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INDEX OF SHEETS

SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. F 2021(743)

NET LENGTH OF ROADWAY= 54,320.64 ft = 10.288 mi
NET LENGTH OF PROJECT= 54,320.64 ft = 10.288 mi
NET LENGTH OF BRIDGE = 00,000.00 ft = 00.000 mi

US 84
SCURRY COUNTY

LIMITS: FROM REF MRK 386 TO FM 1142

FOR THE CONSTRUCTION OF: SAFETY IMPROVEMENT PROJECTS

CONSISTING OF: SUPERELEVATION IMPROVEMENTS AND SAFETY LIGHTING

DESIGN SPEED = 70 mph
CURRENT A.D.T. (2019) = 9931 vpd
PROJECTED A.D.T. (2039) = 11917 vpd
FUNCTIONAL CLASS = PRINCIPAL ARTERIAL
EXISTING NBI# = N/A
PROPOSED NBI# = N/A

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	F 2021(743)		1
STATE	DISTRICT	COUNTY	
TEXAS	ABL	SCURRY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0053	07	040	US 84

FINAL PLANS

LETTING DATE: JULY 2021

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

CERTIFICATION FOR FINAL PLANS

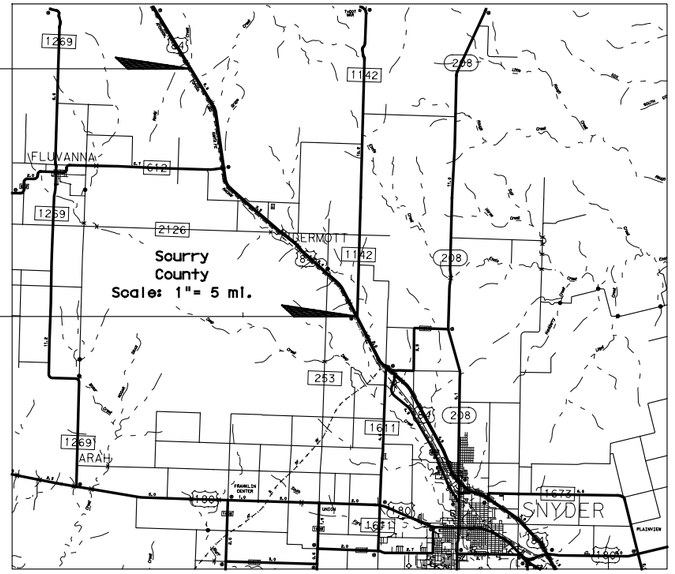
THIS PROJECT WAS BUILT ACCORDING TO THE PLANS AND SPECIFICATIONS. THESE FINAL PLANS REFLECT THE WORK DONE AND THE QUANTITIES SHOWN THEREON AND ON THE FINAL ESTIMATE ARE FINAL QUANTITIES.

_____
AREA ENGINEER DATE

SCURRY COUNTY

BEGIN CONTROL
CSJ: 0053-07-040
REF MRKR: 386
℄ US84_ML STA 896+33.76 FT

END CONTROL
CSJ: 0053-07-040
REF MRKR: 396+0.411
℄ US84_ML STA 358+13.12 FT



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

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

DocuSigned by:
Casey L McGee, P.E. 5/3/2021
2377E0857A804A6...
COMMITTEE CHAIRMAN DATE

Texas Department of Transportation

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SUBMITTED FOR LETTING:

Christopher Hartke
CHRISTOPHER HARTKE, P.E.
TEAGUE NALL & PERKINS, PROJECT MANAGER

RECOMMENDED FOR LETTING: 5/3/2021

DocuSigned by:
Eric Welch
3CA29A463FB047A...
ERIC WELCH, P.E.
TxDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 5/3/2021

DocuSigned by:
Stewart J. Chapman
40878CB750864A9...
STEWART J. CHAPMAN, P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING: 5/4/2021

DocuSigned by:
Michael Haithcock
5757E28879884FD...
MICHAEL A. HAITHCOCK, P.E.
DIRECTOR OF TP & D

APPROVED FOR LETTING: 5/4/2021

DocuSigned by:
Thomas G. Allbritton, P.E.
0F6F7E74C37D430...
THOMAS G. ALLBRITTON, P.E.
DISTRICT ENGINEER

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).

PENTABLE:
DATE: 4/30/2021
FILE: 0053-07-040_TITLE.dgn

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INDEX OF SHEETS

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.

NAME , P.E. 4/26/2021 DATE

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

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US 84

INDEX OF SHEETS

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	2
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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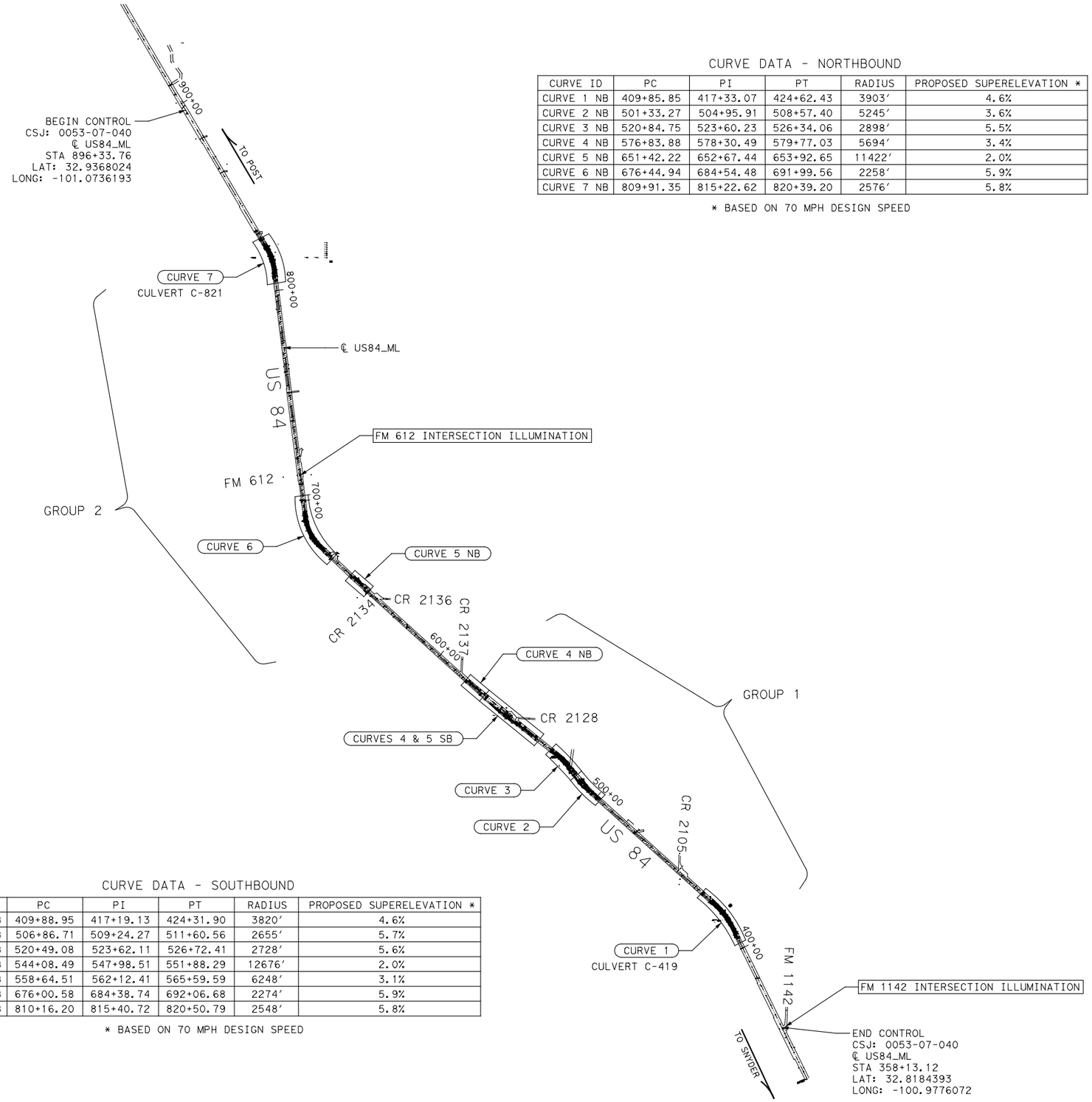

CURVE DATA - NORTHBOUND

CURVE ID	PC	PI	PT	RADIUS	PROPOSED SUPERELEVATION *
CURVE 1 NB	409+85.85	417+33.07	424+62.43	3903′	4.6%
CURVE 2 NB	501+33.27	504+95.91	508+57.40	5245′	3.6%
CURVE 3 NB	520+84.75	523+60.23	526+34.06	2898′	5.5%
CURVE 4 NB	576+83.88	578+30.49	579+77.03	5694′	3.4%
CURVE 5 NB	651+42.22	652+67.44	653+92.65	11422′	2.0%
CURVE 6 NB	676+44.94	684+54.48	691+99.56	2258′	5.9%
CURVE 7 NB	809+91.35	815+22.62	820+39.20	2576′	5.8%

* BASED ON 70 MPH DESIGN SPEED

CURVE DATA - SOUTHBOUND

CURVE ID	PC	PI	PT	RADIUS	PROPOSED SUPERELEVATION *
CURVE 1 SB	409+88.95	417+19.13	424+31.90	3820′	4.6%
CURVE 2 SB	506+86.71	509+24.27	511+60.56	2655′	5.7%
CURVE 3 SB	520+49.08	523+62.11	526+72.41	2728′	5.6%
CURVE 4 SB	544+08.49	547+98.51	551+88.29	12676′	2.0%
CURVE 5 SB	558+64.51	562+12.41	565+59.59	6248′	3.1%
CURVE 6 SB	676+00.58	684+38.74	692+06.68	2274′	5.9%
CURVE 7 SB	810+16.20	815+40.72	820+50.79	2548′	5.8%

* BASED ON 70 MPH DESIGN SPEED

N

½ 0 ½ 1

SCALE: 1" = 1 MI.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

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US 84

PROJECT LAYOUT

SCALE: 1"=1MI SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	3
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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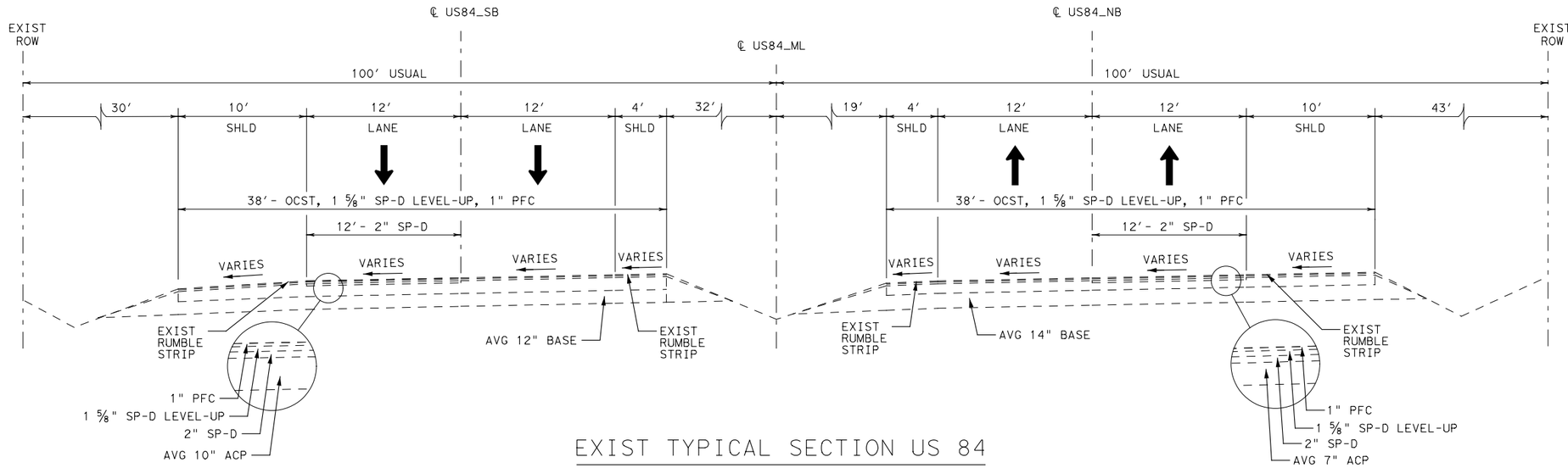
5 0 5 10
SCALE: 1" = 10'



EXIST TYPICAL SECTION US 84

NOTES:

1. EXISTING TYPICAL SECTION AND SUPERELEVATION RATES INFORMATION HAVE BEEN OBTAINED FROM RECORD PLANS CSJ 0053-07-037 AND FIELD SURVEY.

EXISTING SUPERELEVATION AT CURVES

CURVE 1 SB	4.4%
CURVE 2 SB	4.7%
CURVE 3 SB	5.5%
CURVE 4 SB	NO SUPERELEVATION
CURVE 5 SB	2.4%
CURVE 6 SB	4.2%
CURVE 7 SB	5.5%

EXISTING SUPERELEVATION AT CURVES

CURVE 1 NB	4.4%
CURVE 2 NB	2.5%
CURVE 3 NB	5.1%
CURVE 4 NB	NO SUPERELEVATION
CURVE 5 NB	0.8%
CURVE 6 NB	4.2%
CURVE 7 NB	5.5%

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation
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US 84

TYPICAL SECTIONS

SCALE: 1"=10' SHEET 1 OF 5

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	4
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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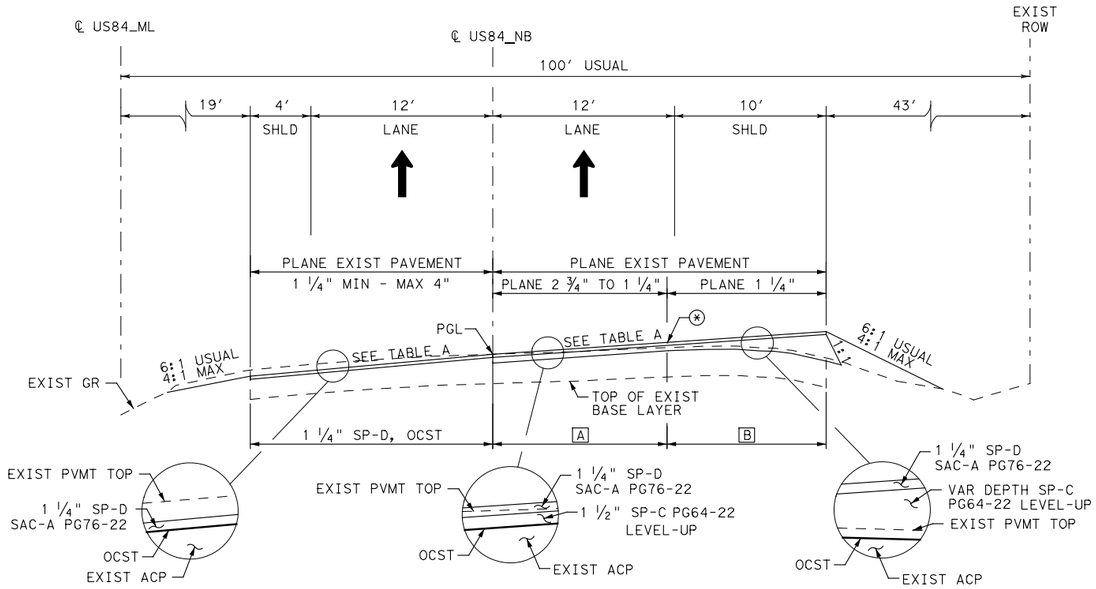


PROP TYPICAL SECTION NB

AT CURVE

CURVE 1 NB STA 410+45 TO 424+03
CURVE 2 NB STA 501+83 TO 508+07
CURVE 3 NB STA 521+53 TO 525+67
CURVE 4 NB STA 577+33 TO 579+28
CURVE 5 NB STA 651+78 TO 653+57
CURVE 6 NB STA 677+16 TO 691+29
CURVE 7 NB STA 810+61 TO 819+69

A 1 1/4" SP-D
1 1/2" SP-C LEVEL-UP
OCST

B 1 1/4" SP-D
SP-C LEVEL-UP MIN 1 1/2" (AT ⊗)
SP-C LEVEL-UP MAX 16"
OCST

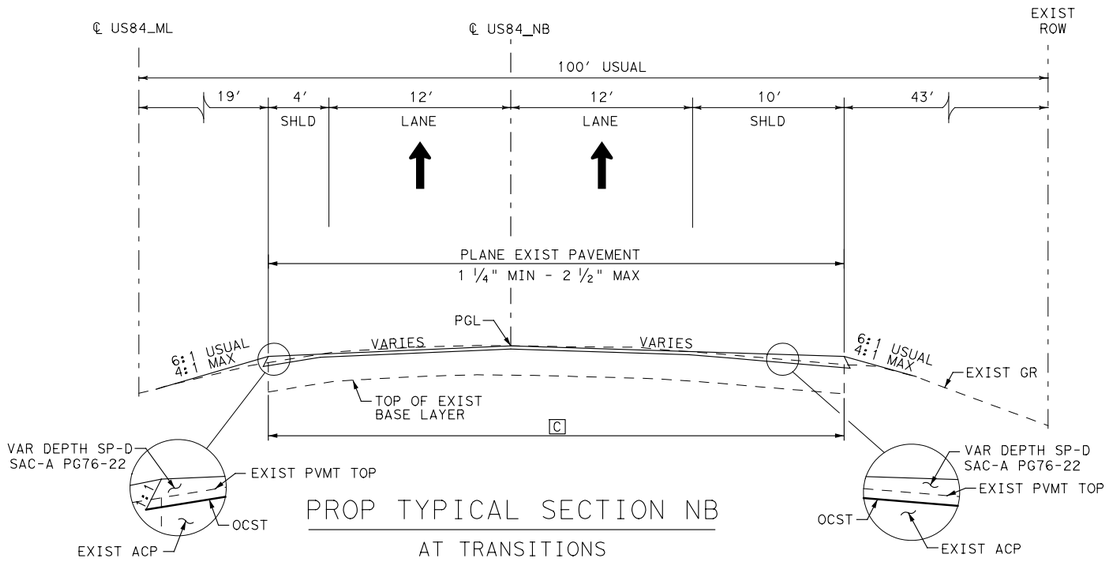
TABLE A

CURVE ID	FULL SUPERELEVATION *
CURVE 1 NB	4.6%
CURVE 2 NB	3.6%
CURVE 3 NB	5.5%
CURVE 4 NB	3.4%
CURVE 5 NB	2.0%
CURVE 6 NB	5.9%
CURVE 7 NB	5.8%

5 0 5 10
SCALE: 1" = 10'

NOTES:

1. PLANE MINIMUM 1 1/4" TO REMOVE EXISTING PFC LAYER.
2. MINIMUM LIFT THICKNESS IS 1 1/4" FOR SP-D.
3. MINIMUM LIFT THICKNESS IS 1 1/2" FOR SP-C.
4. SEE SUPERELEVATION TABLE SHEETS FOR ADDITIONAL INFORMATION.



PROP TYPICAL SECTION NB

AT TRANSITIONS

CURVE 1 NB STA 407+23 TO 410+45, 424+03 TO 426+92
CURVE 2 NB STA 499+48 TO 501+83, 508+07 TO 510+17
CURVE 3 NB STA 518+18 TO 521+53, 525+67 TO 528+94
CURVE 4 NB STA 574+75 TO 577+33, 579+28 TO 581+75
CURVE 5 NB STA 649+39 TO 651+78, 653+57 TO 655+15
CURVE 6 NB STA 674+10 TO 677+16, 691+29 TO 694+85
CURVE 7 NB STA 806+72 TO 810+61, 819+69 TO 822+75

C SP-D MIN 1 1/4" (AT ℄)
SP-D MAX 3 1/2"
OCST

4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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US 84

TYPICAL SECTIONS

SCALE: 1"=10'

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	5
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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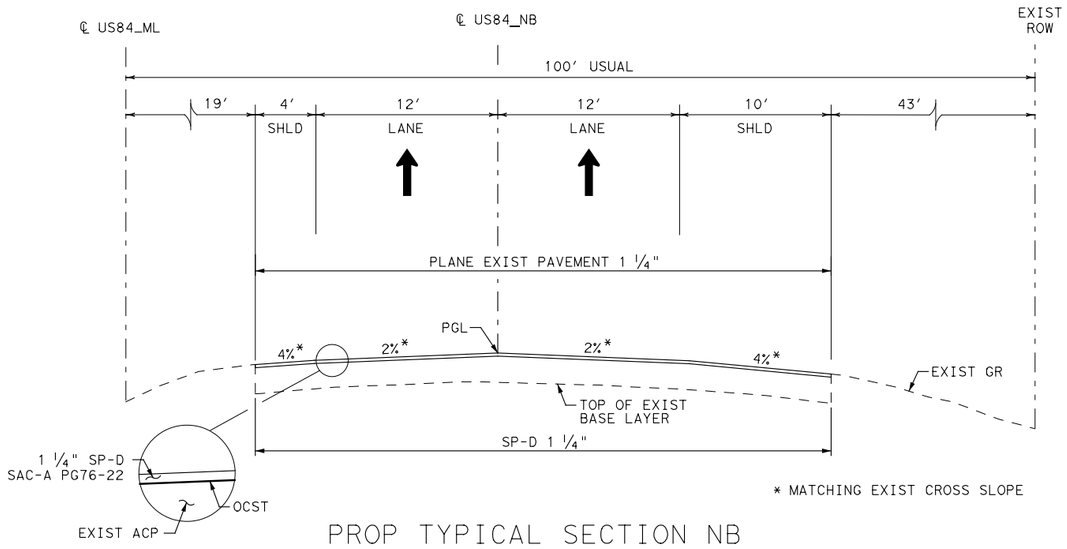

PROP TYPICAL SECTION NB

NO SUPERELEVATION (MILL & OVERLAY ONLY)

BETWEEN CURVE 2 AND 3 NB STA 511+17 TO 518+18

5 0 5 10

SCALE: 1" = 10'

NOTES:

1. PLANE MINIMUM 1 ¼" TO REMOVE EXISTING PFC LAYER.
2. MINIMUM LIFT THICKNESS IS 1 1/4" FOR SP-D.
3. MINIMUM LIFT THICKNESS IS 1 1/2" FOR SP-C.
4. SEE SUPERELEVATION TABLE SHEETS FOR ADDITIONAL INFORMATION.

4/26/2021

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FIRM REGISTRATION NO. F-1471

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TYPICAL SECTIONS

SCALE: 1"=10' SHEET 3 OF 5

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
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CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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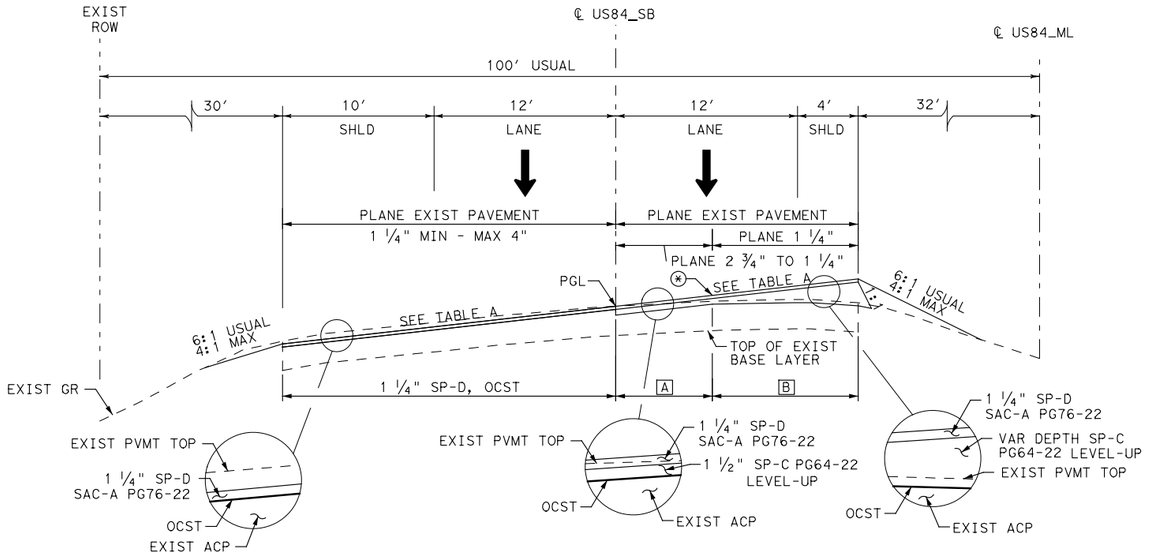


PROP TYPICAL SECTION SB

AT CURVE

CURVE 1 SB STA 410+57 TO 423+73
CURVE 2 SB STA 507+37 TO 511+11
CURVE 3 SB STA 521+17 TO 526+05
CURVE 4 SB STA 544+57 TO 551+39
CURVE 5 SB STA 559+01 TO 565+24
CURVE 6 SB STA 676+72 TO 691+36
CURVE 7 SB STA 810+86 TO 819+81

Ⓐ 1 ¼" SP-D
1 ½" SP-C LEVEL-UP
OCST

Ⓑ 1 ¼" SP-D
SP-C LEVEL-UP MIN 1 ½" (AT Ⓧ)
SP-C LEVEL-UP MAX 16"
OCST

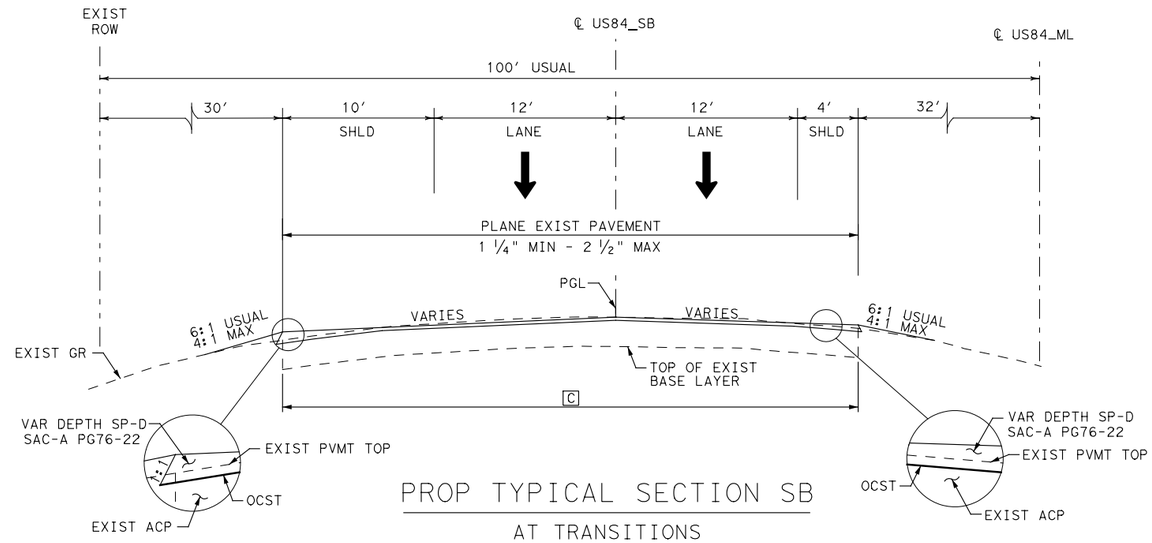
TABLE A

CURVE ID	FULL SUPERELEVATION *
CURVE 1 SB	4.6%
CURVE 2 SB	5.7%
CURVE 3 SB	5.6%
CURVE 4 SB	2.0%
CURVE 5 SB	3.1%
CURVE 6 SB	5.9%
CURVE 7 SB	5.8%

5 0 5 10
SCALE: 1" = 10'

NOTES:

1. PLANE MINIMUM 1 ¼" TO REMOVE EXISTING PFC LAYER.
2. MINIMUM LIFT THICKNESS IS 1 1/4" FOR SP-D.
3. MINIMUM LIFT THICKNESS IS 1 1/2" FOR SP-C.
4. SEE SUPERELEVATION TABLE SHEETS FOR ADDITIONAL INFORMATION.



PROP TYPICAL SECTION SB

AT TRANSITIONS

CURVE 1 SB STA 405+88 TO 410+57, 423+73 TO 427+13
CURVE 2 SB STA 503+82 TO 507+37, 511+11 TO 514+23
CURVE 3 SB STA 516+50 TO 521+17, 526+05 TO 529+45
CURVE 4 SB STA 542+00 TO 544+57, 551+39 TO 555+00
CURVE 5 SB STA 555+40 TO 559+01, 565+24 TO 567+15
CURVE 6 SB STA 673+34 TO 676+72, 691+36 TO 694+35
CURVE 7 SB STA 806+87 TO 810+86, 819+81 TO 822+92

Ⓒ SP-D MIN 1 ¼" (AT ℄)
SP-D MAX 3 ½"
OCST

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FIRM REGISTRATION NO. F-1471

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US 84

TYPICAL SECTIONS

SCALE: 1"=10' SHEET 4 OF 5

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
BH	TEXAS	ABL	SCURRY	7
CHECK	CONTROL	SECTION	JOB	
JMP	0053	07	040	
CHECK				
JL				

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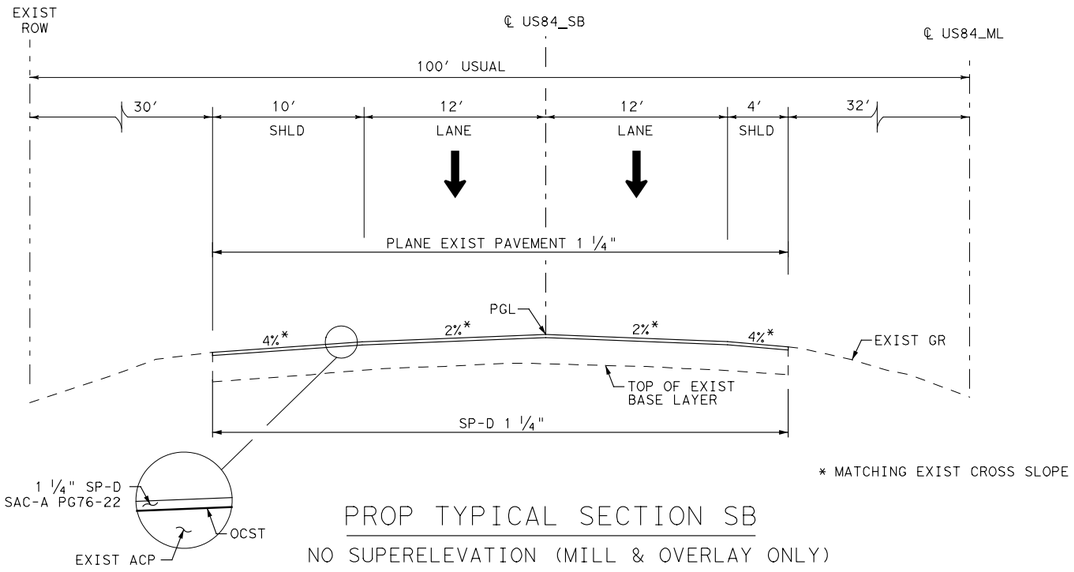
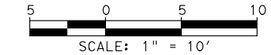


* MATCHING EXIST CROSS SLOPE

PROP TYPICAL SECTION SB

NO SUPERELEVATION (MILL & OVERLAY ONLY)

BETWEEN CURVE 2 AND 3 SB STA 514+23 TO 516+50
BETWEEN CURVE 4 AND 5 SB STA 555+00 TO 555+40



NOTES:

1. PLANE MINIMUM 1 ¼" TO REMOVE EXISTING PFC LAYER.
2. MINIMUM LIFT THICKNESS IS 1 1/4" FOR SP-D.
3. MINIMUM LIFT THICKNESS IS 1 1/2" FOR SP-C.
4. SEE SUPERELEVATION TABLE SHEETS FOR ADDITIONAL INFORMATION.

4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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US 84

TYPICAL SECTIONS

SCALE: 1"=10′ SHEET 5 OF 5

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	8
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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ABILENE DISTRICT GENERAL NOTES
2014 SPECIFICATIONS

General

II. BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY
Protection of Fiber Optic Cable Systems
The State and/or its Contractor shall, five working days before any work is performed, call the railroad's communications network control center at 1-800-533-2891 (a 24-hour number) to assist in determining if fiber optic communications, control systems, or other type of cable systems are buried in the general locations where work is to be performed. In the event such cable is present, the State and/or its Contractor shall then call the owner of the cable line to determine its exact location. The Contractor shall indemnify and hold harmless the railroad against any cost or claims arising out of damage to any fiber optic communications, control systems or other types of cable systems, but only to the extent such damage is caused by negligence of the Contractor.

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

Stewart Chapman, P.E.: Stewart.Chapman@txdot.gov
Maxie Allen, P.E.: Maxie.Allen@txdot.gov
(Snyder 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.

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.

Project Number: See Title Sheet
Control: 0053-07-040
County: Scurry
Highway: US 84

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.

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"**

"Provide notification to the District Signal Shop by telephone at 325-676-6974 and by email at Juan.Salgado@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 48 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.

Obtain approval from the Engineer of staked locations for illumination foundations, pull boxes, and power source prior to construction.

Item 7, "Legal Relations and Responsibilities"

The total area disturbed for this project is 26.9 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.

Project Number: See Title Sheet
Control: 0053-07-040
County: Scurry
Highway: US 84

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 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.

Maintain and submit a project schedule monthly. Submit to the Engineer the updated project schedule no later than the 25th calendar day of the following month.

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.

Begin work 90 calendar days after the authorization date to begin work. Do not begin work before or after this period unless authorized in writing by the Engineer. The delay is needed to allow for purchasing light poles.

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 164, "Seed for Erosion Control"

Quantities shown are approximate; limits of the temporary and permanent seeding will be determined during construction.

Temporary seeding will be required in several small areas as work progresses to comply with the storm water pollution prevention plan and may require multiple mobilizations of seeding crew.

Item 168, "Vegetation Watering"

Water rate for this project shall be ¼" of water per acre every two weeks for a 3-month period.

Item 316, "Surface Treatments"

The Engineer must authorize work if the wind exceeds 20 mph.

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.
Cover or protect any sealed expansion joints or rail on bridges and any railroad tracks encountered on this project, as directed by the Engineer. Clean any of these items not properly protected. This work will not be paid for directly but will be considered subsidiary to Item 316.

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 4 Aggr.
ASPH (AC-20-5TR) @ .36 GAL/SY
ASPH (AC-20-XP) @ .36 GAL/SY
Estimated Winter Rates with Grade 4 Aggr.
ASPH (CRS-2P) @ .40 GAL/SY *

Project Number: See Title Sheet
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AGGREGATES
AGGR (TY-PB GR-4 SAC –B) – 1 CY/140 SY

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

Item 354, "Planing and Texturing Pavement"

Stockpile all unused planed materials at south of FM 1611 overpass on west side of US 84 approximately 2 miles from the south end of the project.

Build stockpiles in horizontal layers with a maximum height of 10 feet, as directed. Minimize driving on the stockpile to prevent excessive compaction.

State will retain ownership of excess RAP.

Item 416, "Drilled Shaft Foundations"

Place riprap around the illumination foundation as shown on Standard Sheet RID(2)-17. Riprap will be paid for under item 432.

All soil, water, and slurry removed from drilled shafts shall be captured and disposed of properly. No discharge of these materials into, or in close proximity to, the surrounding water will be allowed.

Item 432, "Riprap"

Provide conventionally reinforced concrete for all riprap on this project.

Item 502, "Barricades, Signs and Traffic Handling"

Mobile traffic control in accordance with TPC 3 series will be required for placement of short duration, short term, intermediate term, and long-term traffic control.

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.

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.

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.

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.

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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 533, "Milled Rumble Strips"

The milled rumble strips should be placed on shoulder according to rs(1-4)-13 standards and the shoulder widths as shown below.

- Shoulder width of greater than 2 feet or less than 6 feet the rumble strip will be centered on the shoulder.
- Shoulder width of greater than 6 feet the rumble strip will begin 2 feet from the edge line.
- Or as directed by the engineer

Item 540, "Metal Beam Guard Fence"

Steel posts for metal beam guard fence may be field cut to proper rail height with a power saw when approved by the engineer.

Core drill 1 ¼ diameter holes through existing slab. Percussion or impact drilling is not permitted. Patch spalls, when directed by the engineer, in accordance with item 429, "Concrete Structure Repair", at the contractor's expense.

Item 542, "Removing Metal Beam Guard Fence"

Contractor may keep the Metal Beam Guard Fence.

Item 585, "Ride Quality for Pavement Surfaces"

The Engineer reserves the right to prohibit corrective work and assess the penalty for each occurrence of localized roughness per Article 585.3.4.2.3.2.

Use pay adjustment schedule **1 (one)** for Ride Quality bonus/penalty calculation.

Item 610, "Roadway Illumination Assemblies"

The Contractor is responsible for fixture testing costs; see Materials and Test Division test method TEX-1110.

Contractor should refer to the Texas Department of Transportation's Highway Illumination Manual, January 2018, Chapter 6, and Section 7 for additional information on lateral placement of illumination foundations as described in note 6 on RID (2)-17.
http://onlinemanuals.txdot.gov/txdotmanuals/hwi/index.htm

Fabricate steel roadway illumination poles in accordance with TxDOT standard RIP-17. Poles fabricated according to RIP-17 require no shop drawings.

Alternate designs to RIP-17 or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For instructions on submitting shop drawings electronically go to TxDOT home page, Business with TxDOT, Bridge information, Shop drawings. File is titled: Guide to Electronic Shop Drawing Submittal

Place riprap around the illumination foundation as shown on Standard Sheet RID (2)-17.
Riprap will be paid for under item 432.

Item 618, "Conduit"

All conduit shall be SCH 80 PVC.

High density polyethylene (HDPE) may be substituted for schedule 80 PVC in bores.

High density polyethylene (HDPE) may be threaded and used with threaded PVC connectors or couplings.
Conduit elbows will be the long radius variety.

Rigid metal conduit elbows 1" and larger that are required to be installed on conduit system, will not be paid for separately, but will be considered subsidiary to the various bid items.

All couplings and connections shall be tight and waterproof. Each end of every PVC pipe connection and/or coupling shall be cleaned with PVC cleaner and glued thoroughly with PVC sealer. Proposed and existing conduit shall be brought into a pull box and elbowed unless otherwise shown. Where a rigid metal conduit run terminates, a bushing shall be provided to protect the wire from abrasion.

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The conduit shall be placed 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 the conduit shall be routed under the utility or obstacle unless otherwise approved by the Engineer.

The conduit shall be placed on a 2-inch sand cushion and then backfilled with a minimum of 6 inches of sand fill. The remainder of the trench shall be backfilled with flexible base or soil as required by location of conduit on the project.
Flexible metal shall not be used on this project.

Use materials from prequalified material producers list as shown on the Texas department of Transportation (TxDOT) – Construction Division's (CST) material producer list. Category is "Roadway Illumination and Electrical Supplies".

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 marker is acceptable.

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

For both transformer and shoe- base type illumination poles, provide double-pole breakaway fuse holder as shown on the Texas department of Transportation (TxDOT) – Construction Division's (CST) material producer list. Category is "Roadway Illumination and Electrical Supplies". Fuse holder is shown on the list under Items 610 and 620. Provide 10-amp time delay fuses.

Item 628, "Electrical Service"

Coordinate setting up the electrical service with District Signal Shop@ 325-676-6984 to insure the meter is installed under the proper account name.

Provide 30 days prior notification for new service to be energized. Notify the District Signal Shop @ 325-676-6984.

Any service installed by others shall comply with all TxDOT Standards from weather head to fixtures.

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.

Remove entire small sign foundation.
Deliver and stockpile all signs to be salvaged to the Scurry county maintenance yard, located approximately 2 miles from the south end of the project.

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.

All MBGF delineation shall be GF2 mounted on posts.

Use a minimum 2 inch long lag screws with washers to attach flexible GF2 barrier reflectors to wooden post. For steel posts, use an approved adhesive, or other method approved by Engineer.

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.

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Item 666, "Retro reflectorized Pavement Markings"

Provide a complete system of thermoplastic pavement markings at locations indicated on the plans and as directed by the engineer. The plans are intended to show typical conditions, which can be extended to similar conditions throughout this project as approved or directed.

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"

Provide a complete system of raised pavement markers at locations indicated on the plans and as directed by the engineer. The plans are intended to show typical conditions, which can be extended to similar conditions throughout this project as approved or directed.

Bituminous adhesive shall be used on this project.

Item 3077, "Superpave Mixtures"

Furnish aggregate for final surfaces with a surface aggregate classification of "**A**".

Provide an SP-D Fine Mixture with a minimum design VMA of 17.0% and a minimum plant-produced VMA of 16.5%.

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.
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.

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Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)"

BASIS OF ESTIMATE FOR STATIONARY TMAs				
		TMA (Stationary)		
Phase	Standard	Required	Additional	TOTAL
1 & 2	TCP(1-5)-18	1		1
	TCP(2-6)-18	1		1
	TCP(5-1)-18	1		1
Basis of Estimate for Mobile TMAs				
		TMA (Mobile)		
Phase	Standard	Required	Additional	TOTAL
3	TCP(3-2)-13	3		3
	TCP(3-3)-14	3		3

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.

QUANTITY SHEET

CONTROLLING PROJECT ID 0053-07-040 **DISTRICT** Abilene **COUNTY** Scurry
HIGHWAY US 84

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0053-07-040**			
		PROJECT ID		**A00133720**			
		COUNTY		**Scurry**			
		HIGHWAY		**US 84**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6031	REMOVING CONC (HEADWALL)	CY	1.000		1.000	
	110-6001	EXCAVATION (ROADWAY)	CY	105.000		105.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	7,183.000		7,183.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	40,470.000		40,470.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	20,235.000		20,235.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	20,235.000		20,235.000	
	168-6001	VEGETATIVE WATERING	MG	681.100		681.100	
	316-6001	ASPH (MULTI OPTION)	GAL	32,352.000		32,352.000	
	316-6224	AGGR(TY-PB GR-4 SAC-B)	CY	642.000		642.000	
	354-6023	PLANE ASPH CONC PAV(0" TO 4")	SY	37,838.000		37,838.000	
	354-6051	PLANE ASPH CONC PAV (0" TO 1 1/2")	SY	24,277.000		24,277.000	
	354-6053	PLANE ASPH CONC PAV (1 1/4")	SY	52,028.000		52,028.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	80.000		80.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	3.000		3.000	
	432-6006	RIPRAP (CONC)(CL B)	CY	3.500		3.500	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	56.000		56.000	
	460-6003	CMP (GAL STL 24 IN)	LF	27.000		27.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	14.000		14.000	
	465-6560	INL(CMP)(PAZD-CZ)(FG)(4FTX4FT-4FTX4FT)	EA	1.000		1.000	
	466-6130	HEADWALL (CH - PW - S) (DIA= 24 IN)	EA	1.000		1.000	
	467-6377	SET (TY II) (24 IN) (CMP) (4: 1) (C)	EA	1.000		1.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	496-6002	REMOV STR (INLET)	EA	1.000		1.000	
	496-6004	REMOV STR (SET)	EA	1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF	6.000		6.000	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	1,044.000		1,044.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	1,044.000		1,044.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	4,560.000		4,560.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	4,560.000		4,560.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	188.000		188.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	188.000		188.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	42,270.000		42,270.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	525.000		525.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	50.000		50.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2.000		2.000	

QUANTITY SHEET

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HIGHWAY US 84

			CONTROL SECTION JOB		**0053-07-040**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00133720**			
			COUNTY		**Scurry**			
			HIGHWAY		**US 84**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL			
	540-6014	SHORT RADIUS	LF	50.000		50.000		
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	4.000		4.000		
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	612.500		612.500		
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	4.000		4.000		
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	2.000		2.000		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000		
	610-6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	10.000		10.000		
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	1,105.000		1,105.000		
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	560.000		560.000		
	620-6004	ELEC CONDR (NO.12) INSULATED	LF	3,330.000		3,330.000		
	620-6007	ELEC CONDR (NO.8) BARE	LF	1,665.000		1,665.000		
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	9.000		9.000		
	628-6004	ELC SRV TY A 120/240 060(NS)AL(E)SP(O)	EA	2.000		2.000		
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	58.000		58.000		
	644-6028	IN SM RD SN SUP&AM TYS80(1)SA(P-BM)	EA	2.000		2.000		
	644-6076	REMOVE SM RD SN SUP&AM	EA	37.000		37.000		
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	13.000		13.000		
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	5.000		5.000		
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	21,061.000		21,061.000		
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	21,209.000		21,209.000		
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	1,586.000		1,586.000		
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	220.000		220.000		
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	5,290.000		5,290.000		
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	21,061.000		21,061.000		
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	21,209.000		21,209.000		
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	32.000		32.000		
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	5.000		5.000		
	672-6010	REFL PAV MRKR TY II-C-R	EA	80.000		80.000		
	3077-6014	SP MIXESSP-CPG64-22 (LEVEL-UP)	TON	4,503.000		4,503.000		
	3077-6065	SP MIXESSP-DSAC-A PG76-22	TON	7,923.000		7,923.000		
	3077-6075	TACK COAT	GAL	8,987.000		8,987.000		
	5092-6001	FILLING MILLED ASPHALT RUMBLE STRIPS	LF	21,209.000		21,209.000		
	6185-6002	TMA (STATIONARY)	DAY	69.000		69.000		
	6185-6005	TMA (MOBILE OPERATION)	DAY	46.000		46.000		
	6350-6001	LEAD LED CHEVRON	EA	6.000		6.000		
	6350-6002	LED CHEVRON	EA	52.000		52.000		

QUANTITY SHEET

CONTROLLING PROJECT ID 0053-07-040 **DISTRICT** Abilene **COUNTY** Scurry
HIGHWAY US 84

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0053-07-040**			
		PROJECT ID		**A00133720**			
		COUNTY		**Scurry**			
		HIGHWAY		**US 84**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	08	EROSION CONTROL MAINTENANCE (NON-PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY (NON-PART)	LS	1.000		1.000	

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SUMMARY OF DRAINAGE ITEMS

LOCATION	104 6031	432 6001	460 6003	464 6007	465 6560	466 6130	467 6377	467 6417	496 6002	496 6004	496 6007
	REMOVING CONC (HEADWALL)	RIPRAP (CONC) (4 IN)	CMP (GAL STL 24 IN)	RC PIPE (CL III) (30 IN)	INL (CMP)(PAZD-CZ)(FG) (4FTX4FT-4FTX4FT)	HEADWALL (CH - PW - S) (DIA= 24 IN)	SET (TY II) (24 IN) (CMP) (4: 1) (C)	SET (TY II) (30 IN) (RCP) (3: 1) (C)	REMOV STR (INLET)	REMOV STR (SET)	REMOV STR (PIPE)
	CY	CY	LF	LF	EA	EA	EA	EA	EA	EA	LF
CULVERT C-419			11				1			1	4
CR 2126 INT	1			14				1			2
CULVERT C-821		3	16		1	1			1		
PROJECT TOTALS	1	3	27	14	1	1	1	1	1	1	6

SUMMARY OF ROADWAY ITEMS

LOCATION	110 6001	132 6003	316 ** 6001	316 ** 6224	354 6023	354 6051	354 6053	432 6045	540 6001	540 6002	540 6006	540 6014	540 6016	542 6001	542 6002	542 6004	544 6001	544 6003	658 6061	658 6064	3077** 6014	3077** 6065	3077** 6075
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	ASPH (MULTI OPTION)	AGGR (TY-PB GR-4 SAC-B)	PLANE ASPH CONC PAV (0" TO 4")	PLANE ASPH CONC PAV (0" TO 1 1/2")	PLANE ASPH CONC PAV (1 1/4")	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	SHORT RADIUS	DOWNSTREAM ANCHOR TERMINAL SECTION	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	SP MIXES SP-C PG64-22 (LEVEL-UP)	SP MIXES SP-D SAC-A PG76-22	TACK COAT
	CY	CY	GAL	CY	SY	SY	SY	CY	LF	LF	EA	LF	EA	LF	EA	EA	EA	EA	EA	EA	TON	TON	GAL
CSJ 0053-07-040	105	7183	32352	642	37838	24277	52028	56	525	50	2	50	4	612.5	4	2	4	4	13	5	4503	7923	8987
PROJECT TOTALS	105	7183	32352	642	37838	24277	52028	56	525	50	2	50	4	612.5	4	2	4	4	13	5	4503	7923	8987

SUMMARY OF ILLUMINATION ITEMS

LOCATION	416 6029	432 6006	610 6214	618 6046	618 6047	620 6004	620 6007	624 6002	628 6004
	DRILL SHAFT (RDWY ILL POLE) (30 IN)	RIPRAP (CONC) (CL B)	IN RD IL (TY SA) 40T-8 (250W EQ) LED	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO. 12) INSULATED	ELEC CONDR (NO. 8) BARE	GROUND BOX TY A (122311)W/APRON	ELC SRV TY A 120/240 060(NS)AL(E)SP(O)
	LF	CY	EA	LF	LF	LF	LF	EA	EA
FM 1142 INTERSECTION	48	2.1	6	735	370	2210	1105	6	1
FM 612 INTERSECTION	32	1.4	4	370	190	1120	560	3	1
PROJECT TOTALS	80	3.5	10	1105	560	3330	1665	9	2

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	662 6063	662 6095	662 6109	5092 6001	6185 6002	6185 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	FILLING MILLED ASPHALT RUMBLE STRIPS	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	EA	LF	DAY	DAY
CSJ 0053-07-040	21061	21209	1586	21209	69	46
PROJECT TOTALS	21061	21209	1586	21209	69	46

** BASIS OF ESTIMATE

ITEM NO	DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT
316-6001	ASPH (MULTI OPTION)	0.36 GAL/SY	89869	32352	GAL
316-6224	AGGR (TY-PB GR-4 SAC-B)	1 CY/140 SY	89869	642	CY
3077-6014	SP MIXES SP-C PG64-22 (LEVEL-UP)	110 LB/SY/IN	52029	4503	TON
3077-6065	SP MIXES SP-D SAC-A PG76-22	110 LB/SY/IN	37840	7923	TON
3077-6075	TACK COAT	0.10 GAL/SY	89869	8987	GAL

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FIRM REGISTRATION NO. F-1471

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SUMMARY OF QUANTITIES

SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	19
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

LOCATION	533 6001	644 6027	644 6028	644 6076	666 6036	666 6300	666 6303	666 6315	668 6076	668 6092	672 6010	6350 6001	6350 6002
	RUMBLE STRIPS (SHOULDER)	IN SM RD SN SUP&AM TYS80 (1)SA(P)	IN SM RD SN SUP&AM TYS80(1) SA(P-BM)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)4" (BRK) (100MIL)	RE PM W/RET REQ TY I (W)4" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y)4" (SLD) (100MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	REFL PAV MRKR TY II-C-R	LEAD LED CHEVRON	LED CHEVRON
	LF	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	EA
SHEET 1 OF 10	7378	18				930	3689	3689			12	1	17
SHEET 2 OF 10	810	2				100	405	405			2	1	1
SHEET 3 OF 10	8340					1040	4170	4170			13		
SHEET 4 OF 10	3678					460	1839	1839			6		
SHEET 5 OF 10	3314		2		220	400	1583	1731	32	5	16		
SHEET 6 OF 10	2830					360	1415	1415			5		
SHEET 7 OF 10	1152					150	576	576			2		
SHEET 8 OF 10	6912	18		24		870	3456	3456			11	1	17
SHEET 9 OF 10	1440	4		6		180	720	720			3	1	3
SHEET 10 OF 10	6416	16		7		800	3208	3208			10	2	14
PROJECT TOTALS	42270	58	2	37	220	5290	21061	21209	32	5	80	6	52

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 6001	164 6009	164 6011	168 ** 6001	506 6001	506 6011	506 6038	506 6039	506 6042	506 6043
	BROADCAST SEED (PERM) (RURAL) (SANDY)	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	LF	LF	LF	LF	LF	LF
SHEET 1 OF 16	3568	1784	1784	60.0	72	72				
SHEET 2 OF 16	7903	3951.5	3951.5	133.0	54	54	1034	1034		
SHEET 3 OF 16	727	363.5	363.5	12.2	54	54	181	181		
SHEET 4 OF 16	2753	1376.5	1376.5	46.3	36	36				
SHEET 5 OF 16	1851	925.5	925.5	31.2	180	180	263	263		
SHEET 6 OF 16	3202	1601	1601	53.9	36	36	1454	1454		
SHEET 7 OF 16	1089	544.5	544.5	18.3	54	54				
SHEET 8 OF 16	1719	859.5	859.5	28.9	72	72			52	52
SHEET 9 OF 16	1322	661	661	22.2	36	36				
SHEET 10 OF 16	539	269.5	269.5	9.1	36	36				
SHEET 11 OF 16	731	365.5	365.5	12.3	72	72			84	84
SHEET 12 OF 16	1502	751	751	25.3	54	54				
SHEET 13 OF 16	3866	1933	1933	65.1	108	108				
SHEET 14 OF 16	818	409	409	13.8	54	54				
SHEET 15 OF 16	3294	1647	1647	55.4	54	54	841	841		
SHEET 16 OF 16	5586	2793	2793	94.0	72	72	787	787	52	52
PROJECT TOTALS	40470	20235	20235	681.1	1044	1044	4560	4560	188	188

** BASIS OF ESTIMATE

ITEM	DESCRIPTION	RATE	UNIT
168	VEGETATIVE WATERING	6,788 GAL/ACRE/CYCLE 6 CYCLES	MG

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SUMMARY OF QUANTITIES

SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	20
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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CURVE 1

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
405+00	0	0	0	0
405+50	0	0	0	0
406+00	1	1	0	25
406+50	0	2	0	21
407+00	0	5	7	23
407+50	2	11	0	43
408+00	0	16	0	48
408+50	0	20	0	52
409+00	1	21	23	37
409+50	1	21	28	35
410+00	0	28	34	41
410+50	0	25	32	41
411+00	0	36	36	37
411+50	0	42	35	36
412+00	0	46	29	36
412+50	0	44	25	36
413+00	0	50	12	43
413+50	0	47	14	45
414+00	3	38	12	44
414+50	2	24	13	39
415+00	0	25	13	38
415+50	1	27	13	36
416+00	1	40	14	36
416+50	0	48	13	39
417+00	1	77	25	41
417+50	0	91	22	43
418+00	0	102	23	42
418+50	0	110	29	40
419+00	0	167	31	40
419+50	0	155	31	37
420+00	0	158	34	43
420+50	0	166	39	40
421+00	0	168	37	40
421+50	0	177	33	37
422+00	0	154	27	42
422+50	0	151	33	49
423+00	0	139	33	38
423+50	0	109	38	32
424+00	1	80	41	37
424+50	1	44	28	50
425+00	0	29	33	33
425+50	0	19	13	35
426+00	0	15	0	45
426+50	0	14	0	46
427+00	0	8	0	27
427+50	0	0	0	0
428+00	0	0	0	0
428+50	0	0	0	0
429+00	0	0	0	0
SUBTOTAL	15	2750	905	1670

CURVES 2 & 3

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
499+00	0	0	0	0
499+50	0	2	0	23
500+00	0	4	0	23
500+50	0	3	0	24
501+00	0	4	0	27
501+50	0	3	15	17
502+00	0	4	14	17
502+50	0	4	14	17
503+00	0	4	12	17
503+50	0	4	13	17
504+00	1	2	13	33
504+50	2	2	11	31
505+00	0	4	11	38
505+50	2	6	14	41
506+00	1	10	13	44
506+50	1	22	35	30
507+00	2	41	44	30
507+50	1	47	46	30
508+00	2	38	38	30
508+50	0	29	31	29
509+00	1	18	29	29
509+50	0	11	31	30
510+00	1	12	18	33
510+50	1	8	22	32
511+00	0	8	31	32
511+50	0	6	25	33
512+00	0	6	20	36
512+50	0	5	15	37
513+00	0	4	0	46
513+50	0	4	0	44
514+00	0	3	0	42
514+50	0	0	0	40
515+00	0	0	0	37
515+50	0	0	0	40
516+00	0	0	0	37
516+50	0	0	0	36
517+00	0	0	0	40
517+50	0	3	0	33
518+00	0	4	0	47
518+50	1	6	14	33
519+00	1	10	19	37
519+50	1	17	20	39
520+00	2	26	26	46
520+50	2	27	31	39
521+00	2	22	36	40
521+50	2	11	33	39
522+00	2	8	22	37
522+50	1	6	16	39
523+00	1	5	14	39
523+50	0	5	15	41
524+00	0	5	13	44
524+50	0	5	28	34
525+00	0	9	31	34
525+50	0	20	37	30
526+00	1	38	46	29
526+50	1	65	18	40
527+00	1	70	18	36
527+50	2	74	12	36
528+00	1	49	10	35
528+50	1	20	0	36
529+00	0	10	0	19
529+50	0	5	0	21
530+00	0	0	0	0
530+50	0	0	0	0
531+00	0	0	0	0
SUBTOTAL	37	838	976	2046

CURVES 4 & 5 SB

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
542+00	0	0	0	0
542+50	0	3	0	23
543+00	0	5	12	19
543+50	0	7	15	19
544+00	0	9	16	17
544+50	0	11	21	17
545+00	0	11	22	18
545+50	0	9	19	22
546+00	0	8	15	23
546+50	0	8	14	28
547+00	0	8	16	20
547+50	0	7	18	17
548+00	0	8	22	16
548+50	0	8	26	16
549+00	0	7	22	16
549+50	0	8	23	16
550+00	0	9	20	16
550+50	0	8	0	16
551+00	0	7	22	22
551+50	0	8	20	21
552+00	0	8	22	23
552+50	0	10	17	25
553+00	0	12	17	22
553+50	0	20	16	21
554+00	0	7	14	20
554+50	0	4	0	25
555+00	0	0	0	25
555+50	0	2	0	22
556+00	0	2	0	21
556+50	0	2	0	34
557+00	0	2	0	25
557+50	0	2	0	31
558+00	0	4	0	39
558+50	0	8	0	39
559+00	0	10	17	38
559+50	0	11	16	36
560+00	0	13	25	34
560+50	0	15	23	33
561+00	0	10	18	25
561+50	0	7	18	22
562+00	0	8	21	21
562+50	0	8	19	20
563+00	0	7	22	20
563+50	0	5	26	18
564+00	0	6	31	19
564+50	0	7	36	17
565+00	0	10	43	16
565+50	0	15	45	16
566+00	0	18	35	16
566+50	0	14	24	16
567+00	0	6	0	25
567+50	0	0	0	0
568+00	0	0	0	0
SUBTOTAL	0	402	831	1129

CURVES 4 & 5 NB

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
574+50	0	0	0	0
575+00	0	2	0	23
575+50	1	2	0	15
576+00	0	2	0	19
576+50	1	2	9	14
577+00	0	3	13	15
577+50	0	3	12	14
578+00	0	1	9	14
578+50	0	1	10	14
579+00	0	1	9	14
579+50	0	1	0	18
580+00	0	2	0	18
580+50	0	2	0	17
581+00	0	1	0	18
581+50	0	1	0	20
582+00	0	0	0	0
582+50	0	0	0	0
583+00	0	0	0	0
645+00	0	0	0	0
645+50	0	4	20	14
646+00	0	6	20	15
646+50	0	5	18	16
647+00	0	5	0	28
647+50	0	5	0	33
648+00	0	4	16	20
648+50	0	4	16	19
649+00	0	5	18	19
649+50	0	6	17	23
650+00	0	9	18	20
650+50	0	9	16	18
651+00	0	9	18	15
651+50	0	0	0	0
SUBTOTAL	2	95	239	473

CURVE 6

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
673+50	0	4	0	17
674+00	1	10	16	29
674+50	1	8	16	30
675+00	0	5	7	33
675+50	0	4	12	36
676+00	0	5	15	36
676+50	0	6	12	36
677+00	0	4	21	29
677+50	0	5	13	39
678+00	0	7	14	39
678+50	0	9	17	38
679+00	0	12	17	39
679+50	1	10	17	34
680+00	1	11	15	38
680+50	1	14	15	38
681+00	0	16	15	38
681+50	0	13	12	40
682+00	0	11	13	38
682+50	0	14	14	42
683+00	0	16	15	42
683+50	3	17	18	43
684+00	0	20	16	42
684+50	0	26	13	42
685+00	0	31	14	44
685+50	0	33	16	44
686+00	1	29	15	41
686+50	0	22	14	42
687+00	0	14	12	37
687+50	2	11	14	42
688+00	1	11	14	37
688+50	0	9	18	42
689+00	0	6	14	40
689+50	0	5	29	30
690+00	0	3	32	30
690+50	0	3	31	30
691+00	0	2	31	30
691+50	2	3	19	33
692+00	1	7	19	30
692+50	1	10	20	31
693+00	2	10	15	32
693+50	1	14	0	44
694+00	1	19	0	36
694+50	1	13	0	14
807+00	0	3	13	38
807+50	0	5	14	38
808+00	0	12	18	34
SUBTOTAL	21	522	697	1661

CURVE 7

STATION	EXCAVATION CY **	EMBANKMENT CY **	SP-C TON **	SP-D TON **
808+50	0	8	16	35
809+00	1	10	19	29
809+50	2	12	22	30
810+00	1	18	27	30
810+50	1	24	26	34
811+00	0	35	32	34
811+50	0	54	32	30
812+00	1	70	30	30
812+50	1	70	27	37
813+00	1	72	30	33
813+50	0	77	29	34
814+00	0	77	29	31
814+50	1	78	24	34
815+00	0	75	23	35
815+50	0	72	23	33
816+00	0	82	25	33
816+50	2	98	27	39
817+00	0	101	23	38
817+50	0	86	26	35
818+00	0	82	34	30
818+50	1	85	32	32
819+00	1	129	43	29
819+50	1	171	57	29
820+00	3	194	56	29
820+50	6	190	42	29
821+00	4	271	36	29
821+50	0	184	35	30
822+00	2	128	19	36
822+50	1	23	12	36
SUBTOTAL	30	2576	856	944

** BREAKDOWN FOR CONTRACTOR'S INFORMATION ONLY. SEE SUMMARY OF QUANTITIES FOR ACTUAL PAY ITEMS.

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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SUMMARY OF EARTHWORK

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	21
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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US 84 SEQUENCE OF WORK

A. REFER TO TRAFFIC CONTROL PLAN TYPICAL SECTIONS FOR PHASE CONSTRUCTION. ROAD CLOSURE OF ALL THROUGH LANES IS PROHIBITED UNLESS APPROVED BY THE ENGINEER.

B. CURVE LOCATIONS SHALL BE GROUPED INTO TWO SEGMENTS THAT CAN BE CONSTRUCTED AT THE SAME TIME. SEE PROJECT LAYOUT SHEET FOR ADDITIONAL INFORMATION.
GROUP 1: CURVE 1 THRU CURVE 4 NB
GROUP 2: CURVE 5 NB THRU CURVE 7

C. CULVERT CONSTRUCTION AT CURVE 1 AND 7 SHALL BE PERFORMED PRIOR TO ROADWAY CONSTRUCTION AT CURVE 1 AND 7 TO ENSURE MAXIMUM 4:1 EMBANKMENT SLOPE AT ALL TIMES. REMOVAL AND REPLACEMENT OF MBGF ON THE OUTSIDE SHALL BE PERFORMED AT END OF PHASE 1 AND SHALL BE PERFORMED AT END OF PHASE 2 FOR MBGF ON THE INSIDE.

D. SEQUENCE OF CONSTRUCTION SHALL GENERALLY CONFORM TO THE FOLLOWING PHASING. CONTRACTOR SHALL SUBMIT A DETAILED WORK SEQUENCE FOR AN APPROVAL PRIOR TO STARTING ANY WORK.

PHASE 1 (OUTSIDE LANE AND SHOULDER)

1. SETUP TRAFFIC CONTROL FOR PHASE 1 AS SHOWN IN TRAFFIC CONTROL PLAN TYPICAL SECTIONS AND APPLICABLE STANDARDS. FILL IN EXISTING RUMBLE STRIPS AT INSIDE SHOULDER AND PLACE WORK ZONE PAVEMENT MARKINGS PRIOR TO OPENING UP TO TRAFFIC.

2. INSTALL EROSION CONTROL MEASURES PER SW3P SITE PLAN AND APPLICABLE STANDARDS.

3. CONSTRUCT SUPERELEVATION AT THE CURVES OF THE ROADWAY IN ACCORDANCE WITH PROPOSED TYPICAL SECTIONS AND SUPERELEVATION TABLES. BACKFILL AND GRADE EMBANKMENT TO 4:1 MAX SLOPES IN MEDIANS AND OUTSIDE FRONT SLOPES.
   - LOW SIDE (CURVE 2,4,5,6 NB) (CURVE 1,3,7 SB)
   STEP 1: PLANE 1 1/4" MIN TO 4" MAX ACROSS LOWER SHOULDER AND TRAVEL LANE.
   STEP 2: PLACE OCST OVER PLANED SURFACE.
   - HIGH SIDE (CURVE 1,3,7 NB) (CURVE 2,4,5,6 SB)
   STEP 1: PLANE 1 1/4" ACROSS HIGHER SHOULDER AND TRAVEL LANE.
   STEP 2: PLANE ADDITIONAL 2 1/4" MAX TO ACHIEVE PROPOSED SUPERELEVATION AS REQUIRED.
   STEP 3: PLACE OCST OVER PLANED SURFACE.
   STEP 4: PLACE LEVEL-UP AS REQUIRED.

4. RESTORE DISTURBED AREAS AND PLACE TERMPORARY SEEDING ALONG THE OUTSIDE SHOULDER.

5. REMOVE APPROPRIATE EROSION CONTROL MEASURES UNLESS NOTED OTHERWISE IN THE PLANS.

6. REMOVE TRAFFIC CONTROL DEVICES.

PHASE 2 (INSIDE LANE AND SHOULDER)

1. SETUP TRAFFIC CONTROL FOR PHASE 2 AS SHOWN IN TRAFFIC CONTROL PLAN TYPICAL SECTIONS AND APPLICABLE STANDARDS. FILL IN EXISTING RUMBLE STRIPS AT OUTSIDE SHOULDER AND PLACE WORK ZONE PAVEMENT MARKINGS PRIOR TO OPENING UP TO TRAFFIC.

2. INSTALL EROSION CONTROL MEASURES PER SW3P SITE PLAN AND APPLICABLE STANDARDS.

3. CONSTRUCT SUPERELEVATION AT THE CURVES OF THE ROADWAY IN ACCORDANCE WITH PROPOSED TYPICAL SECTIONS AND SUPERELEVATION TABLES. BACKFILL AND GRADE EMBANKMENT TO 4:1 MAX SLOPES IN MEDIANS AND OUTSIDE FRONT SLOPES.
   - LOW SIDE (CURVE 1,3,7 NB) (CURVE 2,4,5,6 SB)
   STEP 1: PLANE 1 1/4" MIN TO 4" MAX ACROSS LOWER SHOULDER AND TRAVEL LANE.
   STEP 2: PLACE OCST OVER PLANED SURFACE.
   - HIGH SIDE (CURVE 2,4,5,6 NB) (CURVE 1,3,7 SB)
   STEP 1: PLANE 1 1/4" ACROSS HIGHER SHOULDER AND TRAVEL LANE.
   STEP 2: PLANE ADDITIONAL 2 1/4" MAX TO ACHIEVE PROPOSED SUPERELEVATION AS REQUIRED.
   STEP 3: PLACE OCST OVER PLANED SURFACE.
   STEP 4: PLACE LEVEL-UP AS REQUIRED.

4. RESTORE DISTURBED AREAS AND PLACE TEMPORARY SEEDING ALONG THE INSIDE SHOULDER.

5. REMOVE APPROPRIATE EROSION CONTROL MEASURES UNLESS NOTED OTHERWISE IN THE PLANS.

6. REMOVE TRAFFIC CONTROL DEVICES.

PHASE 3 (ENTIRE ROADWAY)

1. PLACE FINAL SURFACE OVERLAY OVER FULL PAVEMENT WIDTH FOR THE ENTIRE PROJECT IMPROVEMENT LIMITS IN ACCORDANCE WITH APPLICABLE STANDARDS.

E. ALL WORK RELATED TO ILLUMINATION MAY BE COMPLETED INDEPENDENTLY OF OTHER WORK.

NOTES:

1. AVOID PLACING ADVANCE WARNING SIGNS AND ANY TRAFFIC CONTROL DEVICES WITHIN THE RAILROAD ROW. PLACE 100 FT OUTSIDE OF THE RAILROAD ROW.

2. CONSTRUCT DRIVEWAYS IN PHASE 1 AND CONSTRUCT CROSSOVERS IN PHASE 2.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER
4/26/2021

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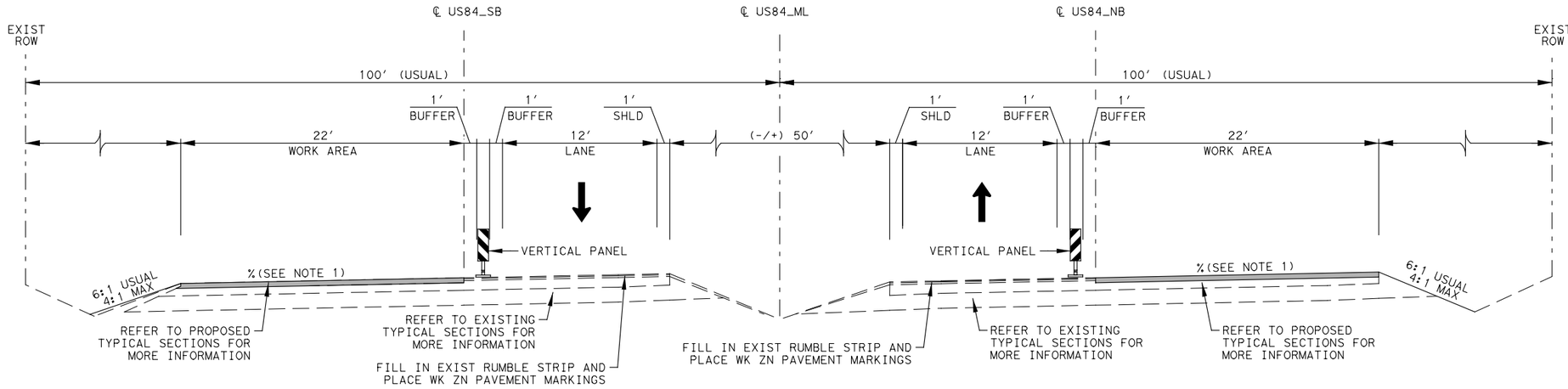
US 84
SUGGESTED
SEQUENCE OF WORK

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	22
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

OTH_US84_SEQUENCE OF WORK.dgn



SOUTHBOUND - PHASE 1 (CURVE 1,3,4,7)

SCALE: 1′=10′

NORTHBOUND - PHASE 1 (CURVE 1,3,7)

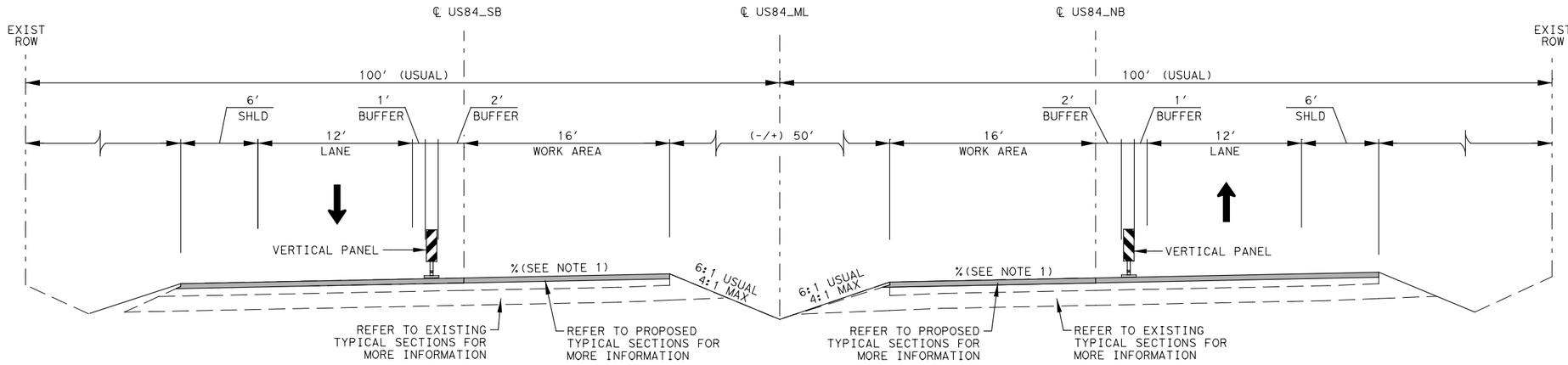
SCALE: 1′=10′

5 0 5 10

SCALE: 1" = 10′

NOTE:

1. REFER TO SUPERELEVATION TABLES FOR PROPOSED CROSS-SLOPE INFORMATION.



SOUTHBOUND - PHASE 2 (CURVE 1,3,4,7)

SCALE: 1′=10′

NORTHBOUND - PHASE 2 (CURVE 1,3,7)

SCALE: 1′=10′

STATE OF TEXAS
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US 84

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SCALE: 1"=10′ SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
BH	TEXAS	ABL	SCURRY	23
CHECK	CONTROL	SECTION	JOB	
JMP	0053	07	040	
CHECK				
JL				

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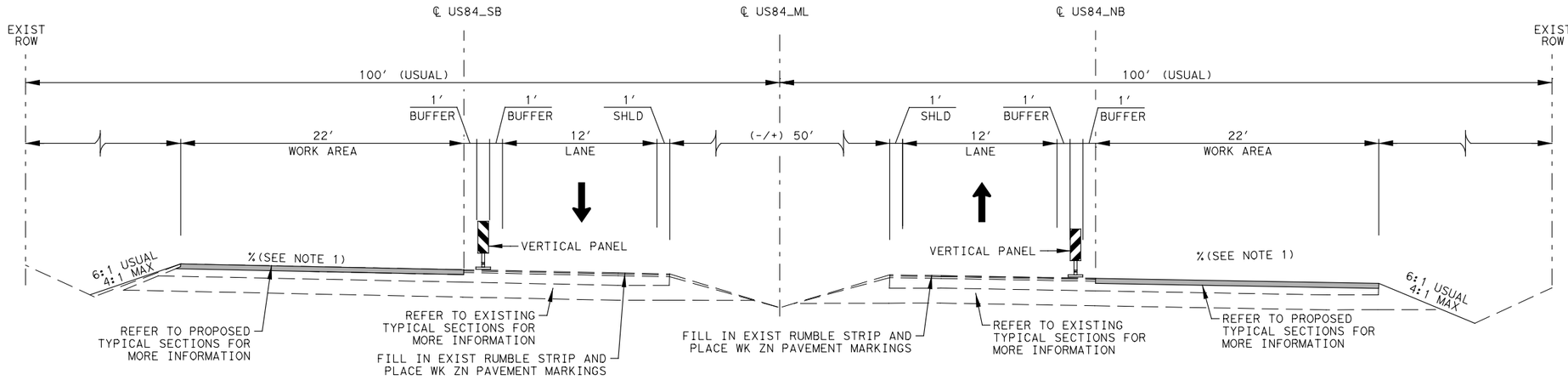


SOUTHBOUND - PHASE 1 (CURVE 2,5,6)

SCALE: 1′=10′

NORTHBOUND - PHASE 1 (CURVE 2,4,5,6)

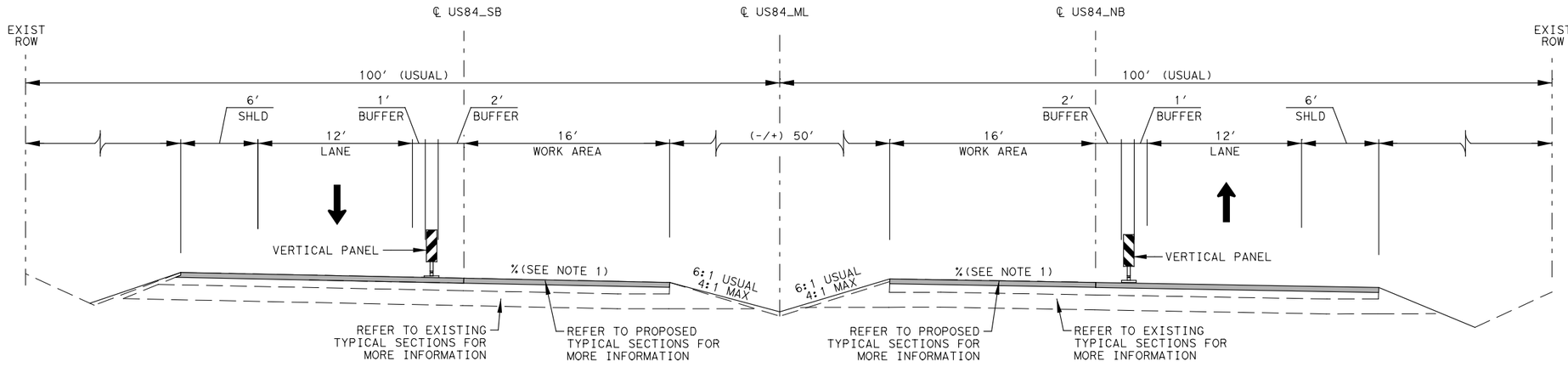
SCALE: 1′=10′

5 0 5 10

SCALE: 1" = 10′

NOTE:

1. REFER TO SUPERELEVATION TABLES FOR PROPOSED CROSS-SLOPE INFORMATION.



SOUTHBOUND - PHASE 2 (CURVE 2,5,6)

SCALE: 1′=10′

NORTHBOUND - PHASE 2 (CURVE 2,4,5,6)

SCALE: 1′=10′

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TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SCALE: 1"=10′ SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	24
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_TCP_TYP_02.dgn

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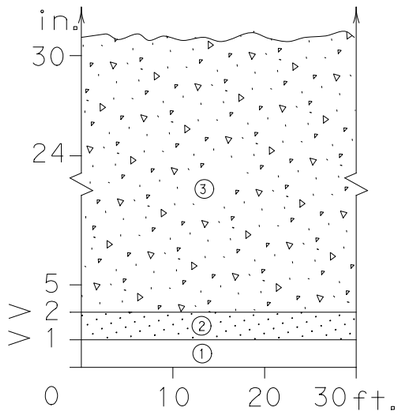
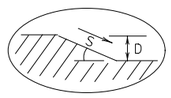
DATE:
FILE:

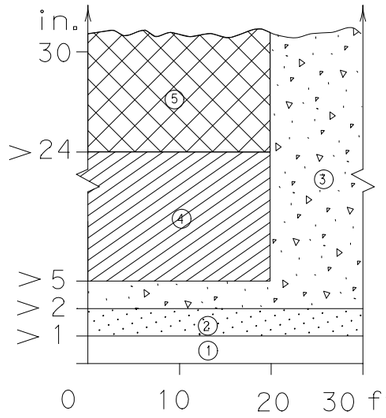
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

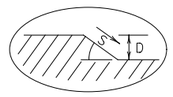


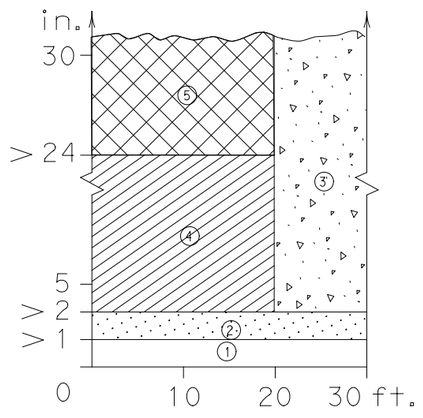
Edge Condition I
S = (3:1) (or flatter)



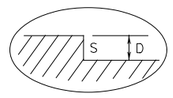


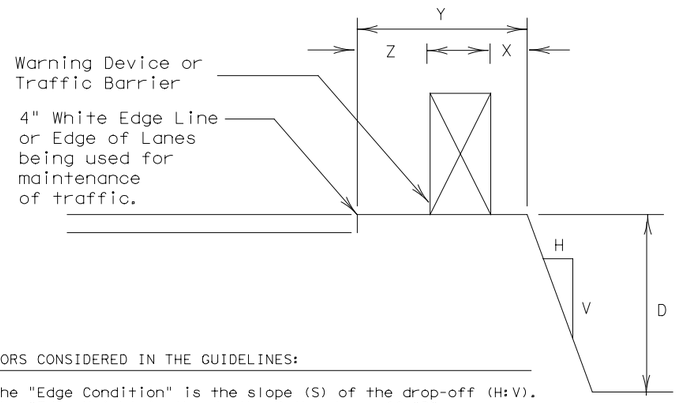
Edge Condition II
S = ((2.99):1) to (1:1)





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	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive 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:

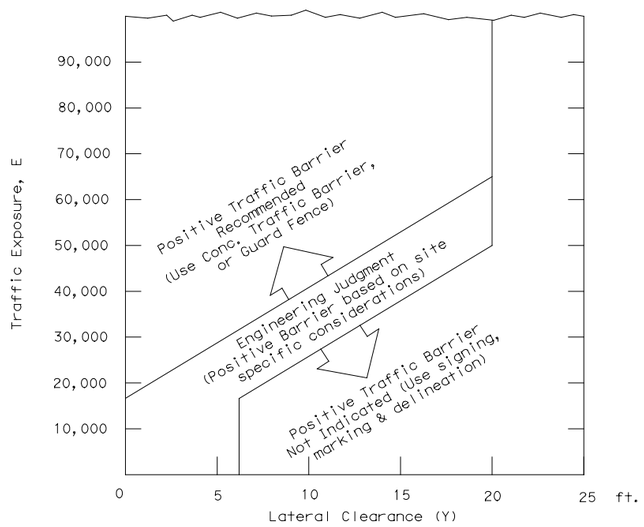
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 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 (▨)



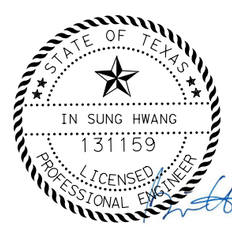
1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the dura-tion time in years of the dropoff condition.

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 a lateral offset of 20 feet from the edge of the travel lane.

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.

Engineer's Seal



4/26/2021

Date _____

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

©TxDOT August 2000

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	0053	07	040	US 84
08-01 correct typos	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		25

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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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

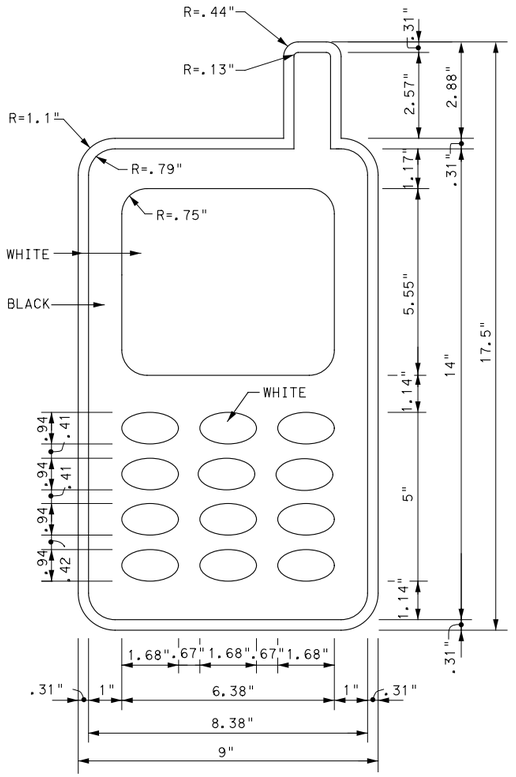
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

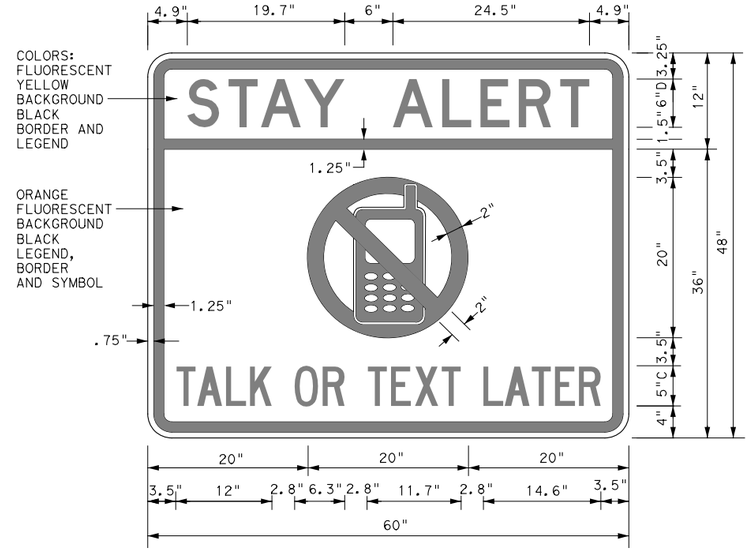
12. The Engineer has the final decision on the location of all traffic control devices.

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 APPAREL 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.





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
4-03 5-10 8-14 9-07 7-13	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		26

DATE: 4/26/2021 3:30:57 PM
FILE: bc-14.dgn

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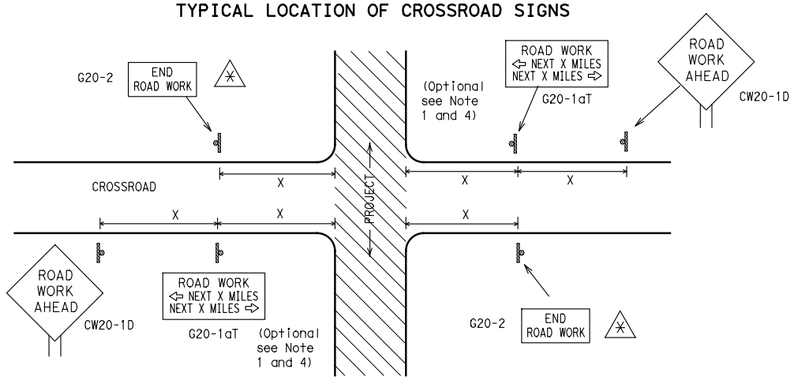
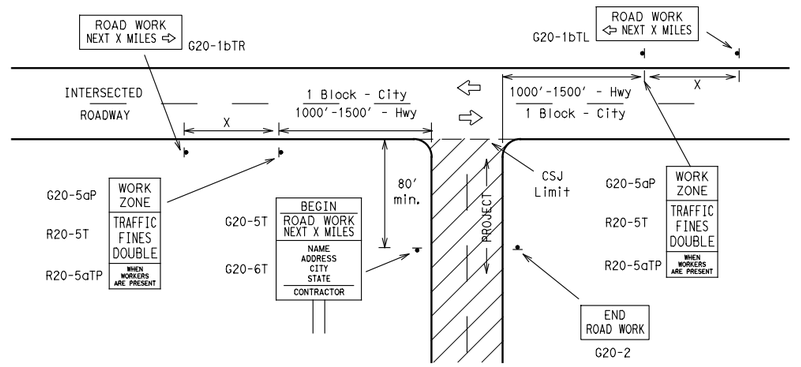
TYPICAL LOCATION OF CROSSROAD SIGNS



⁂ 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. 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]

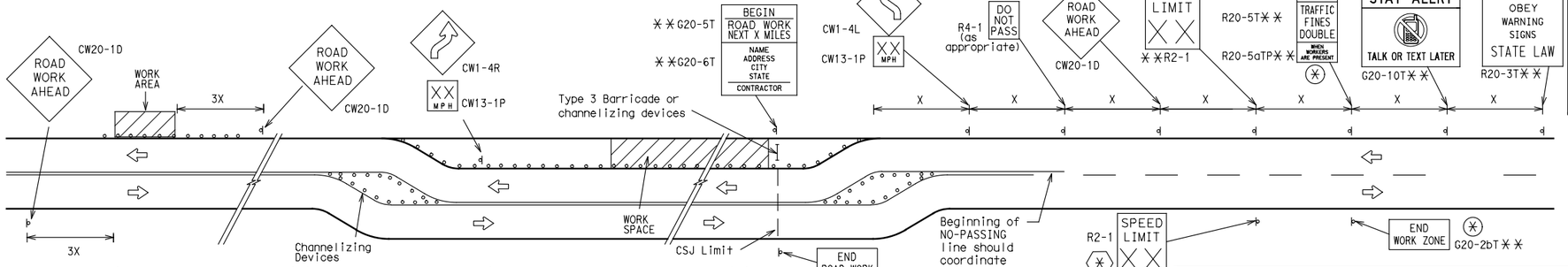
⁂ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. 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.

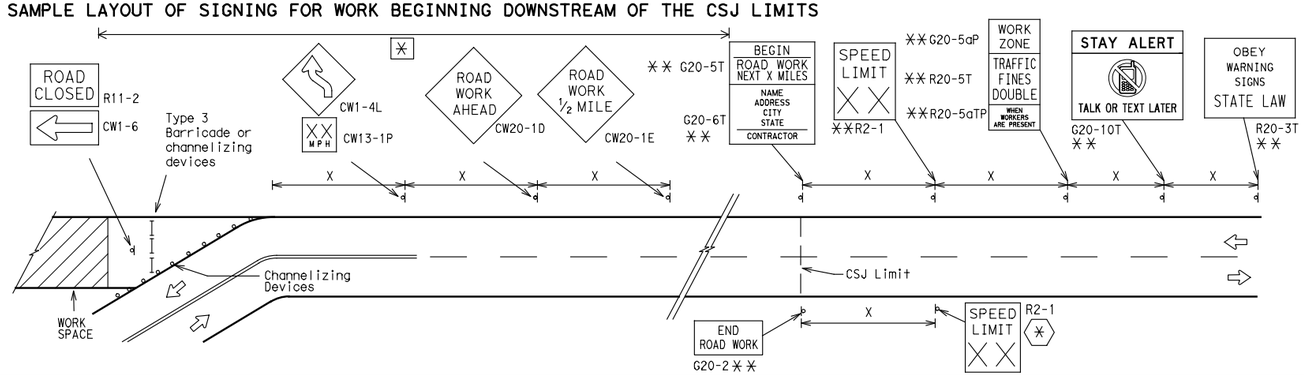
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

⁂⁂ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

⁂ 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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Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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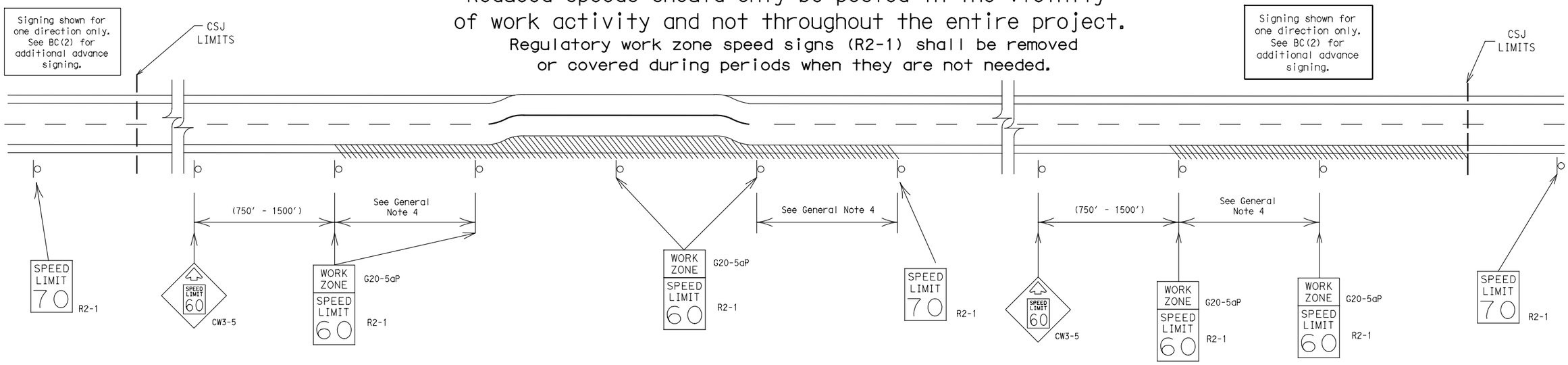
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled 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.

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Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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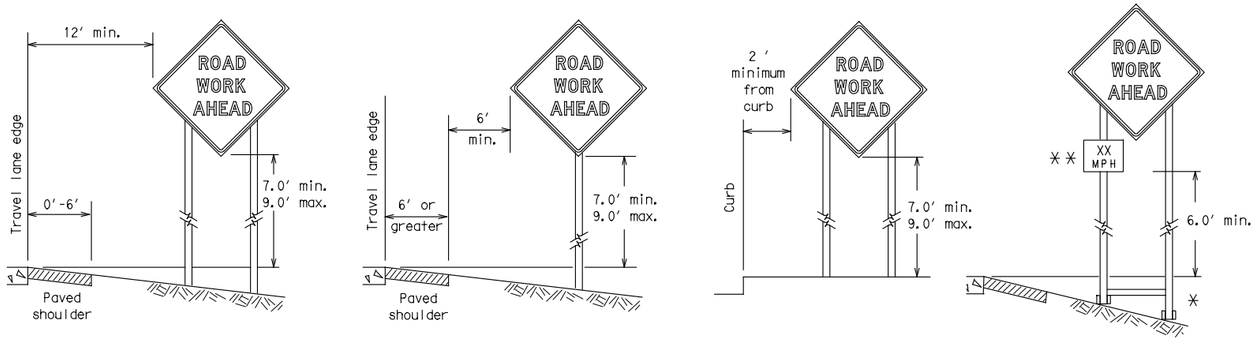
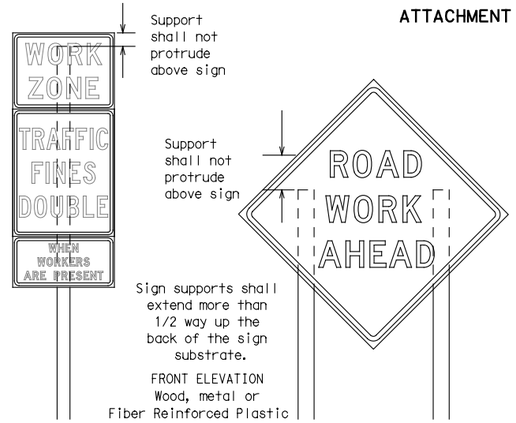
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



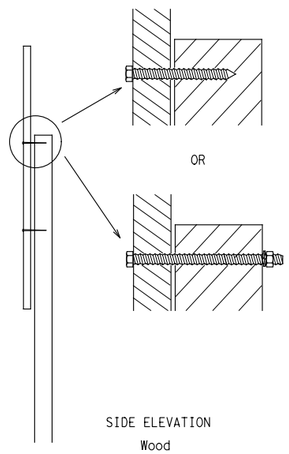
⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⚹⚹ 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



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.

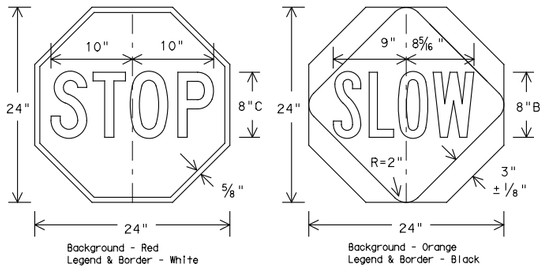


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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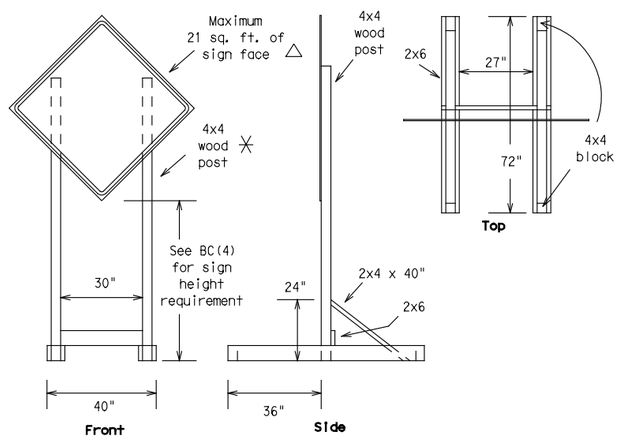
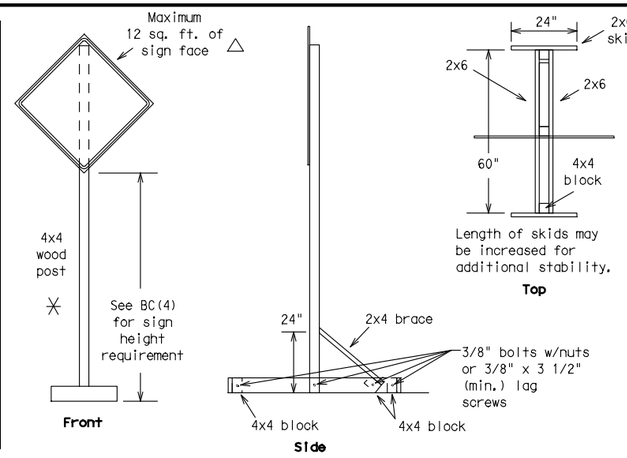
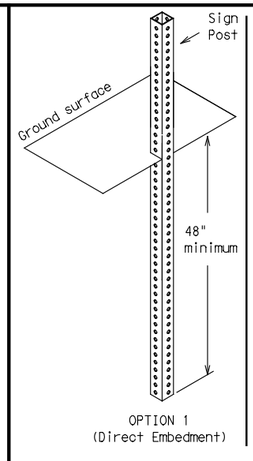
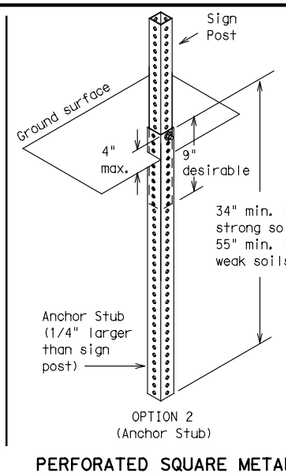


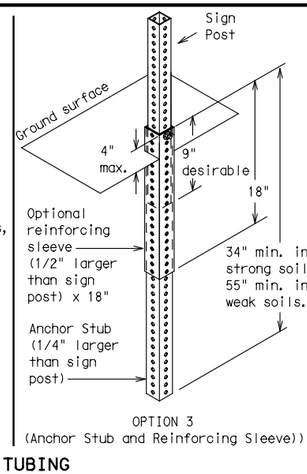


SKID MOUNTED WOOD SIGN SUPPORTS

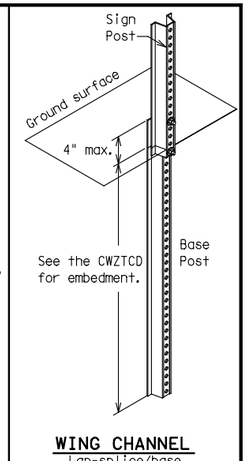
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □







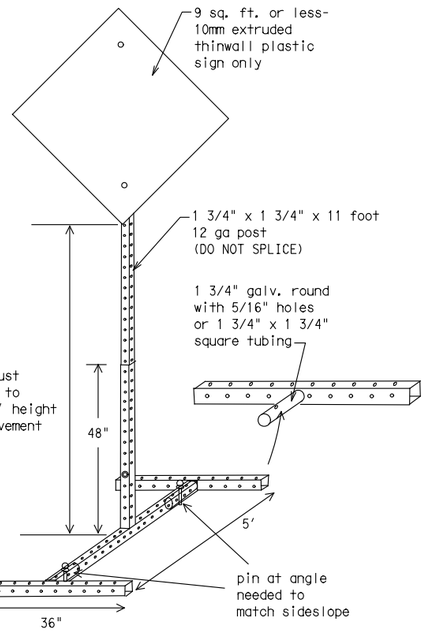
PERFORATED SQUARE METAL TUBING

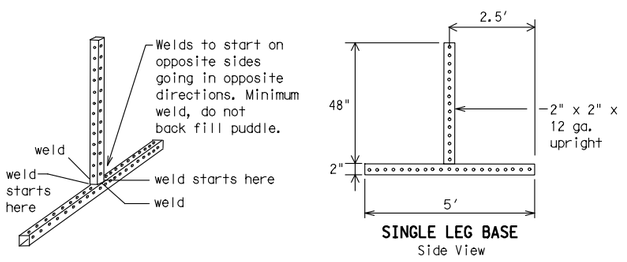


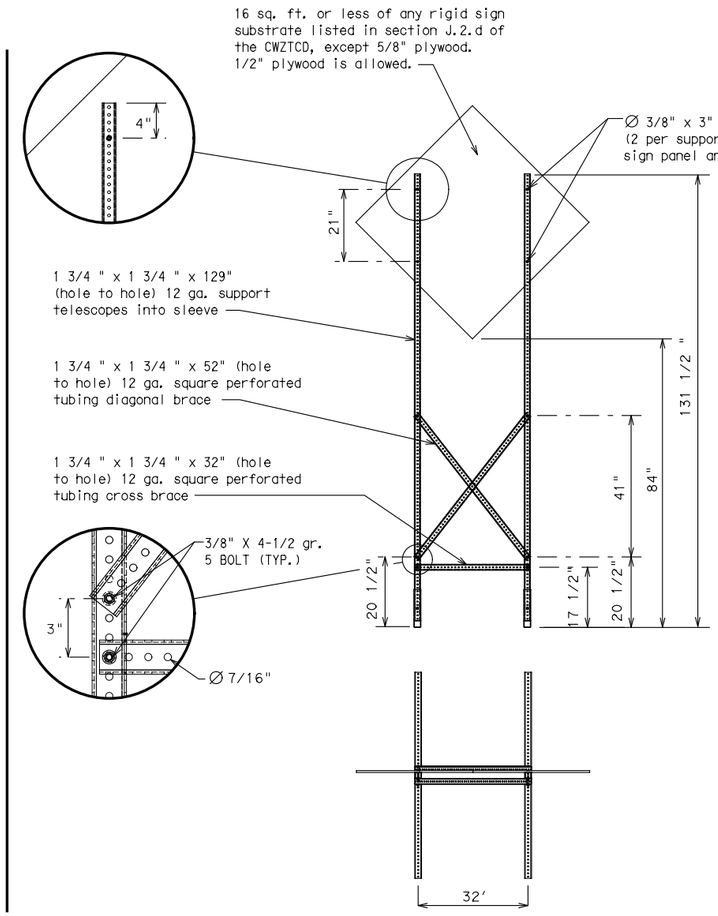
WING CHANNEL
Lap-splice/base bolted anchor

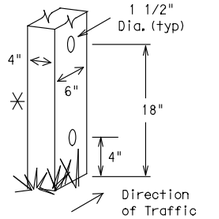
GROUND MOUNTED SIGN SUPPORTS

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.



