STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. STP 2022(830)HES

CSJ: 1155-04-013	NET LENGTH OF ROADWAY=	20,579.98 ft =	3.898 mi
	NET LENGTH OF BRIDGE =	73.00 ft =	0.014 mi
	NET LENGTH OF PROJECT=	20,652.98 ft =	3.912 mi
CSJ: 0558-03-027	NET LENGTH OF ROADWAY=	2,692.80 ft =	0.510 mi
	NET LENGTH OF BRIDGE =	0.00 ft =	0.000 mi
	NET LENGTH OF PROJECT=	2,692.80 ft =	0.510 mi

FM 1785 WIDENING
BORDEN COUNTY

LIMITS: FROM HOWARD COUNTY TO FM 669

FOR THE CONSTRUCTION OF: WIDEN ROAD - ADD SHOULDERS

CONSISTING OF: WIDEN AND ADD TURN LANES

DESIGN SPEED = 50 mph
CURRENT A.D.T. (2020) = 272 vpd
PROJECTED A.D.T. (2040) = 381 vpd
FUNCTIONAL CLASS = MAJOR COLLECTOR
EXISTING AND = 08-017-0-1155-04-006
PROPOSED NBI# 08-017-0-1155-04-007

FHWA TEXAS DIVISION	PROJECT NO.			SHEET NO.
	STP 2022(830)HES			1
STATE	DISTRICT	COUNTY		
TEXAS	ABL	BORDEN		
CONTROL	SECTION	JOB	HIGHWAY NO.	
1155	04	013, ETC.	FM 1785, ETC	

FINAL PLANS

LETTING DATE: 08/01/2022

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

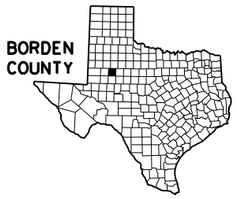
CERTIFICATION FOR FINAL PLANS

THIS PROJECT WAS BUILT ACCORDING TO THE PLANS AND SPECIFICATIONS. THESE FINAL PLANS REFLECT THE WORK DONE AND THE QUANTITIES SHOWN THEREON AND ON THE FINAL ESTIMATE ARE FINAL QUANTITIES.

AREA ENGINEER DATE

INDEX OF SHEETS

SEE SHEET 2

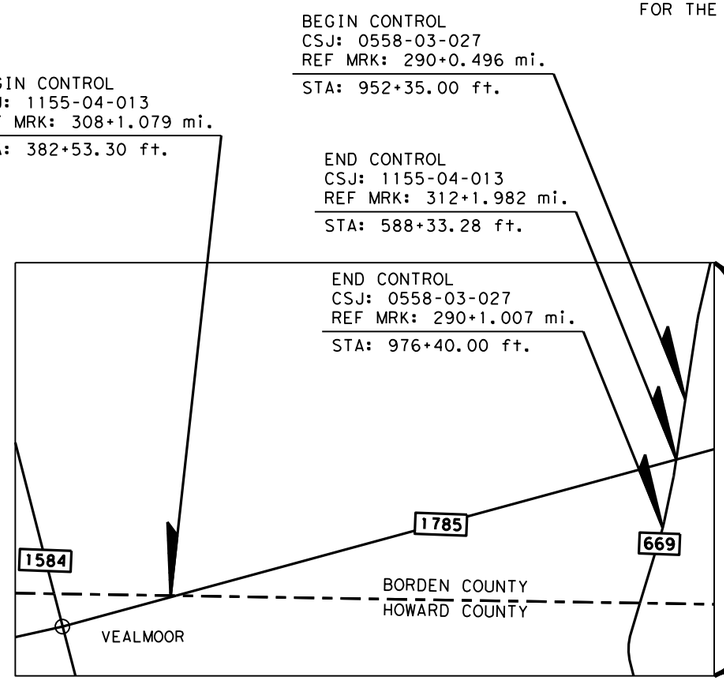


BEGIN CONTROL
CSJ: 1155-04-013
REF MRK: 308+1.079 mi.
STA: 382+53.30 ft.

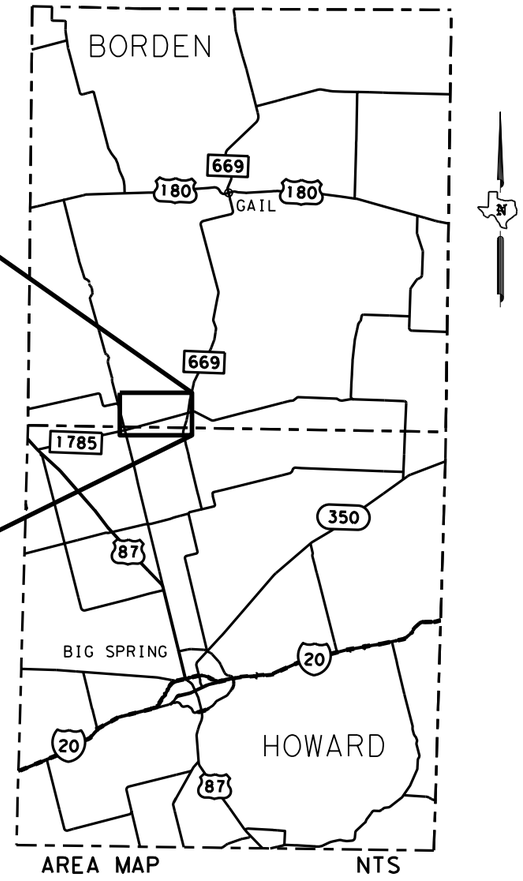
BEGIN CONTROL
CSJ: 0558-03-027
REF MRK: 290+0.496 mi.
STA: 952+35.00 ft.

END CONTROL
CSJ: 1155-04-013
REF MRK: 312+1.982 mi.
STA: 588+33.28 ft.

END CONTROL
CSJ: 0558-03-027
REF MRK: 290+1.007 mi.
STA: 976+40.00 ft.



PROJECT VICINITY MAP
SCALE: 1" = 6000'



AREA MAP NTS

EXCEPTIONS: N/A
EQUATIONS: N/A
RAILROAD CROSSINGS: N/A

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

THE DISTRICT TRAFFIC SAFETY COMMITTEE HAS REVIEWED THE TRAFFIC CONTROL PLAN FOR THIS PROJECT AND IT IS IN COMPLIENCE WITH CURRENT TRAFFIC CONTROL STANDARDS.

DocuSigned by: Casey McGee 2377E0B87A804A6... COMMITTEE CHAIRMAN — 6/3/2022 DATE

Texas Department of Transportation

RECOMMENDED FOR LETTING: 6/3/2022
DocuSigned by: Ryan Roy Sayles EBF7BBC5184947E...
RYAN SAYLES, P.E.
AREA ENGINEER

SUBMITTED FOR LETTING: 6/2/2022
DocuSigned by: Will B Brazzil B90C12C33A144D...
WILL B. BRAZZIL
TxDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 6/3/2022
DocuSigned by: Michael Haithcock 57B7E2887B84FD...
MICHAEL A. HAITHCOCK, P.E.
DIRECTOR OF T P & D

RECOMMENDED FOR LETTING: 6/3/2022
DocuSigned by: Bryce Turentine 11C7B898B674427...
BRYCE M. TURENTINE, P.E.
TRAFFIC ENGINEER

APPROVED FOR LETTING: 6/3/2022
DocuSigned by: Thomas D. Allbritton, P.E. 0F6F1E4D4B2D430...
THOMAS D. ALLBRITTON, P.E.
DISTRICT ENGINEER

PENTABLE:
DATE: 6/1/2022
FILE: pw://txdot.projectwiseonline.com:TX0072/Documents/08 - ABL/Design Projects/11556401 3/4 - Design/Plan Set/1. General/TITLE SHEET.dgn

INDEX OF SHEETS

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A # HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

P.E.
BRYCE M. TURENTINE , P.E. 05/31/2022
DATE

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Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
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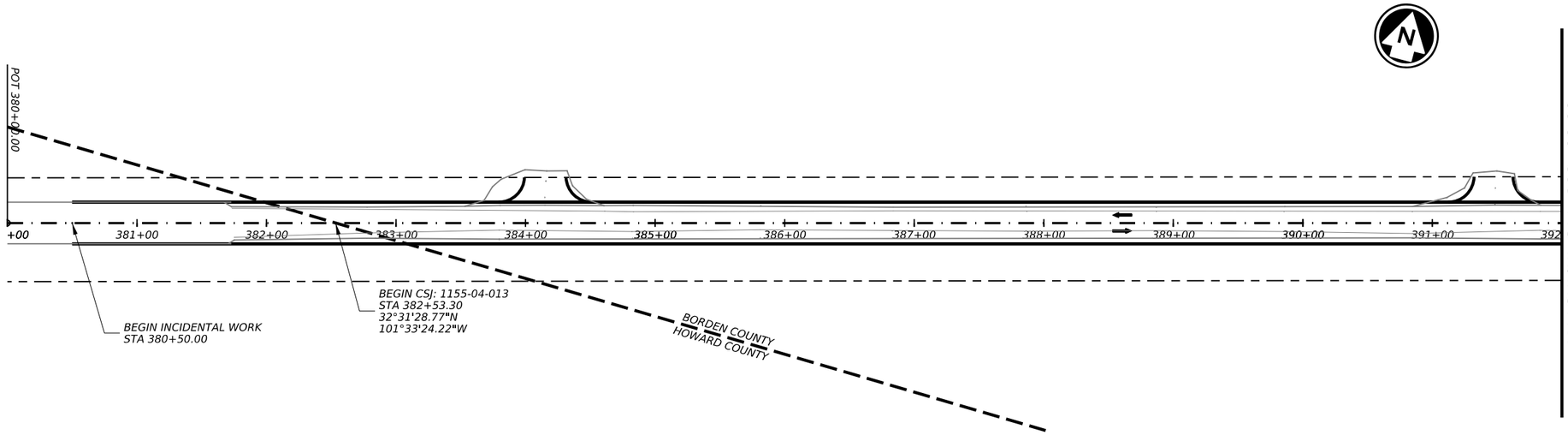
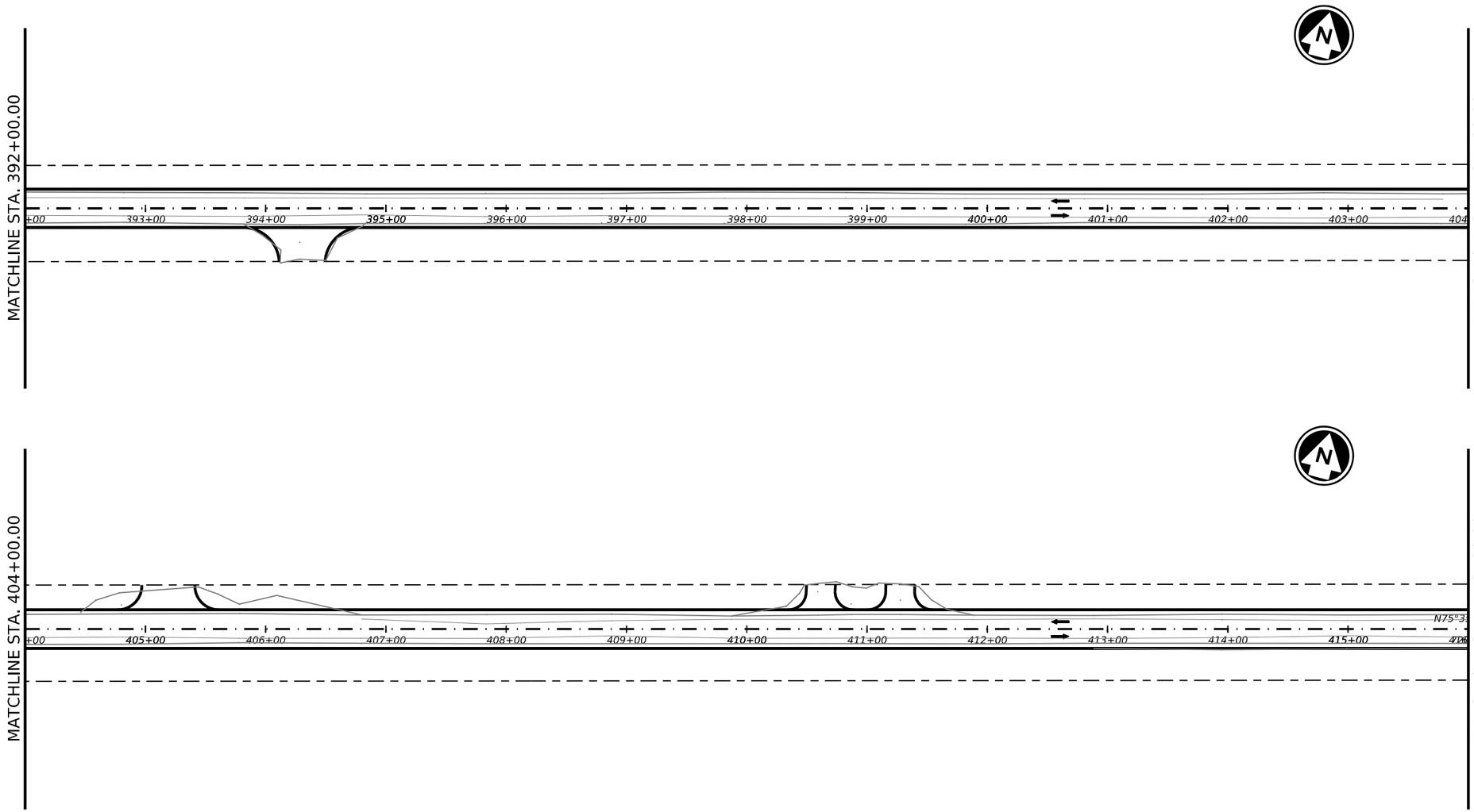
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.





LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER
P.E.

05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 1 OF 7

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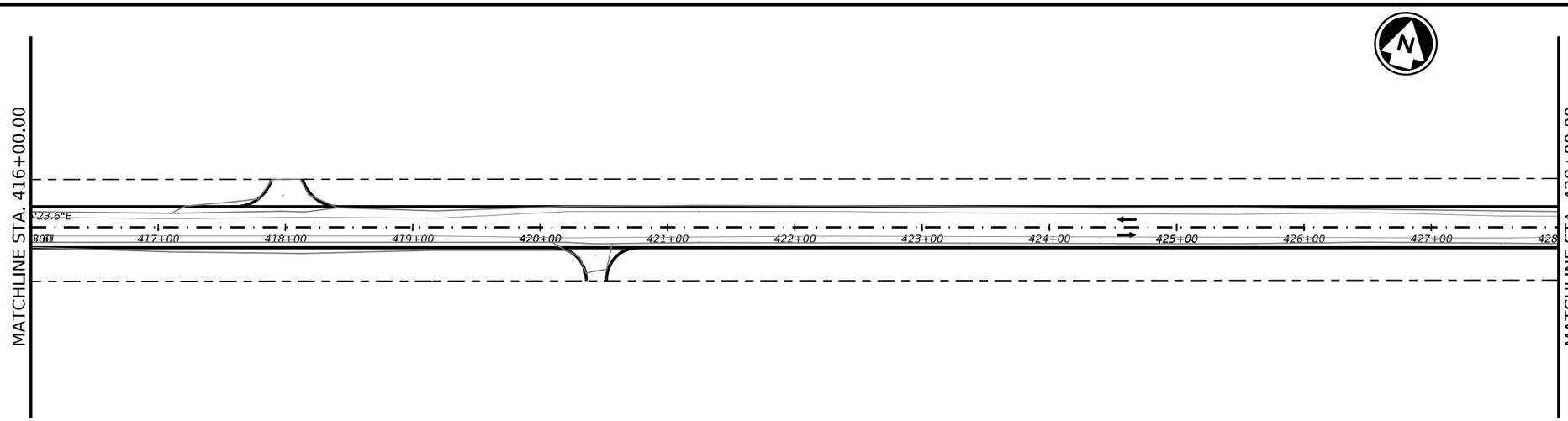

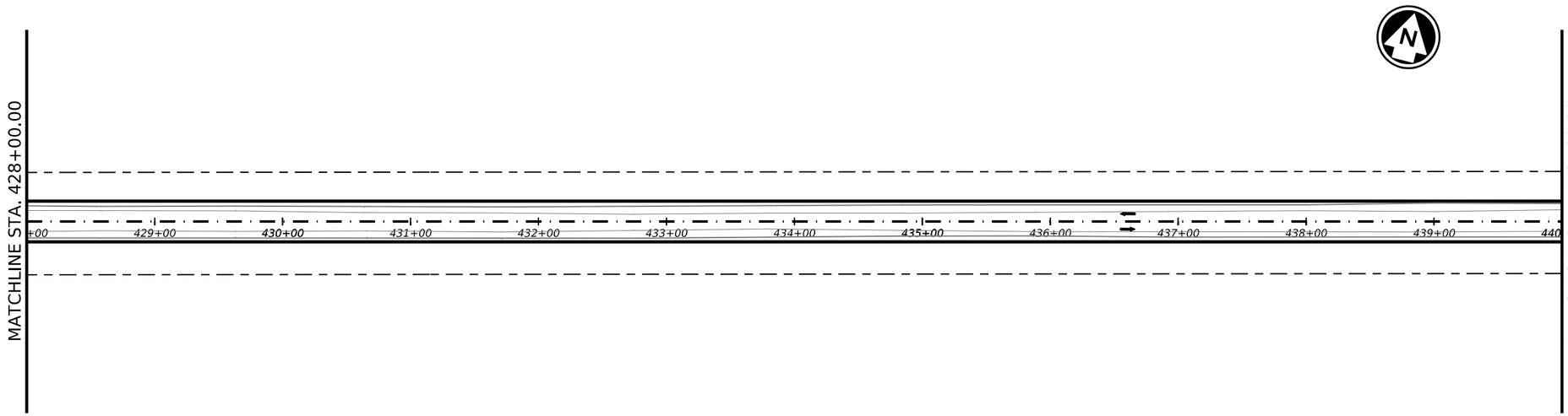

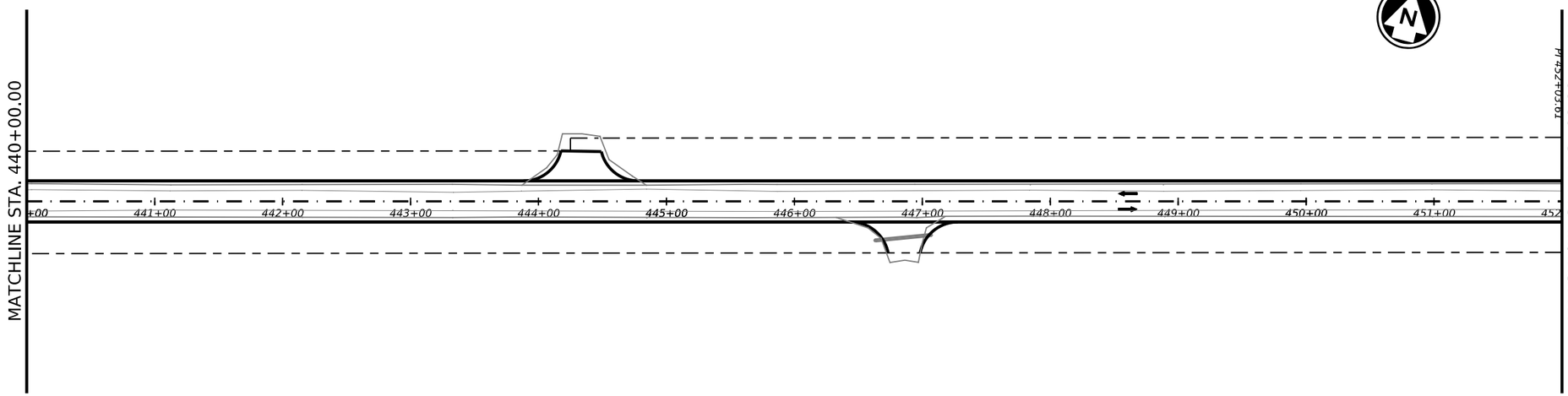

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
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PROFESSIONAL ENGINEER

P.E.

05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 2 OF 7

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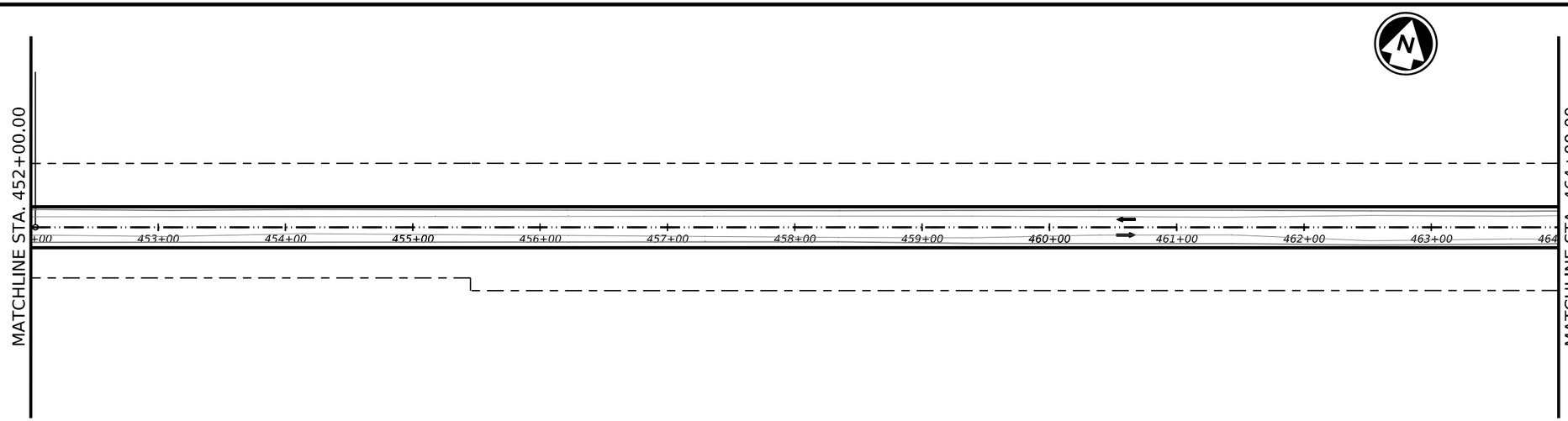

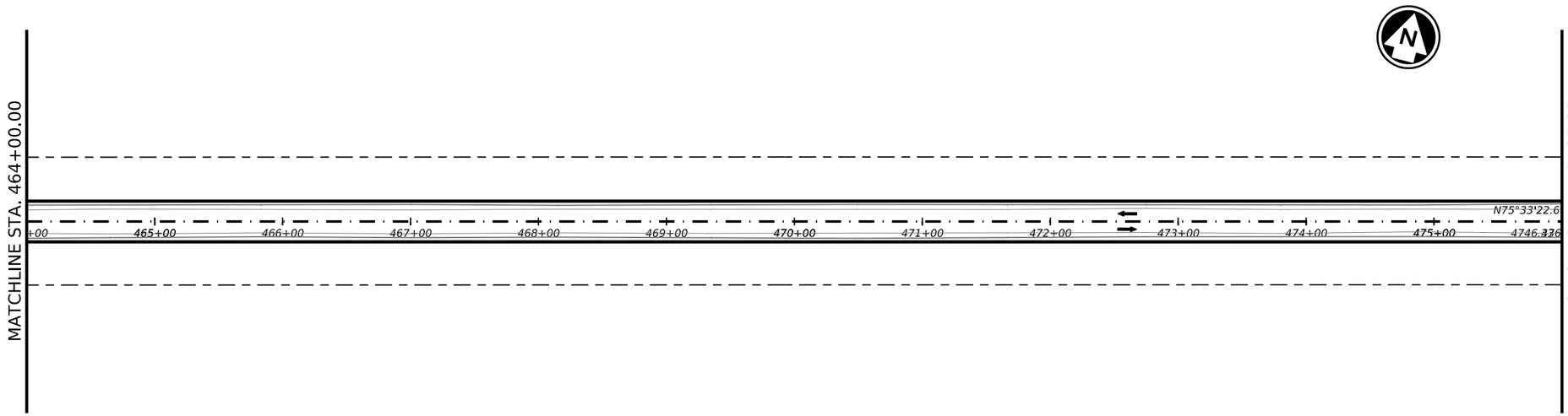

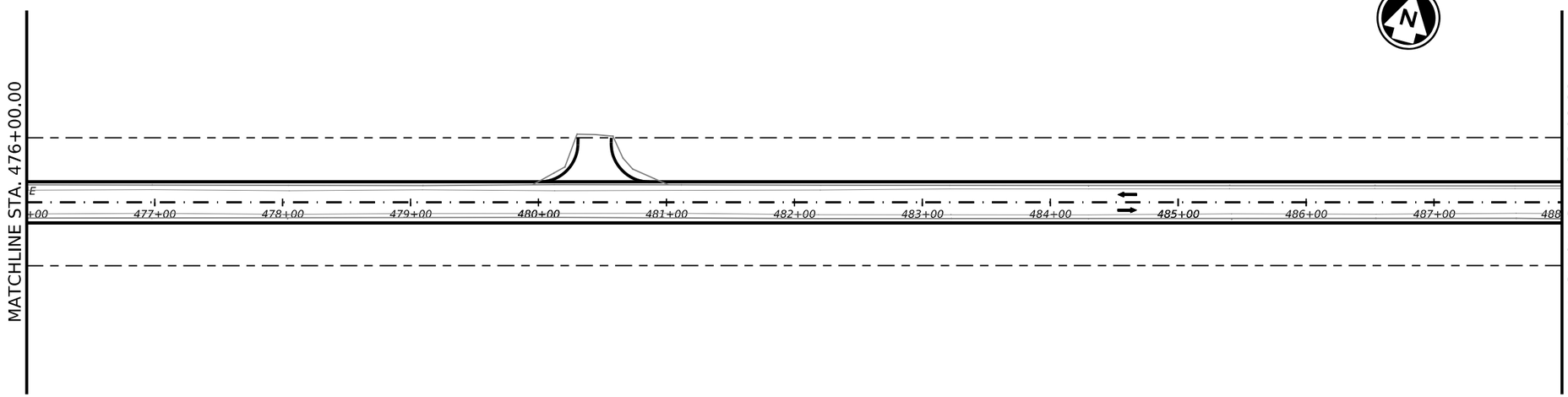

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
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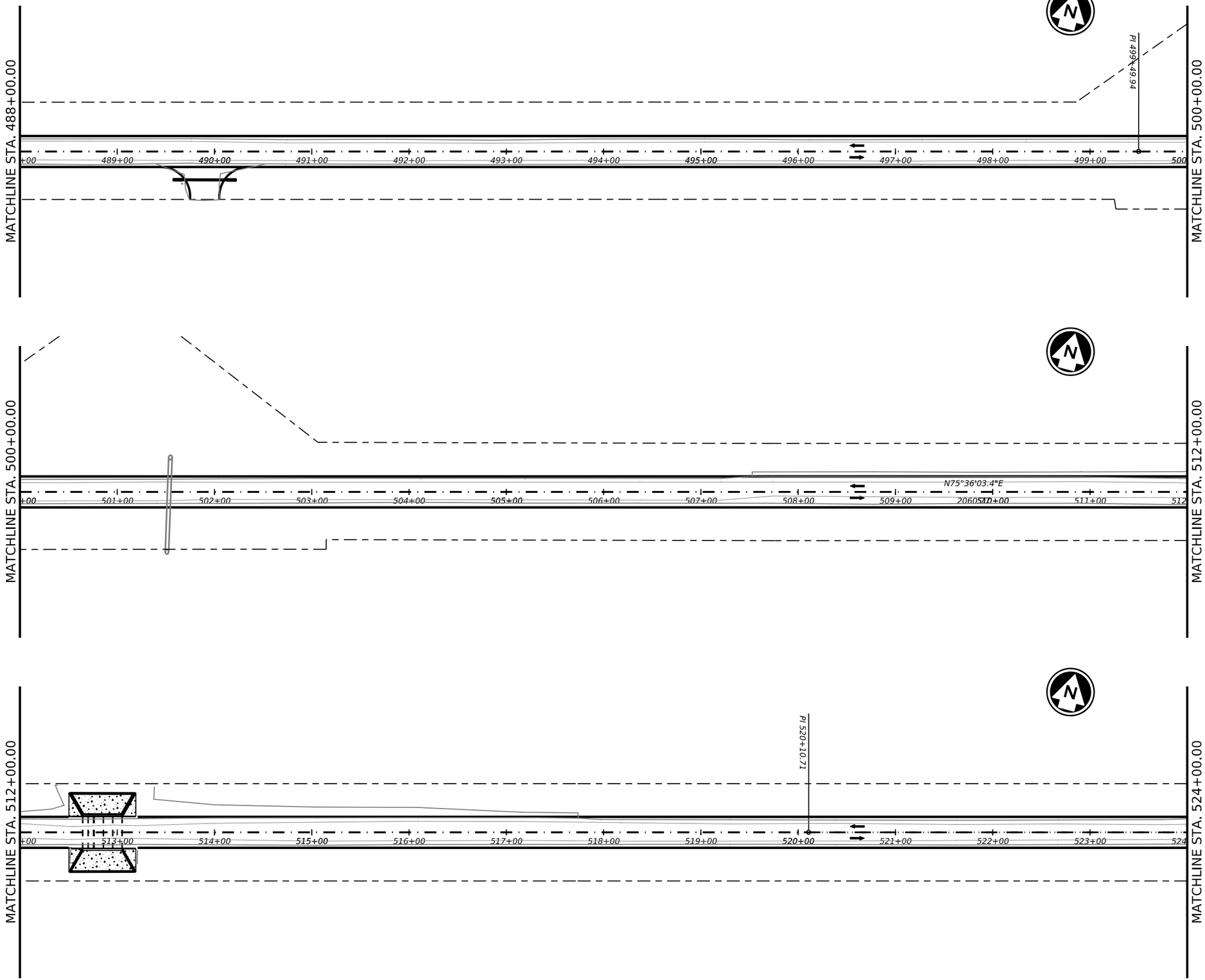

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
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LICENSED
PROFESSIONAL ENGINEER

P.E.

05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
ABL	BORDEN		6

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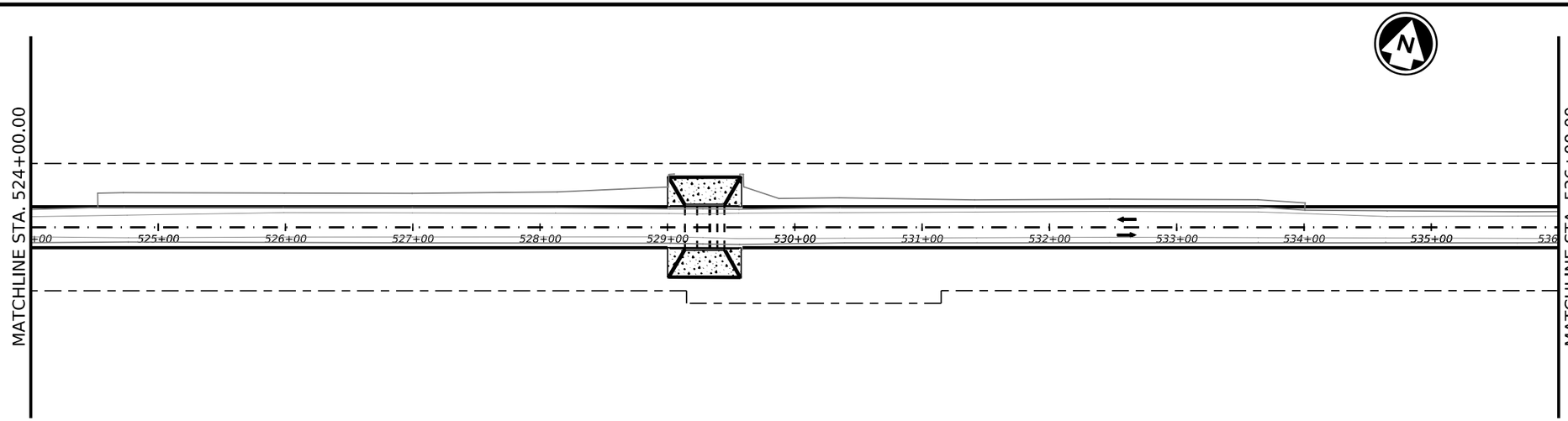

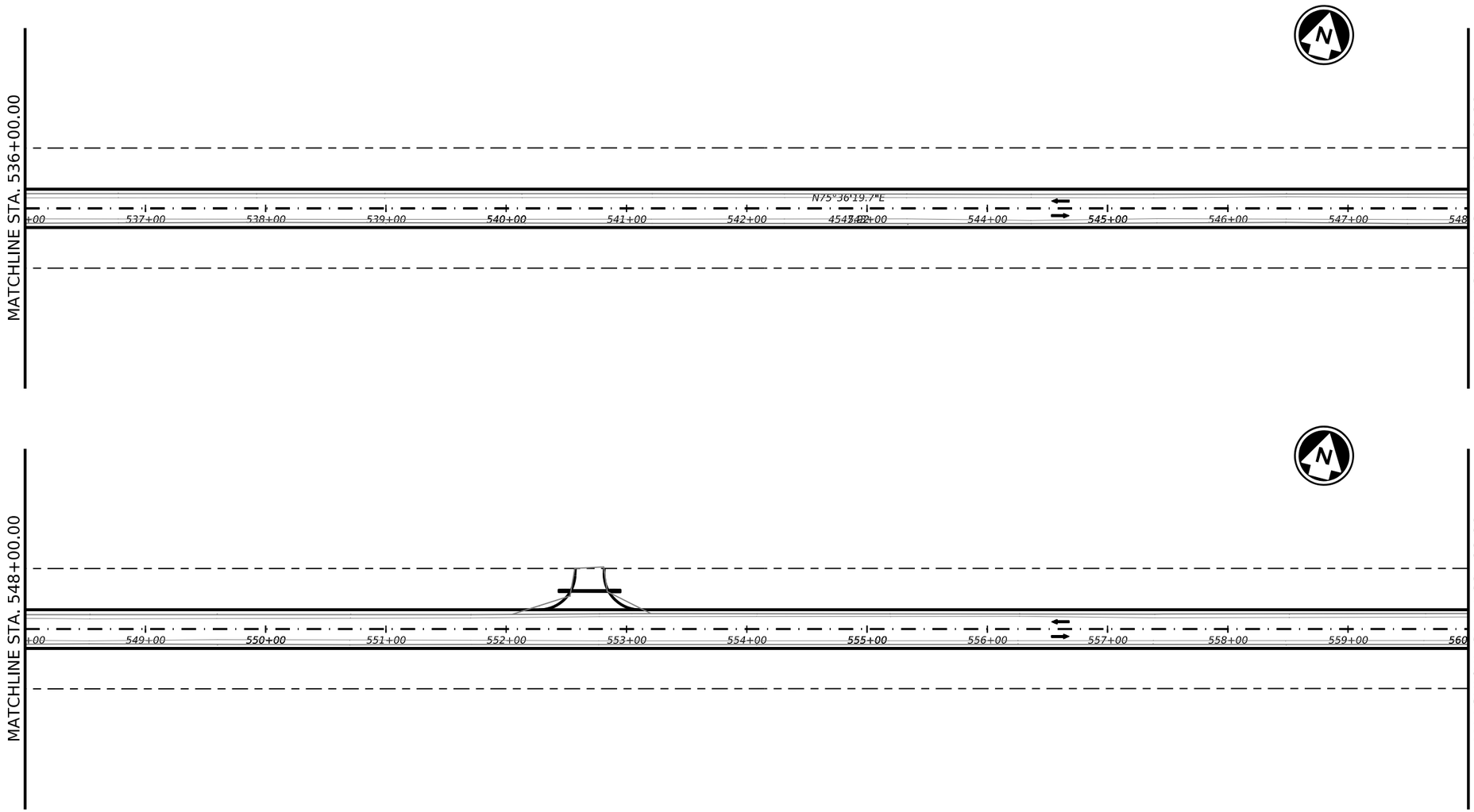

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
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05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
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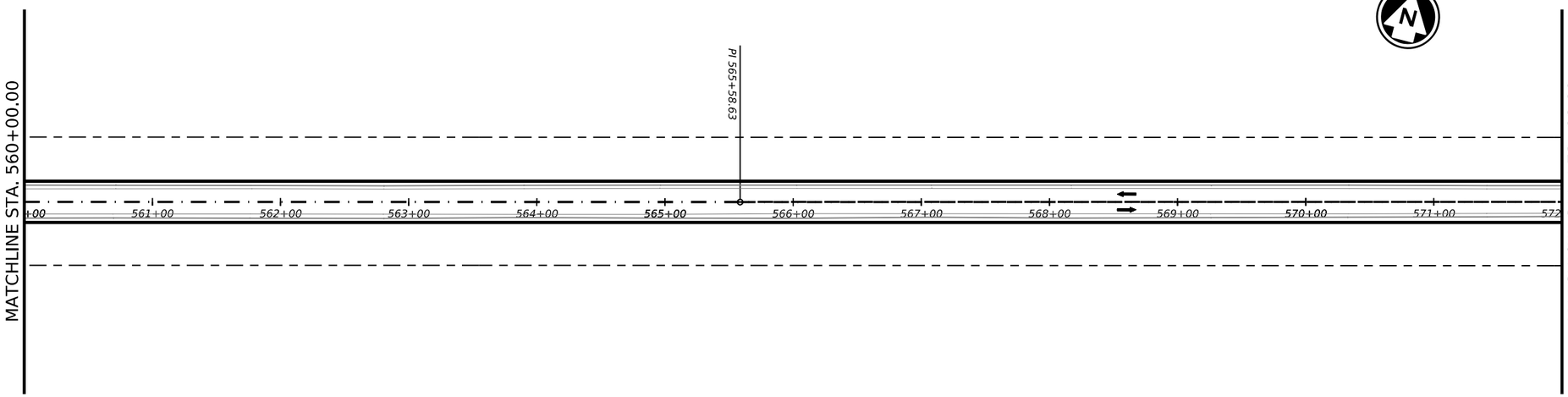

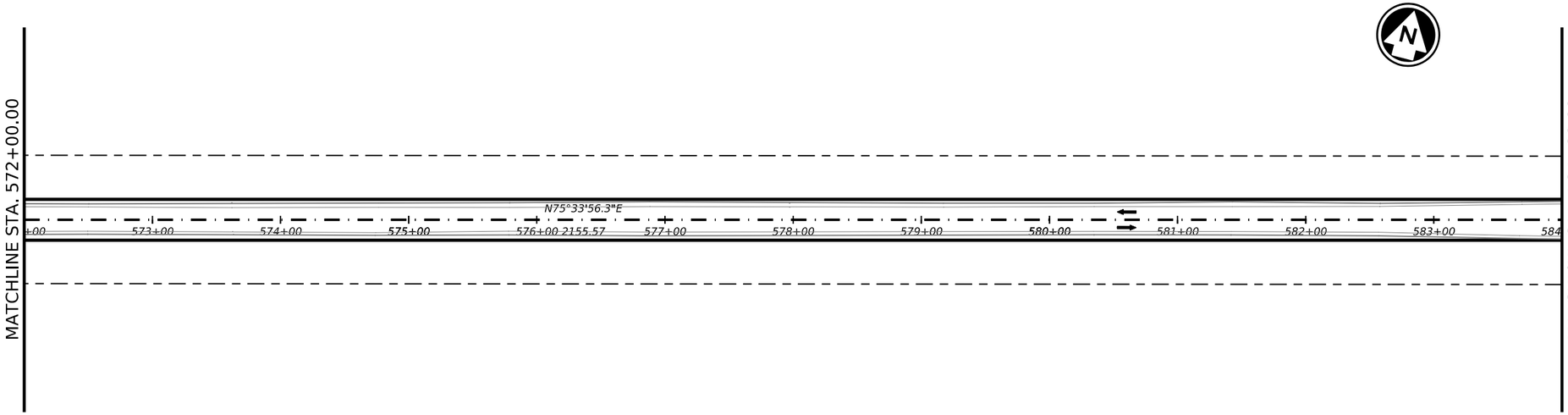

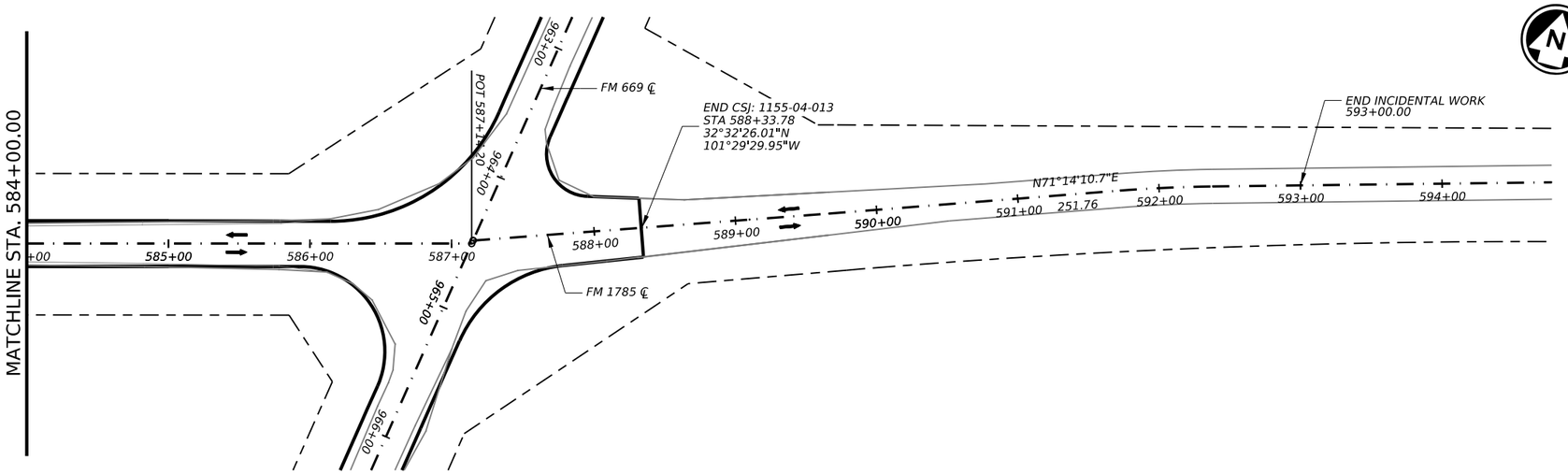

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
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LICENSED
PROFESSIONAL ENGINEER

P.E.

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Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 1785

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
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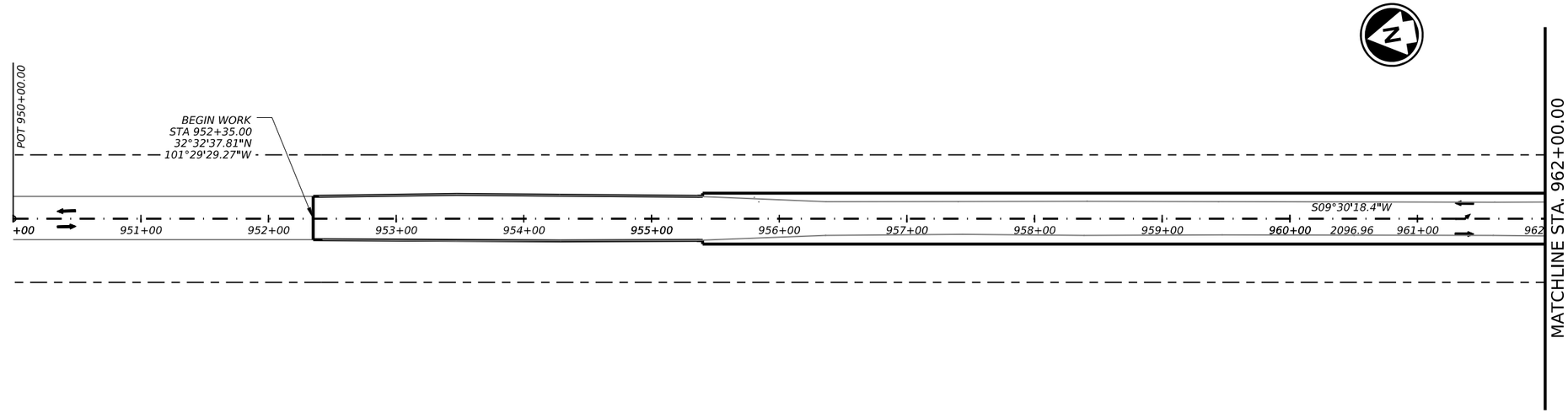

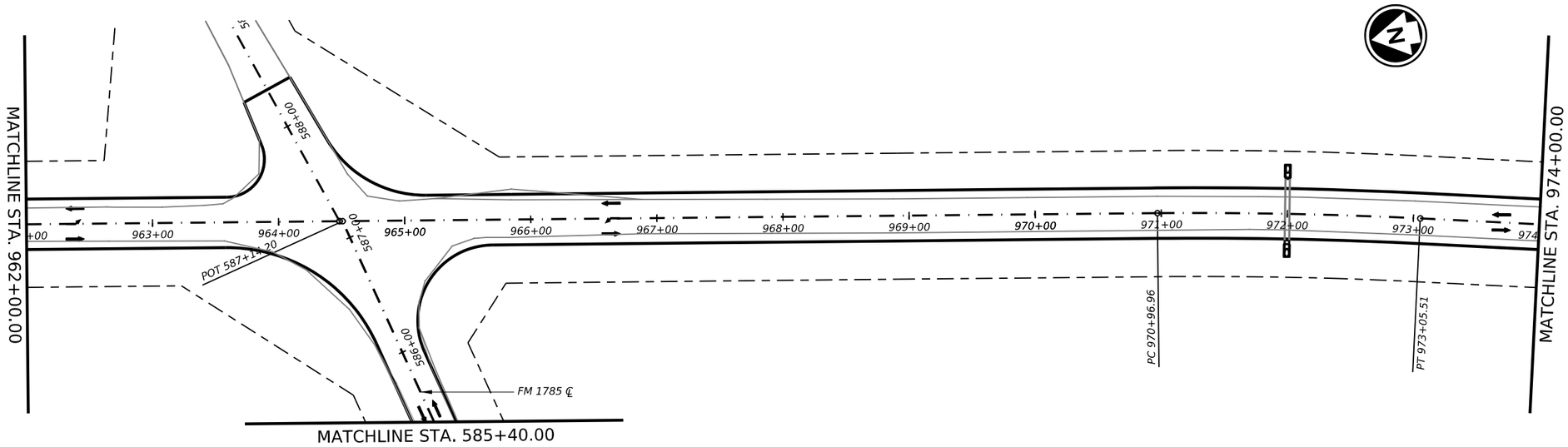

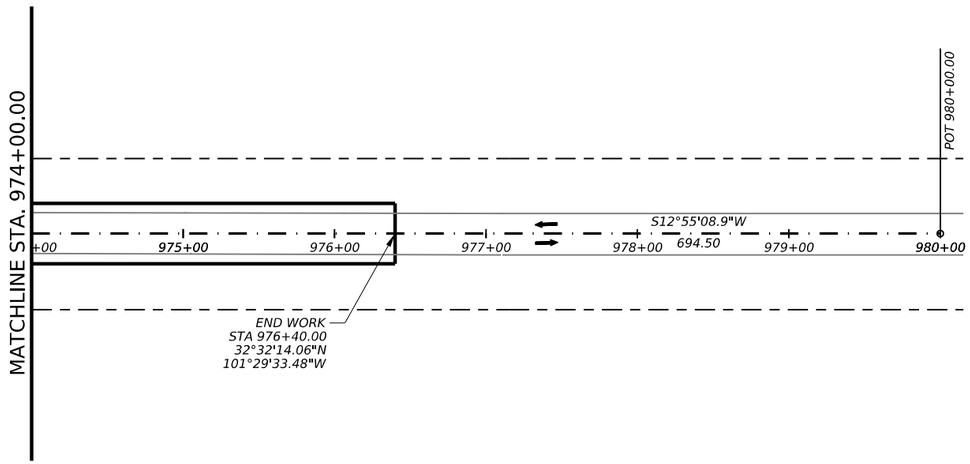

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW

0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PROJECT LAYOUT
FM 669

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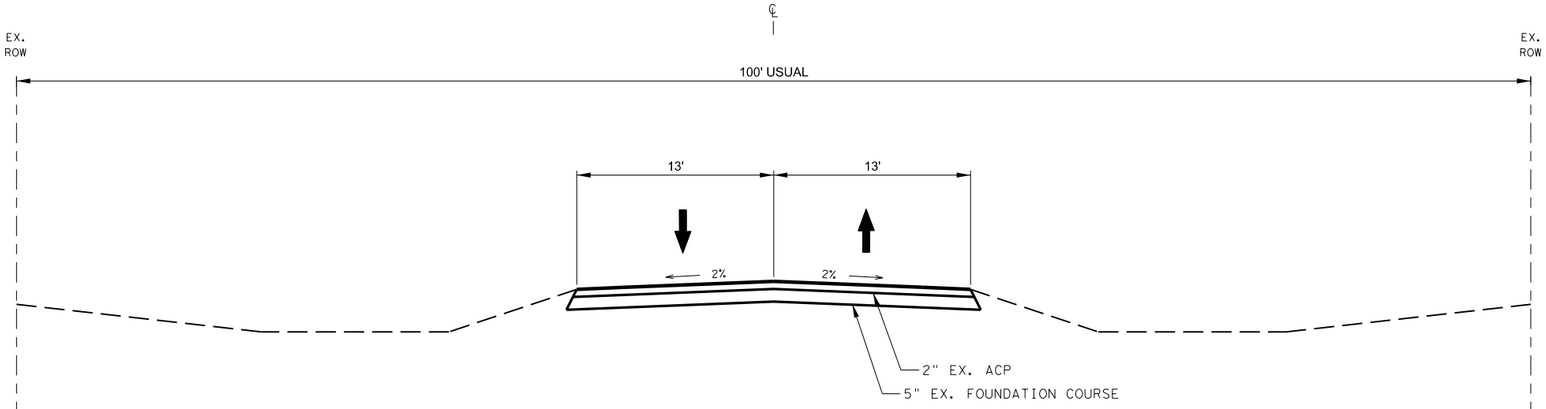
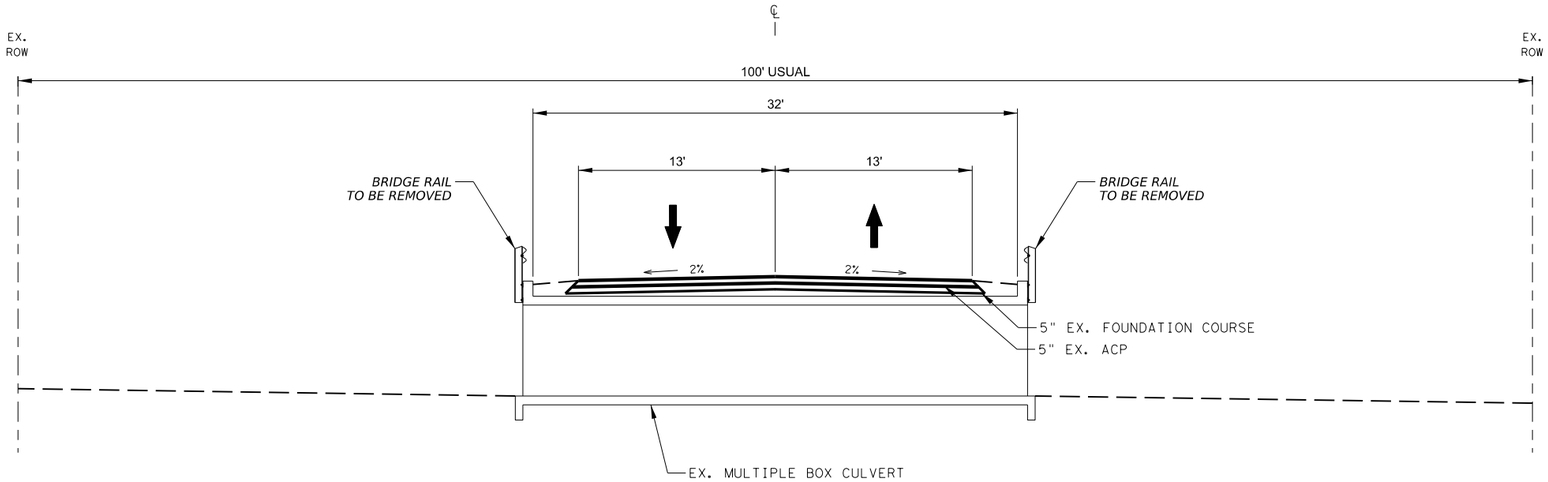


FM 1785
EXISTING TYPICAL SECTION
STATIONS 382+56.63 TO 513+32
STATIONS 513+96 TO 529+83
STATIONS 530+38 TO 587+84



FM 1785
EXISTING TYPICAL SECTION
STATIONS 513+32 TO 513+96
STATIONS 529+83 TO 530+38

STATE OF TEXAS
BRYCE M. TURENTINE
91200
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PROFESSIONAL ENGINEER

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05/24/2022

EXISTING TYPICAL SECTIONS

 Texas Department of Transportation

NOT TO SCALE SHEET 1 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
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DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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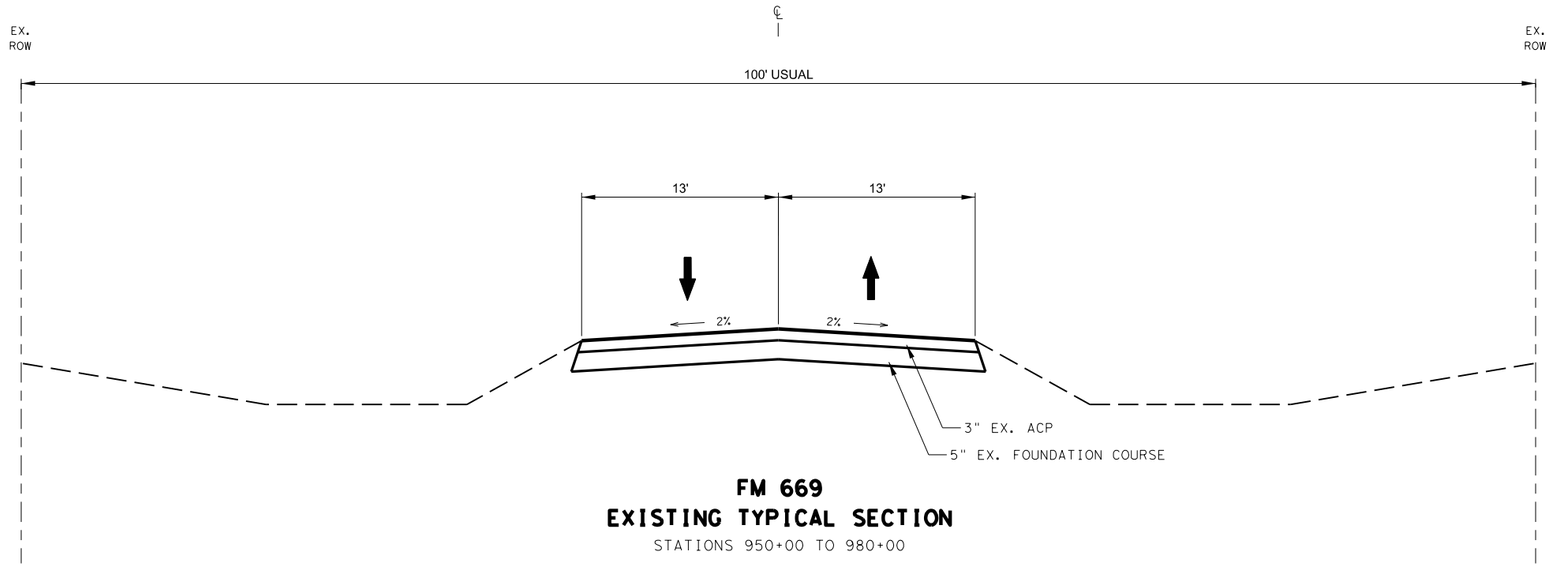

FM 669
EXISTING TYPICAL SECTION
STATIONS 950+00 TO 980+00

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/24/2022

EXISTING TYPICAL SECTIONS

 Texas Department of Transportation

NOT TO SCALE SHEET 2 OF 2

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DISTRICT	CONTROL	SECTION	JOB
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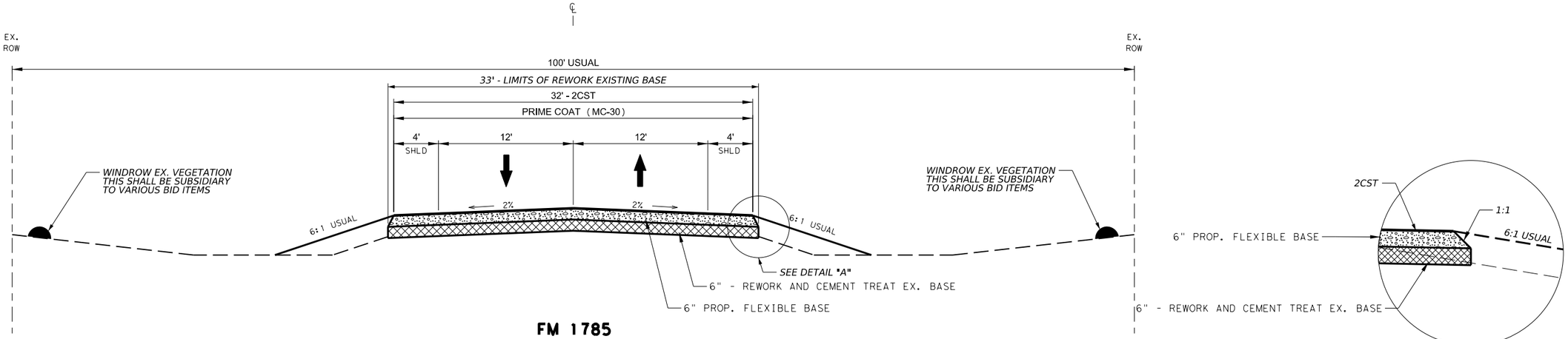
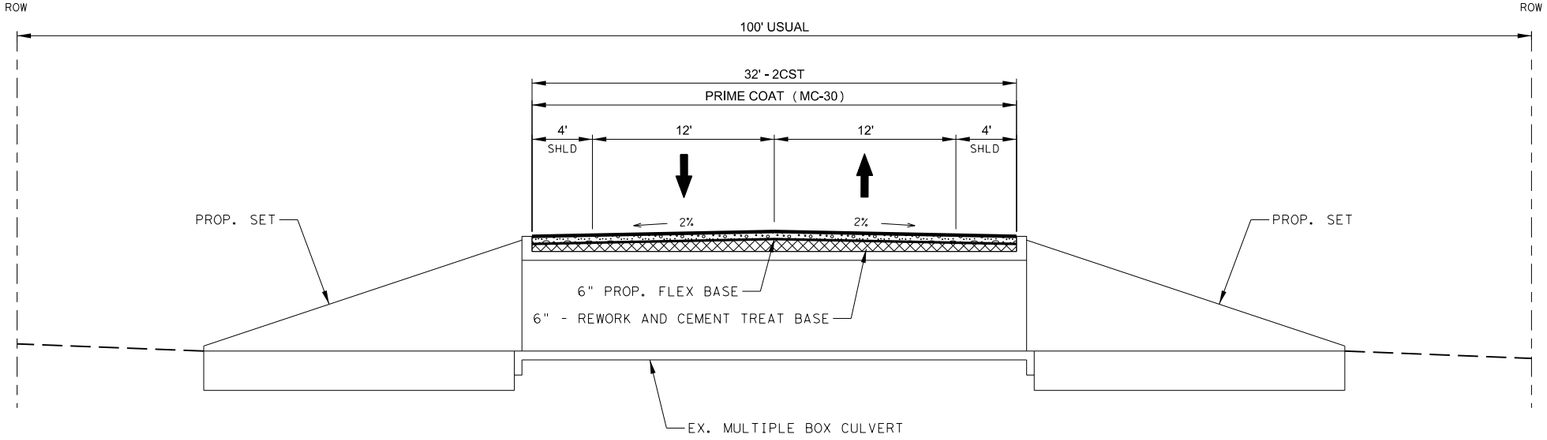


FM 1785
PROPOSED TYPICAL SECTION
STATIONS 380+25 TO 513+32
STATIONS 513+96 TO 529+83
STATIONS 530+38 TO 587+84

DETAIL "A"



FM 1785
PROPOSED TYPICAL SECTION
STATIONS 513+32 TO 513+96
STATIONS 529+83 TO 530+38

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

P.E.

05/24/2022

PROPOSED TYPICAL SECTIONS

Texas Department of Transportation

NOT TO SCALE

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		12
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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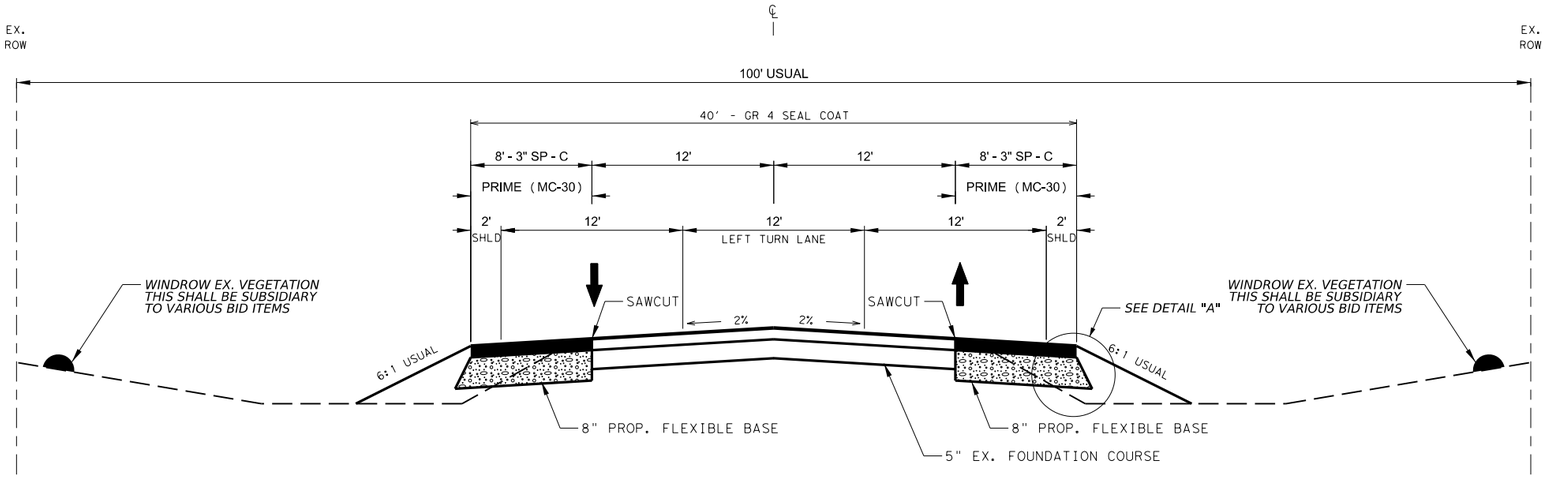
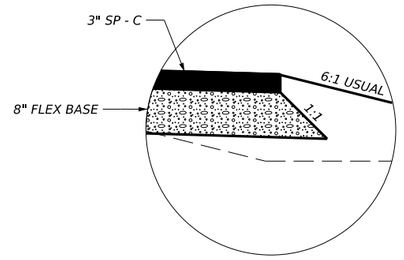


FM 669
PROPOSED TYPICAL SECTION
STATIONS 955+35 TO 976+40

NOTES:

1. *THE EXISTING PROFILE GRADE IS TO BE MAINTAINED ALONG FM 669.*
2. *THE CROSS SLOPE SHOWN IS TYPICAL.THE CROSS SLOPE OF THE WIDENED PAVEMENT IS TO MATCH THE EXISTING.*
3. *SAWCUT 12' FROM THE CENTERLINE. rEMOVAL OF PAVEMENT OUTSIDE OF THE SAWCUT SHALL BE PAID FOR AS EXCAVATION.*
4. *SEE PLAN AND PROFILE SHEETS FOR WIDENING TRANSITION DETAILS.*



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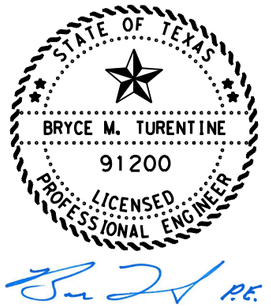

05/24/2022

PROPOSED TYPICAL SECTIONS

 Texas Department of Transportation

NOT TO SCALE SHEET 2 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		13
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/1. General/TYPICAL SECTIONS 4.dgn
DATE: 5/24/2022 4:46:37 PM

Project Number: See Title Sheet
Control:1155-04-013
County: Borden
Highway: FM 1785

ABILENE DISTRICT GENERAL NOTES
2014 SPECIFICATIONS

General

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

Ryan R. Sayles, P.E.: Ryan.Sayles@txdot.gov
(Big Spring Area Office)

Contractor questions will be accepted through email, phone, and in person by the above individuals.
All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

All questions submitted that generate a response will be posted through this site.
The site is organized by:
District
Project Type (Construction or Maintenance)
Letting Date
CCSJ/Project Name.

Modified Standards
SETBR (MOD)

Failure to make necessary corrections to SW3P based on SW3P inspections will be cause for withholding the monthly estimate until such corrections have been made.

Failure to make necessary corrections to traffic control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections have been made.

Provide ingress/egress to the adjacent properties in areas under construction. Phased construction of driveways and streets shall be required to provide uninterrupted access to adjacent properties. Coordinate work with the property owners before beginning any construction in the vicinity of the drive.

Cut neat, straight lines with vertical faces along pavement edges or along joints between existing asphalt or concrete pavement and new pavement perpendicular or parallel to the direction of traffic by methods described in applicable bid items, or as directed. Provide clean edges or joints without jagged appearance or chunks broken out. This work is considered subsidiary to various bid items.

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Environmental

Endangered and Protected Species

1. Migratory Birds
   a. **Bird nesting season is typically 15Feb through 15Sep annually.**
   b. The Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, or anywhere they are encountered.
   c. Perform all tree trimming and other vegetation clearing activities during the non-breeding season (typically 15Sep-15Feb annually). Perform any inactive nest removal and bird exclusion methods to prevent birds from establishing nests. Phasing of work during construction may be necessary to stay in compliance.
   d. When active nests are unexpectedly encountered on-site during construction, the Contractor will stop work and immediately notify the Engineer. Take measures to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the Migratory Bird Treaty Act, Texas Parks and Wildlife Code, and TxDOT policy.
   e. The Engineer will notify the Contractor when work may resume.
   f. The Contractor should be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between 15Feb and 15Sep. The Contractor can discuss other preventative measures with the Engineer and/or District Environmental Staff.

Best Management Practices

1. Bird BMPs
   a. Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season.
   b. Avoiding the removal of unoccupied, inactive nests, as practicable.
   c. Preventing the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
   d. Not collecting, capturing, relocating, or transporting birds, eggs, young, or active nests without a permit.

Item 5, "Control of Work"
Use Method C for construction surveying.
All known utilities are identified in the plans, including the crossing of power lines. Use this information to identify potential issues with power poles and power lines prior to bidding. Make necessary arrangements with utility owners regarding temporary protections such as bracing power poles, and de-energizing power lines. The Department will not reimburse the cost of such temporary protections to the Contractor, unless the Engineer determines that inadequate information was available at the time the project was bid. **"Call Before You Dig" "Call 811"**

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GENERAL NOTES

Provide notification to the District Traffic Engineering Section by telephone at 325-676-6991 and by email at ABL_TrafficFix@txdot.gov when planning drilling or excavation work in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 72 hours in advance of performing the work.

Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work. Preserve and document the marked utility locations to prevent unnecessary secondary notifications. Notify the Engineer of conflicts between proposed work and underground utilities.

Item 7, "Legal Relations and Responsibilities"
The total area disturbed for this project is 10.6 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the government that operates a separate storm sewer system.
Provide one SW3P Notification Board for this project. Notification Boards are to be placed at locations within the right-of-way but outside the clear zone as directed by the Engineer. Consider this work to be subsidiary to the various bid items of the contract.
The Contractor's attention is directed to the Texas Aggregate Quarry Pit Safety Act. Any pit or quarry meeting the definition of an unacceptable unsafe location as defined in the Act is subject to regulations set forth in this Act. A copy of the Texas Administrative Code, Title 43, Part, 1, Chapter 21, Subchapter M may be viewed at http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC.

No significant traffic generator events identified.

Hard hats are required at all times during construction when construction personnel are in TxDOT Right-of-Way.

Item 8 "Prosecution and Progress"
Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process and/or execute all contracts at the same time.
The Contractor is hereby authorized to begin work prior to the expiration of the number of calendar days provided in the Special Provision to Item 8, Article 8.1. Notify the Engineer in

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writing of the date to begin work. Time charges will commence when work begins or on the expiration of the number of calendar days provided, whichever occurs first.

Coordinate and update the work schedule with the project inspector daily. Give a minimum of 24 hours of notice to project inspector if work requiring inspection or testing is to be performed. Failure to do so may cause that work to be delayed or postponed if TxDOT personnel are not available. Work performed without suitable inspection, as determined by the Engineer, may be ordered removed and replaced at Contractor's expense.

Working days will be charged in accordance with Section 8.3.1.1., "Five-Day Workweek.

Prepare the progress schedule as a Critical Path Method (CPM).

Milestones
Disincentives and incentives using road user cost shall apply to the Milestone work as shown in the plans and in accordance with Special Provision 008-006.

This project has a milestone, identified as Milestone 1, on Phase 2: FM 1785 Rehabilitation. Time charges of the milestone begin at initiation of any work that results in implementation of the Phase 2 detour route for rehabilitation of FM 1785. The time charges for substantial completion of the milestone end when both lanes of FM 1785 are open to traffic and appropriate signing, pavement markings, and channelization measures are in place for safe operation of FM 1785 in both directions of travel.

The daily road user cost for this milestone is $2,500 per working day.

The contractor has 102 working days to complete the milestone.

Failure to substantially complete the work for this milestone within the established number of working days results in the assessment of disincentives using the daily road user cost shown above.

The maximum number of working days for computing incentive credit for this milestone is 20 working days. The maximum incentive credit possible for this milestone is $50,000.

Item 9, "Measurement and Payment"
The progress payment period shall end on the 25th of each month, unless directed by the Area Office Engineer. Material on Hand (MOH) is due two business days before estimate cut off.

Item 251, "Reworking Base Courses"
Some patches of asphalt material or stabilized base may be encountered while reconditioning the existing base. When such material is encountered, remove and dispose of as directed. This removal is considered subsidiary to this item. Additional base will be paid under item 247 "Flexible Base".

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Item 316, "Surface Treatments"
When cool season emulsion asphalt is used, delay the second surface treatment course or ACP overlay 7 days.

Seal driveways, mailbox turnouts, and intersections prior to sealing the roadway, unless otherwise approved.

Provide pre-coat aggregate with **PG 64-22** or as approved by the Engineer.

For items of work that include both summer and winter materials or the Asphalt (Multi Option), the Engineer will determine which asphalt to apply based on timing and prevailing weather conditions. The Asphalt (Multi Option) shall consist of the following choices and rates.

Estimated Summer Rates with Grade 3 Aggr.
ASPH (AC-20-5TR) @ .40 GAL/SY
Estimated Winter Rates with Grade 3 Aggr.
ASPH (CRS-2P) @ .42 GAL/SY*

AGGREGATES
AGGR (TY-PB GR-3 SAC –B) – 1 CY/105 SY

The rates shown are for estimating purposes and the engineer can dictate higher or lower rates based on roadway conditions.

Item 421, "Hydraulic Cement Concrete"
Use a cement meeting the requirements of Ty II when Mix Design Option 7 is selected for cast in place concrete.

Class C fly ash and Type I cement will not be allowed for any mix unless approved by the Engineer.

Air Entrainment requirements are waived with exception to bridge deck concrete, and rails, top slabs of direct traffic culverts and approach slabs. Air Entrainment is required for all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.).

For this project, the Engineer will provide strength-testing equipment for acceptance testing.

For this project, the Engineer will provide the curing facility.
Precast SET's are not allowed on skewed structures on this project.
Precast units are not allowed for extending box culvert on this project.

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Item 502, "Barricades, Signs and Traffic Handling"
Provide the Engineer with written notification seven (7) days in advance of major traffic changes. A major traffic change is defined as the temporary (greater than one day) or permanent relocation of traffic lanes typically in an urban setting. The notice will, at a minimum, include the expected date, time and scope of the traffic change. The Department will utilize the information provided to inform the traveling public of the changes. Failure to provide advance notice, or to provide accurate information, will result in delaying the work until such time that the public has been notified.

Additional signs, barricades and traffic handling may be necessary to complete the work shown herein and will be provided by the contractor as required and will be considered subsidiary to this item.

Provide separate attenuators for each work area within a common lane closure as approved or directed by the Engineer.

In sections where traffic is restricted to one lane, two-way traffic, flaggers will be stationed at each end of that section with two-way communication devices and a pilot car will control operations. The above shall not apply when temporary traffic signals are in use.

Relocate existing roadside signs to temporary supports as approved by the engineer.

All safety appurtenances such as signs, delineators, object markers and route markers will be in place prior to opening each phase of the construction to traffic, unless otherwise directed.

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.

The Contractor's person responsible for TCP compliance must be available by local telephone and have a response time within 45 minutes.

Work will not be allowed on both sides of the roadbed at the same time.

Equip all work vehicles within 30 feet of the traveled way with a functioning amber strobe light or rotating beacon visible from all directions.

Repair barricades within the timeline shown on the barricade inspection report. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department.

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Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Conflicting guide signs shall be covered as approved by the Engineer. This work shall be subsidiary to Item 502.

Pilot car is subsidiary to item 502.

Reduced regulatory speed limit signs should only be posted in the vicinity of ongoing work activity as shown on BC (3)-14 and not throughout the entire project. Removing, relocating or covering speed limit signs shall be considered subsidiary to item 502.

Item 504, "Field Office for Laboratory"

Field Laboratory:
Furnish a "Type D" structure for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to the requirements of Item 504, furniture and equipment to be furnished by the Contractor shall include*:*

- eye wash station
- first-aid kit
- two fire extinguishers
- Provide internet connectivity for use by TxDOT lab testing personnel at all laboratory structures on this project.

Item 512, "Portable Concrete Traffic Barrier
TxDOT shall furnish portable concrete traffic barrier (PCTB) sections.

Type X Joint installation shall be used. Joint hardware shall be supplied by the contractor.

PCTB will be picked up and stockpiled as approved by the Engineer at FM 2599 and IH 20 approx. 28 miles from the project limits.

Item 530, "Intersections, Driveways, and Turnouts"
Excavation and embankment necessary to construct the intersections and driveways according to the details shown elsewhere shall be considered subsidiary to this item.

Item 618, "Conduit"
Use SCH80 PVC conduit unless otherwise shown in the plans or approved by the engineer. Do not use flexible metal conduit on this project.
High density polyethylene (HDPE) may be substituted for PVC in bores , and/or long runs, if approved by the engineer
High density polyethylene (HDPE) may be threaded and used with threaded PVC connectors or couplings.

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Use only long radius conduit elbows.
Rigid metal conduit elbows 1" and larger, if used,are subsidiary to the installation of the conduit.

Install conduit runs, including couplings and connections, that are tight and waterproof. Clean each end of every PVC pipe connection and/or coupling with PVC cleaner and thoroughly glue with PVC sealer.

Install conduit at a minimum depth of 2 feet unless otherwise shown on the plans or directed by the Engineer. If utility lines or other obstacles are at the 2-foot minimum depth then route the conduit under the utility or obstacle unless otherwise approved by the Engineer.

Place the conduit on a 2-inch cushion of fine granular material and then backfill with a minimum of 6 inches of fine granular material. Backfill the remainder of the trench in accordance with the requirements of Item 400.

Item 620, "Electrical Conductors"
A bare copper wire No. 8 AWG or larger will be installed in every conduit throughout the electrical system in accordance with Item 620, the electrical detail sheets, and the latest edition of the National Electric Code (NEC).

Grounding Conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the current National Electrical Code.

Labeling conductors with label maker is acceptable.

Use ONLY certified persons to perform electrical work. See Item 7.18 "Electrical Requirements" for additional details.

Provide 10-amp time delay fuses.

Item 644, "Small Roadside Sign Supports and Assemblies"
Use the latest edition of the "Standard Highway Sign Designs for Texas" for Sign types for which design details are not shown on the plans.

Sign placement shall be in accordance with the latest edition of the TMUTCD & TxDOT's Sign Crew Field Book located at the following addresses.
TMUTCD - https://www.txdot.gov/business/resources/signage/tmutcd.html
TxDOT's Sign Crew Field Book - http://onlinemanuals.txdot.gov/txdotmanuals/sfb/index.htm

Before final sign installation, stake all sign locations for approval by the engineer.

All triangle slip base small sign mounts installed under this item shall utilize clamp type bases.

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Remove entire small sign foundation.

Item 658, "Delineator and Object Marker Assemblies"
Delineators and object marker assemblies will use winged channel posts. The winged channel posts will be 1.12 lb/ft and 6.5 ft in length.

Item 662, "Work Zone Pavement Markings"
Place work zone pavement markings (flexible tabs) prior to the seal coat operation.

Dispose of tabs and paper in an approved trash receptacle. (Reference Standard **SW3P**, waste material)

Use traffic paint for non-removable work zone pavement markings.

Item 666, "Retro reflectorized Pavement Markings"
All longitudinal pavement markings (including profile pavement markings) must meet minimum retro reflectivity requirements.

Establish a true and correct alignment with a method approved by the Engineer. This work will be considered subsidiary.

Contractor is responsible for re-establishing location and alignment for new pavement markings matching pavement marking alignment prior to construction activities. This work will be considered subsidiary.

Item 672, "Raised Pavement Markers"
Bituminous adhesive shall be used on this project.

Item 677, "Eliminating Existing Pavement Markings and Markers"
Remove the existing raised pavement markings (RPMs) and profile pavement markings as the work progresses, or as directed by the Engineer. Removal methods shall be approved by the Engineer. Properly dispose of materials removed. Removal of existing profile pavement markings will be paid for directly. Removal of RPMs will not be paid for directly but will be subsidiary to the pertinent bid items.

Item 685, "Roadside Flashing Beacon Assemblies"
One-Pole Solar Powered Roadside Flashing Beacon shall consist of an installation with one foundation, pole and transformer base and the use of a ground box/battery vault as shown on the standard sheet(s).

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Item 3077, "Superpave Mixtures"
Furnish aggregate for final surfaces with a minimum surface aggregate classification of "**B**".

Provide an SP-C Fine Mixture with a minimum design VMA of 16.0% and a minimum plant-produced VMA of 15.5%.
The Engineer reserves the right to test all sources even if the source is listed in the Bituminous Source Rated Quality Catalog.
Provide the testing lab samples to calibrate the ignition oven no later than five **(5)** working days prior to mix design verification.

Meet the minimum Hamburg Wheel Test requirements shown below:

- PG 64 or lower – 5,000 passes
- PG 70 – 10,000 passes
- PG 76 – 20,000 passes

Paving operations will not be allowed to begin until TxDOT has tested and obtained passing Hamburg results on the trial batch.

A maximum of 0.50% anti-stripping agent will be allowed for each specified mix type.

Dilution of tack coat is not allowed.
Do not exceed a laydown width of 16' per pass.

Substitute Binders will not be allowed unless RAP or RAS is used in the production of the mixture.

RAS will not be allowed in surface mixes.

A warm mix additive will be required for hotmix hauls over 50 miles.

Unless otherwise directed by the engineer, a warm mix additive will be required when paving during November 1st through March 15th.

The maximum allowable dust / asphalt ratio that will be allowed is 0.6 to 1.2.

The use of a tapered longitudinal joint will be required for pavement thicker than 2 inches.

Use a self-propelled, wheel-mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver on this project. Minimum requirements for the MTV are a storage capacity of approximately 25 tons, a pivoting discharge conveyor, and a means of completely remixing the ACP prior to placement.

Provide PG 64-22 tack coat at a rate of 0.10 gal/sy.

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The Contractor will be required to tack 100% of the surfaces with uniform coverage prior to the subsequent lift. The type and grade of tack will be approved by the Engineer prior to use.

Tack all vertical joints unless otherwise directed.
Cement and kiln dust will not be allowed to be used as mineral fillers.
Shoulders shall not be placed prior to adjoining main lanes.
Final surface of driveway shall not be placed prior to adjoining surface.

Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)"
Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA) will not be considered a major item of work on this project.

TMAs will only be paid while workers are present or to protect a blunt object.

BASIS OF ESTIMATE FOR STATIONARY TMAs				
		TMA (Stationary)		
Phase	Standard	Required	Additional	TOTAL
1	2-8	1		1
2	See TCP Typ. Section Sheet 3	1		1
3	1-2, 2-2, 2-3	1		1
4	2-1	1		1
Basis of Estimate for Mobile TMAs				
		TMA (Mobile)		
Phase	Standard	Required	Additional	TOTAL
4	3-1, 3-3	2		2

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project. The Contractor must get approval from the Engineer for any changes in the number of TMA as shown in the plans.

If a TMA is used for both mobile and stationary traffic control on the same day, it will be paid for as stationary for that day.

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1155-04-013 **DISTRICT** Abilene **COUNTY** Borden
HIGHWAY FM 1785, FM 669

				CONTROL SECTION JOB	0558-03-027		1155-04-013		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00187542		A00177151			
				COUNTY	Borden		Borden			
				HIGHWAY	FM 669		FM 1785			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY				2,476.000		2,476.000	
	110-6001	EXCAVATION (ROADWAY)	CY		684.000		4,254.000		4,938.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY		1,005.000		4,302.000		5,307.000	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY		933.000		12,320.000		13,253.000	
	251-6085	REWRK BSE MATL (TY B)(7")(ORD COMP)	SY				584.000		584.000	
	251-6125	REWORK BS MATL (TY C)(7")(ORD COMP)	SY				59,219.000		59,219.000	
	275-6001	CEMENT	TON				837.000		837.000	
	275-6019	CEMENT TREAT (SUBGRADE)(6")	SY				74,981.000		74,981.000	
	310-6009	PRIME COAT (MC-30)	GAL		718.000		14,543.000		15,261.000	
	316-6001	ASPH (MULTI OPTION)	GAL				30,541.000		30,541.000	
	316-6017	ASPH (AC-20-5TR)	GAL		4,606.000		30,541.000		35,147.000	
	316-6222	AGGR(TY-PB GR-3 SAC-B)	CY		105.000		1,386.000		1,491.000	
	354-6031	PLANE ASPH CONC PAV(0" TO 12")	SY				1,361.000		1,361.000	
	354-6088	PLANE ASPH CONC PAV (0" TO 5")	SY				1,269.000		1,269.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF				100.000		100.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY				61.000		61.000	
	460-6012	CMP AR (GAL STL DES 5)	LF		13.000				13.000	
	460-6038	CMP AR (GAL STL DES 1)	LF				78.000		78.000	
	467-6190	SET (TY I)(S= 5 FT)(HW= 7 FT)(3:1) (C)	EA				4.000		4.000	
	467-6193	SET (TY I)(S= 5 FT)(HW= 8 FT)(3:1) (C)	EA				4.000		4.000	
	467-6307	SET (TY I)(S= 9 FT)(HW= 7 FT)(3:1) (C)	EA				4.000		4.000	
	467-6310	SET (TY I)(S= 9 FT)(HW= 8 FT)(3:1) (C)	EA				6.000		6.000	
	467-6512	SET (TY II) (DES 1) (CMP) (6: 1) (P)	EA				4.000		4.000	
	467-6556	SET (TY II) (DES 5) (CMP) (3: 1) (C)	EA		1.000				1.000	
	467-6557	SET (TY II) (DES 5) (CMP) (4: 1) (C)	EA		1.000				1.000	
	480-6001	CLEAN EXIST CULVERTS	EA		1.000		10.000		11.000	
	496-6099	REMOVE STR (RAIL)	LF				240.000		240.000	
	500-6001	MOBILIZATION	LS				1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO				9.000		9.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF		430.000		3,165.000		3,595.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF		430.000		3,165.000		3,595.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF		190.000		640.000		830.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		190.000		640.000		830.000	
	512-6013	PORT CTB (DES SOURCE)(SGL SLP)(TY 1)	LF				900.000		900.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF				900.000		900.000	
	512-6037	PORT CTB (STKPL)(SGL SLP)(TY 1)	LF				900.000		900.000	
	530-6016	DRIVEWAYS (BASE)	SY				1,398.000		1,398.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1155-04-013 **DISTRICT** Abilene **COUNTY** Borden
HIGHWAY FM 1785, FM 669

				CONTROL SECTION JOB	0558-03-027		1155-04-013		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00187542		A00177151			
				COUNTY	Borden		Borden			
				HIGHWAY	FM 669		FM 1785			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL		
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF				484.000		484.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA				8.000		8.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA				4.000		4.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA				4.000		4.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA				4.000		4.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF		20.000		20.000		40.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF		48.000		48.000		96.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF		96.000		96.000		192.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA				16.000		16.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA		2.000		1.000		3.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA				1.000		1.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA				4.000		4.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA		5.000		22.000		27.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA		2.000		8.000		10.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF				20,630.000		20,630.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF		4,320.000		34,130.000		38,450.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF				24.000		24.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF		4,620.000		6,000.000		10,620.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA		20.000				20.000	
	662-6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA		150.000		1,032.000		1,182.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF		750.000				750.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF		6,208.000		40,932.000		47,140.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF				4,390.000		4,390.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF		6,171.000		12,432.000		18,603.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF				30.000		30.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA		4.000				4.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA		4.000				4.000	
	672-6007	REFL PAV MRKR TY I-C	EA		38.000				38.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA		310.000		377.000		687.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF		9,240.000		2,104.000		11,344.000	
	681-6001	TEMP TRAF SIGNALS	EA				2.000		2.000	
	685-6005	RELOCT RDSD FLSH BCN AM (SOLAR PWRD)	EA		2.000				2.000	
	690-6008	INSTALL OF GROUND BOXES	EA				2.000		2.000	
	3077-6013	SP MIXESSP-CSAC-B PG64-22	TON		593.000				593.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA				2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY		18.000		143.000		161.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY		4.000		18.000		22.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1155-04-013 **DISTRICT** Abilene **COUNTY** Borden
HIGHWAY FM 1785, FM 669

			CONTROL SECTION JOB		**0558-03-027**		**1155-04-013**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00187542**		**A00177151**			
			COUNTY		**Borden**		**Borden**			
			HIGHWAY		**FM 669**		**FM 1785**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS			1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS			1.000		1.000	

SUMMARY OF TCP QUANTITIES - CSJ: 1155-04-013												
PHASE	512	512	512	545	545	545	662	662	662	662	662	677
	6013	6025	6037	6003	6005	6019	6034	6063	6075	6095	6110	6001
	PORT CTB (DES SOURCE) (SGL SLP) (TY 1)	PORT CTB (MOVE) (SGL SLP) (TY 1)	PORT CTB (STKPL) (SGL SLP) (TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N) (TL3)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB) TY Y	ELIM EXT PAV MRK & MRKS (4")
	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	EA	LF
PROJECT DURATION	-	-	-	-	-	-	-	-	-	-	-	-
PHASE 1	900	900	900	4	4	4	-	13500	24	6000	-	2104
PHASE 2	-	-	-	-	-	-	20630	20630	-	-	-	-
PHASE 3	-	-	-	-	-	-	-	-	-	-	516	-
PHASE 4	-	-	-	-	-	-	-	-	-	-	516	-
TOTALS	900	900	900	4	4	4	20630	34130	24	6000	1032	2104

SUMMARY OF TCP QUANTITIES - CSJ: 1155-04-013 (CONT.)				
PHASE	681	6001	6185	6185
	6001	6002	6002	6005
	TEMP TRAF SIGNALS	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	EA	DAY	DAY
PROJECT DURATION	-	2	-	-
PHASE 1	2	-	54	6
PHASE 2	-	-	89	6
PHASE 3	-	-	-	2
PHASE 4	-	-	-	4
TOTALS	2	2	143	18

SUMMARY OF TCP QUANTITIES - CSJ: 0558-03-027							
PHASE	662	662	662	662	677	6185	6185
	6063	6095	6109	6110	6001	6002	6005
	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y	ELIM EXT PAV MRK & MRKS (4")	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	EA	EA	LF	DAY	DAY
PHASE 3	4620	4620	-	-	9240	18	2
PHASE 4	-	-	20	150	-	-	2
TOTALS	4620	4620	20	150	9240	18	4

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		22
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

EARTHWORK QUANTITIES - CSJ: 1155-04-013					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
382+00.000	0	0	0	0	0
383+00.000	16	6	16	6	10
384+00.000	17	5	33	11	22
385+00.000	17	3	50	14	36
386+00.000	16	8	66	22	44
387+00.000	14	14	80	36	44
388+00.000	12	23	92	59	33
389+00.000	11	27	103	86	17
390+00.000	11	23	114	109	5
391+00.000	13	16	127	125	2
392+00.000	14	13	141	138	3
393+00.000	15	14	156	152	4
394+00.000	15	9	171	161	10
395+00.000	14	5	185	166	19
396+00.000	18	14	203	180	23
397+00.000	23	13	226	193	33
398+00.000	26	2	252	195	57
399+00.000	29	0	281	195	86
400+00.000	26	0	307	195	112
401+00.000	24	2	331	197	134
402+00.000	18	8	349	205	144
403+00.000	15	13	364	218	146
404+00.000	16	14	380	232	148
405+00.000	17	8	397	240	157
406+00.000	18	7	415	247	168
407+00.000	15	15	430	262	168
408+00.000	13	17	443	279	164
409+00.000	11	25	454	304	150
410+00.000	12	23	466	327	139
411+00.000	17	9	483	336	147
412+00.000	17	6	500	342	158
413+00.000	15	9	515	351	164
414+00.000	17	5	532	356	176
415+00.000	20	1	552	357	195
416+00.000	18	3	570	360	210
417+00.000	14	8	584	368	216
418+00.000	14	8	598	376	222
419+00.000	14	12	612	388	224
420+00.000	10	27	622	415	207
421+00.000	10	28	632	443	189
422+00.000	13	22	645	465	180
423+00.000	13	23	658	488	170
424+00.000	14	26	672	514	158
425+00.000	13	26	685	540	145
426+00.000	11	29	696	569	127
427+00.000	12	21	708	590	118
428+00.000	14	9	722	599	123

EARTHWORK QUANTITIES - CSJ: 1155-04-013 CONT.					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
429+00.000	14	11	736	610	126
430+00.000	13	11	749	621	128
431+00.000	15	8	764	629	135
432+00.000	17	3	781	632	149
433+00.000	19	1	800	633	167
434+00.000	19	2	819	635	184
435+00.000	16	5	835	640	195
436+00.000	14	12	849	652	197
437+00.000	14	18	863	670	193
438+00.000	11	22	874	692	182
439+00.000	12	19	886	711	175
440+00.000	15	12	901	723	178
441+00.000	14	15	915	738	177
442+00.000	13	14	928	752	176
443+00.000	14	12	942	764	178
444+00.000	14	16	956	780	176
445+00.000	12	17	968	797	171
446+00.000	13	14	981	811	170
447+00.000	16	9	997	820	177
448+00.000	15	16	1012	836	176
449+00.000	13	29	1025	865	160
450+00.000	13	25	1038	890	148
451+00.000	13	16	1051	906	145
452+00.000	15	9	1066	915	151
453+00.000	15	9	1081	924	157
454+00.000	14	11	1095	935	160
455+00.000	14	10	1109	945	164
456+00.000	15	11	1124	956	168
457+00.000	14	15	1138	971	167
458+00.000	11	18	1149	989	160
459+00.000	10	22	1159	1011	148
460+00.000	12	31	1171	1042	129
461+00.000	14	24	1185	1066	119
462+00.000	17	8	1202	1074	128
463+00.000	18	3	1220	1077	143
464+00.000	19	3	1239	1080	159
465+00.000	14	13	1253	1093	160
466+00.000	8	33	1261	1126	135
467+00.000	8	41	1269	1167	102
468+00.000	9	39	1278	1206	72
469+00.000	9	41	1287	1247	40
470+00.000	11	30	1298	1277	21
471+00.000	14	21	1312	1298	14
471+83.108	12	27	1324	1325	-1
472+00.000	12	29	1336	1354	-18
473+00.000	11	34	1347	1388	-41
474+00.000	11	33	1358	1421	-63
475+00.000	12	25	1370	1446	-76

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		23
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

EARTHWORK QUANTITIES - CSJ: 1155-04-013 CONT.					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
476+00.000	14	17	1384	1463	-79
477+00.000	15	14	1399	1477	-78
478+00.000	15	15	1414	1492	-78
479+00.000	11	30	1425	1522	-97
480+00.000	10	35	1435	1557	-122
481+00.000	11	39	1446	1596	-150
482+00.000	11	44	1457	1640	-183
483+00.000	11	48	1468	1688	-220
484+00.000	10	54	1478	1742	-264
485+00.000	13	42	1491	1784	-293
486+00.000	14	29	1505	1813	-308
487+00.000	11	35	1516	1848	-332
488+00.000	11	38	1527	1886	-359
489+00.000	13	28	1540	1914	-374
490+00.000	12	28	1552	1942	-390
491+00.000	12	22	1564	1964	-400
492+00.000	14	11	1578	1975	-397
493+00.000	16	5	1594	1980	-386
494+00.000	16	7	1610	1987	-377
495+00.000	14	19	1624	2006	-382
496+00.000	10	28	1634	2034	-400
497+00.000	10	30	1644	2064	-420
498+00.000	12	23	1656	2087	-431
499+00.000	12	20	1668	2107	-439
500+00.000	9	28	1677	2135	-458
501+00.000	7	29	1684	2164	-480
502+00.000	9	27	1693	2191	-498
503+00.000	10	36	1703	2227	-524
504+00.000	7	52	1710	2279	-569
505+00.000	6	47	1716	2326	-610
506+00.000	7	37	1723	2363	-640
507+00.000	10	34	1733	2397	-664
508+00.000	14	21	1747	2418	-671
509+00.000	15	12	1762	2430	-668
510+00.000	16	8	1778	2438	-660
511+00.000	27	17	1805	2455	-650
512+00.000	208	14	2013	2469	-456
512+50.000	94	0	2107	2469	-362
513+21.000	0	0	2107	2469	-362
514+00.000	34	4	2141	2473	-332
515+00.000	56	11	2197	2484	-287
516+00.000	22	8	2219	2492	-273
517+00.000	16	11	2235	2503	-268
518+00.000	14	13	2249	2516	-267
519+00.000	12	26	2261	2542	-281
520+00.000	10	44	2271	2586	-315
521+00.000	10	42	2281	2628	-347

EARTHWORK QUANTITIES - CSJ: 1155-04-013 CONT.					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
522+00.000	10	28	2291	2656	-365
523+00.000	12	21	2303	2677	-374
524+00.000	13	25	2316	2702	-386
525+00.000	14	20	2330	2722	-392
526+00.000	15	11	2345	2733	-388
527+00.000	15	11	2360	2744	-384
528+00.000	148	14	2508	2758	-250
528+57.370	303	10	2811	2768	43
529+00.000	417	7	3228	2775	453
529+59.000	0	0	3228	2775	453
530+00.000	173	2	3401	2777	624
531+00.000	194	26	3595	2803	792
532+00.000	23	33	3618	2836	782
533+00.000	12	14	3630	2850	780
534+00.000	13	9	3643	2859	784
535+00.000	13	10	3656	2869	787
536+00.000	14	12	3670	2881	789
537+00.000	14	16	3684	2897	787
538+00.000	14	15	3698	2912	786
539+00.000	13	13	3711	2925	786
540+00.000	13	10	3724	2935	789
541+00.000	14	13	3738	2948	790
542+00.000	12	20	3750	2968	782
543+00.000	13	22	3763	2990	773
544+00.000	12	25	3775	3015	760
545+00.000	10	33	3785	3048	737
546+00.000	8	39	3793	3087	706
547+00.000	7	42	3800	3129	671
548+00.000	7	46	3807	3175	632
549+00.000	10	40	3817	3215	602
550+00.000	14	23	3831	3238	593
551+00.000	15	17	3846	3255	591
552+00.000	13	20	3859	3275	584
553+00.000	11	20	3870	3295	575
554+00.000	11	24	3881	3319	562
555+00.000	11	23	3892	3342	550
556+00.000	10	20	3902	3362	540
557+00.000	9	26	3911	3388	523
558+00.000	8	32	3919	3420	499
559+00.000	7	38	3926	3458	468
560+00.000	8	37	3934	3495	439
561+00.000	9	39	3943	3534	409
562+00.000	8	40	3951	3574	377
563+00.000	9	29	3960	3603	357
564+00.000	11	20	3971	3623	348
565+00.000	12	19	3983	3642	341

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		24
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

EARTHWORK QUANTITIES - CSJ: 1155-04-013 CONT.					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
566+00.000	13	16	3996	3658	338
567+00.000	12	16	4008	3674	334
568+00.000	11	22	4019	3696	323
569+00.000	10	24	4029	3720	309
570+00.000	10	25	4039	3745	294
570+89.084	10	32	4049	3777	272
571+00.000	10	32	4059	3809	250
572+00.000	7	59	4066	3868	198
573+00.000	4	69	4070	3937	133
574+00.000	7	58	4077	3995	82
575+00.000	13	43	4090	4038	52
576+00.000	15	23	4105	4061	44
577+00.000	15	11	4120	4072	48
578+00.000	13	21	4133	4093	40
579+00.000	9	39	4142	4132	10
580+00.000	9	39	4151	4171	-20
581+00.000	11	30	4162	4201	-39
582+00.000	10	35	4172	4236	-64
583+00.000	11	36	4183	4272	-89
584+00.000	13	21	4196	4293	-97
585+00.000	58	9	4254	4302	-48

EARTHWORK QUANTITIES - CSJ: 0558-03-027					
BASELINE STATION	STATION CUT VOLUME	STATION FILL VOLUME	ACCUM CUT VOLUME	ACCUM FILL VOLUME	MASS ORDINATE
955+40.000	0	0	0	0	0
956+00.000	24	17	24	17	7
956+98.373	33	40	57	57	0
957+00.000	33	40	90	97	-7
958+00.000	28	46	118	143	-25
959+00.000	29	41	147	184	-37
960+00.000	31	38	178	222	-44
961+00.000	31	40	209	262	-53
962+00.000	31	39	240	301	-61
963+00.000	35	26	275	327	-52
963+65.000	29	6	304	333	-29
965+70.000	0	0	304	333	-29
966+00.000	14	4	318	337	-19
966+33.134	24	6	342	343	-1
967+00.000	44	11	386	354	32
968+00.000	37	13	423	367	56
969+00.000	33	20	456	387	69
970+00.000	33	19	489	406	83
971+00.000	28	29	517	435	82
971+46.267	25	97	542	532	10
972+00.000	22	175	564	707	-143
973+00.000	22	176	586	883	-297
974+00.000	26	41	612	924	-312
975+00.000	29	35	641	959	-318
976+00.000	30	33	671	992	-321
976+40.000	13	13	684	1005	-321

SUMMARY OF EARTHWORK QUANTITIES - CSJ: 1155-04-013			
LOCATION		110 6001 EXCAVATION (ROADWAY)	132 6004 EMBANKMENT (FINAL) (DENS CONT) (TY B)
SHEET	STATION RANGE	CY	CY
P&P SHEET 1 OF 21	382+00 TO 392+00	141	138
P&P SHEET 2 OF 21	392+00 TO 404+00	239	94
P&P SHEET 3 OF 21	404+00 TO 416+00	190	128
P&P SHEET 4 OF 21	416+00 TO 428+00	152	239
P&P SHEET 5 OF 21	428+00 TO 440+00	179	124
P&P SHEET 6 OF 21	440+00 TO 452+00	165	192
P&P SHEET 7 OF 21	452+00 TO 464+00	173	165
P&P SHEET 8 OF 21	464+00 TO 476+00	145	383
P&P SHEET 9 OF 21	476+00 TO 488+00	143	423
P&P SHEET 10 OF 21	488+00 TO 500+00	150	249
P&P SHEET 11 OF 21	500+00 TO 512+00	336	334
P&P SHEET 12 OF 21	512+00 TO 524+00	303	233
P&P SHEET 13 OF 21	524+00 TO 536+00	1354	179
P&P SHEET 14 OF 21	536+00 TO 548+00	137	294
P&P SHEET 15 OF 21	548+00 TO 560+00	127	320
P&P SHEET 16 OF 21	560+00 TO 572+00	132	373
P&P SHEET 17 OF 21	572+00 TO 584+00	130	425
P&P SHEET 18 OF 21	584+00 TO 585+00	58	9
	TOTALS	4254	4302

