channel Invert Elevation:	700.66 ft

CULVERT DATA	
Barrel Shape:	Concrete Box
Barrel Span:	12.00 ft
Barrel Rise:	4.00 ft
Barrel Material:	Concrete
Embedment:	0.00 in
Barrel Manning's n:	0.0120
Culvert Type:	Straight
Inlet Configuration:	Square Edge (90°) Headwall

CULVERT SUMMARY TABLE: EXISTING

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 Year	117.60	117.60	703.98	2.398	0.889	1-S2n	0.663	1.439	0.876	1.668	11.182	3.523
5 Year	157.90	157.90	704.50	2.914	1.262	1-S2n	0.789	1.752	1.101	1.923	11.956	3.812
10 Year	189.30	189.30	704.87	3.289	1.551	1-S2n	0.895	1.977	1.268	2.096	12.439	4.000
25 Year	233.40	233.40	705.38	3.796	1.966	1-S2n	1.023	2.273	1.493	2.313	13.029	4.227
50 Year	269.00	269.00	705.79	4.203	2.343	5-S2n	1.120	2.499	1.666	2.470	13.451	4.387
100 Year	306.90	306.90	706.23	4.648	2.805	5-S2n	1.219	2.279	1.846	2.625	13.858	4.540

SUMMARY OF FLOWS AT CROSSING: EXISTING

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CC-CW-A Discharge (cfs)	Roadway Discharge (cfs)	Iterations
703.98	2 Year	117.60	117.60	0.00	1
704.50	5 Year	157.90	157.90	0.00	1
704.87	10 Year	189.30	189.30	0.00	1
705.38	25 Year	233.40	233.40	0.00	1
705.79	50 Year	269.00	269.00	0.00	1
706.23	100 Year	306.90	306.90	0.00	1
707.20	Overtopping	382.82	382.82	0.00	Overtopping

NOTES:

1. HY-8 VERSION 7.6 USED FOR CULVERT HYDRAULIC CALCULATIONS.
2. DESIGNATED STORM EVENT IS 10 YEAR.

CULVERT CC-CW-A - PROPOSED

SITE DATA	
Site Data Option:	Culvert Invert Data
Inlet Station:	82.00 ft
Inlet Elevation:	701.60 ft
Outlet Station:	116.00 ft
Outlet Elevation:	700.67 ft
Number of Barrels:	1

ROADWAY DATA	
Roadway Profile Shape:	Irregular
Roadway Surface:	Paved
Roadway Top Width:	28.00 ft

TAILWATER DATA	
Tailwater Channel Option:	Trapezoidal Channel
Channel Slope:	0.0100
Channel Manning's n:	0.0450
Channel Invert Elevation:	700.66 ft

CULVERT DATA	
Barrel Shape:	Concrete Box
Barrel Span:	12.00 ft
Barrel Rise:	4.00 ft
Barrel Material:	Concrete
Embedment:	0.00 in
Barrel Manning's n:	0.0120
Culvert Type:	Straight
Inlet Configuration:	Square Edge (30-75 flare) Wingwall

CULVERT SUMMARY TABLE: PROPOSED

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 Year	117.60	117.60	703.76	2.165	0.886	1-S2n	0.669	1.439	0.878	1.668	11.160	3.523
5 Year	157.90	157.90	704.25	2.653	1.232	1-S2n	0.806	1.752	1.102	1.923	11.937	3.812
10 Year	189.30	189.30	704.60	3.002	1.514	1-S2n	0.904	1.977	1.270	2.096	12.420	4.000
25 Year	233.40	233.40	705.06	3.468	1.917	1-S2n	1.033	2.273	1.495	2.313	13.010	4.227
50 Year	269.00	269.00	705.44	3.840	2.295	1-S2n	1.131	2.499	1.669	2.470	13.433	4.387
100 Year	306.90	306.90	705.84	4.243	2.743	5-S2n	1.231	2.279	1.848	2.625	13.840	4.540

SUMMARY OF FLOWS AT CROSSING: PROPOSED

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CC-CW-A Discharge (cfs)	Roadway Discharge (cfs)	Iterations
703.76	2 Year	117.60	117.60	0.00	1
704.25	5 Year	157.90	157.90	0.00	1
704.60	10 Year	189.30	189.30	0.00	1
705.06	25 Year	233.40	233.40	0.00	1
705.44	50 Year	269.00	269.00	0.00	1
705.84	100 Year	306.90	306.90	0.00	1
707.69	Overtopping	455.14	455.14	0.00	Overtopping

11/3/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

HYDRAULIC CALCULATIONS
CULVERT CC-CW-A

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		58

50 YEAR SCOUR CALCULATIONS
PIER SCOUR COMPUTATION RESULTS

FREQ (yrs)	K_1	K_2	K_3	Y_1	a	Fr_1	V	y_s
50	1.0	1.0	1.1	3.64	3.00	0.75	8.09	6.23

*VELOCITY IS THE VELOCITY AT THE PIER FROM HEC-RAS FLOW DISTRIBUTION ASSUMING MAXIMUM FLOW VELOCITY IN SECTION

CONTRACTION SCOUR COMPUTATION RESULTS

FREQ (yrs)	Q_1	Q_2	W_1	W_2	y_1	y_2	y_0	y_c
50	1747	2104	62.97	59.58	4.30	5.24	3.58	1.66

100 YEAR SCOUR CALCULATIONS
PIER SCOUR COMPUTATION RESULTS

FREQ (yrs)	K_1	K_2	K_3	Y_1	a	Fr_1	V	y_s
100	1.0	1.0	1.1	3.92	3.00	0.78	8.81	6.52

*VELOCITY IS THE VELOCITY AT THE PIER FROM HEC-RAS FLOW DISTRIBUTION ASSUMING MAXIMUM FLOW VELOCITY IN SECTION

CONTRACTION SCOUR COMPUTATION RESULTS

FREQ (yrs)	Q_1	Q_2	W_1	W_2	y_1	y_2	y_0	y_c
100	2407	2070	62.97	59.58	4.55	4.15	3.90	0.25

PIER SCOUR ANALYSIS

USING HEC-18 EQ 7.1

$y_s = 2.0 * K_1 * K_2 * K_3 * y_1 * (a / y_1)^{0.65} * Fr_1^{0.43}$

WHERE:

y_s = PIER SCOUR DEPTH (FT)

K_1 = CORRECTION FACTOR FOR PIER NOSE SHAPE (FOR A GROUP OF CYLINDERS, K_1 = 1.0)

K_2 = CORRECTION FACTOR FOR ANGLE OF ATTACK (ANGLE OF ATTACK = 8°)

K_3 = CORRECTION FACTOR FOR BED CONDITION (DUNE HEIGHT < 10', K_3 = 1.1)

y_1 = FLOW DEPTH DIRECTLY UPSTREAM OF THE PIER (FT)

a = PIER WIDTH (FT)

$Fr_1 = V / (g*Y_1)^{0.5}$ = FROUDE NUMBER UPSTREAM OF PIER, WHERE V = VELOCITY AT PIER (FT / SEC), AND g = 32.2 FT / SEC^2 (GRAVITATIONAL CONSTANT)

LIVE BED CONTRACTION SCOUR ANALYSIS

USING HEC-18 EQ 6.2

$y_2 / y_1 = (Q_2 / Q_1)^{6/7} (W_1 / W_2)^{k_1}$ and $y_c = y_2 - y_1$

WHERE:

y_c = AVERAGE CONTRACTION SCOUR DEPTH

y_1 = AVERAGE DEPTH IN MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

y_2 = AVERAGE DEPTH IN CONTRACTED SECTION

Q_1 = FLOW IN UPSTREAM CHANNEL TRANSPORTING SEDIMENT

Q_2 = FLOW IN CONCENTRATED CHANNEL

W_1 = BOTTOM WIDTH OF MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

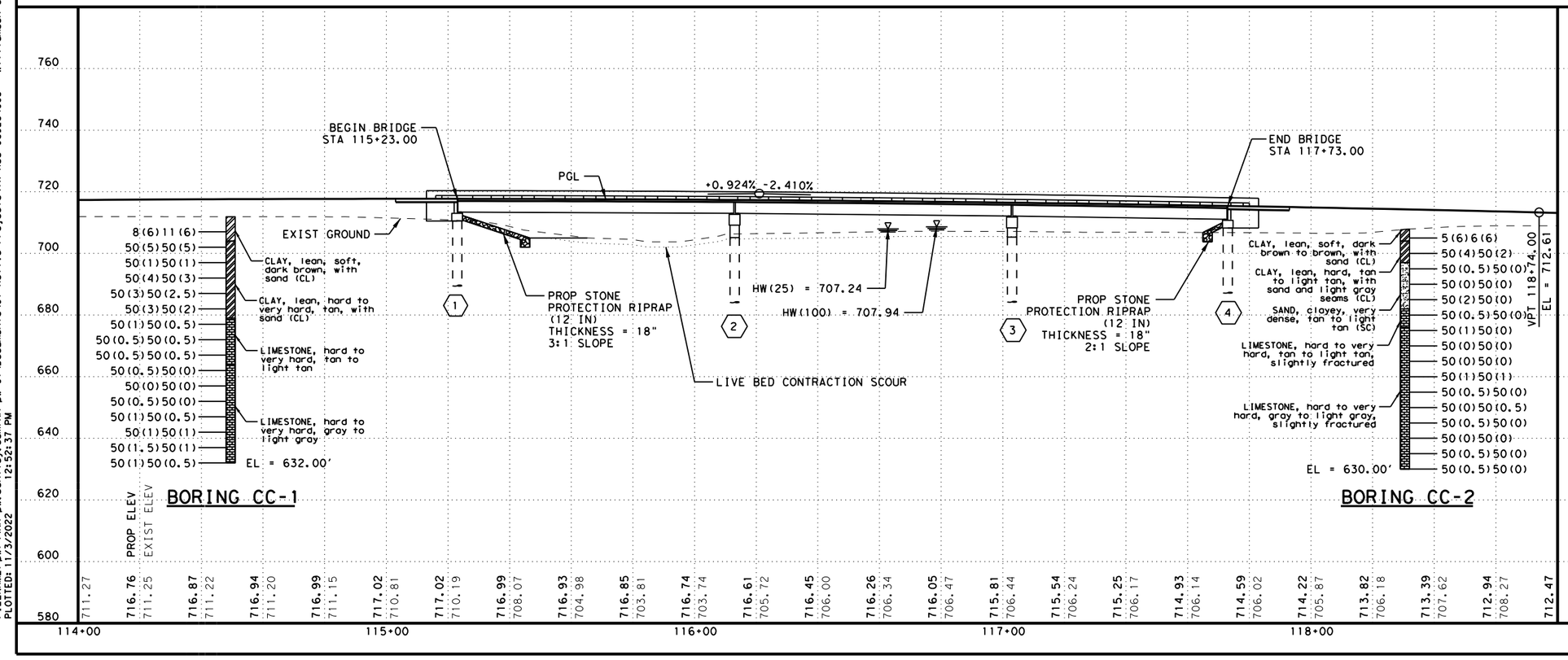
W_2 = BOTTOM WIDTH OF CONTRACTED SECTION LESS THE CUMULATIVE WIDTH OF PIERS

N

0' 20' 40' HORZ
0' 20' 40' VERT
SCALE

NOTES:

1. SCOUR ANALYSIS BASED ON TXDOT GEOTECHNICAL MANUAL (GM) AND FHWA H.E.C.-18 "EVALUATING SCOUR AT BRIDGES".
2. THE D50 SOIL PARTICLE SIZE FOR THIS PROJECT IS THE MINIMUM SIZE ALLOWED BY THE GM.
3. THE MAXIMUM CALCULATED SCOUR WAS DURING THE 50 YEAR STORM AT A DISHCHARGE OF 2104 CFS. THE BRIDGE WAS ANALYZED IN THE 50 AND 100 YR EVENTS.



11/3/2022

AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

SCOUR ANALYSIS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		59

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
122+66.34 (Lt)	1 ~12'x 4'	0.25'	SCP-12	SETB-FW-0	0°	4:1	12"	12"	0.250'	5.000'	18.667'	10.777'	21.554'	14.000'	33.554'	0.0	0.1	10.2	N/A
122+66.34 (Rt)	1 ~12'x 4'	1.75'	SCP-12	SETB-FW-0	0°	4:1	12"	12"	0.250'	5.000'	18.667'	10.777'	21.554'	14.000'	33.554'	0.0	0.1	10.2	N/A

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

11/15/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED
PROFESSIONAL ENGINEER

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		60

DATE: 11/15/2022 1:23:34 PM
FILE: c:\pw\khl\d0221693\bcsstde1-20.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities (3) per ft of wing length (Two~Wings) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING (Two~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

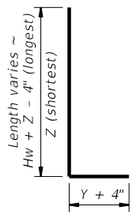
(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, 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.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

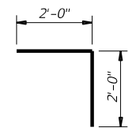
TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

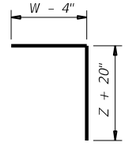


BARS J1

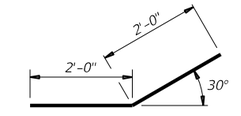
BARS V



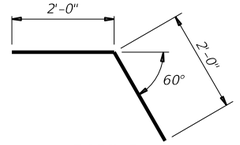
BARS L



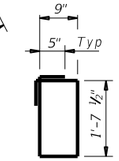
BARS J2



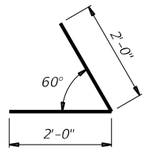
BARS D



BARS R



BARS K
(Length = 5'-5")



BARS OL

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (tan (30°))
Lw = (A) ÷ cos (30°))

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (two wings ~ SF) = (Hw + 0.333') (Lw)

Hw = Height of wingwall (feet)
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)

See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.

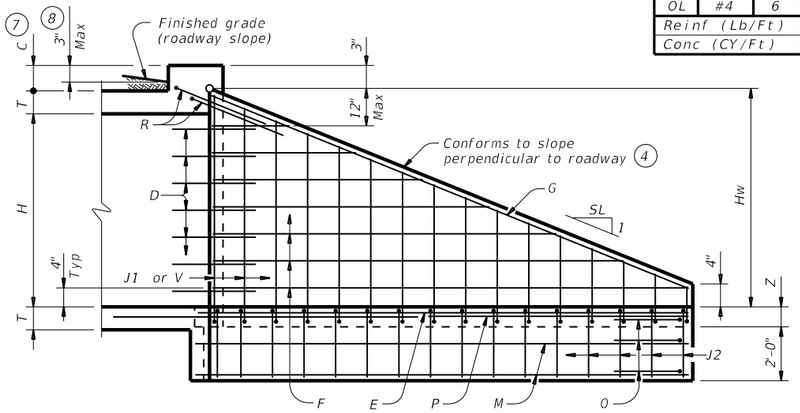
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in 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.
Provide Class "C" concrete (f`c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners 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 and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

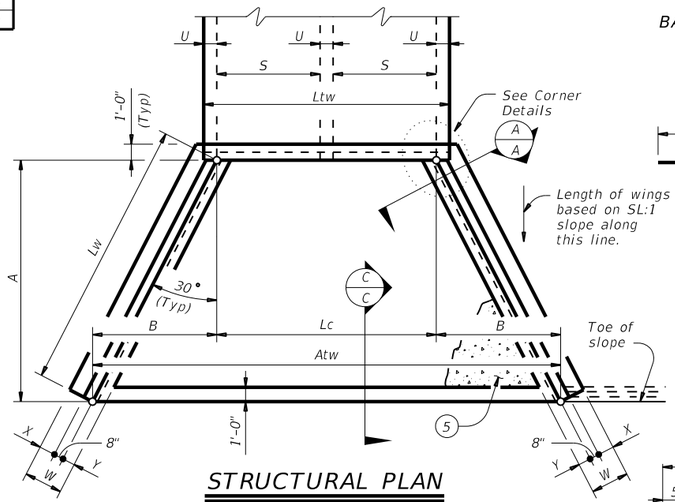
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing 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.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, 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.

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



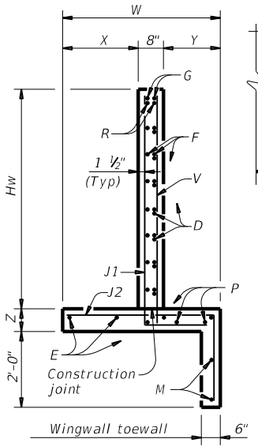
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

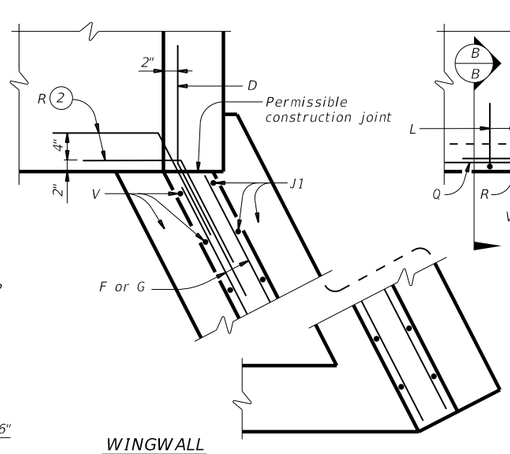


STRUCTURAL PLAN

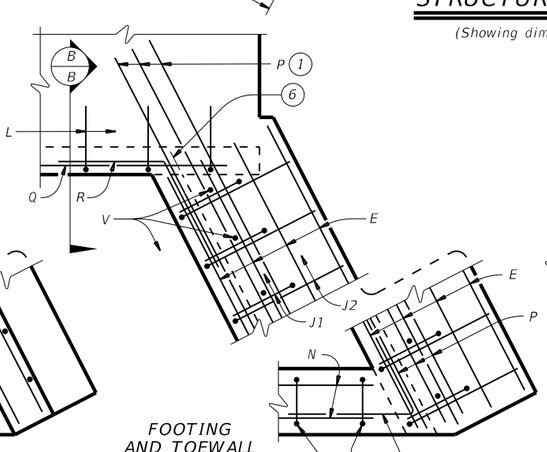
(Showing dimensions.)



SECTION A-A



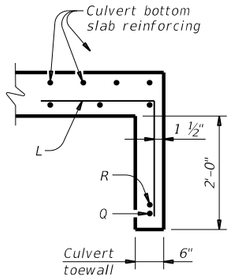
WINGWALL



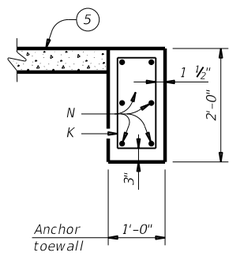
FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

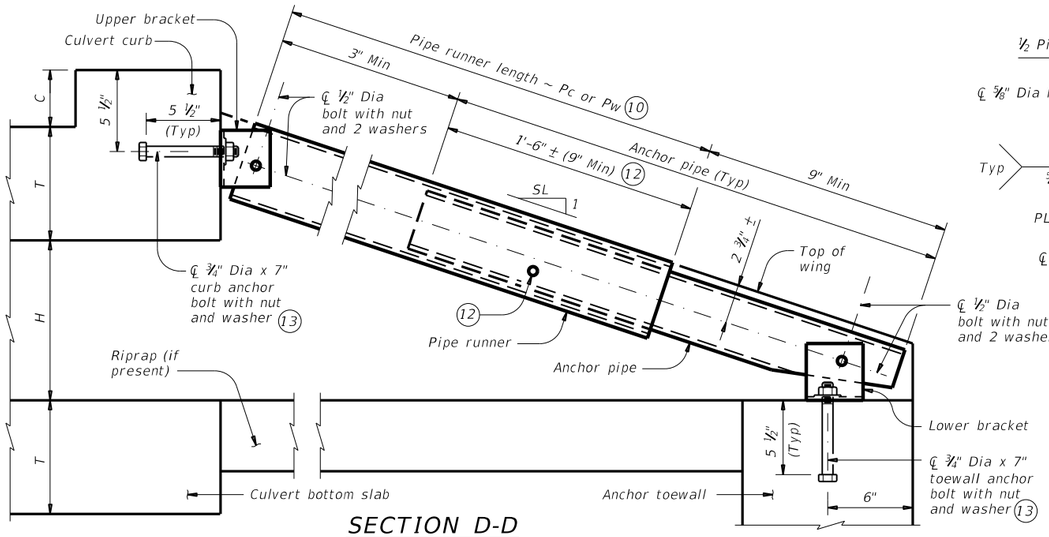
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

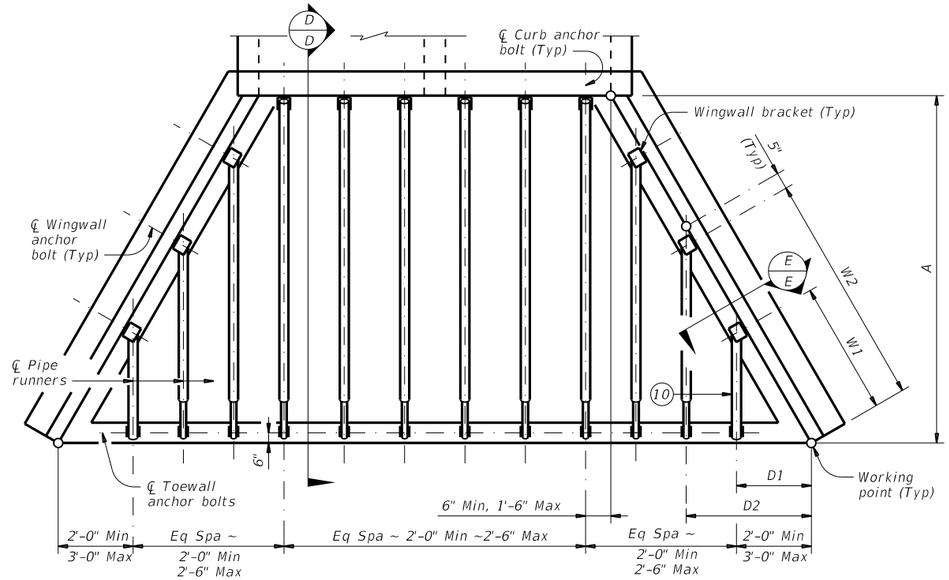
FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		61

DATE: 11/3/2022 12:52:53 PM
FILE: c:\pw\kh1\d0221693\setbf0se-20.dgn

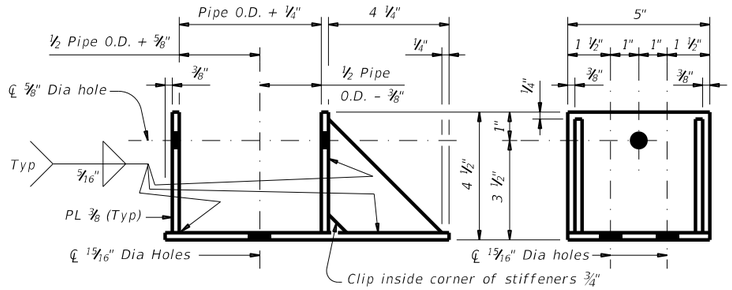


SECTION D-D

(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)

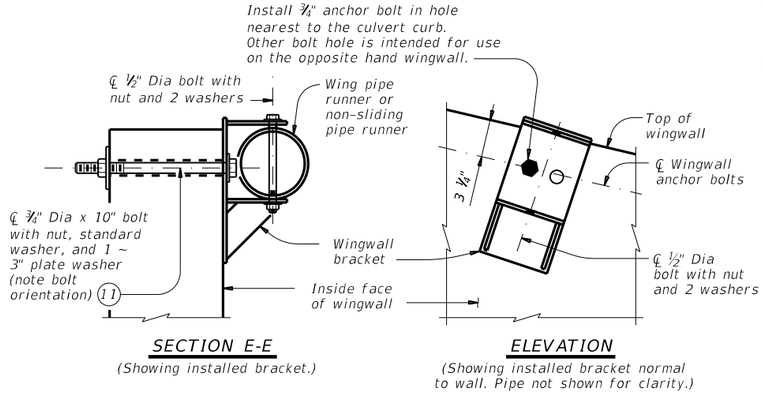


PIPE RUNNER PLAN



ELEVATION

SIDE VIEW



SECTION E-E

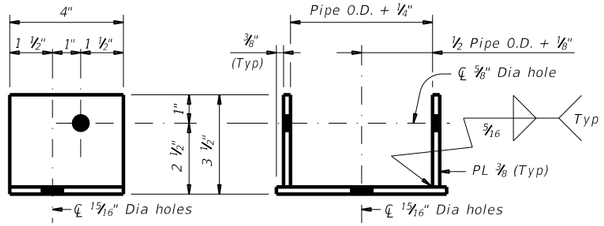
(Showing installed bracket.)

ELEVATION

(Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

WINGWALL BRACKET DETAILS

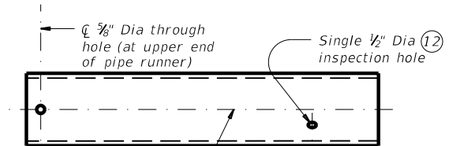


SIDE VIEW

ELEVATION

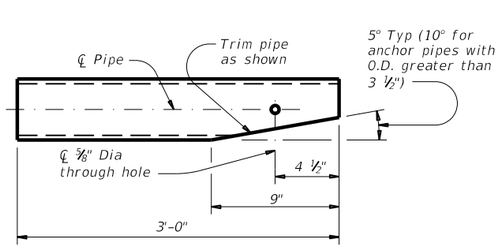
Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

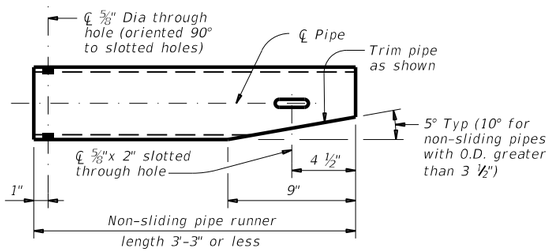


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) If pipe runner length (Pw) is 1'-9" or less replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of pipe runner, use the ½" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (2.000) (Dn) – (0.416')
Pwn = (Dn) (K2) – (2.063')
Pw1 Non-Sliding Pipe Runner (If required) = (D1) (K2) – (0.563')
Pc = (A) (K1) – (1.688')

Wn = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)
Dn = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)
Pw = Wingwall pipe runner length (feet)
Pc = Curb pipe runner length (feet)
K = Constant values for use in formulas

Slope SL:1	K1		K2
3:1	~ 1.054	~	1.826
4:1	~ 1.031	~	1.785
6:1	~ 1.014	~	1.756

n = Wing pipe runner number

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

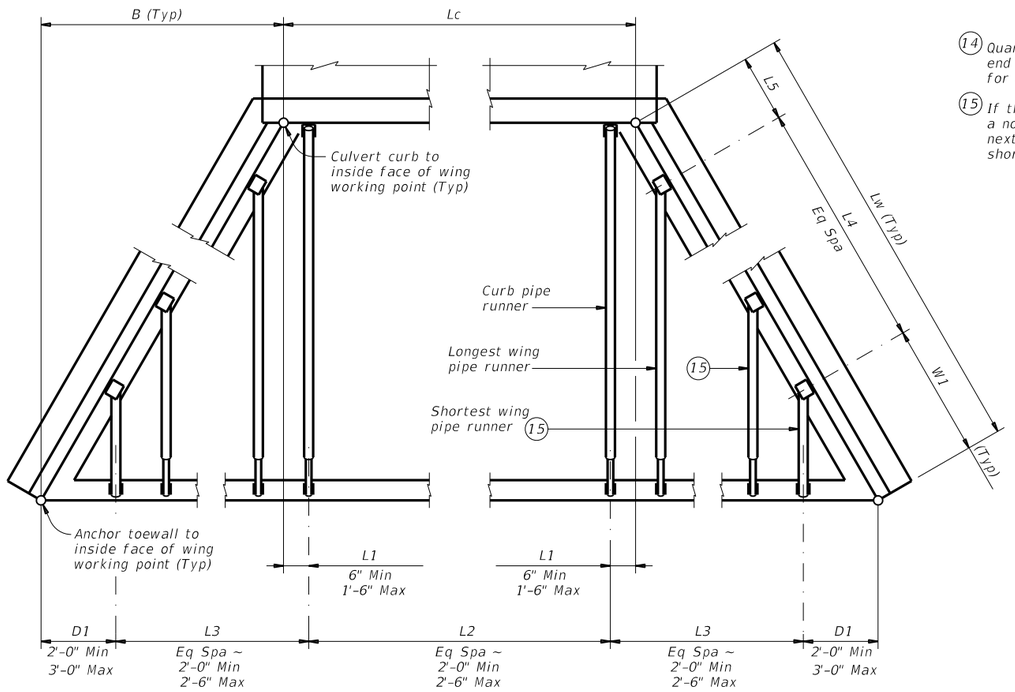
FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		62

DATE: 11/3/2022 12:52:53 PM
FILE: c:\pw\km1\d0221693\setbf0se-20.dgn

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total Length (14)	Size (2",3" or 4")	Total Length (14)
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)				
122+66.34 (Lt)	12.000'	1.000'	4	2.500'	10.000'	3.000'	4	2.194'	8.777'	5.583'	3	4.389'	13.166'	2.805'	5	17.563'	15.042'	3.292'	N/A	4"	161.146'	3"	39.000'
122+66.34 (Rt)	12.000'	1.000'	4	2.500'	10.000'	3.000'	4	2.194'	8.777'	5.583'	3	4.389'	13.166'	2.805'	5	17.563'	15.042'	3.292'	N/A	4"	161.146'	3"	39.000'



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(15) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

11/15/2022

STATE OF TEXAS
AUSTIN S. HELTON
124922
LICENSED PROFESSIONAL ENGINEER

DATE: 11/15/2022 1:23:39 PM
FILE: c:\pw\kh1\d0221693\setbf0se-20.dgn

SHEET 3 OF 3

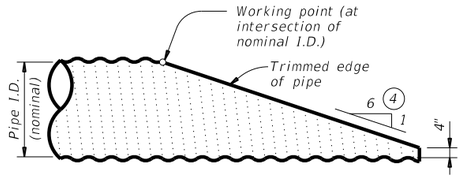
Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

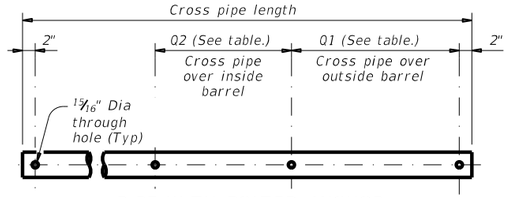
FILE: setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		63



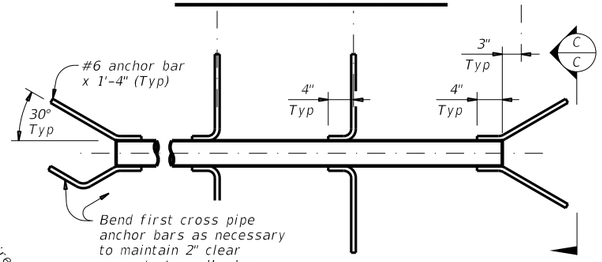
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

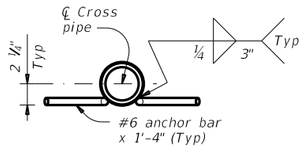
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

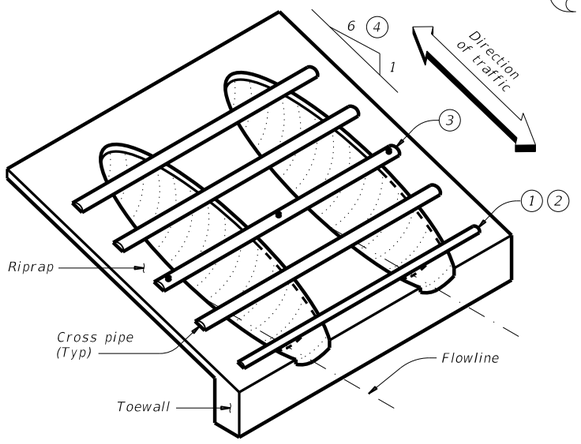


PIPE WITH ANCHOR BARS

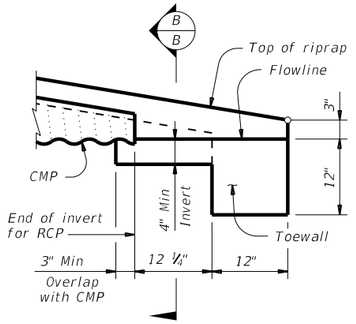


SECTION C-C

CROSS PIPE DETAILS

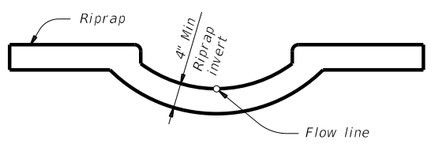


ISOMETRIC VIEW OF TYPICAL INSTALLATION



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.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

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"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
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"		

(1) 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.

(2) 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.

(3) 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.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

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

(6) 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.

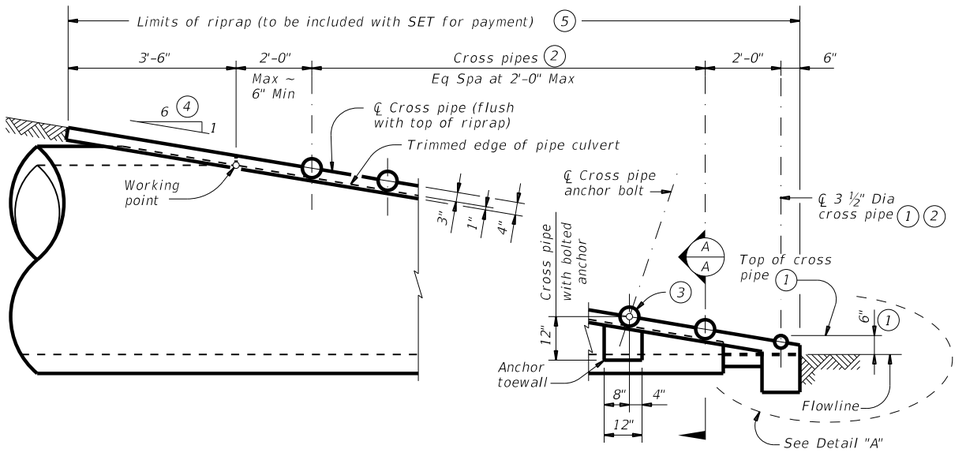
GENERAL NOTES:

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.

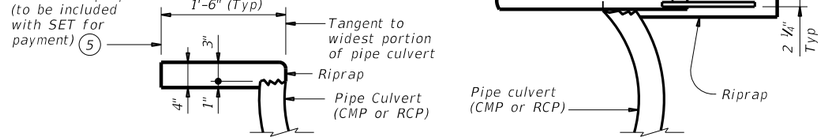
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



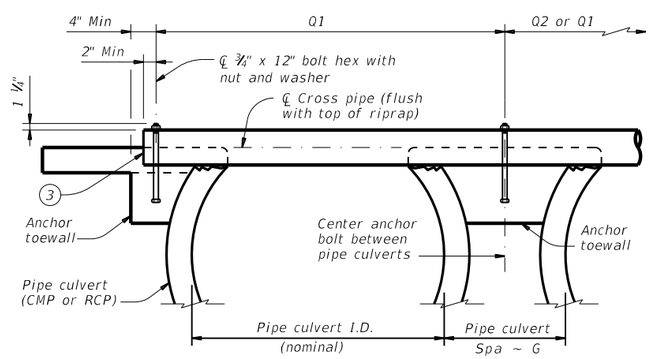
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

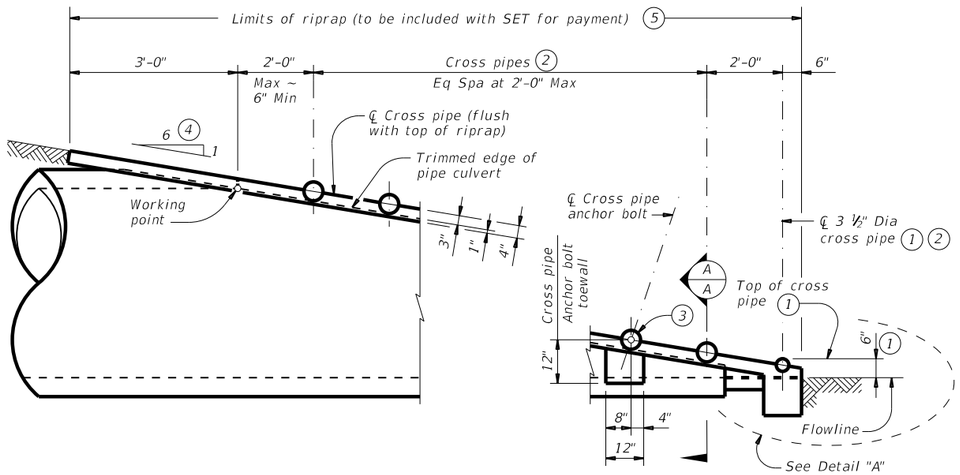
SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		64

DATE: 11/3/2022 12:53:00 PM
FILE: c:\pw\kh1\d0221693\setppdse-20 (1).dgn



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.)

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES 2

Corrugated Metal Pipe (CMP) Culverts

Design	Conc Riprap (CY) 6	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	17"	13"	1' – 0"	N/A	2' – 8"	2' – 5"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	21"	15"	1' – 2"	N/A	3' – 1"	2' – 11"		
3	0.9	28"	20"	1' – 5"	N/A	3' – 9"	3' – 9"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
4	1.0	35"	24"	1' – 8"	4' – 4"	4' – 6"	4' – 7"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	42"	29"	1' – 11"	4' – 11"	5' – 2"	5' – 5"		
6	1.4	49"	33"	2' – 2"	5' – 6"	5' – 11"	6' – 3"	All pipe culverts	5" Std (5.563" O.D.)
7	1.6	57"	38"	2' – 5"	6' – 2"	6' – 8"	7' – 2"		
8	1.8	64"	43"	2' – 10"	6' – 9"	7' – 6"	8' – 2"		
9	1.9	71"	47"	3' – 2"	7' – 4"	8' – 3"	9' – 1"		

Reinforced Concrete Pipe (RCP) Culverts

Design	Conc Riprap (CY) 6	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	22"	13 ½"	1' – 0"	N/A	3' – 1"	2' – 10"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	26"	15 ½"	1' – 2"	N/A	3' – 6"	3' – 4"		
3	0.9	28 ½"	18"	1' – 5"	N/A	3' – 10"	3' – 9 ½"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
4	1.0	36 ¼"	22 ½"	1' – 8"	4' – 5"	4' – 7"	4' – 8 ¼"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	43 ¾"	26 ⅝"	1' – 11"	5' – 1"	5' – 4"	5' – 6 ¾"		
6	1.4	51 ½"	31 ⅝"	2' – 2"	5' – 8"	6' – 1"	6' – 5 ¼"	All pipe culverts	5" Std (5.563" O.D.)
7	1.6	58 ½"	36"	2' – 5"	6' – 4"	6' – 10"	7' – 3 ½"		
8	1.8	65"	40"	2' – 10"	6' – 10"	7' – 7"	8' – 3"		
9	1.9	73"	45"	3' – 2"	7' – 6"	8' – 5"	9' – 3"		

1. 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.
2. 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.
3. 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.
4. Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
5. Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".
6. Quantities shown are for one end of one pipe culvert. For multiple Pipe 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.

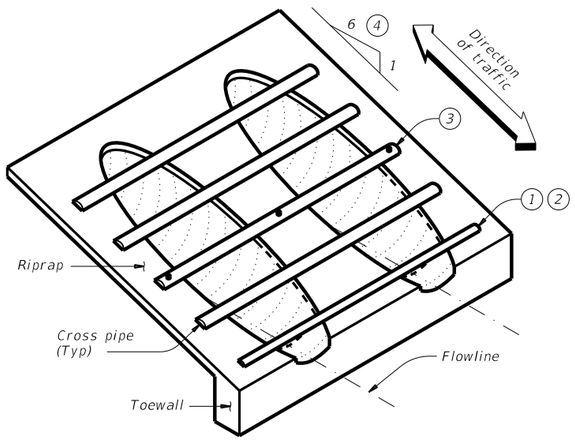
GENERAL NOTES:

Pipe runners 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.

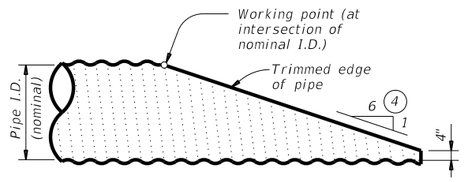
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

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.



ISOMETRIC VIEW OF TYPICAL INSTALLATION



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 cipe (RCP) culvert are similar.)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

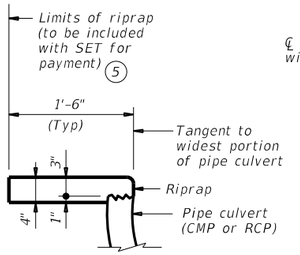
SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

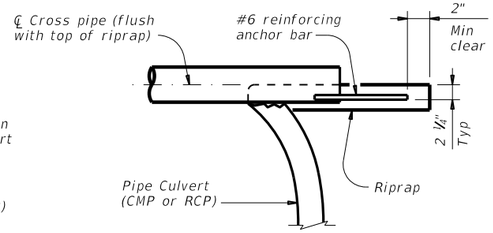
SETP-PD-A

FILE: setppase-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		65

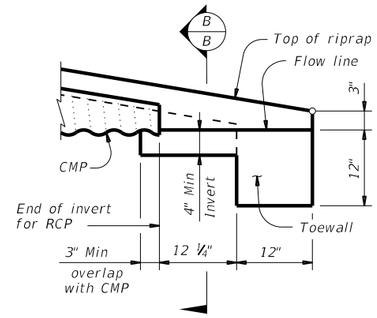
DATE: 11/3/2022 12:53:07 PM
FILE: c:\pw\khl\d0221693\setppase-20 (1).dgn



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

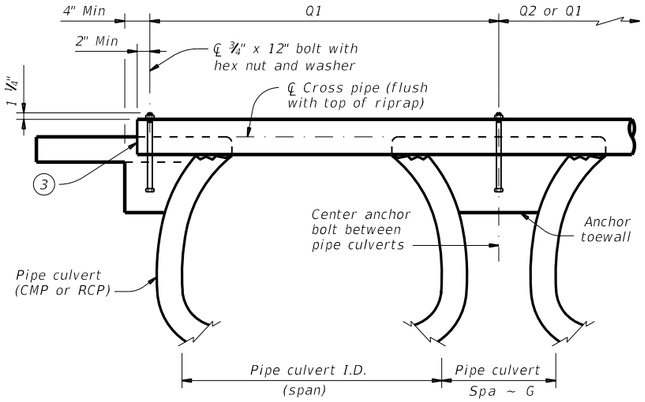


SHOWING CROSS PIPE WITH ANCHOR BAR



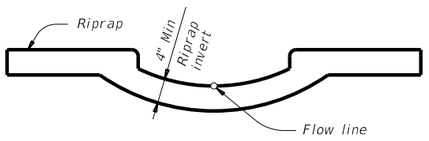
DETAIL "A"

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



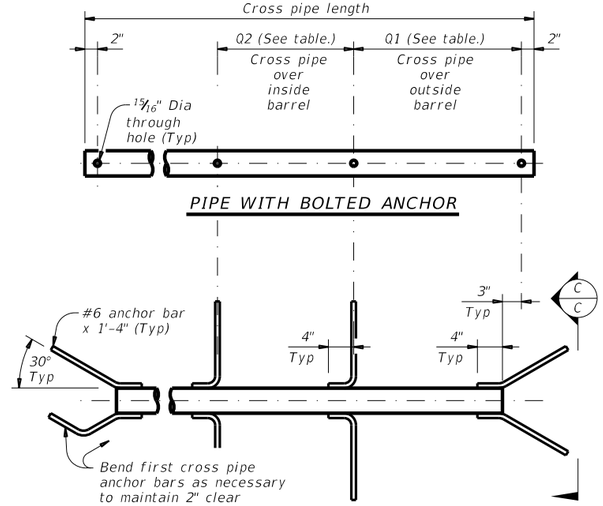
SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

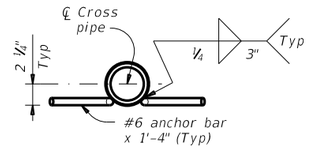


SECTION B-B

(Cross pipes not shown for clarity.)



PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

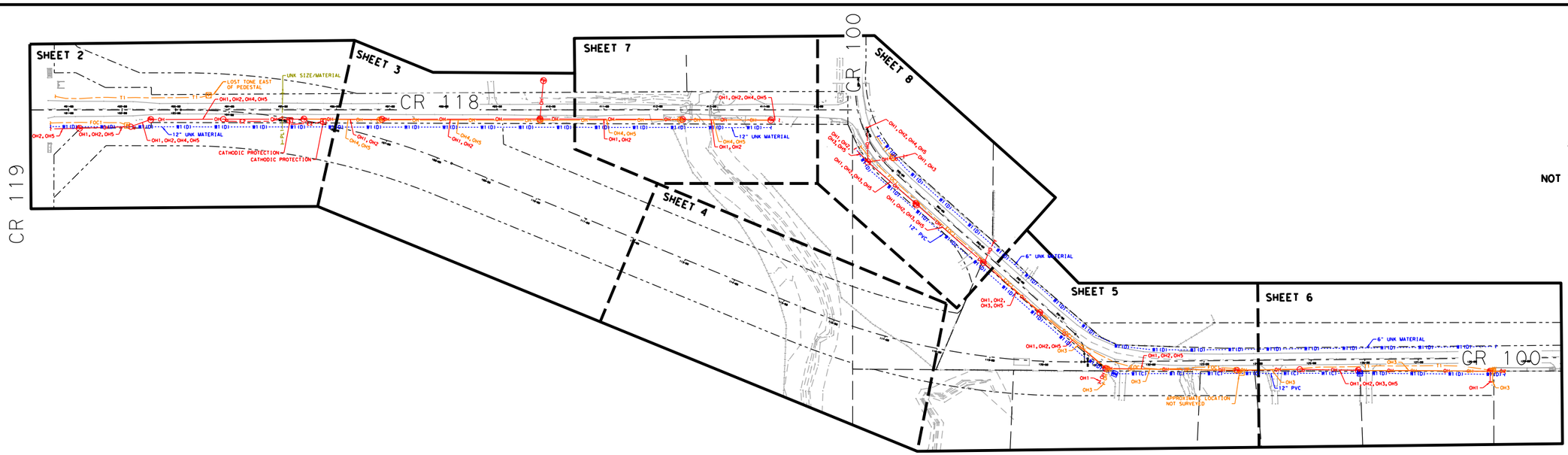
SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

FILE: setppase-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		66

DATE: 11/3/2022 12:53:08 PM
FILE: c:\pw\khl\d0221693\setppase-20 (1).dgn



SPECIAL NOTES

1. ALL PIPE SIZES WERE TAKEN FROM UTILITY RECORDS WHERE POSSIBLE. THE UTILITIES DEPICTED WERE INVESTIGATED BY THE RIOS GROUP, INC.. ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION, WAS PROVIDED BY OTHERS AND THE RIOS GROUP, INC. DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 02/11/2022. THE RIOS GROUP, INC. EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR NEW UTILITY INSTALLATIONS, MODIFICATIONS, AND/OR ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME OF FIELD INVESTIGATION. CALL TEXAS ONE CALL SYSTEM (800)245-4545 FOR UTILITY LOCATIONS 48 HOURS PRIOR TO ANY WORK.

4. WHERE POSSIBLE, WATER, GAS, AND COMMUNICATION SERVICE LINES WERE DESIGNATED. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS MAY NOT SHOW SERVICE LINE LOCATIONS. THEREFORE ALL SERVICE LINES MAY NOT BE SHOWN.

QUALITY LEVELS

Quality Level "D" - Information derived from existing records and/or oral collection.

Quality Level "C" - Information obtained by surveying and plotting visible above ground utility features and by using professional judgment in correlating information to Quality Level "D" information.

Quality Level "B" - Designate: Two-dimensional horizontal mapping. This information is obtained through the application and interpretation of appropriate non-destructive surface geophysical methods. Utility indications are referenced to established survey control. Incorporates Quality Levels "C" and "D" information to produce Quality Level "B" information.

Quality Level "A" - Locate: Precise horizontal and vertical location of utilities obtained by the actual exposure and subsequent measurement of subsurface utilities at a specific point. Diameters shown are verified visually and may not be exact.

MATERIAL ABBREVIATIONS

STL - STEEL
PE - POLYETHYLENE
AC - TRANSITE
CI - CAST IRON
DI - DUCTILE IRON
PVC - POLYVINYL CHLORIDE
DBC - DIRECT BURIED CABLE
RCP - REINFORCED CONCRETE PIPE
VC - VITRIFIED CLAY
FG - FIBERGLASS
CSC - CONCRETE/STEEL CYLINDER
CMP - CORRUGATED METAL PIPE
CONC - CONCRETE
CLAY - CLAY
UNK - UNKNOWN

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

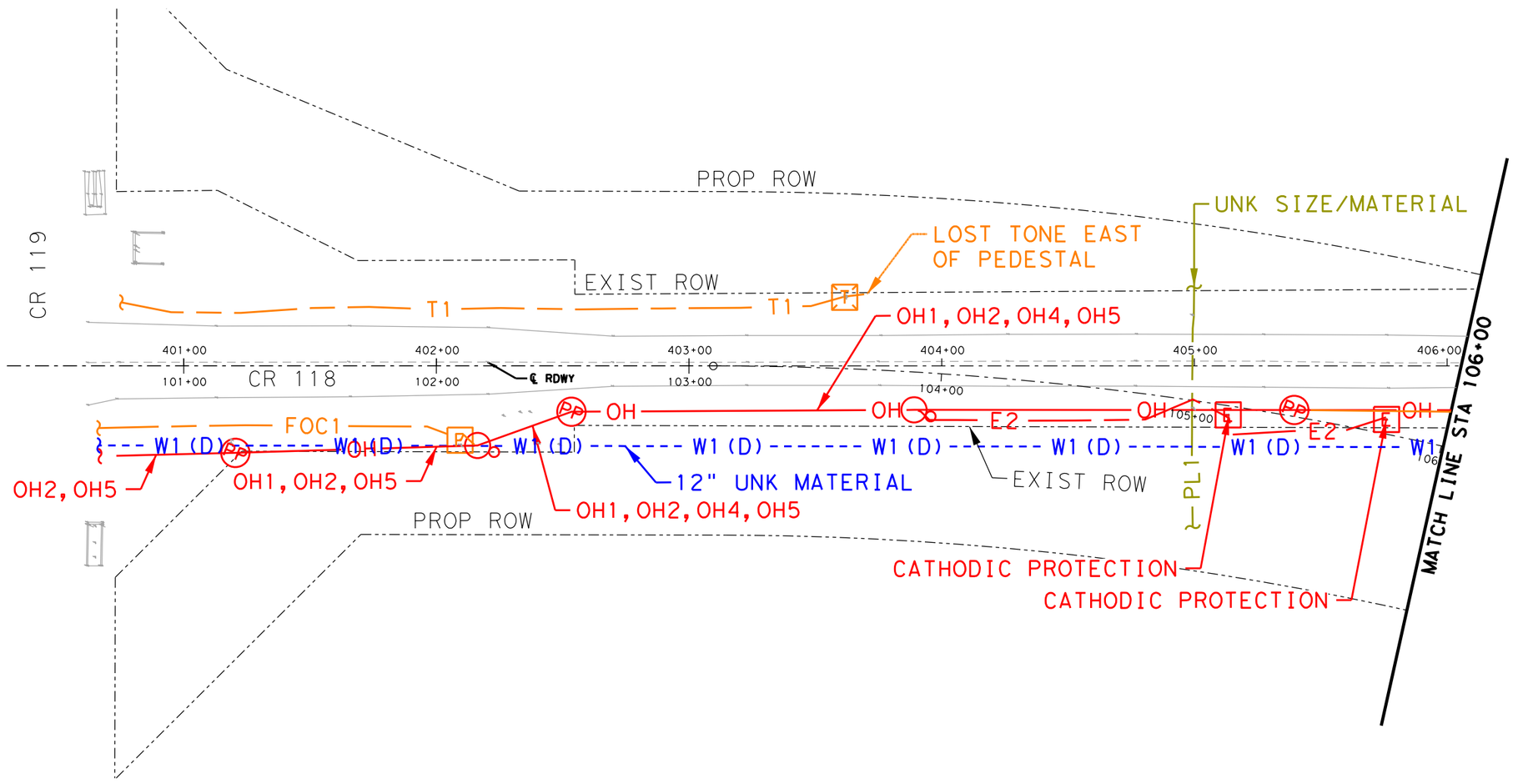
INDEX LAYOUT

SHEET 01 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	67
CONT.	SECT.	JOB	
0914	05	204,220	

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$SYTIME$$$



LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE)
UNITE PRIVATE
NETWORK (FO/DUCT)

QL "B" — T1 —
— FOC1 —

ELECTRIC / POWER

ONCOR
PRIVATE

QL "B" — E1 —
— E2 —

GAS / PETROLEUM

ATMOS

QL "B" — PL1 —

POTABLE WATER

JONAH WATER

QL "C" ------- W1 (C) -------

JONAH WATER

QL "D" ------- W1 (D) -------

OVERHEAD UTILITY

OVERHEAD UTILITY

QL "C" ——— OH ———

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER

WATER METER

FILENAME: $$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$$SYTIME$$$

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

BEGIN PROJECT TO
ALIGNMENT STA 106+00

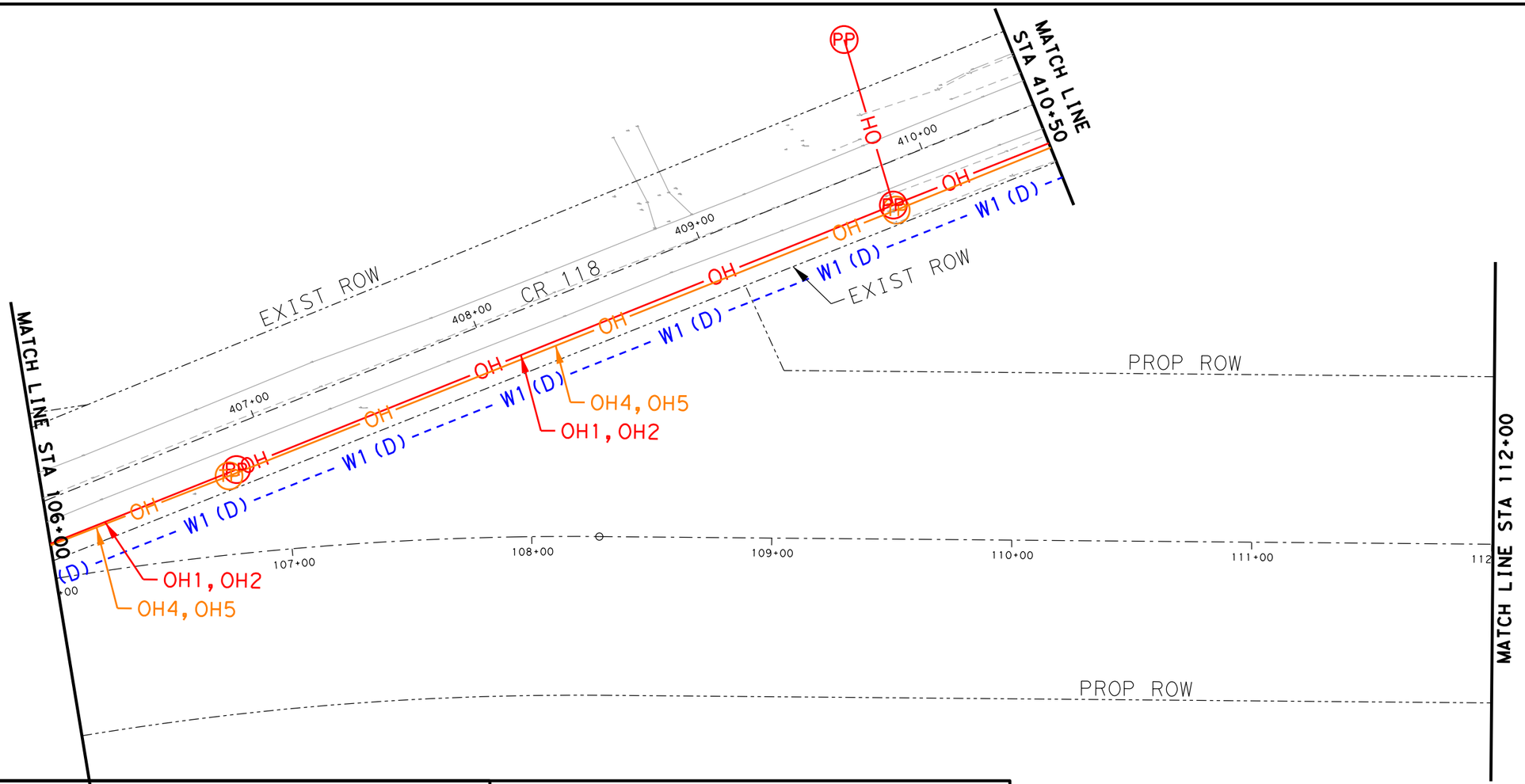
SHEET 02 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	68
CONT.	SECT.	JOB	
0914	05	204,220	

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.