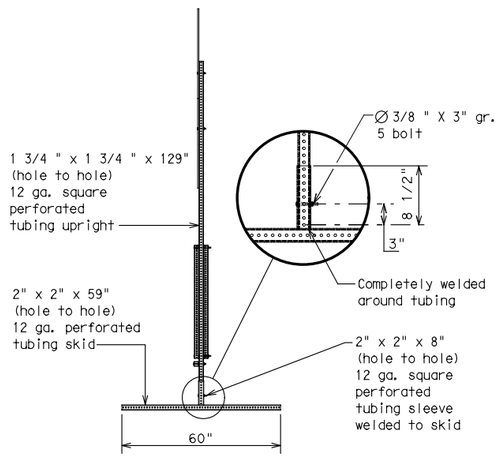






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND 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 Operations Division Standard*

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* 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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ABL	SCURRY		31

100

DATE: 4/26/2021 3:30:59 PM
FILE: bc-14.dgn

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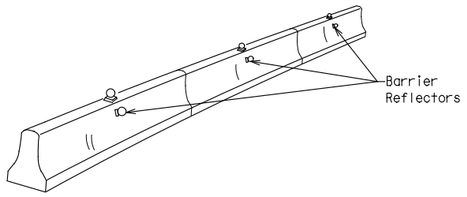
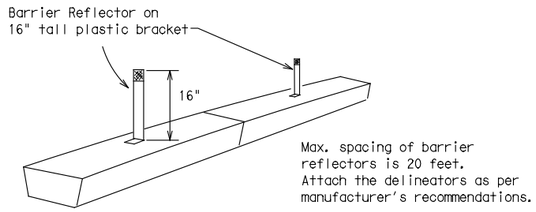
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

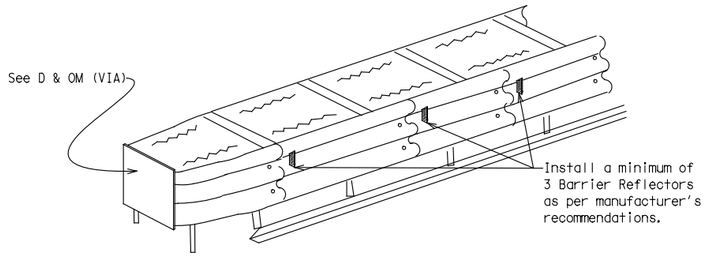


CONCRETE TRAFFIC BARRIER (CTB)

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.



LOW PROFILE CONCRETE BARRIER (LPCB)

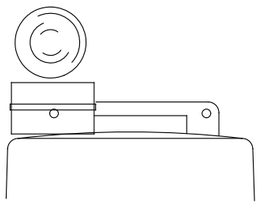


DELINEATION OF END TREATMENTS

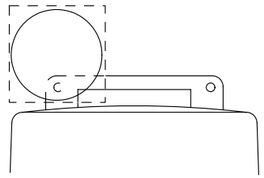
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. 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

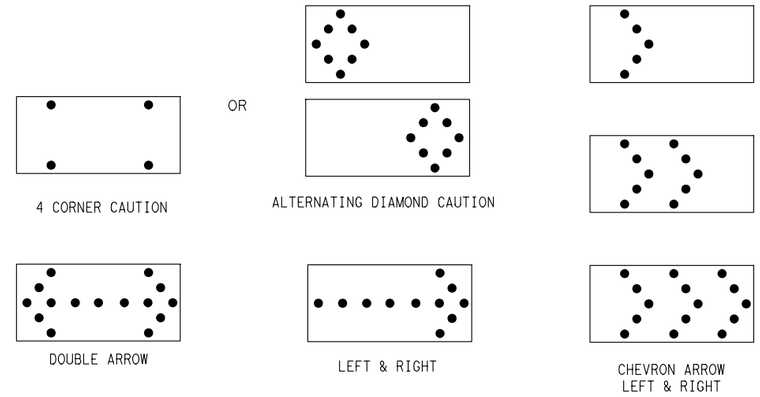
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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 National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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 Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ABL	SCURRY		32

101

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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:

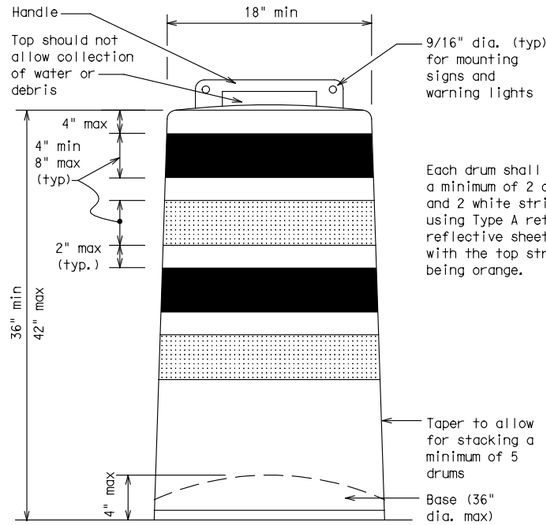
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

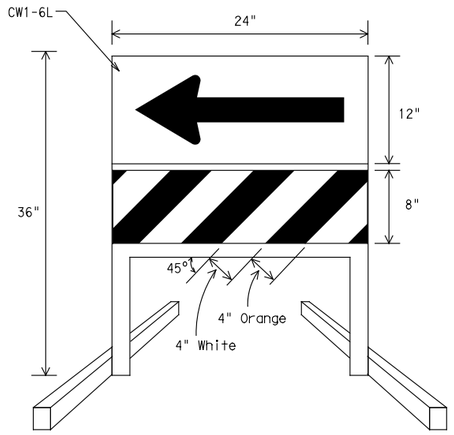
RETROREFLECTIVE SHEETING

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 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.





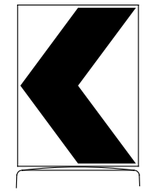
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

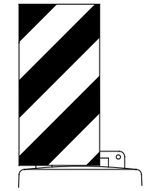
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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4-03 7-13	DIST	COUNTY		SHEET NO.
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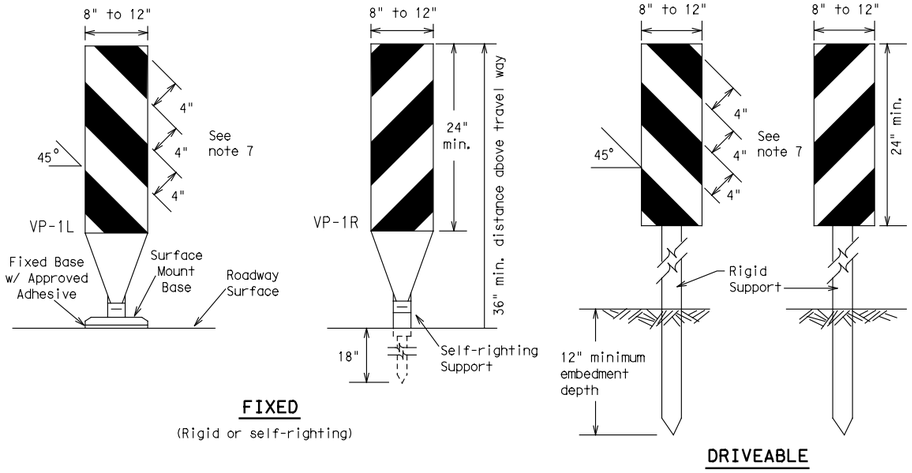
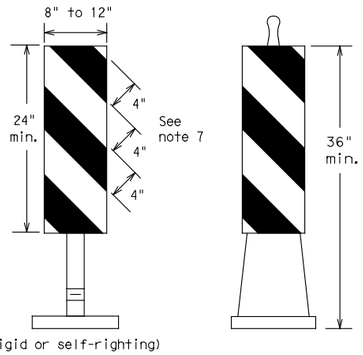


FIXED
(Rigid or self-righting)

DRIVEABLE

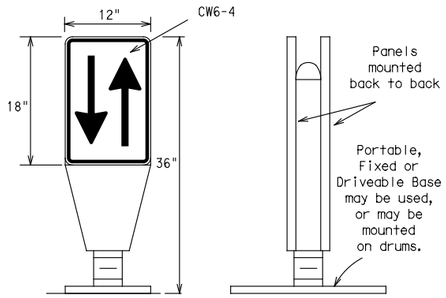


(Rigid or self-righting)

PORTABLE

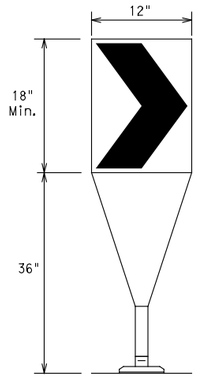
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 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)



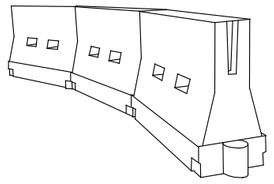
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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) placed 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 NCHRP 350 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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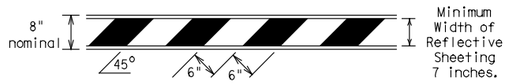
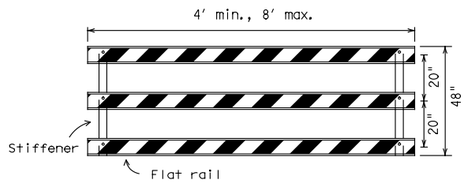
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



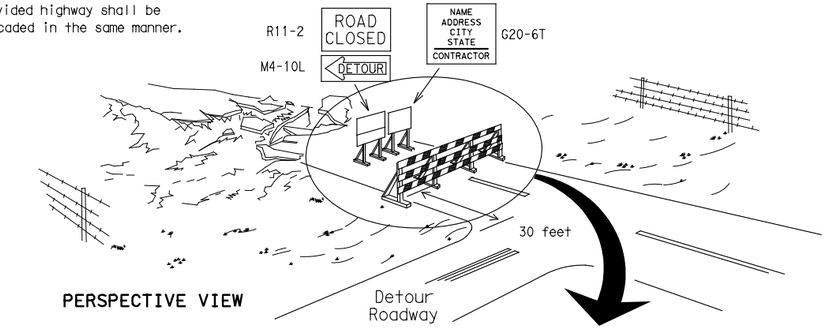
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

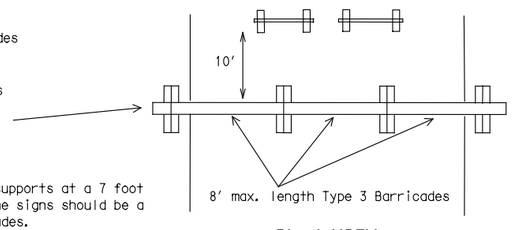
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

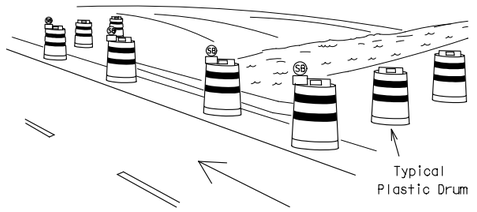
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

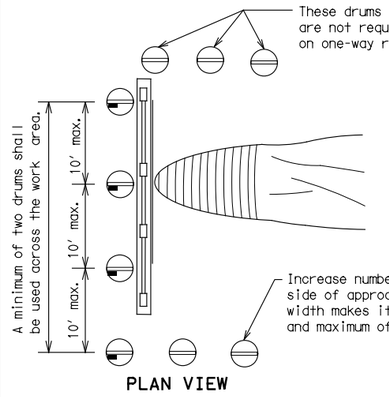
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

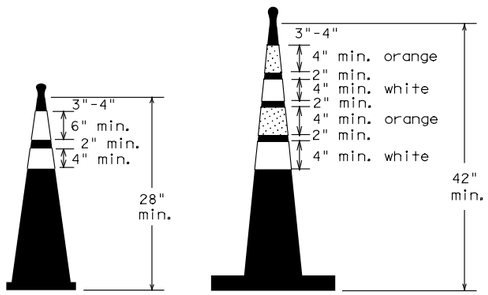
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

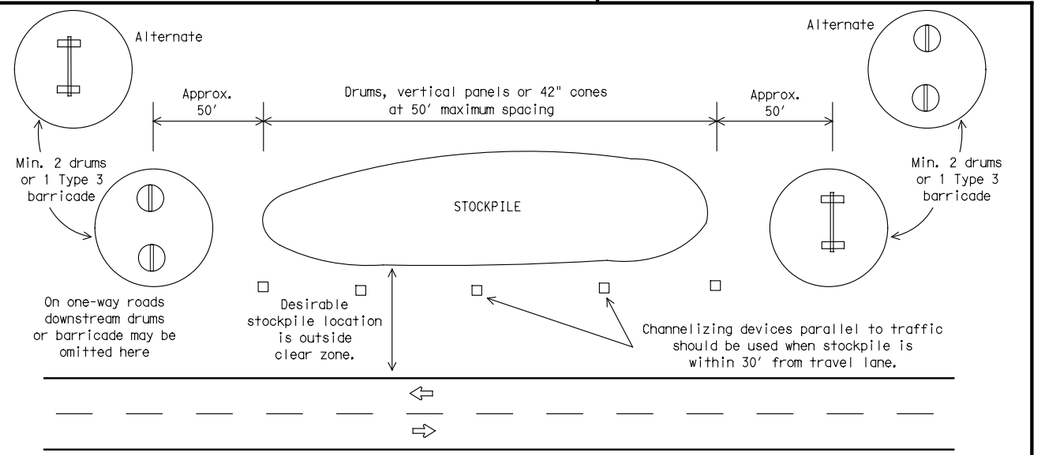
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

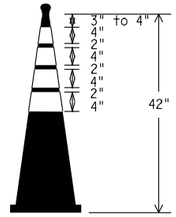
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

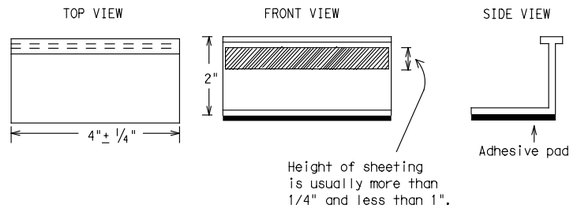
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	ABL	SCURRY		36
11-02 8-14				

105

DATE: 4/26/2021 3:31:01 PM
FILE: bc-14.dgn

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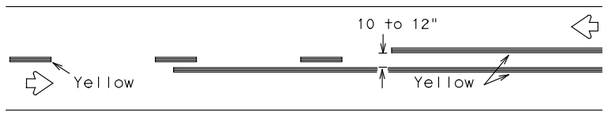
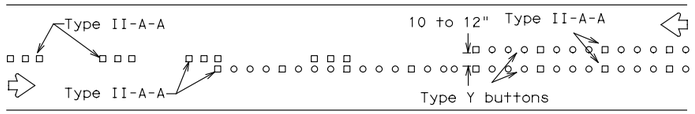
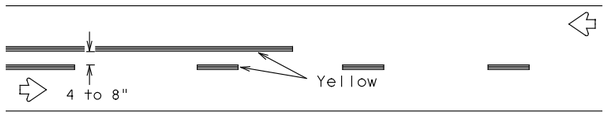
PAVEMENT MARKING PATTERNS



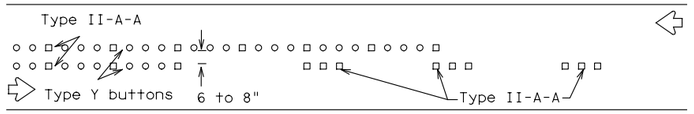
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



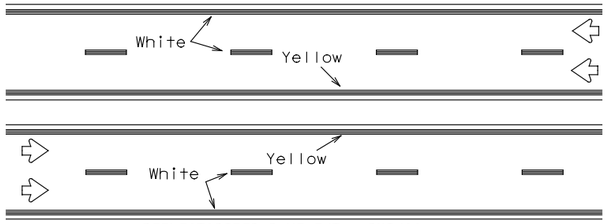
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



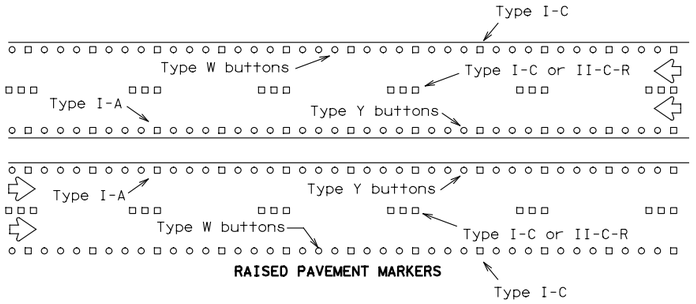
RAISED PAVEMENT MARKERS - PATTERN B

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

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



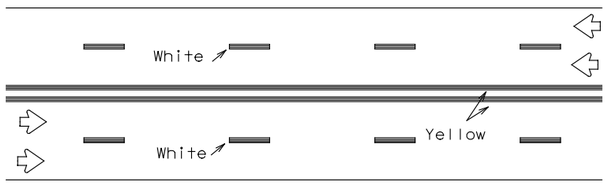
REFLECTORIZED PAVEMENT MARKINGS



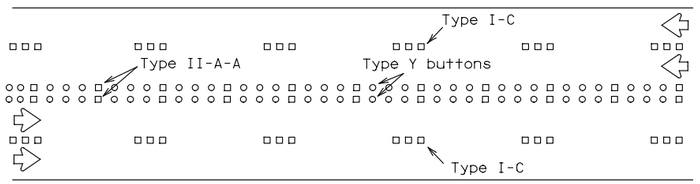
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



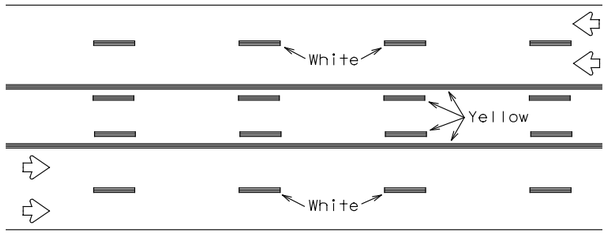
REFLECTORIZED PAVEMENT MARKINGS



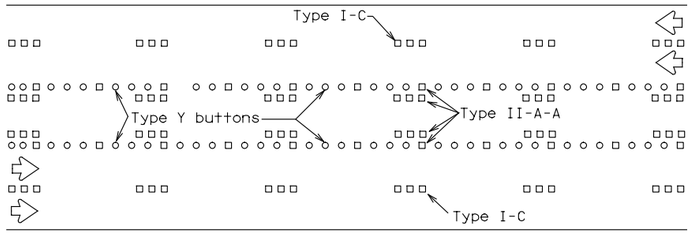
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

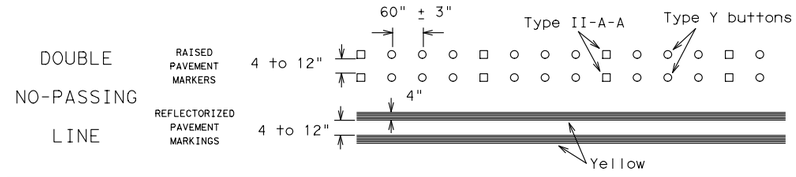
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

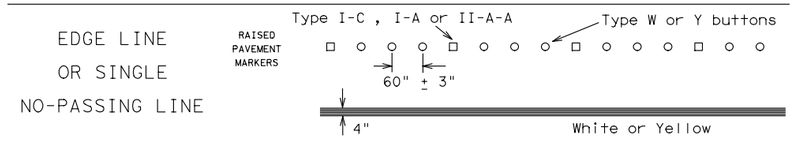
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

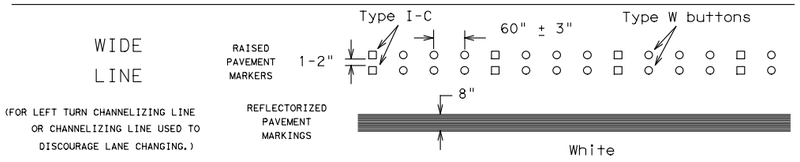


EDGE LINE OR SINGLE NO-PASSING LINE



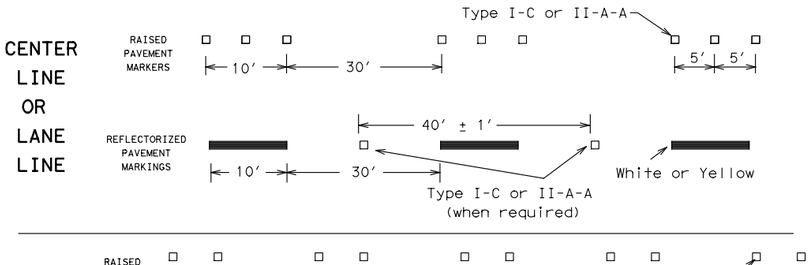
WIDE LINE

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

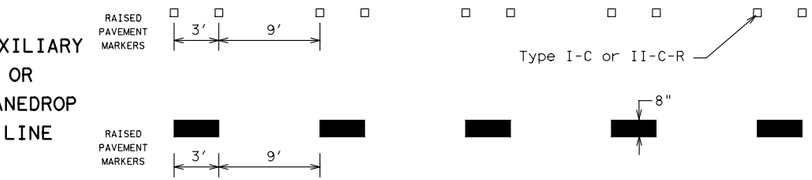


BROKEN LINES

CENTER LINE OR LANE LINE

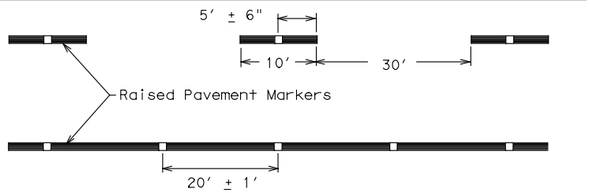


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	ABL	SCURRY		37
11-02 8-14				

106

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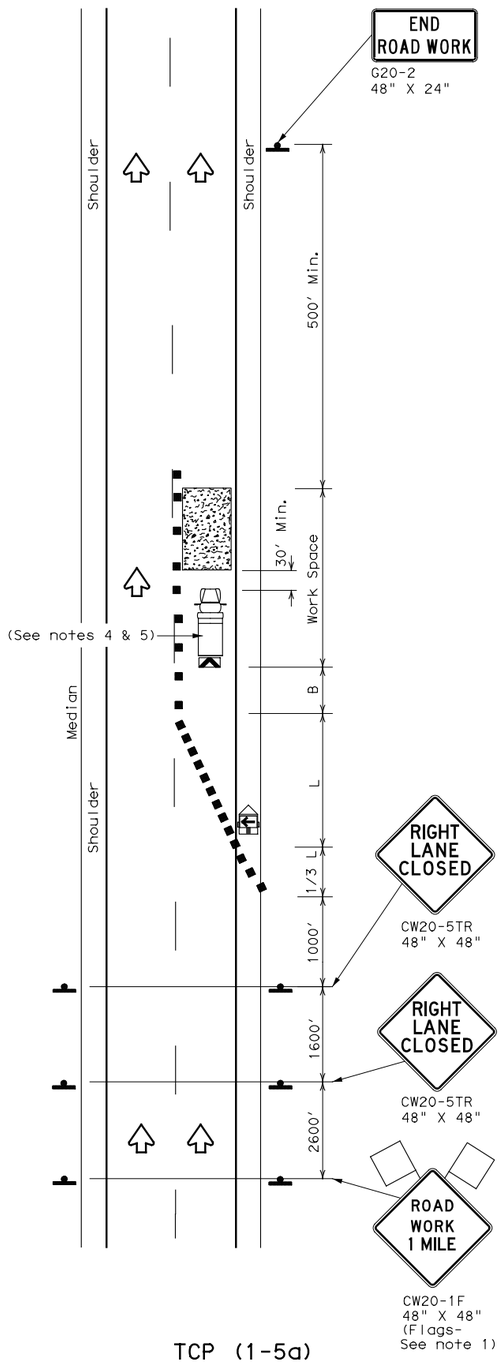
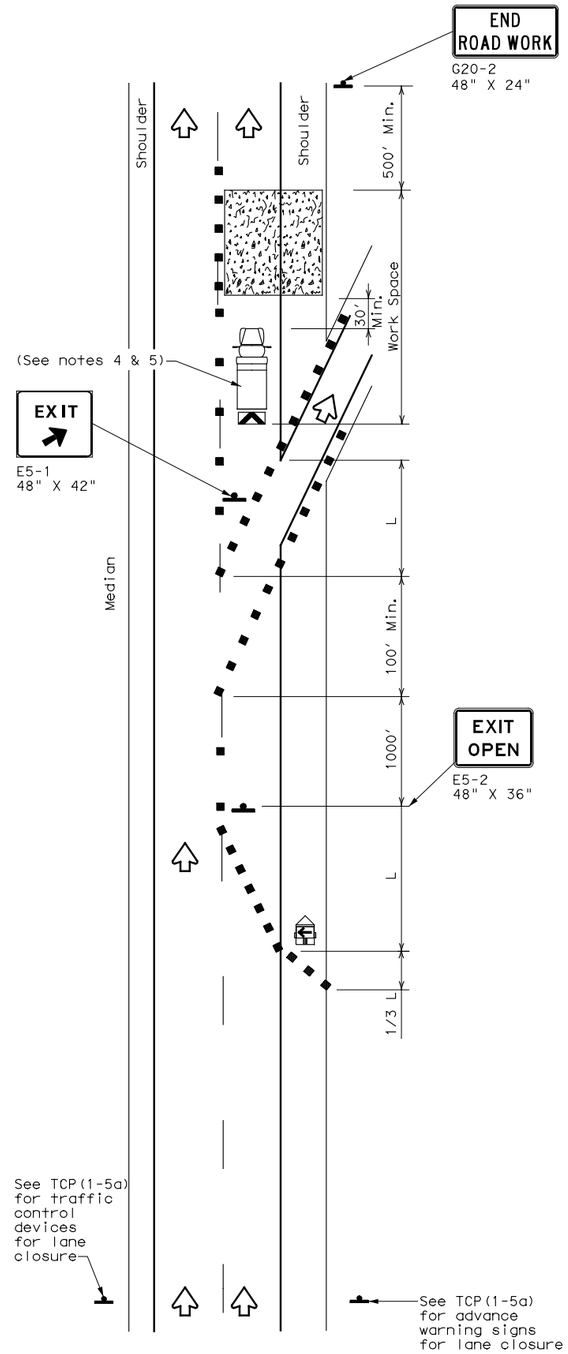


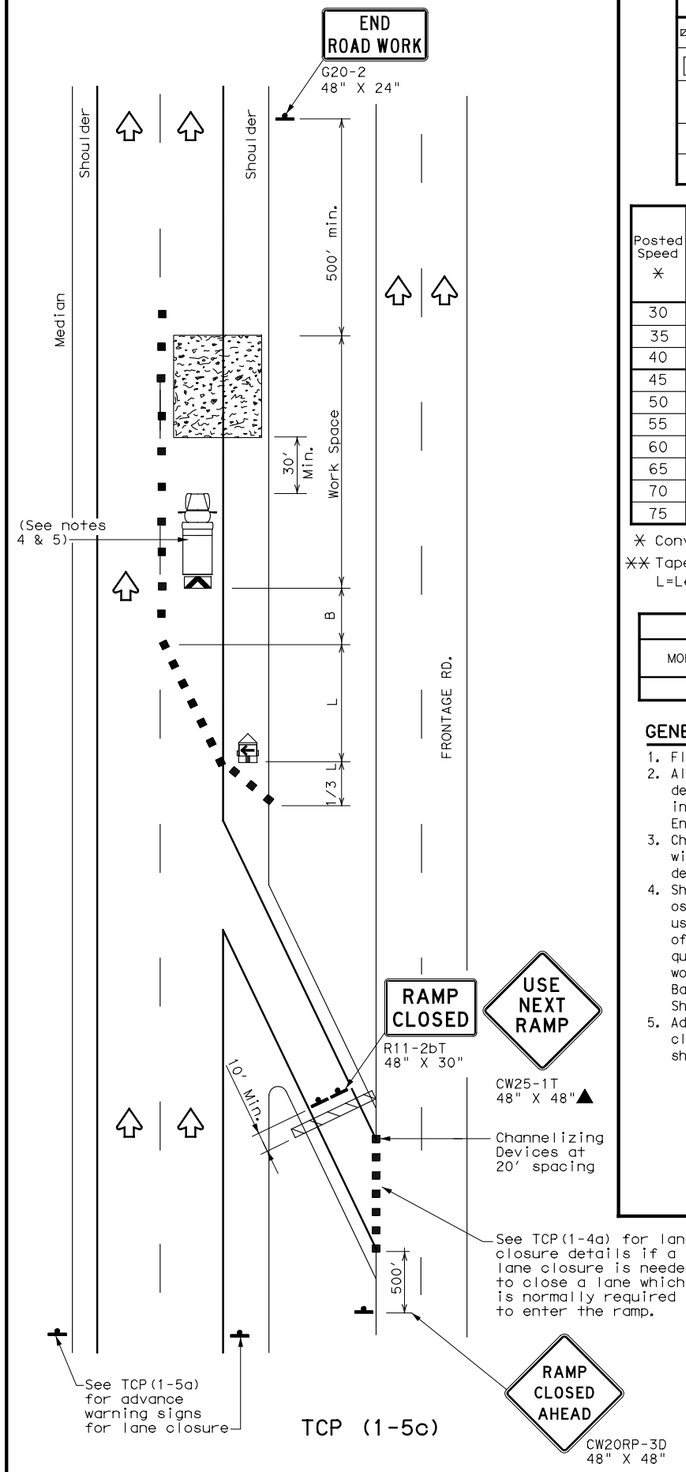
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

✳ Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		38

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FILE: tcp1-5-18.dgn

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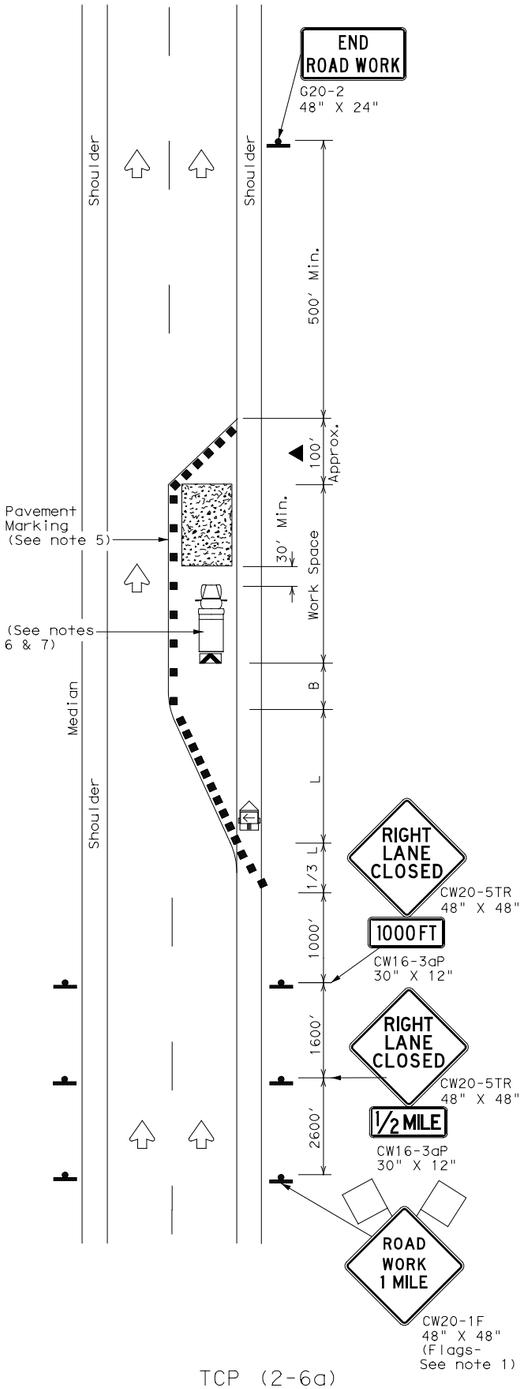
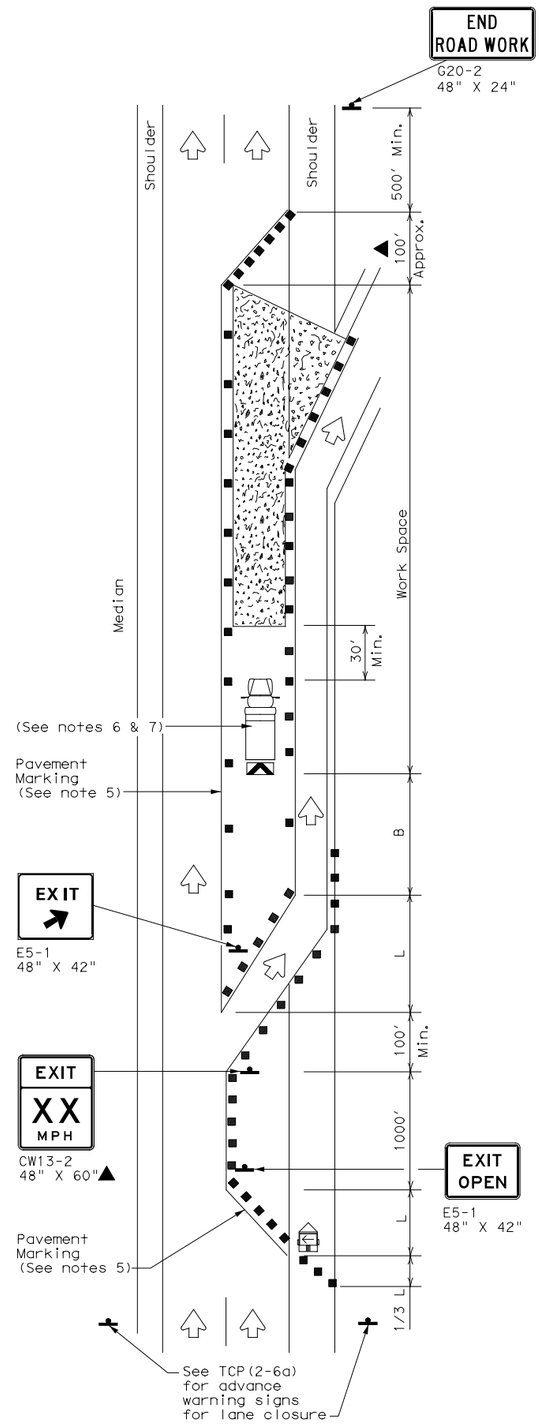
DATE: 4/26/2021 3:31:01 PM
FILE: tcp2-6-18.dgn



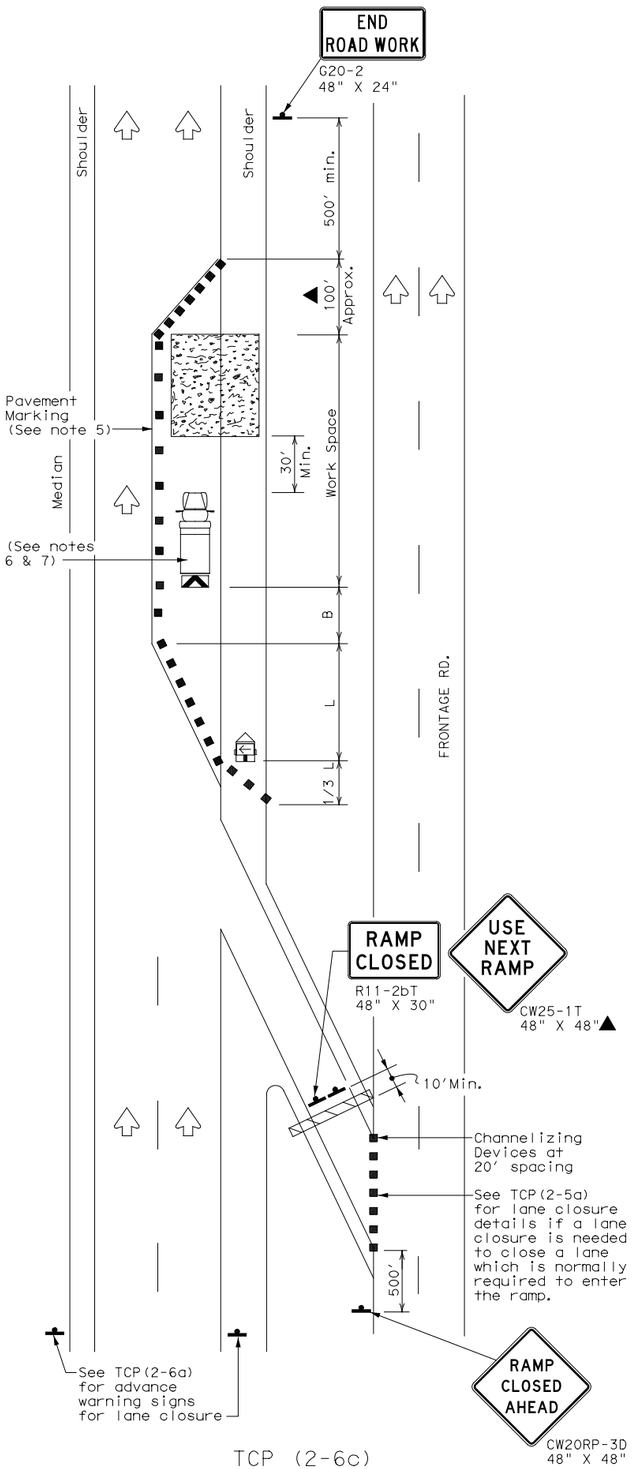
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. 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.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		39

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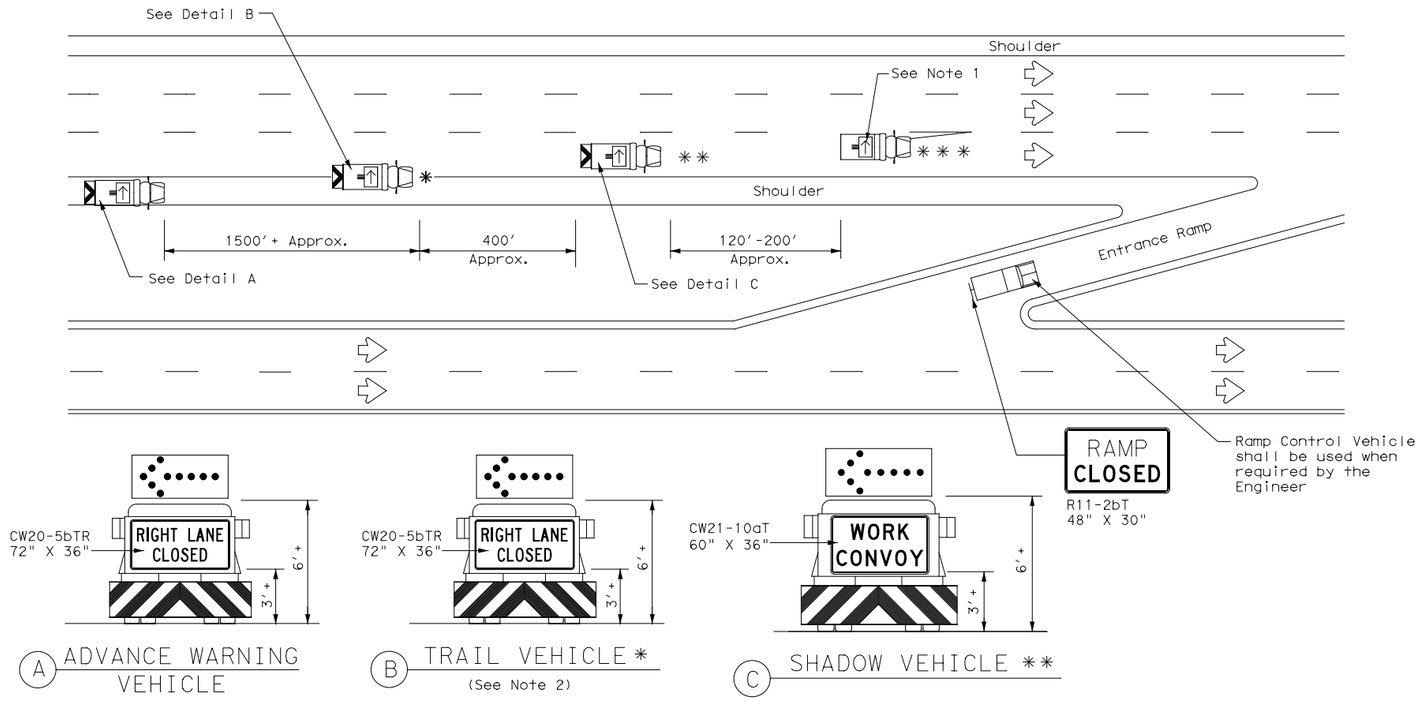
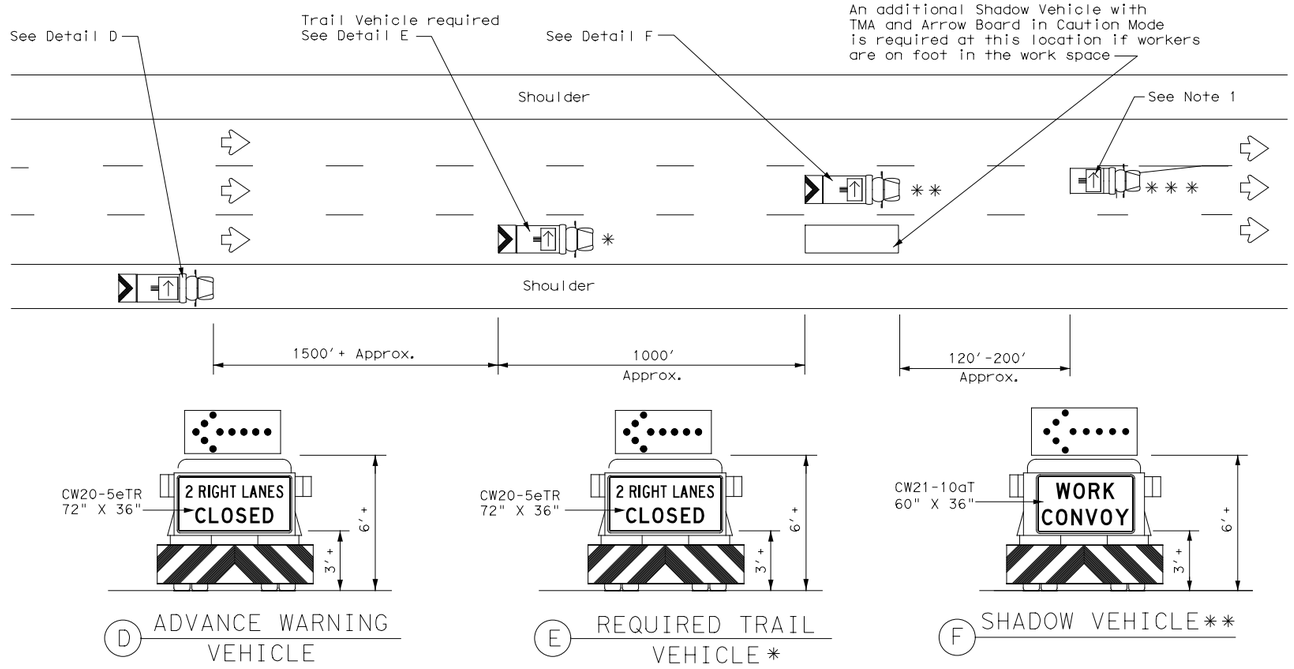


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



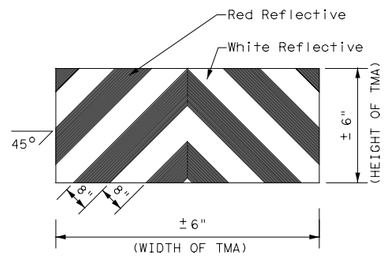
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. 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.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
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 may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a 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, must 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. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.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	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		40

176

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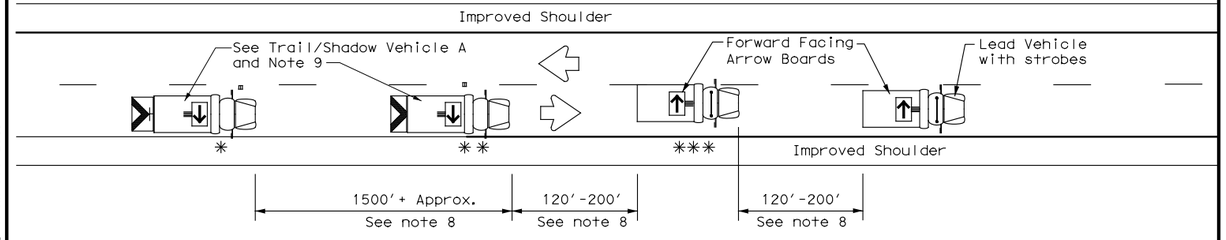
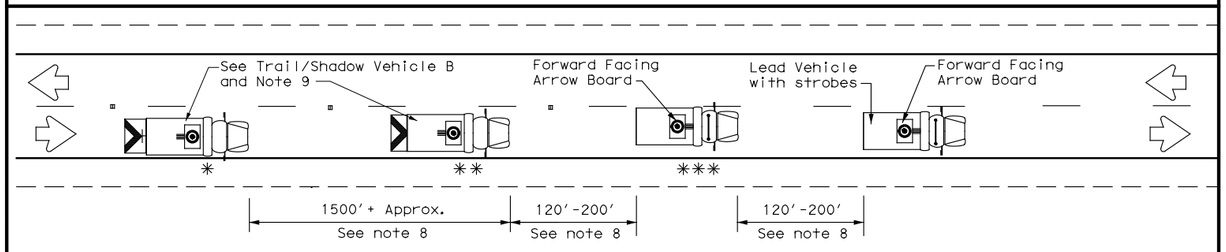


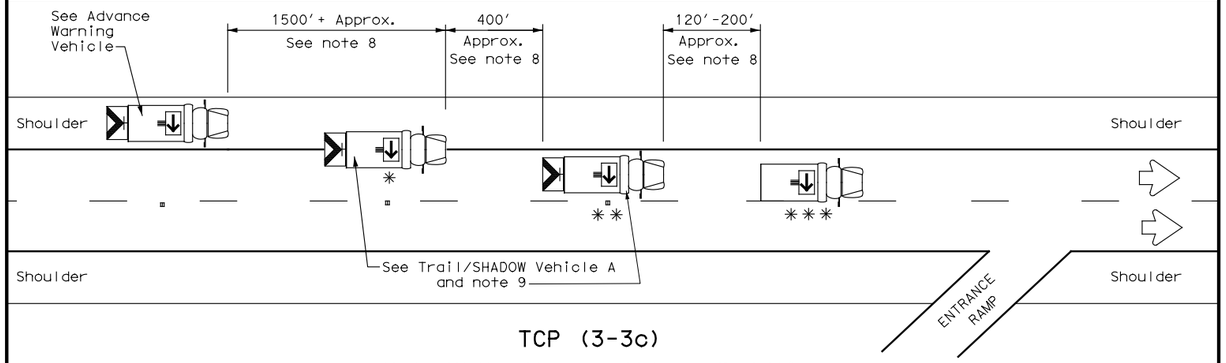
TCP (3-3a)

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



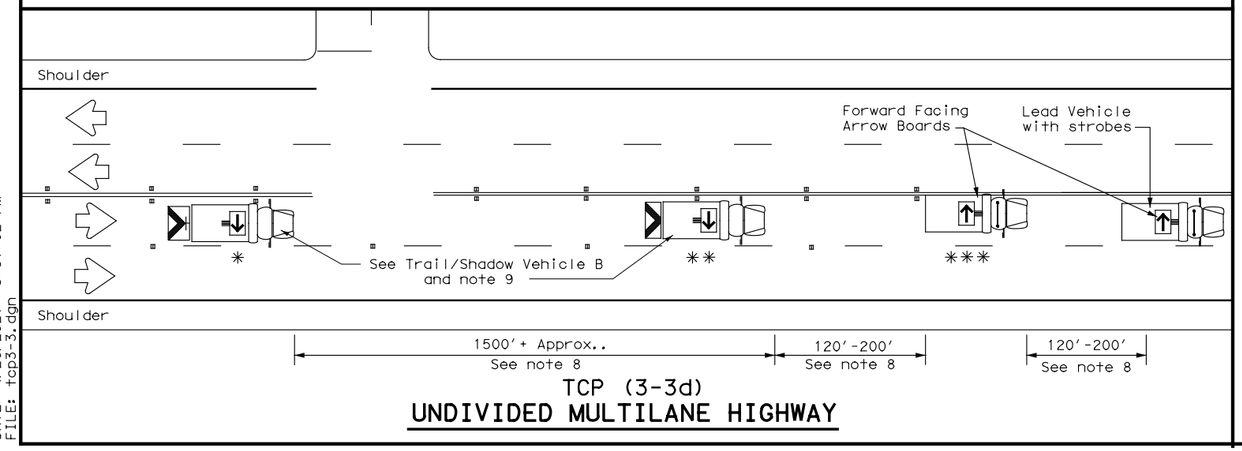
TCP (3-3b)

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



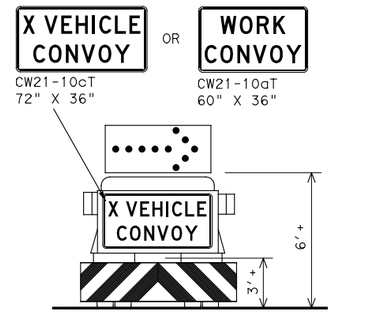
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



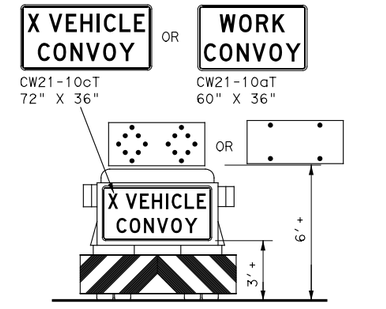
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



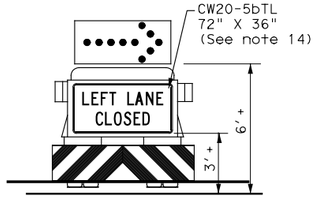
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

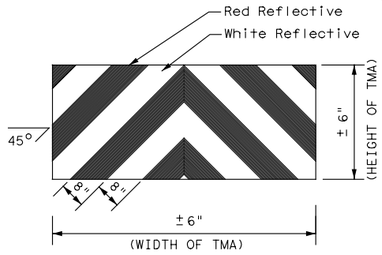


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ABL	SCURRY		41
1-97 7-14				

177

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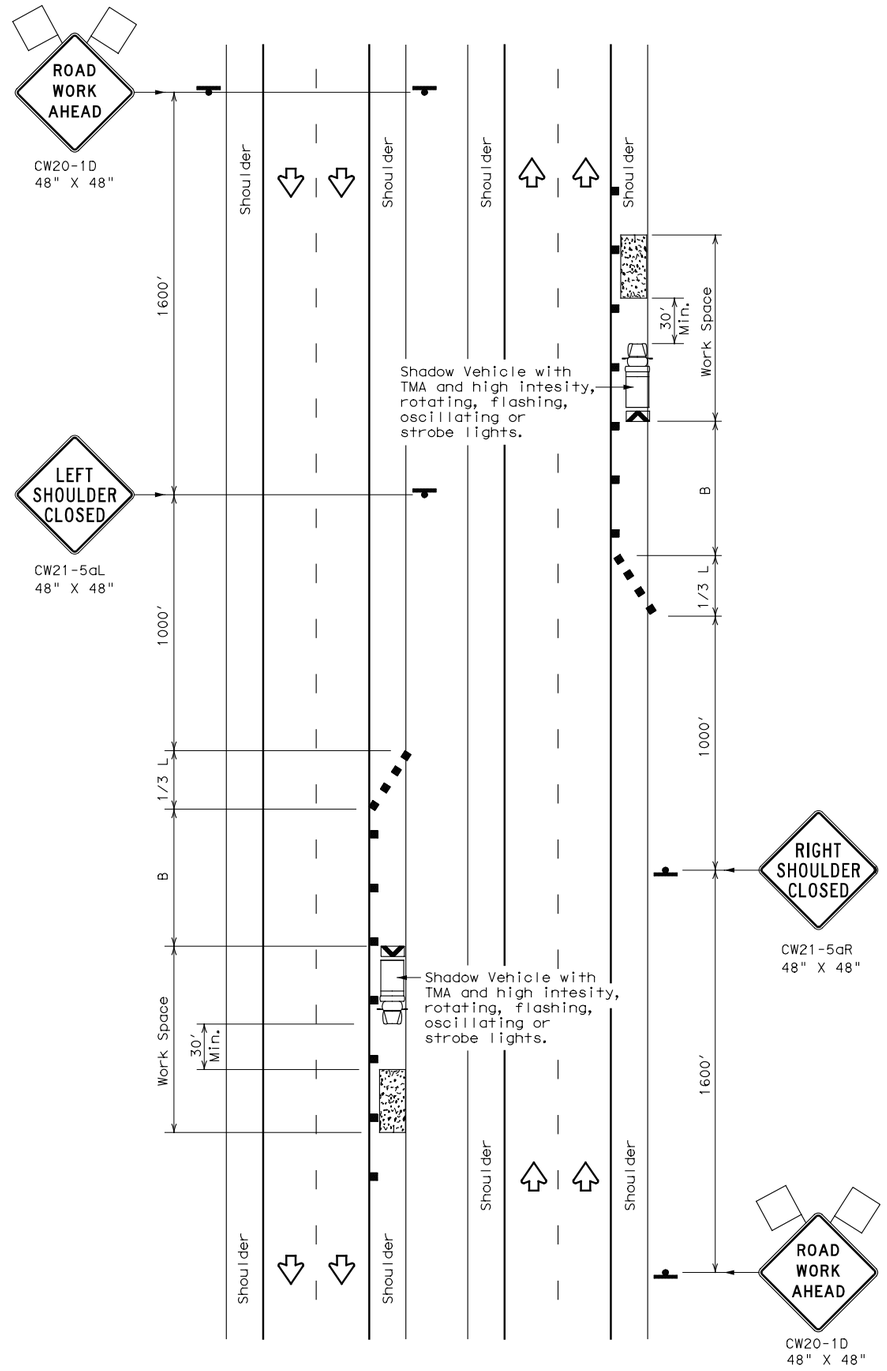
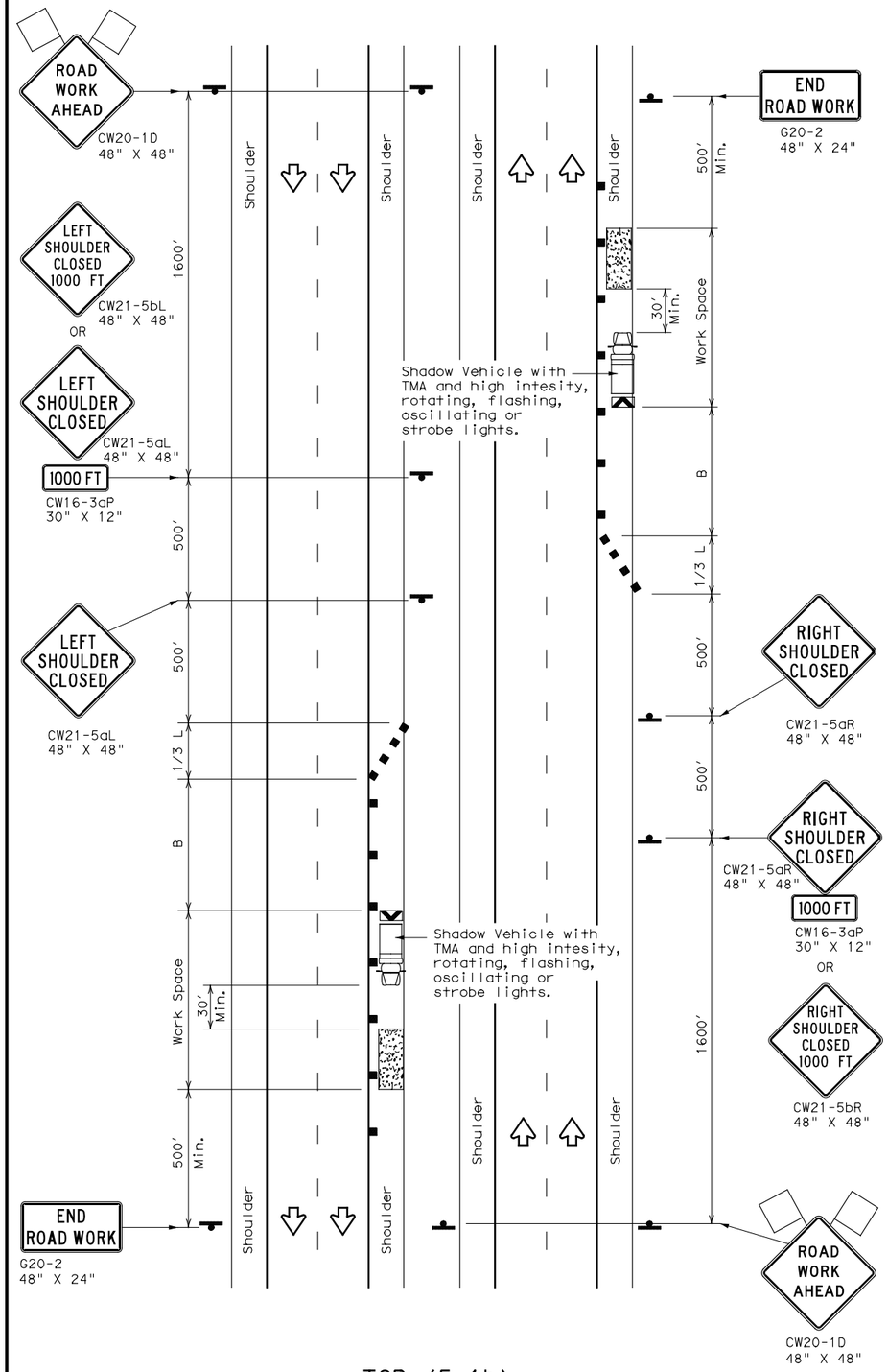


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

* 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(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		42

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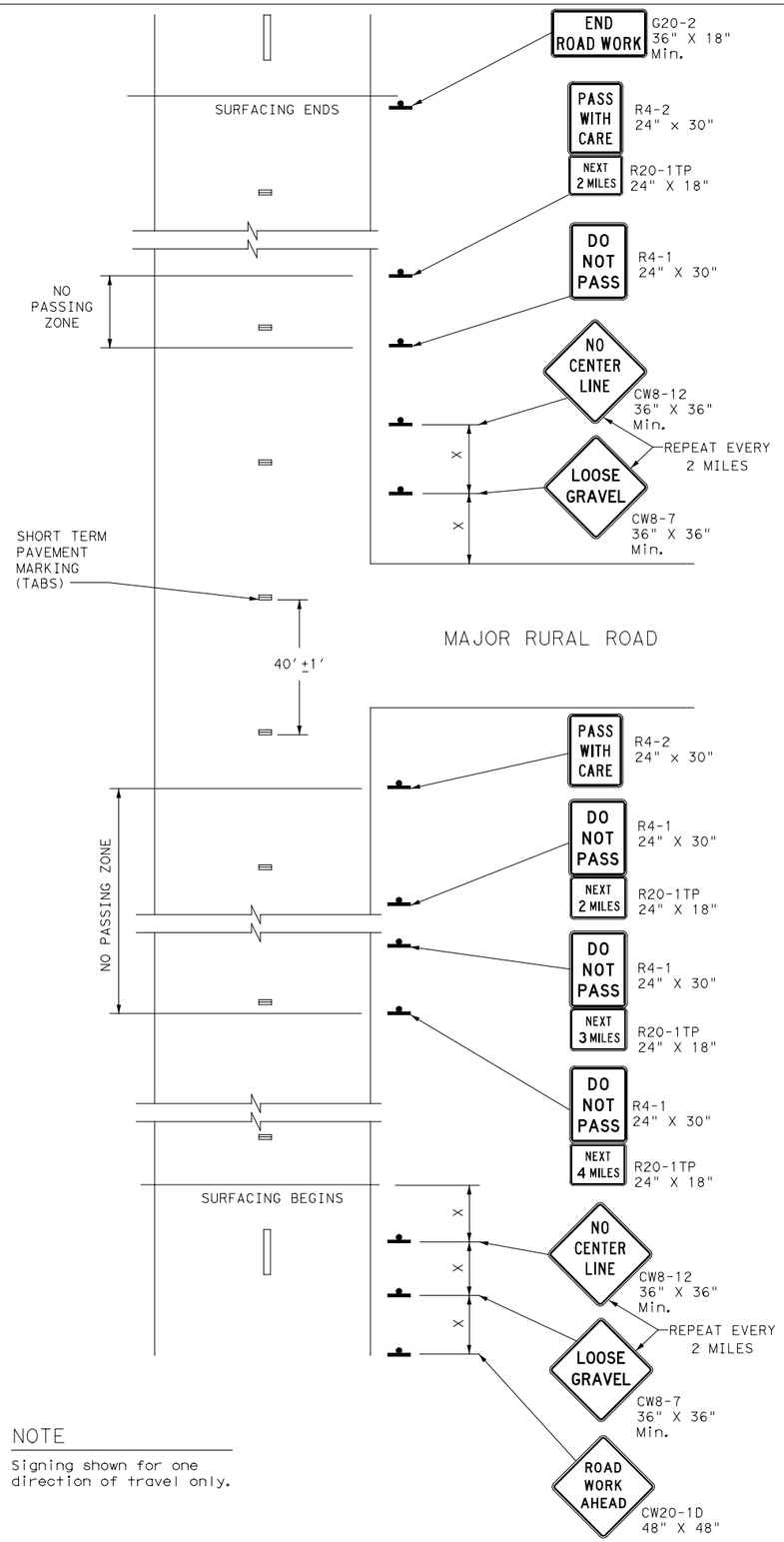
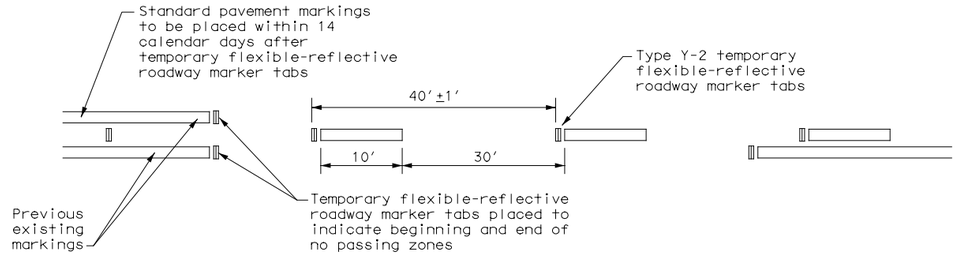


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	ABL	SCURRY		43

210

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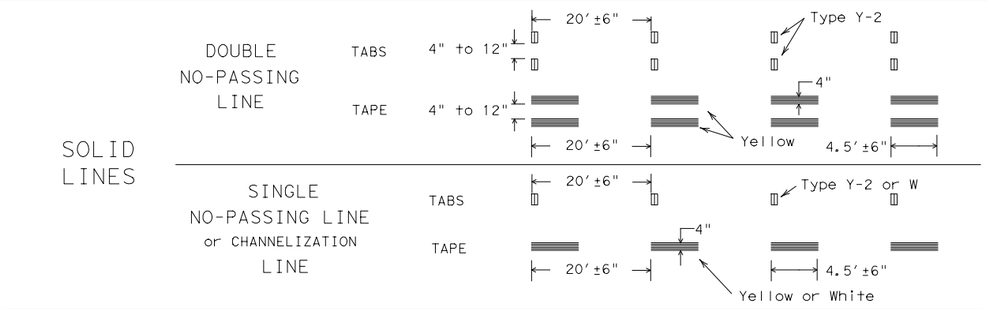
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



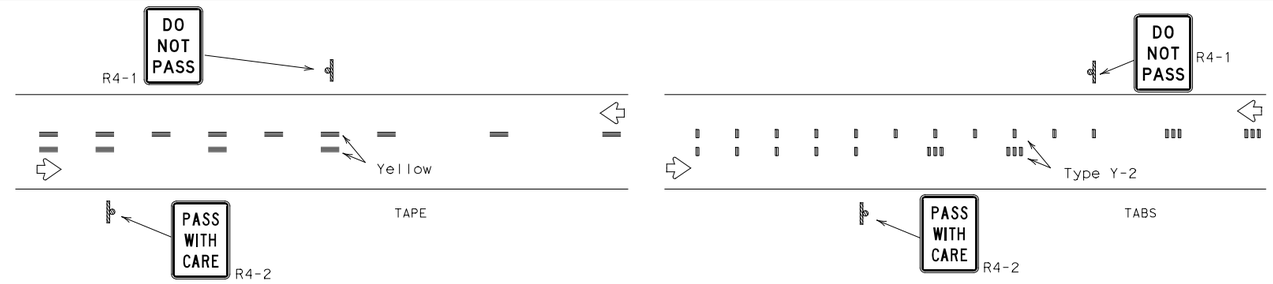
NOTES:

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.

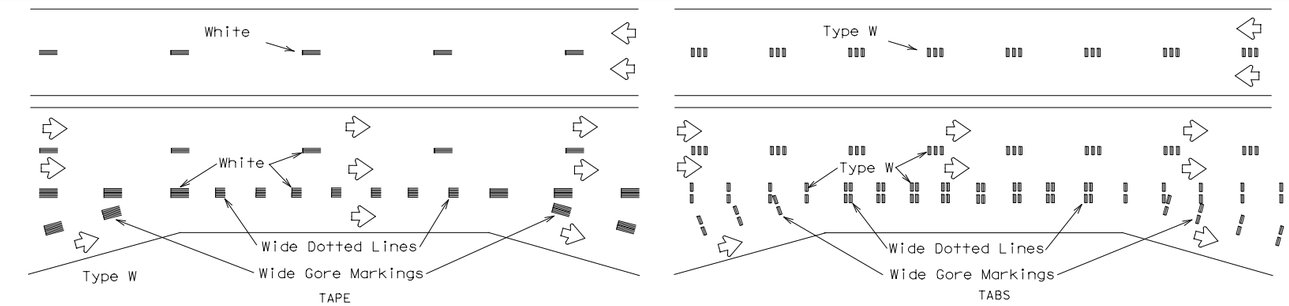
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

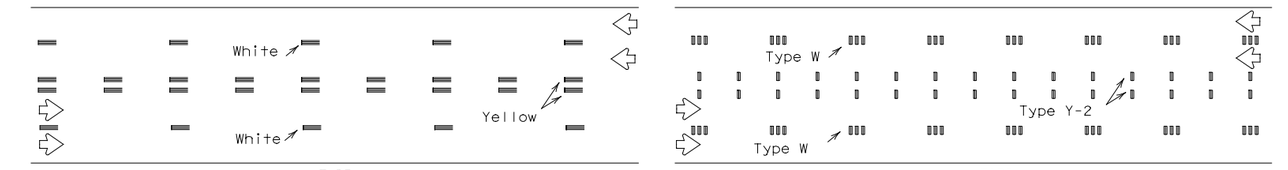
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



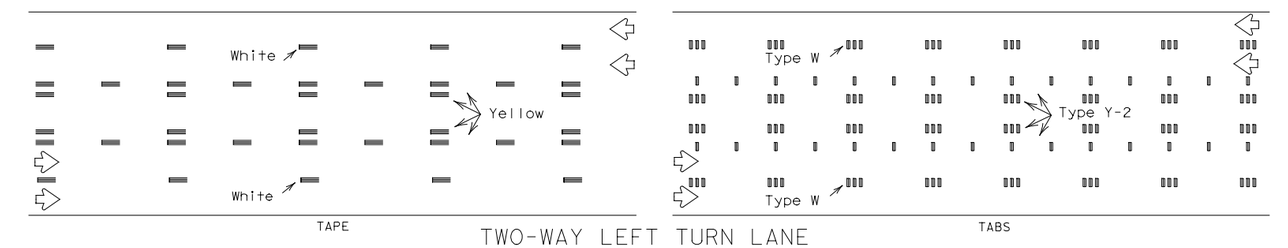
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



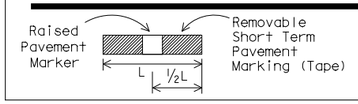
LANE LINES FOR DIVIDED HIGHWAY



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

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1-97		DIST	COUNTY		SHEET NO.
3-03		ABL	SCURRY		44
7-13					

111

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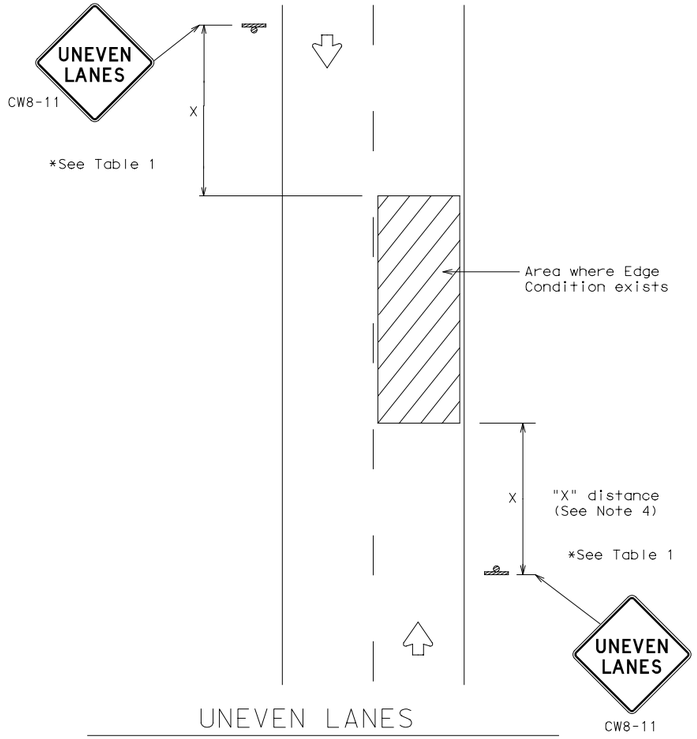
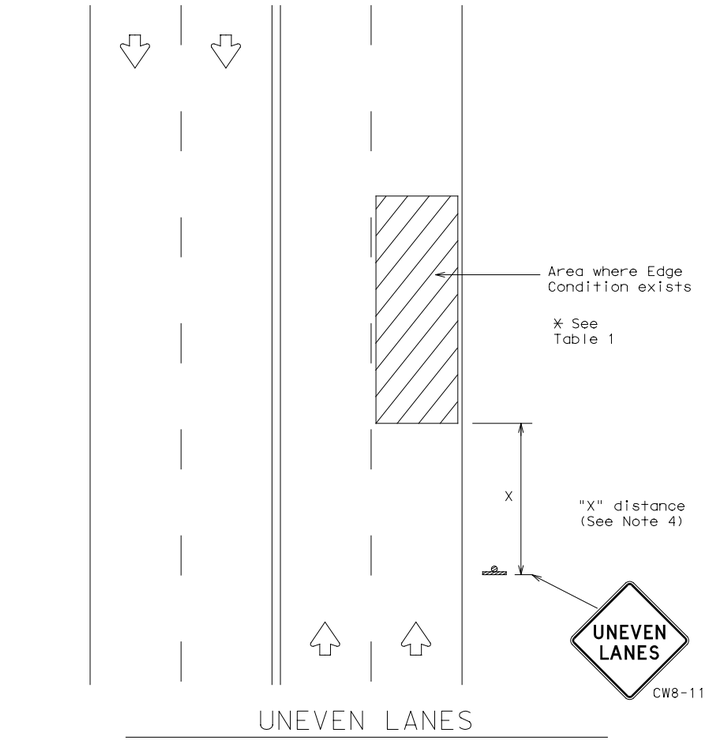
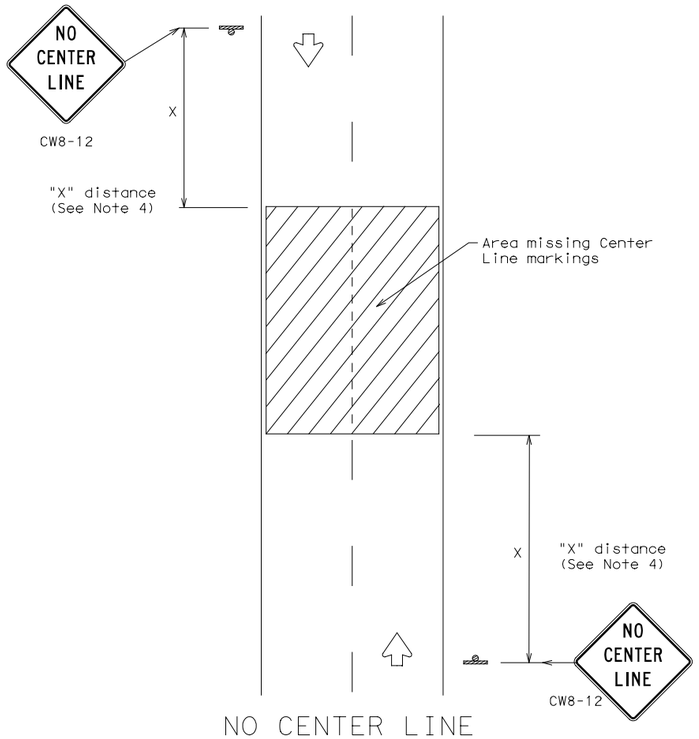


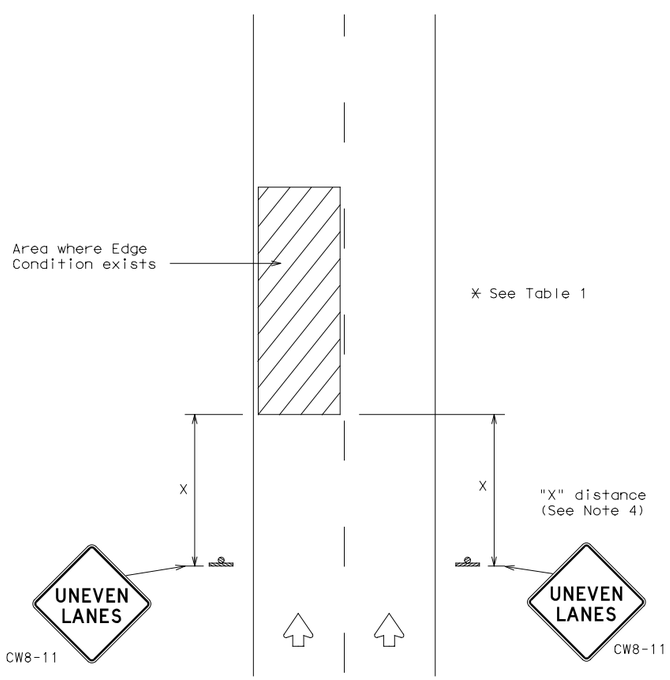
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

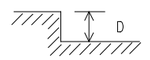
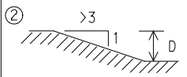
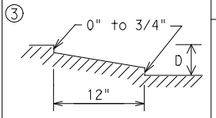
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

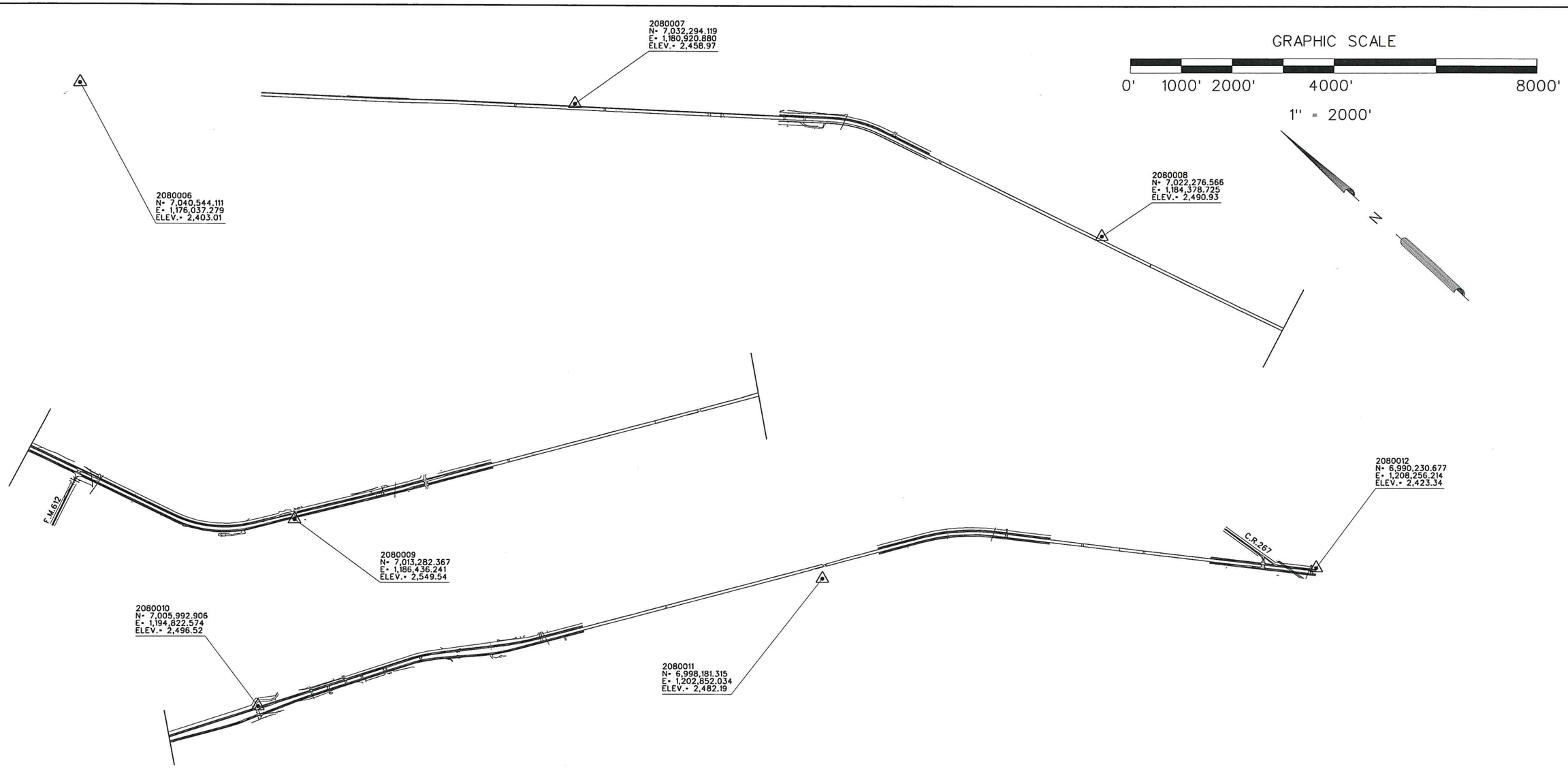
SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	ABL	SCURRY		45

112

DATE: 4/26/2021 3:31:04 PM
FILE: wzul-13.dgn



I hereby certify that the horizontal and vertical data shown hereon was determined by a field survey during September 2020 utilizing the TxDOT Virtual Reference System RTK Network, and is correctly shown hereon.

STATE OF TEXAS
REGISTERED
TIM A. FROST
5316
PROFESSIONAL
LAND SURVEYOR

Timothy A. Frost, R.P.L.S. No. 5316
December 4, 2020
TBPLS Firm No. 100116-01

Coordinates shown hereon refer to the Texas Coordinate System of 1983 (North Central Zone; NAD83(2011) EPOCH 2010.00) as derived locally from TxDOT's VRS Network via Real Time Kinematic (RTK) methods. An average Combination Factor of 1.00021 was used to scale grid coordinates and distances to surface. All coordinates shown are surface.

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Texas Department of Transportation
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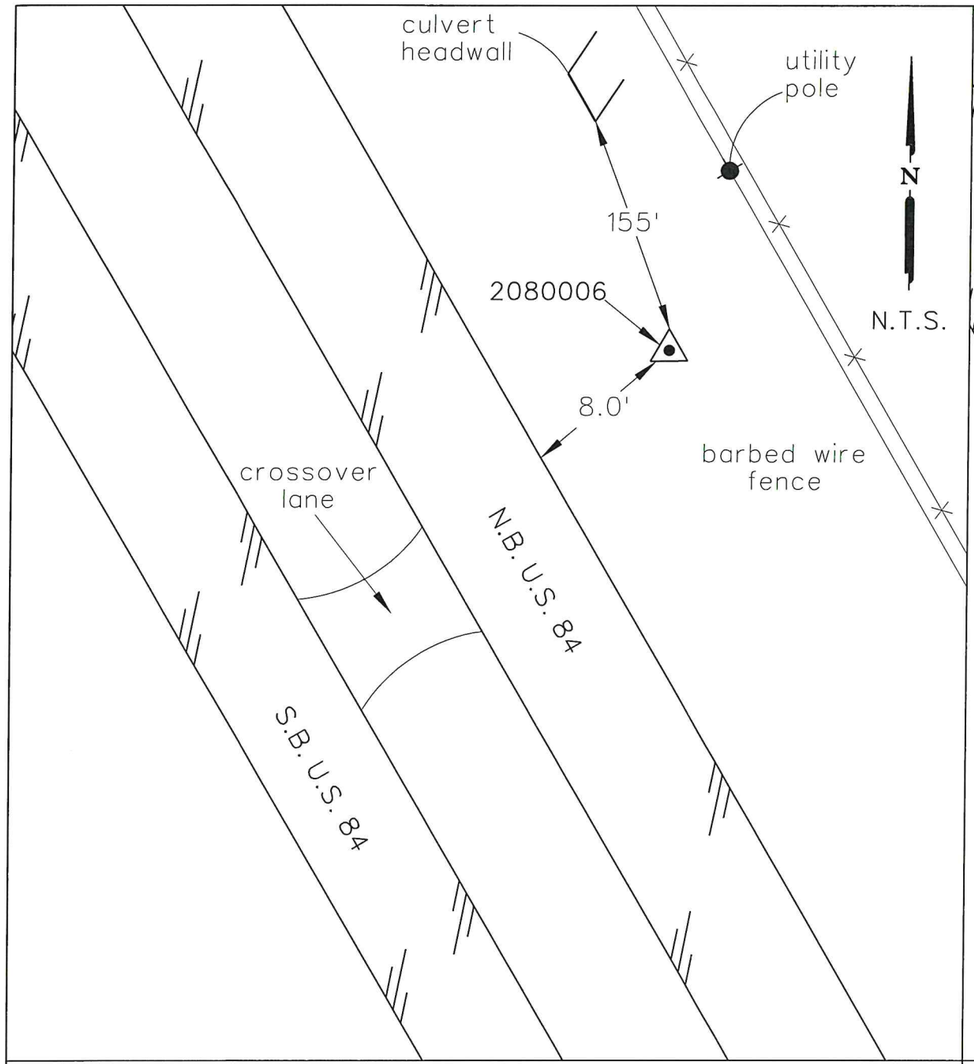
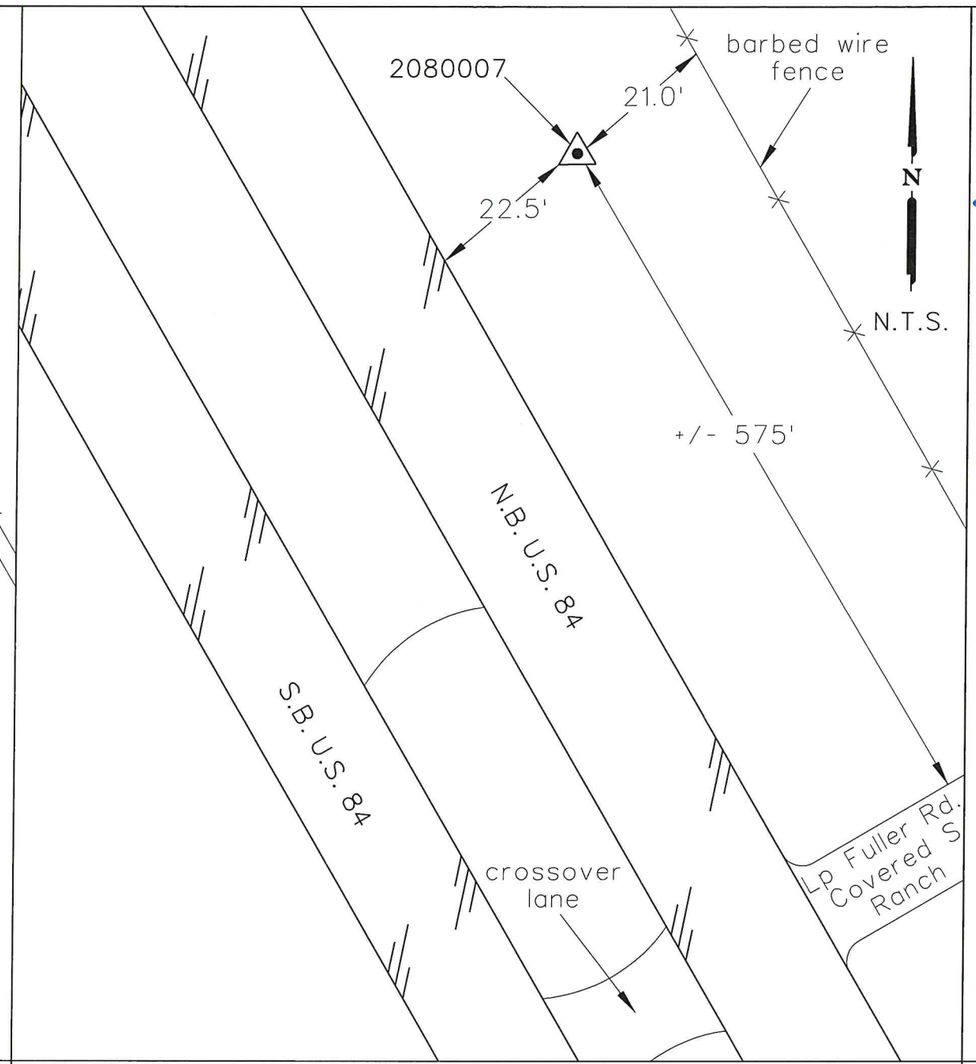
US 84
SURVEY CONTROL INDEX SHEET

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
CHECK	6	SEE TITLE SHEET		46
	STATE	DIST.	COUNTY	
DETAIL	TEXAS	ABILENE	SCURRY	
CHECK	CONT.	SECT.	JOB	HIGHWAY NO.
	0053	07	040	US 84





I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY DURING SEPTEMBER 2020 UTILIZING THE TXDOT VIRTUAL REFERENCE SYSTEM RTK NETWORK, AND IS CORRECTLY SHOWN HEREON.

9/15/2020

Timothy A. Frost
Registered Professional Land Surveyor
No. 5316

TEAGUE NALL & PERKINS
5237 N. RIVERSIDE DR., SUITE 100
FORT WORTH, TEXAS 76137

TBPLS FIRM NO. 100116-01

STATE OF TEXAS
REGISTERED
Timothy A. Frost
5316
PROFESSIONAL
LAND SURVEYOR

CONTROL POINT NO. 2080006

2080006, a Type II Aluminum Disk set in concrete, flush with ground, located 1.25 miles south of the Scurry-Garza county line, 9.3' east of the east edge of asphalt for the northbound lanes of US 84. Also, 0.5 mile north of a private gate/cattleguard and dirt road exiting the east right of way of US 84.

US SURVEY FEET
NAVD 88 ELEVATION = 2,403.01'
DATE SET: SEPTEMBER 21, 2020
MONUMENT: TYPE II

SCURRY COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 7,040,544.111
SURFACE EAST: 1,176,037.279
GRID NORTHING: 7,039,065.907
GRID EAST: 1,175,790.363
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

CONTROL POINT NO. 2080007

2080007, a Type II Aluminum Disk set in concrete, flush with ground, 575' north of entry to Lp Fuller Road & Covered S Ranch. 22.5' east of east edge of asphalt for northbound US 84, and 21' west of a barbed wire fence.

US SURVEY FEET
NAVD 88 ELEVATION = 2,458.97'
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

SCURRY COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 7,032,294.119
SURFACE EAST: 1,180,920.880
GRID NORTHING: 7,030,817.647
GRID EAST: 1,180,672.939
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

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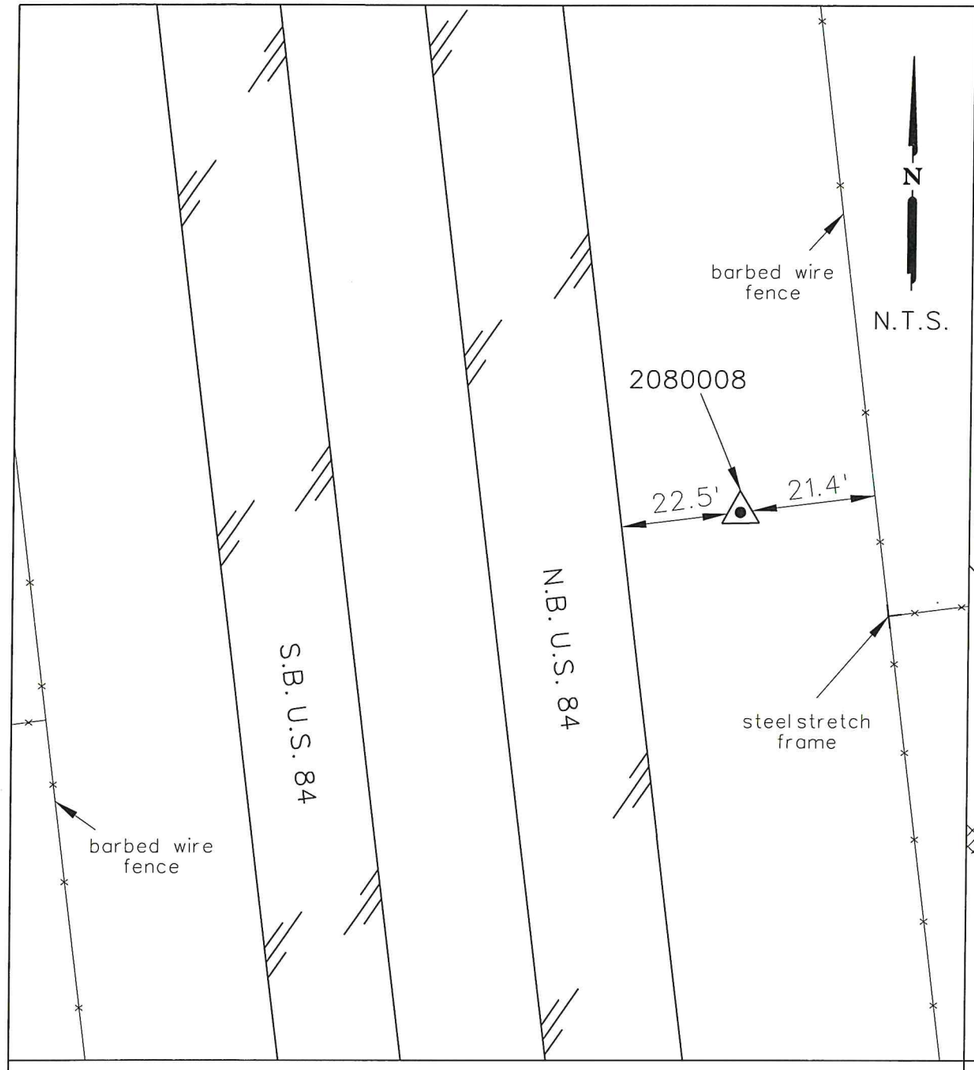
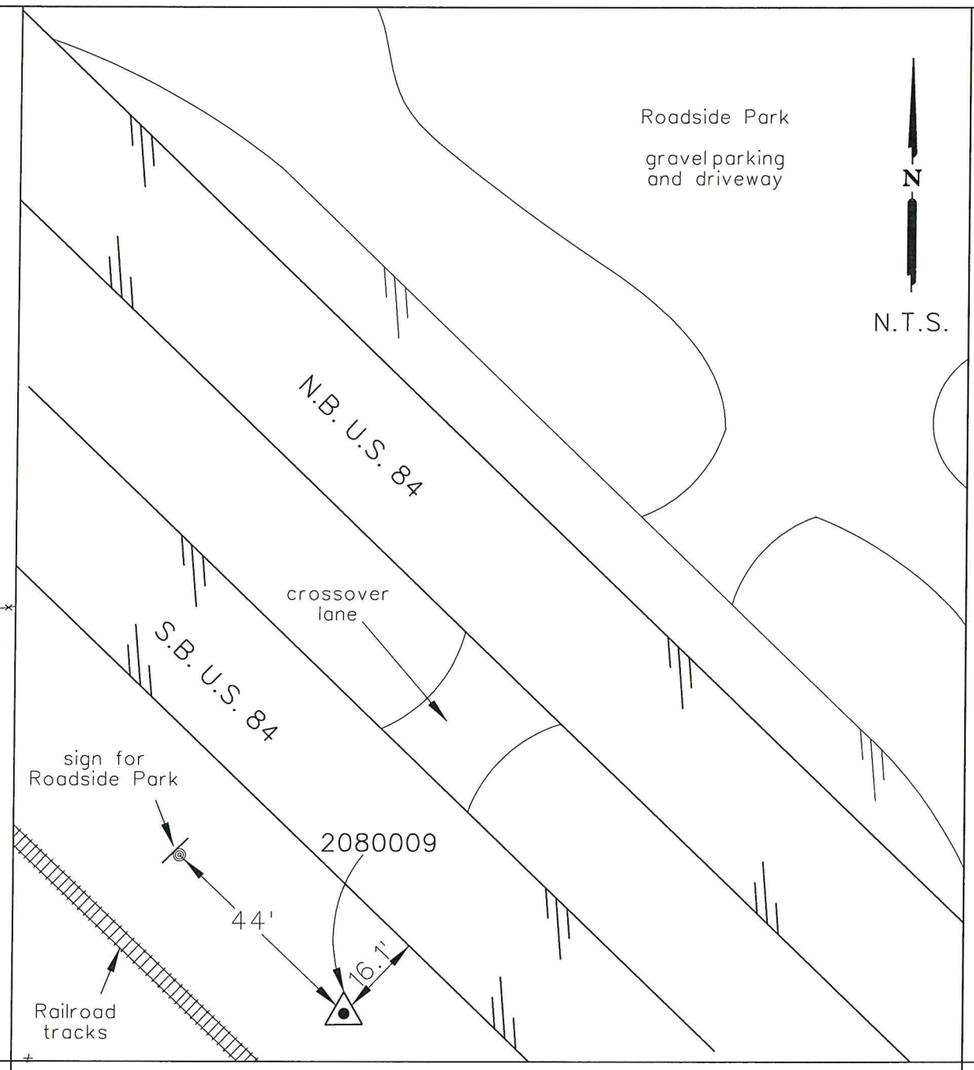
SURVEY CONTROL

SCALE: N/A

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		US 84
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ABILENE	SCURRY	47
CHECK	CONTROL	SECTION	JOB	
	0053	07	040	





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9/15/2020

Timothy A. Frost
Registered Professional Land Surveyor
No. 5316

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5237 N. RIVERSIDE DR., SUITE 100
FORT WORTH, TEXAS 76137

TBPLS FIRM NO. 100116-01

STATE OF TEXAS
REGISTERED
Timothy A. Frost
5316
PROFESSIONAL
LAND SURVEYOR

CONTROL POINT NO. 2080008

2080008, a Type II Aluminum Disk set in concrete, flush with ground, locate 5,055' north of intersection of F.M. 612 and southbound US 84. 22.5' east of the east edge of asphalt for northbound US 84, and 21.4' west of a barbed wired fence along the east right of way of US 84. Also 31' northwest of a steel stretch frame in fence line along the east right of way of US 84.

US SURVEY FEET
NAVD 88 ELEVATION = 2,490.93'
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

SCURRY COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 7,022,276.566
SURFACE EAST: 1,184,378.725
GRID NORTHING: 7,020,802.197
GRID EAST: 1,184,130.058
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

CONTROL POINT NO. 2080009

2080009, a Type II Aluminum Disk set in concrete, flush with ground, located 2,625' northwest of intersection of CR 2136 and US 84. 16.1' west of the west edge of asphalt for the southbound lanes of US 84, and approximately 44' southeast of a Roadside Park sign.

US SURVEY FEET
NAVD 88 ELEVATION = 2,549.54
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

SCURRY COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 7,013,282.367
SURFACE EAST: 1,186,436.241
GRID NORTHING: 7,011,809.887
GRID EAST: 1,186,187.141
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

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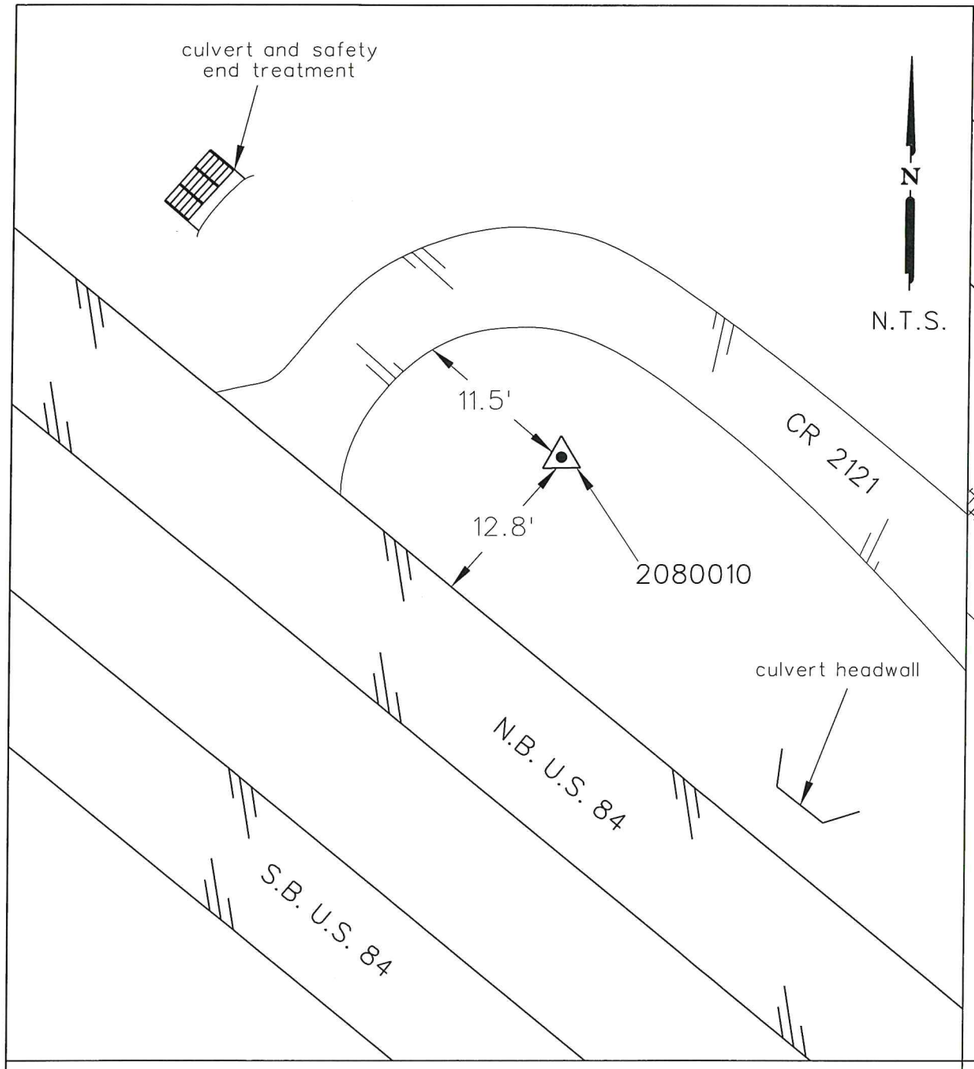
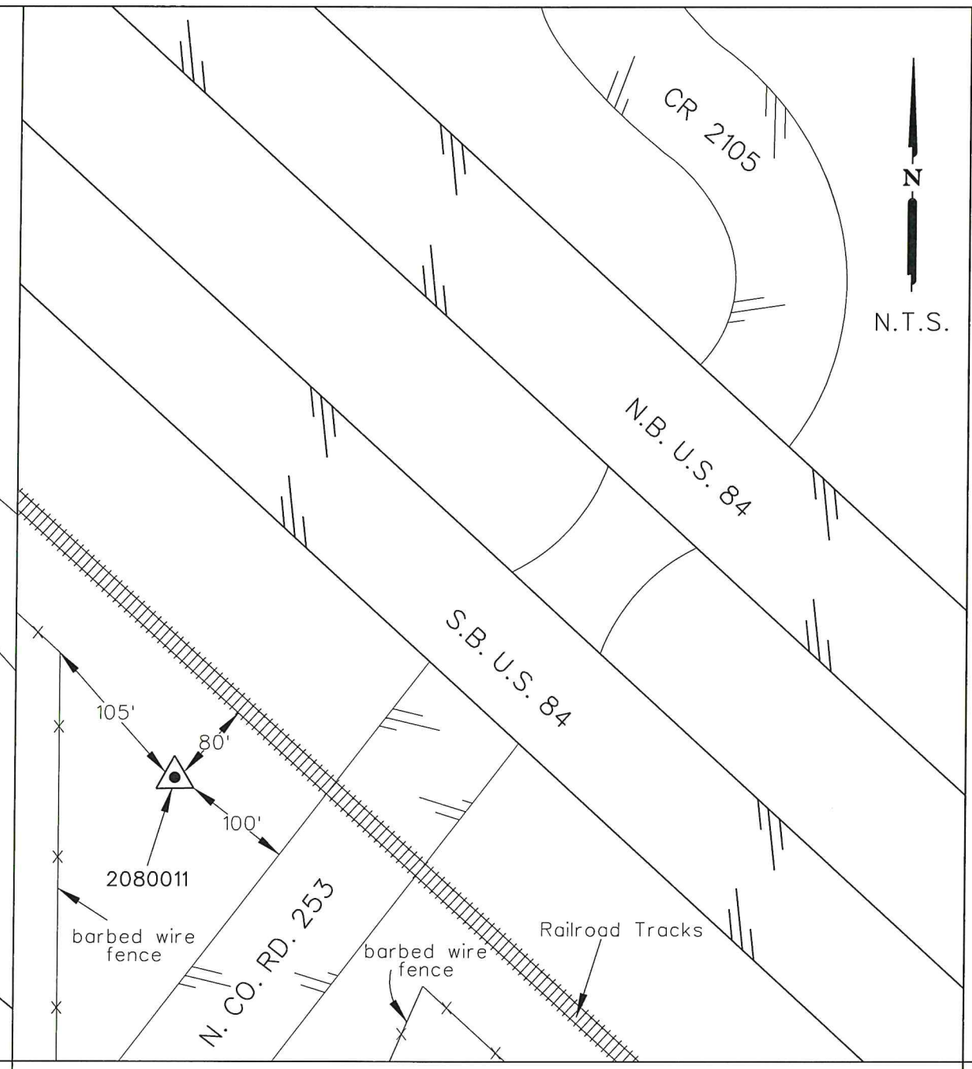
SURVEY CONTROL

SCALE: N/A

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		US 84
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ABILENE	SCURRY	48
CHECK	CONTROL	SECTION	JOB	
	0053	07	040	





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Timothy A. Frost 9/15/2021

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5237 N. RIVERSIDE DR., SUITE 100
FORT WORTH, TEXAS 76137

TBPLS FIRM NO. 100116-01

STATE OF TEXAS
REGISTERED
Timothy A. Frost
5316
PROFESSIONAL
LAND SURVEYOR

CONTROL POINT NO. 2080010

2080010, a Type II Aluminum Disk set in concrete, flush with ground, located at the northeast corner of intersection of northbound US 84 & CR 2121. 12.8' east of east edge of asphalt of northbound US 84, and 11.5' southeast of the south edge of asphalt for CR 2121.