SUMMARY OF EARTHWORK QUANTITIES - CSJ: 0558-03-027			
LOCATION		110 6001 EXCAVATION (ROADWAY)	132 6004 EMBANKMENT (FINAL) (DENS CONT) (TY B)
SHEET	STATION RANGE	CY	CY
P&P SHEET 19 OF 21	952+50 TO 962+00	240	301
P&P SHEET 20 OF 21	962+00 TO 974+00	372	623
P&P SHEET 21 OF 21	974+00 TO 976+40	72	81
	TOTALS	684	1005

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		25
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

BASIS OF ESTIMATE - CSJ: 1155-03-014						
ITEM	DESCRIPTION	RATE		AREA (SY)	QUANTITY	UNIT
275-6001	CEMENT (3%)	22	LBS / SY	74981	837	TON
310-6009	PRIME COAT (MC-30)	0.2	GAL / SY	72717	14543	GAL
316-6001	ASPHALT (MULTI OPTION) (1ST COURSE)	0.42	GAL / SY	72717	30541	GAL
316-6222	AGGR(TY-PB GR-3 SAC-B) (1ST COURSE)	105	SY / CY	72717	693	CY
316-6017	ASPH (AC-20-5TR) (2ND COURSE)	0.42	GAL / SY	72717	30541	GAL
316-6222	AGGR(TY-PB GR-3 SAC-B) (2ND COURSE)	105	SY / CY	72717	693	CY

BASIS OF ESTIMATE - CSJ: 0558-03-027						
ITEM	DESCRIPTION	RATE		AREA (SY)	QUANTITY	UNIT
310-6009	PRIME COAT (MC-30)	0.2	GAL / SY	3591	718	GAL
316-6017	ASPH (AC-20-5TR) (2ND COURSE)	0.42	GAL / SY	10967	4606	GAL
316-6222	AGGR(TY-PB GR-3 SAC-B) (2ND COURSE)	105	SY / CY	10967	105	CY
3077-6013	SP MIXES SP-C SAC-B PG64-22	330	LBS / SY	3591	593	TONS

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		26
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF ASPHALT SURFACE AREAS - CSJ: 1155-04-013								
LOCATION		PRIME COAT	SURFACE TREATMENTS				PLANING	
		310	316	316	316	316	354 6031	354 6088
		PRIME COAT (MC-30)	ASPHALT (MULTI OPTION) (1ST COURSE)	AGGR (TY PB GR-3 SAC-B) (1ST COURSE)	ASPH (AC-20-5TR) (2ND COURSE)	AGGR(TY-PB GR-3 SAC-B) (2ND COURSE)	PLANE ASPH CONC PAV (0" TO 12")	PLANE ASPH CONC PAV (0" TO 5")
SHEET	STATION RANGE	SY	SY	SY	SY	SY	SY	SY
P&P SHEET 1 OF 21	380+50 TO 392+00	4089	4089	4089	4089	4089	-	-
P&P SHEET 2 OF 21	392+00 TO 404+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 3 OF 21	404+00 TO 416+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 4 OF 21	416+00 TO 428+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 5 OF 21	428+00 TO 440+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 6 OF 21	440+00 TO 452+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 7 OF 21	452+00 TO 464+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 8 OF 21	464+00 TO 476+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 9 OF 21	476+00 TO 488+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 10 OF 21	488+00 TO 500+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 11 OF 21	500+00 TO 512+00	4267	4267	4267	4267	4267	-	380
P&P SHEET 12 OF 21	512+00 TO 524+00	4267	4267	4267	4267	4267	-	916
P&P SHEET 13 OF 21	524+00 TO 536+00	4267	4267	4267	4267	4267	1361	-
P&P SHEET 14 OF 21	536+00 TO 548+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 15 OF 21	548+00 TO 560+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 16 OF 21	560+00 TO 572+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 17 OF 21	572+00 TO 584+00	4267	4267	4267	4267	4267	-	-
P&P SHEET 18 OF 21	584+00 TO 585+00	356	356	356	356	356	-	-
	TOTALS	72717	72717	72717	72717	72717	1361	1296

SUMMARY OF ASPHALT SURFACE AREAS - CSJ: 0558-03-027					
LOCATION		PRIME COAT	SURFACE TREATMENTS		HMA
		310	316	316	3077
		PRIME COAT (MC-30)	ASPH (AC-20-5TR) (2ND COURSE)	AGGR(TY-PB GR-3 SAC-B) (2ND COURSE)	SP MIXES SP-C SAC-B PG64-22
SHEET	STATION RANGE	SY	SY	SY	SY
P&P SHEET 19 OF 21	952+35 TO 962+00	1173	4137	4137	1173
P&P SHEET 20 OF 21	962+00 TO 974+00	1991	5763	5763	1991
P&P SHEET 21 OF 21	974+00 TO 976+40	427	1067	1067	427
	TOTALS	3591	10967	10967	3591

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		27
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF FLEXIBLE BASE - CSJ: 1155-04-013						
LOCATION		LENGTH	WIDTH	AREA	DEPTH	247 6041 FL BS (CMP IN PLC) (TYA GR1-2) (FNAL POS)
SHEET	STATION RANGE	LF	LF	SY	IN	CY
P&P SHEET 1 OF 21	382+53.30 TO 392+00	947	32.5	3420	6	570
P&P SHEET 2 OF 21	392+00 TO 404+00	1200	32.5	4334	6	723
P&P SHEET 3 OF 21	404+00 TO 416+00	1200	32.5	4334	6	723
P&P SHEET 4 OF 21	416+00 TO 428+00	1200	32.5	4334	6	723
P&P SHEET 5 OF 21	428+00 TO 440+00	1200	32.5	4334	6	723
P&P SHEET 6 OF 21	440+00 TO 452+00	1200	32.5	4334	6	723
P&P SHEET 7 OF 21	452+00 TO 464+00	1200	32.5	4334	6	723
P&P SHEET 8 OF 21	464+00 TO 476+00	1200	32.5	4334	6	723
P&P SHEET 9 OF 21	476+00 TO 488+00	1200	32.5	4334	6	723
P&P SHEET 10 OF 21	488+00 TO 500+00	1200	32.5	4334	6	723
P&P SHEET 11 OF 21	500+00 TO 512+00	1200	32.5	4334	6	723
P&P SHEET 12 OF 21	512+00 TO 524+00	1200	32.5	4334	6	723
P&P SHEET 13 OF 21	524+00 TO 536+00	1200	32.5	4334	6	723
P&P SHEET 14 OF 21	536+00 TO 548+00	1200	32.5	4334	6	723
P&P SHEET 15 OF 21	548+00 TO 560+00	1200	32.5	4334	6	723
P&P SHEET 16 OF 21	560+00 TO 572+00	1200	32.5	4334	6	723
P&P SHEET 17 OF 21	572+00 TO 584+00	1200	32.5	4334	6	723
P&P SHEET 18 OF 21	584+00 TO 587+02	302	32.5	1091	6	182
	TOTALS	20449		73855		12320

SUMMARY OF FLEXIBLE BASE - CSJ: 0558-03-027						
LOCATION		LENGTH	WIDTH	AREA	DEPTH	247 6041 FL BS (CMP IN PLC) (TYA GR1-2) (FNAL POS)
SHEET	STATION RANGE	LF	LF	SY	IN	CY
P&P SHEET 19 OF 21	955+40 TO 962+00	660	17	1247	8	278
P&P SHEET 20 OF 21	962+00 TO 974+00	1200	VARIES	2116	8	471
P&P SHEET 21 OF 21	974+00 TO 976+40	240	17	453	8	101
	TOTALS	2100		3816		850

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		28
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF CEMENT TREATMENT - CSJ: 1155-04-013										
LOCATION		LENGTH	REWORK BASE			CEMENT TREAT BASE				
			WIDTH	251	251	WIDTH	AREA	DEPTH	275	275
				6125	6085				6001	6019
				REWORK BS MATL (TY C)(7") (ORD COMP)	REWRK BSE MATL (TY B)(7") (ORD COMP)				CEMENT	CEMENT TREAT (SUBGRADE) (6")
SHEET	STATION RANGE	LF	LF	SY	SY	LF	SY	IN	TONS	SY
P&P SHEET 1 OF 21	380+50 TO 382+53.30	203	32	722	-	N/A	N/A	N/A	-	-
P&P SHEET 1 OF 21	382+53.30 TO 392+00	947	26	2736	-	33	3473	6	39	3473
P&P SHEET 2 OF 21	392+00 TO 404+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 3 OF 21	404+00 TO 416+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 4 OF 21	416+00 TO 428+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 5 OF 21	428+00 TO 440+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 6 OF 21	440+00 TO 452+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 7 OF 21	452+00 TO 464+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 8 OF 21	464+00 TO 476+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 9 OF 21	476+00 TO 488+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 10 OF 21	488+00 TO 500+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 11 OF 21	500+00 TO 512+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 12 OF 21	512+00 TO 524+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 13 OF 21	524+00 TO 536+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 14 OF 21	536+00 TO 548+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 15 OF 21	548+00 TO 560+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 16 OF 21	560+00 TO 572+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 17 OF 21	572+00 TO 584+00	1200	26	3467	-	33	4400	6	49	4400
P&P SHEET 18 OF 21	584+00 TO 585+00	100	26	289	-	33	367	6	5	367
P&P SHEET 18 OF 21	585+00 TO 587+02	202	26	-	584	33	741	6	9	741
	TOTALS	20247		59219	584				837	74981

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		29
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF PAVEMENT MARKING ITEMS - CSJ: 1155-04-013					
LOCATION	668	666	666	666	672
	6076	6342	6344	6345	6009
	PREFAB PAV MRK TY C (W) (24")	REF PROF PAV MRK TY I (W)4"(SLD) (100MIL)	REF PROF PAV MRK TY I (Y)4"(BRK) (100MIL)	REF PROF PAV MRK TY I (Y)4"(SLD) (100MIL)	REFL PAV MRKR TY II-A-A
SHEET	LF	LF	LF	LF	EA
SIGN AND STRIPING LAYOUT 1 OF 11	-	4400	550	-	28
SIGN AND STRIPING LAYOUT 2 OF 11	-	4800	600	1450.00	49
SIGN AND STRIPING LAYOUT 3 OF 11	-	4800	600	1400.00	48
SIGN AND STRIPING LAYOUT 4 OF 11	-	4800	540	1850	50
SIGN AND STRIPING LAYOUT 5 OF 11	-	4800	500	2000	50
SIGN AND STRIPING LAYOUT 6 OF 11	-	4800	600	-	30
SIGN AND STRIPING LAYOUT 7 OF 11	-	4800	600	-	30
SIGN AND STRIPING LAYOUT 8 OF 11	-	4800	400	2800	55
SIGN AND STRIPING LAYOUT 9 OF 11	49	2932	-	2932	37
PROJECT TOTALS	49	40932	4390	12432	377

SUMMARY OF PAVEMENT MARKING ITEMS - CSJ: 0558-03-027								
LOCATION	666	666	666	666	668	668	672	672
	6036	6342	6344	6345	6077	6085	6009	6007
	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REF PROF PAV MRK TY I (W)4"(SLD) (100MIL)	REF PROF PAV MRK TY I (Y)4"(BRK) (100MIL)	REF PROF PAV MRK TY I (Y)4"(SLD) (100MIL)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY I-C
SHEET	LF	LF	LF	LF	EA	EA	EA	EA
SIGN AND STRIPING LAYOUT 10 OF 11	750	5728	-	5447	4	4	273	38
SIGN AND STRIPING LAYOUT 11 OF 11	-	480	-	724	-	-	37	-
PROJECT TOTALS	750	6208	0	6171	4	4	310	38

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		30
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF SIGNING ITEMS - CSJ: 1155-04-013										
LOCATION	618	620	620	644	644	644	644	644	658	690
	6046	6007	6008	6001	6004	6030	6033	6076	6047	6008
	CONDT (PVC) (SCH 80) (2")	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	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 TYS80 (1)SA(T)	IN SM RD SN SUP&AM TYS80 (1)SA(U)	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Y) (WC)GND	INSTALL OF GROUND BOXES
SHEET	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA
SIGN AND STRIPING LAYOUT 1 OF 11	-	-	-	5	-	-	-	5	-	-
SIGN AND STRIPING LAYOUT 2 OF 11	-	-	-	1	-	-	-	1	-	-
SIGN AND STRIPING LAYOUT 3 OF 11	-	-	-	4	-	-	-	4	-	-
SIGN AND STRIPING LAYOUT 5 OF 11	-	-	-	1	-	-	-	1	-	-
SIGN AND STRIPING LAYOUT 6 OF 11	-	-	-	1	-	-	-	1	4	-
SIGN AND STRIPING LAYOUT 7 OF 11	-	-	-	1	-	-	-	1	4	-
SIGN AND STRIPING LAYOUT 8 OF 11	-	-	-	1	-	-	-	1	-	-
SIGN AND STRIPING LAYOUT 9 OF 11	20	48	96	2	1	1	4	8	-	2
PROJECT TOTALS	20	48	96	16	1	1	4	22	8	2

SUMMARY OF SIGNING ITEMS - CSJ: 0558-03-027								
LOCATION	618	620	620	644	644	644	658	685
	6046	6007	6008	6001	6004	6076	6047	6005
	CONDT (PVC) (SCH 80) (2")	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	IN SM RD SN SUP&AM TY10BWG (1)SA(P)	IN SM RD SN SUP&AM TY10BWG (1)SA(T)	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Y) (WC)GND	RELOCT RDSD FLSH BCN AM
SHEET	LF	LF	LF	EA	EA	EA	EA	EA
SIGN AND STRIPING LAYOUT 10 OF 11	20	48	96	3	2	5	2	2
PROJECT TOTALS	20	48	96	3	2	5	2	2

QUANTITY SUMMARY

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		31
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF SW3P ITEMS - CSJ: 1155-04-013					
LOCATION		506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
SHEET	STATION RANGE	LF	LF	LF	LF
SW3P SITE PLAN 1 OF 11	380+50 TO 404+00			65	65
SW3P SITE PLAN 2 OF 11	404+00 TO 428+00			105	105
SW3P SITE PLAN 3 OF 11	428+00 TO 452+00			40	40
SW3P SITE PLAN 4 OF 11	452+00 TO 476+00	1040	1040		
SW3P SITE PLAN 5 OF 11	476+00 TO 500+00	100	100	60	60
SW3P SITE PLAN 6 OF 11	500+00 TO 524+00	1340	1340	200	200
SW3P SITE PLAN 7 OF 11	524+00 TO 548+00			140	140
SW3P SITE PLAN 8 OF 11	548+00 TO 572+00	685	685	30	30
SW3P SITE PLAN 9 OF 11	572+00 TO 587+14.20			60	60
	TOTALS	3165	3165	640	640

SUMMARY OF SW3P ITEMS - CSJ: 0558-03-027					
LOCATION		506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
SHEET	STATION RANGE	LF	LF	LF	LF
SW3P SITE PLAN 10 OF 11	950+00 TO 974+00	170	170	120	120
SW3P SITE PLAN 11 OF 11	974+00 TO 980+00	260	260	70	70
	TOTALS	430	430	190	190

QUANTITY SUMMARY

Texas Department of Transportation

SHEET 11 OF 12

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		32
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF DRIVEWAYS - CSJ: 1155-04-013						
DRIVEWAY NUBMER	SHEET	FM 1785 CENTERLINE STATION	530 6016 DRIVEWAYS (BASE)	460 6038 CMP AR (GAL STL DES 1)	467 6512 SET (TY II) (DES 1) (CMP) (6: 1) (P)	480 6001 CLEAN EXIST CULVERTS
			SY	LF	EA	EA
1	P&P SHEET 1 OF 21	384+13.66	88	-	-	-
2	P&P SHEET 1 OF 21	391+41.12	85	-	-	-
3	P&P SHEET 2 OF 21	394+32.11	139	-	-	-
4	P&P SHEET 3 OF 21	405+16.96	121	-	-	-
5	P&P SHEET 3 OF 21	410+60.46	67	-	-	-
6	P&P SHEET 3 OF 21	411+26.48	65	-	-	-
7	P&P SHEET 4 OF 21	417+99.53	96	-	-	-
8	P&P SHEET 4 OF 21	420+44.52	77	-	-	-
9	P&P SHEET 6 OF 21	444+32.51	121	-	-	-
10	P&P SHEET 6 OF 21	446+85.88	108	-	-	1
11	P&P SHEET 9 OF 21	480+42.13	141	-	-	-
12	P&P SHEET 10 OF 21	489+88.86	154	46	2	-
13	P&P SHEET 15 OF 21	552+69.45	136	32	2	-
		TOTALS	1398	78	4	1

SUMMARY OF REMOVAL ITEMS - CSJ: 1155-04-013			
LOCATION	104 6009 REMOVING CONC (RIPRAP)	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6002 REMOVE TERMINAL ANCHOR SECTION
	SY	LF	EA
P&P SHEET 11 OF 21	530	16	2
P&P SHEET 12 OF 21	846	226	2
P&P SHEET 13 OF 21	1100	242	4
TOTALS	2476	484	8

SUMMARY OF DRAINAGE ITEMS - CSJ: 0558-03-027				
LOCATION	460 6012 CMP AR (GAL STL DES 5)	467 6556 SET (TY II) (DES 5) (CMP) (3: 1) (C)	467 6557 SET (TY II) (DES 5) (CMP) (4: 1) (C)	480 6001 CLEAN EXIST CULVERTS
	LF	EA	EA	EA
EX. CMP AR @ STA 972+00.00	13	1	1	1

QUANTITY SUMMARY

Texas Department of Transportation

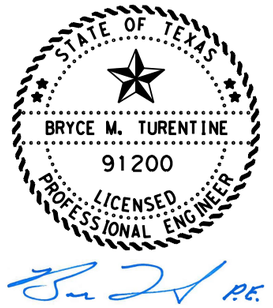
SHEET 12 OF 12

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		33
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

SUMMARY OF BRIDGES

CSJ	PLAN PROFILE SHEET	BRIDGE NBI #		DESIGN		BRIDGE LOCATION	STATION		LENGTH	CLEAR RDWY WIDTH	LOADING	429-6007 CONC STR REPAIR (VERTICAL & OVERHEAD)	432-6001 RIPRAP (CONC) (4 IN)	467-6190 SET (TY I) (S= 5 FT) (HW= 7 FT) (3:1) (C)	467-6193 SET (TY I) (S= 5 FT) (HW= 8 FT) (3:1) (C)
		EXISTING	PROPOSED	EXISTING	PROPOSED		BEGIN	END	FT	FT		SF	CY	EA	EA
1155-04-013	12	08-017-0-1155-04-006	08-017-0-1155-04-006	MULTIPLE BOX CULVERT 2 - 5' X 5' X 32' AND 3 - 9' X 6' X 32'	SET (TY 1)	FM 1785 AT DRAW	512+64	513+05	41	32	N/A	50	35		4
1155-04-013	13	08-017-0-1155-04-007	08-017-0-1155-04-007	MULTIPLE BOX CULVERT 2 - 5' X 5' X 32' AND 2 - 9' X 5' X 32'	SET (TY 1)	FM 1785 AT DRAW	529+13	529+45	32	32	N/A	50	26	4	
TOTALS												**100**	**61**	**4**	**4**

CSJ (CONT'D FROM ABOVE)	467-6307 SET (TY I) (S= 9 FT) (HW= 7 FT) (3:1) (C)	467-6310 ^SET (TY I) (S= 9 FT) (HW= 8 FT) (3:1) (C)	480-6001 CLEAN EXIST CULVERTS	496-6099 REMOVE STR (RAIL)
EA	EA	EA	EA	LF
1155-04-013		6	5	130
1155-04-013	4		4	110
TOTALS	**4**	**6**	**9**	**240**



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BRIDGE SUMMARY

 Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		34
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

GENERAL NOTES

1. ENSURE THAT ALL PAVEMENT EDGE DROP-OFFS ARE TREATED IN ACCORDANCE WITH THE "TREATMENT FOR VARIOUS EDGE CONDITIONS" SHEET AND IN A MANNER APPROVED BY THE ENGINEER. HIGH DROP-OFFS ARE ANTICIPATED IN AREAS WITH PLANING WORK. WITH THE APPROVAL OF THE ENGINEER, THE SEQUENCE OF PLANING WORK MAY BE CHANGED TO ELIMINATE HIGH DROP-OFFS OR REDUCE THIER DURATION.
2. FOR PHASE 2, SET UP THE DETOUR ACCORDING TO THE DETOUR LAYOUT SHEET. TRAFFIC WILL FLOW IN THE EASBOUND DIRECTION ON FM 1785 FOR THE DURATION OF PHASE 2.
3. FOR PHASES 2 AND 3, WORK WILL BE ALLOWED ON ONLY ONE SIDE OF THE ROAD AT A TIME.
4. DURING PHASE 3, PIPE CULVERT WORK SHOULD NOT PROCEED OUTSIDE OF THE MAIN WORKZONE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

SEQUENCE OF WORK

PHASE 1: BRIDGE CLASS CULVERTS

PHASE 1A:

1. PREPARE SITE FOR WORK.
2. CLEAN OUT CULVERTS AND COMPLETE ANY WORK THAT DOES NOT REQUIRE THE RAIL AND GUARD FENCE TO BE REMOVED.
3. PRIOR TO THE REMOVAL OF RAIL AND GUARD FENCE, SET UP TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION AND TCP DETAILS FOR PHASE 1A. STANDARD TCP (2-8) - 18 SHALL BE USED WITH TEMPORARY TRAFFIC SIGNALS.
4. REMOVE RAIL AND GUARD FENCE.
5. CONSTRUCT WING WALLS, TOE WALL AND CONCRETE RIPRAP.
6. INSTALL PIPE RUNNERS.
7. BACKIFILL WING WALLS AND SHAPE FRONTSLOPES TO A TRAVERSABLE GRADE.

PHASE 1B:

8. SET UP TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION AND TCP DETAILS FOR PHASE 1B. STANDARD TCP (2-8) - 18 SHALL BE USED WITH TEMPORARY TRAFFIC SIGNALS.
9. REMOVE RAIL AND GUARD FENCE.
10. CONSTRUCT WING WALLS, TOE WALL AND CONCRETE RIPRAP.
11. INSTALL PIPE RUNNERS.
12. BACKIFILL WING WALLS AND SHAPE FRONTSLOPES TO A TRAVERSABLE GRADE.

PHASE 2: FM 1785 REHABILITATION

PHASE 2A:

1. PREPARE SITE FOR WORK.
2. SET UP THE DETOUR ROUTE ACCORDING TO THE DETOUR LAYOUT SHEET.
3. CLOSE THE NORTH TRAVEL LANE OF FM 1785 AND SET UP ONE-WAY TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION FOR PHASE 2A.
4. PLANE ACP IN AREAS SHOWN IN THE PLANS. CONSTRUCT NORTH SIDE OF ROADWAY INCLUDING 1CST.

PHASE 2B:

5. CLOSE THE SOUTH TRAVEL LANE OF FM 1785 AND SET UP ONE-WAY TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION FOR PHASE 2B.
6. PLANE ACP IN AREAS SHOWN IN THE PLANS. CONSTRUCT SOUTH SIDE OF ROADWAY INCLUDING 1CST.

PHASE 3: FM 669 WIDENING

PHASE 3A:

1. PREPARE SITE FOR WORK.
2. SET UP TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION FOR PHASE 3A AND STANDARD TCP (2-2) - 18. USE A PILOT CAR.
3. CONSTRUCT WEST SIDE OF ROADWAY WIDINING. WHEN CONSTRUCTING THIS SIDE OF THE ROADWAY, WORK INCREMENTALLY SO THAT BOTH TRAVEL LANES CAN BE OPENED AT NIGHT.

PHASE 3B:

4. RESET TRAFFIC CONTROL ACCORDING TO THE TCP TYPICAL SECTION FOR PHASE 3B AND STANDARD TCP (2-3) - 18.
5. CONSTRUCT EAST SIDE OF ROADWAY WIDENING.

PHASE 4: PROJECT COMPLETION

1. FOR PHASE 4, SET UP TRAFFIC CONTROL AS REQUIRED ACCORDING TO TCP (3-1), (3-3), AND (7-1) . MULTIPLE OPERATIONS MAY BE CARRIED OUT SIMULTANEOUSLY, WITH THE APPROVAL OF THE ENGINEER.
2. CONSTRUCT SURFACE TREATMENT ON FM 1785 AND FM 669.
3. INSTALL PAVEMENT MARKINGS ON FM 1785 AND FM 669.
4. CLEAN UP PROJECT SITE.

STATE OF TEXAS
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91200
LICENSED PROFESSIONAL ENGINEER

P.E.

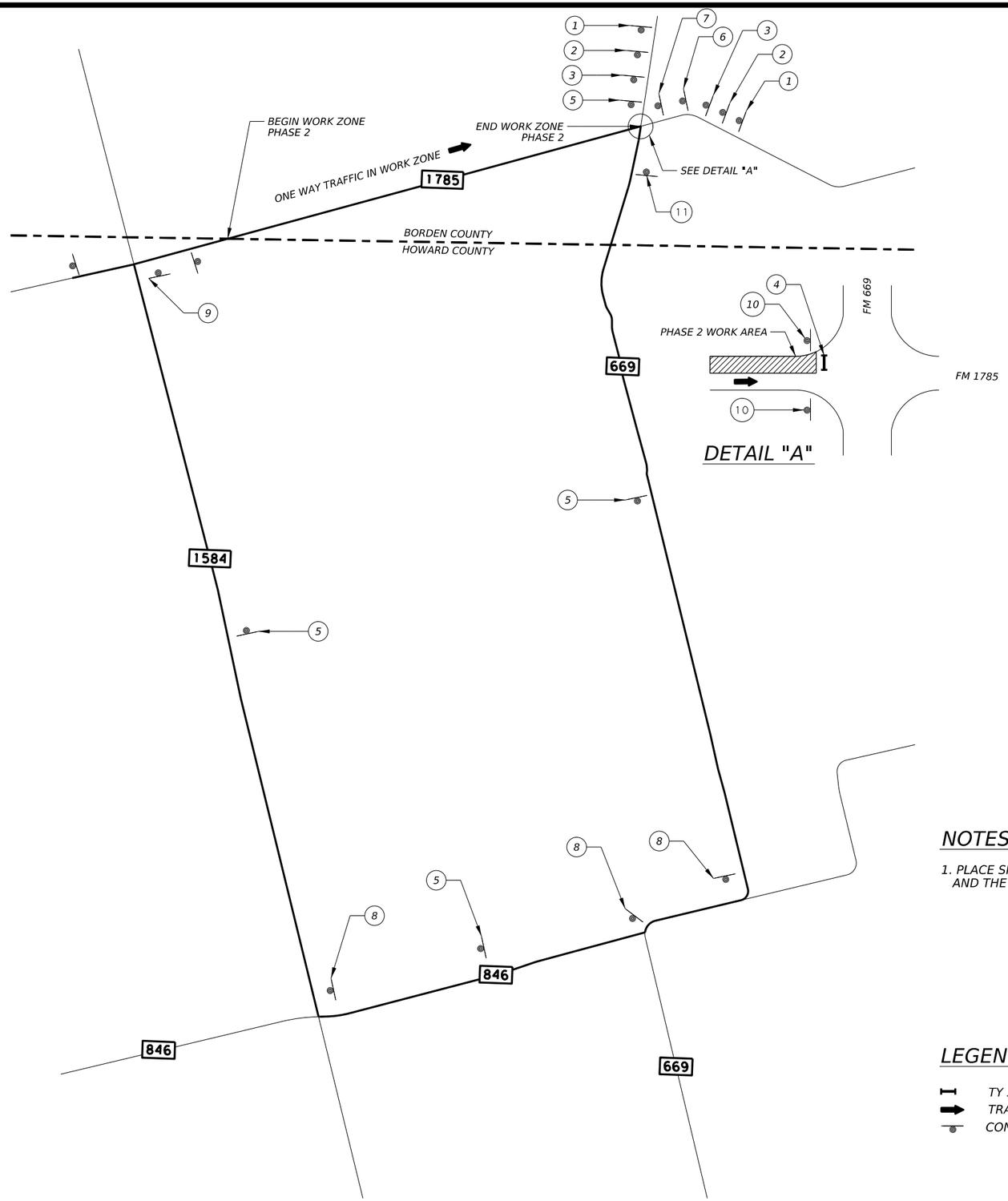
05/24/2022

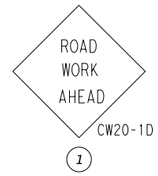
TCP NARRATIVE

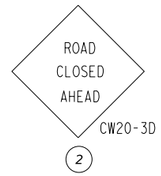
Texas Department of Transportation

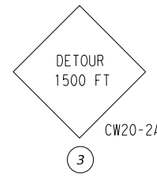
SHEET 1 OF 1

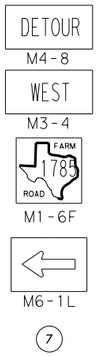
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	TAYLOR, ETC.		35
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

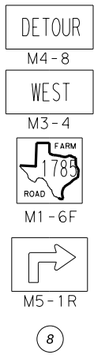


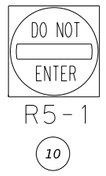


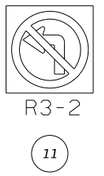










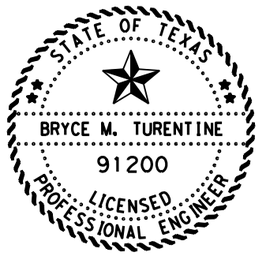


NOTES:

1. PLACE SIGNS ACCORDING TO THE APPLICABLE STANDARDS AND THE TMUTCD.

LEGEND

- TY 3 BARRICADE
- TRAFFIC DIRECTION
- CONSTRUCTION SIGN



05/24/2022

DETOUR LAYOUT
PHASE 2

Texas Department of Transportation

NOT TO SCALE

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		36
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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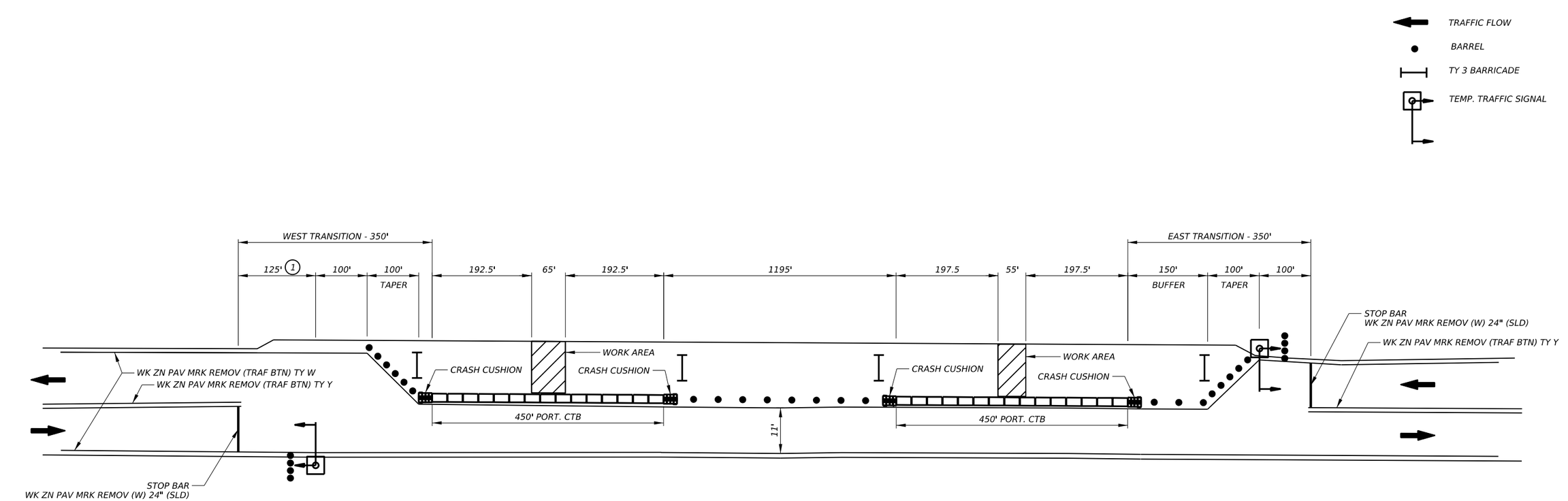

PHASE 1A - TCP DETAILS
FM 1785

(1) *THE LENGTH BETWEEN THE STOP BAR AND THE TRAFFIC SIGNAL IS ESTIMATED AT 125'. ADJUST THIS LENGTH, BASED ON THE LENGTH OF THE CRASH CUSHION USED, TO MAINTAIN THE TOTAL LENGTH OF THE WEST TRANSITION AT 350'.*

NOTES:

1. *SET UP SIGNS AND PAVEMENT MARKINGS ACCORDING TO STANDARD TCP (2-8) - 18.*
2. *UNLESS OTHERWISE APPROVED BY THE ENGINEER, MAINTAIN THE PAVEMENT MARKINGS ON APPROACH TO AND INCLUDING THE STOP BARS FOR THE DURATION OF PHASE 1. CHANGES BETWEEN THE STOP BARS WILL BE REQUIRED AS PART OF PHASE 1B.*

STATE OF TEXAS
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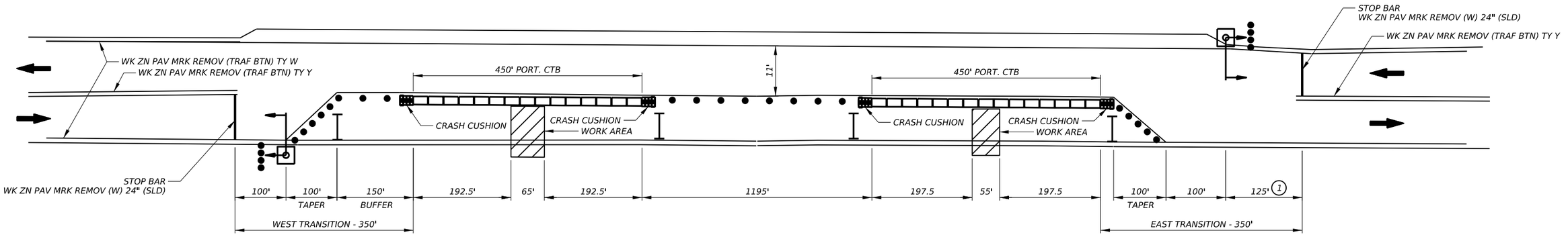
05/24/2022

TCP DETAILS

Texas Department of Transportation

NOT TO SCALE

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		37
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



PHASE 1B - TCP DETAILS
FM 1785

(1) *THE LENGTH BETWEEN THE STOP BAR AND THE TRAFFIC SIGNAL IS ESTIMATED AT 125'. ADJUST THIS LENGTH, BASED ON THE LENGTH OF THE CRASH CUSHION USED, TO MAINTAIN THE TOTAL LENGTH OF THE EAST TRANSITION AT 350'.*

NOTES:

1. *SET UP SIGNS AND PAVEMENT MARKINGS ACCORDING TO STANDARD TCP (2-8) - 18.*
2. *UNLESS OTHERWISE APPROVED BY THE ENGINEER, MAINTAIN THE PAVEMENT MARKINGS ON APPROACH TO AND INCLUDING THE STOP BARS FOR THE DURATION OF PHASE 1. CHANGES BETWEEN THE STOP BARS WILL BE REQUIRED AS PART OF PHASE 1B.*

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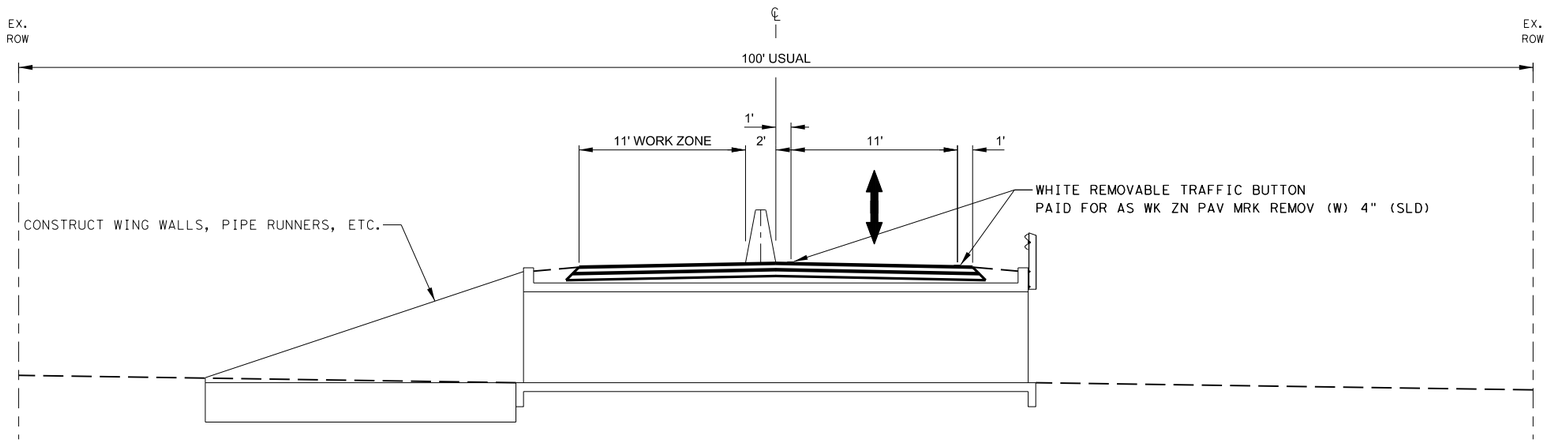
TCP DETAILS

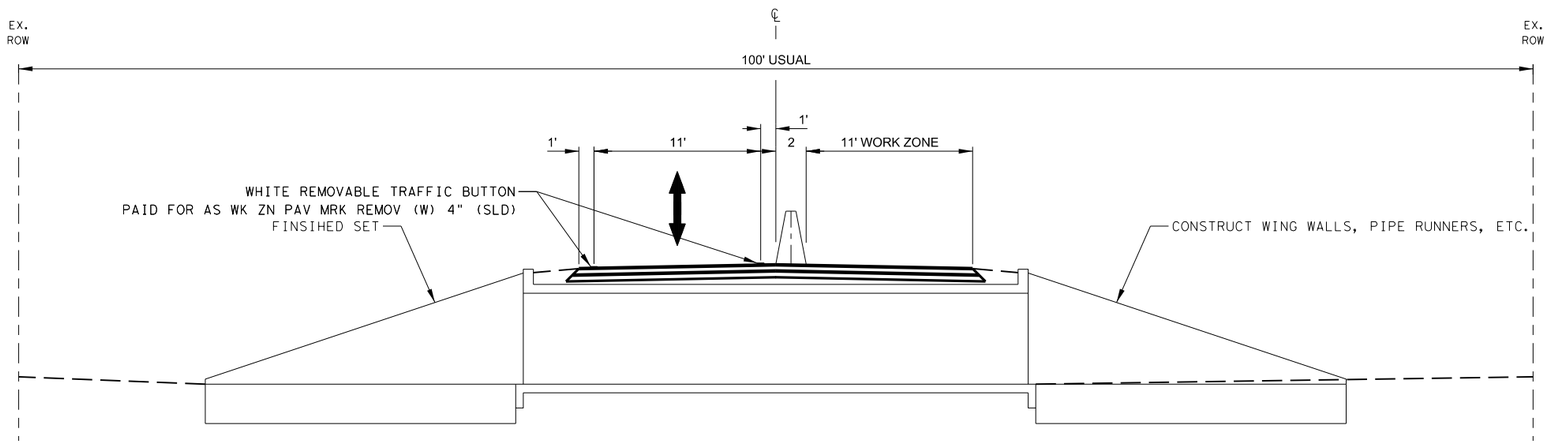
Texas Department of Transportation

NOT TO SCALE

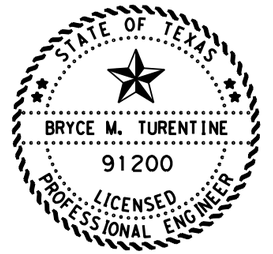
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		38
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



FM 1785
PHASE 1A
STATIONS 510+50 TO 533+05



FM 1785
PHASE 1B
STATIONS 510+50 TO 533+05



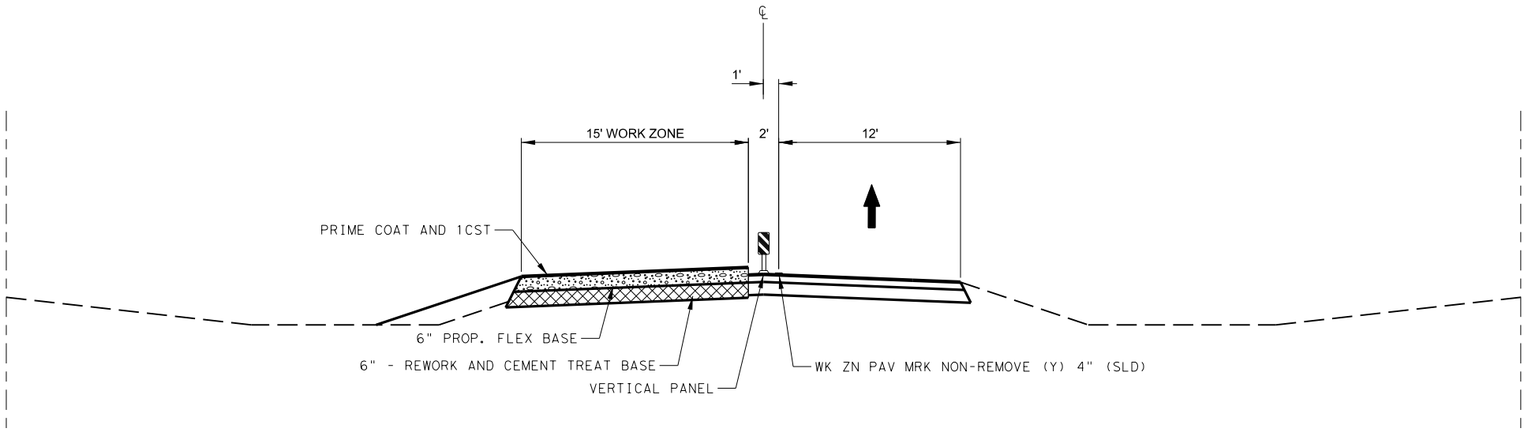
05/31/2022

TCP TYPICAL SECTIONS

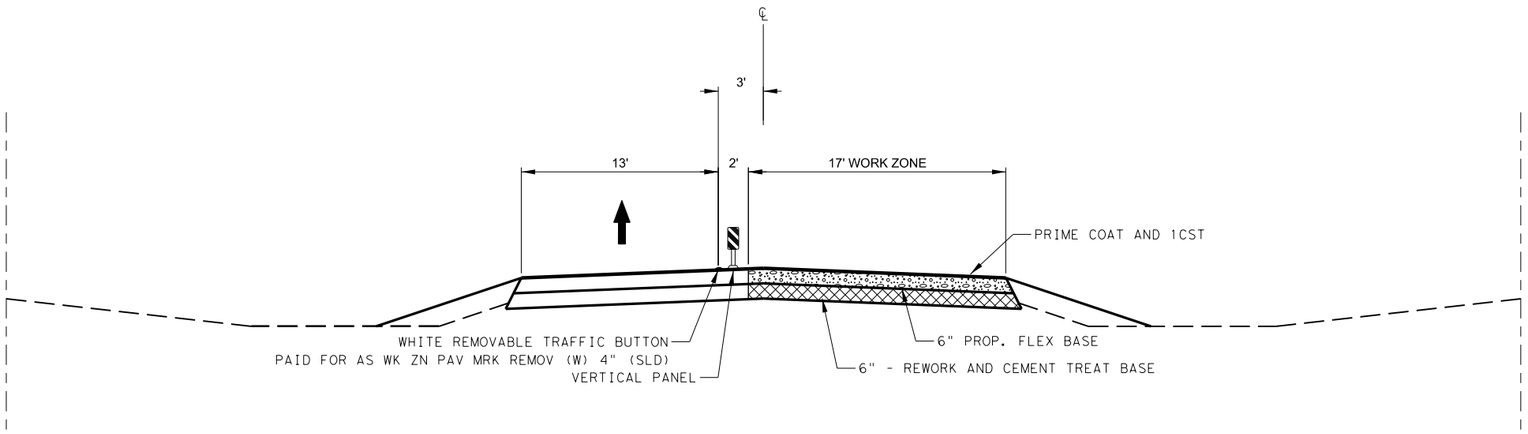
 Texas Department of Transportation

NOT TO SCALE SHEET 1 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		39
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



FM 1785
PHASE 2A
STATIONS 380+25 TO 587+84



FM 1785
PHASE 2B
STATIONS 380+25 TO 587+84

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TCP TYPICAL SECTIONS

 Texas Department of Transportation

NOT TO SCALE SHEET 2 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		40
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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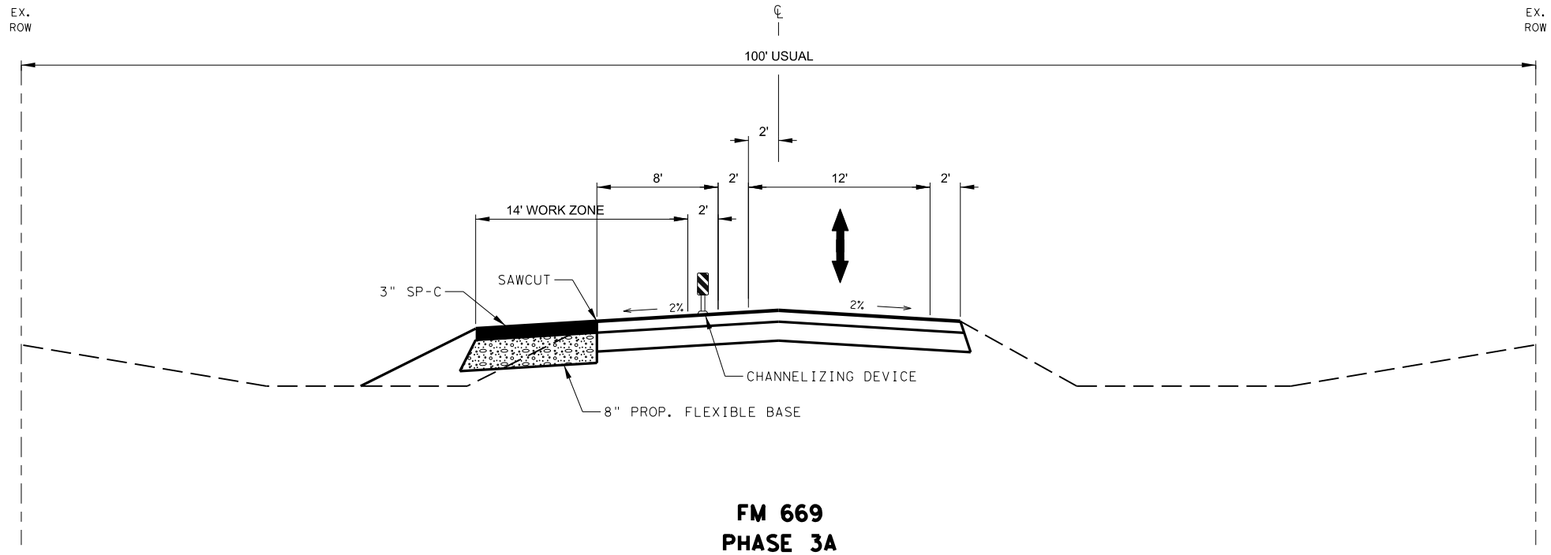
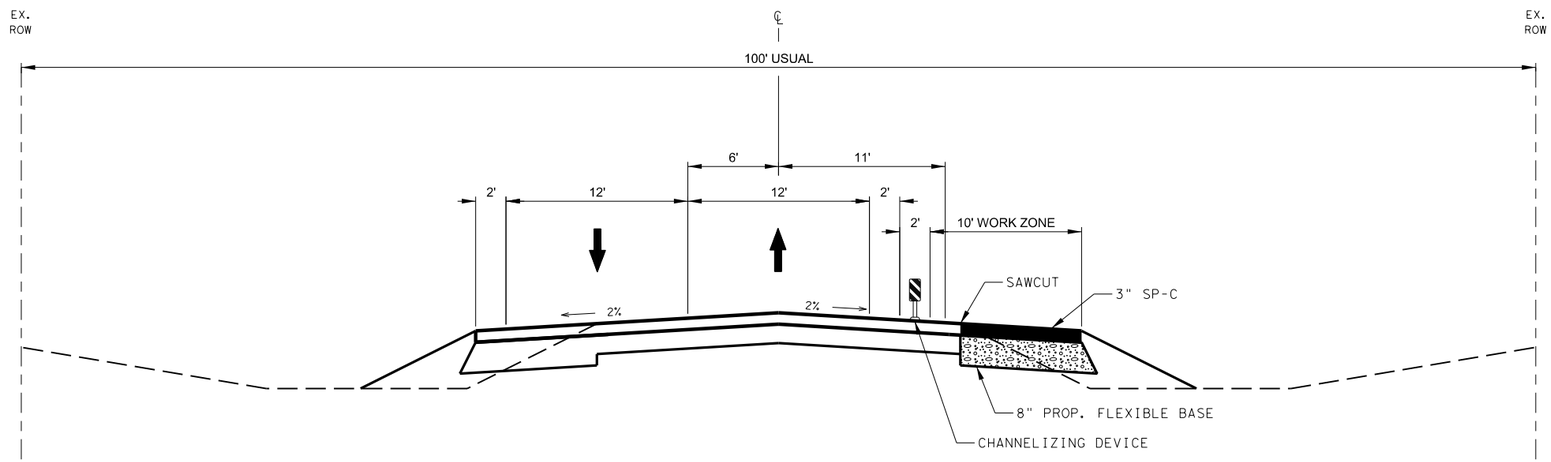


FM 669
PHASE 3A
STATIONS 952+35 TO 976+40



FM 669
PHASE 3B
STATIONS 952+35 TO 976+40

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TCP TYPICAL SECTIONS

 Texas Department of Transportation

NOT TO SCALE SHEET 3 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		41
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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DATE: 5/24/2022 4:46:41 PM

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	1	31	BRIDGE CLASS CULVERTS	509+00	TL-3	BI	N/A	N/A	PCTB	24"	42"	30'	4								X	
2	1	31	BRIDGE CLASS CULVERTS	509+00	TL-3	BI	N/A	N/A	PCTB	24"	42"	30'		4	4	1					X	
												TOTALS										

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

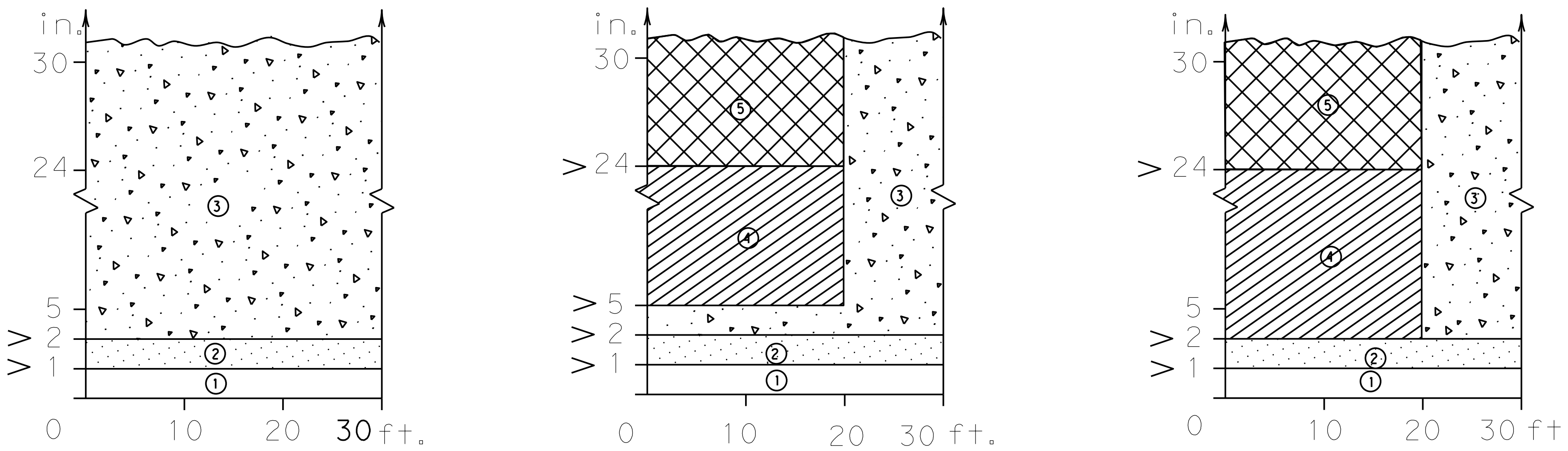
FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwyise.htm

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT / SECT / JOB		HIGHWAY
REVISIONS	1155 / 04 / 013, ETC.		FM 1785, ETC.
	DIST	COUNTY	
	ABL	BORDEN	
	FEDERAL AID PROJECT		SHEET NO.
			42

DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

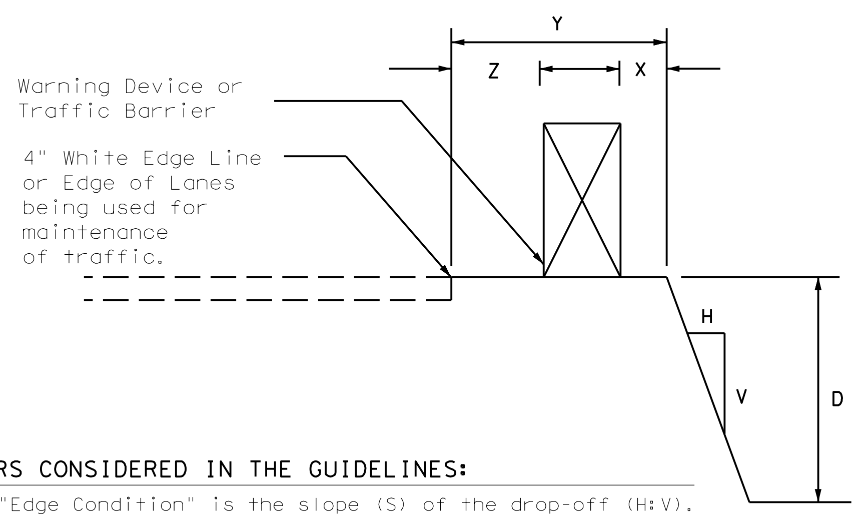
Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet



Edge Condition I
S = (3:1) (or flatter)

Edge Condition II
S = ((2.99):1) to (1:1)

Edge Condition III
S is steeper than (1:1)



FACTORS CONSIDERED IN THE GUIDELINES:

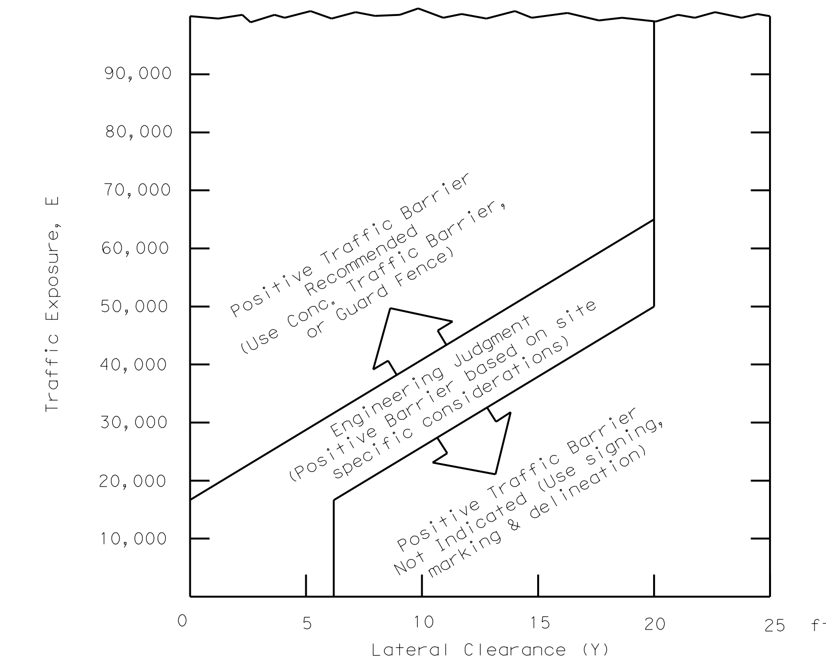
1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".
2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

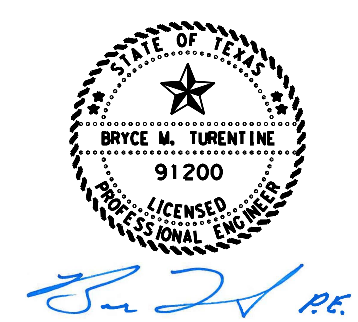
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.
3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differen-tial when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▩)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.



05/24/2022

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS 03-01 08-01 9-21	DIST ABL		COUNTY BORDEN	SHEET NO. 43

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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

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REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	1155	04	013, ETC.	FM 1785, ETC
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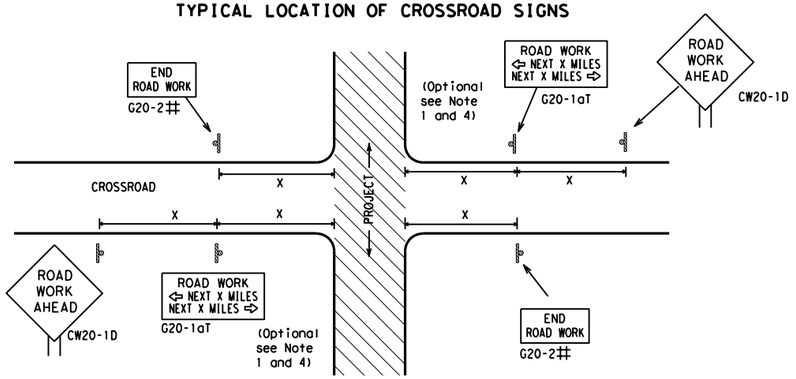
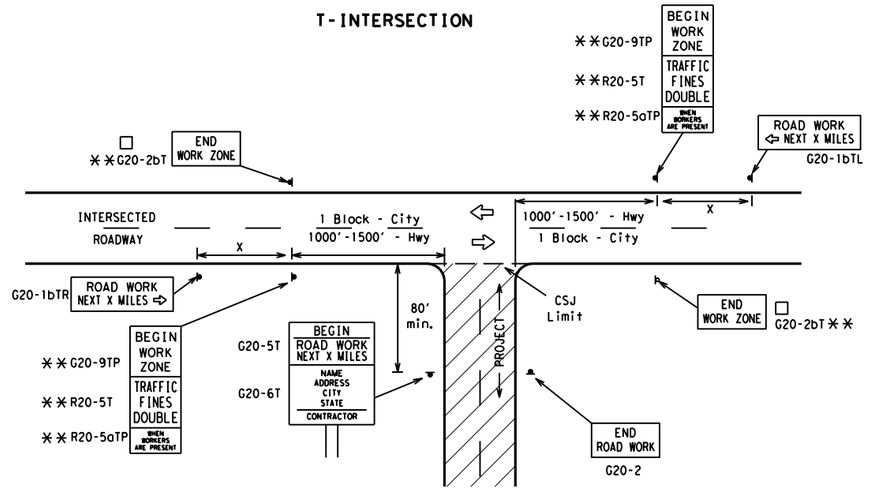
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

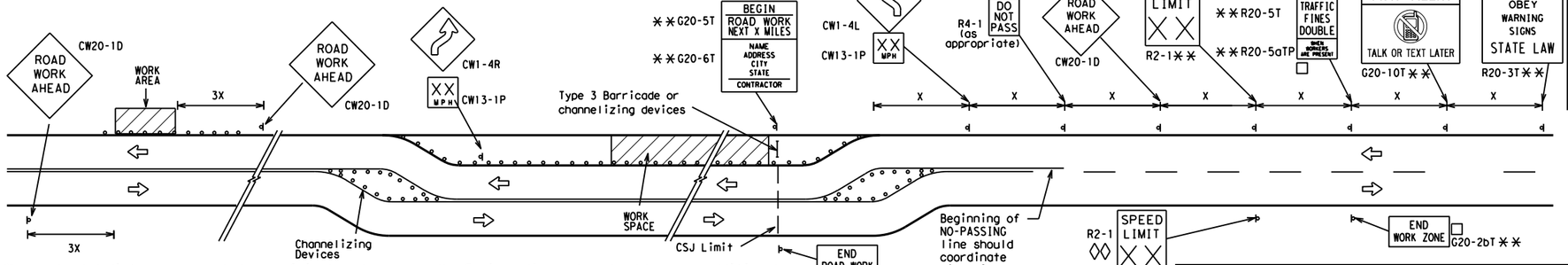
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

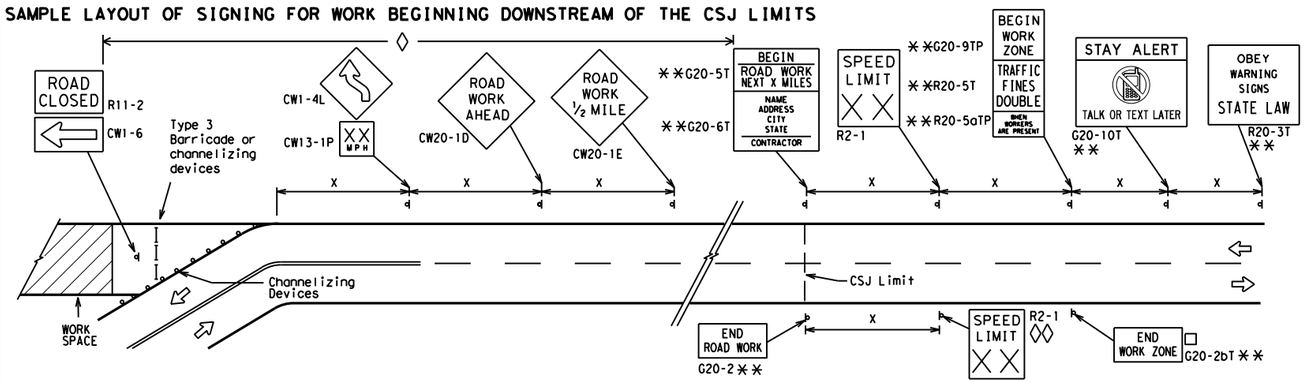
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

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BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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7-13 5-21	ABL	BORDEN		45

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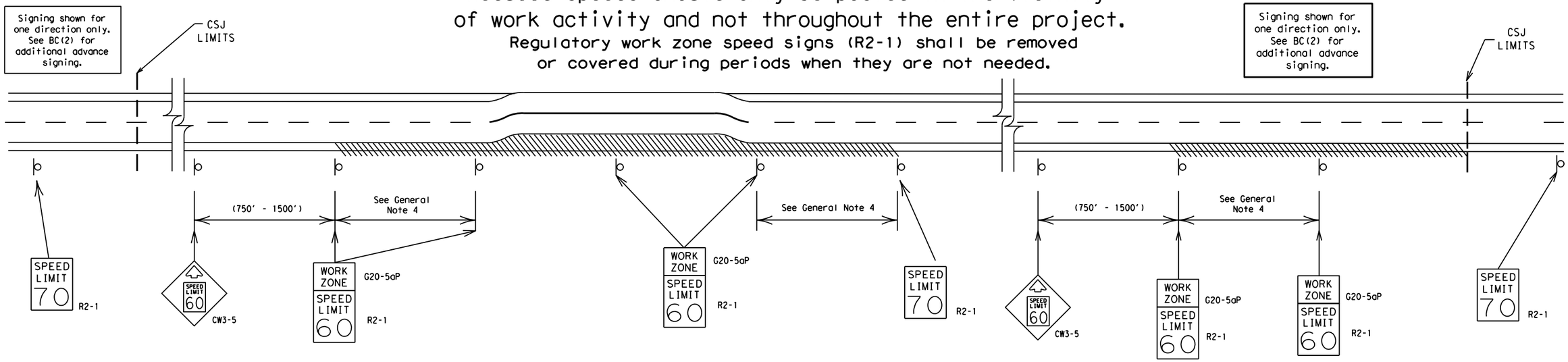
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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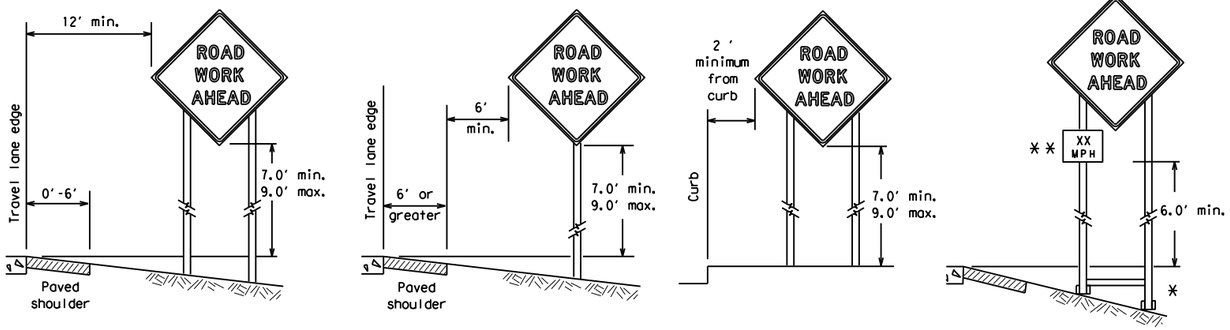
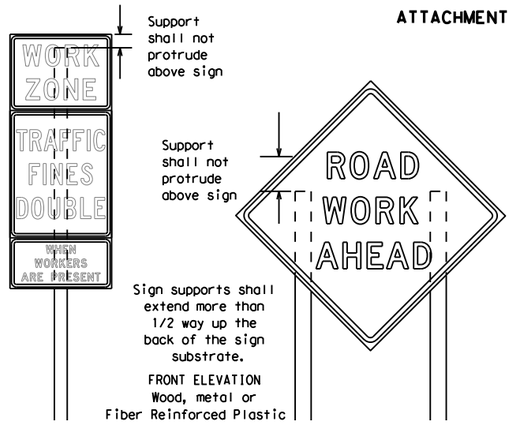
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

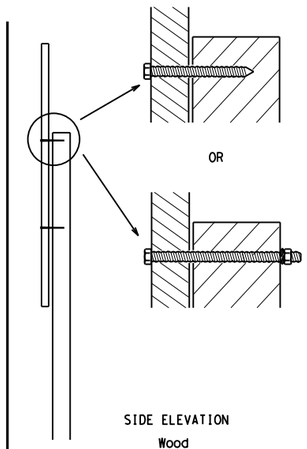


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





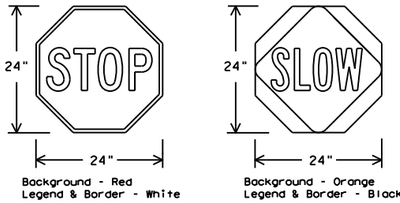
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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7-13 5-21	ABL	BORDEN		47

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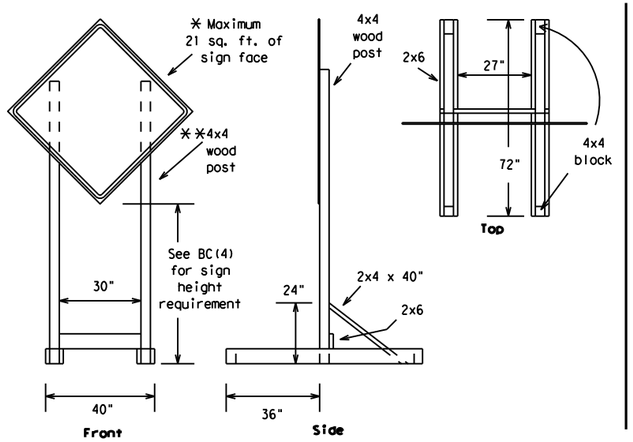
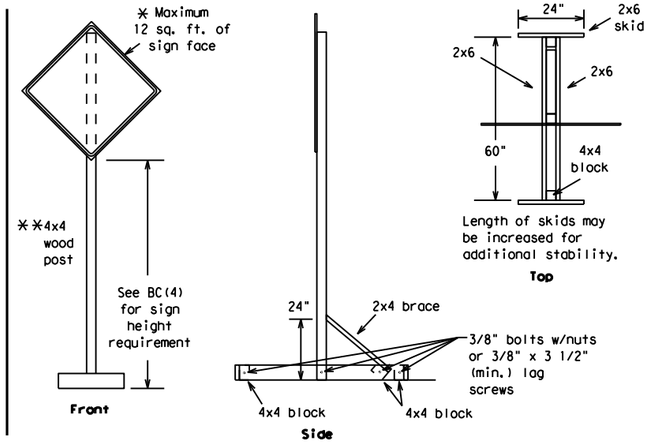
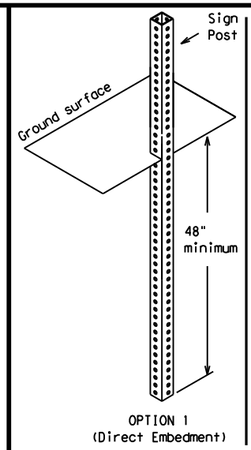
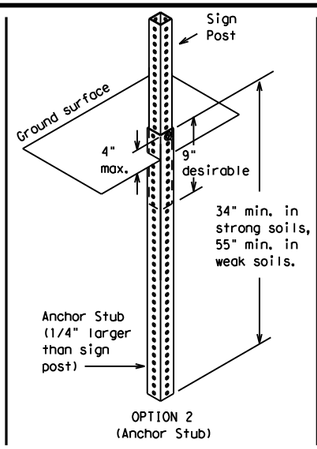


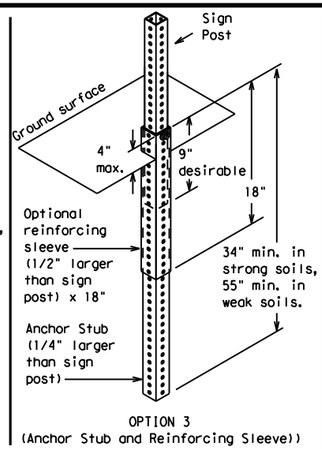


SKID MOUNTED WOOD SIGN SUPPORTS

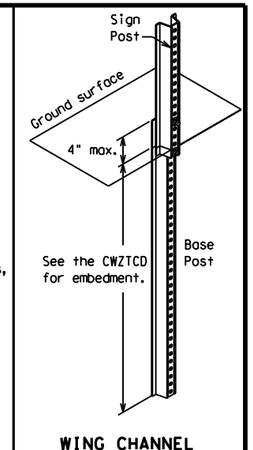
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







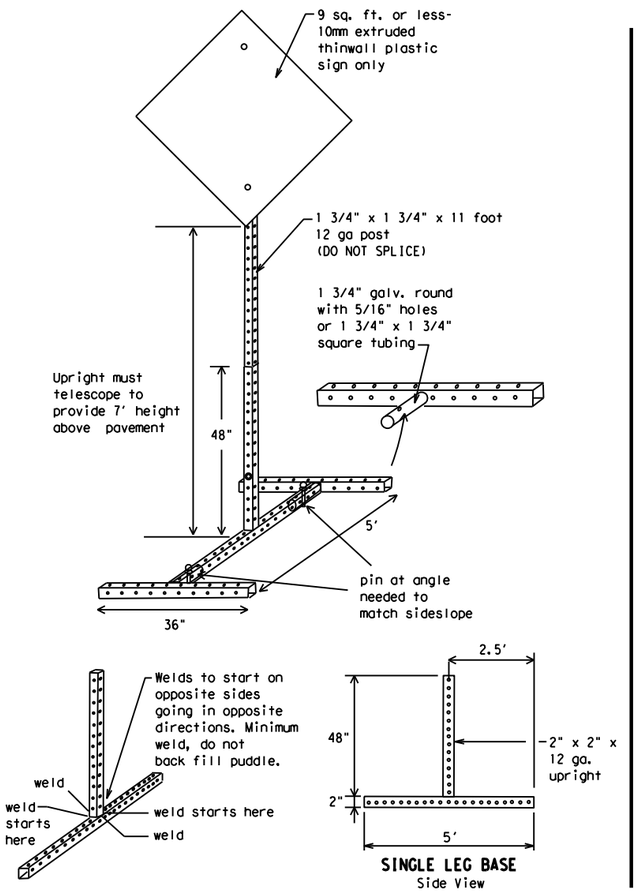
PERFORATED SQUARE METAL TUBING

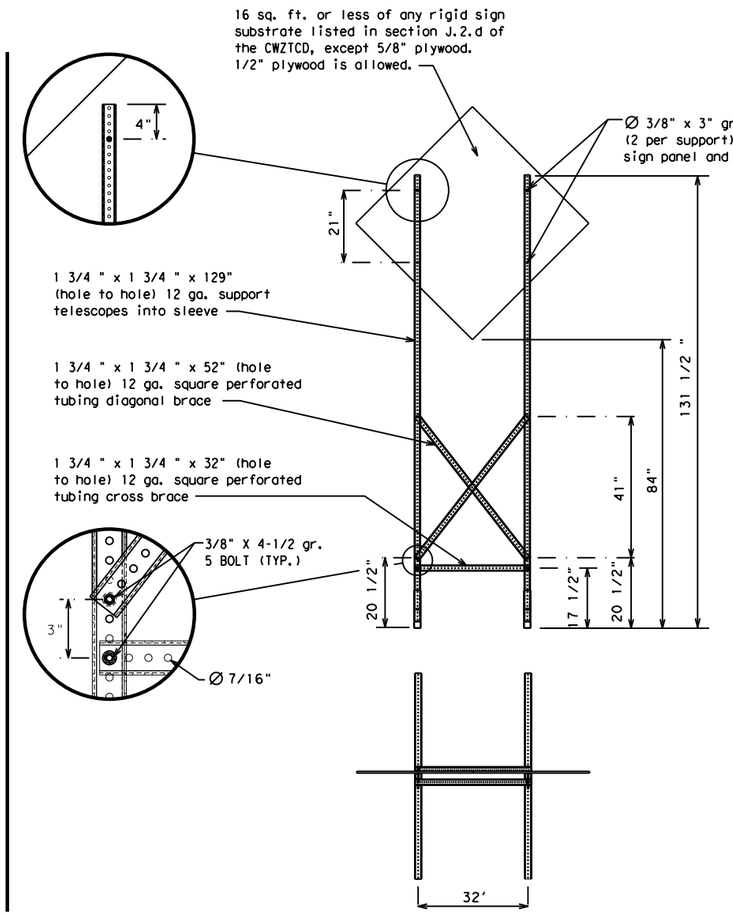


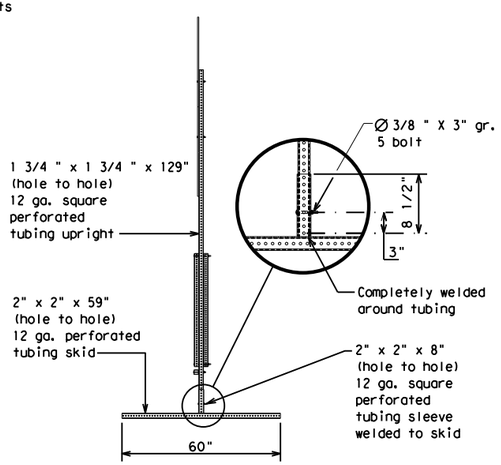
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.FM 1785, ETC	
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	BORDEN		48

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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		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** 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	1155	04	013, ETC.	FM 1785, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	BORDEN		49

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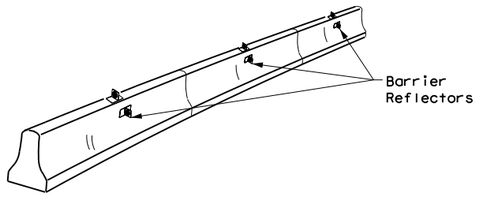
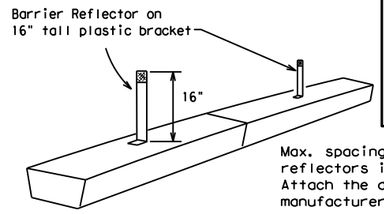
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

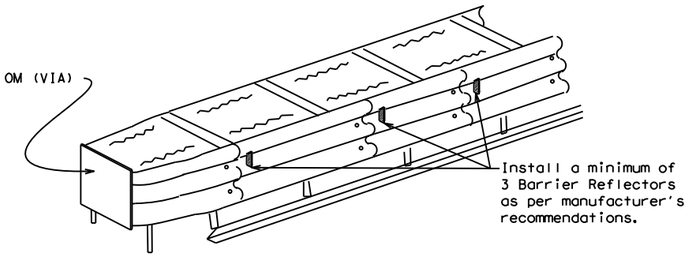


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

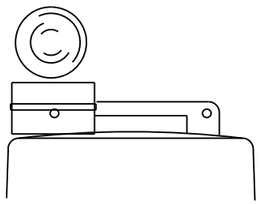


DELINEATION OF END TREATMENTS

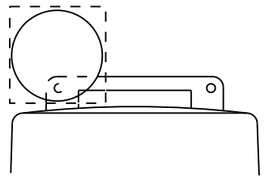
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

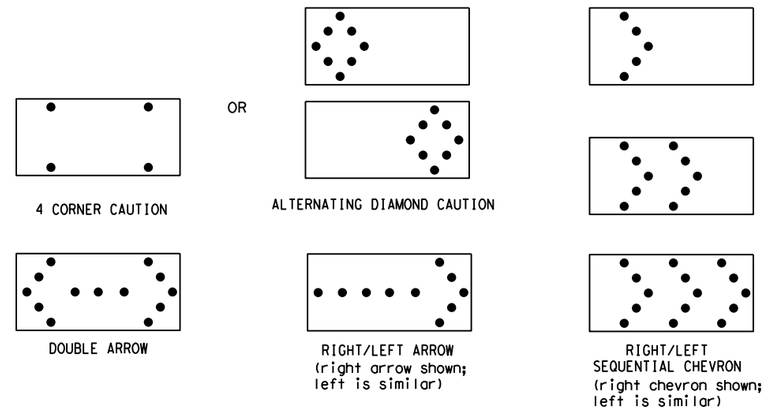
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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
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REVISIONS	1155	04	013, ETC.	FM 1785, ETC.
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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:

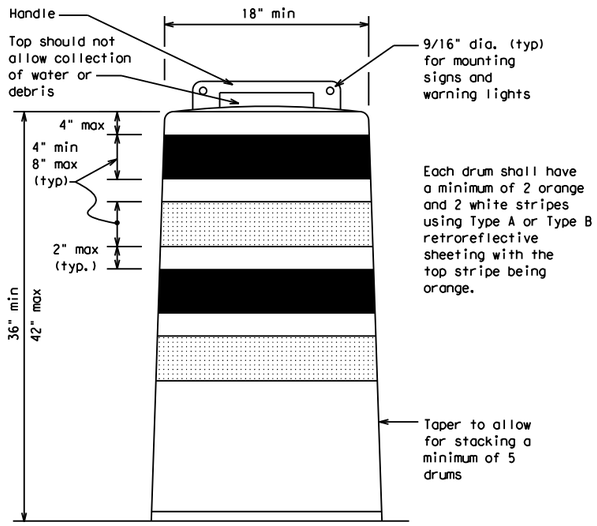
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

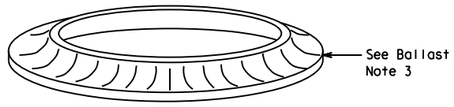
RETROREFLECTIVE SHEETING

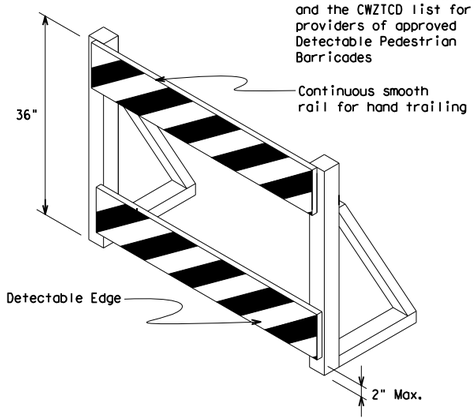
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

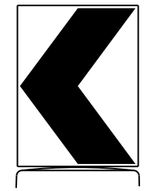




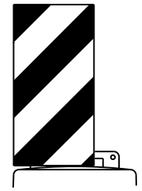


DETECTABLE PEDESTRIAN BARRICADES

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
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REVISIONS	1155	04	013, ETC.FM 1785, ETC	
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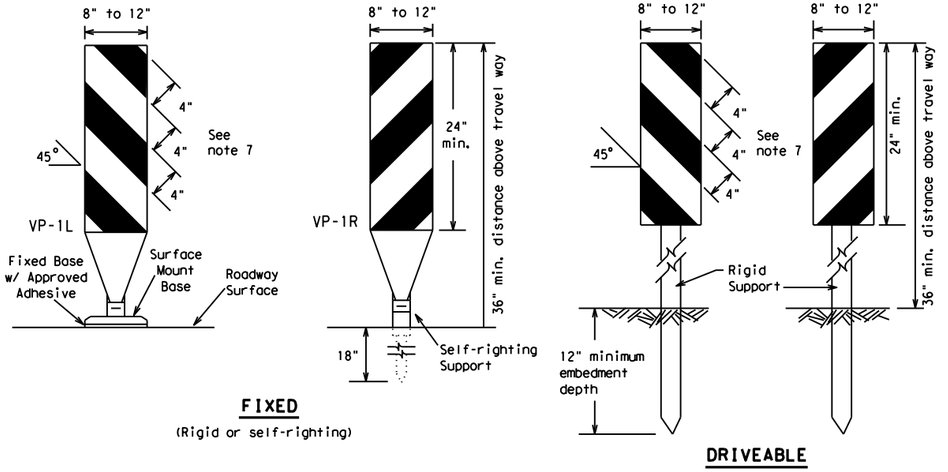
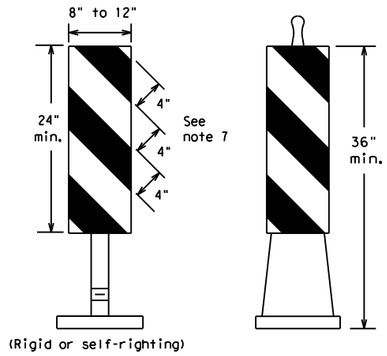


FIXED
(Rigid or self-righting)

DRIVEABLE

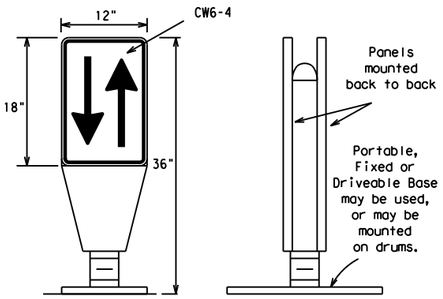


(Rigid or self-righting)

PORTABLE

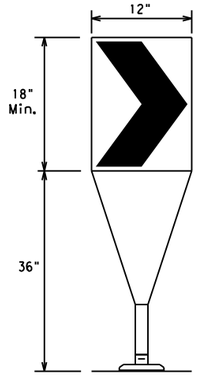
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



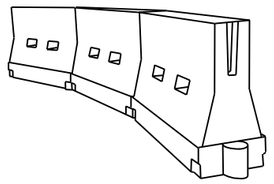
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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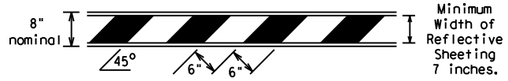
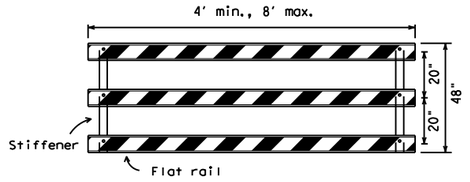
TYPE 3 BARRICADES

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.



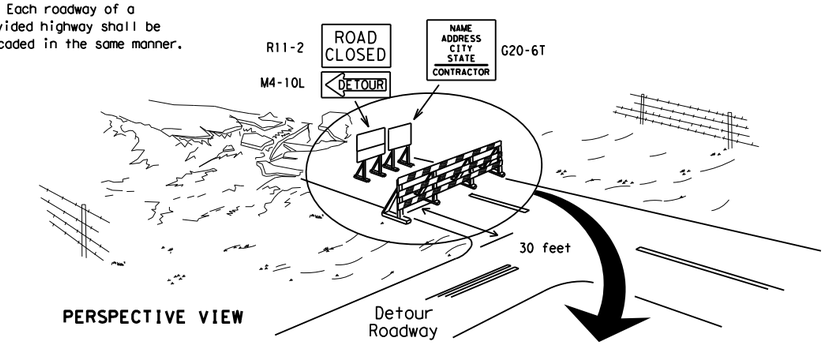
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

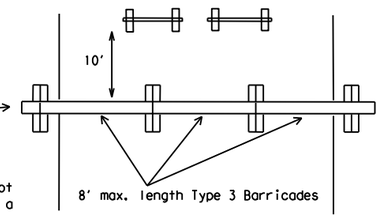
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

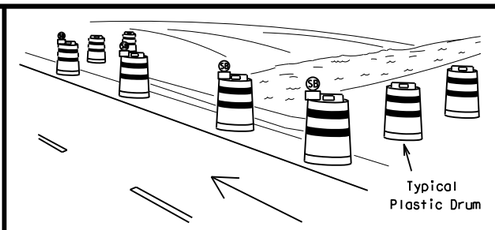
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

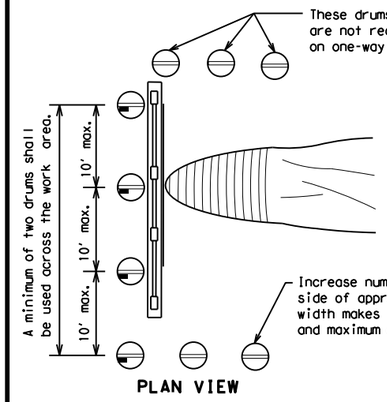
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

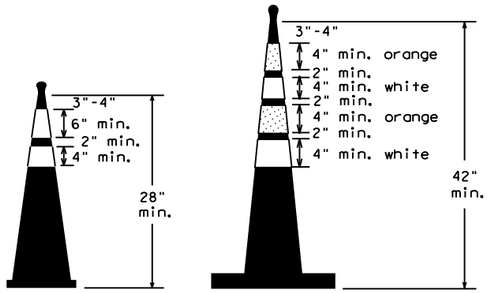
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

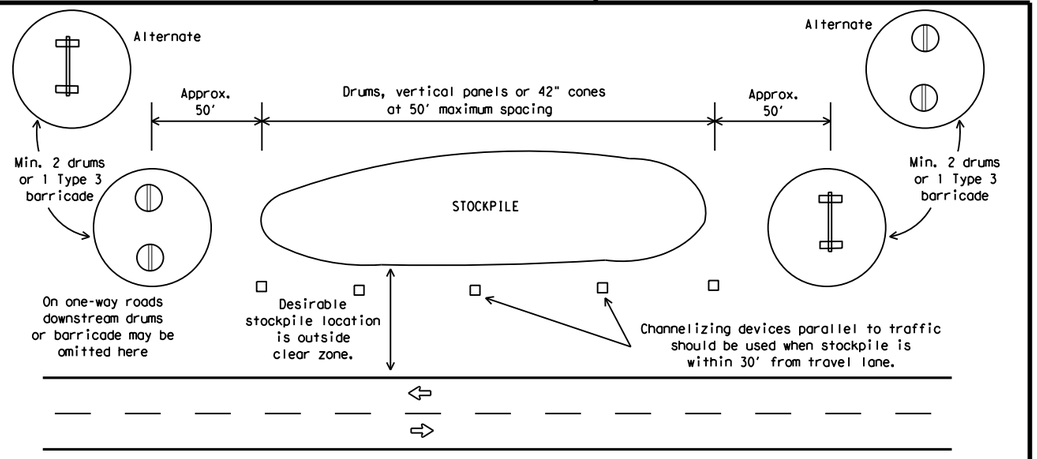
PLAN VIEW

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		53

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

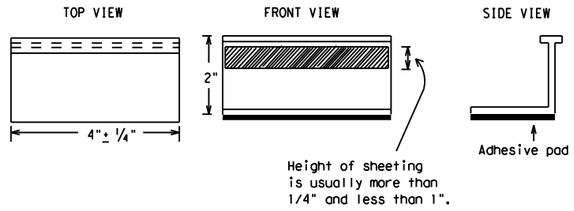
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		54

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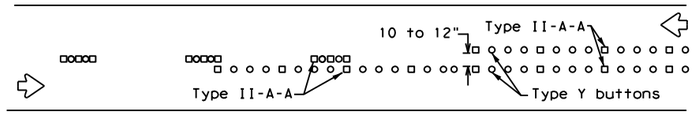
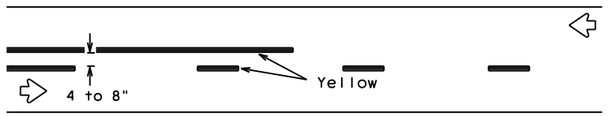
DATE: 5/25/2022 1:31:10 PM
FILE: pw:/txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/2. TCP/bc-21.dgn

PAVEMENT MARKING PATTERNS

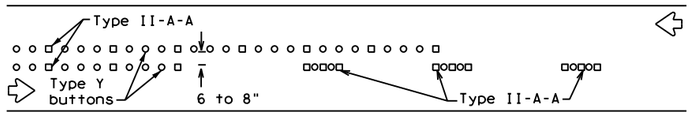
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



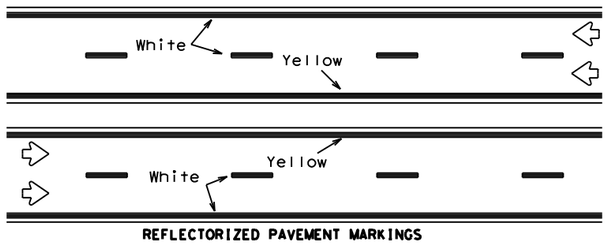
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



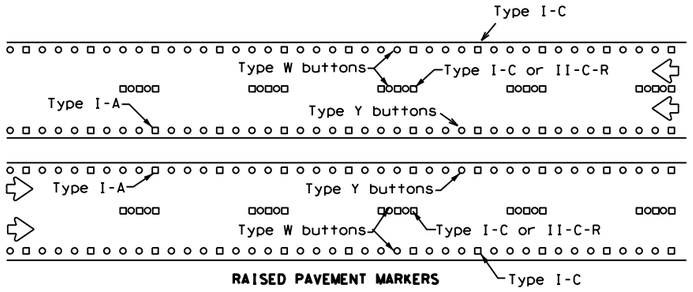
RAISED PAVEMENT MARKERS - PATTERN B

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



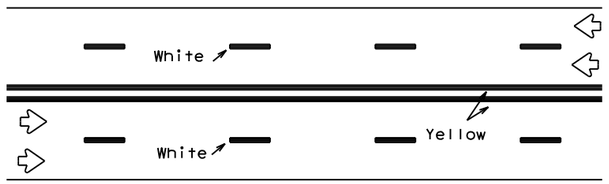
REFLECTORIZED PAVEMENT MARKINGS



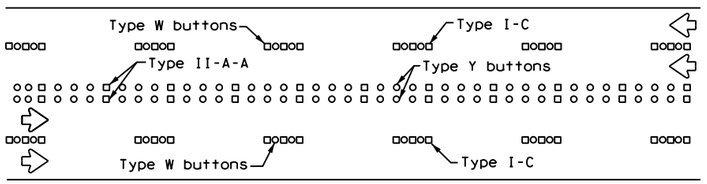
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



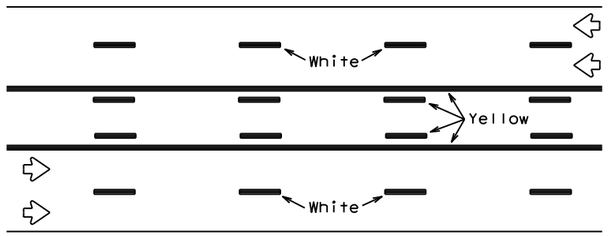
REFLECTORIZED PAVEMENT MARKINGS



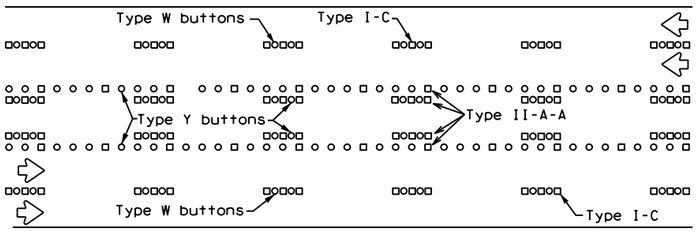
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

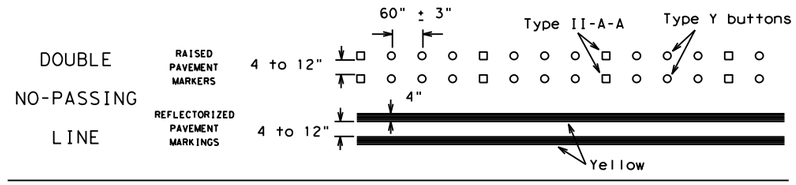
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

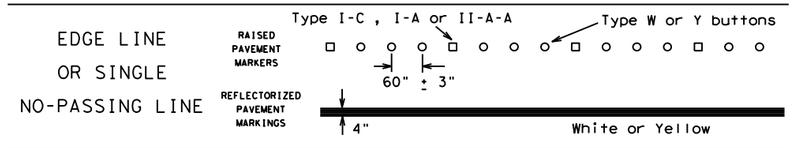
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

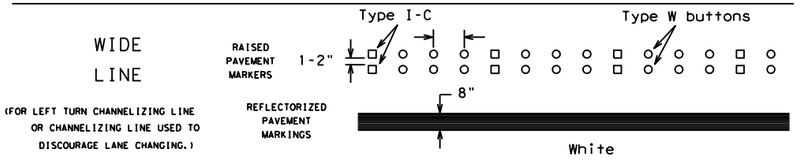


EDGE LINE OR SINGLE NO-PASSING LINE



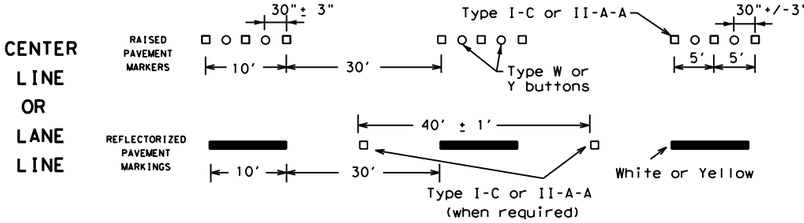
WIDE LINE

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

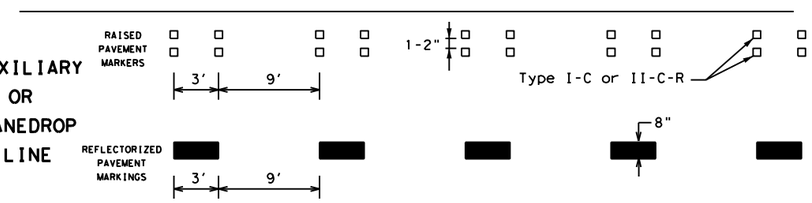


BROKEN LINES

CENTER LINE OR LANE LINE

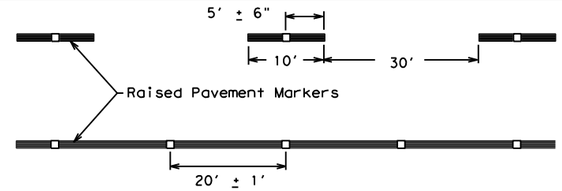


AUXILIARY OR LANEDROP LINE



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
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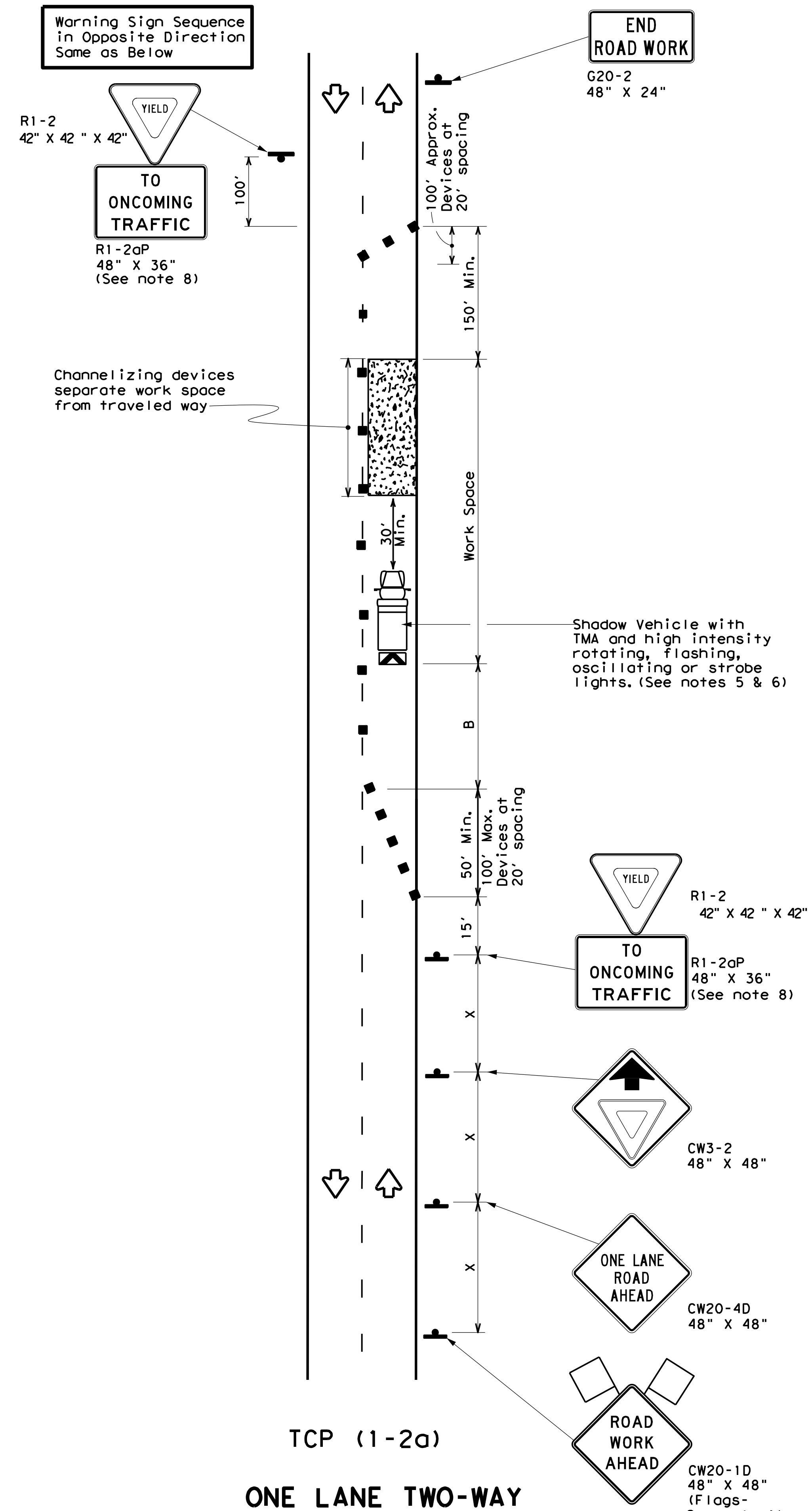
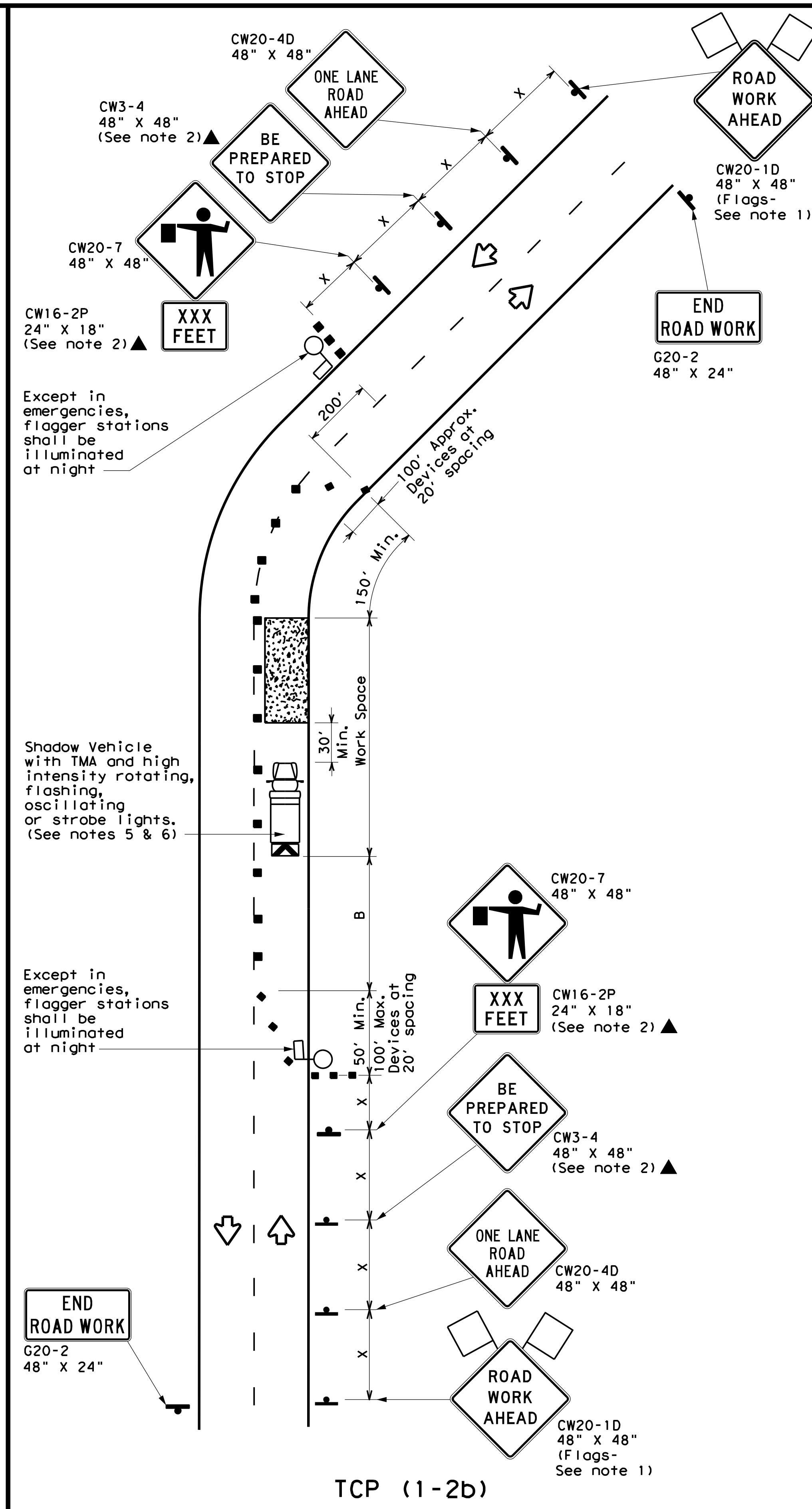
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		55



