CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NUMBER
C 113-2-63
CSJ: 0113-02-063

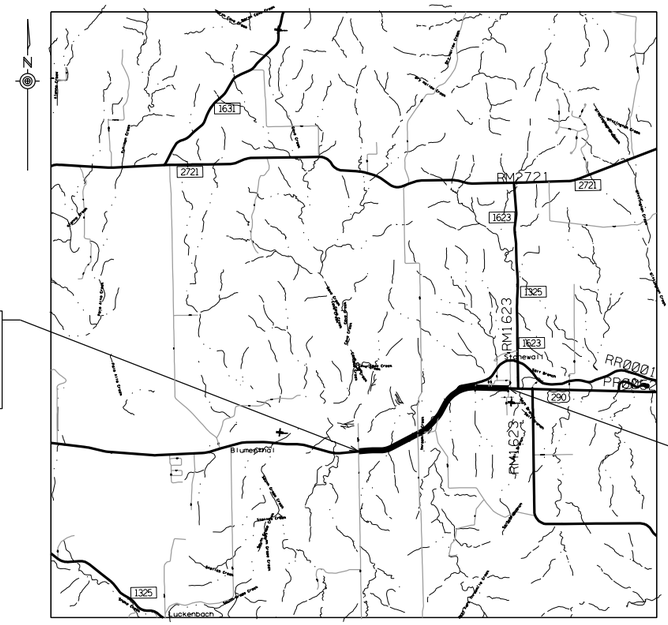
NET LENGTH OF PROJECT = 15,300.00 FEET = 2.898 MILES
- ROADWAY = 15,125.00 FEET = 2.865 MILES
- BRIDGE = 175.00 FEET = 0.033 MILES

GILLESPIE COUNTY
US 290

FROM: JENSCHKE LANE
TO: CEMETERY RD

FOR THE CONSTRUCTION OF INTERSECTION AND OPERATIONAL IMPROVEMENT

CONSISTING OF WIDEN WITH CONTINUOUS LEFT TURN



BEGIN PROJECT
CSJ: 0113-02-063
STA: 474+00.00
REF MRKR:
MILE PT: 11.451
DFO: 52.854

END PROJECT
CSJ: 0113-02-063
STA: 627+00.00
REF MRKR:
MILE PT: 14.345
DFO: 55.748

LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

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: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008).

Texas Department of Transportation

DESIGN SPEED

MAIN LANES: 60 MPH

A.D.T.

2024: 10,511 VPD
2044: 21,020 VPD

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

CONTRACTOR: _____

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. _____ DATE

RECOMMENDED FOR LETTING: 3/31/2023

DocuSigned by: Susana Ceballos P.E.
E1816167B5C7414...
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 3/31/2023

DocuSigned by: Joe Muck
9647B86859014BB...
AREA ENGINEER

APPROVED FOR LETTING: 3/31/2023

DocuSigned by: Heather Ashley-Nguyen
8912AF18F45A416...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

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STATE OF TEXAS
AL SHAWN
132389
LICENSED
PROFESSIONAL ENGINEER

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

DocuSigned by: Al Shawn DB70AAF7BCCE42D... P.E. 3/17/2023 DATE

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

DocuSigned by: Mouness Yacoub P.E. C558EA119EB3496... MO P.E. 3/17/2023 DATE

STATE OF TEXAS
MOUNESS H. YACOUB
91227
PROFESSIONAL ENGINEER

Austin District
Central Design

Texas Department of Transportation

US 290

INDEX OF SHEETS

SHEET 1 OF 1

© 2023		CONT	SECT	JOB	HIGHWAY
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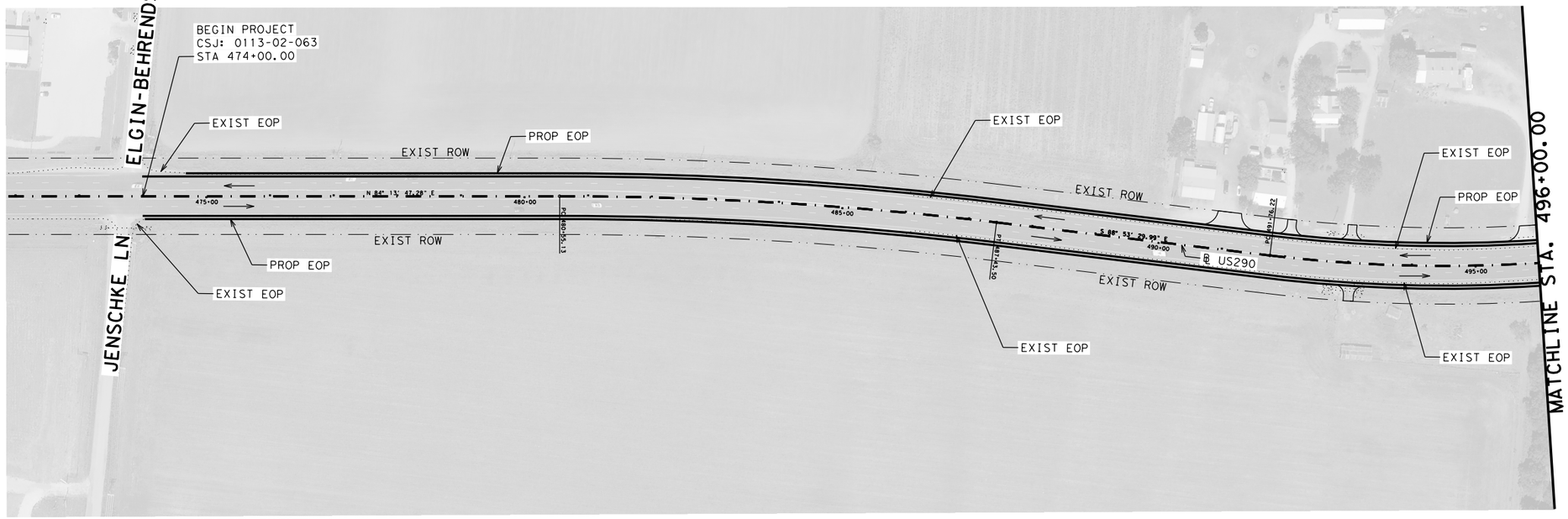

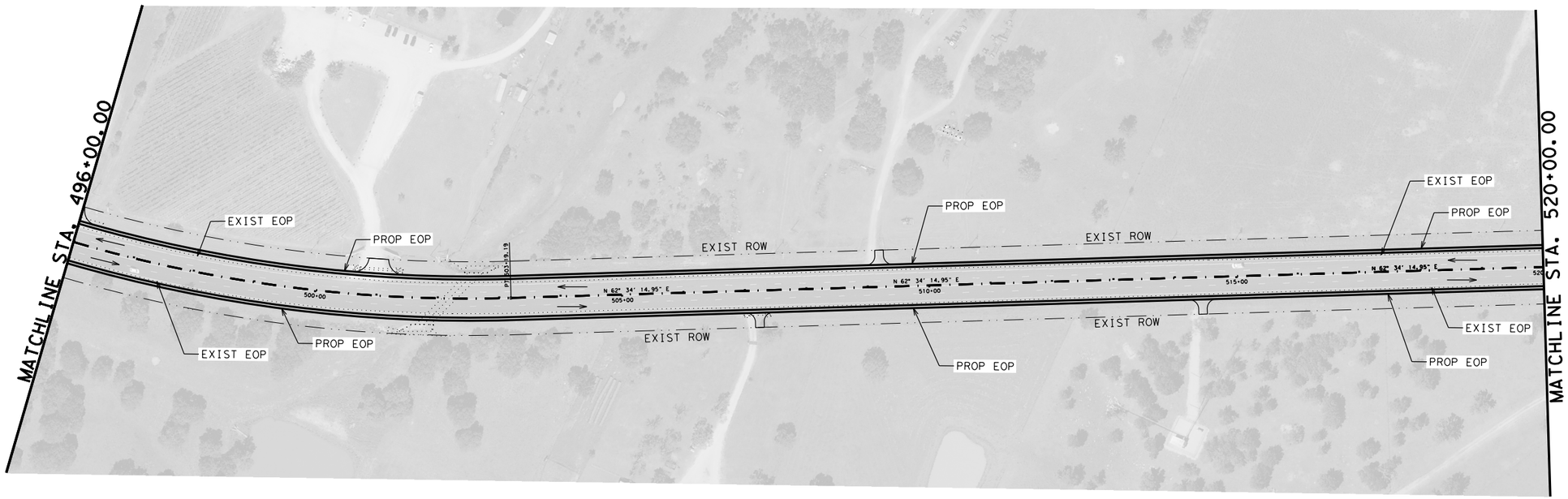

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STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

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Mouness Yacoub P.E.
C558EA119EB3496...

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US 290

PROJECT LAYOUT

SHEET 1 OF 4

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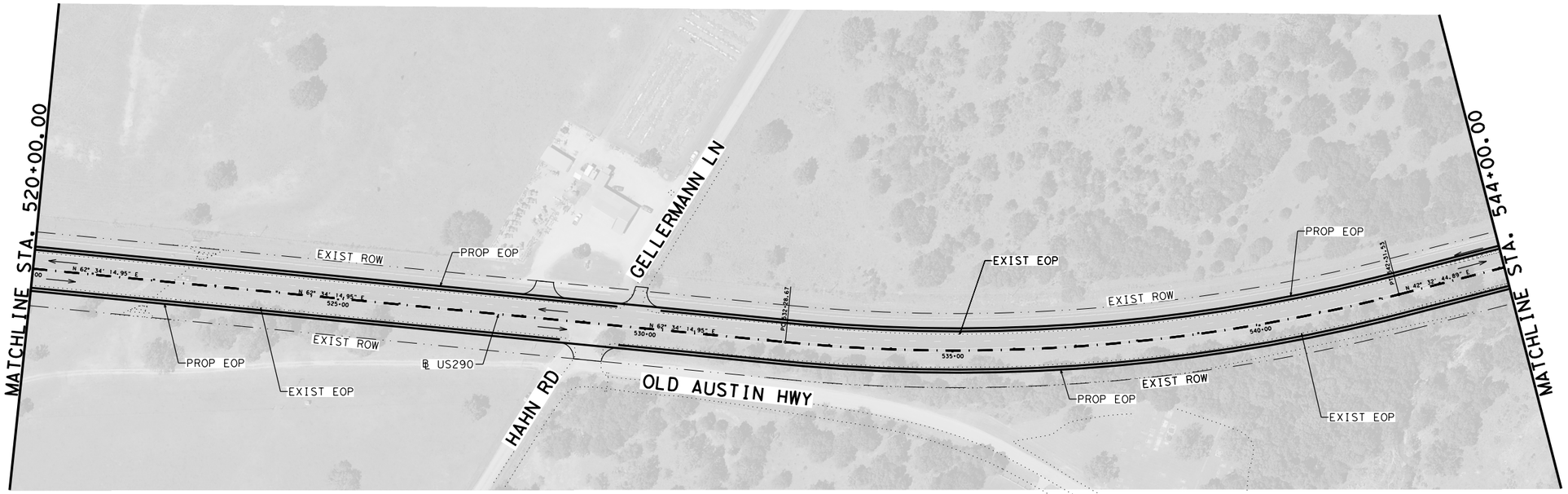

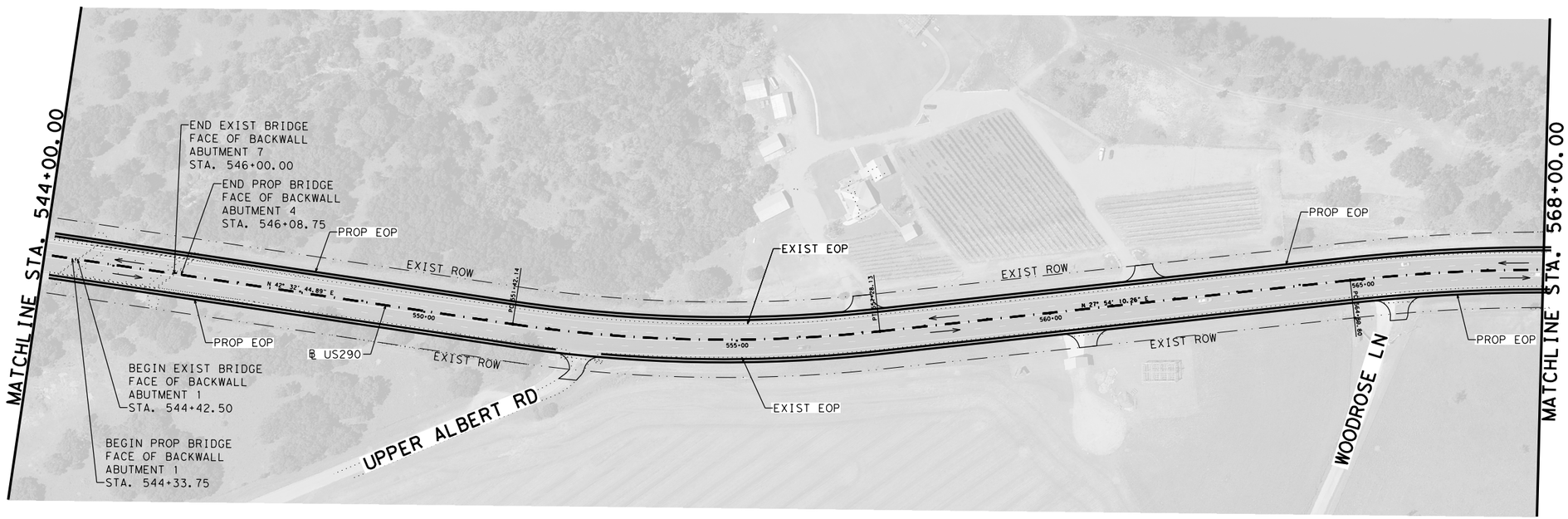

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91227
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PROJECT LAYOUT

SHEET 2 OF 4

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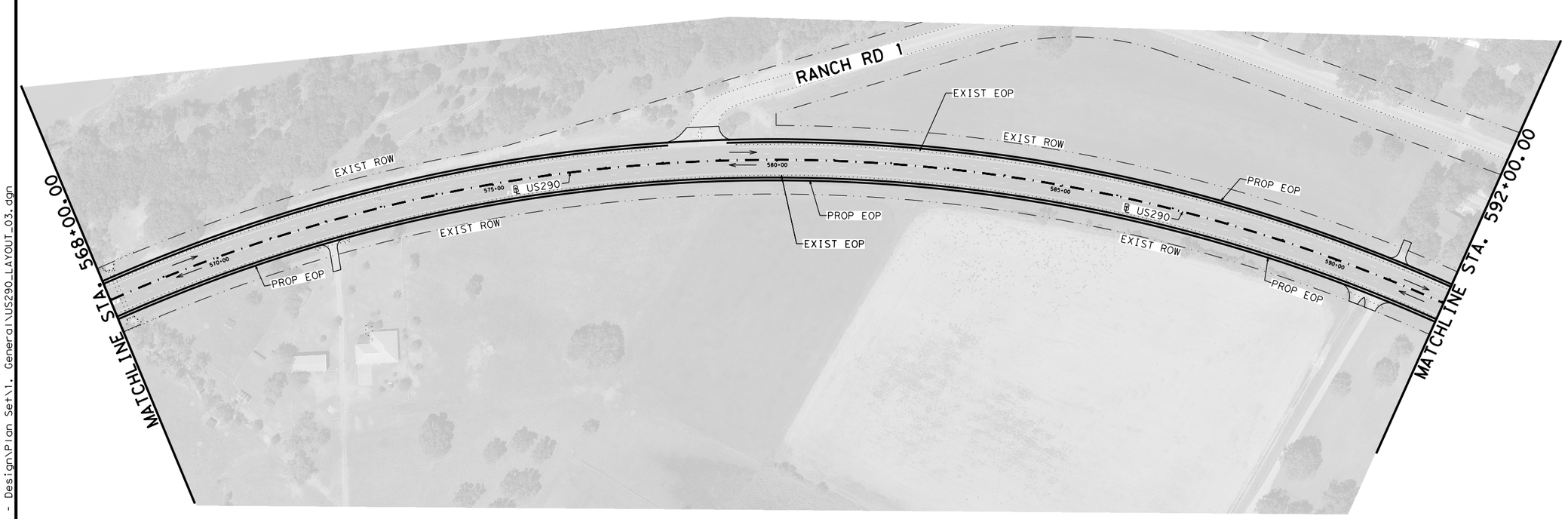

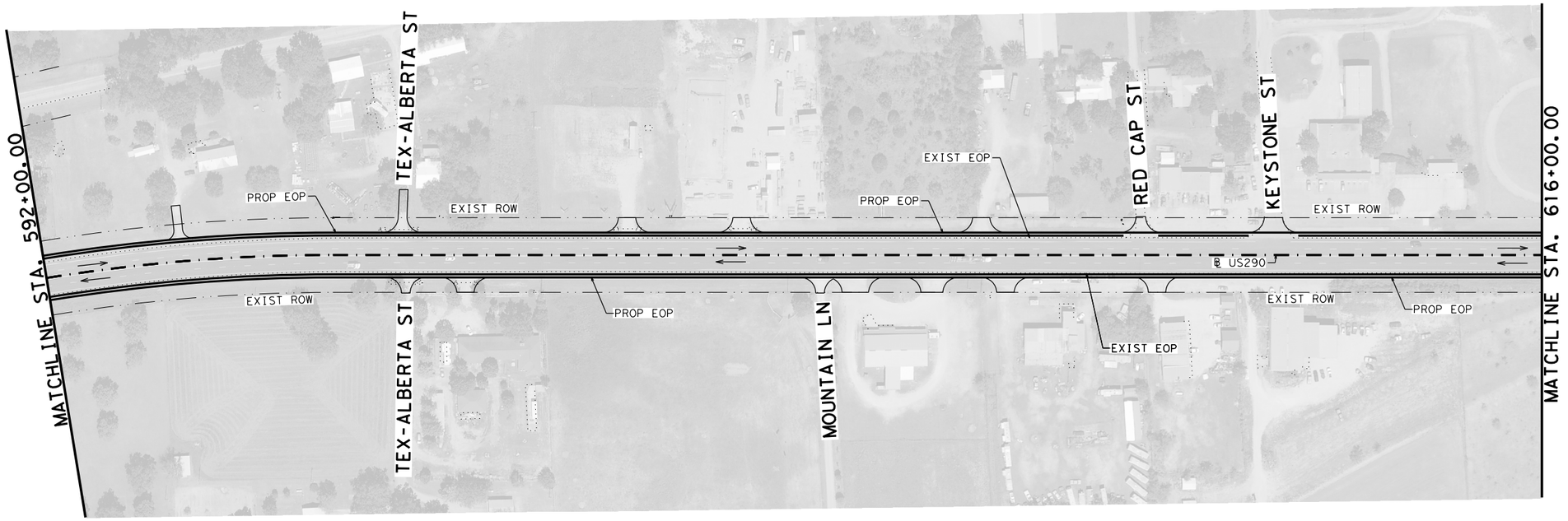

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STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
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PROJECT LAYOUT

SHEET 3 OF 4

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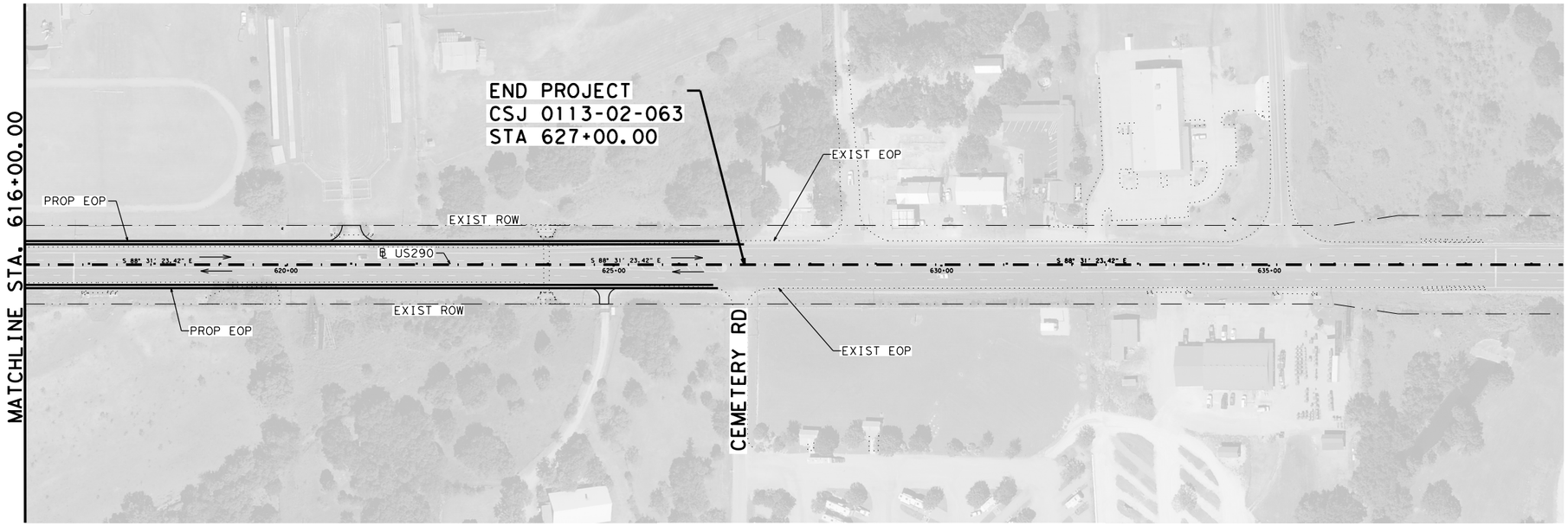

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1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

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Austin District
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Texas Department of Transportation

US 290

PROJECT LAYOUT

SHEET 4 OF 4

© 2023	CONT	SECT	JOB	HIGHWAY
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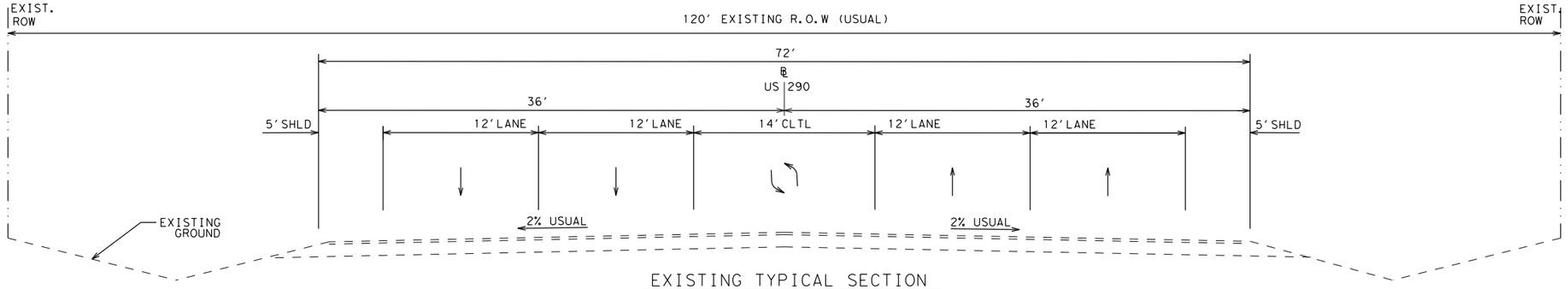
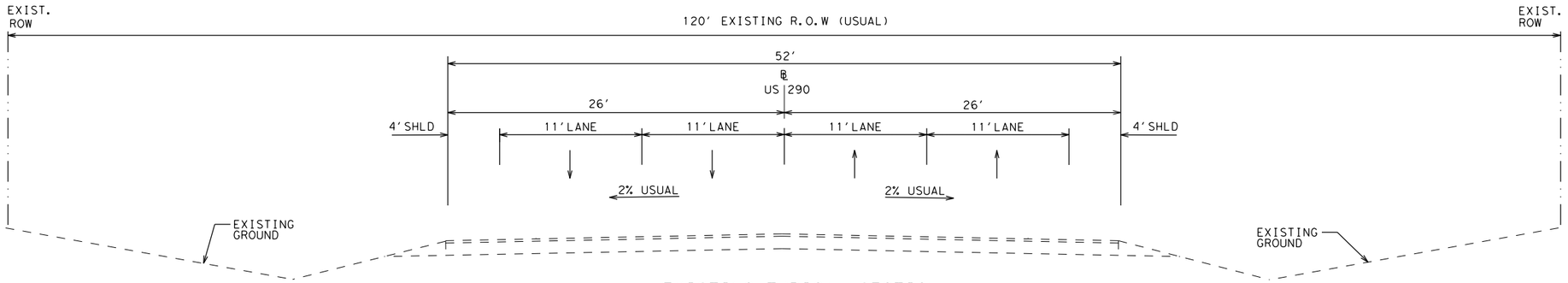


EXISTING TYPICAL SECTION
STA 474+00.00 TO 486+00.00



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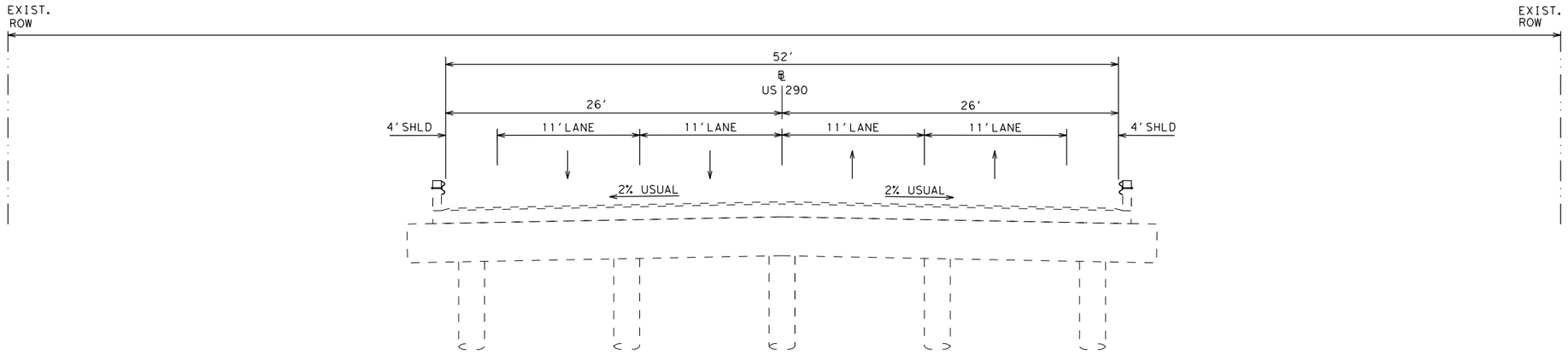
STA 486+00.00 TO 544+42.50
STA 546+00.00 TO 627+00.00
120' EXISTING R.O.W (USUAL)



EXISTING BRIDGE TYPICAL SECTION
STA 544+42.50 TO STA 546+00.00

NOTES:
- MILL OR LEVEL UP AREAS TO MATCH PROPOSED CROSS SLOPE ONLY
- REPAIR PAVEMENT IN LOCATIONS AS DIRECTED BY THE ENGINEER
- HORIZONTAL AND VERTICAL PROFILE IS FOR INFO. SEE THE DESIGNERS GUIDE NOTE ABOUT HORIZONTAL AND VERTICAL PROFILE FOR WIDEN JOB.

STATE OF TEXAS
MOUNESS H. YACOUB
91227
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US 290
EXISTING TYPICAL SECTIONS

SHEET 1 OF 3

© 2023		CONT	SECT	JOB	HIGHWAY
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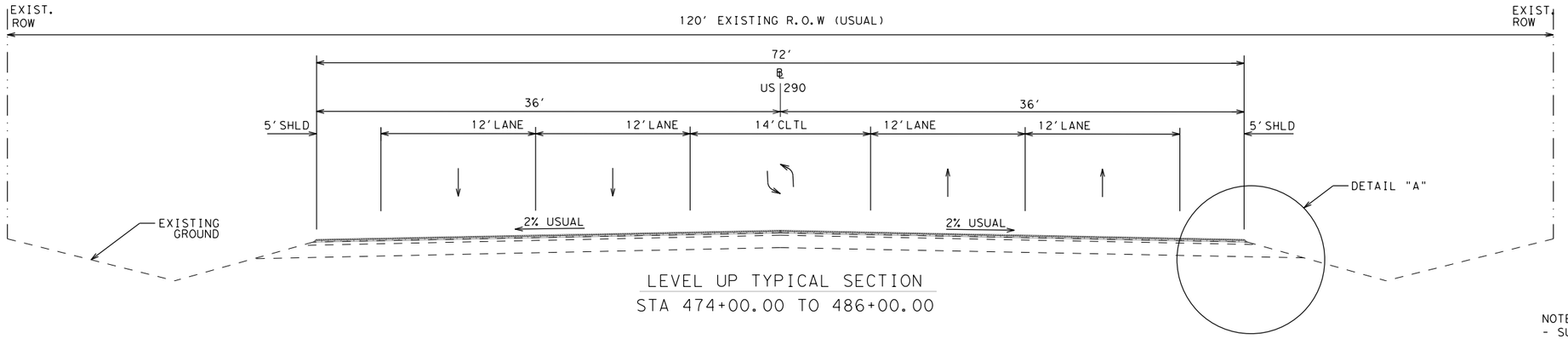

LEVEL UP TYPICAL SECTION
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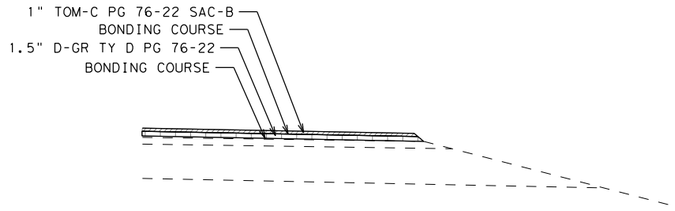

DETAIL A

NOTES:
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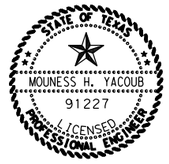
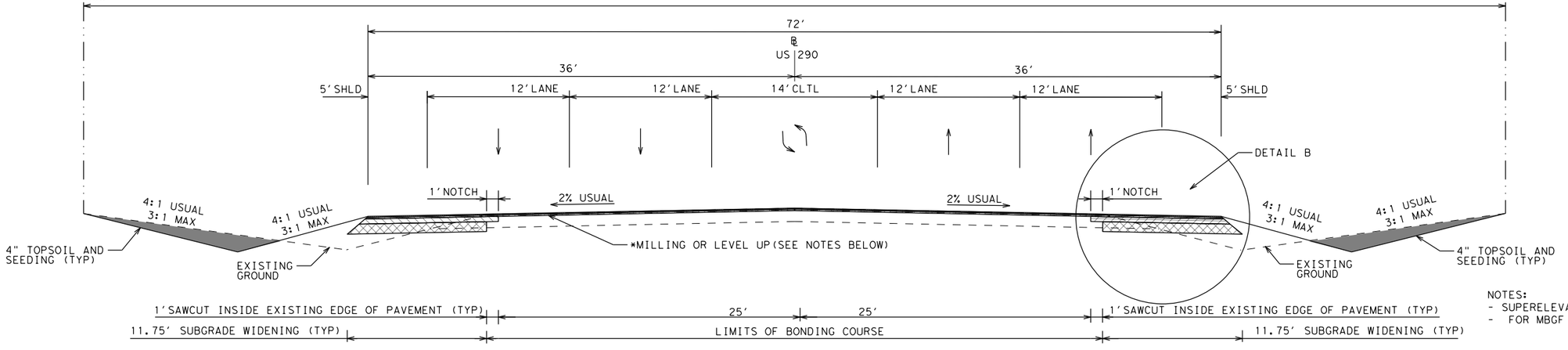
- FOR MBGF SHOWN ON PLAN AND PROFIL SHEETS.





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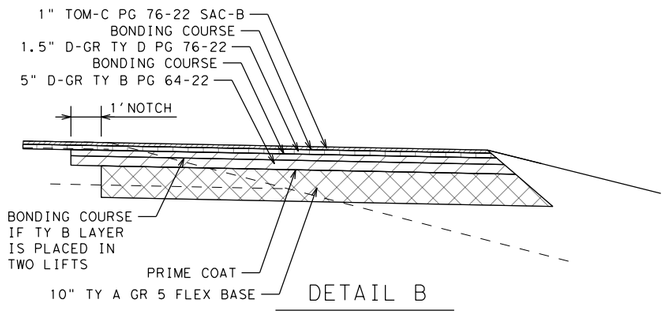
- SUPERELEVATION TRANSITION SHOWN ON SHEET No.54
- FOR MBGF SHOWN ON PLAN AND PROFIL SHEETS.

PROPOSED TYPICAL SECTION
STA 486+00.00 TO STA 541+50.00
STA 548+00.00 TO STA 560+00.00
STA 578+00.00 TO STA 627+00.00

NOTES:
- MILL OR LEVEL UP AREAS TO MATCH PROPOSED CROSS SLOPE ONLY
- REPAIR PAVEMENT IN LOCATIONS AS DIRECTED BY THE ENGINEER
- HORIZONTAL AND VERTICAL PROFILE IS FOR INFO. SEE THE DESIGNERS GUIDE NOTE ABOUT HORIZONTAL AND VERTICAL PROFILE FOR WIDEN JOB.
- EXISTING PAVEMENT STRUCTURE TO REMAIN SHALL BE SCARIFIED AND COMPACTED PRIOR TO PLACE EMBANKMENT OR NEW PAVEMENT STRUCTURE . EXISTING PAVEMENT STRUCTURE SHALL BE REMOVED TO ALLOW FOR PLACEMENT OF ENTIRE PROPOSED PAVEMENT STRUCTURE. THIS WORK IS SUBSIDIARY.



DETAIL B

Austin District
Central Design

Texas Department of Transportation

US 290
PROPOSED TYPICAL SECTIONS

SHEET 2 OF 3

© 2023	CONT	SECT	JOB	HIGHWAY
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	AUS	GILLESPIE		8

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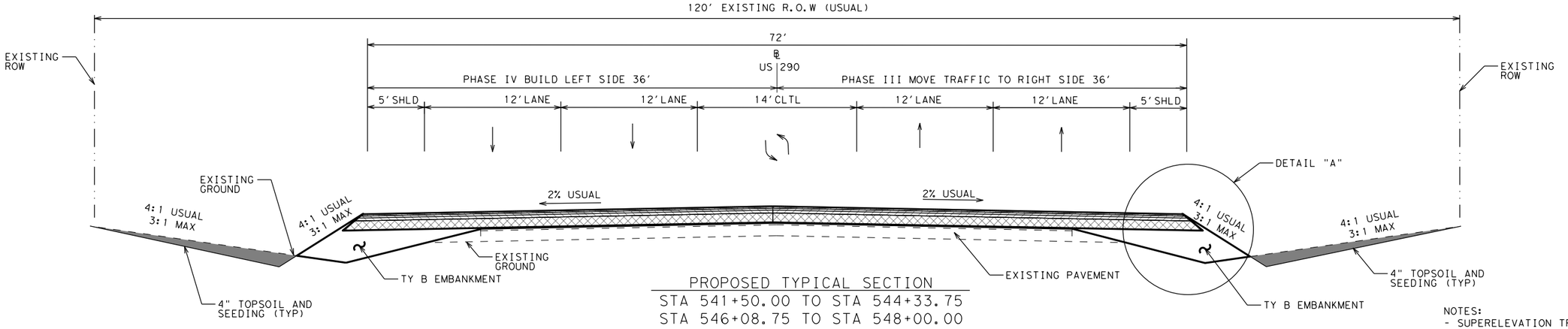

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STA 546+08.75 TO STA 548+00.00

NOTES:
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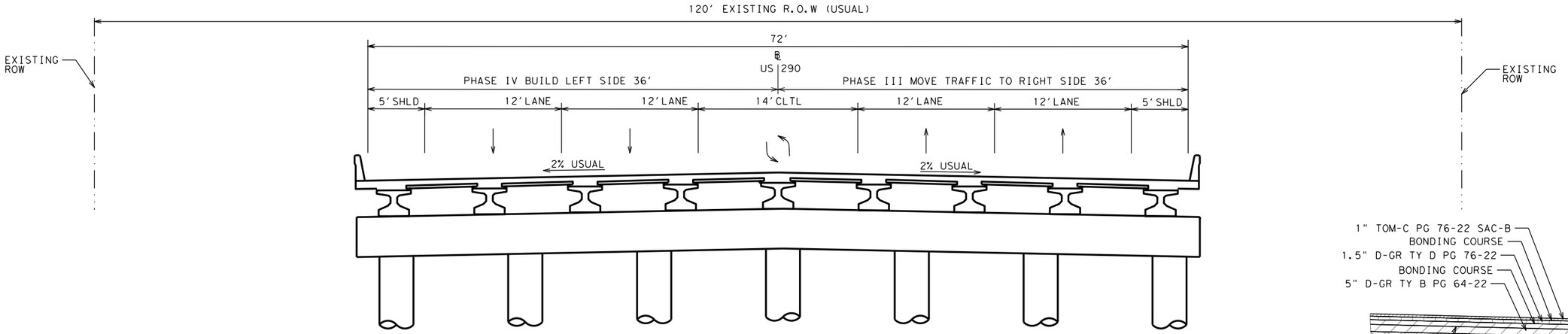
- FOR MBGF SHOWN ON PLAN AND PROFIL SHEETS.



PROPOSED BRIDGE TYPICAL SECTION
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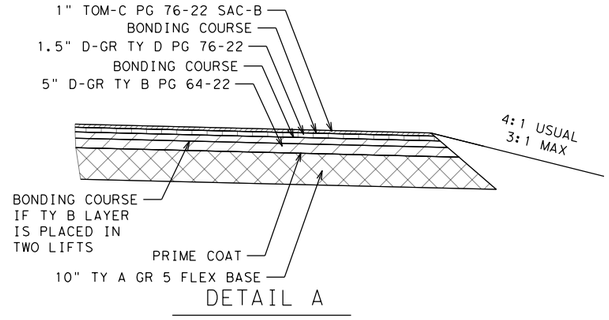

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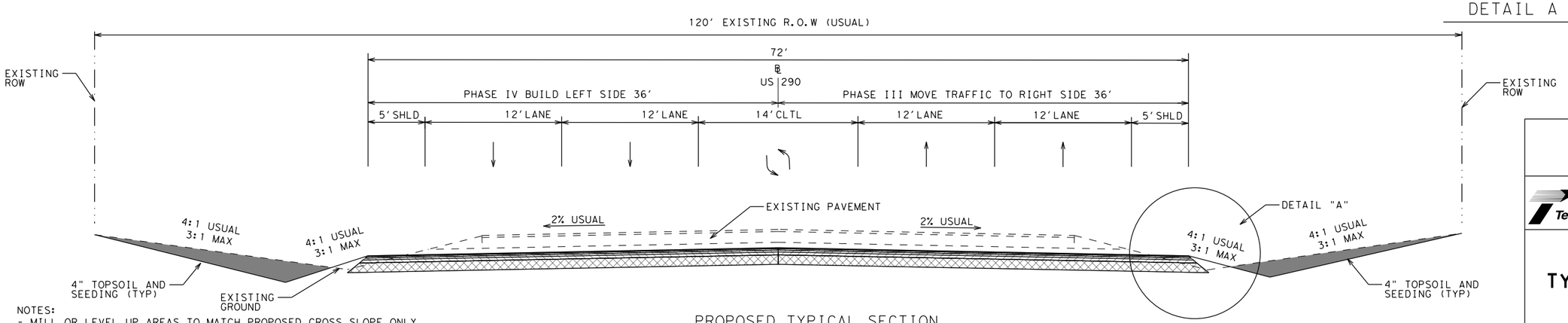

PROPOSED TYPICAL SECTION
STA 560+00.00 TO STA 578+00.00

NOTES:
- MILL OR LEVEL UP AREAS TO MATCH PROPOSED CROSS SLOPE ONLY
- REPAIR PAVEMENT IN LOCATIONS AS DIRECTED BY THE ENGINEER
- HORIZONTAL AND VERTICAL PROFILE IS FOR INFO. SEE THE DESIGNERS GUIDE NOTE ABOUT HORIZONTAL AND VERTICAL PROFILE FOR WIDEN JOB.
- EXISTING PAVEMENT STRUCTURE TO REMAIN SHALL BE SCARIFIED AND COMPACTED PRIOR TO PLACE EMBANKMENT OR NEW PAVEMENT STRUCTURE.EXISTING PAVEMENT STRUCTURE SHALL BE REMOVED TO ALLOW FOR PLACEMENT OF ENTIRE PROPOSED PAVEMENT STRUCTURE.THIS WORK IS SUBSIDIARY.

NOTES:
- SUPERELEVATION TRANSITION SHOWN ON SHEET No. 54
- FOR MBGF SHOWN ON PLAN AND PROFIL SHEETS.

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

Austin District
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US 290
PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

© 2023	CONT	SECT	JOB	HIGHWAY
DS: BB CK: MFH	0113	02	063	US 290
DW: BB CK: MFH	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		9

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GENERAL NOTES: Version: September 9, 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
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
341/3076	**Dense-Graded Hot-Mix Asphalt**	110 LB/SY/IN
342/3079	**Permeable Friction Course (PFC)**	90.0 LB/SY/IN
347/3081	**Thin Overlay Mixtures (TOM)**	
	SAC B	113.0 LB/SY/IN
	SAC A	116.0LB/SY/IN
3084	**Bonding Course**	0.09 GAL/SY
	Tack Coat	0.08 GAL/SY

** For Informational Purposes Only

The following standard detail sheet or sheets have been modified:

Modified Standards
IGEB (MOD)

County: Gillespie
Highway: US 290

Sheet: 10
Control: 0113-02-063

GENERAL
Contractor questions on this project are to be addressed to the following individual(s):
Burnet Area Joe.Muck@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.

ITEM 5 – CONTROL OF THE WORK
Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Precast Alternate Proposals.
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.

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
Burnet Area Joe.Muck@txdot.gov AUS_BU-ShopReview@txdot.gov

Cooperating with Joint Bid Utilities.
The Engineer will designate a utility inspector at the pre-construction meeting. All durations exclude utility owner holidays.

Provide a complete package of information for all resubmittals. Submit each item and individual components of that item under separate cover.

Prior to submitting a RFI, meet and discuss with TxDOT and the utility inspector. Include a proposed solution, existing and proposed line elevations, and redline of proposed changes with the RFI. Make note of adjacent utilities in the RFI if it includes relocation of a line. Submit RFIs via email to TxDOT and the utility inspector.

Complete pre-testing and have the utility inspector verify prior to formal testing and inspection. Submit email to TxDOT and the utility inspector requesting a formal test and inspection 14 calendar days before the test date. Pay retest fees directly to utility owner at current rates.

Submit an email to the utility inspector identifying the lines, valves, location, and date of shut offs or limited service 21 calendar days before for all lines and 60 calendar days before for water lines 24 in. or greater. The utility owner will conduct a test shut off before actual shut off. Do not shut off power or water lines 24 in. or greater between June 1st and August 31st. Provide a verbal notification 7 calendar days and written notification 72 hours before impact to service to all customers.

Provide an electronic pdf of as-builts within 28 calendar days of a line becoming active. Include GPS coordinates of items not installed per original plans including meters, manholes, valves, bends, and fire hydrant locations in the as-builts. Include limits of encasements such as steel and flowable fill. Include final version of RFI's and revised plan sheets.

Alignment and Profile.
Unless shown in the plans, profile and alignment data for roadways being overlaid or widened are for design verification only. Provide survey and construct the roadway in accordance with the typical section. Bid items and data may be provided to adjust cross slope and super elevations.

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.

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.

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.

PSL in Edwards Aquifer Recharge and Contributing Zone.
Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL. TxDOT will coordinate with the necessary agencies. Approval of the PSL is not guaranteed. Un approved PSL is not a compensable impact.

Work within a USACE Jurisdictional Area.
Do not initiate activities within a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Obtain written approval from the Engineer for activities not specifically addressed in the plans. Provide a signed sketch and description 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. Un approved work is not a compensable impact.

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.

Law Enforcement Personnel.
Submit charge summary and invoices using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

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.

ITEM 8 – PROSECUTION AND PROGRESS
Working days will be charged in accordance with 8.3.1.4, "Standard Workweek."

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 134 - BACKFILLING PAVEMENT EDGES
If seal coat is final surface, install backfill prior to placing seal coat.

For all backfill, compact using a light pneumatic roller, install at 3:1 slope to tie into existing terrain, and apply at rate of 0.12 GAL/SY a typical erosion control material per Item 300.

For TY A backfill, furnish flexible base meeting the requirement for any type or grade, except Grade 4, in accordance with Item 247. Compressive strengths and wet ball mill for flexible base are waived for this item. Alternate materials include RAP, salvaged material from Item 105, and salvaged material from Item 351. The alternate materials are not required to be tested but visually verified as 100% passing a 2.5 in. sieve.

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 204 – SPRINKLING
Apply water for dust control as directed. When dust control is not being maintained, cease operations until dust control is maintained. Consider subsidiary to the pertinent Items.

ITEM 216 - PROOF ROLLING
Correct and perform "Proof Rolling" retest at the Contractor's expense, to the satisfaction of the Engineer, when initial "Proof Rolling" yields a failing result.

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.

ITEM 300s – SURFACE COURSES AND PAVEMENTS

Asphalt season is May 1 thru September 15. Emulsified Asphalt season is April 1 thru October 15. The latest work start date for asphalt season is August 1.

If an under seal is not provided, furnish a tack coat. Apply tack coat at 0.08 GAL/SY (residual). Apply non-tracking tack coat using manufacturer recommend rates.

ITEM 310 – PRIME COAT
Apply blotter material to all driveways and intersections. This work is subsidiary.

When Multi Option is allowed, provide MC 30, EC 30 or AE-P. MC 30 is not allowed in Travis County.

Rolling to ensure penetration is required.

ITEM 314 - EMULSIFIED ASPHALT TREATMENT
Process the top 1.5 inches of base material. Use 30% of total volume emulsified asphalt in the mixture.

Use emulsified asphalt, AEP or equal, for dust control. This work is subsidiary.

ITEM 316 – SEAL COAT
Ensure that all underseals are covered by HMACP before exposing to traffic for roadways listed in Table 1 of Item 502 or ADT greater than 5,000.

Aggregates (Multi Option) for seal coats not exposed to traffic and underseals shall be Type E, PA, PB, A or B. The Grade shall range between 4 and 5.

Use a medium pneumatic roller in accordance with Item 210.

Surface all transitions, tapers, climbing lanes and intersections to the limits as directed.

Remove and dispose of off the ROW the audible/profile markings, reflectorized markings, and raised markers. Blade pavement edges to remove vegetation. Any areas with excessive asphalt or aggregate will be removed. Continue sweeping excess aggregate off the roadway, riprap, and shoulder up to two weeks after completing the work. This work is subsidiary.

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.

ITEMS 347/3081 - THIN OVERLAY MIXTURES (TOM)
For SAC A, blending SAC B aggregate with an RSSM greater than the SAC A rating or 10, whichever is greater, is prohibited.

When using a Thermal Imaging System follow the Weather Condition requirements for When Not Using a Thermal Imaging System.

Produce mixture with a Department approved WMA additive or process to facilitate compaction when the haul distance is greater than 40 miles or when the air temperature is 70°F and falling. WMA processes such as water or foaming processes are not allowed under these circumstances.

ITEM 351 – FLEXIBLE PAVEMENT STRUCTURE REPAIR
Use materials and lift thickness per SS3076. Type C and D mixes will receive an underseal per SS 3085 if the repair surface is the final surface. This work is subsidiary.

Unless otherwise shown on the plans, use the following for repairs:
Type C and D mix will use PG 76 -22 and will be placed with a paver.
Type B mix will use PG 64 -22 and may use a blade to place the mix.
For up to 2 in. deep repairs use Type D PG 76-22 SAC B.
For up to 6 in. deep repairs use Type C PG 76-22 SAC B.
For greater than 6 in. deep repairs use 2 in. Type C or D surface and Type B for the bottom lifts.
For greater than 6 in. deep repairs will be milled then overlaid, adjust the depth of the Type C or D to provide Type C or D to a depth 1.5 in. below the bottom of the milling.

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 work day.

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.

TxDOT Concrete Curb and Curb and Gutter standard. Reinforcement will be No. 3 or No. 4 bars placed in accordance with concrete riprap Item 432.3.1.

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.

For Header-Type Expansion Joints, go to the following TxDOT website for approved systems:
https://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/polyconc.pdf

For Asphalt-Plug Expansion Joints, go to the following TxDOT website for approved systems:
https://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/jtsealrs.pdf

ITEM 466 - HEADWALLS AND WINGWALLS

Remove all loose formwork and materials from the waterway at the end of each work week or prior to a rain event. Debris that falls into the waterway must be removed at the end of each work day. 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.

ITEM 467 - SAFETY END TREATMENT

Field adjust pipe end to maintain the necessary slope. Field cutting of pipe end is allowed. Coat all metal field cuts or exposed reinforcement with asphalt paint.

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
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
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 3 (Mobile Operations)

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

Closures allowed from sunrise to sunset. 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.

Cover, relocate or remove existing signs that conflict with traffic control. 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. 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 traffic control, if at any time the queue becomes greater than 20 minutes. Have a contingency plan of how modification will occur. Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.
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 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.

ITEM 512 – PORTABLE TRAFFIC BARRIER
Designated source barrier stockpile locations: SH 45 just west of US 183 South, SH 130 @ Harold Green, or SH 130 @ Greg Manor Rd. Upon completion of the project, designated source PTB deemed unsalvageable by the Engineer will become the property of the contractor and paid for removal using Item 104. Connection hardware is NOT available for designated source, furnish and retain all hardware to install the PTB.

In lieu of a crash cushion, place 25:1 Class C concrete transition where concrete PTB terminates adjacent to existing concrete barrier. Installation and removal will be paid using existing Item 512 bid items.

If bid item allows concrete or steel, the steel barrier must provide a maximum deflection of 2 ft. 3 in. Pinning and other work to obtain the required deflection is subsidiary.

Any increase in temporary barrier quantities that occur due to Contractor changes in the sequence of work or the traffic control plan will not be paid.

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.

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.

ITEMS 600s & 6000s – ITS, LIGHTING, SIGNING, MARKINGS, AND SIGNALS
Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Contractor shall provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

For signal shop contact Charles Vaughn Jr (Charles.Vaughn@txdot.gov) and Douglas Turner (Douglas.L.Turner@txdot.gov).

Use the TxDOT provided form to submit an electrical, illumination, and signal checklist prior to request for signal activation or a punch list.

Provide a 7 day advance email notice to the Engineer to request illumination or traffic signal punch list inspection.
Provide a 14 day advance email notice to the Engineer with signal technician contact information and signal locations prior to working or assuming operations of illumination or traffic signal.
Provide a 60 day advance email notice to the Engineer to request signal timing if timing is not provided in the plans.

Provide a 180 day advance email notice to the Engineer for equipment to be provided by TxDOT. Provide equipment that requires TxDOT programming, etc. to TxDOT 180 day in advance.

Prior to relief of maintenance, a Test Period is required for signals and ITS equipment in accordance with Item 680.3.1.8. Response time to reported trouble calls shall be less than 2 hours. Complete repairs within 24 hours. Notify the Engineer and maintain a logbook in the controller cabinet of each trouble call. Do not clear the error log in the conflict monitor without approval. Maintain the existing ITS equipment and HUB buildings operational during construction. ITS downtime is allowed from 12A to 4A. Downtime is restricted to one time per HUB or equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

Stakes or other physical method shall be installed to hold down conduit prior to placement of concrete/flow fill encasement.

Minimum distance between HDPE joints will be 200 ft.

For conduit mounted to bridges in hangers, fiberglass can be substituted for RMC. Furnish and install per Special Specification 6390.

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 662 - WORK ZONE PAVEMENT MARKINGS
Notify the Engineer at least 24 hours in advance of work for this item.

Maintain removable and short-term markings daily. Remove within 48 hours after permanent striping has been completed.

Item 668 is not allowed for use as Item 662.

Roadways with existing profile pavement markings or rumble strips must supplement work zone solid lines with traffic buttons spaced at 12 in. Traffic buttons used to supplement the work zone markings will be paid by the each in addition to the work zone item.

ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS
Notify the Engineer at least 24 hr. before beginning work.

Place longitudinal markings no later than 7 calendar days after placement of the surface for roadways with AADT greater than 20,000.

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 685 – ROADSIDE FLASHING BEACON ASSEMBLIES
Installation includes all components in the assembly, signs, signal heads, and conductors in the foundation and within 6 in. of the foundation to provide a fully operational assembly.

Test period for the assembly shall be in accordance with item 680.3.1.8.

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 3084 – BONDING COURSE
The minimum application rates are listed in Table BC. Miscellaneous Tack is allowed for use with dense-graded Type B HMA. If a tack bid item is not provided, use bonding course item.

The target shear bond strengths are listed in Table BCS. 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 BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Emulsified Asphalt	0.06
TRAIL – Hot Asphalt	0.12
Spray Applied Underseal Membrane	0.10

Table BCS (For Informational Tests)

Material	Target Shear Bond Strength (Tex-249-F psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Provide 2 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”.

of the roadway, relocation is subsidiary.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0113-02-063 **DISTRICT** Austin **COUNTY** Gillespie
HIGHWAY US 290

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0113-02-063**			
		PROJECT ID		**A00061953**			
		COUNTY		**Gillespie**			
		HIGHWAY		**US 290**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	153.000		153.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	227.000		227.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	11,168.000		11,168.000	
	110-6001	EXCAVATION (ROADWAY)	CY	26,961.000		26,961.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	11,974.000		11,974.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	59,500.000		59,500.000	
	164-6033	DRILL SEEDING (PERM) (RURAL) (SANDY)	SY	59,500.000		59,500.000	
	164-6041	DRILL SEEDING (TEMP) (WARM)	SY	29,750.000		29,750.000	
	164-6043	DRILL SEEDING (TEMP) (COOL)	SY	29,750.000		29,750.000	
	168-6001	VEGETATIVE WATERING	MG	3,000.000		3,000.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	59,500.000		59,500.000	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	12,983.000		12,983.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL	8,896.000		8,896.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	2,776.900		2,776.900	
	354-6004	PLAN & TEXT ASPH CONC PAV(0" TO 4")	SY	2,100.000		2,100.000	
	400-6005	CEM STABIL BKFL	CY	406.000		406.000	
	401-6001	FLOWABLE BACKFILL	CY	13.500		13.500	
	403-6001	TEMPORARY SPL SHORING	SF	1,015.000		1,015.000	
	416-6001	DRILL SHAFT (18 IN)	LF	200.000		200.000	
	416-6004	DRILL SHAFT (36 IN)	LF	1,390.000		1,390.000	
	420-6013	CL C CONC (ABUT)	CY	108.100		108.100	
	420-6029	CL C CONC (CAP)	CY	102.200		102.200	
	420-6037	CL C CONC (COLUMN)	CY	36.600		36.600	
	422-6001	REINF CONC SLAB	SF	12,950.000		12,950.000	
	422-6015	APPROACH SLAB	CY	319.000		319.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	1,710.500		1,710.500	
	432-6002	RIPRAP (CONC)(5 IN)	CY	506.000		506.000	
	432-6006	RIPRAP (CONC)(CL B)	CY	123.500		123.500	
	432-6016	RIPRAP (STONE TY R)(DRY)(12 IN)	CY	12.000		12.000	
	432-6025	RIRRAP (STONE COMMON)(DRY)(15 IN)	CY	135.600		135.600	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	1,096.000		1,096.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	81.600		81.600	
	450-6023	RAIL (TY SSTR)	LF	422.000		422.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	201.000		201.000	
	462-6057	CONC BOX CULV (6 FT X 6 FT)(EXTEND)	LF	28.000		28.000	
	462-6065	CONC BOX CULV (8 FT X 6 FT)(EXTEND)	LF	72.000		72.000	
	464-6017	RC PIPE (CL IV)(18 IN)	LF	1,412.000		1,412.000	

Estimate & Quantity Sheet

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			HIGHWAY		**US 290**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	464-6018	RC PIPE (CL IV)(24 IN)		LF	176.000		176.000	
	466-6183	WINGWALL (PW - 1) (HW=8 FT)		EA	7.000		7.000	
	467-6347	SET (TY II) (18 IN) (CMP) (6: 1) (C)		EA	80.000		80.000	
	467-6379	SET (TY II) (24 IN) (CMP) (6: 1) (C)		EA	10.000		10.000	
	496-6004	REMOV STR (SET)		EA	24.000		24.000	
	496-6005	REMOV STR (WINGWALL)		EA	7.000		7.000	
	496-6006	REMOV STR (HEADWALL)		EA	7.000		7.000	
	496-6007	REMOV STR (PIPE)		LF	809.000		809.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)		EA	1.000		1.000	
	500-6001	MOBILIZATION		LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	13.000		13.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)		LF	200.000		200.000	
	506-6004	ROCK FILTER DAMS (INSTALL) (TY 4)		LF	200.000		200.000	
	506-6030	BACKHOE WORK (EROSION & SEDMT CONT)		HR	80.000		80.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	9,800.000		9,800.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	9,800.000		9,800.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")		LF	9,800.000		9,800.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	9,800.000		9,800.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)		LF	2,520.000		2,520.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)		LF	2,520.000		2,520.000	
	512-6037	PORT CTB (STKPL)(SGL SLP)(TY 1)		LF	2,520.000		2,520.000	
	530-6010	INTRSCT, DRVWAYS, & TURNOUT (CONC)		SY	104.000		104.000	
	530-6011	INTRSCT, DRVWAYS, & TURNOUT (ACP)		SY	3,920.400		3,920.400	
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF	3,719.000		3,719.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA	4.000		4.000	
	540-6014	SHORT RADIUS		LF	66.000		66.000	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION		EA	2.000		2.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)		LF	40.000		40.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)		EA	5.000		5.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	450.000		450.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	26.000		26.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	4.000		4.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)		EA	4.000		4.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)		EA	4.000		4.000	
	545-6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)		EA	4.000		4.000	
	552-6003	WIRE FENCE (TY C)		LF	1,075.000		1,075.000	
	560-6002	MAILBOX INSTALL-D (TWG-POST) TY 1		EA	1.000		1.000	

Estimate & Quantity Sheet

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		HIGHWAY		**US 290**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA	7.000		7.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	6.000		6.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	31.000		31.000	
	644-6005	IN SM RD SN SUP&AM TY10BWG(1)SA(T-2EXT)	EA	2.000		2.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	3.000		3.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	1.000		1.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2.000		2.000	
	644-6031	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	EA	4.000		4.000	
	644-6037	IN SM RD SN SUP&AM TYS80(1)SA(U-WC)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	93.000		93.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	35.000		35.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	30,600.000		30,600.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	30,600.000		30,600.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	30,600.000		30,600.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	30,600.000		30,600.000	
	662-6093	WK ZN PAV MRK REMOV (Y)4"(BRK)	LF	30,600.000		30,600.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	31,260.000		31,260.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	225.000		225.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	30,045.000		30,045.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	225.000		225.000	
	666-6208	REFL PAV MRK TY II (Y) 6" (BRK)	LF	7,500.000		7,500.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	29,788.000		29,788.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	7,650.000		7,650.000	
	666-6324	RE PM W/RET REQ TY II (W) 6" (BRK)	LF	7,650.000		7,650.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	30,045.000		30,045.000	
	666-6346	REF PROF PAV MRK TY I(Y)6"(BRK)(100MIL)	LF	7,500.000		7,500.000	
	666-6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	9,788.000		9,788.000	
	672-6007	REFL PAV MRKR TY I-C	EA	383.000		383.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	766.000		766.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	38,500.000		38,500.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	3.000		3.000	
	685-6006	REMOV RDSD FLSH BCN AM (SOLAR PWRD)	EA	3.000		3.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON	14,351.000		14,351.000	
	3076-6048	D-GR HMA TY-D PG76-22	TON	6,853.000		6,853.000	
	3076-6051	D-GR HMA TY-D PG76-22 (LEVEL-UP)	TON	6,206.000		6,206.000	
	3081-6008	TOM-C PG76-22 SAC-B	TON	6,800.000		6,800.000	
	3084-6001	BONDING COURSE	GAL	37,034.000		37,034.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0113-02-063 **DISTRICT** Austin **COUNTY** Gillespie
HIGHWAY US 290

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0113-02-063**			
		PROJECT ID		**A00061953**			
		COUNTY		**Gillespie**			
		HIGHWAY		**US 290**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	120.000		120.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	120.000		120.000	
	7251-6001	Subsurface Util Locate (Outside Rdbed)	EA	44.000		44.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LEAD ABATEMENT (NON-PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF ROADWAY ITEMS

LOCATION	110 6001 EXCAVATION (ROADWAY)	132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	247 6366 FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS)	310 6001 PRIME COAT (MULTI OPTION)	351 6002 FLEXIBLE PAVEMENT STRUCTURE REPAIR (6")	354 6004 PLAN & TEXT ASPH CONC PAV (0" TO 4")	401 6001 FLOWABLE BACKFILL	432 6006 RIPRAP (CONC) (CL B)	530 6010 INTRSCT, DRVWAYS, & TURNOUT (CONC)	530 6011 INTRSCT, DRVWAYS, & TURNOUT (ACP)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 6014 SHORT RADIUS
	CY	CY	CY	GAL	SY	SY	CY	CY	SY	SY	LF	EA	LF
P&P SHEET 1 OF 13	324	192	0										
P&P SHEET 2 OF 13	1476	985	730	517						389.6			
P&P SHEET 3 OF 13	1941	1178	832	681			3	26.5		163	560		
P&P SHEET 4 OF 13	1507	358	824	598			0.5	5		106.6	70		
P&P SHEET 5 OF 13	1367	804	825	612			2	20.5		352	355		
P&P SHEET 6 OF 13	2924	1577	1234	909		1200	1	10.5			900	1	
P&P SHEET 7 OF 13	1044	1369	817	783		300	1.5	11		137	600	3	
P&P SHEET 8 OF 13	3300	1027	2155	984			1	10	104	352.6	194		
P&P SHEET 9 OF 13	7745	386	2358	1675		600	1.5	16		299	640		66
P&P SHEET 10 OF 13	658	887	834	604						255			
P&P SHEET 11 OF 13	1029	1088	829	570						592.6			
P&P SHEET 12 OF 13	2042	207	824	515						1121			
P&P SHEET 13 OF 13	1604	1916	721	448			3	24		152	400		
					2776.9								
PROJECT TOTALS	**26961**	**11974**	**12983**	**8896**	**2776.9**	**2100**	**13.5**	**123.5**	**104**	**3920.4**	**3719**	**4**	**66**

SUMMARY OF ROADWAY ITEMS

LOCATION	540 6015 DRIVEWAY TERMINAL ANCHOR SECTION	540 6020 MTL W - BEAM GD FEN (LOW FILL CULVERT)	540 6033 MTL BM GD FEN (LONG SPAN SYSTEM)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	552 6003 WIRE FENCE (TY C)	560 6002 MAILBOX INSTALL-D (TWG-POST) TY 1	560 6003 MAILBOX INSTALL-M (TWG-POST) TY 1	3076 6001 D-GR HMA TY-B PG64-22	3076 6048 D-GR HMA TY-D PG76-22	3076 6051 D-GR HMA TY-D PG76-22 (LEVEL-UP)	3081 6008 TOM-C PG76-22 SAC-B	3084 6001 BONDING COURSE	7251 6001 SUBSURFACE UTIL LOCATE (OUTSIDE RDBED)
	EA	LF	EA	EA	LF	EA	EA	TON	TON	TON	TON	GAL	EA
P&P SHEET 1 OF 13								668	0	394	456	2240	
P&P SHEET 2 OF 13							1	1008	414	454	550	2884	5
P&P SHEET 3 OF 13		40		4	210			1017	432	183	548	2923	2
P&P SHEET 4 OF 13				1			1	1009	427	216	545	2923	2
P&P SHEET 5 OF 13			2	3	160			1010	428	205	545	2923	1
P&P SHEET 6 OF 13				5				1180	674	420	549	2923	
P&P SHEET 7 OF 13				3	65			942	468	411	434	2923	1
P&P SHEET 8 OF 13				2			1	1944	1057	334	550	2923	4
P&P SHEET 9 OF 13	2		1	4	500			1567	1253	212	550	2923	2
P&P SHEET 10 OF 13								1020	434	1719	550	2923	3
P&P SHEET 11 OF 13							1	1014	431	1274	547	2923	5
P&P SHEET 12 OF 13						1	3	1009	427	309	499	2923	7
P&P SHEET 13 OF 13			2	4	140			963	408	75	477	2680	12
PROJECT TOTALS	**2**	**40**	**5**	**26**	**1075**	**1**	**7**	**14351**	**6853**	**6206**	**6800**	**37034**	**44**

SUMMARY OF REMOVAL ITEMS

LOCATION	100 6002 PREPARING ROW	104 6009 REMOVING CONC (RIPRAP)	105 6011 REMOVING STAB BASE AND ASPH PAV (2"-6")	496 6004 REMOV STR (SET)	496 6005 REMOV STR (WINGWALL)	496 6006 REMOV STR (HEADWALL)	496 6007 REMOV STR (PIPE)	496 6010 REMOV STR (BRIDGE 100 - 499 FT LENGTH)	542 6001 REMOVE METAL BEAM GUARD FENCE	544 6003 GUARDRAIL END TREATMENT (REMOVE)	644 6076 REMOVE SM RD SN SUP&AM
	STA	SY	SY	EA	EA	EA	LF	EA	LF	EA	EA
P&P SHEET 1 OF 7	22		222	4			157				6
P&P SHEET 2 OF 7	24	102	534	4	2	2	183				
P&P SHEET 3 OF 7	24	44	534		2	2			150	2	3
P&P SHEET 4 OF 7	24		2773	6			123	1	300	2	7
P&P SHEET 5 OF 7	24	28	6338		1	1	102				20
P&P SHEET 6 OF 7	24		534	6			167				7
P&P SHEET 7 OF 7	11	53	233	4	2	2	77				
PROJECT TOTALS	**153**	**227**	**11168**	**24**	**7**	**7**	**809**	**1**	**450**	**4**	**43**

Austin District
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US 290 QUANTITY SUMMARY

SHEET 1 OF 3

DSI: BB	CK: MFH	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		14

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SUMMARY OF BRIDGE = 1 ITEMS NBI: 140870011302514

LOCATION	400 6005	403 6001	416 6001	416 6004	420 6013	420 6029	420 6037	422 6001	422 6015	425 6035	432 6033	450 6023	454 6018
	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY SSTR)	SEALED EXPANSION JOINT (4 IN) (SE - M)
	CY	SF	LF	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF
	406	800	200	1390	108.1	102.2	36.6	12950	319	1710.5	1095	422	201
PROJECT TOTALS	**406**	**800**	**200**	**1390**	**108.1**	**102.2**	**36.6**	**12950**	**319**	**1710.5**	**1095**	**422**	**201**

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6048	666 6306	666 6346	666 6347	666 6343	672 6007	672 6009	666 6174	666 6210	666 6182	666 6208	666 6324
	REFL PAV MRK TY I (W)24"(SLD)(100 MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	REF PROF PAV MRK TY I(Y)6"(BRK)(100 MIL)	REF PROF PAV MRK TY I(Y)6"(SLD)(100 MIL)	REF PROF PAV MRK TY I(W)6"(SLD)(100 MIL)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (Y) 6" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (Y) 6" (BRK)	RE PM W/RET REQ TY II (W) 6" (BRK)
	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF
P&P SHEET 1 OF 7		1100	1100	4400	4400	55	110	4400	4400		1100	1100
P&P SHEET 2 OF 7		1200	1200	4800	4800	60	120	4800	4800		1200	1200
P&P SHEET 3 OF 7	56	1200	1140	4484	4635	60	120	4635	4484	56	1140	1200
P&P SHEET 4 OF 7	23	1200	1180	4660	4650	60	120	4650	4660	23	1180	1200
P&P SHEET 5 OF 7	48	1200	1160	4604	4695	60	120	4695	4604	48	1160	1200
P&P SHEET 6 OF 7	26	1200	1160	4640	4665	60	120	4665	4640	26	1160	1200
P&P SHEET 7 OF 7	72	550	560	2200	2200	28	56	2200	2200	72	560	550
PROJECT TOTALS	**225**	**7650**	**7500**	**29788**	**30045**	**383**	**766**	**30045**	**29788**	**225**	**7500**	**7650**

SUMMARY OF SIGNING ITEMS

LOCATION	644 6001	644 6004	644 6005	644 6007	644 6027	644 6030	644 6031	644 6037	644 6076	658 6061	685 6004	685 6006
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(T-2EXT)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	IN SM RD SN SUP&AM TYS80(1)SA(U-WC)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	REMOV RDSD FLSH BCN AM (SOLAR PWRD)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
	6	31	2	3	1	2	4	1	50	35	3	3
PROJECT TOTALS	**6**	**31**	**2**	**3**	**1**	**2**	**4**	**1**	**50**	**35**	**3**	**3**

SUMMARY OF DRAINAGE ITEMS

LOCATION	403 6001	432 6025	462 6057	462 6065	464 6003	464 6005	466 6183	467 6363	467 6395
	TEMPORARY SPL SHORING	RIRRAP (STONE COMMON)(DRY)(15 IN)	CONC BOX CULV (6 FT X 6 FT)(EXTEND)	CONC BOX CULV (8 FT X 6 FT)(EXTEND)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	WINGWALL (PW - 1) (HW=8 FT)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)
	SF	CY	LF	LF	LF	LF	EA	EA	EA
P&P SHEET 1 OF 13									
P&P SHEET 2 OF 13					144	72		18	6
P&P SHEET 3 OF 13	50	50		48	24	104	2	4	4
P&P SHEET 4 OF 13					48		6	0	
P&P SHEET 5 OF 13	50	33.85	16		0		6	0	
P&P SHEET 6 OF 13									
P&P SHEET 7 OF 13					40			2	
P&P SHEET 8 OF 13					180			8	
P&P SHEET 9 OF 13	65	22	12		128		1	8	
P&P SHEET 10 OF 13					64			2	
P&P SHEET 11 OF 13					166			8	
P&P SHEET 12 OF 13					410			18	
P&P SHEET 13 OF 13	50	29.75		24	44		2	2	
PROJECT TOTALS	**215**	**135.6**	**28**	**72**	**1248**	**176**	**17**	**70**	**10**

Austin District
Central Design

Texas Department of Transportation

US 290 QUANTITY SUMMARY

SHEET 2 OF 3

DS: BB	CK: MFH	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		15

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	512 6107	512 6110	512 6112	545 6007	545 6003	545 6005	662 6004	662 6032	662 6034	662 6063	662 6093	662 6095
	PORT CTB (FURN & INST) (TL-3 LPCB)	PORT CTB (MOVE) (TL-3 LPCB)	PORT CTB (REMOVE) (TL-3 LPCB)	CRASH CUSH ATTEN (INSTL) (L) (N) (T L3)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 4" (BRK)	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (BRK)	WK ZN PAV MRK REMOV (Y) 4" (SLD)
	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	LF
P&P SHEET 1 OF 13							2000	2000	2000	2000	2000	2000
P&P SHEET 2 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 3 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 4 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 5 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 6 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 7 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 8 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 9 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 10 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 11 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 12 OF 13							2400	2400	2400	2400	2400	2400
P&P SHEET 13 OF 13							2200	2200	2200	2200	2200	2860
	2520	2520	2520	4	4	4						
PROJECT TOTALS	**2520**	**2520**	**2520**	**4**	**4**	**4**	**30600**	**30600**	**30600**	**30600**	**30600**	**31260**

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	677 6001	6001 6002	6185 6002	6185 6005
	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	EA	DAY	DAY
P&P SHEET 1 OF 13	2500			
P&P SHEET 2 OF 13	3000			
P&P SHEET 3 OF 13	3000			
P&P SHEET 4 OF 13	3000			
P&P SHEET 5 OF 13	3000			
P&P SHEET 6 OF 13	3000			
P&P SHEET 7 OF 13	3000			
P&P SHEET 8 OF 13	3000			
P&P SHEET 9 OF 13	3000			
P&P SHEET 10 OF 13	3000			
P&P SHEET 11 OF 13	3000			
P&P SHEET 12 OF 13	3000			
P&P SHEET 13 OF 13	3000			
		2	120	120
PROJECT TOTALS	**38500**	**2**	**120**	**120**

SUMMARY OF MOBILIZATION ITEMS

LOCATION	500 6001	502 6001
	MOBILIZATION	BARRICADES, SIGNS AND TRAFFIC HANDLING
	LS	MO
	1.00	13.00
PROJECT TOTALS	**1**	**13**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	160 6003	164 6033	164 6041	164 6043	168 6001	169 6001	432 6002	432 6016
	FURNISHING AND PLACING TOPSOIL (4")	DRILL SEEDING (PERM) (RURAL) (SANDY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	RIPRAP (CONC) (5 IN)	RIPRAP (STONE TY R) (DRY) (12 IN)
	SY	SY	SY	SY	MG	SY	CY	CY
N/A	59500	59500	29750	29750	3000	59500	506	12
PROJECT TOTALS	**59500**	**59500**	**29750**	**29750**	**3000**	**59500**	**506**	**12**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	432 6045	506 6002	506 6004	506 6030	506 6038	506 6039	506 6041	506 6043
	RIPRAP (MOW STRIP) (4 IN)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 4)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	CY	LF	LF	HR	LF	LF	LF	LF
N/A	81.6	200	200	80	9800	9800	9800	9800
PROJECT TOTALS	**81.6**	**200**	**200**	**80**	**9800**	**9800**	**9800**	**9800**

Austin District
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Texas Department of Transportation

US 290
QUANTITY SUMMARY

SHEET 3 OF 3

DS: BB	CK: MFH	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		16

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GENERAL NOTES

1. CONSTRUCT THE ROADWAY USING TRAFFIC CONTROL PLAN PROVIDED. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 502. SETUP TRAFFIC CONTROL AS PER PLANS. CONTRACTOR MAY USE VERTICAL PANELS OR BARRELS.
2. SPRINKLE FOR DUST CONTROL AS DIRECTED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY.
3. INCORPORATE 3: 1 SAFETY WEDGES FOR ALL DROP OFFS GREATER THAN TWO (2) INCHES LEFT OVERNIGHT. CONSIDER THIS SUBSIDIARY TO THE VARIOUS ITEMS.
4. MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT SITE TO REDUCE PONDING WHERE EVER POSSIBLE.
5. SEQUENCE OF CONSTRUCTION MAY CHANGE WITH PRIOR APPROVAL FROM THE ENGINEER.
6. CONSTRUCTION SHALL BEGIN IN LOCATIONS CLEAR OF UTILITY CONFLICTS.
7. SEE STANDARDS BC & WZ FOR TYPE AND LOCATION OF ALL ADVANCE SIGNS.

PHASE 1

PHASE 1 CONSISTS OF EXTENDING CROSS DRAINAGE CULVERTS, EASTBOUND BRIDGE REPLACEMENT, ASPHALT LEVEL UP ON TWO SIDES OF BRIDGE (STEP 1) AND PGL DROP DOWN PORTION (STEP 2). SEE TCP TYPICAL SECTIONS FOR MORE DETAILS.

STEP 1 - EXTEND CROSS DRAINAGE STRUCTURES

1. PLACE SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND APPLICABLE BC STANDARDS.
2. INSTALL EROSION CONTROLS. TREE PROTECTION TO BE INSTALLED AND TO REMAIN IN PLACE UNTIL COMPLETION OF PROJECT.
3. THE REMOVAL WORK AND SHIFTING OF TRAFFIC SHALL BE ACCOMPLISHED DURING THE SAME WORK PERIOD.
4. REMOVE EXISTING STRIPING AND PLACE WORK ZONE STRIPING AS SHOWN ON TCP TYPICAL SECTION.
5. REMOVE HEADWALL AND EXTEND DOWNSTREAM PORTION OF CULVERT. SEE CUTTING AND RESTORING PAVEMENT DETAILS FOR MORE INFORMATION AND EXCAVATION LIMITS.
6. REMOVE AND REPLACE UPSTREAM PORTION OF CULVERT. SEE CUTTING AND RESTORING PAVEMENT DETAILS FOR MORE INFORMATION AND EXCAVATION LIMITS.

STEP 1 - EASTBOUND BRIDGE REPLACEMENT AND PGL LEVEL UP RECONSTRUCTION

1. PLACE SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND APPLICABLE TCP(1-4)-18 STANDARDS. SHIFT THE TRAFFIC TO WEST BOUND.
2. REMOVE AND REPLACE UPSTREAM PORTION OF BRIDGE. RECONSTRUCT EASTBOUND OF ROAD.

STEP 2 - EASTBOUND PGL DROP DOWN RECONSTRUCTION

PHASE 2

PHASE 2 CONSISTS OF WESTBOUND BRIDGE REPLACEMENT, ASPHALT LEVEL UP ON TWO SIDES OF BRIDGE (STEP 1) AND PGL DROP DOWN PORTION (STEP 2). SEE TCP TYPICAL SECTIONS FOR MORE DETAILS.

STEP 1 - WESTBOUND BRIDGE REPLACEMENT AND PGL LEVEL UP RECONSTRUCTION

1. PLACE SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND APPLICABLE BC STANDARDS.
2. REMOVE EXISTING STRIPING AND PLACE WORK ZONE STRIPING AS SHOWN ON TCP TYPICAL SECTION.
3. REMOVE AND REPLACE DOWNSTREAM PORTION OF BRIDGE. RECONSTRUCT WESTBOUND OF ROAD.

STEP 2 - PGL DROP DOWN WESTBOUND RECONSTRUCTION

PHASE 3

PHASE 3 CONSISTS OF PAVEMENT WIDENING AND LEVEL UP OR FULL DEPTH REPAIR IF NECESSARY. SEE TCP TYPICAL SECTIONS FOR MORE DETAILS.

1. INSTALL EROSION CONTROL DEVICES AS DIRECTED BY THE ENGINEER. TREE PROTECTION TO BE INSTALLED AND TO REMAIN IN PLACE UNTIL COMPLETION OF PROJECT.
2. PLACE SIGNS AND BARRICADES AS SHOWN IN THE PLANS AND APPLICABLE BC STANDARDS.
3. REMOVE EXISTING STRIPING AND PLACE WORK ZONE STRIPING AS SHOWN ON TCP TYPICAL SECTION.
4. PREPARE RIGHT OF WAY.
5. CONSTRUCT FULL DEPTH REPAIR OR LEVEL-UP OF EXISTING PAVEMENT WITH TYPE D TO ROAD CENTERLINE AS NECESSARY BEFORE WIDENING.
6. SAWCUT, EXCAVATE, AND PREPARE SUBGRADE.
7. REGRADE ROAD-SIDE DITCHES.
8. INSTALL WIDENED PAVEMENT STRUCTURE ALONG BOTH SIDES AS SHOWN IN THE PLANS.
9. RECONSTRUCT DRIVEWAYS AND CROSS STREETS AND INSTALL PARALLEL DRAINAGE/ SET'S. VERIFY UTILITY CLEARANCE AT DRIVEWAYS AND INTERSECTIONS.

PHASE 4

PHASE 4 CONSISTS OF COMPLETING THE SURFACE TREATMENT AND REMAINING WORK ON THE PROJECT.

1. INSTALL PERMANENT SIGNS AS SHOWN IN THE PLANS.
2. MILL & SEAL AND THEN PLACE FINAL OVERLAY. (SEE TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS TCP(7-1)-13.
3. AFTER THE SURFACE TREATMENT HAS CURED, UTILIZE TCP(3-1)-13 & TCP(3-3)-14 TO PLACE PAVEMENT MARKINGS (SEE PAVEMENT MARKINGS LAYOUT).
4. PERFORM FINAL CLEAN UP.
5. OPEN ALL LANES TO TRAFFIC.
6. REMOVE TEMPORARY EROSION CONTROL DEVICES ONCE VEGETATION IS ESTABLISHED AND APPROVED BY THE ENGINEER.

1/17/2023

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PROFESSIONAL ENGINEER

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Austin District
Central Design

Texas Department of Transportation

US 290
TCP
SEQUENCE
OF WORK

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		17

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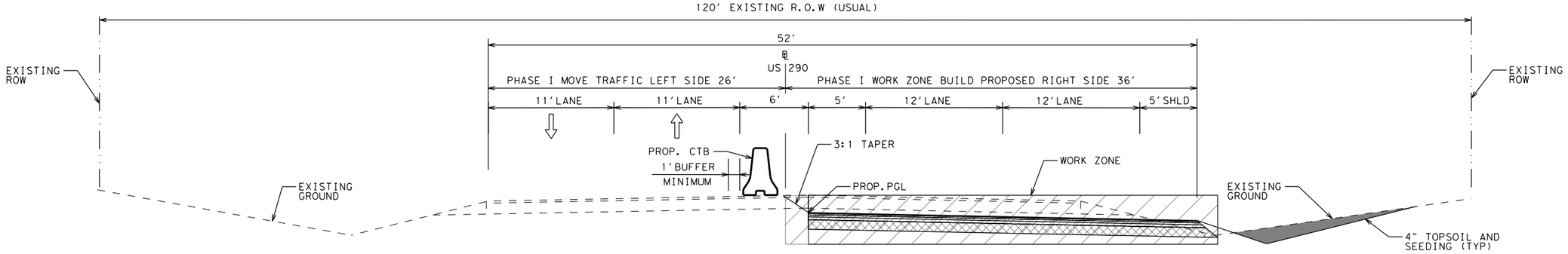
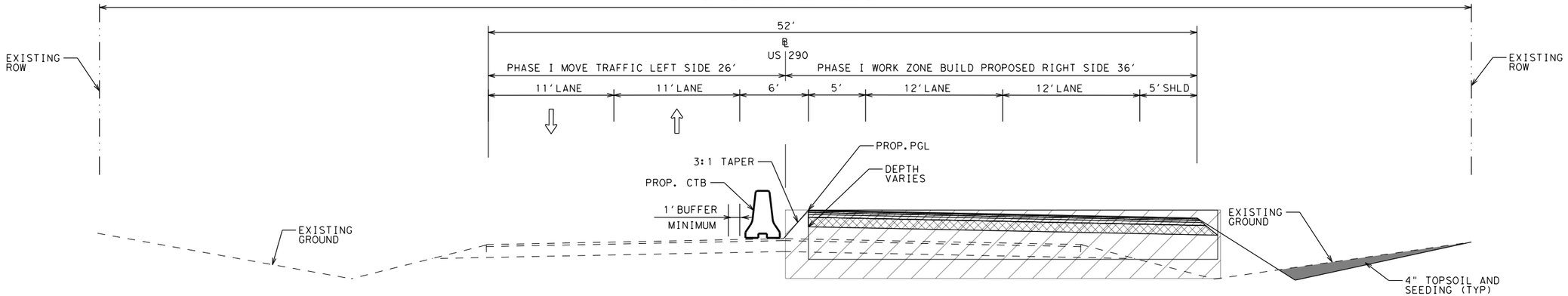


TCP TYPICAL SECTION FOR SIMULTANEOUS PGL DROP DOWN
STA 560+00.00 TO STA 578+00.00
PHASE I STEP 1



TCP TYPICAL SECTION FOR SIMULTANEOUS PGL LEVEL UP
STA 541+50.00 TO STA 544+33.75
STA 546+08.75 TO STA 548+00.00
PHASE I STEP 2

NOTES:
- MILL OR LEVEL UP AREAS TO MATCH PROPOSED CROSS SLOPE ONLY
- REPAIR PAVEMENT IN LOCATIONS AS DIRECTED BY THE ENGINEER
- THE 3:1 TAPER IN FILL SECTIONS SHALL BE CONSTRUCTED OF TYPE B HOTMOX AND PAID USING TYPE B PAY ITEM. THIS HOTMIX WEDGE MAY REMAIN DURING CONSTRUCTION OF NEXT PHASE. REMOVAL OF THE TOP PORTION OF THE WEDGE TO ALLOW PLACEMENT OF THE TYPE D AND TOM MIX IS REQUIRED AND SUBSIDIARY.

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US 290
TCP TYPICAL SECTIONS

SHEET 1 OF 3

© 2023		CONT	SECT	JOB	HIGHWAY
DS:BB	CK:MFH	0113	02	063	US 290
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DW:BB	CK:MFH	AUS	GILLESPIE		18

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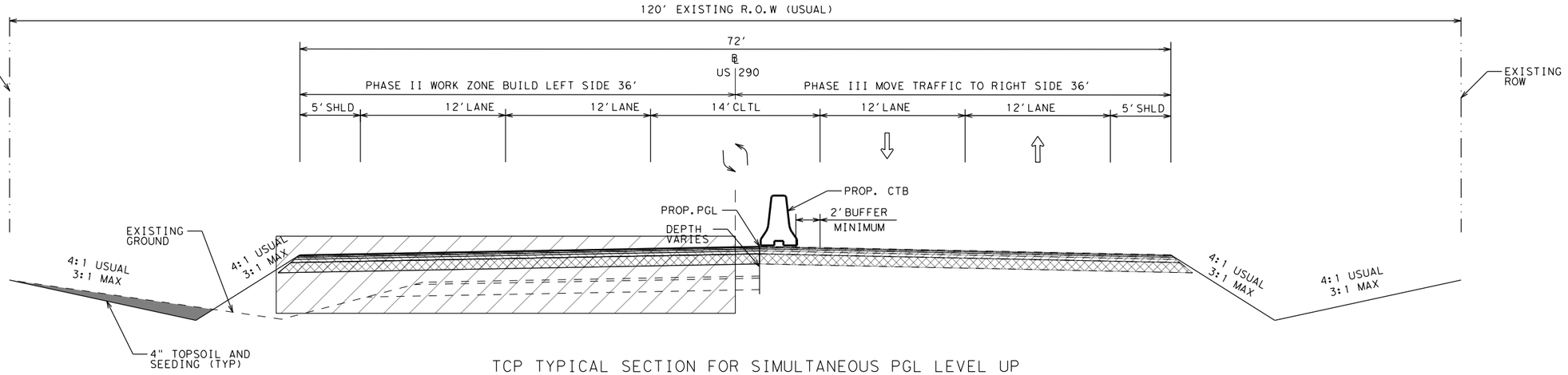
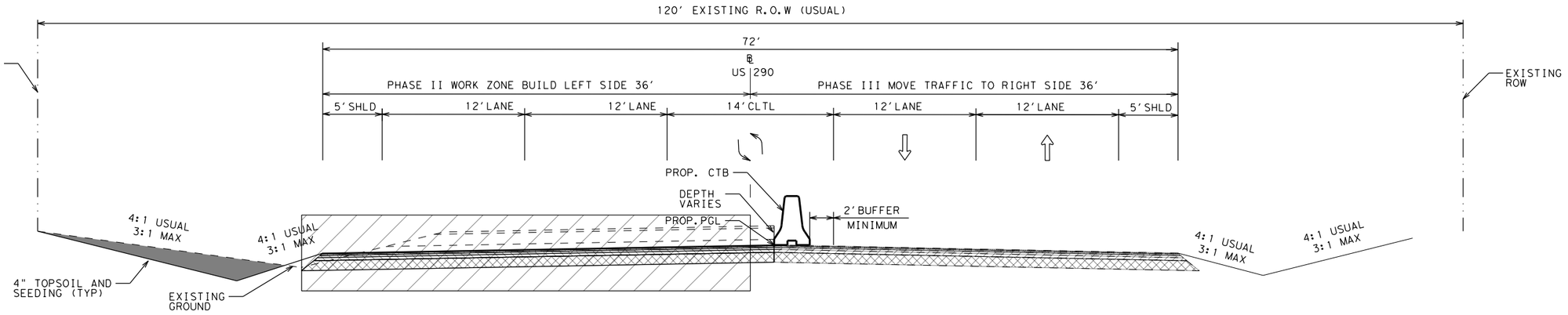


TCP TYPICAL SECTION FOR SIMULTANEOUS PGL LEVEL UP
STA 541+50.00 TO STA 544+33.75
STA 546+08.75 TO STA 548+00.00
PHASE II STEP 1



TCP TYPICAL SECTION FOR SIMULTANEOUS PGL DROP DOWN
STA 560+00.00 TO STA 578+00.00
PHASE II STEP 2

NOTES:
- MILL OR LEVEL UP AREAS TO MATCH PROPOSED CROSS SLOPE ONLY
- REPAIR PAVEMENT IN LOCATIONS AS DIRECTED BY THE ENGINEER

1/17/2023

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US 290
TCP TYPICAL SECTIONS

SHEET 2 OF 3

© 2023		CONT	SECT	JOB	HIGHWAY
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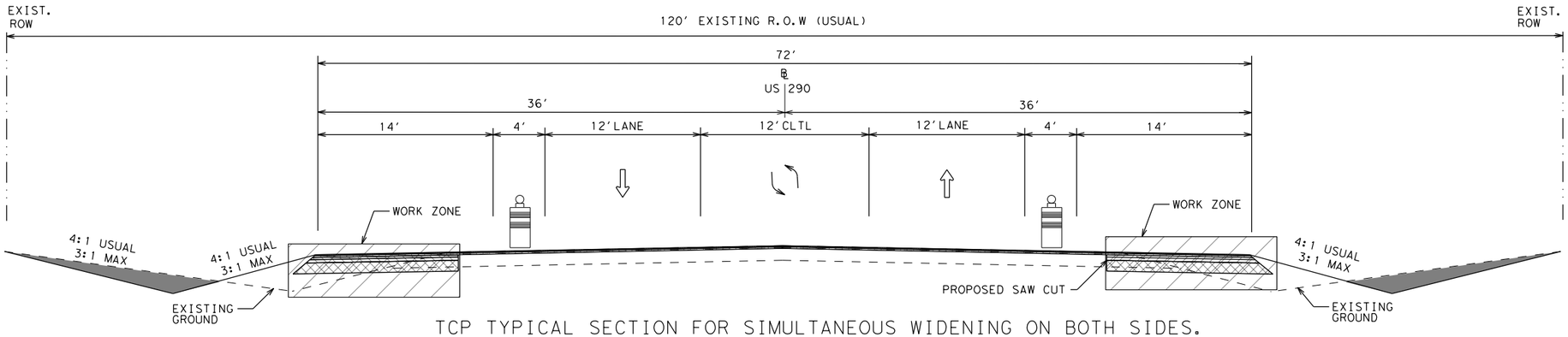


TCP TYPICAL SECTION FOR SIMULTANEOUS WIDENING ON BOTH SIDES.

PHASE III

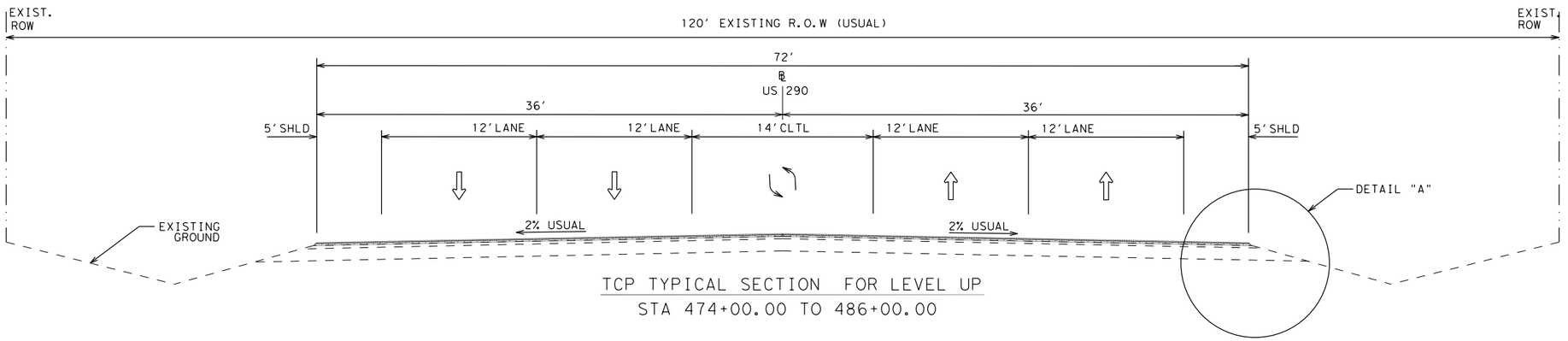
PROPOSED TYPICAL SECTION

STA 486+00.00 TO STA 541+50.00
STA 548+00.00 TO STA 560+00.00
STA 578+00.00 TO STA 627+00.00

NOTES TO CONTRACTOR:

USE 3:1 SAFETY SLOPES FOR ALL DROP OFFS GRATER THAN 2-INCHES AT THE END OF WORK SHIFT, CONSIDER THIS SUBSIDIARY TO ITEM 502.

MULTIPLE WORKZONE PHASES MAY BE OPERATED CONCURRENTLY.
SEQUENCE OF CONSTRUCTION MAY BE CHANGED WITH PRIOR APPROVAL.
MAINTAIN A 1 FT CLEARZONE BETWEEN EDGE OF TRAVEL LANE AND TRAFFIC BARREL.
REFER TO BC STANDARDS FOR TRAFFIC BARREL SPACING REQUIREMENTS.



TCP TYPICAL SECTION FOR LEVEL UP

STA 474+00.00 TO 486+00.00

PHASE IV

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US 290
TCP TYPICAL SECTIONS

SHEET 3 OF 3

DS: BB	CK: MFH	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
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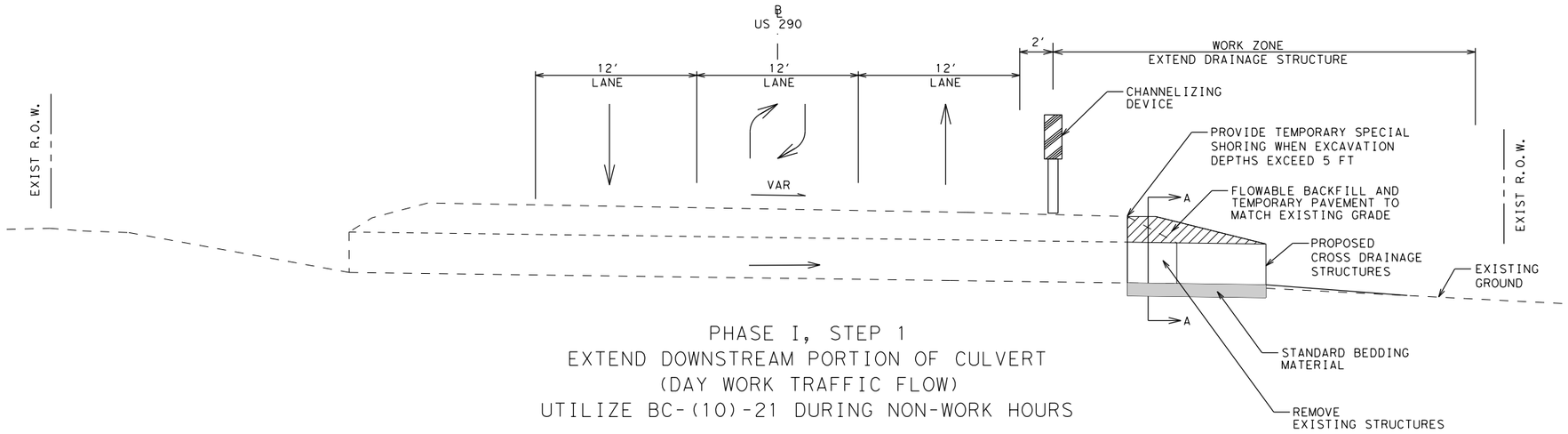
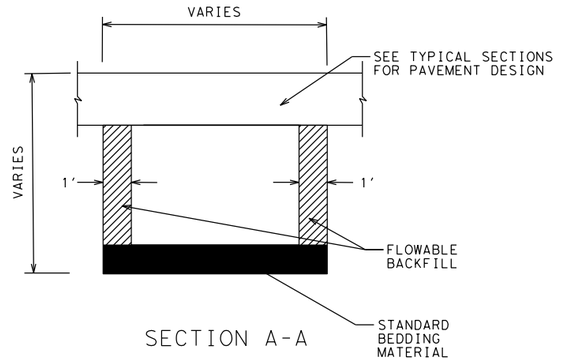
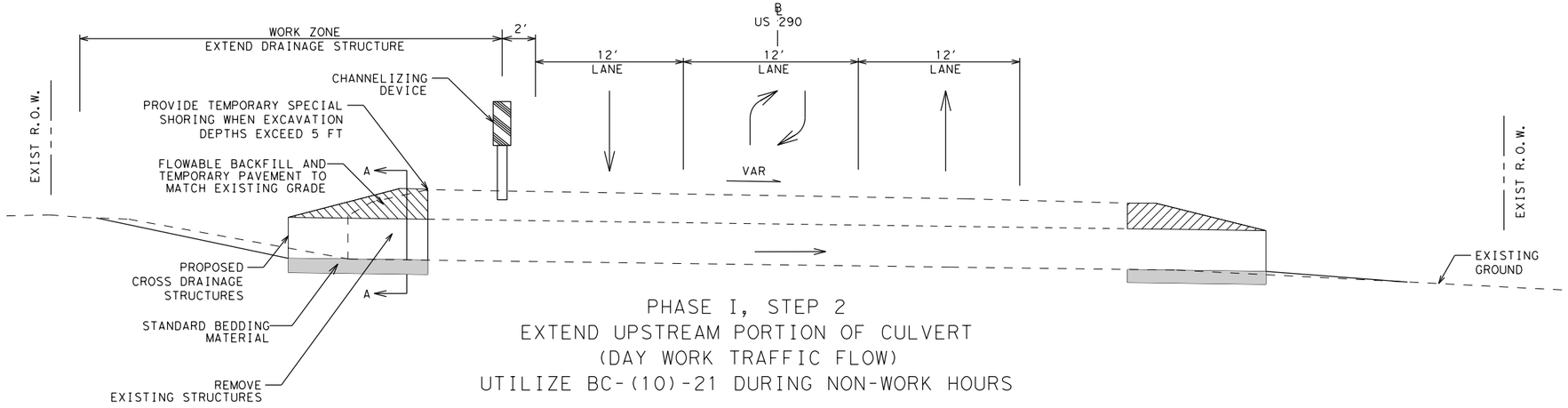


PHASE I, STEP 1
EXTEND DOWNSTREAM PORTION OF CULVERT
(DAY WORK TRAFFIC FLOW)
UTILIZE BC-(10)-21 DURING NON-WORK HOURS



SECTION A-A



PHASE I, STEP 2
EXTEND UPSTREAM PORTION OF CULVERT
(DAY WORK TRAFFIC FLOW)
UTILIZE BC-(10)-21 DURING NON-WORK HOURS

NOT TO SCALE

1/17/2023

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TCP TYPICAL SECTIONS CULVERT EXTENSION

SHEET 1 OF 1

© 2023		CONT	SECT	JOB	HIGHWAY
DS: BB	CK: MFH	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW: BB	CK: MFH	AUS	GILLESPIE		21

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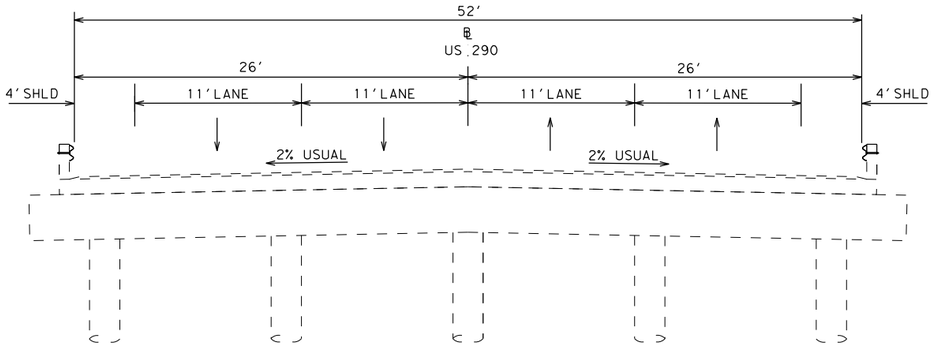
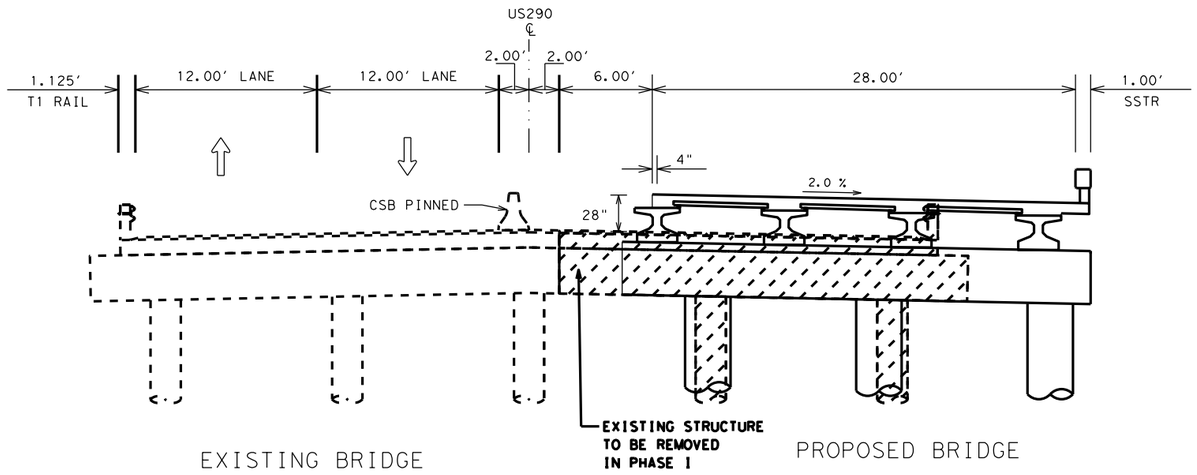
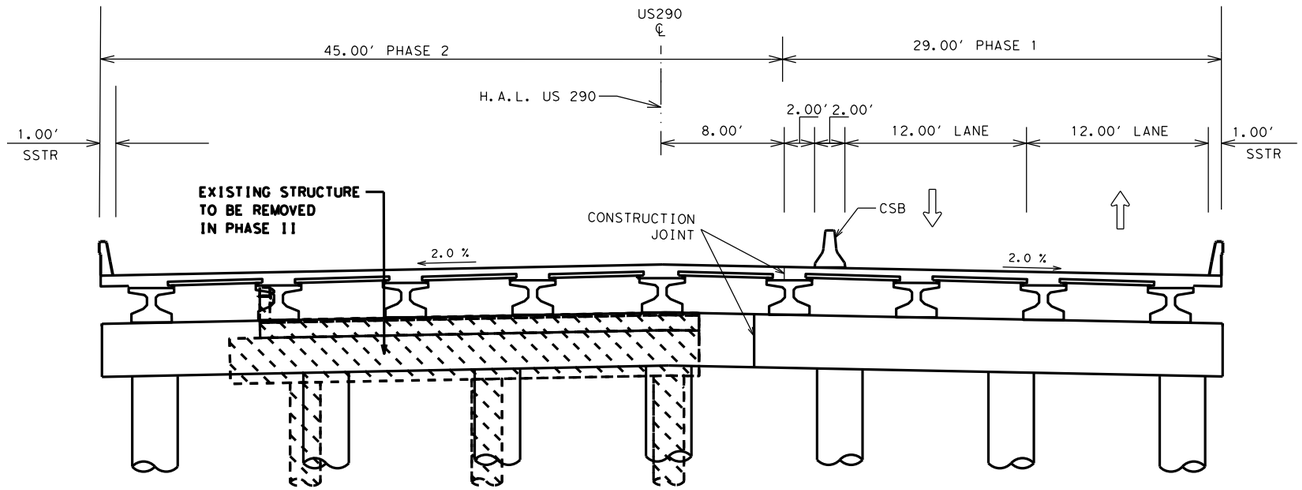


EXISTING BRIDGE TYPICAL SECTION



EXISTING BRIDGE PROPOSED BRIDGE

PHASE I STEP 1



PHASE II STEP 2

LEGEND:

-PHASE I
BRIDGE TO BE REMOVED

-PHASE II
BRIDGE TO BE REMOVED

1/17/2023

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US 290
TCP TYPICAL SECTIONS & CONSTRUCTION PHASING BRIDGE

SHEET 1 OF 1

© 2023	CONT	SECT	JOB	HIGHWAY
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0113	02	063	US 290
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	AUS	GILLESPIE		23

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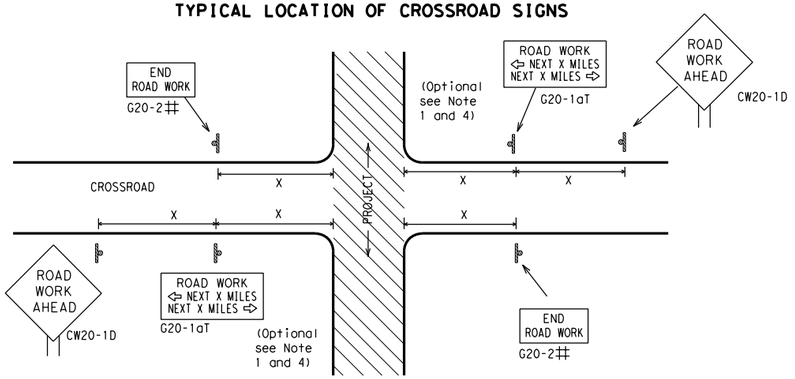
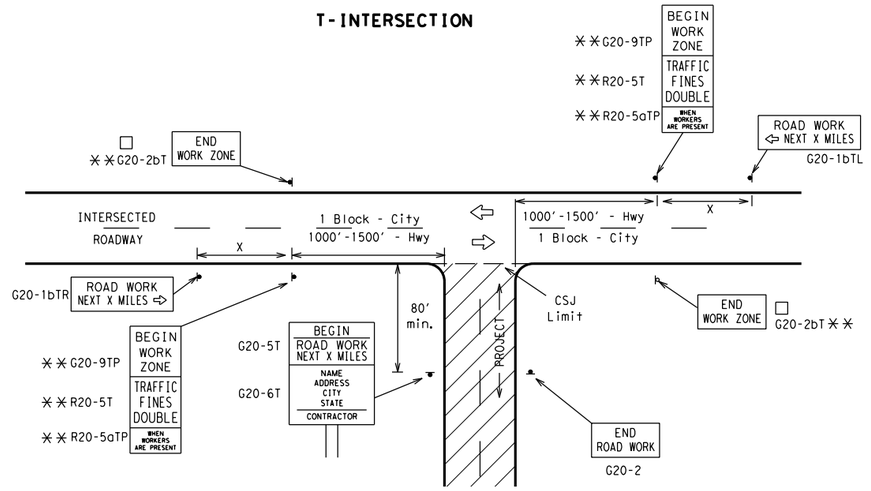
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

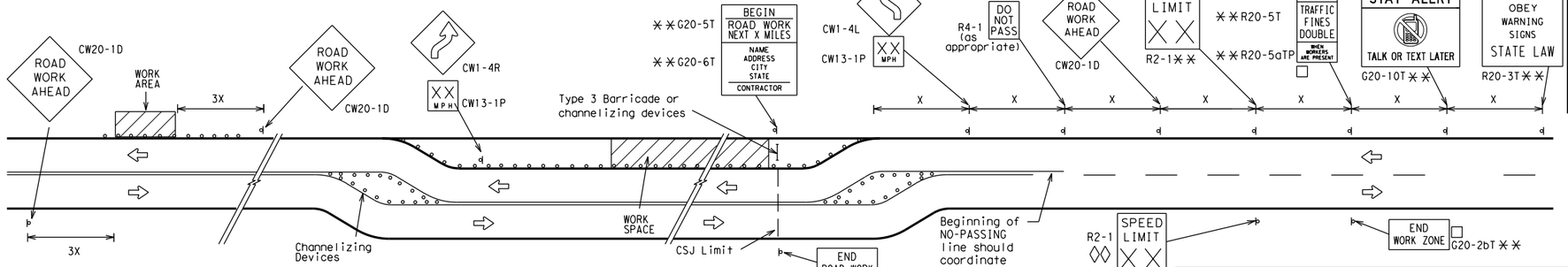
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

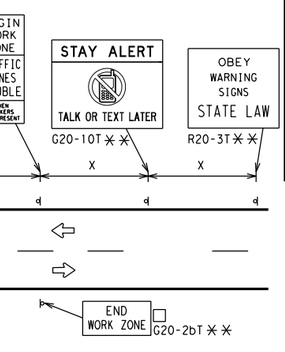
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

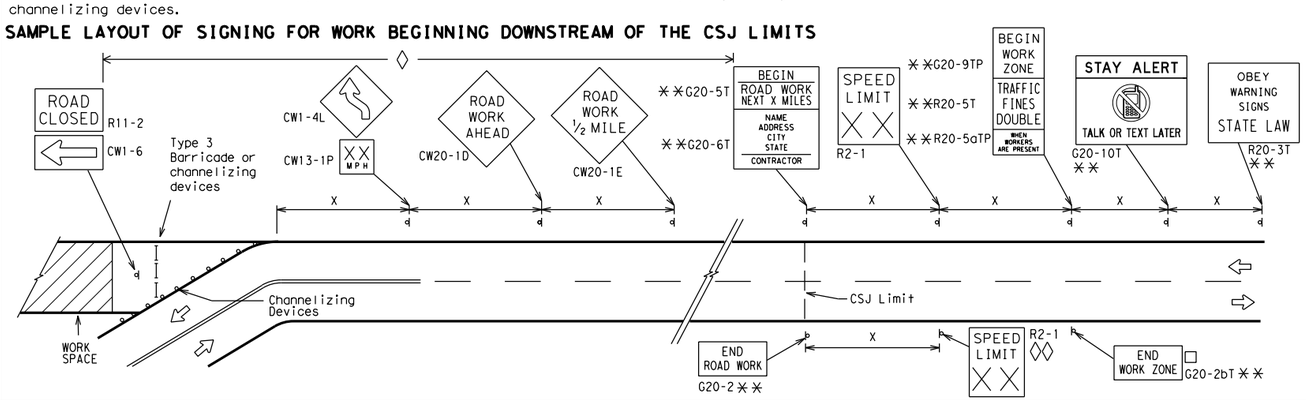


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

LEGEND

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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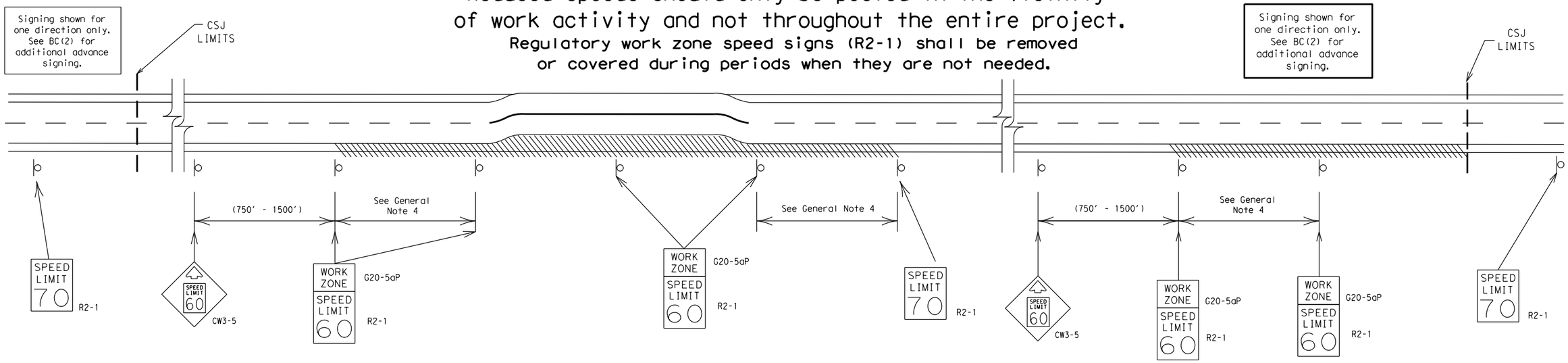
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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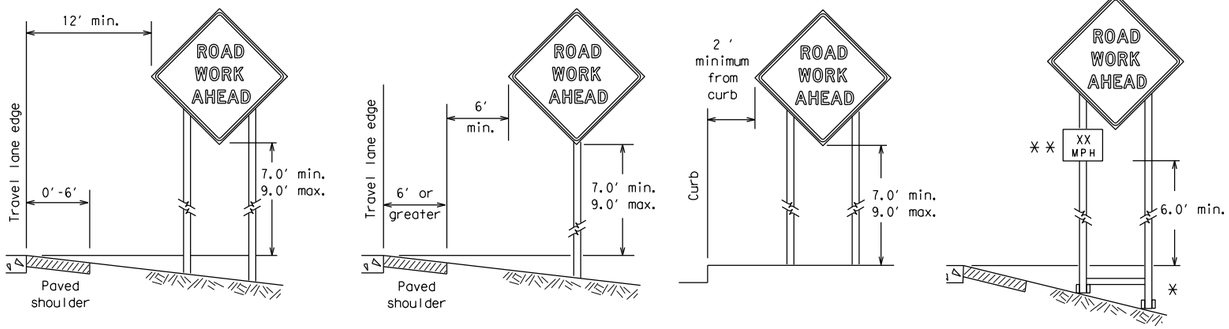
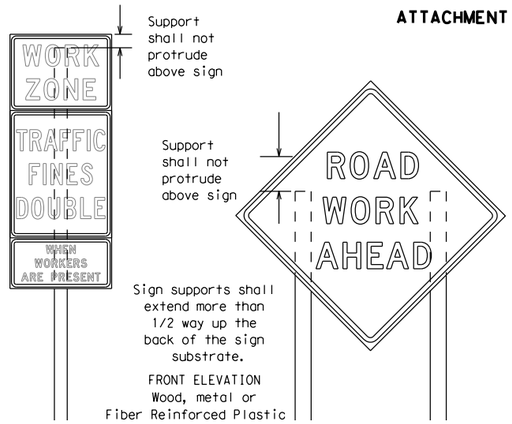
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



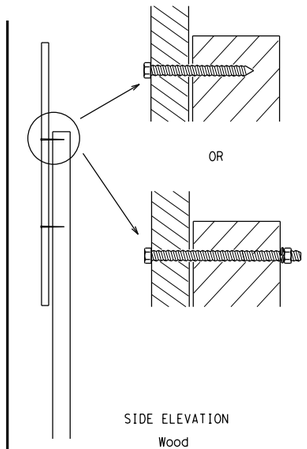
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

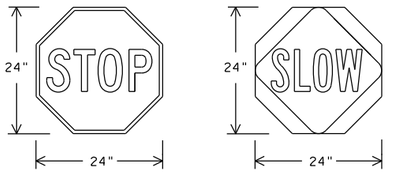
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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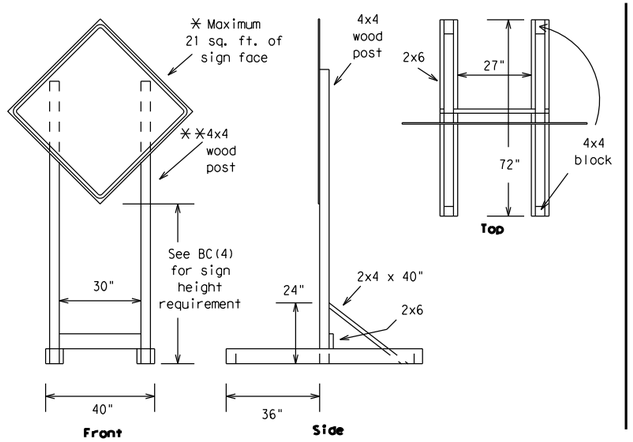
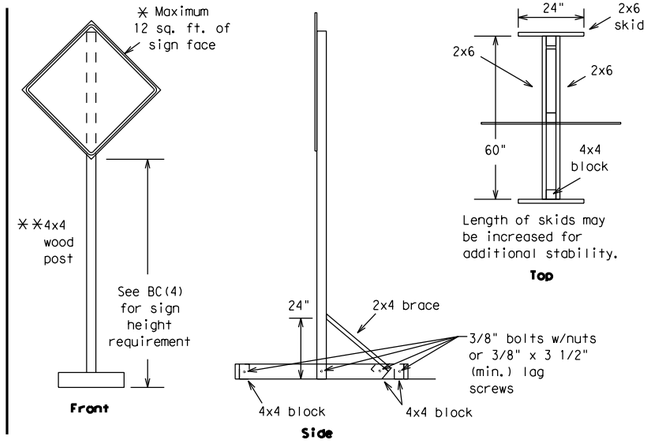
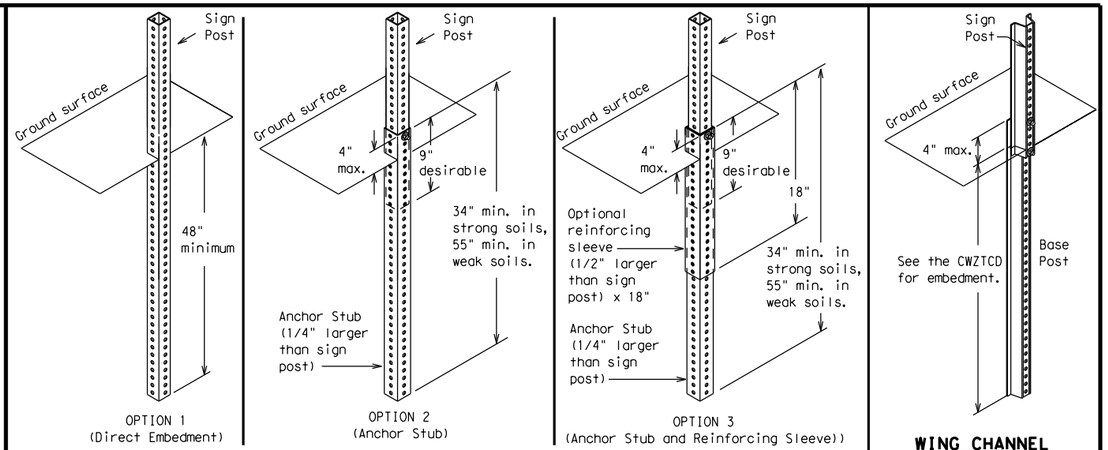




SKID MOUNTED WOOD SIGN SUPPORTS

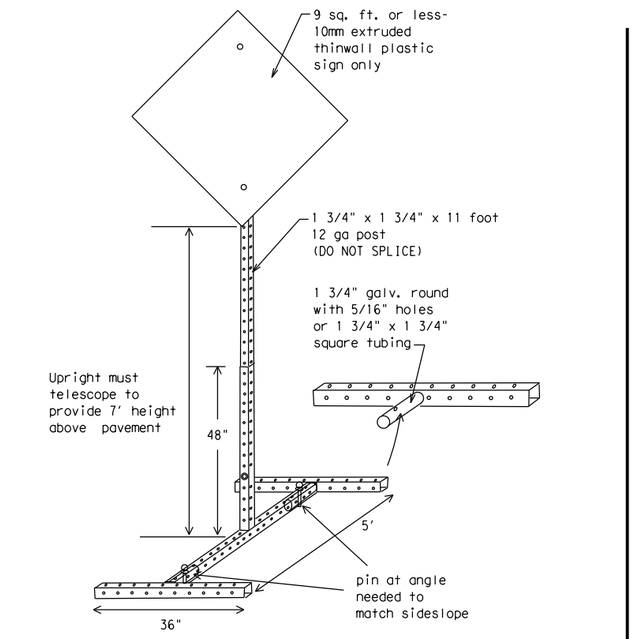
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

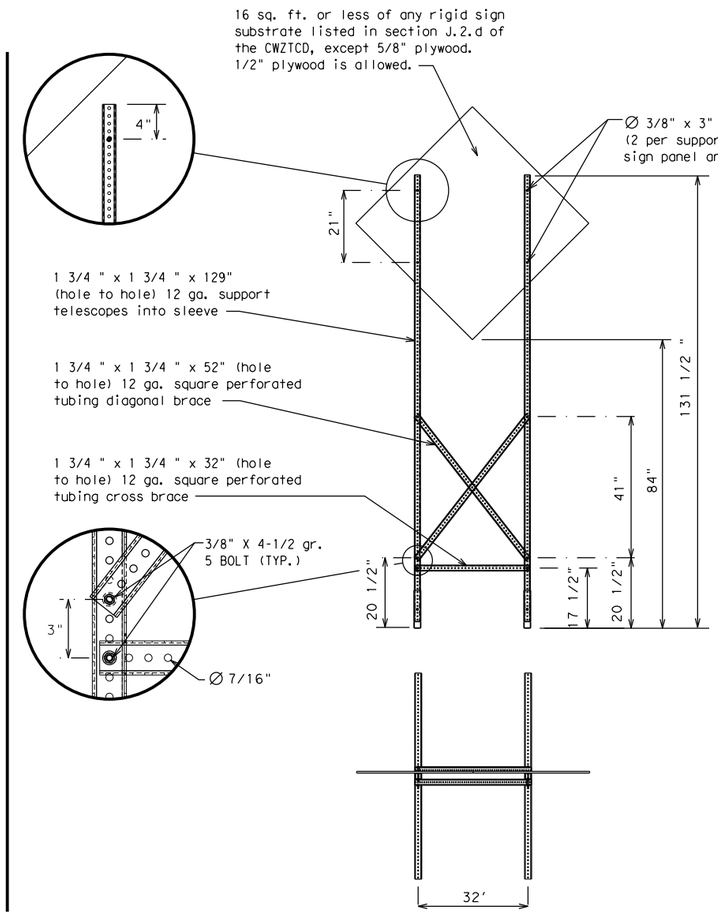


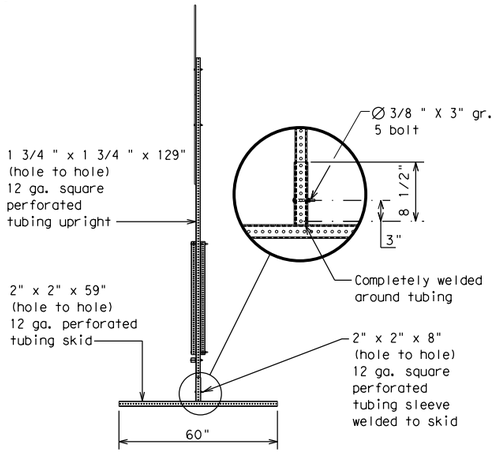
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	GILLESPIE		28

100

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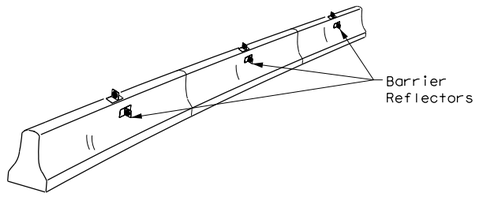
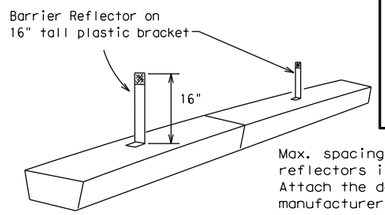
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

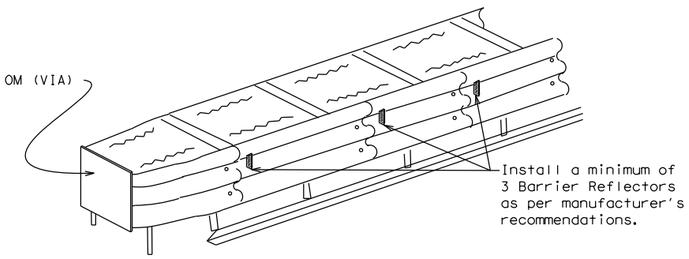


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

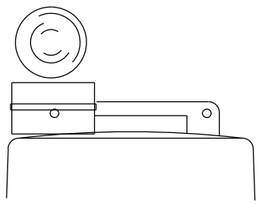


DELINEATION OF END TREATMENTS

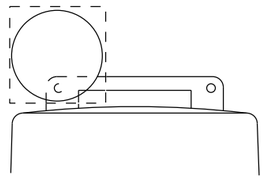
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

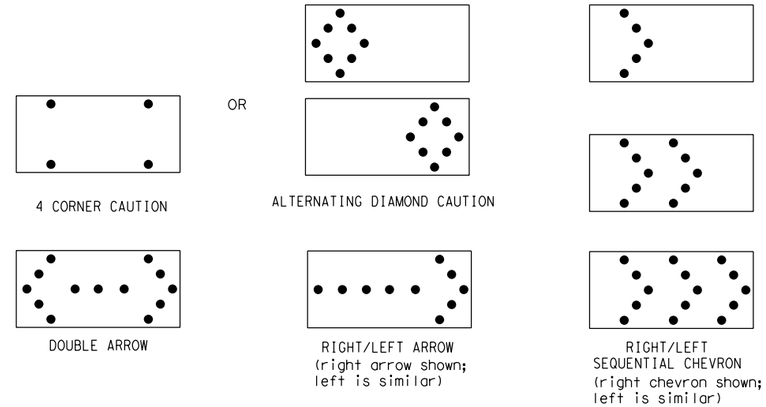
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation | Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	GILLESPIE		29

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

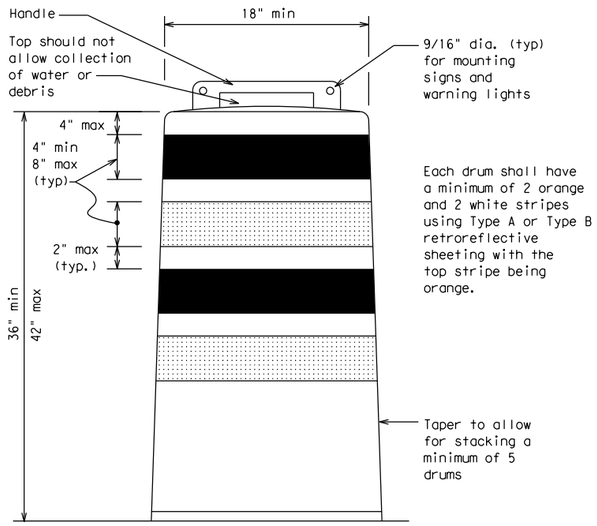
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

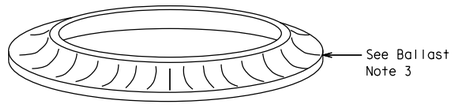
RETROREFLECTIVE SHEETING

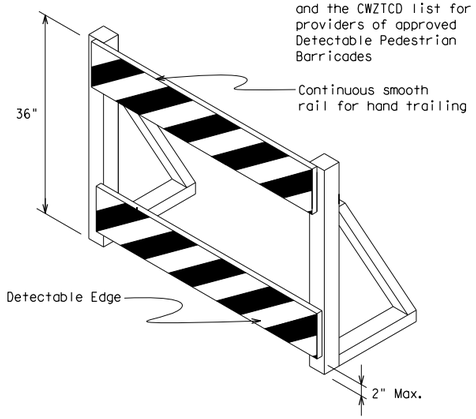
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

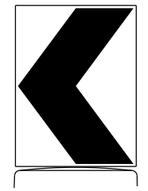




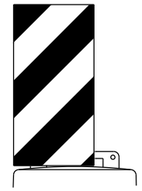


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
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9-07 5-21	AUS	GILLESPIE		30
7-13				

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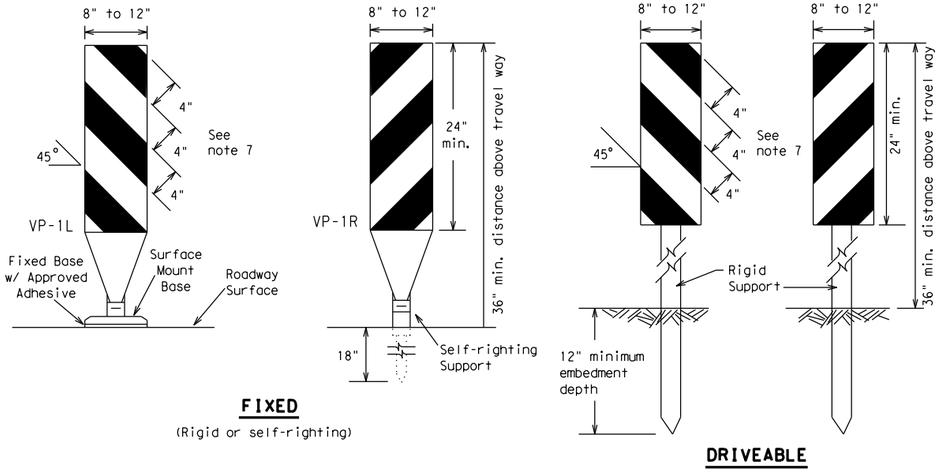


FIXED
(Rigid or self-righting)

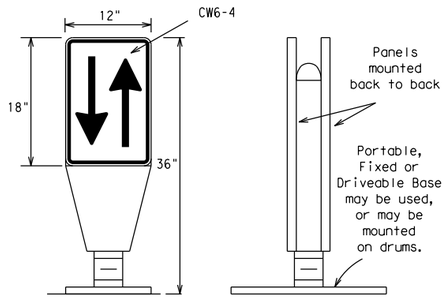
DRIVEABLE

(Rigid or self-righting)

PORTABLE

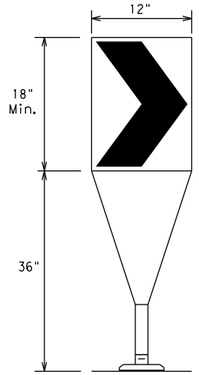
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



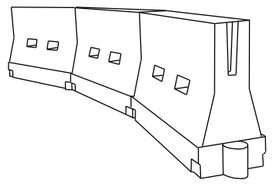
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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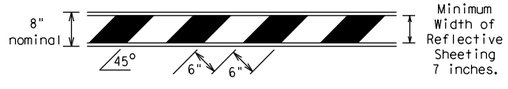
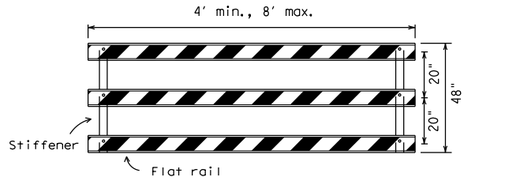
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be 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.



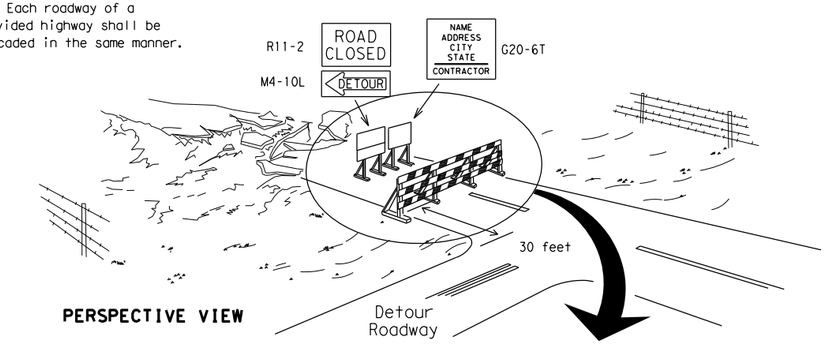
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

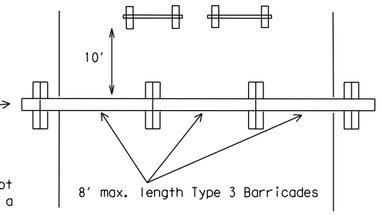
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

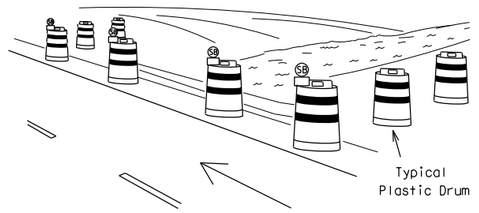
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

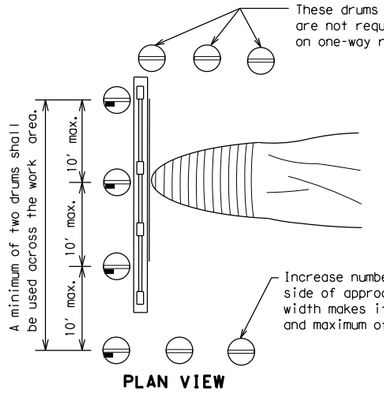
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

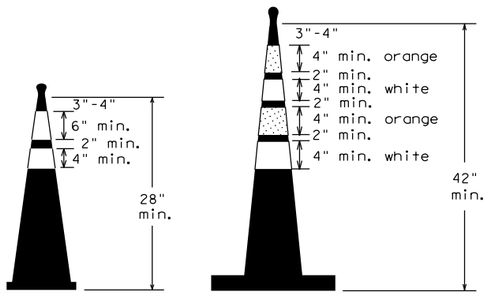
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

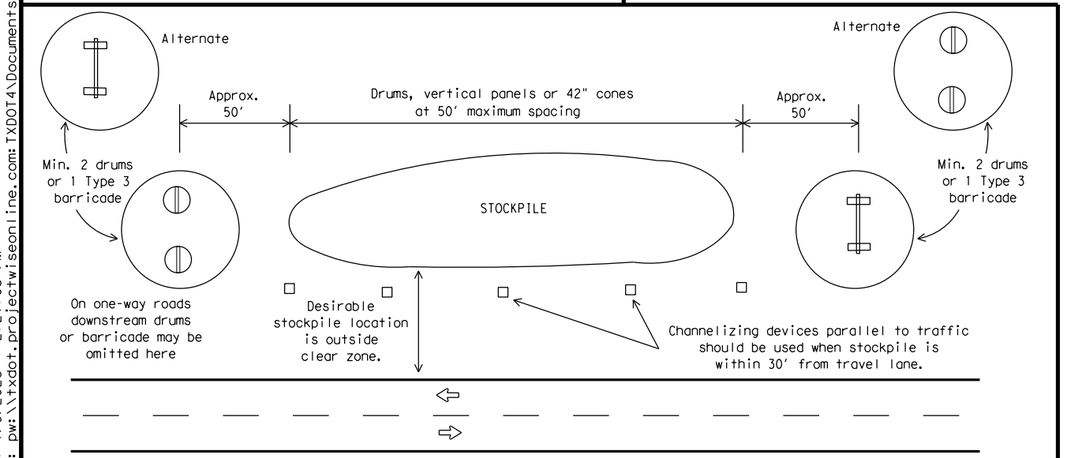
PLAN VIEW

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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

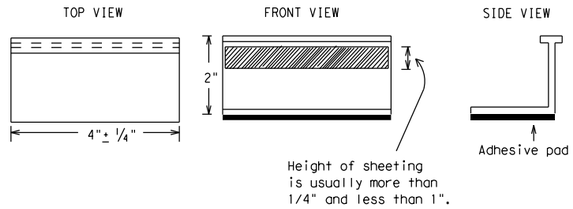
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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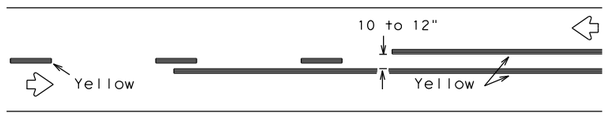
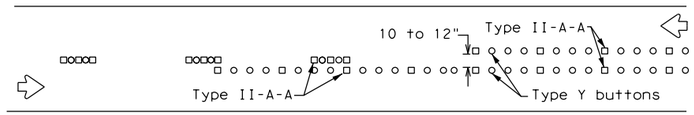
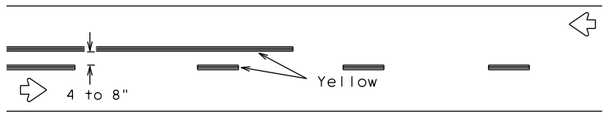
PAVEMENT MARKING PATTERNS



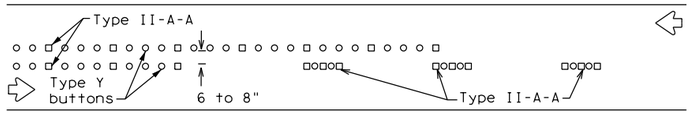
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



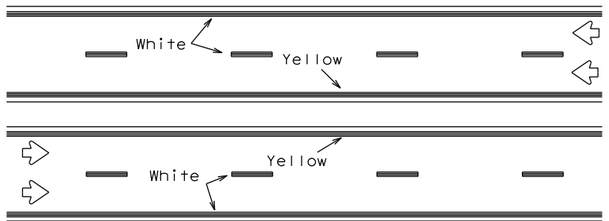
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



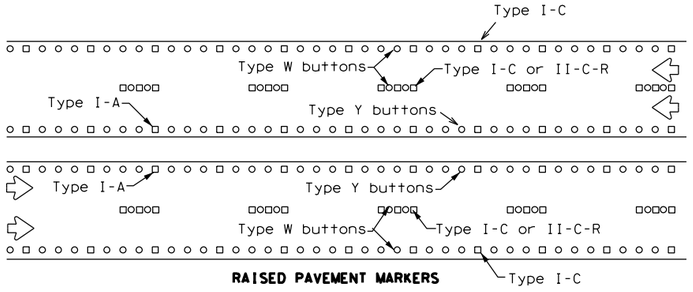
RAISED PAVEMENT MARKERS - PATTERN B

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

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



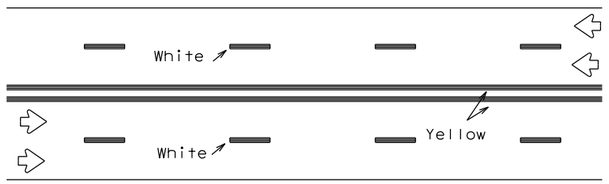
REFLECTORIZED PAVEMENT MARKINGS



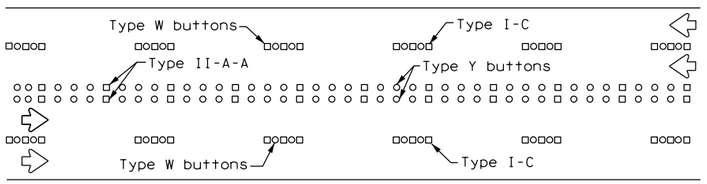
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



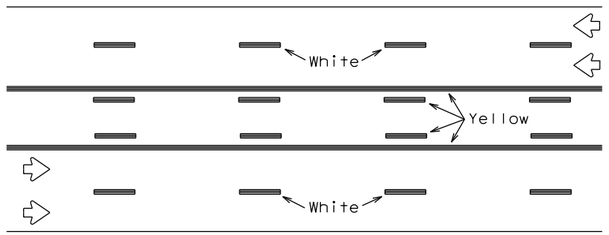
REFLECTORIZED PAVEMENT MARKINGS



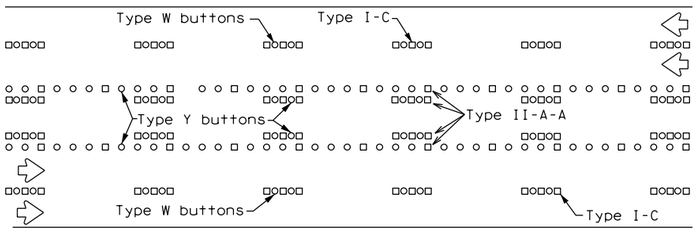
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

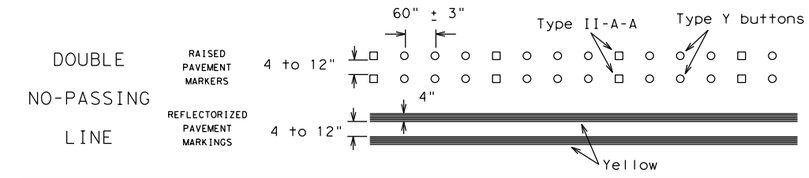
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

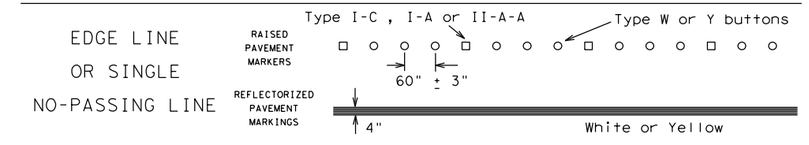
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

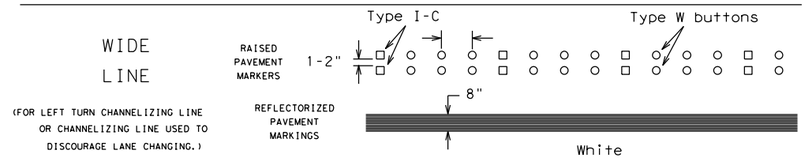


EDGE LINE OR SINGLE NO-PASSING LINE



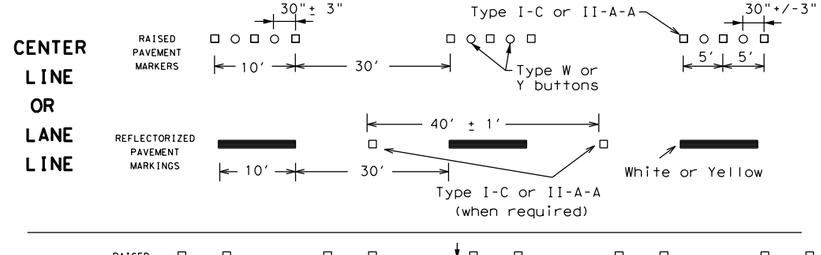
WIDE LINE

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

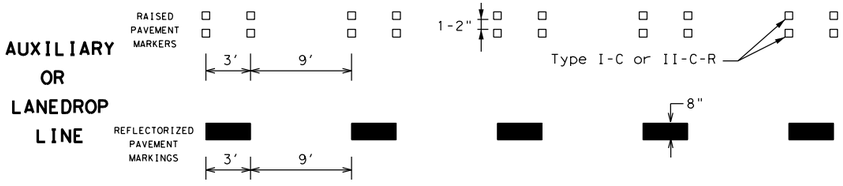


BROKEN LINES

CENTER LINE OR LANE LINE

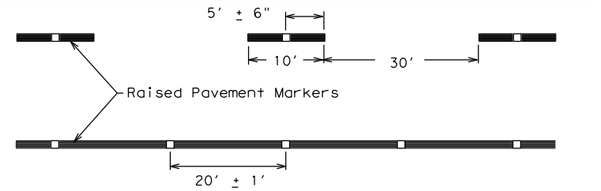


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		34

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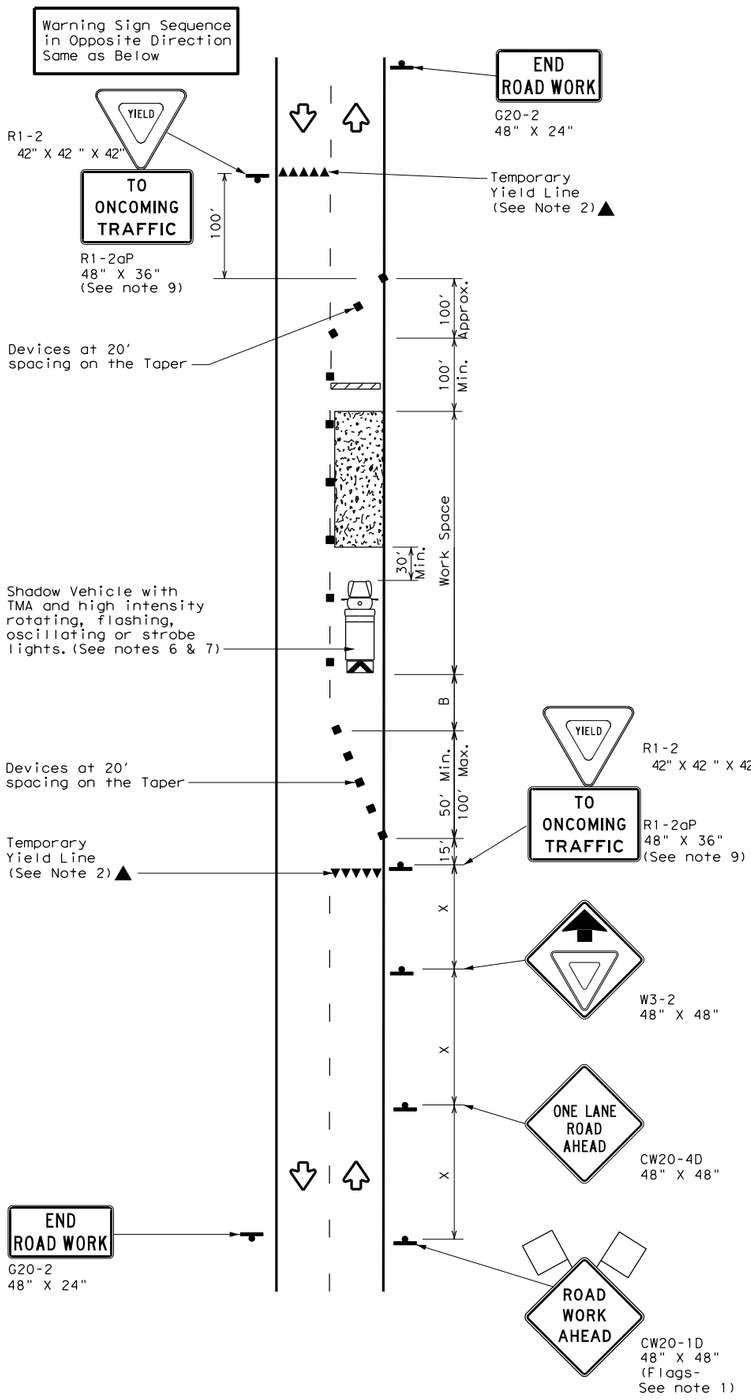
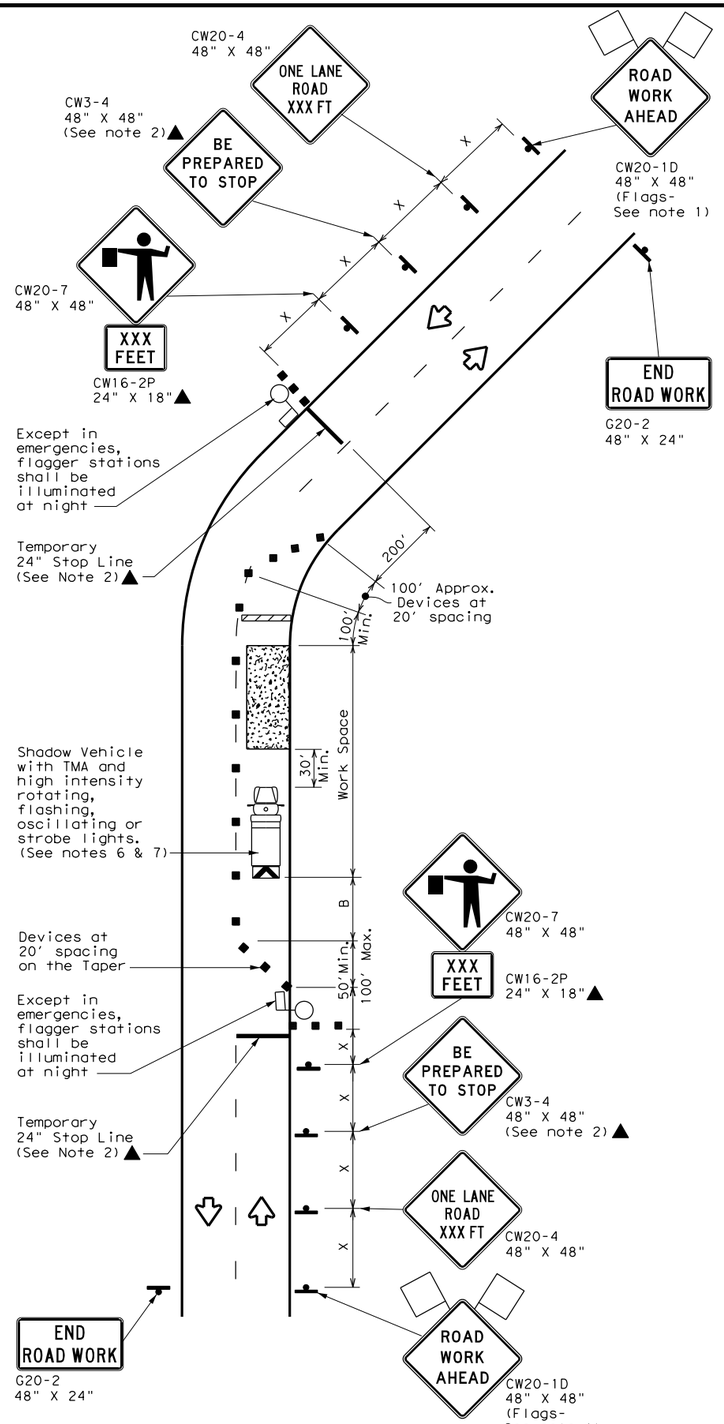


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		35

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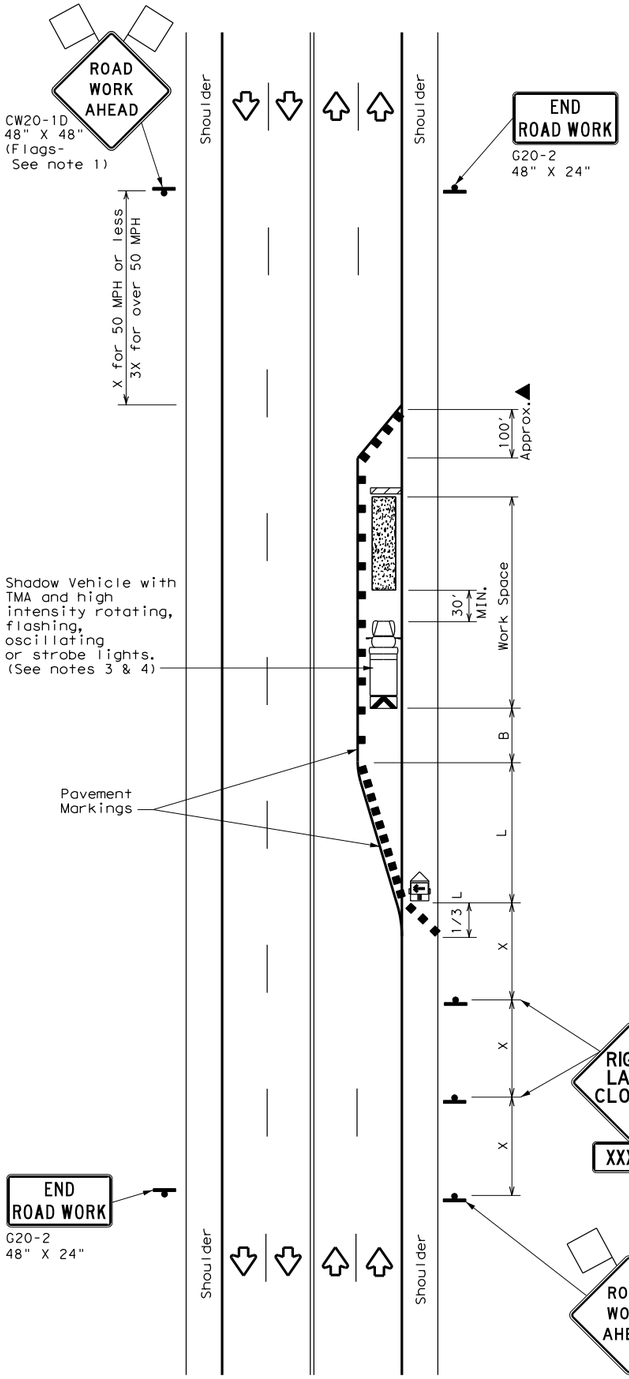
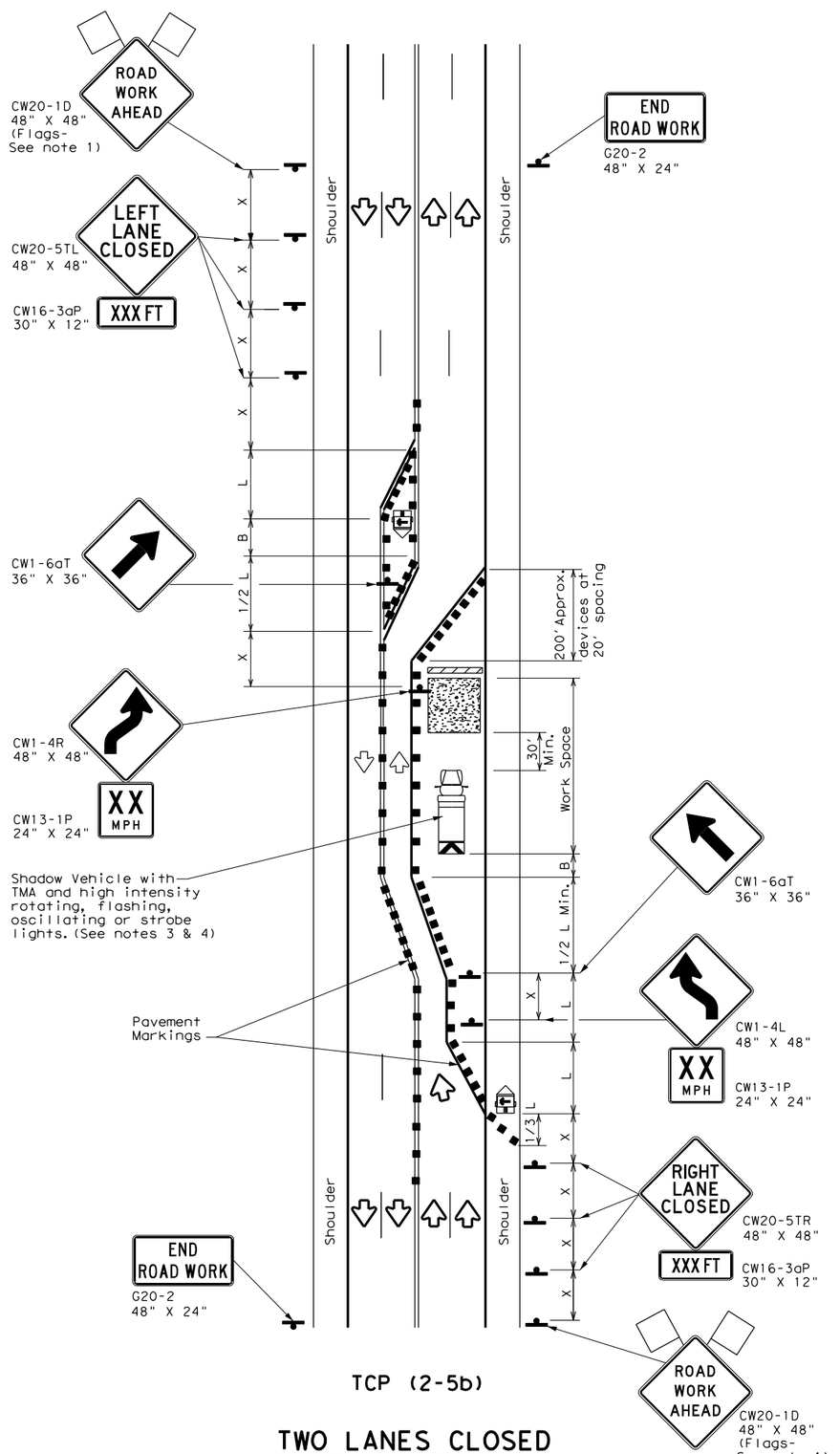


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	AUS	GILLESPIE		36

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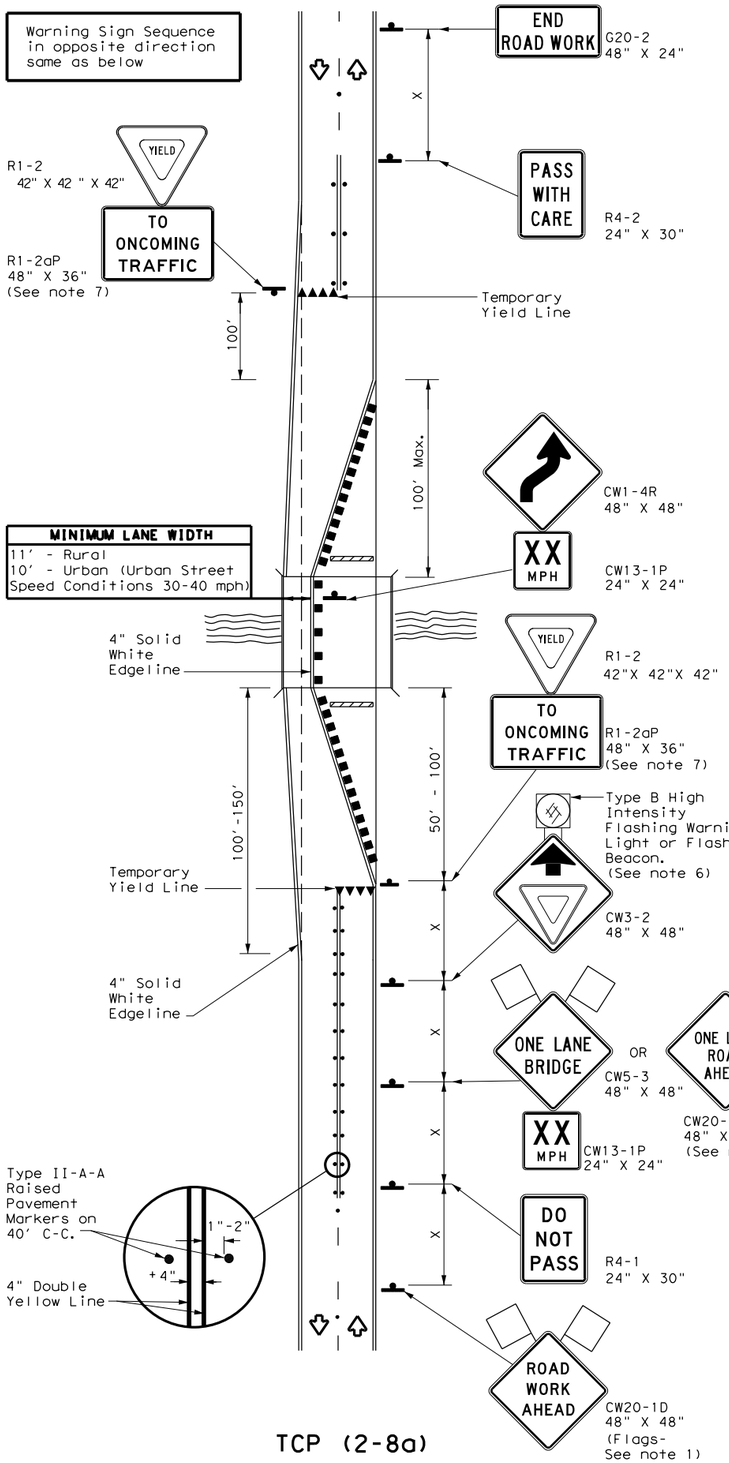
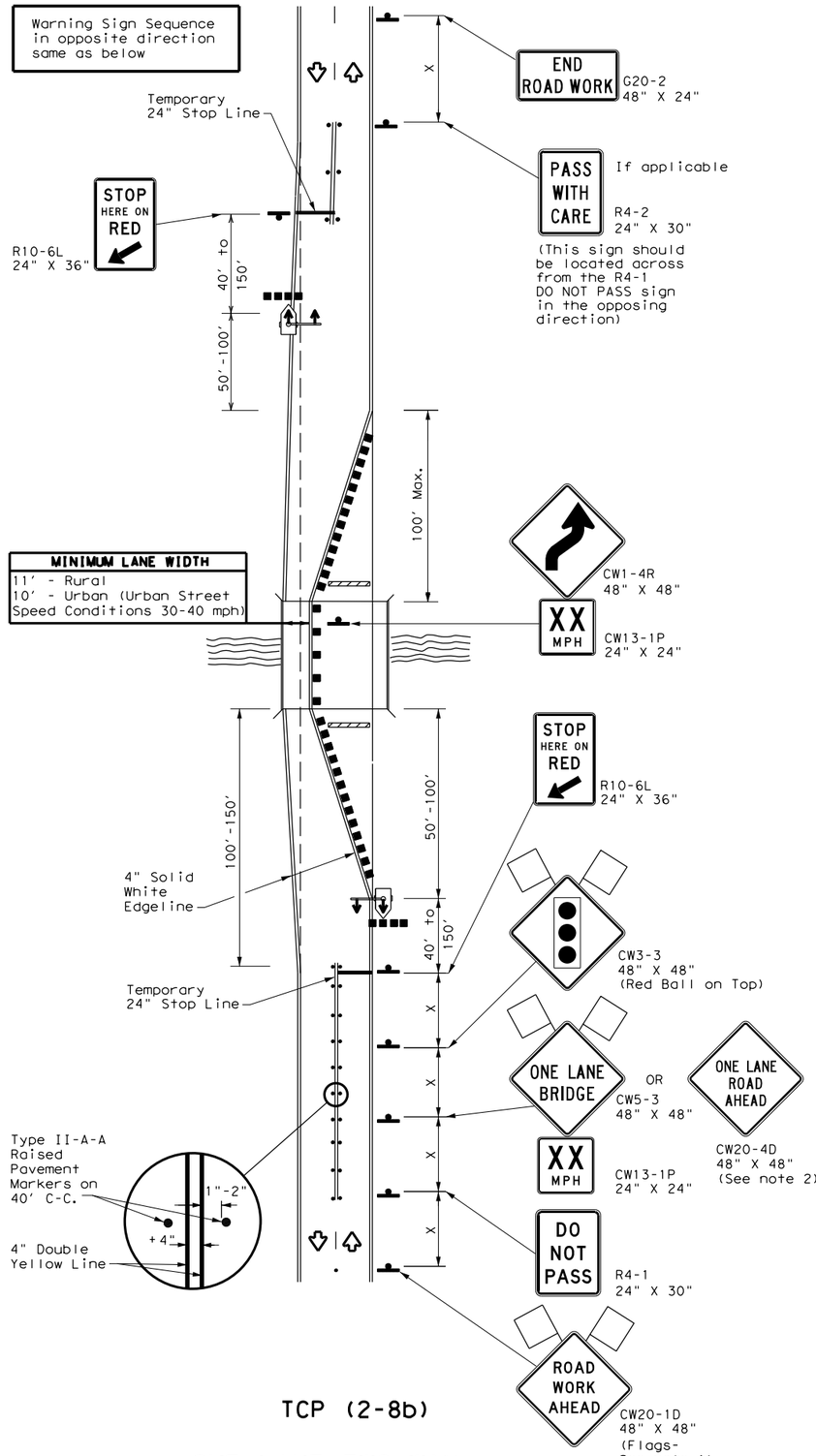


TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (2-8a)

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

TCP (2-8b)

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

Texas Department of Transportation

Traffic Operations Division Standard

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

TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
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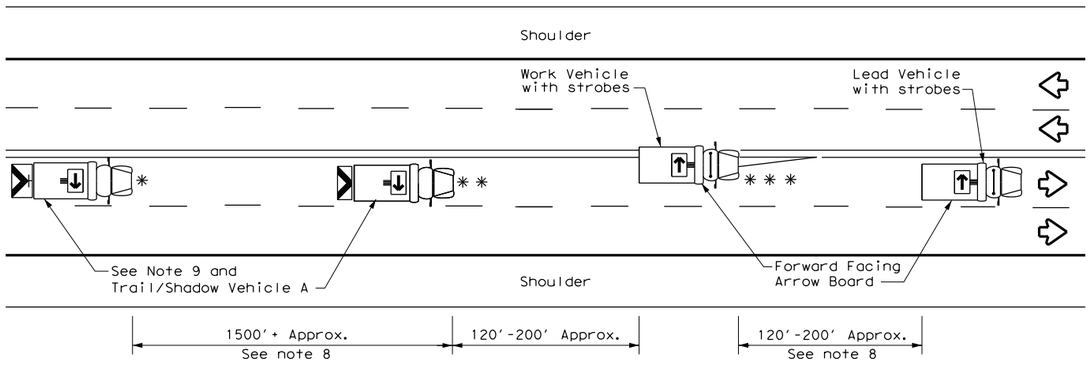
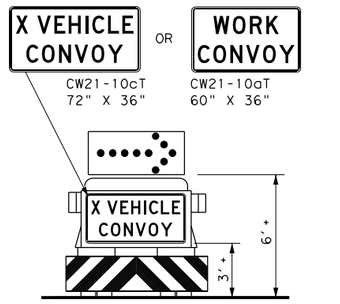
1-97 2-12	AUS	GILLESPIE		37
4-98 2-18				



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

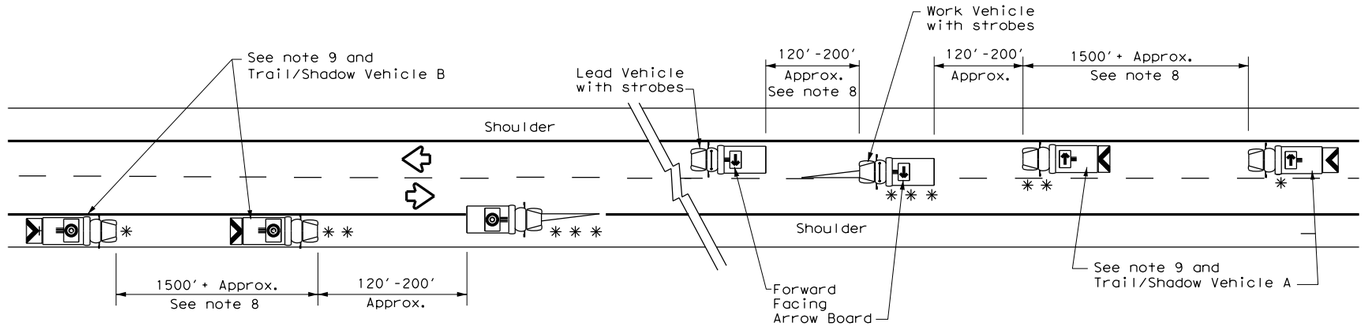
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

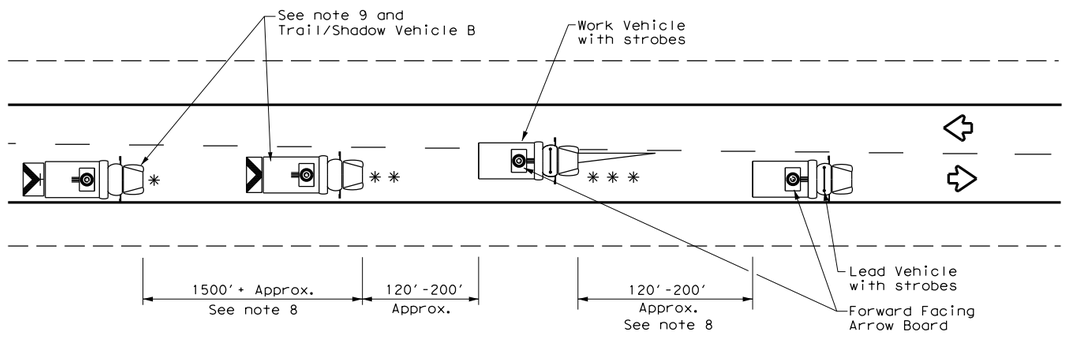


WORK ON SHOULDER

WORK ON TRAVEL LANE

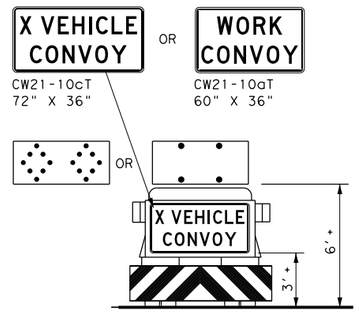
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



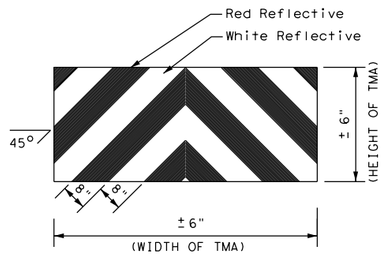
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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	AUS	GILLESPIE		38

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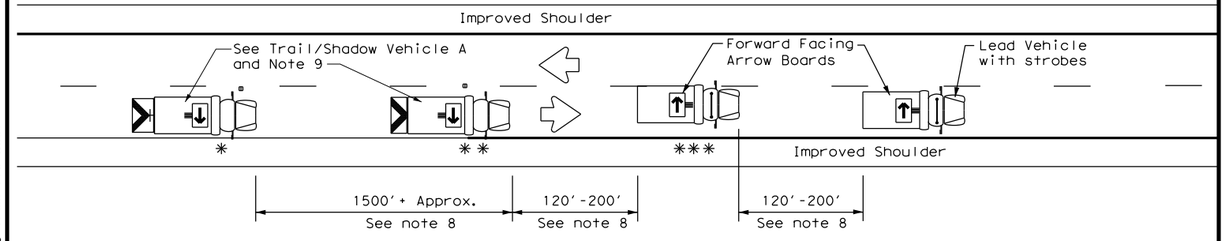
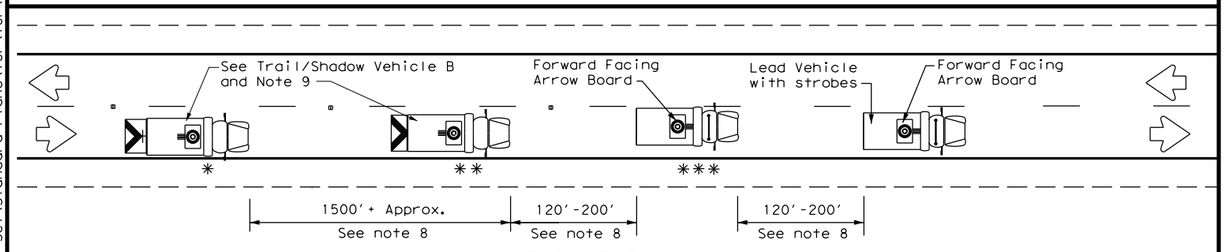


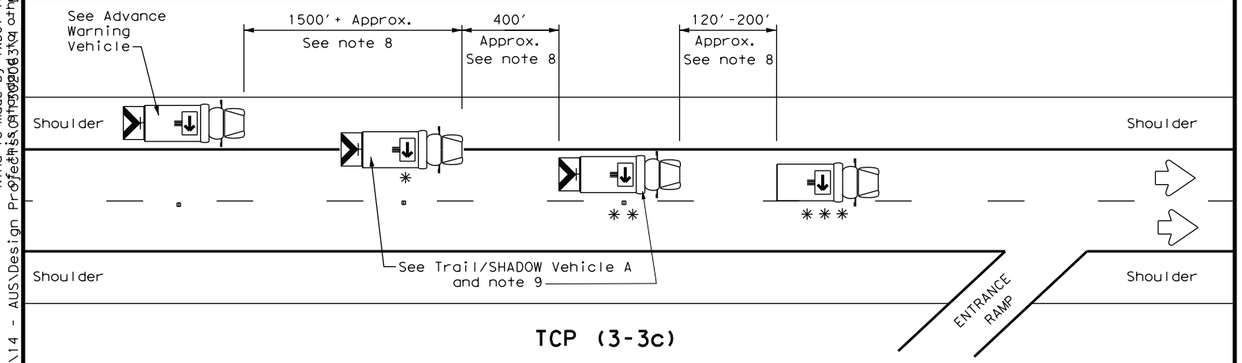
TCP (3-3a)

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



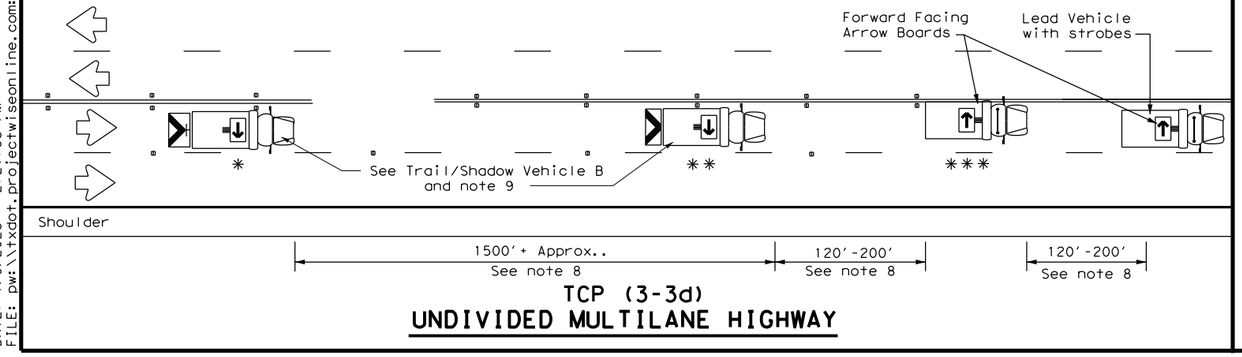
TCP (3-3b)

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



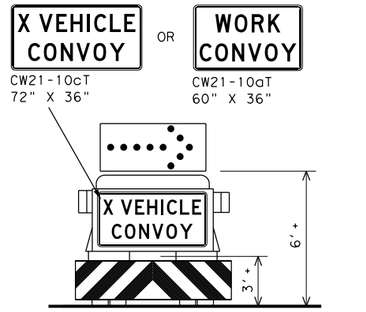
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



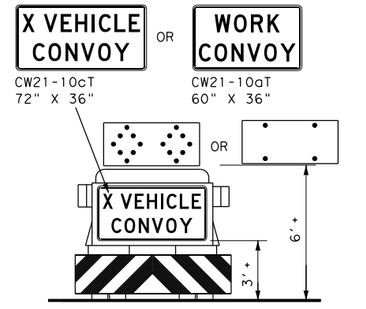
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



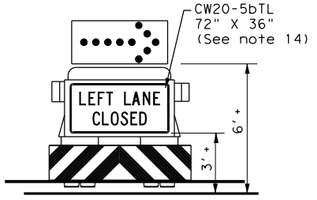
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

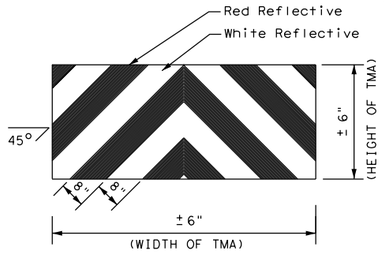


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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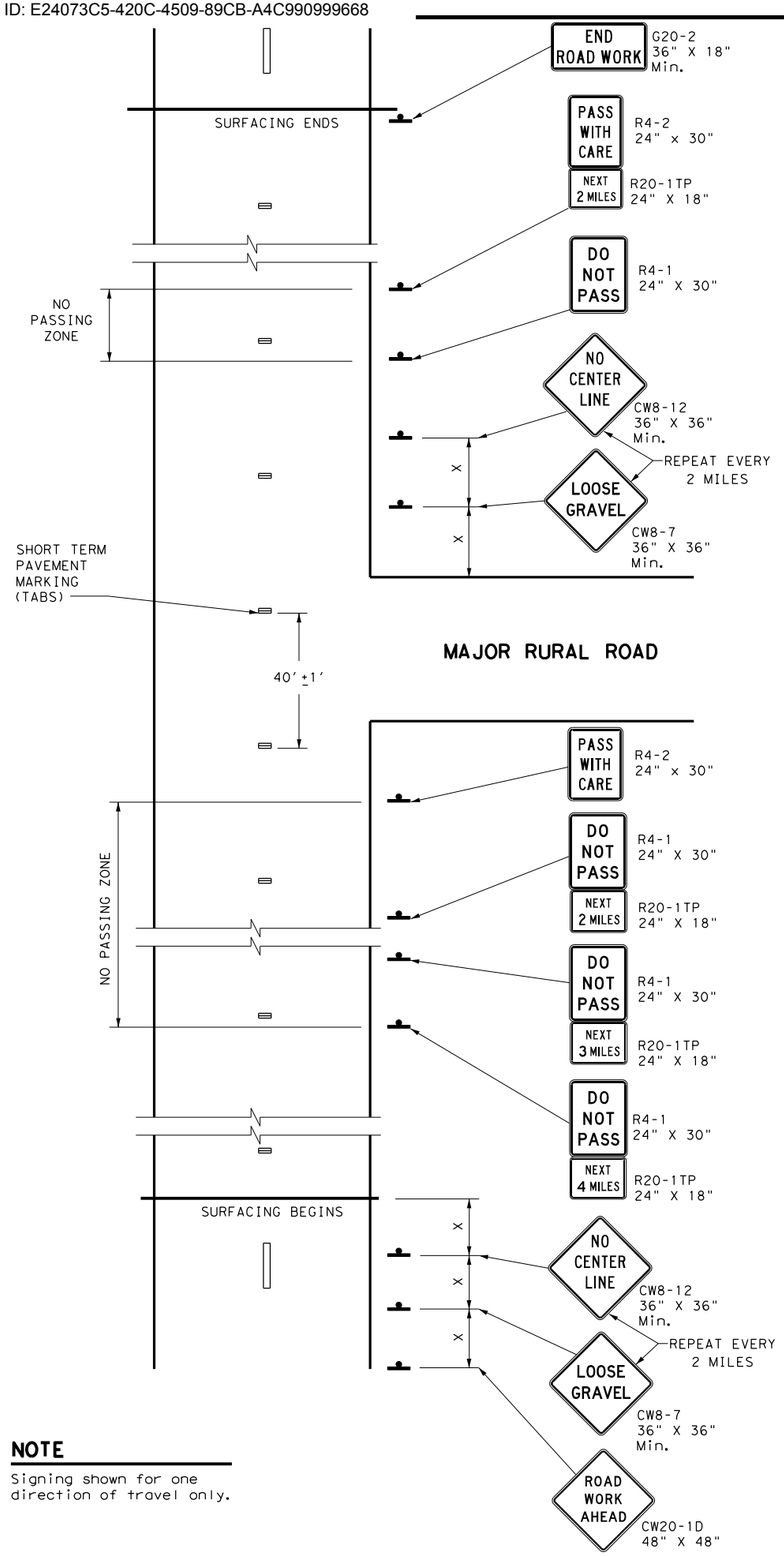
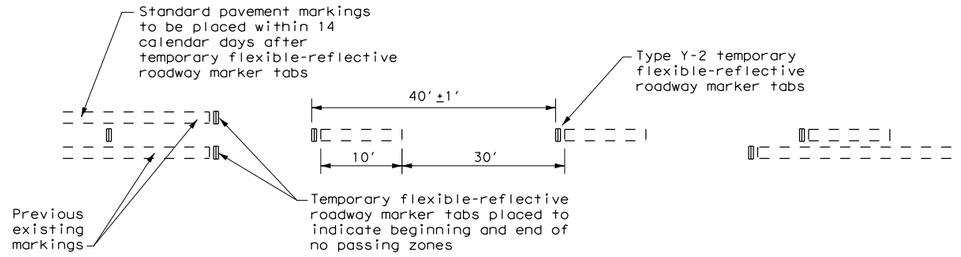


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

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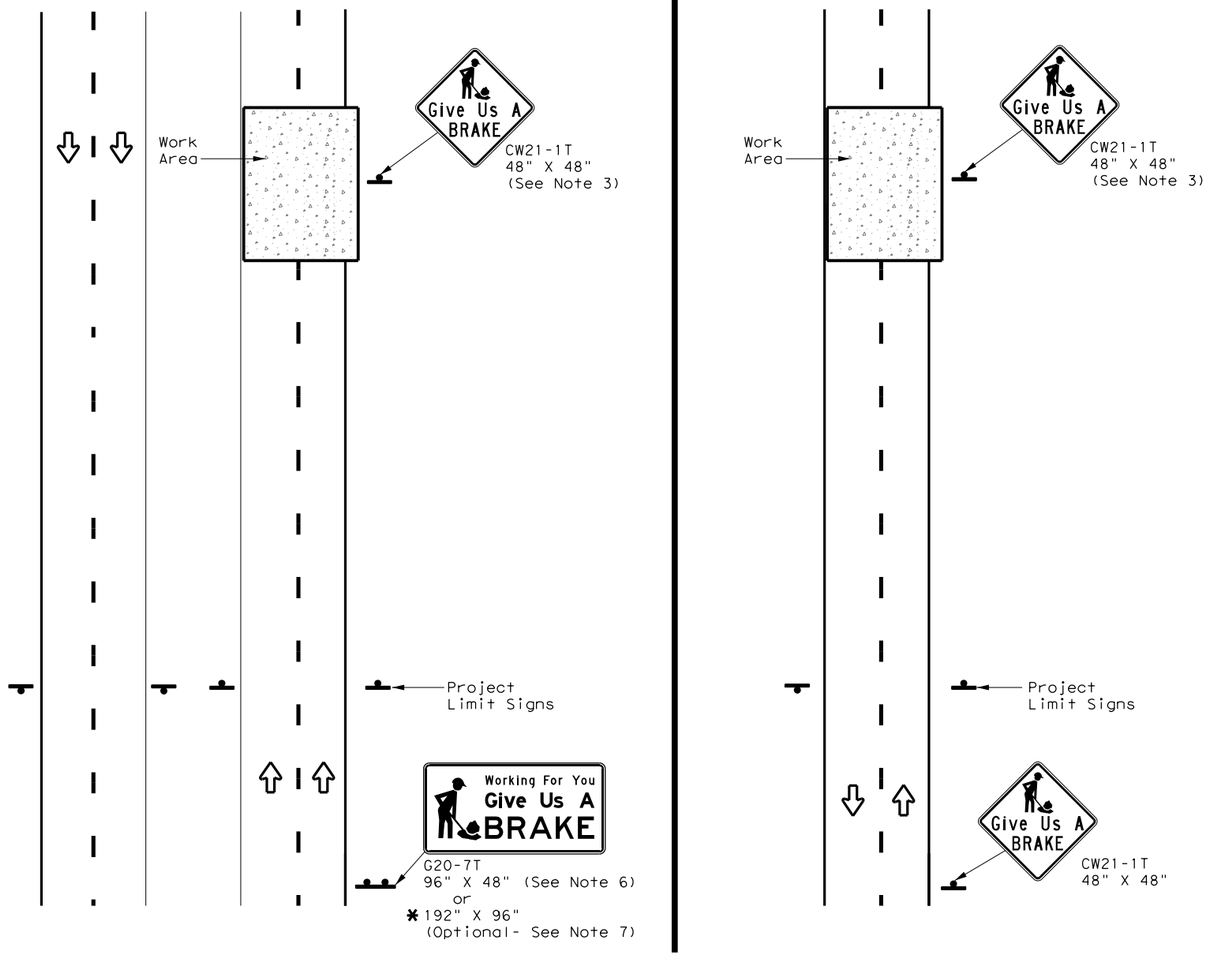

DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

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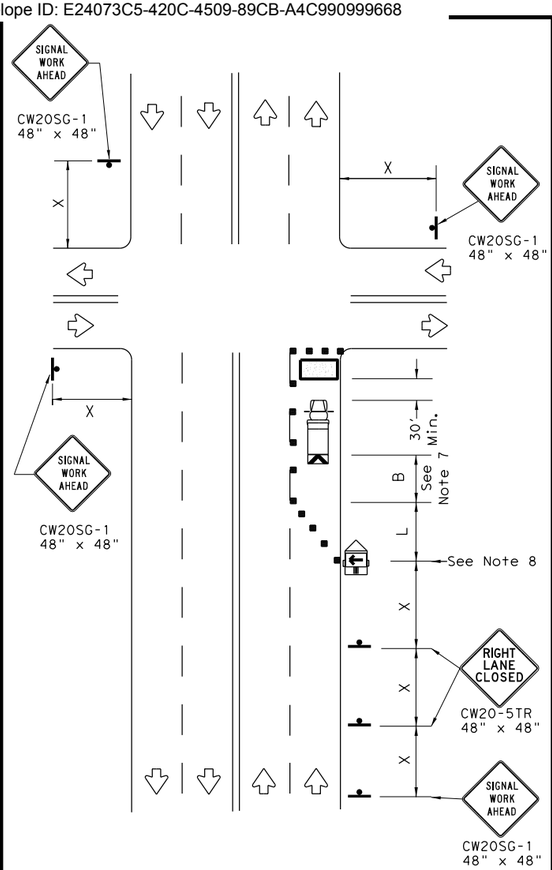
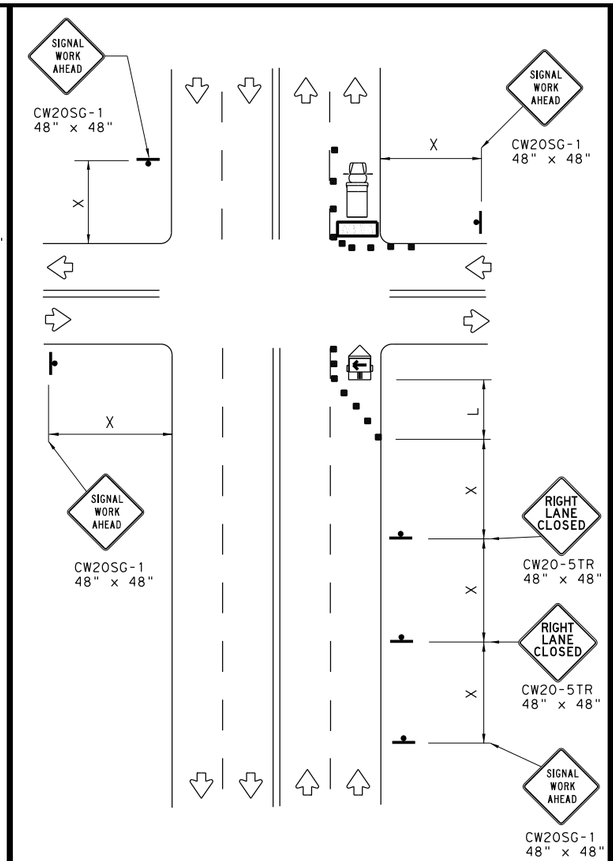


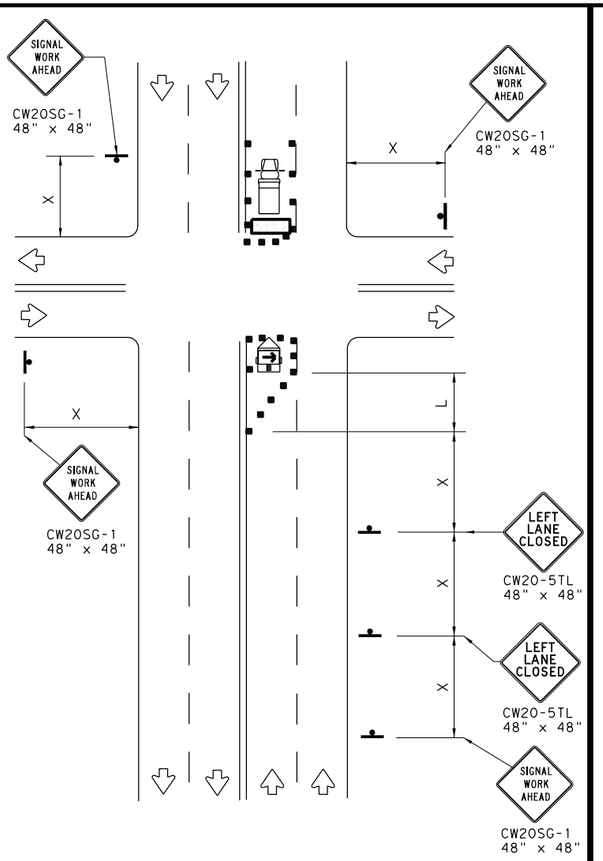
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

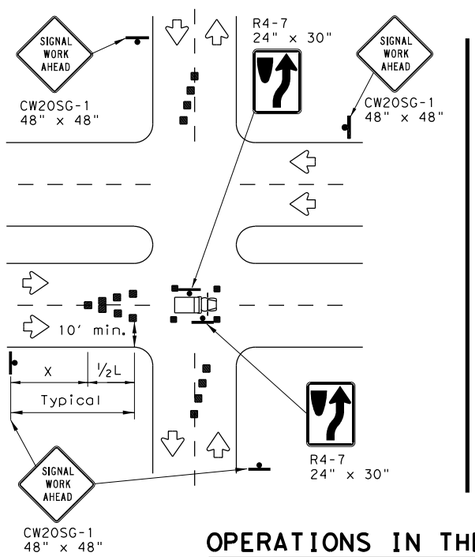
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

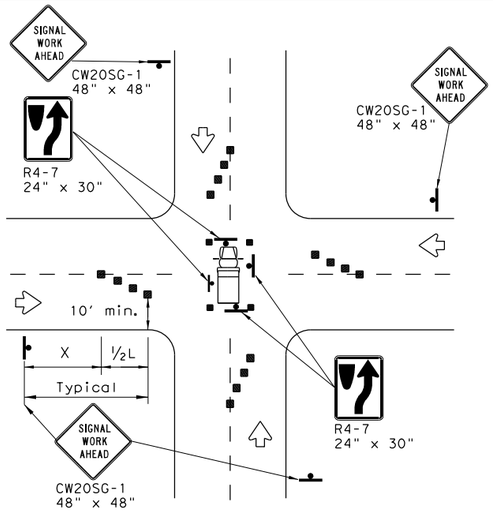
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'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

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.





OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation | *Traffic Operations Division Standard*

TRAFFIC SIGNAL WORK TYPICAL DETAILS

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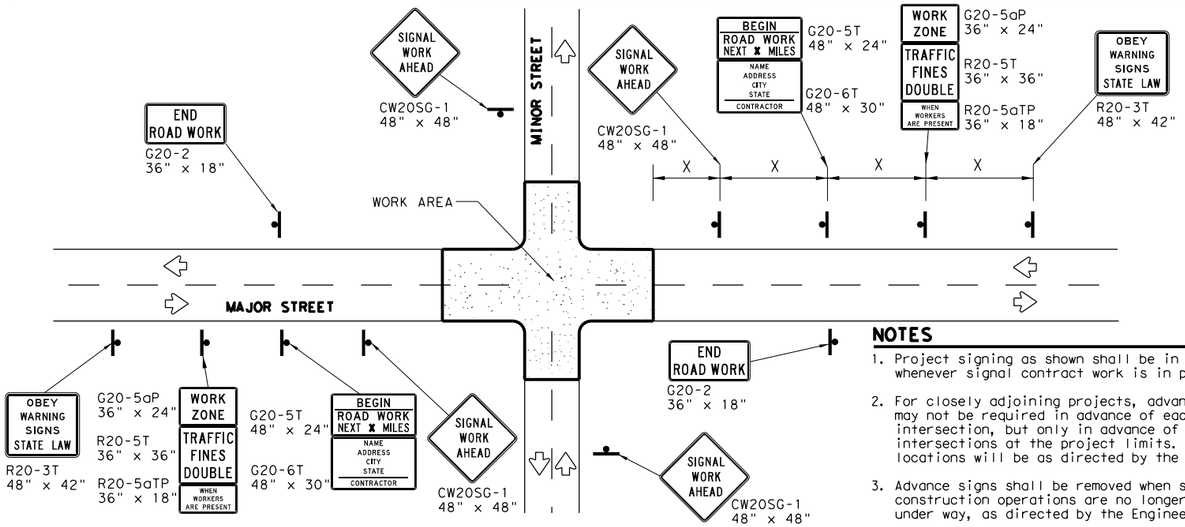


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

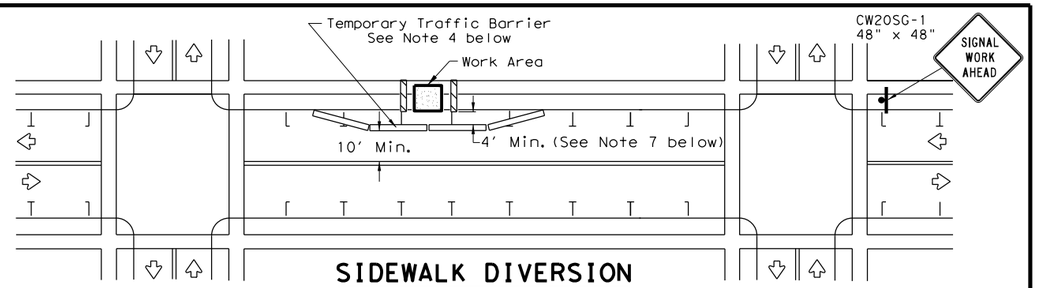
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fastners. 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.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

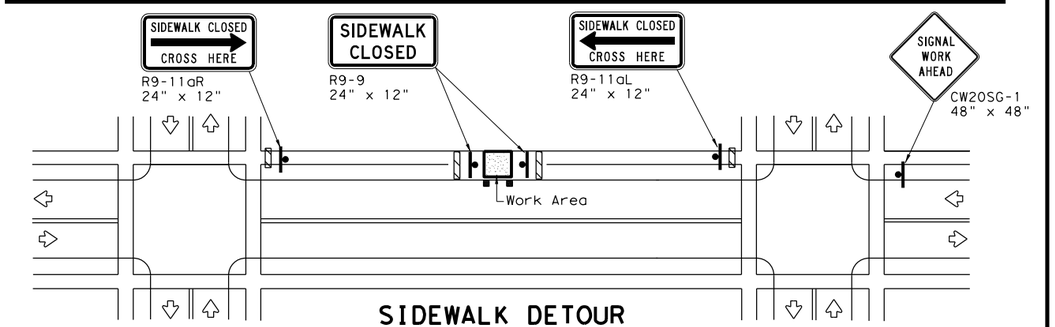
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

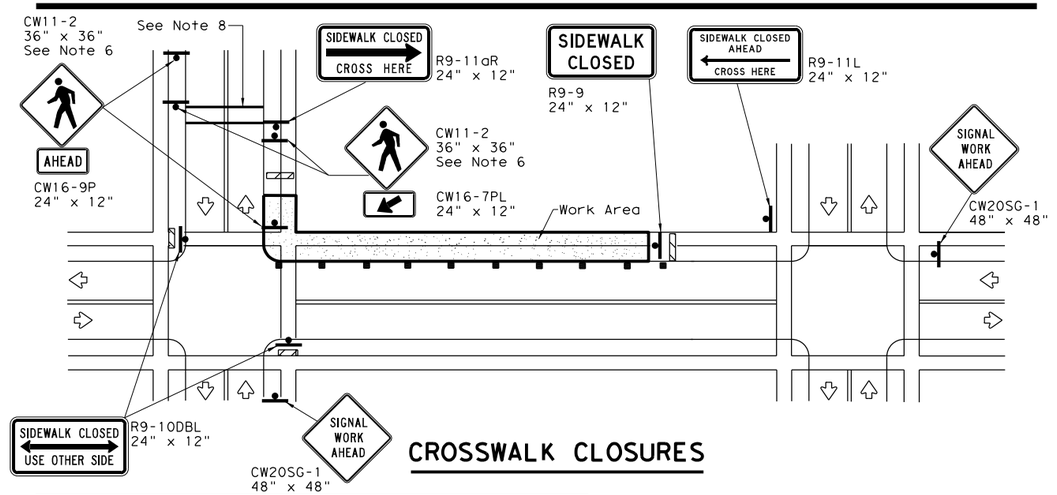
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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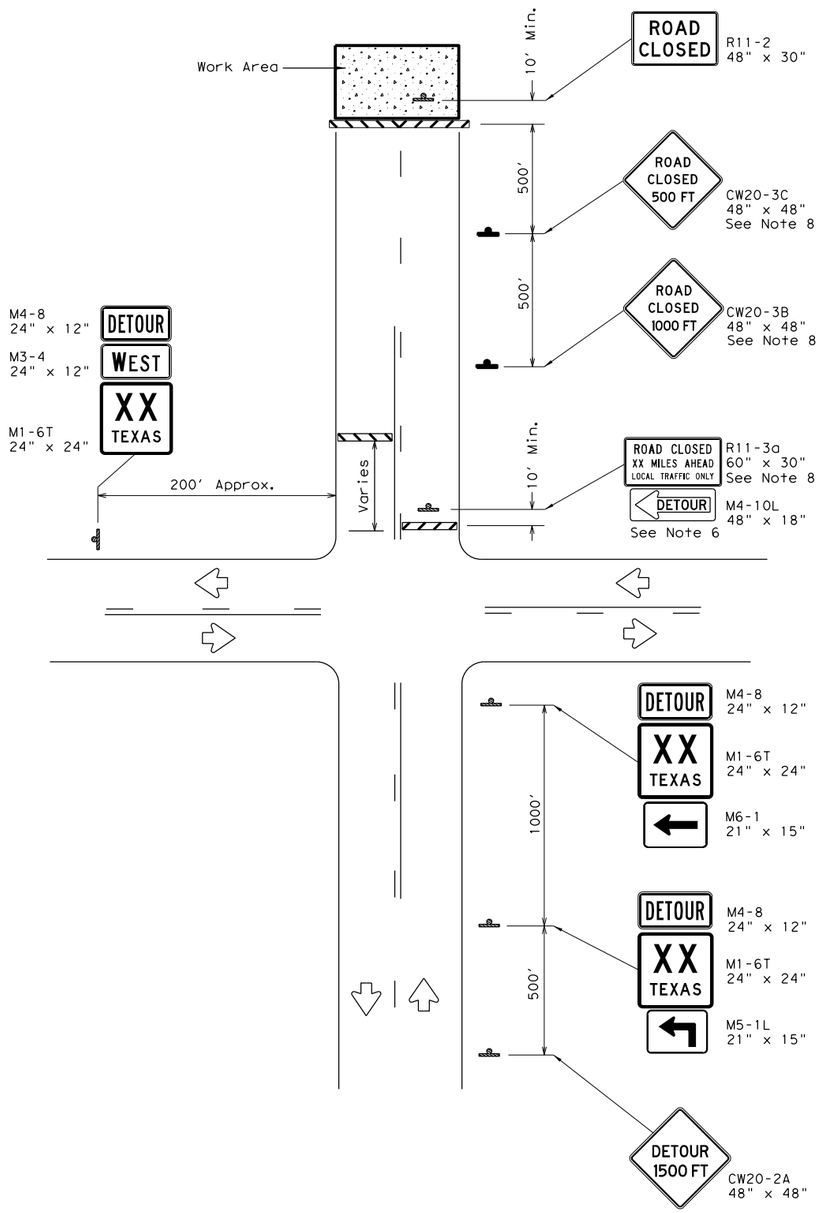
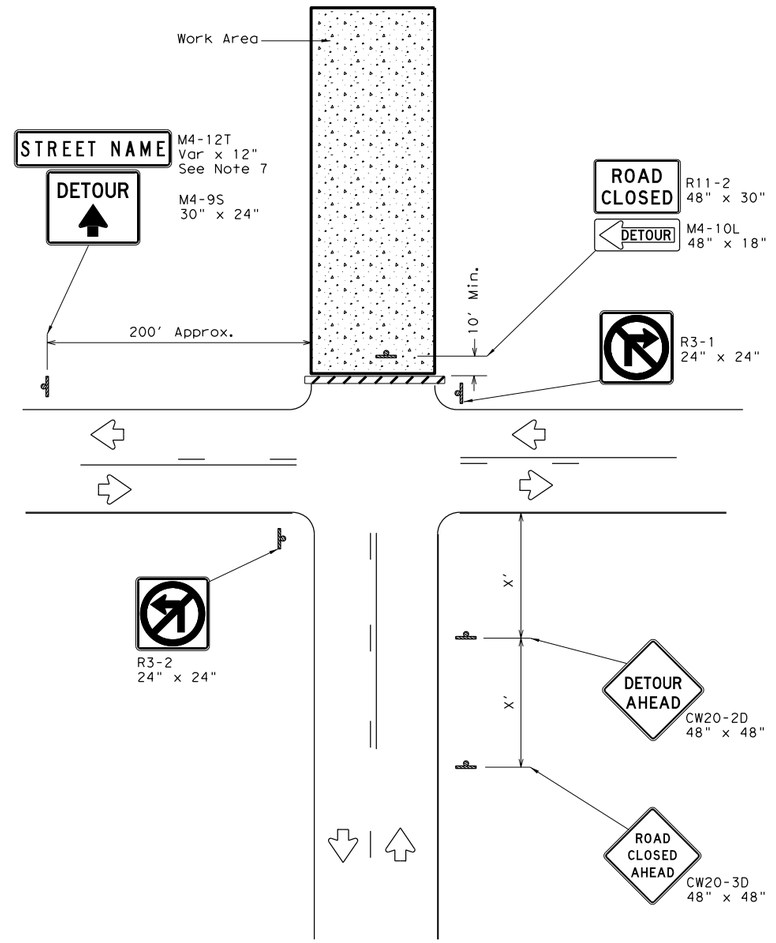
4-98 3-03	AUS	GILLESPIE		43



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

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©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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2-98 3-03	AUS	GILLESPIE		44

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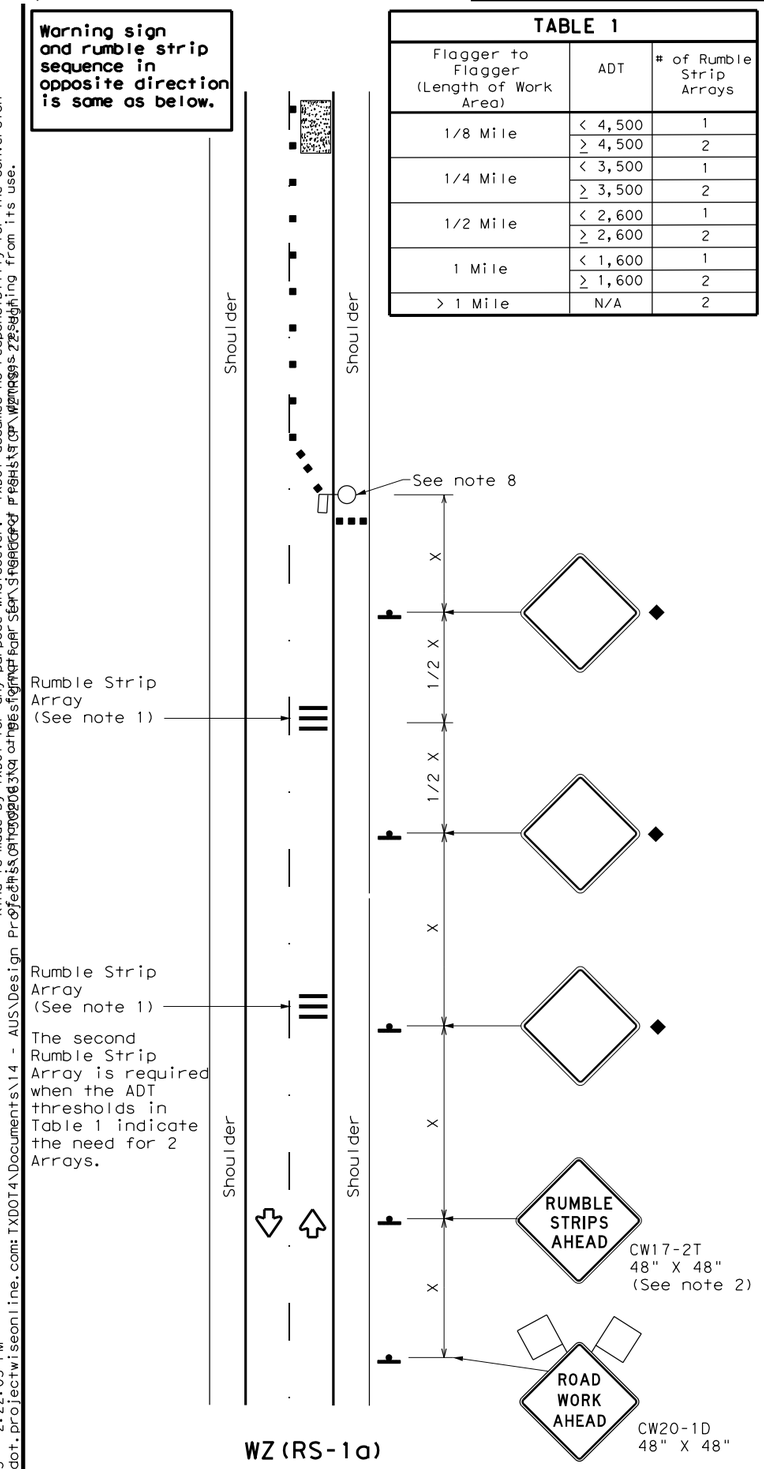
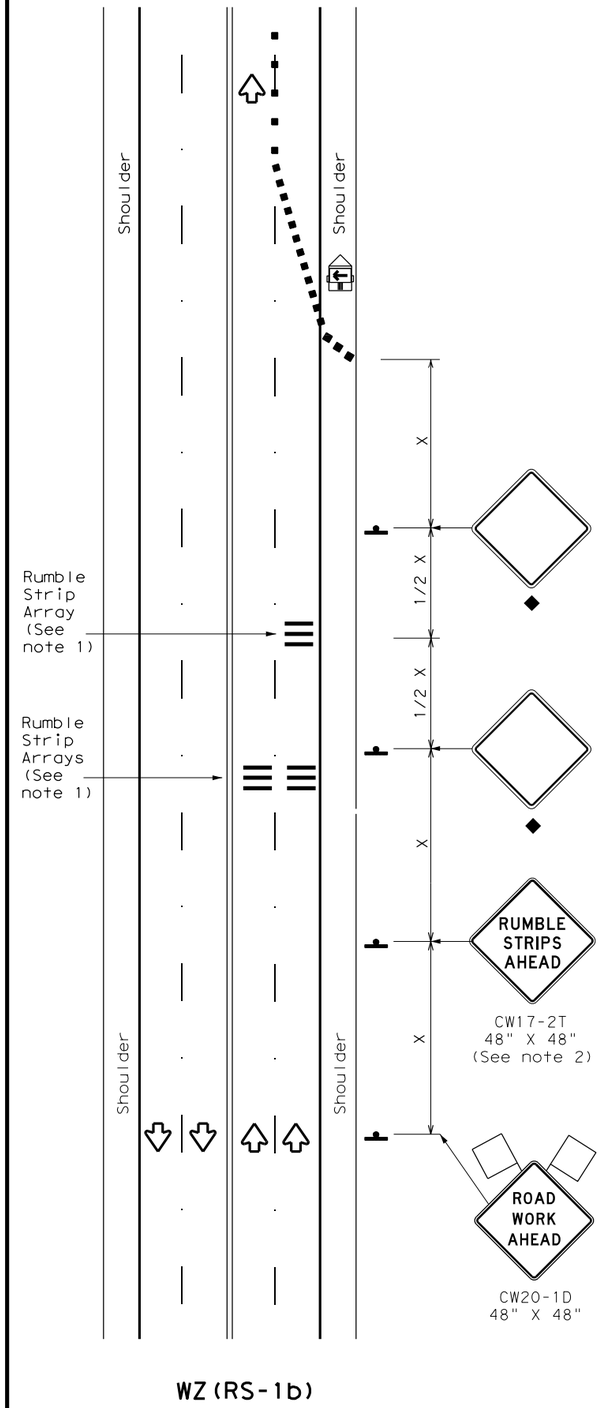
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

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©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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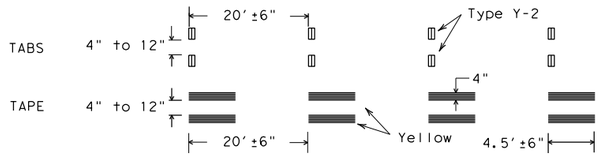
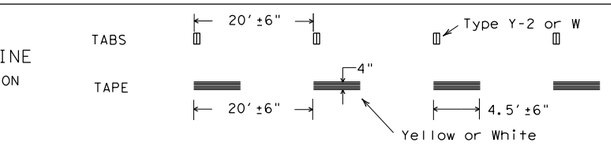
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

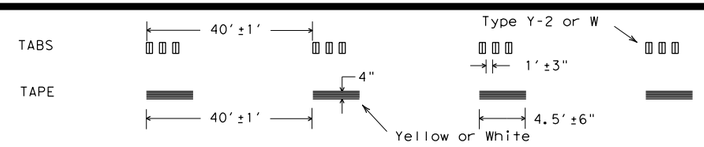


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



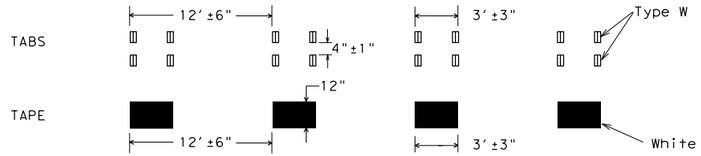
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

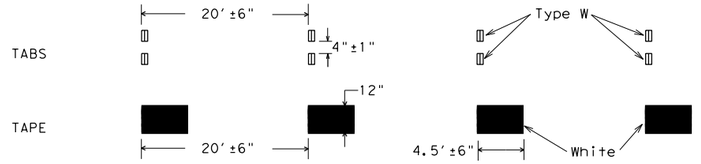


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



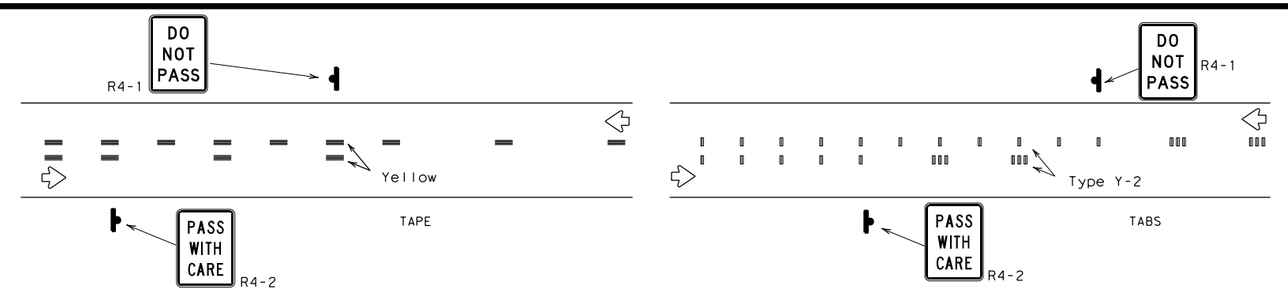
NOTES:

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

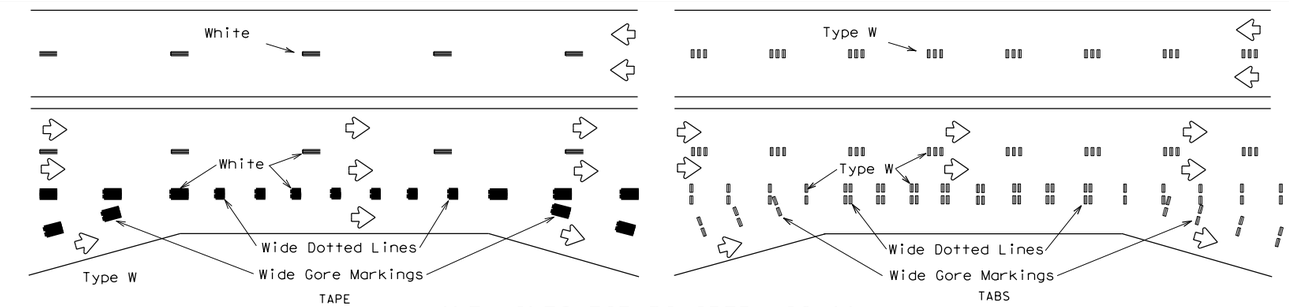
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

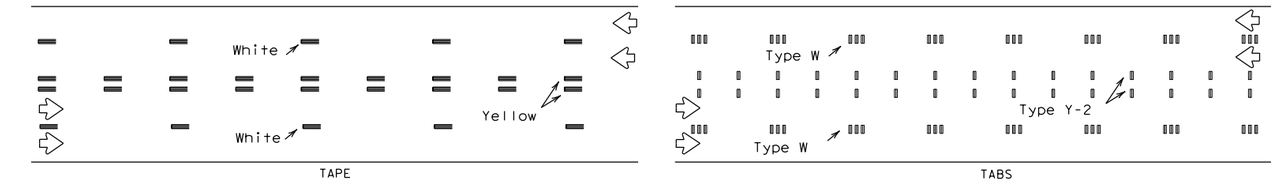
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



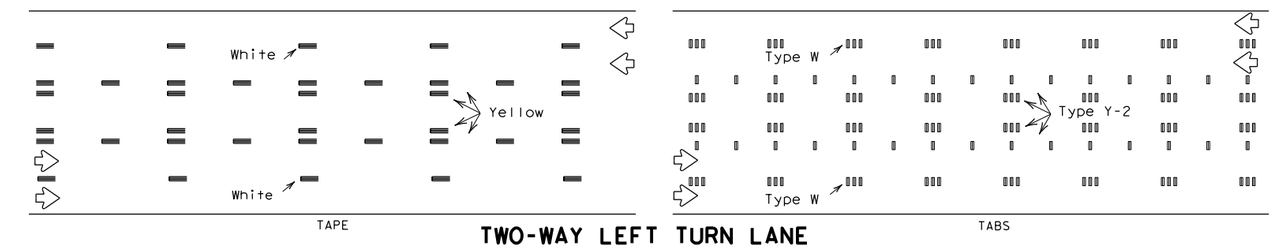
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



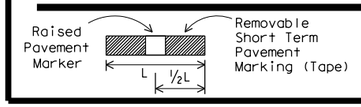
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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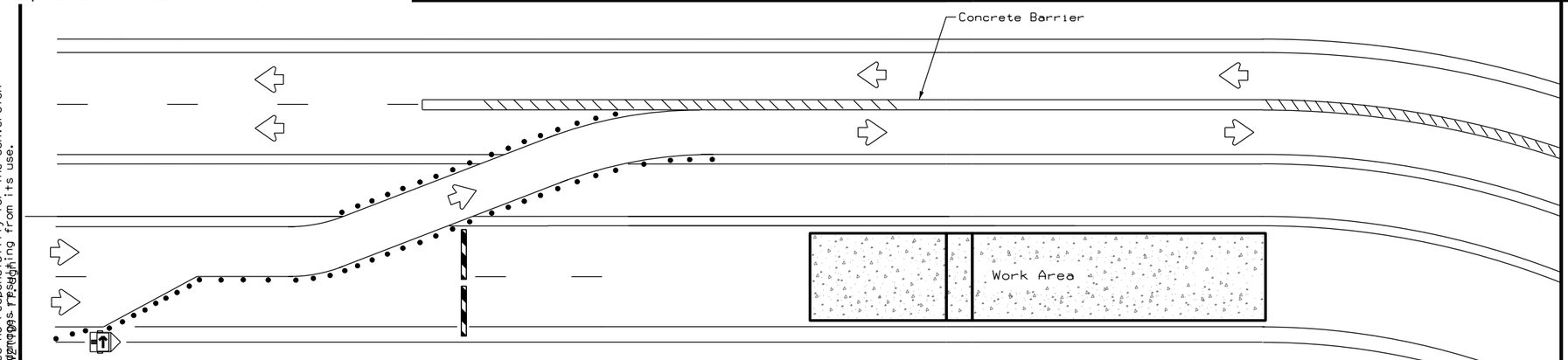


NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

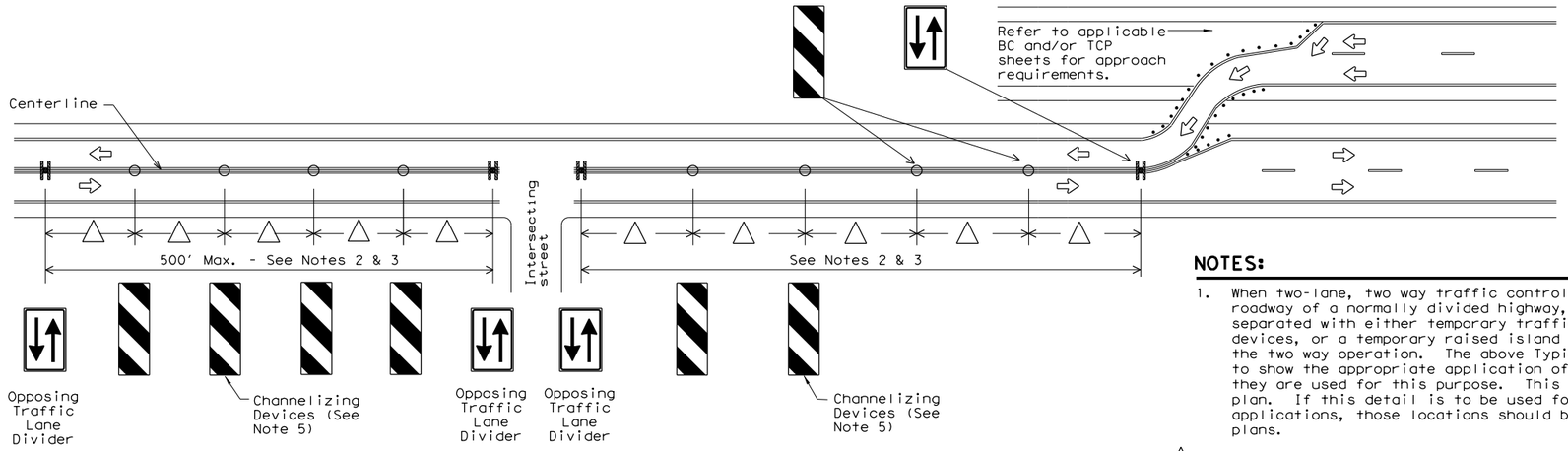
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.
2. △ Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

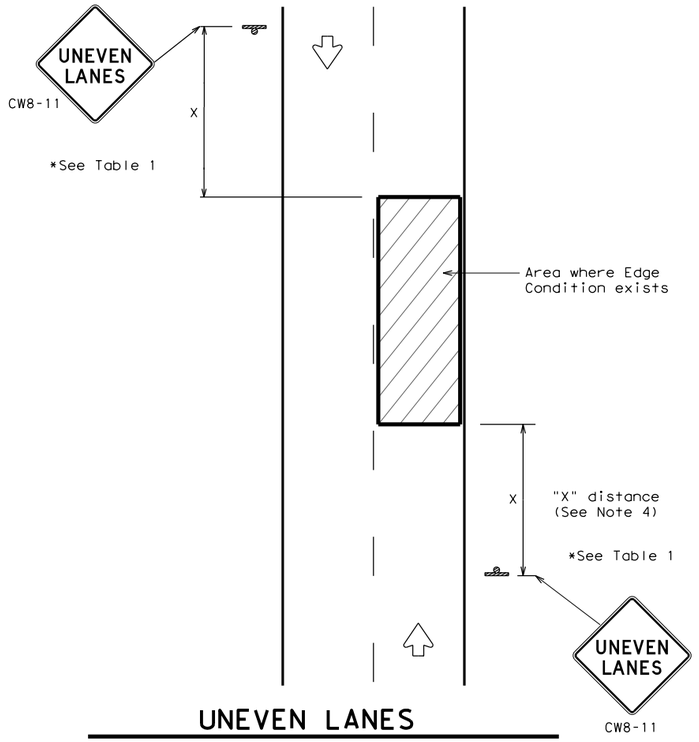
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

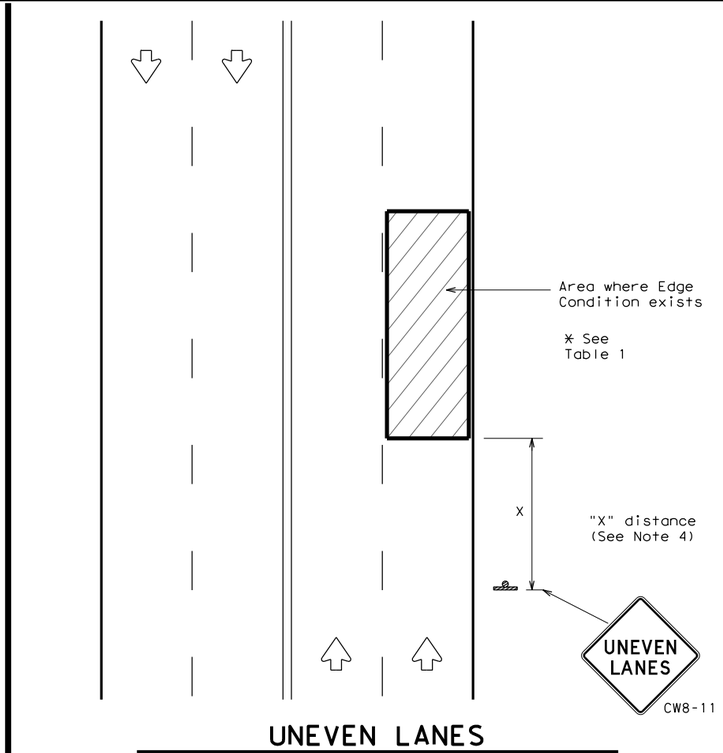
WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		47

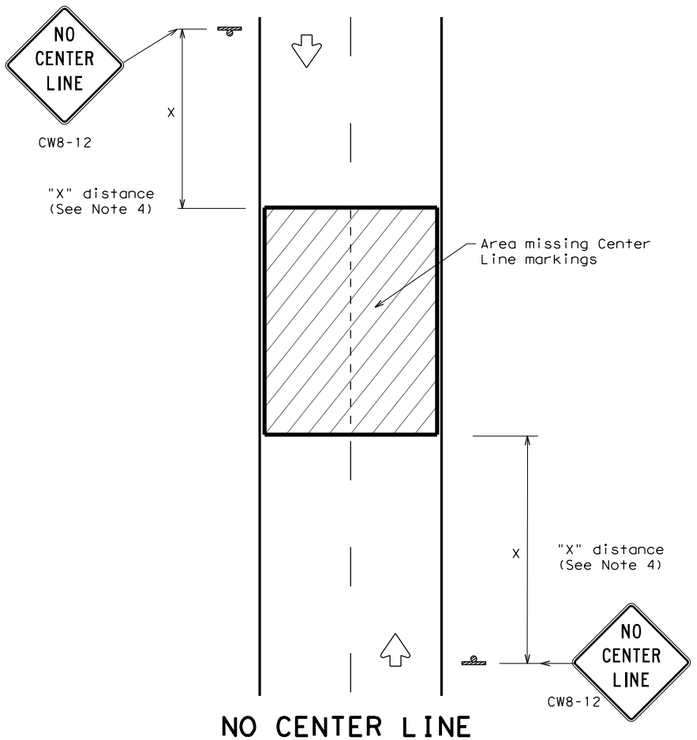
DATE: 1/9/2023 2:22:22 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\93306\Traffic Signing\Standards\wzul-13.dgn



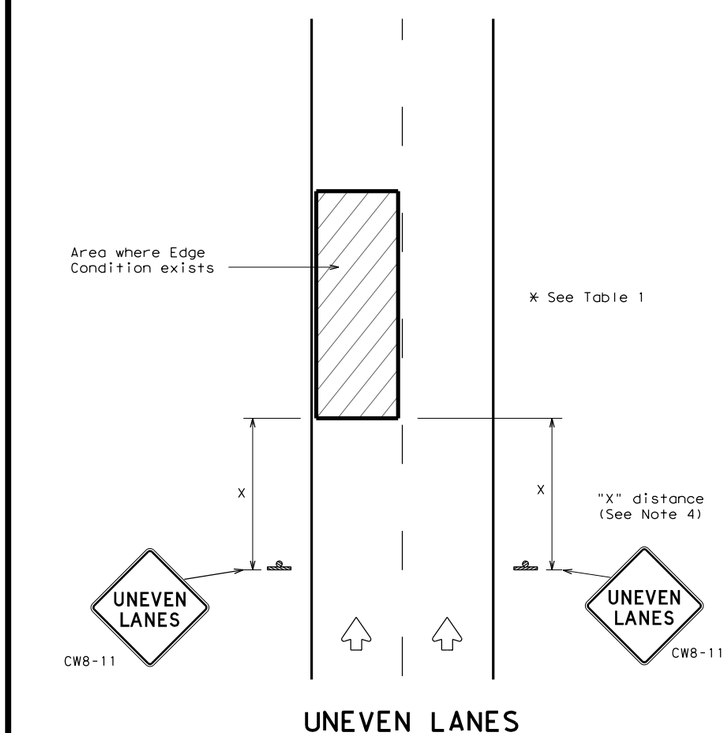
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

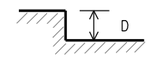
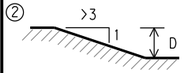
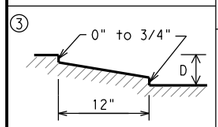
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

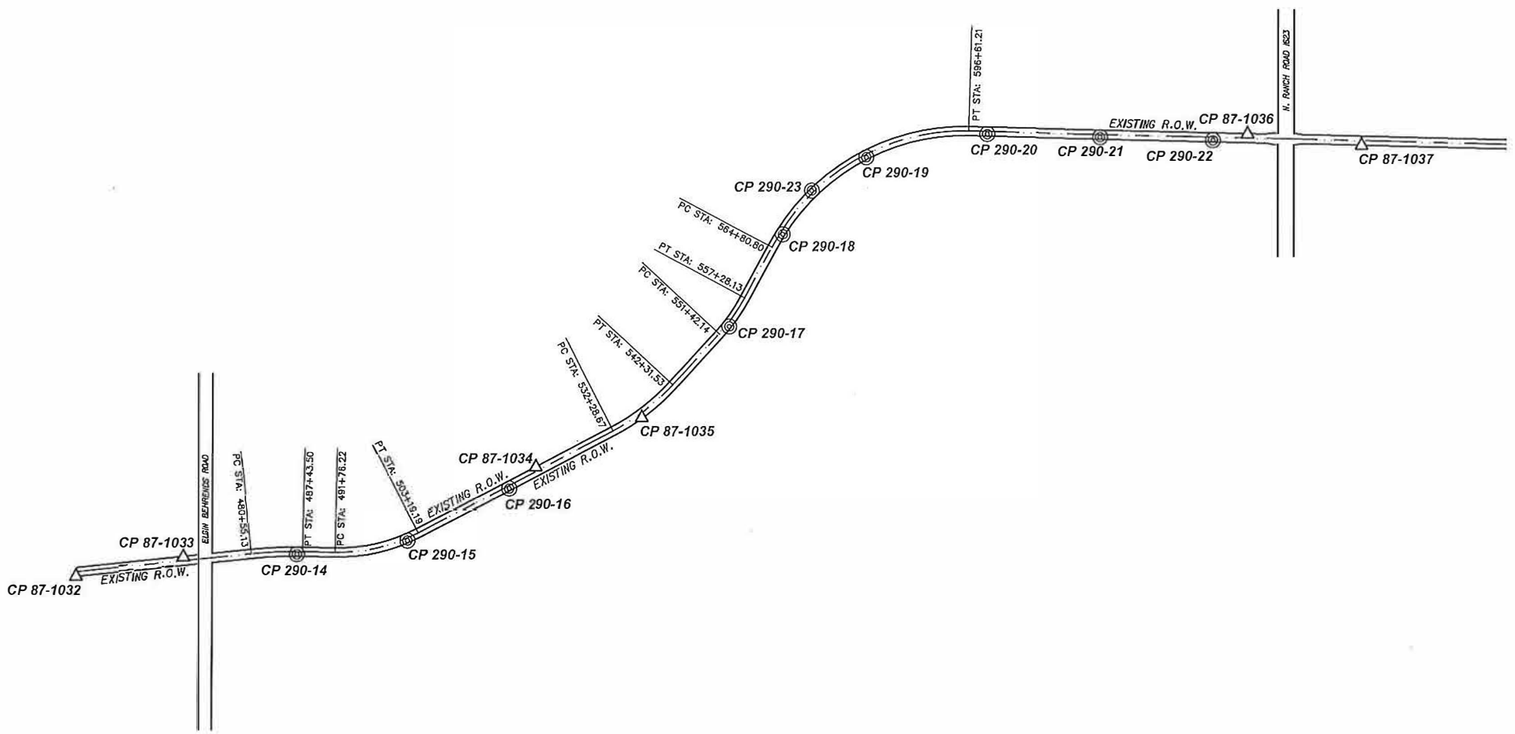
Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	AUS	GILLESPIE		48



PRIMARY CONTROL				
POINT #	NORTH	EAST	ELEV.	DESCRIPTION
87-1032	10,048,664.58	2,810,478.50	1,489.26	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER
87-1033	10,048,918.40	2,811,903.61	1,493.43	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER
87-1034	10,050,100.04	2,816,565.60	1,473.34	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER
87-1035	10,050,748.08	2,817,977.47	1,466.05	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER
87-1036	10,054,474.34	2,826,002.63	1,450.26	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER
87-1037	10,054,323.13	2,827,523.35	1,458.34	SET 3/4" ALUMINUM ROD DRIVEN TO REFUSAL WITH ACCESS COVER

SECONDARY CONTROL				
POINT #	NORTH	EAST	ELEV.	DESCRIPTION
290-14	10,048,951.51	2,813,405.43	1,490.38	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-15	10,049,132.60	2,814,875.96	1,479.23	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-16	10,049,817.50	2,816,212.66	1,477.79	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-17	10,051,950.46	2,819,135.46	1,463.64	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-18	10,053,165.54	2,819,832.81	1,459.59	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-19	10,054,178.75	2,820,943.43	1,458.55	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-20	10,054,476.73	2,822,549.04	1,460.98	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-21	10,054,438.79	2,824,049.19	1,461.39	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-22	10,054,392.72	2,825,548.66	1,449.36	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP
290-23	10,053,741.04	2,820,217.68	1,461.44	SET 5/8" IRON ROD WITH TxDOT ALUMINUM CAP

0 50 100

SCALE 1" = 1,000' 22" x 34"
SCALE 1" = 2,000' 11" x 17"

NOTES:

1.) PRIMARY AND SECONDARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS WITH TxDOT VRS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1".

2.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00010 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010, TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00010

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE TxDOT VRS ELEVATIONS OF CONTROL POINTS 87-1024, 87-1031, 87-1032, AND 87-1037.

LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- FIRE HYDRANT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

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

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

STATE OF TEXAS REGISTERED DARRYL L. ZERCHER 5609 PROFESSIONAL LAND SURVEYOR

02 OCT 2019

DARRYL L. ZERCHER — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5609

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TBPE NO. F-1733 • TBPLS NO. 100495-00

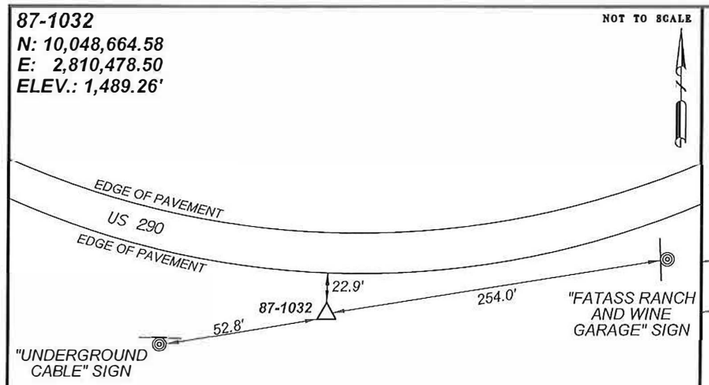
2019 Texas Department of Transportation

US 290 HORIZONTAL & VERTICAL CONTROL SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		49

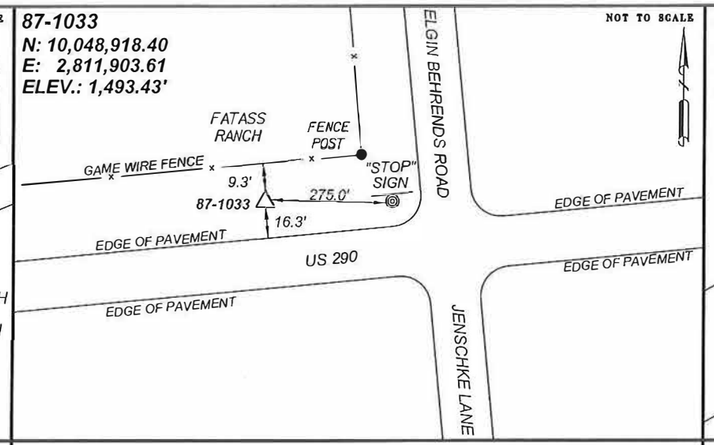
STATE	DIST.	COUNTY	
TEXAS	14	GILLESPIE	
CONT.	SECT.	JOB	HIGHWAY NO.
0113	02	063	US 290

87-1032
N: 10,048,664.58
E: 2,810,478.50
ELEV.: 1,489.26'



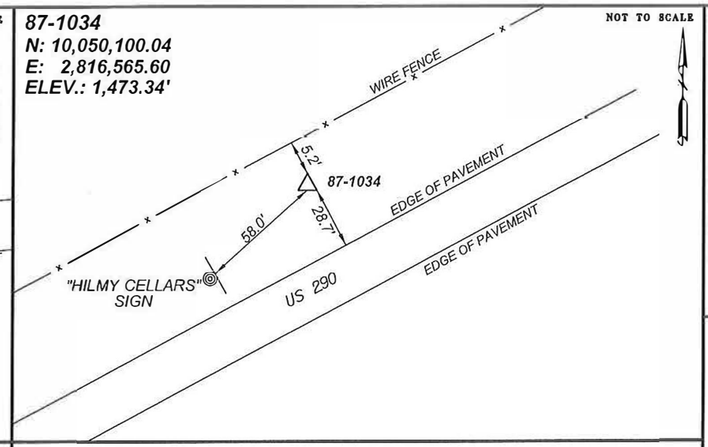
87-1032 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 5.4 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE SOUTH SIDE OF US 290 APPROXIMATELY 0.30 OF A MILE SOUTHWEST FROM THE INTERSECTION OF JENSCHKE LANE AND US 290.

87-1033
N: 10,048,918.40
E: 2,811,903.61
ELEV.: 1,493.43'



87-1033 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 9.6 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE NORTH SIDE OF US 290 APPROXIMATELY 215 FEET WEST OF THE INTERSECTION OF ELGIN BEHRENDS RD AND US 290.

87-1034
N: 10,050,100.04
E: 2,816,565.60
ELEV.: 1,473.34'



87-1034 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 6.6 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE NORTH SIDE OF US 290 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF HAHN ROAD AND US 290.

NOTES:

1.) PRIMARY AND SECONDARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS WITH TxDOT VRS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1".

2.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00010 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010, TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00010

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE TxDOT VRS ELEVATIONS OF CONTROL POINTS 87-1024, 87-1031, 87-1032, AND 87-1037.

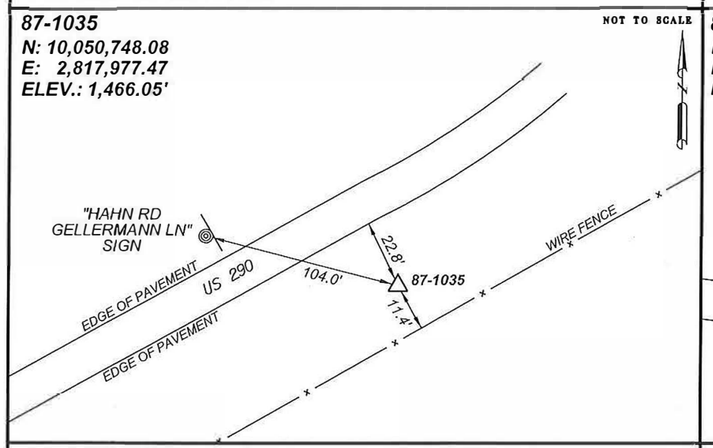
LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- FIRE HYDRANT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

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

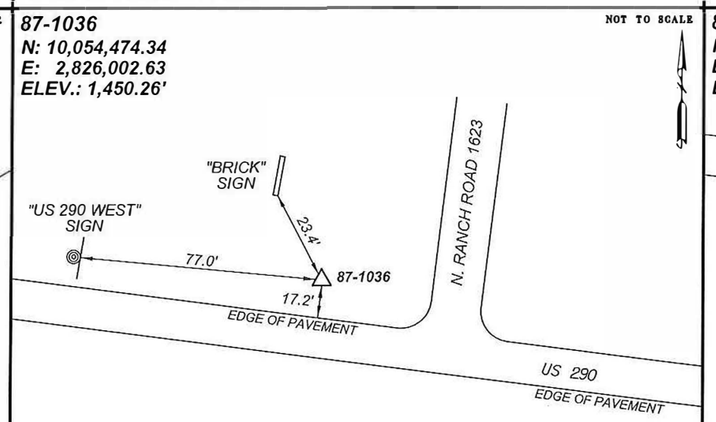
THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

87-1035
N: 10,050,748.08
E: 2,817,977.47
ELEV.: 1,466.05'



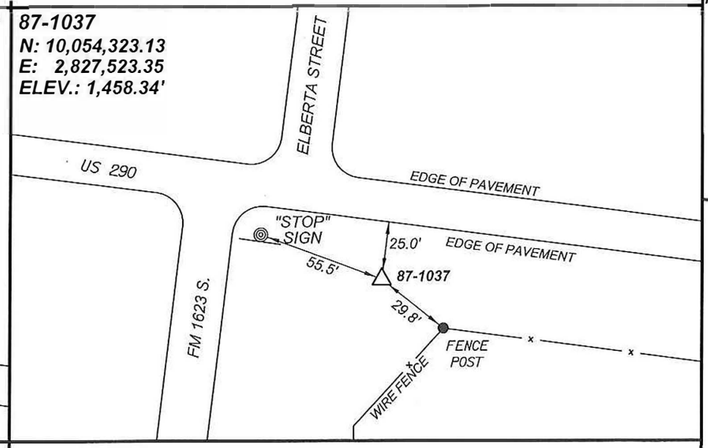
87-1035 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 1.7 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE SOUTH SIDE OF US 290 APPROXIMATELY 0.1 OF A MILE NORTHEAST OF THE INTERSECTION GELLERMANN LANE AND US 290.

87-1036
N: 10,054,474.34
E: 2,826,002.63
ELEV.: 1,450.26'



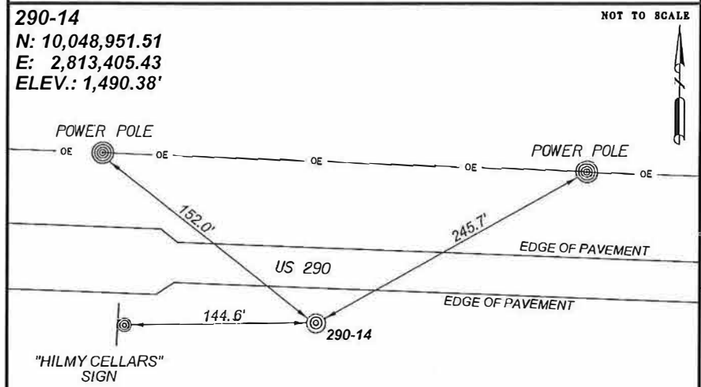
87-1036 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 6.1 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE NORTH SIDE OF US 290 APPROXIMATELY 154 FEET WEST OF THE INTERSECTION OF N. RANCH ROAD 1623 AND US 290.

87-1037
N: 10,054,323.13
E: 2,827,523.35
ELEV.: 1,458.34'



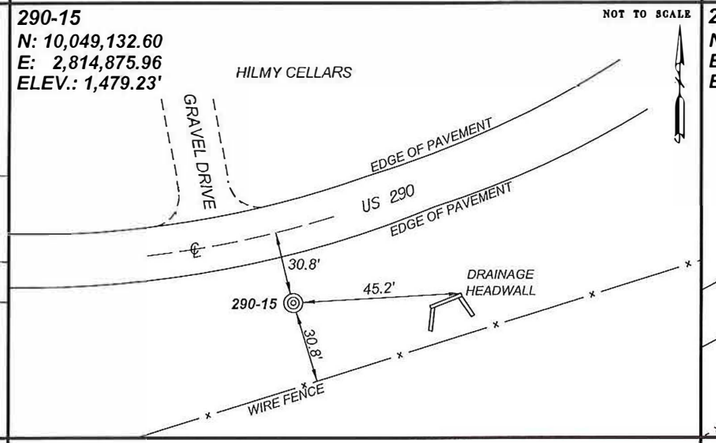
87-1037 IS A 3/4" ALUMINUM DEEP ROD DRIVEN TO REFUSAL AT A DEPTH OF 6.4 FEET WITH AN ACCESS COVER SET IN CONCRETE ON THE SOUTH SIDE OF US 290 AT THE SOUTHEAST CORNER OF THE INTERSECTION OF N. RANCH ROAD 1623 AND US 290.

290-14
N: 10,048,951.51
E: 2,813,405.43
ELEV.: 1,490.38'



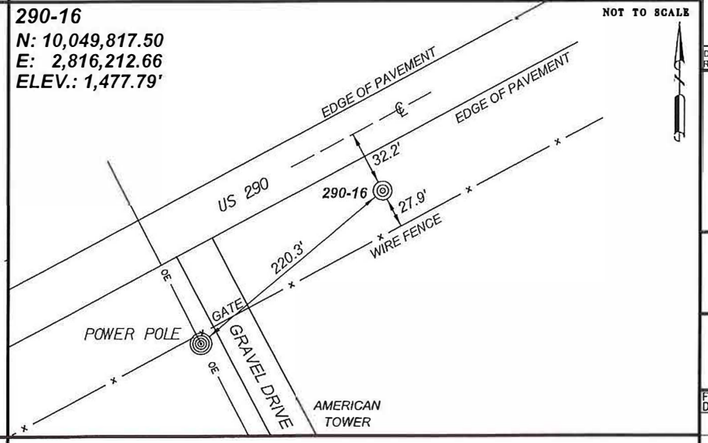
290-14 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 0.2 OF A MILE EAST OF THE INTERSECTION OF JENSCHKE LANE AND US 290.

290-15
N: 10,049,132.60
E: 2,814,875.96
ELEV.: 1,479.23'



290-15 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 0.5 OF A MILE SOUTHWEST OF THE INTERSECTION OF HAHN ROAD AND US 290.

290-16
N: 10,049,817.50
E: 2,816,212.66
ELEV.: 1,477.79'



290-16 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF US 290 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF HAHN ROAD AND US 290.

STATE OF TEXAS REGISTERED DARRYL L. ZERCHER 5609 PROFESSIONAL LAND SURVEYOR

02 OCT 2019

DARRYL L. ZERCHER — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5609

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TBPE NO. F-1733 • TBPLS NO. 100195-00

2019 Texas Department of Transportation

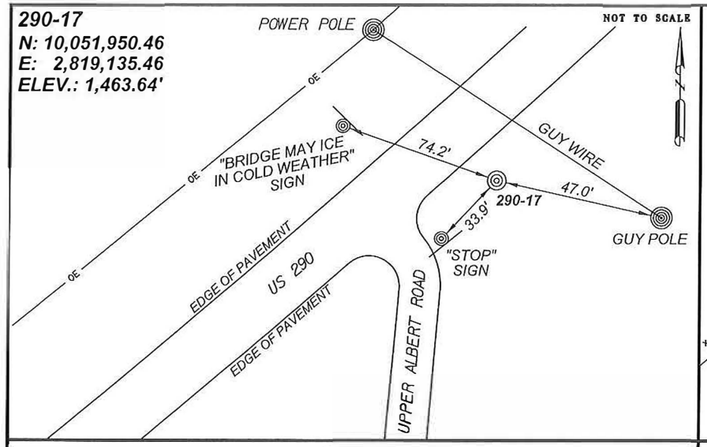
US 290
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		50

STATE	DIST.	COUNTY	
TEXAS	14	GILLESPIE	
CONT.	SECT.	JOB	HIGHWAY NO.
0113	02	063	US 290

290-17

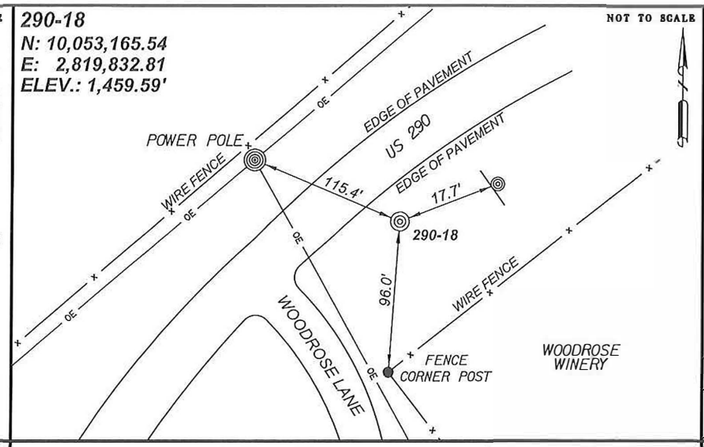
N: 10,051,950.46
E: 2,819,135.46
ELEV.: 1,463.64'



290-17 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE EAST SIDE OF US 290 AT THE NORTHEAST CORNER OF THE INTERSECTION OF UPPER ALBERT ROAD AND US 290.

290-18

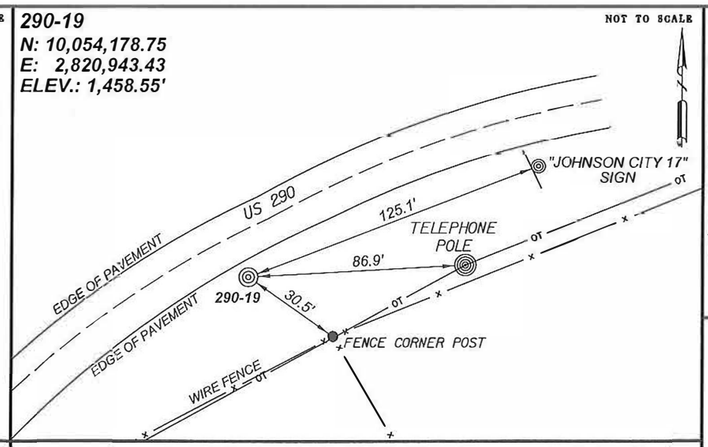
N: 10,053,165.54
E: 2,819,832.81
ELEV.: 1,459.59'



290-18 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE EAST SIDE OF US 290 APPROXIMATELY 142 FEET NORTHEAST OF THE INTERSECTION OF WOODROSE LANE AND US 290.

290-19

N: 10,054,178.75
E: 2,820,943.43
ELEV.: 1,458.55'



290-19 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 0.1 OF A MILE NORTHEAST OF THE INTERSECTION OF RANCH ROAD 1 AND US 290.

NOTES:

1.) PRIMARY AND SECONDARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS WITH TxDOT VRS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1".

2.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00010 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010, TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00010

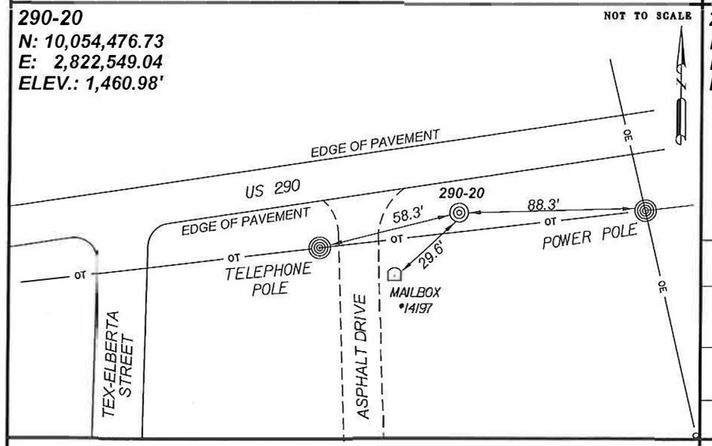
4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE TxDOT VRS ELEVATIONS OF CONTROL POINTS 87-1024, 87-1031, 87-1032, AND 87-1037.

LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- FIRE HYDRANT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

290-20

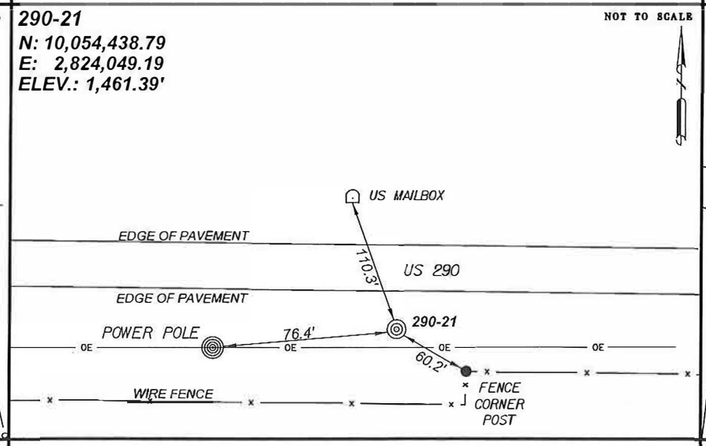
N: 10,054,476.73
E: 2,822,549.04
ELEV.: 1,460.98'



290-11 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 130 FEET EAST OF THE INTERSECTION OF TEX-ELBERTA STREET AND US 290.

290-21

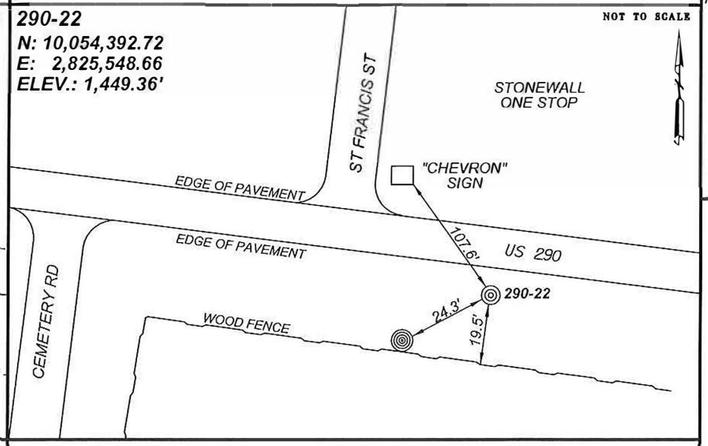
N: 10,054,438.79
E: 2,824,049.19
ELEV.: 1,461.39'



290-21 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 240 FEET EAST OF THE INTERSECTION OF KEYSTONE STREET AND US 290.

290-22

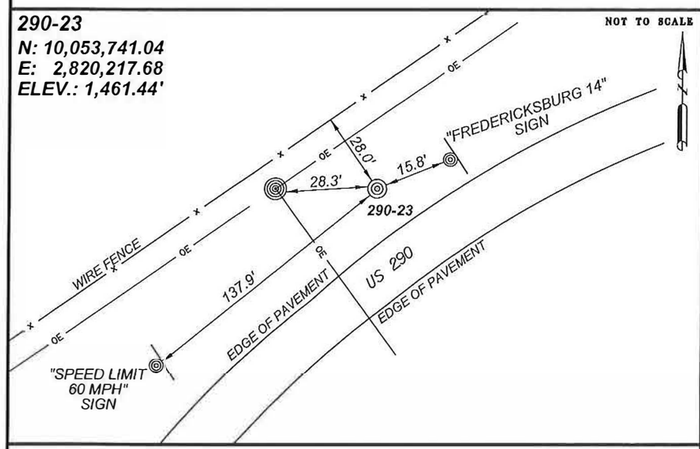
N: 10,054,392.72
E: 2,825,548.66
ELEV.: 1,449.36'



290-22 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE SOUTH SIDE OF US 290 APPROXIMATELY 50 FEET EAST OF THE INTERSECTION OF ST FRANCIS STREET AND US 290.

290-23

N: 10,053,741.04
E: 2,820,217.68
ELEV.: 1,461.44'



290-23 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET ON THE NORTHWEST SIDE OF US 290 APPROXIMATELY 0.2 OF A MILE NORTHEAST OF THE INTERSECTION OF WOODROSE LANE AND US 290.

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

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

STATE OF TEXAS REGISTERED DARRYL L. ZERCHER 5609 PROFESSIONAL LAND SURVEYOR

02 OCT 2019

DARRYL L. ZERCHER — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5609

CDS muery
ENGINEERS • SURVEYORS
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

2019 Texas Department of Transportation

US 290
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		51

STATE	DIST.	COUNTY	
TEXAS	14	GILLESPIE	
CONT.	SECT.	JOB	HIGHWAY NO.
0113	02	063	US 290

<* 2 Describe Chain US290*EAST

Chain US290*EAST contains:
147 CUR US290*EAST*3 CUR US290*EAST*6 CUR US290*EAST*9 CUR US290*EAST*12 CUR US290*EAST*15 148

Beginning chain US290*EAST description
Feature: Geom*Centerline

Point 147 N 10,048,724.3045 E 2,810,502.4995 Sta 457+52.20

Course from 147 to PC US290*EAST*3 N 84° 13′ 47.28" E Dist 2,302.9274

Curve Data

Curve US290*EAST*3
P.I. Station 483+99.73 N 10,048,990.4838 E 2,813,136.6123
Delta = 6° 52′ 42.72" (RT)
Degree = 0° 59′ 57.29"
Tangent = 344.6000
Length = 688.3720
Radius = 5,733.8981
External = 10.3457
Long Chord = 687.9587
Mid. Ord. = 10.3270
P.C. Station 480+55.13 N 10,048,955.8381 E 2,812,793.7583
P.T. Station 487+43.50 N 10,048,983.8182 E 2,813,481.1478
C.C. N 10,043,250.9929 E 2,813,370.2376
Back = N 84° 13′ 47.28" E
Ahead = S 88° 53′ 29.99" E
Chord Bear = N 87° 40′ 08.65" E

Course from PT US290*EAST*3 to PC US290*EAST*6 S 88° 53′ 29.99" E Dist 432.7170

Curve Data

Curve US290*EAST*6
P.I. Station 497+59.82 N 10,048,964.1597 E 2,814,497.2746
Delta = 28° 32′ 15.05" (LT)
Degree = 2° 29′ 48.43"
Tangent = 583.6000
Length = 1,142.9700
Radius = 2,294.7814
External = 73.0469
Long Chord = 1,131.1922
Mid. Ord. = 70.7934
P.C. Station 491+76.22 N 10,048,975.4483 E 2,813,913.7838
P.T. Station 503+19.19 N 10,049,232.9962 E 2,815,015.2669
C.C. N 10,051,269.8003 E 2,813,958.1715
Back = S 88° 53′ 29.99" E
Ahead = N 62° 34′ 14.95" E
Chord Bear = N 76° 50′ 22.48" E

Course from PT US290*EAST*6 to PC US290*EAST*9 N 62° 34′ 14.95" E Dist 2,909.4795

Curve Data

Curve US290*EAST*9
P.I. Station 537+35.27 N 10,050,806.6196 E 2,818,047.3138
Delta = 20° 01′ 30.06" (LT)
Degree = 1° 59′ 48.41"
Tangent = 506.6000
Length = 1,002.8652
Radius = 2,869.4081
External = 44.3775
Long Chord = 997.7688
Mid. Ord. = 43.7016
P.C. Station 532+28.67 N 10,050,573.2533 E 2,817,597.6653
P.T. Station 542+31.53 N 10,051,179.8505 E 2,818,389.8662
C.C. N 10,053,120.0851 E 2,816,275.8671
Back = N 62° 34′ 14.95" E
Ahead = N 42° 32′ 44.89" E
Chord Bear = N 52° 33′ 29.92" E

Course from PT US290*EAST*9 to PC US290*EAST*12 N 42° 32′ 44.89" E Dist 910.6077

Curve Data

Curve US290*EAST*12
P.I. Station 554+36.74 N 10,052,067.7717 E 2,819,204.8029
Delta = 14° 38′ 34.63" (LT)
Degree = 2° 29′ 55.83"
Tangent = 294.6000
Length = 585.9895
Radius = 2,292.8932
External = 18.8482
Long Chord = 584.3961
Mid. Ord. = 18.6945
P.C. Station 551+42.14 N 10,051,850.7290 E 2,819,005.6004
P.T. Station 557+28.13 N 10,052,328.1222 E 2,819,342.6679
C.C. N 10,053,401.1361 E 2,817,316.3411
Back = N 42° 32′ 44.89" E
Ahead = N 27° 54′ 10.26" E
Chord Bear = N 35° 13′ 27.58" E

Course from PT US290*EAST*12 to PC US290*EAST*15 N 27° 54′ 10.26" E Dist 752.6670

Curve Data

Curve US290*EAST*15
P.I. Station 582+57.10 N 10,054,563.0774 E 2,820,526.1581
Delta = 63° 34′ 26.32" (RT)
Degree = 1° 59′ 56.12"
Tangent = 1,776.3000
Length = 3,180.4108
Radius = 2,866.3319
External = 505.7743
Long Chord = 3,019.7538
Mid. Ord. = 429.9144
P.C. Station 564+80.80 N 10,052,993.2858 E 2,819,694.8963
P.T. Station 596+61.21 N 10,054,517.2975 E 2,822,301.8681
C.C. N 10,051,651.9177 E 2,822,227.9952
Back = N 27° 54′ 10.26" E
Ahead = S 88° 31′ 23.42" E
Chord Bear = N 59° 41′ 23.42" E

Course from PT US290*EAST*15 to 148 S 88° 31′ 23.42" E Dist 7,135.4607

Point 148 N 10,054,333.3978 E 2,829,434.9586 Sta 667+96.67

Ending chain US290*EAST description

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessy Yacoub P.E.
C558EA119EB3496...

Austin District
Central Design

Texas Department of Transportation

US 290
HORIZONTAL
ALIGNMENT DATA

SHEET 1 OF 1

© 2023		CONT	SECT	JOB	HIGHWAY
DS: BB	CK: MFH	0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		52

Beginning profile US290*PR1 description:
Feature: Road*Centerline

		STATION	ELEV	GRADE	TOTAL L	BACK L	AHEAD L
VPI	1	474+00.00	1,494.4700				
VPI	2	474+60.00	1,494.1500	-0.5333			
VPI	3	477+25.00	1,493.8000	-0.1321			
VPI	4	479+75.00	1,493.0500	-0.3000			
VPI	5	481+85.00	1,492.9000	-0.0714			
VPI	6	483+42.98	1,492.4700	-0.2722			
VPI	7	487+45.00	1,491.7500	-0.1791			
VPC		488+80.00	1,491.0750	-0.5000	K = 420.1	SSD = 1410.1	
VPI	8	490+65.00	1,490.1500		370.0000	185.0000	185.0000
VPT		492+50.00	1,487.5956	-1.3808			
VPI	9	496+87.54	1,481.5542	-1.3808			
VPC		497+55.00	1,480.6535	-1.3353	K = 213.4		
VPI	10	499+35.00	1,478.2500		360.0000	180.0000	180.0000
Low Point		500+39.99	1,478.7508				
VPT		501+15.00	1,478.8826	0.3515			
VPI	11	501+33.17	1,478.9465	0.3515			
VPI	12	505+41.68	1,479.9896	0.2553			
VPC		508+77.50	1,481.1228	0.3375	K = 194.2	SSD = 2047.9	
VPI	13	509+30.00	1,481.3000		105.0000	52.5000	52.5000
High Point		509+43.03	1,481.2334				
VPT		509+82.50	1,481.1933	-0.2033			
VPI	14	512+44.84	1,480.6600	-0.2033			
VPI	15	515+45.00	1,479.8000	-0.2865			
VPC		515+45.10	1,479.8001	0.0999	K = 294.3	SSD = 1687.5	
High Point		515+74.50	1,479.8148				
VPI	16	516+45.10	1,479.9000		200.0000	100.0000	100.0000
VPT		517+45.10	1,479.3202	-0.5798			
VPI	17	517+91.71	1,479.0500	-0.5798			
VPI	18	524+50.00	1,477.0500	-0.3038			
VPI	19	529+20.00	1,474.8700	-0.4638			
VPI	20	531+60.00	1,473.4900	-0.5750			
VPI	21	532+55.00	1,472.5600	-0.9789			
VPC		534+60.00	1,470.3323	-1.0867	K = 207.7	SSD = 1274.5	
VPI	22	535+55.00	1,469.3000		190.0000	95.0000	95.0000
VPT		536+50.00	1,467.3986	-2.0014			
VPI	23	538+72.27	1,462.9500	-2.0014			
VPC		540+00.03	1,460.3948	-2.0000	K = 190.0		
VPI	24	542+05.03	1,456.2948		410.0000	205.0000	205.0000
Low Point		543+80.03	1,456.5948				
VPT		544+10.03	1,456.6185	0.1579			
VPC		547+01.98	1,457.0794	0.1579	K = 200.0		
VPI	25	548+10.00	1,457.2500		216.0447	108.0224	108.0224
VPT		549+18.02	1,458.5874	1.2381			
VPI	26	551+25.00	1,461.1500	1.2381			
VPI	27	552+18.39	1,462.4300	1.3706			
VPC		554+00.00	1,464.2629	1.0093	K = 474.0	SSD = 1039.2	
VPI	28	558+00.00	1,468.3000		800.0000	400.0000	400.0000
High Point		558+78.35	1,466.6768				
VPT		562+00.00	1,465.5854	-0.6787			
VPI	29	565+00.00	1,463.5494	-0.6787			
VPC		567+00.00	1,461.2497	-1.1499	K = 279.2		
VPI	30	569+00.00	1,458.9500		400.0000	200.0000	200.0000
Low Point		570+21.00	1,459.4042				
VPT		571+00.00	1,459.5160	0.2830			
VPI	31	574+00.00	1,460.3650	0.2830			
VPI	32	575+00.00	1,460.5250	0.1600			
VPI	33	577+00.00	1,461.0550	0.2650			
VPC		577+00.00	1,461.0550	0.4400	K = 674.1	SSD = 3737.1	
VPI	34	578+00.00	1,461.4950		199.9900	99.9950	99.9950
VPT		579+00.00	1,461.6383	0.1433			
VPI	35	579+50.00	1,461.7100	0.1433			
VPI	36	581+00.00	1,461.8850	0.1167			
VPI	37	582+50.00	1,462.0200	0.0900			
VPI	38	584+00.00	1,462.1650	0.0967			
VPI	39	592+50.00	1,462.6050	0.0518			
VPI	40	596+50.00	1,463.0182	0.1033			
VPC		599+30.00	1,462.9716	-0.0166	K = 367.0		
Low Point		599+36.10	1,462.9711				
VPI	41	600+30.00	1,462.9550		200.0000	100.0000	100.0000
VPT		601+30.00	1,463.4833	0.5283			
VPI	42	603+51.79	1,464.6550	0.5283			
VPC		605+90.00	1,466.1834	0.6416	K = 393.7	SSD = 931.0	
High Point		608+42.61	1,466.9939				
VPI	43	609+90.00	1,468.7500		800.0000	400.0000	400.0000
VPT		613+90.00	1,463.1883	-1.3904			
VPI	44	616+26.50	1,459.9000	-1.3904			
VPC		617+84.20	1,457.3548	-1.6139	K = 359.2		
VPI	45	620+34.20	1,453.3200		500.0000	250.0000	250.0000
VPT		622+84.20	1,452.7650	-0.2220			
VPI	46	622+99.97	1,452.7300	-0.2220			
VPI	47	623+46.66	1,452.5700	-0.3427			
VPI	48	624+65.46	1,452.4200	-0.1263			
VPI	49	625+63.06	1,452.0500	-0.3791			
VPI	50	627+00.00	1,451.8100	-0.1753			

Ending profile US290*PR1 description

3/16/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

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Austin District
Central Design

Texas Department of Transportation

US 290

VERTICAL ALIGNMENT DATA

SHEET 1 OF 1

© 2023		CONT	SECT	JOB	HIGHWAY
DS: BB	CK: MFH	0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		53

SUPERELEVATION: LEFT LANE				
CURVE SET	POINT TYPE	STA	CROSS SLOPE	RADIUS
	Normal Crown	474+00.0000	-2.00%	
1	Normal Crown In	477+49.0000	-2.00%	
1	Full Super In	481+25.0000	2.70%	5733.8981
1	Full Super Out	486+60.0000	2.70%	5733.8981
2	Full Super In	492+80.0001	-5.00%	-2294.7814
2	Full Super Out	502+00.0001	-5.00%	-2294.7814
2	Normal Crown Out	507+60.0001	-2.00%	
3	Normal Crown In	528+13.0001	-2.00%	
3	Full Super In	533+25.0001	-4.40%	-2869.4081
3	Full Super Out	541+25.0001	-4.40%	-2869.4081
3	Normal Crown Out	546+37.0001	-2.00%	
4	Normal Crown In	546+90.0001	-2.00%	
4	Full Super In	552+50.0001	-5.00%	-2292.8932
4	Full Super Out	556+10.0001	-5.00%	-2292.8932
5	Full Super In	565+80.0001	4.50%	2866.3319
5	Full Super Out	595+50.0001	4.50%	2866.3319
5	Normal Crown Out	600+70.0001	-2.00%	
	Normal Crown	627+00.0000	-2.00%	

SUPERELEVATION: RIGHT LANE				
CURVE SET	POINT TYPE	STA	CROSS SLOPE	RADIUS
	Normal Crown	474+00.0000	-2.00%	
1	Normal Crown In	477+49.0000	-2.00%	
1	Full Super In	481+25.0000	-2.70%	5733.8981
1	Full Super Out	486+60.0000	-2.70%	5733.8981
2	Full Super In	492+80.0001	5.00%	-2294.7814
2	Full Super Out	502+00.0001	5.00%	-2294.7814
2	Normal Crown Out	507+60.0001	-2.00%	
3	Normal Crown In	528+13.0001	-2.00%	
3	Full Super In	533+25.0001	4.40%	-2869.4081
3	Full Super Out	541+25.0001	4.40%	-2869.4081
3	Normal Crown Out	546+37.0001	-2.00%	
4	Normal Crown In	546+90.0001	-2.00%	
4	Full Super In	552+50.0001	5.00%	-2292.8932
4	Full Super Out	556+10.0001	5.00%	-2292.8932
5	Full Super In	565+80.0001	-4.50%	2866.3319
5	Full Super Out	595+50.0001	-4.50%	2866.3319
5	Normal Crown Out	600+70.0001	-2.00%	
	Normal Crown	627+00.0000	-2.00%	

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mounessy Yacoub P.E.
C558EA119EB3496...

Austin District
Central Design

Texas Department of Transportation

US 290
SUPERELEVATION DATA

SHEET 1 OF 1

© 2023		CONT	SECT	JOB	HIGHWAY
DS: BB	CK: MFH	0113	02	063	US 290
DW: BB	CK: MFH	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		54

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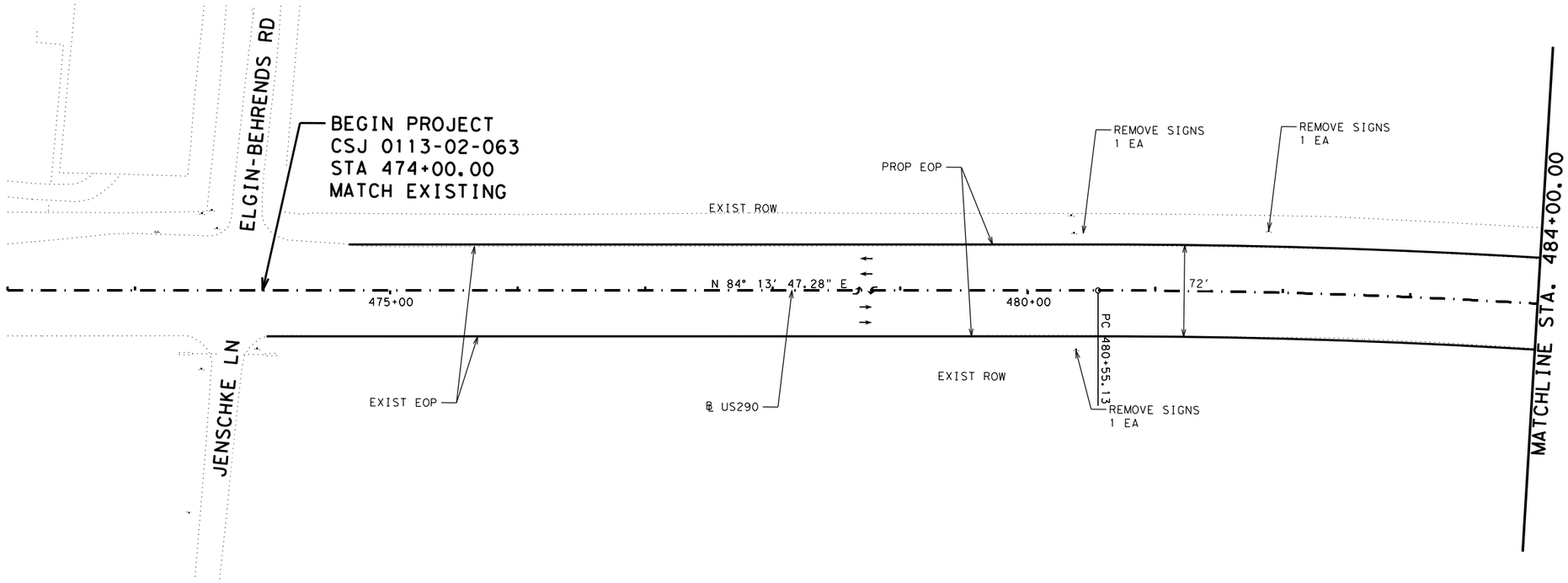

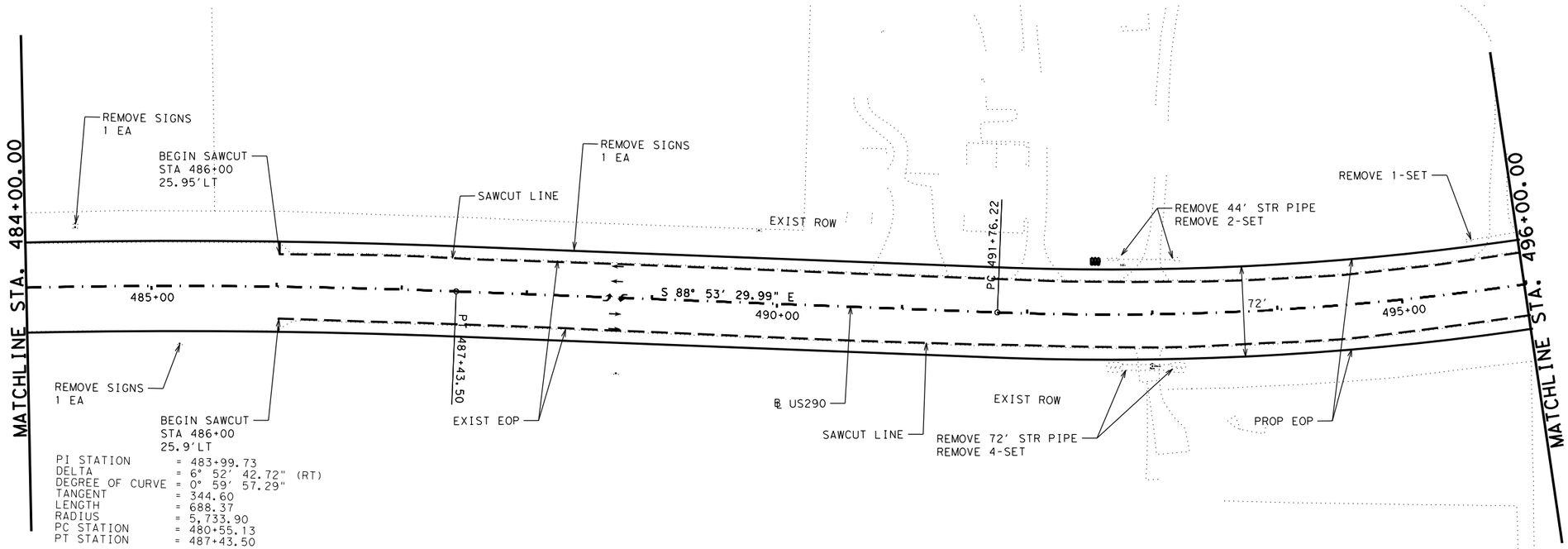

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
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DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 1 OF 7

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		55

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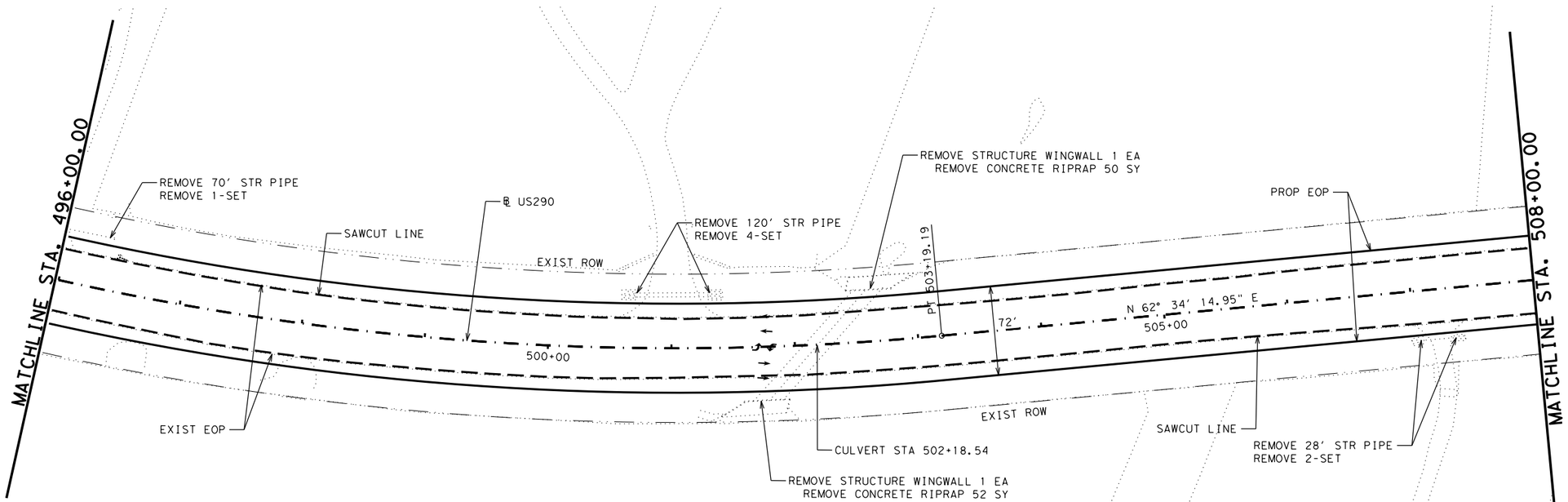

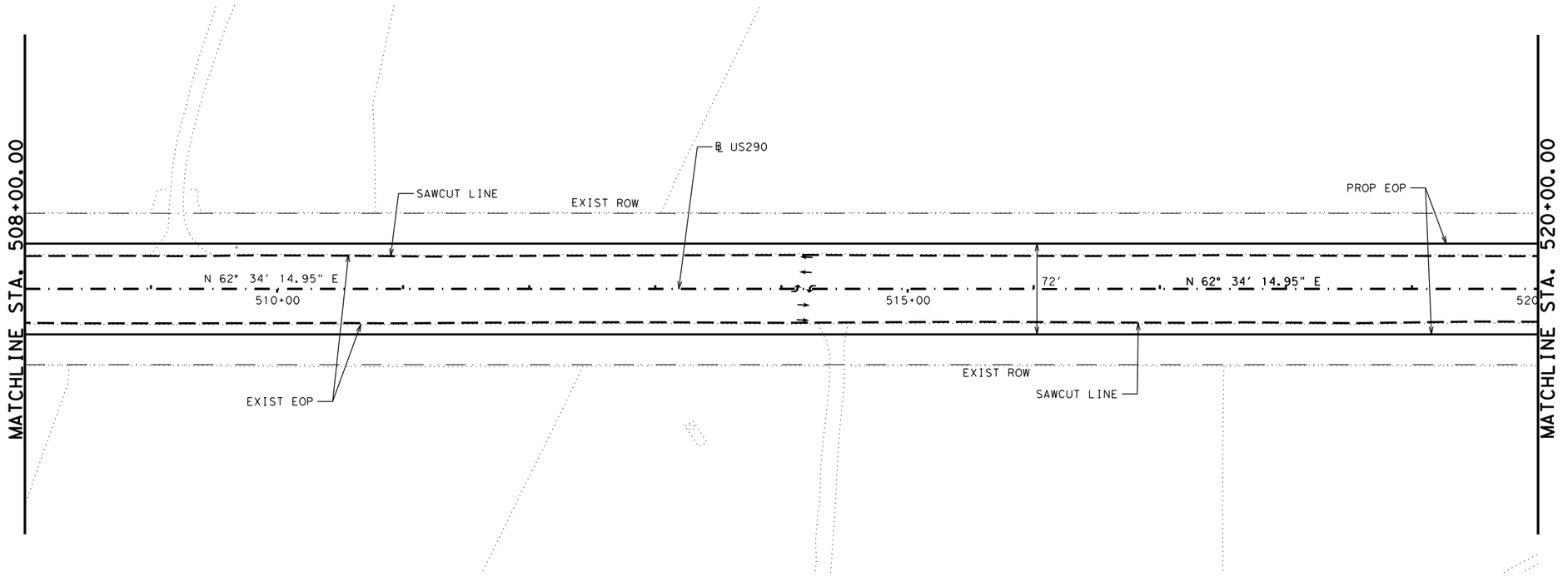

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 2 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		56

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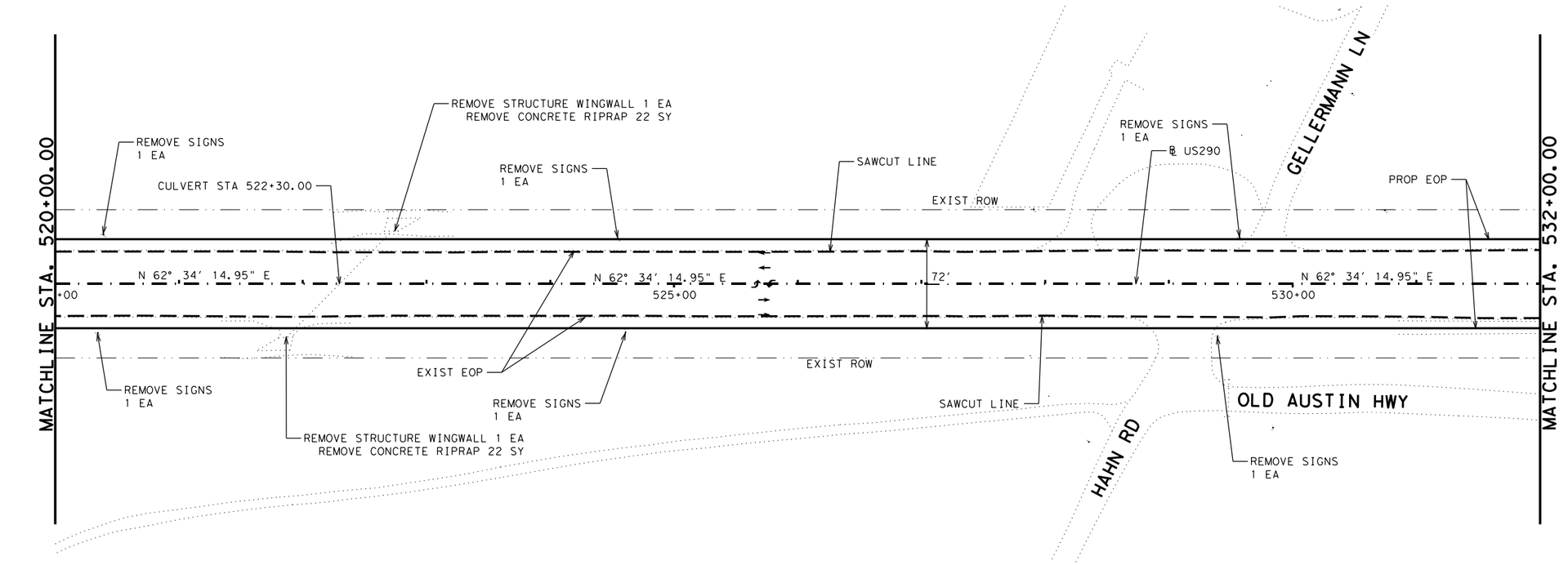

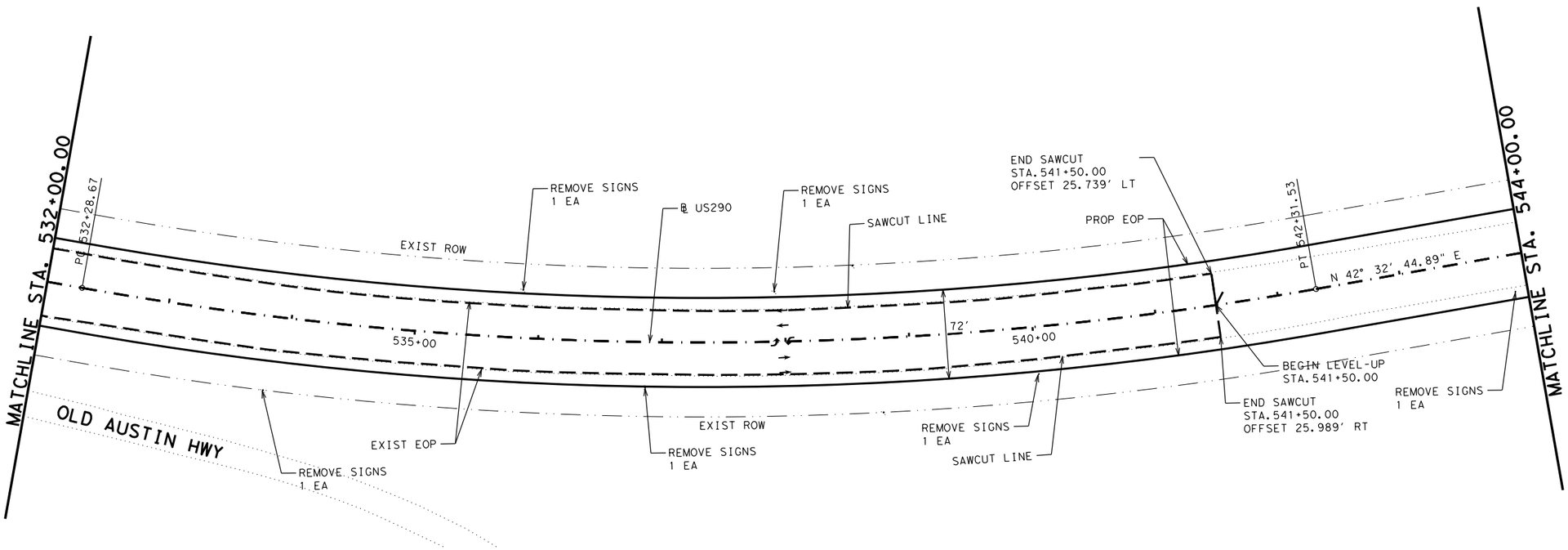

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 3 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		57

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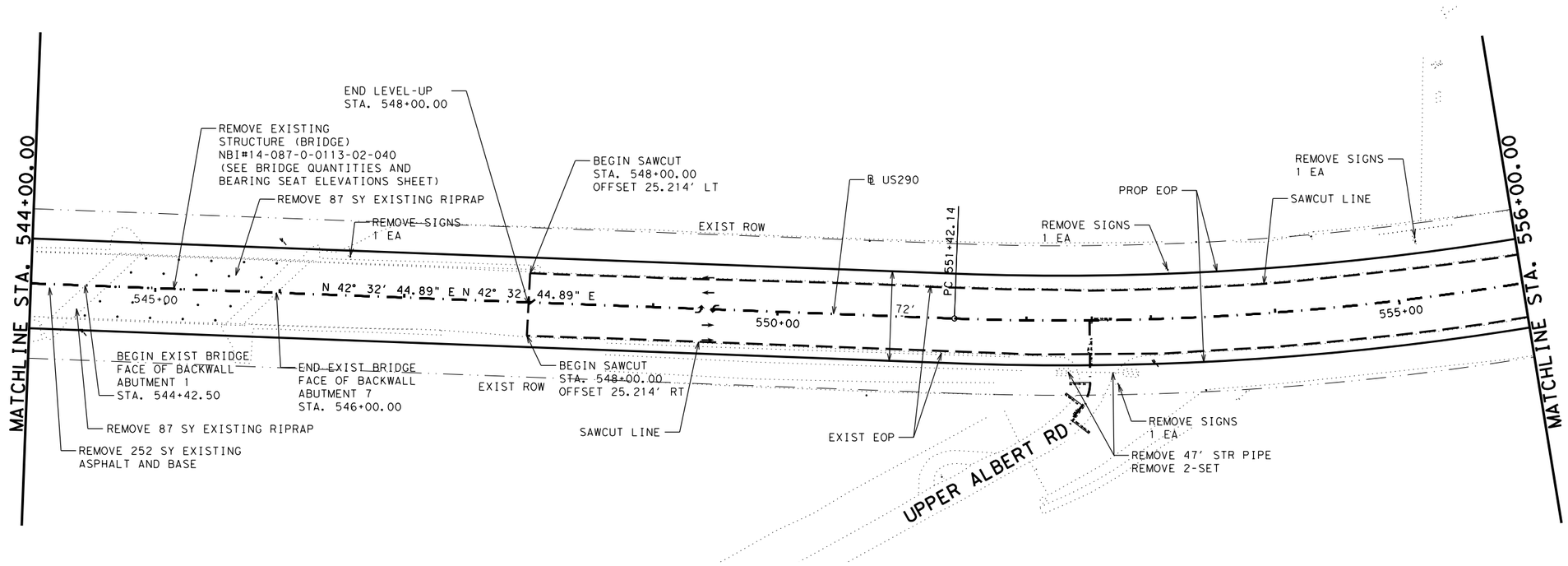

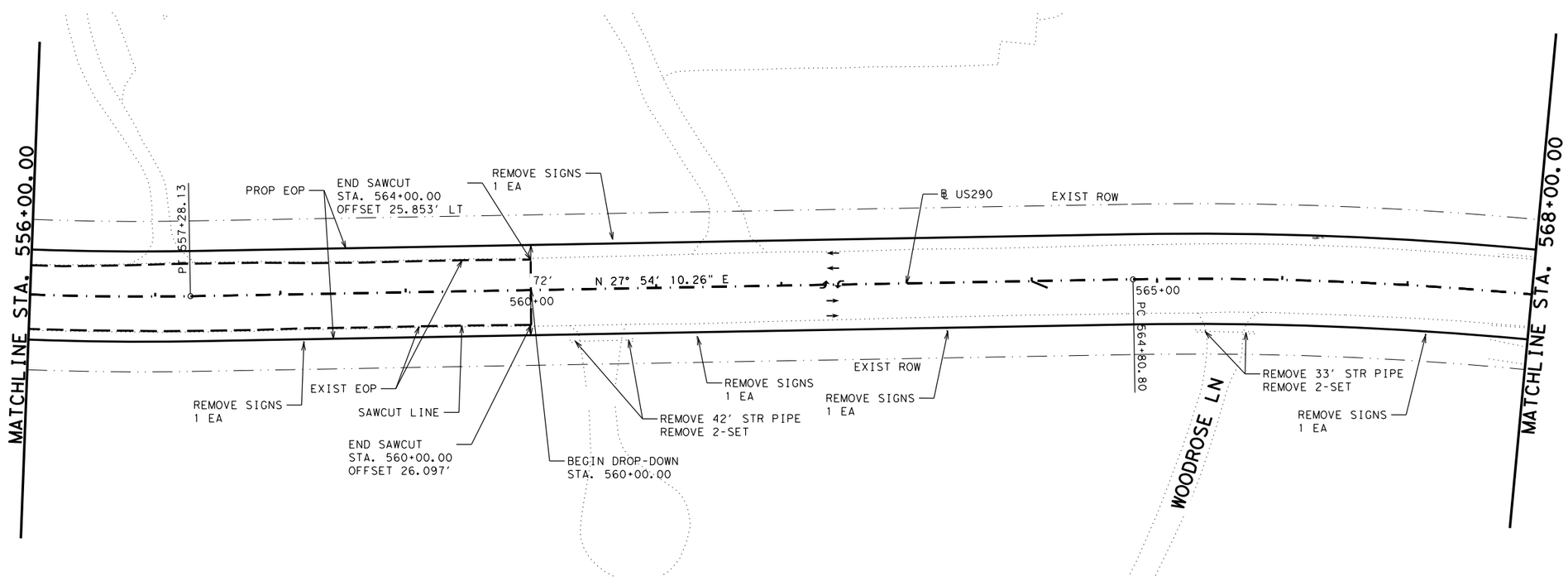

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 4 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		58

DATE: 1/9/2023 2:23:32 PM
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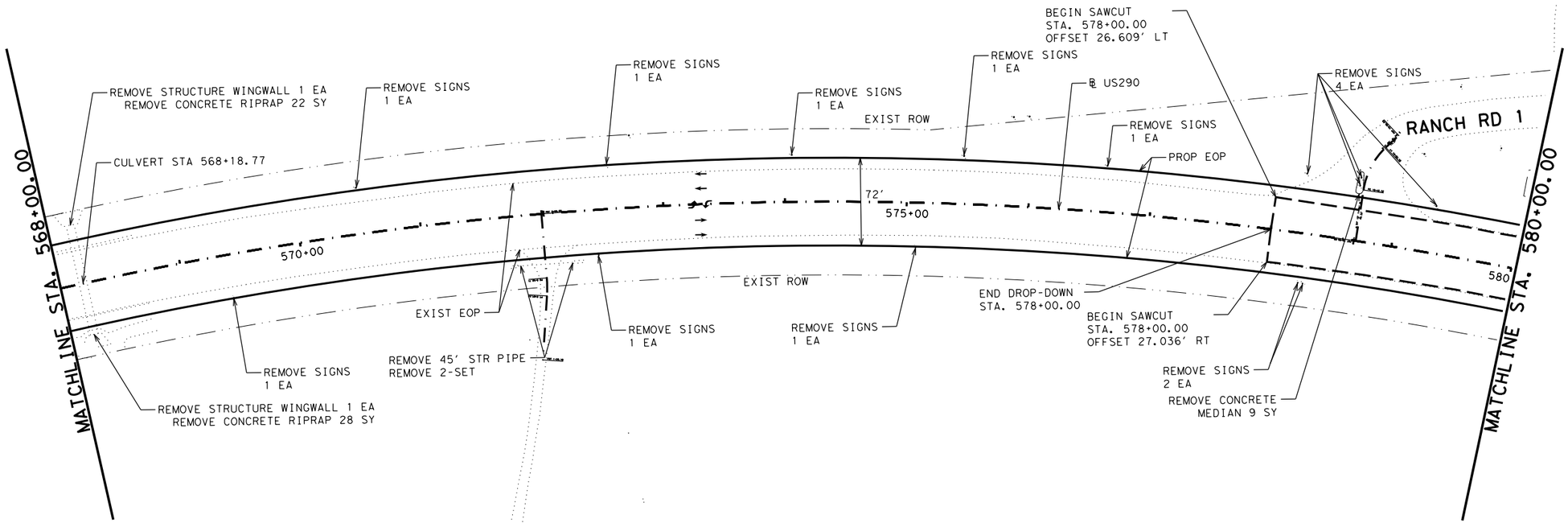

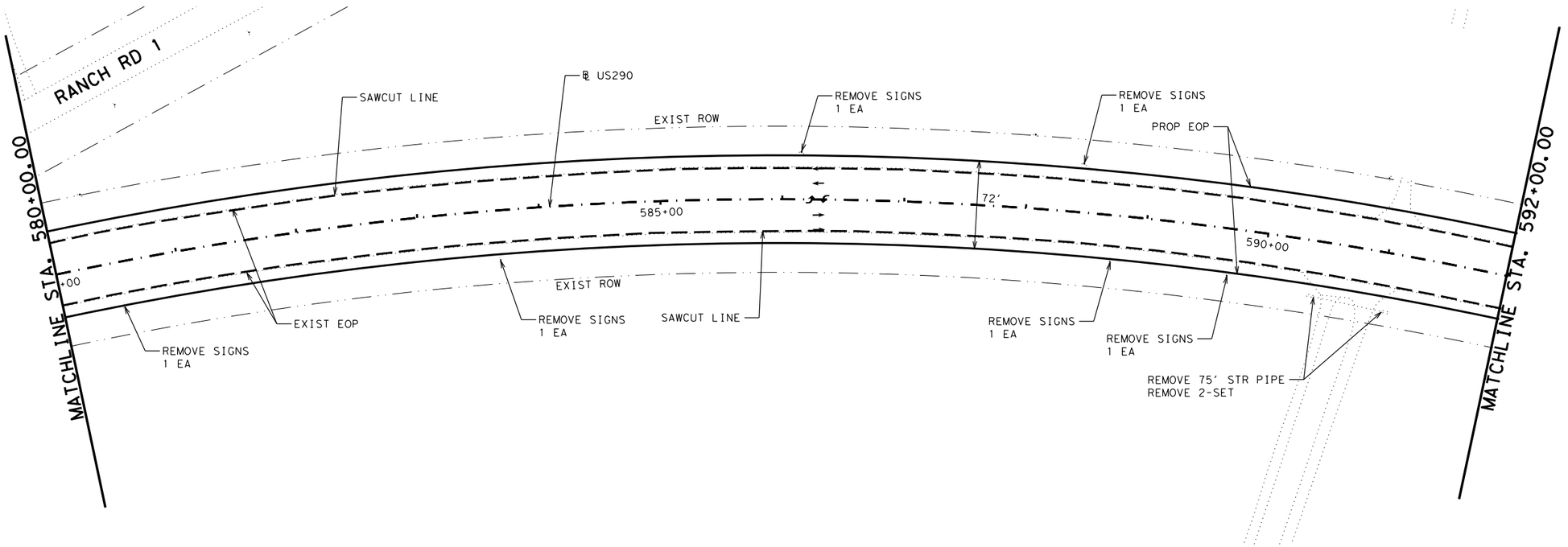

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 5 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		59

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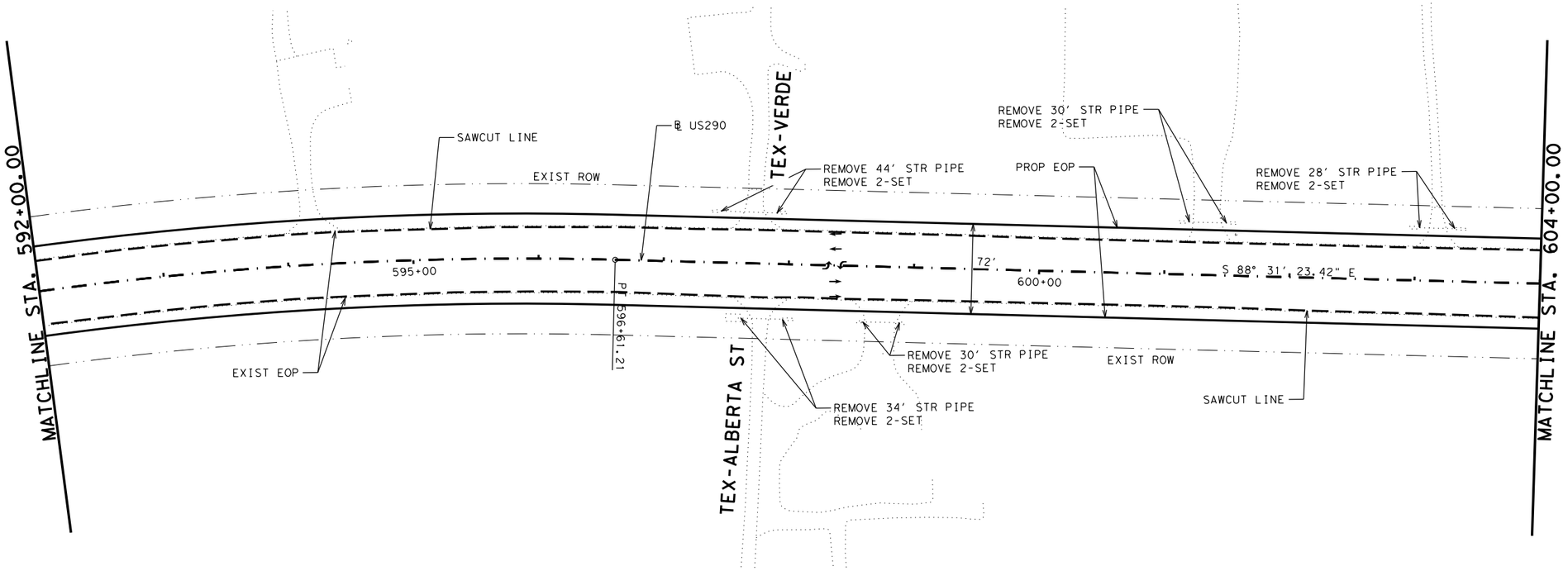

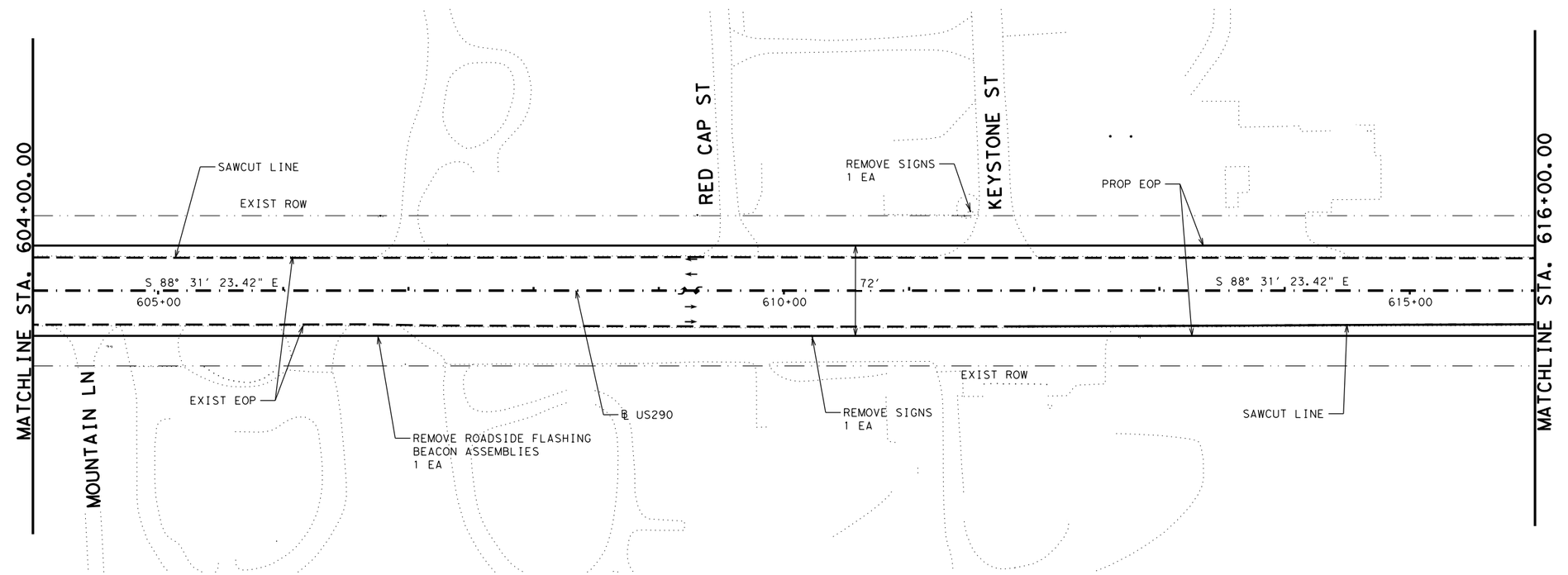

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
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DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 6 OF 7

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		60

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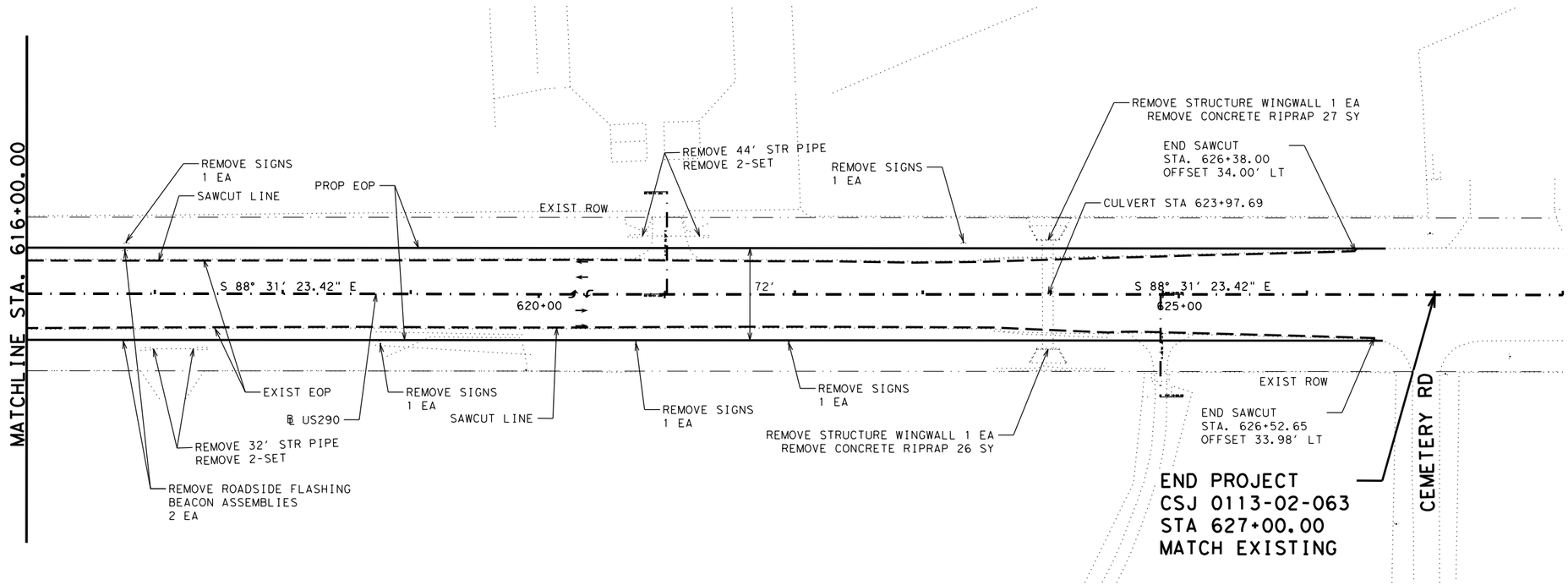

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
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Texas Department of Transportation

US290

REMOVAL PLAN

SHEET 7 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		61

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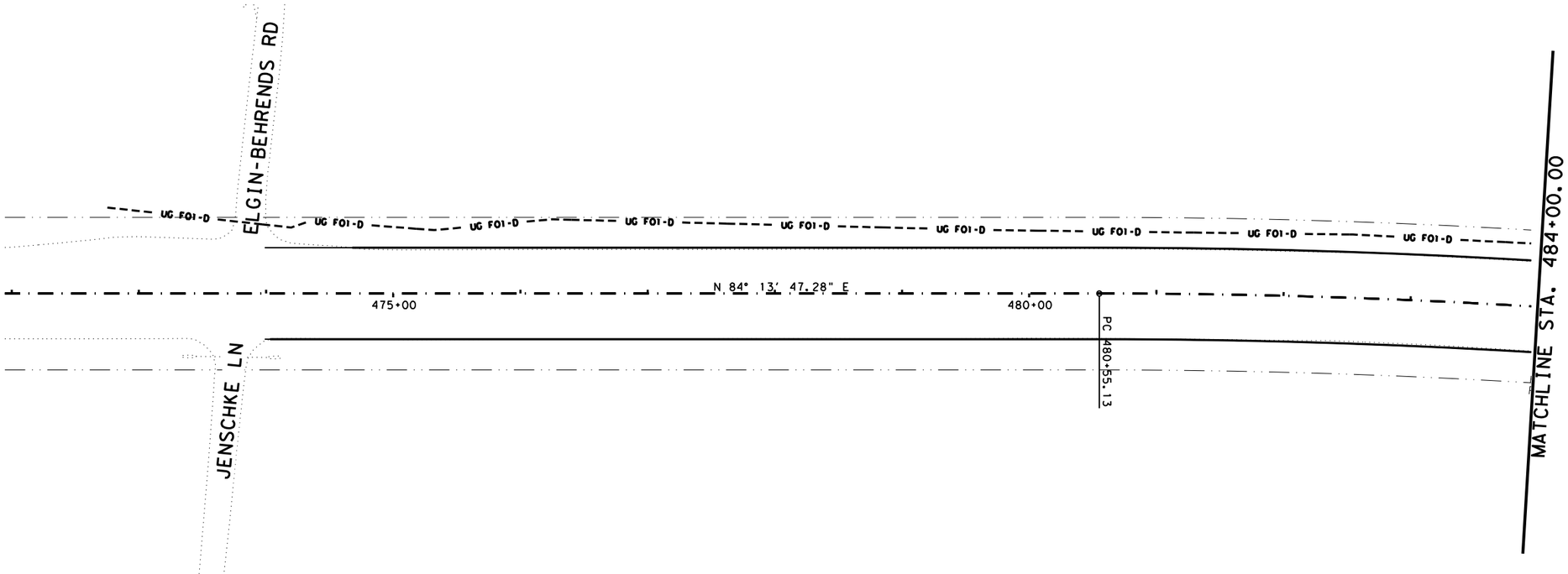

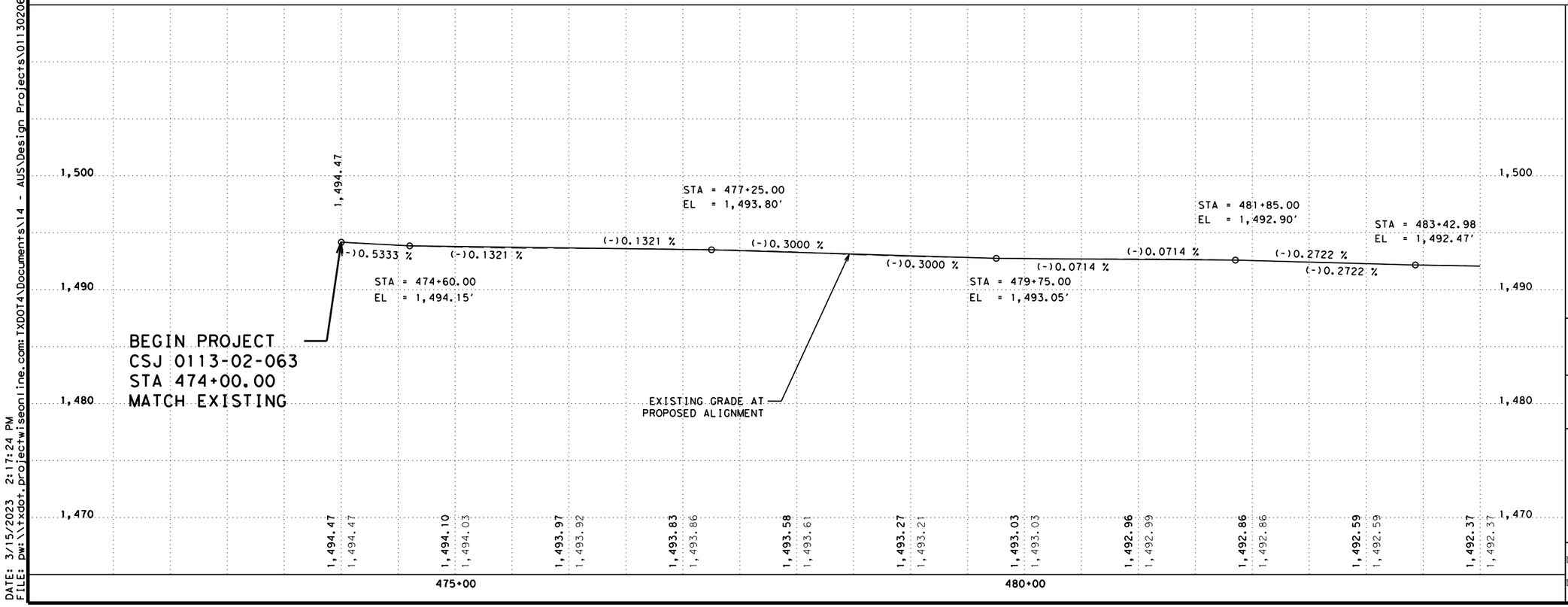

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 1 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		62

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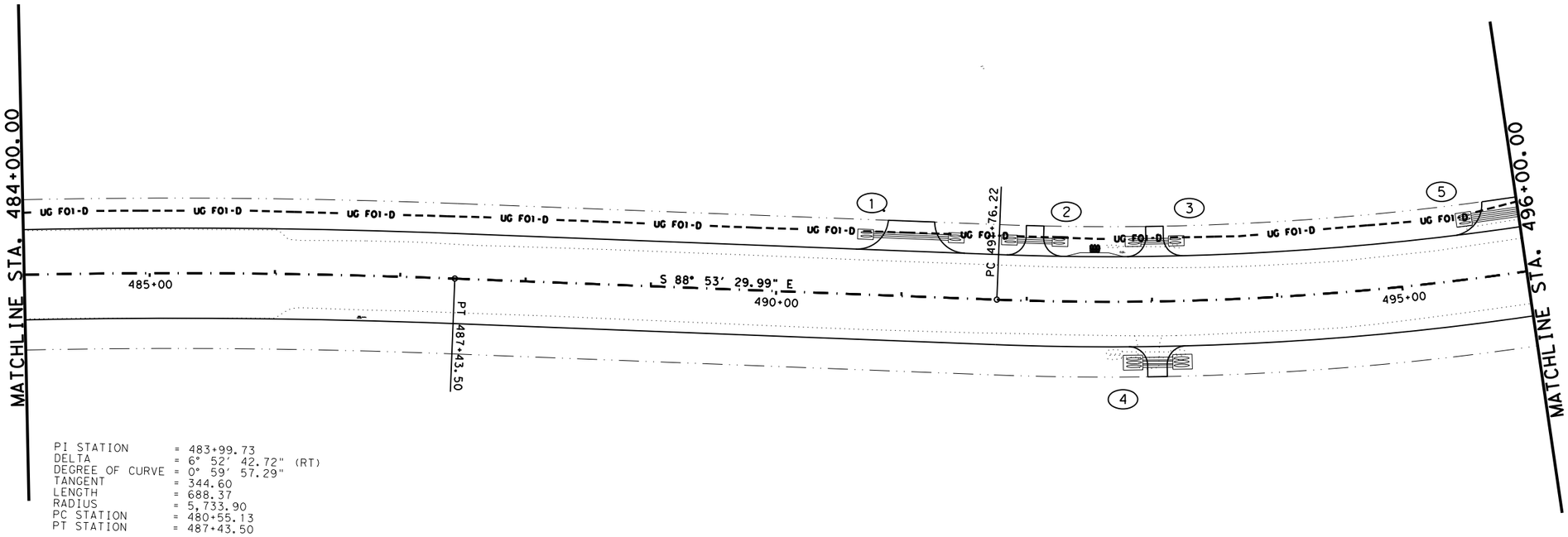

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DEGREE OF CURVE = 0° 59' 57.29"
TANGENT = 344.60
LENGTH = 688.37
RADIUS = 5,733.90
PC STATION = 480+55.13
PT STATION = 487+43.50

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
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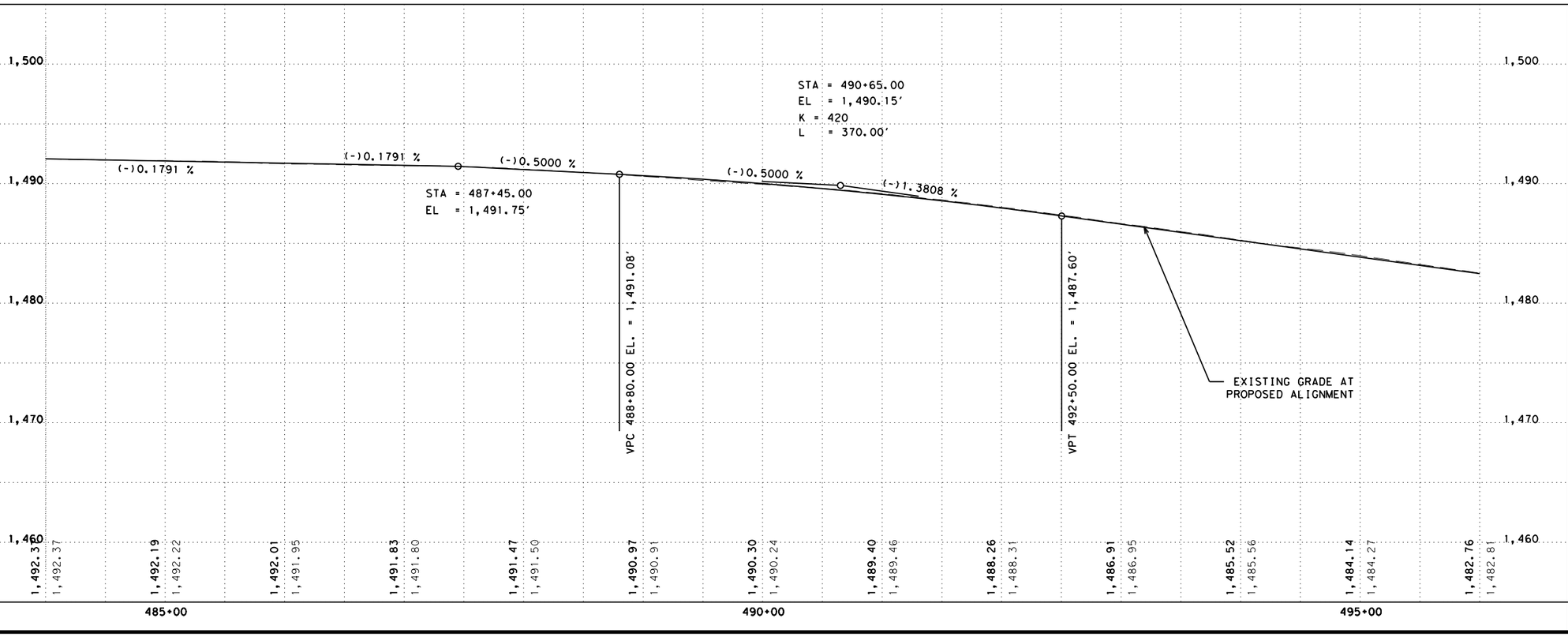

SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 2 OF 13

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		63

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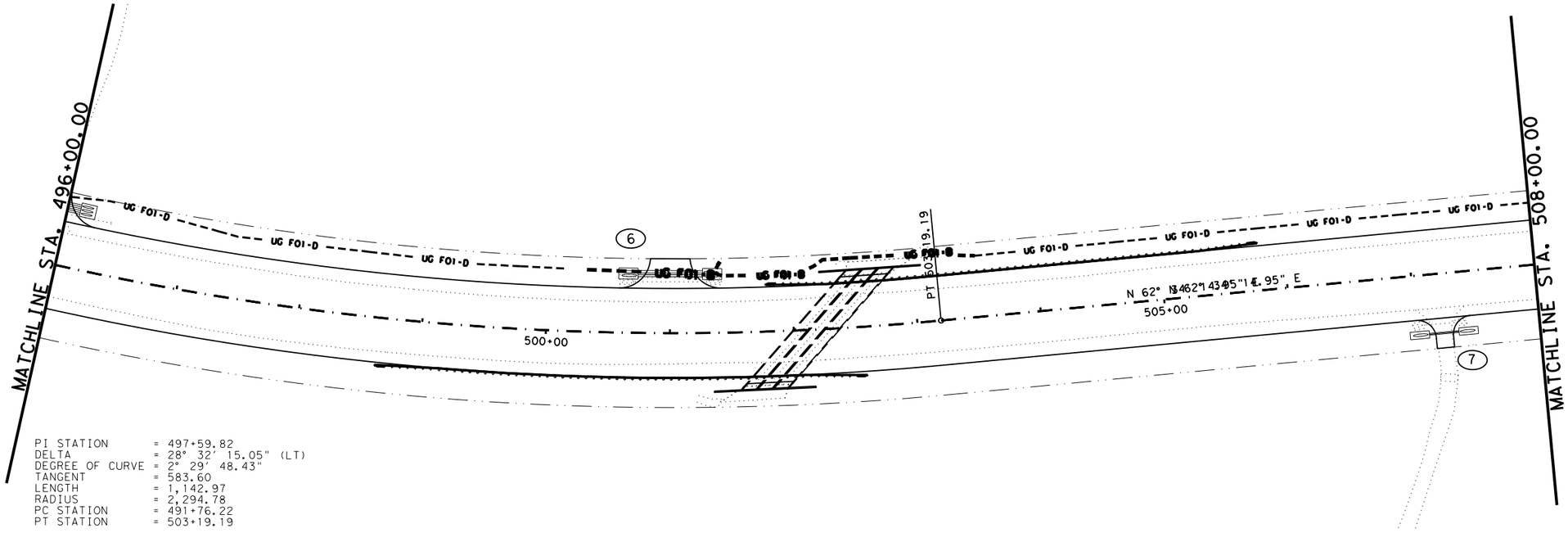


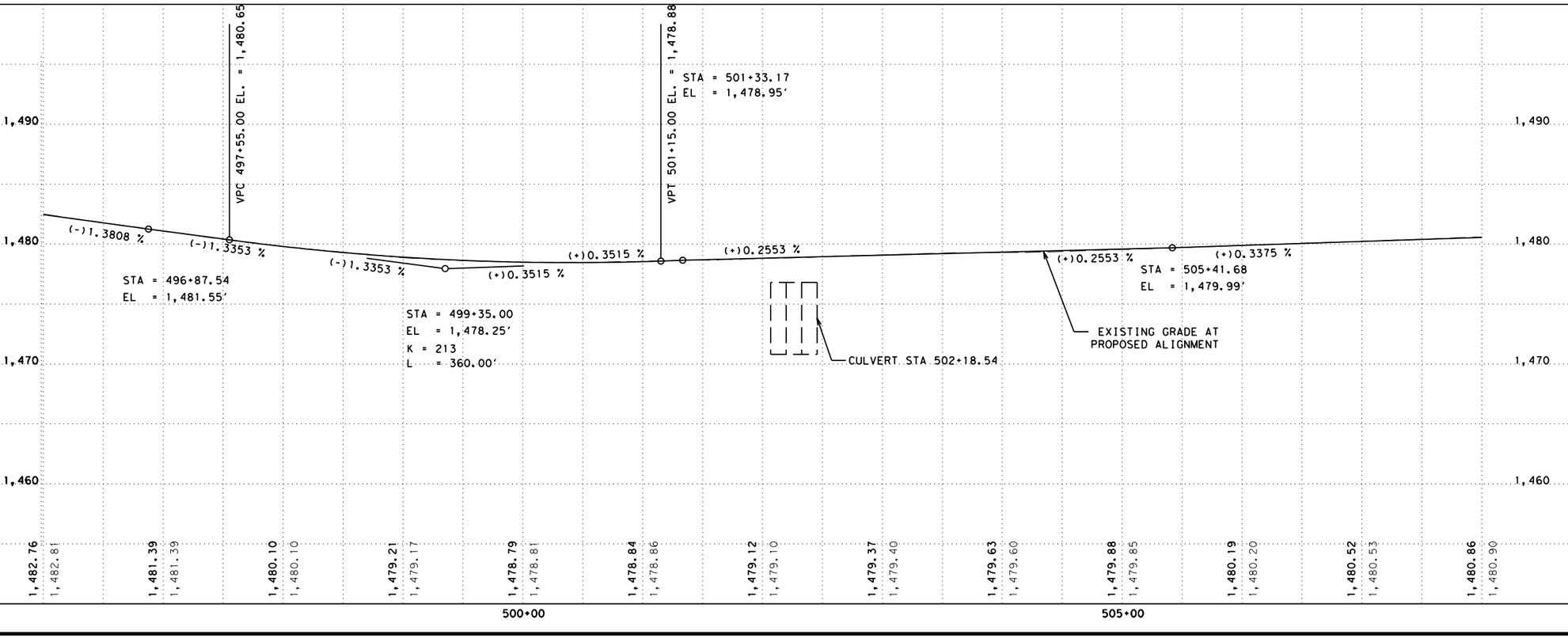
LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-B-- --UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		64

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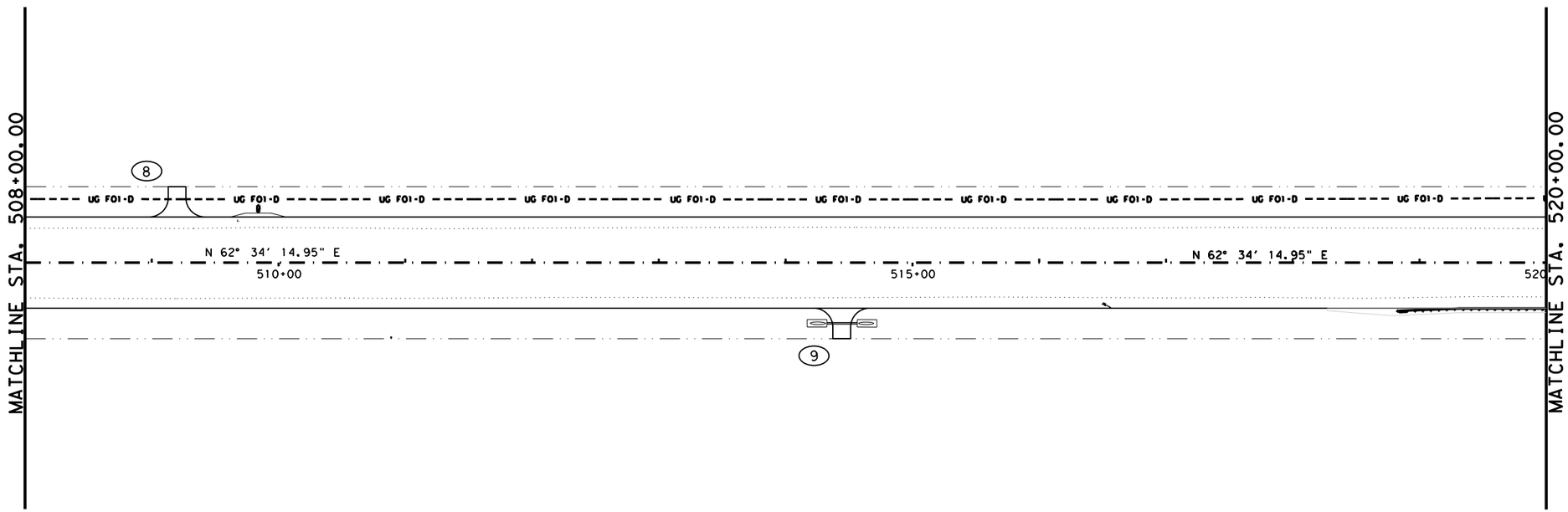

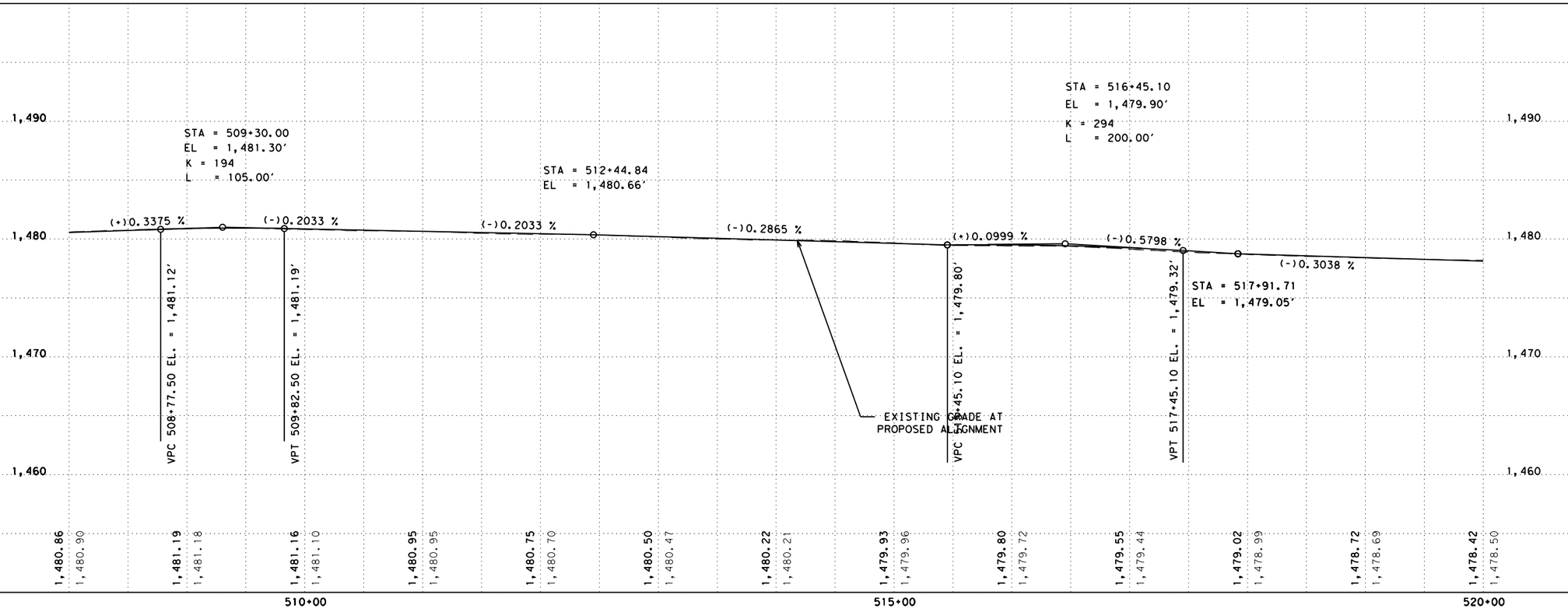

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
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DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 4 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		65

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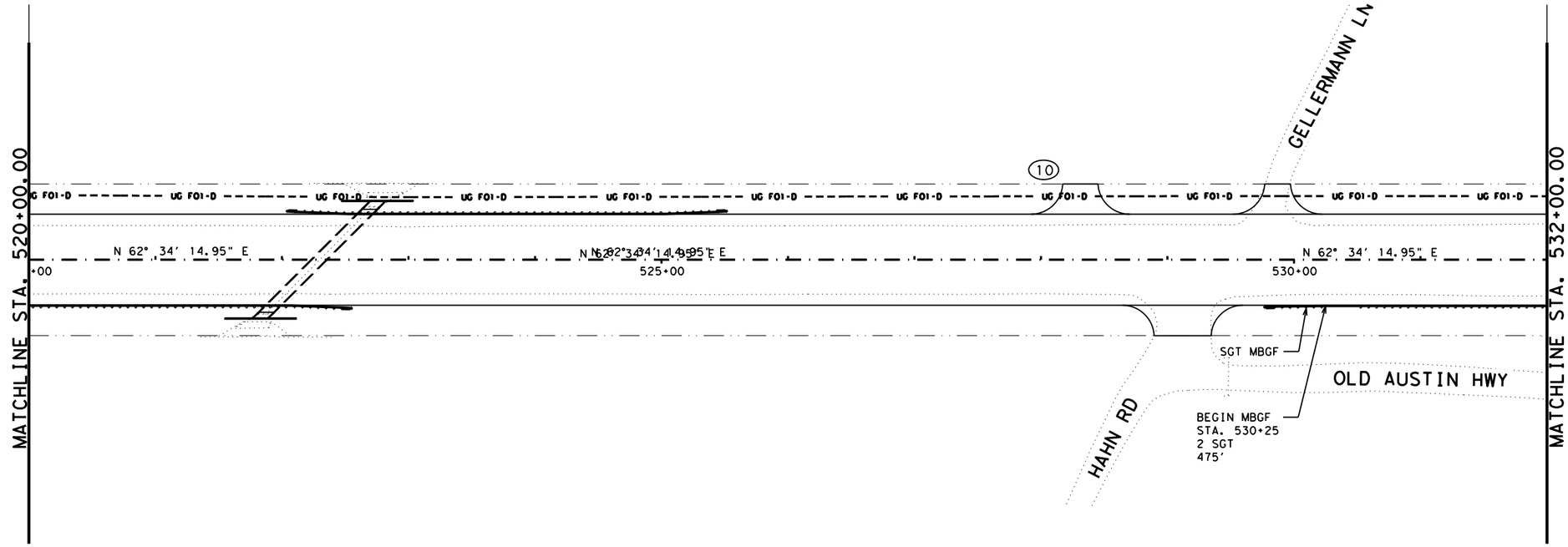


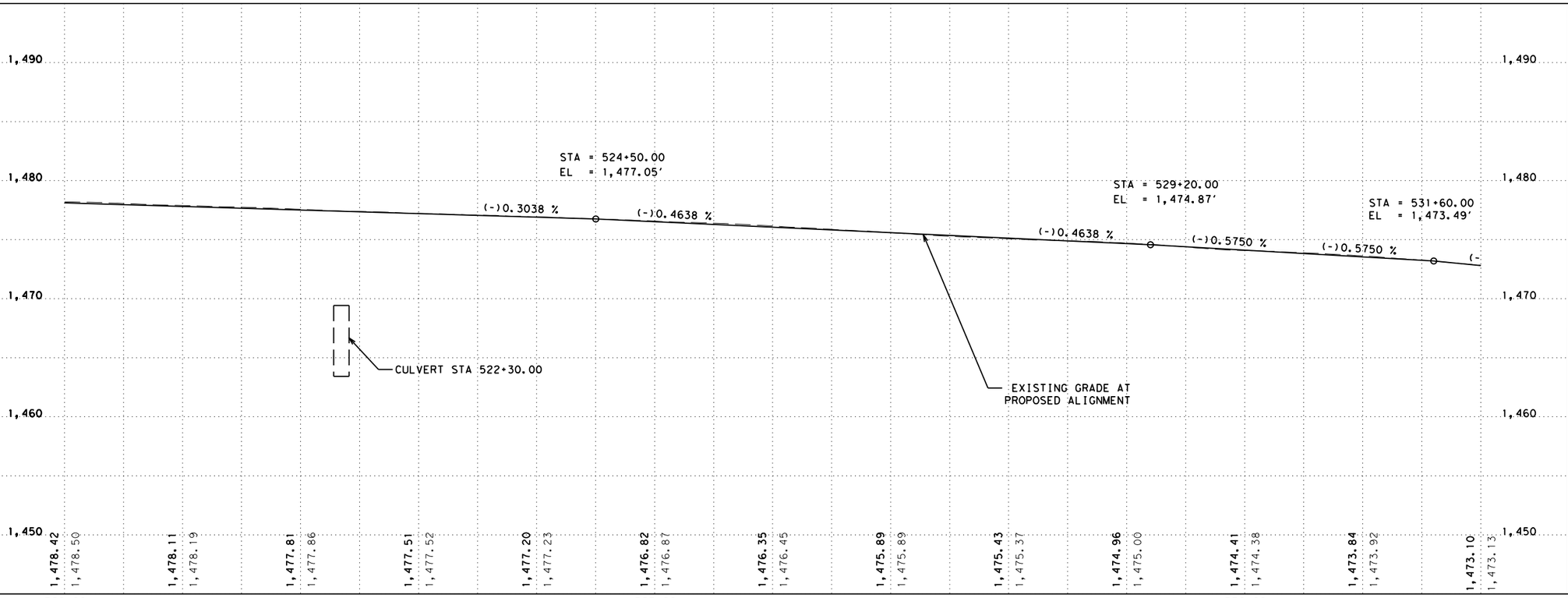
LEGEND

- FULL DEPTH WIDENING
- 5" CONCRETE RIPRAP
- DRIVEWAY ID (DWX)
- PROPOSED MAILBOX
- DIRECTION OF TRAFFIC
- FRONTIER FIBER LINE TO BE ABANDONED IN PLACE --UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessyacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 5 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
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DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		66

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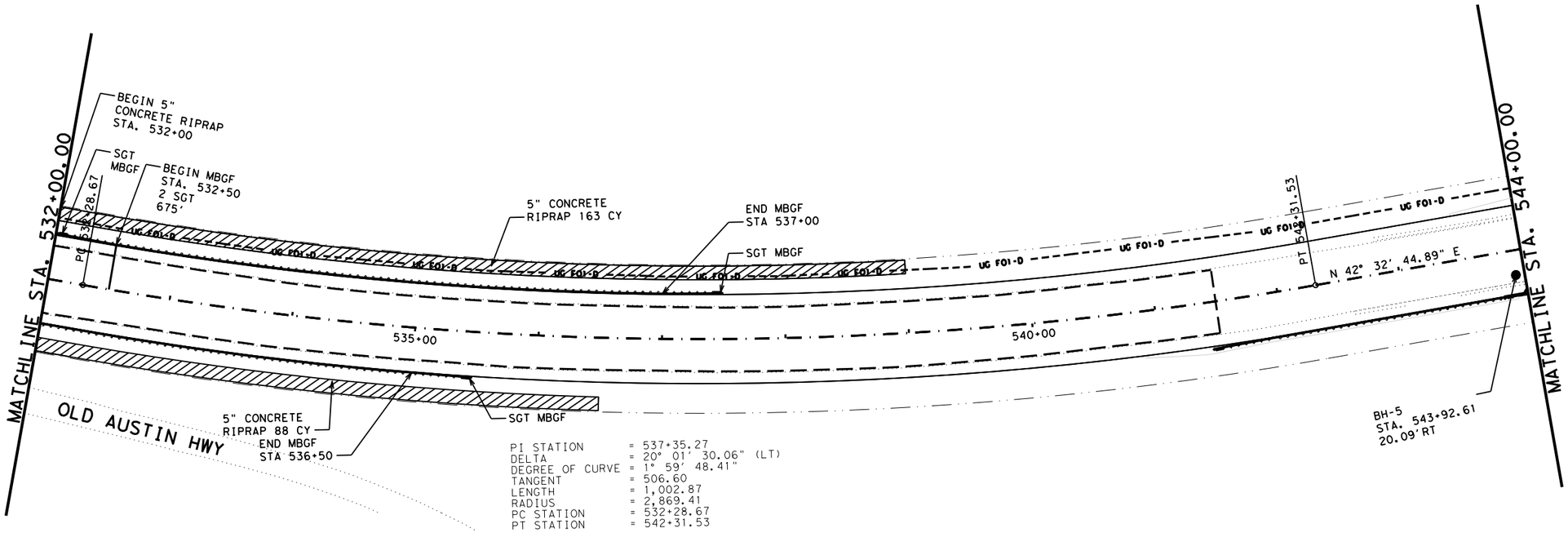


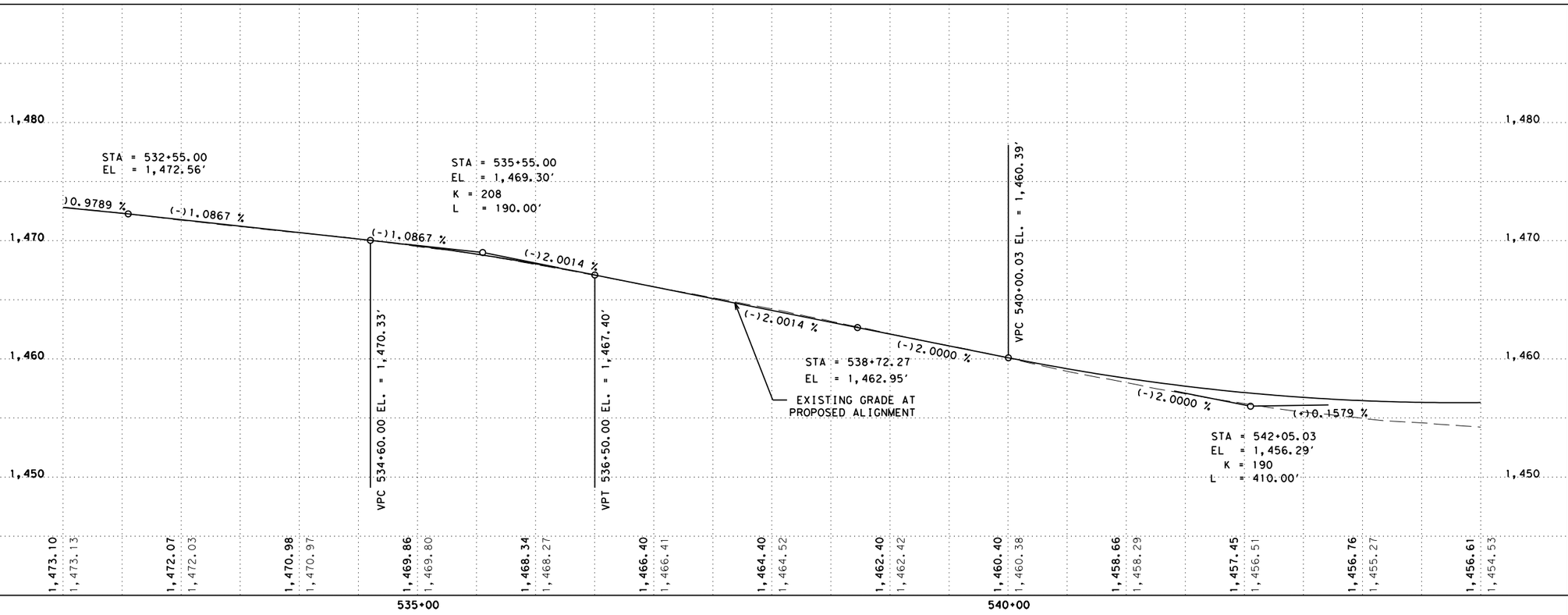
LEGEND

- FULL DEPTH WIDENING
- 5" CONCRETE RIPRAP
- DRIVEWAY ID (DWX)
- PROPOSED MAILBOX
- DIRECTION OF TRAFFIC
- FRONTIER FIBER LINE TO BE ABANDONED IN PLACE --UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 6 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		67

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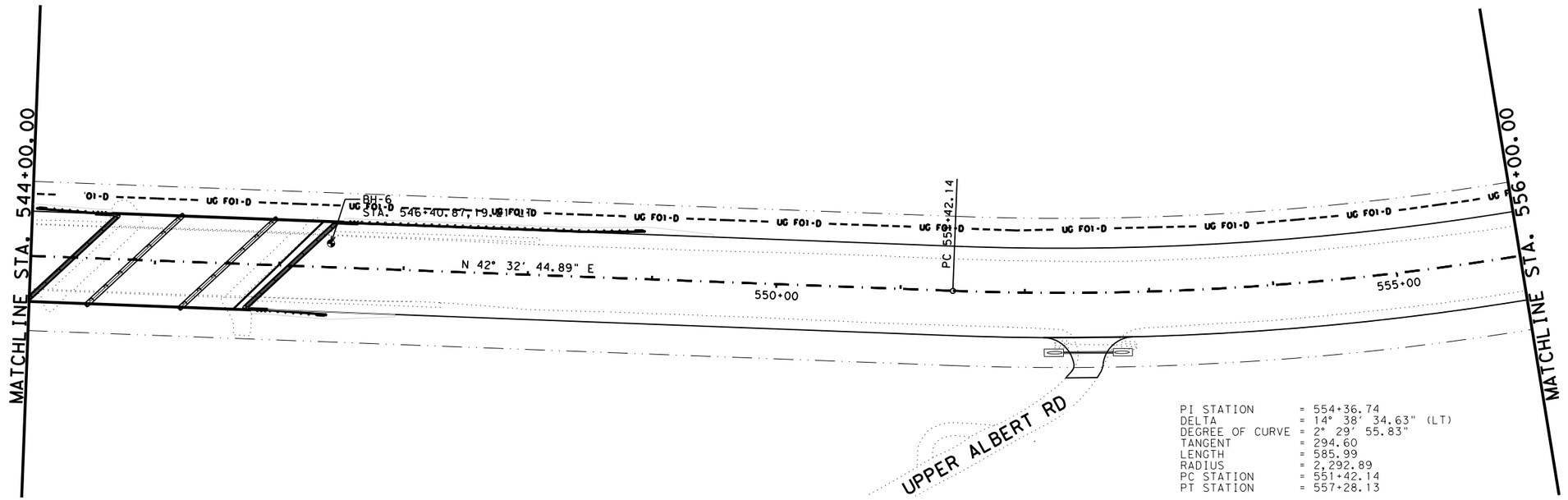


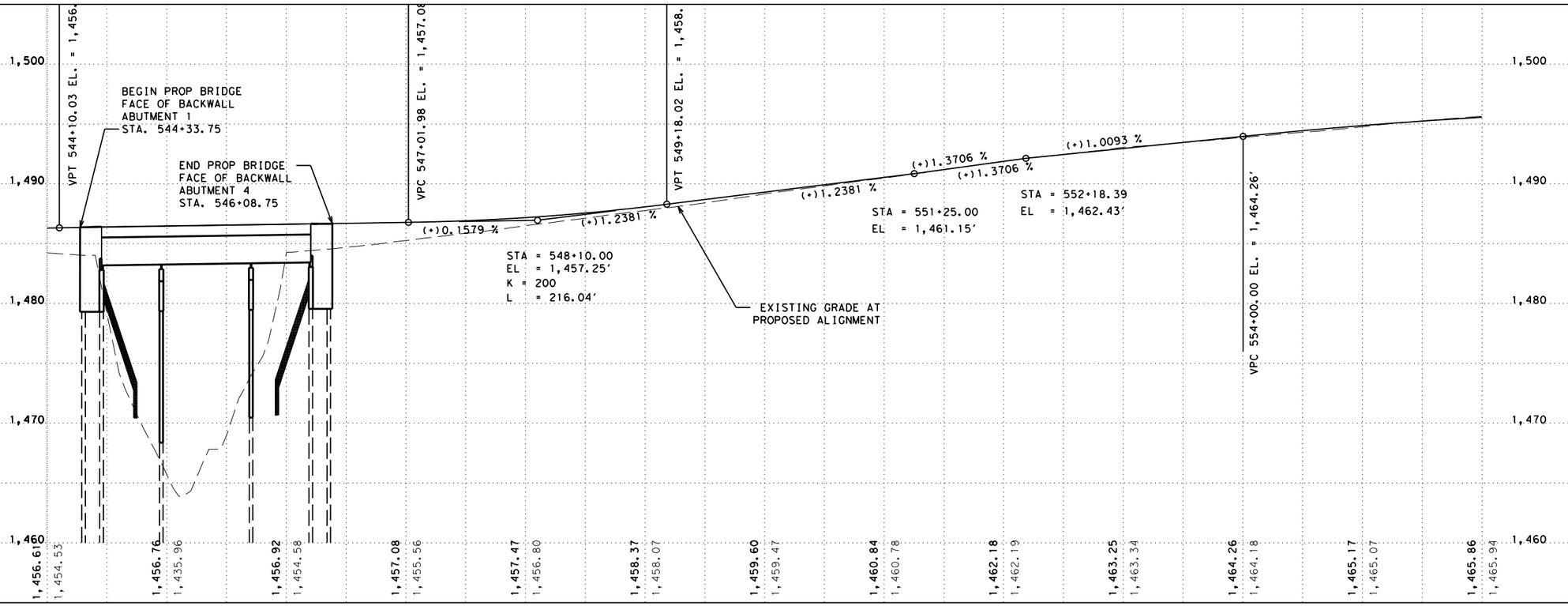
LEGEND

- FULL DEPTH WIDENING
- 5" CONCRETE RIPRAP
- DRIVEWAY ID (DWX)
- PROPOSED MAILBOX
- DIRECTION OF TRAFFIC
- FRONTIER FIBER LINE TO BE ABANDONED IN PLACE --UG FO1-D--

3/16/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessh Yacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 7 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		68

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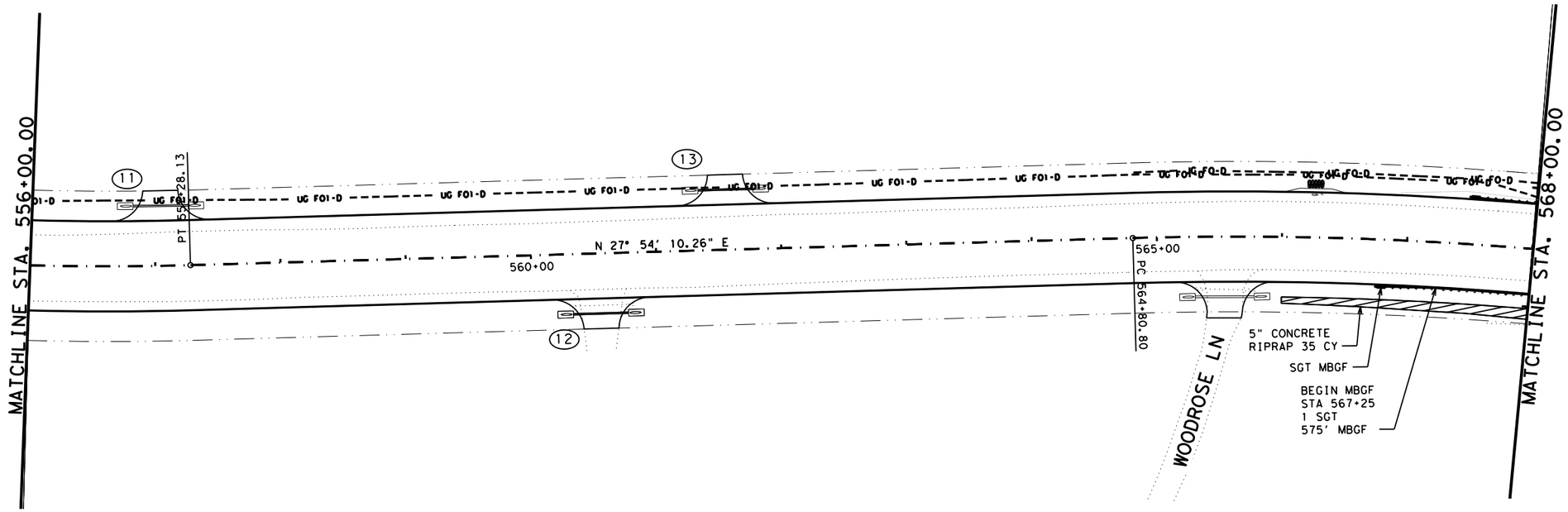

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--
HCTC FIBER LINE TO BE ABANDONED IN PLACE	-- UG FO-D --

3/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
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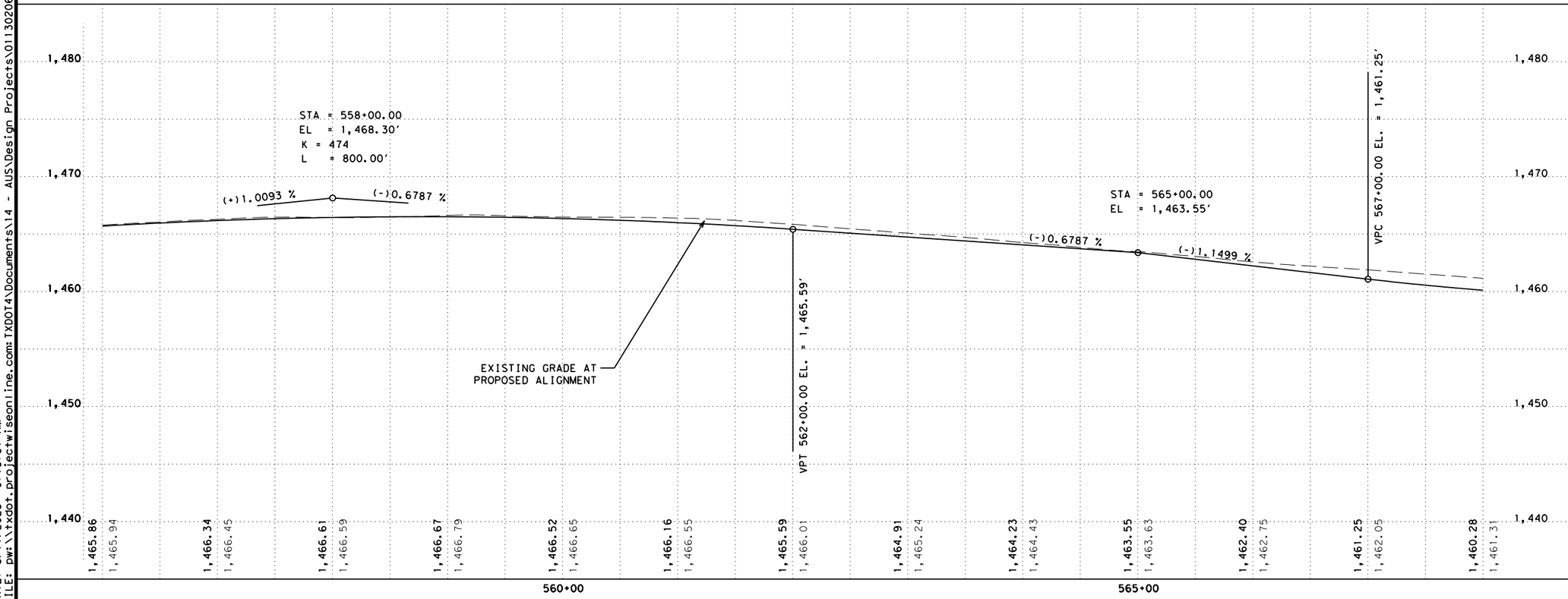
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessa Yacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 8 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		69

DATE: 3/17/2023 9:18:31 AM
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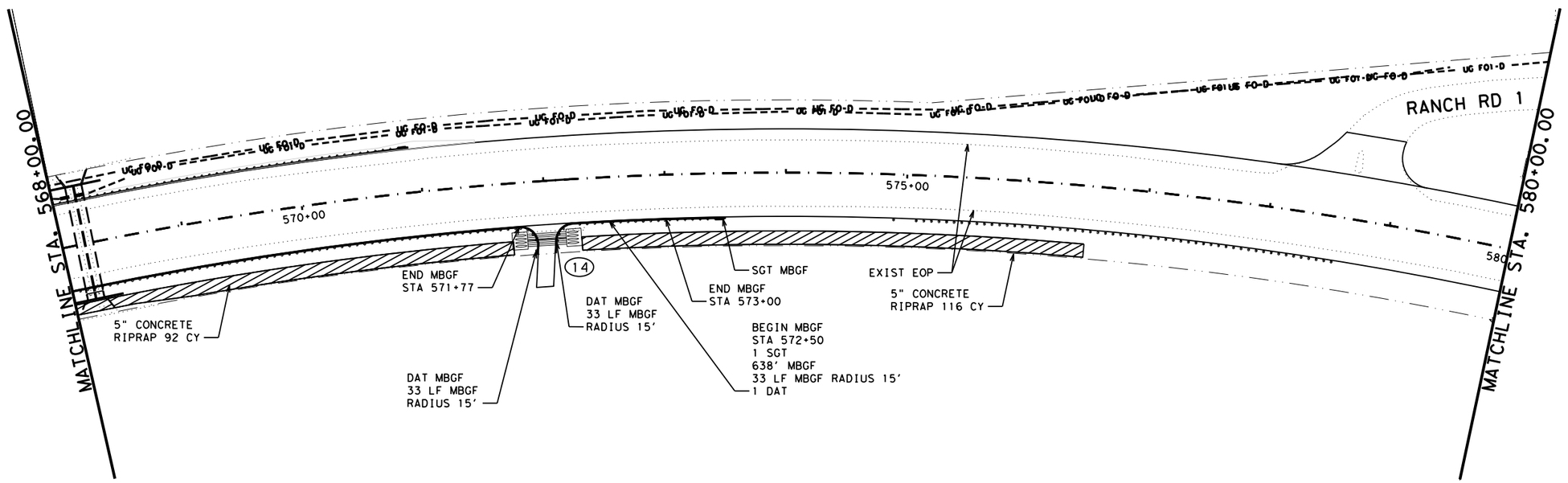
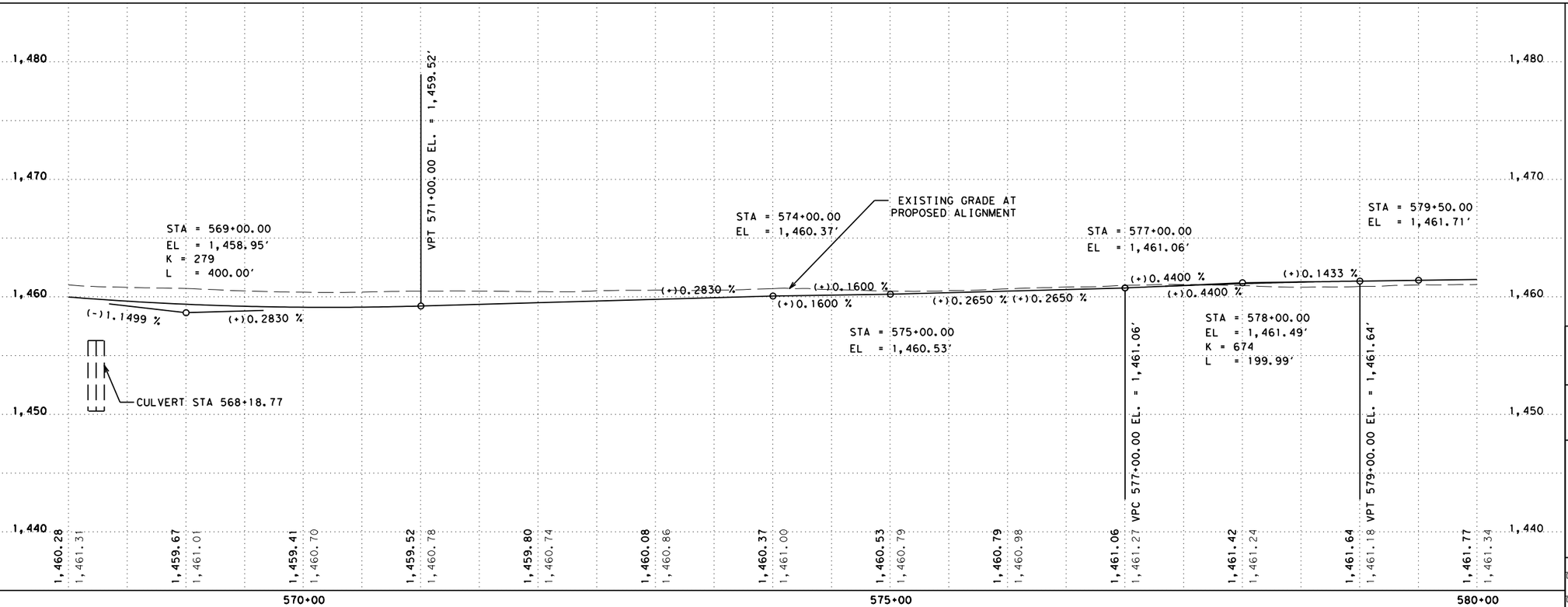


5" CONCRETE RIPRAP



LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--
HCTC FIBER LINE TO BE ABANDONED IN PLACE	-- UG FO-D --

3/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessyacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
PLAN & PROFILE

SHEET 9 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		70

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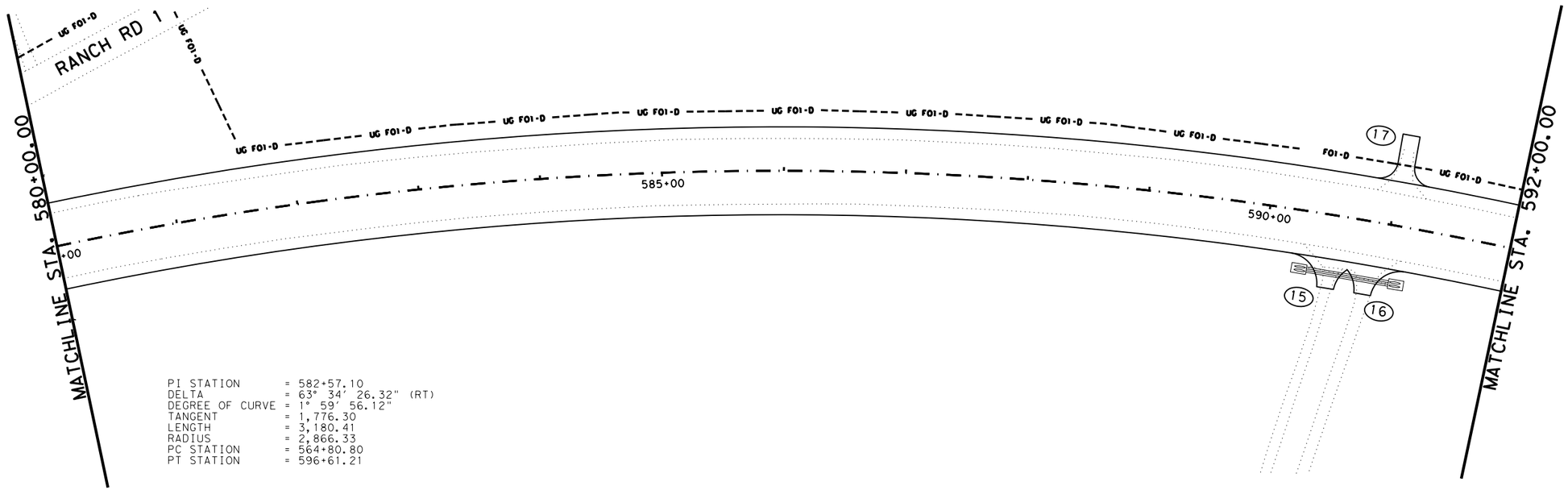

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DELTA = 63° 34' 26.32" (RT)
DEGREE OF CURVE = 1° 59' 56.12"
TANGENT = 1,776.30
LENGTH = 3,180.41
RADIUS = 2,866.33
PC STATION = 564+80.80
PT STATION = 596+61.21

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--

3/15/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

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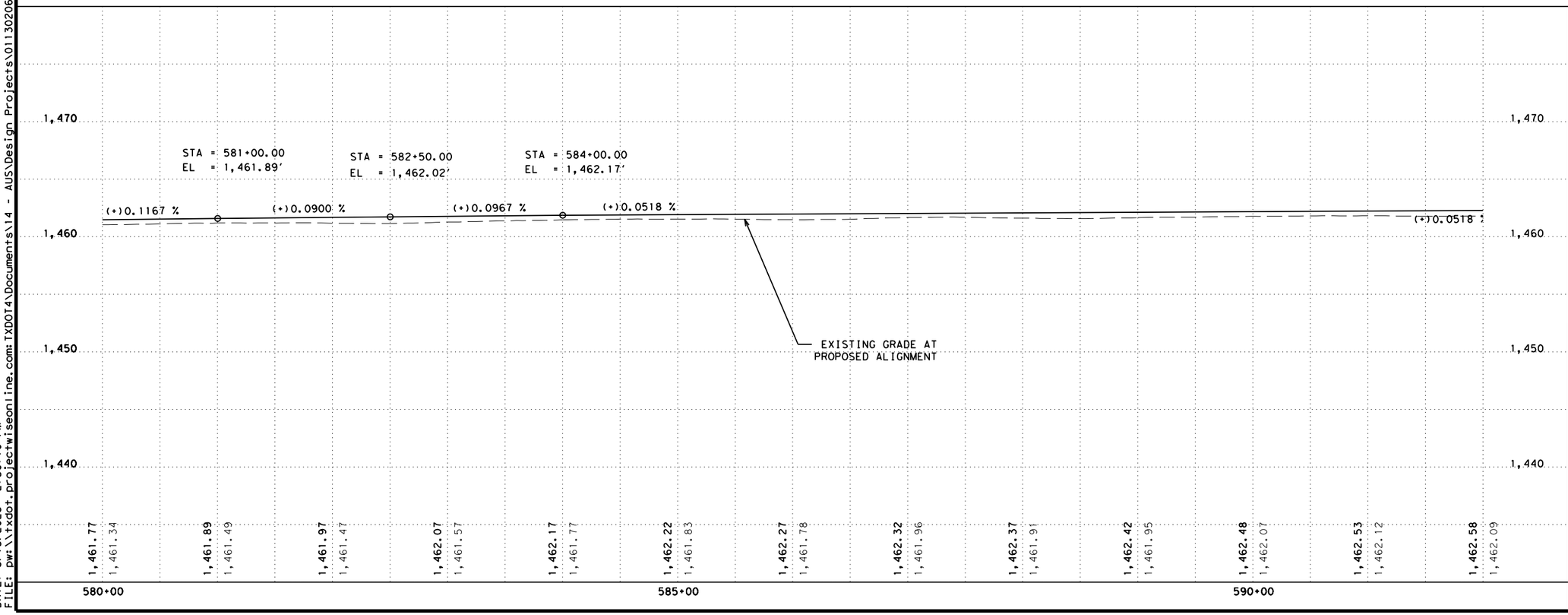
Mouness Yacoub P.E.
C558EA119EB3496...



