PROJECT NO.			
F 2023(136)			
CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		1

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. F 2023(136)

NET LENGTH OF PROJECT= 24,008 FT.= 4.547 MI.

FM 316
HENDERSON COUNTY

LIMITS: FROM VAN ZANDT C/L (FM 1861), SOUTH TO U.S. 175, IN EUSTACE

FOR THE CONSTRUCTION OF ROADWAY REHABILITATION

CONSISTING OF SCARIFYING, TREAT EXISTING MATERIAL & SUBGRADE, PRIME COAT, ACP BASE, OCST, ACP SURFACE, STRUCTURES, SIGNS AND PAVEMENT MARKINGS.

FUNCTIONAL CLASSIFICATION = MAJOR COLLECTOR
DESIGN SPEED = 45 MPH
A.D.T. (2020) = 2511
A.D.T. (2043) = 3900

FINAL PLANS

DATE CONTRACT LETTING: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK COMPLETED & ACCEPTED: _____

CONTRACTOR: _____

USED ____ OF ____ ALLOTTED DAYS _____

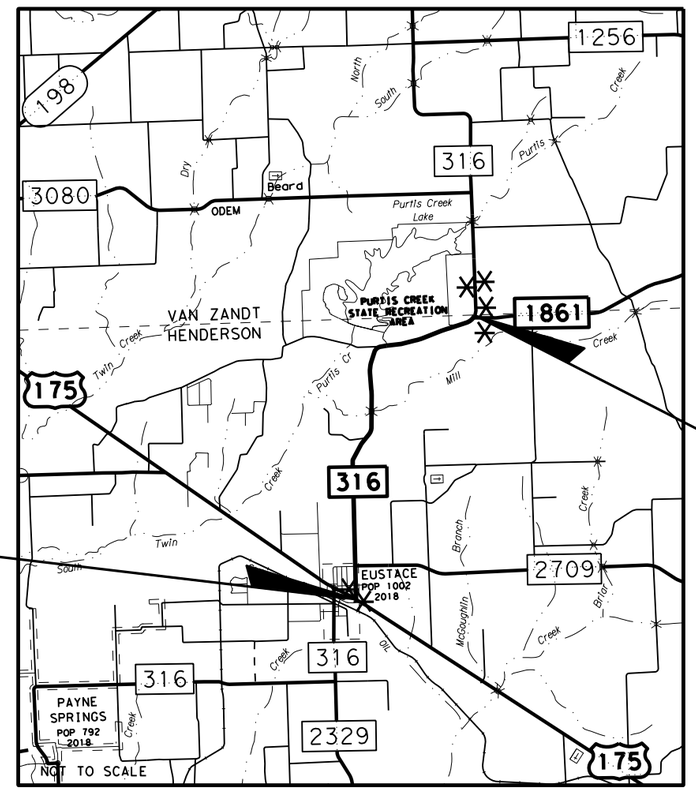
FINAL CONTRACT COST : $ _____

FINAL AS BUILT PLANS

THE CONSTRUCTION WAS PERFORMED UNDER MY SUPERVISION IN ACCORDANCE WITH THE PLANS AND CONTRACT

_____ DATE

_____ AREA ENGINEER



BEGIN PROJECT
CSJ: 0649-07-009
STA: 296+04.55
REF MRK: 294A

END PROJECT
CSJ: 0646-07-009
STA: 507+96.25
REF MRK: 296

✳ SIGN IN ACCORDANCE WITH THE STANDARD BC SHEETS AND PART 6 OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

Texas Department of Transportation

SUBMITTED FOR LETTING: 9/28/2022

DocuSigned by: Rolando Mendez 8F5FE128DB7C484...
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 9/28/2022

DocuSigned by: 6149184A8C65461...
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, JULY 05, 2022)

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GENERAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX OF SHEETS
3 - 7	TYPICAL SECTIONS
8,8A- 8J	GENERAL NOTES
9,9A- 9C	ESTIMATE AND QUANTITY SHEET
10 - 23	QUANTITY SUMMARY SHEETS
24 31	SUMMARY OF SMALL SIGNS

TRAFFIC CONTROL PLAN

SHEET NO.	DESCRIPTION
32	CONSTRUCTION SEQUENCE
33	TREATMENT FOR VARIOUS EDGE CONDITIONS
SHEET NO.	**STANDARDS**
34 - 45	BC(1)-21 THRU BC(12)-21
46 - 48	TCP (1-1)-18, TCP (1-2)-18, TCP (1-3)-18
49 - 51	TCP (2-1)-18, TCP (2-2)-18, TCP (2-3)-18
52 - 53	TCP (3-1)-13, TCP (3-3)-14
54	TCP (7-1)-13
55 - 56	TCP (S-1)-08A, TCP (S-2)-08A
57	WZ (STPM)-13
58	WZ (UL)-13
59	WZ (RS)-22

ROADWAY DETAILS

SHEET NO.	DESCRIPTION
60	3R COMPLIANCE DATA SHEET
61 - 62	HORIZONTAL ALIGMENT DATA
63 - 72	PROJECT LAYOUTS
73 - 78	MISCELLANEOUS DETAILS
SHEET NO.	**STANDARDS**
79 - 82	MB(1)-21 THRU MB(4)-21
83	GF (31)MS-19

DRAINAGE ITEMS

SHEET NO.	DESCRIPTION
84	BCS
85	CULVERT LAYOUT
86	CULVERT BACKWALL DETAILS
87	FLOWABLE BACKFILL DETAIL
88 - 89	MISCELLANEOUS DRAINAGE DETAILS
90	(ALT BID 1A) GROUTED MANHOLE CONNECTION INSTALLATION DETAIL
91	(ALT BID 1A) HP STORM-SAFETY END TREATMENT

DRAINAGE ITEMS CONT'D

SHEET NO.	STANDARDS
92	PSET-SC
93	PSET-SP
94 - 95	SETB-CD
96	MC-MD
97 - 98	MC-6-16
99 - 100	MC-6-16 (MOD)
101	ECD
102	PW
103	PB
104	(ALT BID 1A) GROUTED MANHOLE CONNECTION INSTALLATION DETAIL
105	PJB
106	PDD
107 - 108	PSL
109 - 110	SRR

BRIDGE ITEMS

SHEET NO.	DESCRIPTION
111	CLEANING AND SEALING EXISTING BRIDGE JOINTS

TRAFFIC ITEMS

SHEET NO.	DESCRIPTION
112 - 121	SIGN LAYOUT
122 - 124	SMALL SIGN DETAILS
SHEET NO.	**STANDARDS**
125 - 129	D&OM(1)-20 THRU D&OM(5)-20
130	D&OM(VIA)-20
131 - 135	TSR (1)-13, TSR (2)-13, TSR (3)-13, TSR (4)-13, TSR (5)-13
136	SMD(GEN)-08
137 - 139	SMD(SLIP-1)-08, SMD(SLIP-2)-08, SMD(SLIP-3)-08
140 - 141	PM(1)-20 & PM(2)-20
142 - 143	RS (3)-13, RS (4)-13

ENVIRONMENTAL ISSUES

SHEET NO.	DESCRIPTION
144	FM 316, ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
145	FM 316, STORMWATER POLLUTION PREVENTION PLAN (SW3P)
146	CONCRETE WASHOUT DETAIL
SHEET NO.	**STANDARDS**
147	EC(1)-16
148	EC(2)-16

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

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316 SUPPLEMENTAL INDEX OF SHEETS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		2

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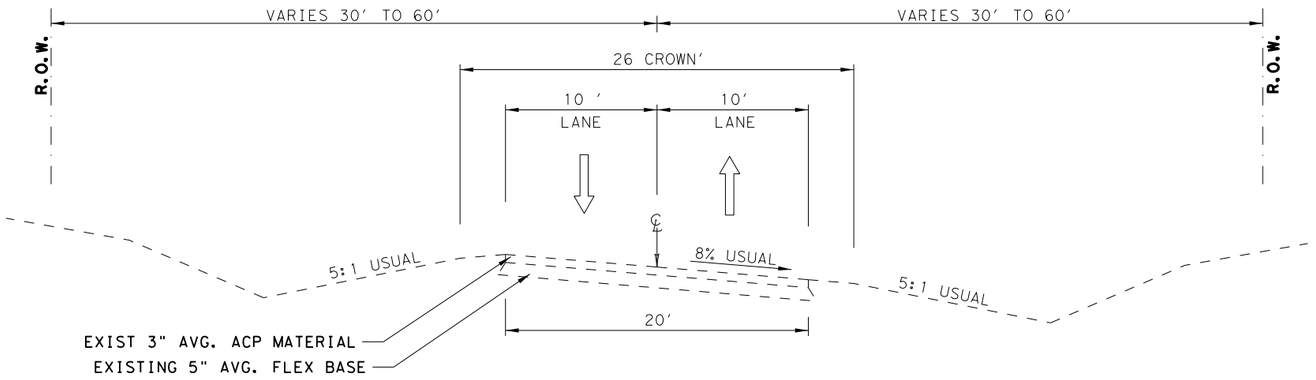
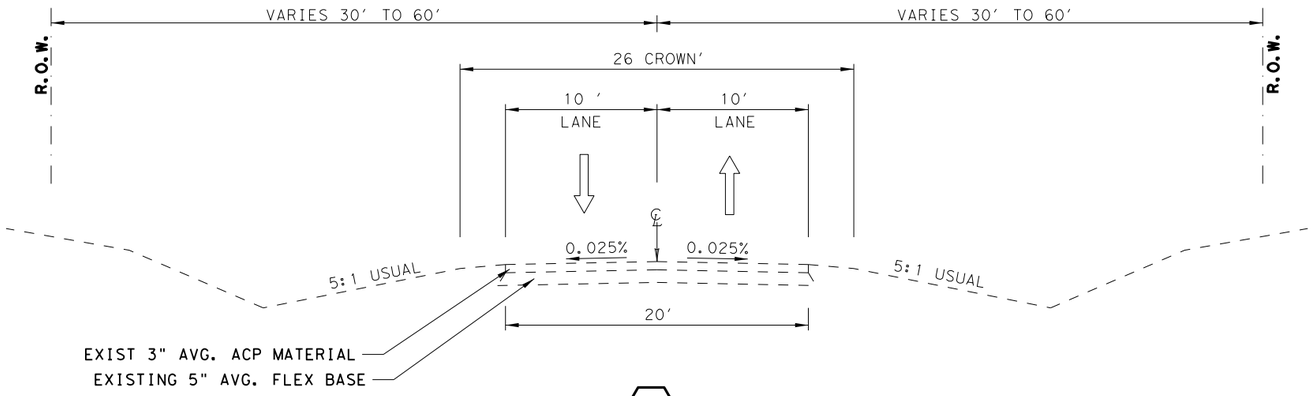


1

EXISTING SECTION

FM 316
STA 265+00 TO STA 277+00



2

EXISTING SECTION

FM 316
STA 339+00 TO STA 380+84
STA 382+34 TO STA 508+75

0 5' 10'

SCALE: 1" = 10'

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		3

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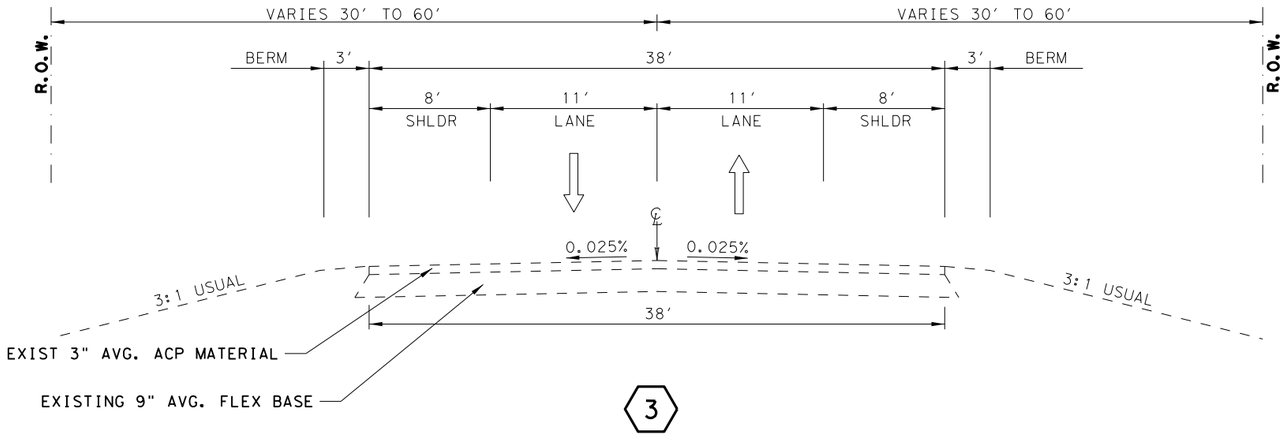