N

0' 50' 100'

SCALE

LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE) / UNITE PRIVATE NETWORK (FO/DUCT) — QL "B" — T1 / FOC1

ELECTRIC / POWER

ONCOR / PRIVATE — QL "B" — E1 / E2

GAS / PETROLEUM

ATMOS — QL "B" — PL1

POTABLE WATER

JONAH WATER — QL "C" — W1 (C)

JONAH WATER — QL "D" — W1 (D)

OVERHEAD UTILITY

OVERHEAD UTILITY

QL "C" — OH

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
WATER METER

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$$YTIME$$$

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive Building K, Suite 400 Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

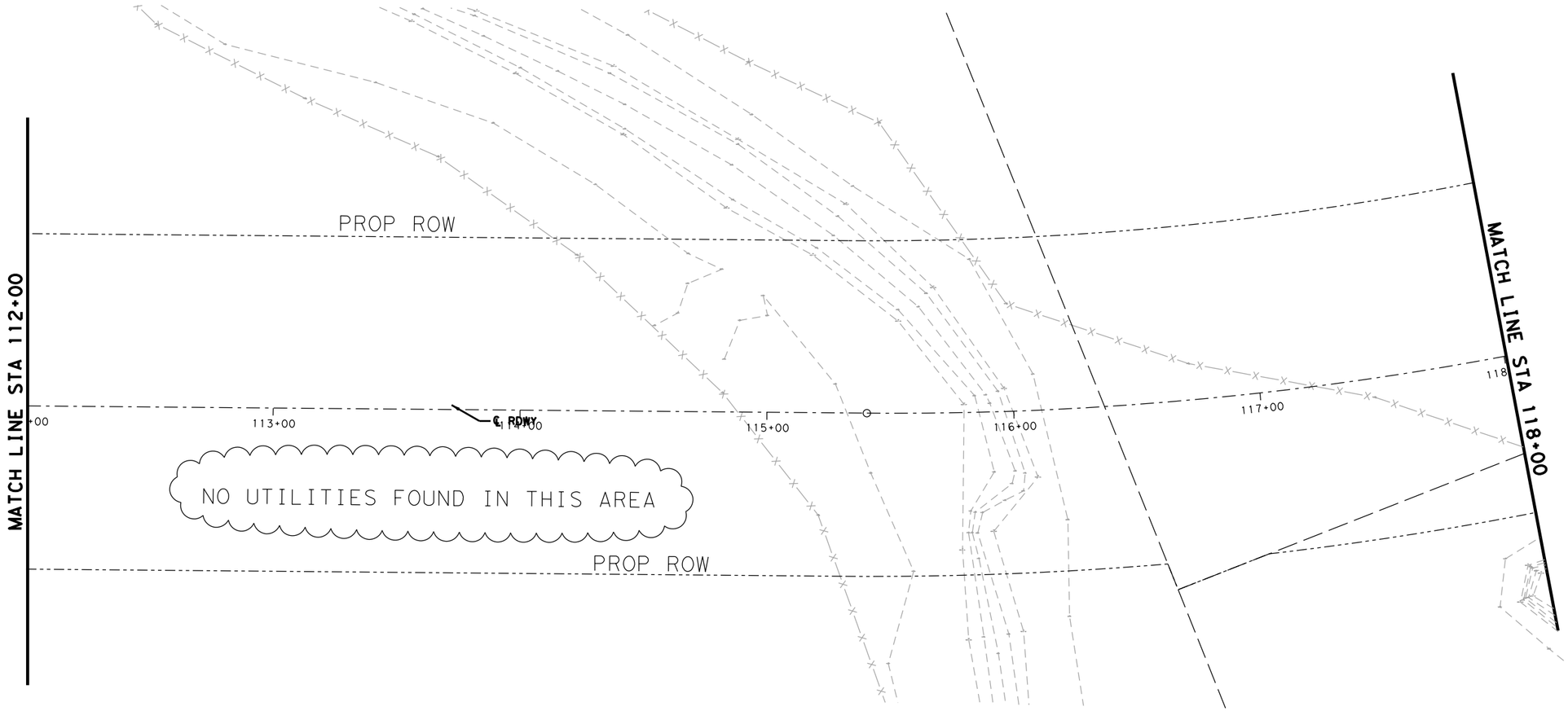
S.U.E. PLAN SHEET

ALIGNMENT STA 106+00 TO
ALIGNMENT STA 112+00

SHEET 03 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	69
CONT.	SECT.	JOB	
0914	05	204,220	



N

0' 50' 100'

SCALE

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE) / UNITE PRIVATE NETWORK (FO/DUCT) — QL "B" — T1 / FOC1

ELECTRIC / POWER

ONCOR — QL "B" — E1
PRIVATE — QL "B" — E2

GAS / PETROLEUM

ATMOS — QL "B" — PL1

POTABLE WATER

JONAH WATER — QL "C" — W1 (C)
JONAH WATER — QL "D" — W1 (D)

OVERHEAD UTILITY

OVERHEAD UTILITY

QL "C" — OH

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
WATER METER

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive Building K, Suite 400 Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

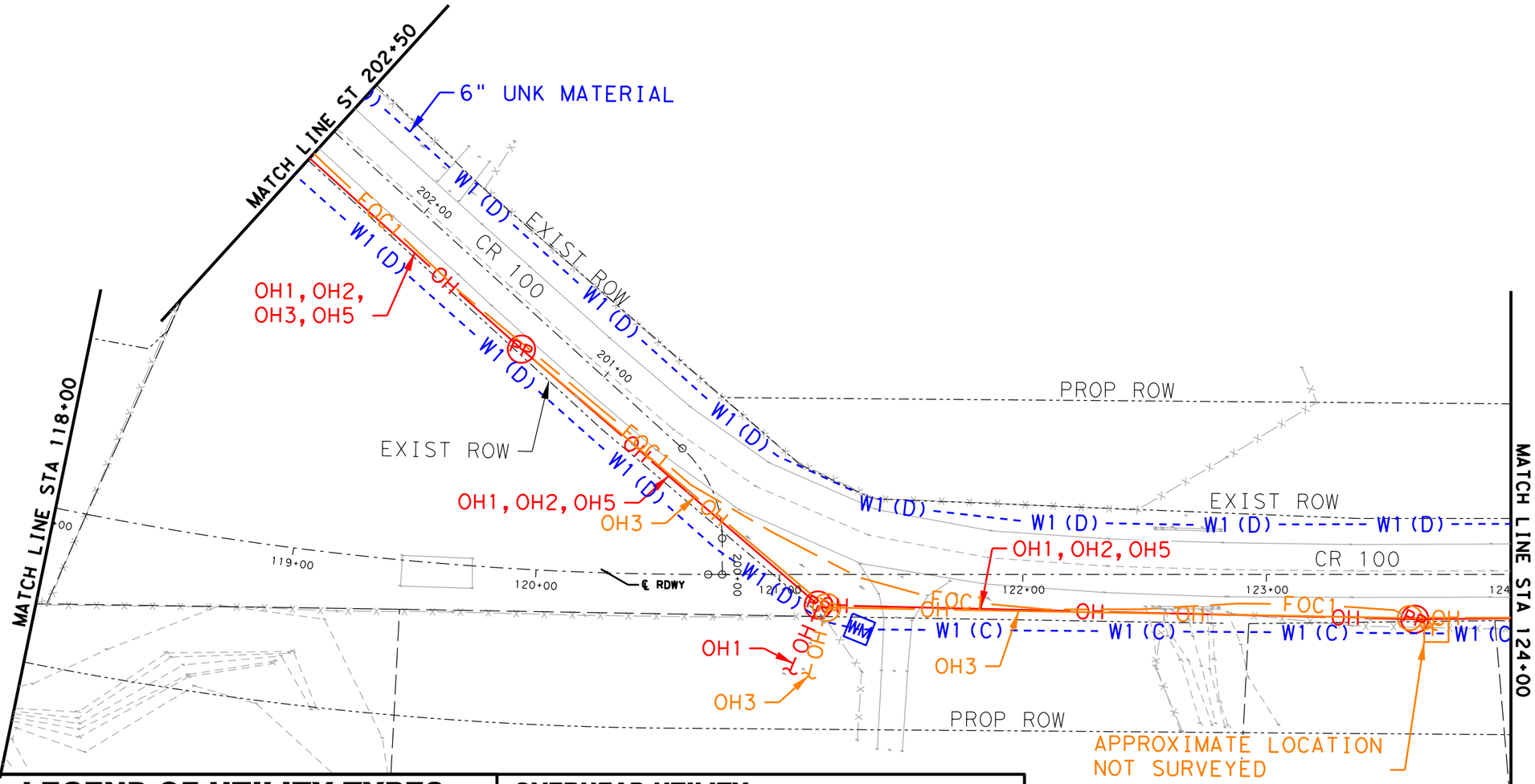
ALIGNMENT STA 112+00 TO
ALIGNMENT STA 118+00

SHEET 04 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	70
CONT.	SECT.	JOB	
0914	05	204,220	

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$$YTIME$$$



LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE)
UNITE PRIVATE NETWORK (FO/DUCT)

QL "B" — T1 —
QL "B" — FOC1 —

ELECTRIC / POWER

ONCOR
PRIVATE

QL "B" — E1 —
QL "B" — E2 —

GAS / PETROLEUM

ATMOS

QL "B" — PL1 —

POTABLE WATER

JONAH WATER

QL "C" ------- W1 (C) -------

JONAH WATER

QL "D" ------- W1 (D) -------

OVERHEAD UTILITY

OVERHEAD UTILITY

QL "C" — OH —

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER

ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER

WATER METER

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$$DATE$$$$ $$$SYTIME$$$

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED
PROFESSIONAL ENGINEER

11-04-2022

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

ALIGNMENT STA 118+00 TO
ALIGNMENT STA 124+00

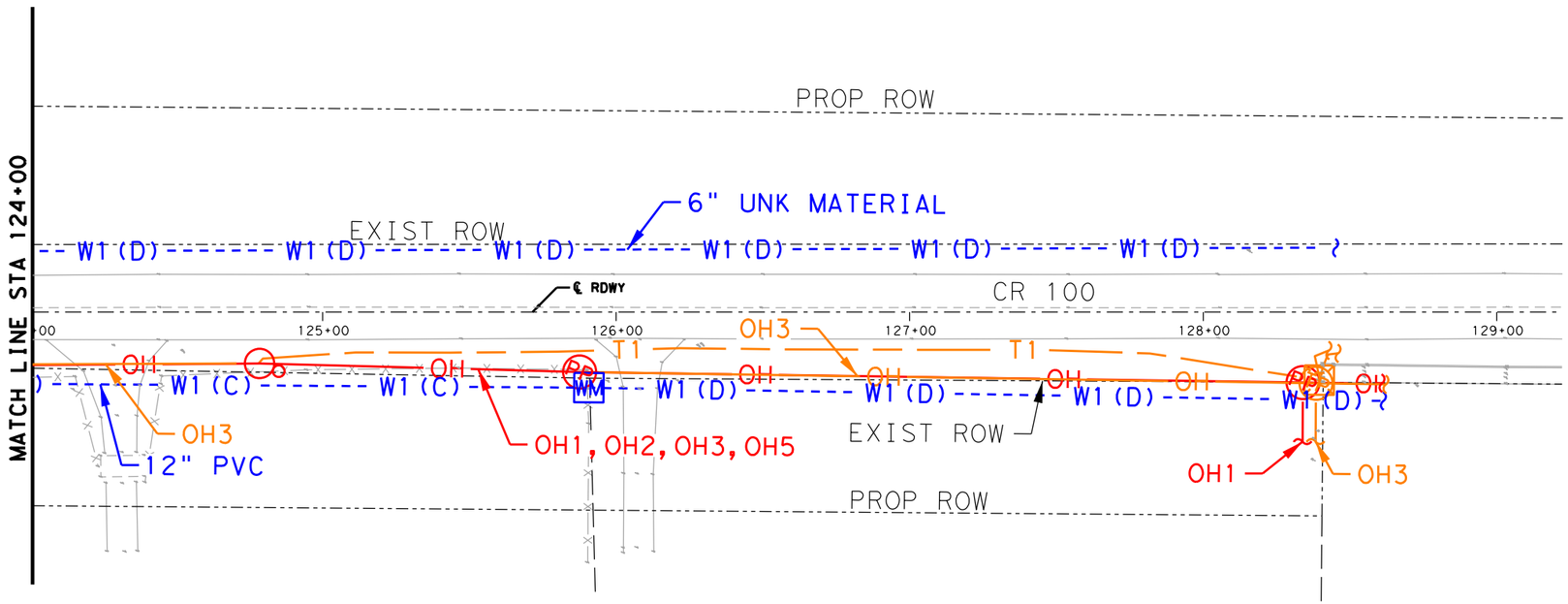
SHEET 05 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	71
CONT.	SECT.	JOB	
0914	05	204,220	

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.



LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE) / UNITE PRIVATE NETWORK (FO/DUCT) — QL "B" — T1 / FOC1

ELECTRIC / POWER

ONCOR / PRIVATE — QL "B" — E1 / E2

GAS / PETROLEUM

ATMOS — QL "B" — PL1

POTABLE WATER

JONAH WATER — QL "C" — W1 (C)

JONAH WATER — QL "D" — W1 (D)

OVERHEAD UTILITY

OVERHEAD UTILITY

QL "C" — OH

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
WATER METER

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

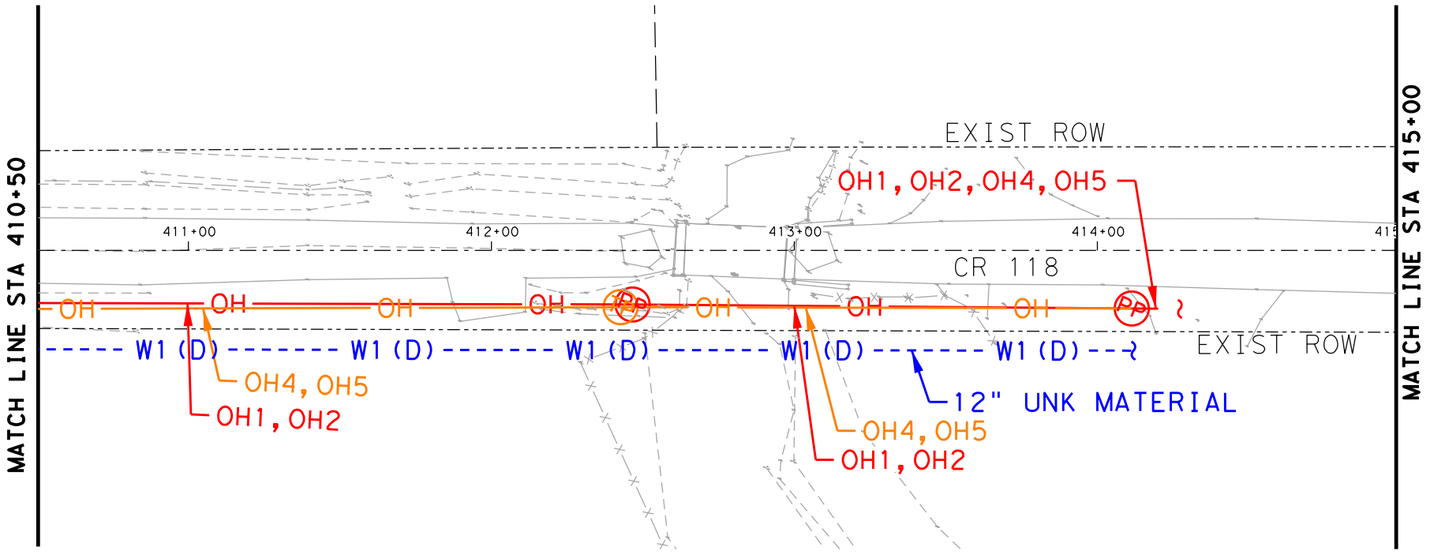
ALIGNMENT STA 124+00 TO
END OF PROJECT

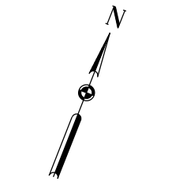
SHEET 06 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	72
CONT.	SECT.	JOB	
0914	05	204,220	

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$$YYTIME$$$





The Rios Group, Inc.
TBPE Firm # F-14595

11-04-2022

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

S.U.E. PLAN SHEET

MATCH LINE SHEET 3 TO
MATCH LINE SHEET 8

SHEET 07 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	73
CONT.	SECT.	JOB	
0914	05	204,220	

LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE)
UNITE PRIVATE NETWORK (FO/DUCT)
QL "B" — T1 — FOC1

ELECTRIC / POWER

ONCOR
PRIVATE
QL "B" — E1 — E2

GAS / PETROLEUM

ATMOS
QL "B" — PL1 —

POTABLE WATER

JONAH WATER
QL "C" — W1 (C) —

JONAH WATER
QL "D" — W1 (D) —

OVERHEAD UTILITY

QL "C" — OH —

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER

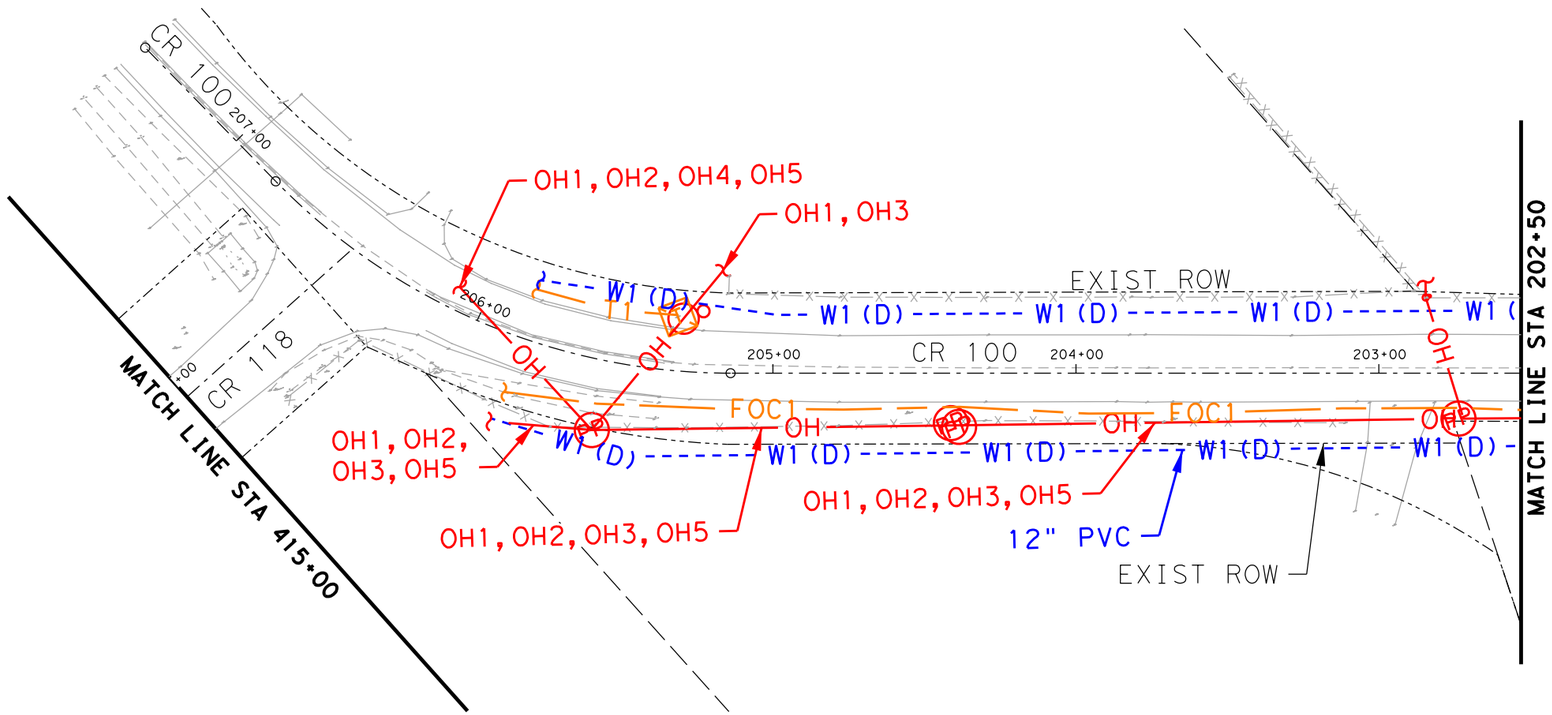
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER

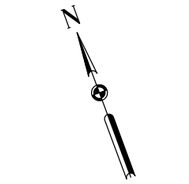
WATER METER

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$$ $$$$SYTIME$$$$





LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY - - - - - - -

COMMUNICATIONS

LUMEN (TELE)
UNITE PRIVATE
NETWORK (FO/DUCT)
QL "B" — T1 — FOC1

ELECTRIC / POWER

ONCOR
PRIVATE
QL "B" — E1 — E2

GAS / PETROLEUM

ATMOS
QL "B" — PL1

POTABLE WATER

JONAH WATER
QL "C" W1 (C)

JONAH WATER
QL "D" W1 (D)

OVERHEAD UTILITY

QL "C" — OH

OH1 - ONCOR
OH2 - FIBERLIGHT
OH3 - LUMEN (TELE)
OH4 - UNITE PRIVATE NETWORK (FOC)
OH5 - SPECTRUM (FOC)

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
FIBER HANDHOLE
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
WATER METER

FILENAME: $$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$
PLOTTED: $$DATE$$$ $$$SYTIME$$$

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

The Rios Group, Inc.
TBPE Firm # F-14595

STATE OF TEXAS
TRAVIS S. ISAACSON
100094
LICENSED PROFESSIONAL ENGINEER

11-04-2022

90% PLANS

Kimley»Horn F-928

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
575 Round Rock West Drive
Building K, Suite 400
Round Rock, TX 78681

© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

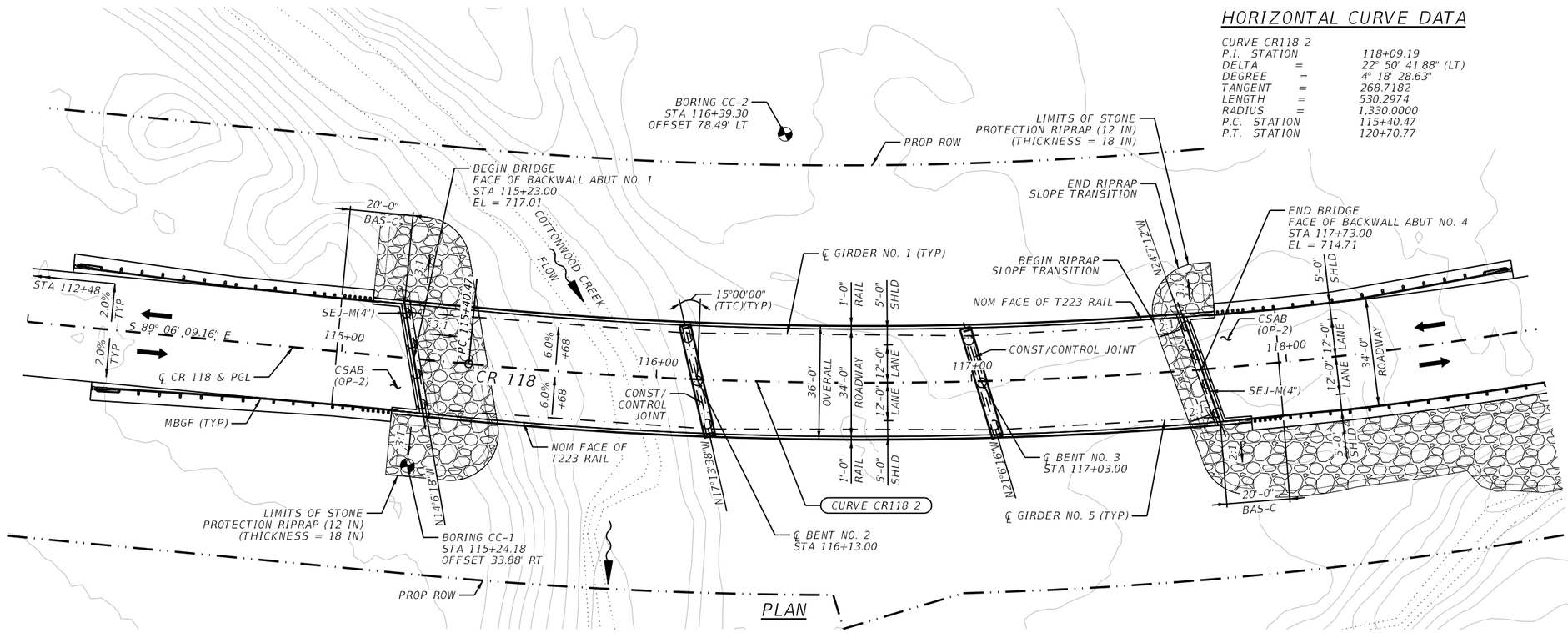
S.U.E. PLAN SHEET

MATCH LINE SHEET 7 TO
MATCH LINE SHEET 5

SHEET 08 OF 08

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	BR 2020(733)	CR 118

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	AUS	WILLIAMSON	74
CONT.	SECT.	JOB	
0914	05	204,220	



HORIZONTAL CURVE DATA

CURVE CR118 2	
P.I. STATION	118+09.19
DELTA =	22° 50' 41.88" (LT)
DEGREE =	4° 18' 28.63"
TANGENT =	268.7182
LENGTH =	530.2974
RADIUS =	1,330.0000
P.C. STATION	115+40.47
P.T. STATION	120+70.77

N

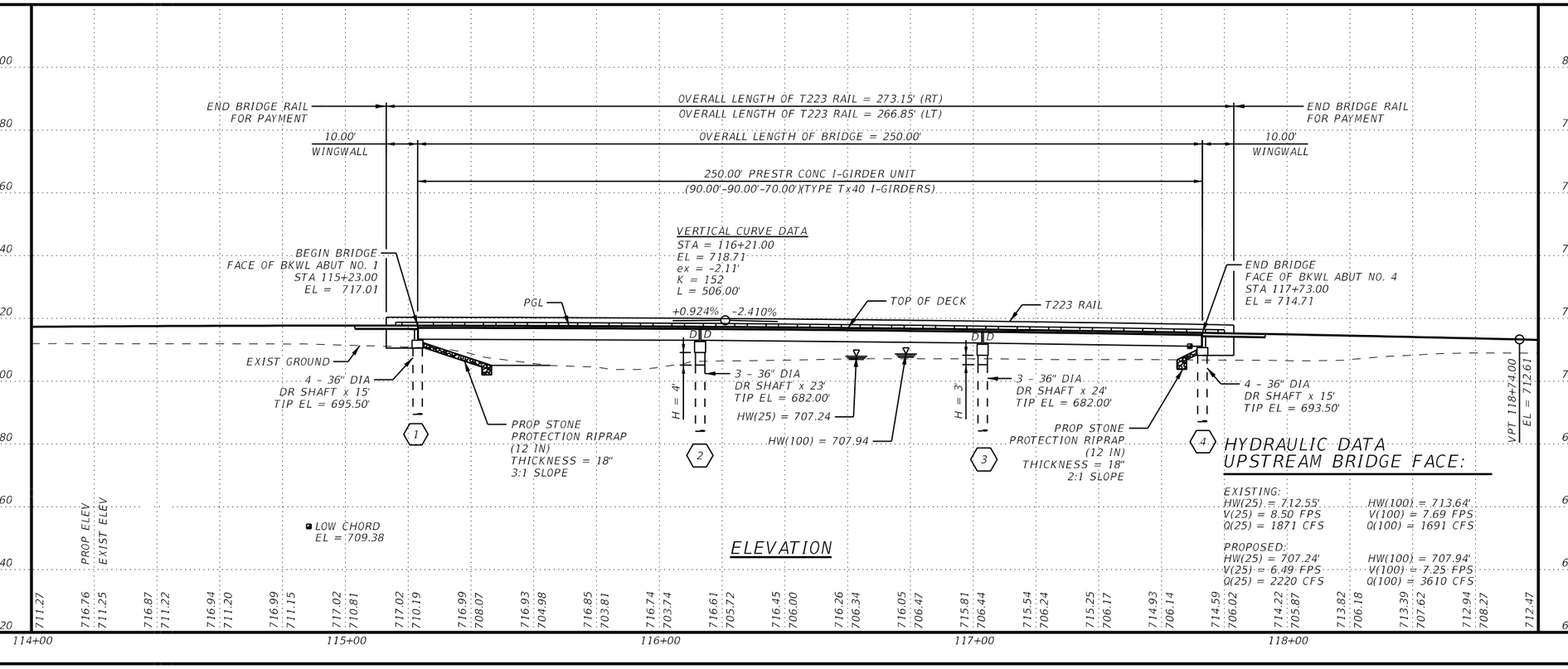
0' 20' 40' HORZ
0' 20' 40' VERT
SCALE

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND CURRENT INTERIMS.
2. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
3. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS AND ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
4. PROPOSED CR 118 BRIDGE AT COTTONWOOD CREEK IS ALONG NEW ALIGNMENT. EXISTING BRIDGE IS NORTH OF PROPOSED BRIDGE.
5. BEARING CONDITIONS:
   D = DOWEL; BLANK = NO DOWEL
6. SEE BRIDGE BORING LOGS SHEET FOR GEOTECHNICAL INFORMATION.
7. ALL ABUTMENTS AND BENTS SHALL BE SKEWED 15°0'0" TANGENT TO CURVE (TTC).

DESIGN SPEED = 60 MPH
ADT (2023) = 600 VPD
ADT (2043) = 800 VPD
FUNCT CLASS = RURAL MINOR ARTERIAL
EXIST NBI NO: 14-246-0-AA04-94-001
PROP NBI NO: 14-246-0-AA04-94-501

HL-93 LOADING



HYDRAULIC DATA
UPSTREAM BRIDGE FACE:

EXISTING:
HW(25) = 712.55'
V(25) = 8.50 FPS
Q(25) = 1871 CFS
HW(100) = 713.64'
V(100) = 7.69 FPS
Q(100) = 1691 CFS

PROPOSED:
HW(25) = 707.24'
V(25) = 6.49 FPS
Q(25) = 2220 CFS
HW(100) = 707.94'
V(100) = 7.25 FPS
Q(100) = 3610 CFS

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

Kimley»Horn F-928

© 2022 Texas Department of Transportation

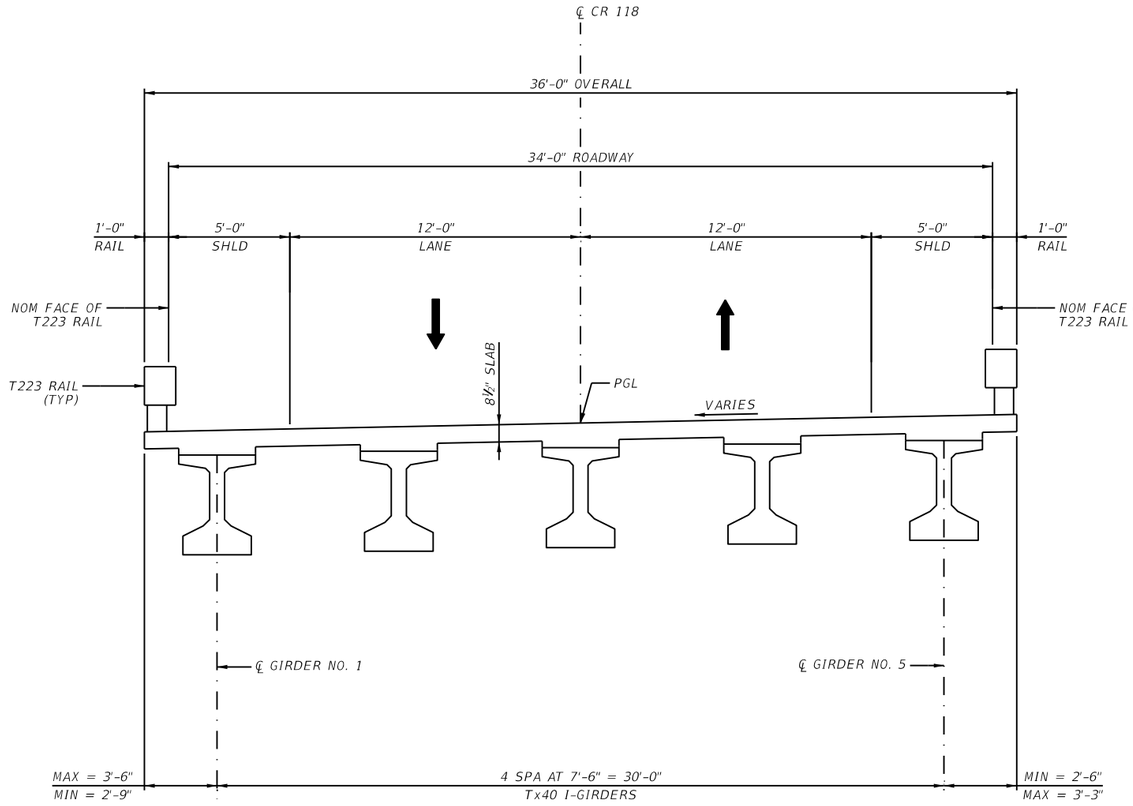
CR 118 AT COTTONWOOD CREEK

BRIDGE LAYOUT

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		75

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Design Data\04 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_LAYOUT
PLOTTED: 11/22/2022 11:00:37 AM



PROPOSED BRIDGE TYPICAL SECTION

11/3/2022
STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

BRIDGE TYPICAL SECTION

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		76

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_TYP.dgn
PLOTTED: 11/3/2022 12:55:04 PM

SUMMARY OF ESTIMATED QUANTITIES - CR 118 AT COTTONWOOD CREEK

CSJ: 0914-05-204	ITEM NO.	0400 6005	0416 6004	0420 6013	0420 6029	0420 6037	0422 6001	0422 6015	0425 6037	0432 6031	0450 6006	0454 6018
BRIDGE ELEMENT / BID ITEM DESCRIPTION		CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX40)	RIPRAP (STONE PROTECTION) (12 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
NBI#: 14-246-0-AA04-94-501		CY	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF
2 - ABUTMENTS		141	120	47.4				67		459	40.0	73
2 - BENTS			141		32.0	5.6						
1 - 250.00' PRESTR CONC Tx40 I-GIRDER UNIT							9,000		1,236.70		500.0	
TOTAL		141	261	47.4	32.0	5.6	9,000	67	1,236.70	459	540.0	73

11/3/2022

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

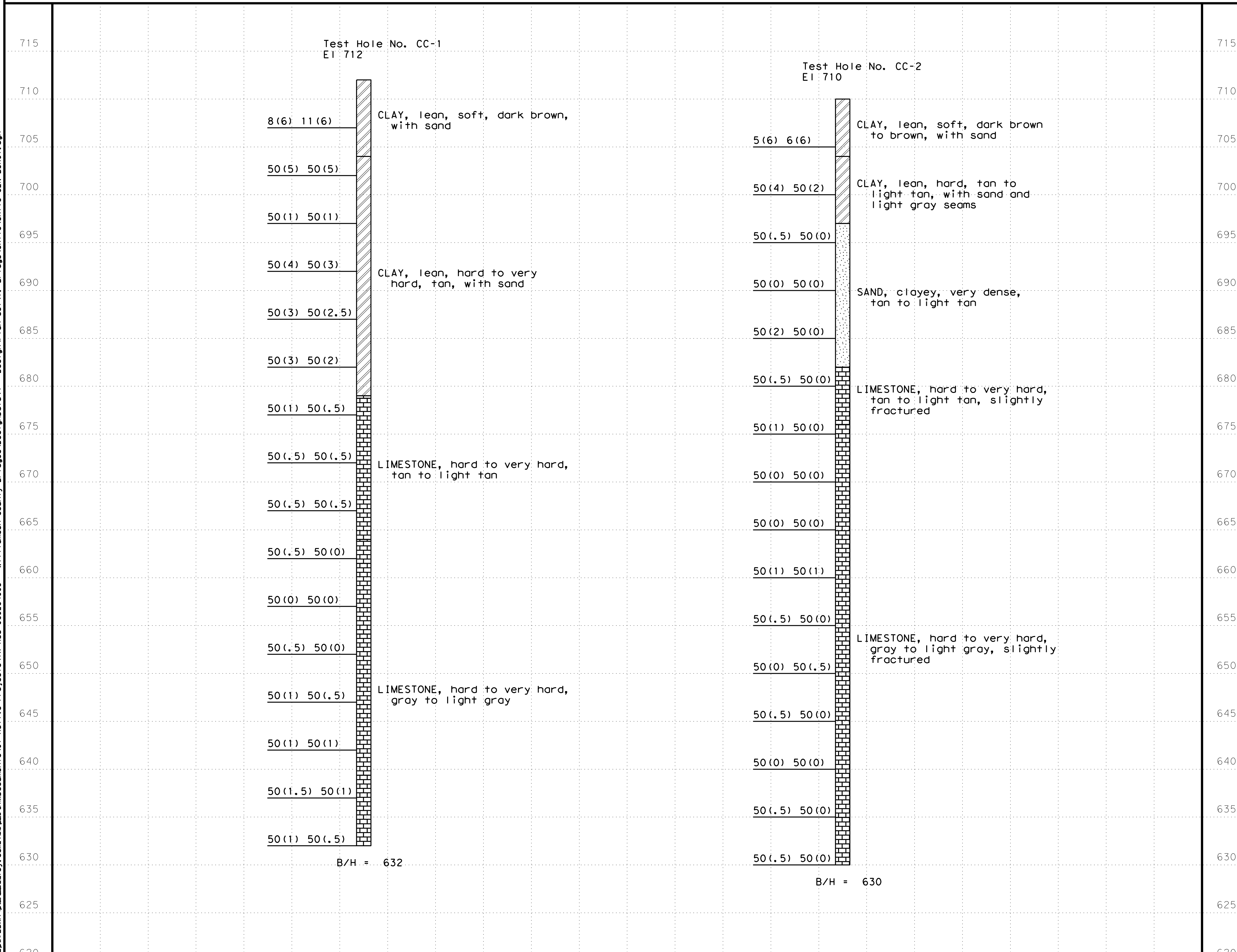
CR 118 AT COTTONWOOD CREEK

ESTIMATED QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		77

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\7. Bridge\CR118\CR118_BRG_QTY
PLOTTED: 11/3/2022 12:55:20 PM


715
710
705
700
695
690
685
680
675
670
665
660
655
650
645
640
635
630
625
620
Test Hole No. CC-1
El 712
8(6) 11(6)
50(5) 50(5)
50(1) 50(1)
50(4) 50(3)
50(3) 50(2.5)
50(3) 50(2)
50(1) 50(.5)
50(.5) 50(.5)
50(.5) 50(.5)
50(.5) 50(0)
50(0) 50(0)
50(.5) 50(0)
50(1) 50(.5)
50(1) 50(1)
50(1.5) 50(1)
50(1) 50(.5)
CLAY, lean, soft, dark brown, with sand
CLAY, lean, hard to very hard, tan, with sand
LIMESTONE, hard to very hard, tan to light tan
LIMESTONE, hard to very hard, gray to light gray
B/H = 632
Test Hole No. CC-2
El 710
5(6) 6(6)
50(4) 50(2)
50(.5) 50(0)
50(0) 50(0)
50(2) 50(0)
50(.5) 50(0)
50(1) 50(0)
50(0) 50(0)
50(0) 50(0)
50(1) 50(1)
50(.5) 50(0)
50(0) 50(.5)
50(.5) 50(0)
50(0) 50(0)
50(.5) 50(0)
50(.5) 50(0)
CLAY, lean, soft, dark brown to brown, with sand
CLAY, lean, hard, tan to light tan, with sand and light gray seams
SAND, clayey, very dense, tan to light tan
LIMESTONE, hard to very hard, tan to light tan, slightly fractured
LIMESTONE, hard to very hard, gray to light gray, slightly fractured
B/H = 630

Kimley»Horn F-928

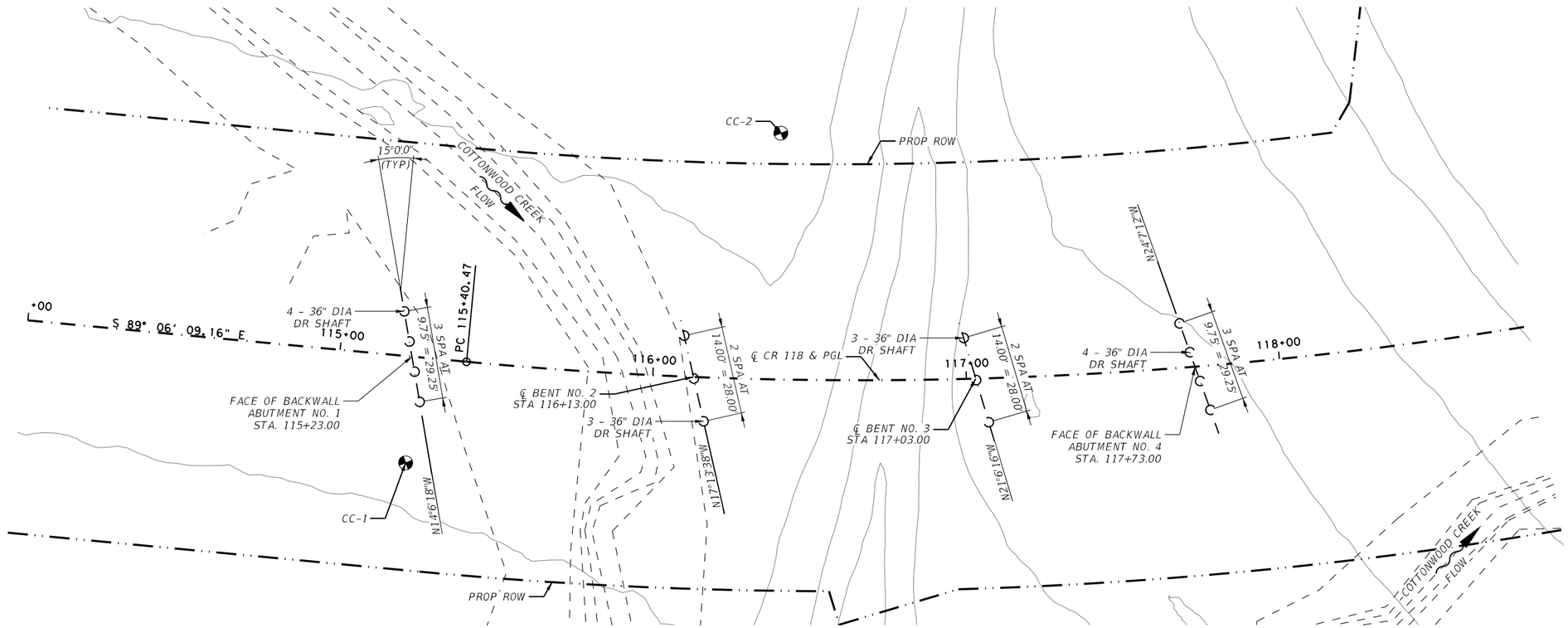
Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

SOIL BORE LOG

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		78



FOUNDATION LAYOUT

11/3/2022

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

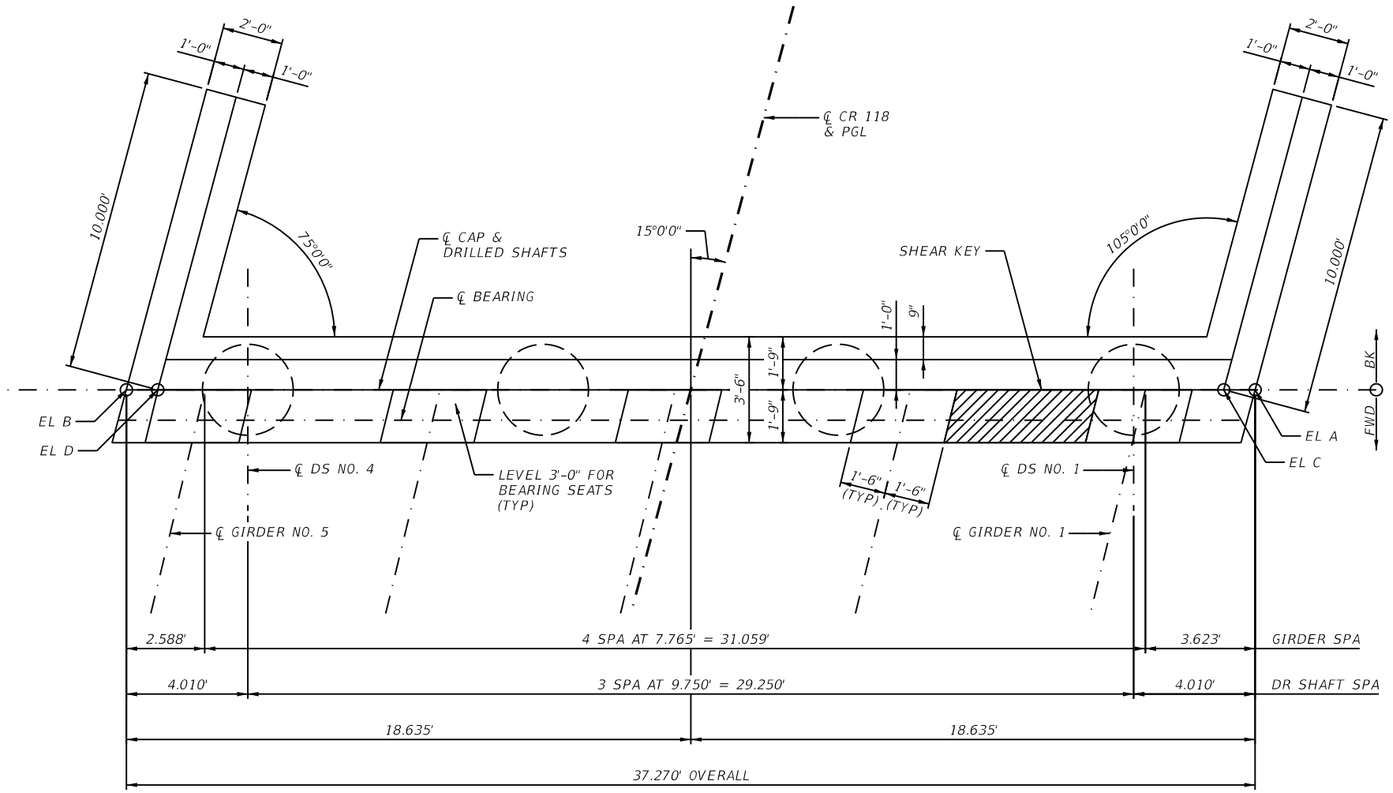
CR 118 AT COTTONWOOD CREEK

FOUNDATION LAYOUT

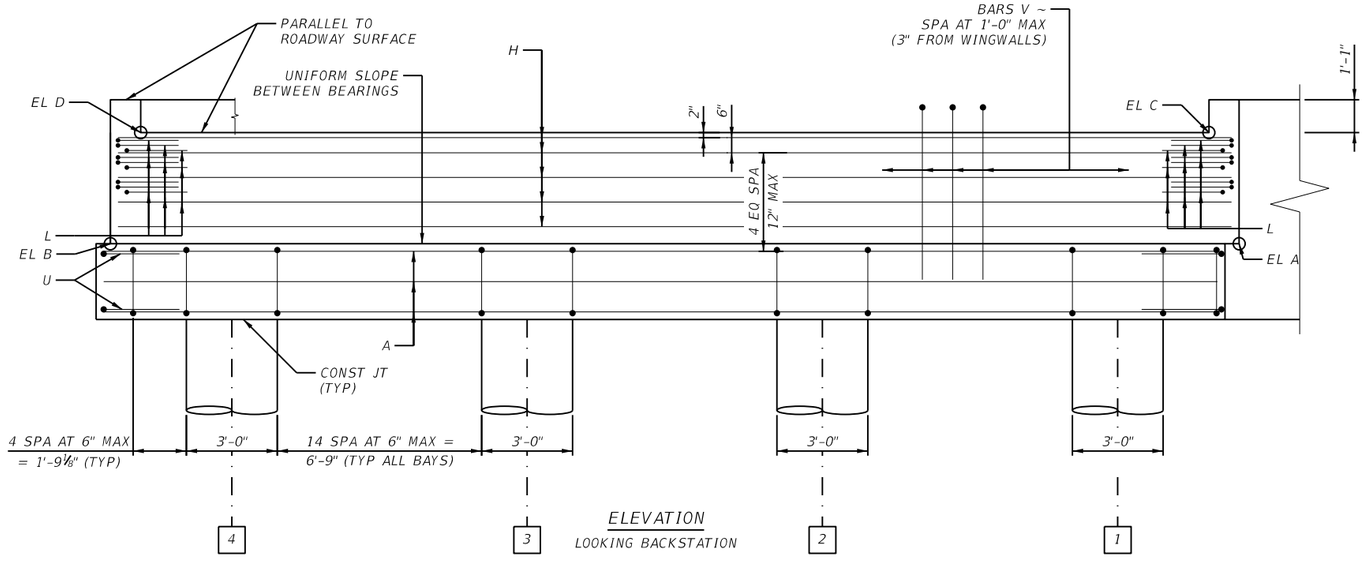
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		79

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_FL
PLOTTED: 11/3/2022 12:55:35 PM

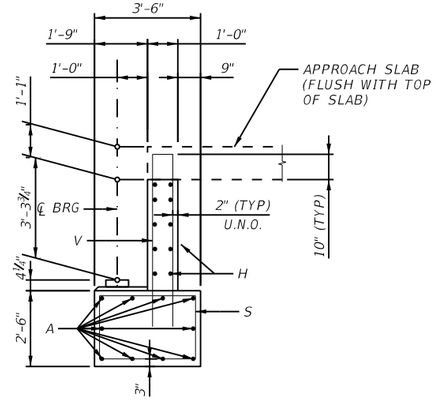


PLAN

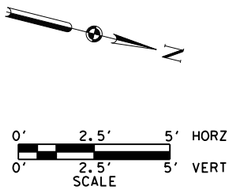


ELEVATION

LOOKING BACKSTATION



SECTION A-A



NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE T223 RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALL.
5. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.
6. SEE ABUTMENT DETAILS SHEET FOR WINGWALL DETAILS, BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE, f'c = 3,600 PSI
PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:
103 TONS/SHAFT

11/3/2022
STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

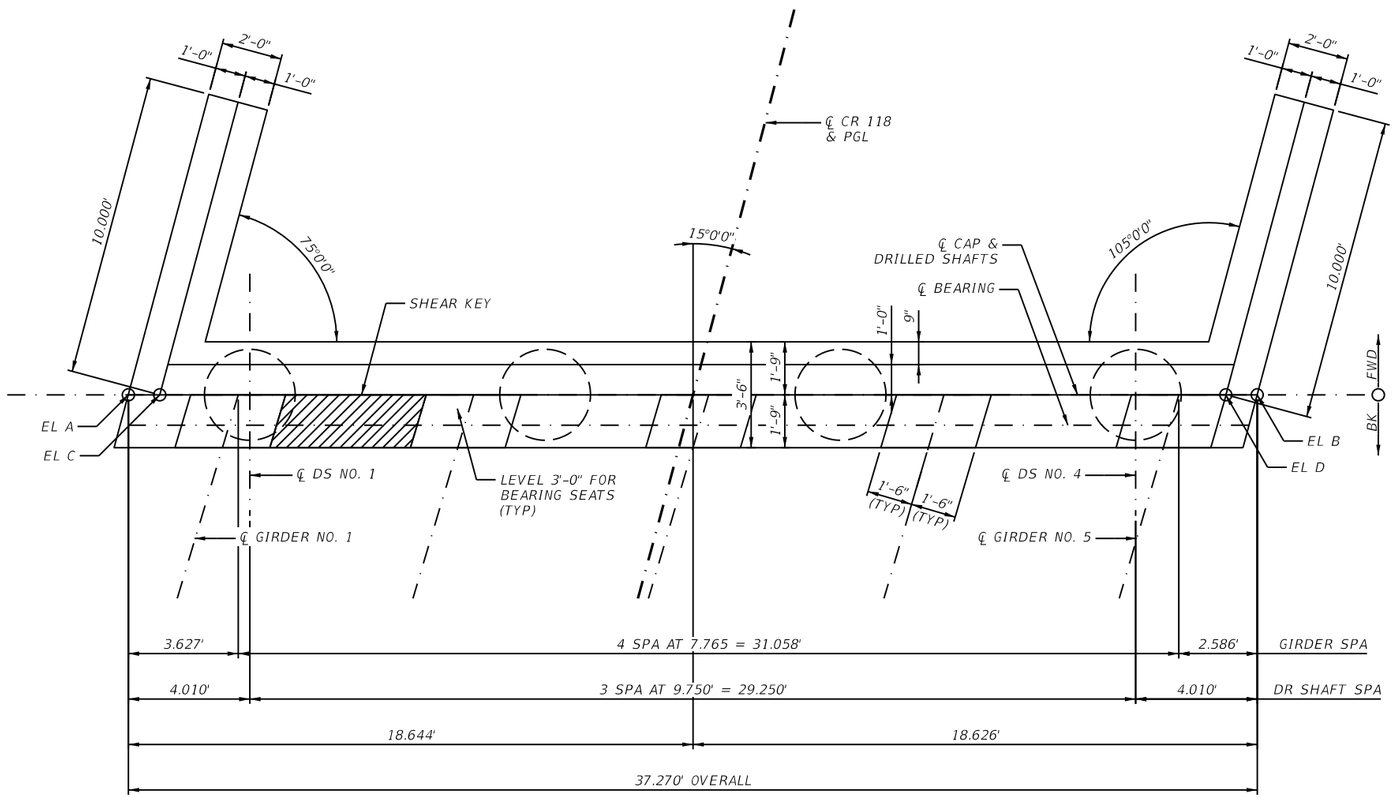
CR 118 AT COTTONWOOD CREEK

ABUTMENT NO. 1

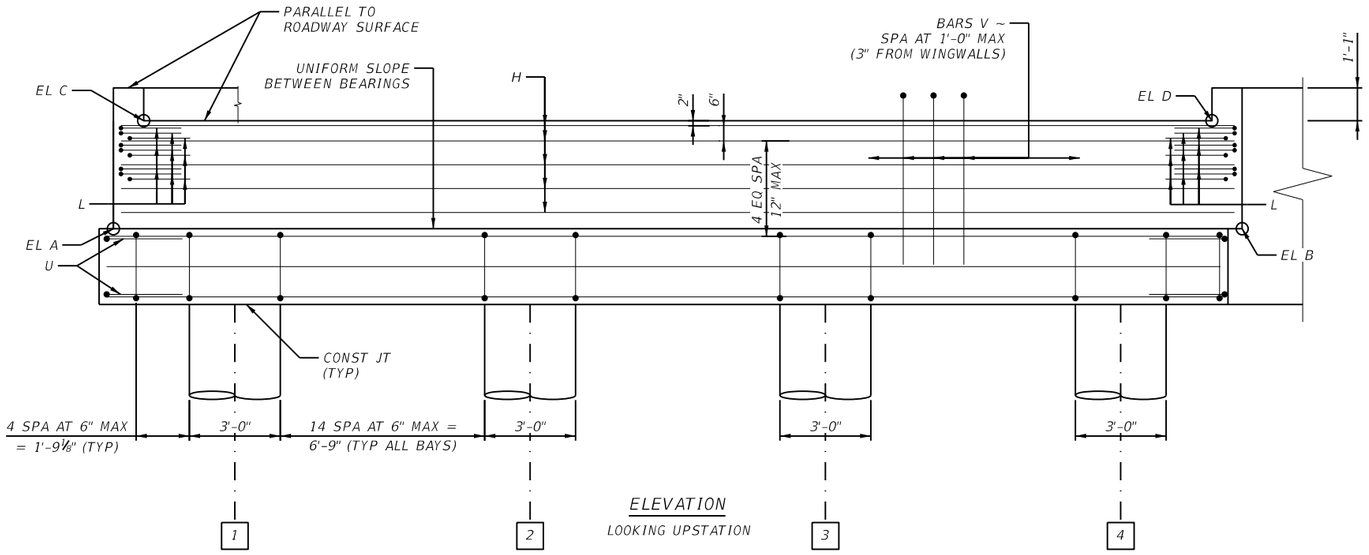
SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		80

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_ABUT 01
PLOTTED: 11/3/2022 12:55:43 PM

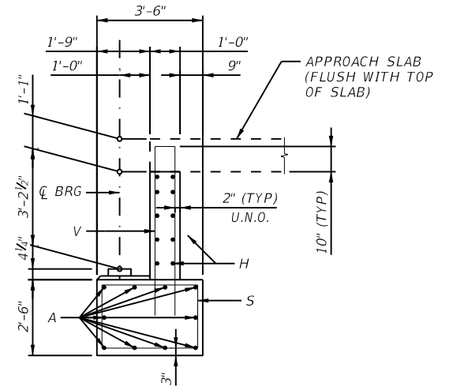


PLAN

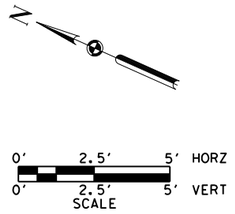


ELEVATION

LOOKING UPSTATION



SECTION A-A



NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE T223 RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALL.
5. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.
6. SEE ABUTMENT DETAILS SHEET FOR WINGWALL DETAILS, BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE, f'c = 3,600 PSI
PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:
103 TONS/SHAFT

11/3/2022

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

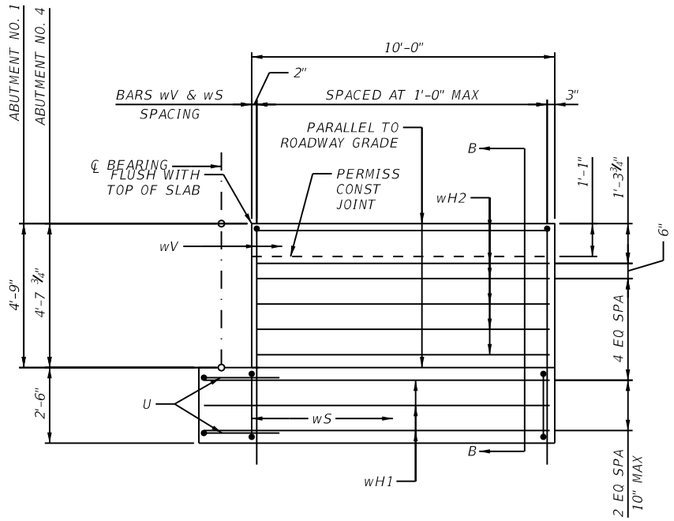
© 2022 Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

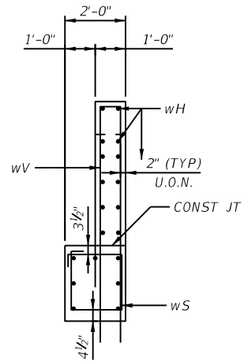
ABUTMENT NO. 4

SHEET 1 OF 1

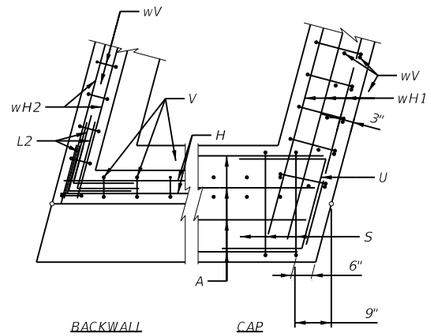
©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		81



WINGWALL ELEVATION



SECTION B-B



BACKWALL CAP

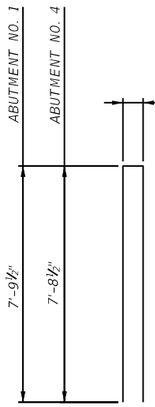
CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES				
ABUTMENT 1				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	4	#11	37'-4"	794
H	10	#6	36'-11"	555
L1	9	#6	4'-0"	54
L2	9	#6	4'-0"	54
S	50	#5	11'-6"	648
U	4	#6	8'-2"	49
V	35	#5	16'-3"	593
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	349
wS	22	#4	7'-10"	115
wV	22	#5	16'-3"	373
REINFORCING STEEL *			LB	3,824
CLASS "C" CONCRETE (ABUT)			CY	23.8