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
4-90 4-98 / 2-94 2-12 / 1-97 2-18	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	56

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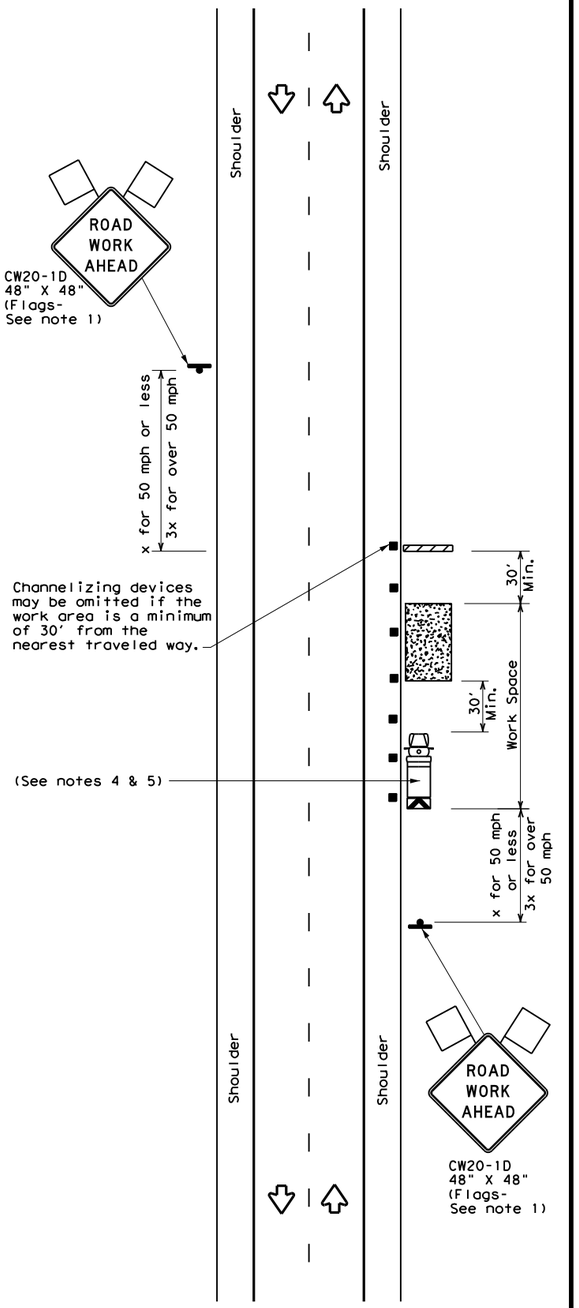
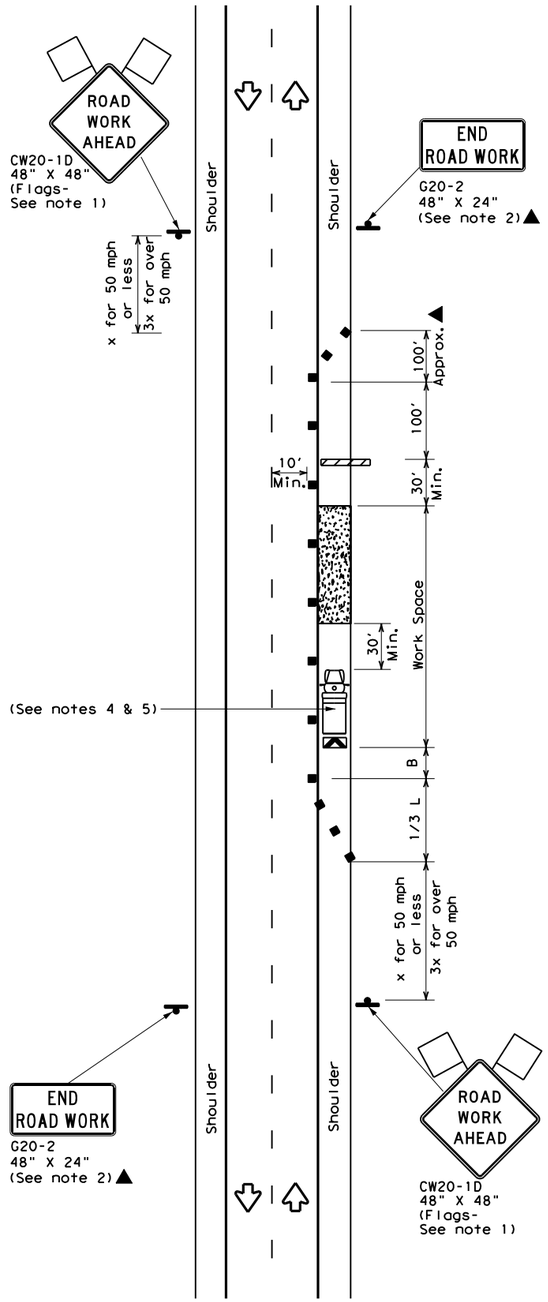


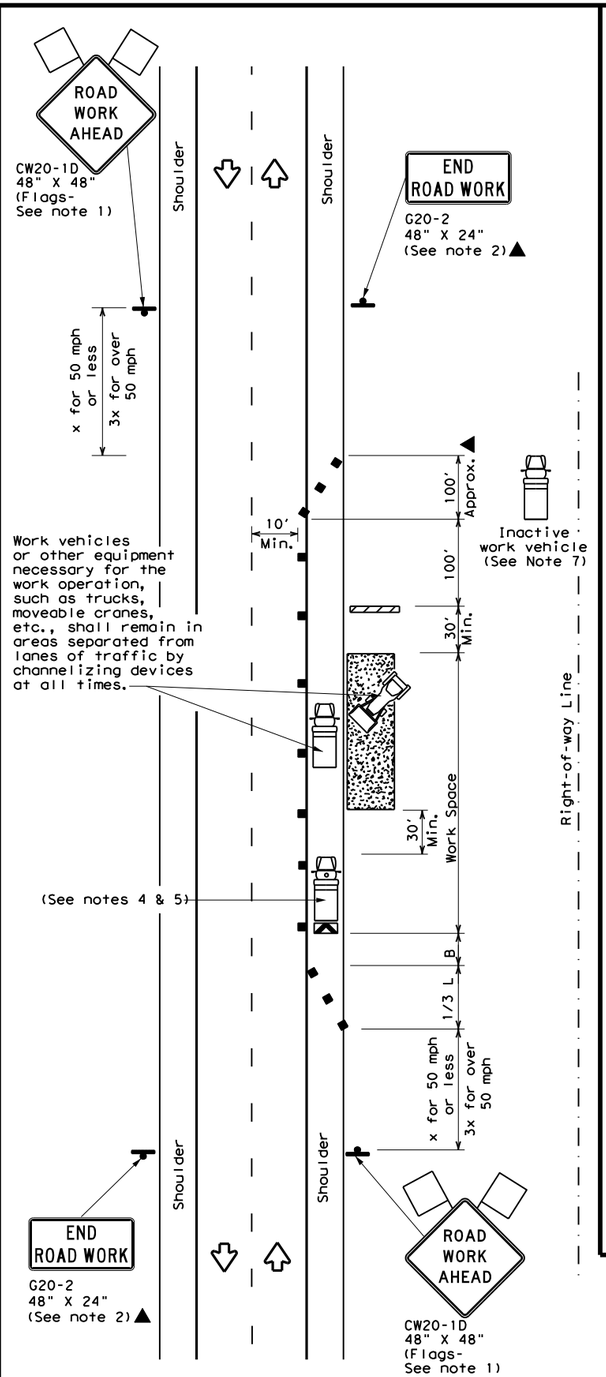
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS 2-94 4-98 / 8-95 2-12 / 1-97 2-18	1155	04	013, ETC.	FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		57

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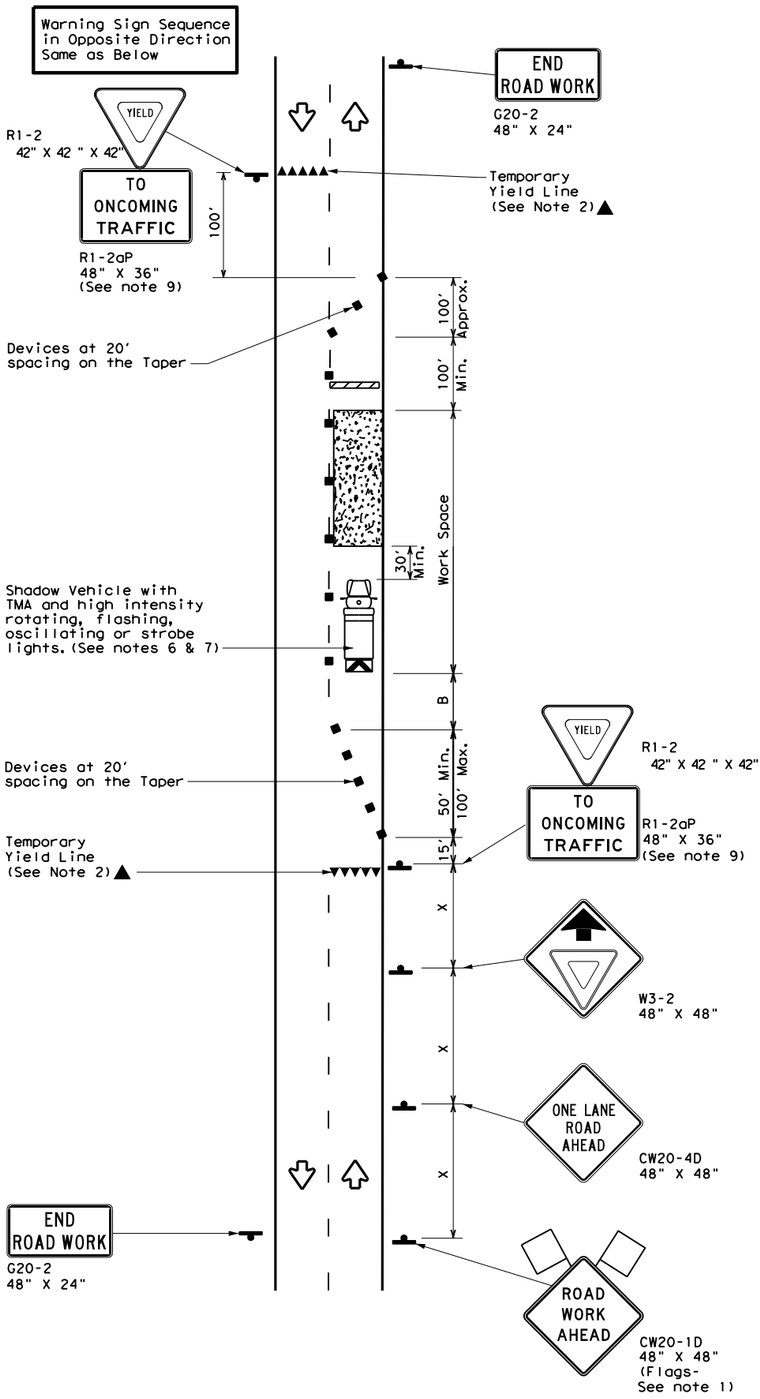
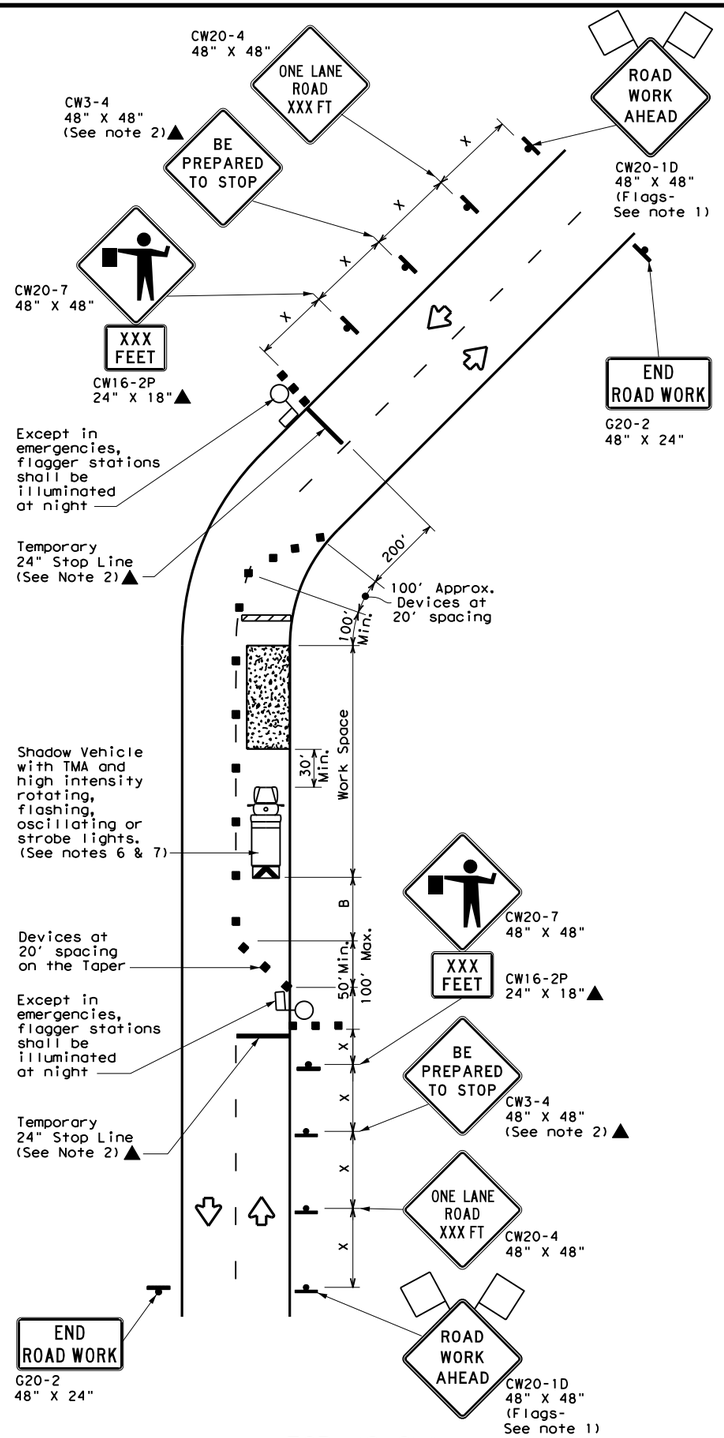


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		58

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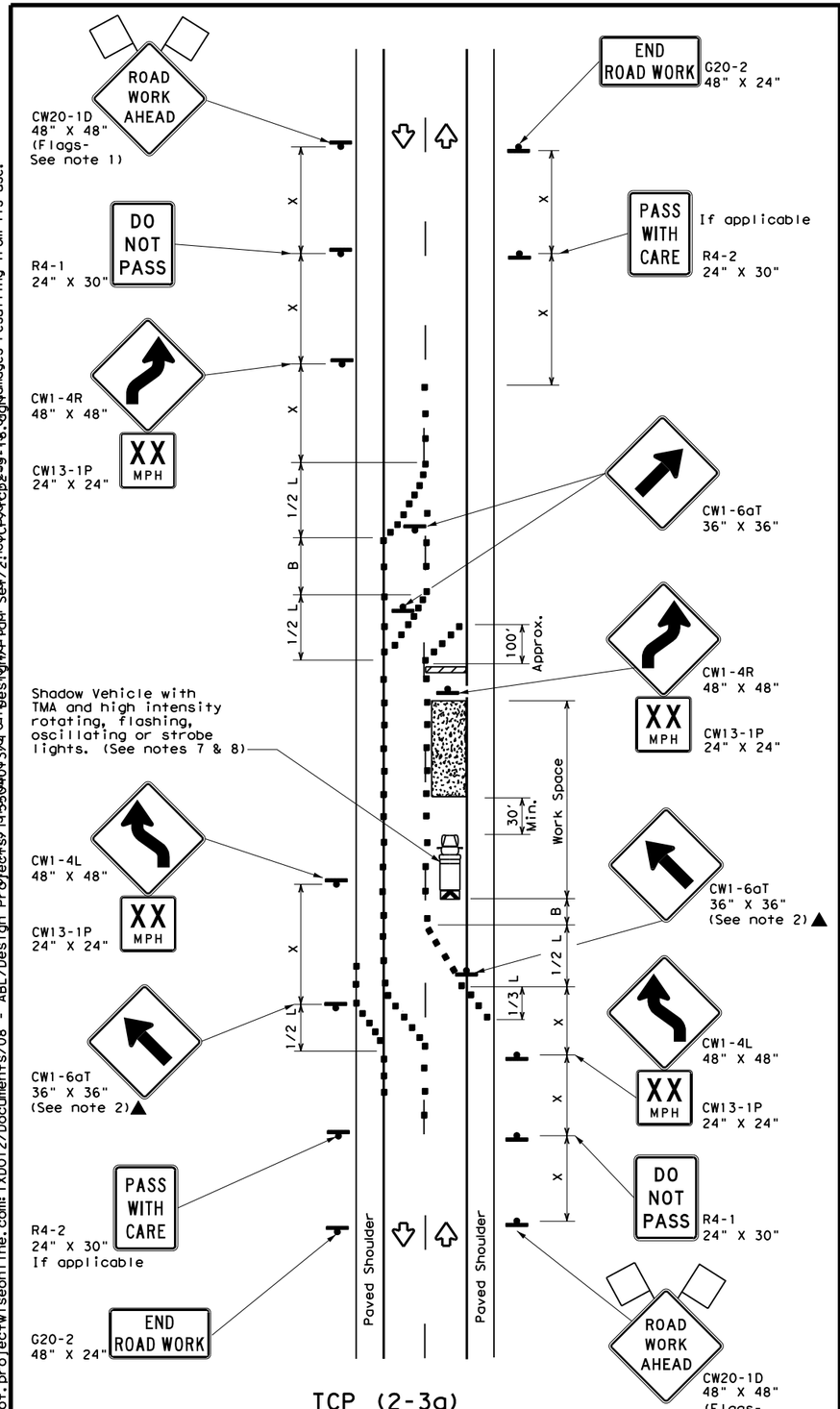
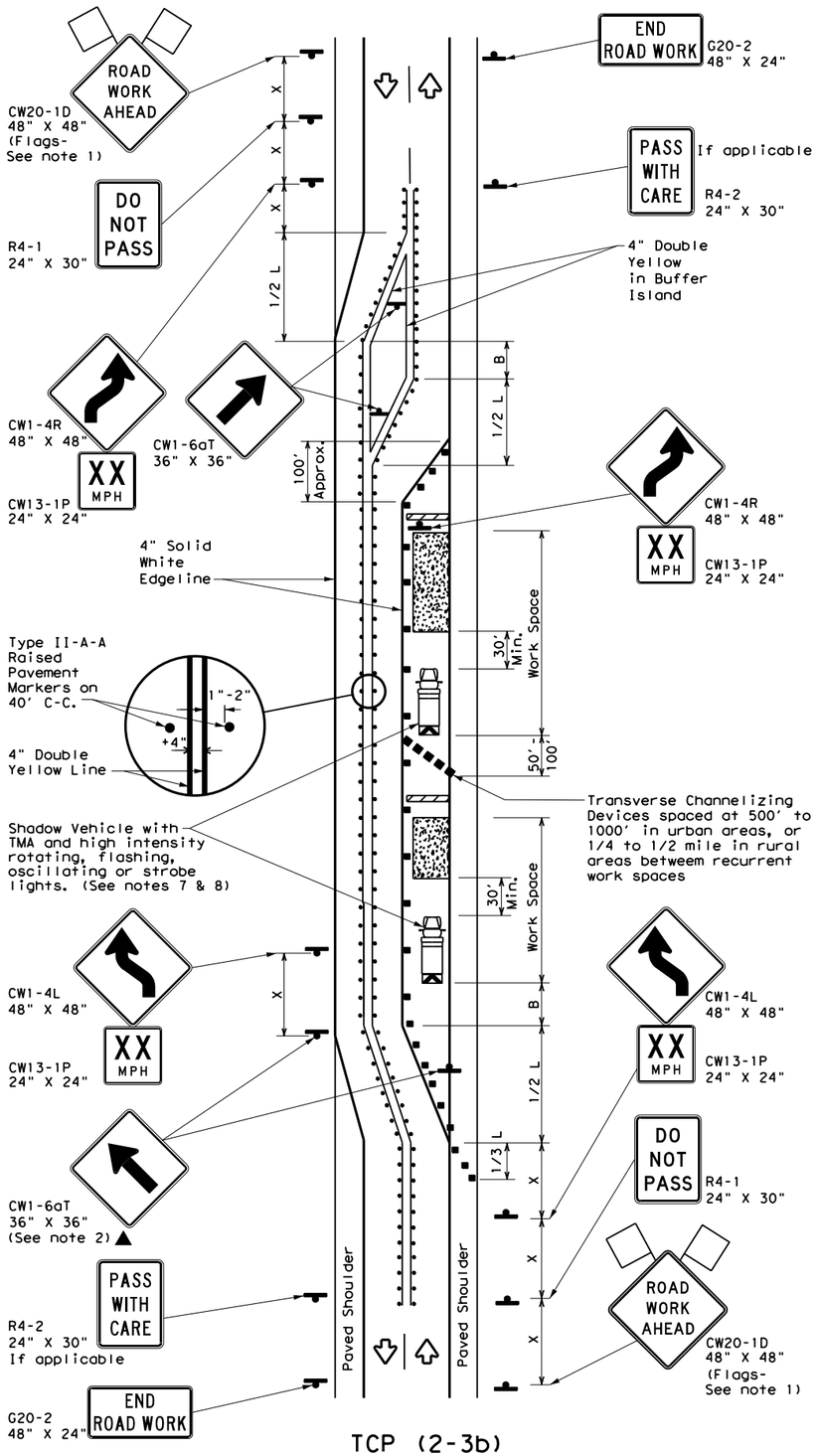


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

	Type 3 Barricade	■ ■	Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	• • • •	Raised Pavement Markers Ty II-AA
	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
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. 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 (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation | *Traffic Operations Division Standard*

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	ABL	BORDEN		59
4-98 2-18				

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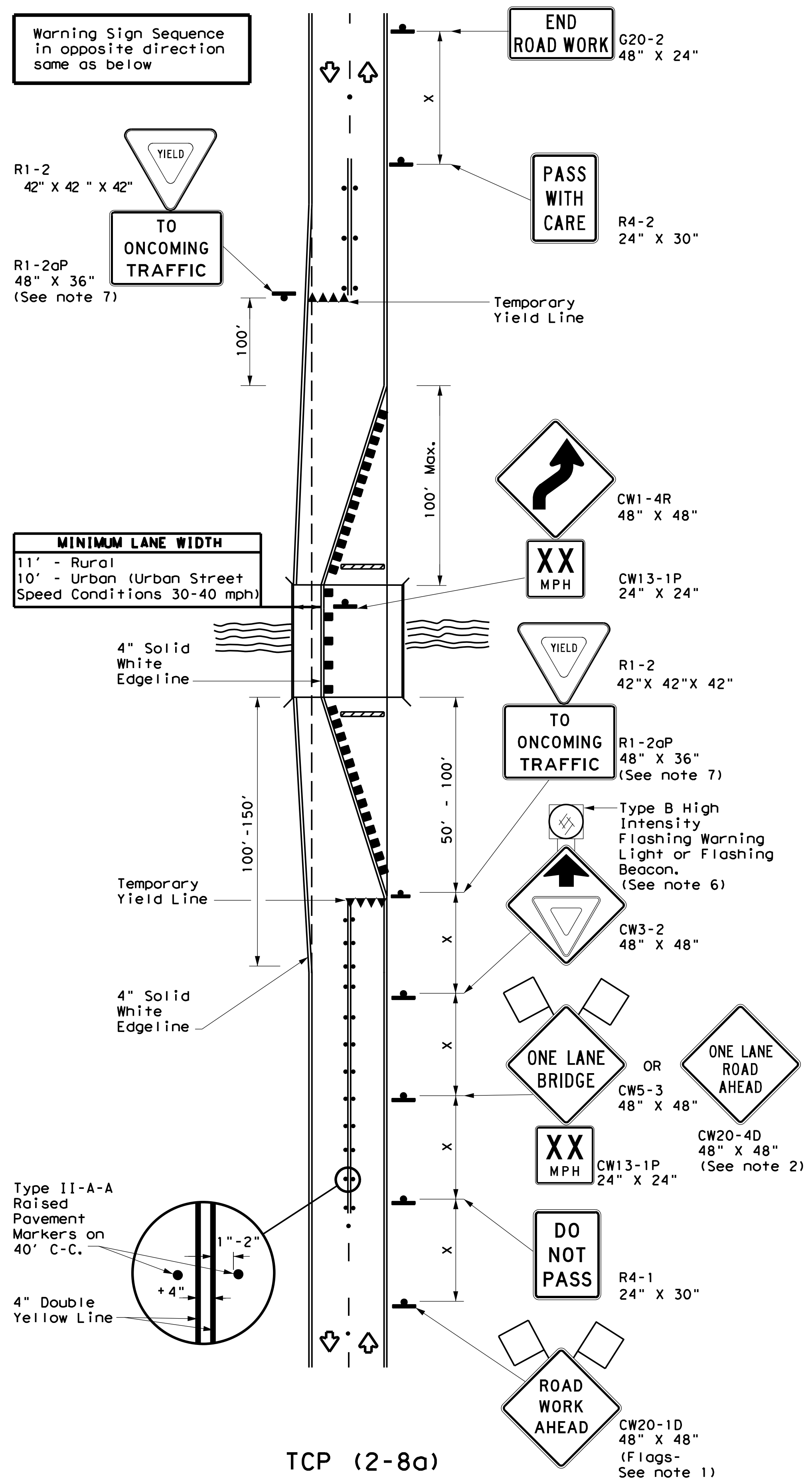
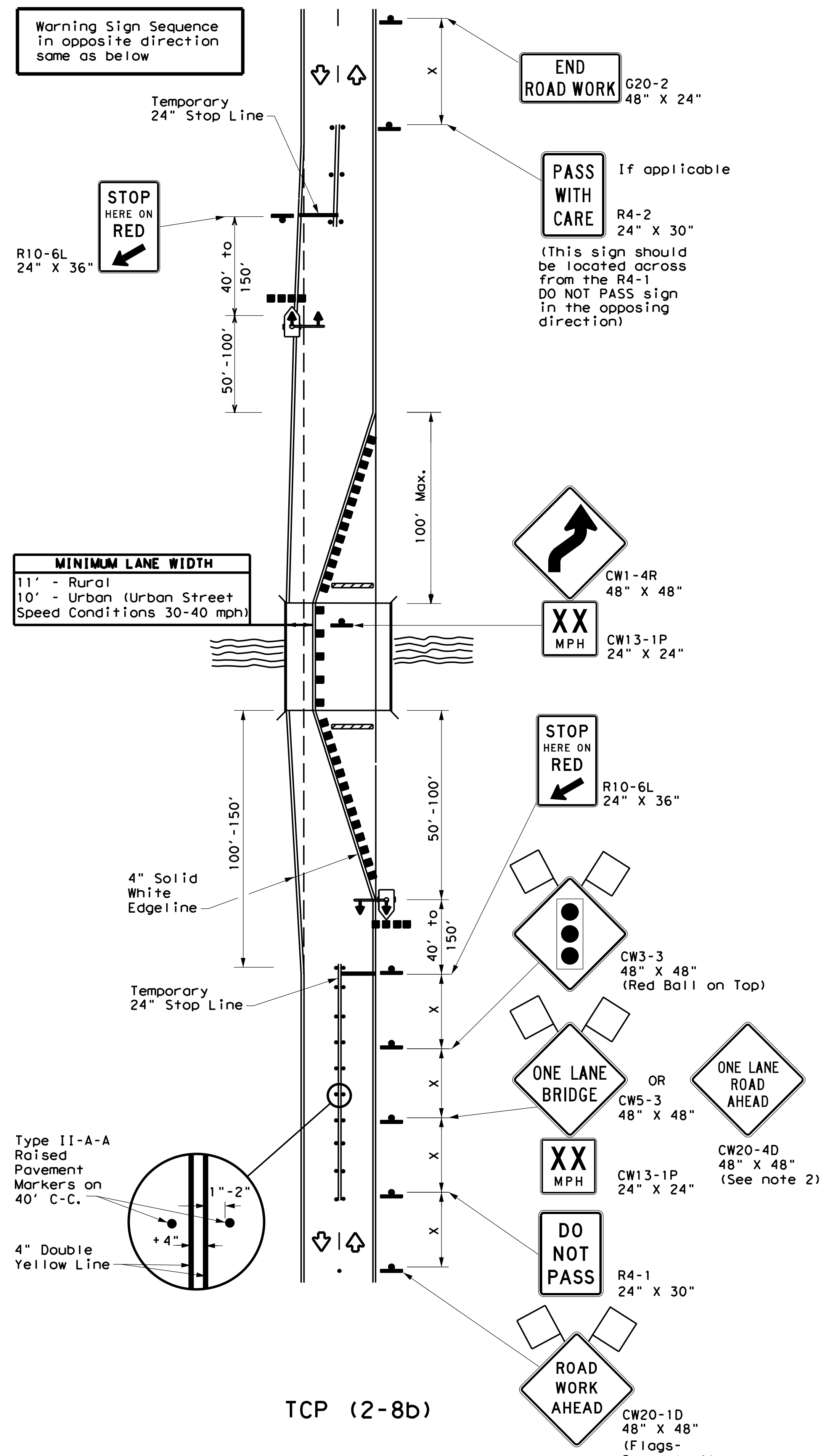


TCP (2-8a)

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 **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	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

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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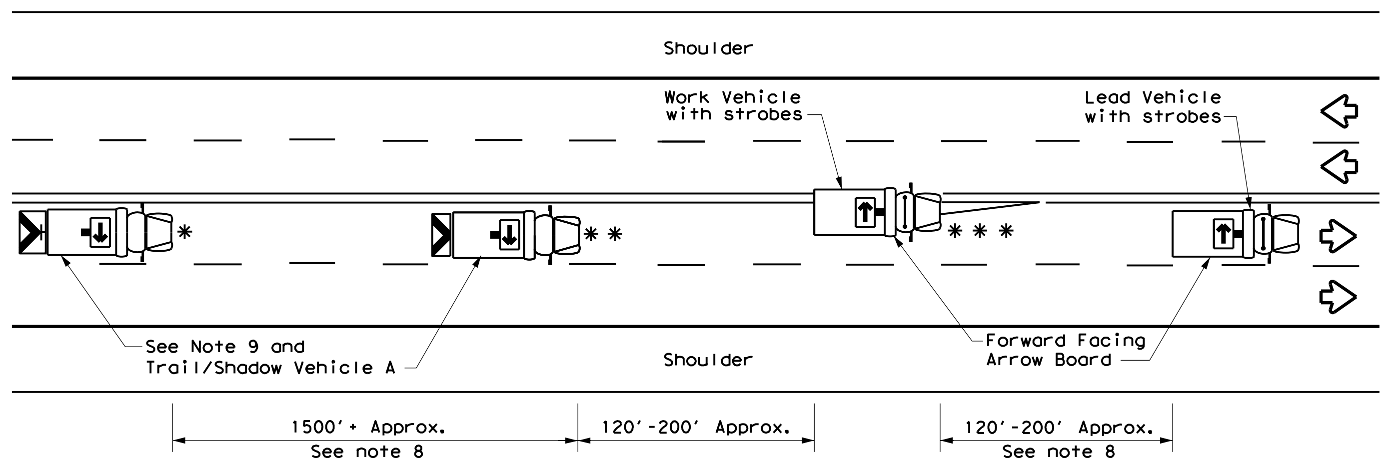
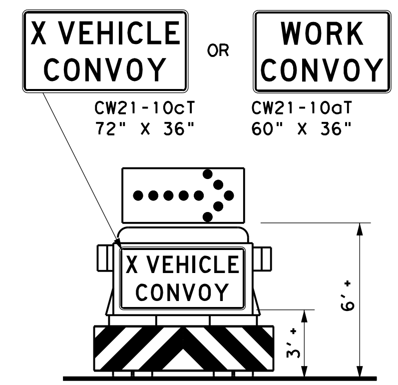


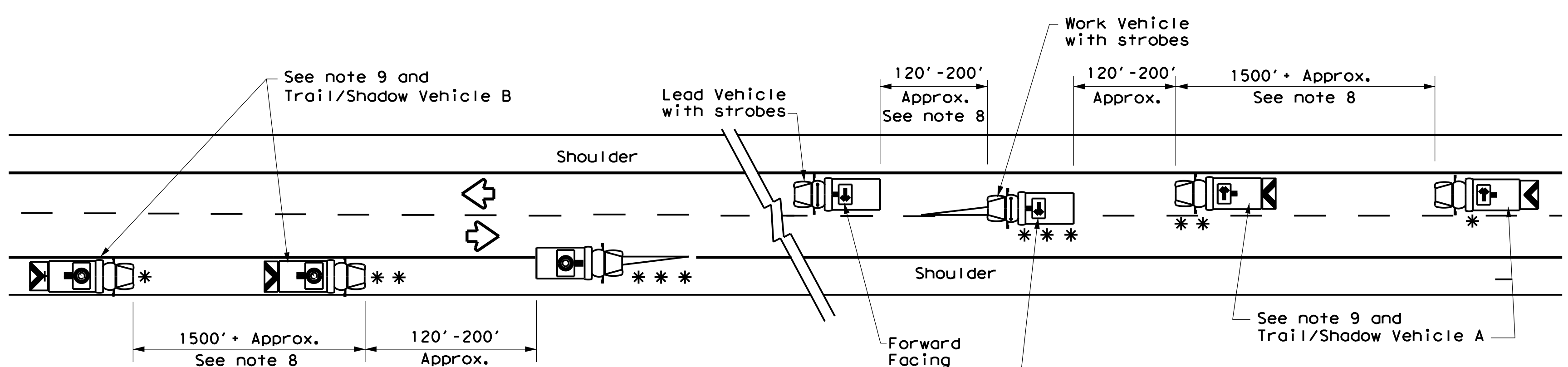
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

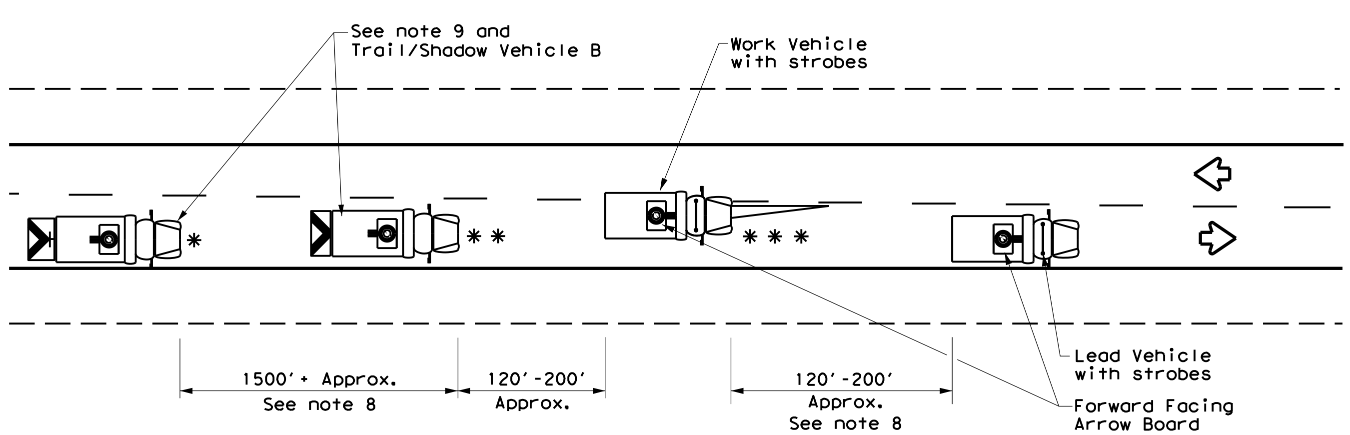


WORK ON SHOULDER

WORK ON TRAVEL LANE

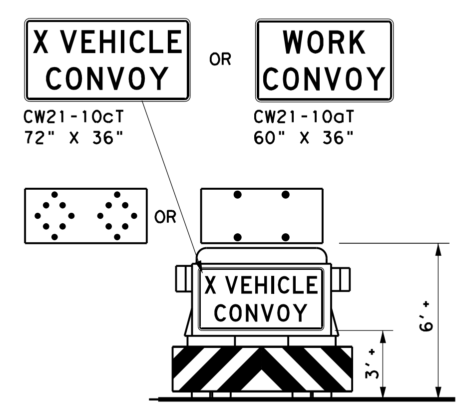
TCP (3-1b)

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

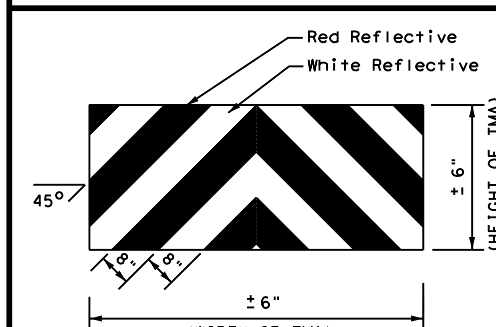
LEGEND

Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
* *	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.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1155	04	013, ETC.	FM 1785, ETC
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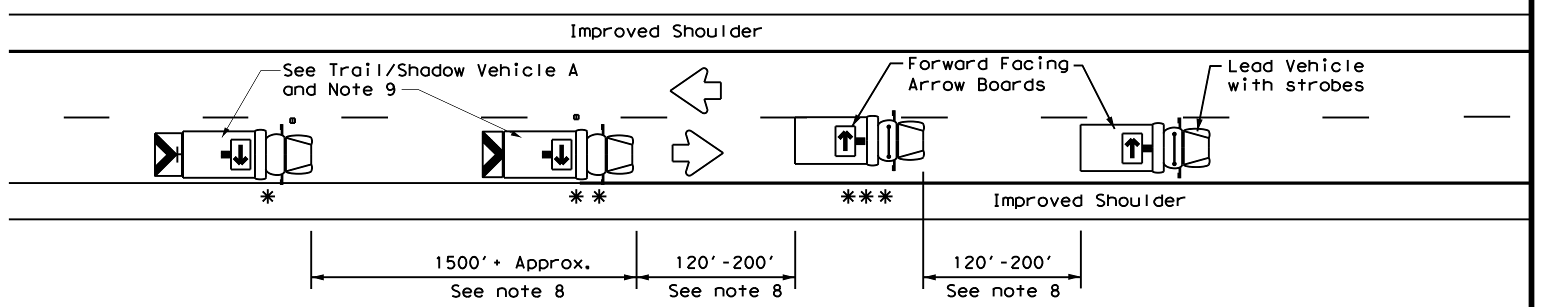
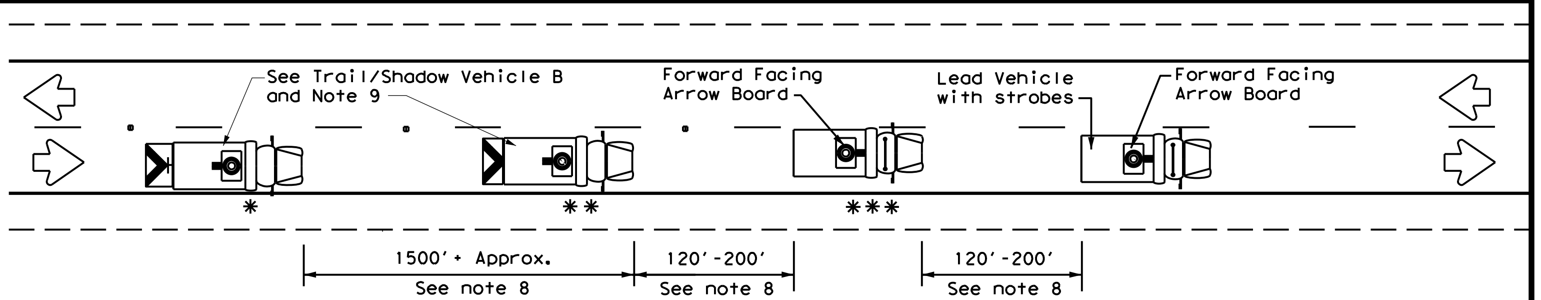
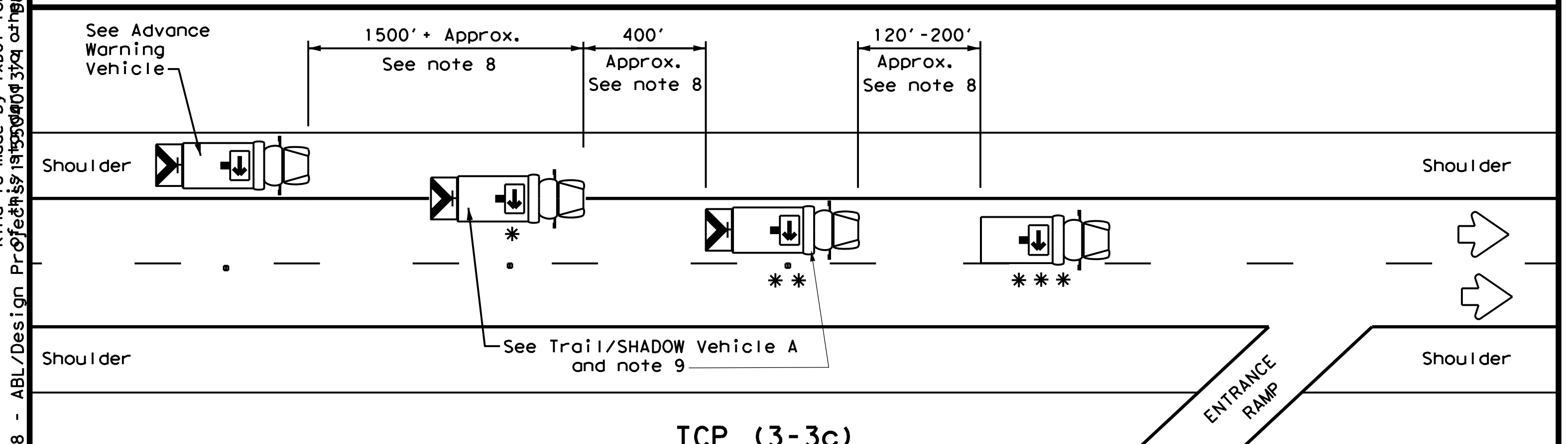


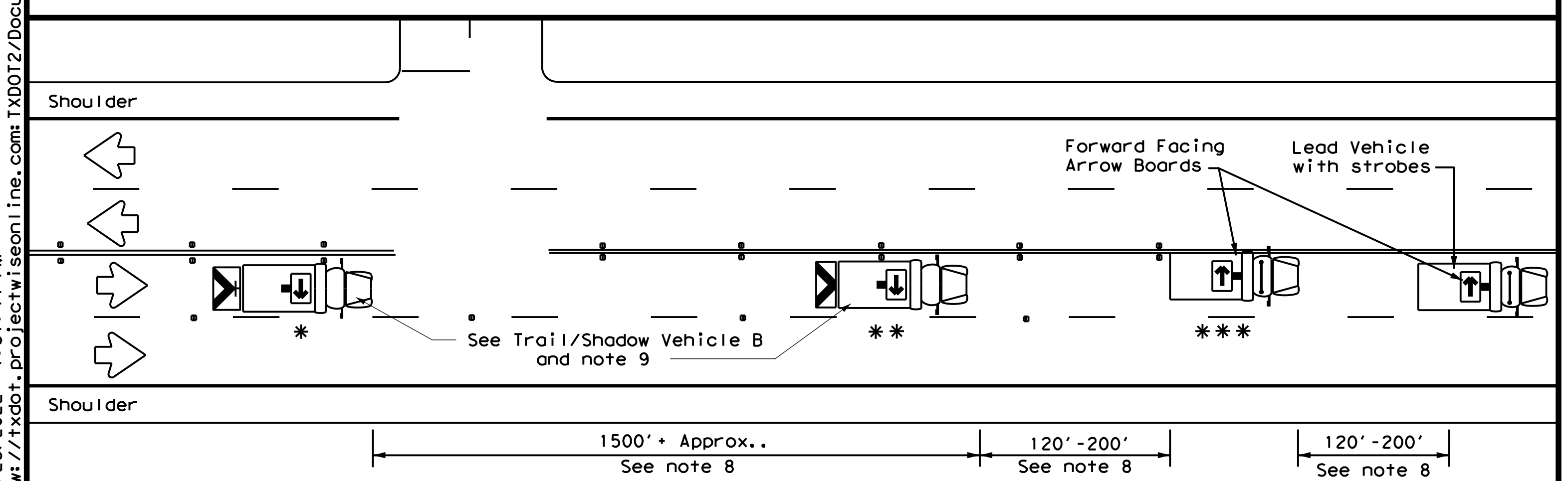
TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



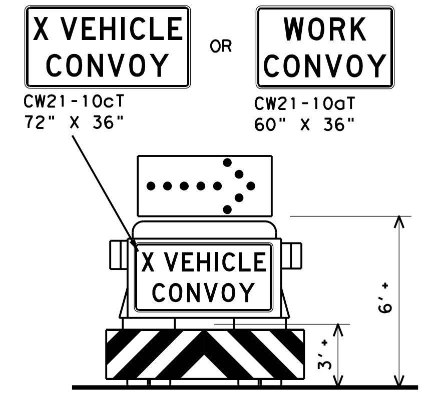
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



TCP (3-3c)
DIVIDED MULTILANE HIGHWAY

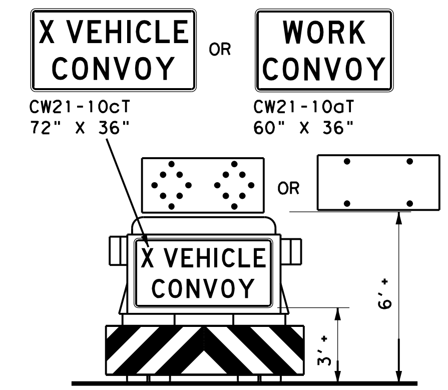


TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY



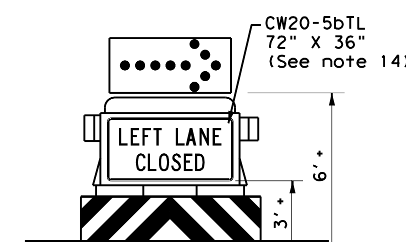
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

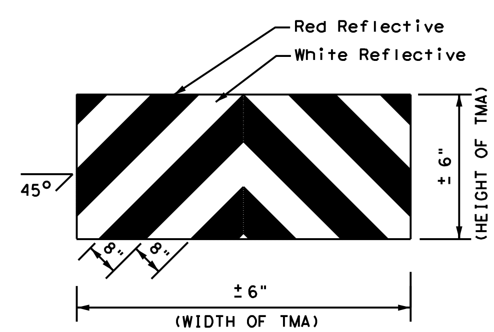


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
**	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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97 7-14	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	62

177

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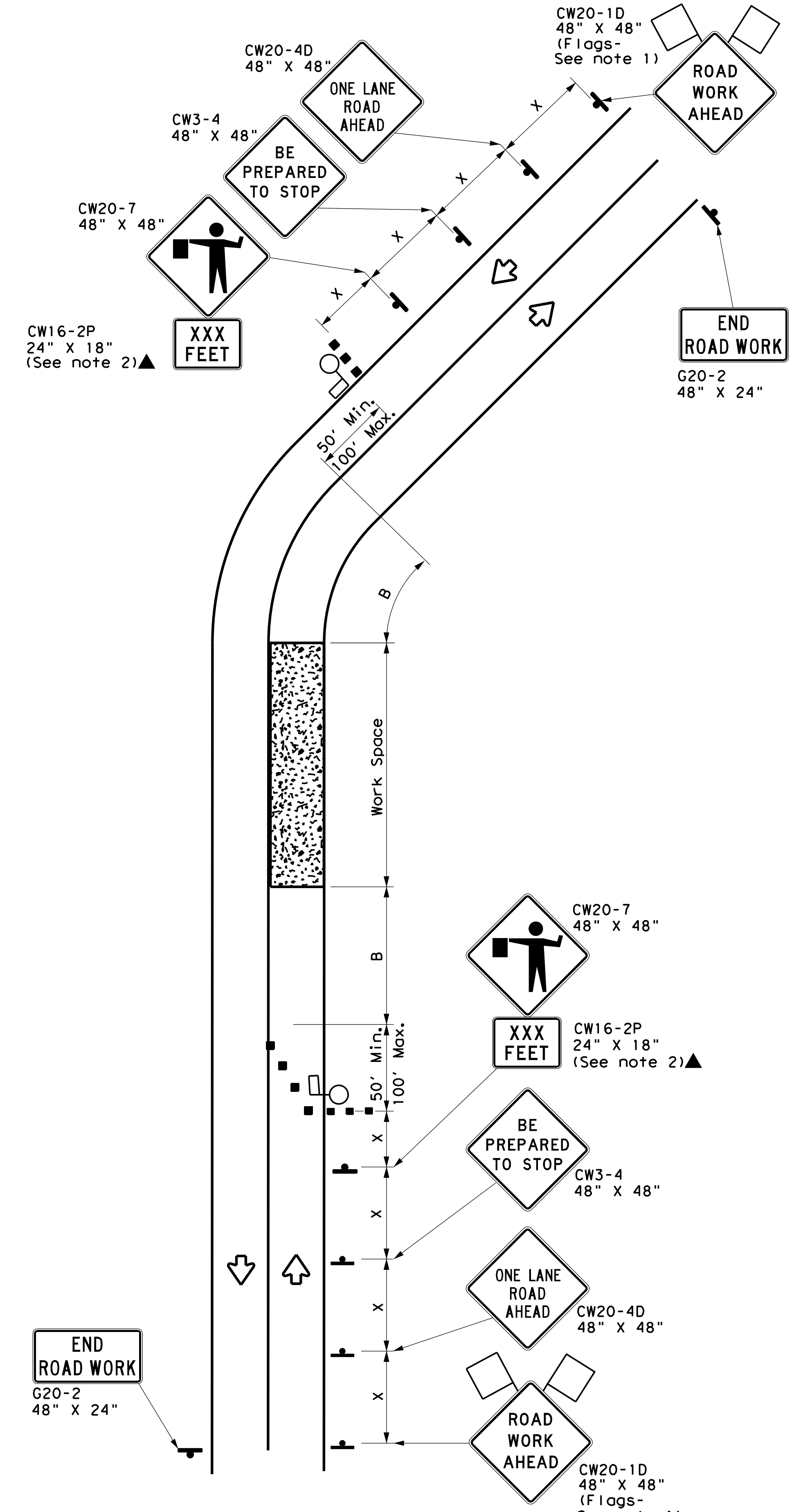
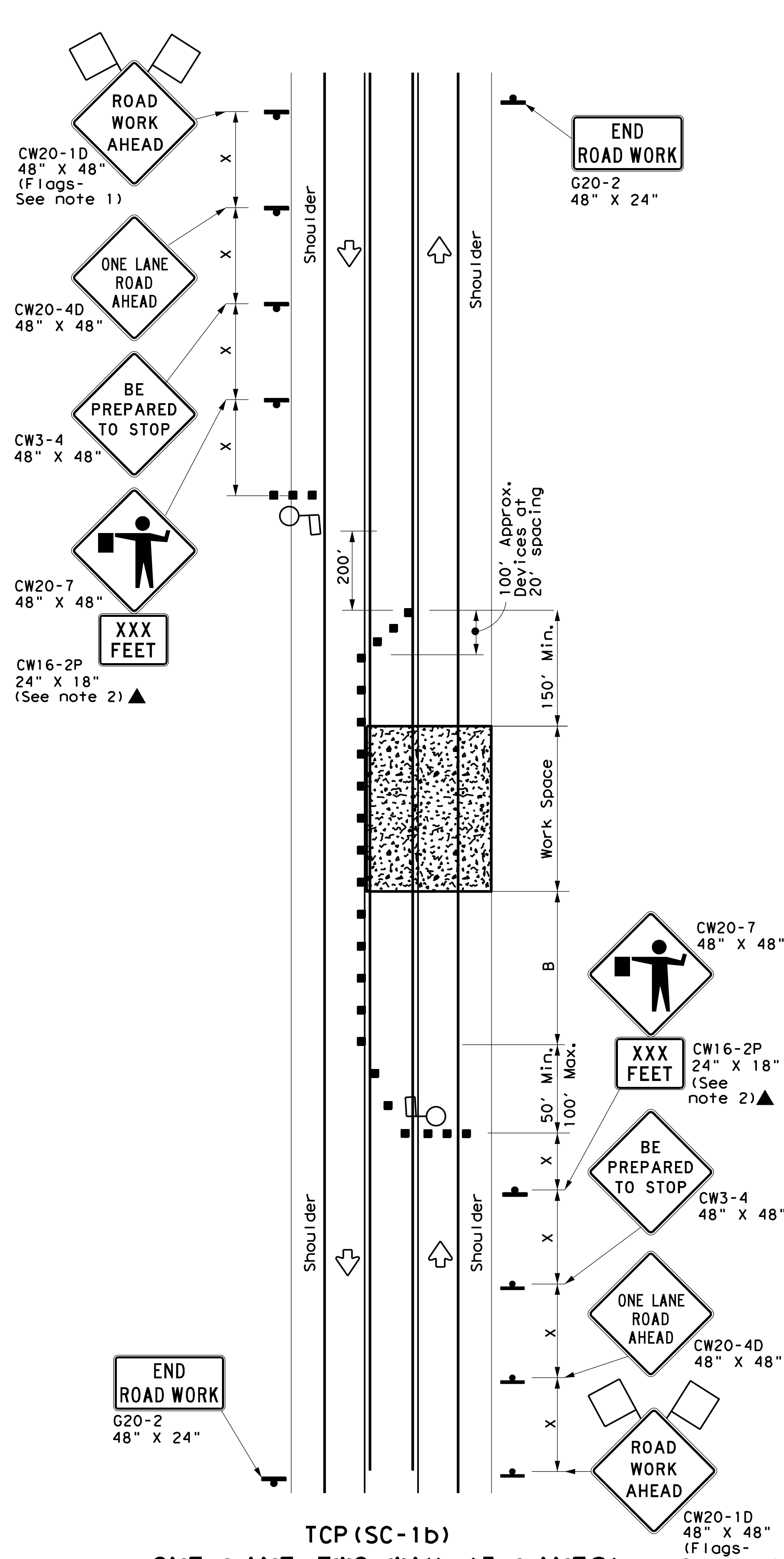


TCP(SC-1a)

ONE LANE TWO-WAY (2 LANES)
CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (3 LANES)
CONTROL WITH PILOT VEHICLE
AND CHANNELIZING DEVICES

LEGEND

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
5. Flaggers should use two-way radios or other methods of communication at all times to control traffic.
6. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.
7. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
8. If the seal coat operation crosses intersections, traffic in these areas must be controlled, Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning other member of the traffic control crew at the intersection.
9. Temporary rumble strips are not required on seal coat operations.
10. Pilot car is used to guide vehicles through traffic control zone, vehicle shall have an identification name displayed and "PILOT CAR, FOLLOW ME" (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS

TCP(SC-1)-21

FILE: tcpsc-1-21.dgn	DN:	CK:	DW:	CK:
©TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	63

217

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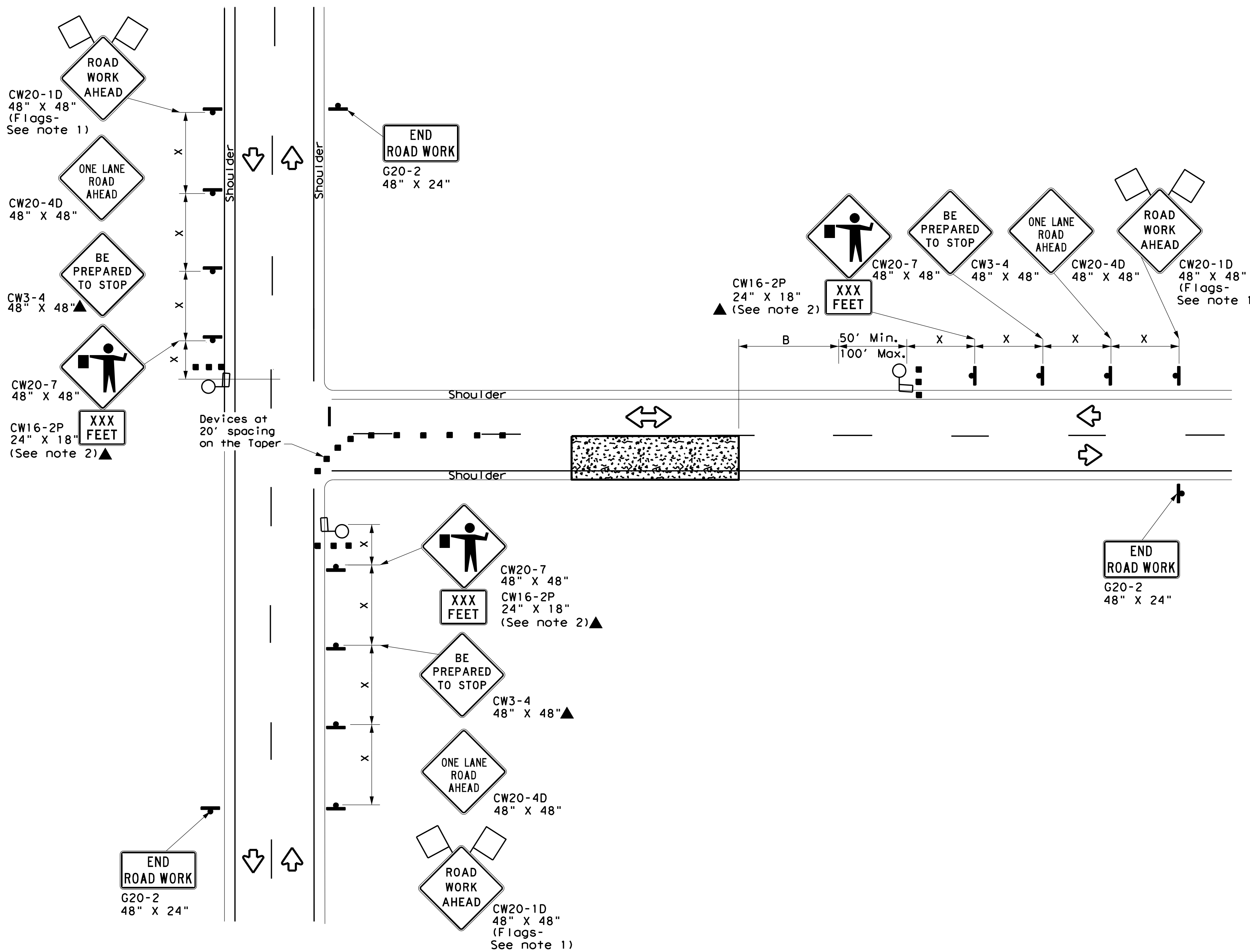

ONE LANE TWO-WAY (T-INTERSECTION) CONTROL WITH PILOT VEHICLE

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication at all times to control traffic.
5. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.
6. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
7. Temporary rumble strips are not required on seal coat operations.
8. Pilot car is used to guide vehicles through traffic control zone, vehicle shall have an identification name displayed and "PILOT CAR, FOLLOW ME" (G20-4) sign or message board mounted in a conspicuous position on rear.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS

TCP(SC-4)-21

FILE: tcpsc-4-21.dgn	DN:	CK:	DW:	CK:
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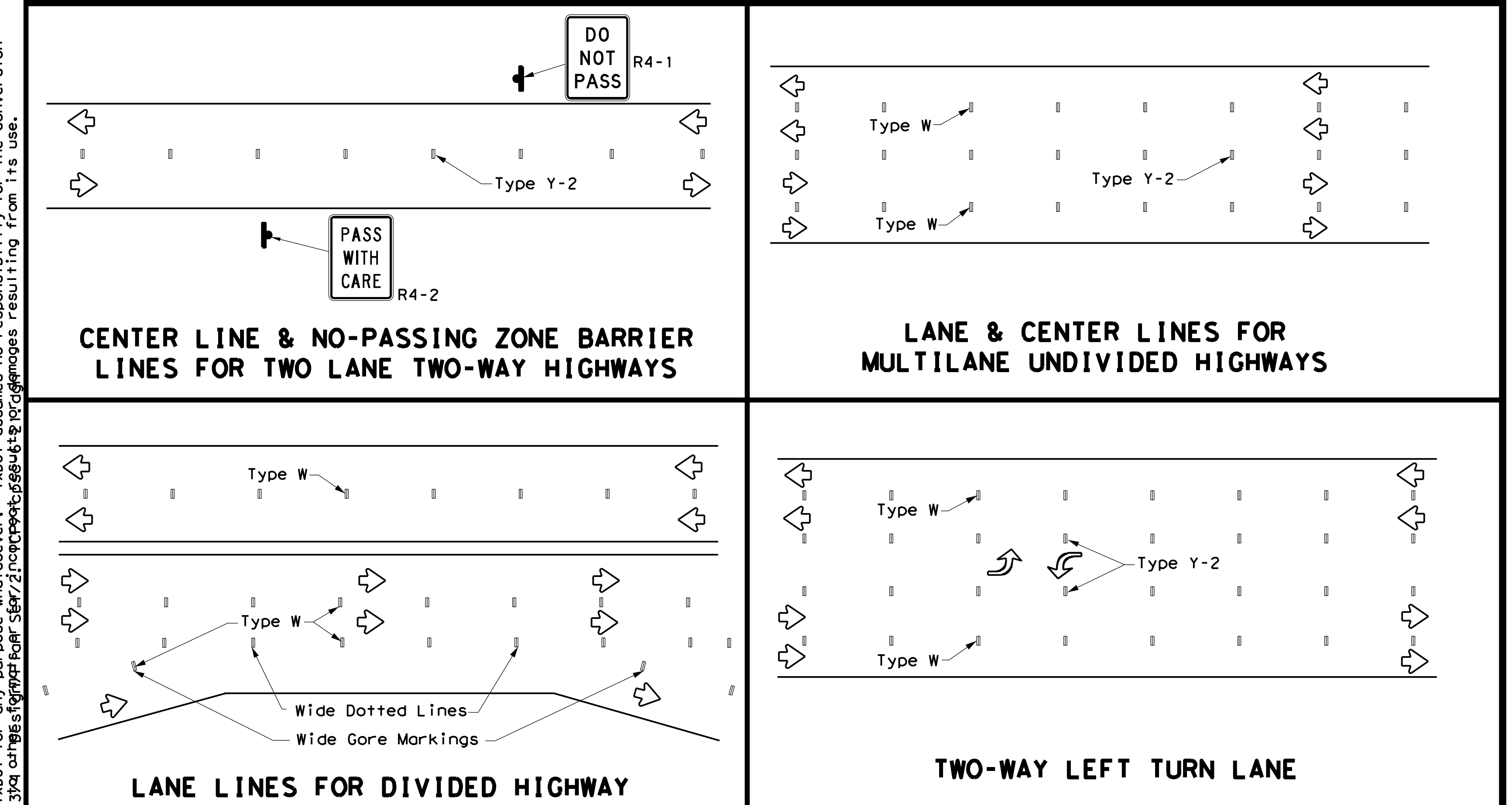
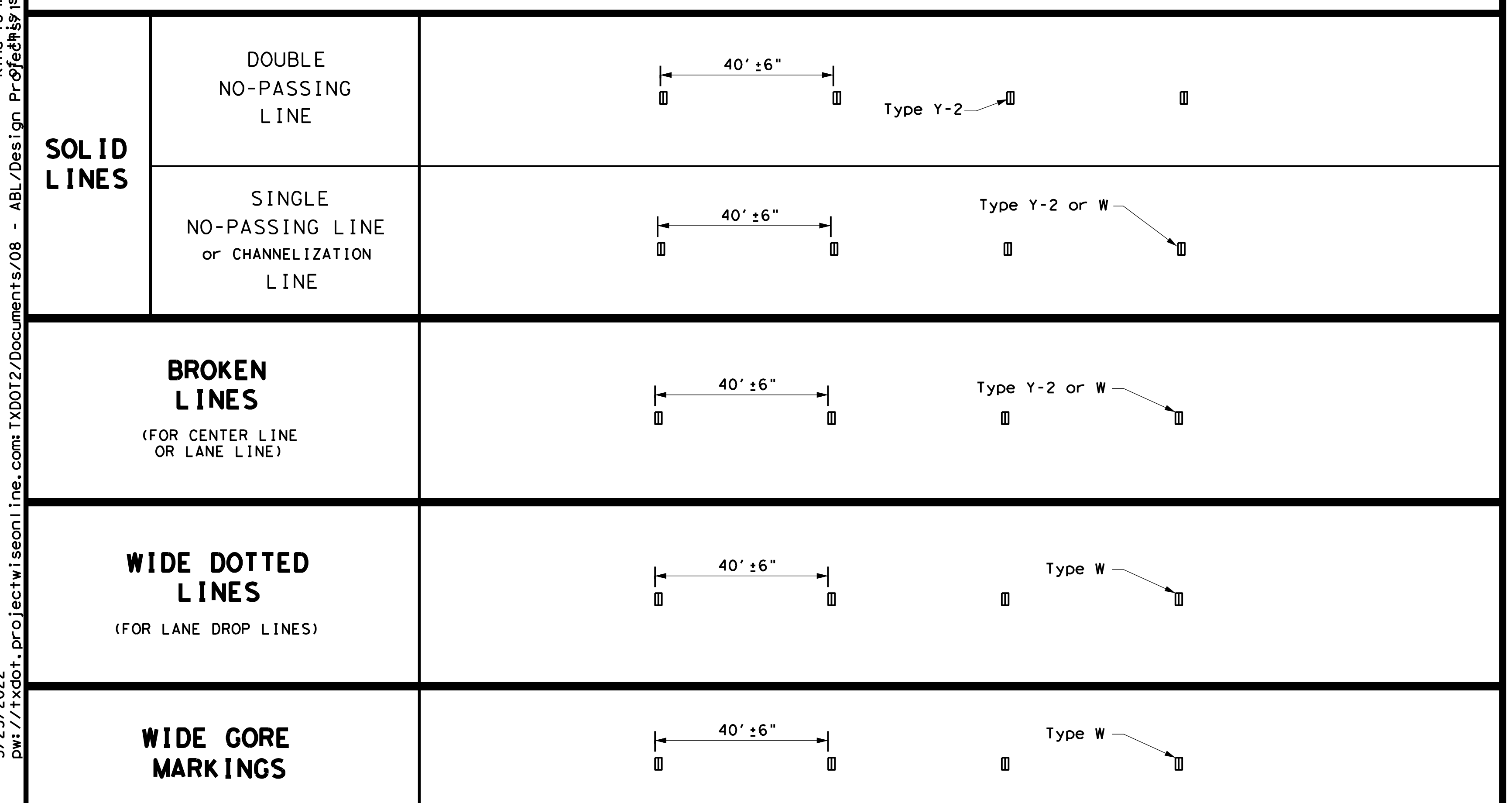
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)



NOTES:

1. Short term pavement markings shall be temporary flexible-reflective roadway marker tabs with protective cover 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 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.

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

5/25/2022
pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/...

SHEET 6 OF 7

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP(SC-6)-21

FILE: tcpsc-6-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
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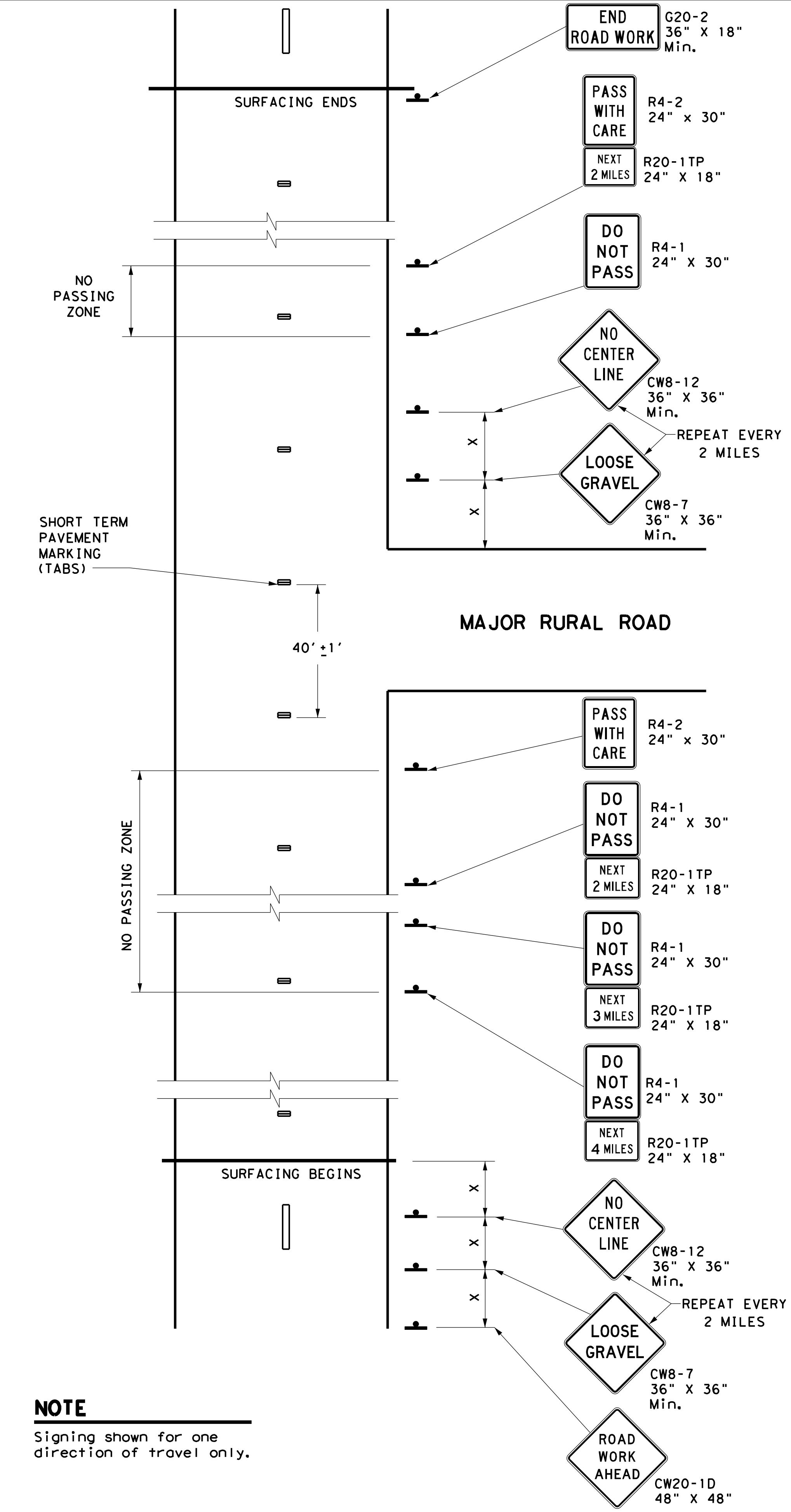
	ABL		BORDEN	65

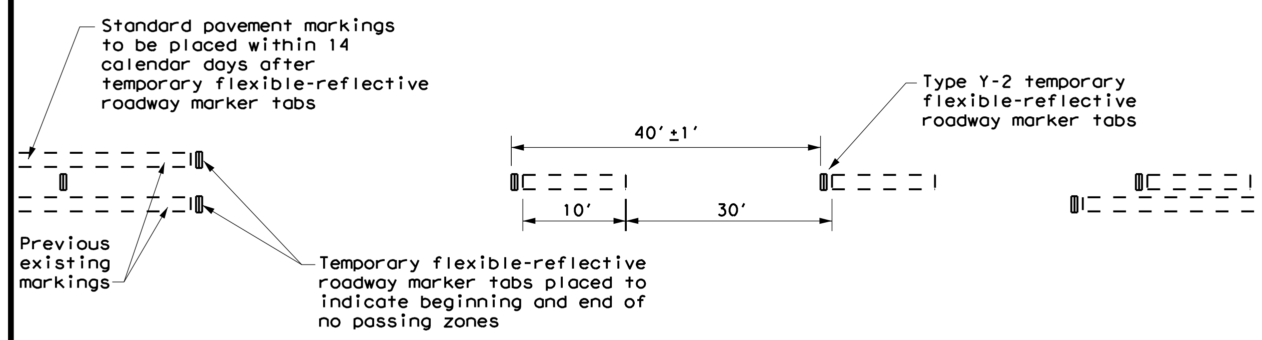
222



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 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.

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 Short Duration / Short Term Stantionary 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 Safety Division Standard

TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-7)-21

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©TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
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	ABL		BORDEN	66

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

Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
TABLE 1		
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

Rumble Strip Array (See note 1)

Rumble Strip Array (See note 1)

The second Rumble Strip Array is required when the ADT thresholds in Table 1 indicate the need for 2 Arrays.

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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

* Conventional Roads Only

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

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

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

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

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

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Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	1155	04	013, ETC.	FM 1785, ETC.
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	ABL	BORDEN		67

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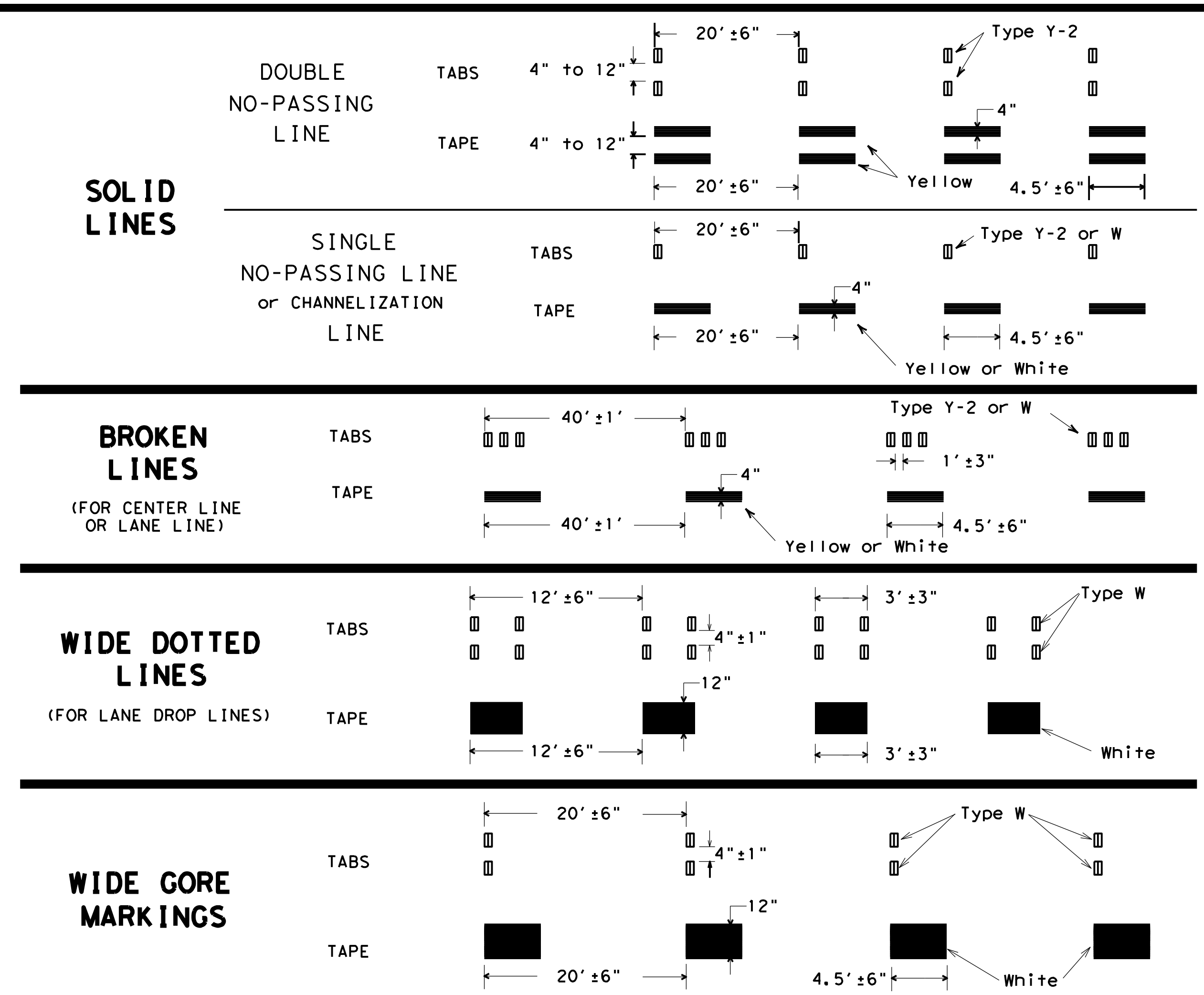
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



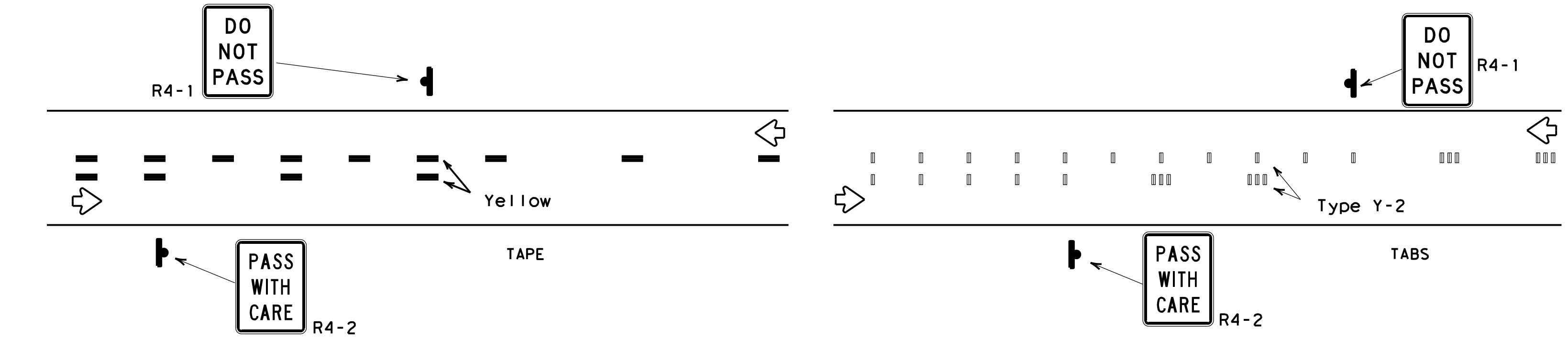
NOTES:

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

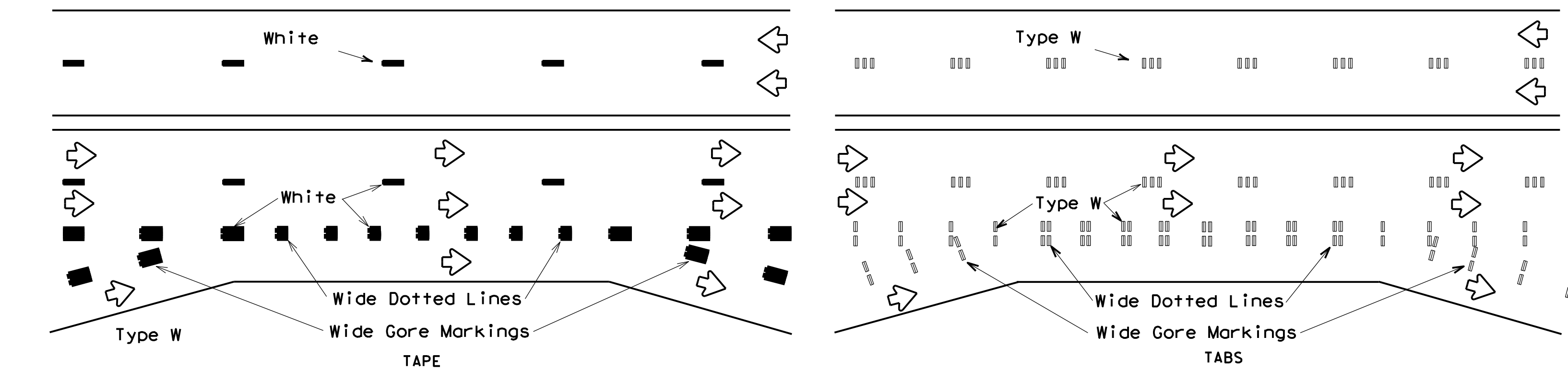
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

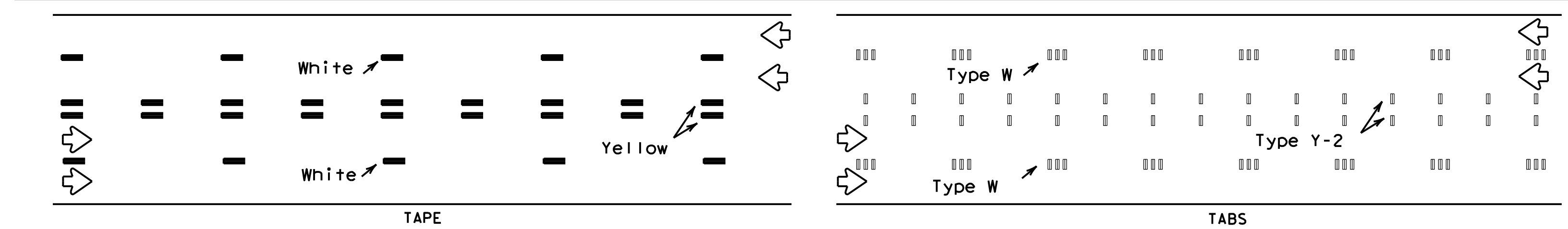
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



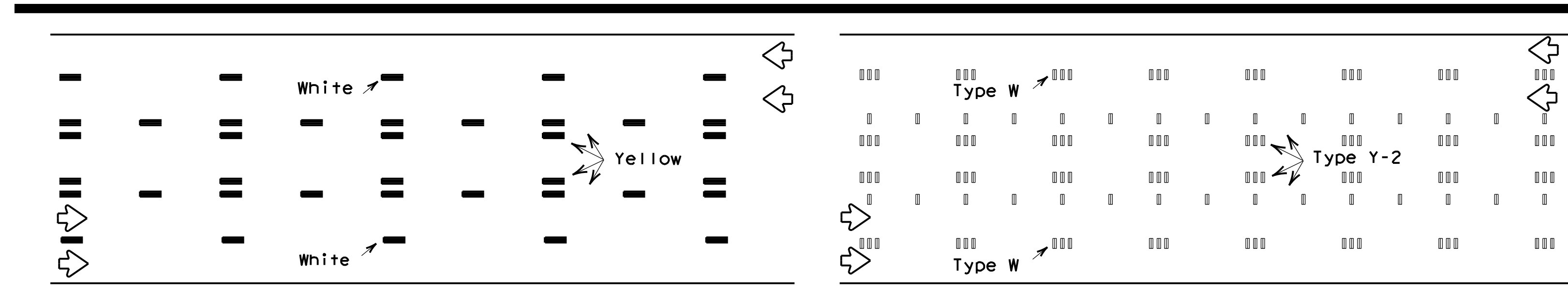
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



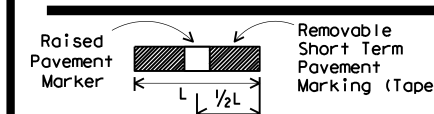
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 3-03 7-13	1155	04	013, ETC.	FM 1785, ETC
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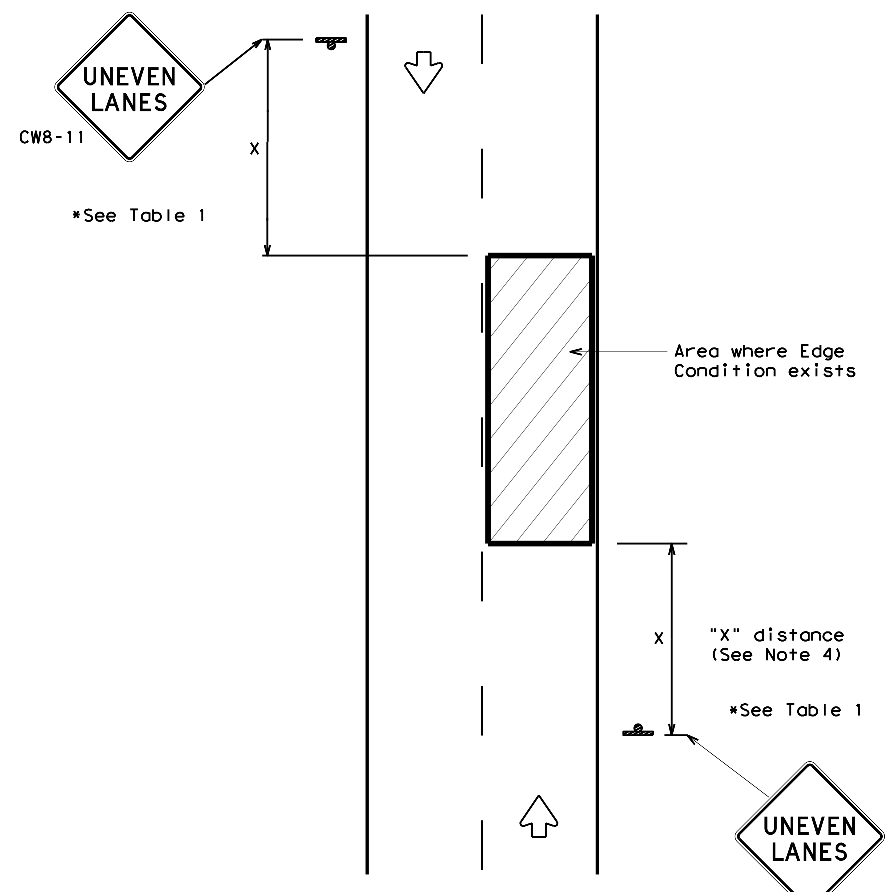
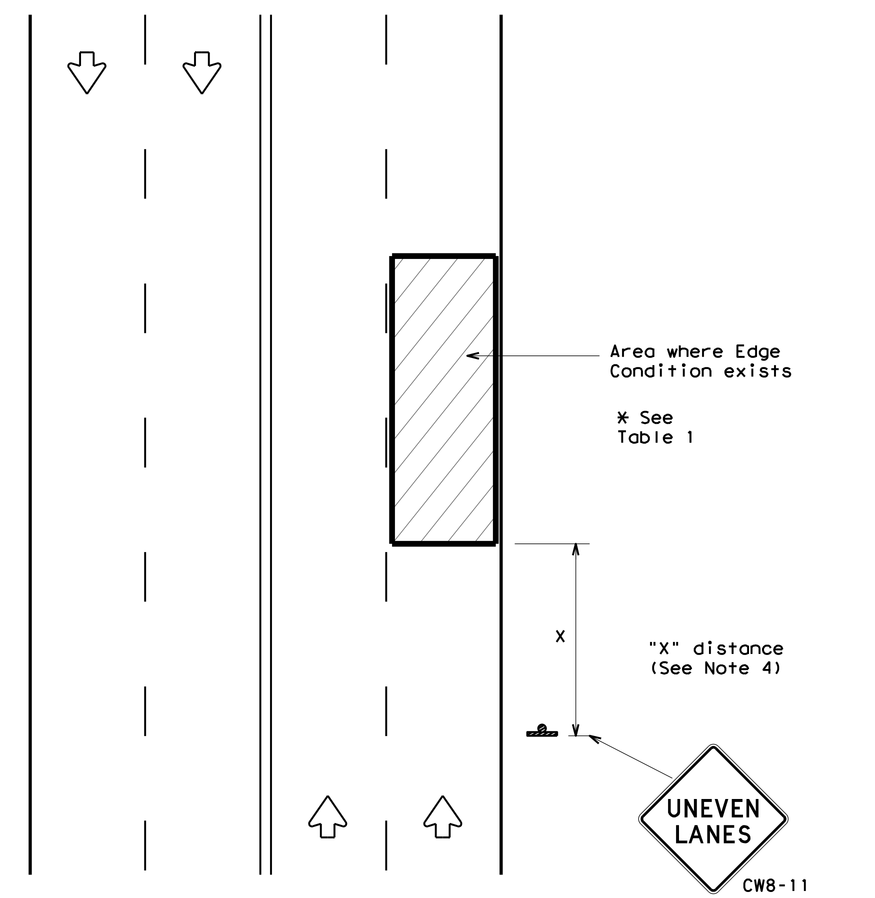
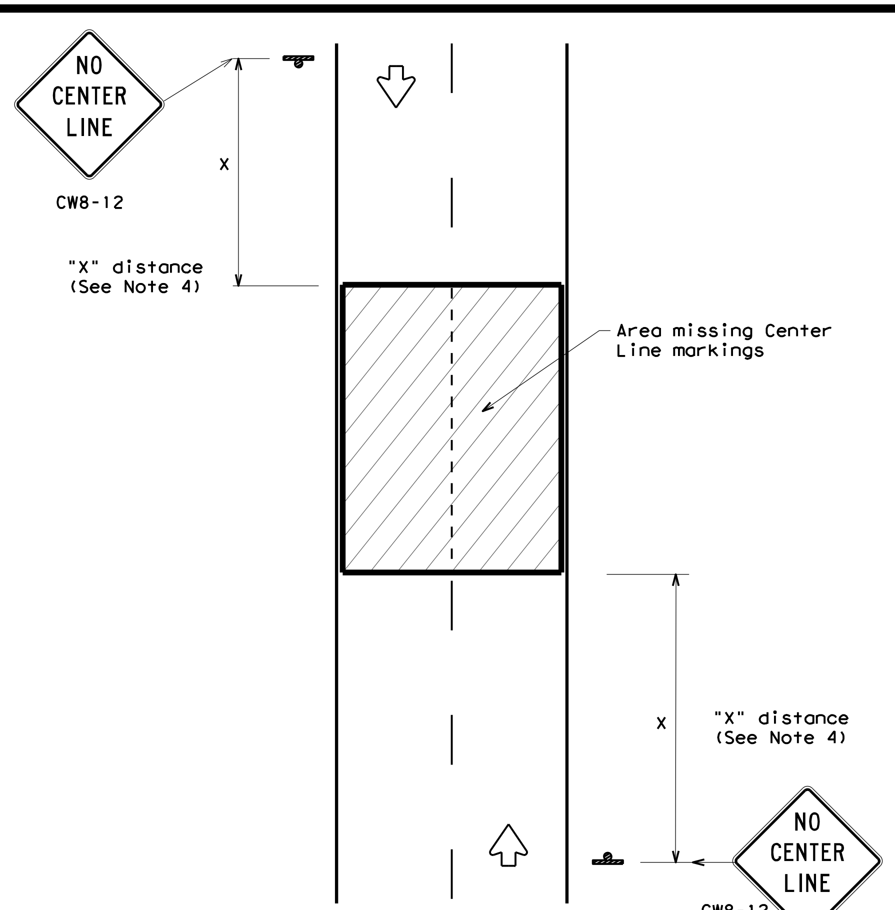


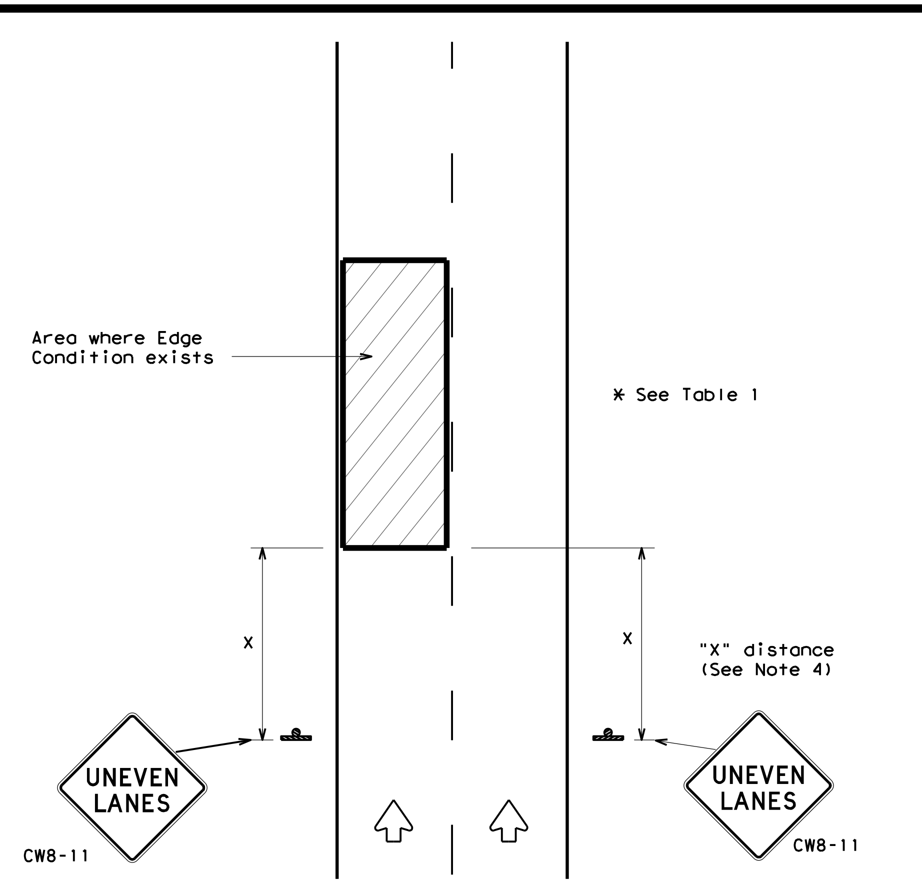
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



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 (D)	Less than or equal to: $1\frac{1}{4}$" (maximum-planing) $1\frac{1}{2}$" (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 (>3, 1, D)	Less than or equal to 3"	Sign: CW8-11
③ (0" to 3/4", D, 12") 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 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS 8-95 2-98 7-13 1-97 3-03	DIST ABL	COUNTY BORDEN		SHEET NO. 69

112

DATE: 5/25/2022
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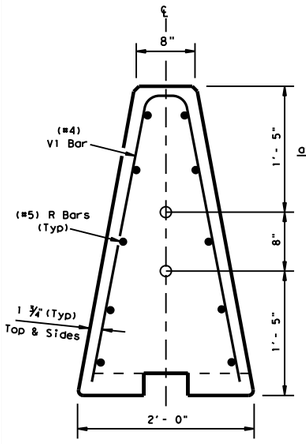
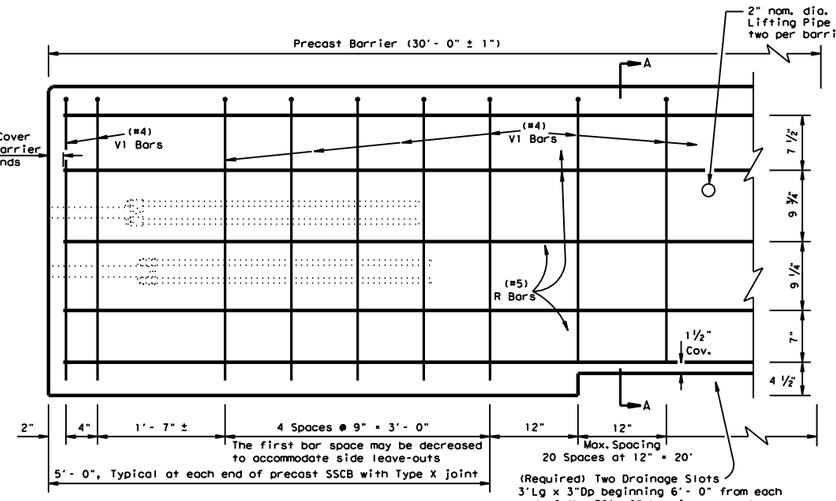


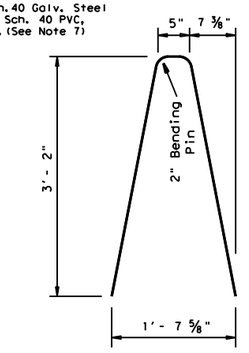
End View
Precast Barrier

Pipe locations for Joint Type X connection



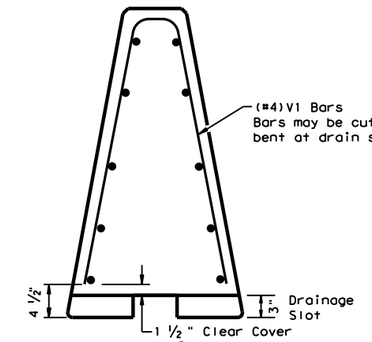
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



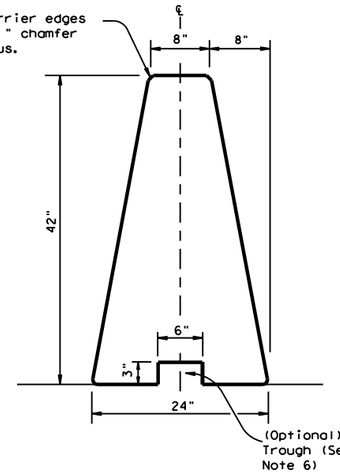
V1 Bar
#4 Rebar

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



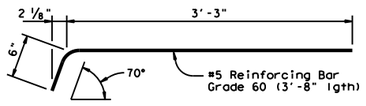
Section A-A
Steel Placement at (Required) Drainage Slots