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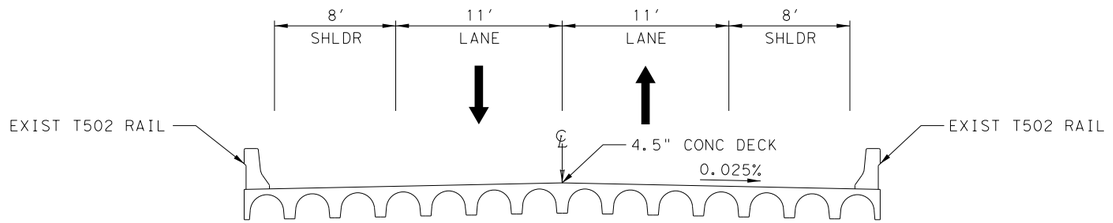
EXISTING SECTION

FM 316
STA 379+00 TO STA 380+84
STA 382+34 TO STA 384+00



4

EXISTING SECTION

FM 316 - MILL CREEK BRIDGE
STA 380+84 TO STA 382+34

0 5' 10'
SCALE: 1" = 10'

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
TYPICAL SECTIONS

Texas Department of Transportation
SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		4

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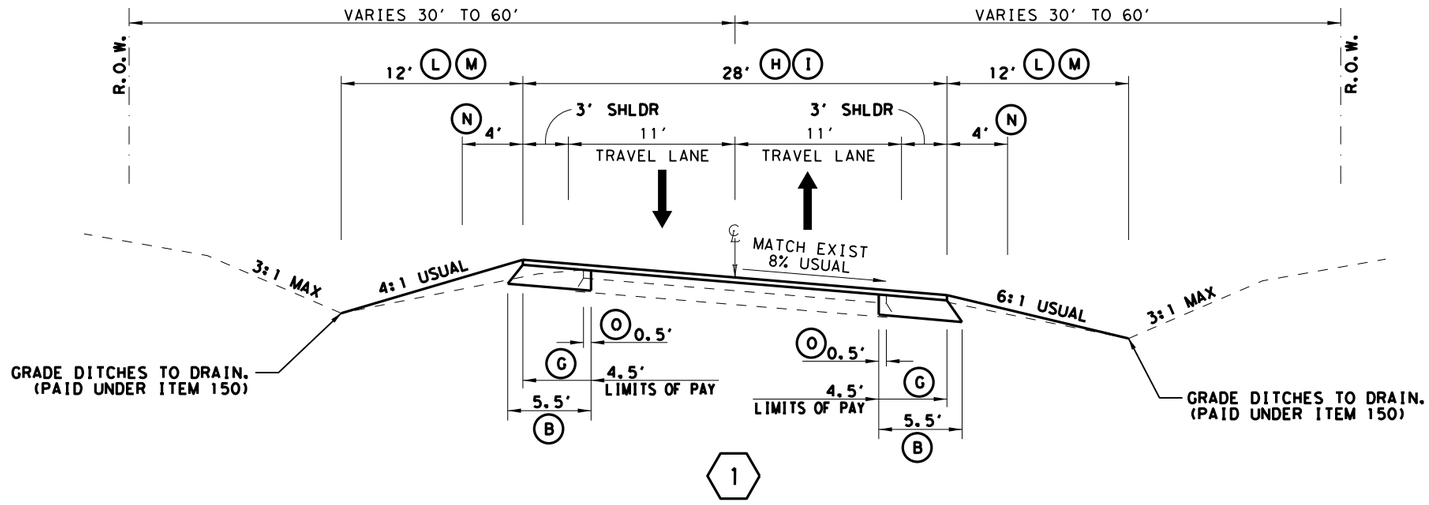


1

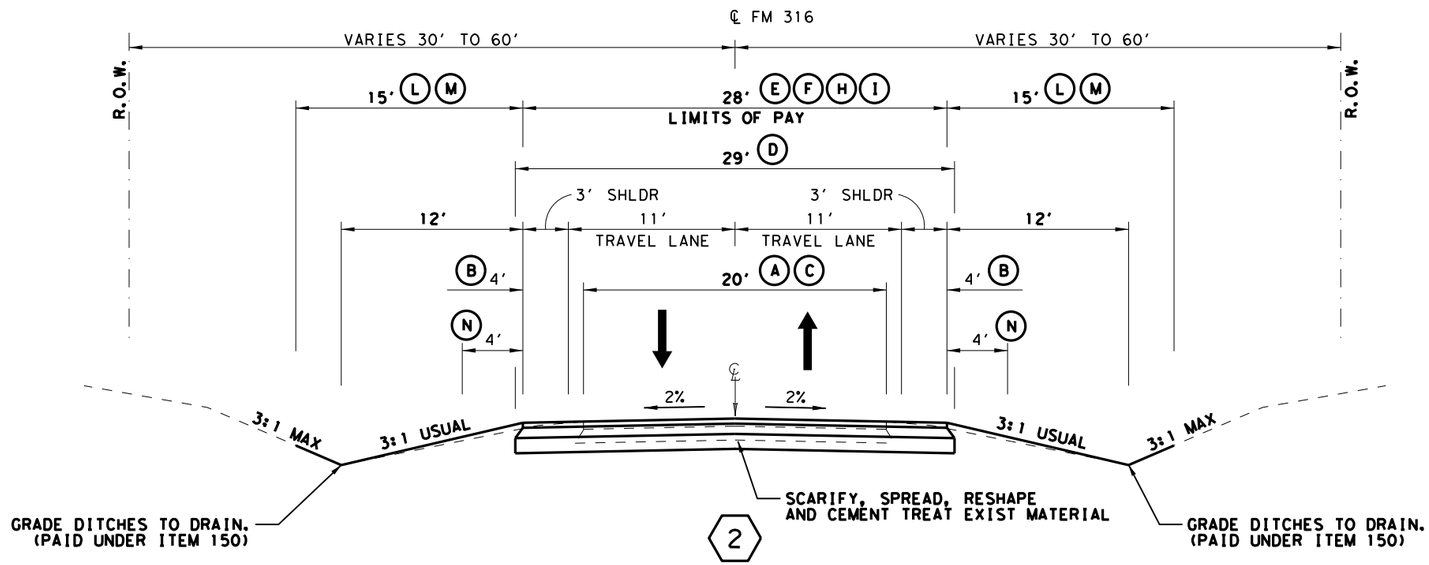
PROPOSED SECTION

FM 316

STA 265+00 TO STA 277+00

LEGEND

- (A) MILL 2" OF EXIST ROADWAY SURFACE
- (B) SUBGRADE WIDENING
- (C) REWORK BS MATL (TY C) (10") (ORD COMP)
- (D) CEMENT TREAT (EXIST MATL) (10")
- (E) PRIME COAT
- (F) 4" SUPERPAVE (TY B) BASE
- (G) 8" SUPERPAVE (TY B) BASE
- (H) OCST
- (I) 2" SUPERPAVE (TY C) SURFACE
- (J) 8" BASE REPAIR
- (K) BACKFILL (TY A)
- (L) BACKFILL (TY B)
- (M) BONDED FIBER MATRIX SEED
- (N) EMULSION
- (O) SAWCUT 6 IN. INTO EXISTING BASE TO PROVIDE A SMOOTH VERTICAL JOINT
- (P) PROPOSED 5" MOW STRIP FOR EXISTING MBGF



2

PROPOSED SECTION

FM 316

STA 277+00 TO STA 339+00

SEQUENCE OF WORK

1) FROM STA 265+00 TO STA 277+00
PROPOSED SUBGRADE WIDENING.

2) FROM STA 277+00 TO STA 378+50 AND
FROM STA 385+00 TO STA 508+00
MILL 2" OFF EXISTING ROADWAY.
SCARIFY 10", REWORK THE REMAINING
MATERIAL, CEMENT TREAT AND SPREAD
THE REWORKED MATERIAL TO 29' WIDTH.

3) FROM STA 378+00 TO STA 380+84 AND
FROM 382+34 TO STA 385+00
BRIDGE APPROACH AND DEPARTURE
MILL 2" OF EXISTING SURFACE. PERFORM
8" BASE REPAIR. (MAINLANES ONLY)

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
TYPICAL SECTIONS

0 5' 10'

SCALE: 1" = 10'

Texas Department of Transportation

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		5

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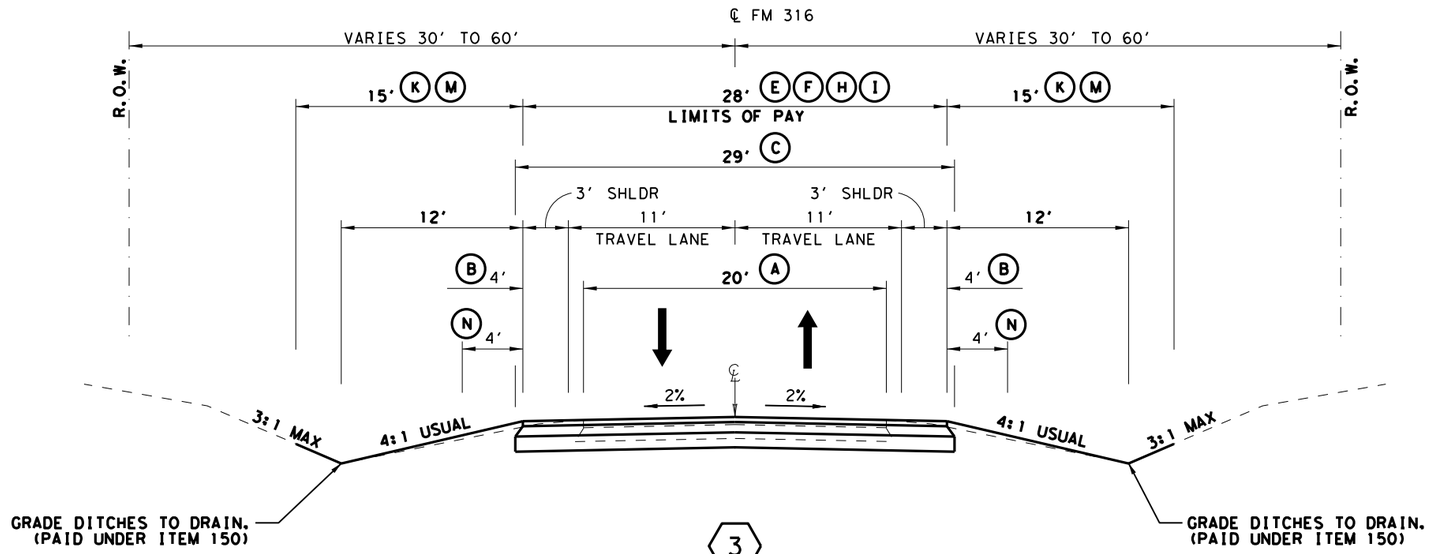


3

PROPOSED SECTION

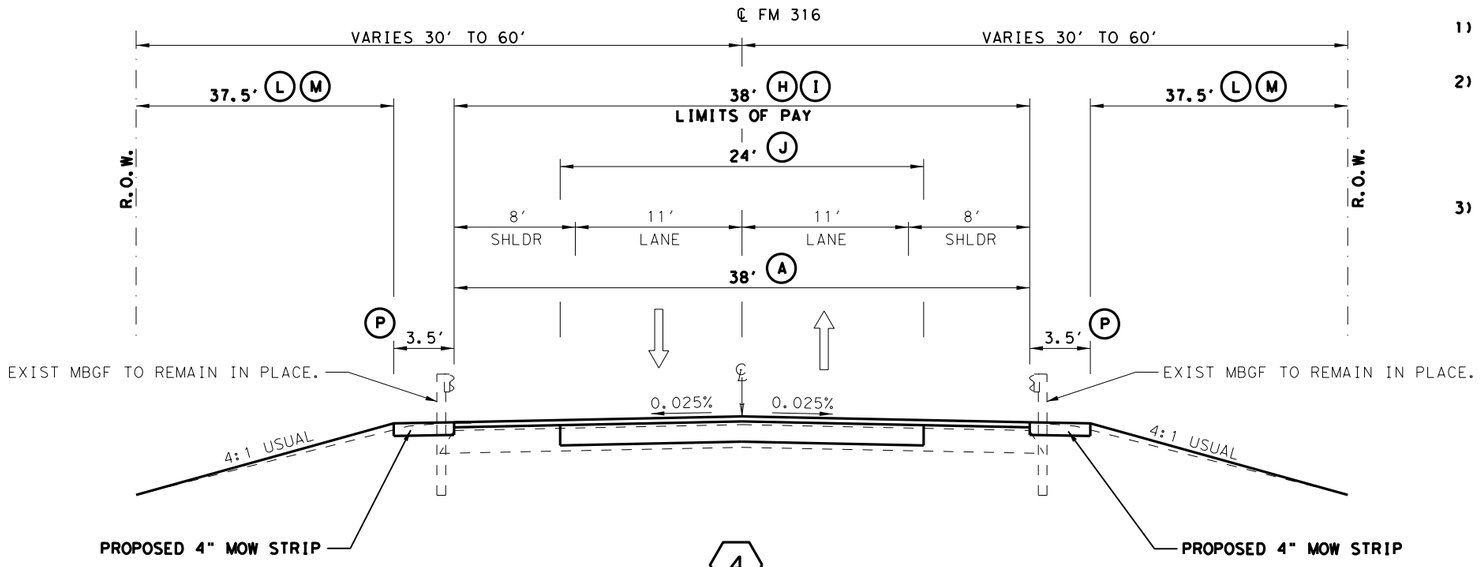
FM 316

STA 339+00 TO STA 378+00 TRANSITION FROM STA 378+00 TO 4 STA 379+00

STA 385+00 TO STA 508+75

LEGEND

- A MILL 2" OF EXIST ROADWAY SURFACE
- B SUBGRADE WIDENING
- C REWORK BS MATL (TY C) (10") (ORD COMP)
- D CEMENT TREAT (EXIST MATL) (10")
- E PRIME COAT
- F 4" SUPERPAVE (TY B) BASE
- G 8" SUPERPAVE (TY B) BASE
- H OCST
- I 2" SUPERPAVE (TY C) SURFACE
- J 8" BASE REPAIR
- K BACKFILL (TY A)
- L BACKFILL (TY B)
- M BONDED FIBER MATRIX SEED
- N EMULSION
- O SAWCUT 6 IN. INTO EXISTING BASE TO PROVIDE A SMOOTH VERTICAL JOINT
- P PROPOSED 5" MOW STRIP FOR EXISTING MBGF