SCALES (IN FEET):
HORZ- 0 100
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SHEET 10 OF 13

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
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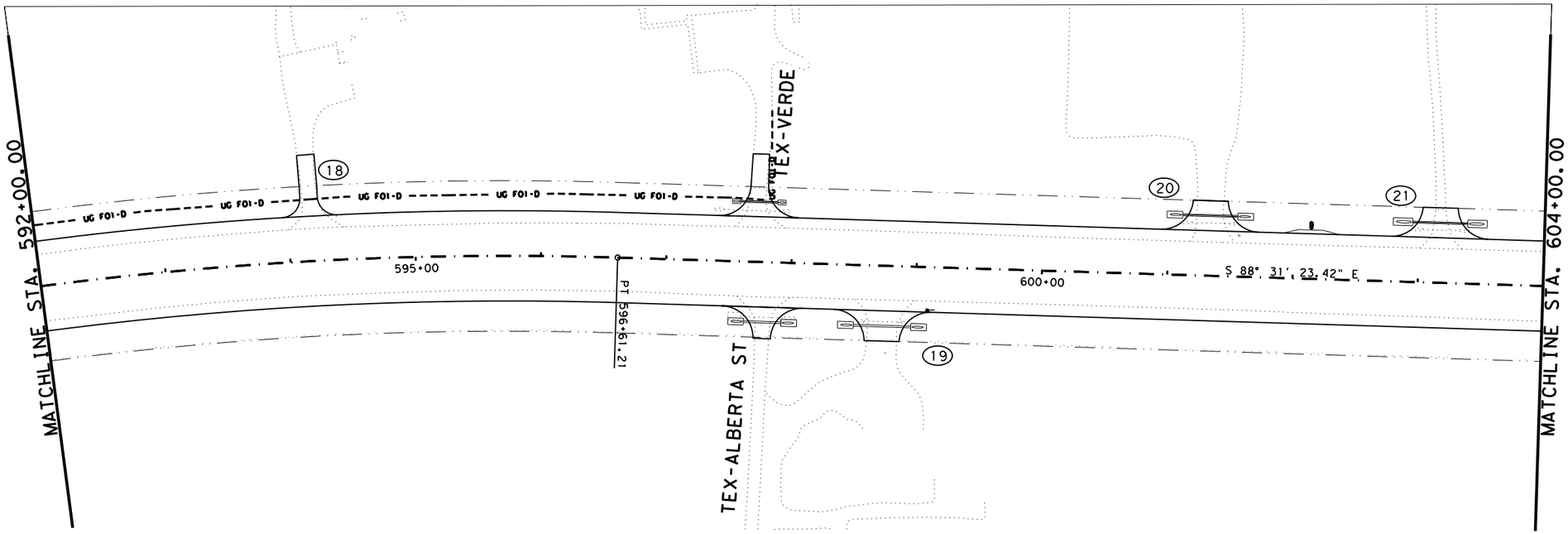

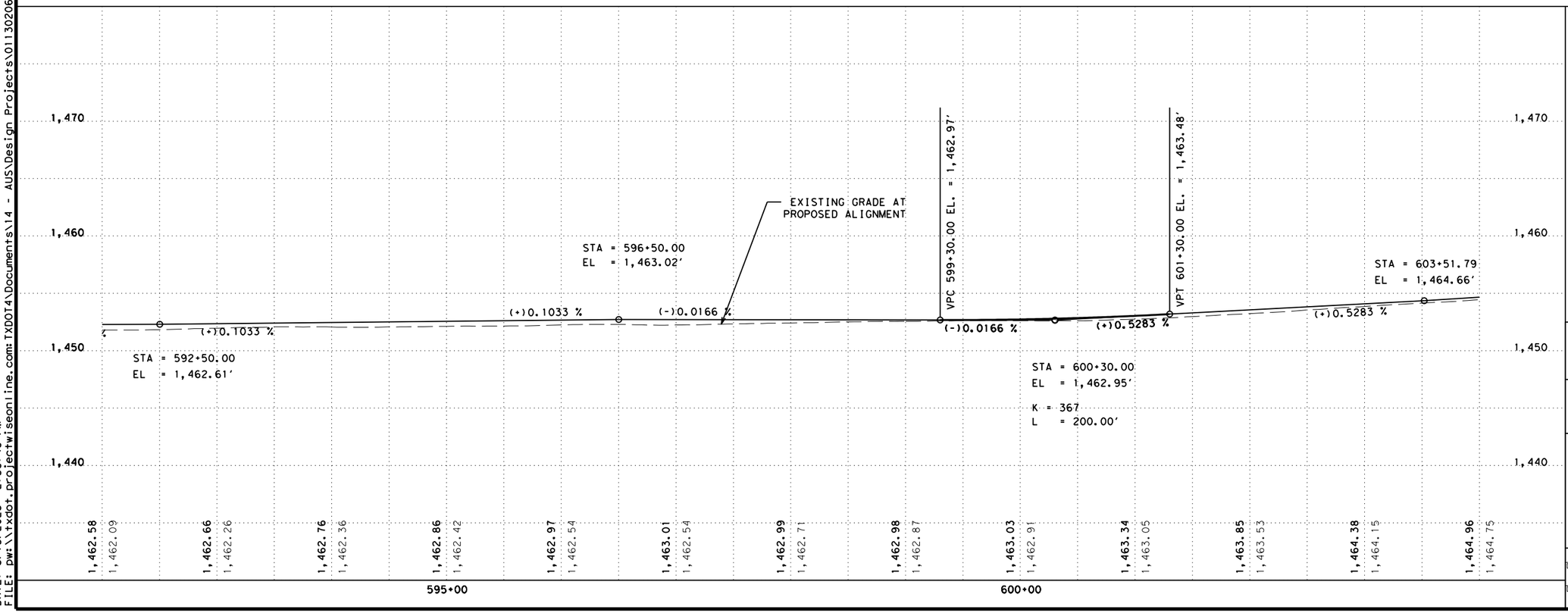

LEGEND

FULL DEPTH WIDENING	
5" CONCRETE RIPRAP	
DRIVEWAY ID	DWX
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	
FRONTIER FIBER LINE TO BE ABANDONED IN PLACE	--UG FO1-D--

3/15/2023

STATE OF TEXAS
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91227
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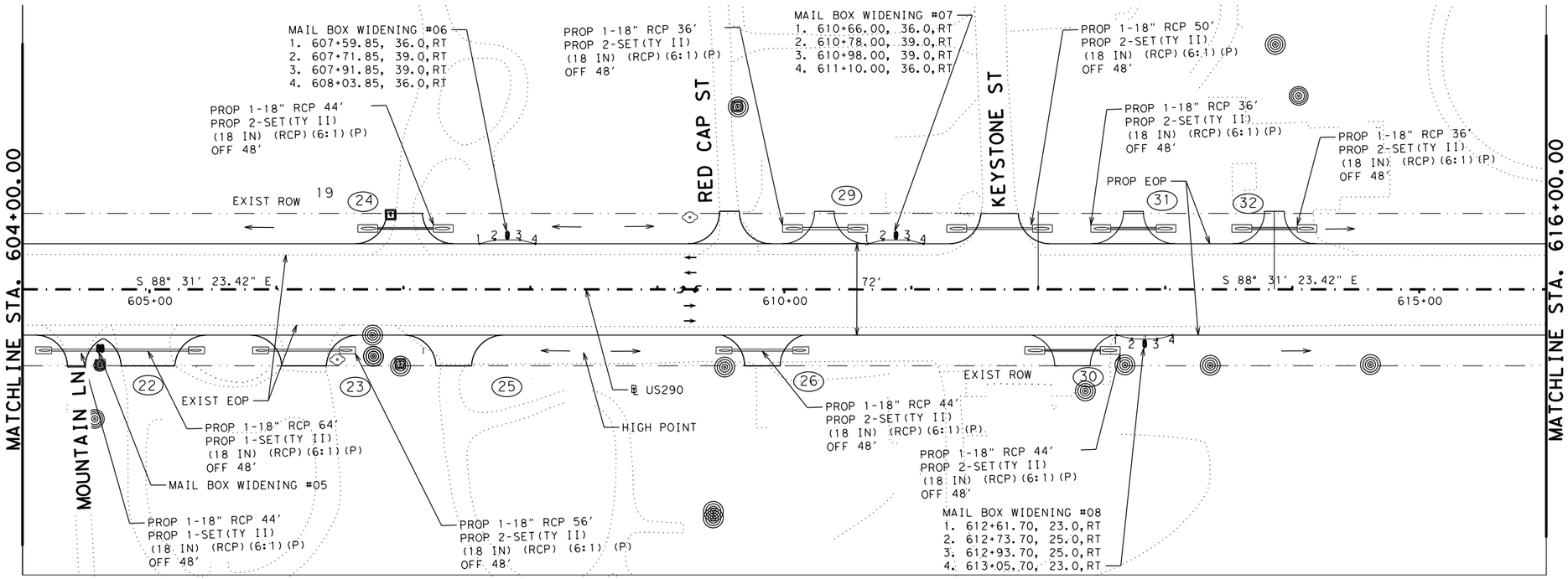

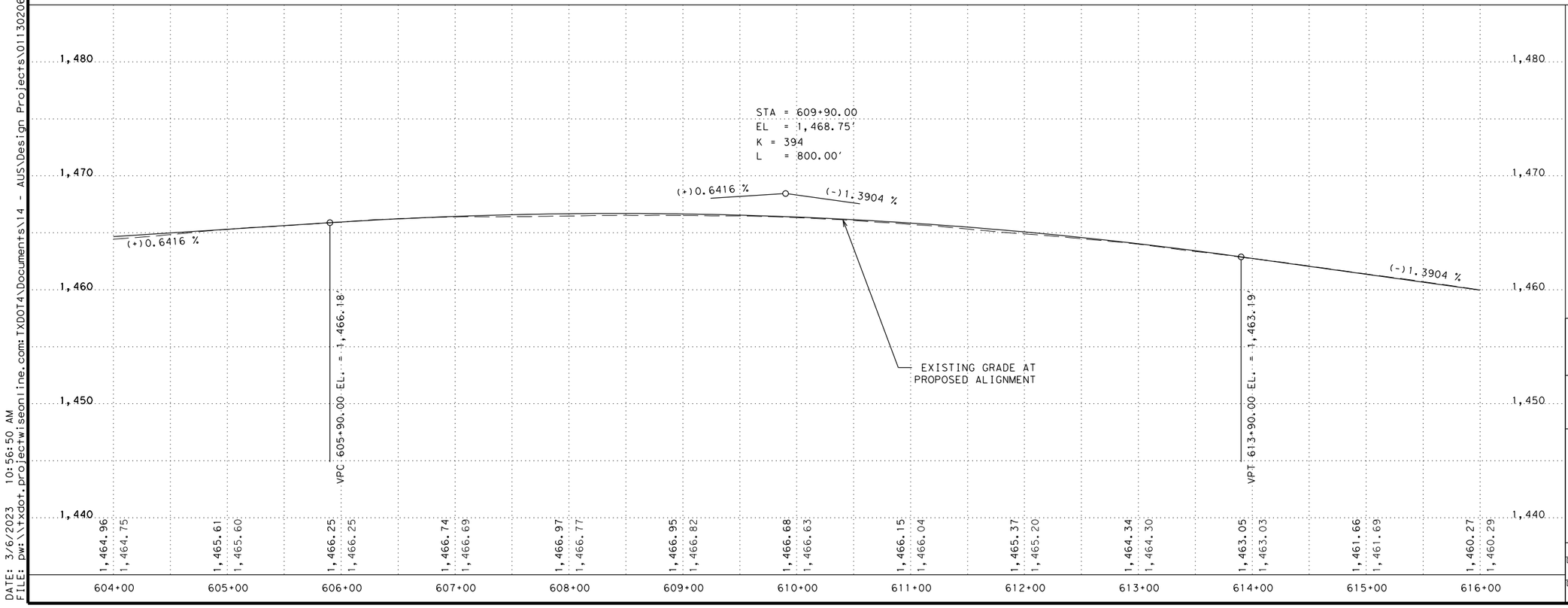

LEGEND

- FULL DEPTH WIDENING
- 5" CONCRETE RIPRAP
- DRIVEWAY ID (DWX)
- PROPOSED MAILBOX
- DIRECTION OF TRAFFIC

3/6/2023

STATE OF TEXAS
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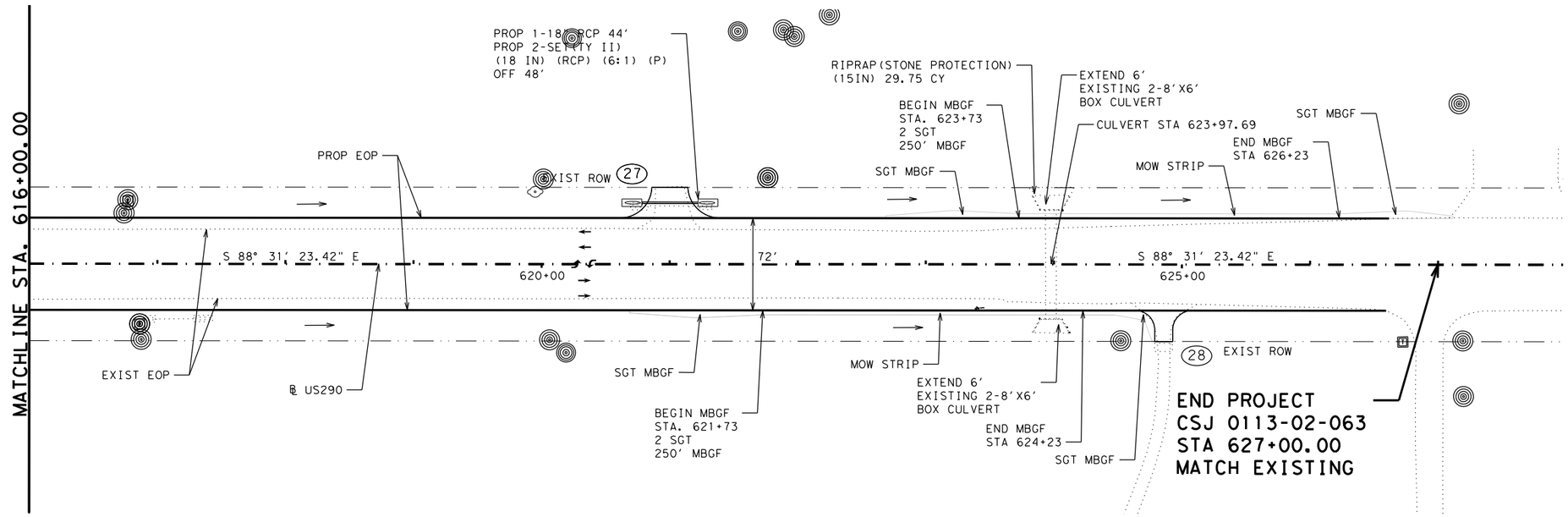

LEGEND

- FULL DEPTH WIDENING
- 5" CONCRETE RIPRAP
- DRIVEWAY ID (DWX)
- PROPOSED MAILBOX
- DIRECTION OF TRAFFIC

2/9/2023

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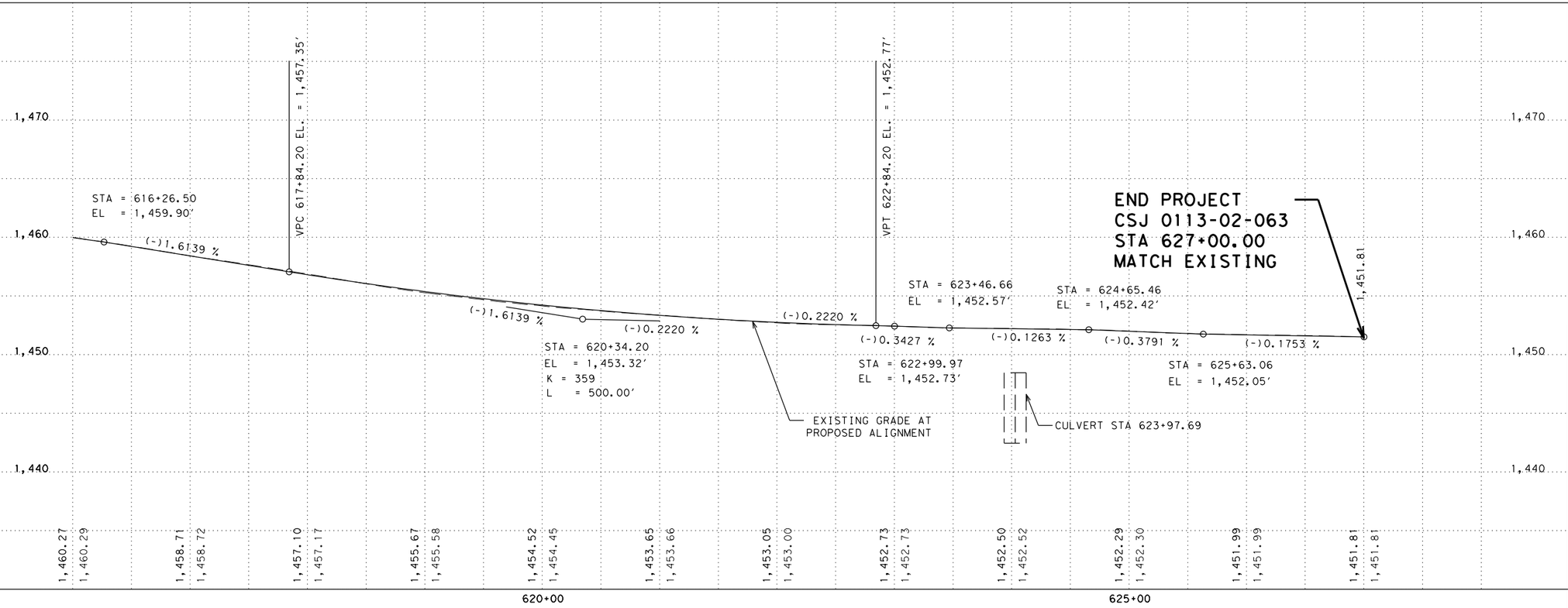

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SHEET 13 OF 13

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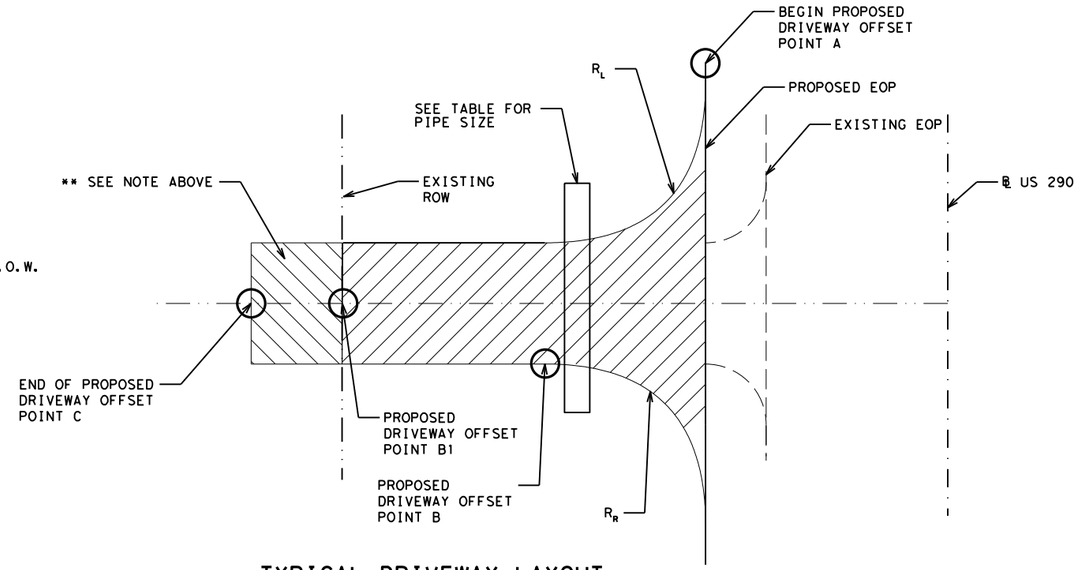
DRIVEWAY NO.	MAILBOX TURNOUT	P&P SHEET NO.	DRIVEWAY TYPE		STATION	SIDE (LT/RT)	DWY LENGTH (FT)	DWY WIDTH @ MOUTH (FT)	DWY WIDTH @ THROAT (FT)	RADIUS R_L (FT)	RADIUS R_R (FT)	MAILBOX TURNOUT (SY)	PIPE								S.E.T. SIDE SLOPE	NEED CONSTRUCTION LICENSE
			SURFACE AREA (SY)	PROP SURFACE									EX TYPE	PROP TYPE	EX LENGTH (FT)	PROP LENGTH (FT)	EX SIZE (IN)	PROP SIZE (IN)	EX NO. OF BARRELS	PROP NO. OF BARRELS		
1	Y	2	128	Asphalt	491+06.00	LT	24	84.6	37	25	25					60		18		2	6:1	NO
2	Y	2	48	Asphalt	492+05.00	LT	24	44.3	14	15	15					28		18		2	6:1	NO
3	Y	2	48	Asphalt	493+03.00	LT	24	44.3	14	15	15	10.6	CMP	RCP	44.5	22	20	18	1	2	6:1	NO
4	N	2	49	Asphalt	493+00.00	RT	24	42.7	14	15	15		CMP	RCP	38	24	29X42	24	2	3	6:1	NO
5	N	2	106	Asphalt	495+86.86	LT	24	77	28	25	25		CMP	RCP	70	48	20	18	1	3	6:1	NO
6	N	3	115	Asphalt	501+00.00	LT	24	82.78	32	25	25		CMP	RCP	60	52	20X27	24	2	2	6:1	NO
7	N	3	48	Asphalt	507+22.72	RT	24	44	14	15	15		CMP	RCP	29	24	18X28	18	1	1	6:1	NO
8	Y	4	48	Asphalt	509+20.00	LT	24	44	14	15	15											
9	N	4	48	Asphalt	514+44.00	RT	24	44	14	15	15	10.6		RCP		24		18		1	6:1	NO
10	N	5	104	Asphalt	528+31.26	LT	24	78	28	25	25											NO
11	N	8	103	Asphalt	557+07.00	LT	24	77	28	25	25			RCP		44		18		1	6:1	NO
12	N	8	104	CONC	560+54.72	RT	24	78	28	25	25		CMP	RCP	43	44	15X20	18	1	1	6:1	NO
13	Y	8	104	Asphalt	560+56.73	LT	24	78	28	25	25	10.6		RCP		44		18		1	6:1	NO
14	Y	9	90	Asphalt	572+00.00	RT	24	44	14	15	15		CMP	RCP	45	32	20X28	18	1	4	6:1	NO
15	N	10	64	Asphalt	590+55.00	LT	24	48	14	25	25		CMP	RCP	27	32	15X20	18	1	2	6:1	NO
16	N	10	64	Asphalt	590+86.48	LT	24	48	14	25	25		CMP	RCP	30	32	15X20	18	1	2	6:1	NO
17	N	10	127	Asphalt	591+04.00	RT	39	44	14	15	15											YES
18	N	11	95	Asphalt	594+17.17	LT	54	44	14	15	15											YES
19	N	11	105	Asphalt	598+73.71	RT	24	78	28	25	25		CMP	RCP	30	48	15X20	18	1	1	6:1	NO
20	Y	11	104	Asphalt	601+33.00	LT	24	78	28	25	25	10.6	CMP	RCP	30	44	20	18	1	1	6:1	NO
21	Y	11	104	Asphalt	602+16.53	LT	24	78	28	25	25		CMP	RCP	28	44	20	18	1	1	6:1	NO
22	Y	12	143	Asphalt	604+99.00	RT	24	86	42.4	25	25			RCP		64		18		1	6:1	NO
23	N	12	124	Asphalt	606+21.74	RT	24	85	35	25	25			RCP		56		18		1	6:1	NO
24	Y	12	104	Asphalt	507+00.85	LT	24	78	28	25	25	10.6		RCP		44		18		1	6:1	NO
25	N	12	105	Asphalt	507+39.67	RT	24	78	28	25	25	10.6										
26	N	12	100	Asphalt	609+82.73	RT	24	64	28	25	25	10.6		RCP		44		18		1	6:1	NO
27	N	13	104	Asphalt	620+00.00	LT	24	78	28	25	25		CMP	RCP	44.5	44	24	18	1	1	6:1	NO
28	N	13	48	Asphalt	624+85.75	RT	24	44	14	15	15										6:1	NO
29	N	12	74	Asphalt	610+31.50	LT	24	78	28	25	25			RCP		36		18		1	6:1	NO
30	N	12	100	Asphalt	612+26.90	RT	24	64	64	28	25			RCP		44		18		1	6:1	NO
31	N	12	74	Asphalt	612+74.90	LT	24	78	28	25	25			RCP		36		18		1	6:1	NO
32	N	12	74	Asphalt	613+85.90	LT	24	78	28	25	25			RCP		36		18		1	6:1	NO
HAHN RD	N	5	150	Asphalt	529+11.97	RT	24	95	45	25	25											
GELLERMANN LN	N	5	98	Asphalt	529+87.03	LT	30	70	20	25	25											
UPPER ALBERT RD	N	7	137	Asphalt	552+50.71	RT	45	72	28	25	25		CMP	RCP	46	40	20X28	18	1	1	6:1	NO
WOODROSE LN	N	8	135	Asphalt	565+54.10	RT	26	78.6	26	25	25		CMP	RCP	32	48	15X20	18	1	1	6:1	NO
RANCH RD 1	N	9	209	Asphalt	578+70.40	LT	26.7	125	56.25	25	50											
TEX-VERDE	N	11	106	Asphalt	597+72.42	LT	69	64	14	25	25		CMP	RCP	35	44	24	18	1	1	6:1	NO
TEX-ALBERTA ST	N	11	68	Asphalt	597+78.04	RT	25	64	14	25	25		CMP	RCP	30	30	20	18	1	1	6:1	NO
MOUNTAIN LN	N	12	69	Asphalt	604+42.45	RT	25	53	14	25	25			RCP		44		18		1	6:1	NO
RED CAP ST	N	12	74	Asphalt	609+56.85	LT	25.6	65.63	15.65	25	25											
KEYSTONE ST	N	12	108	Asphalt	611+69.50	LT	24	79.45	29.5	25	25			RCP		52		18		1	6:1	NO

NOTES

** OBTAIN A CONSTRUCTION LICENSE AGREEMENT BEFORE CONSTRUCTING OUTSIDE TXDOT R.O.W. SEE THE DRIVEWAY P&P FOR ADDITIONAL INFORMATION.

*** INSTALL 6:1 S.E.T.S ON EACH END OF ALL DRIVEWAY PIPES. SEE DRIVEWAY P&P FOR OFFSET POINTS A, B, B1, AND C.



TYPICAL DRIVEWAY LAYOUT

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DRIVEWAY DETAILS

SHEET 1 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
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		AUS	GILLESPIE		75

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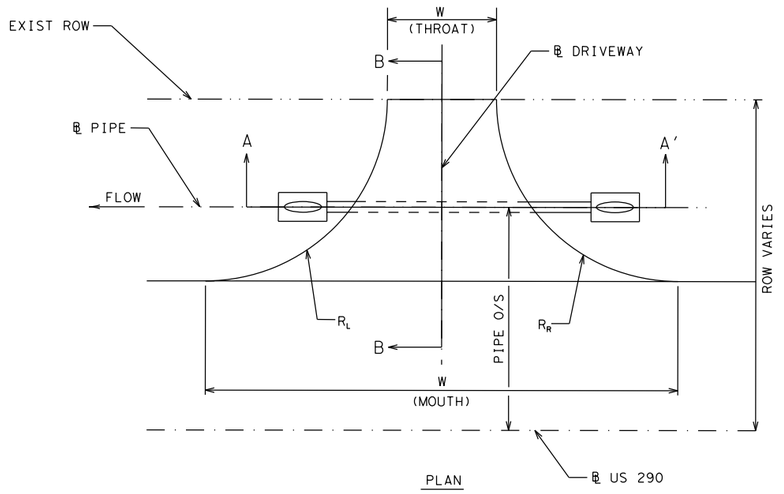
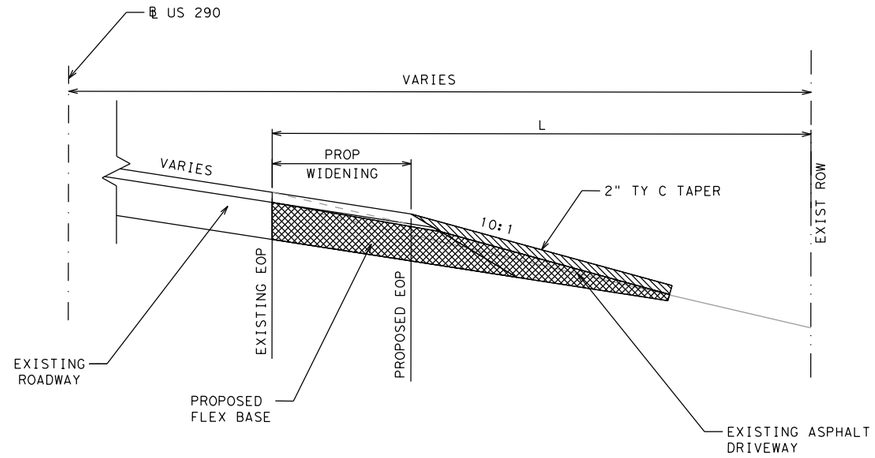
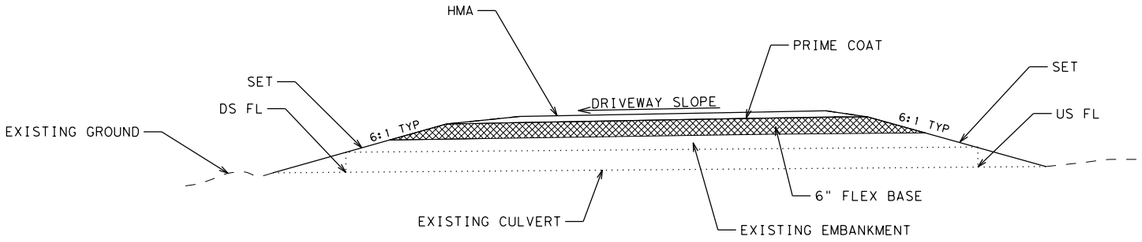


DRIVEWAY WITH CULVERT



SECTION B-B

FOR ASPHALT DRIVEWAYS



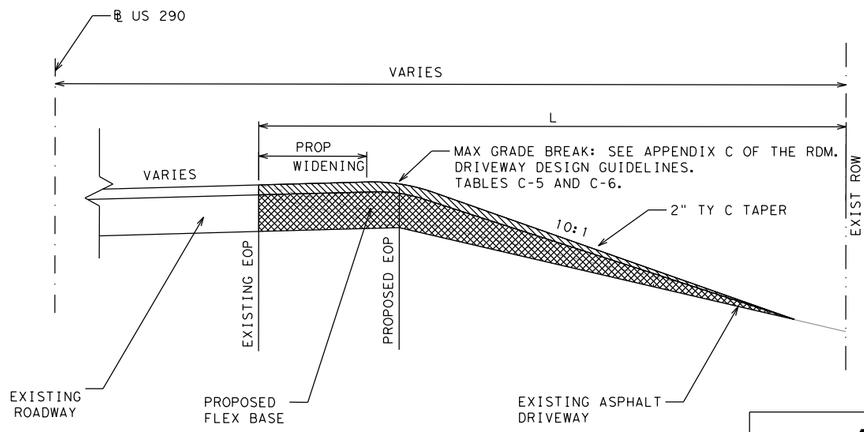
SECTION A-A'

FOR SURFACE TREATED DRIVEWAYS

NOTE:

DRIVEWAY EARTHWORK QUANTITIES CALCULATED BEYOND TYPICAL ROADWAY SLOPE.

GRADE ALL DRIVEWAYS TO DRAIN.



SECTION B-B

FOR ASPHALT DRIVEWAYS

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DRIVEWAY DETAILS

SHEET 2 OF 2

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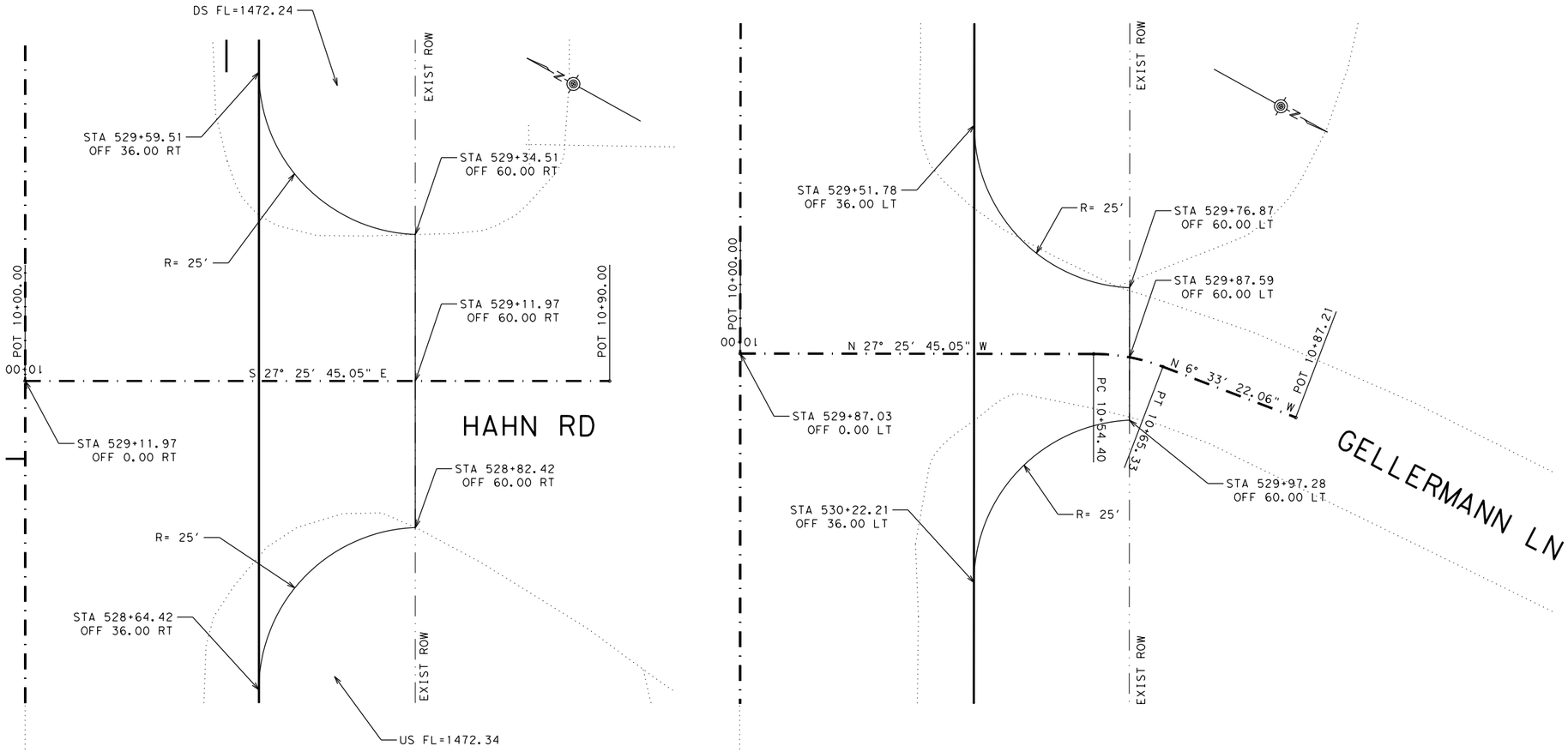

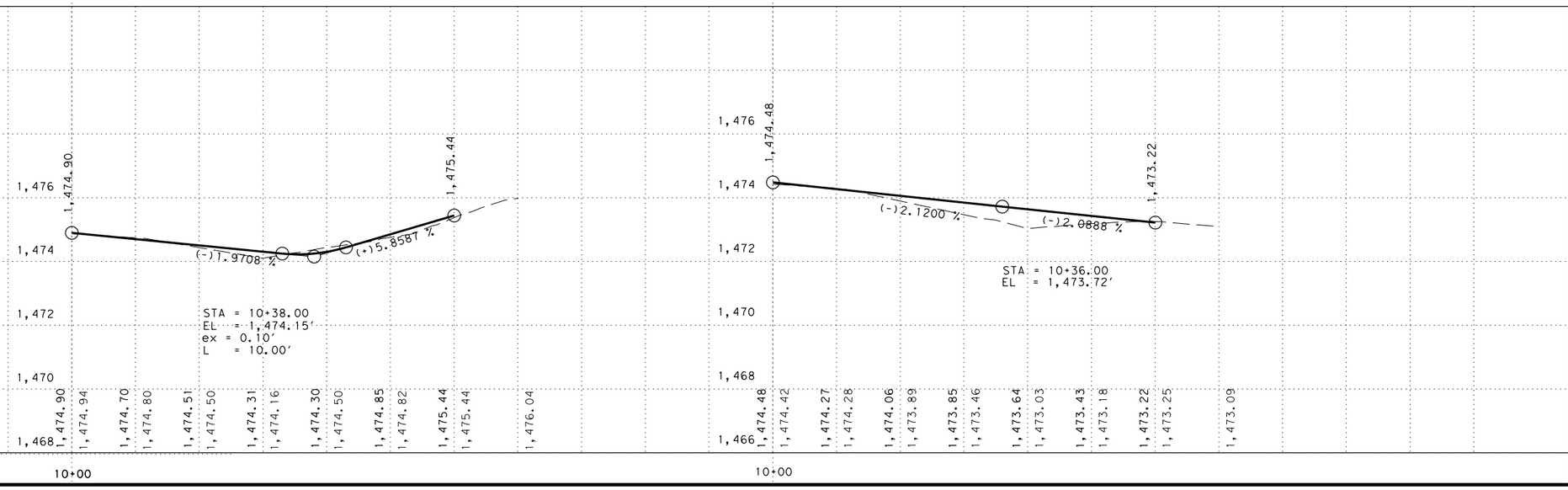

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MOUNESS H. YACOUB
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SHEET 1 OF 5

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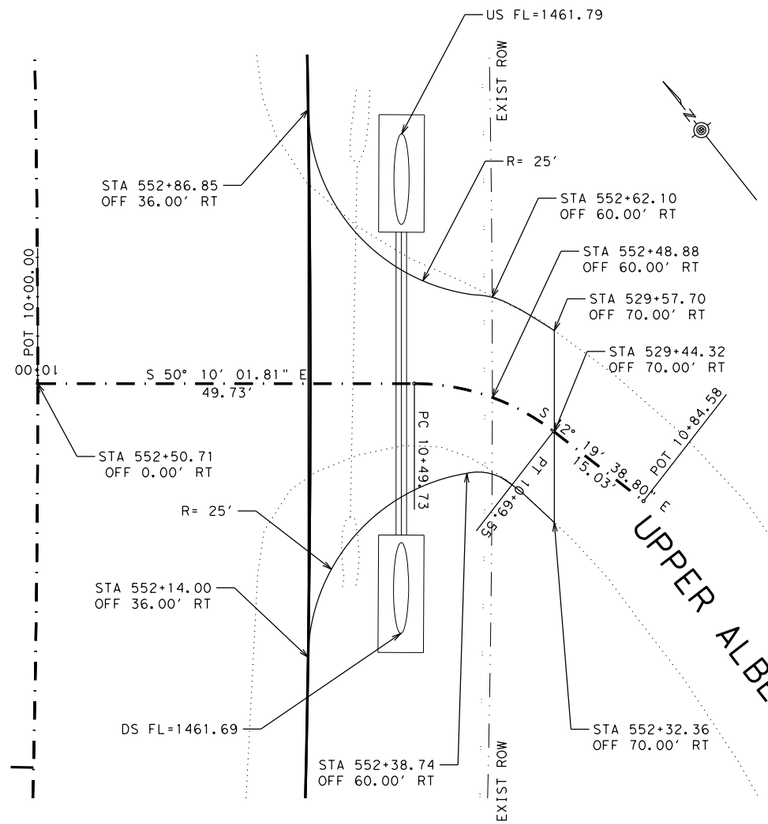

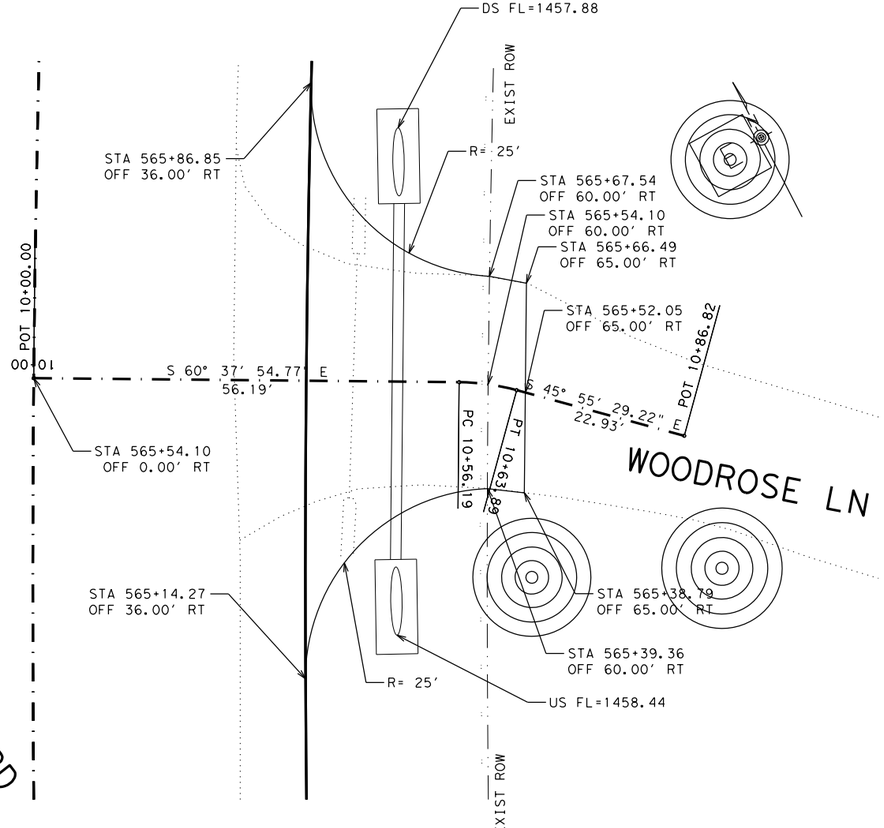

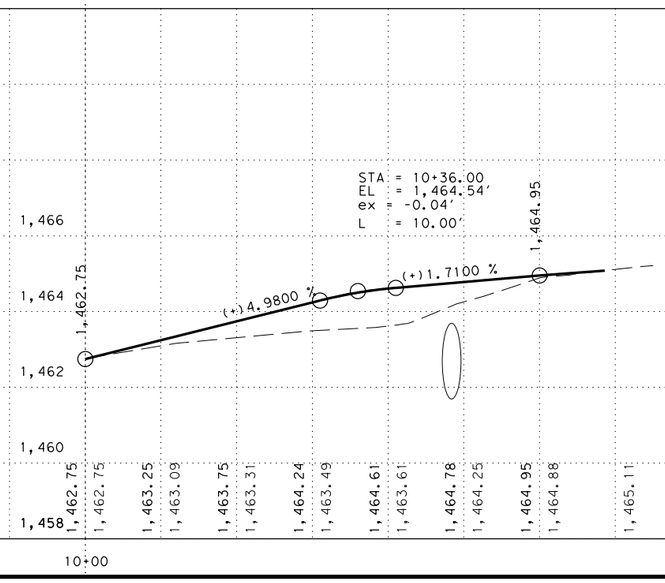

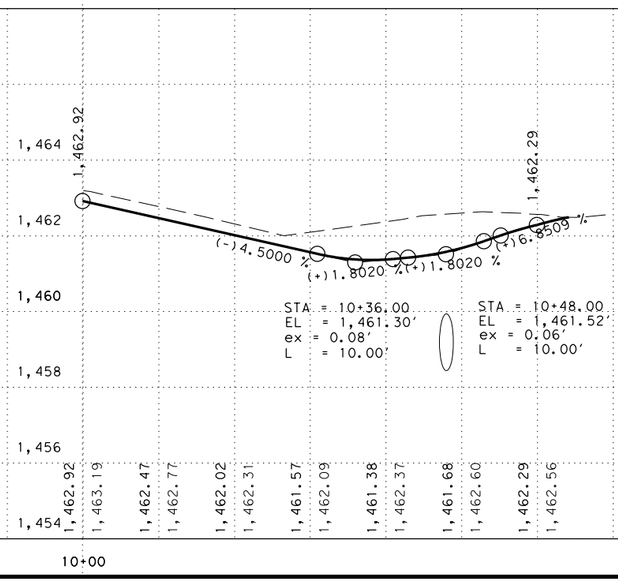

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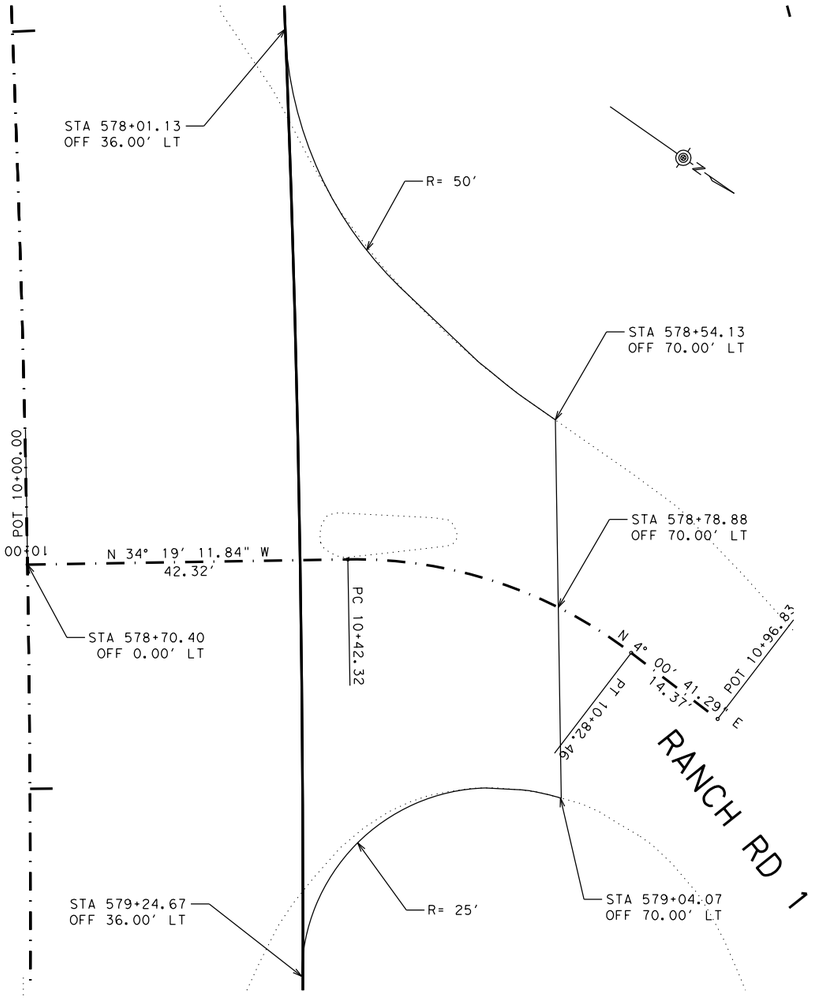

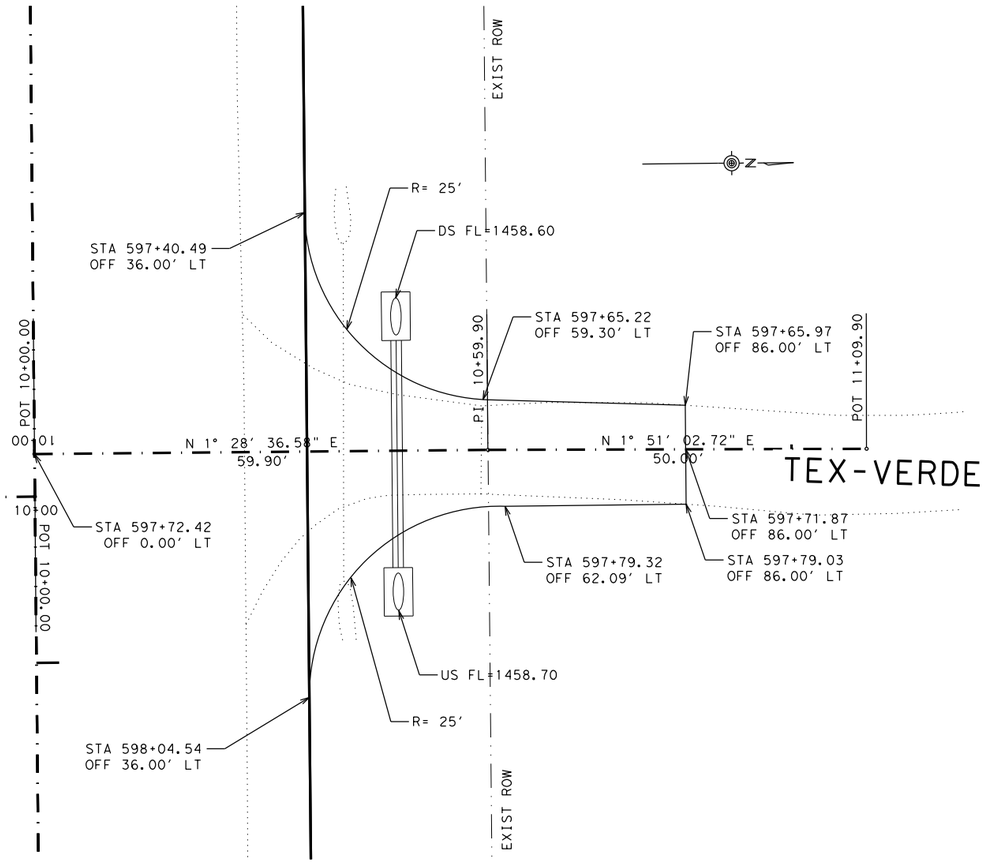

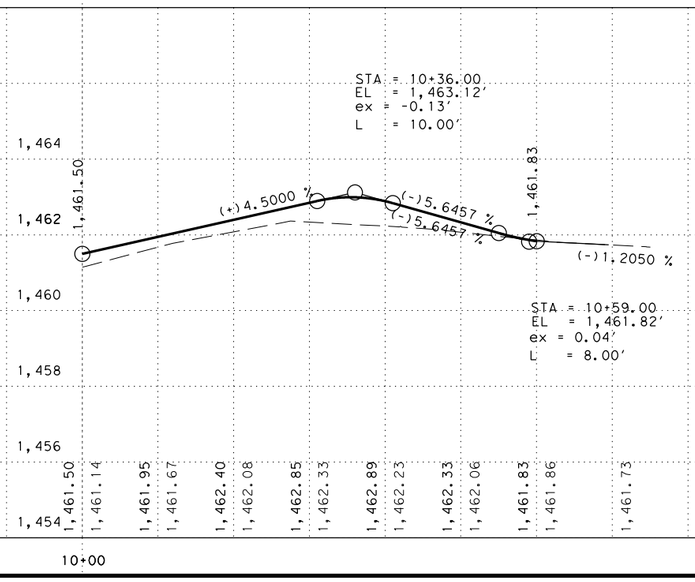

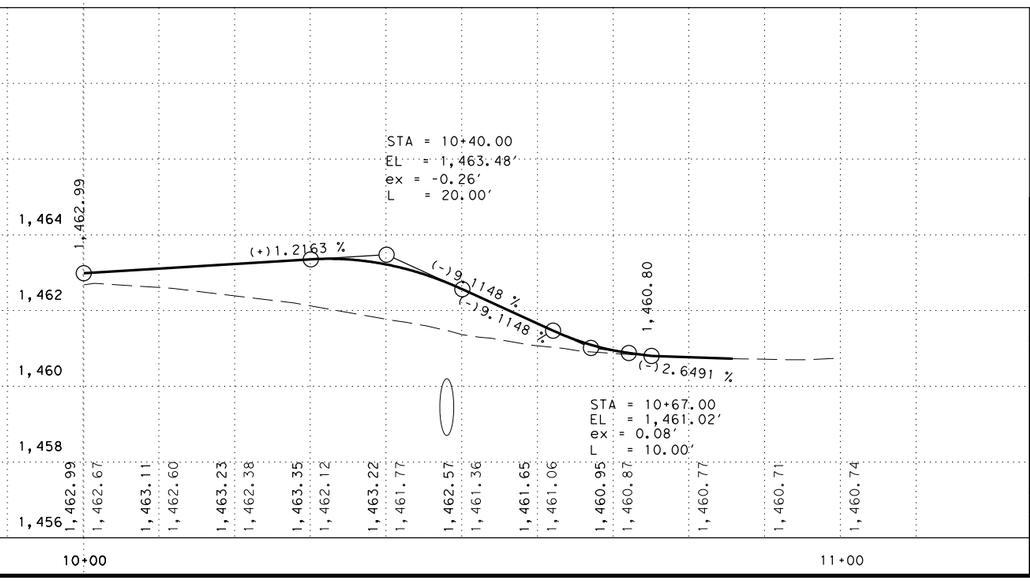

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SHEET 3 OF 5

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		AUS	GILLESPIE		79

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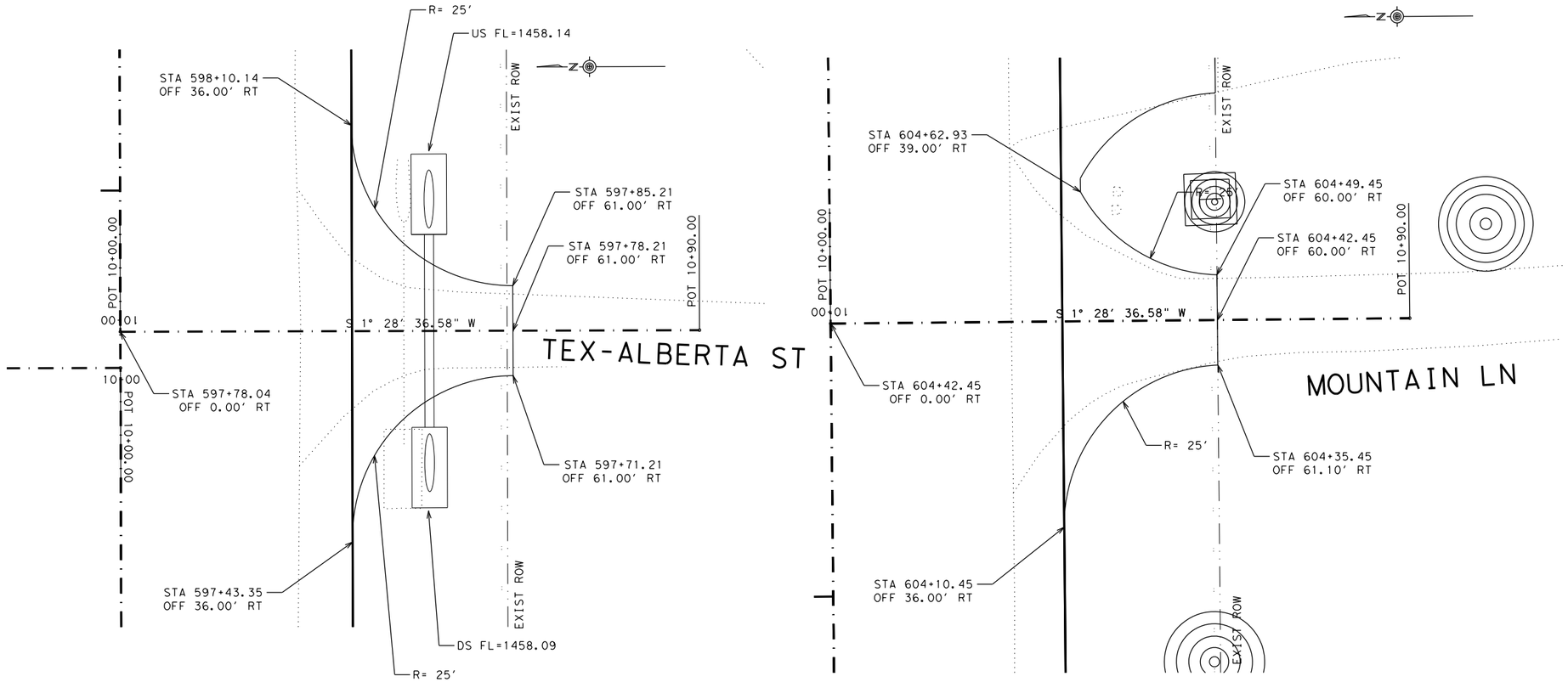

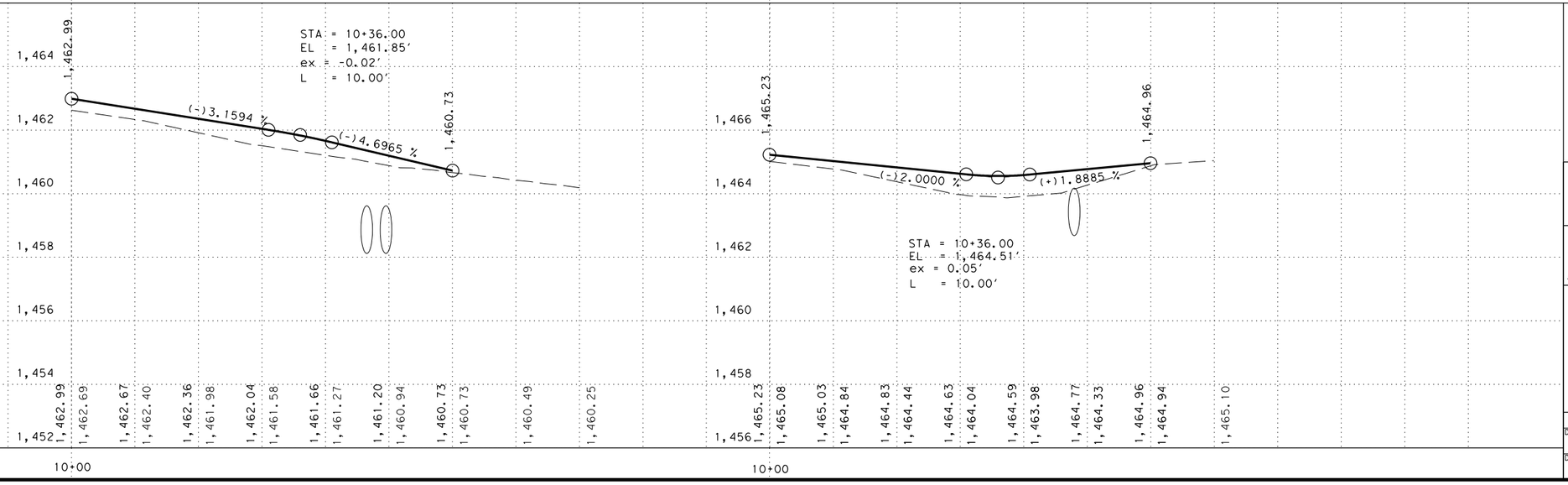

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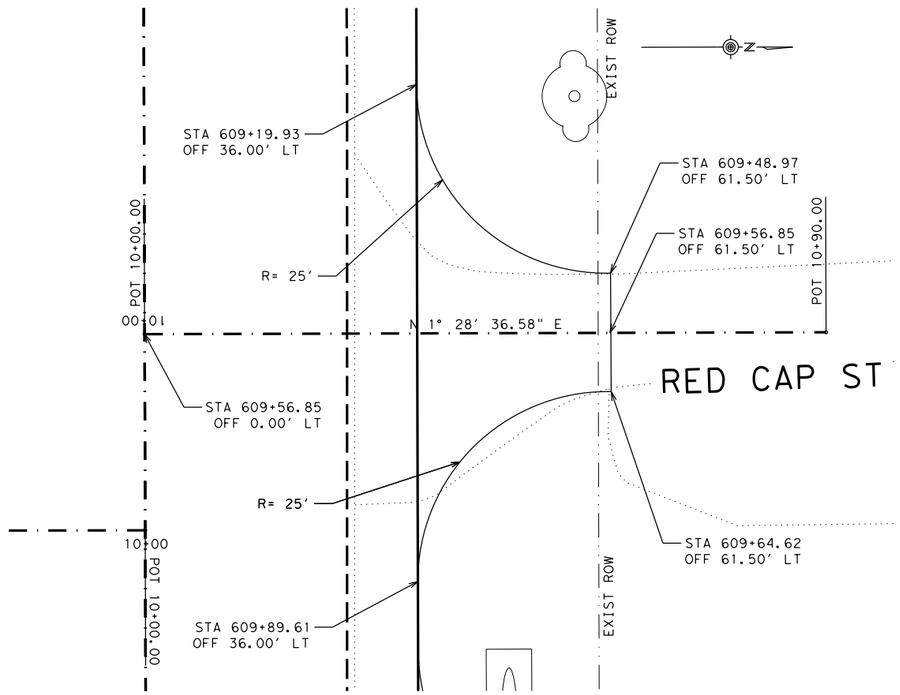

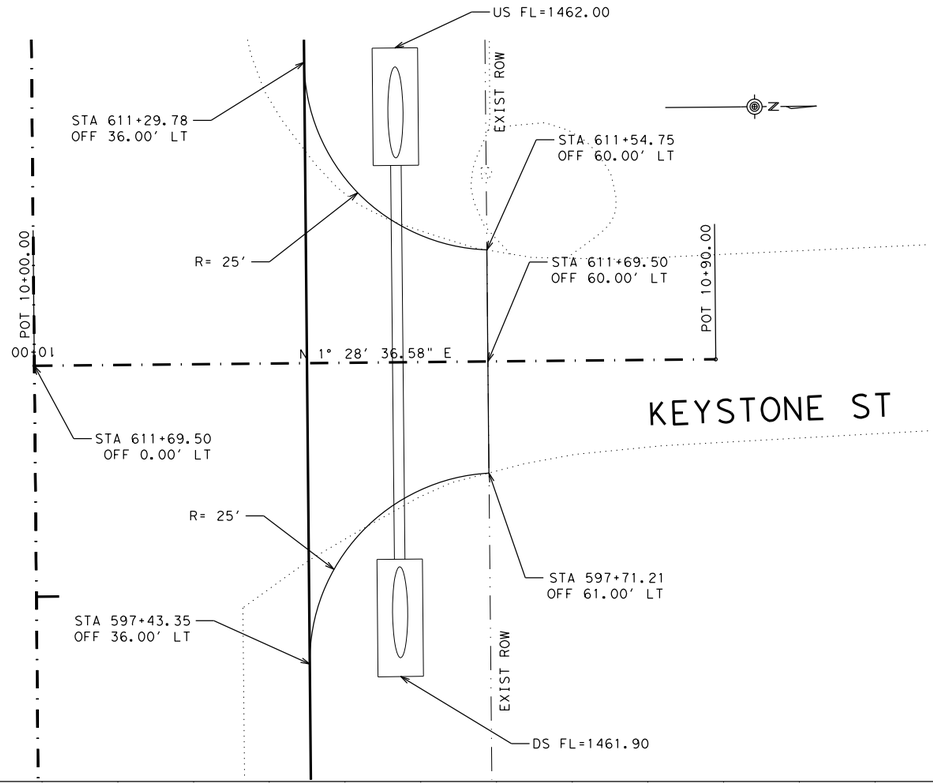

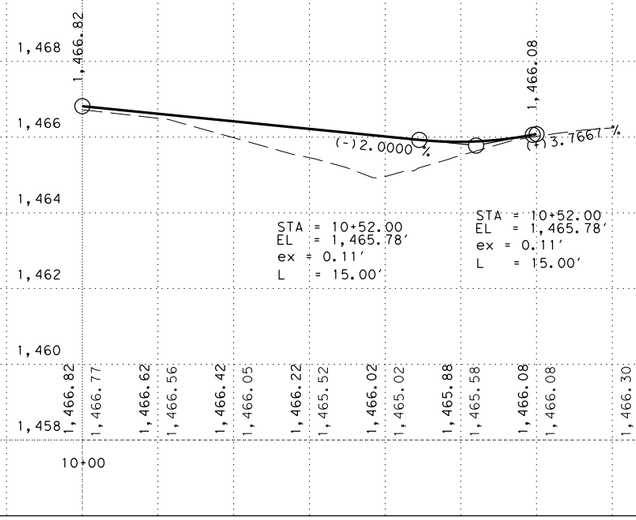

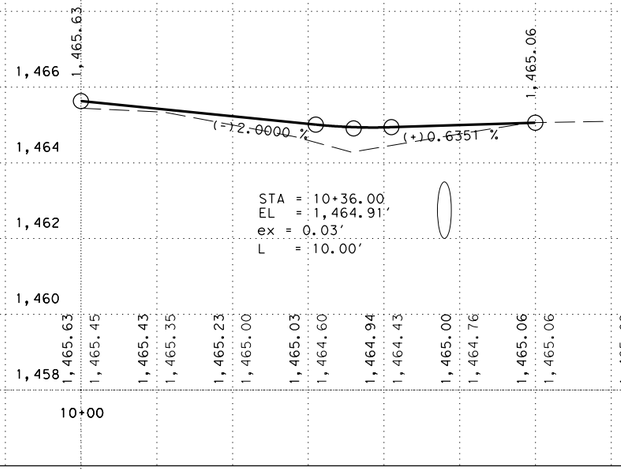

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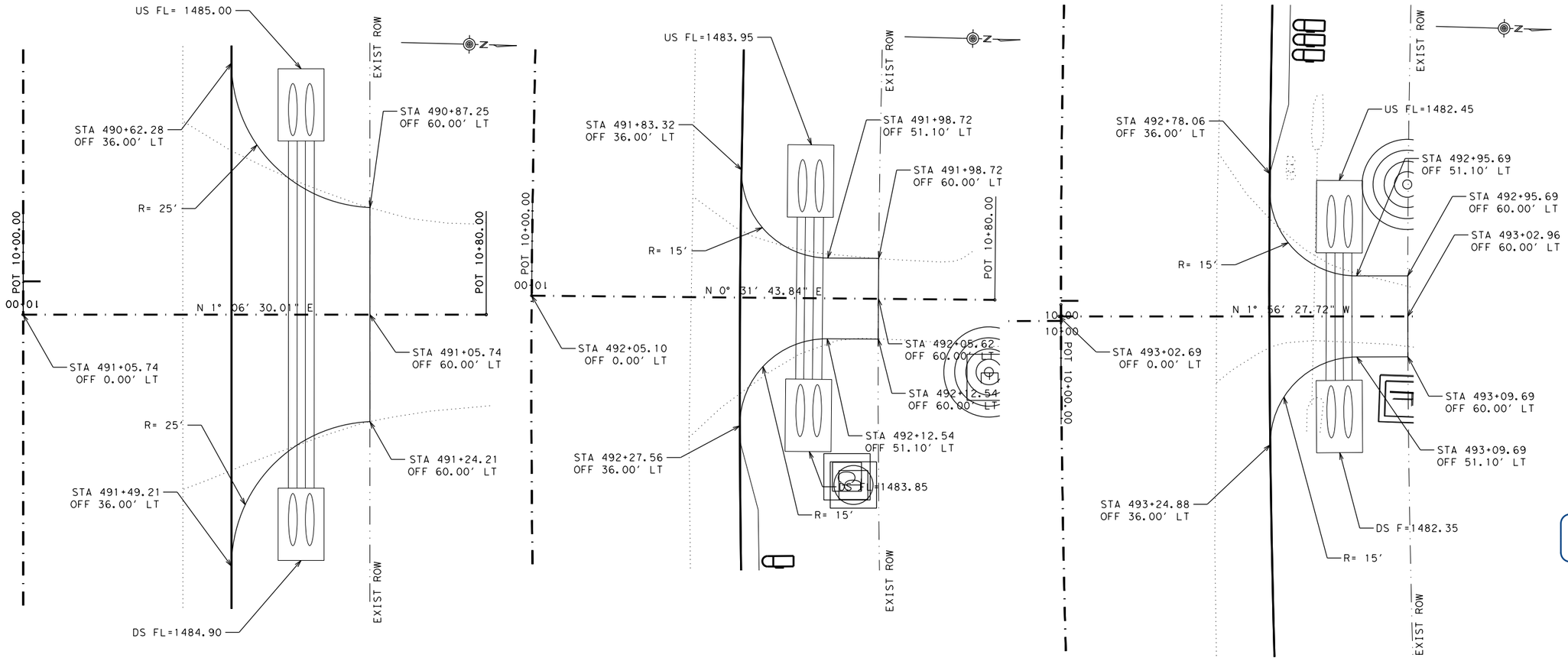

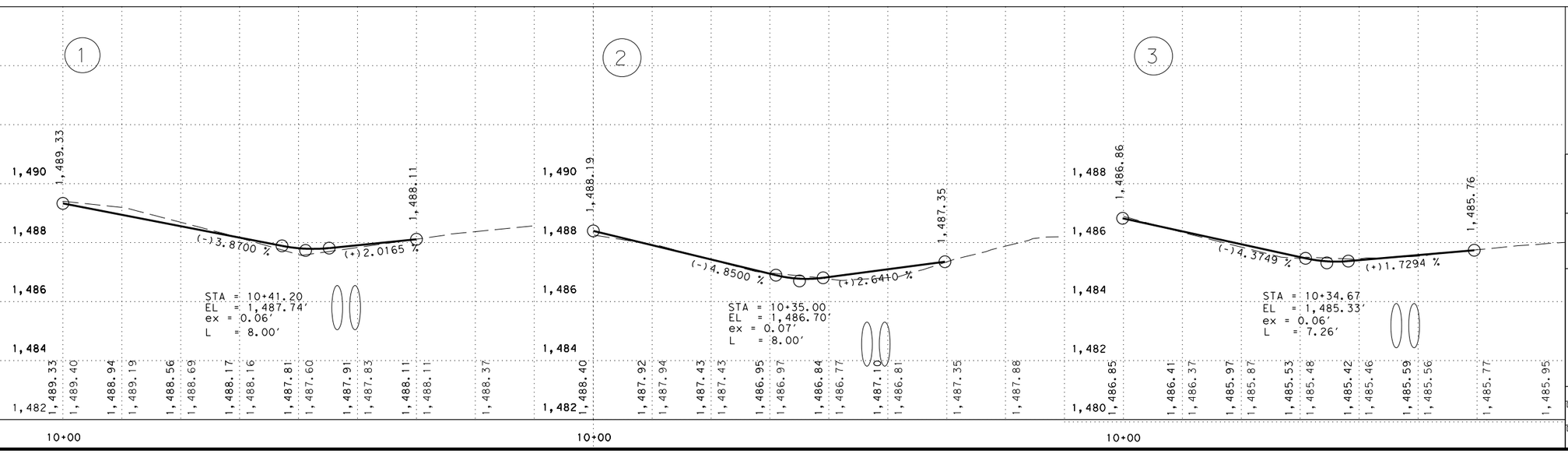

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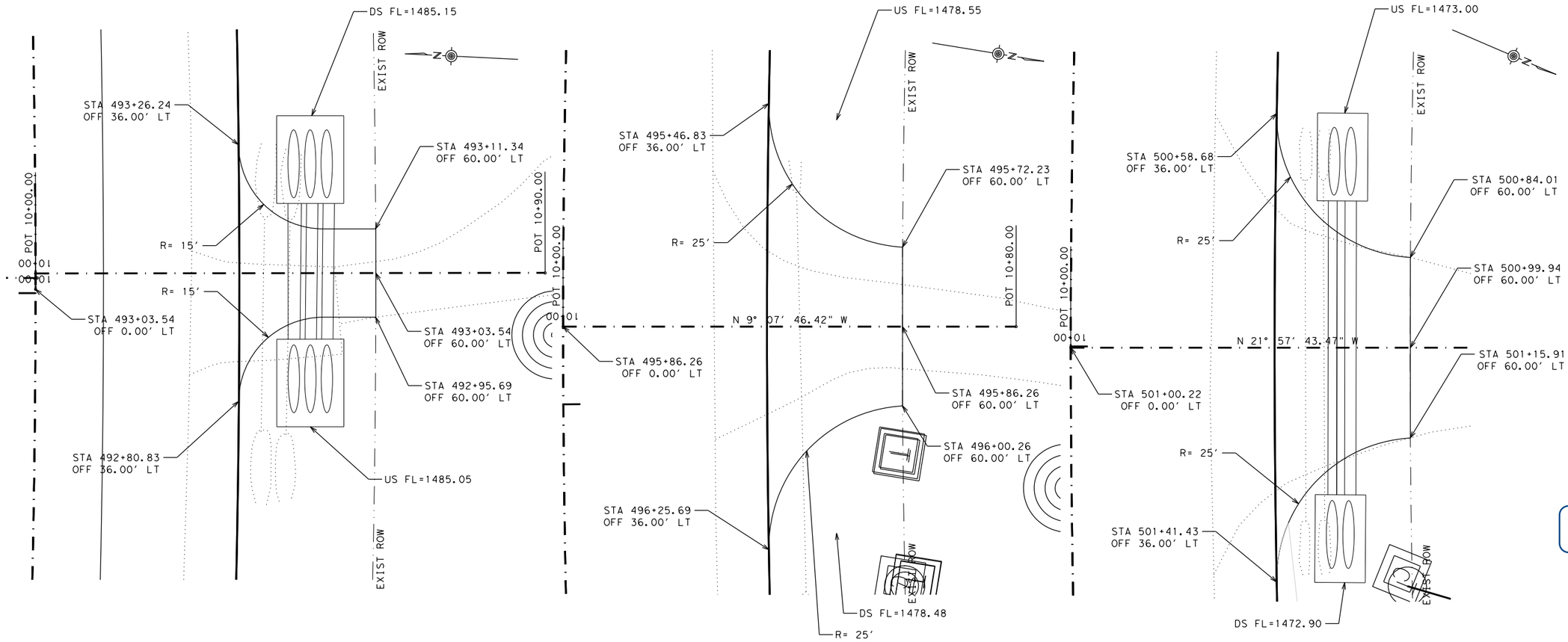

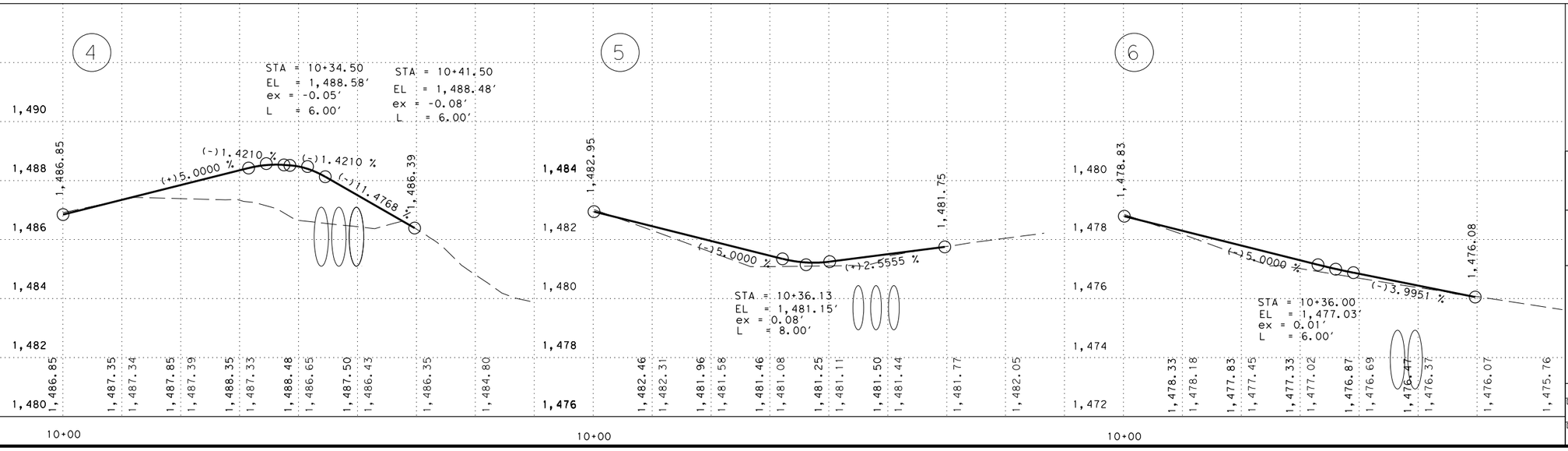

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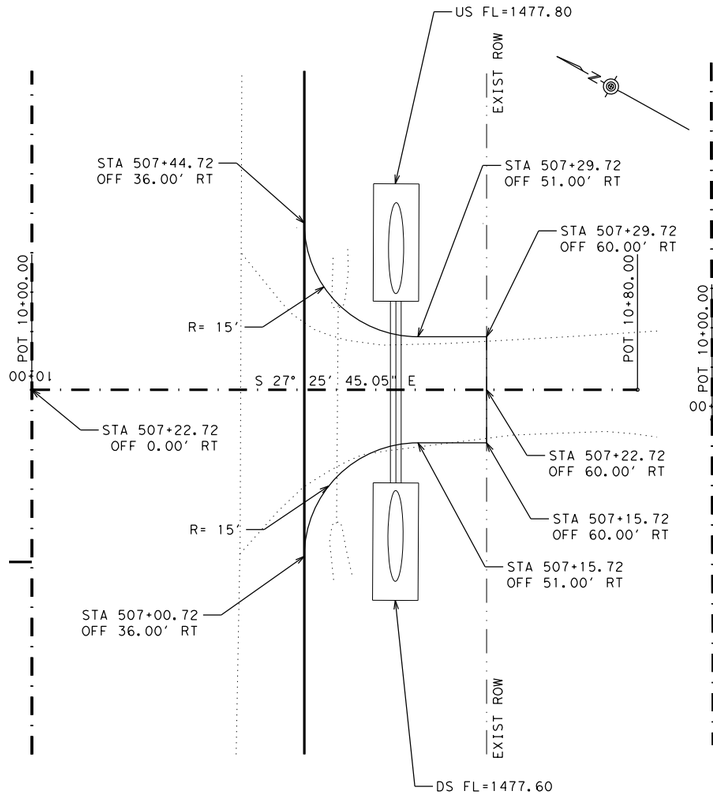

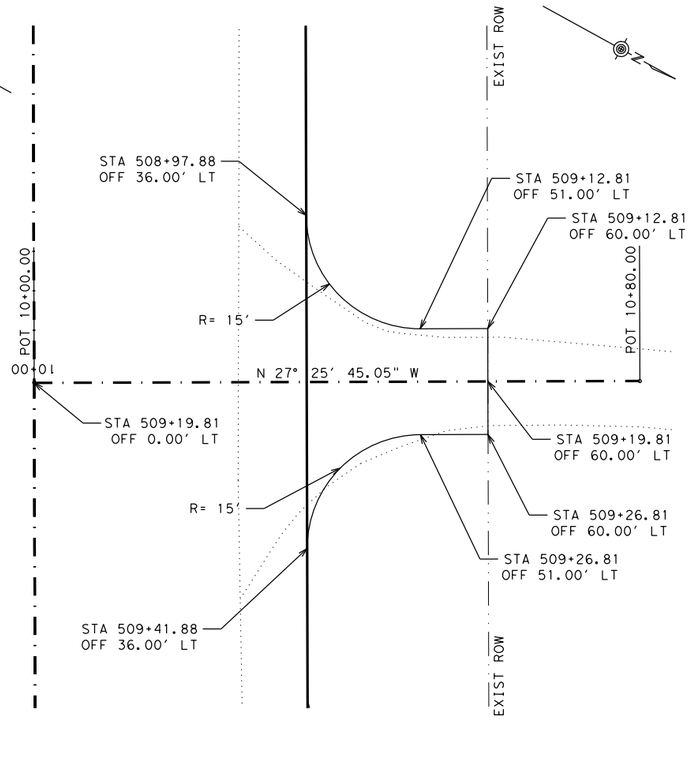

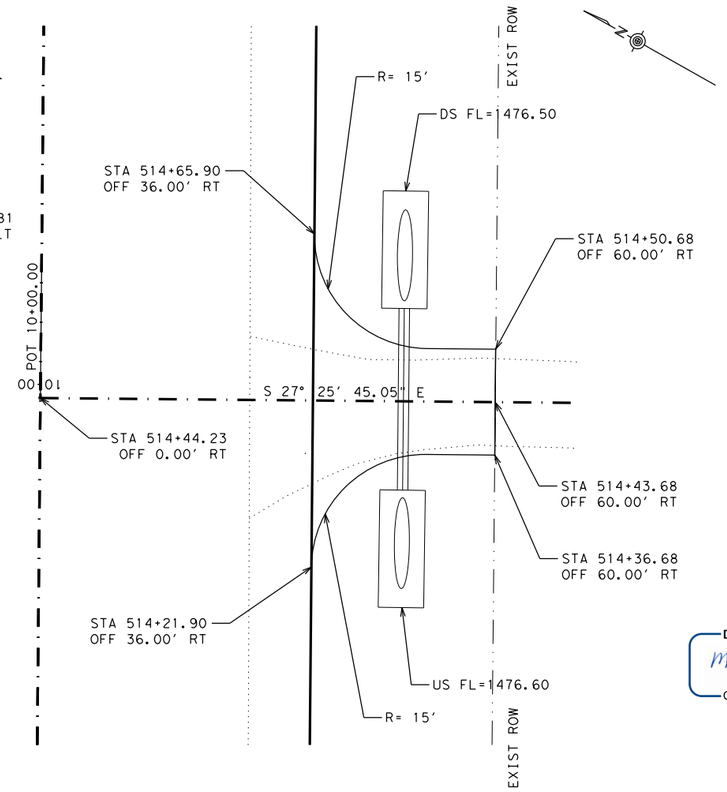

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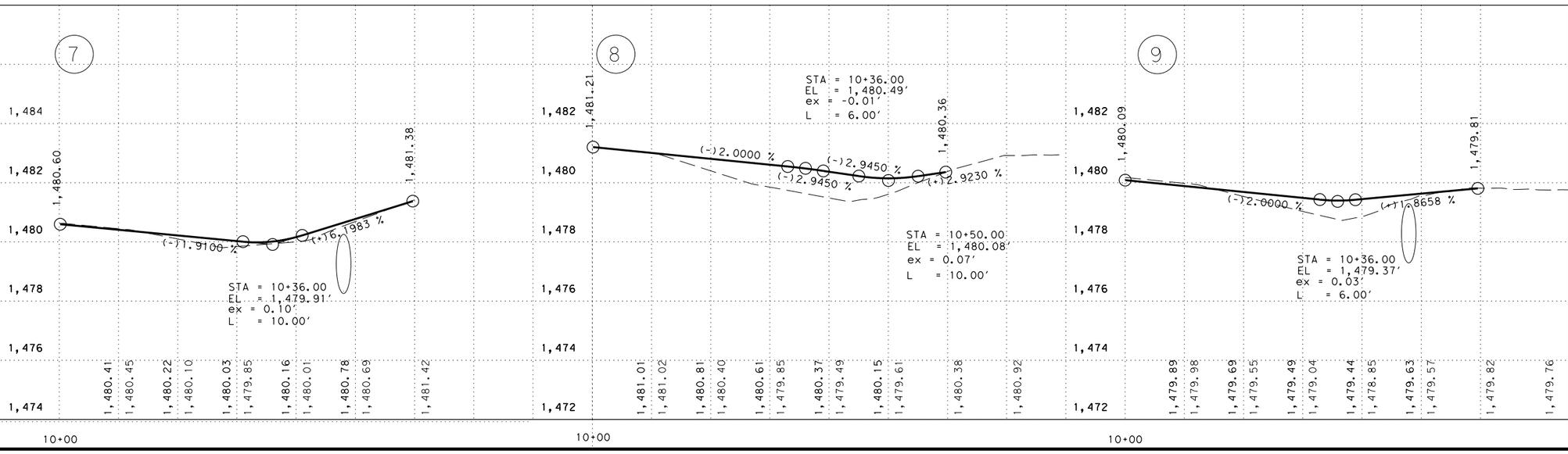

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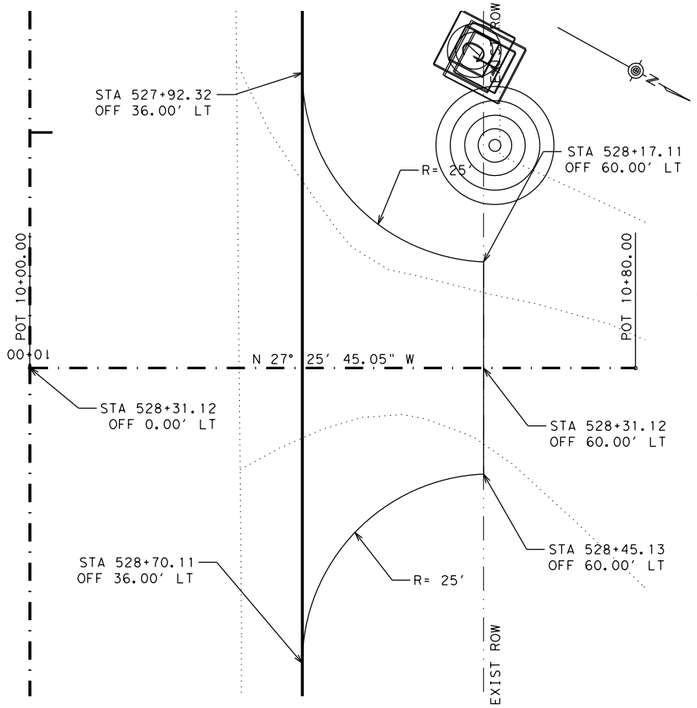

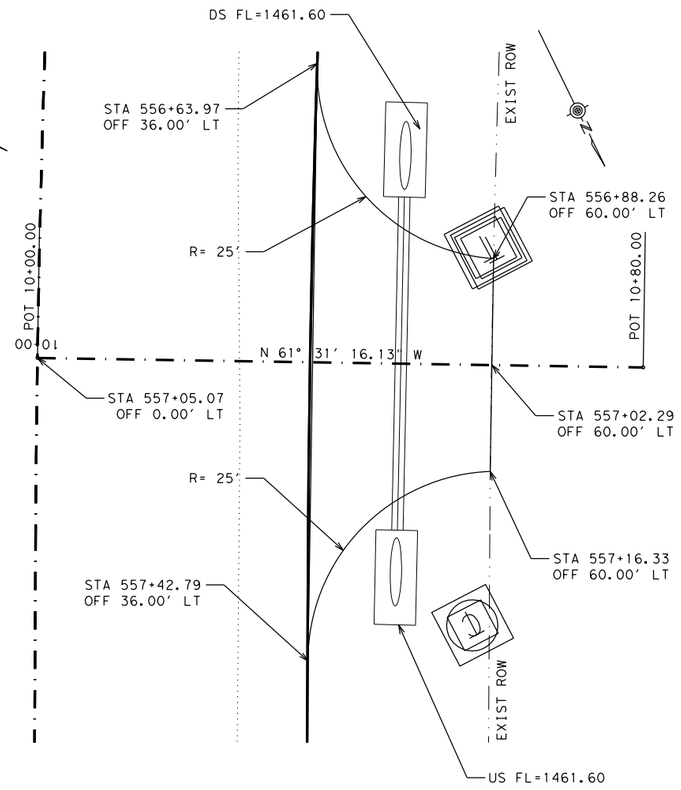

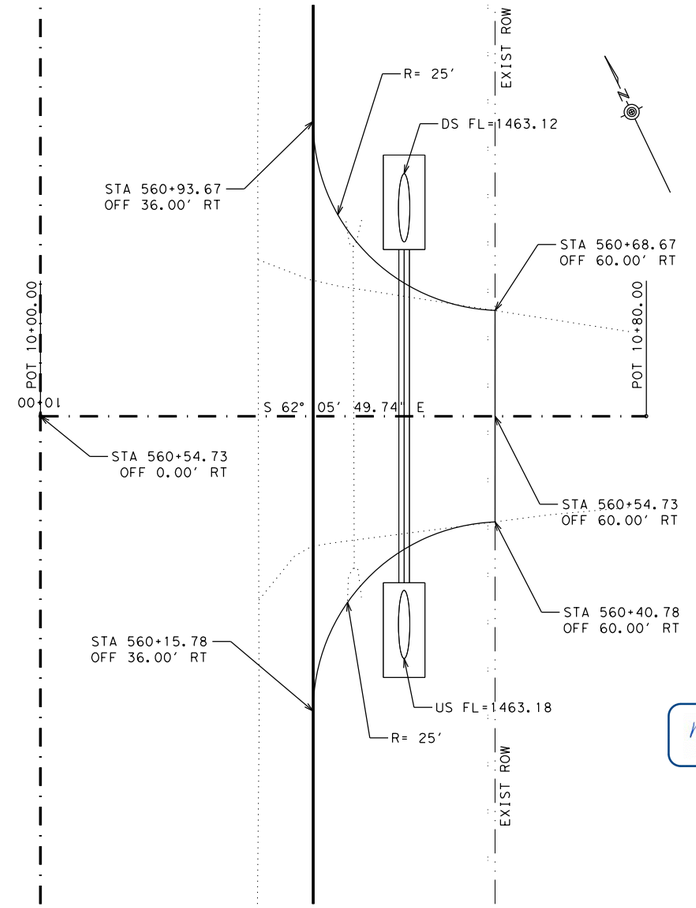

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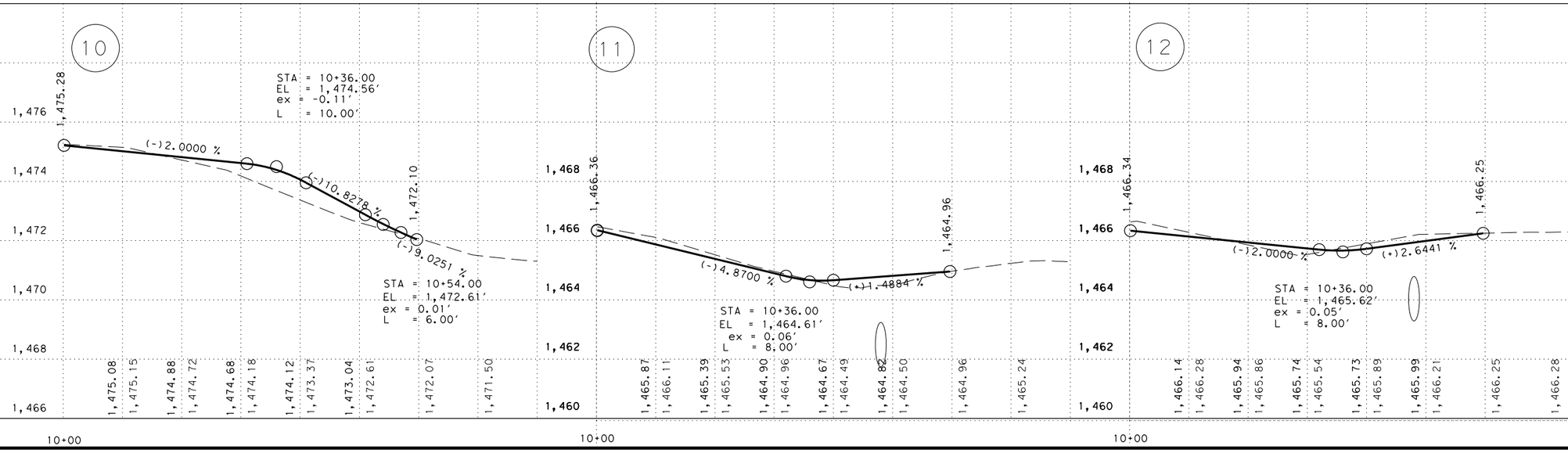

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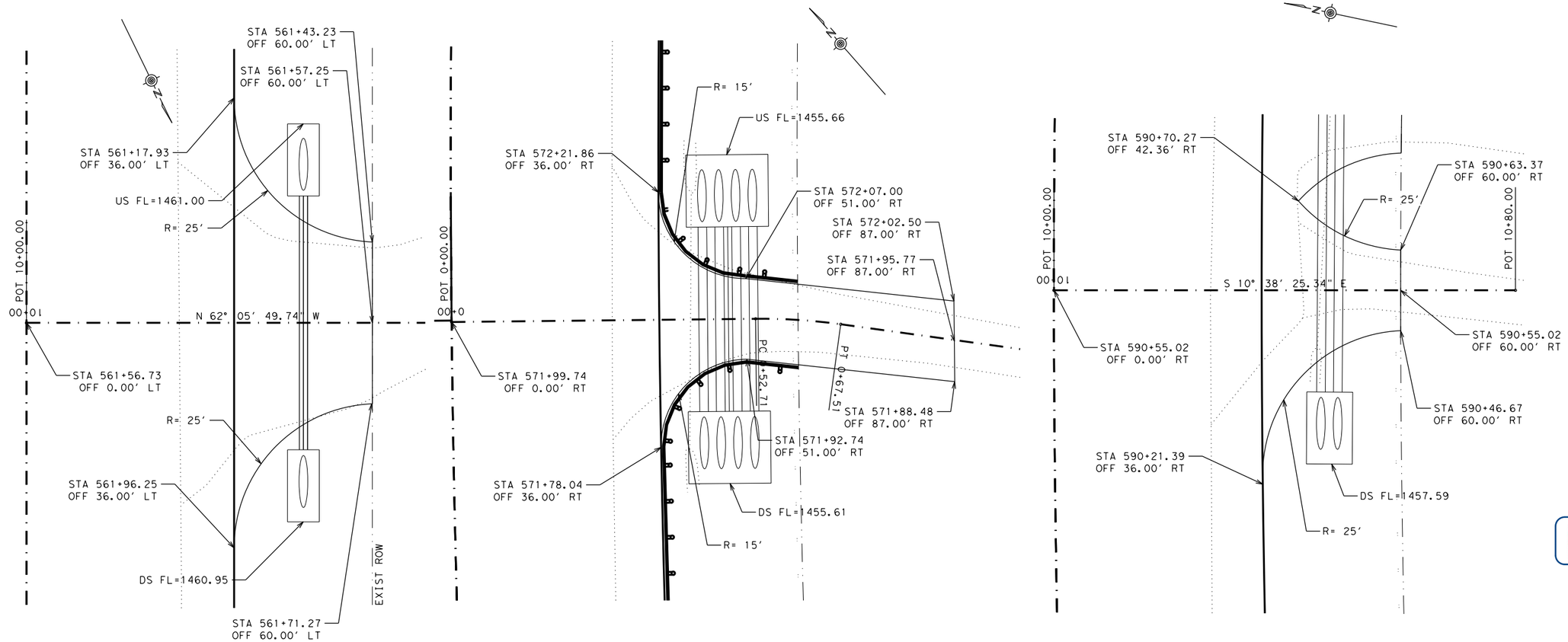

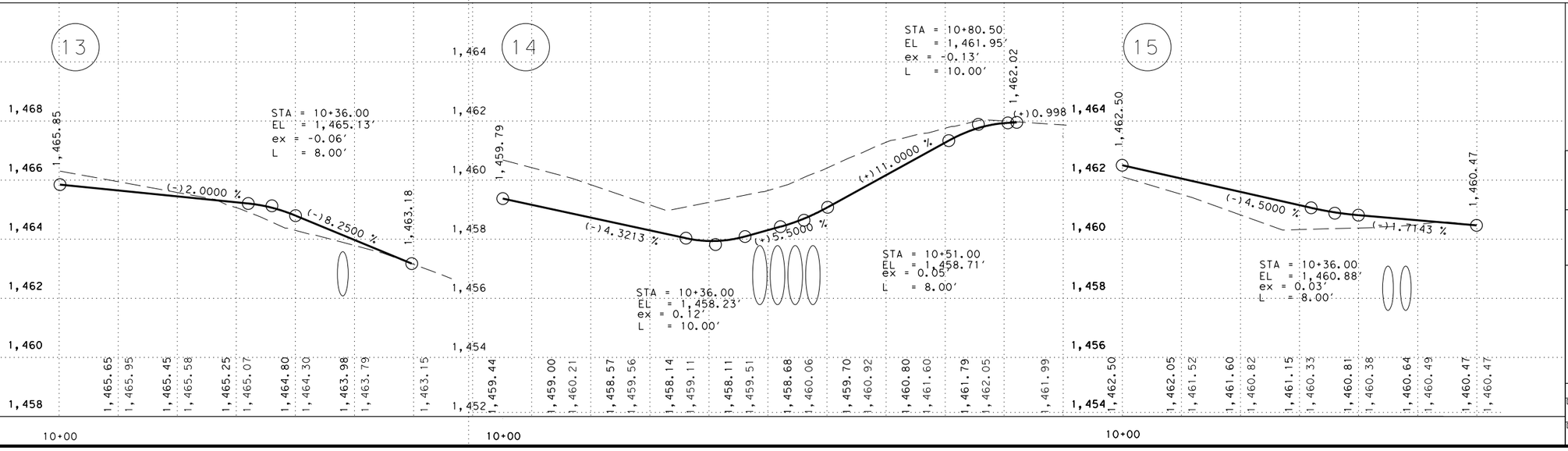

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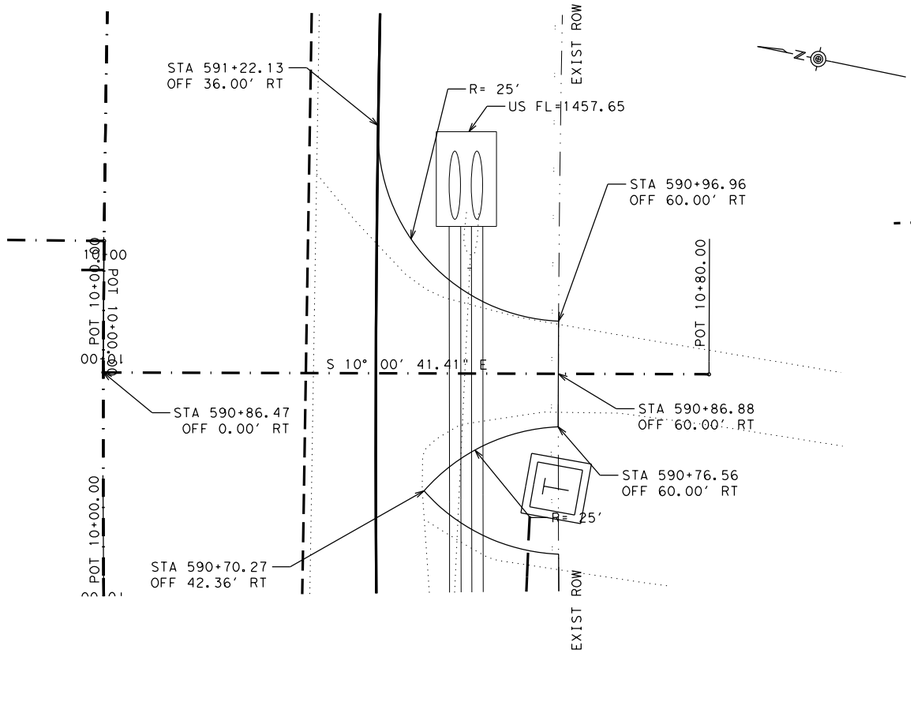

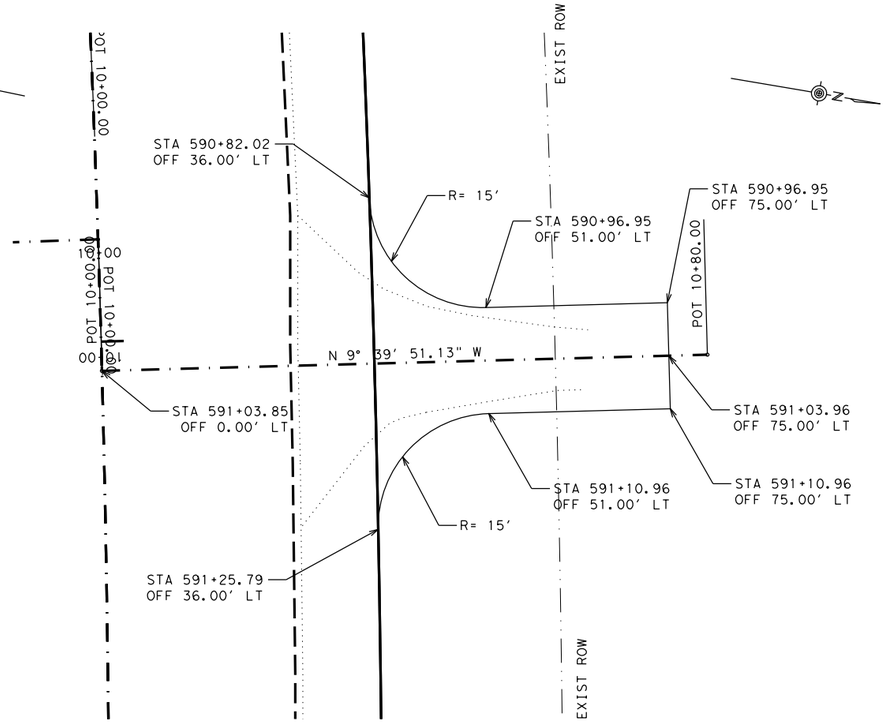

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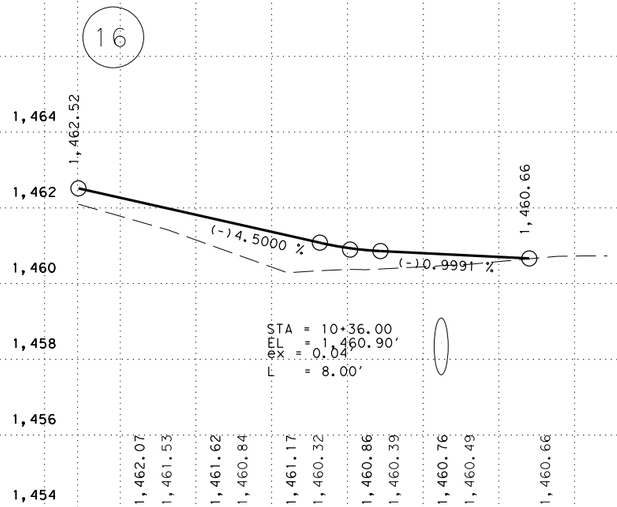

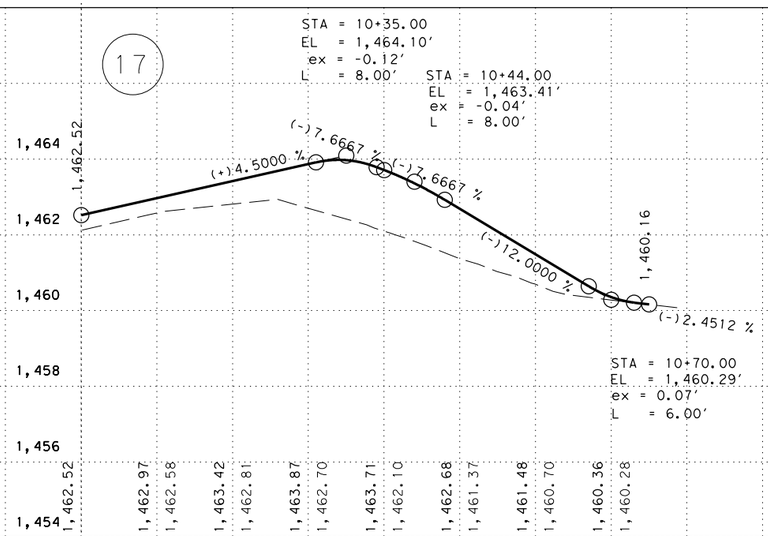

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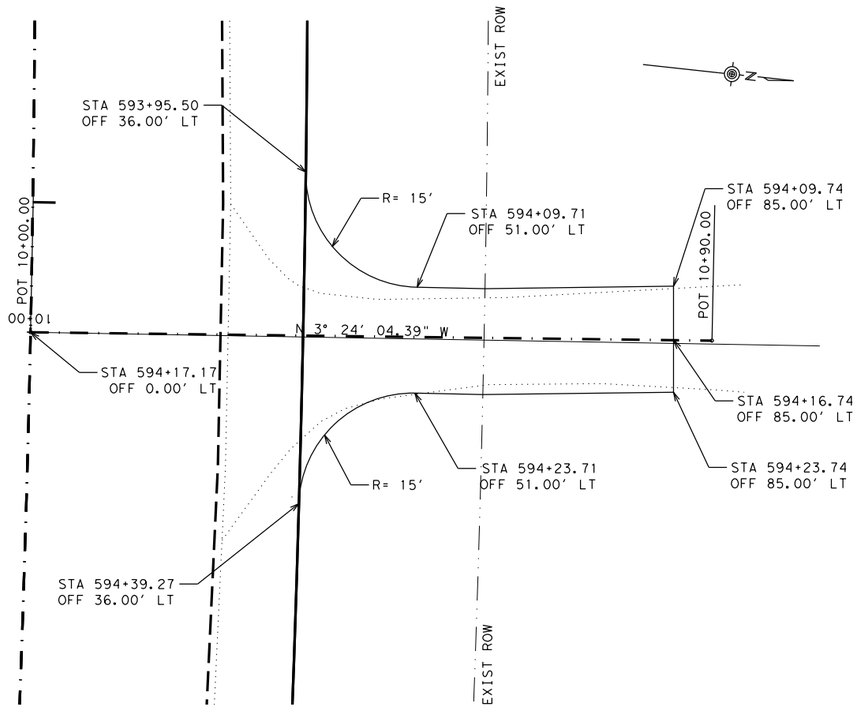

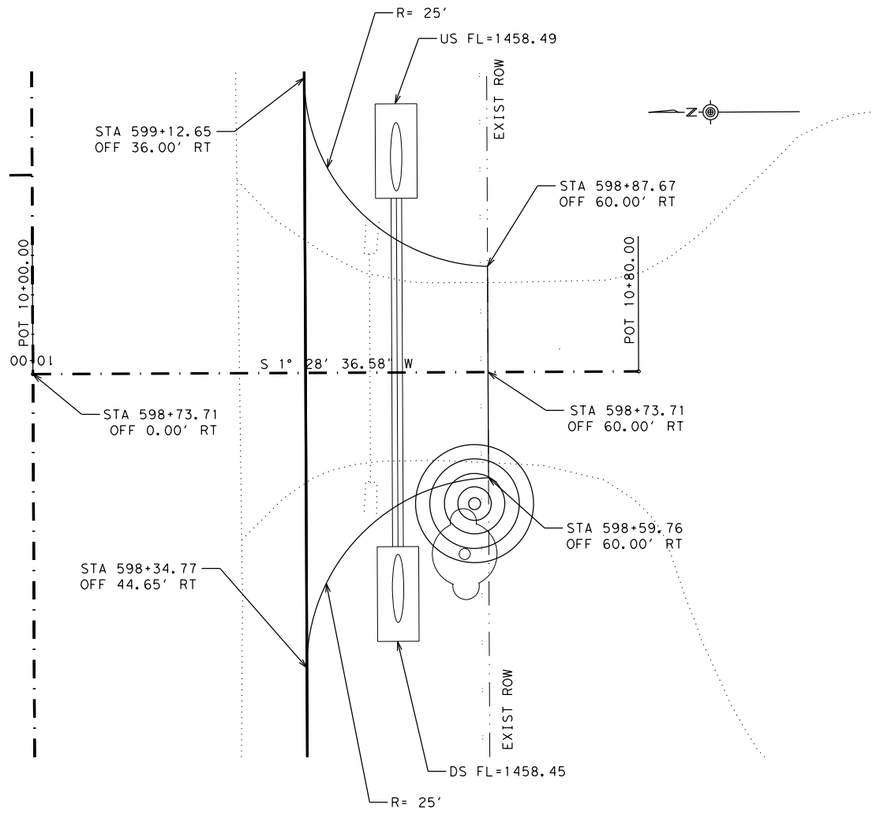

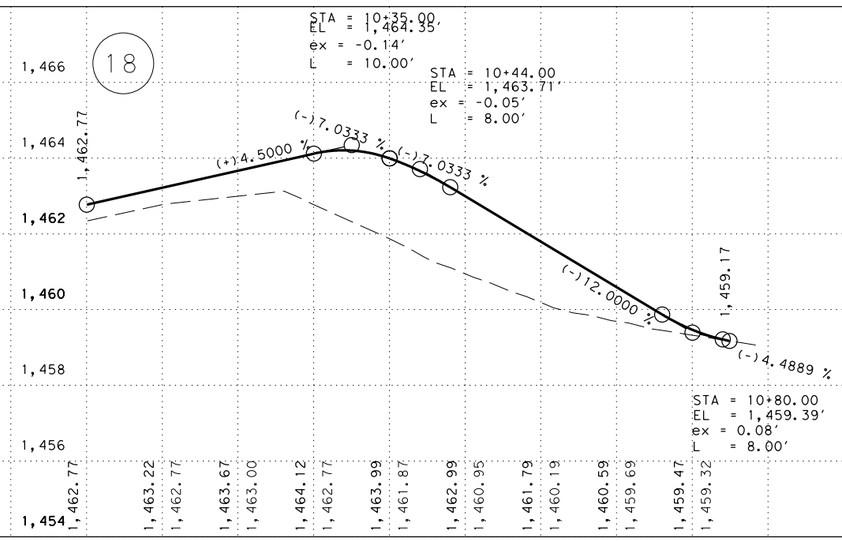

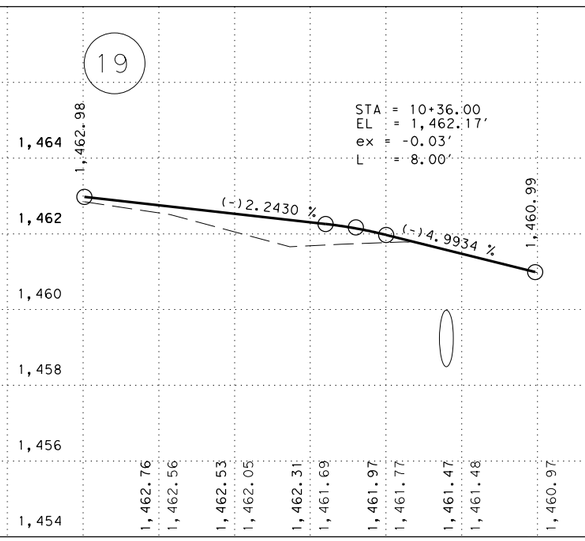

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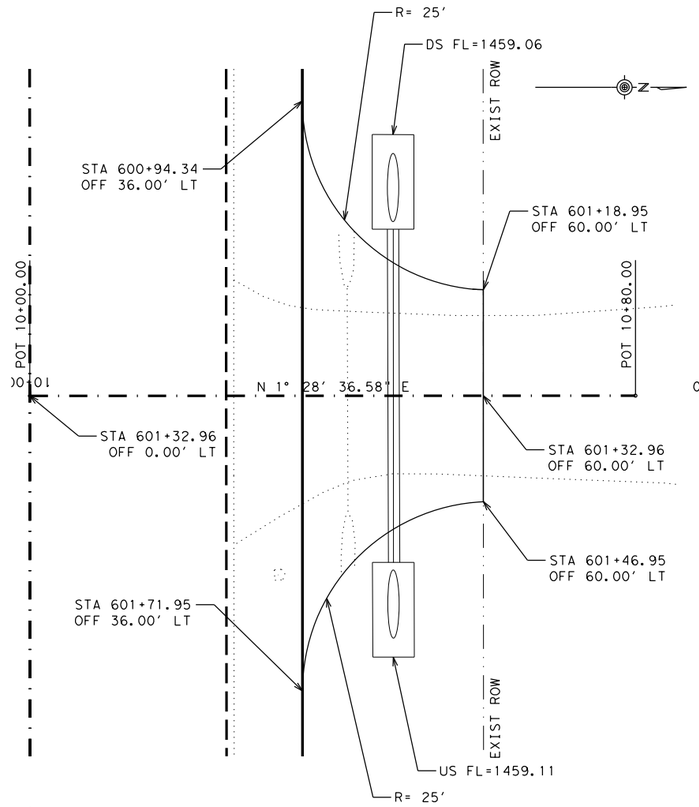

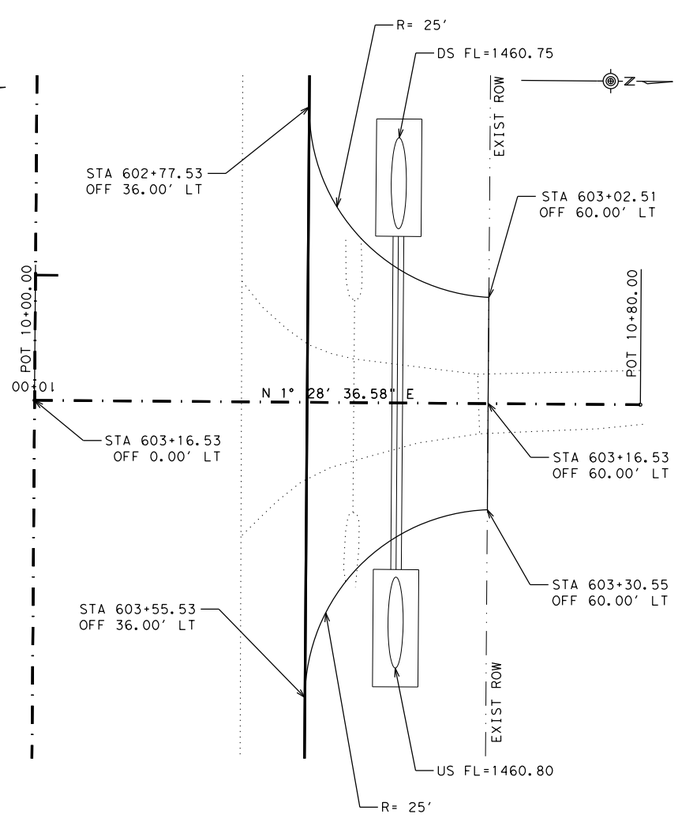

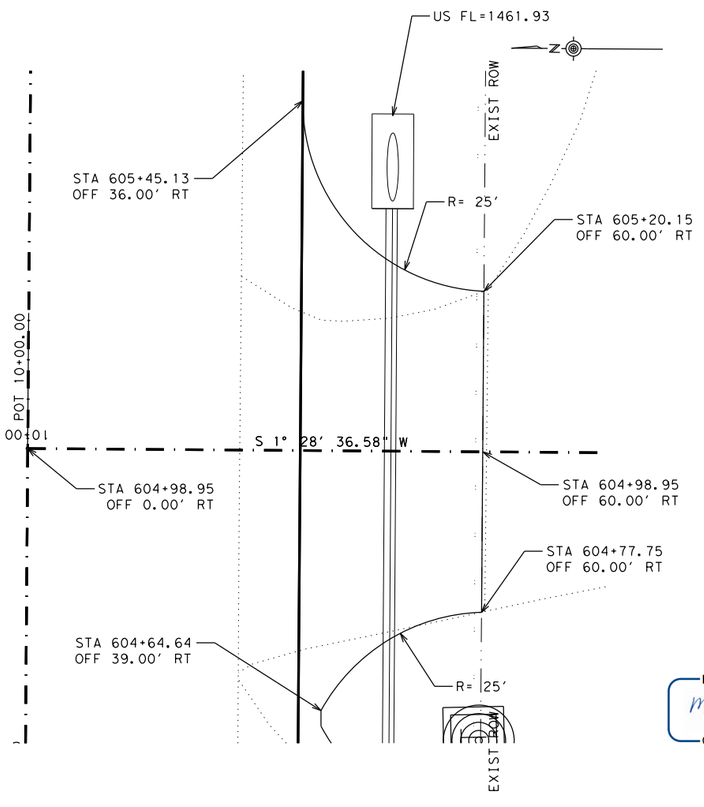

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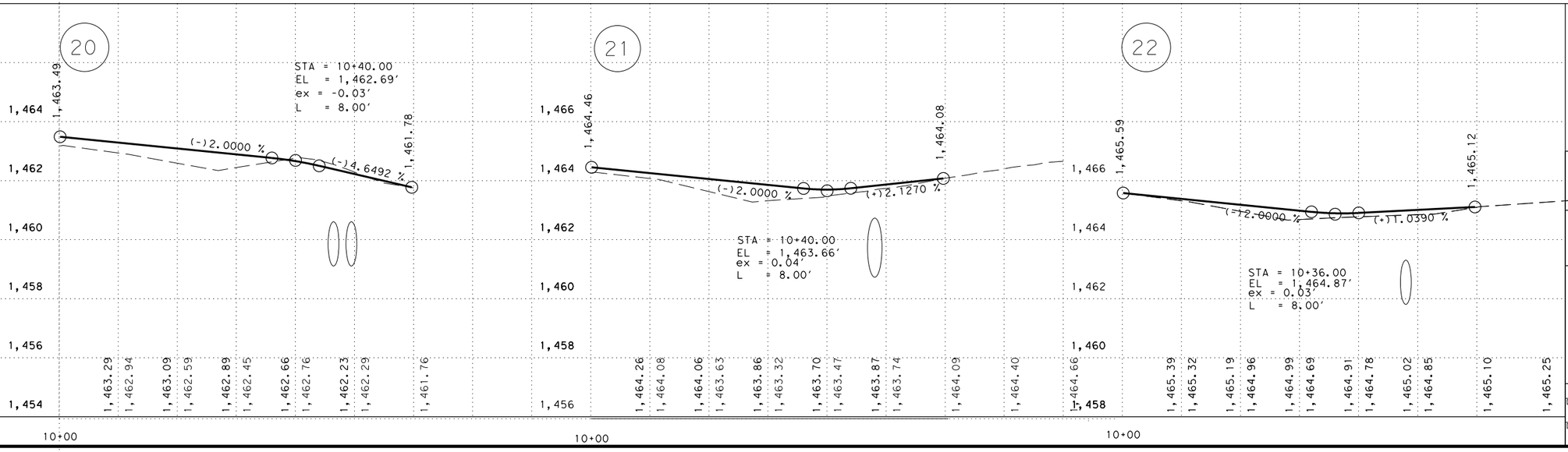

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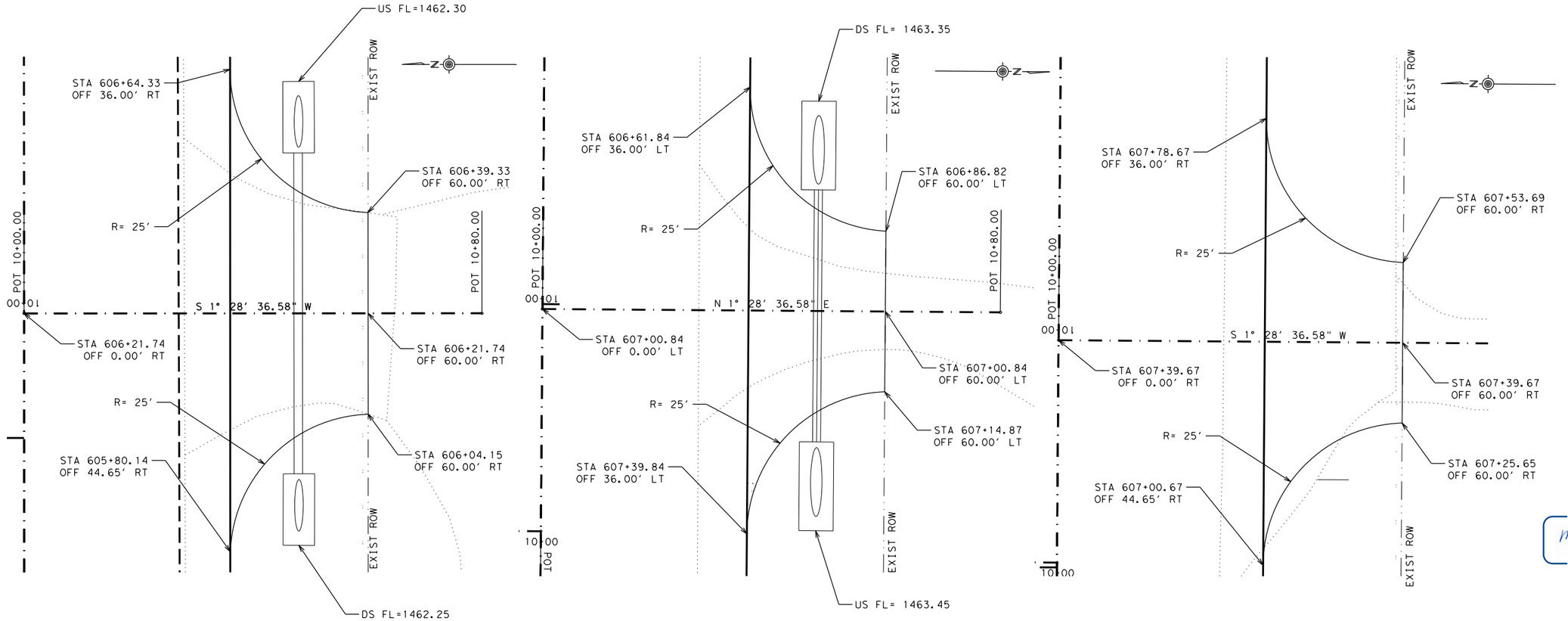

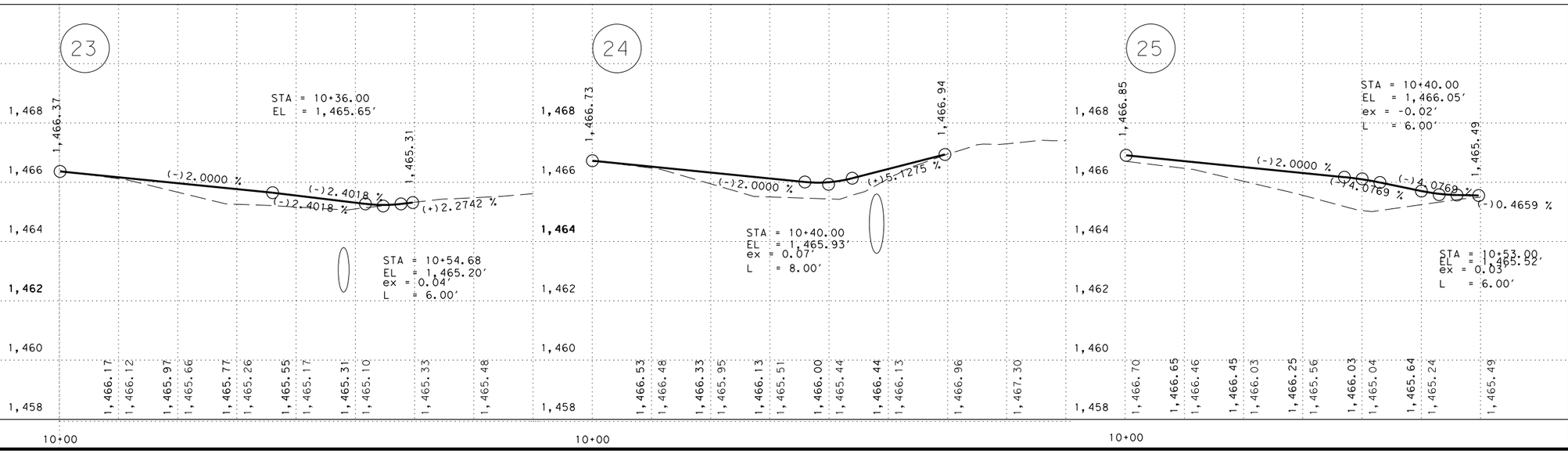

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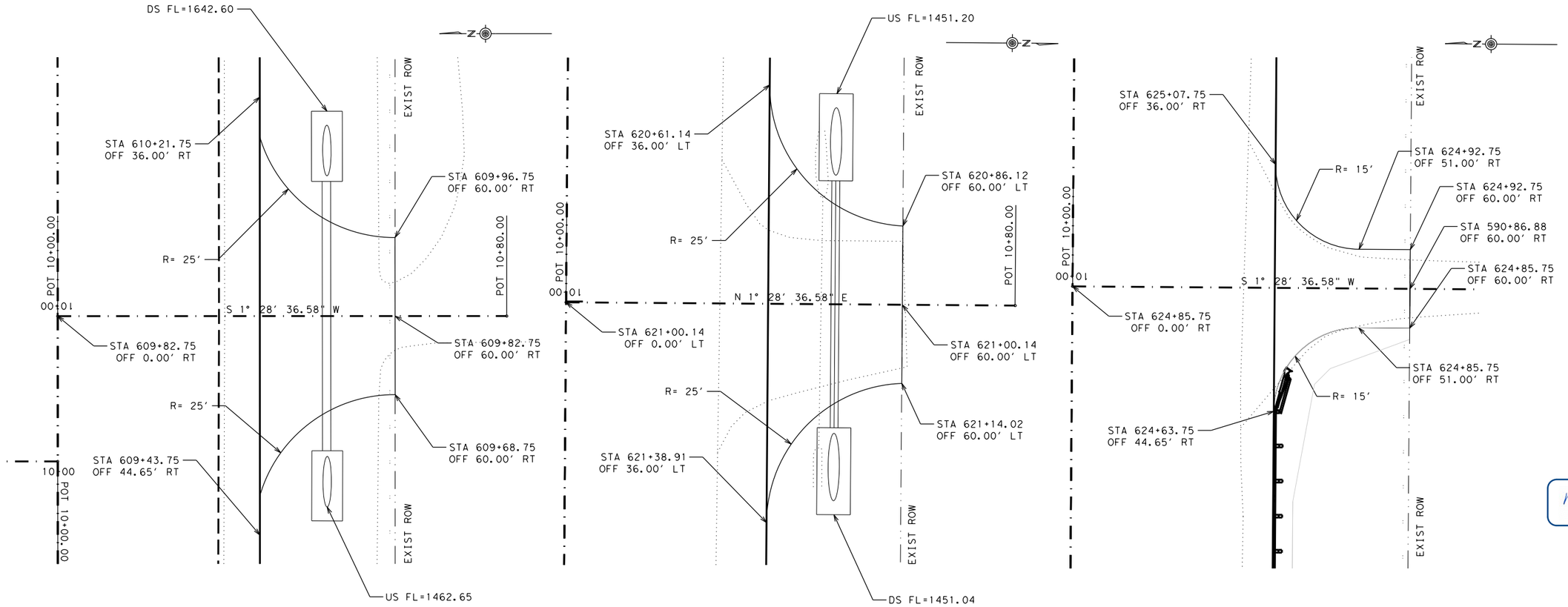

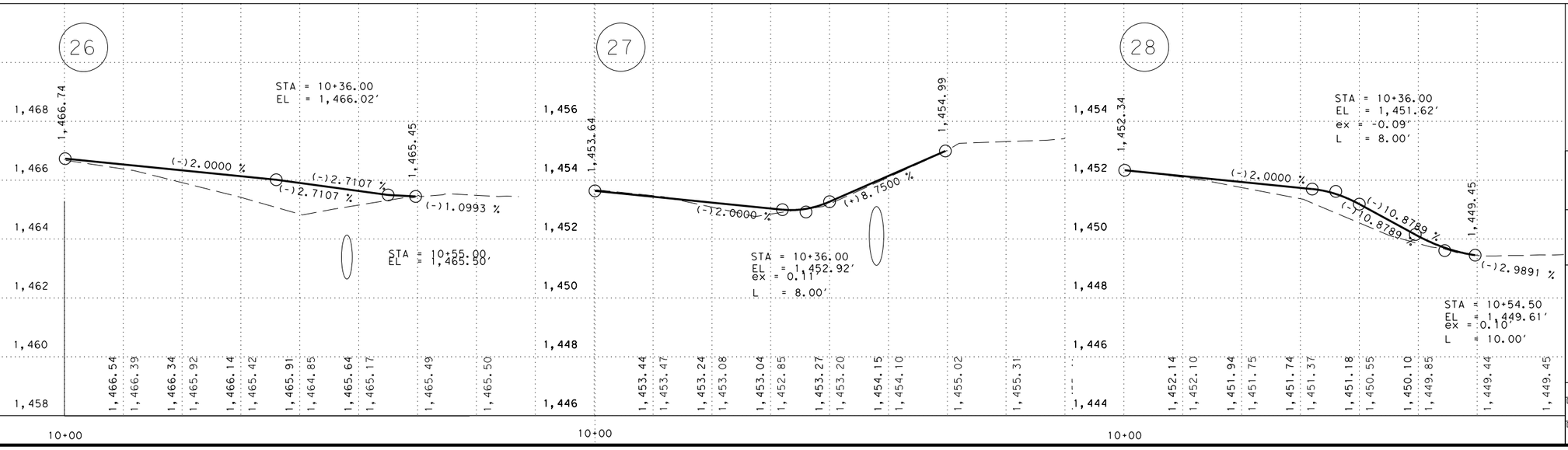

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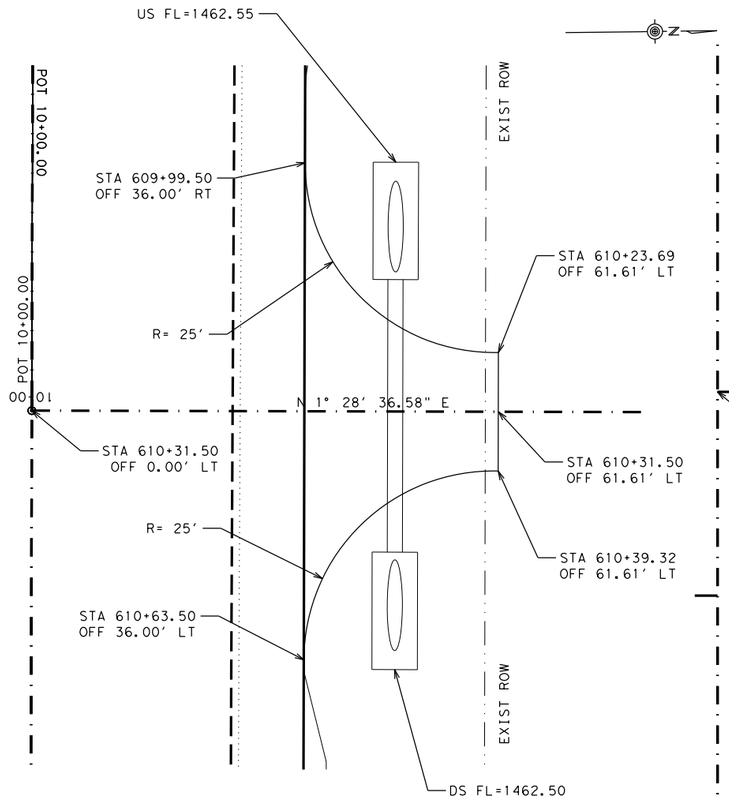

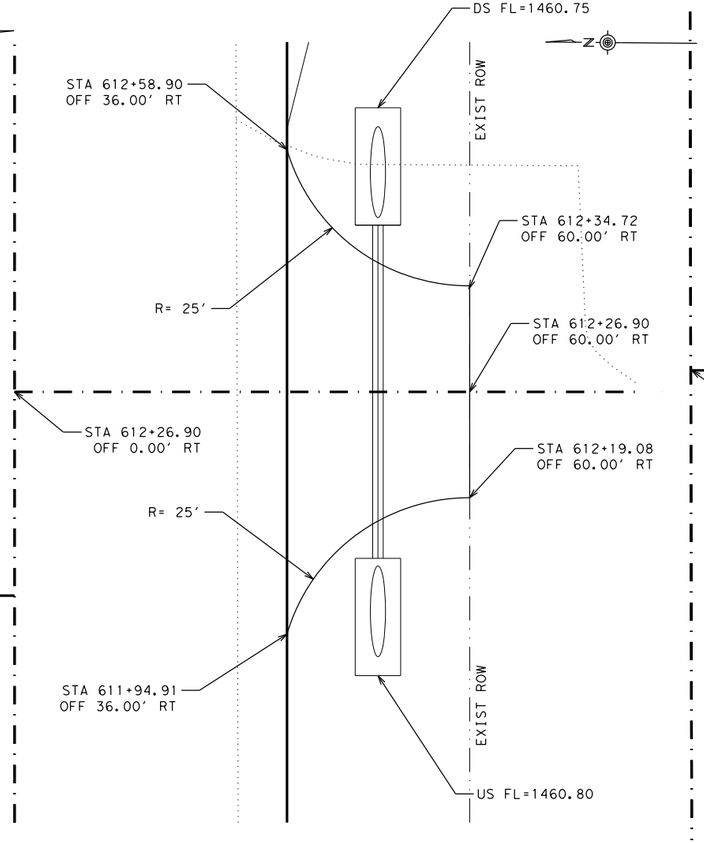

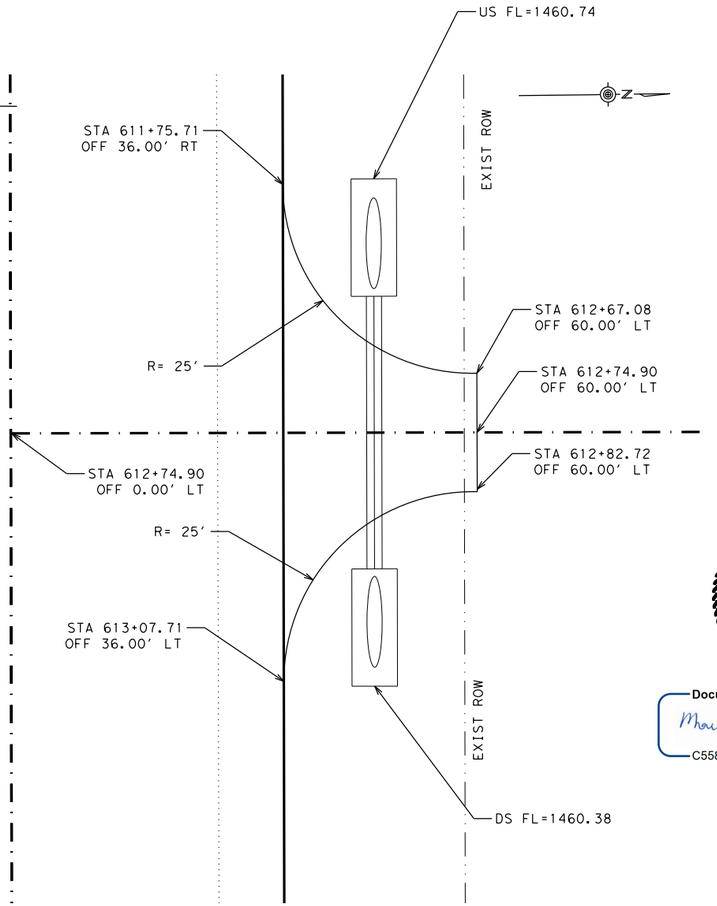

3/6/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
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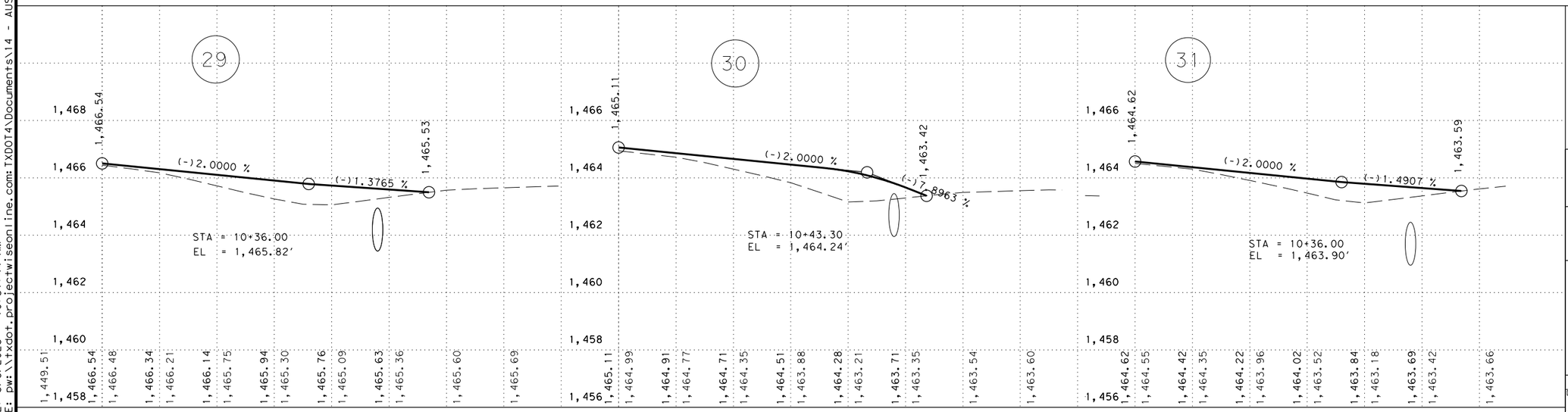

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HORZ- 0 20
VERT- 0 4

Austin District
Central Design

Texas Department of Transportation

US 290
DRIVEWAY
PLAN & PROFILE

SHEET 11 OF 12

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		92

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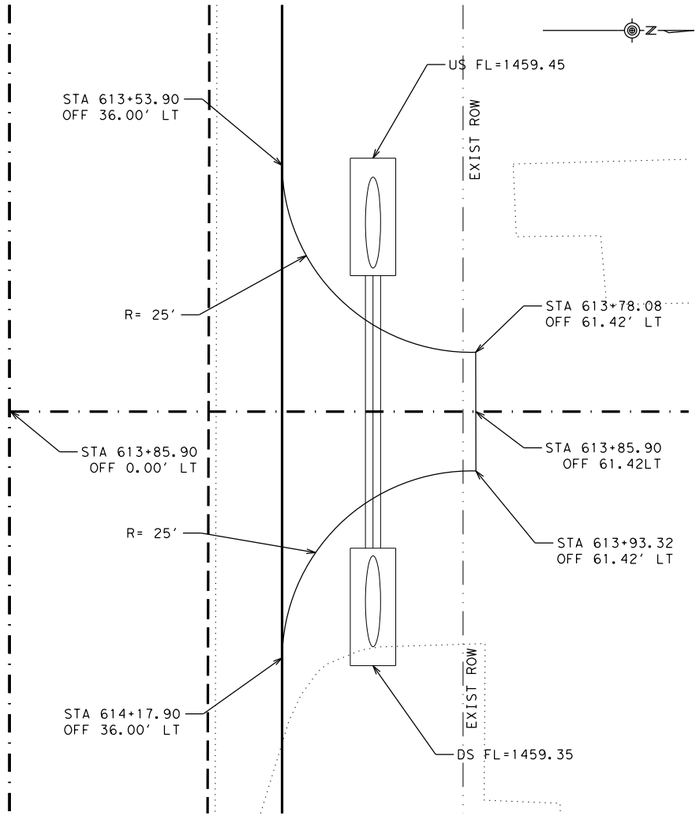

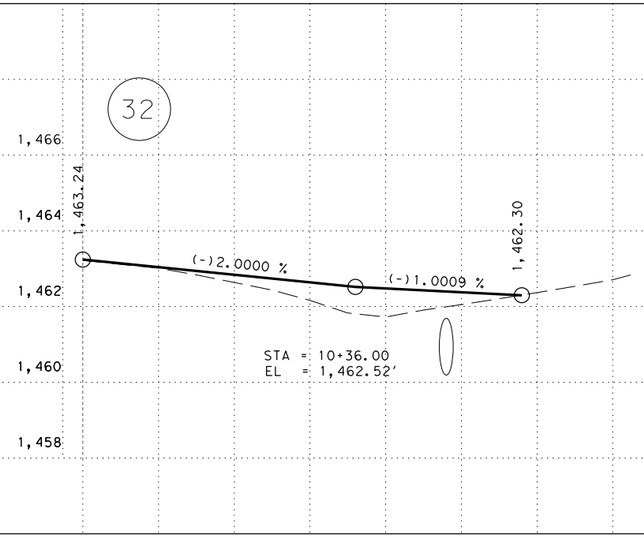

3/6/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 4

Austin District
Central Design

Texas Department of Transportation

US 290
DRIVEWAY
PLAN & PROFILE

SHEET 12 OF 12

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
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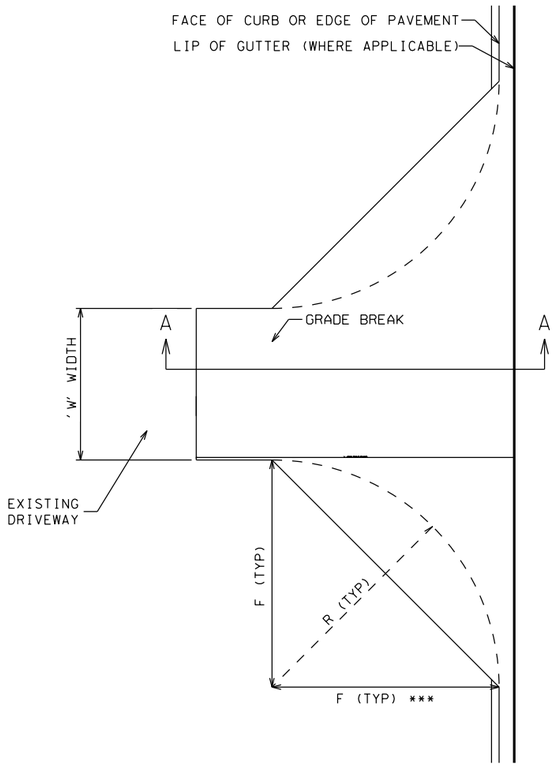


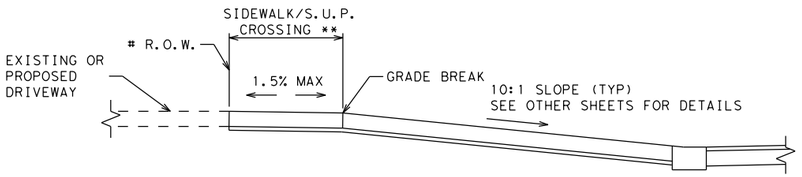
DRIVEWAY PLAN

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.

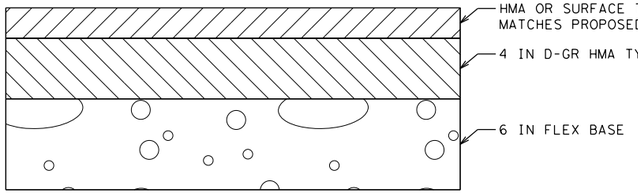


ACTUAL TIE-IN SHOWN ELSEWHERE IN PLANS OR AS DIRECTED

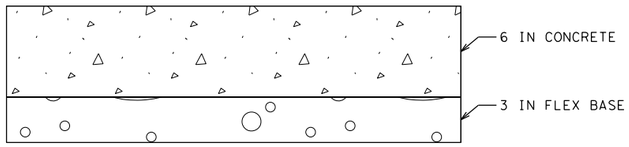
DRIVEWAY WITH GUTTER SECTION A-A

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

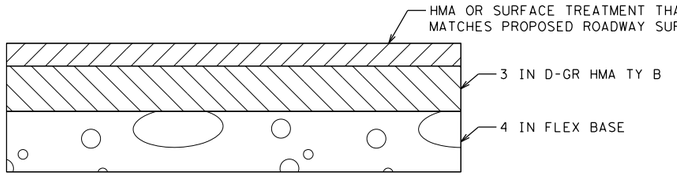
** LOCATE SIDEWALK CROSSING TO ALIGN WITH ADJACENT SIDEWALK; SIDEWALK/S.U.P. WIDTH AND LOCATION SHOWN ELSEWHERE ON THE PLANS.



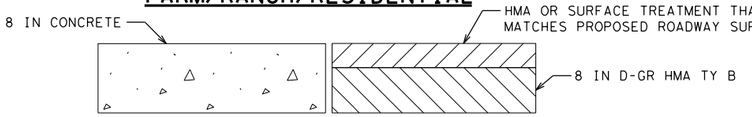
HMA OR SURFACE TREATEMENT - COMMERCIAL



CONCRETE - ALL DRIVEWAY TYPES

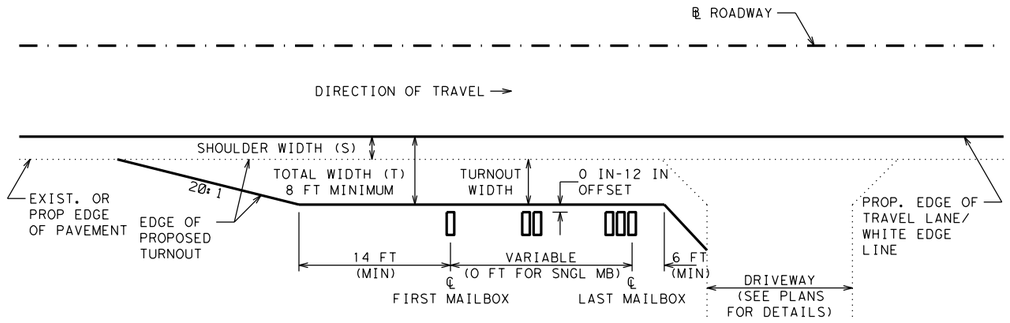


HMA OR SURFACE TREATMENT - FARM/RANCH/RESIDENTIAL

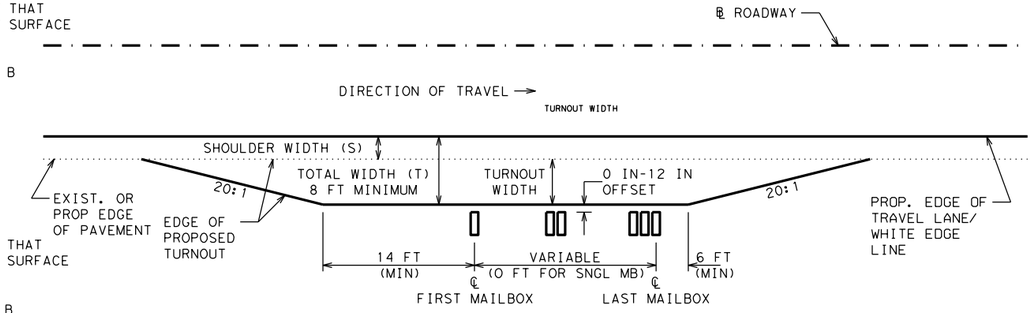


FAST TRACK ACP (TYPE 3) OR CONCRETE

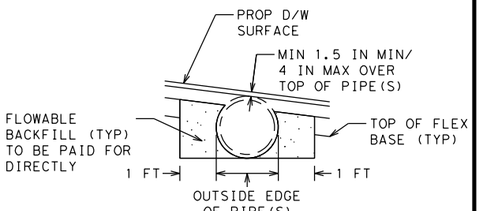
DRIVEWAY AND TURNOUT TYPICAL SECTIONS



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

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)

CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		94

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

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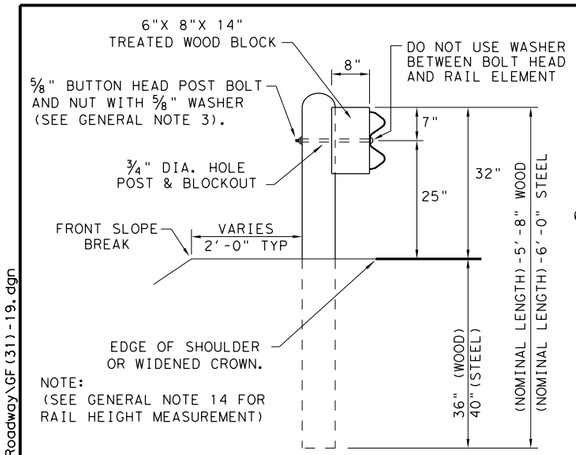
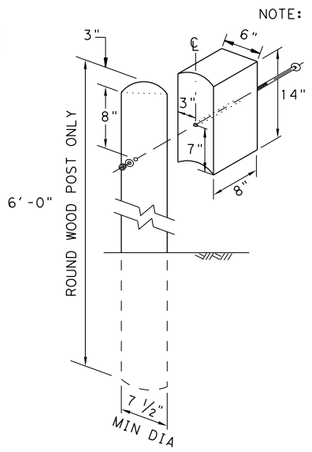
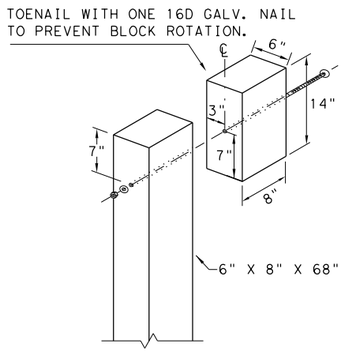


TYPICAL POST PLACEMENT

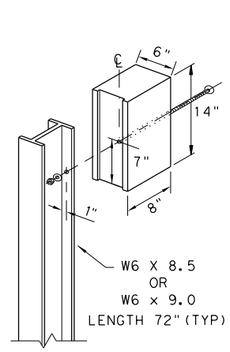


WOOD BLOCK TO ROUND WOOD POST

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

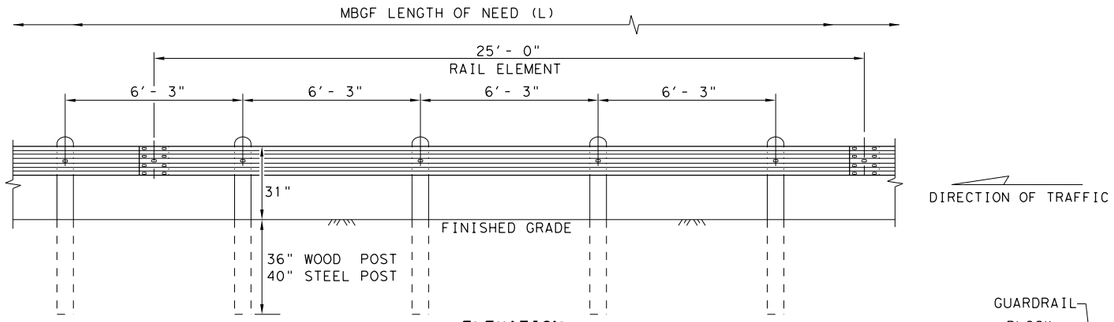


WOOD BLOCK TO RECTANGULAR WOOD POST



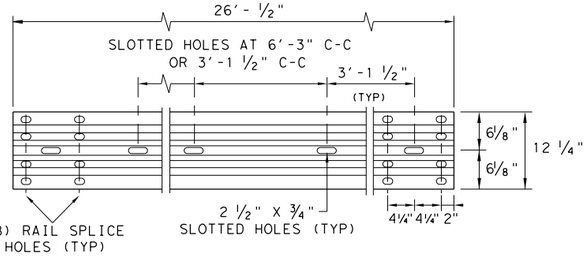
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

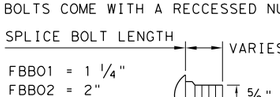
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

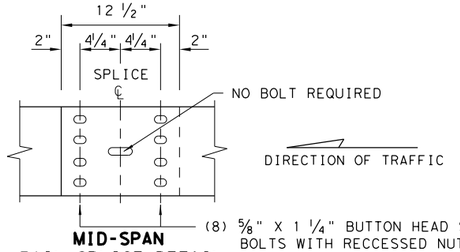
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



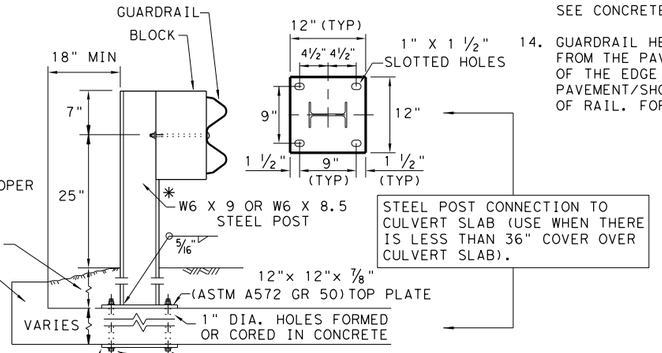
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 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	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		95

DATE: 1/9/2023
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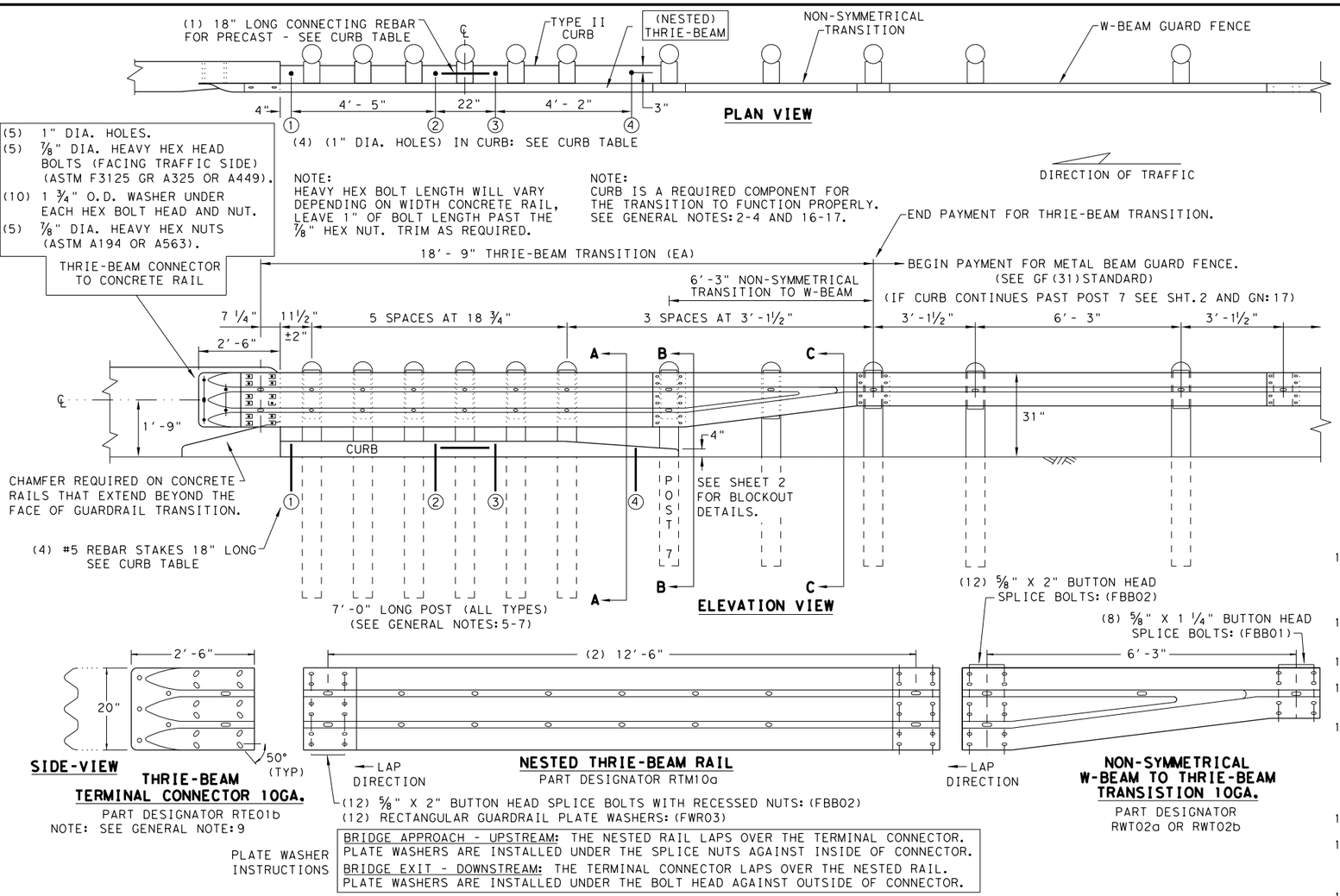


GENERAL NOTES

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- 3/4" 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 1/2" 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 5/8" 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 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

THRIE-BEAM TERMINAL - CURB TABLE

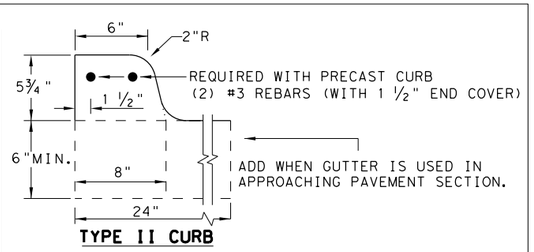
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

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

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

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.

* 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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

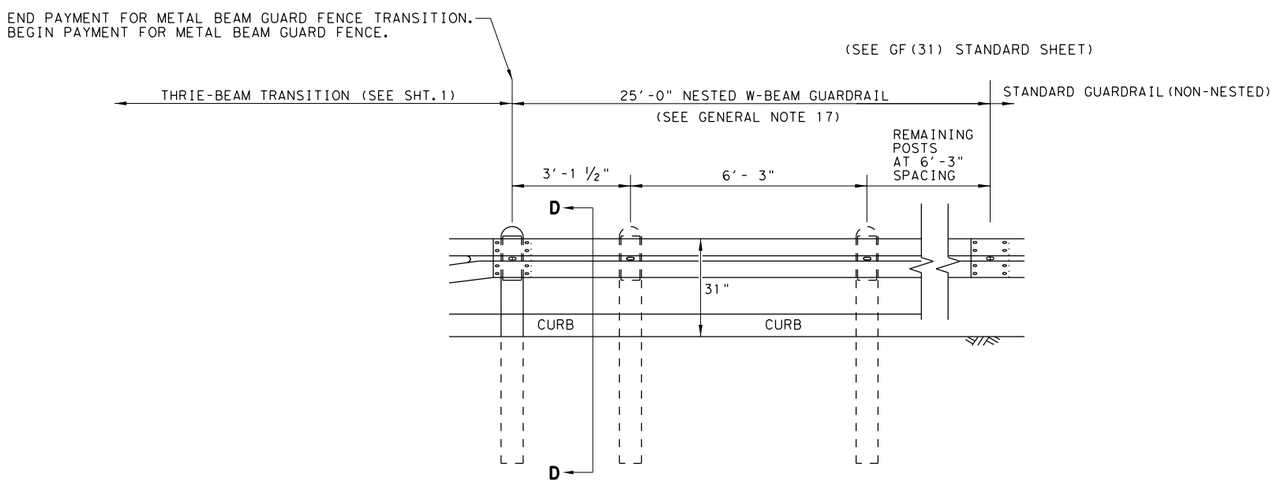
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

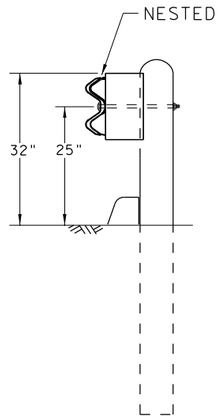
FILE: gf31tr-tl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0113	02	063	US 290		
	DIST	COUNTY		SHEET NO.		
	AUS	GILLESPIE		96		

DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020634 - Design\Plan Set\Standard Plans\Roadway\gf31trt1320.dgn

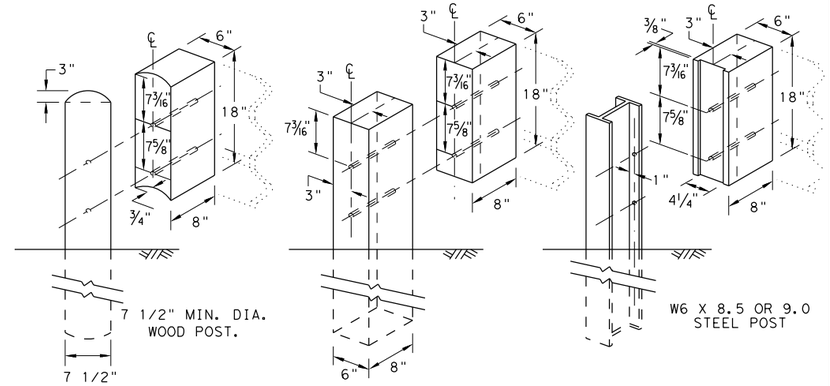
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
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	AUS	GILLESPIE		97

DATE: 1/9/2023
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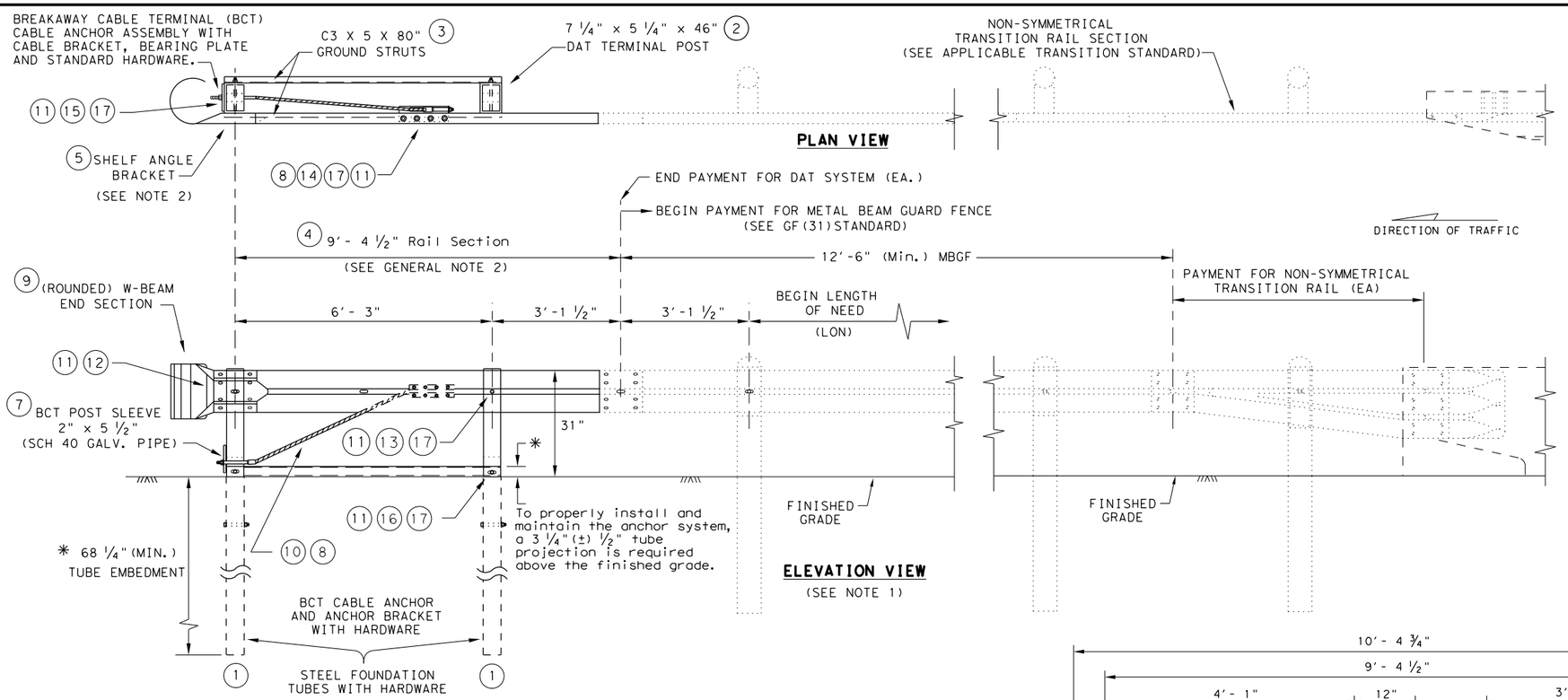


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

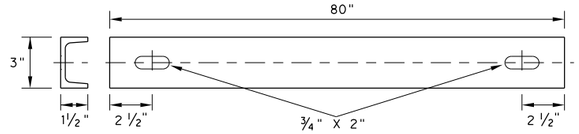
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

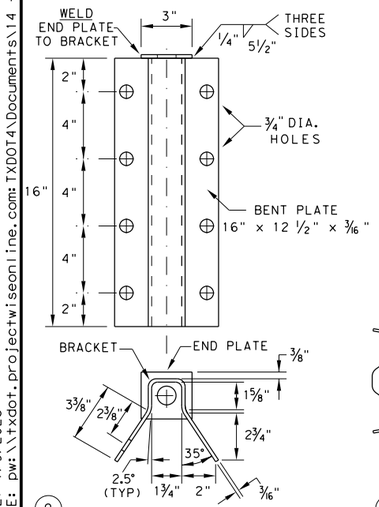
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

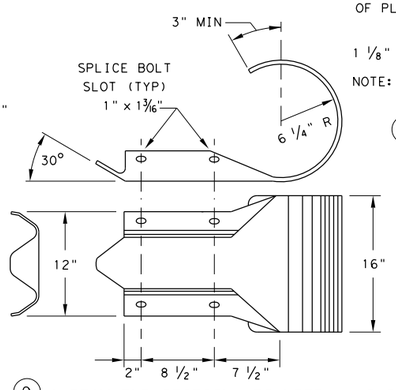
(4) **TERMINAL RAIL ELEMENT FOR DAT**



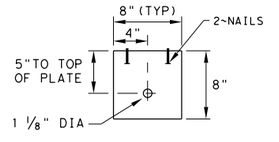
(3) **CHANNEL STRUT**
C3 X 5 X 80", GRADE A36



(8) **GUARDRAIL ANCHOR BRACKET**

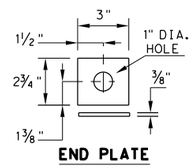


(9) **W-BEAM END SECTION (ROUNDED) (12 GA.)**

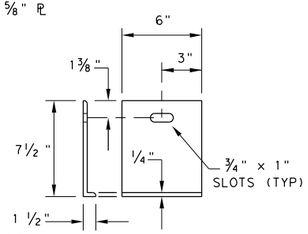


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

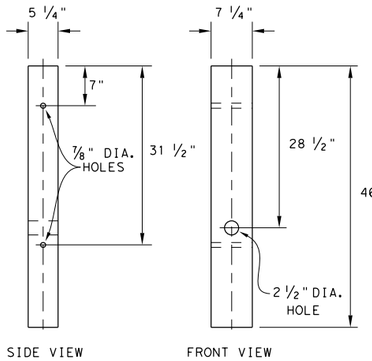
(6) **BEARING PLATE**
8"x 8"x 5/8" PL



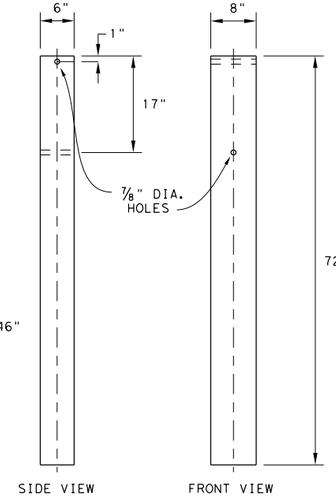
END PLATE



(5) **SHELF ANGLE BRACKET**



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



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

Texas Department of Transportation

Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0113	02	063	US 290	
	DIST	COUNTY		SHEET NO.	
	AUS	GILLESPIE		98	

DATE: 1/9/2023
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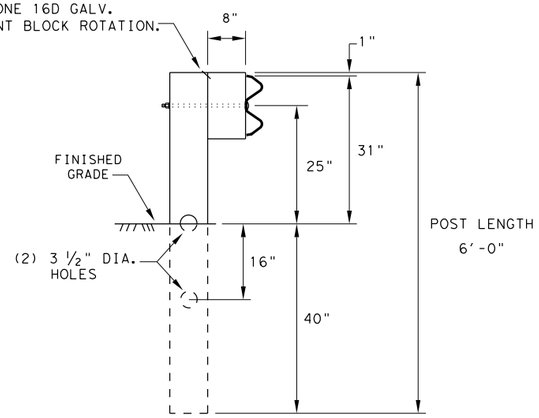
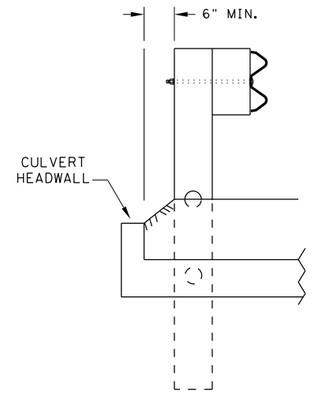
NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

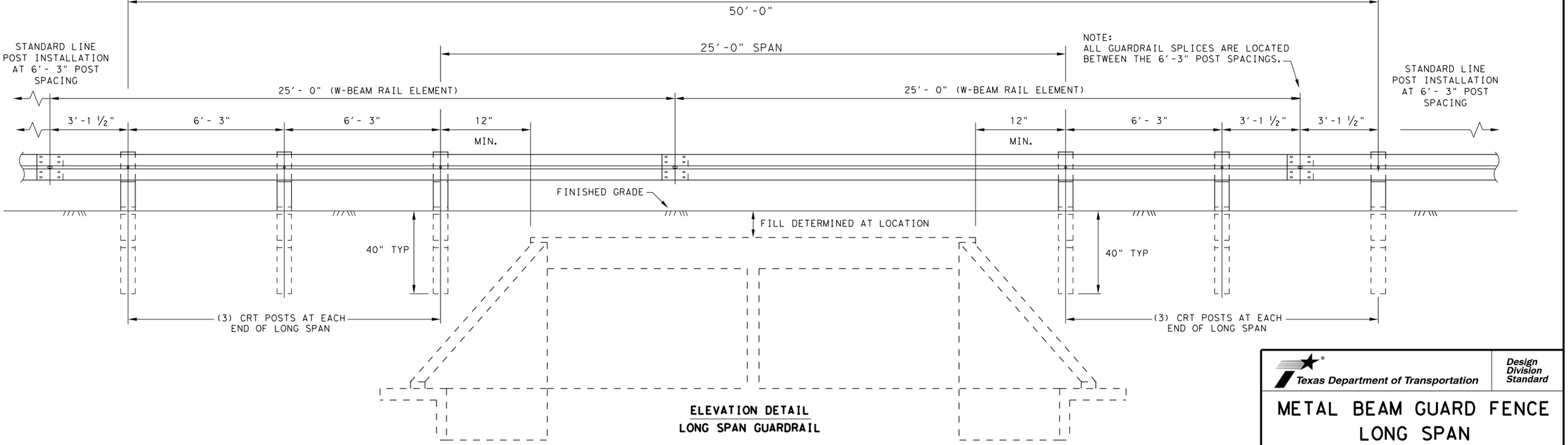
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

DIRECTION OF TRAFFIC

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
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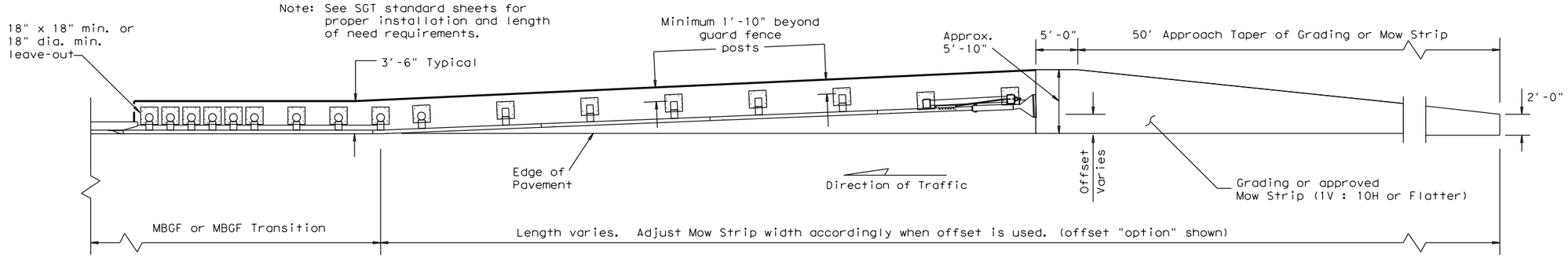
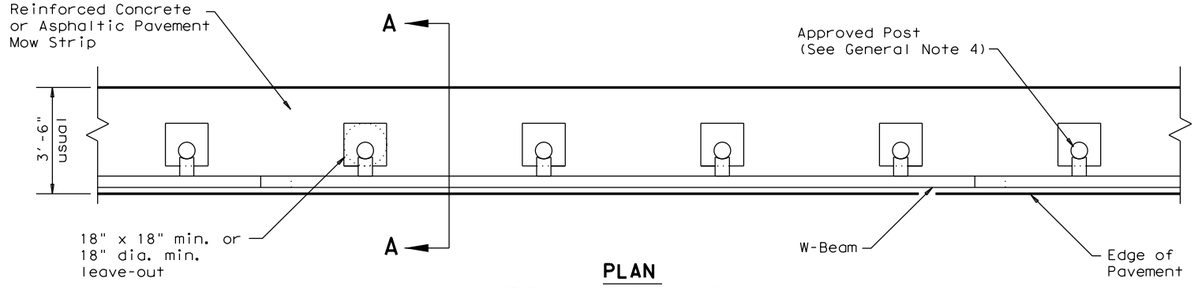
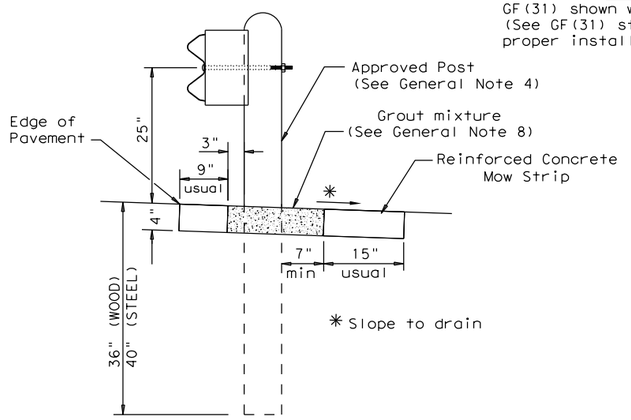


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



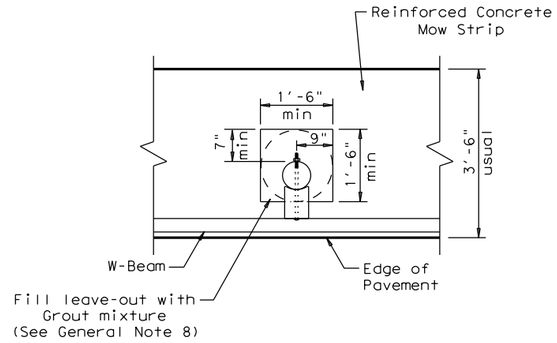
PLAN

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



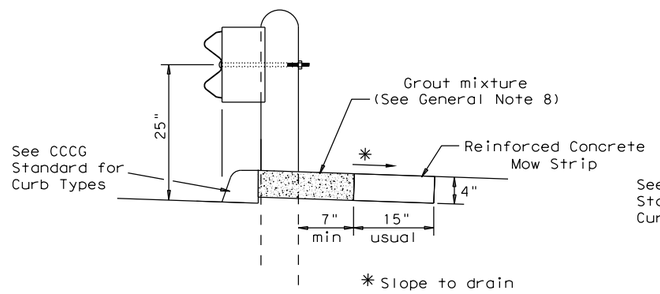
SECTION A-A

Typical



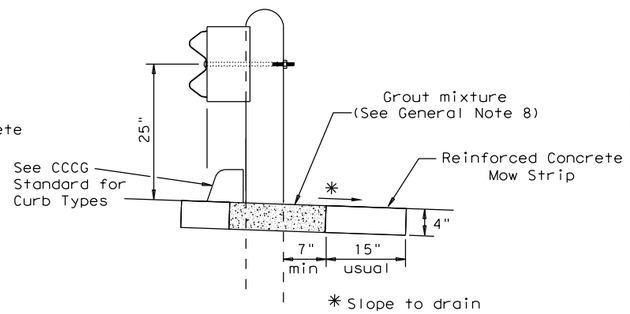
MOW STRIP DETAIL

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



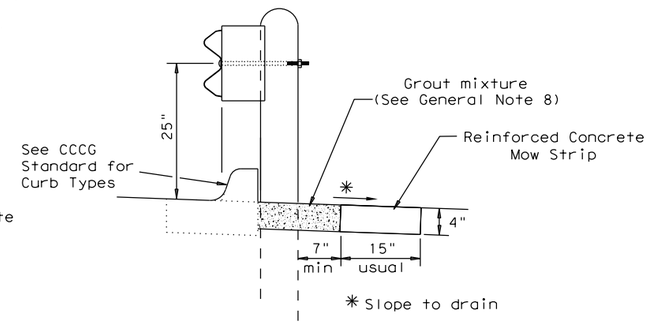
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
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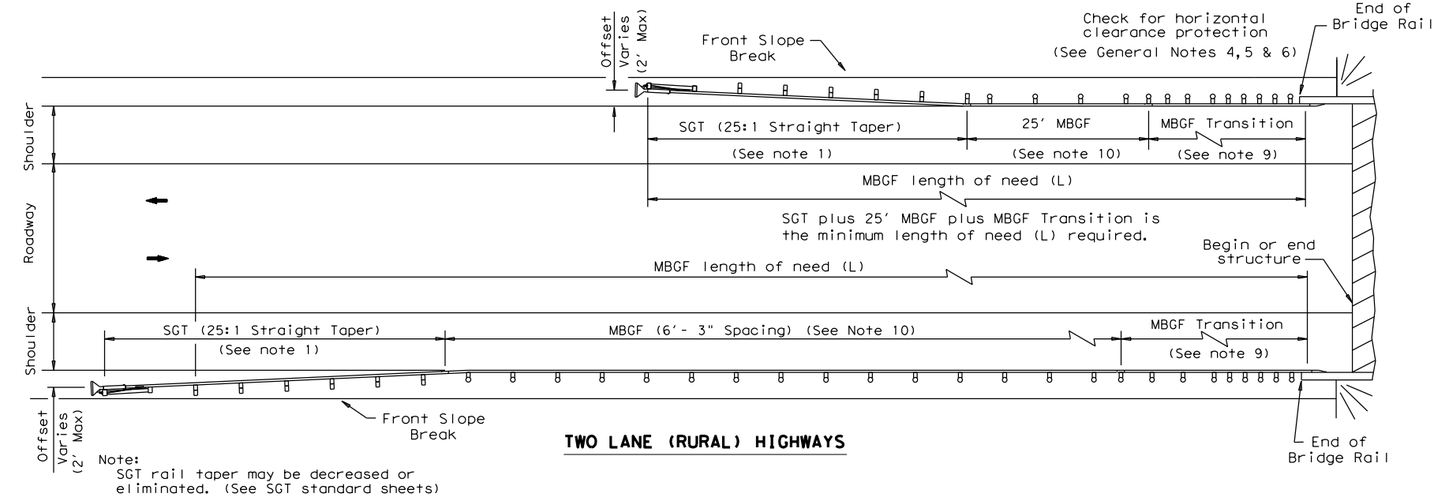
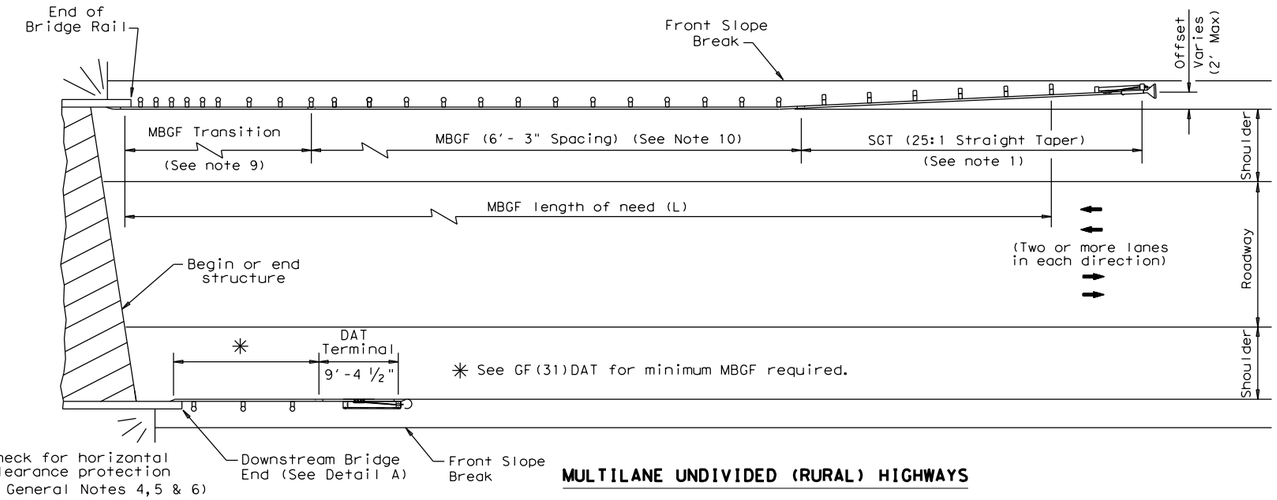
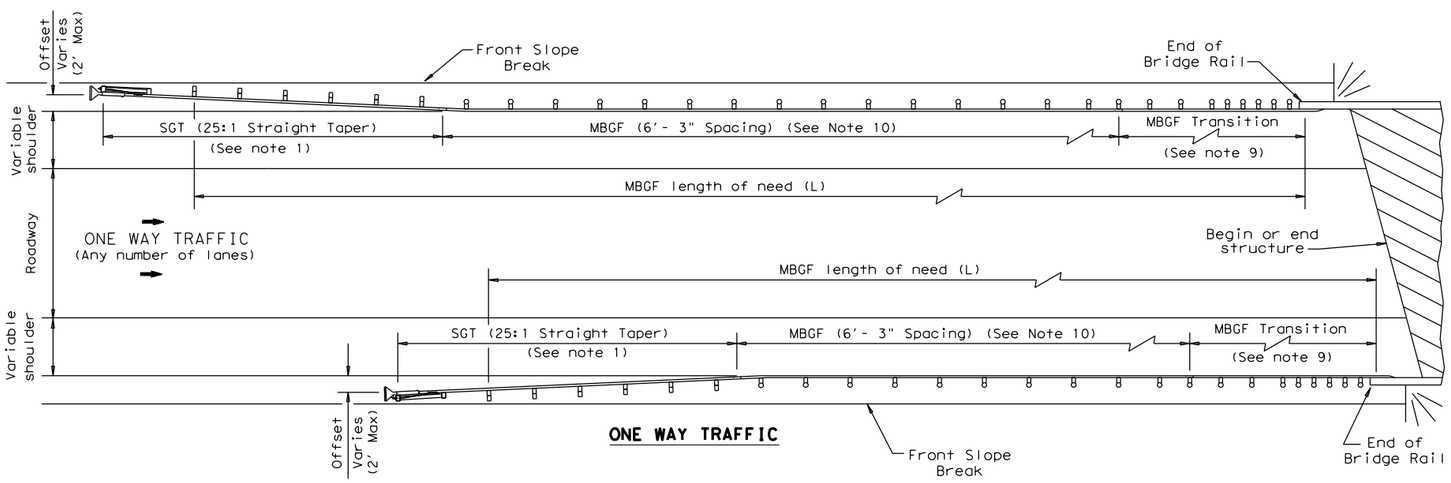


TWO LANE (RURAL) HIGHWAYS

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



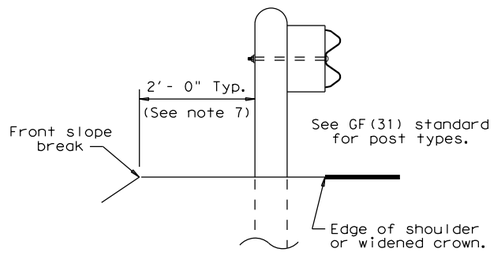
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



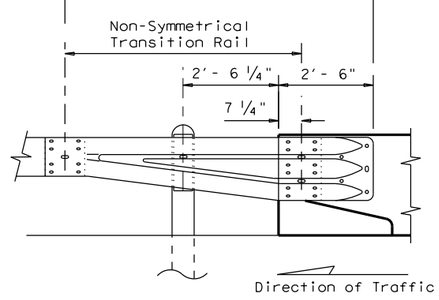
ONE WAY TRAFFIC

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

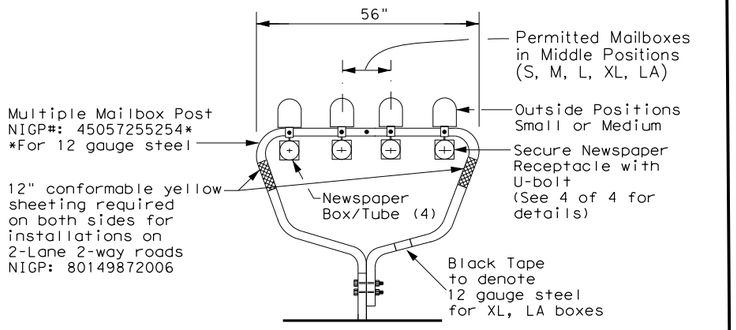
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

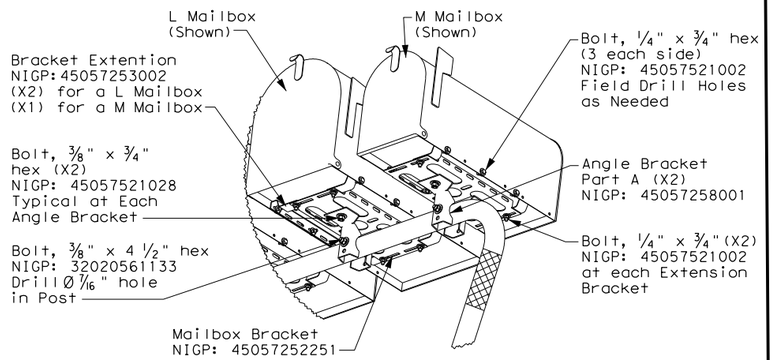
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		101

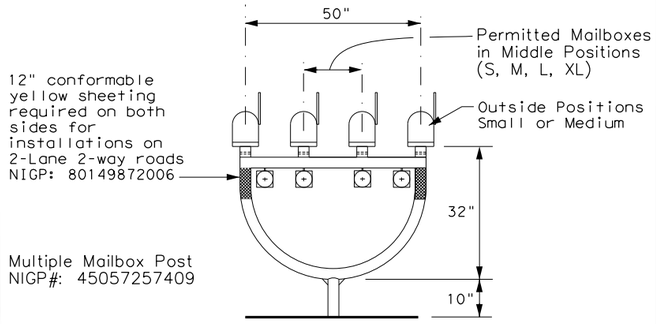
DATE: 1/9/2023 2:29:48 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\CAD\MB-21.dgn

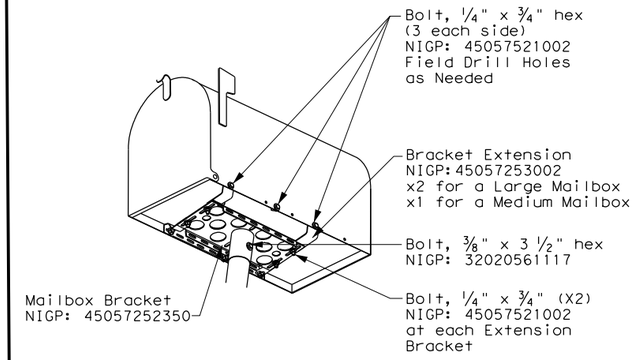
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

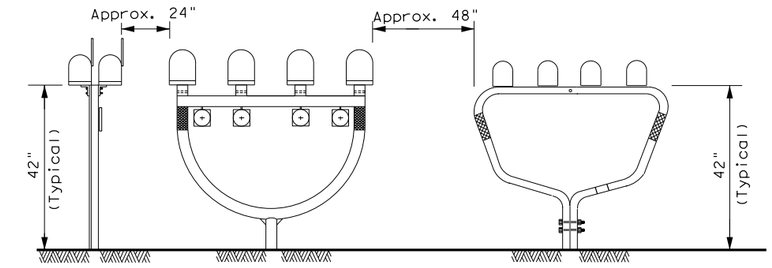
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

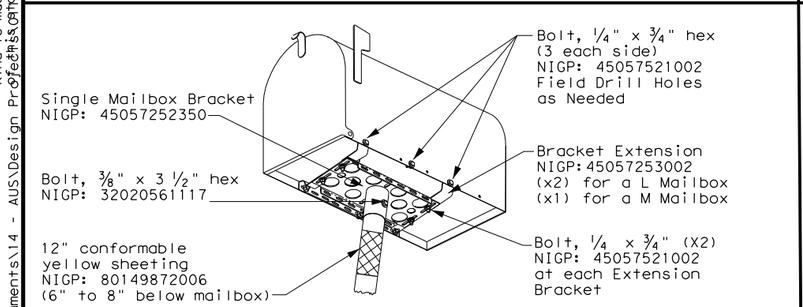
1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

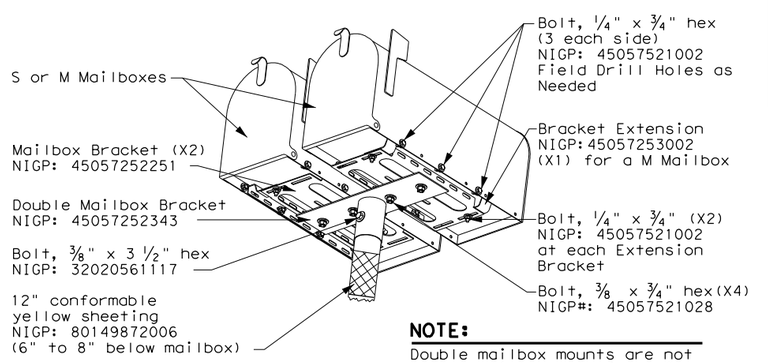
TYPICAL INSTALLATION MEASUREMENTS



NOTE:
Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

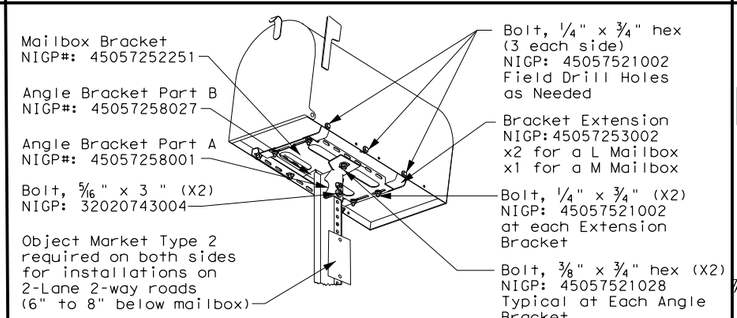
TYPE 2 and 4 - SINGLE/DOUBLE

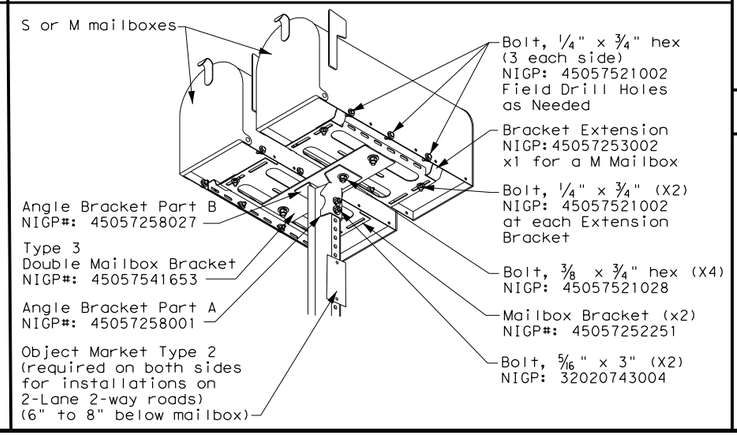




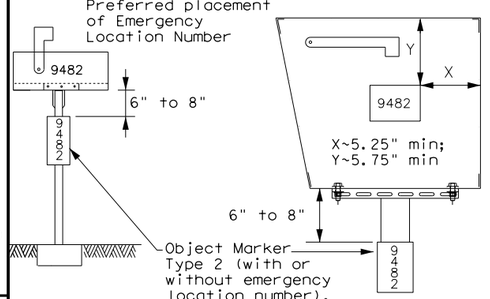
NOTE:
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





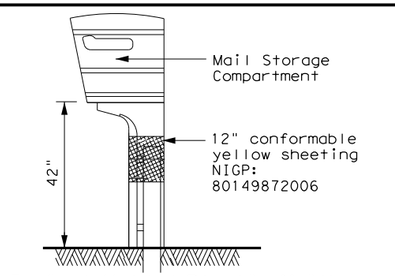
PLACEMENT OF EMERGENCY LOCATION NUMBER



NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		102

DATE: 1/9/2023 2:29:49 PM
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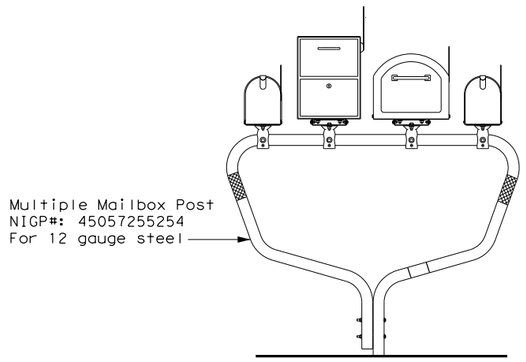
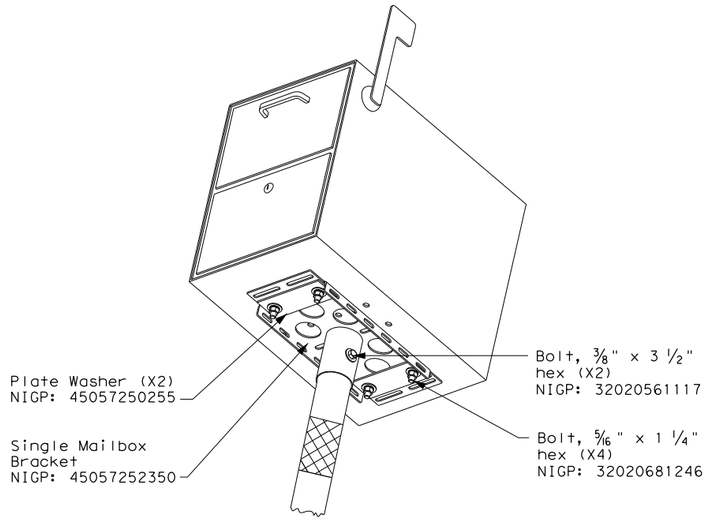
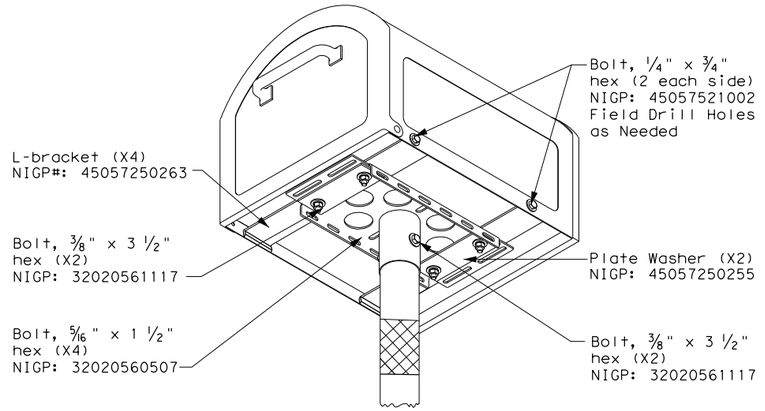
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

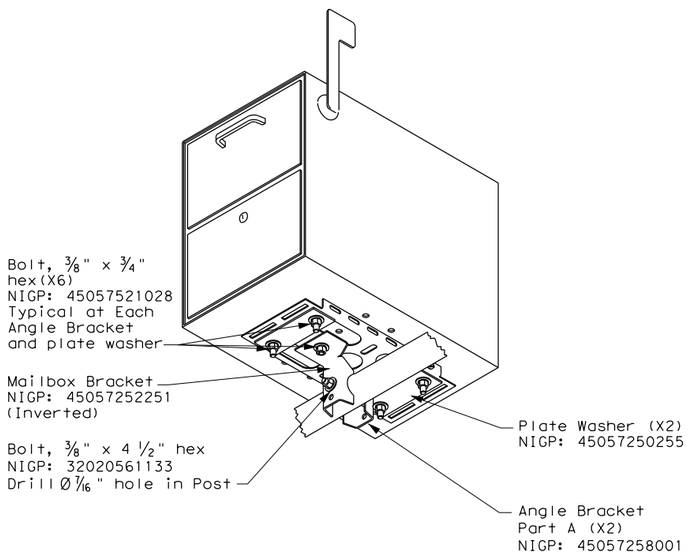


TYPE 2/4 - SINGLE XL MAILBOX

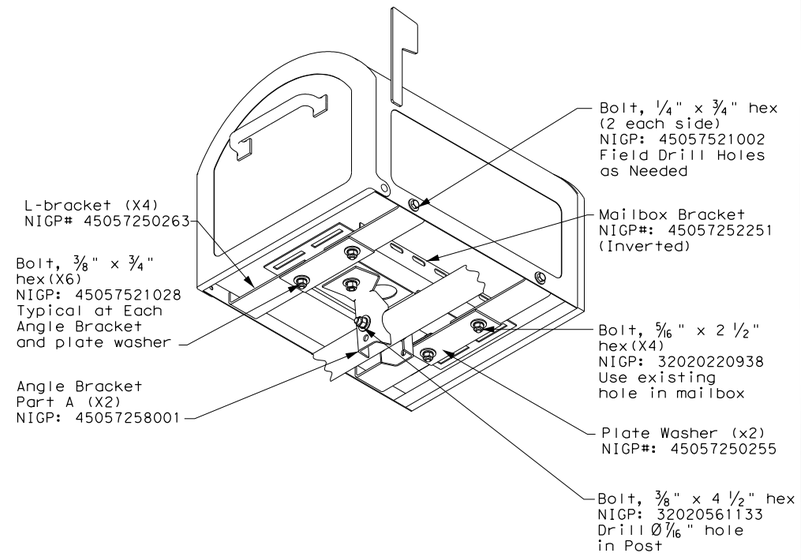


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

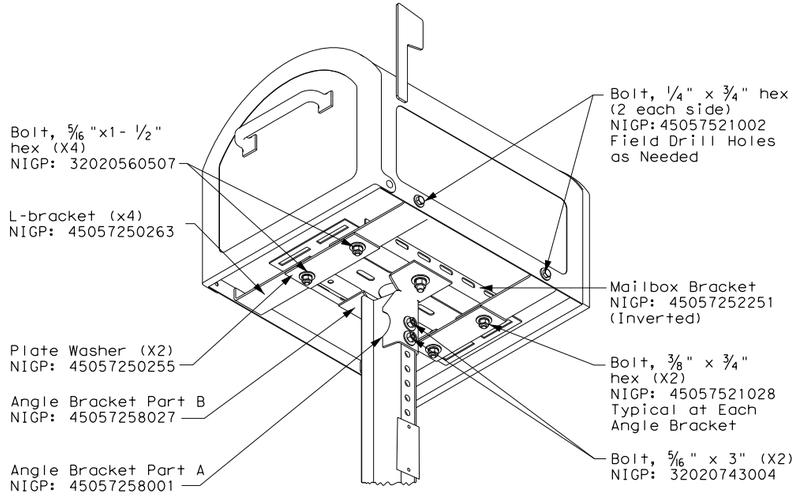
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0113	02	063	US 290
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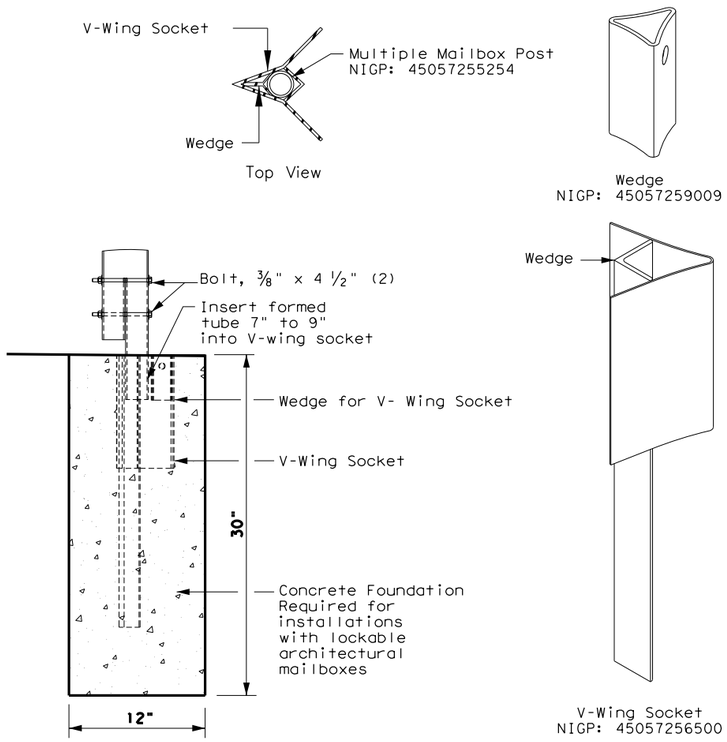
	AUS	GILLESPIE		103

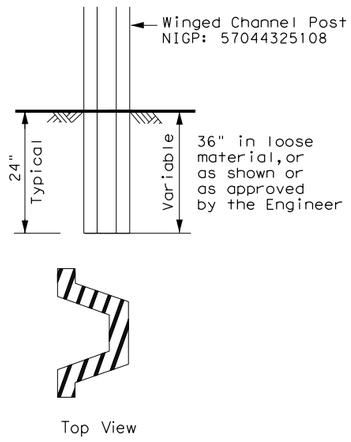
DATE: 1/9/2023 2:29:49 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\MB-21.dgn

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



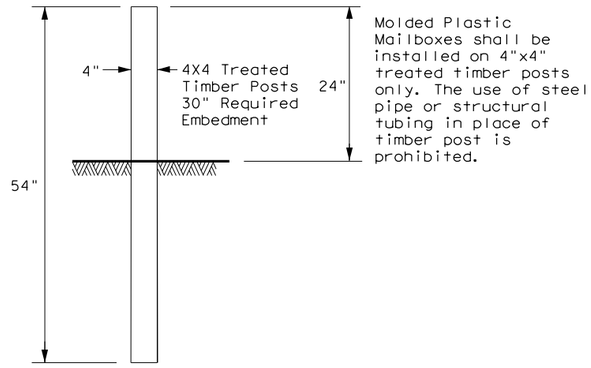
TYPE 3 - SUPPORT/FOUNDATION



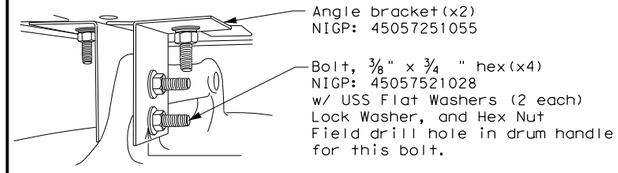
NOTES:

1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

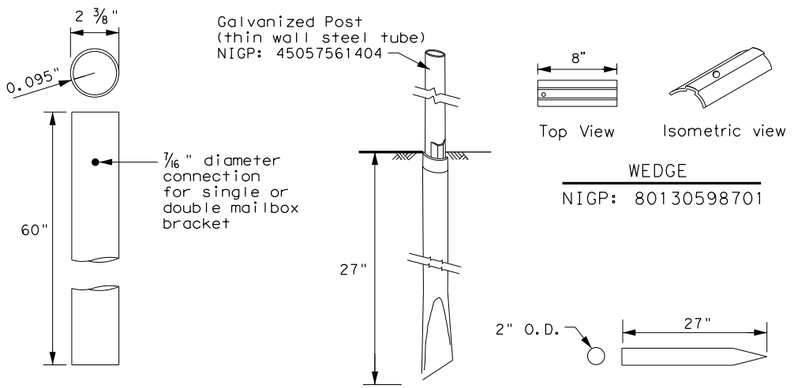
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

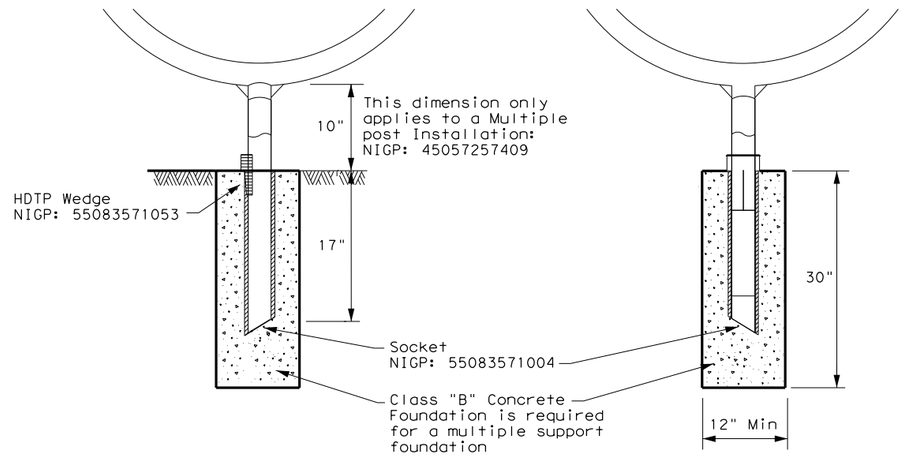


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

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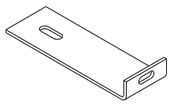
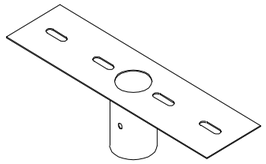
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		104

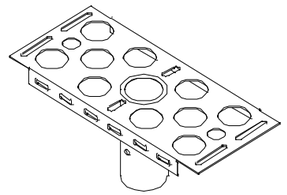
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



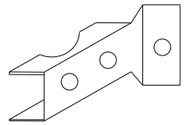
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



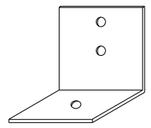
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



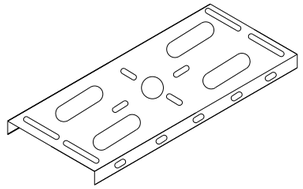
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



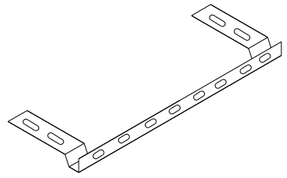
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



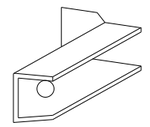
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



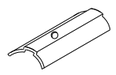
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



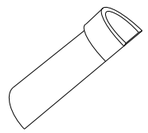
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



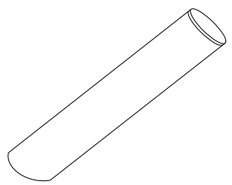
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

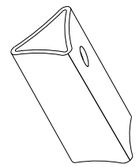


NIGP: 55083571053
Type 4 Mailbox Wedge

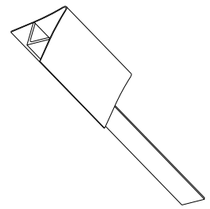


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		105

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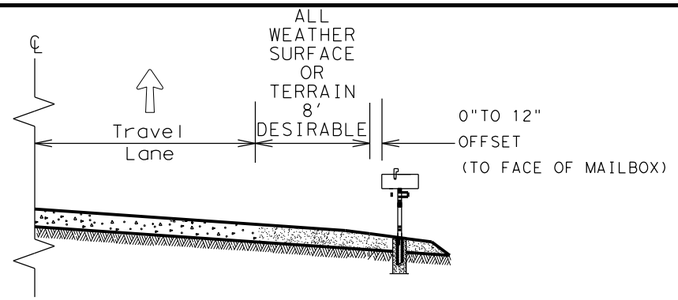
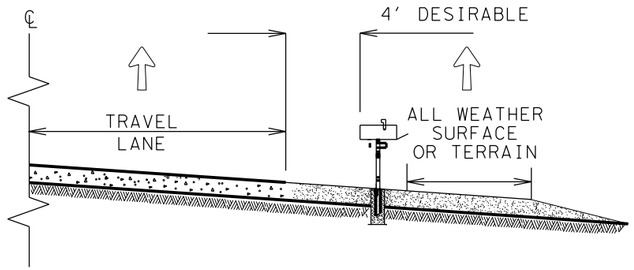
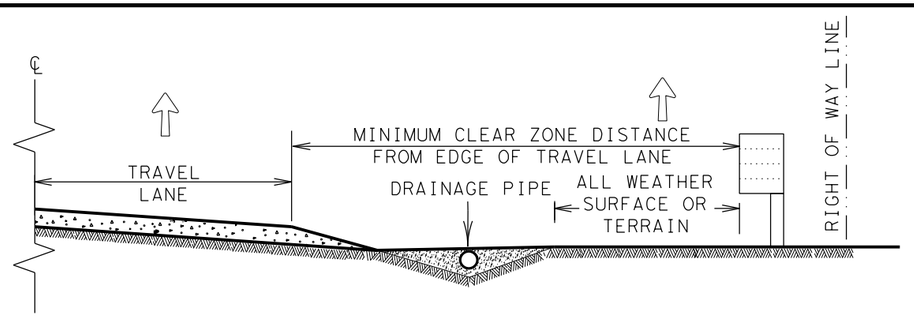


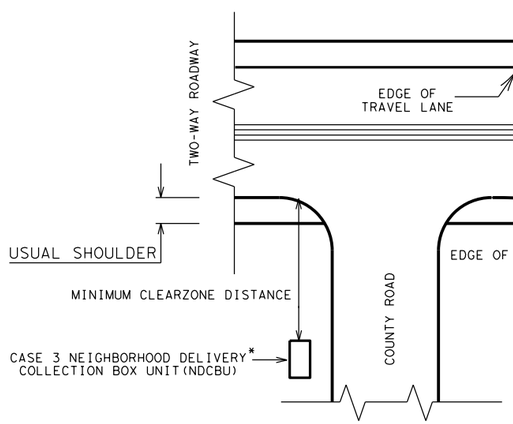
CASE 1. OFF TRAVEL WAY DELIVERY

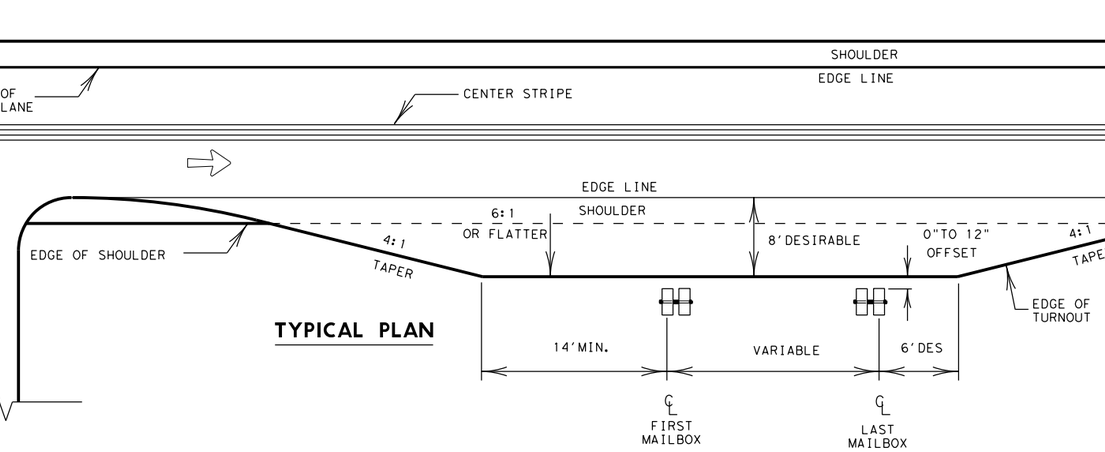


CASE 2. BACK SIDE DELIVERY

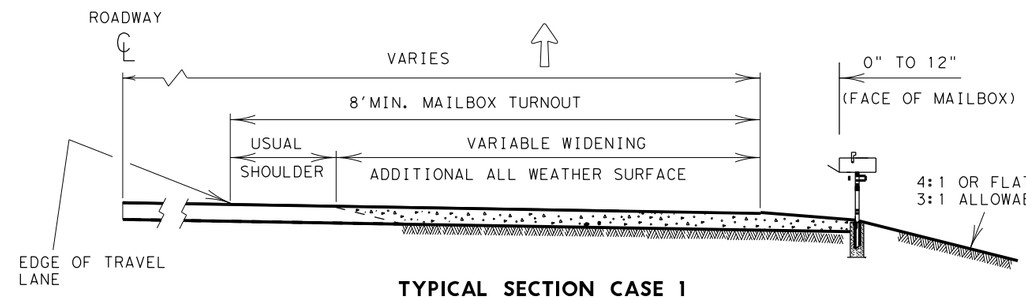


CASE 3. DELIVERY NEAR RIGHT OF WAY LINE





TYPICAL PLAN



TYPICAL SECTION CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. WHEN 3 OR MORE MULTI-RACKS ARE ANTICIPATED, THE USE OF AN NDCBU IS RECOMMENDED. ONLY RURAL PATRONS LOCATED ON STATE MAINTAINED HIGHWAYS MAY HAVE A MAILBOX OR NDCBU SLOT ON TXDOT RIGHT OF WAY.

*NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

Texas Department of Transportation

Maintenance Division Standard

Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS

MBP(1)-22

FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		106

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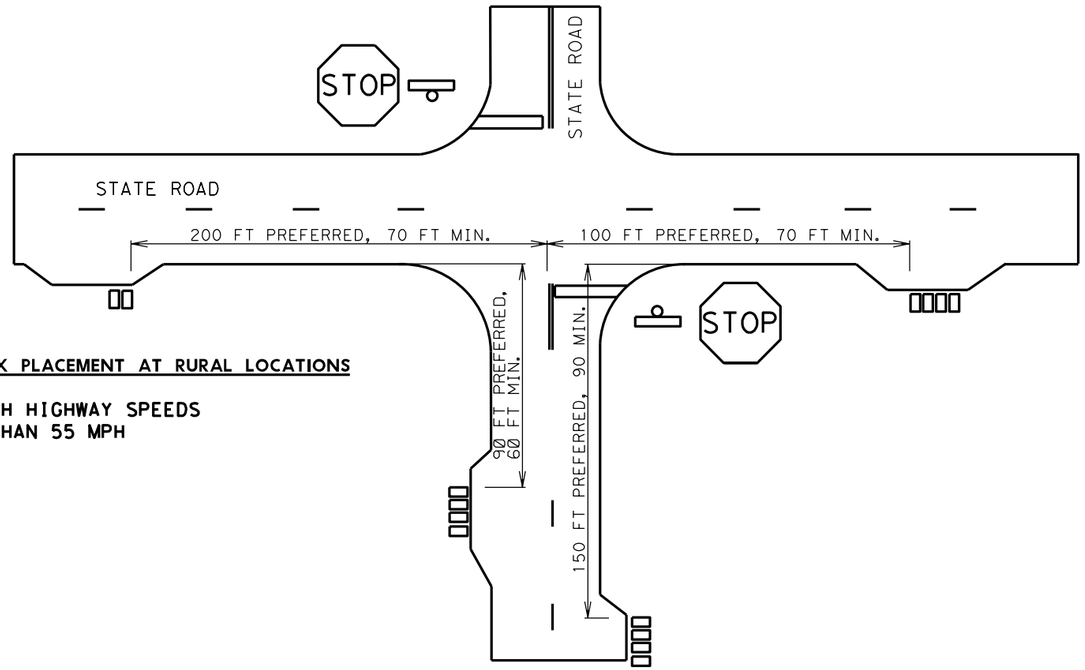
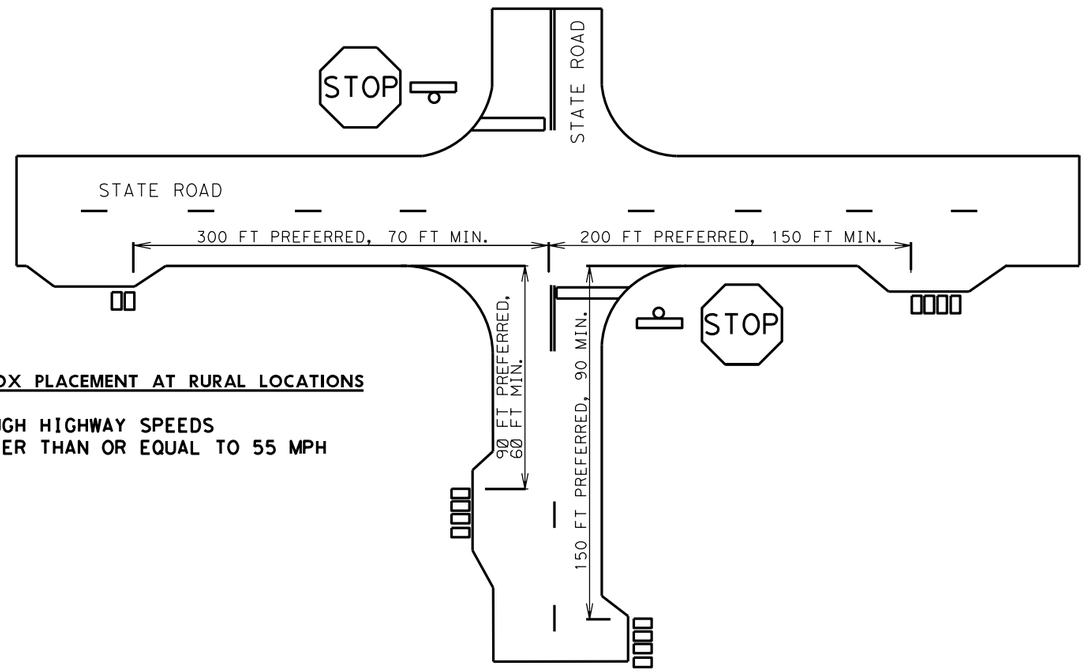


MAILBOX PLACEMENT AT RURAL LOCATIONS

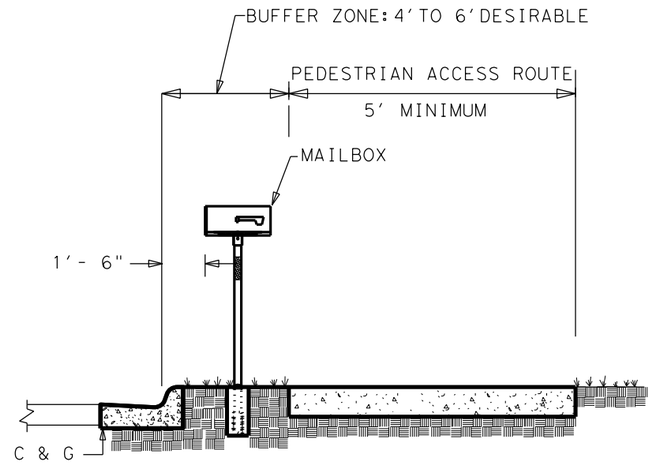
THROUGH HIGHWAY SPEEDS
LESS THAN 55 MPH



MAILBOX PLACEMENT AT RURAL LOCATIONS

THROUGH HIGHWAY SPEEDS
GREATER THAN OR EQUAL TO 55 MPH

CURB AND GUTTER MAILBOX INSTALLATION



NOTES:

1. A NON-TRAVERSABLE SURFACE MUST BE INSTALLED NEAR THE MAILBOX (NATURAL VEGETATION OR OTHER) IN THE BUFFER ZONE. ALTERNATIVELY, A BASE WITH A MINIMUM HEIGHT OF 2.5 INCHES MAY BE INSTALLED SO THAT THE EDGE OF THE MAILBOX DOES NOT EXTEND OUT MORE THAN 4 INCHES HORIZONTALLY BEYOND THE BASE.

2. THE SIDEWALK WIDTH MAY BE REDUCED TO 4 FOOT FOR SHORT DISTANCES AROUND THE MAILBOX IF NEEDED.

3. MAINTAIN A MINIMUM OF 5 FEET BETWEEN OBSTRUCTIONS IN THE PEDESTRIAN ACCESS ROUTE.

Texas Department of Transportation | Maintenance Division Standard

MAILBOX PLACEMENT CURBS & INTERSECTIONS

MBP(2)-22

FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	0113	02	063	US 290
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	AUS	GILLESPIE		107

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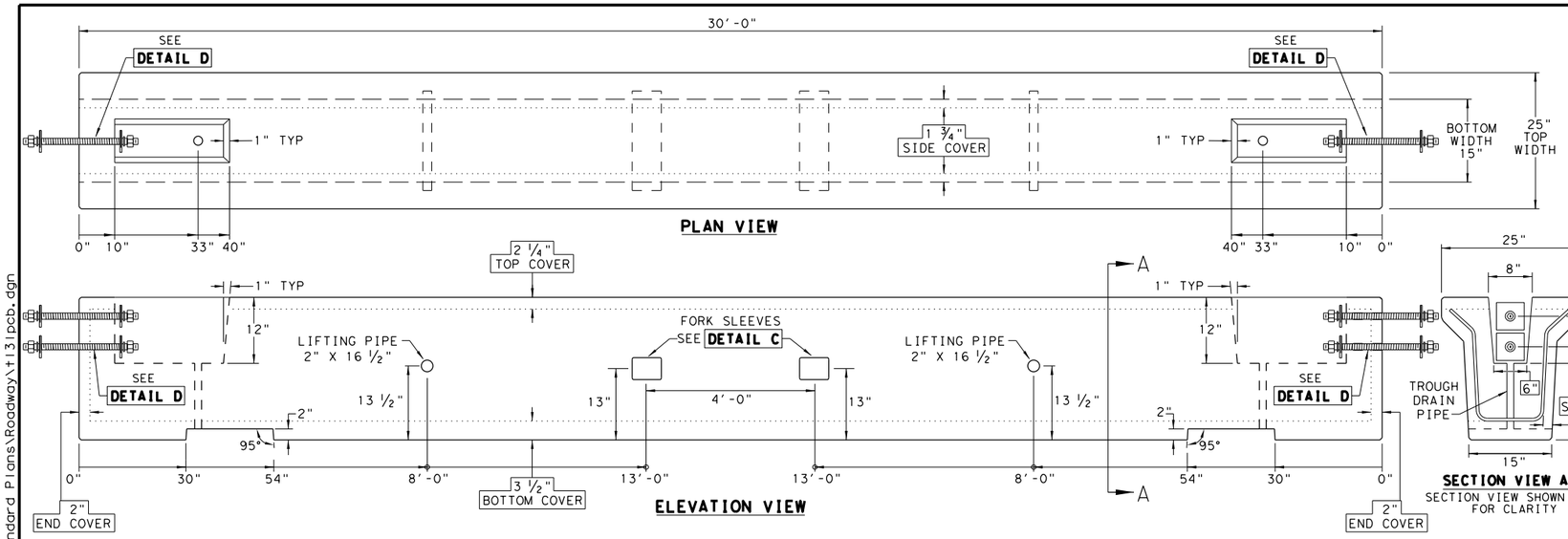
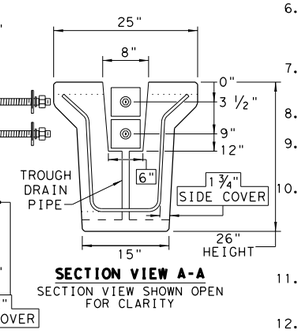




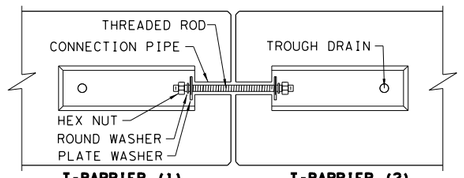
SECTION VIEW A-A
SECTION VIEW SHOWN OPEN FOR CLARITY

GENERAL NOTES

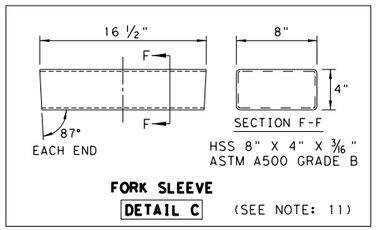
1. THE TL-3 LOW PROFILE CONCRETE BARRIER IS APPROVED FOR USE WITHIN TEMPORARY WORK ZONE LOCATIONS FOR HIGH-SPEED CONDITIONS.
2. PRECAST LOW PROFILE T-BARRIER (LPTB), LENGTH SHALL BE 30 FT.
3. CONCRETE SHALL BE CLASS H WITH A MINIMUM COMPRESSIVE STRENGTH OF 3,600 PSI. CHAMFER EXPOSED EDGES ¾" AS SHOWN ON DETAIL.
4. JOINT CONNECTION HARDWARE SHALL BE IN ACCORDANCE WITH ITEM 449, "ANCHOR BOLTS." AND IS CONSIDERED SUBSIDIARY.
5. ALL STEEL HARDWARE USED FOR JOINT CONNECTION SHALL BE IN ACCORDANCE WITH ITEM 445, GALVANIZING.
6. PVC PIPE REQUIRED FOR THE JOINT CONNECTION, LIFTING PIPES AND TROUGH DRAINAGE PIPES SHALL BE IN ACCORDANCE WITH ITEM 481, AND MEET THE REQUIREMENTS OF ASTM D1785.
7. WELDED WIRE CAGE MAY BE CUT OR BENT, IF NECESSARY, BUT MUST BE APPROVED BY THE ENGINEER.
8. DEFORMED WELDED WIRE SHALL CONFORM TO ASTM A1064.
9. WHERE USED, REBAR REINFORCEMENT SHALL BE GRADE 60 AND CONFORM TO ASTM A615.
10. THE BARRIER SYSTEM IS DESIGNED TO HAVE APPROXIMATELY 25" OF DYNAMIC OR PERMANENT DEFLECTION AS IT CONTAINS AND REDIRECTS A TL-3 ERRANT PICKUP TRUCK. A MINIMUM LENGTH OF 180 FT. OF BARRIER RUN IS RECOMMENDED; SHORTER RUNS MAY BE CONSIDERED BUT DEFLECTIONS WOULD BE GREATER.
11. THE FORK SLEEVES ARE OPTIONAL. ADDITIONALLY, THE FORK SLEEVES MAY BE MADE OF PVC.
12. THE TL-3 LOW PROFILE BARRIER SHOULD NEVER BE ANCHORED IN ANY WAY.
13.

CONNECTION ROD HARDWARE (SEE DETAIL D)

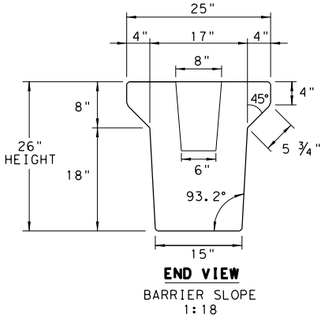
QTY	PART NAME	SIZE
2	THREADED ROD (ASTM A193 GR.B7)	⅞" X (26" LENGTH)
4	ROUND WASHER (ASTM F436)	⅞"
4	PLATE WASHER (A36)	5" X 5" X ½" THICK WITH 1" DIA. HOLE
4	HEAVY HEX NUT (ASTM A563)	⅞"
2	TROUGH DRAIN	1 ½" X 12" PVC PIPE
4	CONNECTION PIPE	1 ½" X 10" PVC PIPE



DETAIL D



FORK SLEEVE
DETAIL C (SEE NOTE: 11)



END VIEW
BARRIER SLOPE 1:18

WWR & REBAR INFORMATION TABLE

QTY	WWR - BAR	SIZE	DETAIL
31	WWR V	#4 - WWR D20	DETAIL A
6	WWR H	#5 - WWR D31	
6	BAR Y	#4	
2	BAR U1	#6 X 20" X 60"	DETAIL B
2	BAR U2	#6 X 13" X 60"	
2	BAR U3	#6 X 12" X 60"	
2	BAR U4	#6 X 11" X 60"	

RIGID PVC PIPE (SCH 40) TABLE

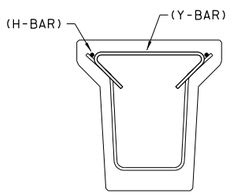
QTY	PART NAME	SIZE
4	CONNECTION ROD PIPE	1 ½" X 10" LENGTH
2	TROUGH DRAIN	1 ½" X 12" LENGTH
2	LIFTING PIPE	2" X 16 ½" LENGTH

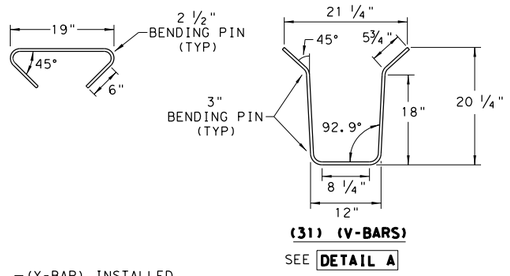
COVER DIMENSIONS TABLE

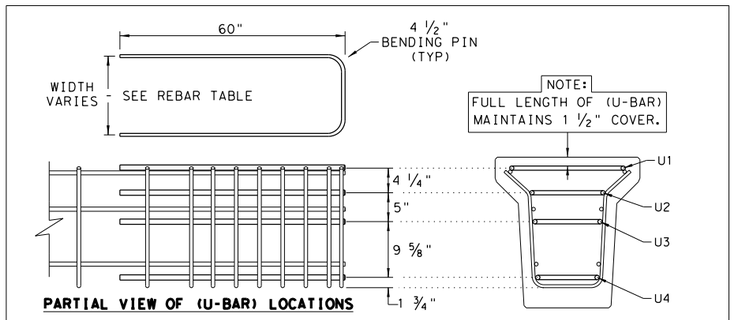
BARRIER TOP	2 ¼"
BARRIER TOP FULL LENGTH U-BAR	1 ½"
BARRIER BOTTOM	3 ½"
BARRIER SIDE	1 ¾"
BARRIER END	2"

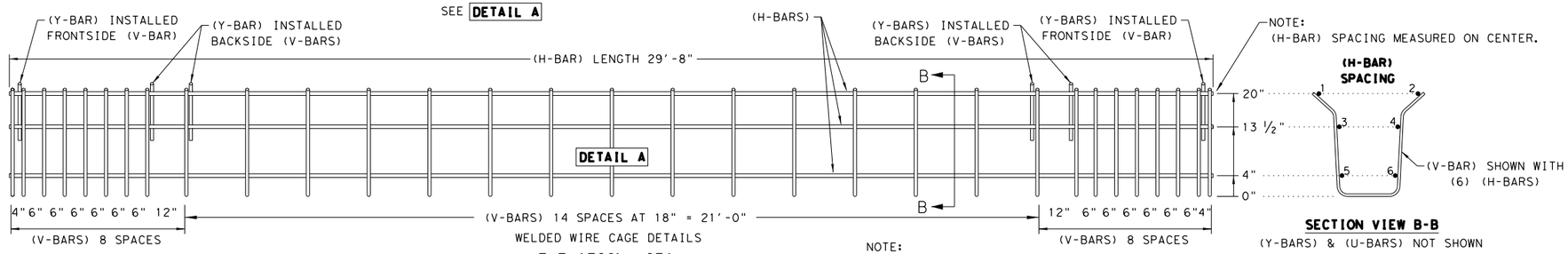
WORKING WIDTH IS APPOXIMATELY 51 INCHES.

THE WEIGHT OF ONE T-SHAPE 30 FT. PRECAST BARRIER IS APPROX. 7.4 TONS OR 500 LBS PER FOOT.









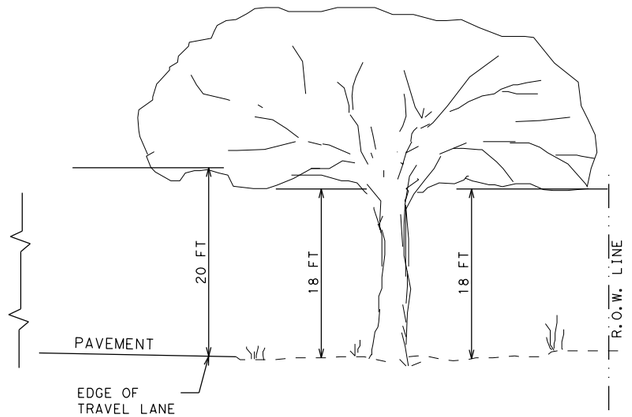
Texas Department of Transportation

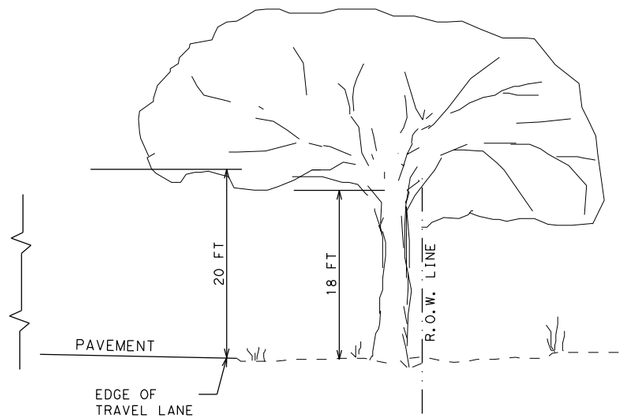
Design Division Standard

LOW PROFILE T-BARRIER PRECAST CONCRETE MASH - TL-3

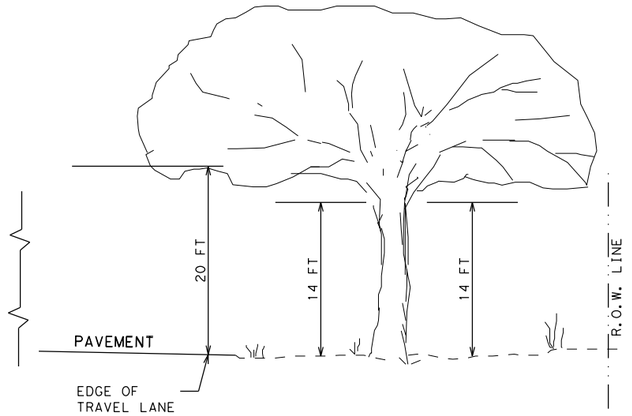
LPTB-22

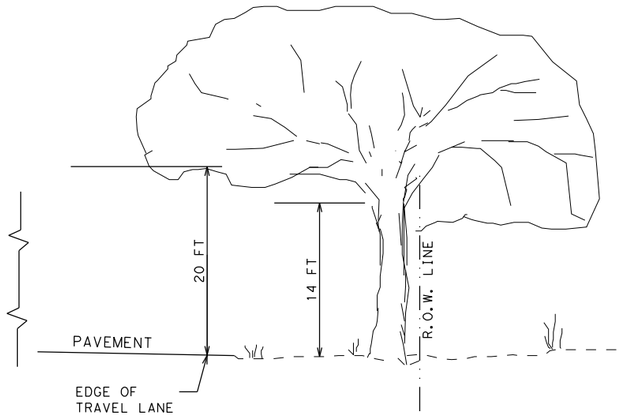
FILE: lptb21.dgn	DN: TxDOT	CK: KM	DW: CES	CK: CGL
© TxDOT: JULY 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		108





NON-OAK SPECIES
TREE PRUNING LIMITS



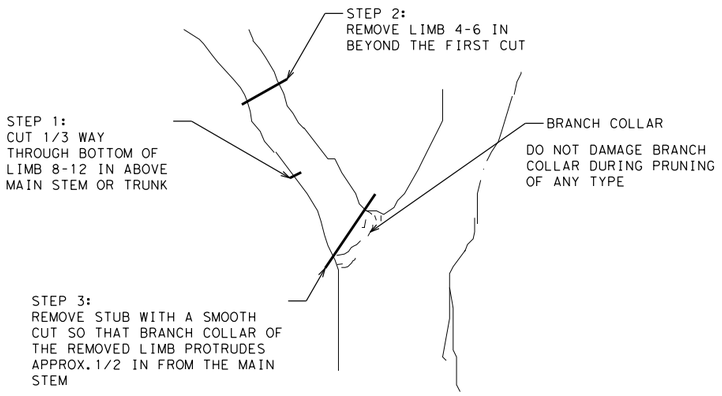


OAK SPECIES
TREE PRUNING LIMITS

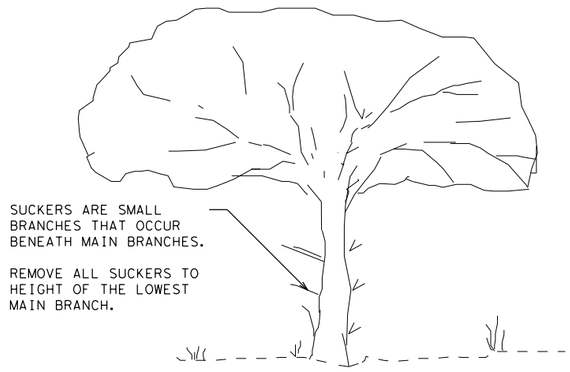
GENERAL NOTES

PAYMENT FOR THIS WORK IS SUBSIDIARY TO PREP R.O.W.

1. REMOVE ALL DEAD TREES, DEAD BRUSH, AND DEAD MULTI-TRUNKED TREES WITHIN THE R.O.W.. TREES, SHRUBS, OR MULTI-TRUNKED TREES THAT DIE DURING CONSTRUCTION SHALL BE REMOVED PRIOR TO COMPLETION OF THE PROJECT.
2. USE WORK METHODS IN ACCORDANCE WITH ANSI A300 STANDARDS AND ITEM 752.
3. FLAILING EQUIPMENT IS NOT ALLOWED ON OAK TREES.
4. REPAIR DAMAGE TO PRIVATE FENCES AND/OR PRIVATE PROPERTY.
5. PERFORM TREE PRUNING ONLY WITHIN THE R.O.W.. NO CUTS SHALL BE MADE OUTSIDE THE R.O.W..
6. PERFORM TREE PRUNING PER DETAIL FOR ENTIRE R.O.W. AREA WITHIN PROJECT LIMITS. THE ENGINEER MAY DEFINE AREAS TO RESTRICT TREE PRUNING.
7. REVIEW EPIC SHEETS FOR AREAS TO BE AVOIDED DUE TO ENVIRONMENTAL REASONS OR ADDITIONAL NOTES THAT PERTAIN TO TREE PRUNING.
8. MIGRATORY BIRDS AND BATS MAY BE NESTING WITHIN THE PROJECT LIMITS. PERFORM TREE TRIMMING OUTSIDE THE NESTING SEASON DATES LISTED IN THE GENERAL NOTES.
9. NO TRIMMING OF THE VEGETATION THAT CONTAINS AN ACTIVE NEST FOR MIGRATORY BIRDS IS ALLOWED.
10. THE TRIMMING OR CUTTING OF RED OAK AND LIVE OAK SPECIES FOR PURPOSES OTHER THAN PROTECTING PUBLIC SAFETY IS ONLY PERMITTED BETWEEN JULY 1ST AND JANUARY 31ST AND PROHIBITED BETWEEN FEBRUARY 1ST AND JUNE 30TH
11. ALL PRUNING CUTS MUST BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE EXPOSED SURFACE FROM CONTAMINATION. USE OF AEROSOL CAN IS THE PREFERRED METHOD OF APPLICATION FOR SEALING CUTS. ANY WOUNDS, WHETHER MADE BY TRIMMING, CONSTRUCTION OR ACCIDENT, SHALL BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE SURFACE FROM CONTAMINATION. THE TXDOT INSPECTOR MAY CONDUCT UNANNOUNCED INSPECTIONS TO ENSURE COMPLIANCE.
12. IF MORE THAN 25% OF THE TREE CANOPY WILL BE REMOVED CONTACT THE TXDOT ABORIST OR INSPECTOR FOR APPROVAL PRIOR TO PROCEEDING.



PROPER TREE PRUNING
FOR LIMBS 2" IN DIA. AND GREATER



SUCKER REMOVAL DETAIL

Texas Department of Transportation | Austin District Standard

PREP R.O.W. PRUNING DETAIL

PRWPD-20 (AUS)

CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		109

DATE: 1/9/2023 2:30:02 PM
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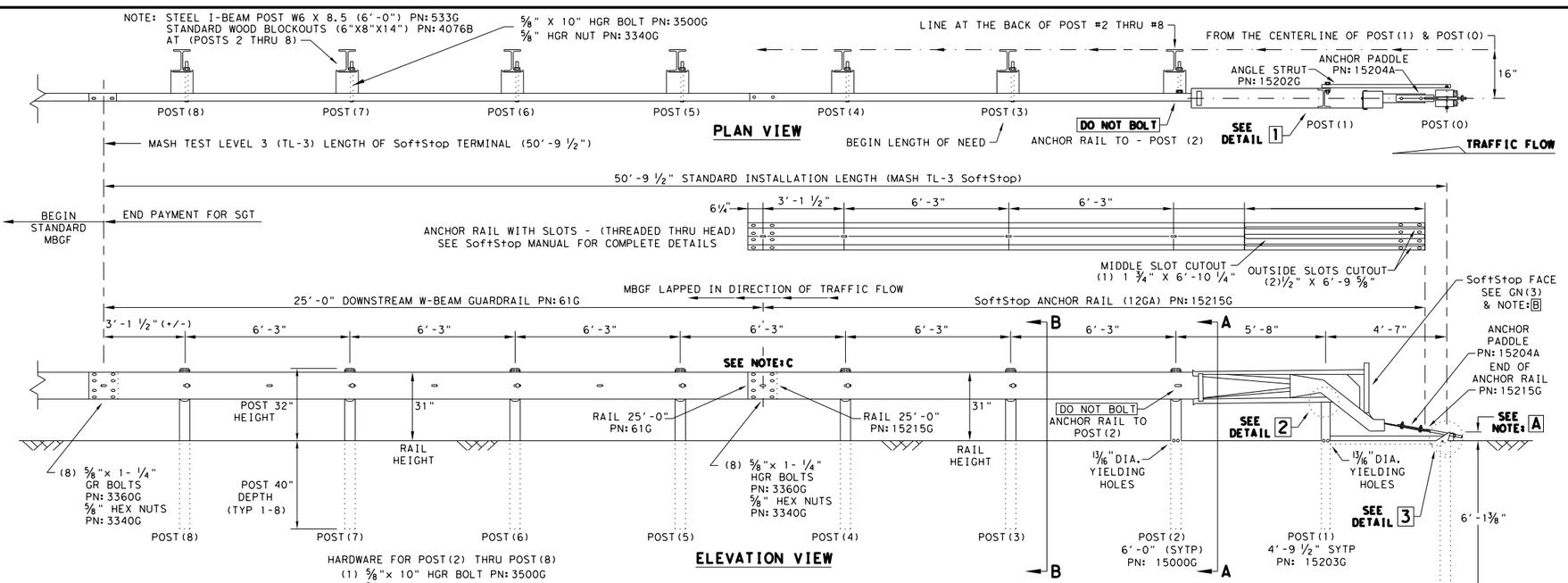
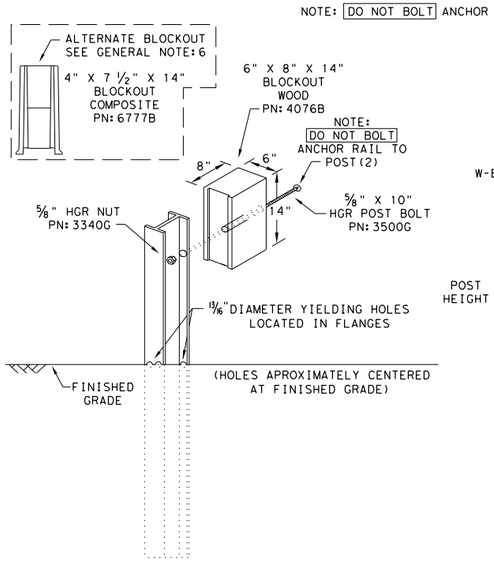
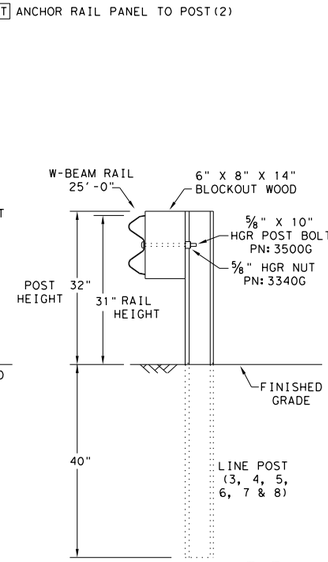




ISOMETRIC VIEW POST(1 & 2)

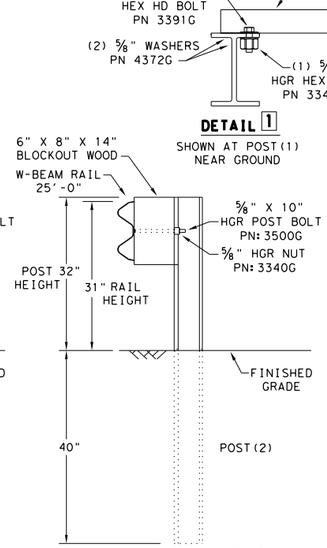
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B

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

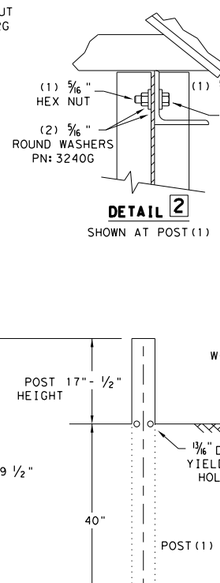


SECTION VIEW A-A

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

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

DETAIL 1

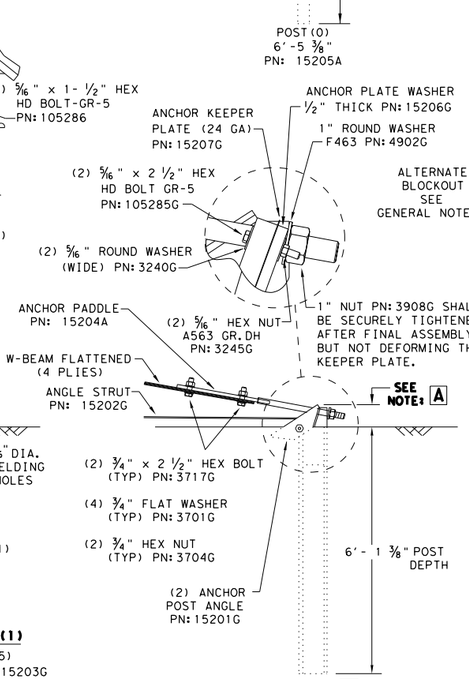


DETAIL 2

FRONT VIEW POST(1)

4'-9 1/2" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

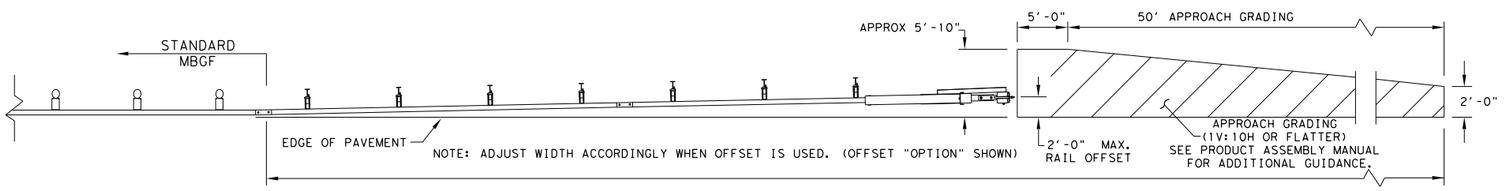
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



DETAIL 3 AT POST(0)

6'-5 3/8" (W6 X 15)
I-BEAM POST PN: 15205A

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

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

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" 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 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
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 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3

SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		110

DATE: 1/9/2023
FILE: dw: \\txdot.projectwiseonline.com: TXDOT4\Documents\14 - AUS\Design Projects\MASH Roadway Designs (RPG)\31 sgt(11s)31-18.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
7-5/8" FROM REFERENCE LINE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

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

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

CABLES

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

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

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

MBGF RAIL 2 | MBGF RAIL 1

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

DETAIL (C)

TRAFFIC FLOW

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

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- 1/2"

49'-8 5/16"

6'-3" | 6'-3" | 6'-3" | 6'- 3/4" | 6'-3" | 6'-3" | 6'-3" | 37 1/2" | 5'-3 11/16"

RAIL HEIGHT 31"

ARROWS

RAIL HEIGHT 31"

HEAD HEIGHT

DETAIL (B)

32-1/4"

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

DETAIL (D)

CABLES

FINISHED GRADE | FINISHED GRADE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-1/8"

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

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

SOIL ANCHOR POST
ITEM (1)

A — A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE

DETAIL (D)

HEAD HEIGHT 32-1/4"

TOP OF POST

31-7/8"

FINISHED GRADE

40-1/8"

68-1/8"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

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

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

SECTION VIEW A-A

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

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL 5/8" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

(RAIL 1)

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

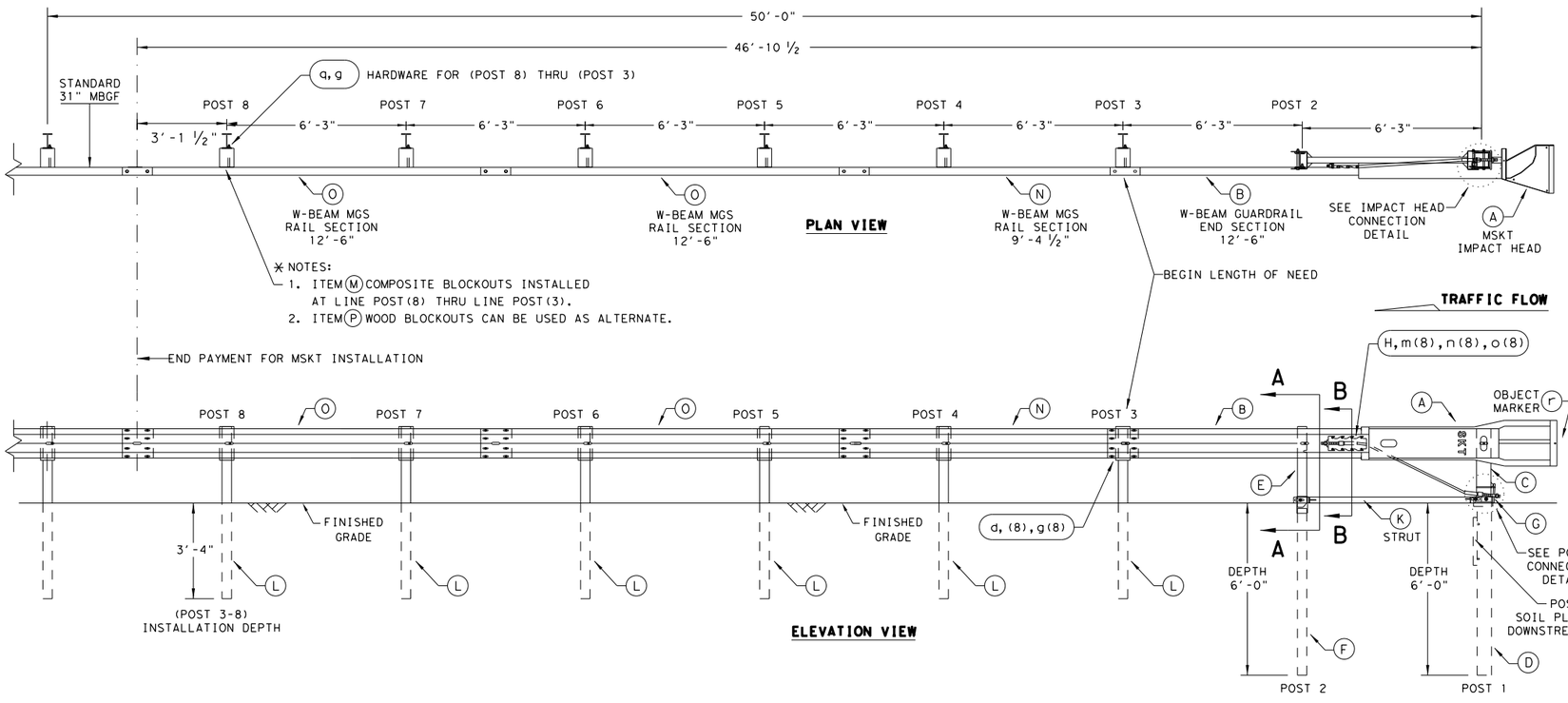
Texas Department of Transportation

Design Division Standard

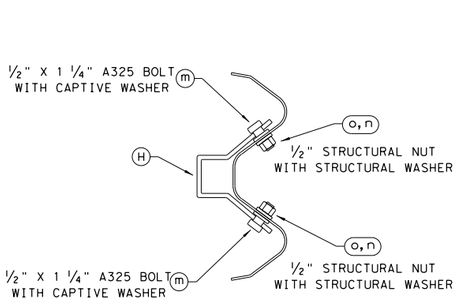
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

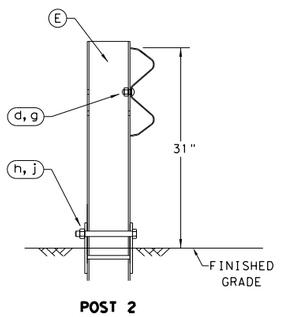
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		111

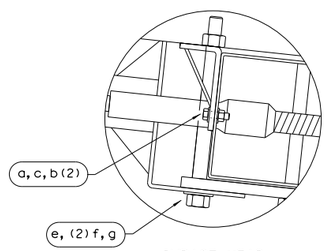
DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\011302063\4 - Design\Plan Set\Standard Plans\Roadway\SGT(12S)31-18.dgn

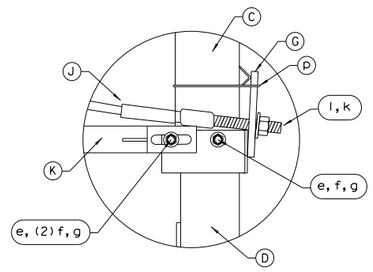


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









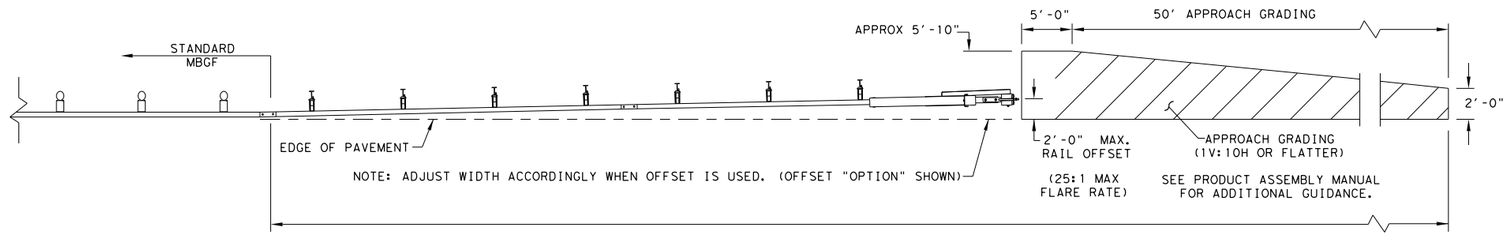
SEE NOTES: ✳

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

GENERAL NOTES

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

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

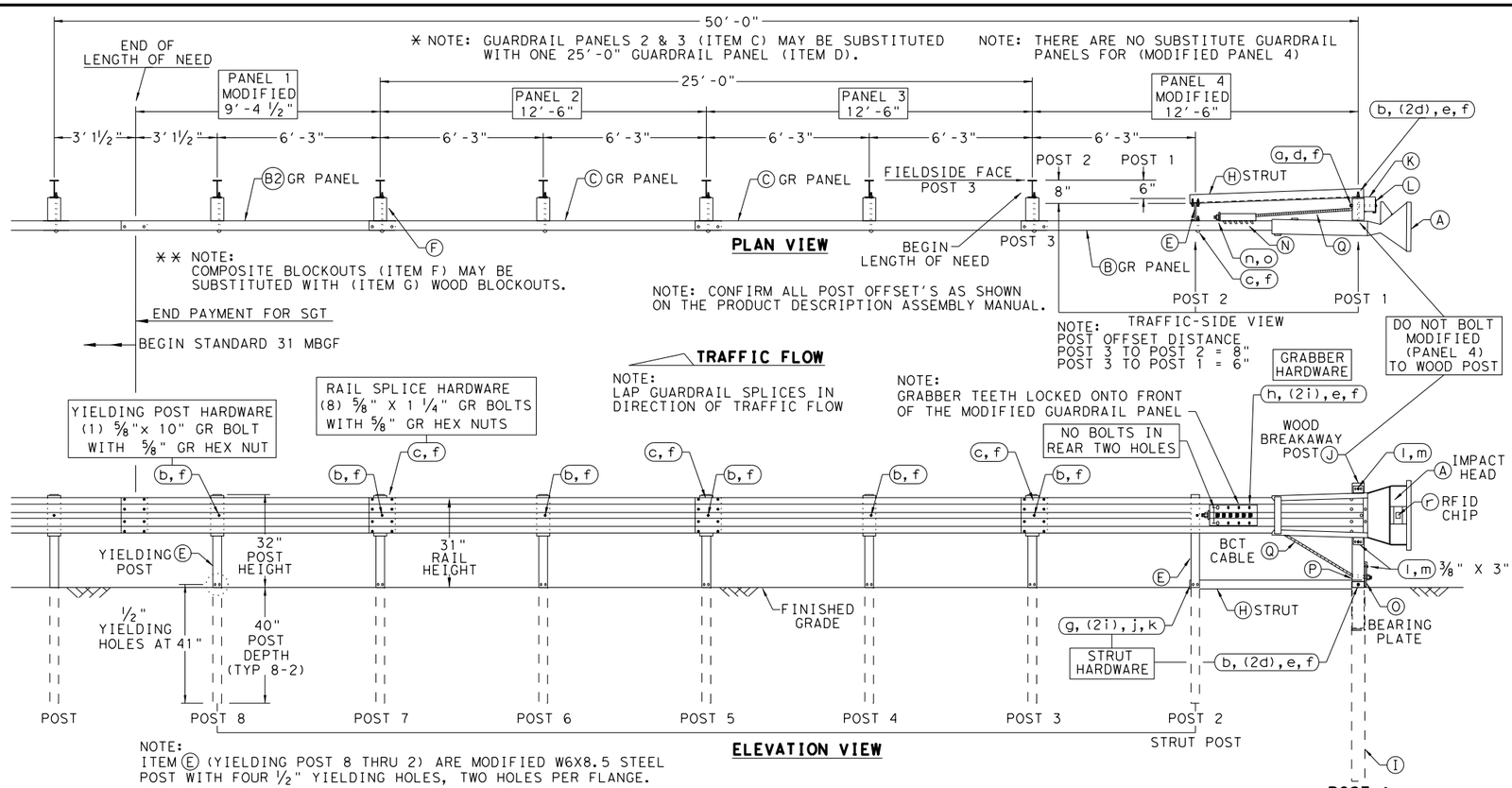
Texas Department of Transportation

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	0113	02	063	US 290	
	DIST	COUNTY		SHEET NO.	
	AUS	GILLESPIE		112	

DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020634 - Design\Plan Set\Standard Plans\Roadway\SGT(15)31-20.dgn

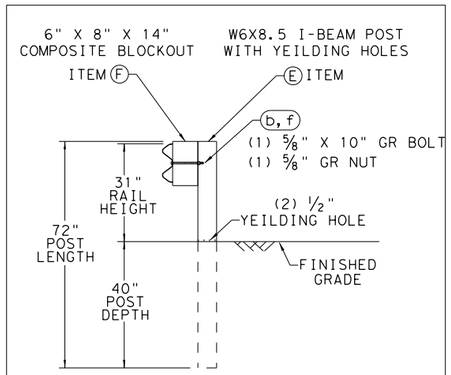


GENERAL NOTES

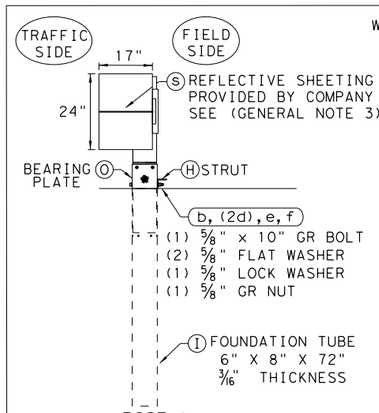
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

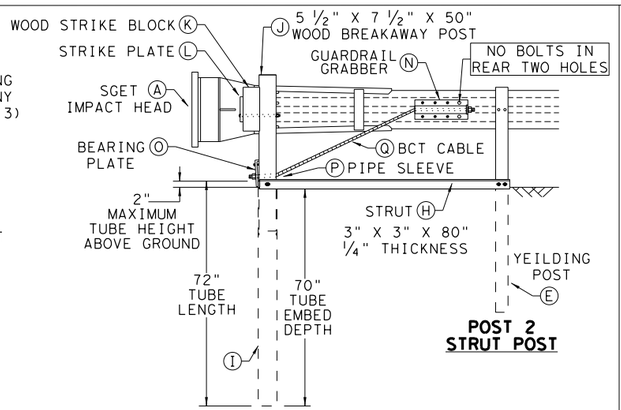
ALTERNATIVE ITEMS NOTE: SEE PLAN VIEW
* D
** G



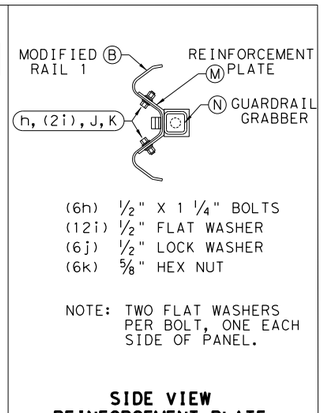
SIDE VIEW
POST 8 - POST 3 (TYP)



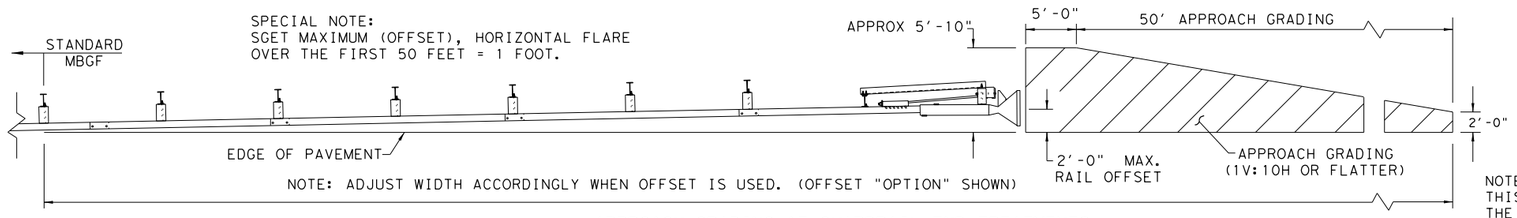
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

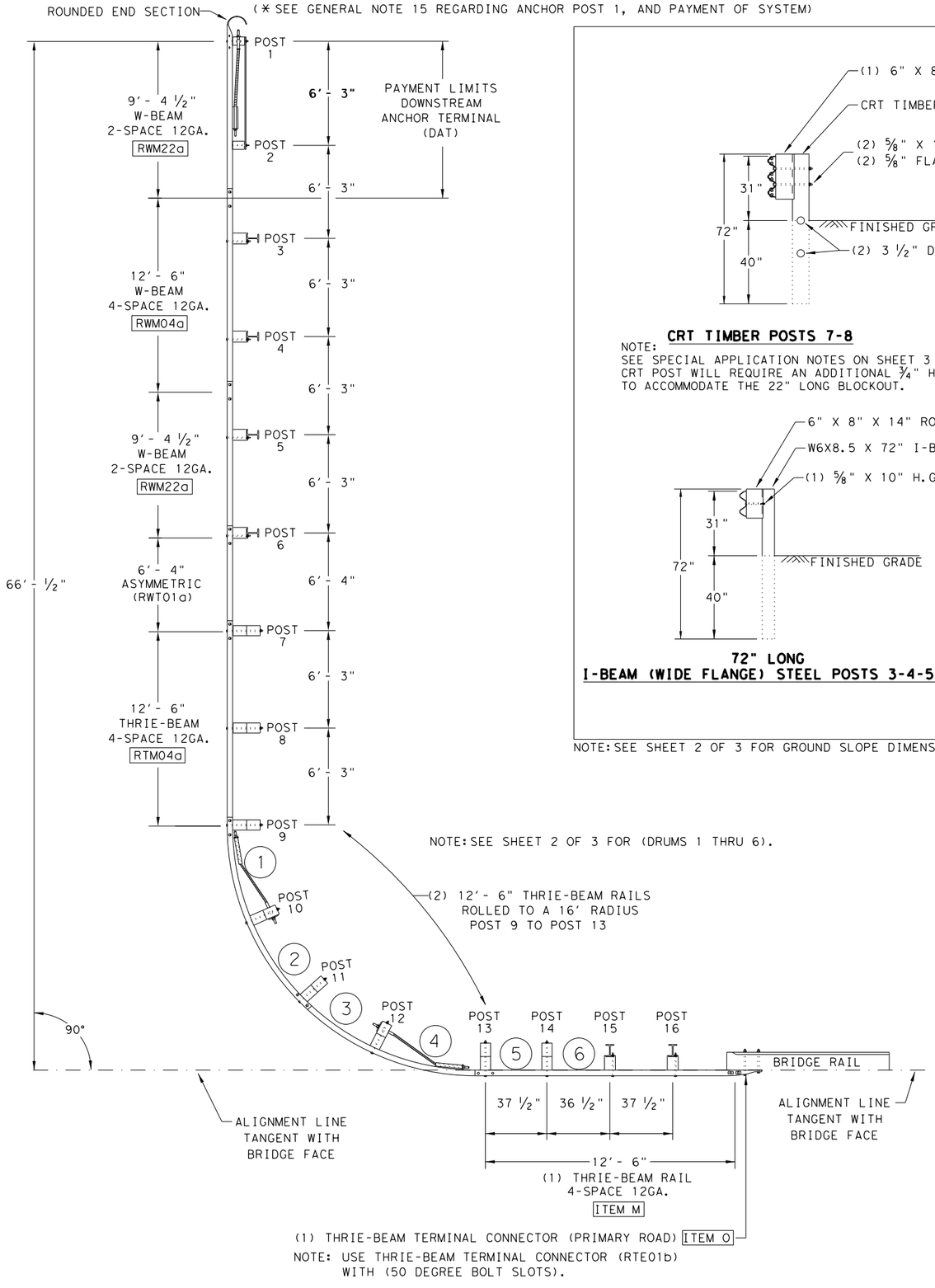
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

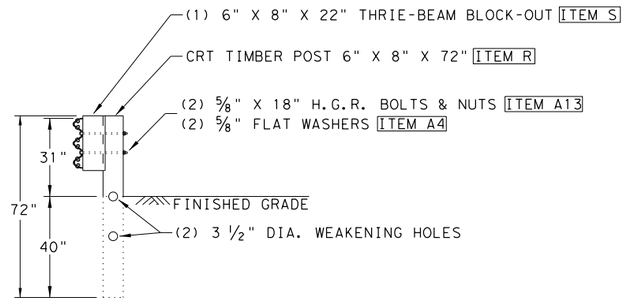
Texas Department of Transportation — Design Division Standard

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	0113	02	063	US 290	
	DIST	COUNTY		SHEET NO.	
	AUS	GILLESPIE		113	

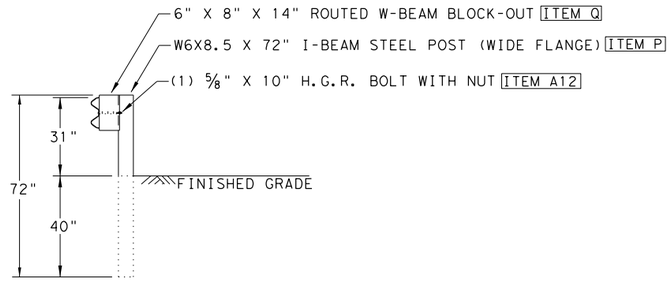
DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113023063\4 - Design\Plan Set\Standard Plans\Roadway\SRG(TL-2)-21.dgn



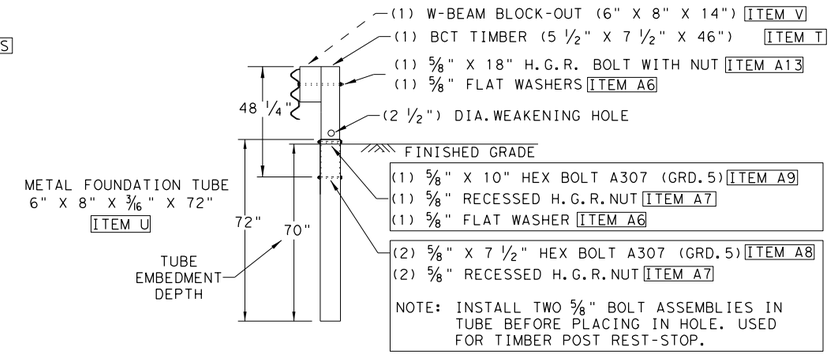


CRT TIMBER POSTS 7-8

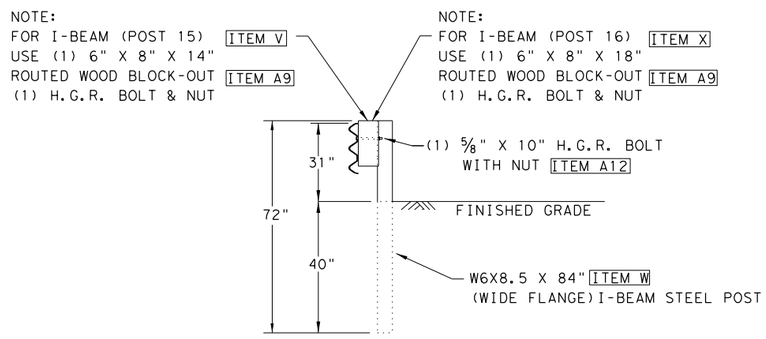
NOTE:
SEE SPECIAL APPLICATION NOTES ON SHEET 3 OF 3.
CRT POST WILL REQUIRE AN ADDITIONAL ¾" HOLE TO ACCOMMODATE THE 22" LONG BLOCKOUT.



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

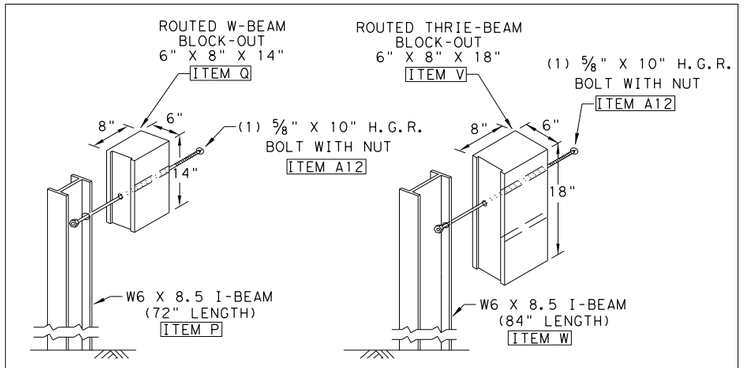


BCT TIMBER POSTS WITH METAL FOUNDATION TUBES
9-10-11-12-13-14



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

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



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

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

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

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

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

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

FILE: srgt1221	TxDOT	CK:KM	DN:VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		114

DATE: 1/9/2023
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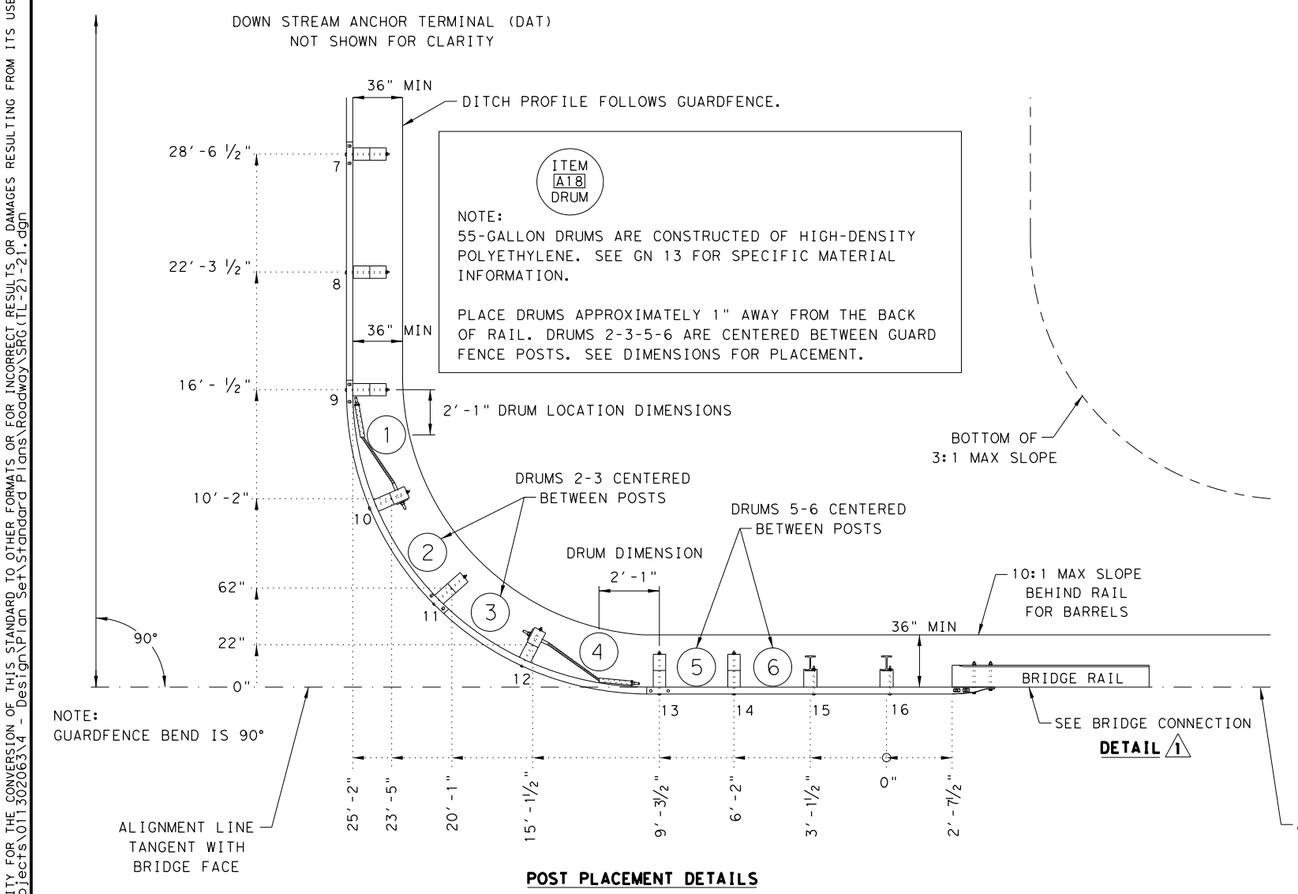
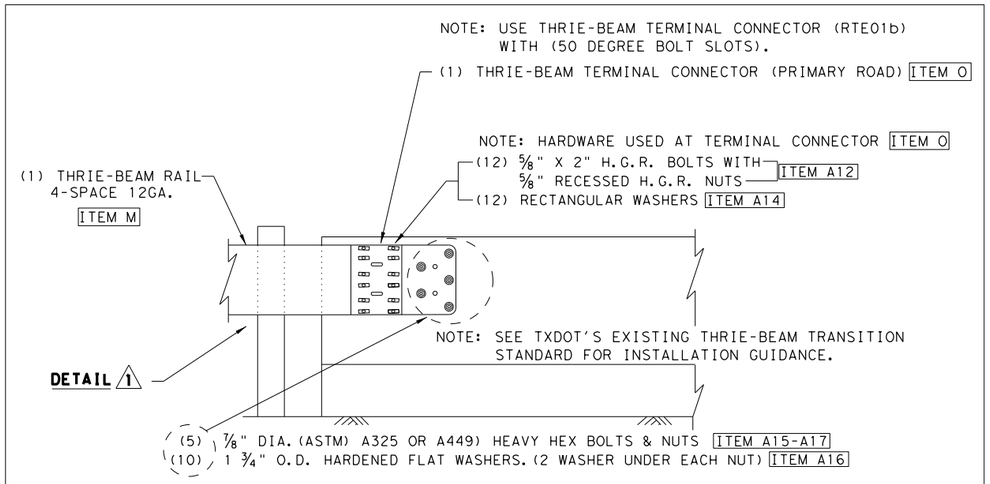


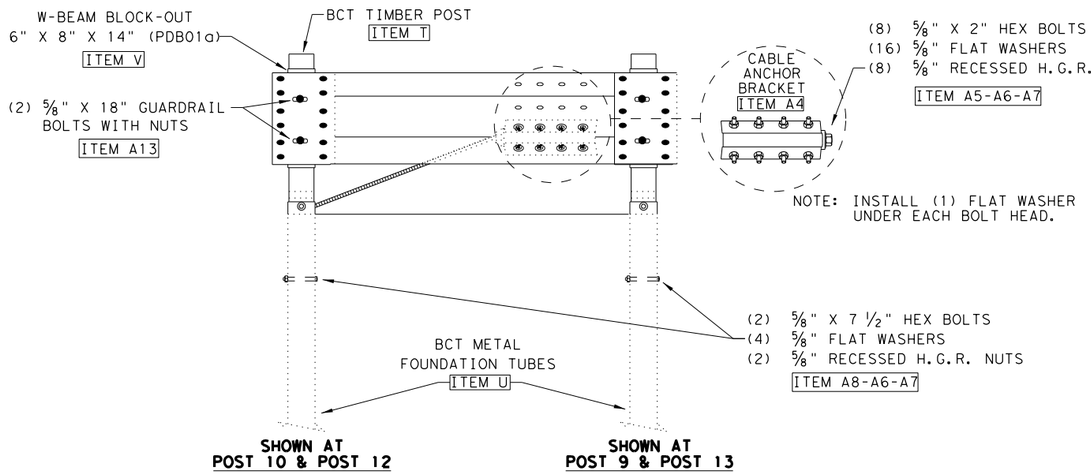
POST PLACEMENT DETAILS

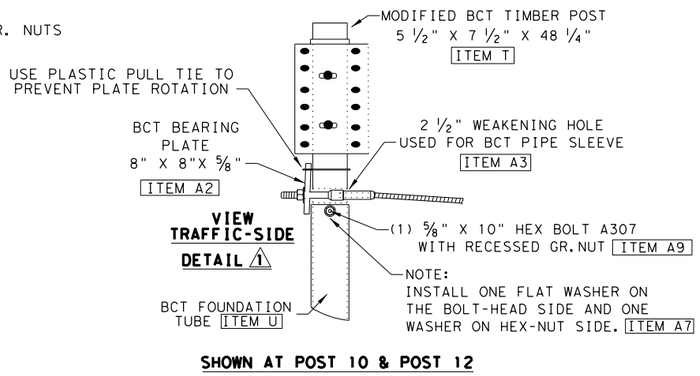


NOTE: TO ACCOMMODATE THE THRIE-BEAM TERMINAL CONNECTOR AT THE ROADWAY BRIDGE RAIL. DRILL (5) 1" DIA. HOLES. USE CONNECTOR PLATE FOR HOLE LOCATION TEMPLATE.

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

PRIMARY ROADWAY BRIDGE-RAIL DETAIL





SHOWN AT POST 10 & POST 12

BCT TIMBER POST WITH METAL FOUNDATION TUBE

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

Texas Department of Transportation | Design Division Standard

TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

FILE: srgt1221	TxDOT	CK:KM	DN:VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		115

14-XXX-0-XXXX-XX-XXX

4" minimum

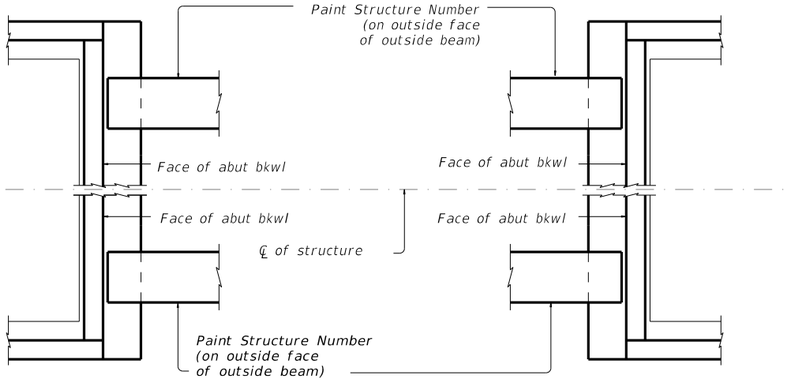
District designation | County designation | Placeholder | Control | Section | Structure number

PAINTED STRUCTURE NUMBER LEGEND

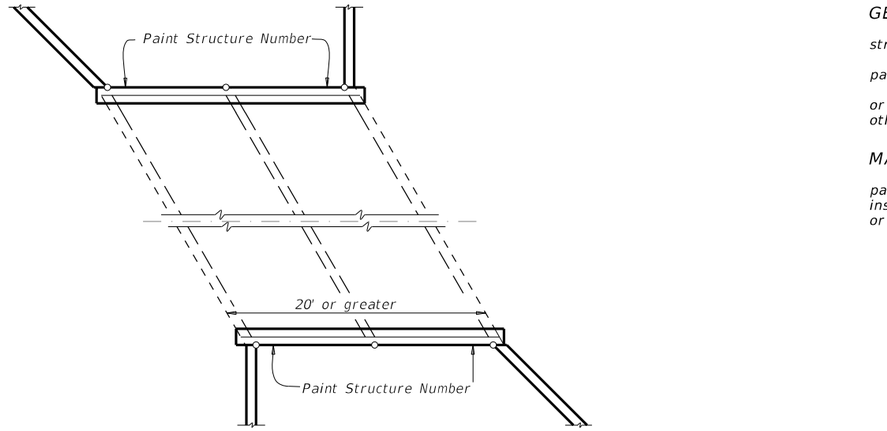
14-XXX-0-XXXX-XX-XXX

- District designation
  14 = Austin District
- County designation
- Placeholder required for national inventory purposes
- Control
- Section
- Structure number

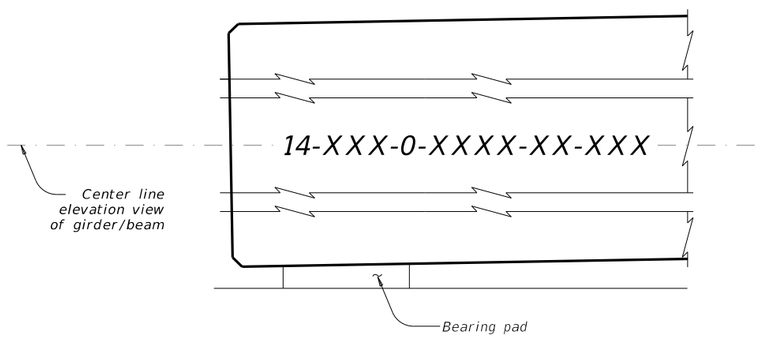
011 = Bastrop
016 = Blanco
027 = Burnet
028 = Caldwell
087 = Gillespie
106 = Hays
144 = Lee
150 = Llano
157 = Mason
227 = Travis
246 = Williamson



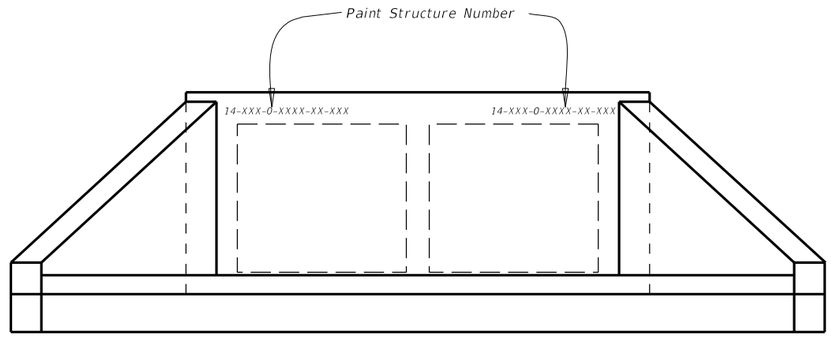
AT BRIDGE LOCATIONS



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
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		215A

DATE: 1/30/2023 2:02:38 PM
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DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020634 - Design\Plan Set\Standard Plans\Roadway\SRG(TL-2)-21.dgn

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

SPECIAL APPLICATION NOTES.

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

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

3. NOTE FOR INSTALLER: THE TWO (2) CRT POSTS ITEM (R), AT POST LOCATIONS 7 & 8.), WILL REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A 3/4" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-7/8" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

   OPTION FOR ADDITIONAL 3/4" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO 3/4" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM 3/4" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM 3/4" HOLE.

GENERAL NOTES

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

2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT POST POSITIONS.

3. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12 1/2" OR 25 FOOT NOMINAL LENGTHS.

4. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND TYPE A (1 3/4" O.D.) WASHER AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1 1/4" OR 2" LONG AT TRIPLE RAIL SPLICES WITH A DOUBLE RECESSED NUT (ASTM A563).

5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.

6. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.

7. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A SLOPE RATE OF NOT MORE THAN 1V:10H.

8. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.

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

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

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

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

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

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

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

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

* NOTE: SEE SHEET 1 OF 3.

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

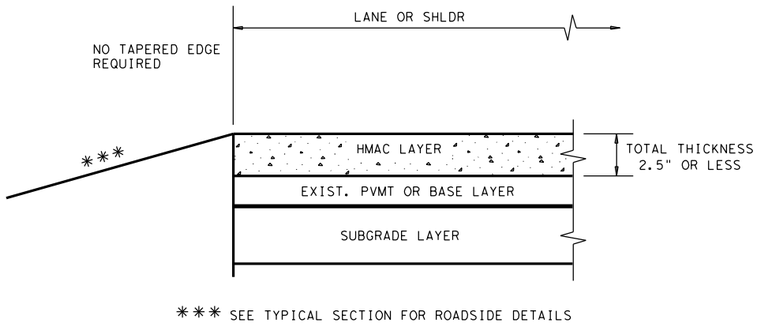
Texas Department of Transportation | Design Division Standard

TL-2
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-2)-21

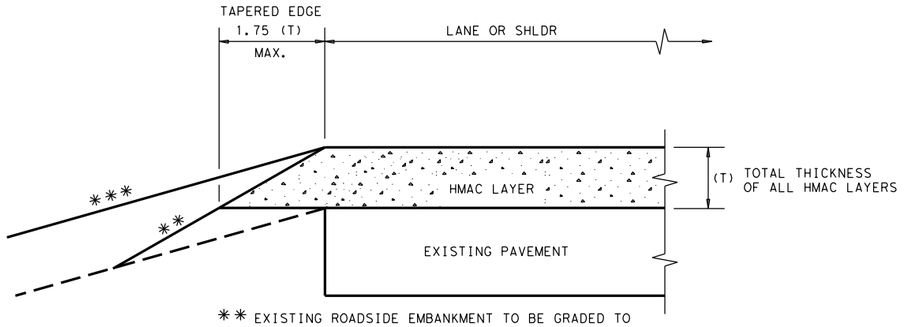
FILE: srgtl221	TxDOT	CK:KM	DN:VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		116

DATE: 1/9/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020631\4 - Design\Plan Set\Standard Plans\Roadway\TE(HMAC)-11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

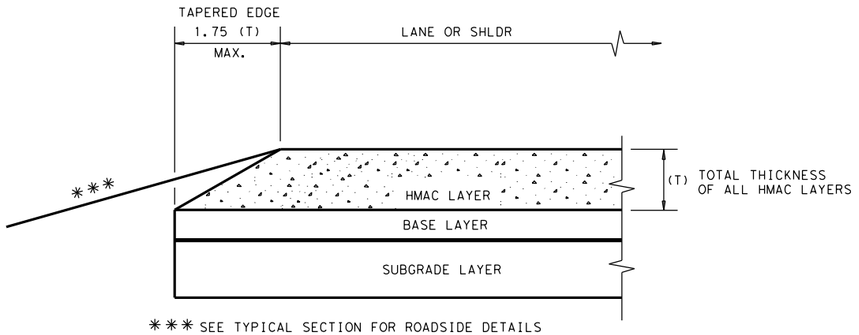
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** 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.

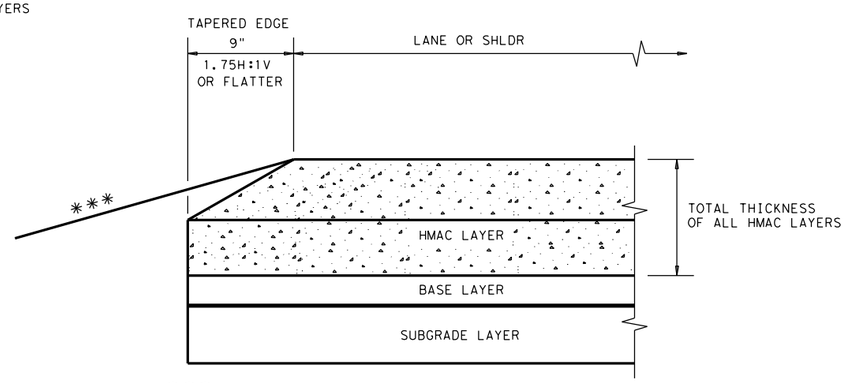
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

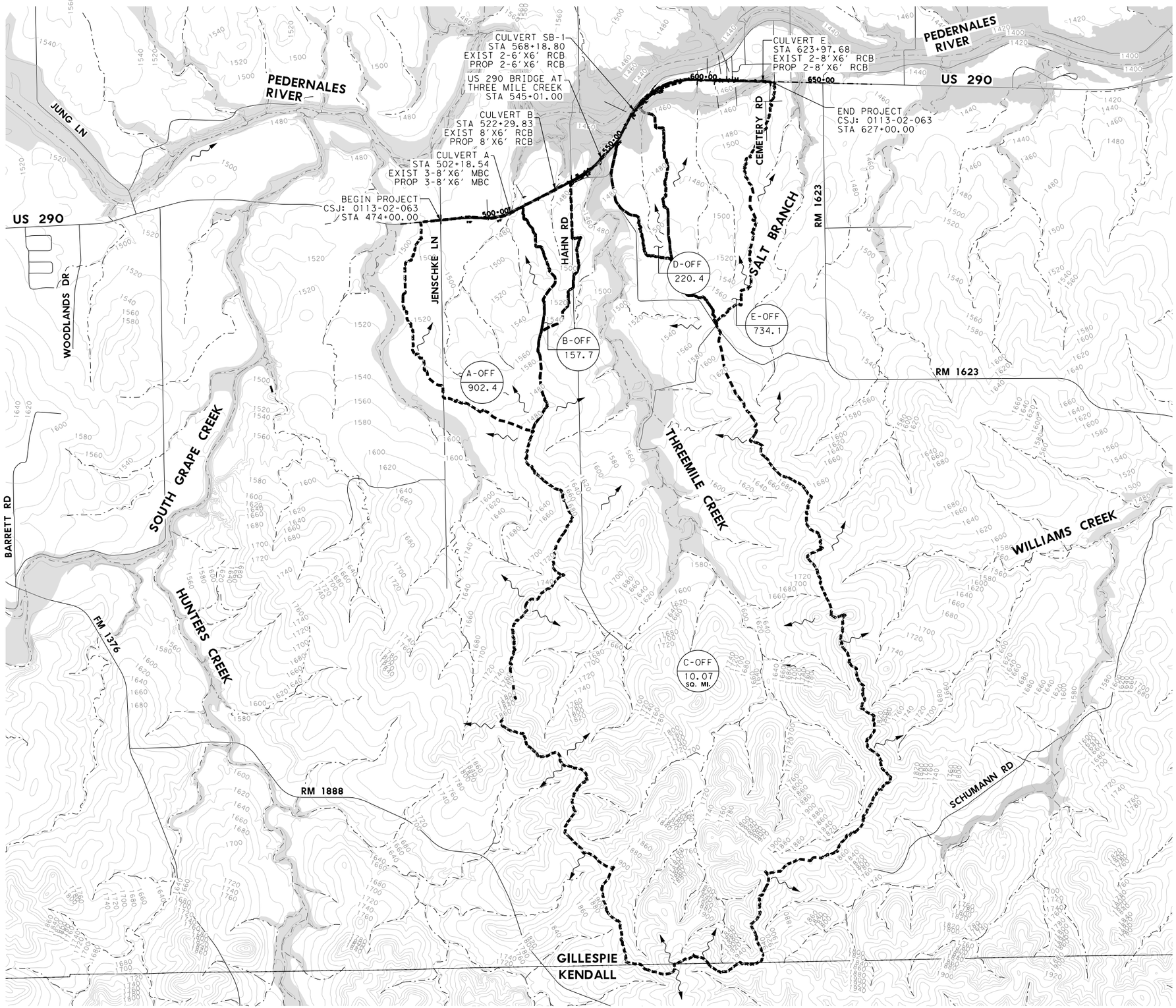
1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE 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	0113	02	063		US 290		
	DIST	COUNTY			SHEET NO.		
	AUS	GILLESPIE			117		



LEGEND

- DRAINAGE AREA BOUNDARY
- SURFACE RUNOFF DIRECTION
- 20' CONTOURS
- FEMA ZONE AE FLOODPLAIN
- FEMA ZONE A FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

1) THIS SITE LIES WITHIN A FLOOD HAZARD (ZONE A AND ZONE AE) AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP No. 48171C0477C, AND 48171C0481C GILLESPIE COUNTY, TEXAS, DATED OCT. 19, 2001.
2) RAINFALL DEPTHS WERE OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) ATLAS 14, VOLUME 11
3) RUNOFF COMPUTATIONS PERFORMED WITH HEC-HMS VERSION 4.6
4) STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING FREQUENCY STORM
5) RUNOFF VOLUME WAS COMPUTED USING THE SCS CURVE NUMBER LOSS METHOD
6) TIME OF CONCENTRATION (Tc) WAS COMPUTED USING THE NRCS MEHTHOD
7) THE LAG TIME (T_{LAG}) FOR THE SCS UNIT HYDROGRAPH WAS DEFINED AS: $T_{LAG} = 0.6 \times Tc$
8) SOURCE OF TOPOGRAPHY DATA: USGS 2015 LIDAR 1M DEM. CONTOUR INTERVAL 20 FT.
9) SEE SHEET NO. 119 "HYDROLOGIC COMPUTATIONS" FOR SUMMARY OF INPUT PARAMETERS AND FLOWS
10) THE PROJECT INFORMATION FOR COORDINATION REQUEST WAS SENT TO DWAYN BOOS, THE FLOODPLAIN ADMINISTRATOR AT GILLESPIE COUNTY ON OCTOBER 19, 2022.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER
2/14/2023

wanzhang

0 25 50 4000
SCALE: 1"=4000'

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CK*DN	6	TEXAS				US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063	118

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2/14/2023 4:05:33 PM
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US290_DR_ODAM_01.dgn

NOAA ATLAS 14 RAINFALL (INCHES)

LATITUDE: 30.2253° LONGITUDE: -98.6824°

DURATION	2-YEAR (50% AEP)	5-YEAR (20% AEP)	10-YEAR (10% AEP)	25-YEAR (4% AEP)	50-YEAR (2% AEP)	100-YEAR (1% AEP)
5-MIN	0.511	0.646	0.763	0.930	1.06	1.20
10-MIN	0.816	1.03	1.22	1.49	1.70	1.93
15-MIN	1.02	1.29	1.52	1.85	2.11	2.38
30-MIN	1.44	1.81	2.13	2.58	2.93	3.31
60-MIN	1.88	2.38	2.81	3.42	3.90	4.43
2-HR	2.34	3.00	3.59	4.45	5.16	5.94
3-HR	2.61	3.38	4.08	5.13	6.00	6.98
6-HR	3.08	4.04	4.93	6.29	7.45	8.77
12-HR	3.54	4.68	5.76	7.41	8.84	10.50
24-HR	4.02	5.34	6.62	8.57	10.30	12.20

TR-55 METHOD TIME OF CONCENTRATION CALCULATIONS

DRAINAGE AREA ID	OUTFALL ID	SHEET FLOW PARAMETERS				
		MANNING'S ROUGHNESS COEFFICIENT	FLOW LENGTH (FT)	TWO-YEAR 24-HOUR RAINFALL (IN)	LAND SLOPE (FT/FT)	TIME OF CONCENTRATION SHEET FLOW (HR)
A-OFF	CULVERT A	0.04	100.0	4.02	0.013	0.060
B-OFF	CULVERT B	0.04	100.0	4.02	0.013	0.060
C-OFF	THREE MILE CREEK BRIDGE	0.04	100.0	4.02	0.016	0.056
D-OFF	CULVERT SB-1	0.04	100.0	4.02	0.013	0.060
E-OFF	CULVERT E	0.04	100.0	4.02	0.013	0.060

DRAINAGE AREA ID	OUTFALL ID	SHALLOW CONCENTRATED FLOW PARAMETERS				
		SURFACE DESCRIPTION	FLOW LENGTH (FT)	SLOPE (FT/FT)	AVERAGE VELOCITY (FT/S)	TIME OF CONCENTRATION SHALLOW CONCENTRATED
A-OFF	CULVERT A	UNPAVED	2206.0	0.030	2.80	0.22
B-OFF	CULVERT B	UNPAVED	3128.0	0.018	2.19	0.40
C-OFF	THREE MILE CREEK BRIDGE	UNPAVED	2662.0	0.056	3.83	0.19
D-OFF	CULVERT SB-1	UNPAVED	2540.0	0.014	1.89	0.37
E-OFF	CULVERT E	UNPAVED	2244.0	0.019	2.24	0.28

DRAINAGE AREA ID	OUTFALL ID	CHANNEL FLOW PARAMETERS				
		CHANNEL SLOPE (FT/FT)	MANNING'S ROUGHNESS COEFFICIENT	AVERAGE VELOCITY (FT/S)	FLOW LENGTH (FT)	TIME OF CONCENTRATION CHANNEL FLOW (HR)
A-OFF	CULVERT A	0.0083	0.04	4.55	11006.0	0.67
B-OFF	CULVERT B	0.0077	0.04	4.38	3355.0	0.21
C-OFF	THREE MILE CREEK BRIDGE	0.0090	0.04	4.74	43778.0	2.57
D-OFF	CULVERT SB-1	0.0085	0.04	4.60	4660.0	0.28
E-OFF	CULVERT E	0.0070	0.04	4.18	11209.0	0.75

NRCS METHOD CALCULATIONS

DRAINAGE AREA ID	OUTFALL ID	AREA (AC)	CN	LAG TIME (MIN)	FLOW (CFS)					
					2-YEAR (50% AEP)	5-YEAR (20% AEP)	10-YEAR (10% AEP)	25-YEAR (4% AEP)	50-YEAR (2% AEP)	100-YEAR (1% AEP)
A-OFF	CULVERT A	902.4	56.8	34	242.5	563.8	928.3	1525.1	2054.0	2643.2
B-OFF	CULVERT B	157.7	53.1	24	32.3	89.8	160.1	278.9	386.6	506.9
C-OFF	THREE MILE CREEK BRIDGE	6443.5	58.9	101	1066.8	2254.0	3599.0	5848.8	7896.6	10218.8
D-OFF	CULVERT SB-1	220.4	57.1	26	71.0	165.4	270.8	442.1	592.9	759.8
E-OFF	CULVERT E	734.1	57.4	39	194.0	439.5	716.1	1168.0	1568.4	2013.9

NOTES:

1) RUNOFF COMPUTATIONS PERFORMED WITH HEC-HMS VERSION 4.6
2) RAINFALL DEPTHS WERE OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) ATLAS 14, VOLUME 11
3) STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING FREQUENCY STORM
4) RUNOFF VOLUME WAS COMPUTED USING THE SCS CURVE NUMBER LOSS METHOD
5) CLIMATIC ADJUSTMENT WAS APPLIED TO CALCULATED CURVE NUMBERS BASED ON TXDOT HYDRAULIC DESIGN MANUAL CHAPTER 4, SECTION 13
6) TIME OF CONCENTRATION (Tc) WAS COMPUTED USING THE NRCS MEHTHOD
7) THE LAG TIME (T_{LAG}) FOR THE SCS UNIT HYDROGRAPH WAS DEFINED AS: $T_{LAG} = 0.6 \times Tc$

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER
2/14/2023

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

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US 290

HYDROLOGIC COMPUTATIONS

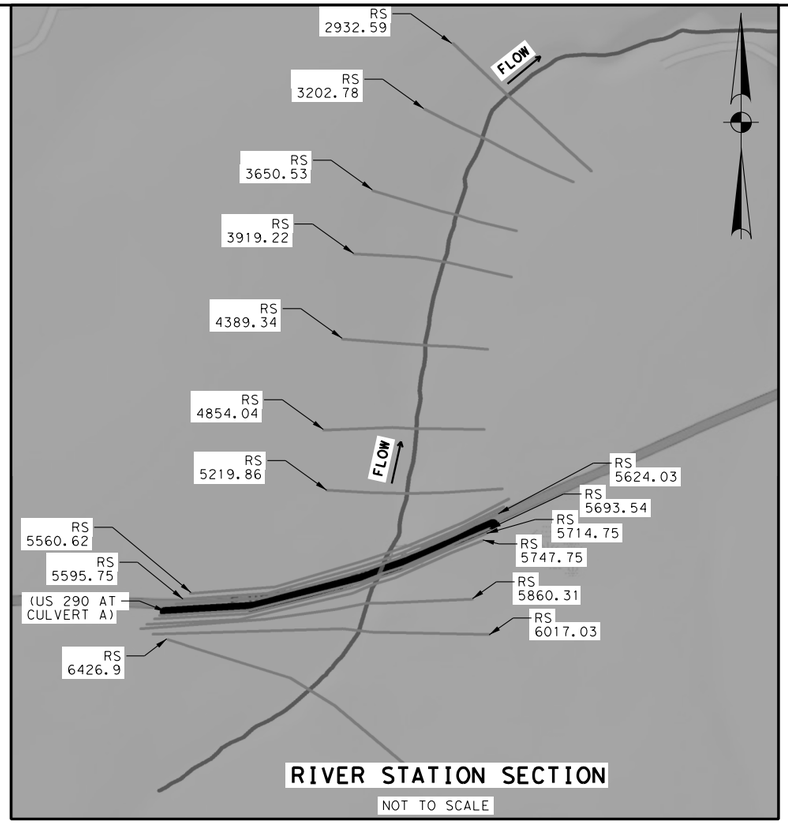
SHEET 1 OF 1

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CH*DN	6	TEXAS					US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063		119

HYDRAULIC MODEL RESULTS

HEC-RAS RESULTS FOR CULVERT CROSSING A

HEC-RAS STATION	PROFILE	PLAN	Q TOTAL (CFS)	MIN CH EL (FT)	W.S. ELEV (FT)	W.S DIFF (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
6426.90	25_Yr	Exist	1525.10	1476.36	1479.83	---	---	1479.98	0.00337	4.71	891.29	680.09	0.46
6426.90	25_Yr	Prop	1525.10	1476.36	1479.83	0.00	---	1479.98	0.00337	4.71	891.29	680.09	0.46
6426.90	100_Yr	Exist	2643.20	1476.36	1481.55	---	---	1481.59	0.00072	2.90	2312.43	990.86	0.23
6426.90	100_Yr	Prop	2643.20	1476.36	1482.16	0.61	---	1482.18	0.00037	2.24	2961.15	1164.32	0.17
6017.03	25_Yr	Exist	1525.10	1475.93	1479.16	---	---	1479.20	0.00118	2.76	1515.11	719.62	0.27
6017.03	25_Yr	Prop	1525.10	1475.93	1479.16	0.00	---	1479.20	0.00118	2.76	1515.11	719.62	0.27
6017.03	100_Yr	Exist	2643.20	1475.93	1481.39	---	---	1481.40	0.00032	2.04	3442.78	1000.19	0.15
6017.03	100_Yr	Prop	2643.20	1475.93	1482.07	0.68	---	1482.08	0.00018	1.68	4149.68	1072.09	0.12
5860.31	25_Yr	Exist	1525.10	1472.51	1479.04	---	---	1479.09	0.00043	2.51	1706.43	676.81	0.18
5860.31	25_Yr	Prop	1525.10	1472.51	1479.04	0.00	---	1479.09	0.00043	2.51	1706.43	676.81	0.18
5860.31	100_Yr	Exist	2643.20	1472.51	1481.33	---	---	1481.36	0.00022	2.24	3554.93	973.83	0.14
5860.31	100_Yr	Prop	2643.20	1472.51	1482.04	0.71	---	1482.06	0.00014	1.86	4304.44	1100.89	0.11
5747.75	25_Yr	Exist	1525.10	1470.81	1478.88	---	1474.31	1479.02	0.00049	3.11	624.69	719.90	0.20
5747.75	25_Yr	Prop	1525.10	1470.81	1478.88	0.00	1474.31	1479.02	0.00049	3.11	624.69	719.90	0.20
5747.75	100_Yr	Exist	2643.20	1470.81	1481.32	---	1475.53	1481.34	0.00013	1.90	4325.00	1083.42	0.11
5747.75	100_Yr	Prop	2643.20	1470.81	1482.02	0.70	1475.53	1482.04	0.00009	1.66	5191.59	1353.03	0.09
5714.75	25_Yr	Exist	1525.10	1470.76	1475.76	---	1475.76	1478.27	0.00363	12.70	120.07	24.00	1.00
5714.75	25_Yr	Prop	1525.10	1470.76	1475.76	0.00	1475.76	1478.27	0.00363	12.70	120.07	24.00	1.00
5714.75	100_Yr	Exist	2643.20	1470.76	1481.28	---	1479.61	1481.33	0.00026	3.13	2237.11	1099.30	0.10
5714.75	100_Yr	Prop	2643.20	1470.76	1482.01	0.73	1479.61	1482.04	0.00011	2.22	3148.92	1292.26	0.06
5693.54	25_Yr	Exist	1525.10	1470.20	1475.20	---	1475.20	1477.71	0.00363	12.70	120.07	24.00	1.00
5693.54	25_Yr	Prop	1525.10	1470.20	1475.20	0.00	1475.20	1477.71	0.00363	12.70	120.07	24.00	1.00
5693.54	100_Yr	Exist	2643.20	1470.20	1480.76	---	1480.76	1481.20	0.00199	7.44	1031.03	979.02	0.29
5693.54	100_Yr	Prop	2643.20	1470.20	1481.45	0.69	1481.45	1481.90	0.00200	7.93	975.99	730.81	0.28
5624.03	25_Yr	Exist	1525.10	1469.70	1474.71	---	1474.71	1477.21	0.00361	12.68	120.25	24.00	1.00
5624.03	25_Yr	Prop	1525.10	1469.70	1474.71	0.00	1474.71	1477.21	0.00361	12.68	120.25	24.00	1.00
5624.03	100_Yr	Exist	2643.20	1469.70	1479.53	---	1479.53	1480.04	0.00231	7.89	850.22	705.60	0.32
5624.03	100_Yr	Prop	2643.20	1469.70	1480.95	1.42	1480.95	1481.50	0.00225	8.41	841.45	660.26	0.31
5595.75	25_Yr	Exist	1525.10	1469.32	1474.32	---	1474.32	1476.83	0.00363	12.70	120.07	24.00	1.00
5595.75	25_Yr	Prop	1525.10	1469.32	1474.32	0.00	1474.32	1476.83	0.00363	12.70	120.07	24.00	1.00
5595.75	100_Yr	Exist	2643.20	1469.32	1477.80	---	1477.80	1478.42	0.00224	8.21	776.64	543.73	0.38
5595.75	100_Yr	Prop	2643.20	1469.32	1477.80	0.00	1477.80	1478.42	0.00224	8.21	776.64	543.73	0.38
5560.62	25_Yr	Exist	1525.10	1469.68	1474.94	---	1473.21	1475.31	0.00264	4.91	324.64	351.77	0.42
5560.62	25_Yr	Prop	1525.10	1469.68	1474.94	0.00	1473.21	1475.31	0.00264	4.91	324.64	351.77	0.42
5560.62	100_Yr	Exist	2643.20	1469.68	1475.77	---	1474.38	1476.48	0.00413	6.93	399.46	480.58	0.55
5560.62	100_Yr	Prop	2643.20	1469.68	1475.77	0.00	1474.38	1476.48	0.00413	6.93	399.46	480.58	0.55
5219.86	25_Yr	Exist	1525.10	1469.21	1473.86	---	---	1474.15	0.00411	5.99	569.75	408.31	0.53
5219.86	25_Yr	Prop	1525.10	1469.21	1473.86	0.00	---	1474.15	0.00411	5.99	569.75	408.31	0.53
5219.86	100_Yr	Exist	2643.20	1469.21	1474.54	---	---	1474.85	0.00413	6.66	866.46	469.61	0.54
5219.86	100_Yr	Prop	2643.20	1469.21	1474.54	0.00	---	1474.85	0.00413	6.66	866.46	469.61	0.54
4854.04	25_Yr	Exist	1525.10	1467.61	1472.29	---	---	1472.61	0.00435	6.22	604.12	413.20	0.54
4854.04	25_Yr	Prop	1525.10	1467.61	1472.29	0.00	---	1472.61	0.00435	6.22	604.12	413.20	0.54
4854.04	100_Yr	Exist	2643.20	1467.61	1473.15	---	---	1473.43	0.00362	6.45	1004.64	522.12	0.51
4854.04	100_Yr	Prop	2643.20	1467.61	1473.15	0.00	---	1473.43	0.00362	6.45	1004.64	522.12	0.51
4389.34	25_Yr	Exist	1525.10	1465.57	1469.61	---	1468.93	1470.18	0.00626	7.08	451.36	269.55	0.65
4389.34	25_Yr	Prop	1525.10	1465.57	1469.61	0.00	1468.93	1470.18	0.00626	7.08	451.36	269.55	0.65
4389.34	100_Yr	Exist	2643.20	1465.57	1470.56	---	1470.15	1471.22	0.00623	8.21	745.08	347.43	0.67
4389.34	100_Yr	Prop	2643.20	1465.57	1470.56	0.00	1470.15	1471.22	0.00623	8.21	745.08	347.43	0.67
3919.22	25_Yr	Exist	1525.10	1461.33	1464.99	---	1464.99	1465.90	0.01423	9.11	216.40	118.74	0.93
3919.22	25_Yr	Prop	1525.10	1461.33	1464.99	0.00	1464.99	1465.90	0.01423	9.11	216.40	118.74	0.93
3919.22	100_Yr	Exist	2643.20	1461.33	1465.86	---	1465.86	1467.03	0.01343	10.52	329.63	141.15	0.95
3919.22	100_Yr	Prop	2643.20	1461.33	1465.86	0.00	1465.86	1467.03	0.01343	10.52	329.63	141.15	0.95
3650.53	25_Yr	Exist	1525.10	1460.64	1463.85	---	---	1464.05	0.00328	4.31	439.00	217.81	0.45
3650.53	25_Yr	Prop	1525.10	1460.64	1463.85	0.00	---	1464.05	0.00328	4.31	439.00	217.81	0.45
3650.53	100_Yr	Exist	2643.20	1460.64	1464.94	---	---	1465.18	0.00265	4.80	693.42	251.97	0.42
3650.53	100_Yr	Prop	2643.20	1460.64	1464.94	0.00	---	1465.18	0.00265	4.80	693.42	251.97	0.42
3202.78	25_Yr	Exist	1525.10	1456.61	1461.53	---	1460.87	1462.14	0.00549	6.90	269.52	109.42	0.61
3202.78	25_Yr	Prop	1525.10	1456.61	1461.53	0.00	1460.87	1462.14	0.00549	6.90	269.52	109.42	0.61
3202.78	100_Yr	Exist	2643.20	1456.61	1462.78	---	1461.94	1463.53	0.00502	7.91	419.23	129.94	0.61
3202.78	100_Yr	Prop	2643.20	1456.61	1462.78	0.00	1461.94	1463.53	0.00502	7.91	419.23	129.94	0.61
2932.59	25_Yr	Exist	1525.10	1455.54	1459.71	---	1459.16	1460.44	0.00719	7.25	264.63	109.26	0.68
2932.59	25_Yr	Prop	1525.10	1455.54	1459.71	0.00	1459.16	1460.44	0.00719	7.25	264.63	109.26	0.68
2932.59	100_Yr	Exist	2643.20	1455.54	1460.88	---	1460.21	1461.89	0.00718	8.78	401.50	126.31	0.72
2932.59	100_Yr	Prop	2643.20	1455.54	1460.88	0.00	1460.21	1461.89	0.00718	8.78	401.50	126.31	0.72



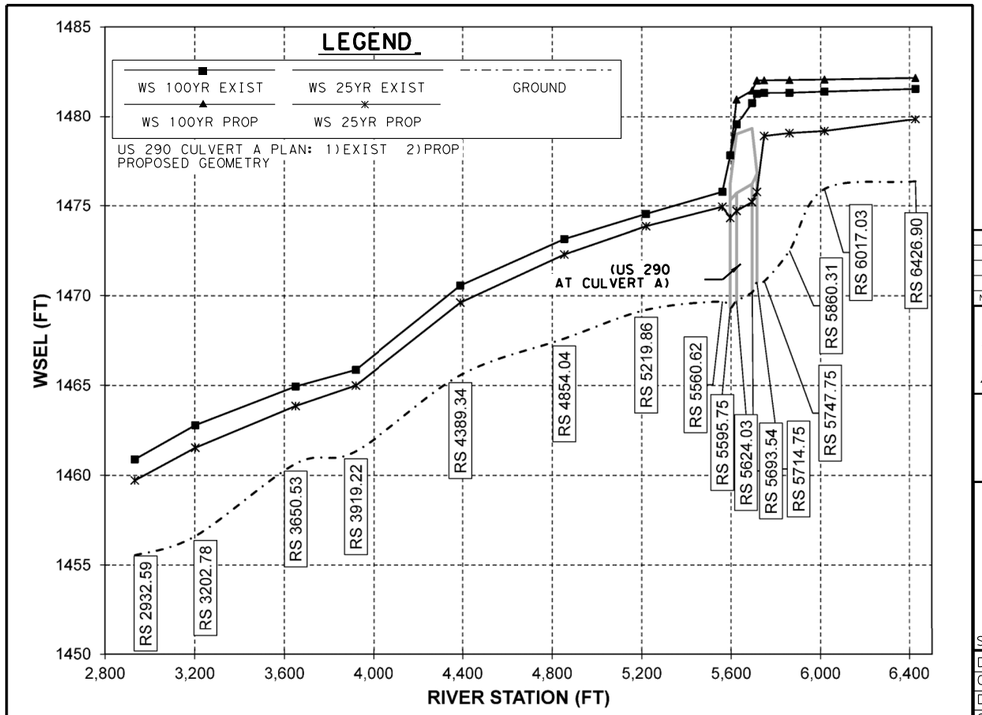
RIVER STATION SECTION

NOT TO SCALE

NOTES:

1. THIS SITE IS SHOWN ON FEMA FLOOD INSURANCE RATE MAP FOR GILLESPIE COUNTY, TX, PANEL NO. 48171C0477C WITH THE EFFECTIVE DATE 10/19/2001, AND DOES NOT LIE WITHIN A REGULATORY FLOODPLAIN
2. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE EXISTING AND PROPOSED HYDRAULIC MODELS.
3. TO CAPTURE THE CHANGE OF SLOPE WITHIN THE CULVERT, LID CROSS SECTIONS WERE USED TO MODEL THE EXISTING AND PROPOSED US 290 CULVERT AT CROSSING A
4. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.00718 FT/FT.
5. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT A	
Q25 = 1525.1 CFS	Q100 = 2643.2 CFS
V25 = 12.70 FT/S	V100 = 7.93 FT/S
HW25 = 1475.20'	HW100 = 1481.45'



2/14/2023

wan zhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

HYDRAULIC DATA SHEET US 290 AT CULVERT A

STA 502+18.54

SHEET 1 OF 2

DN:	DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CH*DN	6	TEXAS				US 290
DW:	DW	STATE DIST.	COUNTY	CONTROL	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CK*DW	AUS	GILLESPIE	0113	02	063	120

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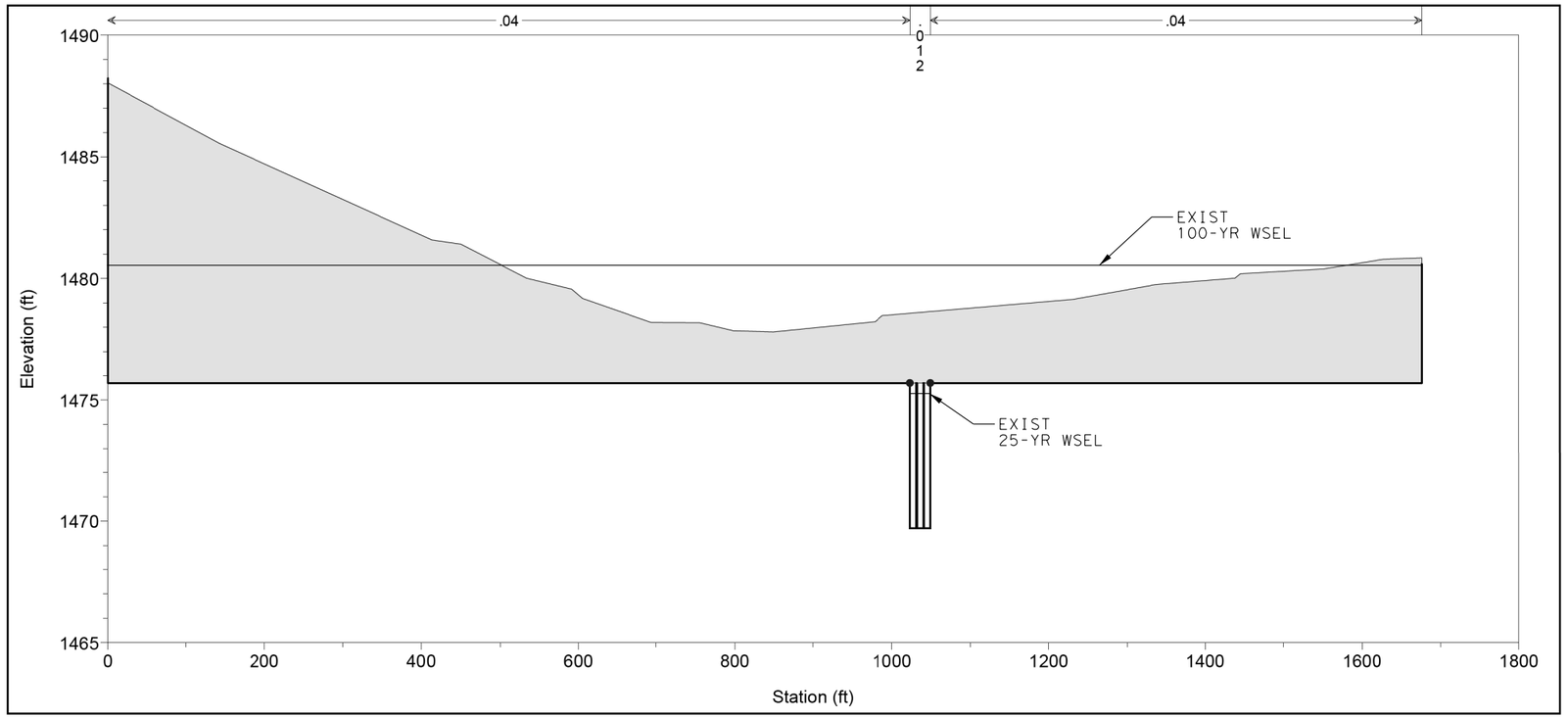
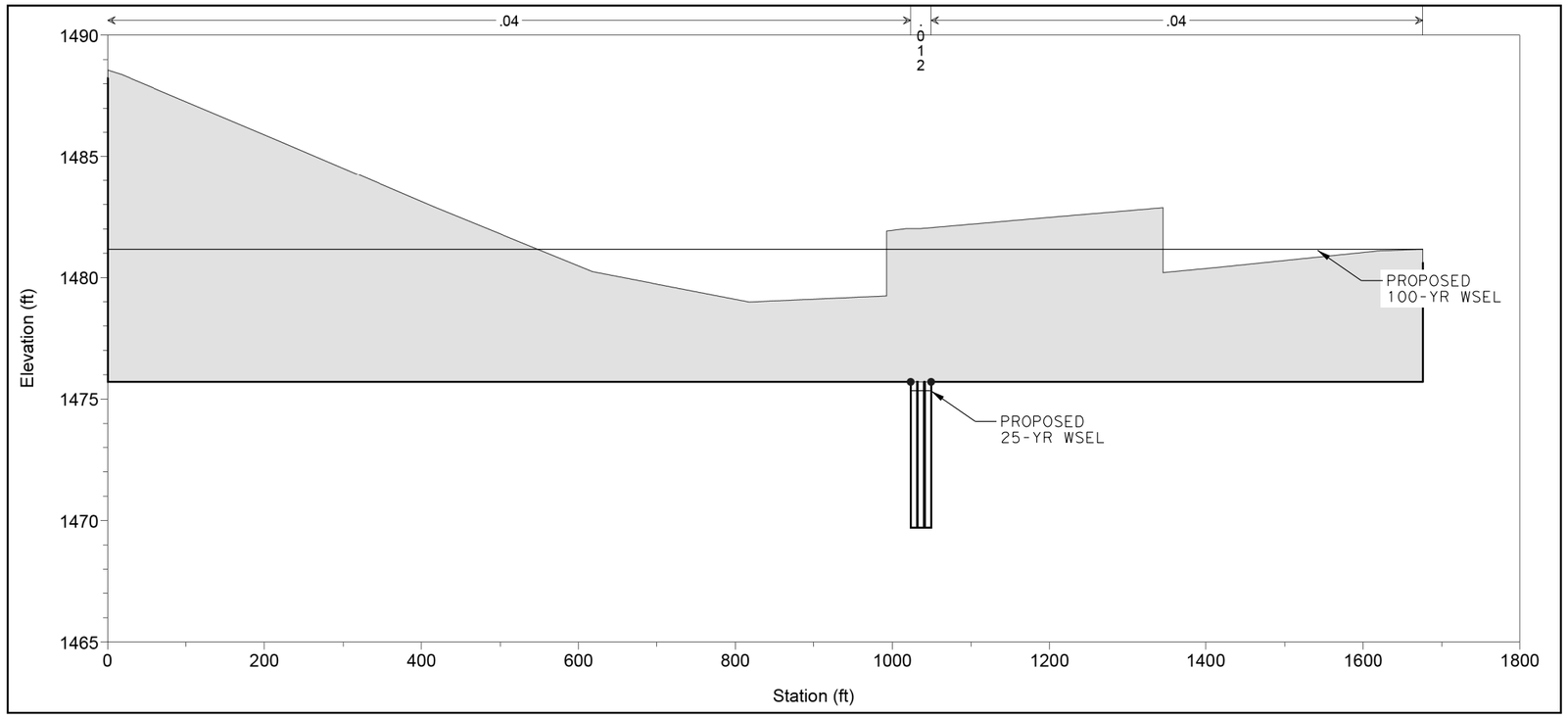


EXISTING CULVERT A AT US 290



PROPOSED CULVERT A AT US 290

NOTES:

1. THIS SITE IS SHOWN ON FEMA FLOOD INSURANCE RATE MAP FOR GILLESPIE COUNTY, TX, PANEL NO. 48171C0477C WITH THE EFFECTIVE DATE 10/19/2001, AND DOES NOT LIE WITHIN A REGULATORY FLOODPLAIN
2. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE EXISTING AND PROPOSED HYDRAULIC MODELS.
3. TO CAPTURE THE CHANGE OF SLOPE WITHIN THE CULVERT, LID CROSS SECTIONS WERE USED TO MODEL THE EXISTING AND PROPOSED US 290 CULVERT AT CROSSING A
4. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.00718 FT/FT.
5. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT A	
Q25 = 1525.1 CFS	Q100 = 2643.2 CFS
V25 = 12.70 FT/S	V100 = 7.93 FT/S
HW25 = 1475.20'	HW100 = 1481.45'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

wan zhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

HYDRAULIC DATA SHEET US 290 AT CULVERT A

STA 502+18.54

SHEET 2 OF 2

DN: DN	FED. RD. DIV. NO. 6	STATE TEXAS	PROJECT NO.			HIGHWAY NO. US 290
CK DN: CH*DN						
DW: DW	STATE DIST. AUS	COUNTY GILLESPIE	CONTROL NO. 0113	SECTION NO. 02	JOB NO. 063	SHEET NO. 121
CK DW: CK*DW						

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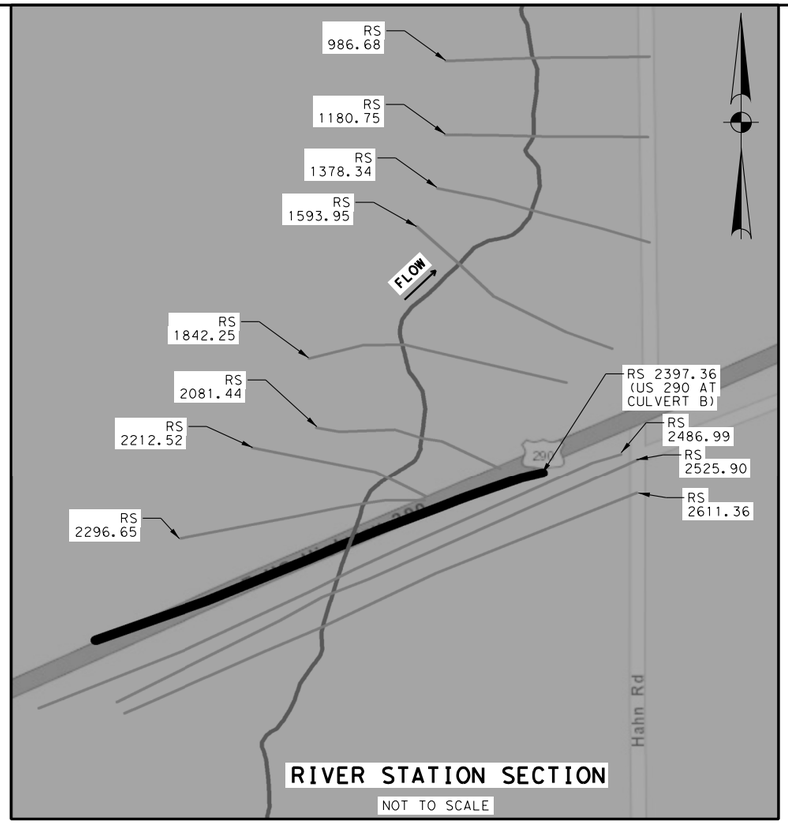
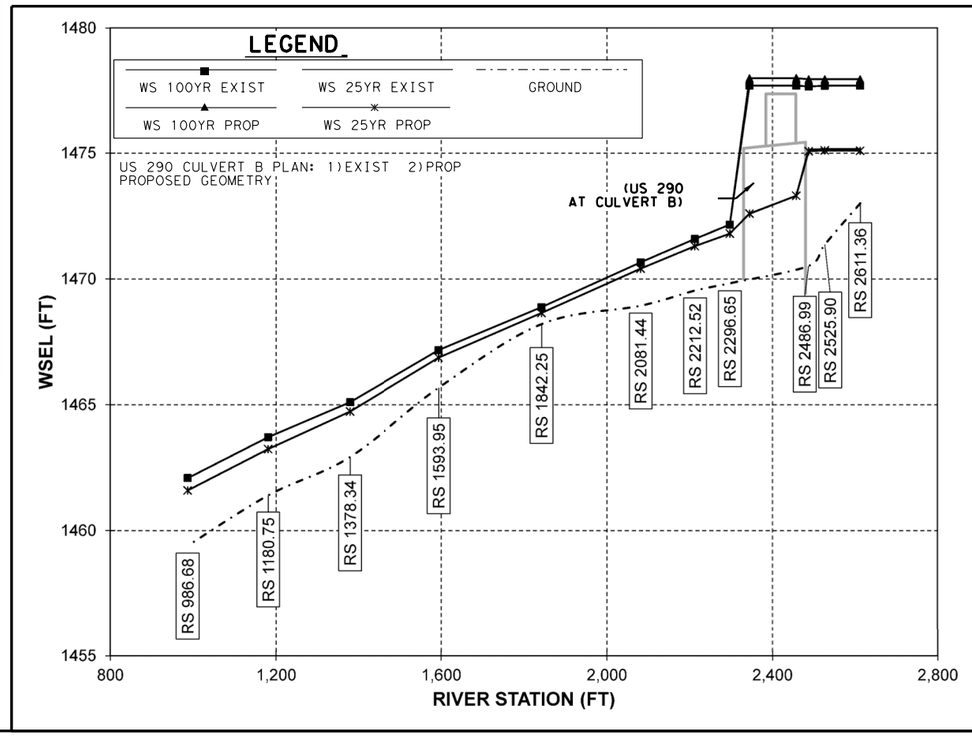
HYDRAULIC MODEL RESULTS

HEC-RAS RESULTS FOR CULVERT CROSSING B													
HEC-RAS STATION	PROFILE	PLAN	Q TOTAL (CFS)	MIN CH EL (FT)	W.S. ELEV (FT)	W.S DIFF (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
2611.36	25_Yr	Exist	278.90	1473.00	1475.15	---	---	1475.17	0.00073	1.44	359.29	589.06	0.19
2611.36	25_Yr	Prop	278.90	1473.00	1475.09	-0.06	---	1475.11	0.00091	1.57	323.50	552.44	0.21
2611.36	100_Yr	Exist	506.90	1473.00	1477.71	---	---	1477.71	0.00001	0.34	2504.51	982.98	0.03
2611.36	100_Yr	Prop	506.90	1473.00	1477.96	0.25	---	1477.96	0.00001	0.30	2760.07	1050.74	0.03
2525.90	25_Yr	Exist	278.90	1471.37	1475.16	---	---	1475.16	0.00002	0.37	1444.94	779.39	0.04
2525.90	25_Yr	Prop	278.90	1471.37	1475.10	-0.06	---	1475.10	0.00002	0.38	1398.95	754.73	0.04
2525.90	100_Yr	Exist	506.90	1471.37	1477.70	---	---	1477.71	0.00000	0.25	3983.69	1182.05	0.02
2525.90	100_Yr	Prop	506.90	1471.37	1477.96	0.26	---	1477.96	0.00000	0.23	4289.32	1208.19	0.02
2486.99	25_Yr	Exist	278.90	1470.52	1475.13	---	1472.12	1475.15	0.00018	1.20	239.37	879.81	0.11
2486.99	25_Yr	Prop	278.90	1470.52	1475.07	-0.06	1472.12	1475.09	0.00019	1.22	235.44	875.00	0.11
2486.99	100_Yr	Exist	506.90	1470.52	1477.67	---	1472.65	1477.70	0.00010	1.30	403.71	1131.92	0.09
2486.99	100_Yr	Prop	506.90	1470.52	1477.96	0.29	1472.65	1477.96	0.00000	0.20	4823.28	1154.61	0.01
2397.36	US 290 AT CULVERT B - (8'x6' SBC)												
2296.65	25_Yr	Exist	278.90	1469.83	1471.80	---	1471.46	1472.13	0.00884	4.77	60.81	105.25	0.67
2296.65	25_Yr	Prop	278.90	1469.83	1471.80	0.00	1471.46	1472.13	0.00884	4.77	60.81	105.25	0.67
2296.65	100_Yr	Exist	506.90	1469.83	1472.15	---	1472.01	1472.87	0.01440	6.96	75.35	158.06	0.88
2296.65	100_Yr	Prop	506.90	1469.83	1472.15	0.00	1472.01	1472.87	0.01440	6.96	75.35	158.06	0.88
2212.52	25_Yr	Exist	278.90	1469.54	1471.30	---	---	1471.45	0.00583	3.32	104.15	179.86	0.52
2212.52	25_Yr	Prop	278.90	1469.54	1471.30	0.00	---	1471.45	0.00583	3.32	104.15	179.86	0.52
2212.52	100_Yr	Exist	506.90	1469.54	1471.59	---	---	1471.80	0.00694	4.16	158.31	196.09	0.59
2212.52	100_Yr	Prop	506.90	1469.54	1471.59	0.00	---	1471.80	0.00694	4.16	158.31	196.09	0.59
2081.44	25_Yr	Exist	278.90	1468.94	1470.41	---	1470.33	1470.56	0.00784	3.49	116.02	281.03	0.59
2081.44	25_Yr	Prop	278.90	1468.94	1470.41	0.00	1470.33	1470.56	0.00784	3.49	116.02	281.03	0.59
2081.44	100_Yr	Exist	506.90	1468.94	1470.66	---	---	1470.81	0.00768	3.95	187.16	299.52	0.60
2081.44	100_Yr	Prop	506.90	1468.94	1470.66	0.00	---	1470.81	0.00768	3.95	187.16	299.52	0.60
1842.25	25_Yr	Exist	278.90	1468.21	1468.65	---	---	1468.71	0.00760	1.33	134.20	270.22	0.46
1842.25	25_Yr	Prop	278.90	1468.21	1468.65	0.00	---	1468.71	0.00760	1.33	134.20	270.22	0.46
1842.25	100_Yr	Exist	506.90	1468.21	1468.88	---	---	1468.97	0.00782	1.89	204.74	341.36	0.50
1842.25	100_Yr	Prop	506.90	1468.21	1468.88	0.00	---	1468.97	0.00782	1.89	204.74	341.36	0.50
1593.95	25_Yr	Exist	278.90	1465.68	1466.87	---	---	1466.96	0.00790	2.99	119.50	213.35	0.57
1593.95	25_Yr	Prop	278.90	1465.68	1466.87	0.00	---	1466.96	0.00790	2.99	119.50	213.35	0.57
1593.95	100_Yr	Exist	506.90	1465.68	1467.17	---	---	1467.28	0.00708	3.45	191.85	259.41	0.56
1593.95	100_Yr	Prop	506.90	1465.68	1467.17	0.00	---	1467.28	0.00708	3.45	191.85	259.41	0.56
1378.34	25_Yr	Exist	278.90	1462.93	1464.73	---	1464.60	1465.01	0.00955	4.66	78.78	126.50	0.68
1378.34	25_Yr	Prop	278.90	1462.93	1464.73	0.00	1464.60	1465.01	0.00955	4.66	78.78	126.50	0.68
1378.34	100_Yr	Exist	506.90	1462.93	1465.10	---	1465.06	1465.44	0.01002	5.55	134.89	182.87	0.72
1378.34	100_Yr	Prop	506.90	1462.93	1465.10	0.00	1465.06	1465.44	0.01002	5.55	134.89	182.87	0.72
1180.75	25_Yr	Exist	278.90	1461.40	1463.24	---	---	1463.44	0.00683	4.07	88.28	105.56	0.58
1180.75	25_Yr	Prop	278.90	1461.40	1463.24	0.00	---	1463.44	0.00683	4.07	88.28	105.56	0.58
1180.75	100_Yr	Exist	506.90	1461.40	1463.71	---	---	1463.95	0.00614	4.62	151.08	148.13	0.58
1180.75	100_Yr	Prop	506.90	1461.40	1463.71	0.00	---	1463.95	0.00614	4.62	151.08	148.13	0.58
986.68	25_Yr	Exist	278.90	1459.40	1461.60	---	1461.42	1461.91	0.00908	4.77	69.89	77.62	0.67
986.68	25_Yr	Prop	278.90	1459.40	1461.60	0.00	1461.42	1461.91	0.00908	4.77	69.89	77.62	0.67
986.68	100_Yr	Exist	506.90	1459.40	1462.09	---	1461.90	1462.49	0.00909	5.72	112.87	99.74	0.70
986.68	100_Yr	Prop	506.90	1459.40	1462.09	0.00	1461.90	1462.49	0.00909	5.72	112.87	99.74	0.70



RIVER STATION SECTION

NOT TO SCALE



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3. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.00908 FT/FT.
4. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT B	
Q25 = 278.9 CFS	Q100 = 506.9 CFS
V25 = 1.22 FT/S	V100 = 0.20 FT/S
HW25 = 1475.07'	HW100 = 1477.96'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER

2/14/2023

wanzhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

HYDRAULIC DATA SHEET
US 290 AT CULVERT B
STA 522+29.83

SHEET 1 OF 2

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CK*DN	6	TEXAS				US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063	122

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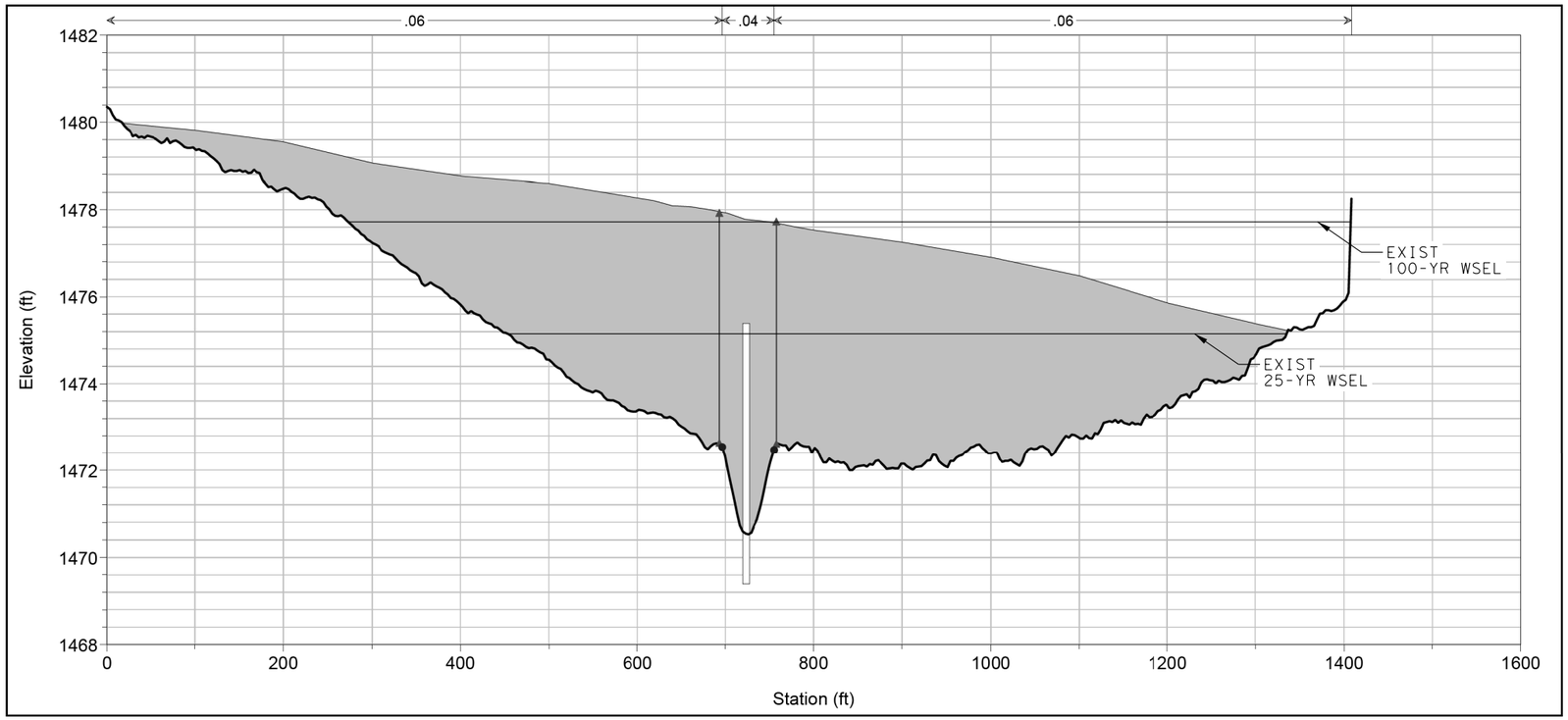
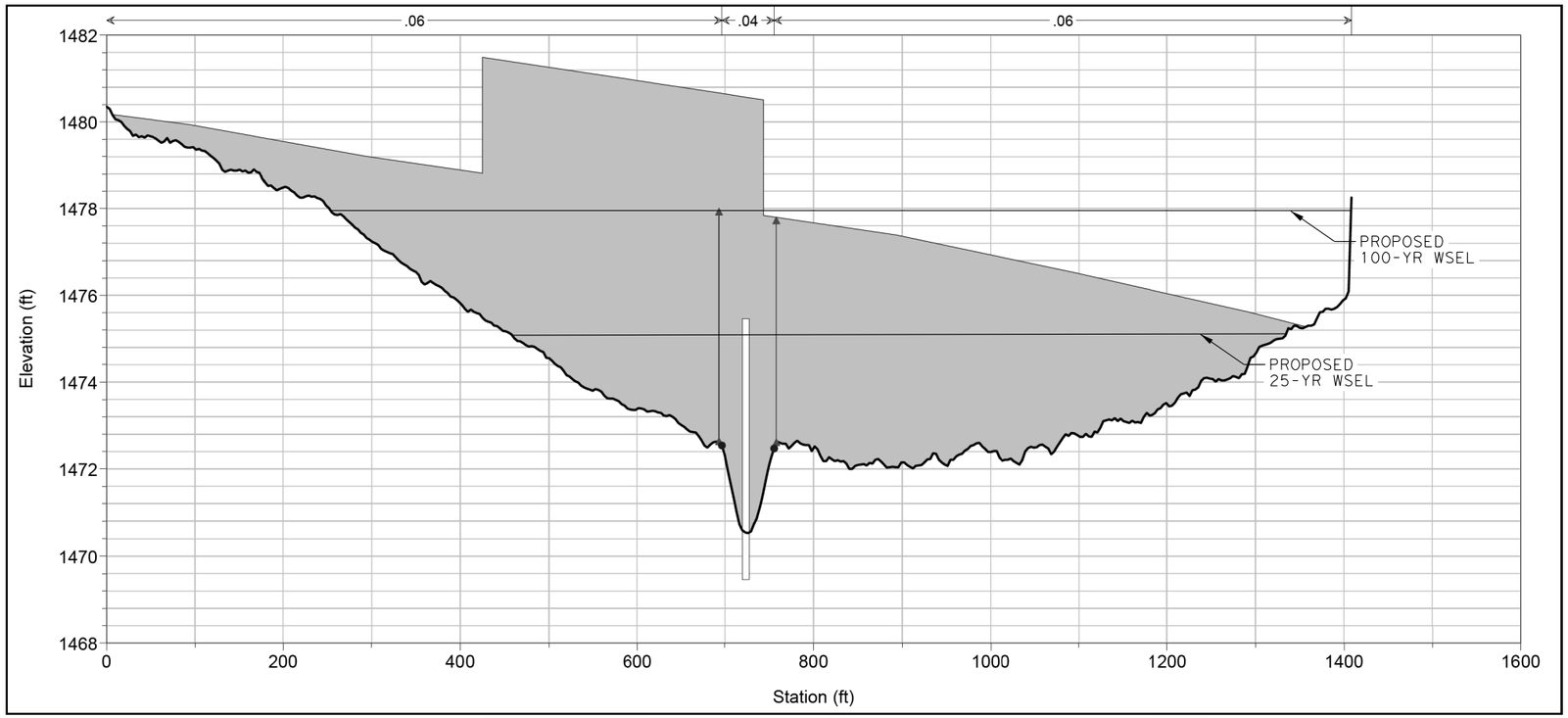


EXISTING CULVERT B AT US 290



PROPOSED CULVERT B AT US 290

NOTES:

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Q25 = 278.9 CFS	Q100 = 506.9 CFS
V25 = 1.22 FT/S	V100 = 0.20 FT/S
HW25 = 1475.07'	HW100 = 1477.96'

STATE OF TEXAS
WAN ZHANG
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LICENSED PROFESSIONAL ENGINEER

2/14/2023

wan zhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

HYDRAULIC DATA SHEET
US 290 AT CULVERT B
STA 522+29.83

SHEET 2 OF 2

DN:	DN	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	CH*DN	6	TEXAS					US 290
DW:	DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	CK*DW	AUS	GILLESPIE	0113	02	063		123

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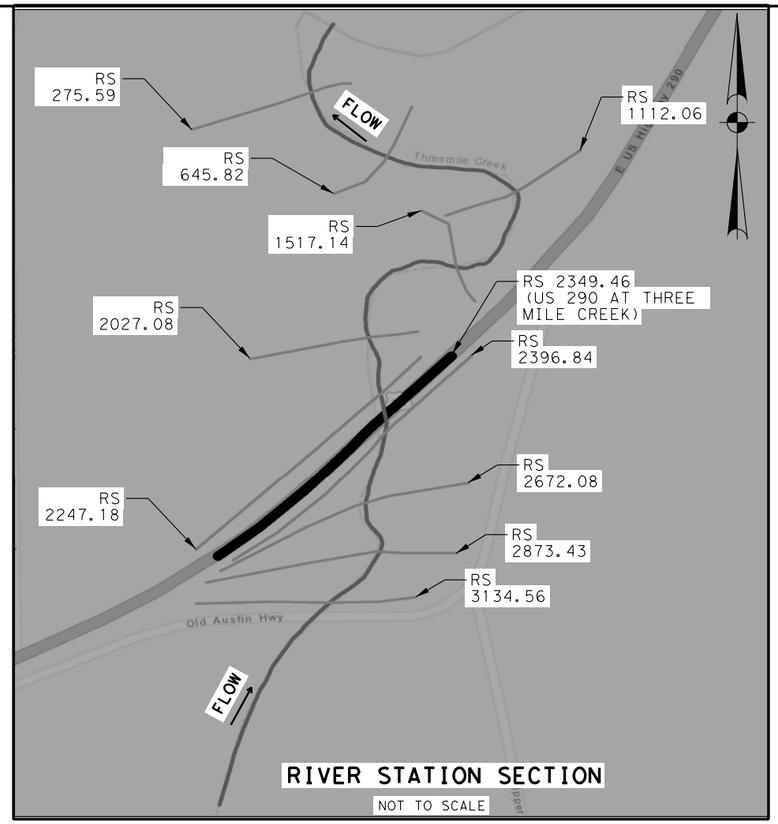
HYDRAULIC MODEL RESULTS

HEC-RAS RESULTS FOR THREEMILE CREEK BRIDGE

HEC-RAS STATION	PROFILE	PLAN	Q TOTAL (CFS)	MIN CH EL (FT)	W.S. ELEV (FT)	W.S DIFF (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
3134.56	25_Yr	Exist	5848.80	1439.31	1451.09		---	1451.79	0.00165	7.59	1331.17	187.68	0.40
3134.56	25_Yr	Prop	5848.80	1439.31	1451.08	-0.01	---	1451.78	0.00166	7.59	1329.50	187.64	0.40
3134.56	100_Yr	Exist	10218.80	1439.31	1455.42		---	1456.25	0.00140	8.65	2203.20	220.40	0.39
3134.56	100_Yr	Prop	10218.80	1439.31	1455.10	-0.32	---	1455.98	0.00152	8.89	2131.58	217.09	0.40
2873.43	25_Yr	Exist	5848.80	1437.44	1448.90		1448.16	1450.93	0.00583	12.61	799.09	158.92	0.71
2873.43	25_Yr	Prop	5848.80	1437.44	1448.54	-0.36	1448.16	1450.85	0.00685	13.33	742.70	156.84	0.77
2873.43	100_Yr	Exist	10218.80	1437.44	1454.13		---	1455.68	0.00297	11.96	1757.18	223.59	0.54
2873.43	100_Yr	Prop	10218.80	1437.44	1453.63	-0.50	---	1455.34	0.00339	12.50	1648.05	211.59	0.58
2672.08	25_Yr	Exist	5848.80	1435.91	1448.53		---	1449.95	0.00285	9.98	816.72	127.30	0.51
2672.08	25_Yr	Prop	5848.80	1435.91	1448.16	-0.37	---	1449.71	0.00322	10.37	770.83	122.01	0.54
2672.08	100_Yr	Exist	10218.80	1435.91	1453.68		---	1455.17	0.00204	10.77	1657.99	203.12	0.46
2672.08	100_Yr	Prop	10218.80	1435.91	1453.10	-0.58	---	1454.76	0.00236	11.31	1542.19	194.36	0.49
2396.84	25_Yr	Exist	5848.80	1434.89	1448.34		1444.17	1449.04	0.00150	7.76	1483.55	239.25	0.38
2396.84	25_Yr	Prop	5848.80	1434.89	1447.90	-0.44	1444.17	1448.70	0.00178	8.24	1383.47	232.68	0.41
2396.84	100_Yr	Exist	10218.80	1434.89	1453.78		1447.32	1454.36	0.00093	7.74	2705.78	411.84	0.32
2396.84	100_Yr	Prop	10218.80	1434.89	1453.19	-0.59	1447.32	1453.84	0.00107	8.12	2573.81	380.49	0.34
2349.46	US 290 BRIDGE AT THREEMILE CREEK												
2247.18	25_Yr	Exist	5848.80	1432.93	1446.58		1443.24	1448.06	0.00321	10.12	777.64	131.44	0.53
2247.18	25_Yr	Prop	5848.80	1432.93	1446.58	0.00	1443.24	1448.06	0.00321	10.12	777.64	131.44	0.53
2247.18	100_Yr	Exist	10218.80	1432.93	1451.71		1446.90	1453.11	0.00210	10.50	1734.59	270.58	0.46
2247.18	100_Yr	Prop	10218.80	1432.93	1451.71	0.00	1446.89	1453.11	0.00210	10.50	1734.59	270.58	0.46
2027.08	25_Yr	Exist	5848.80	1430.33	1444.08		1442.43	1446.77	0.00587	13.73	583.19	88.93	0.70
2027.08	25_Yr	Prop	5848.80	1430.33	1444.08	0.00	1442.43	1446.77	0.00587	13.73	583.19	88.93	0.70
2027.08	100_Yr	Exist	10218.80	1430.33	1448.31		1446.32	1451.79	0.00547	16.24	1051.11	146.81	0.71
2027.08	100_Yr	Prop	10218.80	1430.33	1448.31	0.00	1446.32	1451.79	0.00547	16.24	1051.09	146.80	0.71
1517.14	25_Yr	Exist	5848.80	1428.42	1441.94		---	1444.07	0.00425	12.17	646.20	89.76	0.62
1517.14	25_Yr	Prop	5848.80	1428.42	1441.94	0.00	---	1444.07	0.00425	12.17	646.20	89.76	0.62
1517.14	100_Yr	Exist	10218.80	1428.42	1446.61		---	1449.26	0.00371	14.14	1201.59	153.11	0.61
1517.14	100_Yr	Prop	10218.80	1428.42	1446.61	0.00	---	1449.26	0.00371	14.14	1201.57	153.11	0.61
1112.06	25_Yr	Exist	5848.80	1426.56	1441.23		---	1442.62	0.00232	9.77	770.35	88.67	0.47
1112.06	25_Yr	Prop	5848.80	1426.56	1441.23	0.00	---	1442.62	0.00232	9.77	770.35	88.67	0.47
1112.06	100_Yr	Exist	10218.80	1426.56	1445.91		---	1447.90	0.00235	11.99	1245.59	117.15	0.50
1112.06	100_Yr	Prop	10218.80	1426.56	1445.91	0.00	---	1447.90	0.00235	11.99	1245.57	117.15	0.50
645.82	25_Yr	Exist	5848.80	1424.49	1439.28		---	1441.20	0.00382	11.31	614.65	79.12	0.56
645.82	25_Yr	Prop	5848.80	1424.49	1439.28	0.00	---	1441.20	0.00382	11.31	614.65	79.12	0.56
645.82	100_Yr	Exist	10218.80	1424.49	1443.87		---	1446.49	0.00366	13.61	1037.59	105.16	0.58
645.82	100_Yr	Prop	10218.80	1424.49	1443.87	0.00	---	1446.49	0.00366	13.61	1037.60	105.16	0.58
275.59	25_Yr	Exist	5848.80	1424.47	1438.44		1433.69	1439.89	0.00265	9.80	680.31	76.08	0.48
275.59	25_Yr	Prop	5848.80	1424.47	1438.44	0.00	1433.69	1439.89	0.00265	9.80	680.31	76.08	0.48
275.59	100_Yr	Exist	10218.80	1424.47	1443.09		1437.39	1445.20	0.00266	12.05	1111.68	109.45	0.51
275.59	100_Yr	Prop	10218.80	1424.47	1443.09	0.00	1437.39	1445.20	0.00266	12.05	1111.69	109.45	0.51



RIVER STATION SECTION

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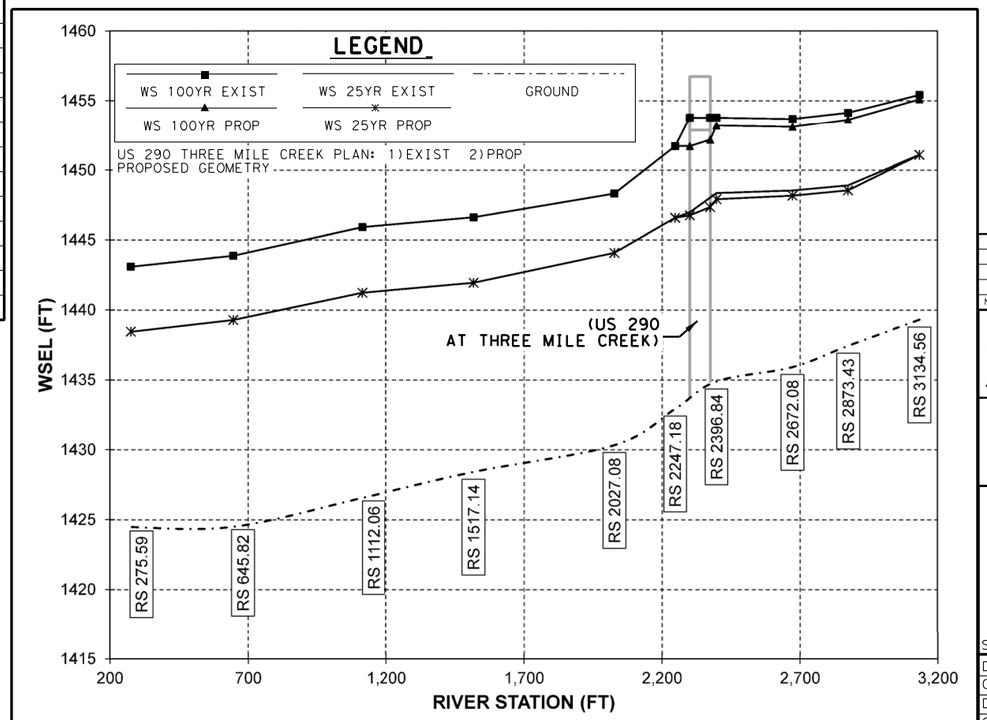

NOTES:

1. THIS SITE IS SHOWN ON FEMA FLOOD INSURANCE RATE MAP FOR GILLESPIE COUNTY, TX, PANEL NO. 48171C0481C WITH THE EFFECTIVE DATE 10/19/2001, IT LIES WITHIN A REGULATORY FLOODPLAIN (ZONE AE)
2. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE EXISTING AND PROPOSED HYDRAULIC MODELS.
3. THIS PROPOSED STRUCTURE RESULTS IN A "ZERO RISE" CONDITION TO THE REGULATED "ZONE AE" 100-YEAR FLOODPLAIN.
4. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.00265 FT/FT.
5. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

INTERNAL BRIDGE HYDRAULIC DATA US 290 BRIDGE AT THREE MILE CREEK	
Q25 = 5848.8 CFS	Q100 = 10218.8 CFS
V25 = 7.59 FT/S	V100 = 6.73 FT/S
HW25 = 1447.34'	HW100 = 1452.17'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
2/14/2023

wan zhang

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

US 290

HYDRAULIC DATA SHEET
US 290 AT THREE MILE CREEK

STA 545+01.00

SHEET 1 OF 2

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CH*DN	6	TEXAS					US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063		124

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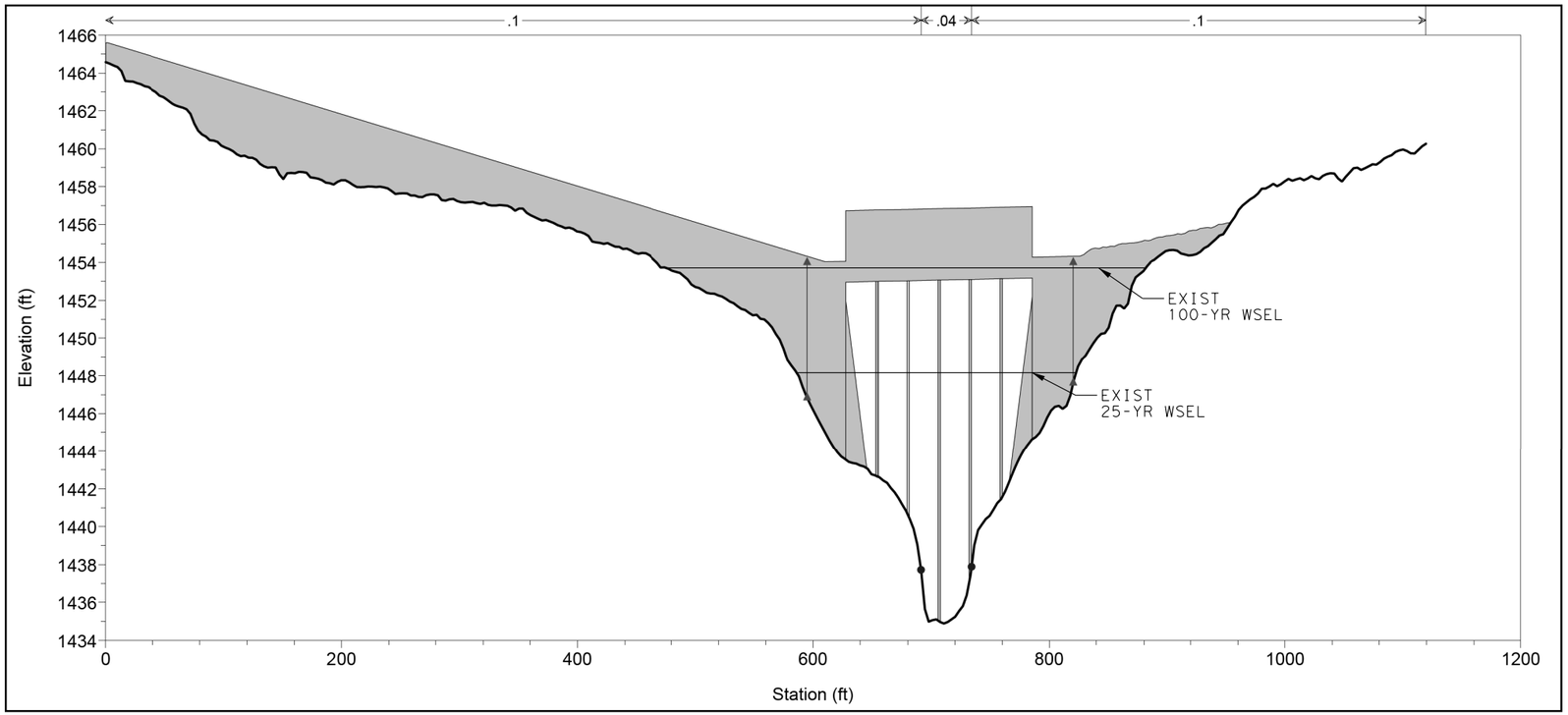
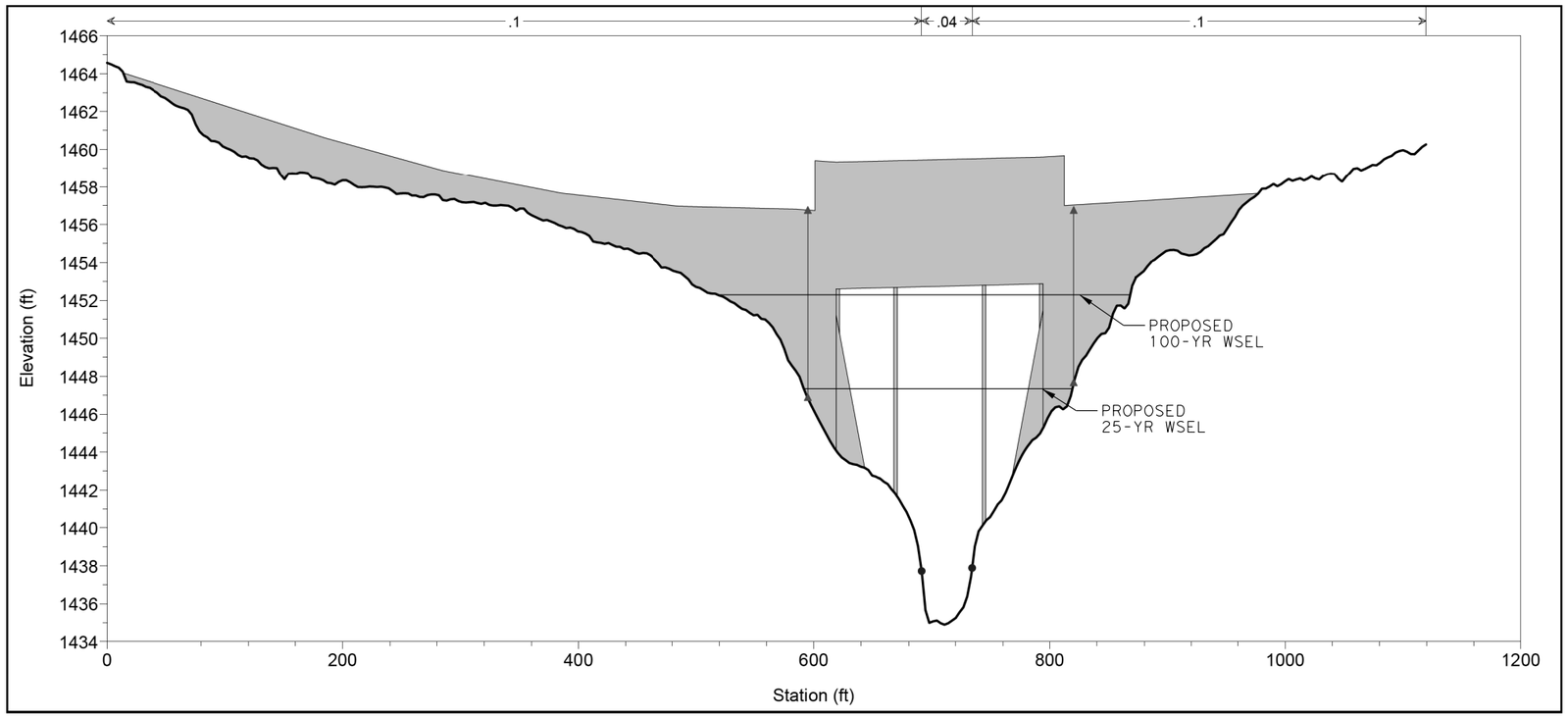


EXISTING US 290 BRIDGE AT THREEMILE CREEK



PROPOSED US 290 BRIDGE AT THREEMILE CREEK

NOTES:

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281-945-0081 FX

US 290

HYDRAULIC DATA SHEET
US 290 AT THREE MILE CREEK
STA 545+01.00

SHEET 2 OF 2

DN: DN	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CH*DN	6	TEXAS				US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063	125

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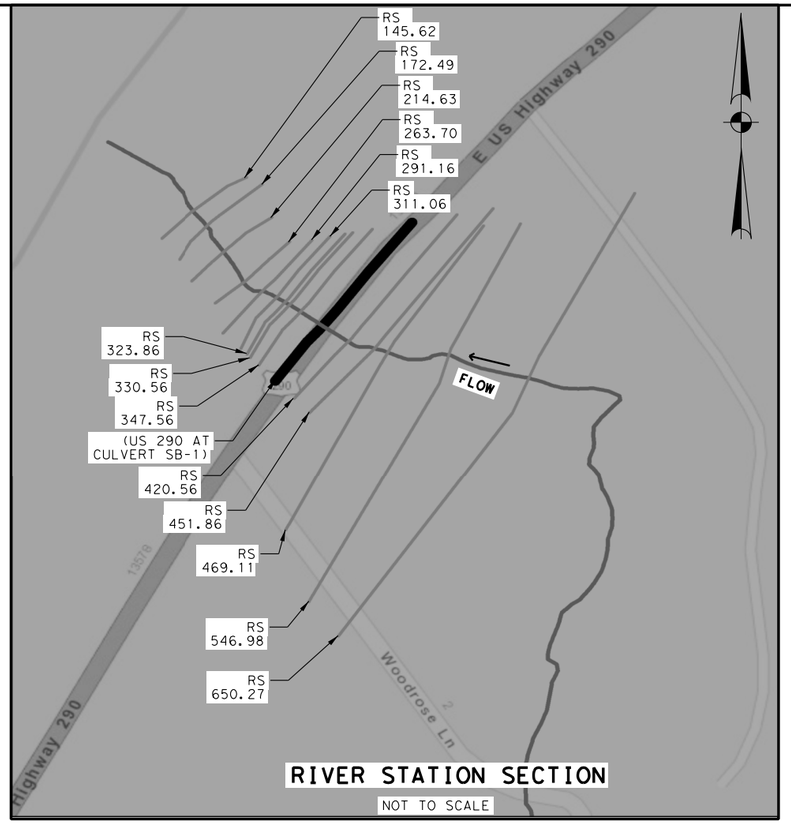
HYDRAULIC MODEL RESULTS

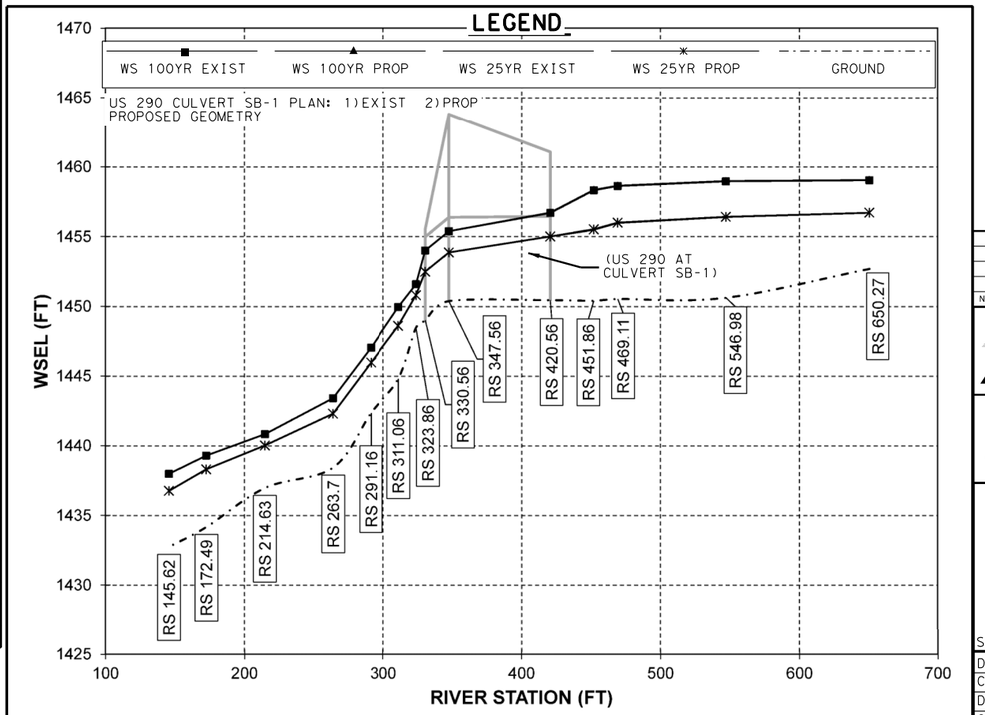
HEC-RAS RESULTS FOR CULVERT CROSSING SB-1

HEC-RAS STATION	PROFILE	PLAN	Q TOTAL (CFS)	MIN CH EL (FT)	W.S. ELEV (FT)	W.S DIFF (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
650.27	25_Yr	Exist	442.10	1452.68	1456.70	---	1456.70	1457.69	0.02041	8.01	55.21	28.32	1.01
650.27	25_Yr	Prop	442.10	1452.68	1456.70	0.00	1456.70	1457.69	0.02041	8.01	55.21	28.32	1.01
650.27	100_Yr	Exist	759.80	1452.68	1459.03	---	---	1459.45	0.00449	5.24	146.36	52.60	0.52
650.27	100_Yr	Prop	759.80	1452.68	1459.05	0.02	---	1459.47	0.00438	5.20	147.67	53.36	0.51
546.98	25_Yr	Exist	442.10	1450.61	1456.39	---	---	1456.65	0.00275	4.07	108.63	33.35	0.40
546.98	25_Yr	Prop	442.10	1450.61	1456.41	0.02	---	1456.66	0.00272	4.05	109.14	33.42	0.40
546.98	100_Yr	Exist	759.80	1450.61	1458.95	---	---	1459.15	0.00136	3.60	211.05	45.56	0.29
546.98	100_Yr	Prop	759.80	1450.61	1458.97	0.02	---	1459.17	0.00134	3.58	212.22	45.66	0.29
469.11	25_Yr	Exist	442.10	1450.52	1455.97	---	---	1456.38	0.00399	5.12	86.28	23.07	0.47
469.11	25_Yr	Prop	442.10	1450.52	1455.99	0.02	---	1456.40	0.00392	5.10	86.77	23.11	0.46
469.11	100_Yr	Exist	759.80	1450.52	1458.61	---	---	1459.00	0.00239	4.95	153.44	28.08	0.37
469.11	100_Yr	Prop	759.80	1450.52	1458.64	0.03	---	1459.02	0.00235	4.92	154.28	28.15	0.37
451.86	25_Yr	Exist	442.10	1450.40	1455.48	---	1454.38	1456.19	0.00784	6.79	65.11	18.23	0.63
451.86	25_Yr	Prop	442.10	1450.40	1455.51	0.03	1454.38	1456.21	0.00763	6.72	65.77	18.30	0.63
451.86	100_Yr	Exist	759.80	1450.40	1458.31	---	1455.71	1458.88	0.00405	6.09	124.84	24.23	0.47
451.86	100_Yr	Prop	759.80	1450.40	1458.34	0.03	1455.71	1458.91	0.00398	6.04	125.70	24.32	0.47
420.56	25_Yr	Exist	442.10	1450.41	1455.00	---	1453.90	1456.00	0.00190	8.02	55.11	12.00	0.66
420.56	25_Yr	Prop	442.10	1450.44	1455.00	0.00	1453.93	1456.02	0.00193	8.07	54.77	12.00	0.67
420.56	100_Yr	Exist	759.80	1450.41	1456.68	---	1455.42	1458.41	0.00423	10.55	72.00	0.00	0.74
420.56	100_Yr	Prop	759.80	1450.44	1456.70	0.02	1455.45	1458.43	0.00423	10.55	72.00	0.00	0.74
347.56	25_Yr	Exist	442.10	1450.37	1453.86	---	1453.86	1455.59	0.00383	10.55	41.91	12.00	1.00
347.56	25_Yr	Prop	442.10	1450.37	1453.86	0.00	1453.86	1455.59	0.00383	10.55	41.91	12.00	1.00
347.56	100_Yr	Exist	759.80	1450.37	1455.38	---	1455.38	1457.86	0.00451	12.65	60.07	12.00	1.00
347.56	100_Yr	Prop	759.80	1450.37	1455.38	0.00	1455.38	1457.86	0.00451	12.65	60.07	12.00	1.00
330.56	25_Yr	Exist	442.10	1448.99	1452.48	---	1452.48	1454.21	0.00383	10.55	41.91	12.00	1.00
330.56	25_Yr	Prop	442.10	1448.99	1452.48	0.00	1452.48	1454.21	0.00383	10.55	41.91	12.00	1.00
330.56	100_Yr	Exist	759.80	1448.99	1454.00	---	1454.00	1456.48	0.00451	12.65	60.06	12.00	1.00
330.56	100_Yr	Prop	759.80	1448.99	1454.00	0.00	1454.00	1456.48	0.00451	12.65	60.06	12.00	1.00
323.86	25_Yr	Exist	442.10	1448.46	1450.79	---	1450.79	1451.65	0.01985	7.44	59.41	34.37	1.00
323.86	25_Yr	Prop	442.10	1448.46	1450.79	0.00	1450.79	1451.65	0.01985	7.44	59.41	34.37	1.00
323.86	100_Yr	Exist	759.80	1448.46	1451.58	---	1451.58	1452.72	0.01827	8.56	88.73	38.88	1.00
323.86	100_Yr	Prop	759.80	1448.46	1451.58	0.00	1451.58	1452.72	0.01827	8.56	88.73	38.88	1.00
311.06	25_Yr	Exist	442.10	1444.81	1448.60	---	1448.60	1449.74	0.01943	8.55	51.70	22.76	1.00
311.06	25_Yr	Prop	442.10	1444.81	1448.60	0.00	1448.60	1449.74	0.01943	8.55	51.70	22.76	1.00
311.06	100_Yr	Exist	759.80	1444.81	1449.94	---	1449.94	1451.01	0.01367	8.44	106.73	81.46	0.88
311.06	100_Yr	Prop	759.80	1444.81	1449.94	0.00	1449.94	1451.01	0.01367	8.44	106.73	81.46	0.88
291.16	25_Yr	Exist	442.10	1442.36	1445.96	---	1445.96	1447.08	0.01925	8.50	52.01	23.16	1.00
291.16	25_Yr	Prop	442.10	1442.36	1445.96	0.00	1445.96	1447.08	0.01925	8.50	52.01	23.16	1.00
291.16	100_Yr	Exist	759.80	1442.36	1447.03	---	1447.03	1448.46	0.01799	9.61	79.05	27.60	1.00
291.16	100_Yr	Prop	759.80	1442.36	1447.03	0.00	1447.03	1448.46	0.01799	9.61	79.05	27.60	1.00
263.70	25_Yr	Exist	442.10	1438.43	1442.29	---	1442.29	1443.47	0.01953	8.72	50.68	21.48	1.00
263.70	25_Yr	Prop	442.10	1438.43	1442.29	0.00	1442.29	1443.47	0.01953	8.72	50.68	21.48	1.00
263.70	100_Yr	Exist	759.80	1438.43	1443.40	---	1443.40	1444.92	0.01833	9.90	76.75	25.34	1.00
263.70	100_Yr	Prop	759.80	1438.43	1443.40	0.00	1443.40	1444.92	0.01833	9.90	76.75	25.34	1.00
214.63	25_Yr	Exist	442.10	1436.97	1440.02	---	1440.02	1440.91	0.02036	7.57	58.38	33.48	1.01
214.63	25_Yr	Prop	442.10	1436.97	1440.02	0.00	1440.02	1440.91	0.02036	7.57	58.38	33.48	1.01
214.63	100_Yr	Exist	759.80	1436.97	1440.83	---	1440.83	1442.00	0.01800	8.70	87.54	38.38	1.00
214.63	100_Yr	Prop	759.80	1436.97	1440.83	0.00	1440.83	1442.00	0.01800	8.70	87.54	38.38	1.00
172.49	25_Yr	Exist	442.10	1434.17	1438.30	---	1438.30	1439.39	0.01986	8.40	52.62	24.13	1.00
172.49	25_Yr	Prop	442.10	1434.17	1438.30	0.00	1438.30	1439.39	0.01986	8.40	52.62	24.13	1.00
172.49	100_Yr	Exist	759.80	1434.17	1439.29	---	1439.29	1440.76	0.01874	9.74	78.02	27.06	1.01
172.49	100_Yr	Prop	759.80	1434.17	1439.29	0.00	1439.29	1440.76	0.01874	9.74	78.02	27.06	1.01
145.62	25_Yr	Exist	442.10	1432.74	1436.76	---	1436.76	1438.06	0.01964	9.17	48.23	18.49	1.00
145.62	25_Yr	Prop	442.10	1432.74	1436.76	0.00	1436.76	1438.06	0.01964	9.17	48.23	18.49	1.00
145.62	100_Yr	Exist	759.80	1432.74	1437.98	---	1437.98	1439.67	0.01877	10.43	72.82	21.82	1.01
145.62	100_Yr	Prop	759.80	1432.74	1437.98	0.00	1437.98	1439.67	0.01877	10.43	72.82	21.82	1.01