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



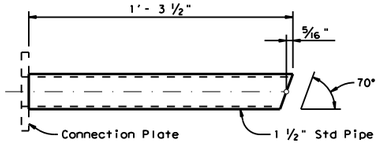
Single Slope Concrete Traffic Barrier

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



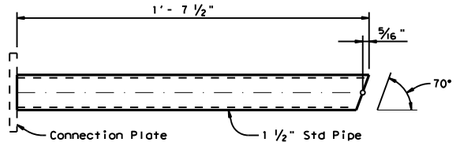
DEFORMED BAR ANCHOR DETAILS

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



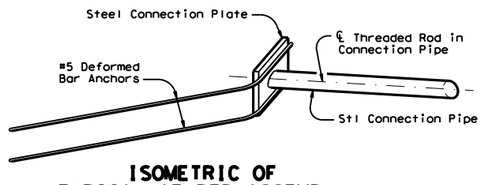
UPPER CONNECTION PIPE DETAILS

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



LOWER CONNECTION PIPE DETAILS

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

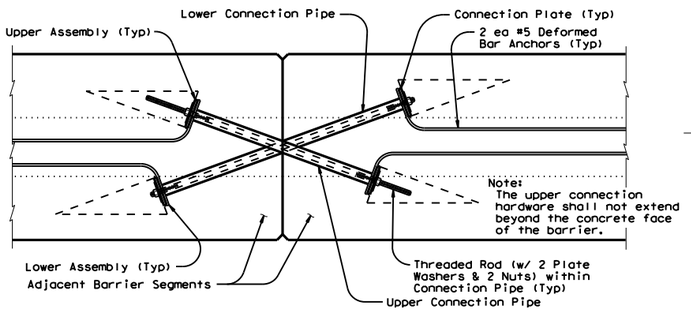


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

General Notes

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



TYPE X JOINT INSTALLATION DETAIL

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

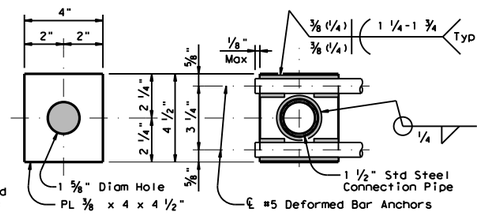
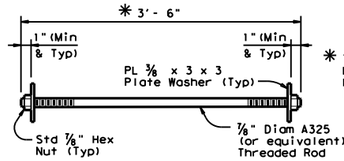


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

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

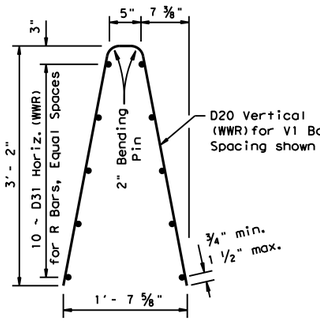


* The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR THREADED ROD DETAIL

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

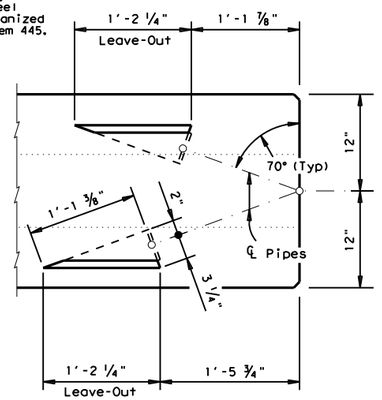
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



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

(WWR) General Notes

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



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013,	ETC.FM 1785, ETC
	DIST	COUNTY		SHEET NO.
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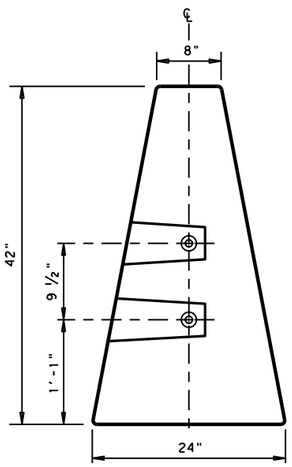
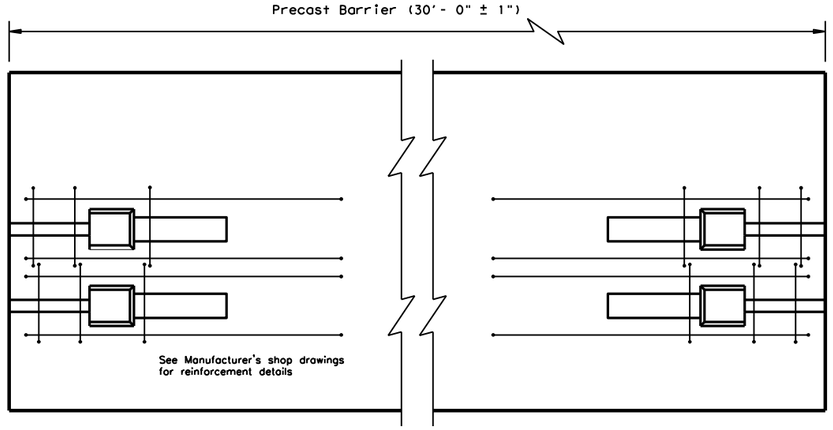
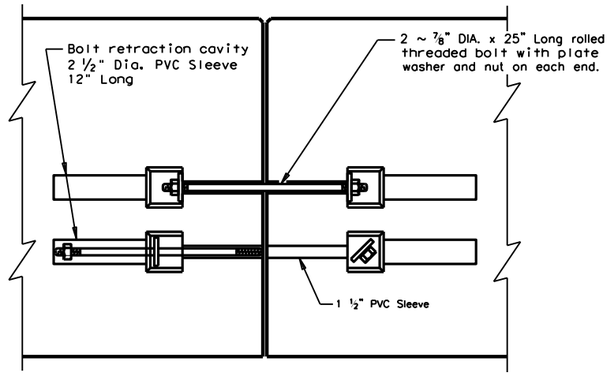


END VIEW
"QUICK-BOLT" POCKET LOCATIONS



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



ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)

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

VIEW FROM ABOVE
J-J HOOK CONNECTION

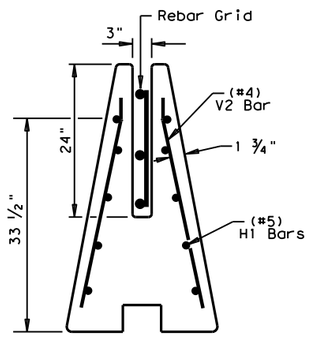
END VIEW

Proprietary Joint Connections (SSCB)

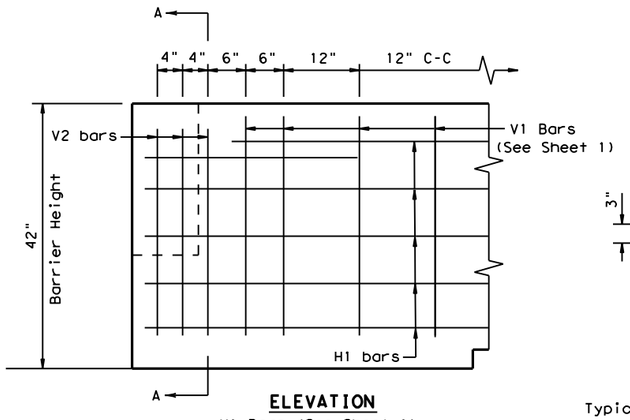
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

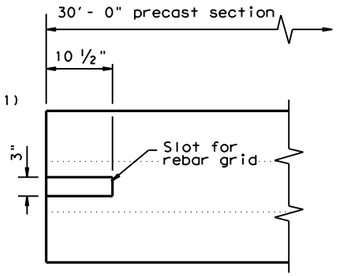
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



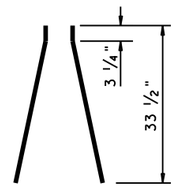
SECTION A-A
Showing (Type R) Rebar Grid



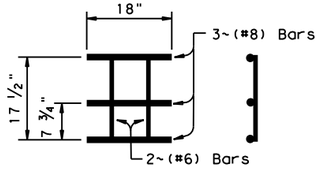
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



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



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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REVISIONS	1155	04	013,	ETC.FM 1785, ETC
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	ABL	BORDEN		71

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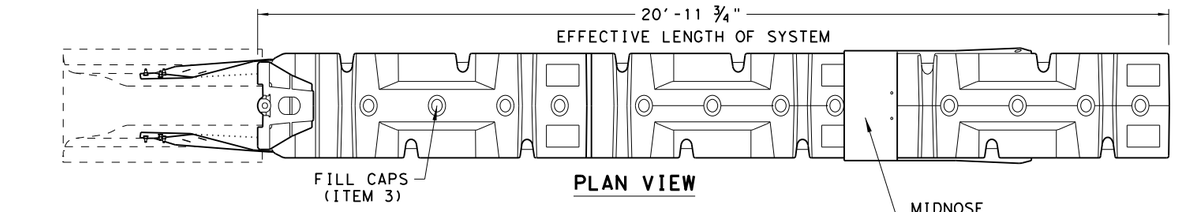
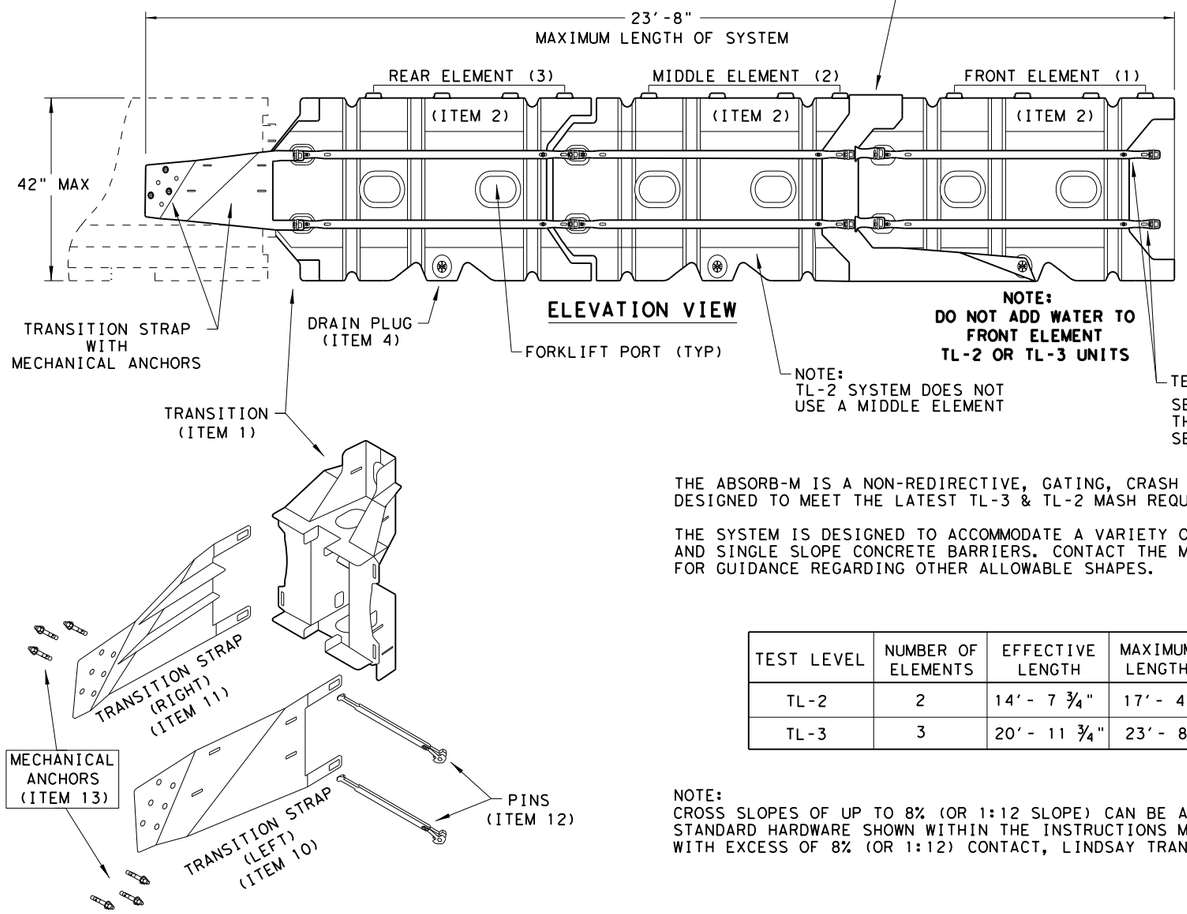
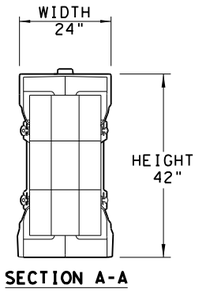
SYSTEM SHOWN - ABSORB-M TL-3







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

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

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

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

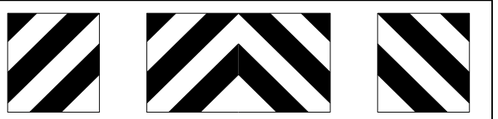
GENERAL NOTES

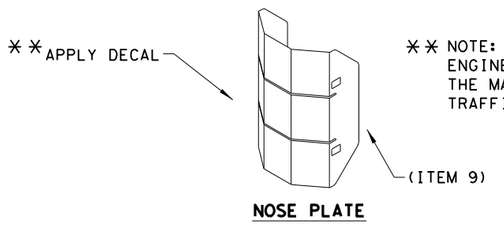
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE





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

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

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

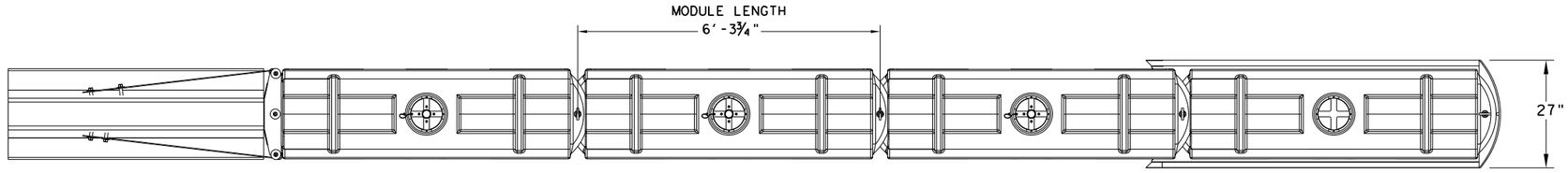
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

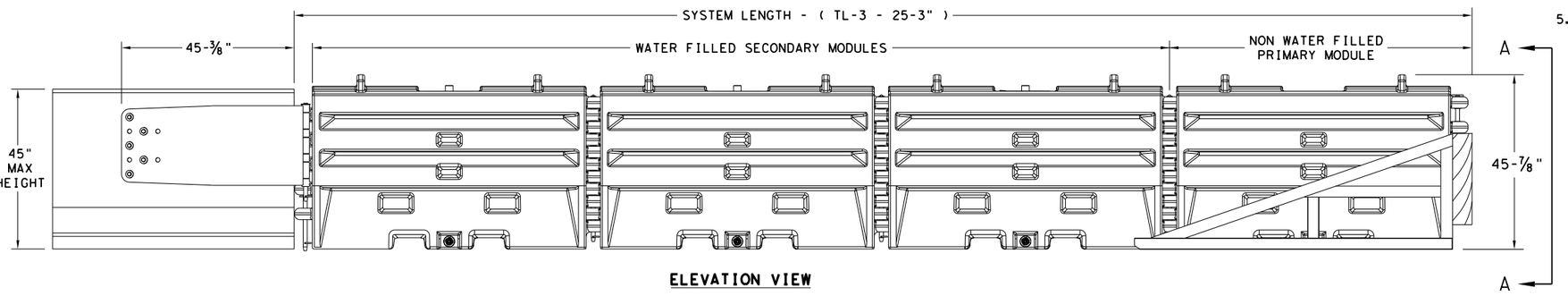
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013,	ETC.FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		72

DATE: 5/25/2022
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/2. TCP/sled19.dgn



PLAN VIEW



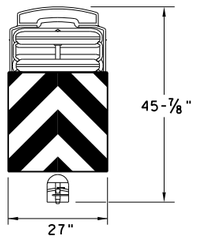
ELEVATION VIEW

GENERAL NOTES

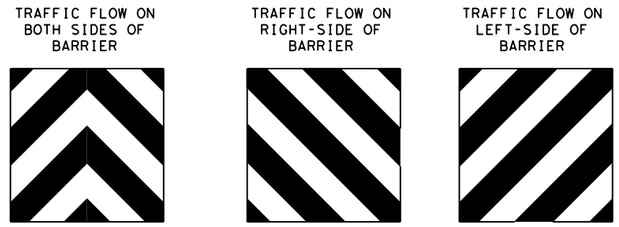
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

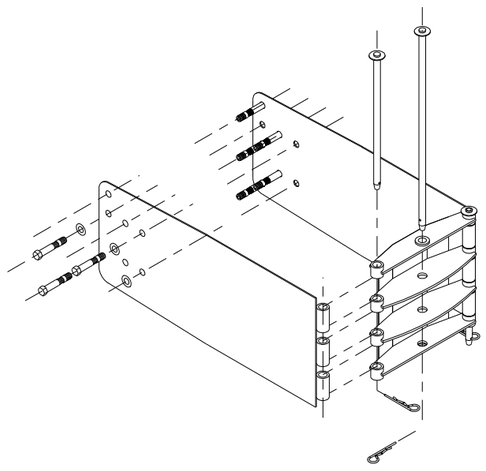


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

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

Texas Department of Transportation — Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		73

Alignment Name:	FM669_CL		
	Station	Northing	Easting
Element: Linear			
POT:	950+00.000	6895570.999	1047076.549
PC:	970+96.956	6893502.832	1046730.268
Tangential Direction:	S09°30'18.359"W		
Tangential Length:	2096.956		
Element: Circular			
PC:	970+96.956	6893502.832	1046730.268
PI:	972+01.263	6893399.957	1046713.043
CC:		6894080.806	1043278.32
PT:	973+05.507	6893298.291	1046689.723
Radius:	3500		
Delta:	03°24'50.516"	Right	
Degree of Curvature (Arc):	01°38'13.280"		
Length:	208.551		
Tangent:	104.307		
Chord:	208.521		
Middle Ordinate:	1.553		
External:	1.554		
Back Tangent Direction:	S09°30'18.359"W		
Back Radial Direction:	N80°29'41.641"W		
Chord Direction:	S11°12'43.616"W		
Ahead Radial Direction:	N77°04'51.126"W		
Ahead Tangent Direction:	S12°55'08.874"W		
Element: Linear			
PT:	973+05.507	6893298.291	1046689.723
POT:	980+00.004	6892621.375	1046534.45
Tangential Direction:	S12°55'08.874"W		
Tangential Length:	694.496		

Alignment Name:	FM1785_CL		
	Station	Northing	Easting
Element: Linear			
POT:	380+00.000	6888983.216	1026774.978
PI:	452+03.611	6890775.913	1033751.957
Tangential Direction:	N75°35'23.564"E		
Tangential Length:	7203.611		
Element: Linear			
PI:	452+03.611	6890775.913	1033751.957
PI:	499+49.943	6891959.787	1038348.272
Tangential Direction:	N75°33'22.560"E		
Tangential Length:	4746.332		
Element: Linear			
PI:	499+49.943	6891959.787	1038348.272
PI:	520+10.711	6892472.246	1040344.306
Tangential Direction:	N75°36'03.381"E		
Tangential Length:	2060.768		
Element: Linear			
PI:	520+10.711	6892472.246	1040344.306
PI:	565+58.627	6893602.846	1044749.449
Tangential Direction:	N75°36'19.722"E		
Tangential Length:	4547.916		
Element: Linear			
PI:	565+58.627	6893602.846	1044749.449
POT:	587+14.201	6894140.168	1046836.98
Tangential Direction:	N75°33'56.256"E		
Tangential Length:	2155.574		

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

P.E.

05/24/2022

HORIZONTAL ALIGNMENT DATA

Texas Department of Transportation

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		74
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/3. Roadway/ALIGNMENT DATA
DATE: 5/24/2022 1:25:20 PM

FM 1785_CL

	Station	Elevation
Element: Linear		
POT	379+43.003 R1	2631.682
VPC	382+70.744 R1	2630.568
Tangent Grade:	-0.003	
Tangent Length:	327.74	
Element: Symmetrical Parabola		
VPC	382+70.744 R1	2630.568
VPI	383+45.744 R1	2630.313
VPT	384+20.744 R1	2630.023
Length:	150	
Entrance Grade:	-0.003	
Exit Grade:	-0.004	
r = 100 * (g2 - g1) / L:	-0.031	
K = l / (g2 - g1):	3191.489	
Middle Ordinate:	-0.009	
Element: Linear		
VPT	384+20.744 R1	2630.023
VPC	385+27.915 R1	2629.608
Tangent Grade:	-0.004	
Tangent Length:	107.171	
Element: Symmetrical Parabola		
VPC	385+27.915 R1	2629.608
VPI	388+27.915 R1	2628.447
VPT	391+27.915 R1	2625.147
Length:	600	
Entrance Grade:	-0.004	
Exit Grade:	-0.011	
r = 100 * (g2 - g1) / L:	-0.119	
K = l / (g2 - g1):	841.515	
Middle Ordinate:	-0.535	
Element: Linear		
VPT	391+27.915 R1	2625.147
VPC	394+44.295 R1	2621.667
Tangent Grade:	-0.011	
Tangent Length:	316.381	
Element: Symmetrical Parabola		
VPC	394+44.295 R1	2621.667
VPI	396+44.295 R1	2619.467
VPT	398+44.295 R1	2618.163
Length:	400	
Entrance Grade:	-0.011	
Exit Grade:	-0.007	
r = 100 * (g2 - g1) / L:	0.112	
K = l / (g2 - g1):	892.549	
Middle Ordinate:	0.224	
Element: Linear		
VPT	398+44.295 R1	2618.163
VPC	400+00.000 R1	2617.148
Tangent Grade:	-0.007	
Tangent Length:	155.705	

	Station	Elevation
Element: Symmetrical Parabola		
VPC	400+00.000 R1	2617.148
VPI	402+00.000 R1	2615.844
VPT	404+00.000 R1	2613.255
Length:	400	
Entrance Grade:	-0.007	
Exit Grade:	-0.013	
r = 100 * (g2 - g1) / L:	-0.161	
K = l / (g2 - g1):	622.155	
Middle Ordinate:	-0.321	
Element: Linear		
VPT	404+00.000 R1	2613.255
VPC	405+40.000 R1	2611.442
Tangent Grade:	-0.013	
Tangent Length:	140	
Element: Symmetrical Parabola		
VPC	405+40.000 R1	2611.442
VPI	406+90.000 R1	2609.5
VPT	408+40.000 R1	2612.358
VLP	406+61.388 R1	2610.656
Length:	300	
Entrance Grade:	-0.013	
Exit Grade:	0.019	
r = 100 * (g2 - g1) / L:	1.067	
K = l / (g2 - g1):	93.752	
Middle Ordinate:	1.2	
Element: Linear		
VPT	408+40.000 R1	2612.358
VPC	409+62.404 R1	2614.69
Tangent Grade:	0.019	
Tangent Length:	122.404	
Element: Symmetrical Parabola		
VPC	409+62.404 R1	2614.69
VPI	411+62.404 R1	2618.5
VPT	413+62.404 R1	2616.87
VHP	412+42.566 R1	2617.358
Length:	400	
Entrance Grade:	0.019	
Exit Grade:	-0.008	
r = 100 * (g2 - g1) / L:	-0.68	
K = l / (g2 - g1):	147.055	
Middle Ordinate:	-1.36	
Element: Linear		
VPT	413+62.404 R1	2616.87
VPC	419+15.381 R1	2612.364
Tangent Grade:	-0.008	
Tangent Length:	552.977	
Element: Symmetrical Parabola		
VPC	419+15.381 R1	2612.364
VPI	420+65.381 R1	2611.142
VPT	422+15.381 R1	2610.509
Length:	300	
Entrance Grade:	-0.008	
Exit Grade:	-0.004	
r = 100 * (g2 - g1) / L:	0.131	
K = l / (g2 - g1):	763.141	
Middle Ordinate:	0.147	

NOTE: ALIGNMENT PROFILE DATA IS FOR DESIGN AND REVIEW ONLY AND IS NOT TO BE USED FOR CONSTRUCTION.

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

P.E.

05/24/2022

VERTICAL ALIGNMENT DATA

Texas Department of Transportation

SHEET 1 OF 7

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		75
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/3. Roadway/ALIGNMENT DATA
DATE: 5/24/2022 1:25:20 PM

FM 1785_CL (CONT.)

	Station	Elevation
Element: Linear		
VPT	422+15.381 R1	2610.509
VPC	422+30.181 R1	2610.446
Tangent Grade:	-0.004	
Tangent Length:	14.8	
Element: Symmetrical Parabola		
VPC	422+30.181 R1	2610.446
VPI	424+80.181 R1	2609.392
VPT	427+30.181 R1	2611.392
VLP	424+02.795 R1	2610.082
Length:	500	
Entrance Grade:	-0.004	
Exit Grade:	0.008	
r = 100 * (g2 - g1) / L:	0.244	
K = l / (g2 - g1):	409.232	
Middle Ordinate:	0.764	
Element: Linear		
VPT	427+30.181 R1	2611.392
VPC	430+54.914 R1	2613.99
Tangent Grade:	0.008	
Tangent Length:	324.733	
Element: Symmetrical Parabola		
VPC	430+54.914 R1	2613.99
VPI	434+04.914 R1	2616.79
VPT	437+54.914 R1	2611.177
VHP	432+87.907 R1	2614.922
Length:	700	
Entrance Grade:	0.008	
Exit Grade:	-0.016	
r = 100 * (g2 - g1) / L:	-0.343	
K = l / (g2 - g1):	291.241	
Middle Ordinate:	-2.103	
Element: Linear		
VPT	437+54.914 R1	2611.177
VPC	441+14.015 R1	2605.419
Tangent Grade:	-0.016	
Tangent Length:	359.101	
Element: Symmetrical Parabola		
VPC	441+14.015 R1	2605.419
VPI	442+64.015 R1	2603.014
VPT	444+14.015 R1	2601.124
Length:	300	
Entrance Grade:	-0.016	
Exit Grade:	-0.013	
r = 100 * (g2 - g1) / L:	0.115	
K = l / (g2 - g1):	873.338	
Middle Ordinate:	0.129	
Element: Linear		
VPT	444+14.015 R1	2601.124
VPC	449+37.409 R1	2594.529
Tangent Grade:	-0.013	
Tangent Length:	523.394	

	Station	Elevation
Element: Symmetrical Parabola		
VPC	449+37.409 R1	2594.529
VPI	450+87.409 R1	2592.639
VPT	452+37.409 R1	2591.146
Length:	300	
Entrance Grade:	-0.013	
Exit Grade:	-0.01	
r = 100 * (g2 - g1) / L:	0.088	
K = l / (g2 - g1):	1135.34	
Middle Ordinate:	0.099	
Element: Linear		
VPT	452+37.409 R1	2591.146
VPC	457+75.000 R1	2585.792
Tangent Grade:	-0.01	
Tangent Length:	537.591	
Element: Symmetrical Parabola		
VPC	457+75.000 R1	2585.792
VPI	459+50.000 R1	2584.05
VPT	461+25.000 R1	2577.326
Length:	350	
Entrance Grade:	-0.01	
Exit Grade:	-0.038	
r = 100 * (g2 - g1) / L:	-0.813	
K = l / (g2 - g1):	122.959	
Middle Ordinate:	-1.245	
Element: Linear		
VPT	461+25.000 R1	2577.326
VPC	462+30.000 R1	2573.292
Tangent Grade:	-0.038	
Tangent Length:	105	
Element: Symmetrical Parabola		
VPC	462+30.000 R1	2573.292
VPI	463+30.000 R1	2569.449
VPT	464+30.000 R1	2572.235
VLP	463+45.946 R1	2571.064
Length:	200	
Entrance Grade:	-0.038	
Exit Grade:	0.028	
r = 100 * (g2 - g1) / L:	3.314	
K = l / (g2 - g1):	30.177	
Middle Ordinate:	1.657	
Element: Linear		
VPT	464+30.000 R1	2572.235
VPC	465+70.000 R1	2576.134
Tangent Grade:	0.028	
Tangent Length:	140	
Element: Symmetrical Parabola		
VPC	465+70.000 R1	2576.134
VPI	467+20.000 R1	2580.313
VPT	468+70.000 R1	2581.014
Length:	300	
Entrance Grade:	0.028	
Exit Grade:	0.005	
r = 100 * (g2 - g1) / L:	-0.773	
K = l / (g2 - g1):	129.416	
Middle Ordinate:	-0.869	

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STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/24/2022

VERTICAL ALIGNMENT DATA

Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		76
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

	Station	Elevation
Element: Linear		
VPT	468+70.000 R1	2581.014
VPC	471+13.268 R1	2582.15
Tangent Grade:	0.005	
Tangent Length:	243.268	
Element: Symmetrical Parabola		
VPC	471+13.268 R1	2582.15
VPI	472+38.268 R1	2582.735
VPT	473+63.268 R1	2584.526
Length:	250	
Entrance Grade:	0.005	
Exit Grade:	0.014	
r = 100 * (g2 - g1) / L:	0.386	
K = l / (g2 - g1):	258.887	
Middle Ordinate:	0.302	
Element: Linear		
VPT	473+63.268 R1	2584.526
VPC	473+64.508 R1	2584.544
Tangent Grade:	0.014	
Tangent Length:	1.24	
Element: Symmetrical Parabola		
VPC	473+64.508 R1	2584.544
VPI	474+89.508 R1	2586.335
VPT	476+14.508 R1	2585.349
VHP	475+25.737 R1	2585.699
Length:	250	
Entrance Grade:	0.014	
Exit Grade:	-0.008	
r = 100 * (g2 - g1) / L:	-0.889	
K = l / (g2 - g1):	112.511	
Middle Ordinate:	-0.694	
Element: Linear		
VPT	476+14.508 R1	2585.349
VPC	479+23.121 R1	2582.914
Tangent Grade:	-0.008	
Tangent Length:	308.613	
Element: Symmetrical Parabola		
VPC	479+23.121 R1	2582.914
VPI	481+23.121 R1	2581.336
VPT	483+23.121 R1	2569.424
Length:	400	
Entrance Grade:	-0.008	
Exit Grade:	-0.06	
r = 100 * (g2 - g1) / L:	-1.292	
K = l / (g2 - g1):	77.418	
Middle Ordinate:	-2.583	
Element: Linear		
VPT	483+23.121 R1	2569.424
VPC	486+20.000 R1	2551.743
Tangent Grade:	-0.06	
Tangent Length:	296.879	

	Station	Elevation
Element: Symmetrical Parabola		
VPC	486+20.000 R1	2551.743
VPI	487+70.000 R1	2542.809
VPT	489+20.000 R1	2537.923
Length:	300	
Entrance Grade:	-0.06	
Exit Grade:	-0.033	
r = 100 * (g2 - g1) / L:	0.899	
K = l / (g2 - g1):	111.185	
Middle Ordinate:	1.012	
Element: Linear		
VPT	489+20.000 R1	2537.923
VPC	491+96.787 R1	2528.906
Tangent Grade:	-0.033	
Tangent Length:	276.787	
Element: Symmetrical Parabola		
VPC	491+96.787 R1	2528.906
VPI	492+71.787 R1	2526.463
VPT	493+46.787 R1	2527.288
VLP	493+08.922 R1	2527.08
Length:	150	
Entrance Grade:	-0.033	
Exit Grade:	0.011	
r = 100 * (g2 - g1) / L:	2.905	
K = l / (g2 - g1):	34.423	
Middle Ordinate:	0.817	
Element: Linear		
VPT	493+46.787 R1	2527.288
VPC	493+65.301 R1	2527.492
Tangent Grade:	0.011	
Tangent Length:	18.514	
Element: Symmetrical Parabola		
VPC	493+65.301 R1	2527.492
VPI	494+75.301 R1	2528.702
VPT	495+85.301 R1	2526.754
VHP	494+49.605 R1	2527.955
Length:	220	
Entrance Grade:	0.011	
Exit Grade:	-0.018	
r = 100 * (g2 - g1) / L:	-1.305	
K = l / (g2 - g1):	76.64	
Middle Ordinate:	-0.789	
Element: Linear		
VPT	495+85.301 R1	2526.754
VPC	496+49.678 R1	2525.614
Tangent Grade:	-0.018	
Tangent Length:	64.377	
Element: Symmetrical Parabola		
VPC	496+49.678 R1	2525.614
VPI	497+99.678 R1	2522.958
VPT	499+49.678 R1	2521.289
Length:	300	
Entrance Grade:	-0.018	
Exit Grade:	-0.011	
r = 100 * (g2 - g1) / L:	0.219	
K = l / (g2 - g1):	456.231	
Middle Ordinate:	0.247	
Element: Linear		
VPT	499+49.678 R1	2521.289
VPC	501+76.483 R1	2518.764
Tangent Grade:	-0.011	
Tangent Length:	226.806	

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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

P.E.

05/24/2022

VERTICAL ALIGNMENT DATA

Texas Department of Transportation

SHEET 3 OF 7

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		77
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

	Station	Elevation
Element: Symmetrical Parabola		
VPC	501+76.483 R1	2518.764
VPI	503+26.483 R1	2517.095
VPT	504+76.483 R1	2514.603
Length:	300	
Entrance Grade:	-0.011	
Exit Grade:	-0.017	
r = 100 * (g2 - g1) / L:	-0.183	
K = l / (g2 - g1):	547.419	
Middle Ordinate:	-0.206	
Element: Linear		
VPT	504+76.483 R1	2514.603
VPC	507+22.879 R1	2510.511
Tangent Grade:	-0.017	
Tangent Length:	246.396	
Element: Symmetrical Parabola		
VPC	507+22.879 R1	2510.511
VPI	508+72.879 R1	2508.019
VPT	510+22.879 R1	2508.019
Length:	300	
Entrance Grade:	-0.017	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	0.554	
K = l / (g2 - g1):	180.611	
Middle Ordinate:	0.623	
Element: Linear		
VPT	510+22.879 R1	2508.019
VPC	514+68.002 R1	2508.019
Tangent Grade:	0	
Tangent Length:	445.122	
Element: Symmetrical Parabola		
VPC	514+68.002 R1	2508.019
VPI	516+18.002 R1	2508.019
VPT	517+68.002 R1	2509.603
Length:	300	
Entrance Grade:	0	
Exit Grade:	0.011	
r = 100 * (g2 - g1) / L:	0.352	
K = l / (g2 - g1):	284.135	
Middle Ordinate:	0.396	
Element: Linear		
VPT	517+68.002 R1	2509.603
VPC	518+14.587 R1	2510.095
Tangent Grade:	0.011	
Tangent Length:	46.585	
Element: Symmetrical Parabola		
VPC	518+14.587 R1	2510.095
VPI	521+39.587 R1	2513.526
VPT	524+64.587 R1	2510.572
VHP	521+63.875 R1	2511.939
Length:	650	
Entrance Grade:	0.011	
Exit Grade:	-0.009	
r = 100 * (g2 - g1) / L:	-0.302	
K = l / (g2 - g1):	330.816	
Middle Ordinate:	-1.596	

	Station	Elevation
Element: Linear		
VPT	524+64.587 R1	2510.572
VPC	525+30.309 R1	2509.975
Tangent Grade:	-0.009	
Tangent Length:	65.723	
Element: Symmetrical Parabola		
VPC	525+30.309 R1	2509.975
VPI	526+30.309 R1	2509.066
VPT	527+30.309 R1	2509.063
Length:	200	
Entrance Grade:	-0.009	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	0.453	
K = l / (g2 - g1):	220.734	
Middle Ordinate:	0.227	
Element: Linear		
VPT	527+30.309 R1	2509.063
VPC	531+64.696 R1	2509.05
Tangent Grade:	0	
Tangent Length:	434.387	
Element: Symmetrical Parabola		
VPC	531+64.696 R1	2509.05
VPI	532+64.696 R1	2509.047
VPT	533+64.696 R1	2509.897
VLP	531+65.383 R1	2509.05
Length:	200	
Entrance Grade:	0	
Exit Grade:	0.009	
r = 100 * (g2 - g1) / L:	0.426	
K = l / (g2 - g1):	234.485	
Middle Ordinate:	0.213	
Element: Linear		
VPT	533+64.696 R1	2509.897
VPC	534+32.749 R1	2510.475
Tangent Grade:	0.009	
Tangent Length:	68.053	
Element: Symmetrical Parabola		
VPC	534+32.749 R1	2510.475
VPI	535+82.749 R1	2511.75
VPT	537+32.749 R1	2513.336
Length:	300	
Entrance Grade:	0.009	
Exit Grade:	0.011	
r = 100 * (g2 - g1) / L:	0.069	
K = l / (g2 - g1):	1449.275	
Middle Ordinate:	0.078	
Element: Linear		
VPT	537+32.749 R1	2513.336
VPC	538+63.103 R1	2514.714
Tangent Grade:	0.011	
Tangent Length:	130.354	

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VERTICAL ALIGNMENT DATA

 Texas Department of Transportation

SHEET 4 OF 7

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		78
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

	Station	Elevation
Element: Linear		
VPT	553+85.000 R1	2550.064
VPC	562+00.000 R1	2588.59
Tangent Grade:	0.047	
Tangent Length:	815	
Element: Symmetrical Parabola		
VPC	562+00.000 R1	2588.59
VPI	564+00.000 R1	2598.044
VPT	566+00.000 R1	2596.484
VHP	565+43.345 R1	2596.705
Length:	400	
Entrance Grade:	0.047	
Exit Grade:	-0.008	
r = 100 * (g2 - g1) / L:	-1.377	
K = l / (g2 - g1):	72.635	
Middle Ordinate:	-2.754	
Element: Linear		
VPT	566+00.000 R1	2596.484
VPC	566+45.738 R1	2596.127
Tangent Grade:	-0.008	
Tangent Length:	45.738	
Element: Symmetrical Parabola		
VPC	566+45.738 R1	2596.127
VPI	567+45.738 R1	2595.347
VPT	568+45.738 R1	2595.225
Length:	200	
Entrance Grade:	-0.008	
Exit Grade:	-0.001	
r = 100 * (g2 - g1) / L:	0.329	
K = l / (g2 - g1):	303.859	
Middle Ordinate:	0.165	
Element: Linear		
VPT	568+45.738 R1	2595.225
VPC	570+12.596 R1	2595.022
Tangent Grade:	-0.001	
Tangent Length:	166.857	
Element: Symmetrical Parabola		
VPC	570+12.596 R1	2595.022
VPI	572+12.596 R1	2594.778
VPT	574+12.596 R1	2585.778
Length:	400	
Entrance Grade:	-0.001	
Exit Grade:	-0.045	
r = 100 * (g2 - g1) / L:	-1.095	
K = l / (g2 - g1):	91.362	
Middle Ordinate:	-2.189	
Element: Linear		
VPT	574+12.596 R1	2585.778
VPC	574+14.651 R1	2585.686
Tangent Grade:	-0.045	
Tangent Length:	2.055	

	Station	Elevation
Element: Symmetrical Parabola		
VPC	574+14.651 R1	2585.686
VPI	576+14.651 R1	2576.686
VPT	578+14.651 R1	2575.686
Length:	400	
Entrance Grade:	-0.045	
Exit Grade:	-0.005	
r = 100 * (g2 - g1) / L:	1	
K = l / (g2 - g1):	100	
Middle Ordinate:	2	
Element: Linear		
VPT	578+14.651 R1	2575.686
VPC	578+95.837 R1	2575.28
Tangent Grade:	-0.005	
Tangent Length:	81.186	
Element: Symmetrical Parabola		
VPC	578+95.837 R1	2575.28
VPI	580+95.837 R1	2574.28
VPT	582+95.837 R1	2562.33
Length:	400	
Entrance Grade:	-0.005	
Exit Grade:	-0.06	
r = 100 * (g2 - g1) / L:	-1.369	
K = l / (g2 - g1):	73.059	
Middle Ordinate:	-2.738	
Element: Linear		
VPT	582+95.837 R1	2562.33
VPC	583+15.377 R1	2561.162
Tangent Grade:	-0.06	
Tangent Length:	19.541	
Element: Symmetrical Parabola		
VPC	583+15.377 R1	2561.162
VPI	584+65.377 R1	2552.2
VPT	586+15.377 R1	2547.911
Length:	300	
Entrance Grade:	-0.06	
Exit Grade:	-0.029	
r = 100 * (g2 - g1) / L:	1.039	
K = l / (g2 - g1):	96.282	
Middle Ordinate:	1.168	
Element: Linear		
VPT	586+15.377 R1	2547.911
POT	587+14.058 R1	2545.09
Tangent Grade:	-0.029	
Tangent Length:	98.681	

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STATE OF TEXAS
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05/24/2022

VERTICAL ALIGNMENT DATA

 Texas Department of Transportation

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		79
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FM 669_CL

	Station	Elevation
Element: Linear		
POT	949+90.819	2513.102
VPC	951+84.953	2517.708
Tangent Grade:	0.024	
Tangent Length:	194.134	
Element: Symmetrical Parabola		
VPC	951+84.953	2517.708
VPI	952+84.953	2520.081
VPT	953+84.953	2523.432
Length:	200	
Entrance Grade:	0.024	
Exit Grade:	0.034	
r = 100 * (g2 - g1) / L:	0.489	
K = l / (g2 - g1):	204.608	
Middle Ordinate:	0.244	
Element: Linear		
VPT	953+84.953	2523.432
VPC	956+56.620	2532.534
Tangent Grade:	0.034	
Tangent Length:	271.667	
Element: Symmetrical Parabola		
VPC	956+56.620	2532.534
VPI	958+06.620	2537.559
VPT	959+56.620	2540.011
Length:	300	
Entrance Grade:	0.034	
Exit Grade:	0.016	
r = 100 * (g2 - g1) / L:	-0.572	
K = l / (g2 - g1):	174.843	
Middle Ordinate:	-0.643	
Element: Linear		
VPT	959+56.620	2540.011
VPC	960+81.509	2542.052
Tangent Grade:	0.016	
Tangent Length:	124.889	
Element: Symmetrical Parabola		
VPC	960+81.509	2542.052
VPI	961+81.509	2543.687
VPT	962+81.509	2544.429
Length:	200	
Entrance Grade:	0.016	
Exit Grade:	0.007	
r = 100 * (g2 - g1) / L:	-0.446	
K = l / (g2 - g1):	224.183	
Middle Ordinate:	-0.223	

	Station	Elevation
Element: Linear		
VPT	962+81.509	2544.429
VPC	963+63.559	2545.039
Tangent Grade:	0.007	
Tangent Length:	82.05	
Element: Symmetrical Parabola		
VPC	963+63.559	2545.039
VPI	963+78.559	2545.15
VPT	963+93.559	2545.004
VHP	963+76.535	2545.087
Length:	30	
Entrance Grade:	0.007	
Exit Grade:	-0.01	
r = 100 * (g2 - g1) / L:	-5.721	
K = l / (g2 - g1):	17.478	
Middle Ordinate:	-0.064	
Element: Linear		
VPT	963+93.559	2545.004
VPC	964+12.388	2544.82
Tangent Grade:	-0.01	
Tangent Length:	18.829	
Element: Symmetrical Parabola		
VPC	964+12.388	2544.82
VPI	964+22.388	2544.723
VPT	964+32.388	2544.923
VLP	964+18.943	2544.789
Length:	20	
Entrance Grade:	-0.01	
Exit Grade:	0.02	
r = 100 * (g2 - g1) / L:	14.86	
K = l / (g2 - g1):	6.73	
Middle Ordinate:	0.074	
Element: Linear		
VPT	964+32.388	2544.923
VPC	964+33.930	2544.954
Tangent Grade:	0.02	
Tangent Length:	1.542	
Element: Symmetrical Parabola		
VPC	964+33.930	2544.954
VPI	964+46.430	2545.203
VPT	964+58.930	2545.073
VHP	964+50.364	2545.118
Length:	25	
Entrance Grade:	0.02	
Exit Grade:	-0.01	
r = 100 * (g2 - g1) / L:	-12.158	
K = l / (g2 - g1):	8.225	
Middle Ordinate:	-0.095	

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05/24/2022

VERTICAL ALIGNMENT DATA

Texas Department of Transportation

SHEET 6 OF 7

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		80
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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FM 669_CL (CONT.)

	Station	Elevation
Element: Linear		
VPT	964+58.930	2545.073
VPC	965+07.637	2544.566
Tangent Grade:	-0.01	
Tangent Length:	48.707	
Element: Symmetrical Parabola		
VPC	965+07.637	2544.566
VPI	965+25.137	2544.384
VPT	965+42.637	2544.397
VLP	965+40.194	2544.396
Length:	35	
Entrance Grade:	-0.01	
Exit Grade:	0.001	
r = 100 * (g2 - g1) / L:	3.199	
K = l / (g2 - g1):	31.26	
Middle Ordinate:	0.049	
Element: Linear		
VPT	965+42.637	2544.397
VPC	965+57.030	2544.409
Tangent Grade:	0.001	
Tangent Length:	14.393	
Element: Symmetrical Parabola		
VPC	965+57.030	2544.409
VPI	965+82.030	2544.428
VPT	966+07.030	2544.594
Length:	50	
Entrance Grade:	0.001	
Exit Grade:	0.007	
r = 100 * (g2 - g1) / L:	1.169	
K = l / (g2 - g1):	85.547	
Middle Ordinate:	0.037	
Element: Linear		
VPT	966+07.030	2544.594
VPC	967+81.750	2545.752
Tangent Grade:	0.007	
Tangent Length:	174.72	
Element: Symmetrical Parabola		
VPC	967+81.750	2545.752
VPI	969+31.750	2546.745
VPT	970+81.750	2545.398
VHP	969+09.099	2546.173
Length:	300	
Entrance Grade:	0.007	
Exit Grade:	-0.009	
r = 100 * (g2 - g1) / L:	-0.52	
K = l / (g2 - g1):	192.19	
Middle Ordinate:	-0.585	

	Station	Elevation
Element: Linear		
VPT	970+81.750	2545.398
VPC	972+24.349	2544.117
Tangent Grade:	-0.009	
Tangent Length:	142.599	
Element: Symmetrical Parabola		
VPC	972+24.349	2544.117
VPI	973+88.585	2542.642
VPT	975+52.820	2542.624
Length:	328.471	
Entrance Grade:	-0.009	
Exit Grade:	0	
r = 100 * (g2 - g1) / L:	0.27	
K = l / (g2 - g1):	370	
Middle Ordinate:	0.365	
Element: Linear		
VPT	975+52.820	2542.624
VPC	975+58.962	2542.624
Tangent Grade:	0	
Tangent Length:	6.141	
Element: Symmetrical Parabola		
VPC	975+58.962	2542.624
VPI	975+86.173	2542.621
VPT	976+13.385	2542.522
Length:	54.423	
Entrance Grade:	0	
Exit Grade:	-0.004	
r = 100 * (g2 - g1) / L:	-0.645	
K = l / (g2 - g1):	155	
Middle Ordinate:	-0.024	
Element: Linear		
VPT	976+13.385	2542.522
POT	977+12.160	2542.165
Tangent Grade:	-0.004	
Tangent Length:	98.775	

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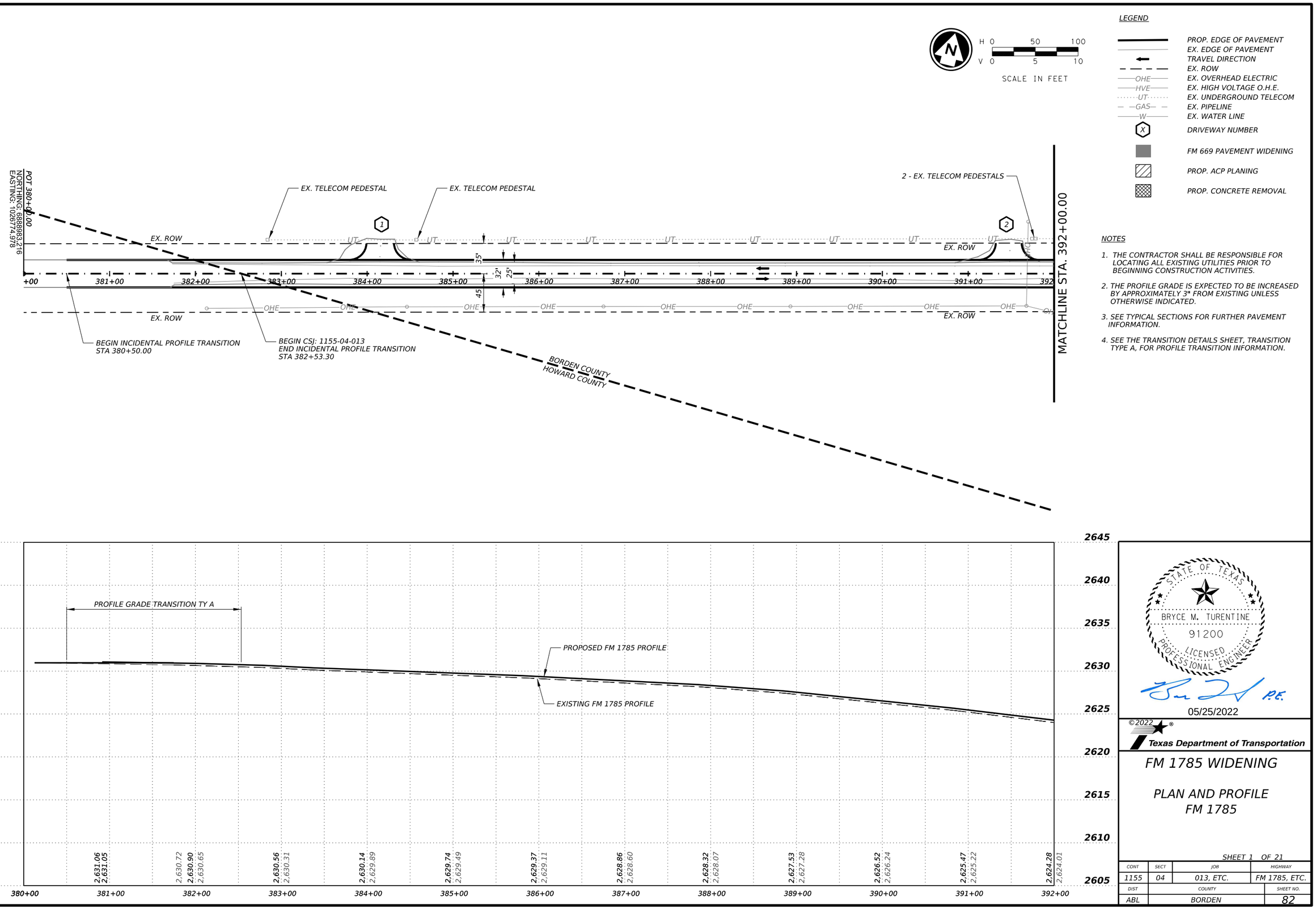
05/24/2022

VERTICAL ALIGNMENT DATA

Texas Department of Transportation

SHEET 7 OF 7

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		81
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES.
2. THE PROFILE GRADE IS EXPECTED TO BE INCREASED BY APPROXIMATELY 3" FROM EXISTING UNLESS OTHERWISE INDICATED.
3. SEE TYPICAL SECTIONS FOR FURTHER PAVEMENT INFORMATION.
4. SEE THE TRANSITION DETAILS SHEET, TRANSITION TYPE A, FOR PROFILE TRANSITION INFORMATION.

STATE OF TEXAS
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05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 1785

SHEET 1 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		82

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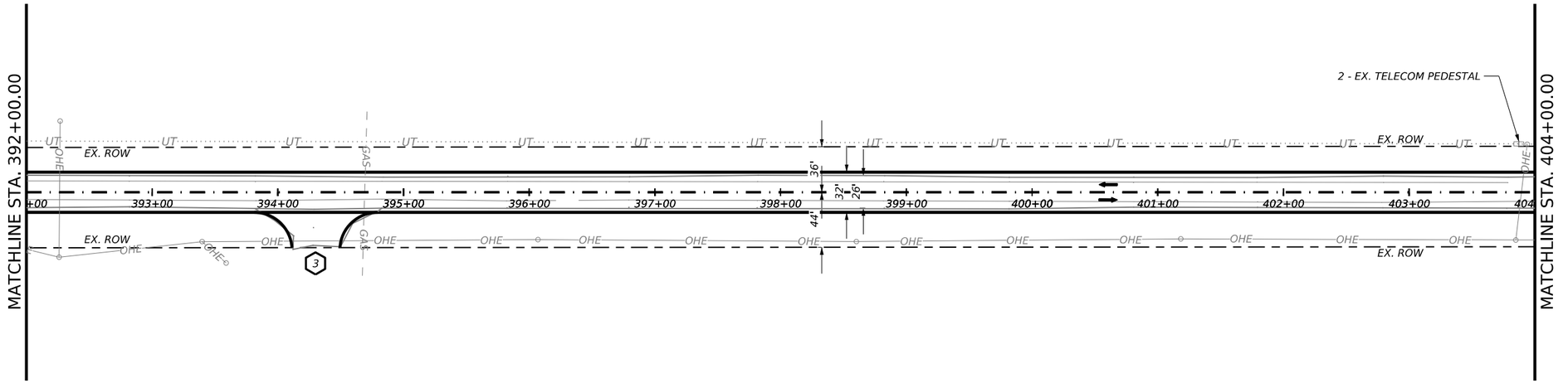

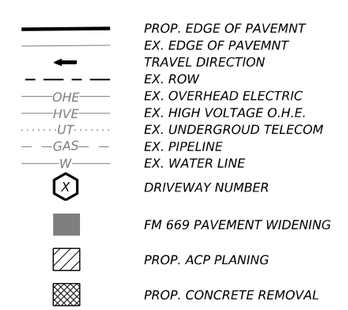

NOTES

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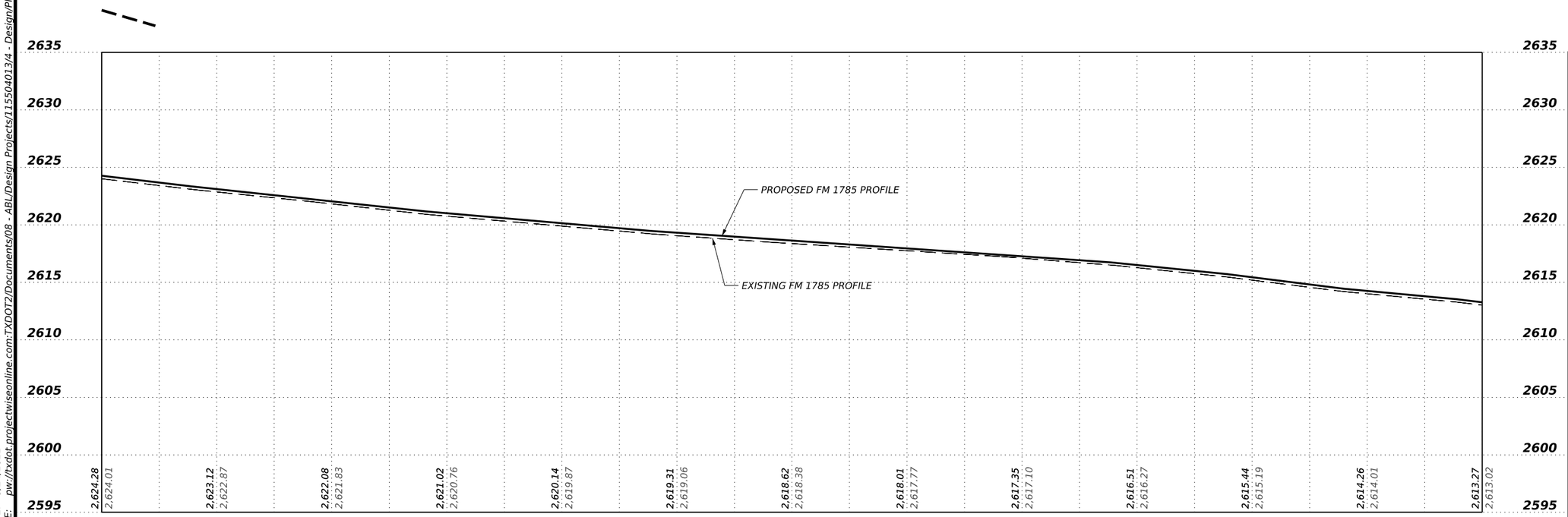
2. THE PROFILE GRADE IS EXPECTED TO BE INCREASED BY APPROXIMATLY 3" FROM EXISTING UNLESS OTHERWISE INDICATED.
3. SEE TYPICAL SECTIONS FOR FURTHER PAVEMENT INFORMATION.



05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 2 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		83

DATE: 5/24/2022 1:25:47 PM
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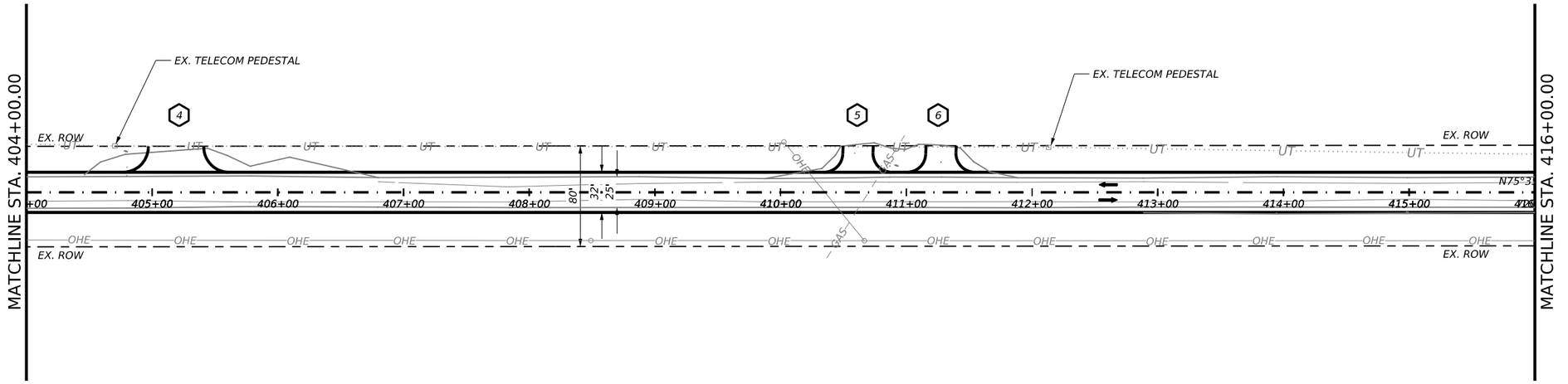

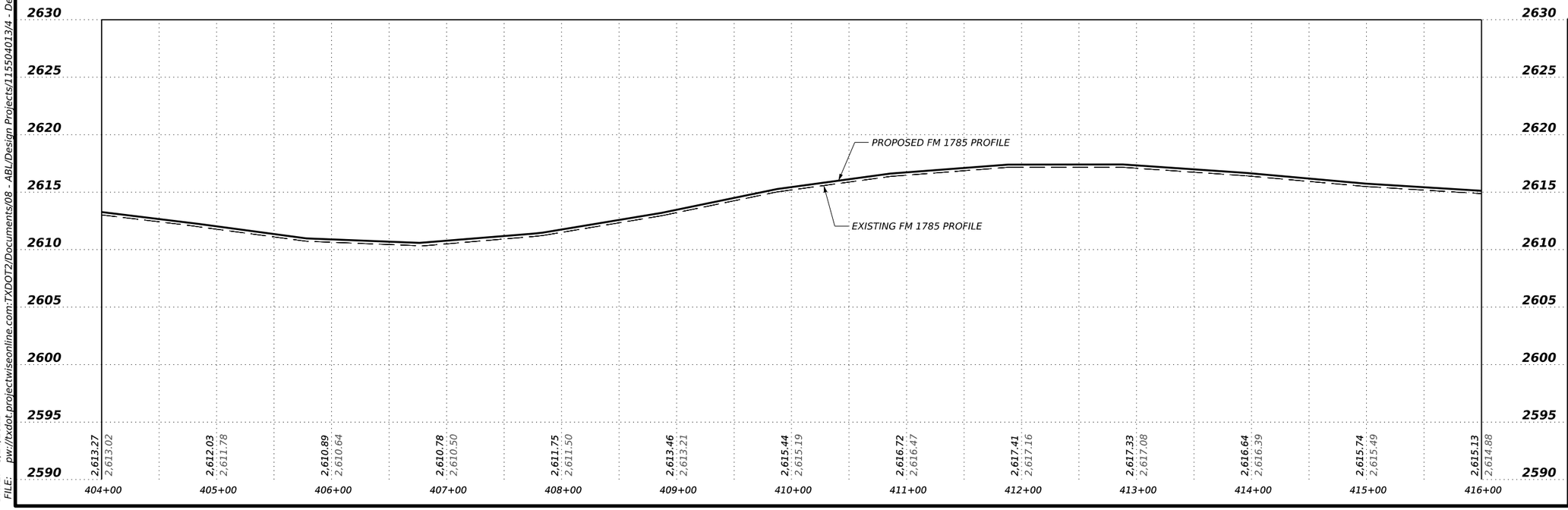

H 0 50 100
V 0 5 10
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
- W — EX. WATER LINE
- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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STATE OF TEXAS
BRYCE M. TURENTINE
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P.E.
05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 3 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		84

DATE: 5/24/2022 1:25:54 PM
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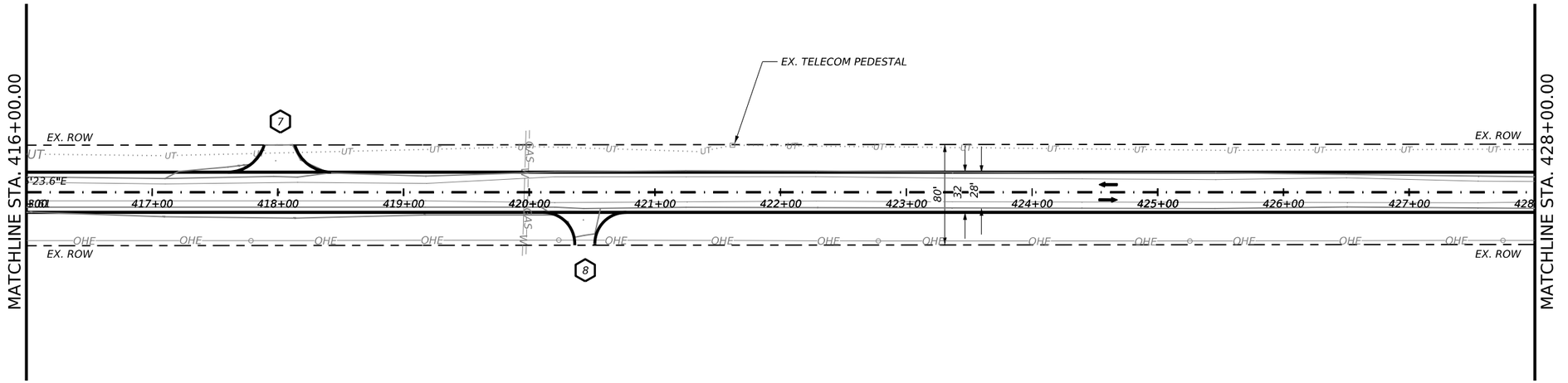

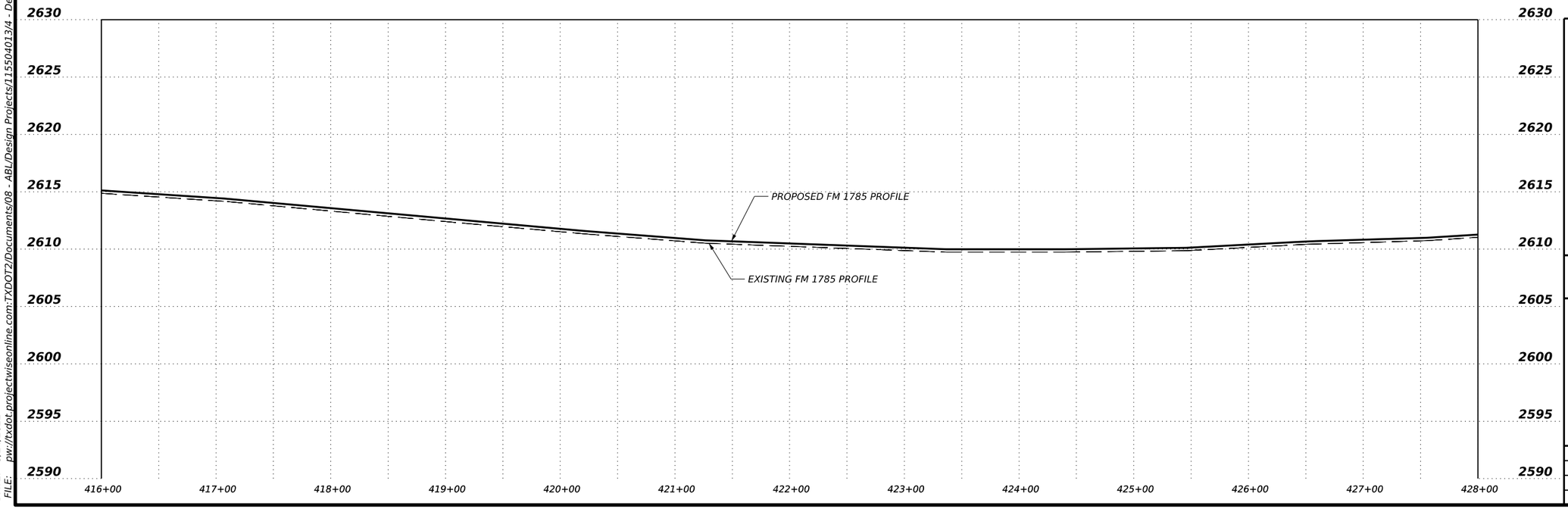

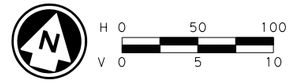

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 1785

SHEET 4 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		85

DATE: 5/24/2022 1:26:00 PM
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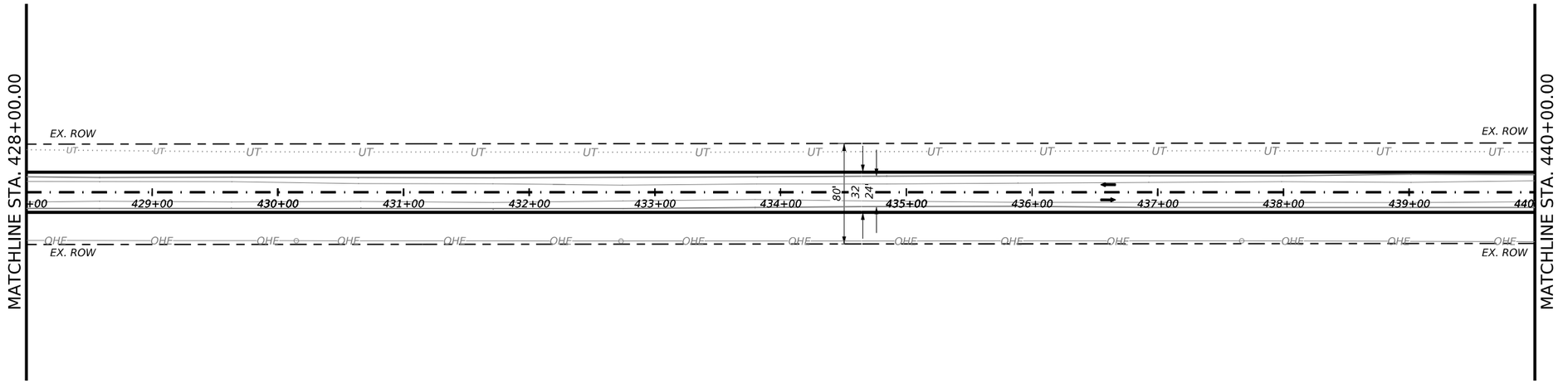

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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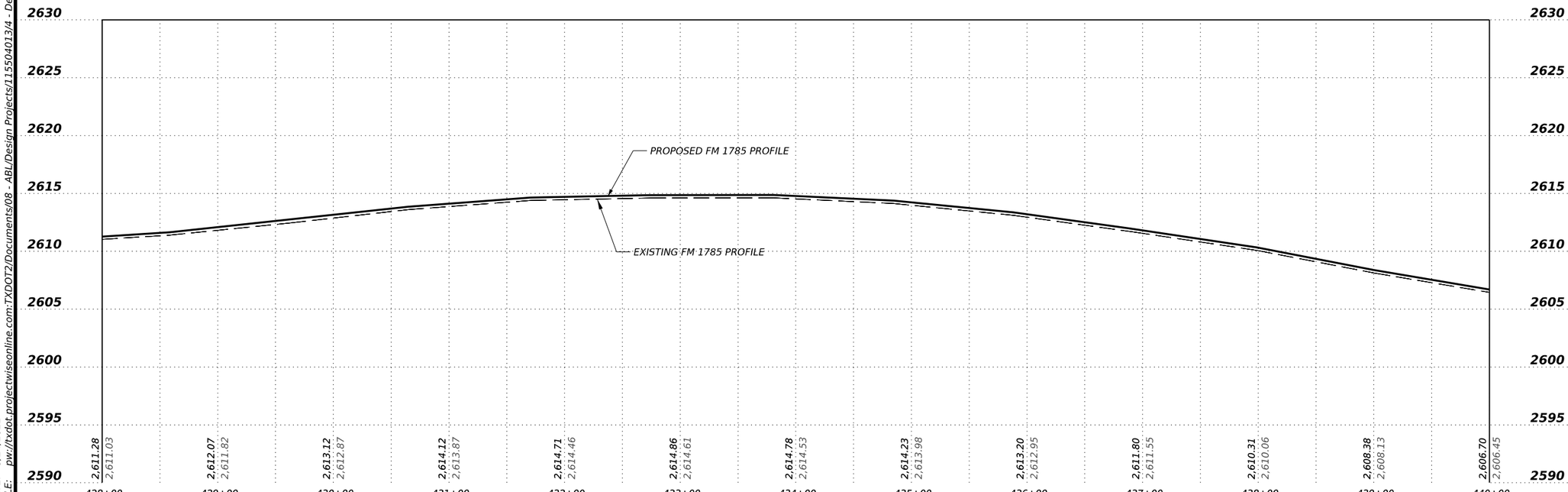

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PLAN AND PROFILE FM 1785

SHEET 5 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		86

DATE: 5/24/2022 1:26:06 PM
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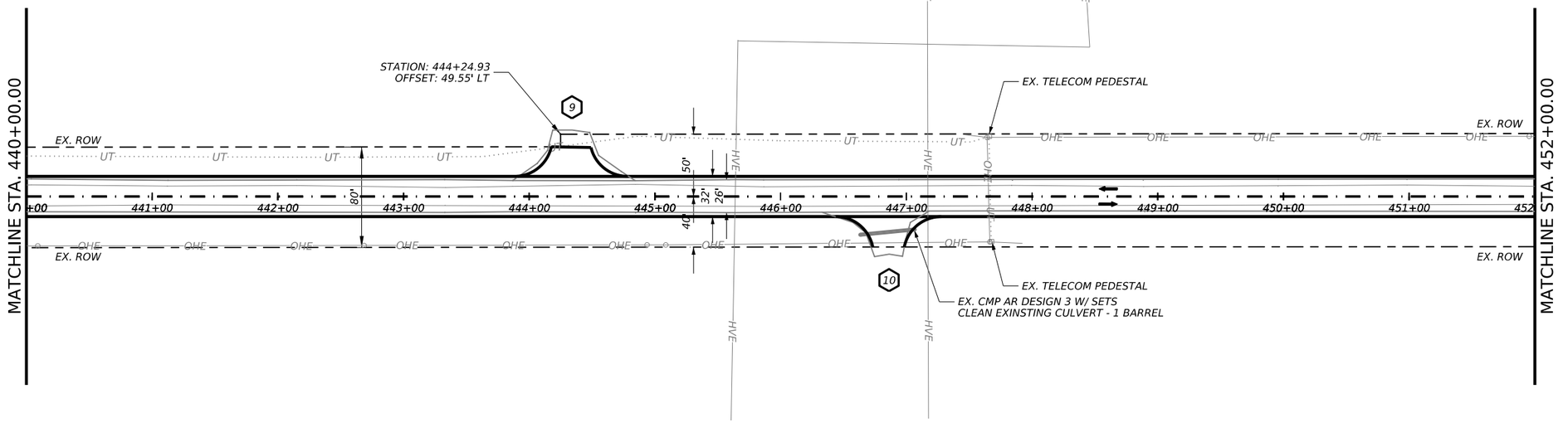

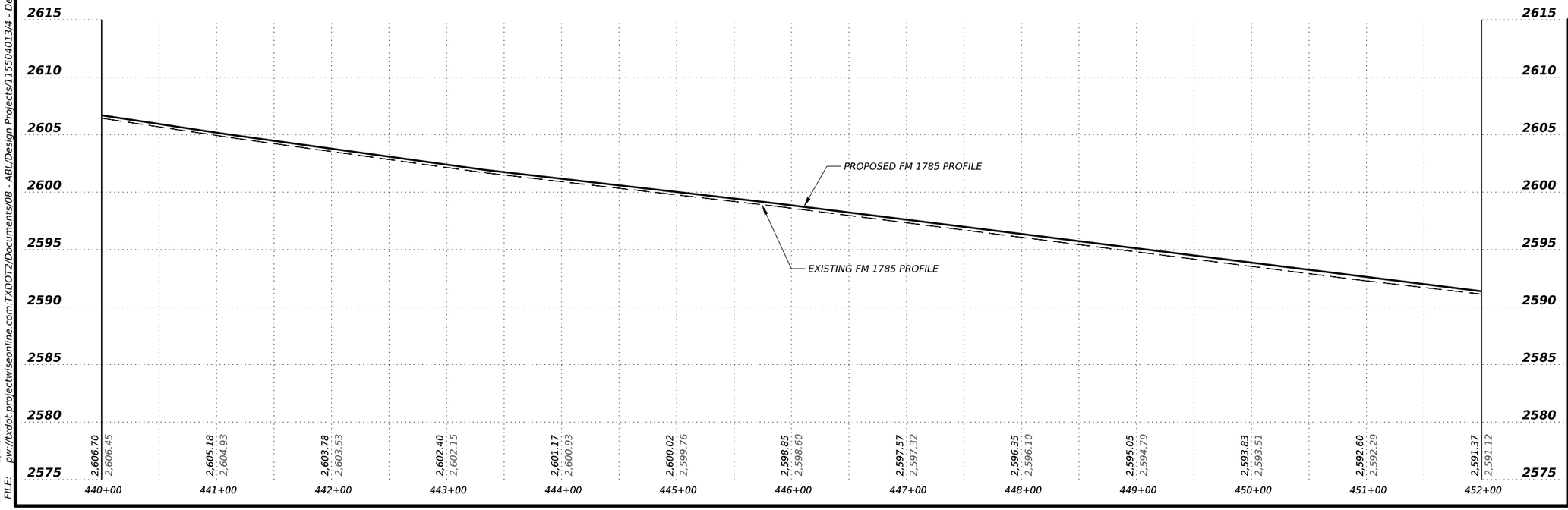

H 0 50 100
V 0 5 10
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
- W — EX. WATER LINE
- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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PLAN AND PROFILE FM 1785

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		87

DATE: 5/24/2022 1:26:12 PM
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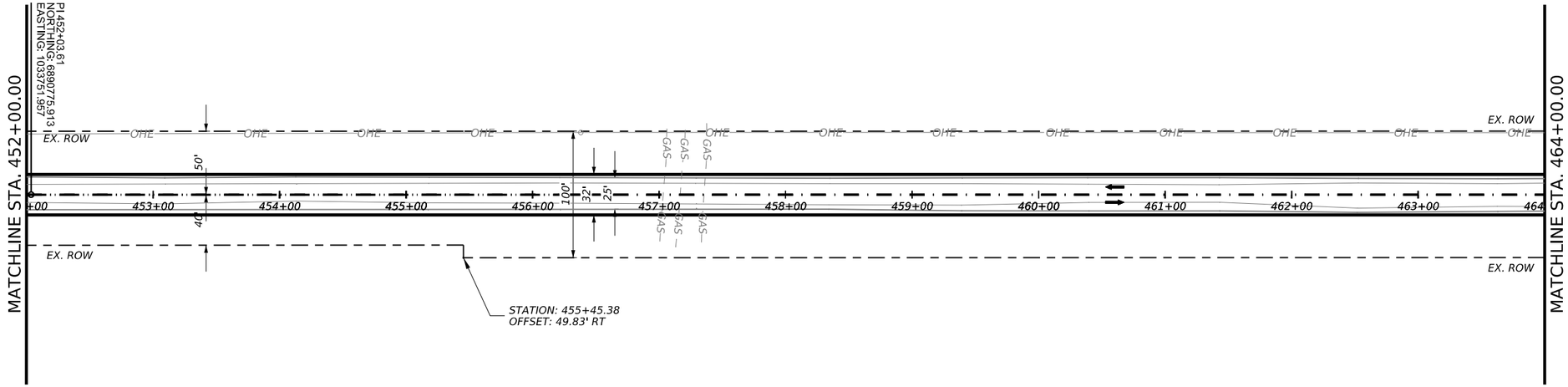

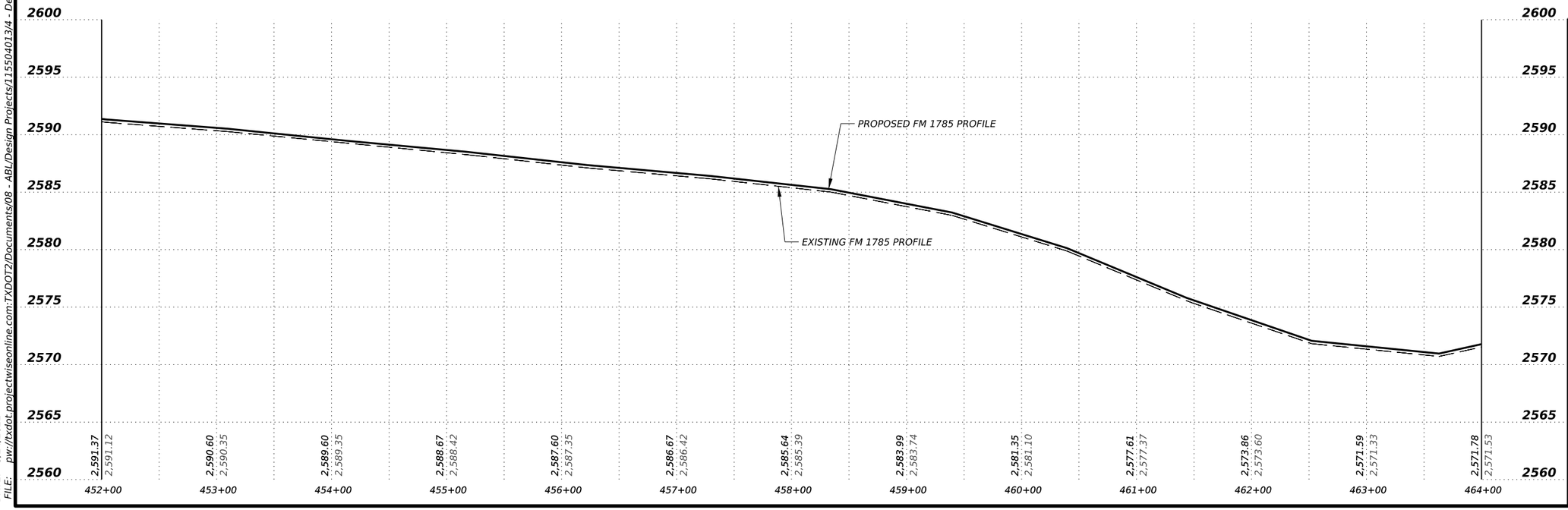

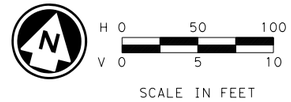

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 7 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		88

DATE: 5/24/2022 1:26:16 PM
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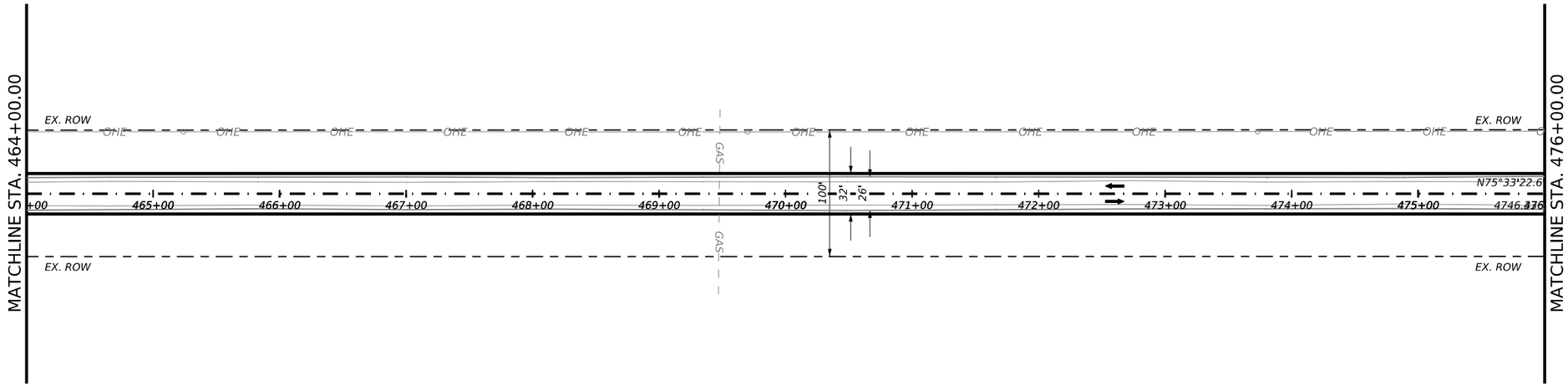

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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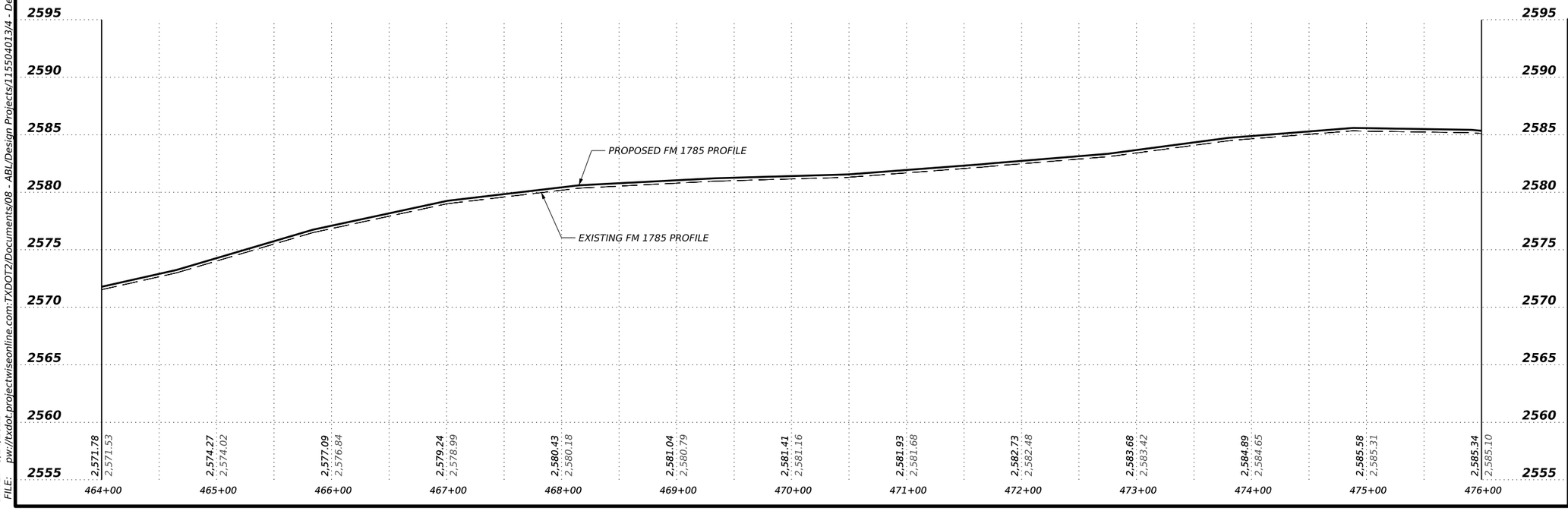

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 8 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		89

DATE: 5/24/2022 1:26:22 PM
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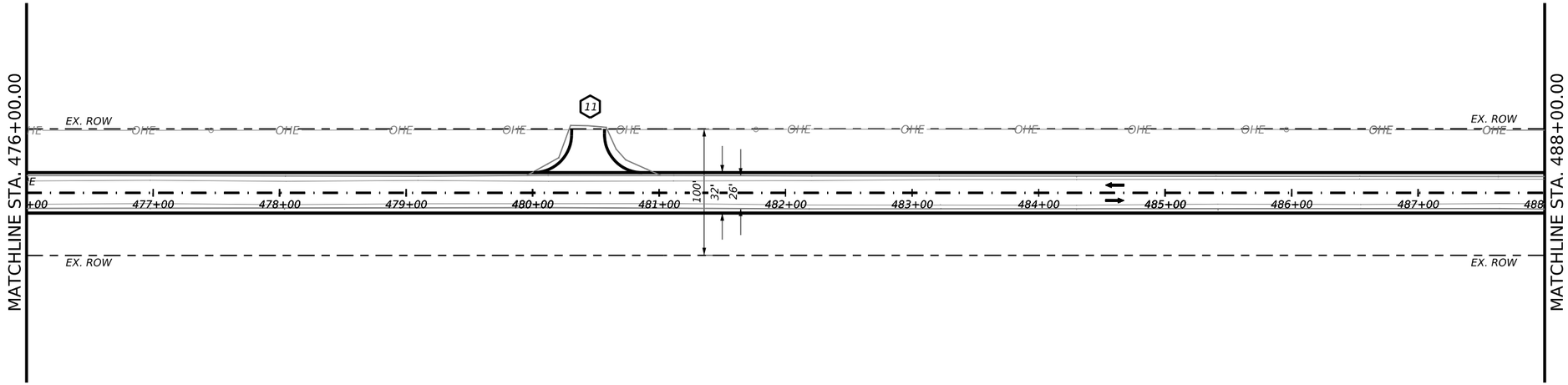

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
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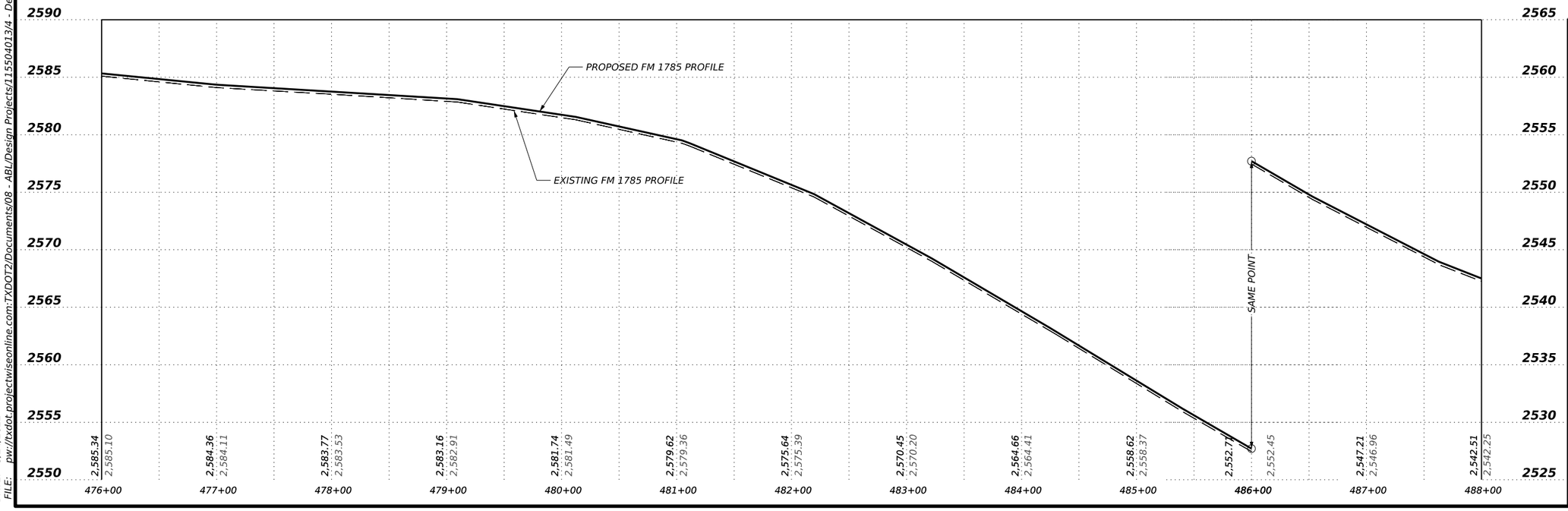

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BRYCE M. TURENTINE
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05/24/2022

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 9 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		90

DATE: 5/24/2022 1:26:27 PM
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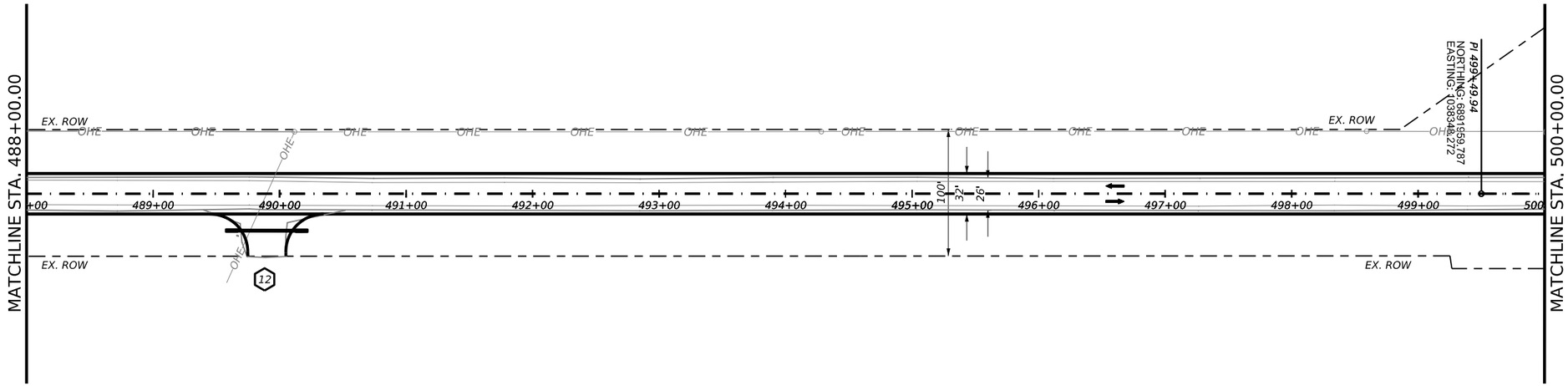

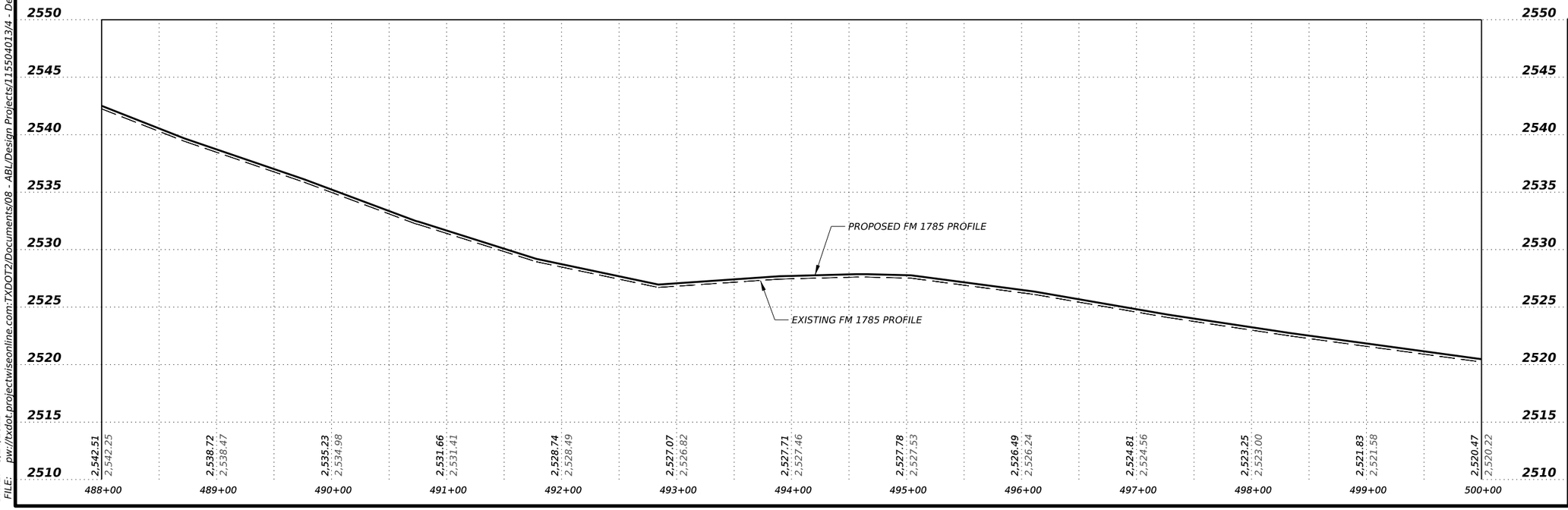

H 0 50 100
V 0 5 10
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 1785

SHEET 10 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		91

DATE: 5/24/2022 1:26:33 PM
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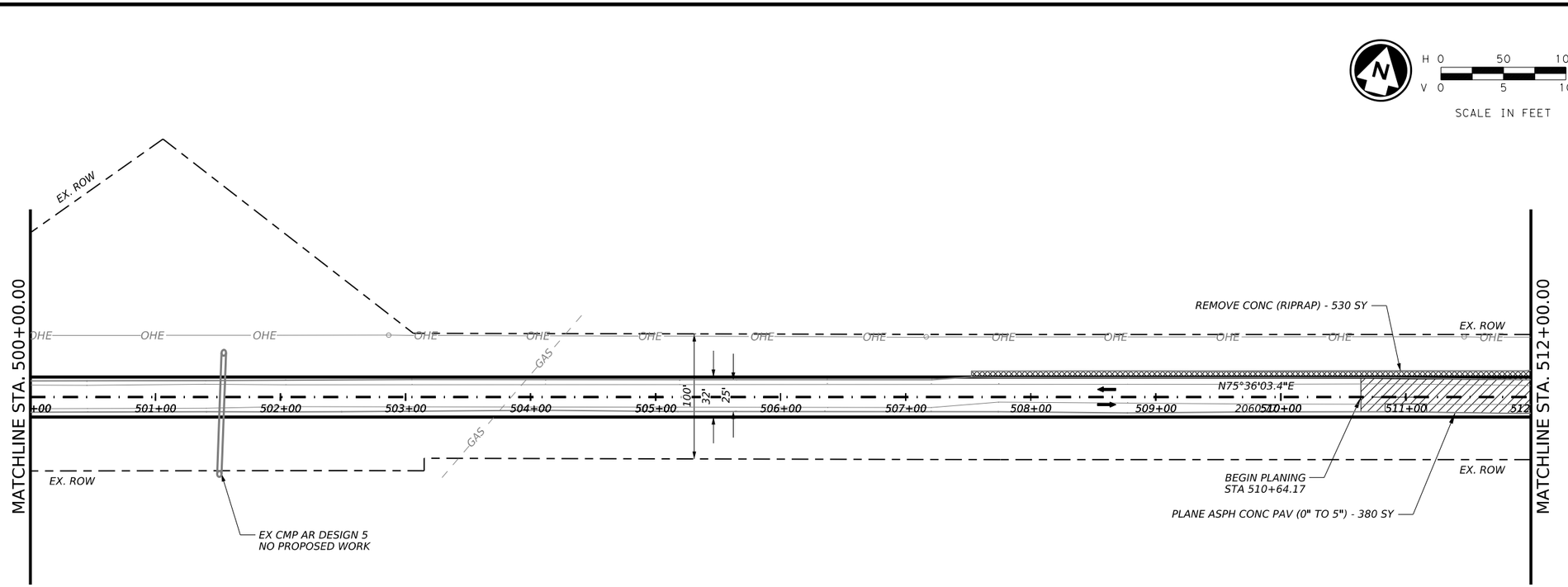

LEGEND

- PROP. EDGE OF PAVEMENT
- EX. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUND TELECOM
- GAS — EX. PIPELINE
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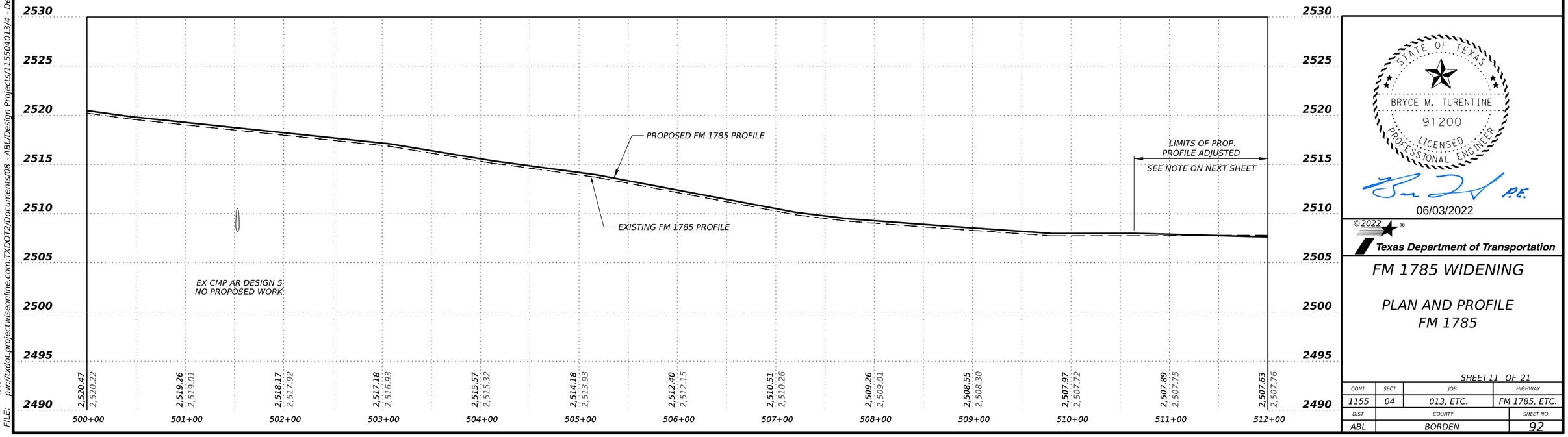

STATE OF TEXAS
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06/03/2022

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 11 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		92

DATE: 6/3/2022 1:25:08 AM
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CK
DW
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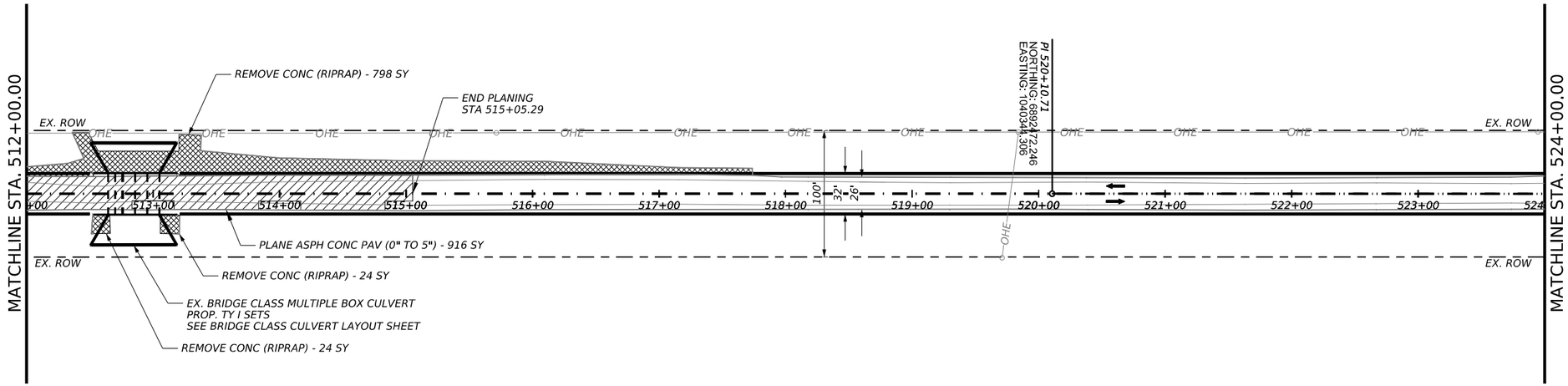
DW



LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
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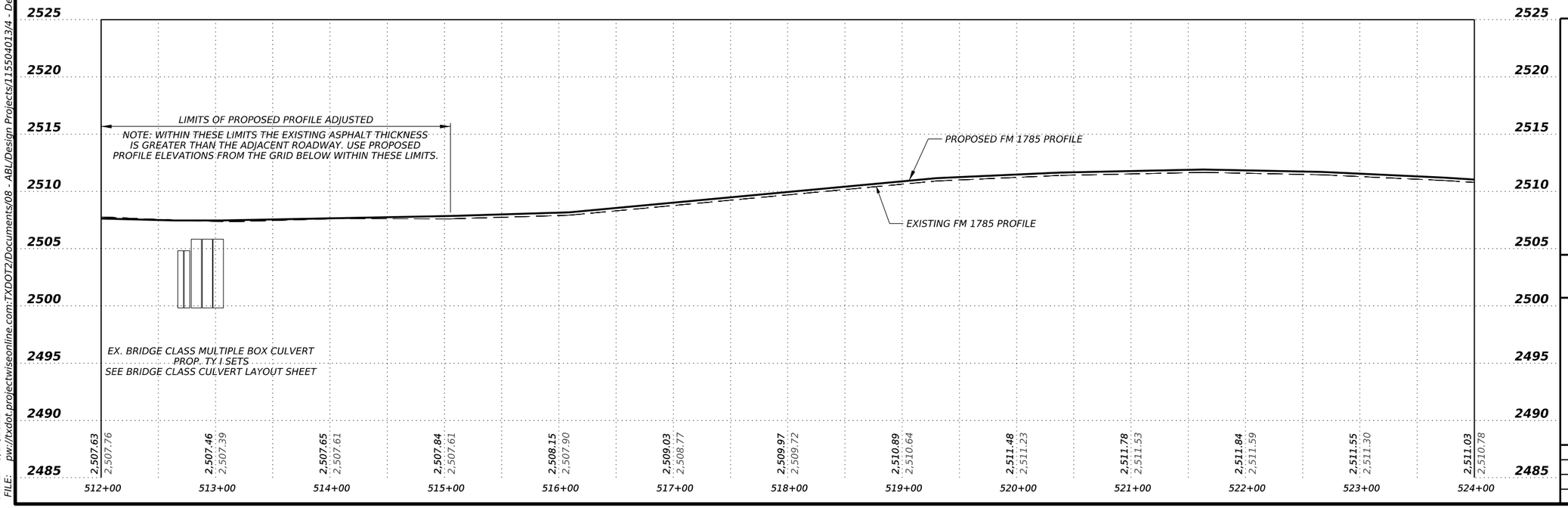

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05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 12 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		93

DATE: 5/24/2022 1:26:43 PM
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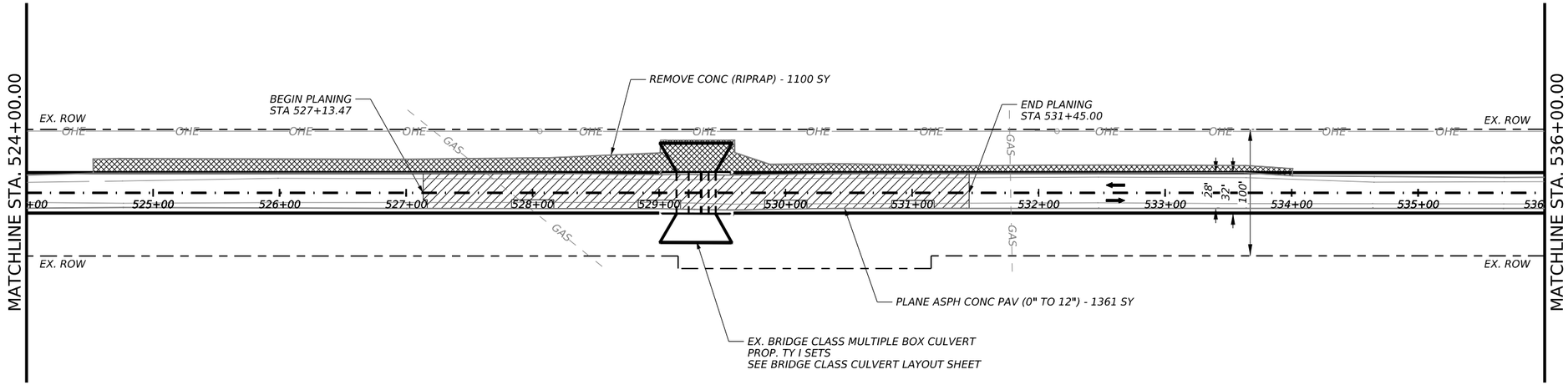

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
- W — EX. WATER LINE
- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

NOTES

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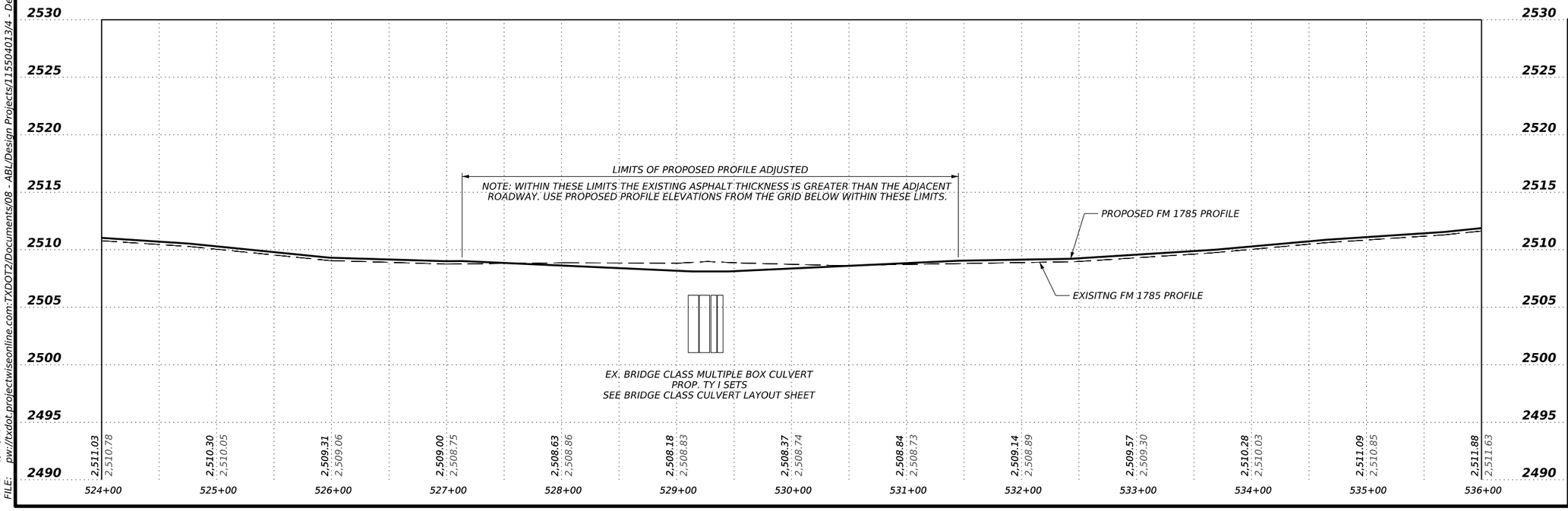
2. THE PROFILE GRADE IS EXPECTED TO BE INCREASED BY APRROXIMATLY 3" FROM EXISTING UNLESS OTHERWISE INDICATED.
3. SEE TYPICAL SECTIONS FOR FURTHER PAVEMENT INFORMATION.