4

PROPOSED SECTION

FM 316

STA 379+00 TO STA 380+84

STA 382+34 TO STA 384+00 TRANSITION FROM STA 384+00 TO 3 STA 385+00

SEQUENCE OF WORK

1) FROM STA 265+00 TO STA 277+00
PROPOSED SUBGRADE WIDENING.

2) FROM STA 277+00 TO STA 378+50 AND
FROM STA 385+00 TO STA 508+00
MILL 2" OFF EXISTING ROADWAY.
SCARIFY 10", REWORK THE REMAINING
MATERIAL, CEMENT TREAT AND SPREAD
THE REWORKED MATERIAL TO 29' WIDTH.

3) FROM STA 378+00 TO STA 380+84 AND
FROM 382+34 TO STA 385+00
BRIDGE APPROACH AND DEPARTURE
MILL 2" OF EXISTING SURFACE. PERFORM
8" BASE REPAIR. (MAINLANES ONLY)

0 5' 10'

SCALE: 1" = 10'

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		6

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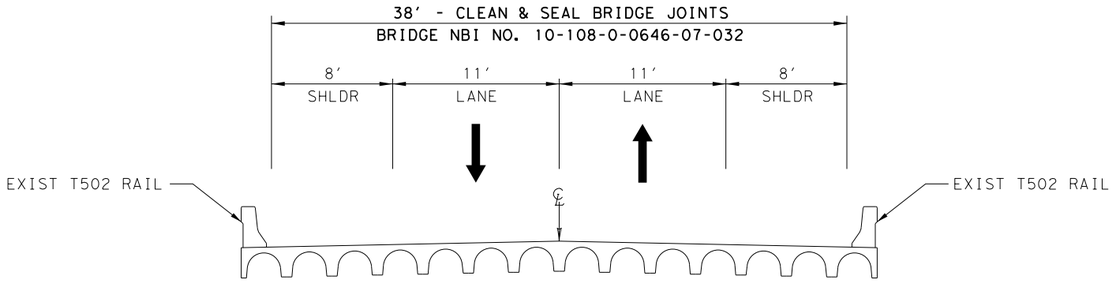

5

PROPOSED SECTION

FM 316 - MILL CREEK BRIDGE

STA 380+84 TO STA 382+34

LEGEND

- (A) MILL 2" OF EXIST ROADWAY SURFACE
- (B) SUBGRADE WIDENING
- (C) REWORK BS MATL (TY C)(10")(ORD COMP)
- (D) CEMENT TREAT (EXIST MATL) (10")
- (E) PRIME COAT
- (F) 4" SUPERPAVE (TY B) BASE
- (G) 8" SUPERPAVE (TY B) BASE
- (H) OCST
- (I) 2" SUPERPAVE (TY C) SURFACE
- (J) 8" BASE REPAIR
- (K) BACKFILL (TY A)
- (L) BACKFILL (TY B)
- (M) BONDED FIBER MATRIX SEED
- (N) EMULSION
- (O) SAWCUT 6 IN. INTO EXISTING BASE TO PROVIDE A SMOOTH VERTICAL JOINT
- (P) PROPOSED 5" MOW STRIP FOR EXISTING MBGF

SEQUENCE OF WORK

1) FROM STA 265+00 TO STA 277+00
PROPOSED SUBGRADE WIDENING.

2) FROM STA 277+00 TO STA 378+50 AND
FROM STA 385+00 TO STA 508+00
MILL 2" OFF EXISTING ROADWAY.
SCARIFY 10", REWORK THE REMAINING
MATERIAL, CEMENT TREAT AND SPREAD
THE REWORKED MATERIAL TO 29' WIDTH.

3) FROM STA 378+00 TO STA 380+84 AND
FROM 382+34 TO STA 385+00
BRIDGE APPROACH AND DEPARTURE
MILL 2" OF EXISTING SURFACE. PERFORM
8" BASE REPAIR. (MAINLANES ONLY)

0 5' 10'

SCALE: 1" = 10'

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		7

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GENERAL NOTES:

GENERAL.

Contractor questions on this project are to be addressed to the following individuals:

Eric Fisher Eric.Fisher@txdot.gov

Louis McDow III Louis.McDow@txdot.gov

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

All Contractor questions will be reviewed by the Engineer. 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.

For this Contract, the following standard sheets have been modified:

MC-6-16 (MOD)

All stockpiles within TxDOT right of way, must not exceed 12 ft. in height and must have 3:1 slope unless otherwise directed. Place stockpiles in a manner that will be outside the horizontal clear zone, will not obstruct traffic or sight distance, and will not interfere with roadway drainage.

Perform work as necessary off the right of way on temporary construction easements for driveway construction. All work performed in these areas will be paid for under the pertinent bid items of the Contract.

Do not haul with loaded scrapers on the surfaced areas of any highway except as approved.

Remove all vegetation from pavement edges, intersections, and driveways prior to planing operations, seal coat, or ACP operations. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

Project Number: **Sheet 8**

County: Henderson **Control:** 0646-07-009

Highway: FM 316

ATTN: Provide a 20-ft. length per 1-in. depth temporary taper with like material at all transverse joints in the travel lane before opening to traffic. This work will not be paid for directly but will be subsidiary to the bid items of the Contract.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to various bid items.

PROJECT MOWING

Mow the highway right of way in the project limits a maximum of 2 cycles per year, as directed. Mowing will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Provide approved mowing equipment capable of mowing on slopes without unduly marring finished slope surfaces or damaging existing growth. The minimum cutting width should not be less than 5 ft. unless otherwise approved.

Mow all areas of existing vegetation and vegetation placed during the project, as directed. The mowing height should be 5 in. unless otherwise directed. Repair portions of sod or grass which are damaged during mowing operations in an acceptable manner.

Mow as close as possible to all fixed objects, exercising extreme care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are part of the facility. Hand trim around such objects, unless otherwise specified.

Use safety chains or other manufacturer's safety devices to prevent injury to people or damage to property caused by flying debris propelled out from under rotary mowers. Chains should be a minimum size of 5/16 in. and links spaced side by side around the front, sides and rear of mower. When mowing at the specified cutting height, the chains should be long enough to drag the ground. If at any time it is determined that mowing or trimming equipment is defective to the point that it may affect the quality of work or create unsafe conditions, then immediately repair or replace the equipment.

LITTER PICKUP

Remove litter from the right of way in the project limits a maximum of 3 cycles per year as directed. Litter pickup will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Equipment used for litter pickup must be approved.

Collect and properly dispose of all litter deposited by construction operations or the traveling public from within the right of way as directed. This includes cans, bottles, paper, plastic items, metal scraps, lumber, etc. Do not dump or stockpile collected litter on Department property.

ITEM 4. SCOPE OF WORK

Upon completion of the work and before final acceptance, remove all foreign material, stains, and marks from concrete surfaces. Sandblast clean concrete surfaces as directed. Clean existing concrete structures that are marked or stained by the Contractor's operations. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

During final clean up, remove all foreign material that has accumulated at bridge abutments and bent caps as approved. All work and equipment involved in the removal of this material is subsidiary to the bid items of the Contract.

ITEM 5. CONTROL OF THE WORK

If utility lines need adjustments during construction operations, modify operations and continue the work in a manner that will allow others to make the utility adjustments. Additional working time may be allowed for delays caused by these utility adjustments.

Establish proposed centerlines throughout the project from control points and alignment data as shown on the plans.

Use "Method C" for construction surveying in accordance with Section 5.9.3.

Refer to the horizontal and vertical alignment data summaries for satellite-control point information.

Maintain and re-establish the centerline stations throughout each project as required for each phase of work.

Utility locations shown on the plans are approximate. Contact utilities in accordance with Article 5.6., "Cooperating With Utilities."

ITEM 7. LEGAL RELATIONS AND RESPONSIBILITIES

Keep mailboxes in a position accessible to the carrier's vehicle along the travelway. When grading operations necessitate the moving of mailboxes, place mailboxes nearby at a location accessible to the carrier's vehicle. Return mailboxes to a position accessible to the carrier's vehicle along the travelway when grading operations are not in progress. The Contractor may mount mailboxes on a portable stand that keeps the mailbox in a level position approximately 42 in. above the pavement.

Project Number: **Sheet 8A**

County: Henderson **Control:** 0646-07-009

Highway: FM 316

Furnish mounts for mailboxes in accordance with the Compliant Work Zone Traffic Control Device List for temporary mailboxes. When existing mailboxes are non-standard size, supply the new standard sized mailbox when temporarily relocated on drum and label the address as directed. This process will not be paid for directly, but will be subsidiary to the various bid items.

Coordinate with the local mail carrier where to place temporary mailboxes.

Concrete truck drivers and concrete pump operators are required to wash out only in designated areas specifically constructed for eliminating run-off. Dispose of materials in accordance with federal, state, and local requirements.

Maintain positive drainage for permanent and temporary work for the duration of the project. The Contractor will be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work will be subsidiary to various bid items.

The total disturbed area for this project is 22.966 acres. The disturbed area in this project and the Contractor Project Specific Locations (PSL's) 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. Obtain any required authorization from the TCEQ for any Contractor PSL for construction support activities on or off the ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceed 5 acres, before disturbance, provide a copy of the Contractor NOI for PSLs on the ROW and within 1 mile of the project limits to the Engineer and to any local government that operates a Municipal Separate Storm Sewer System (MSSS).

No significant traffic generator events identified.

ITEM 8. PROSECUTION AND PROGRESS

The hours that one lane can be closed are 8:30 A.M. to 1 hour prior to sunset.

A lane closure that exceeds the lane restrictions defined in Item 8 is subject to a fee of $500 per 15 minutes.

Prepare the progress schedule as a bar chart.

ITEM 9. MEASUREMENT & PAYMENT

In accordance with Article 9.1., "Measurement of Quantities," furnish the tare and maximum gross weights as well as the volume capacity of all vehicles, trucks, truck-tractors, trailers, semi-

trailers, or combination of such vehicles used to deliver materials for this Contract. Also, furnish calculations supporting these weights and capacities. Provide all measurements required for pay a minimum of 2 days before the trucks are used.

ITEM 100. PREPARING RIGHT OF WAY

Perform work as necessary off the right of way on temporary or drainage easements and at those locations where improvements have been taken or partially taken by right of way acquisition. Review these locations with the Area Engineer. The cost of this work will be included in the unit price bid for this Item.

Burning will not be permitted within the right-of-way.

ITEM 104. REMOVING CONCRETE

Blasting will not be permitted on this project.

ITEMS 110 & 132. EXCAVATION & EMBANKMENT

Excavation and embankment for driveways, intersections, mailbox turnouts and crossovers will not be paid for directly, but will be subsidiary to the various bid items unless otherwise shown on the plans.

In a cut section, if the soil encountered in the subgrade is unsuitable for reasons other than excess moisture, this material will be declared “waste” and the Contractor will be required to undercut for a minimum depth of 1 ft. and a maximum depth as determined and replaced with a material having a plasticity index of 6 to 18. This required undercutting will be paid for under Item 110, “Excavation.”

When excavation is required to adjust stream flow lines at culvert ends, flatten the side slopes of channels and the backslopes of parallel ditches to the maximum extent possible within the existing right of way and channel easements.