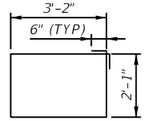
* FOR CONTRACTOR'S INFORMATION ONLY

TABLE OF ESTIMATED QUANTITIES				
ABUTMENT 4				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	4	#11	37'-4"	794
H	10	#6	36'-11"	555
L1	9	#6	4'-0"	54
L2	9	#6	4'-0"	54
S	50	#5	11'-6"	648
U	4	#6	8'-2"	49
V	35	#5	16'-1"	587
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	349
wS	22	#4	7'-10"	115
wV	22	#5	16'-1"	369
REINFORCING STEEL *			LB	3,814
CLASS "C" CONCRETE (ABUT)			CY	23.6

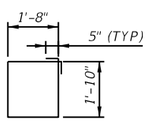
* FOR CONTRACTOR'S INFORMATION ONLY



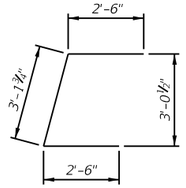
BARS V & wV



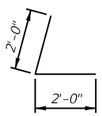
BARS S



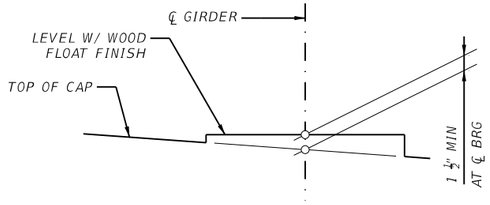
BARS wS



BARS U



BARS L



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

CONTROL ELEVATIONS				
	TOP OF CAP		TOP OF BACKWALL	
	EL A	EL B	EL C	EL D
ABUT 1	711.274'	713.135'	715.933'	715.925'
ABUT 4	709.057'	711.049'	713.707'	713.548'

CONTROL ELEVATIONS				
TOP OF DRILLED SHAFT*				
	DS 1	DS 2	DS 3	DS 4
ABUT 1	708.974'	709.461'	709.948'	710.435'
ABUT 4	706.771'	707.292'	707.813'	708.335'

* ELEVATIONS AT ℄ OF DRILLED SHAFT

BEARING SEAT ELEVATIONS					
	GRDR 1	GRDR 2	GRDR 3	GRDR 4	GRDR 5
ABUT 1 (FWD)	711.580'	711.981'	712.386'	712.755'	713.131'
ABUT 4 (BK)	709.376'	709.791'	710.206'	710.621'	711.036'

11/22/2022
STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

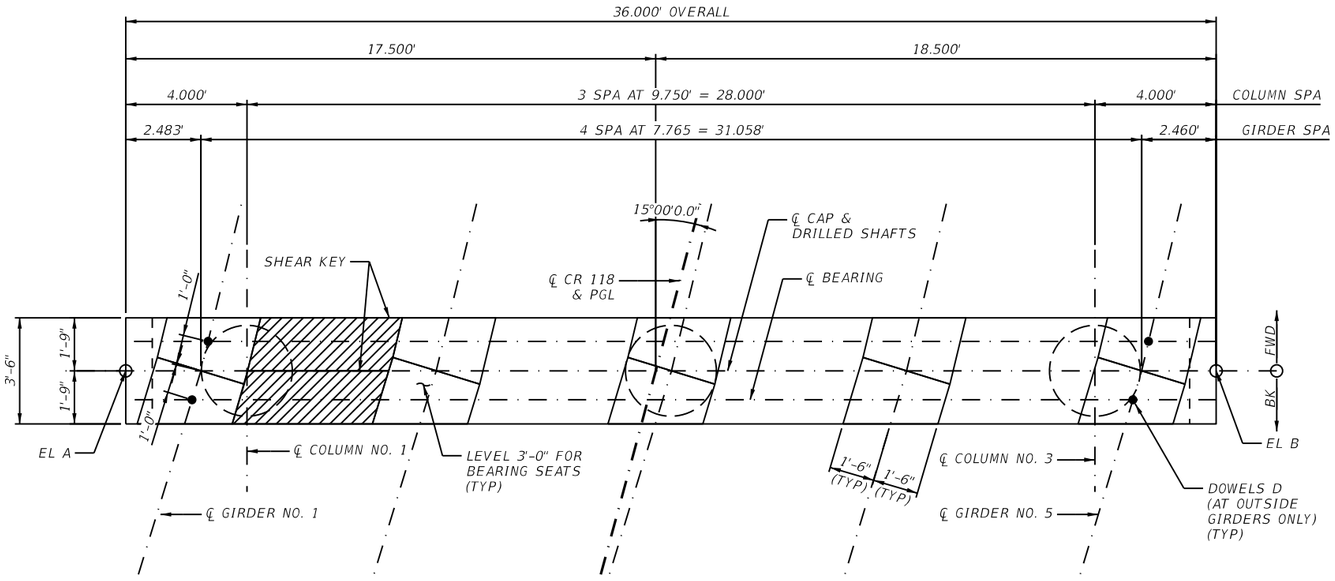
© 2022
Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

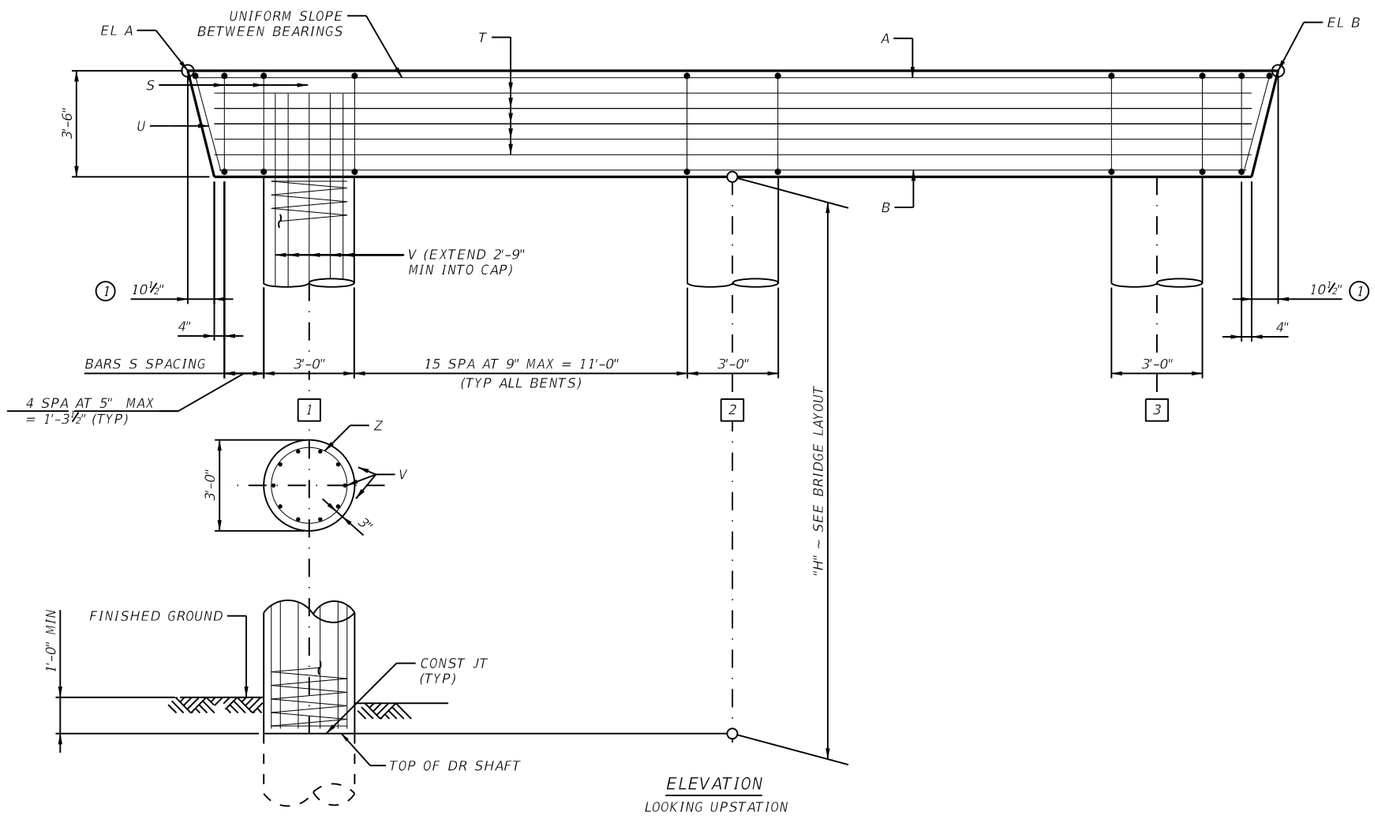
ABUTMENT DETAILS

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		82

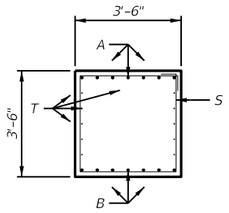


PLAN

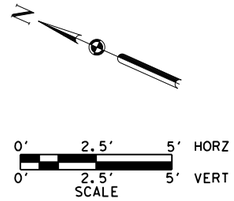


ELEVATION

LOOKING UPSTATION



SECTION A-A



NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.
5. SEE BENT DETAILS SHEET FOR BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.

(1) MEASURED PARALLEL TO THE TOP OF CAP-CROSS SLOPE.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE, f'c = 3,600 PSI
PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:
235 TONS/SHAFT

Kimley»Horn F-928

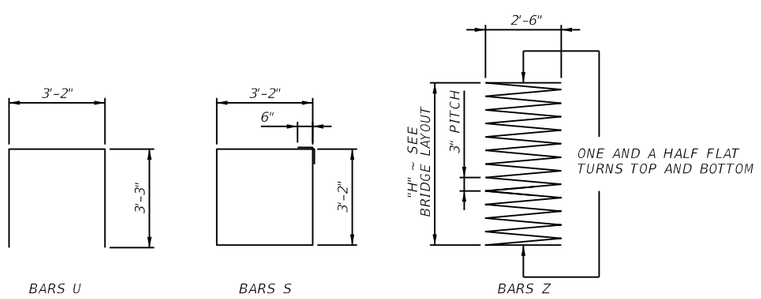
Texas Department of Transportation

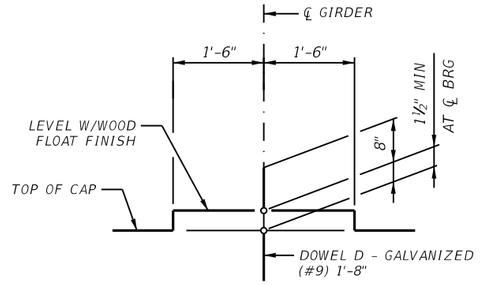
CR 118 AT COTTONWOOD CREEK

BENTS NO. 2 & 3

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		83





BEARING SEAT DETAIL

BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD

TABLE OF ESTIMATED QUANTITIES				
BENT 2 & 3 (QUANTITIES PER BENT)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	35'-6"	1,320
B	7	#11	34'-0"	1,265
D	4	#9	1'-8"	23
S	38	#5	13'-8"	542
T	10	#5	34'-0"	355
U	2	#5	9'-8"	20
REINFORCING STEEL *			LB	3,525
CLASS "C" CONCRETE (CAP)			CY	16.0

* FOR CONTRACTOR'S INFORMATION ONLY

TABLE OF ESTIMATED QUANTITIES										
TABLE OF VARIABLE BENT COLUMN QUANTITIES									ESTIMATED BENT COLUMN QUANTITIES	
	COL	"H"	BARS V #9			BARS Z #4			REINF*	CL C CONC (COLUMN)
		FT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	LB	CY
BENT 2	1-3	4	30	6'-9"	689	3	149'-3"	299	988	3.2
BENT 3	1-3	3	30	5'-9"	587	3	117'-10"	236	823	2.4
								TOTAL	1,811	5.6

* FOR CONTRACTOR'S INFORMATION ONLY

CONTROL ELEVATIONS					
	TOP OF CAP		TOP OF COLUMN*		
	EL A	EL B	COL 1	COL 2	COL 3
BENT 2	710.901'	712.923'	707.626'	708.412'	709.198'
BENT 3	710.088'	712.054'	706.807'	707.571'	708.336'

* ELEVATIONS AT ℄ OF COLUMN

BEARING SEAT ELEVATIONS					
BENT 2 (BK)	711.166'	711.602'	712.038'	712.474'	712.911'
BENT 2 (FWD)	711.194'	711.630'	712.066'	712.502'	712.938'
BENT 3 (BK)	710.349'	710.773'	711.197'	711.622'	712.046'
BENT 3 (FWD)	710.387'	710.811'	711.235'	711.659'	712.083'

11/3/2022

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

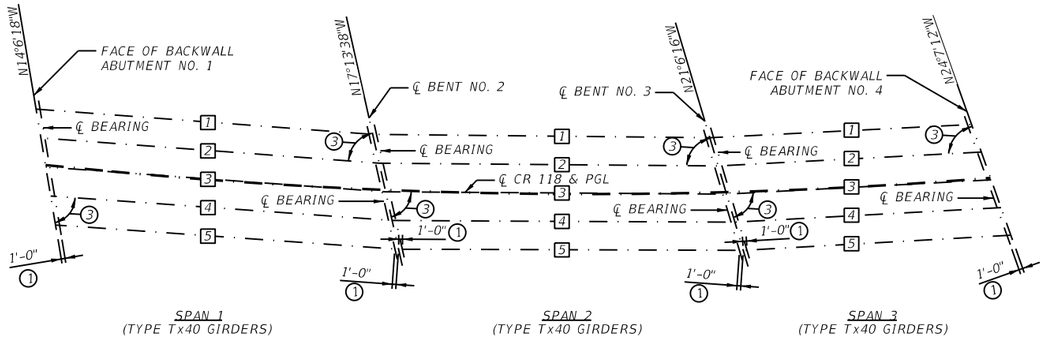
CR 118 AT COTTONWOOD CREEK

BENT DETAILS

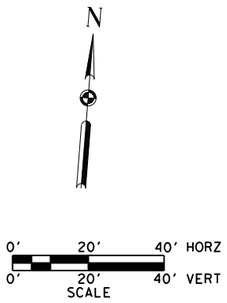
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		84

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_BENT_DET
PLOTTED: 11/3/2022 12:56:13 PM



FRAMING PLAN



NOTES:

1. SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.
2. BEAM LENGTHS SHOWN ARE BOTTOM OF BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.
3. GIRDER ANGLE (TYP).

BENT REPORT

BENT NO. 1 (S 14 6 9.01 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.529 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	76 7 10
	BEAM 2	7.765	76 11 29
	BEAM 3	7.765	76 15 46
	BEAM 4	7.765	76 20 1
	BEAM 5	7.765	76 24 14
	TOTAL	31.058	

BENT NO. 2 (S 17 13 37.60 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.536 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	72 59 41
	BEAM 2	7.765	73 4 1
	BEAM 3	7.765	73 8 18
	BEAM 4	7.765	73 12 33
	BEAM 5	7.765	73 16 45
	TOTAL	31.058	

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.(2)	BEAM SLOPE
BEAM 1	89.167	87.137	88.29	-0.0047
BEAM 2	89.576	87.546	88.70	-0.0043
BEAM 3	89.984	87.955	89.11	-0.0040
BEAM 4	90.392	88.363	89.51	-0.0032
BEAM 5	90.801	88.772	89.92	-0.0025

BENT REPORT

BENT NO. 2 (S 17 13 37.60 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.536 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	76 45 48
	BEAM 2	7.765	76 51 5
	BEAM 3	7.765	76 56 19
	BEAM 4	7.765	77 1 29
	BEAM 5	7.765	77 6 35
	TOTAL	31.058	

BENT NO. 3 (S 21 6 15.37 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.536 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	72 53 10
	BEAM 2	7.765	72 58 27
	BEAM 3	7.765	73 3 41
	BEAM 4	7.765	73 8 51
	BEAM 5	7.765	73 13 57
	TOTAL	31.058	

BEAM REPORT

BEAM REPORT, SPAN 2

	HORIZONTAL C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.(2)	BEAM SLOPE
BEAM 1	88.968	86.968	88.11	-0.0097
BEAM 2	89.475	87.475	88.61	-0.0098
BEAM 3	89.982	87.982	89.12	-0.0099
BEAM 4	90.490	88.490	89.63	-0.0099
BEAM 5	90.998	88.998	90.14	-0.0100

BENT REPORT

BENT NO. 3 (S 21 6 15.37 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.536 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	76 19 57
	BEAM 2	7.765	76 25 14
	BEAM 3	7.765	76 30 28
	BEAM 4	7.765	76 35 38
	BEAM 5	7.765	76 40 44
	TOTAL	31.058	

BENT NO. 4 (S 24 7 11.41 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 15.536 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	73 19 1
	BEAM 2	7.765	73 24 18
	BEAM 3	7.765	73 29 32
	BEAM 4	7.765	73 34 42
	BEAM 5	7.765	73 39 48
	TOTAL	31.058	

BEAM REPORT

BEAM REPORT, SPAN 3

	HORIZONTAL C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.(2)	BEAM SLOPE
BEAM 1	69.203	67.159	68.32	-0.0150
BEAM 2	69.597	67.554	68.72	-0.0151
BEAM 3	69.992	67.949	69.11	-0.0151
BEAM 4	70.386	68.344	69.51	-0.0152
BEAM 5	70.781	68.739	69.90	-0.0152

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
11/22/2022

Kimley»Horn F-928

Texas Department of Transportation

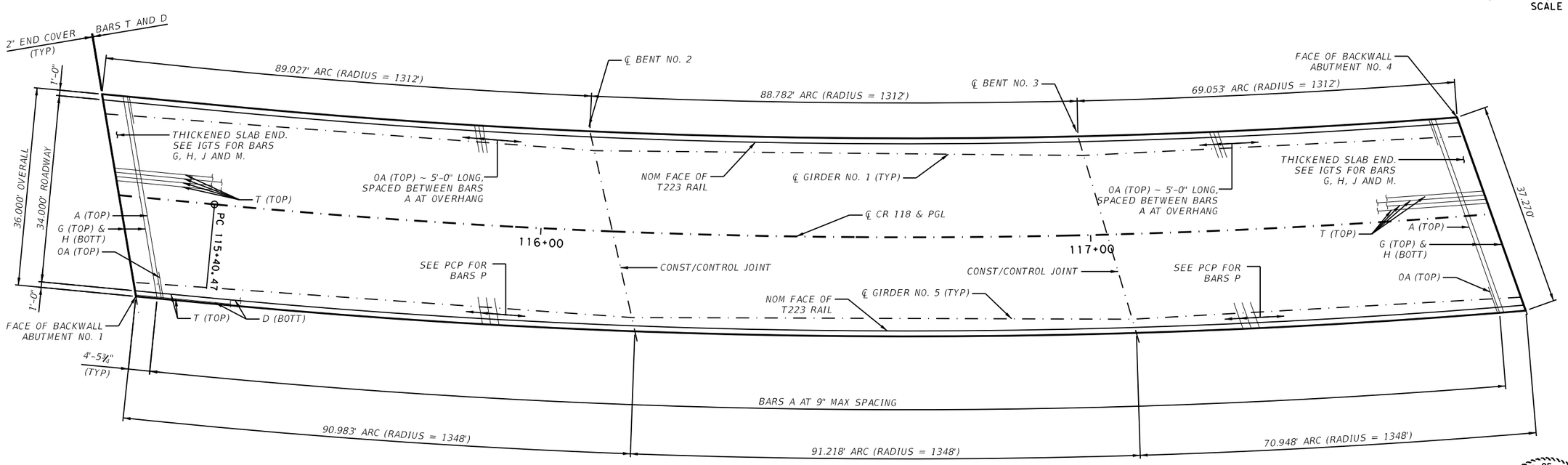
CR 118 AT COTTONWOOD CREEK

FRAMING PLAN

SHEET 1 OF 1

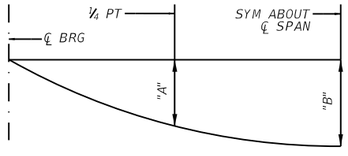
©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		85

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\7. Bridge\CR118\CR118_BRG_FRAME
PLOTTED: 11/22/2022 7:57:39 AM



PLAN

DEAD LOAD DEFLECTION TABLE		
SPAN NO.	"A" FT	"B" FT
1	0.082	0.115
2	0.083	0.116
3	0.029	0.041



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ONLY (Ec = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

TABLE OF ESTIMATED QUANTITIES			
	REINF CONCRETE SLAB	PRESTRESSED CONCRETE GIRDERS (Tx40) (1)	TOTAL REINF STEEL * (2)
	SF	LF	LB
SPAN 1	3,240	445.53	7,452
SPAN 2	3,240	445.61	7,452
SPAN 3	2,520	345.56	5,796

* FOR CONTRACTOR'S INFORMATION ONLY

(1) GIRDER LENGTHS ARE MEASURED ALONG BOTTOM OF FLANGE.

(2) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

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

MATERIAL NOTES:

ALL CONCRETE SHALL BE CLASS S (HPC) CONCRETE, (f'c = 4,000 PSI)

ALL REINFORCING SHALL BE EPOXY COATED, GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPOS, WHEN REQUIRE4D.
UNCOATED ~ #4 - 1'-7".

LAPS IN BARS A AND T SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.

NOTES:

1. DESIGNED ACCORDING TO AASHTO LFRD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND CURRENT INTERIMS.
2. MULTI-SPAN UNITS, WITH SLAB CONTINUOUS OVER INTERIOR BENTS, MAY BE FORMED WITH THE DETAILS SHOWN ON THIS SHEET AND TXDOT STANDORD SHEET, IGCS.
3. SEE TXDOT STANDARD, IGTS, FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.
4. SEE TXDOT STANDARD, IGMS, FOR MISCELLANEOUS SLAB DETAILS.
5. SEE TXDOT STANDARD, PCP AND PCP-FAB, FOR PANEL DETAILS.
6. SEE TXDOT STANDARD, PMDF, FOR DETAILS AND QUANTITY ADJUSTMENT IF THIS OPTION IS USED.
7. SEE TXDOT STANDARD, SEJ-M, FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN.
8. SEE TXDOT STANDARD, T223 RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT BAR.

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
11/3/2022

Kimley»Horn F-928

Texas Department of Transportation

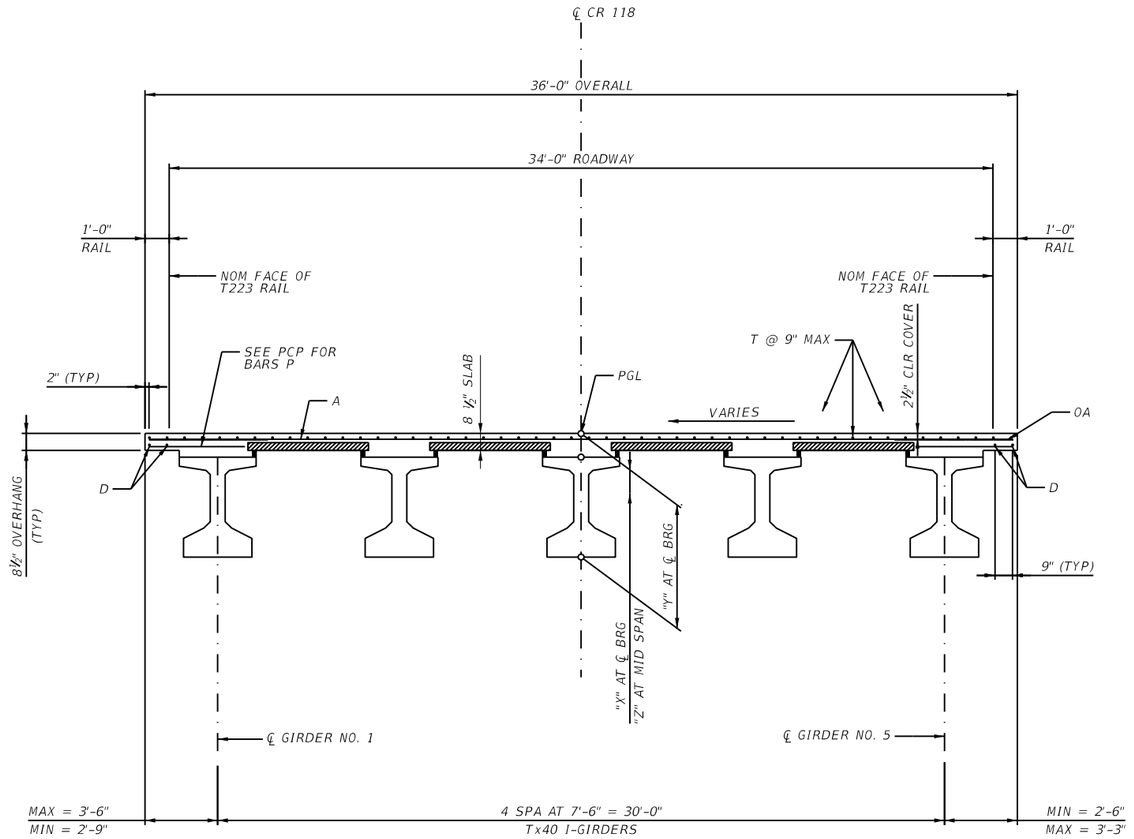
CR 118 AT COTTONWOOD CREEK

SLAB DETAILS

SHEET 1 OF 1

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		86

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\7. Bridge\CR118\CR118_BRG_SLAB
PLOTTED: 11/3/2022 12:56:27 PM



PROPOSED BRIDGE TYPICAL SECTION

TABLE OF SECTION DEPTHS			
SPAN NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT MID SPAN
1	12 3/4"	4'-4 3/4"	11"
2	12 1/4"	4'- 4 1/4"	10 1/4"
3	11 1/2"	4'-3 1/2"	10 1/4"

TABLE OF VARYING OVERHANGS *		
℄ BENT	LEFT	RIGHT
1	3.500'	2.500'
2	3.500'	2.500'
3	3.500'	2.500'
4	3.500'	2.500'

11/3/2022

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

BRIDGE TYPICAL TRANSVERSE SECTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		87

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\7. Bridge\CR118\CR118_BRG_TTV.dgn
PLOTTED: 11/3/2022 12:56:34 PM

DATE: 11/22/2022 10:57:19 AM
FILE: c:\pw\khl\d0219309\CR118_IGND.dgn

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
CR 118 AT COTTONWOOD CREEK	1	1-5	TX40		30	0.6	270	14.40	8.40	6	28.5	5.000	6.500	3.498	-3.857	4744	0.629	0.822	1.50	1.94	1.02
	2	1-5	TX40		30	0.6	270	14.40	8.40	6	30.5	5.000	6.500	3.444	-3.815	4731	0.634	0.822	1.50	1.94	1.05
	3	1-5	TX40		16	0.6	270	15.16	14.27	4	28.5	4.100	5.000	2.087	-2.419	3104	0.645	0.819	1.42	1.84	1.28

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

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

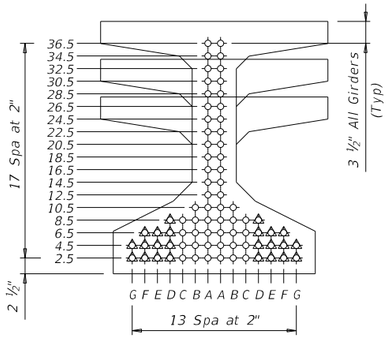
When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

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

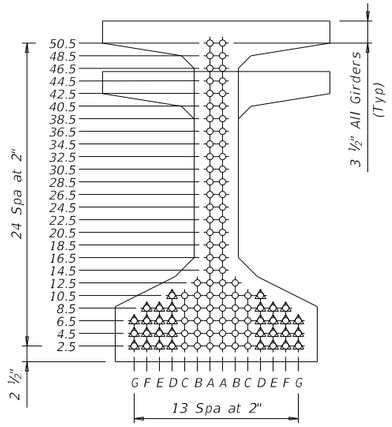
DEPRESSED STRAND DESIGNS:

Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.

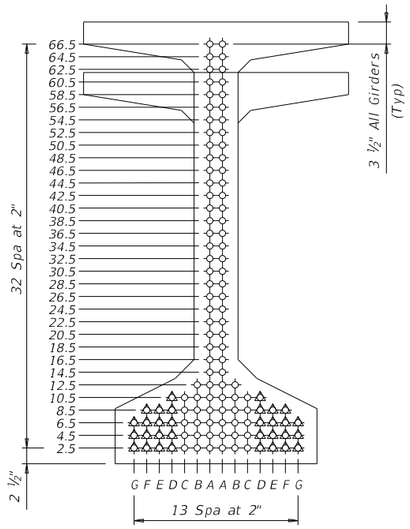
To complete this sheet input the girder designs in the table and the relative humidity under Design Notes. In all cases, remove this block. This sheet must be signed, sealed, and dated by a registered Professional Engineer.



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
11/22/2022

Texas Department of Transportation

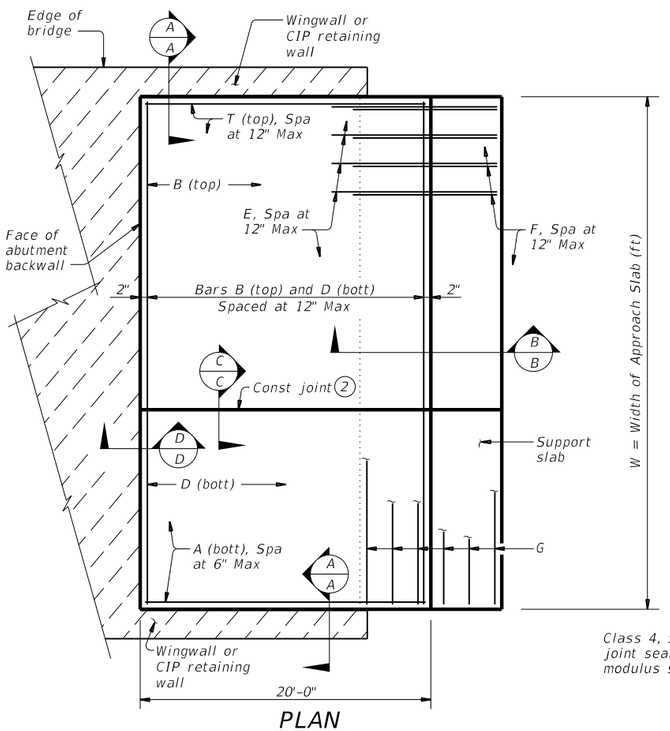
Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND(MOD)

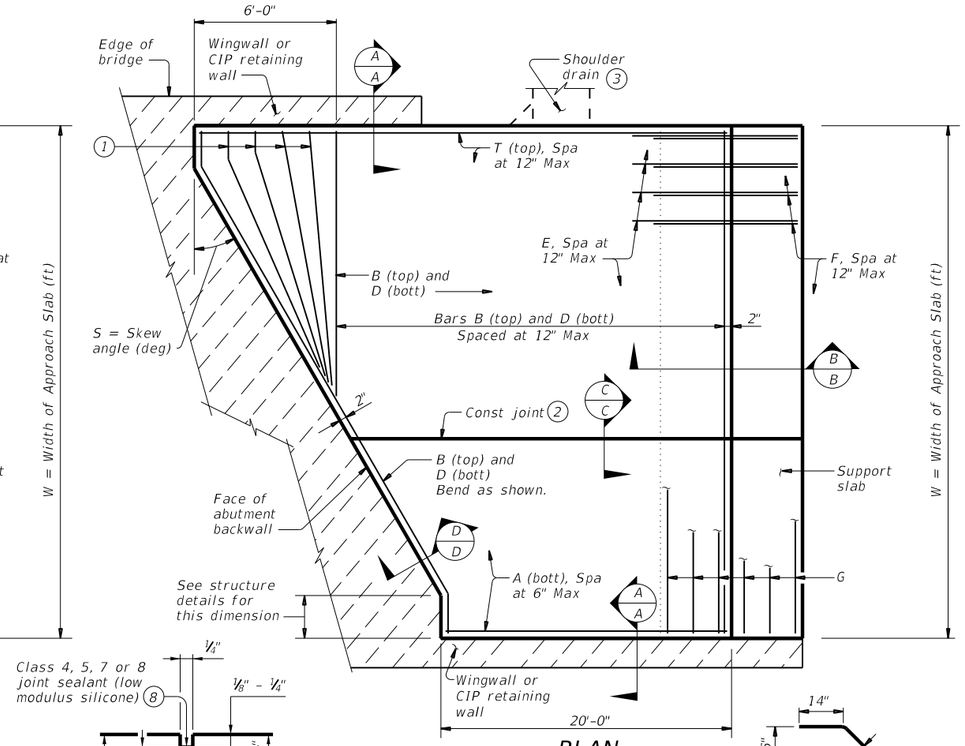
FILE: igndsts1-22.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only. 3-22: Added Load Rating.	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		88

DATE: 11/3/2022 12:56:49 PM
FILE: c:\pw\km1\d0222653\bascste1-20 (1).dgn



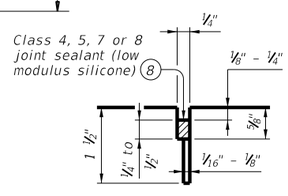
PLAN

(Showing non-skewed approach slab.)

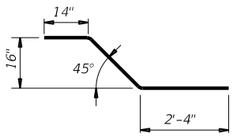


PLAN

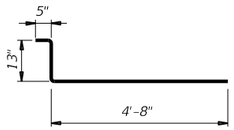
(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



BARS E (#5)



BARS F (#5)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W – 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

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

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

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

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

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

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

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

(8) Place in accordance with Item 438.

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

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

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

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

Provide Grade 60 reinforcing steel.

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

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

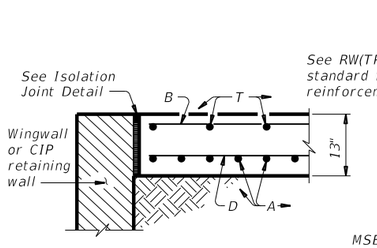
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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

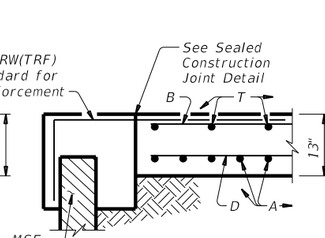
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

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

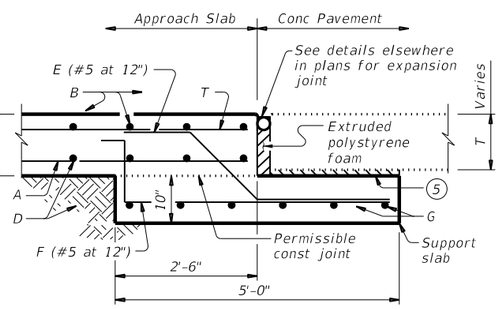


SHOWING WINGWALL OR CIP RETAINING WALL

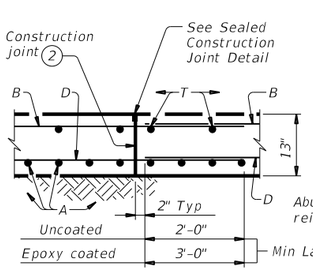


SHOWING MSE WALL

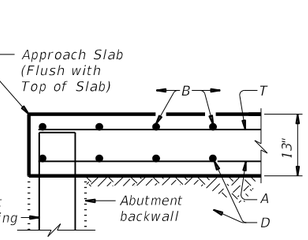
SECTION A-A



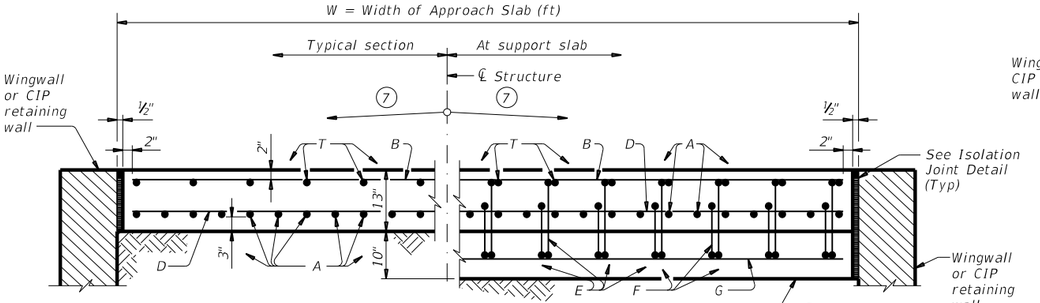
SECTION B-B



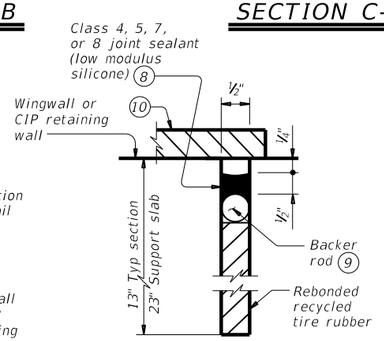
SECTION C-C (6)



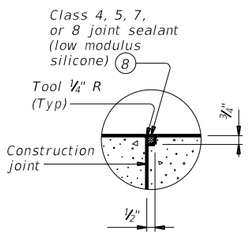
SECTION D-D



TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

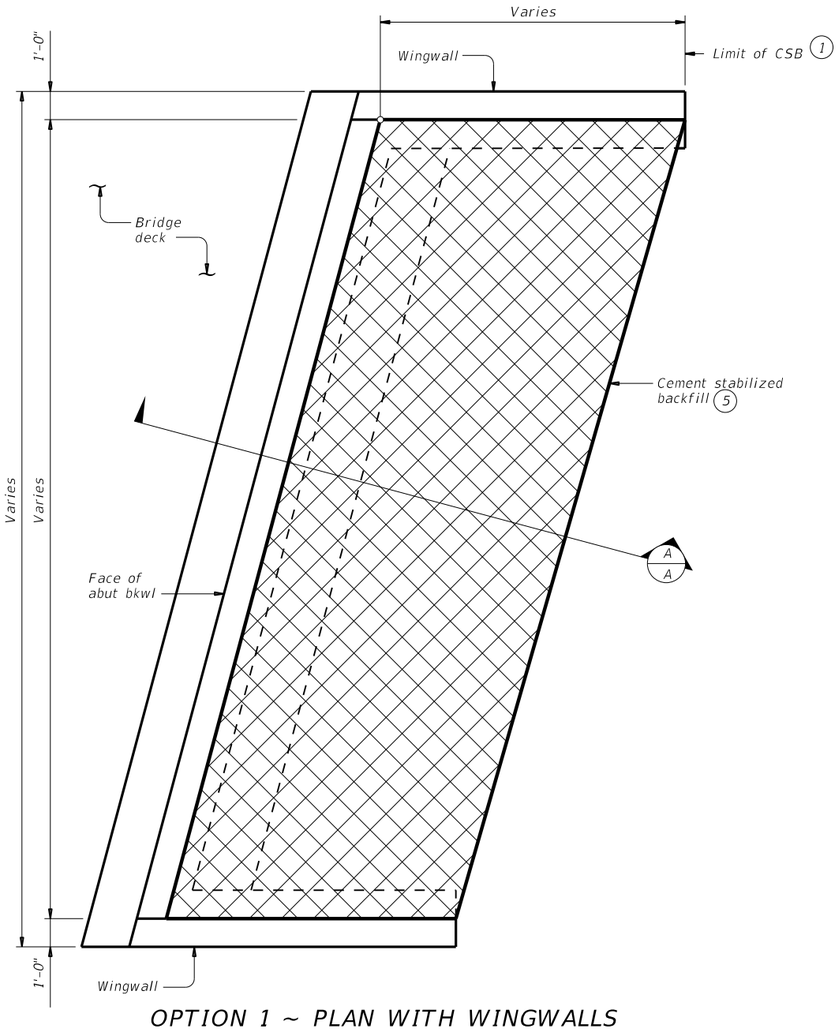
BRIDGE APPROACH SLAB

CONCRETE PAVEMENT

BAS-C

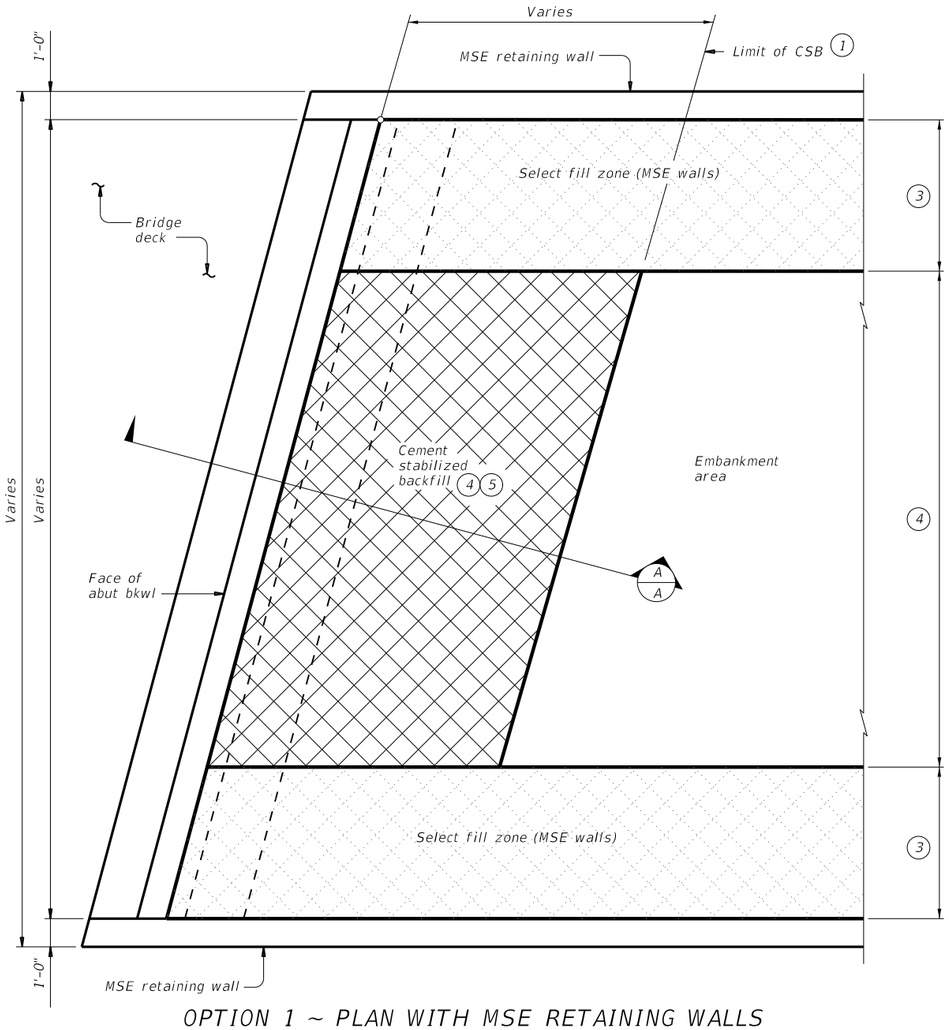
FILE: bascste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		89

DATE: 11/3/2022 12:56:55 PM
FILE: c:\pw\khl\d0222653\csabste1-20 (1).dgn

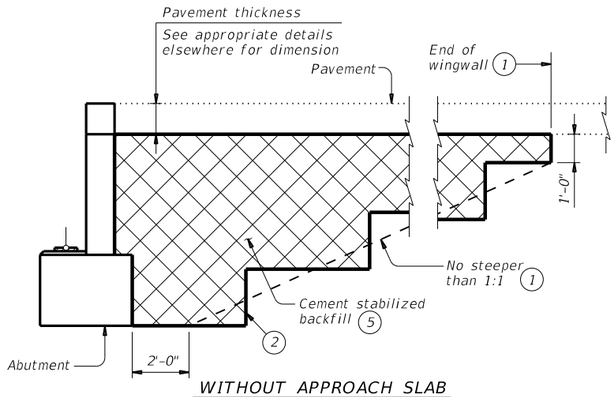


OPTION 1 ~ PLAN WITH WINGWALLS

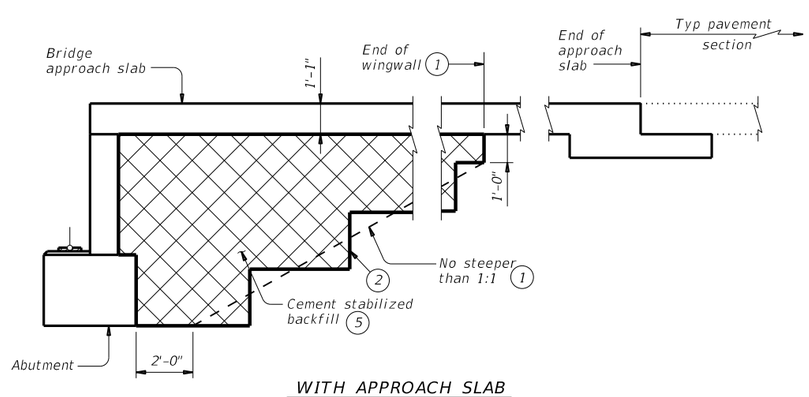
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

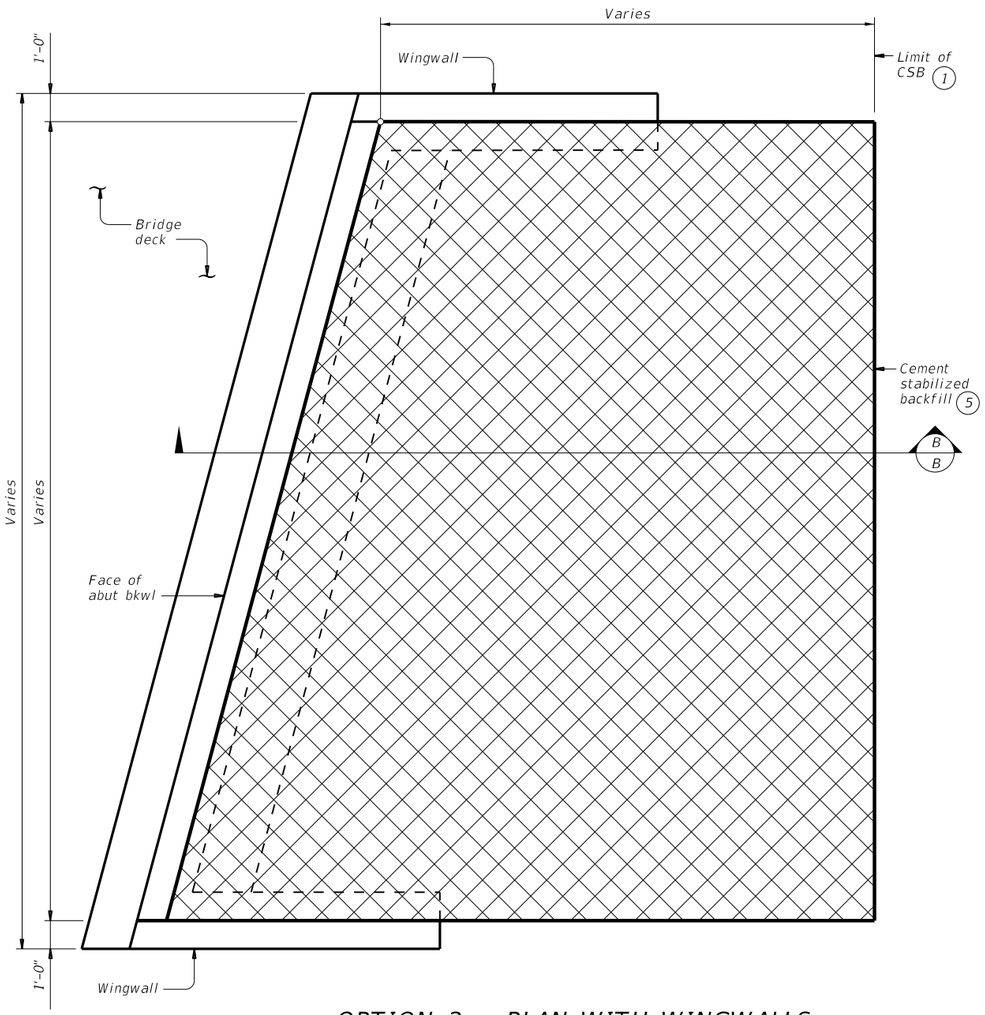
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

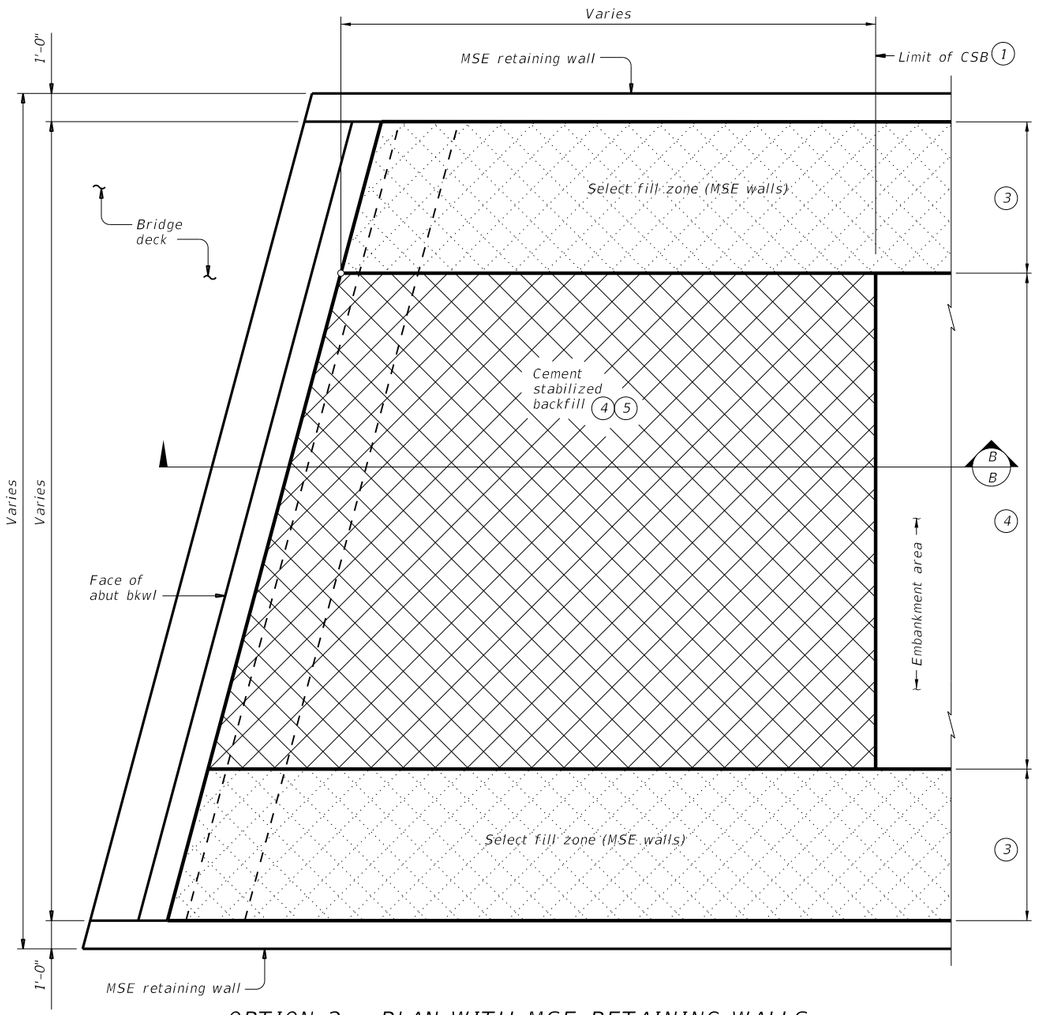
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		90

DATE: 11/3/2022 12:56:56 PM
FILE: c:\pw\khl\d0222653\csabste1-20 (1).dgn



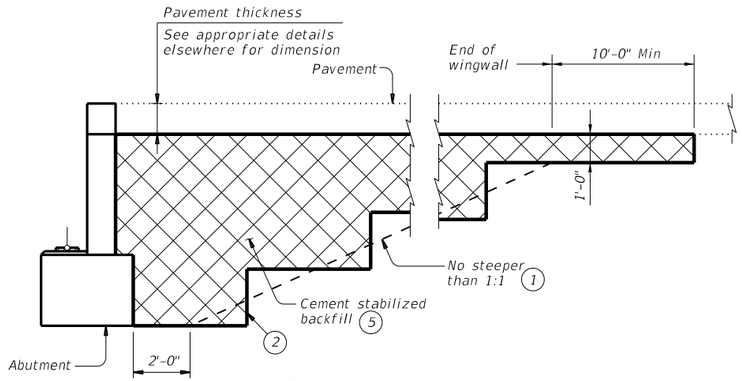
OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.

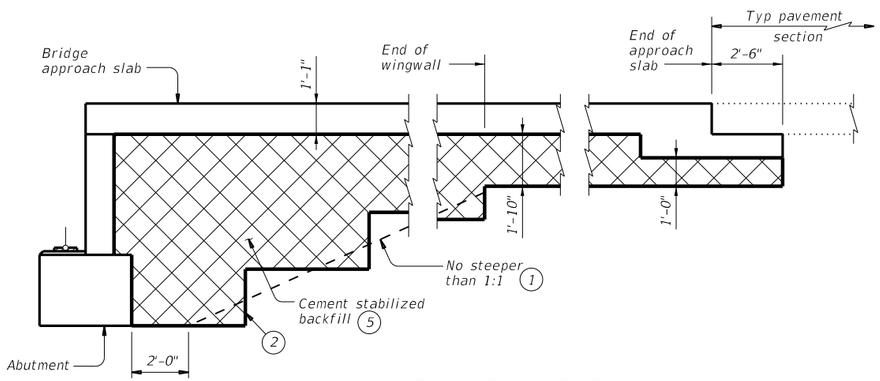


OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

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



WITHOUT APPROACH SLAB



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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

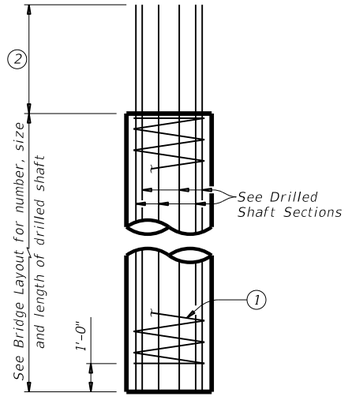
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

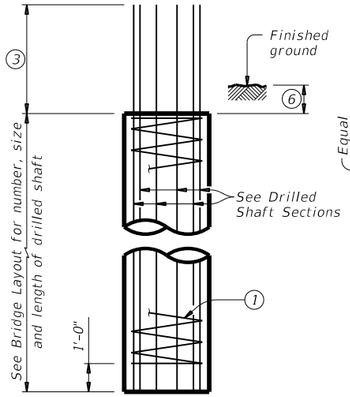
CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		91

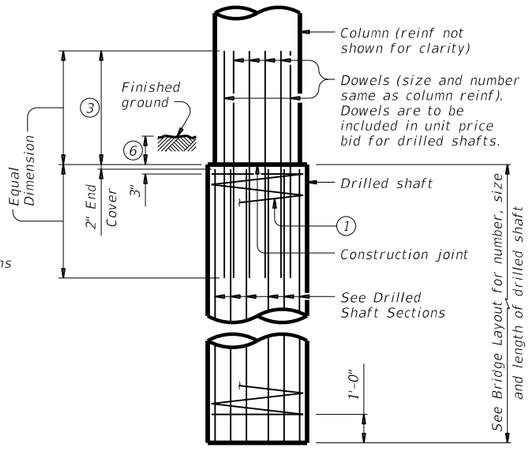
DATE: 11/3/2022 12:57:04 PM
FILE: c:\pw\khl\d0222653\fdstde01-20 (1).dgn



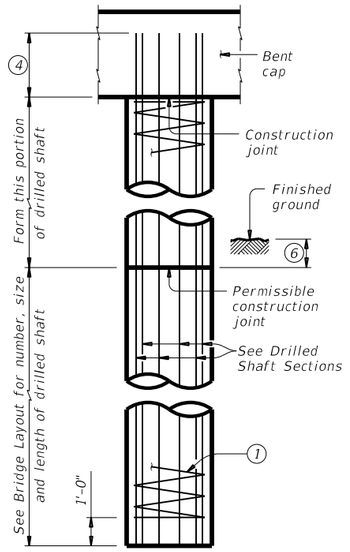
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



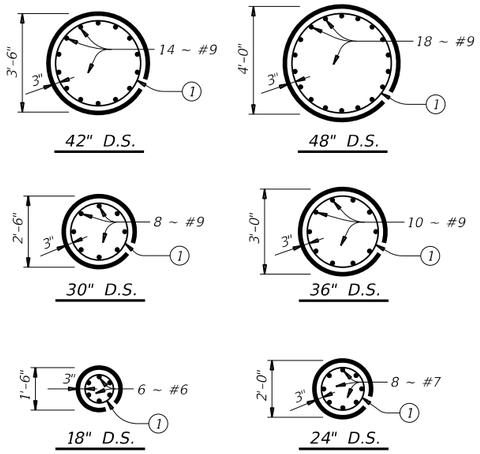
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

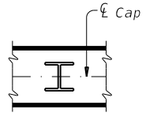


DRILLED SHAFT SECTIONS

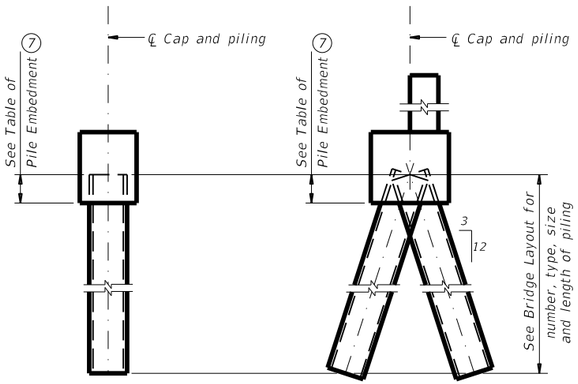
DRILLED SHAFT DETAILS

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

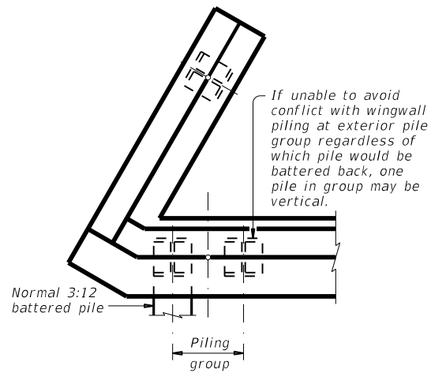
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



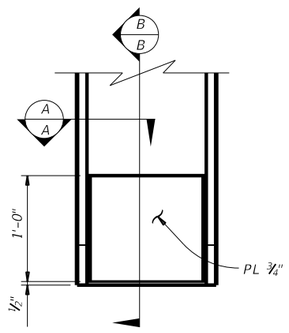
ORIENTATION OF STEEL H-PILING



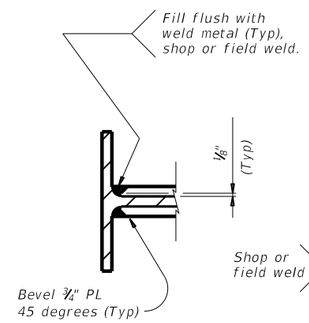
PILING DETAILS
(Concrete or steel H)



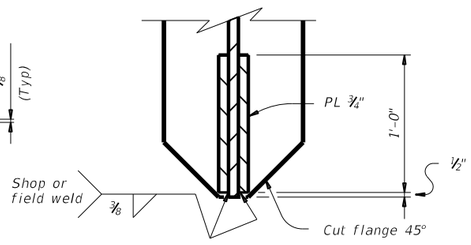
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



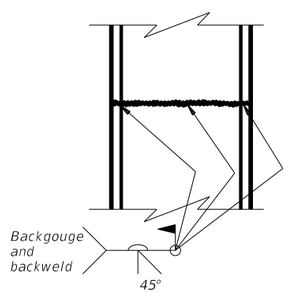
SECTION A-A

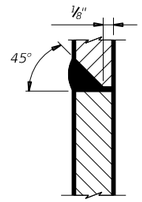


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

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





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

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

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

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

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

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

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

(7) Or as shown on plans.