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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 13 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		94

DATE: 5/24/2022 1:26:49 PM
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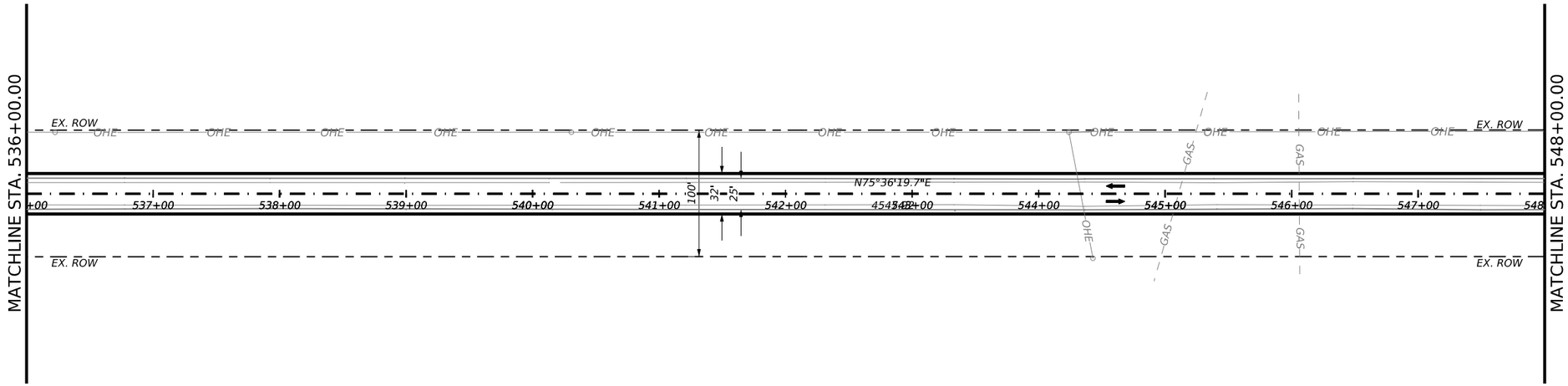

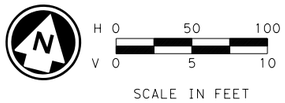

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
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- GAS — EX. PIPELINE
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- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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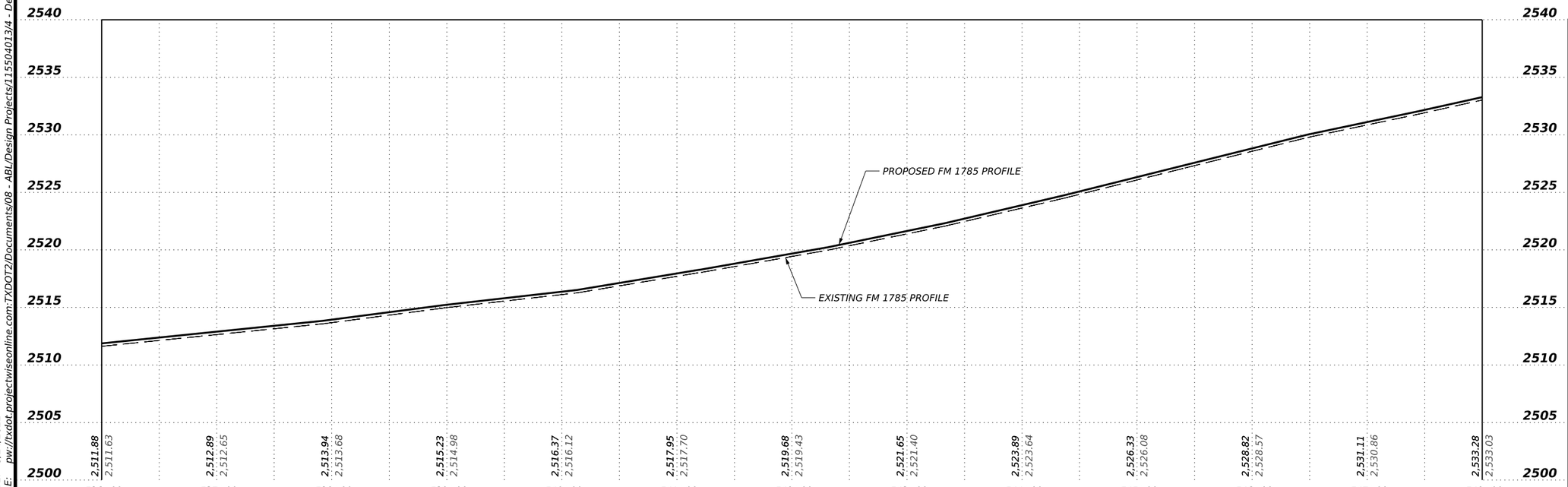

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET 14 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		95

DATE: 5/24/2022 1:26:54 PM
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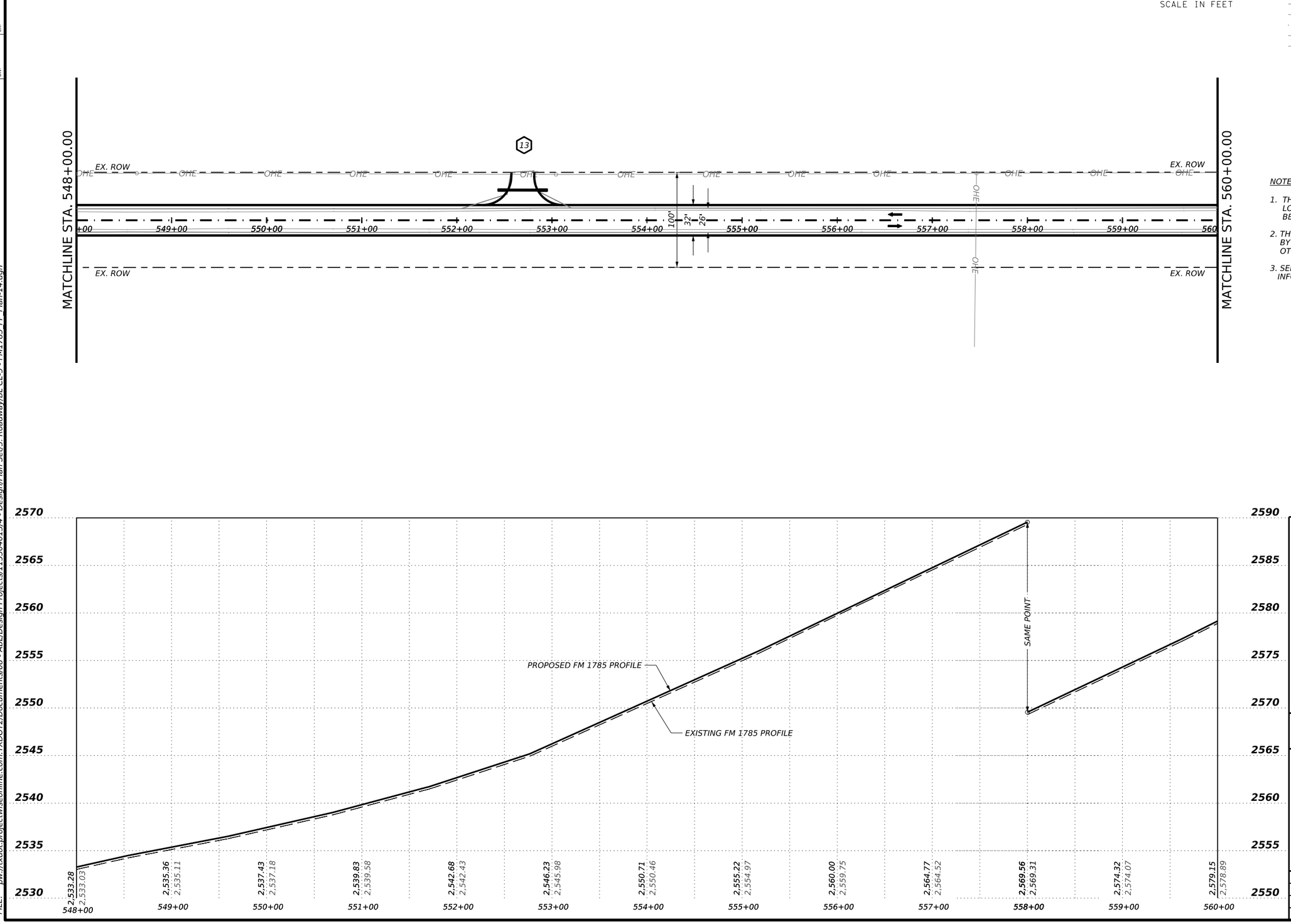

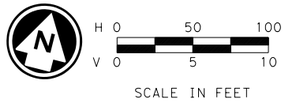

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
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- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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FM 1785 WIDENING

PLAN AND PROFILE
FM 1785

SHEET 15 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		96

DATE: 5/24/2022 1:26:59 PM
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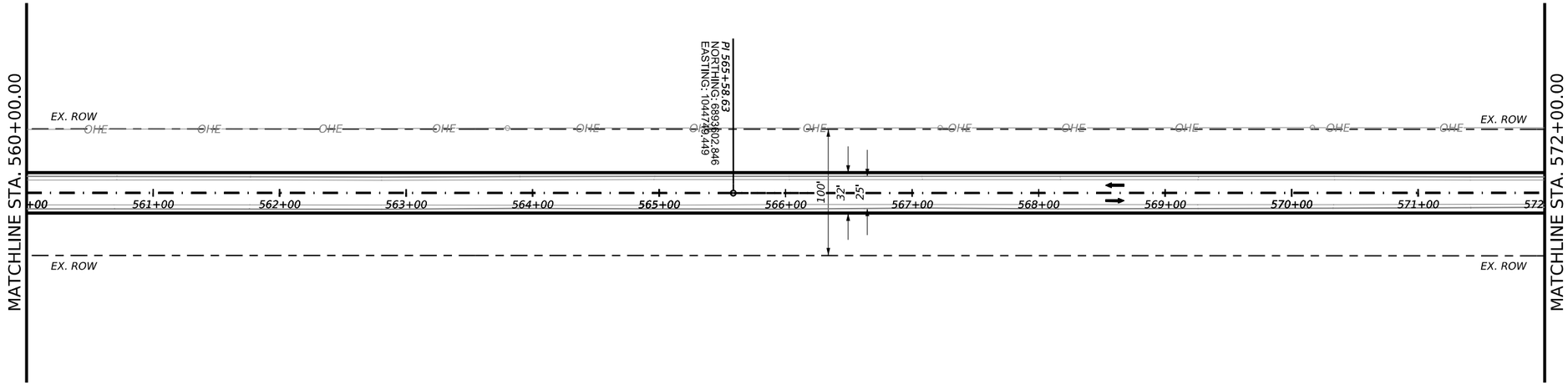
CK DW CK DW



LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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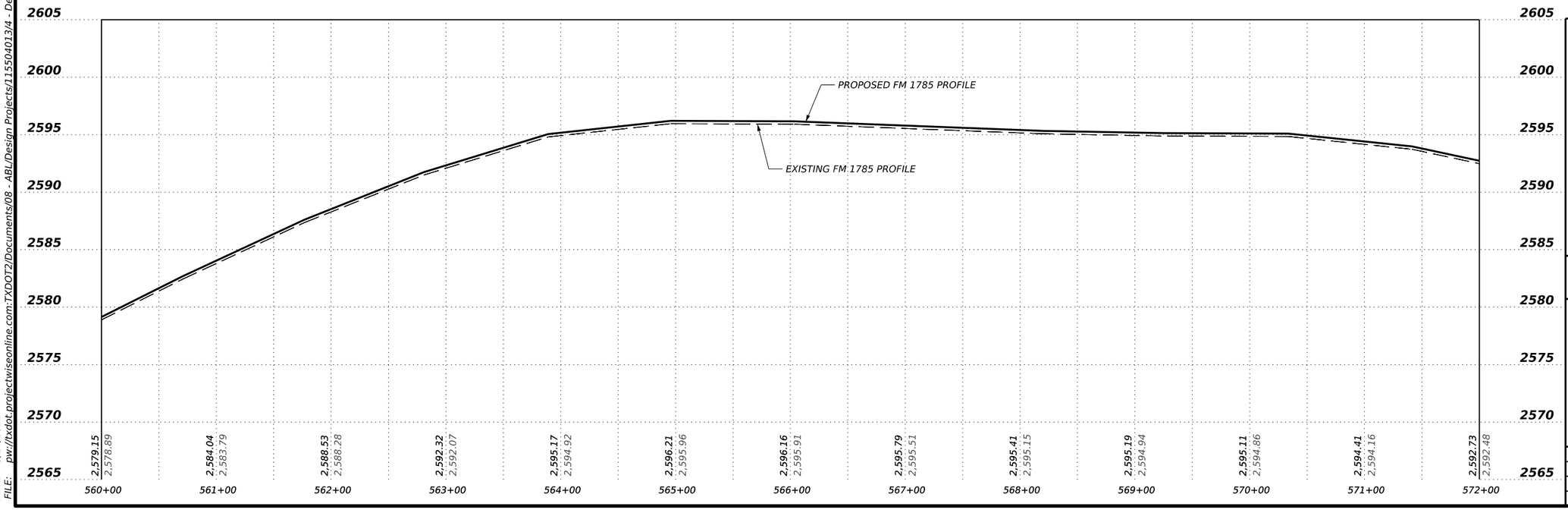

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET16 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		97

DATE: 5/24/2022 1:27:05 PM
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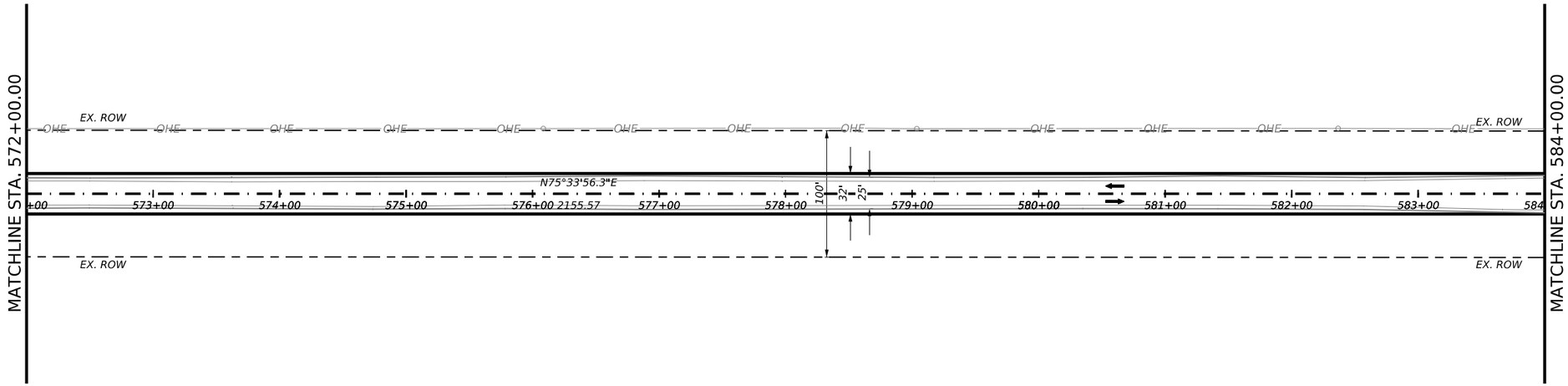
CK
DW
CK
DW



LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
- UT — EX. UNDERGROUD TELECOM
- GAS — EX. PIPELINE
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- X — DRIVEWAY NUMBER
- FM 669 PAVEMENT WIDENING
- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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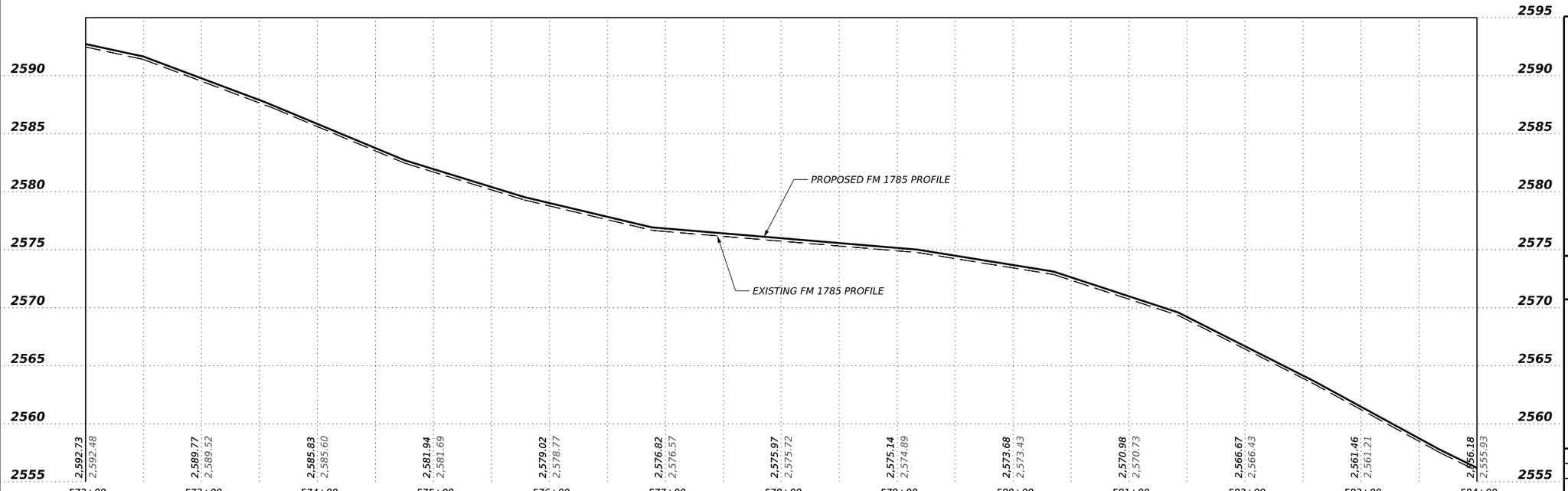

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FM 1785 WIDENING

PLAN AND PROFILE FM 1785

SHEET17 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		98

DATE: 5/24/2022 1:27:10 PM
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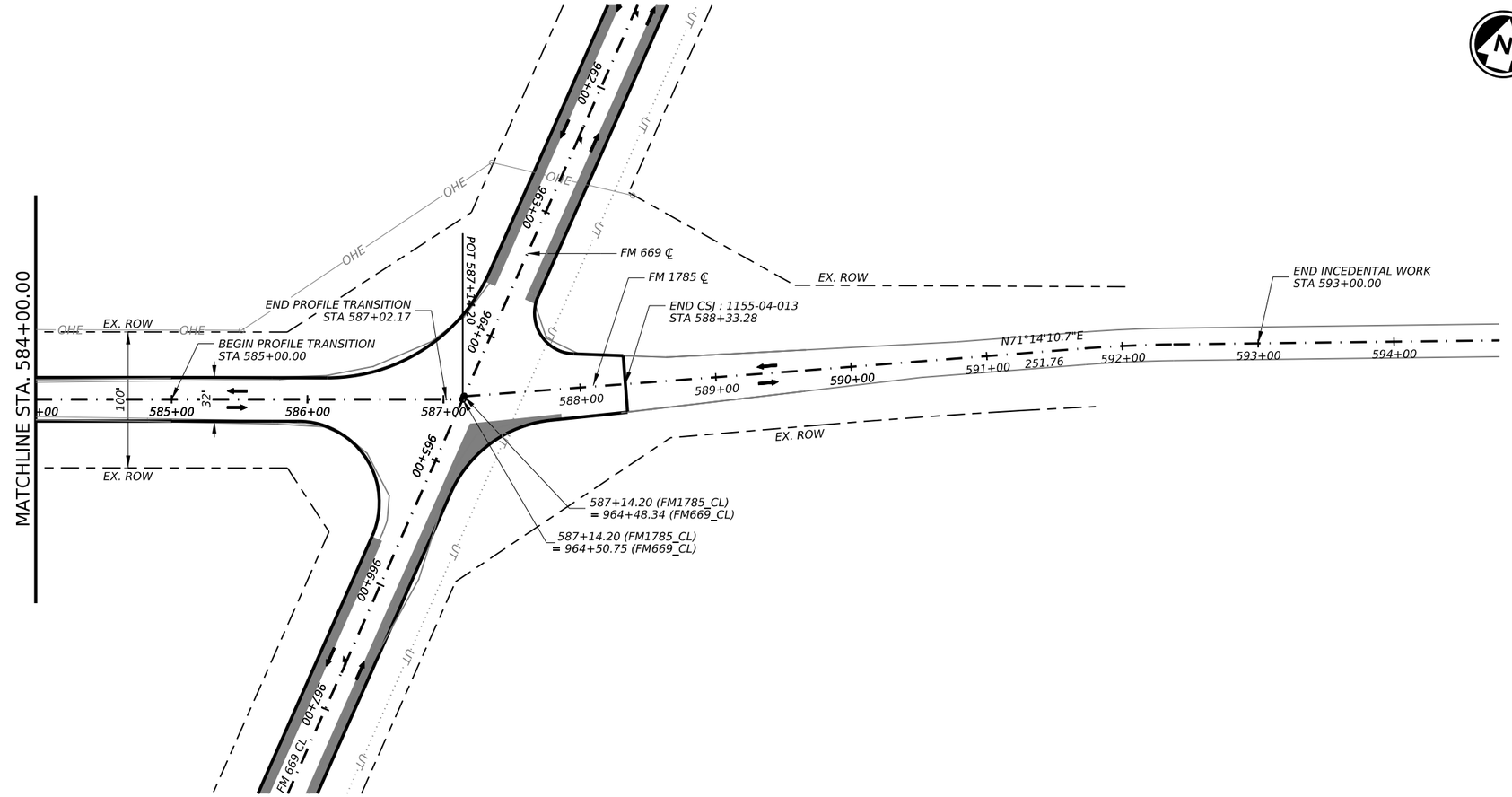

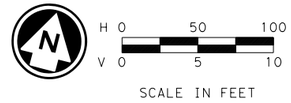

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
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- GAS — EX. PIPELINE
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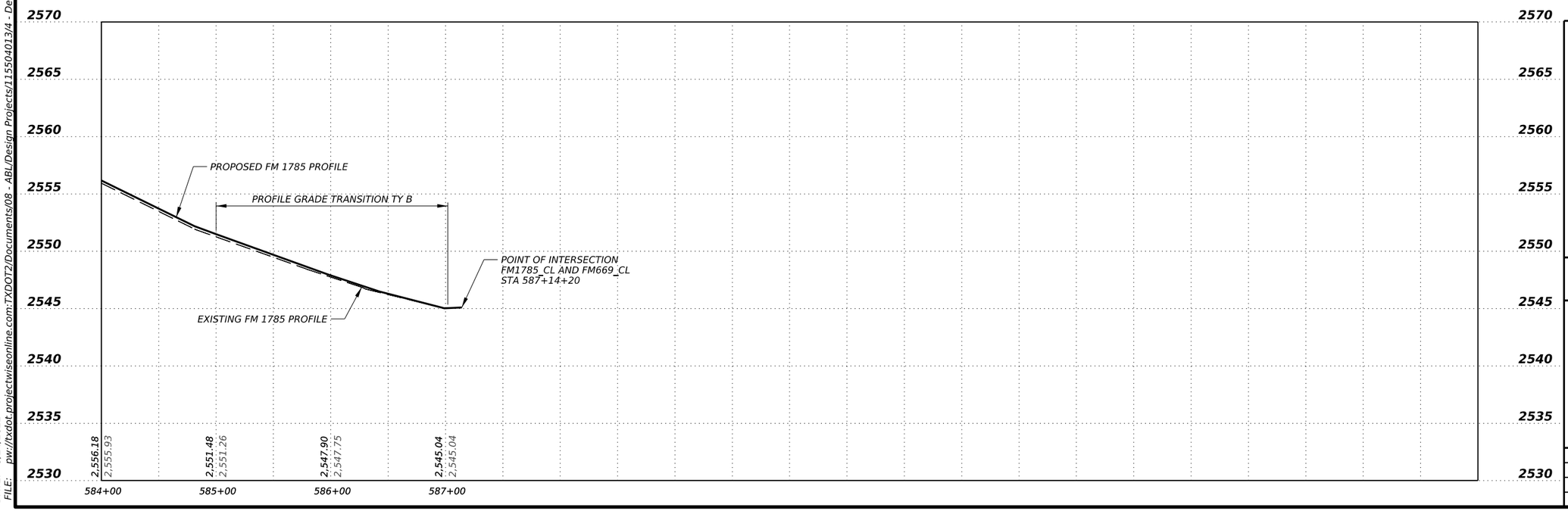
3. SEE TYPICAL SECTIONS FOR FURTHER PAVEMENT INFORMATION.
4. SEE INTERSECTION DETAILS SHEET FOR FURTHER INFORMATION.
5. SEE THE TRANSITION DETAILS SHEET, TRANSITION TYPE B, FOR PROFILE TRANSITION INFORMATION.



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05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 1785

SHEET18 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		99

DATE: 5/24/2022 4:47:00 PM
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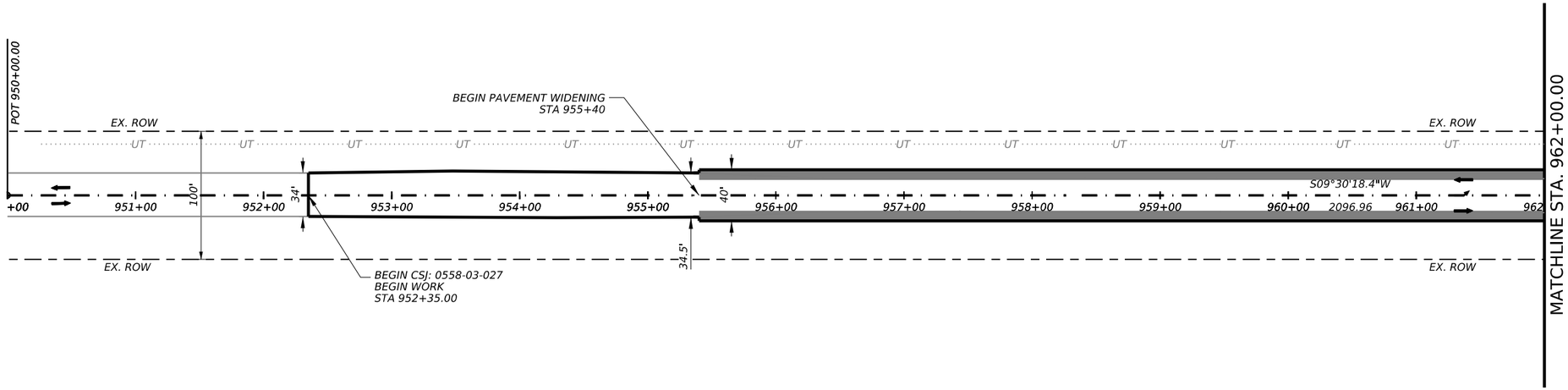

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
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- GAS — EX. PIPELINE
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- PROP. ACP PLANING
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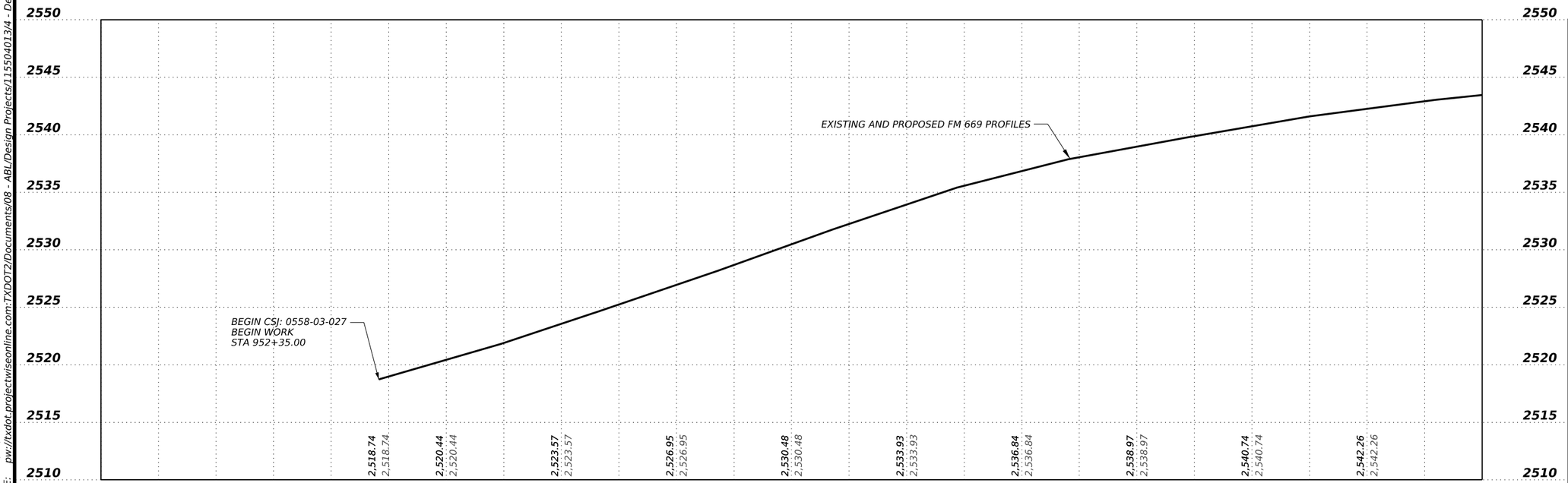

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Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 669

SHEET 19 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		100

DATE: 5/24/2022 1:27:21 PM
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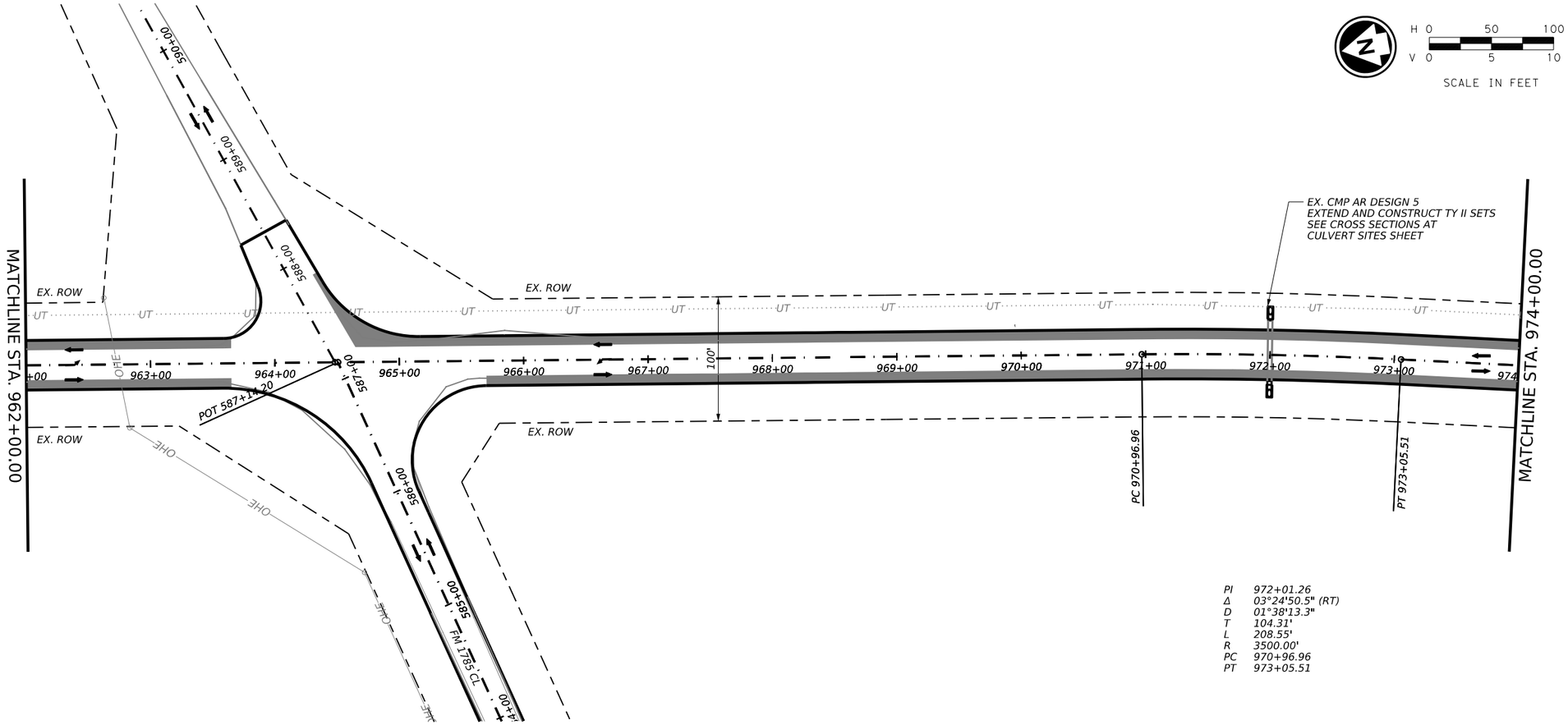

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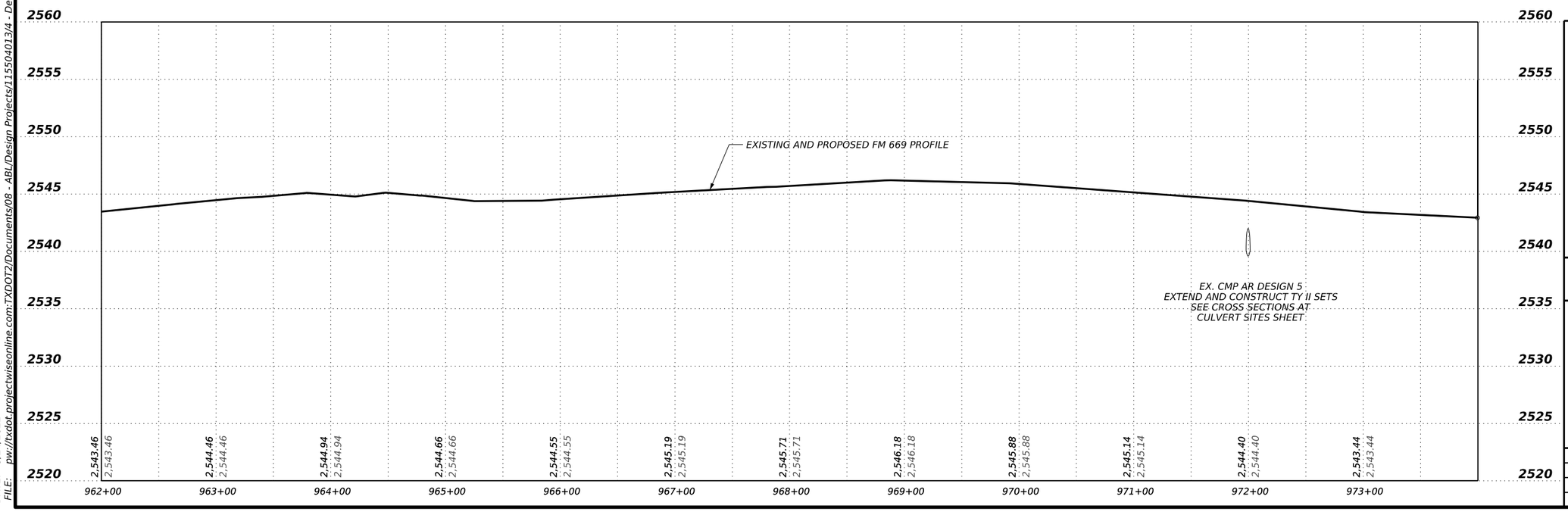

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05/24/2022

Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE FM 669

SHEET 20 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		101

DATE: 5/24/2022 5:00:12 PM
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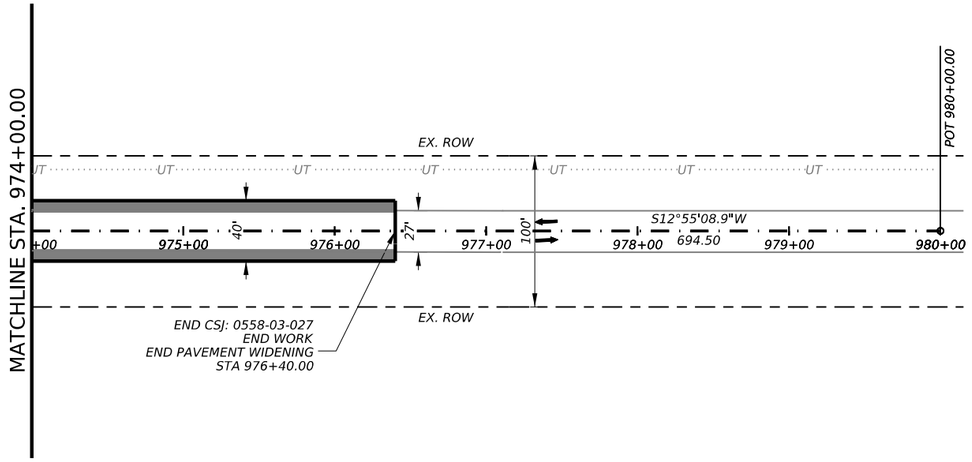

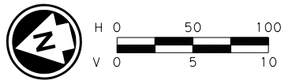

LEGEND

- PROP. EDGE OF PAVEMNT
- EX. EDGE OF PAVEMNT
- TRAVEL DIRECTION
- EX. ROW
- OHE — EX. OVERHEAD ELECTRIC
- HVE — EX. HIGH VOLTAGE O.H.E.
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- PROP. ACP PLANING
- PROP. CONCRETE REMOVAL

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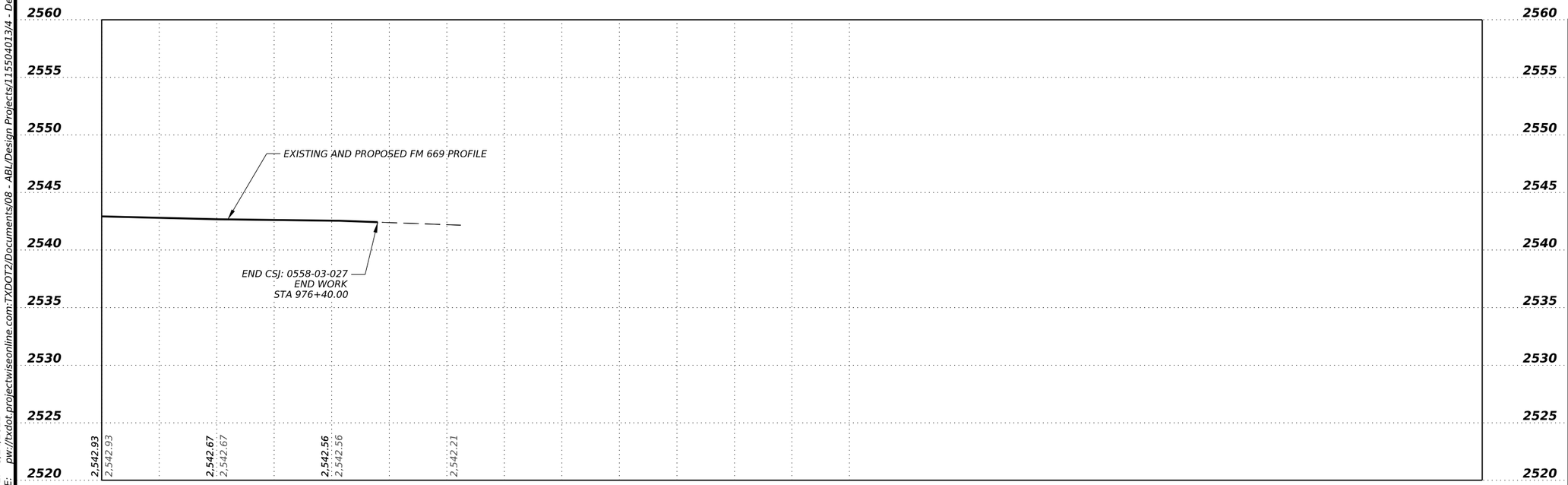

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Texas Department of Transportation

FM 1785 WIDENING

PLAN AND PROFILE
FM 669

SHEET 21 OF 21

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		102

DATE: 5/24/2022 1:27:31 PM
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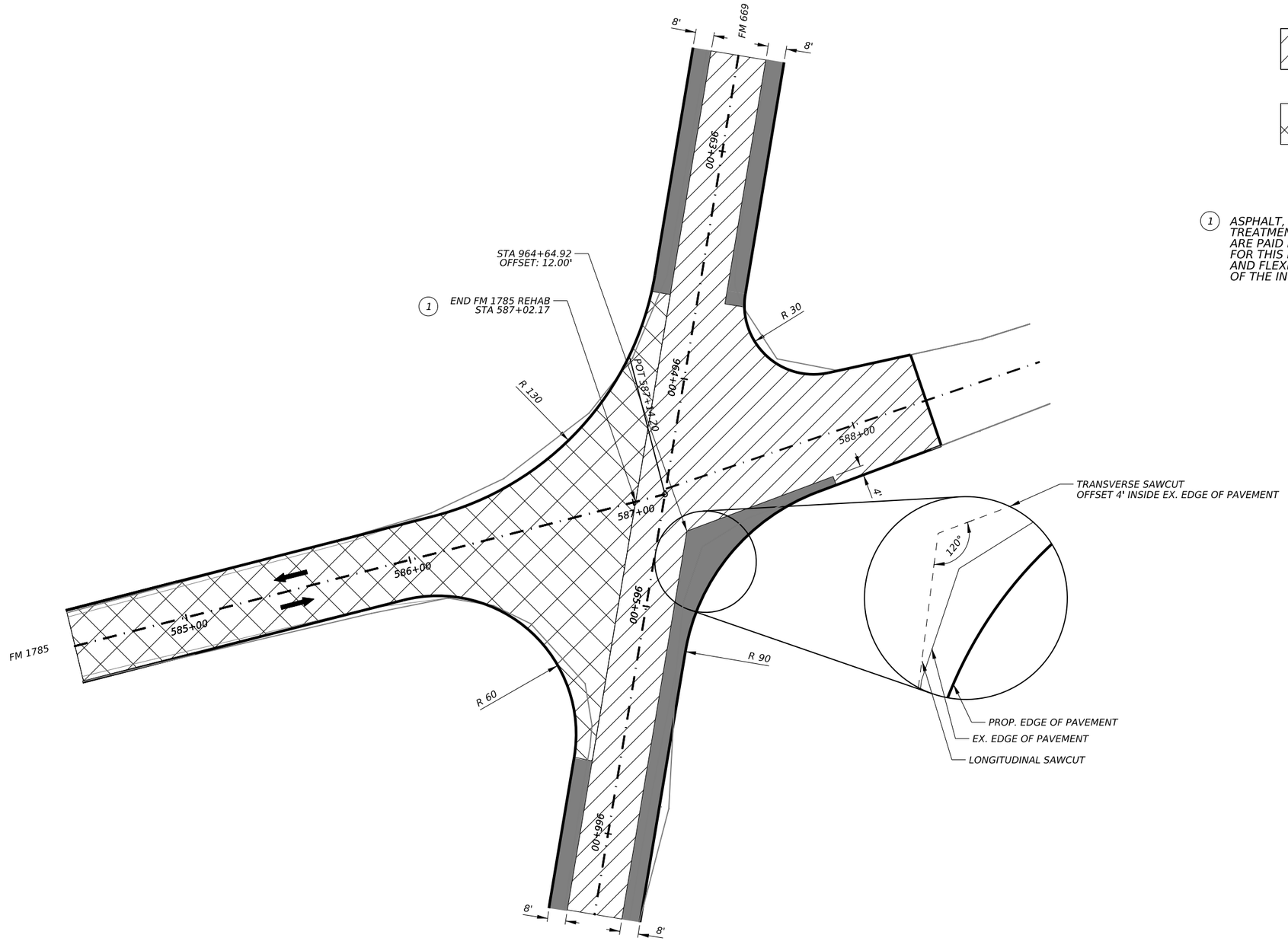

FM 669 WIDENING

SURFACE TREATMENT ONLY

FM 1785 REHABILITATION

(1) ASPHALT, FLEXIBLE BASE, REWORK BASE, AND CEMENT TREATMENT ITEMS USED IN THE FM 1785 REHAB AREA ARE PAID FOR UNDER CSJ 1155-04-013. THE END LIMIT FOR THIS PAYMENT IS FM 1785 STA 587+02.17. ASPHALT AND FLEXIBLE BASE ITEMS USED TO CONSTRUCT OTHER AREAS OF THE INTERSECTION ARE PAID FOR UNDER CSJ 0558-03-027.

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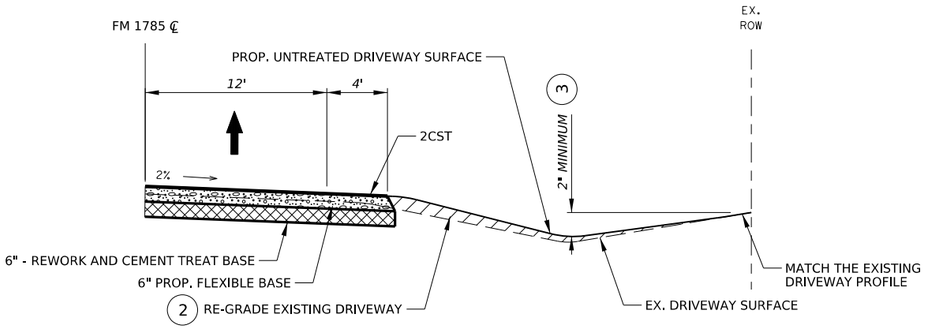
INTERSECTION DETAIL

Texas Department of Transportation

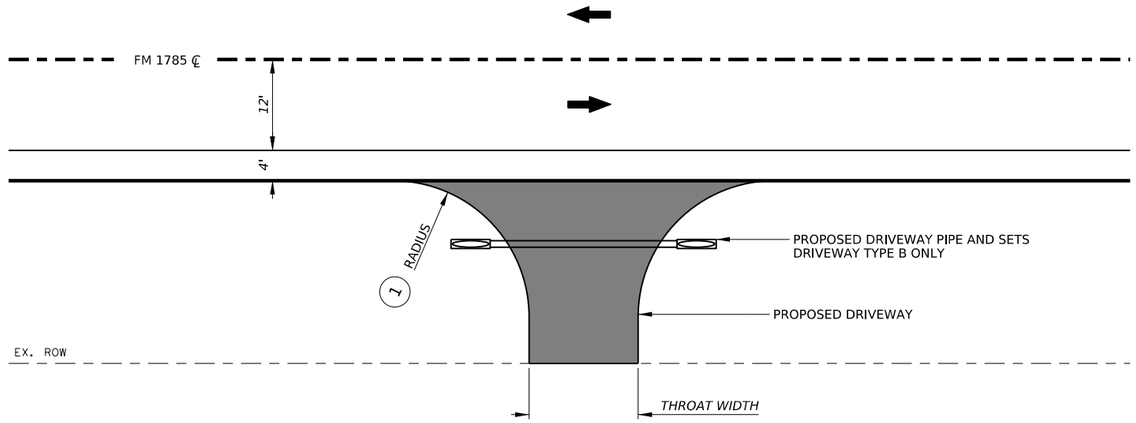
SCALE: 1" = 50' SHEET 1 OF 1

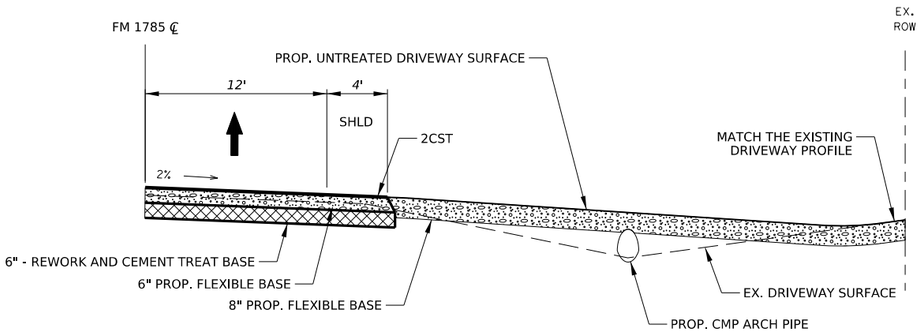
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		103
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/3. Roadway/INTERSECTION DETAIL
DATE: 5/24/2022 1:27:37 PM

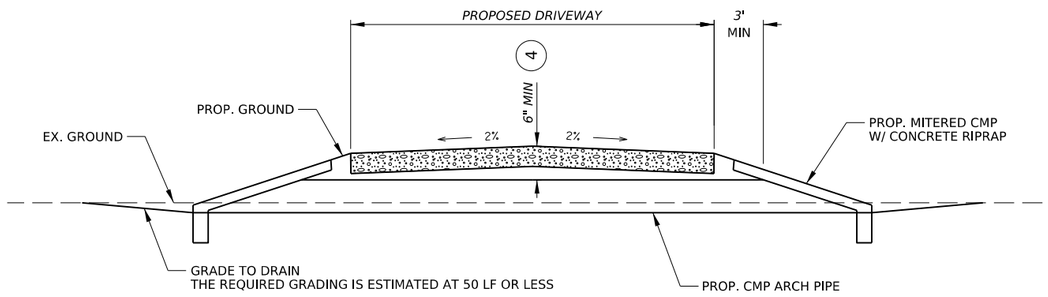


HALF TYPICAL SECTION - DRIVEWAY TYPE A





HALF TYPICAL SECTION - DRIVEWAY TYPE B



TYPICAL SECTION AT PIPE - DRIVEWAY TYPE B

DRIVEWAY DESIGN DATA

DRIVEWAY NUBMER	SHEET	FM 1785 CENTERLINE STATION	SIDE OF ROAD	DRIVEWAY TYPE	WIDTH	RADIUS (BOTH SIDES)	LENGTH
					LF	LF	LF
1	P&P SHEET 1 OF 21	384+13.66	LT	A	32	20	19
2	P&P SHEET 1 OF 21	391+41.12	LT	A	30	20	20
3	P&P SHEET 2 OF 21	394+32.11	RT	A	38	30	28
4	P&P SHEET 3 OF 21	405+16.96	LT	A	44	20	21
5	P&P SHEET 3 OF 21	410+60.46	LT	A	24	15	21
6	P&P SHEET 3 OF 21	411+26.48	LT	A	24	15	21
7	P&P SHEET 4 OF 21	417+99.53	LT	A	24	30	22
8	P&P SHEET 4 OF 21	420+44.52	RT	A	16	25	26
9	P&P SHEET 6 OF 21	444+32.51	LT	A	32	30	23
10	P&P SHEET 6 OF 21	446+85.88	RT	A	25	30	24
11	P&P SHEET 9 OF 21	480+42.13	LT	A	26	30	35
12	P&P SHEET 10 OF 21	489+88.86	RT	B	30	30	33
13	P&P SHEET 15 OF 21	552+69.45	LT	B	24	30	34

(1) *DRIVEWAYS SHALL HAVE IDENTICAL LEFT AND RIGHT RADII.*

(2) *MATCH THE EXISTING DRIVEWAY GRADE TO THE GREATEST DEGREE POSSIBLE WITHOUT EXCEEDING AN 8% MAXIMUM GRADE. TAKE SPECIAL CARE TO MINIMIZE FILL AT THE DRIVEWAY LOW POINT.*

(3) *ENSURE THAT THE DRIVAWAY LOW POINT IS AT LEAST 2" BELOW THE EDGE OF ROW ELEVATION OR EDGE OF PAVEMENT ELEVATION, WHICHEVER IS LOWER. THE MAXIMUM GRADE MAY BE EXCEDED TO ACHIEVE THIS REQUIREMENT WITH THE APPROVAL OF THE ENGINEER.*

(4) *WHEN APPROVED BY THE ENGINEER, REDUCE THE COVER OVER THE PIPE TO AS LITTLE AS 6" TO REDUCE THE REQUIRED GRADING.*

GENERAL NOTES:

1. SEE THE DRIVEWAY SUMMARY FOR DRIVEWAY PAY ITEMS AND QUANTITIES.

STATE OF TEXAS
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05/24/2022

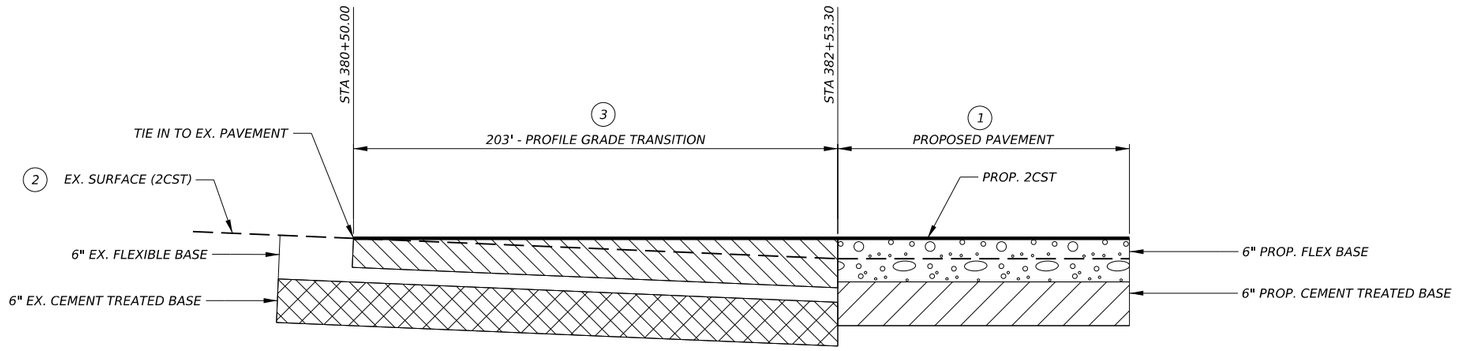
DRIVEWAY DETAILS

 Texas Department of Transportation

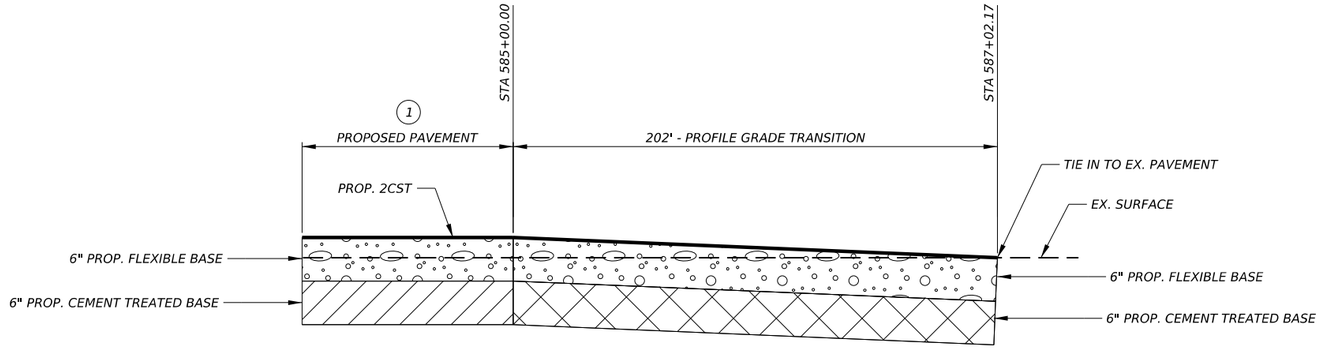
NOT TO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		104
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/3. Roadway/DRIVEWAY DETAILS.dgn
DATE: 5/24/2022 1:27:43 PM



PROFILE GRADE TRANSITION TY A



PROFILE GRADE TRANSITION TY B

PROP. FLEXIBLE BASE

PROP. FLEXIBLE BASE - SEE NOTE 3

PROP. REWORK BASE TY C

PROP. REWORK BASE TY B

EX. CEMENT TREATED BASE

1. *SEE PROPOSED TYPICAL SECTIONS FOR FURTHER INFORMATION.*
2. *WEST OF STA 382+53.3, THE PAVEMENT CONSISTS OF 6" CEMENT TREATED BASE, 6" FLEXIBLE BASE, AND A TWO COURSE SURFACE TREATMENT.*
3. *UNIFORMLY CUT AND REMOVE EXISTING MATERIAL 4" BELOW THE EX. ROADWAY SURFACE. PLACE FLEXIBLE BASE (TY A GR 1-2), WITH DEPTH VARYING BETWEEN 4" AND 7", TO ACHIEVE A UNIFORM PROFILE GRADE TRANSITION. THIS WORK SHALL BE PAID FOR AS REWORK BASE TY C (7").*

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TRANSITION DETAILS

Texas Department of Transportation

NOT TO SCALE

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		105
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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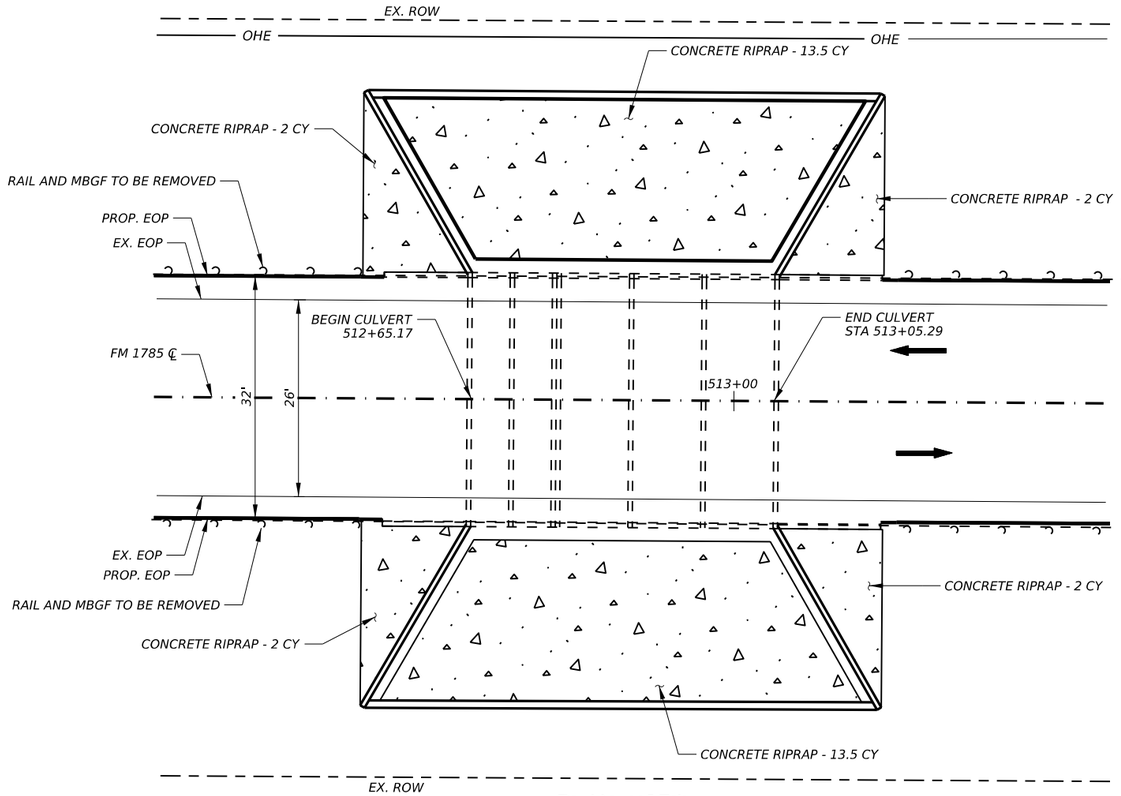
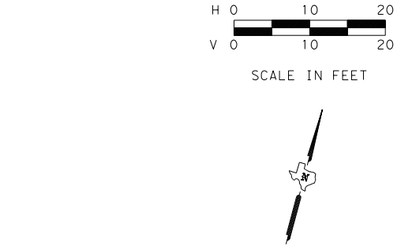
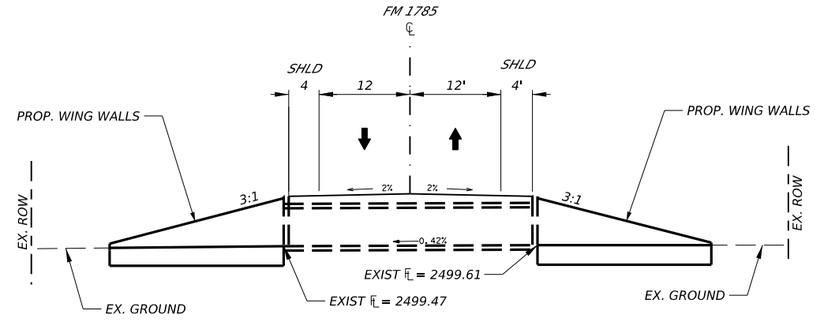


PLAN VIEW



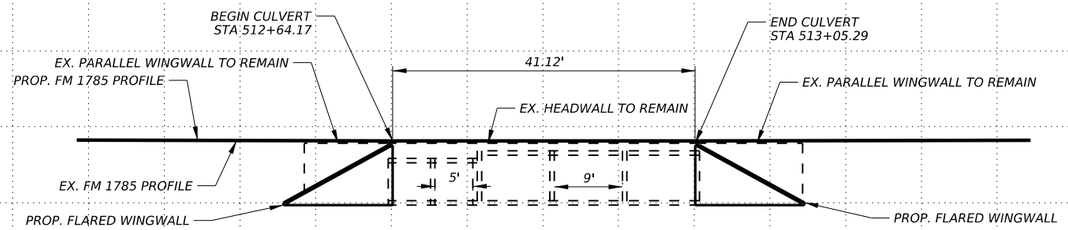
NOTES

1. EXISTING HEADWALLS AND PARALLEL WINGWALLS ARE TO REMAIN. BACKFILL AND CONSTRUCT RIPRAP BETWEEN THE EXISTING AND PROPOSED WINGWALLS.
2. CONSTRUCT WING WALLS AND PIPE RUNNERS IN ACCORDANCE WITH SETBR (MOD) AND SETB-FW-0.
3. REFER TO THE PLAN AND PROFILE SHEETS FOR EXISTING AND PROPOSED PROFILE GEOMETRY AND DETAILS.



TRANSVERSE VIEW

NOT TO SCALE



STA 512+64.17 TO STA 513+05.29

EXISTING 2 - 5'X 5'X 32' AND 3 - 9'X 6'X 32' BOX CULVERTS
PROPOSED TY 1 SET WITH 30° FLARED WINGWALLS

ELEVATION VIEW

ITEM	DESCRIPTION	QUANTITY	UNIT
429	CONC STR REPAIR (VERTICAL & OVERHEAD)	50	SF
432	RIPRAP (CONC)(4 IN)	35	CY
467	SET (TY I)(S= 5 FT)(HW= 8 FT)(3:1) (C)	4	EA
467	SET (TY I)(S= 9 FT)(HW= 8 FT)(3:1) (C)	6	EA
480	CLEAN EXIST CULVERTS	5	EA
496	REMOVE STR (RAIL)	130	LF
542	REMOVE METAL BEAM GUARD FENCE	242	LF
542	REMOVE TERMINAL ANCHOR SECTION	4	EA

EXISTING NBI # 08-017-0-1155-04-006
PROPOSED NBI # 08-017-0-1155-04-006
DESIGN SPEED = 50 MPH
CURRENT ATD (2020) = 272 VPD
FUNCTIONAL CLASS = MAJOR COLLECTOR
TERRAIN = ROLLING

STATE OF TEXAS
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05/26/2022

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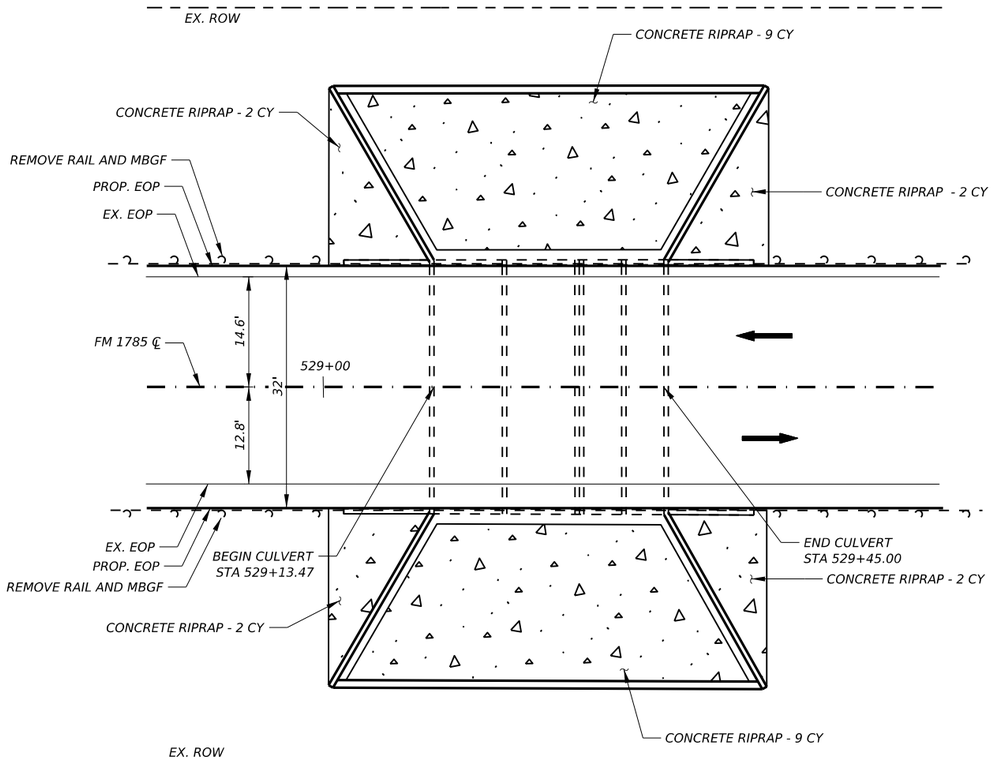
BRIDGE CLASS CULVERT LAYOUT

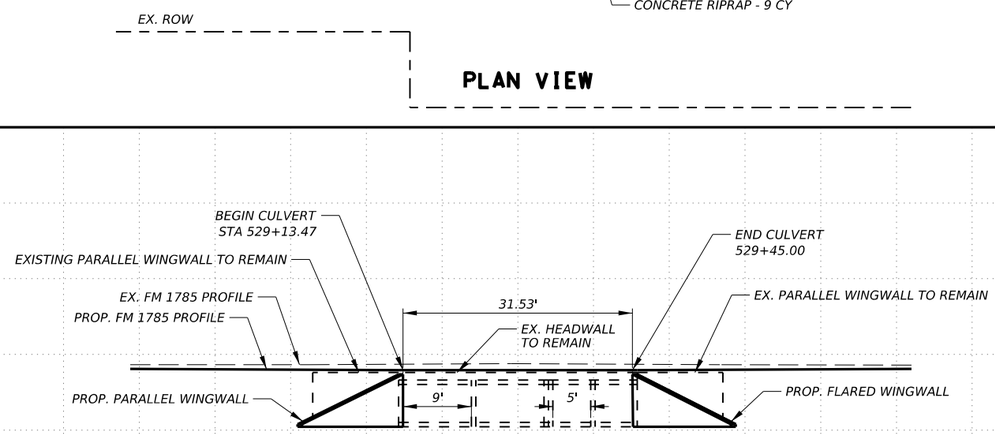
Texas Department of Transportation

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		106
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



PLAN VIEW

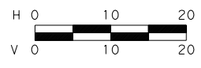


STA 529+13.47 TO STA 529+45.00

EXISTING 2 - 5'X 5'X 32' AND 2 - 9'X 5'X 32' BOX CULVERTS
PROPOSED TY 1 SET WITH 30° FLARED WINGWALLS

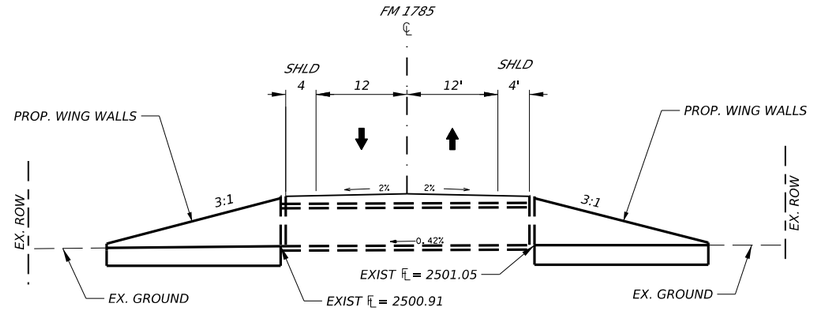
ELEVATION VIEW

ITEM	DESCRIPTION	QUANTITY	UNIT
429	CONC STR REPAIR (VERTICAL & OVERHEAD)	50	SF
432	RIPRAP (CONC)(4 IN)	26	CY
467	SET (TY I)(S= 5 FT)(HW= 7 FT)(3:1) (C)	4	EA
467	SET (TY I)(S= 9 FT)(HW= 7 FT)(3:1) (C)	4	EA
480	CLEAN EXIST CULVERTS	4	EA
496	REMOVE STR (RAIL)	110	LF
542	REMOVE METAL BEAM GUARD FENCE	242	LF
542	REMOVE TERMINAL ANCHOR SECTION	4	EA



NOTES

1. *EXISTING HEADWALLS AND PARALLEL WINGWALLS ARE TO REMAIN. BACKFILL AND CONSTRUCT RIPRAP BETWEEN THE EXISTING AND PROPOSED WINGWALLS.*
2. *CONSTRUCT WING WALLS AND PIPE RUNNERS IN ACCORDANCE WITH SETBR (MOD) AND SETB-FW-0.*
3. *REFER TO THE PLAN AND PROFILE SHEETS FOR EXISTING AND PROPOSED PROFILE GEOMETRY AND DETAILS.*



TRANSVERSE VIEW

NOT TO SCALE

EXISTING NBI # 08-017-0-1155-04-007
PROPOSED NBI # 08-017-0-1155-04-007
DESIGN SPEED = 50 MPH
CURRENT ATD (2020) = 272 VPD
FUNCTIONAL CLASS = MAJOR COLLECTOR
TERRAIN = ROLLING

STATE OF TEXAS
BRYCE M. TURENTINE
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LICENSED PROFESSIONAL ENGINEER

05/26/2022

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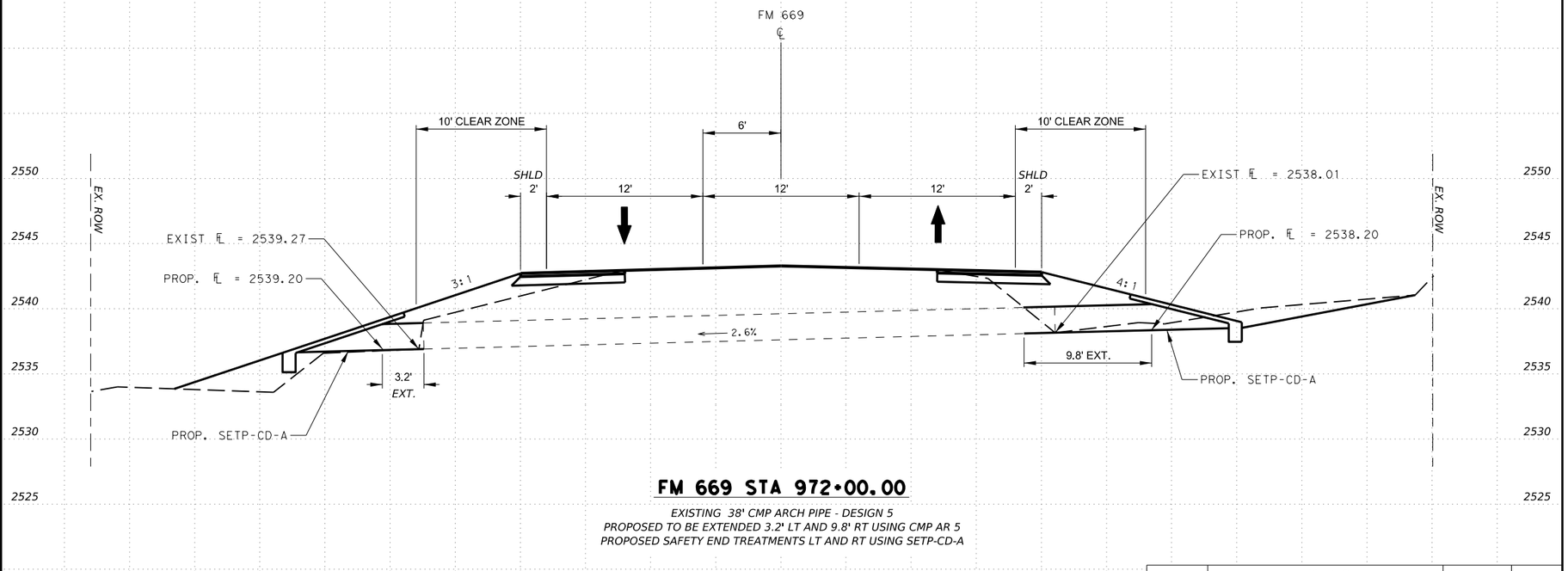
BRIDGE CLASS CULVERT LAYOUT

Texas Department of Transportation

SCALE: 1" = 20' SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		107
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



FM 669 STA 972+00.00

EXISTING 38" CMP ARCH PIPE - DESIGN 5
PROPOSED TO BE EXTENDED 3.2' LT AND 9.8' RT USING CMP AR 5
PROPOSED SAFETY END TREATMENTS LT AND RT USING SETP-CD-A

ITEM	DESCRIPTION	QUANTITY	UNIT
460	CMP AR (GAL STL DES 5)	13	LF
467	SET (TY II) (DES 5) (CMP) (3:1) (C)	1	EA
467	SET (TY II) (DES 5) (CMP) (4:1) (C)	1	EA
480	CLEAN EXIST CULVERTS	1	EA

NO WORK THIS HALF-GRID

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06/03/2022

CROSS SECTIONS AT CULVERT SITES

Texas Department of Transportation

SCALE: 1" = 10' SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		108
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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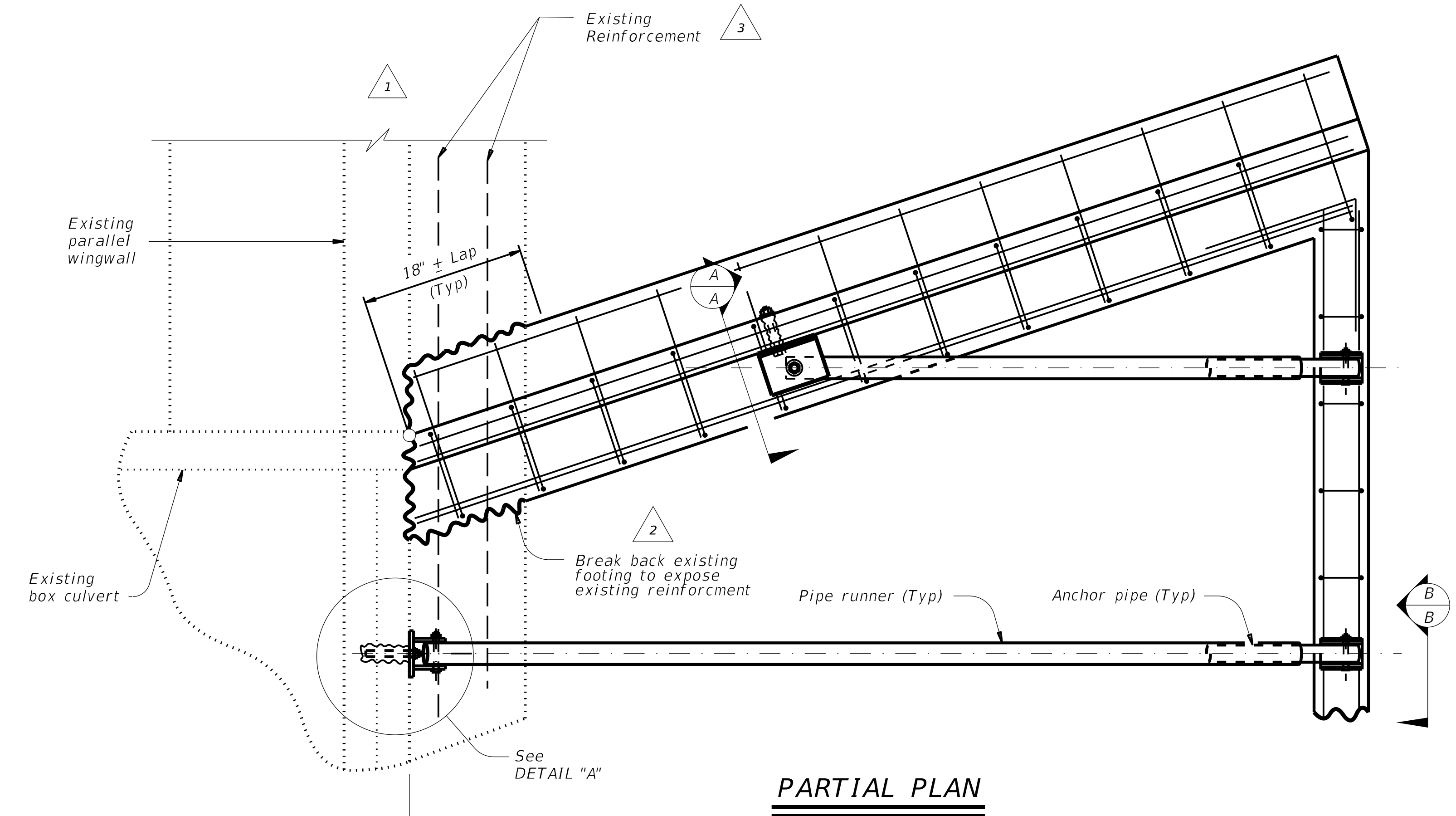
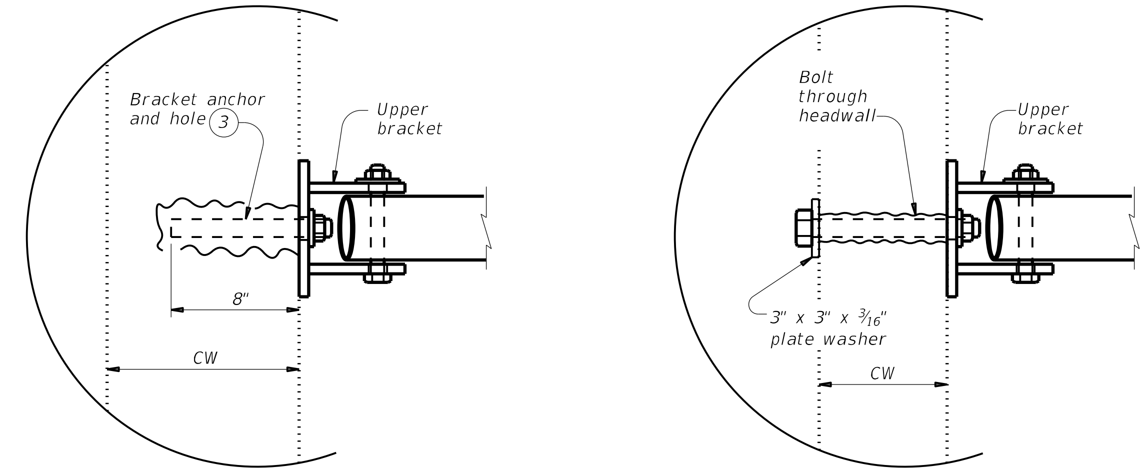


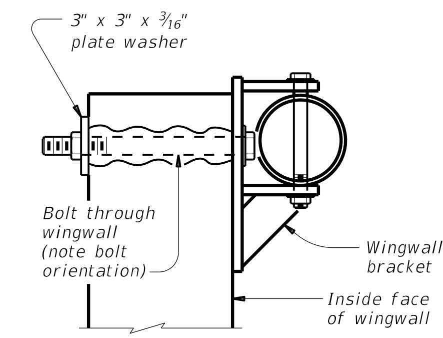
PARTIAL PLAN



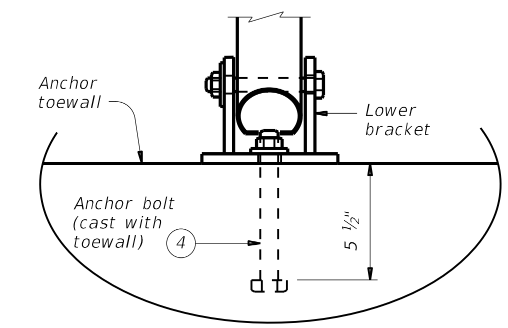
For CW greater than 8"

For CW 8" and less

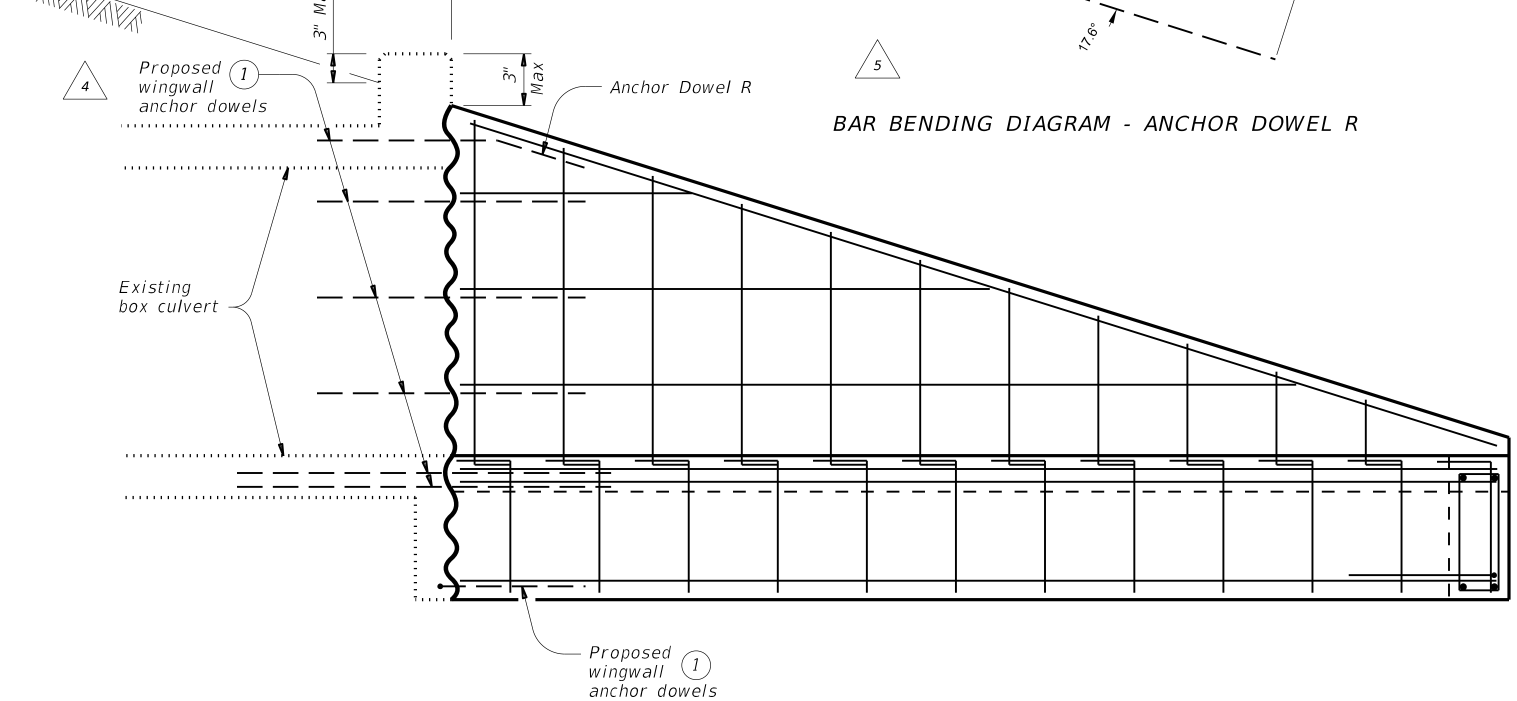
DETAIL "A"



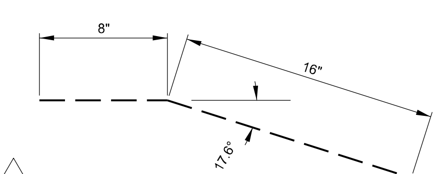
SECTION A-A



SECTION B-B



ELEVATION



BAR BENDING DIAGRAM - ANCHOR DOWEL R

(1) Drill and embed dowels to lap with the proposed wing wall reinforcing. The Engineer may require additional dowels other than those shown on this sheet. All dowels must be #5 x 2'-0". Embed wingwall anchor dowels into existing box culvert using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8".

(2) For vehicle safety, reduce curb height, if necessary to provide a maximum 3" projection above finished grade. No quantity changes or additional compensation will be allowed for this work.

(3) Provide 3/4" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rod with one hex head nut and one hardened steel washer. Embed threaded rods into curb, wingwall, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

(4) At Contractor's option, adhesive anchors may be used. Provide 3/4" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

MATERIAL NOTES:

Install epoxy adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing epoxy, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Anchorage bars or bolts must be clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

Use these details in conjunction with the SETB standard sheets.
Shorten reinforcing Bars D, M, P, and R when utilizing existing reinforcing, as shown. If required, add dowels to lap with new reinforcing, as shown. No increase or decrease to the pay quantities is permitted for these adjustments in the reinforcing steel or concrete quantities.

STATE OF TEXAS
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05/24/2022

SHEET MODIFICATIONS	
1	SHOW EXISTING PARALLEL WINGWALL AND FOOTING
2	SHOW ADDITIONAL CONCRETE TO BE BROKEN BACK
3	SHOW EXISTING FOOTING REINFORCEMENT
4	CHANGED "EXISTING WINGWALL REINFORCING" TO "PROPOSED WINGWALL ANCHOR DOWELS"
5	ADDED SEPERATE LABEL AND BAR BENDING DIAGRAM FOR "ANCHOR DOWEL R"
6	CHANGED THE NOTES TO REFLECT THE DIFFERENCES IN THE IN-SITU CONDITIONS AND THE CHANGES IN THE REQUIRED WORK.

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

RETROFIT DETAILS FOR EXISTING BOX CULVERTS

SETBR (MOD)

FILE: setbrste-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	109

DATE: 5/24/2022 4:47:15 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155041013/4 Design/Plan Set/5 Drainage/setbrste-20 (MOD).dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
AT DRAW - STA 512+64.17 (BOTH)	2 ~ 5' X 5'	A	MC-5-20	SETB-FW-0	0	3:1	8"	7"	2.083	7.500	21.500	12.413	24.826	N/A	64.827	27	N/A	30.0	N/A
	3 ~ 9' X 6'	B	MC-9-10				9"		1.000										
AT DRAW - STA 529+13.47 (BOTH)	2 ~ 5' X 5'	A	MC-5-20	SETB-FW-0	0	3:1	8"	7"	1.083	6.500	18.500	10.681	21.362	N/A	51.779	18	N/A	23.2	N/A
	2 ~ 9' X 5'	B	MC-9-10				9"		1.000										

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.

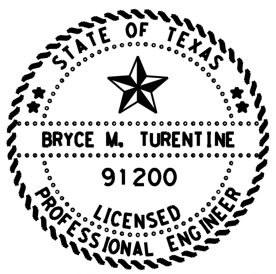
(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(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.



P.E.
05/24/2022

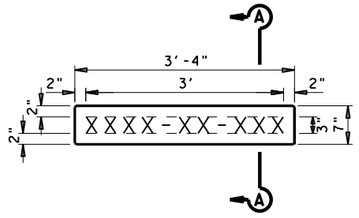
Texas Department of Transportation
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS	DIST ABL	COUNTY BORDEN		SHEET NO. 110

STRUCTURE ID TEMPLATES

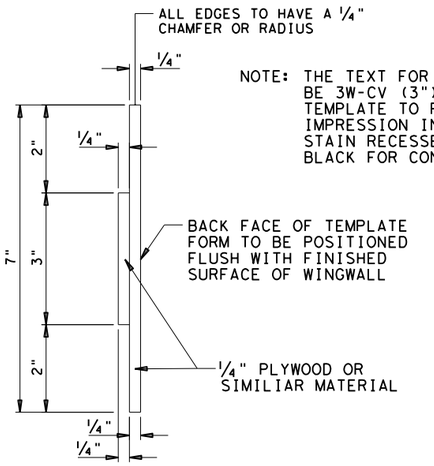


NOTE: THE SYMBOLS XXXX-XX-XXX REPRESENT THE STRUCTURE NUMBER WHICH IS SHOWN IN THE TABLE TO THE RIGHT.

ALL CHARACTERS ARE REQUIRED, AND ARE TO BE FORMATTED EXACTLY AS SHOWN IN THE STRUCTURE NUMBER COLUMN TO THE RIGHT.

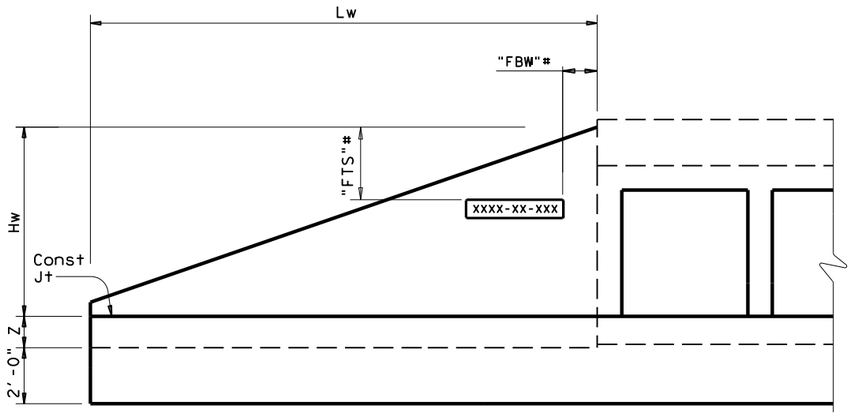
STRUCTURE ID TEMPLATE NUMBERS						
NBI NUMBER	LOCATION	STRUCTURE NUMBER	"Lw"	"Hw"	"FBW"#	"FTS"#
08-017-0-1155-04-006	STA 512+64.17 AT DRAW	1155-04-006	24.826'	7.5'	2' 6"	3' 5"
08-017-0-1155-04-007	STA 529+13.47 AT DRAW	1155-04-007	21.362'	6.5'	2' 6"	3' 5"

FIELD LOCATE TO AVOID CONFLICT WITH REINFORCEMENT AND RIPRAP. THE ENGINEER SHALL APPROVE INSTALLATION LOCATION PRIOR TO PLACEMENT.

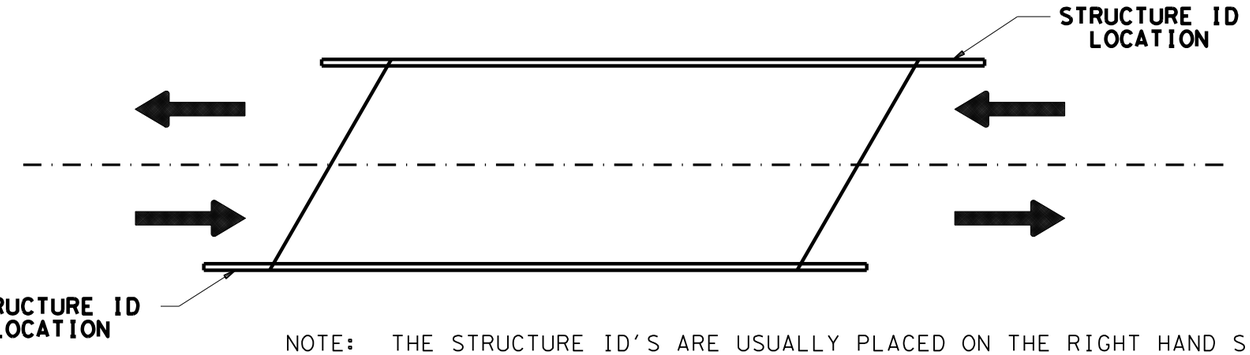


NOTE: THE TEXT FOR ALL TEMPLATES SHOULD BE 3W-CV (3") CLEAR VIEW FONT. TEMPLATE TO PROVIDE A RECESSED IMPRESSION INTO CAST CONCRETE. STAIN RECESSED NUMERAL SURFACES BLACK FOR CONTRAST.