ITEM 112. SUBGRADE WIDENING

In a cut section, if the soil encountered in the subgrade is unsuitable or unstable, undercut a minimum depth of 1 ft. and a maximum depth as directed. Replace with a material having a plasticity index of 6 to 18.

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ITEM 132. EMBANKMENT

Furnish Type C embankment consisting of suitable earth material (rock, loam, clay, or other approved materials) that will form a stable embankment. The top 2 ft. of embankment material should have a plasticity index between 6 and 18.

Test borrow sources and furnish results to the Engineer for select embankment, the Engineer will then run confirmation testing.

ITEM 134. BACKFILLING PAVEMENT EDGES

Place TY A or TY B material for backfilling pavement edges using an approved road widener. The use of this machine will allow the material for backfilling the pavement edge to be placed from the final roadway surface. Use a self-propelled machine capable of transferring backfill material from a dump truck located on the pavement surface to the front slope along the pavement edge. This machine may have a strike-off that will spread the material to conform to the typical section. The dump trucks and road widener should travel in the direction of the traffic unless otherwise approved. The use of this machine will be subsidiary to Item 134.

Compact the backfill adjacent to the pavement edge with a pneumatic roller or other approved equipment. This rolling will not be paid for directly, but will be subsidiary to Item 134.

ITEM 150. BLADING

Any required mowing and pulverizing before blading will not be paid for directly, but will be subsidiary to Item 150.

Use blading to finish slopes after placement of the ACP surface and use blading to reshape unimproved driveways as directed.

Compact blading material as directed.

ITEM 164. SEEDING FOR EROSION CONTROL

The rates, types of seed, asphalt, and locations for the straw mulch and broadcast seed items will be determined if temporary erosion control is needed.

Mow tall vegetation prior to placement of erosion control measures in order to provide optimal growing conditions. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

The season and seed mixture for “Broadcast Seeding (Temporary Erosion Control) (Cool Season)” and “Broadcast Seeding (Temporary Erosion Control) (Warm Season)” is specified below:

Cool Season - September 1 thru November 30
Warm Season - May 15 thru August 31

Permanent Planting Mixture	
Species and Rates	
(lb. PLS/ac.)	
(Season: February 1 to May 15)	
Green Sprangletop	0.5
Bermudagrass	5.0
Weeping Lovegrass (Ermelo)	0.5
Sand Lovegrass	0.5
Lance-Leaf Coreopsis	1.0
(Season: September 1 to February 1)	
Bermuda (unhulled)	12
Crimson Clover	10

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Temporary Seeding for Erosion Control	
Warm Season	
(Season: May 15 to August 31)	
Bermudagrass	10
Foxtail Millet	30
Cool Season	
(Season: September 1 to November 30)	
Tall Fescue	4.5
Oats	24
Wheat	34

Place topsoil before temporary seeding unless otherwise directed.

Do not use Bahiagrass.

Use additional temporary seeding if permanent seeding is placed outside the optimum growing season shown for this Item as directed.

Provide a Bonded Fiber Matrix that meets the current requirements of the Approved Products List for Item 169, “Soil Retention Blanket, Class 1, Type D, Spray Type Blanket,” for both permanent and temporary seeding. Install according to manufacturer’s recommendations based on a slope steeper than 3:1 with sandy soils. This Item will be paid for under Item 164.

ITEM 166. FERTILIZER

Place fertilizer at the rate of 1 lb. per 9 sq. yd. on areas prepared for seeding.

ITEM 168. VEGETATIVE WATERING

Apply water to all newly placed sod or seeded areas the same day of installation. Maintain the sod or seeded areas in a sufficiently watered condition. Do not allow sod or seeded areas to dry out so that water stress is evident.

ITEM 251. REWORKING BASE COURSES

If patches of cement-stabilized base are encountered when reconditioning the existing base, remove and dispose of this material as directed. This work will not be paid for directly, but will be subsidiary to Item 251.

Before or during scarifying of the existing pavement, remove all base failures, undercut if required, and backfill with flexible base. Spread the existing base to the proposed width throughout the work area. Haul and dump the additional base material required for each 100-ft. section. Provide a motor grader or other suitable power equipment to spread the piles of material during dumping. Sprinkle material, if necessary, in order to maintain traffic safely through the project. Provide a roadway surface suitable to carry traffic the full roadway width by the end of the day.

ITEM 260. LIME TREATMENT (ROAD-MIXED)

Prior to ACP layer placement under the proposed concrete pavement, provide for approval in an acceptable electronic format, the in-place profile of the subgrade on 50 ft. station intervals along the roadway and at the lane lines.

ITEM 275. CEMENT TREATMENT (ROAD-MIXED)

Prior to ACP layer placement under the proposed concrete pavement, provide for approval in an acceptable electronic format, the in-place profile of the subgrade on 50 ft. station intervals along the roadway and at the lane lines.

ITEM 314. EMULSIFIED ASPHALT TREATMENT

Before application, dilute the emulsion with water up to a maximum dilution of 50% at a distribution rate of 0.30 gal. per sq. yd.

ITEM 316. SEAL COAT

Protect all existing bridges, curbs, and other exposed concrete surfaces from asphaltic materials by any acceptable method. Removal of excessive asphaltic materials deposited on these surfaces will be at the Contractor's expense.

During surface treatment application, if existing conditions warrant, vary the lane widths, transitions, and intersection areas as directed.

Perform rolling as directed with equipment complying with Section 210.2.4.2, "Medium Pneumatic Tire." This work will not be paid for directly, but will be subsidiary to pertinent Items.

Do not apply asphalt later than 1 hour before sunset unless otherwise approved.

The Engineer will approve stockpile sites for materials. Locate stockpile site a minimum of 30 ft. from the roadway unless otherwise authorized. Place stockpiles in a manner that will not interfere with access from abutting property and will not obstruct traffic or sight distance. Avoid stockpiling at intersections. Notify the Engineer at least 5 working days prior to stockpiling material to secure approval of the site. The Engineer may approve stockpiling of materials closer than 30 ft. from the travelway if adequate barricades and devices are furnished and approved. Keep stockpile clear of debris and vegetative growth as approved.

Keep the material pushed into one pile at each stockpile location. Upon completion of each reference project, provide stockpile sites that are clear of debris and dressed in a manner as approved.

Clearly sign stockpile locations with Contractor's name & project name, as approved. This will not be paid for directly, but will be subsidiary to Item 316.

Provide aggregate for shoulders and mainlanes from the same source unless otherwise directed.

Place surface treatments between May 1 and August 31 unless otherwise directed.

The rates shown on the plans for asphalt and aggregate are for estimating purposes only. The rates may be varied as directed.

ITEM 351. FLEXIBLE PAVEMENT STRUCTURE REPAIR

Replace the unstable pavement structure with 8 in. of asphaltic concrete pavement base (Super Pave SP-C), unless otherwise directed. The Engineer will determine the exact locations and limits of pavement repair in the field prior to beginning this Item of work.

Apply a tack coat with a rate of 0.10 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

Furnish planing equipment to remove existing material in accordance with Item 354, as directed. The planing equipment will be subsidiary to Item 351.

Furnish an asphalt paver on full lane width pavement repair sections in accordance with Item 320 unless otherwise directed.

ITEM 354. PLANING AND TEXTURING PAVEMENT

Use a front-end loader or other suitable equipment at the stockpile site to properly stockpile the planed material as required.

ATTN: Vary planing locations to meet field conditions as directed. Begin and end planing at a sawed or planed vertical joint to provide a smooth transition to existing pavement. Provide a 20-ft. length per 1-in. depth temporary taper at all transverse joints in the travel lane before opening to traffic.

Before opening planed areas to traffic, bevel vertical or near vertical longitudinal faces in the pavement surface.

The Department retains ownership of planed material generated on this project. The stockpile site for RAP is located at FM 316 at FM 2339, south of Eustace. The Engineer will determine the exact stockpile location within the designated area.

Furnish a small planing machine as approved for planing small areas and street intersections.

Overlay all planed areas by the end of each day unless otherwise approved.

If unsuitable weather or other unexpected conditions do not allow planed areas to be overlaid, provide and maintain warning signs for overnight lane closures in accordance with the traffic control plan sheets until overlay operations are complete.

Retain all RAP generated from this project.

ITEM 400. EXCAVATION AND BACKFILL FOR STRUCTURES

Construct imperfect trenches for pipe culvert installations according to the following:

Construct the roadway embankment to a height that will match the top of the proposed filler material as shown on the plans. Excavate a trench conforming to the dimensions as shown on the plans to within 1 ft. above the top outside surface of the pipe. Loosely backfill trench with suitable filler material to a depth as shown on the plans. Suitable material should consist of compressible materials such as straw, hay, sawdust, or other materials acceptable to the Engineer. The Contractor may place the first layer of embankment on top of the filler material up to 2 ft. in thickness in order to bridge over the loose filler material. Complete the remainder of the roadway embankment as specified under Item 132. The work and materials involved in

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constructing imperfect trenches will not be paid for directly, but will be subsidiary to Item 400 (where applicable), or Items 110 and 132.

Backfill the excavation to within 10 in. of the existing finished grade when cutting existing pavement for the installation of drainage structures. Restore the remaining 10 in. of pavement with an approved asphaltic concrete pavement or other approved material; place and compact in 3 approximately equal layers. Usual testing of this material is not required, but the Engineer will approve the material at the time of placement. This work will be paid for at the unit price bid for "Cutting and Restoring Pavement."

ITEM 401. FLOWABLE BACKFILL

Use an accelerator that produces a set time in 4 hours. Provide a rheofill or equivalent air entrainment to ensure flowability. Anchor pipes to ensure no movement or displacement by the flowable fill. Furnish paper type cylinder test molds.

ITEM 403. TEMPORARY SPECIAL SHORING

Use mats during placement and removal of temporary special shoring to avoid damage to the pavement structure.

Do not allow shoring to project more than 4-in above natural ground elevation unless otherwise approved.

ITEM 421. HYDRAULIC CEMENT CONCRETE

The Engineer will provide strength-testing equipment.

Provide the Engineer with a mixture design report using Department-provided software in accordance with Section 421.4.1., "Classification of Concrete Mix Designs," of the standard specifications. Include in the report the producer's plant, all materials sources, and a unique identification number for the design.

Air is not required on concrete cast-in-place elements on this project. If the Contractor proposes the use of an existing concrete design containing air, the Engineer must approve the design in writing before placement. If used, air testing will be performed in accordance with the specifications.

ITEM 432. RIPRAP

Locations and quantities may be varied as directed by the Engineer to accommodate field conditions.

ITEM 462. CONCRETE BOX CULVERTS AND DRAINS

Provide Portland cement mortar joints between precast concrete box culverts and existing reinforced box culverts in accordance with Section 464.3., “Jointing.”

Provide cast-in-place concrete box culverts.

Removal of existing wingwalls is subsidiary to Item 462.

If existing curb and wingwalls are left in place during cast-in-place culvert extensions, drill and grout 2 ft. long #6 bars halfway into the existing curb and wingwalls at 18-in. center to center spacing. This work will be subsidiary to Item 462.

ITEM 464. REINFORCED CONCRETE PIPE

Removal of portions of the existing structure, including headwalls, safety end treatments, and pipe, is subsidiary to Item 464.

ITEM 465. JUNCTION BOXES, MANHOLES, AND INLETS

Paint all iron manhole rings and covers with galvanized paint.

Payment for precast elements and inlet extensions are included in the payment for Inlet (Compl).

ITEM 467. SAFETY END TREATMENT

Removal of portions of the existing structure, including headwalls, safety end treatments, and pipe, is subsidiary to Item 467.

ITEM 496. REMOVING STRUCTURES

All materials removed under this Item are the property of the Contractor.

ITEM 502. BARRICADES, SIGNS, AND TRAFFIC HANDLING

The traffic control plan for this Contract consists of: the installation and maintenance of warning signs and other traffic control devices shown on the plans; specification data, which may be included in the general notes; applicable provisions of the Texas Manual on Uniform Traffic Control Devices (TMUTCD); traffic control plan sheets included on the plans; standard BC

sheets; Compliant Work Zone Traffic Control Device List, and Item 502 of the standard specifications.

Use ground-mounted sign mounts with two posts for all temporary work zone signs unless otherwise directed.

Inspect and correct deficiencies each day throughout the duration of the Contract. In accordance with Article 502.4., “Payment,” no payment will be made for the month if the Contractor fails to provide or properly maintain signs and devices in compliance with Contract requirements. Temporary warning signs that are visible when conditions do not apply will be considered improper maintenance of signs.

Provide at least one employee on call nights and weekends (or any other time that work is not in progress) for maintenance of signs and traffic control devices. This employee must have an address and telephone number near the project, as approved. Notify the Engineer in writing of the name, address, and telephone number of this employee. The Engineer will furnish this information to local law enforcement officials.

In addition to providing a Contractor’s Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 30 minutes.