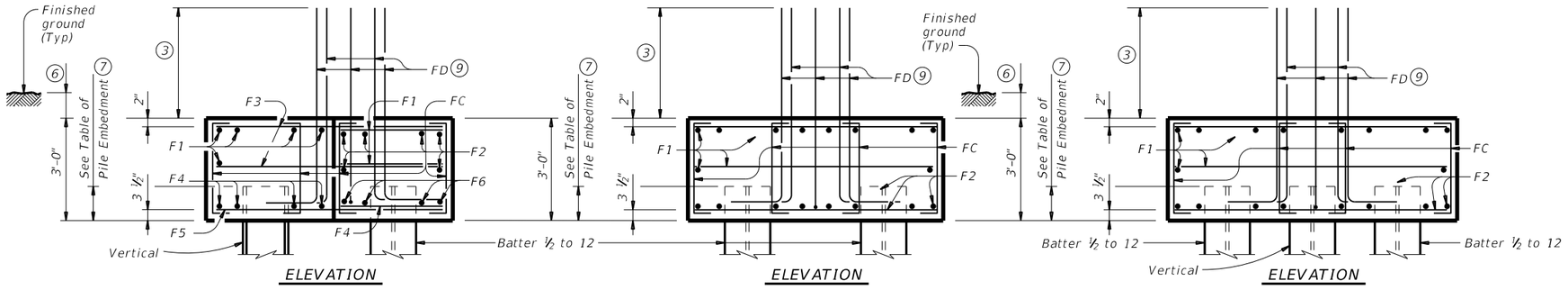
Texas Department of Transportation

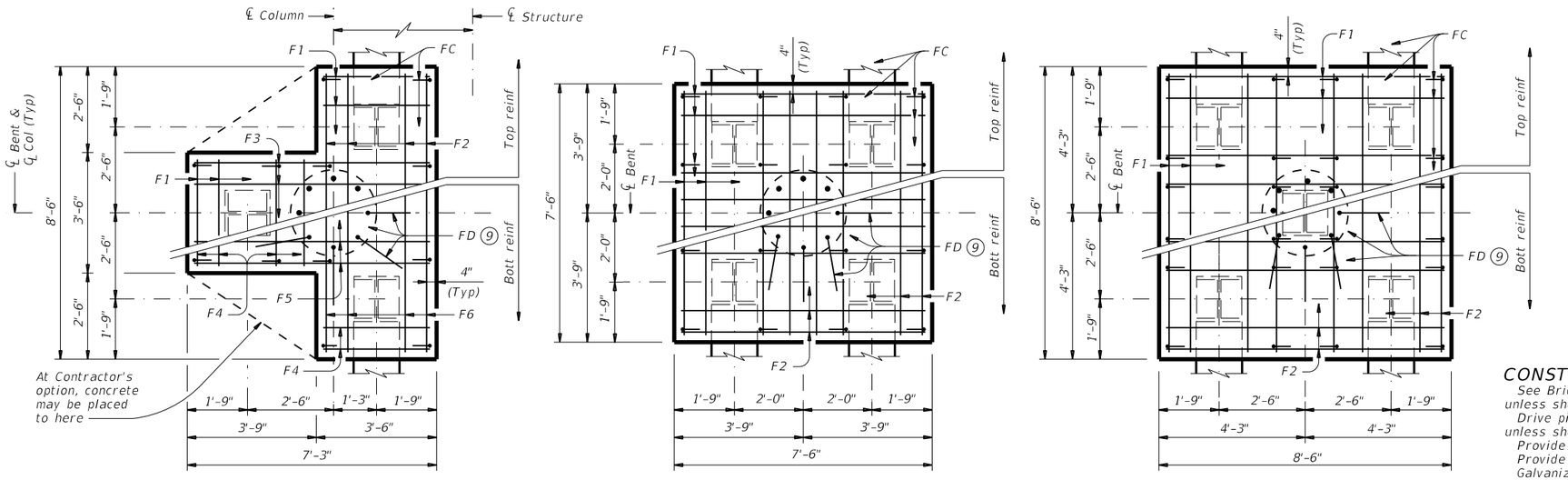
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		92





THREE PILE FOOTING (8)

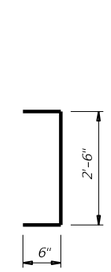
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

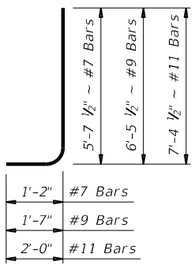
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

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

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

(7) *Or as shown on plans.*

(8) *See Bridge Layout for type, size and length of piling.*

(9) *Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.*

(10) *Adjust FD quantity, size and weight as needed to match column reinforcing.*

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

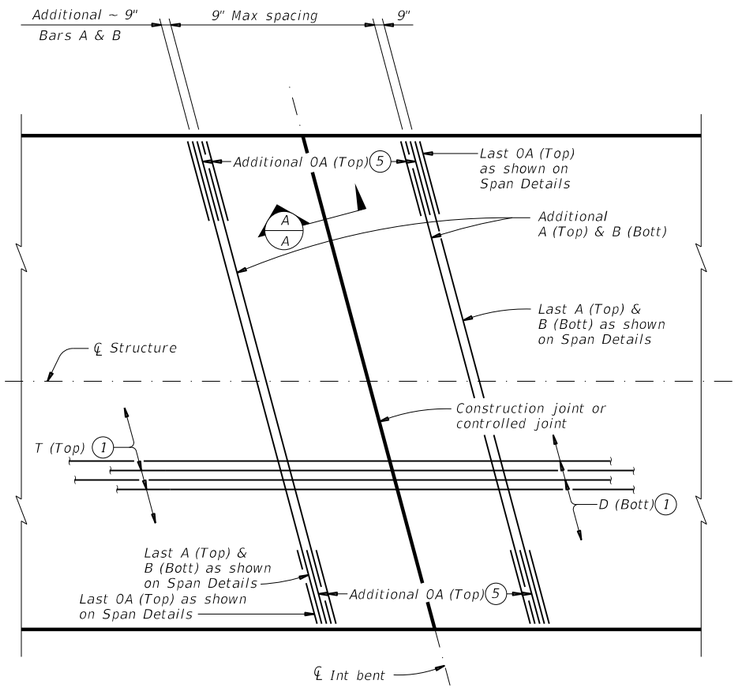
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		93

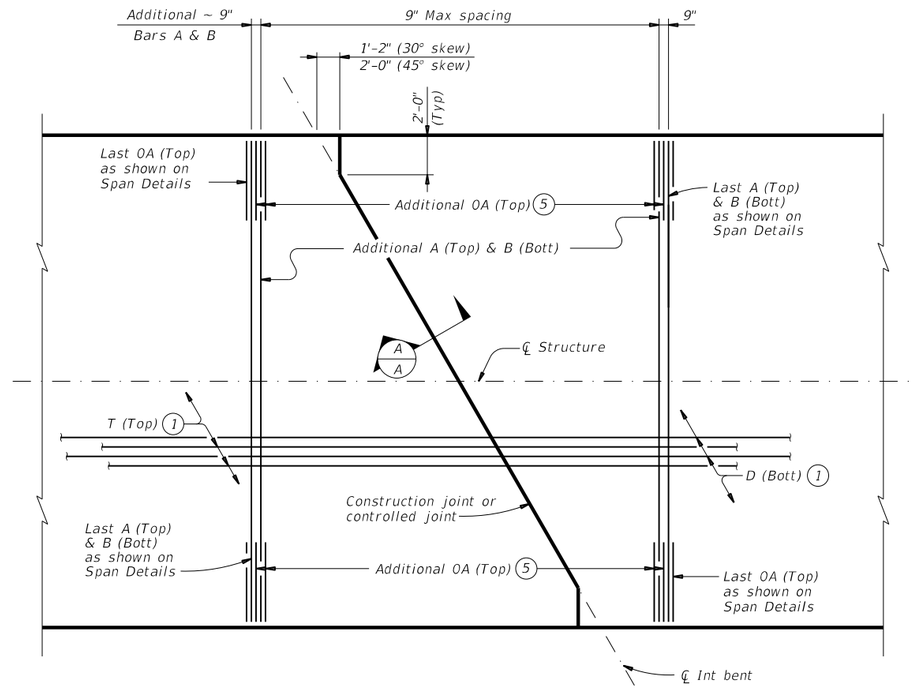
DATE: 11/3/2022 12:57:04 PM
FILE: c:\pw\kh1\d0222653\fdstde01-20 (1).dgn

DATE: 11/3/2022 12:57:11 PM
FILE: c:\pw\khl\d0222653\i\gcs1sts-19.dgn



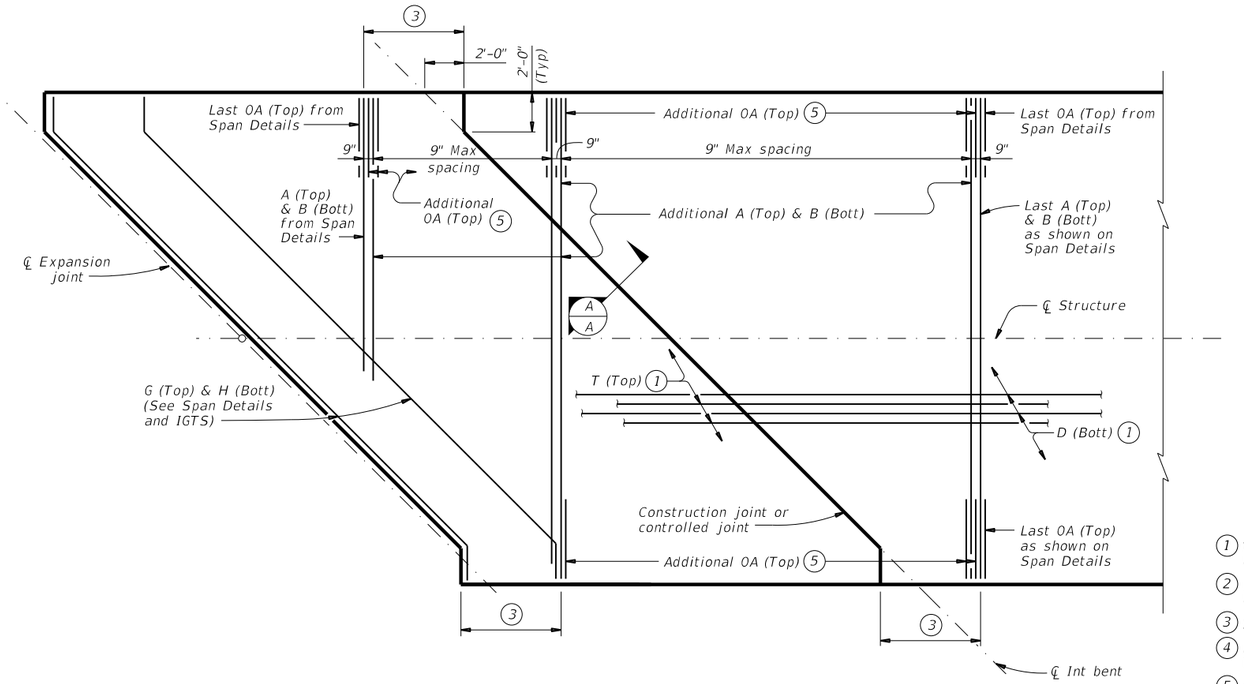
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



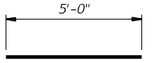
PLAN FOR 30° OR 45° SKEW

(Showing 30° skew)

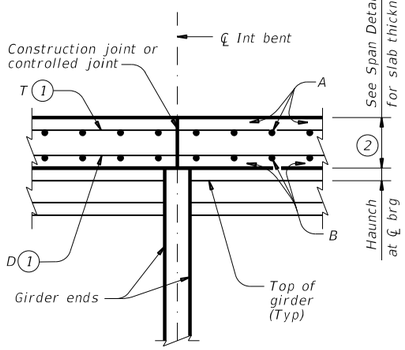


PLAN FOR 45° SKEW 4

(Showing short span condition.)



BARS 0A (#5)



SECTION A-A

Bars 0A (Top) not shown for clarity.

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant slab thickness over the bent.
3. 5'-4" as shown on Span Details.
4. Use these details when no full slab width bars A and B are shown on Span Details.
5. Bars 0A (Top) at 9" Max spacing between Bars A (Top).
6. Values in table assume a temperature change of 70° F after erection when calculating thermal movement in one direction (not total).

TABLE OF (6) ALLOWABLE UNIT LENGTH

Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.1
1.00	3.9
2.00	3.7
3.00	3.5
4.00	3.3
5.00	3.1

Unit length must not exceed the length of the shortest end span times the Unit Length Factor shown in table or 400', whichever is less.

BAR TABLE

BAR	SIZE
A	#4
B	#4
D	#4
T	#4
0A	#5

The details shown on this sheet are applicable for two and three span units comprised of the same girder type.
Units may be comprised of different span lengths. See "Table of Allowable Unit Length".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

CONSTRUCTION NOTES:

Where multi-span units are indicated on the Bridge Layout, the thickened slab end details and reinforcement shown on IGTS standard (Bars AA, G, H, J, K, and M) and on the Span Details will be omitted where slabs are continuous over interior bents. At these locations, the slab details and reinforcement will be as shown on this sheet or on PCP standard (if using this option).

Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).

See Span Details for remainder of slab reinforcement and details.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if shown elsewhere on the plans.

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

The details shown on this sheet are applicable for use only with the Prestressed Concrete I-Girder Standard Designs shown on standards IGSD-24, IGSD-28, IGSD-30, IGSD-32, IGSD-38, IGSD-40 and IGSD-44.

HL93 LOADING

Texas Department of Transportation

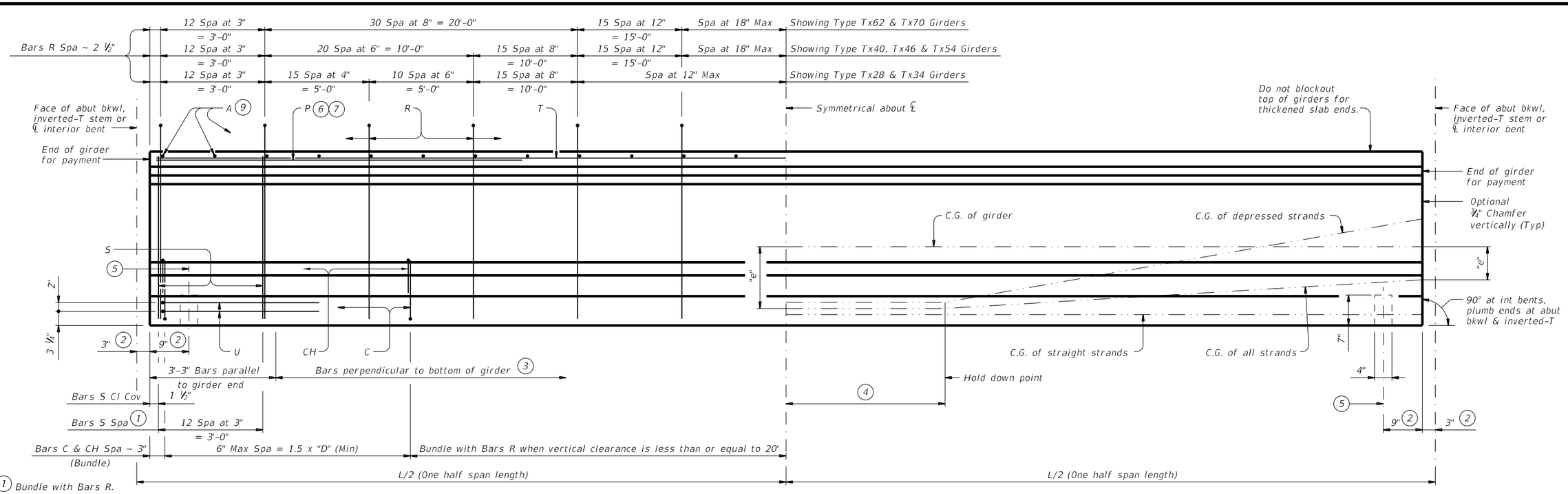
Bridge Division Standard

CONTINUOUS SLAB DETAILS

PRESTR CONC I-GIRDER SPANS

IGCS

FILE: igcs1sts-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added bubble note 6.	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		94



(1) Bundle with Bars R.

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

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

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

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

GIRDER ELEVATION

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

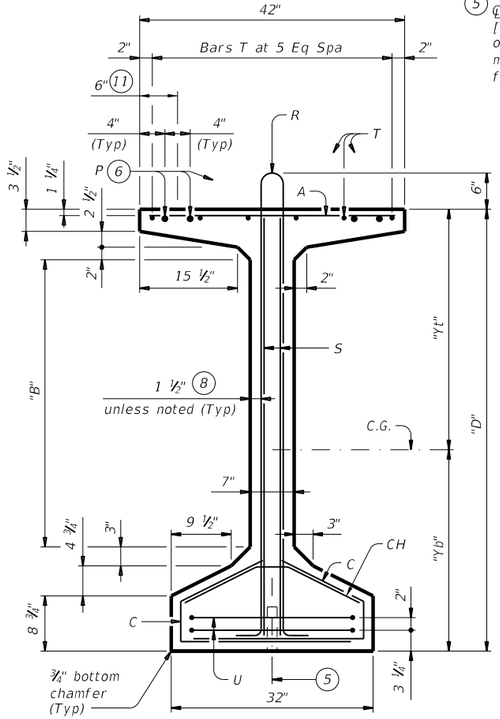
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

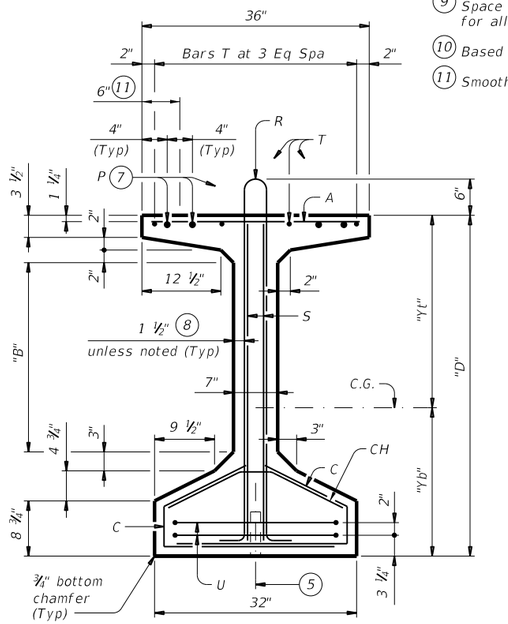
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

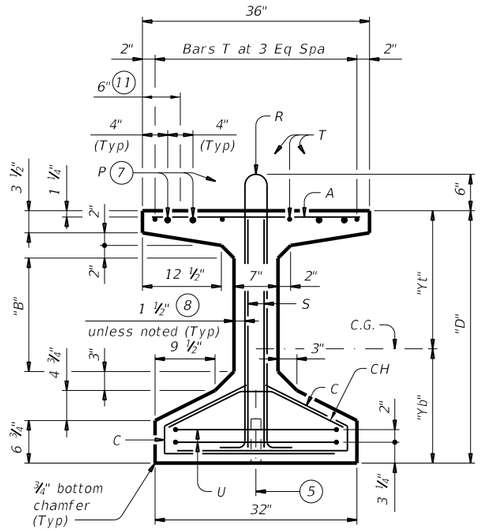
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

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

GENERAL NOTES:

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

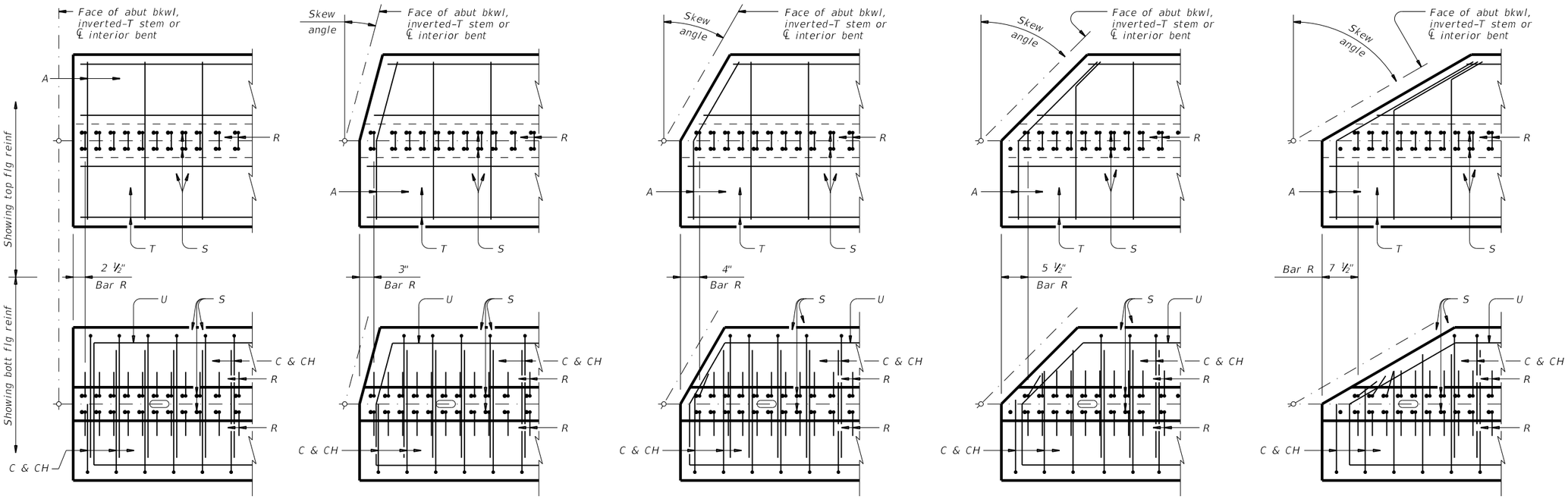
PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		95

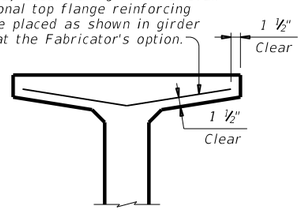
DATE: 11/3/2022 12:57:18 PM
FILE: c:\pw\khl\d0222653\igdstds1-19.dgn

DATE: 11/3/2022 12:57:18 PM
FILE: c:\pw\khl\d0222653\i_gdstds1-19.dgn

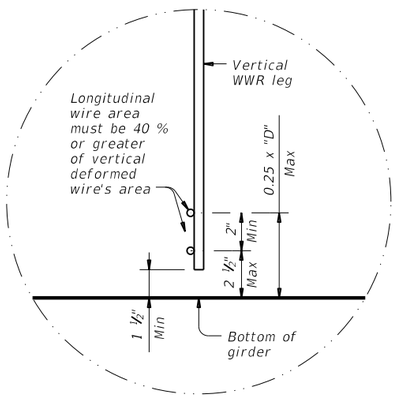


PLAN OF GIRDER ENDS (12)

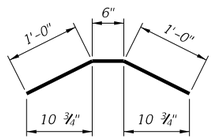
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



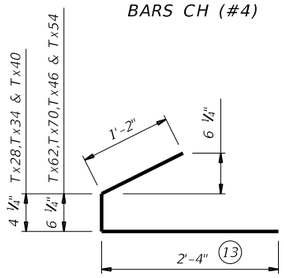
OPTIONAL TOP FLANGE REINFORCING DETAIL



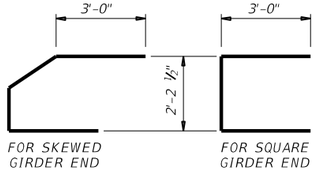
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



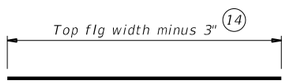
BARS CH (#4)



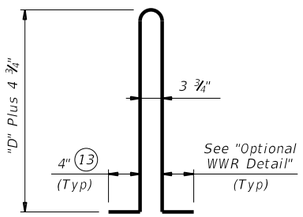
BARS C (#4)



BARS U (#5)

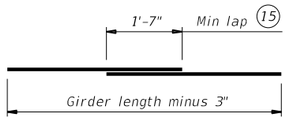


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

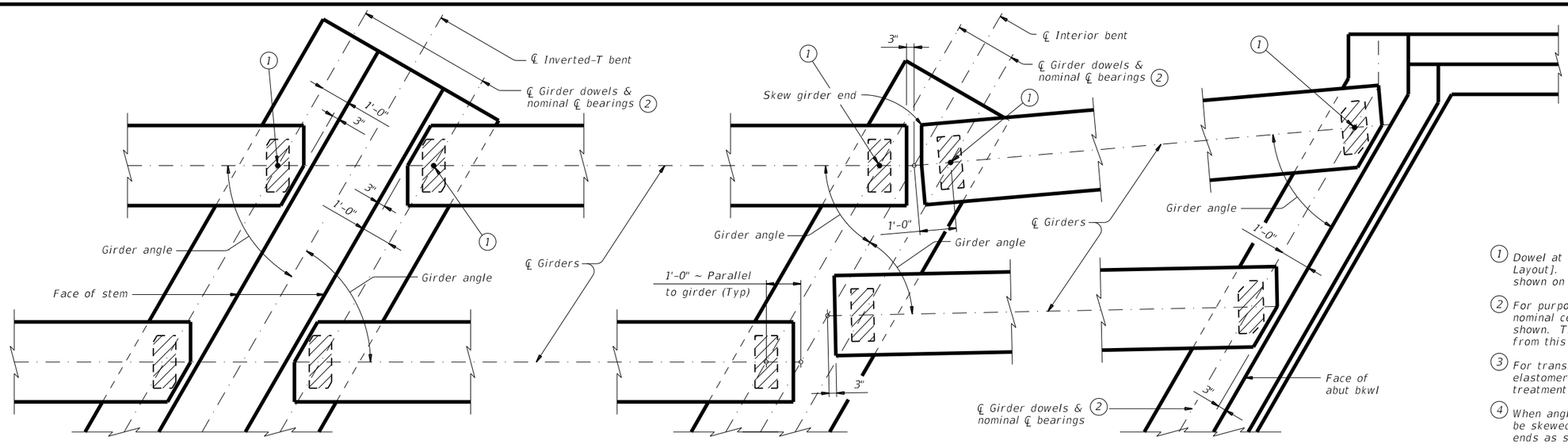
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		96



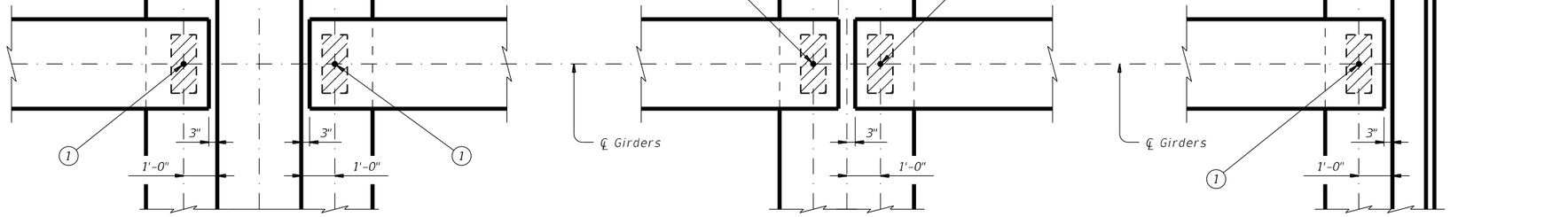
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

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

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

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

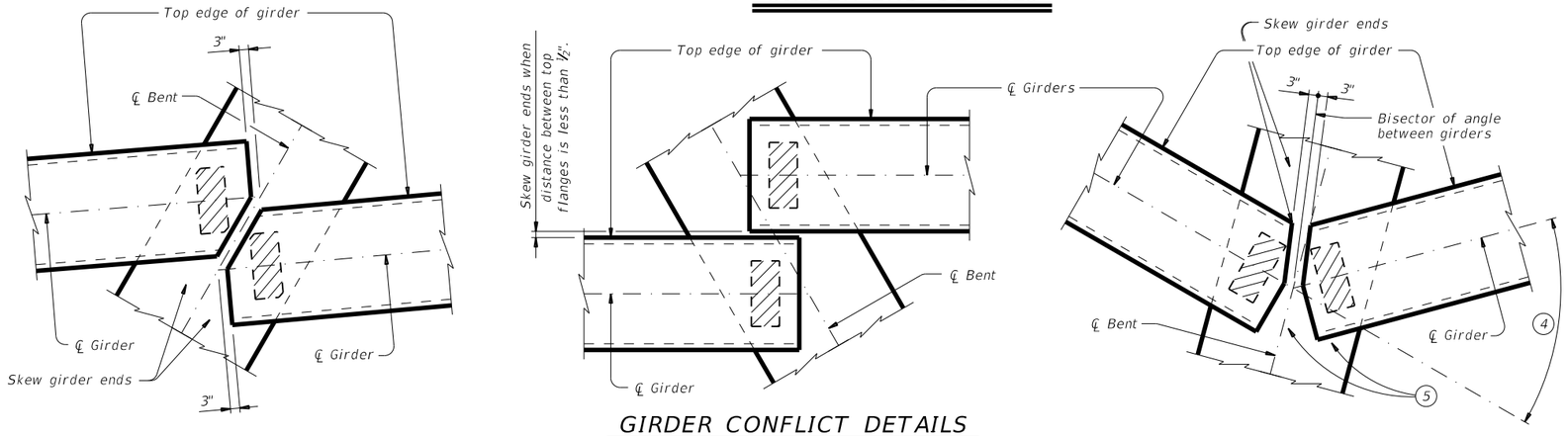
(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



GENERAL NOTES:

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

GIRDER END DETAILS



GIRDER CONFLICT DETAILS

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

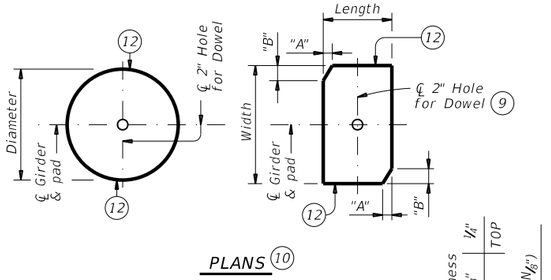
ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

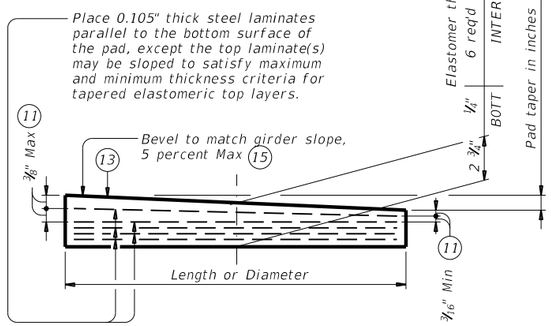
IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		97

DATE: 11/3/2022 12:57:27 PM
FILE: c:\pw\khl\d0222653\igebsts1-17.dgn



PLANS (10)



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

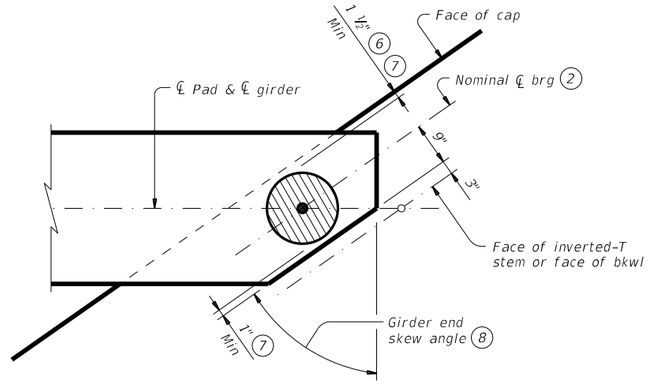
(50 DUROMETER)

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

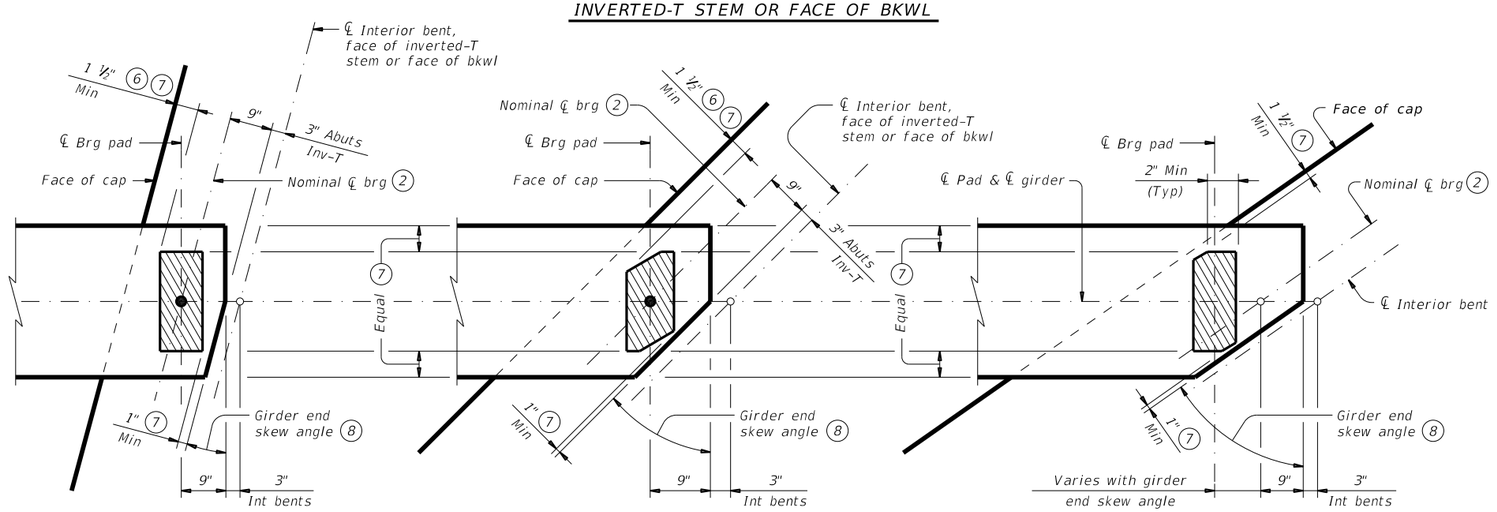
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"



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



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

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

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

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

(11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(12) Locate Permanent Mark here.

(13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

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

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

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

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

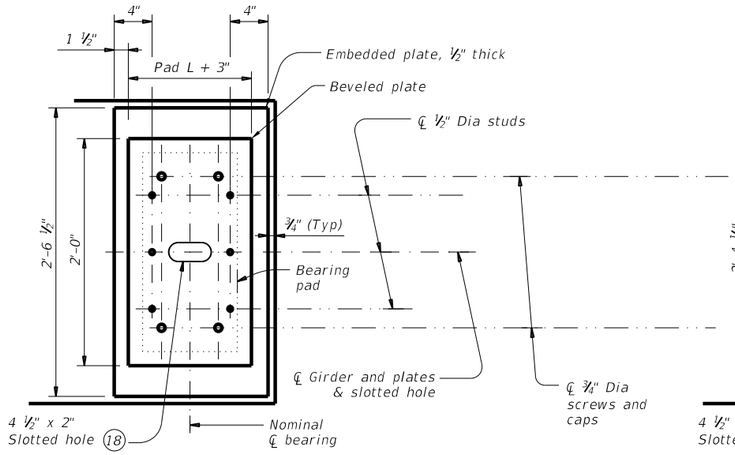
ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

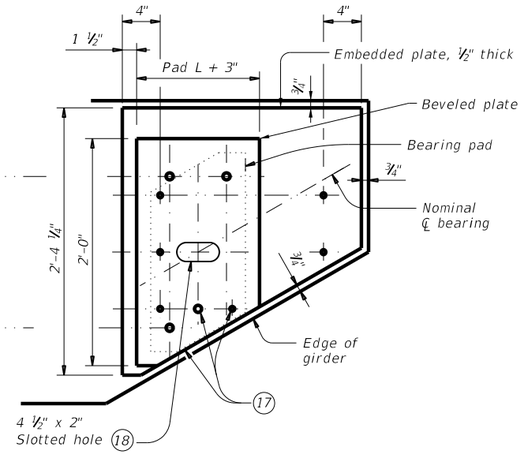
IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		98

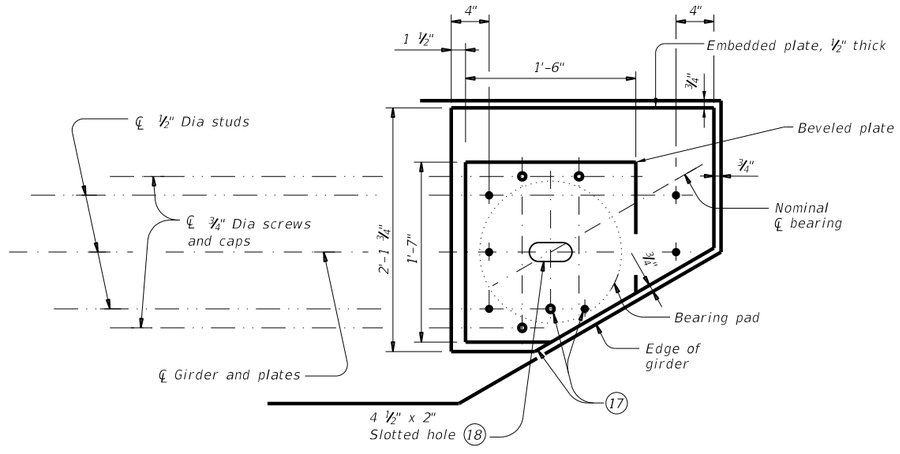
DATE: 11/3/2022 12:57:38 PM
FILE: c:\pw\kh1\d0222653\i gebsts1-17.dgn



NORMAL GIRDER END
RECTANGULAR BEARING PAD

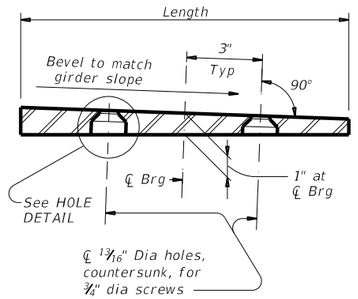


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

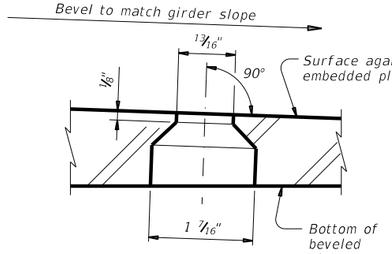


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

BEVELED PLATE DETAILS

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

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

SOLE PLATE NOTES:

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

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

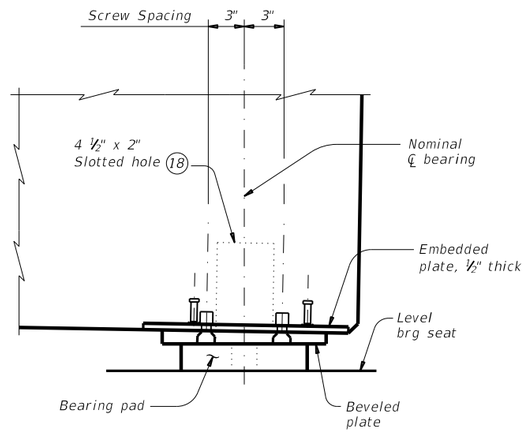
Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

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

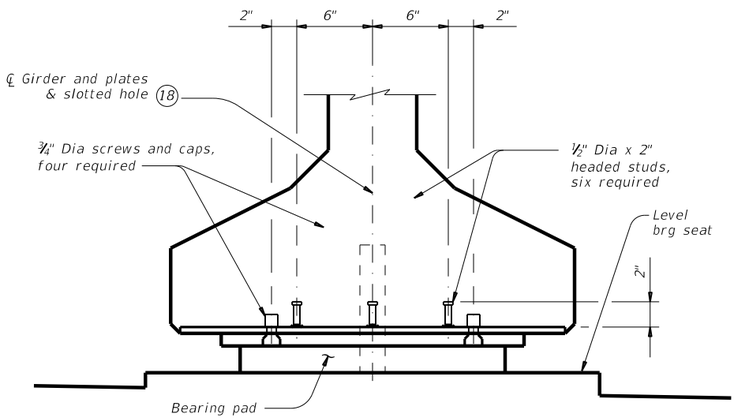
Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

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

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



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

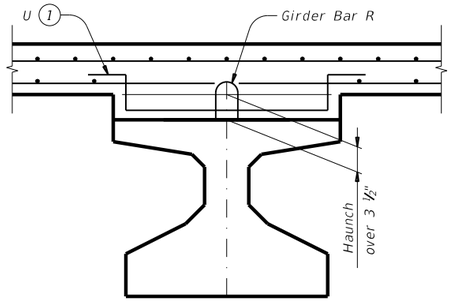
ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

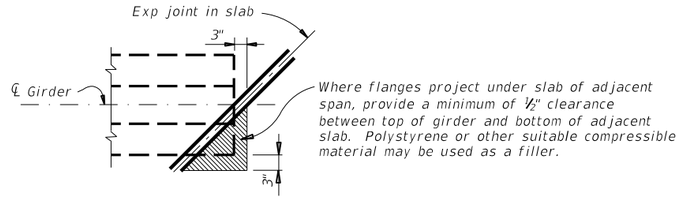
FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		99

DATE: 11/3/2022 12:57:39 PM
FILE: c:\pw\kn1\d0222653\igebsts1-17.dgn

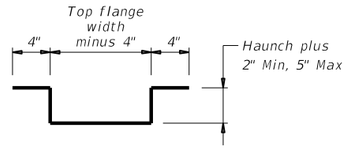
DATE: 11/3/2022 12:57:45 PM
FILE: c:\pw\kh1\d0222653\igmssts1-19.dgn



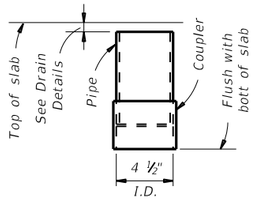
HAUNCH REINFORCING DETAIL



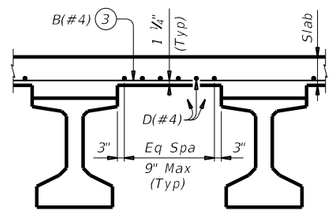
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

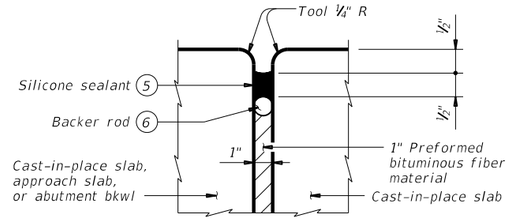


C-I-P DRAIN DETAIL (2)

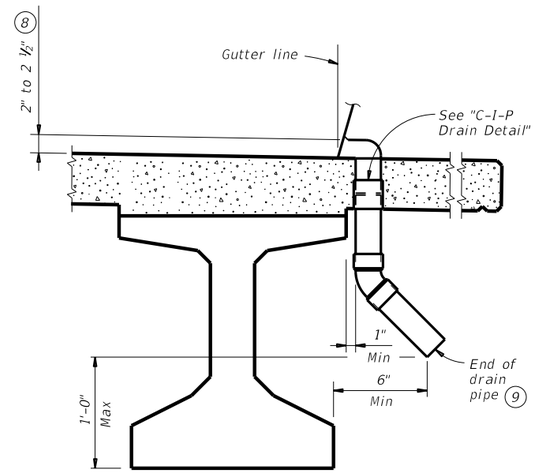


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

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

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

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

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

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

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

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

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

DECK FORMWORK NOTES:

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

Texas Department of Transportation

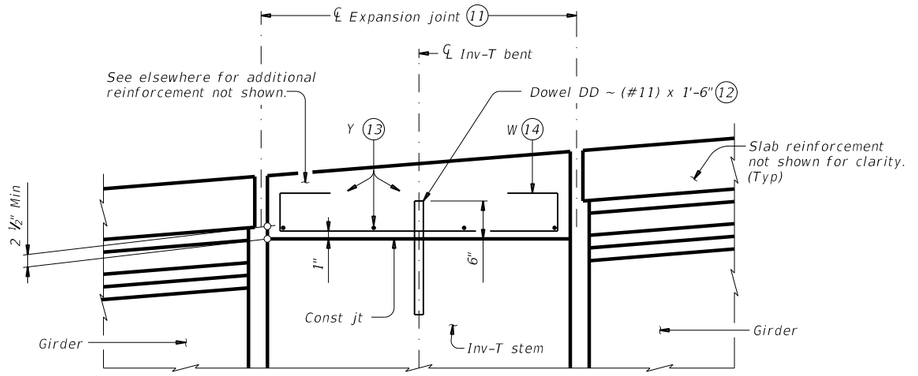
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

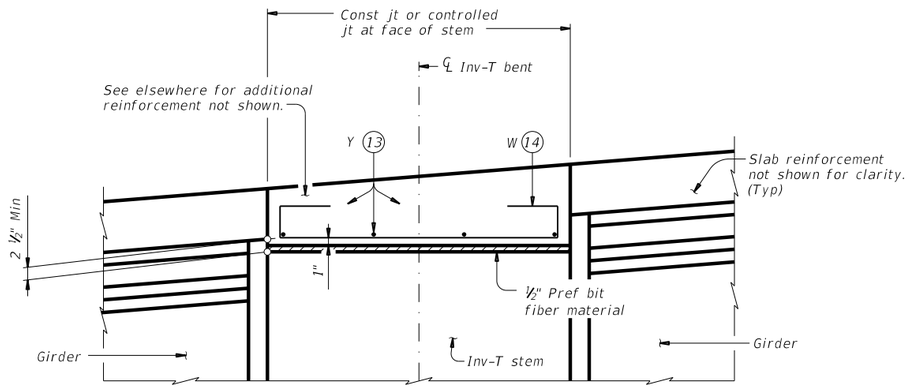
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		100

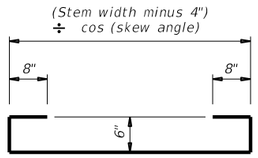


SHOWING EXPANSION JOINTS

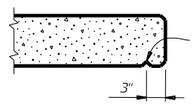


SHOWING CONST JTS OR CONTROLLED JTS

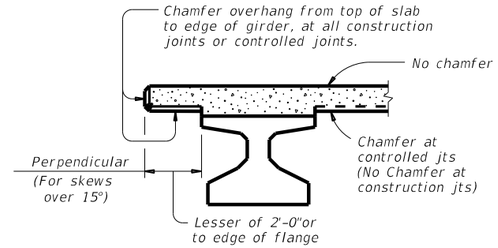
REINFORCEMENT OVER INV-T BENTS



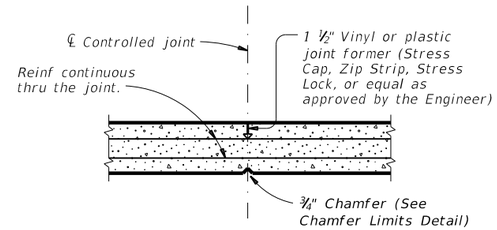
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

DATE: 11/3/2022 12:57:46 PM
FILE: c:\pw\khl\d022653\igmsstsl-19.dgn

SHEET 2 OF 2

Texas Department of Transportation

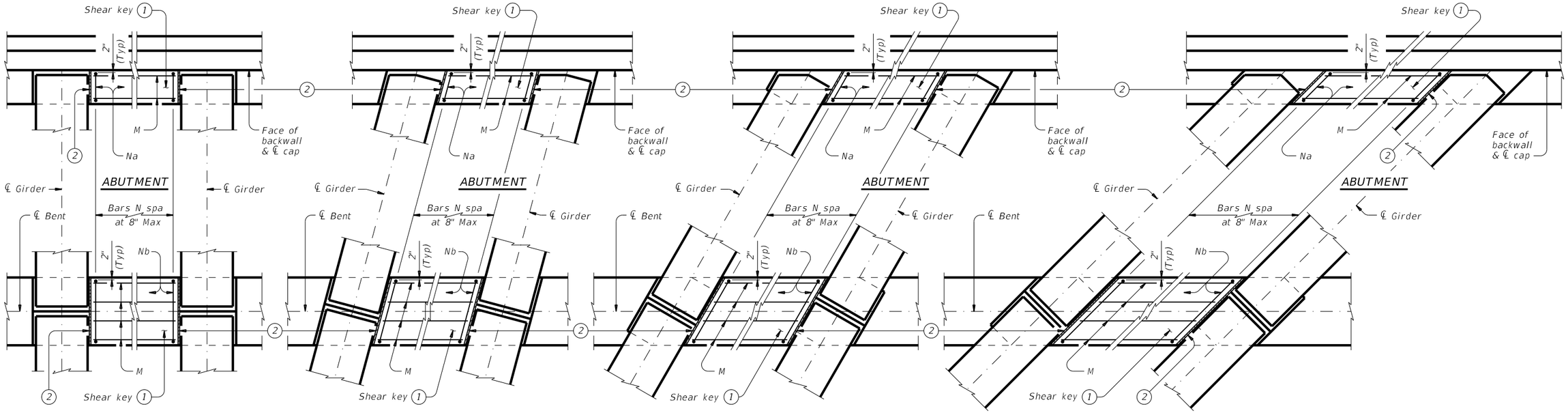
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmsstsl-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-19: Modified Note 7, Type A now a pay item.	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		101



INTERIOR BENT

PARTIAL PLANS WITH NO SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 15° SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 30° SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 45° SKEW

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

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

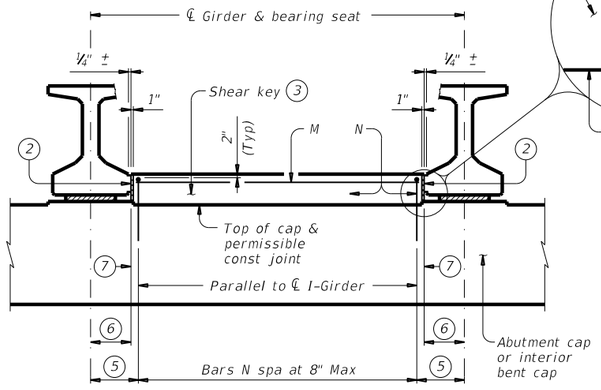
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ✱ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ✱ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

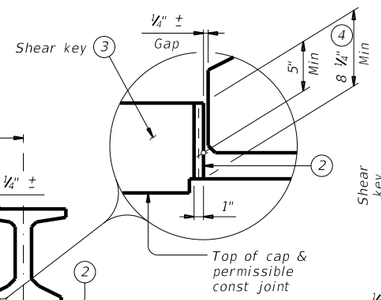
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

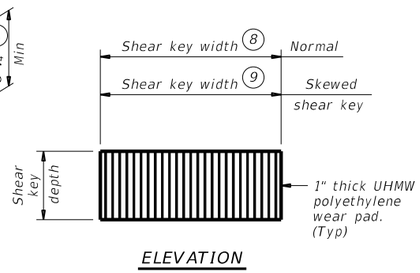
(9) Abutments = ½ Cap width ✱ Cos Skew.
Interior bents = Cap width ✱ Cos Skew.