SECTION A-A



FLARED WING ELEVATION



NOTE: THE STRUCTURE ID'S ARE USUALLY PLACED ON THE RIGHT HAND SIDE OF APPROACHES. THIS PLACES THE ID'S ON DIAGONAL CORNERS. THE STRUCTURE ID'S WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BRIDGE ITEMS.

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED PROFESSIONAL ENGINEER

P.E.

05/24/2022

STRUCTURE ID DETAILS
SIDD-14

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		111
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

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

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

TABLE OF WING WALL REINFORCING (Two~Wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

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

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

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

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

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

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

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

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

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

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

TABLE OF MAXIMUM WING HEIGHTS (9)

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

WING DIMENSION CALCULATIONS:

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

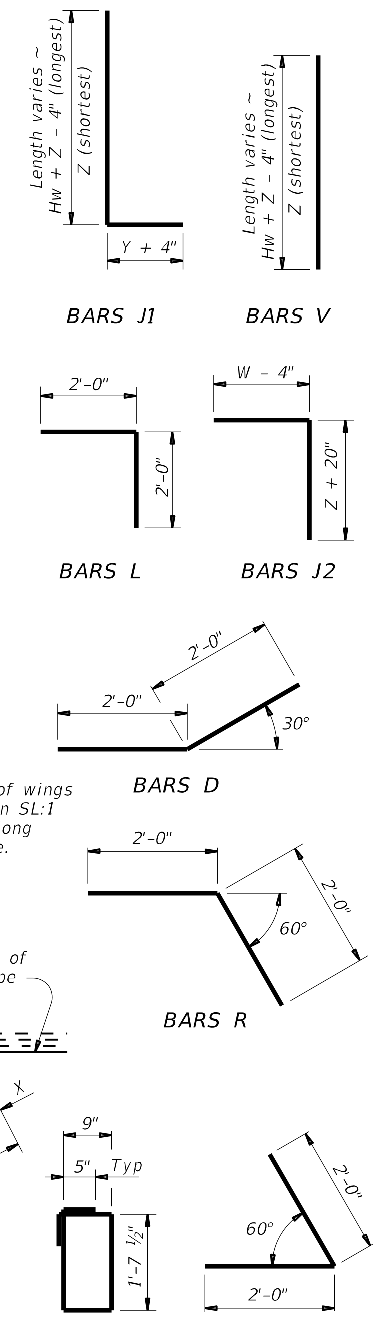
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

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

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

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

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



MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

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

Provide Class "C" concrete (f`c = 3,600 psi).

Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".

Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Provide ASTM A36 steel plates.

Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".

For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

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

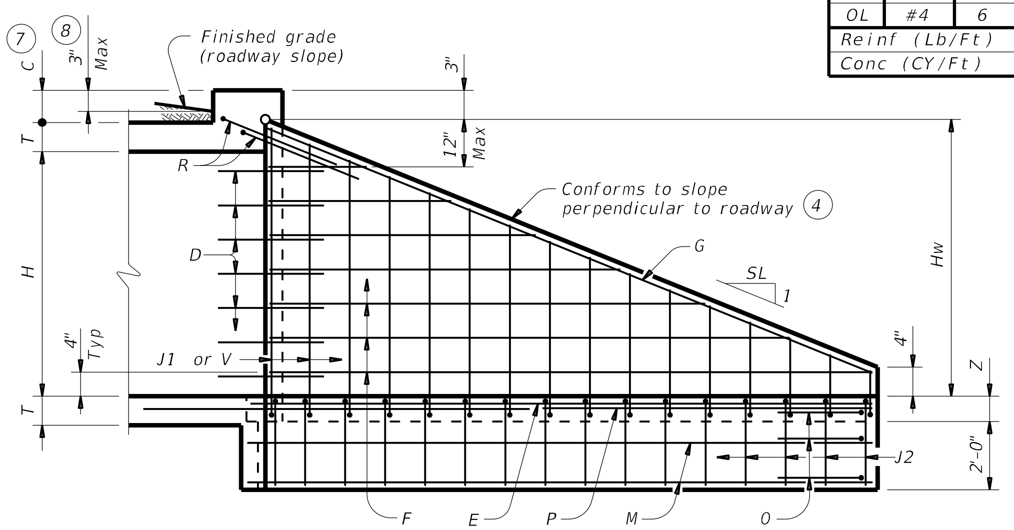
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.

All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.

The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.

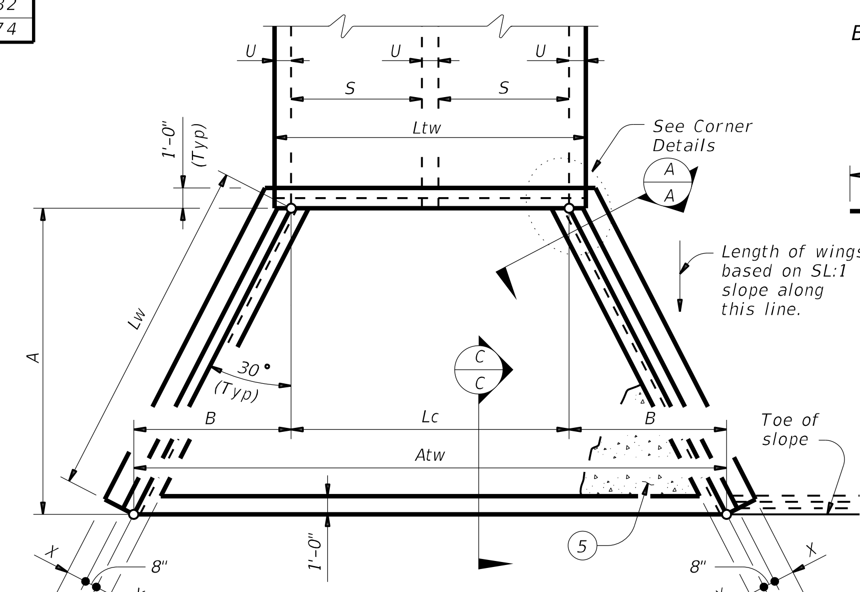
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

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



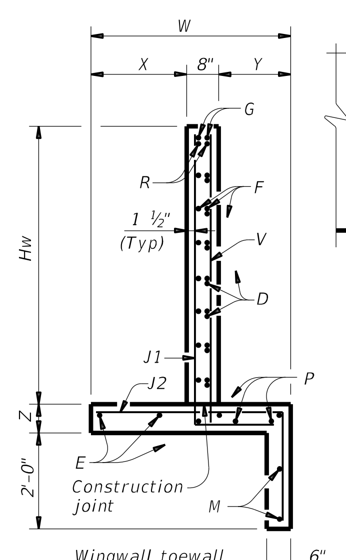
INSIDE ELEVATION OF WINGWALL

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

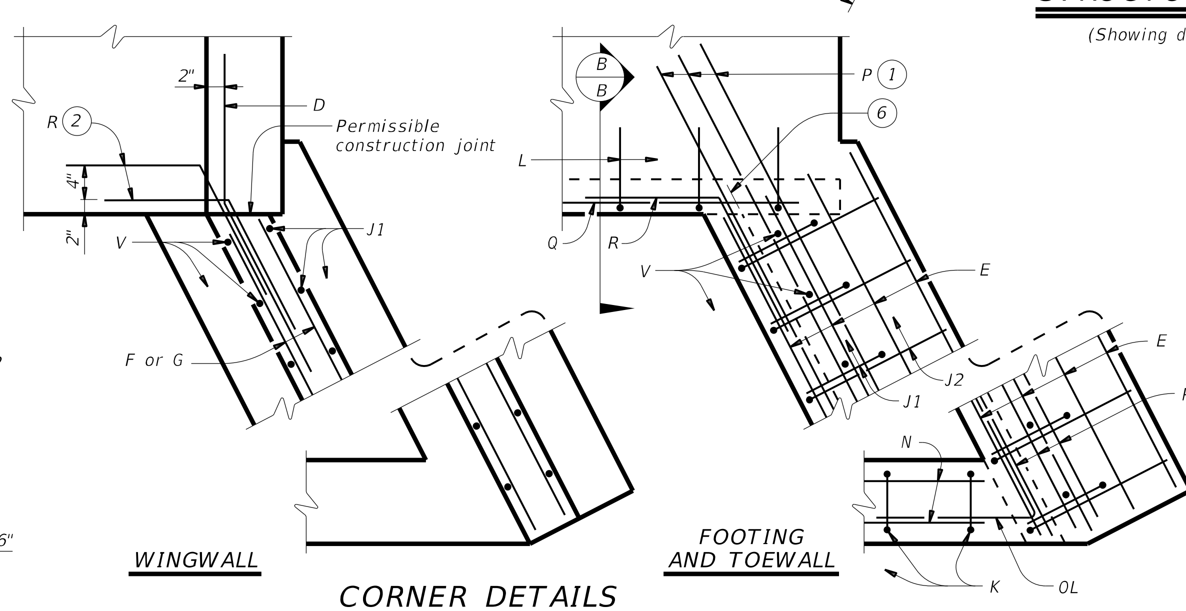


STRUCTURAL PLAN

(Showing dimensions.)



SECTION A-A

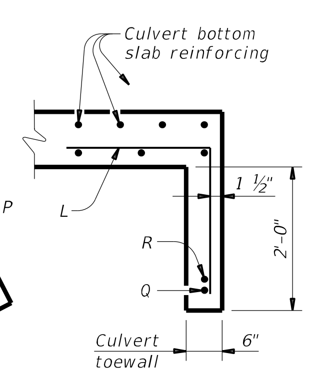


WINGWALL

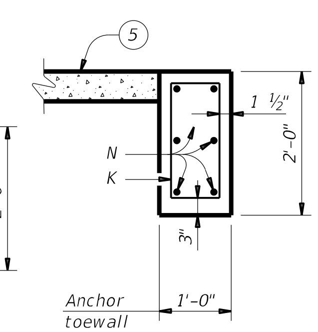
CORNER DETAILS

FOOTING AND TOEWALL

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



SECTION B-B (5)



SECTION C-C

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	112

DATE: 5/25/2022 1:35:20 PM
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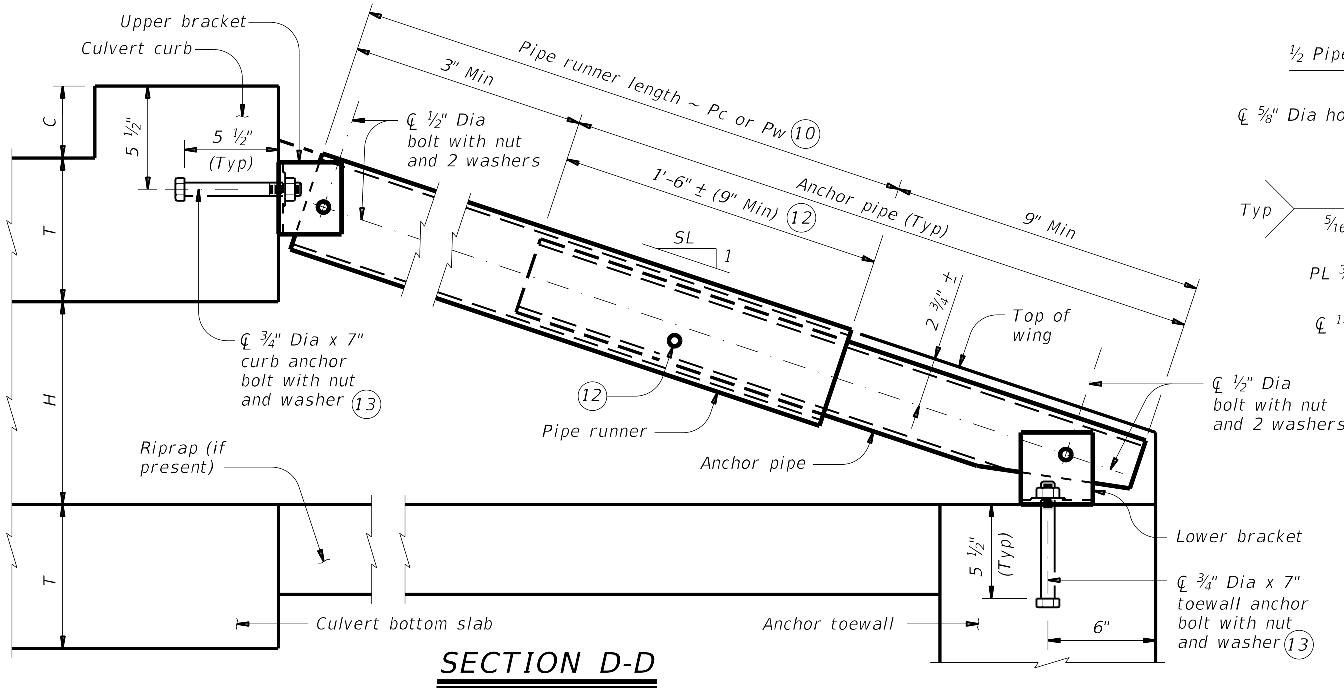
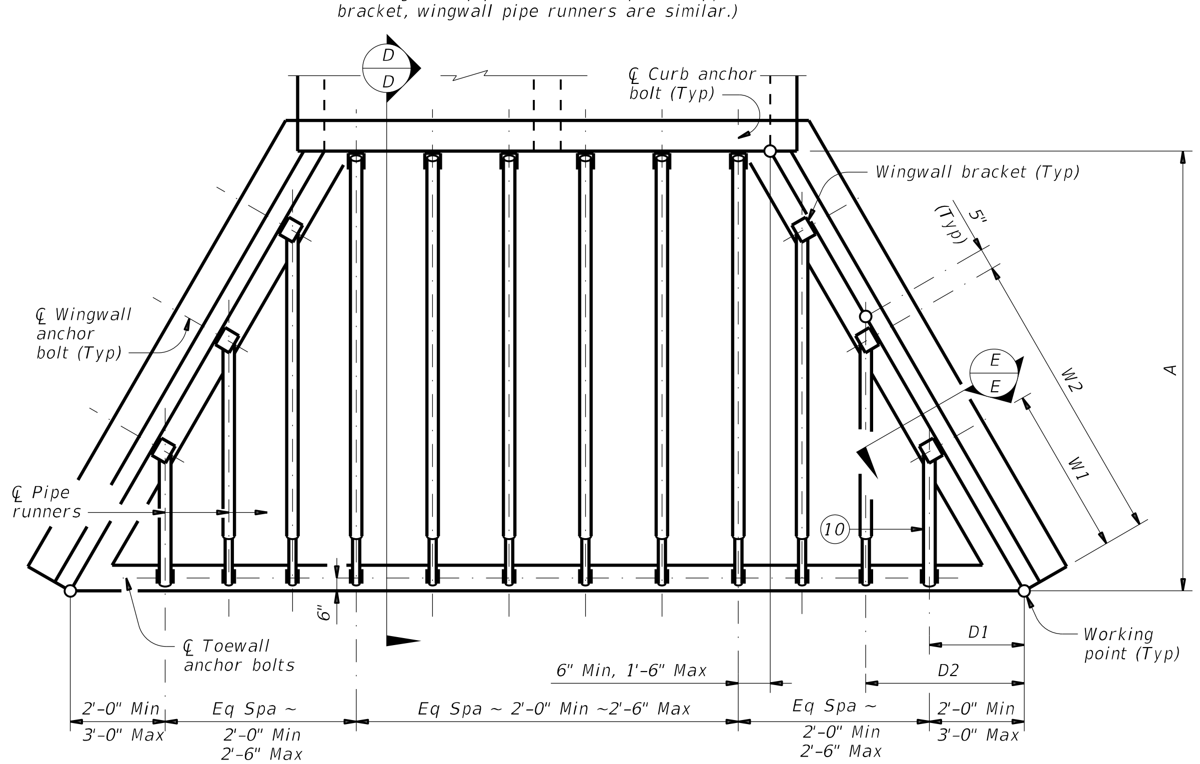
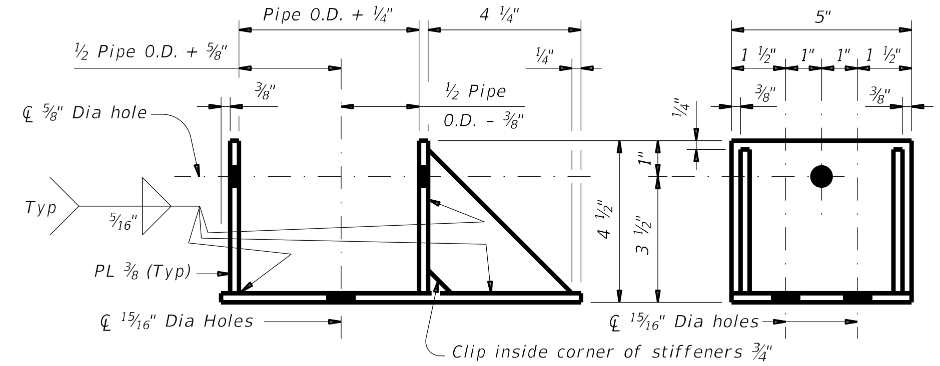


SECTION D-D

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

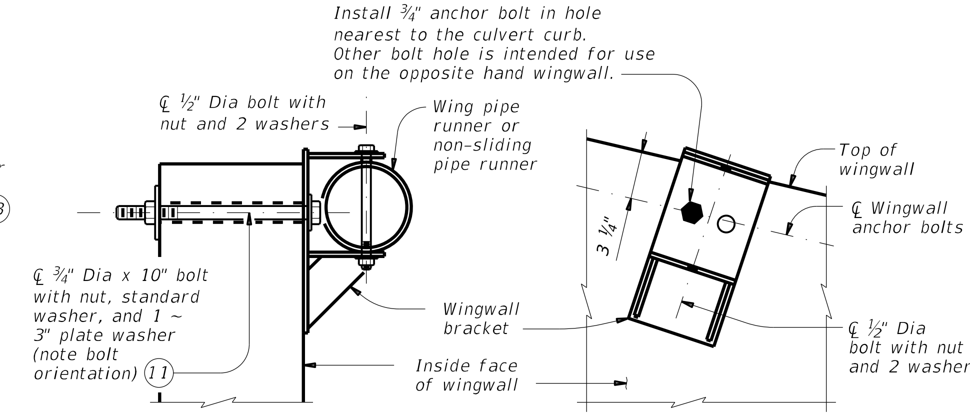


PIPE RUNNER PLAN



ELEVATION

SIDE VIEW



SECTION E-E

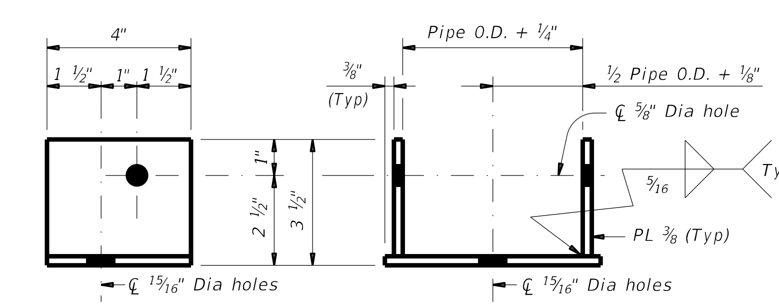
(Showing installed bracket.)

ELEVATION

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

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

WINGWALL BRACKET DETAILS

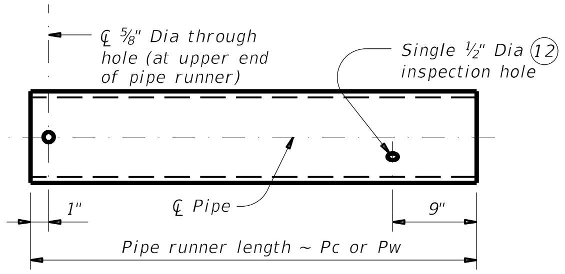


SIDE VIEW

ELEVATION

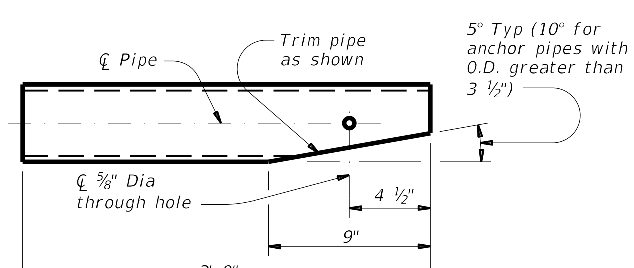
Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

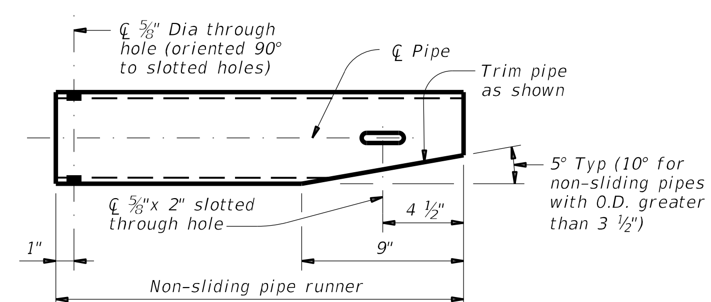


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



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

NON-SLIDING PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

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

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

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

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

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

PIPE RUNNER DIMENSION CALCULATIONS:

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

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

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

n = Wing pipe runner number

SHEET 2 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

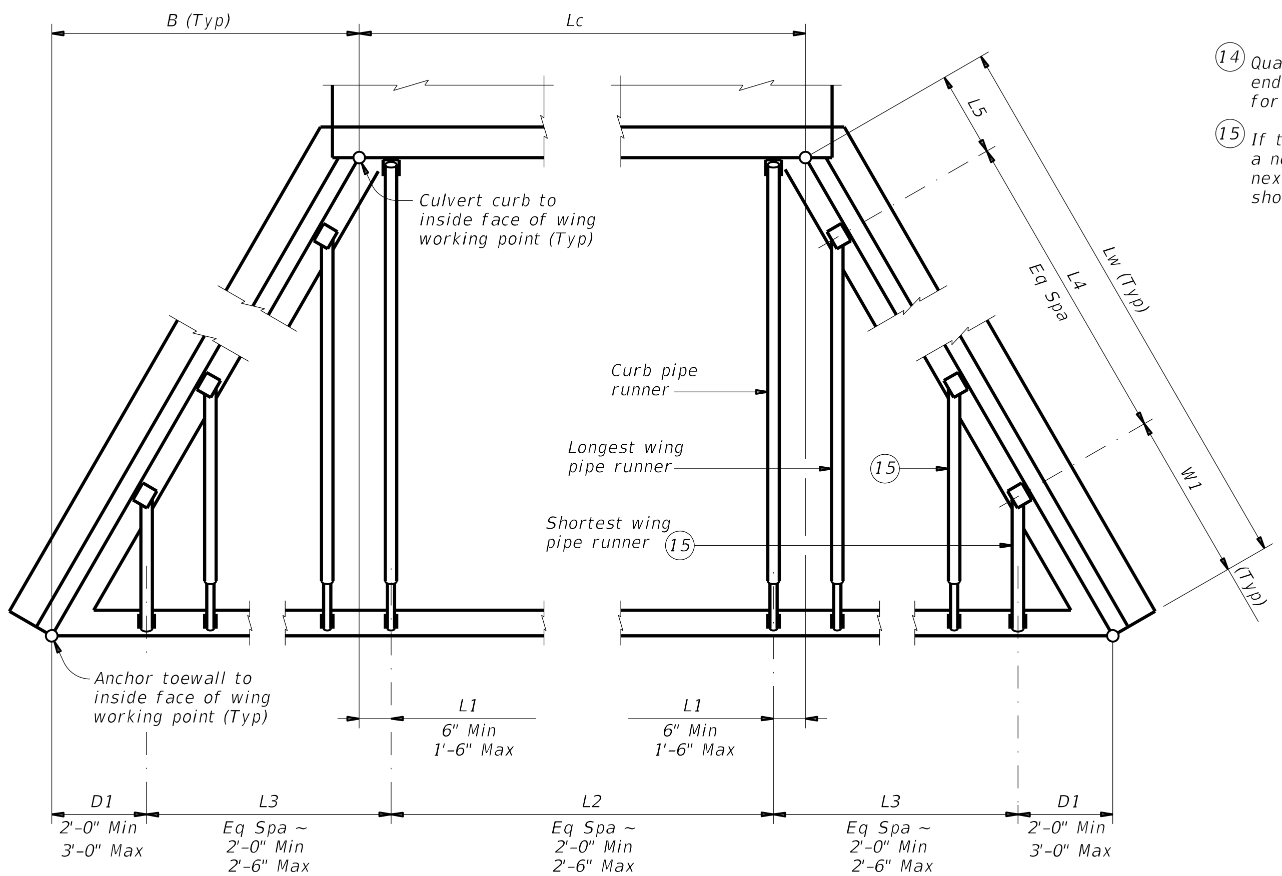
FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS	DIST ABL	COUNTY BORDEN		SHEET NO. 113

DATE: 5/25/2022 1:35:21 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040113/4 Design/Plan Sets/5 Drainage/setbf0se-20.dgn

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
	(Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No.	Length (Ft)	(Ft)	(Ft)	(Ft)	Size (3",4" or 5")	Total (14) Length (Ft)	Size (2",3" or 4")	Total (14) Length (Ft)
AT DRAW - STA 512+64.17	40.000	0.500	16	2.438	39.000	3.000	4	2.478	9.913	5.583	3	4.957	14.870	4.374	17	20.979	17.000	3.415	N/A	5"	877	4"	150
AT DRAW - STA 529+13.47	30.417	0.500	12	2.451	29.417	3.000	4	2.045	8.181	5.583	3	4.091	12.272	3.508	13	17.812	14.625	3.415	N/A	4"	608	3"	126



PIPE RUNNER LAYOUT

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

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

SPECIAL NOTE:

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

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

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

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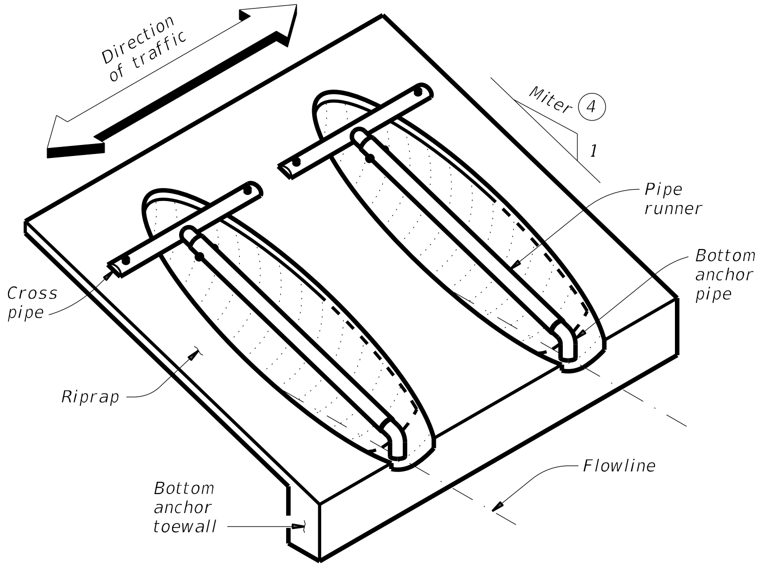
Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

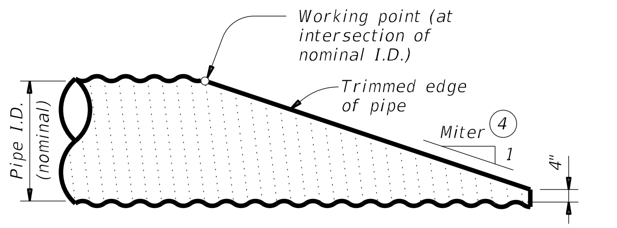
SETB-FW-0

FILE: setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		114



ISOMETRIC VIEW OF TYPICAL INSTALLATION

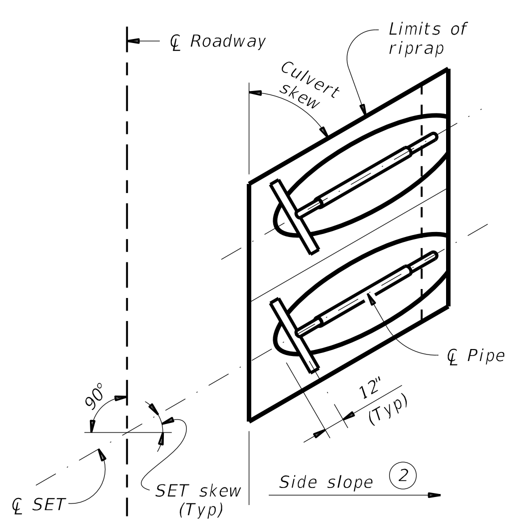
(Showing installation with no skew.)



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

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



PLAN OF SKEWED INSTALLATION

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (3)

Corrugated Metal Pipe (CMP) Culverts

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	17"	13"	1' - 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	21"	15"	1' - 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28"	20"	1' - 5"	3' - 9"	N/A	N/A	3' - 5"	4' - 7"	N/A	N/A	4' - 11"	6' - 5"	N/A	N/A	7' - 11"	10' - 2"
4	35"	24"	1' - 8"	4' - 4"	3' - 10"	4' - 0"	4' - 7"	6' - 0"	5' - 5"	5' - 8"	6' - 6"	8' - 4"	8' - 8"	9' - 1"	10' - 3"	12' - 11"
5	42"	29"	1' - 11"	4' - 11"	5' - 1"	5' - 4"	6' - 1"	7' - 10"	7' - 2"	7' - 5"	8' - 6"	10' - 9"	11' - 2"	11' - 8"	13' - 2"	16' - 6"
6	49"	33"	2' - 2"	5' - 6"	6' - 2"	6' - 5"	7' - 4"	N/A	8' - 6"	8' - 10"	10' - 0"	N/A	13' - 3"	13' - 9"	15' - 6"	N/A
7	57"	38"	2' - 5"	6' - 2"	7' - 6"	7' - 9"	N/A	N/A	10' - 2"	10' - 7"	N/A	N/A	15' - 9"	16' - 4"	N/A	N/A

Reinforced Concrete Pipe (RCP) Culverts

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	22"	13 ½"	1' - 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	26"	15 ½"	1' - 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28 ½"	18"	1' - 5"	3' - 9 ½"	N/A	N/A	2' - 10"	3' - 10"	N/A	N/A	4' - 2"	5' - 5"	N/A	N/A	6' - 9"	8' - 9"
4	36 ¼"	22 ½"	1' - 8"	4' - 5 ¼"	3' - 5"	3' - 7"	4' - 2"	5' - 6"	4' - 11"	5' - 1"	5' - 11"	7' - 7"	7' - 11"	8' - 3"	9' - 5"	11' - 11"
5	43 ¾"	26 ⅝"	1' - 11"	4' - 0 ¾"	4' - 6"	4' - 8"	5' - 5"	6' - 11"	6' - 4"	6' - 7"	7' - 6"	9' - 7"	10' - 0"	10' - 5"	11' - 9"	14' - 10"
6	51 ⅛"	31 5⁄16"	2' - 2"	5' - 8"	5' - 9"	6' - 0"	6' - 10"	N/A	7' - 11"	8' - 3"	9' - 4"	N/A	12' - 4"	12' - 10"	14' - 6"	N/A
7	58 ½"	36"	2' - 5"	6' - 3 ½"	6' - 11"	7' - 3"	N/A	N/A	9' - 6"	9' - 11"	N/A	N/A	14' - 9"	15' - 4"	N/A	N/A

TYPICAL PIPE CULVERT MITERS (4)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (3)

Design	Single Pipe Culvert	Multiple Pipe Culverts
1 and 2	Skews thru 45°	Skews thru 45°
3	Skews thru 35°	Skews thru 10°
4	Normal (no skew)	Always required
5 thru 7	Always required	Always required

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

(2) Recommended values of slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

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

For Design 1 through 5 culvert pipe sizes, the skew must not exceed 45°.
For Design 6 culvert pipes, the skew must not exceed 30°.
For Design 7 culvert pipes, the skew must not exceed 15°.

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

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

MATERIAL NOTES:

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

Provide pipe runners, cross pipes, and anchor pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

GENERAL NOTES:

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

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

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.

SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

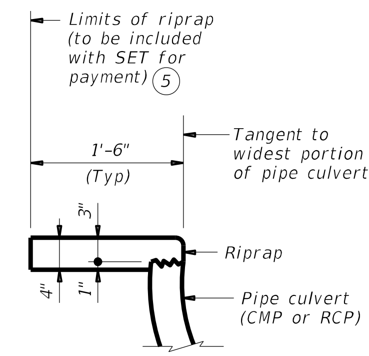
SETP-CD-A

FILE: setpcase-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS	DIST ABL	COUNTY BORDEN		SHEET NO. 115

DATE: 5/25/2022 1:35:27 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013, 4 Design/Plan Set/5 Drainage/setpcase-20.dgn

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (6)
FOR BOTH CORRUGATED METAL PIPE CULVERTS AND CONCRETE PIPE CULVERTS

Design	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
2	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	1.0
3	0.6	0.6	0.7	0.8	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.2
4	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.4
5	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.7
6	0.9	1.0	1.0	N/A	1.1	1.1	1.2	N/A	1.4	1.5	1.6	N/A
7	1.0	1.1	N/A	N/A	1.3	1.3	N/A	N/A	1.7	1.7	N/A	N/A



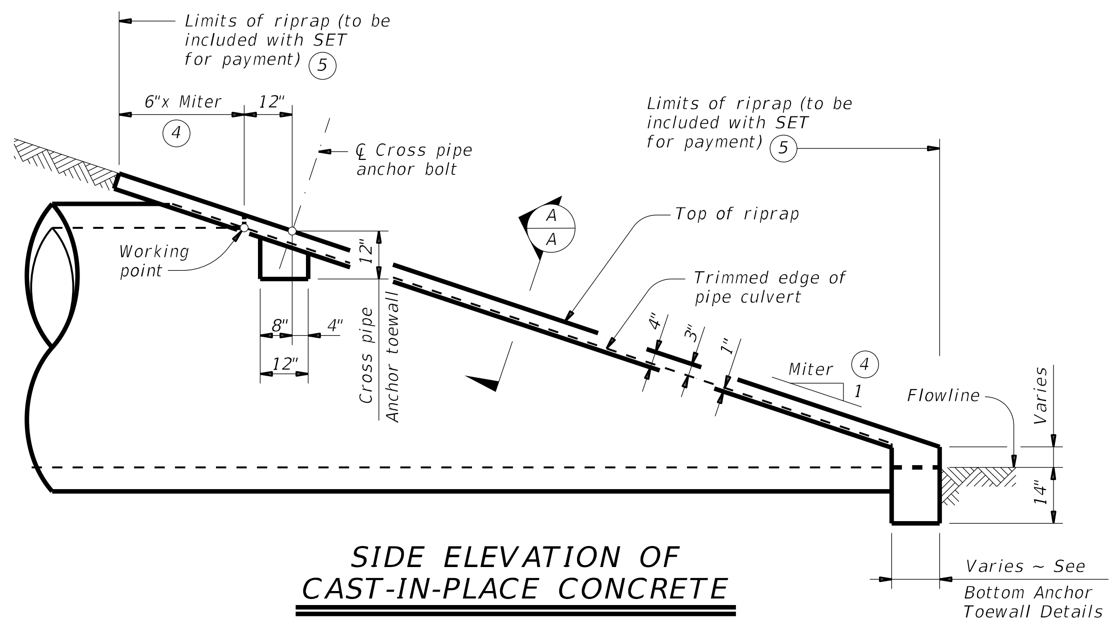
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

(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 pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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

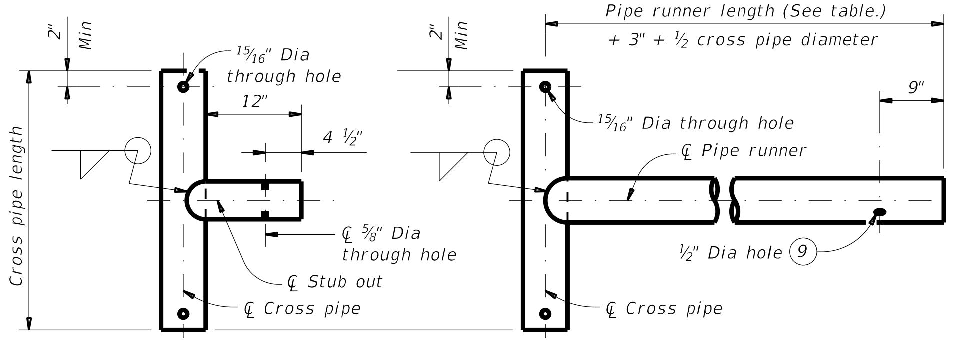
SHEET 2 OF 3

Texas Department of Transportation — Bridge Division Standard

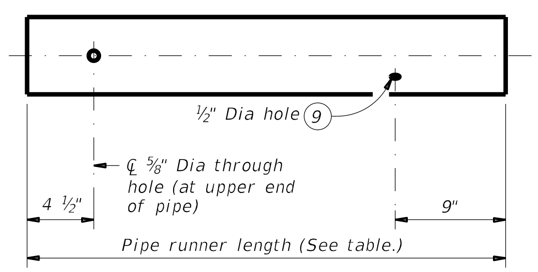
SAFETY END TREATMENT
FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

FILE: setpcase-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS	DIST ABL	COUNTY BORDEN		SHEET NO. 116

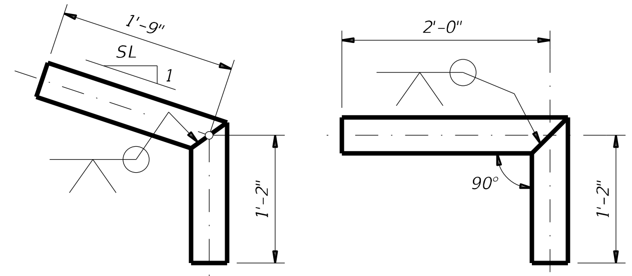


CROSS PIPE AND CONNECTIONS DETAILS

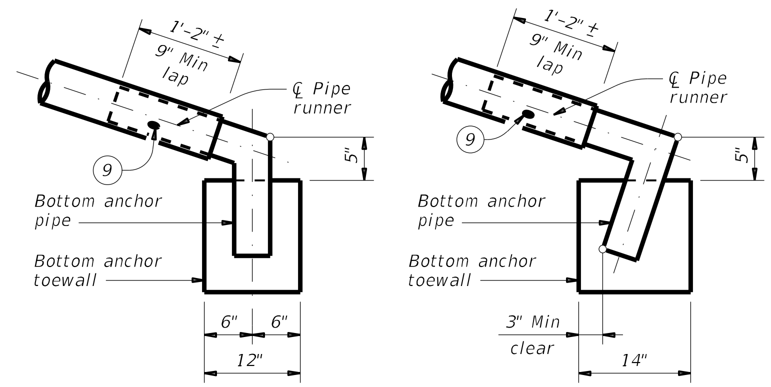


NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

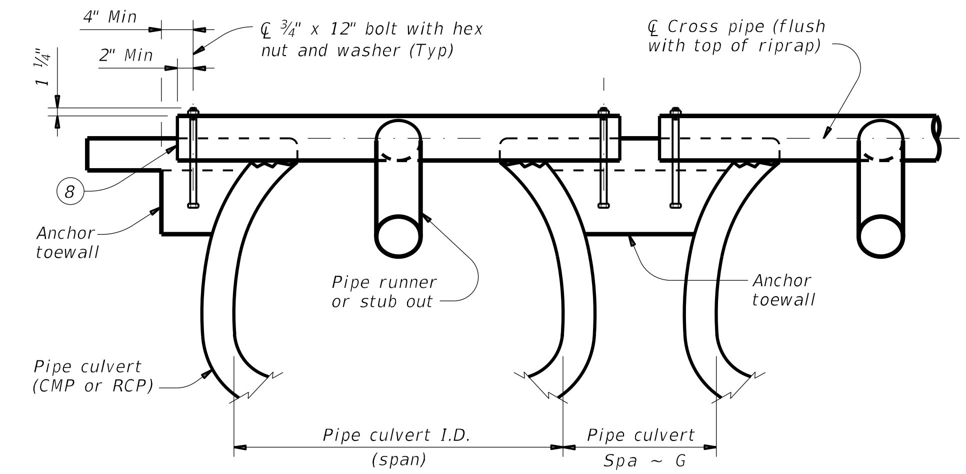


BOTTOM ANCHOR PIPE DETAILS (10)



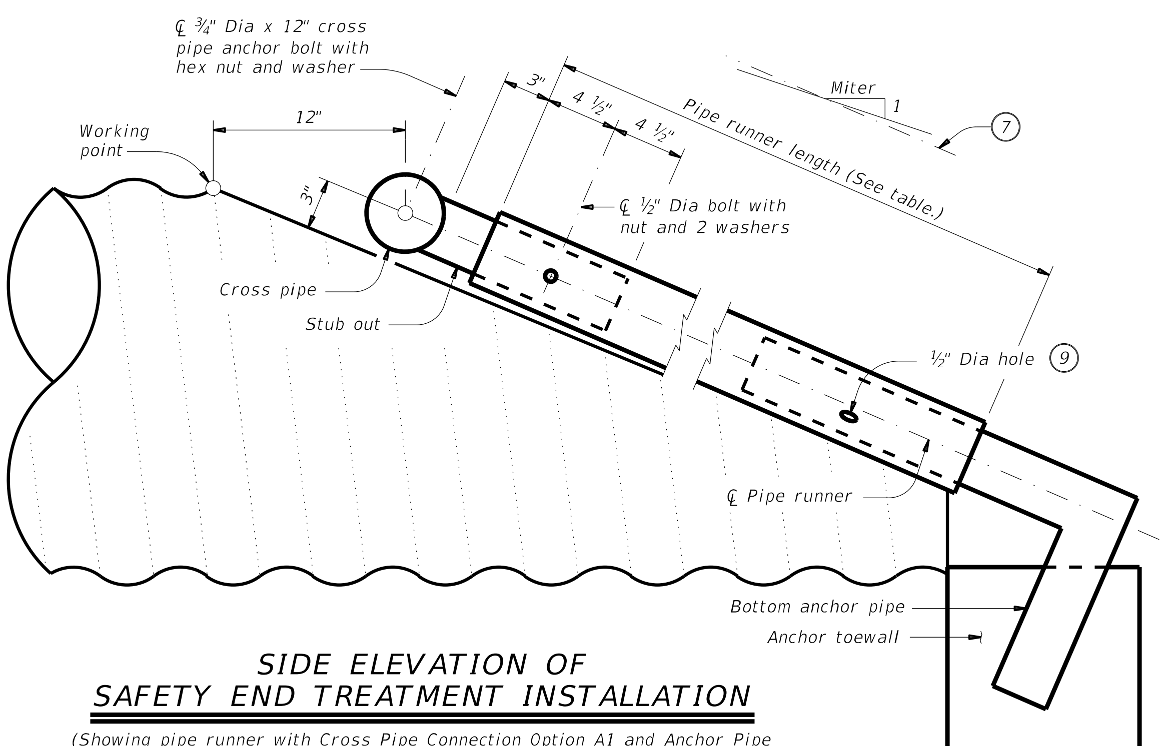
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL

SECTION A-A



SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1#2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

SHEET 3 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

FILE: setpcase-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		117

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	1	R12-1T	WEIGHT LIMIT 58420	24 x 36	X		10BWG	1	SA	P		
	2	D20-1TR	CO RD 255 →	24 x 24	X		10BWG	1	SA	P		
	3	W8-18	RD MAY FLOOD	36 x 36	X		10BWG	1	SA	P		
	4	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
	5	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
2	1	W8-18	RD MAY FLOOD	36 x 36	X		10BWG	1	SA	P		
3	1	D20-5TR	CO RD 253 ← 252 →	24 x 42	X		10BWG	1	SA	P		
	2	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
	3	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
	4	D20-5TR	CO RD 252 ← 253 →	24 x 42	X		10BWG	1	SA	P		
5	1	M3-4 M1-6F D10-7aT	WEST FM 1785 RM 312	24 X 12 24 X 24 3 x 10	X		10BWG	1	SA	P		
6	1	W8-13aT	ICE ON BRIDGE	36 x 36	X		10BWG	1	SA	P		
7	1	W8-13aT	ICE ON BRIDGE	36 x 36	X		10BWG	1	SA	P		
8	1	M2-1 M1-6F	JCT FM 669	21 x 15 24 x 24	X		10BWG	1	SA	P		
9	1	R12-1T	WEIGHT LIMIT 58420	24 x 36	X		10BWG	1	SA	P		
	2	D1-2	← Gail Big Spring →	90 x 30	X		S80	1	SA	T		
	3	D2-1	VEALMOOR 5	78 x 18	X		10BWG	1	SA	T		
	4	M3-4 M1-6F	WEST FM 1785	24 x 12 24 x 24	X		10BWG	1	SA			
	5	M1-6F M6-3 M1-6F M6-4	FM 1785 ↑ FM 669 ↔	24 x 24 21 x 15 24 x 24 21 x 15	X		S80	1	SA	U		
	6	M1-6F M6-3 M1-6F M6-4	FM 1785 ↑ FM 669 ↔	24 x 24 24 x 12 24 x 24 21 x 15	X		S80	1	SA	U		
	7	M1-6F M6-3 M1-6F M6-4	FM 669 ↑ FM 1785 ↔	24 x 24 21 x 15 24 x 24 21 x 15	X		S80	1	SA	U		
	8	M1-6F M6-3 M1-6F M6-4	FM 669 ↑ FM 1785 ↔	24 x 24 21 x 15 24 x 24 21 x 15	X		S80	1	SA	U		
10	1	D2-2	GAIL 18 POST 50	54 x 30	X		10BWG	1	SA	P		
	2	D1-1	VEALMOOR →	90 x 18	X		10BWG	1	SA	T		
	3	M3-1 M1-6F	NORTH FM 669	24 X 12 24 x 24	X		10BWG	1	SA	P		
	4	M3-3 M1-6F	SOUTH FM 669	24 X 12 24 x 24	X		10BWG	1	SA	P		
	5	D1-1	← VEALMOOR	90 x 18	X		10BWG	1	SA	T		

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

NOTE:

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

DATE: 5/25/2022 1:35:33 PM
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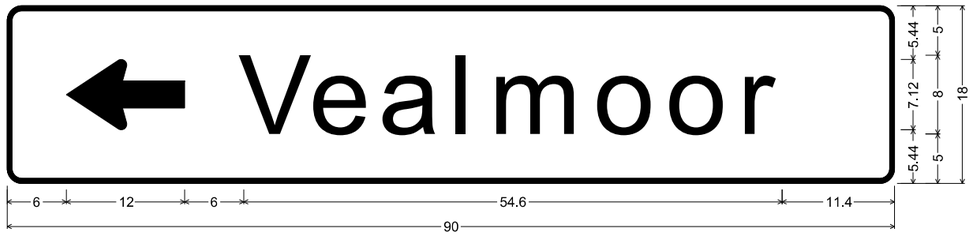
Texas Department of Transportation
Traffic Operations Division Standard

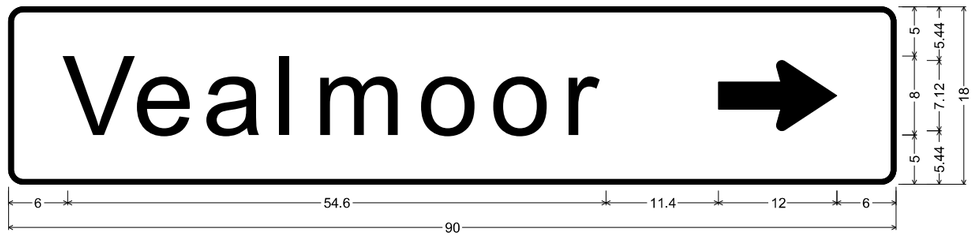
SUMMARY OF SMALL SIGNS

SOSS

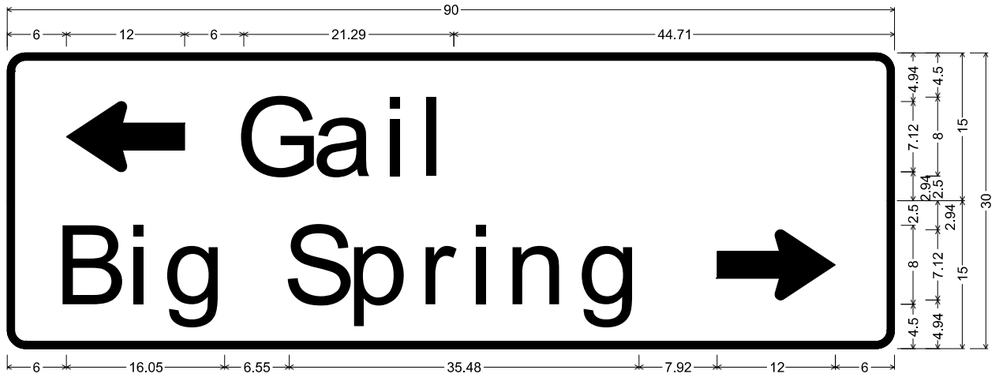
FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS 4-16 8-16	DIST ABL	COUNTY BORDEN		SHEET NO. 118



D1-1 8in LT;
1.50" Radius, 0.50" Border, White on Green;
Standard Arrow Custom 12.00" X 7.13" 180°; "Vealmoor", ClearviewHwy-3-W;



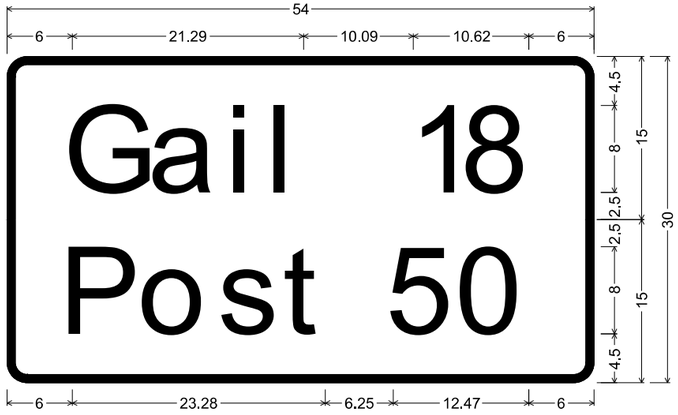
D1-1 8in RT;
1.50" Radius, 0.50" Border, White on Green;
"Vealmoor", ClearviewHwy-3-W; Standard Arrow Custom 12.00" X 7.13" 0°;



D1-2 8in LT-RT;

1.88" Radius, 0.75" Border, White on Green;
Standard Arrow Custom 12.00" X 7.13" 180°; "Gail", ClearviewHwy-3-W;

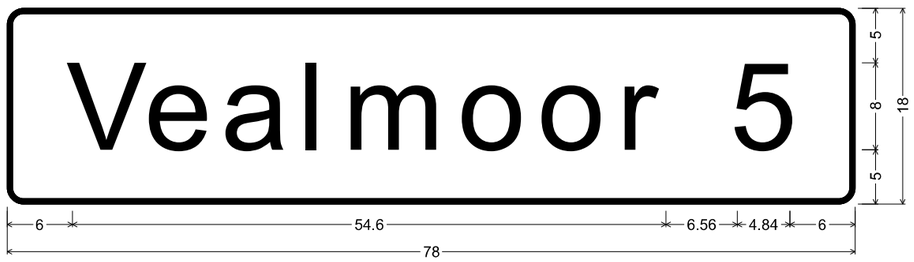
1.88" Radius, 0.75" Border, White on Green;
"Big Spring", ClearviewHwy-3-W; Standard Arrow Custom 12.00" X 7.13" 0°;



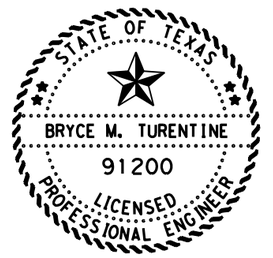
D2-2 8in;

1.88" Radius, 0.75" Border, White on Green;
"Gail", ClearviewHwy-3-W; "18", ClearviewHwy-3-W;

1.88" Radius, 0.75" Border, White on Green;
"Post", ClearviewHwy-3-W; "50", ClearviewHwy-3-W;



D2-1 8in;
1.50" Radius, 0.50" Border, White on Green;
"Vealmoor", ClearviewHwy-3-W; "5", ClearviewHwy-3-W;



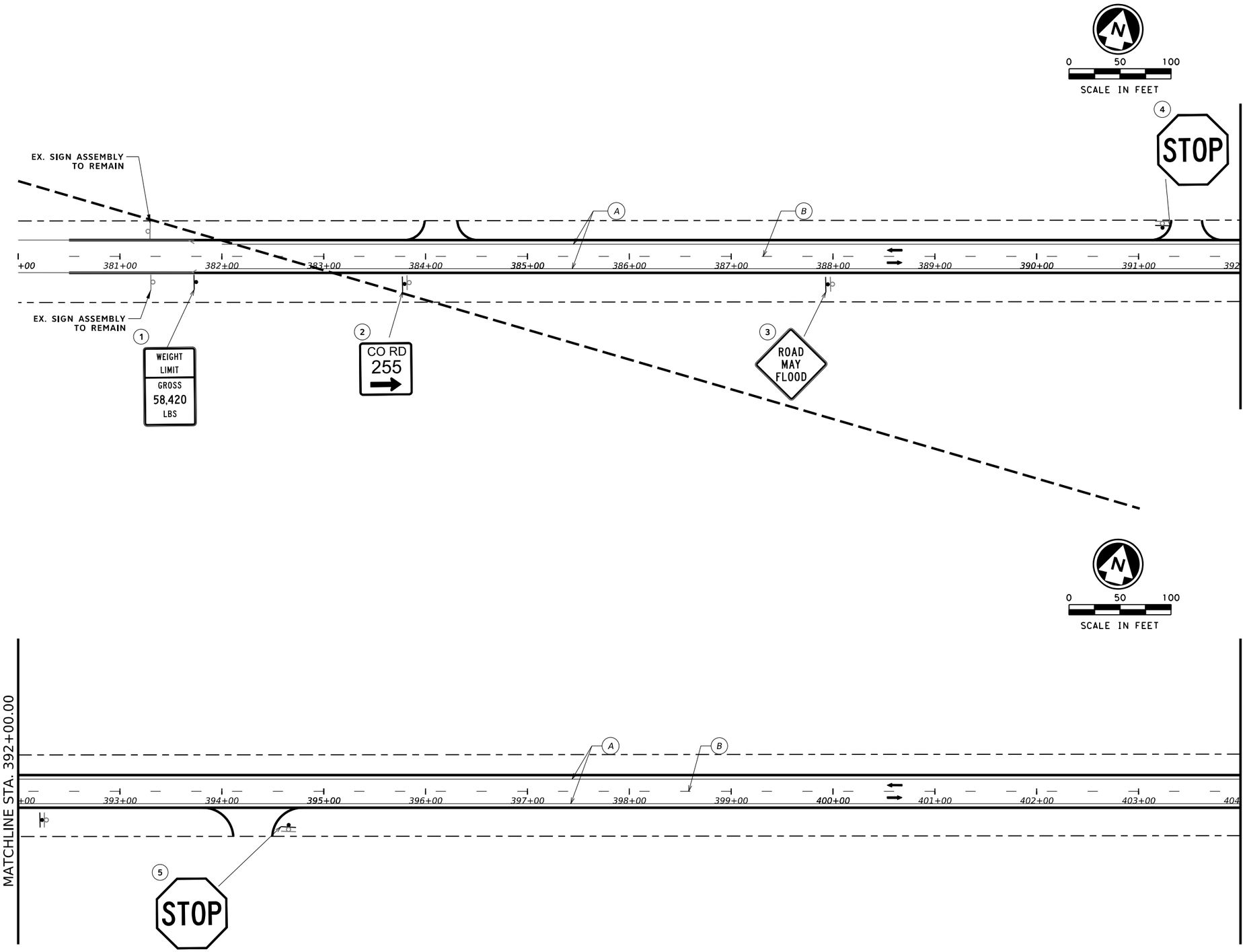
05/31/2022

SIGN DETAILS

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		118A
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.



0 50 100
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. *PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.*
2. *UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.*

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 1785

SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		119

DATE: 5/24/2022 5:27:30 PM
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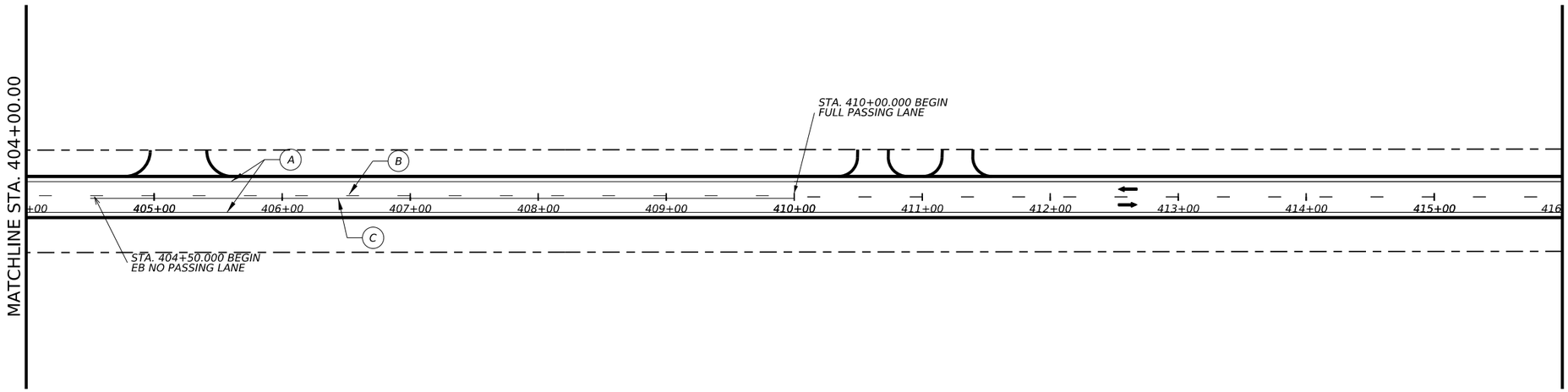


0 50 100

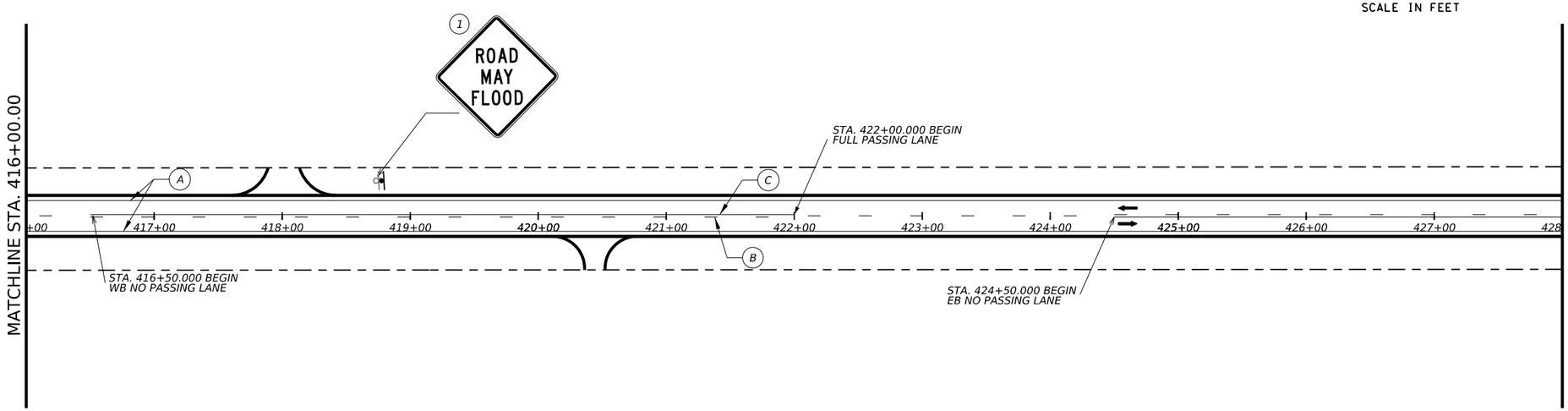
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.



0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

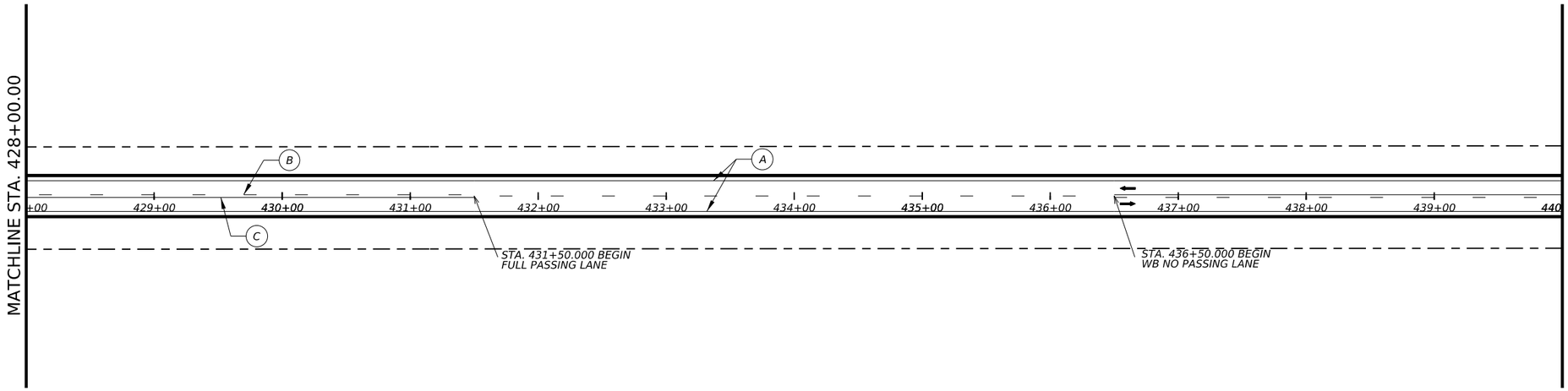
SIGN AND STRIPING LAYOUT FM 1785

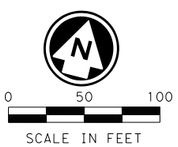
SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		120

DATE: 5/24/2022 5:27:36 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040134 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-2.dgn

CK DW CK DW



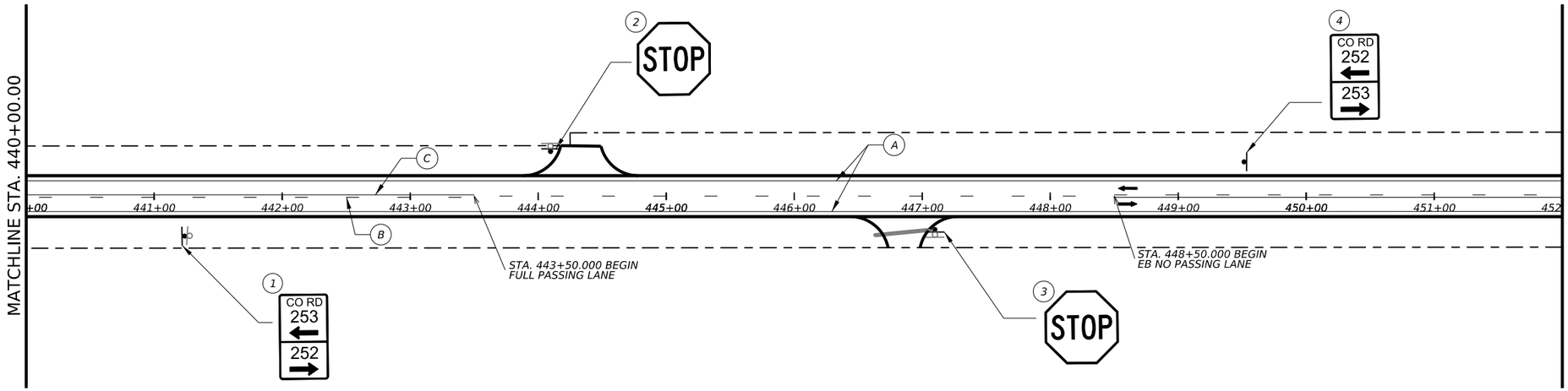


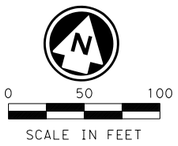
LEGEND

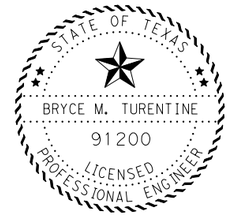
- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.







05/25/2022

Texas Department of Transportation

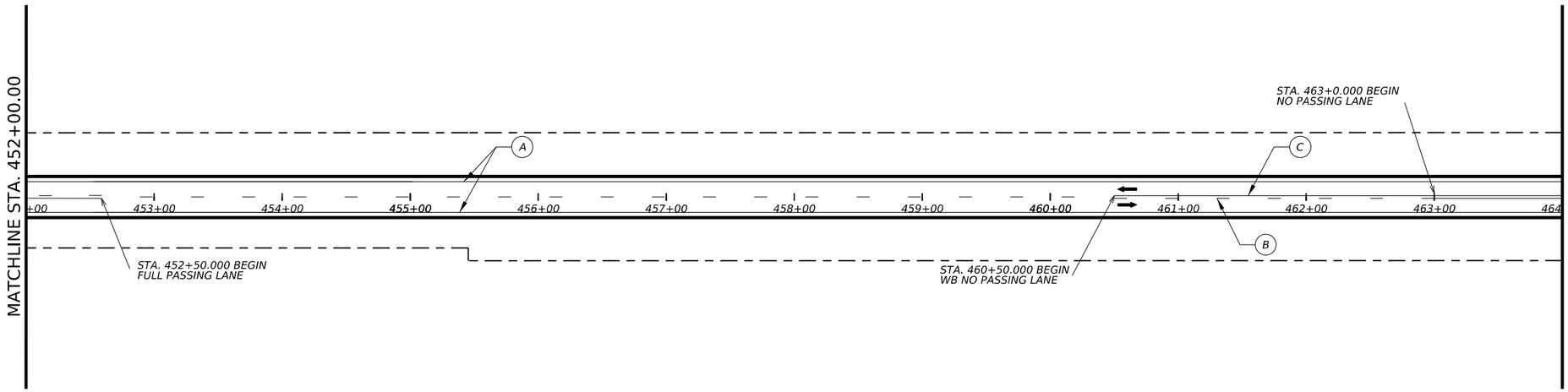
FM 1785 WIDENING

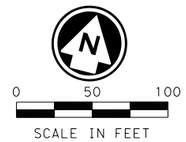
SIGN AND STRIPING LAYOUT FM 1785

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		121

DATE: 5/24/2022 5:27:43 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040134 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-3.dgn

CK DW CK DW



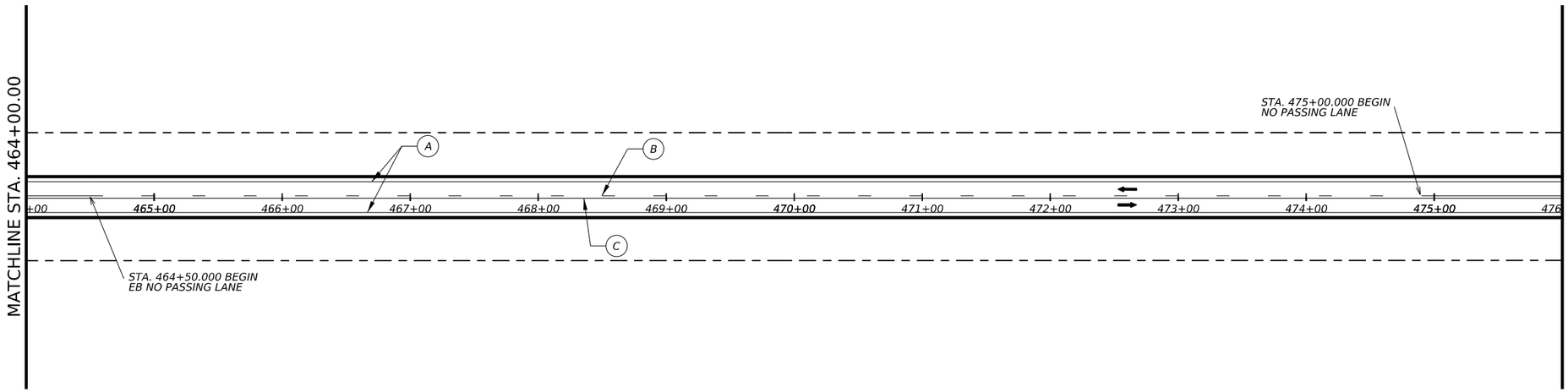


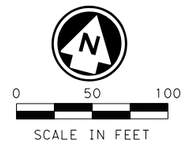
LEGEND

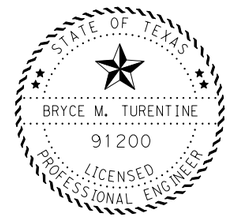
- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.







05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 1785

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		122

DATE: 5/24/2022 5:27:49 PM
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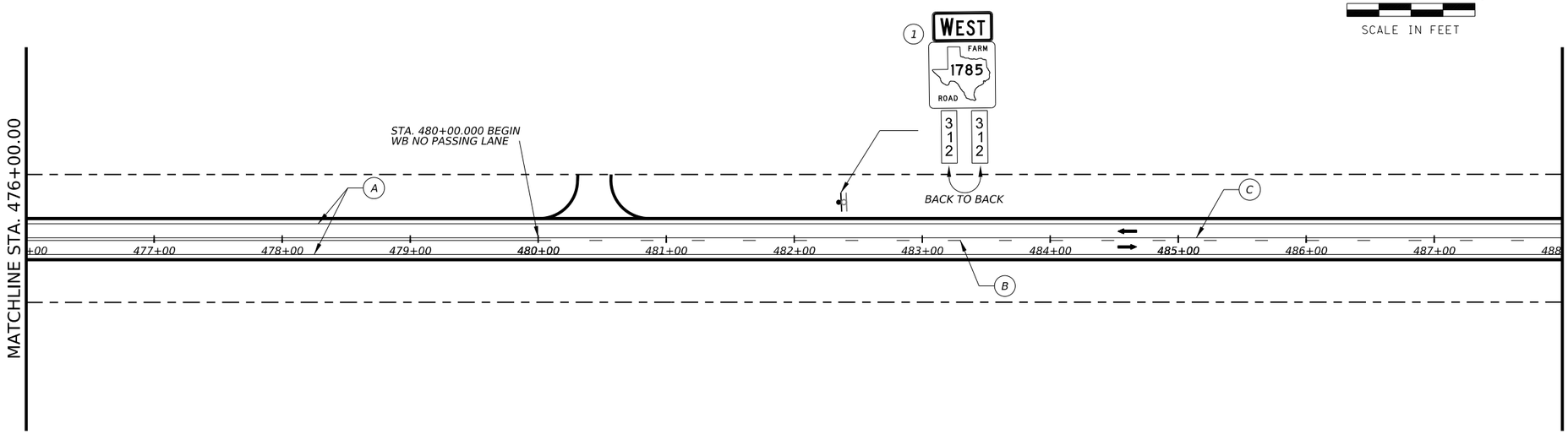


0 50 100

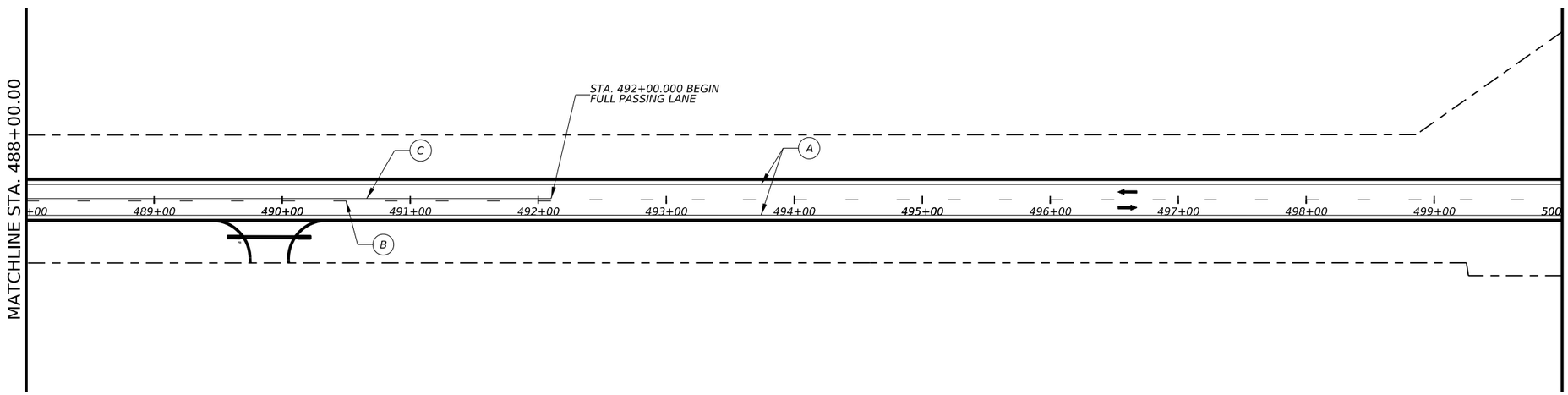
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.



0 50 100

SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 1785

SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		123

DATE: 5/24/2022 5:27:57 PM
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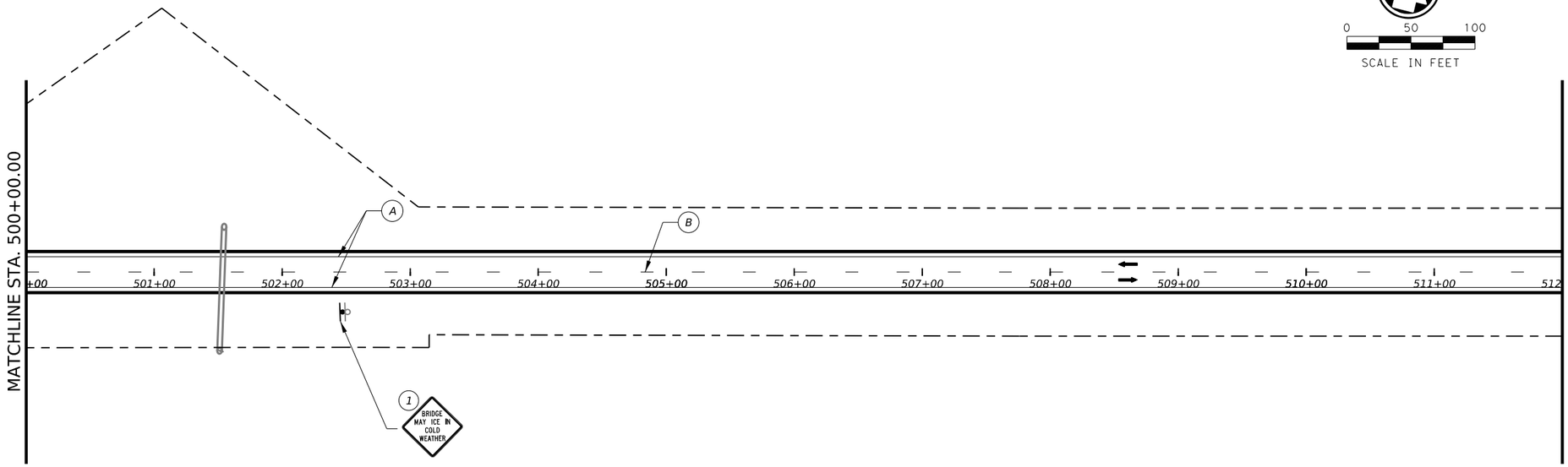
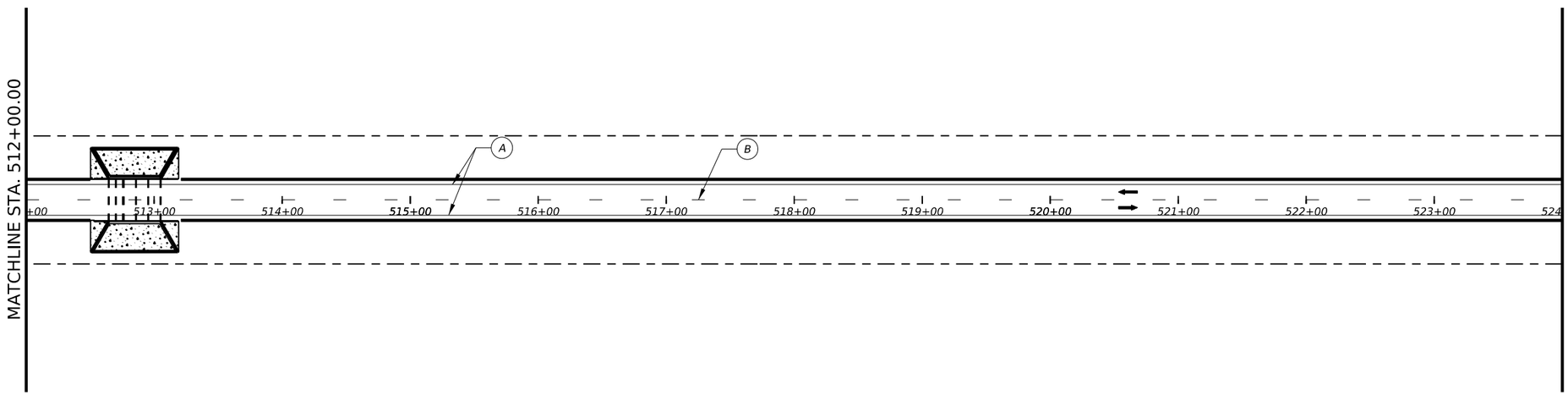


0 50 100
SCALE IN FEET



0 50 100
SCALE IN FEET

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

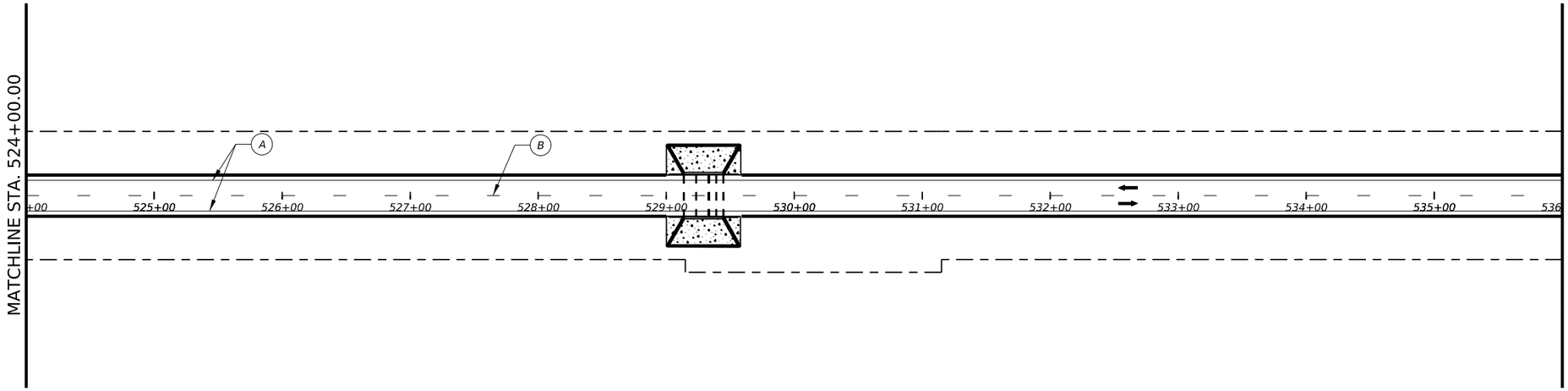
FM 1785 WIDENING

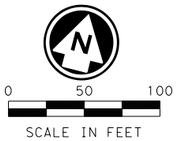
SIGN AND STRIPING LAYOUT FM 1785

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		124

DATE: 5/24/2022 5:28:02 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040134 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-6.dgn





LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
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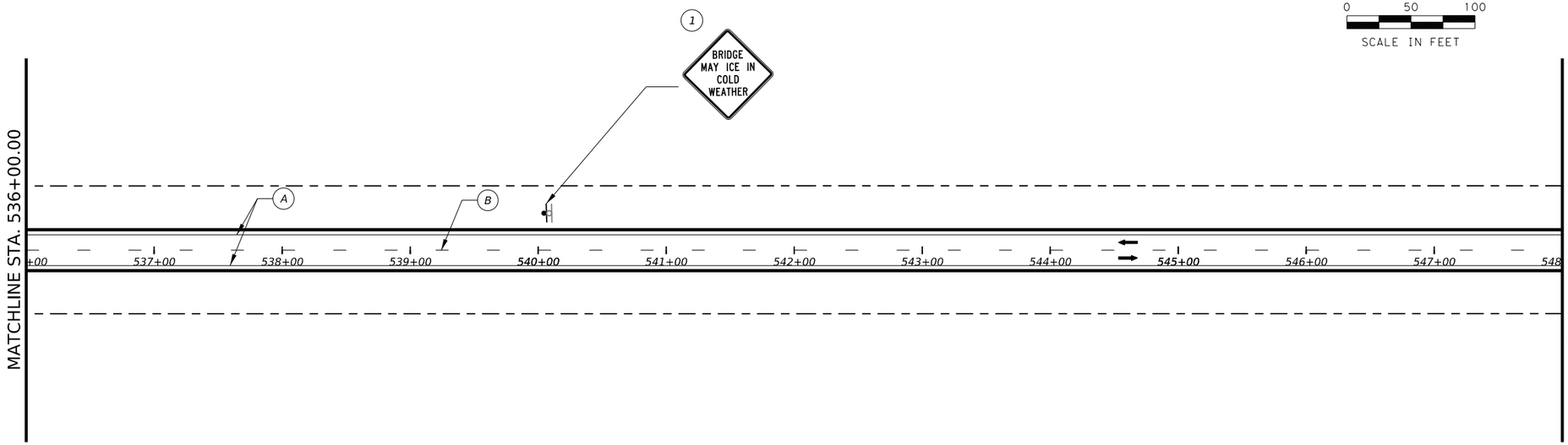
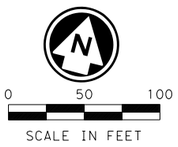
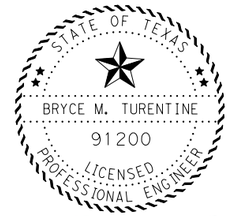






05/25/2022

Texas Department of Transportation

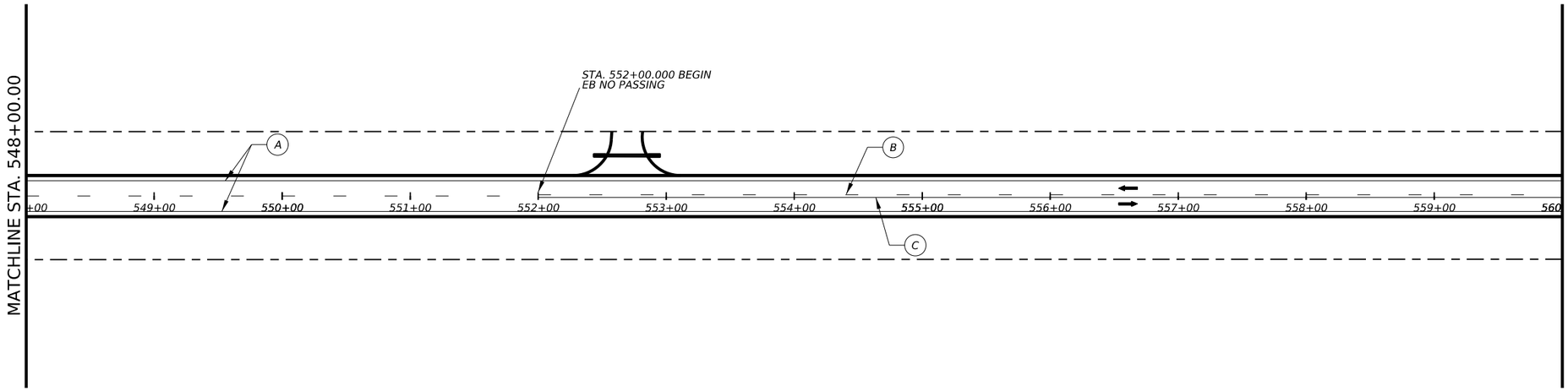
FM 1785 WIDENING

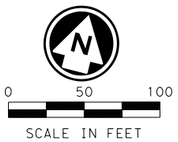
SIGN AND STRIPING LAYOUT FM 1785

SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		125

DATE: 5/24/2022 5:28:07 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-7.dgn



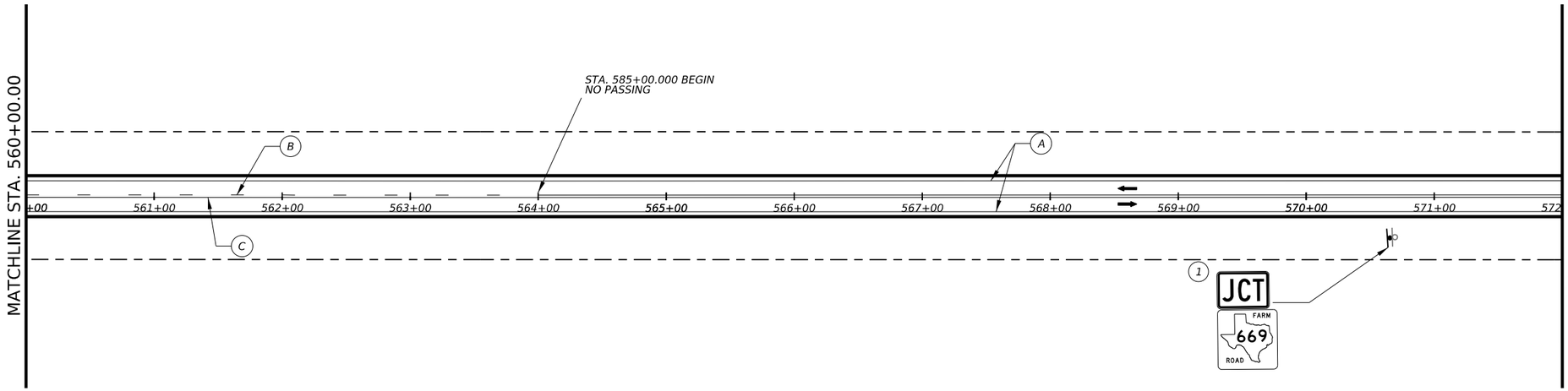


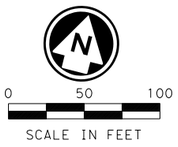
LEGEND

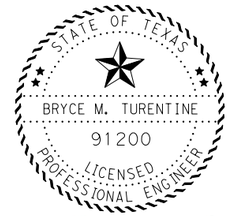
- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.







05/25/2022

Texas Department of Transportation

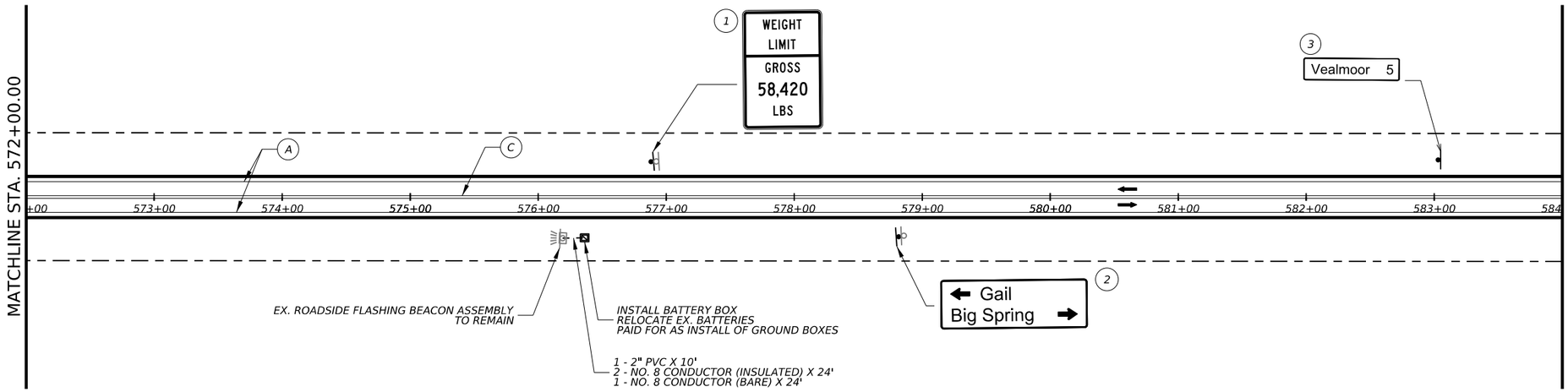
FM 1785 WIDENING

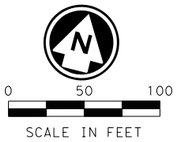
SIGN AND STRIPING LAYOUT FM 1785

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		126

DATE: 5/24/2022 5:28:13 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-8.dgn



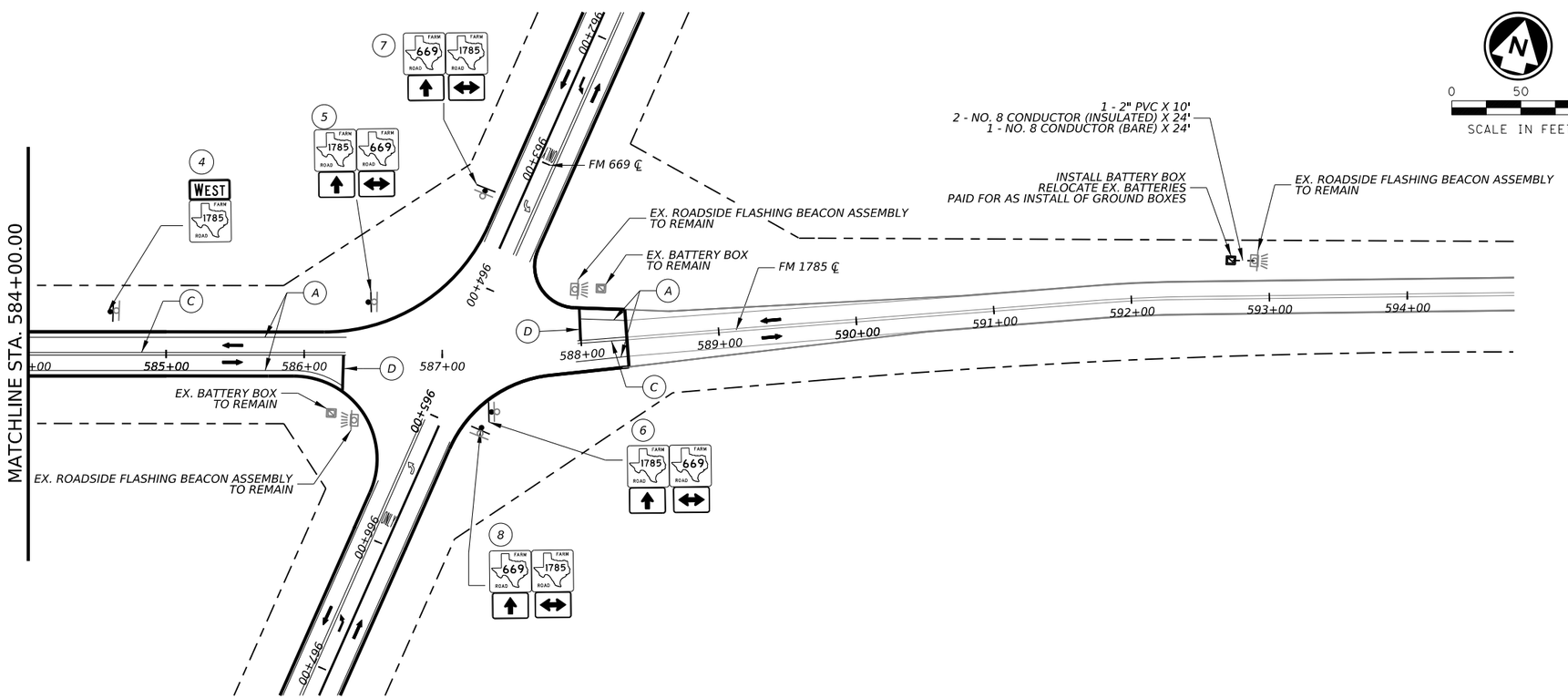


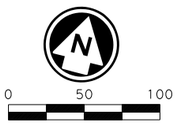
LEGEND

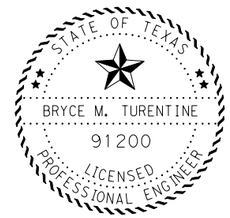
- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.







05/25/2022

Texas Department of Transportation

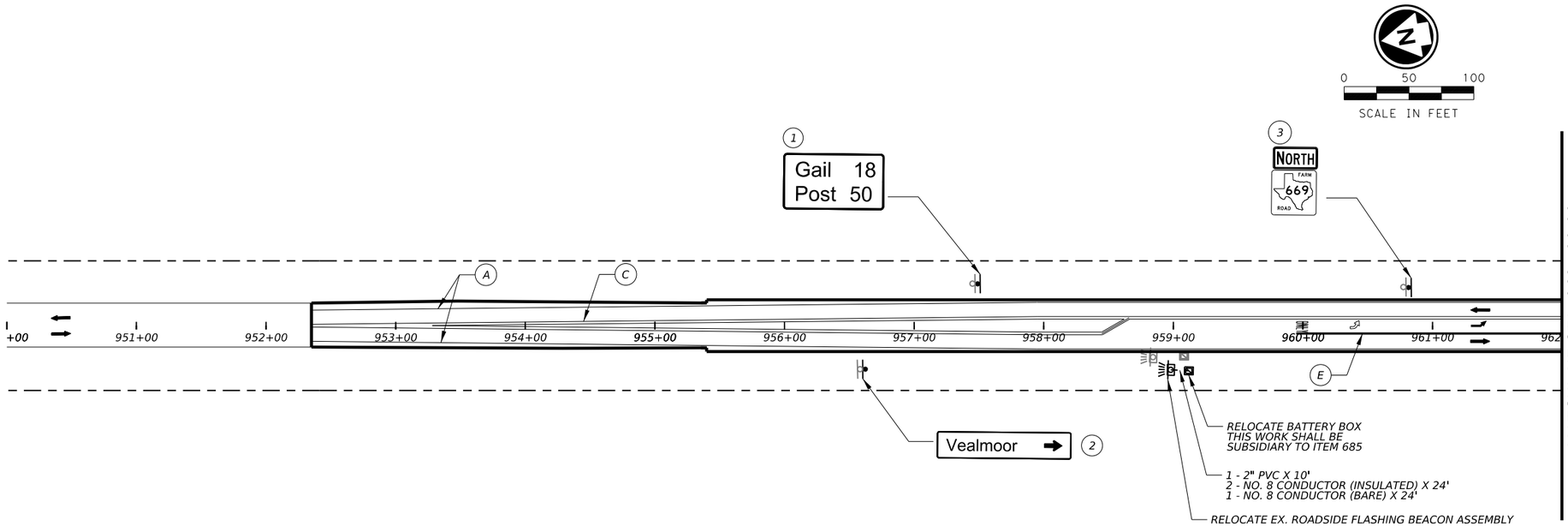
FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 1785

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		127

DATE: 5/24/2022 5:28:34 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040134 - Design/Plan Set/8. Traffic/BL CL-5 Striping - Striping Plan-9.dgn

CK DW CK DW

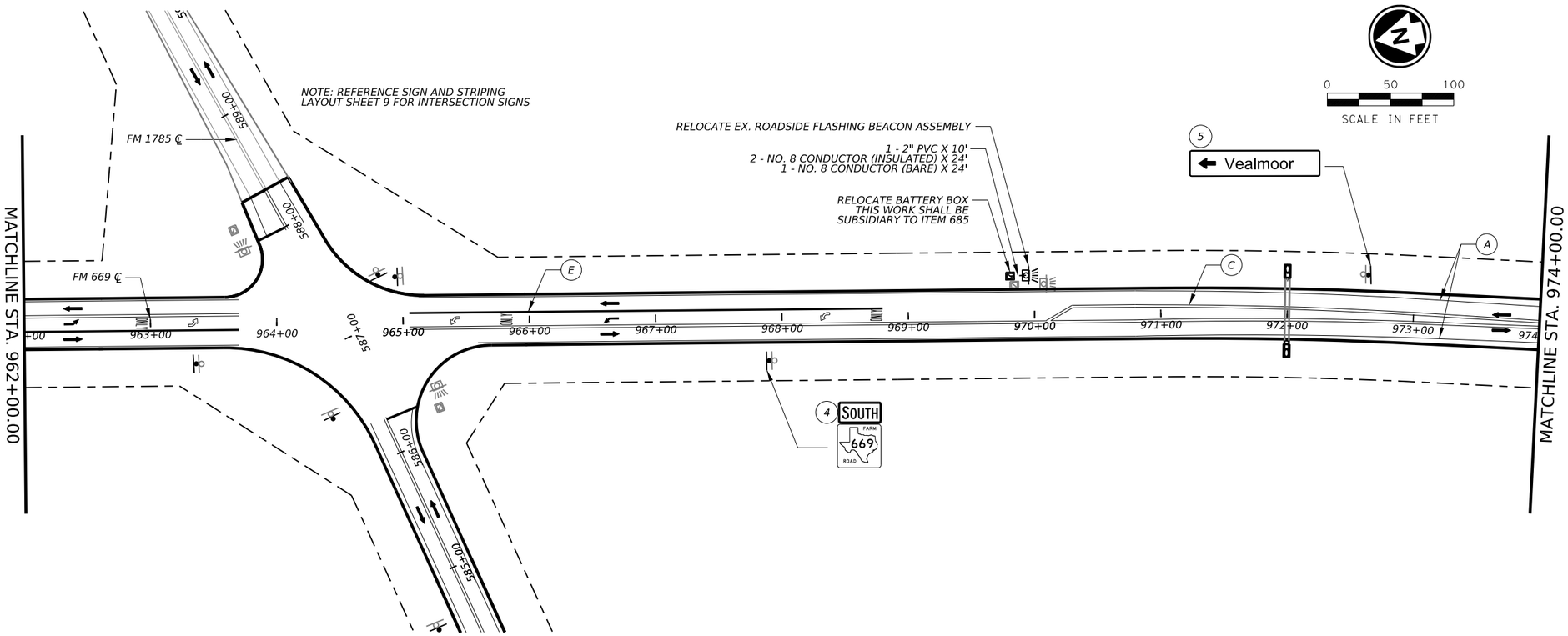


LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.



STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 669

SHEET10 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		128

DATE: 5/24/2022 5:28:43 PM
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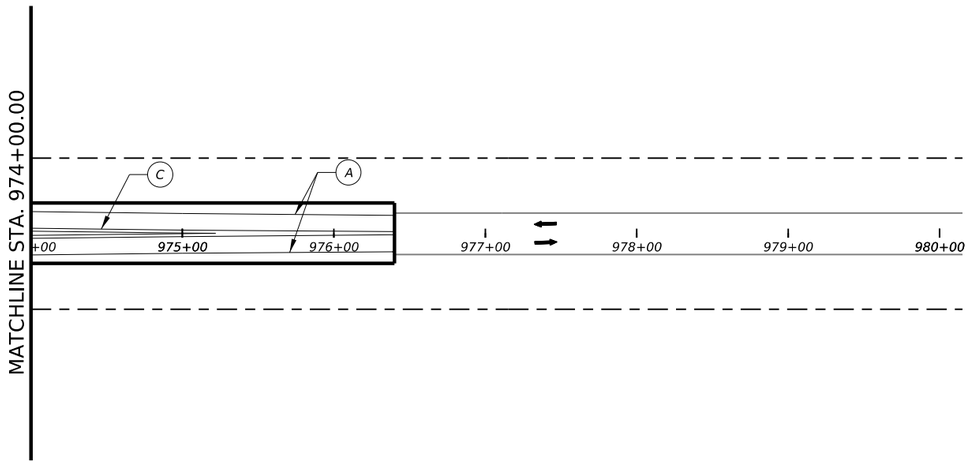
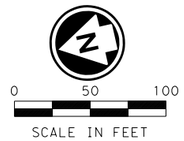


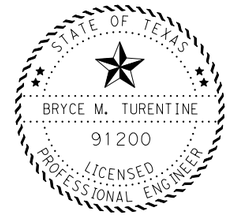


LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- EXISTING SIGN
- PROPOSED SIGN
- ROADSIDE FLASHING BEACON ASSEMBLY TO REMAIN
- RELOCATE ROADSIDE FLASHING BEACON ASSEMBLY
- (#) PROPOSED SIGN NUMBER
- (A) REF PROF PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REF PROF PAV MRK TY I (Y) 4" (BRK) (100 MIL)
- (C) REF PROF PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)

NOTES

1. PAVEMENT MARKINGS AND RPMS SHALL BE PLACED IN ACCORDANCE WITH PM STANDARD SHEETS.
2. UNLESS OTHERWISE INDICATED, ALL EXISTING SMALL SIGN ASSEMBLIES ARE TO BE REMOVED AND REPLACED.