RIVER STATION SECTION

NOT TO SCALE



NOTES:

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2. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE EXISTING AND PROPOSED HYDRAULIC MODELS.
3. THIS PROPOSED STRUCTURE RESULTS IN A "ZERO RISE" CONDITION TO THE REGULATED "ZONE AE" 100-YEAR FLOODPLAIN.
4. TO CAPTURE THE CHANGE OF SLOPE WITHIN THE CULVERT, LID CROSS SECTIONS WERE USED TO MODEL THE EXISTING AND PROPOSED US 290 CULVERT AT STREAM SB-1
5. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.006183 FT/FT.
6. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT SB-1	
Q25 = 442.1 CFS	Q100 = 759.8 CFS
V25 = 8.07 FT/S	V100 = 10.55 FT/S
HW25 = 1455.00'	HW100 = 1456.70'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

NO.	DATE	REVISION	APPROV.
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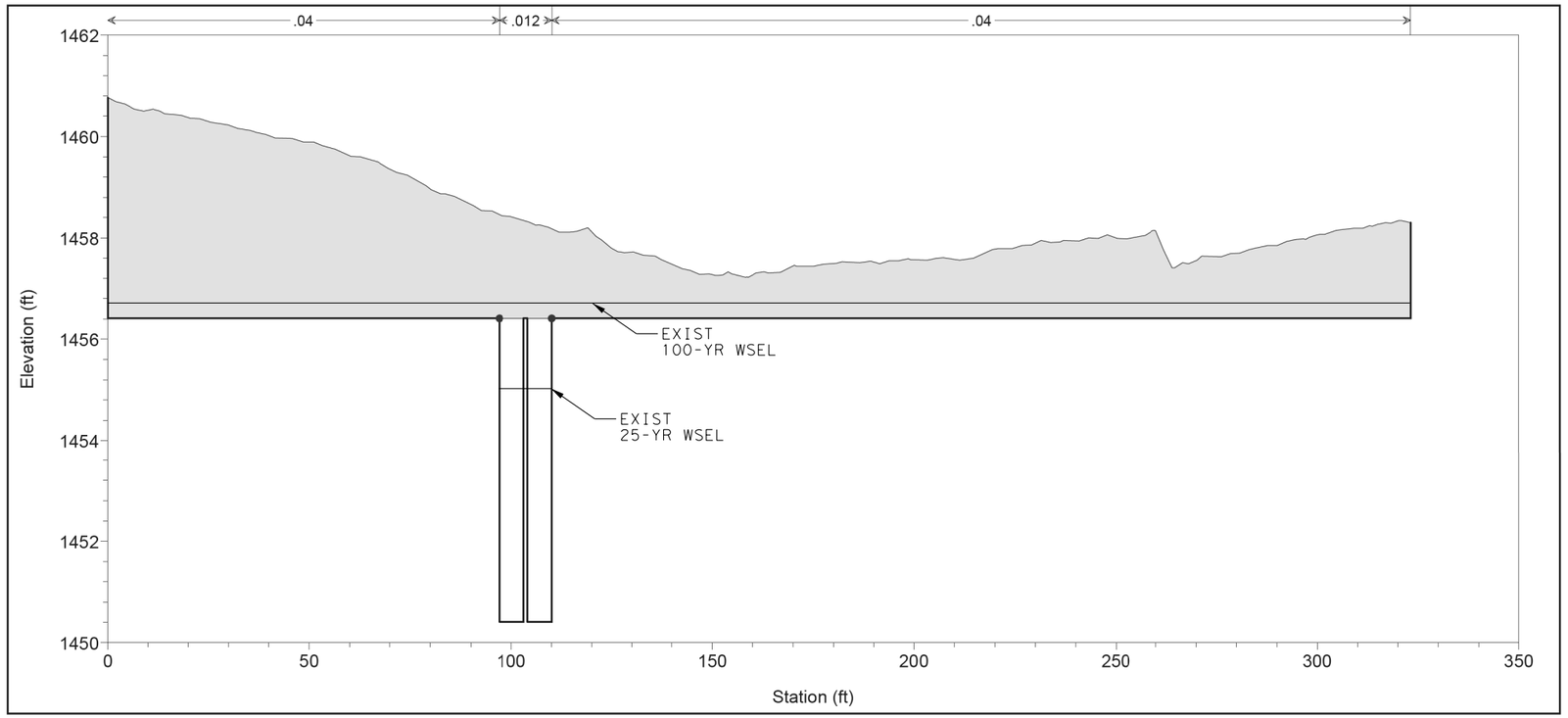
281-945-0069 PH
281-945-0081 FX

US 290

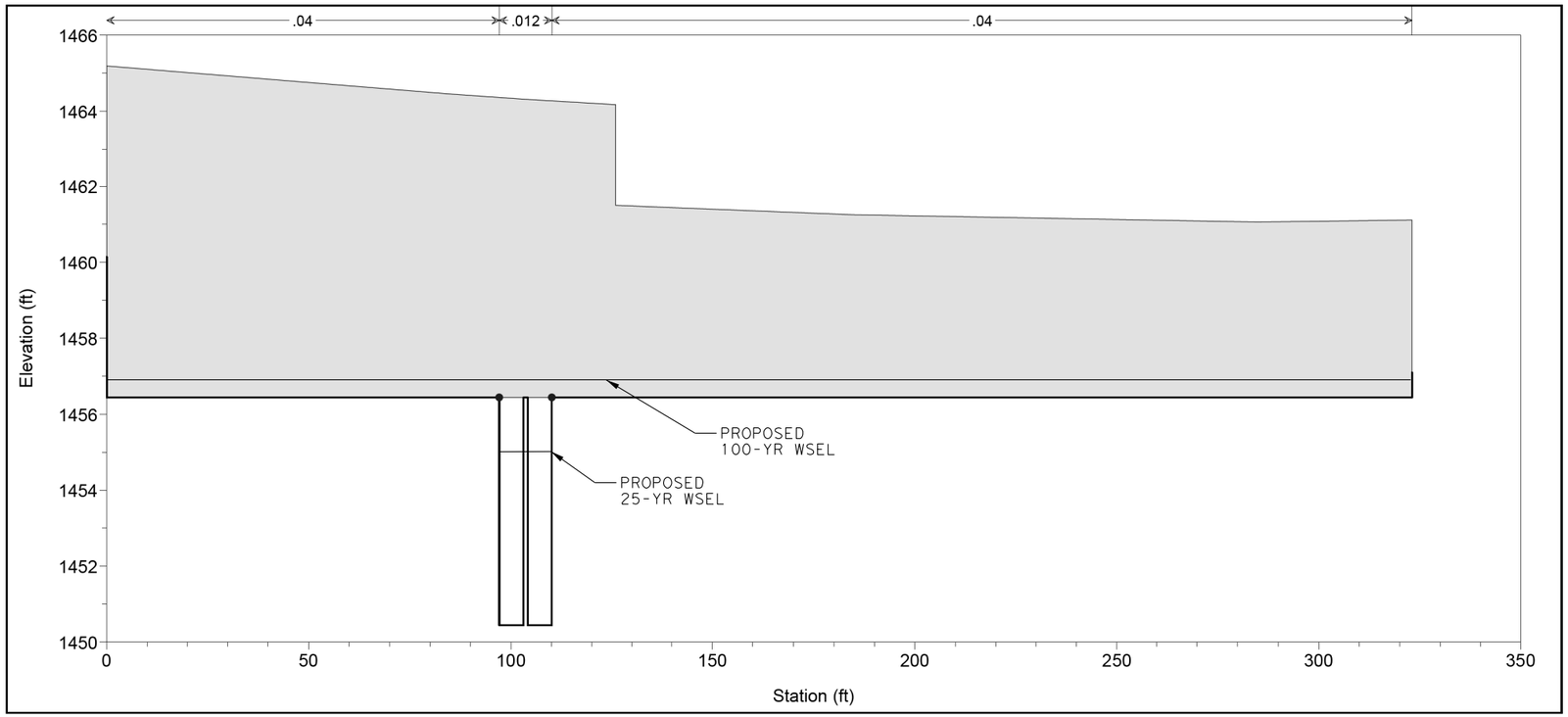
HYDRAULIC DATA SHEET
US 290 AT CULVERT SB-1
STA 568+18.80

SHEET 1 OF 2

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CH*DN	6	TEXAS					US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063		126



EXISTING CULVERT SB-1 AT US 290



PROPOSED CULVERT SB-1 AT US 290

NOTES:

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2. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE EXISTING AND PROPOSED HYDRAULIC MODELS.
3. THIS PROPOSED STRUCTURE RESULTS IN A "ZERO RISE" CONDITION TO THE REGULATED "ZONE AE" 100-YEAR FLOODPLAIN.
4. TO CAPTURE THE CHANGE OF SLOPE WITHIN THE CULVERT, LID CROSS SECTIONS WERE USED TO MODEL THE EXISTING AND PROPOSED US 290 CULVERT AT STREAM SB-1
5. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.006183 FT/FT.
6. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT SB-1	
Q25 = 442.1 CFS	Q100 = 759.8 CFS
V25 = 8.07 FT/S	V100 = 10.55 FT/S
HW25 = 1455.00′	HW100 = 1456.70′

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER

2/14/2023

wan zhang

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281-945-0081 FX

US 290

HYDRAULIC DATA SHEET
US 290 AT CULVERT SB-1
STA 568+18.80

SHEET 2 OF 2

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CH*DN	6	TEXAS				US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063	127

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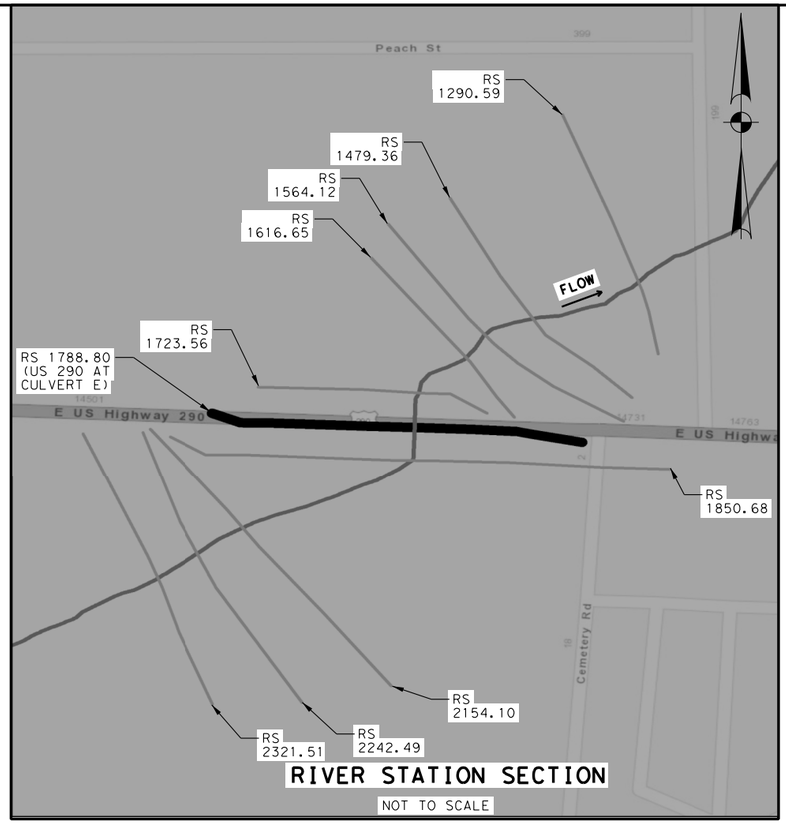
HYDRAULIC MODEL RESULTS

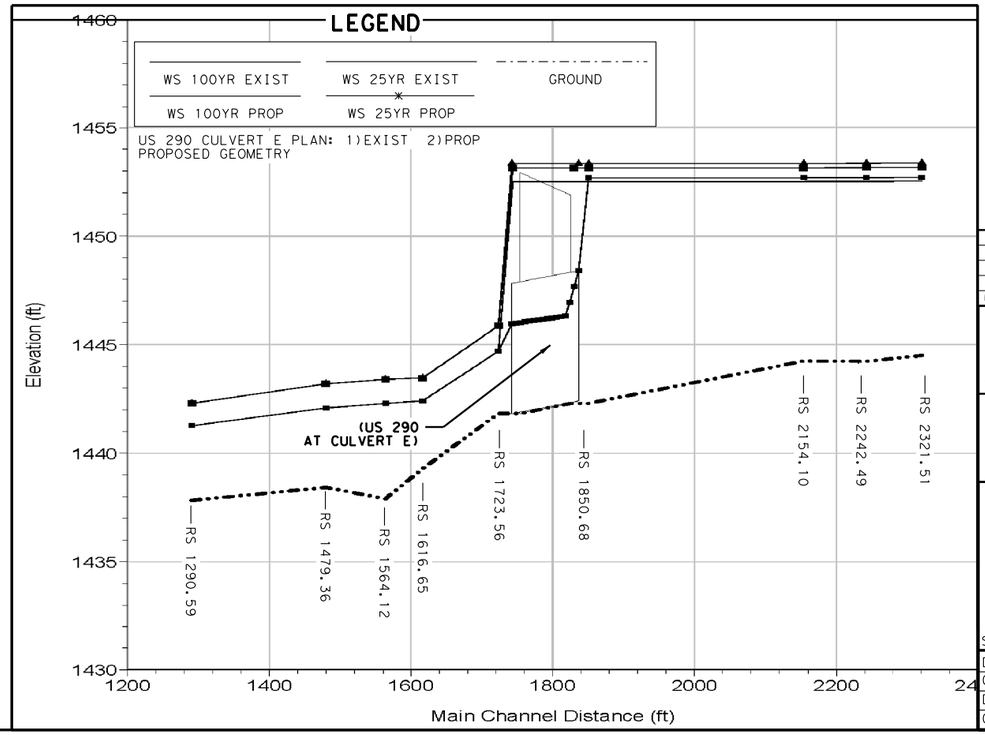
HEC-RAS RESULTS FOR CULVERT CROSSING E

HEC-RAS STATION	PROFILE	PLAN	Q TOTAL (CFS)	MIN CH EL (FT)	W.S. ELEV (FT)	W.S DIFF (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
2321.51	25_Yr	Exist	1168.00	1444.50	1452.53	---	---	1452.54	0.00009	1.27	1826.70	459.14	0.09
2321.51	25_Yr	Prop	1168.00	1444.50	1452.71	0.18	---	1452.71	0.00008	1.21	1908.93	466.31	0.08
2321.51	100_Yr	Exist	2013.90	1444.50	1453.17	---	---	1453.19	0.00018	1.87	2131.20	498.88	0.12
2321.51	100_Yr	Prop	2013.90	1444.50	1453.37	0.20	---	1453.39	0.00016	1.80	2231.06	513.81	0.11
2242.49	25_Yr	Exist	1168.00	1444.22	1452.52	---	---	1452.53	0.00010	1.33	1788.19	417.64	0.09
2242.49	25_Yr	Prop	1168.00	1444.22	1452.70	0.18	---	1452.71	0.00009	1.27	1863.74	426.64	0.08
2242.49	100_Yr	Exist	2013.90	1444.22	1453.15	---	---	1453.18	0.00020	1.99	2060.78	441.99	0.13
2242.49	100_Yr	Prop	2013.90	1444.22	1453.35	0.20	---	1453.37	0.00018	1.90	2149.27	447.35	0.12
2154.10	25_Yr	Exist	1168.00	1444.24	1452.51	---	---	1452.52	0.00007	1.12	1977.42	403.68	0.07
2154.10	25_Yr	Prop	1168.00	1444.24	1452.69	0.18	---	1452.70	0.00006	1.08	2049.95	408.57	0.07
2154.10	100_Yr	Exist	2013.90	1444.24	1453.14	---	---	1453.16	0.00015	1.73	2237.77	430.28	0.11
2154.10	100_Yr	Prop	2013.90	1444.24	1453.34	0.20	---	1453.36	0.00013	1.68	2324.91	439.88	0.10
1850.68	25_Yr	Exist	1168.00	1442.29	1452.51	---	1445.85	1452.51	0.00002	0.62	4015.21	716.42	0.04
1850.68	25_Yr	Prop	1168.00	1442.29	1452.69	0.18	1445.85	1452.69	0.00001	0.60	4144.00	721.93	0.03
1850.68	100_Yr	Exist	2013.90	1442.29	1453.13	---	1446.87	1453.14	0.00003	0.97	4470.46	755.08	0.05
1850.68	100_Yr	Prop	2013.90	1442.29	1453.33	0.20	1446.87	1453.34	0.00003	0.93	4623.19	766.18	0.05
1788.80	US 290 AT CULVERT E - (2-8'x6' MBC)												
1723.56	25_Yr	Exist	1168.00	1441.82	1444.69	---	1444.69	1446.02	0.01803	9.49	131.16	151.67	0.99
1723.56	25_Yr	Prop	1168.00	1441.82	1444.69	0.00	1444.69	1446.02	0.01803	9.49	131.16	151.67	0.99
1723.56	100_Yr	Exist	2013.90	1441.82	1445.87	---	1445.87	1447.75	0.01637	11.37	188.68	198.35	1.00
1723.56	100_Yr	Prop	2013.90	1441.82	1445.87	0.00	1445.87	1447.75	0.01637	11.37	188.68	198.35	1.00
1616.65	25_Yr	Exist	1168.00	1439.28	1442.40	---	---	1442.91	0.01467	6.79	220.66	122.10	0.88
1616.65	25_Yr	Prop	1168.00	1439.28	1442.40	0.00	---	1442.91	0.01467	6.79	220.66	122.10	0.88
1616.65	100_Yr	Exist	2013.90	1439.28	1443.46	---	---	1444.01	0.01031	7.00	358.01	137.58	0.77
1616.65	100_Yr	Prop	2013.90	1439.28	1443.46	0.00	---	1444.01	0.01031	7.00	358.01	137.58	0.77
1564.12	25_Yr	Exist	1168.00	1437.89	1442.29	---	---	1442.46	0.00282	4.09	413.33	175.77	0.42
1564.12	25_Yr	Prop	1168.00	1437.89	1442.29	0.00	---	1442.46	0.00282	4.09	413.33	175.77	0.42
1564.12	100_Yr	Exist	2013.90	1437.89	1443.40	---	---	1443.61	0.00262	4.59	616.66	191.18	0.42
1564.12	100_Yr	Prop	2013.90	1437.89	1443.40	0.00	---	1443.61	0.00262	4.59	616.66	191.18	0.42
1479.36	25_Yr	Exist	1168.00	1438.42	1442.08	---	---	1442.24	0.00255	3.71	401.70	166.33	0.39
1479.36	25_Yr	Prop	1168.00	1438.42	1442.08	0.00	---	1442.24	0.00255	3.71	401.70	166.33	0.39
1479.36	100_Yr	Exist	2013.90	1438.42	1443.19	---	---	1443.41	0.00238	4.28	597.50	182.41	0.39
1479.36	100_Yr	Prop	2013.90	1438.42	1443.19	0.00	---	1443.41	0.00238	4.28	597.50	182.41	0.39
1290.59	25_Yr	Exist	1168.00	1437.82	1441.26	---	1440.23	1441.61	0.00468	4.72	247.28	97.13	0.52
1290.59	25_Yr	Prop	1168.00	1437.82	1441.26	0.00	1440.23	1441.61	0.00468	4.72	247.28	97.13	0.52
1290.59	100_Yr	Exist	2013.90	1437.82	1442.29	---	1441.05	1442.79	0.00468	5.68	364.35	140.19	0.55
1290.59	100_Yr	Prop	2013.90	1437.82	1442.29	0.00	1441.05	1442.79	0.00468	5.68	364.35	140.19	0.55



RIVER STATION SECTION

NOT TO SCALE



NOTES:

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3. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH SLOPE OF 0.00468 FT/FT.
4. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT E	
Q25 = 1168.0 CFS	Q100 = 2013.9 CFS
V25 = 0.60 FT/S	V100 = 0.93 FT/S
HW25 = 1452.69'	HW100 = 1453.33'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

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281-945-0069 PH
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US 290

HYDRAULIC DATA SHEET US 290 AT CULVERT E

STA 623+97.68

SHEET 1 OF 2

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CK*DN	6	TEXAS				US 290
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CK*DW	AUS	GILLESPIE	0113	02	063	128

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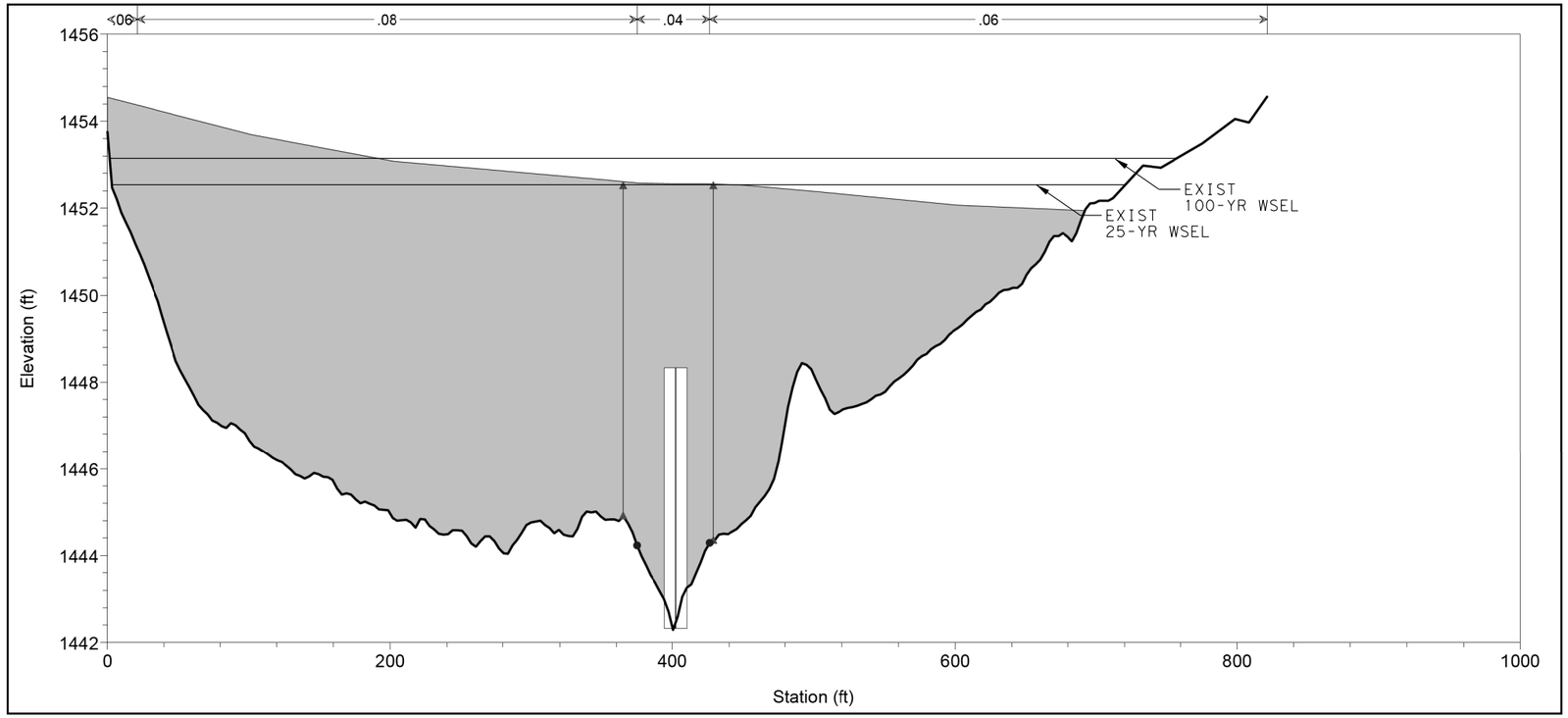
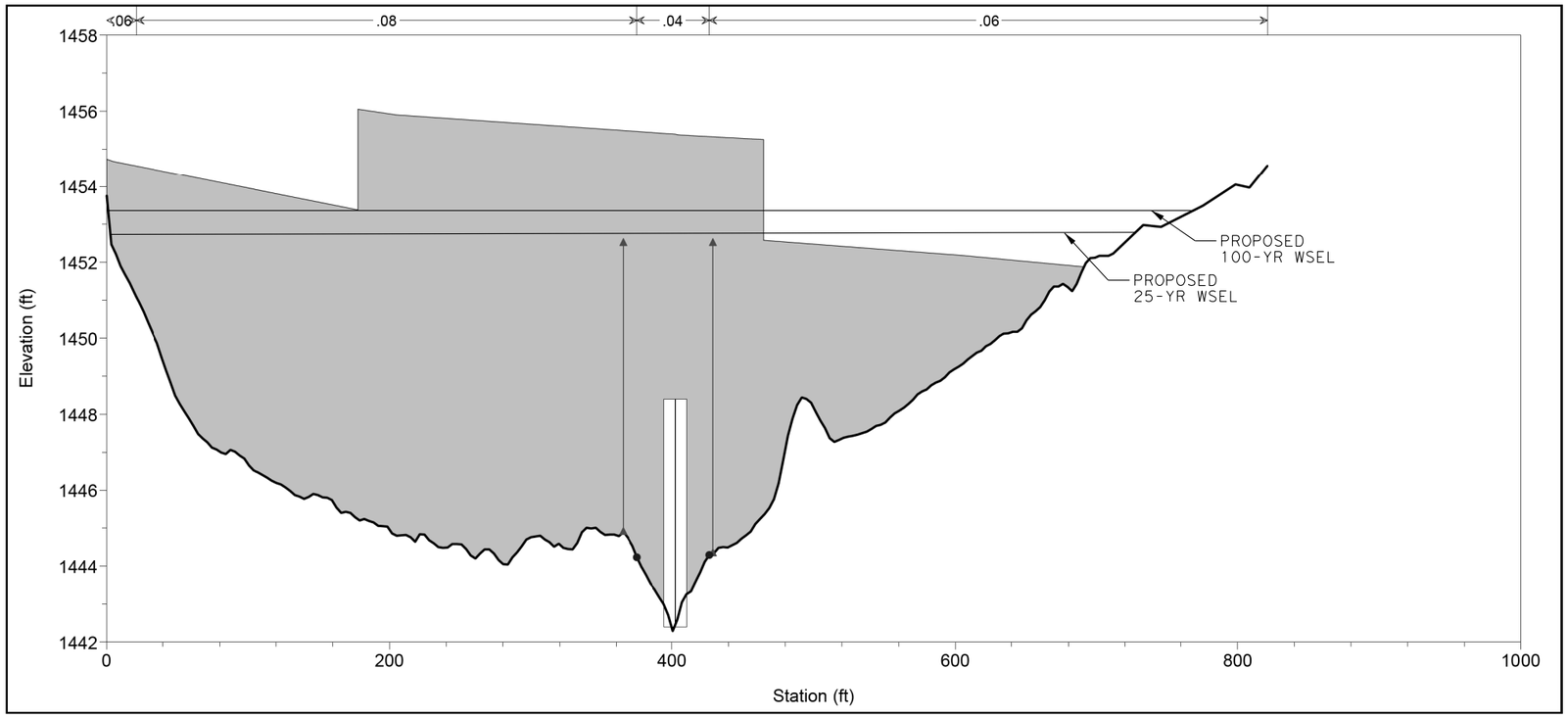


EXISTING CULVERT E AT US 290



PROPOSED CULVERT E AT US 290

NOTES:

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4. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

HYDRAULIC DATA U/S US 290 AT CULVERT E	
Q25 = 1168.0 CFS	Q100 = 2013.9 CFS
V25 = 0.60 FT/S	V100 = 0.93 FT/S
HW25 = 1452.69'	HW100 = 1453.33'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

wan zhang

NO.	DATE	REVISION	APPROV.
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US 290

HYDRAULIC DATA SHEET US 290 AT CULVERT E

STA 623+97.68

SHEET 2 OF 2

DN:	DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CH*DN	6	TEXAS				US 290
DW:	DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CK*DW	AUS	GILLESPIE	0113	02	063	129

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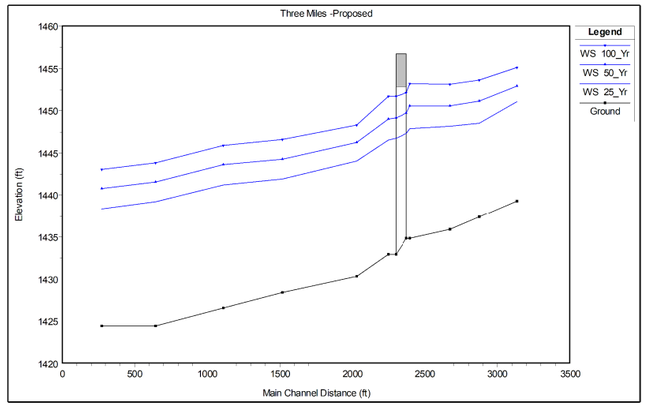


HEC-RAS PROFILE - THREE MILES

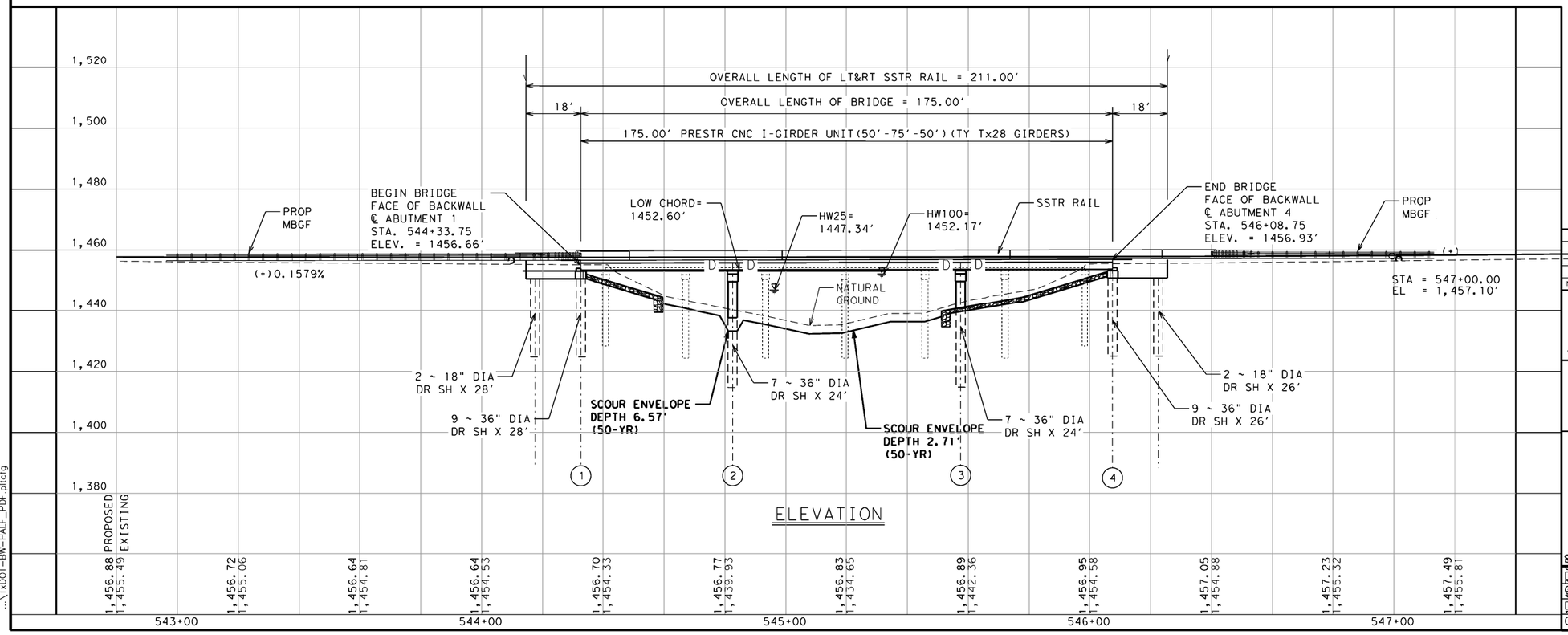
CONCTRACTION SCOUR PARAMETERS		50-YR (DESIGN)	100-YR (CHECK)
Average Depth Upstream of Contraction	ft	13.76	16.27
D_{50}	mm	0.499872	0.499872
Average Velocity Upstream	ft/s	10.94	11.31
Temperature of Water:	ºF	60	60
Slope of Energy Grade Line at Approach Section	ft/ft	0.0028	0.0028
Flow in Contracted Section	cfs	6233.85	7727.95
Flow Upstream that is Transporting Sediment	cfs	5183.33	6136
Width Upstream that is Transporting Sediment	ft	45.78	45.78
Width in Contracted Section (less piers)	ft	42.77	42.77
Depth Prior to Scour in Contracted Section	ft	14.18	16.94
Critical velocity above which bed material of size D and smaller will be transported	ft/s	2.04	2.1
Contraction Scour Condition		Live Bed	Live Bed
Shear Velocity-Live bed	ft/s	1.11	1.2
Fall Velocity: -Live bed	ft/s	0.22	0.22
k1-Live bed		0.69	0.69
Contraction Scour Depth	ft	2.71	3.84

LOCAL PIER SCOUR PARAMETERS		50-YR (DESIGN)	100-YR (CHECK)
Pier Shape		Group of Cylinders	Group of Cylinders
Bed Condition		Clear-Water Scour	Clear-Water Scour
Depth Upstream of Pier 1	ft	6.7	9
Depth Upstream of Pier 2	ft	6.7	8.9
Velocity Upstream of Pier 1	ft/s	2.2	2.4
Velocity Upstream of Pier 2	ft/s	2	2.2
Width of Pier	ft	3	3
Angle of Attack	degree	0	0
Froude Number Upstream Pier 1	ft	0.15	0.14
Froude Number Upstream Pier 2	ft	0.14	0.13
Pier Scour Depth of Pier 1	ft	3.86	4.18
Pier Scour Depth of Pier 2	ft	3.71	4.02

SCOUR SUMMARY		50-YR (DESIGN)	100-YR (CHECK)
Contraction Scour Depth	ft	2.71	3.84
Local Pier Scour Depth at Pier 1	ft	3.86	4.18
Lical Pier Scour Depth at Pier 2	ft	3.71	4.02
Total Scour at Pier 1	ft	6.57	8.02
Total Scour at Pier 2	ft	6.42	7.86

NOTES:

1. HEC-RAS MODEL VERSION 6.1 WAS UTILIZED TO CREATE THE HYDRAULIC MODELS.
2. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
3. SCOUR ANALYSIS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL, REVISED JULY 2020 AND FHWA HEC-18 MANUAL. THE FEDERAL HIGHWAY TOOLBOX VERSION 5.1 WAS USED TO COMPUTE THE CONTRACTION AND PIER SCOUR
4. SCOUR WERE ANALYZED FOR 50-YEAR DESIGN AND 100-YEAR CHECK.



ELEVATION

3/31/2023

wanzhang

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
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Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

HWY NAME

SCOUR ANALYSIS SHEET
US 290 AT THREE MILE CREEK
STA 545+01.00

SHEET 1 OF 1

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	AUS	GILLESPIE	0113	02	063	130

US290_DR_ODAM_05B.dgn

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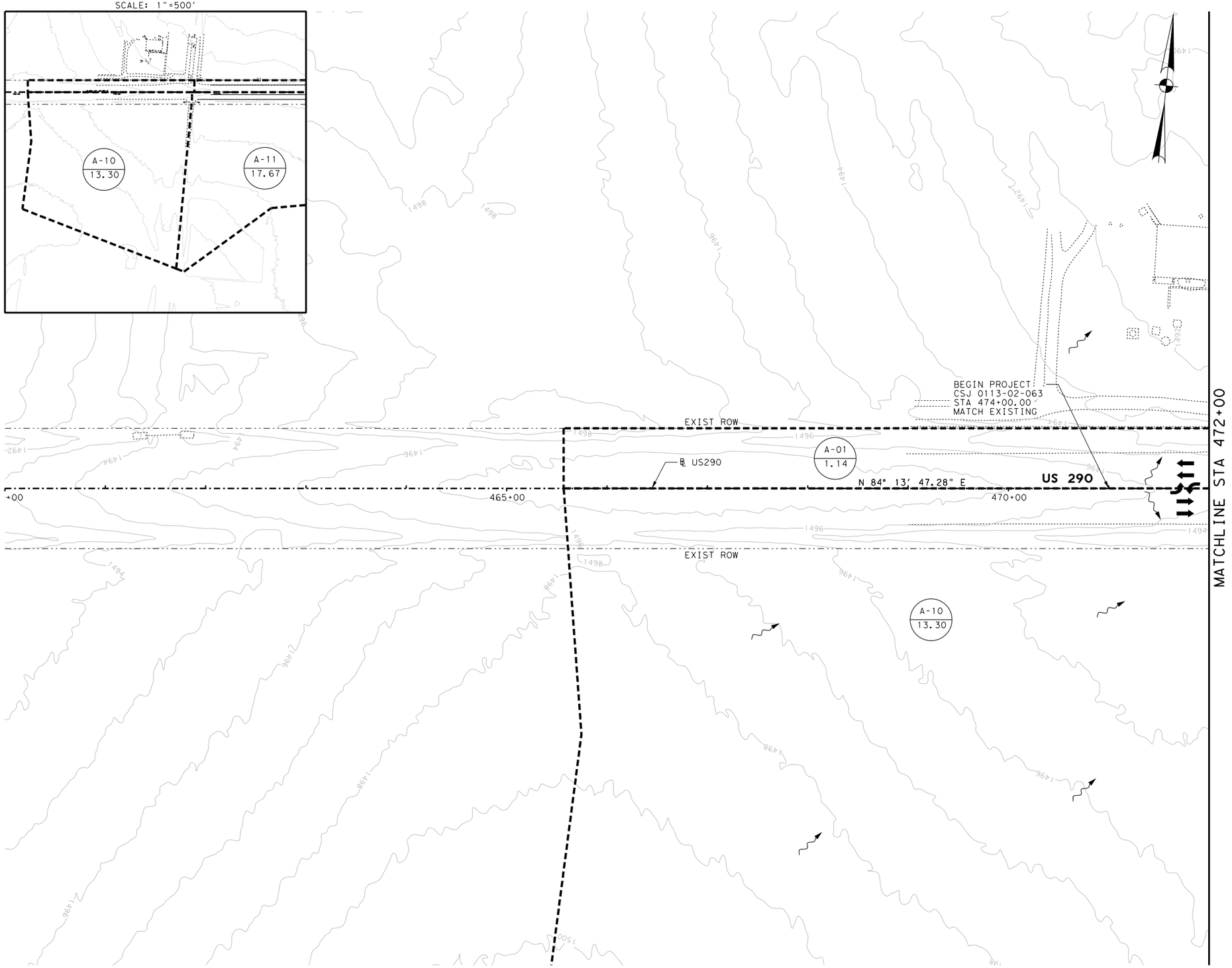
SCALE: 1"=500'



LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

1. CONTOUR DATA IS DERIVED FROM HURRICANE USGS LIDAR, 2019.

STATE OF TEXAS
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2/14/2023

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US 290

DRAINAGE AREA MAPS

BEGIN OF PROJECT TO STA 472+00

SHEET 1 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	131

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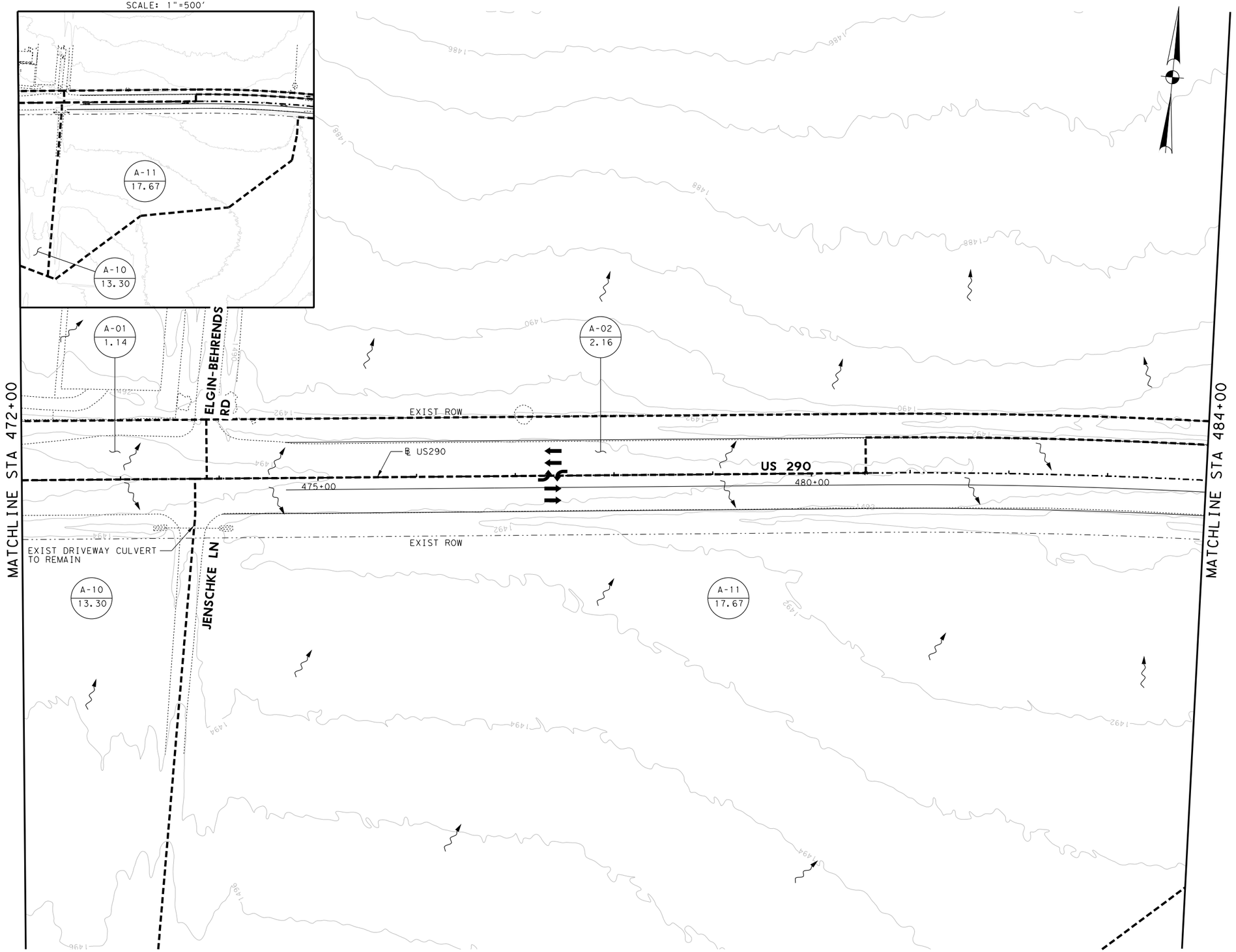

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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US 290

DRAINAGE AREA MAPS

STA 472+00 TO STA 484+00

SHEET 2 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	132

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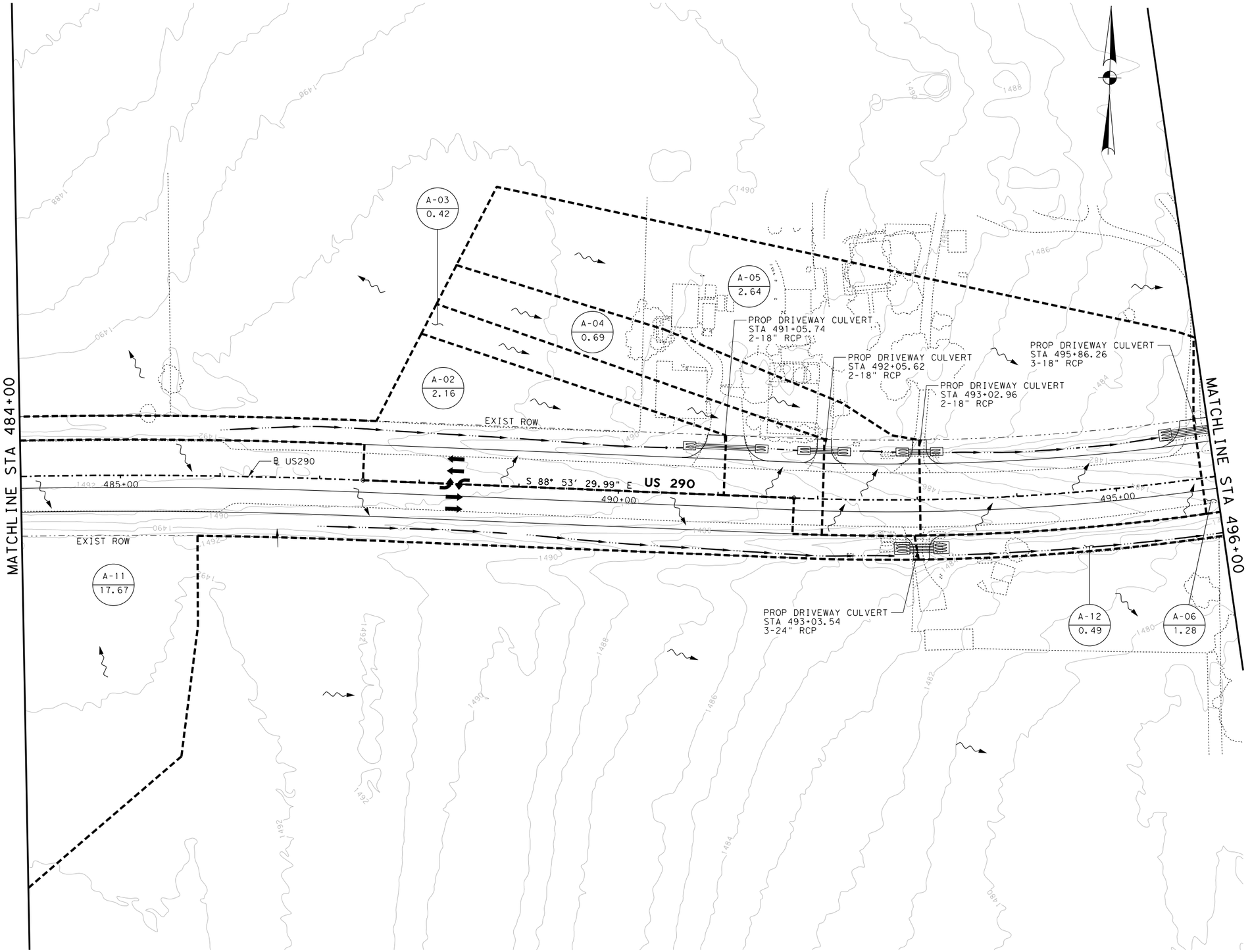

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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US 290

DRAINAGE AREA MAPS

STA 484+00 TO STA 496+00

SHEET 3 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	CC	6	TEXAS					US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063		133

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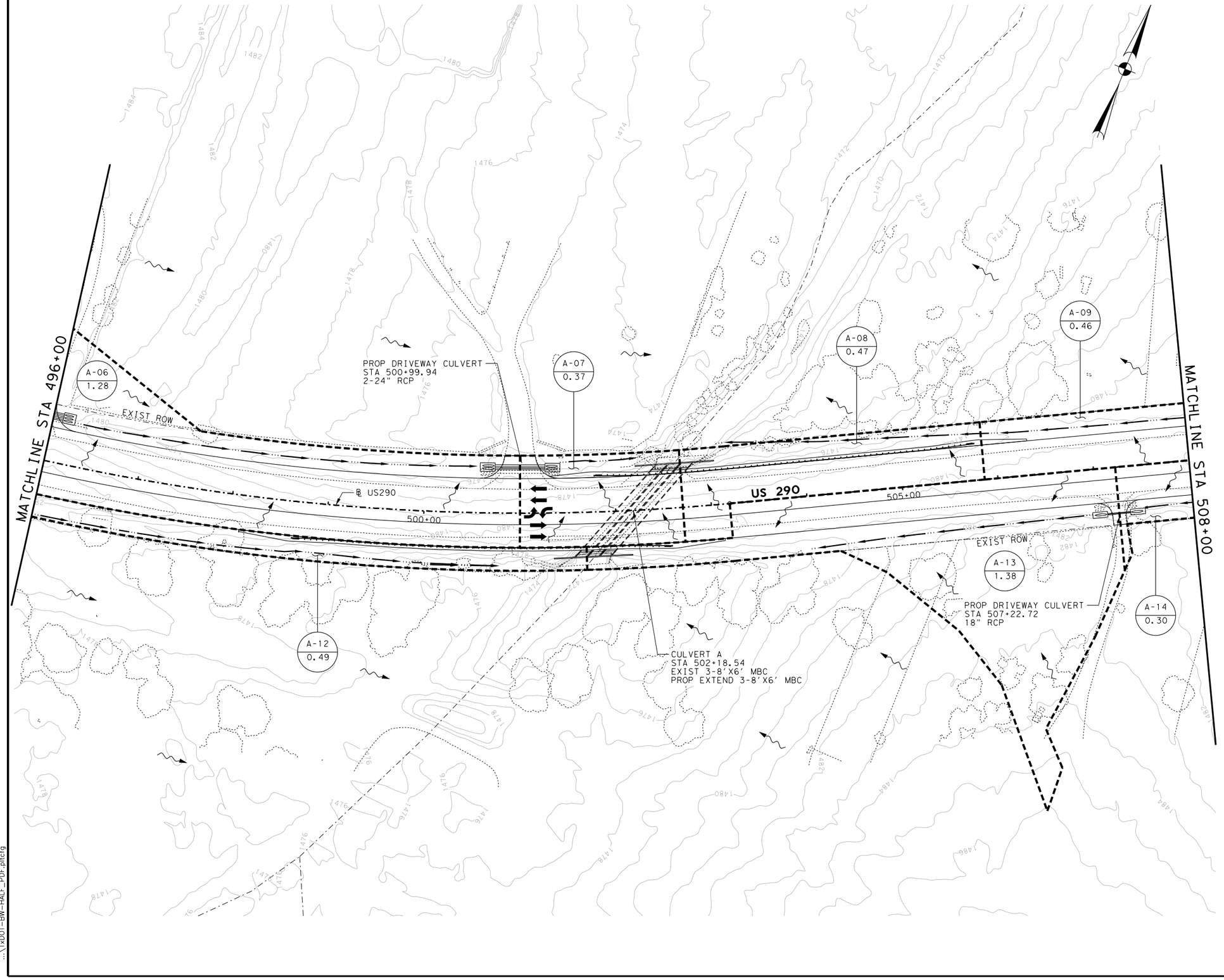

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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US 290

DRAINAGE AREA MAPS

STA 496+00 TO STA 508+00

SHEET 4 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CC	6	TEXAS					US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW: CC	AUS	GILLESPIE	0113	02	063		134

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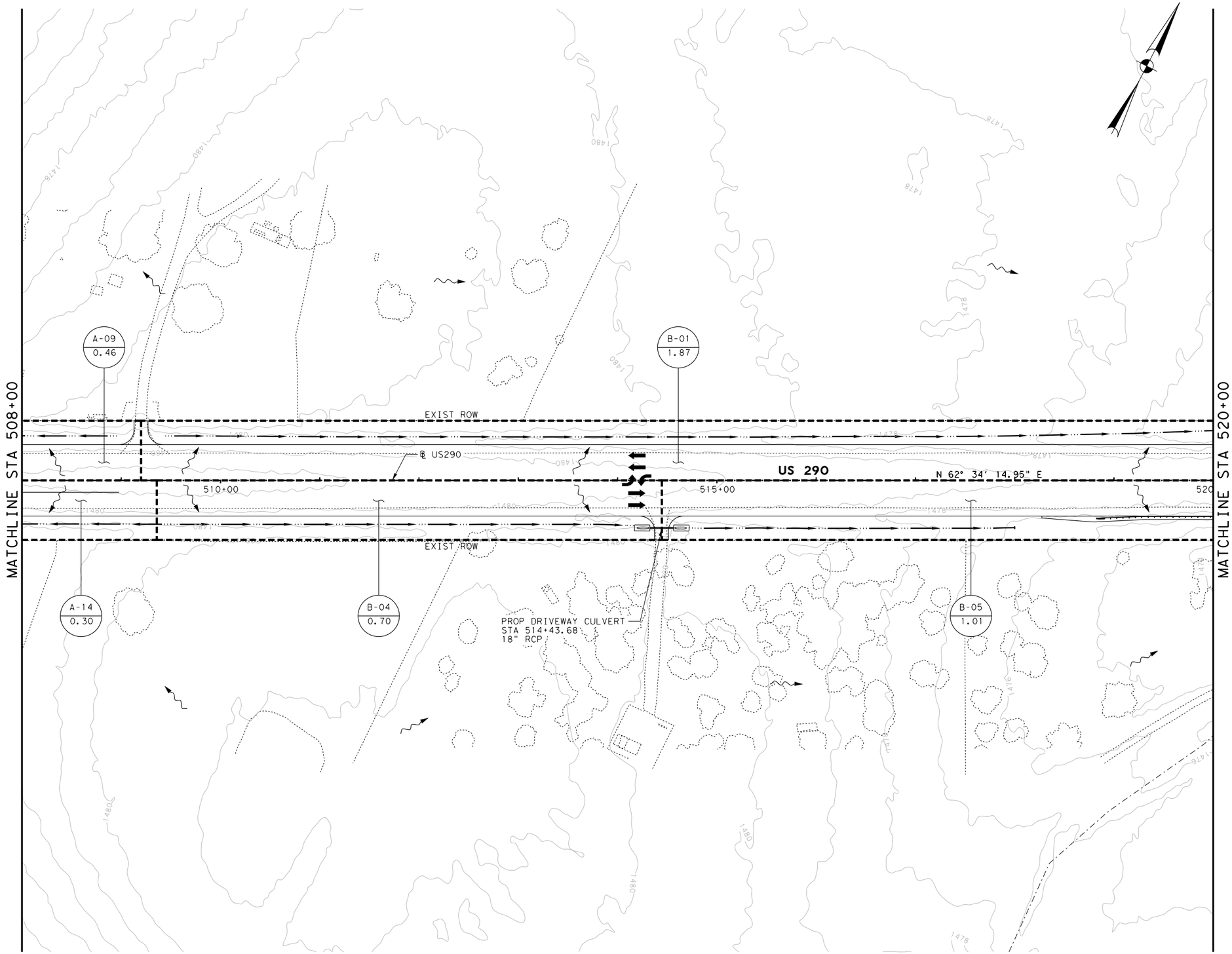

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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DRAINAGE AREA MAPS

STA 508+00 TO STA 520+00

SHEET 5 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	135

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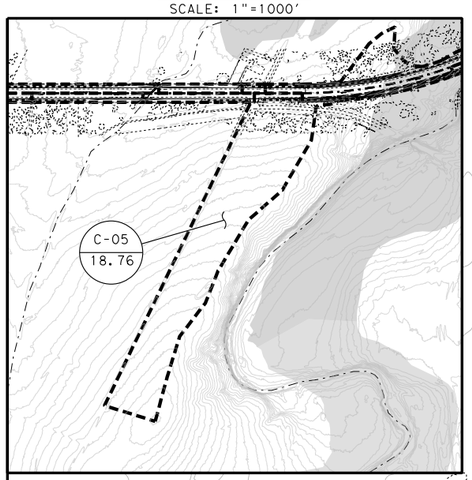

B-01 1.87

B-02 0.76

B-03 0.21

C-01 4.89

GELLERMANN LN

EXIST ROW

℄ US290

US 290

525+00

530+00

MATCHLINE STA 520+00

MATCHLINE STA 532+00

DITCH_EB02

CULVERT B
STA 522+29.83
EXIST 8'X6' SBC
PROP EXTEND 8'X6' SBC

B-05 1.01

B-06 1.01

EXIST ROW

OLD AUSTIN HWY

HAHN RD

C-05 18.76

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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US 290

DRAINAGE AREA MAPS

STA 520+00 TO STA 532+00

SHEET 6 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CC	6	TEXAS					US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
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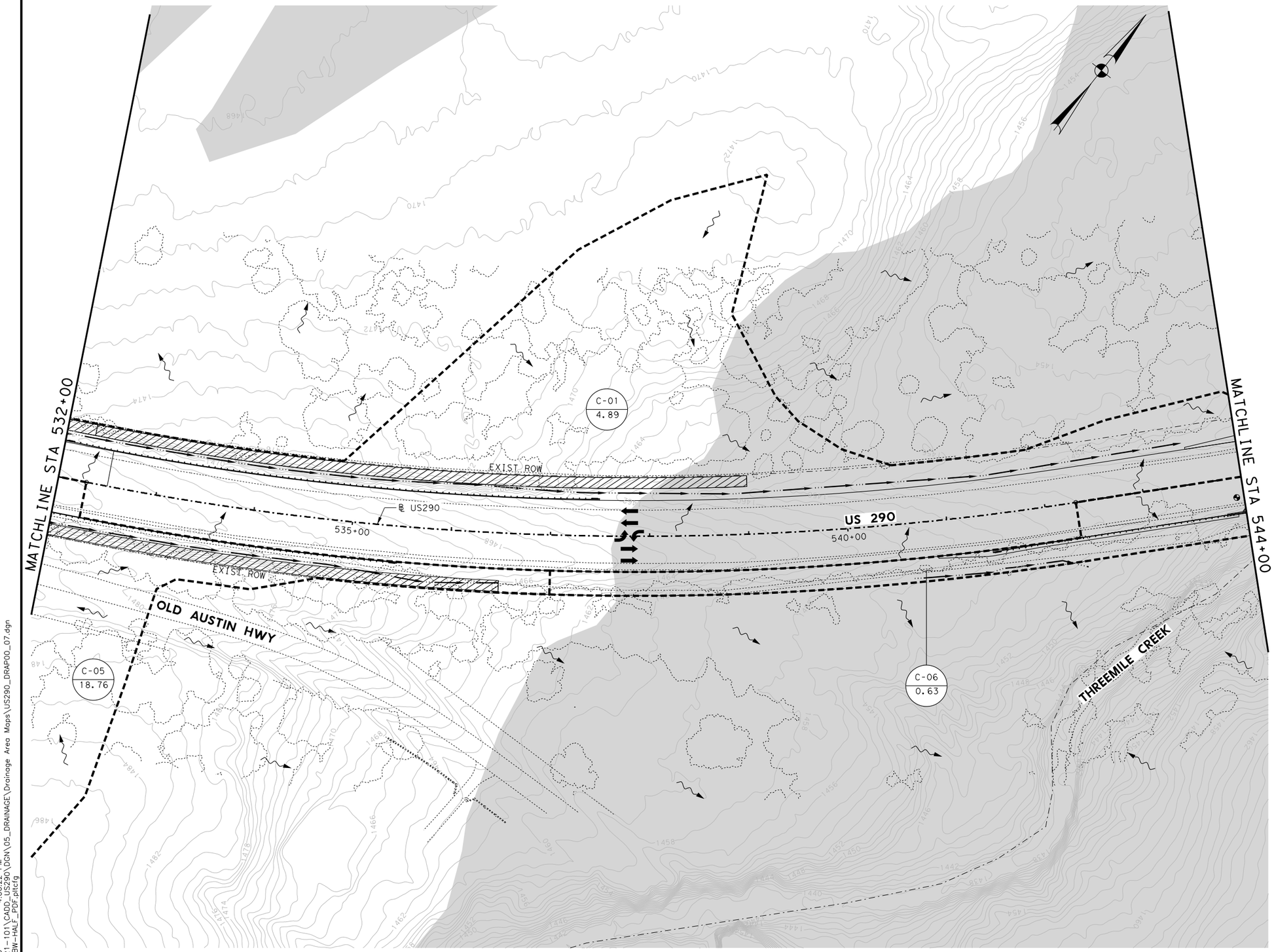

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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US 290

DRAINAGE AREA MAPS

STA 532+00 TO STA 544+00

SHEET 7 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CC	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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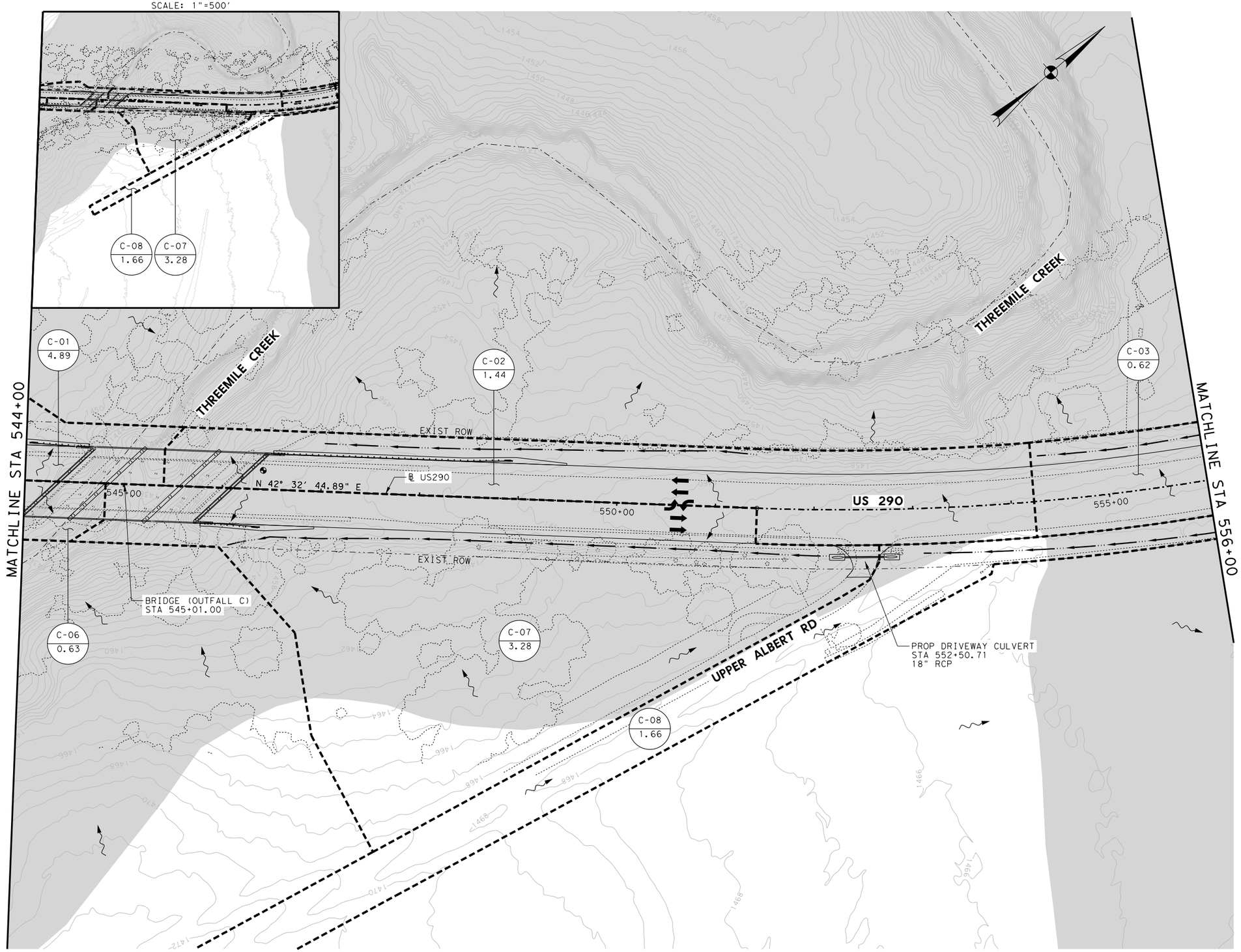

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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DRAINAGE AREA MAPS

STA 544+00 TO STA 556+00

SHEET 8 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CC	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CC	AUS	GILLESPIE	0113	02	063	138

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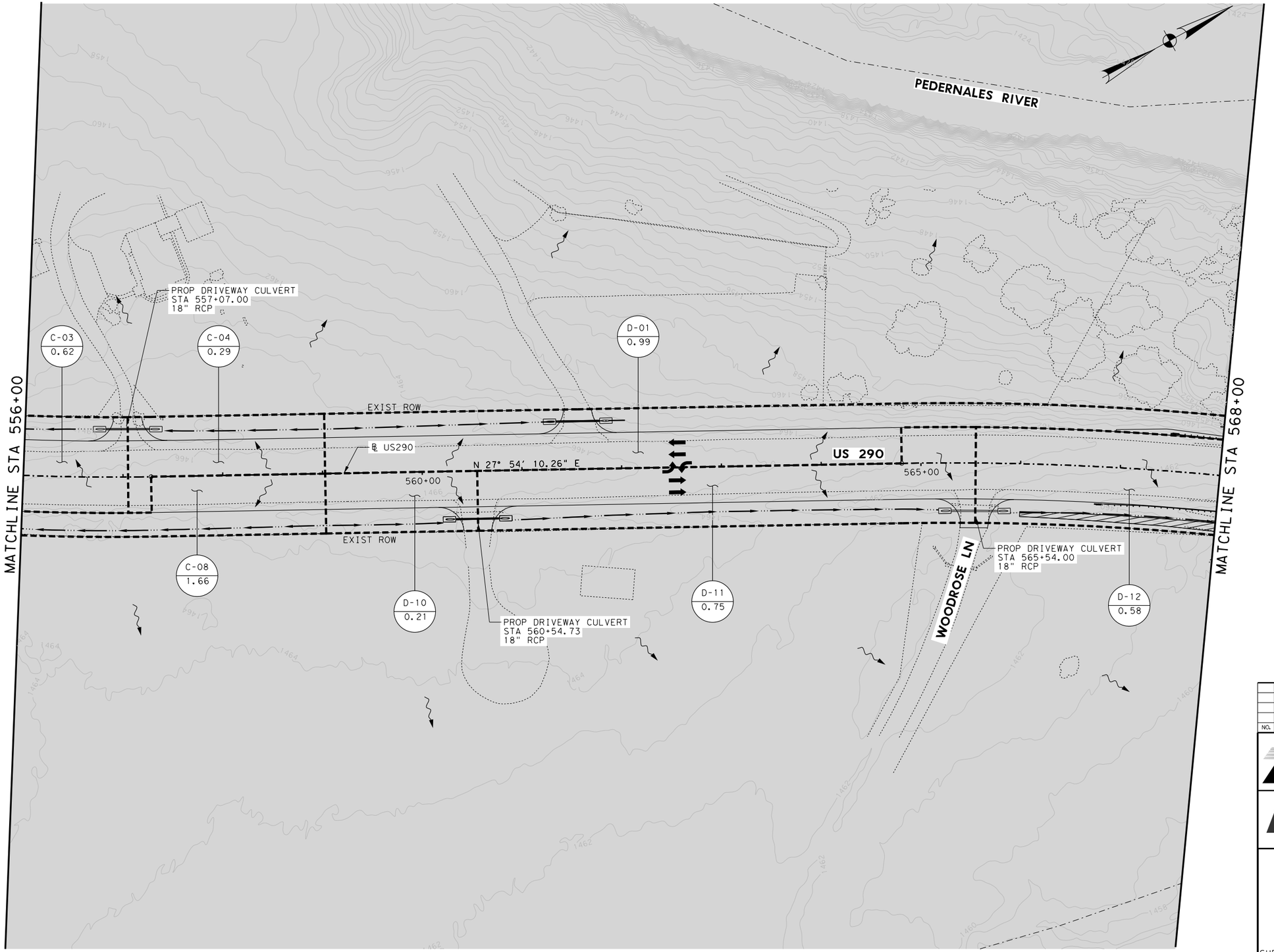

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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DRAINAGE AREA MAPS

STA 556+00 TO STA 568+00

SHEET 9 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CC	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CC	AUS	GILLESPIE	0113	02	063	139

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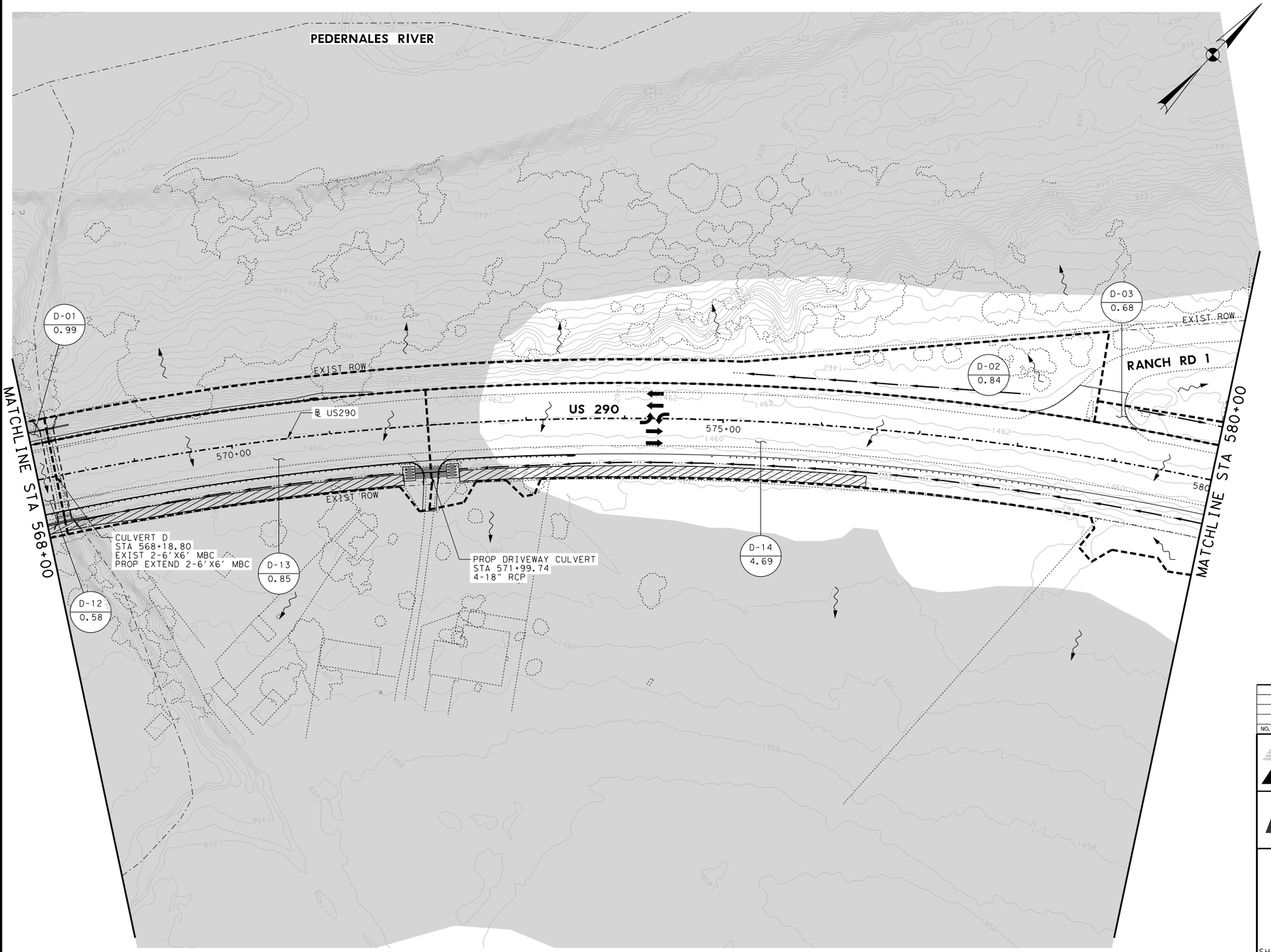

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

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DRAINAGE AREA MAPS

STA 568+00 TO STA 580+00

SHEET 10 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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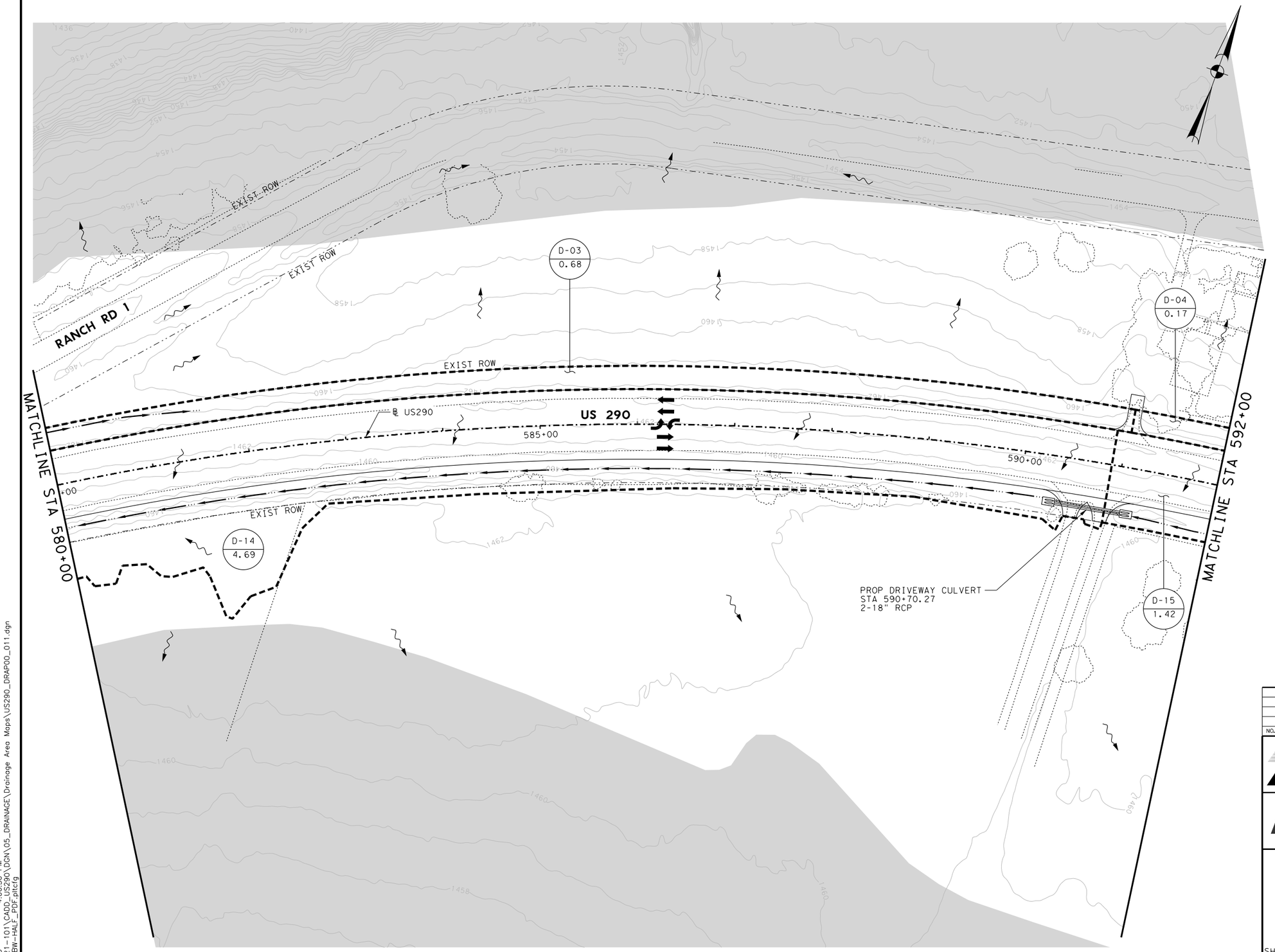

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

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DRAINAGE AREA MAPS

STA 580+00 TO STA 592+00

SHEET 11 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN: CC	6	TEXAS					US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
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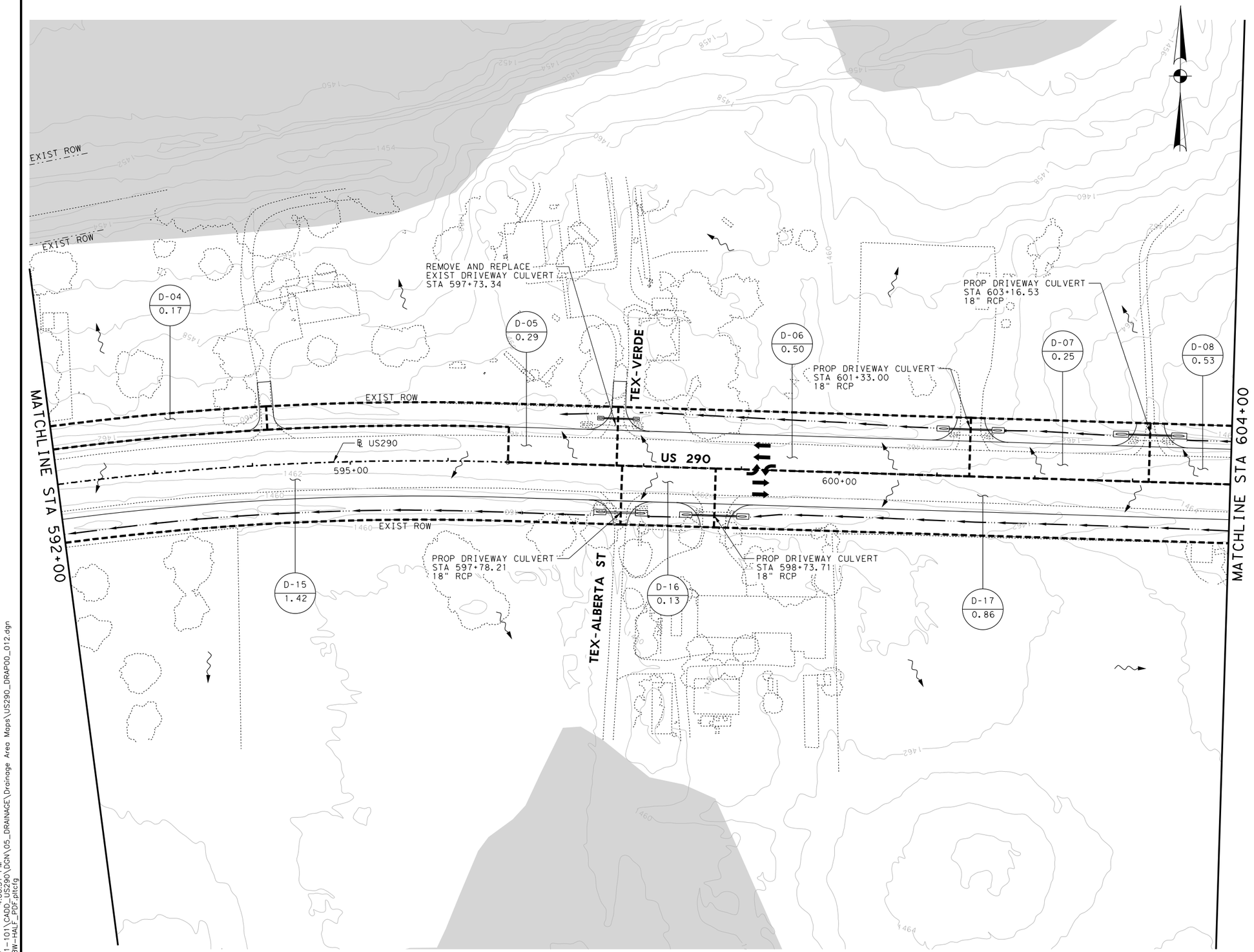

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
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DRAINAGE AREA MAPS

STA 592+00 TO STA 604+00

SHEET 12 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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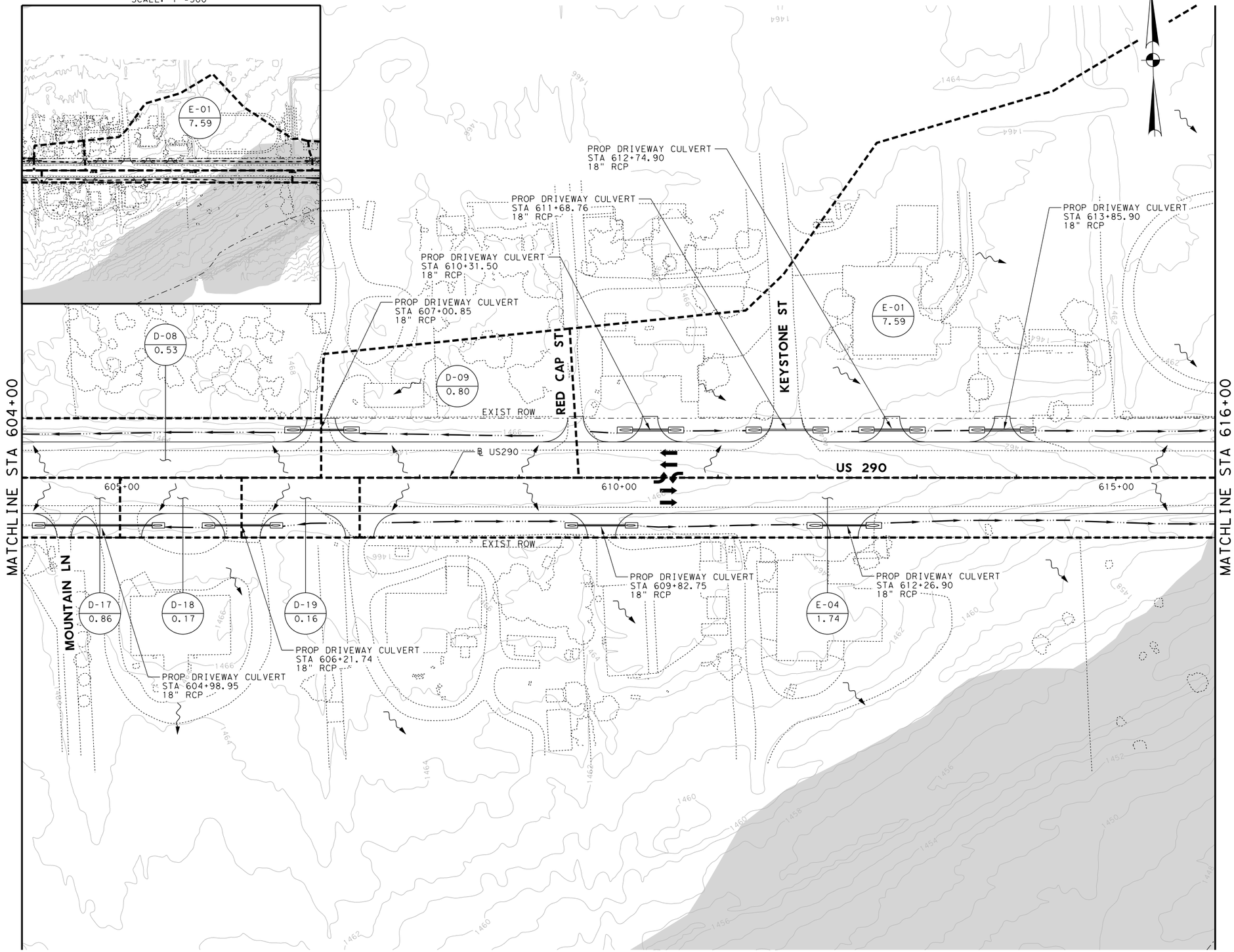

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

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DRAINAGE AREA MAPS

STA 604+00 TO STA 616+00

SHEET 13 OF 14

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	143

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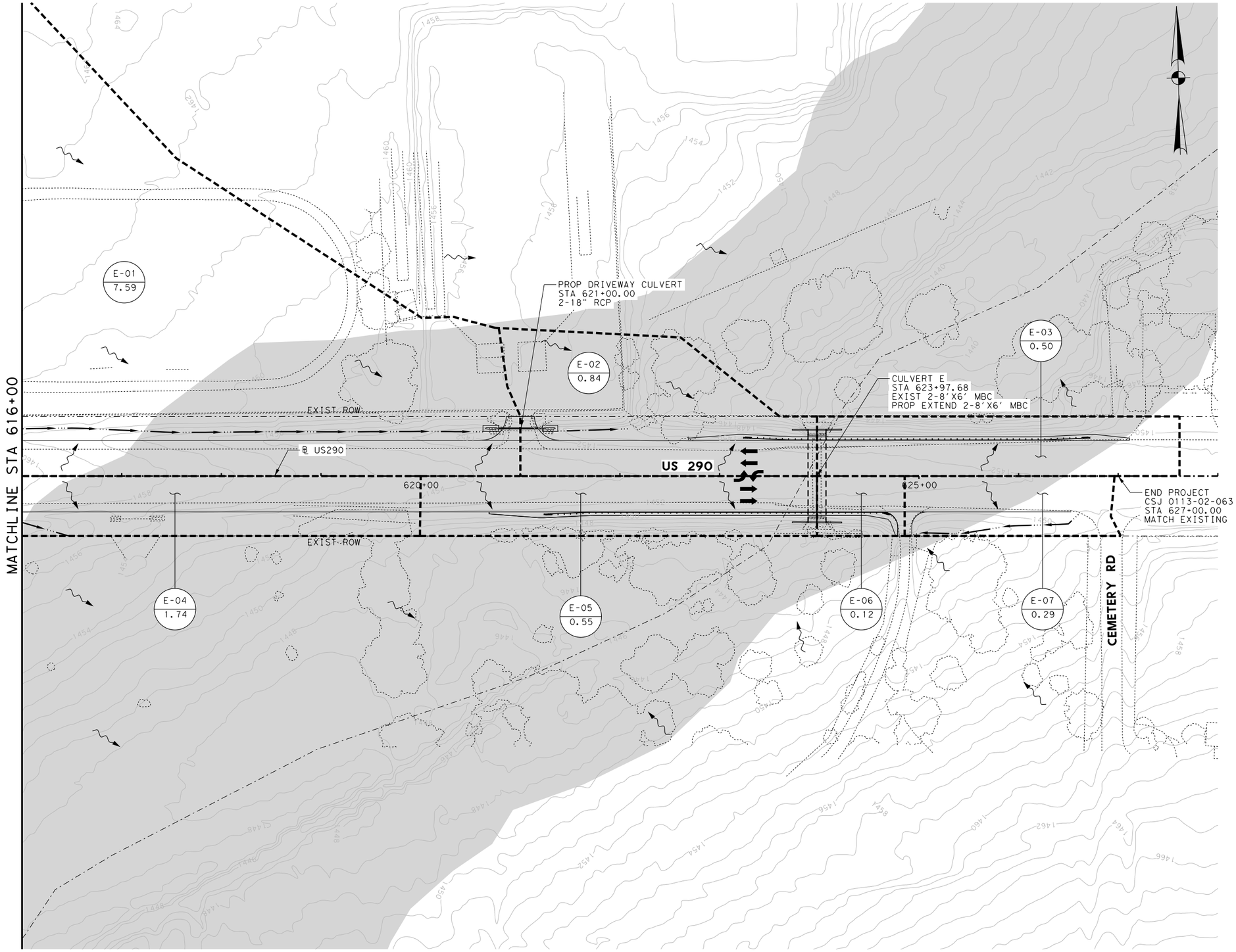

LEGEND

- DRAINAGE AREA BOUNDARY
- PROPOSED DITCH
- STREAM CENTERLINE
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE AE FLOODPLAIN
- X-X / XX.XX — DA ID / AREA (AC)

NOTES:

1. CONTOUR DATA IS DERIVED FROM HURRICANE USGS LIDAR, 2019.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

wanzhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE AREA MAPS

STA 616+00 TO END OF PROJECT

SHEET 14 OF 14

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CC	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CC	AUS	GILLESPIE	0113	02	063	144

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RUNOFF COMPUTATIONS																					
DRAINAGE AREA			COMPOSITE AREA, (AC)						SHEET FLOW LENGTH (FT)	SHALLOW CONCENTRATED FLOW LENGTH (FT)	CHANNEL FLOW LENGTH (FT)	SHEET, Tsh (MIN)	SHALLOW CONCENTRATED , Tsc (MIN)	CHANNEL , Tch (MIN)	Tc ACTUAL (MIN) (Tsh + Tsc + Tch)	Tc USED	FREQ. (YR)	INTENSITY I 5-YR	DISCHARGE Q 5-YR (CFS)	INTENSITY I 100-YR	DISCHARGE Q 100-YR (CFS)
AREA ID	OUTFALL ID	TOTAL AREA (AC)	PAVEMENT (C=0.90)	COMMERCIAL (C=0.65)	RURAL RES. (C=0.40)	GRASS (C=0.30)	WEIGHTED C	CA													
A-01	A	1.14	0.72	0.00	0.00	0.42	0.68		100.00	-	729.00	0.00	0.00	2.97	2.97	10.00	5	6.02	4.66	11.42	8.86
A-02	A	2.16	0.88	0.00	0.02	1.26	0.55		100.00	-	1636.00	0.00	0.00	9.08	9.08	10.00	5	6.02	7.15	11.42	13.57
A-03	A	0.42	0.16	0.00	0.10	0.16	0.55		100.00	255.00	71.00	15.22	2.01	0.14	17.37	17.37	5	4.79	1.11	9.20	2.12
A-04	A	0.69	0.18	0.00	0.21	0.30	0.48		100.00	340.00	73.00	15.22	2.64	0.14	18.01	18.01	5	4.71	1.56	9.05	3.00
A-05	A	2.64	0.54	0.00	0.72	1.38	0.45		100.00	437.00	223.00	15.22	3.40	0.50	19.11	19.11	5	4.58	5.44	8.81	10.46
A-06	A	1.28	0.87	0.00	0.00	0.41	0.71		100.00	335.00	357.00	8.00	3.43	1.26	12.68	12.68	5	5.50	4.99	10.48	9.52
A-07	A	0.37	0.30	0.00	0.00	0.07	0.79		100.00	-	150.00	6.97	0.00	0.20	7.18	10.00	5	6.02	1.76	11.42	3.34
A-08	A	0.47	0.32	0.00	0.00	0.15	0.71		100.00	-	227.00	6.92	0.00	0.38	7.30	10.00	5	6.02	2.01	11.42	3.81
A-09	A	0.46	0.29	0.00	0.00	0.17	0.68		100.00	-	248.00	10.32	0.00	1.02	11.35	11.35	5	5.74	1.80	10.93	3.42
A-10	A	13.30	0.95	0.33	0.00	12.02	0.35		100.00	482.00	644.00	11.53	5.47	2.08	19.08	19.08	5	4.58	21.33	8.81	41.03
A-11	A	17.67	4.42	0.00	0.00	13.25	0.45		100.00	866.00	1566.00	11.53	8.45	8.19	28.17	28.17	5	3.74	29.74	7.27	57.81
A-12	A	0.49	0.04	0.00	0.00	0.45	0.35		-	-	888.68	0.00	0.00	2.49	2.49	10.00	5	6.02	1.03	11.42	1.96
A-13	A	1.38	0.41	0.00	0.00	0.97	0.48		100.00	226.00	514.00	8.74	1.26	2.13	12.13	12.13	5	5.59	3.71	10.66	7.06
A-14	A	0.30	0.19	0.00	0.00	0.11	0.68		100.00	-	126.00	0.00	0.00	0.65	0.65	10.00	5	6.02	1.23	11.42	2.33

RUNOFF COMPUTATIONS																					
DRAINAGE AREA			COMPOSITE AREA, (AC)						SHEET FLOW LENGTH (FT)	SHALLOW CONCENTRATED FLOW	CHANNEL FLOW LENGTH (FT)	SHEET, Tsh (MIN)	SHALLOW CONCENTRATED , Tsc (MIN)	CHANNEL , Tch (MIN)	Tc ACTUAL (MIN) (Tsh + Tsc + Tch)	Tc USED	FREQ. (YR)	INTENSITY I 5-YR	DISCHARGE Q 5-YR (CFS)	INTENSITY I 100-YR	DISCHARGE Q 100-YR (CFS)
AREA ID	OUTFALL ID	TOTAL AREA (AC)	PAVEMENT (C=0.90)	COMMERCIAL (C=0.65)	RURAL RES. (C=0.40)	GRASS (C=0.30)	WEIGHTED C	CA													
B-01	B	1.87	1.14	0.00	0.00	0.73	0.67		100.00	-	1273.00	0.00	0.00	4.89	4.89	10.00	5	6.02	7.54	11.42	14.31
B-02	B	0.76	0.50	0.00	0.00	0.26	0.69		100.00	-	462.00	0.00	0.00	2.39	2.39	10.00	5	6.02	3.15	11.42	5.99
B-03	B	0.21	0.14	0.00	0.00	0.07	0.70		100.00	-	61.00	0.00	0.00	0.19	0.19	10.00	5	6.02	0.88	11.42	1.68
B-04	B	0.70	0.42	0.00	0.00	0.28	0.66		100.00	-	423.00	0.00	0.00	2.55	2.55	10.00	5	6.02	2.78	11.42	5.28
B-05	B	1.01	0.64	0.00	0.00	0.37	0.68		100.00	-	646.00	0.00	0.00	2.59	2.59	10.00	5	6.02	4.13	11.42	7.85
B-06	B	1.01	0.63	0.00	0.00	0.38	0.68		100.00	-	642.00	0.00	0.00	5.32	5.32	10.00	5	6.02	4.13	11.42	7.85

RUNOFF COMPUTATIONS																					
DRAINAGE AREA			COMPOSITE AREA, (AC)						SHEET FLOW LENGTH (FT)	SHALLOW CONCENTRATED FLOW	CHANNEL FLOW LENGTH (FT)	SHEET, Tsh (MIN)	SHALLOW CONCENTRATED , Tsc (MIN)	CHANNEL , Tch (MIN)	Tc ACTUAL (MIN) (Tsh + Tsc + Tch)	Tc USED	FREQ. (YR)	INTENSITY I 5-YR	DISCHARGE Q 5-YR (CFS)	INTENSITY I 100-YR	DISCHARGE Q 100-YR (CFS)
AREA ID	OUTFALL ID	TOTAL AREA (AC)	PAVEMENT (C=0.90)	COMMERCIAL (C=0.65)	RURAL RES. (C=0.40)	GRASS (C=0.30)	WEIGHTED C	CA													
C-01	C	4.89	2.14	0.00	0.00	2.75	0.56		100.00	-	1267.00	0.00	0.00	3.23	3.23	10.00	5	6.02	16.47	11.42	31.29
C-02	C	1.44	0.99	0.00	0.00	0.45	0.71		100.00	-	658.00	0.00	0.00	2.16	2.16	10.00	5	6.02	6.15	11.42	11.68
C-03	C	0.62	0.48	0.00	0.00	0.14	0.76		100.00	-	225.00	0.00	0.00	0.83	0.83	10.00	5	6.02	2.83	11.42	5.38
C-04	C	0.29	0.19	0.00	0.00	0.10	0.69		100.00	-	92.00	0.00	0.00	0.34	0.34	10.00	5	6.02	1.20	11.42	2.29
C-05	C	18.76	1.03	0.00	0.00	17.73	0.33		100.00	2210.00	716.00	8.74	16.62	2.07	27.43	27.43	5	3.80	23.50	7.37	45.64
C-06	C	0.63	0.23	0.00	0.00	0.40	0.52		-	-	665.00	0.00	0.00	1.28	1.28	10.00	5	6.02	1.97	11.42	3.74
C-07	C	3.28	0.79	0.00	0.00	2.49	0.44		100.00	464.00	584.00	15.22	4.12	1.42	20.76	20.76	5	4.40	6.34	8.47	12.23
C-08	C	1.66	0.33	0.00	0.00	1.33	0.42		100.00	933.00	83.00	8.74	10.24	0.23	19.21	19.21	5	4.57	3.18	8.79	6.13

RUNOFF COMPUTATIONS																					
DRAINAGE AREA			COMPOSITE AREA, (AC)						SHEET FLOW LENGTH (FT)	SHALLOW CONCENTRATED FLOW	CHANNEL FLOW LENGTH (FT)	SHEET, Tsh (MIN)	SHALLOW CONCENTRATED , Tsc (MIN)	CHANNEL , Tch (MIN)	Tc ACTUAL (MIN) (Tsh + Tsc + Tch)	Tc USED	FREQ. (YR)	INTENSITY I 5-YR	DISCHARGE Q 5-YR (CFS)	INTENSITY I 100-YR	DISCHARGE Q 100-YR (CFS)
AREA ID	OUTFALL ID	TOTAL AREA (AC)	PAVEMENT (C=0.90)	COMMERCIAL (C=0.65)	RURAL RES. (C=0.40)	GRASS (C=0.30)	WEIGHTED C	CA													
D-01	D	0.99	0.52	0.00	0.00	0.47	0.61		100.00	-	836.00	12.68	0.00	3.79	16.47	16.47	5	4.91	2.97	9.42	5.69
D-02	D	0.84	0.07	0.00	0.00	0.77	0.35		-	-	1074.00	0.00	0.00	9.96	9.96	10.00	5	6.02	1.77	11.42	3.36
D-03	D	0.68	0.02	0.00	0.00	0.66	0.32		-	-	1244.00	0.00	0.00	17.72	17.72	17.72	5	4.75	1.03	9.12	1.98
D-04	D	0.17	0.01	0.00	0.00	0.16	0.35		-	-	304.00	0.00	0.00	2.09	2.09	10.00	5	6.02	0.36	11.42	0.68
D-05	D	0.29	0.10	0.00	0.00	0.19	0.51		-	-	345.00	0.00	0.00	2.16	2.16	10.00	5	6.02	0.89	11.42	1.69
D-06	D	0.50	0.32	0.00	0.00	0.18	0.68		100.00	-	267.00	12.09	0.00	1.51	13.59	13.59	5	5.34	1.82	10.20	3.47
D-07	D	0.25	0.17	0.00	0.00	0.08	0.71		100.00	-	75.00	11.63	0.00	0.20	11.83	11.83	5	5.65	1.00	10.76	1.91
D-08	D	0.53	0.34	0.00	0.00	0.19	0.68		100.00	-	278.00	10.69	0.00	0.97	11.66	11.66	5	5.68	2.05	10.82	3.90
D-09	D	0.80	0.25	0.00	0.17	0.38	0.51		100.00	-	151.00	13.97	0.00	0.67	14.64	14.64	5	5.18	2.11	9.90	4.04
D-10	D	0.21	0.14	0.00	0.00	0.07	0.70		-	-	152.00	0.00	0.00	0.64	0.64	10.00	5	6.02	0.88	11.42	1.68
D-11	D	0.75	0.50	0.00	0.00	0.25	0.70		-	-	499.00	0.00	0.00	1.59	1.59	10.00	5	6.02	3.16	11.42	6.00
D-12	D	0.58	0.47	0.00	0.00	0.11	0.79		100.00	-	208.00	6.83	0.00	0.57	7.40	10.00	5	6.02	2.76	11.42	5.23
D-13	D	0.85	0.65	0.00	0.00	0.20	0.76		100.00	-	323.00	7.09	0.00	0.91	8.00	10.00	5	6.02	3.89	11.42	7.38
D-14	D	4.69	3.15	0.00	0.00	1.54	0.70		100.00	-	1813.00	7.18	0.00	13.03	20.21	20.21	5	4.45	14.62	8.58	28.17
D-15	D	1.42	1.06	0.00	0.00	0.36	0.75		100.00	-	592.00	0.00	0.00	4.50	4.50	10.00	5	6.02	6.41	11.42	12.17
D-16	D	0.13	0.09	0.00	0.00	0.04	0.72		100.00	-	-	9.97	0.00	0.00	9.97	10.00	5	6.02	0.56	11.42	1.07
D-17	D	0.86	0.55	0.00	0.00	0.31	0.68		100.00	-	637.00	10.17	0.00	3.25	13.42	13.42	5	5.37	3.14	10.25	6.00
D-18	D	0.17	0.13	0.00	0.00	0.04	0.76		100.00	-	13.00	11.36	0.00	0.03	11.38	11.38	5	5.73	0.74	10.92	1.41
D-19	D	0.16	0.12	0.00	0.00	0.04	0.75		100.00	-	12.00	11.19	0.00	0.02	11.21	11.21	5	5.77	0.69	10.98	1.32

RUNOFF COMPUTATIONS																					
DRAINAGE AREA			COMPOSITE AREA, (AC)						SHEET FLOW LENGTH (FT)	SHALLOW CONCENTRATED FLOW	CHANNEL FLOW LENGTH (FT)	SHEET, Tsh (MIN)	SHALLOW CONCENTRATED , Tsc (MIN)	CHANNEL , Tch (MIN)	Tc ACTUAL (MIN) (Tsh + Tsc + Tch)	Tc USED	FREQ. (YR)	INTENSITY I 5-YR	DISCHARGE Q 5-YR (CFS)	INTENSITY I 100-YR	DISCHARGE Q 100-YR (CFS)
AREA ID	OUTFALL ID	TOTAL AREA (AC)	PAVEMENT (C=0.90)	COMMERCIAL (C=0.65)	RURAL RES. (C=0.40)	GRASS (C=0.30)	WEIGHTED C	CA													
E-01	E	7.59	0.98	2.49	0.00	4.12	0.49		100.00	414.00	627.00	15.22	4.15	1.73	21.11	21.11	5	4.36	16.21	8.41	31.27
E-02	E	0.84	0.27	0.00	0.00	0.57	0.49		100.00	35.00	232.00	11.53	0.10	0.33	11.97	11.97	5	5.62	2.31	10.71	4.41
E-03	E	0.50	0.36	0.00	0.00	0.14	0.73		100.00	-	276.00	13.15	0.00	0.52	13.67	13.67	5	5.33	1.94	10.18	3.71
E-04	E	1.74	1.33	0.00	0.00	0.41	0.76		100.00	-	1172.00	13.88	0.00	3.22	17.10	17.10	5	4.83	6.38	9.26	12.25
E-05	E	0.55	0.36	0.00	0.00	0.19	0.69		100.00	-	309.00	9.58	0.00	0.71	10.29	10.29	5	5.95	2.26	11.31	4.29
E-06	E	0.12	0.09	0.00	0.00	0.03	0.75		100.00	-	-	15.10	0.00	0.00	15.10	15.10	5	5.11	0.46	9.77	0.88
E-07	E	0.29	0.19	0.00	0.00	0.10	0.69		100.00	-	117.00	13.88	0.00	0.43	14.30	14.30	5	5.23	1.05	9.99	2.00

NOTES:

1. THE E, B and D COEFFICIENTS USED IN THE CALCULATION FOR INTENSITY WERE OBTAINED FROM TXDOT FILE "EBDLKUP-2019-VC6.2.10.XLSM" FOR GILLESPIE COUNTY, ZONE-3 AND ANNUAL MAXIMUM SERIES (AMS) METHODOLOGY. BASED ON NOAA ATLAS 14.
2. A MINIMUM TIME OF CONCENTRATION OF 10 MINUTES IS USED AS OUTLINED IN THE TXDOT HYDRAULIC DESIGN MANUAL, CHAPTER 4, SECTION 12.
3. TIME OF CONCENTRATION WAS CALCULATED USING NRCS METHOD PER TXDOT HDM SEPT 2019.

2/14/2023

wanzhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
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Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE COMPUTATIONS
DRAINAGE AREA CALCS

SHEET 1 OF 1

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	145

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STATION	FLOW LINE	LEFT TOP OF DITCH	RIGHT TOP OF DITCH	TOP OF DITCH	SLOPE	BOTTOM WIDTH	LEFT SIDE SLOPE (BACK SLOPE)	RIGHT SIDE SLOPE (FORE SLOPE)	DEPTH	n	DITCH MATERIAL	AREA	WP	R	Q (5-YR)	Q (100-YR)	VELOCITY	DITCH CAPACITY
	(FT)	(FT)	(FT)	(FT)	%	(FT)	H:1	H:1	(FT)			(SF)	(FT)		(CFS)	(CFS)	(FT/S)	(CFS)
A-02																		
487+00	1488.84	1491.05	1492.63	1491.05	0.0009	0.00	3.00	4.00	2.21	0.035	GRASS	17.09	16.10	1.06	9.03	17.15	1.33	22.72
488+00	1488.58	1491.56	1491.85	1491.56	0.0026	0.00	3.00	4.00	2.98	0.035	GRASS	31.08	21.71	1.43	9.73	18.47	2.76	85.70
489+00	1488.11	1490.93	1490.90	1490.90	0.0047	0.00	3.00	4.00	2.79	0.035	GRASS	27.24	20.33	1.34	10.42	19.79	3.55	96.66
490+00	1487.89	1489.43	1489.78	1489.43	0.0022	0.00	3.00	4.00	1.54	0.035	GRASS	8.30	11.22	0.74	11.12	21.11	1.63	13.56
490+50	1487.17	1488.28	1489.14	1488.28	0.0144	0.00	3.00	4.00	1.11	0.035	GRASS	4.31	8.09	0.53	11.46	21.77	3.36	14.49
A-03																		
491+50	1484.82	1487.66	1487.67	1487.66	0.0356	0.00	3.00	4.00	2.84	0.035	GRASS	28.23	20.69	1.36	12.36	23.49	9.88	278.94
492+00	1484.33	1487.09	1486.84	1486.84	0.0098	0.00	3.00	4.00	2.51	0.035	GRASS	22.05	18.29	1.21	12.92	24.55	4.77	105.28
A-04																		
492+00	1484.33	1487.09	1486.84	1486.84		0.00	3.00	4.00	2.51	0.035	GRASS	22.05	18.29	1.21				
492+50	1483.00	1487.14	1485.96	1485.96	0.0266	0.00	3.00	4.00	2.96	0.035	GRASS	30.67	21.56	1.42	13.70	26.05	8.78	269.25
A-05																		
493+50	1482.04	1485.20	1484.40	1484.40	0.0022	0.00	3.00	4.00	2.36	0.035	GRASS	19.49	17.19	1.13	15.38	29.30	2.17	42.32
494+00	1481.88	1484.41	1483.71	1483.71	0.0032	0.00	4.00	4.00	1.83	0.035	GRASS	13.40	15.09	0.89	16.29	31.04	2.22	29.80
495+00	1480.52	1483.05	1482.34	1482.34	0.0136	0.00	4.70	4.00	1.82	0.035	GRASS	14.41	16.25	0.89	18.10	34.53	4.58	66.03
495+50	1479.76	1482.13	1481.64	1481.64	0.0152	0.00	5.00	4.00	1.88	0.035	GRASS	15.90	17.34	0.92	19.01	36.27	4.96	78.81
A-06																		
496+50	1478.50	1480.17	1480.25	1480.17	0.0126	0.00	5.00	4.00	1.67	0.035	GRASS	12.55	15.40	0.81	20.47	39.07	4.17	52.32
497+00	1477.83	1479.68	1479.57	1479.57	0.0134	0.00	5.00	4.00	1.74	0.035	GRASS	13.62	16.05	0.85	21.03	40.13	4.42	60.20
498+00	1476.56	1478.20	1478.28	1478.20	0.0127	0.00	4.00	4.00	1.64	0.035	GRASS	10.76	13.52	0.80	22.14	42.25	4.12	44.31
499+00	1475.58	1477.41	1477.41	1477.41	0.0098	0.00	6.00	4.00	1.83	0.035	GRASS	16.74	18.68	0.90	23.25	44.37	3.92	65.61
500+00	1474.76	1476.14	1476.97	1476.14	0.0082	0.00	7.60	4.00	1.38	0.035	GRASS	11.05	16.27	0.68	24.36	46.48	2.98	32.89
500+50	1474.16	1475.56	1476.94	1475.56	0.0120	0.00	5.00	4.00	1.40	0.035	GRASS	8.82	12.91	0.68	24.91	47.54	3.62	31.90
A-07																		
501+50	1473.02	1474.95	1477.17	1474.95	0.0166	0.00	3.00	4.00	1.93	0.035	GRASS	13.04	14.06	0.93	25.79	49.21	5.22	67.99
502+00	1472.61	1474.67	1476.94	1474.67	0.0082	0.00	3.00	3.06	2.06	0.035	GRASS	12.86	13.15	0.98	26.67	50.88	3.80	48.84
A-08																		
503+00	1469.66	-	1477.38	1477.38	0.0333	0.00	-	3.04	7.72	0.035	GRASS	90.59	-	-	3.80	7.23	-	-
504+00	1472.99	1473.70	1477.83	1473.70	0.0179	0.00	3.00	3.06	0.71	0.035	GRASS	1.53	4.53	0.34	3.13	5.96	2.76	4.21
505+00	1474.78	1475.90	1478.27	1475.90	0.0192	0.00	3.00	3.08	1.12	0.035	GRASS	3.81	7.17	0.53	2.47	4.69	3.87	14.77
505+50	1475.74	1477.18	1478.51	1477.18	0.0234	0.00	3.00	3.10	1.44	0.035	GRASS	6.32	9.24	0.68	2.13	4.05	5.06	31.98
506+00	1476.91	1478.61	1479.13	1478.61		0.00	3.00	4.00	1.70	0.035	GRASS	10.11	12.39	0.82				
A-09																		
506+00	1476.91	1478.61	1479.13	1478.61	0.0085	0.00	3.00	4.00	1.70	0.035	GRASS	10.11	12.39	0.82	1.80	3.42	3.43	34.69
507+00	1477.76	1479.56	1479.66	1479.56	0.0047	0.00	3.00	4.00	1.80	0.035	GRASS	11.34	13.11	0.86	1.20	2.28	2.65	30.04
508+00	1478.23	1479.87	1480.12	1479.87	0.0034	0.00	3.00	4.00	1.64	0.035	GRASS	9.41	11.95	0.79	0.60	1.14	2.12	19.93
509+00	1478.57	1480.04	1480.45	1480.04		0.00	3.00	4.00	1.47	0.035	GRASS	7.56	10.71	0.71				
B-01																		
509+00	1478.57	1480.04	1480.45	1480.04		0.00	3.00	4.00	1.47	0.035	GRASS	7.56	10.71	0.71				
510+00	1478.48	1479.79	1480.42	1479.79	0.0009	0.00	3.00	4.00	1.31	0.035	GRASS	6.01	9.54	0.63	0.58	1.10	0.94	5.63
511+00	1478.44	1479.67	1480.22	1479.67	0.0004	0.00	3.00	4.00	1.23	0.035	GRASS	5.30	8.96	0.59	1.16	2.20	0.60	3.17
512+00	1478.24	1479.56	1480.01	1479.56	0.0020	0.00	3.00	4.00	1.32	0.035	GRASS	6.10	9.62	0.63	1.74	3.30	1.41	8.57
513+00	1478.00	1479.46	1479.76	1479.46	0.0024	0.00	3.00	4.00	1.46	0.035	GRASS	7.46	10.64	0.70	2.32	4.40	1.65	12.28
514+00	1477.72	1479.21	1479.48	1479.21	0.0028	0.00	3.00	4.00	1.49	0.035	GRASS	7.77	10.86	0.72	2.90	5.51	1.80	14.01
515+00	1477.44	1478.50	1479.19	1478.50	0.0028	0.00	3.00	4.00	1.06	0.035	GRASS	3.93	7.72	0.51	3.48	6.61	1.44	5.65
516+00	1477.23	1478.86	1479.07	1478.86	0.0021	0.00	7.50	4.00	1.63	0.035	GRASS	15.28	19.05	0.80	4.06	7.71	1.68	25.72
517+00	1476.95	1478.35	1478.81	1478.35	0.0028	0.00	8.50	4.00	1.40	0.035	GRASS	12.25	17.75	0.69	4.64	8.81	1.76	21.55
518+00	1476.24	1477.12	1478.29	1477.12	0.0071	0.00	6.00	4.00	0.88	0.035	GRASS	3.87	8.98	0.43	5.22	9.91	2.05	7.93
519+00	1475.45	1477.25	1477.98	1477.25	0.0079	0.00	6.00	4.00	1.80	0.035	GRASS	16.20	18.37	0.88	5.80	11.01	3.48	56.37
520+00	1474.27	1475.16	1477.68	1475.16	0.0118	0.00	3.00	4.00	0.89	0.035	GRASS	2.77	6.48	0.43	6.38	12.11	2.62	7.28
521+00	1473.05	1473.93	1477.38	1473.93	0.0122	0.00	3.00	4.00	0.88	0.035	GRASS	2.71	6.41	0.42	6.96	13.21	2.65	7.18
522+00	1471.88	1472.79	1477.07	1472.79	0.0117	0.00	3.00	4.00	0.91	0.035	GRASS	2.90	6.63	0.44	7.54	14.31	2.65	7.69
B-02																		
B-03																		
528+50	1471.88	1472.72	1474.40	1472.72	0.0056	0.00	3.00	4.00	0.84	0.035	GRASS	2.47	6.12	0.40	0.88	1.68	1.74	4.30
529+00	1472.16	1472.72	1474.09	1472.72	0.0020	0.00	3.00	4.00	0.56	0.035	GRASS	1.10	4.08	0.27	0.44	0.84	0.79	0.87
529+50	1472.26	1472.74	1473.75	1472.74		0.00	3.00	4.00	0.48	0.035	GRASS	0.81	3.50	0.23				
C-01																		
530+00	1471.67	1472.23	1473.36	1472.23		0.00	3.00	4.00	0.56	0.035	GRASS	1.10	4.08	0.27				
531+00	1470.93	1472.11	1472.62	1472.11	0.0074	0.00	3.00	4.00	1.18	0.035	GRASS	4.87	8.60	0.57	1.22	2.32	2.51	12.22
532+00	1470.06	1472.98	1471.73	1471.73	0.0087	0.00	3.00	4.00	1.67	0.035	GRASS	9.76	12.17	0.80	2.44	4.63	3.43	33.47
533+00	1468.59	1475.06	1470.16	1470.16	0.0147	0.00	2.25	3.18	1.57	0.025	CONC	6.69	9.10	0.74	3.66	6.95	5.89	39.40
534+00	1467.80	1475.49	1469.02	1469.02	0.0079	0.00	2.00	3.17	1.22	0.025	CONC	3.85	6.78	0.57	4.88	9.27	3.63	13.97
535+00	1466.55	1475.00	1467.90	1467.90	0.0125	0.00	2.00	3.17	1.35	0.025	CONC	4.71	7.51	0.63	6.10	11.59	4.88	23.01
536+00	1464.88	1472.14	1466.38	1466.38	0.0167	0.00	2.00	3.19	1.50	0.025	CONC	5.84	8.37	0.70	7.32	13.90	6.06	35.38
537+00	1463.33	1468.66	1464.44	1464.44	0.0155	0.00	3.00	3.20	1.11	0.035	GRASS	3.82	7.23	0.53	8.54	16.22	3.46	13.23
538+00	1461.28	1462.25	1462.79	1462.25	0.0205	0.00	10.00	4.00	0.97	0.035	GRASS	6.59	13.75	0.48	9.76	18.54	3.73	24.58
539+00	1459.05	1460.00	1460.79	1460.00	0.0223	0.00	8.00	4.00	0.95	0.035	GRASS	5.42	11.58	0.47	10.98	20.86	3.83	20.74
540+00	1456.91	1457.65	1458.79	1457.65	0.0214	0.00	12.00	4.00	0.74	0.035	GRASS	4.38	11.96	0.37	12.20	23.17	3.19	13.97
541+00	1455.05	1455.81	1457.06	1455.81	0.0186	0.00	13.00	4.00	0.76	0.035	GRASS	4.91	13.04	0.38	13.42	25.49	3.03	14.86
542+00	1454.02	1455.59	1455.96	1455.59	0.0103	0.00	9.00	4.00	1.57	0.035	GRASS	16.02	20.69	0.77	14.64	27.81	3.64	58.37
543+00	1452.94	1455.06	1455.45	1455.06	0.0108	0.00	3.00	4.00	2.12	0.035	GRASS	15.73	15.45	1.02	15.86	30.13	4.48	70.45
543+50	1452.61	1454.39	1455.39	1454.39	0.0066	0.00	5.00	4.00	1.78	0.035	GRASS	14.26	16.42	0.87	16.47	31.29	3.15	44.89

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER

2/14/2023

wan zhang

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE COMPUTATIONS
DITCH CALCS
WESTBOUND

SHEET 1 OF 2

DN:	CC	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	146

US290_DRCP00_02.dgn

STATION	FLOW LINE	LEFT TOP OF DITCH	RIGHT TOP OF DITCH	TOP OF DITCH	SLOPE	BOTTOM WIDTH	LEFT SIDE SLOPE (BACK SLOPE)	RIGHT SIDE SLOPE (FORE SLOPE)	DEPTH	n	DITCH MATERIAL	AREA	WP	R	Q (5-YR)	Q (100-YR)	VELOCITY	DITCH CAPACITY
	(FT)	(FT)	(FT)	(FT)	%	(FT)	H:1	H:1	(FT)			(SF)	(FT)		(CFS)	(CFS)	(FT/S)	(CFS)
C-02																		
547+50	1453.50	1455.67	1456.01	1455.67	0.0040	0.00	3.00	4.00	2.17	0.035	GRASS	16.48	15.81	1.04	10.19	19.35	2.77	45.62
548+00	1453.70	1455.54	1456.17	1455.54	0.0010	0.00	3.00	4.00	1.84	0.035	GRASS	11.85	13.41	0.88	9.72	18.45	1.24	14.69
549+00	1453.80	1455.01	1457.24	1455.01	0.0052	0.00	3.00	4.00	1.21	0.035	GRASS	5.12	8.82	0.58	8.77	16.65	2.14	10.96
550+00	1454.32	1455.90	1458.28	1455.90	0.0008	0.00	3.00	4.00	1.58	0.035	GRASS	8.74	11.51	0.76	7.82	14.86	1.00	8.75
551+00	1454.40	1455.29	1459.32	1455.29	0.0110	0.00	3.00	4.00	0.89	0.035	GRASS	2.77	6.48	0.43	6.88	13.06	2.53	7.03
C-03																		
554+50	1460.85	1461.73	1462.92	1461.73	0.0124	0	3.00	4.00	0.88	0.035	GRASS	2.71	6.41	0.42	4.04	7.67	2.67	7.24
555+00	1461.47	1464.24	1463.35	1463.35	0.0017	0	3.00	4.00	1.88	0.035	GRASS	12.37	13.70	0.90	3.47	6.59	1.64	20.29
556+00	1461.64	1465.01	1464.04	1464.04	0.0018	0	3.00	4.00	2.40	0.035	GRASS	20.16	17.48	1.15	2.34	4.44	1.99	40.04
556+50	1461.73	1465.06	1464.47	1464.47	0.0258	0	3.00	4.00	2.74	0.035	GRASS	26.28	19.96	1.32	1.77	3.36	8.21	215.81
C-04																		
557+50	1463.16	1464.85	1465.16	1464.85	0.0082	0	3.00	4.00	1.69	0.035	GRASS	10.00	12.31	0.81	0.90	1.71	3.36	33.54
558+00	1463.57	1465.09	1465.45	1465.09	0.0043	0	3.00	4.00	1.52	0.035	GRASS	8.09	11.07	0.73	0.60	1.14	2.26	18.31
559+00	1464.00	1465.25	1465.86	1465.25		0	3.00	4.00	1.25	0.035	GRASS	5.47	9.11	0.60				
D-01																		
560+00	1463.00	1465.44	1466.06	1465.44		0	3.00	4.00	2.44	0.035	GRASS	20.84	17.78	1.17				
561+00	1461.47	1464.43	1466.05	1464.43	0.0153	0	3.00	4.00	2.96	0.035	GRASS	30.67	21.56	1.42	0.42	0.81	6.66	204.20
561+50	1460.97	1463.84	1465.97	1463.84	0.0100	0	3.00	4.00	2.87	0.035	GRASS	28.83	20.91	1.38	0.64	1.22	5.27	152.04
562+00	1460.93	1462.5	1465.83	1462.50	0.0008	0	3.00	4.00	1.57	0.035	GRASS	8.63	11.44	0.75	0.85	1.62	1.00	8.61
D-02																		
575+00	1459.24	1461.45	1462.13	1461.45	0.0005	0	3.00	4.00	2.21	0.035	GRASS	17.09	16.10	1.06	9.97	19.01	0.99	16.94
576+00	1459.29	1461.65	1462.39	1461.65	0.0005	0	3.00	4.00	2.36	0.035	GRASS	19.49	17.19	1.13	9.79	18.68	1.04	20.18
577+00	1459.34	1462.02	1462.66	1462.02	0.0005	0	3.00	4.00	2.68	0.035	GRASS	25.14	19.52	1.29	9.61	18.34	1.13	28.32
578+00	1459.39	1461.57	1463.02	1461.57	0.0002	0	3.00	4.00	2.18	0.035	GRASS	16.63	15.88	1.05	9.44	18.00	0.62	10.33
D-03																		
579+00	1459.40	1461.46	1463.24	1461.46	0.0015	0	3.00	4.00	2.06	0.035	GRASS	14.85	15.01	0.99	9.26	17.67	1.64	24.32
580+00	1459.25	1460.91	1463.370	1460.91	0.0010	0	3.00	4.00	1.66	0.035	GRASS	9.64	12.09	0.80	9.17	17.50	1.16	11.17
581+00	1459.15	1460.61	1463.490	1460.61	0.0010	0	4.00	4.00	1.46	0.035	GRASS	8.53	12.04	0.71	9.09	17.34	1.07	9.12
582+00	1459.05	1460.45	1463.580	1460.45	0.0050	0	3.00	4.00	1.40	0.035	GRASS	6.86	10.20	0.67	9.00	17.17	2.31	15.85
D-05																		
597+50	1460.83	1461.38	1463.72	1461.38		0	6.00	3.00	0.55	0.035	GRASS	1.36	5.08	0.27				
D-06																		
598+50	1458.88	1460.74	1463.24	1460.74	0.0008	0	3.00	4.00	1.86	0.035	GRASS	12.11	13.55	0.89	6.68	12.74	1.12	13.53
599+00	1458.92	1460.95	1463.00	1460.95	0.0010	0	3.24	4.00	2.03	0.035	GRASS	14.92	15.25	0.98	6.37	12.16	1.33	19.79
600+00	1459.02	1460.84	1462.60	1460.84	0.0006	0	3.00	4.00	1.82	0.035	GRASS	11.59	13.26	0.87	5.77	11.00	0.95	11.05
600+50	1459.05	1460.78	1462.50	1460.78	0.0190	0	3.00	4.00	1.73	0.035	GRASS	10.48	12.60	0.83	5.46	10.43	5.19	54.34
D-07																		
602+00	1460.68	1462.39	1463.12	1462.39	0.0010	0	3.00	4.00	1.71	0.035	GRASS	10.23	12.46	0.82	4.83	9.21	1.18	12.09
602+50	1460.73	1463.08	1463.38	1463.08	0.0220	0	3.00	4.00	2.35	0.035	GRASS	19.33	17.12	1.13	4.49	8.57	6.85	132.33
D-08																		
604+00	1462.71	1465.84	1464.23	1464.23	0.0046	0	3.00	4.00	1.52	0.035	GRASS	8.09	11.07	0.73	3.87	7.38	2.34	18.93
605+00	1463.17	1466.05	1464.87	1464.87	0.0015	0	3.00	4.00	1.70	0.035	GRASS	10.11	12.39	0.82	3.28	6.27	1.44	14.57
606+00	1463.32	1466.53	1465.51	1465.51	0.0086	0	3.00	4.00	2.19	0.035	GRASS	16.79	15.95	1.05	2.70	5.15	4.08	68.55
D-09																		
608+00	1464.51	1465.74	1466.23	1465.74	0.0029	0	3.00	4.00	1.23	0.035	GRASS	5.30	8.96	0.59	1.27	2.42	1.61	8.55
609+00	1464.80	1465.60	1466.21	1465.60	0.0020	0	3.00	4.00	0.80	0.035	GRASS	2.24	5.83	0.38	0.42	0.81	1.01	2.25
609+50	1464.90	1466.00	1466.13	1466.00		0	12.00	4.00	1.10	0.035	GRASS	9.68	17.78	0.54				
E-01																		
Driveway 29																		
610+00	1462.57	1465.42	1465.94	1465.42		0	3.00	4.00	2.85	0.035	GRASS	28.43	20.76	1.37				
611+00	1462.45	1465.02	1465.41	1465.02	0.0012	0	3.00	4.00	2.57	0.035	GRASS	23.12	18.72	1.23	1.47	2.84	1.70	39.24
Keystone St																		
612+00	1461.89	1464.16	1464.63	1464.16	0.0056	0	3.00	4.00	2.27	0.035	GRASS	18.04	16.54	1.09	2.95	5.68	3.38	60.87
612+50	1460.76	1463.70	1464.15	1463.70	0.0226	0	3.00	4.00	2.94	0.035	GRASS	30.25	21.42	1.41	3.68	7.11	8.06	243.73
Driveway 31																		
613+00	1460.36	1463.20	1463.60	1463.20	0.0080	0	3.00	4.00	2.84	0.035	GRASS	28.23	20.69	1.36	4.42	8.53	4.68	132.23
Driveway 32																		
614+00	1459.86	1462.02	1462.31	1462.02	0.0050	0	3.00	4.00	2.16	0.035	GRASS	16.33	15.74	1.04	5.89	11.37	3.09	50.38
615+00	1458.47	1461.30	1460.92	1460.92	0.0139	0	3.00	4.00	2.45	0.035	GRASS	21.01	17.85	1.18	7.37	14.21	5.60	117.55
616+00	1457.00	1460.73	1459.53	1459.53	0.0147	0	3.00	4.00	2.53	0.035	GRASS	22.40	18.43	1.22	8.84	17.05	5.88	131.70
617+00	1455.42	1459.88	1457.98	1457.98	0.0158	0	3.00	4.00	2.56	0.035	GRASS	22.94	18.65	1.23	10.32	19.90	6.14	140.90
618+00	1454.40	1459.65	1456.37	1456.37	0.0102	0	3.00	4.00	1.97	0.035	GRASS	13.58	14.35	0.95	11.79	22.74	4.14	56.30
619+00	1453.12	1458.29	1454.95	1454.95	0.0128	0	3.00	4.00	1.83	0.035	GRASS	11.72	13.33	0.88	13.26	25.58	4.42	51.81
620+00	1451.87	1456.77	1453.8	1453.80	0.0125	0	3.00	4.00	1.93	0.035	GRASS	13.04	14.06	0.93	14.74	28.42	4.53	59.00
620+50	1451.25	1453.55	1453.31	1453.31	0.0124	0	3.00	4.00	2.06	0.035	GRASS	14.85	15.01	0.99	15.47	29.84	4.71	69.92
E-02																		
621+50	1450.52	1452.23	1452.58	1452.23	0.0114	0	3.00	4.00	1.71	0.035	GRASS	10.23	12.46	0.82	16.67	32.15	3.99	40.80
622+00	1449.90	1454.27	1452.31	1452.31	0.0124	0	3.00	4.00	2.41	0.035	GRASS	20.33	17.56	1.16	17.14	33.03	5.23	106.26

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE COMPUTATIONS
DITCH CALCS
WESTBOUND

SHEET 2 OF 2

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	146A

STATION	FLOW LINE	LEFT TOP OF DITCH	RIGHT TOP OF DITCH	TOP OF DITCH	SLOPE	BOTTOM WIDTH	LEFT SIDE SLOPE (FORESLOPE)	RIGHT SIDE SLOPE (BACK SLOPE)	DEPTH	n	DITCH MATERIAL	AREA	WP	R	Q (5-YR)	Q (100-YR)	VELOCITY	DITCH CAPACITY
	(FT)	(FT)	(FT)	(FT)	%	(FT)	H:1	H:1	(FT)			(SF)	(FT)		(CFS)	(CFS)	(FT/S)	(CFS)
A-11																		
487+00	1489.23	1491.03	1491.85	1491.03	0.0035	5.50	4.00	3.00	1.80	0.035	GRASS	21.24	18.61	1.14	34.94	67.63	2.75	58.41
488+00	1488.88	1491.11	1491.25	1491.11	0.0035	2.50	4.00	3.00	2.23	0.035	GRASS	22.98	18.75	1.23	37.63	72.83	2.88	66.29
489+00	1488.31	1491.04	1490.47	1490.47	0.0057	0.00	4.00	5.70	2.16	0.035	GRASS	22.63	21.41	1.06	40.31	78.04	3.34	75.47
490+00	1486.89	1490.79	1488.93	1488.93	0.0142	0.00	4.00	3.50	2.04	0.035	GRASS	15.61	15.84	0.99	43.00	83.24	5.02	78.40
491+00	1485.93	1490.37	1487.78	1487.78	0.0096	0.00	4.00	3.00	1.85	0.035	GRASS	11.98	13.48	0.89	45.69	88.44	3.86	46.19
492+00	1484.65	1489.69	1486.60	1486.60	0.0128	0.00	4.00	2.00	1.95	0.025	CONC	11.41	12.40	0.92	48.38	93.64	6.38	72.76
492+50	1484.42	1489.26	1486.47	1486.47	0.0046	0.00	4.00	2.00	2.05	0.025	CONC	12.61	13.04	0.97	49.72	96.24	3.95	49.84
493+00	1484.20	1488.71	1486.49	1486.49	0.0044	0.00	4.00	3.00	2.29	0.035	GRASS	18.35	16.68	1.10	51.06	98.85	3.01	55.24
A-12																		
494+00	1481.80	1487.31	1483.44	1483.44	0.024	0.00	4.00	3.00	1.64	0.035	GRASS	9.41	11.95	0.79	51.19	99.08	5.63	52.96
495+00	1480.95	1485.93	1482.91	1482.91	0.0085	0.00	3.50	2.00	1.96	0.025	CONC	10.56	11.52	0.92	51.31	99.31	5.19	54.80
496+00	1479.56	1484.54	1481.43	1481.43	0.0139	0.00	3.25	2.00	1.87	0.025	CONC	9.18	10.54	0.87	51.43	99.54	6.41	58.82
497+00	1478.35	1483.17	1479.92	1479.92	0.0121	1.45	3.50	2.90	1.57	0.025	CONC	10.16	11.98	0.85	51.55	99.77	5.88	59.72
498+00	1477.46	1481.88	1479.64	1479.64	0.0089	0.00	4.00	3.00	2.18	0.035	GRASS	16.63	15.88	1.05	51.67	100.00	4.14	68.89
499+00	1476.86	1480.63	1478.71	1478.71	0.006	1.85	3.07	2.00	1.85	0.025	CONC	12.10	11.96	1.01	51.79	100.23	4.65	56.28
500+00	1475.49	1480.21	1477.07	1477.07	0.0137	1.57	3.06	2.00	1.58	0.025	CONC	8.80	10.19	0.86	51.91	100.46	6.32	55.64
A-13																		
504+00	1476.00	1480.53	1476.82	1476.82	0.0103	0.00	4.00	3.00	0.82	0.035	GRASS	2.35	5.97	0.39	3.45	6.57	2.32	5.46
505+00	1477.03	1480.34	1478.85	1478.85	0.0026	0.00	4.00	3.00	1.82	0.035	GRASS	11.59	13.26	0.87	2.71	5.16	1.98	23.01
506+00	1477.29	1480.19	1481.18	1480.19	0.0022	0.00	4.00	3.00	2.90	0.035	GRASS	29.44	21.13	1.39	1.97	3.74	2.49	73.32
507+00	1477.51	1480.08	1481.07	1480.08		0.00	4.00	3.00	2.57	0.035	GRASS	23.12	18.72	1.23				
A-14																		
507+50	1478.18	1480.02	1481.52	1480.02	0.0026	0.00	4.00	3.00	1.84	0.035	GRASS	11.85	13.41	0.88	1.23	2.33	2.00	23.69
508+00	1478.31	1480.14	1481.79	1480.14	0.0032	0.00	4.00	3.00	1.83	0.035	GRASS	11.72	13.33	0.88	0.92	1.75	2.21	25.90
509+00	1478.63	1480.47	1481.02	1480.47	0.0010	0.00	4.00	3.00	1.84	0.035	GRASS	11.85	13.41	0.88	0.31	0.58	1.24	14.69
509+50	1478.68	1480.51	1480.46	1480.46		0.00	4.00	3.00	1.78	0.035	GRASS	11.09	12.97	0.86				
B-04																		
509+50	1478.68	1480.51	1480.46	1480.46		0.00	4.00	3.00	1.78	0.035	GRASS	11.09	12.97	0.86				
510+00	1478.61	1480.44	1480.09	1480.09	0.0014	0.00	4.00	3.00	1.48	0.035	GRASS	7.67	10.78	0.71	0.28	0.53	1.27	9.73
511+00	1478.40	1480.23	1479.94	1479.94	0.0021	0.00	4.00	3.00	1.54	0.035	GRASS	8.30	11.22	0.74	0.83	1.58	1.60	13.25
512+00	1478.20	1480.03	1479.68	1479.68	0.0020	0.00	4.00	3.00	1.48	0.035	GRASS	7.67	10.78	0.71	1.39	2.64	1.52	11.63
513+00	1477.95	1479.78	1479.8	1479.78	0.0025	0.00	4.00	3.00	1.83	0.035	GRASS	11.72	13.33	0.88	1.95	3.69	1.95	22.90
514+00	1477.67	1479.5	1479.79	1479.50	0.0028	0.00	4.00	3.00	1.83	0.035	GRASS	11.72	13.33	0.88	2.50	4.75	2.07	24.23
B-05																		
515+00	1476.41	1479.19	1479.48	1479.19	0.0224	0.00	4.00	3.00	2.78	0.035	GRASS	27.05	20.25	1.34	3.07	5.84	7.73	209.01
516+00	1476.23	1479.07	1478.88	1478.88	0.0018	0.00	4.00	3.00	2.65	0.035	GRASS	24.58	19.31	1.27	3.66	6.96	2.12	52.15
517+00	1476.05	1478.81	1478.13	1478.13	0.0018	0.00	4.00	3.00	2.08	0.035	GRASS	15.14	15.15	1.00	4.25	8.08	1.81	27.34
518+00	1475.58	1478.29	1476.70	1476.70	0.0047	0.00	4.00	3.00	1.12	0.035	GRASS	4.39	8.16	0.54	4.85	9.20	1.93	8.48
B-06																		
526+00	1472.10	1475.62	1472.72	1472.72	0.0052	0.00	4.00	3.00	0.62	0.035	GRASS	1.35	4.52	0.30	1.77	3.36	1.37	1.84
527+00	1472.62	1475.15	1473.52	1473.52	0.0010	0.00	4.00	3.00	0.90	0.035	GRASS	2.84	6.56	0.43	1.18	2.24	0.77	2.18
528+00	1472.72	1474.69	1473.97	1473.97	0.0005	0.00	4.00	3.00	1.25	0.035	GRASS	5.47	9.11	0.60	0.59	1.12	0.68	3.71
529+00	1472.77	1474.60	1474.77	1474.60		0.00	4.00	3.00	1.83	0.035	GRASS	11.72	13.33	0.88			0.00	
C-05																		
529+50	1472.59	1474.59	1475.01	1474.59		0.00	4.00	3.00	2.00	0.035	GRASS	14.00	14.57	0.96				
530+00	1472.26	1474.53	1474.52	1474.52	0.0066	0.00	3.15	3.00	2.26	0.035	GRASS	15.71	14.62	1.07	1.57	3.04	3.63	56.99
531+00	1472.11	1474.41	1475.8	1474.41	0.0015	0.00	3.15	3.00	2.30	0.035	GRASS	16.27	14.87	1.09	4.70	9.13	1.75	28.47
532+00	1471.76	1474.12	1477.42	1474.12	0.0035	0.00	3.14	2.38	2.36	0.025	CONC	15.37	13.87	1.11	7.83	15.21	3.78	58.05
533+00	1471.66	1473.54	1479.06	1473.54	0.0010	0.00	3.14	2.00	1.88	0.025	CONC	9.08	10.40	0.87	10.96	21.30	1.72	15.64
534+00	1470.85	1472.19	1478.77	1472.19	0.0081	0.00	3.13	2.00	1.34	0.025	CONC	4.61	7.40	0.62	14.10	27.39	3.91	18.01
535+00	1469.39	1471.07	1474.00	1471.07	0.0146	0.00	3.11	3.00	1.68	0.035	GRASS	8.62	10.80	0.80	17.23	33.47	4.43	38.17
536+00	1465.98	1469.91	1468.10	1468.10	0.0341	0.00	4.00	3.00	2.12	0.035	GRASS	15.73	15.45	1.02	20.36	39.56	7.96	125.18
C-06																		
541+00	1455.43	1460.22	1456.71	1456.71	0.0290	0.00	4.00	3.00	1.28	0.035	GRASS	5.73	9.33	0.61	24.81	48.14	5.24	30.06
542+00	1453.24	1458.34	1454.58	1454.58	0.0219	0.00	3.06	3.00	1.34	0.035	GRASS	5.44	8.55	0.64	25.14	48.76	4.66	25.36
C-07																		
546+50	1453.53	1456.26	1456.20	1456.20	0.0024	0.00	4.00	4.00	2.67	0.035	GRASS	28.52	22.02	1.30	9.53	18.36	2.48	70.66
547+00	1453.65	1456.4	1455.19	1455.19	0.0177	0.00	4.00	3.00	1.54	0.035	GRASS	8.30	11.22	0.74	9.00	17.34	4.63	38.46
548+00	1455.42	1457.25	1458.49	1457.25	0.0134	0.00	4.00	3.00	1.83	0.035	GRASS	11.72	13.33	0.88	7.94	15.30	4.52	53.01
549+00	1456.76	1458.6	1460.82	1458.60	0.0168	0.00	4.00	3.00	1.84	0.035	GRASS	11.85	13.41	0.88	6.88	13.26	5.08	60.22
550+00	1458.44	1460.28	1463.23	1460.28	0.0156	0.00	4.00	3.00	1.84	0.035	GRASS	11.85	13.41	0.88	5.83	11.22	4.90	58.03
551+00	1460.00	1461.97	1460.87	1460.87	0.0120	0.00	4.00	3.00	0.87	0.035	GRASS	2.65	6.34	0.42	4.77	9.18	2.61	6.91
552+00	1461.20	1463.71	1461.85	1461.85	0.0304	0.00	4.00	3.00	0.65	0.035	GRASS	1.48	4.74	0.31	3.71	7.15	3.42	5.05
C-08																		
553+00	1462.97	1465.04	1464.29	1464.29	0.0033	0.00	4.00	3.00	1.32	0.035	GRASS	6.10	9.62	0.63	3.18	6.13	1.81	11.01
554+00	1463.30	1466.06	1464.72	1464.72	0.0010	0.00	4.00	3.00	1.42	0.035	GRASS	7.06	10.35	0.68	2.65	5.11	1.04	7.36
555+00	1463.40	1466.97	1464.78	1464.78	0.0010	0.00	4.00	3.00	1.38	0.035	GRASS	6.67	10.05	0.66	2.12	4.08	1.02	6.82
556+00	1463.50	1467.66	1464.76	1464.76	0.0010	0.00	4.00	3.00	1.26	0.035	GRASS	5.56	9.18	0.61	1.59	3.06	0.96	5.35
557+00	1463.60	1467.83	1464.60	1464.60	0.0010	0.00	4.00	3.00	1.00	0.035	GRASS	3.50	7.29	0.48	1.06	2.04	0.83	2.89
558+00	1463.70	1467.74	1464.82	1464.82	0.0002	0.00	4.00	3.00	1.12	0.035	GRASS	4.39	8.16	0.54	0.53	1.02	0.40	1.75
559+00	1463.72	1467.45	1464.77	1464.77		0.00	4.00	3.00	1.05	0.035	GRASS	3.86	7.65	0.50				

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE COMPUTATIONS DITCH CALCS

EASTBOUND

SHEET 1 OF 2

DN:	CC	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	147

US290_DRCP00_03.dgn

STATION	FLOW LINE	LEFT TOP OF DITCH	RIGHT TOP OF DITCH	TOP OF DITCH	SLOPE	BOTTOM WIDTH	LEFT SIDE SLOPE (FORESLOPE)	RIGHT SIDE SLOPE (BACK SLOPE)	DEPTH	n	DITCH MATERIAL	AREA	WP	R	Q (5-YR)	Q (100-YR)	VELOCITY	DITCH CAPACITY
	(FT)	(FT)	(FT)	(FT)	%	(FT)	H:1	H:1	(FT)			(SF)	(FT)		(CFS)	(CFS)	(FT/S)	(CFS)
D-11																		
560+50	1463.15	1466.63	1466.22	1466.22		0	4.00	3.00	3.07	0.035	GRASS	32.99	22.37	1.47				
561+00	1463.09	1466.23	1465.2	1465.20	0.0012	0	4.00	3.00	2.11	0.035	GRASS	15.58	15.37	1.01	1.20	2.28	1.49	23.19
562+00	1462.93	1465.30	1464.84	1464.84	0.0016	0	4.00	3.00	1.91	0.035	GRASS	12.77	13.92	0.92	1.83	3.48	1.61	20.53
563+00	1462.32	1464.27	1463.75	1463.75	0.0061	0	4.00	3.00	1.43	0.035	GRASS	7.16	10.42	0.69	2.46	4.68	2.59	18.53
564+00	1461.29	1463.23	1462.65	1462.65	0.0103	0	4.00	3.00	1.36	0.035	GRASS	6.47	9.91	0.65	3.10	5.88	3.25	21.06
565+00	1460.07	1462.20	1462.06	1462.06	0.0122	0	4.00	3.00	1.99	0.035	GRASS	13.86	14.50	0.96	3.73	7.08	4.56	63.25
565+50	1459.63	1461.46	1462.6	1461.46	0.0088	0	6.00	4.00	1.83	0.035	GRASS	16.74	18.68	0.90	4.04	7.68	3.71	62.17
D-12																		
565+50	1459.63	1461.46	1462.60	1461.46		0	6.00	4.00	1.83	0.035	GRASS	16.74	18.68	0.90				
566+00	1457.74	1460.76	1461.45	1460.76	0.0378	0	4.00	3.00	3.02	0.035	GRASS	31.92	22.00	1.45	4.59	8.72	10.61	338.61
567+00	1457.30	1459.25	1461.12	1459.25	0.0044	0	3.14	3.00	1.95	0.035	GRASS	11.67	12.59	0.93	5.70	10.82	2.68	31.34
568+00	1456.23	1458.66	1460.62	1458.66	0.0107	0	3.14	3.00	2.43	0.035	GRASS	18.13	15.69	1.16	6.80	12.91	4.85	87.89
D-13																		
568+50	1455.13	1457.93	1460.57	1457.93	0.0044	0	3.00	2.00	2.80	0.015	CONC	19.60	15.12	1.30	30.05	57.51	7.84	153.57
569+00	1455.35	1457.67	1461.30	1457.67	0.0019	0	3.12	2.15	2.32	0.015	CONC	14.18	13.10	1.08	29.50	56.46	4.56	64.74
570+00	1455.54	1457.79	1462.28	1457.79	0.0006	0	3.15	2.04	2.25	0.015	CONC	13.14	12.55	1.05	28.39	54.35	2.51	32.96
571+00	1455.60	1458.28	1462.21	1458.28	0.0040	0	3.15	2.03	2.68	0.015	CONC	18.60	14.92	1.25	27.28	52.24	7.28	135.37
572+00	1456.00	1458.18	1460.70	1458.18		0	4.00	3.00	2.18	0.015	CONC	16.63	15.88	1.05				
D-14																		
572+50	1455.80	1458.32	1462.30	1458.32	0.0010	0	3.15	1.96	2.52	0.025	CONC	16.23	13.87	1.17	26.17	50.13	2.07	33.59
573+00	1455.85	1458.46	1462.12	1458.46	0.0010	0	3.15	1.99	2.61	0.025	CONC	17.52	14.44	1.21	25.77	49.37	2.12	37.16
574+00	1455.95	1458.73	1461.85	1458.73	0.0010	0	4.00	2.05	2.78	0.025	CONC	23.43	17.82	1.31	24.98	47.85	2.24	52.44
575+00	1456.04	1458.89	1461.87	1458.89	0.0010	0	4.00	2.03	2.85	0.025	CONC	24.41	18.17	1.34	24.19	46.33	2.27	55.41
576+00	1456.14	1459.15	1461.82	1459.15	0.0010	0	4.00	2.10	3.01	0.025	CONC	27.59	19.39	1.42	23.40	44.80	2.36	65.06
577+00	1456.24	1459.42	1461.19	1459.42	0.0010	0	4.00	1.95	3.18	0.025	CONC	30.07	20.08	1.50	22.61	43.28	2.44	73.42
578+00	1456.34	1459.78	1461.08	1459.78	0.0010	0	4.00	1.69	3.44	0.025	CONC	33.70	20.95	1.61	21.82	41.76	2.56	86.27
579+00	1456.44	1460.00	1461.68	1460.00	0.0010	0	4.00	1.77	3.56	0.025	CONC	36.64	21.94	1.67	21.03	40.23	2.62	96.18
580+00	1456.53	1460.13	1460.56	1460.13	0.0010	0	4.00	1.92	3.60	0.025	CONC	38.27	22.61	1.69	20.24	38.71	2.65	101.37
581+00	1456.63	1460.25	1460.9	1460.25	0.0010	0	4.00	1.87	3.62	0.025	CONC	38.42	22.59	1.70	19.45	37.19	2.66	102.07
582+00	1456.73	1460.34	1461.46	1460.34	0.0010	0	4.00	1.71	3.61	0.025	CONC	37.21	22.04	1.69	18.66	35.67	2.64	98.38
583+00	1456.83	1460.43	1462.00	1460.43	0.0010	0	4.00	1.63	3.60	0.025	CONC	36.53	21.74	1.68	17.87	34.14	2.64	96.26
584+00	1456.93	1460.53	1461.27	1460.53	0.0010	0	4.00	1.67	3.60	0.025	CONC	36.83	21.88	1.68	17.08	32.62	2.64	97.19
585+00	1457.02	1460.58	1461.26	1460.58	0.0010	0	4.00	1.82	3.56	0.025	CONC	36.80	22.05	1.67	16.29	31.10	2.62	96.58
586+00	1457.12	1460.63	1460.84	1460.63	0.0010	0	4.00	1.94	3.51	0.025	CONC	36.56	22.12	1.65	15.50	29.57	2.61	95.29
587+00	1457.22	1460.68	1460.59	1460.59	0.0010	0	4.00	2.19	3.37	0.025	CONC	35.16	22.01	1.60	14.71	28.05	2.55	89.60
588+00	1457.32	1460.73	1460.00	1460.00	0.0010	0	4.00	3.1	2.68	0.035	GRASS	25.58	19.82	1.29	13.91	26.53	1.58	40.39
589+00	1457.42	1460.79	1460.25	1460.25	0.0010	2.5	4.00	3.9	2.83	0.035	GRASS	38.63	25.46	1.52	13.12	25.01	1.76	67.93
590+00	1457.51	1460.84	1459.94	1459.94	0.0249	2.5	4.00	3.4	2.43	0.035	GRASS	27.80	21.06	1.32	12.33	23.48	8.08	224.58
591+00	1460.00	1460.91	1460.16	1460.16		0	6.00	2.90	0.16	0.015	CONC	0.11	1.46	0.08				
D-15																		
591+50	1457.56	1460.92	1459.51	1459.51	0.0008	0	4.00	3.00	1.95	0.035	GRASS	13.31	14.21	0.94	11.54	21.96	1.15	15.34
592+00	1457.60	1460.94	1459.35	1459.35	0.0008	0	4.00	3.00	1.75	0.035	GRASS	10.72	12.75	0.84	11.01	20.95	1.07	11.50
593+00	1457.68	1461.04	1459.24	1459.24	0.0012	0	4.00	3.00	1.56	0.035	GRASS	8.52	11.37	0.75	9.94	18.92	1.22	10.36
594+00	1457.80	1461.12	1459.27	1459.27	0.0013	0	4.00	3.00	1.47	0.035	GRASS	7.56	10.71	0.71	8.87	16.89	1.22	9.21
595+00	1457.93	1461.24	1460.00	1460.00	0.0005	0	4.00	3.00	2.07	0.035	GRASS	15.00	15.08	0.99	7.81	14.86	0.95	14.22
596+00	1457.98	1461.42	1460.00	1460.00	0.0005	0	4.00	3.00	2.02	0.035	GRASS	14.28	14.72	0.97	6.74	12.83	0.93	13.33
597+00	1458.03	1461.63	1460.24	1460.24	0.0190	0	4.00	3.00	2.21	0.035	GRASS	17.09	16.10	1.06	5.67	10.81	6.11	104.40
597+50	1458.98	1461.73	1460.27	1460.27		0	4.00	6.00	1.29	0.035	GRASS	8.32	13.17	0.63				
D-16																		
598+00	1458.38	1461.79	1460.57	1460.57	0.0010	0	4.00	3.00	2.19	0.035	GRASS	16.79	15.95	1.05	5.14	9.79	1.39	23.38
598+50	1458.43	1461.87	1460.39	1460.39		0	4.00	3.00	1.96	0.035	GRASS	13.45	14.28	0.94				
D-17																		
599+00	1459.75	1461.94	1460.61	1460.61	0.0021	0	4.00	8.00	0.86	0.035	GRASS	4.44	10.48	0.42	4.57	8.72	1.10	4.88
600+00	1459.96	1462.17	1460.82	1460.82	0.0044	0	4.00	3.00	0.86	0.035	GRASS	2.59	6.27	0.41	4.05	7.72	1.57	4.05
601+00	1460.40	1462.60	1461.18	1461.18	0.0061	0	4.00	3.00	0.78	0.035	GRASS	2.13	5.68	0.37	3.53	6.72	1.73	3.68
602+00	1461.01	1463.12	1462.10	1462.10	0.0041	0	4.00	3.00	1.09	0.035	GRASS	4.16	7.94	0.52	3.00	5.73	1.77	7.36
603+00	1461.42	1463.64	1463.18	1463.18	0.0026	0	4.00	3.00	1.76	0.035	GRASS	10.84	12.82	0.85	2.48	4.73	1.94	21.04
604+00	1461.68	1464.23	1464.55	1464.23	0.0137	0	4.00	3.00	2.55	0.035	GRASS	22.76	18.58	1.23	1.96	3.73	5.70	129.84
605+00	1463.05	1464.89	1464.97	1464.89		0	4	3	1.84	0.035	GRASS	11.85	13.41	0.88				
D-18																		
605+50	1462.09	1465.19	1465.00	1465.00	0.0022	0	4.00	3.00	2.91	0.035	GRASS	29.64	21.20	1.40	1.06	2.02	2.50	73.99
606+00	1462.20	1465.51	1465.04	1465.04		0	4.00	3.00	2.84	0.035	GRASS	28.23	20.69	1.36				
D-19																		
606+50	1463.74	1465.78	1465.24	1465.24	0.0054	0	4.00	3.00	1.50	0.035	GRASS	7.88	10.93	0.72	0.69	1.32	2.51	19.80
607+00	1464.01	1466.00	1465.42	1465.42	0.0040	0	4.00	3.00	1.41	0.035	GRASS	6.96	10.27	0.68	0.35	0.66	2.08	14.45
607+50	1464.21	1466.15	1465.21	1465.21		0	4.00	3.00	1.00	0.035	GRASS	3.50	7.29	0.48				
E-04																		
608+00	1464.51	1466.23	1465.39	1465.39		0	4.00	3.00	0.88	0.035	GRASS	2.71	6.41	0.42			0.00	0.00
609+00	1464.41	1466.21	1465.27	1465.27	0.0010	0	4.00	3.00	0.86	0.035	GRASS	2.59	6.27	0.41	0.53	1.02	0.75	1.93
609+50	1464.38	1466.11	1465.10	1465.10	0.0006	0	4.00	3.00	0.72	0.035	GRASS	1.81	5.25	0.35	0.80	1.53	0.51	0.93
610+00	1462.58	1465.94	1464.93	1464.93	0.0360	0	4.00	3.00	2.35	0.035	GRASS	19.33	17.12	1.13	1.06	2.04	8.76	169.28
610+50	1462.53	1465.71	1464.73	1464.73	0.0010	0	4.00	3.00	2.20	0.035	GRASS	16.94	16.03	1.06	1.33	2.55	1.40	23.66
611+00	1462.48	1465.41	1464.70	1464.70	0.0010	0	4.00	3.00	2.22	0.035	GRASS	17.25	16.17	1.07	1.60	3.06	1.41	24.24
612+00	1461.06	1464.63	1463.76	1463.76	0.0142	0	4.00	3.00	2.70	0.035	GRASS	25.52	19.67	1.30	2.13	4.08	6.03	153.95
613+00	1460.70	1463.6	1463.07	1463.07	0.0036	0	4.00	3.00	2.37	0.035	GRASS	19.66	17.27	1.14	2.66	5.10	2.79	54.75
614+00	1460.50	1462.31	1461.48	1461.48	0.0020	0	4.00	4.00	0.98	0.035	GRASS	3.84	8.08	0.48	3.19	6.12	1.16	4.45
615+00	1458.95	1460.94	1459.57	1459.57	0.0155	0	4.00	6.00	0.62	0.035	GRASS	1.92	6.33	0.30	3.72	7.15	2.39	4.60
616+00	1457.50	1459.53	1458.38	1458.38	0.0145	0	4.00	6.00	0.88	0.035	GRASS	3.87	8.98	0.43	4.26	8.17	2.93	11.33
E-06																		
625+00	1445.11	1451.55	1446.56	1446.56		0	4.00	3.00	1.45	0.035	GRASS	7.36	10.56	0.70			0.00	0.00
E-07																		
625+50	1446.98	1451.36	1447.89	1447.89	0.0176	0	4.00	3.00	0.91	0.035	GRASS	2.90	6.63	0.44	1.05	2.00	3.25	9.43
626+00	1447.86	1451.25	1449.25	1449.25	0.0162	0	4.00	3.00	1.39	0.035	GRASS	6.76	10.13	0.67	0.52	1.00	4.14	27.99
626+50	1448.67	1451.16	1450.44	1450.44		0	4.00	3.00	1.77	0.035	GRASS	10.97	12.90	0.85			0.00	0.00

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

US 290

DRAINAGE COMPUTATIONS
DITCH CALCS
EASTBOUND

SHEET 2 OF 2

DN:	CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CC	6	TEXAS				US 290
DW:	CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CC	AUS	GILLESPIE	0113	02	063	147A

US290_DRCP00_03A.dgn

DRIVEWAY CULVERT CALCS - WESTBOUND

STA	Proposed Driveway Culvert						Driveway Clearance Provided	HY-8 Results (5-Yr Design)				5-YEAR DESIGN FLOW	100-YEAR CHECK FLOW
	Size	BARRELS	LENGTH	Culv FL US	Culv FL DS	Driveway PGL Elev		HW	Velocity	Driveway Culvert Discharge	Driveway Overflow		
	(INCH)		(FT)	(FT)	(FT)	(FT)	FT	(FT)	(F/S)	(CFS)	(CFS)	(CFS)	(CFS)
491+05.74	18	2	56	1485.00	1484.90	1488.03	1.03	1486.52	4.94	11.46	0.00	11.46	21.77
492+05.62	18	2	27	1483.95	1483.85	1487.10	1.15	1485.51	5.17	12.36	0.00	12.36	23.49
493+02.96	18	2	22	1482.45	1482.35	1485.50	1.05	1484.12	5.40	13.70	0.00	13.70	26.05
495+86.26	18	3	44	1478.55	1478.48	1481.60	1.05	1480.18	4.43	19.01	0.00	19.01	36.27
500+84.01	24	2	48	1473.00	1472.90	1476.56	1.06	1475.15	4.40	24.91	0.00	24.91	47.54
557+02.29	18	1	44	1461.70	1461.60	1464.99	1.29	1462.48	2.83	0.90	0.00	0.90	1.71
561+56.73	18	1	44	1461.00	1460.95	1464.00	1.00	1461.53	2.79	0.85	0.00	0.85	1.62
597+72.42	18	1	44	1458.70	1458.60	1463.48	2.78	1460.52	3.83	6.68	0.00	6.68	12.74
601+32.96	18	1	44	1459.11	1459.06	1462.20	1.09	1460.48	4.71	4.83	0.00	4.83	9.21
603+16.53	18	1	44	1460.80	1460.75	1463.87	1.07	1462.00	4.36	3.87	0.00	3.87	7.38
607+00.85	18	1	44	1463.45	1463.35	1466.50	1.05	1464.10	2.10	1.27	0.00	1.27	2.42
610+31.50	18	1	36	1462.55	1462.50	1465.63	1.08	1463.25	3.17	1.47	0.00	1.47	2.84
611+69.50	18	1	50	1462.00	1461.90	1465.08	1.08	1462.69	2.74	1.47	0.00	1.47	2.84
612+74.90	18	1	36	1460.74	1460.38	1463.80	1.06	1461.94	5.87	4.42	0.00	4.42	8.53
613+85.90	18	1	36	1459.45	1459.35	1462.50	1.05	1460.97	5.07	5.89	0.00	5.89	11.37
621+00.14	18	2	44	1451.20	1451.04	1454.23	1.03	1453.02	5.44	15.47	0.00	15.47	29.84

DRIVEWAY CULVERT CALCS - EASTBOUND

STA	Proposed Driveway Culvert						Driveway Clearance Provided	HY-8 Results (5-Yr Design)				5-YEAR DESIGN FLOW	100-YEAR CHECK FLOW
	Size	BARRELS	LENGTH	Culv FL US	Culv FL DS	Driveway PGL Elev		HW	Velocity	Driveway Culvert Discharge	Driveway Overflow		
	(INCH)		(FT)	(FT)	(FT)	(FT)	(FT)	(FT)	(F/S)	(CFS)	(CFS)	(CFS)	(CFS)
493+03.54	36	2	24	1482.90	1482.70	1487.50	1.10	1485.36	7.75	49.72	0	49.72	96.24
507+22.72	18	1	24	1477.80	1477.60	1480.88	1.08	1478.37	3.91	1.23	0	1.23	3.33
514+43.68	18	1	24	1476.60	1476.50	1479.75	1.15	1477.93	3.32	2.50	0	2.50	4.75
552+50.71	18	1	40	1461.79	1461.69	1464.92	1.13	1462.84	4.09	3.18	0	3.18	6.13
560+54.73	18	1	44	1463.18	1463.12	1466.19	1.01	1463.62	2.53	0.59	0	0.59	1.12
565+54.10	18	1	46	1458.44	1457.88	1461.67	1.23	1459.52	6.05	3.73	0	3.73	7.08
571+99.74	18	4	24	1455.66	1455.61	1458.68	1.02	1458.08	3.70	26.17	0	26.17	50.13
590+70.27	18	2	62	1457.65	1457.59	1460.66	1.01	1459.62	3.27	11.54	0	11.54	21.96
597+78.21	18	1	30	1458.14	1458.09	1461.15	1.01	1459.52	4.82	5.14	0	5.14	9.79
598+73.71	18	1	46	1458.49	1458.45	1461.50	1.01	1459.82	4.62	4.57	0	4.57	8.72
604+98.95	18	1	64	1461.93	1461.85	1464.96	1.03	1462.53	2.97	1.06	0	1.06	2.02
606+21.74	18	1	55	1462.30	1462.25	1465.34	1.04	1462.79	2.64	0.69	0	0.69	1.32
609+82.75	18	1	48	1462.65	1462.60	1465.69	1.04	1463.07	2.02	0.53	0	0.53	1.02
612+26.90	18	1	44	1460.80	1460.75	1463.80	1.00	1461.66	1.70	2.13	0	2.13	4.08

2/14/2023

NO.	DATE	REVISION	APPROV.
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Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

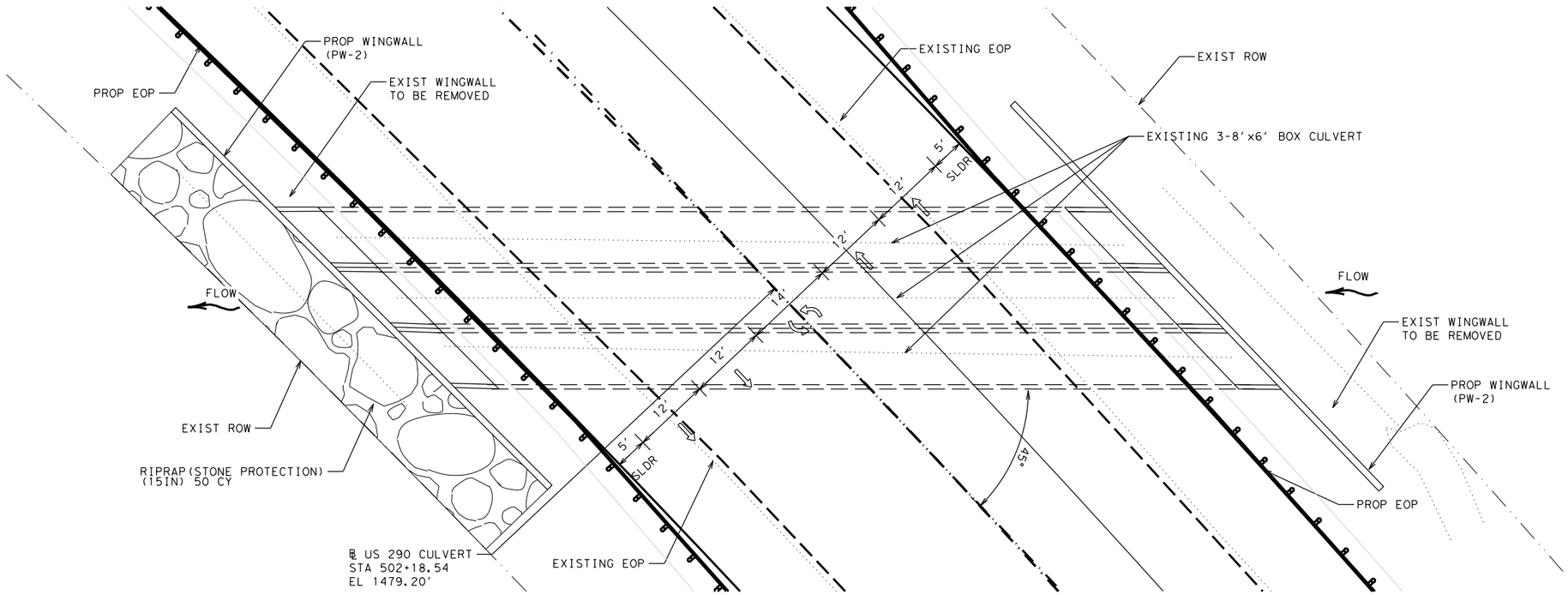
US 290

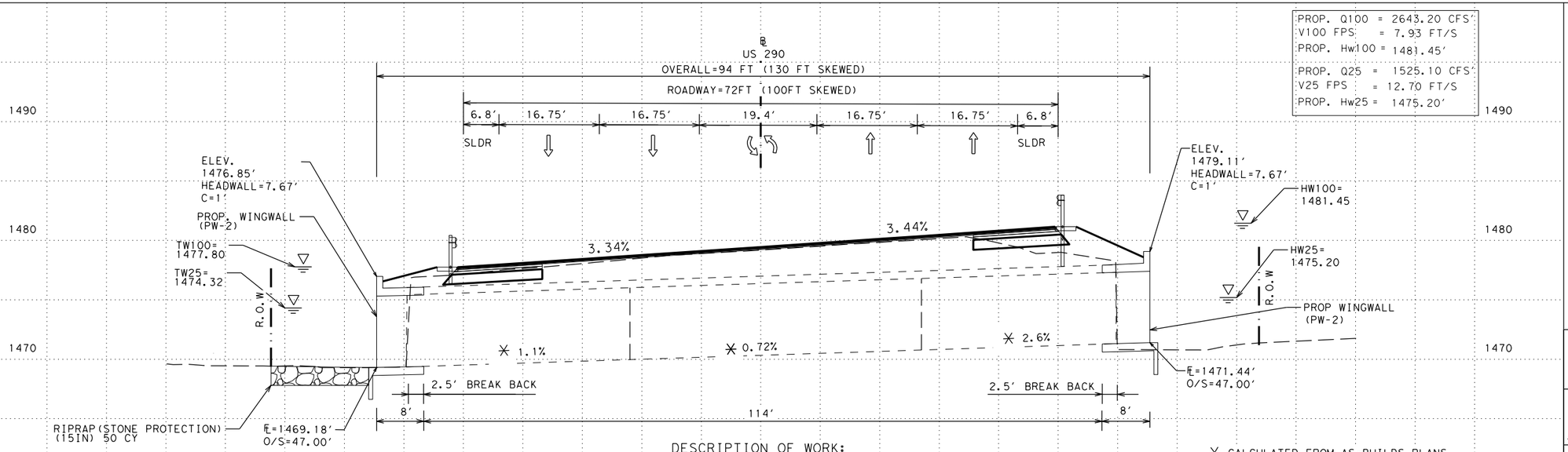
DRAINAGE COMPUTATIONS
DRIVEWAY CULVERT CALCS

SHEET 1 OF 1

DN: CC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: CC	6	TEXAS				US 290
DW: CC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: CC	AUS	GILLESPIE	0113	02	063	148

US290_DRCP00_04.dgn





PROP. Q100 = 2643.20 CFS'
V100 FPS = 7.93 FT/S
PROP. Hw100 = 1481.45'

PROP. Q25 = 1525.10 CFS'
V25 FPS = 12.70 FT/S
PROP. Hw25 = 1475.20'

✳ CALCULATED FROM AS-BUILDS PLANS

DESCRIPTION OF WORK:
REMOVE EXISTING 2 EA HEADWALLS, AND EXTEND
EXISTING 3-8'X6' BOX CULVERT (119'LONG
TO 130'LONG) 2 EA WINGWALL PW (SLOPE 2:1)

NBI# 140870011302039
DESIGN SPEED 60MPH

DESIGN SPEED = 60 MPH
PROP. ADT (2040) = 2,355 VPD
RDWY FUNC CLS = MAJOR (RURAL)
COLLECTOR

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 10

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

Austin District
Central Design

Texas Department of Transportation

US 290
BRIDGE CLASS
CULVERT LAYOUT
STA. 502+18.54

SHEET 1 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		149

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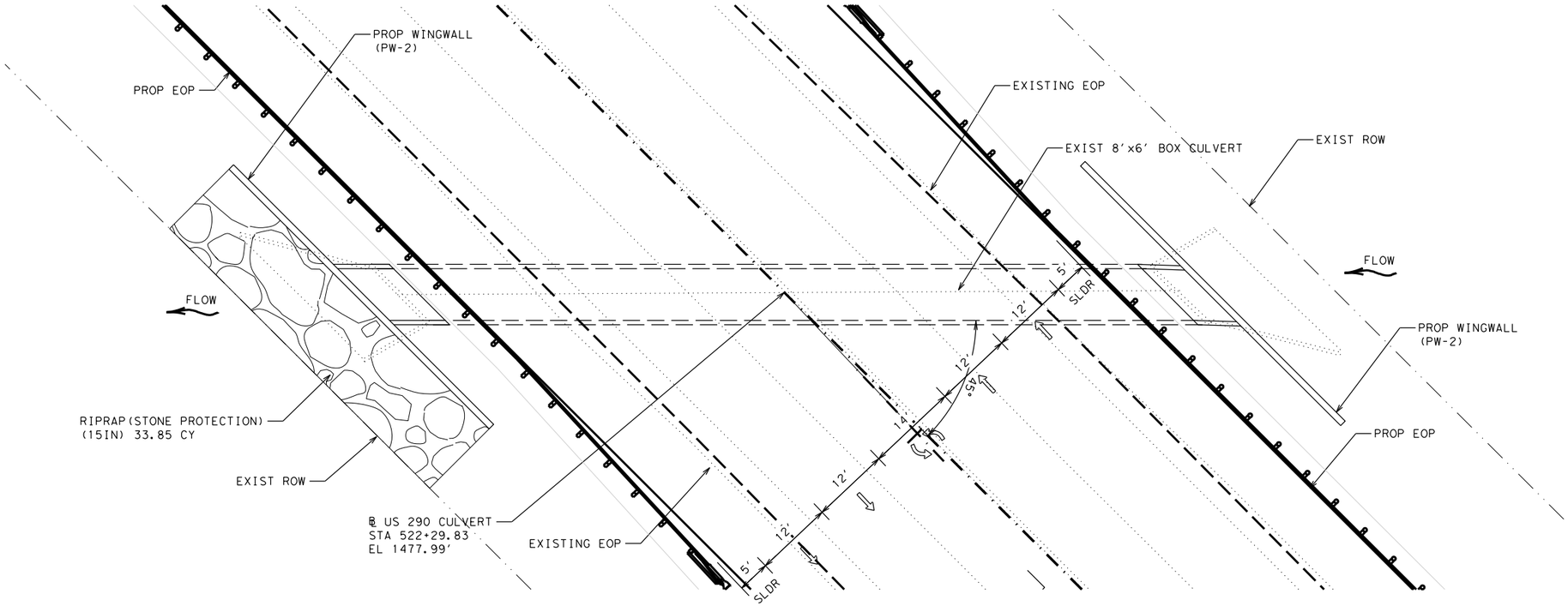

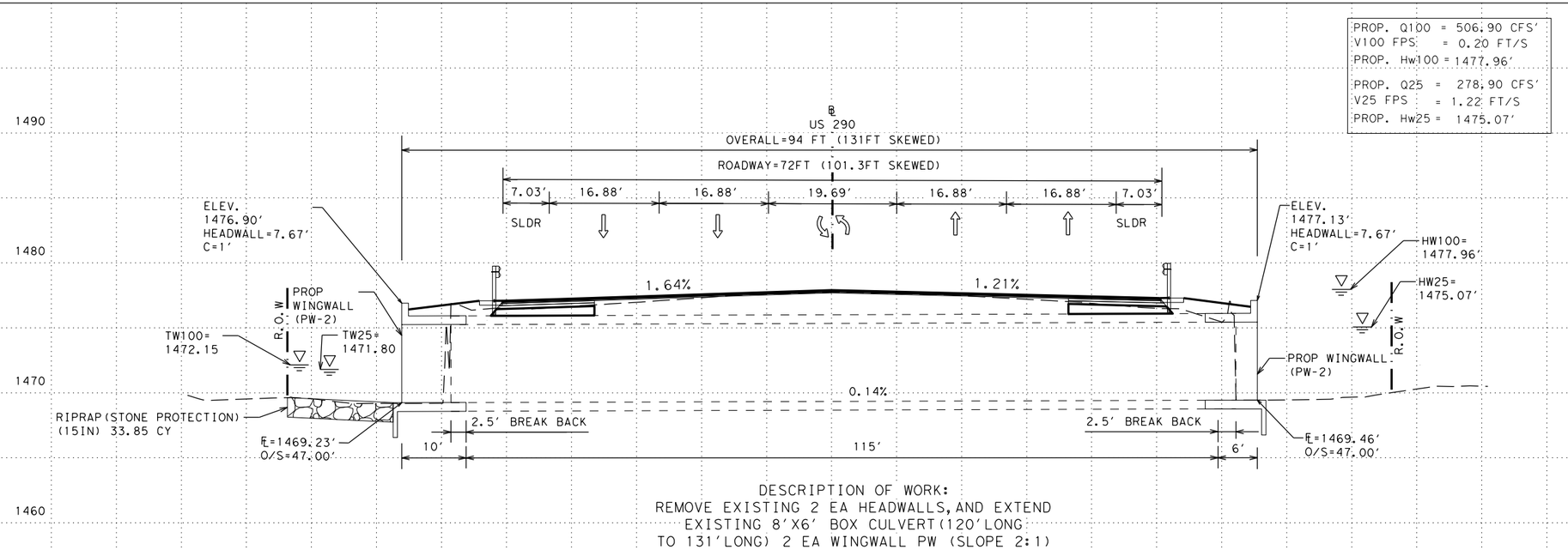

DESCRIPTION OF WORK:
REMOVE EXISTING 2 EA HEADWALLS, AND EXTEND
EXISTING 8'X6' BOX CULVERT(120'LONG
TO 131'LONG) 2 EA WINGWALL PW (SLOPE 2:1)

2/6/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
CULVERT LAYOUT
STA. 522+29.83

SHEET 2 OF 4

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		150

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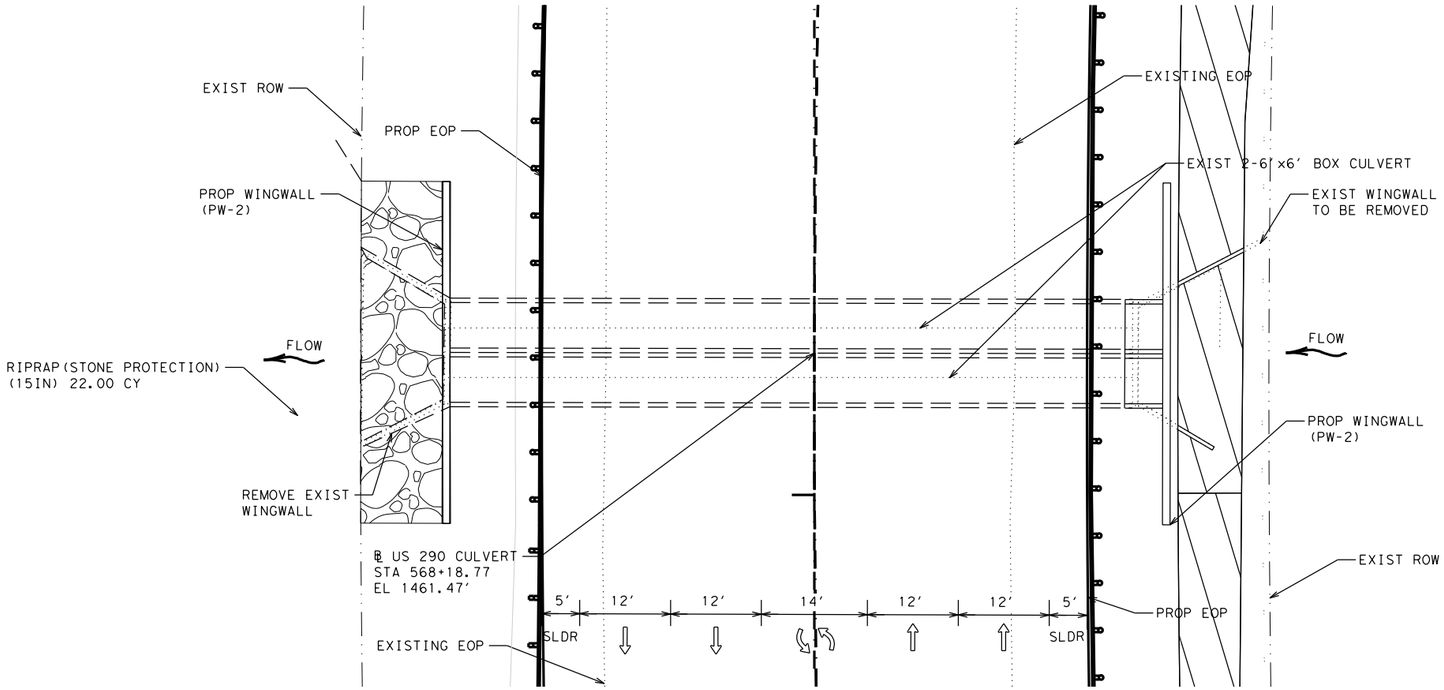

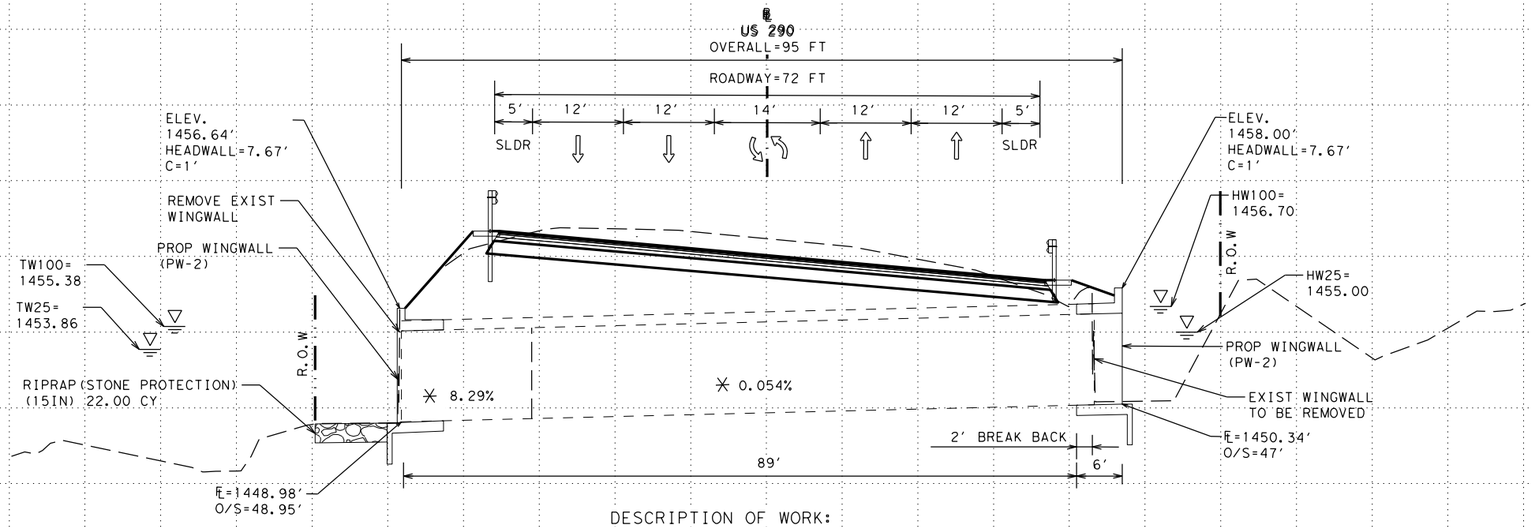

DESCRIPTION OF WORK:
REMOVE EXISTING 1 EA HEADWALLS, AND EXTEND EXISTING 2-6'X6' BOX CULVERT (91'LONG TO 95'LONG) 2 EA WINGWALL PW (SLOPE 2:1)

∗ CALCULATED FROM AS-BUILDS PLANS

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
CULVERT LAYOUT
STA. 568+18.77

SHEET 3 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		151

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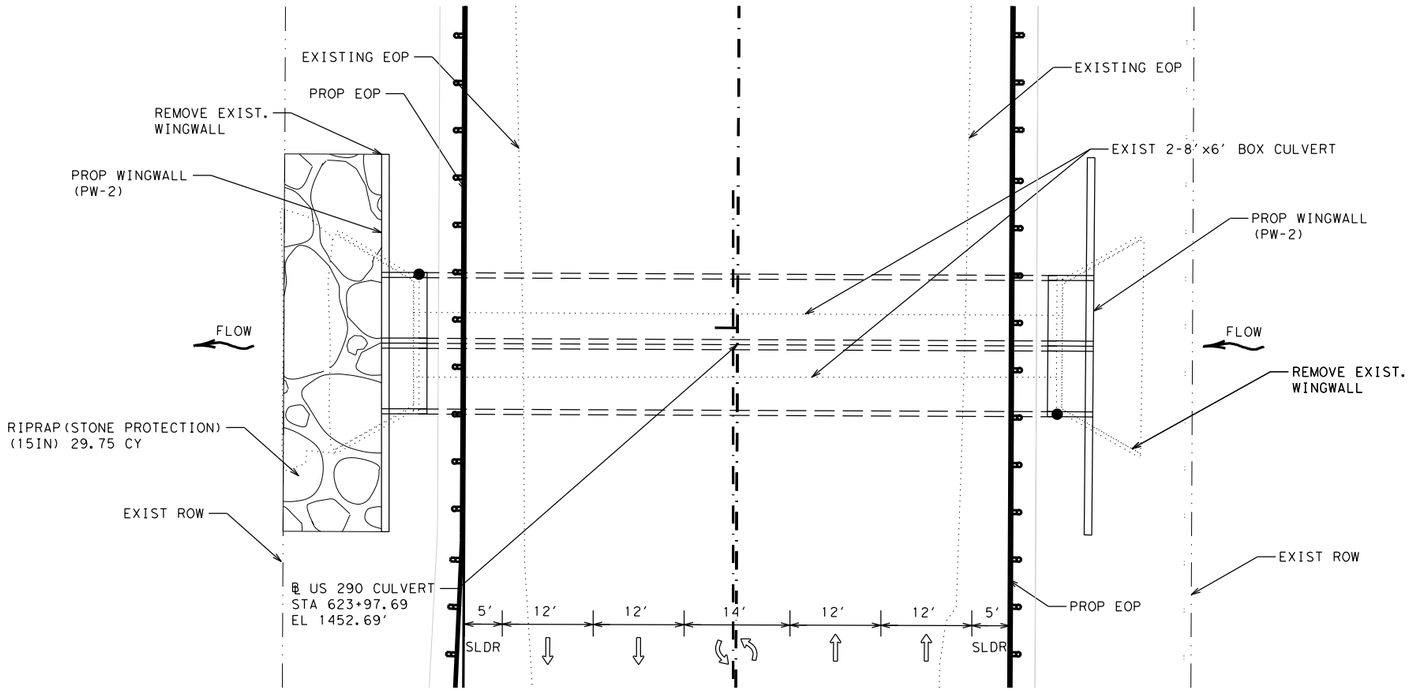

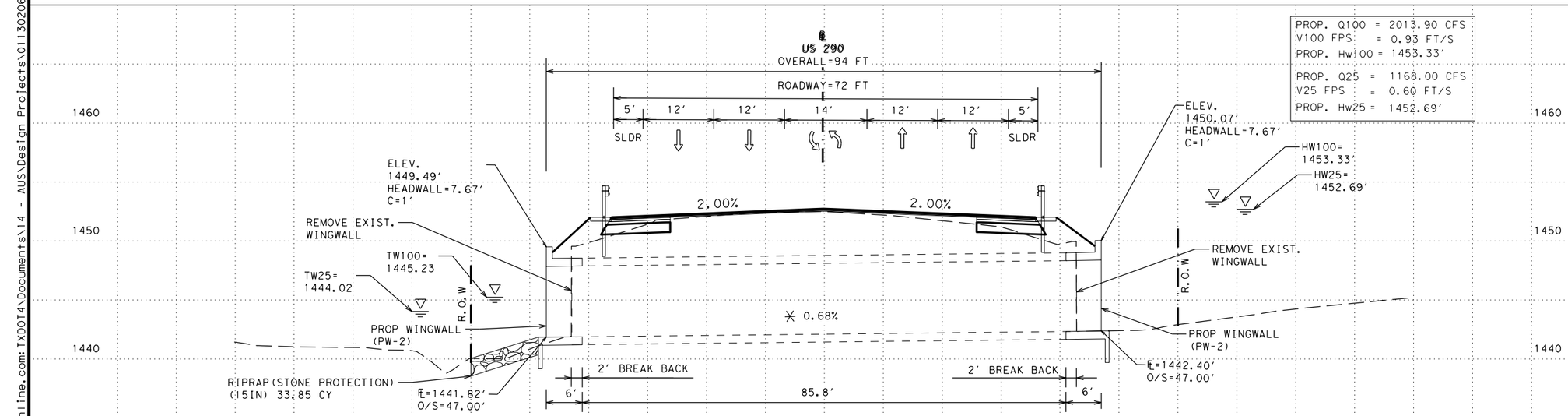

PROP. Q100 = 2013.90 CFS
V100 FPS = 0.93 FT/S
PROP. Hw100 = 1453.33'
PROP. Q25 = 1168.00 CFS
V25 FPS = 0.60 FT/S
PROP. Hw25 = 1452.69'

DESCRIPTION OF WORK:
REMOVE EXISTING 2 EA HEADWALLS, AND EXTEND EXISTING 2-8'X6' BOX CULVERT (86'LONG TO 94'LONG) 2 EA WINGWALL PW (SLOPE 2:1)

✳ CALCULATED FROM AS-BUILDS PLANS

2/6/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 10

Austin District
Central Design

Texas Department of Transportation

US 290
CULVERT LAYOUT
STA. 623+97.69

SHEET 4 OF 4

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		152

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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 Height of Wingwall (1) (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)
502+18.54 (Both)	3 ~ 8' X 6'	3.5'	SCP-8	PW-2	45	2:1	8"	8"	1.000	7.667	N/A	N/A	21.685	41.012	N/A	0.0	3.0	49.6	664
522+29.83 (Both)	1 ~ 8' X 6'	1.8'	SCP-8	PW-2	45	2:1	8"	8"	1.000	7.667	N/A	N/A	21.685	13.199	N/A	0.0	1.0	44.2	664
568+18.8 (Both)	2 ~ 6' X 6'	7.1'	SCP-6	PW-2	0	2:1	7"	7"	1.000	7.583	N/A	N/A	15.167	14.833	N/A	0.0	1.0	32.0	460
623+97.68 (Both)	2 ~ 8' X 6'	3.7'	SCP-8	PW-2	0	2:1	8"	8"	1.000	7.667	N/A	N/A	15.333	19.167	N/A	0.0	1.4	33.2	470

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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.