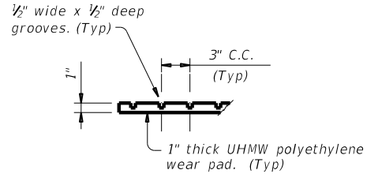
PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

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



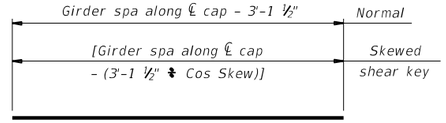


ELEVATION

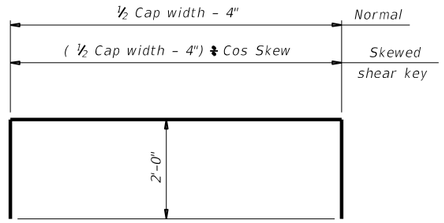


PART SECTION

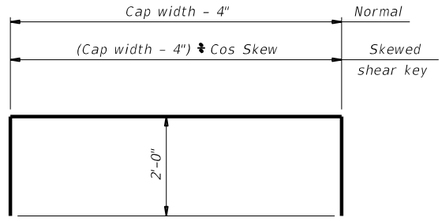
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

Texas Department of Transportation

Bridge Division Standard

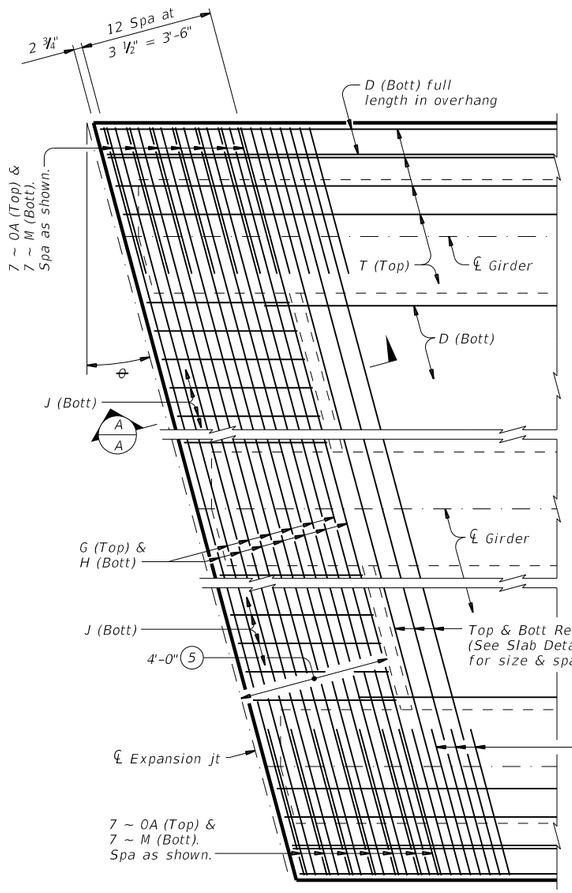
SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

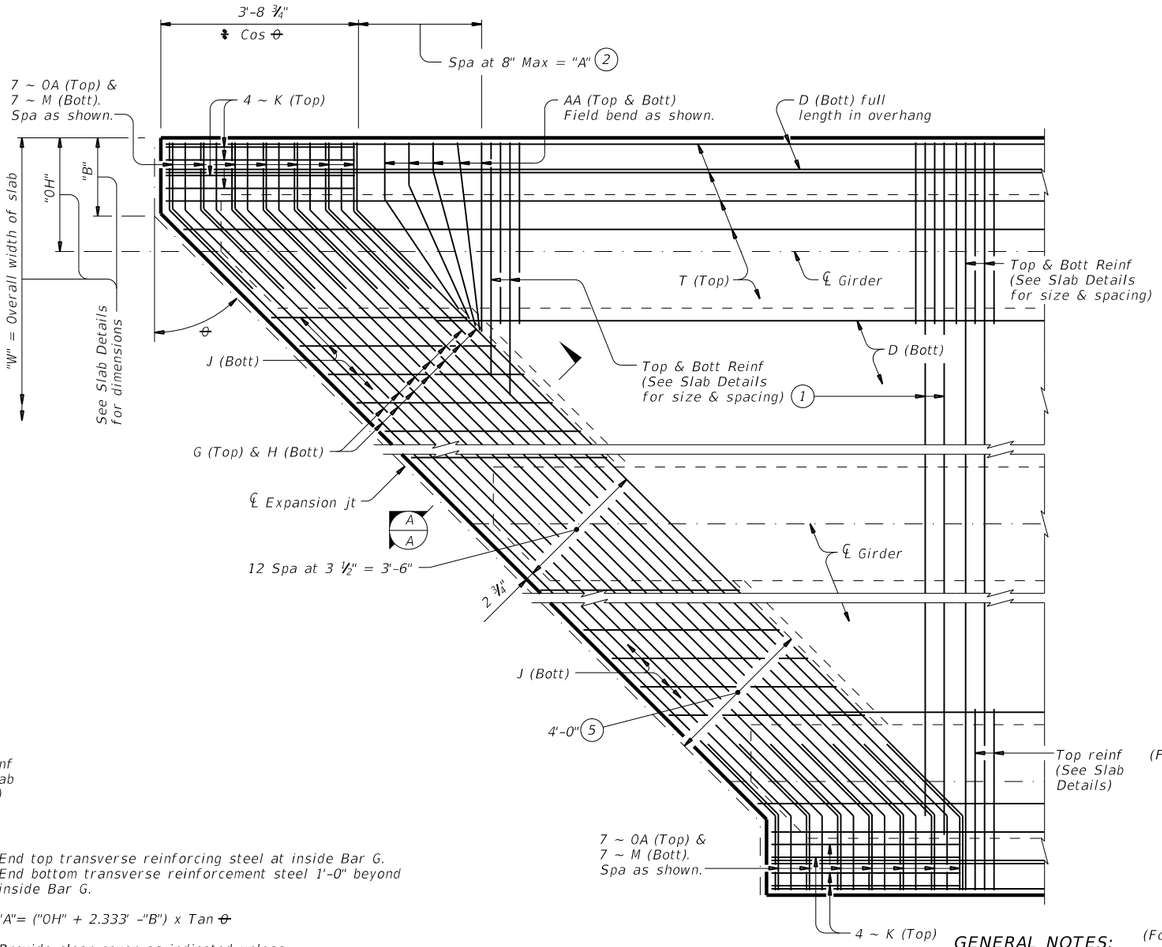
FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		102

DATE: 11/3/2022 12:57:51 PM
FILE: c:\pw\khl\d0222653\i\gskstds-17.dgn

DATE: 11/3/2022 12:57:57 PM
FILE: c:\pw\km1\d0222653\igtsstsl-17.dgn

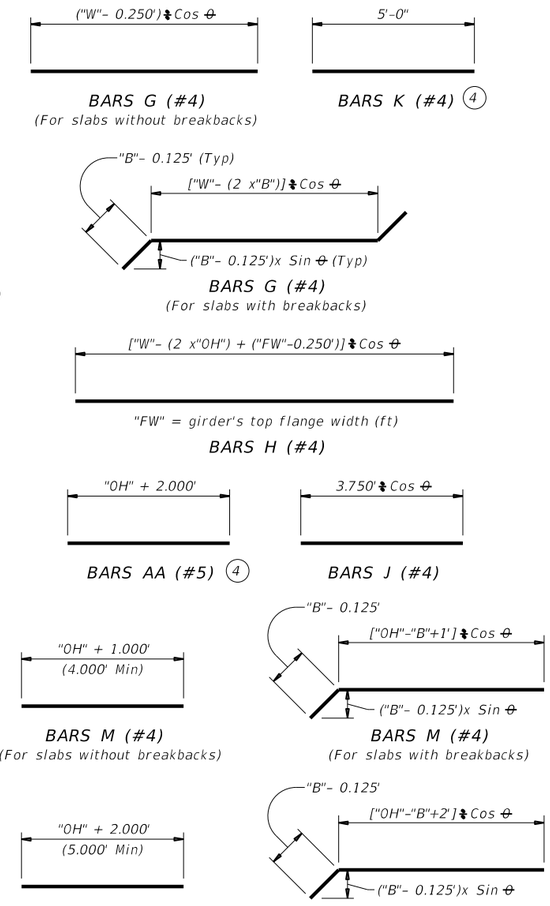


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

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



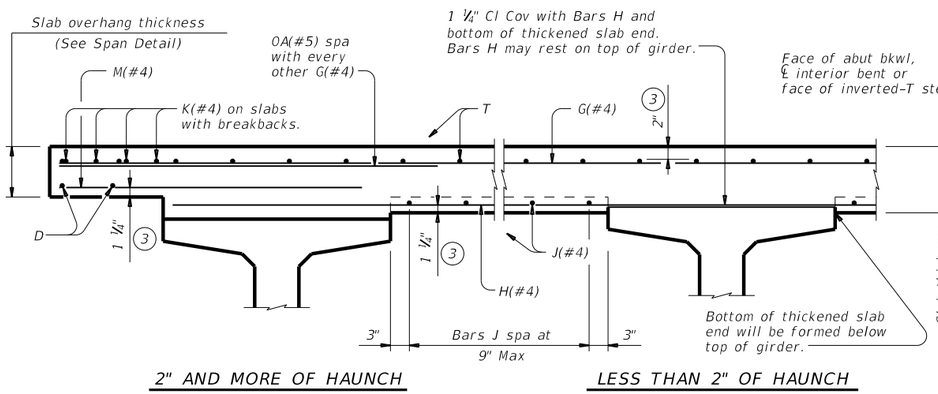
GENERAL NOTES:

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

MATERIAL NOTES:

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

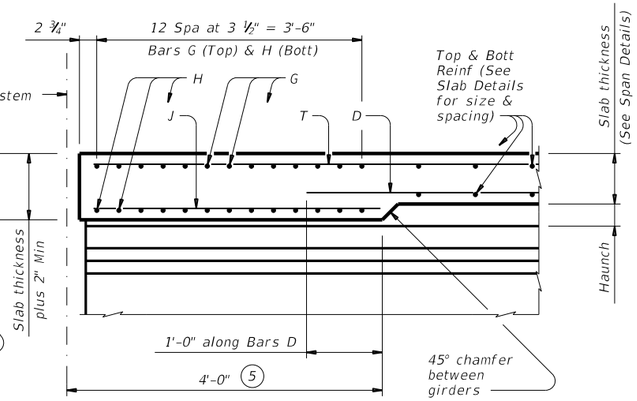
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

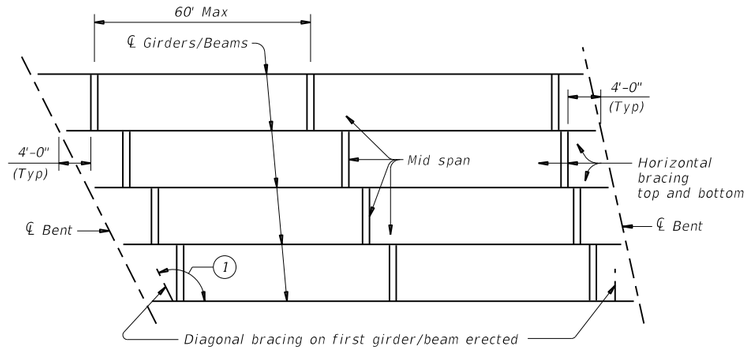
Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS
PRESTRESSED CONCRETE I-GIRDER SPANS

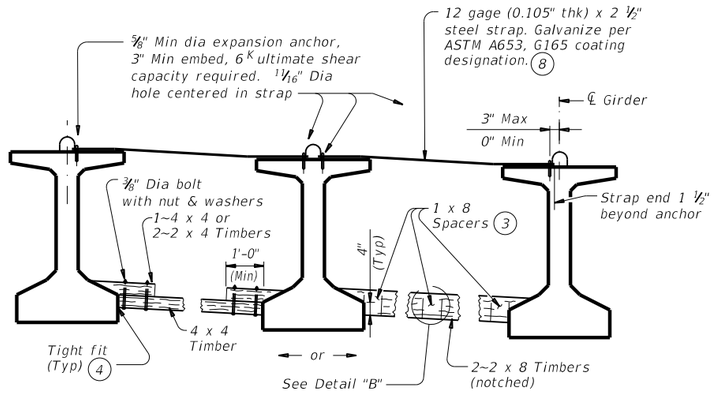
IGTS

FILE: igtsstsl-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		103

DATE: 11/3/2022 12:58:03 PM
FILE: c:\pw\khl\d0222653\mebcsts1-17.dgn

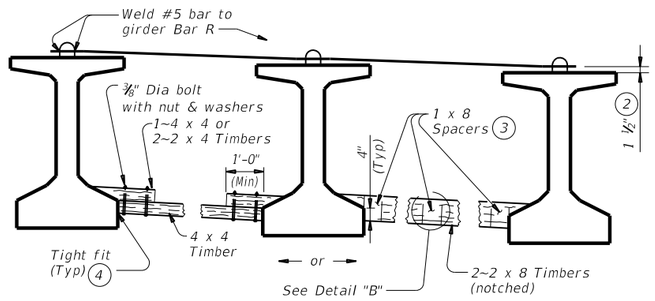


ERECTION BRACING



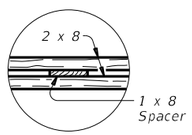
FOR ERECTION BRACING, OPTION 1

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



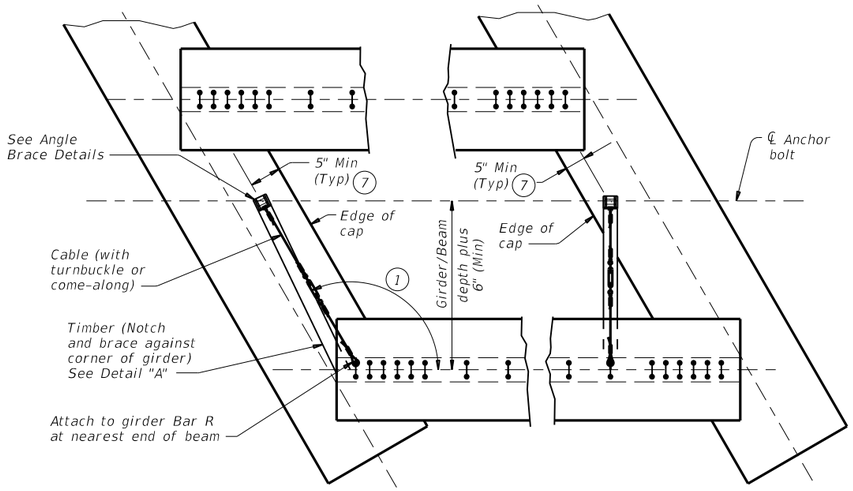
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

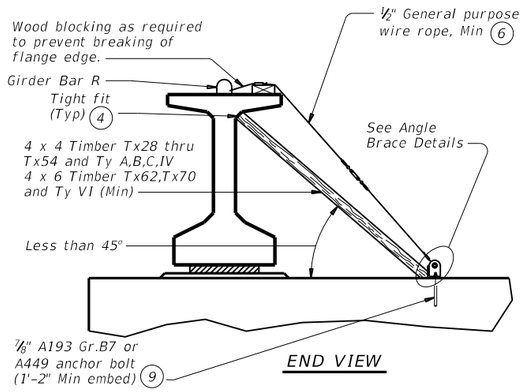


PLAN

DETAIL "B"



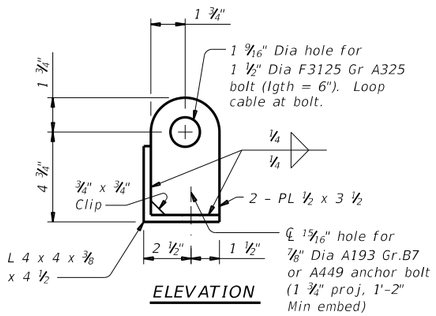
PLAN



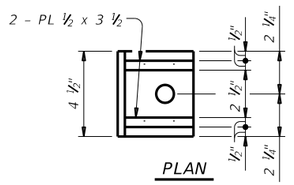
END VIEW

DIAGONAL BRACING DETAILS (5)

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



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

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

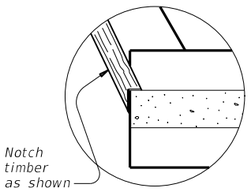
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

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



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

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

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

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

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

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

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

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

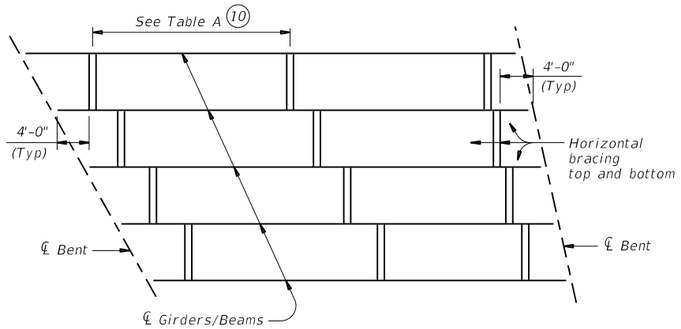
Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		104

DATE: 11/3/2022 12:58:03 PM
FILE: c:\pw\khl\d0222653\mebcsts1-17.dgn



SLAB PLACEMENT BRACING

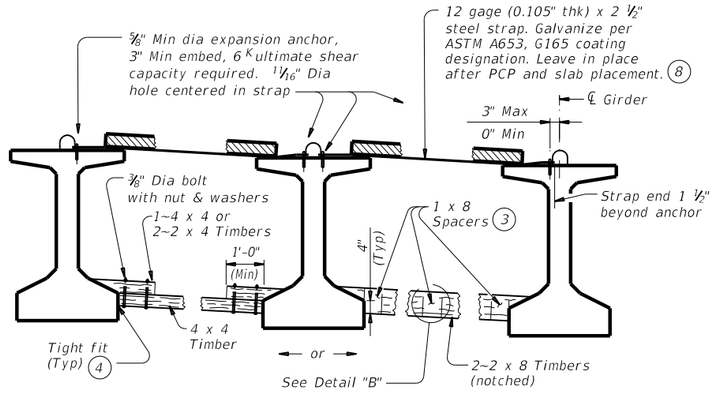
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

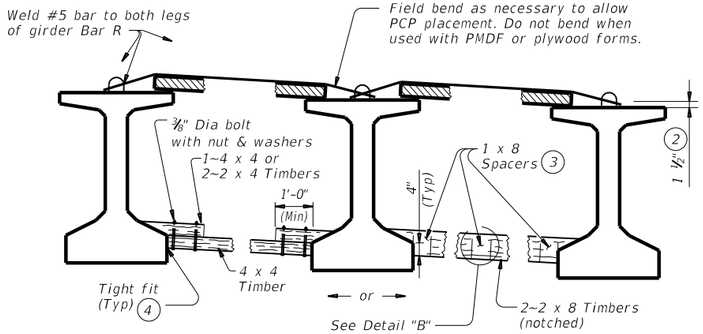
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

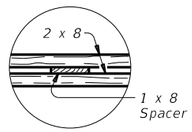
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)



PLAN

DETAIL "B"

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

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

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

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

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

(10) Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

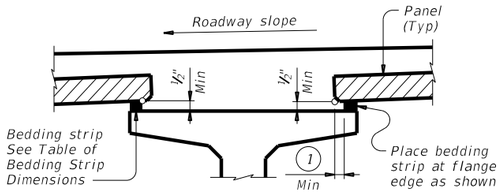
MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

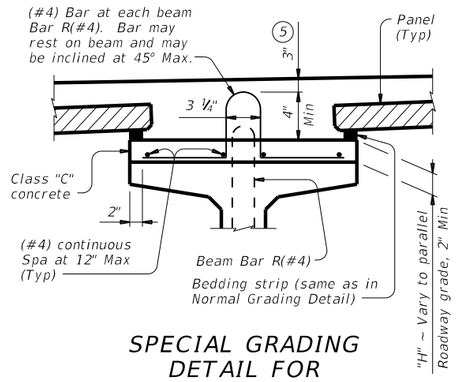
FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		105

DATE: 11/3/2022 12:58:09 PM
FILE: c:\pw\khl\d0222653\pcpstde1-19.dgn



NORMAL GRADING DETAIL (3)

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



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

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

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

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

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

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

(4) Height must not exceed twice the width.

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

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

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

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

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

CONSTRUCTION NOTES:

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

Placing panels to minimize joint openings is recommended.

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

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

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

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

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

MATERIAL NOTES:

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

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

Provide bar Laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

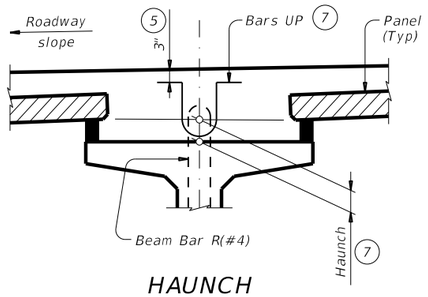
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

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

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

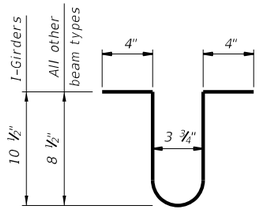
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

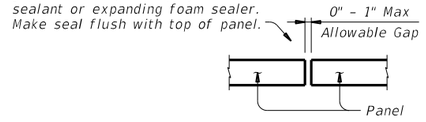


HAUNCH REINFORCING DETAIL

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

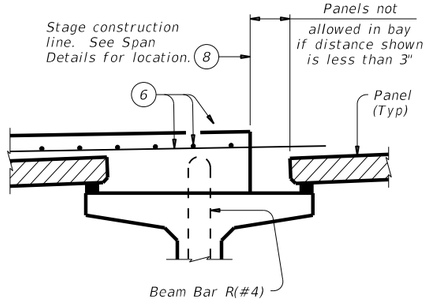


BARS UP (#4) (7)

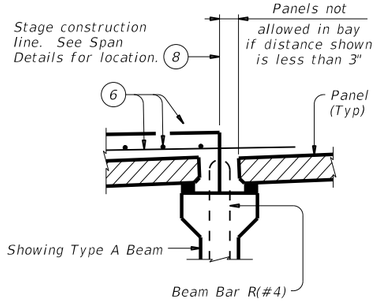


PANEL JOINTS

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



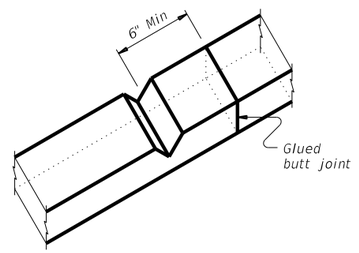
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

HL93 LOADING SHEET 1 OF 4

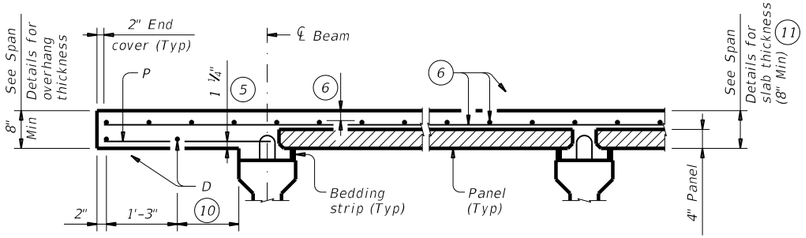
Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

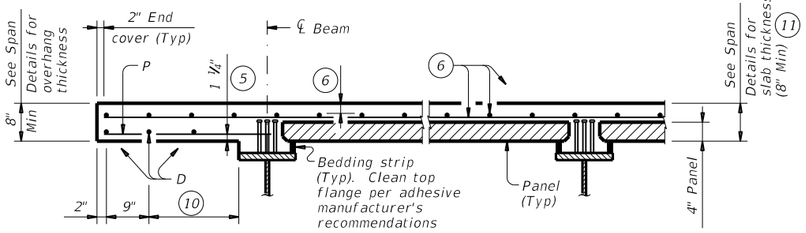
PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		106

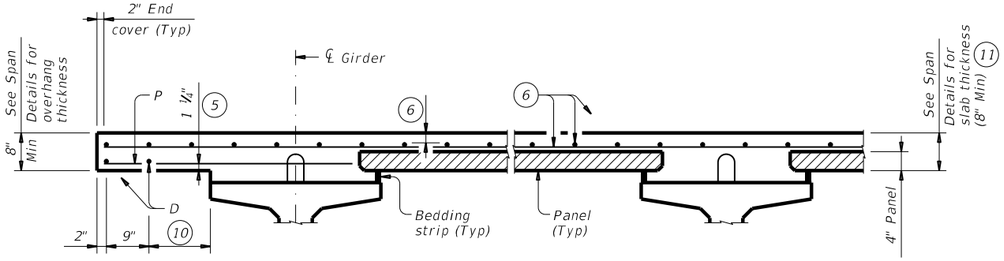
DATE: 11/3/2022 12:58:10 PM
FILE: c:\pw\kh1\d0222653\pcpstde1-19.dgn



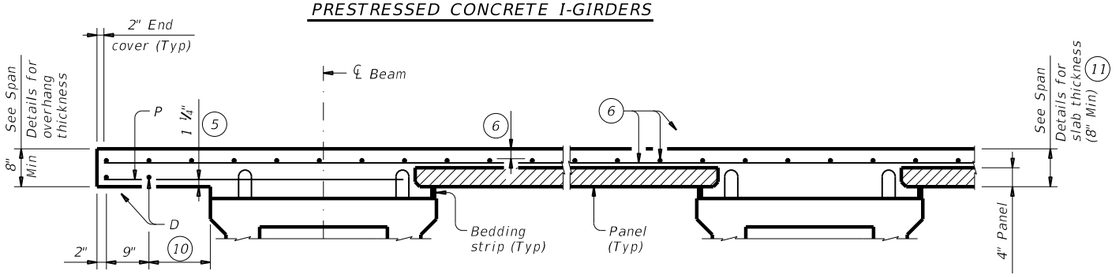
PRESTRESSED CONCRETE I-BEAMS



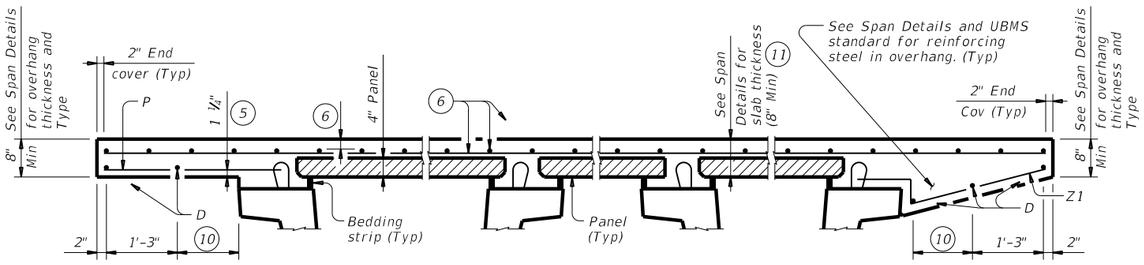
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



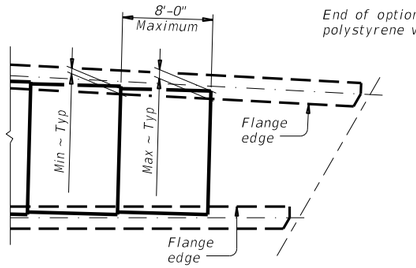
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

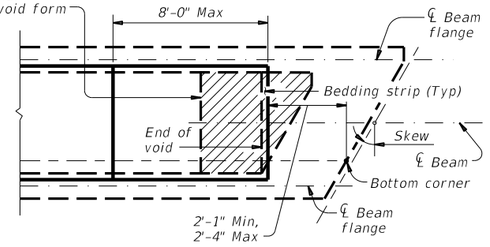
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

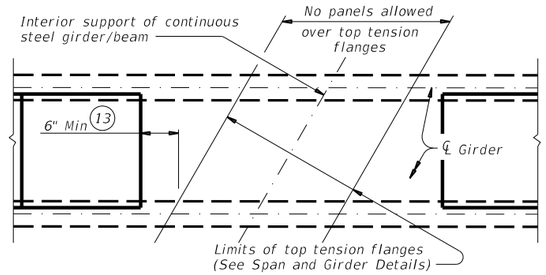


AT FLARED BEAMS OR GIRDERS

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



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

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

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

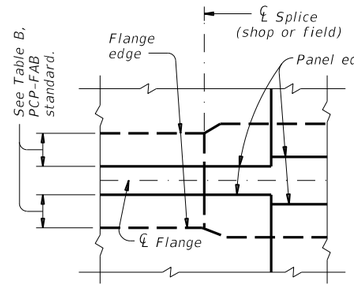
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

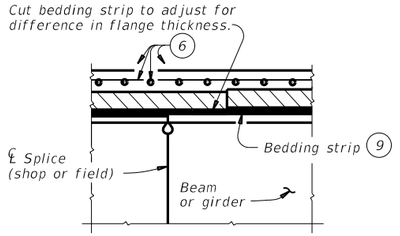
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



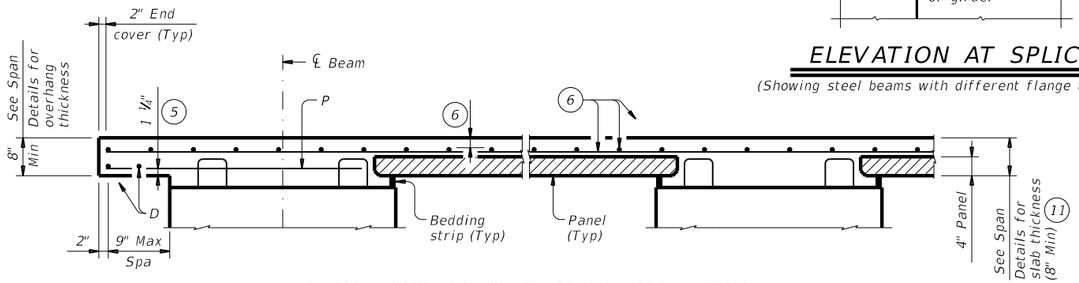
PLAN AT SPLICE

(Showing steel beams with flange width transition)



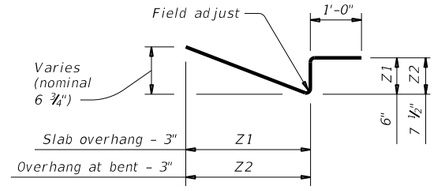
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

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



BARS Z (#4) (12)

HL93 LOADING SHEET 2 OF 4

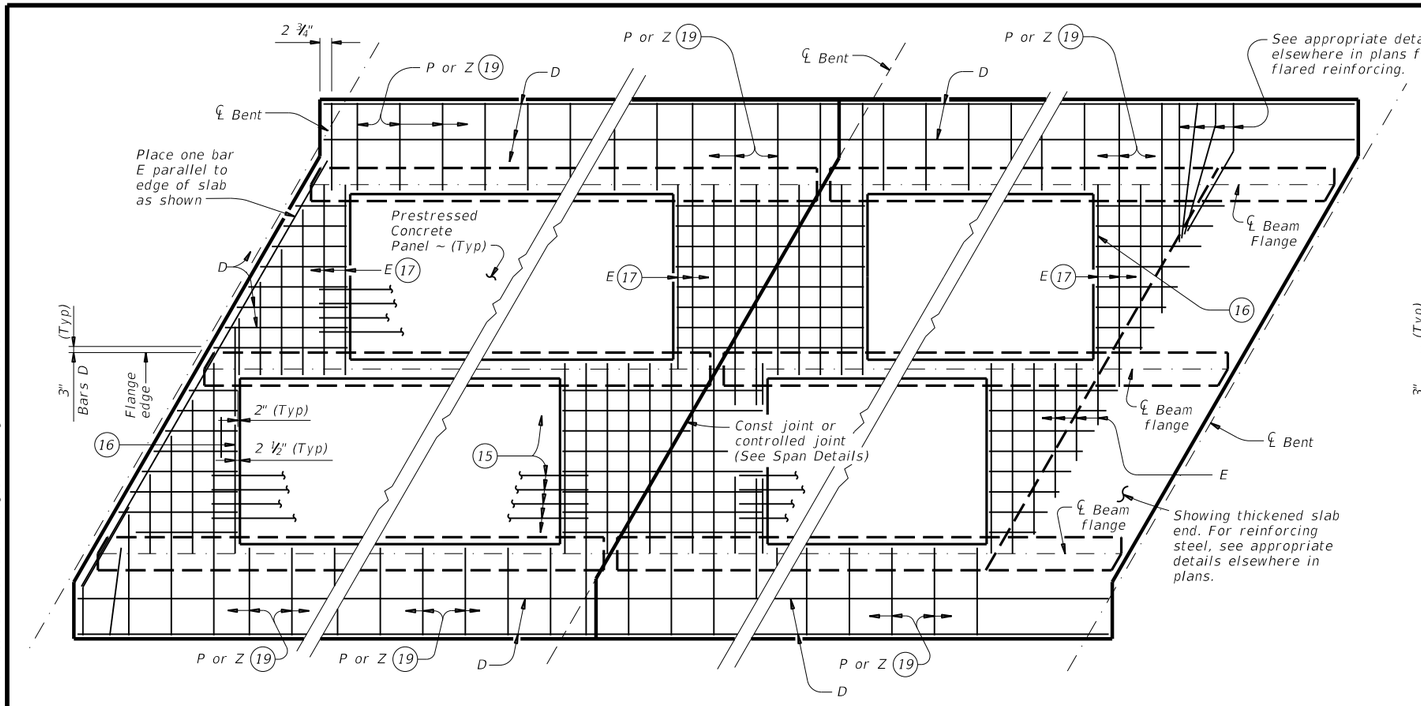
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

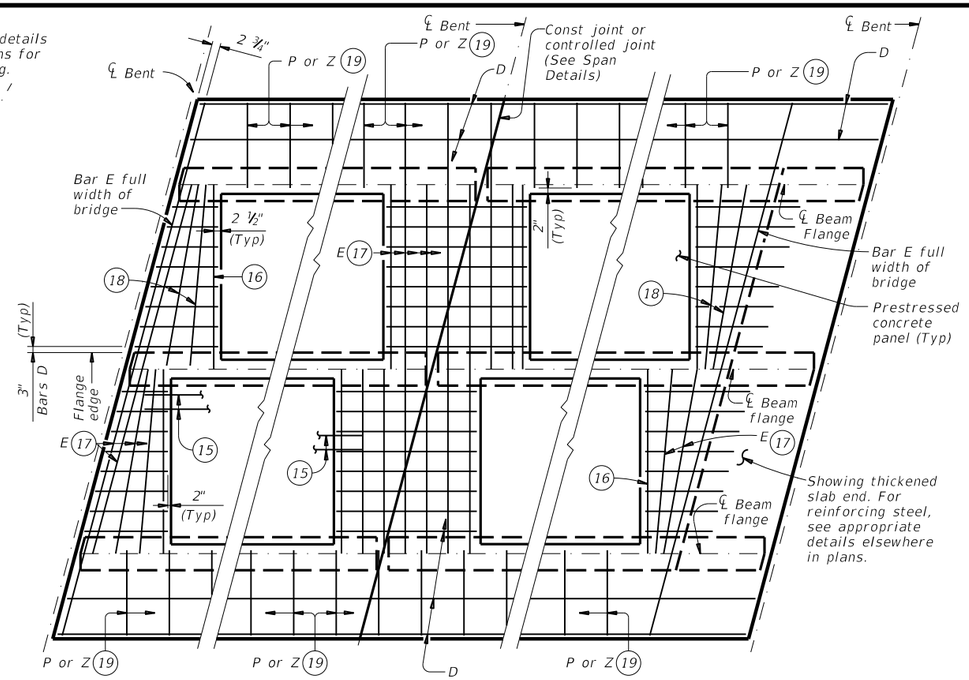
PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		107



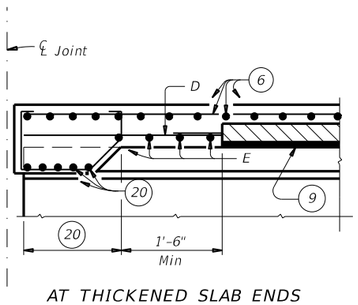
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

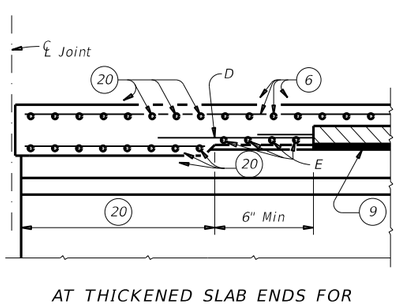


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

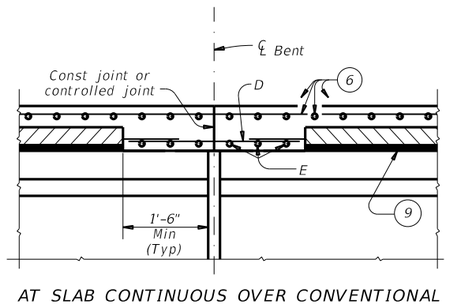
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



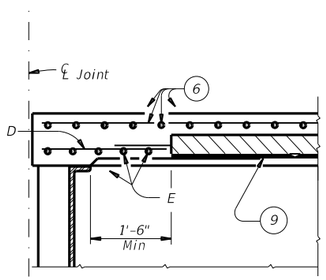
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



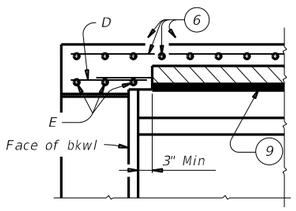
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



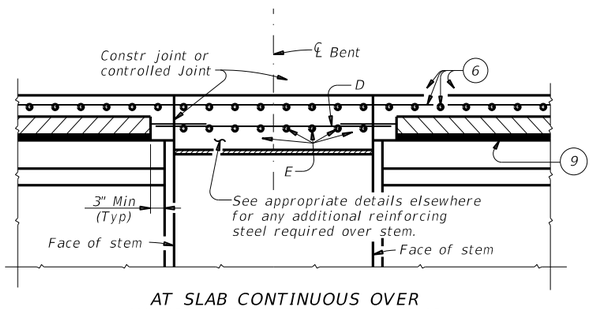
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

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

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

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS

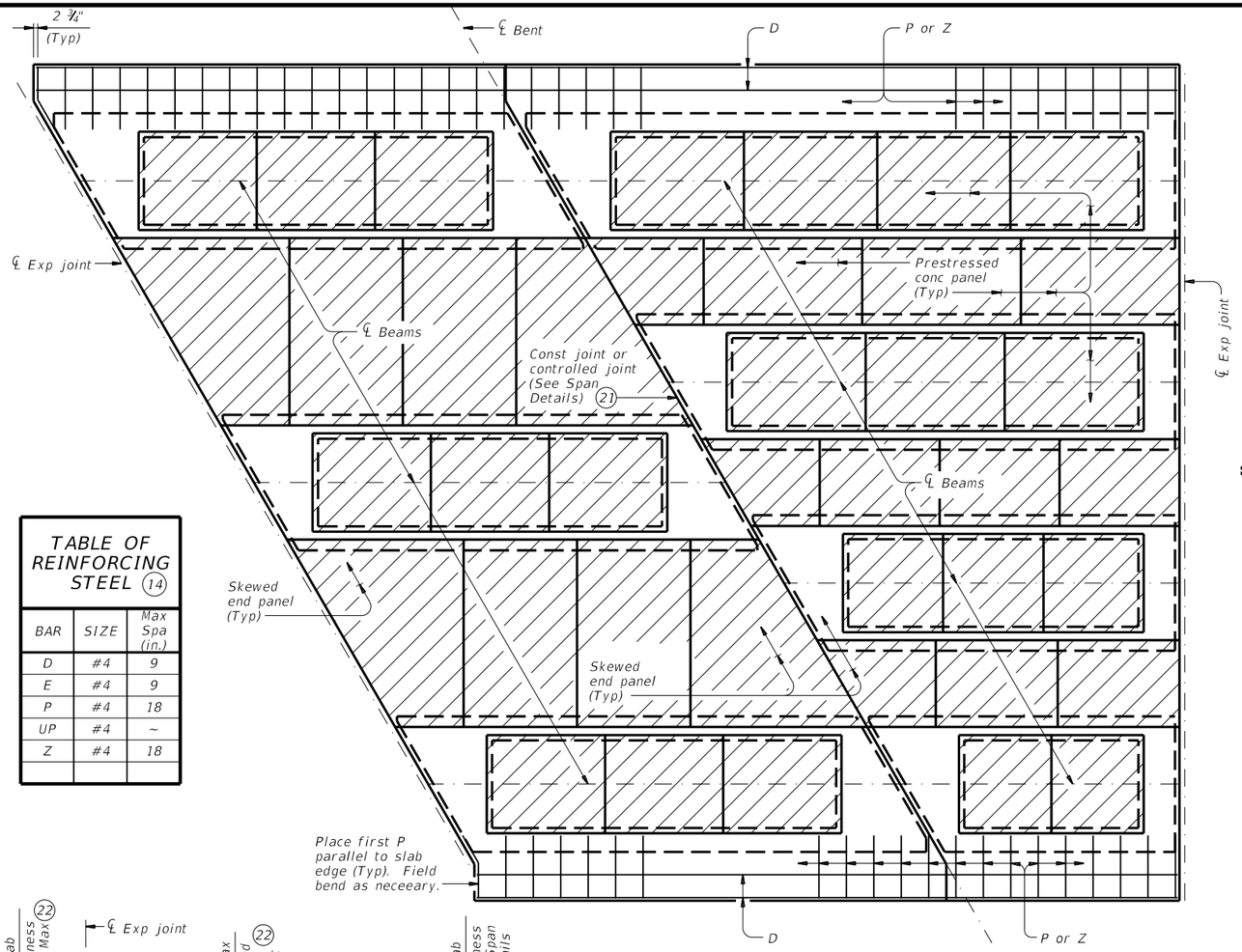
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		108

DATE: 11/3/2022 12:58:11 PM
FILE: c:\pw\kh1\d022655\pcpstde1-19.dgn

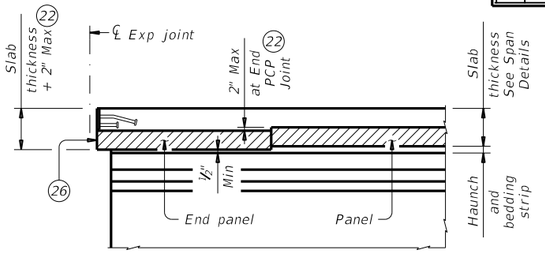
DATE: 11/3/2022 12:58:11 PM
FILE: c:\pw\khl\d0222653\pcpstde1-19.dgn



OPTION 2 ~ PLAN OF SLAB

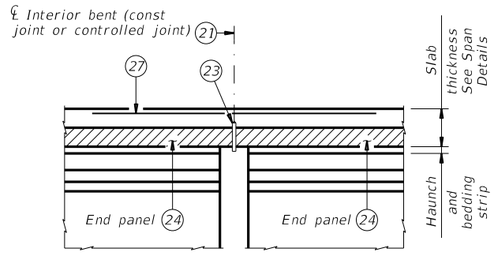
(Showing U-Beams; other beams similar)

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



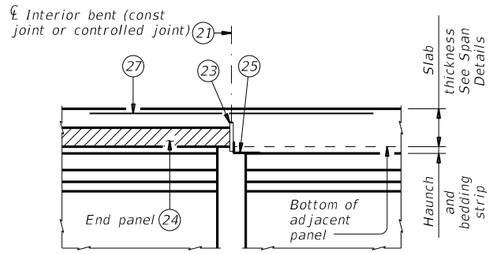
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



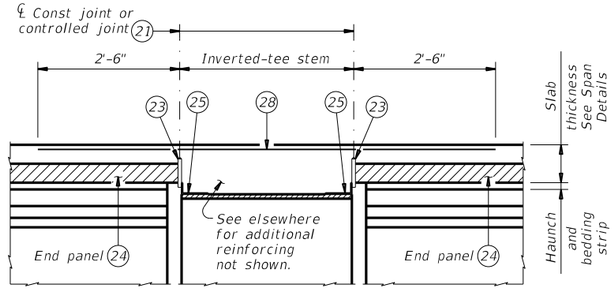
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

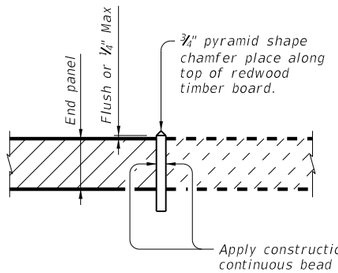
Panel against beam/girder end in adacent span.



INVERTED-T BENT

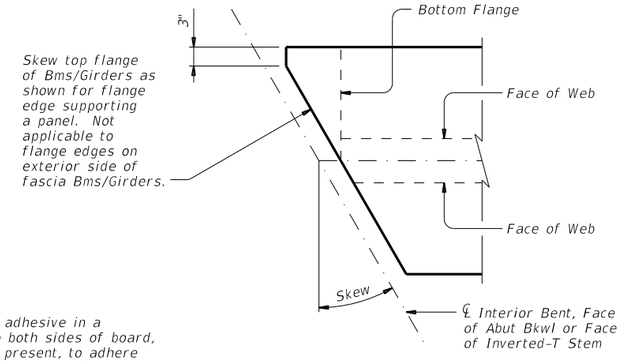
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



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

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

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

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

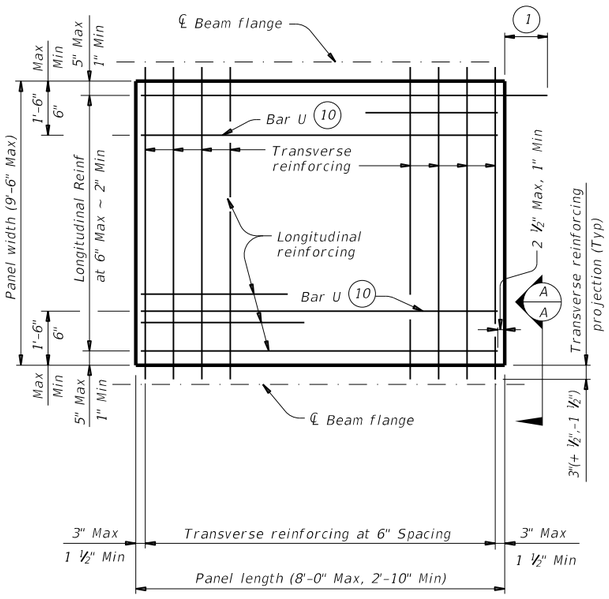
HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation — Bridge Division Standard

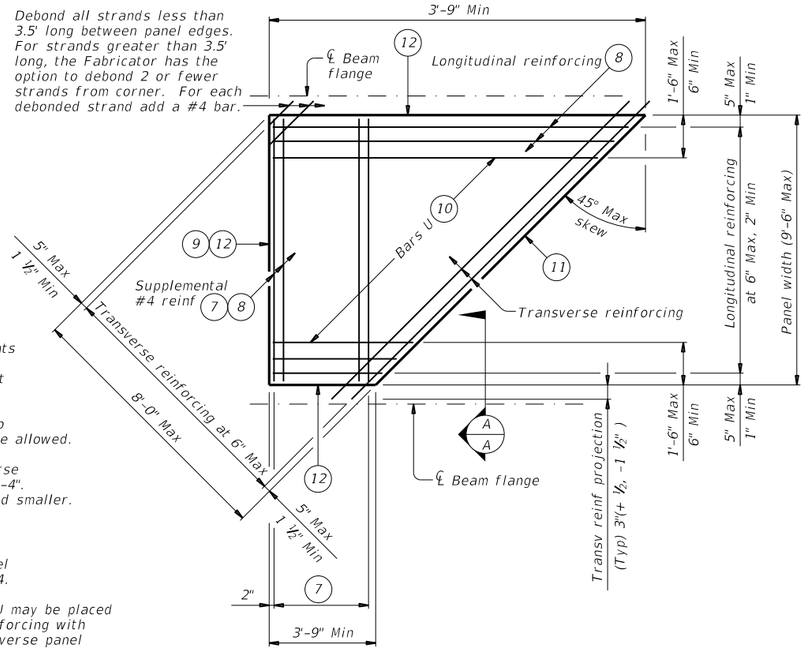
PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		109



TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

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

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

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

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

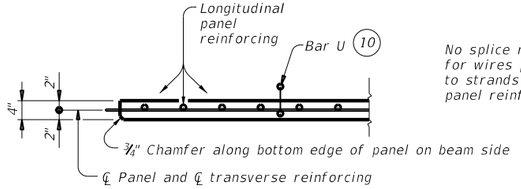
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

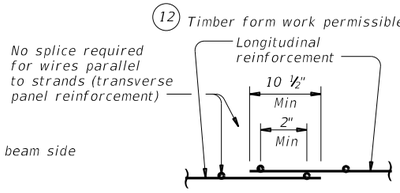
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

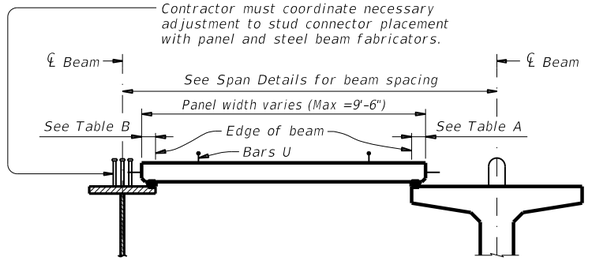


SECTION A-A

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



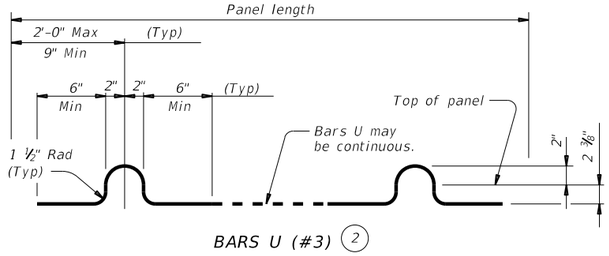
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



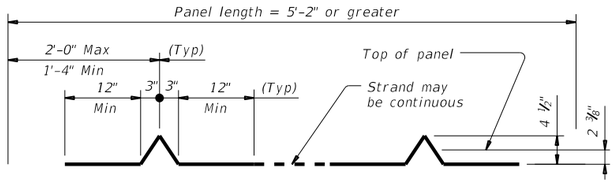
STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

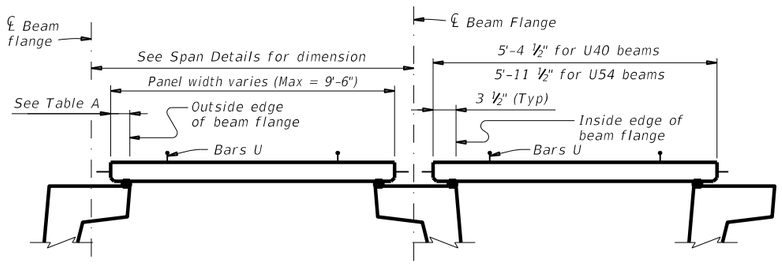
Typ unless noted otherwise



BARS U (#3) (2)



OPTIONAL STRAND FOR BARS U (3)



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

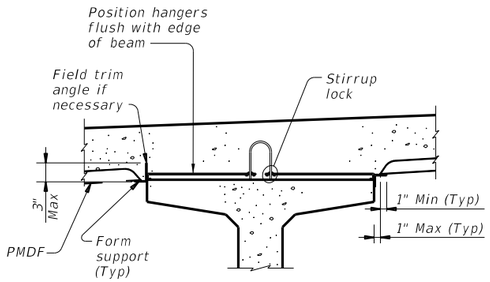
PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

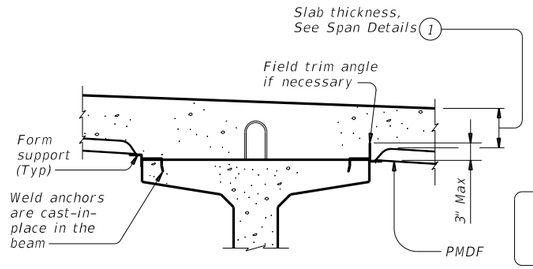
FILE: pcpstde2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		110

DATE: 11/3/2022 12:58:17 PM
FILE: c:\pw\kn1\d0222653\pcpstde2-19.dgn

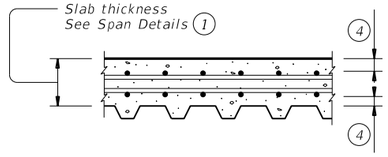
DATE: 11/3/2022 12:58:22 PM
FILE: c:\pw\khl\d0222653\pmdfstel-21 (1).dgn



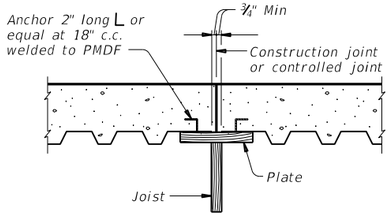
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

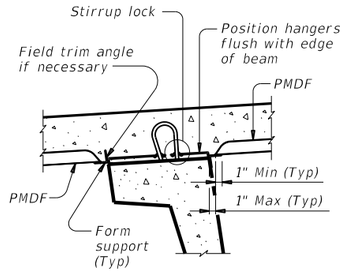


TYP LONGITUDINAL SLAB SECTION

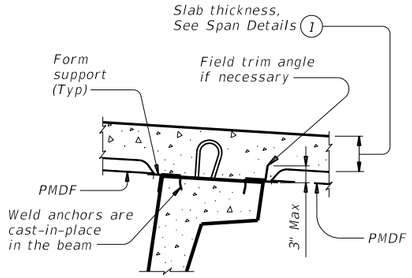


Note: In spans where PMD forms are used, timber forms must be used at construction joints.
Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

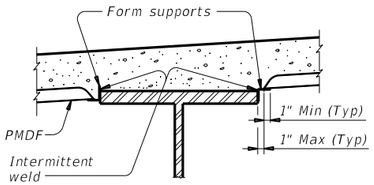
SECTION THRU CONSTRUCTION JOINT



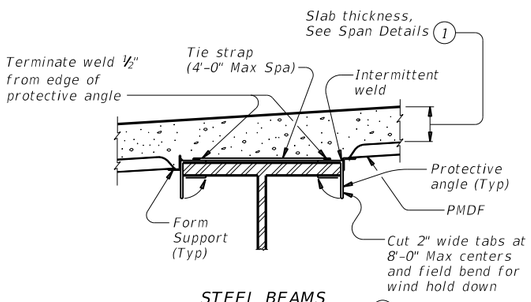
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

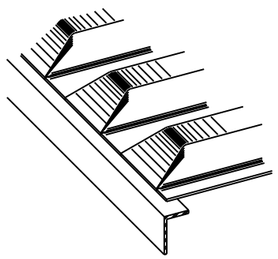


STEEL BEAMS AT COMPRESSION FLANGES

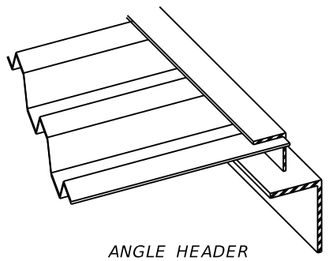


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



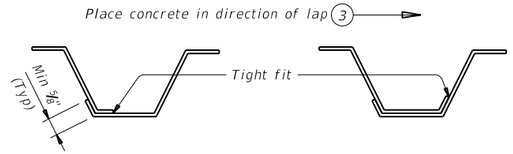
PRECLOSED



ANGLE HEADER

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

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

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

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

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

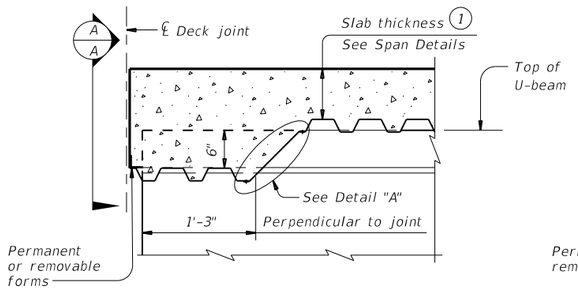
Texas Department of Transportation

Bridge Division Standard

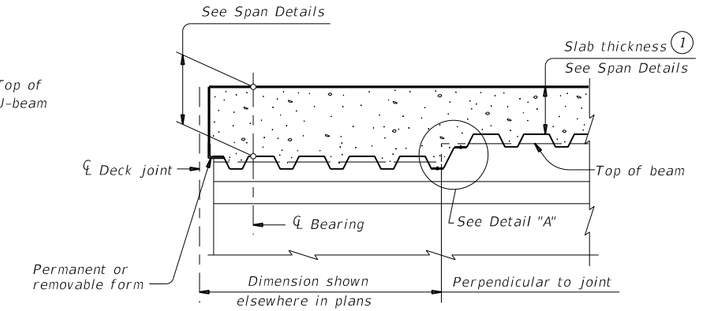
PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfstel-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AUS	WILLIAMSON		111

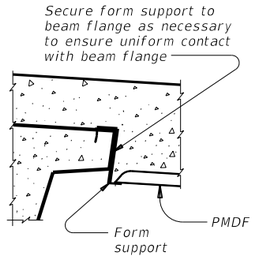


AT THICKENED SLAB END FOR U-BEAMS

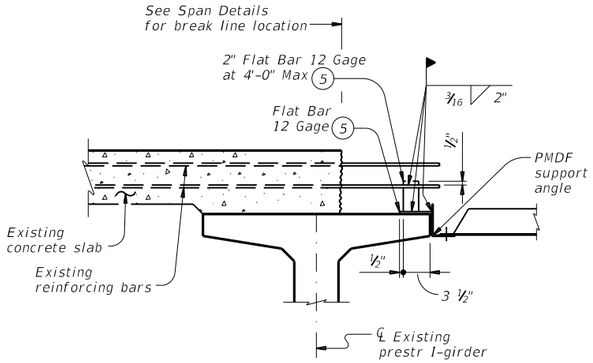


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

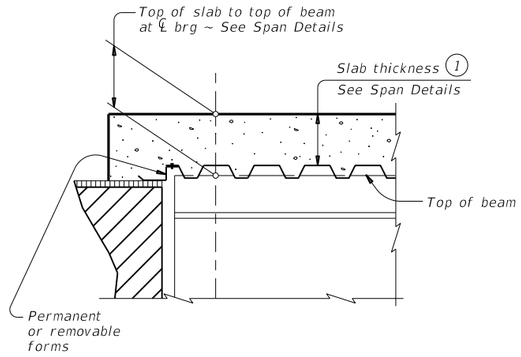
Showing I-beam block-out. No block-out for I-girders or steel beams.



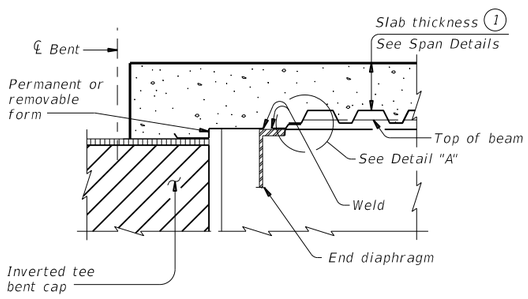
SECTION A-A



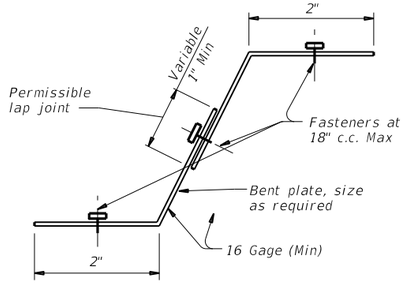
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



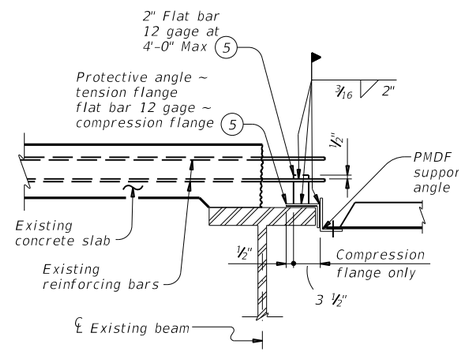
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



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

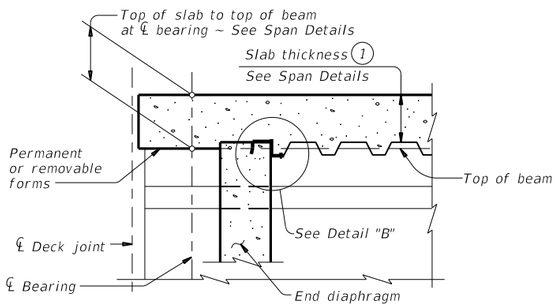


DETAIL "A"

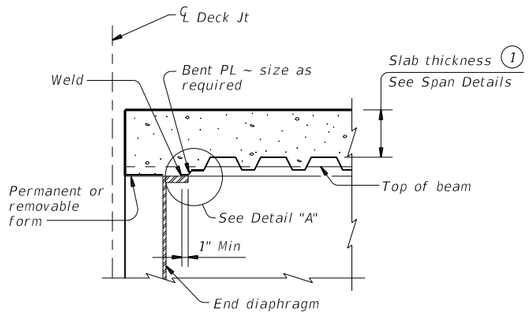


SHOWING STEEL BEAMS

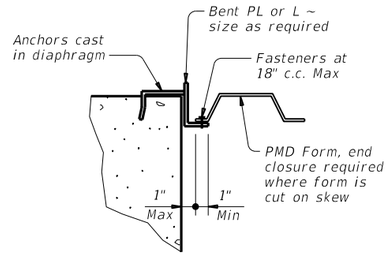
WIDENING DETAILS



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



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfstel-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AUS	WILLIAMSON		112

DATE: 11/3/2022 12:58:23 PM
FILE: c:\pw\khi\d022653\pmdfstel-21 (1).dgn

14-XXX-0-XXXX-XX-XXX

4" minimum

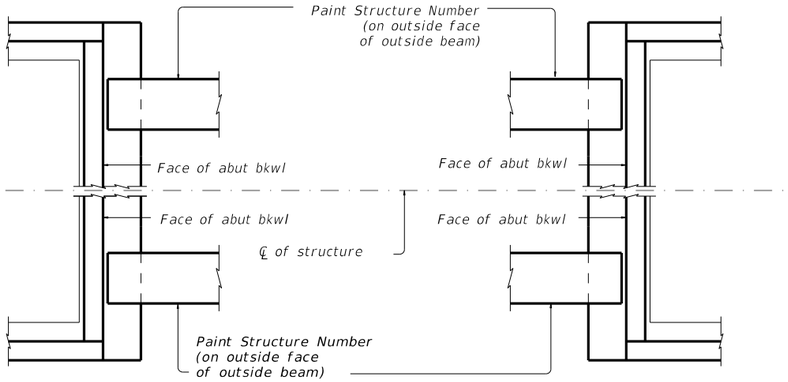
District designation | County designation | Placeholder | Control | Section | Structure number

PAINTED STRUCTURE NUMBER LEGEND

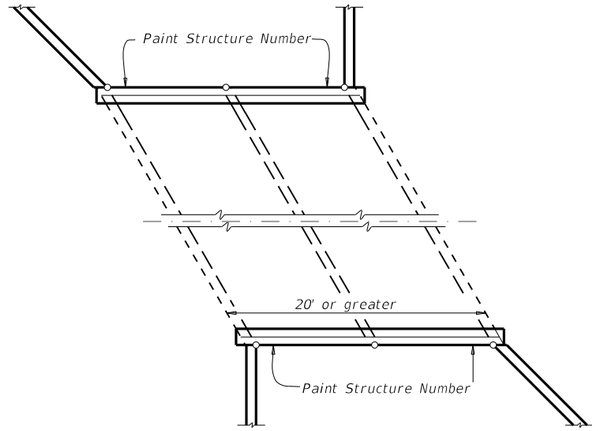
14-XXX-0-XXXX-XX-XXX

- District designation
  14 = Austin District
- County designation
- Placeholder required for national inventory purposes
- Control
- Section
- Structure number

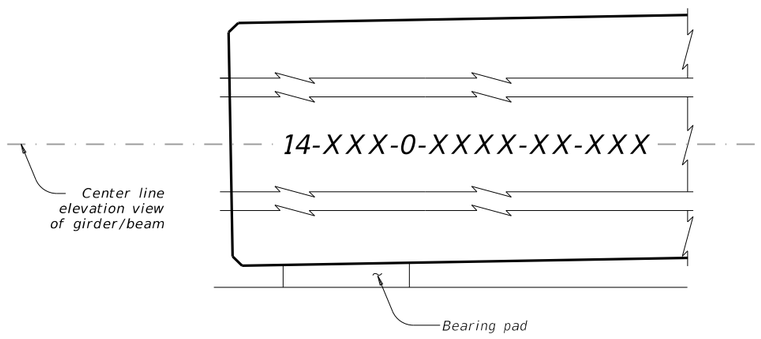
011 = Bastrop
016 = Blanco
027 = Burnet
028 = Caldwell
087 = Gillespie
106 = Hays
144 = Lee
150 = Llano
157 = Mason
227 = Travis
246 = Williamson



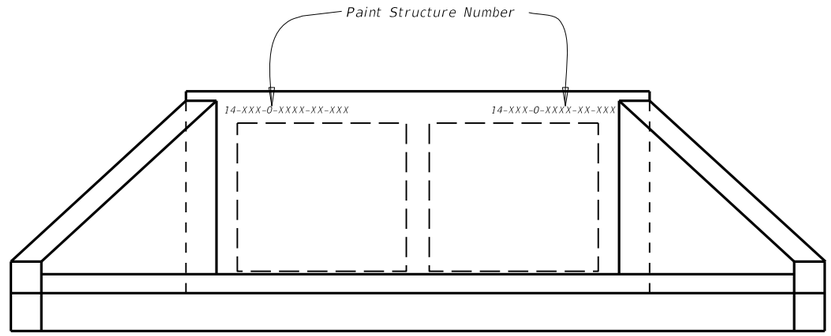
AT BRIDGE LOCATIONS



AT CULVERT LOCATIONS



ELEVATION VIEW DETAIL



ELEVATION VIEW DETAIL

GENERAL NOTES:

Permanently mark each structure with the painted structure number in accordance with the plans.