05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SIGN AND STRIPING LAYOUT FM 669

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		129

DATE: 5/24/2022 5:28:48 PM
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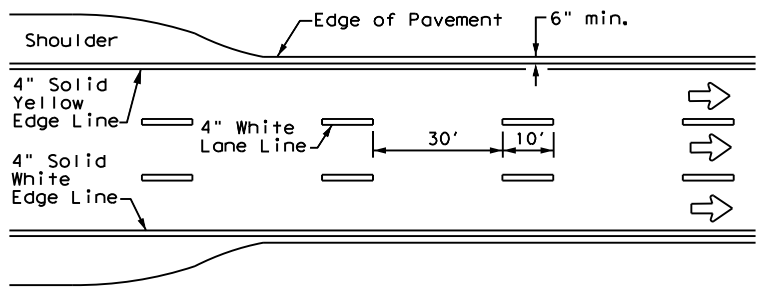
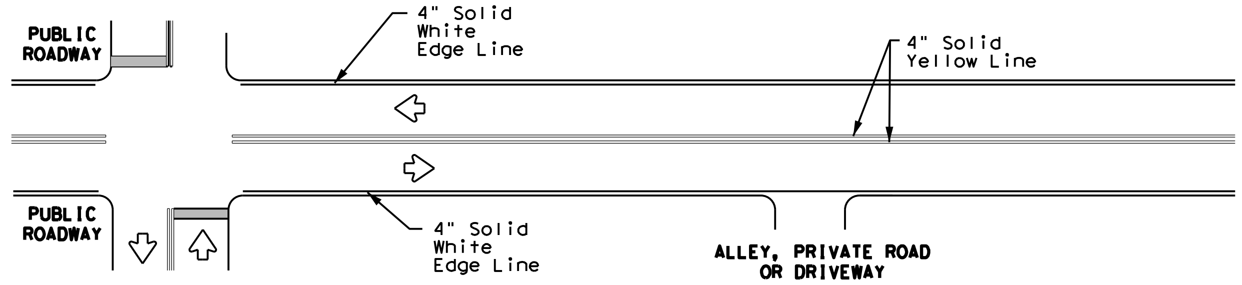
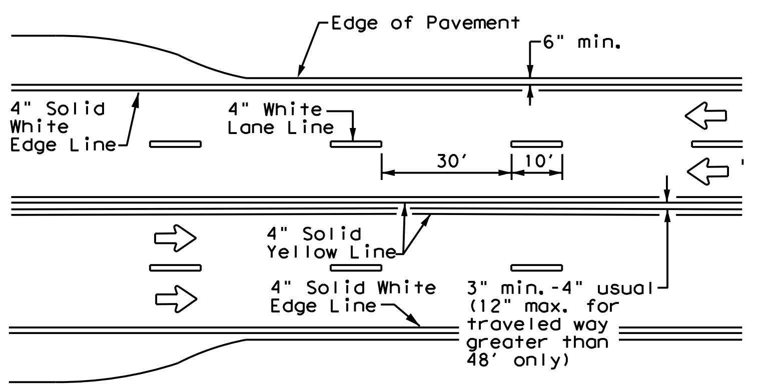


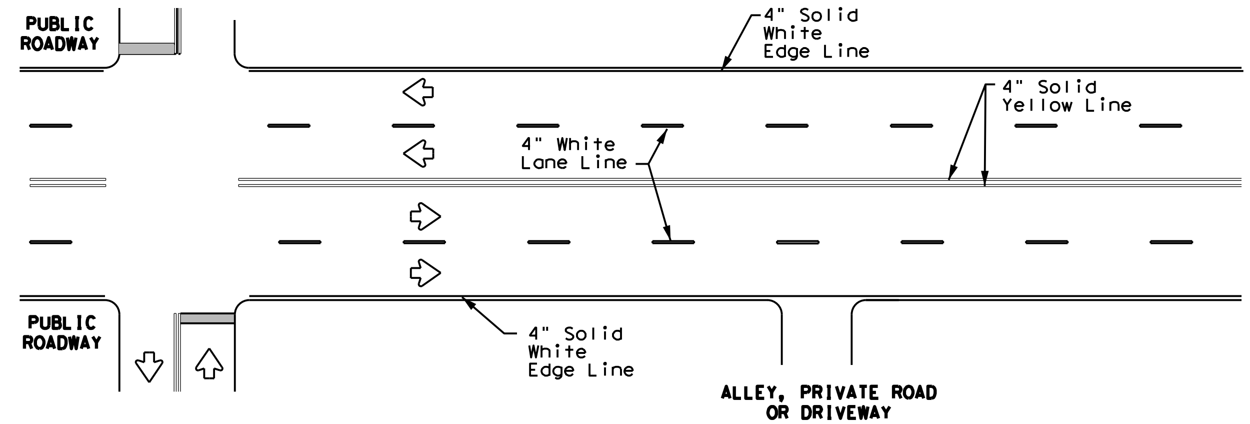
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



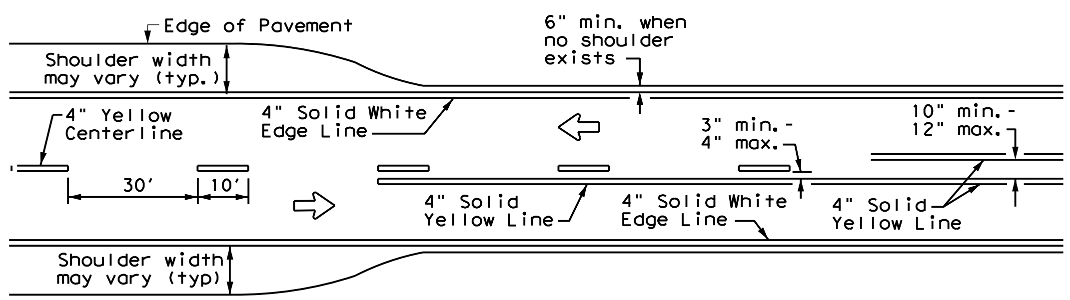
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



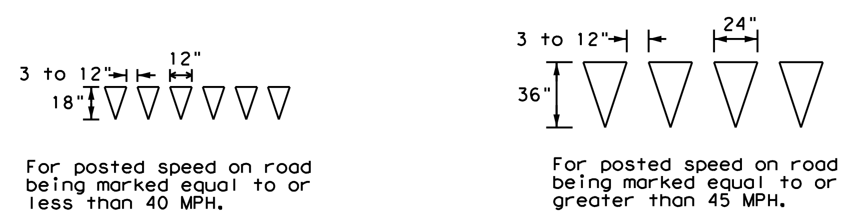
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



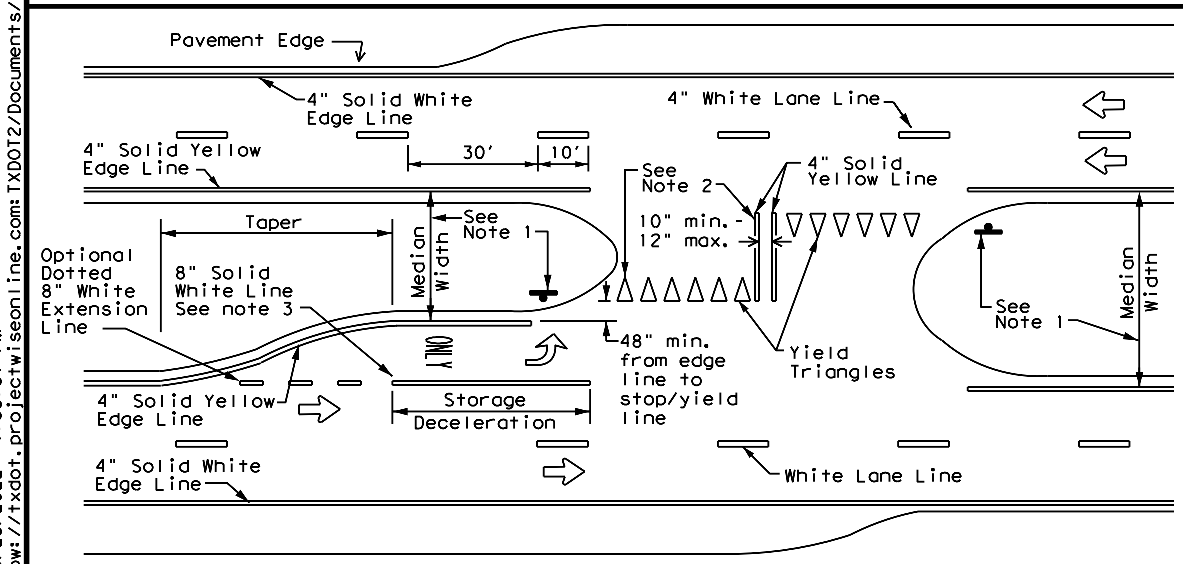
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

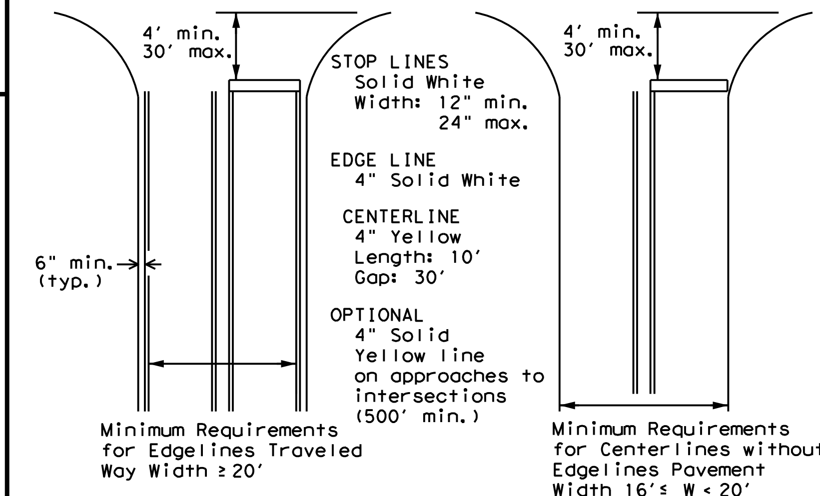
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation — Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

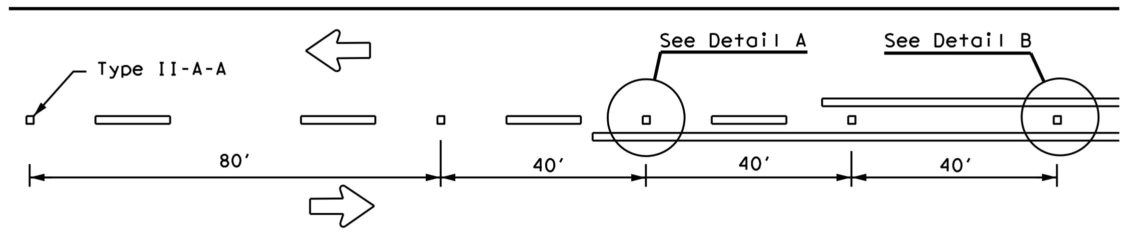
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	1155	04	013, ETC.	FM 1785, ETC
5-00 2-12	DIST		COUNTY	SHEET NO.
8-00 6-20	ABL		BORDEN	130

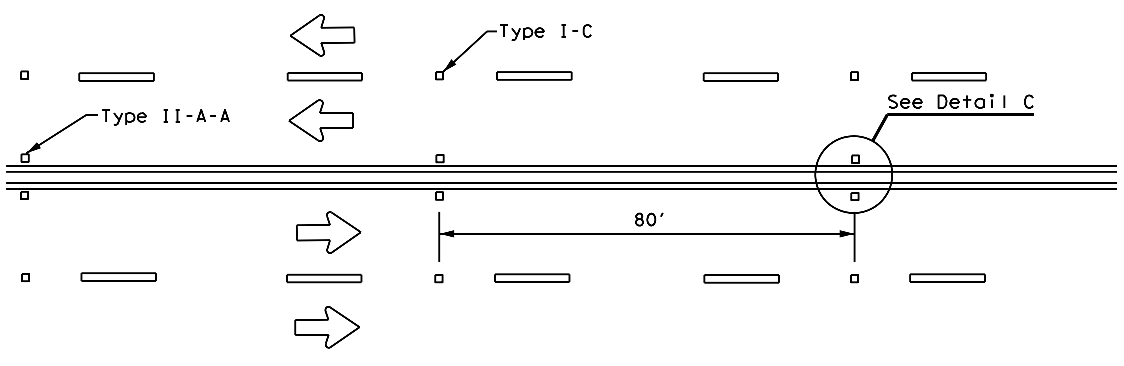
22A

DATE: 5/25/2022 1:35:37 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/...

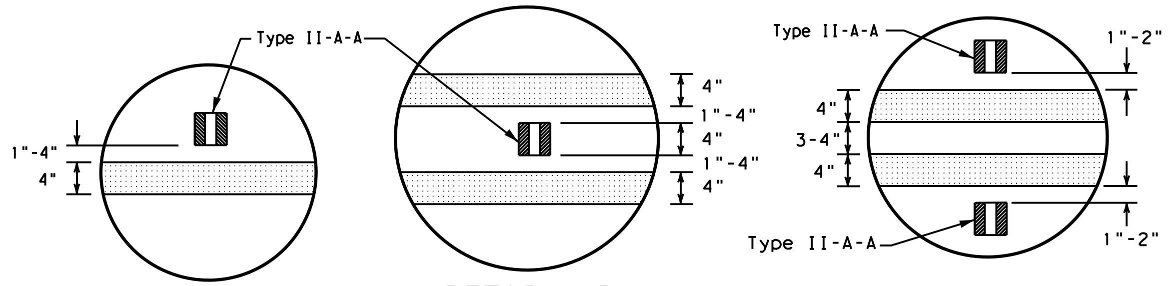
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



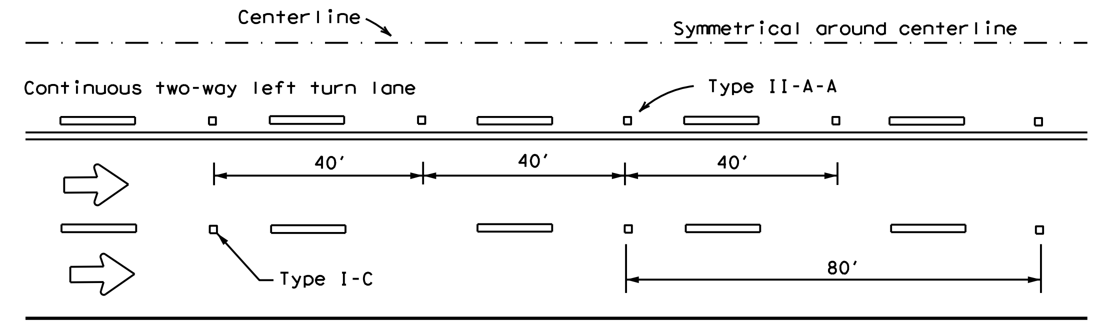
CENTERLINE FOR ALL TWO LANE ROADWAYS



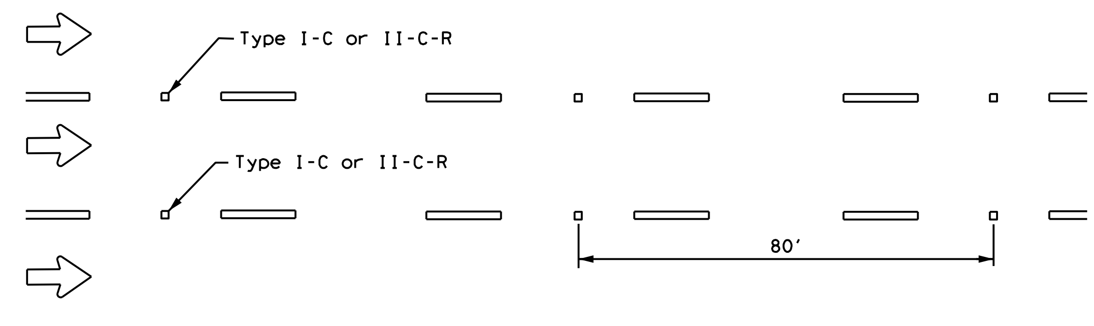
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

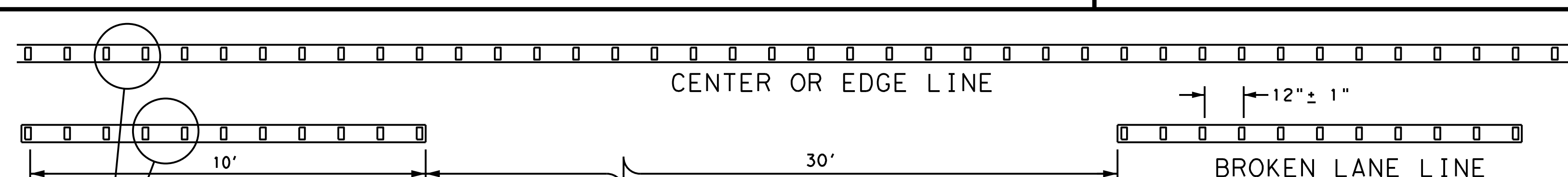


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



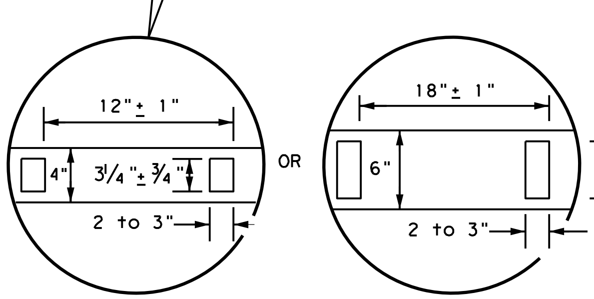
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



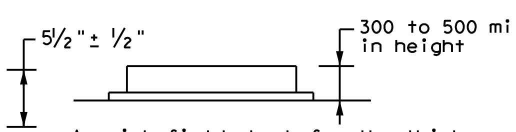
REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE



A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

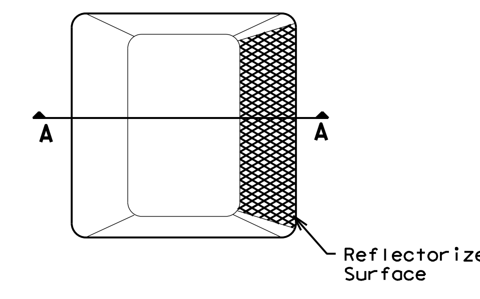
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

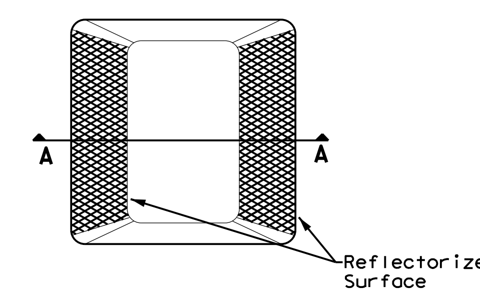
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

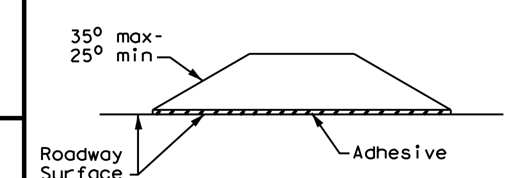
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation — Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 / 5-00 2-12 / 8-00 6-20	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	131

228

DATE: 5/25/2022 1:35:41 PM
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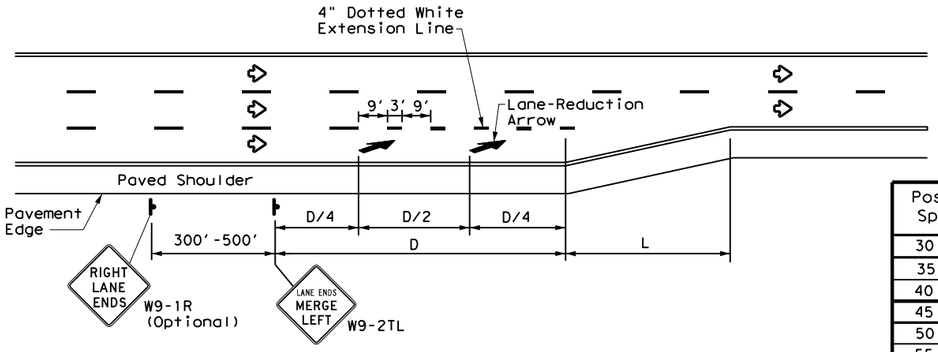
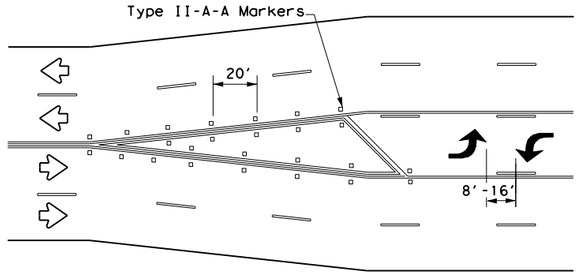


LANE REDUCTION

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	

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 W9-1R "RIGHT LANE ENDS" 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.



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.

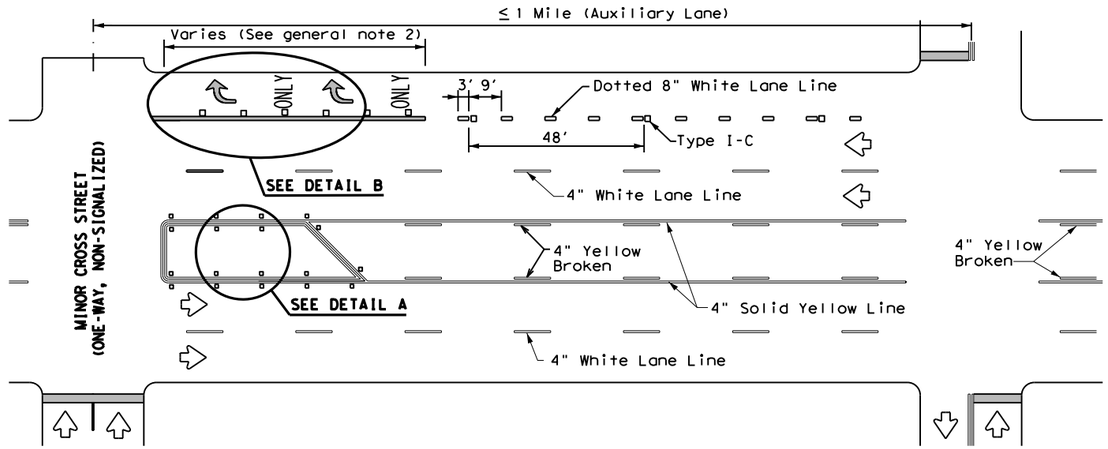
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

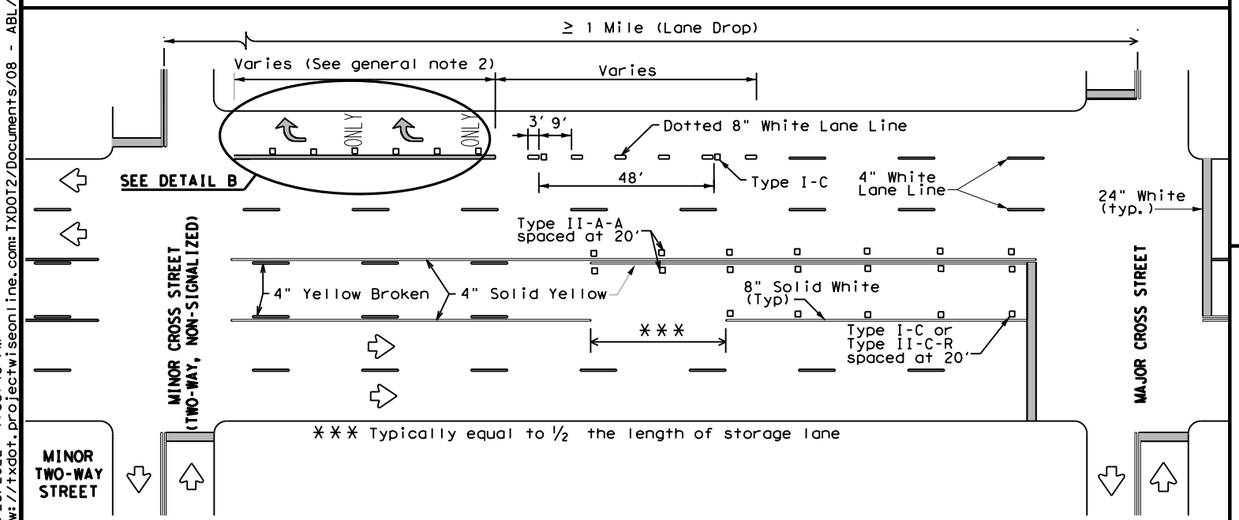
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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.

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

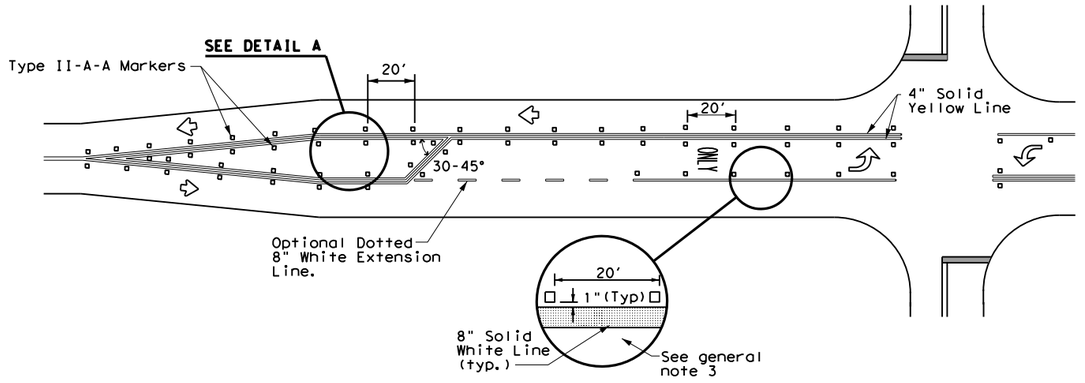
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



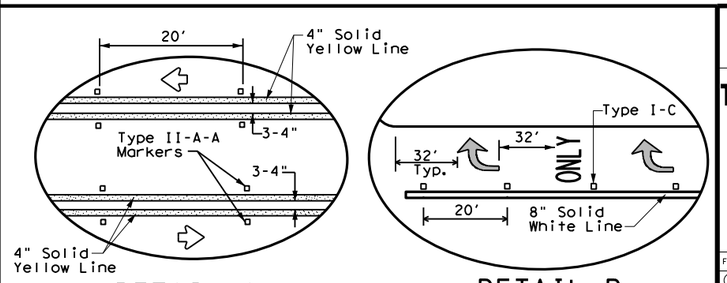
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



Texas Department of Transportation

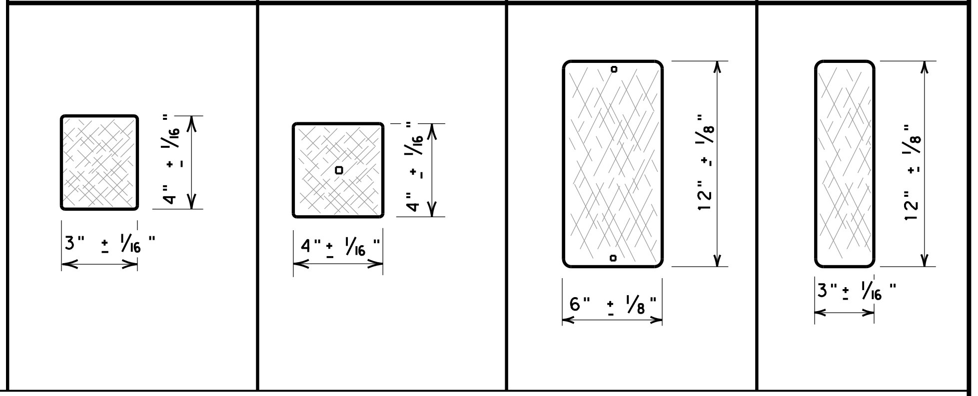
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

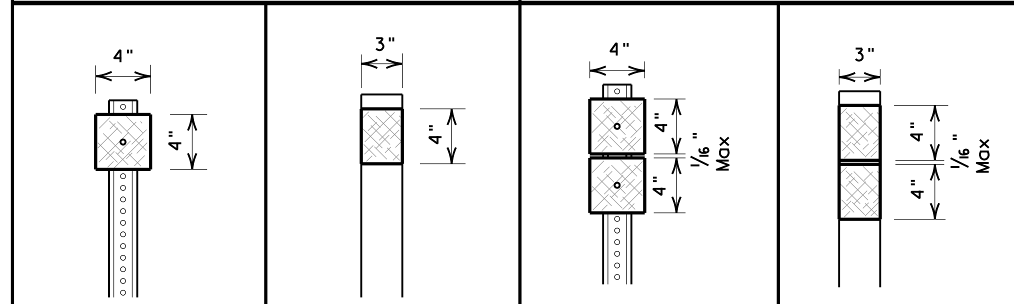
FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	ABL	BORDEN		132
3-03 6-20				

220

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
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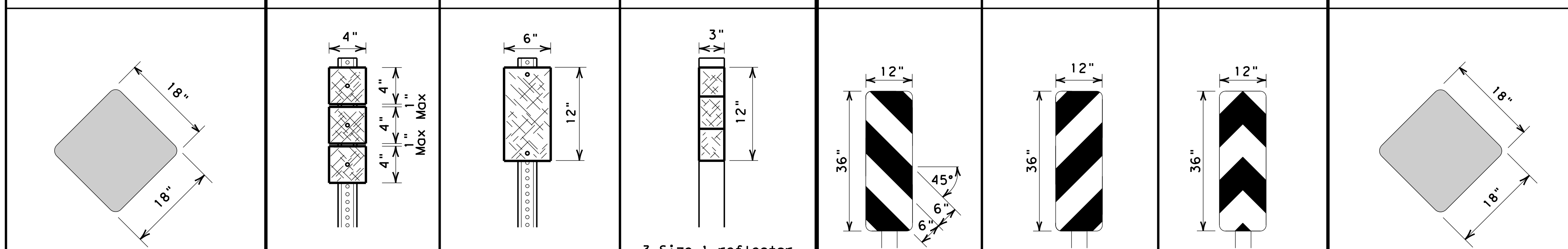
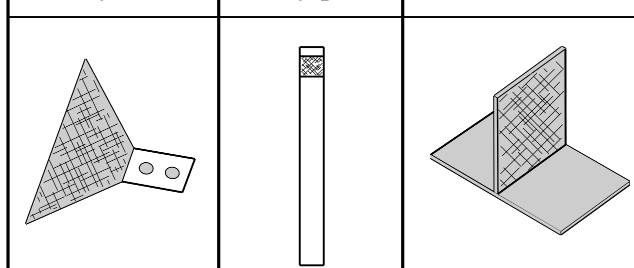
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

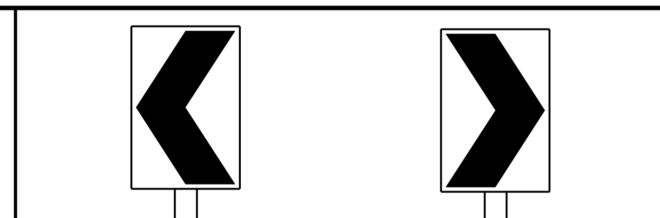
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

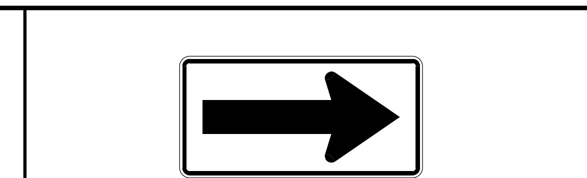
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE				
	W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

DEVICE		
	W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE

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).

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

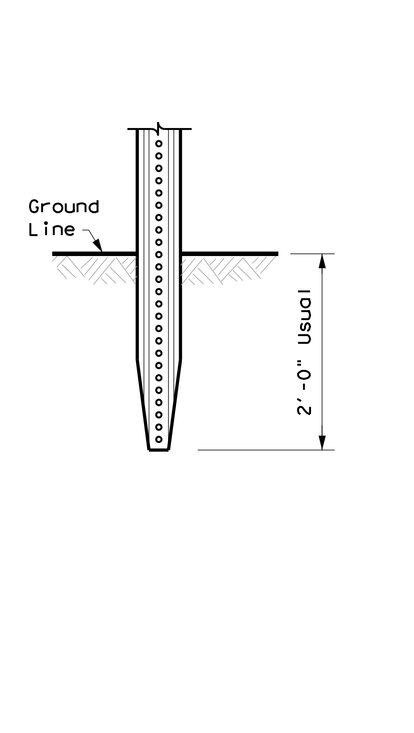
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-09 3-15 4-10 7-20	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	133

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

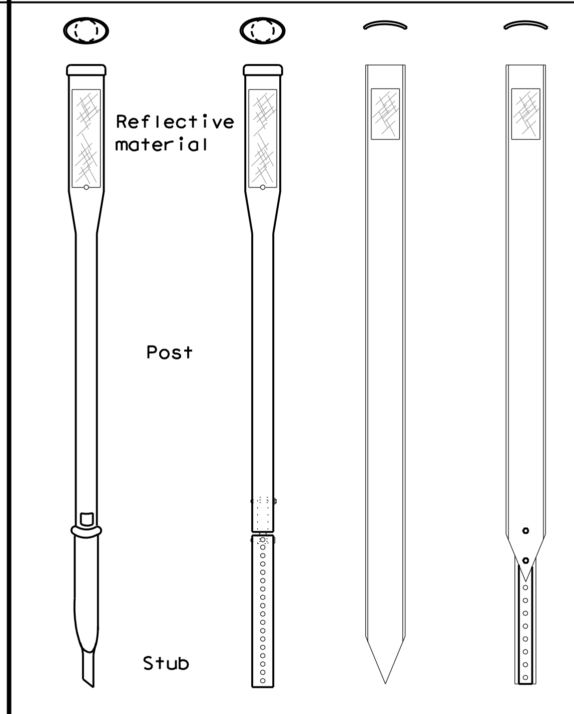


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

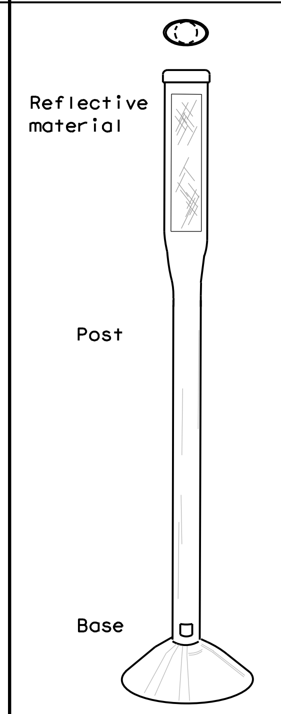
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



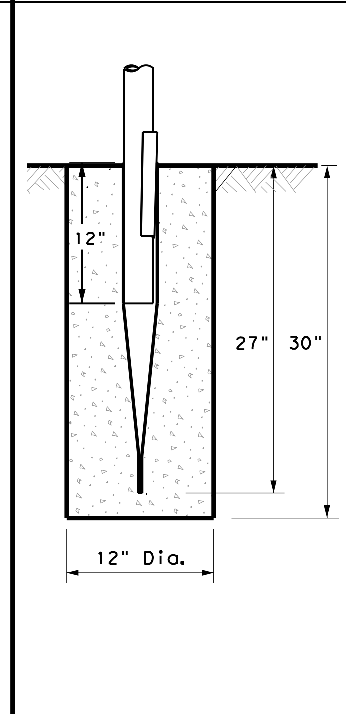
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

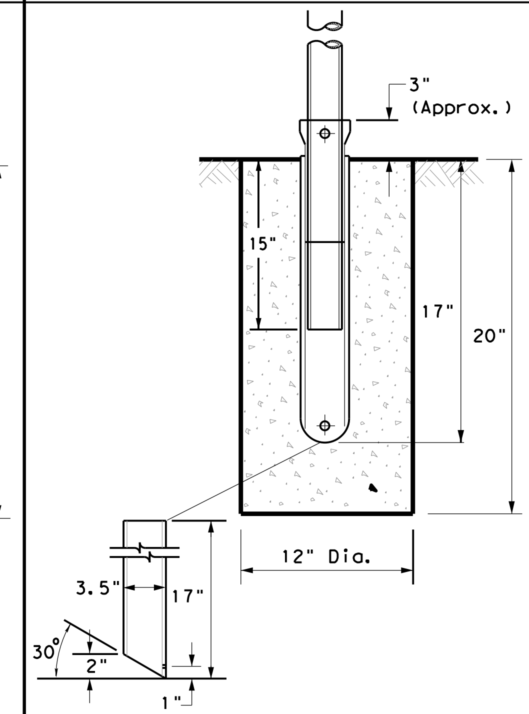
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

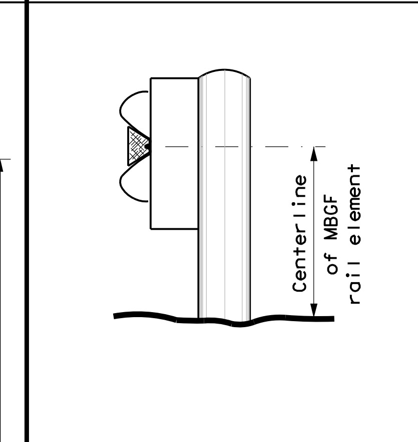
NOTE

1. Install per manufacturer's recommendations.

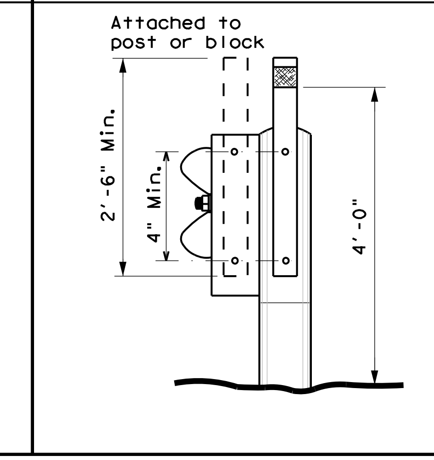
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

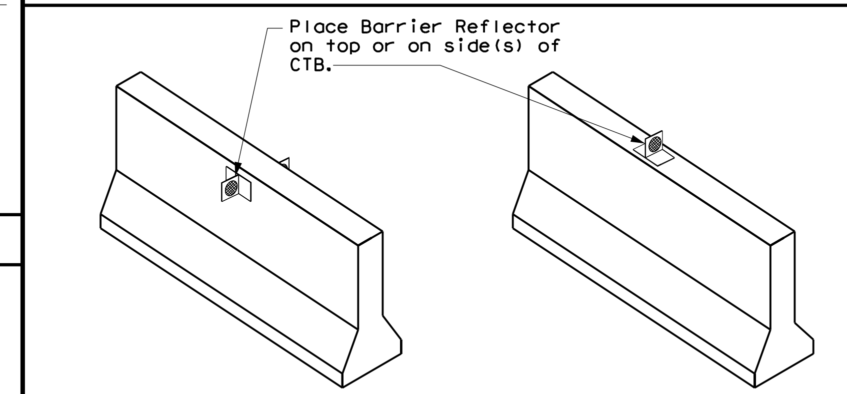
GF1



GF2



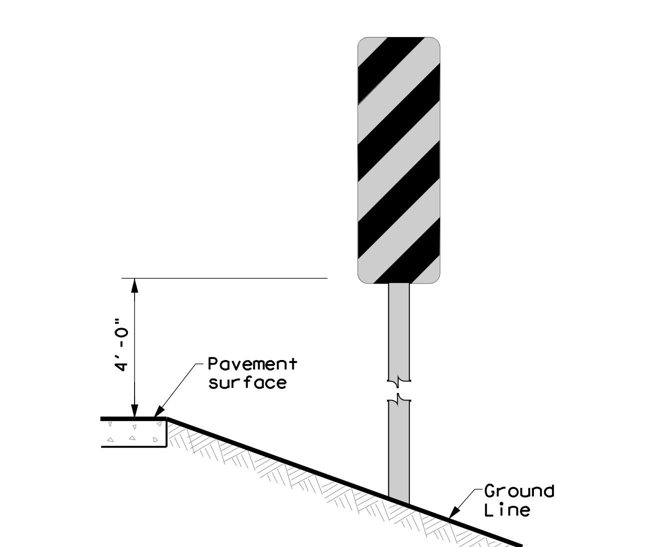
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

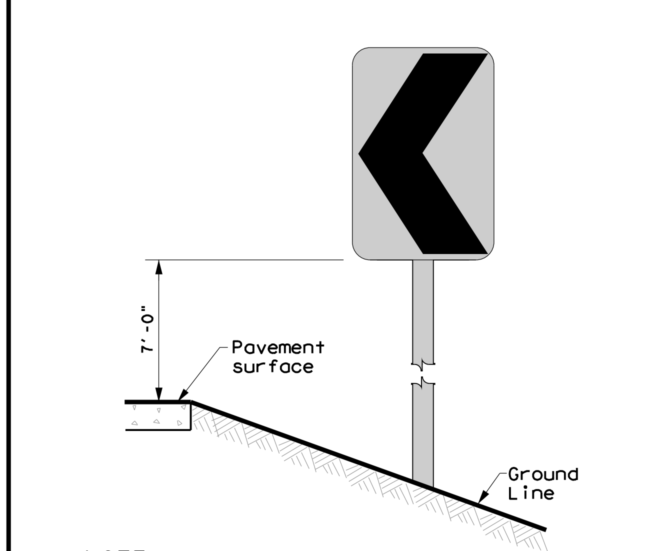
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

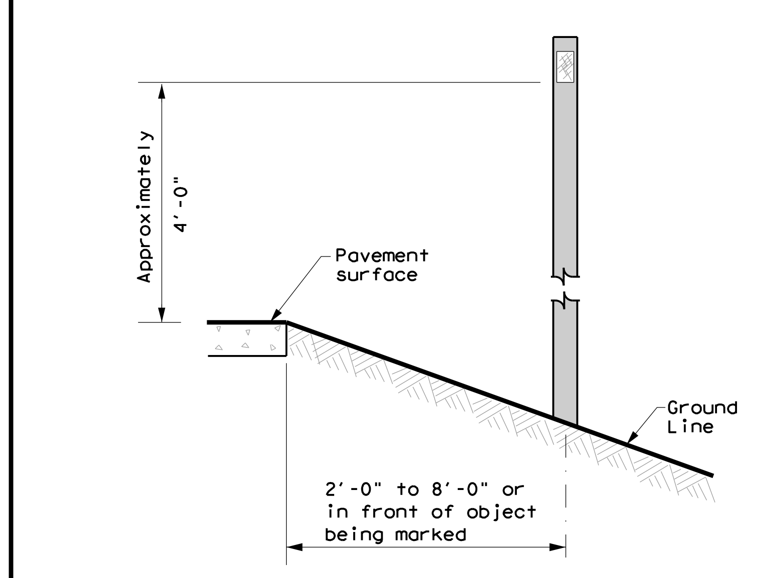
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS 10-09 3-15 4-10 7-20	DIST ABL		COUNTY BORDEN	SHEET NO. 134

20B

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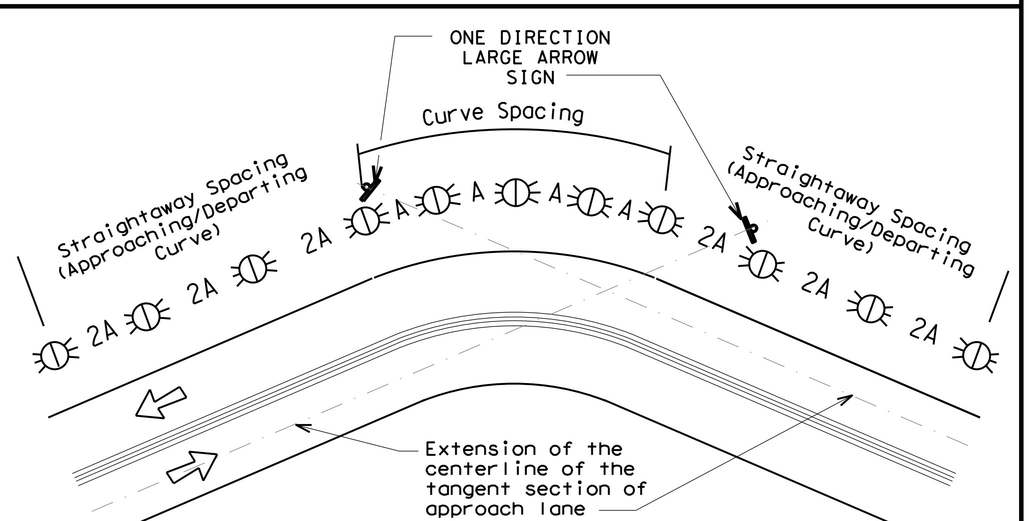
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed: Turn (30 MPH or less)	Curve Advisory Speed: 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

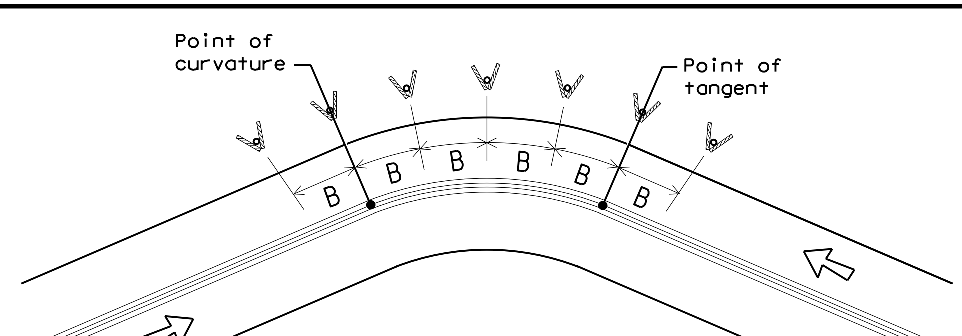
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		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

Symbol	Meaning
(bi-directional delineator symbol)	Bi-directional Delineator
(delineator symbol)	Delineator
(sign symbol)	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 1155	SECT 04	JOB 013, ETC.	HIGHWAY FM 1785, ETC
REVISIONS 3-15 8-15 8-15 7-20	DIST ABL	COUNTY BORDEN		SHEET NO. 135

20C

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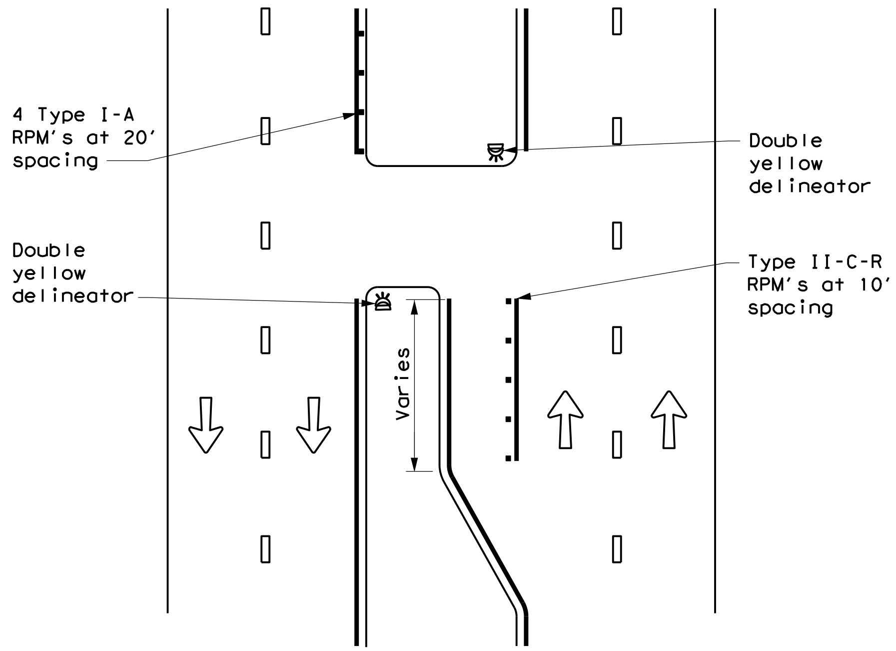
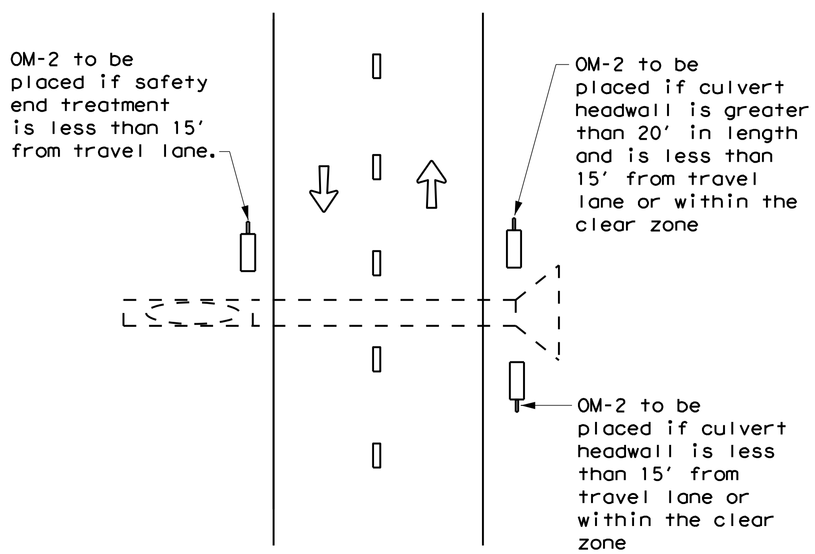
CROSSOVERS



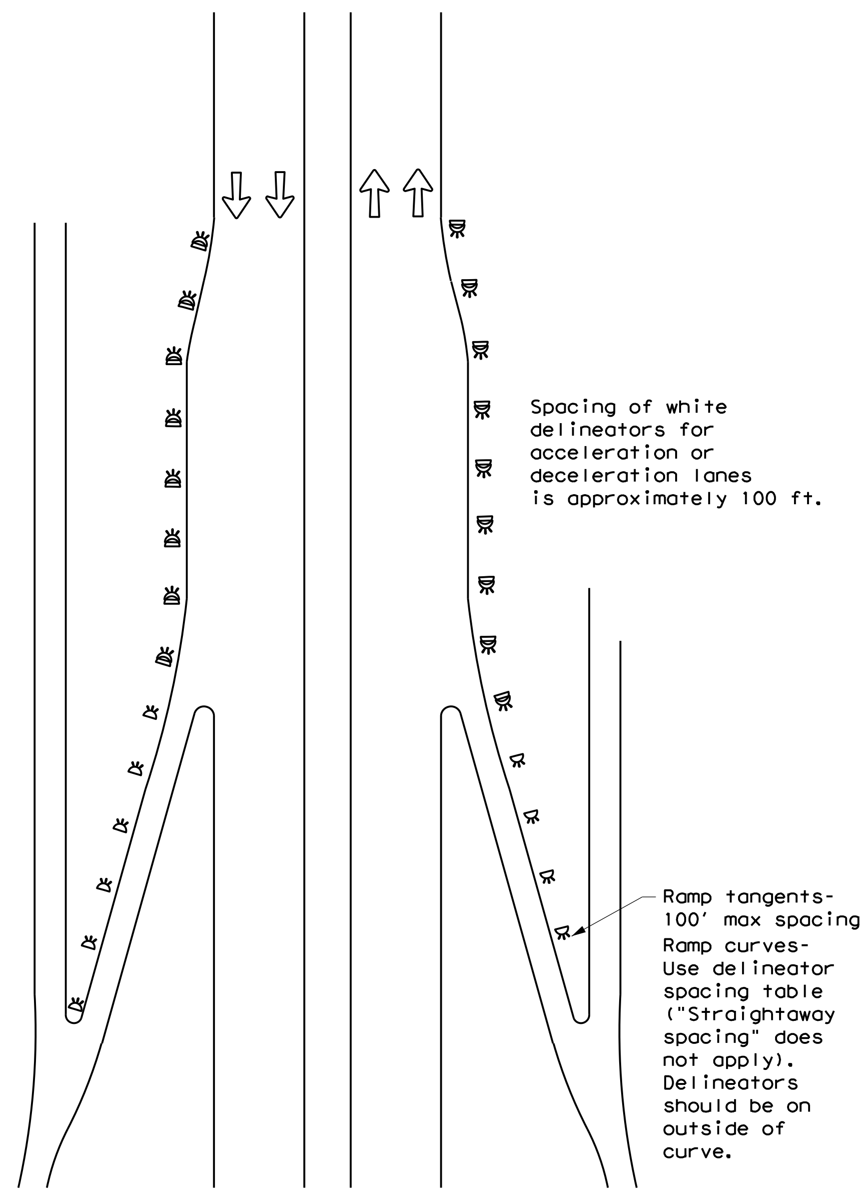
DETAIL 1

FOR CULVERTS WITHOUT MBGF



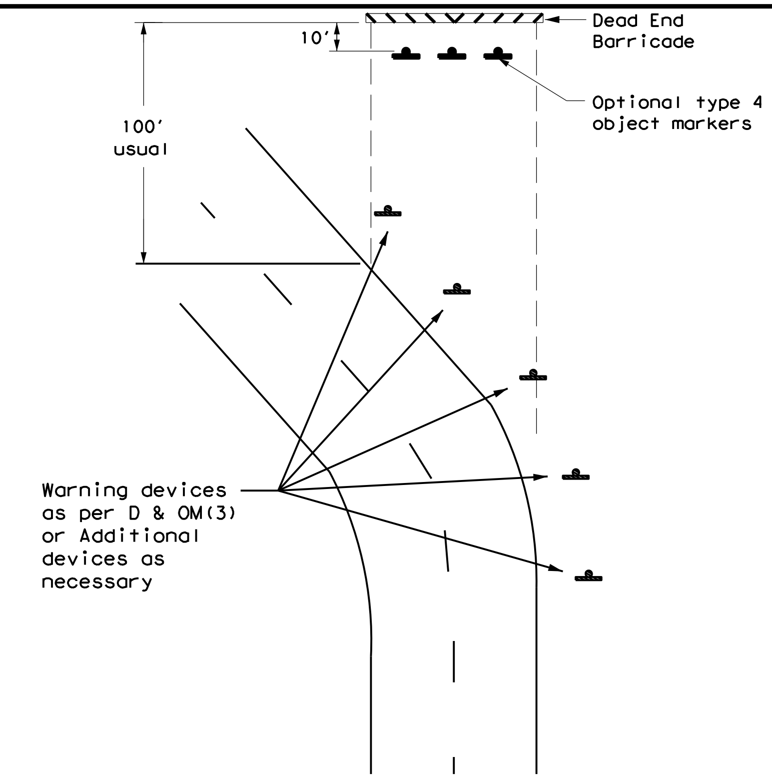
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



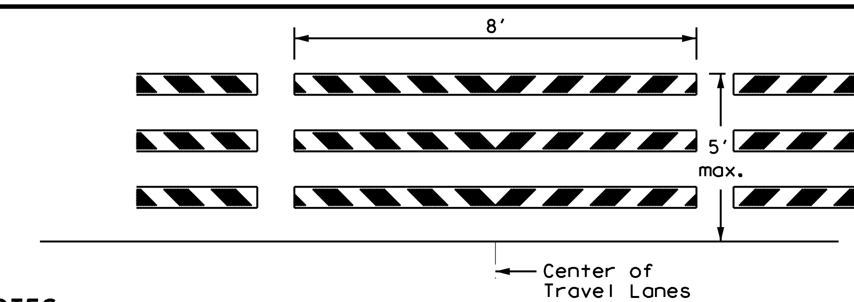
DETAIL 3

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

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation
Traffic Safety Division Standard

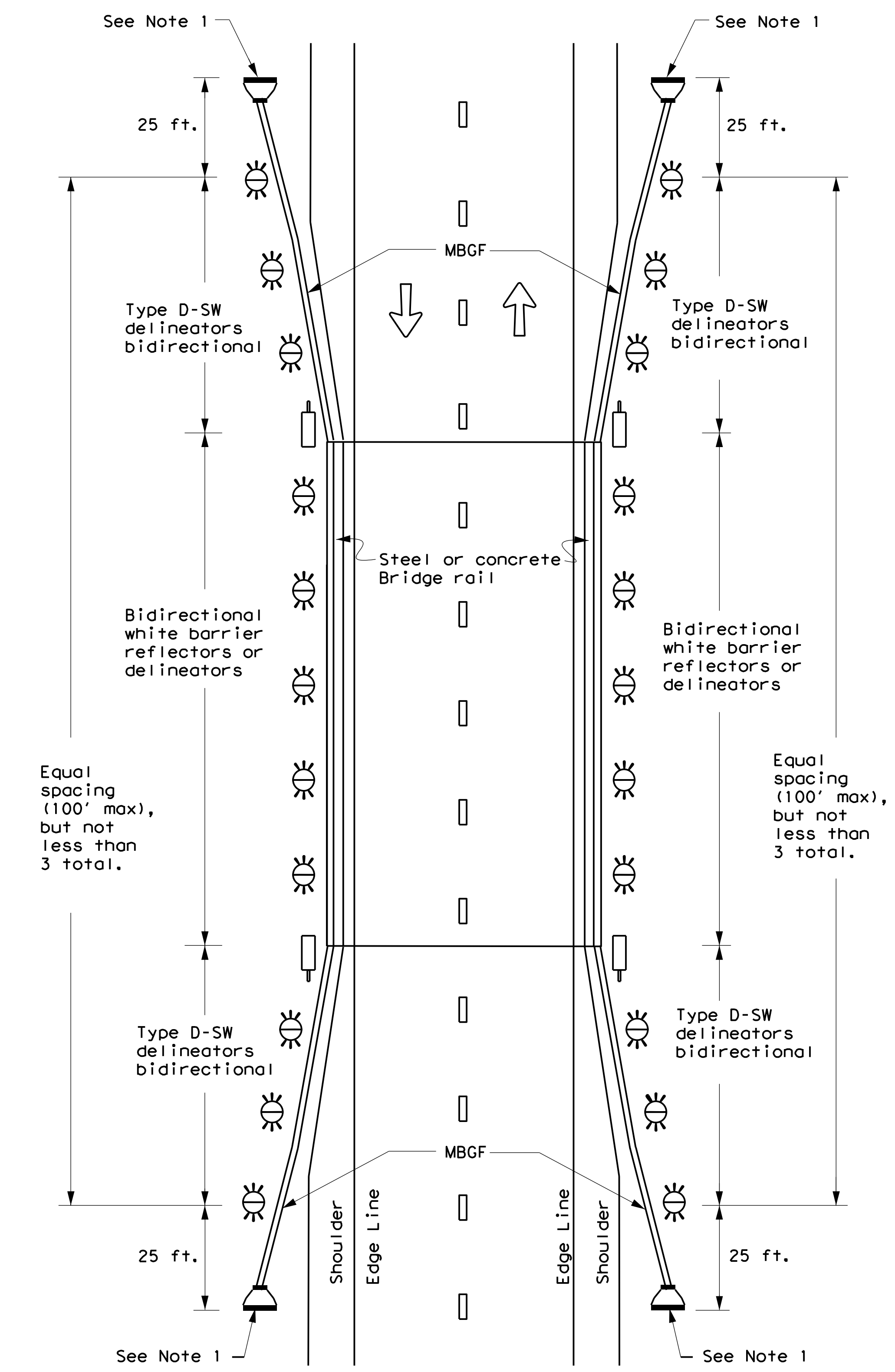
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		136

20D

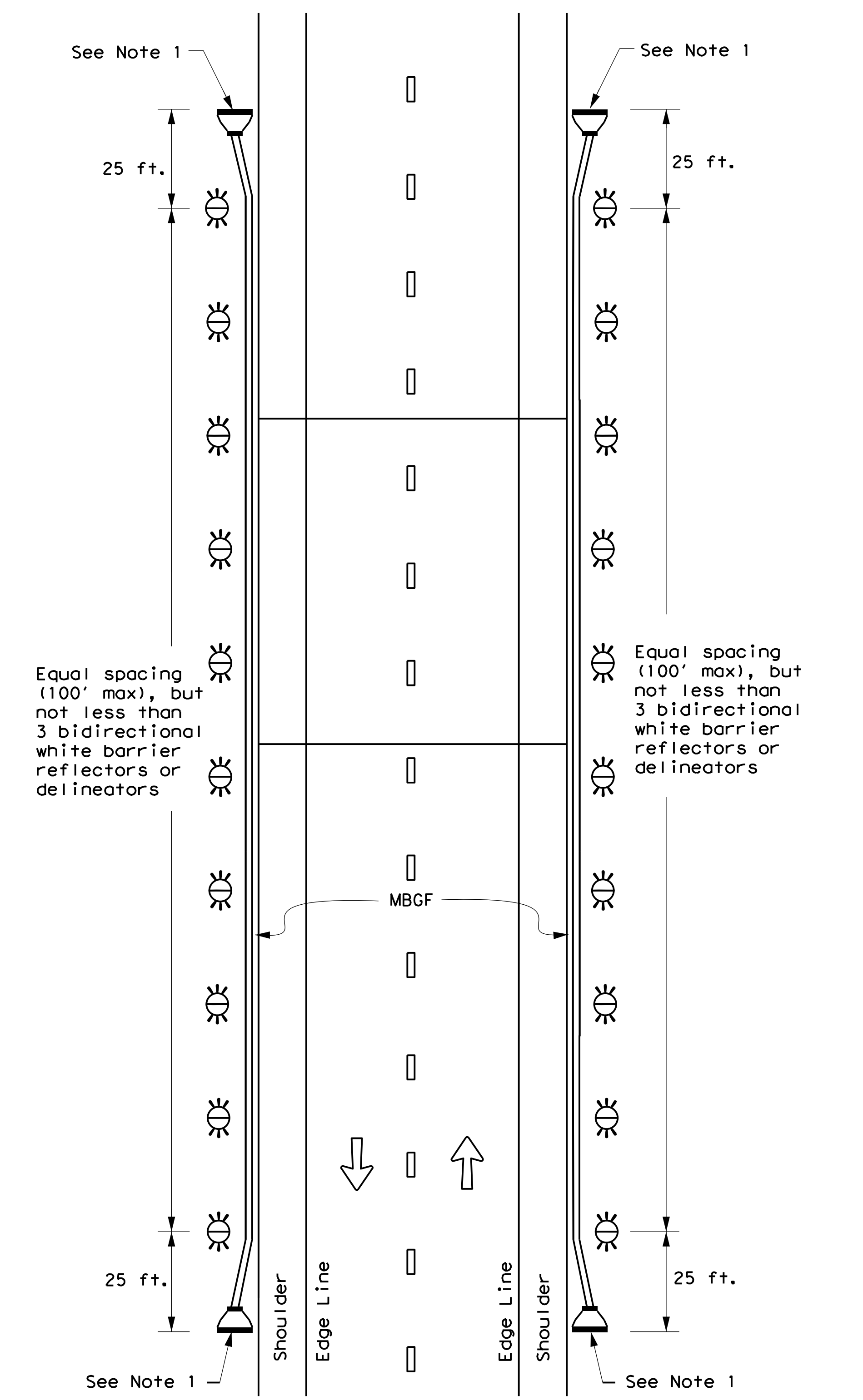
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

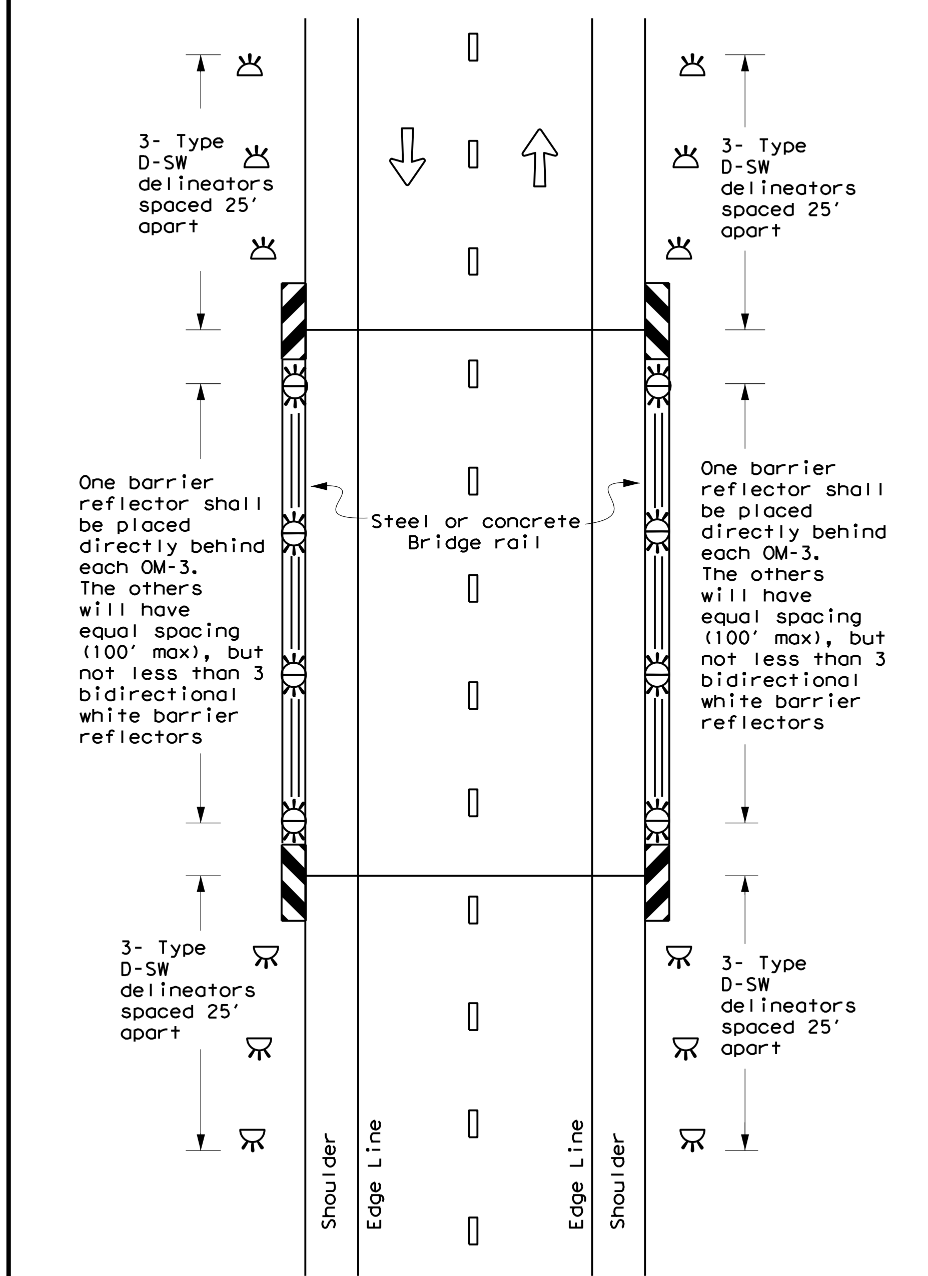
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-20	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	137

20E

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FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/1155040 13/4 - Design/Plan Set/8. Traffic/smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

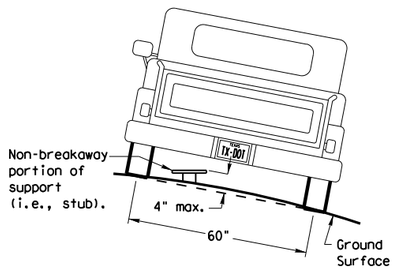
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

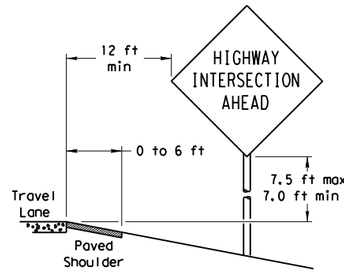
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

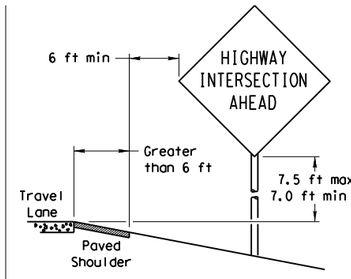
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

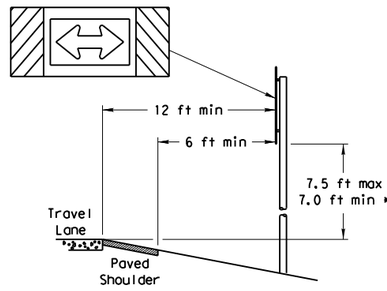
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



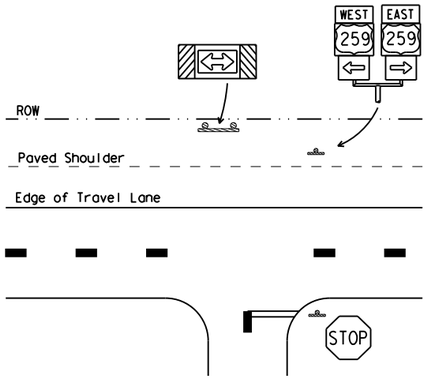
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

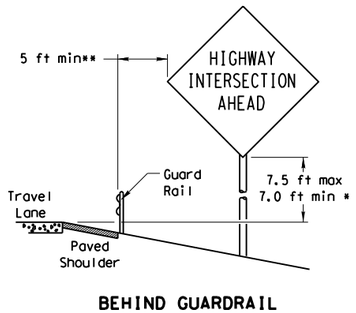
T-INTERSECTION



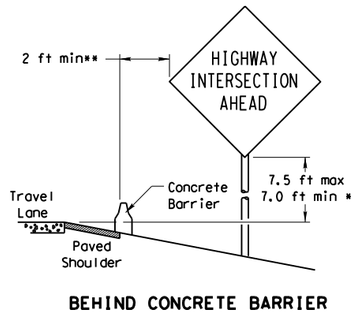
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



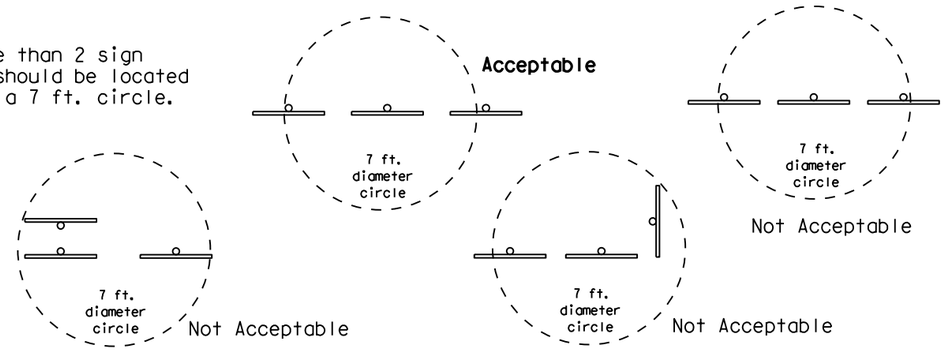
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

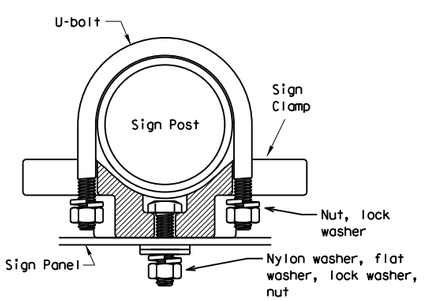
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

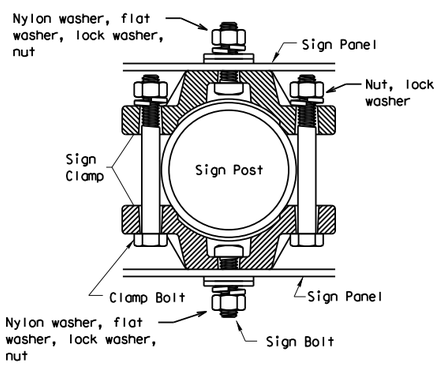


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

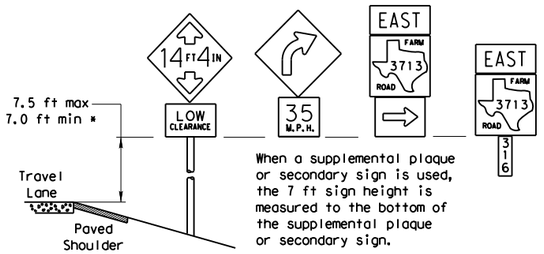
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



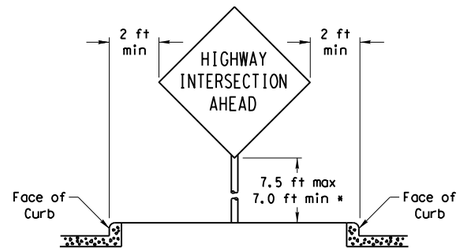
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



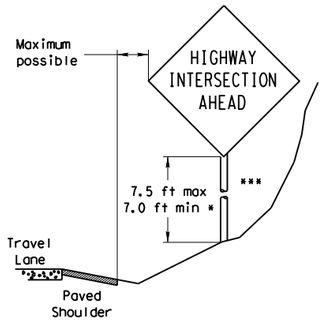
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

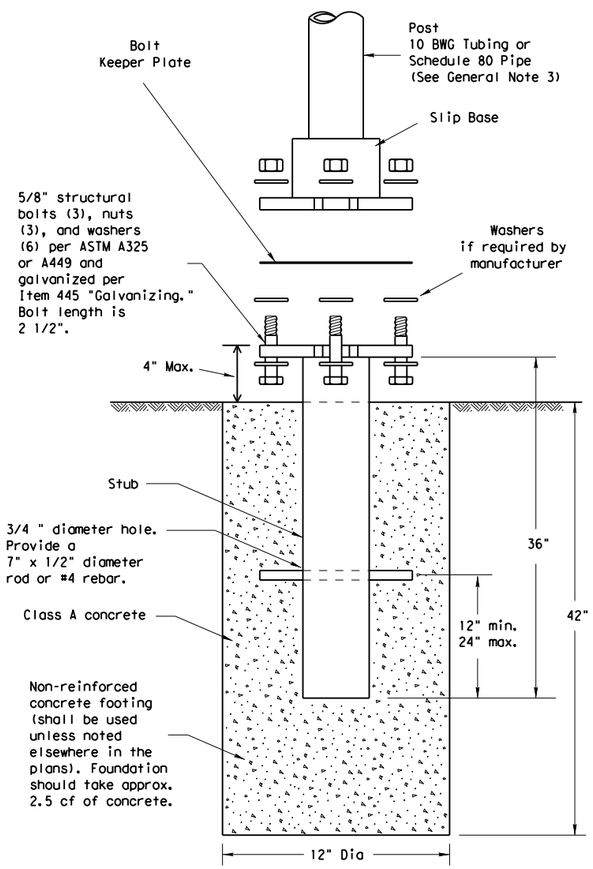
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1155	04	013, ETC.	FM 1785, ETC
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		138

DATE: 5/25/2022 1:36:23 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 - ABL/Design Projects/115504013/4 - Design/Plan Set/8. Traffic/smdsl.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.

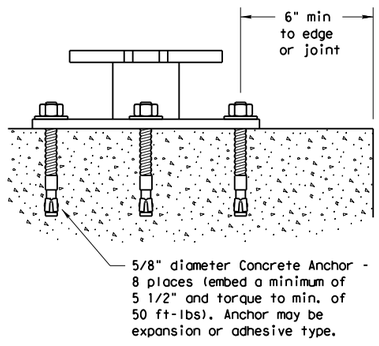
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC

DIST	COUNTY	SHEET NO.
ABL	BORDEN	139

DATE: 5/25/2022 1:36:28 PM
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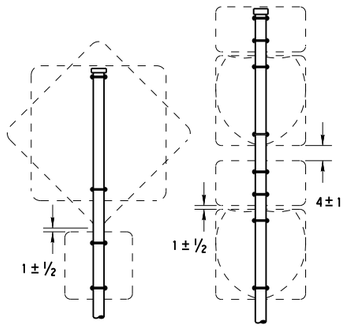
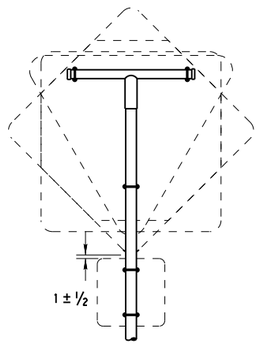


SM RD SGN ASSM TY XXXXX(1)XX(P)



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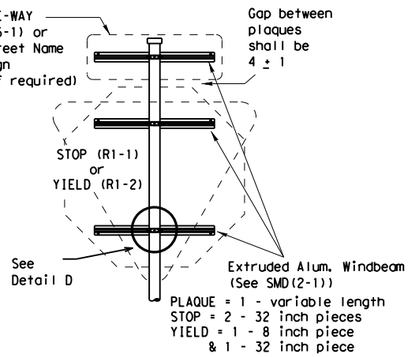

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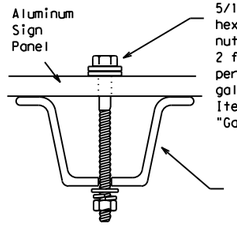
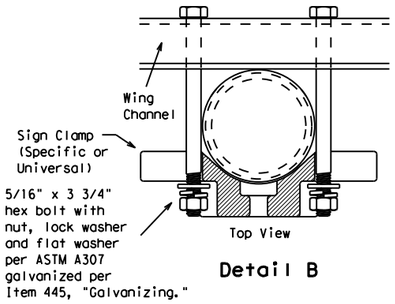
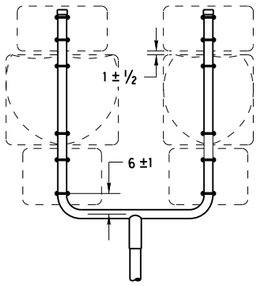


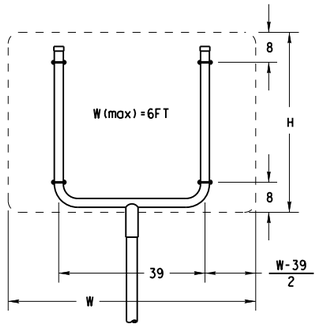
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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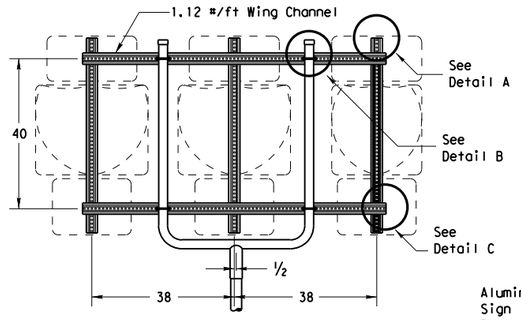
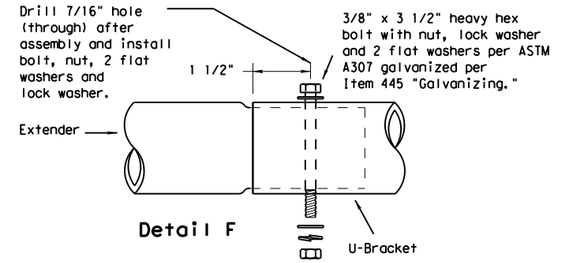
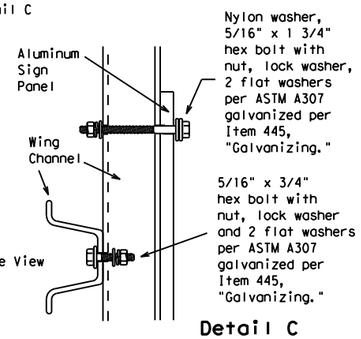


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

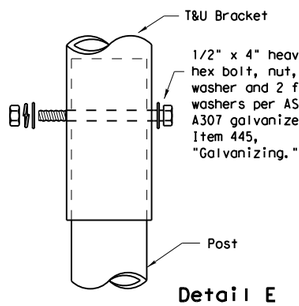


Detail F

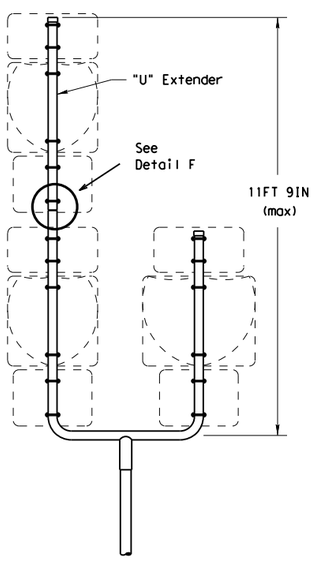
Splices shall only be allowed behind the sign substrate.



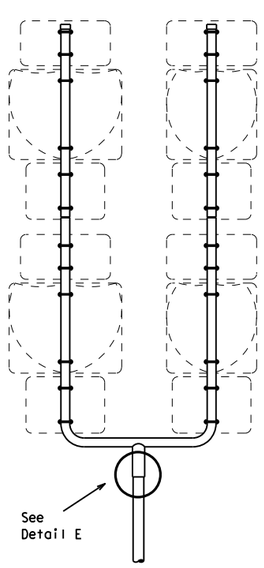
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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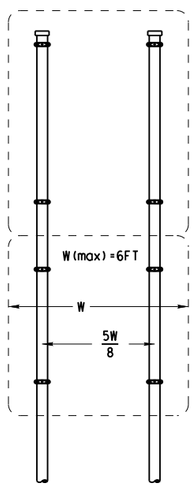
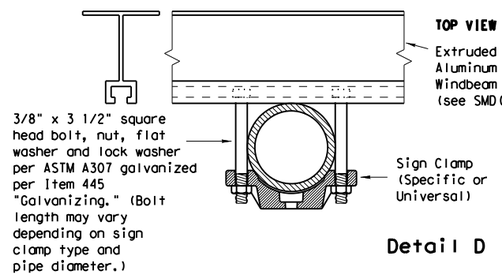
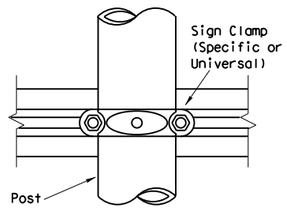


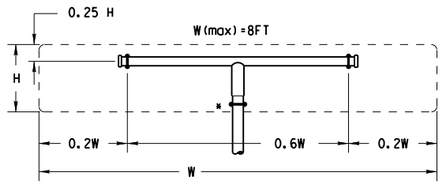
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

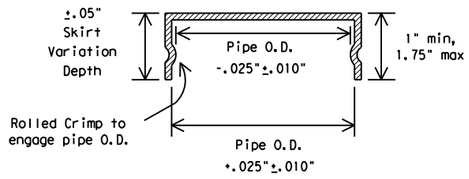




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC

DIST	COUNTY	SHEET NO.
ABL	BORDEN	140

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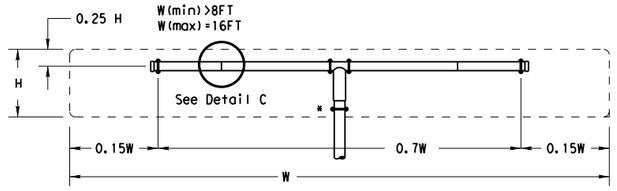
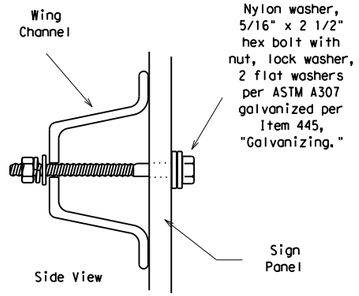
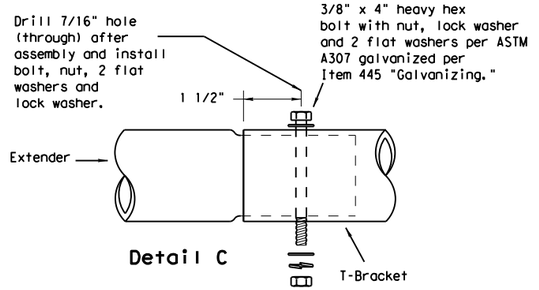


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



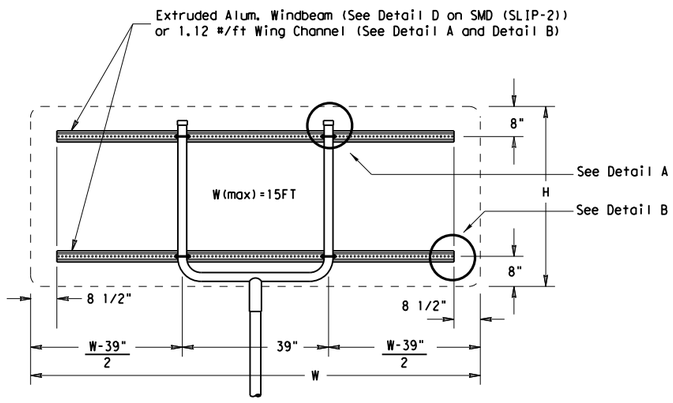
Detail C

Splices shall only be allowed behind the sign substrate.

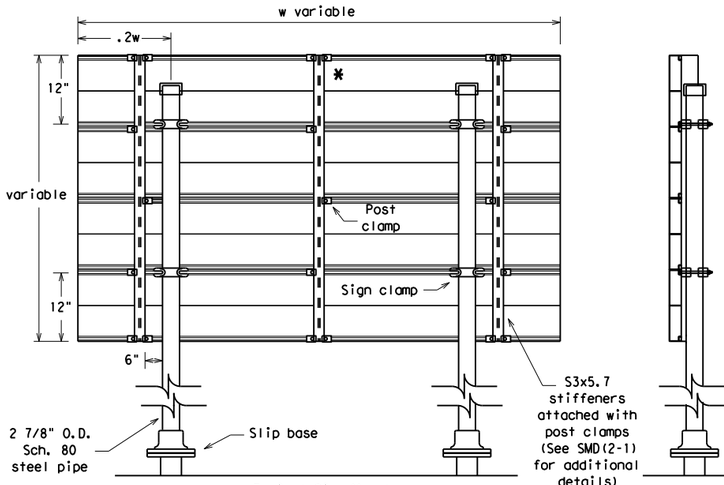
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

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.



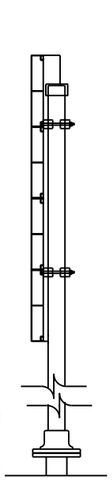
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



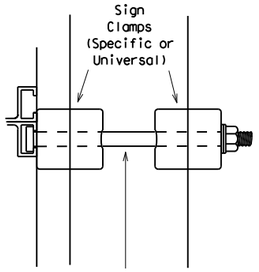
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

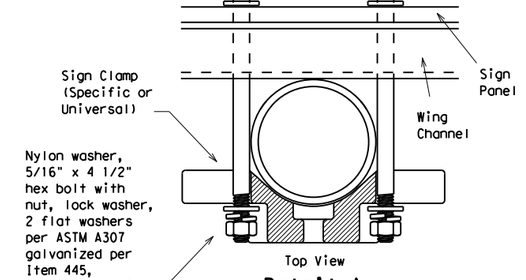
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



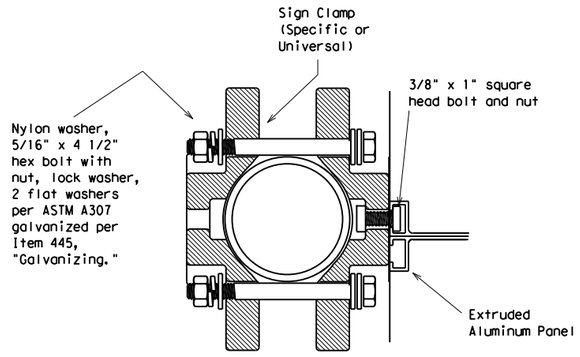
See Detail E
for clamp installation



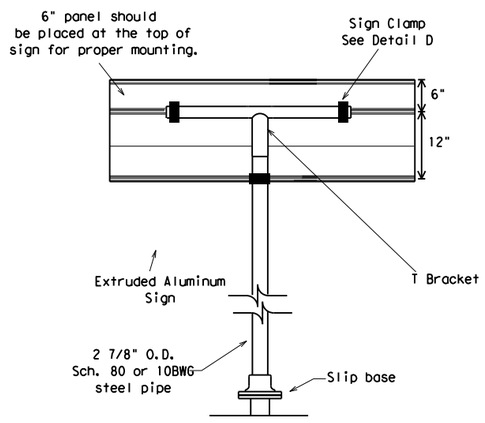
Detail E



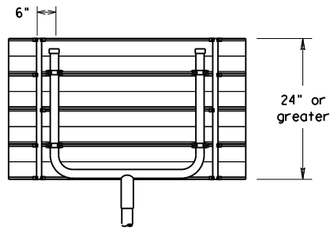
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



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

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1155	04	013, ETC.FM 1785, ETC	
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		141

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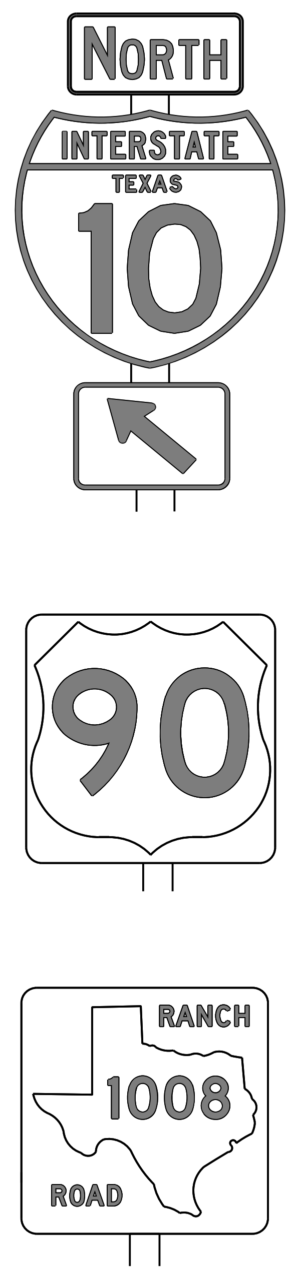
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

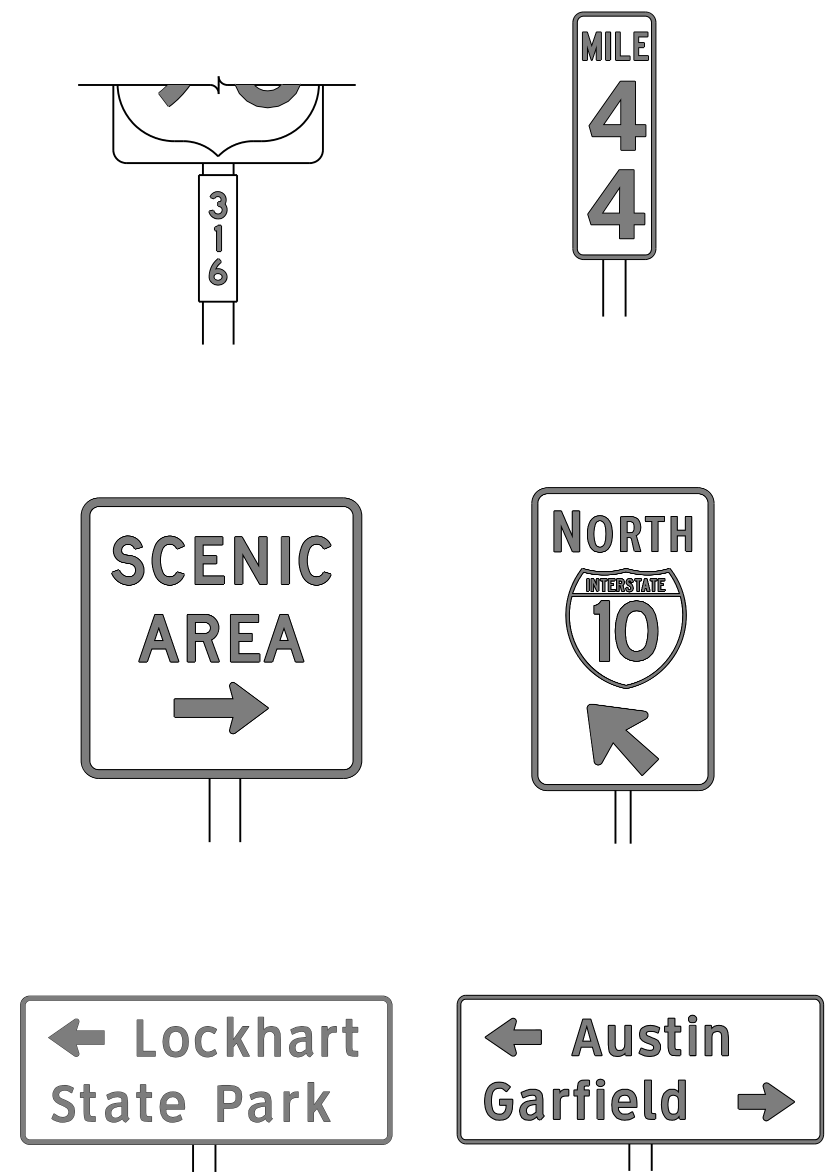
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

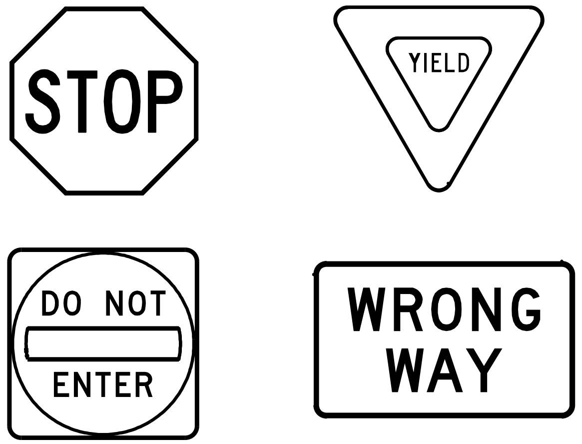
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
12-03 7-13	DIST		COUNTY	SHEET NO.
9-08	ABL		BORDEN	142

3

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

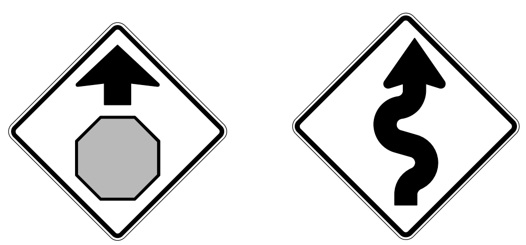
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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 12-03 7-13 9-08	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	143

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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE: ed1-14.dgn	DN:	CK:	DW:	CK:
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REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	144

71A

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

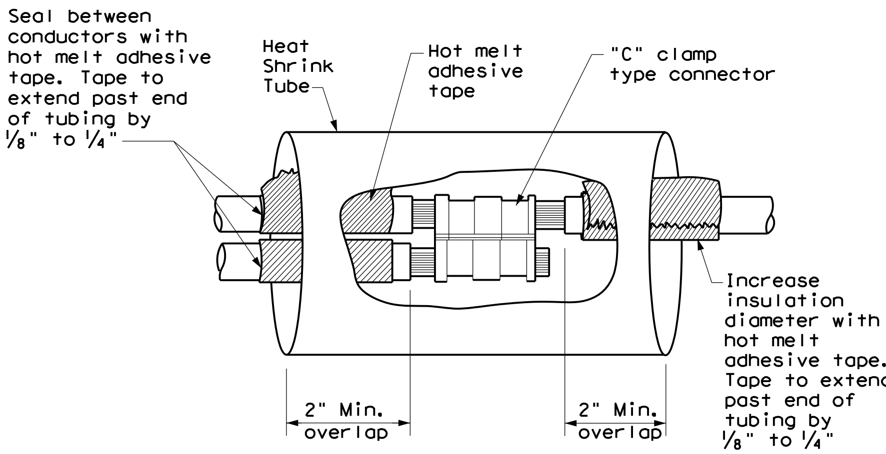
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

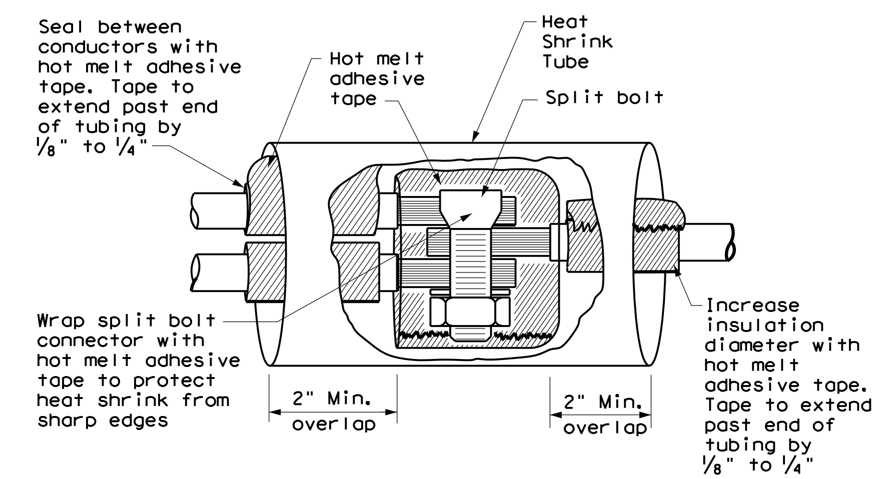
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

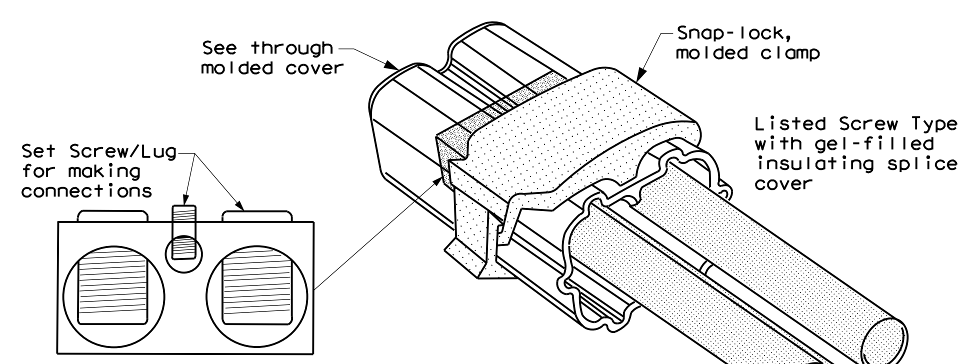
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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

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Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		145

71C

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BATTERY BOX GROUND BOXES NOTES

A. MATERIALS

1. Provide polymer concrete or fiberglass reinforced plastic (FRP) battery box ground box and cover in accordance with Departmental Material Specification (DMS) 11071 "Battery Box Ground Boxes." Battery box will accommodate up to 4 batteries, each measuring 8 in. x 13.5 in. x 10 in. (W x L x D). Label battery box ground box cover in accordance with DMS 11071.

2. Supply a marine grade batteries with covers. Secure the marine grade batteries with covers to the stainless steel rack in the bottom of the ground box with tie down straps.