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.

1/18/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounyss Yacoub P.E.
C558EA119EB3496...

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
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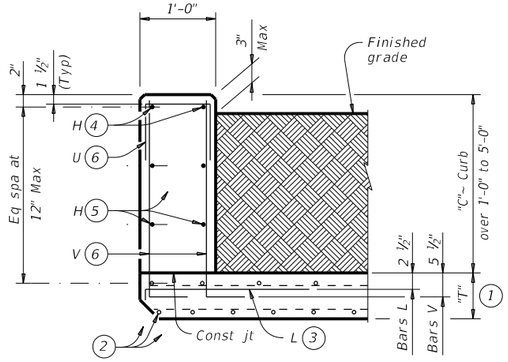
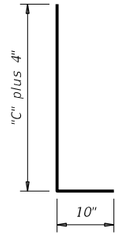
		DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		153



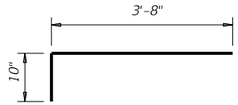
TYPICAL SECTION

Used for curbs over 1'–0" to 5'–0"



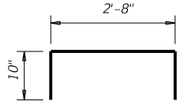
BARS V (#5) (6)

Spaced at 12" Max



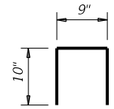
BARS L (#5) (3)

Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)

Spaced at 12" Max



BARS U (#4) (6)

Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'–0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'–0"	0.037	10.4
1'–6"	0.056	14.5
2'–0"	0.074	15.6
2'–6"	0.093	18.0
3'–0"	0.111	19.0
3'–6"	0.130	21.3
4'–0"	0.148	22.4
4'–6"	0.167	24.8
5'–0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'–8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

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

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		154

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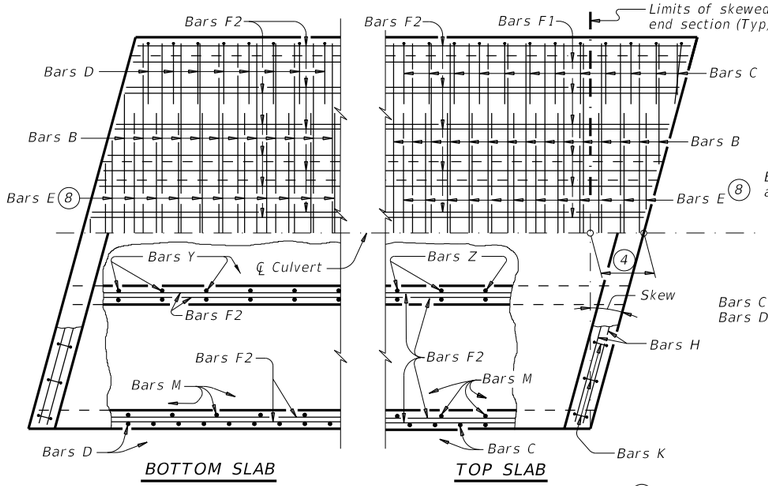
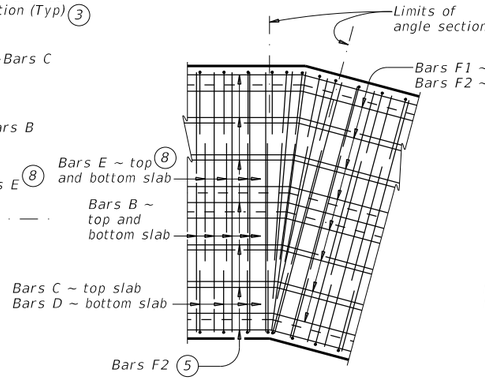
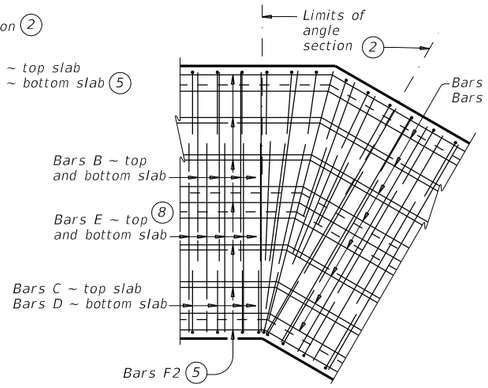


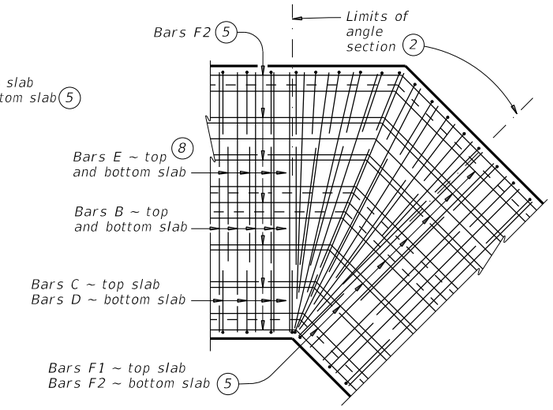
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



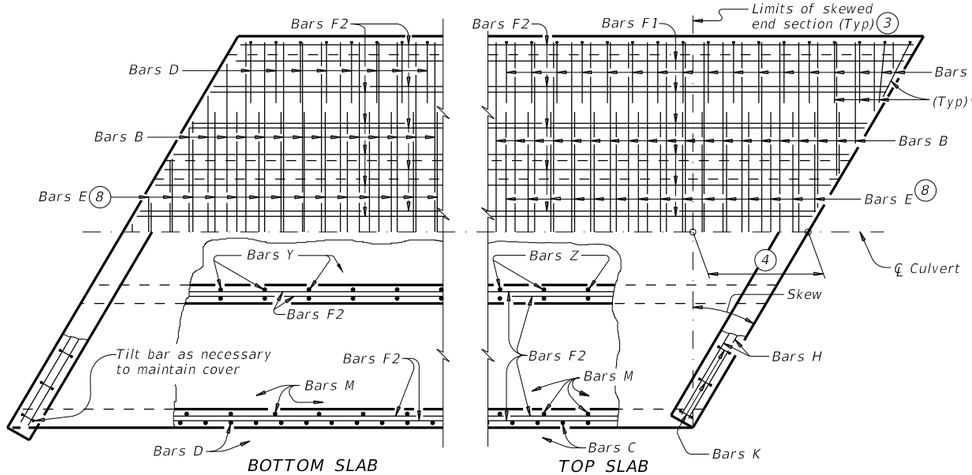
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



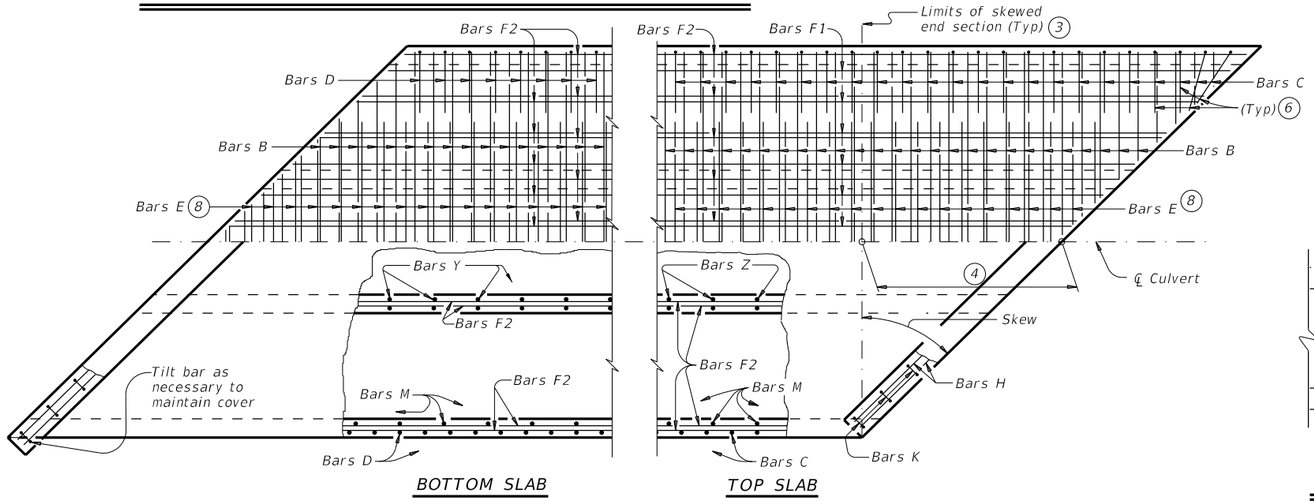
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

1 For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

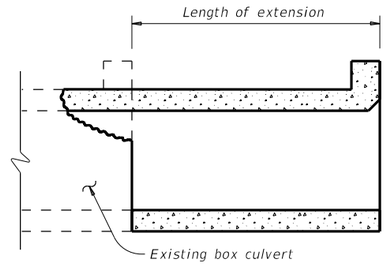
For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 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. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

2 When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

3 The length of Bars B and Bars E will vary in the skewed end sections.

4 [One half of overall width] x [tangent of the skew angle]



LENGTHENING DETAIL 1

5 Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

6 When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

7 At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

8 Extend Bars E as shown on the MC standard sheet for direct traffic culverts.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		155

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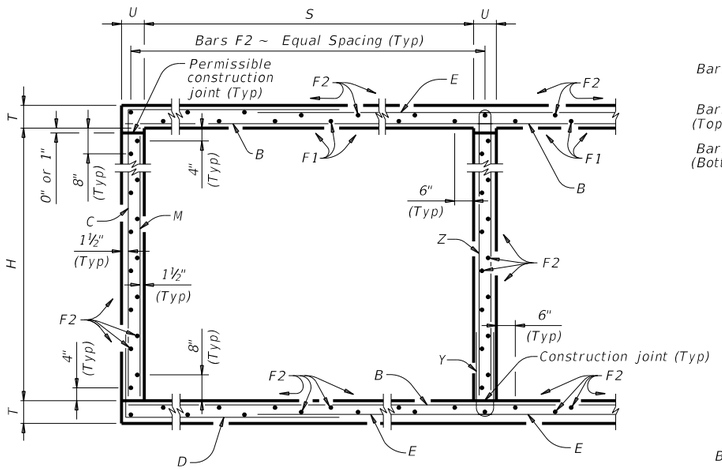
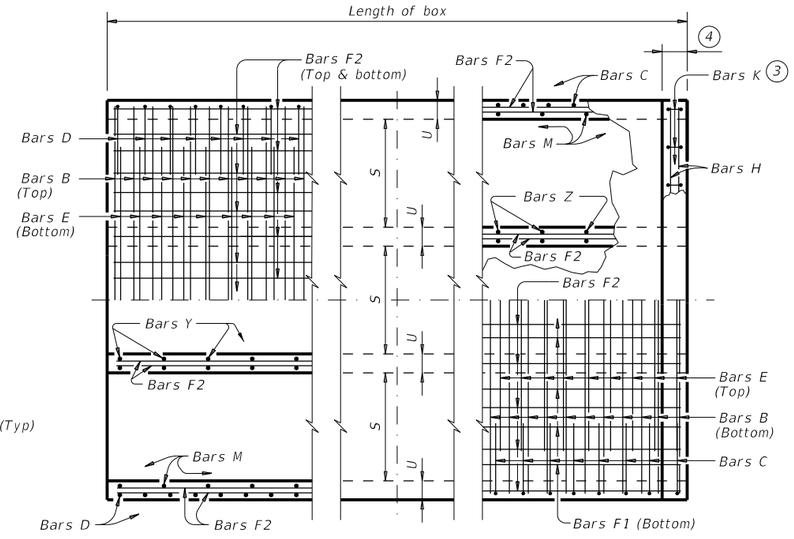
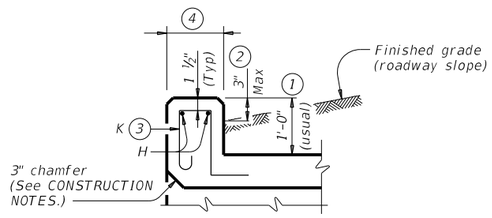


TYPICAL SECTION



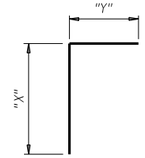
BOTTOM SLAB TOP SLAB

PART PLANS

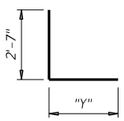


SECTION THRU CURB

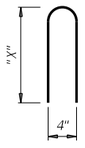
TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
3'-0"	3'-6 ½"	4'-5"
4'-0"	4'-6 ½"	4'-5"
5'-0"	5'-6 ½"	4'-5"
6'-0"	6'-6 ½"	4'-5"
7'-0"	7'-6 ½"	4'-5"



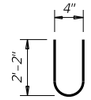
BARS C



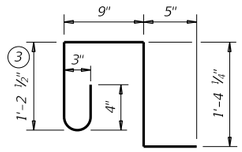
BARS D



BARS Z



BARS Y



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

1 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2 For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3 For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
7'-0" SPAN
0' TO 10' FILL

MC-7-10

FILE: mc710ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		156

DATE: 1/12/2023 2:26:08 PM
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NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4						Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																		Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	7'-0"	3'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	54	18"	39'-9"	1,434	108	9"	3'-0"	216	54	9"	4'-7"	165	7'-3"	262	15'-6"	41	34	95	0.972	230.8	1.2	136	40.0	9,366
3	7'-0"	3'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	77	18"	39'-9"	2,045	108	9"	3'-0"	216	108	9"	4'-7"	331	7'-3"	523	23'-1"	62	50	139	1.412	321.5	1.7	201	58.2	13,061
4	7'-0"	3'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	100	18"	39'-9"	2,655	108	9"	3'-0"	216	162	9"	4'-7"	496	7'-3"	785	30'-8"	82	64	178	1.851	412.3	2.3	260	76.3	16,751
5	7'-0"	3'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	123	18"	39'-9"	3,266	108	9"	3'-0"	216	216	9"	4'-7"	661	7'-3"	1,046	38'-3"	102	80	223	2.290	503.0	2.8	325	94.4	20,446
6	7'-0"	3'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	146	18"	39'-9"	3,877	108	9"	3'-0"	216	270	9"	4'-7"	827	7'-3"	1,308	45'-10"	122	94	262	2.729	593.9	3.4	384	112.6	24,138
2	7'-0"	4'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	54	18"	39'-9"	1,434	108	9"	4'-0"	289	54	9"	4'-7"	165	9'-3"	334	15'-6"	41	34	95	1.037	238.6	1.2	136	42.6	9,680
3	7'-0"	4'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	77	18"	39'-9"	2,045	108	9"	4'-0"	289	108	9"	4'-7"	331	9'-3"	667	23'-1"	62	50	139	1.498	331.2	1.7	201	61.6	13,447
4	7'-0"	4'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	100	18"	39'-9"	2,655	108	9"	4'-0"	289	162	9"	4'-7"	496	9'-3"	1,001	30'-8"	82	64	178	1.959	423.7	2.3	260	80.6	17,209
5	7'-0"	4'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	123	18"	39'-9"	3,266	108	9"	4'-0"	289	216	9"	4'-7"	661	9'-3"	1,335	38'-3"	102	80	223	2.420	516.3	2.8	325	99.6	20,977
6	7'-0"	4'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	146	18"	39'-9"	3,877	108	9"	4'-0"	289	270	9"	4'-7"	827	9'-3"	1,668	45'-10"	122	94	262	2.881	608.9	3.4	384	118.6	24,740
2	7'-0"	5'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	60	18"	39'-9"	1,593	108	9"	5'-0"	361	54	9"	4'-7"	165	11'-3"	406	15'-6"	41	34	95	1.102	250.4	1.2	136	45.2	10,152
3	7'-0"	5'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	85	18"	39'-9"	2,257	108	9"	5'-0"	361	108	9"	4'-7"	331	11'-3"	812	23'-1"	62	50	139	1.584	346.1	1.7	201	65.1	14,045
4	7'-0"	5'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	110	18"	39'-9"	2,921	108	9"	5'-0"	361	162	9"	4'-7"	496	11'-3"	1,217	30'-8"	82	64	178	2.067	441.8	2.3	260	85.0	17,932
5	7'-0"	5'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	135	18"	39'-9"	3,585	108	9"	5'-0"	361	216	9"	4'-7"	661	11'-3"	1,623	38'-3"	102	80	223	2.549	537.5	2.8	325	104.8	21,825
6	7'-0"	5'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	160	18"	39'-9"	4,248	108	9"	5'-0"	361	270	9"	4'-7"	827	11'-3"	2,029	45'-10"	122	94	262	3.032	633.2	3.4	384	124.7	25,713
2	7'-0"	6'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	66	18"	39'-9"	1,752	108	9"	6'-0"	433	54	9"	4'-7"	165	13'-3"	478	15'-6"	41	34	95	1.167	262.2	1.2	136	47.8	10,624
3	7'-0"	6'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	6'-0"	433	108	9"	4'-7"	331	13'-3"	956	23'-1"	62	50	139	1.671	361.0	1.7	201	68.6	14,642
4	7'-0"	6'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	120	18"	39'-9"	3,186	108	9"	6'-0"	433	162	9"	4'-7"	496	13'-3"	1,434	30'-8"	82	64	178	2.175	459.9	2.3	260	89.3	18,655
5	7'-0"	6'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	147	18"	39'-9"	3,903	108	9"	6'-0"	433	216	9"	4'-7"	661	13'-3"	1,912	38'-3"	102	80	223	2.679	558.7	2.8	325	110.0	22,673
6	7'-0"	6'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	174	18"	39'-9"	4,620	108	9"	6'-0"	433	270	9"	4'-7"	827	13'-3"	2,390	45'-10"	122	94	262	3.183	657.6	3.4	384	130.7	26,687
2	7'-0"	7'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	66	18"	39'-9"	1,752	108	9"	7'-0"	505	54	9"	4'-7"	165	15'-3"	550	15'-6"	41	34	95	1.231	270.0	1.2	136	50.4	10,937
3	7'-0"	7'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	7'-0"	505	108	9"	4'-7"	331	15'-3"	1,100	23'-1"	62	50	139	1.757	370.7	1.7	201	72.0	15,027
4	7'-0"	7'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	120	18"	39'-9"	3,186	108	9"	7'-0"	505	162	9"	4'-7"	496	15'-3"	1,650	30'-8"	82	64	178	2.283	471.3	2.3	260	93.6	19,112
5	7'-0"	7'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	147	18"	39'-9"	3,903	108	9"	7'-0"	505	216	9"	4'-7"	661	15'-3"	2,200	38'-3"	102	80	223	2.809	571.9	2.8	325	115.2	23,202
6	7'-0"	7'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	174	18"	39'-9"	4,620	108	9"	7'-0"	505	270	9"	4'-7"	827	15'-3"	2,750	45'-10"	122	94	262	3.334	672.6	3.4	384	136.8	27,288

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

7'-0" SPAN

0' TO 10' FILL

MC-7-10

FILE: mc710ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		157

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

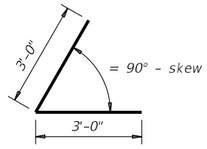
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

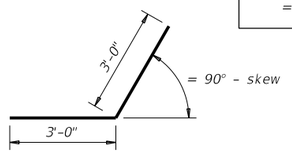
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

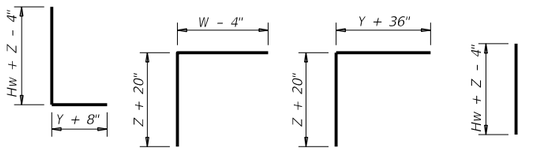
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

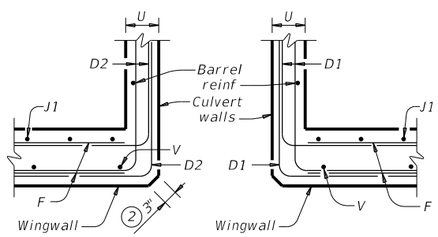
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

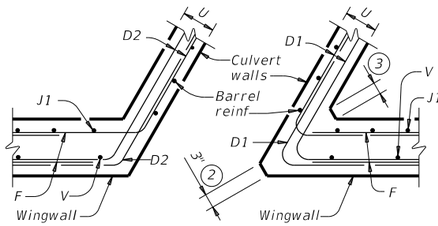
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

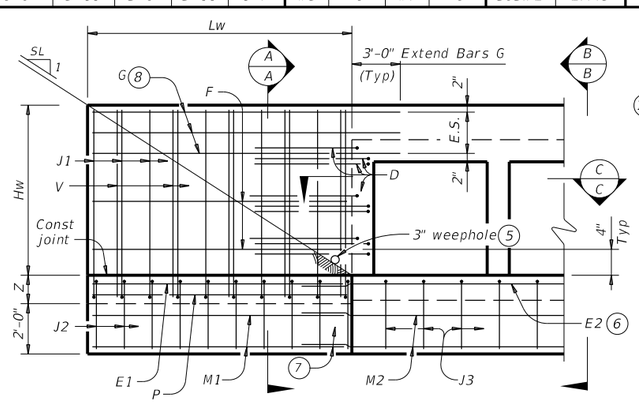
See applicable box culvert standard sheet for S, H, T, and U values.



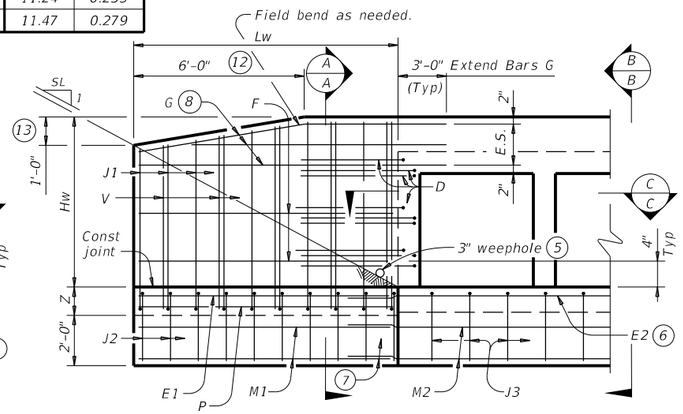
SECTION C-C - PW-1



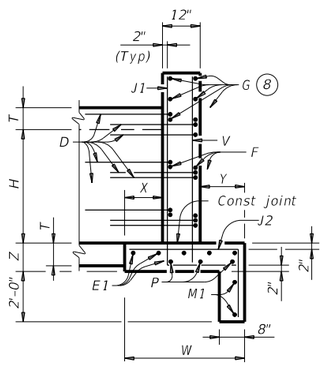
SECTION C-C - PW-2



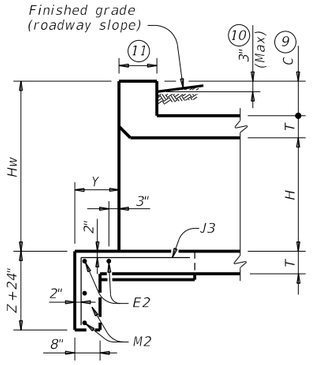
PARTIAL ELEVATION - PW-1



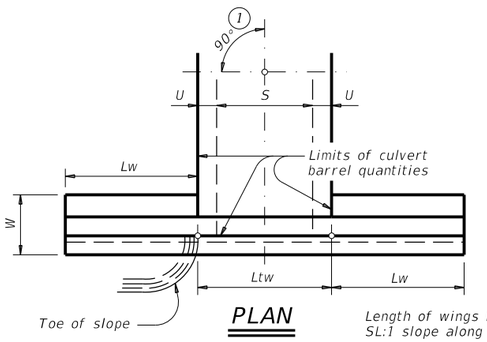
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

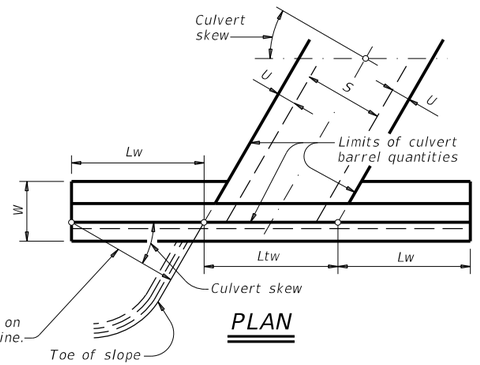


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

FILE:	pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		158

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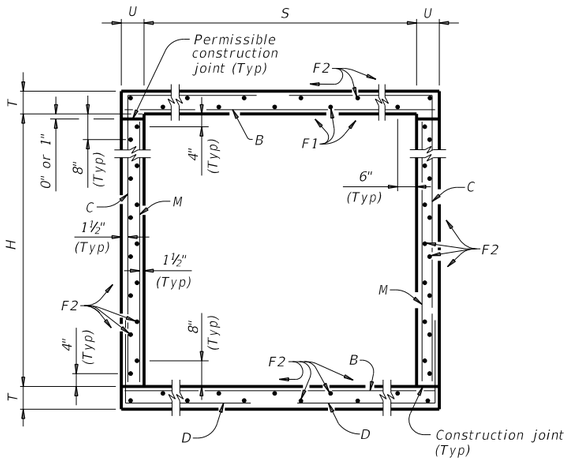
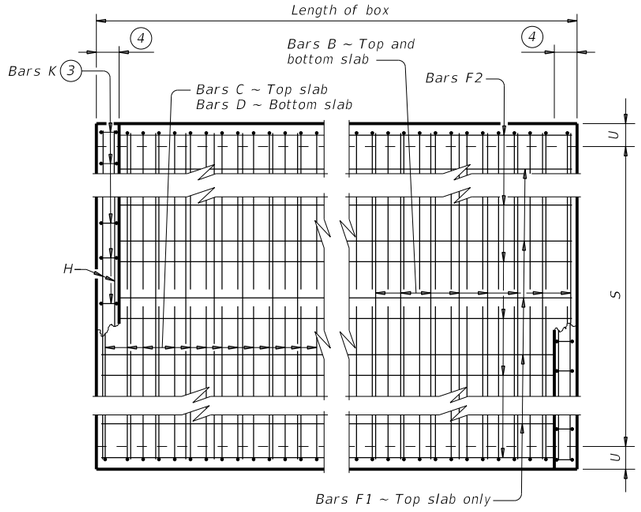
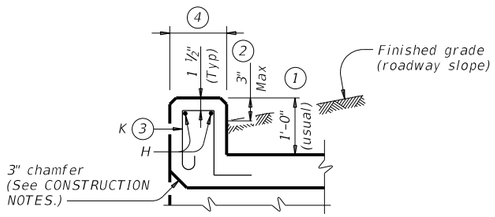
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\SCC-3 & 4.dgn
DGN: 0113020663K4 for details refer to SCC-MD standard sheet



TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

Do not use permanent forms.

Chamfer the bottom edge of the top slab 3" at the entrance.

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:

- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:

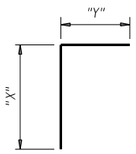
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

GENERAL NOTES:

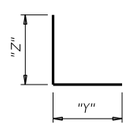
Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.

See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

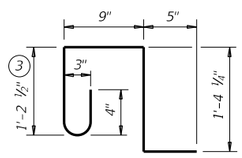
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

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

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	0113	02	063	US 290
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		159

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																										QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

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

SCC-3 & 4

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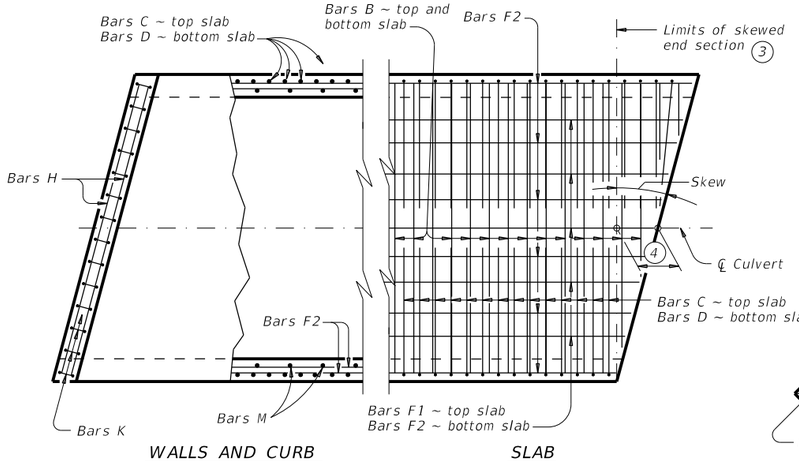
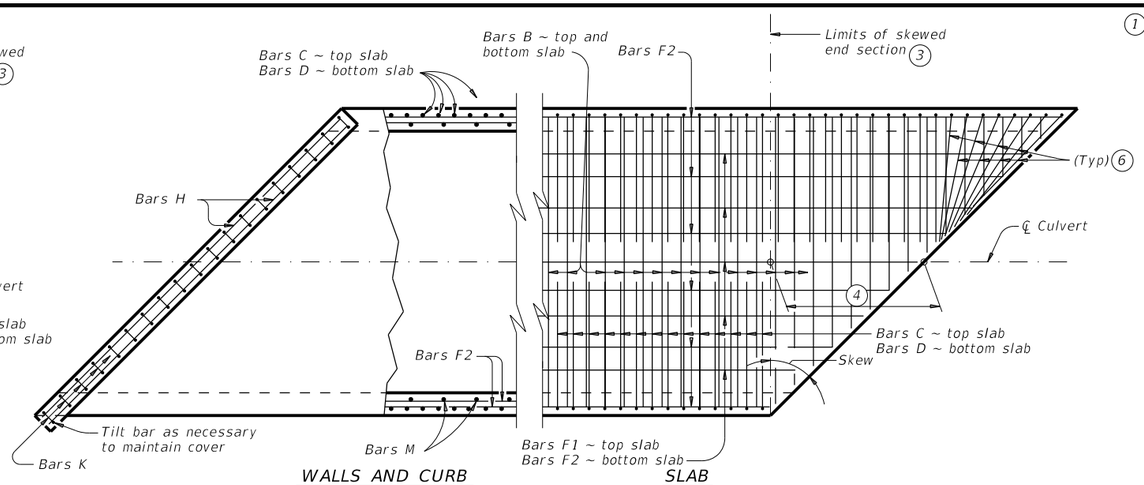
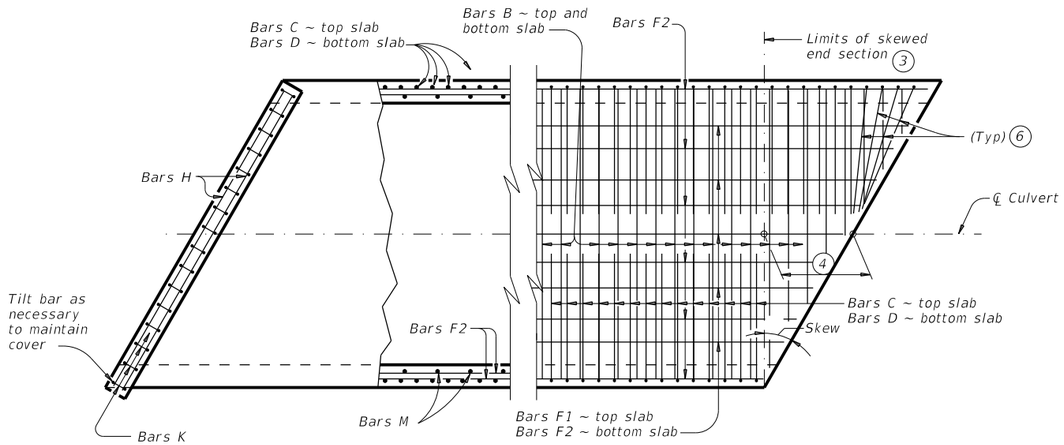


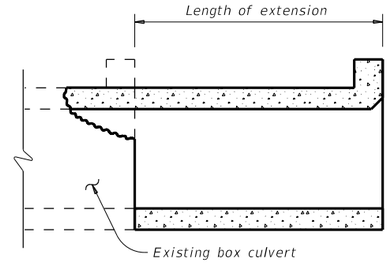
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



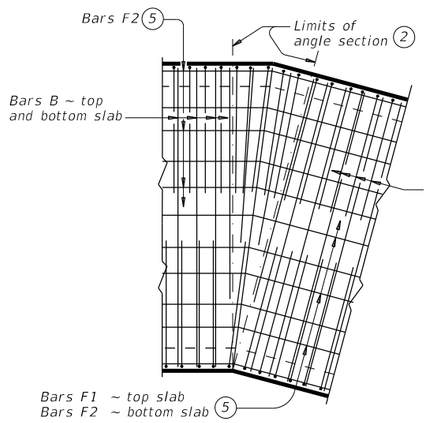
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



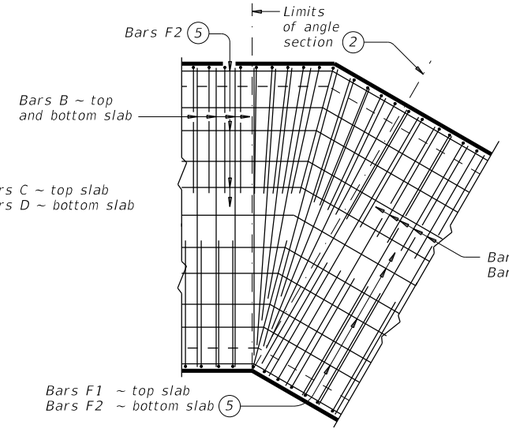
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



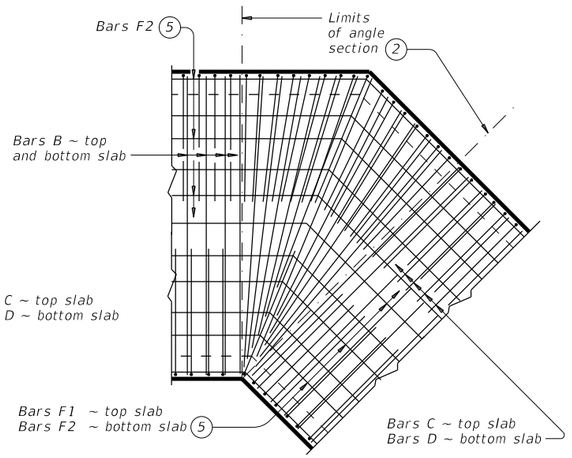
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D , E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 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. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions:
provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.

For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

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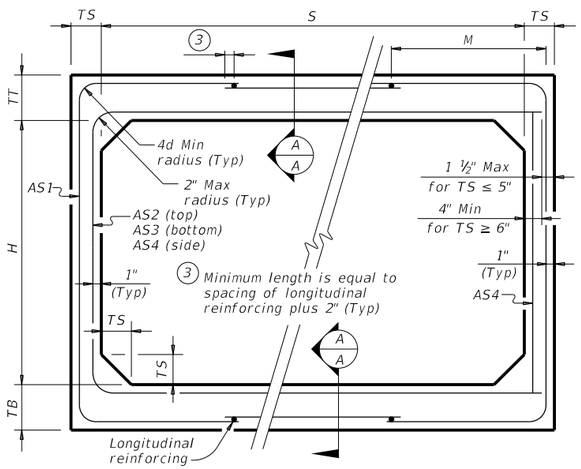
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	–	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	–	–	–	3.6
4	2	5	5	5	3 – 5	38	0.13	0.13	0.13	0.12	–	–	–	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	–	–	–	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	–	–	–	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	–	–	–	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	–	–	–	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	–	–	–	3.6
4	3	7.5	6	5	< 2	–	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	–	–	–	4.1
4	3	5	5	5	3 – 5	38	0.12	0.16	0.16	0.12	–	–	–	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	–	–	–	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	–	–	–	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	–	–	–	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	–	–	–	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	–	–	–	4.1
4	4	7.5	6	5	< 2	–	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	–	–	–	4.6
4	4	5	5	5	3 – 5	38	0.12	0.18	0.18	0.12	–	–	–	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	–	–	–	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	–	–	–	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	–	–	–	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	–	–	–	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	–	–	–	4.6

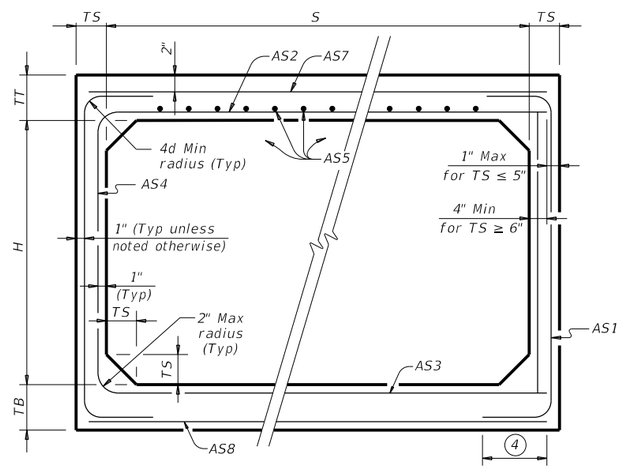
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

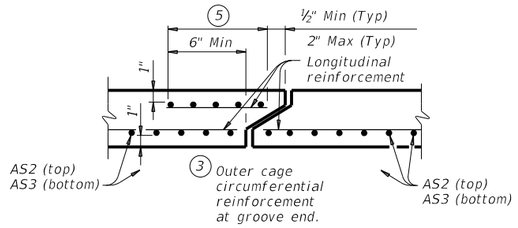
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		162

DATE: 1/12/2023 2:26:55 PM
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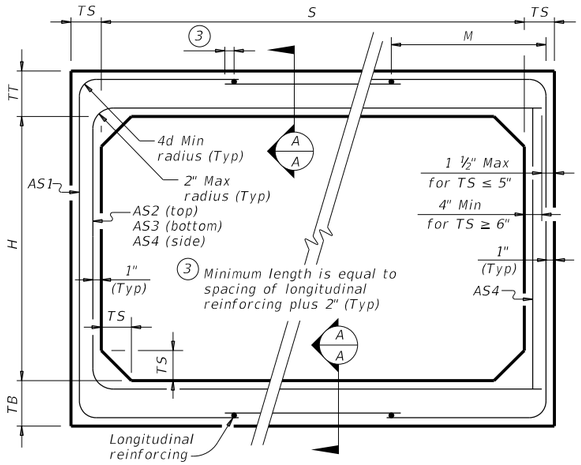
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) ②							① Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	–	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	–	–	–	9.6
7	3	8	8	8	3 – 5	43	0.19	0.19	0.19	0.19	–	–	–	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	–	–	–	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	–	–	–	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	–	–	–	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	–	–	–	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	–	–	–	9.6
7	4	8	8	8	< 2	–	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	–	–	–	10.4
7	4	8	8	8	3 – 5	43	0.19	0.22	0.19	0.19	–	–	–	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	–	–	–	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	–	–	–	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	–	–	–	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	–	–	–	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	–	–	–	10.4
7	5	8	8	8	< 2	–	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	–	–	–	11.2
7	5	8	8	8	3 – 5	43	0.19	0.24	0.21	0.19	–	–	–	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	–	–	–	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	–	–	–	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	–	–	–	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	–	–	–	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	–	–	–	11.2
7	6	8	8	8	< 2	–	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	–	–	–	12.0
7	6	8	8	8	3 – 5	47	0.19	0.25	0.23	0.19	–	–	–	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	–	–	–	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	–	–	–	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	–	–	–	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	–	–	–	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	–	–	–	12.0
7	7	8	8	8	< 2	–	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	–	–	–	12.8
7	7	8	8	8	3 – 5	59	0.19	0.27	0.25	0.19	–	–	–	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	–	–	–	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	–	–	–	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	–	–	–	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	–	–	–	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	–	–	–	12.8

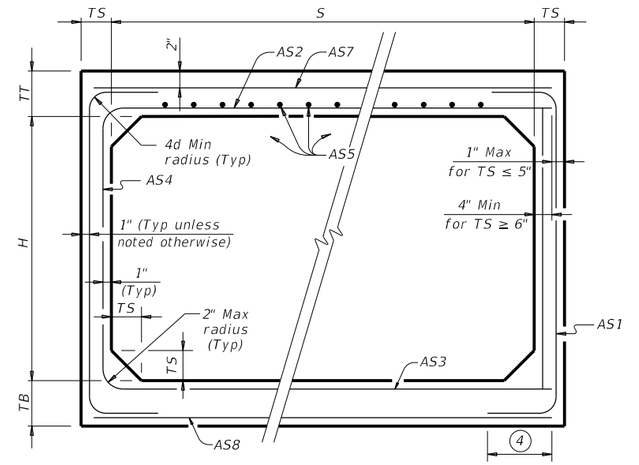
① For box length = 8'-0"

② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

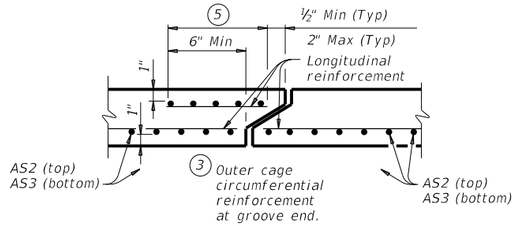
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

SCP-7

FILE: scp07sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		163

DATE: 1/12/2023 2:27:03 PM
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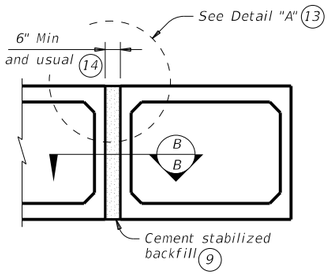
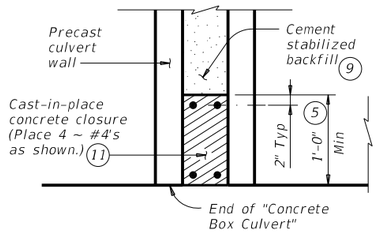
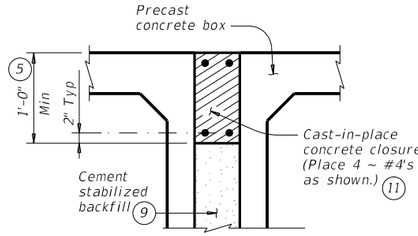


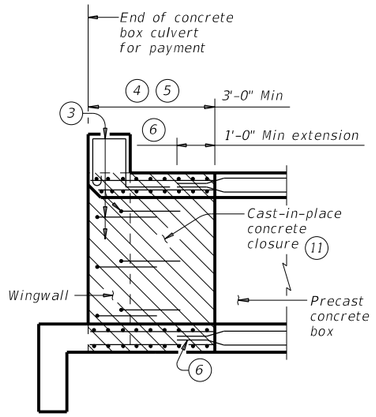
MULTIPLE UNIT PLACEMENT



SECTION B-B

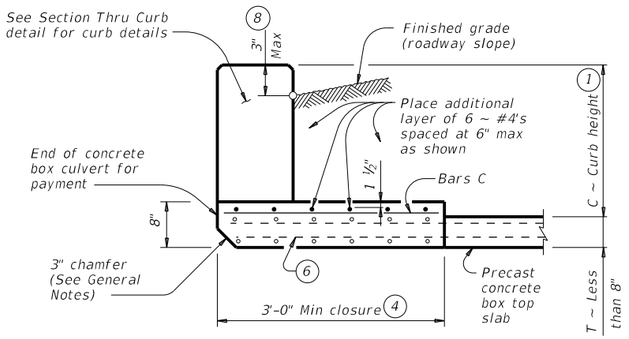


DETAIL "A" (13)

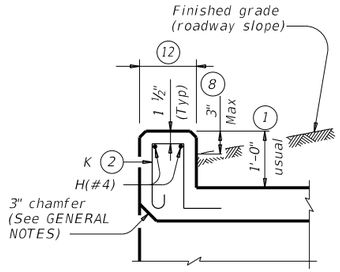


WINGWALL CONNECTION

(Also applies to safety end treatment.)

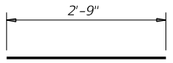


SECTION THRU TOP SLABS LESS THAN 8"

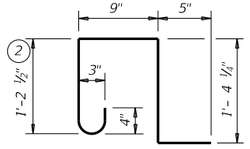


SECTION THRU CURB

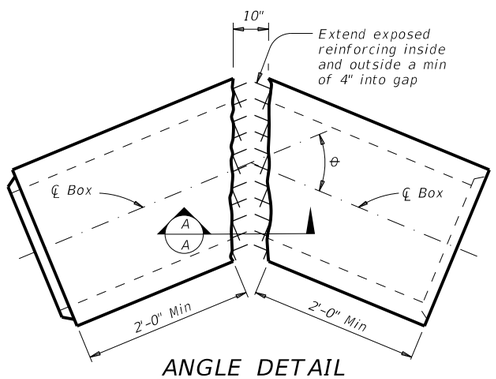
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



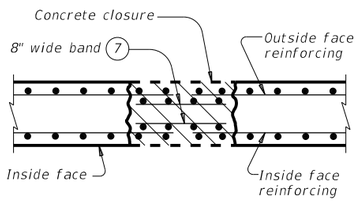
BARS C (#4)
(Spa = 1'-0" Max)



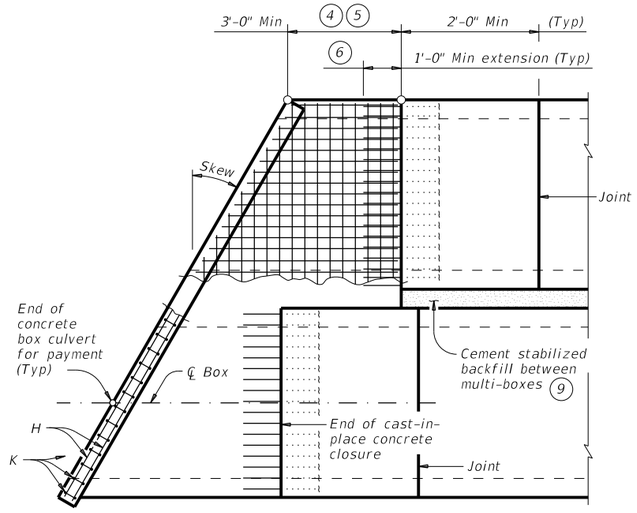
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		164

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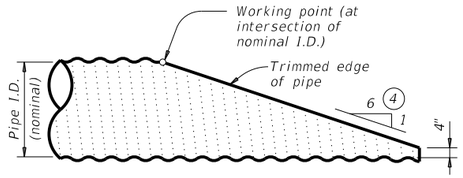
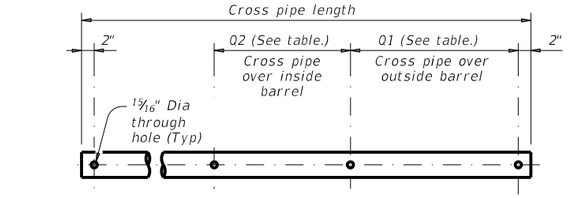


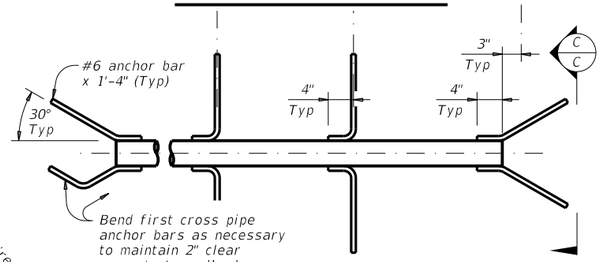
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

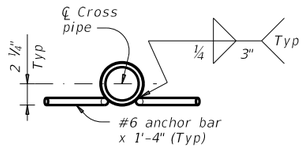
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

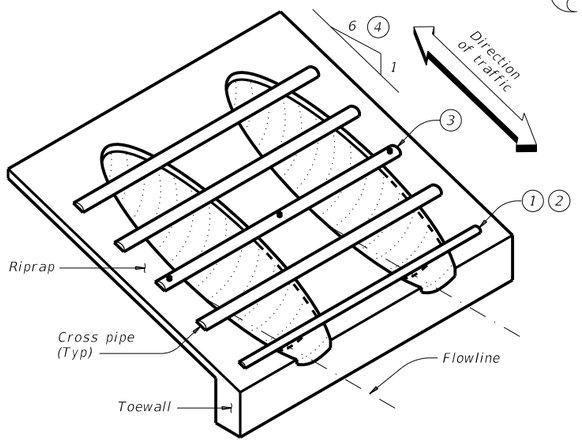


PIPE WITH ANCHOR BARS

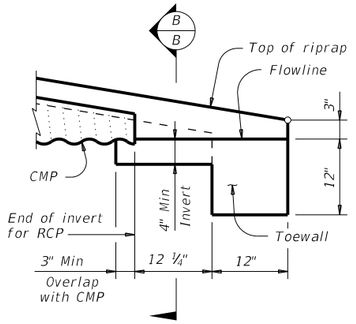


SECTION C-C

CROSS PIPE DETAILS

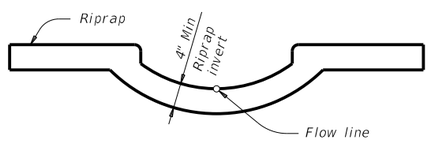


ISOMETRIC VIEW OF TYPICAL INSTALLATION



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.

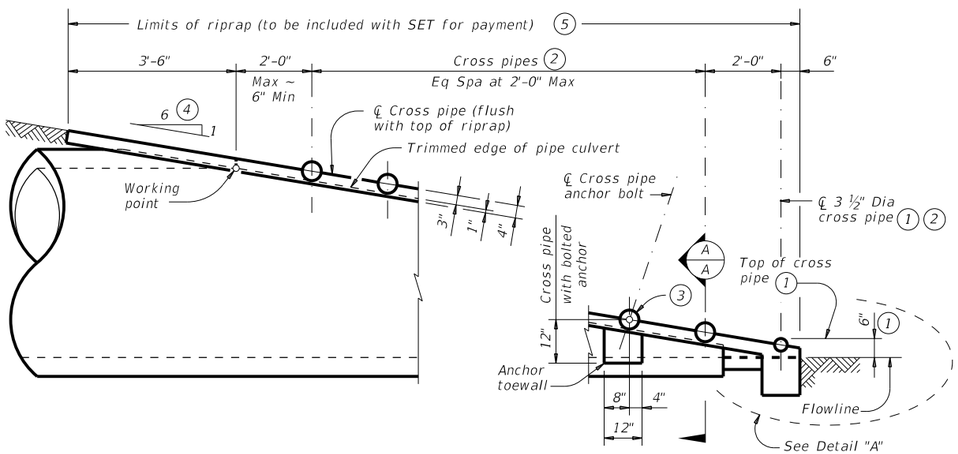
GENERAL NOTES:

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.

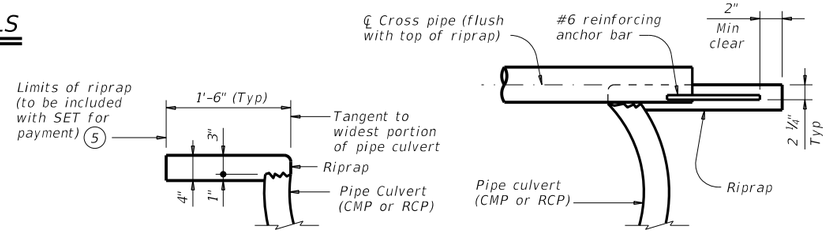
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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



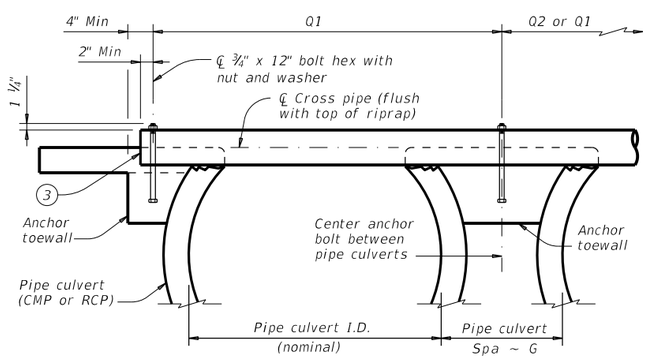
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(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

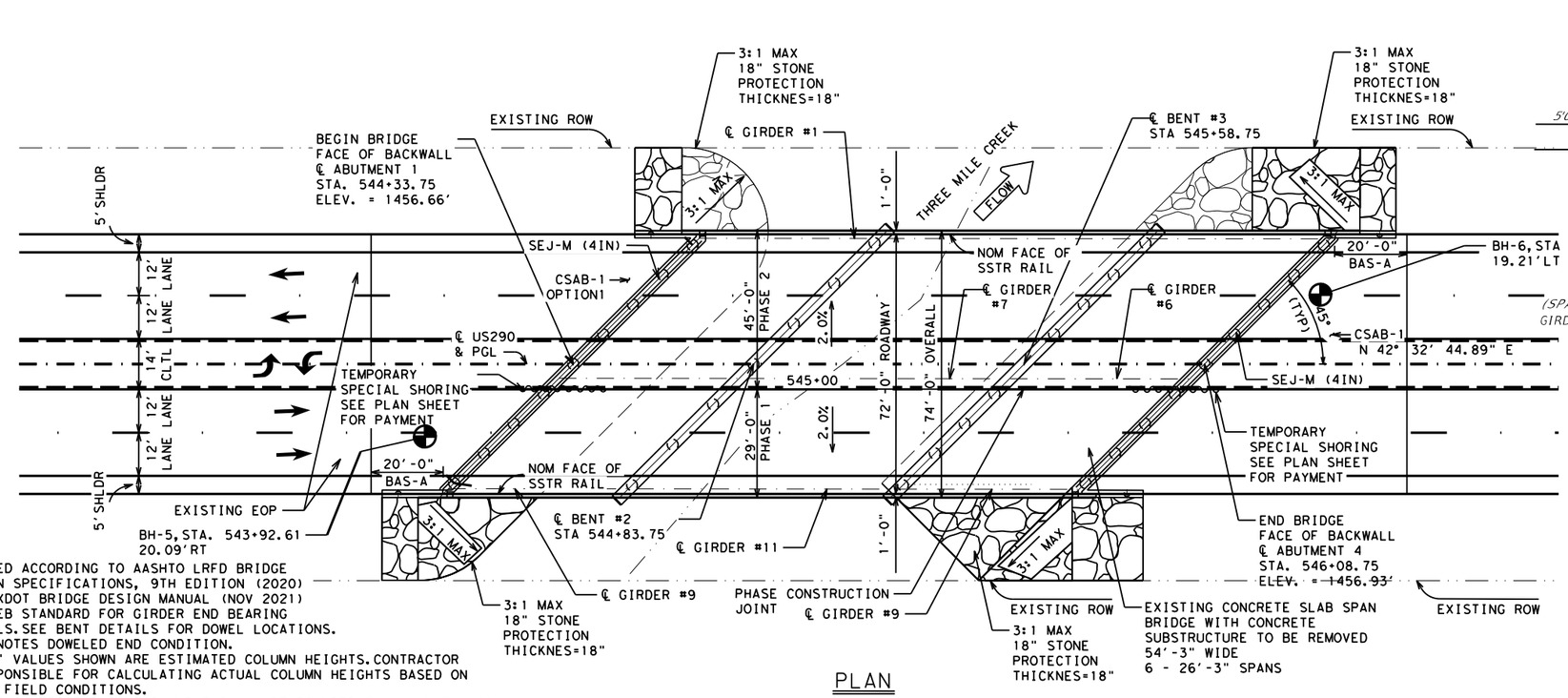
Bridge Division Standard

SAFETY END TREATMENT

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

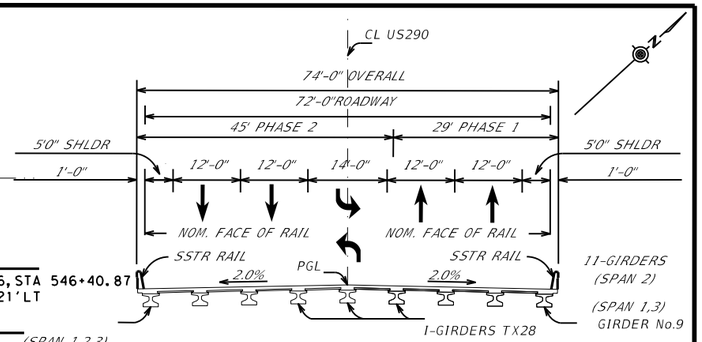
SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		165



PLAN

NOTES:
1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (NOV 2021)
2. SEE IGEB STANDARD FOR GIRDER END BEARING DETAILS. SEE BENT DETAILS FOR DOWEL LOCATIONS. "D" DENOTES DOWELED END CONDITION.
3. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATING ACTUAL COLUMN HEIGHTS BASED ON ACTUAL FIELD CONDITIONS.
4. DRILLED SHAFTS FOR BENT 2 AND 3 SHALL BE FOUNDED TO THE ELEVATIONS SHOWN TO OBTAIN FOUR SHAFT DIAMETERS INTO THE LIGHT BROWN HARD GRAVELLY SILTY CLAY.
5. CONTRACTORS ATTENTION IS DRAWN TO THE WATER BEARING SAND LAYERS AND VOIDS ENCOUNTERED DURING DRILLING OF BORINGS.
6. ALL ABUTMENTS AND BENTS ARE ON BEARING N 2 27'15.11"W
7. TAKE CORE HOLES AT THE BOTTOM OF EACH PROPOSED DRILL SHAFT AT ABUTMENT 4 TO DETERMINE THE CHARACTER OF THE SUPPORTING MATERIAL. THE LENGTH OF THE CORES MUST BE 5' DEEPER THAN THE PROPOSED FOUNDING GRADE, AS INDICATED IN ITEM 416.3.2. REPORT THE FINDINGS TO THE ENGINEER. OTHER AREAS COULD BE TESTED, IF NECESSARY, AS DIRECTED BY THE ENGINEER.
8. MAINTAIN FLOW OF THREE MILE CREEK THROUGH THE PROJECT LIMITS FOR THE DURATION OF CONSTRUCTION OPERATIONS.



TYPICAL TRANSVERSE SECTION

BRIDGE HYDRAULIC DATA TABLE		
PROP HW25 =	1447.34	FT
PROP Q25 =	5849	CFS
PROP V25 =	8.24	FT/S
PROP HW100 =	1452.17	FT
PROP Q100 =	10219	CFS
PROP V25 =	8.12	FT/S

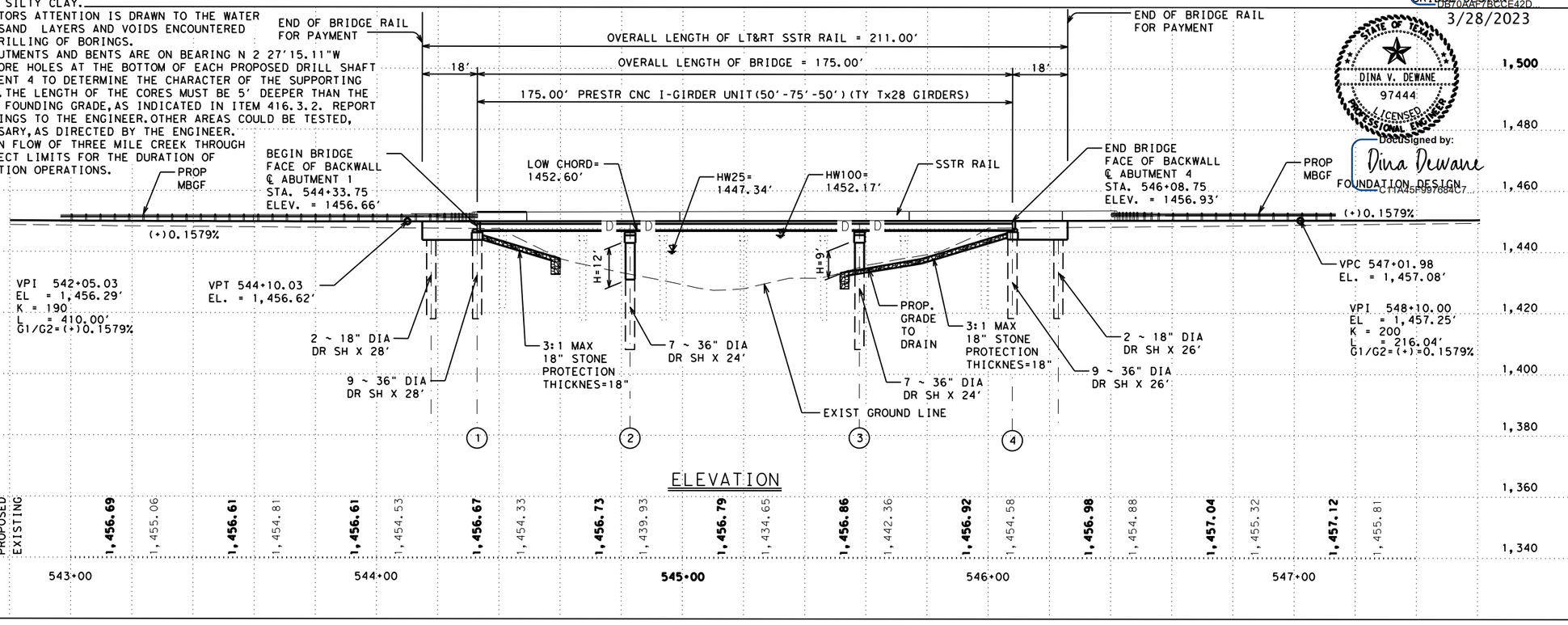
3/27/2023
3/28/2023

STATE OF TEXAS — AL SHAWN — 132389 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Al Shawn — BRIDGE DESIGN — DB70AAF7BCCE42D...

STATE OF TEXAS — MOUNESS H. YACOUB — 91227 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Mounessh Yacoub P.E. — C558EA119EB3496...



ELEVATION

3/28/2023

STATE OF TEXAS — DINA V. DEWANE — 97444 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Dina Dewane — FOUNDATION DESIGN — C71A45F5B7684C7...

EXISTING NBI: 14-087-0-0113-02-040
PROPOSED NBI: 14-087-0-0113-02-514
DESIGN SPEED = 60 MPH
EXIST ADT (2024) = 10,511 VPD
PROP ADT (2044) = 21,020 VPD
TERRAIN: ROLLING
ROADWAY FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL - OTHER

HL-93 LOADING
SUPERSTRUCTURE INV/OPR RATING= 1.07/1.90

SCALES (IN FEET):
HORZ- 0 40
VERT- 0 40

Austin District
Central Design

Texas Department of Transportation

US 290
BRIDGE LAYOUT THREE MILE CREEK
NBI NO: 140870011302514

SHEET 1 OF 1

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		166

DATE: 3/27/2023 2:14:12 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020063\4 - Design\Plan Set\7. Bridge\US0290_BRG_LAYOUT.dgn

DRILLING LOG

WinCore Version 3.3	County	Gillespie	Hole	B-5	District Austin
	Highway	US 290	Structure	Bridge	Date 2/10/22
	CSJ	0113-02-063	Station		Grnd. Elev. 1454.24 ft
			Offset		GW Elev. 1430.24 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
1452.5			SAND, silty, light gray, dry (FILL) (SM)			11				11.5-inch asphalt, Fill: 0-9.5 ft passing #200: 62%; N: 17 bpf
1451.2			CLAY, lean, sandy, dark gray, dry (FILL) (CL)							traces gravel frag., 1-2.5 ft
			GRAVEL, silty, with sand, slightly compact, dark brown, dry (Fill) (GM)			7	0	0		passing #200: 39%; N: 22 bpf
5		13 (6) 13 (6)								non-plastic, 3.5-5 ft
1447.7			CLAY, lean, stiff, brown, moist (Fill) (CL)			11				N: 13 bpf
						19				passing #200: 87%; N: 13 bpf
10		13 (6) 15 (6)								traces wood frag., 8-9.5 ft
1442.7			CLAY, lean, very stiff, brown, moist (CL)			15	47	30		N: 28 bpf
15		33 (6) 31 (6)								
1437.7			SILT, compact, light brown, moist (ML)			9				N: 20 bpf
20		24 (6) 19 (6)								
1432.7			SAND, silty, compact, brown, moist (SM)			12				N: 13 bpf; passing #200: 22% traces gravel frag., 21.5-23 ft
25		36 (6) 28 (6)								
1427.7			CLAY, gravelly silty, with sand, very hard, light brown, wet (CL-ML)			15	24	7		passing #200: 56%; N: 37 bpf some gravel frag., 26.5-28 ft
30		50 (0.5) 50 (0.5)								

Remarks: Groundwater was encountered at a depth of 24 ft during drilling. Northing: 10051285 ; Easting: 2818513.6. The Survey information were provided by TxDOT.

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

Driller: B2Z Engineering, Inc. **Logger: Blayke P.** **Organization: Wood**

\\Dal-FS1\projects\2021\4900211016 TxDOT 36-8iDP5121 (WA-6)\06 Boring Logs\3. US 290\B5-B6.clg

DRILLING LOG

WinCore Version 3.3	County	Gillespie	Hole	B-5	District Austin
	Highway	US 290	Structure	Bridge	Date 2/10/22
	CSJ	0113-02-063	Station		Grnd. Elev. 1454.24 ft
			Offset		GW Elev. 1430.24 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, gravelly silty, with sand, very hard, light brown, wet (CL-ML)			21				N: 50/2in. some gravel frag., 31.5-41.5 ft
35		50 (3) 50 (0.5)								
						17	18	5		passing #200: 70%; N: 50/3
40		50 (2.5) 50 (0.5)								
						17				N: 30/2in. traces gravel frag., 41.5-55 ft
45		50 (1.5) 50 (0)								
										N: 30/0.5in. non-plastic, 46.5-48 ft
50		50 (1.5) 50 (0.5)								
						13				N: 50/3in.
1399.255		50 (0.5) 50 (0.5)								
60										

Remarks: Groundwater was encountered at a depth of 24 ft during drilling. Northing: 10051285 ; Easting: 2818513.6. The Survey information were provided by TxDOT.

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

Driller: B2Z Engineering, Inc. **Logger: Blayke P.** **Organization: Wood**

\\Dal-FS1\projects\2021\4900211016 TxDOT 36-8iDP5121 (WA-6)\06 Boring Logs\3. US 290\B5-B6.clg

STATE OF TEXAS
DINA V. DEWANE
97444
LICENSED PROFESSIONAL ENGINEER

Dina Dewane

01/13/2022

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division

BORING LOGS

FILE: US0290_BRG_8215bd01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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DRILLING LOG

WinCore Version 3.3	County	Gillespie	Hole	B-6	District Austin
	Highway	US 290	Structure	Bridge	Date 2/11/22
	CSJ	0113-02-063	Station		Grnd. Elev. 1454.36 ft
			Offset		GW Elev. 1430.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, silty, slightly compact, gray, moist (FILL) (SM)			11	0	0		14-inch asphalt, Fill: 0-6.5 ft passing #200: 43%; N: 10 bpf non-plastic, 1.0-2.5 ft traces gravel frag., 1-2.5 ft
						12				N: 10 bpf; red, 4-6.5 ft
5		10 (6) 11 (6)								
1447.9			SAND, clayey, with gravel, slightly compact to compact, gray, moist (SC)			6	30	18		passing #200: 43%; N: 11 bpf rare wood frag., 6.5-8 ft
						10				N: 10 bpf
10		17 (6) 20 (6)								N: 21 bpf
15		20 (6) 21 (6)								
						9	36	24		N: 42 bpf; passing #200: 20% trace gravel frag., 16.5-21.5 ft
20		18 (6) 20 (6)								
1432.9			CLAY, gravelly silty, with sand, very hard, light brown (CL-ML)			16				N: 22 bpf
25		50 (0) 50 (0)								N: 50/0.5in.
30		50 (1) 50 (0.5)								

Remarks: Groundwater was encountered at a depth of 24 ft during drilling. Latutude: 10051494.5 ; Longitude: 2818652.5. The Survey information were provided by TxDOT.

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

Driller: B2Z Engineering, Inc. **Logger: Blayke P.** **Organization: Wood**

\\Dal-FS1\projects\2021\4900211016 TxDOT 36-8iDP5121 (WA-6)\06 Boring Logs\3. US 290\B5-B6.clg

DRILLING LOG

WinCore Version 3.3	County	Gillespie	Hole	B-6	District Austin
	Highway	US 290	Structure	Bridge	Date 2/11/22
	CSJ	0113-02-063	Station		Grnd. Elev. 1454.36 ft
			Offset		GW Elev. 1430.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, gravelly silty, with sand, very hard, light brown (CL-ML)							
1422.9			CLAY, sandy Lean, with gravel, hard, moist, brown (CL)			12	44	30		passing #200: 70%; N: 50/4.5
35		50 (0.5) 50 (0)								N: 40/1.5in.
40		21 (6) 50 (4.5)								borehole cave in started, 41 ft
1412.9			GRAVEL, dense, brown (GP)			9	0	n.		N: 43 bpf non-plastic, 41.5-43 ft hammer dropped 29, first drop at 45 ft TCP taken at 47.7 ft
45		44 (6) 42 (6)								N: 50/3in.
50		50 (1) 50 (0)								borehole cave in, 49 ft
1402.9										
55										
60										

Remarks: Groundwater was encountered at a depth of 24 ft during drilling. Latutude: 10051494.5 ; Longitude: 2818652.5. The Survey information were provided by TxDOT.

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

Driller: B2Z Engineering, Inc. **Logger: Blayke P.** **Organization: Wood**

\\Dal-FS1\projects\2021\4900211016 TxDOT 36-8iDP5121 (WA-6)\06 Boring Logs\3. US 290\B5-B6.clg

STATE OF TEXAS
DINA V. DEWANE
97444
LICENSED PROFESSIONAL ENGINEER

01/13/2023

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division

BORING LOGS

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©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		168

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SUMMARY OF ESTIMATED QUANTITIES

	BID ITEM / BID CODE	0400 6005	0403 6001	0416 6001	0416 6004	0420 6013	0420 6029	0420 6037	0422 6001	0422 6015	0425 6035	0432 6033	0450 6023	0454 6018	0496 6010
	BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY SSTR)	SEALED EXPANSION JOINT (4 IN) (SEJ – M)	REMOV STR (BRIDGE 100 – 499 FT LENGTH)
		CY	SF	LF	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF	EA
PHASE I	2 – ABUTMENTS	192	200	54	216	48.4						512	36.0		
	2 - INTERIOR BENTS				144		44.0	16.5							
	1 - 175.00' PRESTRESSED CONC. I-GIRDER UNIT								5075	124	767.70		175.0	82	
	PHASE I SUBTOTAL:	192	200	54	360	48.4 (1)	44.0 (2)	16.5	5075	124	767.70	512	211.0	82	
PHASE II	2 - ABUTMENTS	214		54	270	60.0						584	36.0		
	2 - INTERIOR BENTS				192		55.8	22.0							
	1 - 175.00' PRESTRESSED CONC. I-GIRDER UNIT								7875	195	941.00		175.0	123	
	PHASE II SUBTOTAL:	214		54	462	60.0	55.8	22.0	7875	195	941.00	584	211.0	123	
	OVERALL TOTALS:	406	200	108	822	108.4	99.8	38.5	12950	319	1708.70	1096	422.0	205	1

BEARING SEAT ELEVATIONS

	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7	BEAM 8	BEAM 9	BEAM 10	BEAM 11
BENT 1 (FWD)	1452.596	1452.752	1452.908	1453.064	1453.220	1453.042	1452.858	1452.673	1452.490		
	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7	BEAM 8	BEAM 9	BEAM 10	BEAM 11
BENT 2 (BK)	1452.671	1452.827	1452.983	1453.139	1453.295	1453.117	1452.933	1452.748	1452.563		
(FWD)	1452.570	1452.700	1452.830	1452.960	1453.090	1453.168	1453.016	1452.878	1452.739	1452.601	1452.462
	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7	BEAM 8	BEAM 9	BEAM 10	BEAM 11
BENT 3 (BK)	1452.685	1452.815	1452.945	1453.075	1453.205	1453.283	1453.131	1452.993	1452.854	1452.716	1452.577
(FWD)	1452.792	1452.948	1453.104	1453.260	1453.416	1453.239	1453.054	1452.869	1452.685		
	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7	BEAM 8	BEAM 9		
BENT 4 (BK)	1452.867	1453.023	1453.179	1453.335	1453.491	1453.313	1453.129	1452.944	1452.760		

(1) Quantity includes 0.67 CY shear keys. See Abutment Details sheet and Shear Key Details for I-Girders (IGSK) standard sheet for shear key location, details, and notes.

(2) Quantitiy includes 1.83 CY shear keys. See Interior Bent Details sheet and Shear Key Details for I-Girders (IGSK) standard sheet for shear key location, details, and notes.

HL93 LOADING

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

03/28/2023

Texas Department of Transportation | Bridge Division

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

THREE MILE CREEK

FILE: US0290_BRG_8215eq01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		169

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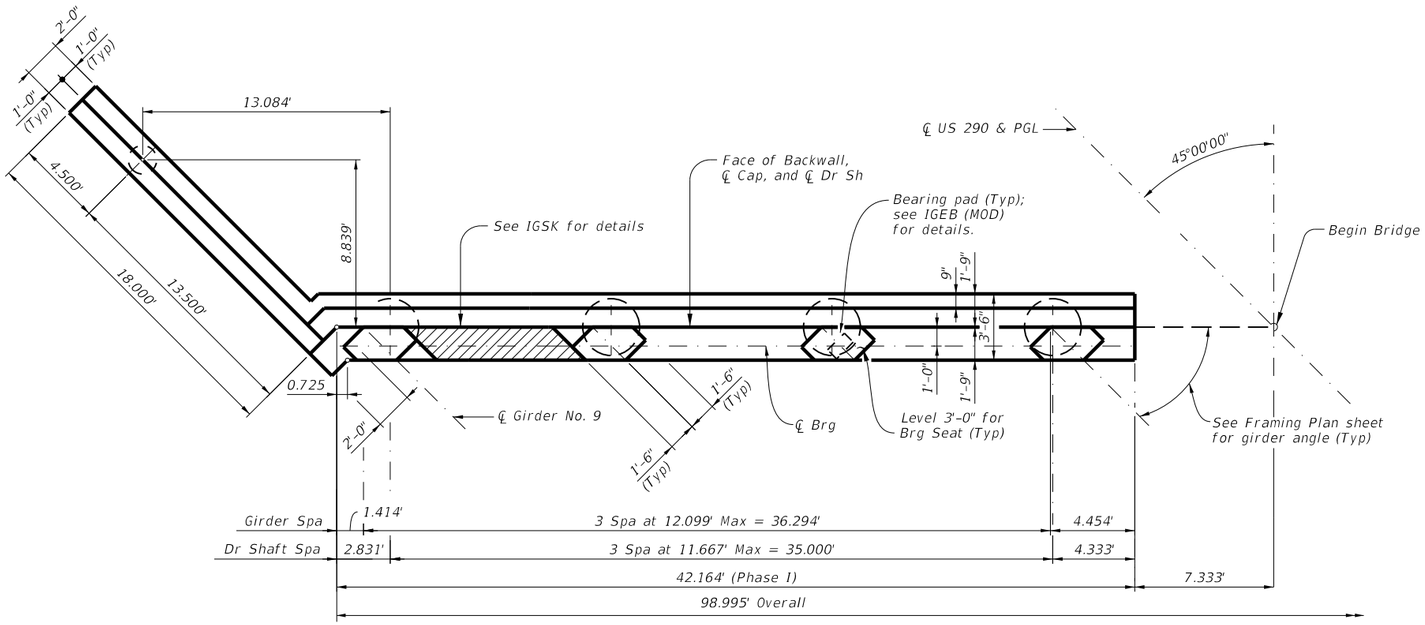
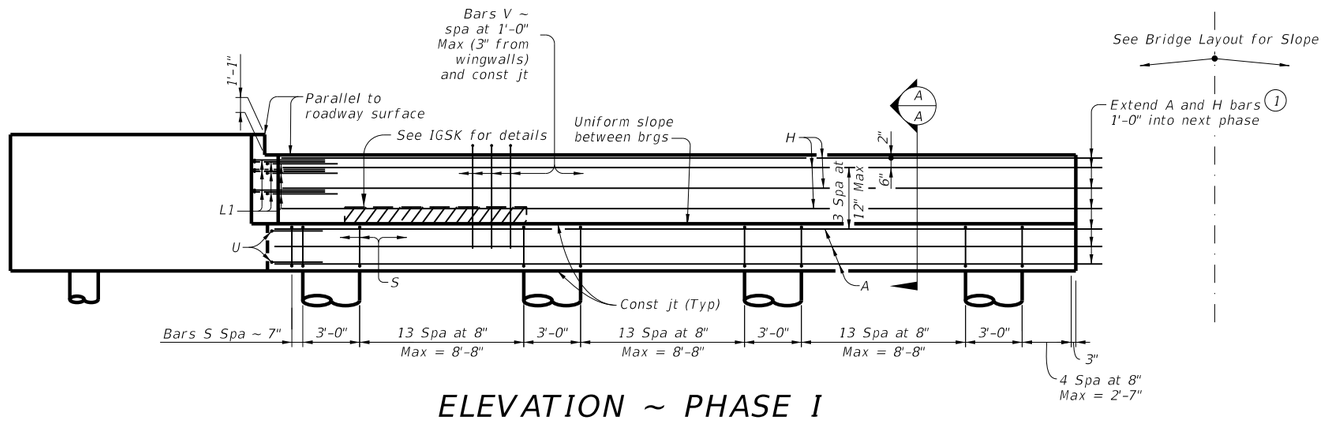
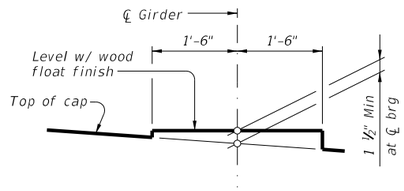


PLAN ~ PHASE I

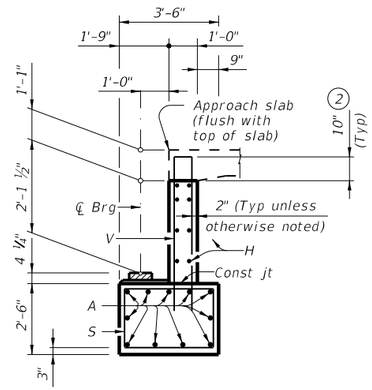


ELEVATION ~ PHASE I



BEARING SEAT DETAIL

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



SECTION A-A

(With approach slab)

(1) Extend bars 1'-0" into Phase 2 Construction. Splice Bars A and H by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

(2) Increase as required to maintain 3" from finished grade.

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HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division

ABUTMENT NO. 1 PHASE I

THREE MILE CREEK

FILE: US0290_BRG_8215ab01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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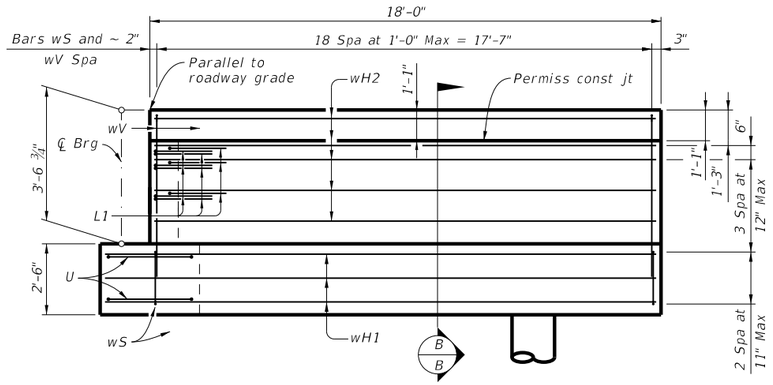
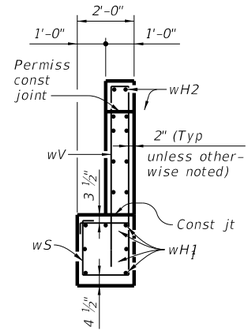
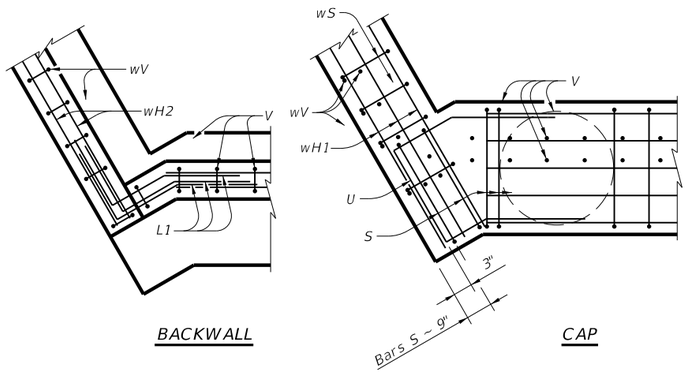


WINGWALL ELEVATION

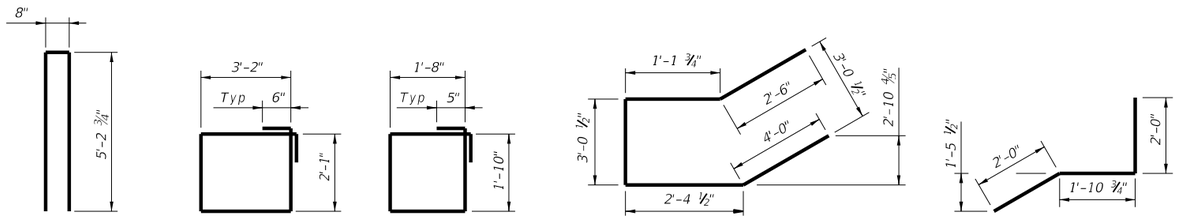


SECTION B-B



BACKWALL CAP

CORNER DETAILS



BARS V & wV BARS S BARS wS BARS U BARS L1

TABLE OF ESTIMATED QUANTITIES PHASE I

Bar	No.	Size	Length	Weight
A	11	#11	42'-7"	2,489
H	8	#6	43'-0"	517
L1	9	#6	5'-11"	80
S	51	#5	11'-6"	612
U	2	#6	13'-1"	39
V	43	#5	11'-2"	501
wH1	7	#6	19'-5"	204
wH2	10	#6	17'-8"	265
wS	19	#4	7'-10"	99
wV	19	#5	11'-2"	221
Reinforcing Steel			Lb	5,027
Class "C" Concrete			CY	24.2

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

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

See Ty SSTR standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 75 tons / dr sh.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Grade 60 reinforcing steel.

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SHEET 2 OF 2

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ABUTMENT NO. 1 PHASE I

THREE MILE CREEK

FILE: US0290_BRG_8215ab01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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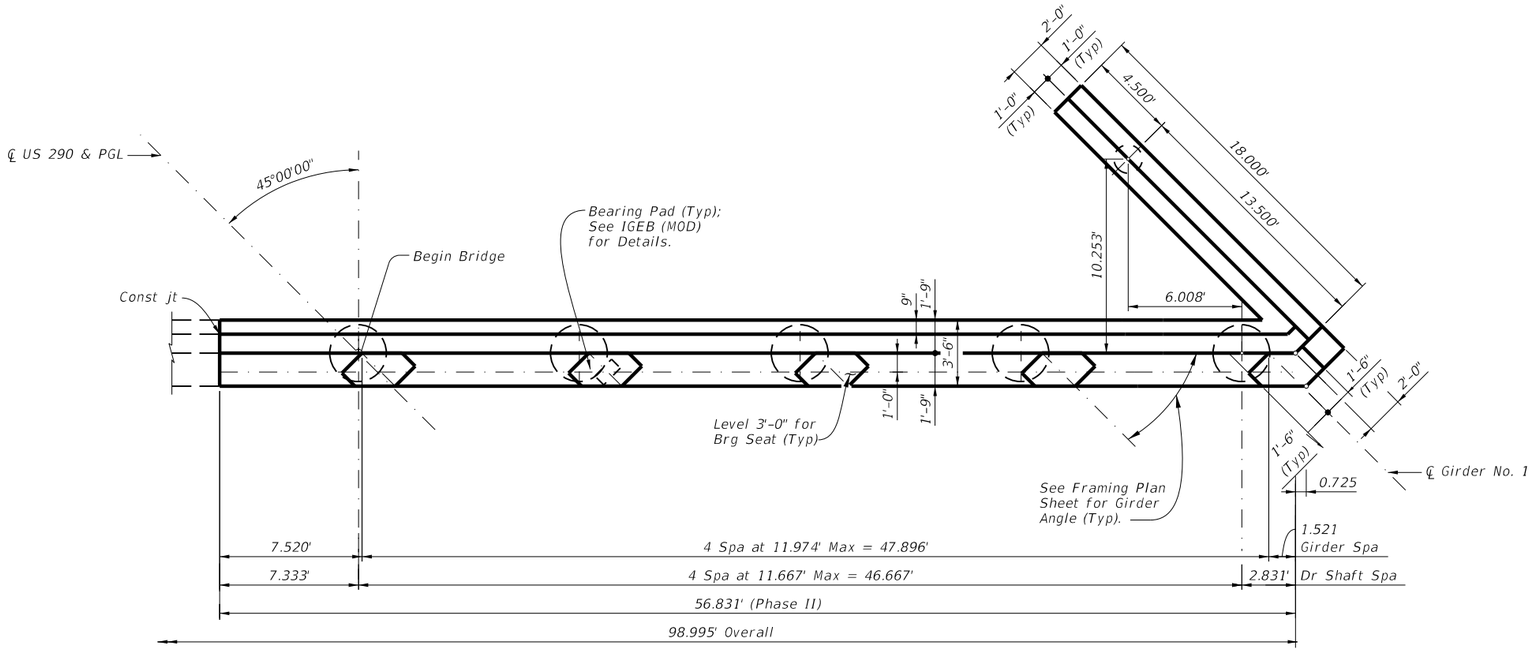
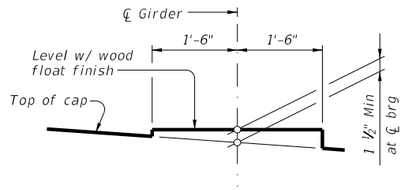
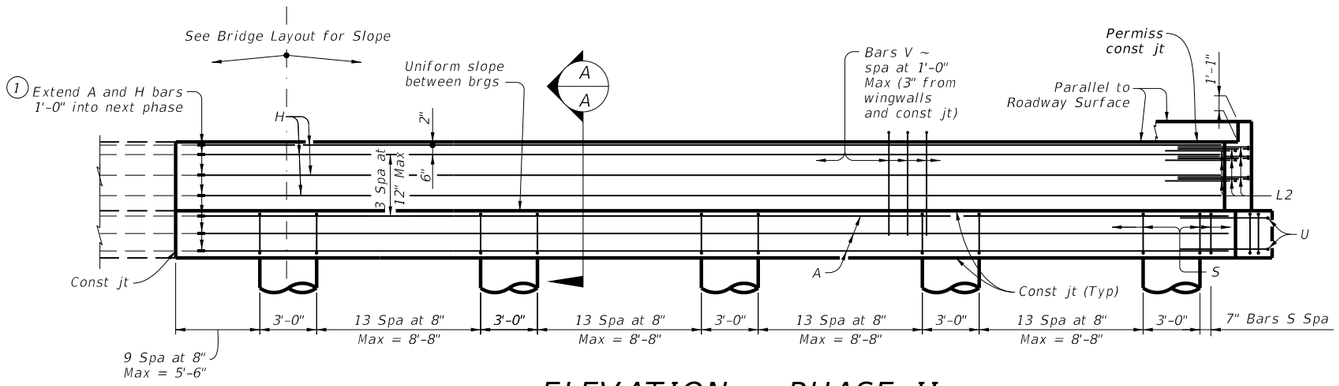


PLAN ~ PHASE II

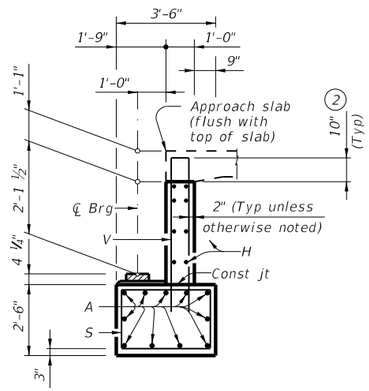


BEARING SEAT DETAIL

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



ELEVATION ~ PHASE II



SECTION A-A

(With approach slab)

1. Extend bars 1'-0" into Phase 2 Construction. Splice Bars A and H by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."
2. Increase as required to maintain 3" from finished grade.

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ABUTMENT NO. 1 PHASE II

THREE MILE CREEK

FILE: US0290_BRG_8215ab01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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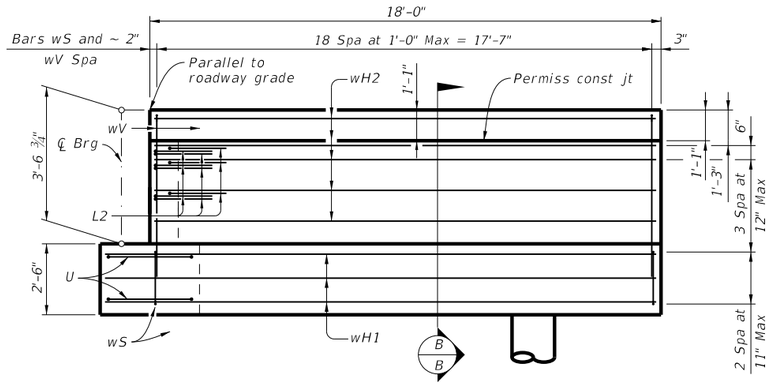
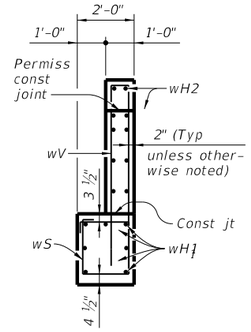
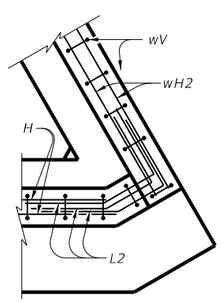


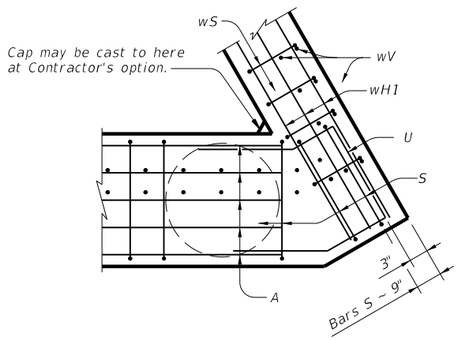
WINGWALL ELEVATION



SECTION B-B

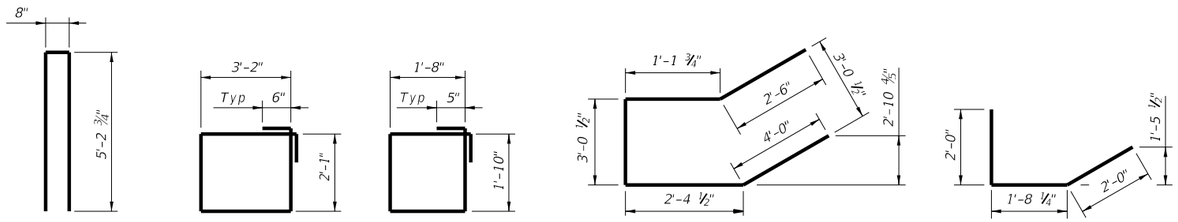


BACKWALL



CAP

CORNER DETAILS



BARS V & wV | BARS S | BARS wS | BARS U | BARS L2

TABLE OF ESTIMATED QUANTITIES PHASE II

Bar	No.	Size	Length	Weight
A	11	#11	55'-3"	3,229
H	8	#6	55'-8"	669
L2	9	#6	5'-9"	78
S	70	#5	11'-6"	840
U	2	#6	13'-1"	39
V	58	#5	11'-2"	676
wH1	7	#6	19'-5"	204
wH2	10	#6	17'-8"	265
wS	19	#4	7'-10"	99
wV	19	#5	11'-2"	221
Reinforcing Steel			Lb	6,320
Class "C" Concrete			CY	30.0

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

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

See Ty SSTR standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 75 tons / dr sh.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Grade 60 reinforcing steel.

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SHEET 2 OF 2

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Texas Department of Transportation

Bridge Division

ABUTMENT NO. 1 PHASE II

THREE MILE CREEK

FILE: US0290_BRG_8215ab01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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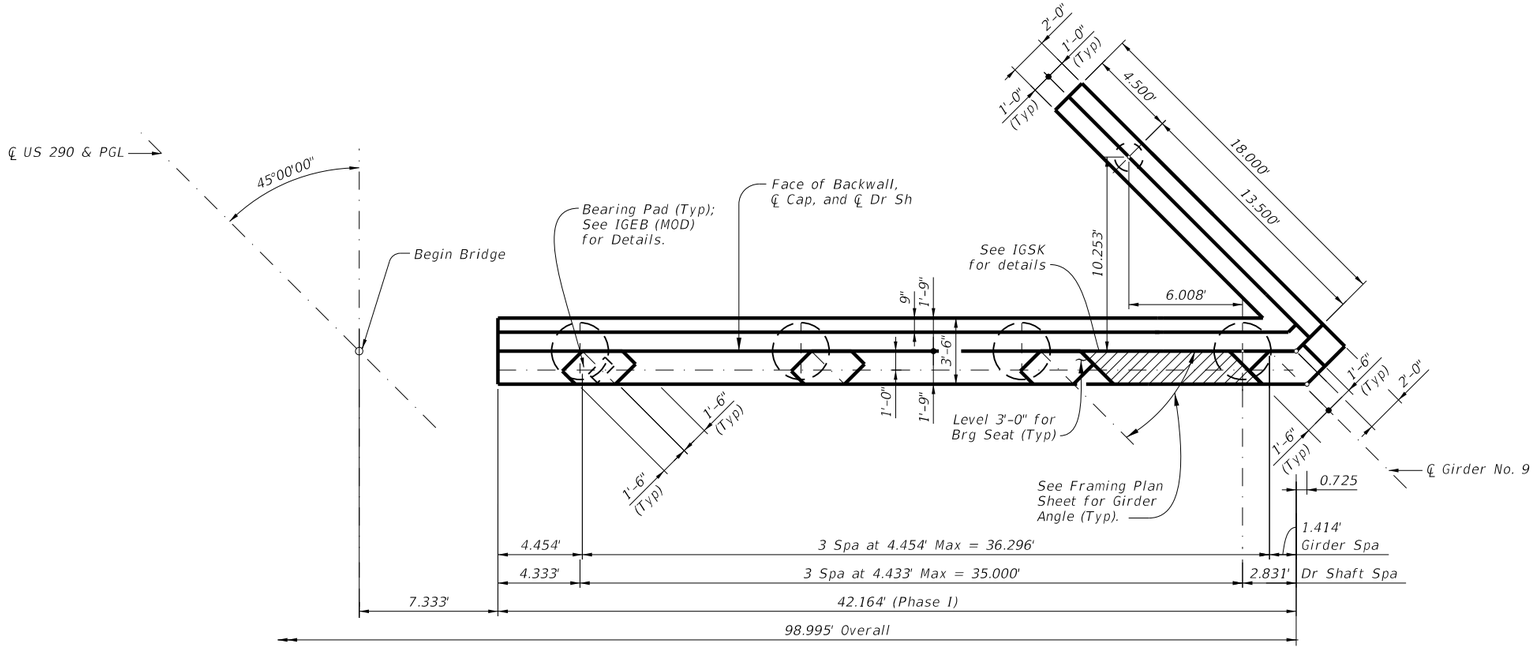
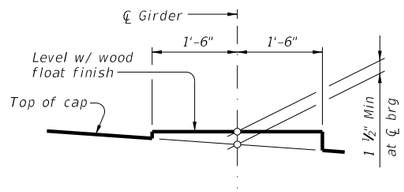
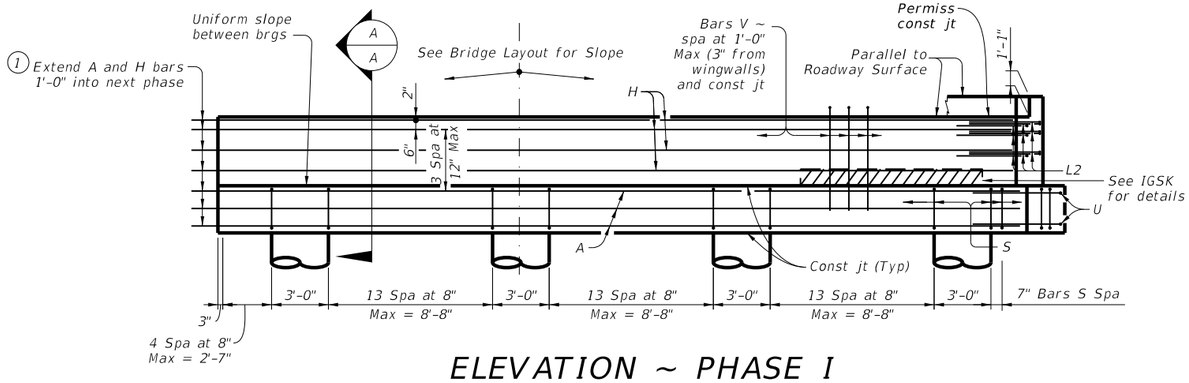


PLAN ~ PHASE I

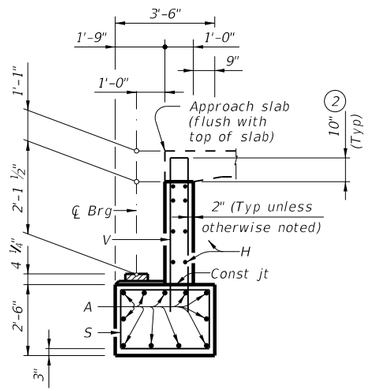


BEARING SEAT DETAIL

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



ELEVATION ~ PHASE I



SECTION A-A

(With approach slab)

1. Extend bars 1'-0" into Phase 2 Construction. Splice Bars A and H by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."
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Texas Department of Transportation

Bridge Division

ABUTMENT NO. 4 PHASE I

THREE MILE CREEK

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©TxDOT MARCH 2022	CONT.	SECT	JOB	HIGHWAY
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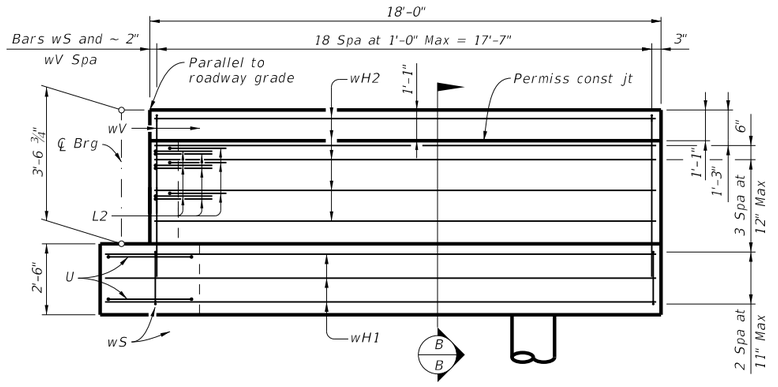
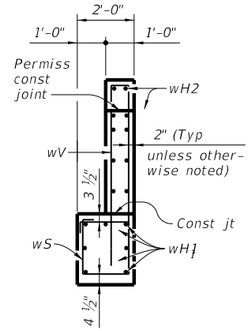
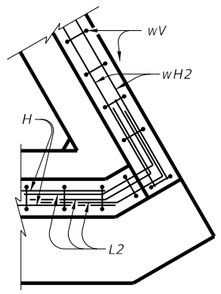


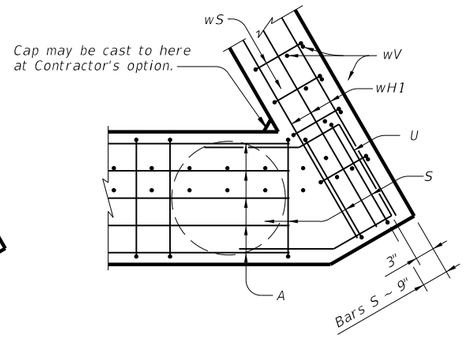
WINGWALL ELEVATION



SECTION B-B



BACKWALL



CAP

CORNER DETAILS

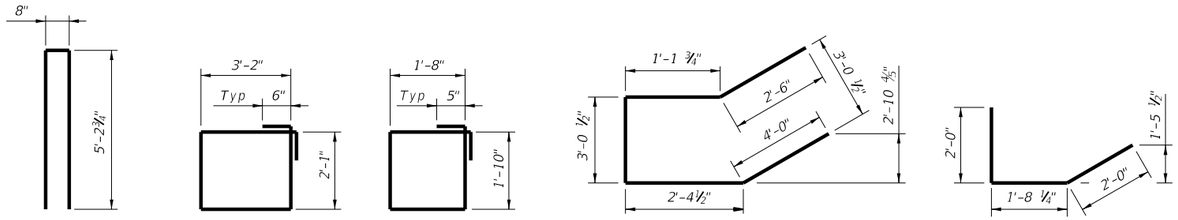


TABLE OF ESTIMATED QUANTITIES PHASE I

Bar	No.	Size	Length	Weight
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U	2	#6	13'-1"	39
V	43	#5	11'-2"	501
wH1	7	#6	19'-5"	204
wH2	10	#6	17'-8"	265
wS	19	#4	7'-10"	99
wV	19	#5	11'-2"	221
Reinforcing Steel			Lb	5,027
Class "C" Concrete			CY	24.2

GENERAL NOTES:

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See Ty SSTR standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 75 tons / dr sh.

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

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi).
Provide Grade 60 reinforcing steel.

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Bridge Division

ABUTMENT NO. 4
PHASE I

THREE MILE CREEK

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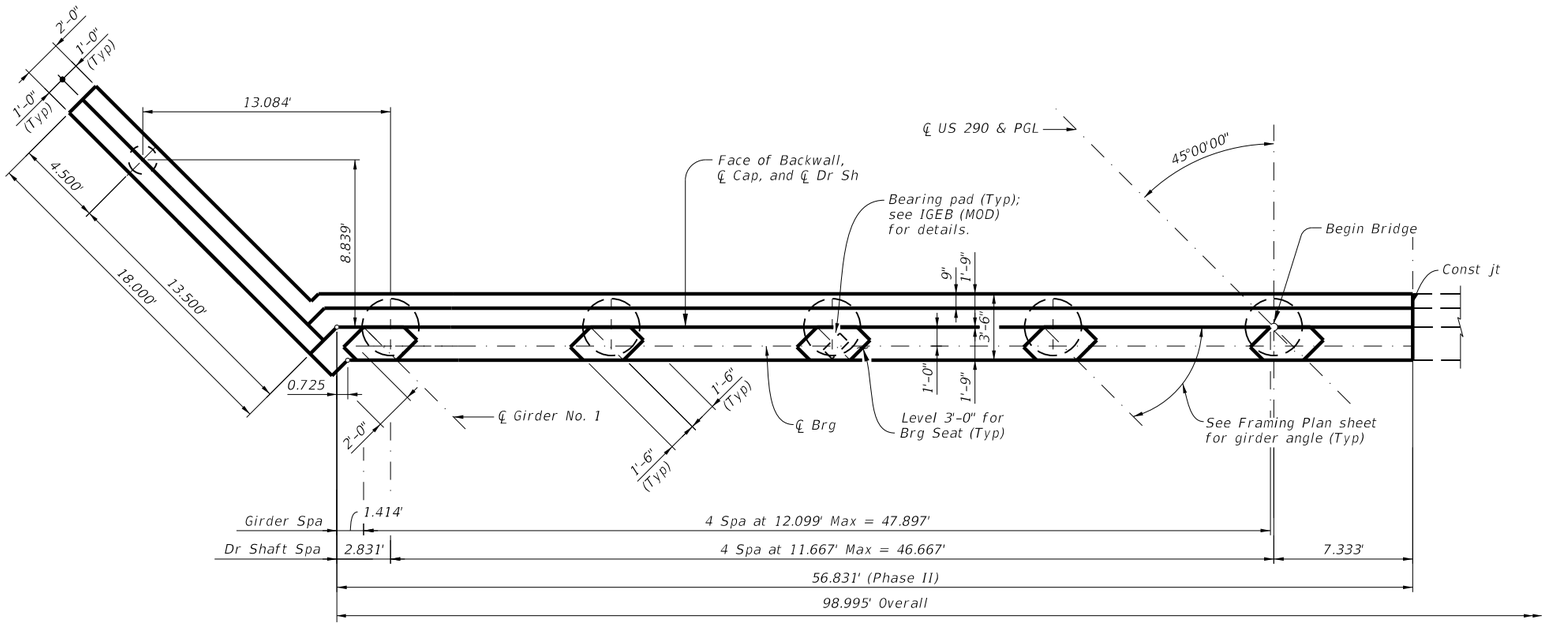
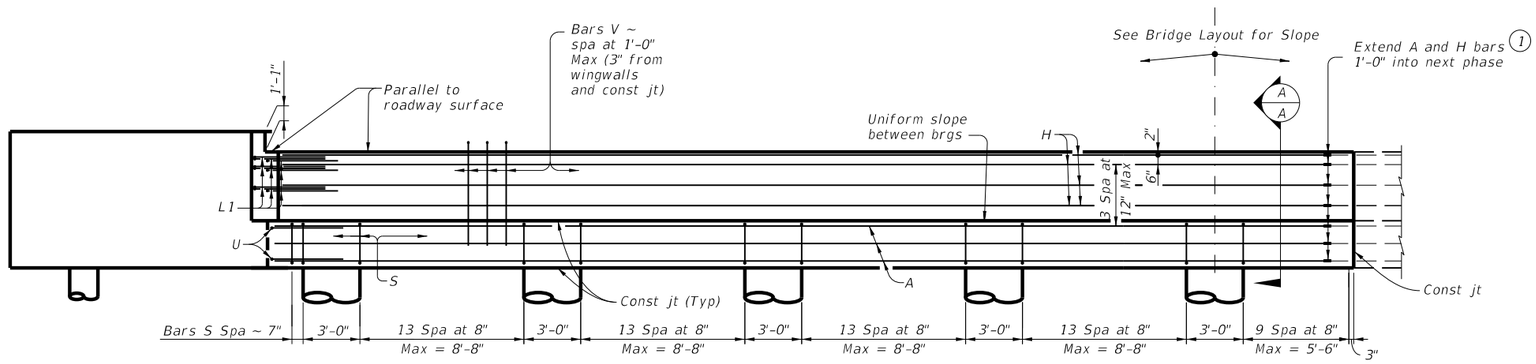
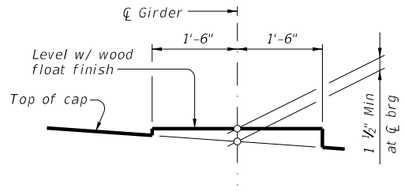


PLAN ~ PHASE II

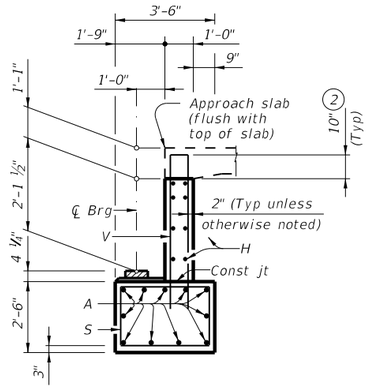


ELEVATION ~ PHASE II



BEARING SEAT DETAIL

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



SECTION A-A

(With approach slab)

1. Extend bars 1'-0" into Phase 2 Construction. Splice Bars A and H by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."
2. Increase as required to maintain 3" from finished grade.

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ABUTMENT NO. 4 PHASE II

THREE MILE CREEK

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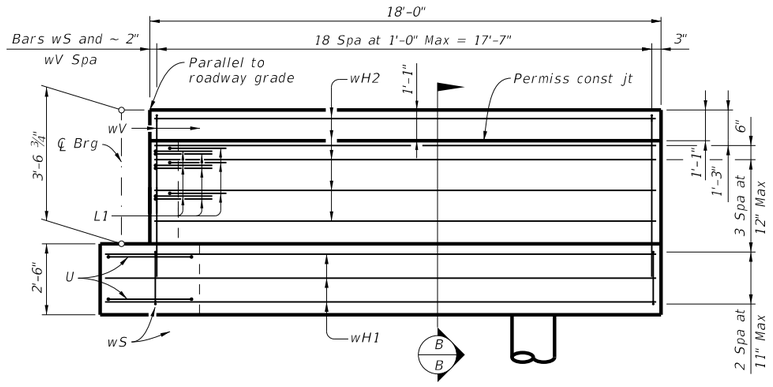
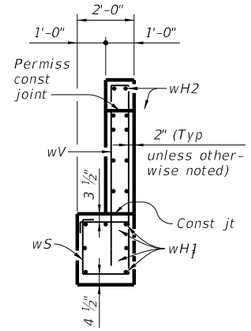
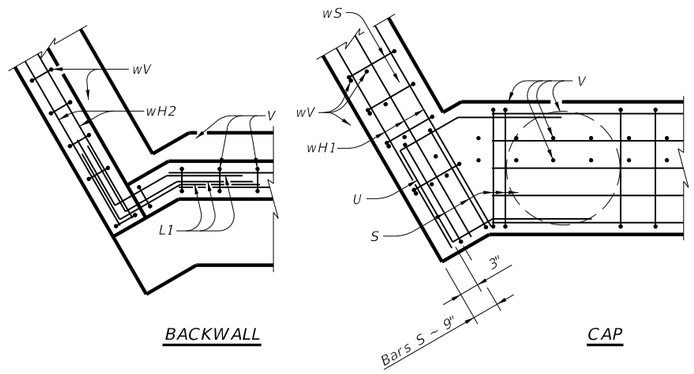


WINGWALL ELEVATION

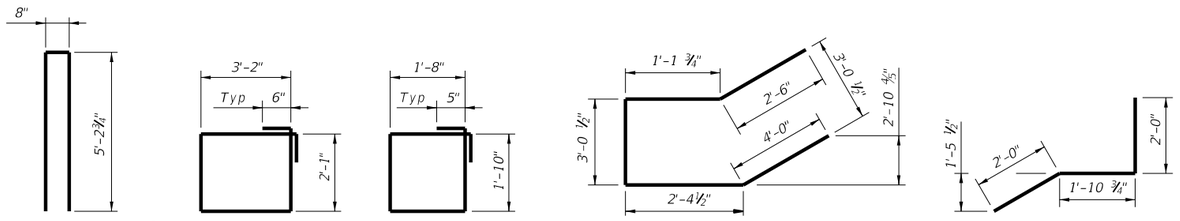


SECTION B-B



BACKWALL CAP

CORNER DETAILS



BARS V & wV (X) BARS S BARS wS BARS U BARS L1

TABLE OF ESTIMATED QUANTITIES PHASE II

Bar	No.	Size	Length	Weight
A	11	#11	55'-3"	3,229
H	8	#6	55'-8"	669
L2	9	#6	5'-9"	78
S	70	#5	11'-6"	840
U	2	#6	13'-1"	39
V	58	#5	11'-2"	676
wH1	7	#6	19'-5"	204
wH2	10	#6	17'-8"	265
wS	19	#4	7'-10"	99
wV	19	#5	11'-2"	221
Reinforcing Steel			Lb	6,320
Class "C" Concrete			CY	30.0

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

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

See Ty SSTR standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 75 tons / dr sh.

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

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi).
Provide Grade 60 reinforcing steel.

HL93 LOADING

SHEET 2 OF 2

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ABUTMENT NO. 4 PHASE II

THREE MILE CREEK

FILE: US0290_BRG_8215ab02.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		177

DATE: 3/22/2022 4:57:53 PM
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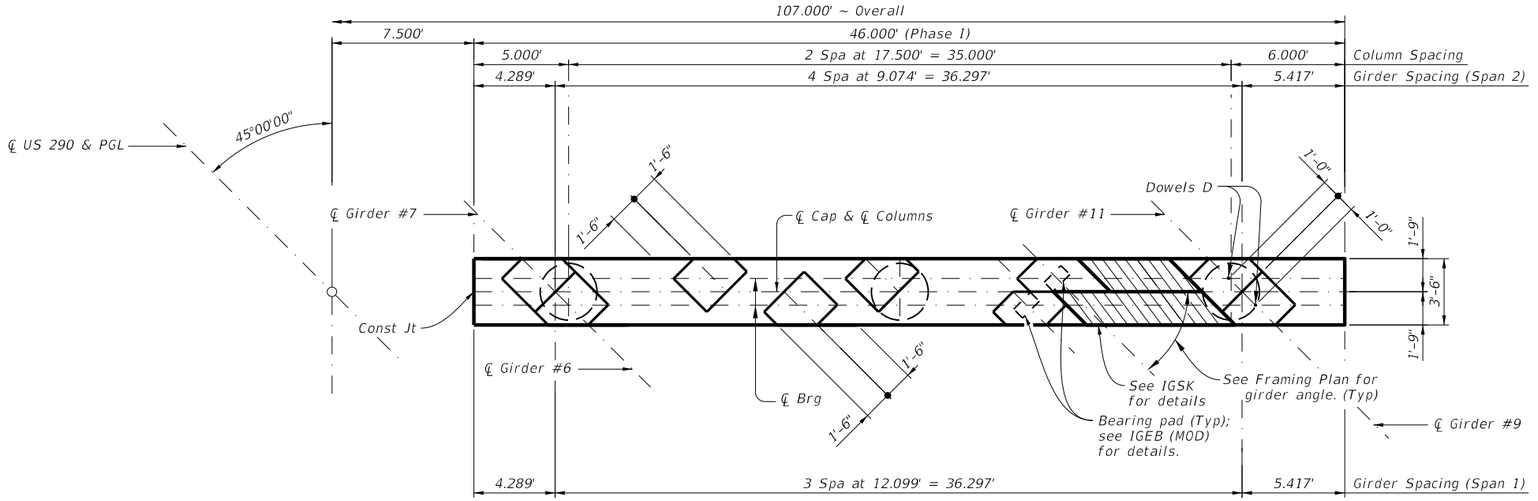
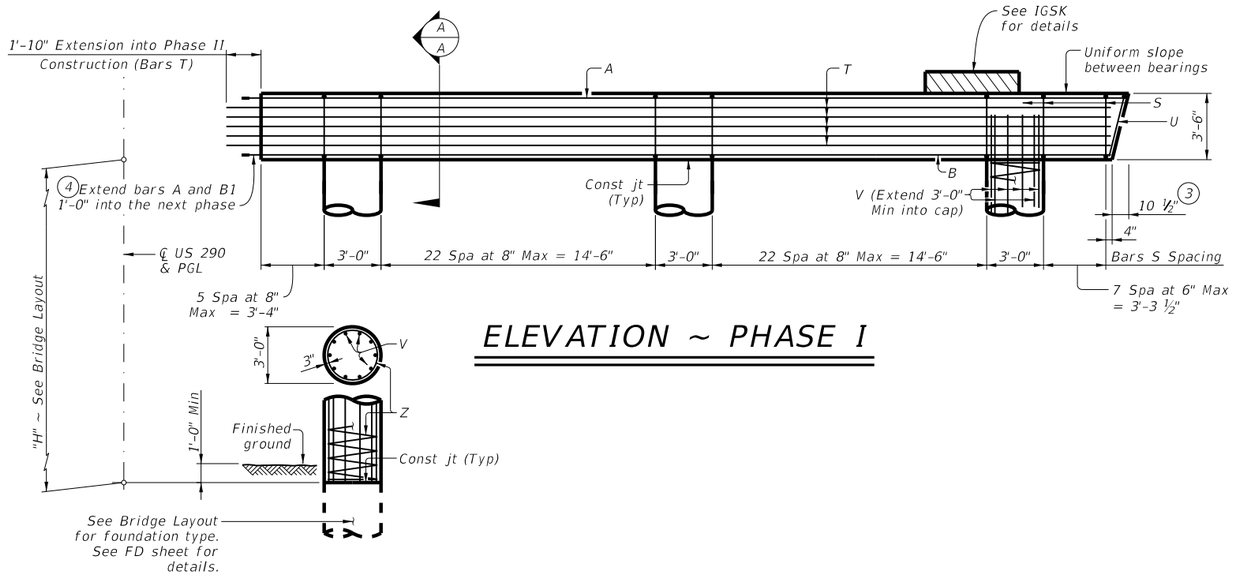
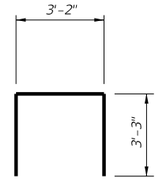


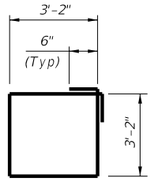
PLAN ~ PHASE I



ELEVATION ~ PHASE I



BARS U



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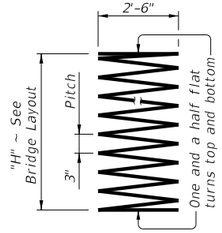

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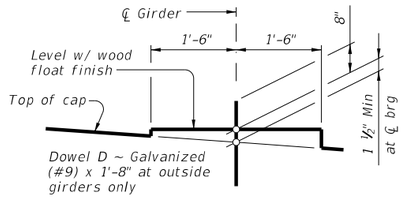
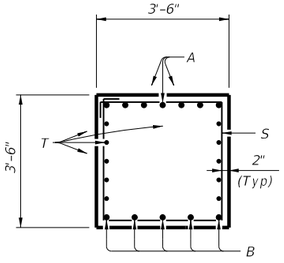


BEARING SEAT DETAIL

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



SECTION A-A

TABLE OF ESTIMATED QUANTITIES PHASE I (1)

Bar	No.	Size	Length	Weight
A	7	#11	46'-10"	1,742
B	5	#11	46'-0"	1,222
D	2	#9	1'-8"	11
S	60	#5	13'-8"	855
T	10	#5	46'-10"	488
U	1	#5	9'-8"	10
Reinforcing Steel			Lb	4,328
Class "C" Concrete (Cap)			CY	22.0

TABLE OF COLUMN QUANTITIES PHASE I (1)(2)

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4		Reinf Steel	Class "C" Conc (Col)
No.	Height	Length	Weight	Length	Weight	Lb	CY
2	12'	15'-0"	1530	400'-7"	803	2333	9.4

(1) Quantities shown are for Phase I one bent only.

(2) For each linear foot of variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing Steel, 220 LB
Class C Conc (Column) by 1.05 CY per bent.

(3) Measured parallel to top of cap cross-slope.

(4) Extend bars 1'-0" into Phase II Construction.
Splice Bars A and B by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

See Shear Key (IGSK) standard sheet for all shear key details and notes, if applicable.

Calculated foundation load = 140 tons / dr sh.

Cover dimensions are clear dimensions, unless shown 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.

Galvanize Dowels D.

HL93 LOADING

SHEET 1 OF 2

STATE OF TEXAS
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01/13/2023

Texas Department of Transportation

Bridge Division

INTERIOR BENT NO. 2 (PHASE I)

THREE MILE CREEK

FILE: US0290_BRG_8215ib01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		178

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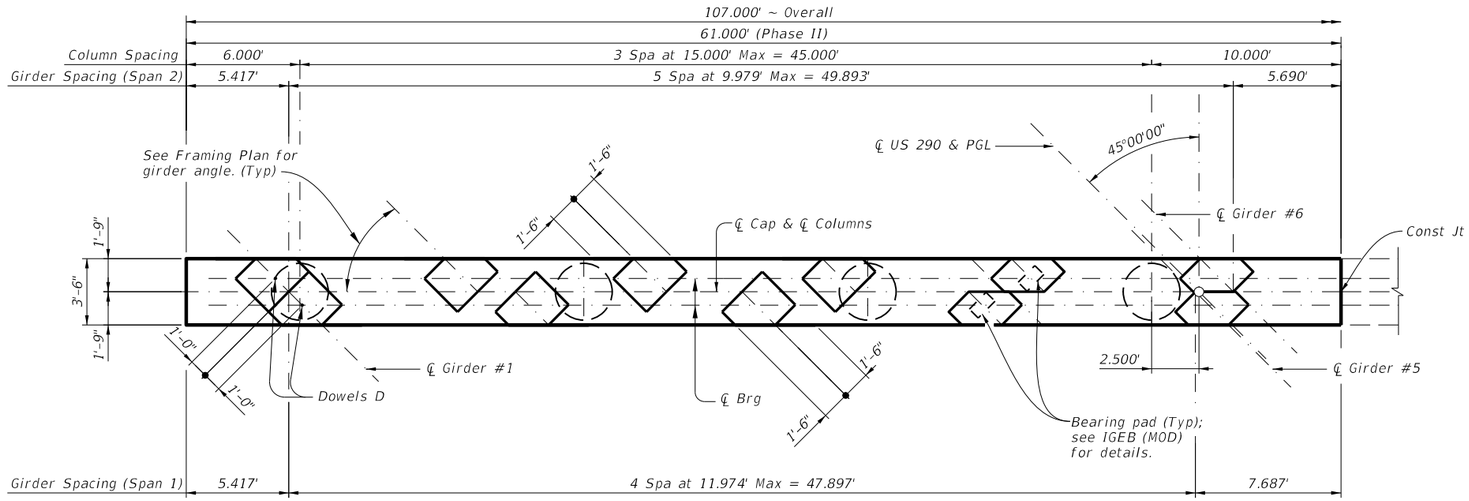
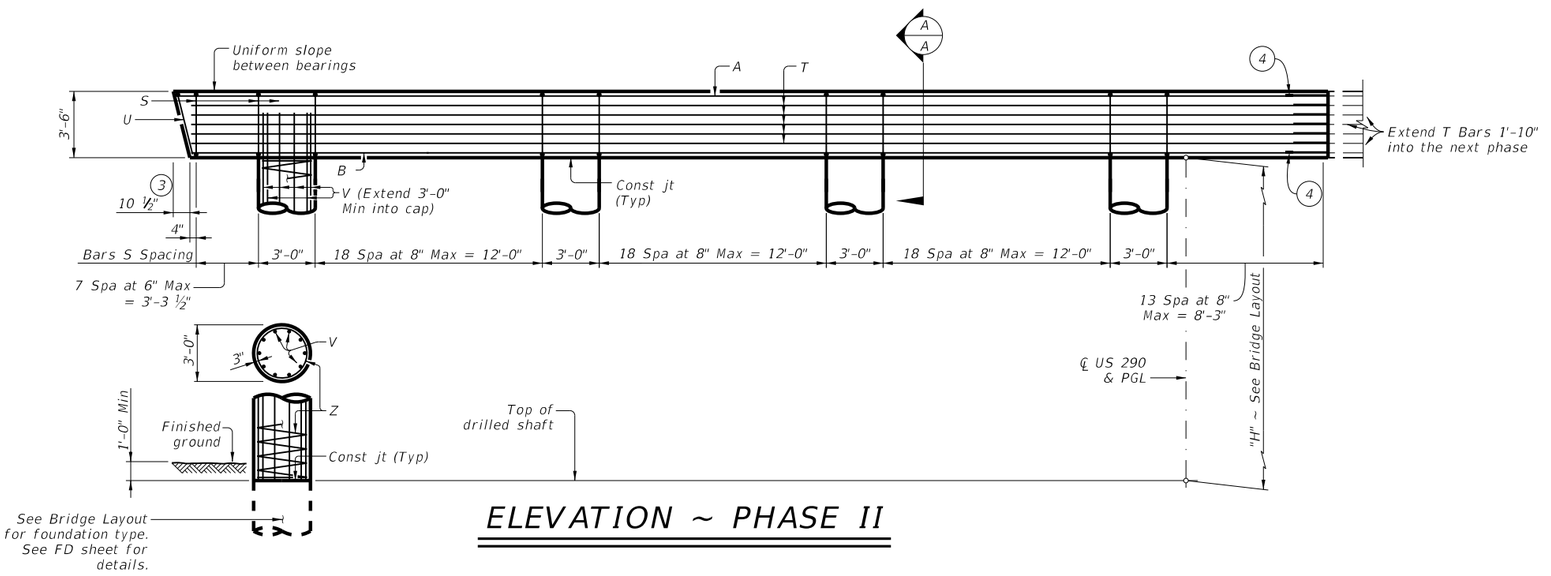
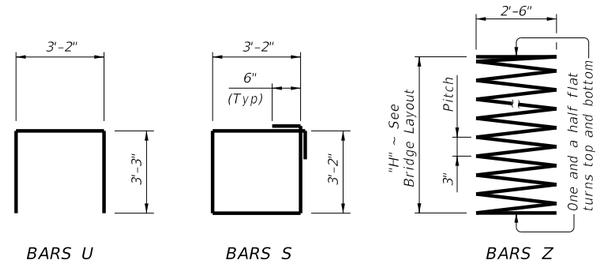
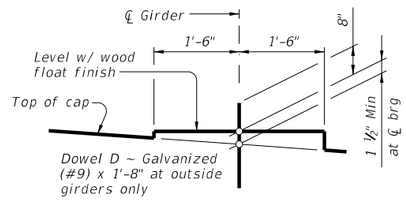


PLAN ~ PHASE II



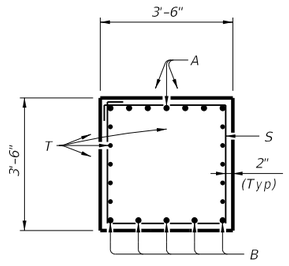
ELEVATION ~ PHASE II





BEARING SEAT DETAIL

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



SECTION A-A

TABLE OF ESTIMATED QUANTITIES PHASE II (1)

Bar	No.	Size	Length	Weight
A	7	#11	59'-10"	2,225
B	5	#11	59'-0"	1,567
D	2	#9	1'-8"	11
S	79	#5	13'-8"	1,126
T	10	#5	60'-0"	626
U	1	#5	9'-8"	10
Reinforcing Steel			Lb	5,565
Class "C" Concrete (Cap)			CY	27.9

TABLE OF COLUMN QUANTITIES PHASE II (1)(2)

Bent	"H"	Bars V 40 ~ #9		Bars Z 4 ~ #4		Reinf Steel	Class "C" Conc (Col)
No.	Height	Length	Weight	Length	Weight	Lb	CY
2	12'	15'-0"	2040	400'-7"	1070	3110	12.6

(1) Quantities shown are for Phase II one bent only.

(2) For each linear foot of variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing Steel, 220 LB
Class C Conc (Column) by 1.05 CY per bent.

(3) Measured parallel to top of cap cross-slope.

(4) Extend bars 1'-0" into Phase II Construction.
Splice Bars A and B by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

See Shear Key (IGSK) standard sheet for all shear key details and notes, if applicable.

Calculated foundation load = 140 tons / dr sh.

Cover dimensions are clear dimensions, unless shown 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.
Galvanize Dowels D.

HL93 LOADING

SHEET 2 OF 2

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Bridge Division

INTERIOR BENT NO. 2 (PHASE II)

THREE MILE CREEK

FILE: US0290_BRG_8215ib01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
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	AUS	GILLESPIE		179

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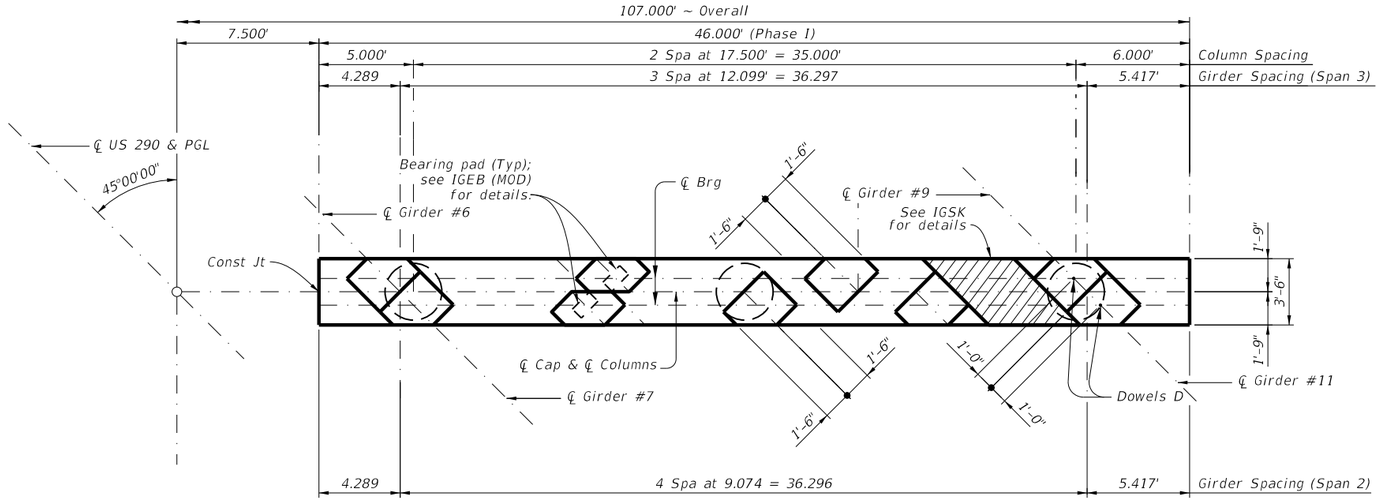
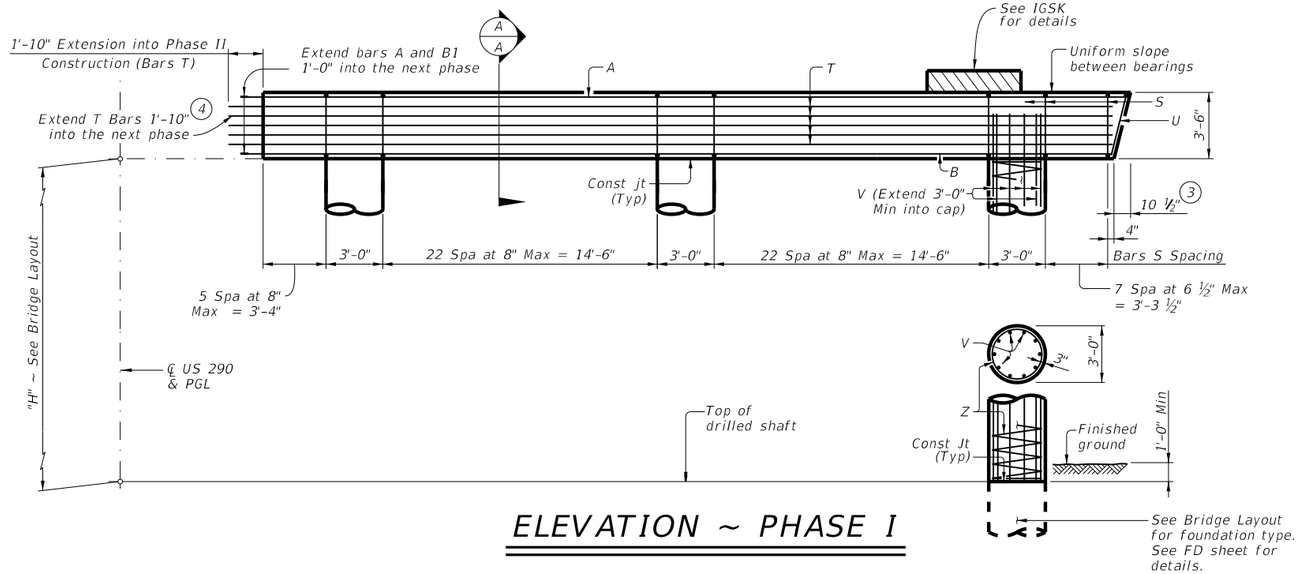
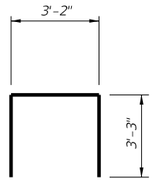


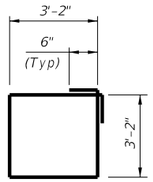
PLAN ~ PHASE I



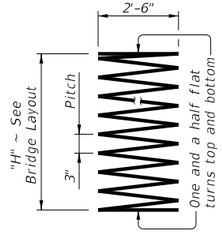
ELEVATION ~ PHASE I



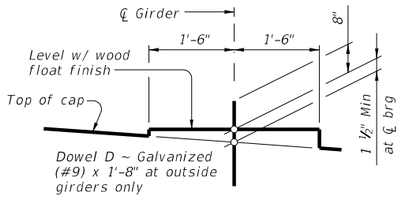
BARS U



BARS S

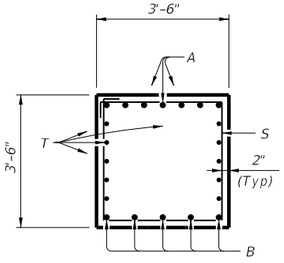


BARS Z



BEARING SEAT DETAIL

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



SECTION A-A

TABLE OF ESTIMATED ① QUANTITIES PHASE I

Bar	No.	Size	Length	Weight
A	7	#11	46'-10"	1,742
B	5	#11	46'-0"	1,222
D	2	#9	1'-8"	11
S	60	#5	13'-8"	855
T	10	#5	46'-10"	488
U	1	#5	9'-8"	10
Reinforcing Steel			Lb	4,328
Class "C" Concrete (Cap)			CY	22.0

TABLE OF COLUMN QUANTITIES ①② PHASE I

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4		Reinf Steel	Class "C" Conc (Col)
No.	Height	Length	Weight	Length	Weight	Lb	CY
3	9'	12'-0"	1224	306'-4"	614	1838	7.1

① Quantities shown are for Phase I one bent only.

② For each linear foot of variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing Steel, 220 LB
Class C Conc (Column) by 1.05 CY per bent.

③ Measured parallel to top of cap cross-slope.

④ Extend bars 1'-0" into Phase II Construction.
Splice Bars A and B by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.

See Shear Key (IGSK) standard sheet for all shear key details and notes, if applicable.

See Bridge Layout for actual skew direction.

Calculated foundation load = 140 tons / dr sh.

Cover dimensions are clear dimensions, unless shown 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.

Galvanize Dowels D.

HL93 LOADING

SHEET 1 OF 2

STATE OF TEXAS
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01/13/2023

Texas Department of Transportation

Bridge Division

INTERIOR BENT NO. 3 (PHASE I)

THREE MILE CREEK

FILE: US0290_BRG_8215ib02.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
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REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		180

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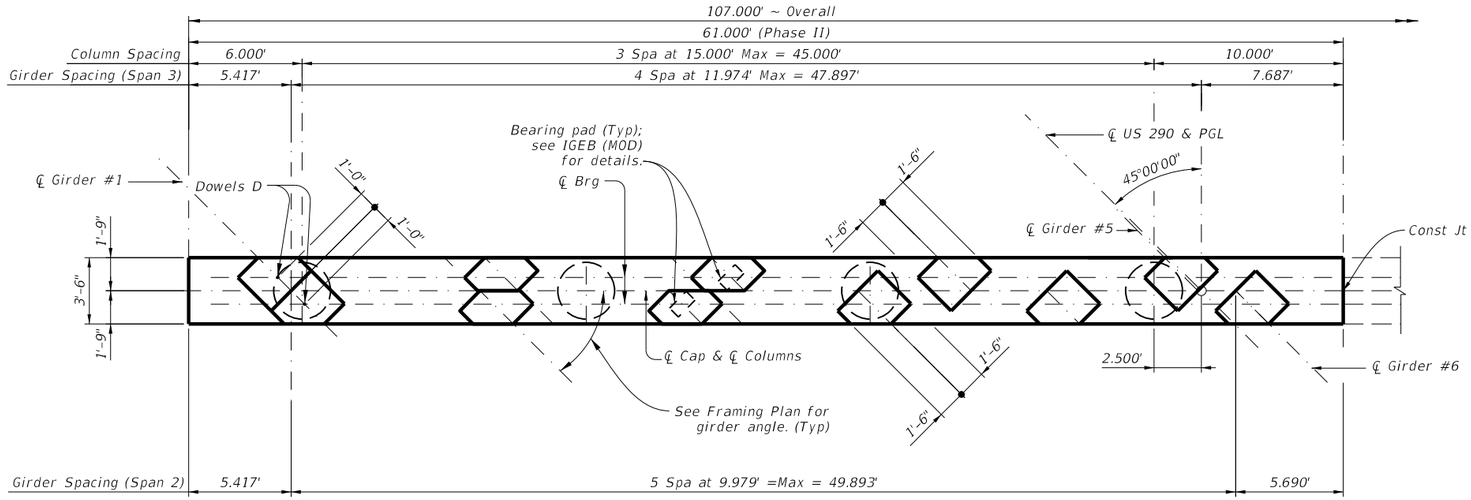
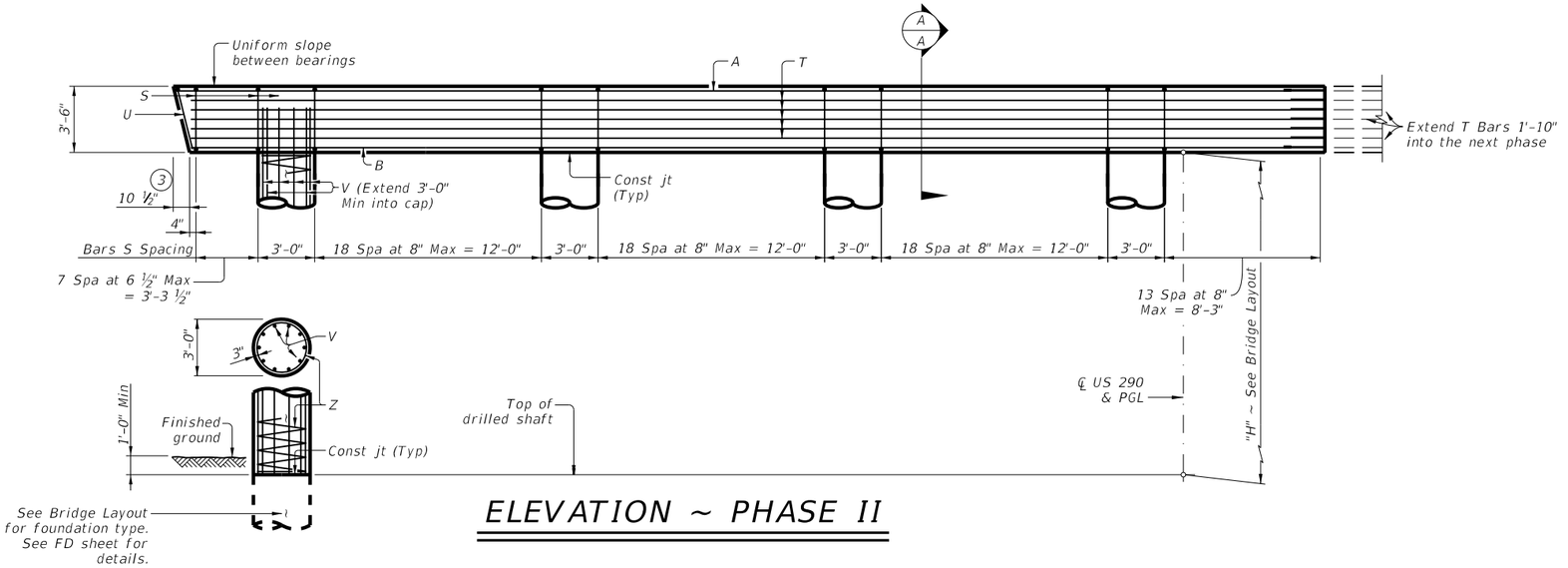
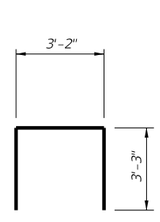


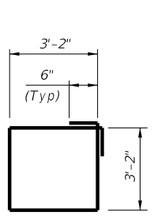
PLAN ~ PHASE II



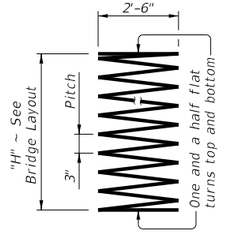
ELEVATION ~ PHASE II



BARS U



BARS S



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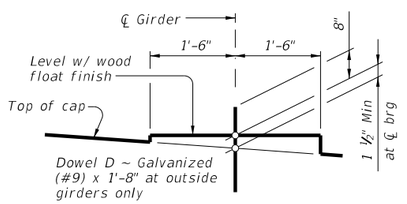
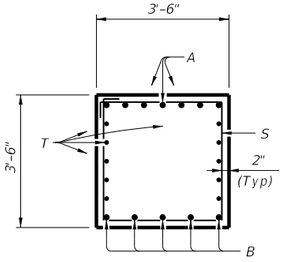


BEARING SEAT DETAIL

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



SECTION A-A

TABLE OF ESTIMATED QUANTITIES PHASE II (1)

Bar	No.	Size	Length	Weight
A	7	#11	59'-10"	2,225
B	5	#11	59'-0"	1,567
D	2	#9	1'-8"	11
S	79	#5	13'-8"	1,126
T	10	#5	60'-0"	626
U	1	#5	9'-8"	10
Reinforcing Steel			Lb	5,565
Class "C" Concrete (Cap)			CY	27.9

TABLE OF COLUMN QUANTITIES (1)(2) PHASE II

Bent	"H"	Bars V 40 ~ #9		Bars Z 4 ~ #4		Reinf Steel	Class "C" Conc (Col)
No.	Height	Length	Weight	Length	Weight	Lb	CY
3	9'	12'-0"	1632	306'-4"	819	2451	9.4

(1) Quantities shown are for Phase II one bent only.

(2) For each linear foot of variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing Steel, 220 LB
Class C Conc (Column) by 1.05 CY per bent.

(3) Measured parallel to top of cap cross-slope.

(4) Extend bars 1'-0" into Phase II Construction.
Splice Bars A and B by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel.".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).
See Common Foundation Details (FD) standard sheet for all foundation details and notes not shown.
See Shear Key (IGSK) standard sheet for all shear key details and notes, if applicable.
See Bridge Layout for actual skew direction.
Calculated foundation load = 140 tons / dr sh.

Cover dimensions are clear dimensions, unless shown 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.
Galvanize Dowels D.

HL93 LOADING

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation

Bridge Division

INTERIOR BENT NO. 3 (PHASE II)

THREE MILE CREEK

FILE: US0290_BRG_8215ib02.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		181

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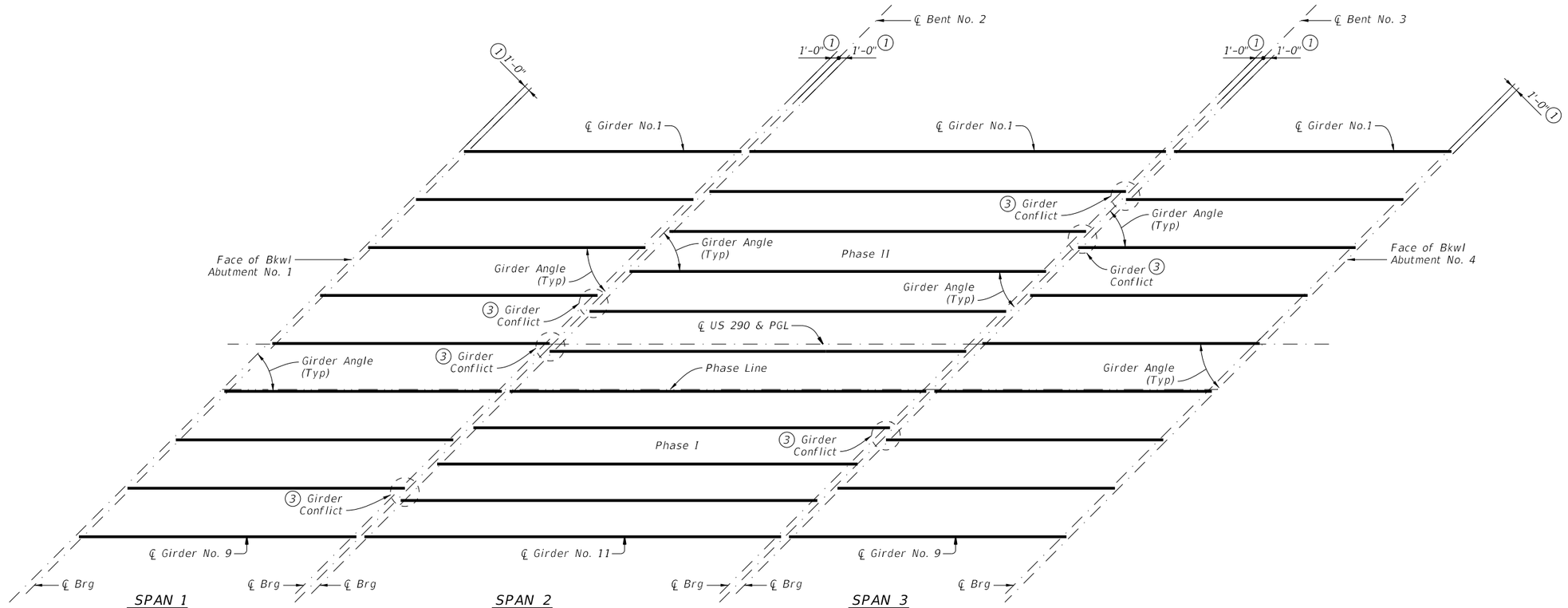

BENT REPORT

BENT NO. 1 (N 2 27 15.11 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 48.083 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	45	0	0
	BEAM 2	11.974	45	0	0
	BEAM 3	11.974	45	0	0
	BEAM 4	11.974	45	0	0
	BEAM 5	11.974	45	0	0
	BEAM 6	11.974	45	0	0
	BEAM 7	12.099	45	0	0
	BEAM 8	12.099	45	0	0
	BEAM 9	12.099	45	0	0
	TOTAL	96.167			

BENT NO. 2 (N 2 27 15.11 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 48.083 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	45	0	0
	BEAM 2	11.974	45	0	0
	BEAM 3	11.974	45	0	0
	BEAM 4	11.974	45	0	0
	BEAM 5	11.974	45	0	0
	BEAM 6	11.974	45	0	0
	BEAM 7	12.099	45	0	0
	BEAM 8	12.099	45	0	0
	BEAM 9	12.099	45	0	0
	TOTAL	96.167			
SPAN 2	BEAM 1	0.000	45	0	0
	BEAM 2	9.979	45	0	0
	BEAM 3	9.979	45	0	0
	BEAM 4	9.979	45	0	0
	BEAM 5	9.979	45	0	0
	BEAM 6	9.979	45	0	0
	BEAM 7	9.979	45	0	0
	BEAM 8	9.074	45	0	0
	BEAM 9	9.074	45	0	0
	BEAM 10	9.074	45	0	0
	BEAM 11	9.074	45	0	0
	TOTAL	96.167			

BENT NO. 3 (N 2 27 15.11 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 48.083 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM 1	0.000	45	0	0
	BEAM 2	9.979	45	0	0
	BEAM 3	9.979	45	0	0
	BEAM 4	9.979	45	0	0
	BEAM 5	9.979	45	0	0
	BEAM 6	9.979	45	0	0
	BEAM 7	9.979	45	0	0
	BEAM 8	9.074	45	0	0
	BEAM 9	9.074	45	0	0
	BEAM 10	9.074	45	0	0
	BEAM 11	9.074	45	0	0
	TOTAL	96.167			
SPAN 3	BEAM 1	0.000	45	0	0
	BEAM 2	11.974	45	0	0
	BEAM 3	11.974	45	0	0
	BEAM 4	11.974	45	0	0
	BEAM 5	11.974	45	0	0
	BEAM 6	11.974	45	0	0
	BEAM 7	12.099	45	0	0
	BEAM 8	12.099	45	0	0
	BEAM 9	12.099	45	0	0
	TOTAL	96.167			

BENT NO. 4 (N 2 27 15.11 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 48.083 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM 1	0.000	45	0	0
	BEAM 2	11.974	45	0	0
	BEAM 3	11.974	45	0	0
	BEAM 4	11.974	45	0	0
	BEAM 5	11.974	45	0	0
	BEAM 6	11.974	45	0	0
	BEAM 7	12.099	45	0	0
	BEAM 8	12.099	45	0	0
	BEAM 9	12.099	45	0	0
	TOTAL	96.167			

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	50.000	47.586	49.40	0.0016
BEAM 2	50.000	47.586	49.40	0.0016
BEAM 3	50.000	47.586	49.40	0.0016
BEAM 4	50.000	47.586	49.40	0.0016
BEAM 5	50.000	47.586	49.40	0.0016
BEAM 6	50.000	47.586	49.40	0.0016
BEAM 7	50.000	47.586	49.40	0.0016
BEAM 8	50.000	47.586	49.40	0.0016
BEAM 9	50.000	47.586	49.40	0.0015

BEAM REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	75.000	73.000	74.50	0.0016
BEAM 2	75.000	73.000	74.50	0.0016
BEAM 3	75.000	73.000	74.50	0.0016
BEAM 4	75.000	73.000	74.50	0.0016
BEAM 5	75.000	73.000	74.50	0.0016
BEAM 6	75.000	73.000	74.50	0.0016
BEAM 7	75.000	73.000	74.50	0.0016
BEAM 8	75.000	73.000	74.50	0.0016
BEAM 9	75.000	73.000	74.50	0.0016
BEAM 10	75.000	73.000	74.50	0.0016
BEAM 11	75.000	73.000	74.50	0.0016

BEAM REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	50.000	47.586	49.40	0.0016
BEAM 2	50.000	47.586	49.40	0.0016
BEAM 3	50.000	47.586	49.40	0.0016
BEAM 4	50.000	47.586	49.40	0.0016
BEAM 5	50.000	47.586	49.40	0.0016
BEAM 6	50.000	47.586	49.40	0.0016
BEAM 7	50.000	47.586	49.40	0.0016
BEAM 8	50.000	47.586	49.40	0.0016
BEAM 9	50.000	47.586	49.40	0.0016

(1) See Elastomeric Bearing & Girder End Details (IGEB (MOD)) standard sheet for orientation of dimension.

(2) Girder lengths shown are bottom girder flange lengths with adjustment made for girder slope.

(3) See Elastomeric Bearing and Girder End Details (IGEB (MOD)) standard sheet for needed beveling for girder conflict.

HL93 LOADING

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation — Bridge Division

FRAMING PLAN PHASE I AND II

(SPANS 1-3)

THREE MILE CREEK

FILE: US0290_BRG_8215bl01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT.	SECT	JOB	HIGHWAY
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	AUS	GILLESPIE		182

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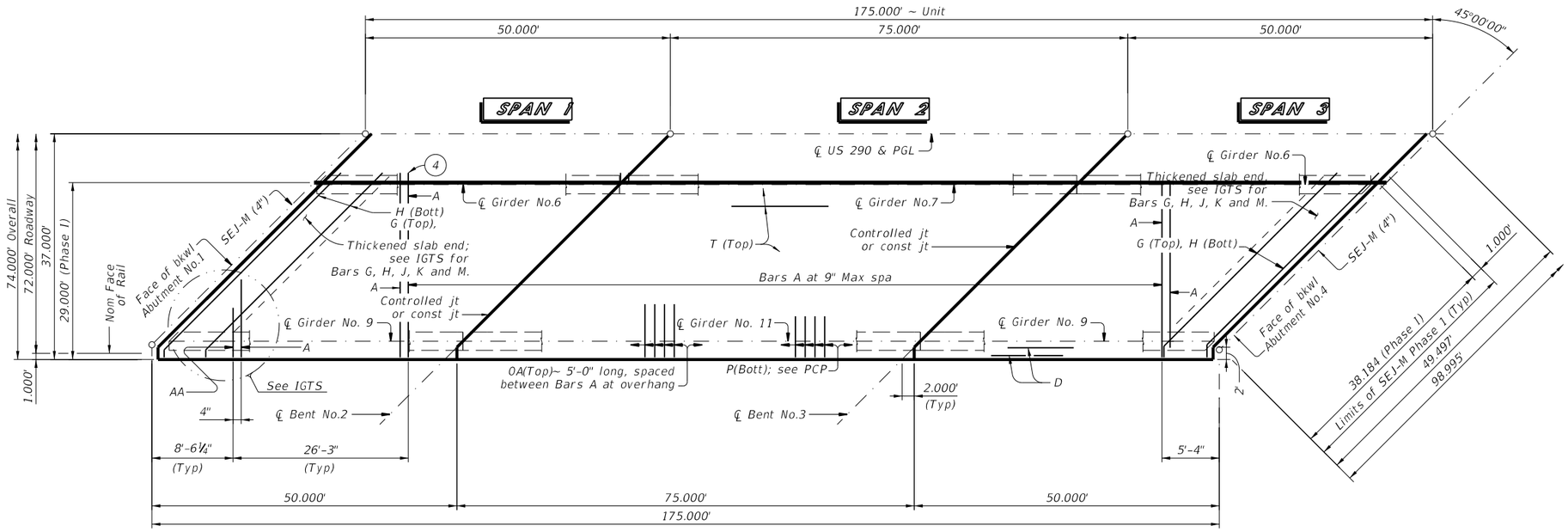

PLAN

(4) Extend Phase 1 bars A, G & H 1'-7" into Phase 2 construction.

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STATE OF TEXAS
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132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation — Bridge Division

175.00' PRESTRESSED CONCRETE GIRDER UNIT

PHASE I

(SPANS 1-3)

THREE MILE CREEK

FILE: US0290_BRG_8215pb01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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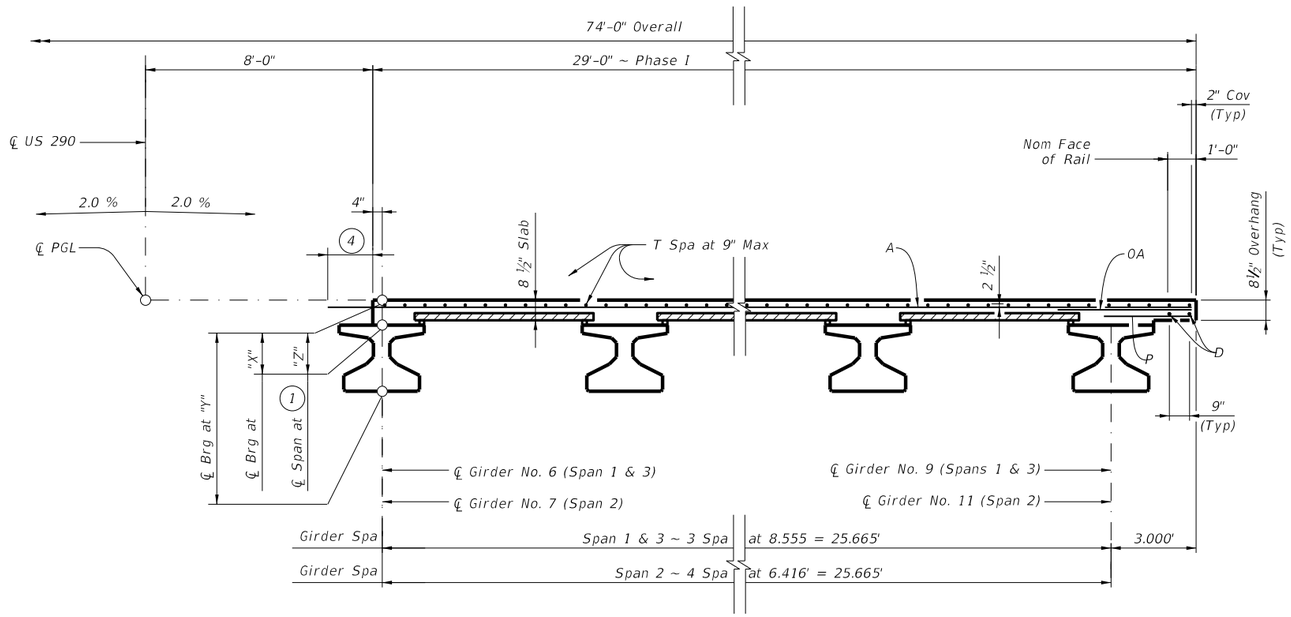


TYPICAL TRANSVERSE SECTION

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

TABLE OF ESTIMATED QUANTITIES

Span No.	Reinf Conc Slab	Prestr Conc Girders (Tx 28) (3)	Total Reinf Steel
	SF	LF	Lb
1	1450	197.60	3335
2	2175	372.50	5003
3	1450	197.60	3335
Total	5075	767.70	11673 (2)

(2) Reinforcing steel weight is calculated using an approximate factor of 2.3 psf.

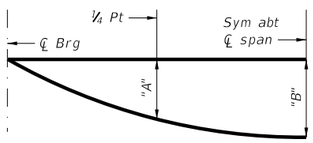
(3) Quantities shown are bottom girder flange lengths with adjustments made for girder slope. See Framing Plan sheet for girder lengths.

(4) Extend Phase 1 bars A, G & H 1'-7" into Phase 2 construction.

(5) Deflections shown for Girder No. 6 & 7 are due to Phase 1 prestressed concrete panels and cast-in-place slab only.

TABLE OF DEAD LOAD DEFLECTIONS PHASE I

Span No.	Girder No.	"A" Ft	"B" Ft
1, 3	(5) 6	0.013'	0.019'
	7,8	0.023'	0.033'
	9	0.020'	0.028'
2	(5) 7	0.053'	0.076'
	8,9,10	0.097'	0.138'
	11	0.094'	0.133'



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflection shown are due to prestressed concrete panels and cast-in-place slab only (Ec = 5,000 ksi). Adjust deflections based on field observations as needed.

TABLE OF SECTION DEPTHS PHASE I

Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.	"Z" at (1) ℄ Span
1, 3	6	10 ½"	3' - 2 ½"	9 ½"
	7,8	10 ½"	3' - 2 ½"	9 ¾"
	9	10 ½"	3' - 2 ½"	9 ⅝"
2	7	11 ¾"	3' - 3 ¾"	9 ⅝"
	8,9,10,11	11 ¾"	3' - 3 ¾"	10 ¼"

(1) Theoretical dimension

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Prestressed Concrete Panels (PCP) and Prestressed Concrete Panel Fabrication Details (PCP-FAB) standard sheets for panel details not shown.

See Thickened Slab End Details (IGTS) standard sheet for thickened slab end details and quantity adjustments.

See Miscellaneous Slab Details (IGMS) standard sheet for miscellaneous details.

See Ty SSTR standard sheets for rail anchorage in slab.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES

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

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, 0A, P, or T unless noted otherwise. Provide the same laps as required for reinforcing bars.

HL93 LOADING

SHEET 2 OF 2

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation — Bridge Division

175.00' PRESTRESSED CONCRETE GIRDER UNIT

PHASE I

(SPANS 1-3)

THREE MILE CREEK

FILE: US0290_BRG_8215pb01.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022	CONT.	SECT	JOB	HIGHWAY
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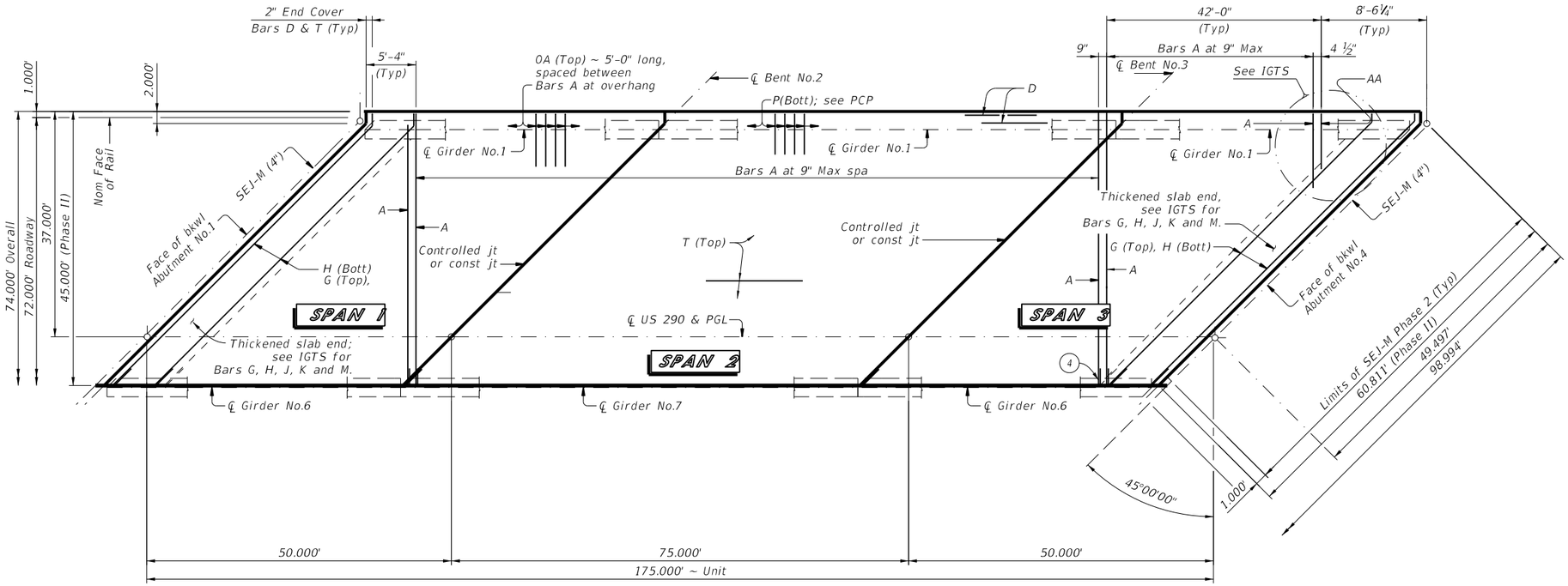

PLAN

(4) Extend Phase 1 bars A, G & H 1'-7" into Phase 2 construction.

HL93 LOADING

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation | Bridge Division

175.00' PRESTRESSED CONCRETE GIRDER UNIT

PHASE II

(SPANS 1-3)

THREE MILE CREEK

FILE: US0290_BRG_8215pb02.dgn	DN: CRG	CK: HTP	DW: JEB	CK: CRG
©TxDOT MARCH 2022 REVISIONS	CONT	SECT	JOB	HIGHWAY
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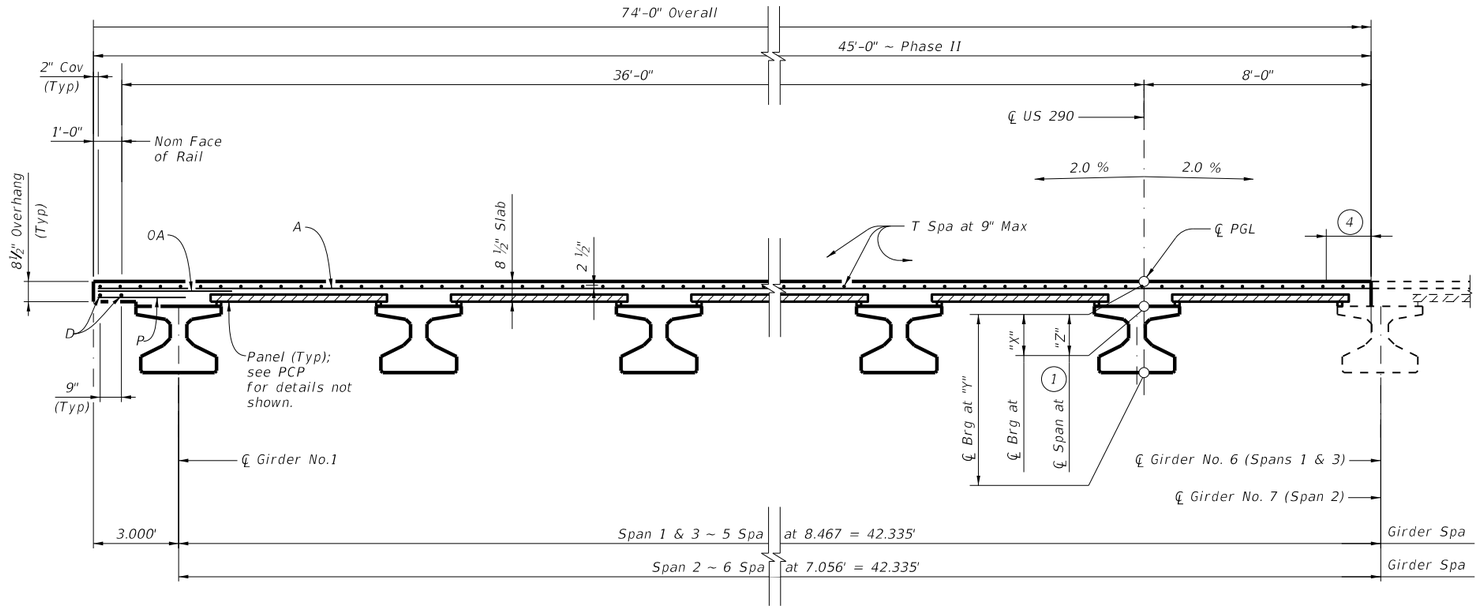
	AUS	GILLESPIE		185



TYPICAL TRANSVERSE SECTION

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

TABLE OF ESTIMATED QUANTITIES

Span No.	Reinf Conc Slab	Prestr Conc Girders (Tx 28) (3)	Total Reinf Steel
	SF	LF	Lb
1	2250	247.00	5175
2	3375	447.00	7763
3	2250	247.00	5175
Total	7875	941.00	18113 (2)

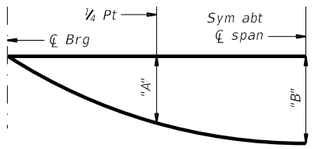
(2) Reinforcing steel weight is calculated using an approximate factor of 2.3 psf.

(3) Quantities shown are bottom girder flange lengths with adjustments made for girder slope. See Framing Plan sheet for girder lengths.

(4) Extend Phase 1 bars A, G & H 1'-7" into Phase 2 construction.

TABLE OF DEAD LOAD DEFLECTIONS PHASE II

Span No.	Girder No.	"A" Ft	"B" Ft
1, 3	1	0.020'	0.028'
	2,3,4,5	0.023'	0.033'
2	1	0.098'	0.138'
	2,3,4,5,6	0.106'	0.151'



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflection shown are due to prestressed concrete panels and cast-in-place slab only (Ec = 5,000 ksi). Adjust deflections based on field observations as needed.

TABLE OF SECTION DEPTHS PHASE II

Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.	"Z" at (1) ℄ Span
1, 3	1	10 ½"	3' - 2 ½"	9 5/8"
	2,3,4,5	10 ½"	3' - 2 ½"	9 ¾"
2	1	11 ¾"	3' - 3 ¾"	10 ¼"
	8	11 ¾"	3' - 3 ¾"	10 ⅜"

(1) Theoretical dimension

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Prestressed Concrete Panels (PCP) and Prestressed Concrete Panel Fabrication Details (PCP-FAB) standard sheets for panel details not shown.

See Thickened Slab End Details (IGTS) standard sheet for thickened slab end details and quantity adjustments.

See Miscellaneous Slab Details (IGMS) standard sheet for miscellaneous details.

See Ty SSTR standard sheets for rail anchorage in slab.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES

Provide Class S concrete (f'c = 4,000 psi).
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, 0A, P, or T unless noted otherwise. Provide the same laps as required for reinforcing bars.

HL90 LOADING

SHEET 2 OF 2

STATE OF TEXAS
AL SHAWN
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LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation — Bridge Division

175.00' PRESTRESSED CONCRETE GIRDER UNIT
PHASE II
(SPANS 1-3)
THREE MILE CREEK

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©TxDOT MARCH 2022	CONT	SECT	JOB	HIGHWAY
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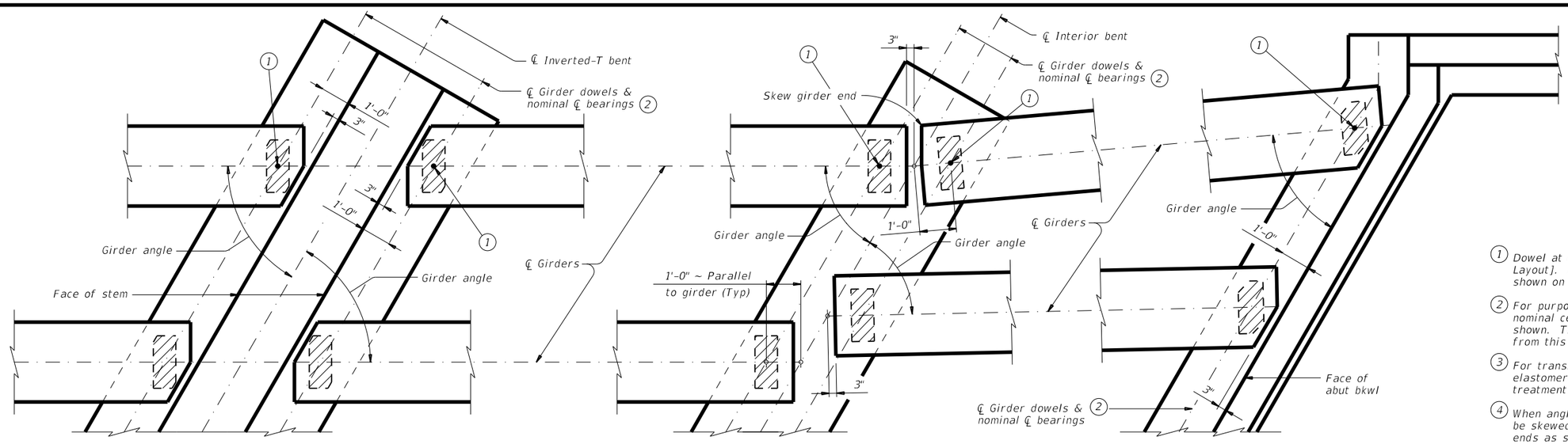


AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

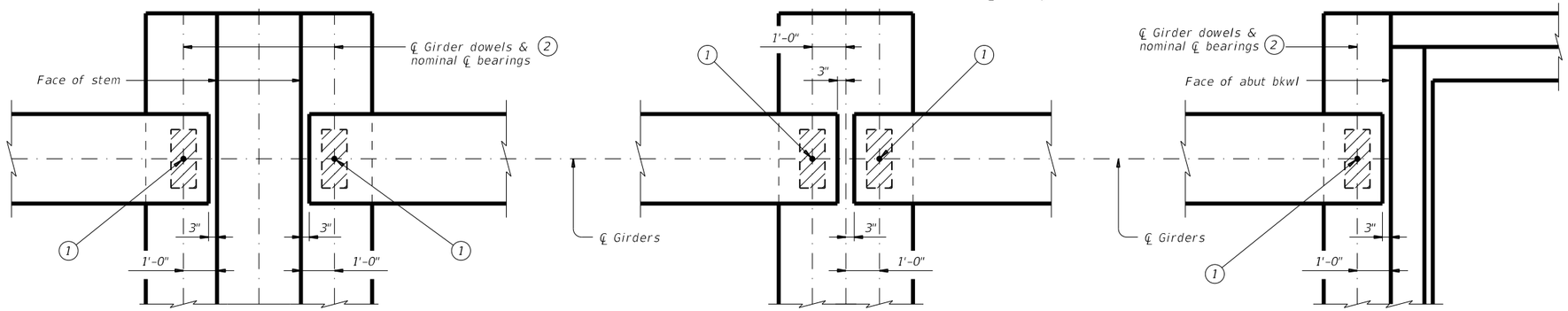
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

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

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

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

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

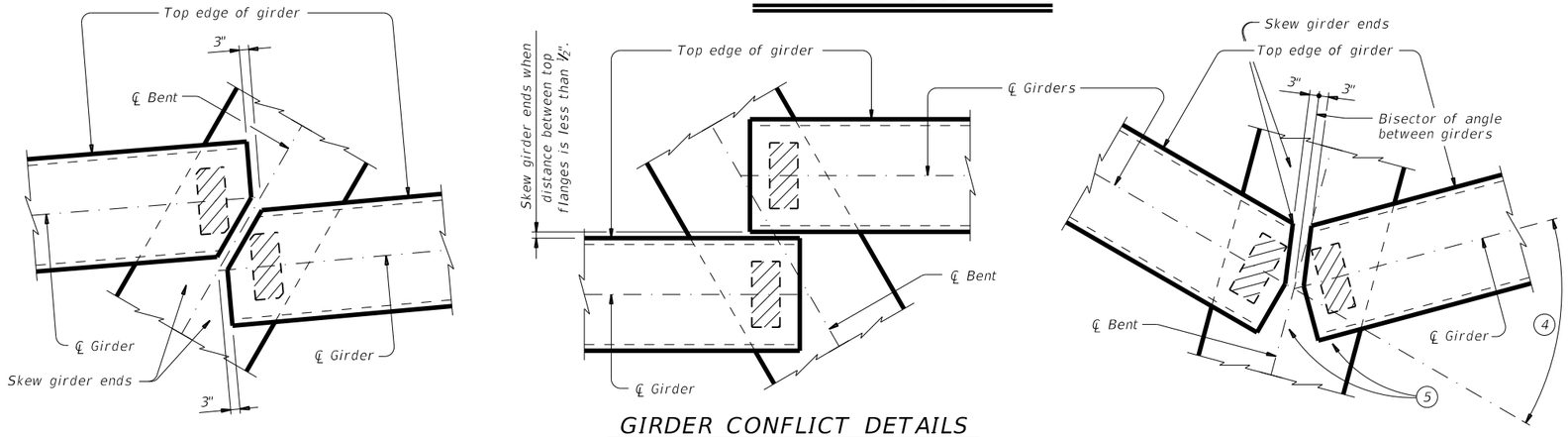


AT INVERTED-T BENT

AT CONVENTIONAL INTERIOR BENT

AT ABUTMENT (3)

GIRDER END DETAILS



GIRDER CONFLICT DETAILS

GENERAL NOTES:
These details accommodate skew angles up to 60°.
Shop drawings for approval are required.
A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

STATE OF TEXAS
AL SHAWN
132389
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01/13/2023

IGEB (MOD)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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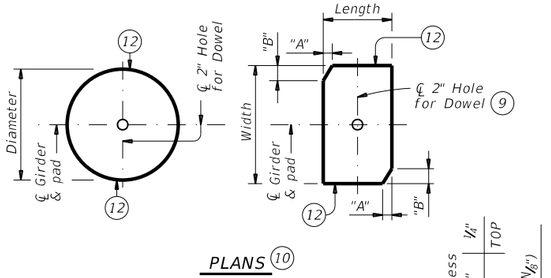
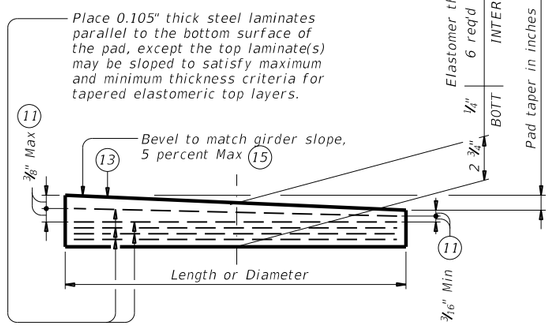


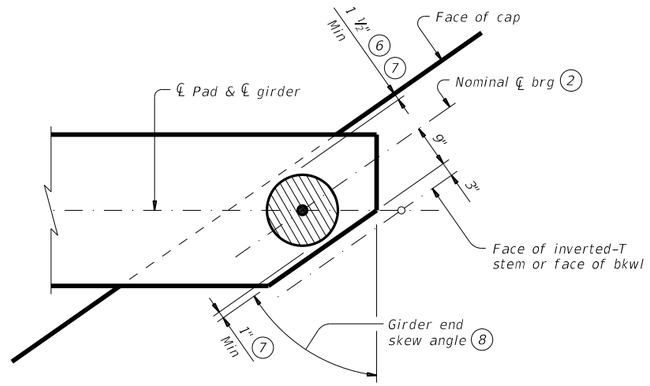
PLANS (10)



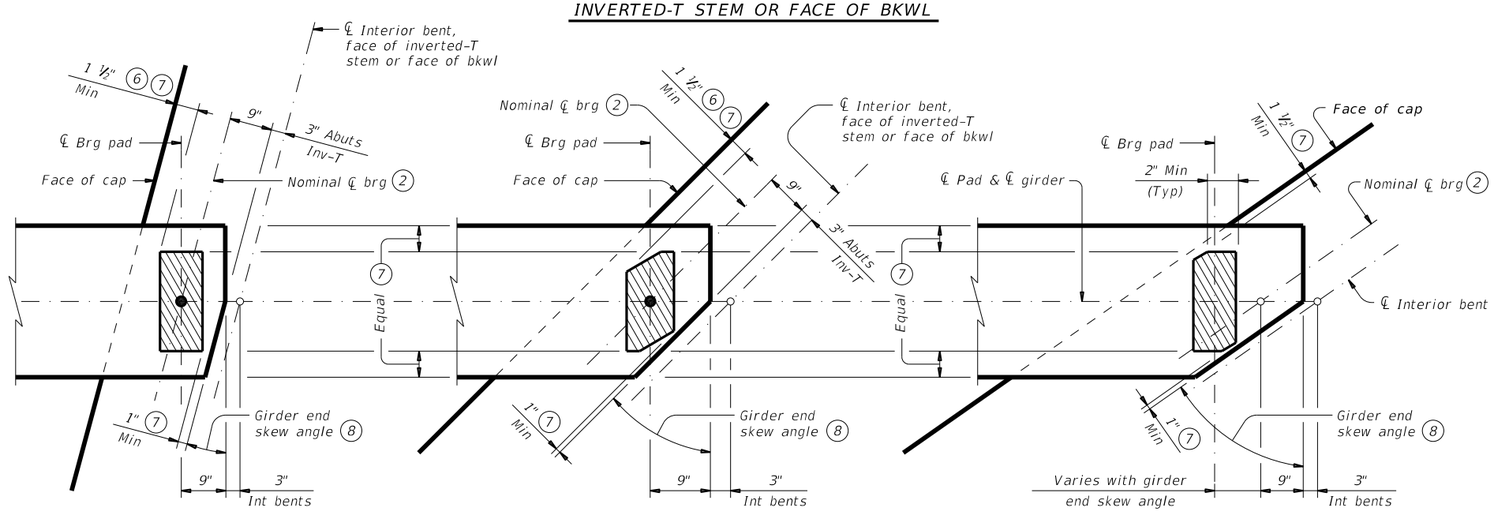
ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



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



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

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

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

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	8" x 15"	---	---
		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 15"	---	---
	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 15"	---	---
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

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

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

(11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(12) Locate Permanent Mark here.