Sign all roads intersecting the project in accordance with current BC standards.

Refer to the traffic control plan sheets for traffic handling through the work area. Contractor may vary the signing arrangement and spacing as necessary to fit field conditions; however, any proposed changes in the traffic control plan must be approved before implementation.

When the sequence of work is shown on the plans, the Contractor may submit an alternate proposal for approval. Submit in writing all proposed variations and revisions.

High-visibility safety apparel is required for workers in accordance with the General Notes on current BC standards.

Place and maintain signs, channelizing devices, and flaggers to direct and route traffic at any location and for any period of time as may be required or directed.

When operations require a lane closure, provide cones, vertical panels, drums, signs, flaggers, and flashing arrow panels as necessary to route traffic around the closed lane as shown on the plans and as directed. Lane closures will be limited to one specific lane as directed.

Lane closures will not be allowed before 8:30 A.M. unless otherwise directed.

Unless otherwise approved, construction operations will not be allowed on Good Friday, Easter weekend, the Friday before Memorial Day thru Memorial Day, July 4th, the Friday before Labor Day thru Labor Day, the Wednesday before Thanksgiving Day thru Sunday, Christmas Eve, Christmas Day, New Year's Eve, New Year's Day, or on any other high traffic days or holidays as determined by the Engineer.

Erect R4-1 (Do Not Pass) and R4-2 (Pass With Care) signs to mark existing no-passing zones as directed. (These signs will not be required if these zones will not be eliminated during construction.)

Maintain existing roadside signs within this project's limits during this Contract. In order to accommodate the grading or other operations, temporarily relocate these signs in accordance with the TMUTCD as directed. Use ground-mounted sign mounts with two posts for all relocated signs unless otherwise directed. This work will not be paid for directly, but will be subsidiary to Item 502.

Provide truck-mounted attenuators (TMA) as shown on the appropriate traffic control plan sheets. Provide a letter certifying that all TMA used on this project meet NCHRP 350 or AASHTO Manual for Assessing Safety Hardware (MASH) requirements.

Regulate all construction activities and equipment to minimize inconvenience to the traveling public. At points where it is necessary for trucks to stop, load, or unload, provide warning signs and flaggers to protect the traveling public.

The pavement must be entirely open to traffic each night. Remove or clearly barricade all material stockpiles, equipment left overnight, or any obstruction within 30 ft. of a travelway as approved.

The Contractor Force Account "Safety Contingency" is intended to be used for work zone enhancements that could not be foreseen in the project planning and design stage for the purpose of improving the effectiveness of the Traffic Control Plan. 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.

Provide flaggers at county roads, commercial driveways, and other intersecting roadways deemed necessary by the Engineer to maintain control of the work zone during one-lane two-way operations. Provide communication radios to each flagger in the work zone and the pilot vehicle operator.

Place Pavement Ends (CW8-3)(36x36) signs as directed when approaching segments of roadway that do not have a paved surface.

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When a culvert extension, inlet construction, or safety end treatment, etc. is within 30 ft. of a travel lane, delineate these areas as shown on current BC standards. In addition, provide a 4-ft. high plastic construction fence at or around any structure or obstruction that would be a hazard to pedestrians unless otherwise approved. Erect fence using a minimum of 4-T-posts, one at each corner of the structure or obstruction.

Where there is excavation adjacent to the pavement edge, provide adequate warning signs, vertical panels, drums, and lights at the pavement edge as directed. Treat pavement drop-offs created by ACP operations in a similar manner in accordance with the details shown on the plans.

Furnish and install work zone/reduce speed ahead and work zone/speed limit signs in accordance with current BC standards at locations as established by the Engineer. Signs must be ground-mounted.

Provide work zone speed limit signs that meet sizing requirements in accordance with Table 2B-1 of the TMUTCD.

When excavation is required next to a travel lane carrying traffic and widening is not completed by the end of the day's operation, place sufficient backfill against the edge of the travel lane in order to provide a 3:1 slope, unless otherwise permitted on the plans. Provide backfill containing a durable crushed stone type of flexible base or other materials as approved. When work resumes on this excavated area, carefully remove and dispose of the backfill material. Materials and labor for this work will not be paid for directly, but will be subsidiary to the various bid items of the Contract.

Refer to the traffic control details for surfacing operations shown on the plans. Install signs as required by this standard or plan sheet. Keep signs in place until after completion of the surface course operation and until placement of the standard pavement markings. Place standard pavement markings within 7 days of surface treatment application. The placement of acceptable permanent pavement markings and the completion of the final cleanup will be considered a part of the surface course operation. These signs are in addition to the signs and barricades that may be required on standard BC sheets. Short-term stationary/short duration portable signs will be required during the removal of the temporary pavement markings.

Provide a pilot vehicle.

Do not perform base widening on both sides of the roadway simultaneously.

The Contractor and the Engineer should agree on the allowable length of roadway sections for scarifying and reshaping the existing base and hauling base material. Provide qualified flaggers at each end of the section being processed to instruct and direct the traveling public.

Prior to beginning work, the Contractor and Engineer must agree on the allowable length of lane closure.

All work required by these general notes, except as provided for by Item 502, will not be paid for directly, but will be subsidiary to Item 502 unless otherwise shown on the plans.

ITEM 504. FIELD OFFICE AND LABORATORY

Provide a facility at the asphalt concrete pavement plant for use by the Engineer as a laboratory. This is an existing requirement of Item 6, Article 5, "Plant Inspection and Testing," of the Standard Specifications. Provide a facility meeting the requirements of Item 504. At a minimum meet the requirements of 504.2.2.4, "Ty D Structure (Asphalt Mix Control Laboratory)" and 504.2.2.4.1, "Asphalt Content by Ignition Method." In addition, provide the following: At least one exterior door opening with a 48-in. minimum width. If steps are required to gain access to the facility's 48-in. door, provide a landing dock with minimum dimensions of 60 in. wide by 60 in. deep. The strong floor and landing of the facility should support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer. This facility will be required of all projects with plant produced asphalt concrete pavement.

No direct payment will be made for Engineer field labs. All construction, maintenance, utilities, custodial services, security, and permits necessary to establish and maintain readiness of this facility is the responsibility of the Contractor. This building/facility is required by the standard specifications and is considered a standard part of any asphalt concrete pavement plant producing materials for Department projects.

Furnish a Superpave Gyratory Compactor calibrated in accordance with Tex-241-F for molding production samples. The Superpave Gyratory Compactor will not be paid for directly, but will be subsidiary to the asphalt concrete pavement Items of work.

ITEM 506. TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

Remove dirt, silt, rocks, debris, and other foreign matter that accumulates in all structures due to project erosion and Contractor's operations. Keep stream channels open at all times. This work will not be paid for directly, but will be subsidiary to this Item.

The total disturbed area for this project is 22.966 acres. The disturbed area in this project, all project locations in the Contract, and 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

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from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any Contractor PSLs for the construction support activities on or off right of way. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, before disturbance, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer (to the appropriate MS4 operator when on an off-State system route).

The Engineer will provide copies of documents to meet TxDOT's posting requirements. Laminate, post, and maintain these documents at the project limits and at major roadways intersecting the project as directed. Post required Contractor documents in the same manner and location. This work will be subsidiary to Item 506.

ITEM 533. MILLED RUMBLE STRIPS

Provide one-lane two-way traffic control on two-lane roadways unless otherwise approved.

Provide traffic control for roadways with other lane configurations as directed.

Provide a sweeper that meets the requirements of Section 354.2.3.

ITEM 560. MAILBOX ASSEMBLIES

Use round posts, set in concrete, with 12 in. reflector tape for all mailbox installations.

Provide new metal mailboxes and place the existing mailboxes at the front door of the homeowner. Ensure the new mailbox is not smaller than the existing. The following mailbox quantities are for Contractor's information only: 0 small mailboxes, 35 medium mailboxes, and 0 large mailboxes.

Place 2-in. address location numbers on each mailbox in accordance with Placement of Emergency Location Number notes on MB-21(1). The color of the numbers must contrast the mailbox color as directed.

ITEM 585. RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type B pay adjustment schedule 1 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

ITEM 636. SIGNS

Install signs in accordance with the Department of Transportation's "Sign Crew Field Book," latest edition, or as directed.

All signs removed from the project are deemed salvageable and become the property of the Department. Stockpile salvageable material at the Athens Maintenance Section located at 2400 NE SL 7, Athens 75751.

ITEM 644. SMALL ROADSIDE SIGN ASSEMBLIES

Sign types for which details are not shown on the plans must conform to "Standard Highway Sign Designs for Texas," latest edition.

Before construction begins, locate all Texas Reference Marker (TRM) signs and Adopt-a-Highway signs using survey control methods for accuracy. Provide the survey data to the Engineer. If either type of sign is relocated during construction activities, survey the sign location and notify the Engineer before placement of the permanent sign.

Stake all sign locations for approval prior to placement.

ITEM 658. DELINEATOR AND OBJECT MARKER ASSEMBLIES

Accept ownership of unsalvageable delineator and object marker assemblies and remove from the right of way.

ITEM 662. WORK ZONE PAVEMENT MARKINGS

For this project, Contractor may use paint and beads for work zone pavement markings (non-removable).

Dispose of all empty paint containers and unused paint in accordance with federal, state, and local requirements.

Do not use foil backed pavement markings as removable work zone pavement markings. Removable work zone pavement markings must be pliant polymer detour grade (removable) material or other markings that can be obliterated or removed to the satisfaction of the Engineer.

Use tape for short-term removable pavement markings on hot mix & PFC surfacing applications.

Tabs may be used before surface treatment application.

Furnish and place work zone pavement markings (short term)(tab) on center lines and lane lines in accordance with WZ(STPM), and provide warning signs in accordance with TCP (7-1). Place tabs within 1 in. of the proper alignment as established by the Contractor and approved by the Engineer. Remove tabs after placement of permanent markings. Tab removal will be subsidiary to Item 662.

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ITEM 666. RETROREFLECTORIZED PAVEMENT MARKINGS

Use the spray method for application of the thermoplastic compound for lane lines, barrier lines, edge lines and channelizing lines.

In high traffic volume areas, do not begin work before 9 A.M. and do not continue work after 4 P.M. unless otherwise approved. In other areas, the Engineer will approve and direct the time of work.

Extrude hot to the pavement surface thermoplastic compound for arrows, stop lines, yield triangles, transverse lines, crosswalk lines, words and symbols.

For lengths greater than 300-ft, provide guide markings that will not leave a permanent mark on the roadway. Have the guide marking material and equipment used for placement approved prior to use. Provide adequate notification for approval of the guide markings prior to placement of the permanent pavement markings.

Provide a crew experienced in the work of installing pilot guideline markings and in the necessary traffic control. Supply all the equipment, personnel, traffic control, and materials necessary for the placement of pilot guideline markings as directed. All work will be in conformance with Part 6 of the TMUTCD.

The Engineer will establish beginning and ending points of no passing zones.

Correct deficiencies in the alignment of pavement markings at Contractor's expense, as directed. Use a strip seal with aggregate and asphalt types and rates as directed to eliminate the deficient pavement markings.

ITEM 672. RAISED PAVEMENT MARKERS

Provide dispensing equipment such that the bituminous material can be directly applied from the melting pot to the pavement surface without secondary handling. Dispensing material from the melting pot into a separate container and then to the pavement surface will not be permitted. Intermittent agitation of the bituminous material will be by a method approved by the Engineer to ensure even heat distribution and must be such that the adhesive is agitated at approved and consistent intervals.

ITEM 677. ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

Unless otherwise directed, utilize Surface Treatment Method for removal on asphaltic surfaces. The Engineer will approve materials and rates prior to use.

Furnish a high-pressure water blasting system for removing paint, thermoplastic, epoxy and preformed tape material from the following surfaces without causing any grooves or trenching of the surface: asphalt, concrete, permeable friction course, grooved asphalt and grooved concrete.

Use a high-pressure water blasting system that consists of a vacuum recovery system that must provide for a nearly dry surface eliminating the possibility of uncontained run-off blasting water or debris, or the need for any secondary clean-up vehicles or operations.

All components required for the complete operation of the water blasting system (ultra-high-pressure pump, vacuum system, clean water supply, vacuum recovery storage, primary truck-mounted and optional secondary tractor-mounted blasting components) must be mounted and transported on a single, fully self-contained and supporting single truck chassis, thereby eliminating the need for any additional water, vacuum or other transport vehicles.

ITEM 3077. SUPERPAVE MIXTURES

When using crushed gravel as a coarse aggregate for ACP, use 1% lime as an antistripping agent.

Provide coarse aggregate for the final surface course from the same source or blended sources unless otherwise directed.

Give the State inspector at the spreading and finishing machine one weight ticket for each load of material. When directed, weigh asphaltic concrete loads on public scales to ensure the proper weight of material.

For materials paid for by the ton, provide a summary spreadsheet in accordance with Article 520.2, “Equipment.”