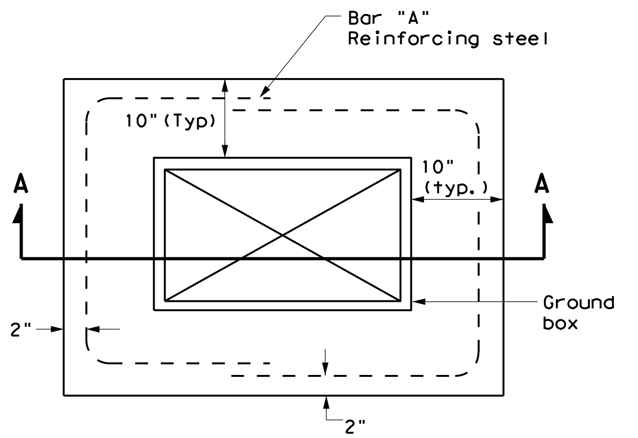
B. CONSTRUCTION METHODS

1. Ensure conduit entry will not interfere with placement of the batteries in the battery box ground box.

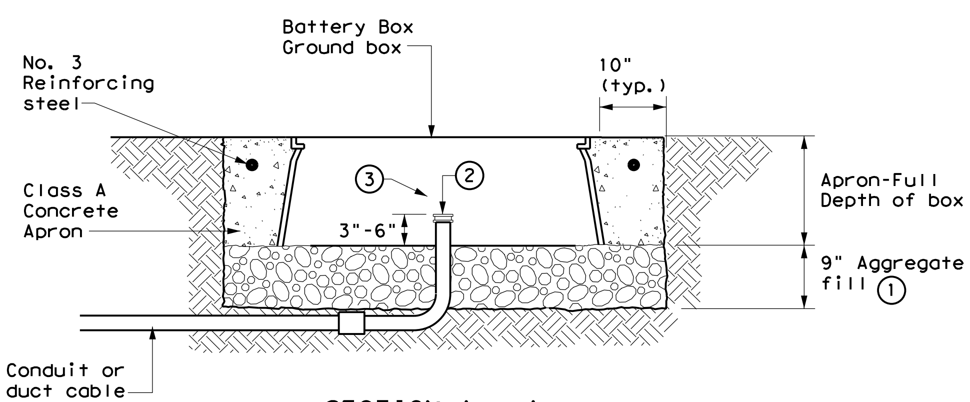
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior to setting the box. Install battery box ground box on top of aggregate.

3. Cast battery box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Battery box ground box aprons, including concrete and reinforcing steel, are subsidiary to battery box ground boxes when called for by descriptive code.

4. Bolt covers down when not working in battery box ground boxes. Keep bolt holes in the box clear of dirt.



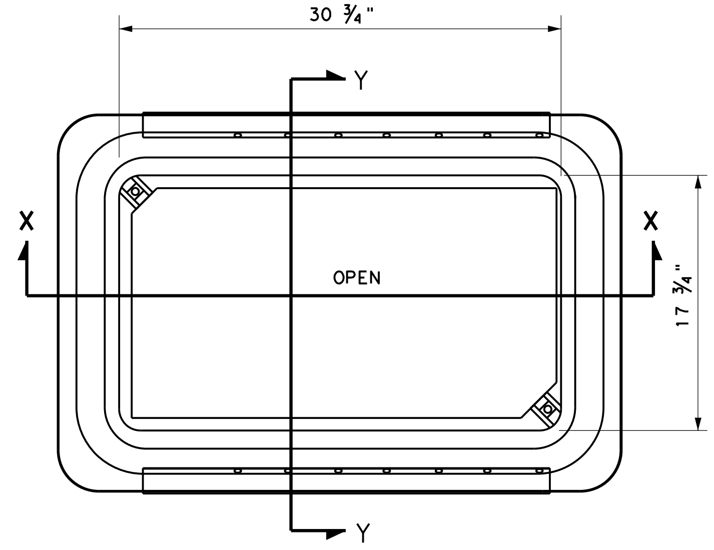
PLAN VIEW



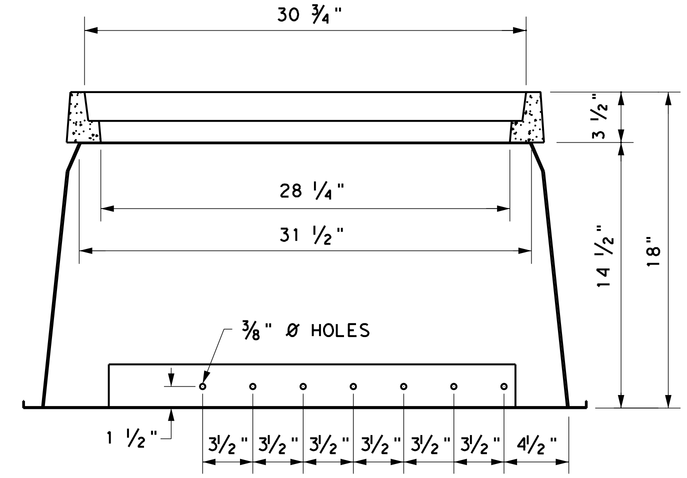
SECTION A - A

APRON FOR BATTERY BOX GROUND BOXES

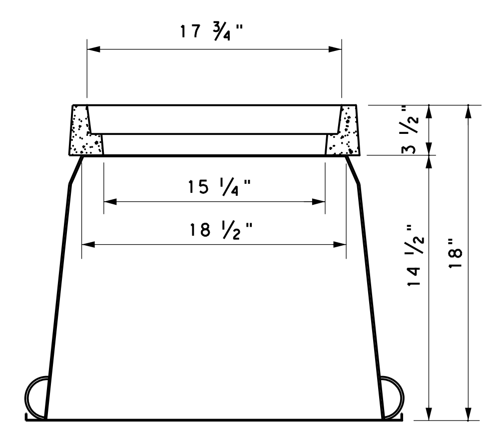
1. Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.
2. Install bushing or bell end fitting on the upper end of all ells.
3. Install all conduits in a neat and workmanlike manner.



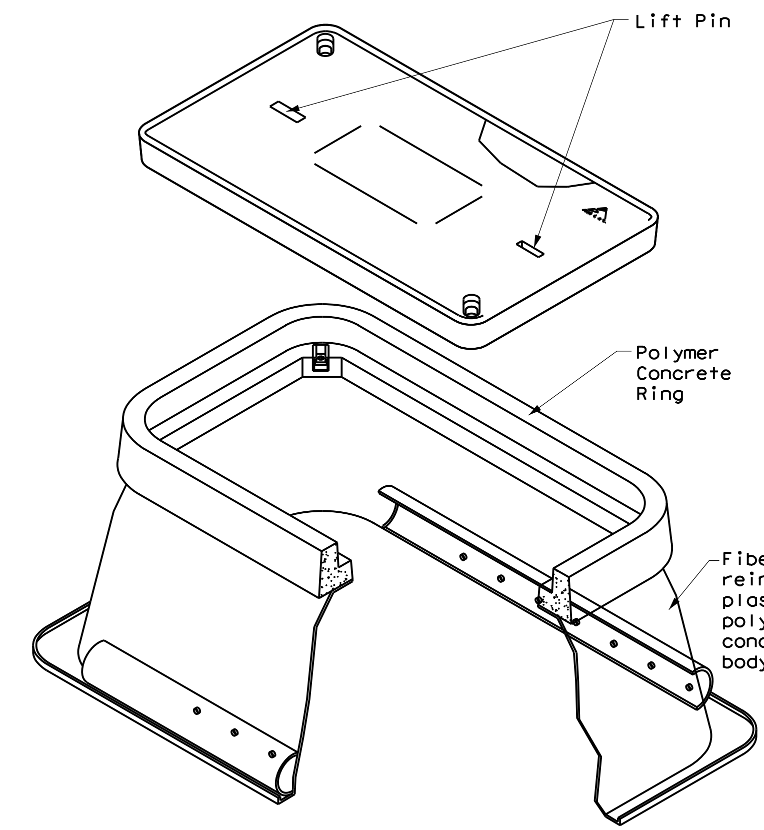
BATTERY BOX TOP VIEW



SECTION X-X



SECTION Y-Y



Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS BATTERY BOX GROUND BOXES

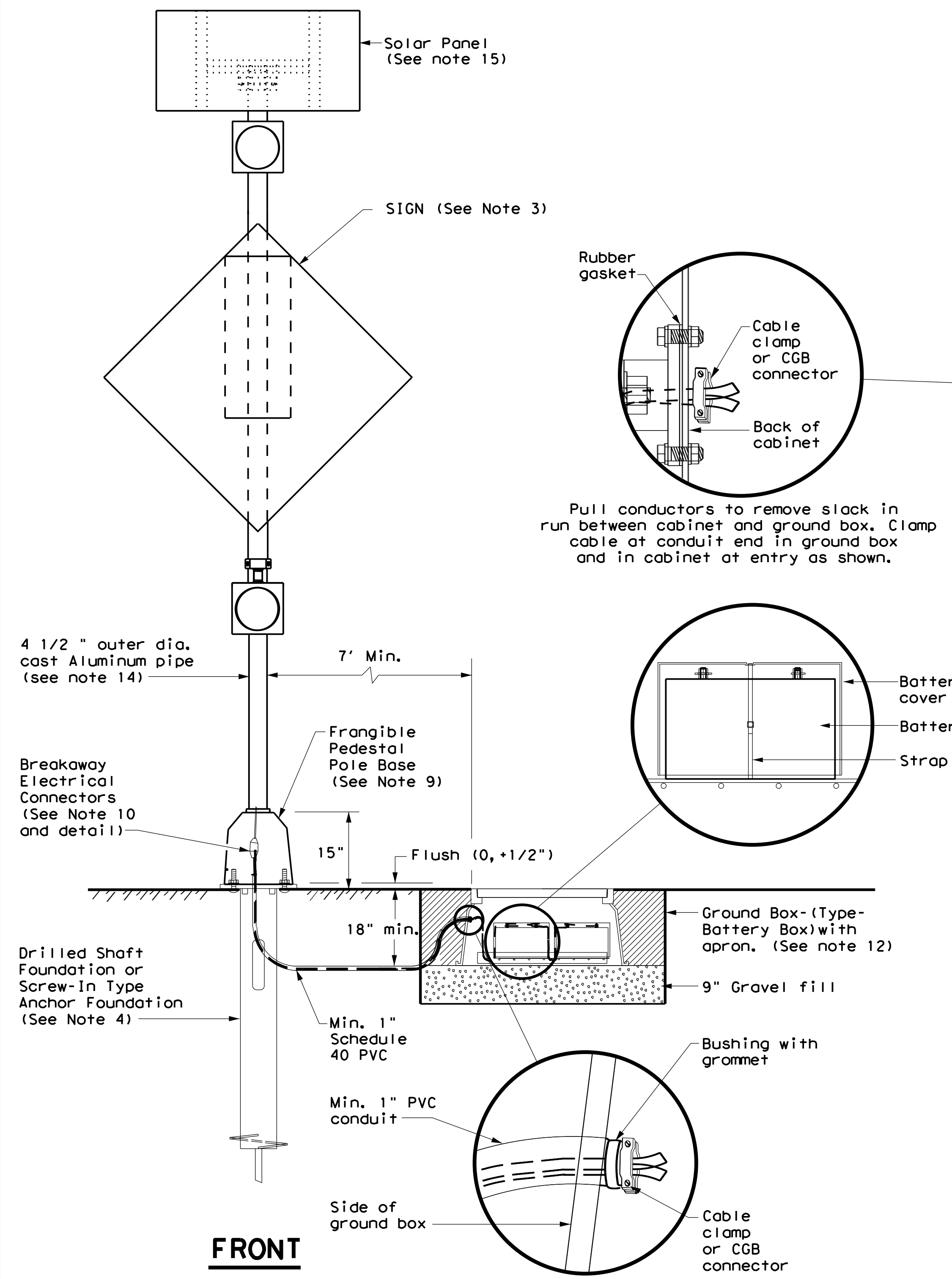
ED(12)-14

FILE: ed12-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC
	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	146

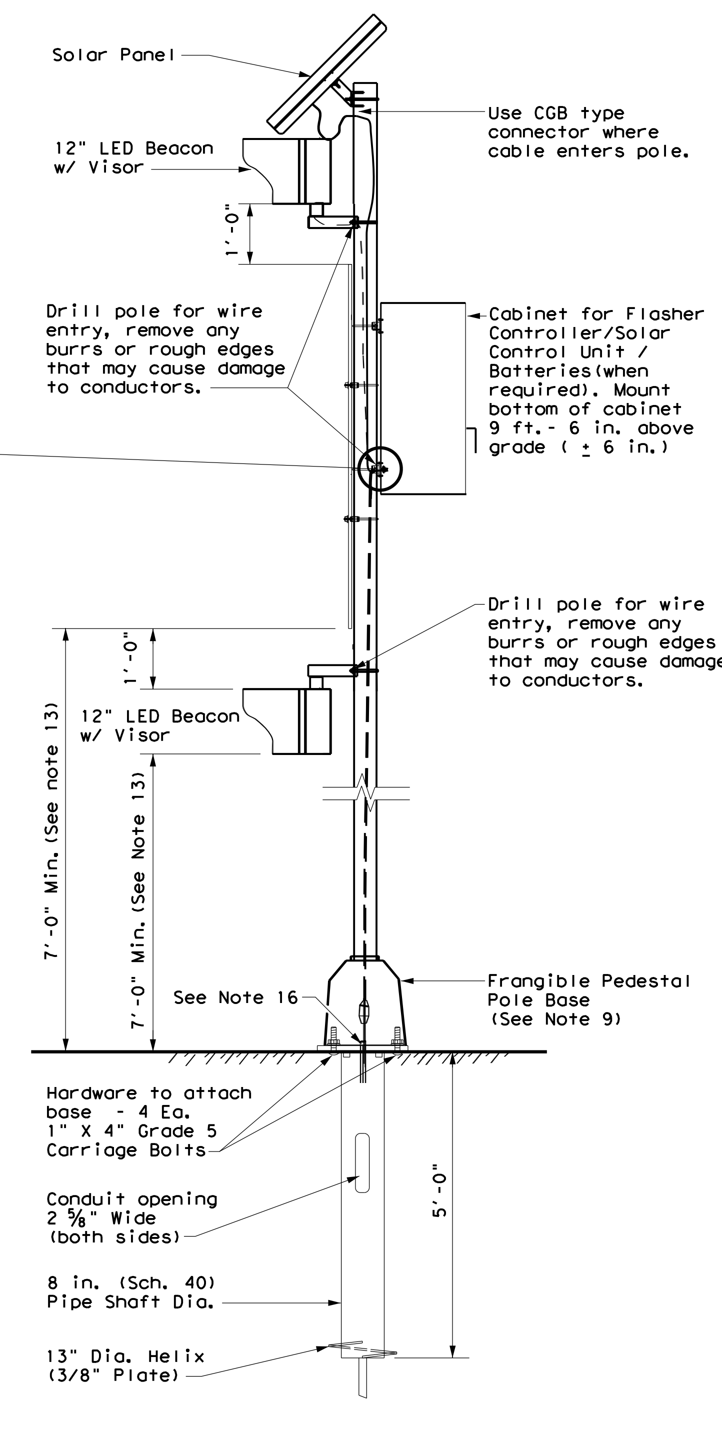
71M

GENERAL NOTES:

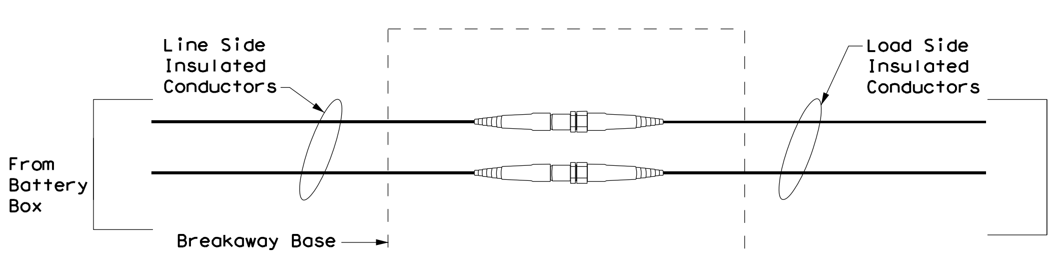
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances 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.



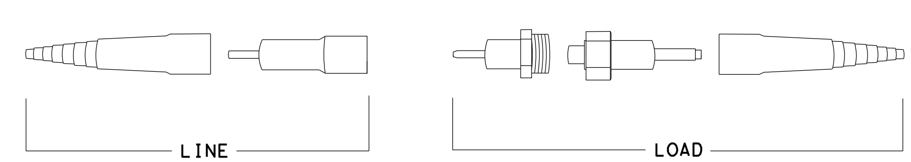
FRONT



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	1155	04	013, ETC.	FM 1785, ETC
12-04 3-13	DIST		COUNTY	SHEET NO.
	ABL		BORDEN	147

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SITE DESCRIPTION

PROJECT LIMITS:
THE PROJECT LIMITS SHOWN ON THE TITLE SHEET AND LIMITS OF TXDOT RIGHT OF WAY SHALL ALSO BE THE LIMITS OF COVERAGE OF THE SW3P.

PROJECT LOCATION MAPS: TITLE SHEET

DRAINAGE PATTERNS: SW3P SITE PLAN

APPROX. SLOPES ANTICIPATED AFTER MAJOR GRADING AND AREAS OF SOIL DISTURBANCE: TYPICAL SECTIONS

MAJOR CONTROLS AND LOCATIONS OF STABILIZATION PRACTICES: SW3P SITE PLAN

PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY PROJECT FIELD OFFICE AND LOCATED IN THE PROJECT SW3P FILE.

SURFACE WATERS AND DISCHARGE LOCATIONS:
DRAINAGE AND CULVERT LAYOUT SHEETS

TYPICAL AREAS WHICH WILL NOT BE DISTURBED: SW3P SITE PLAN

ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY: EPIC SHEET

ESTIMATED START DATES AND DURATION OF ACTIVITIES IN THE INTENDED SCHEDULE/SEQUENCE OF EARTH-DISTURBING ACTIVITIES: CONTRACT TIME ESTIMATE

NATURE OF ACTIVITY:
WIDEN ROAD - ADD SHOULDERS AND TURN LANES

MAJOR SOIL DISTURBING ACTIVITIES:
1. WIDENING SUBGRADE
2. BACKFILLING PAVEMENT EDGES
3. CULVERT WORK, INCLUDING EXTENSION AND SET INSTALLATION

TOTAL PROJECT AREA:
50 ACRES

TOTAL AREA TO BE DISTURBED (AT EACH SITE):
10.6 ACRES

WEIGHTED RUNOFF COEFFICIENT BEFORE CONSTRUCTION:
0.2

WEIGHTED RUNOFF COEFFICIENT AFTER CONSTRUCTION:
0.2

EXISTING CONDITION OF SOIL & VEGETATIVE COVER:
FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES

% OF EXISTING VEGETATIVE COVER:
70%

NAME OF RECEIVING WATERS:
STREAM SEGMENT 1413 OF THE COLORADO RIVER BASIN

EROSION AND SEDIMENT CONTROLS

USE "T" OR "P" IN THE BLANKS BELOW IF APPLICABLE (T= TEMPORARY, P= PERMANENT)

SOIL STABILIZATION PRACTICES:

P	BUFFER ZONES		PERMANENT PLANTING, SODDING, OR SEEDING
	MULCHING	P	PRESERVATION OF NATURAL RESOURCES
	TEMPORARY SEEDING		SOIL RETENTION BLANKET
	OTHER		OTHER

OTHER:

DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITIES ARE SCHEDULED TO RESUME WITHIN 14 DAYS.

FOR CONSTRUCTION PROJECTS, THIS DISTRICT OF THE TEXAS DEPARTMENT OF TRANSPORTATION USES SITEMANAGER, A COMPUTER BASED CONSTRUCTION RECORD-KEEPING SYSTEM, AS PART OF RECORD FOR PROJECT WORK INCLUDING ENVIRONMENTAL RELATED ACTIVITIES. DOCUMENTATION DESCRIBING MAJOR GRADING ACTIVITES, TEMPORARY OR PERMANENT CESSATION OF CONSTRUCTION AND STABILIZATION MEASURE IS PART OF THIS SYSTEM AND IS INCORPORATED BY REFERENCE INTO THIS SW3P.

STRUCTURAL PRACTICES:

	CHANNEL LINERS		DIVERSION DIKE AND SWALE COMBINATIONS
	CURBS AND GUTTERS		DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
	HAY BALES		DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
	PAVED FLUMES		ROCK BEDDING AT CONSTRUCTION EXIT
	PIPE SLOPE DRAINS		STONE OUTLET STRUCTURES
	STORM SEWERS		STORM INLET SEDIMENT TRAP
	SEDIMENT BASINS	T	TEMPORARY EROSION CONTROL LOGS (BIOLOGS)
	SEDIMENT TRAPS		TIMBER MATTING AT CONSTRUCTION EXIT
T	SILT FENCES		VEGETATIVE FILTER STRIPS
	ROCK FILTER DAMS		VELOCITY CONTROL DEVICES
	EROSION CONTROL LOGS	T	LINED CONCRETE WASHOUT

OFFSITE VEHICLE TRACKING CONTROLS:

	HAUL ROADS DAMPENED FOR DUST CONTROL
	EXCESS DIRT ON ROAD REMOVED DAILY
	LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
	STABILIZED CONSTRUCTION ENTRANCE
	OTHER

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:
1. INSTALL STORMWATER MANAGEMENT BMPS.
2. WINDROW TOPSOIL TO THE EDGE OF THE CONSTRUCTION AREAS
3. COMPLETE CULVERT AND ROADWAY WORK.
4. WINDROW SOIL TO THE NEW EDGE OF PAVEMENT.

STORM WATER MANAGEMENT:
1. SEDIMENT CONTROL FENCES
2. EROSION CONTROL LOGS

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER
P.E.
05/24/2022

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:
ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE, BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMAGE FROM HEAVY EQUIPMENT. THE AREAS ADJACENT TO CREEKS AND DRAINAGE WAYS SHALL HAVE PRIORITY FOLLOWED BY DEVICES PROTECTING STORM SEWER INLETS.

INSPECTION:
AN INSPECTION WILL BE PERFORMED BY A TXDOT INSPECTOR EVERY 7 DAYS. AN INSPECTION AND MAINTENANCE REPORT WILL BE MADE PER EACH INSPECTION. BASED ON THE INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED PER THE INSPECTION REPORT.

WASTE MATERIALS:
ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER. THE DUMPSTER WILL MEET ALL STATE AND LOCAL CITY SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE WILL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER WILL BE EMPTIED AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION AND THE TRASH WILL BE HAULED TO A PERMITTED LANDFILL. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE. CONSTRUCTION DEBRIS AND LITTER SHOULD BE PICKED UP ON A DAILY BASIS UNLESS OTHERWISE DIRECTED BY THE ENGINEER. WASTE AND DIRT PILES SHOULD BE REMOVED ON A WEEKLY BASIS.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):
NO LONG TERM WATER QUALITY IMPACTS ARE EXPECTED AS A RESULT OF THE PROPOSED PROJECT. SEE THE NEXT PLAN SHEET FOR A LIST OF POTENTIAL POLLUTANTS. IN THE

WILL BE INSTRUCTED IN THE PROCEDURES FOR SPILL HANDLING AND DISPOSING OF ANY HAZARDOUS MATERIALS THEY WILL BE USING. ALL SPILLS, INCLUDING THOSE OF LESS THAN 25 GALLONS SHALL BE CLEANED IMMEDIATELY AND ANY CONTAMINATED SOIL SHALL BE IMMEDIATELY REMOVED FROM THE SITE AND BE DISPOSED OF PROPERLY. DESIGNATED AREAS SHALL BE DETERMINED BY THE AREA ENGINEER FOR SPOILS DISPOSAL AND MATERIAL STORAGE. THESE AREAS SHALL BE PROTECTED FROM RUN-ON AND RUN-OFF. MATERIALS RESULTING FROM THE DESTRUCTION OF EXISTING ROADS AND BEING REMOVED AND/OR DISPOSED OF BY THE CONTRACTOR WILL BE DONE SO IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL LAWS, ORDINANCES AND REGULATIONS AND WITH THE APPROVAL OF THE PROJECT ENGINEER. ANY CHANGES TO AMBIENT WATER QUALITY DURING CONSTRUCTION OF THE PROPOSED PROJECT SHALL BE PROHIBITED AND MAY RESULT IN ADDITIONAL WATER QUALITY CONTROL MEASURES, WHICH SHALL BE MITIGATED AS SOON AS POSSIBLE AND SHALL BE REPORTED TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) WITHIN 24 HOURS OF BECOMING AWARE OF IMPACTS.

SANITARY WASTE:
ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

REMARKS:
CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS.
ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICABLE OF TEMPORARY EMBANKMENT, TEMPORARY BRIDGES, MATTING, FALSEWORK PILING, DEBRIS OR OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT PART OF THE FINISHED WORK. DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WETLAND, WATER BODY OR STREAMBED.

Texas Department of Transportation

NO SCALE

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		148
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

LIST OF POTENTIAL POLLUTANTS

POTENTIAL POLLUTANT	RELATED SOURCE	CONTROLS
CEMENTATEOUS MATERIAL AND CEMENTATEOUS AGGREGATES (BROKEN CONCRETE)	REMOVAL OF CONCRETE RIPRAP, CULVERT COMPONENTS, BRIDGE COMPONENTS, ETC.	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
MILLED ASPHALTIC CEMENT PAVEMENT (MILLINGS)	OBLITERATION OF ABANDONED ROAD AND PLANING OF ASPHALT	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
VIRGIN ASPHALTIC MATERIAL INCLUSIVE OF PRIME OILS, PRECOAT AGGREGATES, AND HOT MIX BITUMINOUS MIXTURES	APPLICATIONS OF PRIME COATS, SEAL COAT, AND PAVING OPERATIONS	THIS MATERIAL SHALL BE APPLIED AT APPROPRIATE RATES FOR CONSTRUCTION PURPOSES WHICH WILL PRECLUDE THESE MATERIALS FROM ENTERING RUNOFF. IN THE EVENT OF ANY UNINTENDED DISCHARGE, CONTROLS TO CONTAIN RUNOFF WILL BE IMMEDIATELY PLACED AND TCEQ WILL BE IMMEDIATELY NOTIFIED.
CONCRETE, REBAR, WIRE, WIRE FABRIC LUMBER, NAILS, STYROFOAM BLOCK, FIBERBOARD, CURING COMPOUND AND LINSEED OIL	CONSTRUCTION OF CONCRETE BRIDGE COMPONENTS SUCH AS DRILLED SHAFTS, CULVERTS, ABUTMENTS, BENTS, REINFORCED CONCRETE SLABS, RAIL, INLET, CONCRETE TRAFFIC BARRIERS, CURB AND GUTTER, RIPRAP AND SIGN FOUNDATIONS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF. ANY TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO THEIR PREEXISTING CONDITION/ELEVATION.
MASONRY CONCRETE BLOCK, GEOGRID FABRIC, CARDBOARD, AND PLASTIC RAP	CONSTRUCTION OF MODULAR RETAINING WALL SYSTEMS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WOOD POSTS, STEEL POSTS, BARRELS, CONES, SIGN BOARDS (ALUMINUM AND PLYBOARD), FASTENERS, NUTS, BOLTS, AND WASHERS	PLACEMENT AND/OR REMOVAL OF BARRICADES, SIGNS AND TRAFFIC CONTROL DEVICES	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WOOD POST, STEEL POST, STEEL FASTENERS, NUTS, BOLTS, AND WASHERS	CONSTRUCTION OF METAL BEAM GUARD FENCE	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
STRUCTURAL STEEL I-BEAM, SIGN BOARDS, AND CONCRETE FOUNDATIONS	REMOVAL OF ROADSIDE SIGN ASSEMBLIES LARGE AND SMALL	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
THERMOPLASTIC PAINT, GLASS BEADS, REFLECTIVE TABS, AND RAISED REFLECTIVE PAVEMENT MARKERS	APPLICATION OF PAVEMENT MARKINGS/MARKERS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
PETROLEUM PRODUCTS (SMALL QUANTITIES INTRODUCED BY CONTRACTOR)	EQUIPMENT FAILURE, MAINTENANCE AND REPAIR	ALL EQUIPMENT AND VEHICLE MAINTENANCE SHALL BE PERFORMED IN A DESIGNATED AREA WITH APPROPRIATE MEASURES FOR CONTAINMENT AND PROPER DISPOSAL OF ALL WASTE MATERIALS INCLUDING HYDRAULIC OIL AND OTHER LIQUIDS IN ACCORDANCE STATE AND LOCAL WASTE MANAGEMENT REGULATIONS. ALL MATERIAL STORED PRIOR TO DISPOSAL SHALL BE CONTAINED IN A CONTAINER WITH A SECURE COVER MEETING ALL STATE AND LOCAL WASTE MANAGEMENT REGULATIONS.
ELIGIBLE NON-STORM WATER DISCHARGES INCLUDING BUT NOT LIMITED TO NON-POTABLE WATER AND NON-STORM WATER DISCHARGE	MOISTURE APPLICATIONS FOR DUST CONTROL, DENSITY, VEGETATION WATERING, NON-DETERGENT VEHICLE WASHING, AND AIR CONDITIONING CONDENSATE	THIS MATERIAL SHALL BE APPLIED AT APPROPRIATE RATES FOR CONSTRUCTION PURPOSES WHICH WILL PRECLUDE THESE MATERIALS FROM ENTERING RUNOFF. IN THE EVENT OF ANY UNINTENDED DISCHARGE, CONTROLS TO CONTAIN RUNOFF WILL BE IMMEDIATELY PLACED AND THE NON-POTABLE WATER WILL BE RECOVERED AND PROPERLY STORED FOR REUSE.
SURVEY STAKE, FLAGGING TAPE AND PAINT	SURVEY STAKING, ALIGNMENT ESTABLISHMENT	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
WASTEWATER	WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
SOAPS AND SOLVENTS	VEHICLE AND EQUIPMENT WASHING	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.
UNSUITABLE FILL MATERIAL	EXCAVATION - ROADWAY, SPECIAL AND EROSION CONTROL	THIS CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. WHEN STORED ON SITE PRIOR TO DISPOSAL, IT SHALL BE CONTAINED SO AS TO ENSURE THAT IT CANNOT ENTER SURFACE RUNOFF.

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05/24/2022

Texas Department of Transportation

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

REV. DATE: 02/27/2014

NO SCALE

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		149
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Storm water 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.

[ ] No Action Required [x] Required Action

Action No.

1. The project disturbs five or more acres of surface area: TxDOT must file a NOI and coordinate with TCEQ for CGP. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL. This includes, as required, posting a site notice and NOI for the PSL.
2. TxDOT must file a NOT for the project when final stabilization has been achieved.
3. Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
4. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
5. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

II. WORK IN OR NEAR STREAMS, WATER BODIES 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):

[x] 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.

2.

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	[x] Silt Fence	[ ] Vegetative Filter Strips
[ ] Blankets/Matting	[ ] Rock Berm	[ ] Retention/Irrigation Systems
[ ] Mulch	[ ] Triangular Filter Dike	[ ] Sedimentation Basin
[ ] Sodding	[ ] Sand Bag Berm	[ ] Constructed Wetlands
[ ] Interceptor Swale	[ ] Straw & Hay Bale Dike	[ ] Wet Basin
[ ] Diversion Dike	[ ] Brush Berms	[ ] Erosion Control Compost & Mulch
[ ] Erosion Control Compost	[ ] Erosion Control Compost	[ ] Compost Filter Berm and Socks
[ ] Compost Filter Berm and Socks	[ ] Compost Filter Berm and Socks	[ ] Sand Filter Systems
[x] Temporary Erosion Control Logs (BIOLOGS)	[x] Temporary Erosion Control Logs (BIOLOGS)	[ ] Temporary Erosion Control Logs (BIOLOGS)
[x] Preservation of Natural Resources	[ ] Sediment Traps	[ ] Permanent Vegetation (Planting, Sodding, or Seeding)
[ ] Construction Exits	[ ] 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.

[x] 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 [x] Required Action

Action No.

1. USE NATIVE VEGITATION - E.O 13112

2.

3.

4.

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

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.

[ ] No Action Required [x] Required Action

Action No.

1. MIGRATORY BIRD TREATY ACT

2.

3.

4.

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 Storm water 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 [x] 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:

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

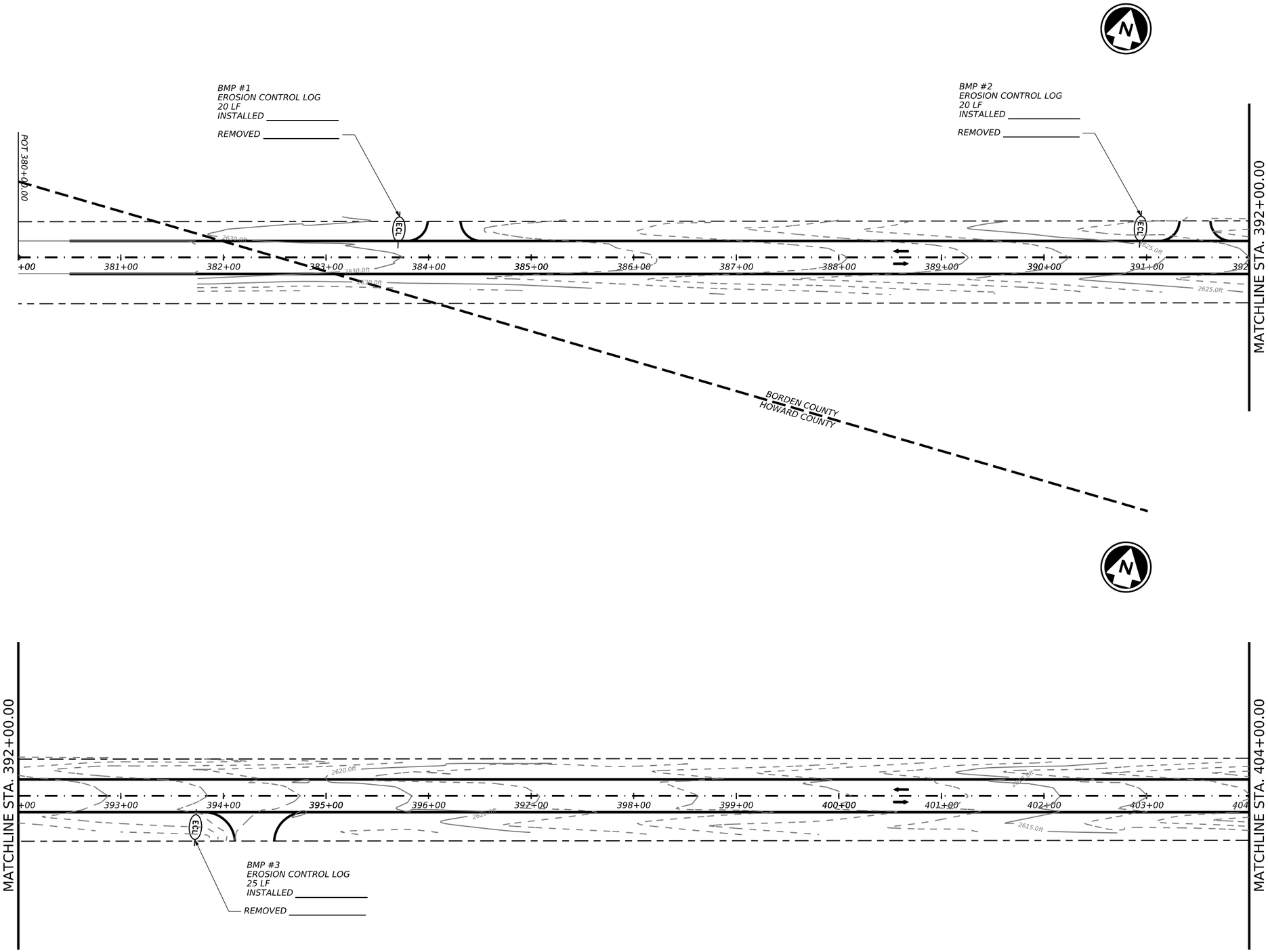
FM 1785 WIDENING ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1785, ETC.
STATE	COUNTY		SHEET NO.
TEXAS	BORDEN		150
DISTRICT	CONTROL	SECTION	JOB
ABL	1155	04	013, ETC.

PREPARED BY (NAME OF DESIGNER)
DATE: 5/25/2022
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/08 -

REV. DATE: 02/2015



LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- LCW — LINED CONCRETE WASHOUT
- ECL — EROSION CONTROL LOG
- SCF — SEDIMENT CONTROL FENCE

0 50 100
SCALE IN FEET

STATE OF TEXAS
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P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		151

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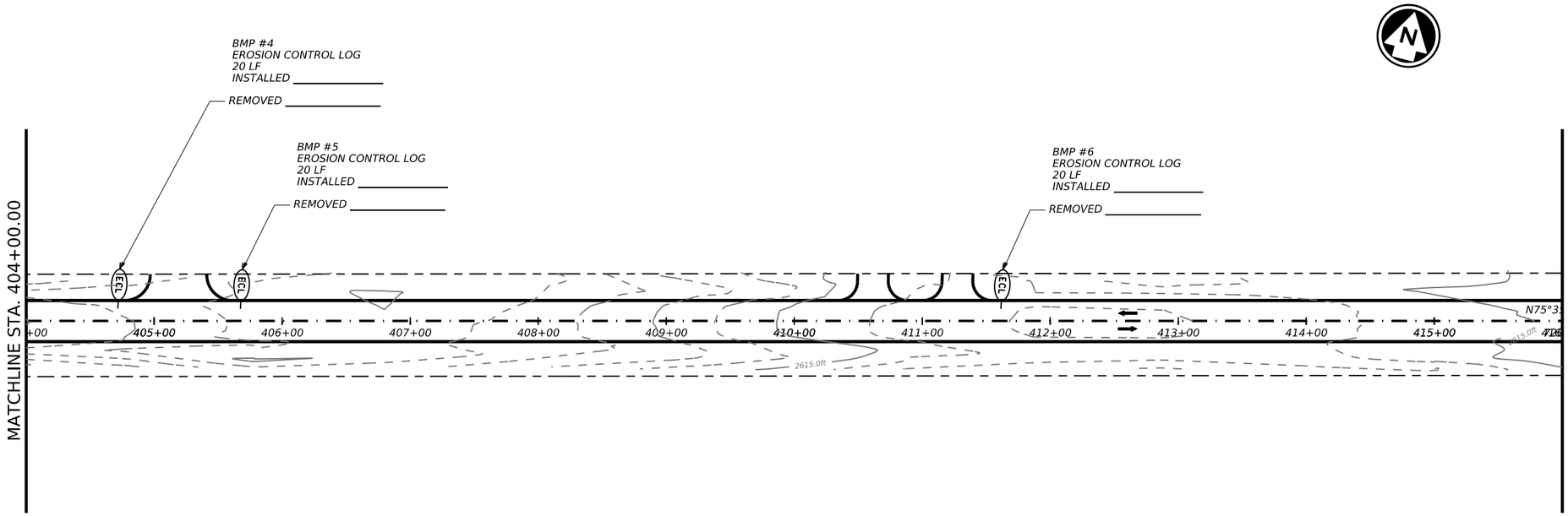

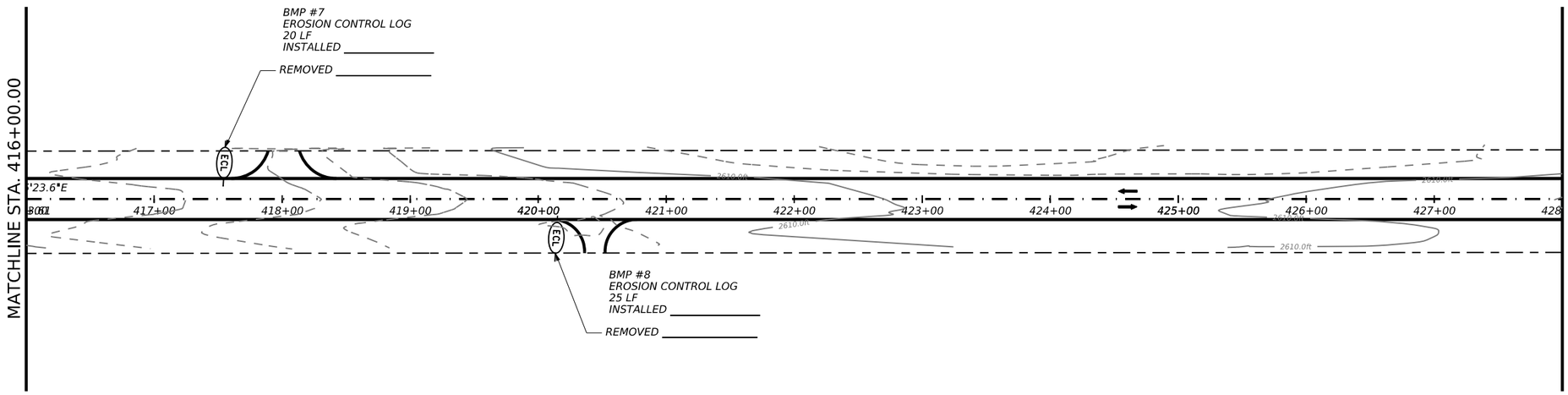

LEGEND

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0 50 100
SCALE IN FEET

STATE OF TEXAS
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FM 1785 WIDENING

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SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		152

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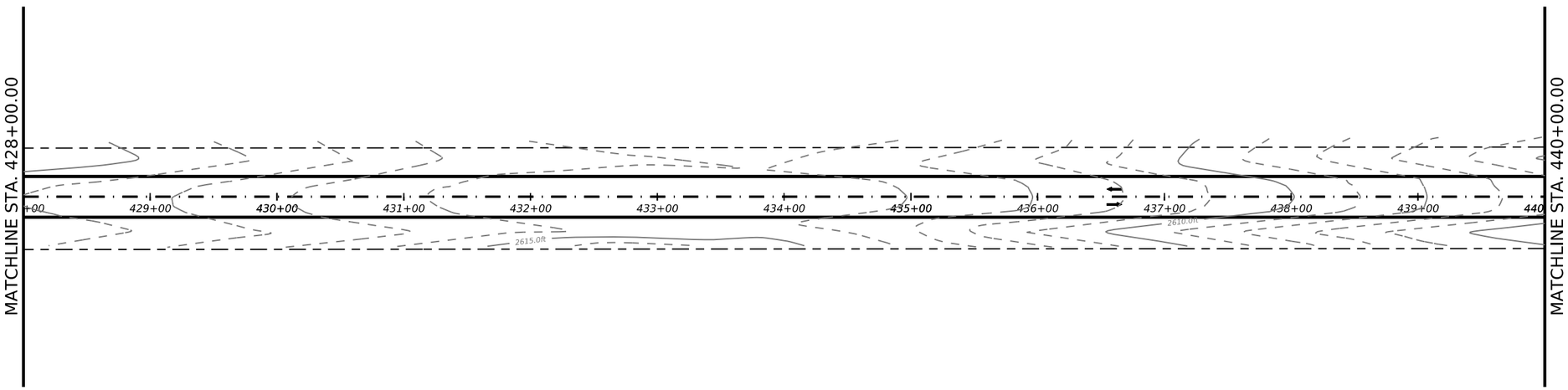

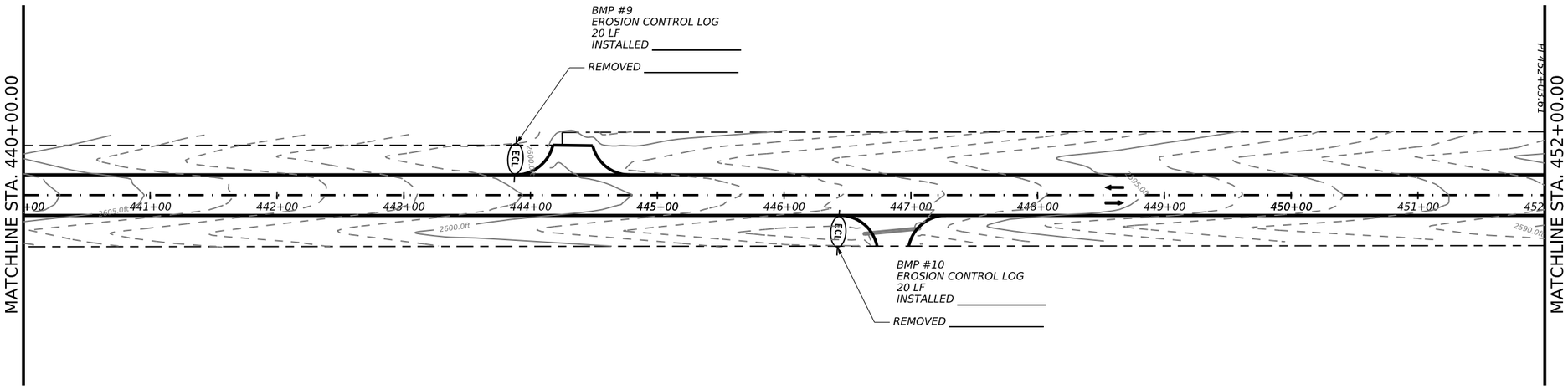

LEGEND

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SCALE IN FEET

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FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		153

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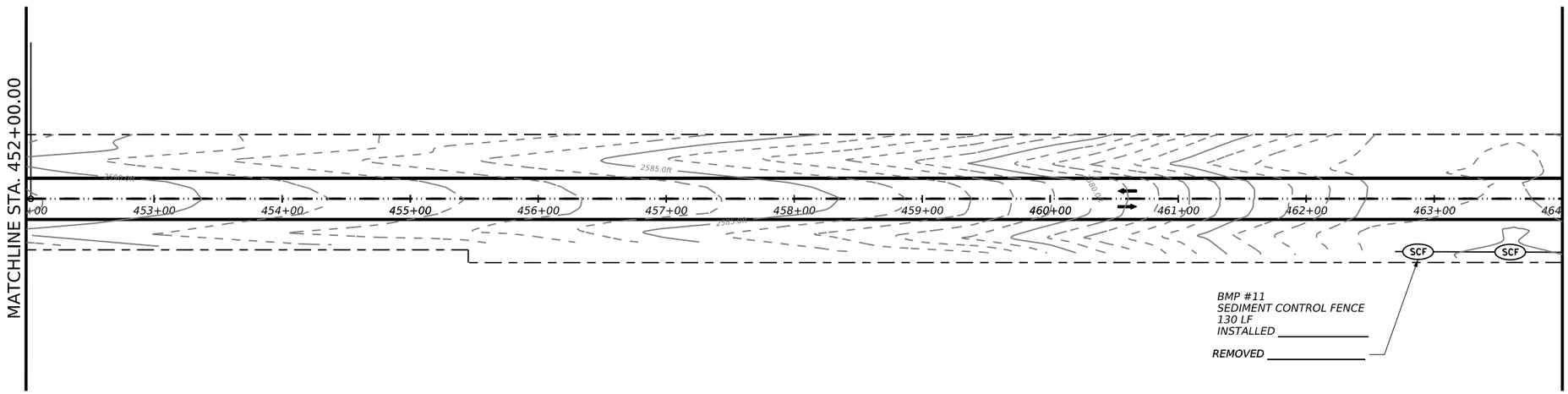

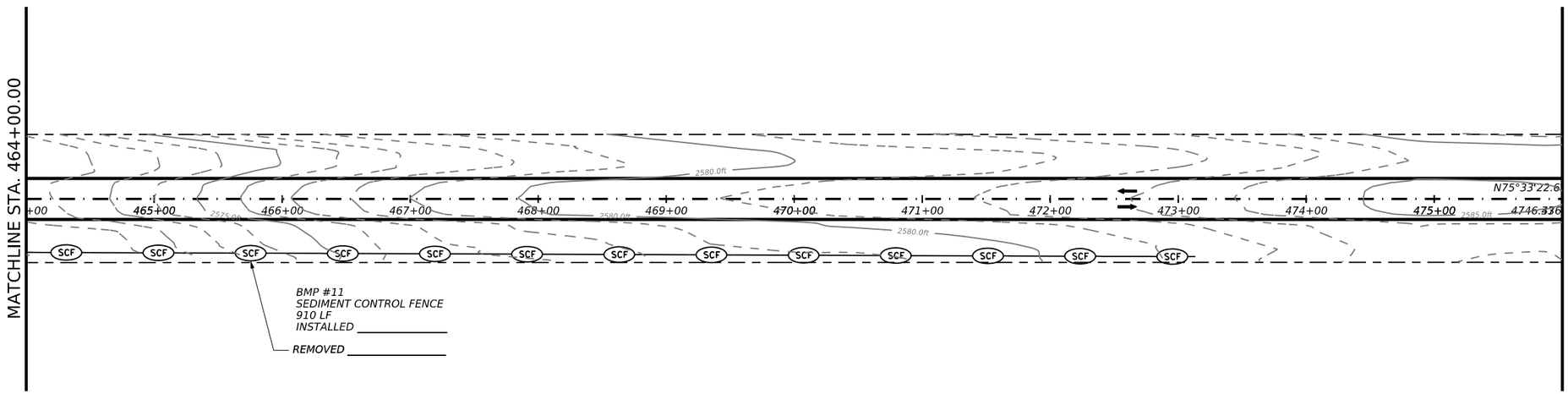

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SCALE IN FEET

STATE OF TEXAS
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05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		154

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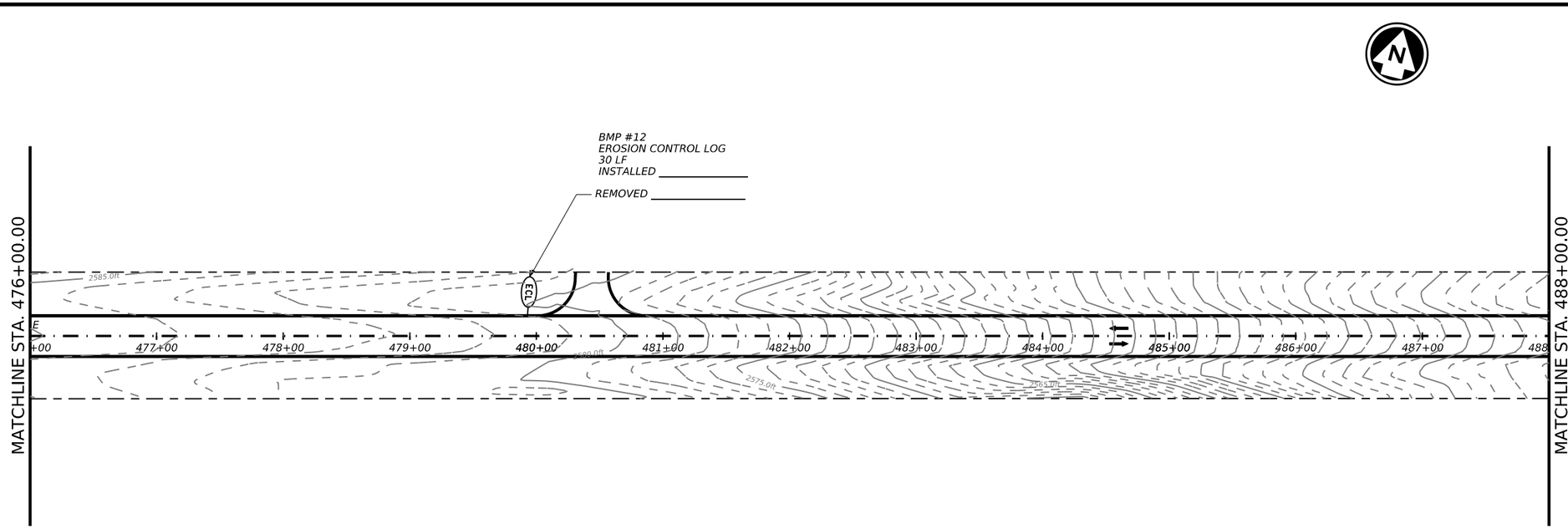

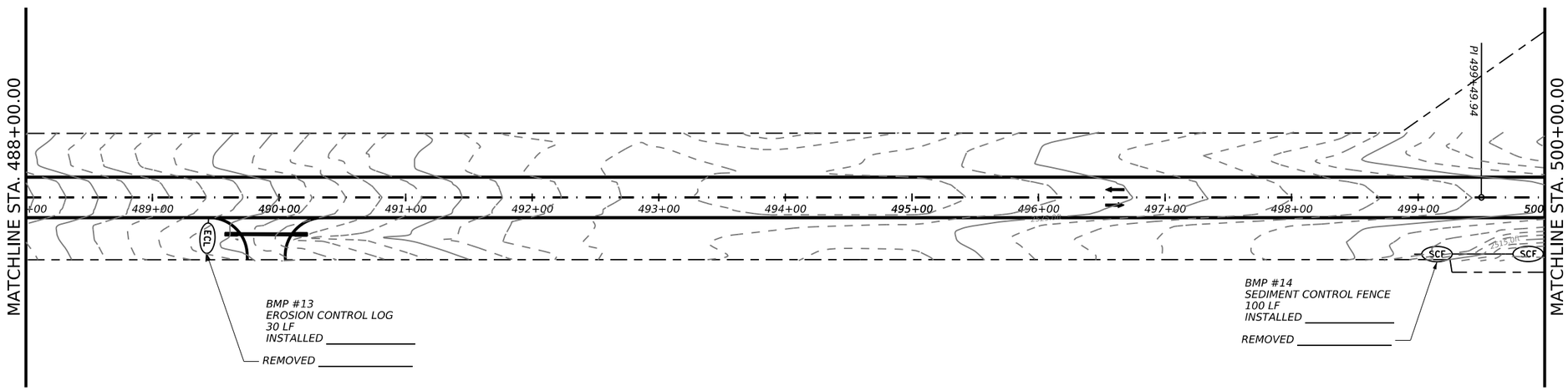

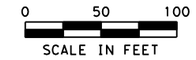

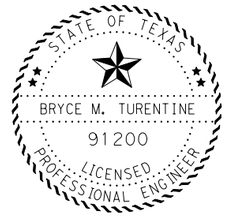

05/25/2022

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FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		155

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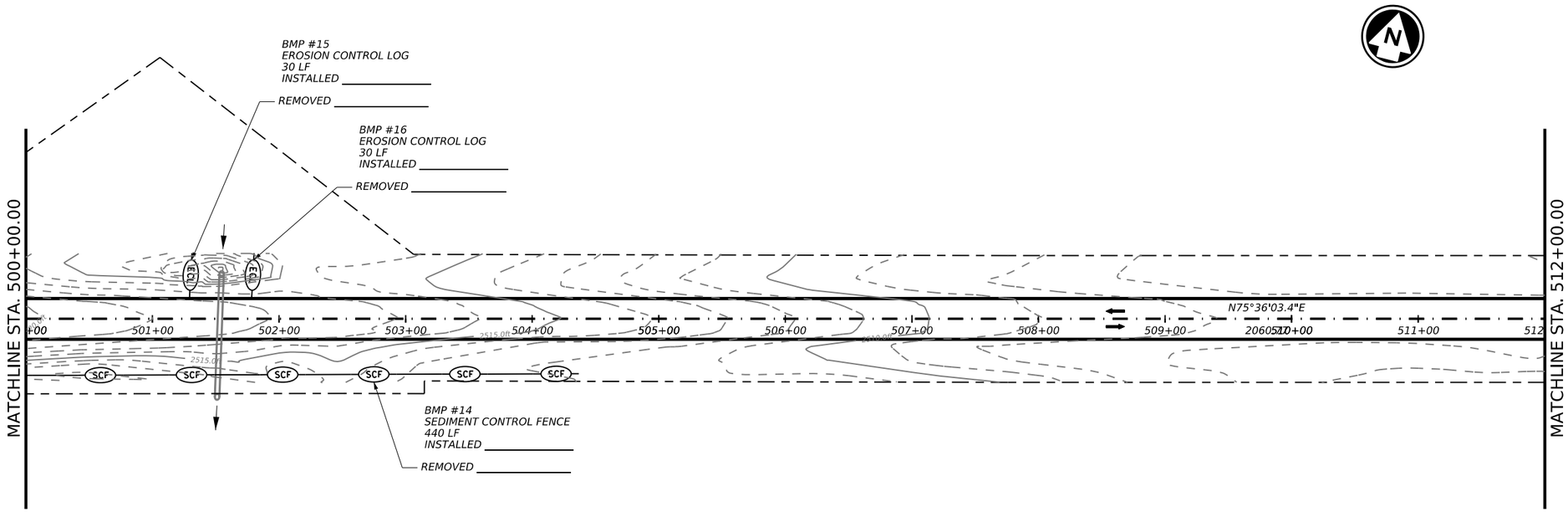

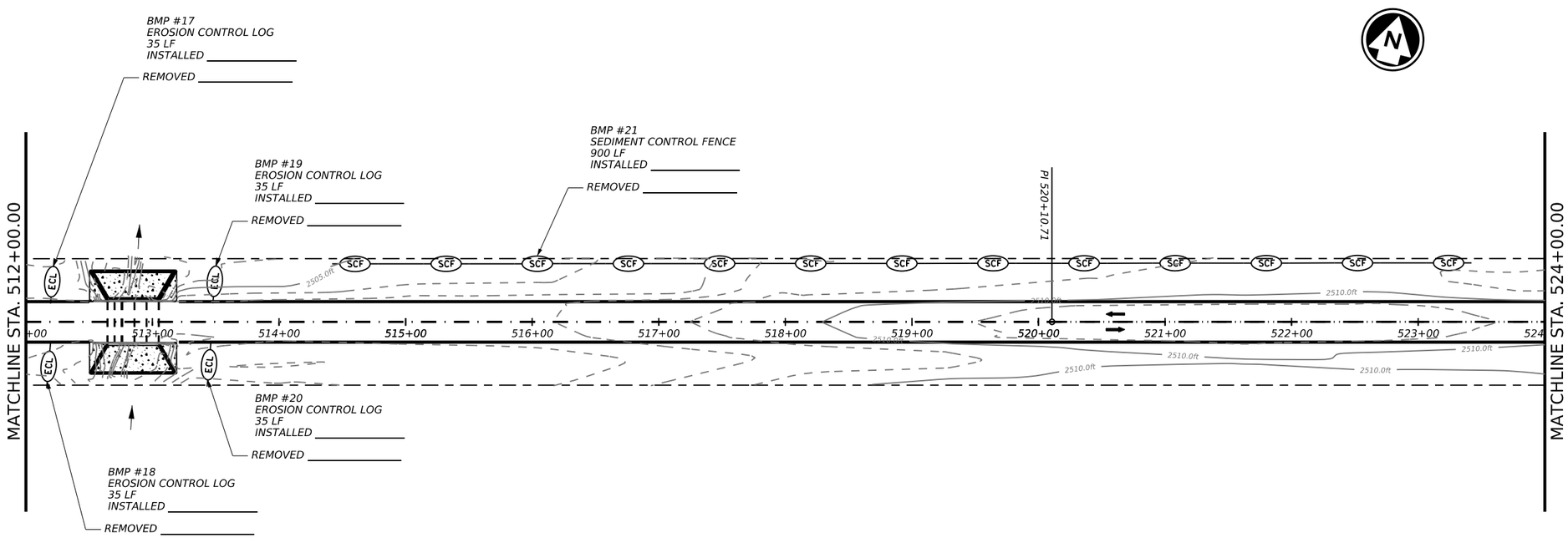

LEGEND

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SCALE IN FEET

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FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		156

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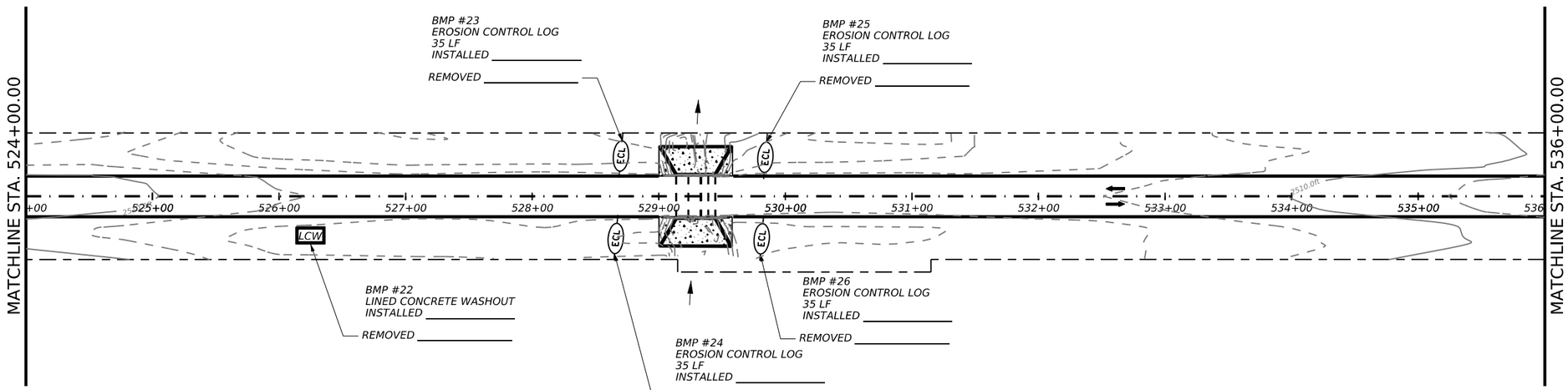

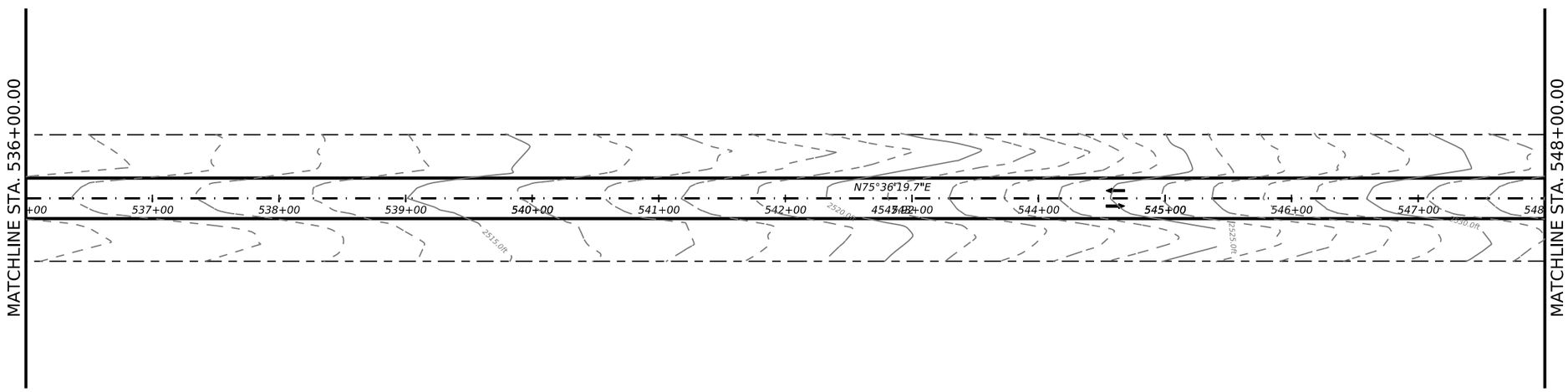

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SCALE IN FEET

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FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		157

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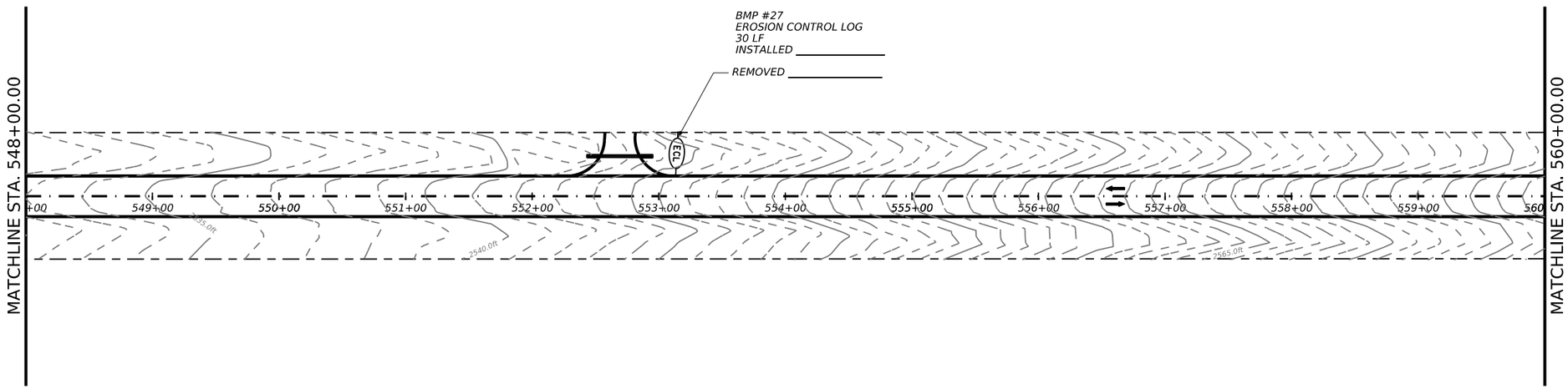

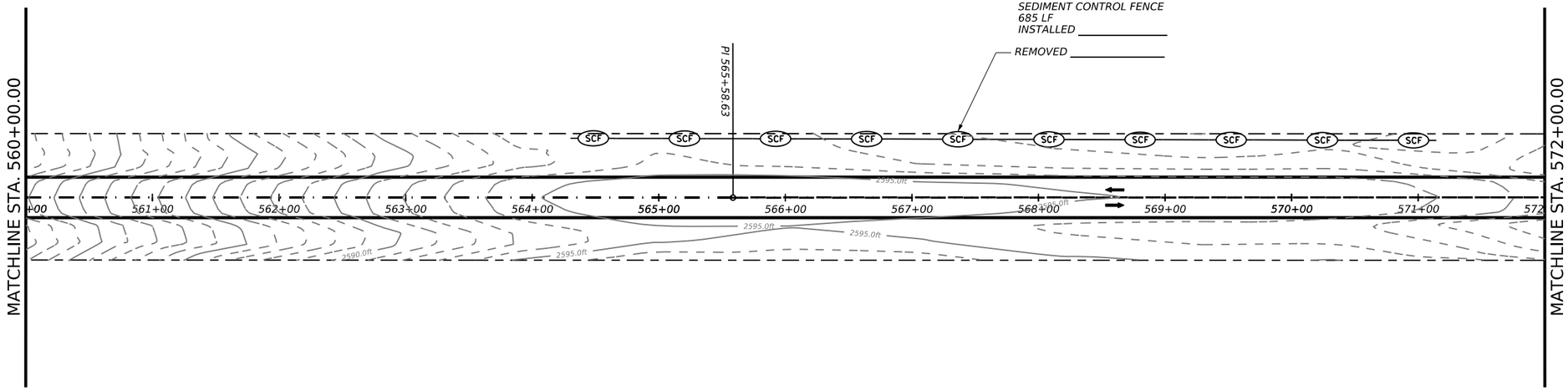

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- LCW — LINED CONCRETE WASHOUT
- ECL — EROSION CONTROL LOG
- SCF — SEDIMENT CONTROL FENCE

0 50 100
SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		158

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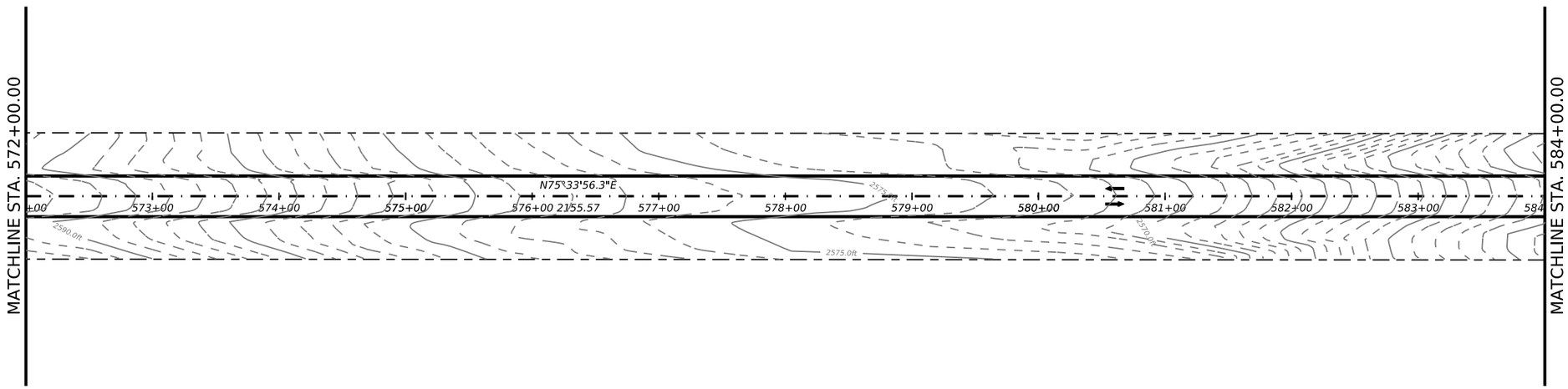

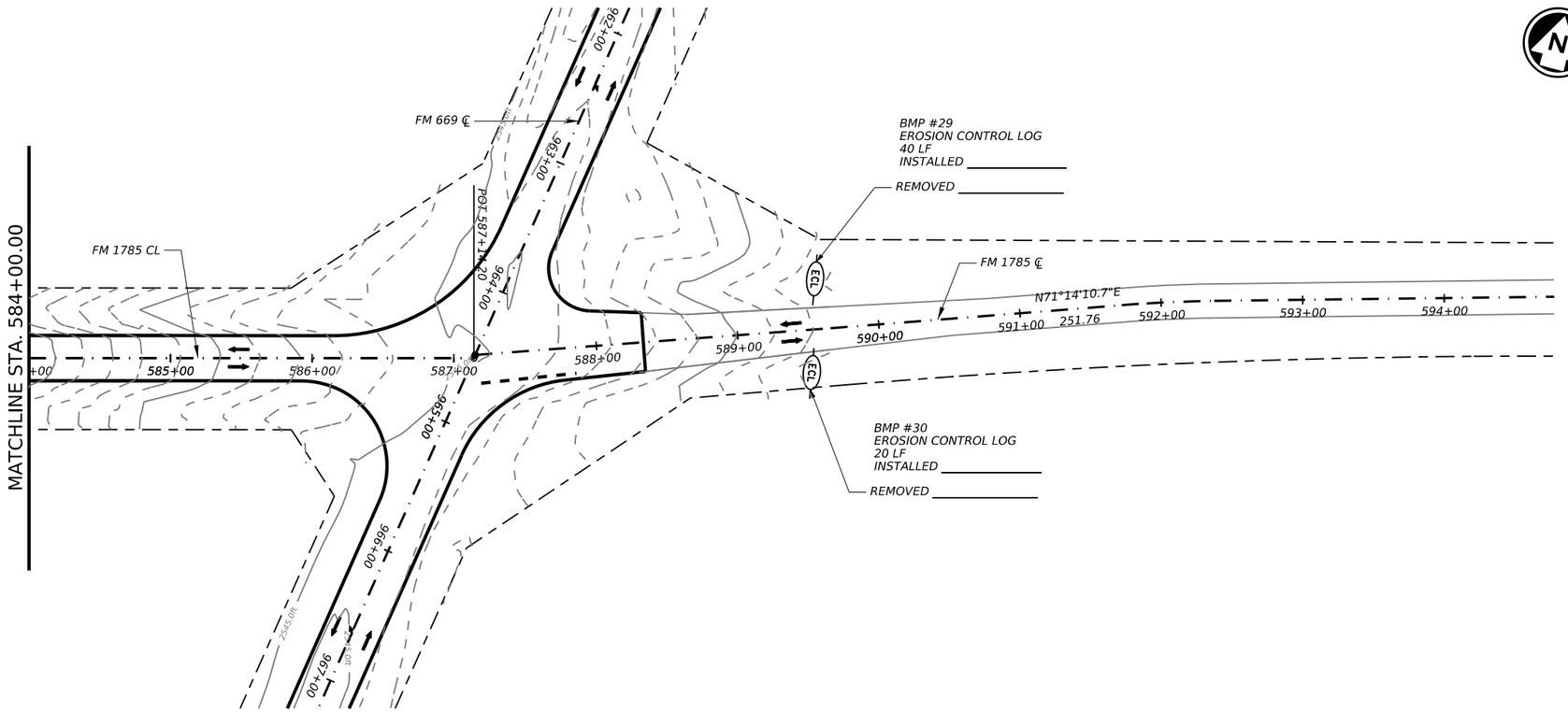

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- LCW — LINED CONCRETE WASHOUT
- ECL — EROSION CONTROL LOG
- SCF — SEDIMENT CONTROL FENCE

0 50 100
SCALE IN FEET

STATE OF TEXAS
BRYCE M. TURENTINE
91200
LICENSED
PROFESSIONAL ENGINEER

05/26/2022

Texas Department of Transportation

FM 1785 WIDENING

SW3P SITE PLAN
FM 1785

SHEET 9 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		159

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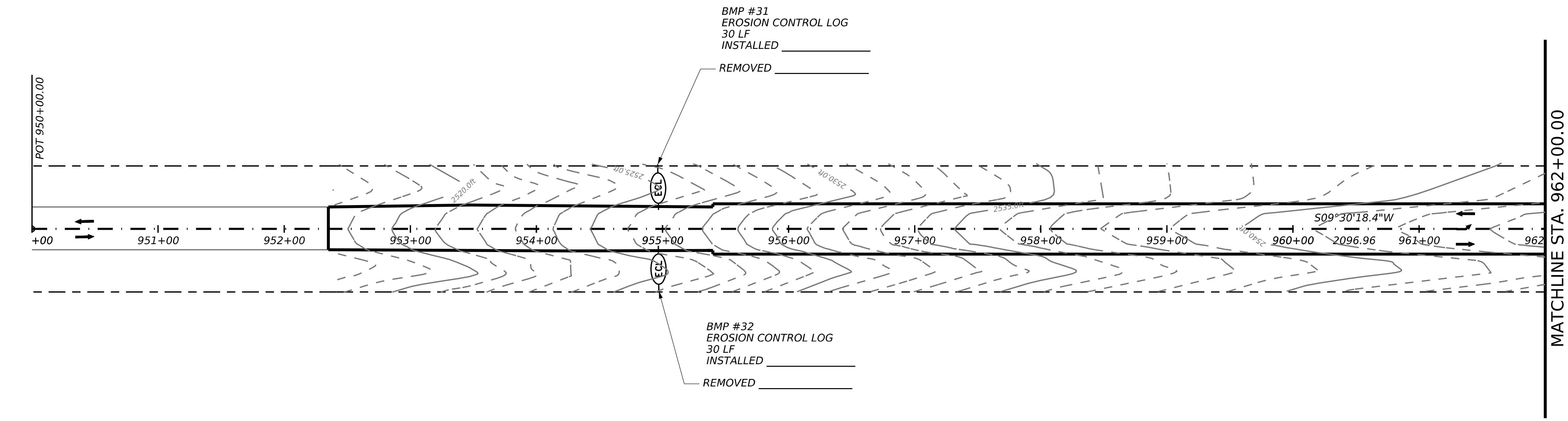
LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- LCW — LINED CONCRETE WASHOUT
- ECL — EROSION CONTROL LOG
- SCF — SEDIMENT CONTROL FENCE



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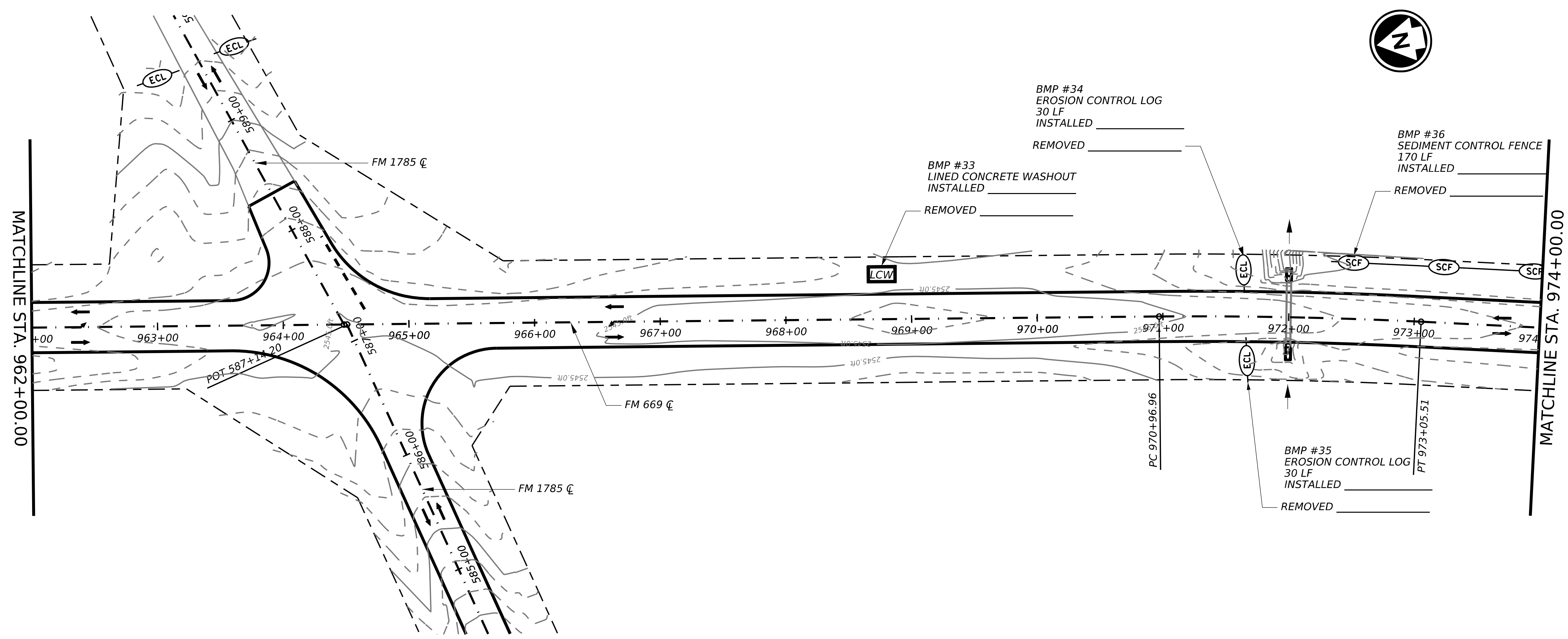

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FM 1785 WIDENING

SW3P SITE PLAN
FM 669

SHEET10 OF 11

CONT	SECT	JOB	HIGHWAY
1155	04	013, ETC.	FM 1785, ETC.
DIST	COUNTY		SHEET NO.
ABL	BORDEN		160

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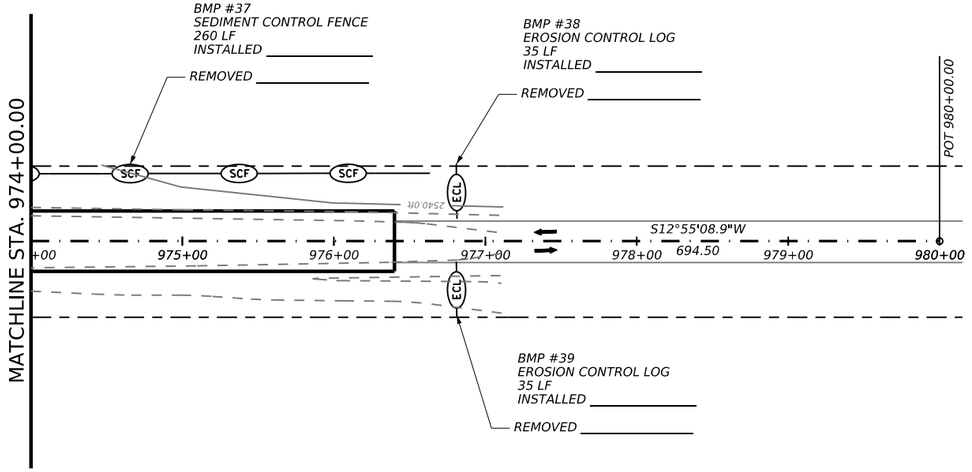

LEGEND

- PROP. EDGE OF PAVEMENT
- TRAVEL DIRECTION
- EX. ROW
- LCW — LINED CONCRETE WASHOUT
- ECL — EROSION CONTROL LOG
- SCF — SEDIMENT CONTROL FENCE

0 50 100
SCALE IN FEET

STATE OF TEXAS
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05/25/2022

Texas Department of Transportation

FM 1785 WIDENING

SW3P SITE PLAN
FM 669

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
ABL	BORDEN		161

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5/25/2022
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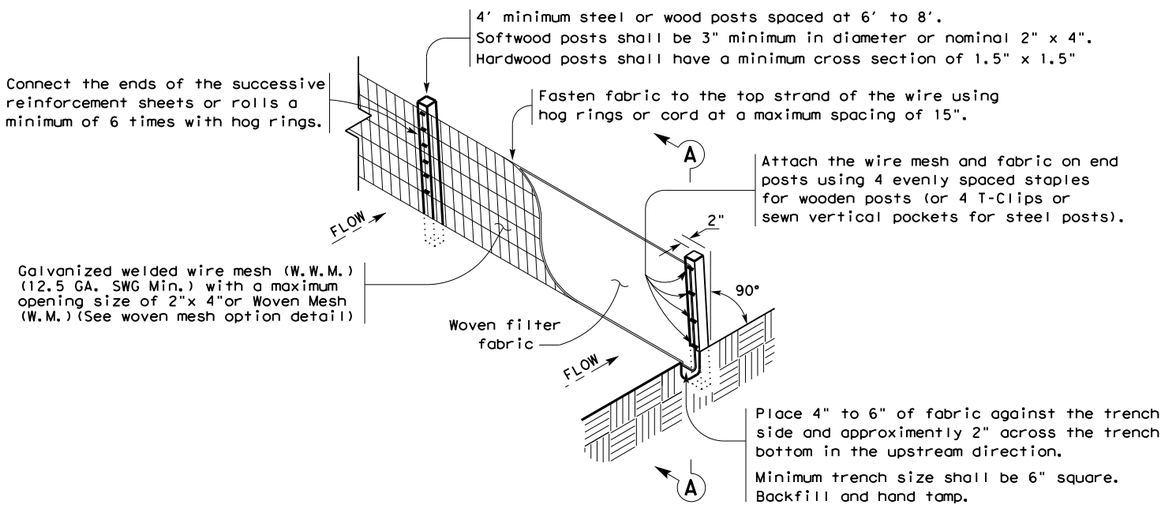
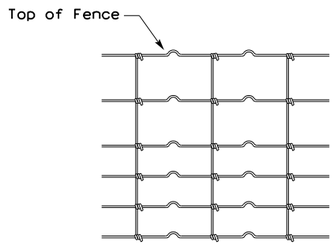
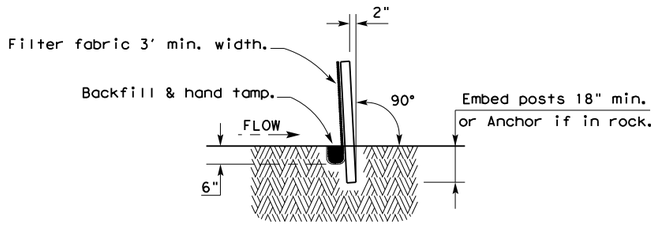


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

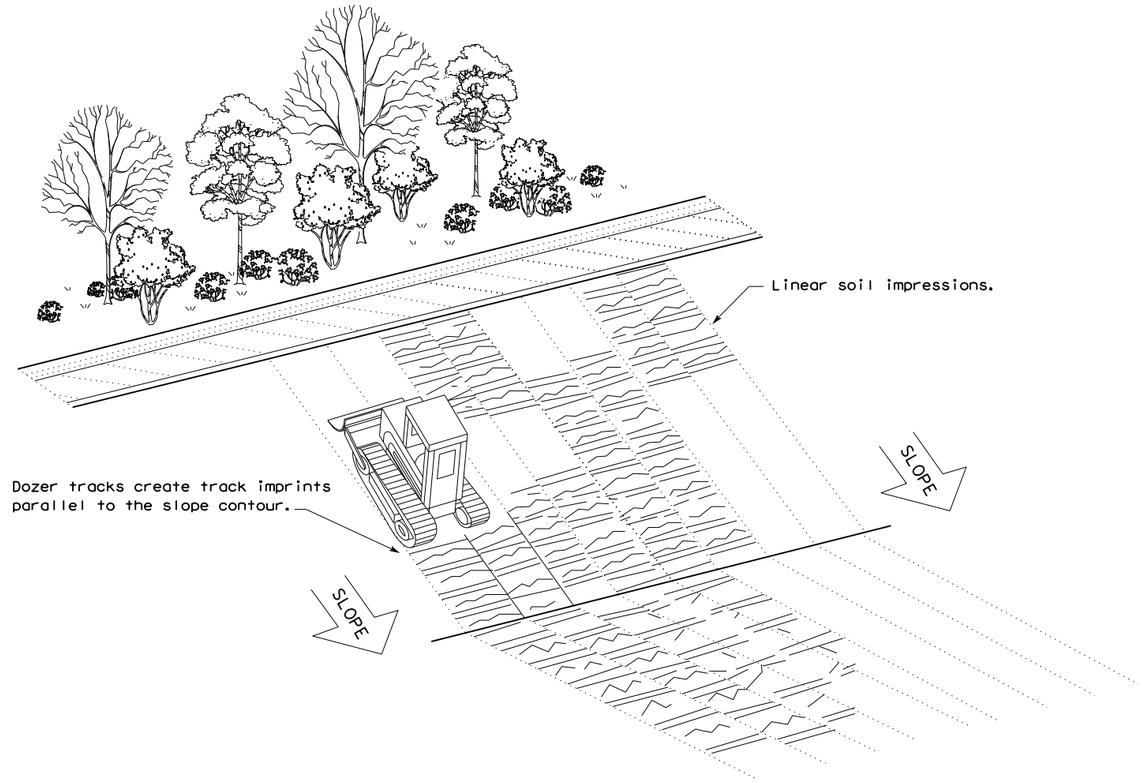
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		162

DATE: 5/25/2022
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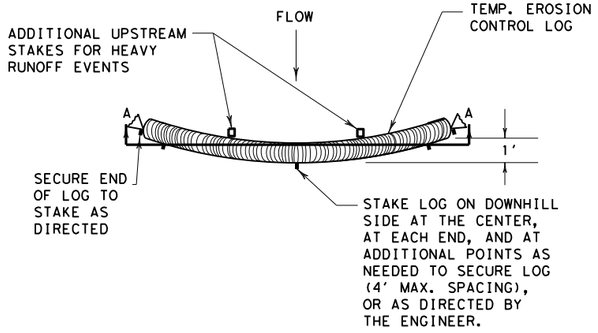
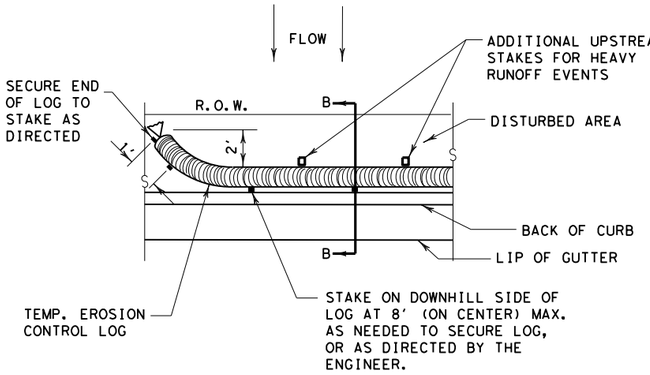
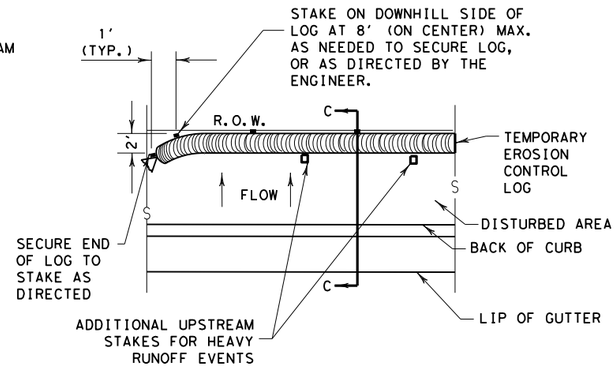


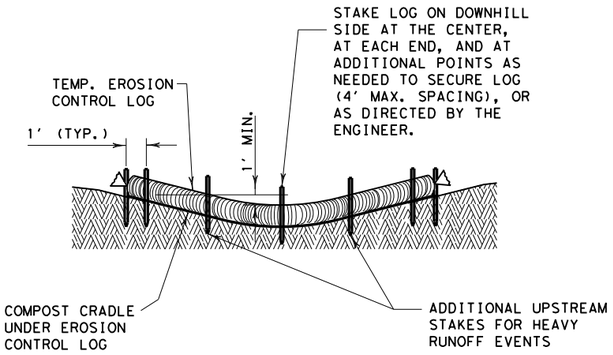
PLAN VIEW



PLAN VIEW



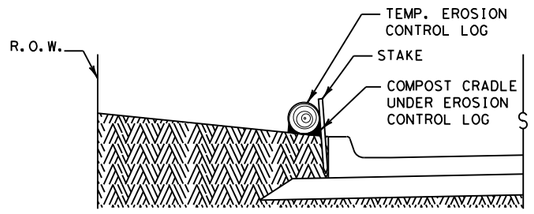
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

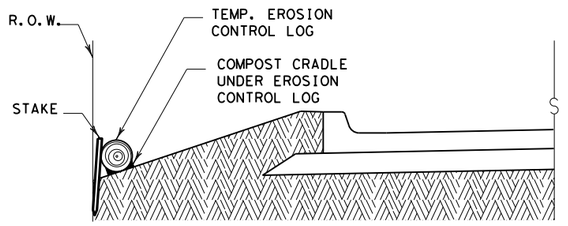
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

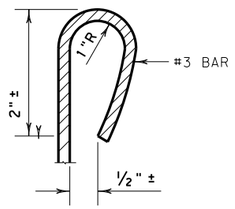
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



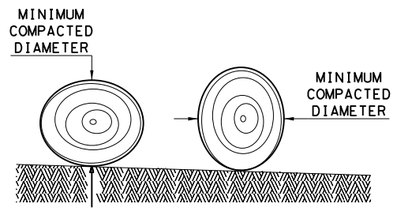
REBAR STAKE DETAIL

LEGEND

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

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013, ETC.	FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		163

DATE: 5/25/2022
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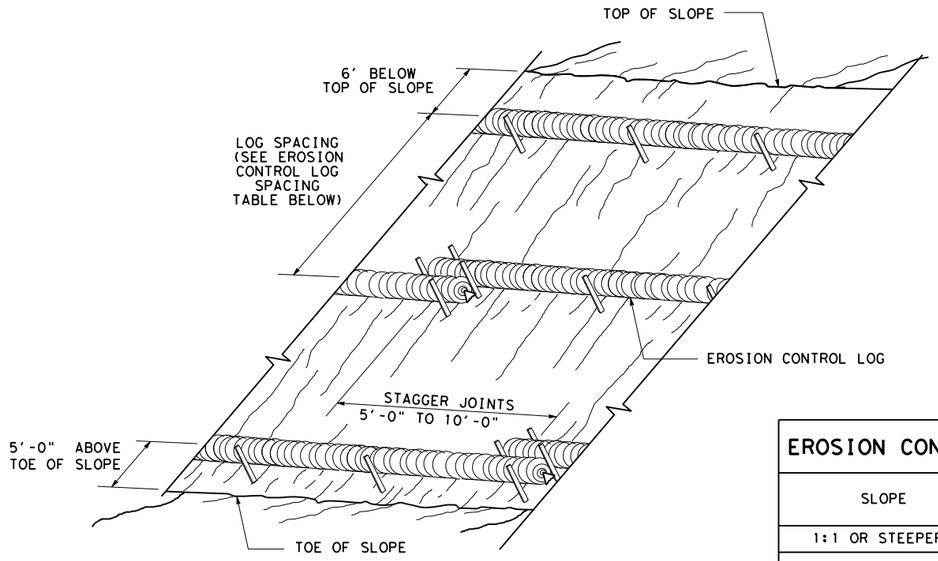
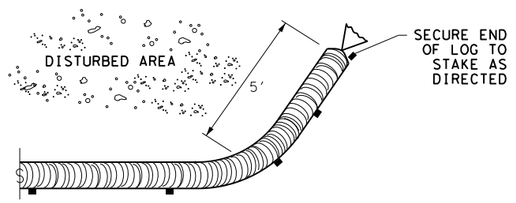


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

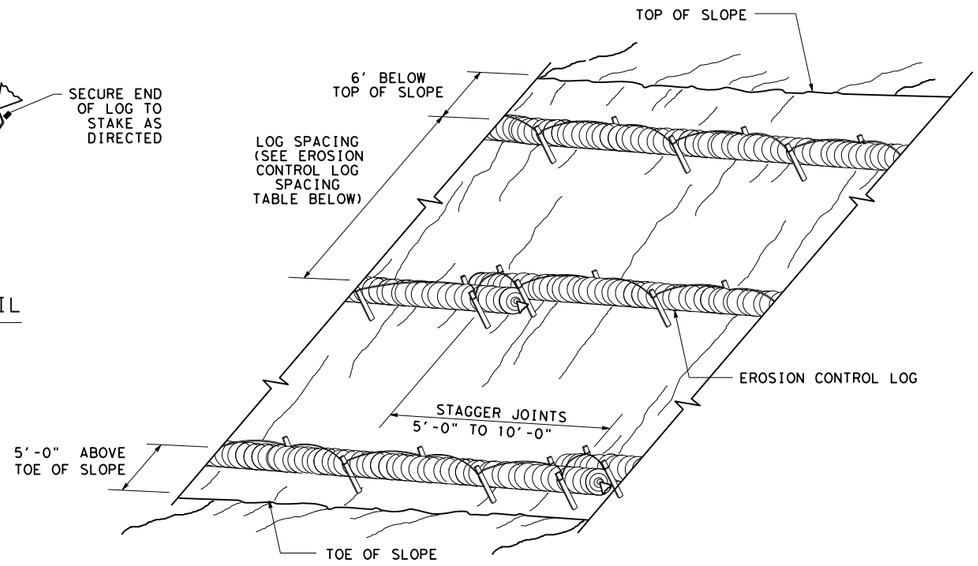
CL-SST



END SECTION RAP DETAIL

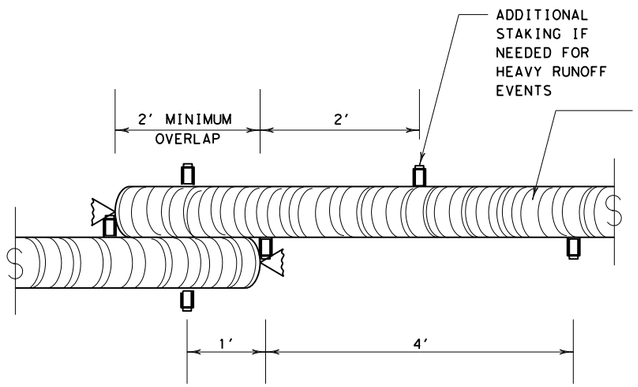
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

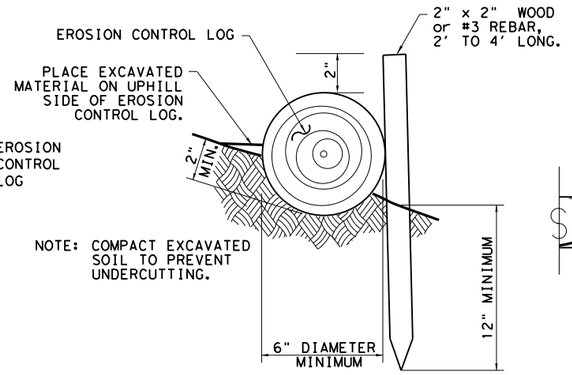
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

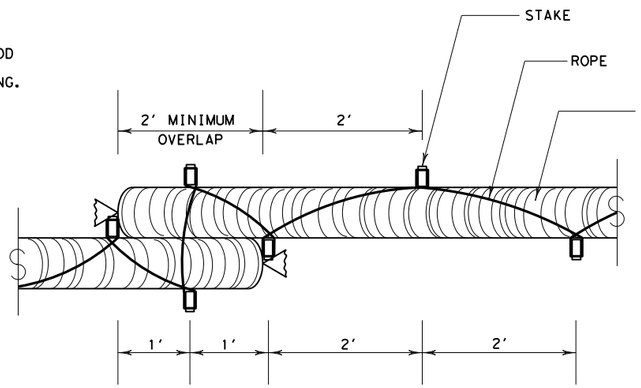


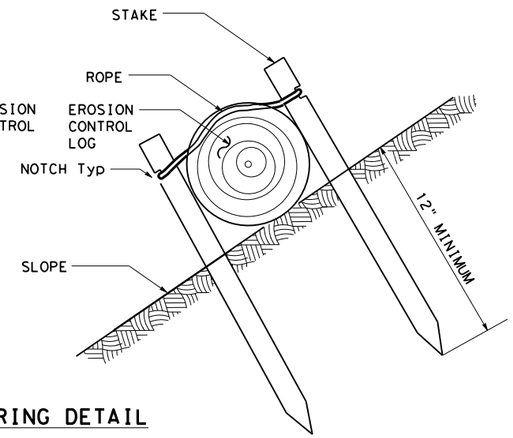


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

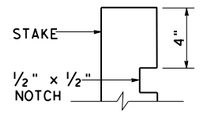
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

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

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1155	04	013,	ETC.FM 1785, ETC.
	DIST	COUNTY		SHEET NO.
	ABL	BORDEN		164

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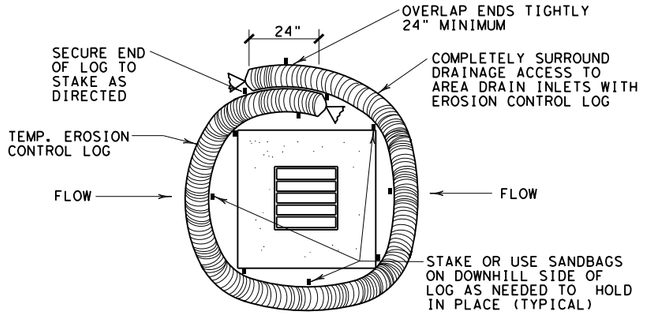
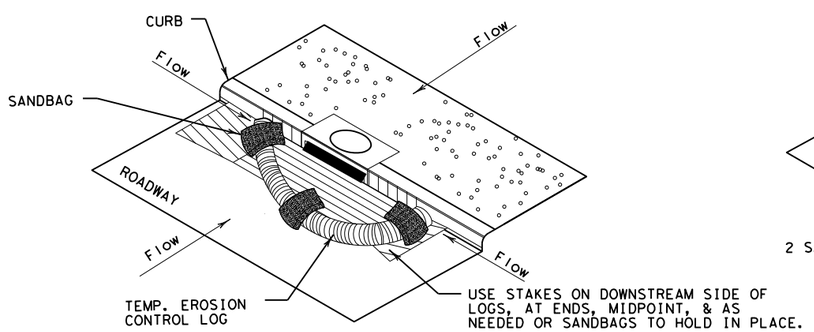


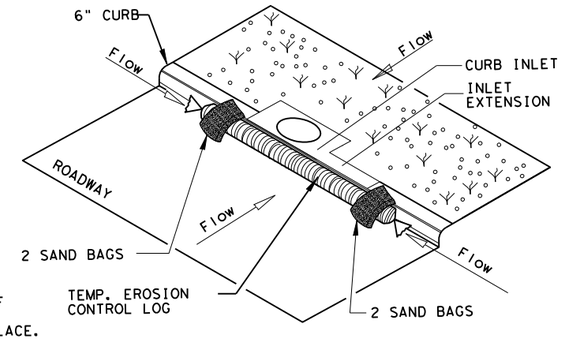
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

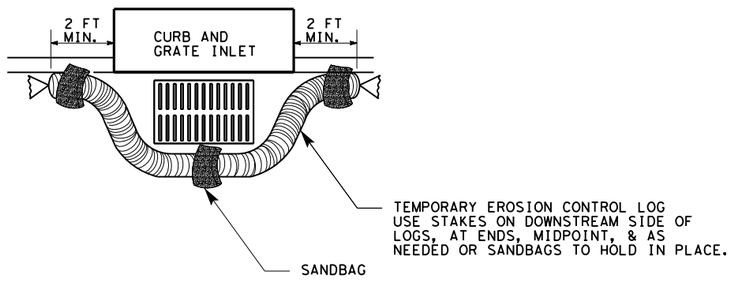
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

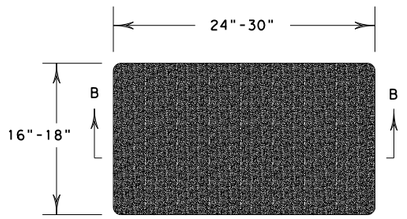
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1155	04	013, ETC.	FM 1785, ETC.		
	DIST	COUNTY		SHEET NO.		
	ABL	BORDEN		165		