(13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

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

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

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

HL93 LOADING

SHEET 2 OF 3

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB (MOD)

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
8/15/22 - Revised G-1-"N", G-3-"N", G-9-"N" bearing size to 8" X 15" and removed clip dimension	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		188

DATE: 11/15/2022 01:07 PM
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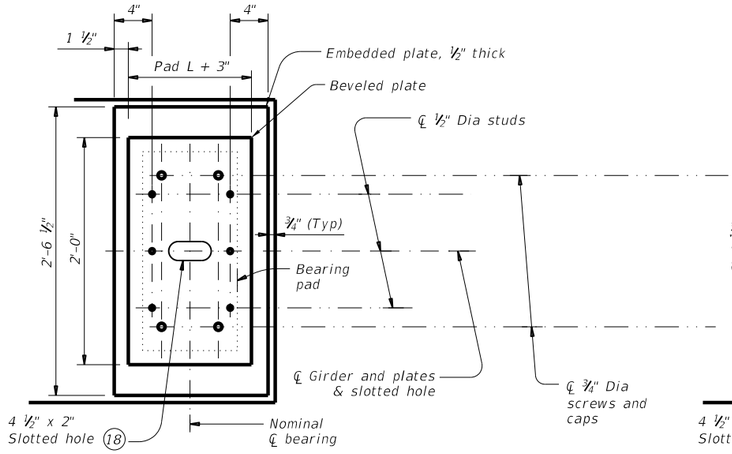
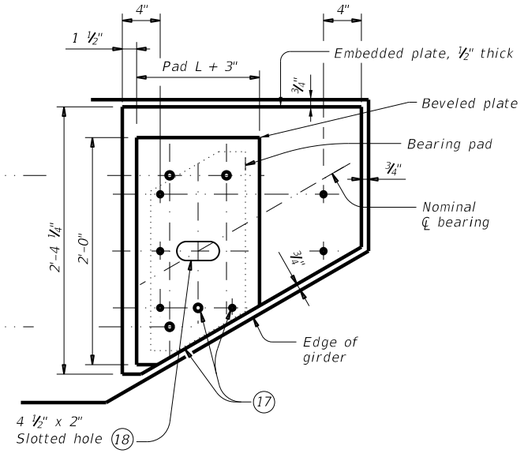
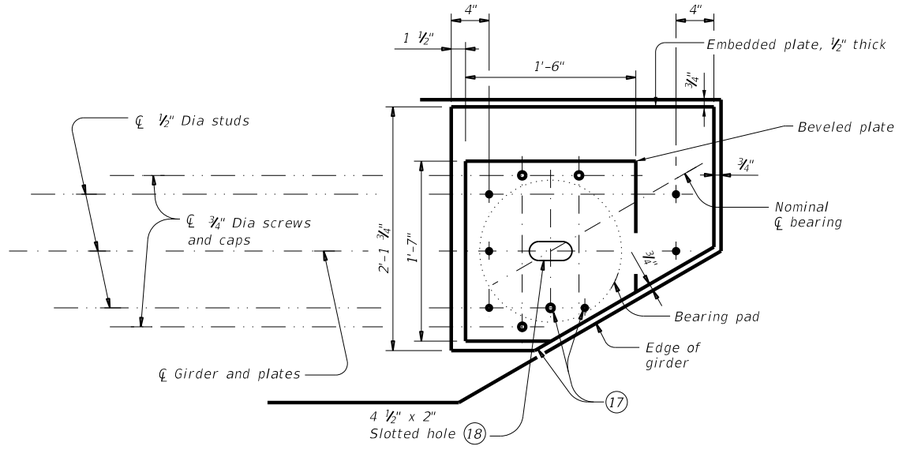


NORMAL GIRDER END
RECTANGULAR BEARING PAD

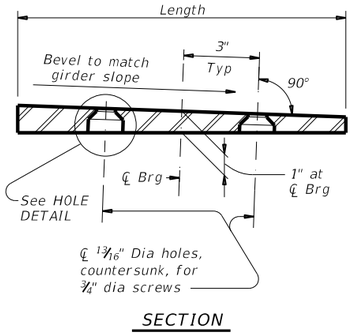


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

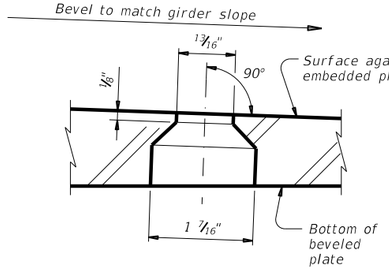


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

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

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

SOLE PLATE NOTES:

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

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

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

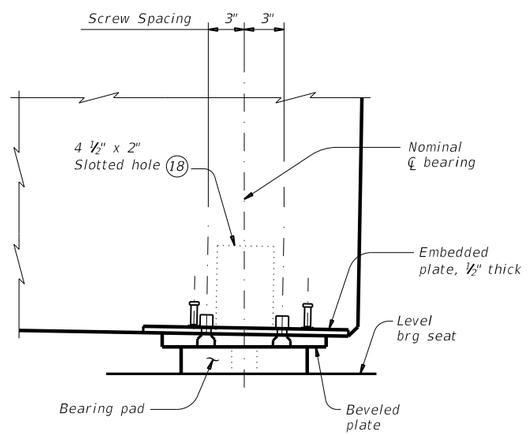
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

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

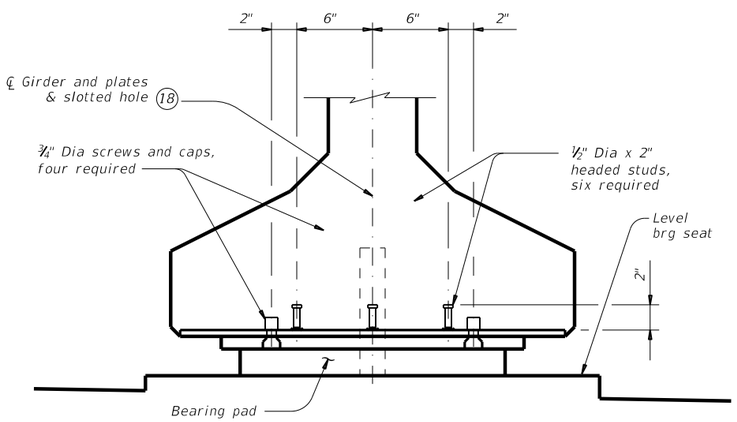
¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga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

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

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

STATE OF TEXAS
AL SHAWN
132389
LICENSED PROFESSIONAL ENGINEER

01/13/2023

Texas Department of Transportation
Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB (MOD)

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		189

DATE: 12/5/2022 3:10:27 PM
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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
US290 Three Mile Creek	1,3	All	Tx28	*	14	0.6	270	9.62	8.34	6	9.5	4.000	6.000	1.686	-2.222	1743	0.652	0.853	1.40	1.82	1.35
	2	All	Tx28	**	28	0.6	270	9.05	4.48	8	24.5	6.000	8.500	3.605	-4.219	2990	0.527	0.747	1.44	1.93	1.06

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER
*	2.5(ABCDE), 4.5(A), 6.5(A)
**	2.5(ABCDEFG), 4.5(ABCDE), 6.5(A), 8.5(A)

(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.

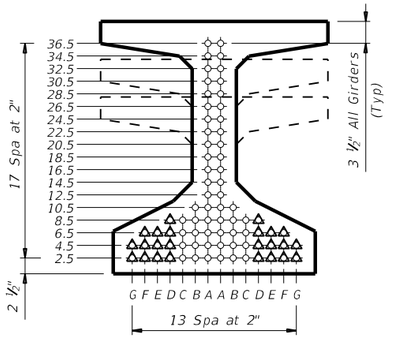
When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

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.

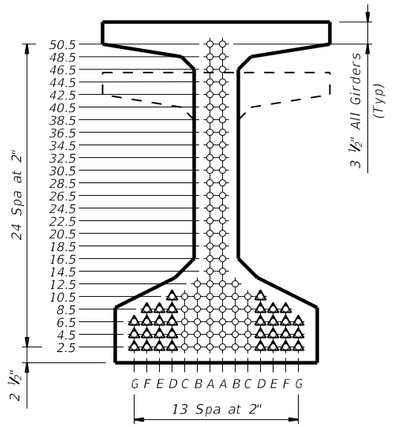
DEPRESSED STRAND DESIGNS:

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.

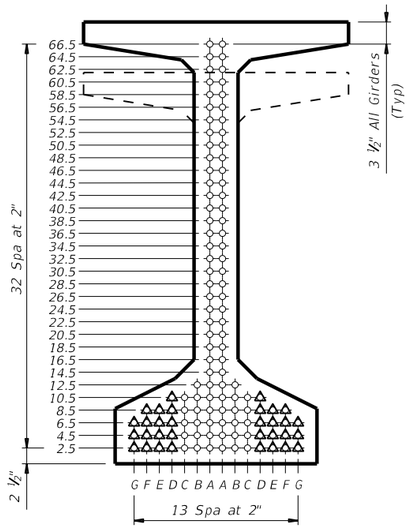
To complete this sheet input the girder designs in the table and the relative humidity under Design Notes. In all cases, remove this block. This sheet must be signed, sealed, and dated by a registered Professional Engineer.



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

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.	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		190

DATE: 3/8/2022 3:47:09 PM
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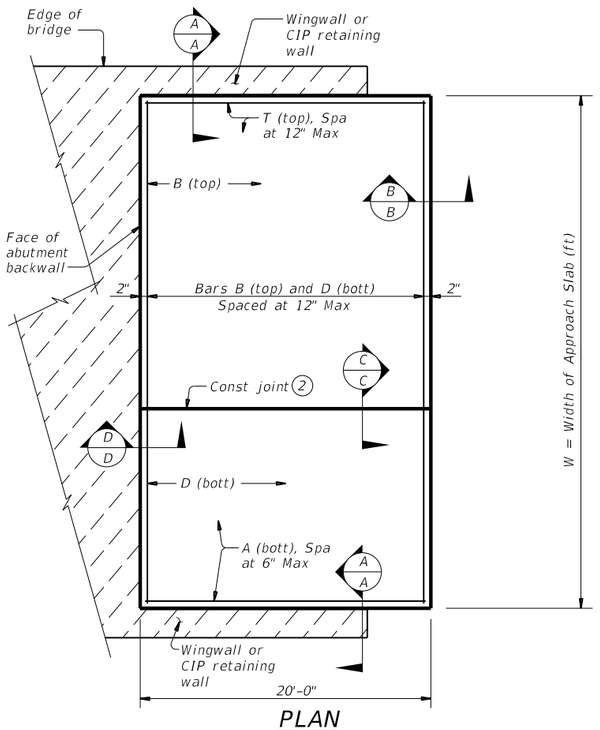
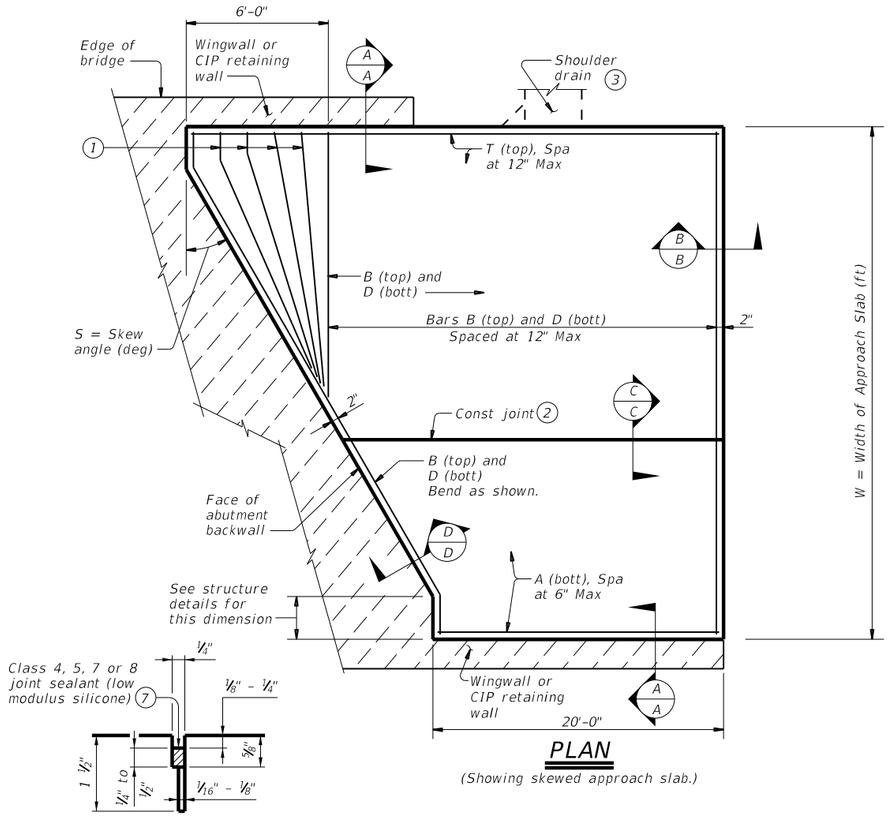


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

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

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

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

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

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

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

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

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

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

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

(7) Place in accordance with Item 438.

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

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

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

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

Provide Grade 60 reinforcing steel.

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

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

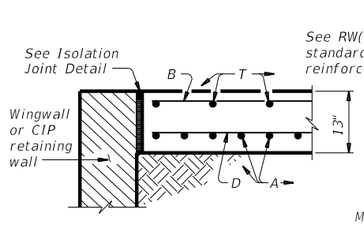
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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

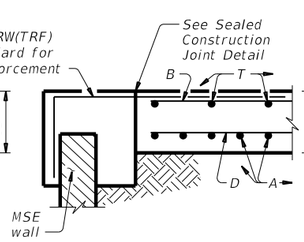
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

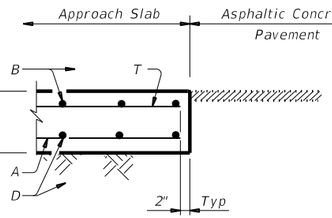
Cover dimensions are clear dimensions, unless noted otherwise.

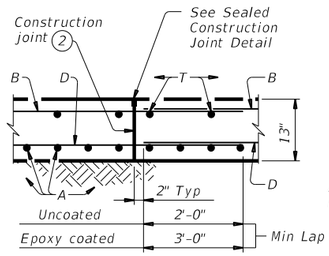


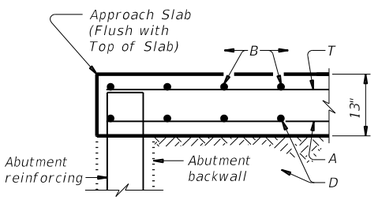
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





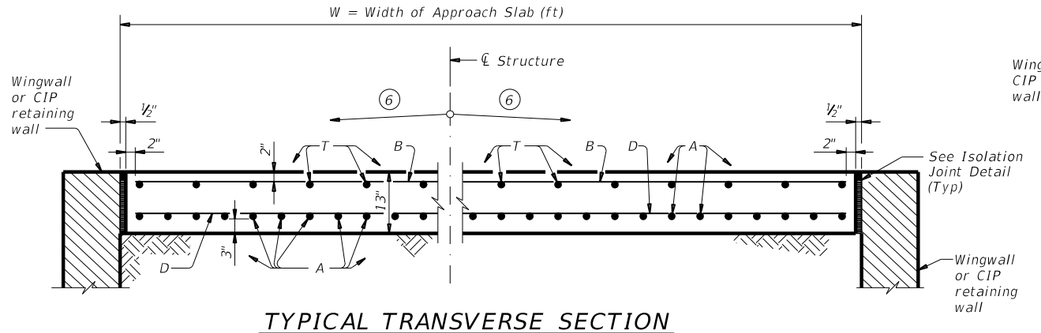


SECTION A-A

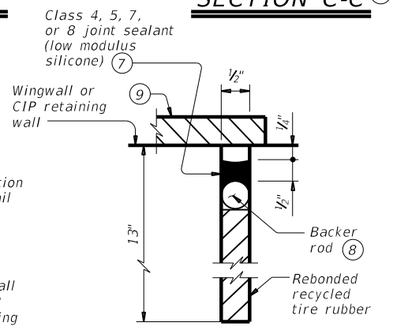
SECTION B-B

SECTION C-C (5)

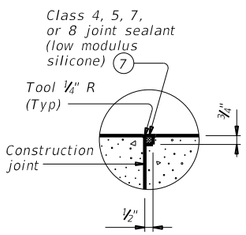
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		191

DATE: 3/8/2022 3:47:09 PM
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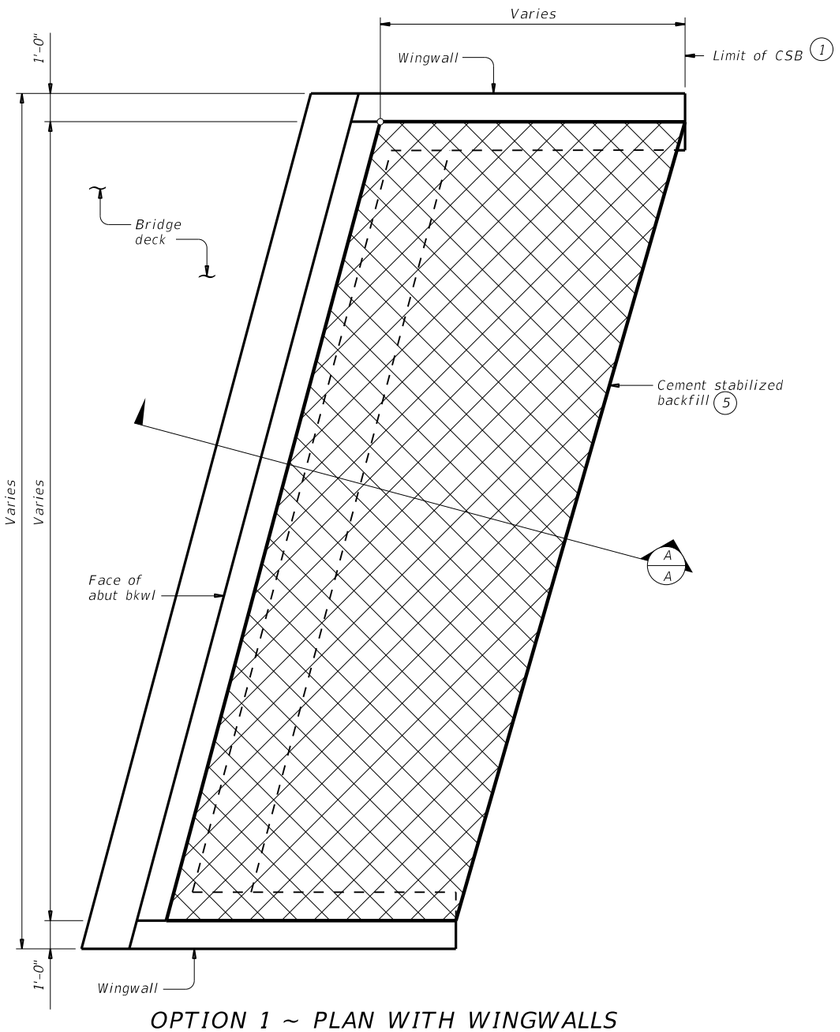
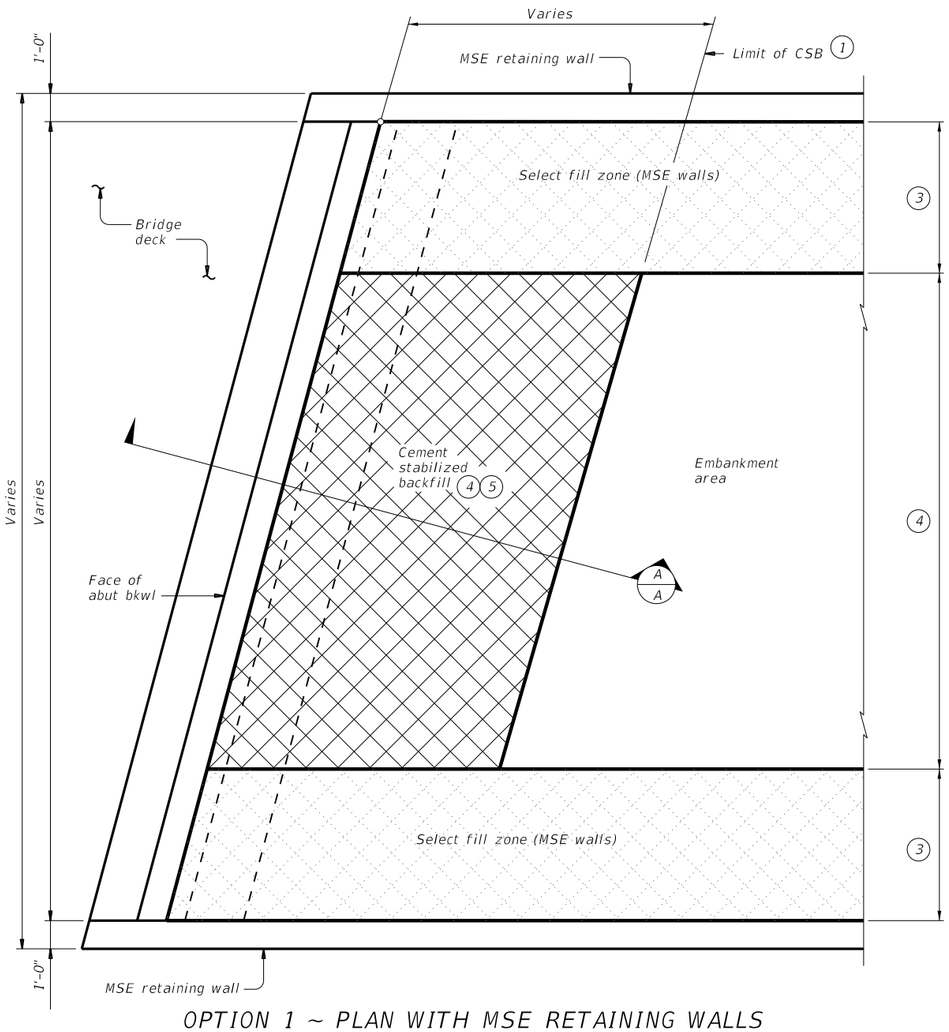


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ 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).

GENERAL NOTES:

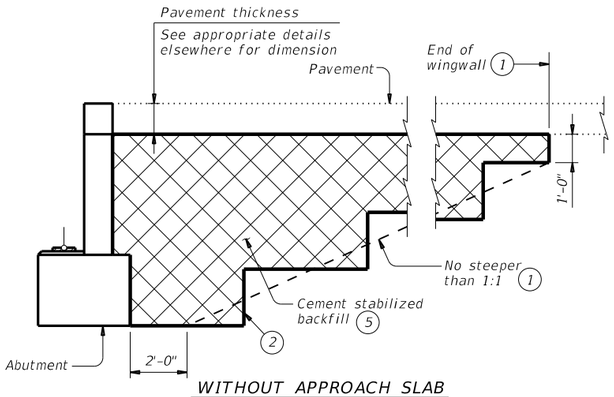
See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for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

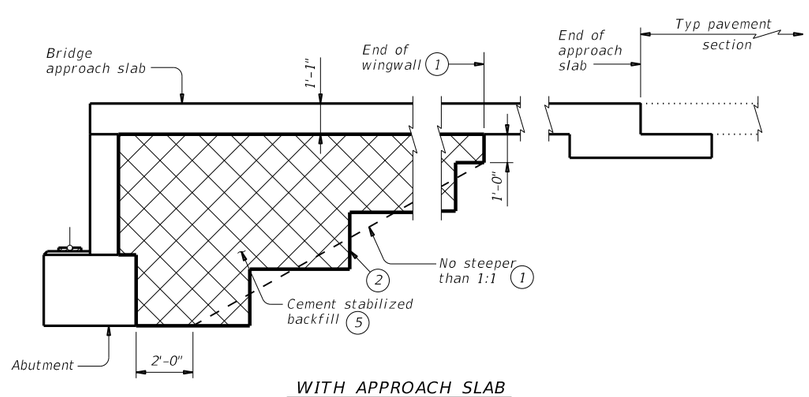
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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.



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

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	0113	02	063	US 290
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		192

DATE: 3/8/2022 3:47:09 PM
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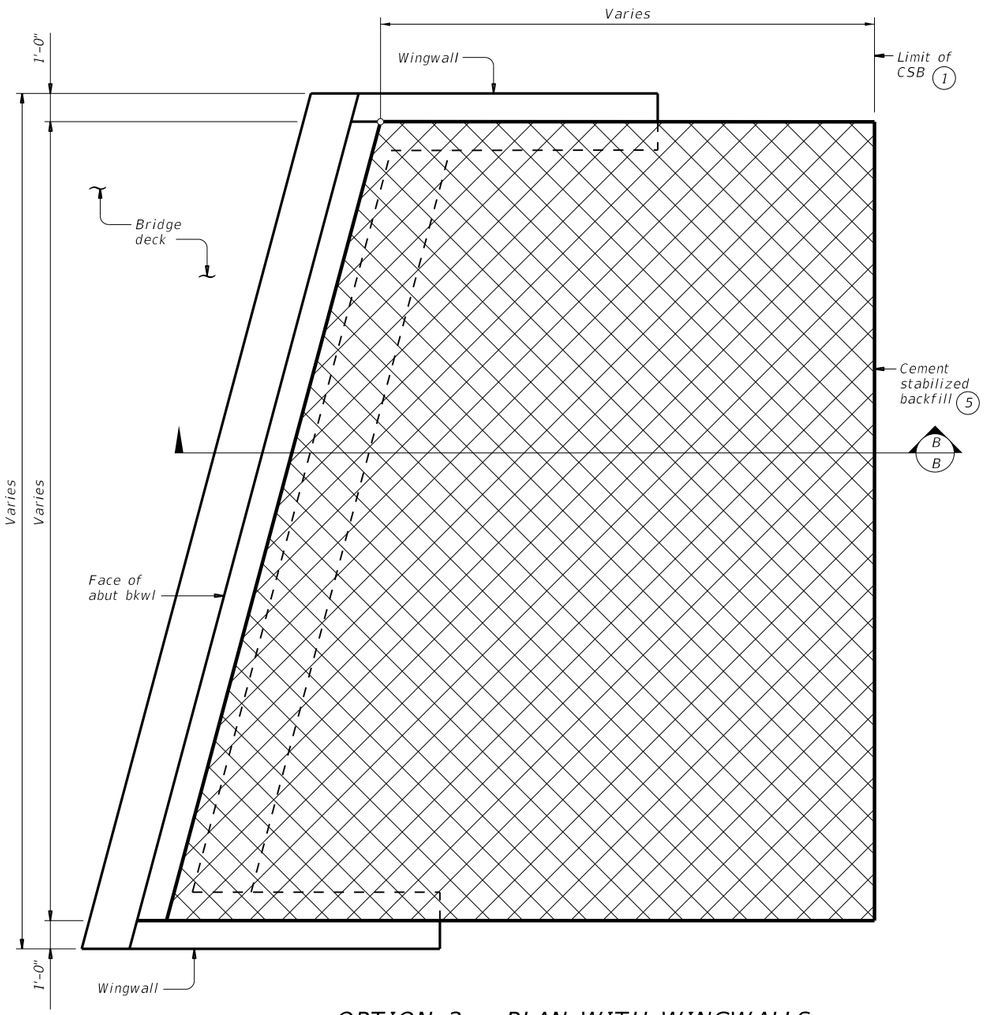
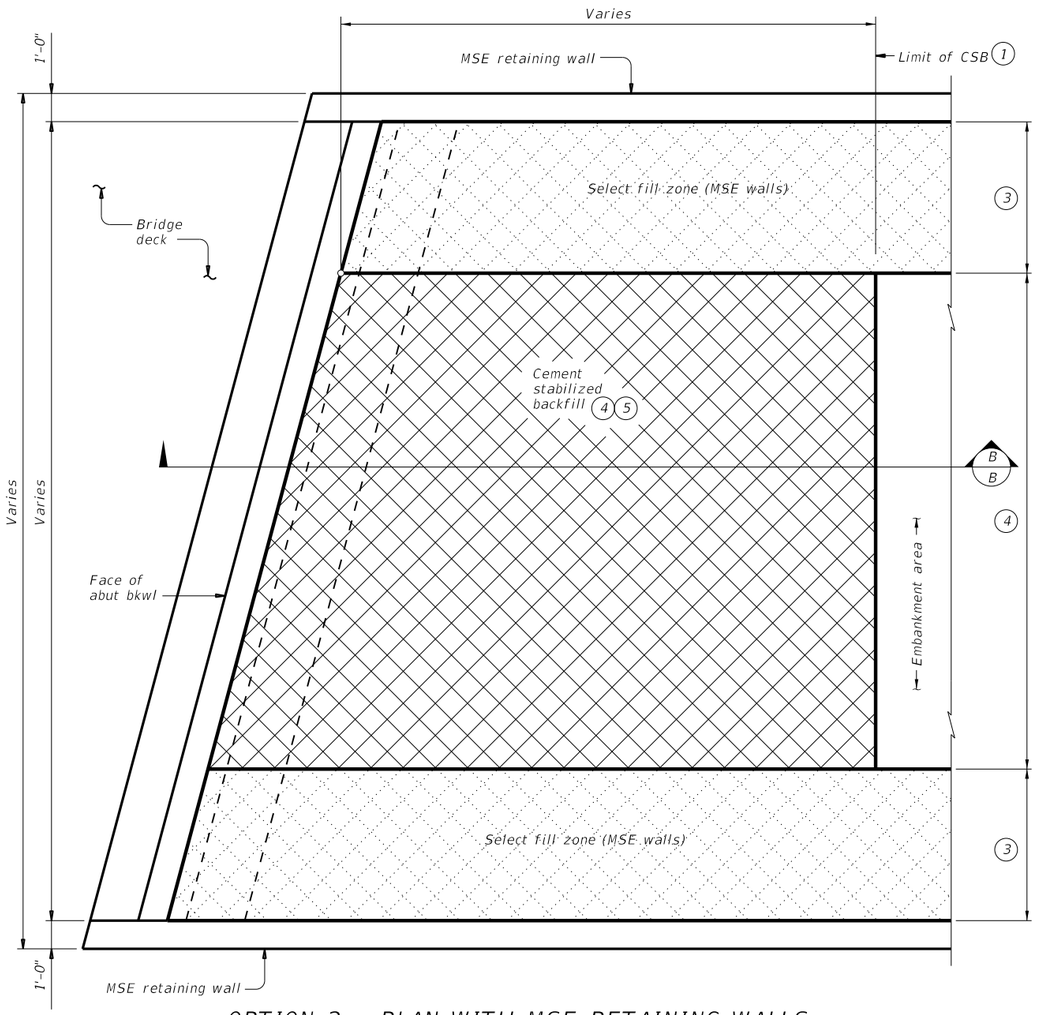


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

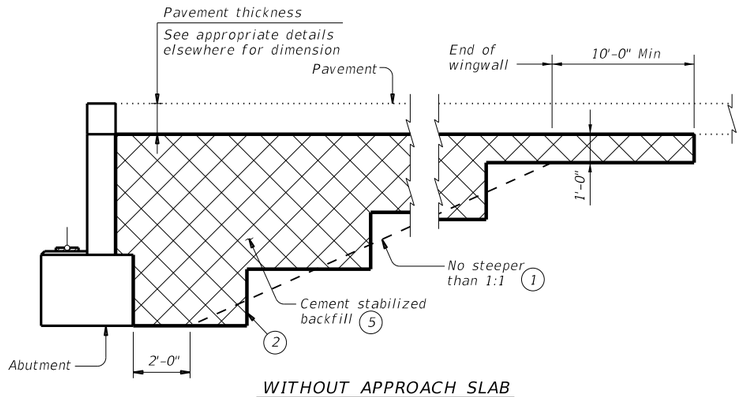
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

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

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

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

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



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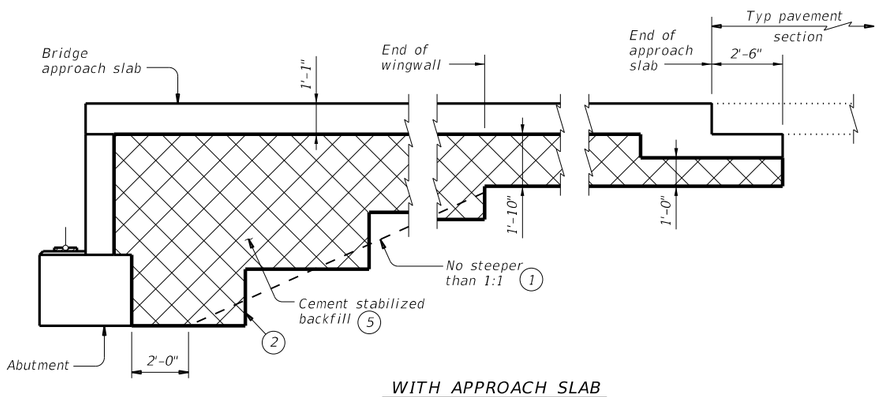

WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		193

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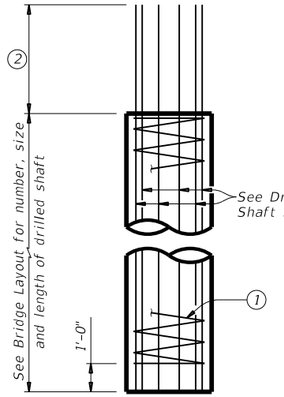
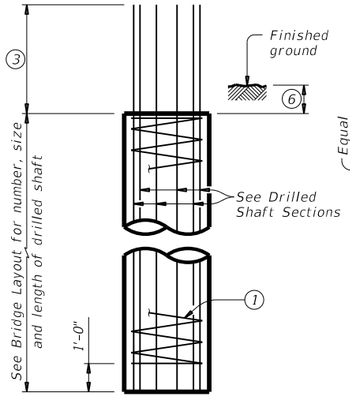
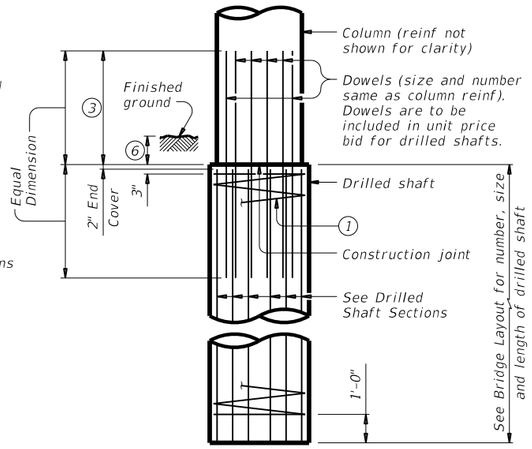


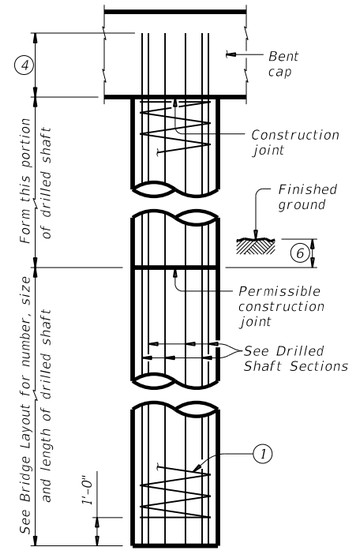
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



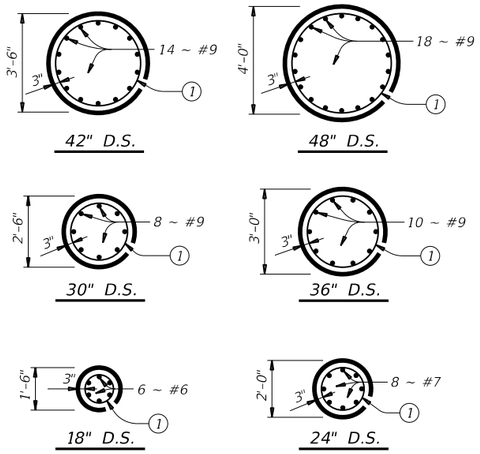
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

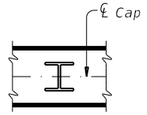


DRILLED SHAFT SECTIONS

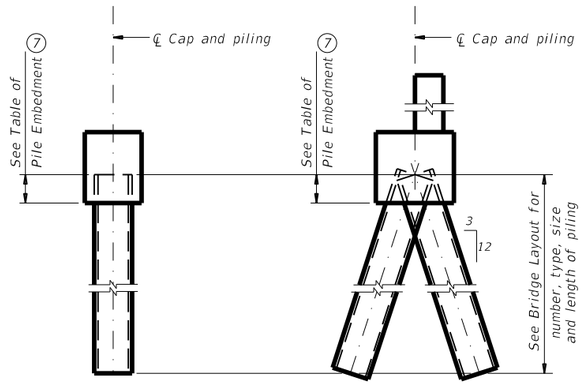
DRILLED SHAFT DETAILS

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

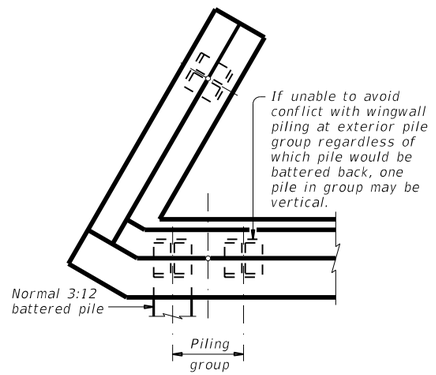
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



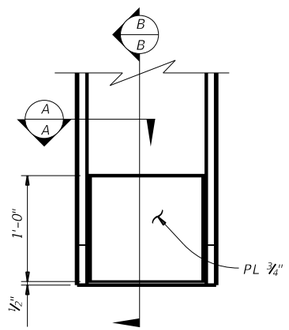
ORIENTATION OF STEEL H-PILING

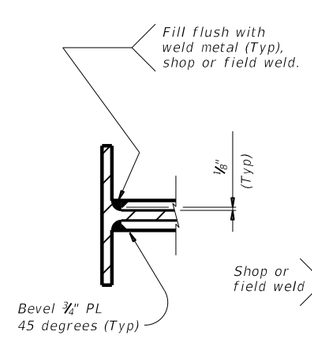


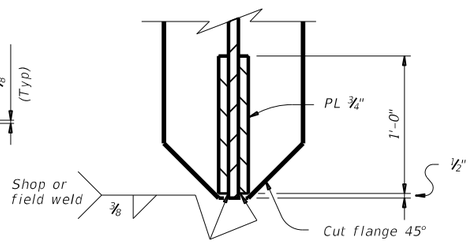
PILING DETAILS
(Concrete or steel H)



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

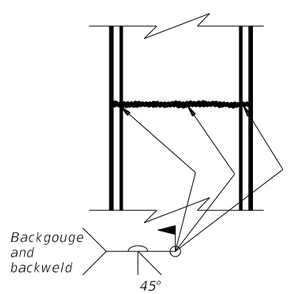


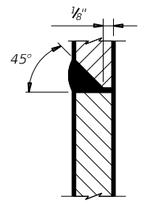




STEEL H-PILE TIP REINFORCEMENT

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	0113	02	063	US 290
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		194

DATE: 3/8/2022 3:47:09 PM
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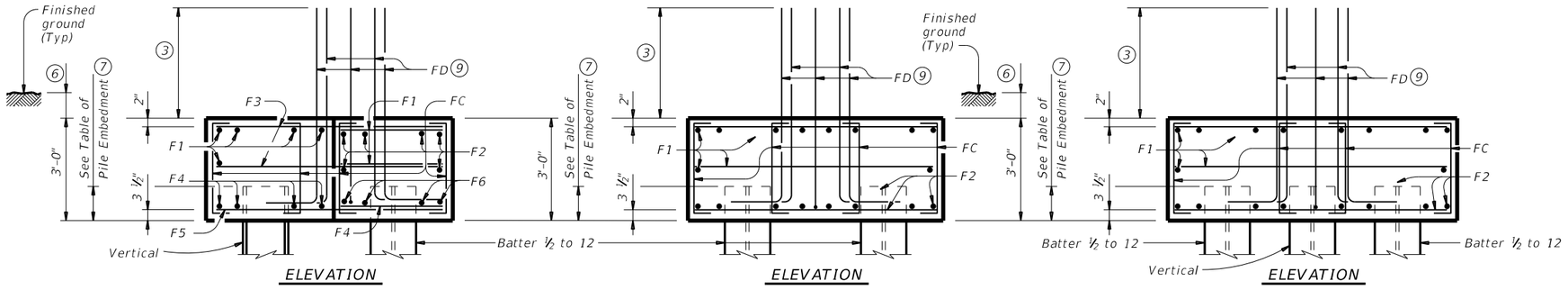
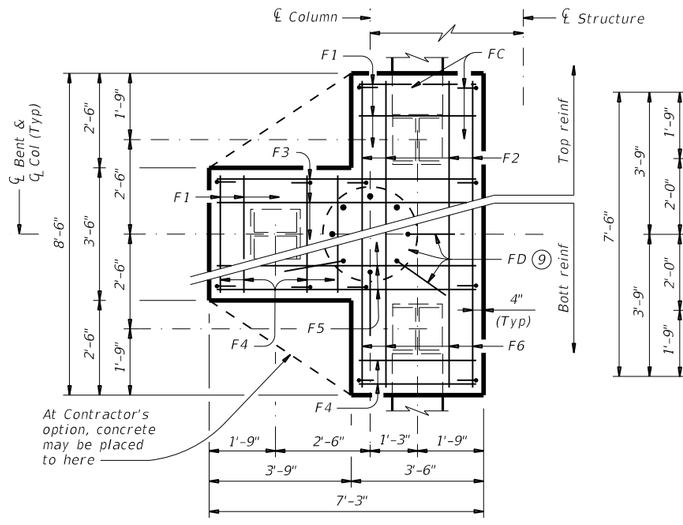
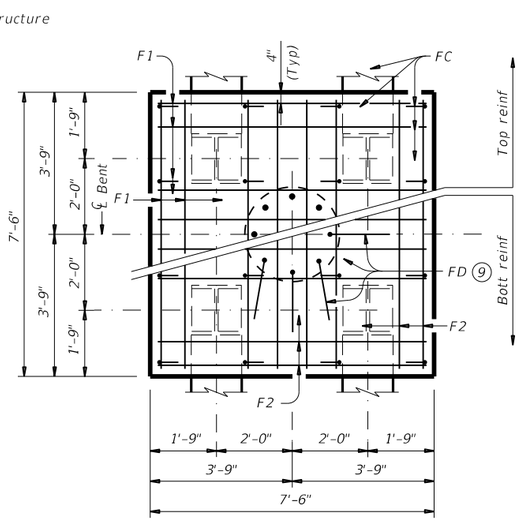




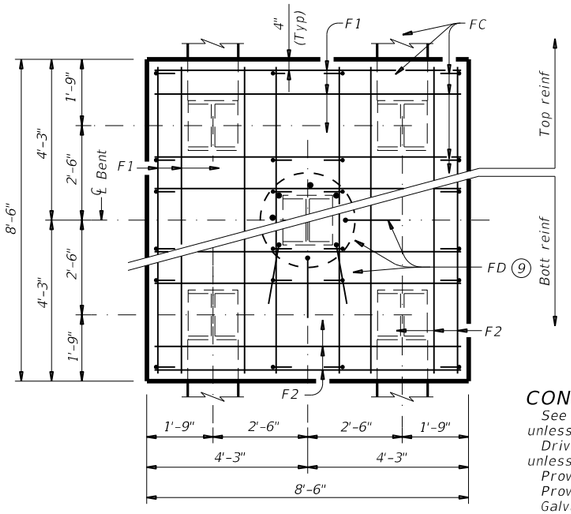
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



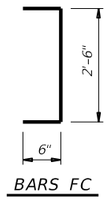
FOUR PILE FOOTING (8)

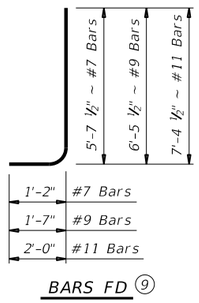
For 42" Dia and smaller columns.



FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.





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

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

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0113	02	063	US 290
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		195

DATE: 3/8/2022 3:47:09 PM
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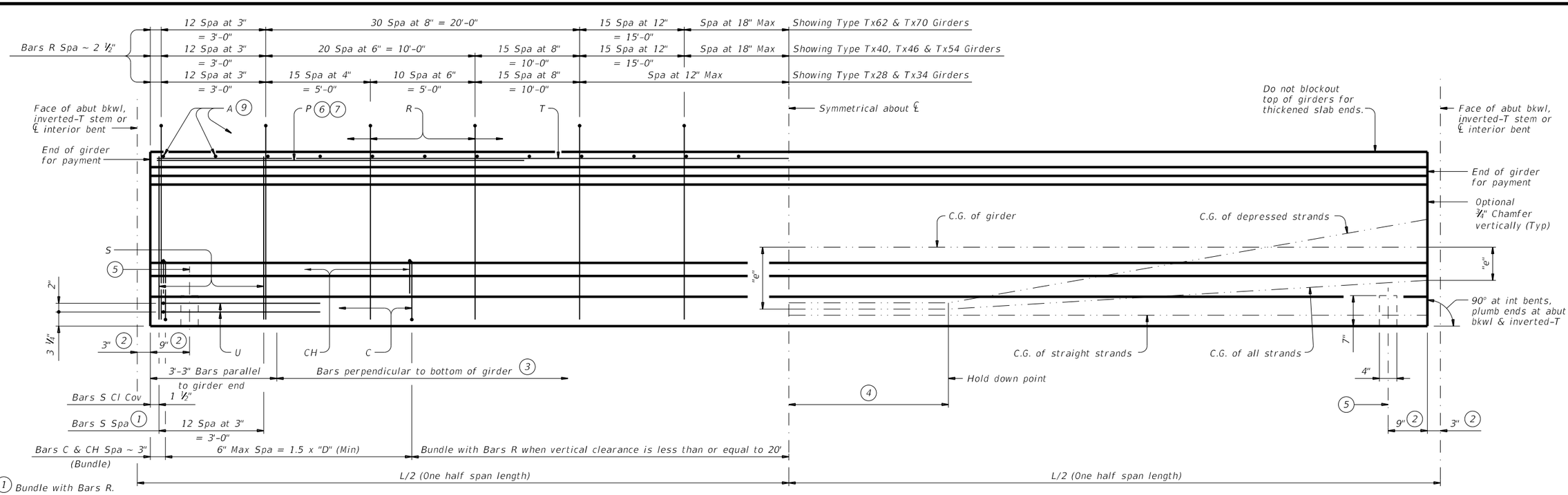


(1) Bundle with Bars R.

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

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

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

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅜") 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.

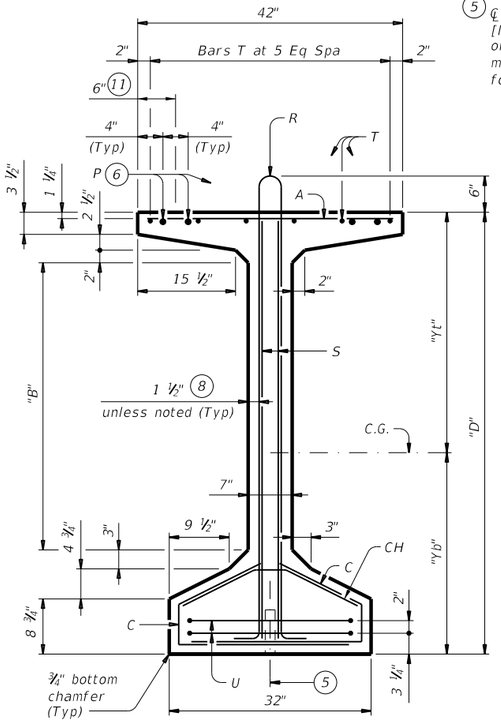
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

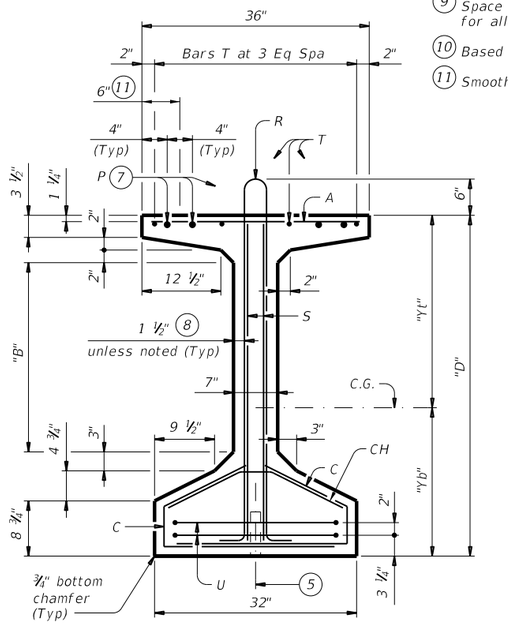
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

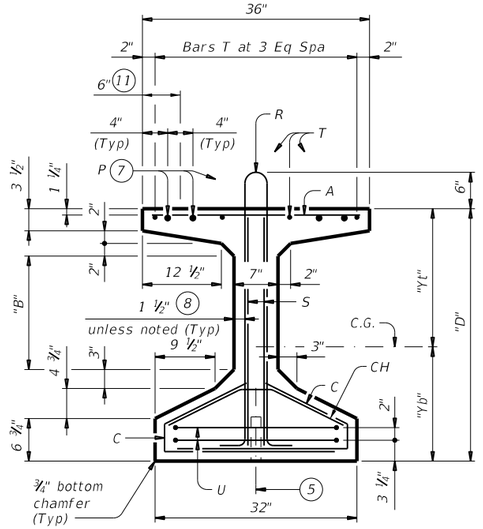
(11) Smooth trowel finish on the slab overhang side of exterior girder.



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	0113	02	063	US 290
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		196

DATE: 3/8/2022 3:47:09 PM
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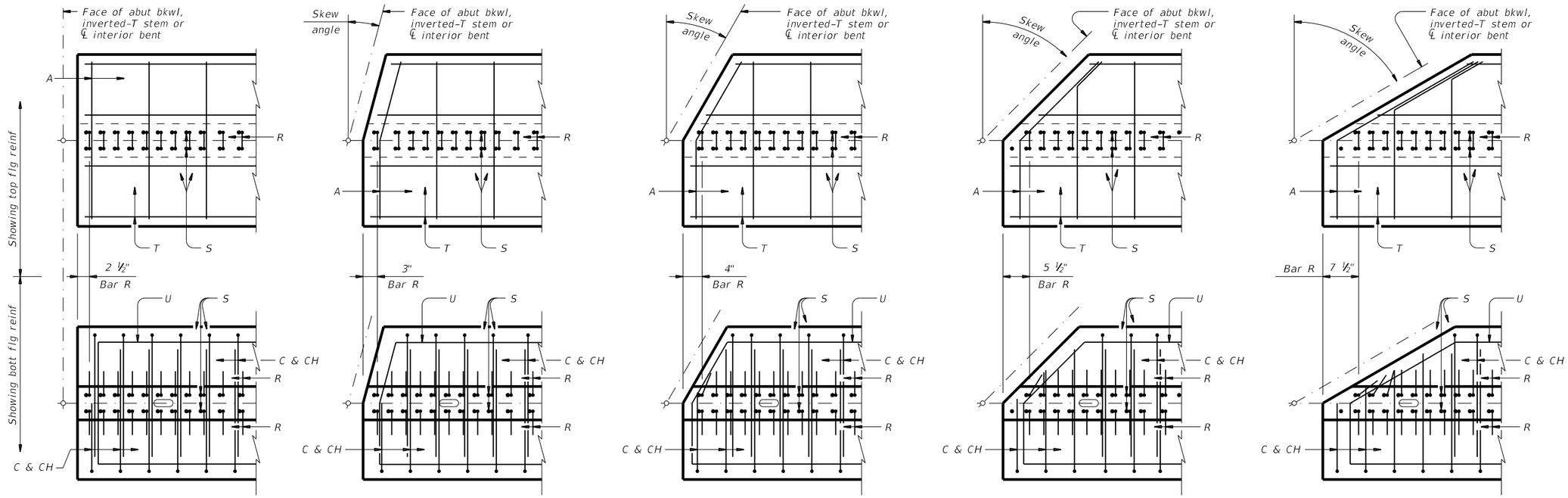
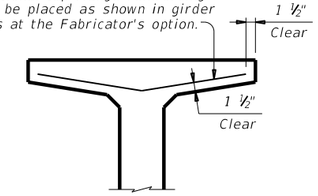
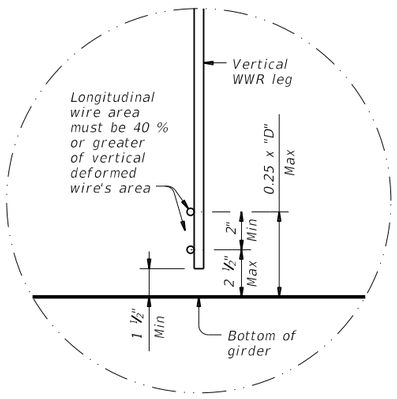


PLAN OF GIRDER ENDS (12)

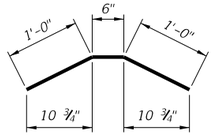
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



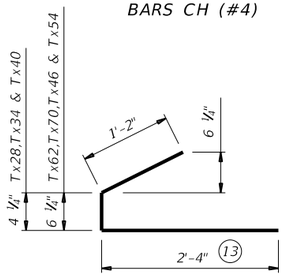
OPTIONAL TOP FLANGE REINFORCING DETAIL



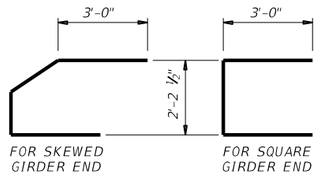
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



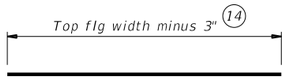
BARS CH (#4)



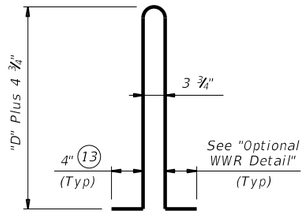
BARS C (#4)



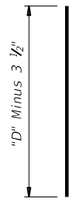
BARS U (#5)



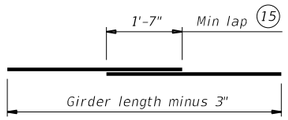
BARS A (#3)



BARS R (#4) (16)



BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		197

DATE: 3/8/2022 3:47:09 PM
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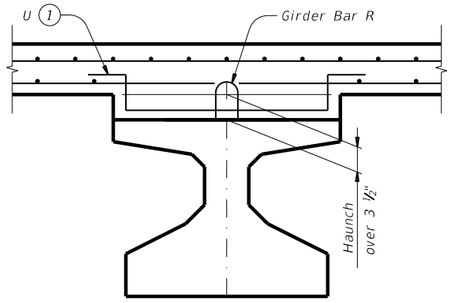
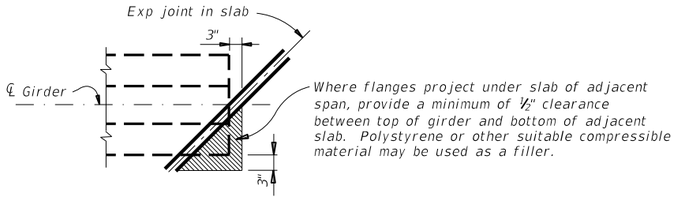
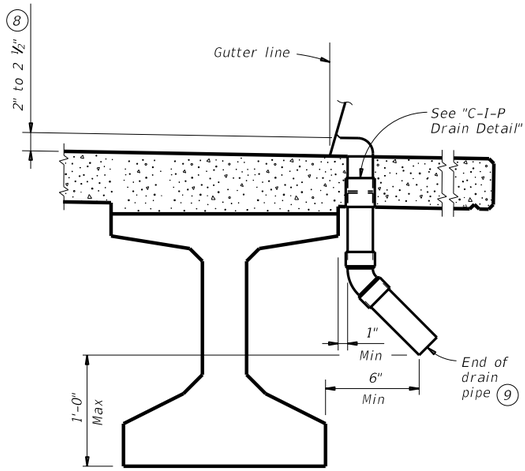


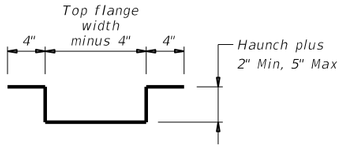
HAUNCH REINFORCING DETAIL



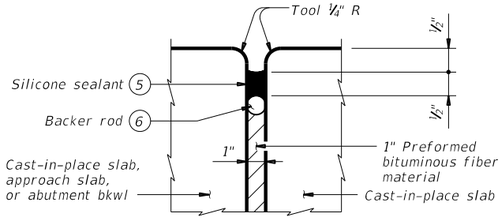
TREATMENT AT GIRDER END FOR SKEWED SPANS



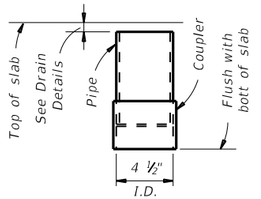
DRAIN DETAIL (10)



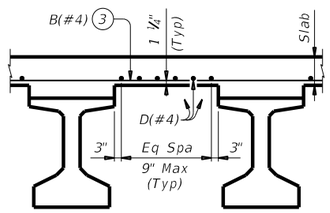
BARS U (#4)



TYPE A JOINT DETAIL (7)



C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.

(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

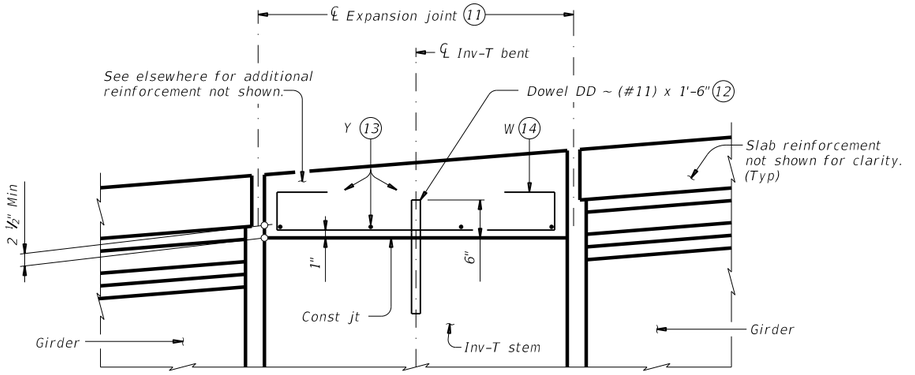
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

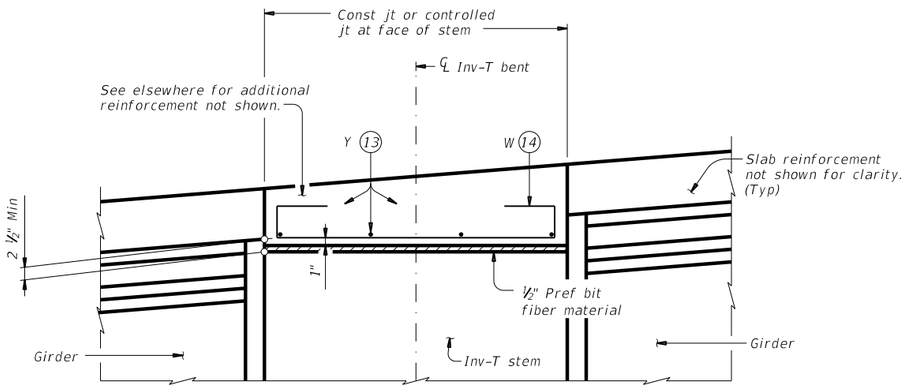
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		198

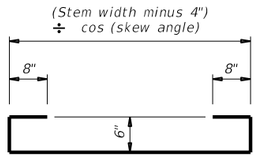


SHOWING EXPANSION JOINTS

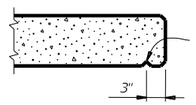


SHOWING CONST JTS OR CONTROLLED JTS

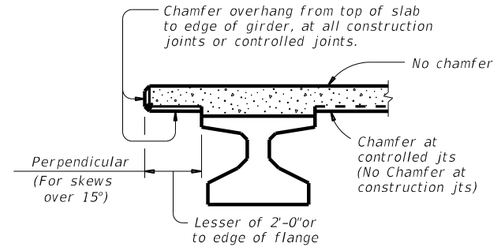
REINFORCEMENT OVER INV-T BENTS



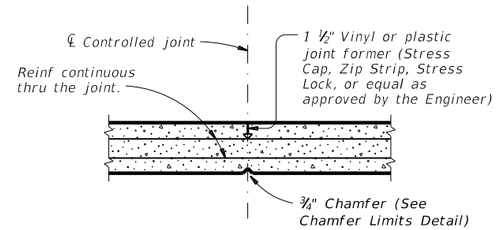
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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10-19: Modified Note 7, Type A now a pay item.	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		199

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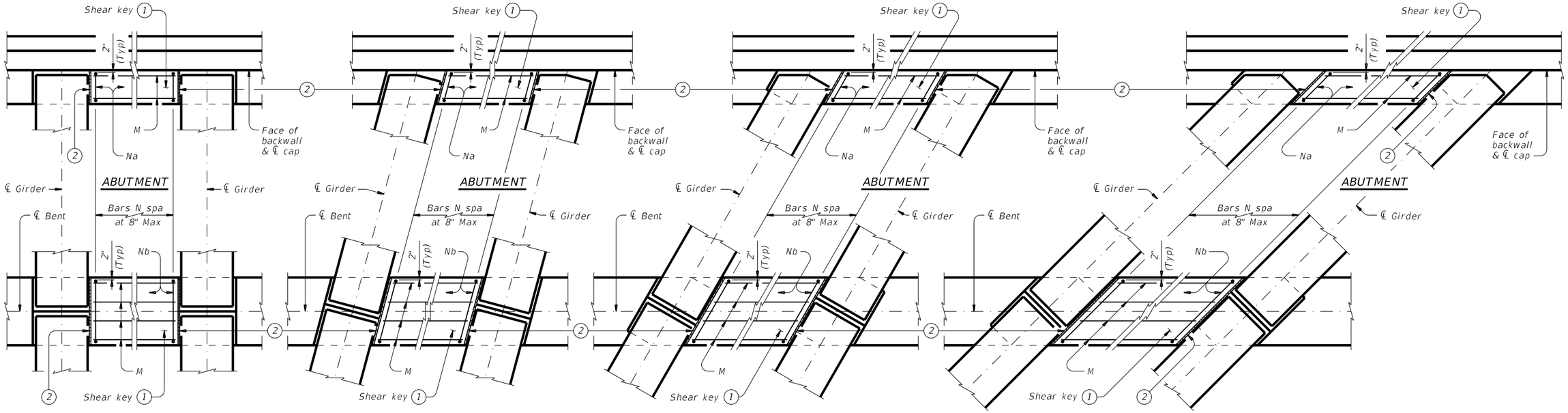


PARTIAL PLANS WITH NO SKEW

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

PARTIAL PLANS WITH 15° SKEW

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

PARTIAL PLANS WITH 30° SKEW

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

PARTIAL PLANS WITH 45° SKEW

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

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

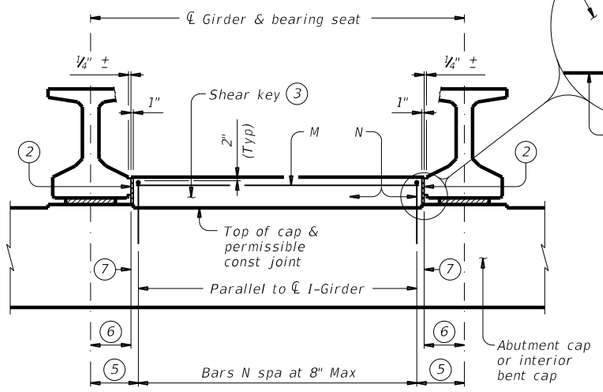
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ✱ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ✱ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

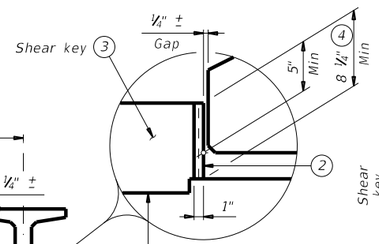
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

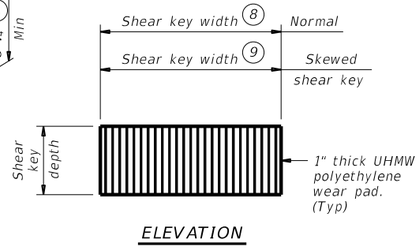
(9) Abutments = ½ Cap width ✱ Cos Skew.
Interior bents = Cap width ✱ Cos Skew.



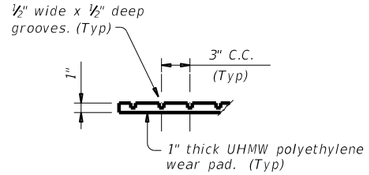
PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

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



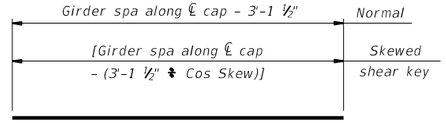


ELEVATION

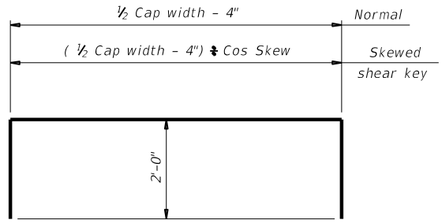


PART SECTION

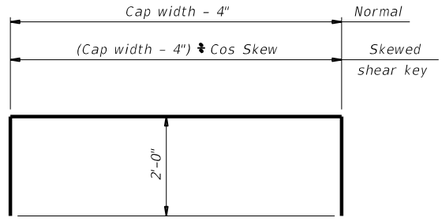
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



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	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		200

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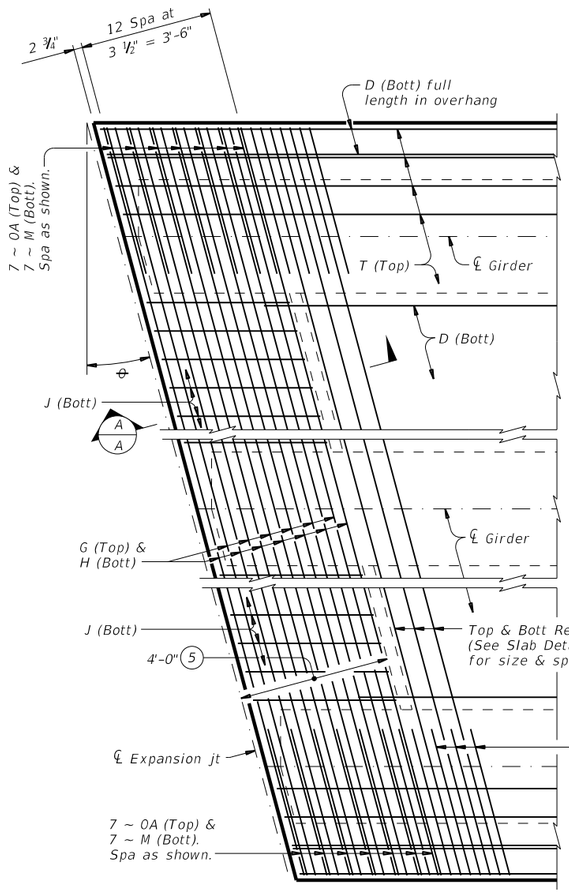
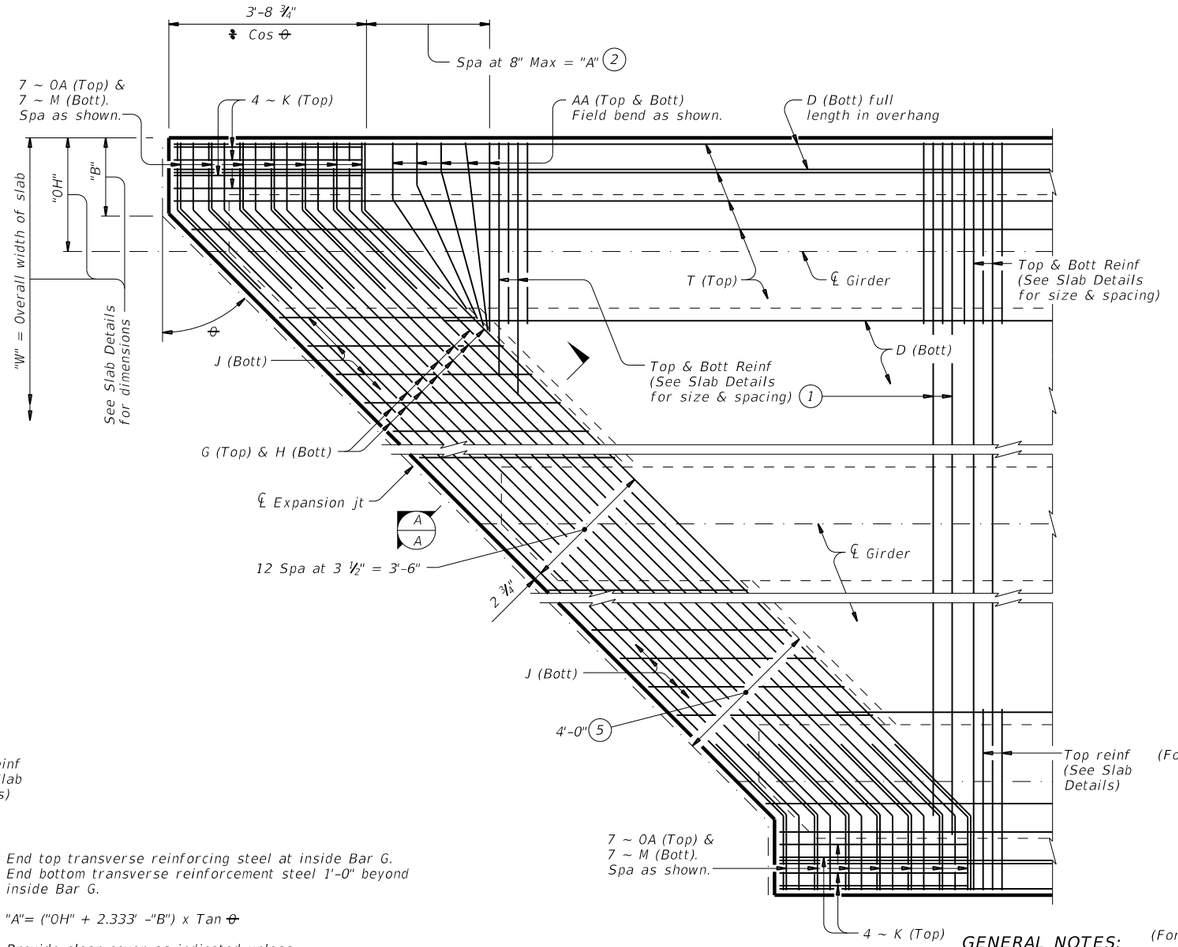


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

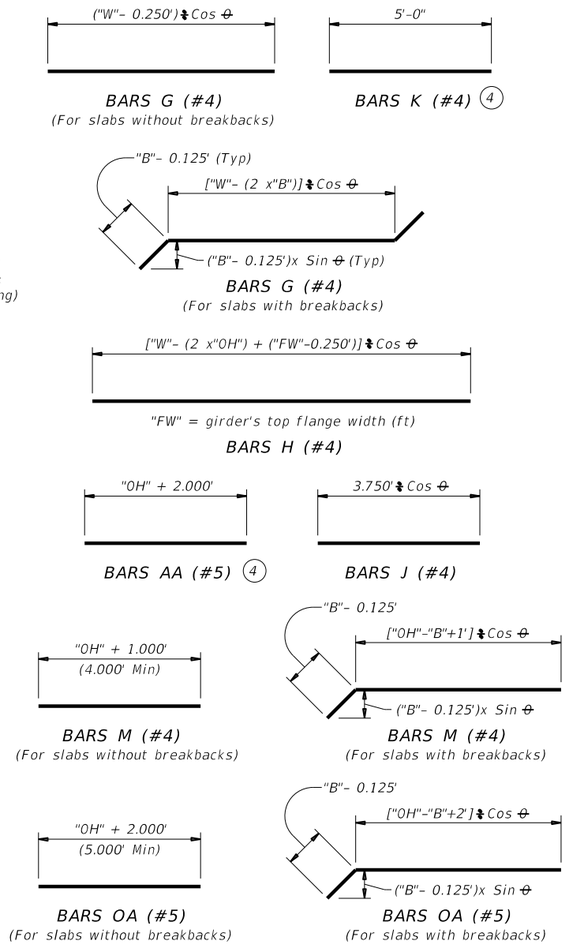
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 2.333' -"B") x Tan θ

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

(4) Only required on slabs with breakbacks.

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



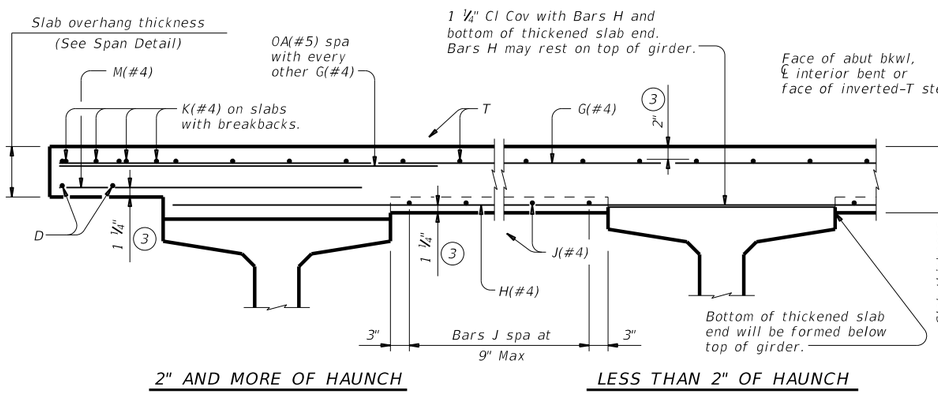
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

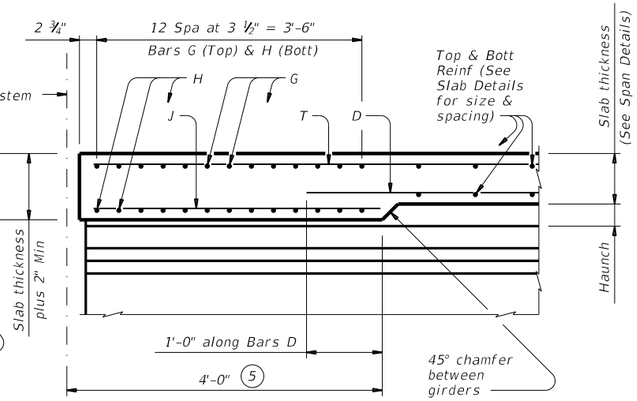
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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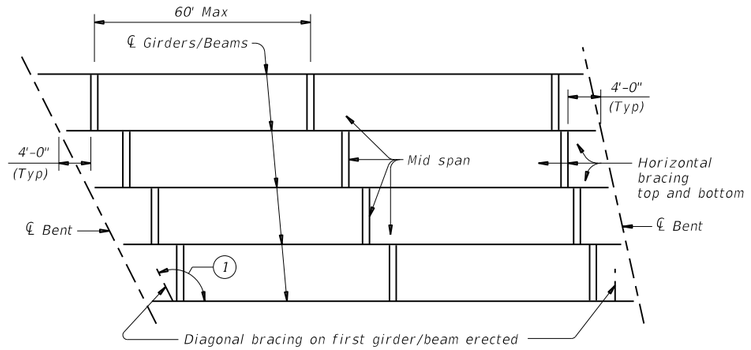
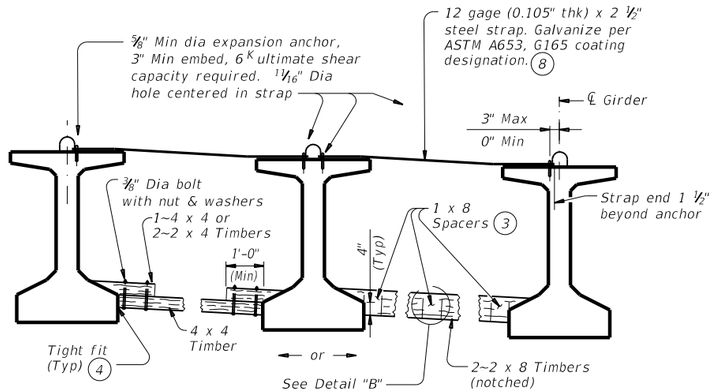
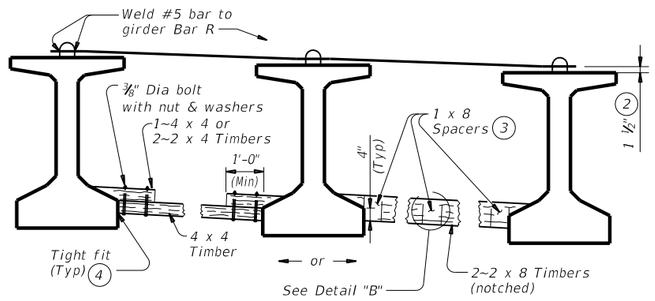


ERECTION BRACING



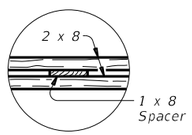
FOR ERECTION BRACING, OPTION 1

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



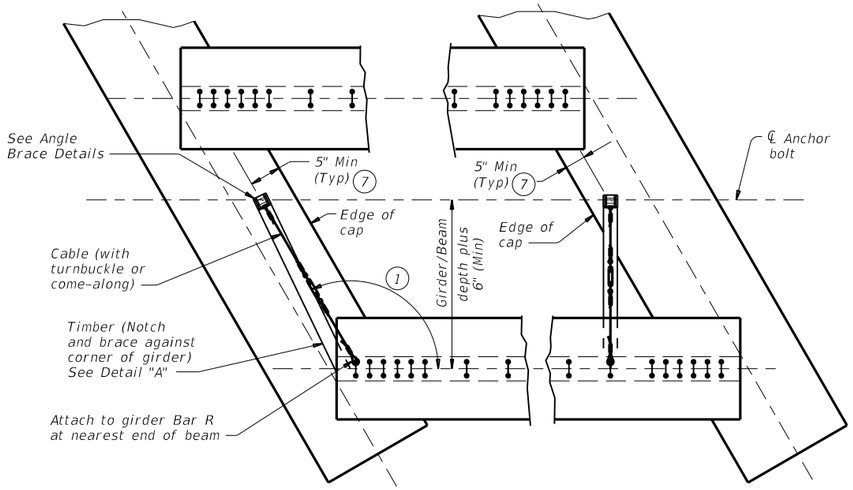
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

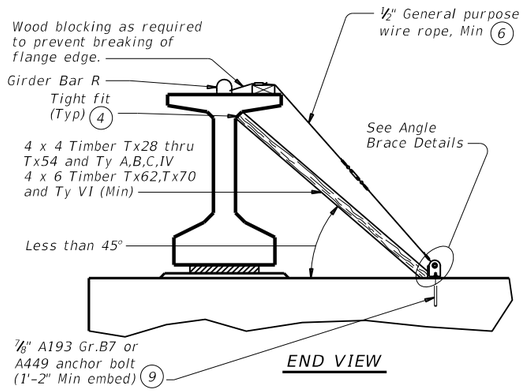


PLAN

DETAIL "B"



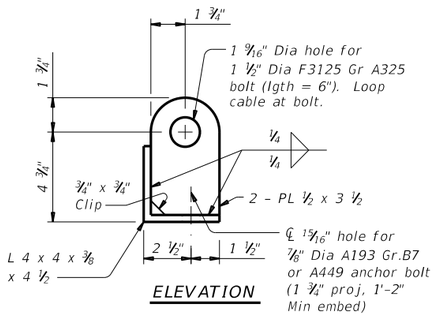
PLAN



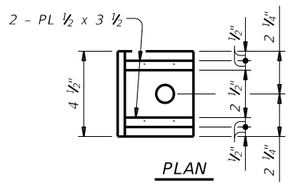
END VIEW

DIAGONAL BRACING DETAILS (5)

(To be used on both ends of the first girder/beam erected in the span in each phase.)



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

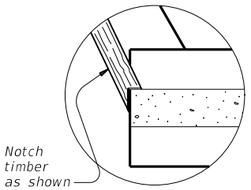
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

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

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

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

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

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

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

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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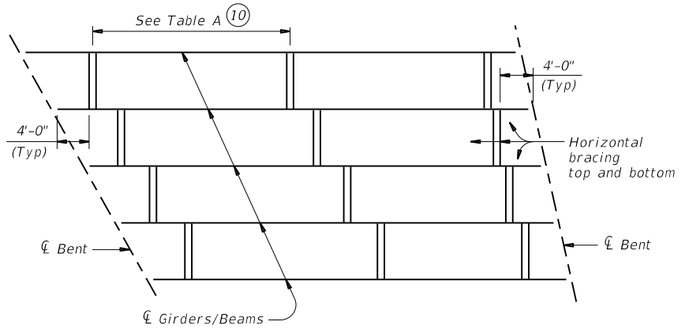


SLAB PLACEMENT BRACING

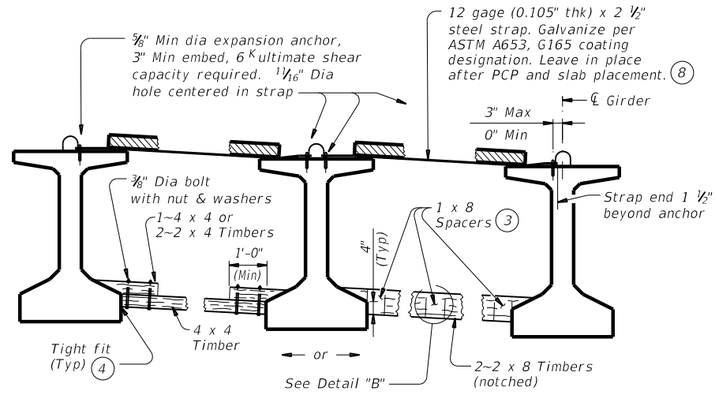
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

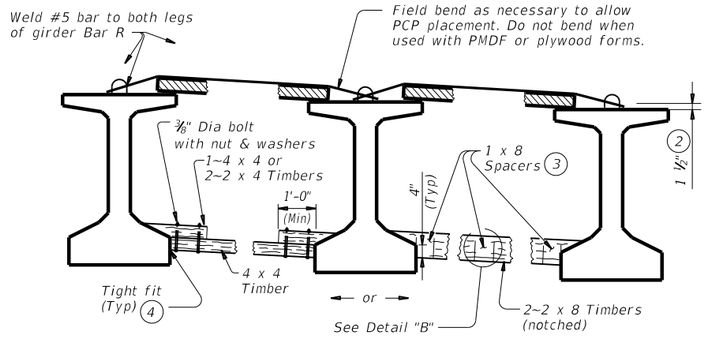
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

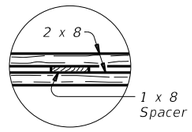
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)



PLAN

DETAIL "B"

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

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

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

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

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

(10) Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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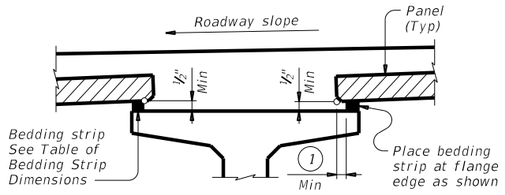
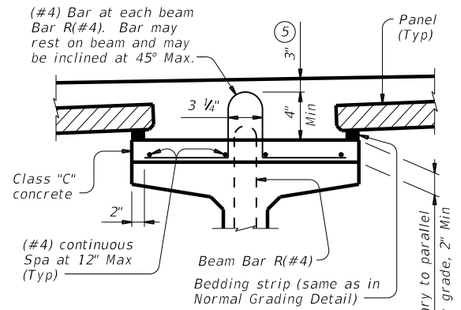


NORMAL GRADING DETAIL (3)

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.

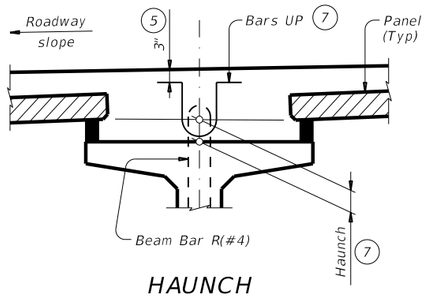
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

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.

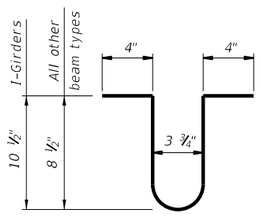
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

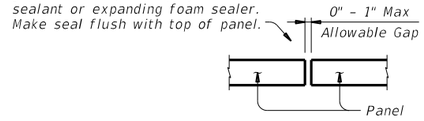


HAUNCH REINFORCING DETAIL

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

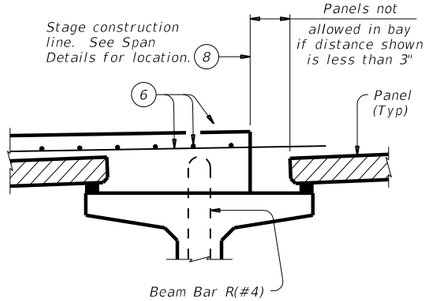


BARS UP (#4) (7)

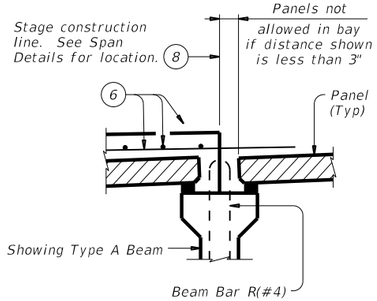


PANEL JOINTS

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



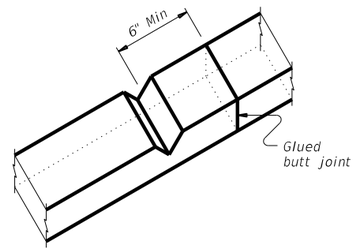
PRESTR CONC I-GIRDERS



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

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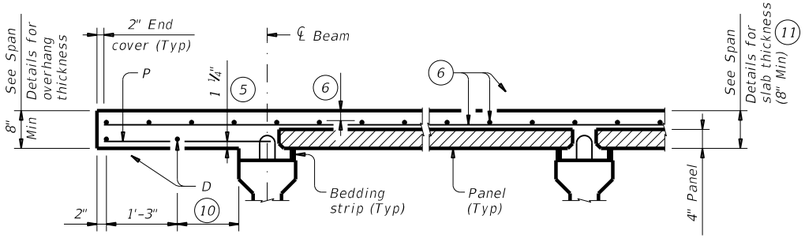
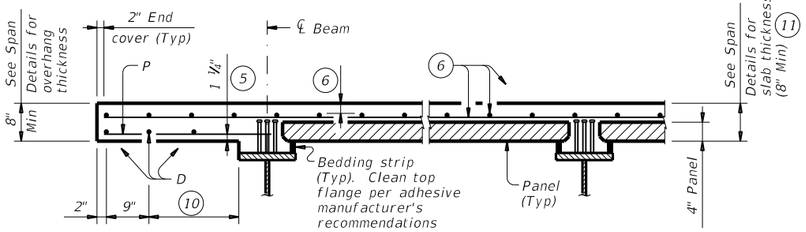
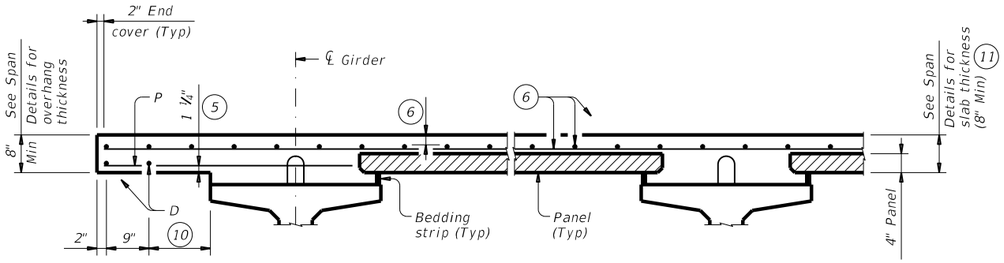


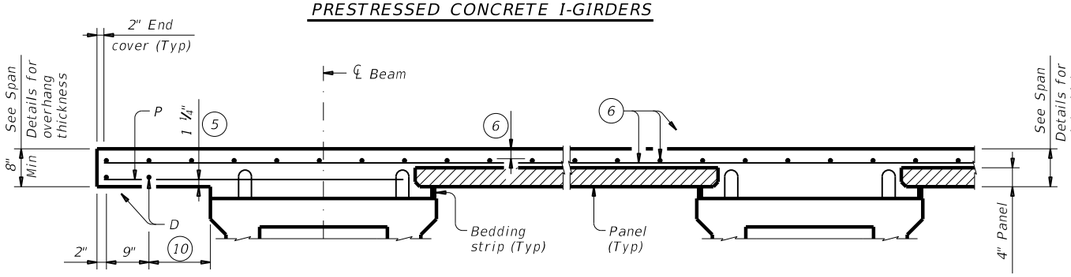
PRESTRESSED CONCRETE I-BEAMS



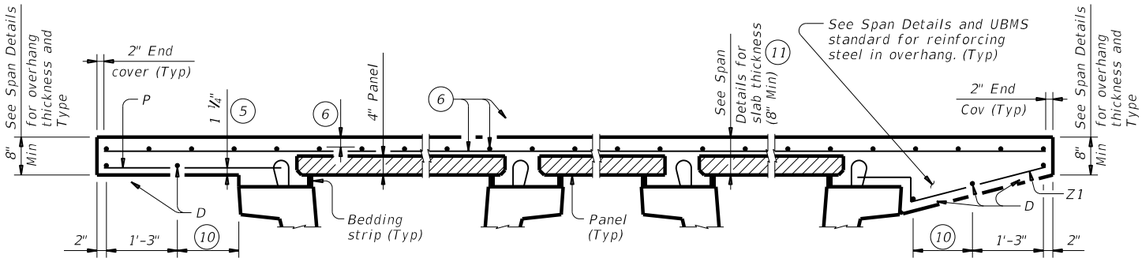
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



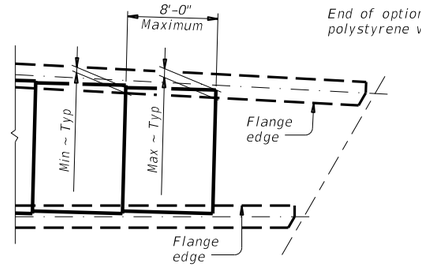
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

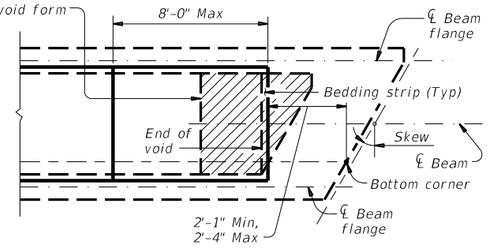
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

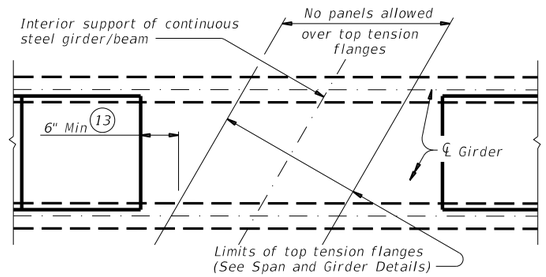


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on 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.

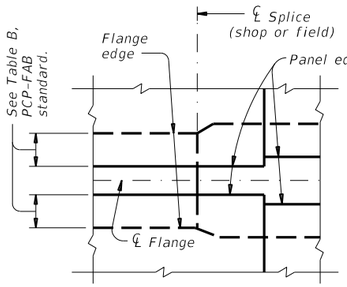
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

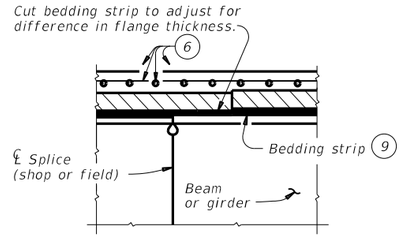
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



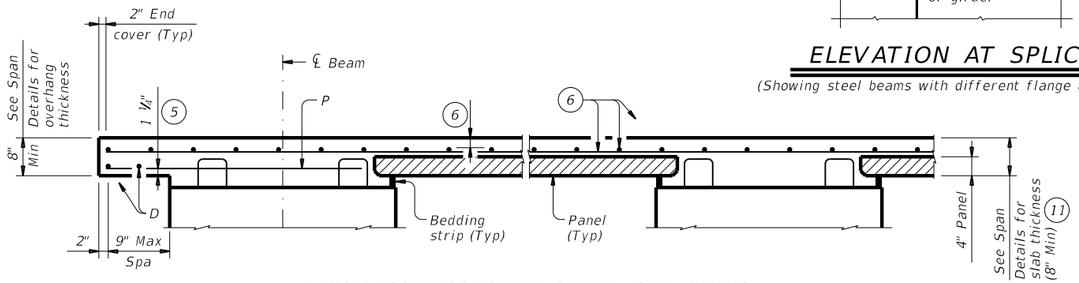
PLAN AT SPLICE

(Showing steel beams with flange width transition)



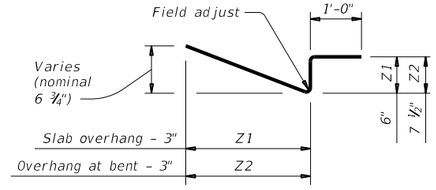
ELEVATION AT SPLICE

(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

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	AUS	GILLESPIE		205

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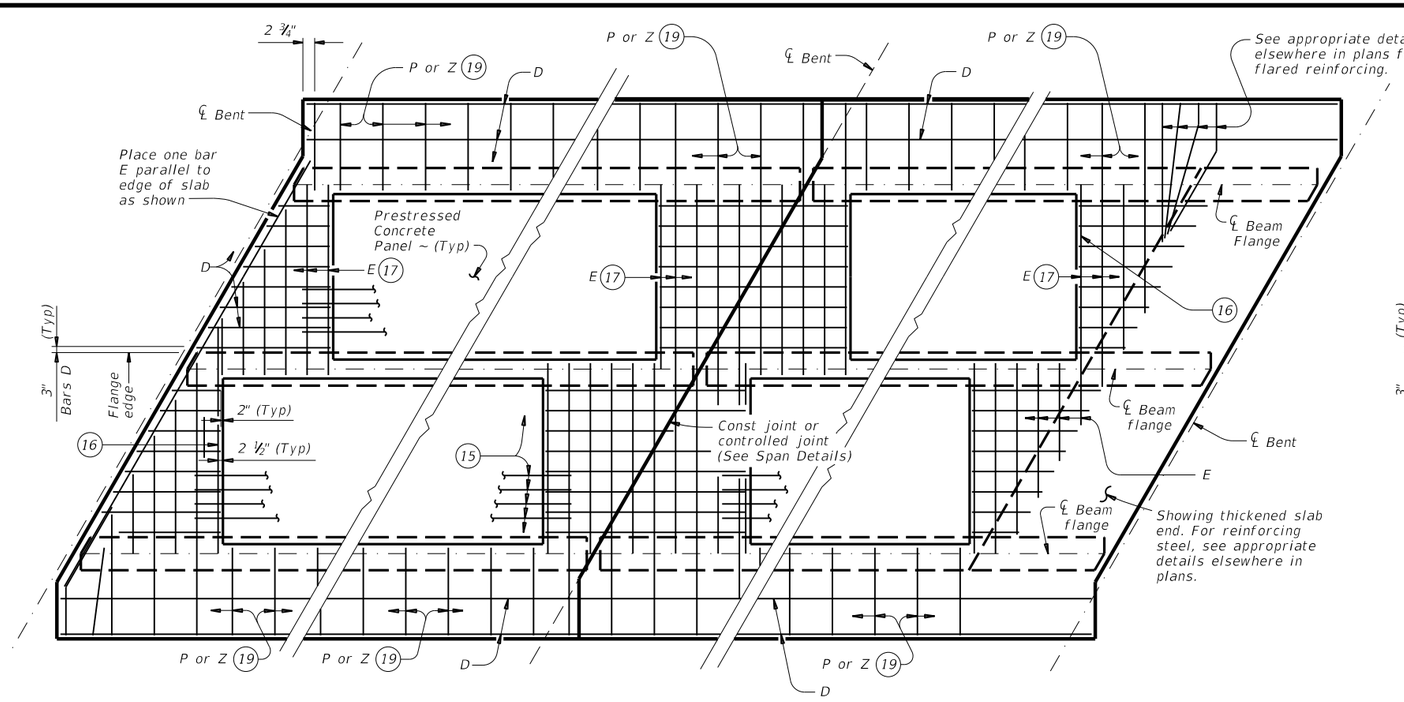
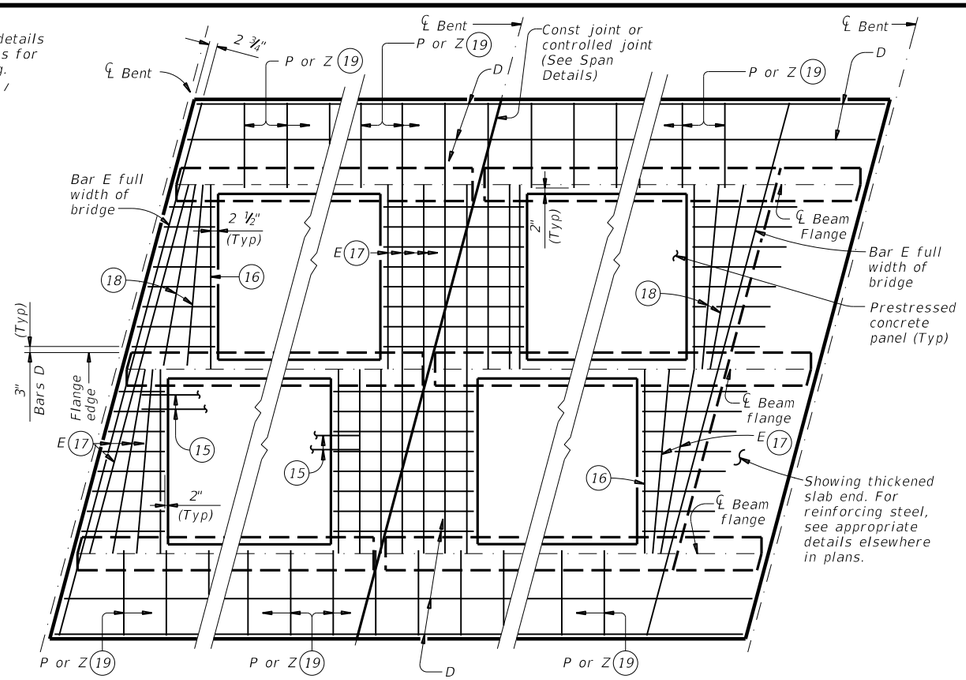


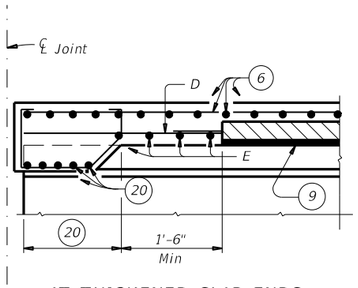
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

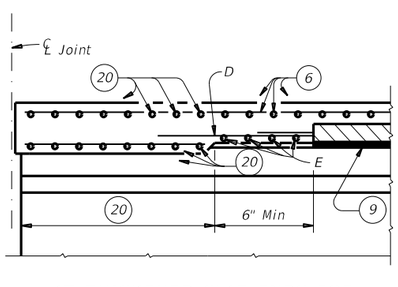


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

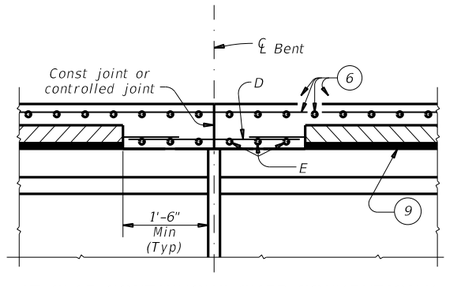
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



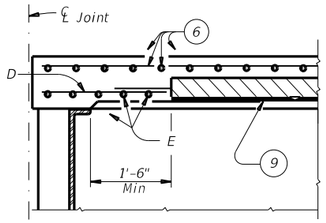
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



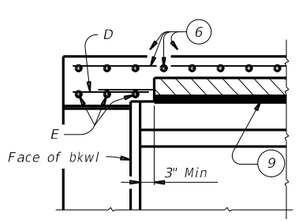
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



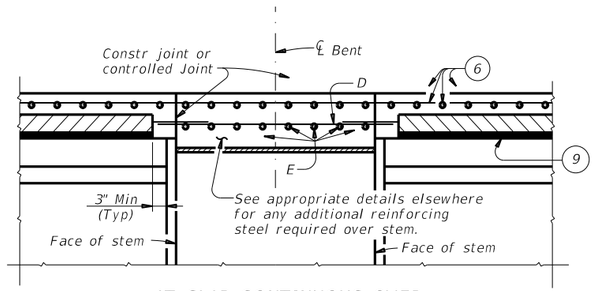
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

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

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

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

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Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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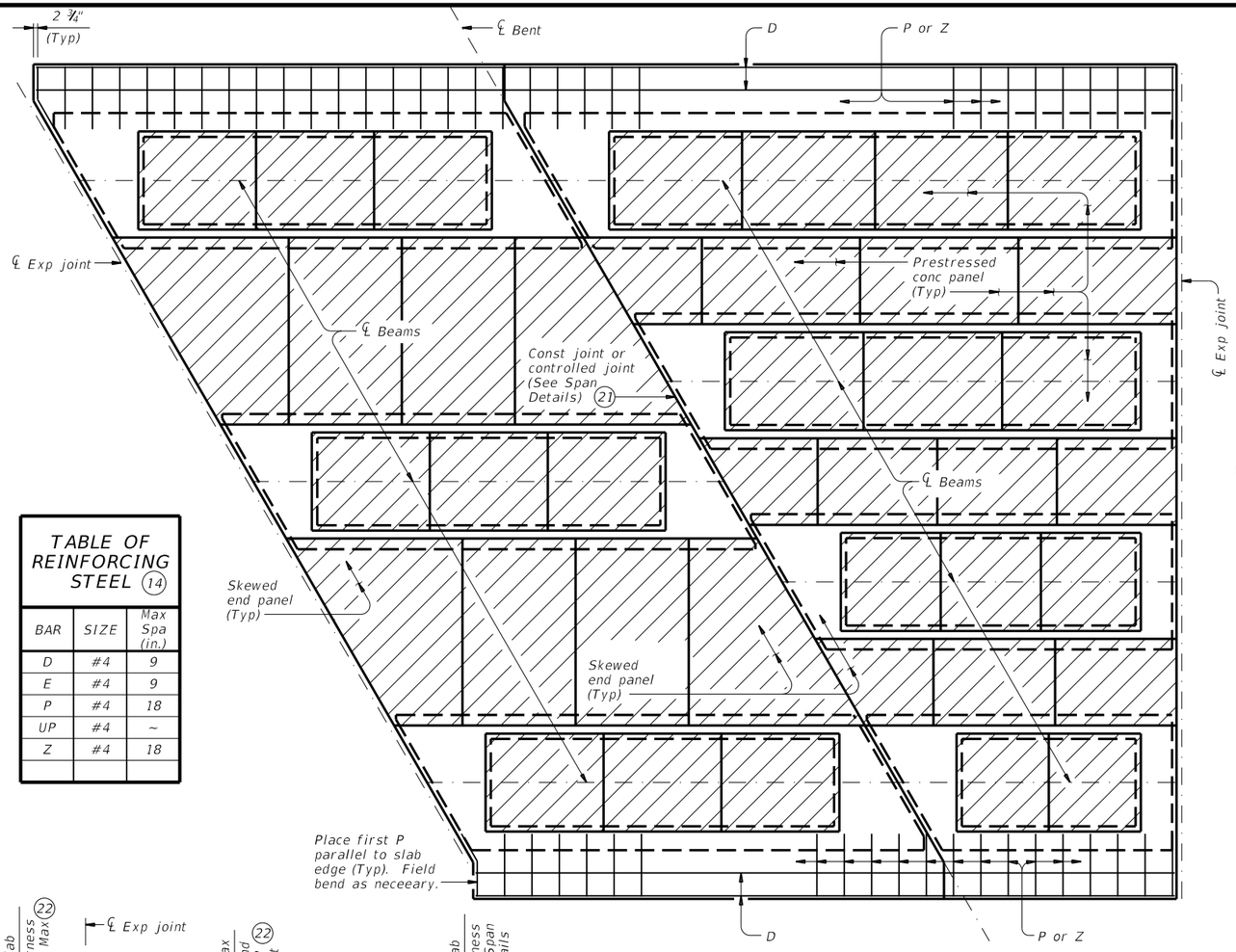
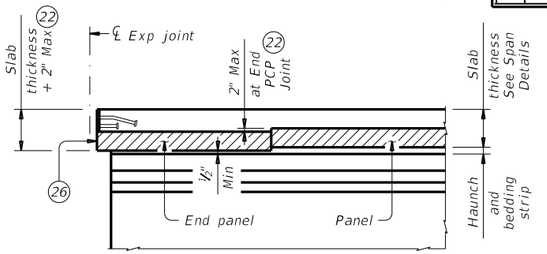


OPTION 2 ~ PLAN OF SLAB

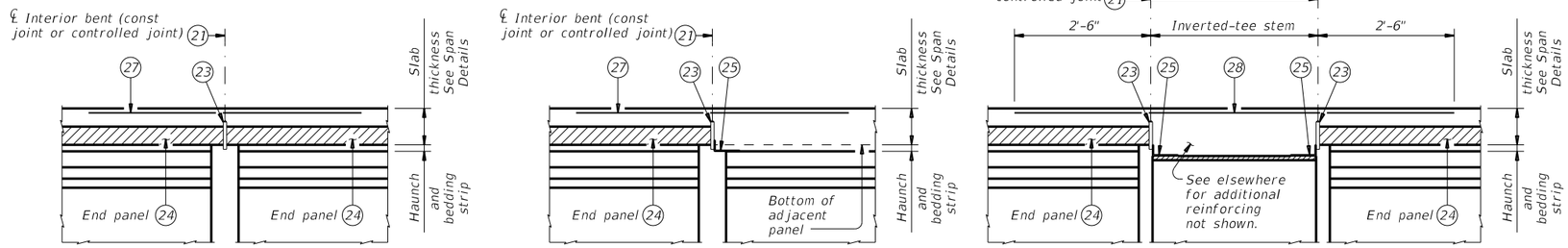
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.

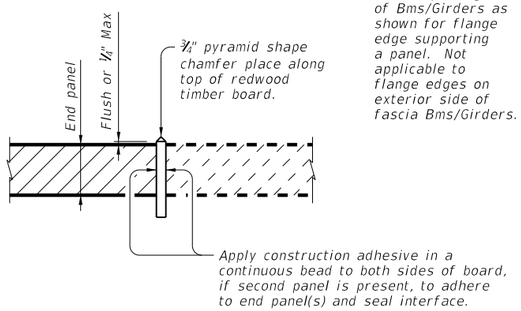
CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adacent span.

INVERTED-T BENT

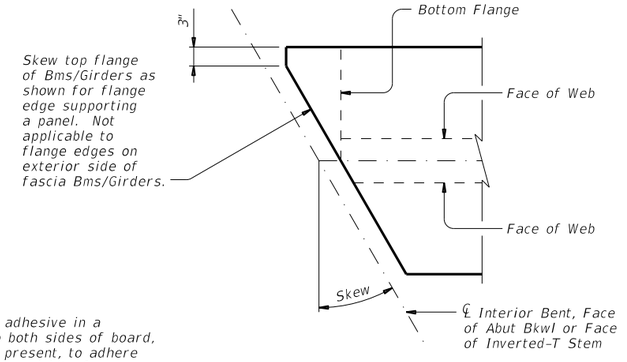
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

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

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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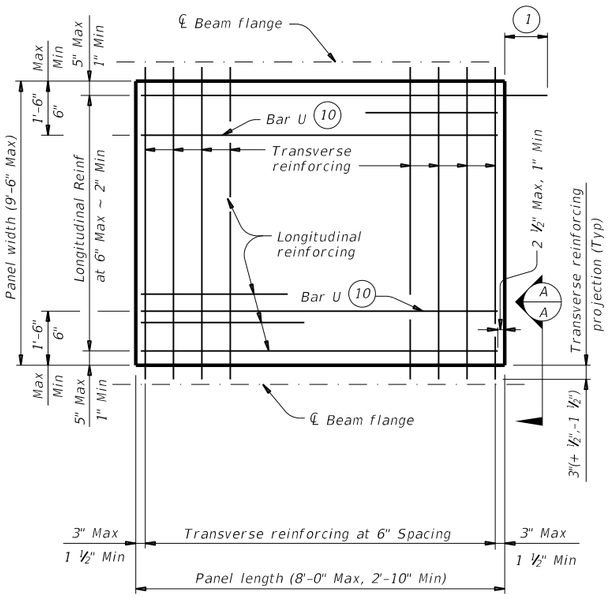
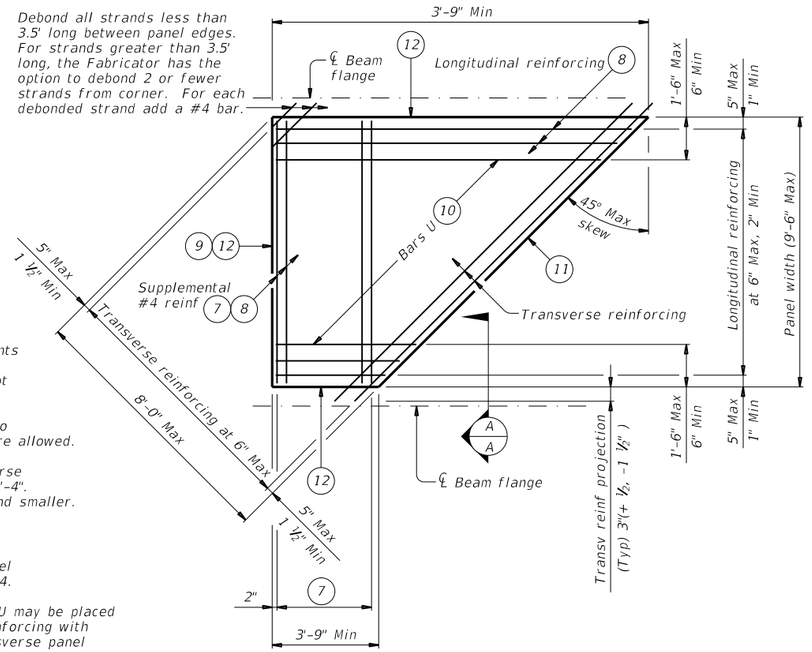


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

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.

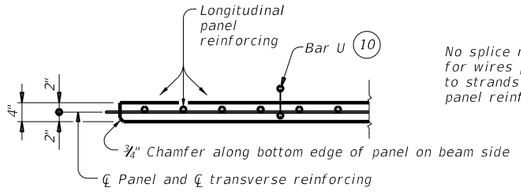
LONGITUDINAL PANEL REINFORCEMENT:

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.

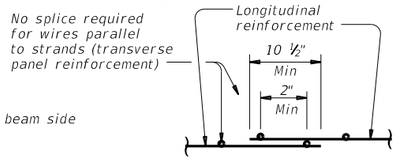
No combination of longitudinal reinforcement options in a panel is allowed.

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.

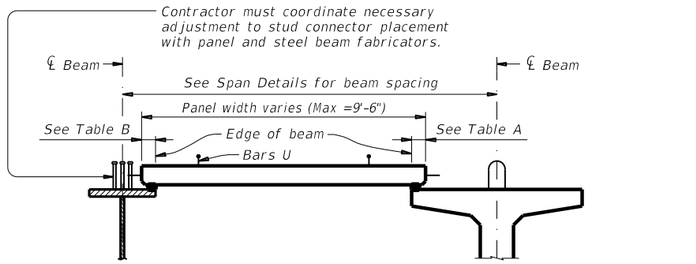


SECTION A-A

(Not showing supplemental #4 bars for skewed end panels.)



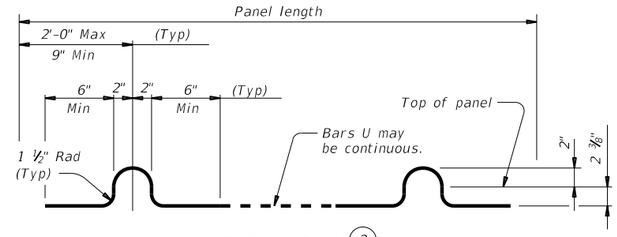
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



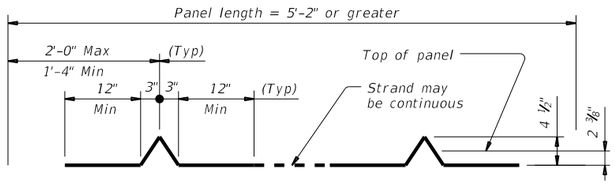
STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

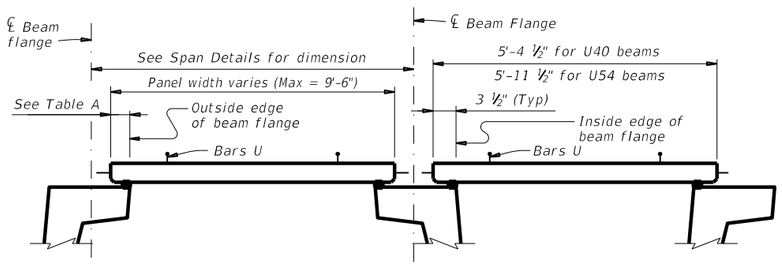
Typ unless noted otherwise



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

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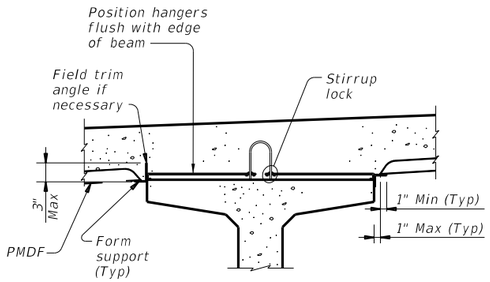
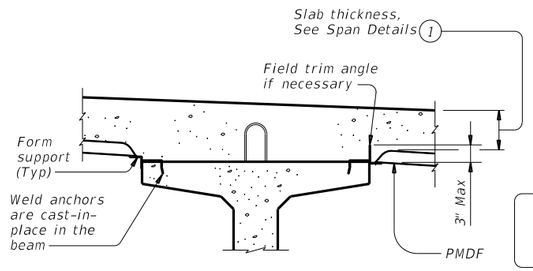
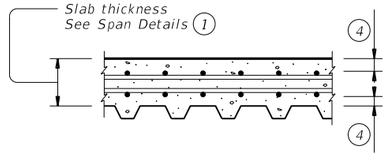


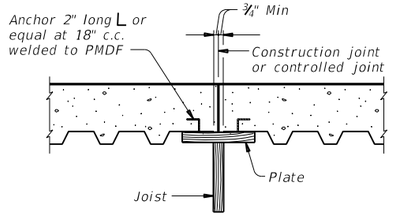
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

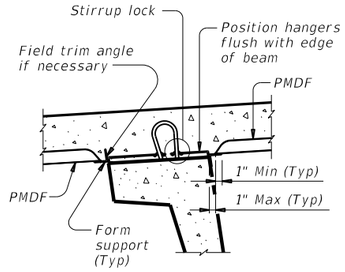


TYP LONGITUDINAL SLAB SECTION

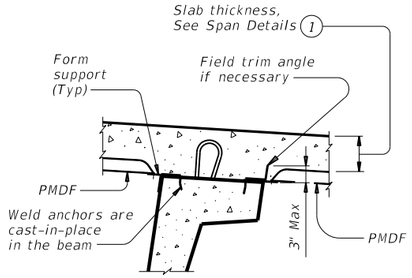


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

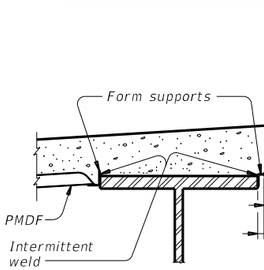
SECTION THRU CONSTRUCTION JOINT



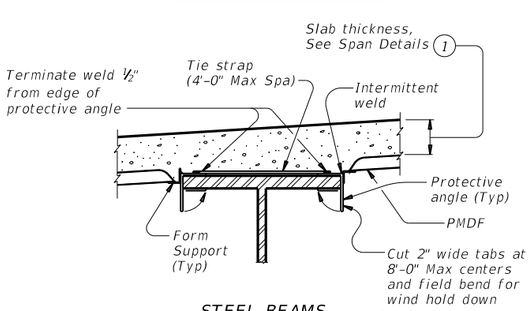
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

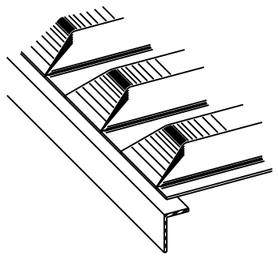


STEEL BEAMS AT COMPRESSION FLANGES

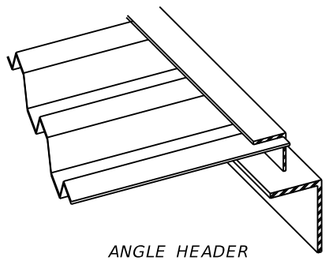


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



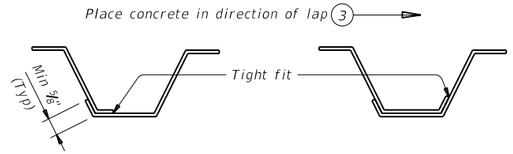
PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

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: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AUS	GILLESPIE		209

DATE: 3/8/2022 3:47:09 PM
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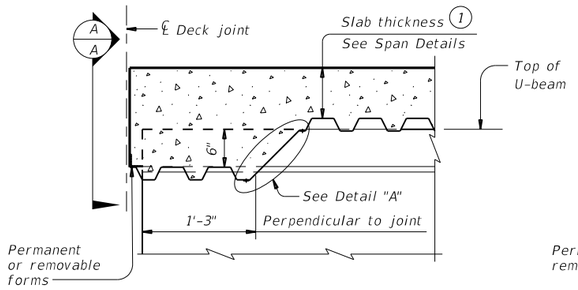
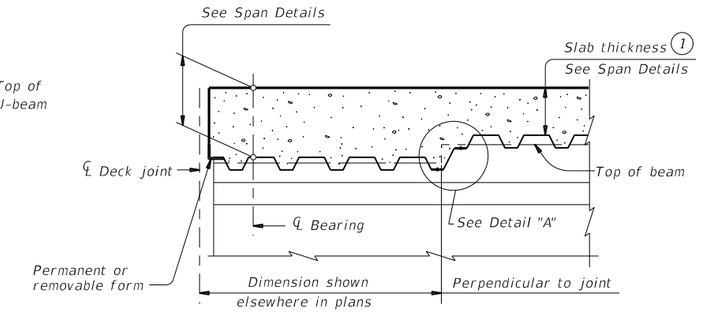
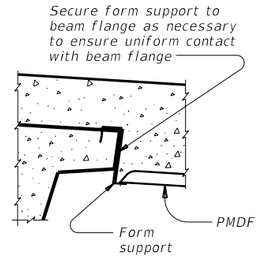


AT THICKENED SLAB END FOR U-BEAMS

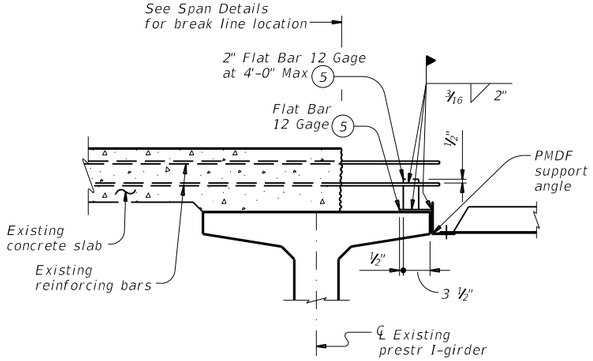


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

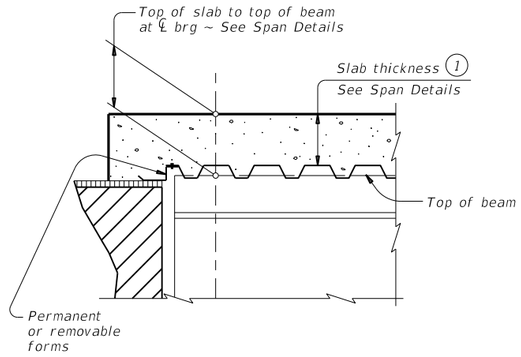
Showing I-beam block-out. No block-out for I-girders or steel beams.



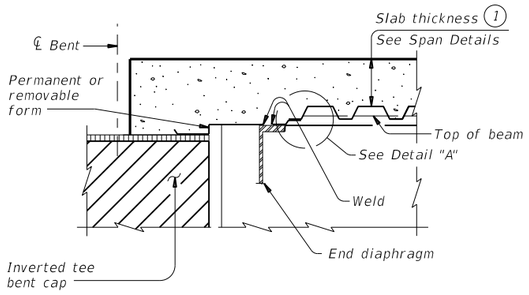
SECTION A-A



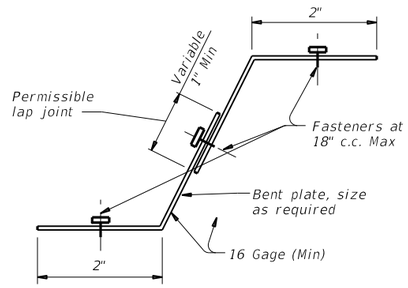
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



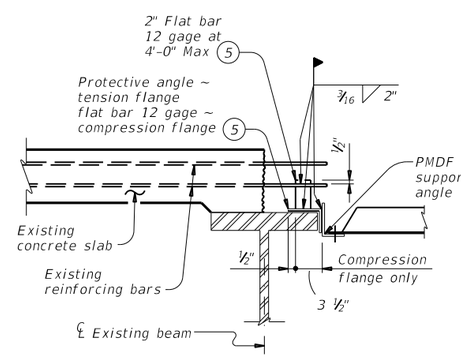
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

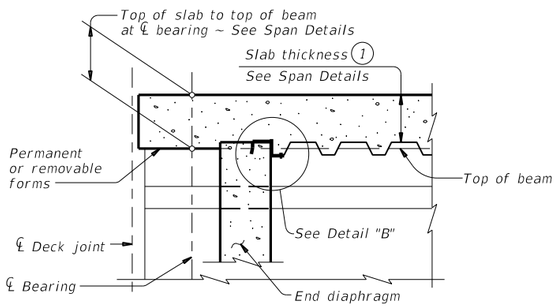


DETAIL "A"

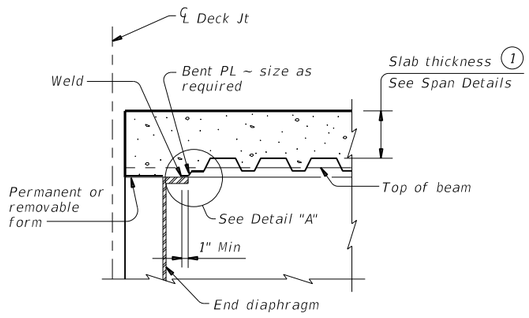


SHOWING STEEL BEAMS

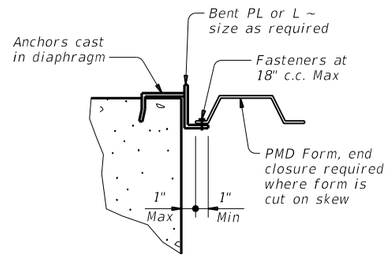
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AUS	GILLESPIE		210

DATE: 3/8/2022 3:47:09 PM
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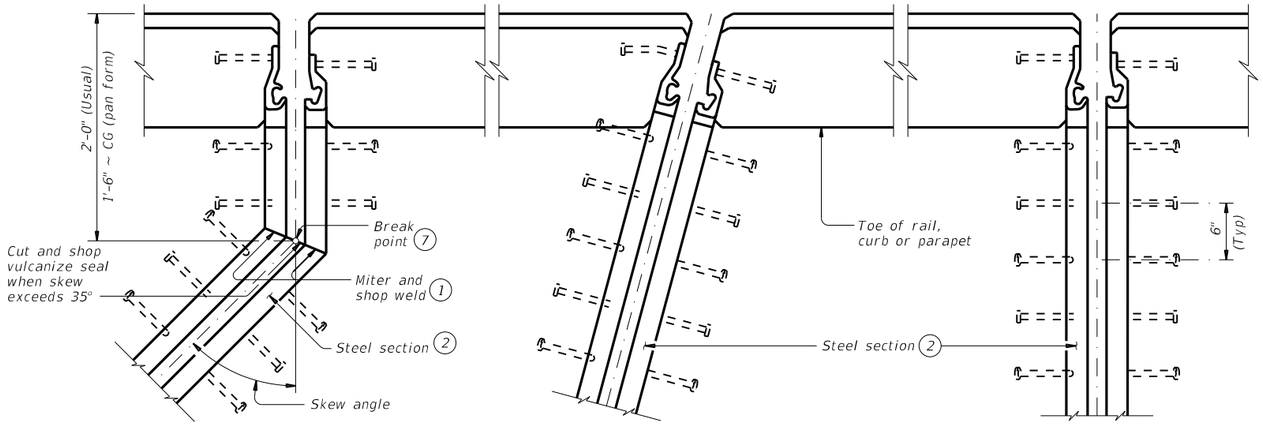
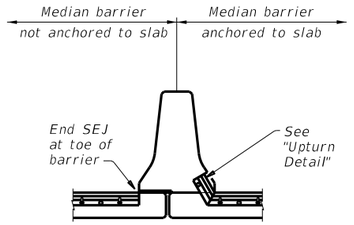
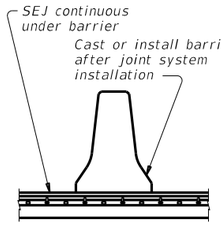


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

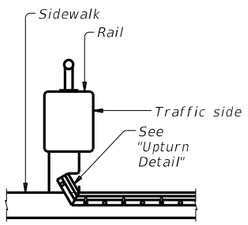
PLANS OF END CONDITIONS



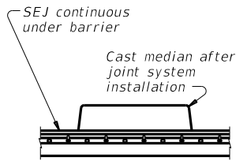
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



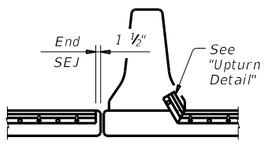
AT MEDIAN BARRIER



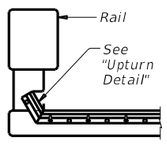
AT SIDEWALK BEHIND BRIDGE RAIL



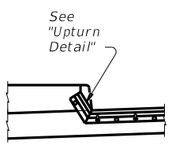
AT RAISED MEDIAN



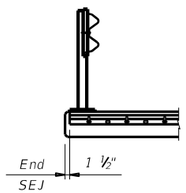
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

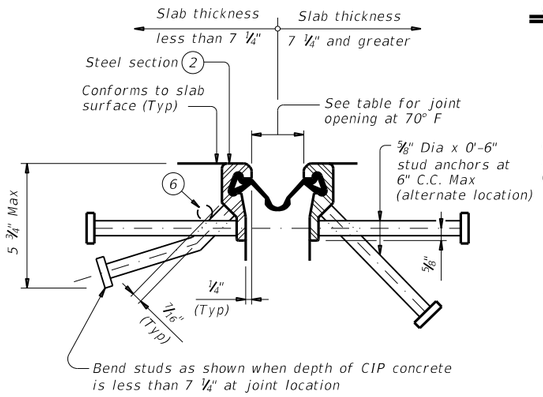


AT SIDEWALK

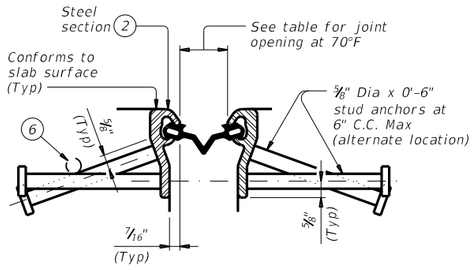


AT STEEL POST BRIDGE RAIL

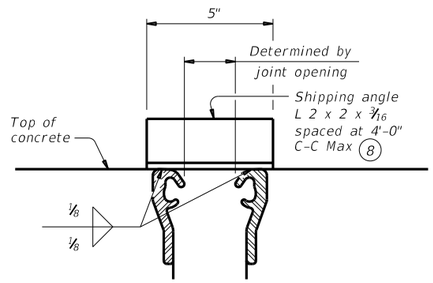
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

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

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE		
SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

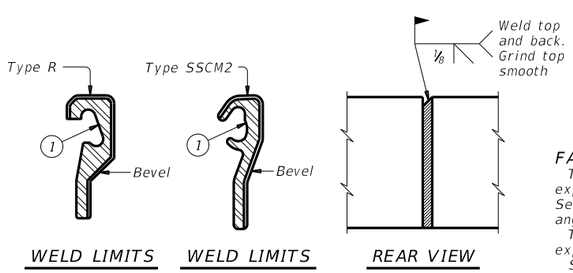
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

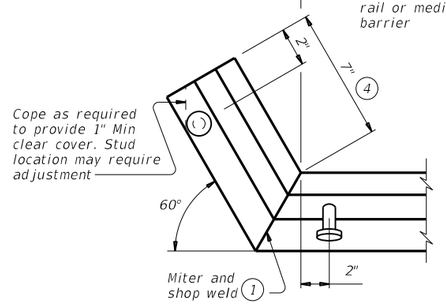
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min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

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

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



UPTURN DETAIL

CONSTRUCTION NOTES:

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

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

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		211

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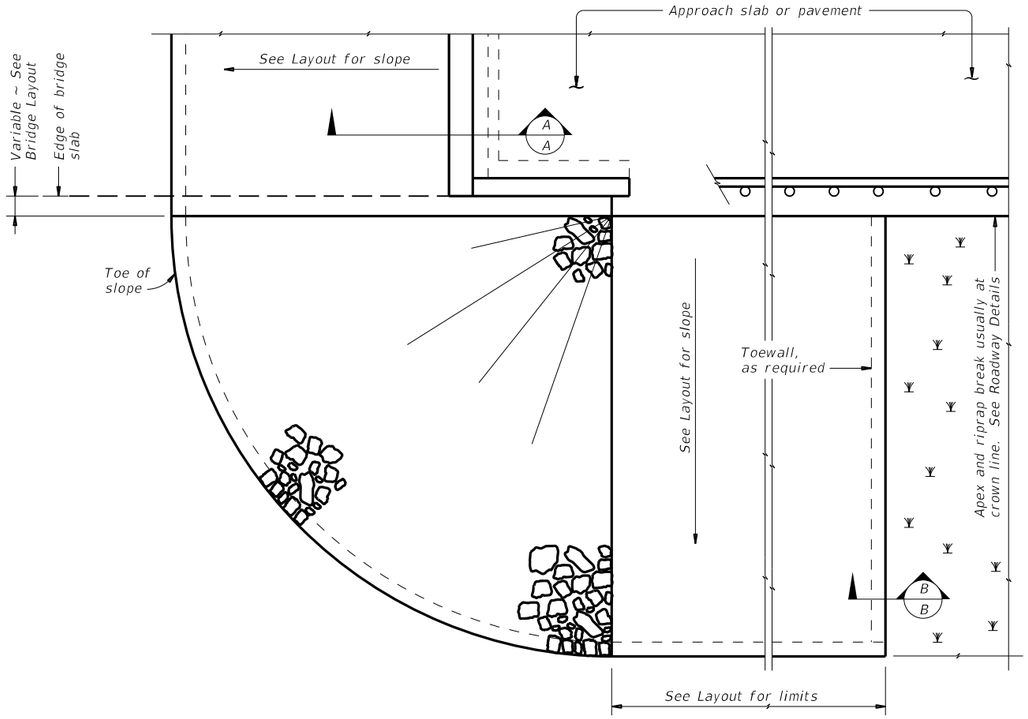
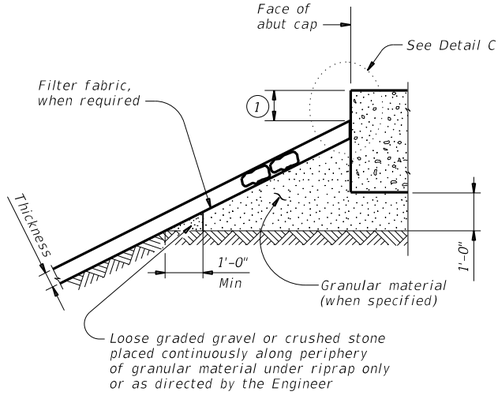
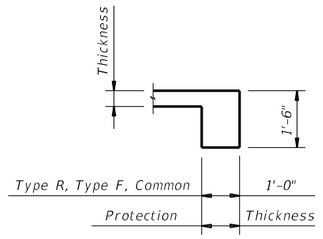


PLAN

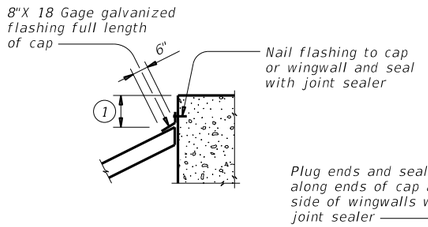


SECTION A-A AT CAP

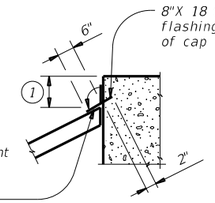


SECTION B-B

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

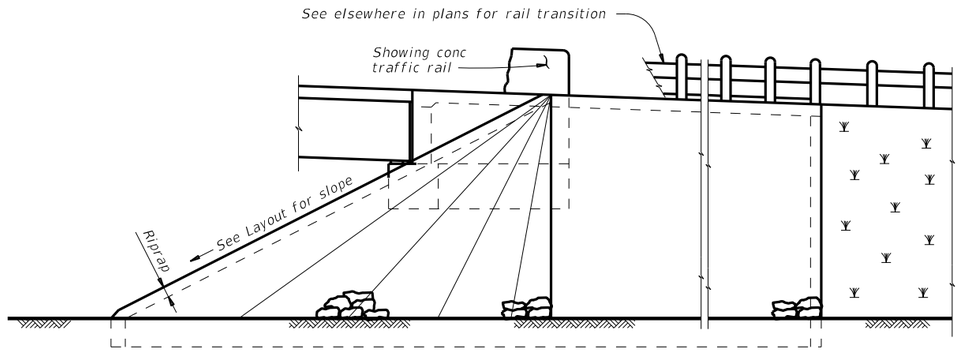


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

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.

(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.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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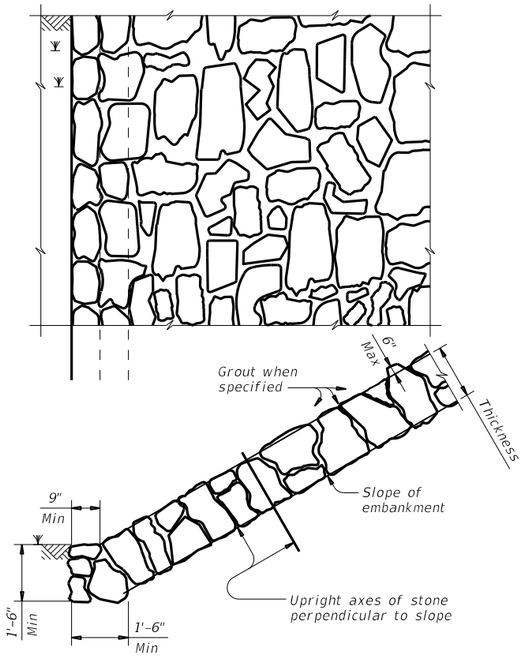


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

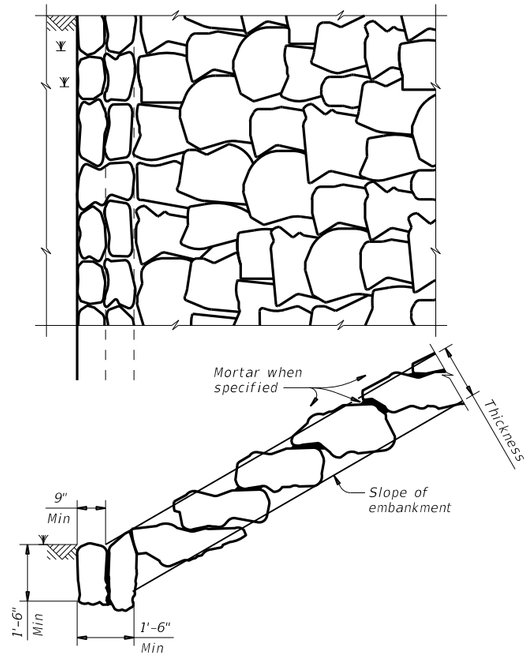


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

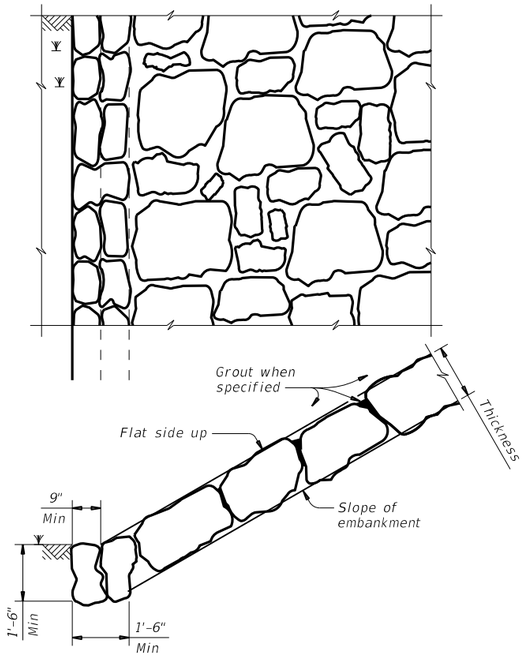


FIGURE 3 ~ TYPE F STONE RIPRAP

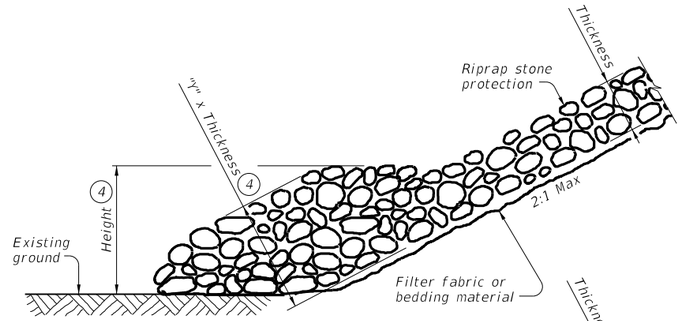
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

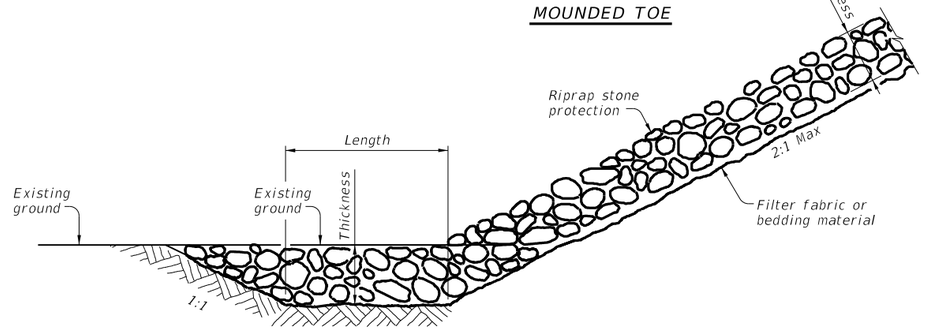
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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)

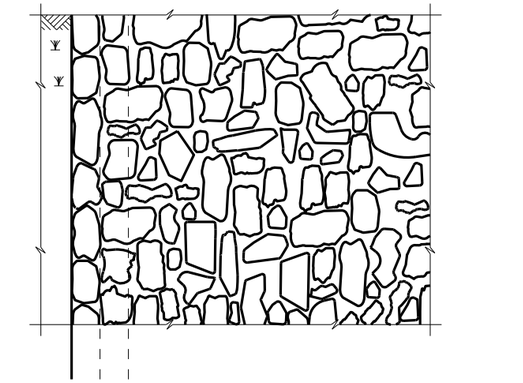


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

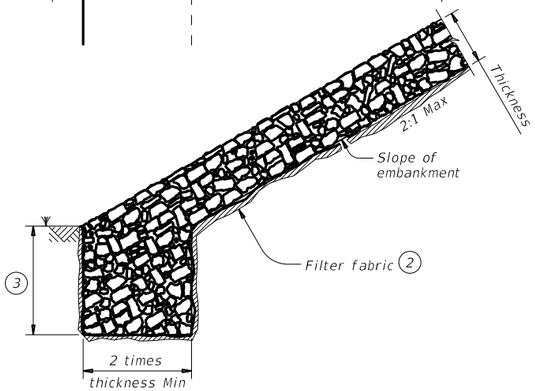


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

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Bridge Division Standard

STONE RIPRAP

SRR

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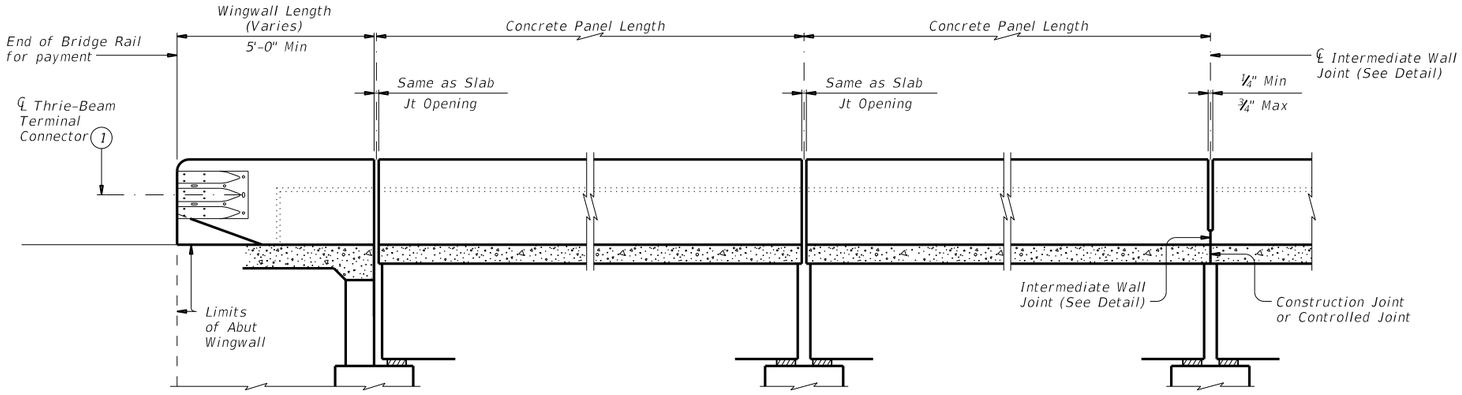
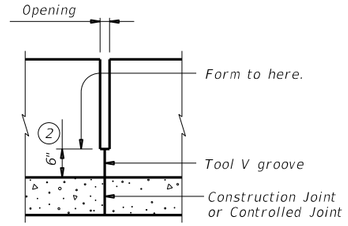


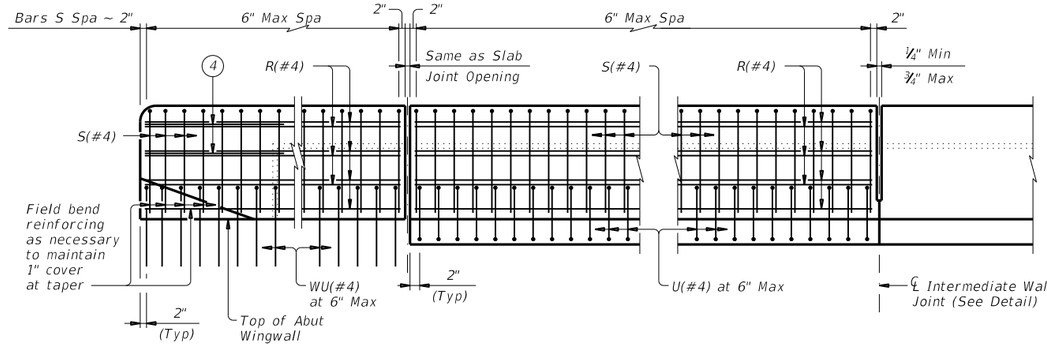
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

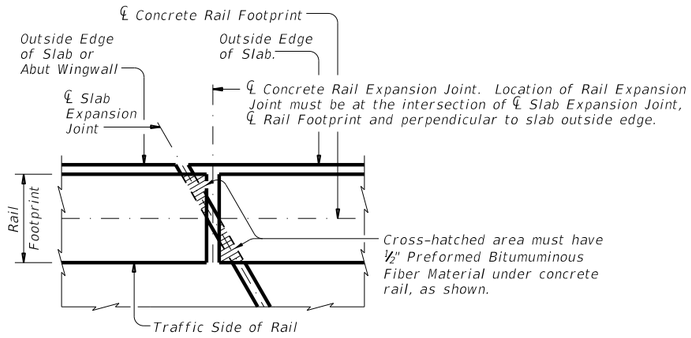


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



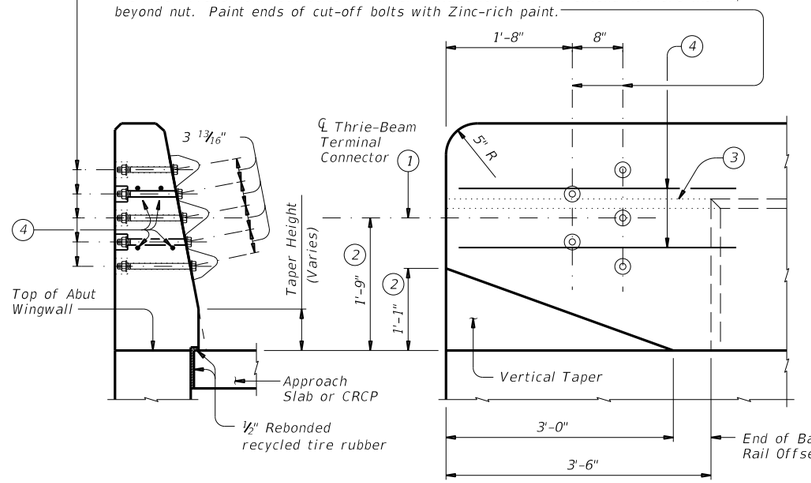
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

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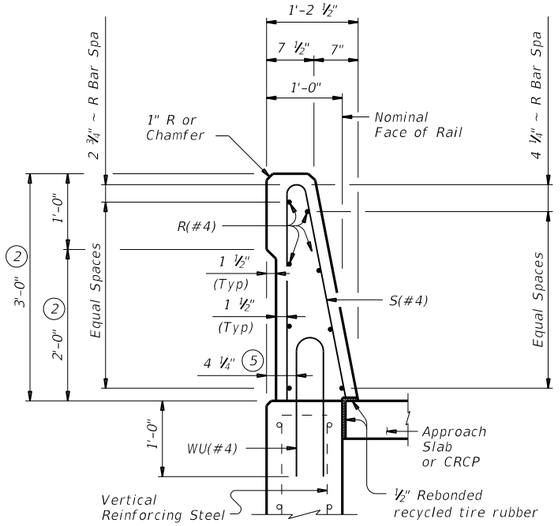
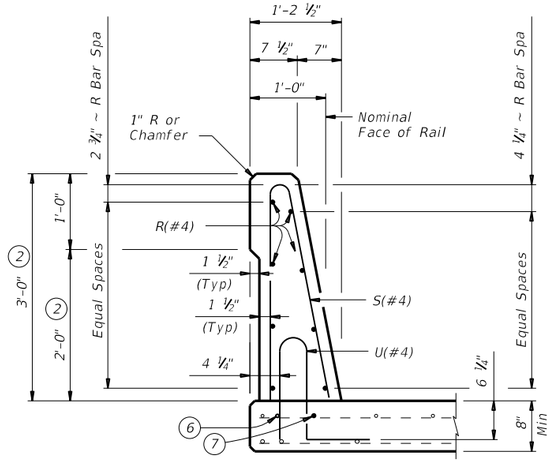


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) No longitudinal wires may be within upper bend.

(9) Bend or cut as required to clear drain slots.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greator to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 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 will not be required for this rail.

Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

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

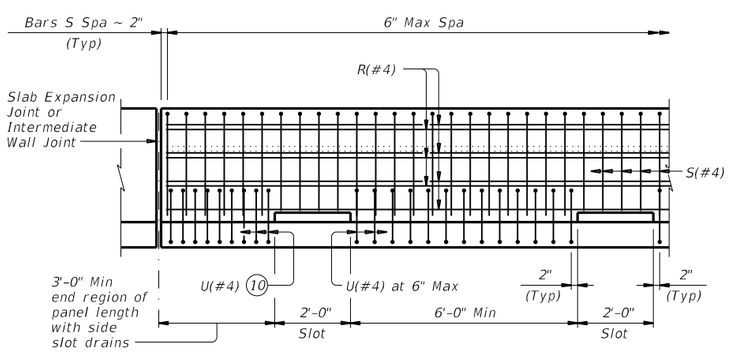
BARS S (#4)

BARS U (#4)

BARS WU (#4)

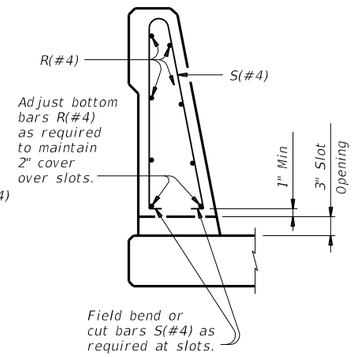
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

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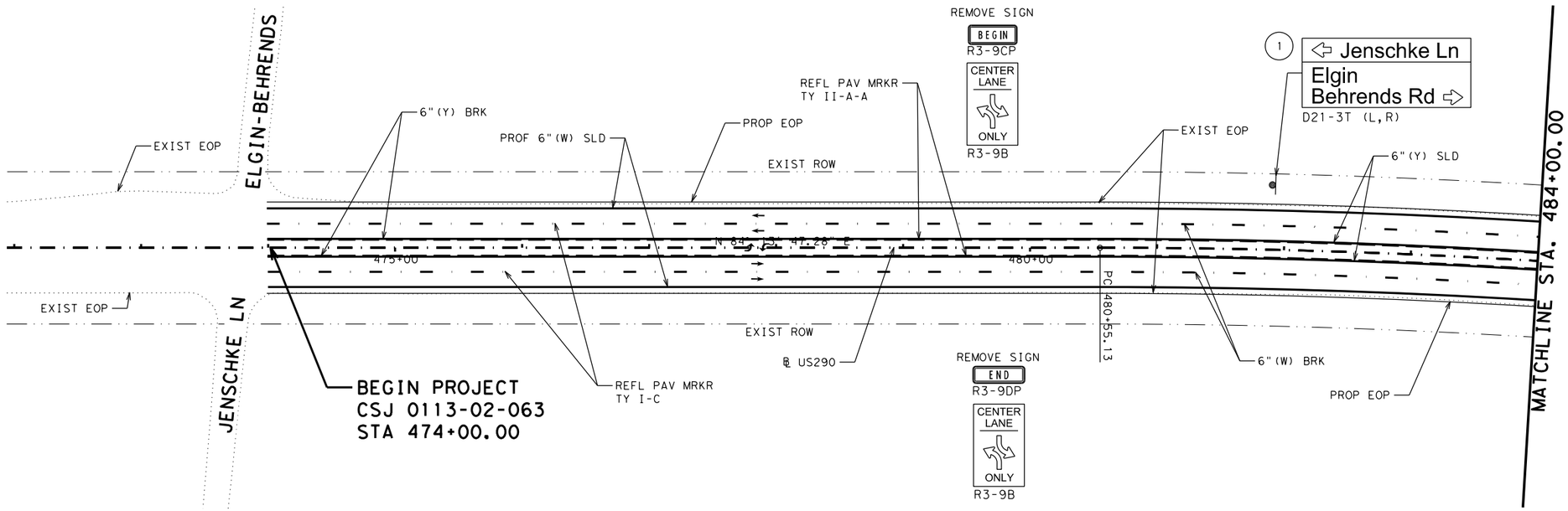

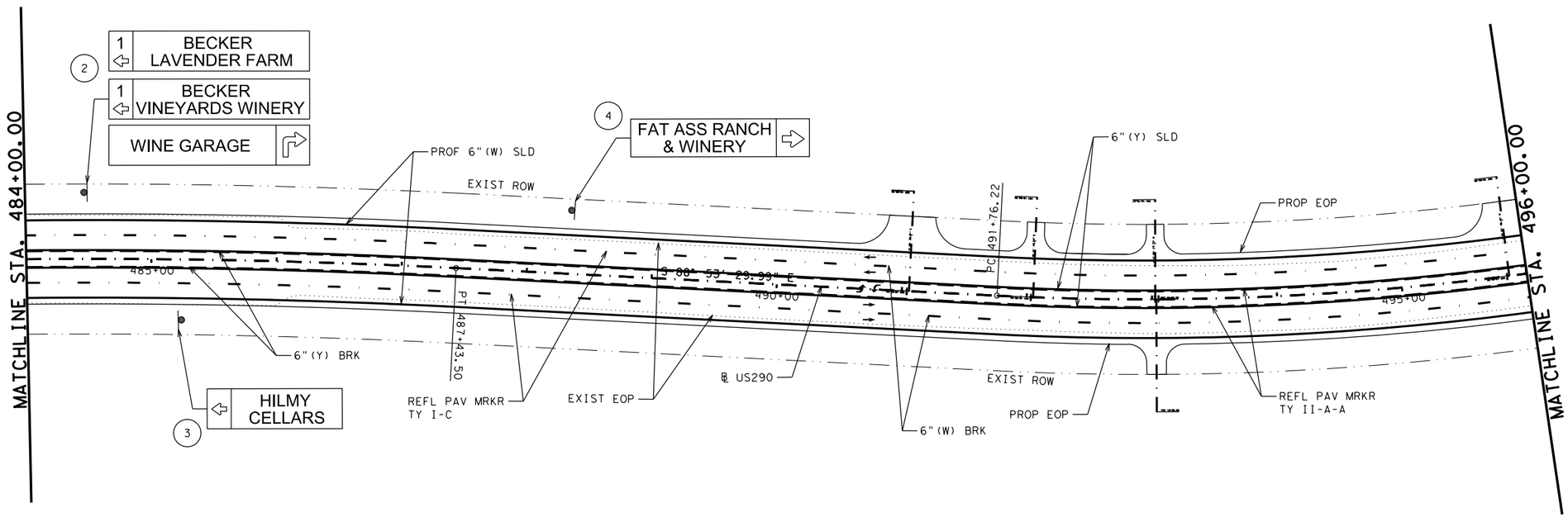

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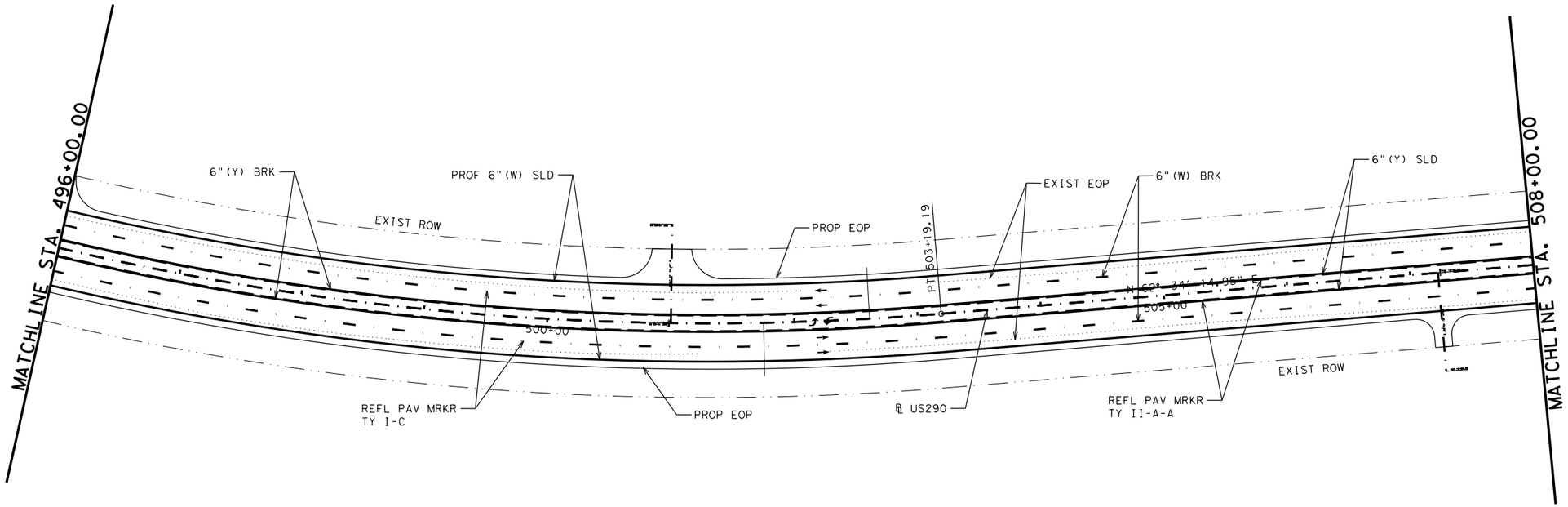

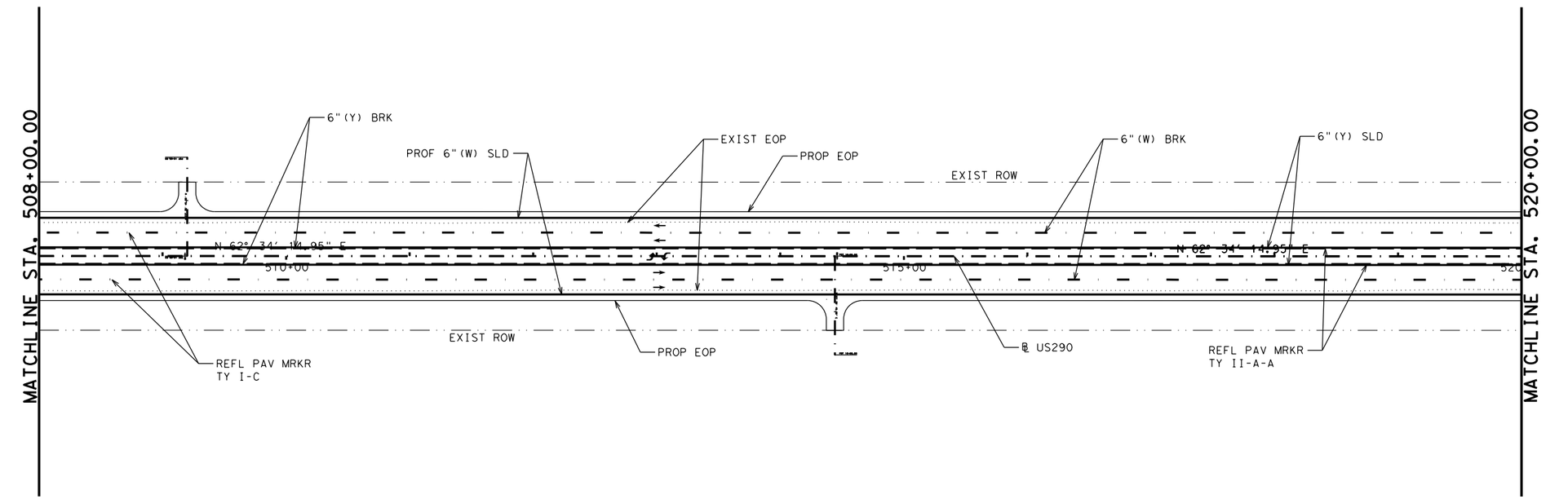

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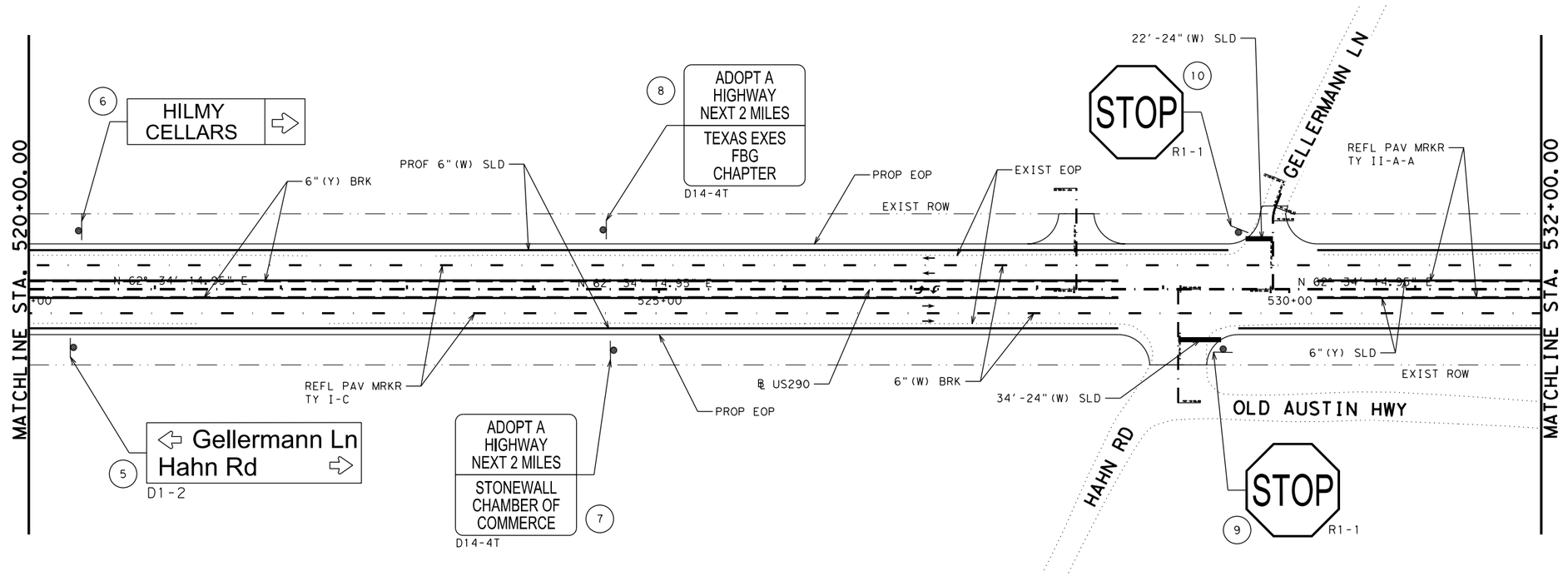

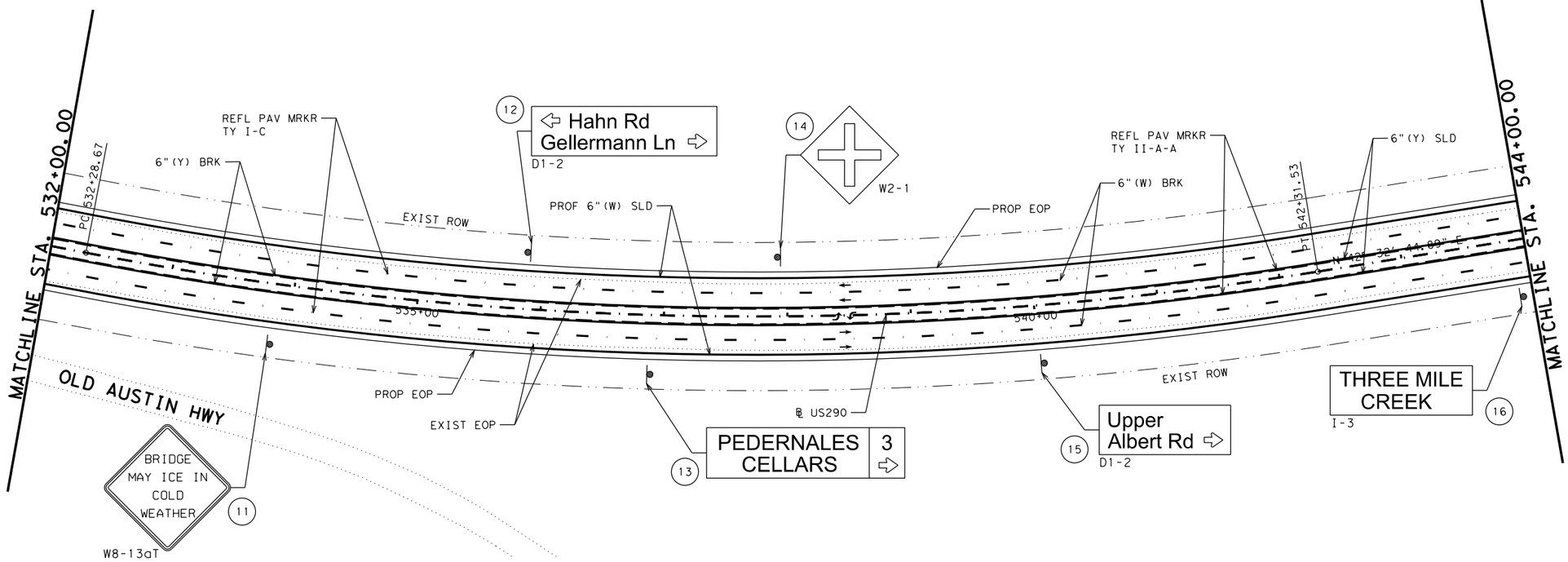

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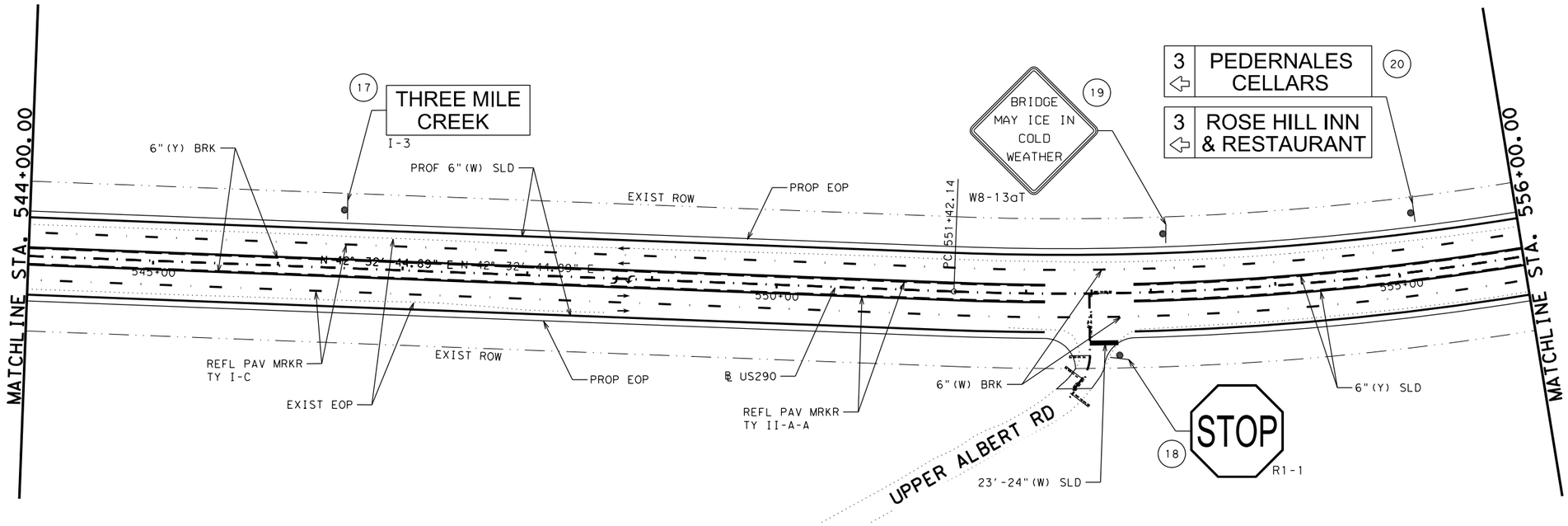

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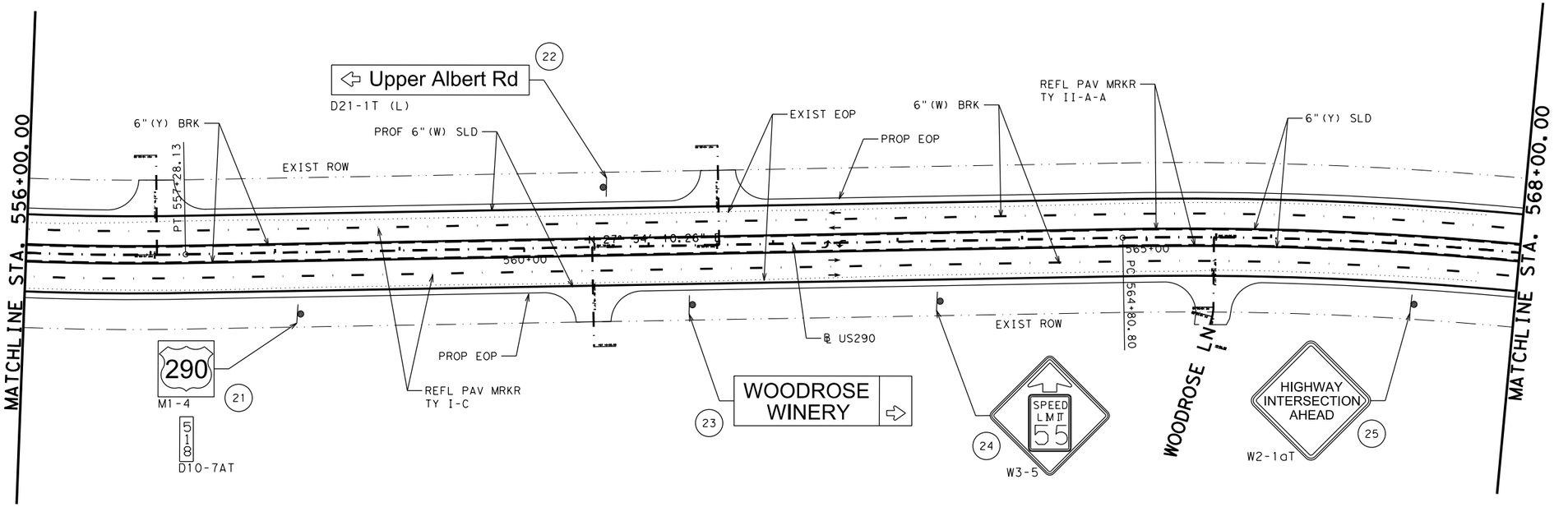

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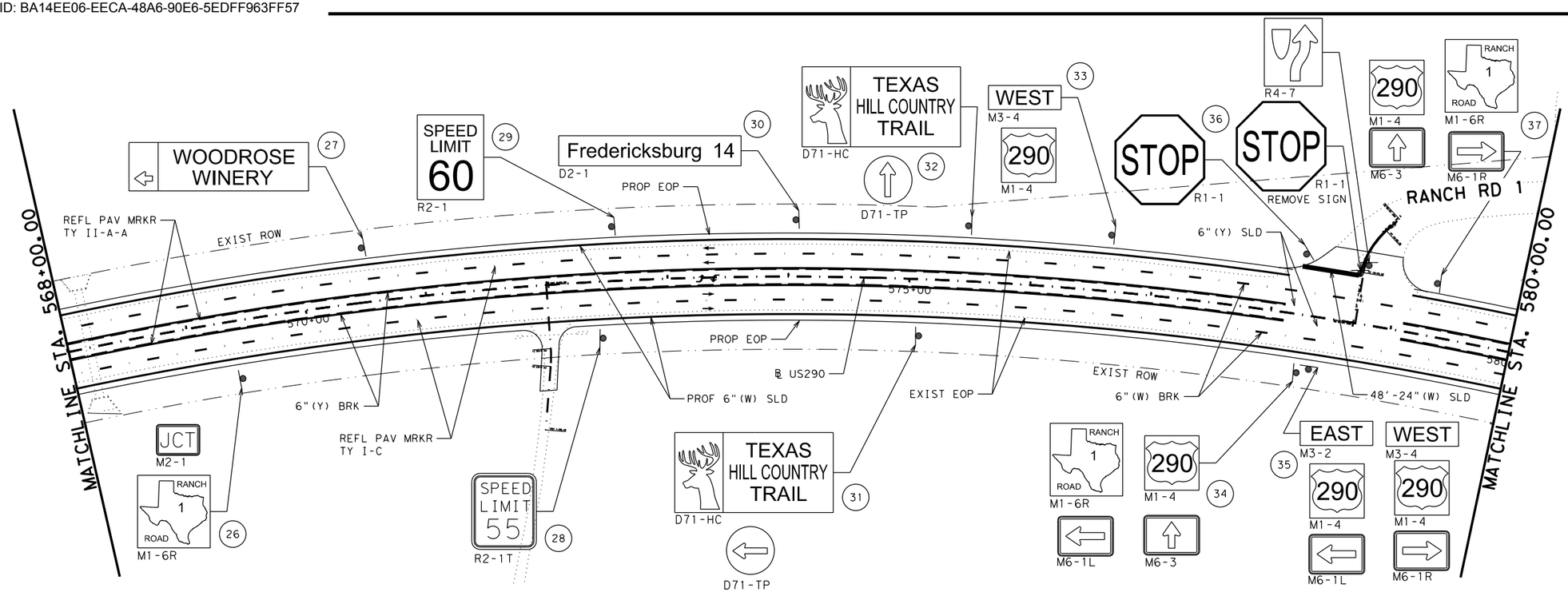

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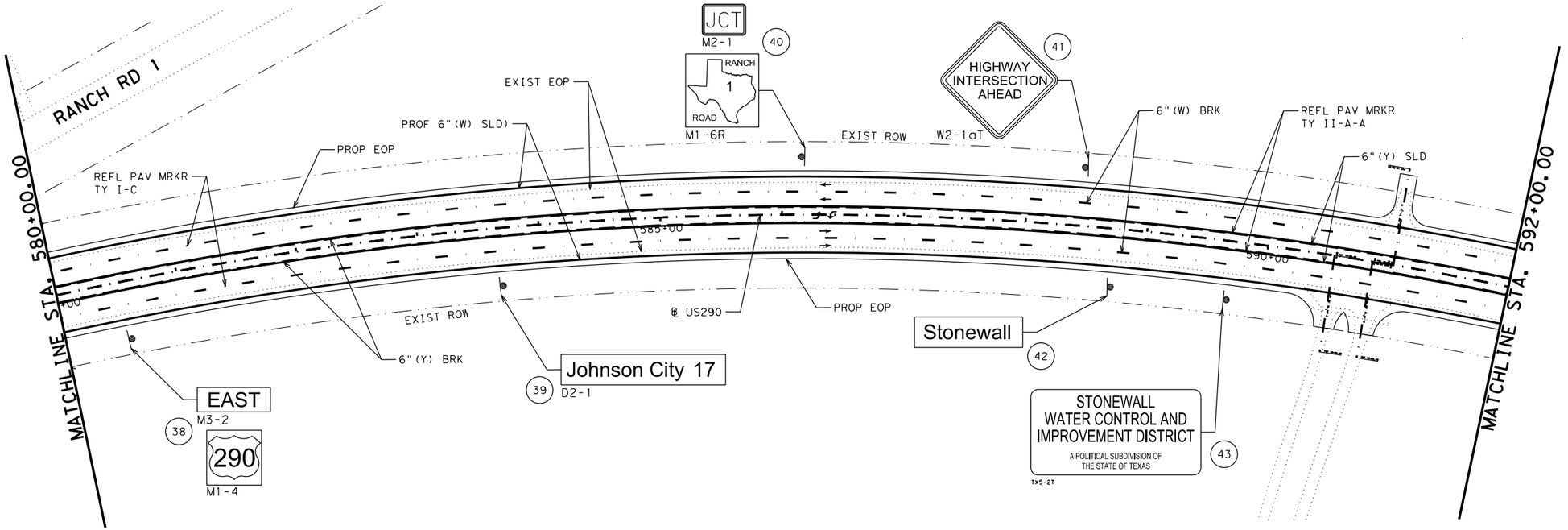

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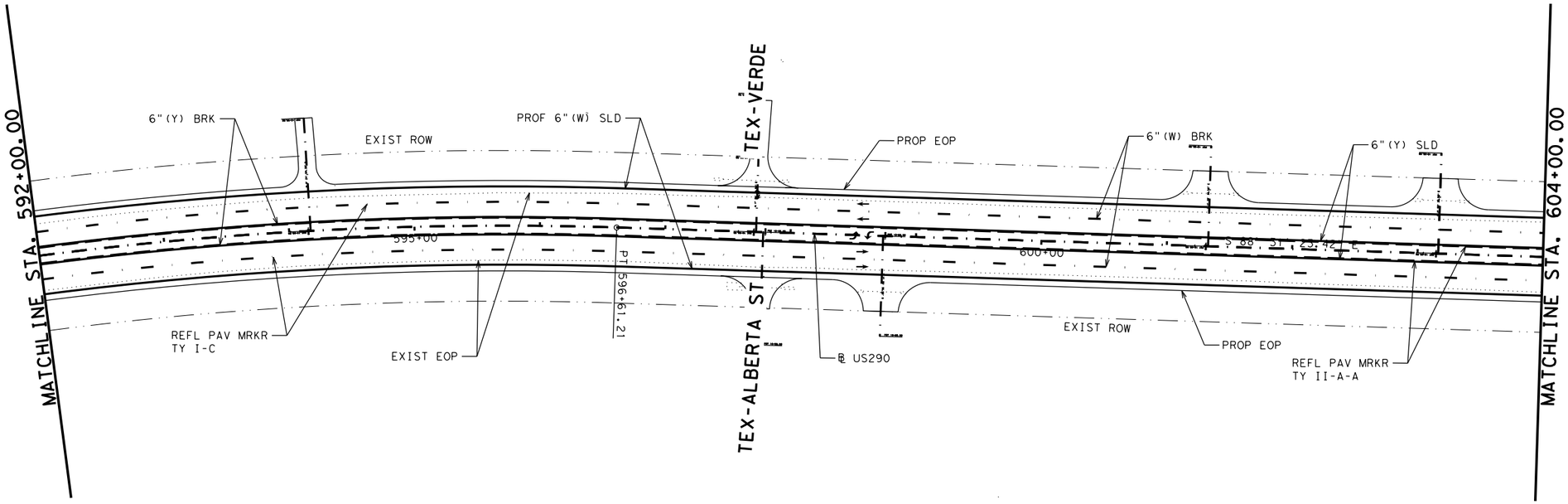

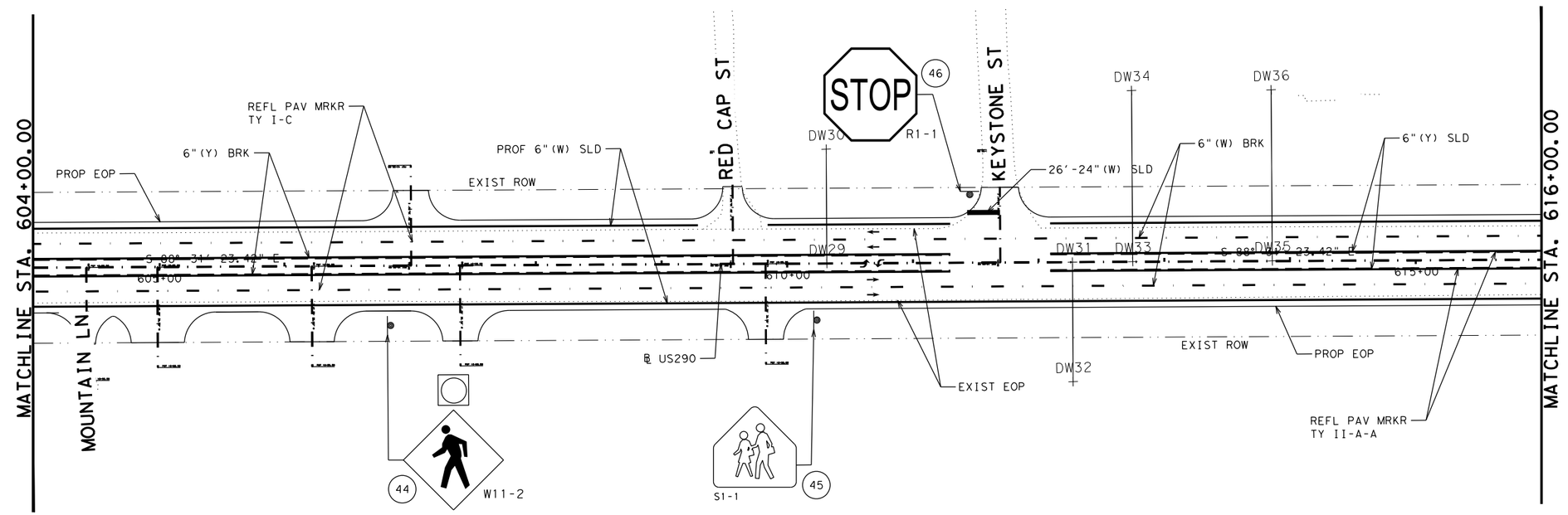

LEGEND

- PROPOSED SIGN
- (X) SIGN NUMBER
- DELINEATOR
- OBJECT MARKER

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290
SIGNING, PAVEMENT MARKINGS & DELINEATION

SHEET 6 OF 7

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		221

DATE: 1/12/2023 2:29:24 PM
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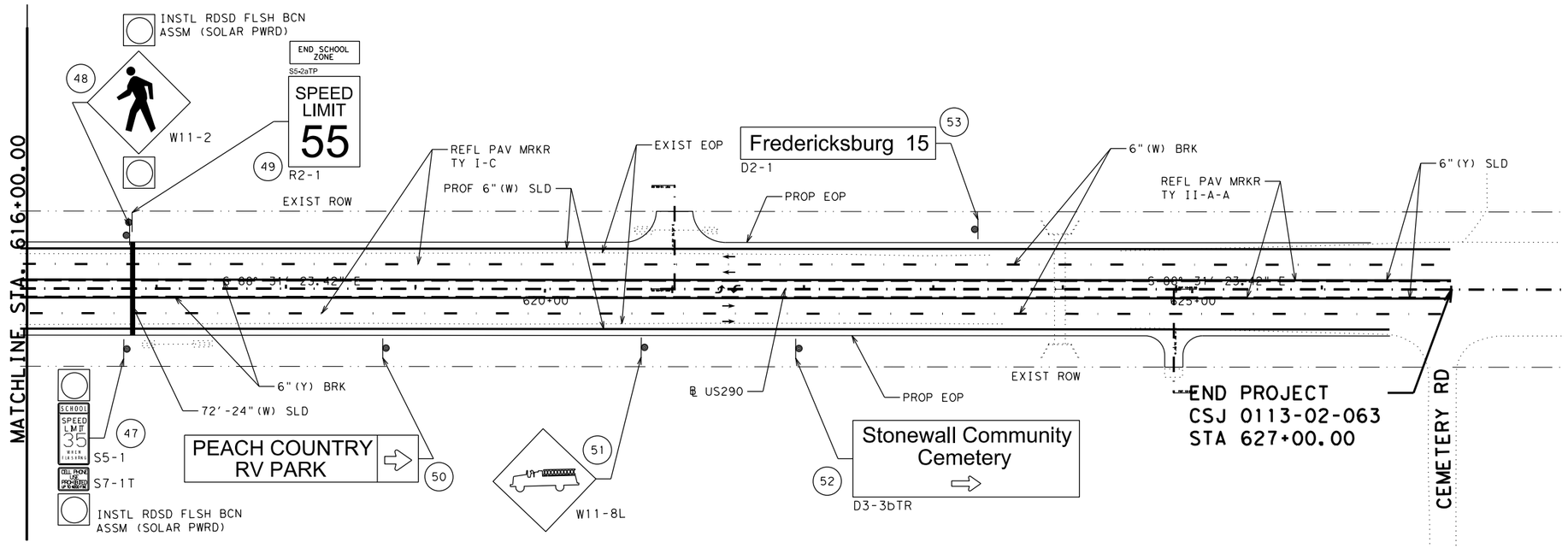

LEGEND

- PROPOSED SIGN
- (X) SIGN NUMBER
- DELINEATOR
- OBJECT MARKER

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US290
SIGNING, PAVEMENT MARKINGS & DELINEATION

SHEET 7 OF 7

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	0113	02	063	US 290
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		222

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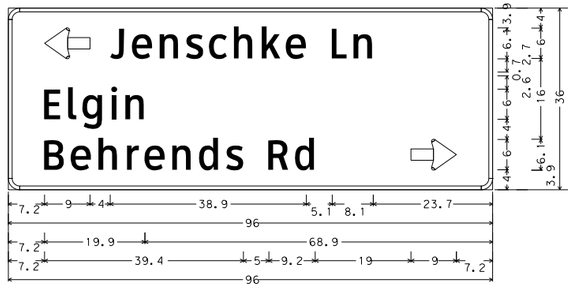
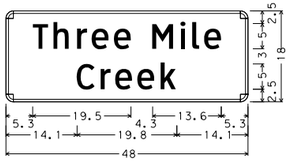
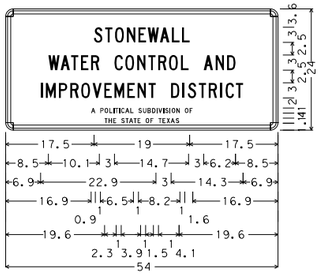


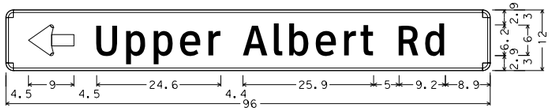
D21-3T(1)_VARx36; Sign # 1
2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°; "Jenschke Ln", ClearviewHwy-3-W;
"Elgin", ClearviewHwy-3-W; "Behrends Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



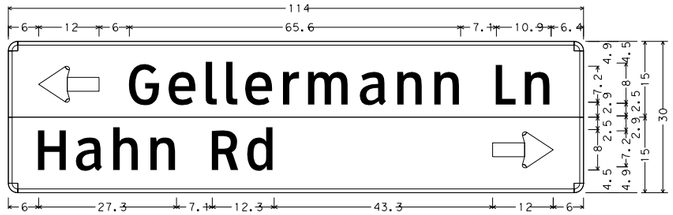
I-3 5in; Sign #16; Sign # 17
1.5" Radius, 0.5" Border, White on Green;
"Three Mile", ClearviewHwy-3-W;
"Creek", ClearviewHwy-3-W;



TX5-2T_VARx24; Sign #45
1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"STONEWALL", C; "WATER CONTROL AND", C;
"IMPROVEMENT DISTRICT", C;
"A POLITICAL SUBDIVISION OF", D;
"THE STATE OF TEXAS", D;



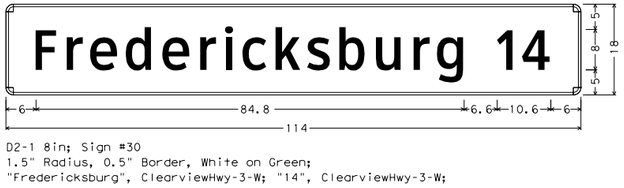
D21-1TL_VARx12; Sign #22
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°; "Upper Albert Rd", ClearviewHwy-3-W;



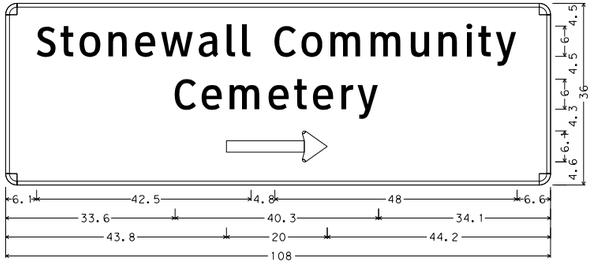
D1-2 8in LT-RT; Sign # 5

1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Gellermann Ln", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on Green;
"Hahn Rd", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;



D2-1 8in; Sign #30
1.5" Radius, 0.5" Border, White on Green;
"Fredericksburg", ClearviewHwy-3-W; "14", ClearviewHwy-3-W;

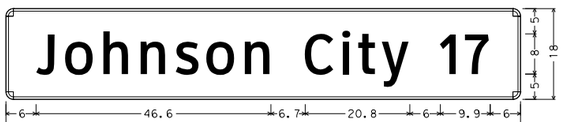


D3-3bTR_VARx36; Sign #54
2.3" Radius, 0.8" Border, White on Green;
"Stonewall Community", ClearviewHwy-3-W; "Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0°;

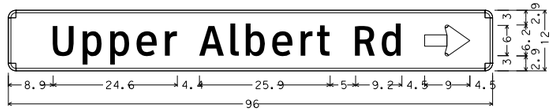
D1-2 8in LT-RT; Sign # 12

1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Hahn Rd", ClearviewHwy-3-W;

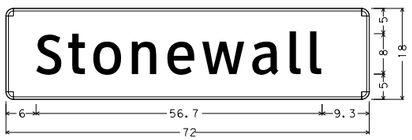
1.9" Radius, 0.8" Border, White on Green;
"Gellermann Ln", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;



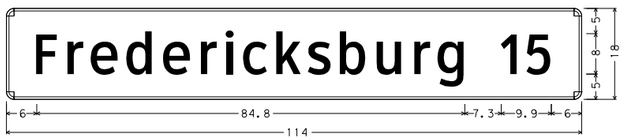
D2-1 8in; Sign # 41
1.5" Radius, 0.5" Border, White on Green;
"Johnson City", ClearviewHwy-3-W; "17", ClearviewHwy-3-W;



D21-1TR_VARx12; Sign #15
1.5" Radius, 0.5" Border, White on Green;
"Upper Albert Rd", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0°;



D2-1 8in; Sign #44
1.5" Radius, 0.5" Border, White on Green;
"Stonewall", ClearviewHwy-5-WR;



D2-1 8in; Sign #55
1.5" Radius, 0.5" Border, White on Green;
"Fredericksburg", ClearviewHwy-3-W; "15", ClearviewHwy-3-W;

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

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Mouness Yacoub P.E.
C558EA119EB3496...