US SURVEY FEET
NAVD 88 ELEVATION = 2,496.52'
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

HOWARD COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 7,005,992.906
SURFACE EAST: 1,194,822.574
GRID NORTHING: 7,004,521.956
GRID EAST: 1,194,571.714
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

CONTROL POINT NO. 2080011

2080011, a Type II Aluminum Disk set in concrete, flush with ground, located southwest of the intersection of CL US 84 and N. County Rd. 253. 100' west of the west edge of asphalt of N. County Rd. 253, and 80' south of railroad tracks. Also 105' southeast of a barbed wire fence corner.

US SURVEY FEET
NAVD 88 ELEVATION = 2,482.19
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

SCURRY COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 6,998,181.315
SURFACE EAST: 1,202,852.034
GRID NORTHING: 6,996,712.006
GRID EAST: 1,202,599.488
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

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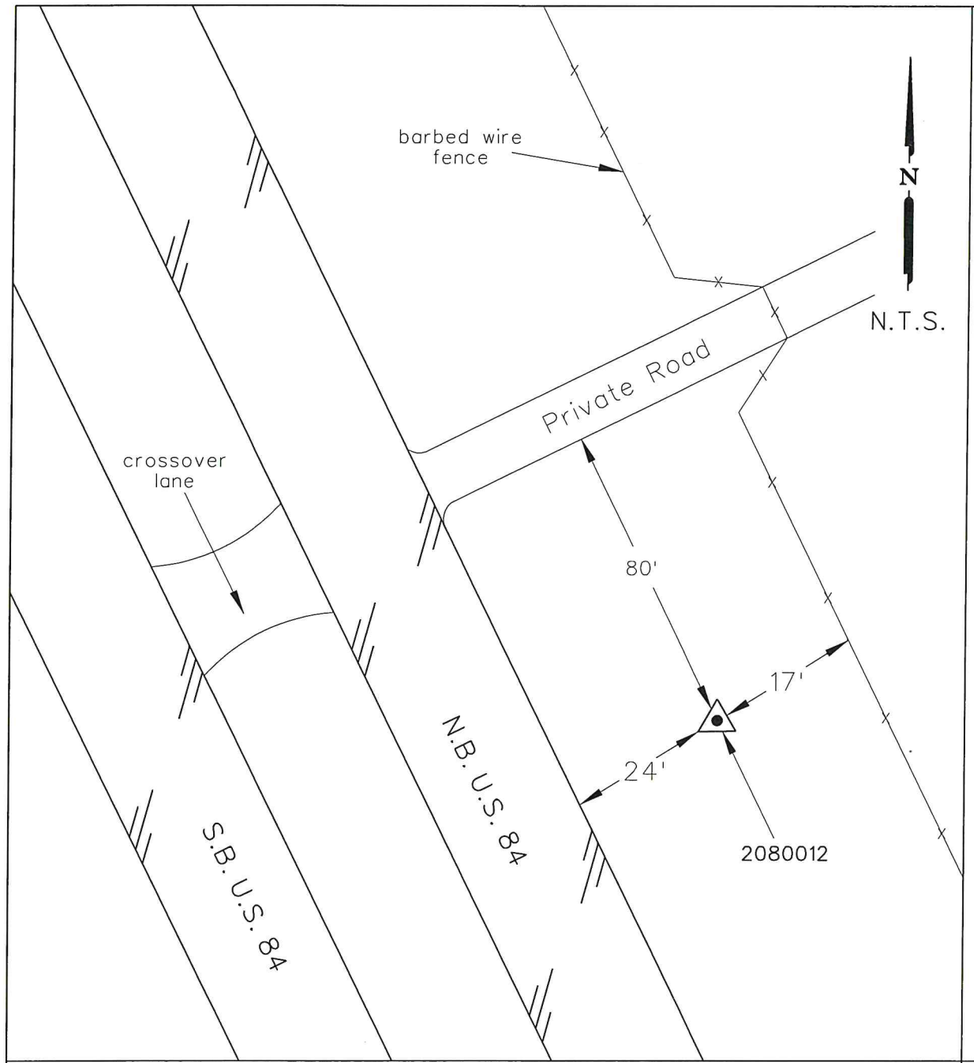
SURVEY CONTROL

SCALE: N/A

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		US 84
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	ABILENE	SCURRY	
CHECK	CONTROL	SECTION	JOB	49
CHECK	0053	07	040	



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9/15/2020

Timothy A. Frost
Registered Professional Land Surveyor
No. 5316

TEAGUE NALL & PERKINS
5237 N. RIVERSIDE DR., SUITE 100
FORT WORTH, TEXAS 76137

TBPLS FIRM NO. 100116-01

CONTROL POINT NO. 2080012

2080010, a Type II Aluminum Disk set in concrete, flush with ground, located 1035' south of intersection of US 84 and FM 1142, along east right of way for US 84. 24' east of the east edge of asphalt for northbound US 84, and 80' south of a private gravel road. Also 17' west of a barbed wire fence.

US SURVEY FEET
NAVD 88 ELEVATION = 2,423.34'
DATE SET: SEPTEMBER 17, 2020
MONUMENT: TYPE II

HOWARD COUNTY SCALE FACTOR: 1.00021
SURFACE NORTHING: 6,990,230.677
SURFACE EAST: 1,208,256.214
GRID NORTHING: 6,988,763.037
GRID EAST: 1,208,002.533
ELEVATION ARE NAVD 88 BASED UPON GEOID 12B
TxDOT VRS NETWORK

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SURVEY CONTROL

SCALE: N/A

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		US 84
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ABILENE	SCURRY	50
CHECK	CONTROL	SECTION	JOB	
	0053	07	040	

4/26/2021 3:44:13 PM

Beginning chain US84_ML description

Point 9001 X 1,208,879.5108 Y 6,988,769.1959 Sta 331+13.25

Course from 9001 to 9002 N 26° 08′ 11.54" W Dist 2,195.5500

Point 9002 X 1,207,912.3452 Y 6,990,740.2440 Sta 353+08.80

Course from 9002 to PC US84_ML1 N 26° 11′ 11.54" W Dist 5,678.7054

		Curve Data				
Curve US84_ML1						
P.I. Station		417+28.17	X	1,205,079.5094	Y	6,996,500.7427
Delta	=	21° 40′ 25.62"	(LT)			
Degree	=	1° 28′ 51.00"				
Tangent	=	740.6640				
Length	=	1,463.6216				
Radius	=	3,869.1600				
External	=	70.2540				
Long Chord	=	1,454.9107				
Mid. Ord.	=	69.0011				
P.C. Station		409+87.51	X	1,205,406.3607	Y	6,995,836.0989
P.T. Station		424+51.13	X	1,204,530.2986	Y	6,996,997.6841
C.C.			X	1,201,934.3233	Y	6,994,128.6578
Back	= N	26° 11′ 11.54" W				
Ahead	= N	47° 51′ 37.16" W				
Chord Bear	= N	37° 01′ 24.35" W				

Course from PT US84_ML1 to PC US84_ML2 N 47° 51′ 37.16" W Dist 7,615.3689

		Curve Data				
Curve US84_ML2						
P.I. Station		504+60.82	X	1,198,591.0221	Y	7,002,371.7078
Delta	=	7° 52′ 26.42"	(RT)			
Degree	=	1° 00′ 00.00"				
Tangent	=	394.3213				
Length	=	787.4009				
Radius	=	5,729.5800				
External	=	13.5530				
Long Chord	=	786.7814				
Mid. Ord.	=	13.5210				
P.C. Station		500+66.50	X	1,198,883.4158	Y	7,002,107.1417
P.T. Station		508+53.90	X	1,198,337.6294	Y	7,002,673.8359
C.C.			X	1,202,727.6218	Y	7,006,355.6906
Back	= N	47° 51′ 37.16" W				
Ahead	= N	39° 59′ 10.74" W				
Chord Bear	= N	43° 55′ 23.95" W				

Course from PT US84_ML2 to PC US84_ML3 N 39° 59′ 10.74" W Dist 1,224.7588

		Curve Data				
Curve US84_ML3						
P.I. Station		523+50.30	X	1,197,376.0346	Y	7,003,820.3760
Delta	=	10° 50′ 00.00"	(LT)			
Degree	=	2° 00′ 00.00"				
Tangent	=	271.6432				
Length	=	541.6669				
Radius	=	2,864.7900				
External	=	12.8500				
Long Chord	=	540.8604				
Mid. Ord.	=	12.7926				
P.C. Station		520+78.66	X	1,197,550.5937	Y	7,003,612.2435
P.T. Station		526+20.32	X	1,197,165.4673	Y	7,003,991.9902
C.C.			X	1,195,355.5976	Y	7,001,771.3162
Back	= N	39° 59′ 10.74" W				
Ahead	= N	50° 49′ 10.74" W				
Chord Bear	= N	45° 24′ 10.74" W				

Course from PT US84_ML3 to PC US84_ML4 N 50° 49′ 10.74" W Dist 5,056.9299

		Curve Data				
Curve US84_ML4						
P.I. Station		578+25.56	X	1,193,130.5662	Y	7,007,280.4717
Delta	=	2° 57′ 56.03"	(RT)			
Degree	=	1° 00′ 00.00"				
Tangent	=	148.3114				
Length	=	296.5566				
Radius	=	5,729.5800				
External	=	1.9192				
Long Chord	=	296.5235				
Mid. Ord.	=	1.9186				
P.C. Station		576+77.25	X	1,193,245.5315	Y	7,007,186.7739
P.T. Station		579+73.81	X	1,193,020.6024	Y	7,007,379.9917
C.C.			X	1,196,865.2709	Y	7,011,628.1220
Back	= N	50° 49′ 10.74" W				
Ahead	= N	47° 51′ 14.70" W				
Chord Bear	= N	49° 20′ 12.72" W				

Course from PT US84_ML4 to PC US84_ML5 N 47° 51′ 14.70" W Dist 7,111.2998

		Curve Data				
Curve US84_ML5						
P.I. Station		652+07.83	X	1,187,657.0235	Y	7,012,234.1704
Delta	=	1° 13′ 37.72"	(RT)			
Degree	=	0° 30′ 00.00"				
Tangent	=	122.7191				
Length	=	245.4289				
Radius	=	11,459.1600				
External	=	0.6571				
Long Chord	=	245.4242				
Mid. Ord.	=	0.6571				
P.C. Station		650+85.11	X	1,187,748.0121	Y	7,012,151.8232
P.T. Station		653+30.54	X	1,187,567.8192	Y	7,012,318.4472
C.C.			X	1,195,437.3492	Y	7,020,648.0838
Back	= N	47° 51′ 14.70" W				
Ahead	= N	46° 37′ 36.99" W				
Chord Bear	= N	47° 14′ 25.85" W				

Course from PT US84_ML5 to PC US84_ML6 N 46° 37′ 36.99" W Dist 2,300.6067

		Curve Data				
Curve US84_ML6						
P.I. Station		684+54.00	X	1,185,297.3851	Y	7,014,463.4687
Delta	=	39° 30′ 00.00"	(RT)			
Degree	=	2° 30′ 00.00"				
Tangent	=	822.8510				
Length	=	1,579.9992				
Radius	=	2,291.8300				
External	=	143.2406				
Long Chord	=	1,548.8953				
Mid. Ord.	=	134.8146				
P.C. Station		676+31.14	X	1,185,895.5136	Y	7,013,898.3792
P.T. Station		692+11.14	X	1,185,195.2955	Y	7,015,279.9622
C.C.			X	1,187,469.4182	Y	7,015,564.3051
Back	= N	46° 37′ 36.99" W				
Ahead	= N	7° 07′ 36.99" W				
Chord Bear	= N	26° 52′ 36.99" W				

Course from PT US84_ML6 to 9003 N 7° 07′ 36.99" W Dist 1,583.9875

Point 9003 X 1,184,998.7733 Y 7,016,851.7113 Sta 707+95.13

Course from 9003 to 9004 N 7° 33′ 00.92" W Dist 3,014.0331

Point 9004 X 1,184,602.7422 Y 7,019,839.6127 Sta 738+09.16

Course from 9004 to 9005 N 7° 08′ 25.82" W Dist 2,336.7016

Point 9005 X 1,184,312.2832 Y 7,022,158.1916 Sta 761+45.87

Course from 9005 to PC US84_ML7 N 7° 07′ 35.55" W Dist 4,840.8818

		Curve Data				
Curve US84_ML7						
P.I. Station		815+22.05	X	1,183,645.3078	Y	7,027,492.8408
Delta	=	23° 16′ 45.18"	(LT)			
Degree	=	2° 12′ 17.35"				
Tangent	=	535.3007				
Length	=	1,055.8329				
Radius	=	2,598.6600				
External	=	54.5608				
Long Chord	=	1,048.5856				
Mid. Ord.	=	53.4388				
P.C. Station		809+86.75	X	1,183,711.7178	Y	7,026,961.6755
P.T. Station		820+42.58	X	1,183,374.3811	Y	7,027,954.5177
C.C.			X	1,181,133.1336	Y	7,026,639.2827
Back	= N	7° 07′ 35.55" W				
Ahead	= N	30° 24′ 20.73" W				
Chord Bear	= N	18° 45′ 58.14" W				

Course from PT US84_ML7 to 9006 N 30° 24′ 20.73" W Dist 7,424.5199

Point 9006 X 1,179,616.6797 Y 7,034,357.8900 Sta 894+67.10

Course from 9006 to 9007 N 31° 37′ 05.31" W Dist 1,065.0484

Point 9007 X 1,179,058.3222 Y 7,035,264.8436 Sta 905+32.15

Course from 9007 to 9008 N 30° 23′ 23.03" W Dist 10,120.8600

Point 9008 X 1,173,938.3898 Y 7,043,995.1414 Sta 1006+53.01

Ending chain US84_ML description

STATE OF TEXAS
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US 84

ALIGNMENT DATA

SHEET 1 OF 3

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	51
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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Beginning chain US84_NB description

Point 84001 X 1,205,872.7584 Y 6,994,965.0052 Sta 400+00.00

Course from 84001 to PC US84_NB1 N 26° 10′ 26.93" W Dist 985.8550

Curve US84_NB1	Curve Data				
P.I. Station	417+33.07	X	1,205,108.2984	Y	6,996,520.3642
Delta =	21° 40′ 29.64" (LT)				
Degree =	1° 28′ 04.52"				
Tangent =	747.2177				
Length =	1,476.5704				
Radius =	3,903.1900				
External =	70.8793				
Long Chord =	1,467.7815				
Mid. Ord. =	69.6151				
P.C. Station	409+85.85	X	1,205,437.8968	Y	6,995,849.7681
P.T. Station	424+62.43	X	1,204,554.3266	Y	6,997,021.8117
C.C.		X	1,201,934.9497	Y	6,994,128.0674
Back = N	26° 10′ 26.93" W				
Ahead = N	47° 50′ 56.56" W				
Chord Bear = N	37° 00′ 41.75" W				

Course from PT US84_NB1 to PC US84_NB2 N 47° 50′ 56.56" W Dist 7,670.8466

Curve US84_NB2	Curve Data				
P.I. Station	504+95.91	X	1,198,598.4664	Y	7,002,412.9732
Delta =	7° 54′ 33.93" (RT)				
Degree =	1° 05′ 32.18"				
Tangent =	362.6391				
Length =	724.1260				
Radius =	5,245.5600				
External =	12.5201				
Long Chord =	723.5512				
Mid. Ord. =	12.4903				
P.C. Station	501+33.27	X	1,198,867.3195	Y	7,002,169.6111
P.T. Station	508+57.40	X	1,198,365.6594	Y	7,002,691.0163
C.C.		X	1,202,387.5425	Y	7,006,058.5608
Back = N	47° 50′ 56.56" W				
Ahead = N	39° 56′ 22.63" W				
Chord Bear = N	43° 53′ 39.60" W				

Course from PT US84_NB2 to PC US84_NB3 N 39° 56′ 22.63" W Dist 1,227.3556

Curve US84_NB3	Curve Data				
P.I. Station	523+60.23	X	1,197,400.8686	Y	7,003,843.2731
Delta =	10° 51′ 37.14" (LT)				
Degree =	1° 58′ 37.49"				
Tangent =	275.4807				
Length =	549.3109				
Radius =	2,898.0000				
External =	13.0640				
Long Chord =	548.4889				
Mid. Ord. =	13.0054				
P.C. Station	520+84.75	X	1,197,577.7217	Y	7,003,632.0561
P.T. Station	526+34.06	X	1,197,187.3865	Y	7,004,017.3852
C.C.		X	1,195,355.7630	Y	7,001,771.5982
Back = N	39° 56′ 22.63" W				
Ahead = N	50° 47′ 59.77" W				
Chord Bear = N	45° 22′ 11.20" W				

Course from PT US84_NB3 to PC US84_NB4 N 50° 47′ 59.77" W Dist 5,049.8120

Curve US84_NB4	Curve Data				
P.I. Station	578+30.49	X	1,193,160.4516	Y	7,007,301.6807
Delta =	2° 56′ 59.53" (RT)				
Degree =	1° 00′ 22.49"				
Tangent =	146.6099				
Length =	293.1551				
Radius =	5,694.0000				
External =	1.8872				
Long Chord =	293.1227				
Mid. Ord. =	1.8865				
P.C. Station	576+83.88	X	1,193,274.0661	Y	7,007,209.0188
P.T. Station	579+77.03	X	1,193,051.7563	Y	7,007,400.0667
C.C.		X	1,196,872.8459	Y	7,011,621.5487
Back = N	50° 47′ 59.77" W				
Ahead = N	47° 51′ 00.24" W				
Chord Bear = N	49° 19′ 30.01" W				

Course from PT US84_NB4 to PC US84_NB5 N 47° 51′ 00.24" W Dist 7,165.1871

Curve US84_NB5	Curve Data				
P.I. Station	652+67.44	X	1,187,646.7099	Y	7,012,292.4638
Delta =	1° 15′ 22.16" (RT)				
Degree =	0° 30′ 05.72"				
Tangent =	125.2228				
Length =	250.4356				
Radius =	11,422.8700				
External =	0.6864				
Long Chord =	250.4306				
Mid. Ord. =	0.6863				
P.C. Station	651+42.22	X	1,187,739.5490	Y	7,012,208.4302
P.T. Station	653+92.65	X	1,187,555.7353	Y	7,012,378.5125
C.C.		X	1,195,405.1285	Y	7,020,677.2465
Back = N	47° 51′ 00.24" W				
Ahead = N	46° 35′ 38.08" W				
Chord Bear = N	47° 13′ 19.16" W				

Course from PT US84_NB5 to PC US84_NB6 N 46° 35′ 38.08" W Dist 2,252.2839

Curve US84_NB6	Curve Data				
P.I. Station	684+54.48	X	1,185,331.3140	Y	7,014,482.4909
Delta =	39° 26′ 46.19" (RT)				
Degree =	2° 32′ 14.46"				
Tangent =	809.5415				
Length =	1,554.6204				
Radius =	2,258.0951				
External =	140.7277				
Long Chord =	1,524.0990				
Mid. Ord. =	132.4719				
P.C. Station	676+44.94	X	1,185,919.4473	Y	7,013,926.2025
P.T. Station	691+99.56	X	1,185,230.5841	Y	7,015,285.7412
C.C.		X	1,187,471.1305	Y	7,015,566.7123
Back = N	46° 35′ 38.08" W				
Ahead = N	7° 08′ 51.90" W				
Chord Bear = N	26° 52′ 14.99" W				

Course from PT US84_NB6 to 84002 N 7° 08′ 51.90" W Dist 1,583.2284

Point 84002 X 1,185,033.5855 Y 7,016,856.6657 Sta 707+82.79

Course from 84002 to 84003 N 7° 32′ 26.24" W Dist 3,013.7015

Point 84003 X 1,184,638.1002 Y 7,019,844.3049 Sta 737+96.49

Course from 84003 to 84004 N 7° 08′ 10.94" W Dist 2,336.4322

Point 84004 X 1,184,347.8419 Y 7,022,162.6374 Sta 761+32.92

Course from 84004 to PC US84_NB7 N 7° 08′ 53.89" W Dist 4,858.4334

Curve US84_NB7	Curve Data				
P.I. Station	815+22.62	X	1,183,677.1586	Y	7,027,510.4444
Delta =	23° 18′ 19.84" (LT)				
Degree =	2° 13′ 26.92"				
Tangent =	531.2657				
Length =	1,047.8410				
Radius =	2,576.0804				
External =	54.2111				
Long Chord =	1,040.6323				
Mid. Ord. =	53.0938				
P.C. Station	809+91.35	X	1,183,743.2682	Y	7,026,983.3080
P.T. Station	820+39.20	X	1,183,407.8899	Y	7,027,968.4156
C.C.		X	1,181,187.2107	Y	7,026,662.7457
Back = N	7° 08′ 53.89" W				
Ahead = N	30° 27′ 13.72" W				
Chord Bear = N	18° 48′ 03.81" W				

Course from PT US84_NB7 to 84005 N 30° 27′ 13.72" W Dist 1,010.5683

Point 84005 X 1,182,895.6898 Y 7,028,839.5639 Sta 830+49.76

Ending chain US84_NB description

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ALIGNMENT DATA

SHEET 2 OF 3

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	52
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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Beginning chain US84_SB description

Point 84500 X 1,205,799.0342 Y 6,994,928.7499 Sta 400+00.00

Course from 84500 to PC US84_SB1 N 26° 12′ 36.42" W Dist 988.9525

Curve Data

Curve US84_SB1						
P.I. Station	417+19.13	X	1,205,039.7553	Y	6,996,471.1209	
Delta =	21° 38′ 33.68"	(LT)				
Degree =	1° 29′ 59.60"					
Tangent =	730.1789					
Length =	1,442.9522					
Radius =	3,820.0000					
External =	69.1595					
Long Chord =	1,434.3889					
Mid. Ord. =	67.9296					
P.C. Station	409+88.95	X	1,205,362.2492	Y	6,995,816.0187	
P.T. Station	424+31.90	X	1,204,498.3835	Y	6,996,961.0984	
C.C.		X	1,201,935.0201	Y	6,994,128.8611	
Back = N	26° 12′ 36.42" W					
Ahead = N	47° 51′ 10.10" W					
Chord Bear = N	37° 01′ 53.26" W					

Course from PT US84_SB1 to PC US84_SB2 N 47° 51′ 10.10" W Dist 8,254.8057

Curve Data

Curve US84_SB2						
P.I. Station	509+24.27	X	1,198,201.9478	Y	7,002,659.7922	
Delta =	10° 13′ 24.64"	(RT)				
Degree =	2° 09′ 27.13"					
Tangent =	237.5564					
Length =	473.8515					
Radius =	2,655.6131					
External =	10.6041					
Long Chord =	473.2231					
Mid. Ord. =	10.5619					
P.C. Station	506+86.71	X	1,198,378.0777	Y	7,002,500.3830	
P.T. Station	511+60.56	X	1,198,056.9077	Y	7,002,847.9315	
C.C.		X	1,200,160.0938	Y	7,004,469.3166	
Back = N	47° 51′ 10.10" W					
Ahead = N	37° 37′ 45.46" W					
Chord Bear = N	42° 44′ 27.78" W					

Course from PT US84_SB2 to PC US84_SB3 N 37° 37′ 45.46" W Dist 888.5180

Curve Data

Curve US84_SB3						
P.I. Station	523+62.11	X	1,197,323.3047	Y	7,003,799.5276	
Delta =	13° 05′ 23.93"	(LT)				
Degree =	2° 06′ 00.07"					
Tangent =	313.0262					
Length =	623.3269					
Radius =	2,728.3464					
External =	17.8982					
Long Chord =	621.9722					
Mid. Ord. =	17.7816					
P.C. Station	520+49.08	X	1,197,514.4229	Y	7,003,551.6179	
P.T. Station	526+72.41	X	1,197,081.0057	Y	7,003,997.7109	
C.C.		X	1,195,353.6337	Y	7,001,885.8255	
Back = N	37° 37′ 45.46" W					
Ahead = N	50° 43′ 09.40" W					
Chord Bear = N	44° 10′ 27.43" W					

Course from PT US84_SB3 to PC US84_SB4 N 50° 43′ 09.40" W Dist 1,736.0841

Curve Data

Curve US84_SB4						
P.I. Station	547+98.51	X	1,195,435.2872	Y	7,005,343.7916	
Delta =	3° 31′ 28.68"	(LT)				
Degree =	0° 27′ 07.18"					
Tangent =	390.0210					
Length =	779.7960					
Radius =	12,676.2171					
External =	5.9987					
Long Chord =	779.6731					
Mid. Ord. =	5.9958					
P.C. Station	544+08.49	X	1,195,737.1842	Y	7,005,096.8613	
P.T. Station	551+88.29	X	1,195,118.7805	Y	7,005,571.6949	
C.C.		X	1,187,711.6115	Y	6,995,284.7941	
Back = N	50° 43′ 09.40" W					
Ahead = N	54° 14′ 38.08" W					
Chord Bear = N	52° 28′ 53.74" W					

Course from PT US84_SB4 to PC US84_SB5 N 54° 14′ 38.08" W Dist 676.2263

Curve Data

Curve US84_SB5						
P.I. Station	562+12.41	X	1,194,287.6920	Y	7,006,170.1270	
Delta =	6° 22′ 23.75"	(RT)				
Degree =	0° 55′ 00.89"					
Tangent =	347.8973					
Length =	695.0769					
Radius =	6,248.7578					
External =	9.6770					
Long Chord =	694.7186					
Mid. Ord. =	9.6621					
P.C. Station	558+64.51	X	1,194,570.0148	Y	7,005,966.8382	
P.T. Station	565+59.59	X	1,194,029.6802	Y	7,006,403.4988	
C.C.		X	1,198,221.3884	Y	7,011,037.7794	
Back = N	54° 14′ 38.08" W					
Ahead = N	47° 52′ 14.33" W					
Chord Bear = N	51° 03′ 26.20" W					

Course from PT US84_SB5 to 84501 N 47° 52′ 14.33" W Dist 1,279.5841

Point 84501 X 1,193,080.6993 Y 7,007,261.8523 Sta 578+39.17

Course from 84501 to 84502 N 47° 50′ 46.74" W Dist 4,991.7680

Point 84502 X 1,189,380.0653 Y 7,010,611.9353 Sta 628+30.94

Course from 84502 to 84503 N 47° 52′ 58.20" W Dist 1,469.0736

Point 84503 X 1,188,290.3433 Y 7,011,597.1678 Sta 643+00.02

Course from 84503 to 84504 N 47° 35′ 57.93" W Dist 400.0000

Point 84504 X 1,187,994.9639 Y 7,011,866.8918 Sta 647+00.02

Course from 84504 to 84505 N 46° 39′ 18.35" W Dist 634.5355

Point 84505 X 1,187,533.5074 Y 7,012,302.4296 Sta 653+34.55

Course from 84505 to 84506 N 46° 46′ 36.65" W Dist 1,868.5563

Point 84506 X 1,186,171.9055 Y 7,013,582.0948 Sta 672+03.11

Course from 84506 to PC US84_SB6 N 47° 40′ 54.14" W Dist 397.4697

Curve Data

Curve US84_SB6						
P.I. Station	684+38.74	X	1,185,258.2554	Y	7,014,413.9858	
Delta =	40° 27′ 23.55"	(RT)				
Degree =	2° 31′ 08.15"					
Tangent =	838.1673					
Length =	1,606.1005					
Radius =	2,274.6082					
External =	149.5137					
Long Chord =	1,572.9426					
Mid. Ord. =	140.2921					
P.C. Station	676+00.58	X	1,185,878.0099	Y	7,013,849.6908	
P.T. Station	692+06.68	X	1,185,152.8400	Y	7,015,245.4977	
C.C.		X	1,187,409.3868	Y	7,015,531.5728	
Back = N	47° 40′ 54.14" W					
Ahead = N	7° 13′ 30.59" W					
Chord Bear = N	27° 27′ 12.37" W					

Course from PT US84_SB6 to 84507 N 7° 13′ 30.59" W Dist 1,612.8799

Point 84507 X 1,184,949.9898 Y 7,016,845.5706 Sta 708+19.56

Course from 84507 to 84508 N 7° 31′ 40.59" W Dist 3,013.7033

Point 84508 X 1,184,555.1654 Y 7,019,833.2991 Sta 738+33.26

Course from 84508 to 84509 N 7° 08′ 47.30" W Dist 2,337.0641

Point 84509 X 1,184,264.4199 Y 7,022,152.2073 Sta 761+70.33

Course from 84509 to PC US84_SB7 N 7° 09′ 15.33" W Dist 4,845.8789

Curve Data

Curve US84_SB7						
P.I. Station	815+40.72	X	1,183,595.5853	Y	7,027,480.7870	
Delta =	23° 15′ 22.55"	(LT)				
Degree =	2° 14′ 52.40"					
Tangent =	524.5122					
Length =	1,034.5822					
Radius =	2,548.8700					
External =	53.4081					
Long Chord =	1,027.4947					
Mid. Ord. =	52.3120					
P.C. Station	810+16.20	X	1,183,660.9087	Y	7,026,960.3584	
P.T. Station	820+50.79	X	1,183,330.0814	Y	7,027,933.1372	
C.C.		X	1,181,131.8830	Y	7,026,642.9192	
Back = N	7° 09′ 15.33" W					
Ahead = N	30° 24′ 37.88" W					
Chord Bear = N	18° 46′ 56.60" W					

Course from PT US84_SB7 to 84510 N 30° 24′ 37.88" W Dist 1,005.6778

Point 84510 X 1,182,821.0152 Y 7,028,800.4545 Sta 830+56.46

Ending chain US84_SB description

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US 84

ALIGNMENT DATA

SHEET 3 OF 3

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	53
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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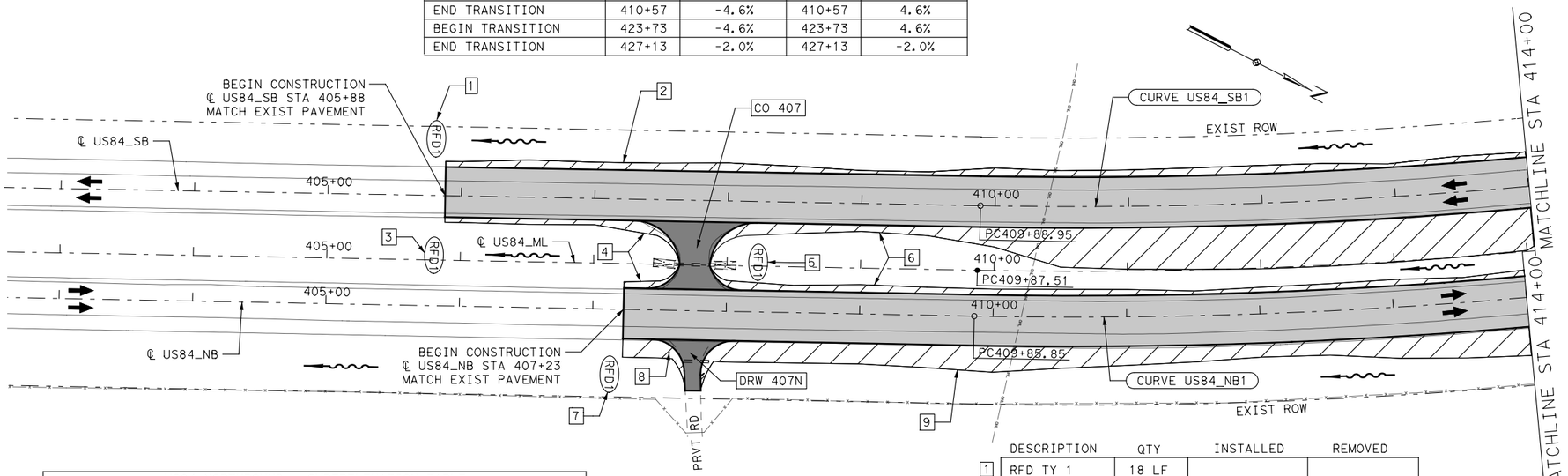
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	405+88	-2.0%	405+88	-2.0%
END TRANSITION	410+57	-4.6%	410+57	4.6%
BEGIN TRANSITION	423+73	-4.6%	423+73	4.6%
END TRANSITION	427+13	-2.0%	427+13	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	407+23	-2.0%	407+23	-2.0%
END TRANSITION	410+45	-4.6%	410+45	4.6%
BEGIN TRANSITION	424+03	-4.6%	424+03	4.6%
END TRANSITION	426+92	-2.0%	426+92	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	453 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	113 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	1866 SY		N/A
7	RFD TY 1	18 LF		
8	PERM SEEDING	65 SY		N/A
9	PERM SEEDING	1071 SY		N/A

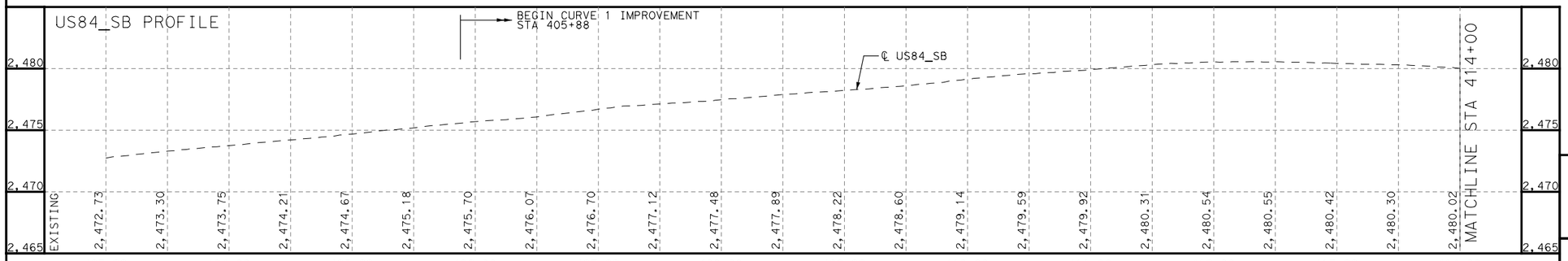
50 0 50 100
SCALE: 1" = 100'

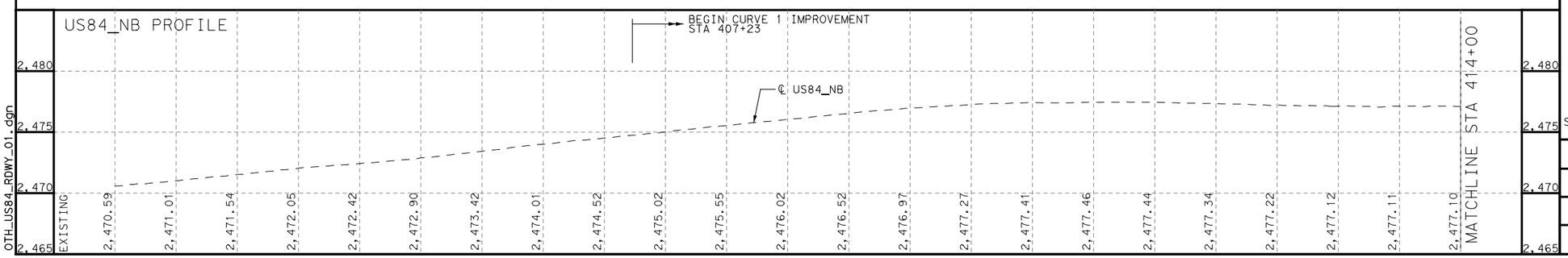
LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL PROVIDE A CONCRETE WASHOUT AS DIRECTED BY THE ENGINEER. LOCATION SHALL BE APPROVED BY THE ENGINEER AND RESTORED UPON THE REMOVAL.
2. SEE SUPERELEVATION TABLES SHEETS FOR ADDITIONAL INFORMATION.
3. SEE DRIVEWAY AND CROSSOVER DETAIL SHEET FOR ADDITIONAL INFORMATION.





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US 84

PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 1 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	54
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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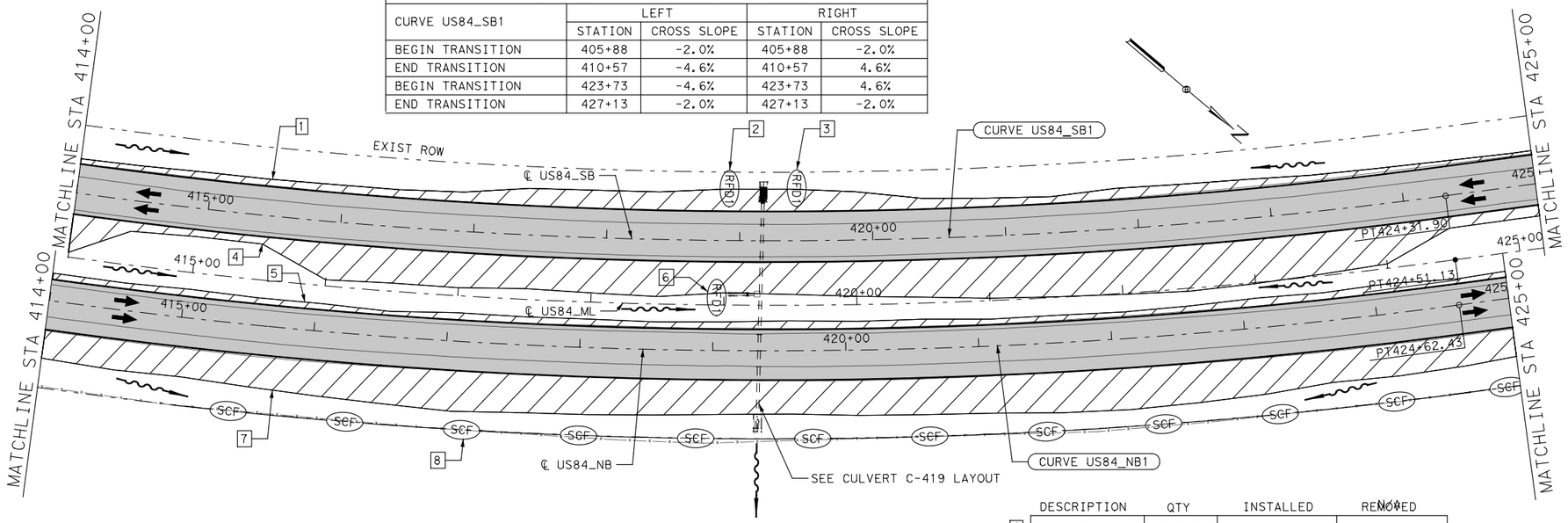
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	405+88	-2.0%	405+88	-2.0%
END TRANSITION	410+57	-4.6%	410+57	4.6%
BEGIN TRANSITION	423+73	-4.6%	423+73	4.6%
END TRANSITION	427+13	-2.0%	427+13	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	407+23	-2.0%	407+23	-2.0%
END TRANSITION	410+45	-4.6%	410+45	4.6%
BEGIN TRANSITION	424+03	-4.6%	424+03	4.6%
END TRANSITION	426+92	-2.0%	426+92	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	1013 SY		N/A
2	RFD TY 1	18 LF		
3	RFD TY 1	18 LF		
4	PERM SEEDING	2954 SY		N/A
5	PERM SEEDING	621 SY		N/A
6	RFD TY 1	18 LF		
7	PERM SEEDING	3315 SY		N/A
8	SCF	1034 LF		

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

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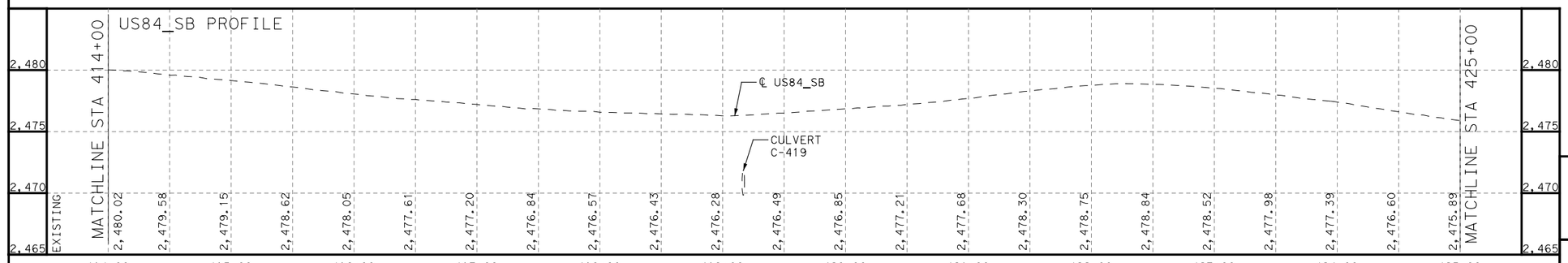

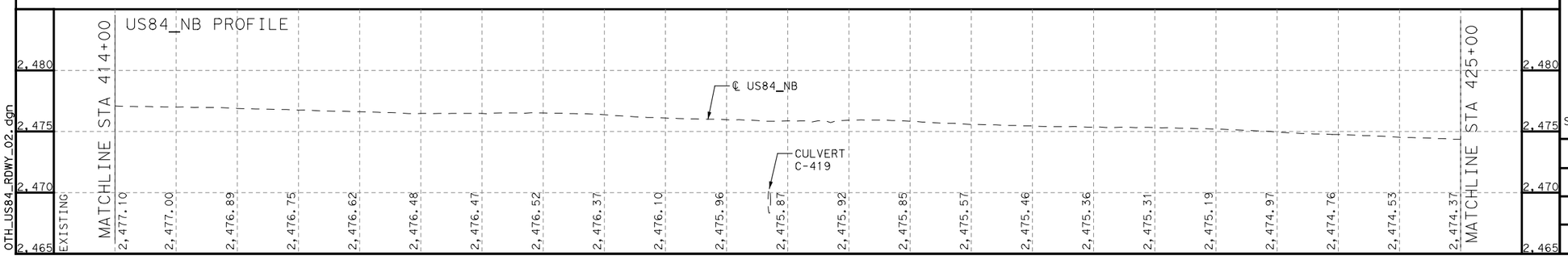

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 2 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	55
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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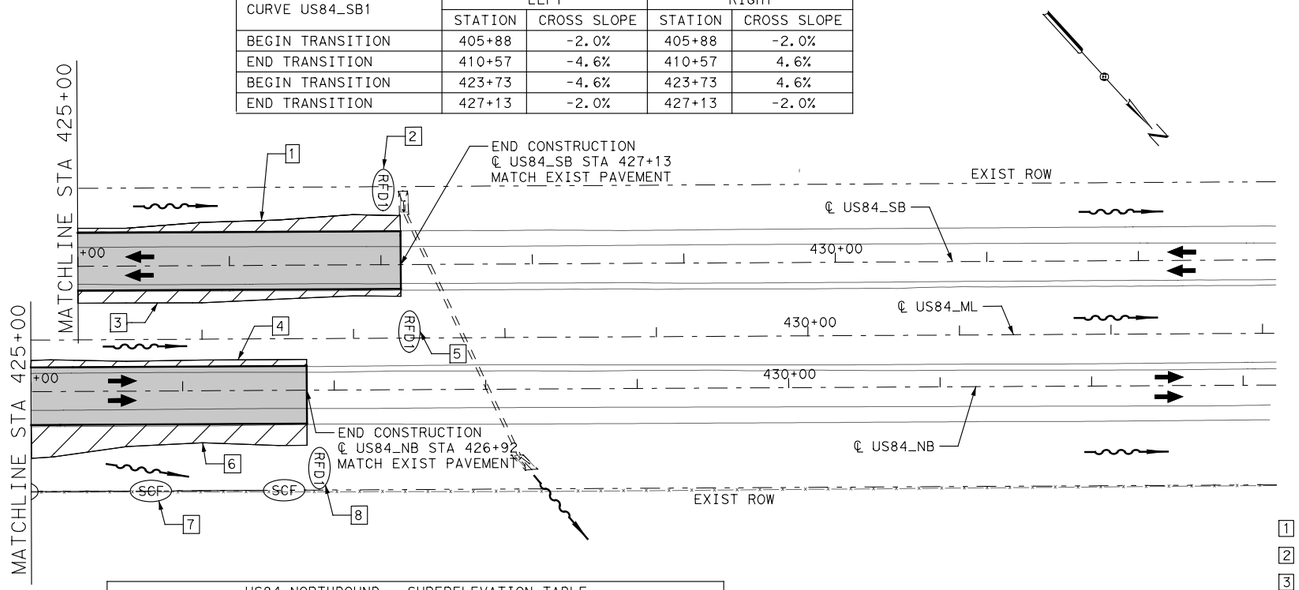
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	405+88	-2.0%	405+88	-2.0%
END TRANSITION	410+57	-4.6%	410+57	4.6%
BEGIN TRANSITION	423+73	-4.6%	423+73	4.6%
END TRANSITION	427+13	-2.0%	427+13	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB1	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	407+23	-2.0%	407+23	-2.0%
END TRANSITION	410+45	-4.6%	410+45	4.6%
BEGIN TRANSITION	424+03	-4.6%	424+03	4.6%
END TRANSITION	426+92	-2.0%	426+92	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	167 SY		N/A
2	RFD TY 1	18 LF		
3	PERM SEEDING	165 SY		N/A
4	PERM SEEDING	85 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	310 SY		N/A
7	SCF	181 LF		
8	RFD TY 1	18 LF		

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
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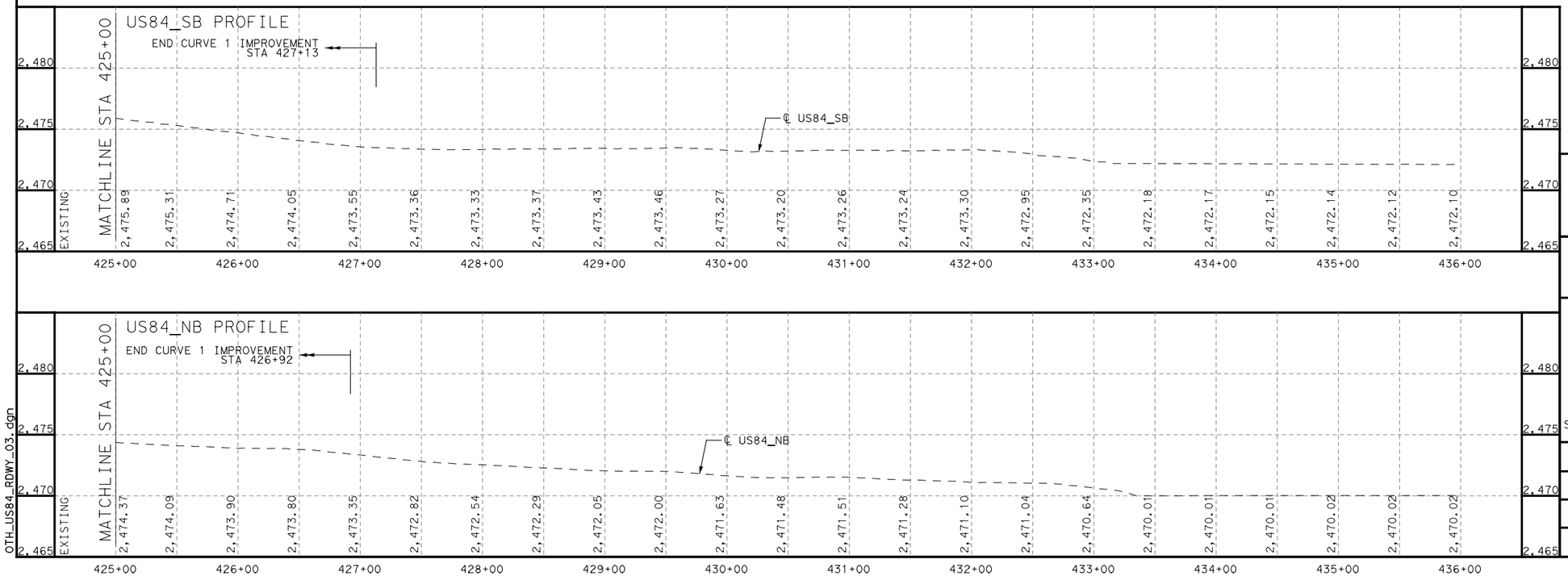

OTH_US84_ROWY_03.dgn

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 3 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	56
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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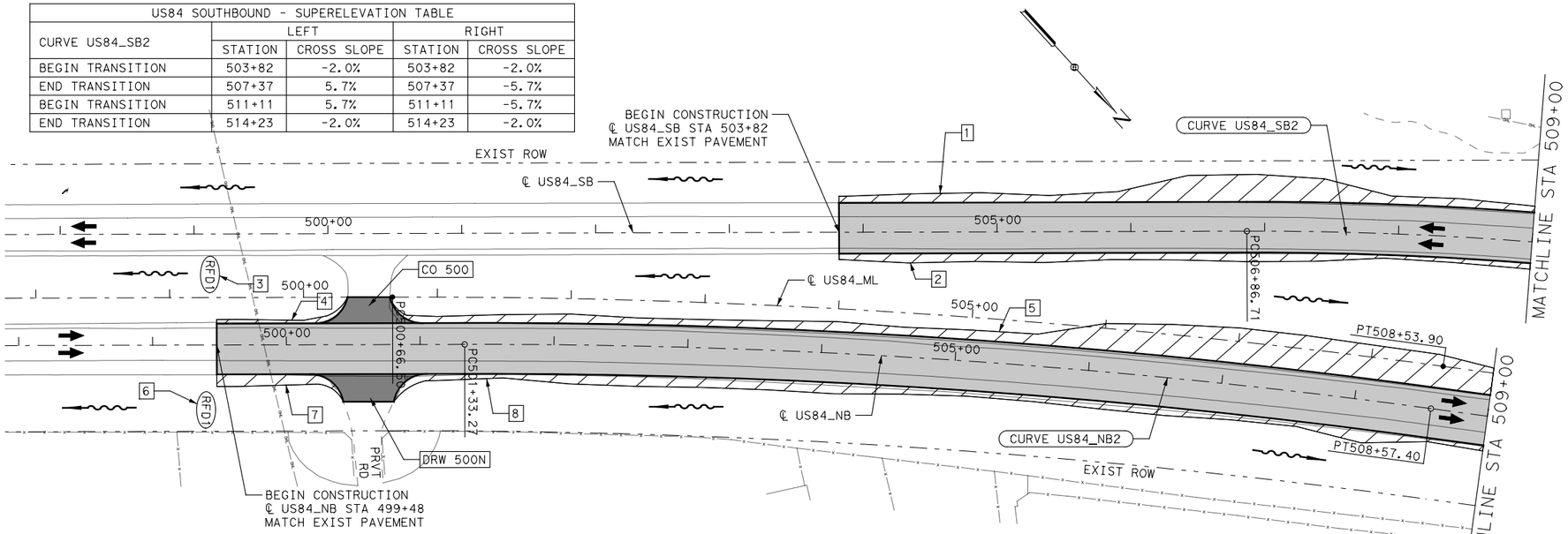
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB2	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	503+82	-2.0%	503+82	-2.0%
END TRANSITION	507+37	5.7%	507+37	-5.7%
BEGIN TRANSITION	511+11	5.7%	511+11	-5.7%
END TRANSITION	514+23	-2.0%	514+23	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB2	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	499+48	-2.0%	499+48	-2.0%
END TRANSITION	501+83	3.6%	501+83	-3.6%
BEGIN TRANSITION	508+07	3.6%	508+07	-3.6%
END TRANSITION	511+17	-2.0%	511+17	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	584 SY		N/A
2	PERM SEEDING	309 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	32 SY		N/A
5	PERM SEEDING	1204 SY		N/A
6	RFD TY 1	18 LF		
7	PERM SEEDING	81 SY		N/A
8	PERM SEEDING	543 SY		N/A

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
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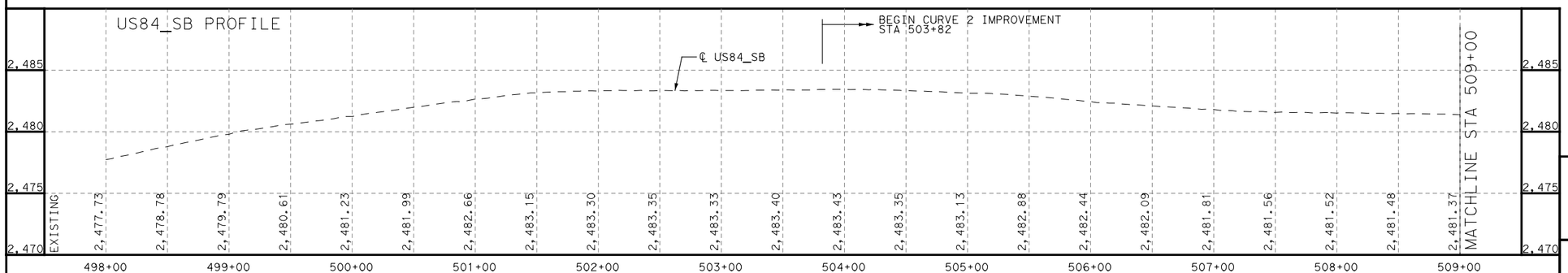

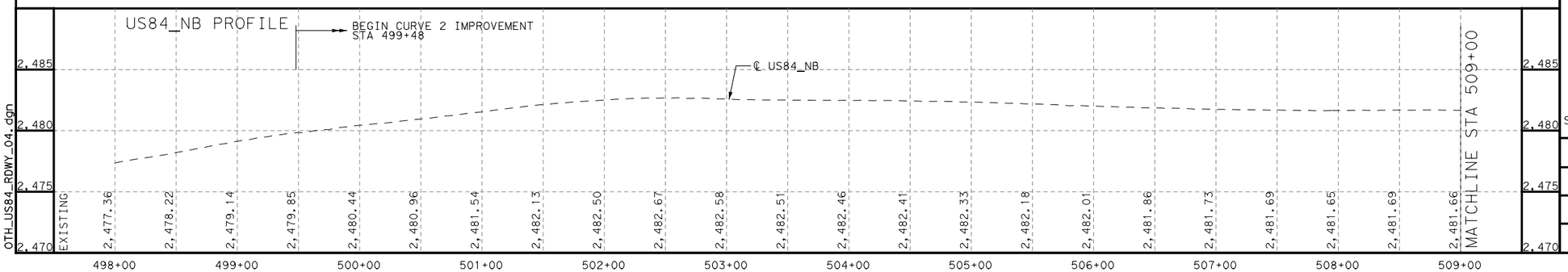

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 4 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	57
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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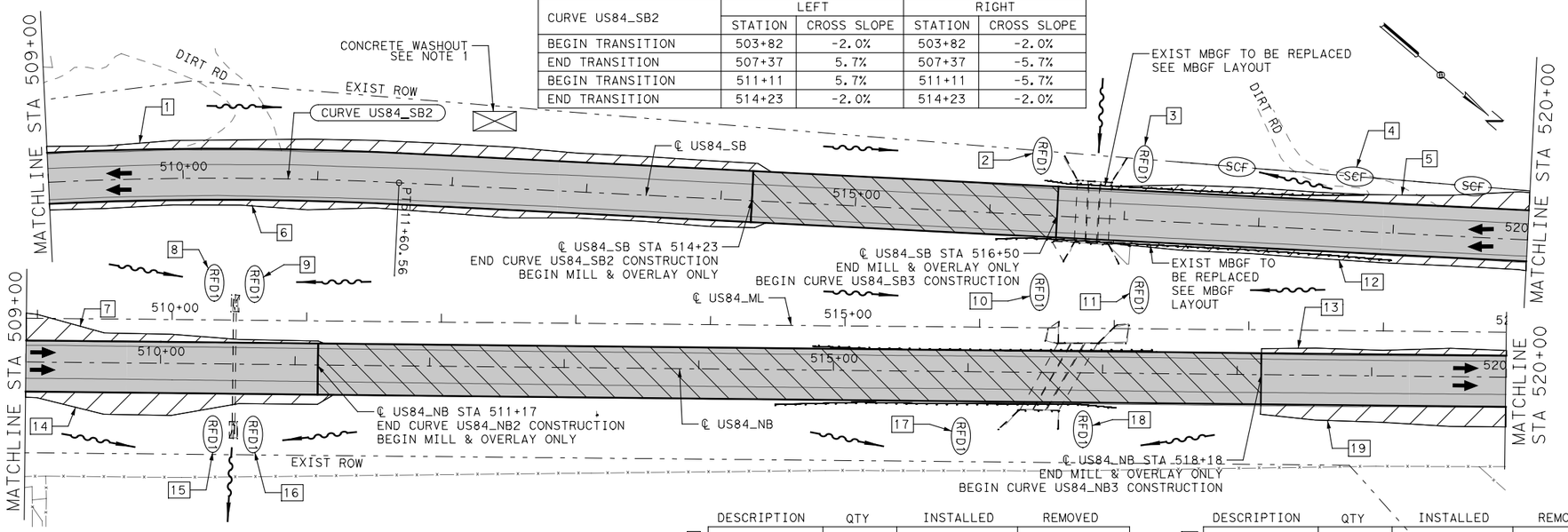
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB2	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	503+82	-2.0%	503+82	-2.0%
END TRANSITION	507+37	5.7%	507+37	-5.7%
BEGIN TRANSITION	511+11	5.7%	511+11	-5.7%
END TRANSITION	514+23	-2.0%	514+23	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB2	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	499+48	-2.0%	499+48	-2.0%
END TRANSITION	501+83	3.6%	501+83	-3.6%
BEGIN TRANSITION	508+07	3.6%	508+07	-3.6%
END TRANSITION	511+17	-2.0%	511+17	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	406 SY		N/A
2	RFD TY 1	18 LF		
3	RFD TY 1	18 LF		
4	SCF	263 LF		
5	PERM SEEDING	234 SY		N/A
6	PERM SEEDING	264 SY		N/A
7	PERM SEEDING	158 SY		N/A
8	RFD TY 1	18 LF		
9	RFD TY 1	18 LF		
10	RFD TY 1	18 LF		

	DESCRIPTION	QTY	INSTALLED	REMOVED
11	RFD TY 1	18 LF		
12	PERM SEEDING	183 SY		N/A
13	PERM SEEDING	80 SY		N/A
14	PERM SEEDING	272 SY		N/A
15	RFD TY 1	18 LF		
16	RFD TY 1	18 LF		
17	RFD TY 1	18 LF		
18	RFD TY 1	18 LF		
19	PERM SEEDING	254 SY		N/A

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
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- CROSSOVER/DRIVEWAY RECONSTRUCTION
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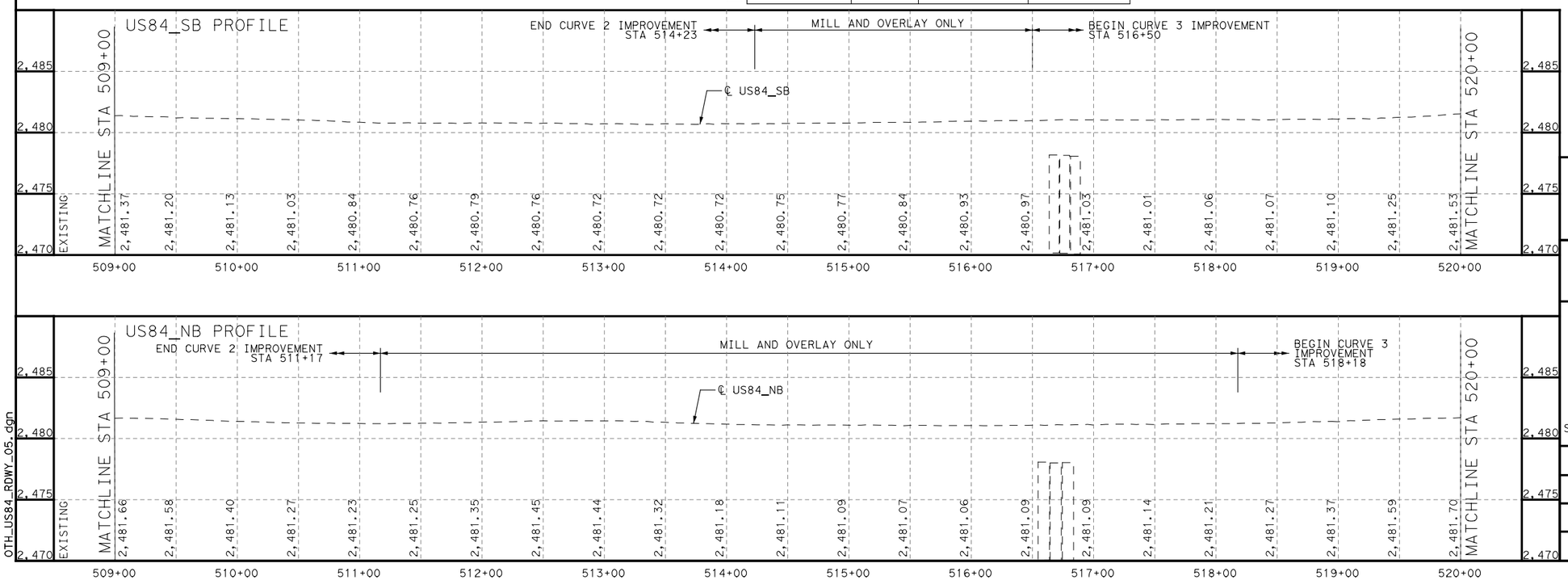

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4/26/2021

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 5 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	58
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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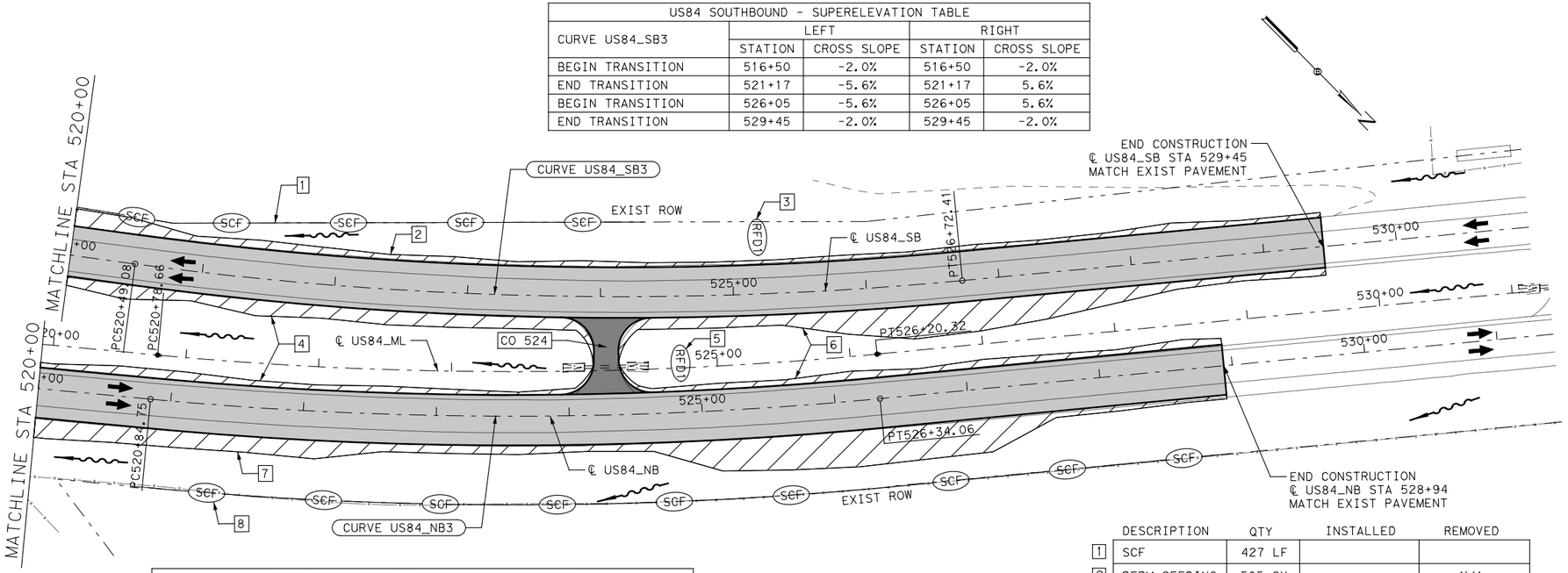
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB3	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	516+50	-2.0%	516+50	-2.0%
END TRANSITION	521+17	-5.6%	521+17	5.6%
BEGIN TRANSITION	526+05	-5.6%	526+05	5.6%
END TRANSITION	529+45	-2.0%	529+45	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB3	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	518+18	-2.0%	518+18	-2.0%
END TRANSITION	521+53	-5.5%	521+53	5.5%
BEGIN TRANSITION	525+67	-5.5%	525+67	5.5%
END TRANSITION	528+94	-2.0%	528+94	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	SCF	427 LF		
2	PERM SEEDING	505 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	635 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	745 SY		N/A
7	PERM SEEDING	1317 SY		N/A
8	SCF	1027 LF		

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
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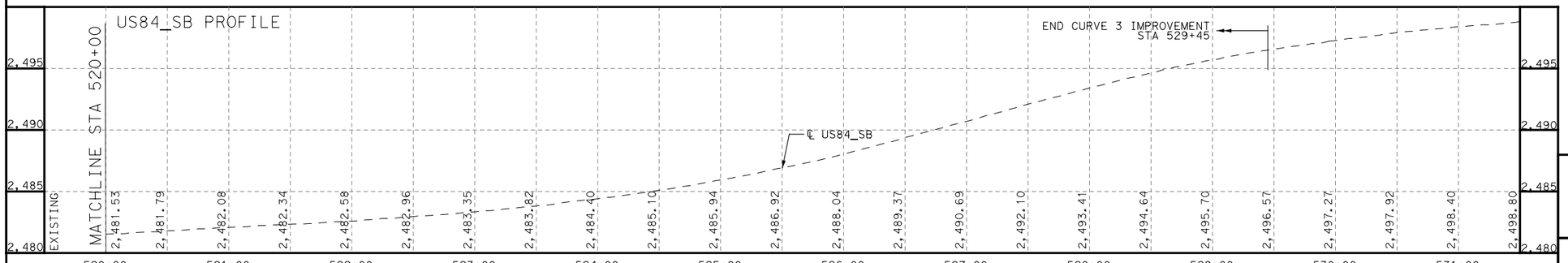

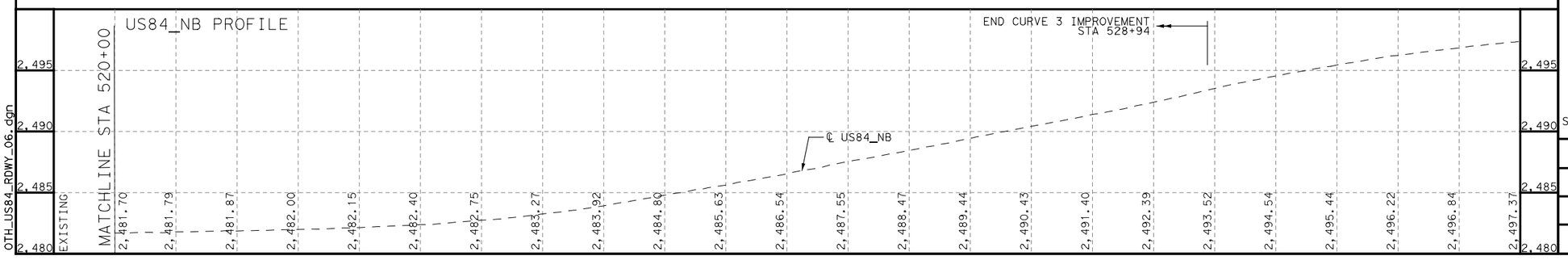

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 6 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	59
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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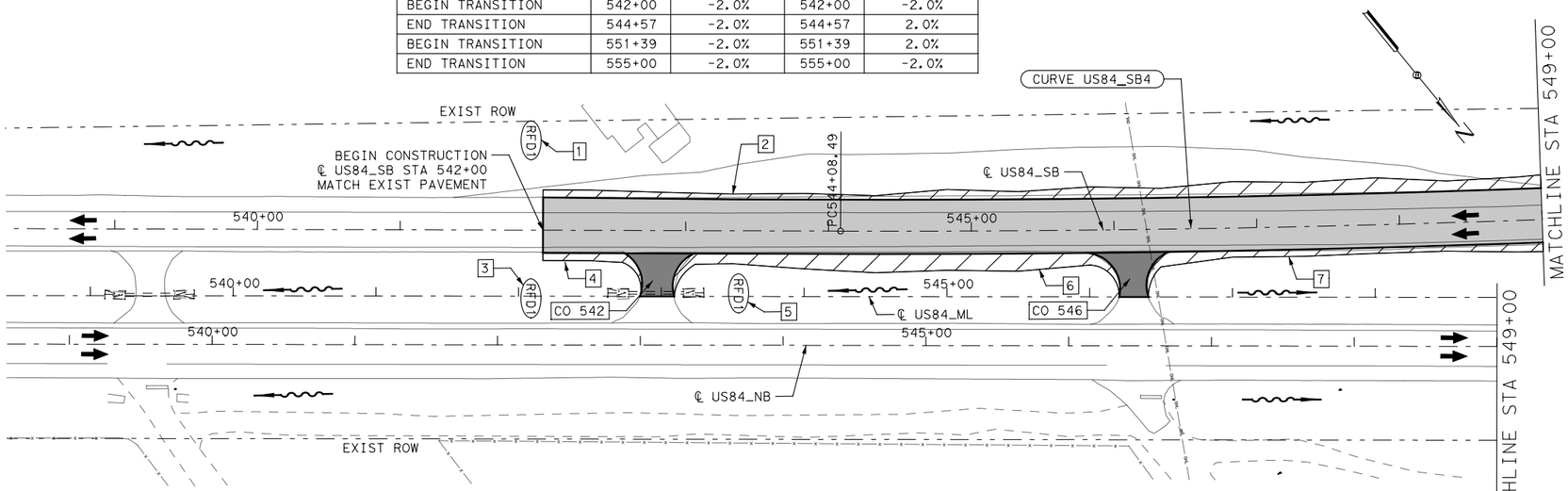
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB4	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	542+00	-2.0%	542+00	-2.0%
END TRANSITION	544+57	-2.0%	544+57	2.0%
BEGIN TRANSITION	551+39	-2.0%	551+39	2.0%
END TRANSITION	555+00	-2.0%	555+00	-2.0%



	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	522 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	44 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	361 SY		N/A
7	PERM SEEDING	162 SY		N/A

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
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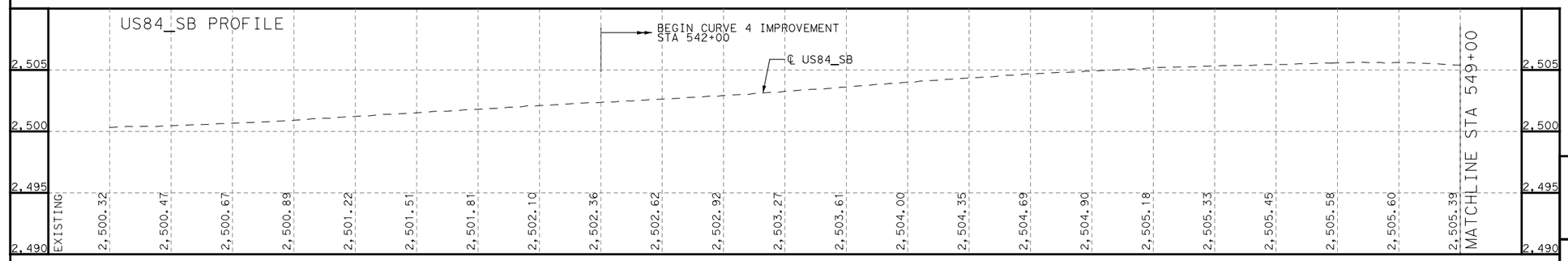

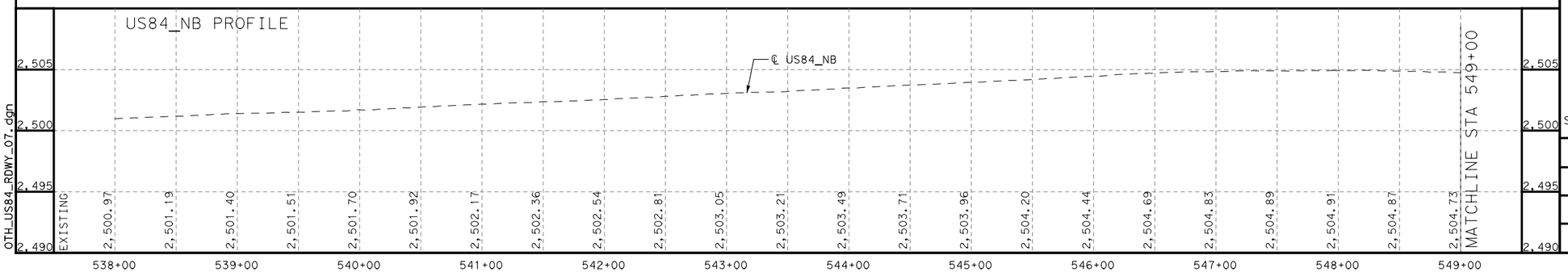

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PLAN & PROFILE AND SW3P SITE PLAN

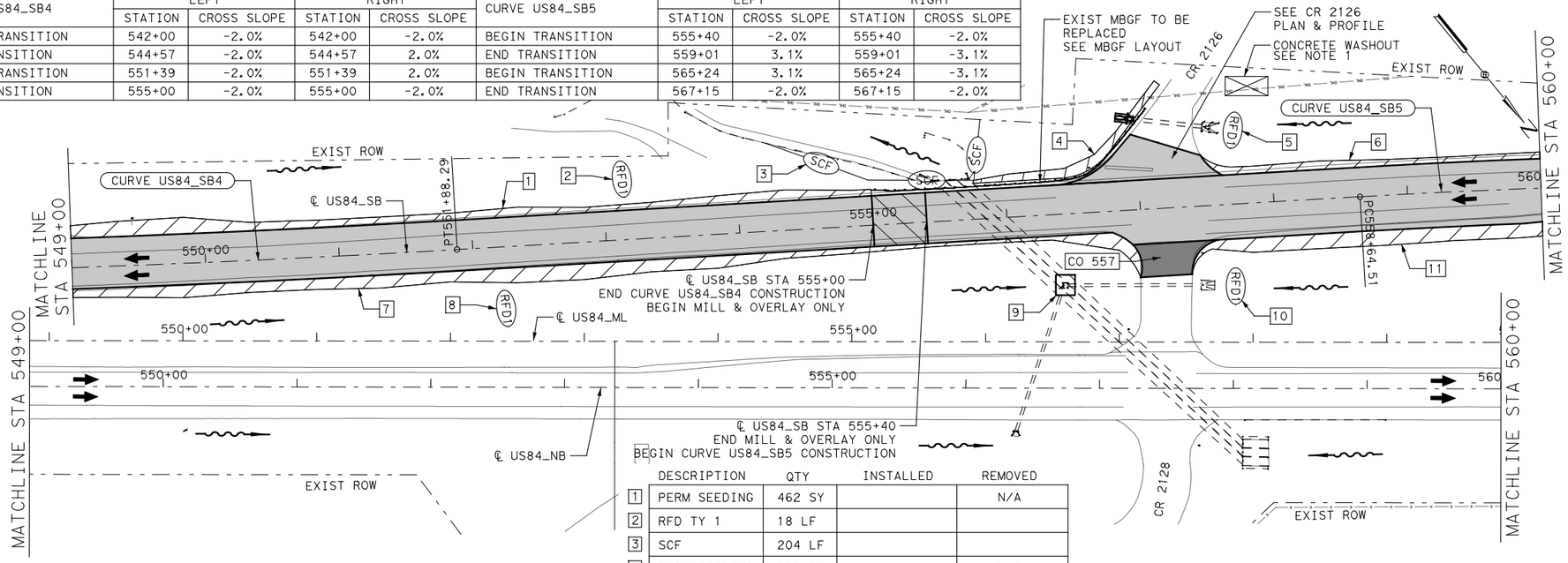
SCALE: 1"=100' H
1"=10' V

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	60
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

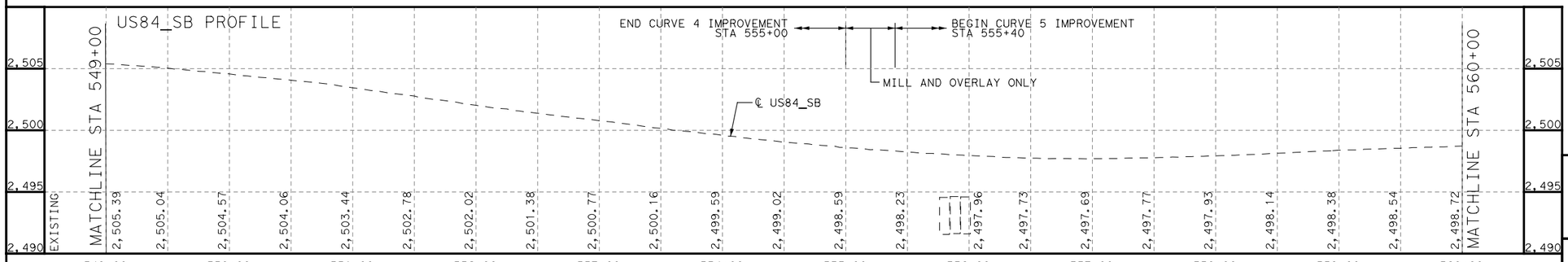
OTH_US84_RDWY_07.dgn

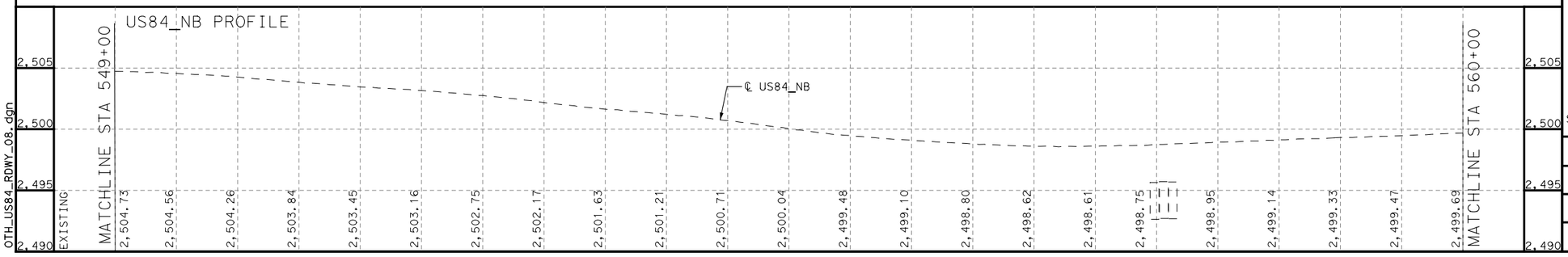
4/26/2021 3:44:20 PM

US84 SOUTHBOUND - SUPERELEVATION TABLE									
CURVE US84_SB4	LEFT		RIGHT		CURVE US84_SB5	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE		STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	542+00	-2.0%	542+00	-2.0%	BEGIN TRANSITION	555+40	-2.0%	555+40	-2.0%
END TRANSITION	544+57	-2.0%	544+57	2.0%	END TRANSITION	559+01	3.1%	559+01	-3.1%
BEGIN TRANSITION	551+39	-2.0%	551+39	2.0%	BEGIN TRANSITION	565+24	3.1%	565+24	-3.1%
END TRANSITION	555+00	-2.0%	555+00	-2.0%	END TRANSITION	567+15	-2.0%	567+15	-2.0%



	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	462 SY		N/A
2	RFD TY 1	18 LF		
3	SCF	204 LF		
4	PERM SEEDING	108 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	143 SY		N/A
7	PERM SEEDING	707 SY		N/A
8	RFD TY 1	18 LF		
9	ECL	52 LF		
10	RFD TY 1	18 LF		
11	PERM SEEDING	299 SY		N/A





50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL PROVIDE A CONCRETE WASHOUT AS DIRECTED BY THE ENGINEER. LOCATION SHALL BE APPROVED BY THE ENGINEER AND RESTORED UPON THE REMOVAL.
2. SEE SUPERELEVATION TABLES SHEETS FOR ADDITIONAL INFORMATION.
3. SEE DRIVEWAY AND CROSSOVER DETAIL SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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US 84

PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 8 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	61
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_ROWY_08.dgn

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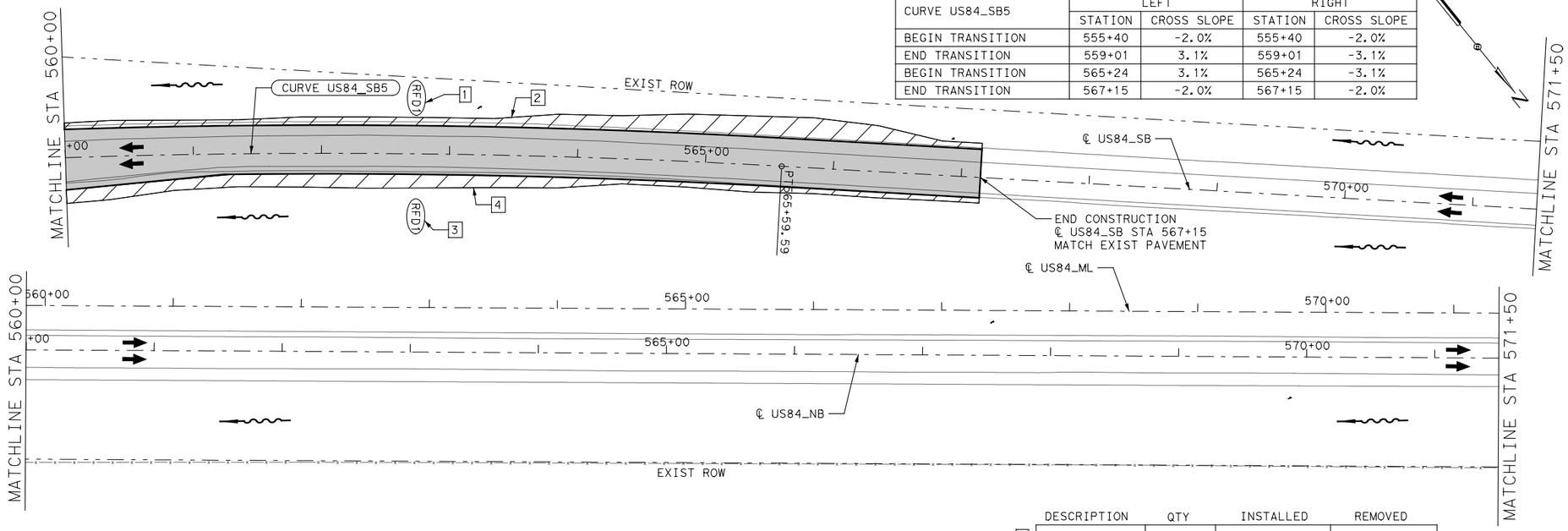
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB5	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	555+40	-2.0%	555+40	-2.0%
END TRANSITION	559+01	3.1%	559+01	-3.1%
BEGIN TRANSITION	565+24	3.1%	565+24	-3.1%
END TRANSITION	567+15	-2.0%	567+15	-2.0%



	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	729 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	593 SY		N/A

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
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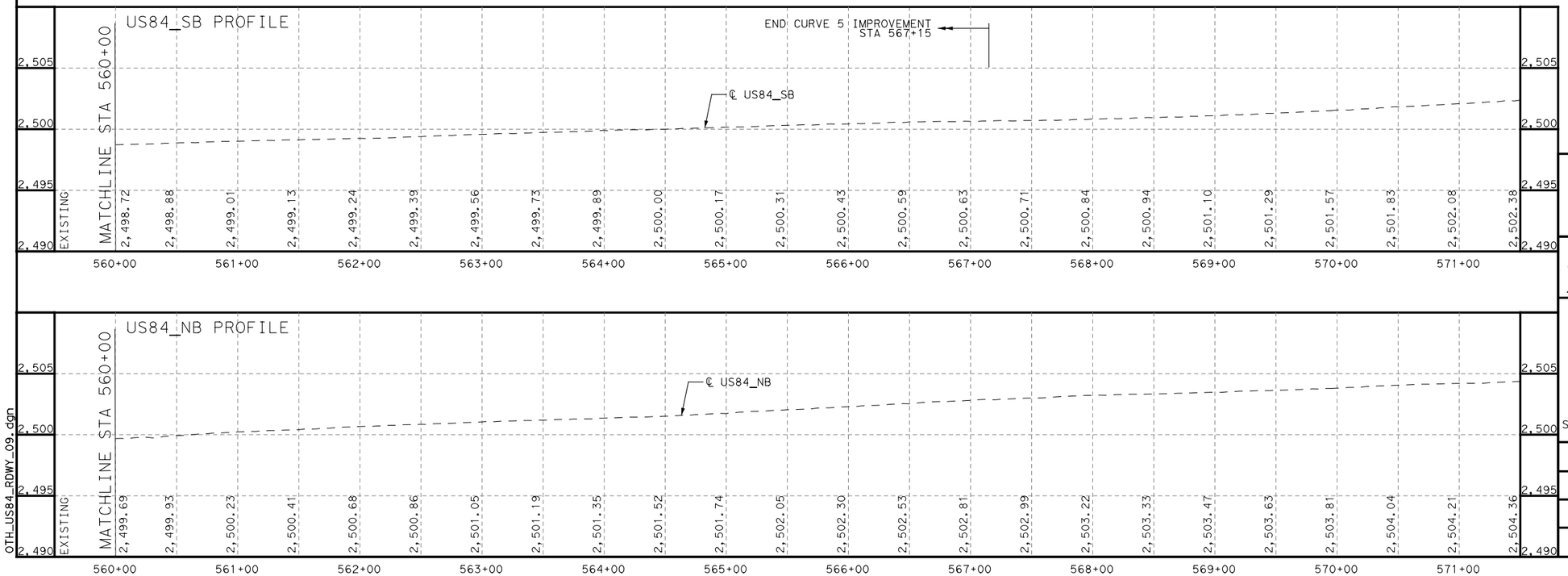

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 9 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	62
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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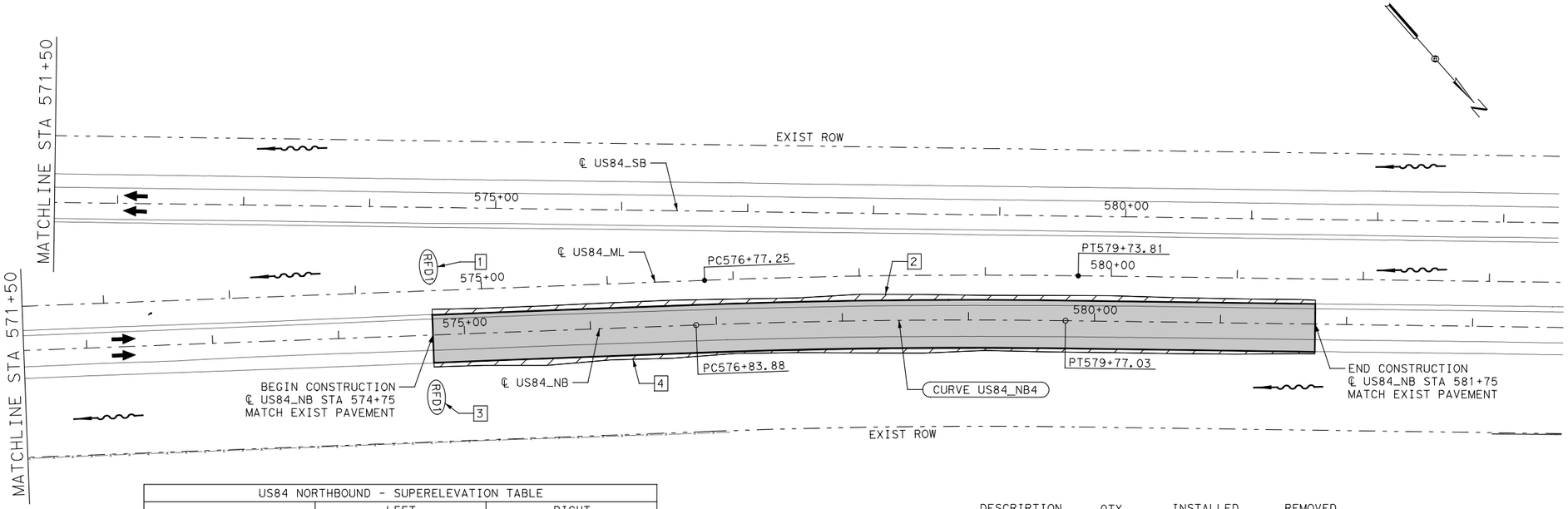

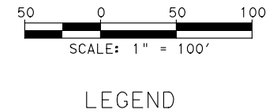

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB4	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	574+75	-2.0%	574+75	-2.0%
END TRANSITION	577+33	3.4%	577+33	-3.4%
BEGIN TRANSITION	579+28	3.4%	579+28	-3.4%
END TRANSITION	581+75	-2.0%	581+75	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	300 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	239 SY		N/A

NOTES:

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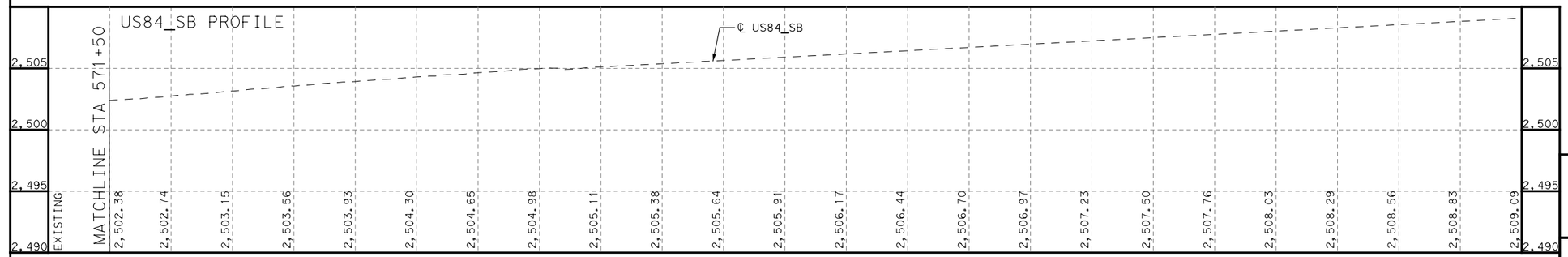

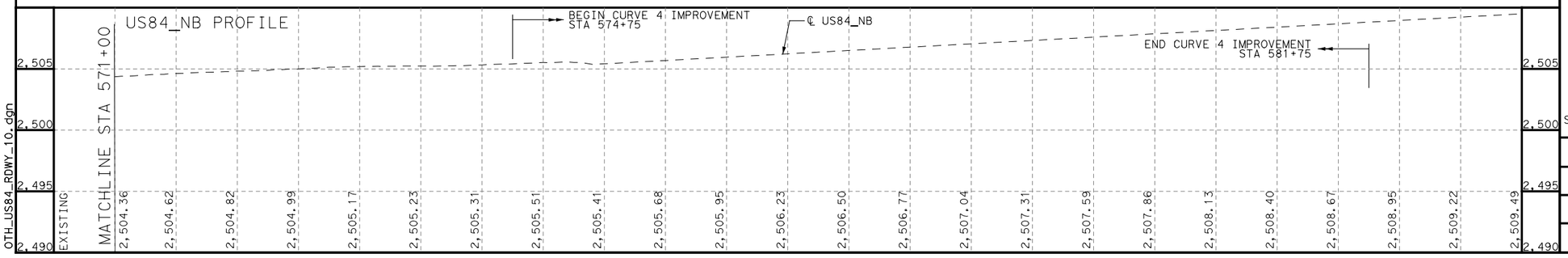

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 10 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	63
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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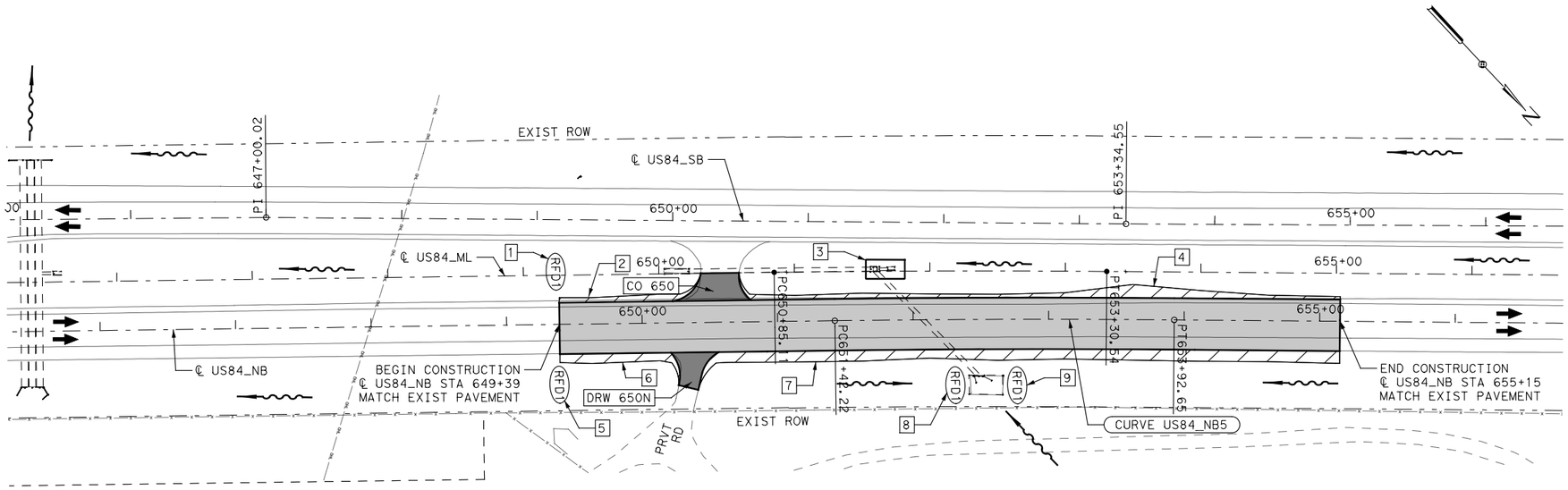

US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB5	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	649+39	-2.0%	649+39	-2.0%
END TRANSITION	651+78	2.0%	651+78	-2.0%
BEGIN TRANSITION	653+57	2.0%	653+57	-2.0%
END TRANSITION	655+15	-2.0%	655+15	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	46 SY		N/A
3	ECL	84 LF		
4	PERM SEEDING	208 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	66 SY		N/A
7	PERM SEEDING	411 SY		N/A
8	RFD TY 1	18 LF		
9	RFD TY 1	18 LF		

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
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- CO/DRW ID — CROSSOVER/DRIVEWAY ID
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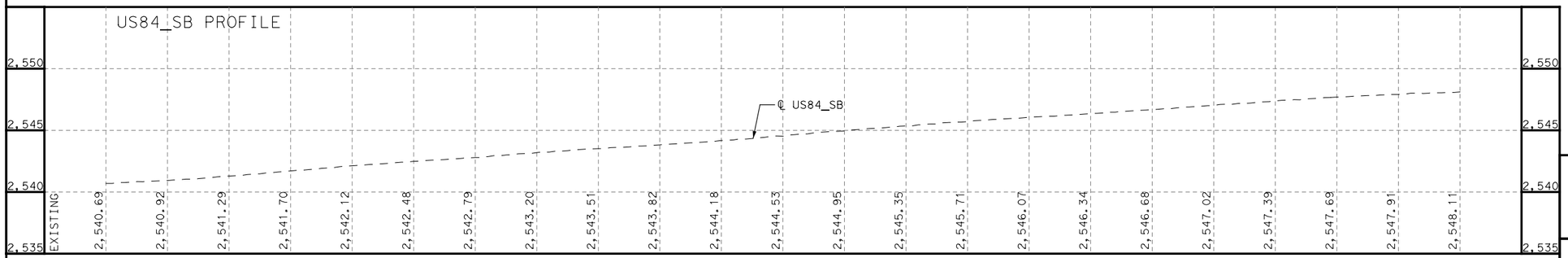
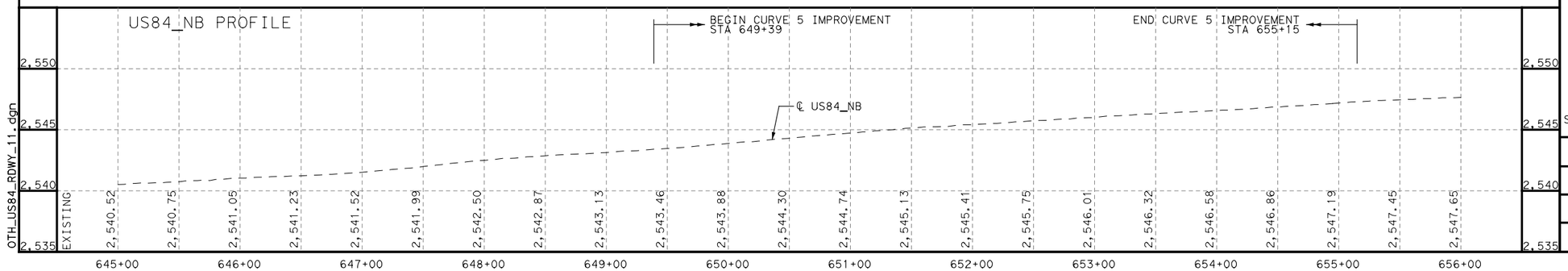
4/26/2021