Provide Class A coarse aggregate for the surface as listed in the Department’s *Bituminous Rated Source Quality Catalog* (BRSQC).

Use an electrical impedance (non-nuclear) measurement gauge to determine mat segregation and joint density for Part V and Part VIII of test procedure Tex-207-F. Do not use nuclear density gauges or thin lift gauges for segregation or joint density determinations. Data reporting for mat segregation and joint density must be performed on Department templates.

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All RAP used on this project must be fractionated. If an existing mix design is submitted for use as Warm Mix Asphalt (WMA), then a new trial batch with passing Hamburg Wheel test results is required.

Apply a tack coat with a rate of 0.10 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

On Table 1, under 3077.2.1.3, the Sand equivalent, % Min is voided and not replaced. The minimum percent for the sand equivalent must be 45 for the combined aggregate.

ITEM 6001. PORTABLE CHANGEABLE MESSAGE SIGN

Provide a non-erodible, stable surface to place the Portable Changeable Message Sign (PCMS) units adjacent to the roadway as directed. Payment for this surface is incidental to Item 6001.

ITEM 6185. TRUCK MOUNTED ATTENUATOR (TMA)

Shadow vehicles with truck mounted attenuator (TMA) are required on the traffic control plan and TCP standards for this project. The Contractor will be responsible for determining if one or more of these traffic control operations will be ongoing at the same time to determine the total number of TMAs needed for the project. Additional truck mounted attenuators (TMAs) may be required as deemed necessary by the Engineer.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0646-07-009 **DISTRICT** Tyler **COUNTY** Henderson
HIGHWAY FM 316

			CONTROL SECTION JOB		**0646-07-009**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178596**		
			COUNTY		**Henderson**		
			HIGHWAY		**FM 316**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	59.000		59.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	57.000		57.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	223.000		223.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	242.970		242.970	
	132-6021	EMBANKMENT (VEHICLE)(ORD COMP)(TY C)	CY	500.000		500.000	
	134-6001	BACKFILL (TY A)	STA	169.750		169.750	
	134-6002	BACKFILL (TY B)	STA	74.000		74.000	
	150-6001	BLADING	STA	243.750		243.750	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	200.000		200.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	40,625.000		40,625.000	
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY	81,250.000		81,250.000	
	164-6055	BONDED FBR MTRX SEED (TEMP)(WARM)	SY	40,625.000		40,625.000	
	164-6056	BONDED FBR MTRX SEED (TEMP)(COOL)	SY	40,625.000		40,625.000	
	166-6002	FERTILIZER	TON	11.280		11.280	
	168-6001	VEGETATIVE WATERING	MG	4,469.000		4,469.000	
	251-6073	REWRKING BS MATL (TY C)(10")(ORD COMP)	SY	49,639.000		49,639.000	
	260-6001	LIME (HYDRATED LIME (DRY))	TON	860.000		860.000	
	260-6009	LIME TRT (EXST MATL)(10")	SY	35,988.000		35,988.000	
	275-6001	CEMENT	TON	860.000		860.000	
	275-6006	CEMENT TREAT (EXIST MATL) (10")	SY	35,988.000		35,988.000	
	314-6012	EMULS ASPH (EROSN CONT)(CSS-1)	GAL	1,625.000		1,625.000	
	316-6029	ASPH (RC-250)	GAL	14,058.000		14,058.000	
	316-6406	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	GAL	34,733.000		34,733.000	
	316-6408	AGGR(TY-PD GR-4 OR TY-PL GR-4)	CY	827.000		827.000	
	316-6485	AGGR (TY-D GR-5 OR TY-L GR-5)	CY	703.000		703.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	3,468.000		3,468.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	622.000		622.000	
	354-6045	PLANE ASPH CONC PAV (2")	SY	52,715.000		52,715.000	
	400-6006	CUT & RESTORING PAV	SY	13.000		13.000	
	401-6001	FLOWABLE BACKFILL	CY	12.000		12.000	
	403-6001	TEMPORARY SPL SHORING	SF	240.000		240.000	
	420-6071	CL C CONC (COLLAR)	EA	1.000		1.000	
	432-6024	RIPRAP (STONE COMMON)(DRY)(12 IN)	CY	10.000		10.000	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)	CY	104.000		104.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	38.000		38.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	228.000		228.000	
	462-6056	CONC BOX CULV (6 FT X 5 FT)(EXTEND)	LF	8.000		8.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0646-07-009 **DISTRICT** Tyler **COUNTY** Henderson
HIGHWAY FM 316

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0646-07-009**			
		PROJECT ID		**A00178596**			
		COUNTY		**Henderson**			
		HIGHWAY		**FM 316**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	462-6157	CONC BOX CULV (6FT X 8FT)(EXTEND)	LF	50.000		50.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	56.000		56.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	14.000		14.000	
	465-6070	INLET (COMPL)(PSL)(RC)(3FTX3FT)	EA	1.000		1.000	
	465-6126	INLET (COMPL)(PSL)(FG)(3FTX3FT-3FTX3FT)	EA	1.000		1.000	
	466-6185	WINGWALL (PW - 2) (HW=10 FT)	EA	1.000		1.000	
	467-6224	SET (TY I)(S= 6 FT)(HW= 6 FT)(4:1) (C)	EA	2.000		2.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	4.000		4.000	
	467-6362	SET (TY II) (18 IN) (RCP) (6: 1) (C)	EA	2.000		2.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	123.000		123.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)	EA	2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	11.000		11.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	4.000		4.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	4.000		4.000	
	496-6016	REMOV STR (PIPE)	EA	64.000		64.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18.000		18.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	360.000		360.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	2,845.000		2,845.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	3,205.000		3,205.000	
	506-6029	EARTHWORK (EROSN & SEDMT CONT, IN VEH)	CY	150.000		150.000	
	506-6030	BACKHOE WORK (EROSION & SEDMT CONT)	HR	100.000		100.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	8,175.000		8,175.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	8,175.000		8,175.000	
	506-6046	TRACKHOE WORK (EROSION & SEDMT CONT)	HR	100.000		100.000	
	530-6002	INTERSECTIONS (ACP)	SY	182.000		182.000	
	530-6005	DRIVEWAYS (ACP)	SY	3,323.000		3,323.000	
	530-6008	TURNOUTS (ACP)	SY	256.000		256.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	223.000		223.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	44,100.000		44,100.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	22,050.000		22,050.000	
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	33.000		33.000	
	560-6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	48.000		48.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0646-07-009 **DISTRICT** Tyler **COUNTY** Henderson
HIGHWAY FM 316

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0646-07-009**			
		PROJECT ID		**A00178596**			
		COUNTY		**Henderson**			
		HIGHWAY		**FM 316**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	21.000		21.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	1.000		1.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	1.000		1.000	
	644-6075	RELOCATE SM RD SN SUP&AM(SIGN ONLY)	EA	8.000		8.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	3.000		3.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	34.000		34.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	51,242.000		51,242.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	158.000		158.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	2,380.000		2,380.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	38,576.000		38,576.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	2,644.000		2,644.000	
	662-6113	WK ZN PAV MRK SHT TERM RMV (Y)(4")	LF	8,958.000		8,958.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	158.000		158.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	450.000		450.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	50.000		50.000	
	666-6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	150.000		150.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	188.000		188.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	51,242.000		51,242.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	2,380.000		2,380.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	37,296.000		37,296.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	300.000		300.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	38.000		38.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	150.000		150.000	
	672-6006	REFL PAV MRKR TY I-A	EA	132.000		132.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	970.000		970.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	638.000		638.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	50.000		50.000	
	3077-6001	SP MIXESSP-BPG64-22	TON	15,992.000		15,992.000	
	3077-6022	SP MIXESSP-CSAC-A PG70-22	TON	8,346.000		8,346.000	
	3077-6075	TACK COAT	GAL	14,966.000		14,966.000	
	5129-6001	INSTALL FTB	LF	300.000		300.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	44.000		44.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3.000		3.000	
	6185-6002	TMA (STATIONARY)	DAY	177.000		177.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	13.000		13.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0646-07-009 **DISTRICT** Tyler **COUNTY** Henderson
HIGHWAY FM 316

		CONTROL SECTION JOB		**0646-07-009**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00178596**			
		COUNTY		**Henderson**			
		HIGHWAY		**FM 316**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
1	464-6003	RC PIPE (CL III)(18 IN)	LF	1,480.000		1,480.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	202.000		202.000	
1A	4122-6009	THERMOPLASTIC PIPE (24 IN)(PP)(TYPE I)	LF	178.000		178.000	
	4122-6013	THERMOPLASTIC PIPE (18 IN)(PP)(TYPE I)	LF	1,436.000		1,436.000	

BASIS OF ESTIMATE

	ITEM	DESCRIPTION	RATE	DESIGN QUANTITY	DESIGN UNIT	PAY QUANTITY	TOTAL	PAY UNIT
[1]	166	FERTILIZER	1 LB/9 SY	203125	SY	11.28	11.28	TON
	168	VEGETATIVE WATERING	11 GAL/SY	203125	SY	4469	4469	MG
[1]	314	EMULS ASPH (EROSN CONT)(CSS-1)	0.15 GAL/SY	10836	SY	1625	1625	GAL
[2]	260	LIME (HYDRATED LIME)(DRY)(5%)(130 LB/CF)(10")	47.8 LB/SY	35988	SY	860	860	TON
	275	CEMENT(5%)(130 LB/CF)(10")	47.8 LB/SY	35988	SY	860	860	TON
	316	ASPH (RC-250) (PRIME COAT	0.2 GAL/SY	70290	SY	14058	14058	GAL
	316	AGGR (TY-D GR-5 OR TY-L GR-5) (PRIME COAT	1 CY/100 SY	70290	SY	703	703	CY
	316	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	0.42 GAL/SY	82698	SY	34733	34733	GAL
	316	AGGR(TY-PD GR-4 OR TY-PL GR-4)	1 CY/100 SY	82698	SY	827	827	CY
	3077	SUPERPAVE MIXTURES SP-B PG 64-22 (BASE) (4")	440 LB/SY	70292	SY	15464	15992	TON
	3077	SUPERPAVE MIXTURES SP-B PG 64-22 (BASE) (8")	880 LB/SY	1200	SY	528		TON
	3077	SUPERPAVE MIXTURES SP-C SAC-A PG70-22 (2" SURFACE)	220 LB/SY	75871	SY	8346	8346	TON
	3077	TACK COAT	0.1 GAL/SY	149664	SY	14966	14966	GAL
	500	MOBILIZATION				1	1	LS
	502	BARRICADES, SIGNS AND TRAFFIC HANDLING				18	18	MO

[1] FOR INFORMATION ONLY.

TABULATION OF SURFACE AREAS

				ITEM 316				ITEM 3077								ITEM 351
				[1] PRIME RC-250		[1] OCST		[1] SUPERPAVE MIXTURES SP-B PG 64-22 (4") (BASE)		[1] SUPERPAVE MIXTURES SP-B PG 64-22 (8") (BASE)		[1] SUPERPAVE MIXTURES SP-C SAC-A PG70-22 (2") (SURFACE)		[1] TACK COAT		
PROJECT LAYOUT SHEET NUMBER	FROM	TO	LENGTH													FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")
SHEET	STA	STA	FT	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	AREA (SY)
1 OF 10	265+00	277+00	1200			28	3734			9	1200	28	3734	VAR	6134	
1 OF 10	277+00	287+00	1000	28	3111	28	3112	28	3112			28	3112	28	6224	
2 OF 10	287+00	313+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
3 OF 10	313+00	339+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
4 OF 10	339+00	365+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
5 OF 10	365+00	378+00	1300	28	4044	28	4045	28	4045			28	4045		8090	
5 OF 10	378+00	379+00	100	33	367	33	367	33	367			33	367		634	267
5 OF 10	379+00	380+84	184			38	777					38	777		1268	491
5 OF 10	382+34	384+00	166			38	701					38	701		1144	443
5 OF 10	384+00	385+00	100			33	367					33	367		634	267
5 OF 10	385+00	391+00	600	28	1867	28	1867	28	1867			28	1867		3734	
6 OF 10	391+00	417+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
7 OF 10	417+00	443+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
8 OF 10	443+00	469+00	2600	28	8089	28	8089	28	8089			28	8089		16178	
9 OF 10	469+00	487+00	1800	28	5600	28	5600	28	5600			28	5600		11200	
9 OF 10	487+00	495+00	800	28	2489	28	2489	28	2489			28	2489		4978	
10 OF 10	495+00	508+75	1375	28	4278	28	4278	28	4278			28	4278		8556	
INTERSECTIONS			1280			48	6827									
AS DIRECTED																2000
PROJECT TOTAL					**70290**		**82698**		**70292**		**1200**		**75871**		**149664**	**3468**

[1] QUANTITIES INCLUDED IN BASIS OF ESTIMATE.