Each Structure shall have 4 (four) Structure numbers painted per structure.

Painting structure number work will not be measured or paid for directly but will be considered subsidiary to other pertinent items.

MATERIAL:

Provide black, lead free, CFC free, and CFHC free paint that is water proof, weather resistant, and dries instantly on all surfaces without smearing, smudging, or rippling

Texas Department of Transportation | Austin District Standard

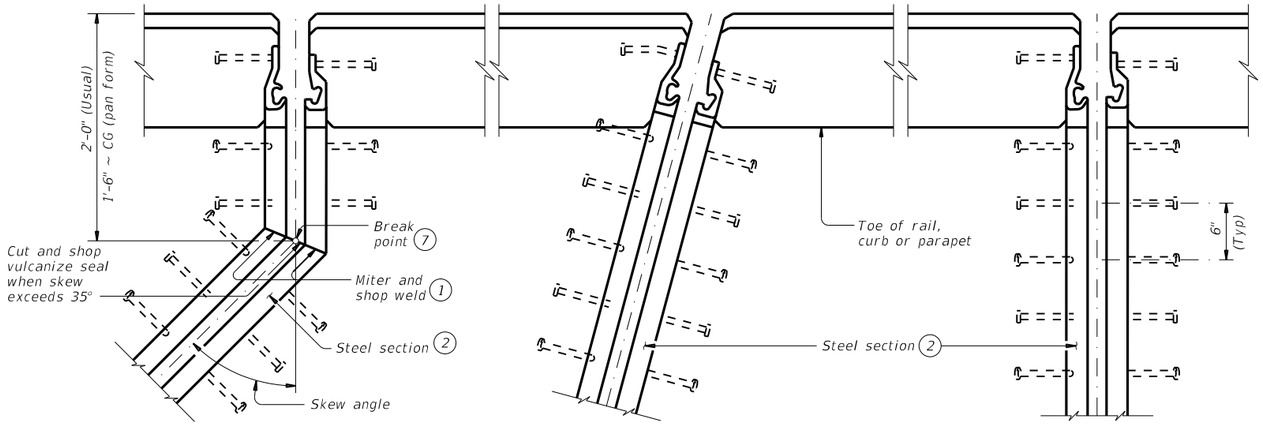
PAINTING STRUCTURE NUMBERS

PSN-19 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		113

DATE: 11/3/2022 12:58:29 PM
FILE: c:\pw\khl\d0222653\psn-19.dgn

DATE: 11/3/2022 12:58:34 PM
FILE: c:\pw\khl\d0222653\sejmstel-19 (1).dgn

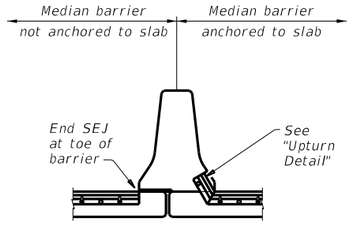


SHOWING SKEWS WITH SLAB BREAKBACKS

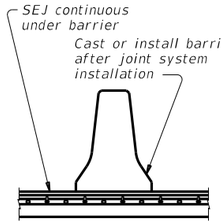
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

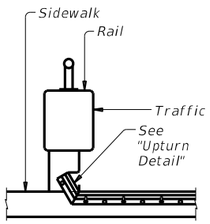
PLANS OF END CONDITIONS



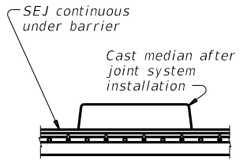
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



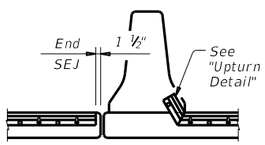
AT MEDIAN BARRIER



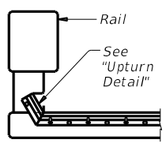
AT SIDEWALK BEHIND BRIDGE RAIL



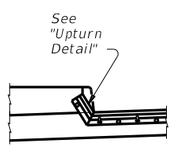
AT RAISED MEDIAN



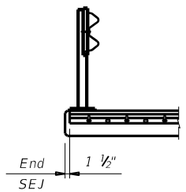
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

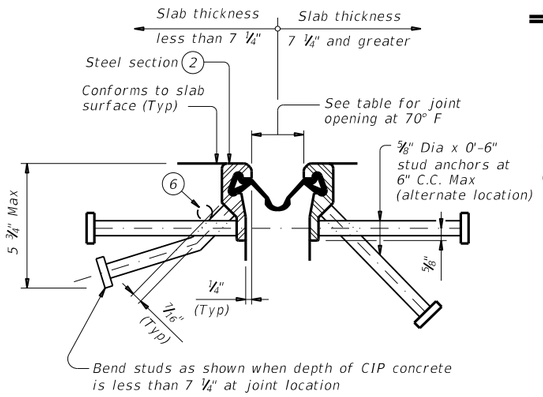


AT SIDEWALK

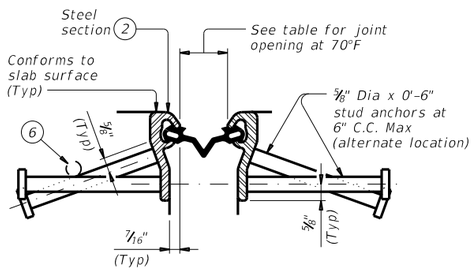


AT STEEL POST BRIDGE RAIL

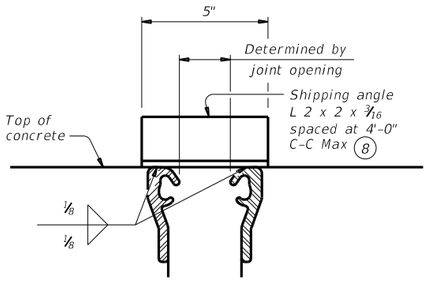
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

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

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

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

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

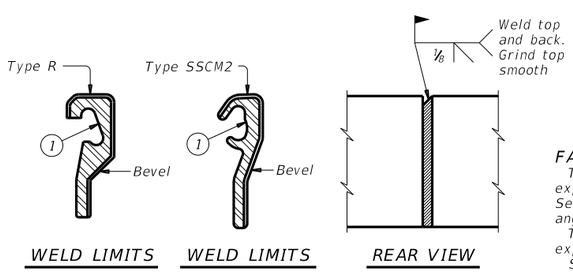
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

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

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

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

CONSTRUCTION NOTES:

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

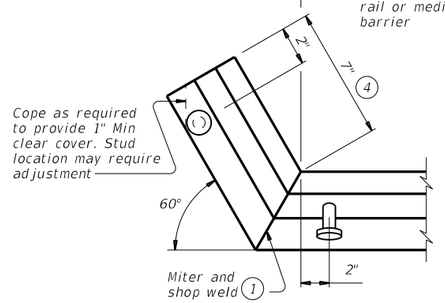
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

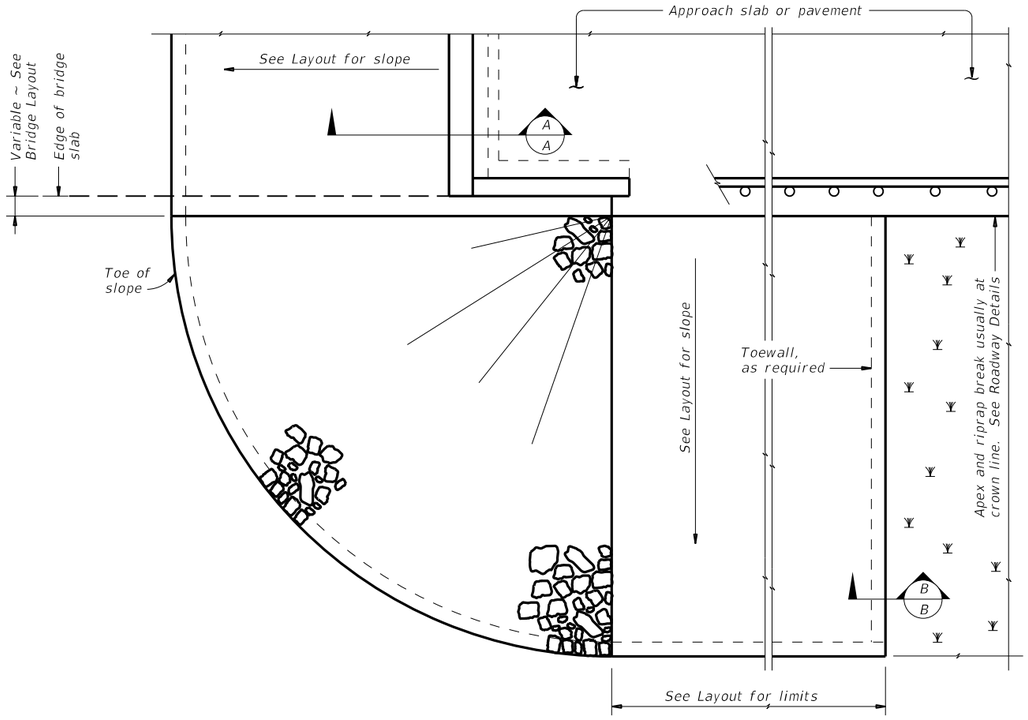
Texas Department of Transportation

Bridge Division Standard

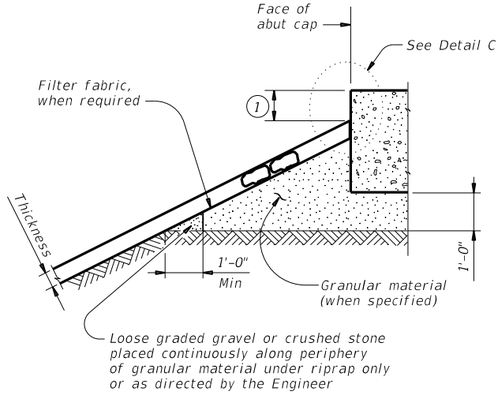
SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

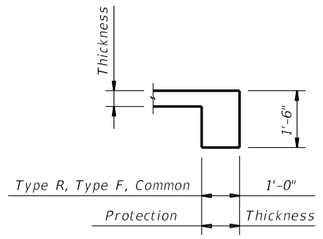
FILE: sejmstel-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		114



PLAN

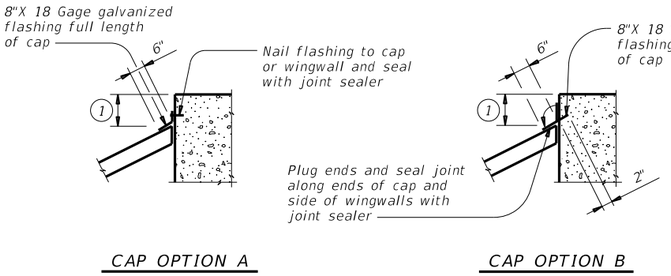


SECTION A-A AT CAP



SECTION B-B

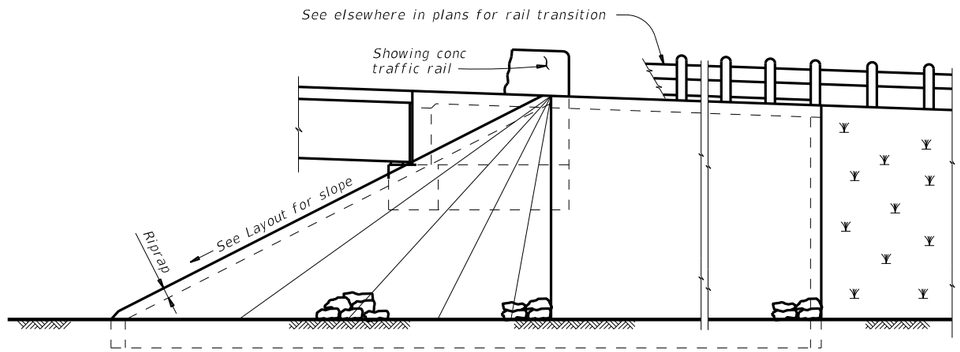
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		115

DATE: 11/3/2022 12:58:40 PM
FILE: c:\pw\kh1\d022653\srrstde1-19 (1).dgn

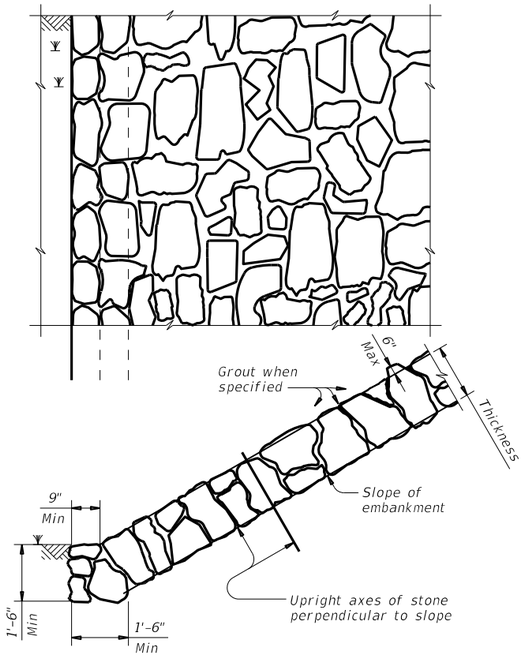


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

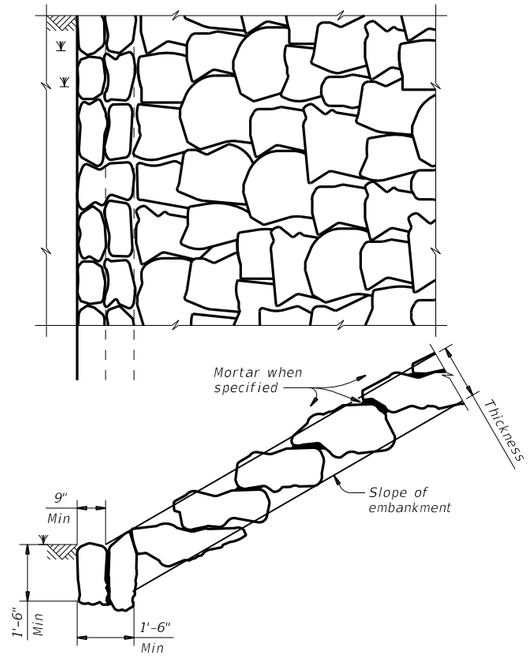


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

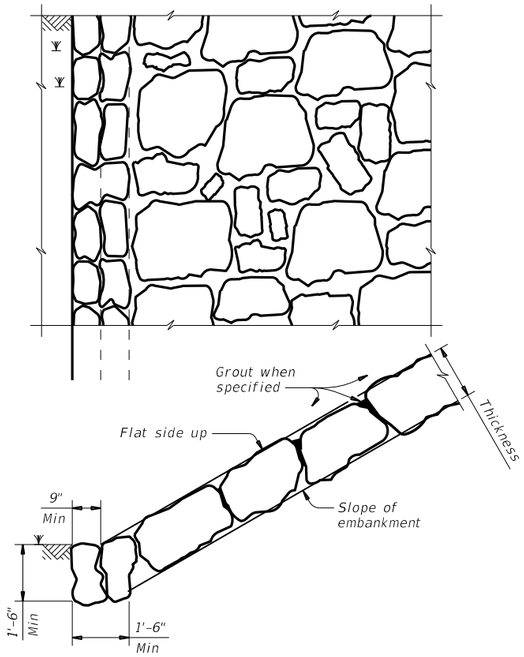


FIGURE 3 ~ TYPE F STONE RIPRAP

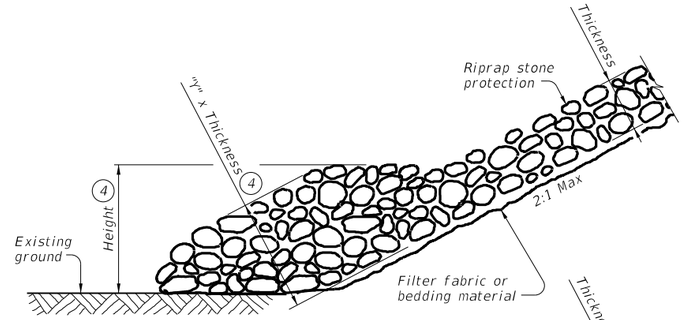
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

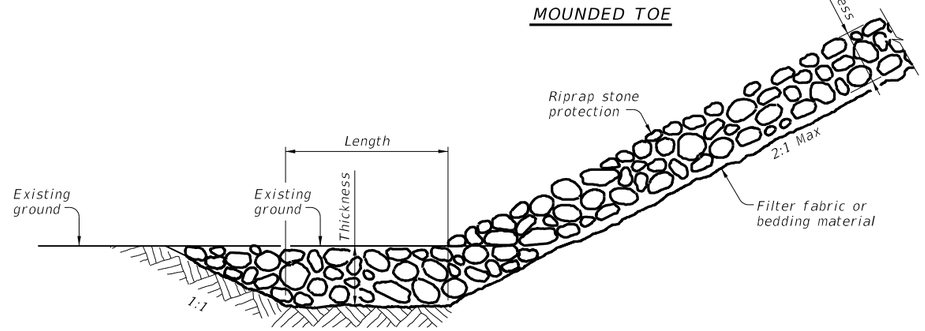
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.

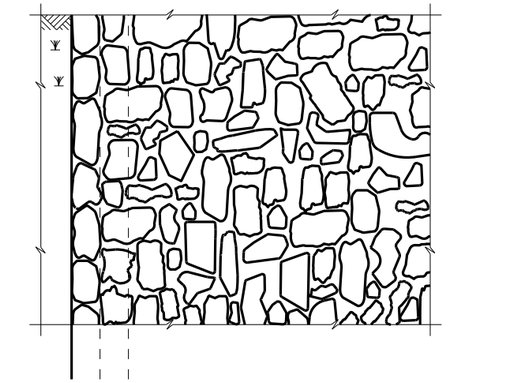


MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)



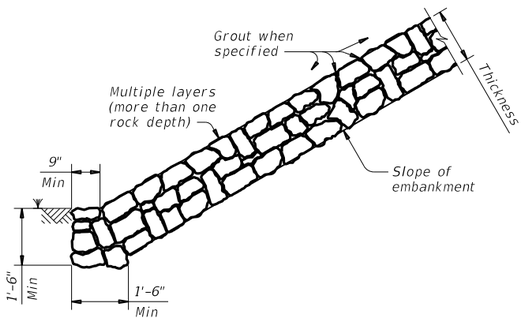
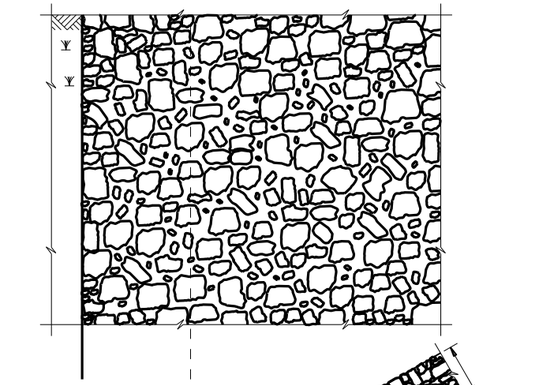


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted



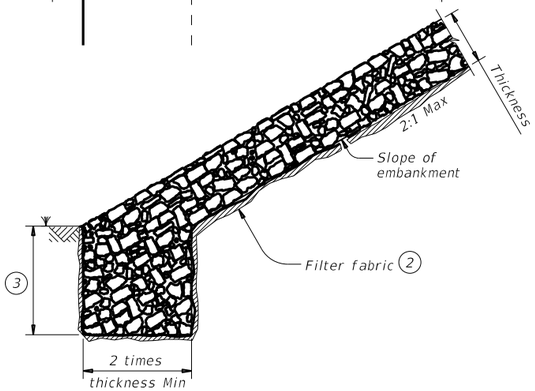


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation

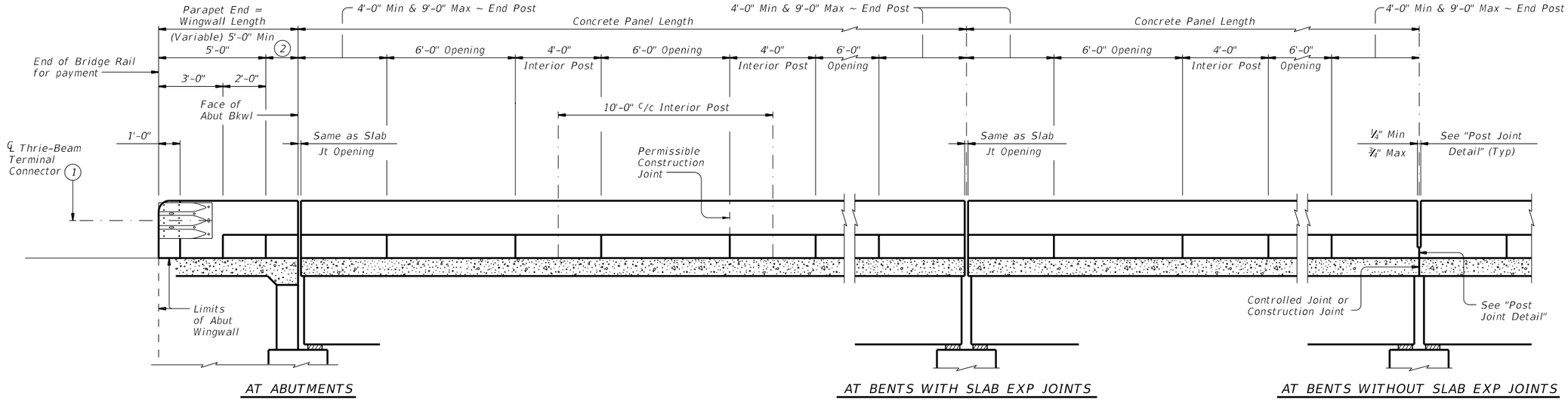
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		116

DATE: 11/3/2022 12:58:40 PM
FILE: c:\pw\khl\d0222653\srrstde1-19 (1).dgn

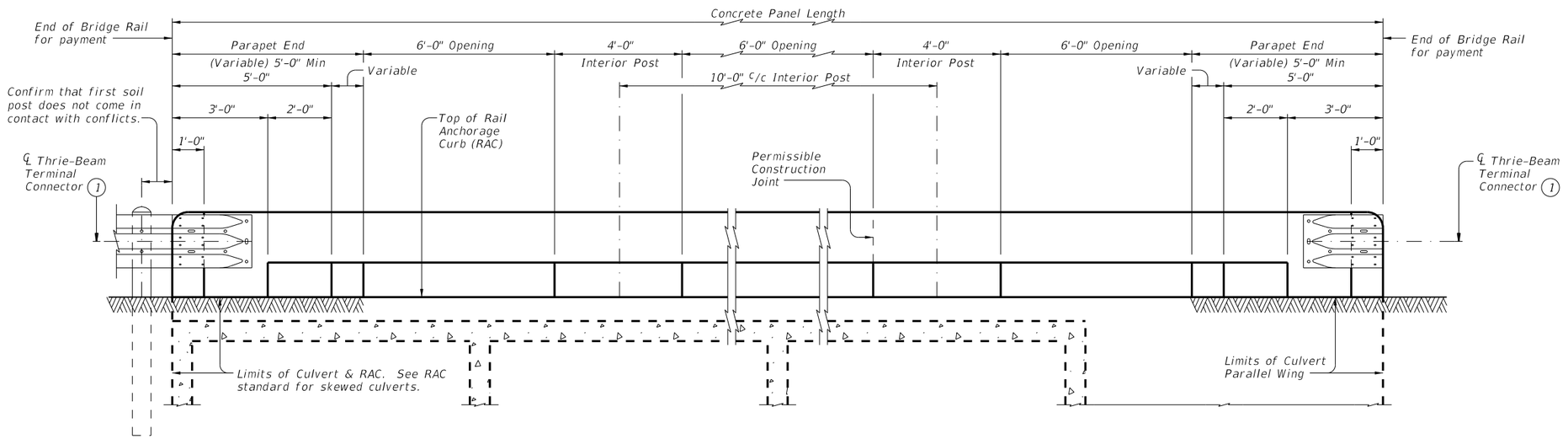


AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS

AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown.
Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

DATE: 11/3/2022 12:58:45 PM
FILE: c:\pwkh1\d0222653\rlstd005-19 (1).dgn

SHEET 1 OF 3

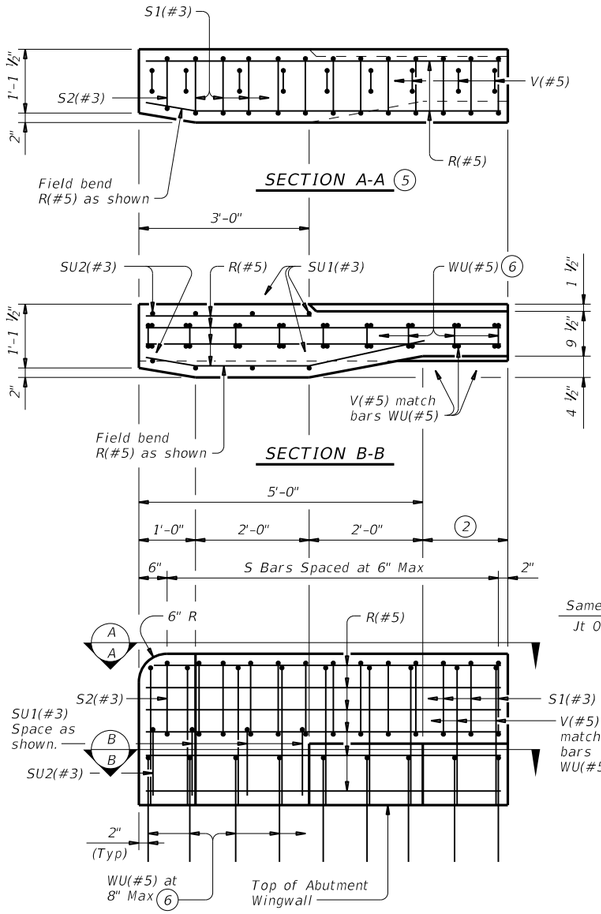
Texas Department of Transportation

Bridge Division Standard

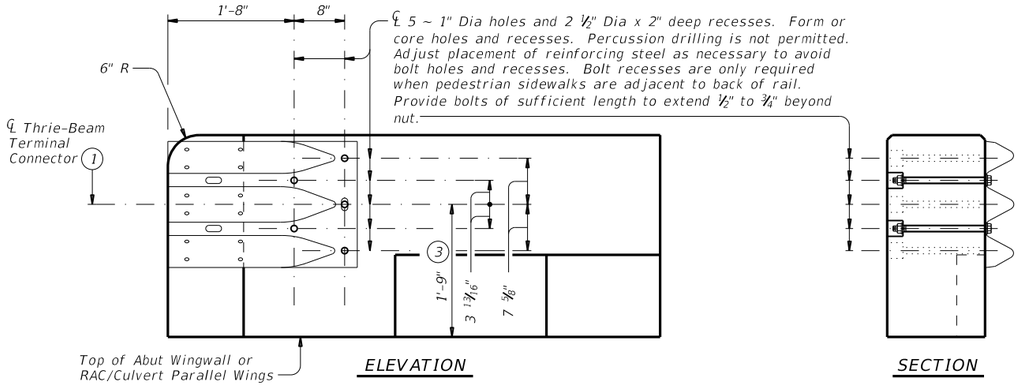
TRAFFIC RAIL

TYPE T223

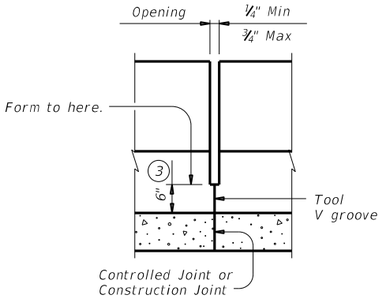
FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		117



PARAPET END AT ABUT WINGWALL (6)

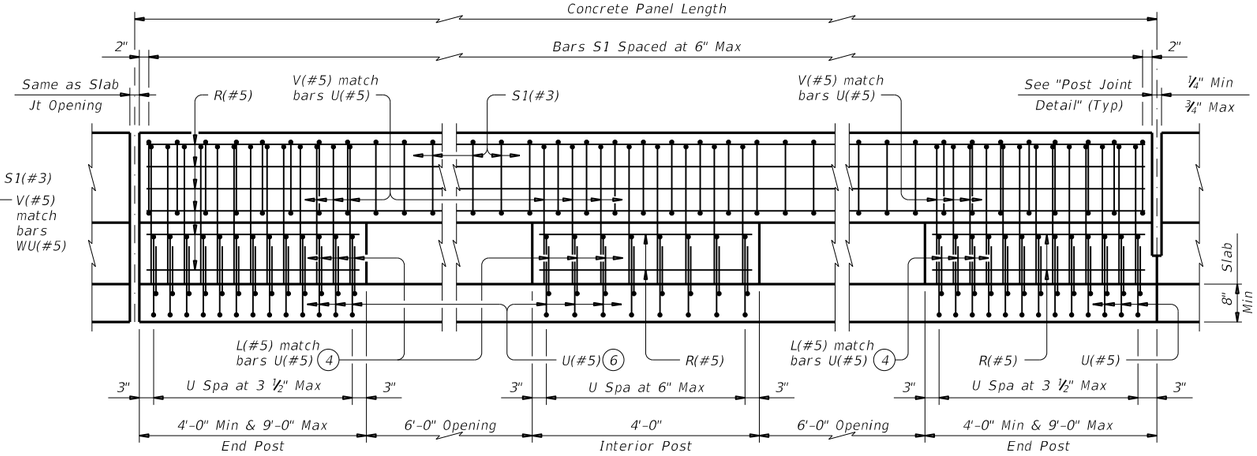


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

DATE: 11/3/2022 12:58:46 PM
FILE: c:\pw\kh1\d022653\r1std005-19 (1).dgn

SHEET 2 OF 3

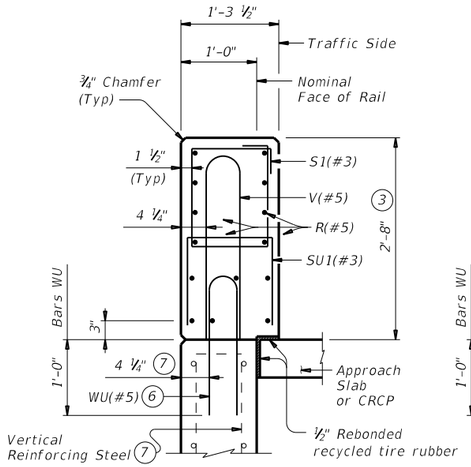
Texas Department of Transportation

Bridge Division Standard

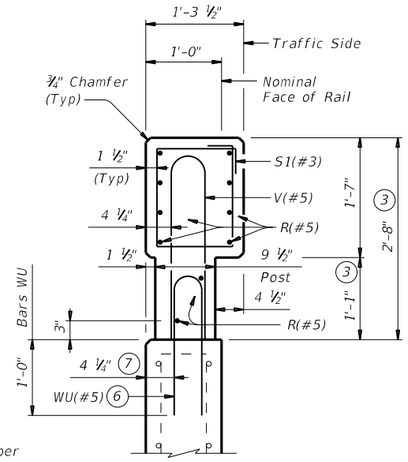
TRAFFIC RAIL

TYPE T223

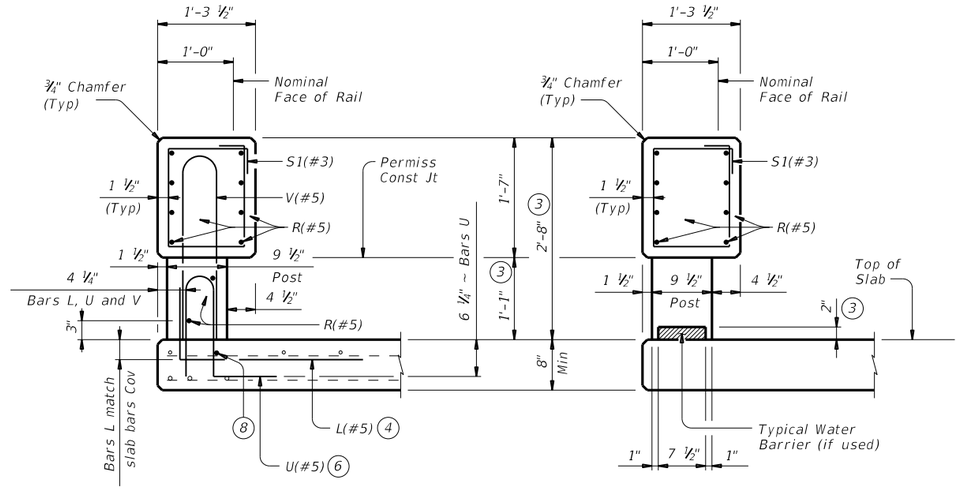
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		118



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

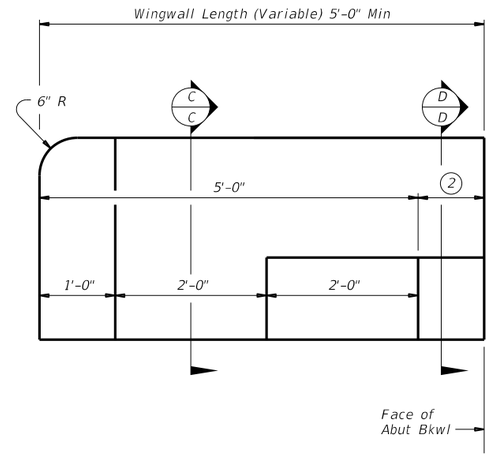


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

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

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

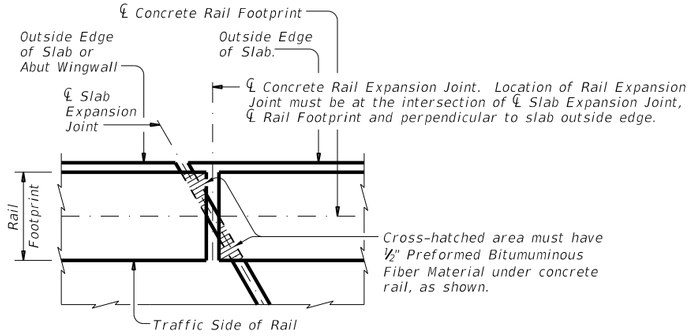
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

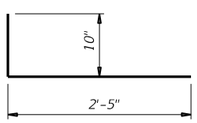
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.

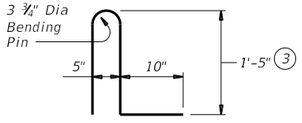


PLAN OF RAIL AT EXPANSION JOINTS

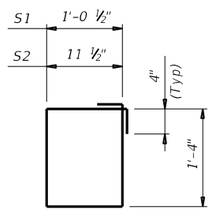
Example showing Slab Expansion Joints without breakbacks.



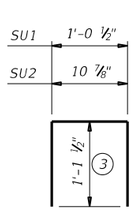
BARS L (#5)



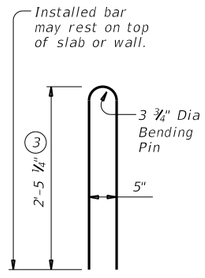
BARS U (#5) (9)



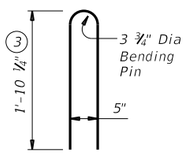
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

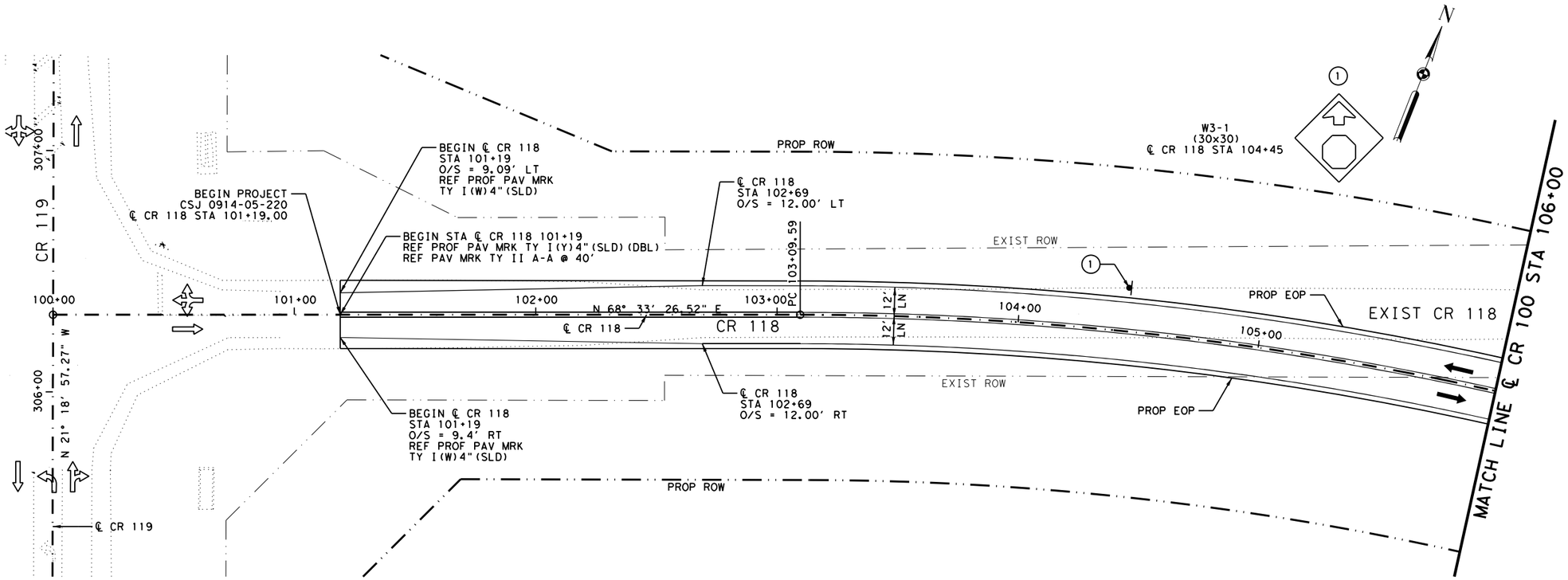
Bridge Division Standard

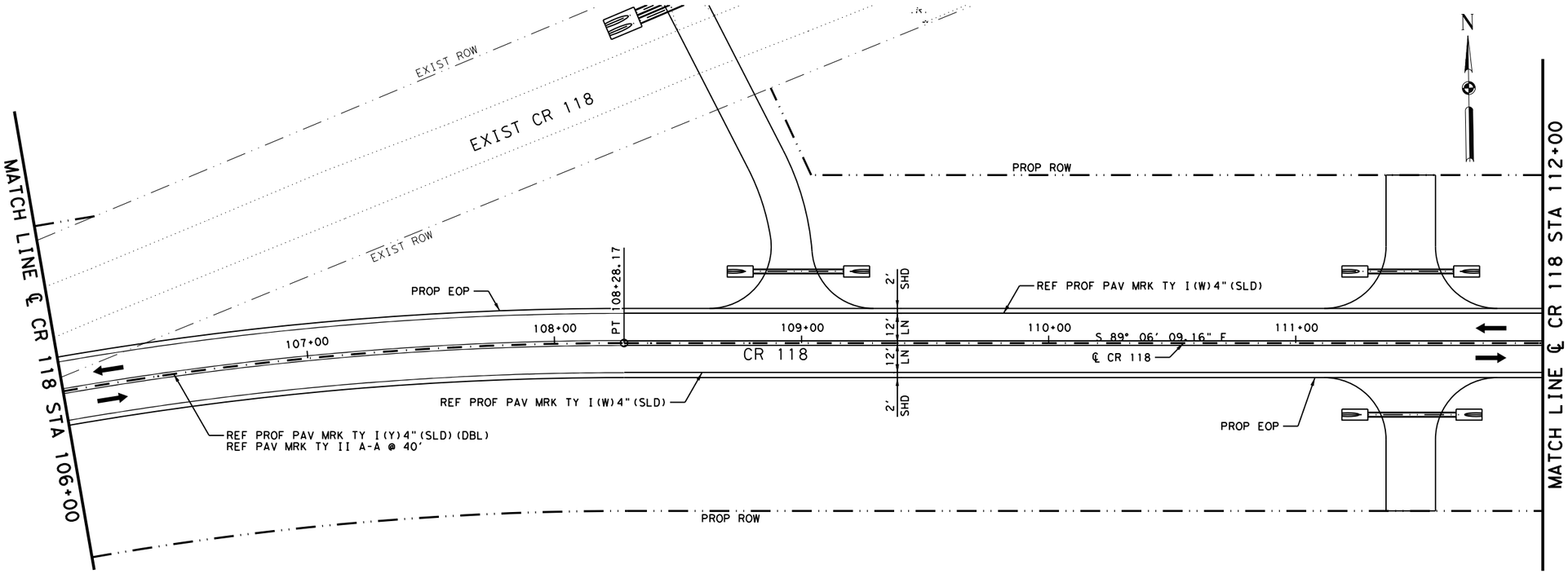
TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		119

DATE: 11/3/2022 12:58:46 PM
FILE: c:\pw\kh1\d0226531\rlstd005-19 (1).dgn





LEGEND

- (#) PROPOSED SMALL SIGN
- (R#) EXIST SIGN TO BE REMOVED
- DIRECTION OF TRAFFIC
- TY 2 (OM-2) OBJECT MARKER
- EXISTING SIGN
- DEL ASSM (D-SW)SZ 1 (BRF)GF-2(BI)
- DEL ASSM (D-SW)SZ (BRF)CTB(BI)
- PROPOSED SIGN

NOTES:

1. REFER TO REMOVAL SHEETS FOR EXISTING SIGN AND OBJECT MARKER REMOVAL.

0' 25' 50'

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

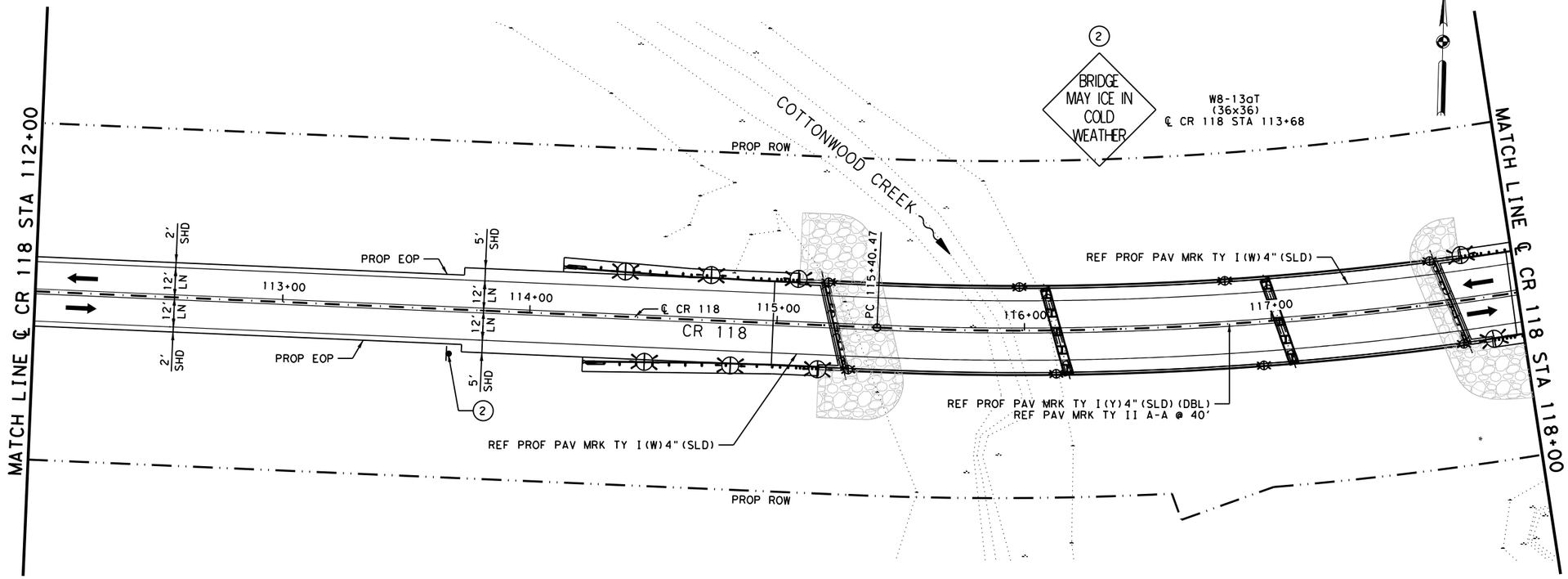
CR 118 AT COTTONWOOD CREEK

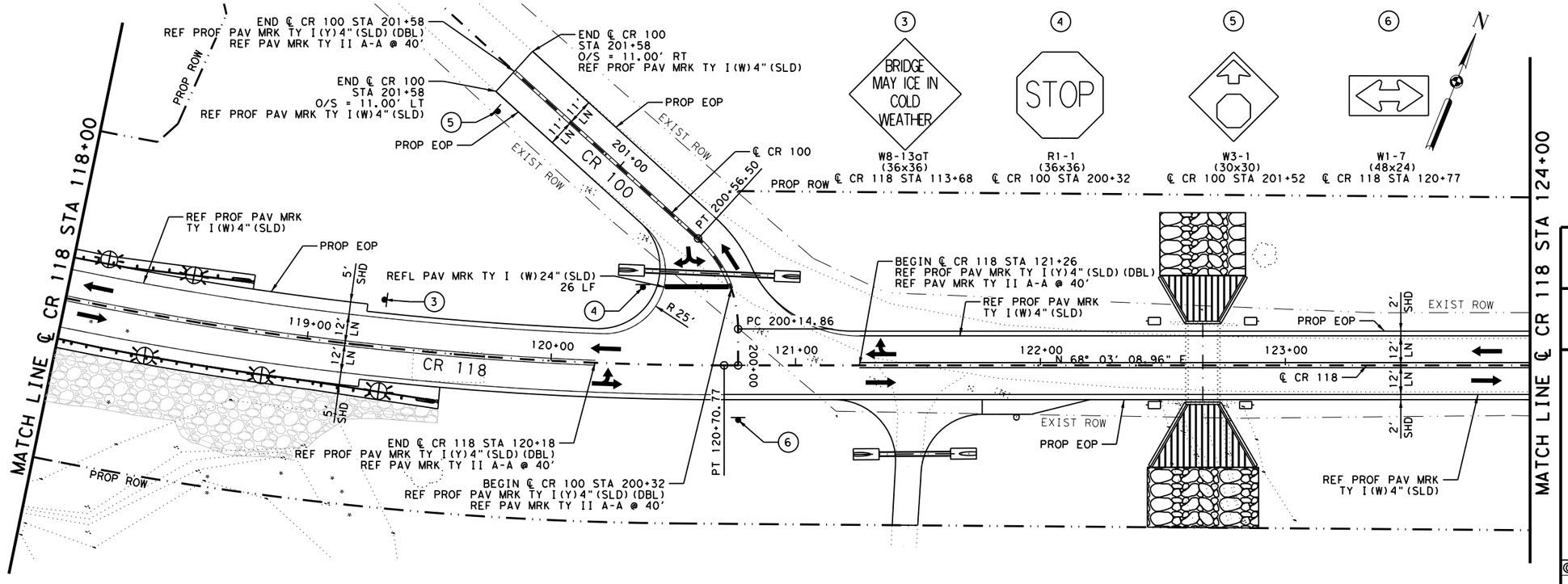
SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 3

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		120

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\8. Traffic\CR118_TRF_SPMD01.dgn
PLOTTED: 11/3/2022 12:58:54 PM





LEGEND

- (#) PROPOSED SMALL SIGN
- R# EXIST SIGN TO BE REMOVED
- DIRECTION OF TRAFFIC
- TY 2 (OM-2) OBJECT MARKER
- EXISTING SIGN
- DEL ASSM (D-SW)SZ 1 (BRF)GF-2(BI)
- DEL ASSM (D-SW)SZ (BRF)CTB(BI)
- PROPOSED SIGN

NOTES:

1. REFER TO REMOVAL SHEETS FOR EXISTING SIGN AND OBJECT MARKER REMOVAL.

0' 25' 50'

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

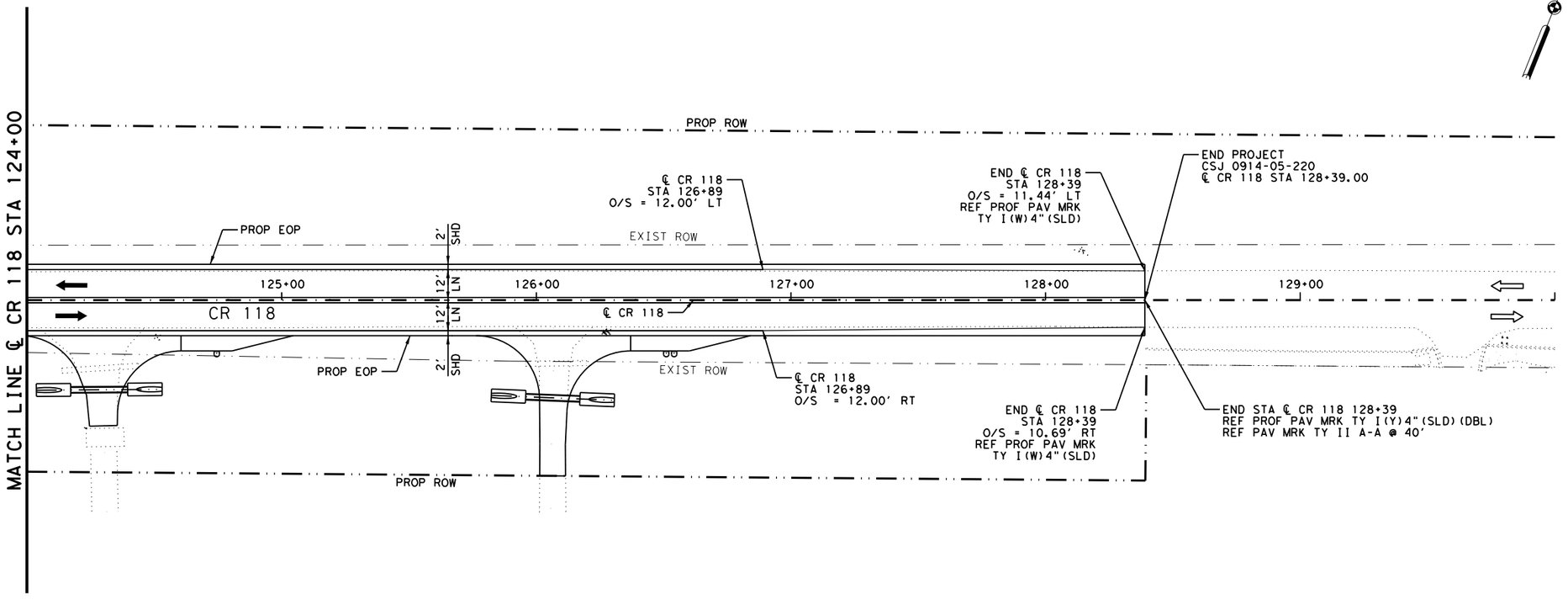
CR 118 AT COTTONWOOD CREEK

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		121

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\8. Traffic\CR118_TRF_SPMD02.dgn
PLOTTED: 11/3/2022 12:59:01 PM



LEGEND

- PROPOSED SMALL SIGN
- EXIST SIGN TO BE REMOVED
- DIRECTION OF TRAFFIC
- TY 2 (OM-2) OBJECT MARKER
- EXISTING SIGN
- DEL ASSM (D-SW)SZ 1 (BRF)GF-2(BI)
- DEL ASSM (D-SW)SZ (BRF)CTB(BI)
- PROPOSED SIGN

NOTES:

1. REFER TO REMOVAL SHEETS FOR EXISTING SIGN AND OBJECT MARKER REMOVAL.

0' 25' 50'

SCALE

11/3/2022

TREY NEAL 106194 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 3 OF 3

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		122

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\8. Traffic\CR118_TRF_SPMD03.dgn
PLOTTED: 11/3/2022 12:59:07 PM

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:

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	W3-1		30 x 30	X		10BWG	1	SA	P		
2	2	W8-13aT		36 x 36	X		10BWG	1	SA	P		
2	3	W8-13aT		36 x 36	X		10BWG	1	SA	P		
2	4	R1-1		36 x 36	X		10BWG	1	SA	P		
2	5	W3-1		30 x 30	X		10BWG	1	SA	P		
2	6	W1-7		48 x 24	X		10BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

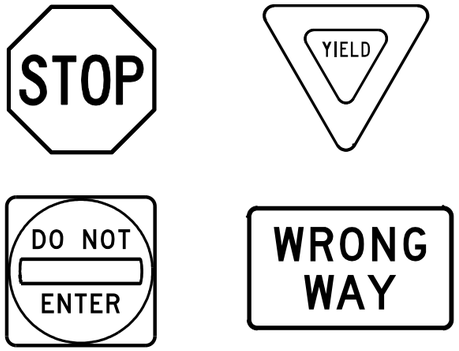
SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204,220	CR 118
4-16	DIST	COUNTY		SHEET NO.
8-16	AUSTIN	WILLIAMSON		123

DATE: 11/3/2022 12:59:18 PM
FILE: c:\pw\kh1\d0221699\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

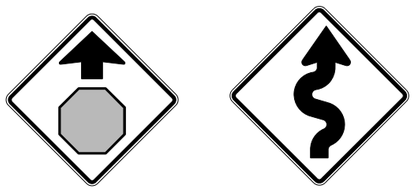
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

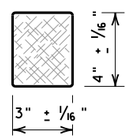
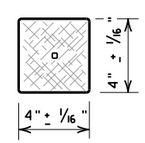
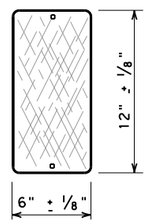
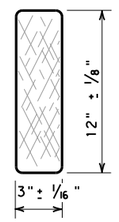
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

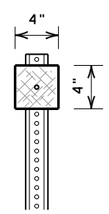
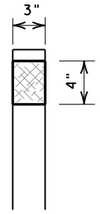
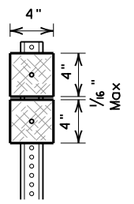
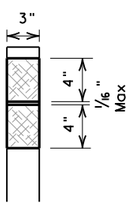
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AUS	WILLIAMSON		124

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

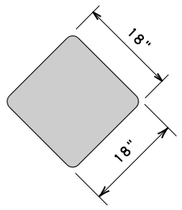
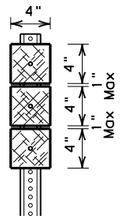
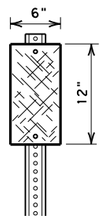
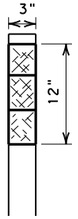
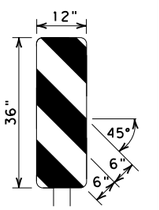
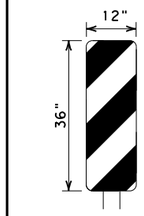
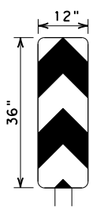
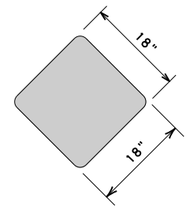
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

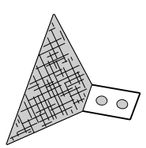
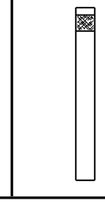
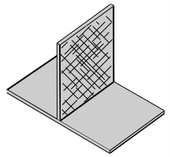
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

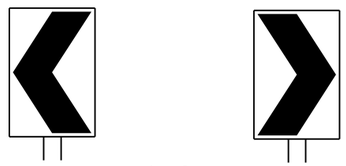
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



W1-8

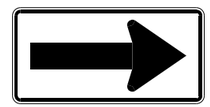
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	WILLIAMSON		125

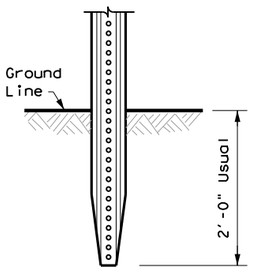
20A

DATE: 11/3/2022 12:59:23 PM
FILE: c:\pw\kni\d0221699\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

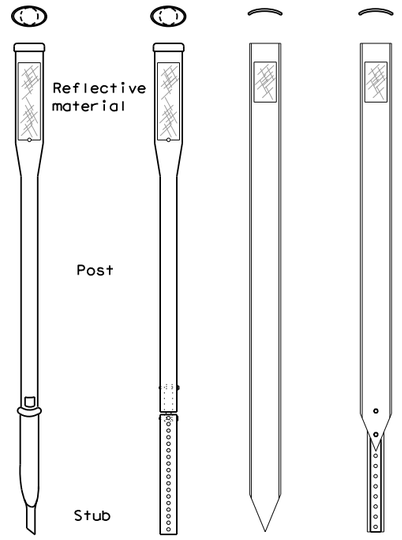


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

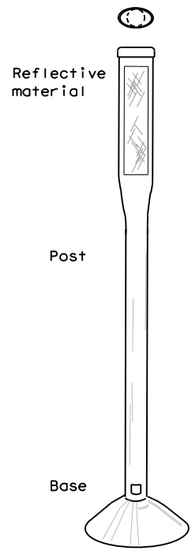
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



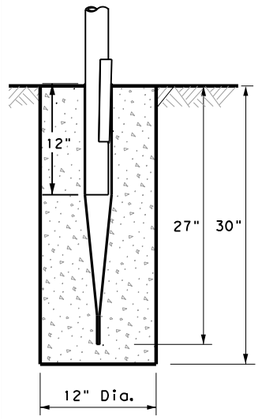
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

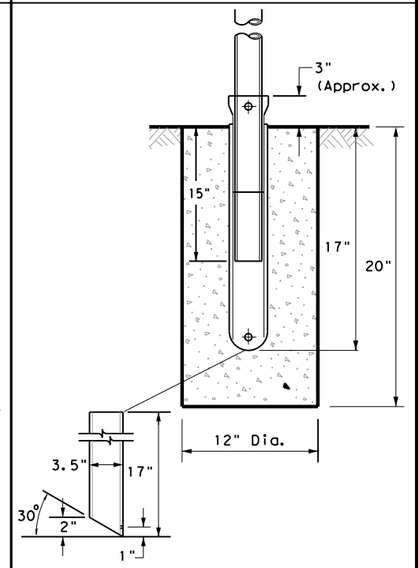
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