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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 11 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	64
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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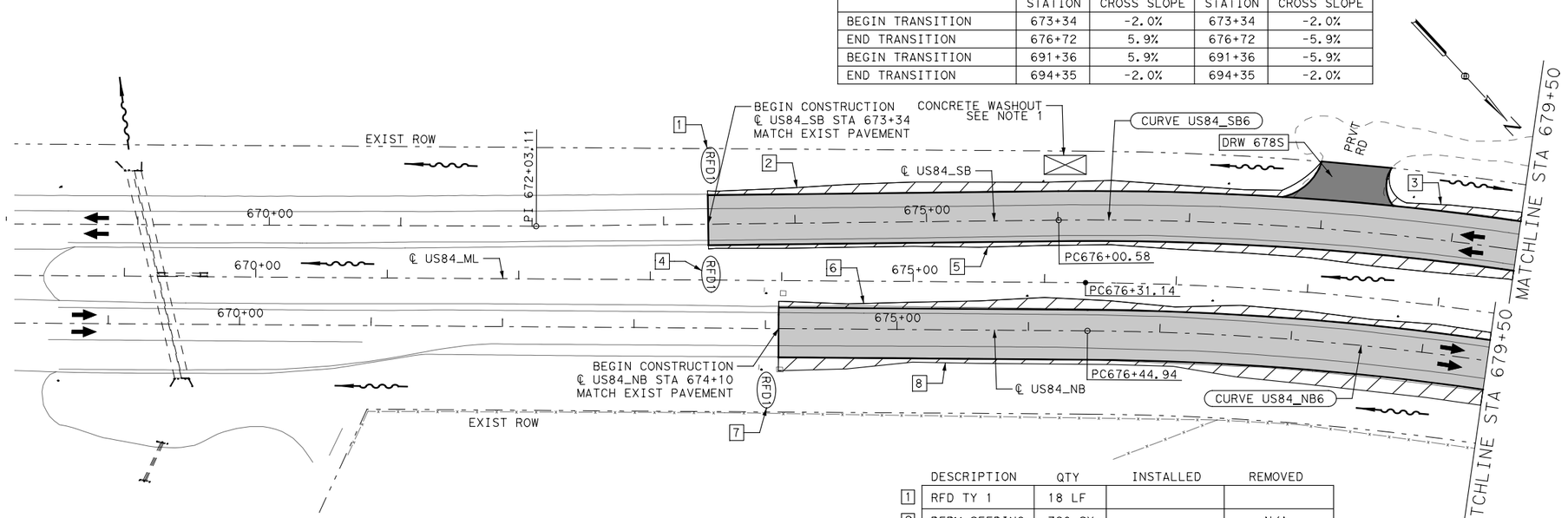
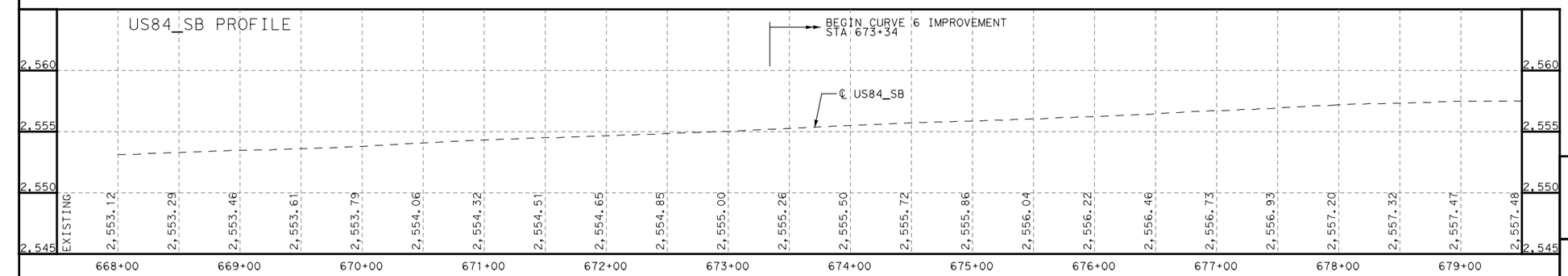
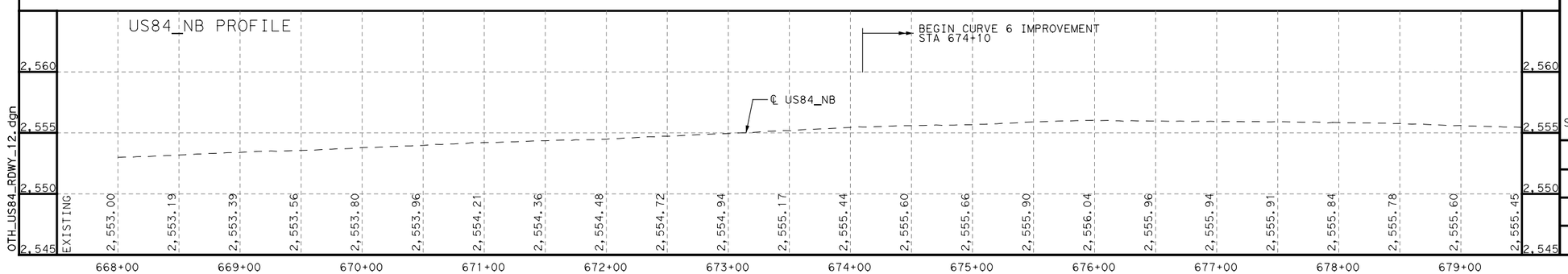
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	673+34	-2.0%	673+34	-2.0%
END TRANSITION	676+72	5.9%	676+72	-5.9%
BEGIN TRANSITION	691+36	5.9%	691+36	-5.9%
END TRANSITION	694+35	-2.0%	694+35	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	674+10	-2.0%	674+10	-2.0%
END TRANSITION	677+16	5.9%	677+16	-5.9%
BEGIN TRANSITION	691+29	5.9%	691+29	-5.9%
END TRANSITION	694+85	-2.0%	694+85	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	320 SY		N/A
3	PERM SEEDING	67 SY		N/A
4	RFD TY 1	18 LF		
5	PERM SEEDING	338 SY		N/A
6	PERM SEEDING	346 SY		N/A
7	RFD TY 1	18 LF		
8	PERM SEEDING	431 SY		N/A





50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
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- # — EROSION CONTROL MEASURE ID
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131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

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FIRM REGISTRATION NO. F-1471

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 12 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	65
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_ROWY_12.dgn

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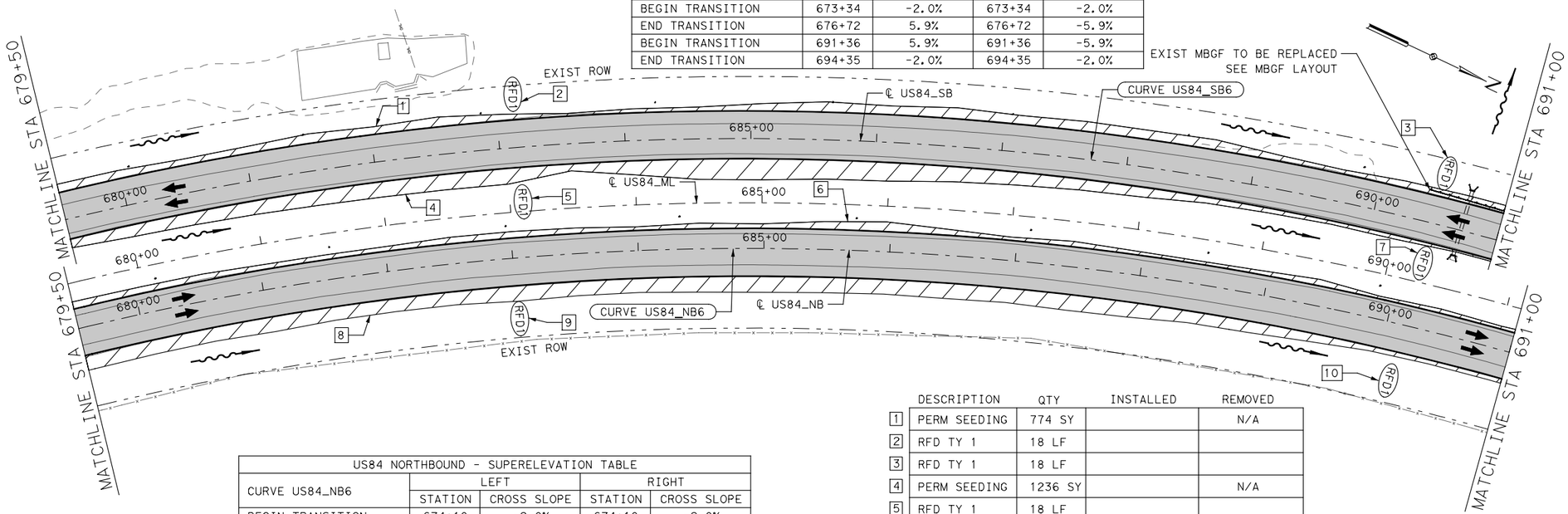
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	673+34	-2.0%	673+34	-2.0%
END TRANSITION	676+72	5.9%	676+72	-5.9%
BEGIN TRANSITION	691+36	5.9%	691+36	-5.9%
END TRANSITION	694+35	-2.0%	694+35	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	674+10	-2.0%	674+10	-2.0%
END TRANSITION	677+16	5.9%	677+16	-5.9%
BEGIN TRANSITION	691+29	5.9%	691+29	-5.9%
END TRANSITION	694+85	-2.0%	694+85	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	774 SY		N/A
2	RFD TY 1	18 LF		
3	RFD TY 1	18 LF		
4	PERM SEEDING	1236 SY		N/A
5	RFD TY 1	18 LF		
6	PERM SEEDING	533 SY		N/A
7	RFD TY 1	18 LF		
8	PERM SEEDING	1323 SY		N/A
9	RFD TY 1	18 LF		
10	RFD TY 1	18 LF		

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
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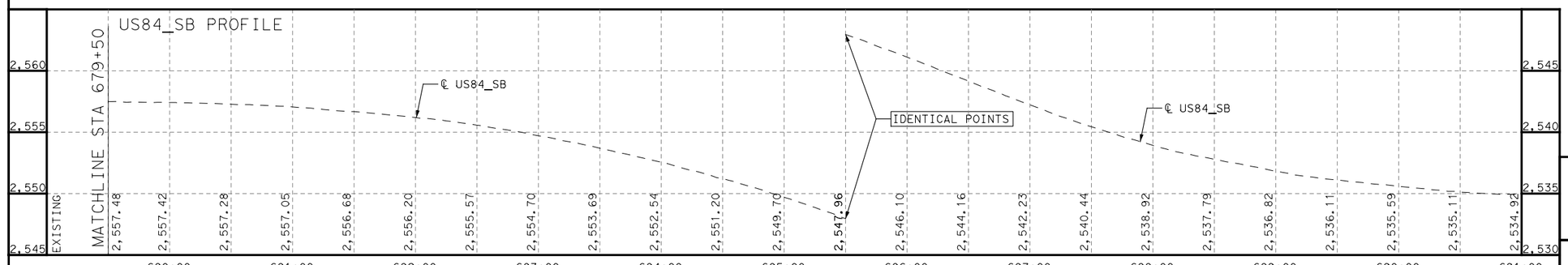

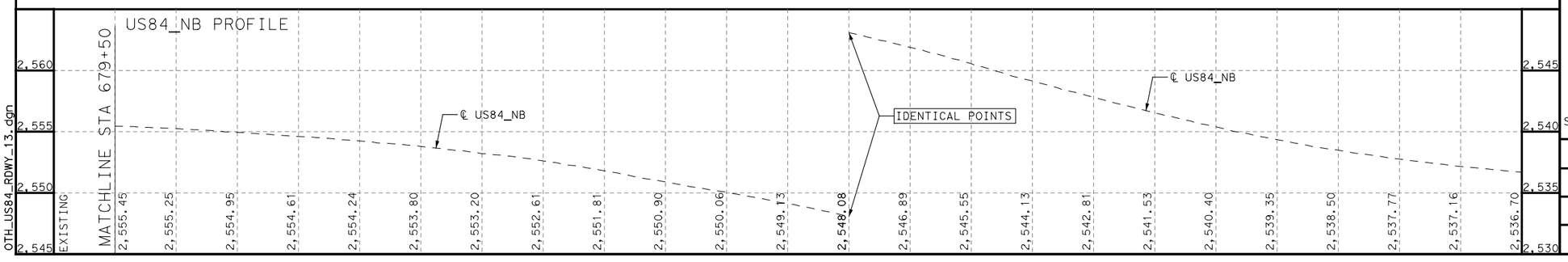

STATE OF TEXAS
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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 13 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	66
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_ROWY_13.dgn

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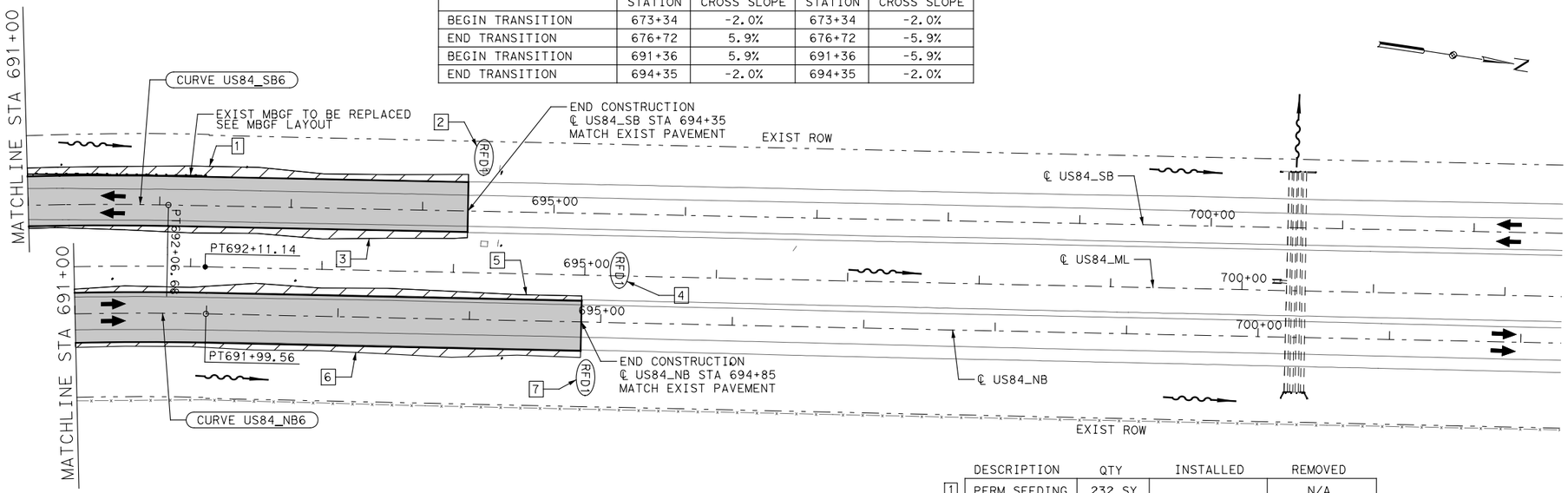
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	673+34	-2.0%	673+34	-2.0%
END TRANSITION	676+72	5.9%	676+72	-5.9%
BEGIN TRANSITION	691+36	5.9%	691+36	-5.9%
END TRANSITION	694+35	-2.0%	694+35	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB6	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	674+10	-2.0%	674+10	-2.0%
END TRANSITION	677+16	5.9%	677+16	-5.9%
BEGIN TRANSITION	691+29	5.9%	691+29	-5.9%
END TRANSITION	694+85	-2.0%	694+85	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	232 SY		N/A
2	RFD TY 1	18 LF		
3	PERM SEEDING	170 SY		N/A
4	RFD TY 1	18 LF		
5	PERM SEEDING	220 SY		N/A
6	PERM SEEDING	196 SY		N/A
7	RFD TY 1	18 LF		

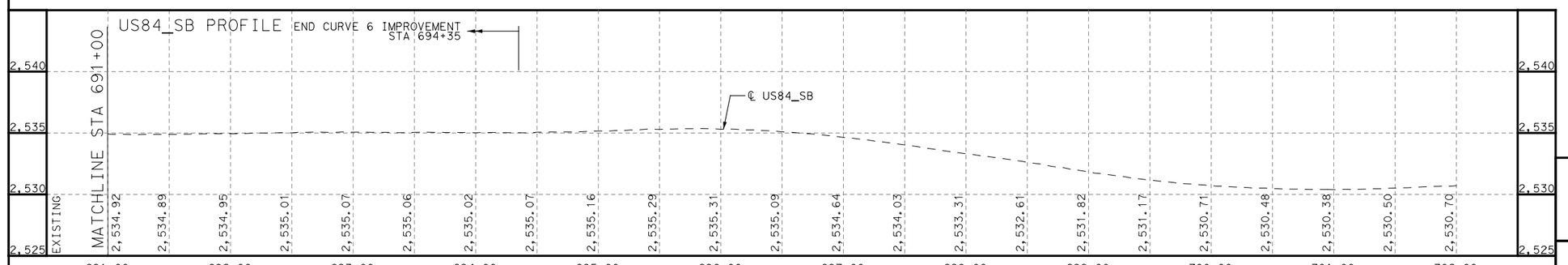
50 0 50 100
SCALE: 1" = 100'

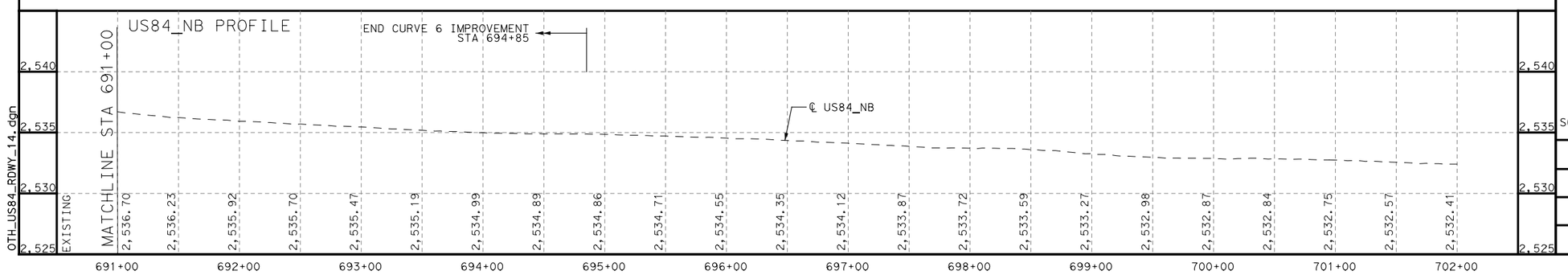
LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL PROVIDE A CONCRETE WASHOUT AS DIRECTED BY THE ENGINEER. LOCATION SHALL BE APPROVED BY THE ENGINEER AND RESTORED UPON THE REMOVAL.
2. SEE SUPERELEVATION TABLES SHEETS FOR ADDITIONAL INFORMATION.
3. SEE DRIVEWAY AND CROSSOVER DETAIL SHEET FOR ADDITIONAL INFORMATION.





OTH_US84_RDWY_14.dgn

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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US 84

PLAN & PROFILE AND SW3P SITE PLAN

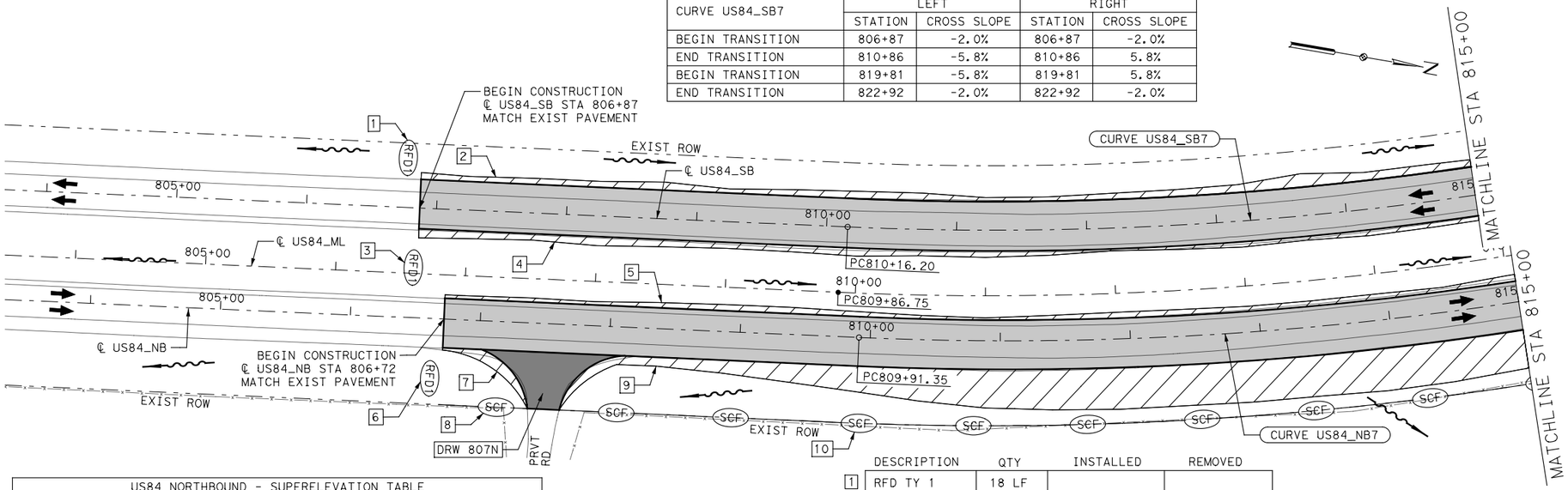
SCALE: 1"=100' H
1"=10' V

SHEET 14 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	67
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

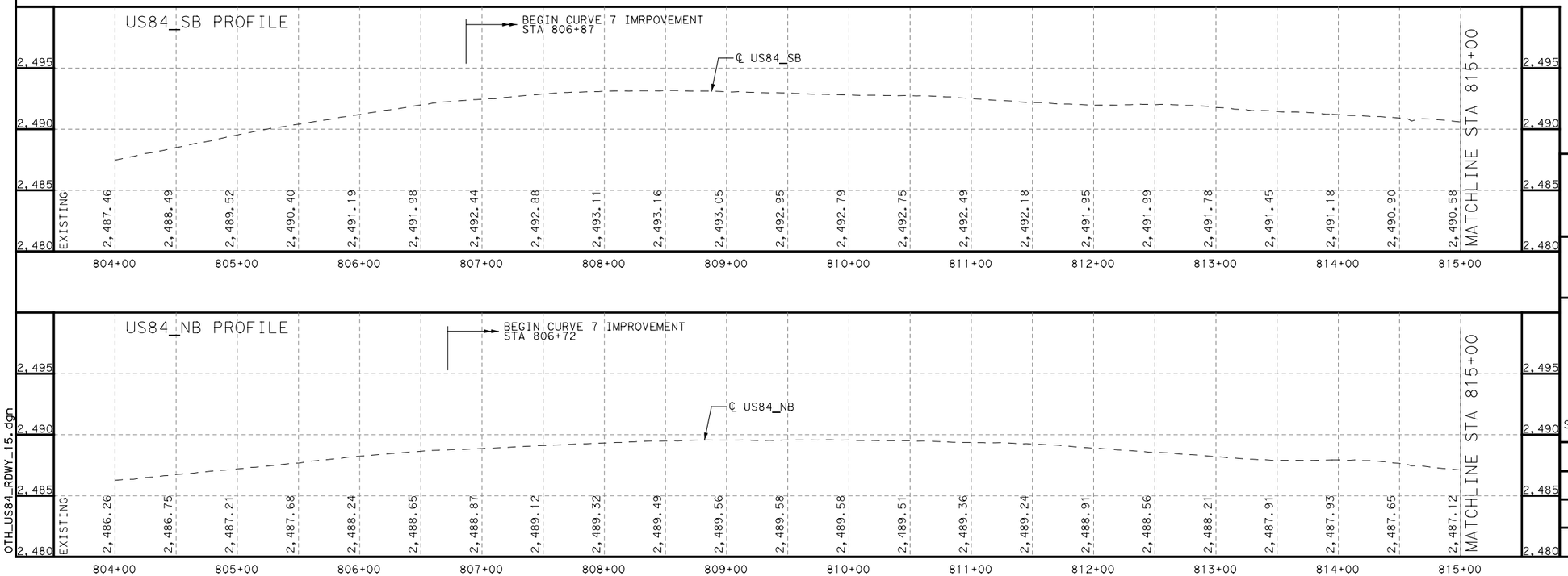
4/26/2021 3:44:25 PM

US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB7	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	806+87	-2.0%	806+87	-2.0%
END TRANSITION	810+86	-5.8%	810+86	5.8%
BEGIN TRANSITION	819+81	-5.8%	819+81	5.8%
END TRANSITION	822+92	-2.0%	822+92	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB7	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	806+72	-2.0%	806+72	-2.0%
END TRANSITION	810+61	-5.8%	810+61	5.8%
BEGIN TRANSITION	819+69	-5.8%	819+69	5.8%
END TRANSITION	822+75	-2.0%	822+75	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	RFD TY 1	18 LF		
2	PERM SEEDING	480 SY		N/A
3	RFD TY 1	18 LF		
4	PERM SEEDING	404 SY		N/A
5	PERM SEEDING	344 SY		N/A
6	RFD TY 1	18 LF		
7	PERM SEEDING	53 SY		N/A
8	SCF	68 LF		
9	PERM SEEDING	2013 SY		N/A
10	SCF	773 LF		



50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
- RUNOFF FLOW
- # — EROSION CONTROL MEASURE ID
- RFD1 — TYPE 1 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- EROSION CONTROL LOG

NOTES:

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2. SEE SUPERELEVATION TABLES SHEETS FOR ADDITIONAL INFORMATION.
3. SEE DRIVEWAY AND CROSSOVER DETAIL SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
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4/26/2021

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PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 15 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	68
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_ROWY_15.dgn

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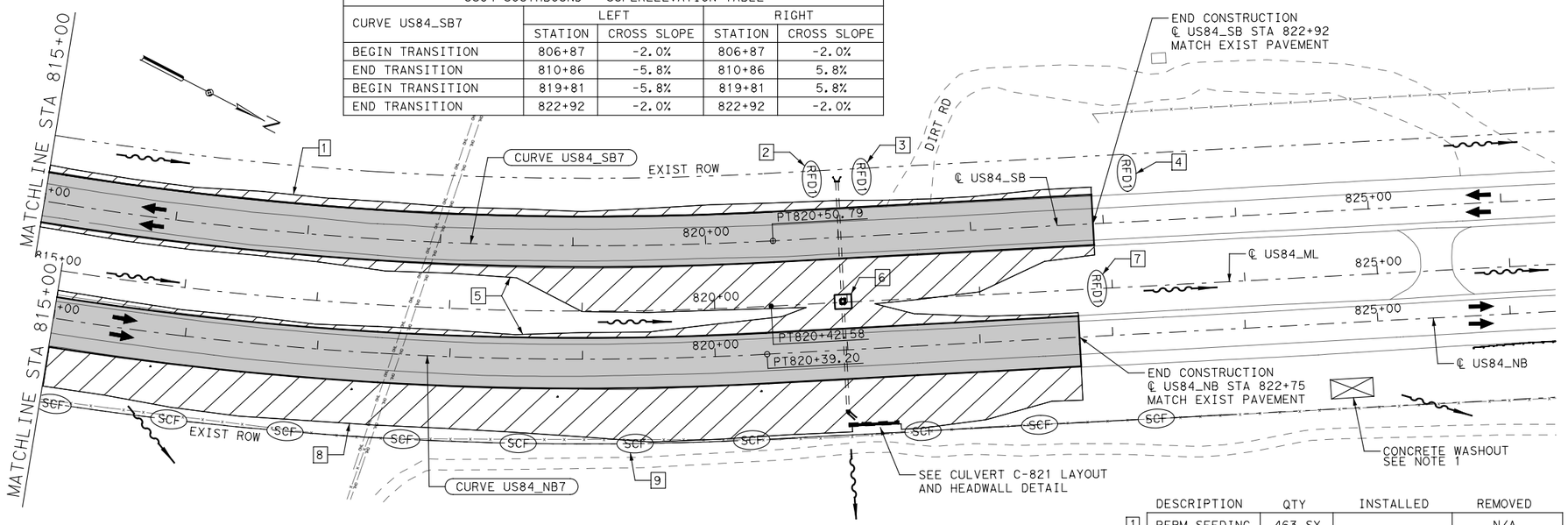
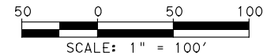
US84 SOUTHBOUND - SUPERELEVATION TABLE				
CURVE US84_SB7	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	806+87	-2.0%	806+87	-2.0%
END TRANSITION	810+86	-5.8%	810+86	5.8%
BEGIN TRANSITION	819+81	-5.8%	819+81	5.8%
END TRANSITION	822+92	-2.0%	822+92	-2.0%



US84 NORTHBOUND - SUPERELEVATION TABLE				
CURVE US84_NB7	LEFT		RIGHT	
	STATION	CROSS SLOPE	STATION	CROSS SLOPE
BEGIN TRANSITION	806+72	-2.0%	806+72	-2.0%
END TRANSITION	810+61	-5.8%	810+61	5.8%
BEGIN TRANSITION	819+69	-5.8%	819+69	5.8%
END TRANSITION	822+75	-2.0%	822+75	-2.0%

	DESCRIPTION	QTY	INSTALLED	REMOVED
1	PERM SEEDING	463 SY		N/A
2	RFD TY 1	18 LF		
3	RFD TY 1	18 LF		
4	RFD TY 1	18 LF		
5	PERM SEEDING	2117 SY		N/A
6	ECL	52 LF		
7	RFD TY 1	18 LF		
8	PERM SEEDING	3006 SY		N/A
9	SCF	787 LF		



LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- ROADWAY IMPROVEMENT LIMITS
- CROSSOVER/DRIVEWAY RECONSTRUCTION
- MILL AND OVERLAY LIMITS
- DISTURBED AREA TO BE SEEDED
- CO/DRW ID — CROSSOVER/DRIVEWAY ID
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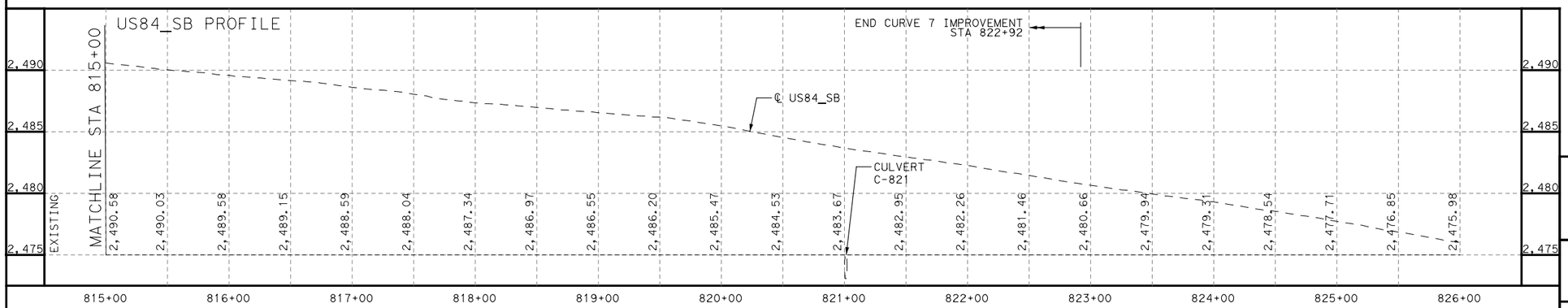
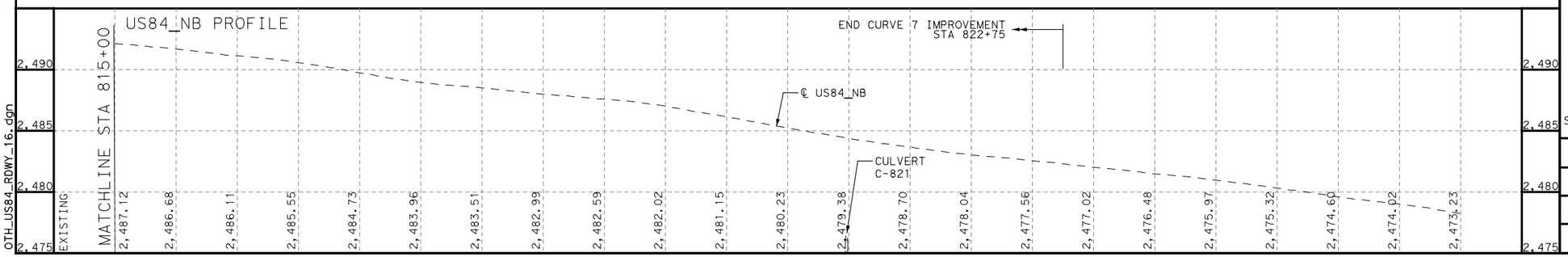
4/26/2021





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US 84

PLAN & PROFILE AND SW3P SITE PLAN

SCALE: 1"=100' H
1"=10' V

SHEET 16 OF 16

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	69
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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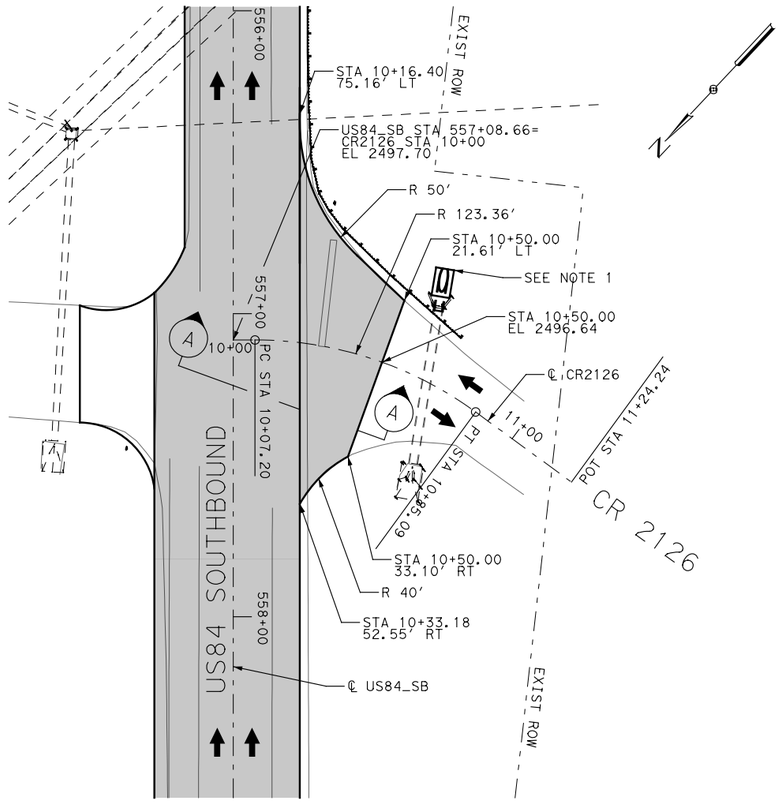


Beginning chain CR2126 description

Point 50 X 1,194,696.4939 Y 7,005,875.7658 Sta 10+00.00

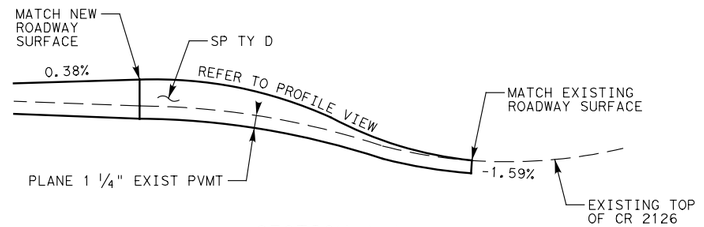
Course from 50 to PC CR21261 S 35° 45′ 21.92" W Dist 7.1994

	Curve Data				
Curve CR21261					
P.I. Station	10+47.49	X	1,194,668.7431	Y	7,005,837.2261
Delta =	36° 10′ 36.31" (RT)				
Degree =	46° 26′ 48.67"				
Tangent =	40.2918				
Length =	77.8885				
Radius =	123.3577				
External =	6.4135				
Long Chord =	76.6011				
Mid. Ord. =	6.0965				
P.C. Station	10+07.20	X	1,194,692.2871	Y	7,005,869.9234
P.T. Station	10+85.09	X	1,194,630.4379	Y	7,005,824.7303
C.C.		X	1,194,592.1808	Y	7,005,942.0057
Back = S	35° 45′ 21.92" W				
Ahead = S	71° 55′ 58.23" W				
Chord Bear = S	53° 50′ 40.08" W				

Course from PT CR21261 to 51 S 71° 55′ 58.23" W Dist 39.1566

Point 51 X 1,194,593.2120 Y 7,005,812.5866 Sta 11+24.24

Ending chain CR2126 description



SECTION A-A

LEGEND

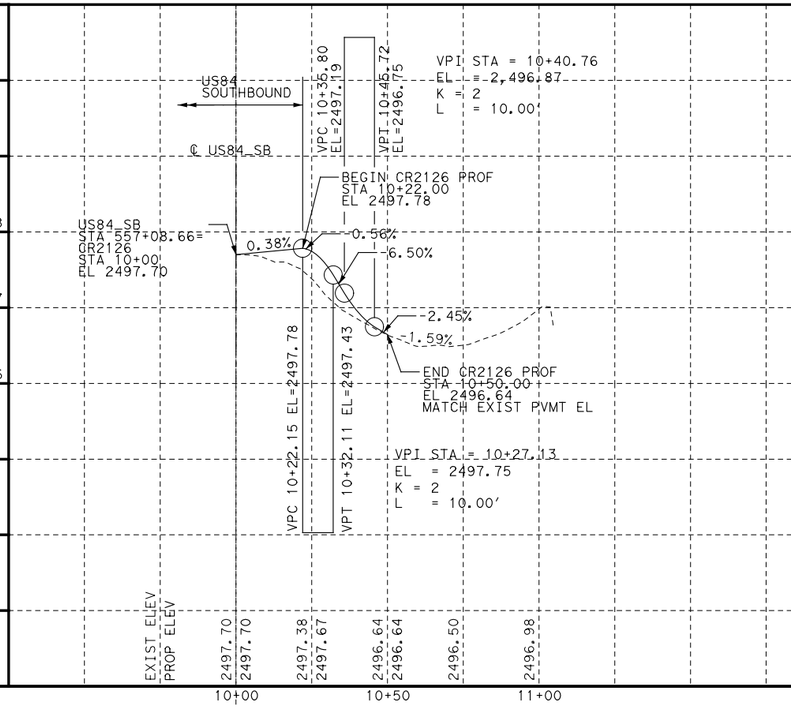
DIRECTION OF TRAVEL

EXIST ROW

ROADWAY IMPROVEMENT LIMITS

NOTES:

1. SEE METAL BEAM GUARD FENCE LAYOUT SHEET 2 OF 2 FOR DETAIL ON EXTENSION OF EXIST CULVERT.
2. CARE SHALL BE TAKEN TO AVOID WORKING IN OR OCCUPYING RAILROAD ROW AT ALL TIMES.
3. MATCH EXISTING CROSS SLOPE FOR CR 2126.



CR 2126 SUMMARY

BEGIN STATION	10+22.00
END STATION	10+50.00
AREA	228 SY
EMBANKMENT	5 CY
SP-D	18 TON

* FOR CONTRACTOR'S INFORMATION ONLY. QUANTITIES ARE ALREADY INCLUDED IN SUMMARY OF QUANTITIES AND SUMMARY OF EARTHWORK SHEETS.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/30/2021

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US 84
CR 2126
PLAN & PROFILE

SCALE: 1"=50' H
1"=2' V

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	70
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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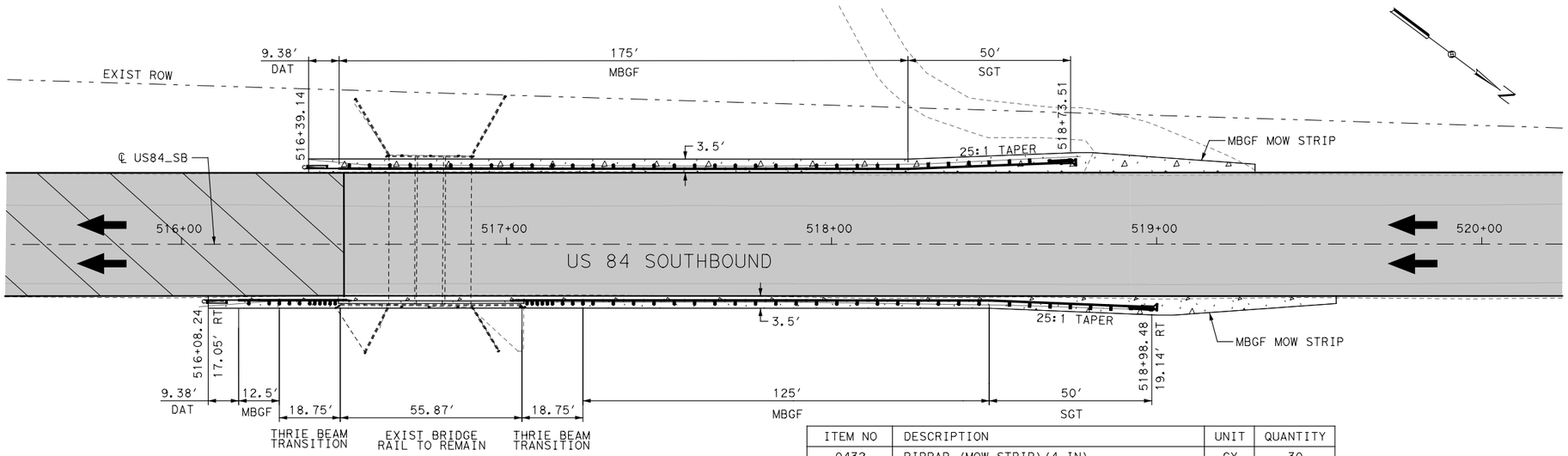
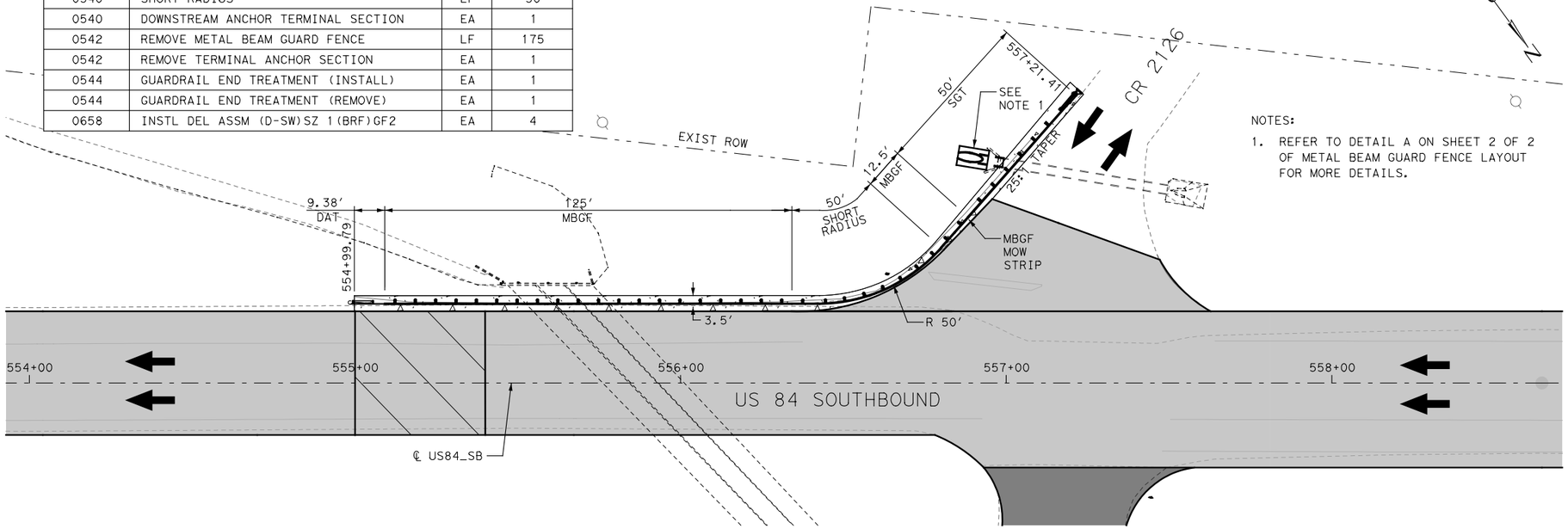
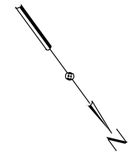


ITEM NO	DESCRIPTION	UNIT	QUANTITY
0432	RIPRAP (MOW STRIP)(4 IN)	CY	30
0540	MTL W-BEAM GD FEN (TIM POST)	LF	287.5
0540	MTL W-BEAM GD FEN (STEEL POST)	LF	25
0540	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
0540	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2
0542	REMOVE METAL BEAM GUARD FENCE	LF	312.5
0542	REMOVE TERMINAL ANCHOR SECTION	EA	2
0542	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	2
0544	GUARDRAIL END TREATMENT (INSTALL)	EA	2
0544	GUARDRAIL END TREATMENT (REMOVE)	EA	2
0658	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	5
0658	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	5

ITEM NO	DESCRIPTION	UNIT	QUANTITY
0432	RIPRAP (MOW STRIP)(4 IN)	CY	14
0540	MTL W-BEAM GD FEN (TIM POST)	LF	112.5
0540	MTL W-BEAM GD FEN (STEEL POST)	LF	25
0540	SHORT RADIUS	LF	50
0540	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
0542	REMOVE METAL BEAM GUARD FENCE	LF	175
0542	REMOVE TERMINAL ANCHOR SECTION	EA	1
0544	GUARDRAIL END TREATMENT (INSTALL)	EA	1
0544	GUARDRAIL END TREATMENT (REMOVE)	EA	1
0658	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	4





NOTES:

1. REFER TO DETAIL A ON SHEET 2 OF 2 OF METAL BEAM GUARD FENCE LAYOUT FOR MORE DETAILS.

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METAL BEAM GUARD FENCE LAYOUT

SCALE: 1"=40′ SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	71
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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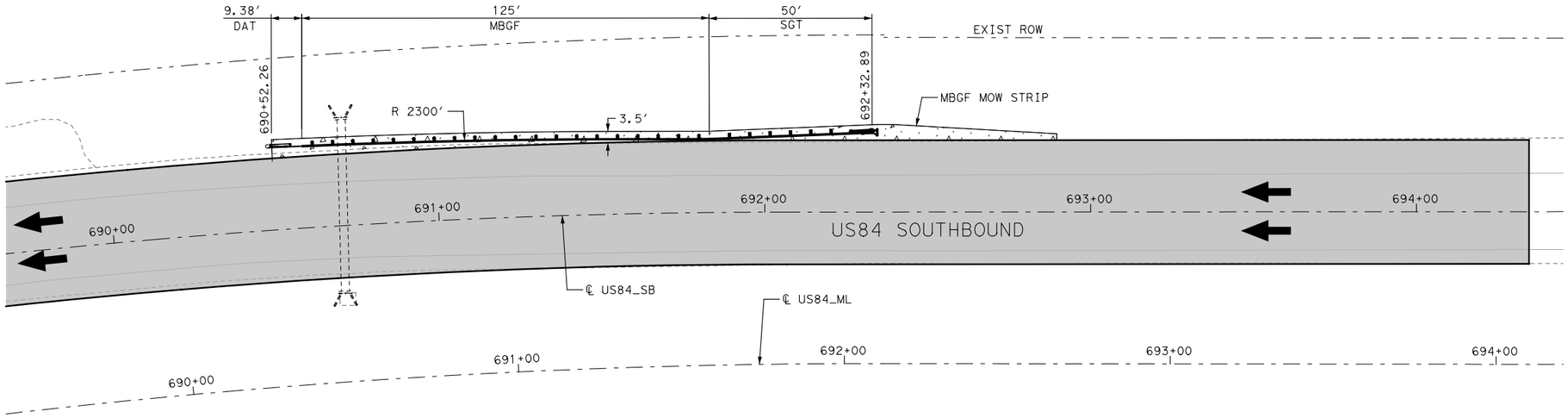
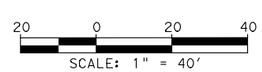
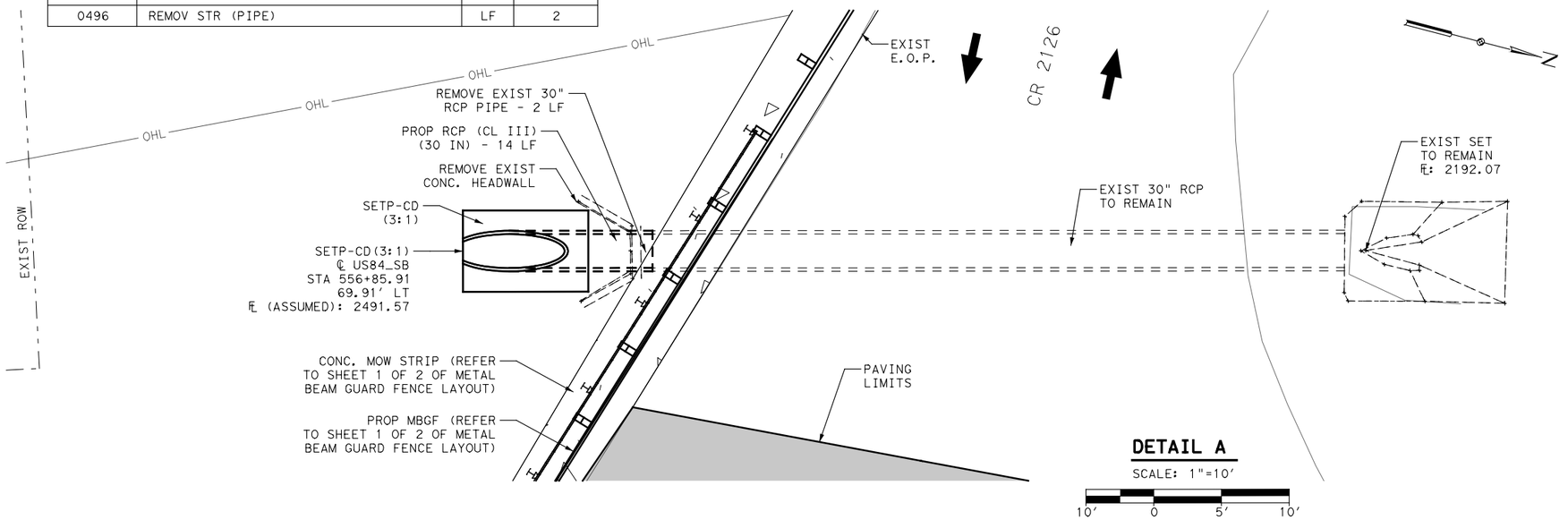
ITEM NO	DESCRIPTION	UNIT	QUANTITY
0432	RIPRAP (MOW STRIP)(4 IN)	CY	12
0540	MTL W-BEAM GD FEN (TIM POST)	LF	125
0540	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
0542	REMOVE METAL BEAM GUARD FENCE	LF	125
0542	REMOVE TERMINAL ANCHOR SECTION	EA	1
0544	GUARDRAIL END TREATMENT (INSTALL)	EA	1
0544	GUARDRAIL END TREATMENT (REMOVE)	EA	1
0658	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	4





ITEM NO	DESCRIPTION	UNIT	QUANTITY
0104	REMOVING CONC (HEADWALL)	CY	1
0464	RC PIPE (CL III)(30 IN)	LF	14
0467	SET (TY II)(30 IN)(RCP)(3:1)(C)	EA	1
0496	REMOV STR (PIPE)	LF	2



DETAIL A

SCALE: 1"=10′

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METAL BEAM GUARD FENCE LAYOUT

SCALE: 1"=40′ SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	72
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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US 84 NORTHBOUND

CROSS SLOPE US 84 NORTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE NB 1	407+23	-2.00%	-2.00%	BEGIN TRANSITION
	407+40	-2.14%	-1.65%	
	407+60	-2.30%	-1.24%	
	407+80	-2.46%	-0.83%	
	408+00	-2.62%	-0.42%	
	408+20	-2.78%	-0.01%	
	408+40	-2.94%	0.40%	
	408+60	-3.11%	0.81%	
	408+80	-3.27%	1.22%	
	409+00	-3.43%	1.63%	
	409+20	-3.59%	2.04%	
	409+40	-3.75%	2.45%	
	409+60	-3.91%	2.86%	
	409+80	-4.08%	3.27%	
	410+00	-4.24%	3.68%	
	410+20	-4.40%	4.09%	
	410+40	-4.56%	4.50%	
	410+45	-4.60%	4.60%	END TRANSITION
	424+03	-4.60%	4.60%	BEGIN TRANSITION
	424+20	-4.45%	4.21%	
	424+40	-4.27%	3.76%	
	424+60	-4.09%	3.30%	
	424+80	-3.91%	2.84%	
	425+00	-3.73%	2.38%	
	425+20	-3.55%	1.93%	
	425+40	-3.37%	1.47%	
	425+60	-3.19%	1.01%	
	425+80	-3.01%	0.56%	
	426+00	-2.83%	0.10%	
	426+20	-2.65%	-0.36%	
	426+40	-2.47%	-0.81%	
	426+60	-2.29%	-1.27%	
	426+80	-2.11%	-1.73%	
	426+92	-2.00%	-2.00%	END TRANSITION
CURVE NB 2	499+48	-2.00%	-2.00%	BEGIN TRANSITION
	499+60	-1.71%	-2.08%	
	499+80	-1.24%	-2.22%	
	500+00	-0.76%	-2.35%	
	500+20	-0.28%	-2.49%	
	500+40	0.19%	-2.63%	
	500+60	0.67%	-2.76%	
	500+80	1.15%	-2.90%	
	501+00	1.62%	-3.03%	
	501+20	2.10%	-3.17%	
	501+40	2.58%	-3.31%	
	501+60	3.05%	-3.44%	
	501+80	3.53%	-3.58%	
	501+83	3.60%	-3.60%	END TRANSITION
	508+07	3.60%	-3.60%	BEGIN TRANSITION
	508+20	3.37%	-3.53%	
	508+40	3.00%	-3.43%	
	508+60	2.64%	-3.33%	
	508+80	2.28%	-3.22%	
	509+00	1.92%	-3.12%	
	509+20	1.56%	-3.02%	
	509+40	1.20%	-2.91%	
	509+60	0.84%	-2.81%	
	509+80	0.47%	-2.71%	
	510+00	0.11%	-2.60%	
	510+20	-0.25%	-2.50%	
	510+40	-0.61%	-2.40%	
	510+60	-0.97%	-2.29%	
	510+80	-1.33%	-2.19%	
	511+00	-1.69%	-2.09%	
	511+17	-2.00%	-2.00%	END TRANSITION

CROSS SLOPE US 84 NORTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE NB 3	518+18	-2.00%	-2.00%	BEGIN TRANSITION
	518+20	-2.02%	-1.96%	
	518+40	-2.23%	-1.51%	
	518+60	-2.44%	-1.06%	
	518+80	-2.65%	-0.61%	
	519+00	-2.86%	-0.16%	
	519+20	-3.07%	0.28%	
	519+40	-3.27%	0.73%	
	519+60	-3.48%	1.18%	
	519+80	-3.69%	1.63%	
	520+00	-3.90%	2.07%	
	520+20	-4.11%	2.52%	
	520+40	-4.32%	2.97%	
	520+60	-4.53%	3.42%	
	520+80	-4.74%	3.87%	
	521+00	-4.95%	4.31%	
	521+20	-5.16%	4.76%	
	521+40	-5.36%	5.21%	
	521+53	-5.50%	5.50%	END TRANSITION
	525+67	-5.50%	5.50%	BEGIN TRANSITION
	525+80	-5.36%	5.20%	
	526+00	-5.15%	4.74%	
	526+20	-4.93%	4.28%	
	526+40	-4.72%	3.83%	
	526+60	-4.50%	3.37%	
	526+80	-4.29%	2.91%	
	527+00	-4.08%	2.45%	
	527+20	-3.86%	1.99%	
	527+40	-3.65%	1.53%	
	527+60	-3.43%	1.07%	
	527+80	-3.22%	0.61%	
	528+00	-3.01%	0.16%	
	528+20	-2.79%	-0.30%	
	528+40	-2.58%	-0.76%	
	528+60	-2.36%	-1.22%	
	528+80	-2.15%	-1.68%	
	528+94	-2.00%	-2.00%	END TRANSITION
CURVE NB 4	574+75	-2.00%	-2.00%	BEGIN TRANSITION
	574+80	-1.90%	-2.03%	
	575+00	-1.48%	-2.14%	
	575+20	-1.06%	-2.24%	
	575+40	-0.64%	-2.35%	
	575+60	-0.22%	-2.46%	
	575+80	0.20%	-2.57%	
	576+00	0.62%	-2.68%	
	576+20	1.03%	-2.79%	
	576+40	1.45%	-2.90%	
	576+60	1.87%	-3.00%	
	576+80	2.29%	-3.11%	
	577+00	2.71%	-3.22%	
	577+20	3.13%	-3.33%	
	577+33	3.40%	-3.40%	END TRANSITION
	579+28	3.40%	-3.40%	BEGIN TRANSITION
	579+40	3.14%	-3.33%	
	579+60	2.70%	-3.22%	
	579+80	2.26%	-3.11%	
	580+00	1.83%	-2.99%	
	580+20	1.39%	-2.88%	
	580+40	0.95%	-2.77%	
	580+60	0.51%	-2.65%	
	580+80	0.08%	-2.54%	
	581+00	-0.36%	-2.43%	
	581+20	-0.80%	-2.31%	
	581+40	-1.23%	-2.20%	
	581+60	-1.67%	-2.09%	
	581+75	-2.00%	-2.00%	END TRANSITION
CURVE NB 5	649+39	-2.00%	-2.00%	BEGIN TRANSITION
	649+40	-1.98%	-2.00%	
	649+60	-1.65%	-2.00%	
	649+80	-1.31%	-2.00%	
	650+00	-0.98%	-2.00%	
	650+20	-0.64%	-2.00%	
	650+40	-0.31%	-2.00%	
	650+60	0.03%	-2.00%	
	650+80	0.36%	-2.00%	
	651+00	0.69%	-2.00%	
	651+20	1.03%	-2.00%	
	651+40	1.36%	-2.00%	
	651+60	1.70%	-2.00%	
	651+78	2.00%	-2.00%	END TRANSITION
	653+57	2.00%	-2.00%	BEGIN TRANSITION
	653+60	1.92%	-2.00%	
	653+80	1.42%	-2.00%	
	654+00	0.91%	-2.00%	
	654+20	0.41%	-2.00%	
	654+40	-0.10%	-2.00%	
	654+60	-0.61%	-2.00%	
	654+80	-1.11%	-2.00%	
	655+00	-1.62%	-2.00%	
	655+15	-2.00%	-2.00%	END TRANSITION

CROSS SLOPE US 84 NORTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE NB 6	674+10	-2.00%	-2.00%	BEGIN TRANSITION
	674+20	-1.74%	-2.13%	
	674+40	-1.23%	-2.38%	
	674+60	-0.71%	-2.64%	
	674+80	-0.19%	-2.89%	
	675+00	0.32%	-3.15%	
	675+20	0.84%	-3.40%	
	675+40	1.36%	-3.66%	
	675+60	1.87%	-3.91%	
	675+80	2.39%	-4.17%	
	676+00	2.91%	-4.42%	
	676+20	3.42%	-4.68%	
	676+40	3.94%	-4.93%	
	676+60	4.45%	-5.19%	
	676+80	4.97%	-5.44%	
	677+00	5.49%	-5.70%	
	677+16	5.90%	-5.90%	END TRANSITION
	691+29	5.90%	-5.90%	BEGIN TRANSITION
	691+40	5.66%	-5.78%	
	691+60	5.21%	-5.56%	
	691+80	4.77%	-5.34%	
	692+00	4.32%	-5.12%	
	692+20	3.88%	-4.90%	
	692+40	3.44%	-4.68%	
	692+60	2.99%	-4.46%	
	692+80	2.55%	-4.25%	
	693+00	2.11%	-4.03%	
	693+20	1.66%	-3.81%	
	693+40	1.22%	-3.59%	
	693+60	0.77%	-3.37%	
	693+80	0.33%	-3.15%	
	694+00	-0.11%	-2.93%	
	694+20	-0.56%	-2.71%	
	694+40	-1.00%	-2.49%	
	694+60	-1.45%	-2.27%	
	694+80	-1.89%	-2.05%	
	694+85	-2.00%	-2.00%	END TRANSITION
CURVE NB 7	806+72	-2.00%	-2.00%	BEGIN TRANSITION
	806+80	-2.08%	-1.84%	
	807+00	-2.27%	-1.44%	
	807+20	-2.47%	-1.04%	
	807+40	-2.66%	-0.64%	
	807+60	-2.86%	-0.24%	
	807+80	-3.06%	0.17%	
	808+00	-3.25%	0.57%	
	808+20	-3.45%	0.97%	
	808+40	-3.64%	1.37%	
	808+60	-3.84%	1.77%	
	808+80	-4.03%	2.17%	
	809+00	-4.23%	2.57%	
	809+20	-4.42%	2.97%	
	809+40	-4.62%	3.37%	
	809+60	-4.81%	3.77%	
	809+80	-5.01%	4.18%	
	810+00	-5.20%	4.58%	
	810+20	-5.40%	4.98%	
	810+40	-5.59%	5.38%	
	810+60	-5.79%	5.78%	
	810+61	-5.80%	5.80%	END TRANSITION
	819+69	-5.80%	5.80%	BEGIN TRANSITION
	819+80	-5.66%	5.52%	
	820+00	-5.42%	5.01%	
	820+20	-5.17%	4.50%	
	820+40	-4.92%	3.99%	
	820+60	-4.67%	3.48%	
	820+80	-4.42%	2.97%	
	821+00	-4.17%	2.46%	
	821+20	-3.92%	1.95%	
	821+40	-3.68%	1.44%	
	821+60	-3.43%	0.93%	
	821+80	-3.18%	0.42%	
	822+00	-2.93%	-0.09%	
	822+20	-2.68%	-0.60%	
	822+40	-2.43%	-1.11%	
	822+60	-2.19%	-1.62%	
	822+75	-2.00%	-2.00%	END TRANSITION

ABBREVIATIONS

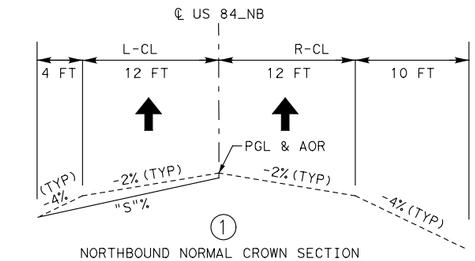
PGL	PROFILE GRADE LINE
AOR	AXIS OF ROTATION
L-CL	LEFT OF CENTERLINE
R-CL	RIGHT OF CENTERLINE

SUPERELEVATION TRANSITION DETAIL

LEGEND

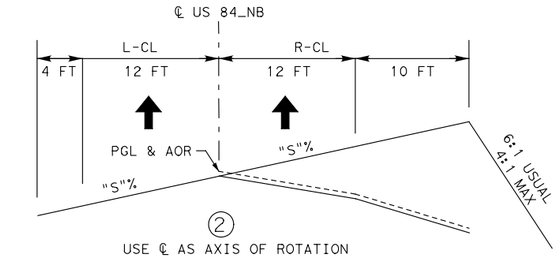
---------- EXIST SURFACE

———— PROP SURFACE



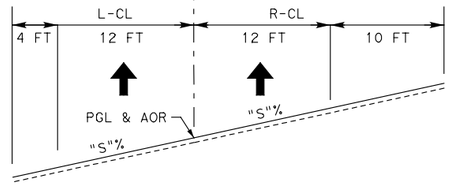
①

NORTHBOUND NORMAL CROWN SECTION
MILL LOWER SHLDR AND LANE IN SINGLE PASS TO ACHIEVE SUPERELEVATION "S"
(PAID FOR BY 354-6023)



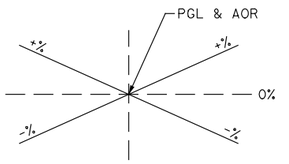
②

USE ℄ AS AXIS OF ROTATION
MILL HIGHER SHLDR AND LANE IN TWO PASSES TO REMOVE EXIST PFC LAYER AND TO MEET MIN LEVEL-UP THICKNESS
(PAID FOR BY 354-6051 & 354-6053)
LEVEL-UP HIGHER SHLDR AND LANE TO ACHIEVE SUPERELEVATION "S"



③

PLACE FINAL SURFACE OVERLAY OVER ENTIRE ROADWAY WIDTH



PAVEMENT CROSS SLOPE SIGN CONVENTION

4/26/2021

NOTES:

1. SEE SUPERELEVATION TABLE FOR SUPERELEVATION ("S") CROSS SLOPE FOR EACH CURVE.
2. MAINTAIN EXISTING ELEVATION AT ℄ TO MATCH PGL.
3. SEE TYPICAL SECTIONS AND SEQUENCE OF WORK FOR ADDITIONAL INFORMATION.
4. PROVIDE LINEAR CROSS SLOPE TRANSITIONS.

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

© 2021

US 84

SUPERELEVATION TABLES

SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	73
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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US 84 SOUTHBOUND

CROSS SLOPE US 84 SOUTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE SB 1	405+88	-2.00%	-2.00%	BEGIN TRANSITION
	406+00	-2.07%	-1.83%	
	406+20	-2.18%	-1.55%	
	406+40	-2.29%	-1.27%	
	406+60	-2.40%	-0.99%	
	406+80	-2.51%	-0.71%	
	407+00	-2.62%	-0.42%	
	407+20	-2.73%	-0.14%	
	407+40	-2.84%	0.14%	
	407+60	-2.95%	0.42%	
	407+80	-3.06%	0.70%	
	408+00	-3.18%	0.98%	
	408+20	-3.29%	1.26%	
	408+40	-3.40%	1.55%	
	408+60	-3.51%	1.83%	
	408+80	-3.62%	2.11%	
	409+00	-3.73%	2.39%	
	409+20	-3.84%	2.67%	
	409+40	-3.95%	2.95%	
	409+60	-4.06%	3.23%	
	409+80	-4.17%	3.52%	
	410+00	-4.28%	3.80%	
	410+20	-4.39%	4.08%	
	410+40	-4.51%	4.36%	
	410+57	-4.60%	4.60%	END TRANSITION
	423+73	-4.60%	4.60%	BEGIN TRANSITION
	423+80	-4.55%	4.46%	
	424+00	-4.39%	4.08%	
	424+20	-4.24%	3.69%	
	424+40	-4.09%	3.30%	
	424+60	-3.93%	2.91%	
	424+80	-3.78%	2.52%	
	425+00	-3.63%	2.13%	
	425+20	-3.48%	1.75%	
	425+40	-3.32%	1.36%	
	425+60	-3.17%	0.97%	
	425+80	-3.02%	0.58%	
	426+00	-2.86%	0.19%	
	426+20	-2.71%	-0.19%	
	426+40	-2.56%	-0.58%	
	426+60	-2.41%	-0.97%	
	426+80	-2.25%	-1.36%	
	427+00	-2.10%	-1.75%	
	427+13	-2.00%	-2.00%	END TRANSITION
CURVE SB 2	503+82	-2.00%	-2.00%	BEGIN TRANSITION
	504+00	-1.61%	-2.18%	
	504+20	-1.18%	-2.39%	
	504+40	-0.74%	-2.59%	
	504+60	-0.31%	-2.79%	
	504+80	0.13%	-2.99%	
	505+00	0.56%	-3.20%	
	505+20	0.99%	-3.40%	
	505+40	1.43%	-3.60%	
	505+60	1.86%	-3.81%	
	505+80	2.29%	-4.01%	
	506+00	2.73%	-4.21%	
	506+20	3.16%	-4.41%	
	506+40	3.60%	-4.62%	
	506+60	4.03%	-4.82%	
	506+80	4.46%	-5.02%	
	507+00	4.90%	-5.22%	
	507+20	5.33%	-5.43%	
	507+37	5.70%	-5.60%	END TRANSITION
	511+11	5.70%	-5.60%	BEGIN TRANSITION
	511+20	5.48%	-5.50%	
	511+40	4.98%	-5.27%	
	511+60	4.49%	-5.03%	
	511+80	4.00%	-4.80%	
	512+00	3.50%	-4.57%	
	512+20	3.01%	-4.34%	
	512+40	2.52%	-4.11%	
	512+60	2.02%	-3.88%	
	512+80	1.53%	-3.65%	
	513+00	1.04%	-3.42%	
	513+20	0.54%	-3.19%	
	513+40	0.05%	-2.96%	
	513+60	-0.45%	-2.73%	
	513+80	-0.94%	-2.50%	
	514+00	-1.43%	-2.27%	
	514+20	-1.93%	-2.03%	
	514+23	-2.00%	-2.00%	END TRANSITION

CROSS SLOPE US 84 SOUTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE SB 3	516+50	-2.00%	-2.00%	BEGIN TRANSITION
	516+60	-2.08%	-1.84%	
	516+80	-2.23%	-1.51%	
	517+00	-2.39%	-1.19%	
	517+20	-2.54%	-0.86%	
	517+40	-2.69%	-0.54%	
	517+60	-2.85%	-0.21%	
	517+80	-3.00%	0.12%	
	518+00	-3.16%	0.44%	
	518+20	-3.31%	0.77%	
	518+40	-3.46%	1.09%	
	518+60	-3.62%	1.42%	
	518+80	-3.77%	1.74%	
	519+00	-3.93%	2.07%	
	519+20	-4.08%	2.39%	
	519+40	-4.24%	2.72%	
	519+60	-4.39%	3.04%	
	519+80	-4.54%	3.37%	
	520+00	-4.70%	3.70%	
	520+20	-4.85%	4.02%	
	520+40	-5.01%	4.35%	
	520+60	-5.16%	4.67%	
	520+80	-5.31%	5.00%	
	521+00	-5.47%	5.32%	
	521+17	-5.60%	5.60%	END TRANSITION
	526+05	-5.60%	5.60%	BEGIN TRANSITION
	526+20	-5.44%	5.26%	
	526+40	-5.23%	4.82%	
	526+60	-5.02%	4.37%	
	526+80	-4.81%	3.92%	
	527+00	-4.59%	3.48%	
	527+20	-4.38%	3.03%	
	527+40	-4.17%	2.58%	
	527+60	-3.96%	2.14%	
	527+80	-3.75%	1.69%	
	528+00	-3.54%	1.24%	
	528+20	-3.32%	0.79%	
	528+40	-3.11%	0.35%	
	528+60	-2.90%	-0.10%	
	528+80	-2.69%	-0.55%	
	529+00	-2.48%	-0.99%	
	529+20	-2.26%	-1.44%	
	529+40	-2.05%	-1.89%	
	529+45	-2.00%	-2.00%	END TRANSITION
CURVE SB 4	542+00	-2.00%	-2.00%	BEGIN TRANSITION
	542+20	-2.00%	-1.69%	
	542+40	-2.00%	-1.38%	
	542+60	-2.00%	-1.07%	
	542+80	-2.00%	-0.75%	
	543+00	-2.00%	-0.44%	
	543+20	-2.00%	-0.13%	
	543+40	-2.00%	0.18%	
	543+60	-2.00%	0.49%	
	543+80	-2.00%	0.80%	
	544+00	-2.00%	1.11%	
	544+20	-2.00%	1.42%	
	544+40	-2.00%	1.74%	
	544+57	-2.00%	2.00%	END TRANSITION
	551+39	-2.00%	2.00%	BEGIN TRANSITION
	551+40	-2.00%	1.99%	
	551+60	-2.00%	1.77%	
	551+80	-2.00%	1.55%	
	552+00	-2.00%	1.32%	
	552+20	-2.00%	1.10%	
	552+40	-2.00%	0.88%	
	552+60	-2.00%	0.66%	
	552+80	-2.00%	0.44%	
	553+00	-2.00%	0.22%	
	553+20	-2.00%	-0.01%	
	553+40	-2.00%	-0.23%	
	553+60	-2.00%	-0.45%	
	553+80	-2.00%	-0.67%	
	554+00	-2.00%	-0.89%	
	554+20	-2.00%	-1.11%	
	554+40	-2.00%	-1.34%	
	554+60	-2.00%	-1.56%	
	554+80	-2.00%	-1.78%	
	555+00	-2.00%	-2.00%	END TRANSITION
CURVE SB 5	555+40	-2.00%	-2.00%	BEGIN TRANSITION
	555+60	-1.72%	-2.06%	
	555+80	-1.43%	-2.12%	
	556+00	-1.15%	-2.18%	
	556+20	-0.87%	-2.24%	
	556+40	-0.59%	-2.30%	
	556+60	-0.30%	-2.37%	
	556+80	-0.02%	-2.43%	
	557+00	0.26%	-2.49%	
	557+20	0.54%	-2.55%	
	557+40	0.83%	-2.61%	
	557+60	1.11%	-2.67%	
	557+80	1.39%	-2.73%	
	558+00	1.67%	-2.79%	
	558+20	1.96%	-2.85%	
	558+40	2.24%	-2.91%	
	558+60	2.52%	-2.98%	
	558+80	2.80%	-3.04%	
	559+00	3.09%	-3.10%	
	559+01	3.10%	-3.10%	END TRANSITION

CROSS SLOPE US 84 SOUTHBOUND				
CURVE ID	STATION	L-CL	R-CL	DESCRIPTION
CURVE SB 5	565+24	3.10%	-3.10%	BEGIN TRANSITION
	565+40	2.67%	-3.01%	
	565+60	2.14%	-2.89%	
	565+80	1.60%	-2.78%	
	566+00	1.07%	-2.66%	
	566+20	0.54%	-2.55%	
	566+40	0.00%	-2.43%	
	566+60	-0.53%	-2.32%	
	566+80	-1.07%	-2.20%	
	567+00	-1.60%	-2.09%	
	567+15	-2.00%	-2.00%	END TRANSITION
CURVE SB 6	673+34	-2.00%	-2.00%	BEGIN TRANSITION
	673+40	-0.64%	-2.67%	
	673+60	-0.25%	-2.87%	
	673+80	0.15%	-3.06%	
	674+00	0.54%	-3.25%	
	674+20	0.94%	-3.45%	
	674+40	1.33%	-3.64%	
	674+60	1.72%	-3.84%	
	674+80	2.12%	-4.03%	
	675+00	2.51%	-4.23%	
	675+20	2.91%	-4.42%	
	675+40	3.30%	-4.62%	
	675+60	3.69%	-4.81%	
	675+80	4.09%	-5.01%	
	676+00	4.48%	-5.20%	
	676+20	4.88%	-5.39%	
	676+40	5.27%	-5.59%	
	676+60	5.66%	-5.78%	
	676+72	5.90%	-5.90%	END TRANSITION
	691+36	5.90%	-5.90%	BEGIN TRANSITION
	691+40	5.79%	-5.85%	
	691+60	5.27%	-5.59%	
	691+80	4.74%	-5.33%	
	692+00	4.21%	-5.07%	
	692+20	3.68%	-4.80%	
	692+40	3.15%	-4.54%	
	692+60	2.62%	-4.28%	
	692+80	2.10%	-4.02%	
	693+00	1.57%	-3.76%	
	693+20	1.04%	-3.50%	
	693+40	0.51%	-3.24%	
	693+60	-0.02%	-2.98%	
	693+80	-0.55%	-2.72%	
	694+00	-1.08%	-2.46%	
	694+20	-1.60%	-2.20%	
	694+35	-2.00%	-2.00%	END TRANSITION
CURVE SB 7	806+87	-2.00%	-2.00%	BEGIN TRANSITION
	807+00	-2.12%	-1.75%	
	807+20	-2.31%	-1.35%	
	807+40	-2.50%	-0.96%	
	807+60	-2.70%	-0.57%	
	807+80	-2.89%	-0.18%	
	808+00	-3.08%	0.21%	
	808+20	-3.27%	0.60%	
	808+40	-3.46%	0.99%	
	808+60	-3.65%	1.38%	
	808+80	-3.84%	1.77%	
	809+00	-4.03%	2.16%	
	809+20	-4.22%	2.55%	
	809+40	-4.41%	2.95%	
	809+60	-4.60%	3.34%	
	809+80	-4.79%	3.73%	
	810+00	-4.98%	4.12%	
	810+20	-5.17%	4.51%	
	810+40	-5.36%	4.90%	
	810+60	-5.55%	5.29%	
	810+80	-5.74%	5.68%	
	810+86	-5.80%	5.80%	END TRANSITION
	819+81	-5.80%	5.80%	BEGIN TRANSITION
	820+00	-5.57%	5.32%	
	820+20	-5.32%	4.82%	
	820+40	-5.08%	4.32%	
	820+60	-4.83%	3.82%	
	820+80	-4.59%	3.32%	
	821+00	-4.35%	2.82%	
	821+20	-4.10%	2.31%	
	821+40	-3.86%	1.81%	
	821+60	-3.61%	1.31%	
	821+80	-3.37%	0.81%	
	822+00	-3.12%	0.31%	
	822+20	-2.88%	-0.19%	
	822+40	-2.64%	-0.70%	
	822+60	-2.39%	-1.20%	
	822+80	-2.15%	-1.70%	
	822+92	-2.00%	-2.00%	END TRANSITION

ABBREVIATIONS

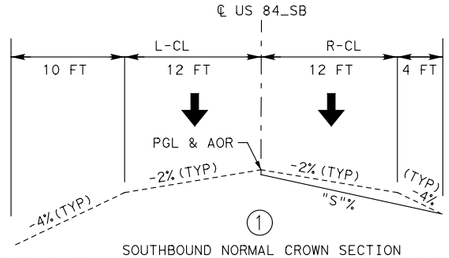
PGL	PROFILE GRADE LINE
AOR	AXIS OF ROTATION
L-CL	LEFT OF CENTERLINE
R-CL	RIGHT OF CENTERLINE

SUPERELEVATION TRANSITION DETAIL

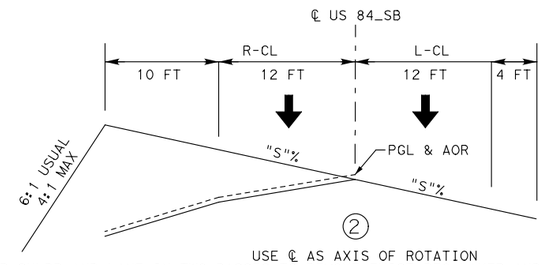
LEGEND

---------- EXIST SURFACE

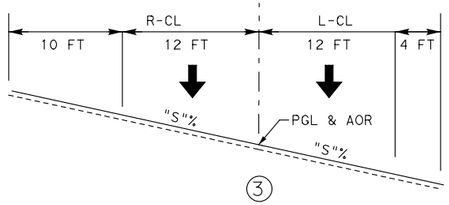
———— PROP SURFACE



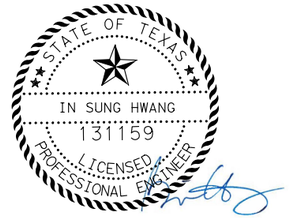
① SOUTHBOUND NORMAL CROWN SECTION
MILL LOWER SHLDR AND LANE IN SINGLE PASS TO ACHIEVE SUPERELEVATION "S"
(PAID FOR BY 354-6023)



② USE ℄ AS AXIS OF ROTATION
MILL HIGHER SHLDR AND LANE IN TWO PASSES TO REMOVE EXIST PFC LAYER AND TO MEET MIN LEVEL-UP THICKNESS
(PAID FOR BY 354-6051 & 354-6053)
LEVEL-UP HIGHER SHLDR AND LANE TO ACHIEVE SUPERELEVATION "S"

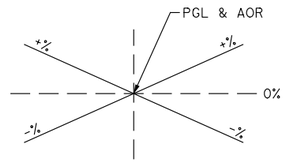


③ PLACE FINAL SURFACE OVERLAY OVER ENTIRE ROADWAY WIDTH



4/26/2021

NOTES:
1. SEE SUPERELEVATION TABLE FOR SUPERELEVATION ("S") CROSS SLOPE FOR EACH CURVE.
2. MAINTAIN EXISTING ELEVATION AT ℄ TO MATCH PGL.
3. SEE TYPICAL SECTIONS AND SEQUENCE OF WORK FOR ADDITIONAL INFORMATION.
4. PROVIDE LINEAR CROSS SLOPE TRANSITIONS.



PAVEMENT CROSS SLOPE SIGN CONVENTION

OTHON ENGINEERING
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US 84

SUPERELEVATION TABLES

SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO.
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK JMP	TEXAS	ABL	SCURRY	74
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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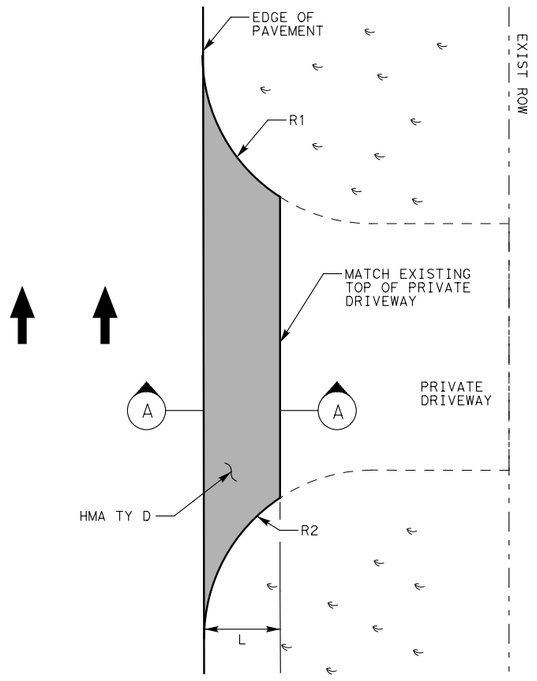
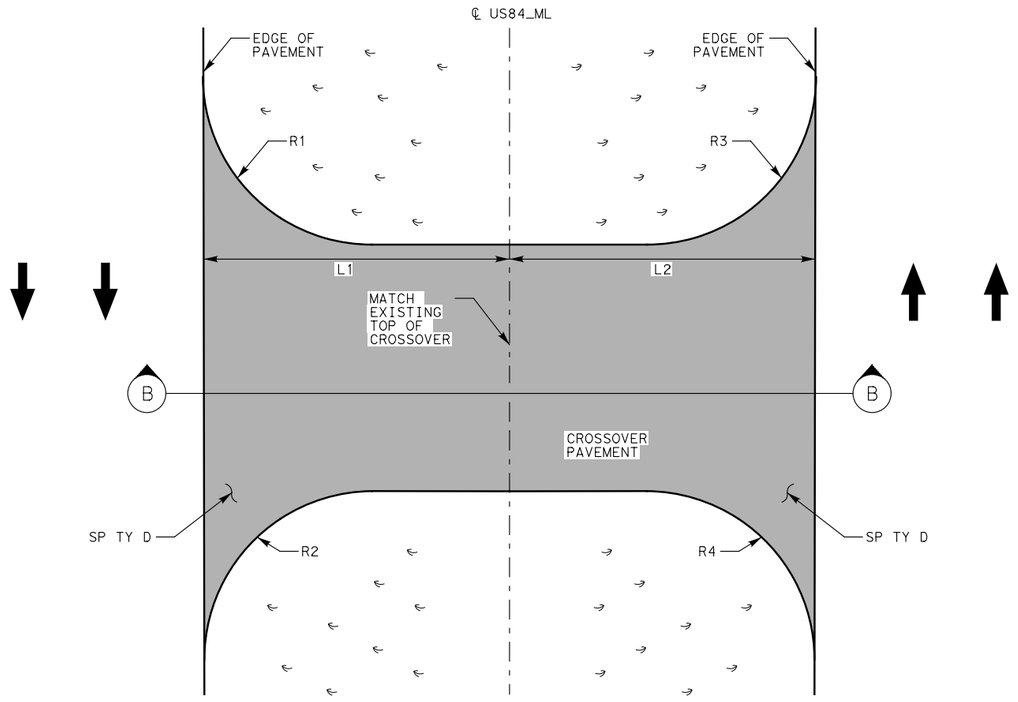
DRIVEWAY SUMMARY TABLE							
DRIVEWAY ID	ROADWAY	STATION	R1	R2	L	D	AREA
DRW 407N	US84_NB	407+74.85	25 FT	25 FT	37.9 FT	4 IN	81 SY
DRW 500N	US84_NB	500+58.73	25 FT	25 FT	20.7 FT	3 IN	114 SY
DRW 650N	US84_NB	650+38.86	25 FT	25 FT	28.4 FT	7 IN	82 SY
DRW 678S	US84_SB	678+14.38	40 FT	25 FT	21.4 FT	4 IN	193 SY
DRW 807N	US84_NB	807+52.13	50 FT	50 FT	43.9 FT	7 IN	240 SY

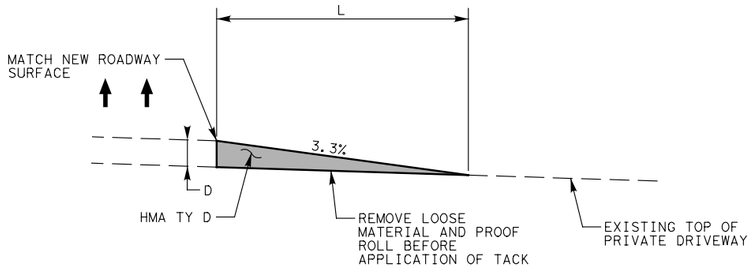
CROSSOVER SUMMARY TABLE											
CROSSOVER ID	ROADWAY	STATION	R1	R2	R3	R4	L1	L2	D1	D2	AREA
CO 407	US84_ML	407+74.85	35 FT	35 FT	25 FT	25 FT	32.3 FT	18.3 FT	4 IN	2 IN	209 SY
CO 500	US84_ML	500+58.73	25 FT	25 FT	25 FT	25 FT	-	19.5 FT	-	4 IN	95 SY
CO 524	US84_ML	524+15.24	25 FT	25 FT	25 FT	25 FT	39.6 FT	17.5 FT	6 IN	2 IN	177 SY
CO 542	US84_ML	542+96.35	25 FT	25 FT	25 FT	25 FT	30.1 FT	-	6 IN	-	91 SY
CO 546	US84_ML	546+29.16	25 FT	25 FT	25 FT	25 FT	31.2 FT	-	8 IN	-	90 SY
CO 557	US84_ML	557+16.57	25 FT	25 FT	25 FT	25 FT	24.6 FT	-	2 IN	-	118 SY
CO 650	US84_ML	650+38.86	25 FT	25 FT	25 FT	25 FT	-	20.3 FT	-	4 IN	75 SY



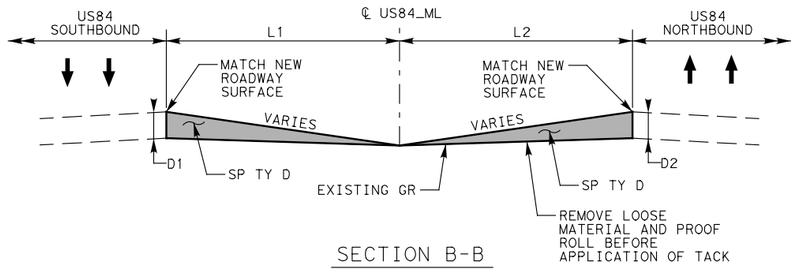
HMA DRIVEWAY PLAN VIEW



HMA CROSSOVER PLAN VIEW



SECTION A-A



SECTION B-B

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

4/26/2021

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DRIVEWAY & CROSSOVER DETAIL

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	75
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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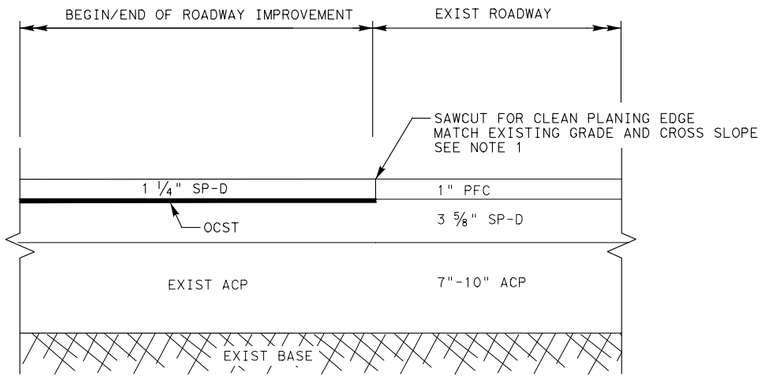

BUTT JOINT DETAIL
AT BEGIN/END OF ROADWAY IMPROVEMENT

N.T.S.