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		10

DATE: 8/2/2022 5:08:49 PM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0407391\FM 316_GEN_SUM_QUANTITY.dgn

SUMMARY OF ROADWAY

PROJECT LAYOUT SHEET NUMBER	FROM	TO	LENGTH	ITEM 112	ITEM 251		ITEM 260				ITEM 275				ITEM 354				ITEM 533	
				SUBGRADE WIDENING ORD COMP	REWORK BS MTL (TY C) (10 IN) (ORD COMP)		[1], [2] LIME (HYDRATED LIME) (DRY)		[2] LIME TREAT (EXIST-MATL) (10 IN)		[1], [2] CEMENT		[2] CEMENT TREAT (EXIST-MATL) (10 IN)		PLANE ASPH CONC PAV (0" TO 2")		PLANE ASPH CONC PAV (2")		RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)
SHEET	STA	STA	FT	STA	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	LF	LF
1 OF 10	265+00	277+00	1200	12.00											28	622			2400	1200
1 OF 10	277+00	287+00	1000	10.00	20	2222	29	1611	29	1611	29	1611	29	1611			20	2222	2000	1000
2 OF 10	287+00	313+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
3 OF 10	313+00	339+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
4 OF 10	339+00	365+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
5 OF 10	365+00	379+00	1400	14.00	20	3111	29	2256	29	2256	29	2256	29	2256			20	3111	2800	1400
5 OF 10	379+00	380+84	184	1.84													38	777	368	184
5 OF 10	380+84	382+34	150	1.50																
5 OF 10	382+34	386+60	426	4.26													38	1799	852	426
5 OF 10	386+60	391+00	440	4.40	20	978	29	709	29	709	29	709	29	709			20	978	880	440
6 OF 10	391+00	417+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
7 OF 10	417+00	443+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
8 OF 10	443+00	469+00	2600	26.00	20	5778	29	4189	29	4189	29	4189	29	4189			20	5778	5200	2600
9 OF 10	469+00	487+00	1800	18.00	20	4000	29	2900	29	2900	29	2900	29	2900			20	4000	3600	1800
9 OF 10	487+00	495+00	800	8.00	20	1778	29	1289	29	1289	29	1289	29	1289			20	1778		
10 OF 10	495+00	507+97	1297	12.97	20	2882	29	2090	29	2090	29	2090	29	2090			20	2882		
INTERSECTIONS																				
AS DIRECTED																		500		
PROJECT TOTAL				**242.97**		**49639**		**35988**		**35988**		**35988**		**35988**		**622**		**52715**	**44100**	**22050**

[1] QUANTITIES INCLUDED IN BASIS OF ESTIMATE.
[2] ESTIMATED 50% OF TREATED SUBGRADE AREA

PORTABLE CHANGEABLE MESSAGE SIGN

SIGN	LOCATION	ITEM 6001		REMARKS
		PORTABLE CHANGEABLE MESSAGE SIGN DAYS	PORTABLE CHANGEABLE MESSAGE SIGN EA	
LOCATION #1 - BEGIN OF PROJEC	FM 316	7		PRIOR TO CONTRUCTION START DATE
LOCATION #2- END OF PROJECT	FM 316	7		PRIOR TO CONTRUCTION START DATE
LOCATION #1 - FM 316	AS DIRECTED		1	
LOCATION #2- FM 316	AS DIRECTED		1	
LOCATION #3- US 175 NORTH	AS DIRECTED	15		
LOCATION #4- US 175 SOUTH	AS DIRECTED	15		
LOCATION #5- FM 2709	AS DIRECTED		1	
PROJECT TOTAL		**44**	**3**	

TRUCK MOUNTED ATTENUATORS

NUMBER OF TRUCKS	ITEM 6185 [1] TMA (STATIONARY) DAY	ITEM 6185 [2] TMA (MOBILE) DAY
1	177	13
TOTALS	**177**	**13**

[1] FOR LANE / SHOULDER CLOSURES
[2] FOR MOBILE OPERATIONS

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		11

VEGETATION SUMMARY

LOCATION	ITEM 160	ITEM 164				ITEM 168
	[3] FURNISHING & PLACING TOPSOIL (4") SY	BOND FBR MTRX SEED (PERM) (RURAL) (SAND) SY	[1] BONDED FBR MTRX SEED (TEMP) (WARM) SY	[1] BONDED FBR MTRX SEED (TEMP) (COOL) SY	[1] BROADCAST SEED (PERM) (RURAL) (SANDY) SY	[2] VEGETATIVE WATERING SY
STA 265+00 TO 508+75	200	81250	40625	40625	40625	203125
PROJECT TOTAL	**200**	**81250**	**40625**	**40625**	**40625**	**203125**

[1] MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE VEGETATION IN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT.

[2] QUANTITY INCLUDED IN THE BASIS OF ESTIMATE.

[3] CONTRACTOR SHALL REUSE 90% OF EXISTING TOPSOIL

GRADING SUMMARY

PROJECT LAYOUT SHEET NUMBER	LOCATION		ITEM 132	ITEM 150	ITEM 134		ITEM 314	REMARKS
	STA		EMBANK (VEHICLE) (ORD COMP) (TY C) CY	BLADING STA	BACKFILL TY A STA	BACKFILL TY B STA	[1] EMULS ASPH (EROSN CONT) (CSS-1) SY	
1 OF 10	265+00	277+00		12.00		12.00	533	
1 OF 10	277+00	287+00		10.00		10.00	444	
2 OF 10	287+00	313+00		26.00		26.00	1156	
3 OF 10	313+00	339+00		26.00		26.00	1156	
4 OF 10	339+00	365+00		26.00	26.00		1156	
5 OF 10	365+00	391+00		26.00	26.00		1156	
6 OF 10	391+00	417+00		26.00	26.00		1156	
7 OF 10	417+00	443+00		26.00	26.00		1156	
8 OF 10	443+00	469+00		26.00	26.00		1156	
9 OF 10	469+00	487+00		18.00	18.00		800	
9 OF 10	487+00	495+00		8.00	8.00		356	
10 OF 10	495+00	508+75		13.75	13.75		611	
FROM DRVWY SUM			77					
FROM X-CULVERT RC PIPE SUM			23					
FROM X-CULVERT RC BOX SUM			400					
TOTALS			**500**	**243.75**	**169.75**	**74.00**	**10836**	

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE. FOR INFORMATION ONLY, THIS ITEM SUBSIDIARY TO BACKFILL.

PREP ROW

LOCATION		DESCRIPTION	ITEM 100
			PREP ROW
STA			STA
FROM	TO		
58+00	79+00	TREE TRIMMING/ REMOVAL	21.0
142+00	148+00	TREE TRIMMING/ REMOVAL	6.0
179+50	192+50	TREE TRIMMING/ REMOVAL	13.0
201+00	205+00	TREE TRIMMING/ REMOVAL	4.0
219+00	222+00	TREE TRIMMING/ REMOVAL	3.0
225+00	227+00	TREE TRIMMING/ REMOVAL	2.0
		AS DIRECTED	10.00
PROJECT TOTAL			**59.00**

FM 316 QUANTITY SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		12

		BASE	ALT	BASE	ALT

DRIVEWAY / INTERSECTION SUMMARY (SHEET 1 OF 3)

LOCATION STA		INTERSECTION	DRIVEWAY NO.	DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH FT	PROP WIDTH FT	PROP DRVW LENGT LF	ITEM 132 [4] EMBANK (VEHICLE) (ORD COMP) (TY C) CY	ITEM 400 CUT & RESTORING PAV SY	ITEM 401 [3] FLOWABLE BACKFILL CY	ITEM 496 REMOVE STR PIPE EA	ITEM 464 [1], [3] RCP (CL III) (18 IN) LF	ITEM 4122 [1A], [3] THERMO-PLASTIC PIPE (18 IN)(PP) (TYPE I) LF	ITEM 464 [1], [3] RCP (CL III) (24 IN) LF	ITEM 4122 [1A], [3] THERMO-PLASTIC PIPE (24 IN)(PP) (TYPE I) LF	ITEM 465 [3] INLET(COMPL) (PSL)(FG) (3FTX3FT-3FTX3FT) EA	ITEM 465 [3] INLET(COMPL) (PSL)(RC) (3FTX3FT) EA	ITEM 467 [3] SET (TY II) (18IN) (RCP) (6:1)(P) EA	ITEM 467 [3] SET (TY II) (24IN) (RCP) (6:1)(P) EA	ITEM 104 REMOVE (CONC) DRVWAY SY	ITEM 530 INTERSECTION (ACP) SY	ITEM 530 DRIVEWAYS (CONC) (HES) SY	ITEM 530 DRIVEWAYS (ACP) SY
273+81	LT		1	18 IN X 20 FT CMP	GRAVEL	12	12	26	1			1	20	20					2					35
278+48	LT		2	NO PIPE	ACP	10	12	26																35
283+60	LT		3	18 IN X 16 FT CMP	ACP	10	12	26	1			1	16	16					2					35
286+52	LT		4	18 IN X 24 FT CMP	GRAVEL	18	18	26	1			1	24	24					2					52
292+73	LT		5	18 IN X 30 FT CMP	GRAVEL	16	16	26	1			1	30	30					2					46
293+97	LT		6	18 IN X 16 FT RCP	ACP	11	12	26	1			1	16	16					2					35
295+69	LT		7	12 IN X 38 FT CMP	GRAVEL	20	20	26	1			1	38	38					2					58
300+09	LT		8	18 IN X 28 FT CMP	GRASS	16	16	26	1			1	28	28					2					46
302+49	LT		9	18 IN X 30 FT CMP	GRAVEL	12	12	26	1			1	30	30					2					35
304+93	LT		10	18 IN X 22 FT RCP	ACP	12	12	26	1			1	22	22					2					35
309+01	LT		11	18 IN X 20 FT RCP	ACP	12	12	26	1			1	20	20					2					35
318+72	RT		12	18 IN X 18 FT STL	ACP	10	12	36	1			1	18	18					2					48
323+67	LT		13	NO PIPE	ACP	14	14	26					24	24					2					40
333+56	LT		14	18 IN X 20 FT RCP	GRASS	16	16	26	1			1	18	18					2					46
334+12	LT		15	20 IN X 46 FT PVC	GRASS	14	14	26	1															40
336+09	RT		16	24 IN X 24 FT CMP	ACP	12	12	31	1			1			24	24				2				41
337+85	RT	CR 2938		NO PIPE																				0
343+90	RT		17	12 IN X 22 FT CMP	ACP	10	12	31	1			1	24	24					2					41
345+02	LT		18	18 IN X 22 FT RCP	CONC.	17	17	26	1			1	22	22					2		52		52	
345+58	RT		19	18 IN X 24 FT RCP	GRASS	12	12	31	1			1	24	24					2					41
348+37	RT		20	18 IN X 20 FT RCP	ACP	12	12	31	1			1	20	20					2					41
355+69	LT		21	NO PIPE	ACP	12	12	31																41
356+61	LT		22	NO PIPE	ACP	12	12	31																41
363+40	RT		23	18 IN X 20 FT RCP	ACP	12	12	44	1			1	20	20					2					59
368+07	RT		24	4- 36 IN X 21 FT CMP	GRAVEL	12	12	44	1															59
372+21	LT		25	18 IN X 26 FT RCP	ACP	10	12	46	1			1	26	26					2					61
372+39	RT		26	2- 36 IN X 24 FT RCP	ACP	10	12	46	1															61
375+35	RT		27	2- 24 IN X 26 FT RCP	ACP	8	12	46	1			2			52	52				4				61
385+72	LT		28	18 IN X 26 FT CMP	CONC.	18	18	19	1			1	26	26					2		49		49	
389+63	RT		29	24 IN X 22 FT RCP	ACP	14	14	46	1			1			22	22				2				72
392+77	LT		30	NO PIPE	GRASS	14	14	26																40
SUBTOTAL									25	0	0	23	466	466	98	98	0	0	40	8	101	0	101	1281

[1] BASE BID.

[1A] QUANTITY SUBJECT TO ALTERNATE BID.

[3] QUANTITY PAID IN THE STRUCTURE SUMMARY.

[4] QUANTITY PAID IN THE GRADING SUMMARY.