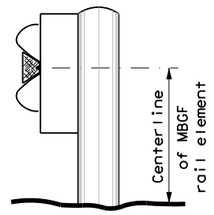
NOTE

1. Install per manufacturer's recommendations.

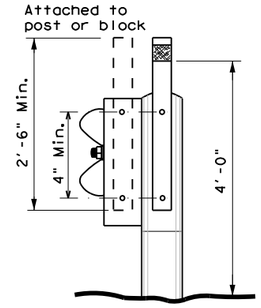
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

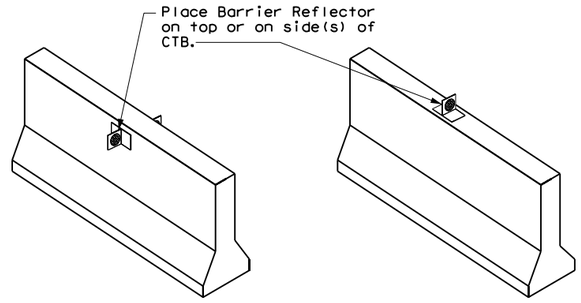
GF1



GF2



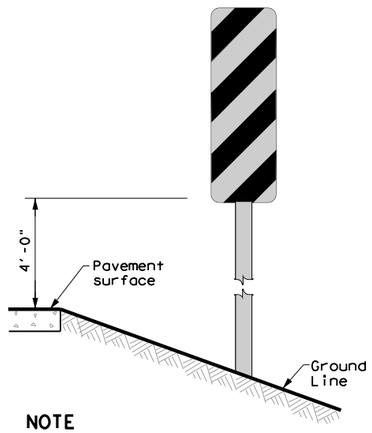
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

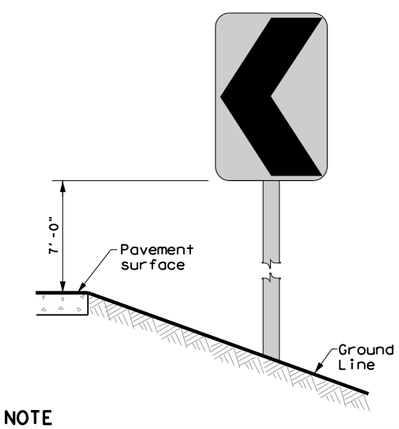
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

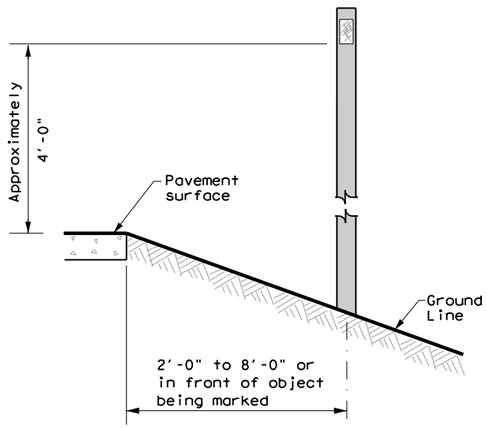
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	WILLIAMSON		126

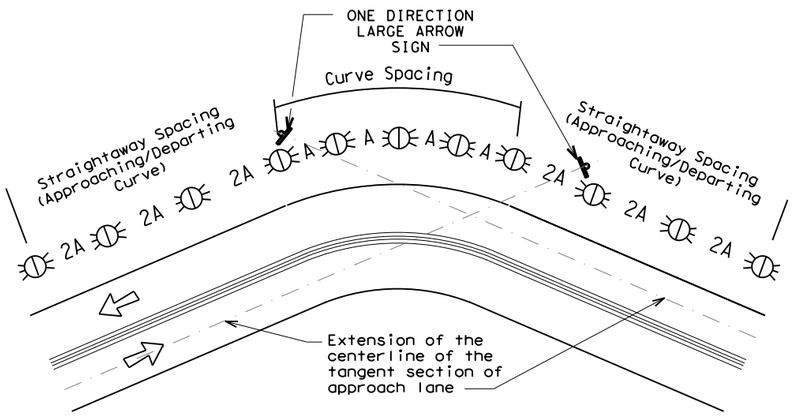
20B

DATE: 11/3/2022 12:59:29 PM
FILE: c:\pw\kh1\d0221699\dom2-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

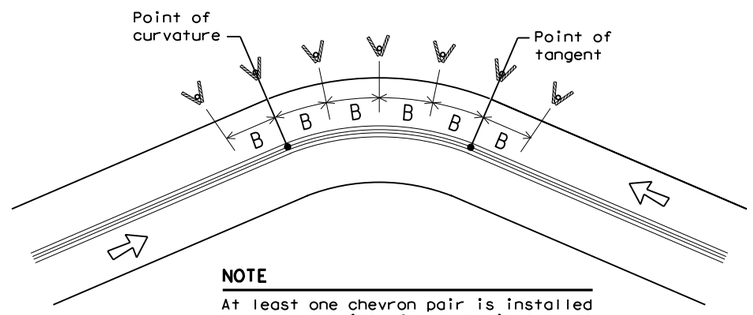
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

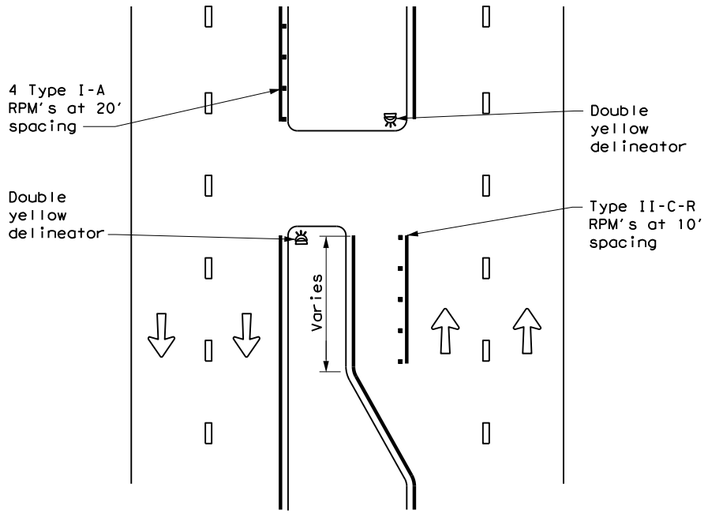
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	AUS	WILLIAMSON		127

20C

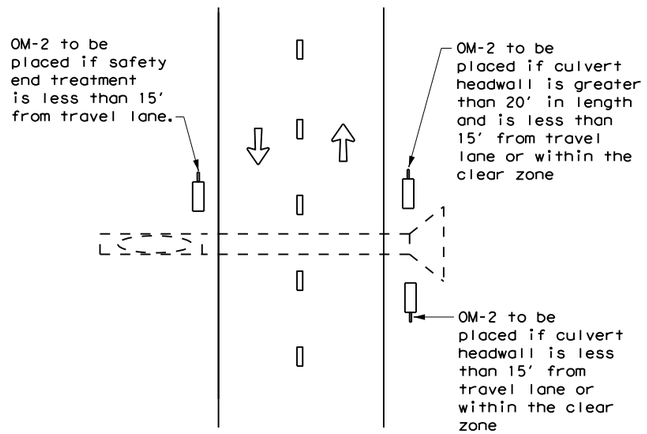
DATE: 11/3/2022 12:59:37 PM
FILE: c:\pw\khl\d0221699\dom3-20.dgn

CROSSOVERS



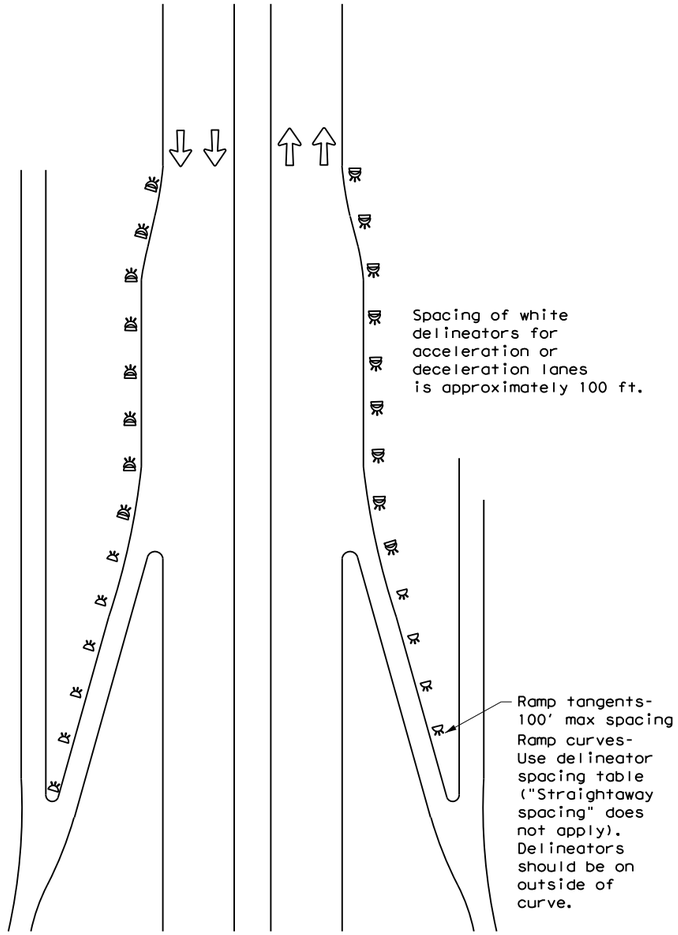
DETAIL 1

FOR CULVERTS WITHOUT MBGF



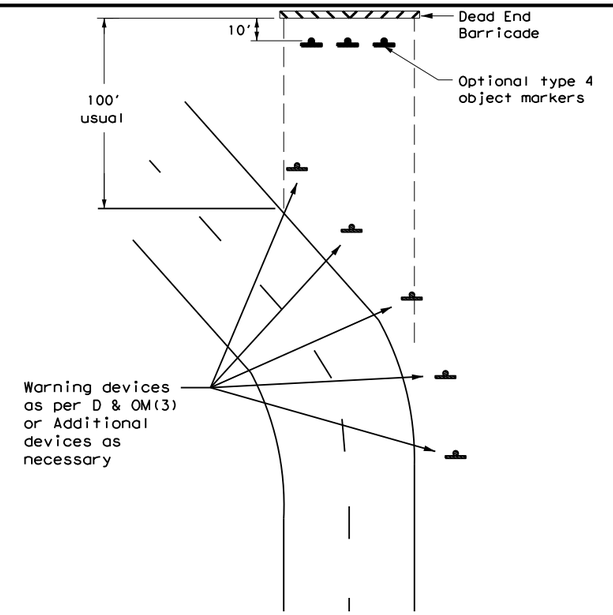
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



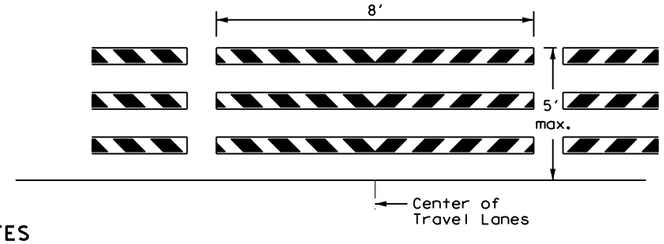
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

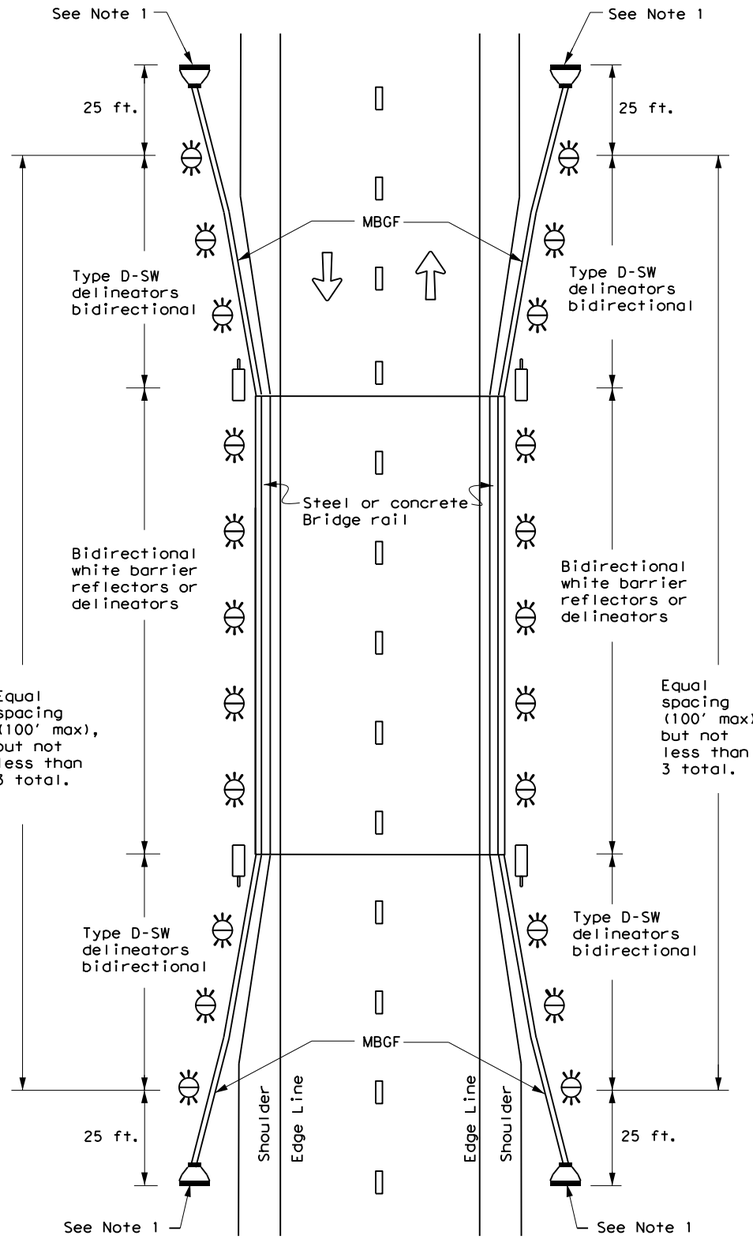
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
3-15 7-20	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		128

20D

DATE: 11/3/2022 12:59:42 PM
FILE: c:\pw\kh1\d0221699\dom4-20.dgn

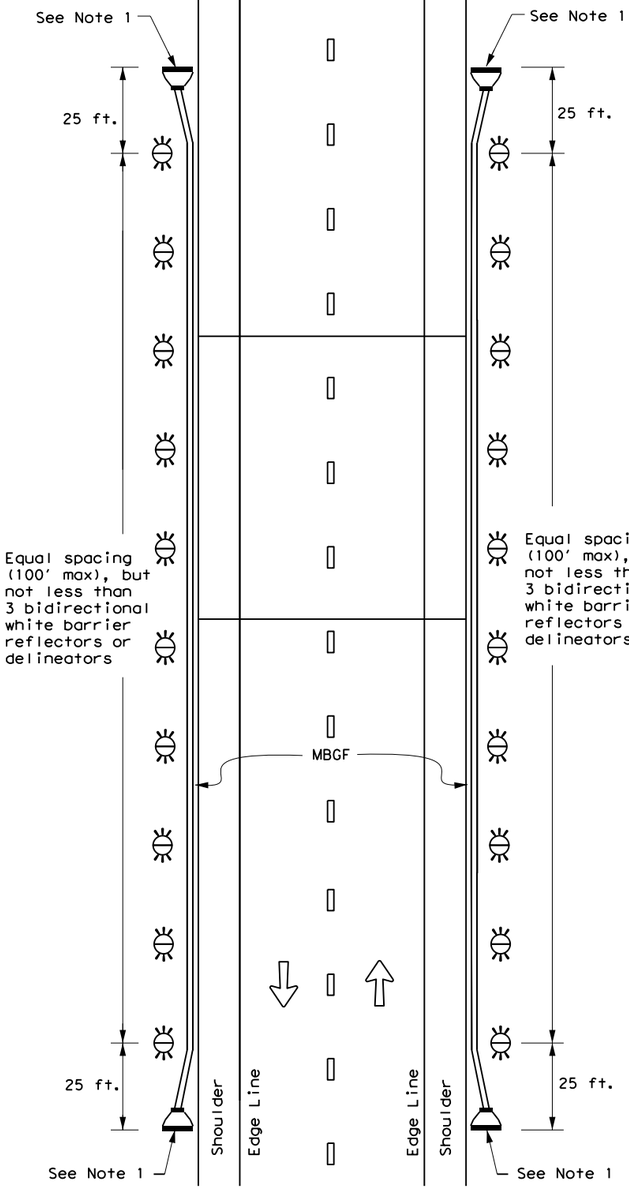
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

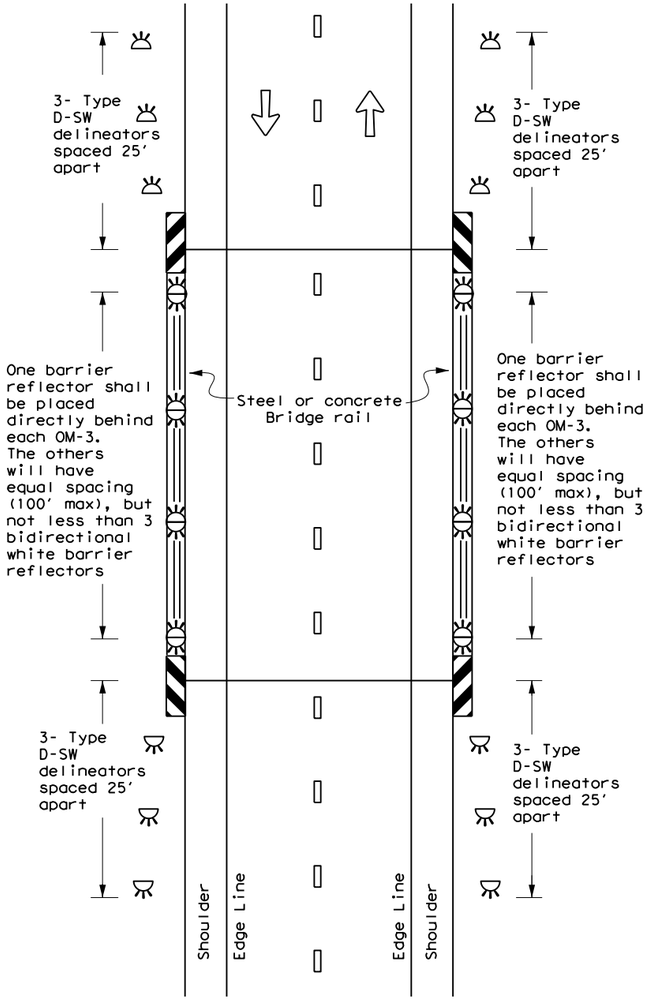
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

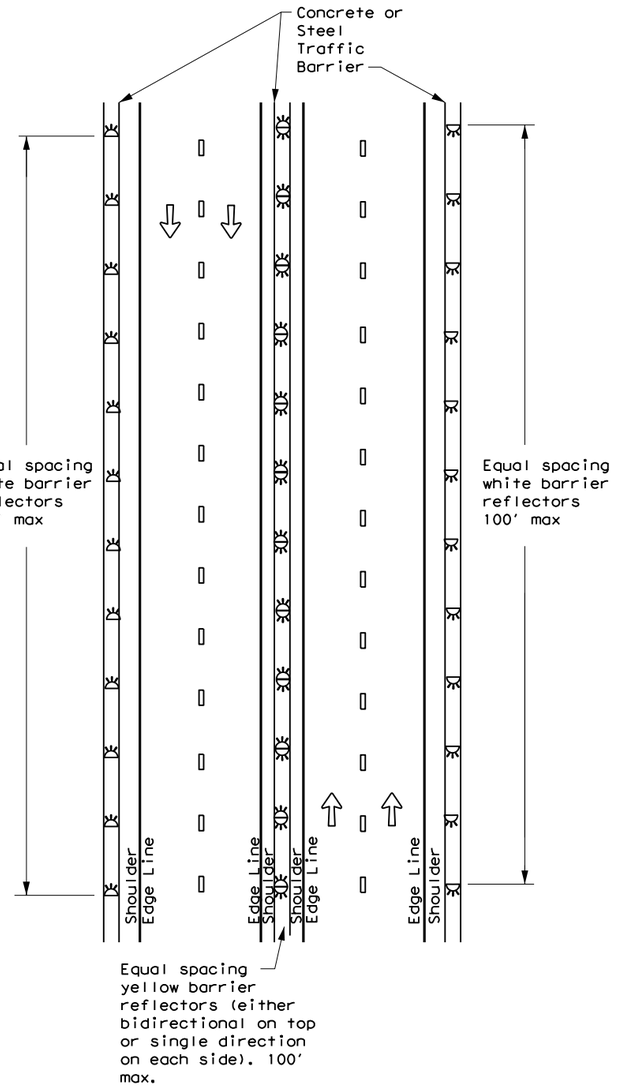
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
7-20	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		129

20E

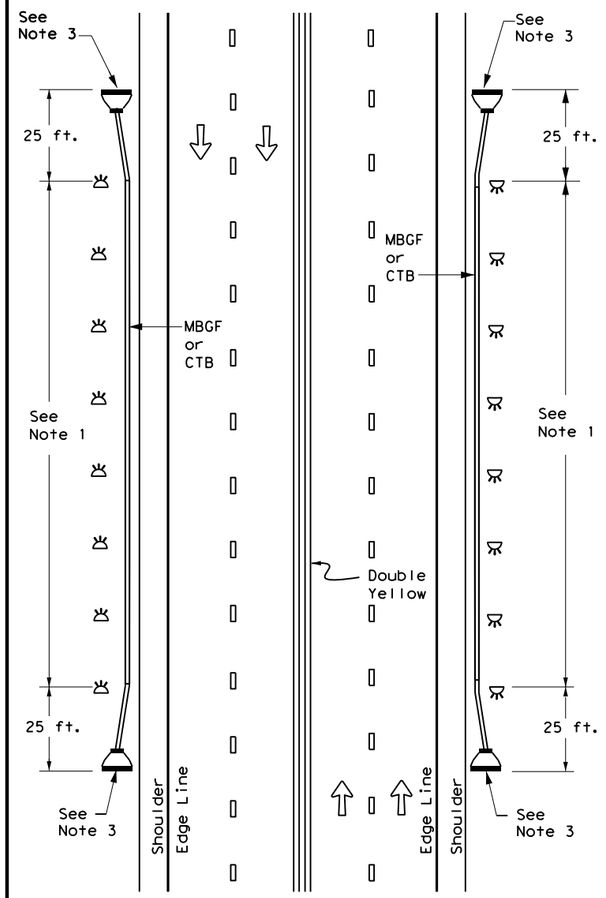
DATE: 11/3/2022 12:59:48 PM
FILE: c:\pw\kn1\d0221699\dom5-20.dgn

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

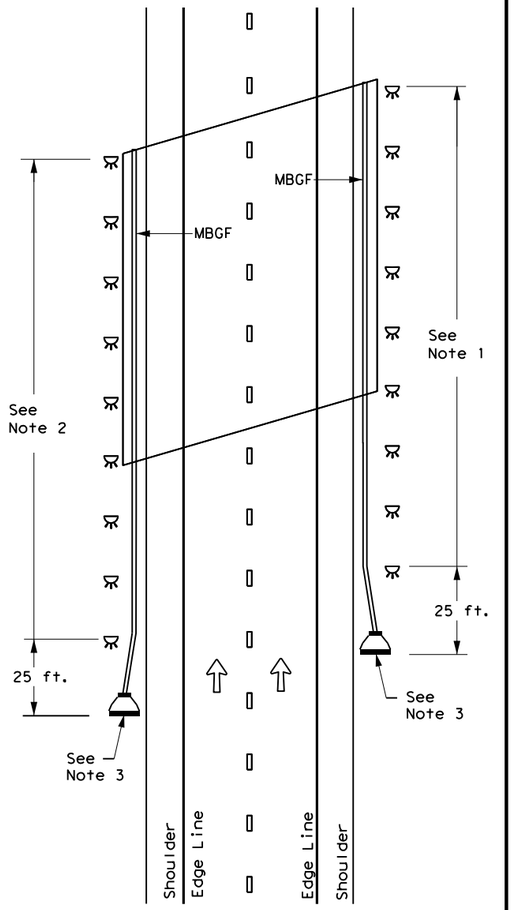
CONTINUOUS CONCRETE OR STEEL BARRIER



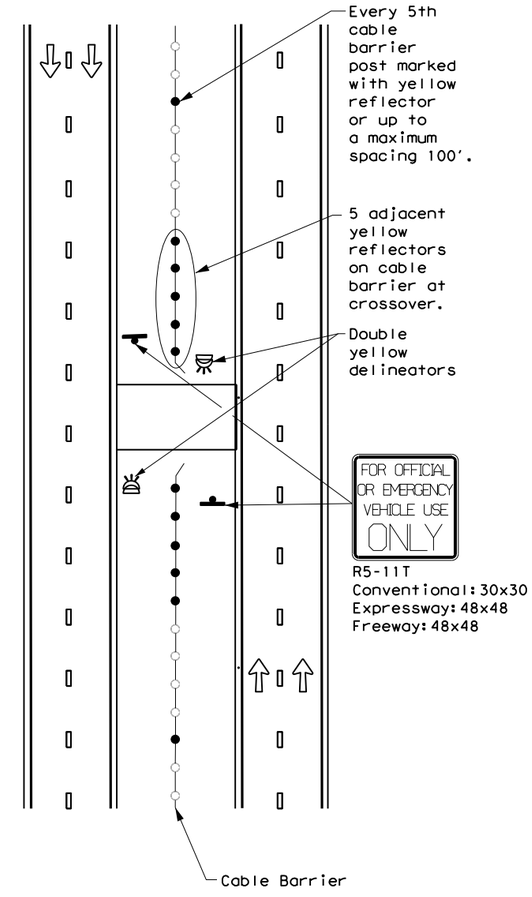
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

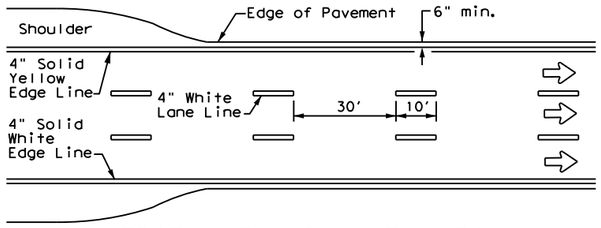
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

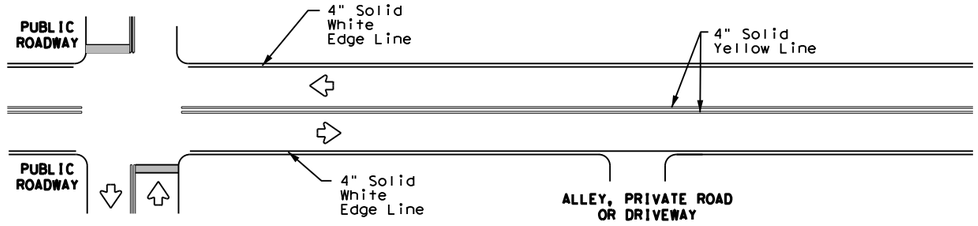
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
7-20	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		130

20F

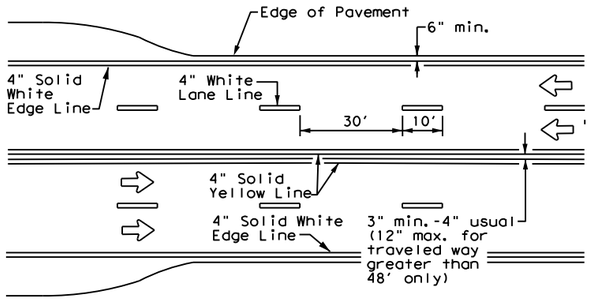
DATE: 11/3/2022 12:59:53 PM
FILE: c:\pw\kni\d0221699\dom6-20.dgn



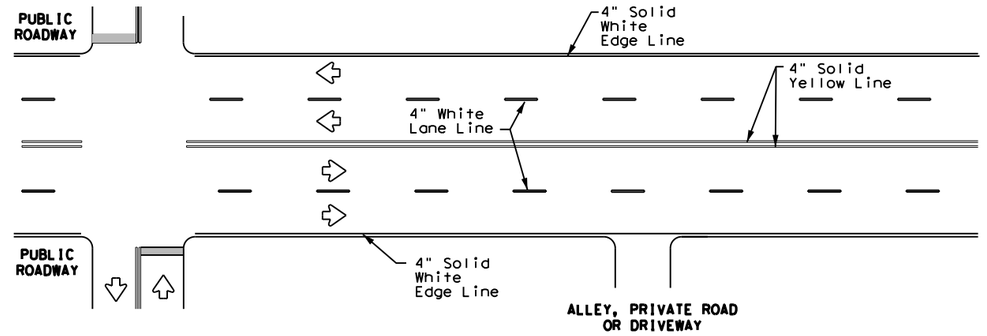
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



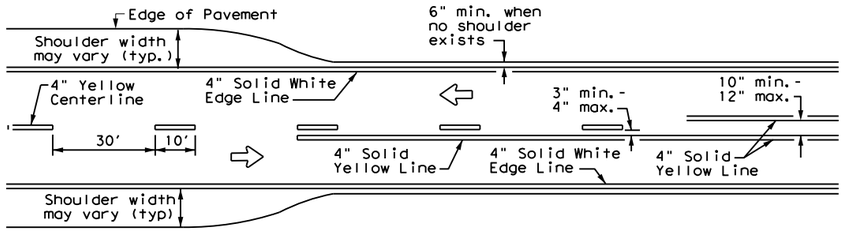
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



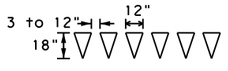
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



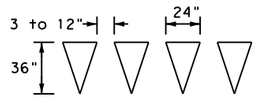
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

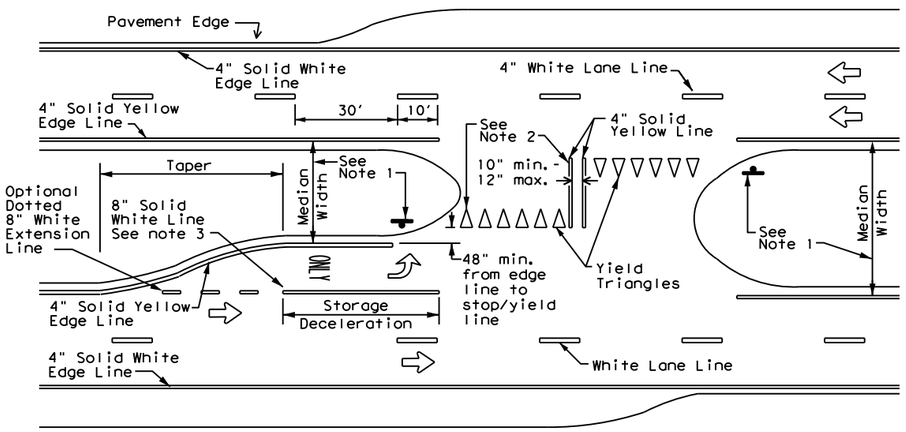


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

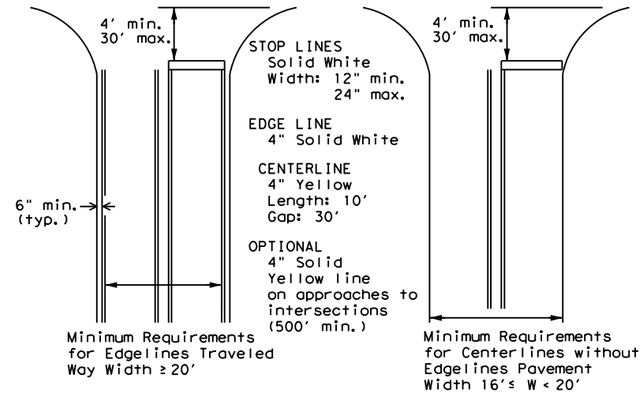
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

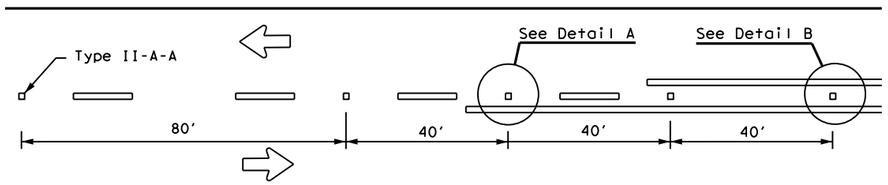
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0914	05	204, ETC.	CR 118
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	AUS	WILLIAMSON		131

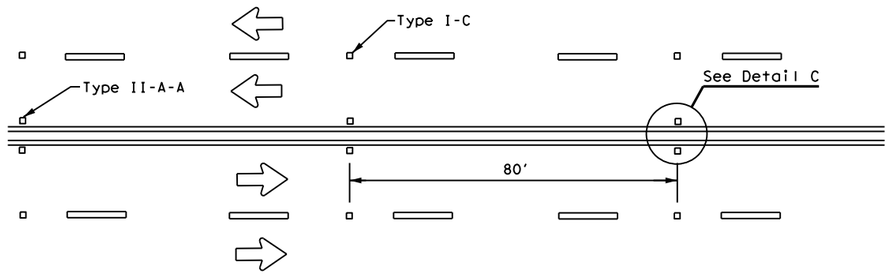
22A

DATE: 11/3/2022 12:59:58 PM
FILE: c:\pw\kni\d0221699\pm1-20 (1).dgn

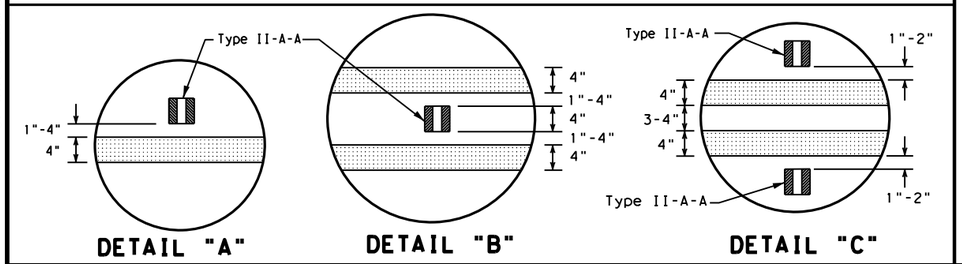
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



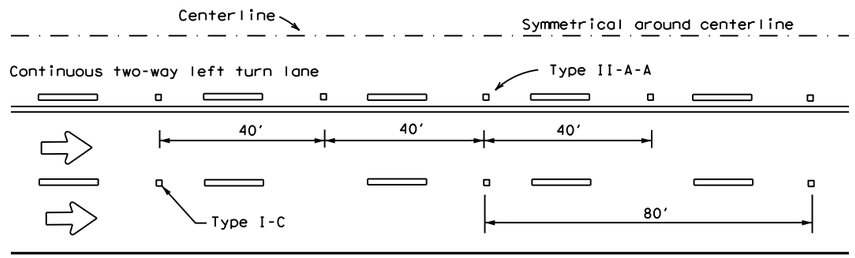
CENTERLINE FOR ALL TWO LANE ROADWAYS



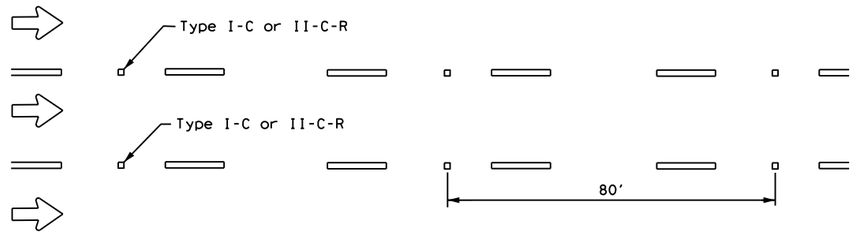
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

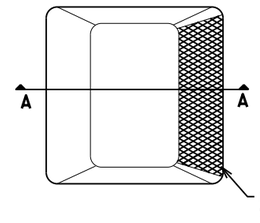


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

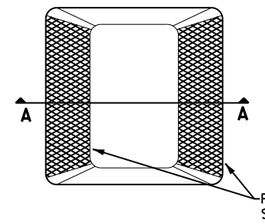
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

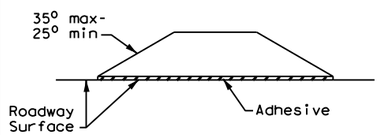
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

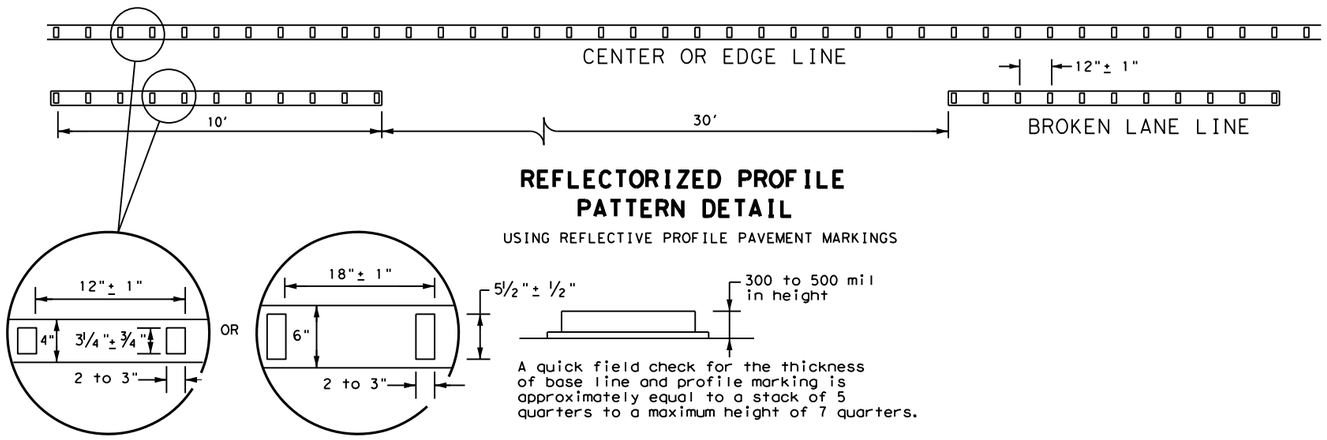


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		132

22B

DATE: 11/3/2022 1:00:03 PM
FILE: c:\pw\kni\d0221699\pm2-20 (1).dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

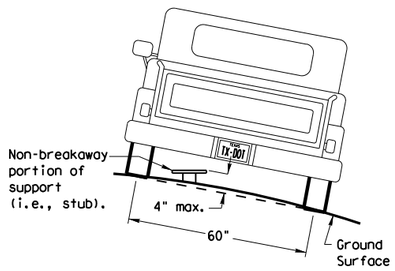
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

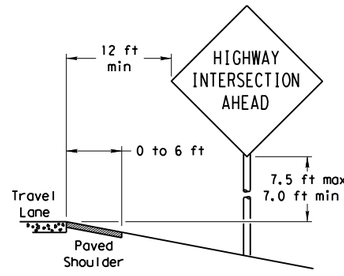
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

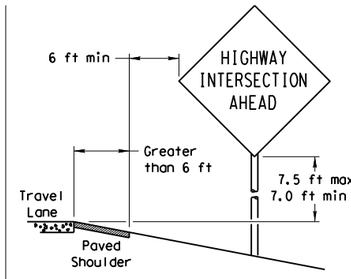
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

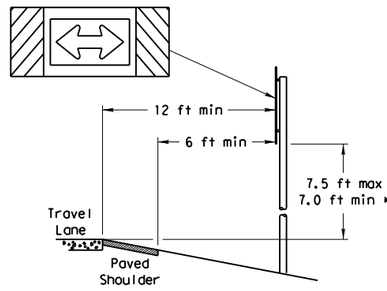
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



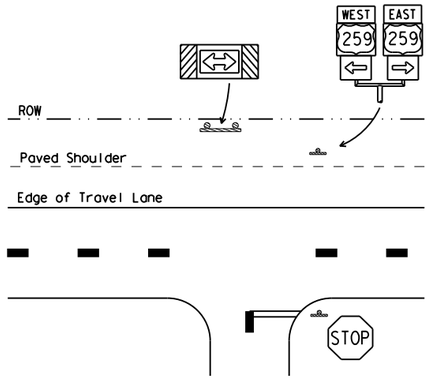
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

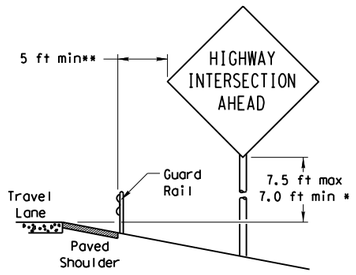
T-INTERSECTION



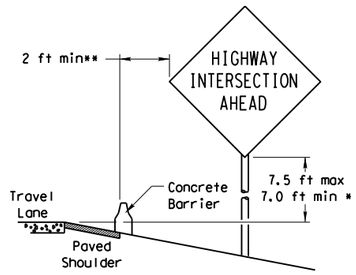
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL

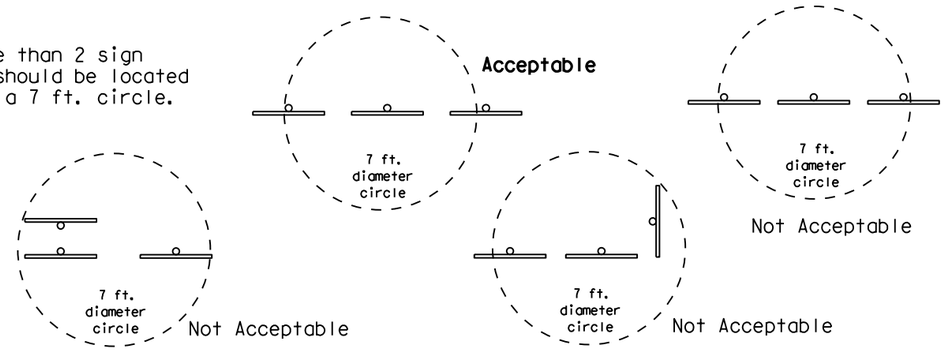


BEHIND CONCRETE BARRIER

**BEHIND GUARDRAIL

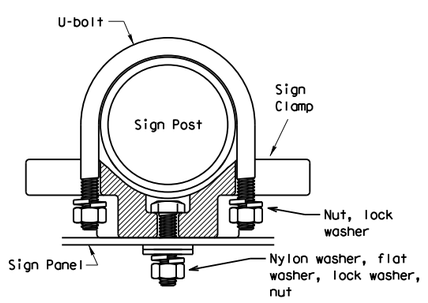
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

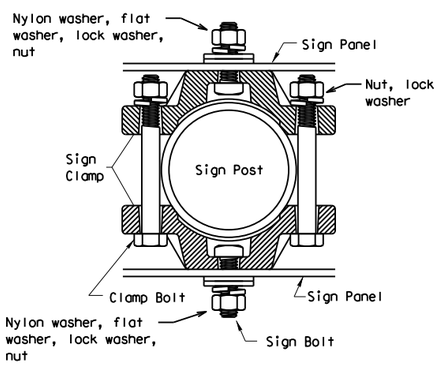


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

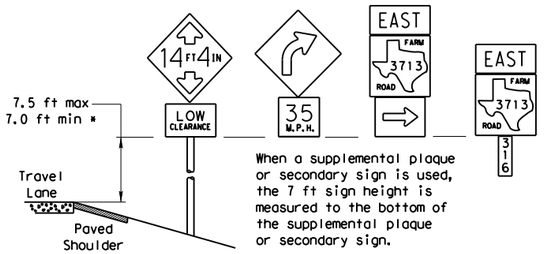
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



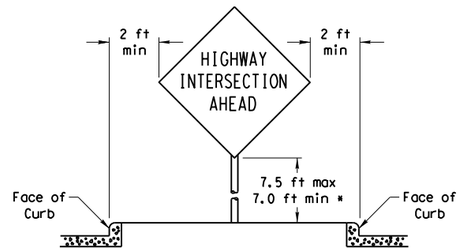
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



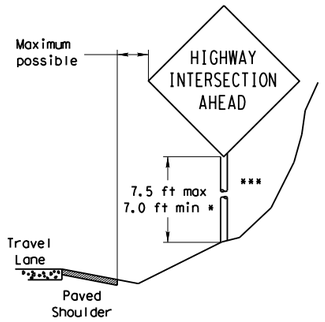
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

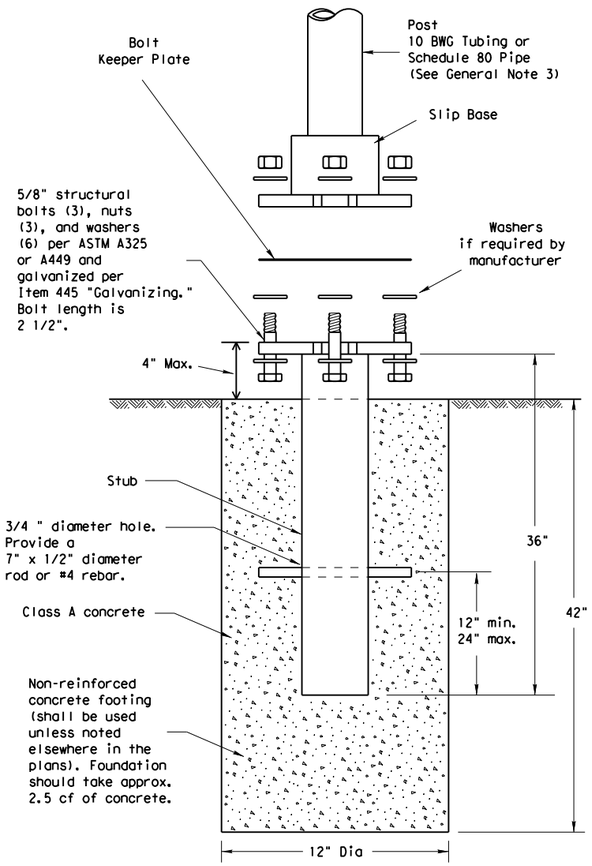
SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		133

DATE: 11/3/2022 1:00:09 PM
FILE: c:\pw\kn1\d0221699\smdgen.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

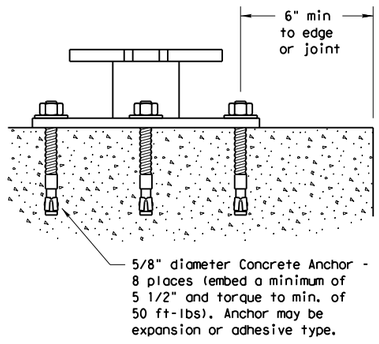
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

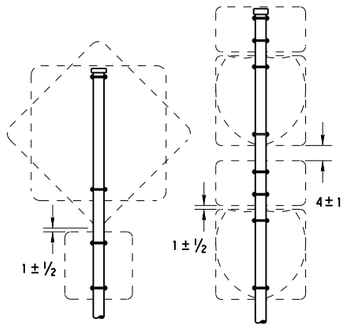
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

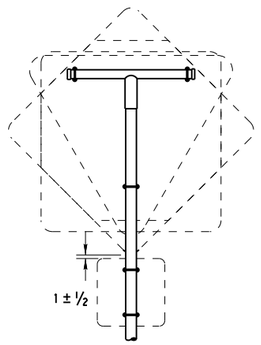
CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118

DIST	COUNTY	SHEET NO.
AUS	WILLIAMSON	134

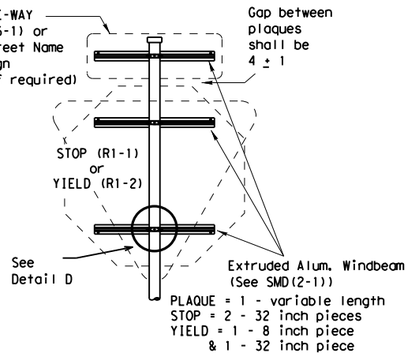
DATE: 11/3/2022 1:00:14 PM
FILE: c:\pw\kni\d0221699\smdsl.dgn



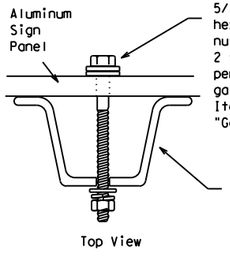
SM RD SGN ASSM TY XXXXX(1)XX(P)



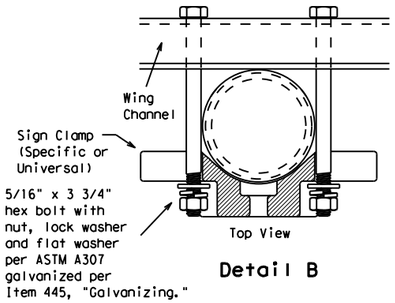
SM RD SGN ASSM TY XXXXX(1)XX(T)



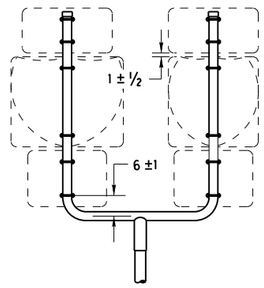
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



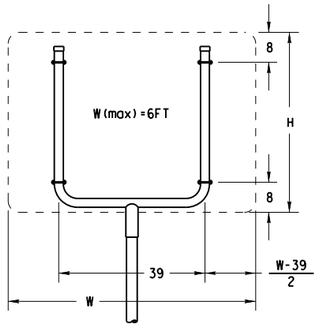
Detail A



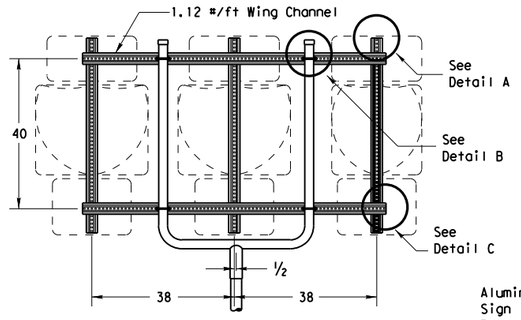
Detail B



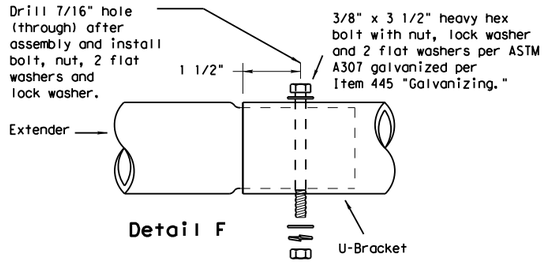
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

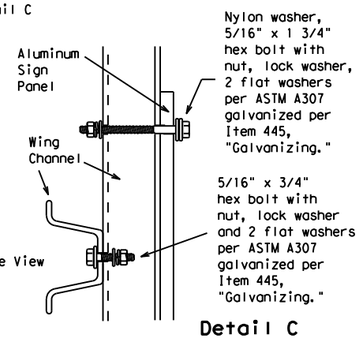


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

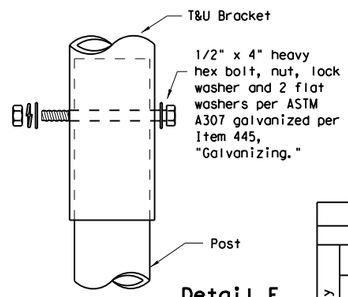


Detail F

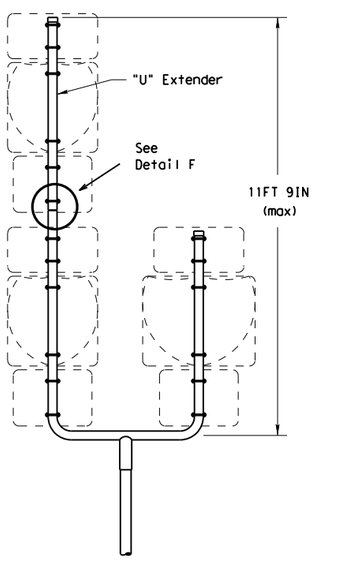
Splices shall only be allowed behind the sign substrate.