NOTE:

1. PAYMENT SHALL BE SUBSIDIARY TO VARIOUS OTHER BID ITEMS.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER

4/30/2021

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MISCELLANEOUS ROADWAY DETAIL

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	76
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_MISC_ROADWAY_DETAIL_01.dgn

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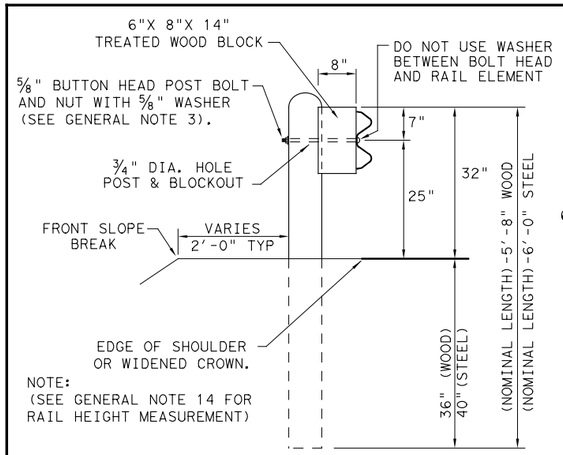
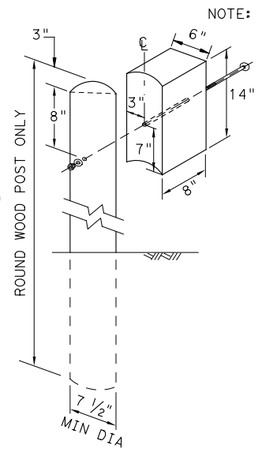
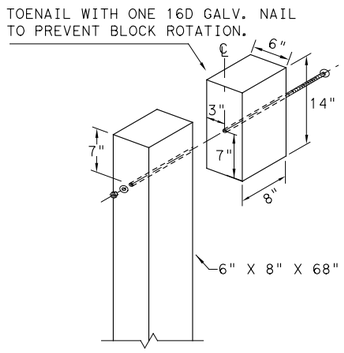


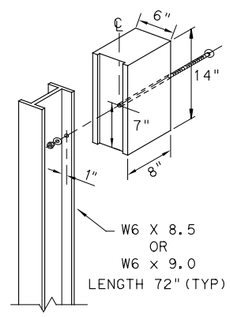
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

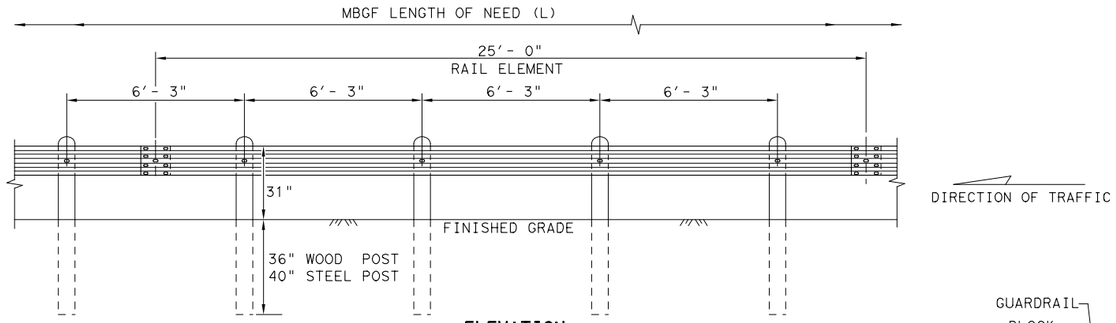


WOOD BLOCK TO RECTANGULAR WOOD POST



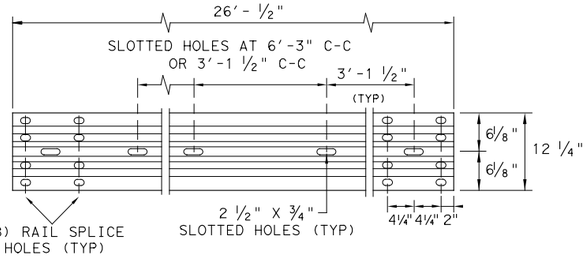
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



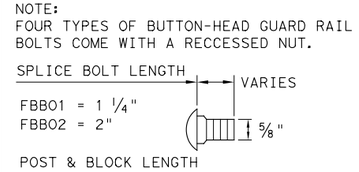
ELEVATION
MID-SPAN RAIL SPLICE

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



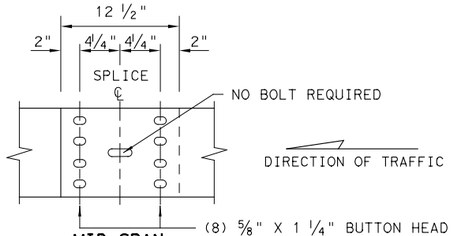
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



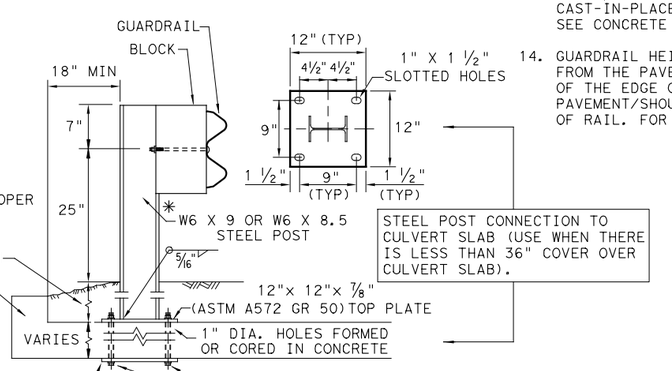
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0053	07	040	US 84	
	DIST	COUNTY		SHEET NO.	
	ABL	SCURRY		77	

DATE: 4/26/2021
FILE: gf3119.dgn

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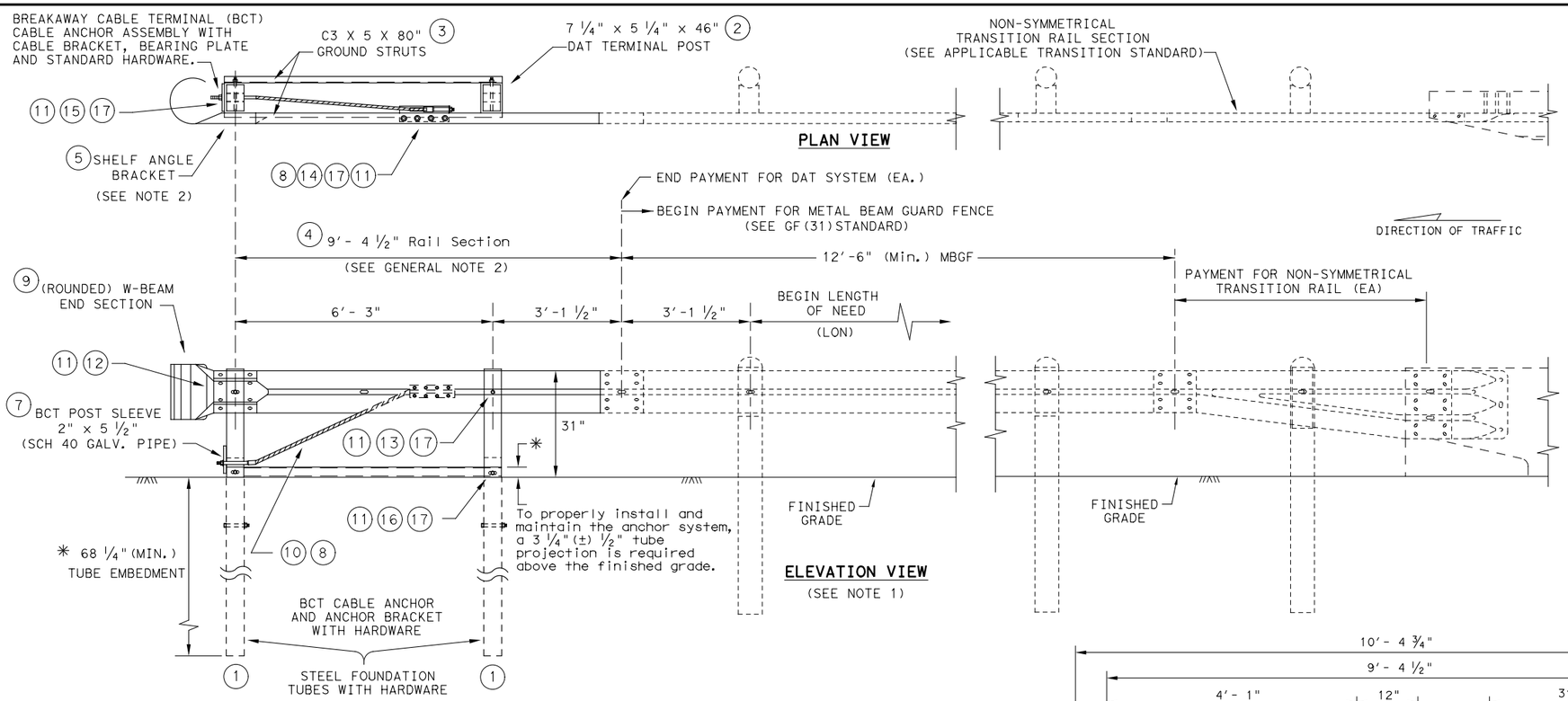
DATE: 4/26/2021
FILE: gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

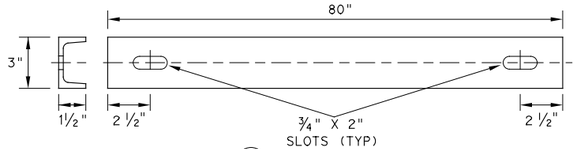
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

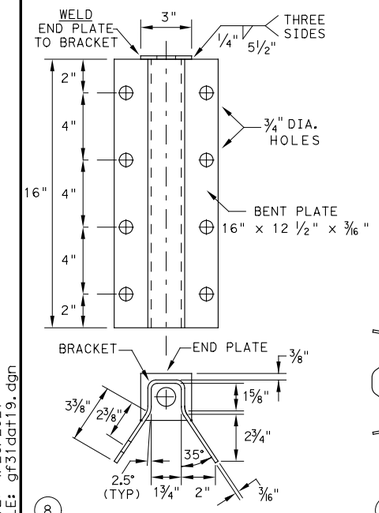
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

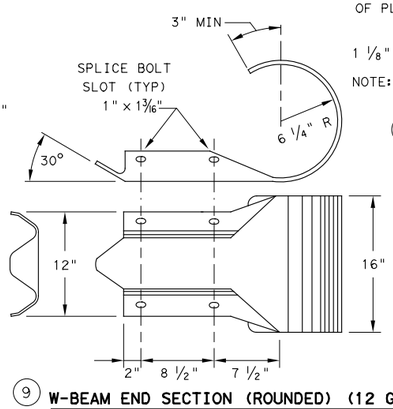
(4) TERMINAL RAIL ELEMENT FOR DAT



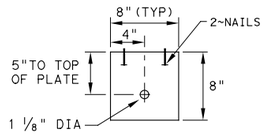
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

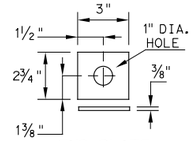


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

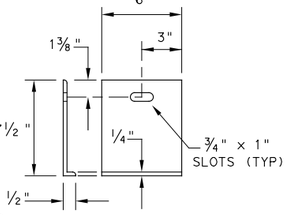


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

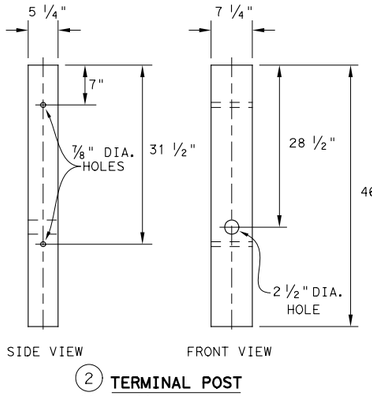
(6) BEARING PLATE
8"x 8"x 5/8" R



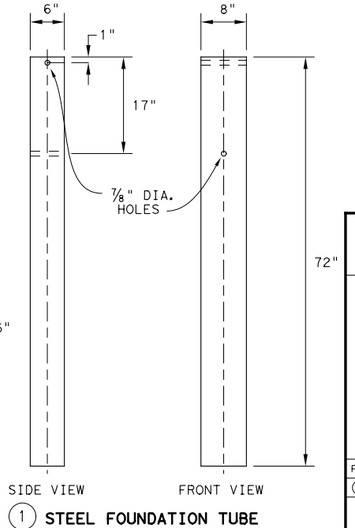
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation

Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		78

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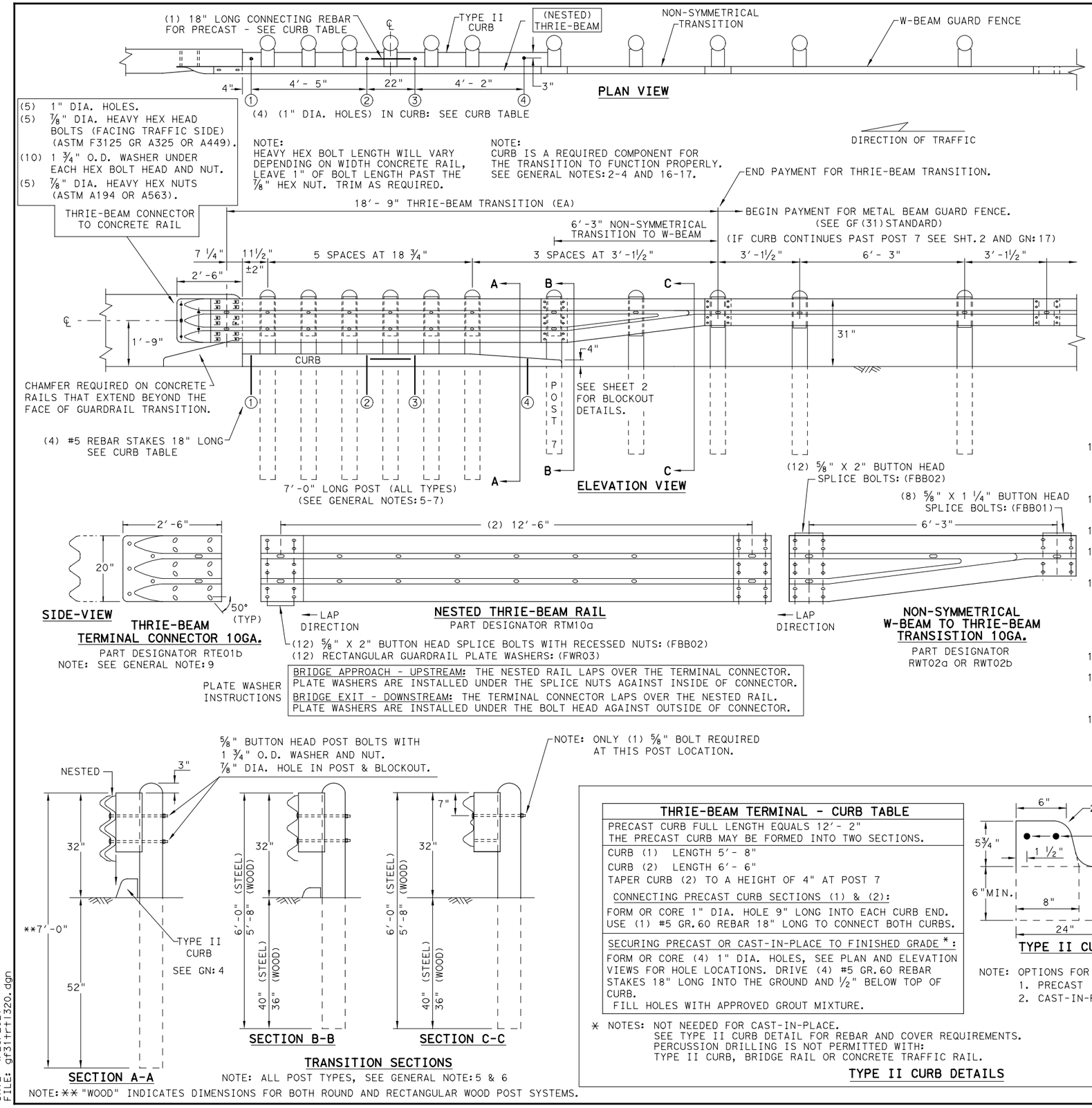


GENERAL NOTES

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

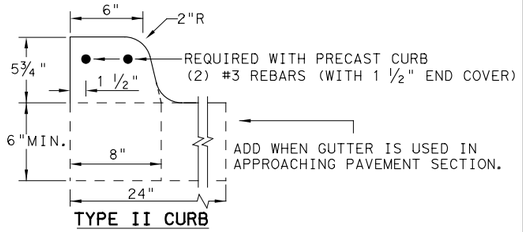
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0053	07	040	US 84	
	DIST	COUNTY		SHEET NO.	
	ABL	SCURRY		79	

DATE: 4/26/2021
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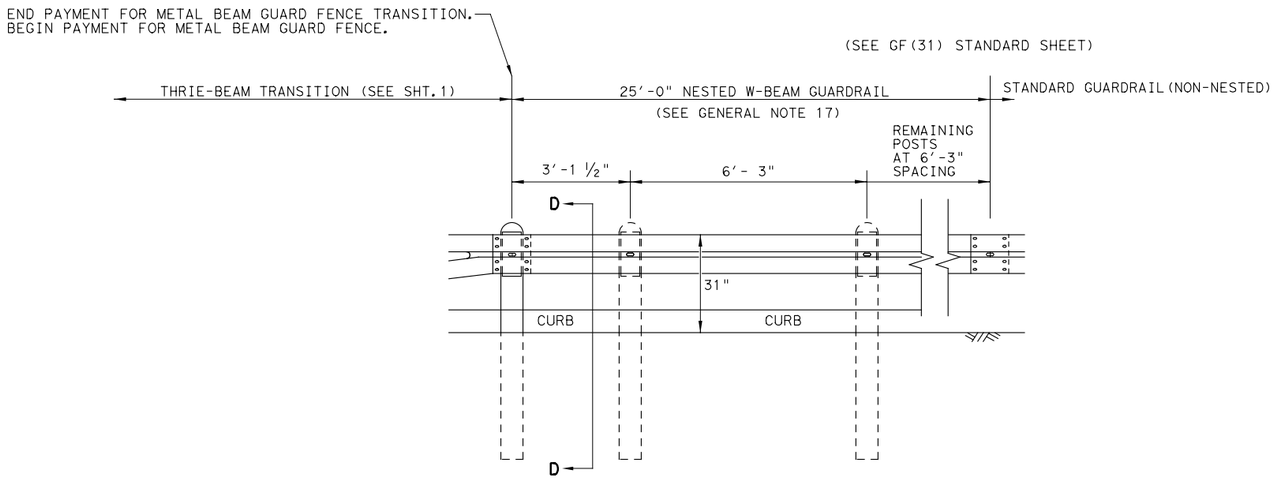
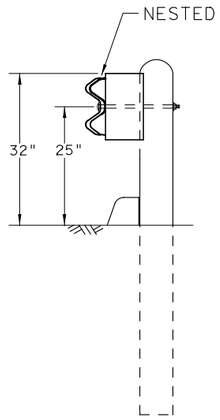
DATE: 4/26/2021
FILE: gf31trt1320.dgn

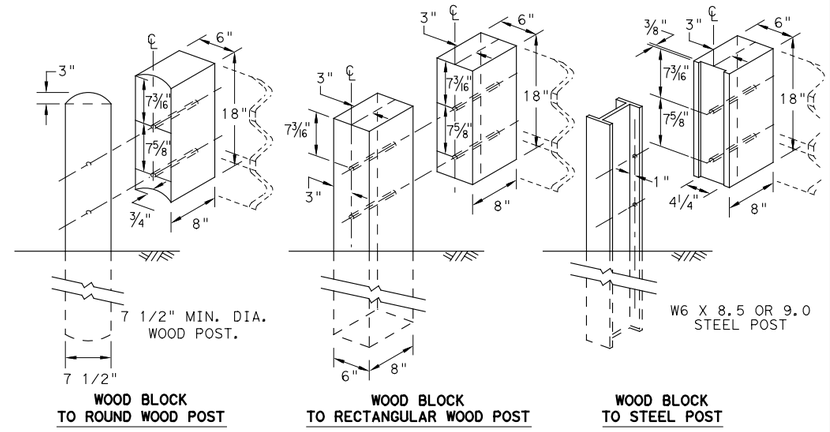
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
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REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		80

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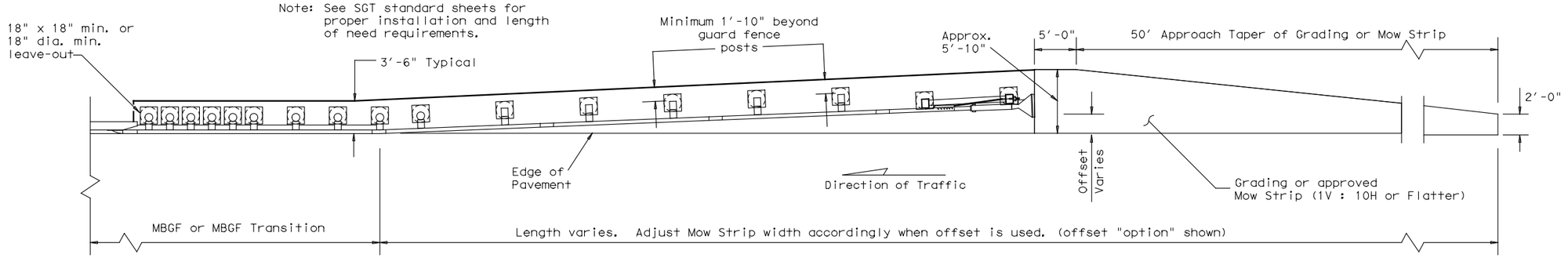
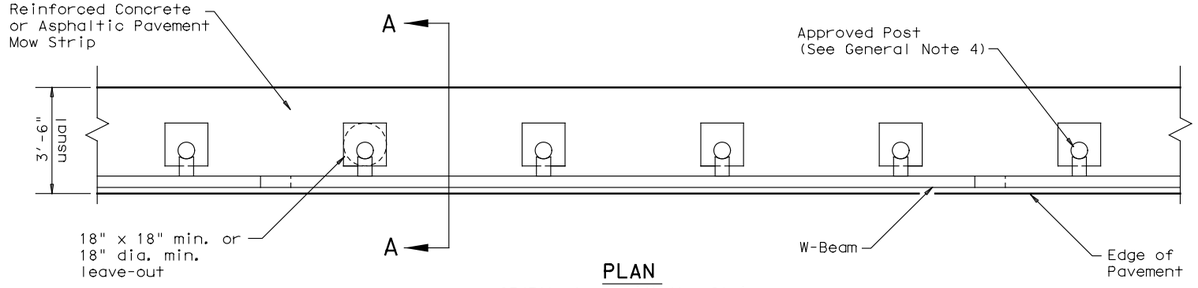
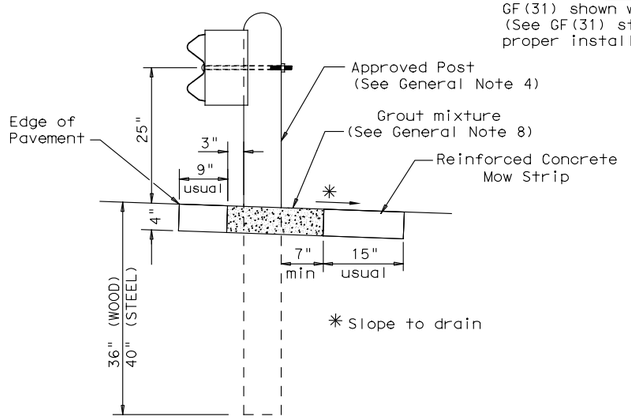


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



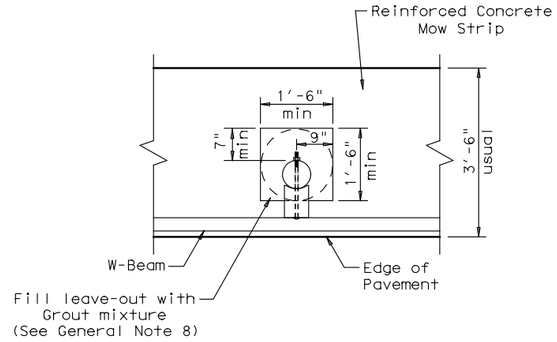
PLAN

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



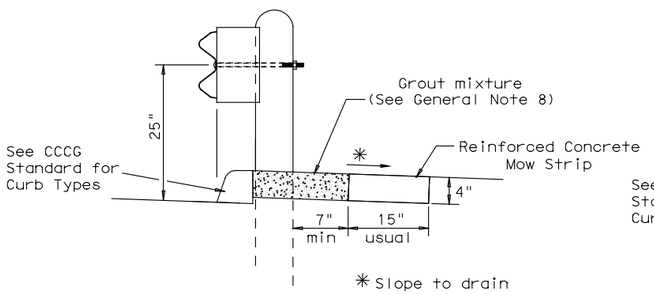
SECTION A-A

Typical



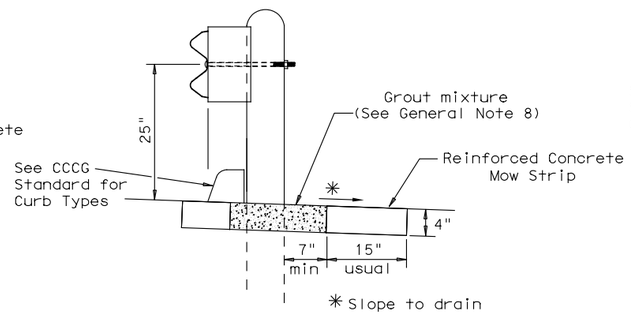
MOW STRIP DETAIL

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



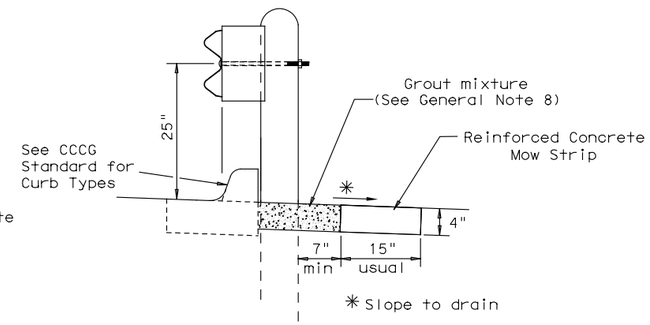
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		81

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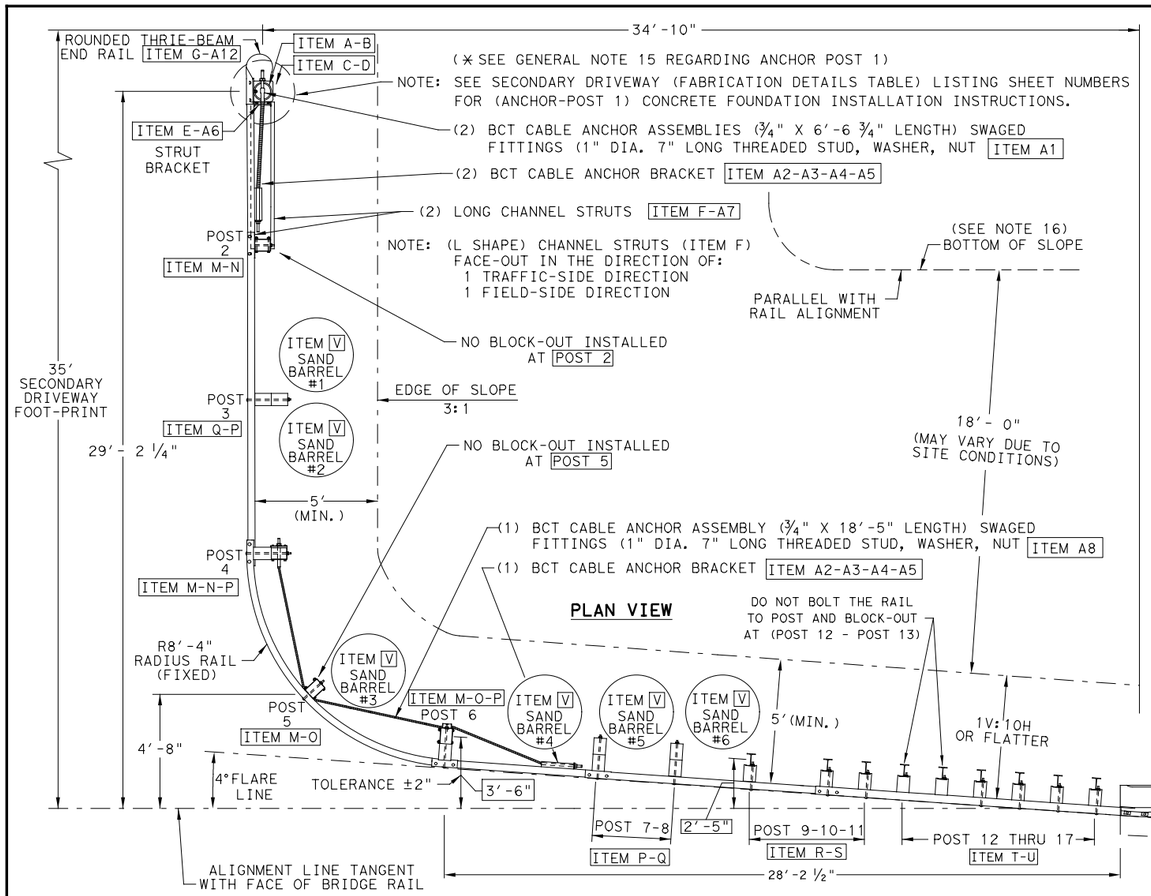
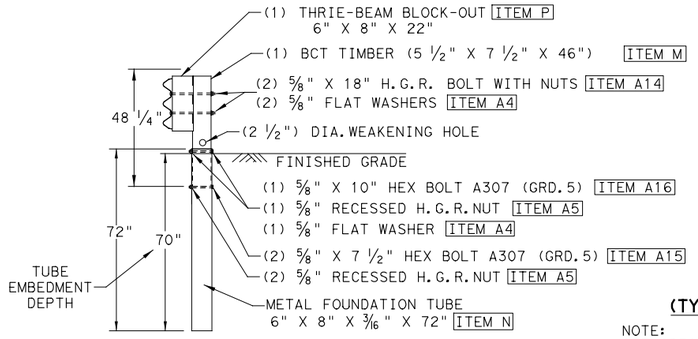
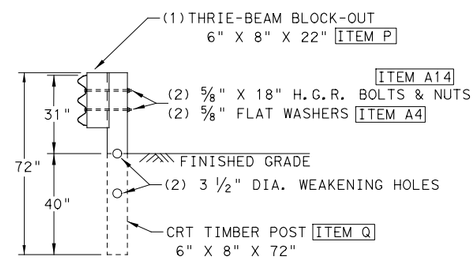




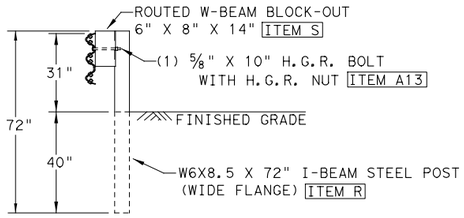
SECTION VIEW (A-A)
TIMBER POST WITH METAL FOUNDATION TUBE
(TYP) BCT POSTS 2-4-5-6

NOTE:
NO BLOCK-OUTS INSTALLED AT BCT POST 2 - POST 5

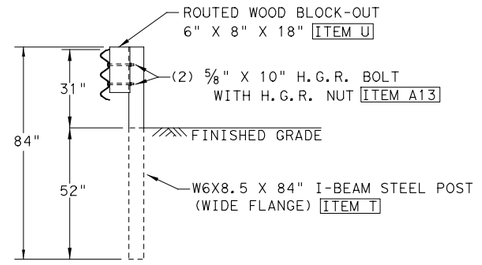


SECTION VIEW (B-B)
(TYP) CRT TIMBER POSTS 3-7-8

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



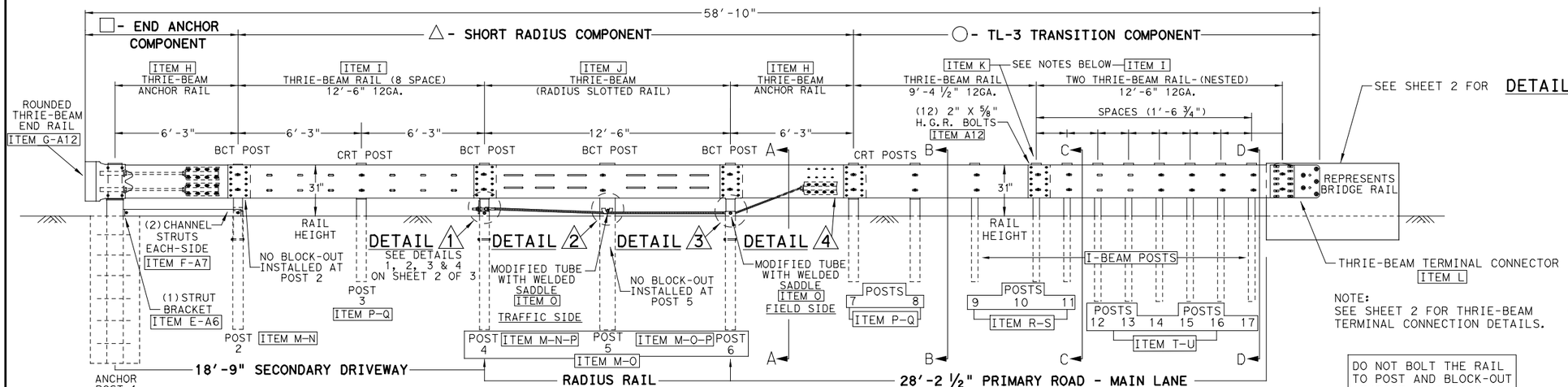
SECTION VIEW C-C
(TYP) AT POSTS 9-10-11



✳ SECTION VIEW D-D
(TYP) AT POSTS 12-13-14-15-16-17

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13



NOTE:
SEE SHEET 2 FOR THRIE-BEAM TERMINAL CONNECTION DETAILS.

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13

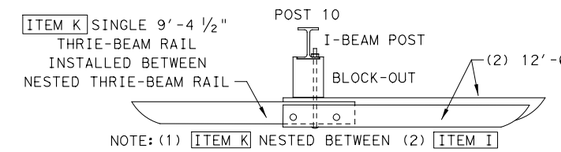
(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

ANCHOR POST 1 FABRICATION DETAILS	
SHEET DESCRIPTION	SHEET NUMBER
ANCHOR POST	SHEET 1 OF 8
ANCHOR SLEAVE	SHEET 2 OF 8
RADIUS RAIL	SHEET 3 OF 8
THRIE-BEAM RAILS	SHEET 4 OF 8
BCT TIMBER POST	SHEET 5 OF 8
STRUT RADIUS ANCHOR	SHEET 6 OF 8
FOUNDATION TUBE	SHEET 7 OF 8
ANCHOR CABLE	SHEET 8 OF 8

FULL-LENGTH ELEVATION VIEW

NOTE: ALL CABLE BRACKET ASSEMBLIES ARE LOCATED ON THE FIELD-SIDE. SHOWN HERE FOR CLARITY.

NOTE: FOR BCT POSTS 2-4-5-6 INSTALL (1) OR (2) ITEM A15-A4-A5 BOLT ASSEMBLIES TO PREVENT TIMBER POST SLIDING DOWN FOUNDATION TUBE.



NESTED-GUARDRAIL SPLICE AT POST 10

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		82

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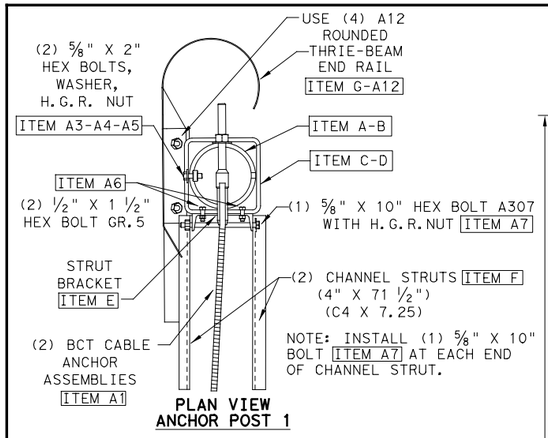
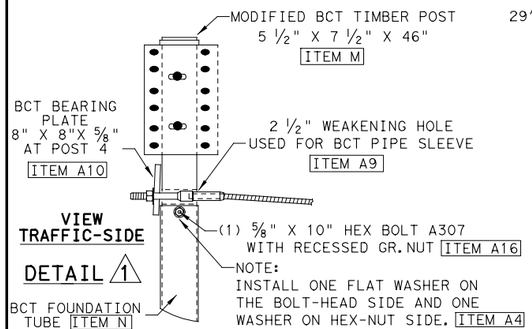
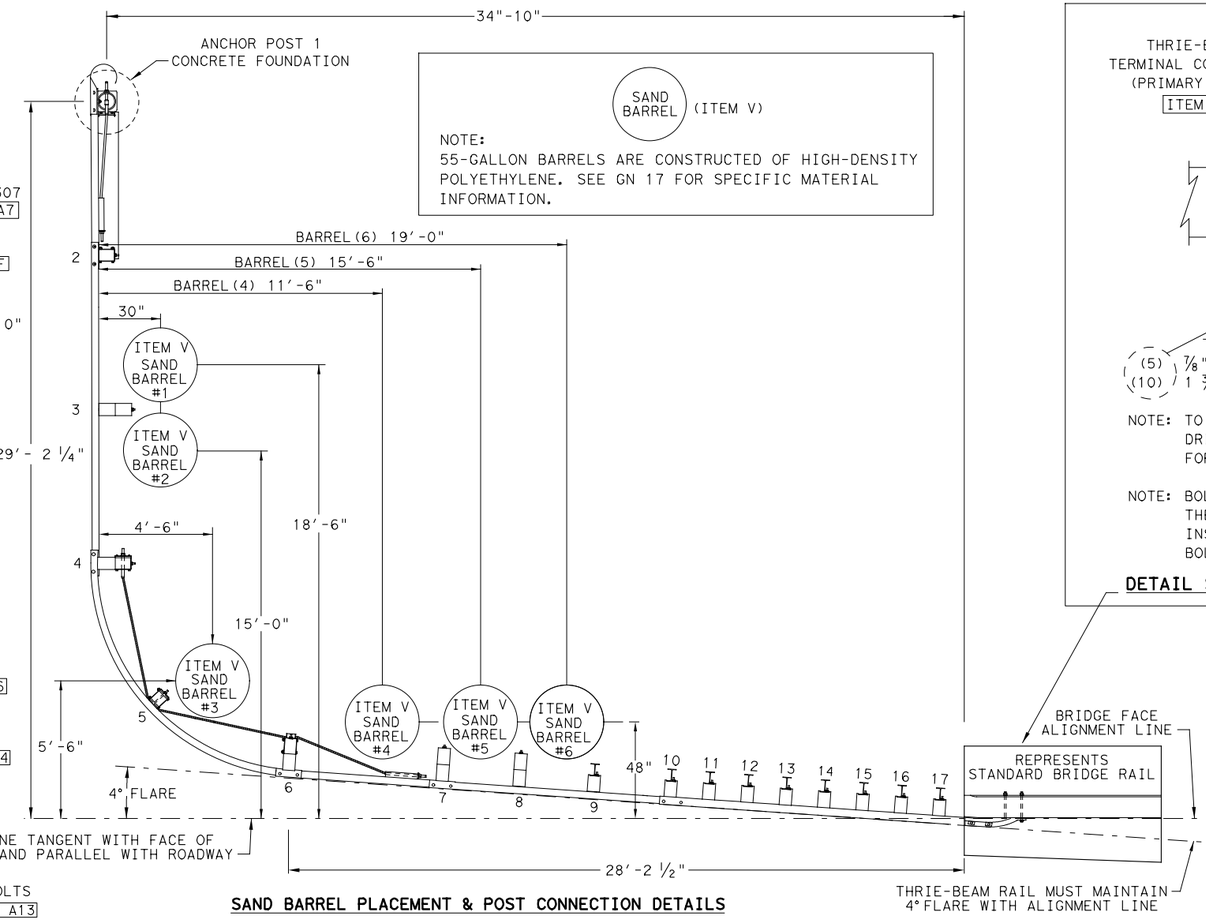


PLAN VIEW ANCHOR POST 1

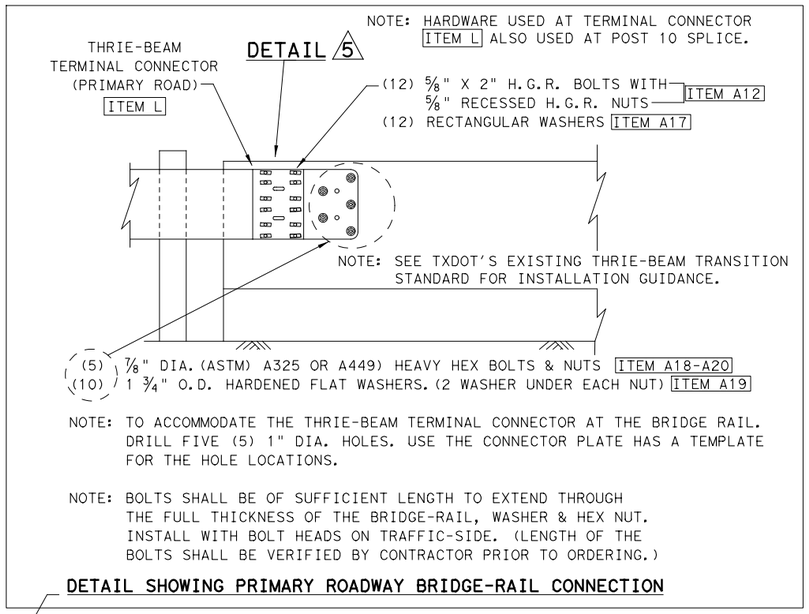


DETAIL 1

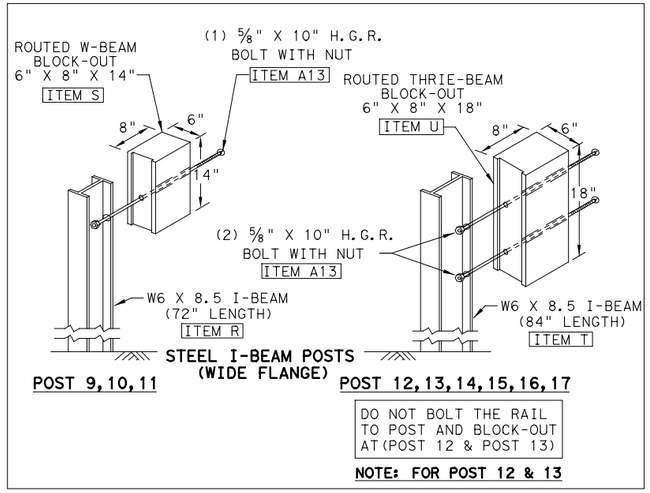
BCT (POST 4) TIMBER POST WITH METAL FOUNDATION TUBE

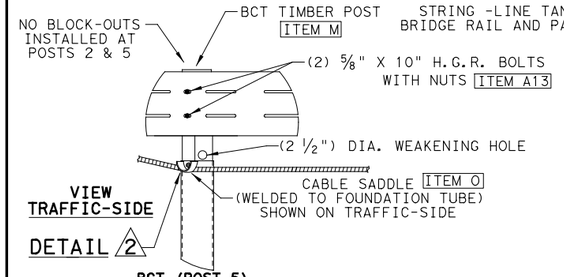


SAND BARREL PLACEMENT & POST CONNECTION DETAILS

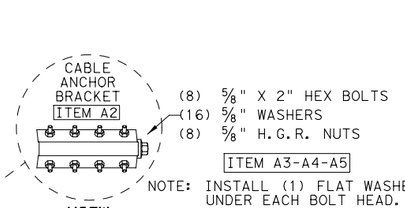


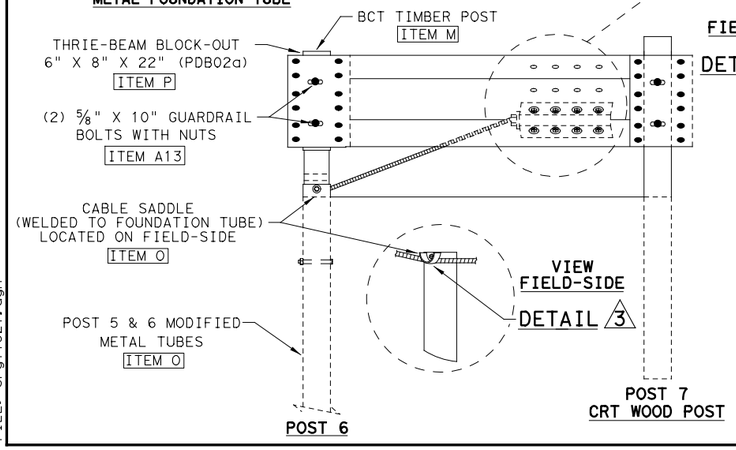
DETAIL SHOWING PRIMARY ROADWAY BRIDGE-RAIL CONNECTION

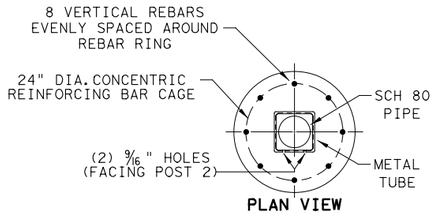




BCT (POST 5) TIMBER POST WITH METAL FOUNDATION TUBE

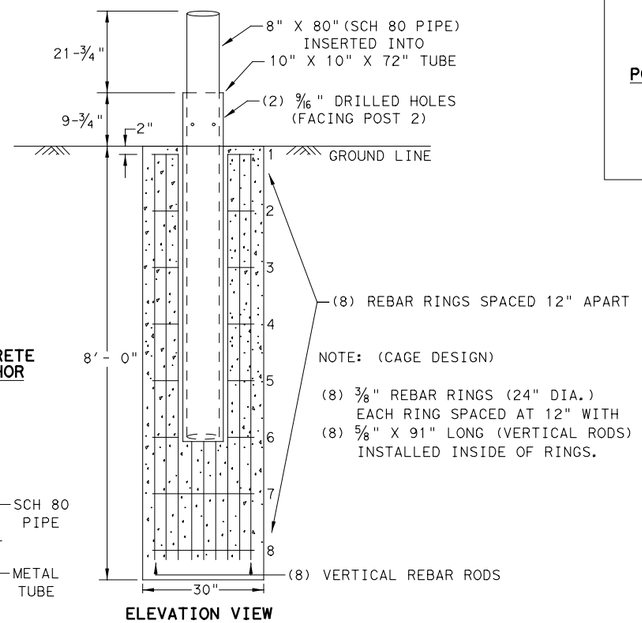






POST 1 REINFORCED CONCRETE FOUNDATION ANCHOR

PLAN VIEW ANCHOR POST 1



ELEVATION VIEW ANCHOR POST 1

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

SHEET 2 OF 3

Texas Department of Transportation — Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgtl321	TxDOT	CK:KM	DN: VP	CK:CGL
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ITEM	ALL LARGE & SMALL COMPONENT DESCRIPTIONS	END ANCHOR (POST 1 & POST 2) □		TL-3 SHORT RADIUS (POST 2 TO POST 7) △		TL-3 TRANSITION (POST 7 TO POST 17) ○		TL-3 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM	
		ITEM	QTY	ITEM	QTY	ITEM	QTY	ITEM	TOTAL QTY
A	POST 1 TOP (SCH.80 PIPE) (8" X 80" LENGTH)	A	1					A	1
B	POST 1 TOP (WELDED SUPPORT COLLAR 10" X 10" X ½" ASTM A36)	B	1					B	1
C	POST 1 TUBE (HSS 10" X 10" X ½" X 72" LENGTH) A500 GR.B	C	1					C	1
D	POST 1 (WELDED PLATE 9 ¼" X 9 ¼" X ⅛") A36	D	1					D	1
E	POST 1 STRUT BRACKET (C8 X 11.50 A36)	E	1					E	1
F	(POST 1 & 2) CHANNEL STRUTS (4" X 71 ½")(C4 X 7.25)A36	F	2					F	2
G	THRIE-BEAM RAIL (END ANCHOR - ROUNDED TYPE) 12GA. (RTE02a)	G	1					G	1
H	THRIE-BEAM RAIL (ANCHOR) (6'-3" LENGTH) 12GA. (RWM14a)	H	1	H	1			H	2
I	THRIE-BEAM RAIL (8 SPACE) (12'-6" LENGTH) 12GA. (RTM08)			I	1	I	2	I	3
J	THRIE-BEAM RAIL (RADIUS 8'-4 ½") (SLOTTED) 12GA.			J	1			J	1
K	THRIE-BEAM RAIL (3 SPACE) (9'-4 ½" LENGTH) 12GA.					K	1	K	1
L	THRIE BEAM RAIL (TERMINAL CONNECTOR) (BRIDGE-RAIL) (RTE01b)					L	1	L	1
M	POST 2,4,5,6 BCT TIMBER (5 ½" X 7 ½" X 46") (PDF04)			M	4			M	4
N	POST 2,4, BCT TUBE (6" X 8" X ⅜" X 72" LENGTH) (PTE05)			N	2			N	2
O	POST 5,6 MODIFIED BCT TUBES (FOR WELDED CABLE SADDLES)			O	2			O	2
P	POST 3,4,6,7,8 THRIE-BEAM BLOCK-OUT (6" X 8" X 22")(PDB02a)			P	4	P	1	P	5
Q	POST 3,7,8 CRT TIMBER POSTS (6" X 8" X 72" LENGTH)(PDE09)			Q	2	Q	1	Q	3
R	POST 9,10,11 I-BEAM POSTS (W6X8.5 X 72" LENGTH) (PWE01)					R	3	R	3
S	POST 9,10,11 ROUTED W-BEAM BLOCK-OUT(6" X 8" X 14")(PDB01b)					S	3	S	3
T	POST 12 THRU 17 I-BEAM POSTS (W6X8.5 X 84" LENGTH) (PWE07)					T	6	T	6
U	POST 12 THRU 17 ROUTED BLOCK-OUT (6" X 8" X 18") (PDB??)					U	6	U	6
V	SAND BARRELS 700-715 LBS							V	6
A1	BCT CABLE ANCHOR ASSEMBLIES (¾" X 6'-6 ¾" LENGTH) (FCA01)	A1	2					A1	2
A2	BCT CABLE ANCHOR BRACKET (FPA01)	A2	2	A2	1			A2	3
A3	⅝" X 2" HEX BOLT A307 GRD.5 (FOR CABLE BRACKETS)	A3	18	A3	8			A3	26
A4	⅝" FLAT WASHER A307 GRD.5 (1 WASHER UNDER BOLT HEAD & 1 NUT)	A4	36	A4	40			A4	76
A5	⅝" RECESSED H.G.R NUT (NUTS FOR HEX BOLTS)	A5	22	A5	20			A5	42
A6	STRUT BRACKET HARDWARE (½" X 1 ½") HEX BOLT A307 GRD.5	A6	2					A6	2
A7	CHANNEL STRUT HARDWARE (⅝" X 10") HEX BOLT A307 GRD.5	A7	2					A7	2
A8	BCT CABLE ANCHOR ASSEMBLY (FCA02) (¾" X 18'-5" LENGTH)			A8	1			A8	1
A9	BCT POST SLEEVE (FMM02a) (POST 4 ONLY)			A9	1			A9	1
A10	BCT CABLE BEARING PLATE (⅝" X 8" X 8" (FPB01) (POST 4 ONLY)			A10	1			A10	1
A11	⅝" X 1 ¼" H.G.R. BOLTS (FBB01) (SPLICES AT POST 2,4,6,7)			A11	48			A11	48
A12	⅝" X 2" H.G.R. BOLTS (FBB02)(ROUND TERM-POST 10-END SPLICE)	A12	4			A12	24	A12	28
A13	⅝" X 10" H.G.R. BOLTS (FBB03) (I-BEAM POSTS RAIL & BLOCKOUT)					A13	18	A13	18
A14	⅝" X 18" H.G.R. BOLTS (FBB04) (POSTS 3,4,6,7,8)			A14	8	A14	2	A14	10
A15	⅝" X 7 ½" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A15	8			A15	8
A16	⅝" X 10" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A16	4			A16	4
A17	RECTANGULAR WASHERS (FWR03) (FOR TERMINAL CONNECTOR RTE01b)					A17	12	A17	12
A18	⅞" X (LENGTH VARIES) HEX BOLTS A325 OR A449 GR.5					A18	5	A18	5
A19	1 ¾" O.D. HARDENED FLAT WASHER A325					A19	10	A19	10
A20	⅞" HEX NUT GR.5 A325					A20	5	A20	5

GENERAL NOTES

1. FOR ADDITIONAL INSTALLATION INFORMATION AND GUIDANCE CONTACT: TEXAS DEPARTMENT OF TRANSPORTATION,(TXDOT'S DESIGN DIVISION). (512) 416-2678. THE EXACT POSITION OF MBGF SHALL BE SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE SIGHT DISTANCE OF THE INSTALLATION WILL NEED TO BE VERIFIED WITH RESPECT TO THE SPECIFIC SITE PLACEMENT.
2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT POST POSITIONS.
3. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12 ½" OR 25 FOOT NOMINAL LENGTHS.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
7. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A SLOPE RATE OF NOT MORE THAN 1V:10H.
8. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.
9. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
10. SPECIAL FABRICATION WILL BE REQUIRED FOR THRIE BEAM RAIL RADIUS (ITEM J).
11. ALL MATERIAL AND WORK INVOLVED IS SUBSIDIARY TO SHORT RADIUS BID ITEM, INCLUDING, BUT NOT LIMITED TO FOUNDATIONS, GRADING, THRIE BEAM RAIL, SAND BARRELS, AND OTHER PARTS.
12. ALL CABLE ASSEMBLIES SHOULD BE TAUT AFTER INSTALLATION. WHEN CABLES ARE MANIPULATED BY HAND THE CABLES SHOULD NOT MOVE MORE THAN 1" IN ANY DIRECTION PERPENDICULAR TO THE CABLE.
13. THE BCT BEARING PLATE INSTALLED AT POST 4 SHOULD BE ORIENTED SUCH THAT THE 3" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE BOTTOM AND 5" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE TOP.
14. FOUNDATION AT POST 1 SHALL BE CLASS C CONCRETE.
15. * POST (1) IS NOT A CRASHWORTHY TERMINAL. THE DESIGN AND PLACEMENT OF POST (1) MUST BE OUTSIDE OF THE CLEAR ZONE OF THE SECONDARY ROADWAY USING THE RESPECTIVE CLEAR ZONE CRITERIA. PLEASE CONTACT THE DESIGN DIVISION (512) 416-2678 FOR ASSISTANCE IN DETERMINING THE APPROPRIATE USE AND/OR PLACEMENT OF THE SYSTEM IN CONSTRAINED LOCATIONS. THE PAYMENT OF THE COMPLETE SYSTEM WILL BE WITH BID ITEMS: 540 XXXX TL-3 31" SHORT RADIUS (COMPLETE).
16. TESTED TO MASH WITH A 3:1 SLOPE OR SHALLOWER IS PREFERABLE IN THE LIMITS OF THE TOP AND BOTTOM OF THE SLOPE AS SHOWN IN THE PLAN VIEW. IF FIELD CONDITIONS REQUIRE A STEEPER SLOPE,THIS MAY BE ALLOWABLE UP TO A 2:1 SLOPE. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE.
17. THE BARRELS ARE ENERGY ABSORPTION ENERGITE III, MODEL 640 FILLED WITH 715 LB (+/-15) SAND; OR AN APPROVED EQUIVALENT. THE APPROXIMATE HEIGHT OF THE BARREL IS 41" (+/-).
18. ALTERNATE METHODS TO TERMINATE THE SRG ALONG THE PRIMARY ROADWAY ARE AVAILABLE WHEN SITE CONDITIONS DICTATE. CONTACT DESIGN DIVISION FOR DETAILS: 512 416-2678

NOTE: SEE SHEET 1 OF 3.

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

SPECIAL APPLICATION NOTES.

1. THIS IS A MASH COMPLIANT TL-3 SHORT RADIUS GUARDRAIL SYSTEM WITH A TOP RAIL HEIGHT OF 31". AVAILABLE FOR USE ON ANY SPEED ROADWAY. THE SYSTEM REQUIRES A MINIMUM PLACEMENT FOOTPRINT OF 34'-10" ALONG THE PRIMARY ROAD AND A 35'-0" ALONG SECONDARY DRIVEWAY.
2. IT IS CRITICAL THAT THE PRIMARY GUARDRAIL MAINTAIN A (4 DEGREE FLARE) WITH THE SECONDARY DRIVEWAY.
3. THE SYSTEM REQUIRES A MINIMUM 5' WIDE (WORK ZONE) DIRECTLY BEHIND THE GUARDRAIL SYSTEM WITH A SLOPE AT 1V:10H OR FLATTER FROM THERE A MAXIMUM 3:1 SLOPE IS RECOMMENDED. SEE SHEET 1 OF 3 FOR FLARE AND SLOPE DETAILS.
4. NOTE FOR INSTALLER: THE THREE (3) CRT POSTS ITEM (Q), AT POST LOCATIONS, 3, 7, & 8.), REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A ¾" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-⅞" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

   OPTION FOR ADDITIONAL ¾" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO ¾" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM ¾" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM ¾" HOLE.

Texas Department of Transportation — Design Division Standard

TL-3 SHORT RADIUS GUARDRAIL MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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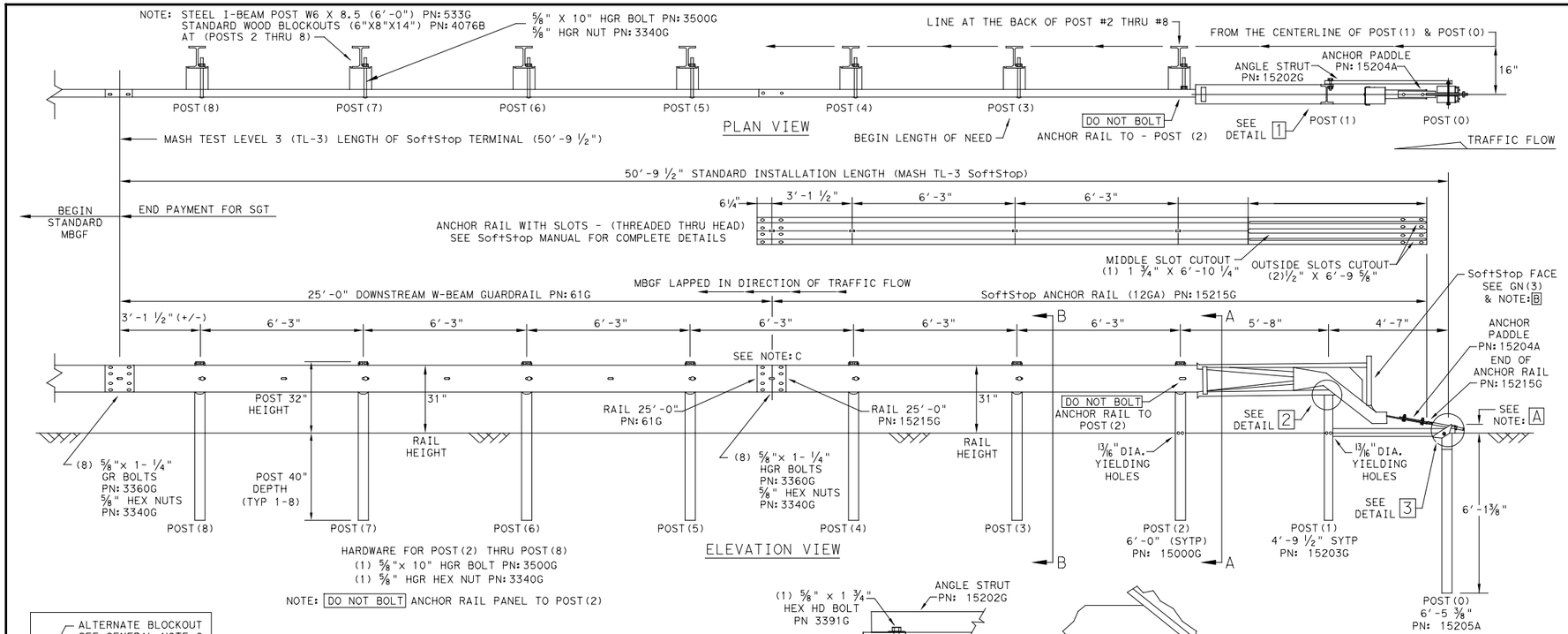

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
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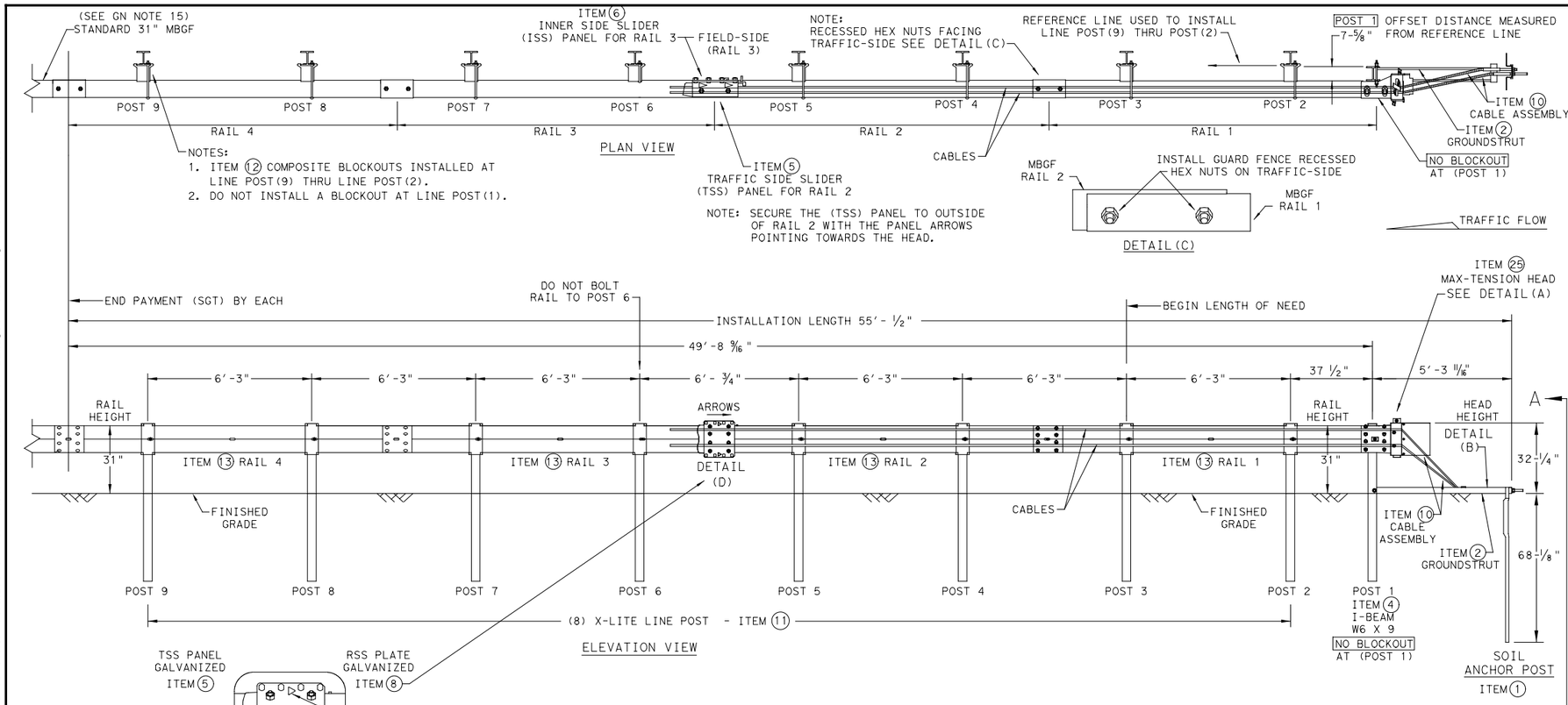
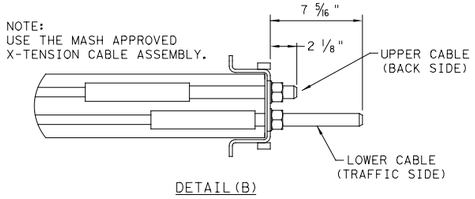
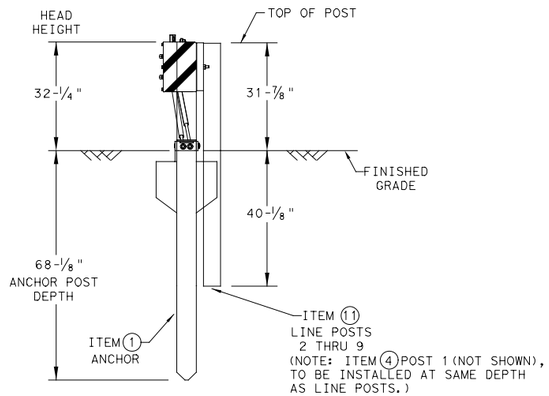


TSS PANEL AND RSS PLATE

DETAIL (D)

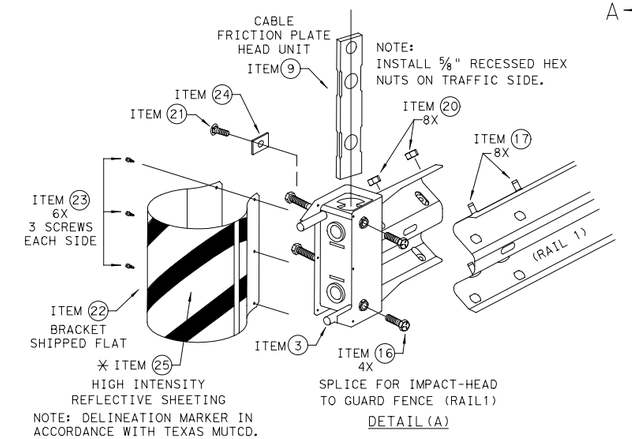


DETAIL (B)



SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

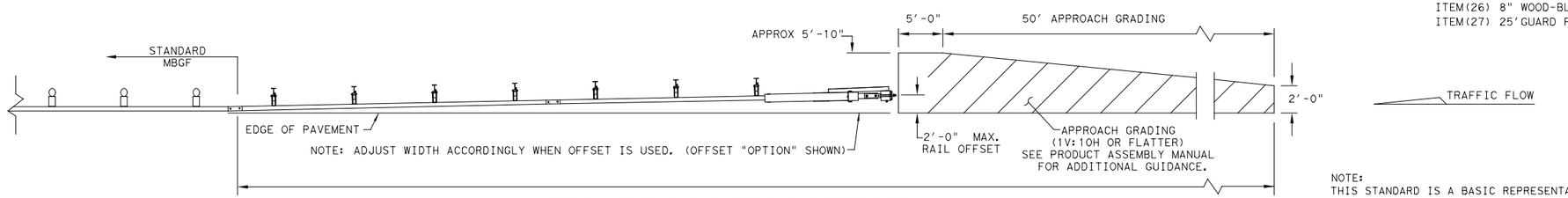
SECTION VIEW A-A



DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

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

Texas Department of Transportation

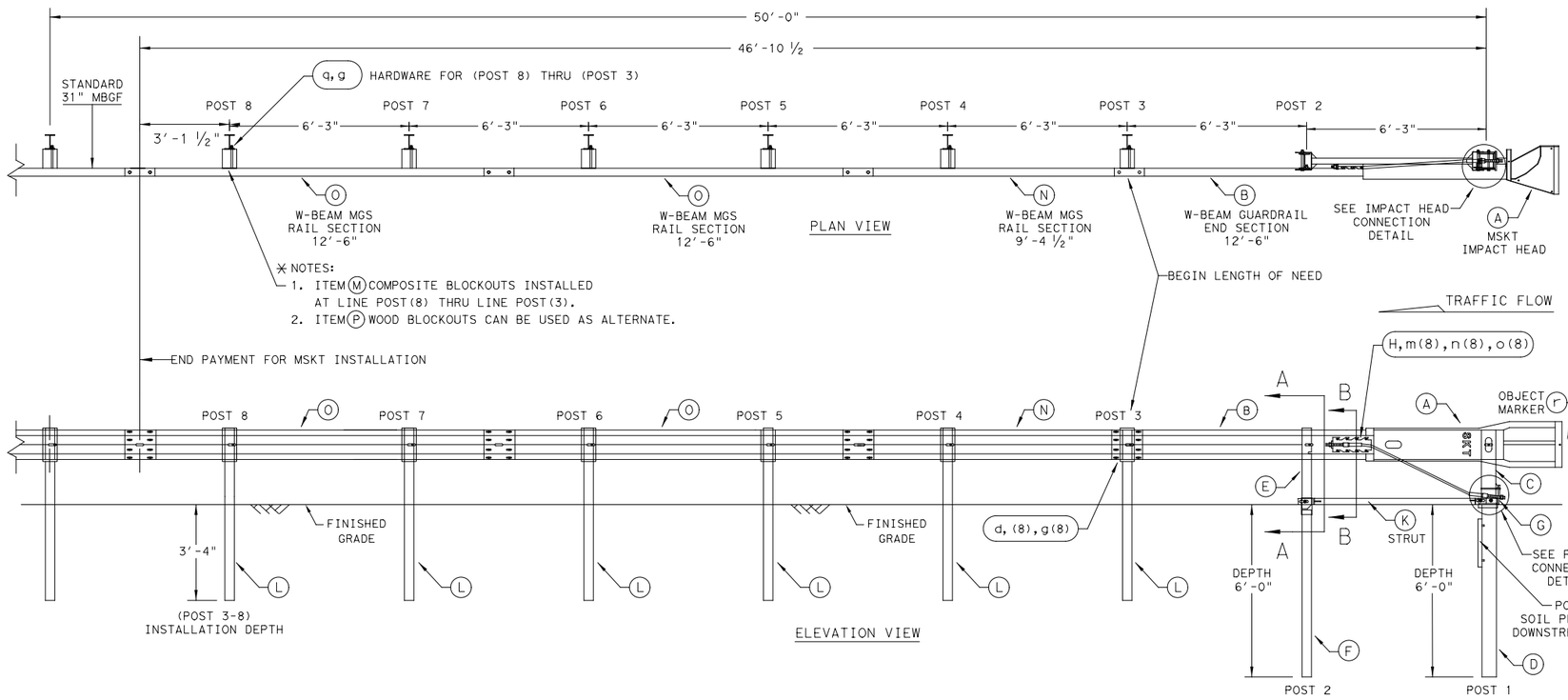
Design Division Standard

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

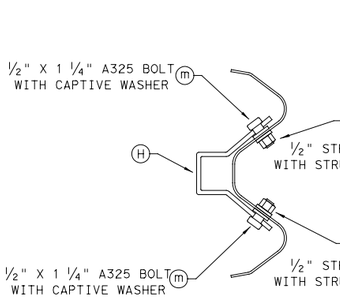
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		86

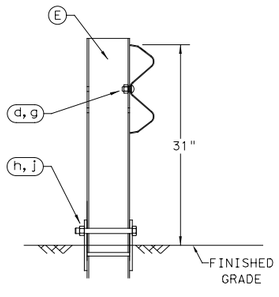
DATE: 4/26/2021
FILE: sgt11s3118.dgn

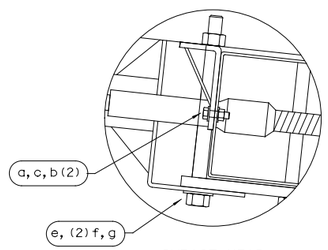
DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSIONOF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

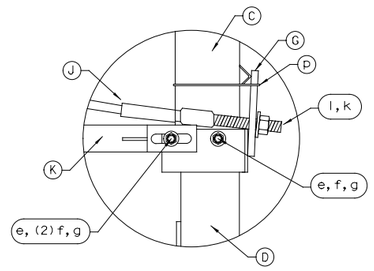


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.







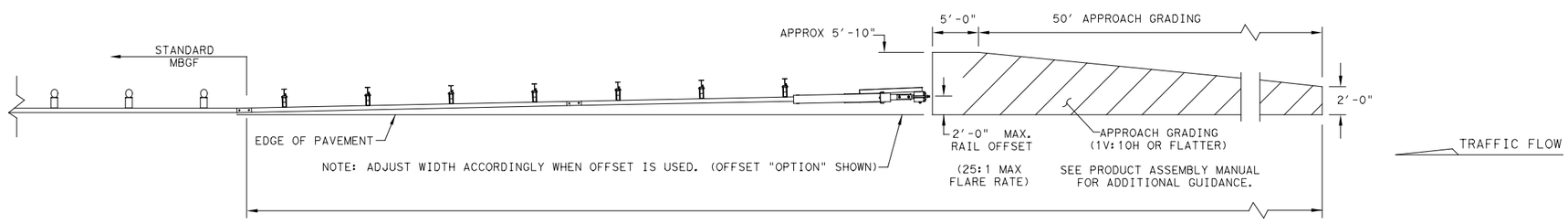


ALTERNATIVE ITEMS NOT SHOWN.
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25′GUARD FENCE PANEL

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6′ W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6′ W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9′-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12′-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25′-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 ⅛" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation — Design Division Standard

SINGLE GUARDRAIL TERMINAL

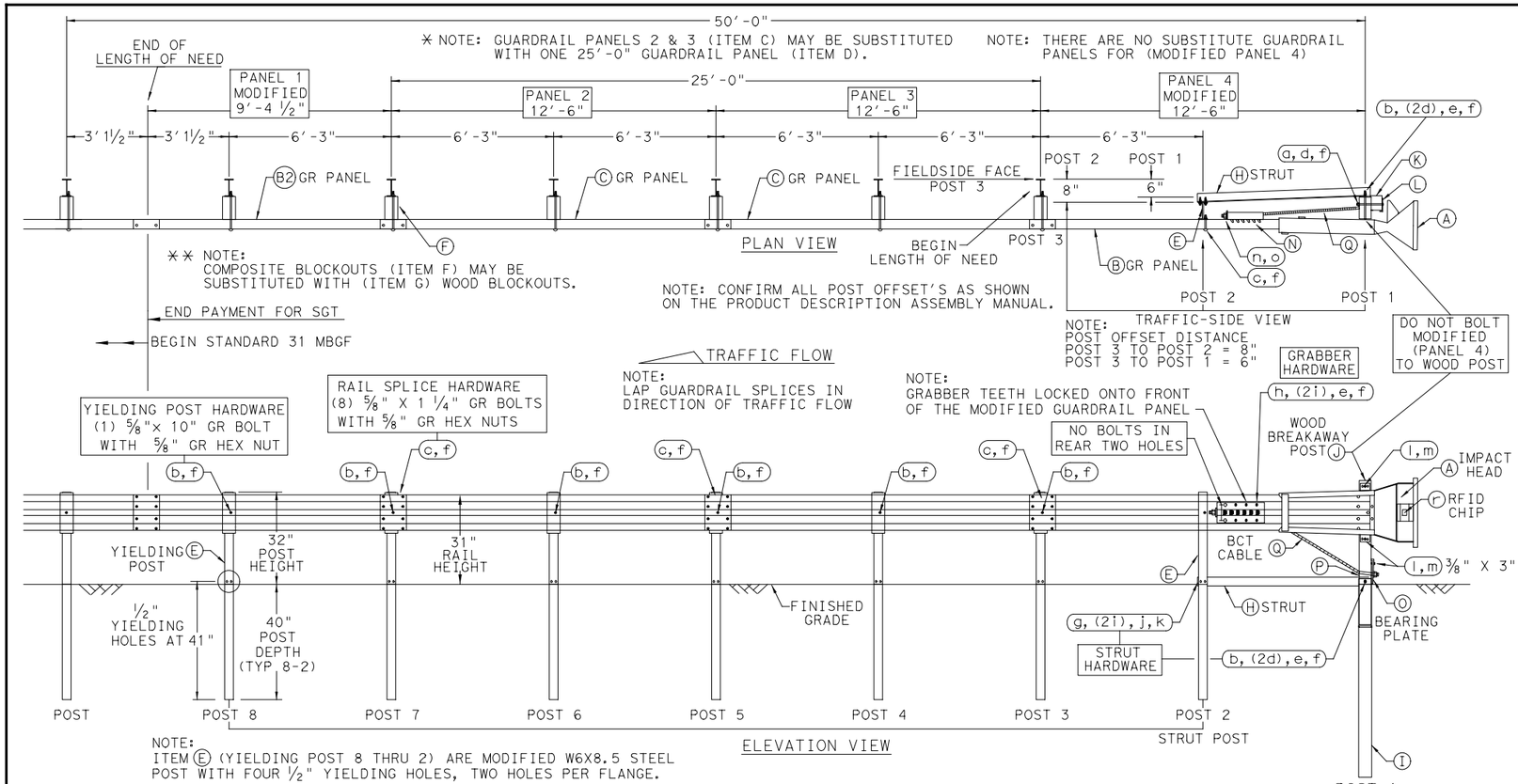
MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0053	07	040	US 84	
	DIST	COUNTY		SHEET NO.	
	ABL	SCURRY		87	

DATE: 4/26/2021
FILE: sgt12s3118.dgn

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



* NOTE: GUARDRAIL PANELS 2 & 3 (ITEM C) MAY BE SUBSTITUTED WITH ONE 25'-0" GUARDRAIL PANEL (ITEM D).

NOTE: THERE ARE NO SUBSTITUTE GUARDRAIL PANELS FOR (MODIFIED PANEL 4)

** NOTE: COMPOSITE BLOCKOUTS (ITEM F) MAY BE SUBSTITUTED WITH (ITEM G) WOOD BLOCKOUTS.

NOTE: CONFIRM ALL POST OFFSET'S AS SHOWN ON THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

NOTE: POST OFFSET DISTANCE
POST 3 TO POST 2 = 8"
POST 3 TO POST 1 = 6"

DO NOT BOLT MODIFIED (PANEL 4) TO WOOD POST

NOTE: LAP GUARDRAIL SPLICES IN DIRECTION OF TRAFFIC FLOW

NOTE: GRABBER TEETH LOCKED ONTO FRONT OF THE MODIFIED GUARDRAIL PANEL

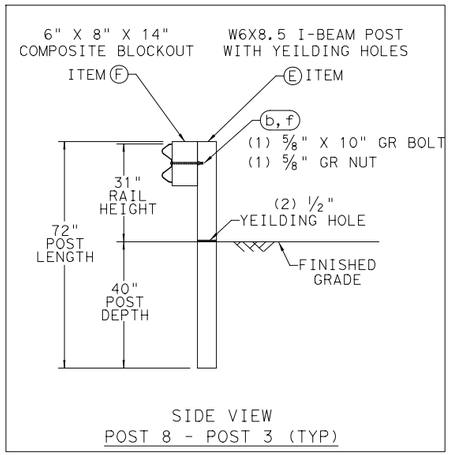
NOTE: ITEM E (YIELDING POST 8 THRU 2) ARE MODIFIED W6X8.5 STEEL POST WITH FOUR 1/2" YIELDING HOLES, TWO HOLES PER FLANGE.

GENERAL NOTES

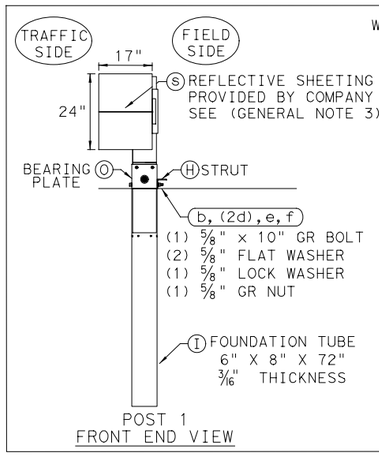
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

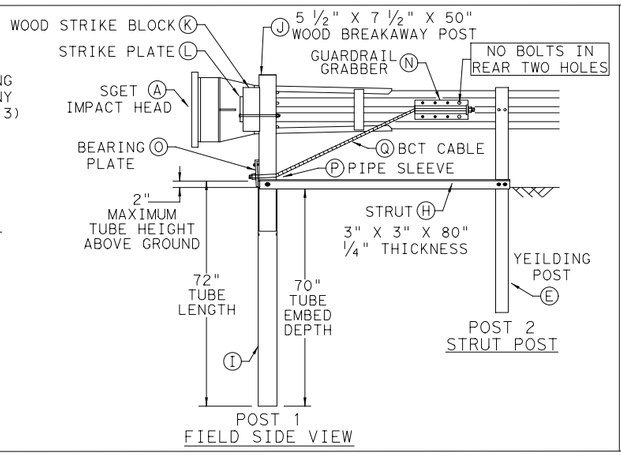
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



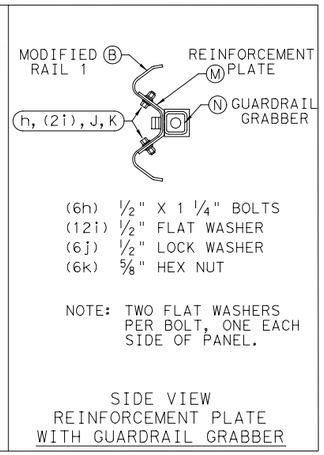
SIDE VIEW
POST 8 - POST 3 (TYP)



POST 1
FRONT END VIEW



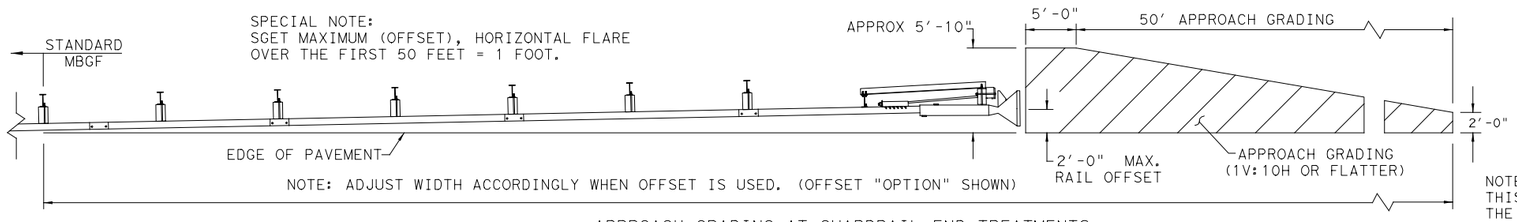
POST 1
FIELD SIDE VIEW



(6h) 1/2" X 1 1/4" BOLTS
(12i) 1/2" FLAT WASHER
(6j) 1/2" LOCK WASHER
(6k) 5/8" HEX NUT

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

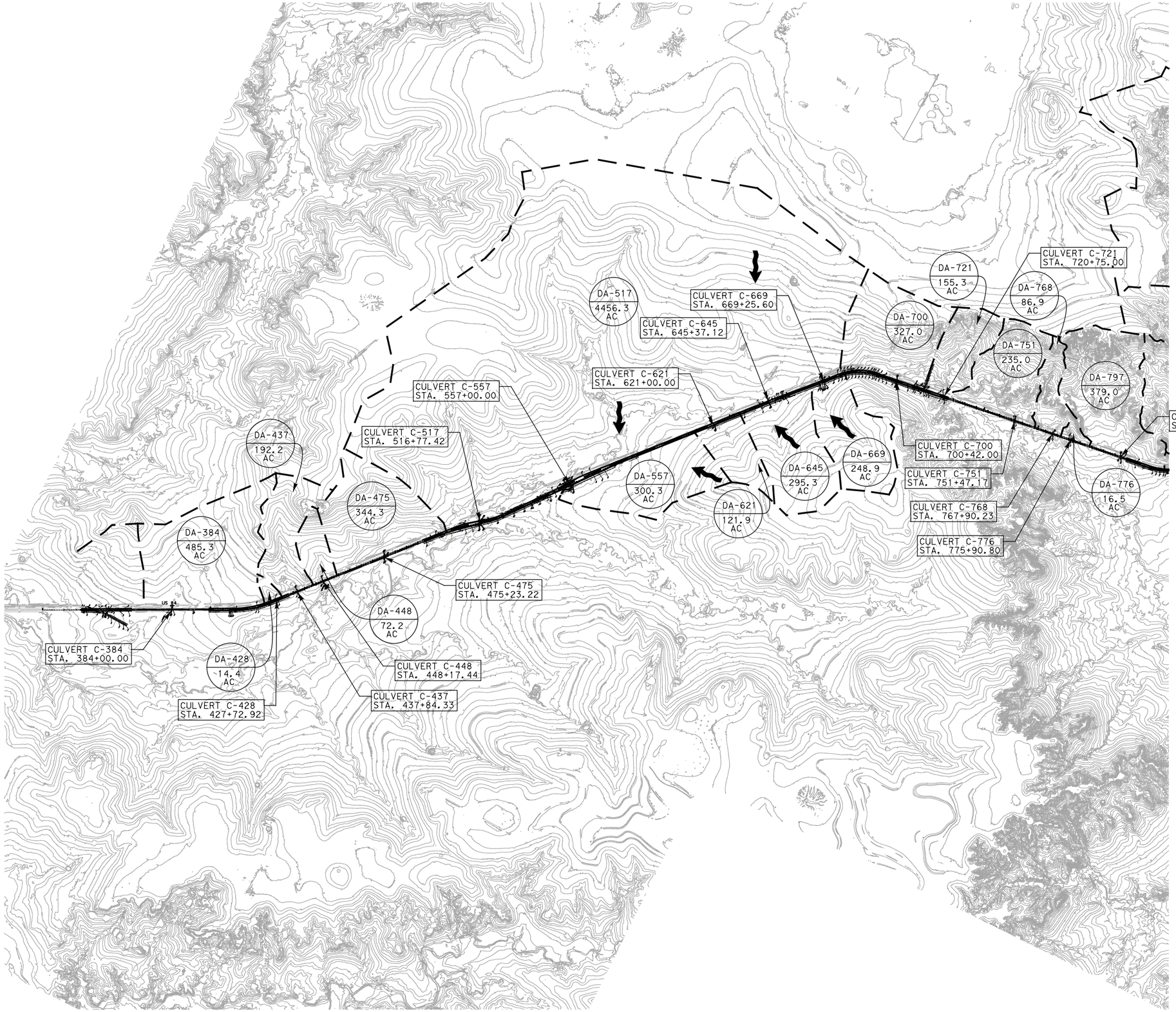
NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation — Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP	
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0053	07	040	US 84	
	DIST	COUNTY		SHEET NO.	
	ABL	SCURRY		88	

DATE: 4/26/2021
FILE: sgt153120.dgn



2000 1000 0 2000 4000

SCALE: 1" = 4000'

LEGEND

DIRECTION OF FLOW

DRAINAGE AREA BOUNDARY

5 FT CONTOURS

DA-XX / XXX.XX AC — DRAINAGE AREA ID / ACREAGE

STATE OF TEXAS
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114172
LICENSED PROFESSIONAL ENGINEER
5/24/2021

FIRM REGISTRATION NO. F-230

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DRAINAGE AREA MAP

(SHEET 1 OF 2)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AR	6	SEE TITLE SHEET		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
DO	TX	ABL	SCURRY	
GRAPHICS	CONTROL	SECTION	JOB	89
AR				
GRPH CHECK	0053	07	040	
DO				

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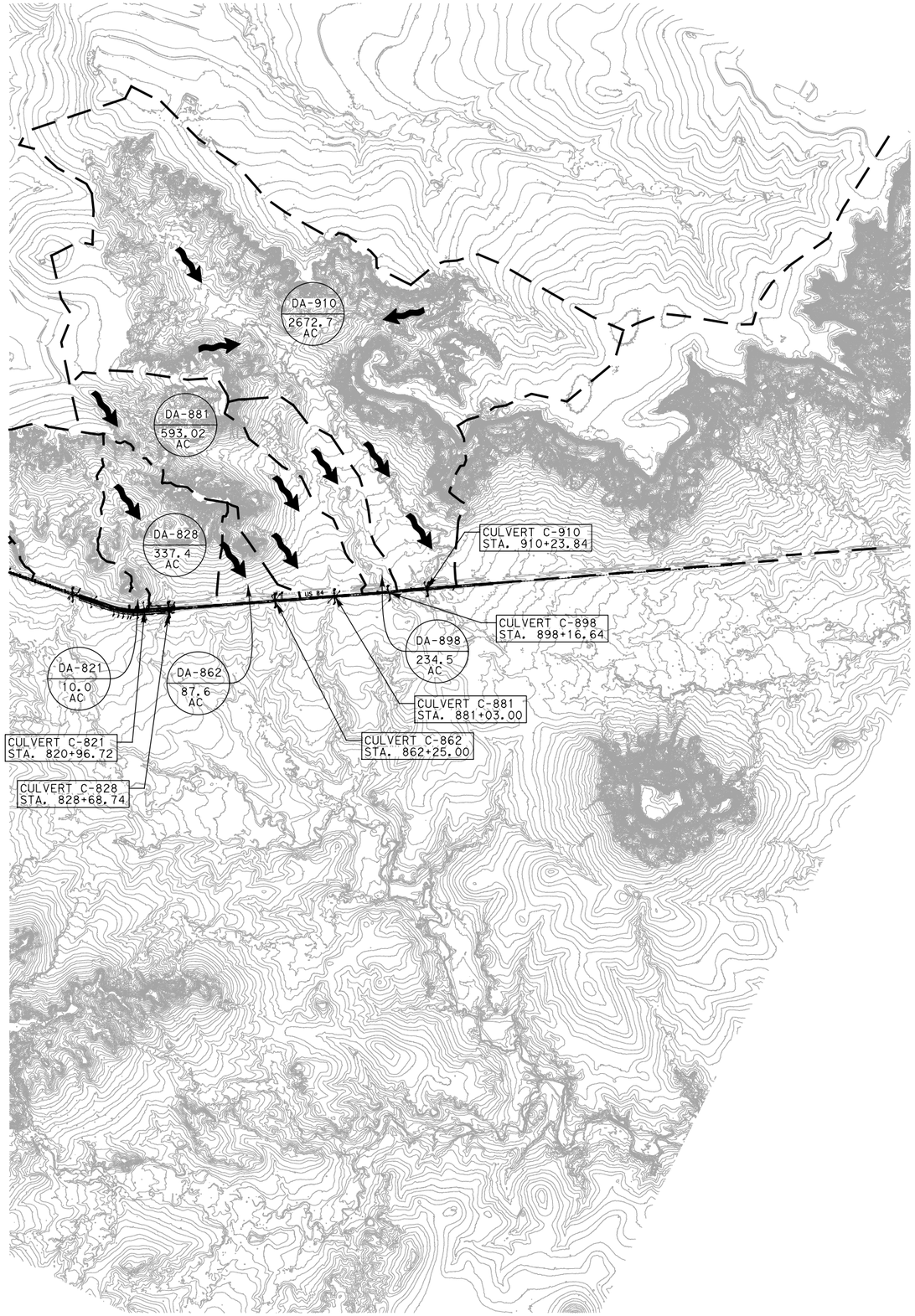

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SCALE: 1" = 4000'

LEGEND

DIRECTION OF FLOW

DRAINAGE AREA BOUNDARY

5 FT CONTOURS

DA-XX / XXX.XX AC — DRAINAGE AREA ID / ACREAGE

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DRAINAGE AREA MAP

(SHEET 2 OF 2)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AR	6	SEE TITLE SHEET		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
DO	TX	ABL	SCURRY	90
GRAPHICS	CONTROL	SECTION	JOB	
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GRPH CHECK				
DO				

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DRAINAGE AREA ID	DRAINAGE STRUCTURE ID	EXISTING STRUCTURE	STATION	DRAINAGE AREA (ACRES)	Tc (MIN)	COMPOSITE 'C' VALUE	INTENSITY 25-YR (IN/HR)	INTENSITY 100-YR (IN/HR)	CURVE NUMBER	Q 25-YR (CFS)	Q 100-YR (CFS)
DA-384	C-384	4-3'x3'	384+00.00	485.3	69	NRCS METHOD			77	1251	1795
DA-428	C-428	1-24" RCP	427+72.92	14.4	134	0.4	1.39	1.87		8	11
DA-437	C-437	2-6'X4'	437+84.33	192.2	52	0.4	2.75	3.67		211	282
DA-448	C-448	2-5'X5'	448+17.44	72.2	24	0.4	4.35	5.71		126	165
DA-475	C-475	3-5'X5'	475+23.22	344.3	47	NRCS METHOD			78	888	1274
DA-517	C-517	3-8'X8'	516+17.42	4456.3	219	NRCS METHOD			78	11493	16487
DA-557	C-557	3-6'X3'	557+00.00	300.3	75	NRCS METHOD			79	774	1111
DA-621	C-621	4-30" CMP	661+00.00	121.9	32	0.4	3.67	4.86		179	237
DA-645	C-645	3-5'X3'	645+37.12	295.3	62	NRCS METHOD			74	761	1092
DA-669	C-669	2-5'X3'	669+25.60	248.9	66	NRCS METHOD			72	642	921
DA-700	C-700	4-30"CMP	700+42.00	327.0	37	NRCS METHOD			73	843	1210
DA-721	C-721	1-5'X5'	720+75.00	155.3	34	0.4	3.57	4.73		222	294
DA-751	C-751	2-6'X6'	751+47.17	235.0	23	NRCS METHOD			80	639	916
DA-768	C-768	1-24" CMP	767+90.23	86.9	10	0.4	6.40	8.21		222	285
DA-776	C-776	1-24" CMP	775+90.80	16.5	10	0.4	6.40	8.21		42	54
DA-797	C-797	3-4'X4'	797+50.27	379.0	121	NRCS METHOD			80	977	1402
DA-821	C-821	1-24" CMP	820+96.72	10.0	10	0.4	6.40	8.21		26	33
DA-828	C-828	4-5'X5'	828+68.74	337.4	40	NRCS METHOD			79	962	1381
DA-862	C-862	3-30" CMP	862+25.00	87.6	18	0.4	4.99	6.51		175	228
DA-881	C-881	2-8'X6'	881+03.00	593.0	95	NRCS METHOD			77	1530	2195
DA-898	C-898	2-6'X6'	898+16.64	234.5	60	NRCS METHOD			75	604	867
DA-910	C-910	3 - 8'x8'	910+23.84	2672.7	287	NRCS METHOD			79	6893	9888

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DRAINAGE AREA DATA SHEET

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AR	6	SEE TITLE SHEET		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
DO	TX	ABL	SCURRY	
GRAPHICS	CONTROL	SECTION	JOB	
AR	0053	07	040	91
GRPH CHECK				
DO				

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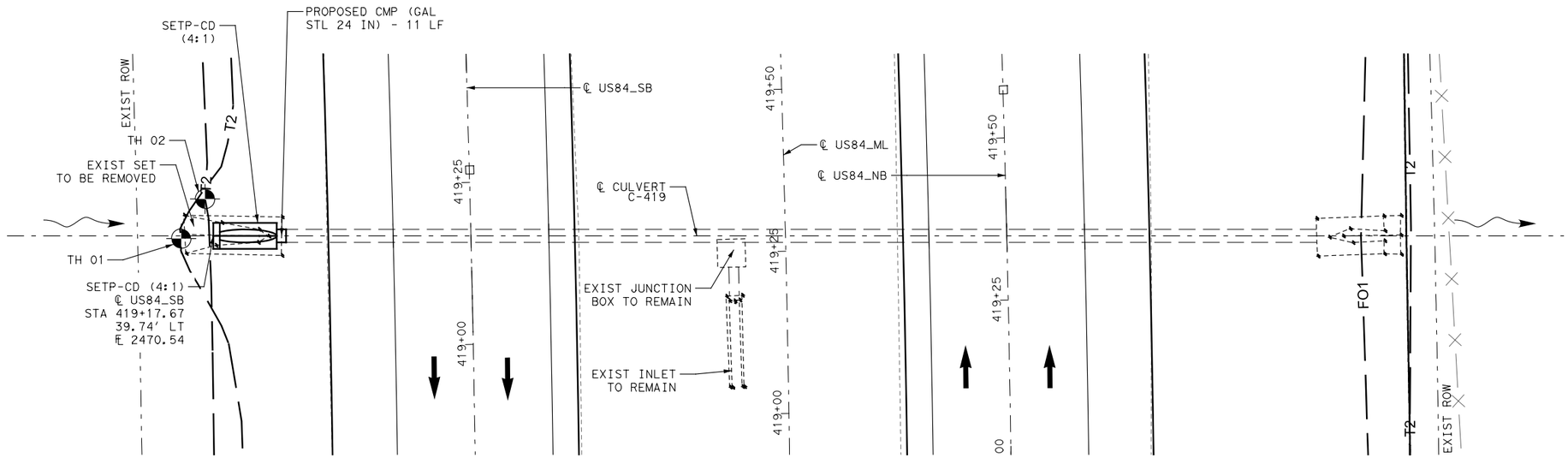
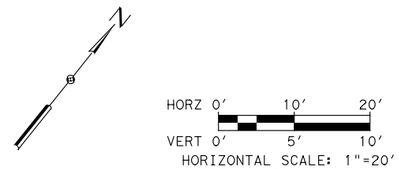


PLAN

SCALE: 1"=20'



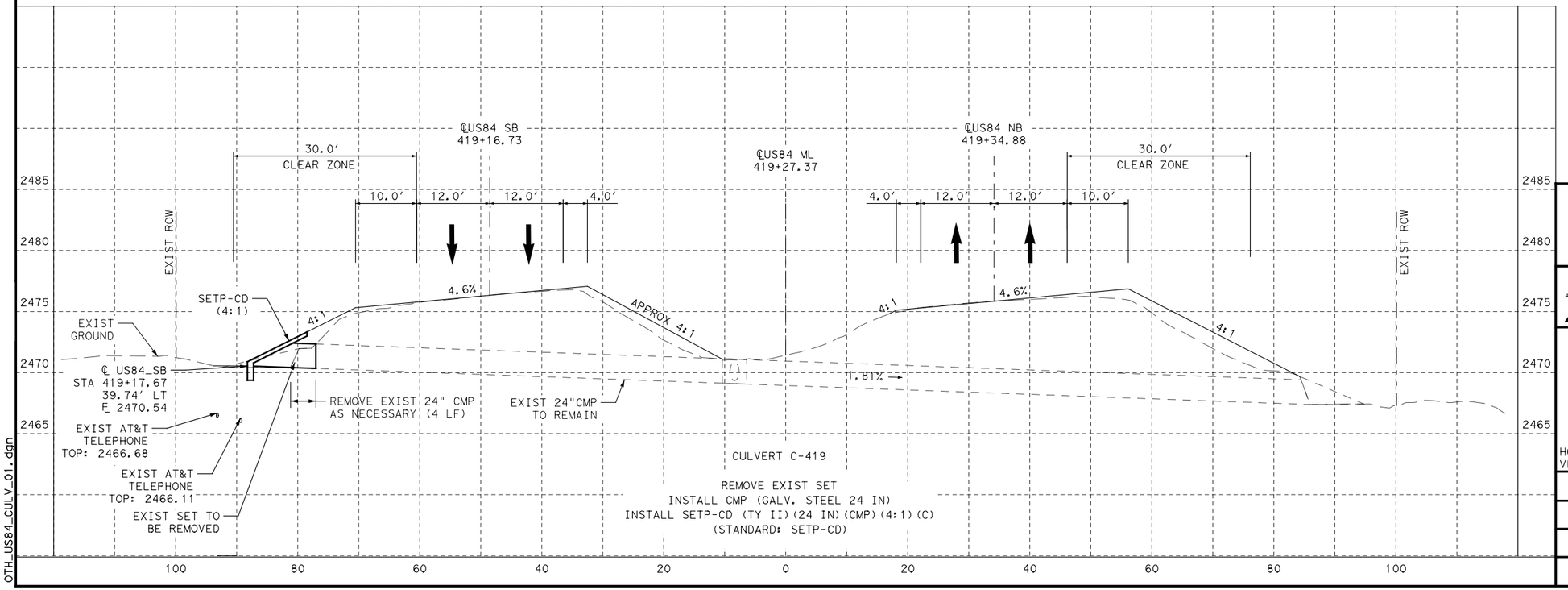
LEGEND

- DIRECTION OF TRAFFIC
- EXIST ROW
- EXIST FENCE
- FLOW
- ℄ DITCH
- F01 — FO1(D) — UG FIBEROPTICS (FIBERLIGHT)
- F02 — UG FIBEROPTICS (AT&T)
- T2 — T2(D) — UG TELEPHONE (AT&T)
- TEST HOLE

NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION OF ALL UTILITIES PRIOR TO STARTING WORK ON CULVERTS.
2. SEE EXISTING UTILITY LAYOUTS FOR ADDITIONAL INFORMATION ON TEST HOLES.

ITEM NO	DESCRIPTION	UNIT	QUANTITY
0460	CMP(GAL STL 24 IN)	LF	11
0467	SET (TY II)(24 IN)(CMP)(4:1)(C)	EA	1
0469	REMOV STR (SET)	EA	1
0469	REMOV STR (PIPE)	LF	4



CULVERT C-419

REMOVE EXIST SET
INSTALL CMP (GALV. STEEL 24 IN)
INSTALL SETP-CD (TY II)(24 IN)(CMP)(4:1)(C)
(STANDARD: SETP-CD)

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CULVERT C-419

HORZ SCALE: 1"=20'
VERT SCALE: 1"=10'

SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO
BH	TEXAS	ABL	SCURRY	92
CHECK	CONTROL	SECTION	JOB	
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CHECK				
JL				

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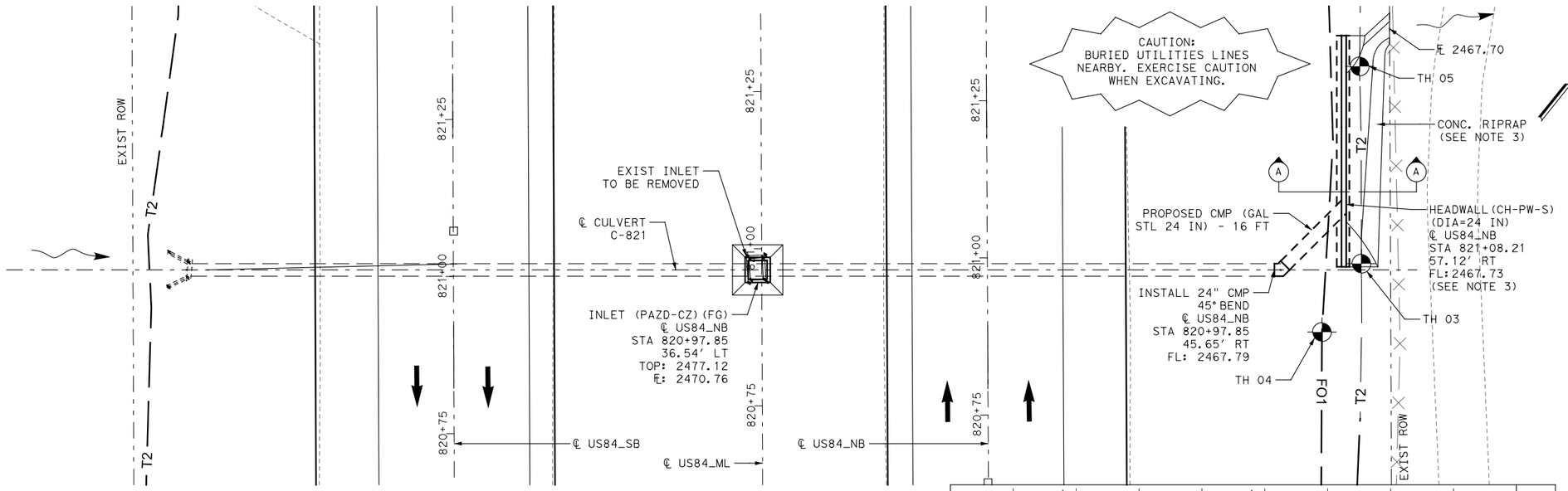
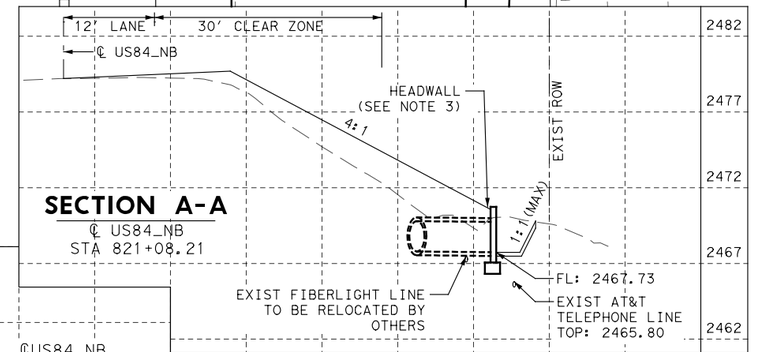
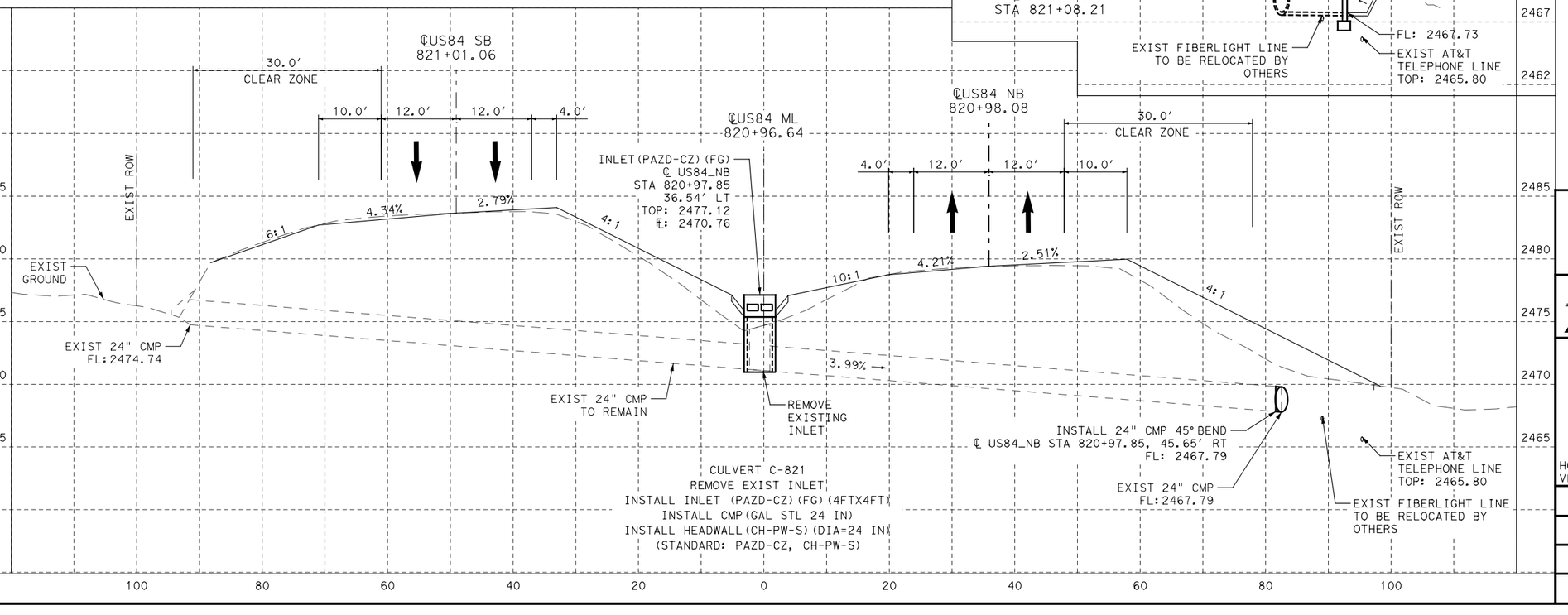


PLAN
SCALE: 1"=20'

ITEM NO	DESCRIPTION	UNIT	QUANTITY
0432	RIPRAP(CONC)(4 IN)	CY	3
0460	CMP(GAL STL 24 IN)	LF	16
0465	INL(CMP)(PAZD-CZ)(FG)(4FTX4FT-4FTX4FT)	EA	1
0466	HEADWALL(CH-PW-S)(DIA=24 IN)	EA	1
0469	REMOV STR (INLET)	EA	1



SECTION A-A
℄ US84_NB
STA 821+08.21



LEGEND

- DIRECTION OF TRAFFIC
- EXIST ROW
- EXIST FENCE
- FLOW
- ℄ DITCH
- F01 — FO1(D) — UG FIBEROPTICS (FIBERLIGHT)
- F02 — UG FIBEROPTICS (AT&T)
- T2 — T2(D) — UG TELEPHONE (AT&T)
- TEST HOLE

NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION OF ALL UTILITIES PRIOR TO STARTING WORK ON CULVERTS.
2. SEE EXISTING UTILITY LAYOUTS FOR ADDITIONAL INFORMATION ON TEST HOLES.
3. REFER TO CULVERT C-821 HEADWALL DETAIL SHEET FOR MORE DETAILS ON HEADWALL AND RIPRAP.

STATE OF TEXAS
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CULVERT C-821

HORZ SCALE: 1"=20'
VERT SCALE: 1"=10'
SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	93
CHECK JL	CONTROL	SECTION	JOB	
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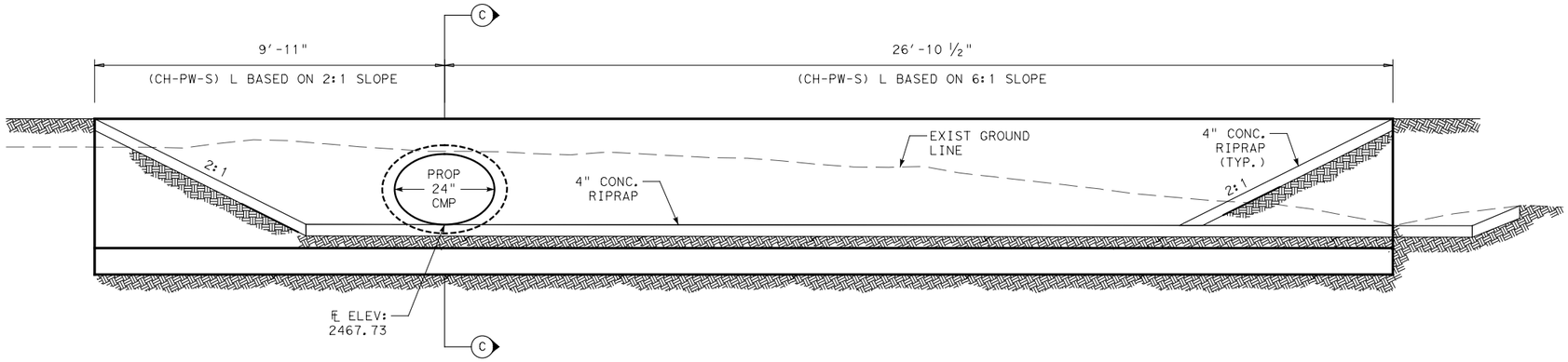
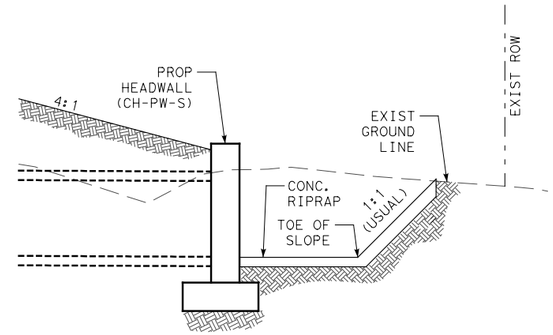


ELEVATION SECTION B-B

SCALE: 1" = 4′

0 1′ 2′ 3′ 4′



SECTION C-C

SCALE: 1" = 4′

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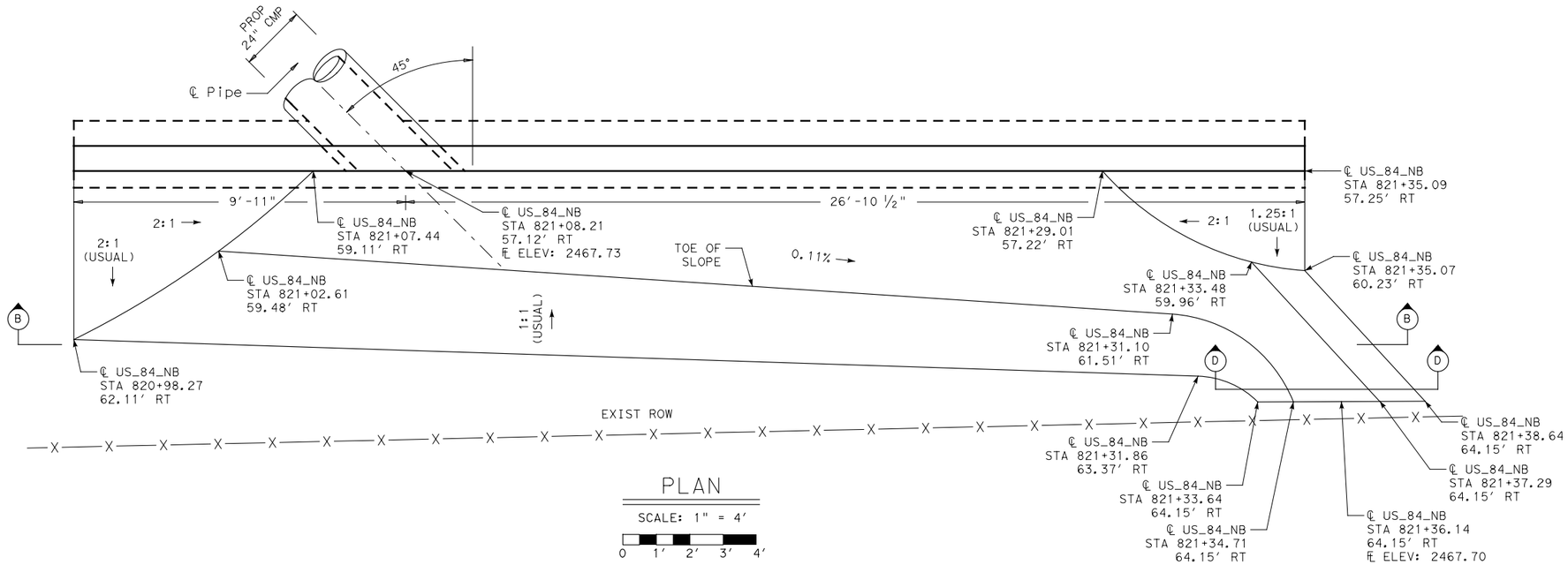


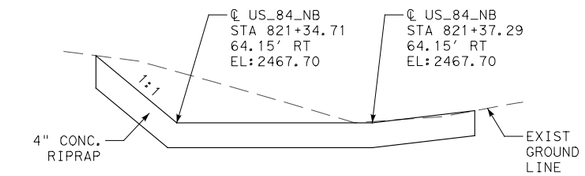
PLAN

SCALE: 1" = 4′

0 1′ 2′ 3′ 4′

GENERAL NOTES:

1. All of the work, labor and material related to the concrete headwall and riprap shown herein will be subsidiary to item 0432 and 0466 and no separate payment will be made.
2. Contractor to submit shop drawings of reinforcement for an approval prior to fabrication.