DATE: 1/12/2023 2:29:38 PM
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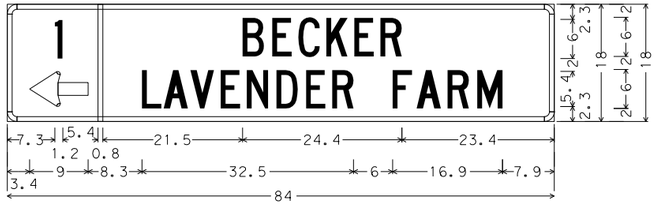
Austin District
Central Design

Texas Department of Transportation

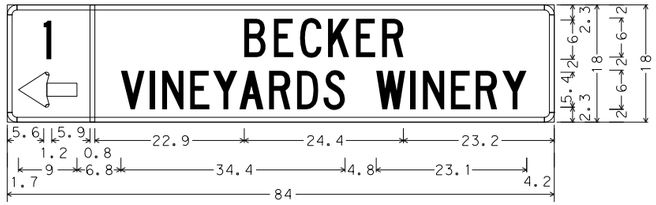
US 290
SIGN DETAILS

SHEET 1 OF 2

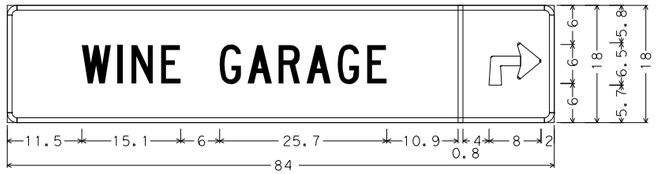
© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	GILLESPIE		223



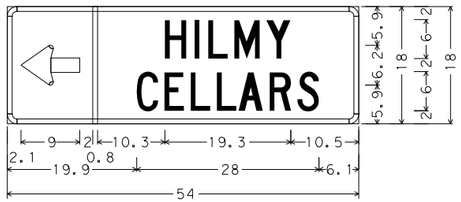
Sign #2
1.5" Radius, 0.8" Border, White on Blue;
"1", C; Standard Arrow Custom 9.0" X 5.4" 180°; "BECKER", C;
"LAVENDER FARM", C;



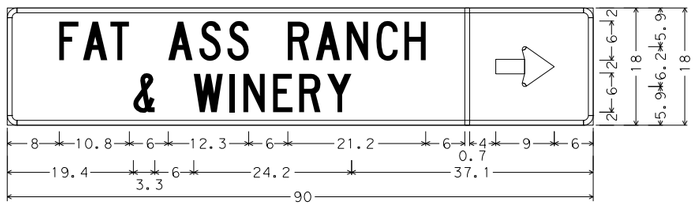
Sign #2
1.5" Radius, 0.8" Border, White on Blue;
"1", C; Standard Arrow Custom 9.0" X 5.4" 180°; "BECKER", C;
"VINEYARDS WINERY", C 80% spacing;



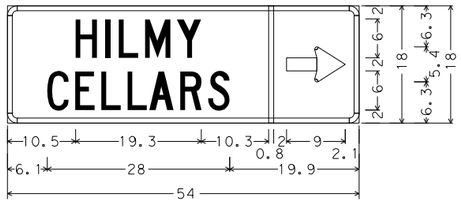
Sign #2
1.5" Radius, 0.8" Border, White on Blue;
"WINE GARAGE", C; 90 Deg Advance Turn Arrow 8.0" X 6.5";



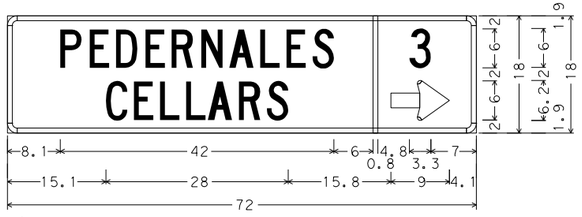
Sign #3
1.5" Radius, 0.8" Border, White on Blue;
Standard Arrow Custom 9.0" X 6.1" 180°;
"HILMY", C; "CELLARS", C;



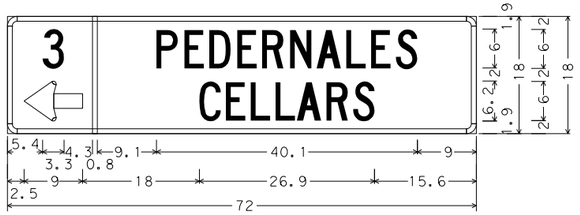
Sign #4
1.5" Radius, 0.8" Border, White on Blue;
"FAT ASS RANCH", C; "& WINERY", C; Standard Arrow Custom 9.0" X 6.1" 0°;



Sign #6
1.5" Radius, 0.8" Border, White on Blue;
"HILMY", C; "CELLARS", C;
Standard Arrow Custom 9.0" X 5.4" 0°;

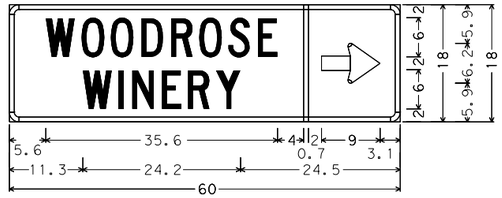


Sign #13
1.5" Radius, 0.8" Border, White on Blue;
"PEDERNALES", C; "CELLARS", C; "3", C;
Standard Arrow Custom 9.0" X 6.1" 0°;

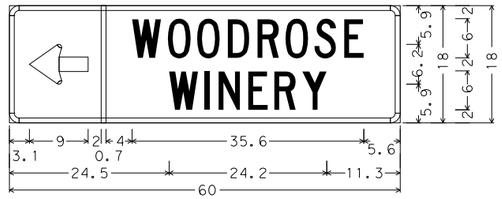


Sign #20
1.5" Radius, 0.8" Border, White on Blue;
"3", C; Standard Arrow Custom 9.0" X 6.1" 180°;
"PEDERNALES", C 80% spacing; "CELLARS", C 80% spacing;

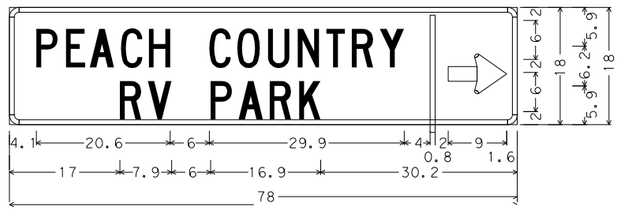
Sign #20
1.5" Radius, 0.8" Border, White on Blue;
"3", C; Standard Arrow Custom 9.0" X 6.1" 180°;
"ROSE HILL INN", C 80% spacing;
"& RESTAURANT", C 80% spacing;



Sign #23
1.5" Radius, 0.8" Border, White on Blue;
"WOODROSE", C; "WINERY", C;
Standard Arrow Custom 9.0" X 6.1" 0°;



Sign #27
1.5" Radius, 0.8" Border, White on Blue;
Standard Arrow Custom 9.0" X 6.1" 180°;
"WOODROSE", C; "WINERY", C;



Sign #52
1.5" Radius, 0.8" Border, White on Blue;
"PEACH COUNTRY", C; "RV PARK", C;
Standard Arrow Custom 9.0" X 6.1" 0°;

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

CONTACT: John Brown-Latham
Email: jbrown-latham@lonestarlogos.com

Austin District
Central Design

Texas Department of Transportation

US 290
SIGN DETAILS

SHEET 2 OF 2

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		224

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"	MOUNTING DESIGNATION: 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 OF 7	1	D21-3T	<LEFT ARROW> Jenschke Ln	96 x 36		X	S80	1	SA	T		
			Elgin									
			Behrends Rd <RIGHT ARROW>									
	2		1 BECKER	84 x 18		X	10BWG	1	SA	T		
			<LEFT ARROW> LAVENDER FARM									
			1BECKER	84 x 18		X	10BWG	1	SA	T		
			<LEFT ARROW> VINEYARDS WINERY									
			WINE GARAGE <RIGHT TURN ARROW>	84 x 18		X	10BWG	1	SA	T		
	3		<LEFT ARROW> HILMY	54 x 18		X	10BWG	1	SA	T		
			CELLARS									
	4		FAT ASS RANCH <RIGHT ARROW>	90 x 18		X	10BWG	1	SA	T		
			& WINERY									
3 OF 7	5	D1-2	<LEFT ARROW> Gellermann Ln	114 x 30		X	S80	1	SA	T	2EXT	
			Hahn Rd <RIGHT ARROW>									
	6		HILMY <RIGHT ARROW>	54 x 18		X	10BWG	1	SA	T		
			CELLARS									
	7	D14-4T	ADOPT A HWY NEXT 2 MILES	48 x 48		X	10BWG	1	SA	T		
			STONEWALL CHAMBER OF COMMERCE									
	8	D14-4T	ADOPT A HWY NEXT 2 MILES	48 x 48		X	10BWG	1	SA	T		
			TEXAS EXES FBG CHAPTER									
	9	R1-1	STOP	36 x 36		X	10BWG	1	SA	T		
	10	R1-1	STOP	36 x 36		X	10BWG	1	SA	T		
	11	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36		X	10BWG	1	SA	T		
	12	D1-2	<LEFT ARROW> Hahn Rd	114 x 30		X	S80	1	SA	T	2EXT	
			Gellermann Ln <RIGHT ARROW>									
	13		PEDERNALES 3	72 x 18		X	10BWG	1	SA	T		
			CELLARS <RIGHT ARROW>									
	14	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30		X	10BWG	1	SA	T		
	15	D21-1TR	Upper	96 x 12		X	10BWG	1	SA	T		
			Albert Rd <RIGHT AROW>									
	16	I-3	THREE MILE CREEK	48 x 18		X	10BWG	1	SA	T		
4 OF 7	17	I-3	THREE MILE CREEK	48 x 18		X	10BWG	1	SA	T		
	18	R1-1	STOP	36 x 36		X	10BWG	1	SA	T		
	19	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36		X	10BWG	1	SA	T		
	20		3 PEDERNALES	72 x 18		X	10BWG	1	SA	T		
			<LEFT ARROW> CELLARS									
			3 ROSE HILL INN	72 x 18		X	10BWG	1	SA	T		
			<LEFT ARROW> & RESTAURANT									
	21	M1-4	US 290	30 x 24		X	10BWG	1	SA	P		
		D10-7AT	518	3 x 10								

DATE:
FILE:

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				
4-16	DIST	COUNTY		SHEET NO.
8-16				225

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) 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
4 OF 7	22	D1-1	<LEFT ARROW> Upper Albert Rd	96 x 12		X	10BWG	1	SA	T	2EXT	
	23		WOODROSE	60 x 18		X	10BWG	1	SA	T		
			WINERY <RIGHT ARROW>									
	24	W3-5	<SYMBOL - REDUCED SPEED AHD> 55	48 x 48		X	10BWG	1	SA	T		
	25	W2-1ATL	HIGHWAY INTERSECTION AHEAD	48 x 48		X	10BWG	1	SA	T		
5 OF 7	26	M2-1	JCT <AUXILIARY SIGN>	21 x 15		X	10BWG	1	SA	P		
		M1-6R	<RM SHIELD> RANCH ROAD 1	24 x 24								
	27		WOODROSE	60 x 18		X	10BWG	1	SA	T		
			<LEFT ARROW> WINERY									
	28	R2-1T	SPEED LIMIT 55	36 X 48		X	10BWG	1	SA	T		
	29	R2-1	SPEED LIMIT 60	36 x 48		X	10BWG	1	SA	T		
	30	D2-1	Fredericksburg 14	114 x 18		X	S80	1	SA	T	2EXT	
	31	D71-HC	TEXAS HILL COUNTRY TRAIL <w/ SYMBOL>	42 x 24		X	10BWG	1	SA	T		
		D71-TP	<LEFT ARROW>									
	32	D71-HC	TEXAS HILL COUNTRY TRAIL <w/ SYMBOL>	42 x 24		X	10BWG	1	SA	T		
		D71-TP	<STRAIGHT ARROW>									
	33	M3-4	WEST <AUXILIARY SIGN>	24 x 12		X	10BWG	1	SA	P		
		M1-4	US 290	30 x 24								
	34	M1-6R	<RM SHIELD> RANCH ROAD 1	24 x 24		X	10BWG	1	SA	U		
		M6-1L	<ARROW - LEFT> <AUX. SIGN>	21 x 15								
		M1-4	US 290	30 x 24								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
	35	M3-2	EAST <AUXILIARY SIGN>	24 x 12		X	10BWG	1	SA	U		
		M1-4	US 290	30 x 24								
		M6-1L	<ARROW - LEFT> <AUX. SIGN>	21 x 15								
		M3-4	WEST <AUXILIARY SIGN>	24 x 12								
		M1-4	US 290	30 x 24								
		M6-1R	<ARROW - RIGHT> <AUX SIGN>	21 x 15								
	36	R1-1	STOP	36 x 36		X	10BWG	1	SA	T		
	37	M1-4	US 290	30 x 24		X	10BWG	1	SA	U		
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
		M1-6R	<RM SHIELD> RANCH ROAD 1	24 x 24								
		M6-1R	<ARROW - RIGHT> <AUX SIGN>	21 x 15								
	38	M3-2	EAST <AUXILIARY SIGN>	24 x 12		X	10BWG	1	SA	P		
		M1-4	US 290	30 x 24								
	39	D2-1	Johnson City 17	102 x 18		X	10BWG	1	SA	T	2EXT	
	40	M2-1	JCT <AUXILIARY SIGN>	21 x 15		X	10BWG	1	SA	P		

DATE:
FILE:

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					
4-16		DIST	COUNTY		SHEET NO.
8-16					226

18

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
	41	W2-1AT	HIGHWAY INTERSECTION AHEAD	48 x 48		X	S80	1	SA	P		
	42	D2-2	Stonewall	72 x 18		X	10BWG	1	SA	T		
	43	TX5-2T	STONEWALL WATER CONTROL AND IMPROVEMENT DISTRICT A POLITICAL SUBDIVISION OF THE STATE OF TEXAS	54 x 24		X	10BWG	1	SA	T		
6 OF 7	44	W11-2	SYMBOL - BE ALERT FOR PEDESTIRANS	48 x 48								
	45	S1-1	SYMBOL - PED CROSSING <PENTAGONAL>	36 x 36		X	10BWG	1	SA	T		
	46	R1-1	STOP	36 x 36		X	10BWG	1	SA	T		
7 OF 7	47	S5-1	SCHOOL / SPEED LIMIT (SPEED) WHEN FLASHING	36 x 72								
		S7-1T	CELL PHONE USE PROHIBITED UP TO $200 FINE	36 x 36								
	48	W11-2	SYMBOL - BE ALERT FOR PEDESTIRANS	48 x 48								
	49	R2-1	SPEED LIMIT 55	36 X 48		X	S80	1	SA	T		
		S5-2aTP	END SCHOOL ZONE	36 x 18								
	50		PEACH COUNTRY RV PARK <RIGHT ARROW>	78 x 18		X	10BWG	1	SA	T		
	51	W11-8L	SYMBOL - BE ALERT FOR EMRGNCY VEHS LT	48 x 48		X	10BWG	1	SA	P		
	52	D3-3bTR	Stonewall Community Cemetery <RIGHT ARROW>	108 x 36		X	S80	1	SA	U	WC	
	53	D2-1	Fredericksburg 15	114 x 18		X	S80	1	SA	T	2EXT	

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"

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE:
FILE:

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				
4-16	DIST	COUNTY		SHEET NO.
8-16				227

TB

DATE: 1/12/2023 2:30:23 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\CAD\Standard Projects\DMS\DMS8600\dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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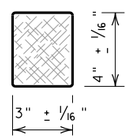
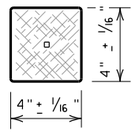
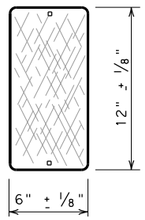
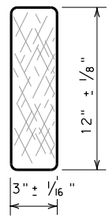
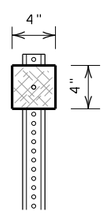
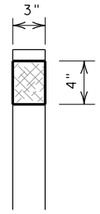
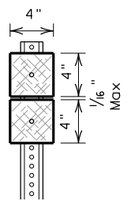
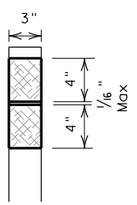
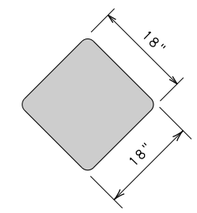
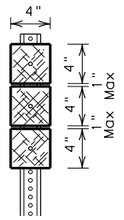
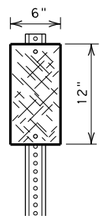
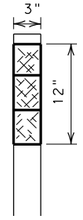
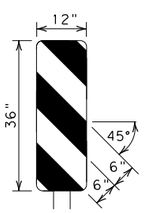
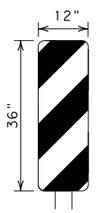
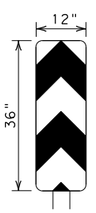
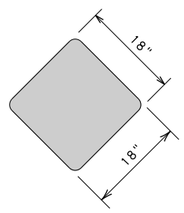
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

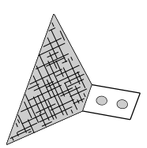
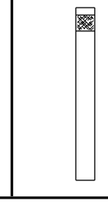
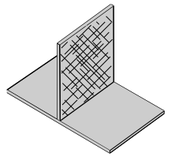
DELINEATORS

	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

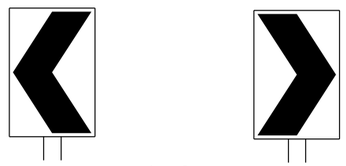
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

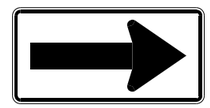
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8
SIZE (W x L)	18"x 24" (Conventional) / 24"x 30" (Conventional Oversize) / 30"x 36" (Expressway) / 36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0" / 7'-0" Only
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6
SIZE (W x L)	48" x 24" (Conventional) / 60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"

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

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

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	0113	02	063	US 290
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	GILLESPIE		228

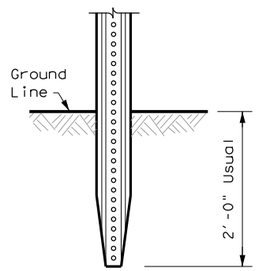
20A

DATE: 1/12/2023 2:30:29 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

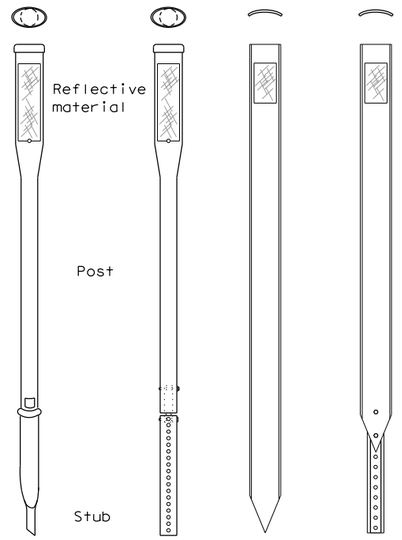


NOTES

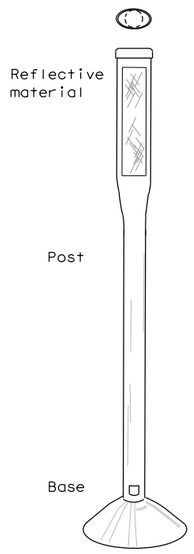
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND



SRF



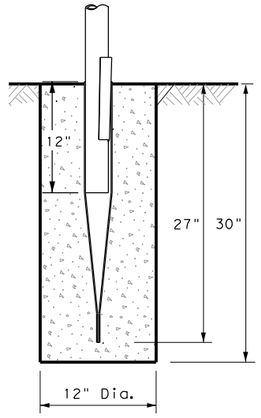
EMBEDDED | SURFACE MOUNT

NOTES

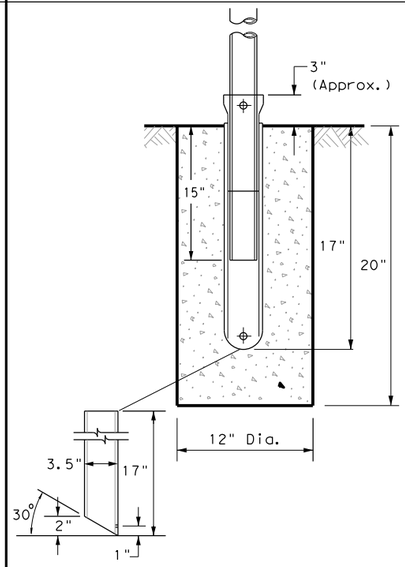
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

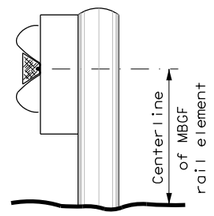
NOTE

1. Install per manufacturer's recommendations.

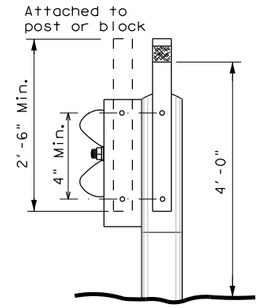
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

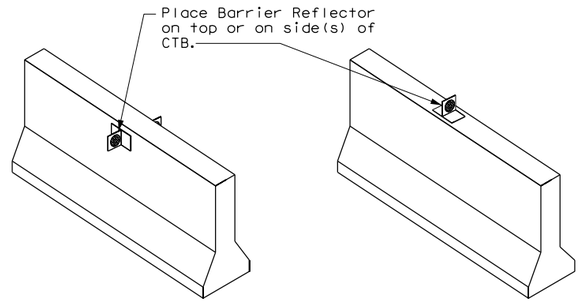
GF1



GF2



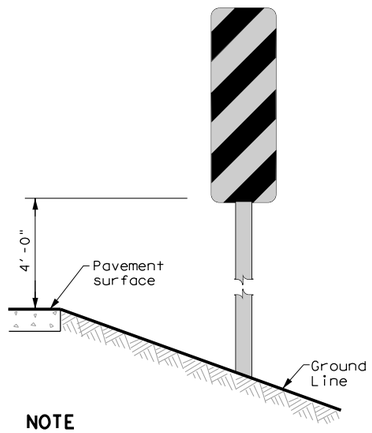
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

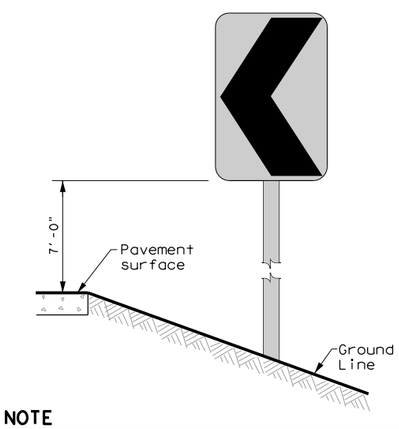
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

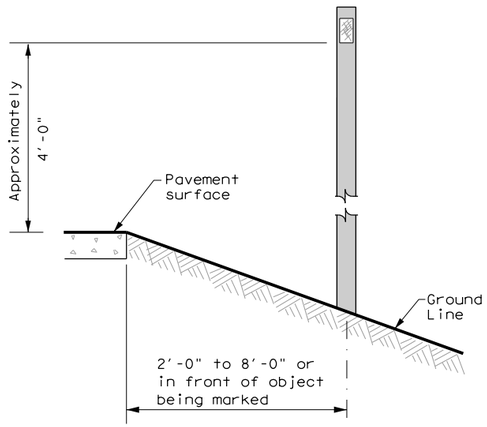
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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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	0113	02	063	US 290
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	GILLESPIE		229

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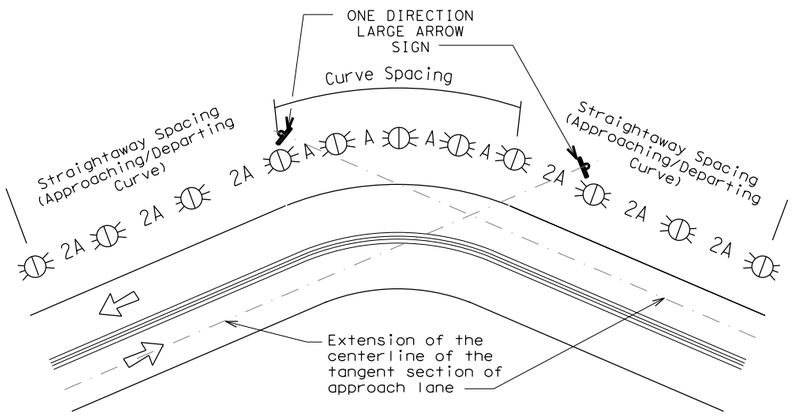
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

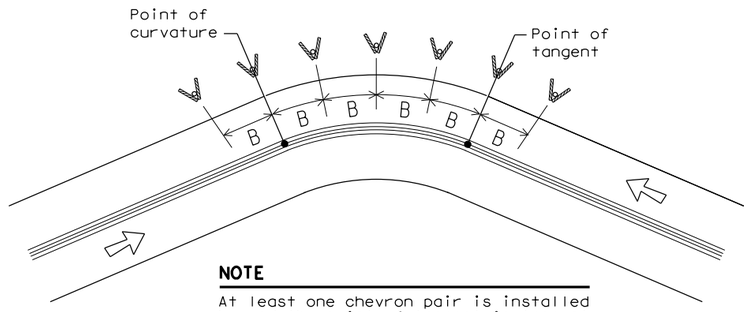
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	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

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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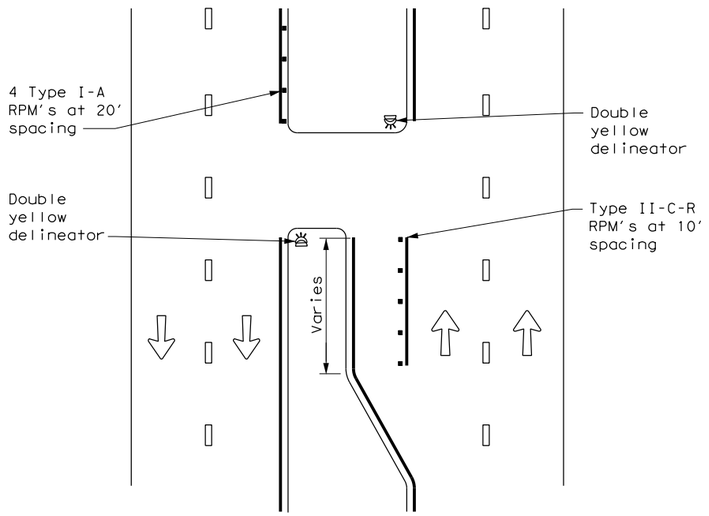
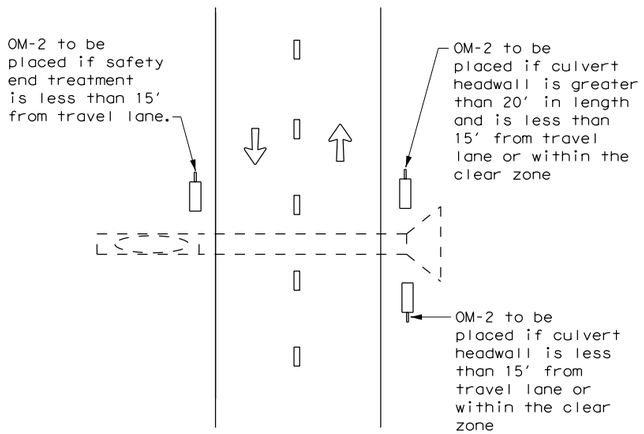
CROSSOVERS



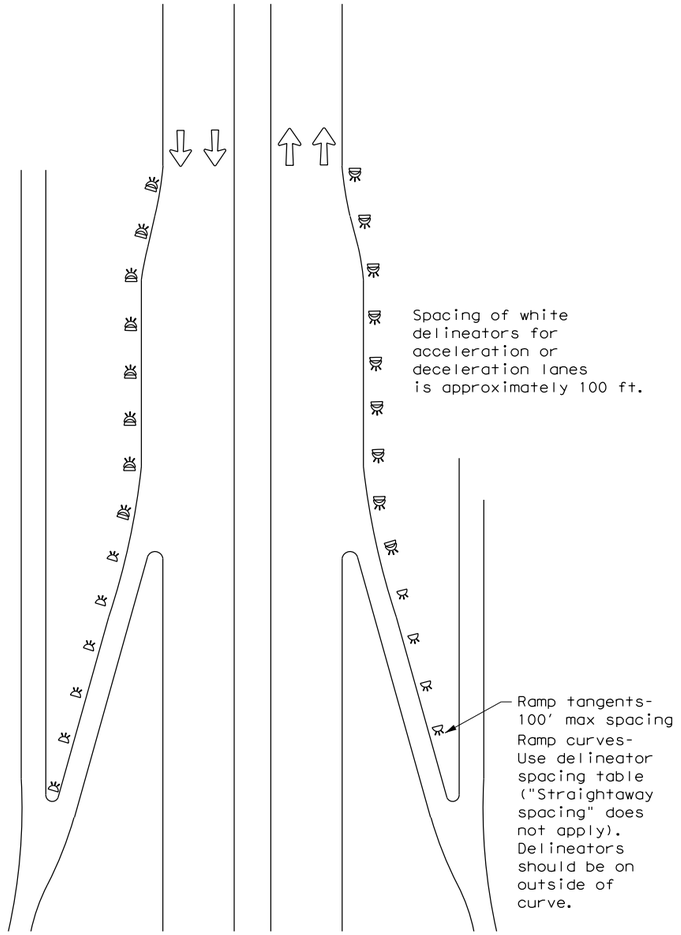
DETAIL 1

FOR CULVERTS WITHOUT MBGF



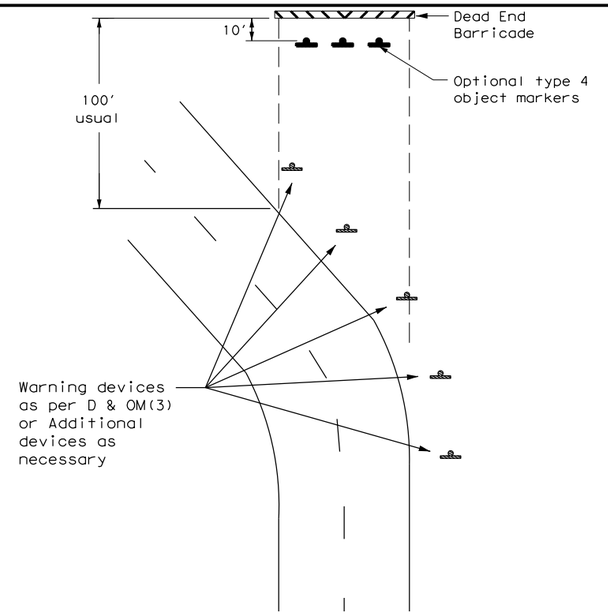
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



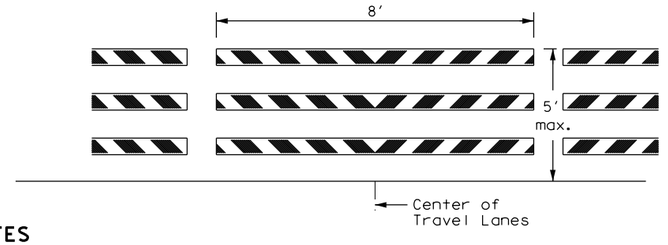
DETAIL 3

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
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7-20	AUS	GILLESPIE		231

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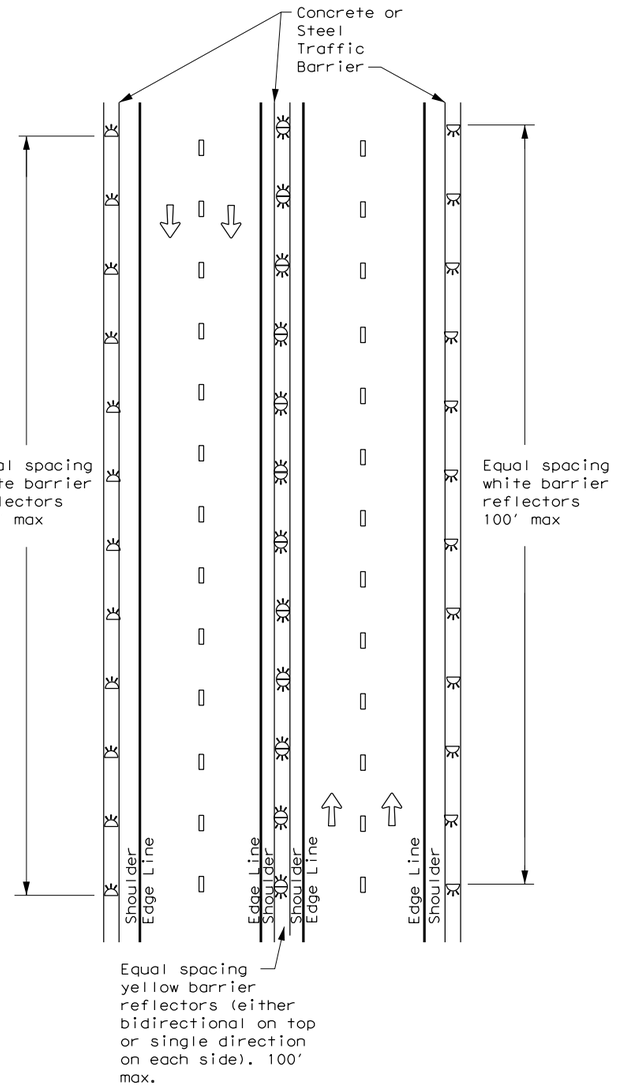
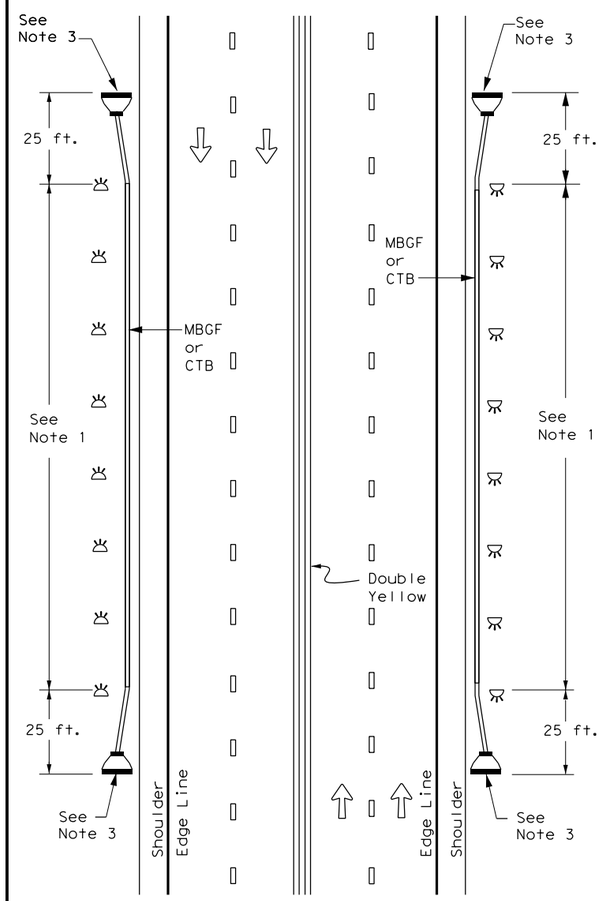
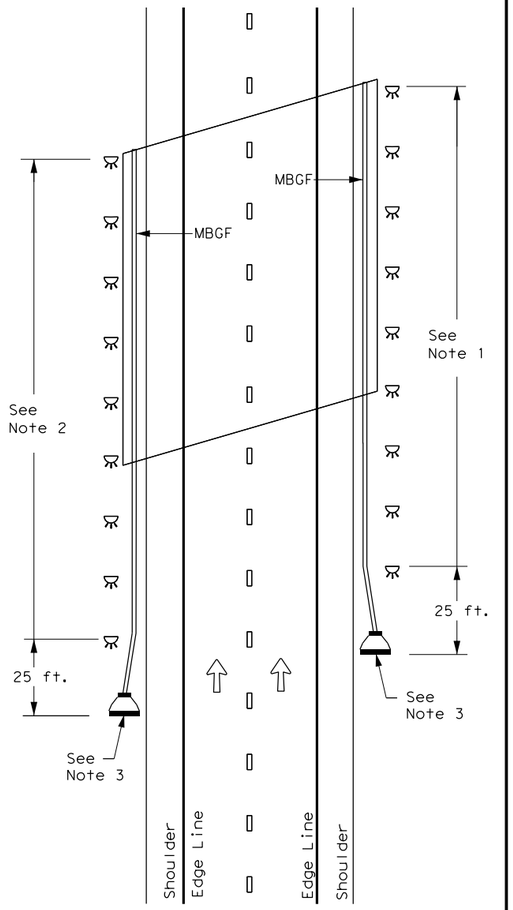
CONTINUOUS CONCRETE OR STEEL BARRIER



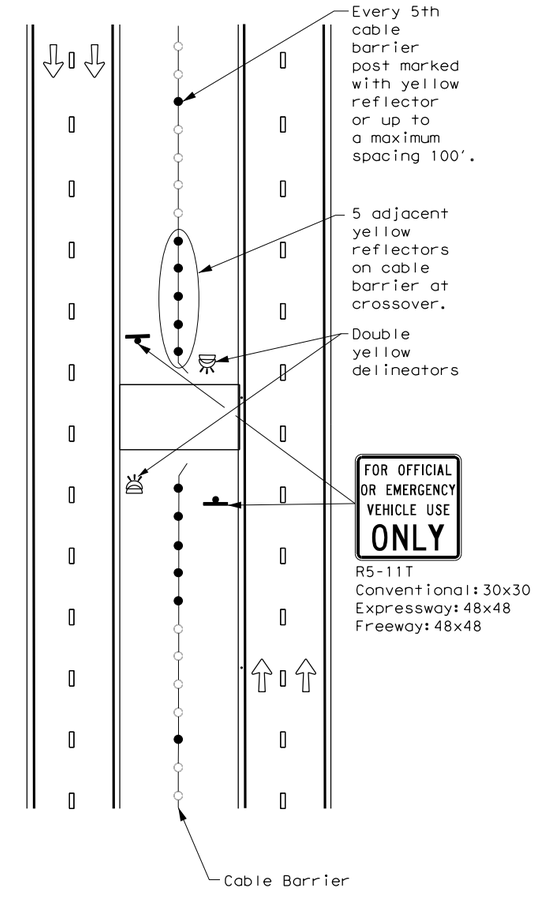
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

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©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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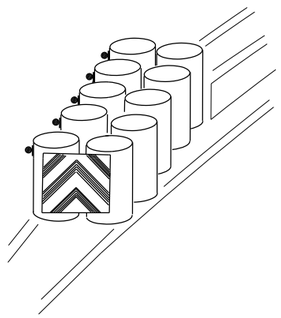
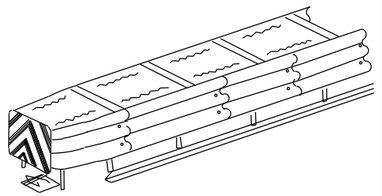
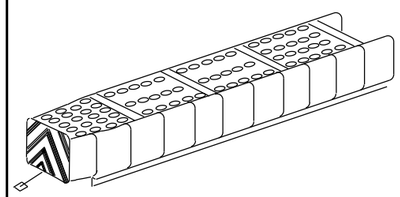
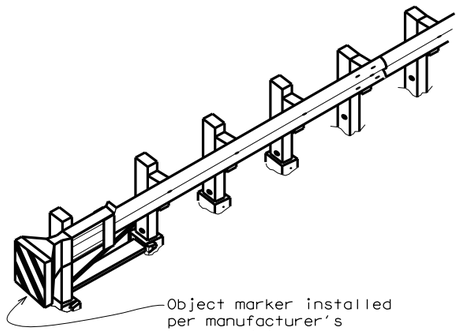
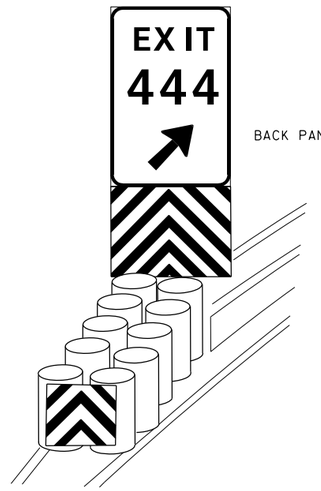
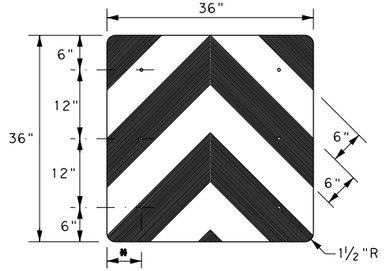


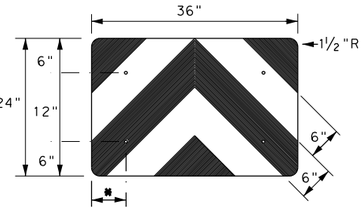




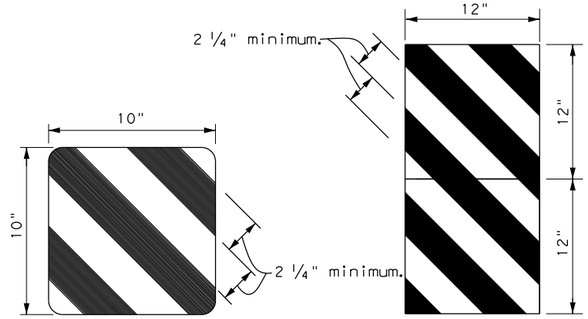




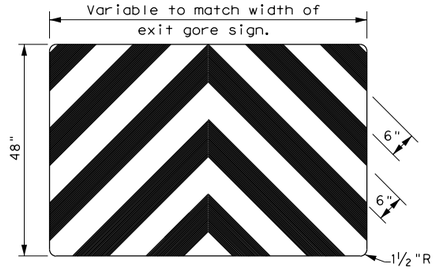


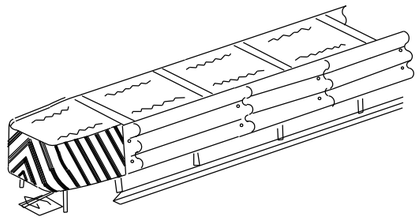


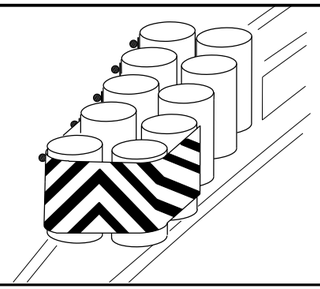
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

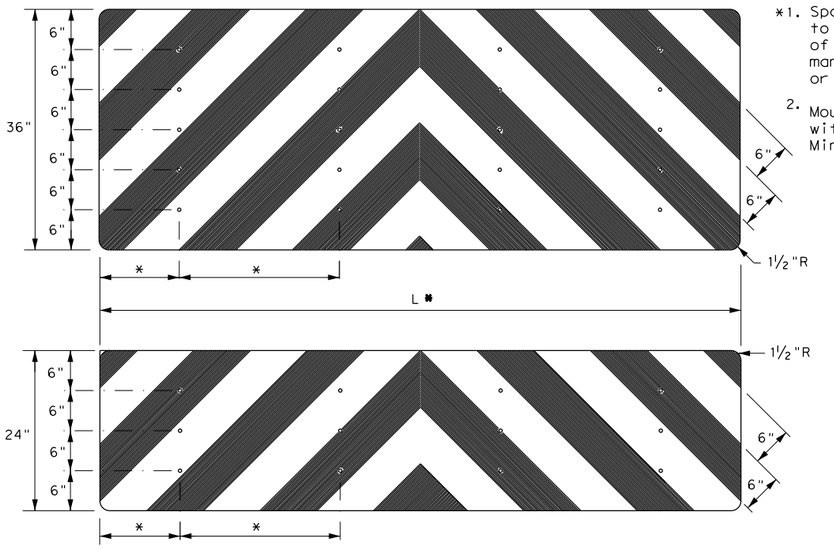


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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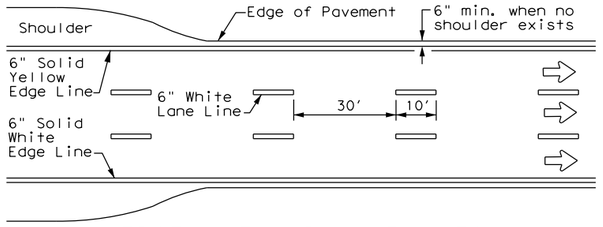
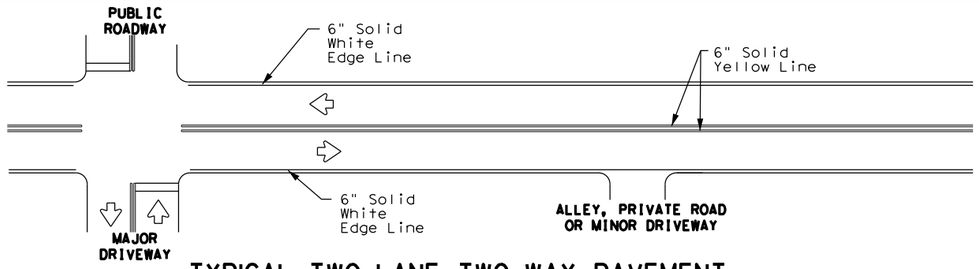
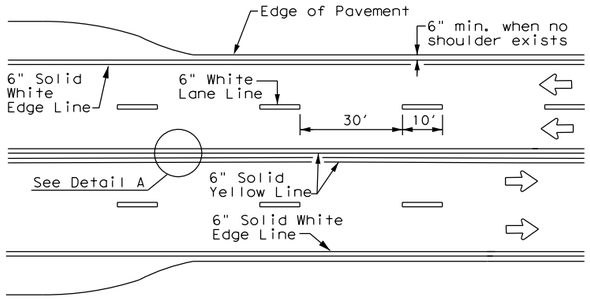
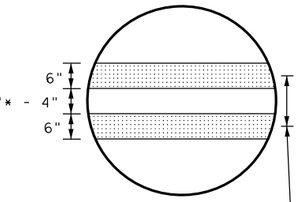


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





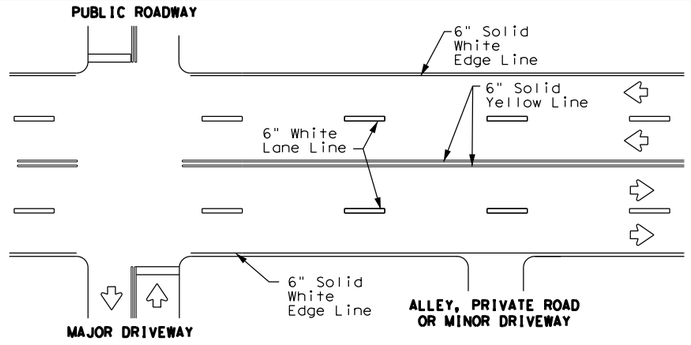
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

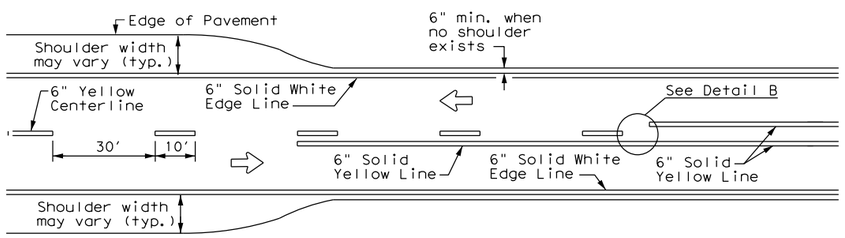
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

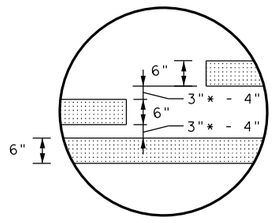
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

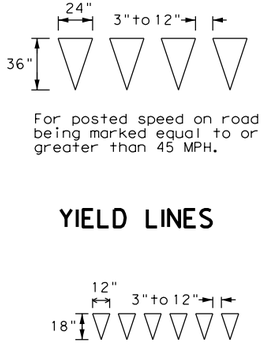


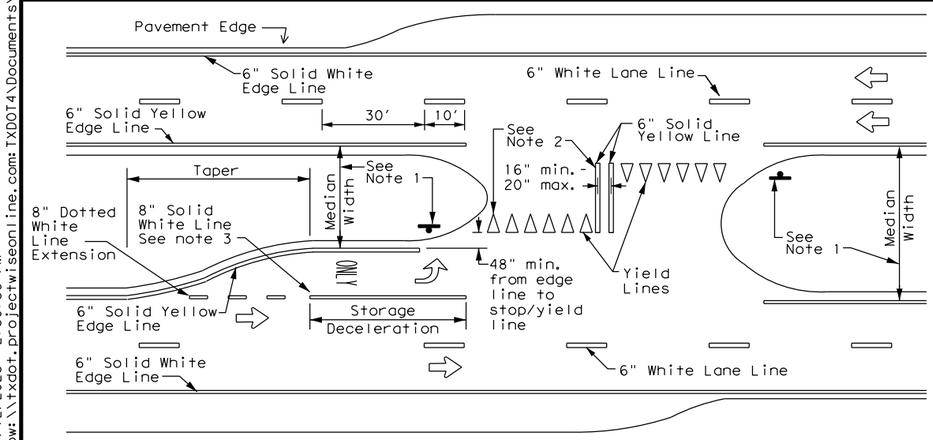
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

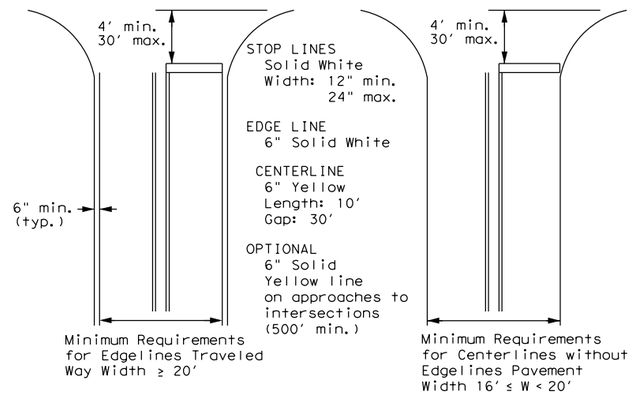
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

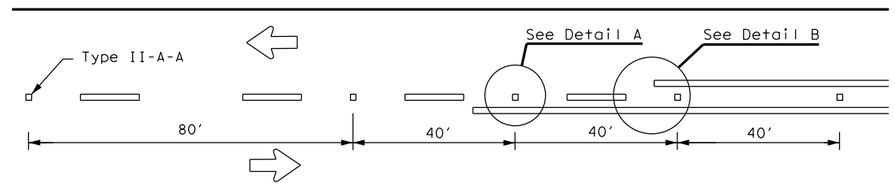
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		234

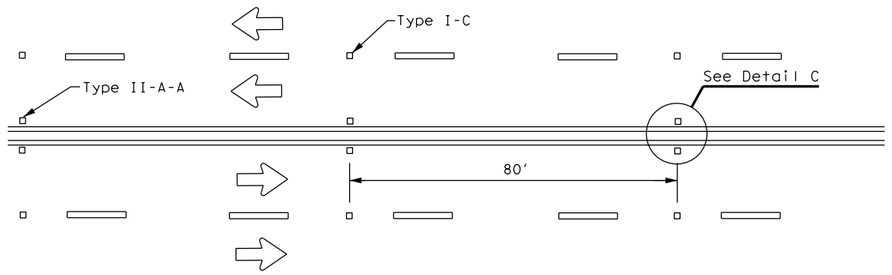
22A

DATE: 1/12/2023 2:31:05 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\AUS0063_pm2-22.dgn

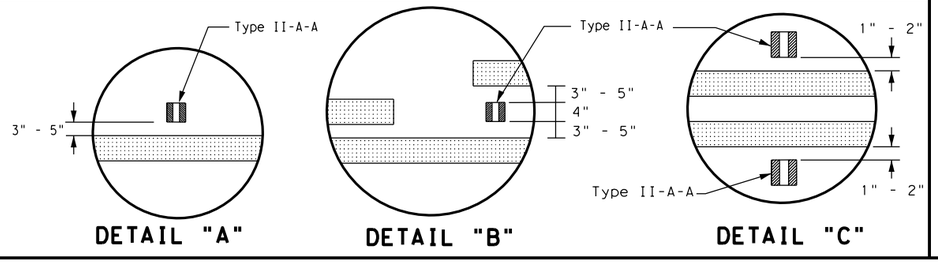
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

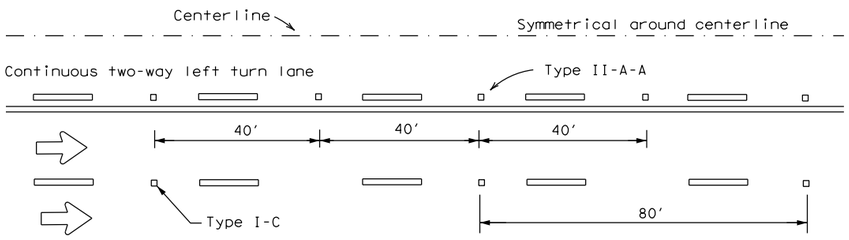


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

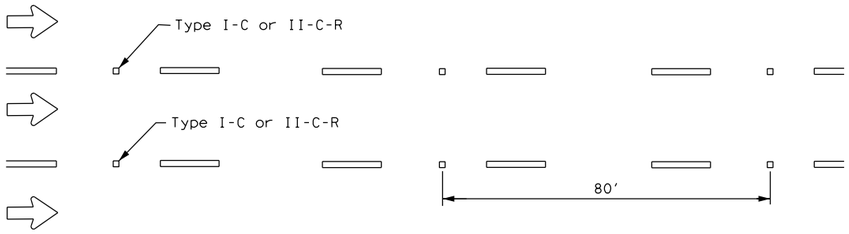


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



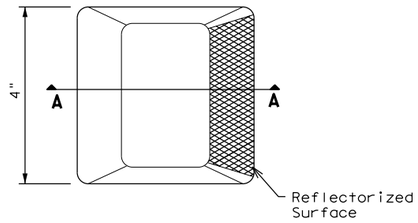
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

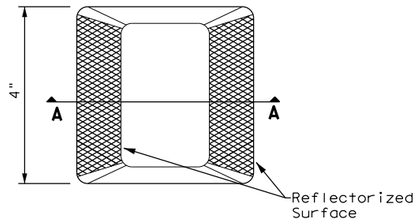
See Note 3.

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

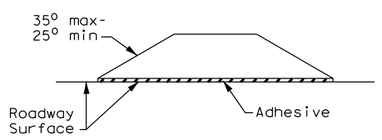
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

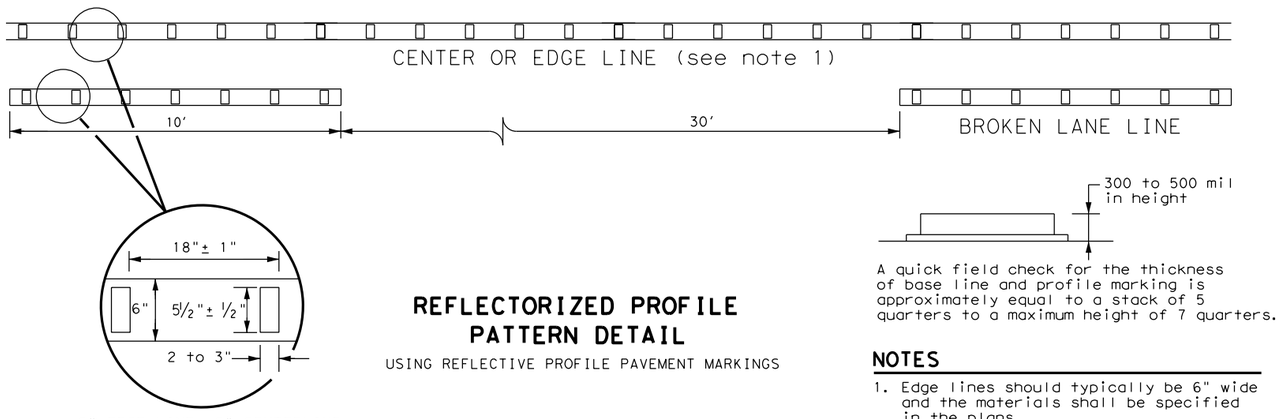


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. 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 along 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.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	AUS	GILLESPIE		235
5-00 2-12				

22B

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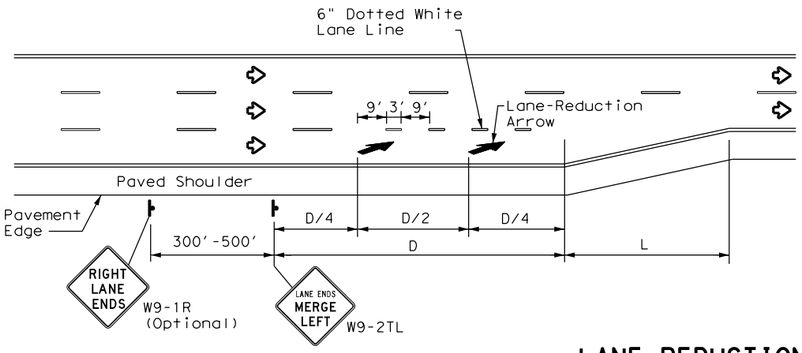


LANE REDUCTION

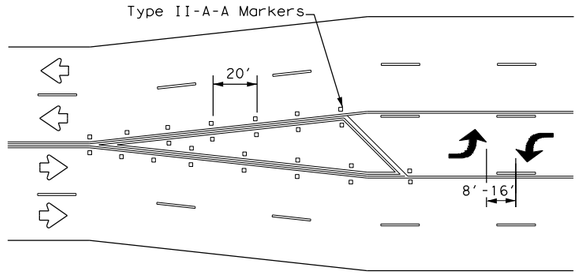
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

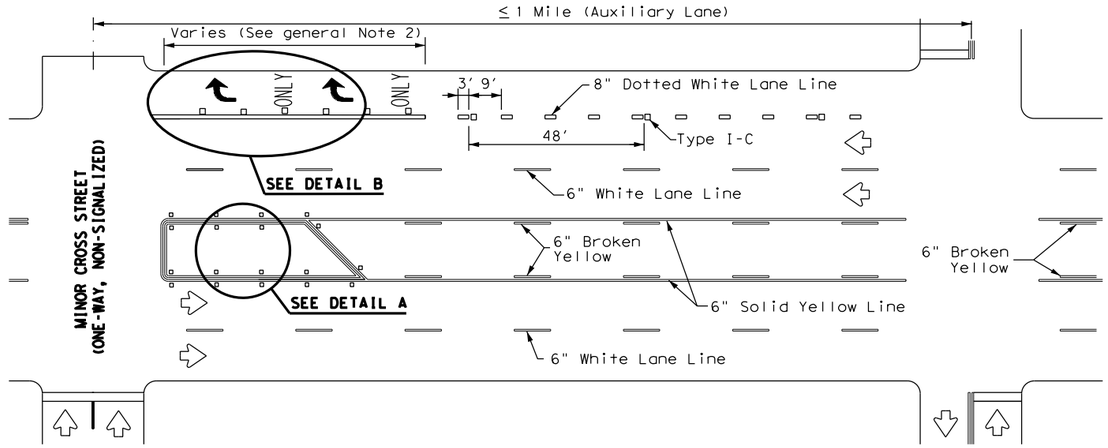


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

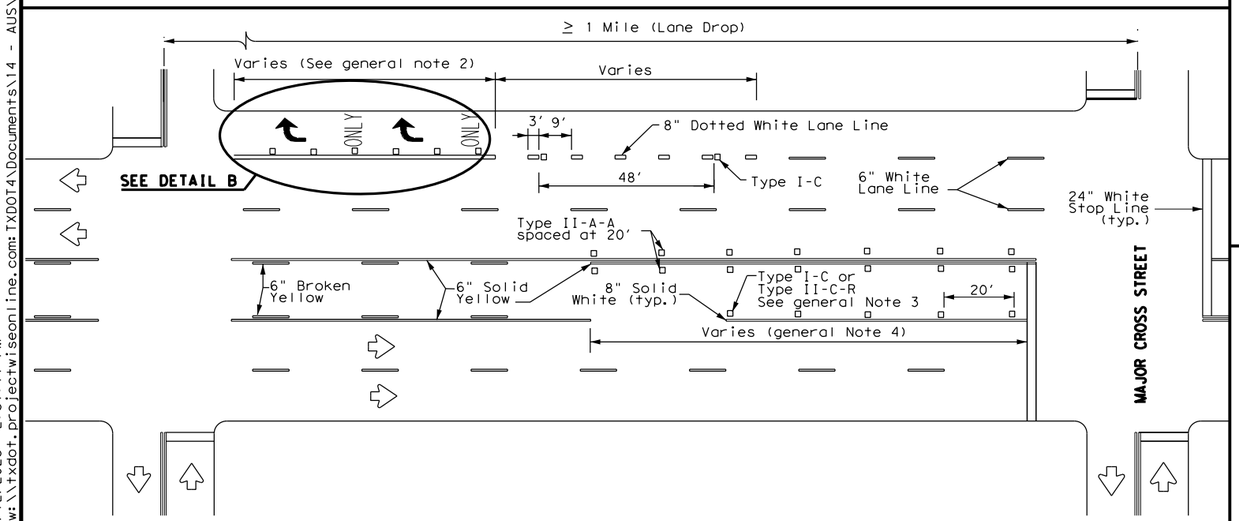
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

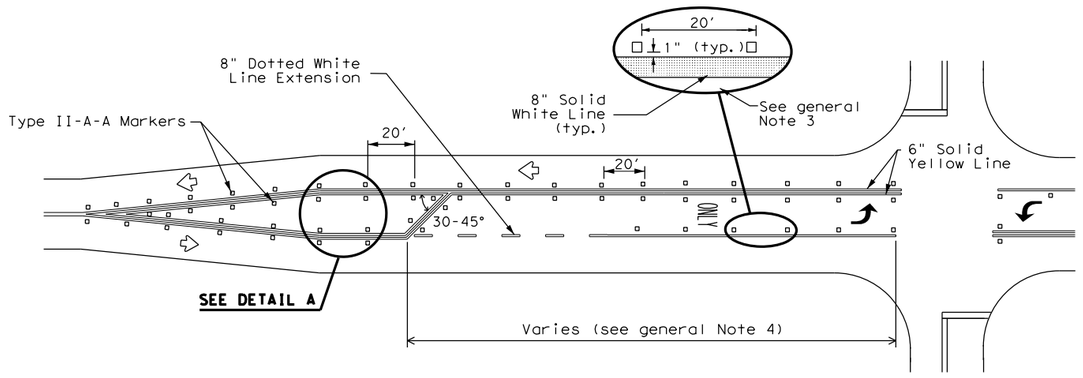
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



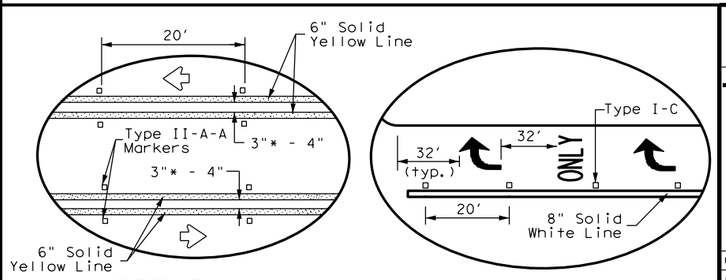
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		236

22C

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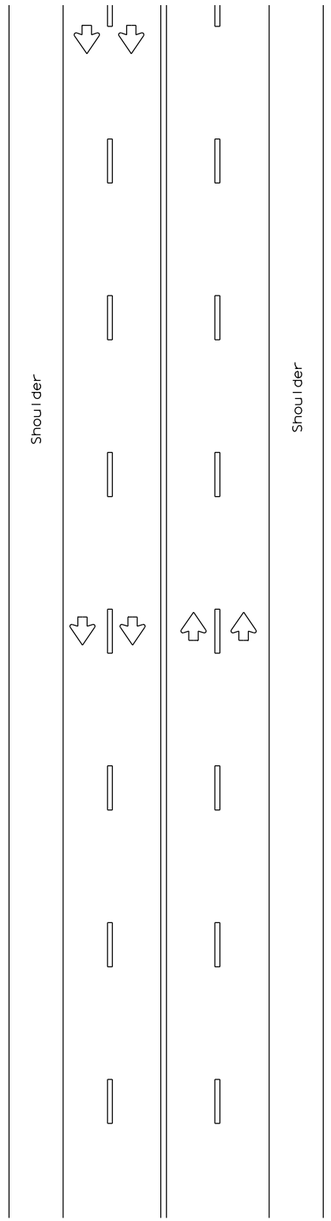
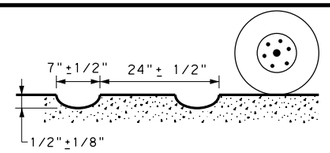
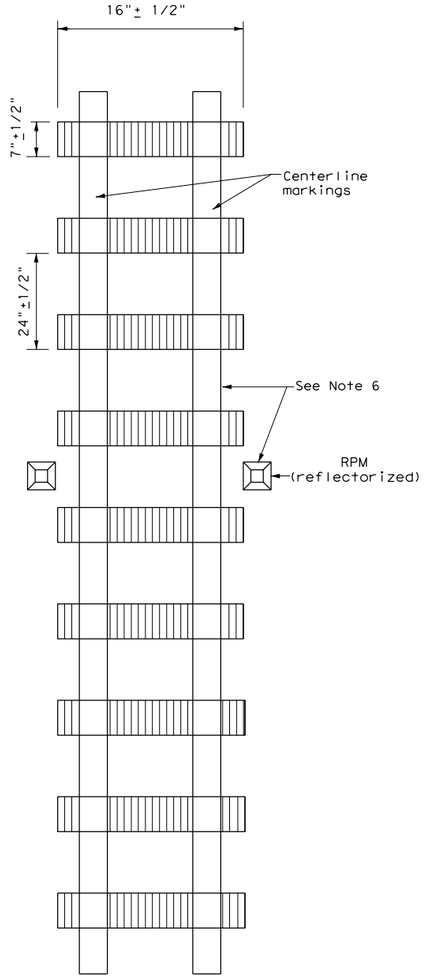


MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

CENTERLINE RUMBLE STRIPS

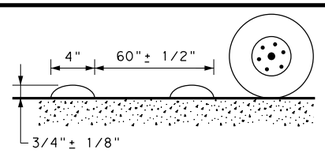


PROFILE VIEW

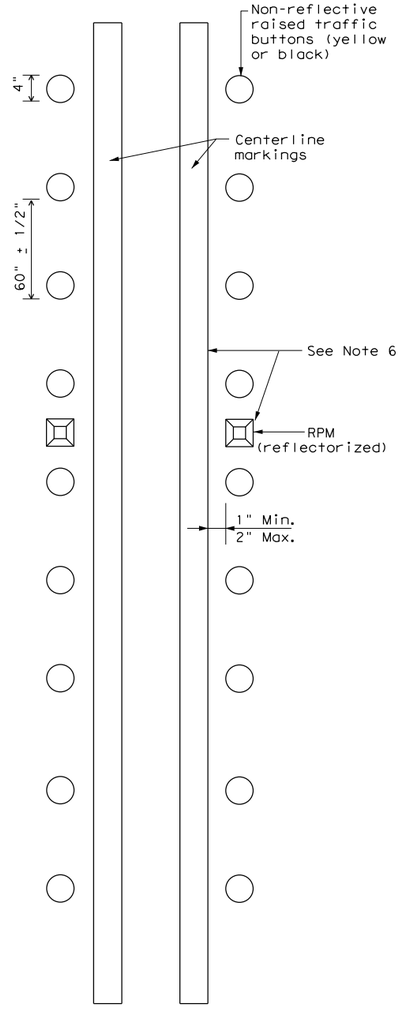


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

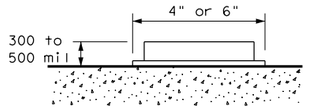


PROFILE VIEW

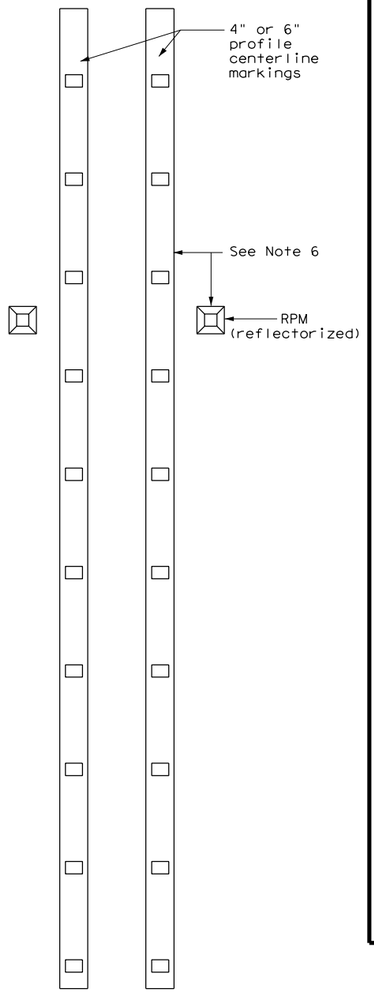


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 3

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

11. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS

RS(2)-13

FILE: rs(2)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		237

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

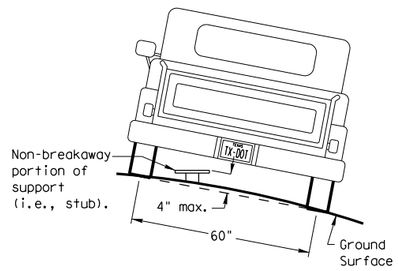
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

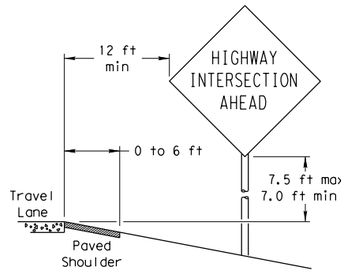
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

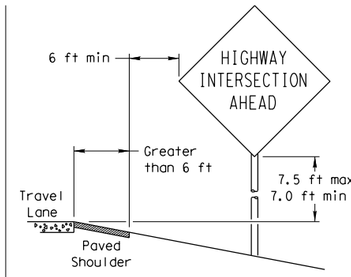
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

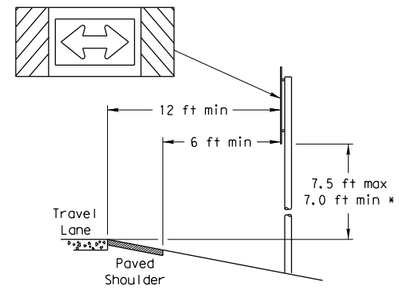
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



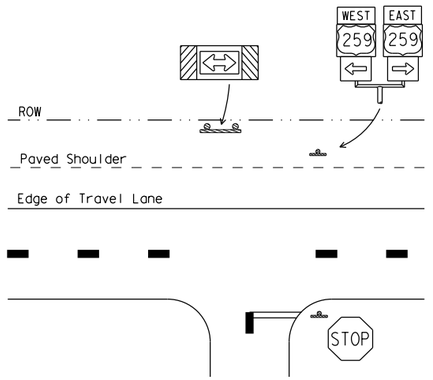
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

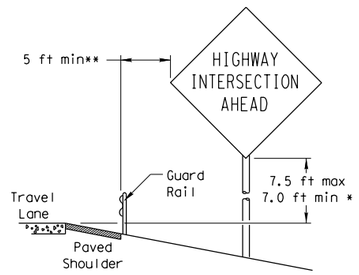
T-INTERSECTION



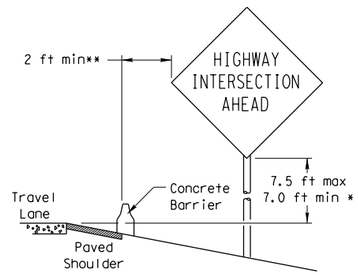
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

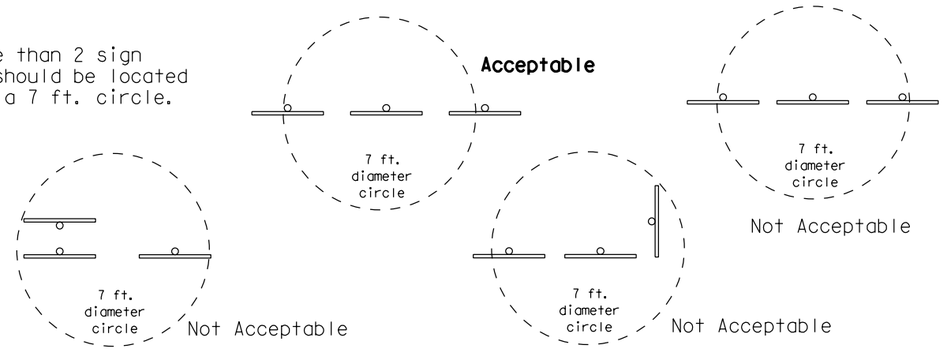
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

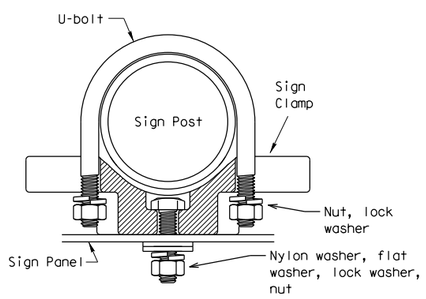
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

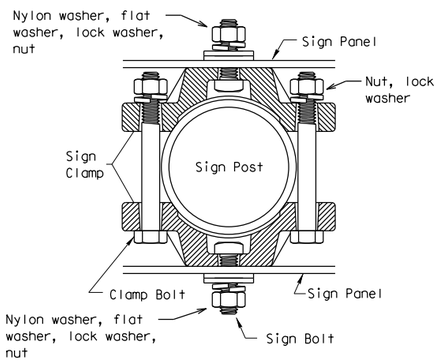


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

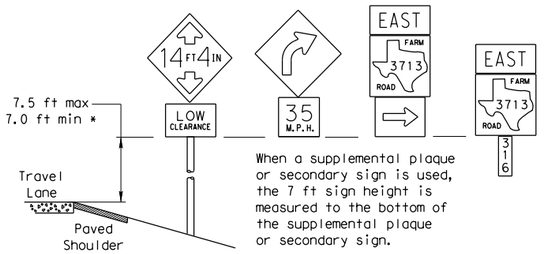
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



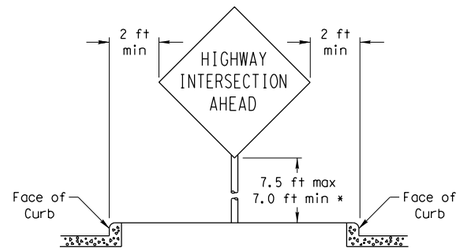
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



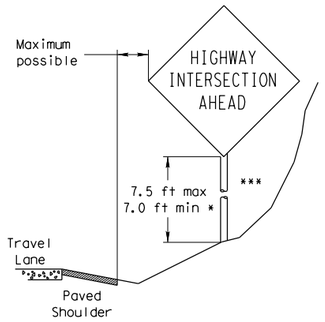
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

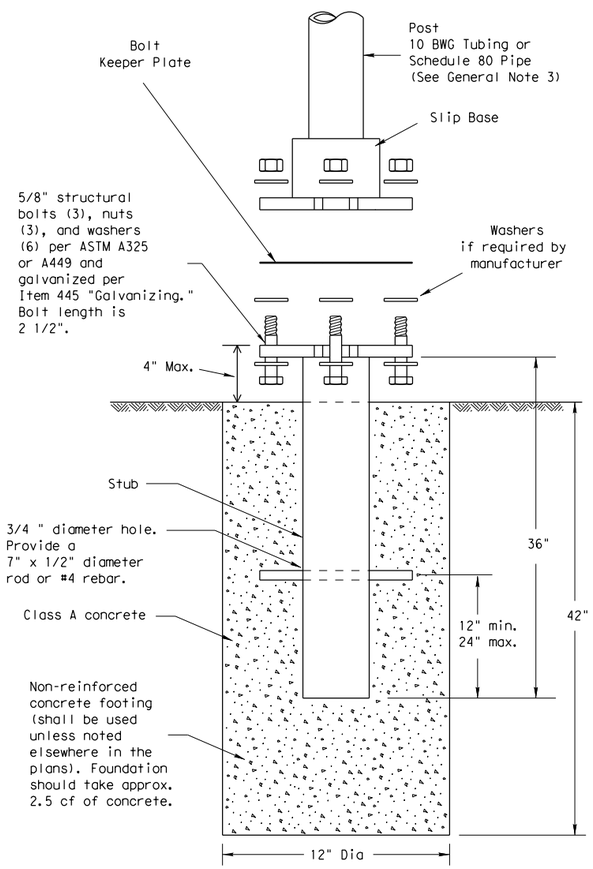
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		238

DATE: 1/12/2023 2:31:29 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020634 - Design\Plan Set\Standard Plans\SMD\SMD(SLIP-1)-08.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.

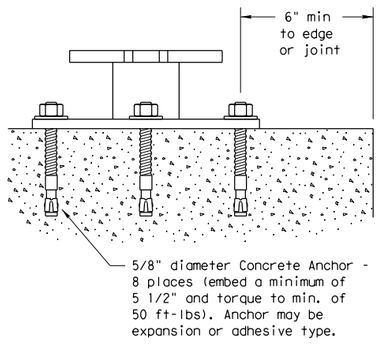
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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
0113	02	063	US 290

DIST	COUNTY	SHEET NO.
AUS	GILLESPIE	239

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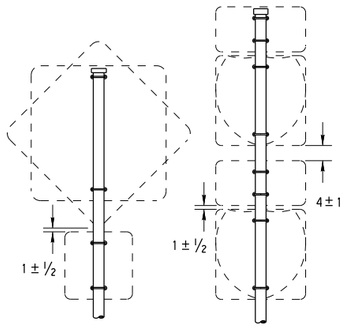

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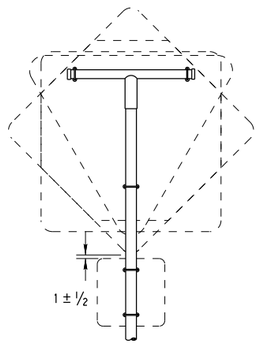

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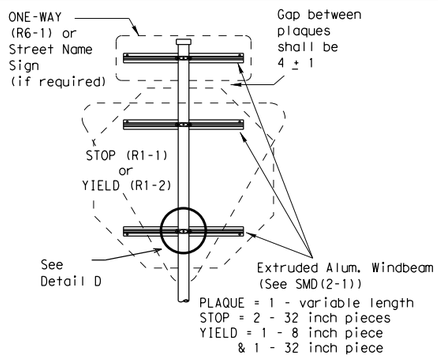

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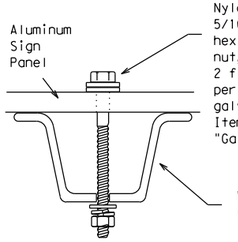
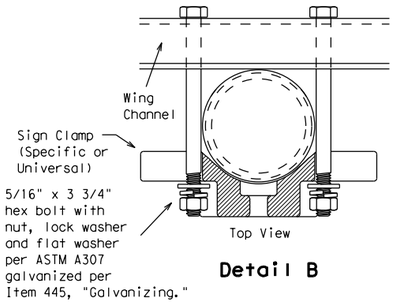


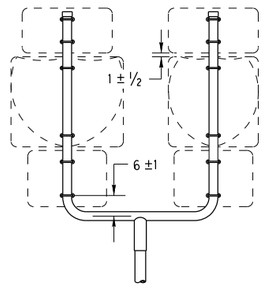
Top View

Detail A

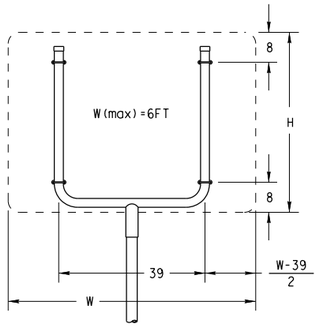


Top View

Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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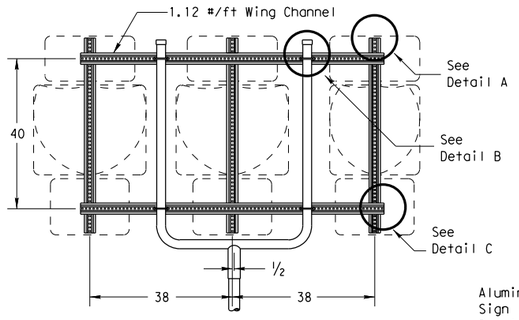
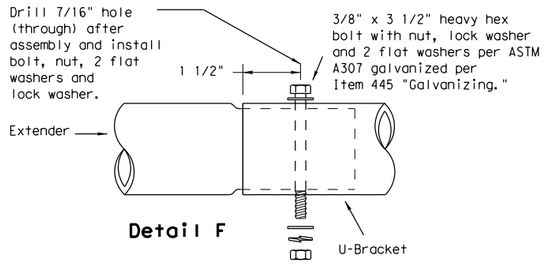
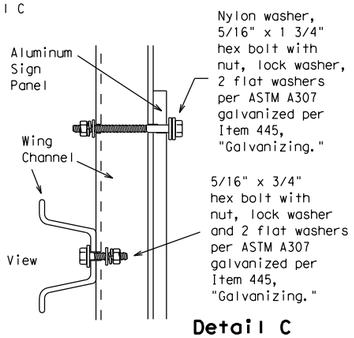


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

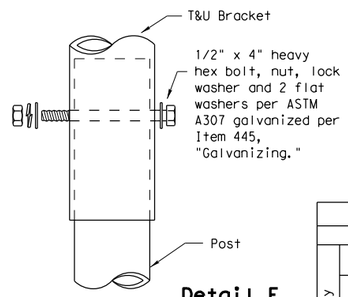


Detail F

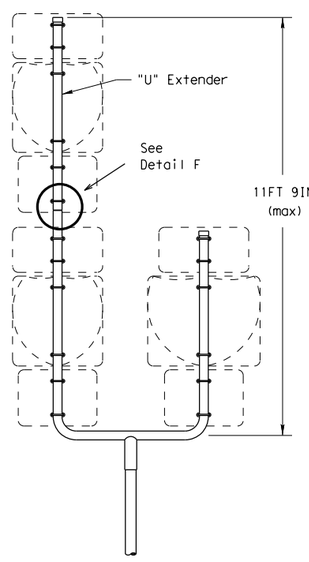
Splices shall only be allowed behind the sign substrate.



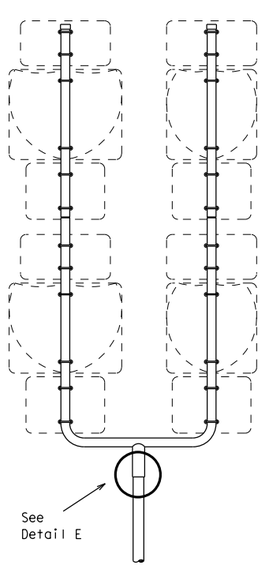
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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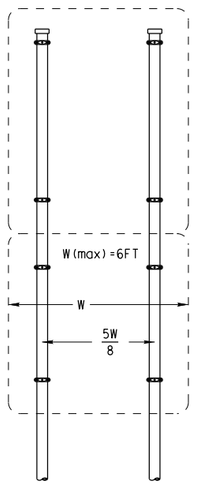
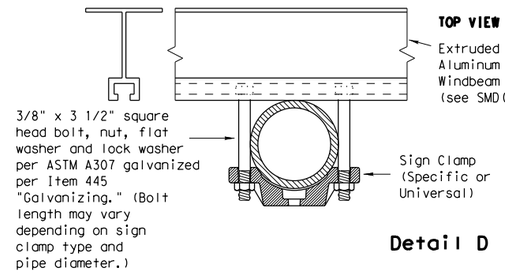
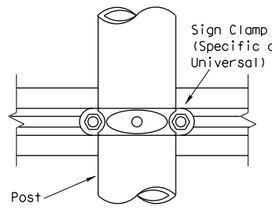


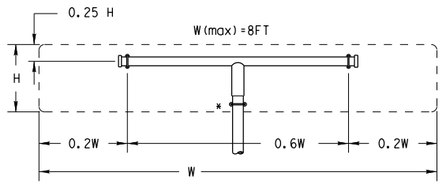
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

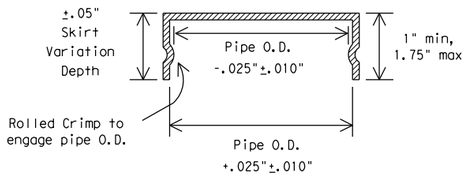




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290

DIST	COUNTY	SHEET NO.
AUS	GILLESPIE	240

9-08 REVISIONS

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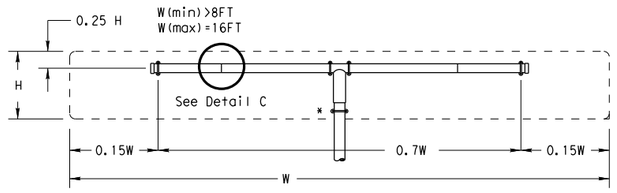
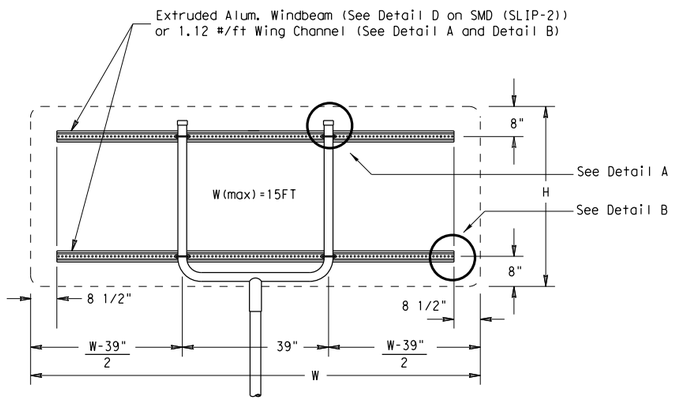
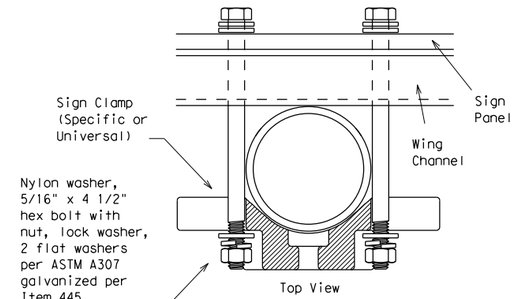


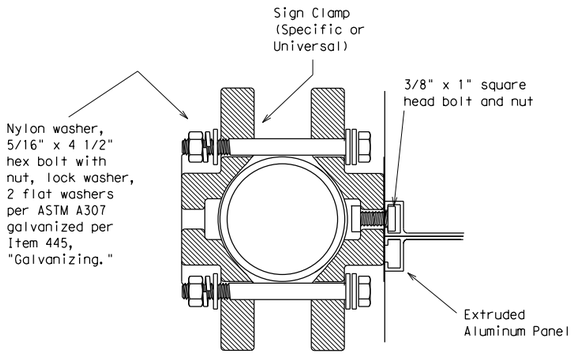
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



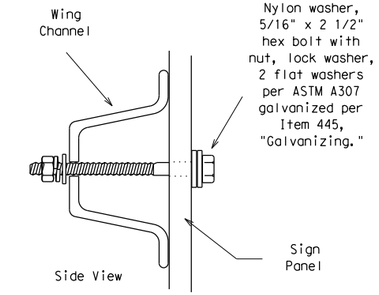
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



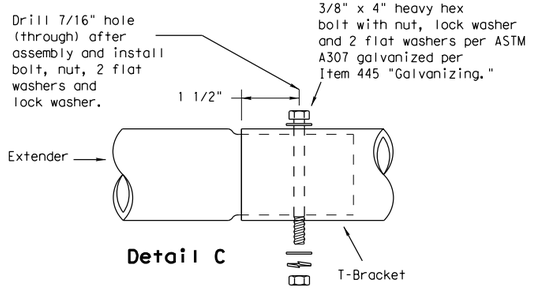
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

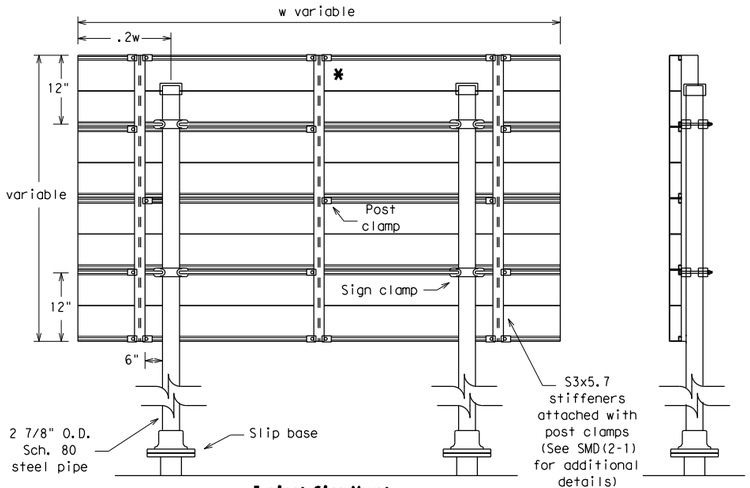


Detail B



Detail C

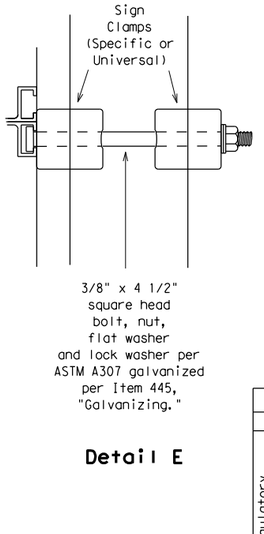
Splices shall only be allowed behind the sign substrate.



Typical Sign Mount

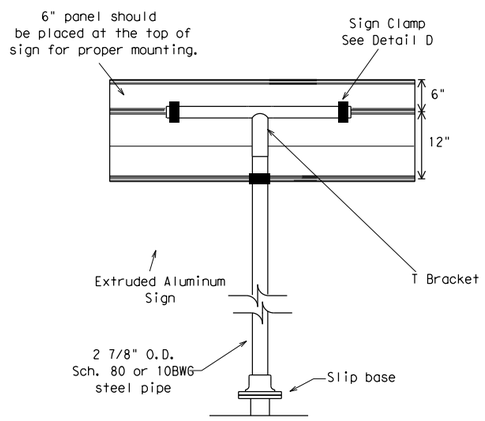
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

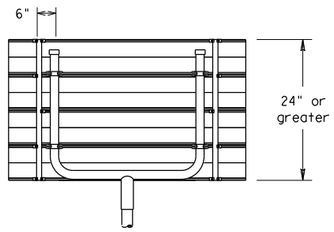


Detail E

See Detail E
for clamp installation



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

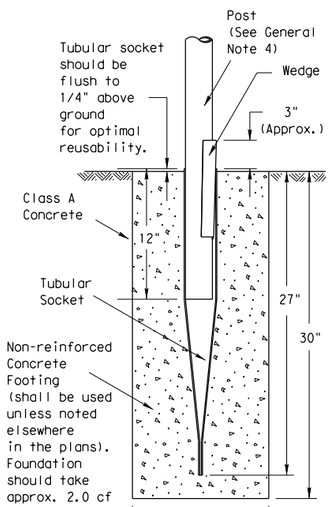
CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290

DIST	COUNTY	SHEET NO.
AUS	GILLESPIE	241

REVISIONS
9-08

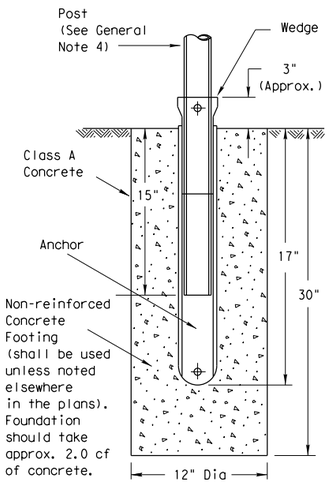
DATE: 1/12/2023 2:31:46 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020634 - Design\Plan Set\Standard Plans\SPMD\SMD(TWT)-08.dgn

Wedge Anchor Steel System



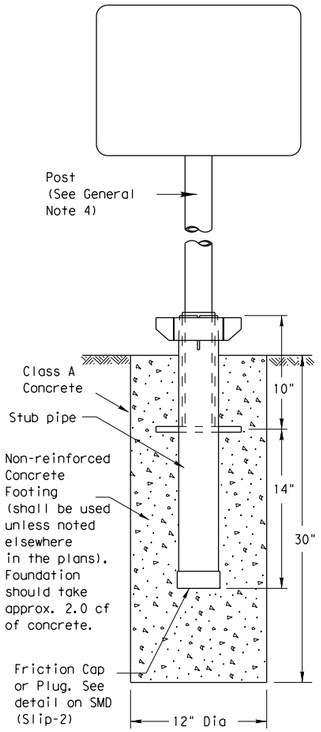
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

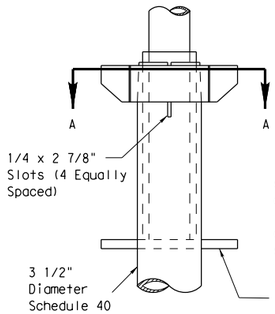


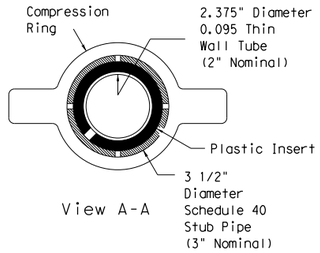
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



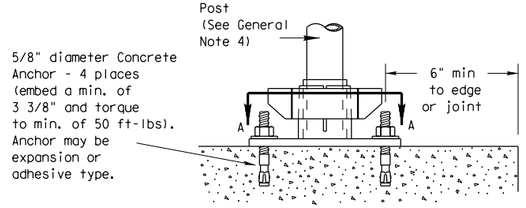
SM RD SGN ASSM TY TWT(X)UA(P)



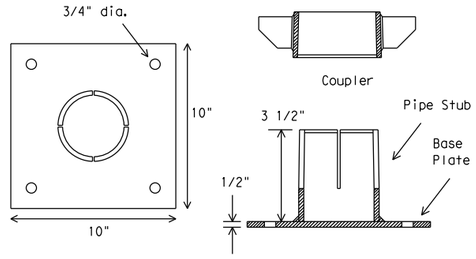


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

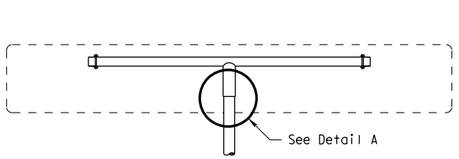


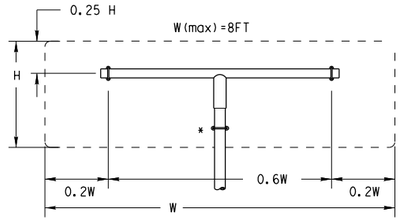
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.



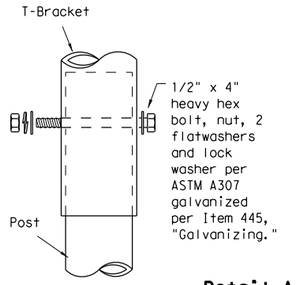
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   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
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0113	02	063	US 290
DIST	COUNTY		SHEET NO.
AUS	GILLESPIE		242

26E

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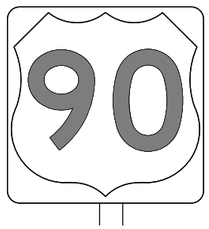
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

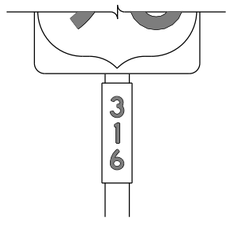
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

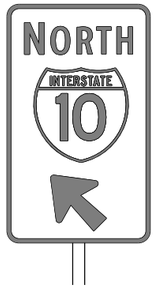


TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING





TYPICAL EXAMPLES

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. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. 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.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE:	tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-08		AUS	GILLESPIE		243

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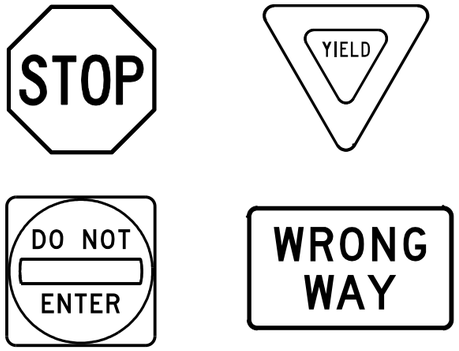
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(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

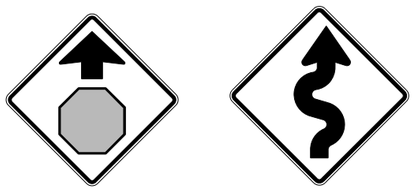
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

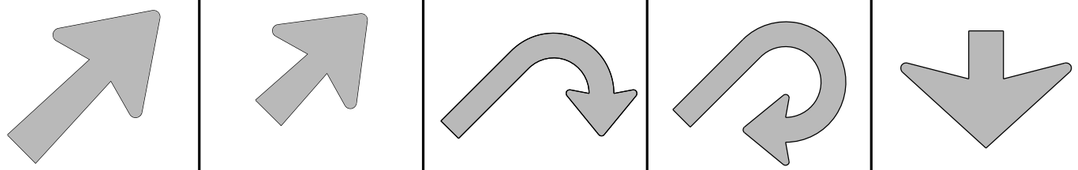
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AUS	GILLESPIE		244

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

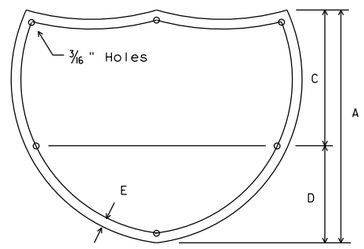
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

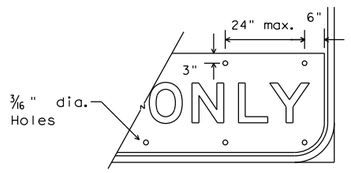
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

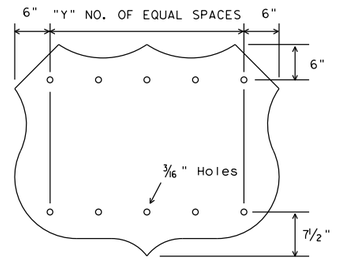


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

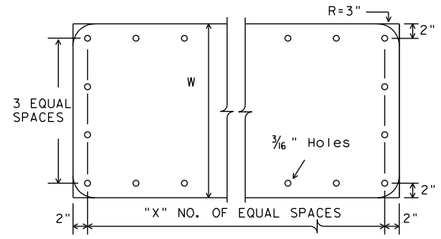


EXIT ONLY PANEL



U.S. ROUTE MARKERS

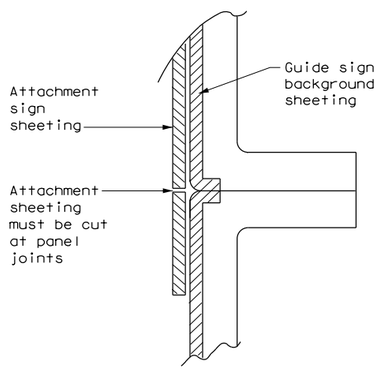
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

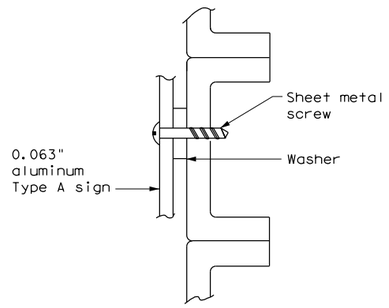
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



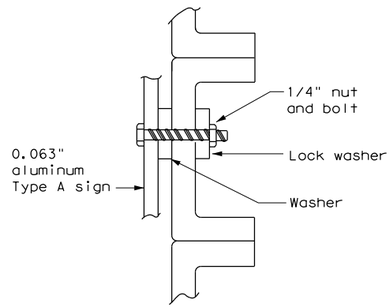
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



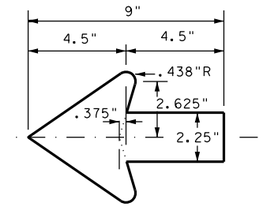
NUT/BOLT ATTACHMENT

NOTE:

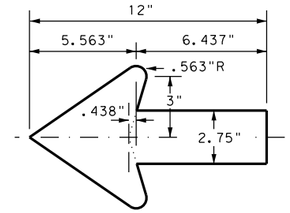
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

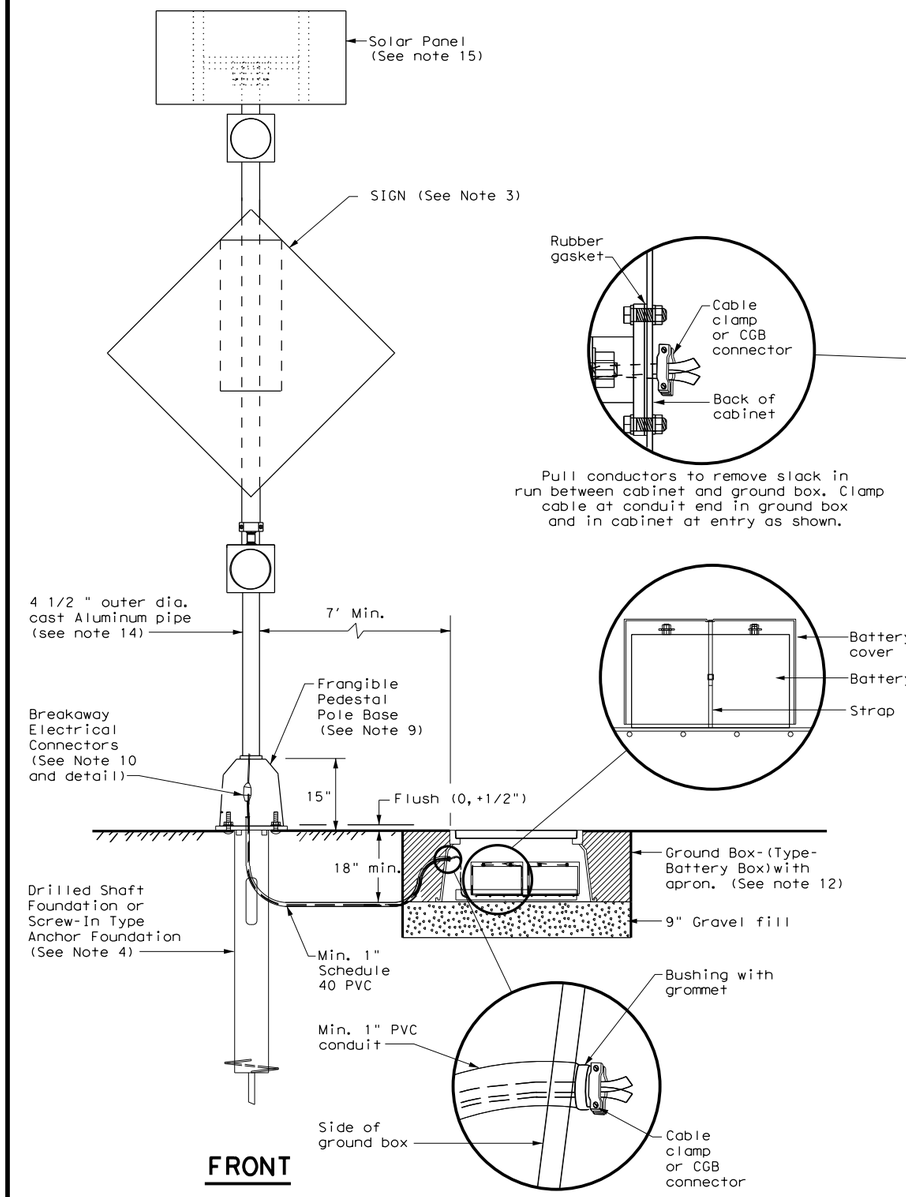
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AUS	GILLESPIE		245

DATE: 1/12/2023 3:45:09 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\SPRFBA(1)-13 Solar Powered Roadside Flashing Beacon Assembly\spb1-13.dgn

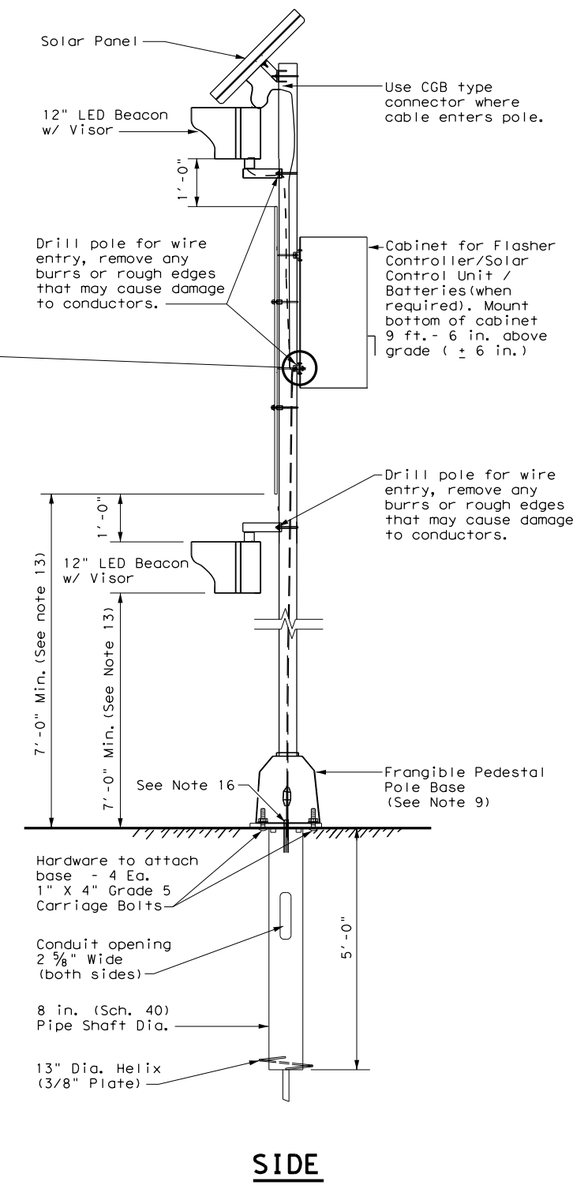
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug. For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.

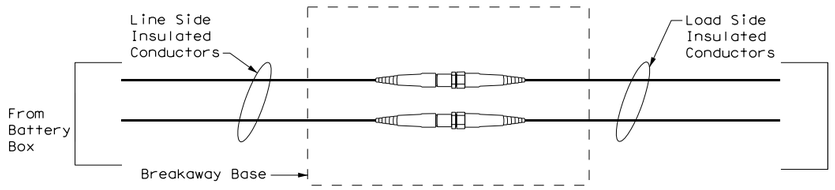


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.

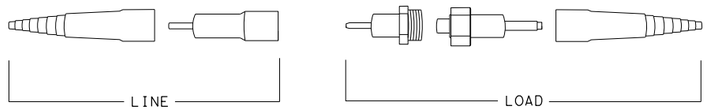
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
12-04	DIST	COUNTY		SHEET NO.
3-13	AUS	GILLESPIE		246

75A

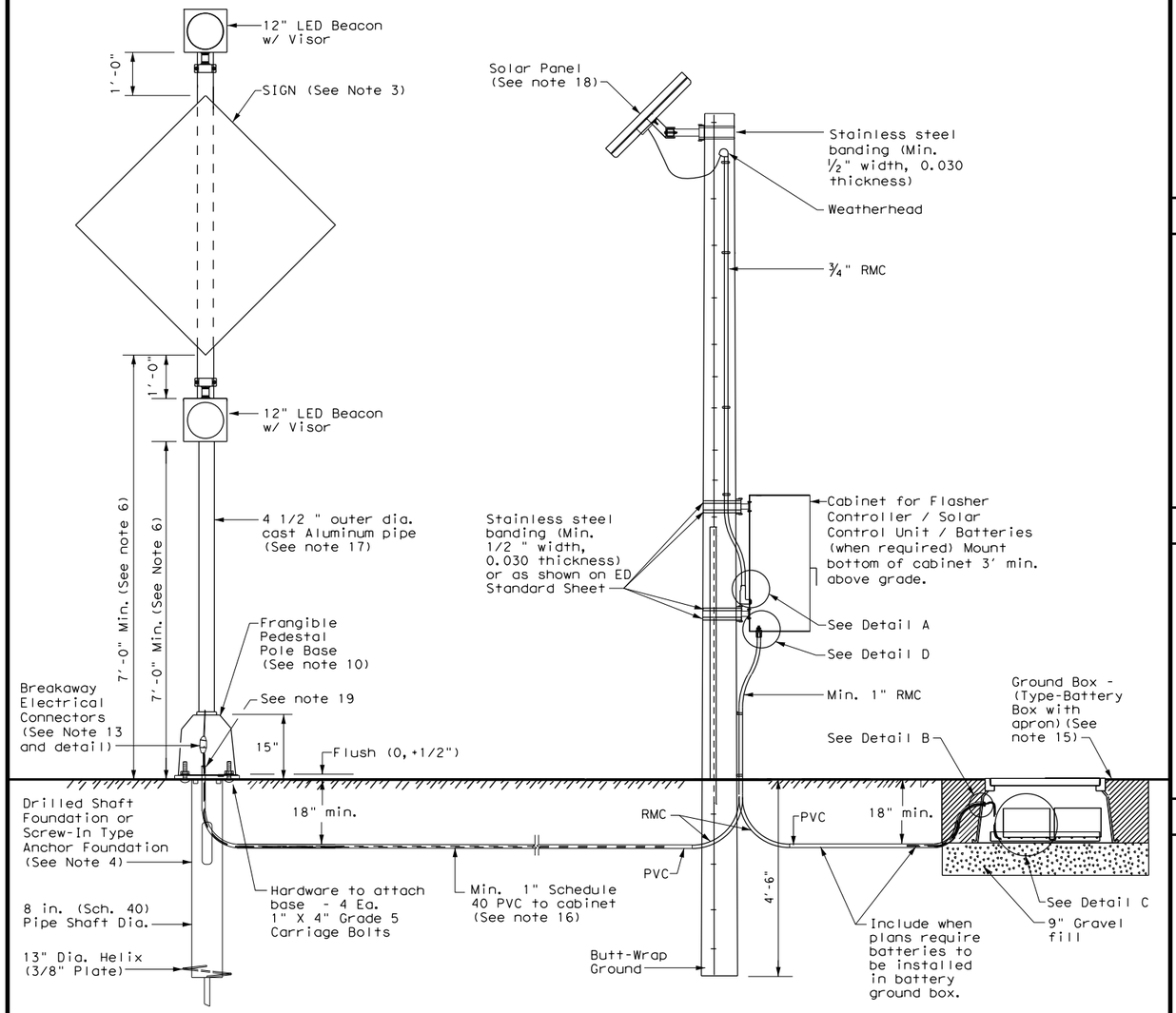
DATE: 1/12/2023 3:45:15 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\SPRFBA(2)-13 Solar Powered Roadside Flashing Beacon Assembly Details (Timber).dgn

GENERAL NOTES:

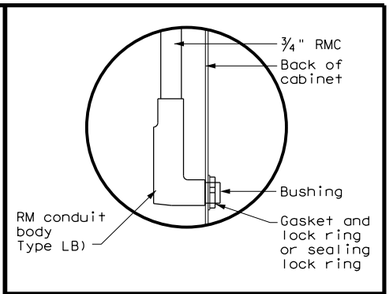
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
7. Provide 20′ in length ANSI class 5 timber poles. Install pole as shown or at the edge of the right of way. The timber pole is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
9. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
10. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
11. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
12. Install the Type LB conduit body attachment in the bottom third of the back of the cabinet. See Detail A.
13. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies". Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
14. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16 " plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
15. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
16. Unless otherwise shown on the plans or recommended by the manufacturer, use the following table to determine the wire size from cabinet to beacons.

Distance from Cabinet to Beacons (ft.)	Minimum Required Wire Size (AWG)
0 - 35	#14
35 - 60	#12
60 - 100	#10
> 100	#8

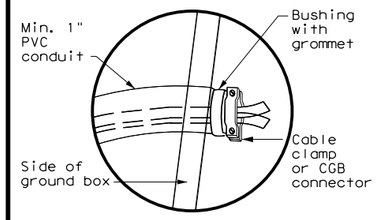
17. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
18. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14′ above grade.
19. Ensure height of conduit is below top of anchor bolts.



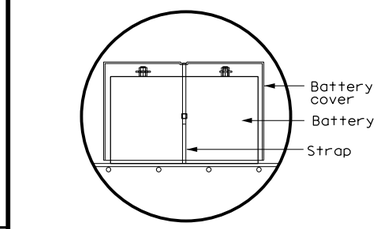
DETAIL FOR SOLAR PANEL, CABINET, AND BATTERIES LOCATED OUT OF CLEAR ZONE ON TIMBER POLE



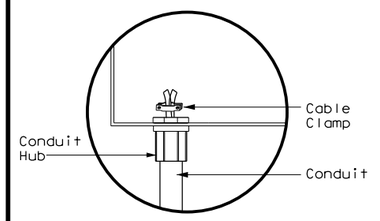
DETAIL A



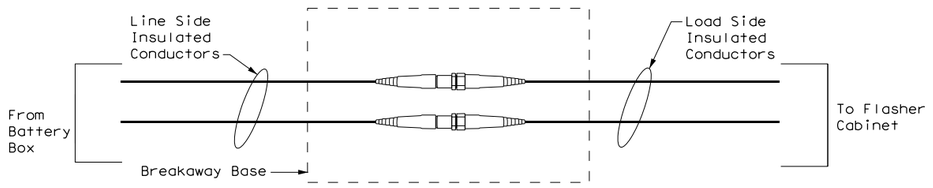
DETAIL B



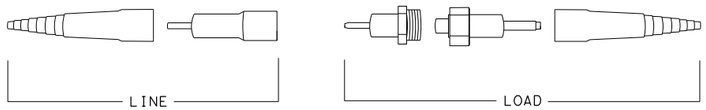
DETAIL C



DETAIL D



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS (TIMBER)

SPRFBA(2)-13

FILE: spb2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
12-04	DIST	COUNTY		SHEET NO.
3-13	AUS	GILLESPIE		247

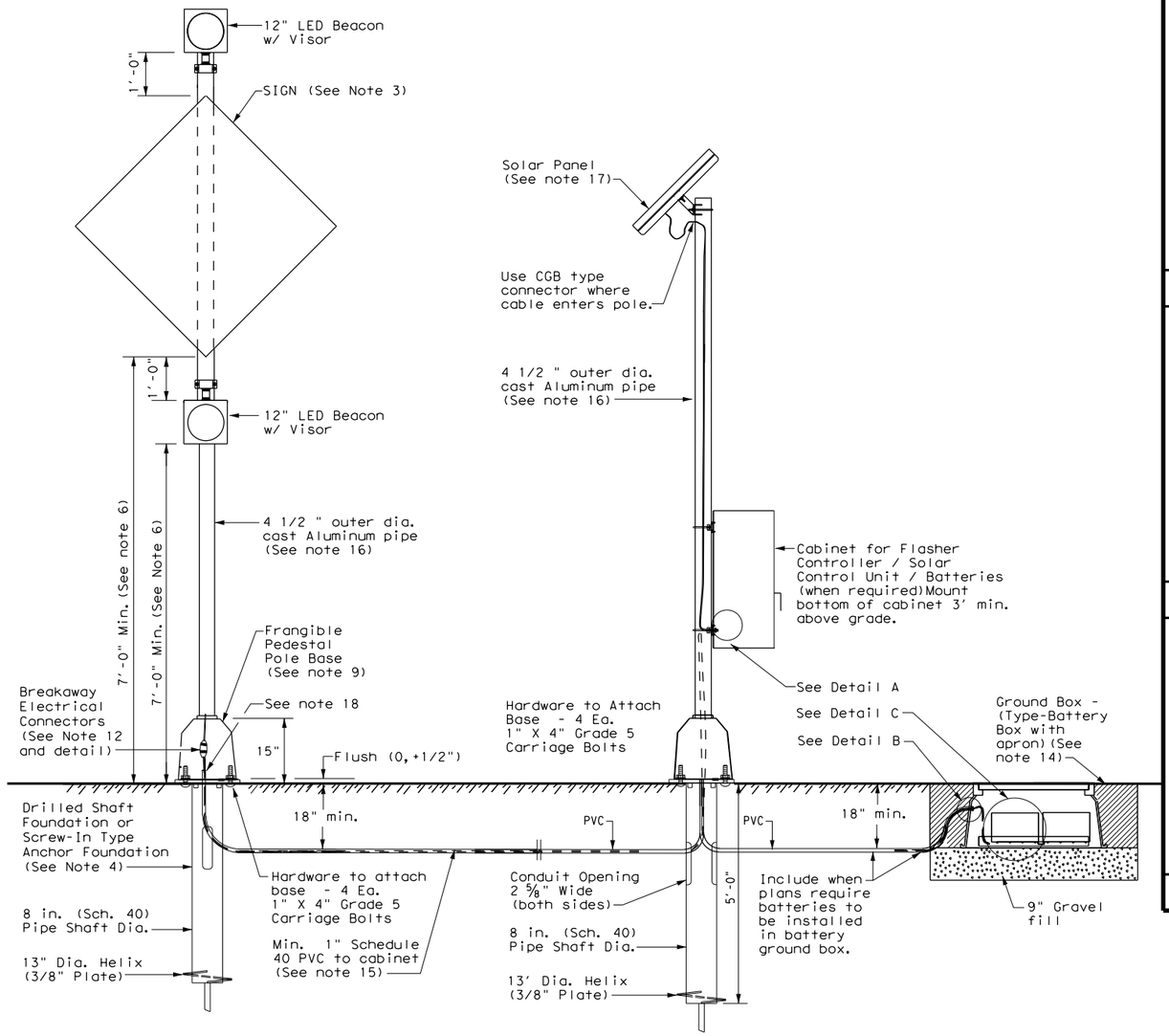
75B

GENERAL NOTES:

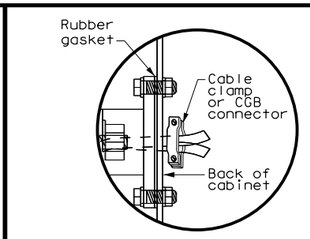
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
7. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
11. Install the cable clamp in the bottom third of the back of the cabinet. See Detail A.
12. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies". Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
13. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16 " plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
14. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
15. Unless otherwise shown on the plans or recommended by the manufacturer, use the following table to determine the wire size from cabinet to beacons.

Distance from Cabinet to Beacons (ft.)	Minimum Required Wire Size (AWG)
0 - 35	#14
35 - 60	#12
60 - 100	#10
> 100	#8

16. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
17. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
18. Ensure height of conduit is below top of anchor bolts.

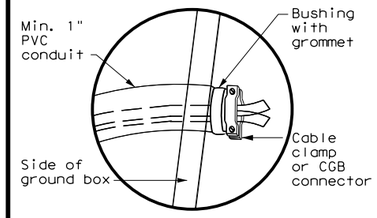


DETAIL FOR SOLAR PANEL, CABINET, AND BATTERIES LOCATED OUT OF CLEAR ZONE ON SEPARATE ALUMINUM POLE ASSEMBLY

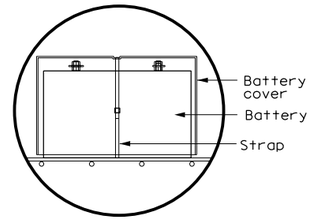


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.

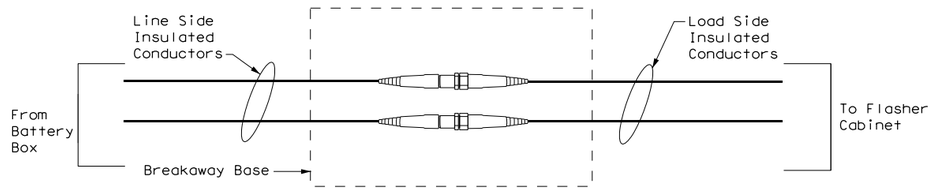
DETAIL A



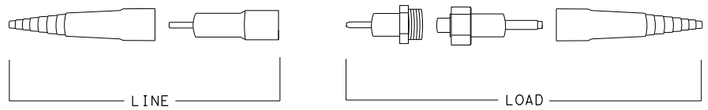
DETAIL B



DETAIL C



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS (ALUMINUM)

SPRFBA(3)-13

FILE: spb3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
12-04	DIST	COUNTY		SHEET NO.
3-13	AUS	GILLESPIE		248

75C

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):
CSJ:0113-02-063

1.2 PROJECT LIMITS:
From:_JENSCHKE LANE_____

To:__CEMETERY RD_____

1.3 PROJECT COORDINATES:
BEGIN: (Lat)_+30.2209697^___,(Long)_-98.7019225^_____

END: (Lat)_+30.2356855^_ _,(Long)_-98.6598398^ _____

1.4 TOTAL PROJECT AREA (Acres): _42.15_____

1.5 TOTAL AREA TO BE DISTURBED (Acres): _27.45____

1.6 NATURE OF CONSTRUCTION ACTIVITY:
PREP ROW,EXCAVATION AND EMBANKMENT,FLEX BASE, _DRAINAGE STRUCTURES,ERISION AND SEDIMENT CONTROLS._____

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Sand (Reese) 0 to 1% slope	Sand, silty,light gray, dry(FILL)(SM)
Sand (Reese) 0 to 1% slope	Sand, silty,compact, gray, moist (FILL)(SM)

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: **Dewatering for drill shafts**
☐ 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: **Significant Material / Sediment Storage**
☐ 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
THREE MILE CREEK	COLORADO RIVER BASIN 1414

* 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
GILLESPIE COUNTY

x

2/27/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mounessyacoub PE
C558EA119EB3496...

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			249
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	GILLESPIE	
CONT.	SECT.	JOB	HIGHWAY NO.
0113	02	063	US 290

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

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

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)
  - [x] 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
  - [x] Required (>10 acres), but not feasible due to:
    - [x] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [x] 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
Stone Riprap at Bridge Three Mile Creek	544+00	546+60

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [x] Excess dirt/mud on road removed daily
- [x] Haul roads dampened for dust control
- [x] Loaded haul trucks to be covered with tarpaulin
- [x] Stabilized construction exit
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [ ] Chemical Management
- [x] Concrete and Materials Waste Management
- [x] Debris and Trash Management
- [x] Dust Control
- [x] 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
Vegetative Buffer outfall Culvert Sta 502+18.54	501+35	505+50
Vegetative Buffer outfall Culvert Sta 522+30.00	519+50	529+69
Vegetative Buffer outfall Bridge Three Mile Creek	543+00	545+50
Vegetative Buffer outfall Culvert Sta 568+18.77	562+00	574+42
Vegetative Buffer outfall Culvert Sta 623+97.69	613+00	626+65

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

2.8 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.

x

2/27/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mounessy Yacoub P.E.
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STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			250
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	GILLESPIE	
CONT.	SECT.	JOB	HIGHWAY NO.
0113	02	063	US 290

DATE: 1/24/2023
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0113020063\4 - Design\Plan Set\9. Environmental\US290_ENV_EPIC.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

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

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

1.	Three Mile Creek	544+33.75 to 546+08.75
2.	Unnamed	502+18.54
3.	Unnamed	522+30.00
4.	Unnamed	568+18.77
5.	Unnamed	623+97.69

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. Minimize the amount of vegetation cleared. Avoid impacts to woody vegetation. Tree and bush trimming, cutting, and removal will be kept to a minimum and implemented only when necessary to complete project work.
2. Removal od mature and native trees should be avoided to the greatest extent practicable.
3.

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. Equipment access should be accomplished from banks and bridge deck at Three Mile Creek. Maintain flow of Three Mile Creek through the project limits for the duration of construction operations.
2. When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing. Temporary fills must be removed in their entirety and the affected areas returned to preconstruction elevations.
3. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.
4. The contractor shall remove all woody vegetation, and old migratory bird nests from any structures, between September 16 and February 28 while any nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting on any structures between March 1 and September 15. All methods must be approved by a qualified professional well in advance of planned use. If active nests are encountered on-site during construction, all construction activity within 50 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

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. Abate lead based paint in accordance with the plans.
2.
3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

2/27/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED
PROFESSIONAL ENGINEER

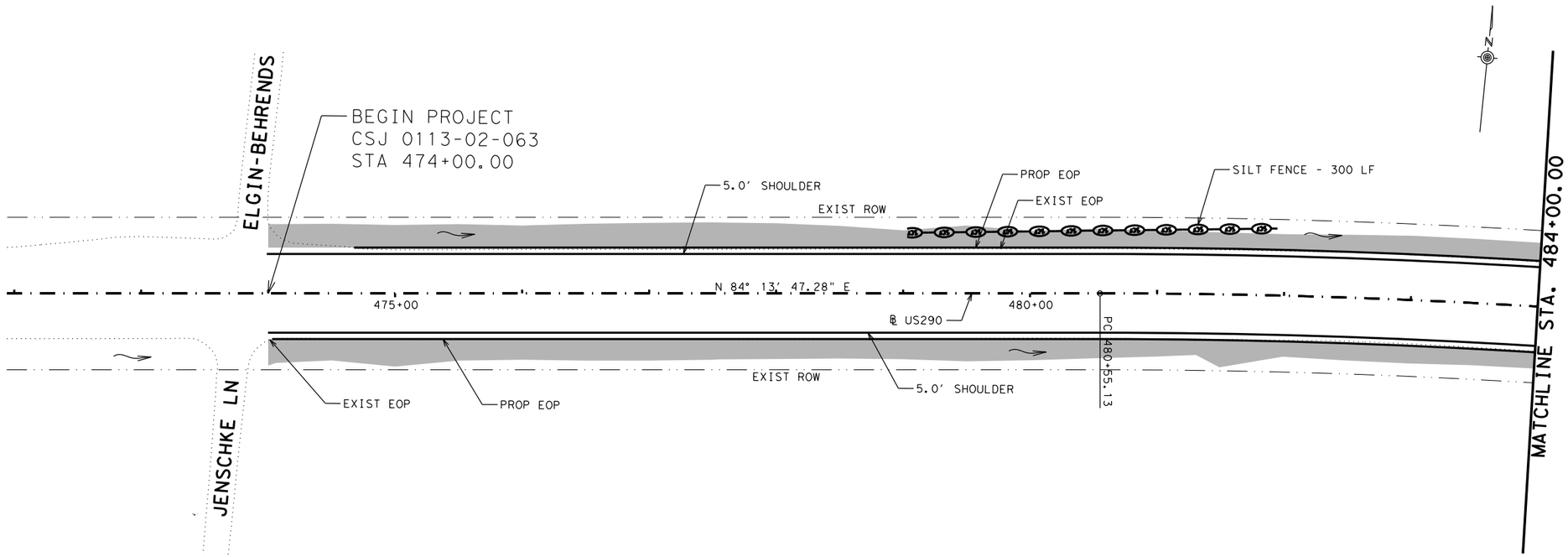
DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

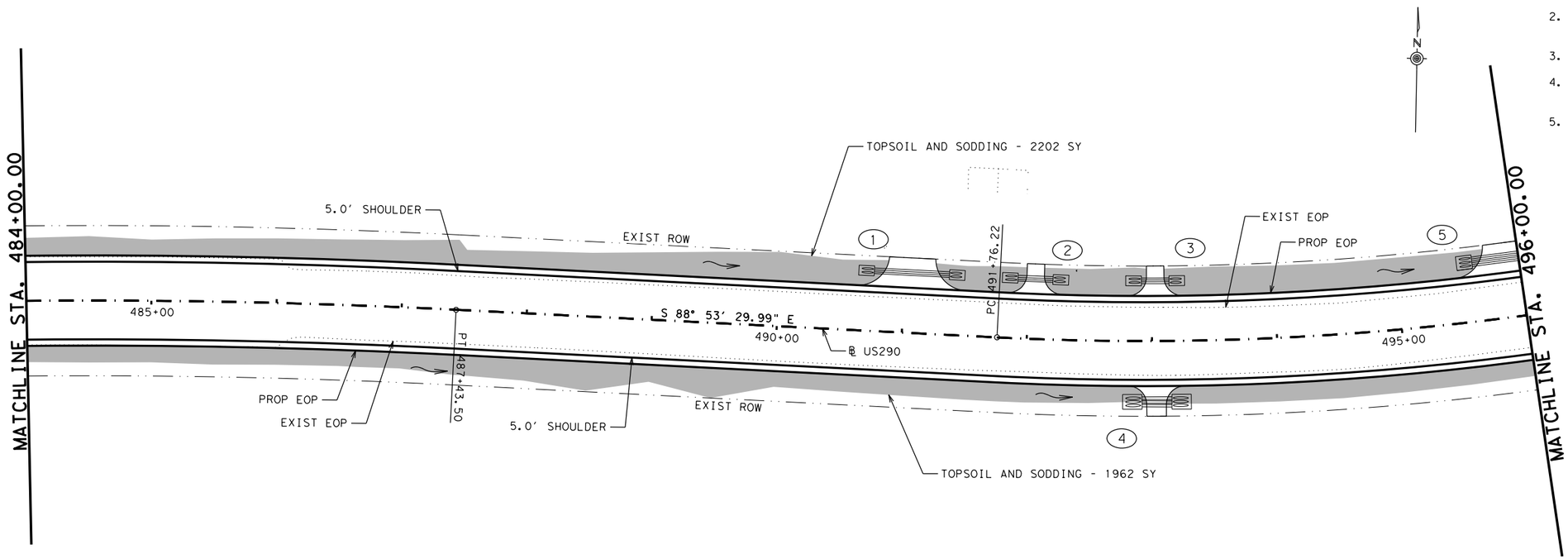
Texas Department of Transportation — Design Division Standard

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)	0113	02	063	US 290
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	GILLESPIE		251





LEGEND

- TOPSOIL & SODDING
- RFD2 — TY 2 ROCK FILTER DAM
- SCF — SILT FENCE
- DIRECTION OF FLOW

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING EROSION CONTROL DEVICES FROM PREVIOUS PHASE(S) THROUGHOUT DURATION OF PROJECT.
2. EXACT LOCATION OF ROCK FILTER DAM AND SEDIMENT CONTROL FENCE TO BE DETERMINED BY THE ENGINEER IN THE FIELD.
3. REMOVE LITTER AND CONSTRUCTION DEBRIS AS NEEDED OR AS DIRECTED BY THE ENGINEER.
4. REMOVE SEDIMENT FROM BMP WHEN IT REDUCES BMP CAPACITY BY 40% ALWAYS PROVIDE CONSISTENT DRAINAGE.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

SCALE (IN FEET):
0 100

Austin District
Central Design

Texas Department of Transportation

US 290
TEMP. AND PERM. EROSION CONTROL LAYOUT

SHEET 1 OF 7

© 2023		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0113	02	063	US 290
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	GILLESPIE		252

DATE: 1/12/2023 2:33:11 PM
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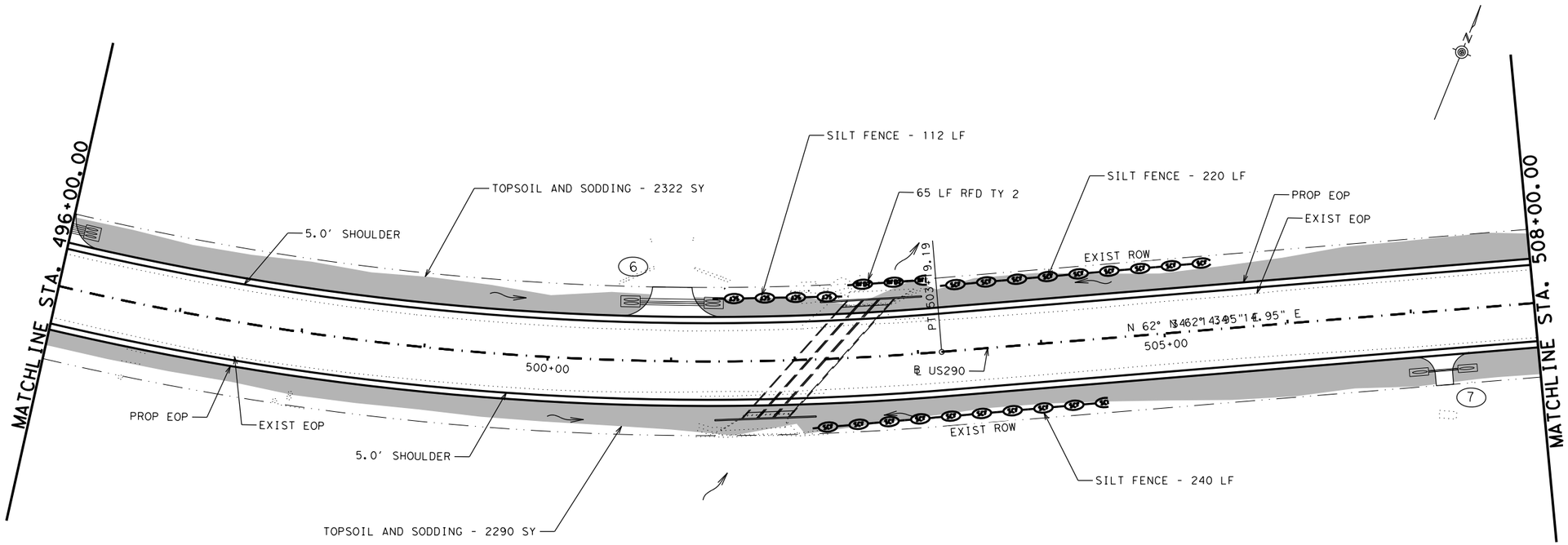

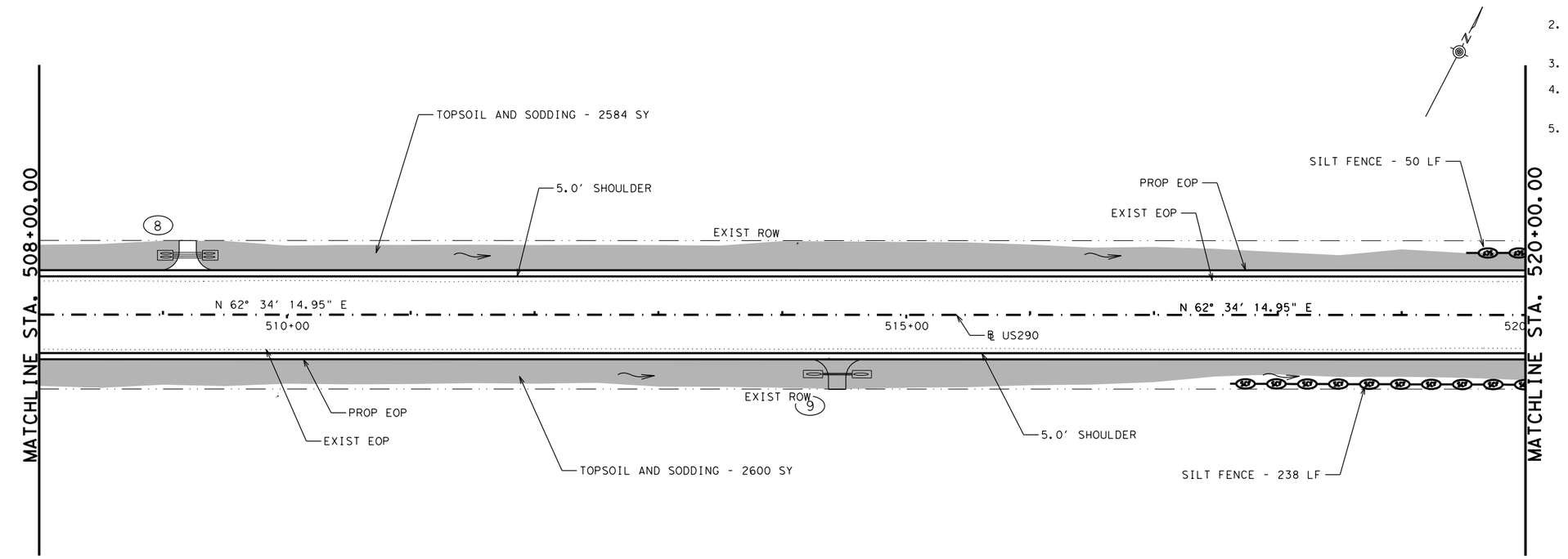

LEGEND

- TOPSOIL & SEEDING
- RFD2 — TY 2 ROCK FILTER DAM
- SCF — SILT FENCE
- DIRECTION OF FLOW

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
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NOTES:

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SCALE (IN FEET):
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Central Design

Texas Department of Transportation

US 290
TEMP. AND PERM. EROSION CONTROL LAYOUT

SHEET 2 OF 7

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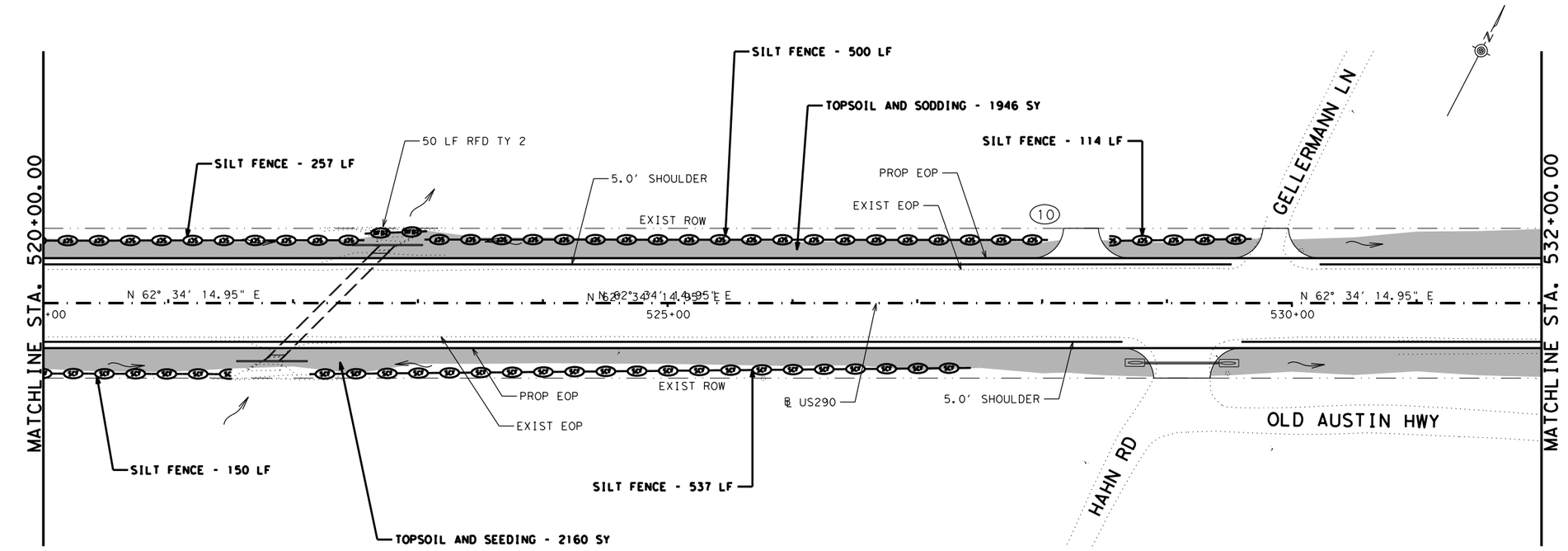

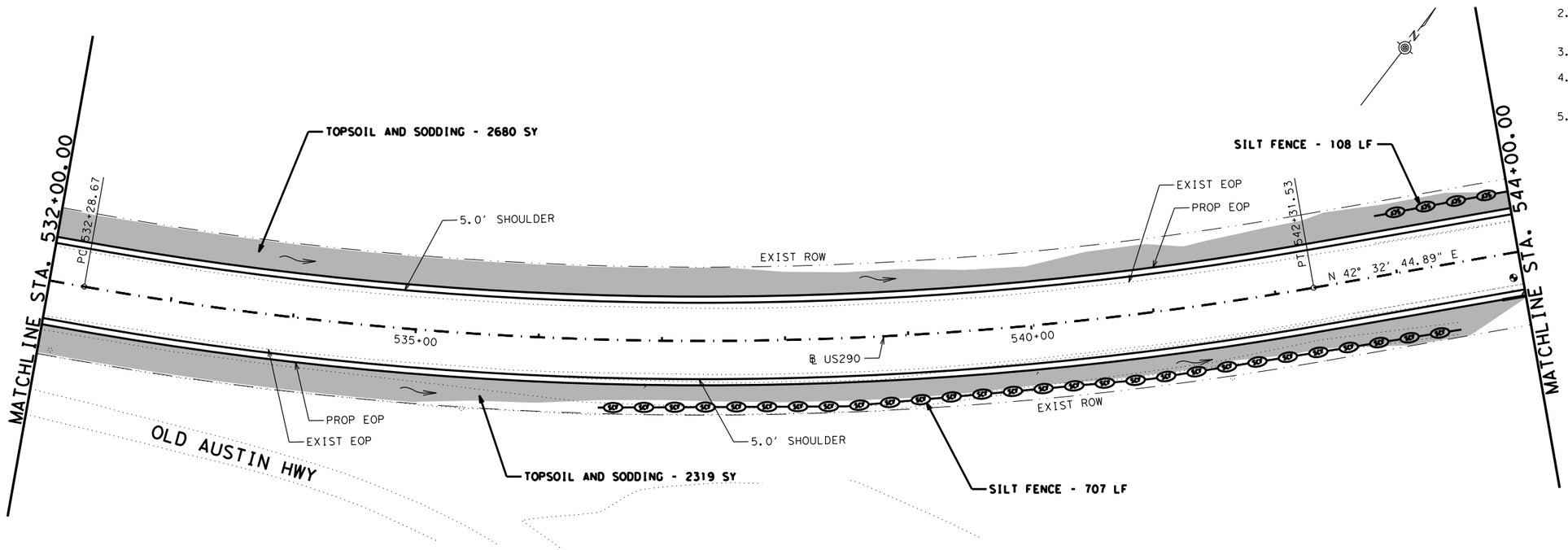

LEGEND

- TOPSOIL & SODDING
- RFD2 — TY 2 ROCK FILTER DAM
- SCF — SILT FENCE
- DIRECTION OF FLOW

1/17/2023

STATE OF TEXAS
MOUNESS H. YACOUB
91227
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mouness Yacoub P.E.
C558EA119EB3496...

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SHEET 3 OF 7

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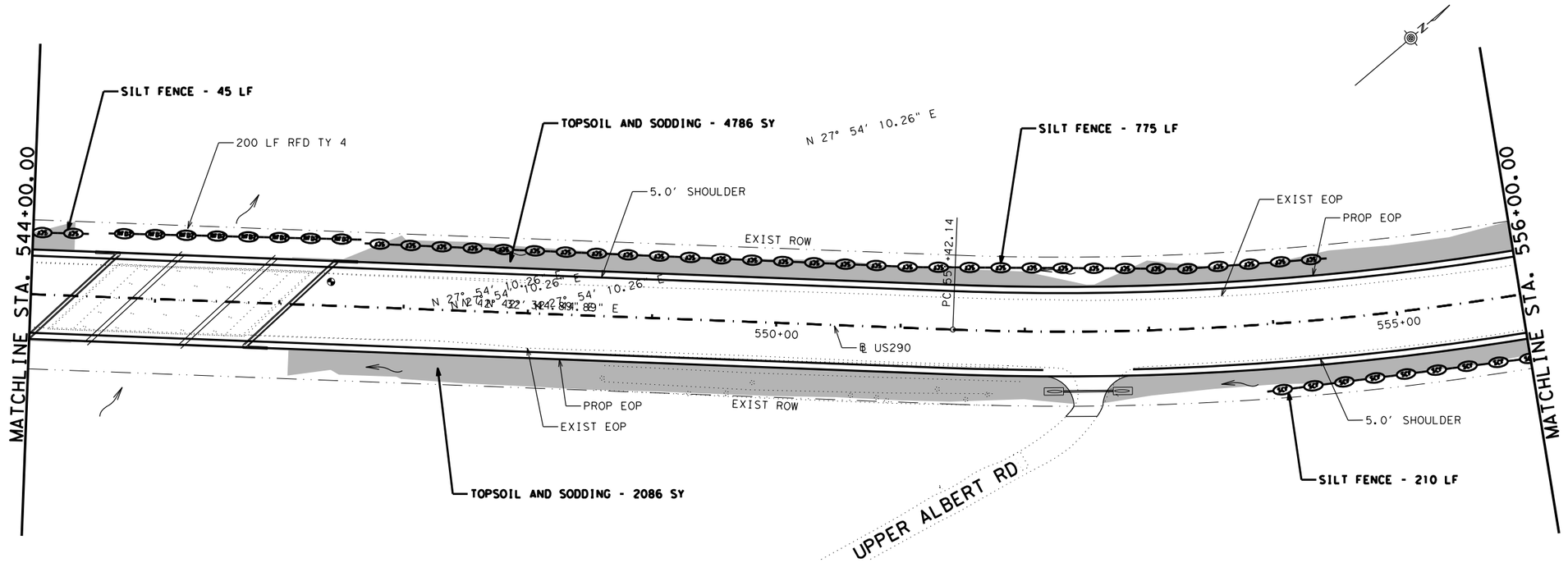

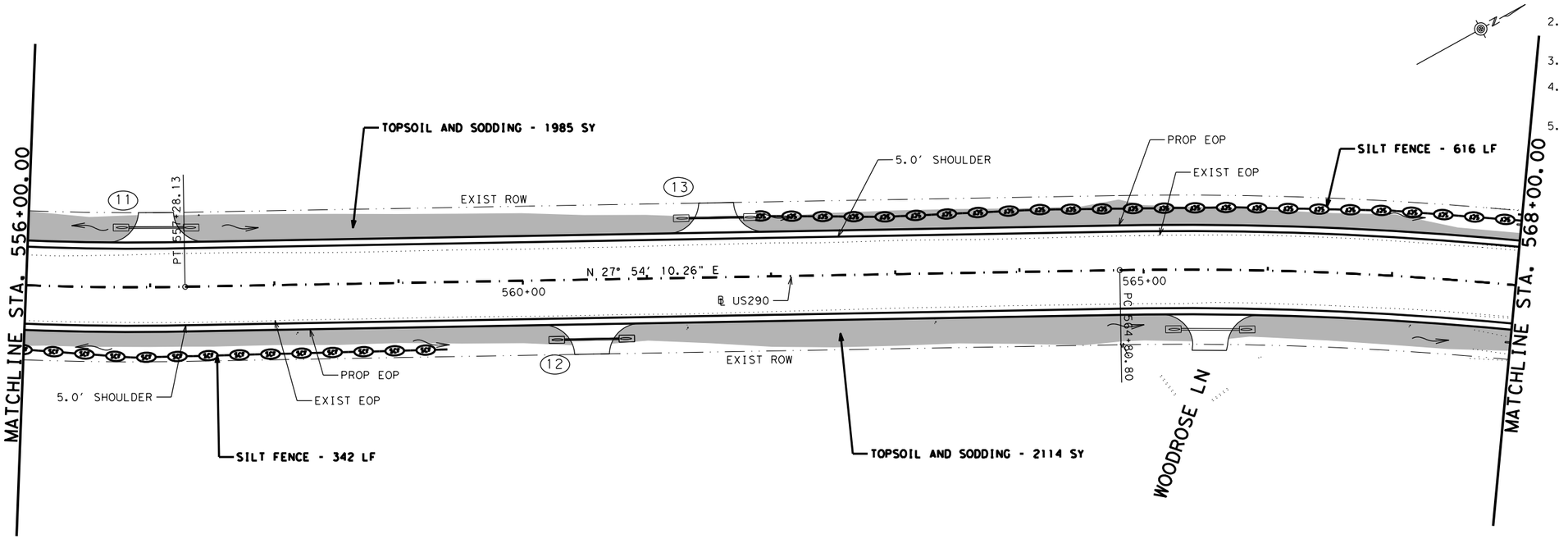

LEGEND

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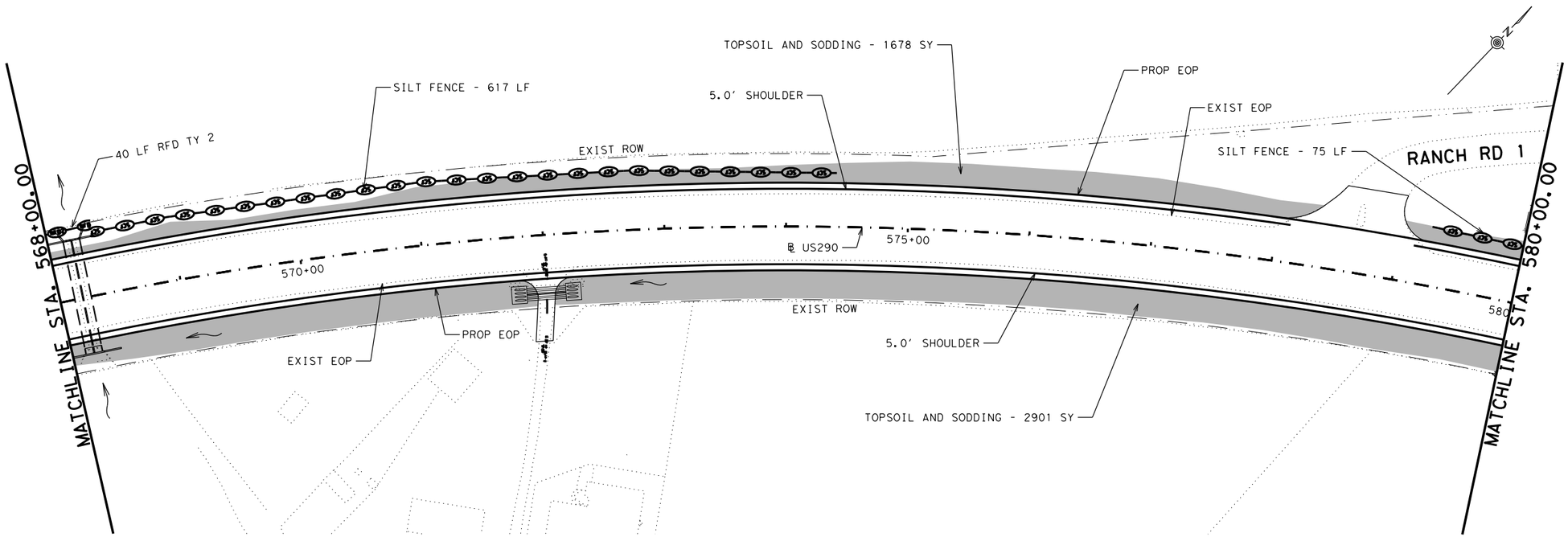

LEGEND

- TOPSOIL & SODDING
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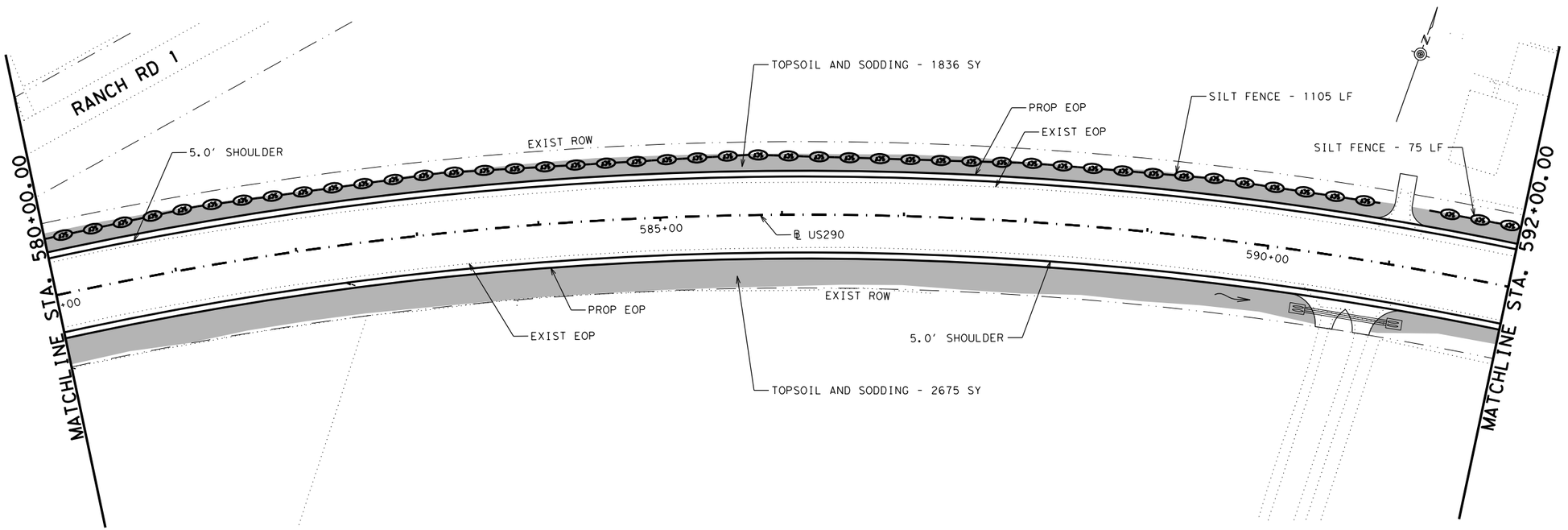

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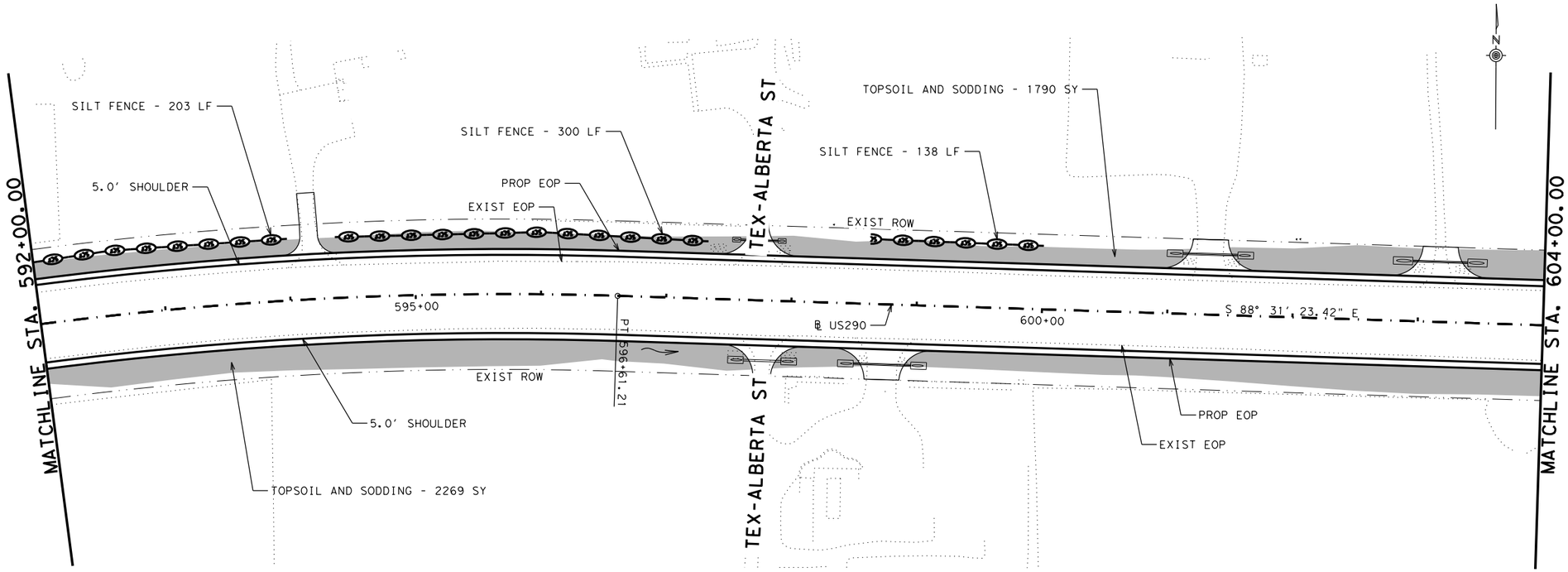

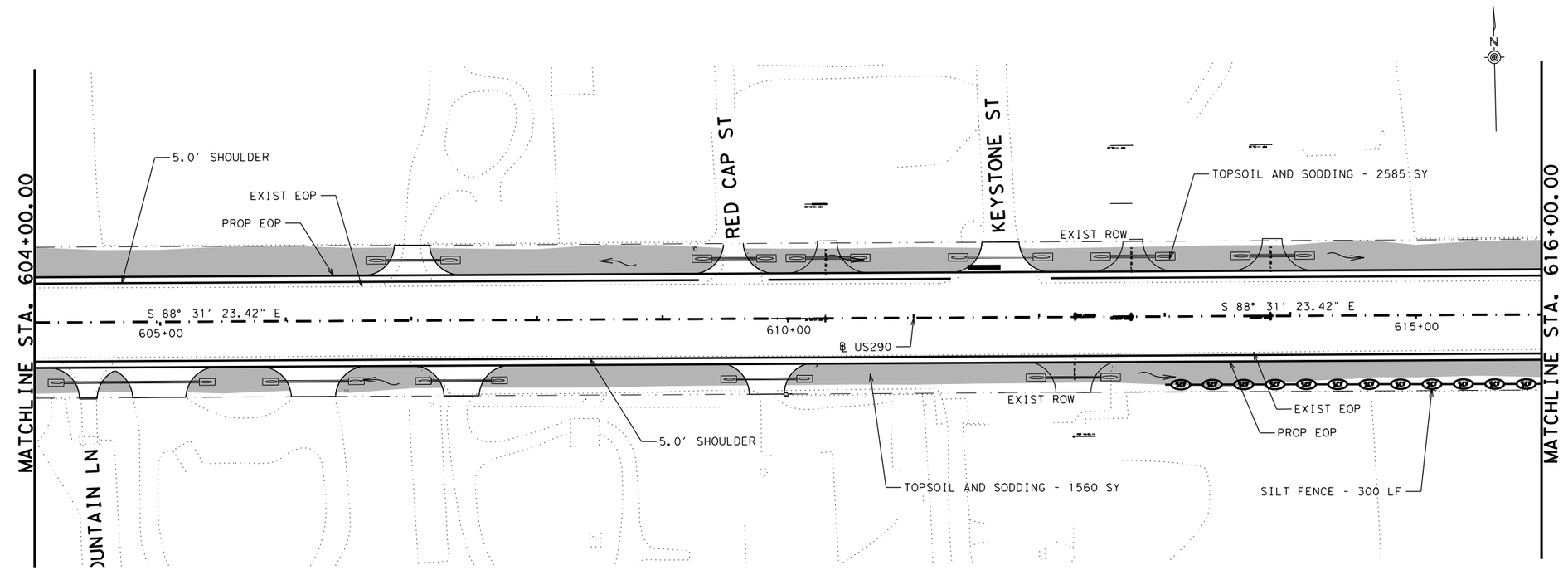

LEGEND

- TOPSOIL & SODDING
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SHEET 6 OF 7

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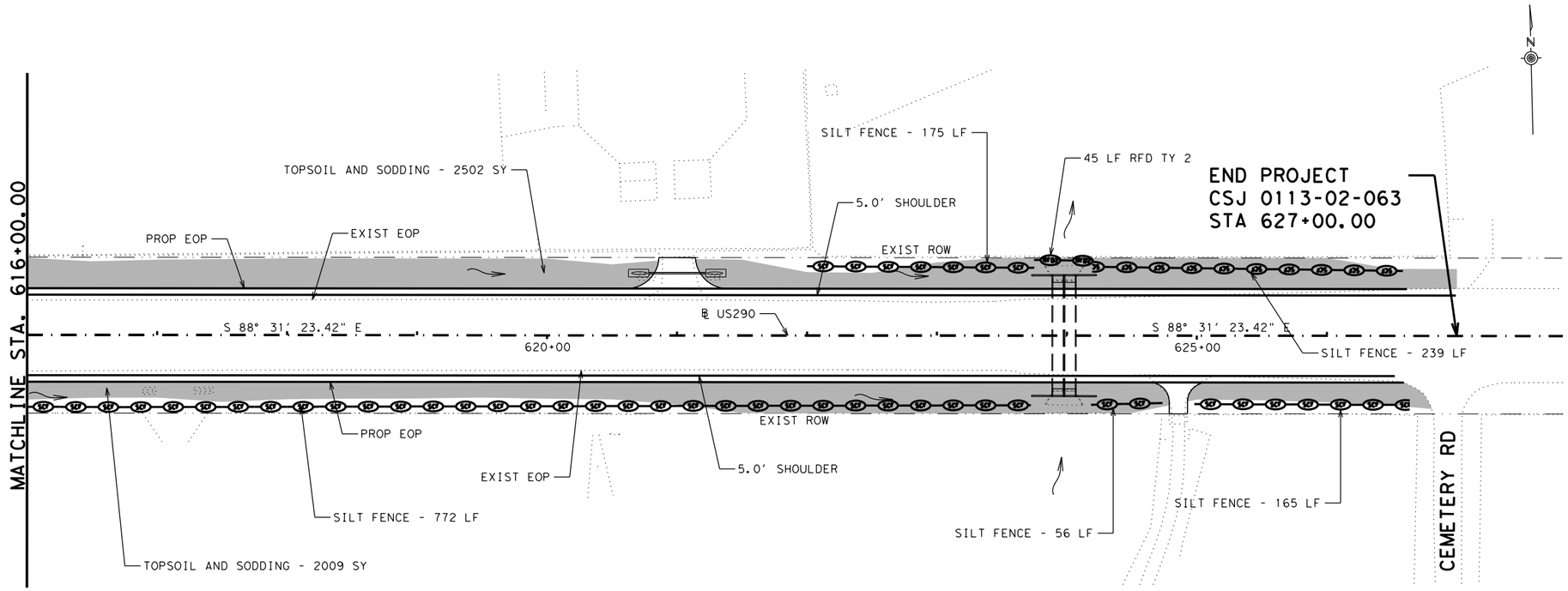

LEGEND

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US 290
TEMP. AND PERM. EROSION CONTROL LAYOUT

SHEET 7 OF 7

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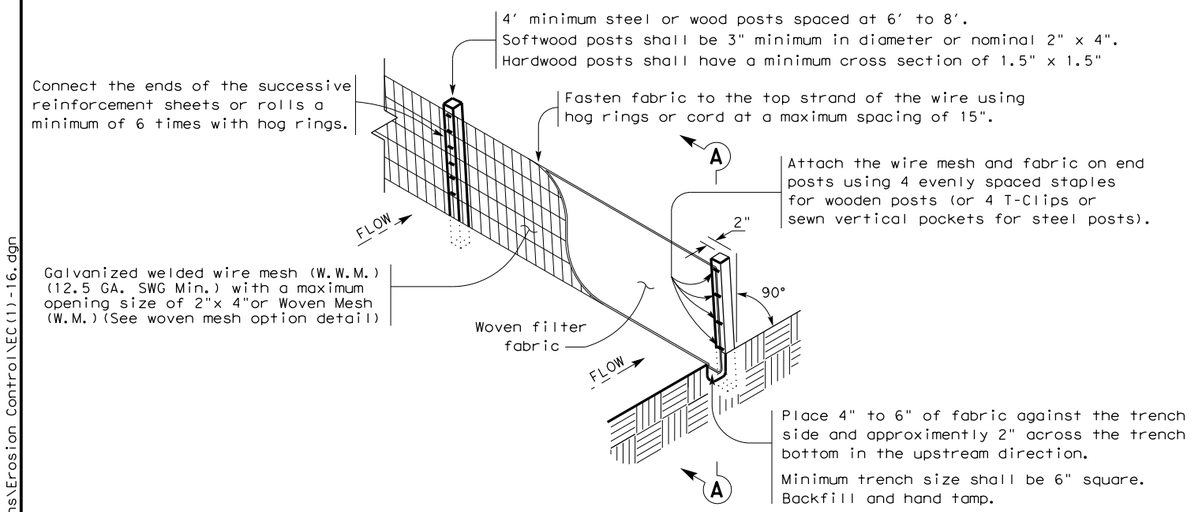
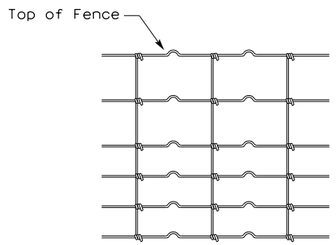
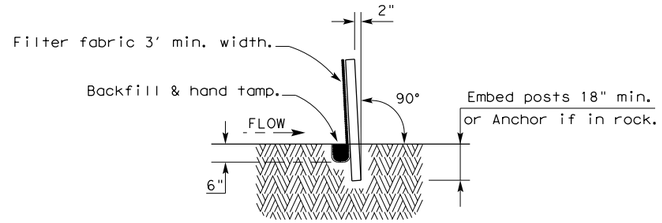


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

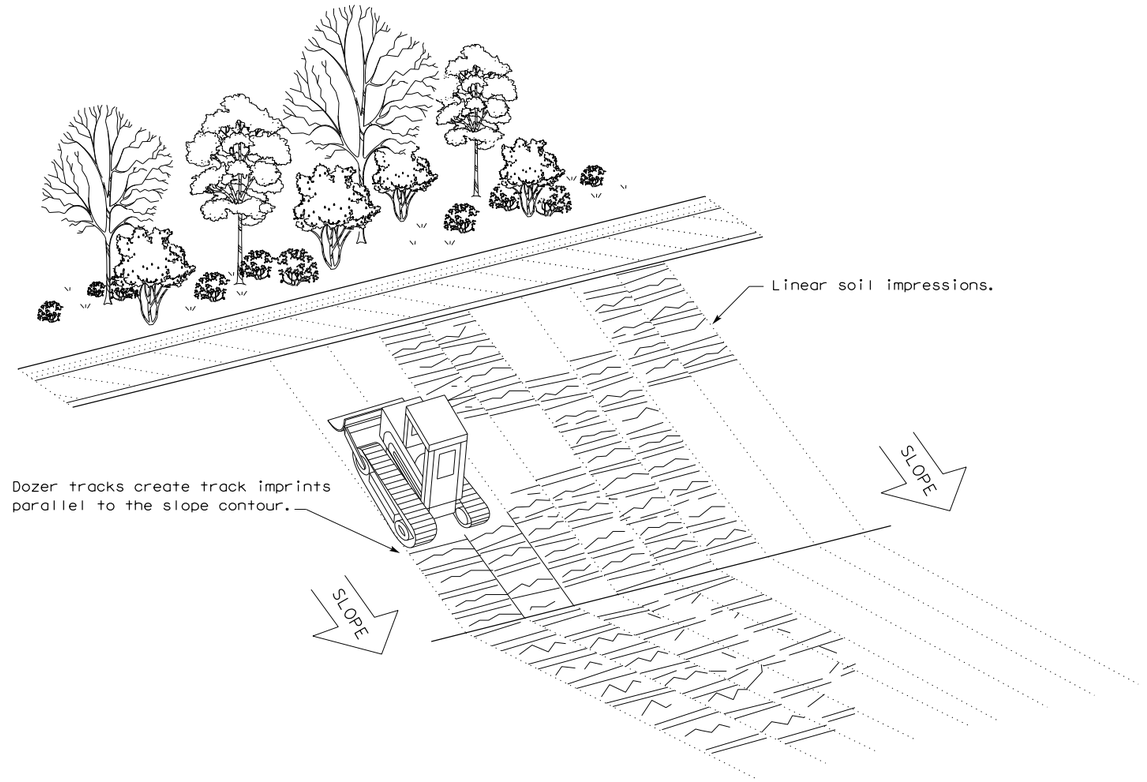
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

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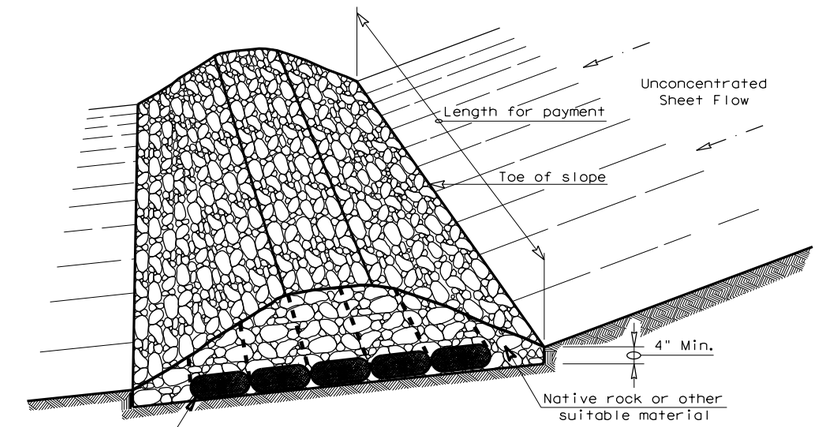
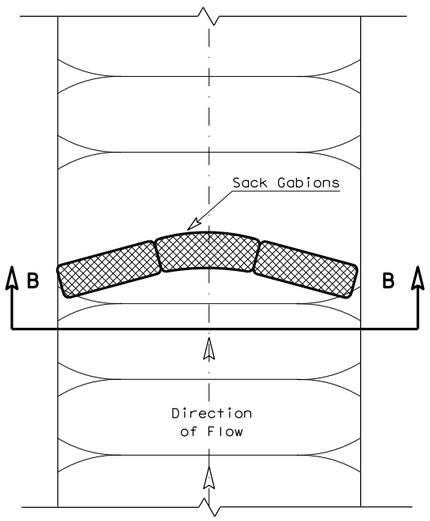
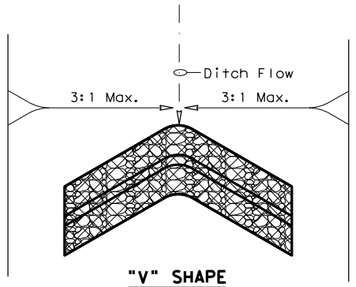


FILTER DAM AT TOE OF SLOPE

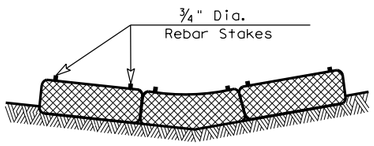
RFD1



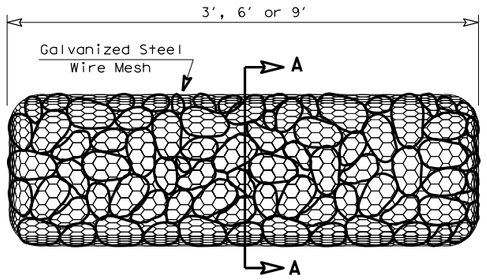
PLAN VIEW



"V" SHAPE
PLAN VIEW

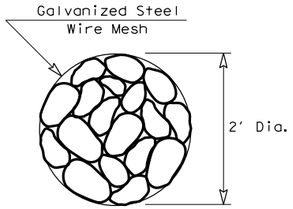


SECTION B-B



TYPE 4 (SACK GABIONS)

RFD4



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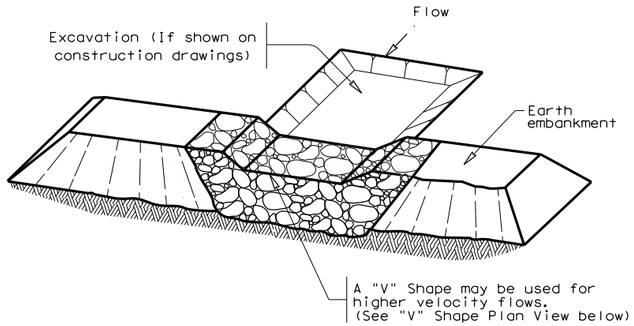
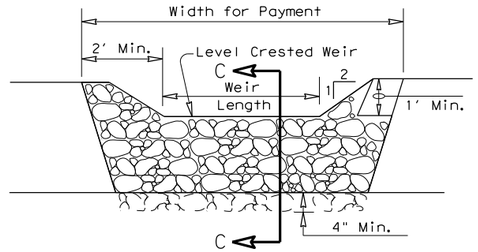


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



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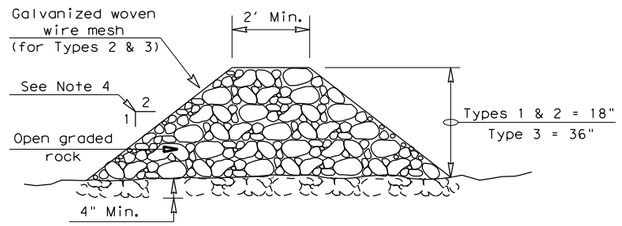
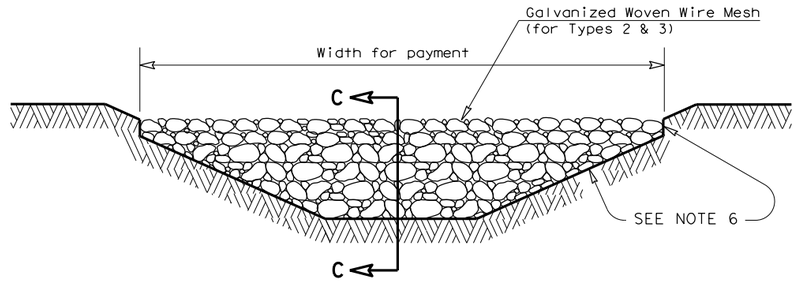


SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

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

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

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

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

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

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

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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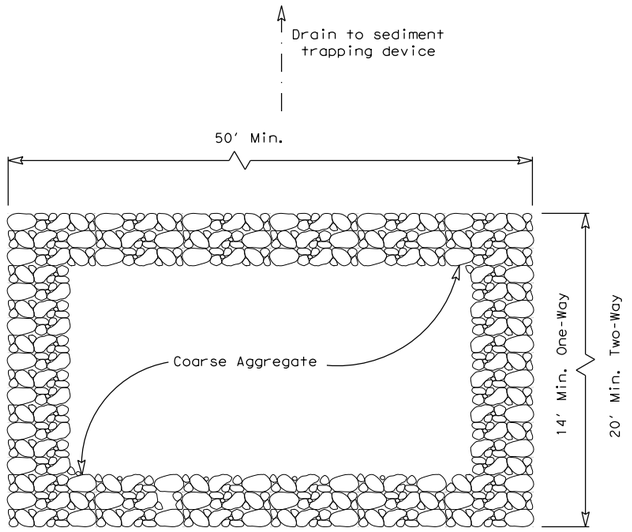
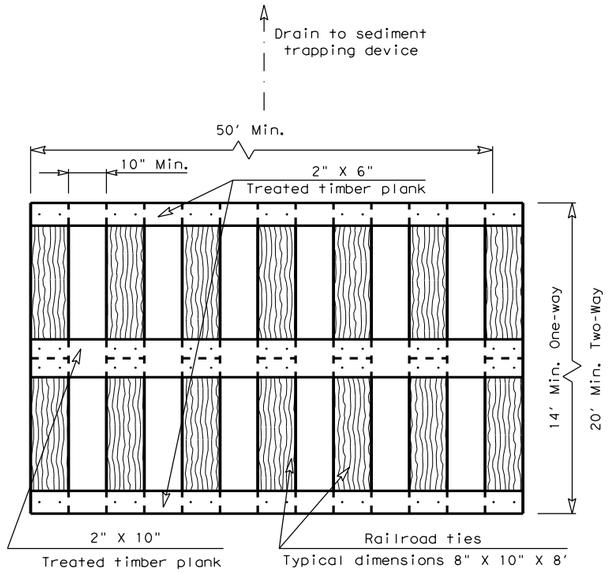
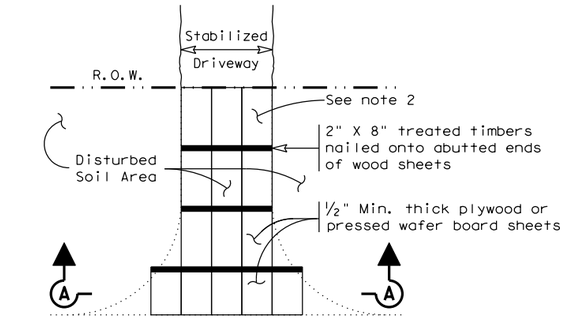


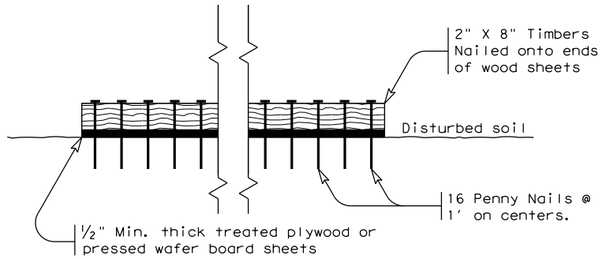
PLAN VIEW



PLAN VIEW



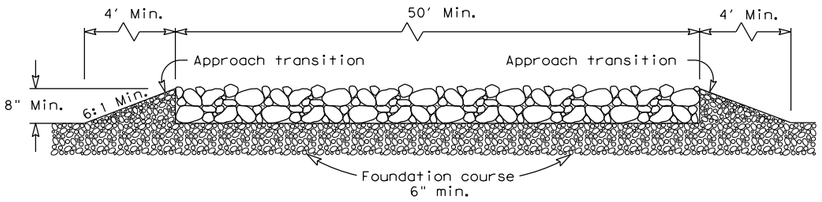
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

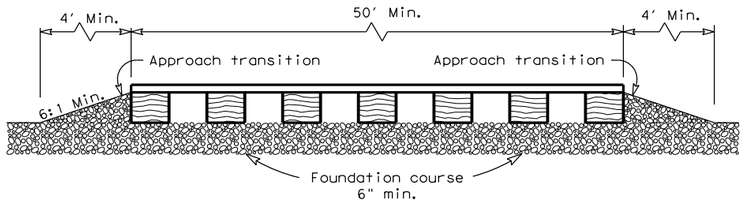
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

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

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0113	02	063	US 290
	DIST	COUNTY		SHEET NO.
	AUS	GILLESPIE		261