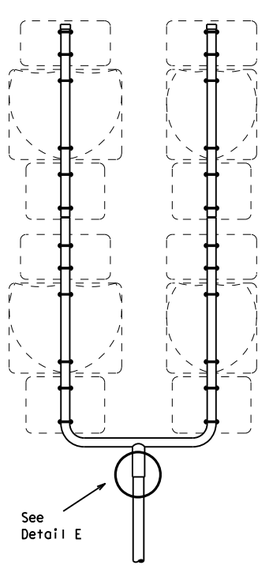
Detail C



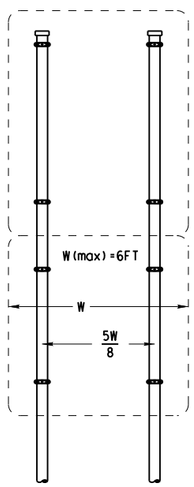
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

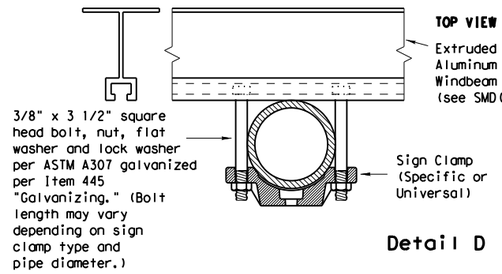


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

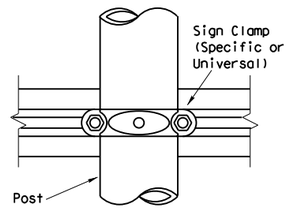


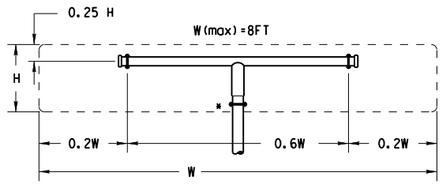
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

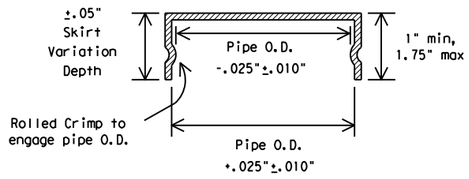




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

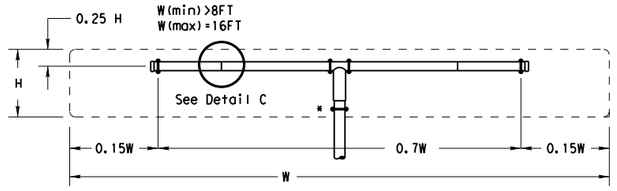
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

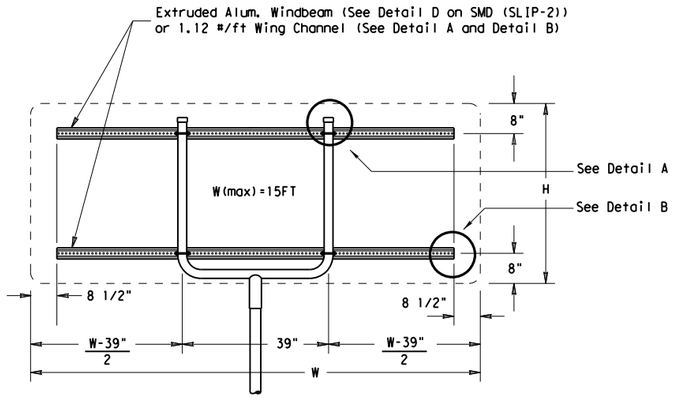
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		135

DATE: 11/3/2022 1:00:19 PM
FILE: c:\pw\kn1\d0221699\smds2.dgn

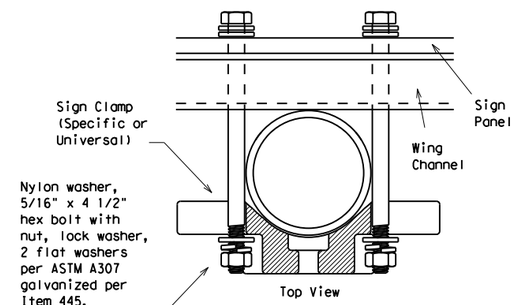


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)

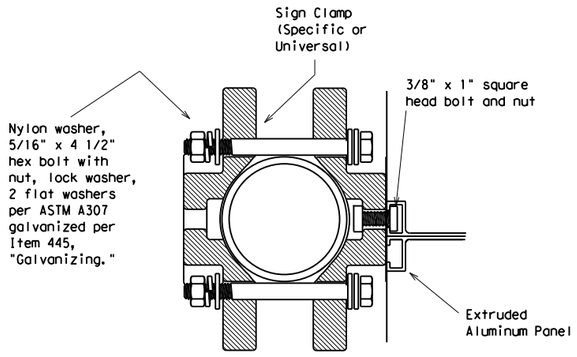


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



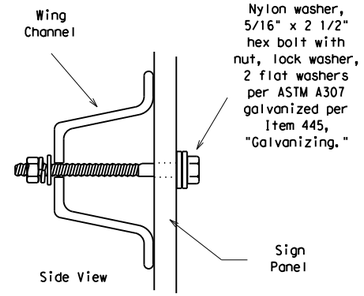
Top View

Detail A

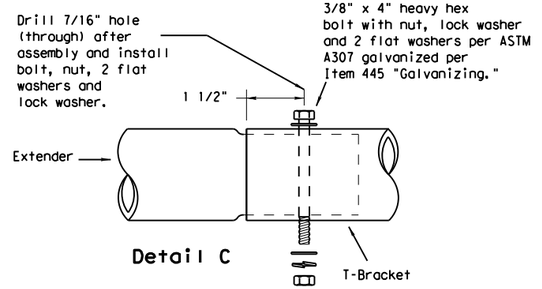


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

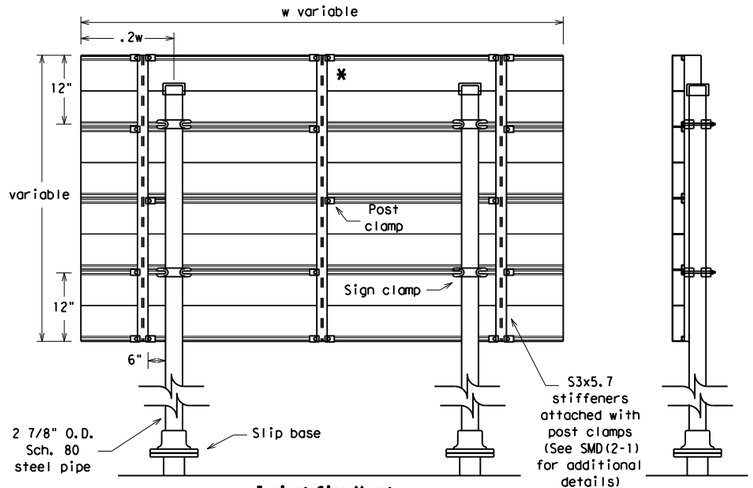


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

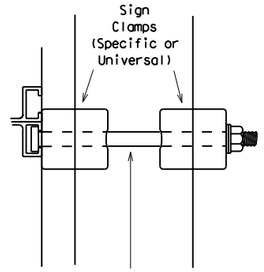


Typical Sign Mount

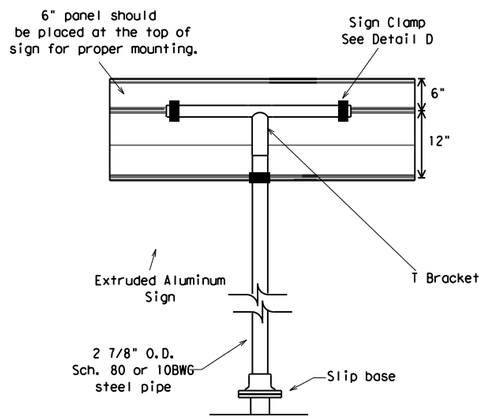
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

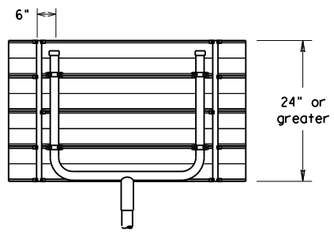
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

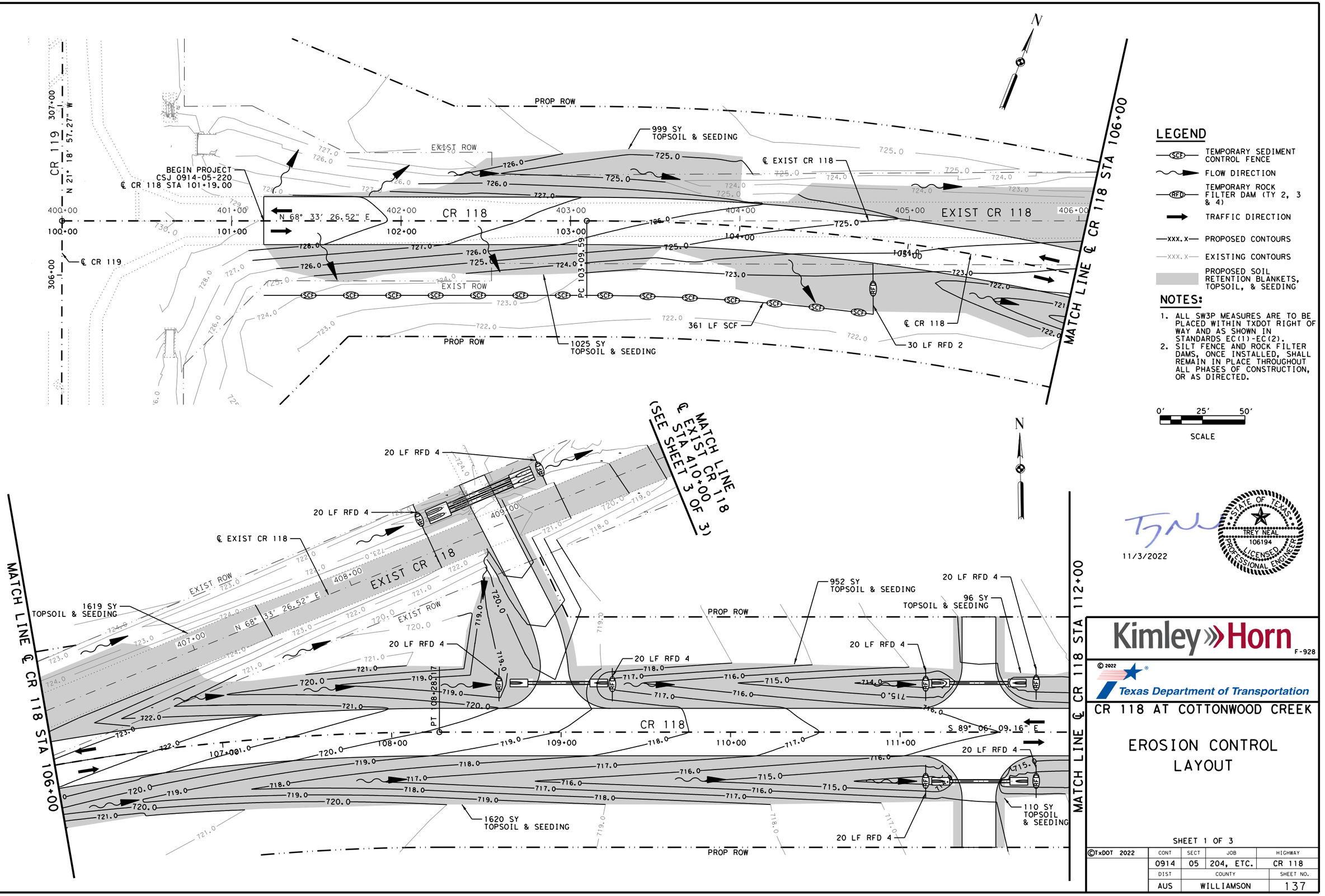
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118

DIST	COUNTY	SHEET NO.
AUS	WILLIAMSON	136

DATE: 11/3/2022 1:00:24 PM
FILE: c:\pw\kni\d0221699\smds3.dgn



11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

© 2022 Texas Department of Transportation

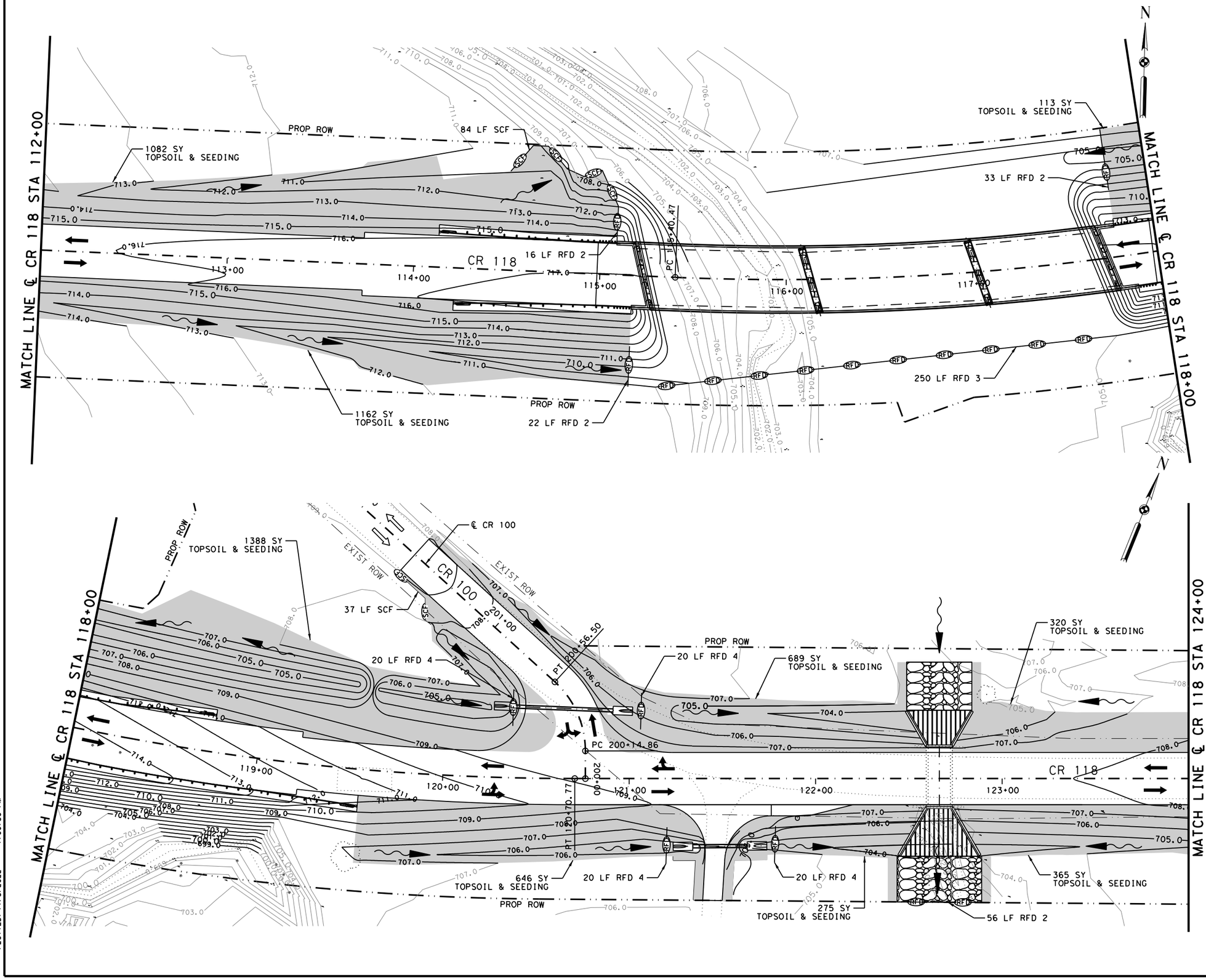
CR 118 AT COTTONWOOD CREEK

EROSION CONTROL LAYOUT

SHEET 1 OF 3

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		137

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\10. Environmental\CR118_ENV_SW3P01.dgn
PLOTTED: 11/3/2022 1:00:32 PM



LEGEND

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- FLOW DIRECTION
- RFD — TEMPORARY ROCK FILTER DAM (TY 2, 3 & 4)
- TRAFFIC DIRECTION
- xxx.x — PROPOSED CONTOURS
- xxx.x — EXISTING CONTOURS
- PROPOSED SOIL RETENTION BLANKETS, TOPSOIL, & SEEDING

NOTES:

1. ALL SW3P MEASURES ARE TO BE PLACED WITHIN TXDOT RIGHT OF WAY AND AS SHOWN IN STANDARDS EC(1)-EC(2).
2. SILT FENCE AND ROCK FILTER DAMS, ONCE INSTALLED, SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION, OR AS DIRECTED.

0′ 25′ 50′

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

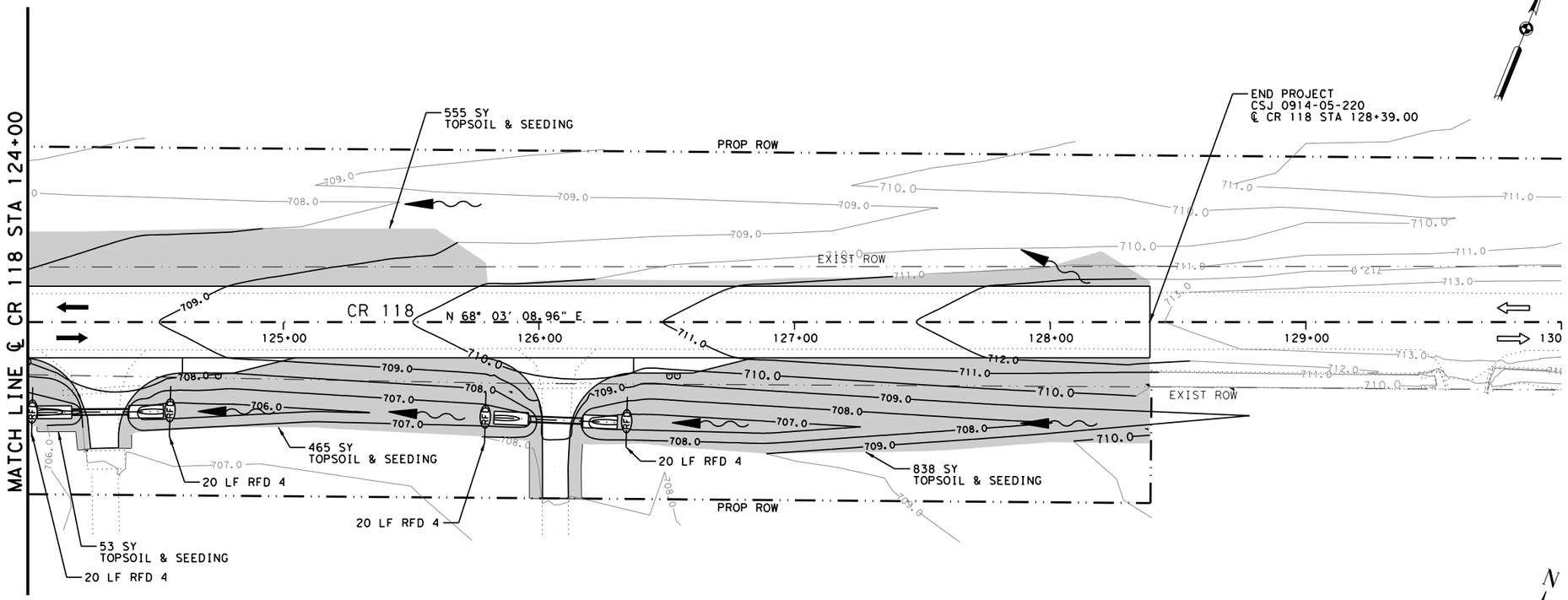
CR 118 AT COTTONWOOD CREEK

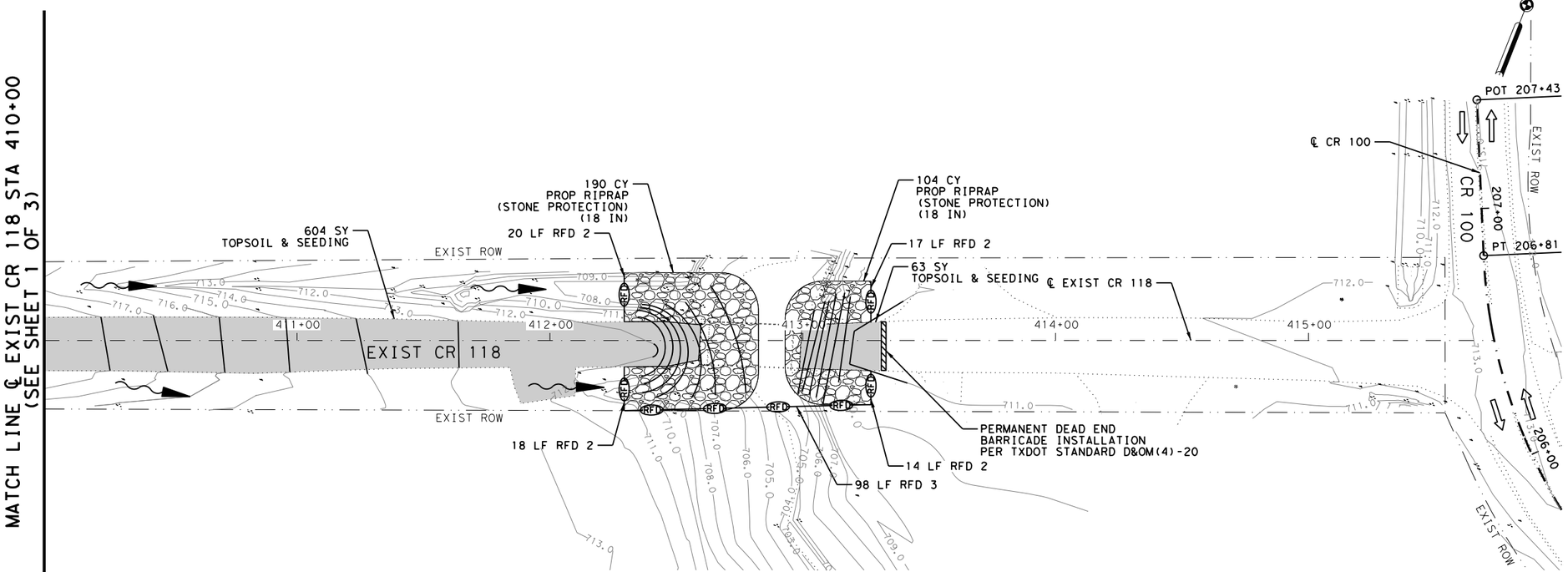
EROSION CONTROL LAYOUT

SHEET 2 OF 3

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		138

FILENAME: pw:\\KH-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\10. Environmental\CR118_ENV_SW3P02.dgn
PLOTTED: 11/3/2022 1:00:38 PM





LEGEND

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- FLOW DIRECTION
- RFD — TEMPORARY ROCK FILTER DAM (TY 2, 3 & 4)
- TRAFFIC DIRECTION
- xxx.x — PROPOSED CONTOURS
- xxx.x — EXISTING CONTOURS
- PROPOSED SOIL RETENTION BLANKETS, TOPSOIL, & SEEDING

NOTES:

1. ALL SW3P MEASURES ARE TO BE PLACED WITHIN TXDOT RIGHT OF WAY AND AS SHOWN IN STANDARDS EC(1)-EC(2).
2. SILT FENCE AND ROCK FILTER DAMS, ONCE INSTALLED, SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION, OR AS DIRECTED.

0' 25' 50'

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

EROSION CONTROL LAYOUT

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		139

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\10. Environmental\CR118_ENV_SW3P03.dgn
PLOTTED: 11/3/2022 11:00:45 PM

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):
_____0914-05-204, ETC._____

1.2 PROJECT LIMITS:
From:_____CR 118 AT COTTONWOOD CREEK_____

To:_____.

1.3 PROJECT COORDINATES:
BEGIN: (Lat)____N 30.5836976,(Long)_____W 97.5692092

END: (Lat)____N 30.581599,(Long)_____W 97.562144

1.4 TOTAL PROJECT AREA (Acres): _____11.68____

1.5 TOTAL AREA TO BE DISTURBED (Acres): __6.15___

1.6 NATURE OF CONSTRUCTION ACTIVITY:

BRIDGE REPLACEMENT AND NEW ROAD

1.7 MAJOR SOIL TYPES:

Soil Type	Description
AUSTIN SILTY CLAY 1 TO 3% SLOPES	7.4%
BRANYON CLAY 1 TO 3% SLOPES	2.3%
BRANYON-KRUM COMPLEX 1 TO 3% SLOPES	15.1%
HOUSTON BLACK CLAY 0 TO 1% SLOPES	16.6%
HOUSTON BLACK CLAY 1 TO 3% SLOPES	41.6%
TINN CLAY 0 TO 1% SLOPES	16.9% FREQUENTLY FLOODED

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: _____
☐ 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

* 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

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2020 (733)		140
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	WILLIAMSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0914	05	204	CR 118

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

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: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ 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

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.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2020 (733)		140A
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	WILLIAMSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0914	05	204	CR 118

DATE: 11/3/2022 2:49:12 PM
FILE: c:\pw\kkh\d0184613\CR118_ENV_EPIC_01.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1. COTTONWOOD CREEK - NWP #14

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Executive Order 13112 on Invasive Species if and when applicable.
2. See the special provisions for vegetation in Item 7 of the general notes.
3. See the special provisions for water quality in Item 7 of the general notes.
4.

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

☐ No Action Required ☒ Required Action

Action No.

1. See the special provisions for terrestial amphibians and reptiles in Item 7 of the general notes.
2. See the special provisions for aquatic amphibians and reptiles in Item 7 of the general notes.
3.
4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

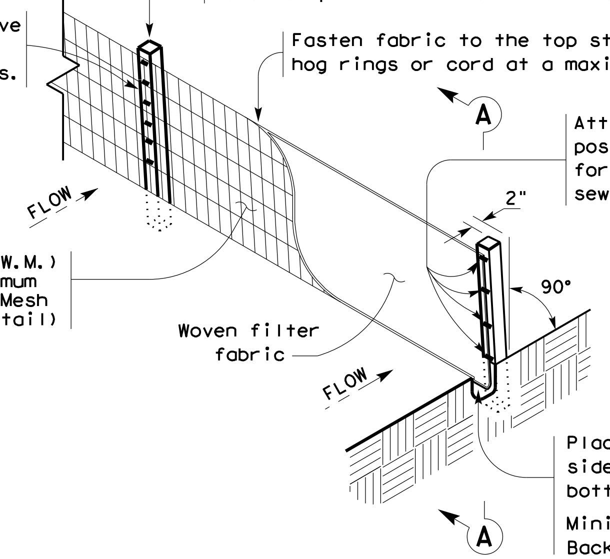
1. The project is located in a Federal Emergency Management Agency mapped floodplain. Notify the local floodplain administrator as necessary and comply with all applicable rules and regulations regarding hydraulic design of the project.
2.
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

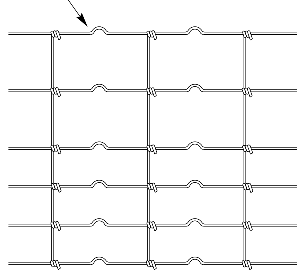
EPIC

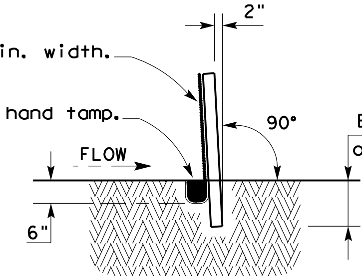
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0914	05	204, ETC.	CR 118
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	AUS	WILLIAMSON		141



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

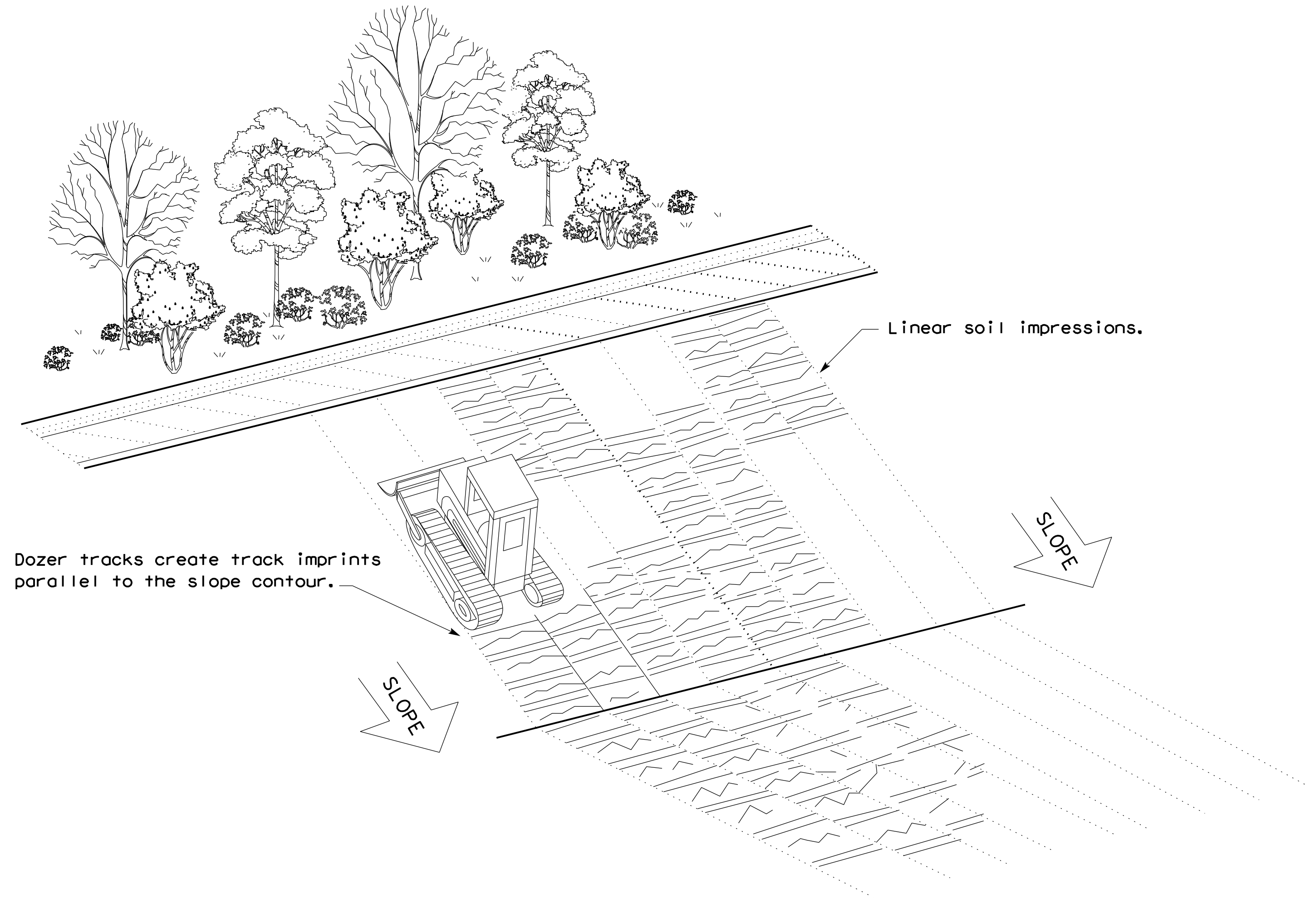
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

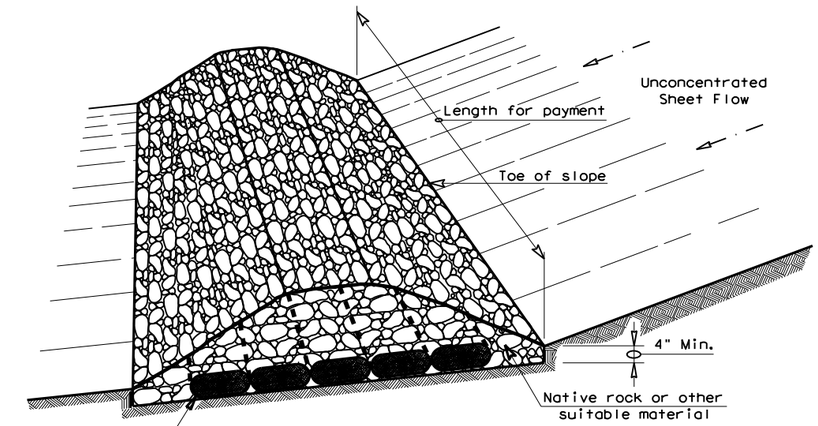
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

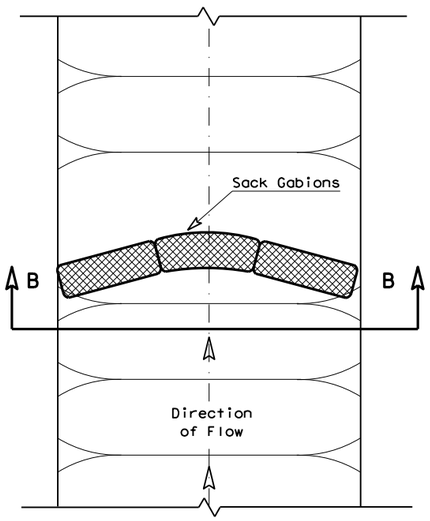
EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST		COUNTY	SHEET NO.
	AUS		WILLIAMSON	142

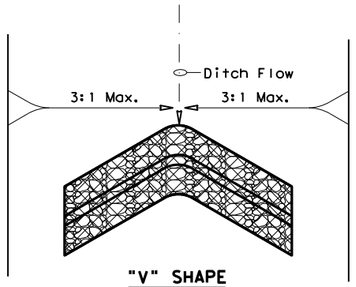


FILTER DAM AT TOE OF SLOPE

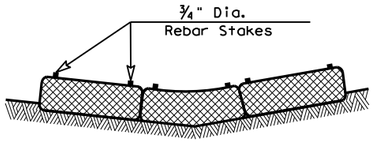
RFD1



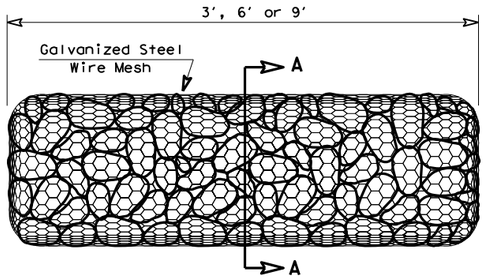
PLAN VIEW



"V" SHAPE PLAN VIEW

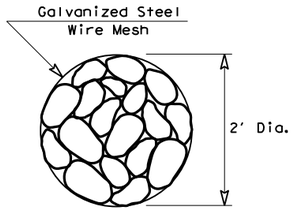


SECTION B-B

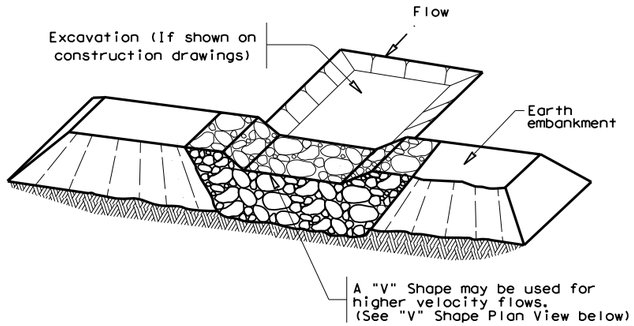


TYPE 4 (SACK GABIONS)

RFD4

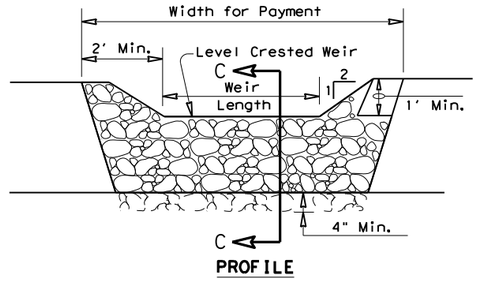


SECTION A-A

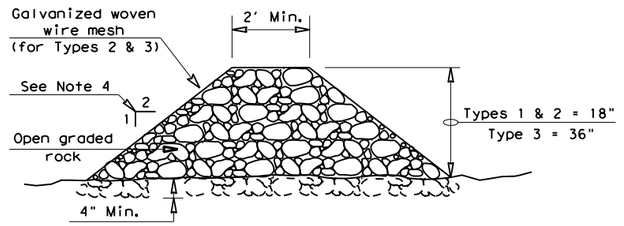


FILTER DAM AT SEDIMENT TRAP

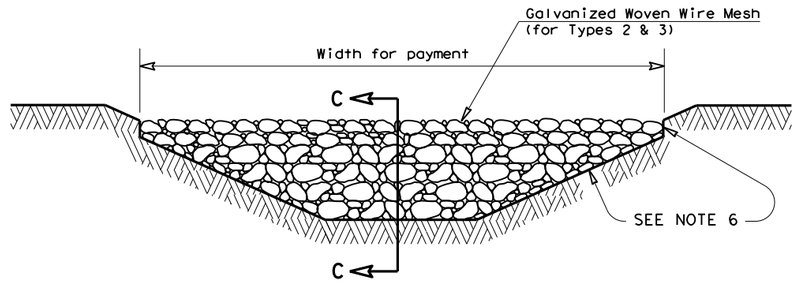
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

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

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

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

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

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

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

PLAN SHEET LEGEND

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

Texas Department of Transportation

Design Division Standard

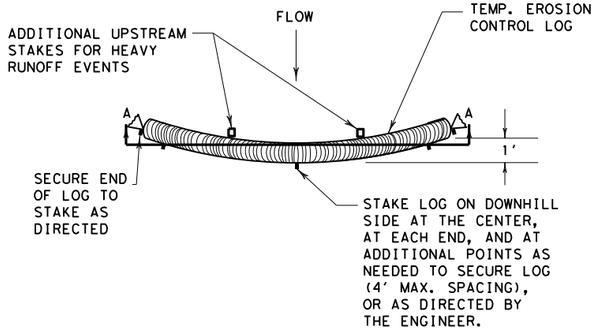
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

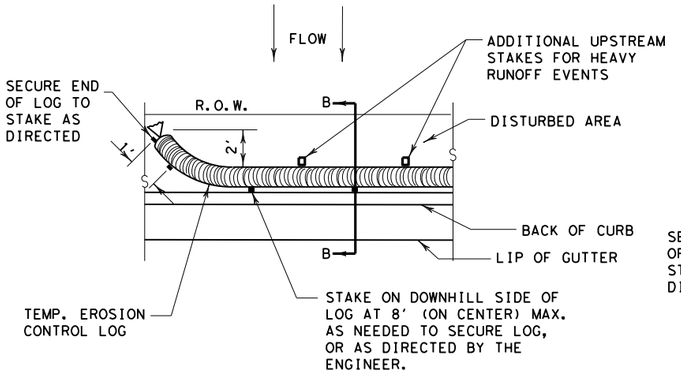
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	204, ETC.	CR 118
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		143

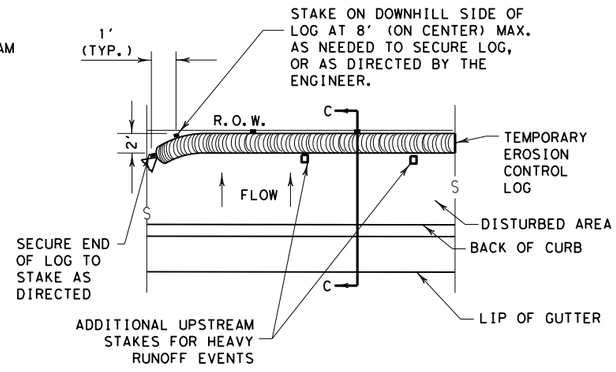
DATE: 11/3/2022
FILE: c:\pw\khi\d0221702\ec216.dgn



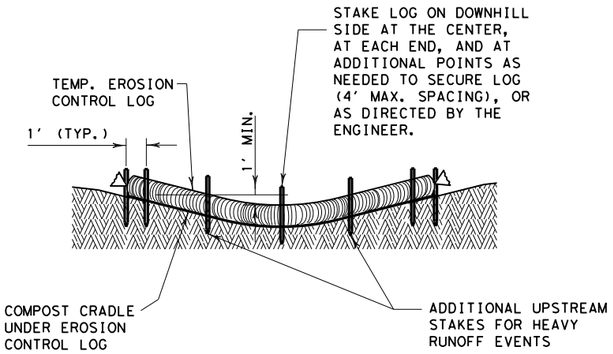
PLAN VIEW



PLAN VIEW



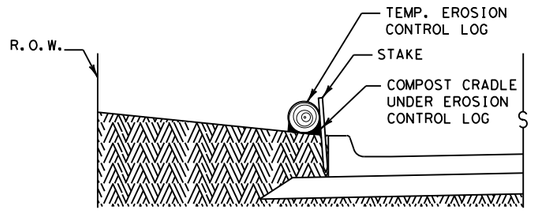
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

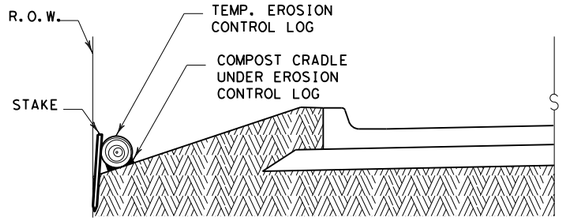
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

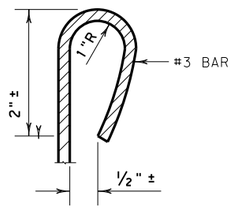
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

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

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.

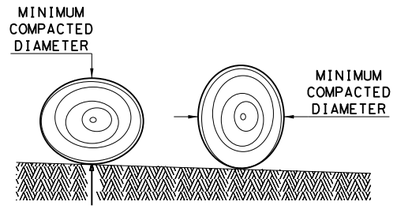
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

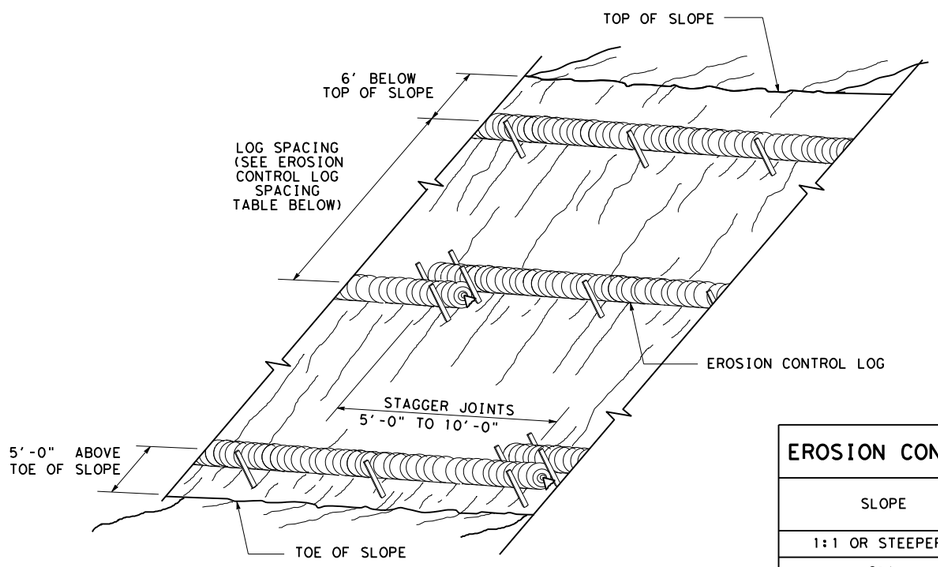
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

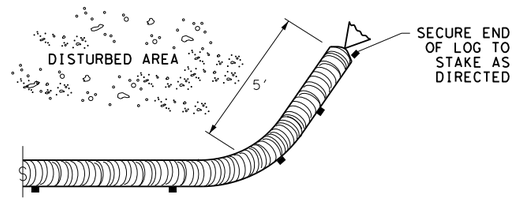
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS			
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0914	05	204, ETC.		CR 118		
	DIST	COUNTY			SHEET NO.		
	AUS	WILLIAMSON			144		

DATE: 11/3/2022
FILE: c:\pw\khi\d0221702\ec916 (1).dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

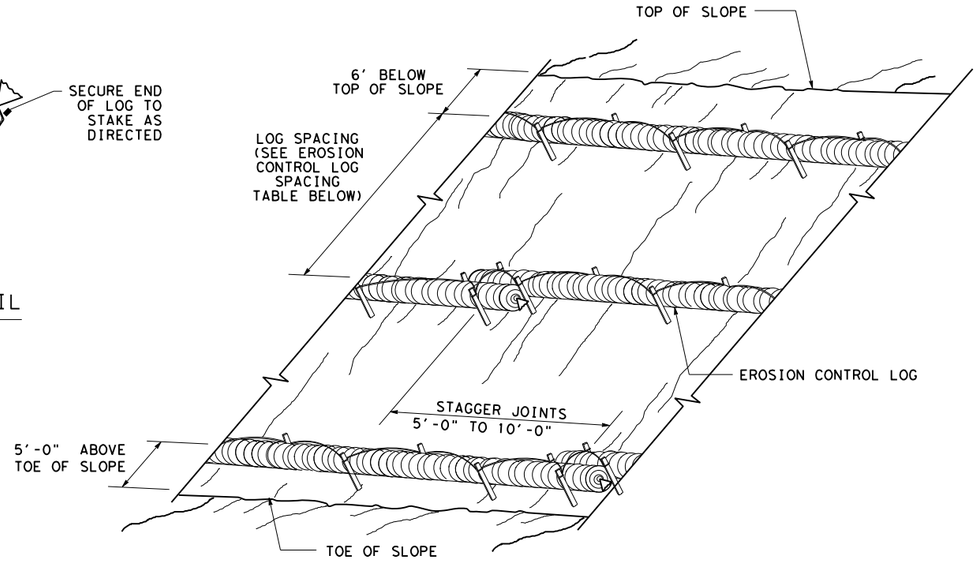
CL-SST



END SECTION RAP DETAIL

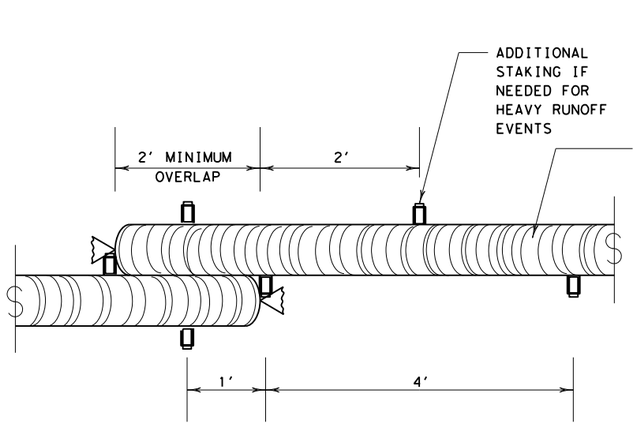
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

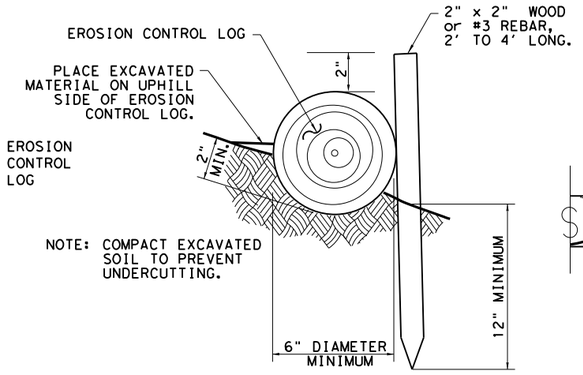
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

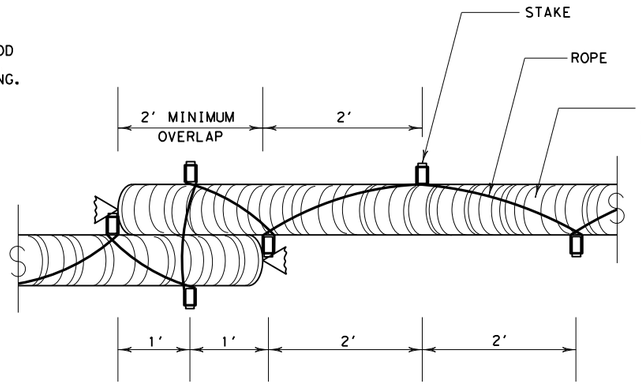


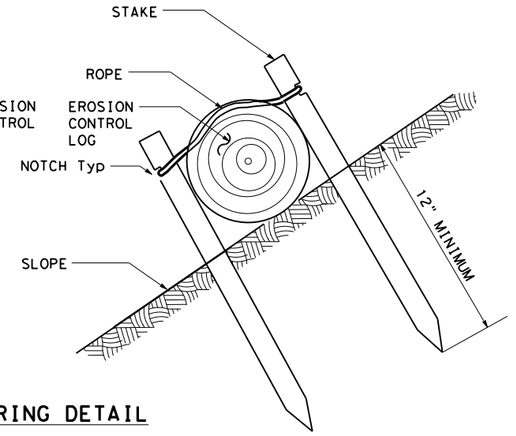


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

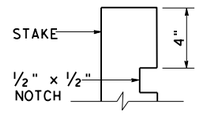
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

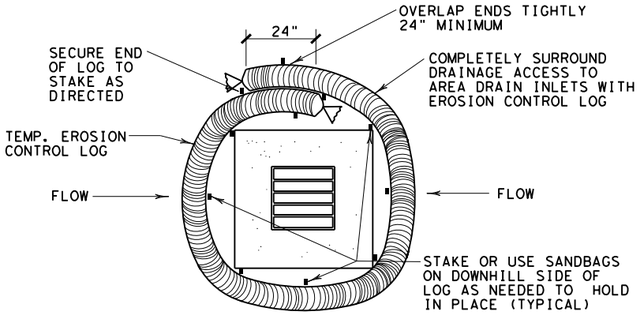
Texas Department of Transportation

Design Division Standard

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

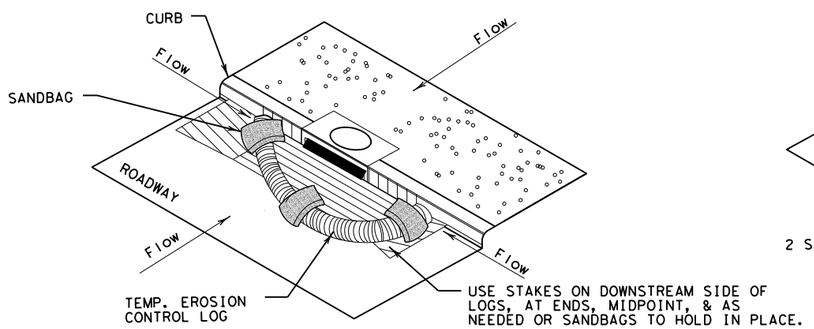
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0914	05	204, ETC.		CR 118	
	DIST	COUNTY			SHEET NO.	
	AUS	WILLIAMSON			145	

DATE: 11/3/2022
FILE: c:\pw\khi\d0221702\ec916 (1).dgn



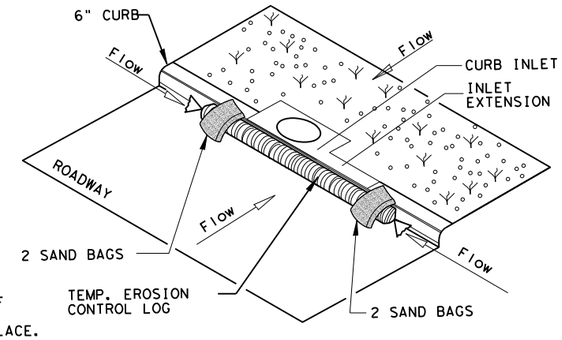
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

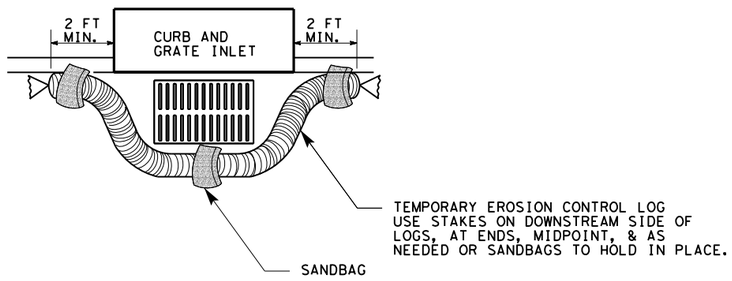
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

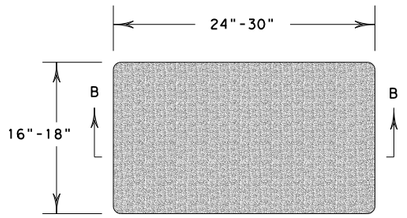
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

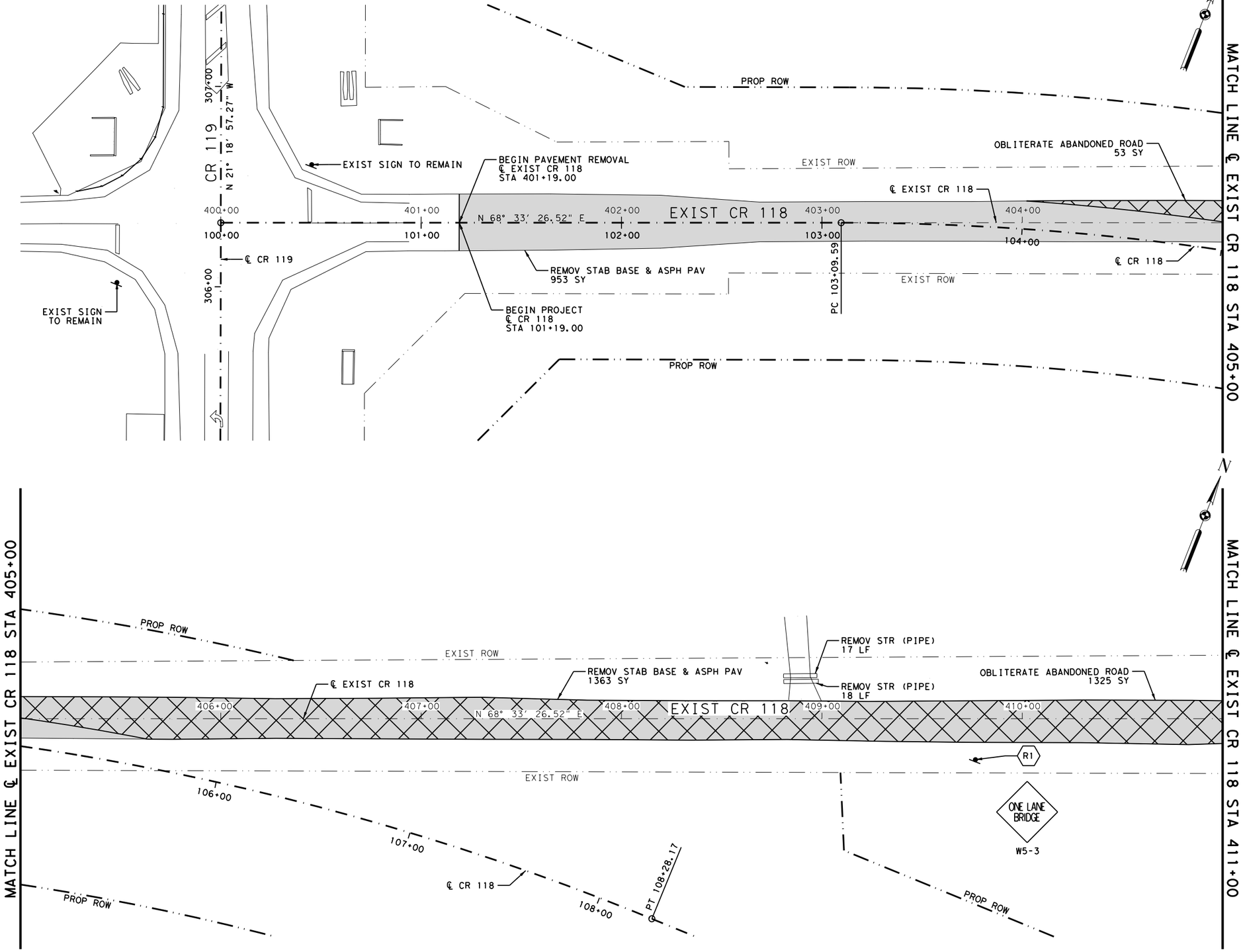
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0914	05	204, ETC.		CR 118	
	DIST	COUNTY				SHEET NO.
	AUS	WILLIAMSON				146

DATE: 11/3/2022
FILE: c:\pw\khi\d0221702\ec916 (1).dgn



LEGEND

- OBLITERATE ABANDONED ROAD
- REMOV STAB BASE & ASPH PAV
- EXISTING SIGN
- R# — EXISTING SIGN TO BE REMOVED
- EXISTING OBJECT MARKER
- R# — EXISTING OBJECT MARKER TO BE REMOVED

NOTES:

1. REMOVAL OF EXISTING GRAVEL DRIVEWAYS IS SUBSIDIARY TO ITEM 0110 6001 EXCAVATION.

0' 25' 50'

SCALE

11/3/2022

TREY NEAL 106194 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

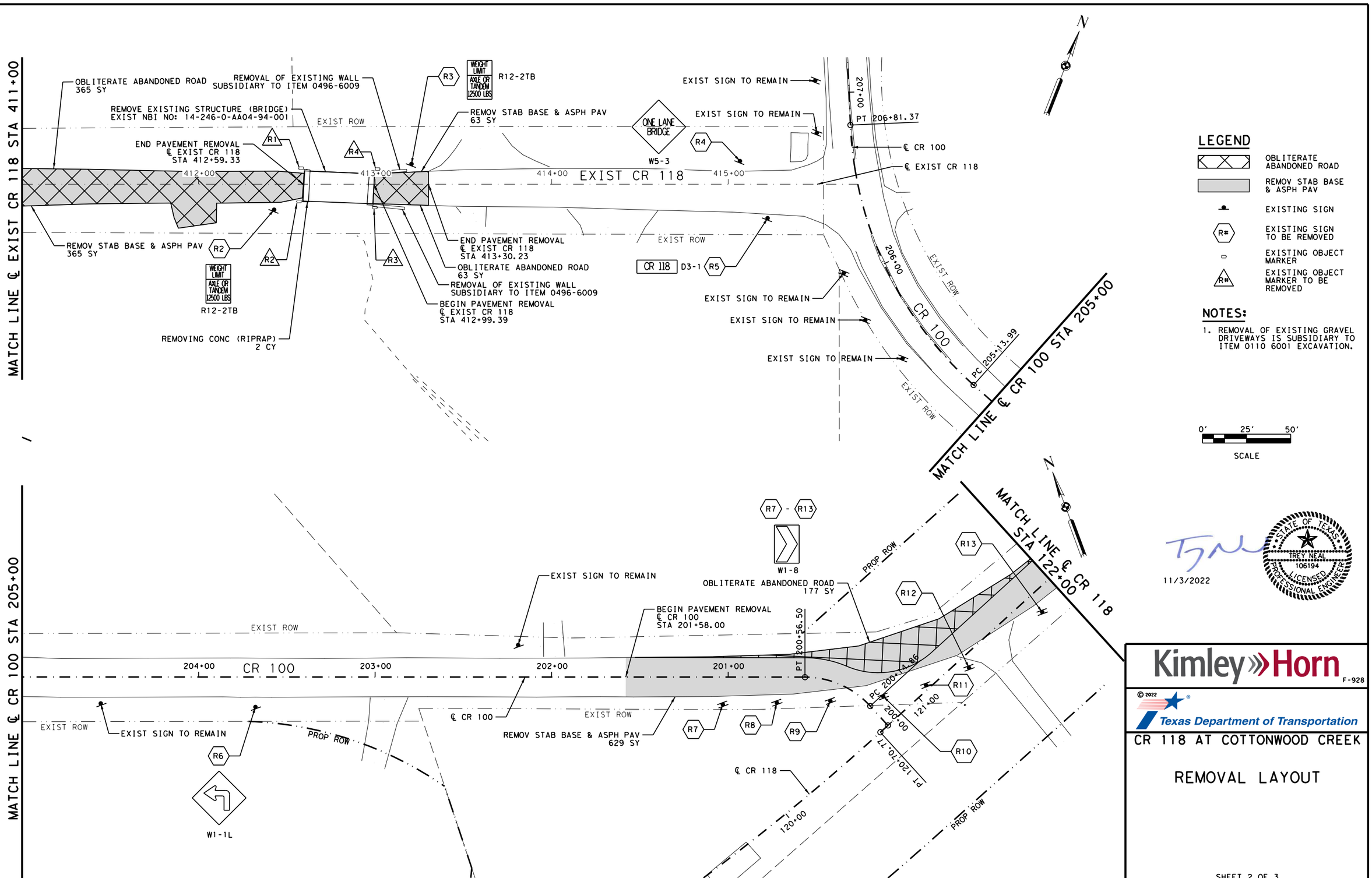
CR 118 AT COTTONWOOD CREEK

REMOVAL LAYOUT

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		147

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_ROW_REMOV01.dgn
PLOTTED: 11/3/2022 11:01:22 PM



FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\Design\Plan Set\3. Roadway\CR118_ROW_REMOV02.dgn
PLOTTED: 11/3/2022 1:01:28 PM

11/3/2022

TREY NEAL 106194 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

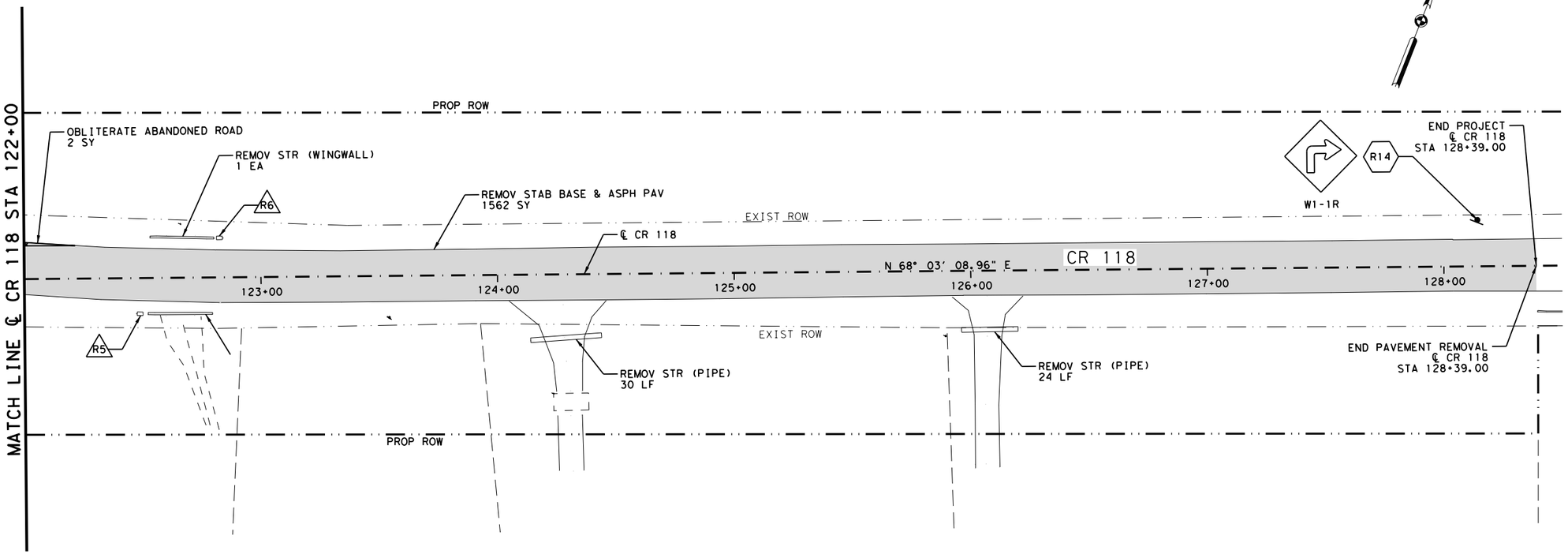
Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

REMOVAL LAYOUT

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		148



LEGEND

- OBLITERATE ABANDONED ROAD
- REMOV STAB BASE & ASPH PAV
- EXISTING SIGN
- R# EXISTING SIGN TO BE REMOVED
- EXISTING OBJECT MARKER
- R# EXISTING OBJECT MARKER TO BE REMOVED

NOTES:

1. REMOVAL OF EXISTING GRAVEL DRIVEWAYS IS SUBSIDIARY TO ITEM 0110 6001 EXCAVATION.

0' 25' 50'

SCALE

11/3/2022

STATE OF TEXAS
TREY NEAL
106194
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

CR 118 AT COTTONWOOD CREEK

REMOVAL LAYOUT

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0914	05	204, ETC.	CR 118
DIST	COUNTY		SHEET NO.
AUS	WILLIAMSON		149

FILENAME: pw:\\kh-pw.bentley.com:kh-pw-01\Documents\01 Active Projects\TX-AUS-069284003 - Williamson County Bridges\DesignData\4 - Design\Plan Set\3. Roadway\CR118_RDW_REMOV03.dgn
PLOTTED: 11/3/2022 1:01:34 PM