SECTION D-D

SCALE: 1" = 8′

0 2′ 4′ 6′ 8′

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CULVERT C-821 HEADWALL DETAIL

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	94
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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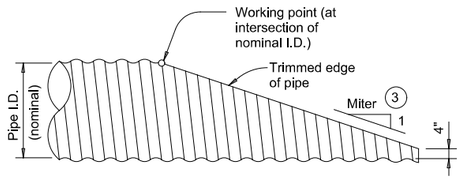
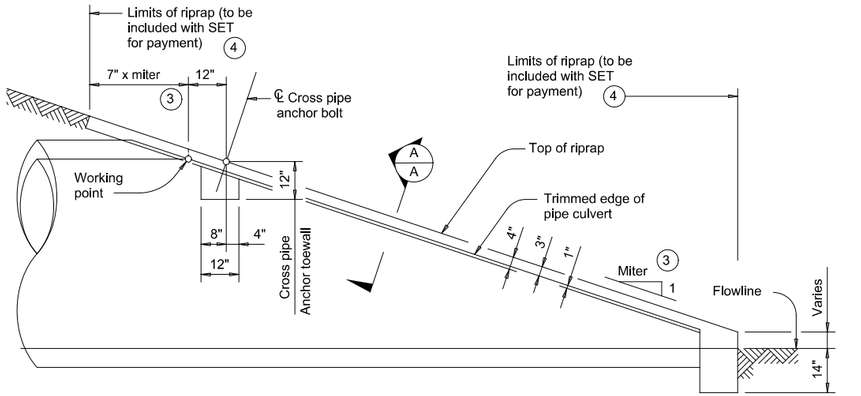


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

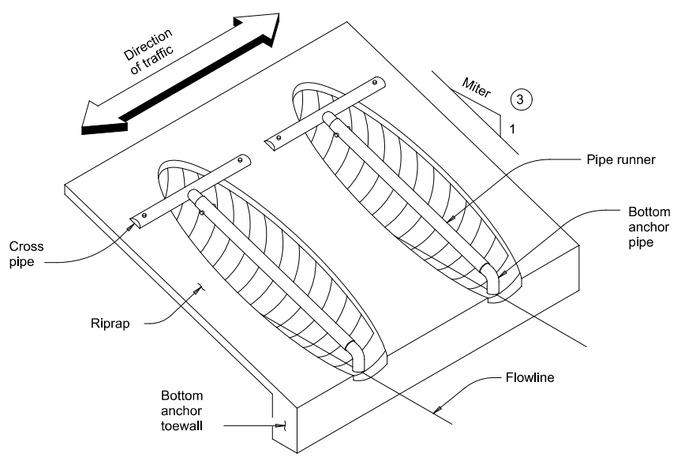
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

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

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

TYPICAL PIPE CULVERT MITERS (3)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

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

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

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

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

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

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

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

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

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

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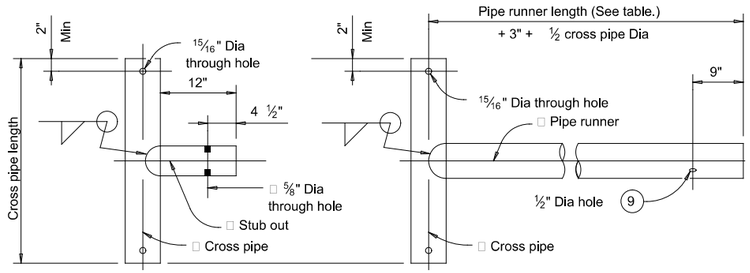
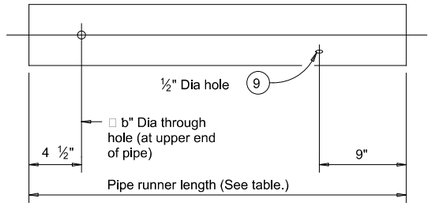


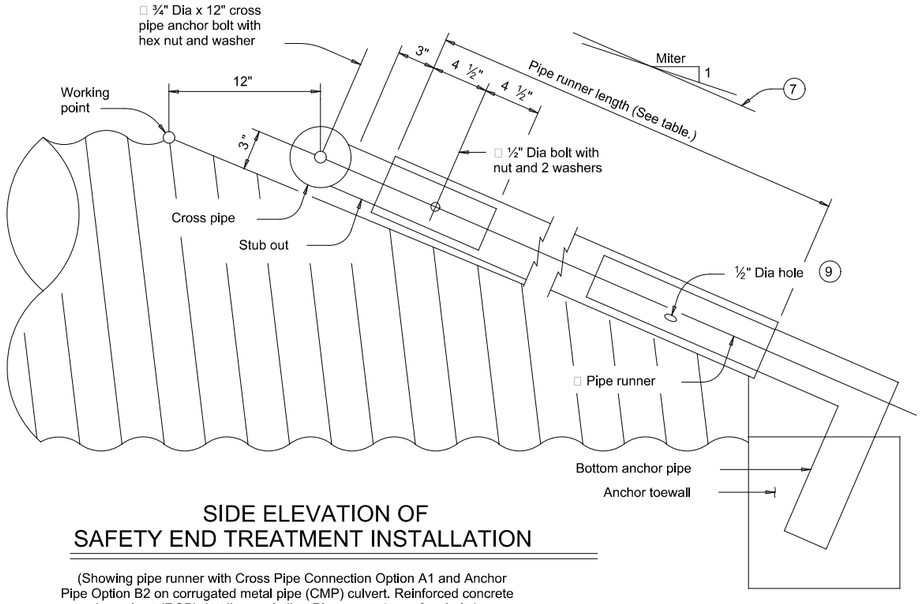
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



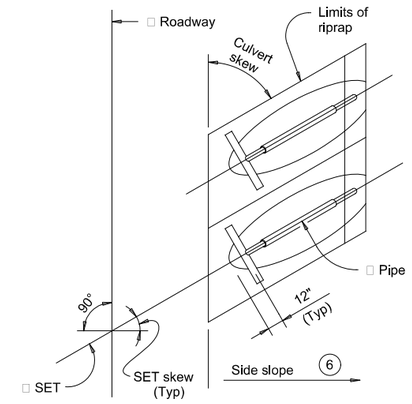
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

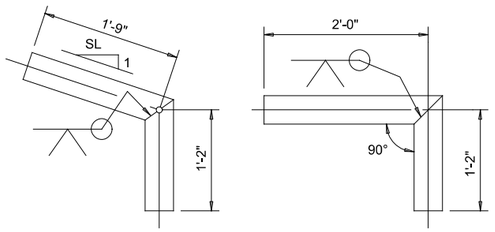


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

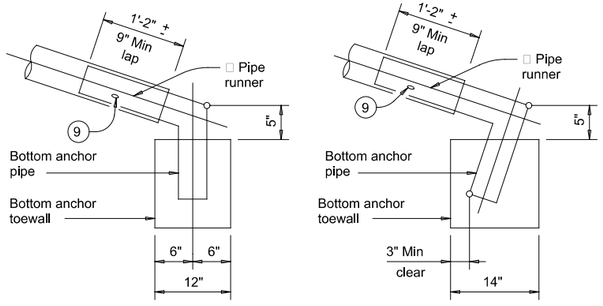


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

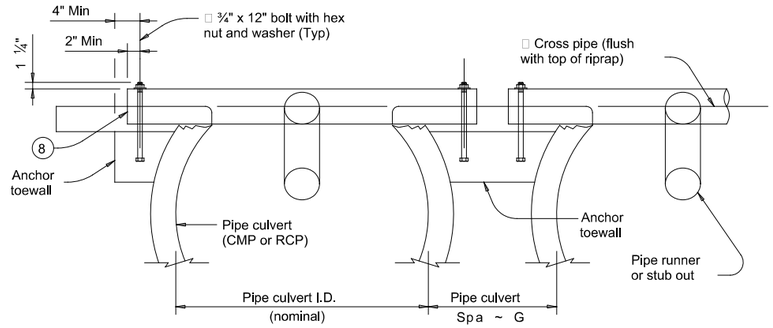
BOTTOM ANCHOR PIPE DETAILS (10)



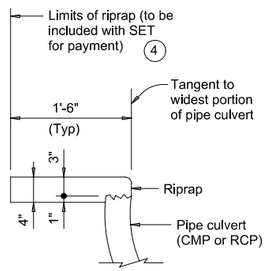
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

(9) After installation, inspect the ½" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

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

MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Payment for riprap and toewall is included in the price bid for each safety end treatment.
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

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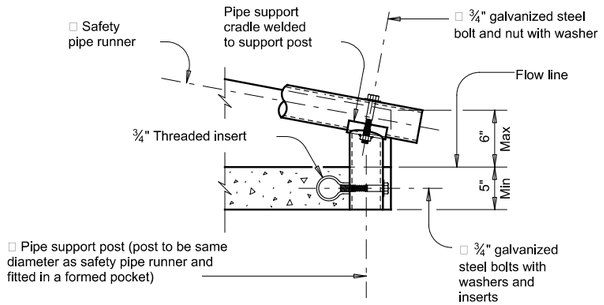
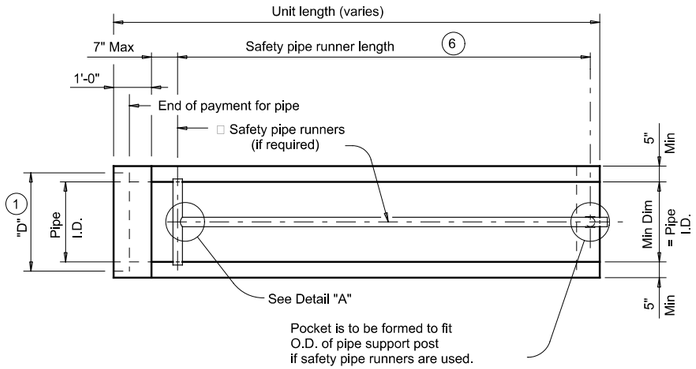
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe Skew	Single Pipe Pipe Runners Required	Multiple Pipes Skew	Multiple Pipes Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 ½"	N/A	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



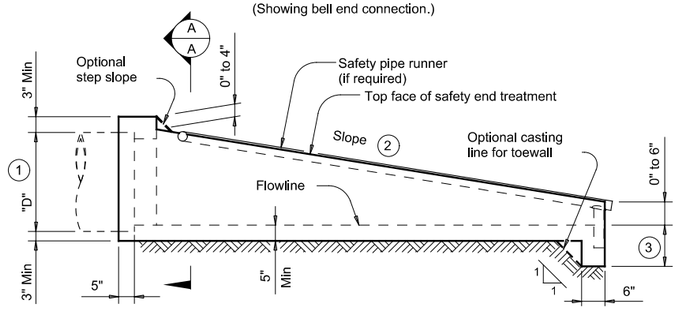
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



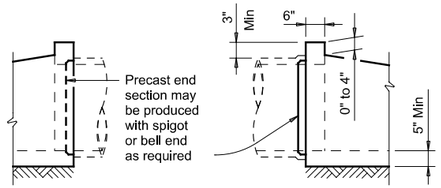
PLAN

(Showing bell end connection.)



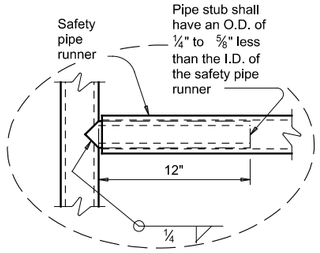
LONGITUDINAL ELEVATION

(Showing bell end connection.)



OPTIONAL JOINT FOR RCP

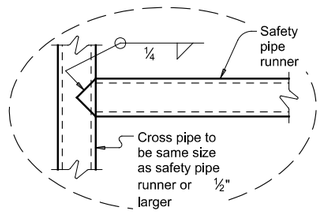
(Showing joint between RCP and precast safety end treatment)



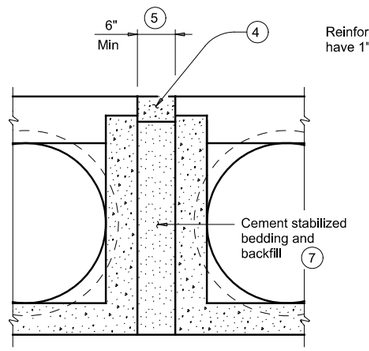
OPTION A

DETAIL A

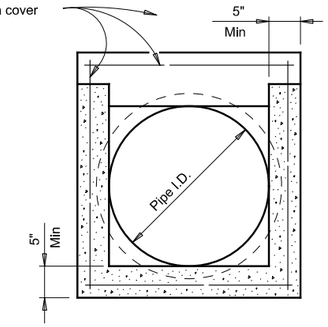
(If required)



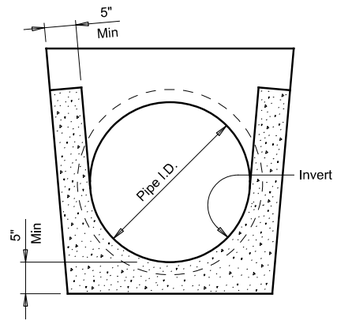
OPTION B



MULTIPLE PIPE INSTALLATION

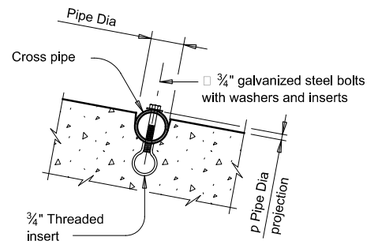


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size: Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

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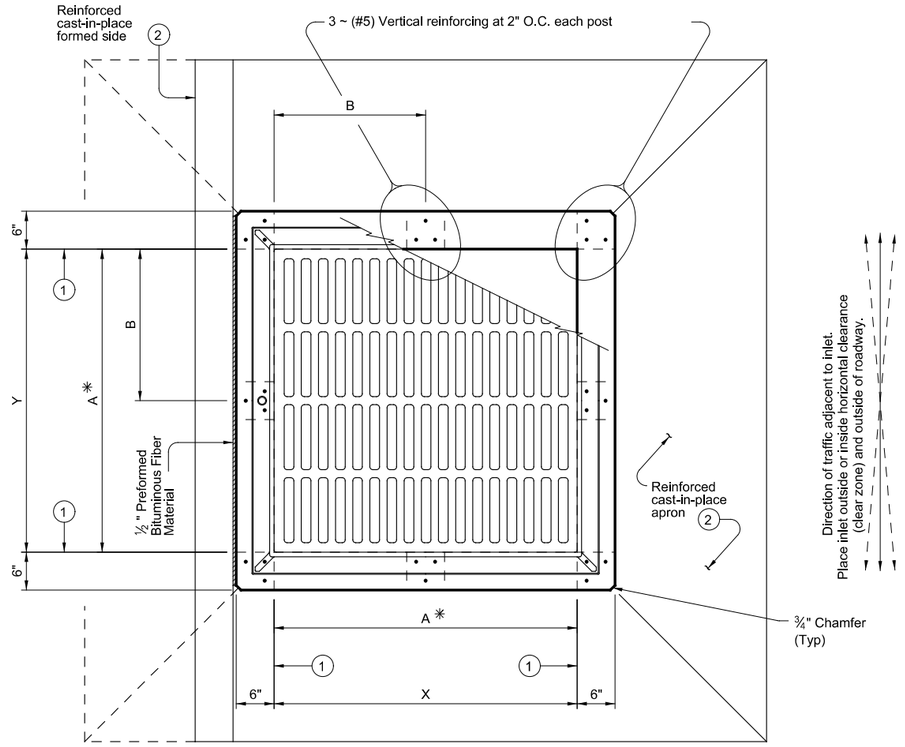
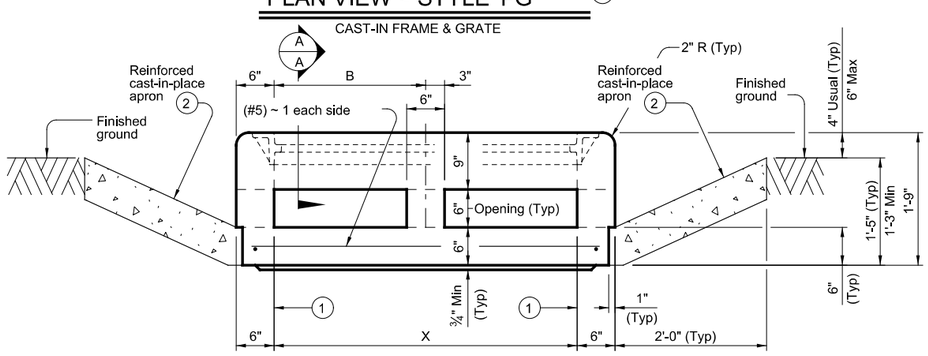
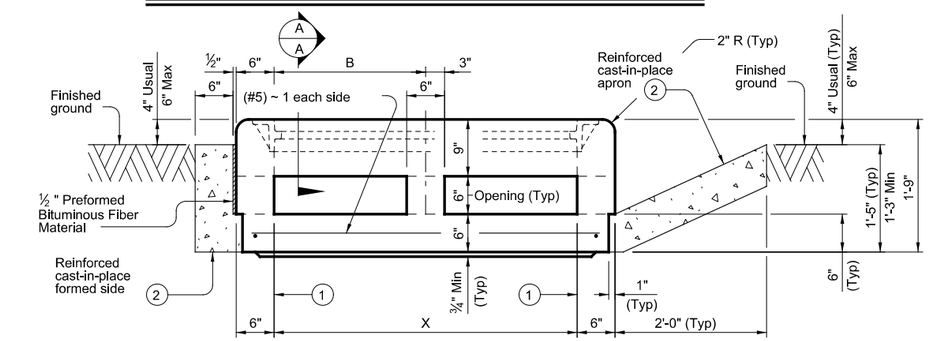


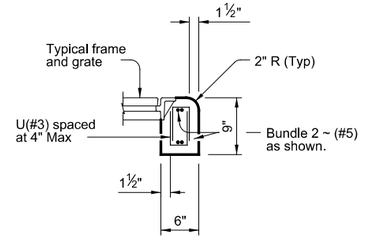
PLAN VIEW ~ STYLE 'FG' (3)



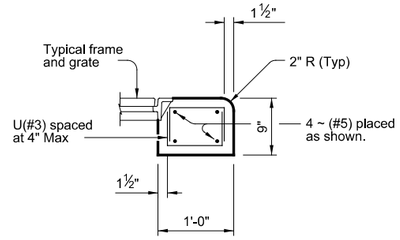
ELEVATION VIEW WITHOUT FORMED SIDE (4)



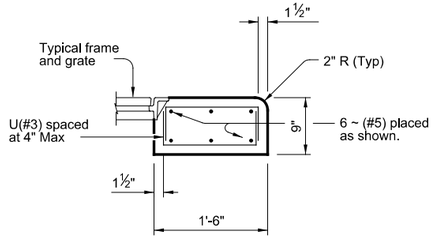
ELEVATION VIEW WITH FORMED SIDE (4)



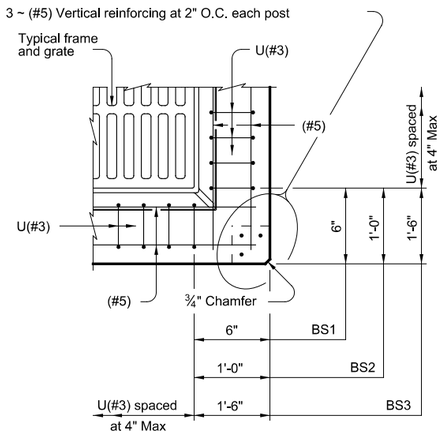
SECTION A-A ~ BS1



SECTION A-A ~ BS2

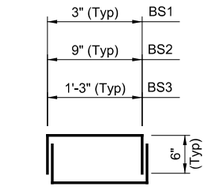


SECTION A-A ~ BS3



TYPICAL CORNER REINFORCING PLAN DETAIL

Showing BS2 other beam sections similar.



BARS U (#3)

Showing one complete bar.

Style	Size (X x Y)	A x A ✳	B x B	Beam Section
FG	3'x3'	3'x3'	1.5'x1.5'	BS1
FG	4'x4'	3'x3'	2'x2'	BS2
FG	4'x4'	4'x4'	2'x2'	BS1
FG	5'x5'	3'x3'	2.5'x2.5'	BS3
FG	5'x5'	4'x4'	2.5'x2.5'	BS2

✳ Nominal frame/grate size.

1. Matches inside face of wall of precast base or riser below inlet.
2. Construct cast-in-place reinforced concrete with or without formed side. Place formed side/sides as directed elsewhere in the plans. Formed sides may only be used on sides parallel to traffic. Use Class "C" concrete. Apron and formed side reinforcing not shown for clarity. Apron and formed side are subsidiary to PAZD-CZ. Apron is 2'-0" width around precast zone drain, unless an optional formed side is used. For apron and formed side, provide (#4) reinforcing at 12" O.C.
3. Top slab reinforcing not shown for clarity.
4. Top slab reinforcing and post reinforcing not shown for clarity.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide clear cover of ¾" to reinforcing from bottom of slab and 2" to reinforcing from top of slab for structural reinforcement.
4. Provide 1 ½" end cover on (#5) reinforcing.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
6. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast Area Zone Drain within Clear Zone (PAZD-CZ) is for use in ditches and medians outside and inside of the horizontal clearance (clear zone). PAZD-CZ is never placed in the roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST AREA ZONE DRAIN WITHIN CLEAR ZONE

PAZD-CZ

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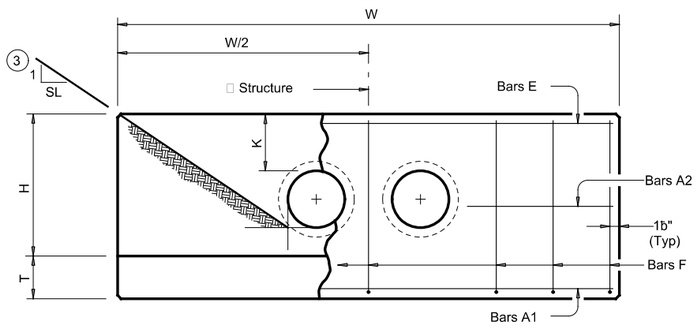
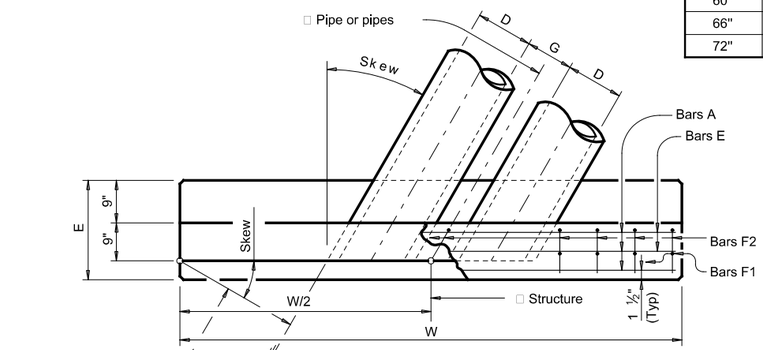
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	15° Skew						30° Skew						45° Skew					
		Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' - 4"	124	1.1	1' - 9 ¾"	15	0.2	10' - 5"	130	1.2	2' - 0"	16	0.2	12' - 9"	159	1.5	2' - 5 ¾"	17	0.3
	15"	10' - 7"	136	1.3	2' - 3"	17	0.2	11' - 10"	159	1.5	2' - 6"	18	0.2	14' - 6"	191	1.8	3' - 0 ¾"	20	0.3
	18"	11' - 11"	165	1.5	2' - 9"	19	0.3	13' - 3"	174	1.7	3' - 1"	29	0.3	16' - 3"	207	2.1	3' - 9 ¼"	33	0.4
	21"	13' - 2"	203	1.9	3' - 2 ¼"	31	0.4	14' - 9"	233	2.1	3' - 6 ¾"	33	0.4	18' - 0"	276	2.6	4' - 4 ¼"	36	0.5
	24"	14' - 6"	240	2.1	3' - 8 ¼"	34	0.4	16' - 2"	251	2.4	4' - 1 ¾"	36	0.5	19' - 10"	318	2.9	5' - 0 ¾"	39	0.6
	27"	15' - 9"	258	2.5	4' - 0 ¾"	38	0.5	17' - 7"	292	2.8	4' - 6 ¼"	39	0.6	21' - 7"	342	3.4	5' - 6 ¼"	44	0.7
	30"	17' - 1"	297	2.8	4' - 5 ¾"	40	0.6	19' - 1"	311	3.1	5' - 0"	42	0.6	23' - 4"	388	3.8	6' - 1 ¾"	47	0.8
	33"	18' - 5"	320	3.3	4' - 9 ¾"	43	0.6	20' - 6"	358	3.6	5' - 4 ¾"	46	0.7	25' - 1"	439	4.4	6' - 7 ¼"	51	0.9
	36"	19' - 8"	401	4.0	5' - 3"	47	0.9	21' - 11"	422	4.5	5' - 10 ¾"	50	0.9	26' - 10"	517	5.5	7' - 2 ¼"	55	1.2
	42"	22' - 3"	476	5.0	6' - 0 ¾"	53	1.1	24' - 10"	528	5.6	6' - 8 ¾"	56	1.2	30' - 5"	634	6.9	8' - 3"	76	1.4
	48"	25' - 11"	577	6.6	6' - 9 ¾"	60	1.3	28' - 10"	637	7.3	7' - 7 ¼"	79	1.5	35' - 4"	791	9.0	9' - 3 ¾"	88	1.8
	54"	28' - 6"	711	7.8	7' - 9"	83	1.6	31' - 9"	781	8.7	8' - 8"	81	1.8	38' - 11"	958	10.7	10' - 7 ¼"	97	2.2
	60"	31' - 1"	805	9.2	8' - 6 ¼"	91	1.9	34' - 8"	881	10.2	9' - 6 ¼"	97	2.1	42' - 5"	1,113	12.5	11' - 8"	124	2.6
	66"	33' - 8"	907	10.6	9' - 0 ¾"	98	2.1	37' - 6"	1,028	11.8	10' - 1 ¼"	102	2.4	46' - 0"	1,235	14.5	12' - 4 ¼"	132	2.9
	72"	36' - 3"	1,071	12.1	9' - 8"	105	2.4	40' - 5"	1,207	13.5	10' - 9 ¼"	110	2.6	49' - 6"	1,446	16.6	13' - 2 ¼"	141	3.2
3:1	12"	13' - 6"	178	1.6	1' - 9 ¾"	15	0.2	15' - 0"	189	1.8	2' - 0"	15	0.2	18' - 5"	237	2.2	2' - 5 ¾"	17	0.2
	15"	15' - 3"	212	1.9	2' - 3"	17	0.2	17' - 0"	223	2.1	2' - 6"	17	0.3	20' - 10"	276	2.6	3' - 0 ¾"	20	0.3
	18"	17' - 1"	231	2.3	2' - 9"	19	0.3	19' - 1"	259	2.5	3' - 1"	29	0.3	23' - 4"	318	3.1	3' - 9 ¼"	32	0.4
	21"	18' - 11"	306	2.7	3' - 2 ¼"	31	0.4	21' - 1"	339	3.0	3' - 6 ¾"	33	0.4	25' - 10"	413	3.7	4' - 4 ¼"	36	0.5
	24"	20' - 8"	345	3.1	3' - 8 ¾"	35	0.4	23' - 1"	384	3.5	4' - 1 ¾"	36	0.5	28' - 3"	462	4.2	5' - 0 ¾"	40	0.6
	27"	22' - 6"	376	3.7	4' - 0 ¾"	38	0.5	25' - 1"	438	4.1	4' - 6 ¼"	39	0.6	30' - 9"	522	5.0	5' - 6 ¼"	44	0.7
	30"	24' - 4"	422	4.1	4' - 5 ¾"	40	0.6	27' - 2"	466	4.6	5' - 0"	42	0.6	33' - 3"	578	5.6	6' - 1 ¾"	47	0.8
	33"	26' - 2"	476	4.8	4' - 10"	43	0.6	29' - 2"	522	5.3	5' - 4 ¾"	46	0.7	35' - 9"	644	6.5	6' - 7 ¼"	51	0.9
	36"	27' - 11"	590	5.9	5' - 3"	47	0.8	31' - 2"	645	6.6	5' - 10 ¾"	50	0.9	38' - 2"	787	8.0	7' - 2 ¼"	56	1.2
	42"	31' - 7"	684	7.3	6' - 0 ¼"	53	1.1	35' - 3"	776	8.2	6' - 8 ¾"	56	1.2	43' - 2"	933	10.0	8' - 3"	79	1.4
	48"	36' - 9"	880	9.6	6' - 9 ¾"	61	1.3	41' - 0"	953	10.7	7' - 7 ¼"	81	1.5	50' - 2"	1,166	13.1	9' - 3 ¾"	88	1.8
	54"	40' - 5"	1,065	11.4	7' - 9"	85	1.6	45' - 0"	1,185	12.7	8' - 8"	89	1.8	55' - 2"	1,435	15.5	10' - 7 ¼"	97	2.2
	60"	44' - 0"	1,224	13.3	8' - 6 ¼"	93	1.9	49' - 1"	1,356	14.8	9' - 6 ¼"	96	2.1	60' - 1"	1,635	18.2	11' - 8"	124	2.6
	66"	47' - 7"	1,357	15.4	9' - 1"	98	2.1	53' - 1"	1,497	17.2	10' - 1 ¼"	103	2.3	65' - 1"	1,892	21.1	12' - 4 ¼"	130	2.9
	72"	51' - 3"	1,624	17.7	9' - 8"	105	2.3	57' - 2"	1,787	19.7	10' - 9 ¼"	109	2.6	70' - 0"	2,218	24.1	13' - 2 ¼"	139	3.2
4:1	12"	17' - 7"	232	2.1	1' - 9 ¾"	15	0.2	19' - 8"	259	2.4	2' - 0"	16	0.2	24' - 0"	314	2.9	2' - 5 ¾"	18	0.2
	15"	19' - 11"	272	2.5	2' - 3"	17	0.2	22' - 3"	301	2.8	2' - 6"	18	0.3	27' - 3"	361	3.5	3' - 0 ¾"	21	0.3
	18"	22' - 3"	313	3.0	2' - 9"	19	0.3	24' - 10"	344	3.3	3' - 1"	29	0.3	30' - 5"	427	4.0	3' - 9 ¼"	32	0.4
	21"	24' - 7"	407	3.6	3' - 2 ¼"	31	0.4	27' - 5"	446	4.0	3' - 6 ¾"	33	0.4	33' - 7"	549	4.9	4' - 4 ¼"	36	0.5
	24"	26' - 11"	455	4.1	3' - 8 ¾"	35	0.4	30' - 0"	499	4.5	4' - 1 ¾"	36	0.5	36' - 9"	609	5.6	5' - 0 ¾"	40	0.6
	27"	29' - 3"	514	4.8	4' - 0 ¾"	38	0.5	32' - 7"	562	5.4	4' - 6 ¼"	40	0.6	39' - 11"	703	6.6	5' - 6 ¼"	43	0.7
	30"	31' - 7"	568	5.4	4' - 5 ¾"	40	0.6	35' - 3"	620	6.0	5' - 0"	42	0.6	43' - 2"	768	7.4	6' - 1 ¾"	49	0.8
	33"	33' - 11"	634	6.2	4' - 10"	43	0.7	37' - 10"	710	7.0	5' - 4 ¾"	46	0.7	46' - 4"	848	8.5	6' - 7 ¼"	52	0.9
	36"	36' - 3"	776	7.7	5' - 3"	48	0.9	40' - 5"	868	8.6	5' - 10 ¾"	49	0.9	49' - 6"	1,058	10.6	7' - 2 ¼"	56	1.1
	42"	40' - 11"	921	9.6	6' - 0 ¼"	53	1.0	45' - 7"	1,022	10.7	6' - 8 ¾"	57	1.2	55' - 10"	1,262	13.1	8' - 3"	78	1.4
	48"	47' - 7"	1,152	12.6	6' - 10"	61	1.3	53' - 1"	1,268	14.0	7' - 7 ¼"	80	1.5	65' - 1"	1,587	17.2	9' - 3 ¾"	86	1.8
	54"	52' - 3"	1,416	14.9	7' - 9 ¼"	86	1.6	58' - 4"	1,589	16.6	8' - 8"	89	1.8	71' - 5"	1,924	20.4	10' - 7 ¼"	95	2.2
	60"	56' - 11"	1,606	17.5	8' - 6 ¾"	92	1.9	63' - 6"	1,806	19.5	9' - 6 ¼"	95	2.1	77' - 9"	2,192	23.9	11' - 8"	122	2.6
	66"	61' - 7"	1,819	20.2	9' - 0 ¾"	97	2.1	68' - 8"	2,019	22.5	10' - 1 ¼"	101	2.4	84' - 2"	2,472	27.6	12' - 4 ¼"	131	2.9
	72"	66' - 3"	2,150	23.2	9' - 8"	104	2.4	73' - 11"	2,379	25.9	10' - 9 ¼"	108	2.6	90' - 6"	2,937	31.7	13' - 2 ¼"	138	3.2
6:1	12"	25' - 11"	342	3.1	1' - 9 ¾"	15	0.2	28' - 10"	374	3.5	2' - 0"	16	0.2	35' - 4"	456	4.3	2' - 5 ¾"	17	0.2
	15"	29' - 3"	390	3.7	2' - 3"	17	0.2	32' - 7"	442	4.2	2' - 6"	18	0.2	39' - 11"	549	5.1	3' - 0 ¾"	20	0.3
	18"	32' - 7"	459	4.4	2' - 9"	20	0.3	36' - 4"	515	4.9	3' - 1"	29	0.3	44' - 7"	629	6.0	3' - 9 ¼"	33	0.4
	21"	36' - 0"	608	5.3	3' - 2 ¼"	31	0.4	40' - 2"	660	5.9	3' - 6 ¾"	33	0.4	49' - 2"	823	7.2	4' - 4 ¼"	38	0.5
	24"	39' - 4"	672	6.0	3' - 8 ¾"	35	0.4	43' - 11"	748	6.7	4' - 1 ¾"	36	0.5	53' - 9"	920	8.2	5' - 0 ¾"	42	0.6
	27"	42' - 8"	770	7.1	4' - 0 ¾"	38	0.5	47' - 8"	852	8.0	4' - 6 ¼"	41	0.5	58' - 4"	1,039	9.7	5' - 6 ¼"	45	0.7
	30"	46' - 1"	839	8.0	4' - 5 ¾"	40	0.6	51' - 5"	949	8.9	5' - 0"	44	0.6	62' - 11"	1,162	10.9	6' - 1 ¾"	48	0.8
	33"	49' - 5"	947	9.2	4' - 10"	45	0.7	55' - 2"	1,040	10.3	5' - 4 ¾"	48	0.7	67' - 6"	1,292	12.6	6' - 7 ¼"	50	0.9
	36"	52' - 10"	1,151	11.4	5' - 3"	49	0.8	58' - 11"	1,287	12.7	5' - 10 ¾"	51	1.0	72' - 1"	1,583	15.6	7' - 2 ¼"	55	1.1
	42"	59' - 6"	1,365	14.2	6' - 0 ¼"	55	1.0	66' - 5"	1,530	15.8	6' - 8 ¾"	57	1.2	81' - 4"	1,875	19.4	8' - 3"	76	1.4
	48"	69' - 4"	1,737	18.5	6' - 10"	59	1.3	77' - 4"	1,942	20.7	7' - 7 ¼"	79	1.5	94' - 9"	2,368	25.3	9' - 3 ¾"	86	1.8
	54"	76' - 1"	2,138	22.0	7' - 9 ¼"	83	1.6	84' - 10"	2,378	24.6	8' - 8"	87	1.8	103' - 11"	2,912	30.1	10' - 7 ¼"	95	2.2
	60"	82' - 10"	2,426	25.8	8' - 6 ¾"	90	1.9	92' - 5"	2,681	28.8	9' - 6 ¼"	94	2.1	113' - 2"	3,294	35.3	11' - 8"	122	2.6
	66"	89' - 7"	2,730	29.9	9' - 0 ¾"	96	2.1	99' - 11"	3,038	33.3	10' - 1 ¼"	101	2.4	122' - 4"	3,697	40.8	12' - 4 ¼"	130	2.9
	72"	96' - 3"	3,218	34.2	9' - 8"	102	2.4	107' - 5"	3,580	38.2	10' - 9 ¼"	108	2.6	131' - 6"	4,372	46.8	13' - 2 ¼"	139	3.2

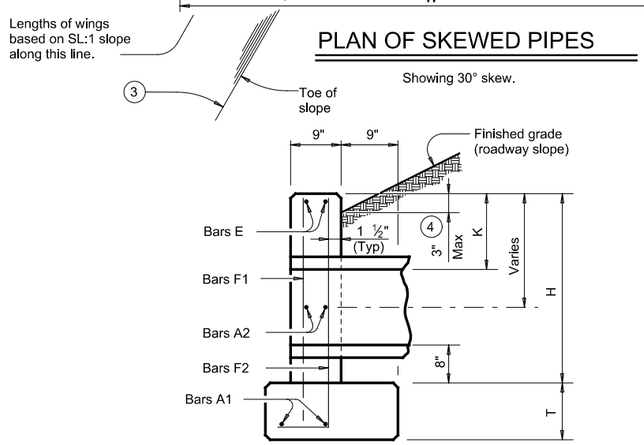


ELEVATION

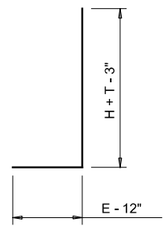


PLAN OF SKEWED PIPES

Showing 30° skew.



SECTION AT CENTER OF PIPE



BARS F2

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' - 9"	1' - 0"	2' - 8"	0' - 9"	1' - 9"
15"	0' - 11"	1' - 0"	2' - 11"	0' - 9"	1' - 9"
18"	1' - 2"	1' - 0"	3' - 2"	0' - 9"	1' - 9"
21"	1' - 4"	1' - 0"	3' - 5"	0' - 9"	2' - 0"
24"	1' - 7"	1' - 0"	3' - 8"	0' - 9"	2' - 0"
27"	1' - 8"	1' - 0"	3' - 11"	0' - 9"	2' - 3"
30"	1' - 10"	1' - 0"	4' - 2"	0' - 9"	2' - 3"
33"	1' - 11"	1' - 0"	4' - 5"	0' - 9"	2' - 6"
36"	2' - 1"	1' - 0"	4' - 8"	1' - 0"	2' - 6"
42"	2' - 4"	1' - 0"	5' - 2"	1' - 0"	2' - 9"
48"	2' - 7"	1' - 3"	5' - 11"	1' - 0"	3' - 0"
54"	3' - 0"	1' - 3"	6' - 5"	1' - 0"	3' - 3"
60"	3' - 3"	1' - 3"	6' - 11"	1' - 0"	3' - 6"
66"	3' - 3"	1' - 3"	7' - 5"	1' - 0"	3' - 9"
72"	3' - 4"	1' - 3"	7' - 11"	1' - 0"	4' - 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' - 6"	~
E	#5	~	2
F	#5	1' - 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

(1) Total quantites include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS
WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

CH-PW-S

FILE: chpwsste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		99

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

DATE: 4/26/2021 3:55:14 PM
chpwsste-20.dgn

UTILITY QUALITY LEVELS

(OBTAINED FROM ASCE PUBLICATION CI/ASCE STANDARD 38-02)

1. UTILITY QUALITY LEVEL D (QL D): INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

2. UTILITY QUALITY LEVEL C (QL C): INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.

3. UTILITY QUALITY LEVEL B (QL B): INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

4. UTILITY QUALITY LEVEL A (QL A): PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

GENERAL NOTES

1. THE UTILITIES DEPICTED WERE INVESTIGATED BY LAMB-STAR ENGINEERING, ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION, WERE PROVIDED BY OTHERS AND LAMB-STAR ENGINEERING DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 10/05/2020. LIMITS OF LAMB-STAR SUE INVESTIGATION ARE FROM STA 346+00 TO STA 838+00 AT SELECT ROADWAY CURVES AND INTERSECTIONS ALONG THE CENTERLINE OF US 84. LAMB-STAR ENGINEERING EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR SUE DATA PROVIDED BY OTHERS AND NEW UTILITY INSTALLATIONS OR MODIFICATIONS, AND ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME SURVEYED. CALL TEXAS 811 FOR UTILITY LOCATIONS 48-HOURS PRIOR TO ANY WORK.

4. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

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

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - FIBER LIGHT (QL-B) — FO1
- FIBER - FIBER LIGHT (QL-D) — FO1(D)
- FIBER - ATT (QL-B) — FO2
- FIBER - ATT (QL-D) — FO2(D)
- TELEPHONE - ATT (QL-B) — T2
- TELEPHONE - ATT (QL-D) — T2(D)

ELECTRIC
- ELECTRIC - TXDOT (QL-B) — E1
- OH ELECTRIC - BIG COUNTRY COOP (QL-C) — OE1
- OH ELECTRIC - UNKNOWN (QL-C) — OE2
- OH ELECTRIC - NEXTERA ENERGY (QL-C) — OHV1

GAS
- PIPELINE - KINDER MORGAN (QL-B) — PL1
- PIPELINE - CENTURION (QL-D) — PL2(D)

ELECTRIC
- ELECTRIC METER (EM)
- PULL BOX (PB)
- POWER POLE (WOOD) (PP)
- GUY WIRE

FIBER
- UNDERGROUND FIBER MARKER (F)
- FIBER TEST STATION (FTS)
- FIBER HAND HOLE (F)
- FIBER PEDESTAL

PIPELINE
- PIPELINE VENT

TELEPHONE
- SERVICE POLE TELEPHONE (T)
- TELEPHONE CABINET (T)
- TELEPHONE PEDESTAL (T)
- UNDERGROUND TELEPHONE MARKER (T)
- RT HUT (T)
- TELEPHONE VAULT (V)

TRAFFIC
- SIGNAL POLE TRAFFIC LIGHT (TSP)

Utility Type	Utility Owner	Utility Contact		
		Name	Phone Number	Email
Communications	AT&T	Michelle Bell		mb1712@att.com
Communications	Fiberlight	Adam Nickerson	682-321-8437	maintenance@fiberlight.com
Electric	Big Country Coop	Robert Bohall	325-776-2244	snyder@bigcountry.net
Electric	Nextera Energy	Doug Smoot	325-572-2009	Douglas.Smoot@nextenergy.com
Gas	Kinder Morgan	Ricky Elliott	325-207-6589	
Gas	Centurion	Ryvan McReynolds	713-806-3726	Ryan*McReynolds@centurionpl.com

STATE OF TEXAS
WILLIAM L. O'DELL
110163
PROFESSIONAL LICENSED ENGINEER
04/27/2021

LAMB-STAR ENGINEERING, L.L.C.
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PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation
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US 84

UTILITY NOTES & LEGEND

SHEET (01 OF 01)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	100
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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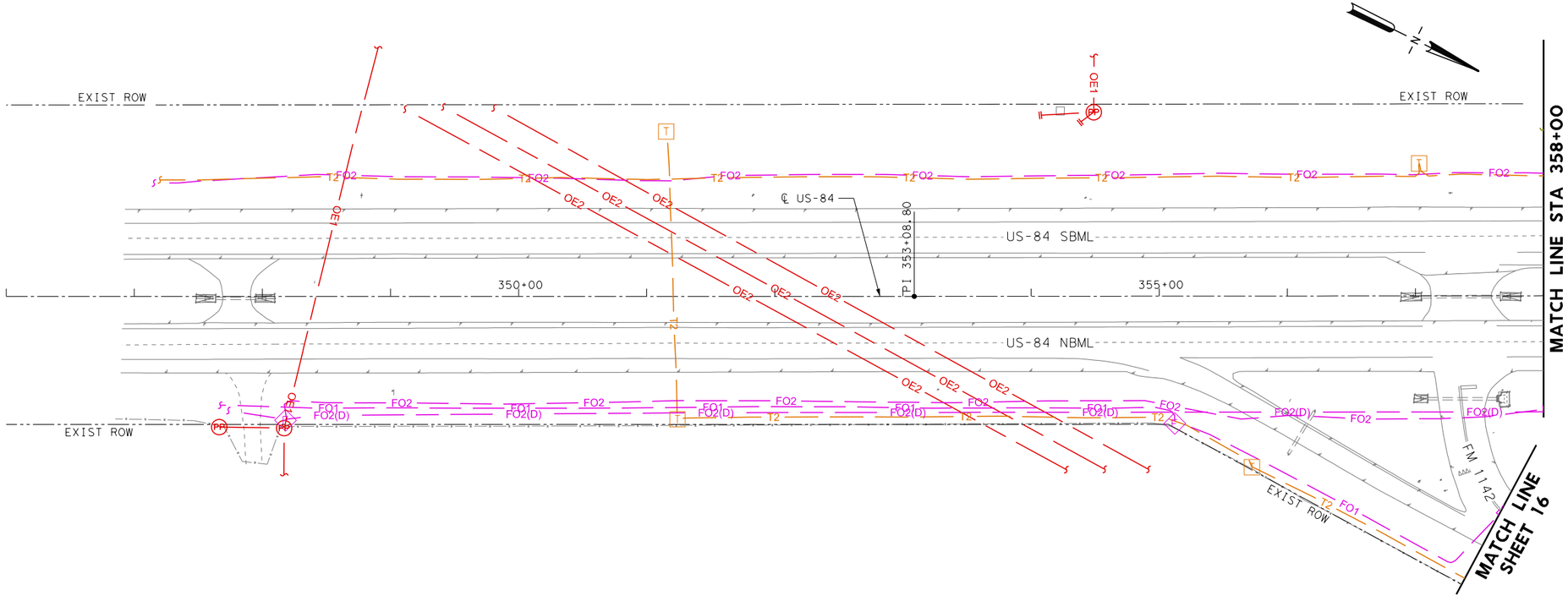

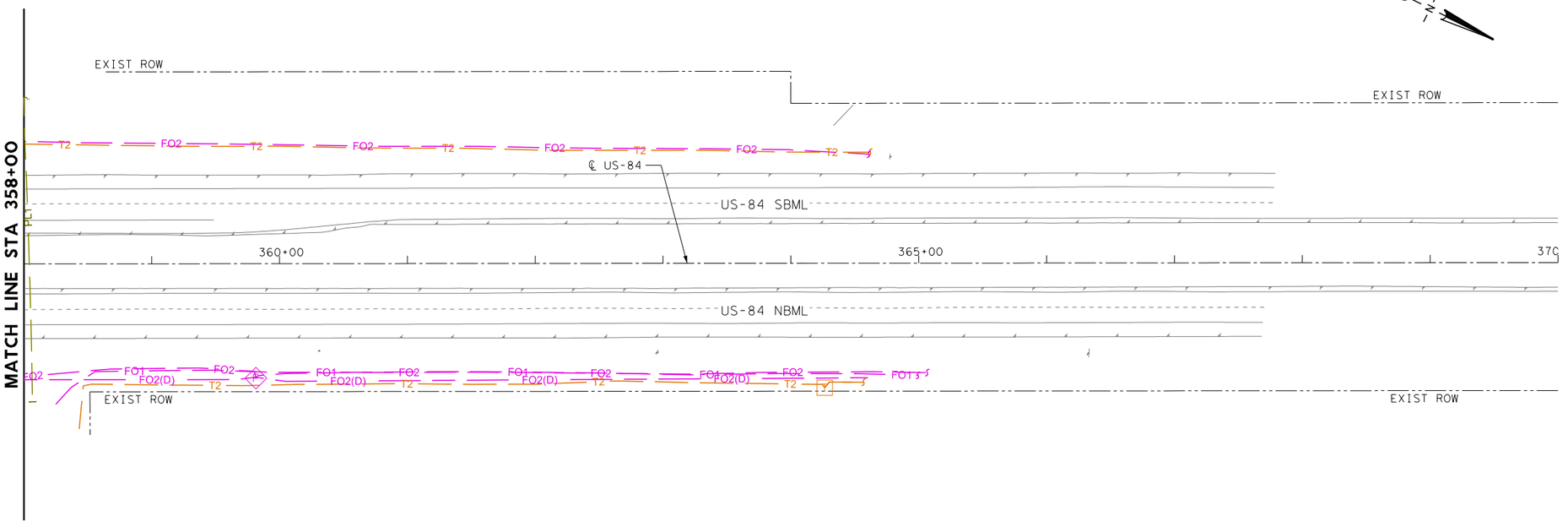

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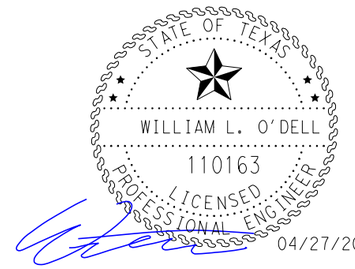
HORIZ SCALE: 1" = 100′



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EXISTING UTILITY LAYOUTS (BEGIN TO STA 370+00)

SHEET (01 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK LSE	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS LSE	TX	ABL	SCURRY	101
GRPH CHECK	CONTROL	SECTION	JOB	
LSE	0053	07	040	

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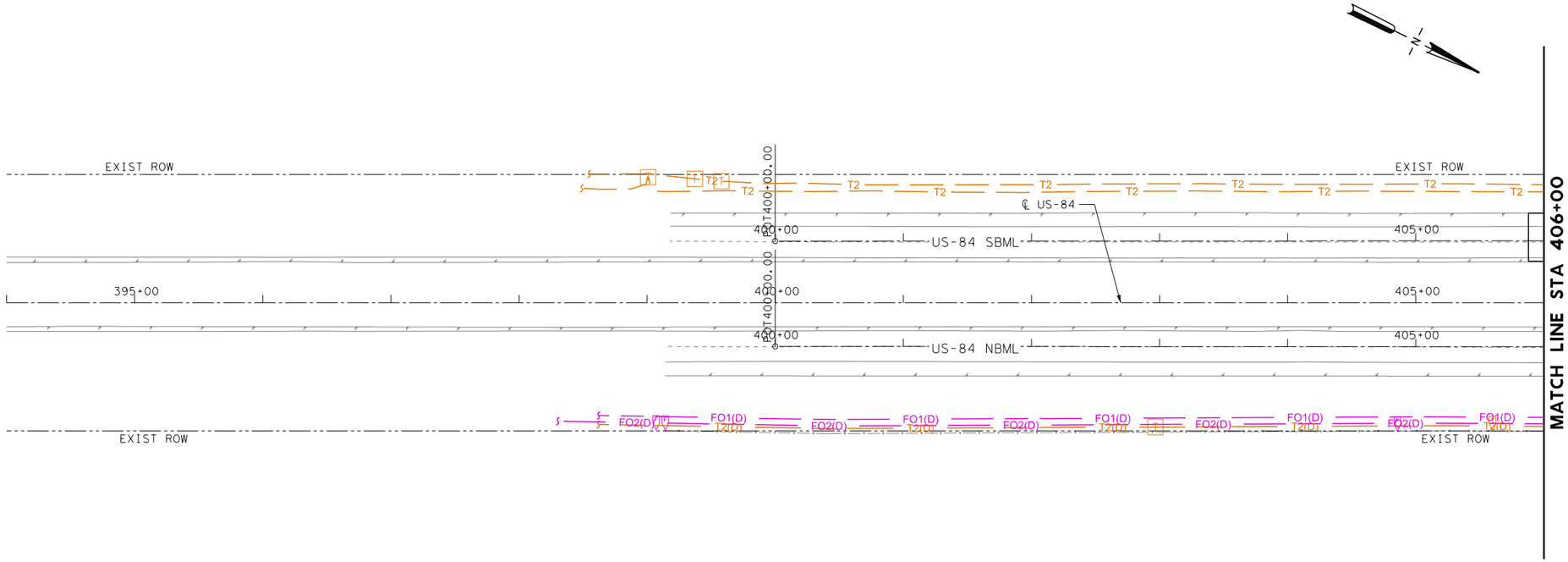

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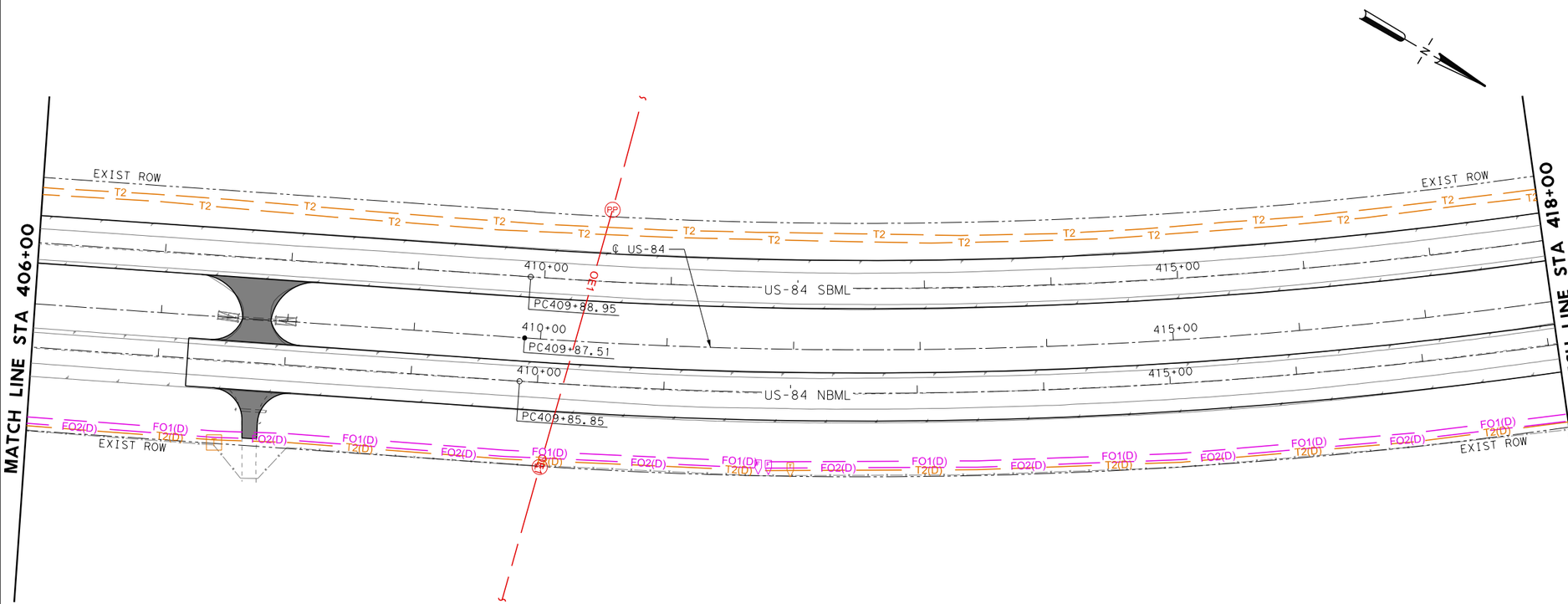
HORIZ SCALE: 1" = 100′



STATE OF TEXAS
WILLIAM L. O'DELL
110163
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04/27/2021

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EXISTING UTILITY LAYOUTS (STA 394+00 TO STA 418+00)

SHEET (02 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	102
GRPH CHECK				
LSE				

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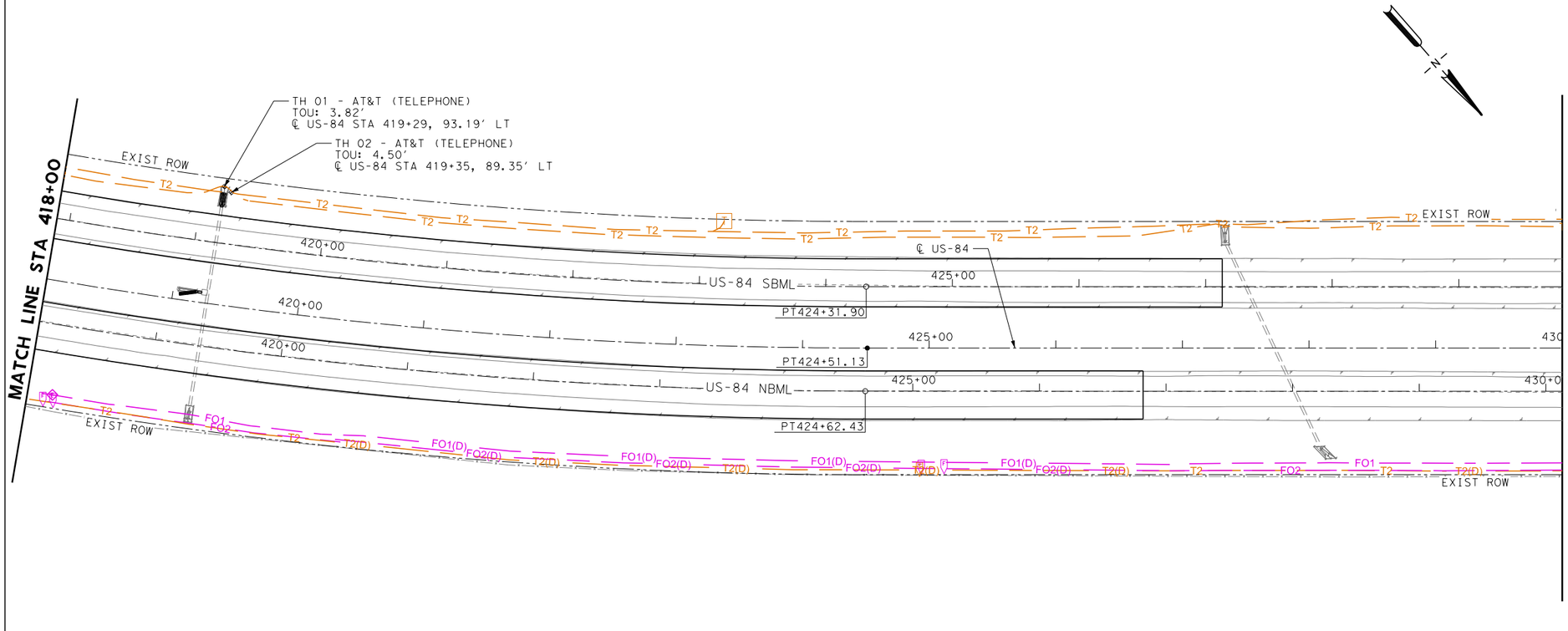

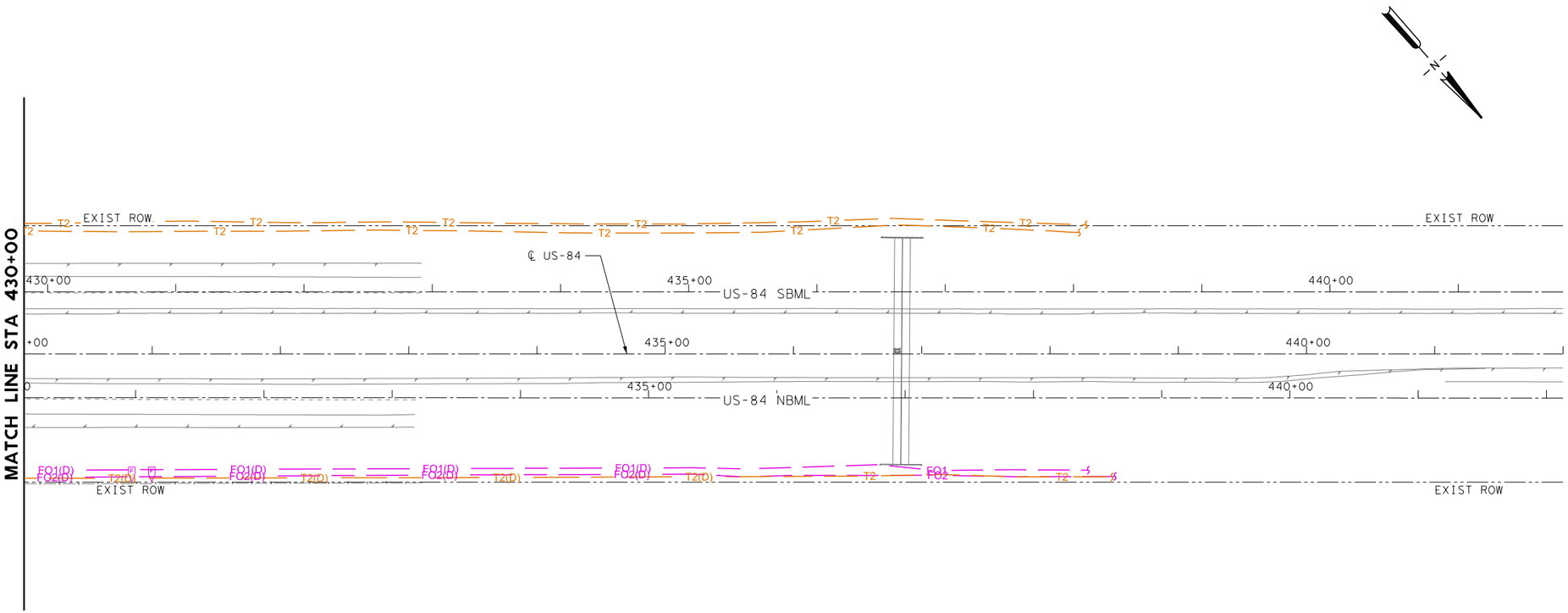

0 25' 50' 100'

HORIZ SCALE: 1" = 100'

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110163
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EXISTING UTILITY LAYOUTS (STA 418+00 TO STA 442+00)

SHEET (03 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	103
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

FILE: L:\Projects\B200848.03 - TNP - US 87+84 - TxDOT ABL Snyder\CAD\Eng\Sheets\LSE*US84*UTIL*04.dgn
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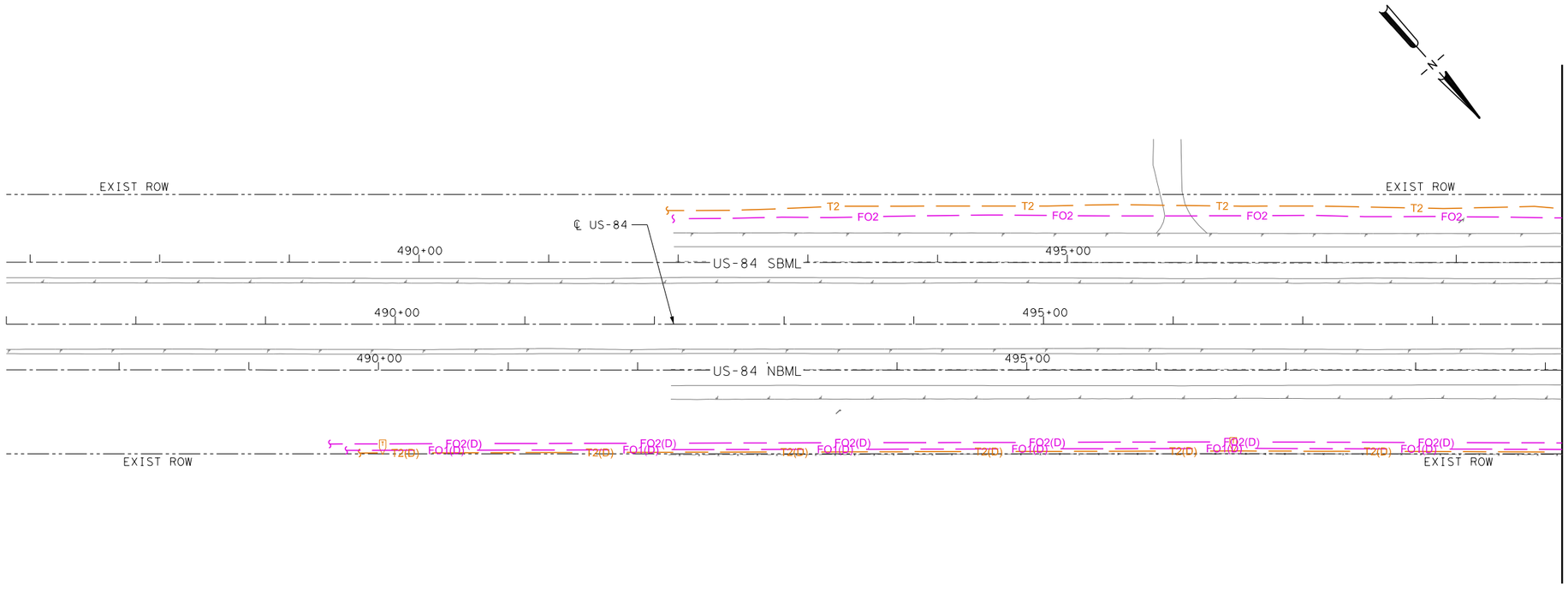

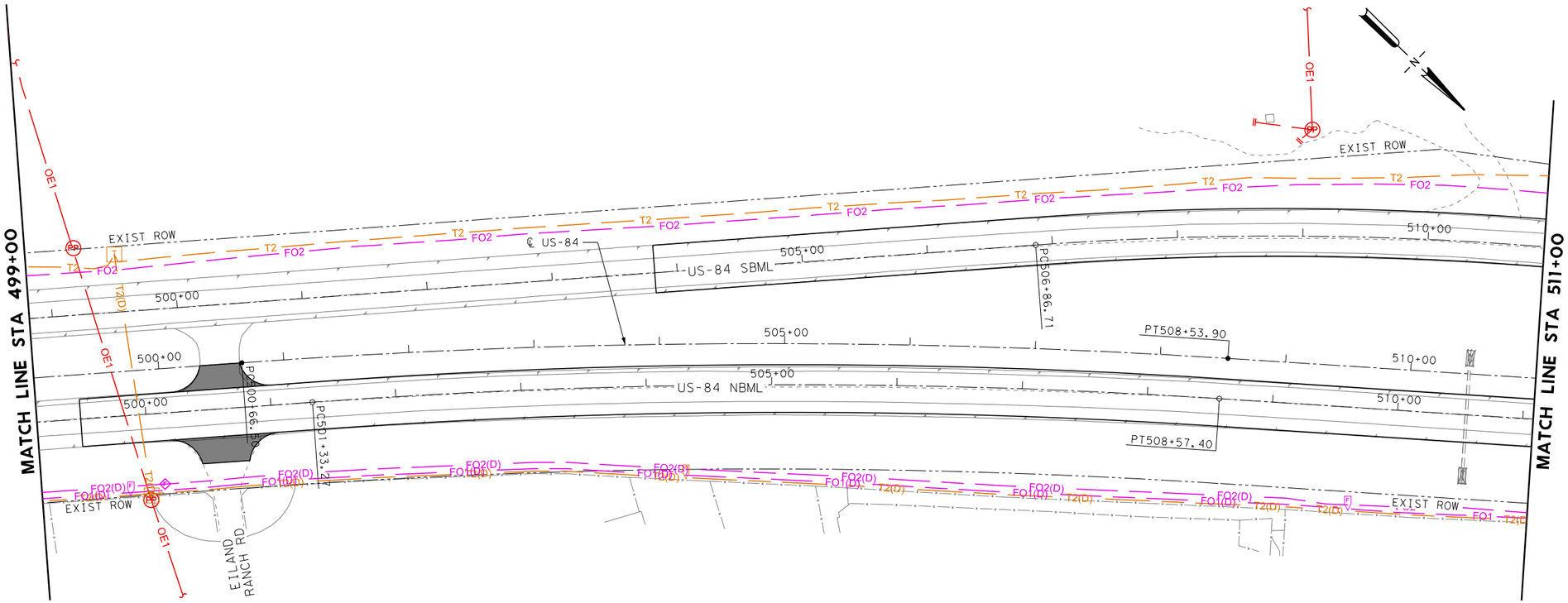

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 487+00 TO STA 511+00)

SHEET (04 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	104
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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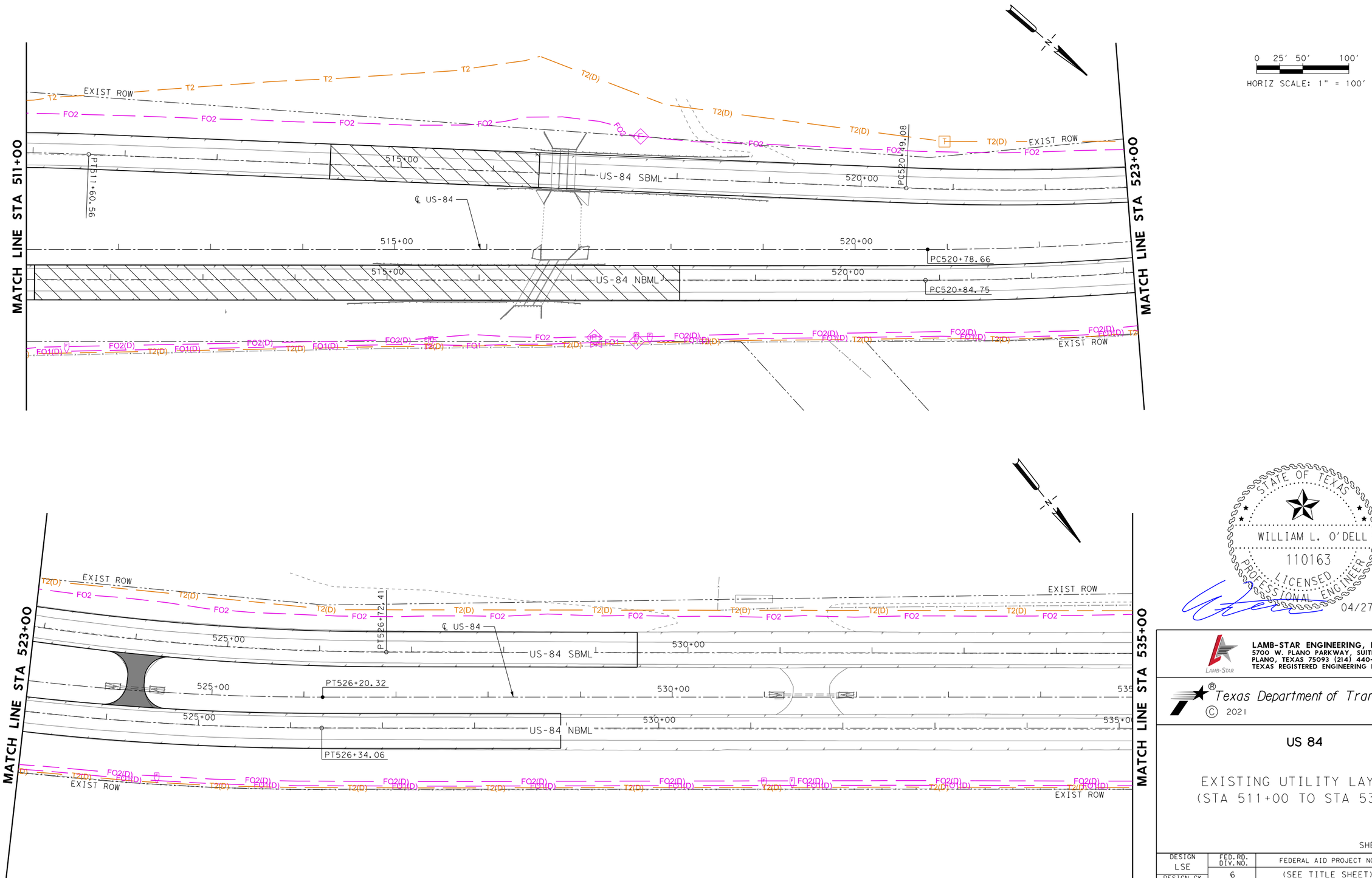

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EXISTING UTILITY LAYOUTS (STA 511+00 TO STA 535+00)

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DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	105
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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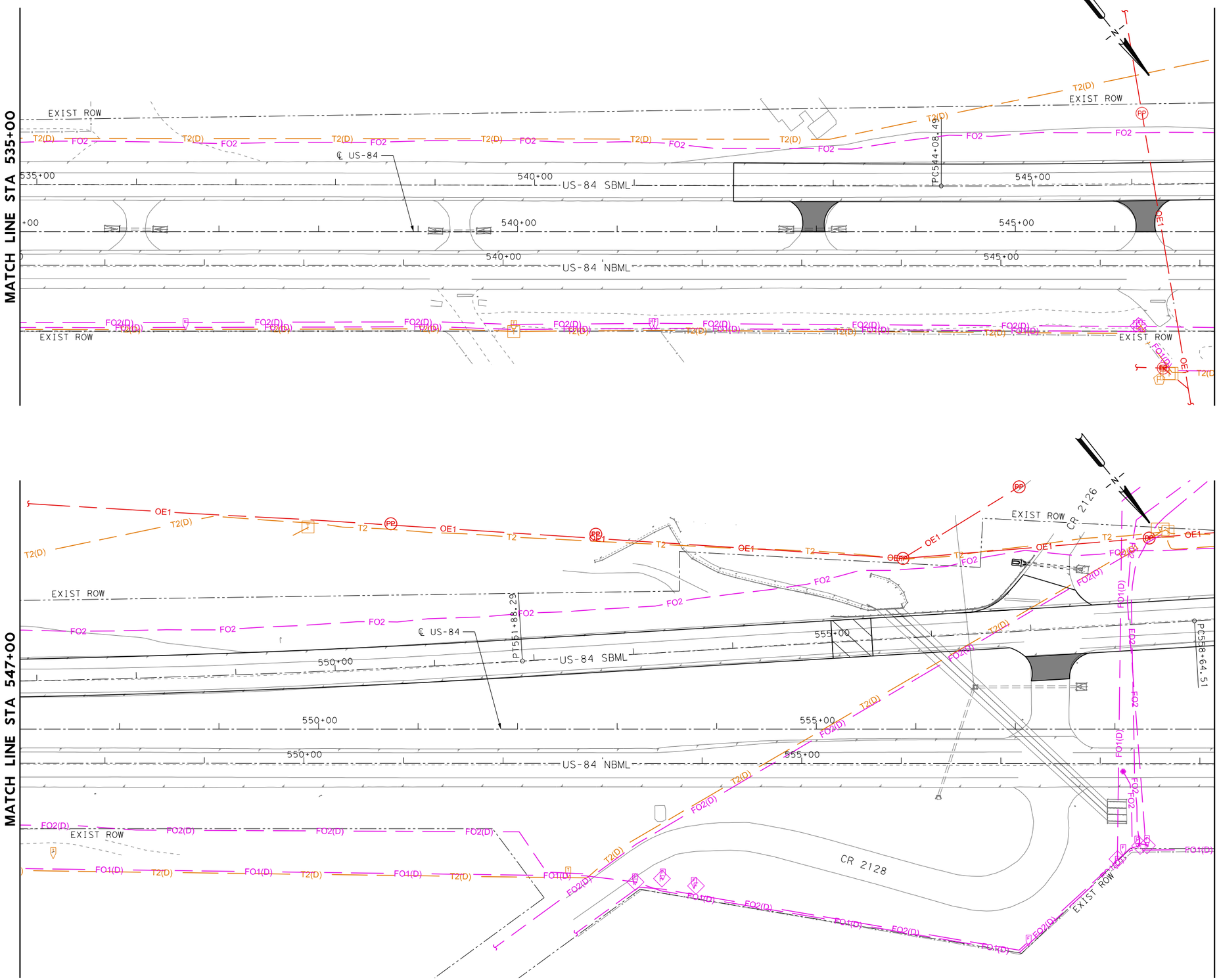

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 535+00 TO STA 559+00)

SHEET (06 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	
GRAPHICS	CONTROL	SECTION	JOB	106
LSE				
GRPH CHECK	0053	07	040	
LSE				

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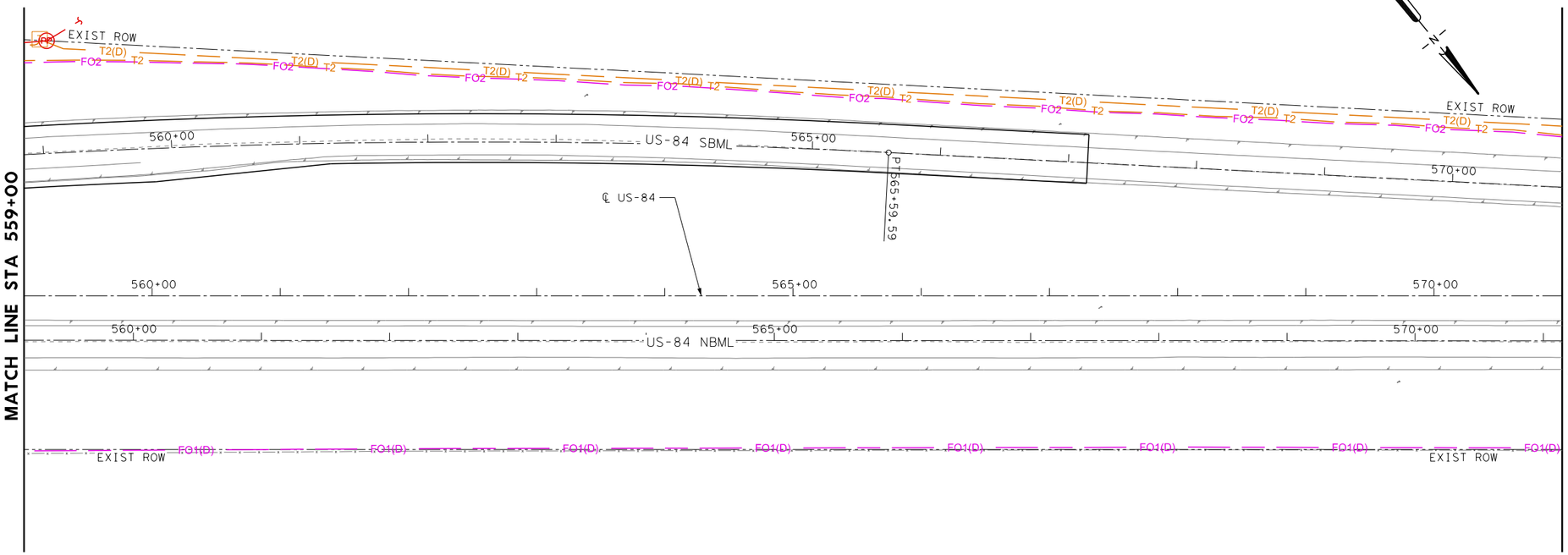

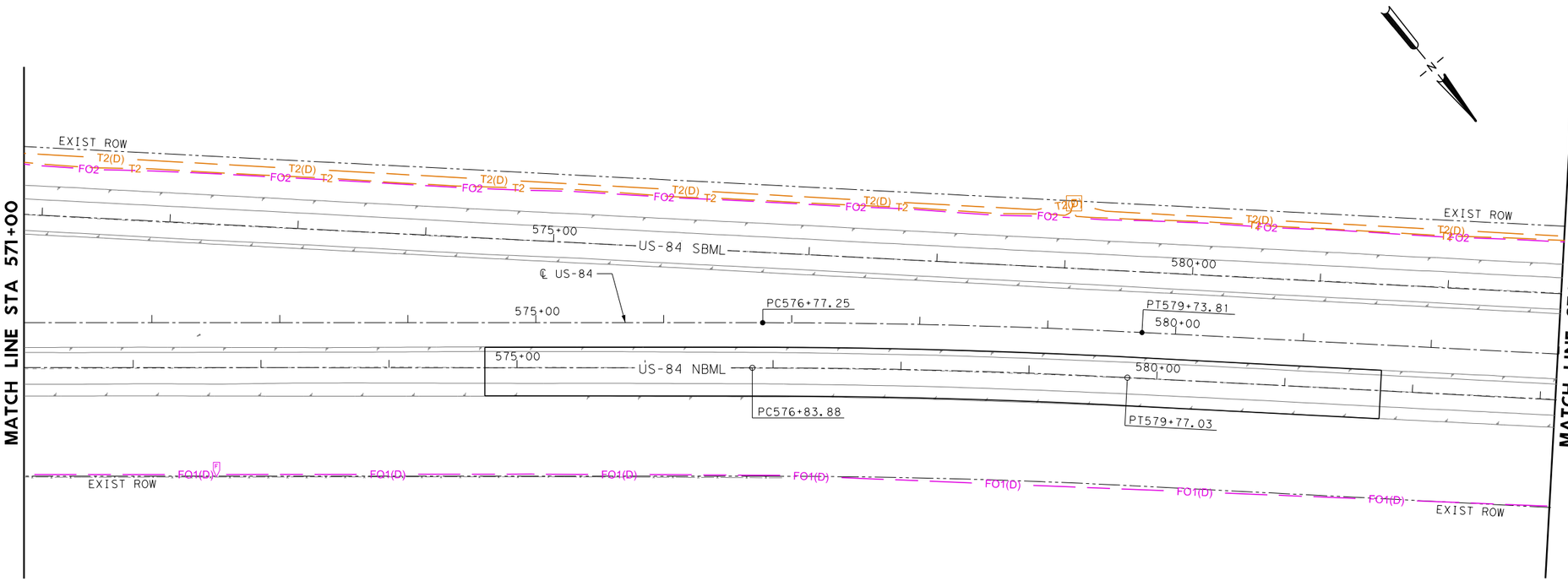

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS
(STA 559+00 TO STA 583+00)

SHEET (07 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	107
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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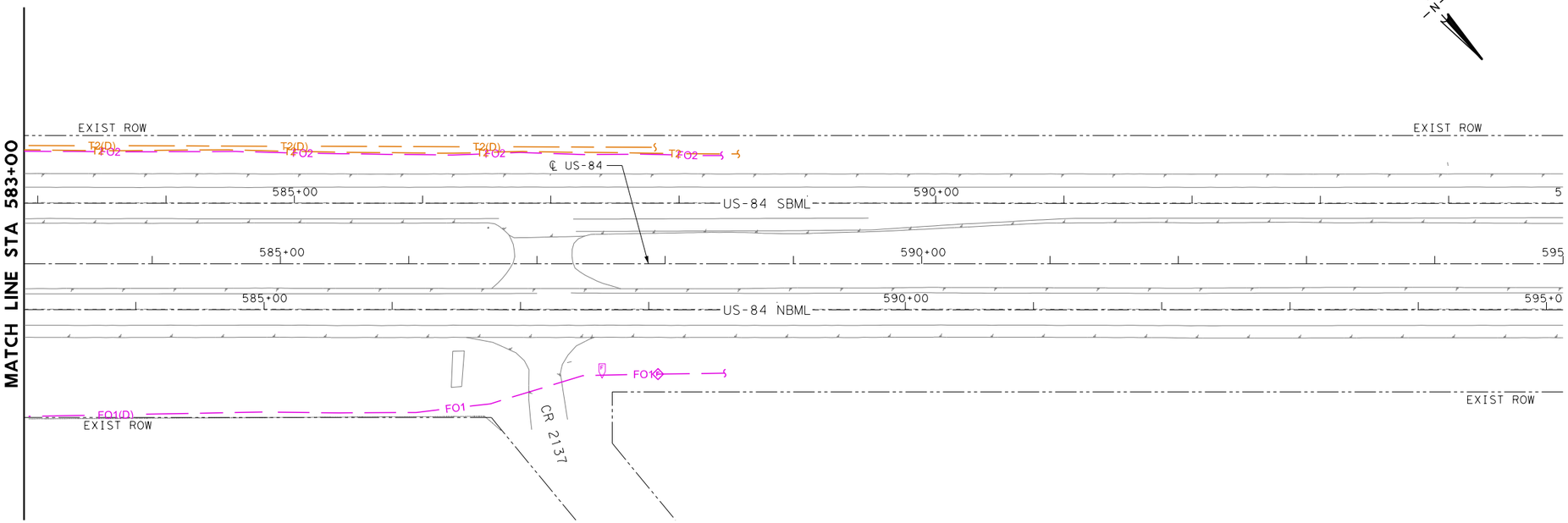

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HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 583+00 TO STA 595+00)

SHEET (08 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	108
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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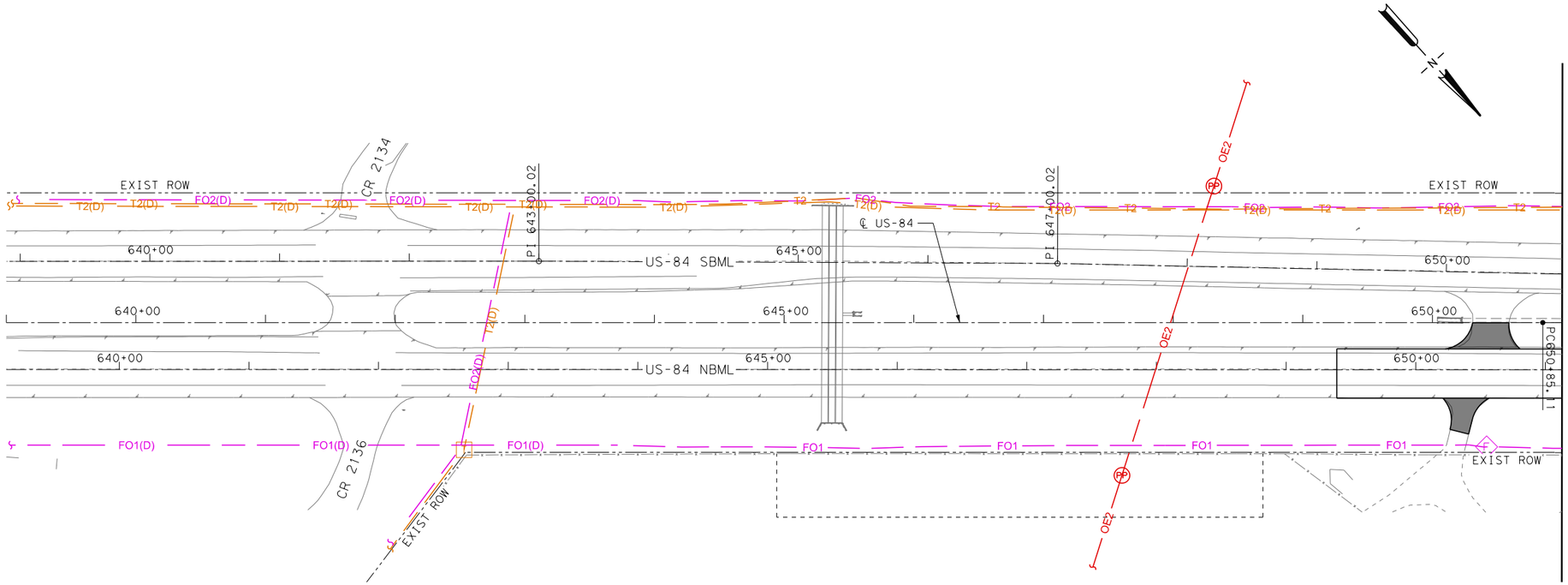

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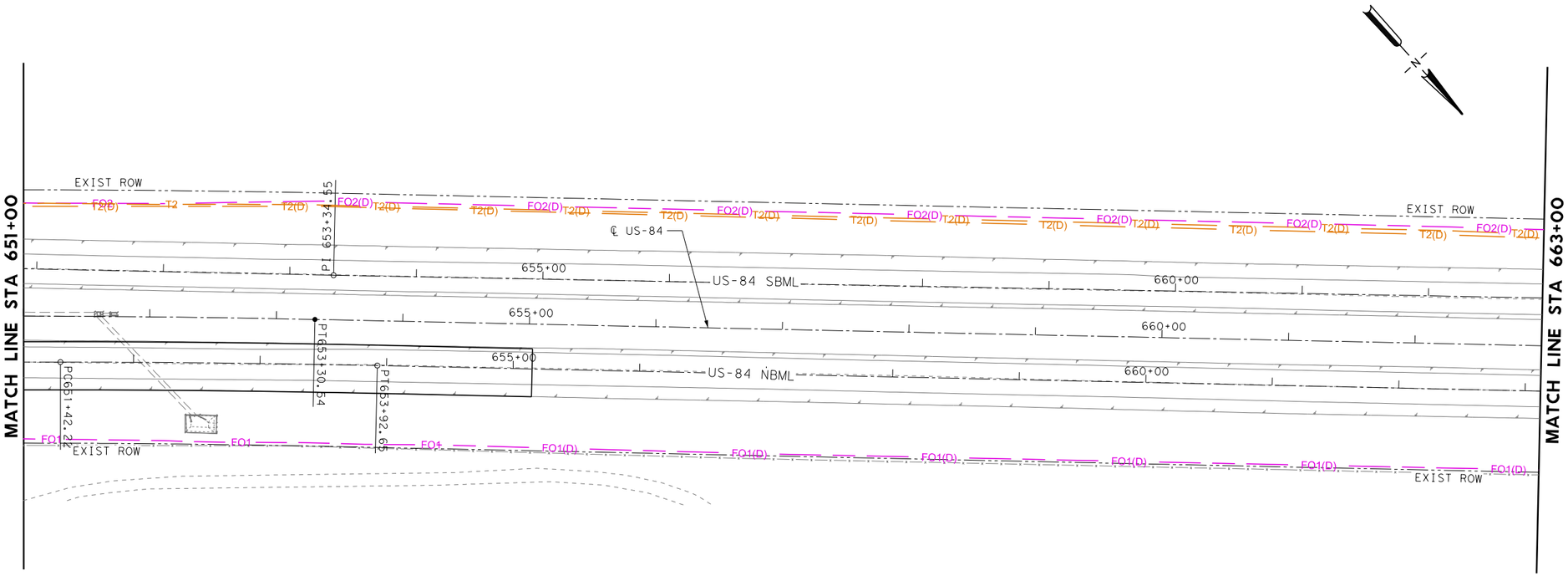

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EXISTING UTILITY LAYOUTS (STA 639+00 TO STA 663+00)

SHEET (09 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	109
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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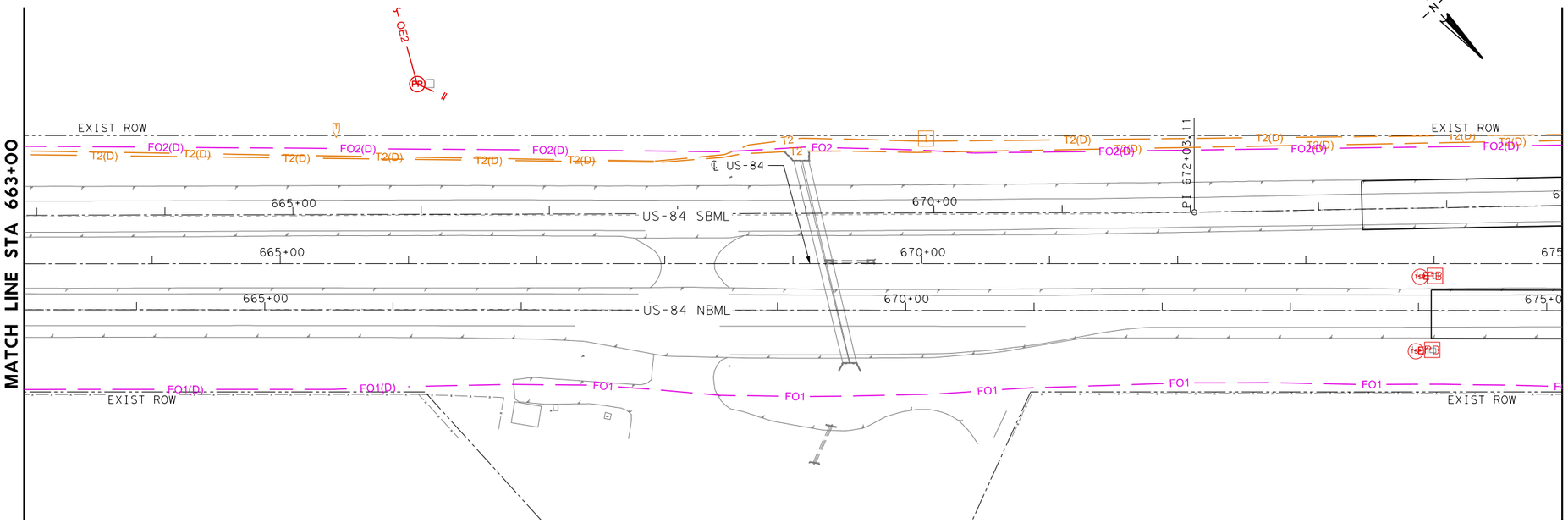

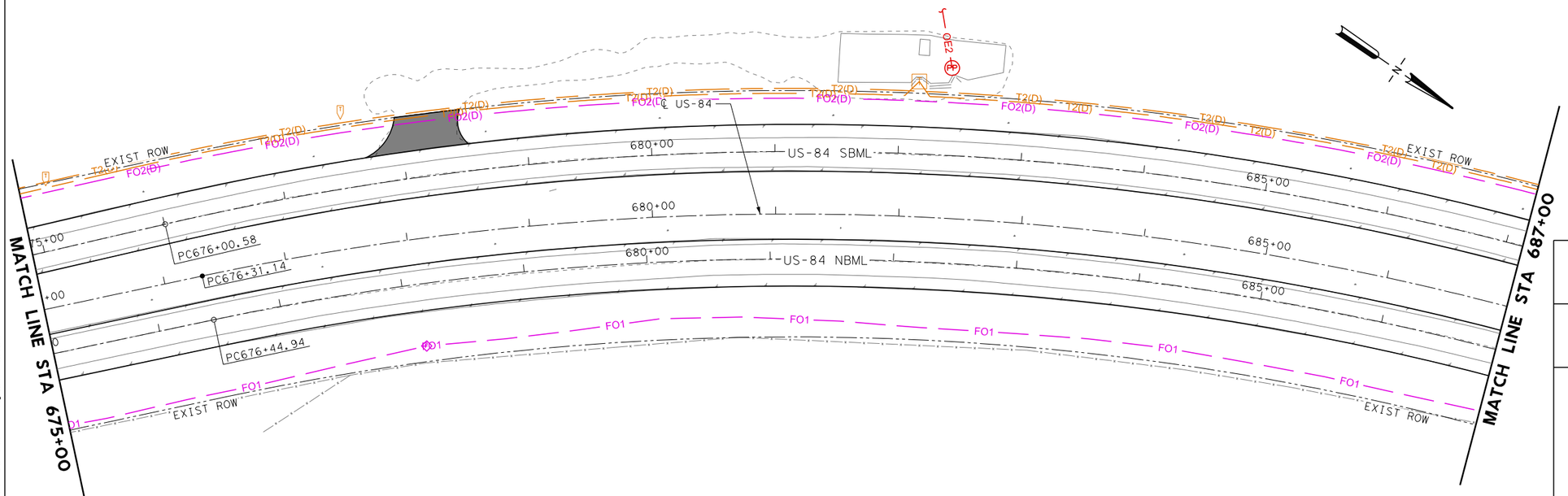

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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WILLIAM L. O'DELL
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EXISTING UTILITY LAYOUTS (STA 663+00 TO STA 687+00)

SHEET (10 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	110
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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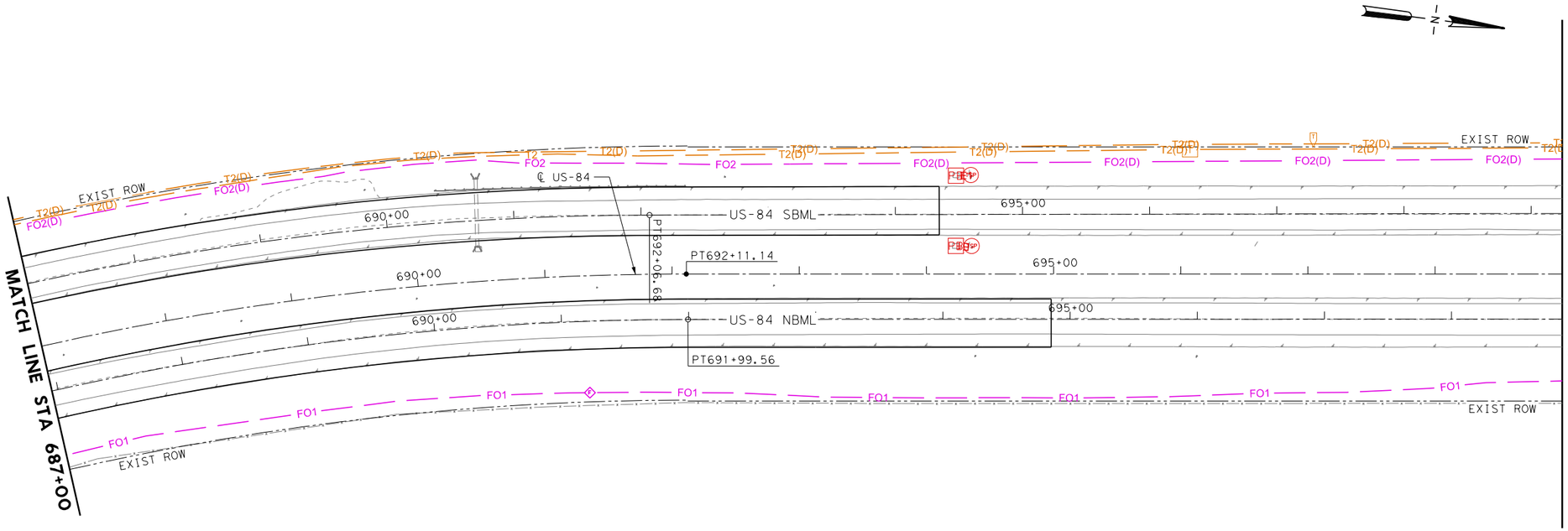

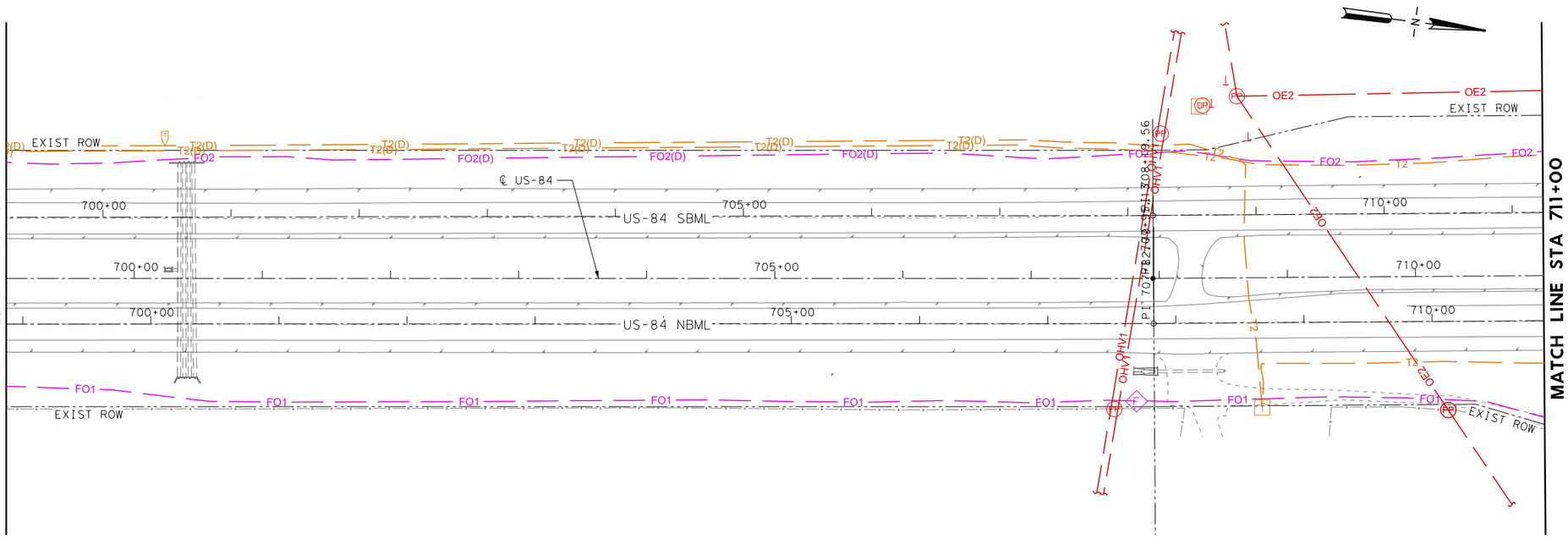

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HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 687+00 TO STA 711+00)

SHEET (11 OF 14)

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	111
GRPH CHECK				
LSE				

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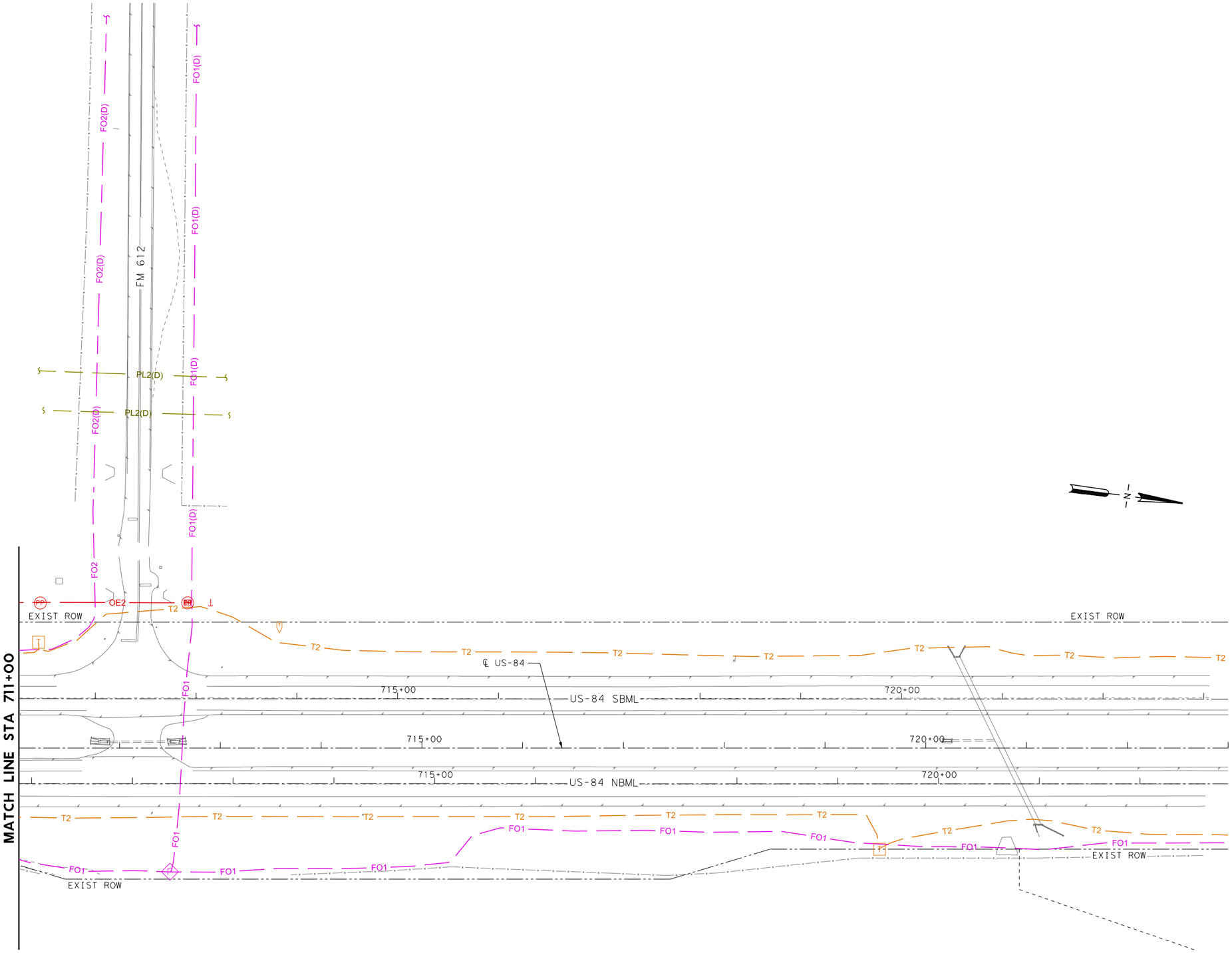

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 711+00 TO STA 723+00)

SHEET (12 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	112
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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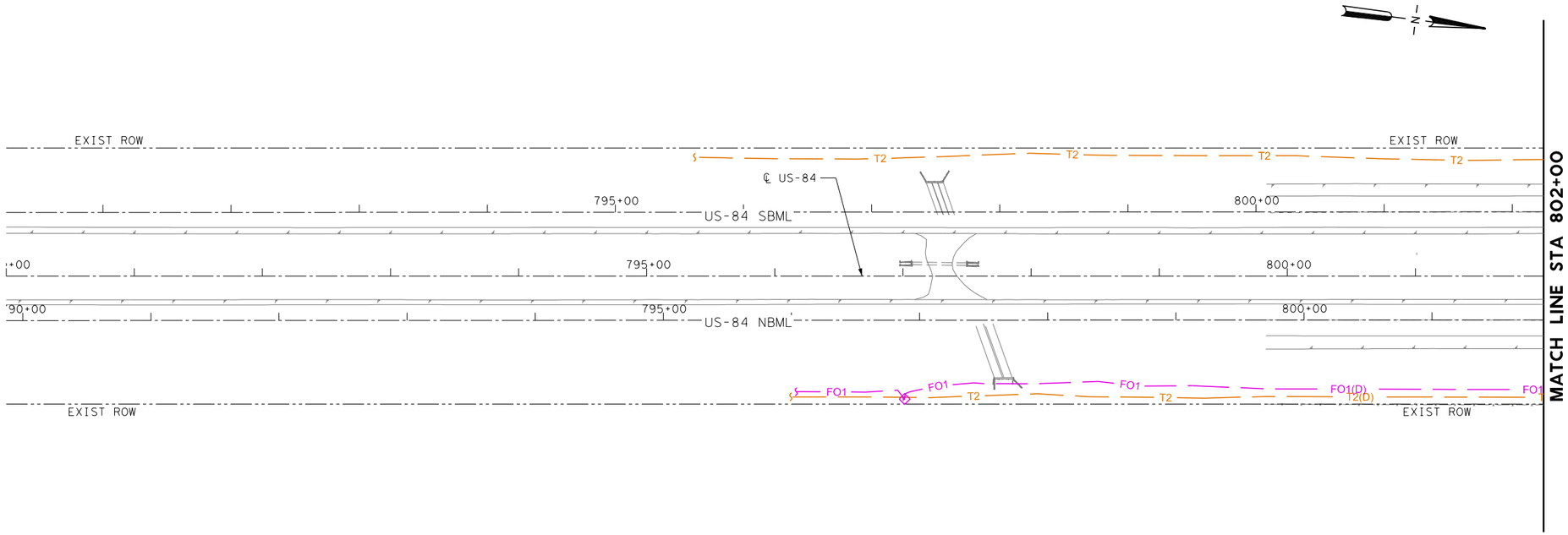

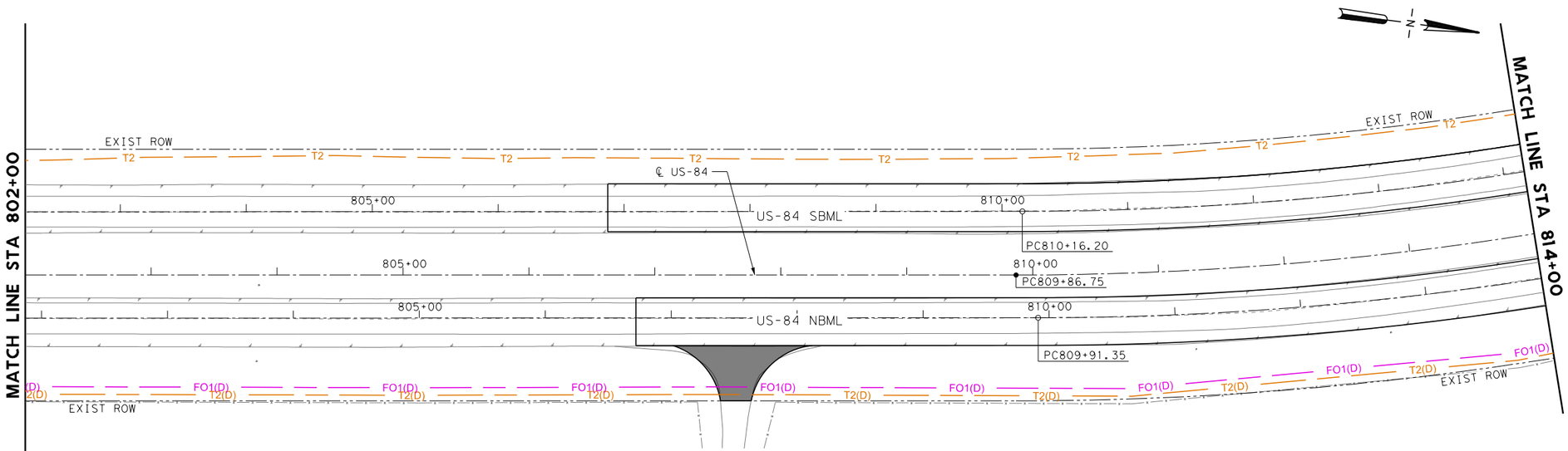

0 25′ 50′ 100′

HORIZ SCALE: 1" = 100′

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EXISTING UTILITY LAYOUTS (STA 790+00 TO STA 814+00)

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DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	113
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

FILE: L:\Projects\B200848.03 - TNP - US 87*84 - TxDOT ABL Snyder\CAD\Eng\Sheets\LSE*US84*UTIL*14.dgn
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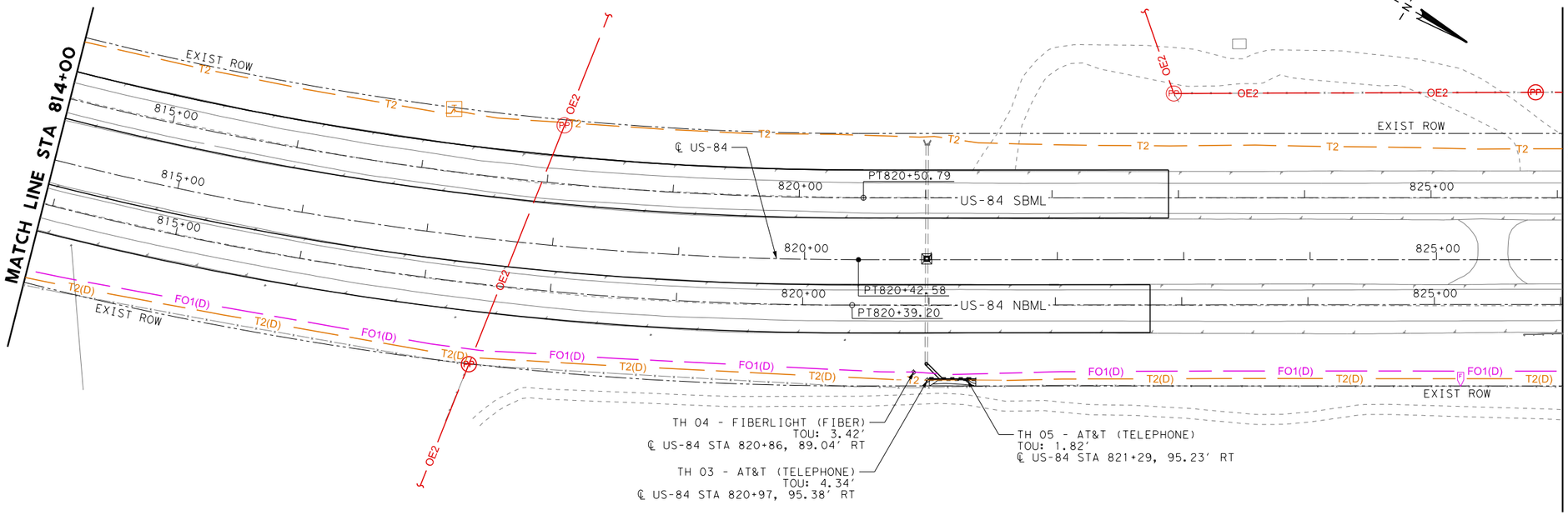
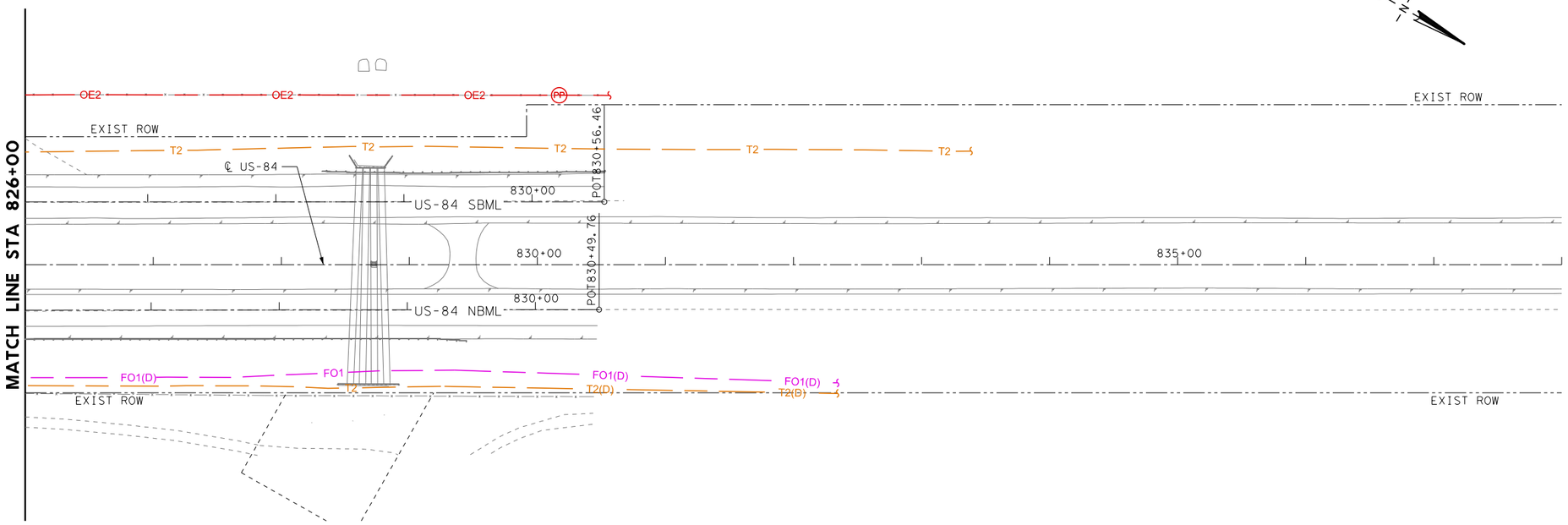


0 25' 50' 100'

HORIZ SCALE: 1" = 100'



STATE OF TEXAS
WILLIAM L. O'DELL
110163
PROFESSIONAL LICENSED ENGINEER
04/27/2021

LAMB-STAR ENGINEERING, L.L.C.
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PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

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EXISTING UTILITY LAYOUTS (STA 814+00 TO END)

SHEET (14 OF 14)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	114
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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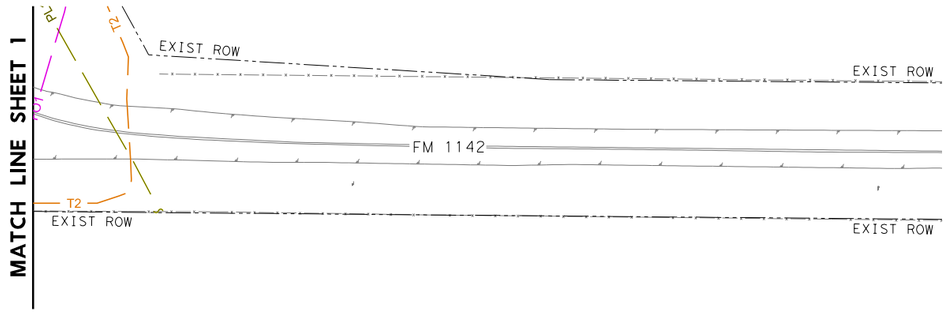

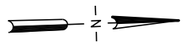

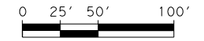

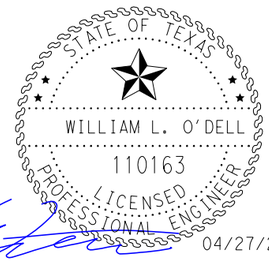

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EXISTING UTILITY LAYOUTS (FM 1142)

SHEET (01 OF 01)

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LSE	6	(SEE TITLE SHEET)		US 84
DESIGN CK	STATE	DISTRICT	COUNTY	SHEET NO.
LSE	TX	ABL	SCURRY	115
GRAPHICS	CONTROL	SECTION	JOB	
LSE	0053	07	040	
GRPH CHECK				
LSE				

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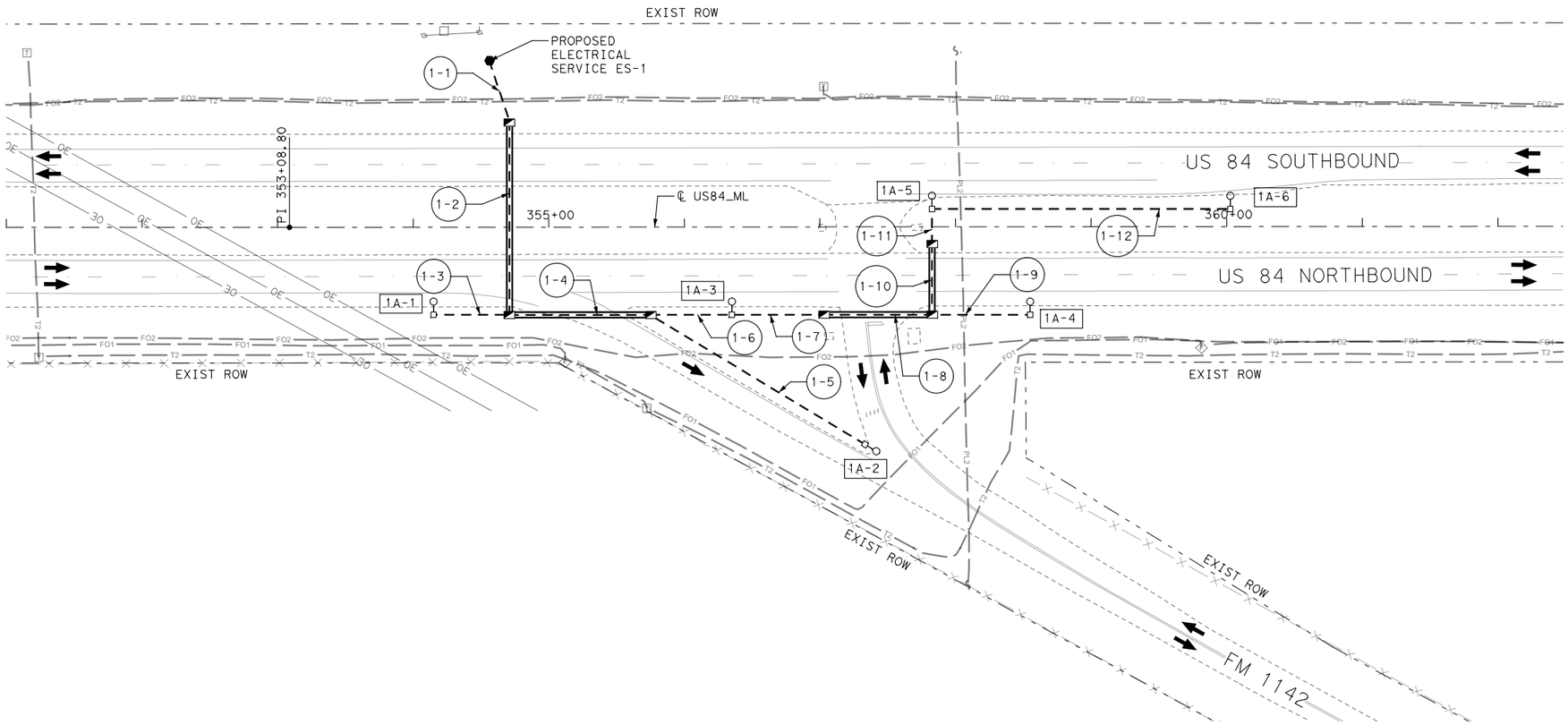

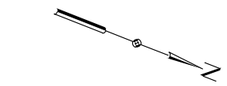

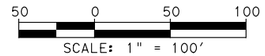

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- ILL CONDUIT 2" PVC SCH 40
- ILL CONDUIT BORE 2" PVC SCH 80
- RD IL (TY SA) 40T-8(250W EQ)LED
- GROUND BOX TY A W/APRON
- ELECTRICAL SERVICE

1-1 RUN DESIGNATION
- RUN NUMBER
- SERVICE NUMBER

1A-1 POLE DESIGNATION
- POLE NUMBER
- CIRCUIT IDENTIFICATION
- SERVICE NUMBER

NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO WORK.
2. LOCATIONS OF THE PROPOSED LIGHT POLES ARE APPROXIMATE AND EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD WITH THE ENGINEER'S APPROVAL.

CONDUIT AND CABLE CHART

RUN NO	CONDUIT STATUS	CONDUIT ITEM 618 2" PVC TRENCHED QTY	CONDUIT ITEM 618 2" PVC TRENCHED LEN	CONDUIT ITEM 618 2" PVC BORED QTY	CONDUIT ITEM 618 2" PVC BORED LEN	CABLE STATUS	CONDUCTORS ITEM 620 NO. 8 BARE WIRE QTY	CONDUCTORS ITEM 620 NO. 8 BARE WIRE LEN	CONDUCTORS ITEM 620 NO. 12 XHHW WIRE QTY	CONDUCTORS ITEM 620 NO. 12 XHHW WIRE LEN	TOTAL LENGTH OF RUN	RUN NO
1-1	I	1	50			I	1	50	2	100	50	1-1
1-2	I			1	140	I	1	140	2	280	140	1-2
1-3	I	1	50			I	1	50	2	100	50	1-3
1-4	I			1	100	I	1	100	2	200	100	1-4
1-5	I	1	180			I	1	180	2	360	180	1-5
1-6	I	1	60			I	1	60	2	120	60	1-6
1-7	I	1	70			I	1	70	2	140	70	1-7
1-8	I			1	80	I	1	80	2	160	80	1-8
1-9	I	1	80			I	1	80	2	160	80	1-9
1-10	I			1	50	I	1	50	2	100	50	1-10
1-11	I	1	25			I	1	25	2	50	25	1-11
1-12	I	1	220			I	1	220	2	440	220	1-12
TOTAL			735		370			1105		2210		

CONDUIT STATUS: I=INSTALL; E=EXISTING; A=ABANDON; R=REMOVE AND SALVAGE

LUMINAIRES

POLE NO.	ITEM	DESCRIPTION	CIRCUIT	STATION	OFFSET (FT)	ITEM 416 DIA	ITEM 416 DEPTH	ITEM 432 RIP RAP	NOTES:
1A-1	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	354 + 15	66 R	30"	8 FT	0.35 CY	
1A-2	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	357 + 33	160 R	30"	8 FT	0.35 CY	
1A-3	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	356 + 35	66 R	30"	8 FT	0.35 CY	
1A-4	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	358 + 55	66 R	30"	8 FT	0.35 CY	
1A-5	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	357 + 83	10 L	30"	8 FT	0.35 CY	
1A-6	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	360 + 03	10 L	30"	8 FT	0.35 CY	

STATION AND OFFSETS ARE REFERENCED FROM CL US-84 UNLESS OTHERWISE NOTED.

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ILLUMINATION LAYOUT FM 1142 INTERSECTION

SCALE: 1"=100' SHEET 1 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	116
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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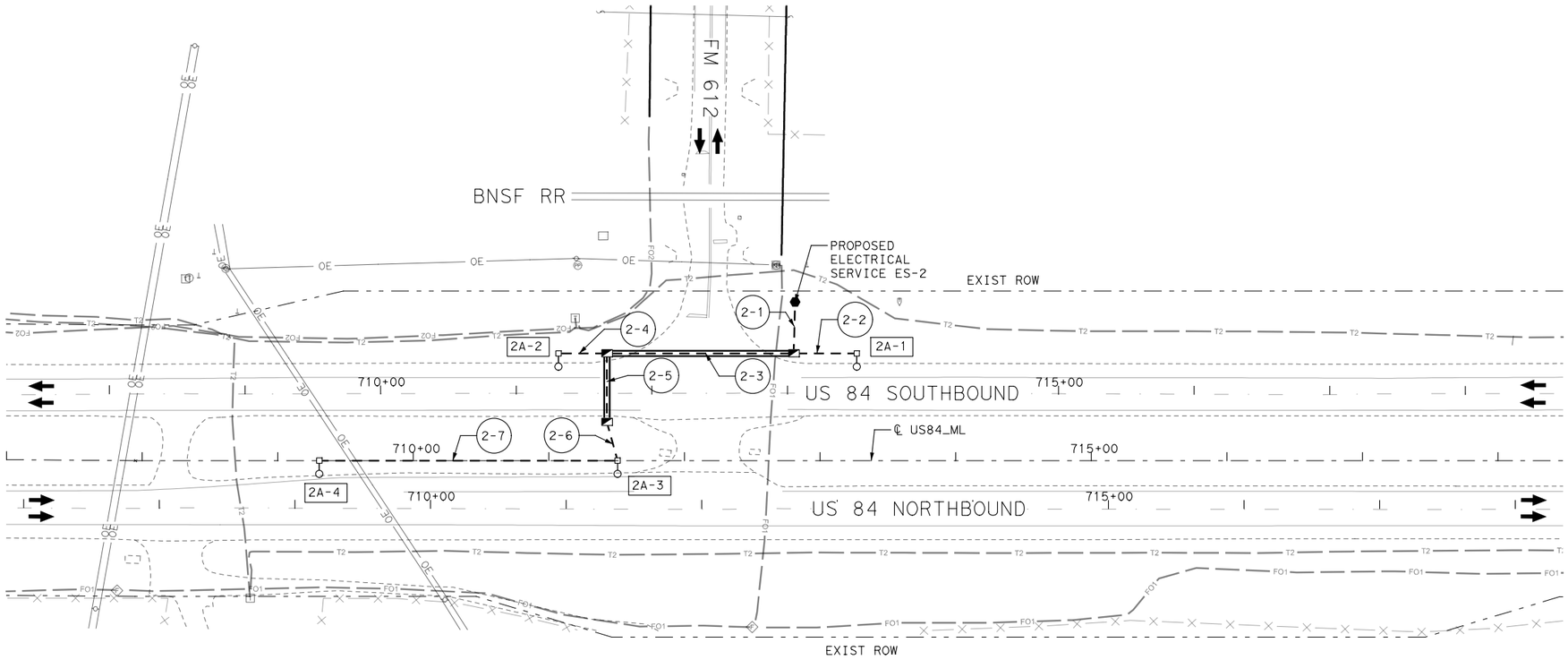


LEGEND

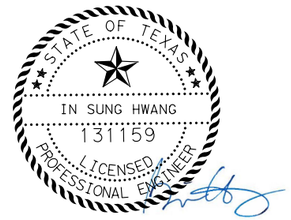
- DIRECTION OF TRAVEL
- EXIST ROW
- ILL CONDUIT 2" PVC SCH 40
- ILL CONDUIT BORE 2" PVC SCH 80
- RD IL (TY SA) 40T-8(250W EQ)LED
- GROUND BOX TY A W/APRON
- ELECTRICAL SERVICE

(1-1) RUN DESIGNATION
- RUN NUMBER
- SERVICE NUMBER

[1A-1] POLE DESIGNATION
- POLE NUMBER
- CIRCUIT IDENTIFICATION
- SERVICE NUMBER

NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO WORK.
2. LOCATIONS OF THE PROPOSED LIGHT POLES ARE APPROXIMATE AND EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD WITH THE ENGINEER'S APPROVAL.



CONDUIT AND CABLE CHART

RUN NO	CONDUIT STATUS	CONDUIT ITEM 618 2" PVC TRENCHED QTY	CONDUIT ITEM 618 2" PVC TRENCHED LEN	CONDUIT ITEM 618 2" PVC BORED QTY	CONDUIT ITEM 618 2" PVC BORED LEN	CABLE STATUS	CONDUCTORS ITEM 620 NO. 8 BARE WIRE QTY	CONDUCTORS ITEM 620 NO. 8 BARE WIRE LEN	CONDUCTORS ITEM 620 NO. 12 XHHW WIRE QTY	CONDUCTORS ITEM 620 NO. 12 XHHW WIRE LEN	TOTAL LENGTH OF RUN	RUN NO
2-1	I	1	40			I	1	40	2	80	40	2-1
2-2	I	1	45			I	1	45	2	90	45	2-2
2-3	I			1	140	I	1	140	2	280	140	2-3
2-4	I	1	35			I	1	35	2	70	35	2-4
2-5	I			1	50	I	1	50	2	100	50	2-5
2-6	I	1	30			I	1	30	2	60	30	2-6
2-7	I	1	220			I	1	220	2	440	220	2-7
TOTAL			370		190			560		1120		

CONDUIT STATUS: I=INSTALL; E=EXISTING; A=ABANDON; R=REMOVE AND SALVAGE

LUMINAIRES

POLE NO.	ITEM	DESCRIPTION	CIRCUIT	STATION	OFFSET (FT)	ITEM 416 DIA	ITEM 416 DEPTH	ITEM 432 RIP RAP	NOTES:
2A-1	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	709 + 30	2 L	30"	8 FT	0.35 CY	
2A-2	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	711 + 07	80 L	30"	8 FT	0.35 CY	
2A-3	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	711 + 44	2 L	30"	8 FT	0.35 CY	
2A-4	610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	A	713 + 27	80 L	30"	8 FT	0.35 CY	

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ILLUMINATION LAYOUT FM 612 INTERSECTION

SCALE: 1"=100' SHEET 2 OF 2

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	117
CHECK JL	CONTROL 0053	SECTION 07	JOB 040	

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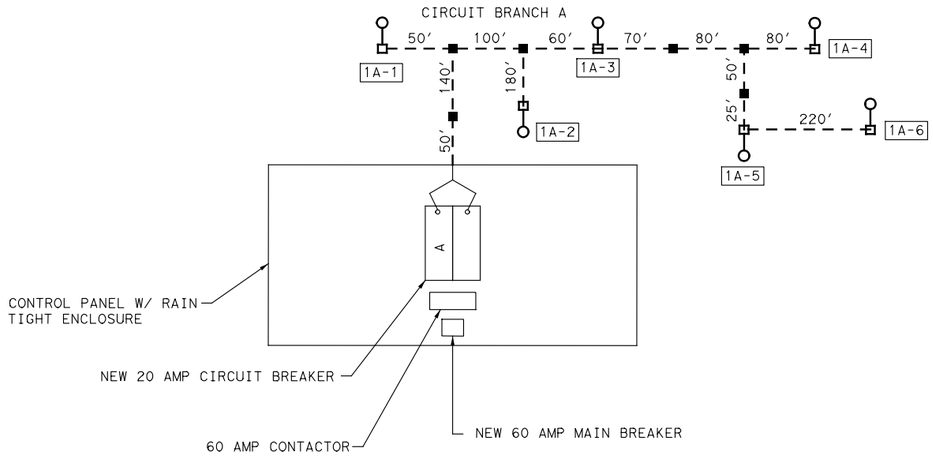
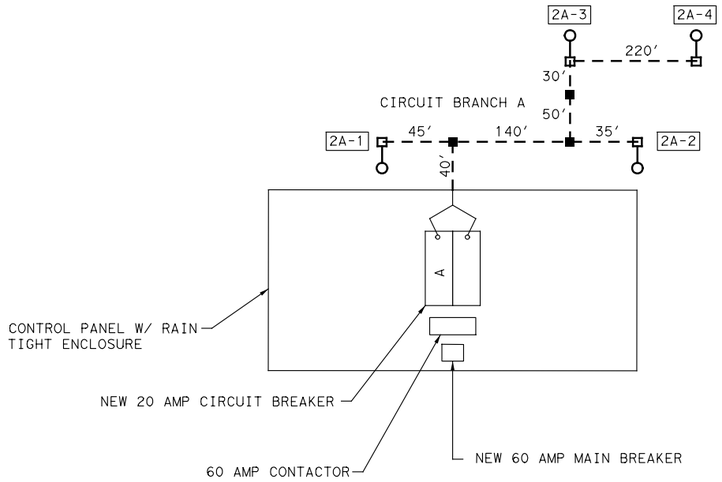


NEW SERVICE POLE ES-1

ELECTRICAL SERVICE DATA ITEM 628												
ELEC. SERVICE ID	SHEET NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE (PVC)**	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE / AMP	TWO-POLE CONTACTOR AMPS	PANELBD. / LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES-01	1 OF 2	ELC SRV TY A 120/240 060(NS)AL(E)SP(O)	1-1/4"	3 / #6	N/A	2P / 60	60	100	A	2P/20	4.3	2.1

** - VERIFY SERVICE CONDUIT SIZE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.



NEW SERVICE POLE ES-2

ELECTRICAL SERVICE DATA ITEM 628												
ELEC. SERVICE ID	SHEET NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE (PVC)**	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE / AMP	TWO-POLE CONTACTOR AMPS	PANELBD. / LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES-02	2 OF 2	ELC SRV TY A 120/240 060(NS)AL(E)SP(O)	1-1/4"	3 / #6	N/A	2P / 60	60	100	A	2P/20	2.8	1.4

** - VERIFY SERVICE CONDUIT SIZE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.

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ELECTRICAL SERVICE DATA SHEET

SHEET 1 OF 1

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	118
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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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		0053	07	040	US 84
		DIST	COUNTY		SHEET NO.
		ABL	SCURRY		119

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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.

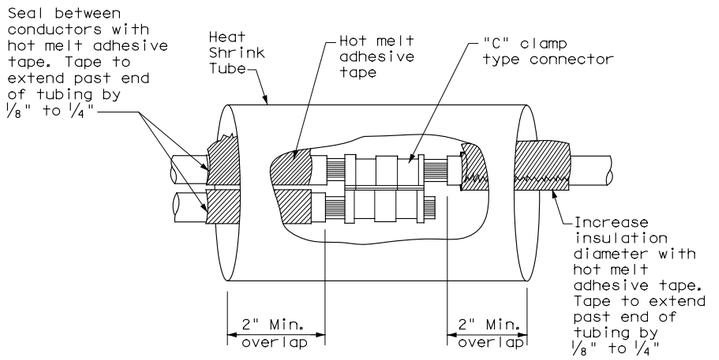
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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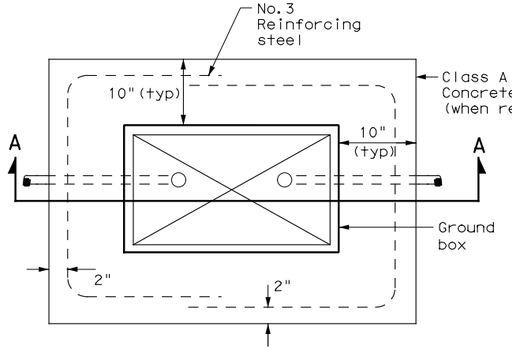
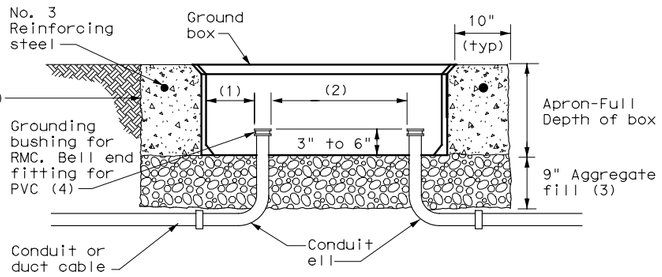


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

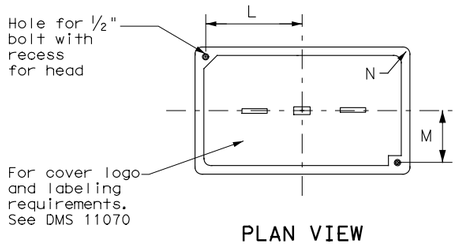
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

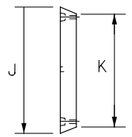
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



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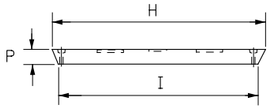

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground 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. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

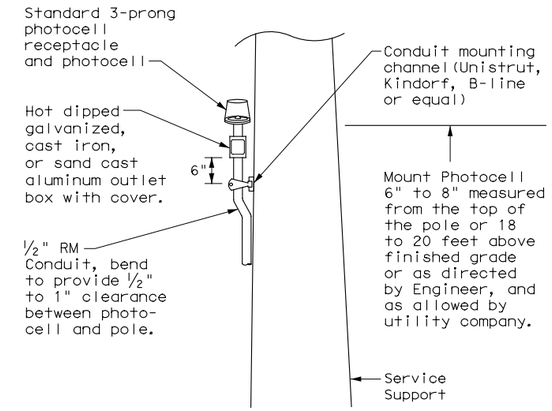
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel("off the shelf")
  SS= Stainless steel(Custom Enclosure)See MPL
  AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  (E)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire mounted
  (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  GC= Granite concrete
  OC= Other concrete
  TP= Timber pole
  SP= Steel pole
  SF= Steel frame
  OT= Pole by others or paid for separately
  EX= Existing pole
  TS= Service on traffic signal pole
  PS= Pedestal Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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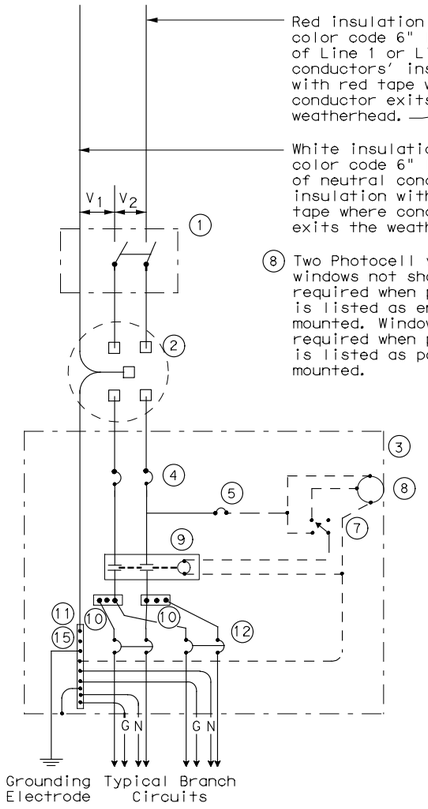
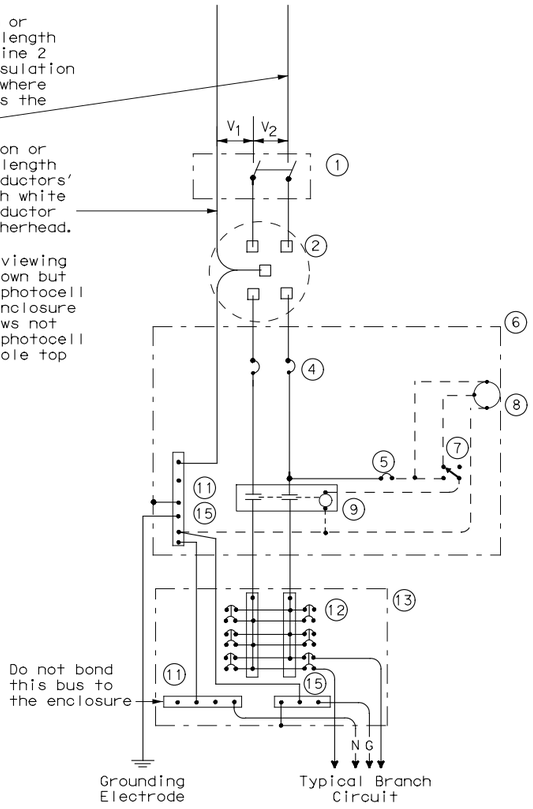
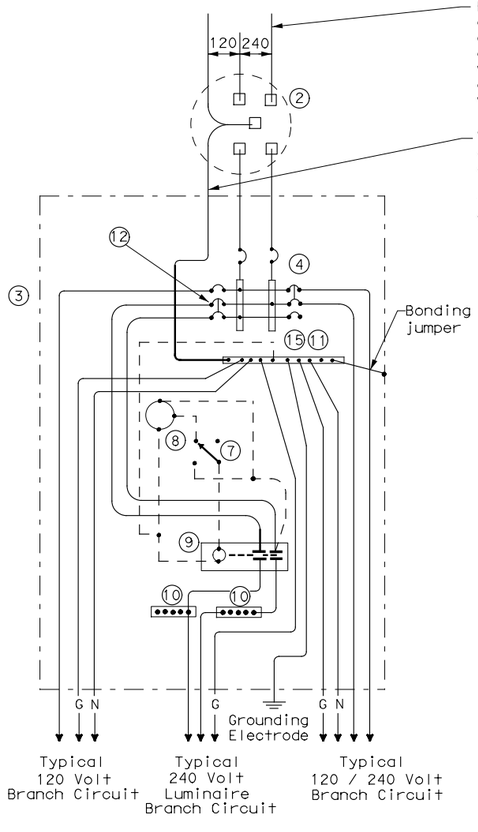


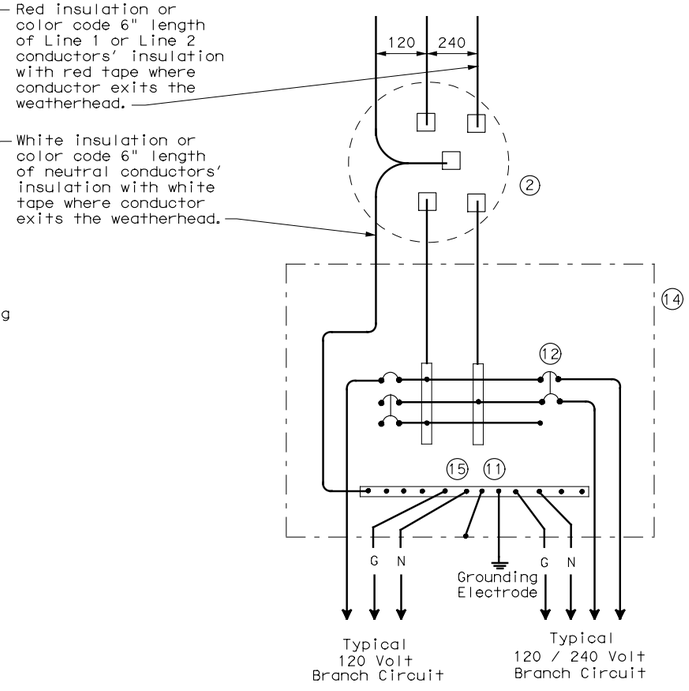
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
– – – –	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		123

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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in ½ in. PVC to ground rod - extend ½ in. PVC 6 in. underground.

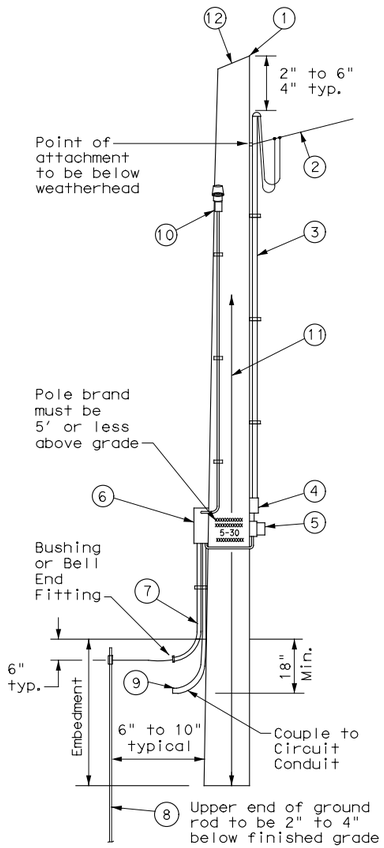
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

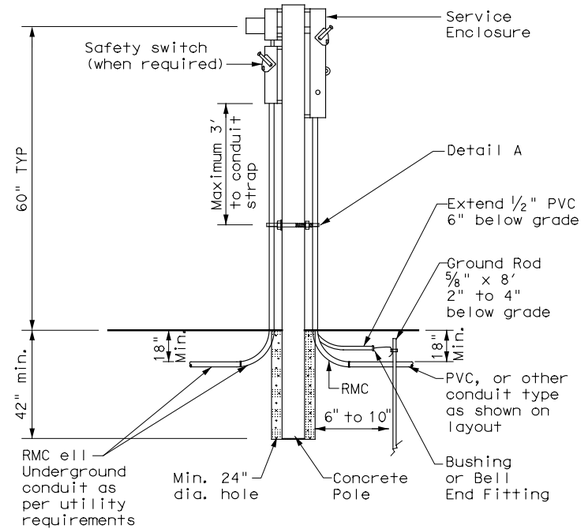


SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

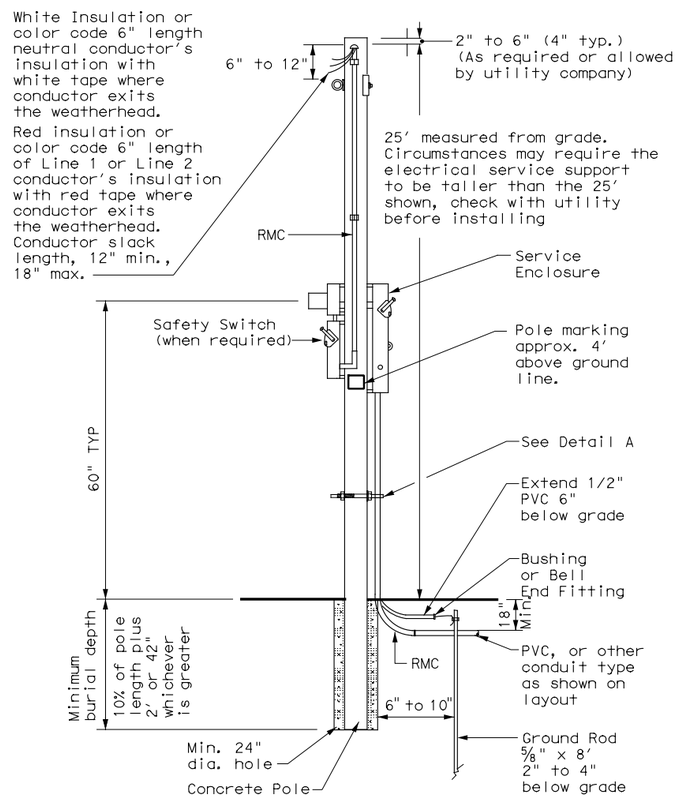
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 ½ in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



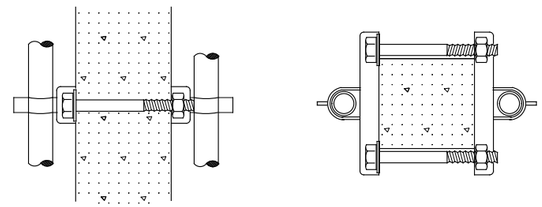
CONCRETE SERVICE SUPPORT

Underground (U)



CONCRETE SERVICE SUPPORT

Overhead (O)



DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

FILE: ed10-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0053	07	040	US 84
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	ABL	SCURRY		124

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. 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, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

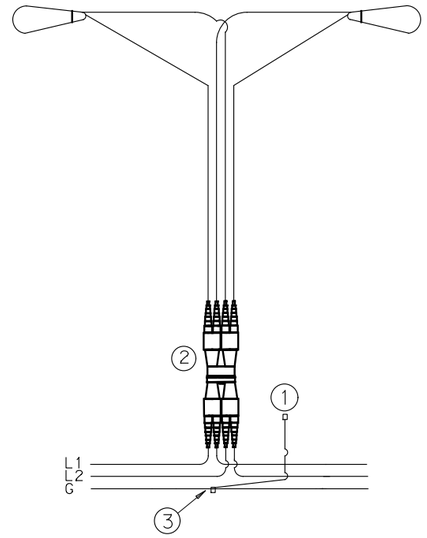
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

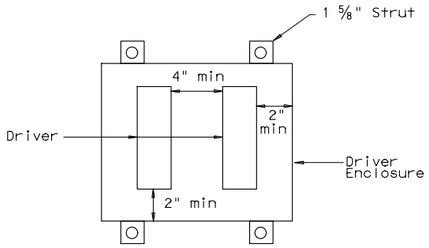
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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REVISIONS	0053	07	040	US 84
7-17	DIST	COUNTY		SHEET NO.
12-20	ABL	SCURRY		125

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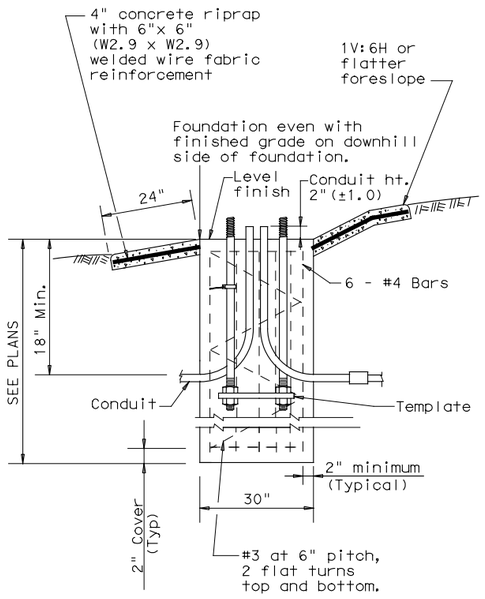
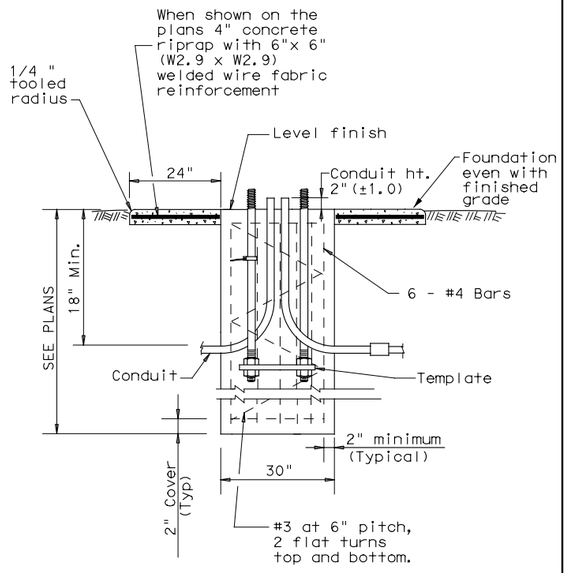


SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in.x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

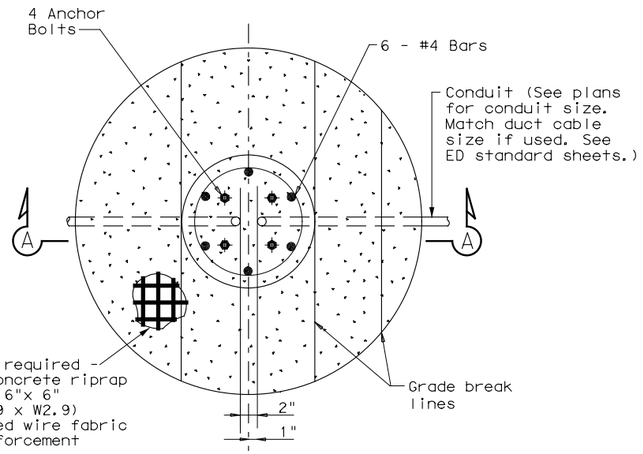
TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

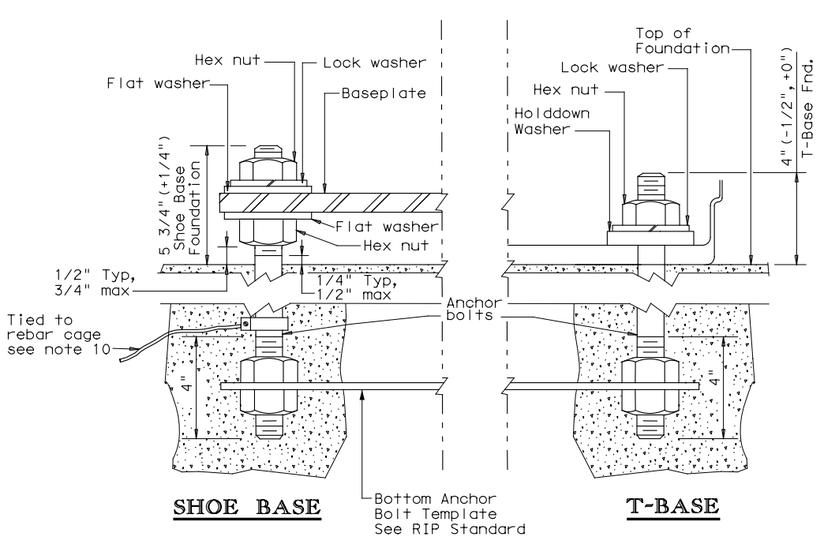
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation — Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

RID(2)-20

FILE: rid2-20.dgn	DN:	CK:	DW:	CK:
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1-11	DIST	COUNTY		SHEET NO.
7-17	ABL	SCURRY		126
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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation Pole	A1	A2	Luminaire	Quantity	T-Base Designation Pole	A1	A2	Luminaire	Quantity	CSB/SSCB Mounted Designation Pole	A1	A2	Luminaire	Quantity
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED	10	(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
	(Type SA 50 S - 10 - 10)			(400W EQ) LED		(Type SA 50 T - 10 - 10)			(400W EQ) LED		(Type SP 48 S - 10 - 10)			(400W EQ) LED	
	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation Pole	A1	A2	Luminaire	Quantity

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
  ST: Pole and mast arm must be steel.
  AL: Pole and mast arm must be aluminum.
  SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).
- Two numerical digits denote nominal mounting height in feet.
- Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)
- First number denotes length of mast arm in feet.
- Use of second mast arm is indicated by second dashed number which denotes length in feet.
- Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)
- Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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7-17	DIST	COUNTY		SHEET NO.
12-19	ABL	SCURRY		127

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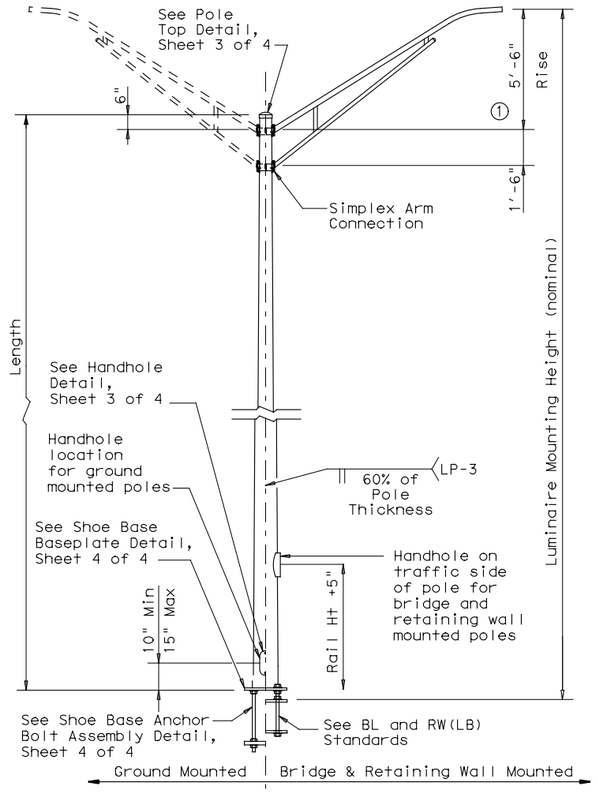
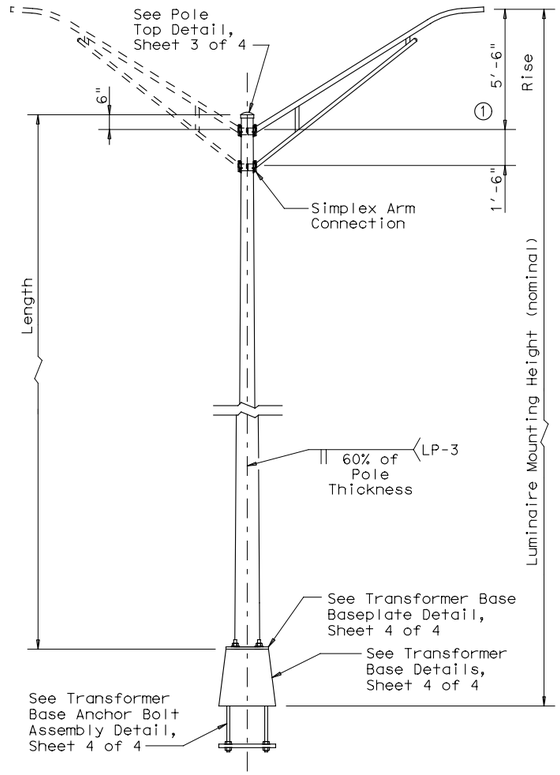


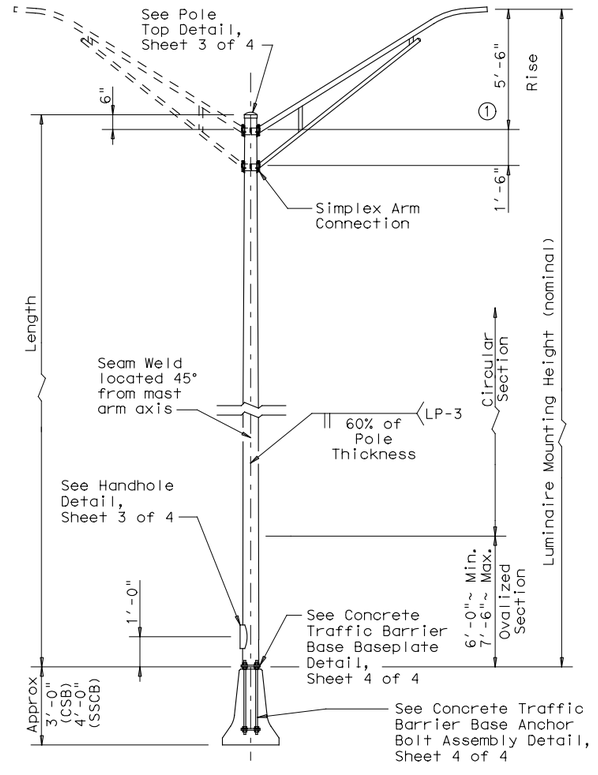
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

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Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

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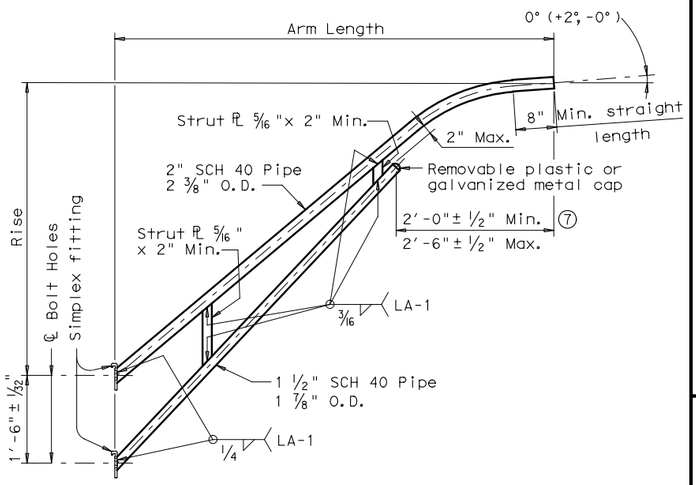
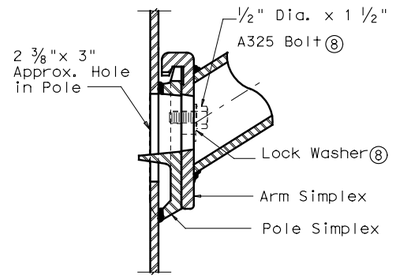


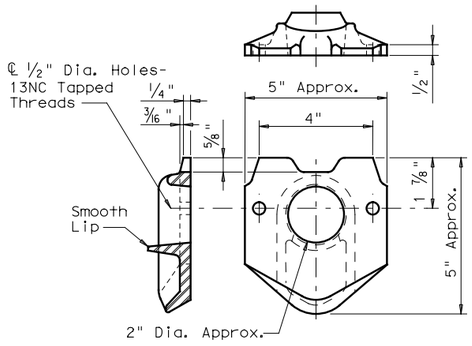
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

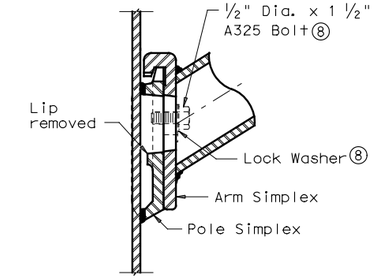
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

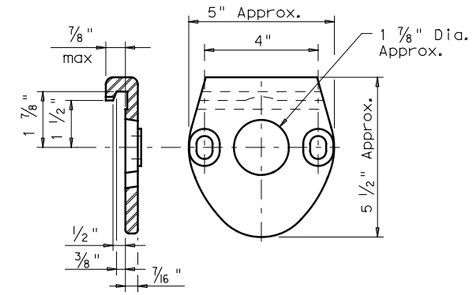


POLE SIMPLEX DETAIL ⑨



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

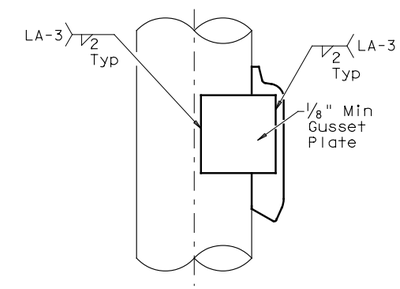
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

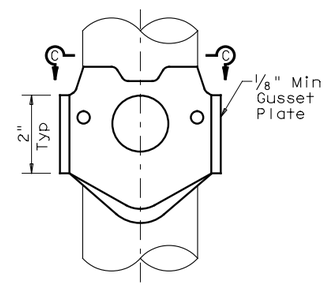
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

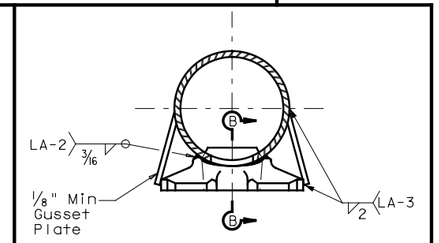
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE

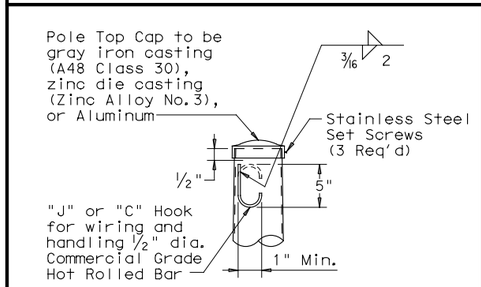


ELEVATION

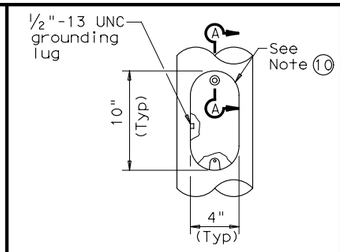


SECTION C-C

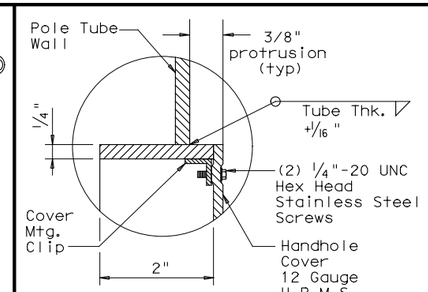
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

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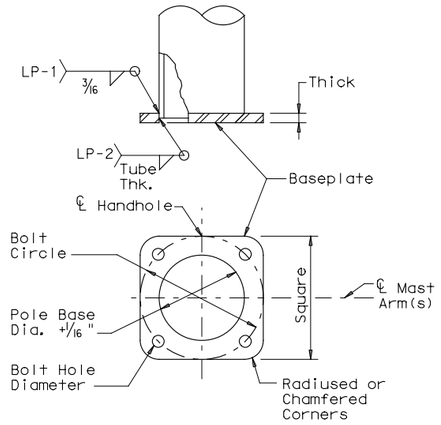
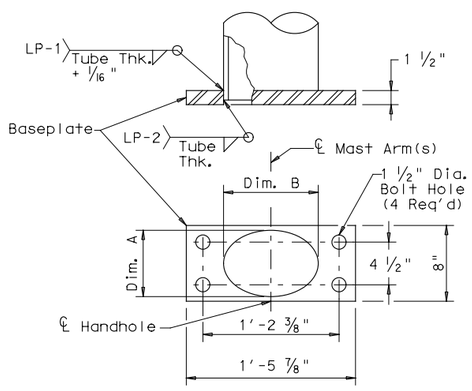


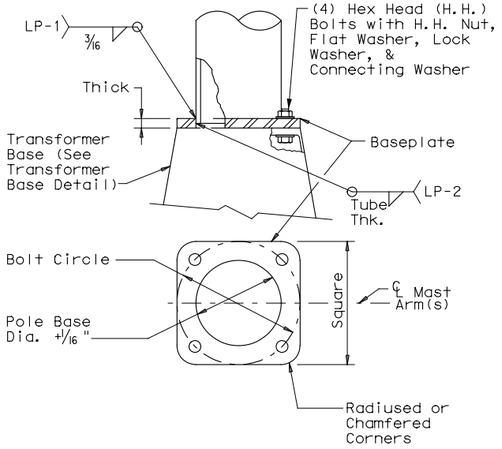
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′- 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



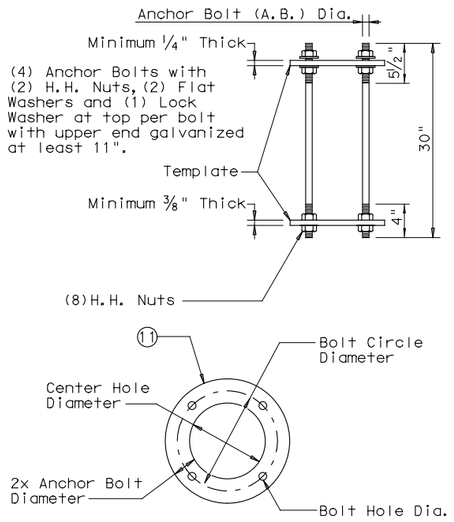
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′- 38′	9"	7"± 1/4"	10"± 1/4"
48′	10 1/2"	7"± 1/4"	13"± 1/4"



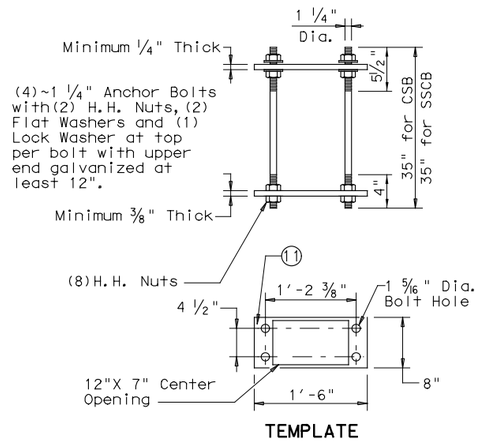
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′- 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



SHOE BASE ANCHOR BOLT ASSEMBLY

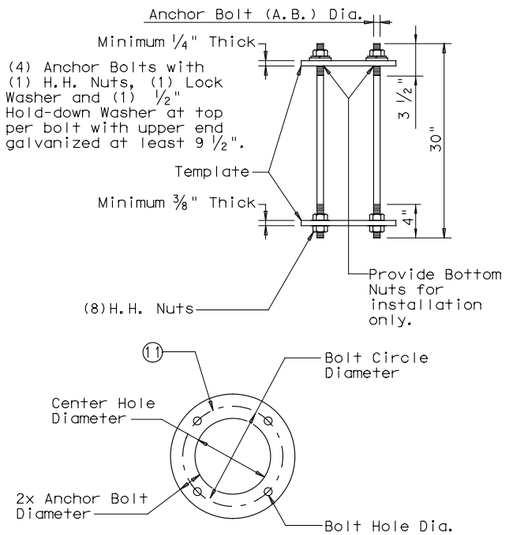
SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



TEMPLATE

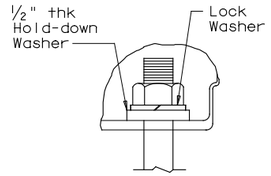
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

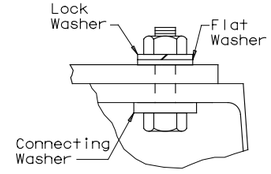


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



DETAIL A



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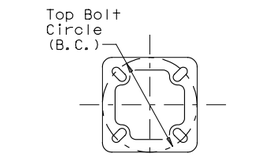
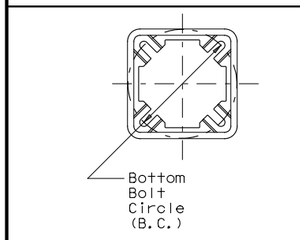


TOP PLAN



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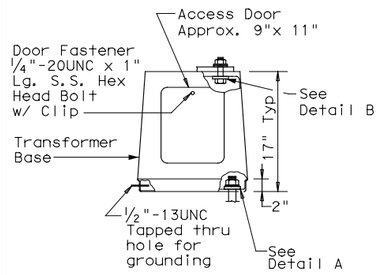

ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

SHEET 4 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		130

730

DATE: 4/26/2021 3:55:34 PM
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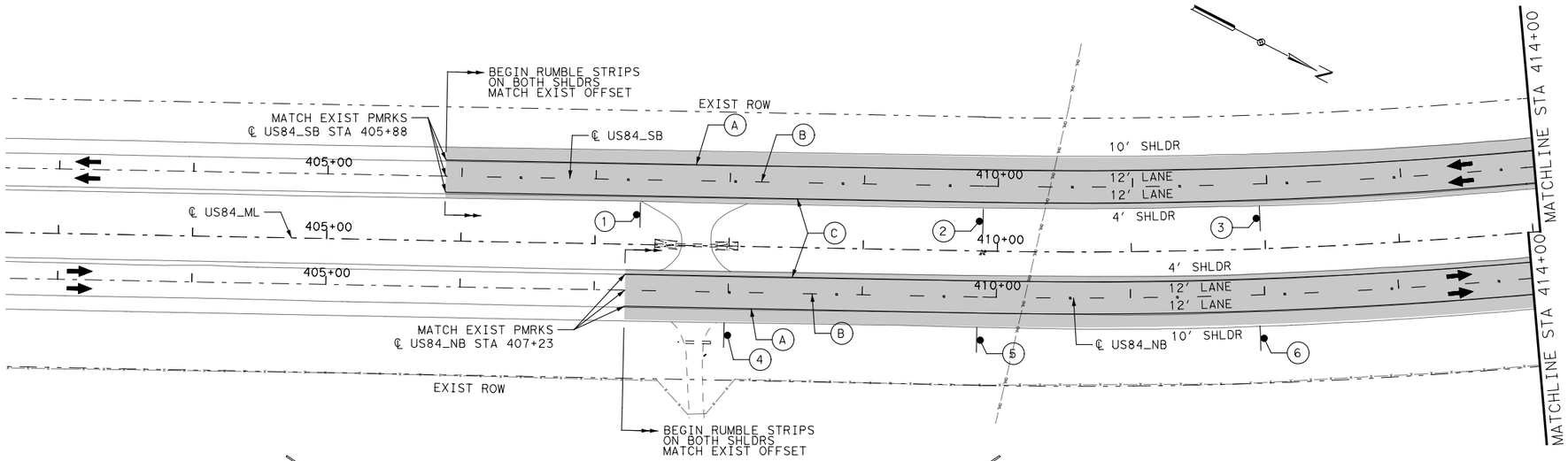

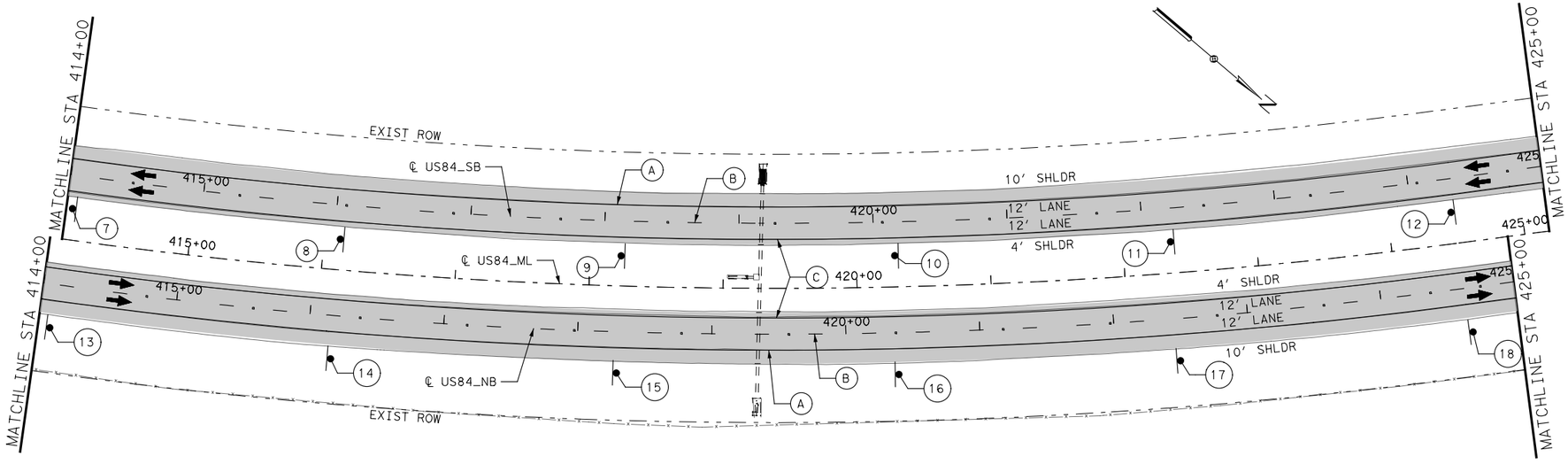

W1-8R
24"X30"
SOLAR POWER

1 STA 407+31
2 STA 409+86
3 STA 411+91
7 STA 414+05
8 STA 406+04
9 STA 418+13
10 STA 420+16
11 STA 422+20
12 STA 424+29

W1-8L
24"X30"
SOLAR POWER

4 STA 408+00 (LEAD LED)
5 STA 409+89
6 STA 411+99
13 STA 414+09
14 STA 416+18
15 STA 418+30
16 STA 420+39
17 STA 422+48
18 STA 424+65

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

NOTES:

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US 84

SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 1 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	131
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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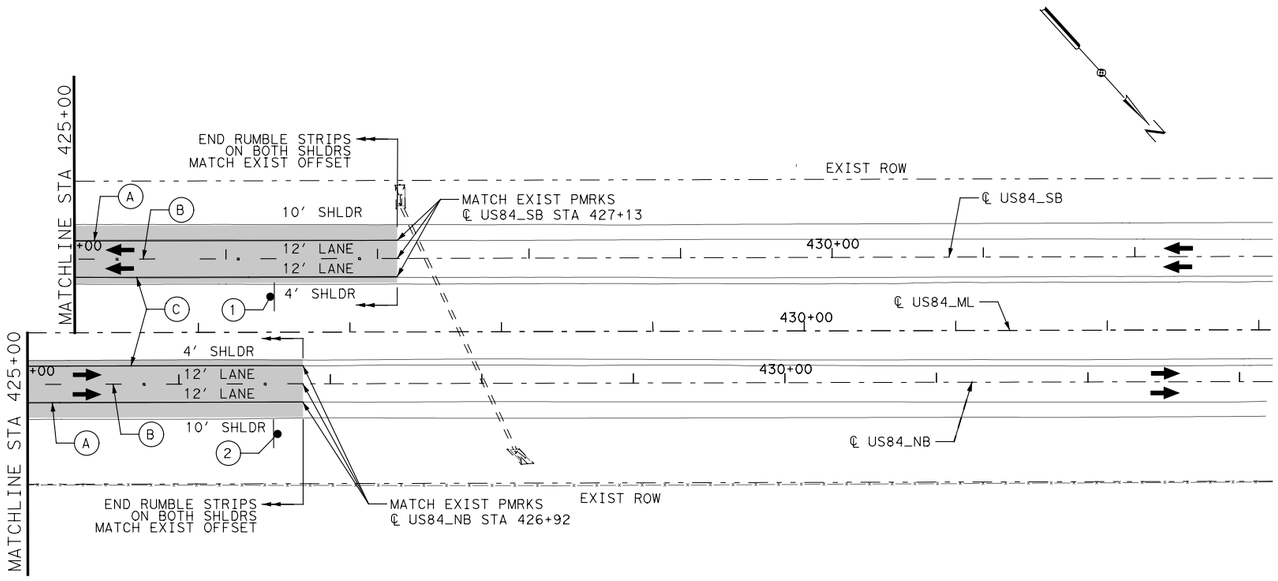

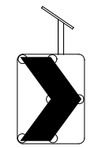

1 STA 426+29 (LEAD LED)

W1-8R
24"X30"
SOLAR POWER

2 STA 426+65

W1-8L
24"X30"
SOLAR POWER

50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/30/2021

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 2 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	132
CHECK JL	CONTROL	SECTION	JOB	
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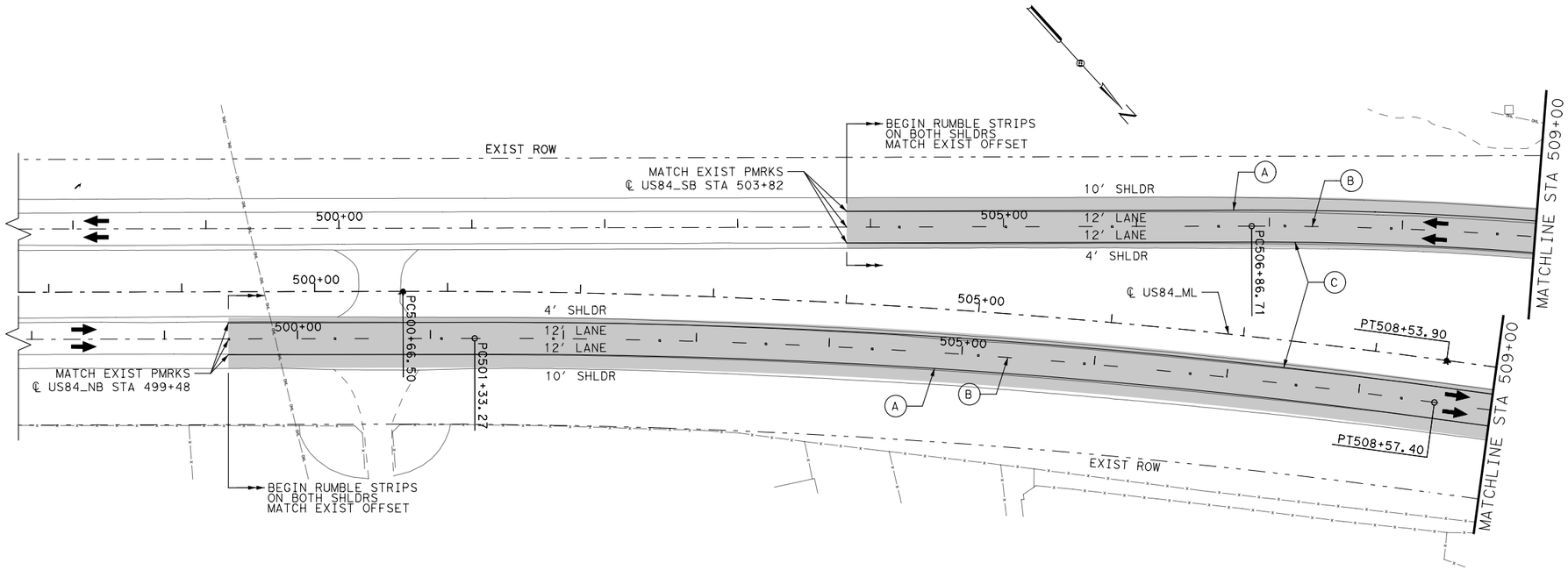

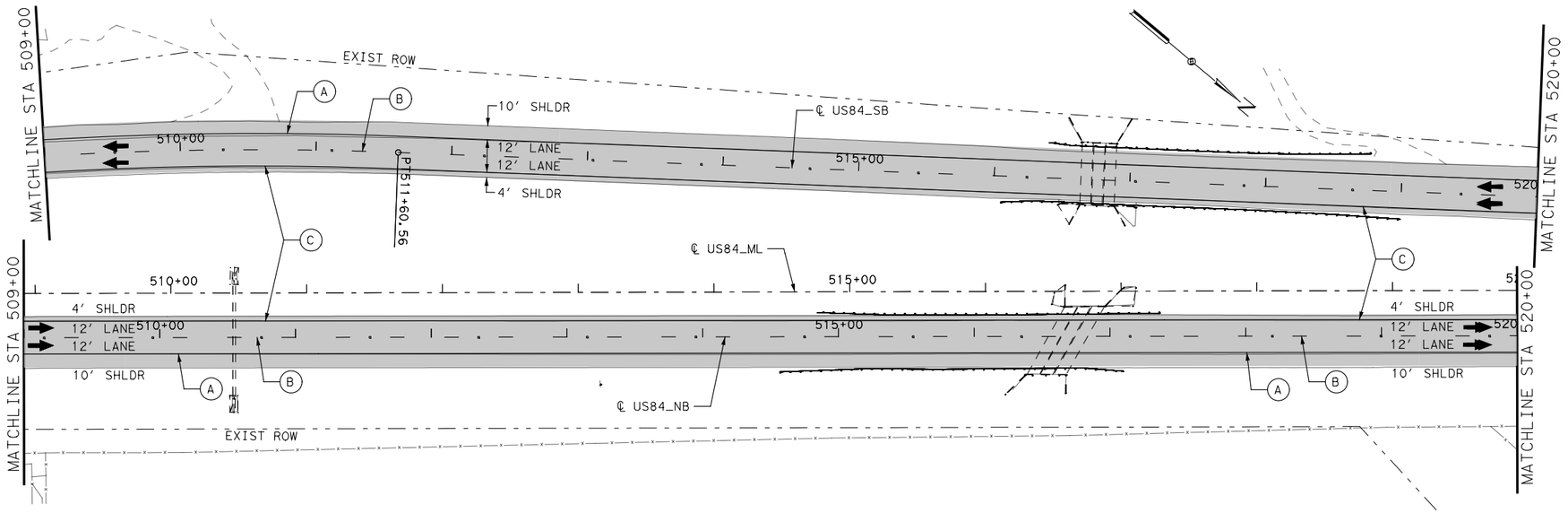

50 0 50 100

SCALE: 1" = 100′

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80′ CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100′ SHEET 3 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	133
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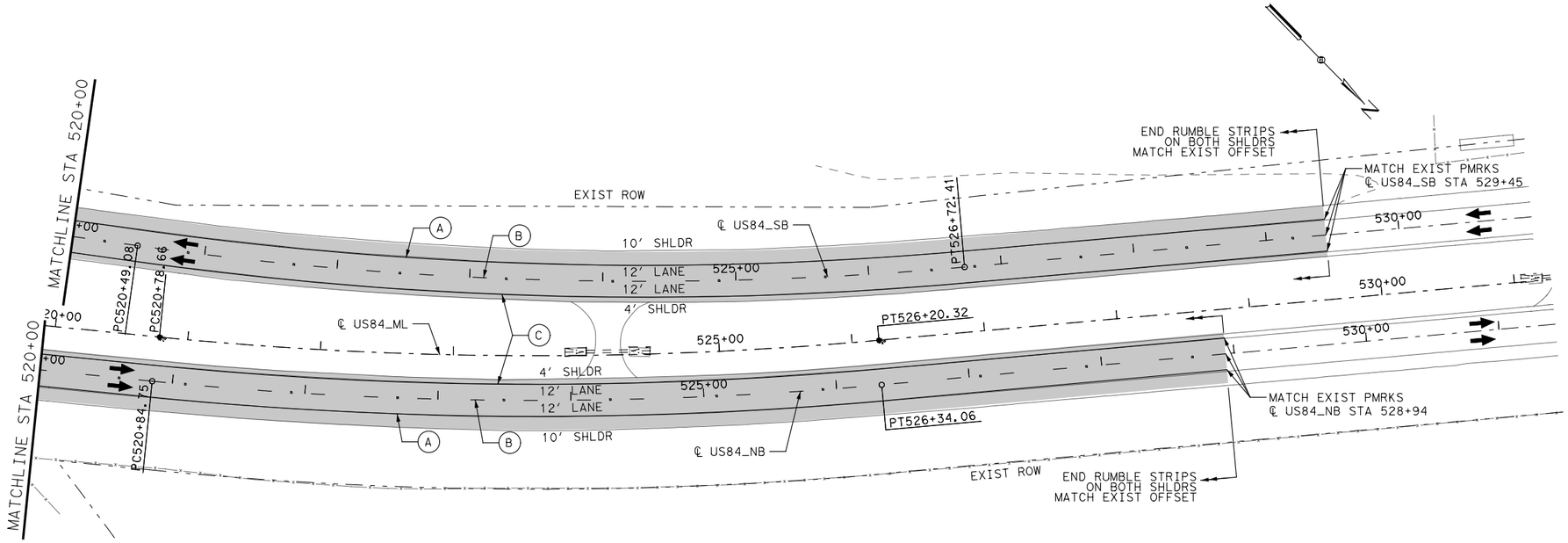

50 0 50 100

SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 4 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	134
CHECK JL	CONTROL	SECTION	JOB	
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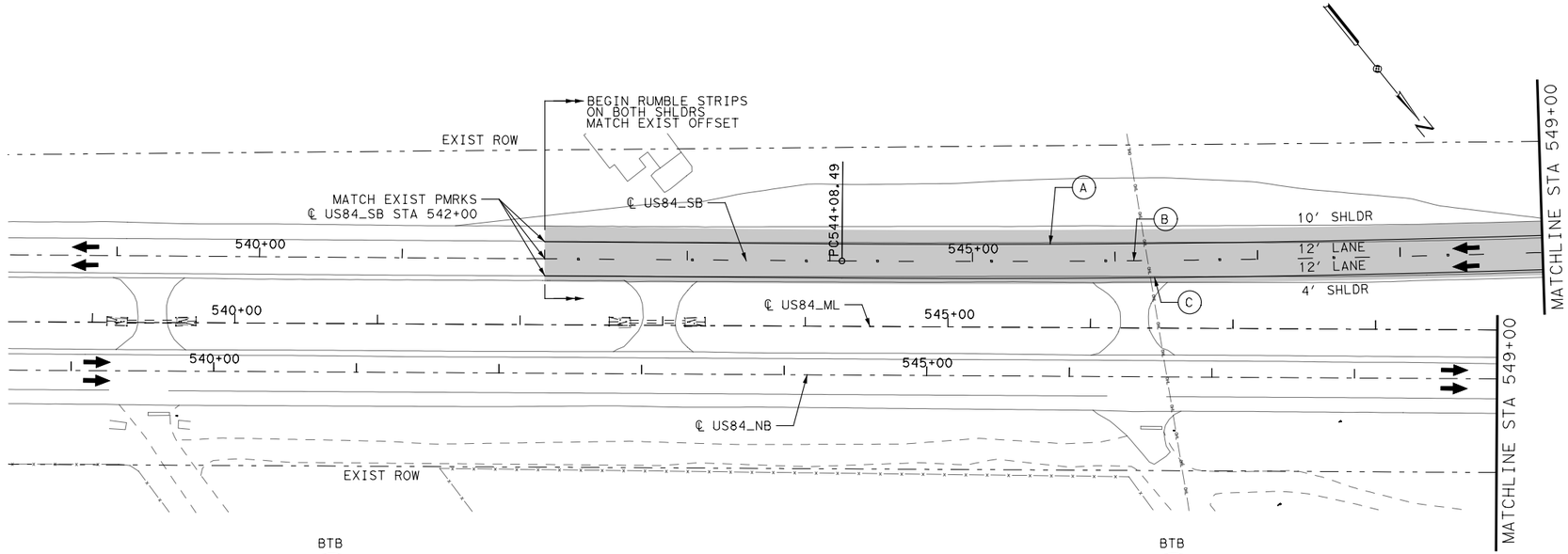

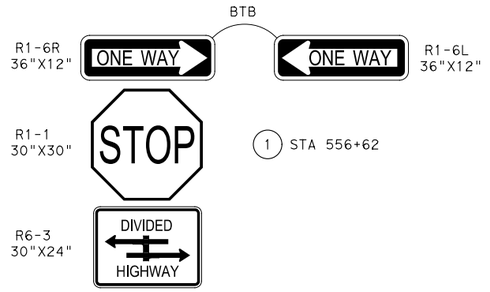

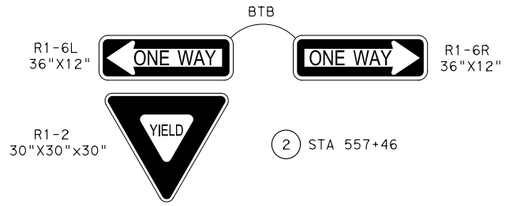

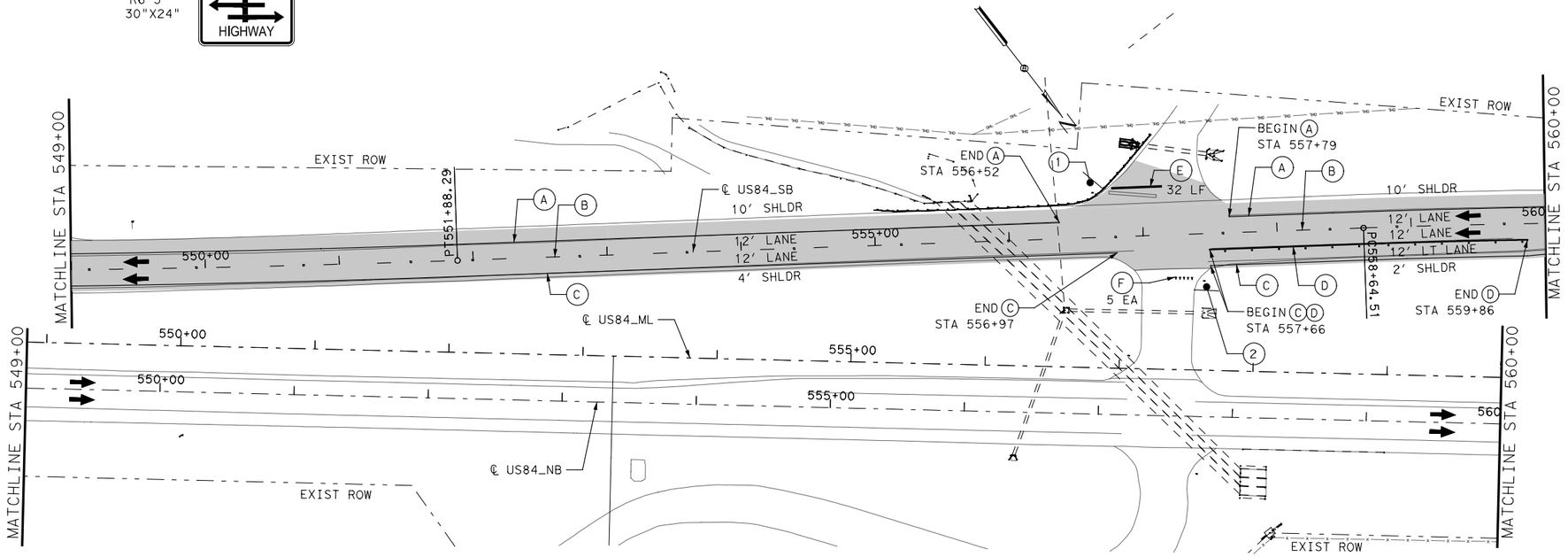

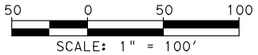

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP SMALL SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)
- (D) RE PM TY I (W)8"(SLD)(100MIL) W/ RPM TY II-C-R @ 20' CC
- (E) PREFAB (W)24"(SLD)
- (F) PREFAB (W)18"(YLD TRI)

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 5 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	135
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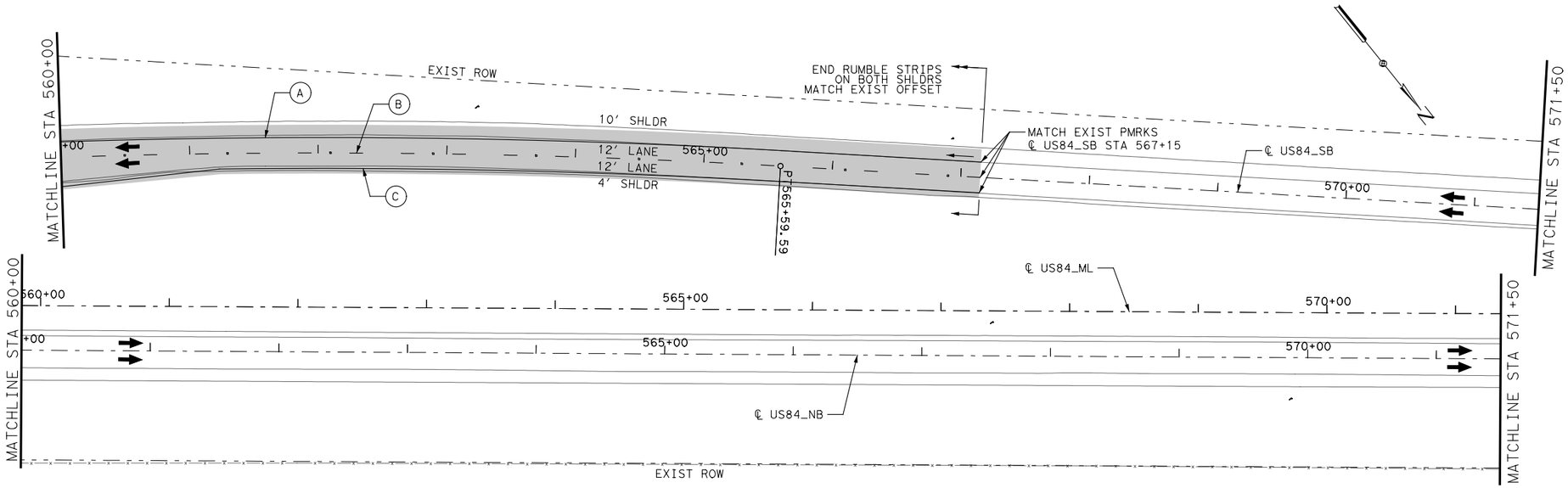

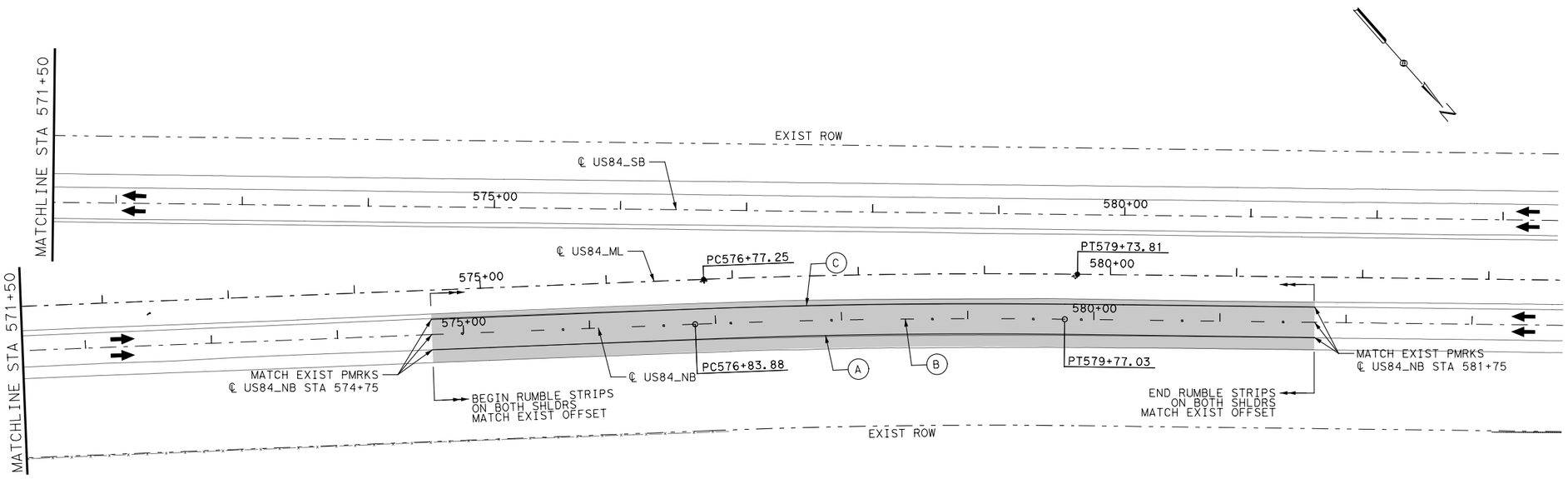

50 0 50 100

SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 6 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
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CHECK JL	CONTROL	SECTION	JOB	
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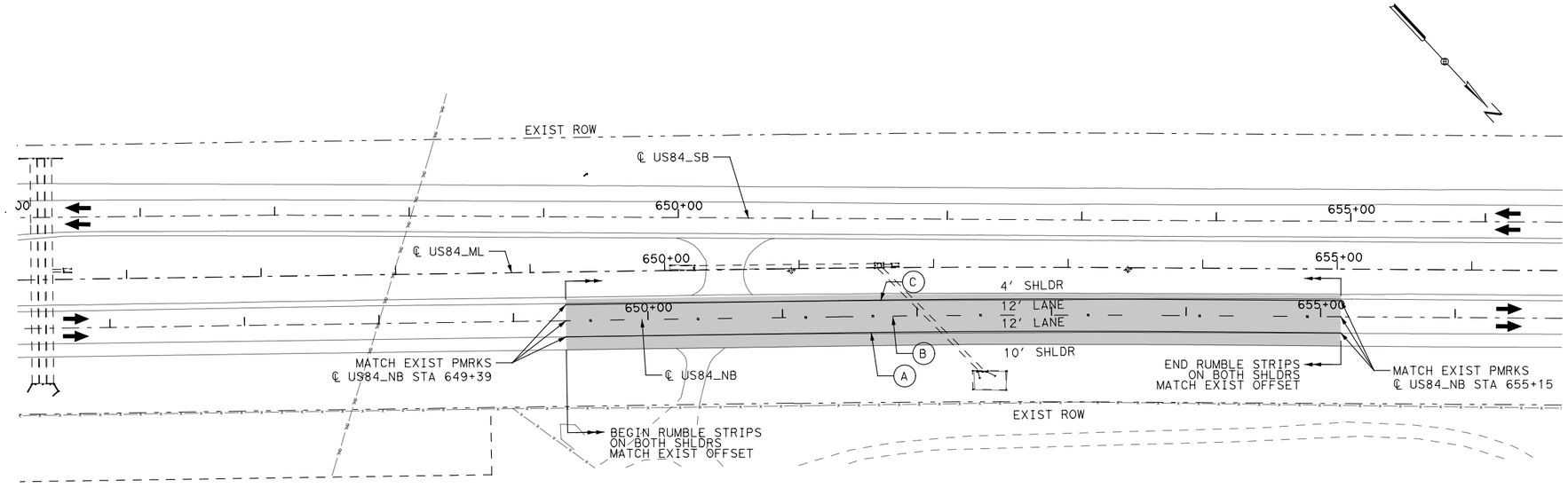

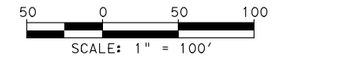

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 7 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
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CHECK JL	CONTROL	SECTION	JOB	
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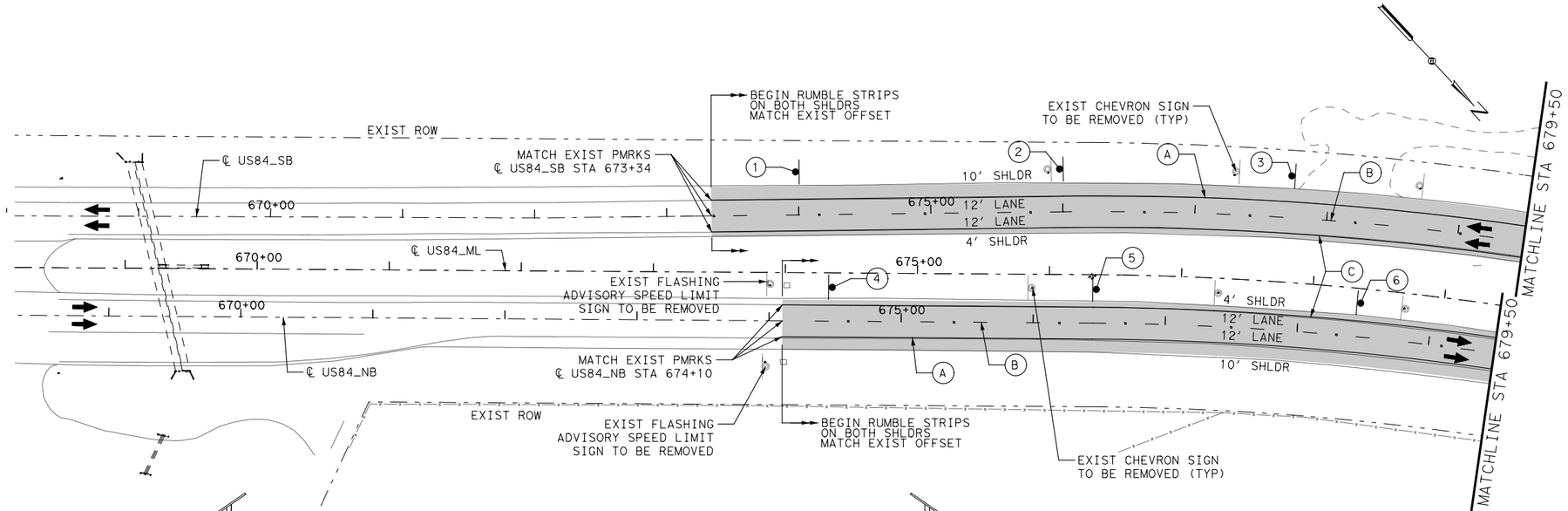
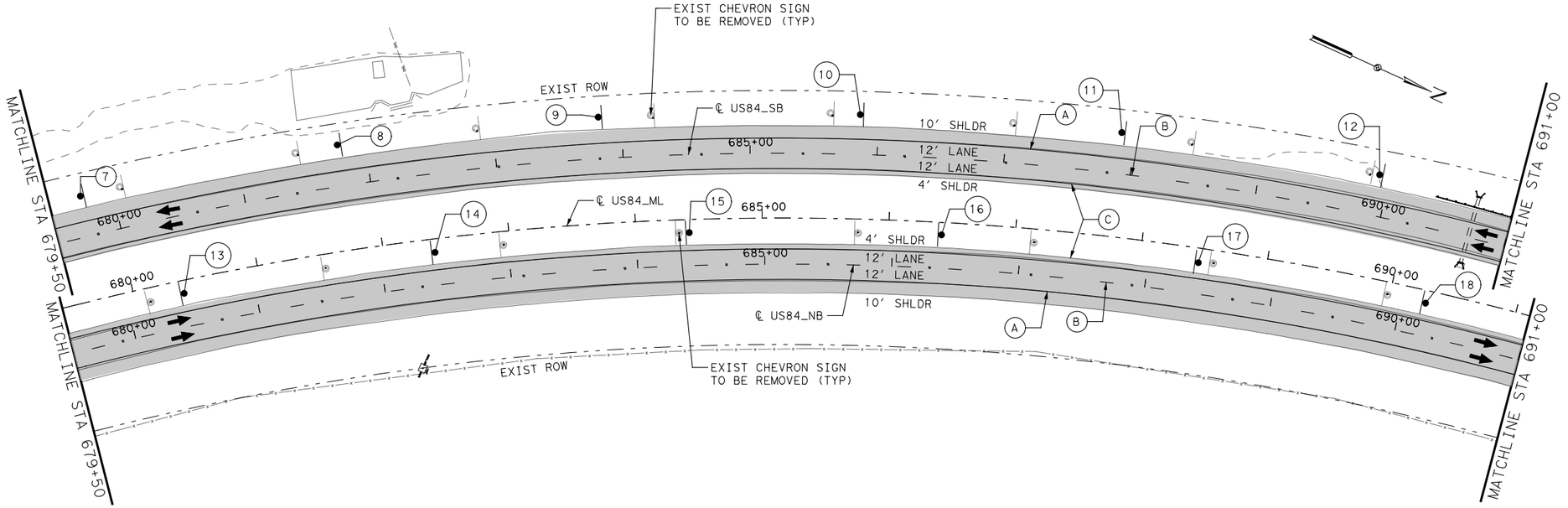


W1-8L
24"X30"
SOLAR POWER

1 STA 673+98
2 STA 675+98
3 STA 677+72
7 STA 679+75
8 STA 681+78
9 STA 683+82
10 STA 685+86
11 STA 687+90
12 STA 689+93

W1-8R
24"X30"
SOLAR POWER

4 STA 674+48 (LEAD LED)
5 STA 676+48
6 STA 678+46
13 STA 680+45
14 STA 682+43
15 STA 684+41
16 STA 686+38
17 STA 688+39
18 STA 690+19



50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

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4/30/2021

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SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 8 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	138
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

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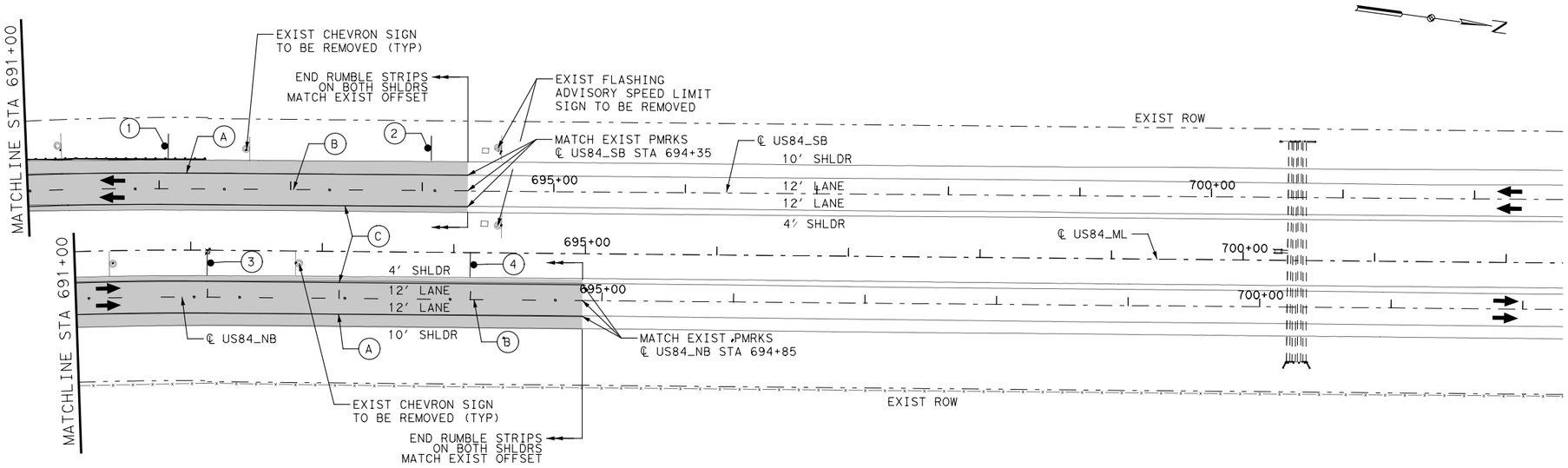

1 STA 692+04

2 STA 694+04 (LEAD LED)

W1-8L
24"X30"
SOLAR POWER

3 STA 692+02

4 STA 694+02

W1-8R
24"X30"
SOLAR POWER

50 0 50 100

SCALE: 1" = 100′

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80′ CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

NOTES:

1. ALL EXISTING SIGNS NOT SHOWN ARE TO REMAIN UNLESS NOTED OTHERWISE IN PLAN.
2. ALL STATIONINGS ARE BASED ON THEIR RESPECTIVE ALIGNMENTS.
3. CONTRACTOR SHALL VERIFY REMOVAL AND INSTALLATION OF SMALL SIGN ASSEMBLY WITH THE ENGINEER PRIOR TO WORK.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

4/30/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

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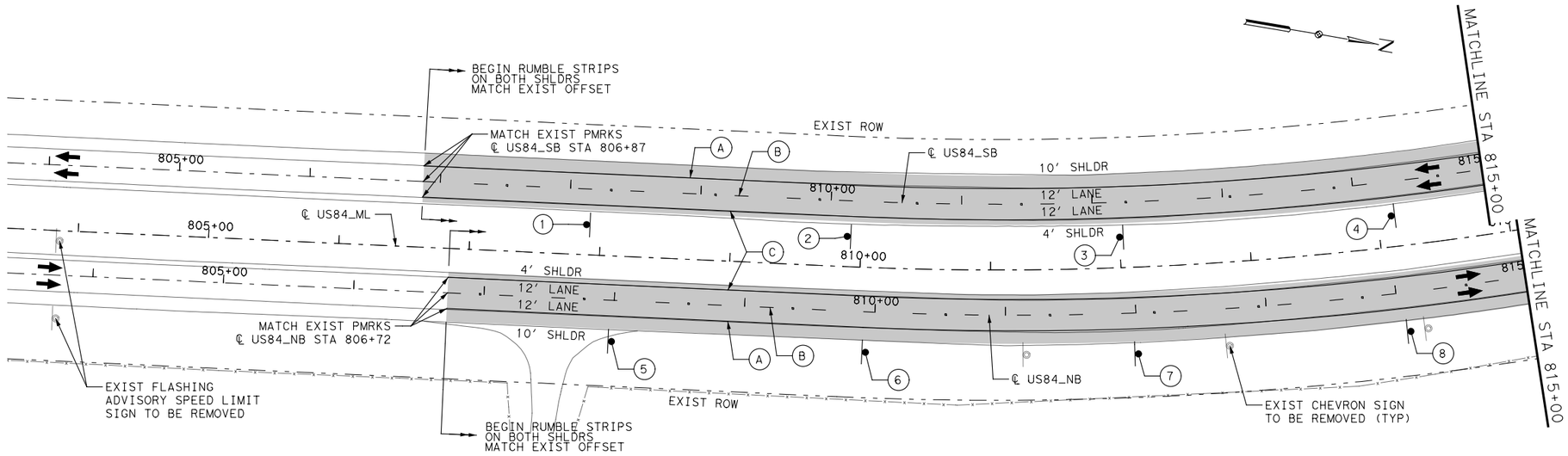
US 84

SIGNING AND PAVEMENT MARKING LAYOUT

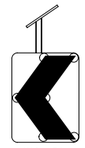
SCALE: 1"=100′ SHEET 9 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	139
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

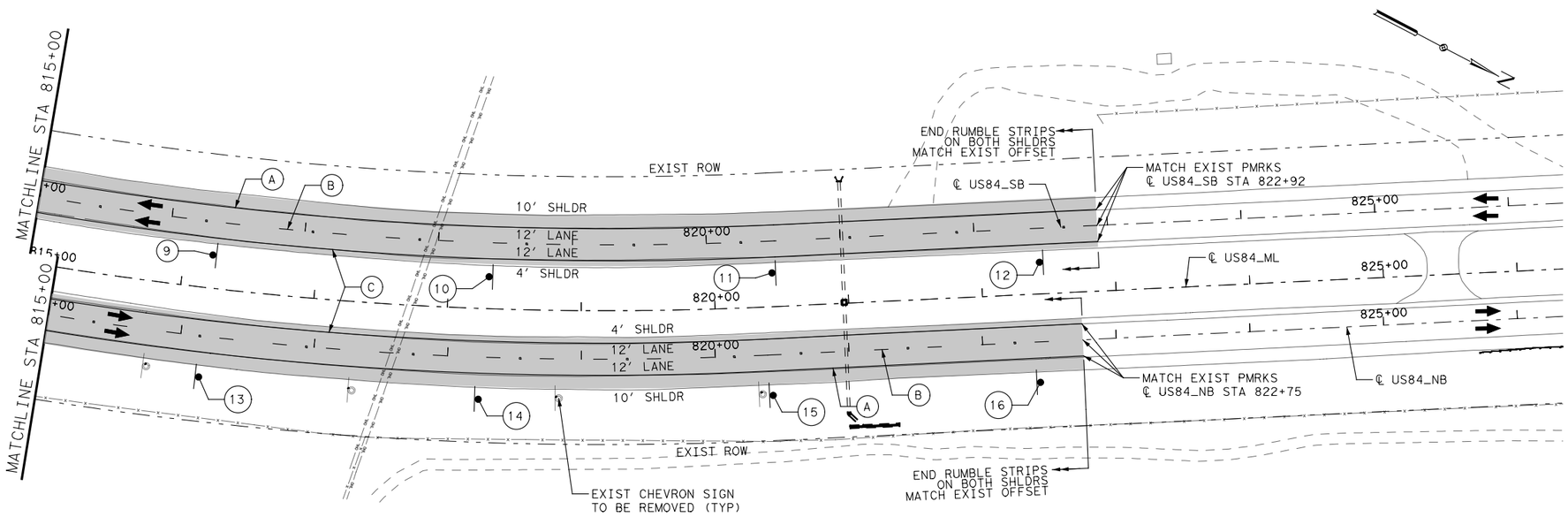
4/30/2021 12:27:23 PM



1 STA 808+14
2 STA 810+14
3 STA 812+20
4 STA 814+27
9 STA 816+34
10 STA 818+39
11 STA 820+48
12 STA 822+48 (LEAD LED)



5 STA 807+99 (LEAD LED)
6 STA 809+94
7 STA 812+01
8 STA 814+08
13 STA 816+17
14 STA 818+24
15 STA 820+42
16 STA 822+42



50 0 50 100
SCALE: 1" = 100'

LEGEND

- DIRECTION OF TRAVEL
- EXIST ROW
- EXIST FENCE
- EXIST SM RD SN SUP&AM TO BE REMOVED
- (#) PROP FLASHING LED CHEVRON SIGN
- (A) RE PM TY I (W)4"(SLD)(100MIL)
- (B) RE PM TY I (W)4"(BRK)(100MIL) W/ RPM TY II-C-R @ 80' CC
- (C) RE PM TY I (Y)4"(SLD)(100MIL)

NOTES:

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STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/30/2021

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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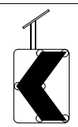
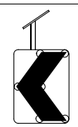
SIGNING AND PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 10 OF 10

DESIGN	FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY NO
BH		SEE TITLE SHEET		US 84
GRAPHICS BH	STATE	DISTRICT	COUNTY	SHEET NO
CHECK JMP	TEXAS	ABL	SCURRY	140
CHECK JL	CONTROL	SECTION	JOB	
	0053	07	040	

OTH_US84_SPM_10.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	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
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
1	1	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	2	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	3	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	4	W1-8L LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		
	5	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	6	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	7	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	8	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	9	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	10	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		

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FILE: OTH_US84_SOSS_01.dgn

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

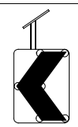
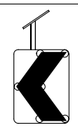
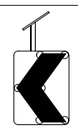
SUMMARY OF SMALL SIGNS

SOSS SHEET 1 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		141

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
1	11	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	12	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	13	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	14	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	15	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	16	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	17	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	18	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
2	1	W1-8R LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		
	2	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		

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

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NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 2 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
4-16	DIST	COUNTY		SHEET NO.
8-16	ABL	SCURRY		142

18

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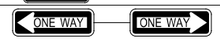
FILE: OTH_US84_SOSS_02.dgn

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
5	1	R1-6R R1-6L		36 x 12	X		S80	1	SA	P	BM	
		R1-1		30 x 30								
		R6-3		30 x 24								
	2	R1-6L R1-6R		36 x 12	X		S80	1	SA	P	BM	
		R1-2		30 x 30 x 30								
8	1	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	2	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	3	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	4	W1-8R LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		
	4	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	5	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	6	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	7	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		

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

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

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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.
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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 3 OF 7

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0053	07	040	US 84
4-16		DIST	COUNTY		SHEET NO.
8-16		ABL	SCURRY		143

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
8	8	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	9	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	10	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	11	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	12	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	13	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	14	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	15	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	16	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	17	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		

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

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

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 4 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
4-16	DIST	COUNTY		SHEET NO.
8-16	ABL	SCURRY		144

18

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FILE: OTH_US84_SOSS_04.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	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
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
8	18	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
9	1	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	2	W1-8L LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		
	3	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	4	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
10	1	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	2	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	3	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	4	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	5	W1-8L LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		

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

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 5 OF 6

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0053	07	040	US 84
4-16		DIST	COUNTY		SHEET NO.
8-16		ABL	SCURRY		145

18

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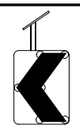
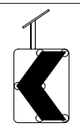
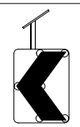
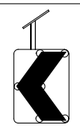
FILE: OTH_US84_SOSS_05.dgn

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
10	6	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	7	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	8	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	9	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	10	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	11	W1-8R LED SOLAR		24 x 30	X		S80	1	SA	P		
	12	W1-8R LED SOLAR (LEAD)		24 x 30	X		S80	1	SA	P		
	13	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	14	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		
	15	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 6 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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4-16	DIST	COUNTY		SHEET NO.
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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
10	16	W1-8L LED SOLAR		24 x 30	X		S80	1	SA	P		

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 7 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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4-16 8-16	DIST	COUNTY		SHEET NO.
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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)

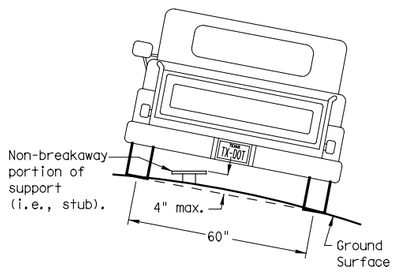
Anchor Type

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))

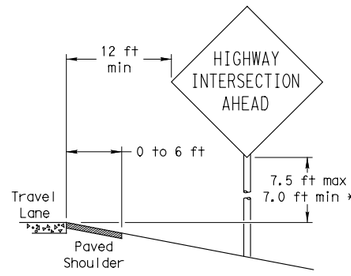
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

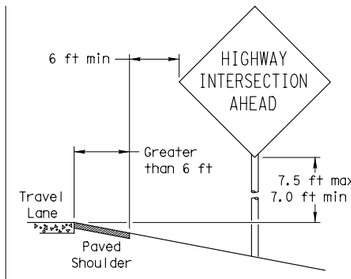
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

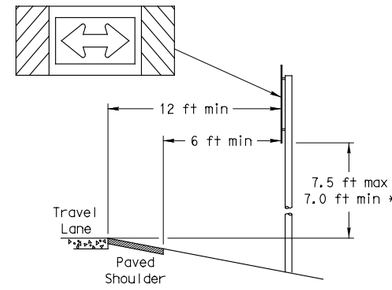
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



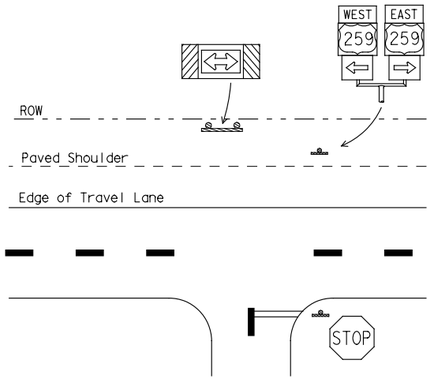
GREATER THAN 6 FT. WIDE

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.

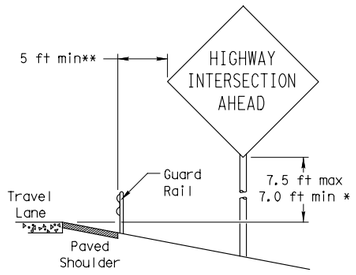
T-INTERSECTION



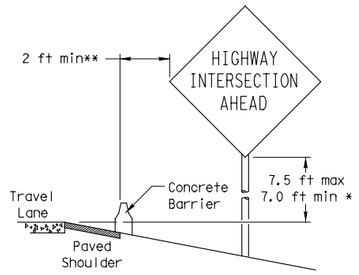
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



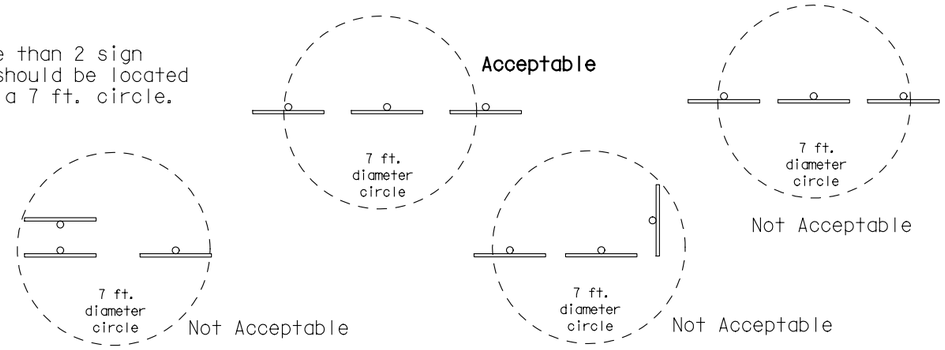
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

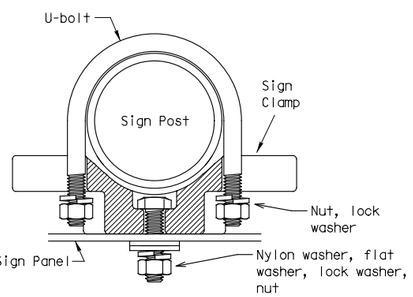
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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

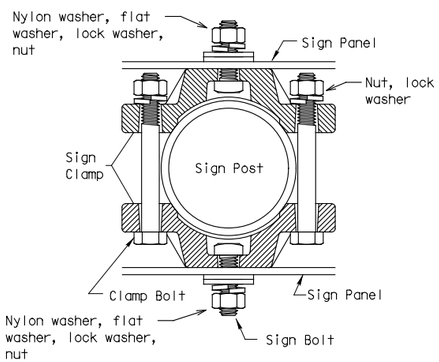


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



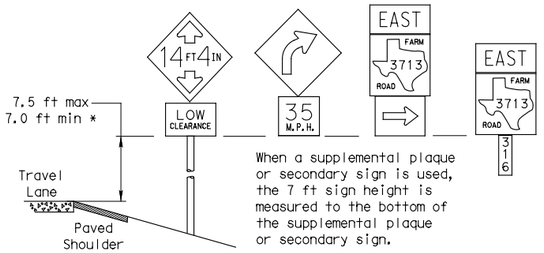
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

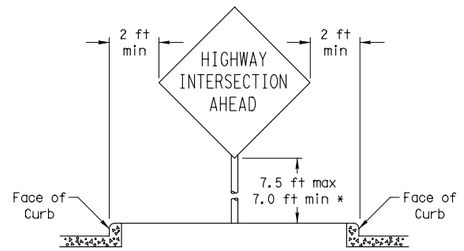
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



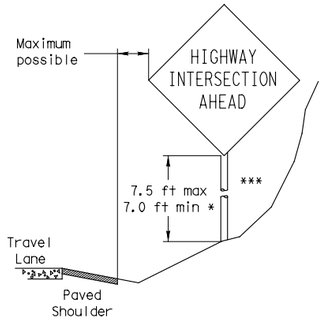
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

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	ABL	SCURRY		148

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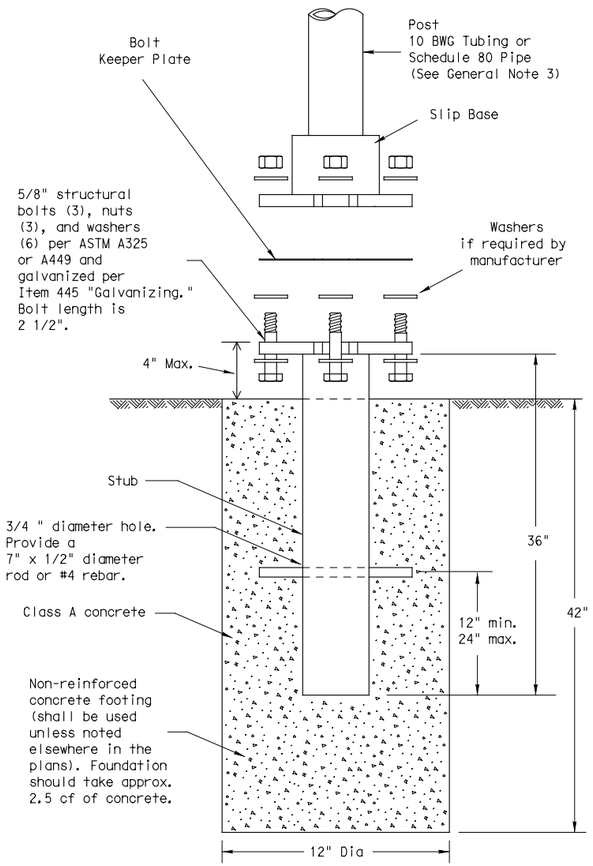
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

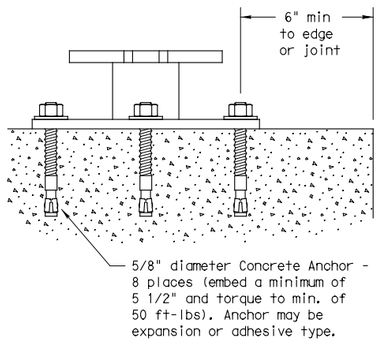
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

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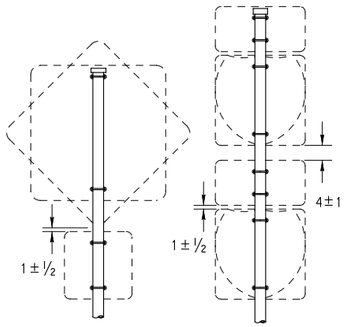
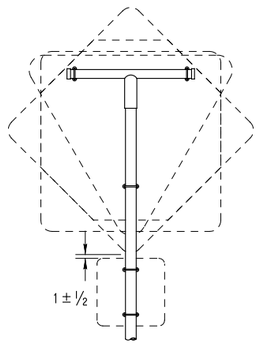


SM RD SGN ASSM TY XXXXX(1)XX(P)



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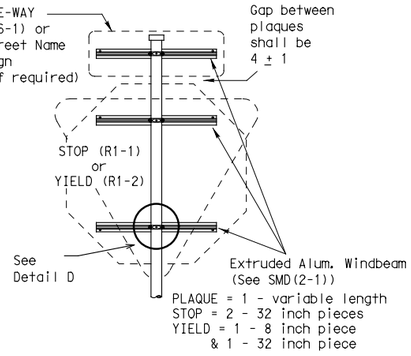

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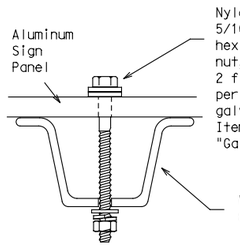
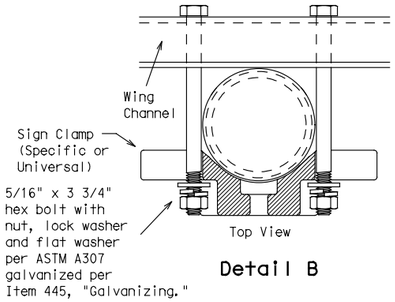
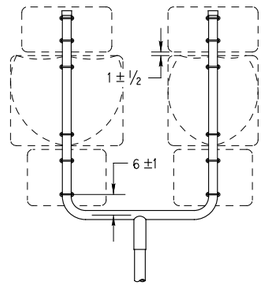


Detail A



Detail B



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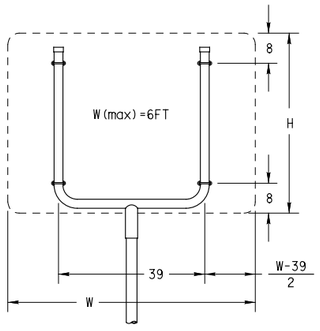

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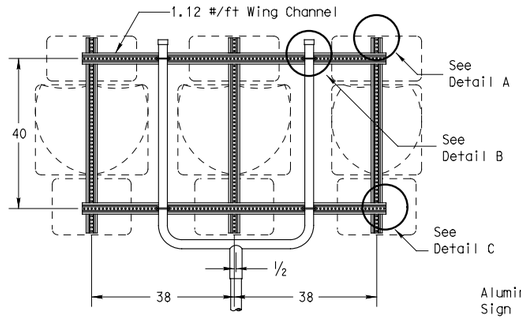
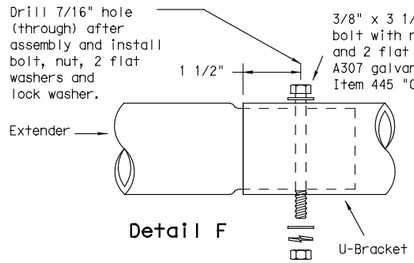
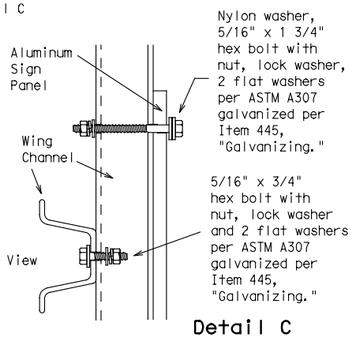


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

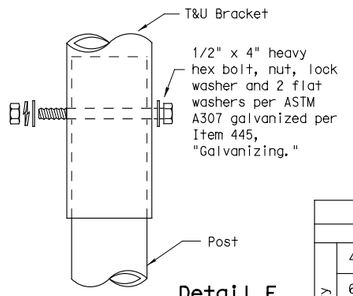


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



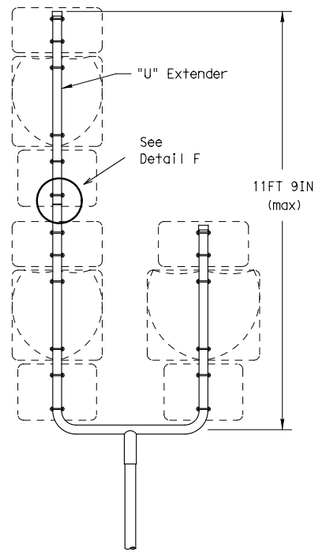
Detail E

GENERAL NOTES:

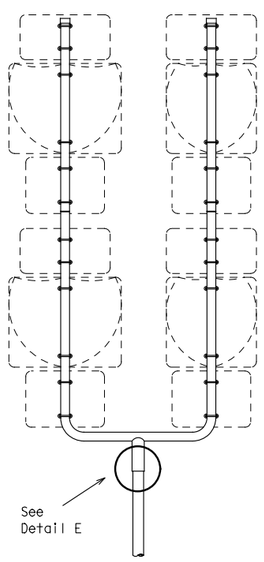
1.

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.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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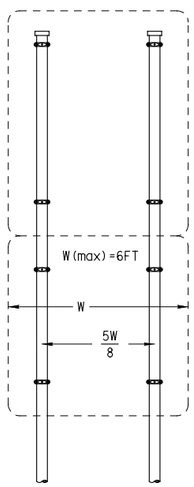
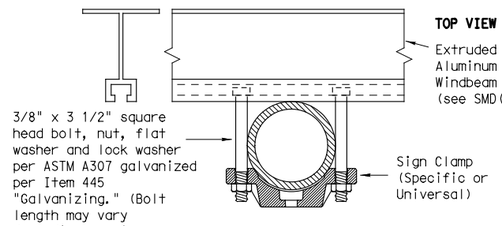
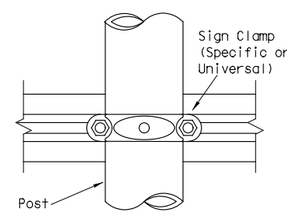


SM RD SGN ASSYM TY XXXXX(2)XX(P)

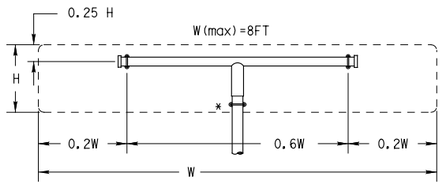
SIDE VIEW



Detail D



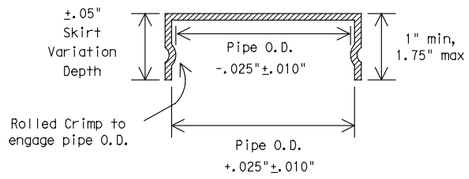
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		150

26C

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FILE: smds2.dgn

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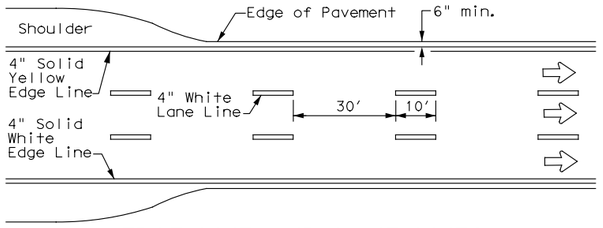
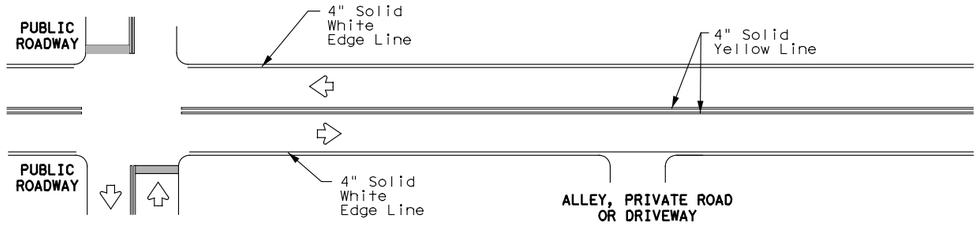
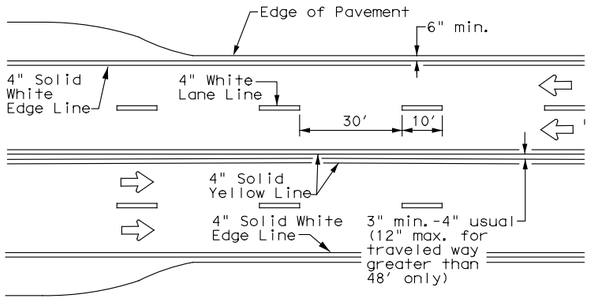


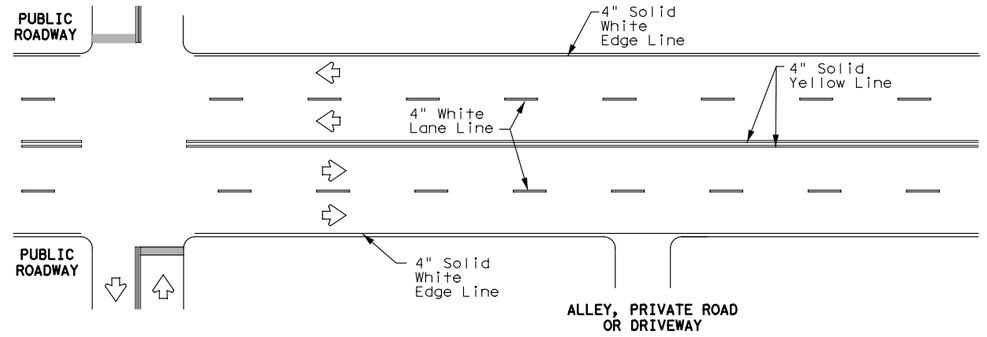
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



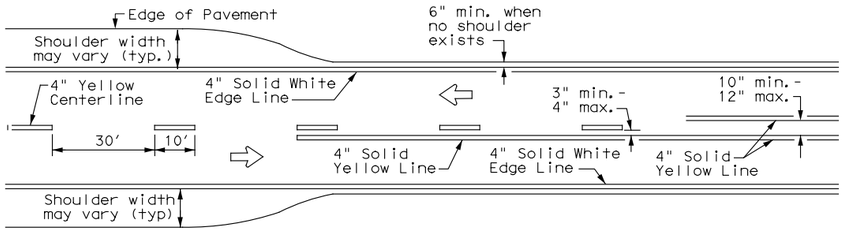
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



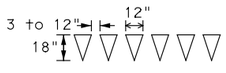
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



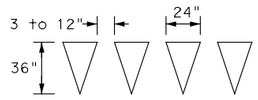
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

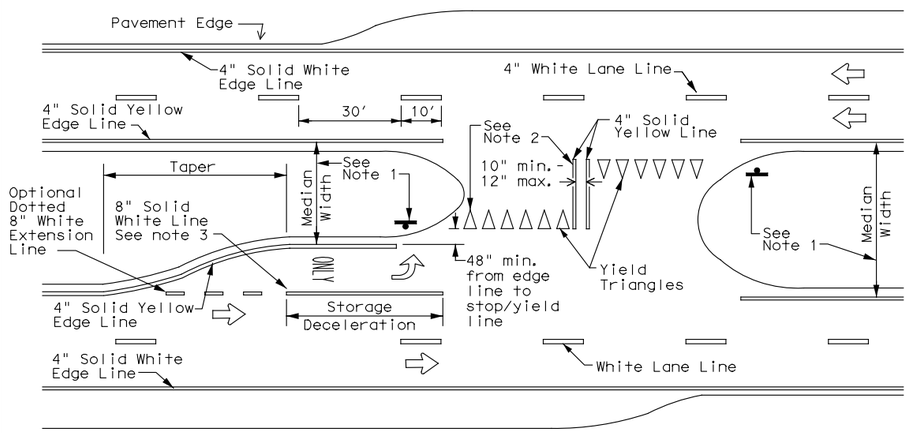


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

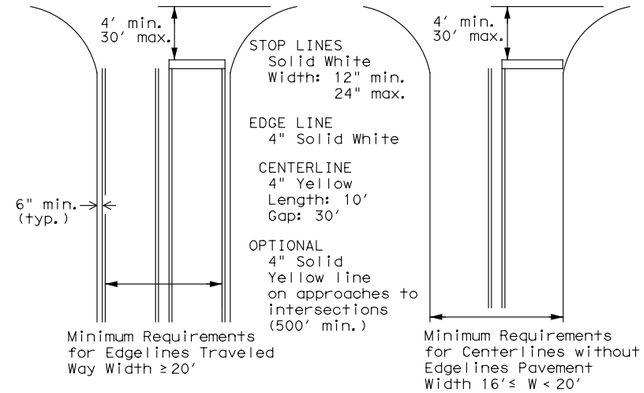
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0053	07	040	US 84
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ABL	SCURRY		151

22A

DATE: 4/26/2021 4:11:30 PM
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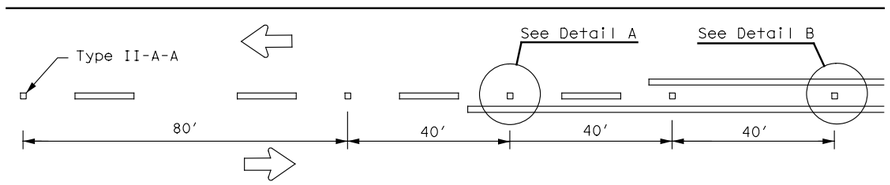
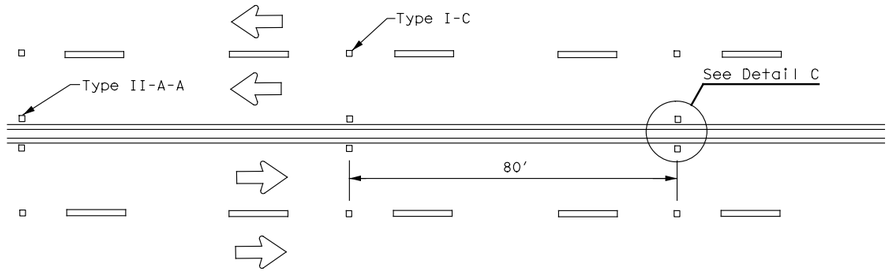
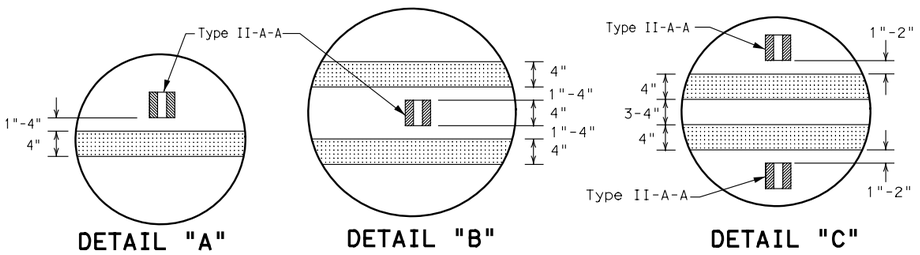
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



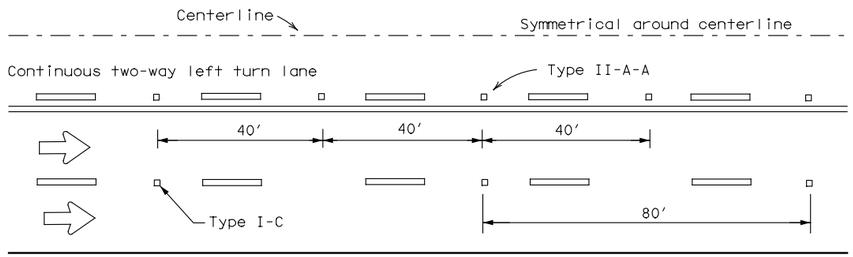
CENTERLINE FOR ALL TWO LANE ROADWAYS



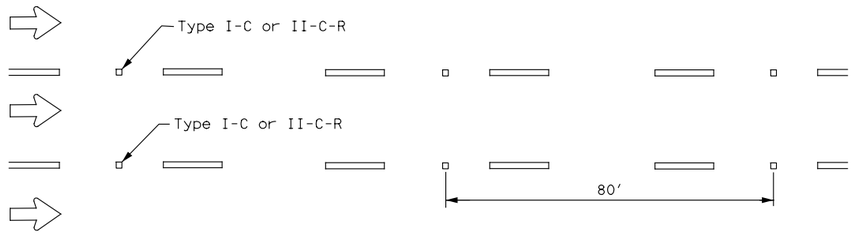
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

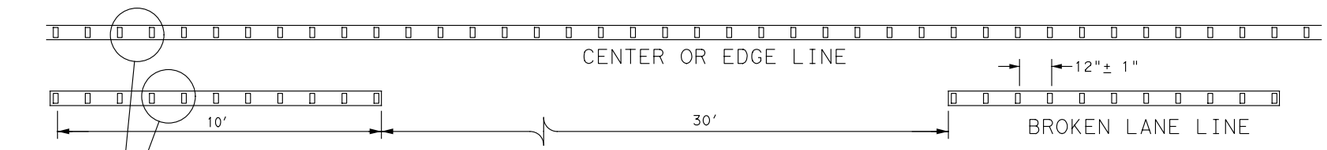


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

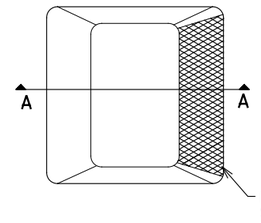
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

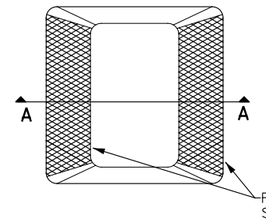
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

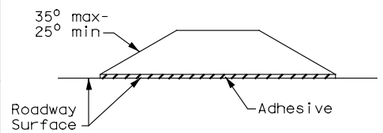
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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	0053	07	040	US 84
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ABL	SCURRY		152

22B

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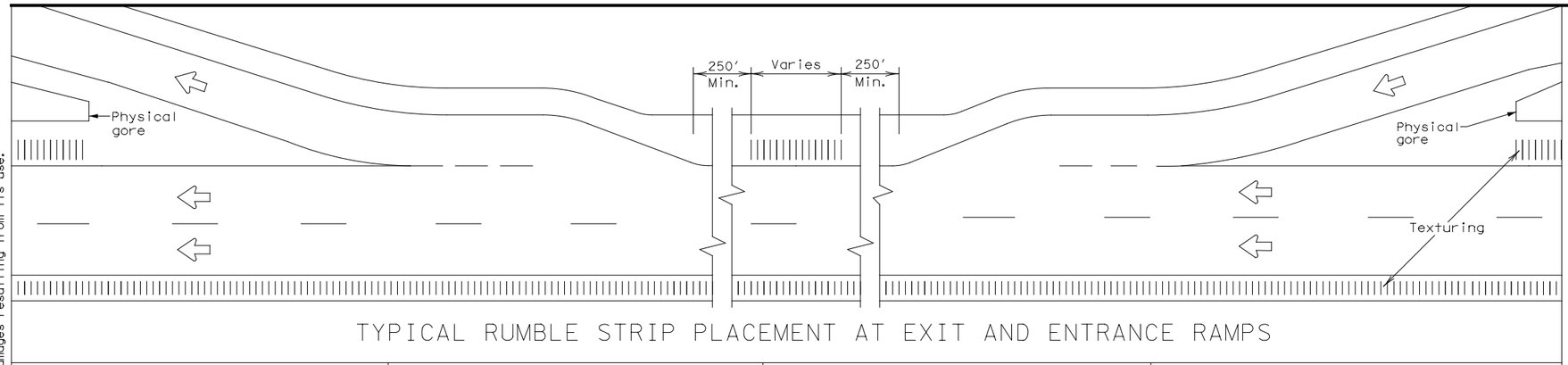
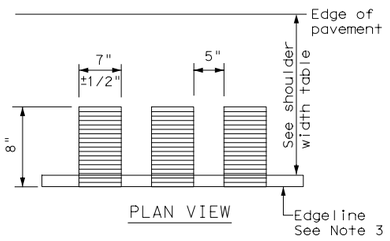
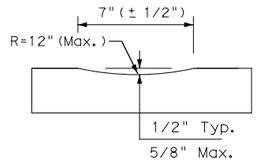


TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

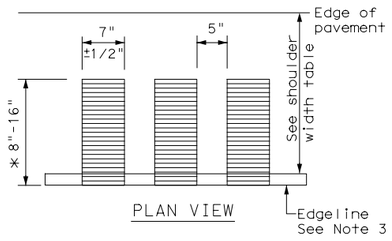


PLAN VIEW



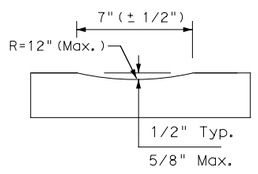
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



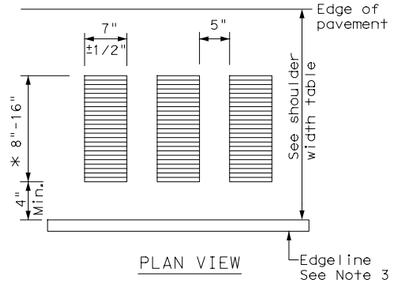
PLAN VIEW

* This distance may vary based on width of shoulder



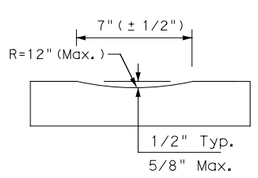
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



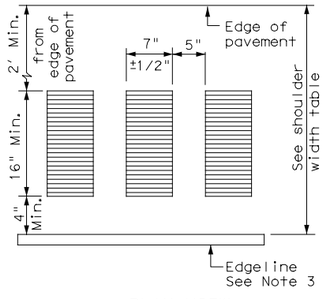
PLAN VIEW

* This distance may vary based on width of shoulder

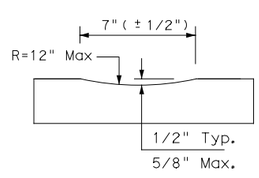


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

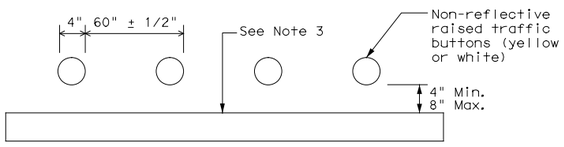


PLAN VIEW



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS

PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-10 10-13	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		153

DATE: 4/26/2021 4:11:31 PM
FILE: rs(1)-13.dgn

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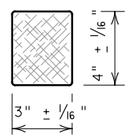
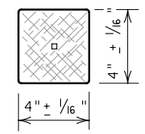
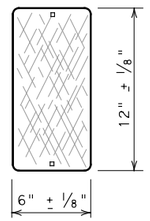
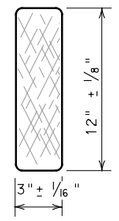
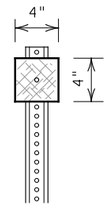
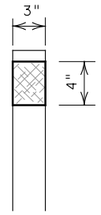
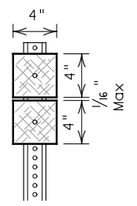
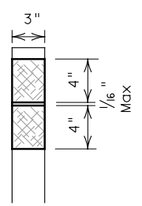
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

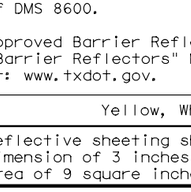
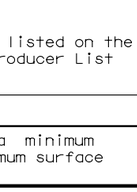
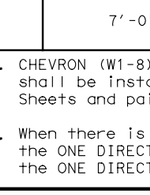
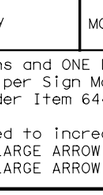
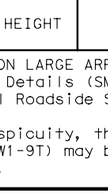
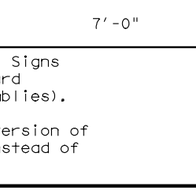
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

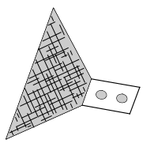
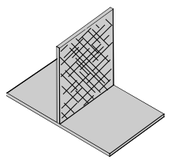
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

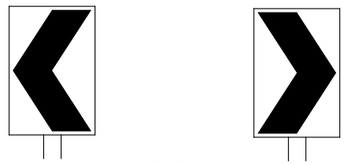
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE



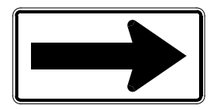
W1-8

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

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

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

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ABL	SCURRY		154

20A

DATE: 4/26/2021 4:11:31 PM
FILE: dom1-20.dgn

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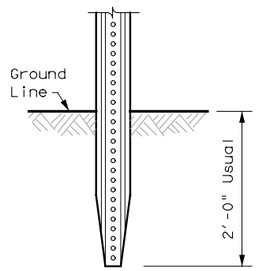
FILE: dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

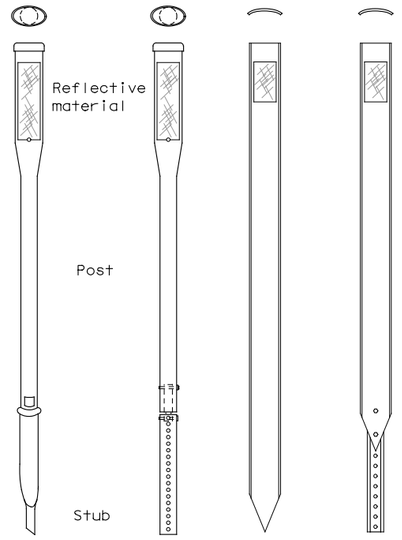


NOTES

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

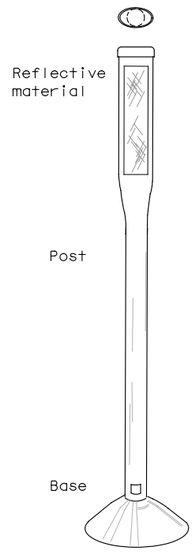
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



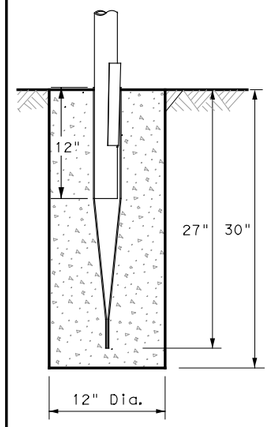
SURFACE MOUNT

NOTES

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

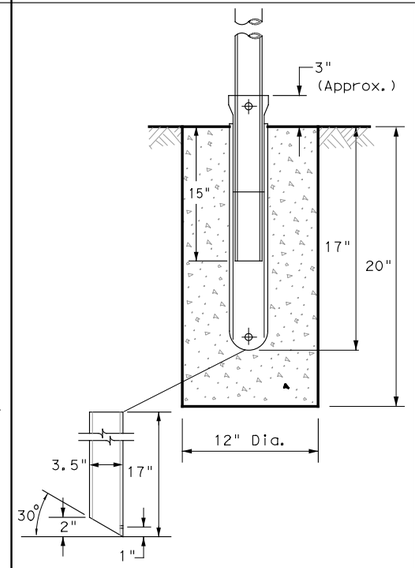
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

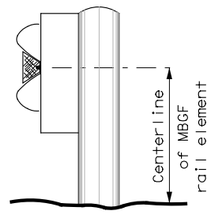
NOTE

1. Install per manufacturer's recommendations.

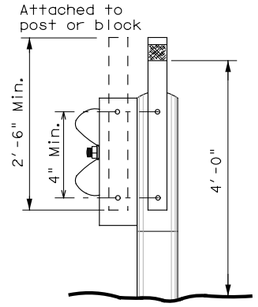
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

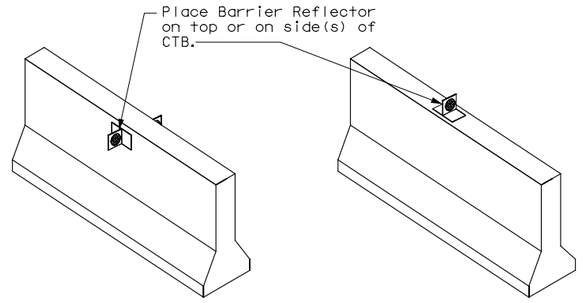
GF1



GF2



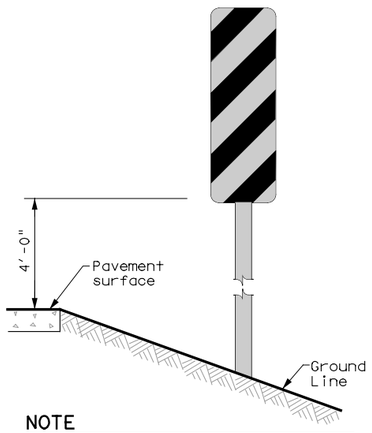
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

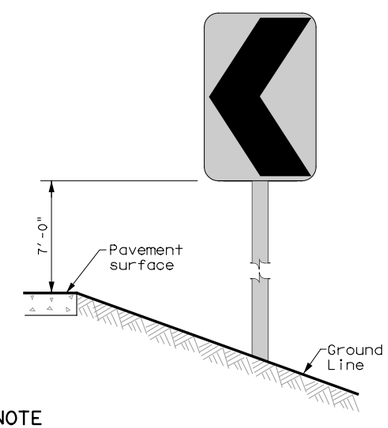
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

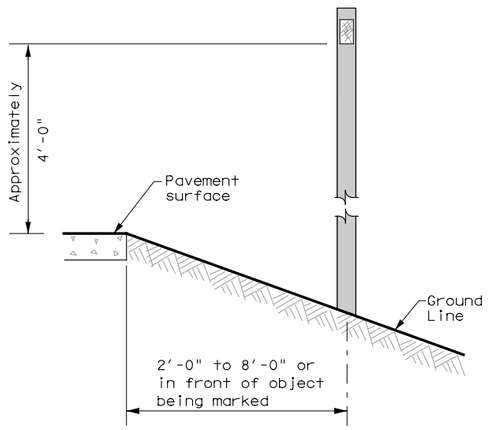
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ABL	SCURRY		155

20B

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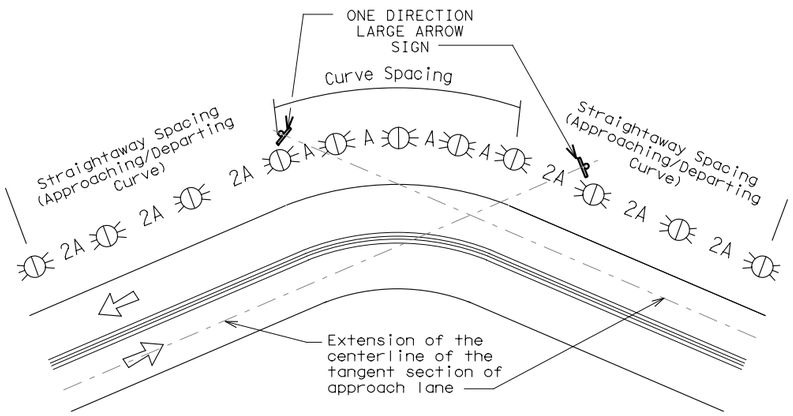
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

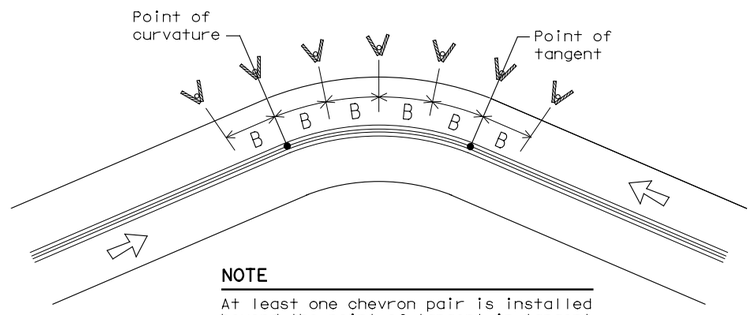
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	ABL	SCURRY		156

20C

DATE: 4/26/2021 4:11:37 PM
FILE: dom3-20.dgn

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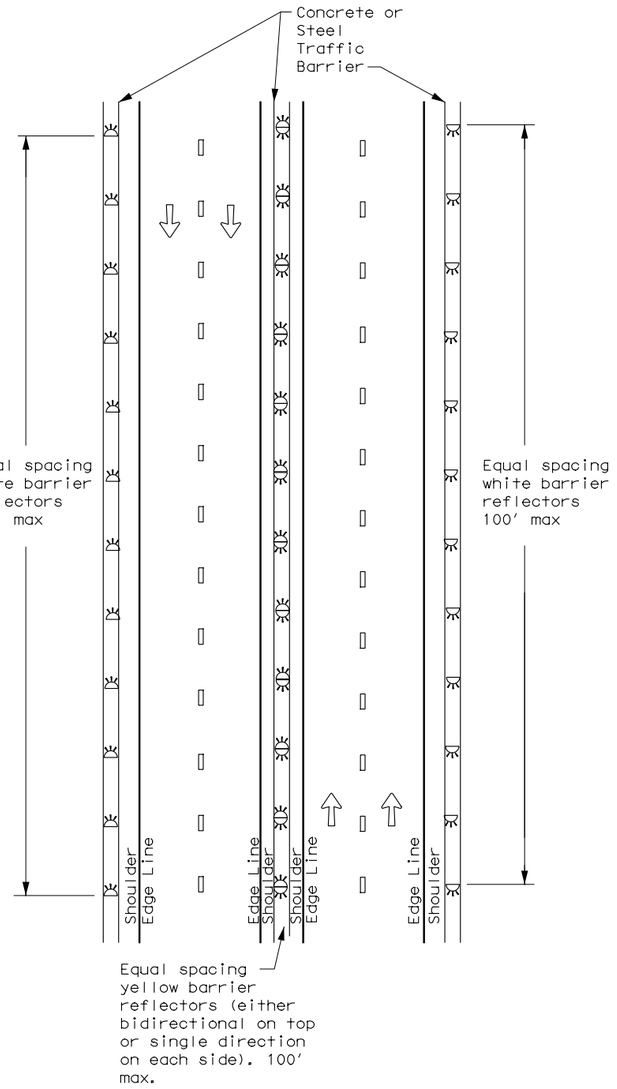
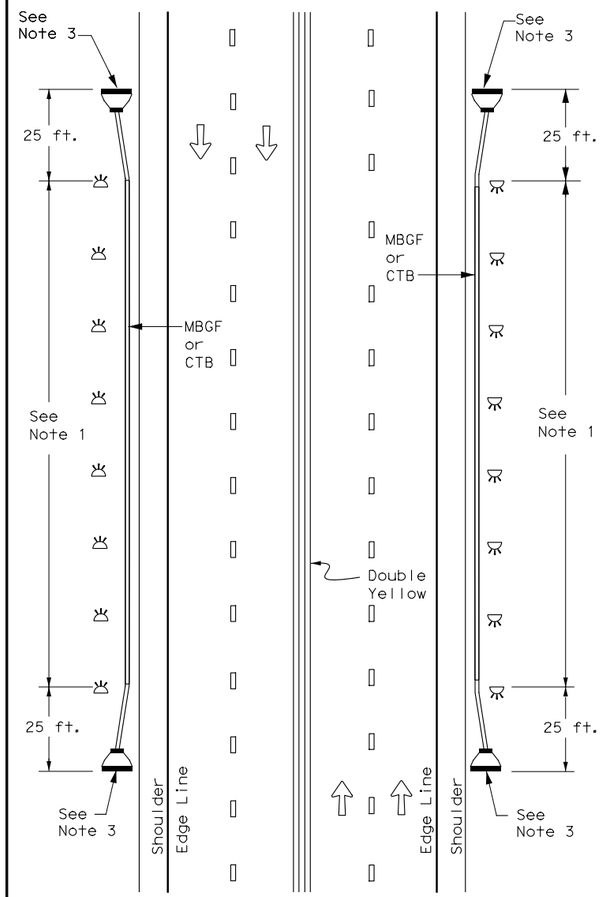
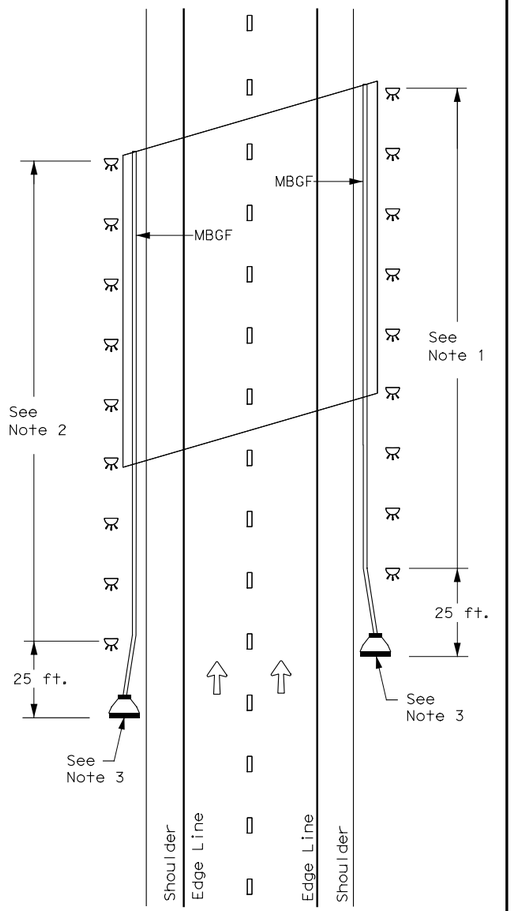
CONTINUOUS CONCRETE OR STEEL BARRIER



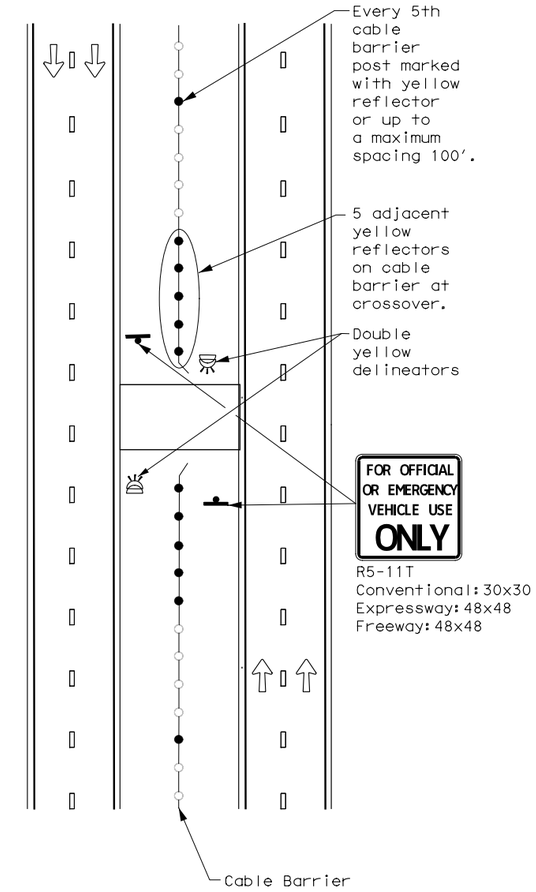
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
7-20	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		157

DATE: 4/26/2021 4:11:37 PM
FILE: dom6-20.dgn

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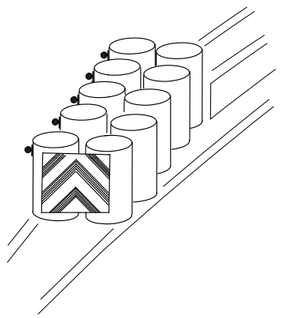
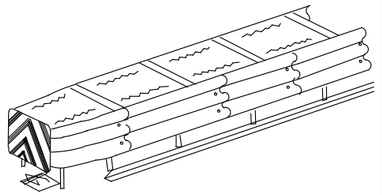
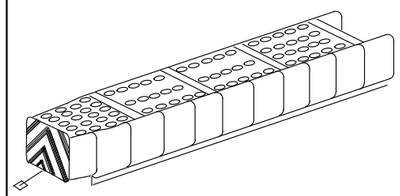
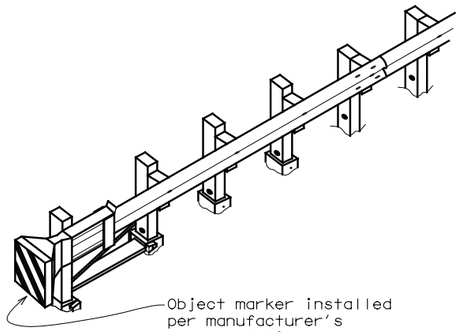
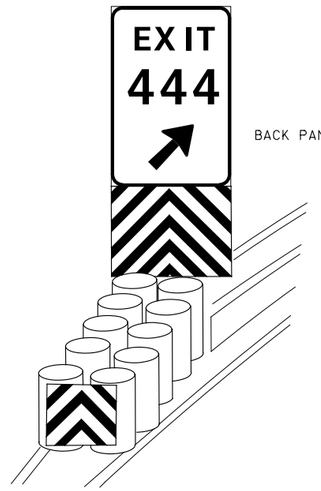
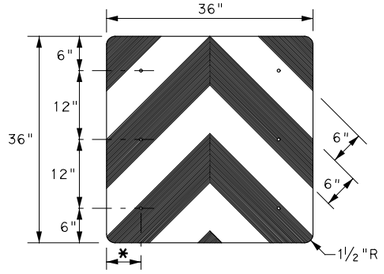


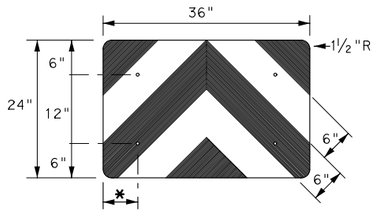




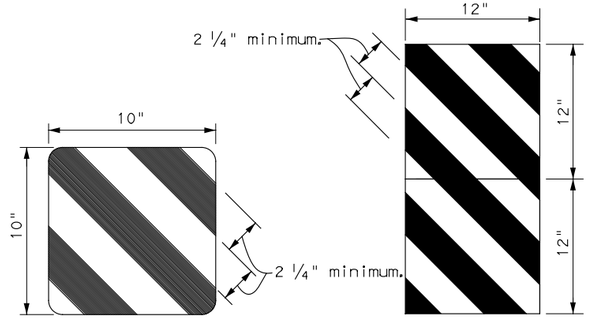




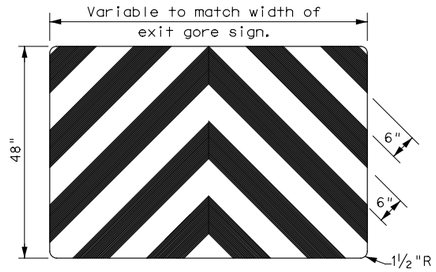


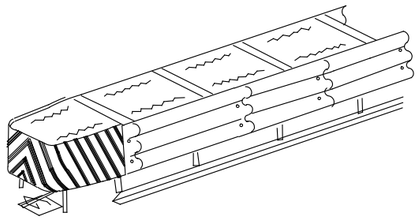


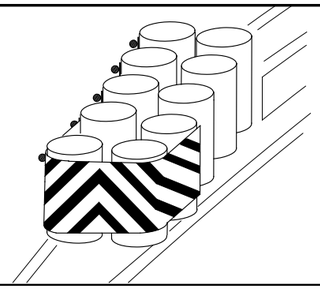
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

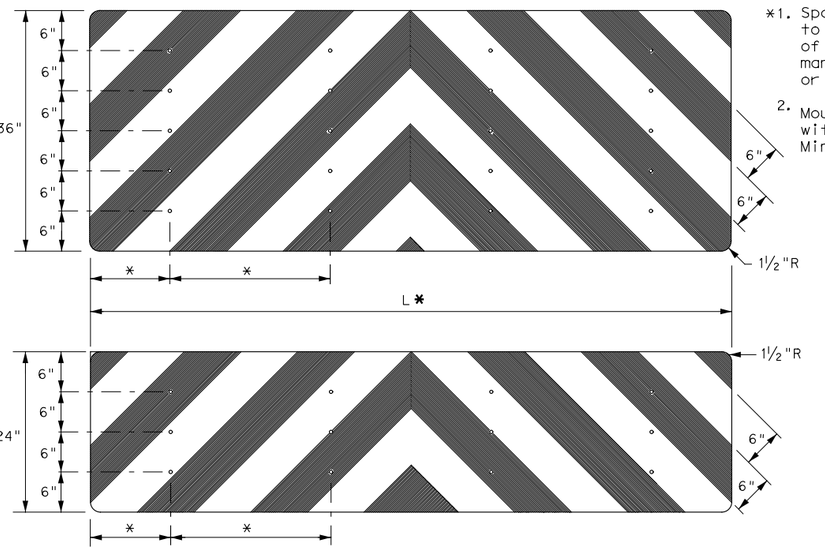


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	ABL	SCURRY		158
4-98 7-20				

20G

DATE: 4/26/2021 4:11:37 PM
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I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 015041Y - 015048W
Crossing Type: ** AT-GRADE
RR Company Owning Track at Crossing: BNSF
Operating RR Company at Track: BNSF
RR MP: 743.350 - 750.260
RR Subdivision: SLATON
City: FLUVANNA-DERMOTT-SNYDER
County: SCURRY
CSJ at this Crossing: 0053-07-040
Highway/Roadway name crossing the railroad: FM 612 AND COUNTY ROADS
# of regularly scheduled trains per day at this crossing: 18
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0

Scope of Work at this Crossing to Be Performed by State Contractor:
STATE CONTRACTOR WILL NOT PERFORM ANY WORK IN RAILROAD ROW.
CONTRACTOR WILL CROSS THE TRACKS TO PLACE SIGN WEST OF THE RAILROAD ROW.

Scope of Work at this Crossing to Be Performed by Railroad Company:
NONE

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

NONE

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 0
On this project, night or weekend flagging is:
☐ Expected
☒ Not Expected

Flagging services will be provided by:
☐ Railroad Company: TxDOT will pay flagging invoices
☐ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ UPRR - UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

☐ BNSF - BNSF.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

☐ KCS - KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
- Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required

☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:
☐ Required
☒ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
☒ Not Required	
☐ Non - Bridge Projects	$2,000,000 / $6,000,000
☐ Bridge Projects	$5,000,000 / $10,000,000
☐ Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:
☒ Not Required
☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
☐ Required: Contractor to obtain (see Item 5, Article 8.4)
With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:
☒ Not Required
☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call BNSF Railway
Railroad Emergency Line at 800-832-5452
Location: DOT 015041Y
RR Milepost 743.350
Subdivision SLATON

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0053	07	040	US 84
3/2020	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		159

DATE: 4/26/2021 4:11:38 PM
FILE: OTH_US84_RR_01.dgn

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: PLAN & PROFILE AND EROSION CONTROL SHEETS

APPROX. SLOPES ANTICIPATED AFTER MAJOR GRADING AND AREAS OF SOIL DISTURBANCE: TYPICAL SECTIONS

MAJOR CONTROLS AND LOCATIONS OF STABILIZATION PRACTICES: PLAN & PROFILE AND SW3P SITE PLAN SHEETS

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:
PLAN & PROFILE AND EROSION CONTROL SHEETS

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:
SUPERELEVATION IMPROVEMENTS AND SAFETY LIGHTING

MAJOR SOIL DISTURBING ACTIVITIES:
ROADWAY EMBANKMENTS

TOTAL PROJECT AREA:
282.0 ACRES

TOTAL AREA TO BE DISTURBED (AT EACH SITE):
26.9 ACRES

WEIGHTED RUNOFF COEFFICIENT BEFORE CONSTRUCTION:
0.20

WEIGHTED RUNOFF COEFFICIENT AFTER CONSTRUCTION:
0.20

EXISTING CONDITION OF SOIL & VEGETATIVE COVER:
FAIR FOR ALL

% OF EXISTING VEGETATIVE COVER:
70%

NAME OF RECEIVING WATERS:
FLOWS INTO GRAPE CREEK THEN SEGMENT 1241B LAKE ALAN HENRY

EROSION AND SEDIMENT CONTROLS

USE "T" OR "P" IN THE BLANKS BELOW IF APPLICABLE (T= TEMPORARY, P= PERMANENT)

SOIL STABILIZATION PRACTICES:

P	BUFFER ZONES	P	PERMANENT PLANTING, SODDING, OR SEEDING
	MULCHING	P	PRESERVATION OF NATURAL RESOURCES
T	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
T	ROCK FILTER DAMS		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
	STORM SEWERS		VELOCITY CONTROL DEVICES
	OTHER	T	LINED CONCRETE WASHOUT

OFFSITE VEHICLE TRACKING CONTROLS:

	HAUL ROADS DAMPENED FOR DUST CONTROL
	EXCESS DIRT ON ROAD REMOVED DAILY
T	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:
SEE SUGGESTED SEQUENCE OF CONSTRUCTION SHEET

STORM WATER MANAGEMENT:
NA

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

Signature , P.E. 4/26/2021
Date

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 EVENT OF A MAJOR SPILL, NOTIFY THE TXDOT ENGINEER IMMEDIATELY. ALL PERSONNEL 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.

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NO SCALE

SHEET 1 OF 2

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 84
STATE	COUNTY		SHEET NO.
TEXAS	SCURRY		160
DISTRICT	CONTROL	SECTION	JOB
ABL	0053	07	040

SW3P.dgn
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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.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER

Signature , P.E. 4/26/2021 Date

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TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

REV. DATE: 02/27/2014

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NO SCALE SHEET 2 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 84
STATE	COUNTY		SHEET NO.
TEXAS	SCURRY		161
DISTRICT	CONTROL	SECTION	JOB
ABL	0053	07	040

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DATE: 4/26/2021
FILE: epic.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

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

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. COMPLY WITH E.O. 13112 ON USE OF NATIVE VEGETATION.
2.
3.
4.

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

☐ No Action Required ☒ Required Action

Action No.

1. COMPLY WITH MIGRATORY BIRD TREATY ACT FOR PROTECTION OF BIRDS AND NESTS.
2.
3.
4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER
4/26/2021

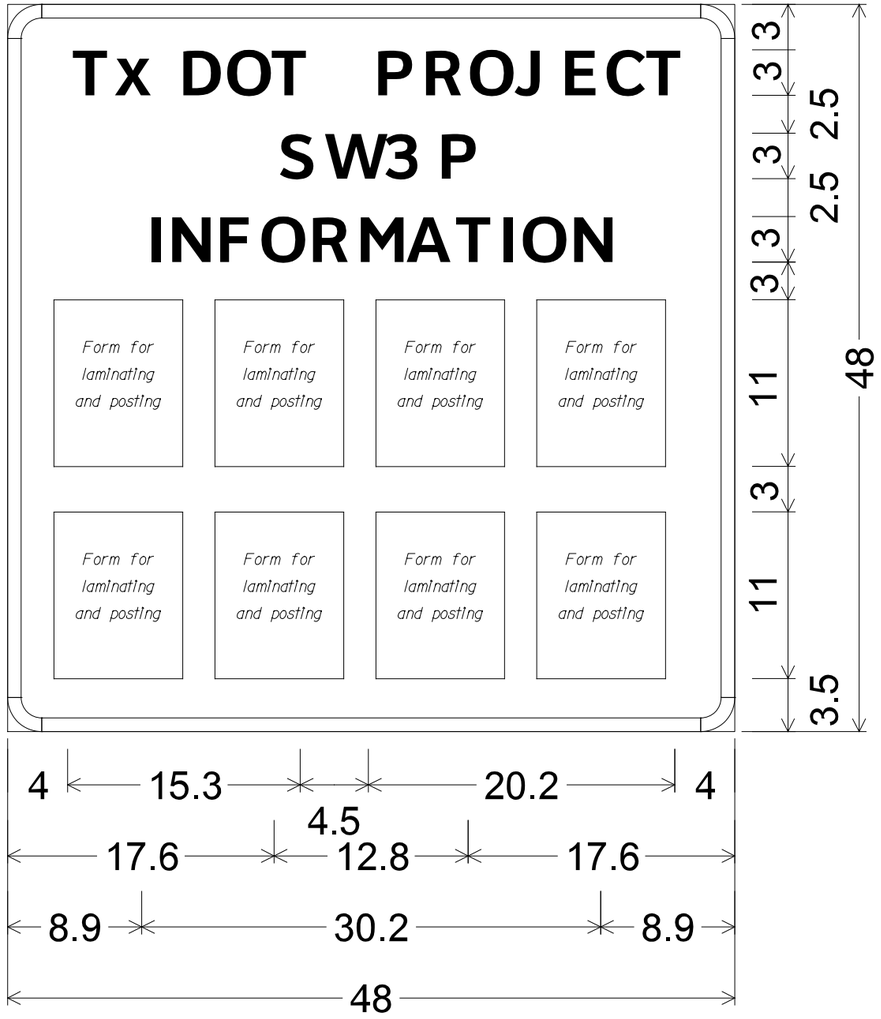
Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0053	07	040	US 84	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	ABL	SCURRY		162	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					



2.3" Radius, 0.9" Border, White on Blue;
[TxDOT PROJECT] E Mod;
[SW3P] E Mod;
[INFORMATION] E Mod;

NOTE:

The Forms needed for laminating and posting to the SW3P Notification Board will be provided by the Engineer. The total number of forms may vary. Notification Boards are to be constructed from Plywood, ½ or ⅝-inch thick, in accordance with TxDOT Departmental Material Specification (DMS)-7100. 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 sign will be placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
4/26/2021

SW3P NOTIFICATION BOARD DETAIL

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NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 84
STATE	COUNTY		SHEET NO.
TEXAS	SCURRY		163
DISTRICT	CONTROL	SECTION	JOB
ABL	0053	07	040

FILE: SW3P NOTIFICATION BOARD DETAIL.DGN
DATE: 4/26/2021 4:11:39 PM

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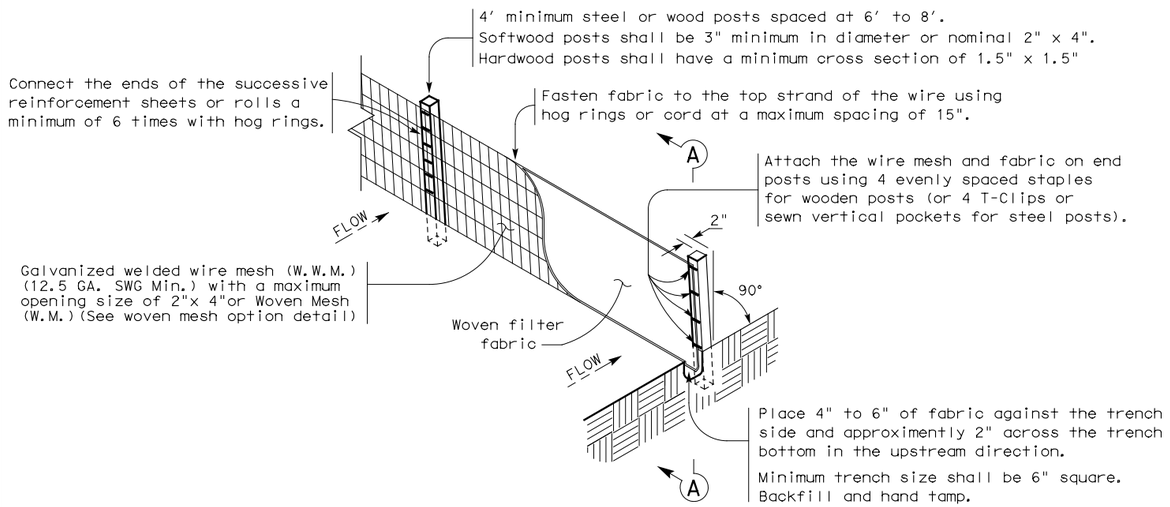
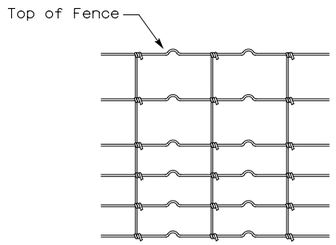
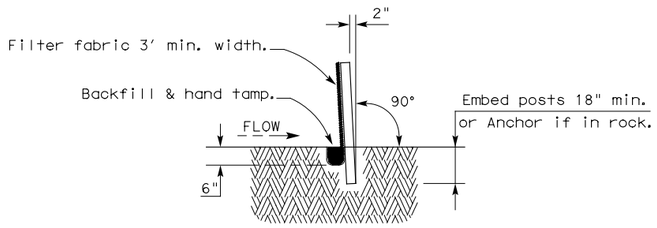


TEMPORARY SEDIMENT CONTROL FENCE

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.

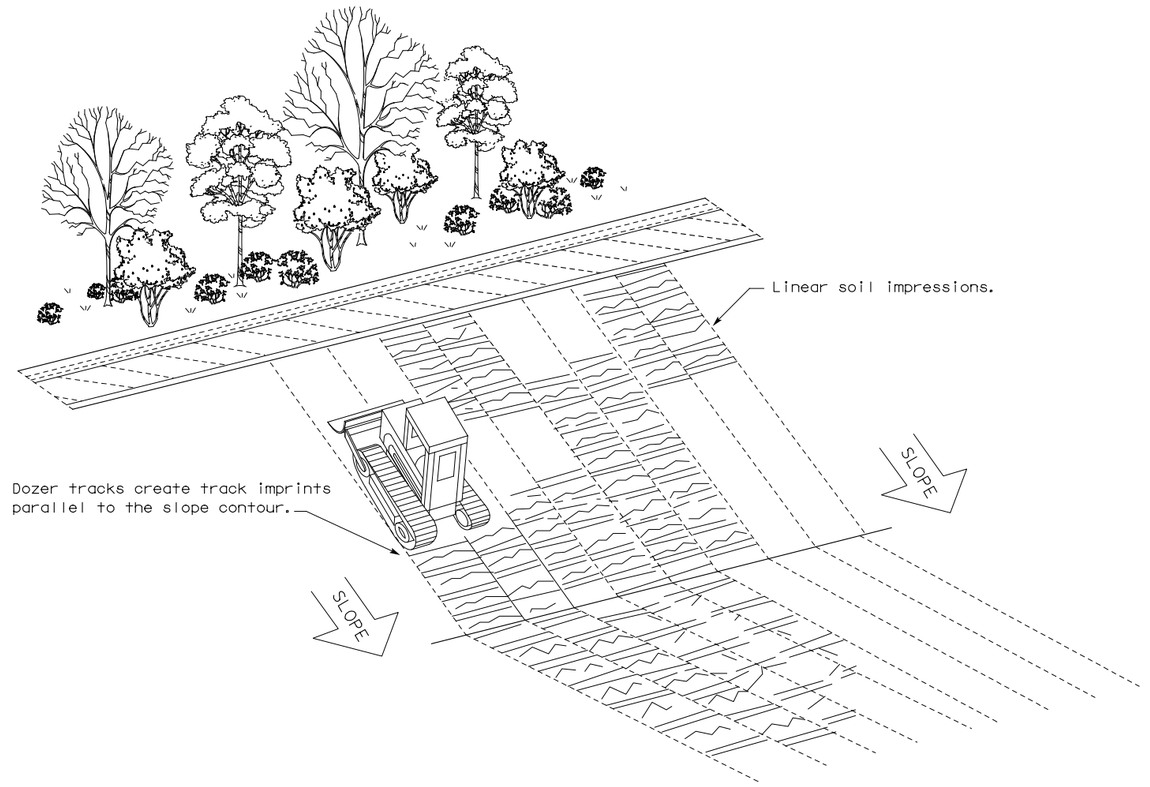
LEGEND

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	0053	07	040	US 84
	DIST	COUNTY		SHEET NO.
	ABL	SCURRY		164

4/8/2021
ec116.dgn

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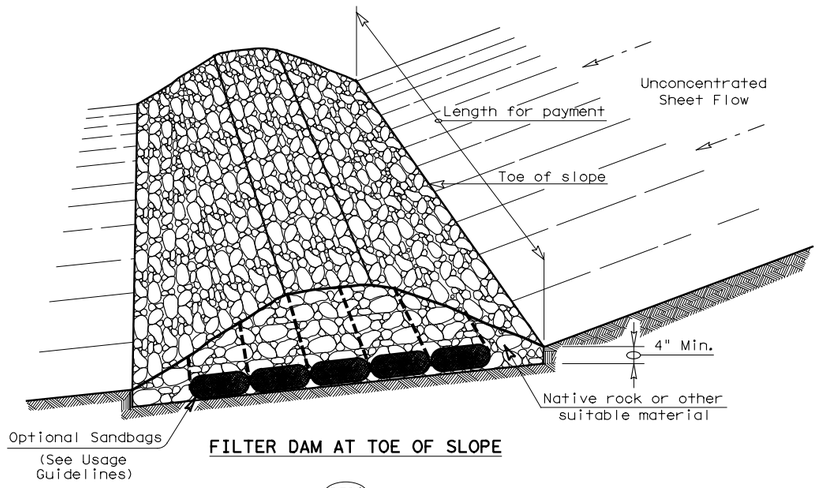
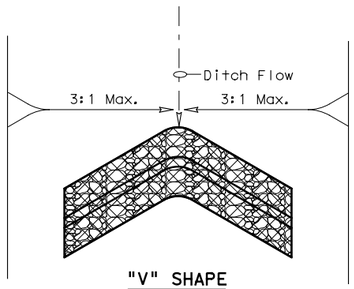
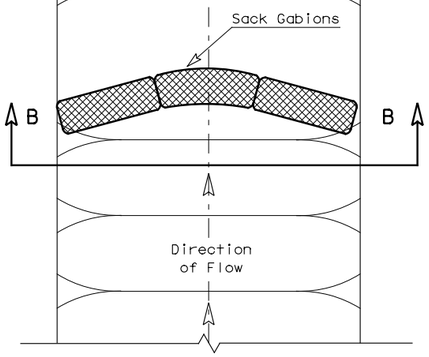


FILTER DAM AT TOE OF SLOPE

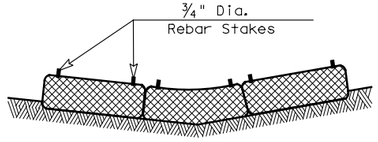
RFD1



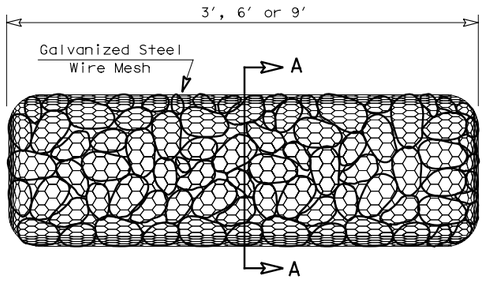
"V" SHAPE
PLAN VIEW



PLAN VIEW

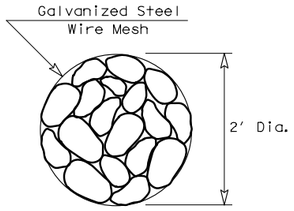


SECTION B-B

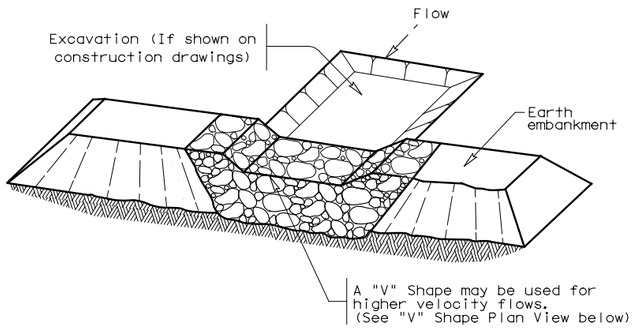


TYPE 4 (SACK GABIONS)

RFD4

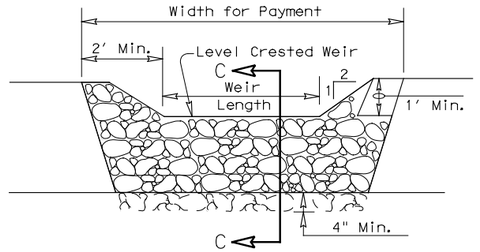


SECTION A-A

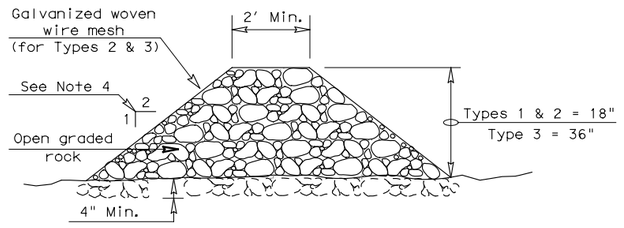


FILTER DAM AT SEDIMENT TRAP

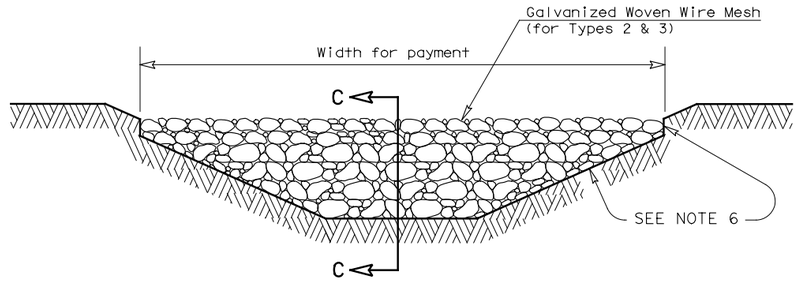
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

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

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

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

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

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

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

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0053	07	040		US 84	
	DIST	COUNTY			SHEET NO.	
	ABL	SCURRY			165	

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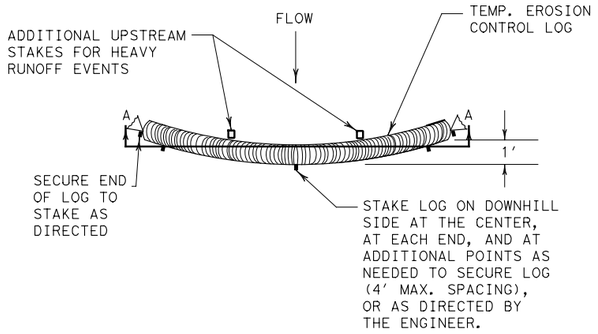
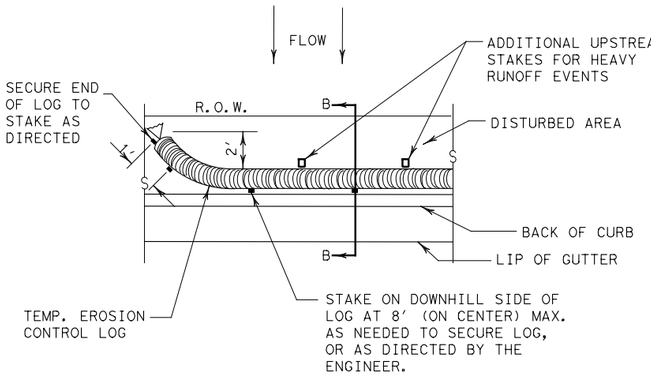
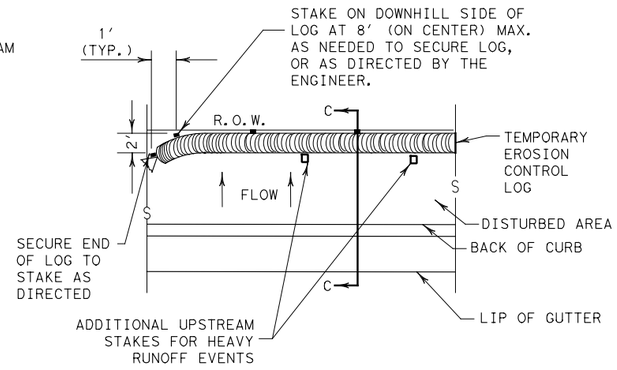


PLAN VIEW



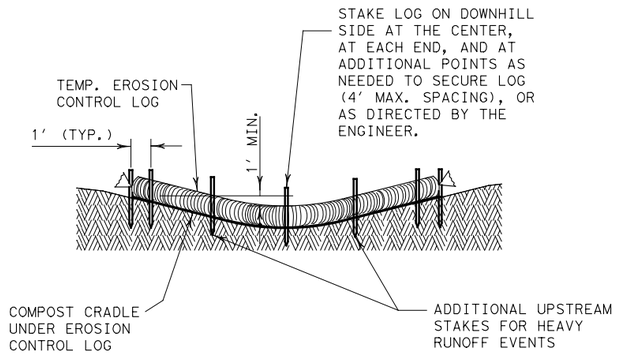
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

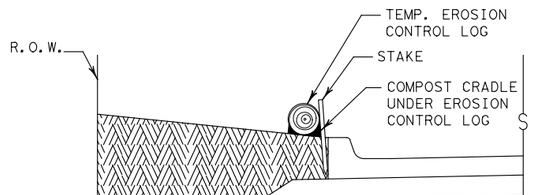
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE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



SECTION A-A

EROSION CONTROL LOG DAM

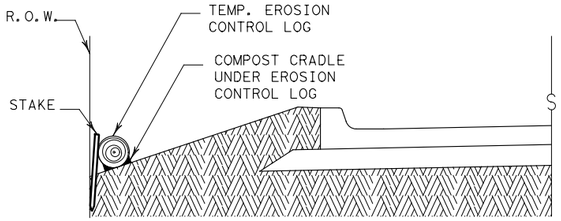
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

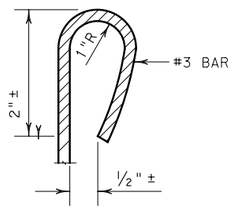
CL-BOC



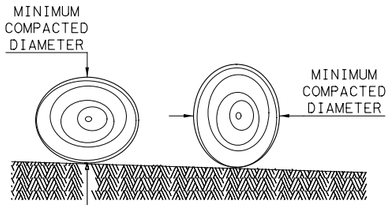
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

LEGEND

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

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

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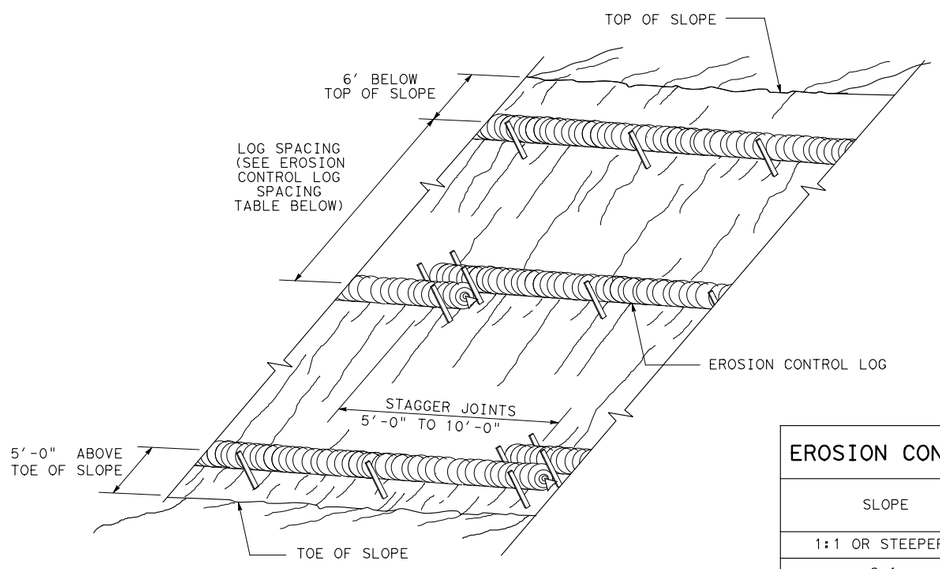
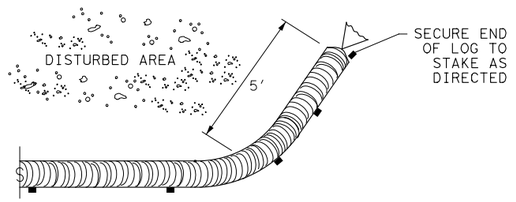


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

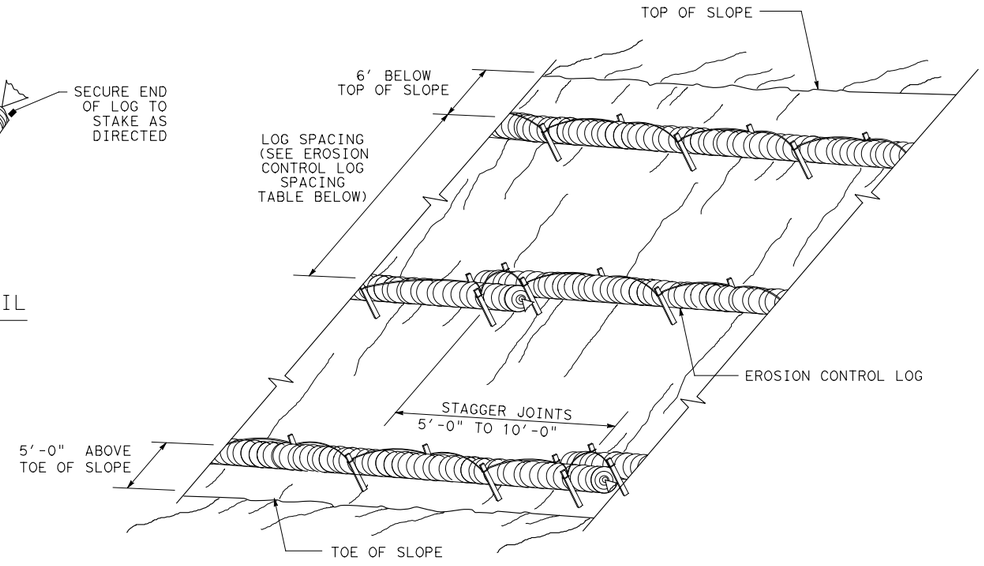
CL-SST



END SECTION RAP DETAIL

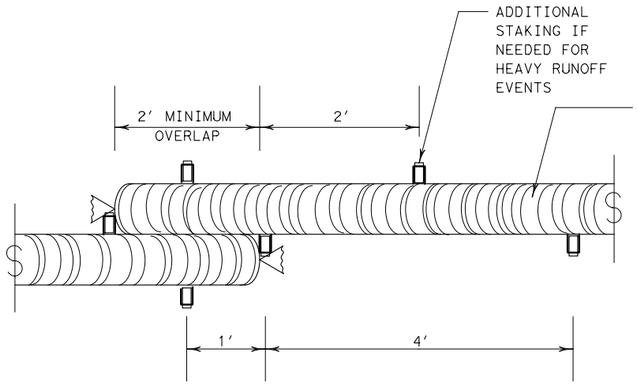
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

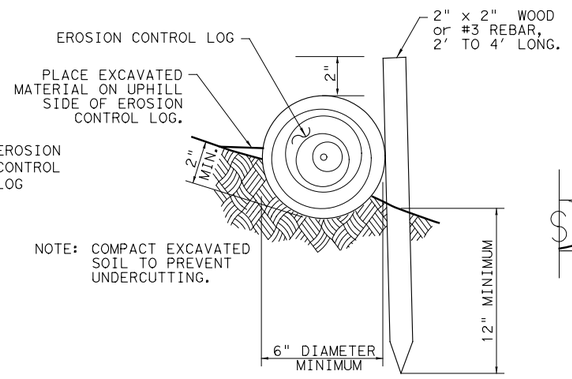
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

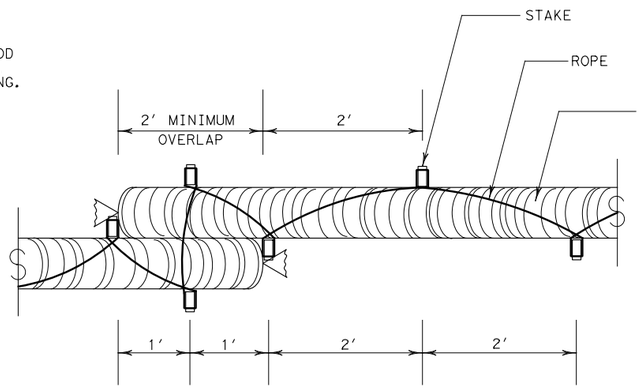


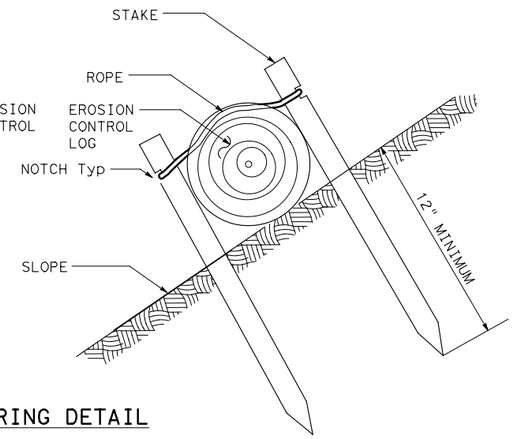


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

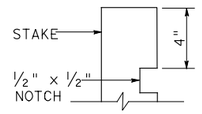
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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

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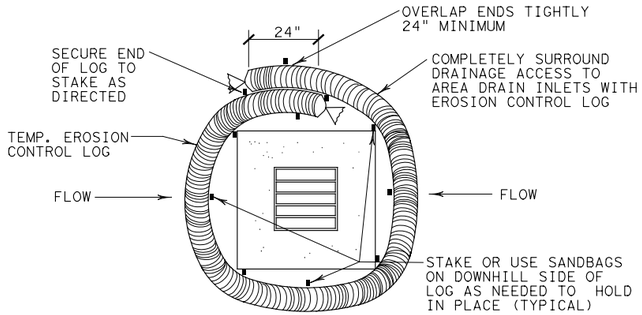
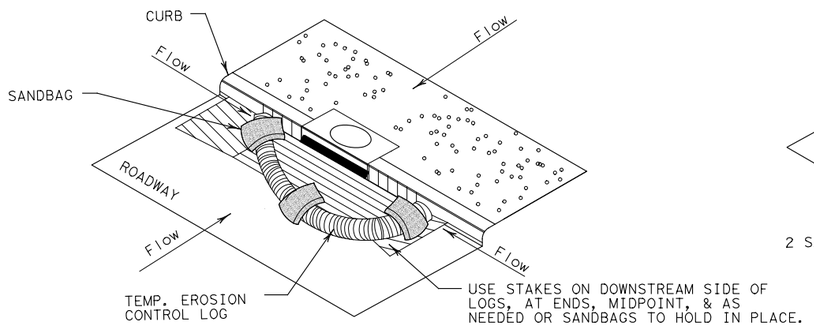


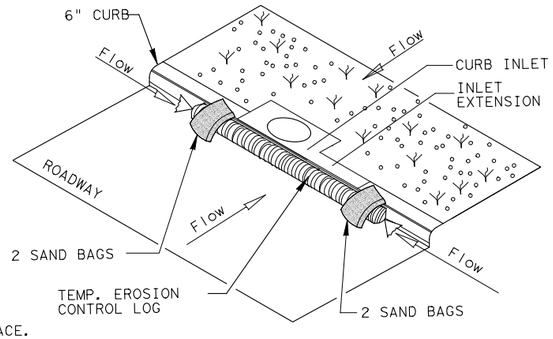
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

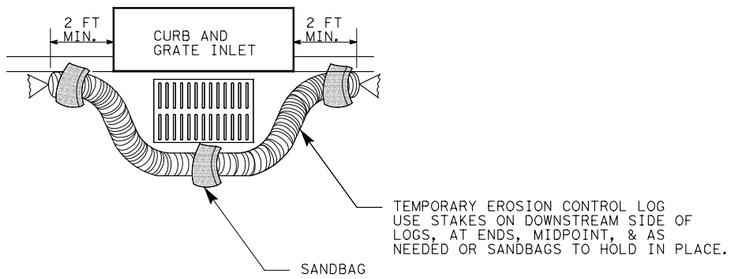
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

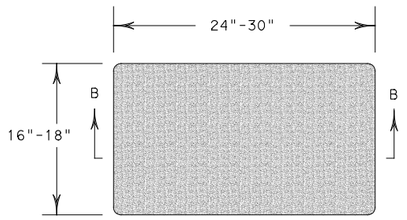
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

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TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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