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		13

								BASE	ALT	BASE	ALT								
DRIVEWAY / INTERSECTION SUMMARY (SHEET 2 OF 3)																			
								ITEM 132	ITEM 400	ITEM 401	ITEM 496	ITEM 464	ITEM 4122	ITEM 464	ITEM 4122	ITEM 465	ITEM 465	ITEM 467		ITEM 104	ITEM 530		
LOCATION		INTERSECTION	DRIVEWAY NO.	DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	PROP WIDTH	PROP DRVW LENGT	[4] EMBANK (VEHICLE) (ORD COMP (TY C)	CUT & RESTORING PAV	[3] FLOWABLE BACKFILL	REMOVE STR PIPE	[1], [3] RCP (CL III) (18 IN)	[1A], [3] THERMO-PLASTIC PIPE (18 IN)(PP) (TYPE I)	[1], [3] RCP (CL III) (24 IN)	[1A], [3] THERMO-PLASTIC PIPE (24 IN)(PP) (TYPE I)	[3] INLET(COMPL) (PSL)(FG) (3FTX3FT-3FTX3FT)	[3] INLET(COMPL) (PSL)(RC) (3FTX3FT)	[3] SET (TY II) (18IN) (RCP) (6:1)(P)	[3] SET (TY II) (24IN) (RCP) (6:1)(P)	REMOVE (CONC) DRVWAY	INTERSECTION (ACP)	DRIVEWAYS (CONC) (HES)	DRIVEWAYS (ACP)
STA						FT	FT	LF	CY	SY	CY	EA	LF	LF	LF	LF	EA	EA	EA	EA	SY	SY	SY	SY
397+22	RT		31	NO PIPE	ACP	12	12	26																35
399+55	LT		32	12 IN X 32 FT RCP	ACP	12	12	26	1			1	32	32					2					35
400+70	RT	CR 2915		NO PIPE																				0
406+92	RT		33	17 IN X 26 FT CMP	GRASS	12	12	46	2			1	36	36			1		1					61
407+31	RT		34	24 IN X 20 FT CMP	CONC.	12	12	24	1			1			30	30				1	49		49	
412+63	RT		35	NO PIPE	ACP	10	12	46																61
415+31	LT		36	NO PIPE	CONC.	36	36	7													33		33	
423+23	LT		37	17 IN X 26 FT CMP	GRAVEL	10	12	31	1			1	26	26					2					41
430+20	LT		38	18 IN X 20 FT CMP	GRAVEL	10	12	31	1			1	20	20					2					41
431+87	RT		39	18 IN X 32 FT CMP	GRASS	14	14	31	1			1	32	32					2					48
432+25	LT		40	18 IN X 22 FT CMP	ACP	12	12	26	1			1	22	22					2					35
432+94	LT		41	NO PIPE	ACP	12	12	26					24	24					2					35
434+08	RT		42	18 IN X 20 FT RCP	ACP	10	12	26	1			1	20	20					2					35
434+45	LT		43	NO PIPE	ACP	14	14	26	1															40
441+92	LT		44	18 IN X 20 FT RCP	ACP	10	12	26	1			1	20	20					2					35
442+65	RT		45	NO PIPE	ACP	12	12	26	1				20	20					2					35
443+74	LT		46	NO PIPE	ACP	10	12	26	1				20	20					2					35
444+82	LT		47	NO PIPE	ACP	10	12	26	1															35
444+89	RT		48	NO PIPE	ACP	32	32	26	1															92
446+47	LT		49	18 IN X 20 FT CMP	GRASS	12	12	26	1			1	20	20					2					35
451+93	LT		50	18 IN X 26 FT CMP	GRAVEL	10	12	26	1			1	26	26					2					35
453+62	RT	NO WORK	51	18 IN X 32 FT RCP	GRASS	16																		
458+21	RT	NO WORK	52	18 IN X 42 FT RCP	GRASS	20																		
458+32	LT		53	18 IN X 22 FT CMP	GRAVEL	10	12	26	1			1	22	22					2					35
462+10	LT		54	18 IN X 16 FT CMP	ACP	10	12	26	1			1	20	20					2					35
464+86	RT		55	NO PIPE	ACP	16	16	26	1															46
465+84	LT		56	NO PIPE	ACP	12	12	26	1															35
467+67	LT		57	18 IN X 26 FT CMP	GRAVEL	10	12	26	1			1	26	26					2					35
470+69	RT		58	18 IN X 20 FT CMP	GRAVEL	10	12	26	1			1	20	20					2					35
471+30	LT		59	18 IN X 20 FT CMP	GRAVEL	10	12	31	1			1	20	20					2					41
476+39	LT		60	18 IN X 22 FT RCP	GRASS	12	12	31	1			1	22	22					2					41
477+27	LT		61	18 IN X 32 FT RCP	ACP	12	12	31	1			1	32	32					2					41
481+19	LT		62	18 IN X 20 FT CMP	GRAVEL	10	12	31	1			1	20	20					2					41
SHEET 2 OF 3 SUBTOTAL									**27**	**0**	**0**	**19**	**500**	**500**	**30**	**30**	**1**	**0**	**41**	**1**	**82**	**0**	**82**	**1153**

[1] BASE BID.

[2] QUANTITY SUBJECT TO ALTERNATE BID.

[3] QUANTITY PAID IN THE STRUCTURE SUMMARY.

[4] QUANTITY PAID IN THE GRADING SUMMARY.

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		14

		BASE	ALT	BASE	ALT

DRIVEWAY / INTERSECTION SUMMARY (SHEET 3 OF 3)

LOCATION		INTERSECTION	DRIVEWAY NO.	DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	PROP WIDTH	PROP DRVW LENGT	ITEM 132 [4] EMBANK (VEHICLE) (ORD COMP (TY C)	ITEM 400 CUT & RESTORING PAV	ITEM 401 [3] FLOWABLE BACKFILL	ITEM 496 REMOVE STR PIPE	ITEM 464 [1], [3] RCP (CL III) (18 IN)	ITEM 4122 [1A], [3] THERMO-PLASTIC PIPE (18 IN)(PP) (TYPE I)	ITEM 464 [1], [3] RCP (CL III) (24 IN)	ITEM 4122 [1A], [3] THERMO-PLASTIC PIPE (24 IN)(PP) (TYPE I)	ITEM 465 [3] INLET(COMPL) (PSL)(FG) (3FTX3FT-3FTX3FT)	ITEM 465 [3] INLET(COMPL) (PSL)(RC) (3FTX3FT)	ITEM 467 [3] SET (TY II) (18IN) (RCP) (6:1)(P)	ITEM 467 [3] SET (TY II) (24IN) (RCP) (6:1)(P)	ITEM 104 REMOVE (CONC) DRVWAY	ITEM 530 INTERSECTION (ACP)	ITEM 530 DRIVEWAYS (CONC) (HES)	ITEM 530 DRIVEWAYS (ACP)
STA						FT	FT	LF	CY	SY	CY	EA	LF	LF	LF	LF	EA	EA	EA	EA	SY	SY	SY	SY
487+45	LT	FM 2709		24 IN X 50 FT PVC	ACP	36	36	21	1	13	7	1			50	50				2		117		84
488+83	LT		63	15 IN X 20 FT STL.	GRASS	10	12	31	1			1	20	20					2					41
489+84	LT		64	18 IN X 22 FT RCP	ACP	8	12	31	1			1	22	22					2					41
490+72	LT		65	18 IN X 22 FT RCP	ACP	10	12	31	1			1	22	22					2					41
491+02	RT		66	16 IN X 24 FT CMP	ACP	18	18	19	1			1	24	24					2					38
491+78	LT		67	12 IN X 22 FT RCP	ACP	10	12	31	1			1	22	22					2					41
492+57	LT		68	17 IN X 20 FT CMP	GRASS	8	12	31	1			1	20	20					2					41
493+62	LT		69	15 IN X 20 FT RCP	ACP	10	12	31	1			1	20	20					2					41
493+81	RT	NO WORK	70	NO PIPE	ACP	10																		
494+86	RT		71	18 IN X 20 FT RCP	ACP	12	12	20	2			1	24	24				1	2					27
495+26	LT	REMOVED	72	NO PIPE	ACP	0	0	0	1															0
495+74	RT		73	18 IN X 20 FT RCP	ACP	10	12	20	1			1	22	22					2					27
496+26	LT		74	18 IN X 56 FT RCP	CONC.	34	34	2	1												40		40	
497+46	RT		75	NO PIPE	ACP	12	12	21																28
497+68	LT		76	NO PIPE	ACP	12	12	26																35
499+57	RT		77	18 IN X 22 FT RCP	GRASS	10	12	20	1			1	20	20					2					27
500+09	LT	COOK ST		18 IN X 28 FT RCP	ACP	14	14	12	1			1	8	8					2			18		19
500+10	RT	COOK ST		18 IN X 26 FT RCP	ACP	20	20	15	1			1	8	8					2			33		33
501+04	RT		78	18 IN X 24 FT RCP	ACP	14	20	20	1			1	28	28					2					44
501+66	RT		79	18 IN X 52 FT CMP	ACP	34	34	20	1			1	52	52					2					76
502+04	LT		80	18 IN X 20 FT RCP	ACP	10	12	21	1			1	20	20					2					28
502+60	RT		81	18 IN X 36 FT RCP	ACP	10	12	21	1			1	36	36					2					28
503+17	LT		82	18 IN X 20 FT RCP	ACP	10	12	21	1			1	20	20					2					28
503+21	RT		83	18 IN X 24 FT RCP	ACP	10	12	21	1			1	24	24					2					28
504+52	RT	CHURCH RD		18 IN X 32 FT RCP	ACP	12	12	13	1			1	8	8					2			14		17
505+23	RT		84	18 IN X 16 FT RCP	GRAVEL	10	12	21	1			1	20	20					2					28
506+18	RT		85	18 IN X 30 FT CMP	GRAVEL	20	20	21	1			1	30	30					2					47
SHEET 3 OF 3 SUBTOTAL									25	13	7	22	470	470	50	50	0	1	42	2	40	182	40	889
SHEET 2 OF 3 SUBTOTAL									27	0	0	19	500	500	30	30	1	0	41	1	82	0	82	1153
SHEET 1 OF 3 SUBTOTAL									25	0	0	23	466	466	98	98	0	0	40	8	101	0	101	1281
PROJECT TOTAL									**77**	**13**	**7**	**64**	**1436**	**1436**	**178**	**178**	**1**	**1**	**123**	**11**	**223**	**182**	**223**	**3323**

[1] BASE BID.

[2] QUANTITY SUBJECT TO ALTERNATE BID.

[3] QUANTITY PAID IN THE STRUCTURE SUMMARY.

[4] QUANTITY PAID IN THE GRADING SUMMARY.

FM 316
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Texas Department of Transportation

SHEET 6 OF 14

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		15

DATE: 8/8/2022 4:17:29 PM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0407391\FM 316_GEN_SUM_QUANTITY.dgn

SUMMARY OF CROSS-CULVERTS FOR RC PIPE

LOCATION		CUL NO.	EXISTING CONDITION	PROPOSED WORK	ITEM 132	ITEM 420	ITEM 432	ITEM 464				ITEM 467							ITEM 480	ITEM 658
					[2] EMBANK (VEHICLE) (ORD COMP) (TY C)	CL C CONC (COLLAR)	[3] RIPRAP (STONE COMMON) (DRY) (12 IN)	[1] RC PIPE (CL III) 18 IN	[1] RC PIPE (CL III) 24 IN	[1] RC PIPE (CL III) 30 IN	[1] RC PIPE (CL III) 36 IN	[1] SET (TY II) (18 IN) (RCP) (3:1) (C)	[1] SET (TY II) (18 IN) (RCP) (4:1) (C)	[1] SET (TY II) (18 IN) (RCP) (6:1) (C)	[1] SET (TY II) (24 IN) (RCP) (4:1) (C)	[1] SET (TY II) (24 IN) (RCP) (6:1) (C)	[1] SET (TY II) (30 IN) (RCP) (3:1) (C)	[1] SET (TY II) (36 IN) (RCP) (3:1) (C)	CLEAN EXISTING CULVERTS	[1] INSTL OM ASSM (OM-2Z) (WFLX) GND
STA					CY	EA	CY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA
CSJ 0646-07-009																				
350+95	RT	3	1 - 18" RCP AT 44' - (CH-7B)	REMV SET & 4' JNT, EXT 4'-18" RCP WITH SET (4:1)	1			4					1							1
350+95	LT			REMV SET & 4' JNT, EXT 4'-18" RCP WITH SET (4:1)	1			4					1							1
393+81	RT	5	1 - 24" RCP AT 48' - (CH-7B)	REMV 4' JNT & SET, EXT 4' RCP, PLACE SET (6:1)	1				4							1				1
393+81	LT			REMV 4' JNT & SET, EXT 4' RCP, PLACE SET (6:1)	1				4							1				1
404+52	RT	6	1 - 18" RCP AT 32' - (CH-7B)	REMV 4' JNT & SET, EXT 8' RCP, PLACE SET (6:1)	1			8						1					1	1
404+52	LT			REMV 4' JNT & SET, EXT 4' RCP, PLACE SET (6:1)	1			4						1					1	1
419+77	RT	8	1 - 18" RCP AT 36' - (CH-7B)	REMV 4' JNT & SET, EXT 4' RCP, PLACE SET (4:1)	1			4					1							1
419+77	LT			REMV 4' JNT & SET, EXT 4' RCP, PLACE SET (3:1)	1			4				1								1
437+79	RT	9	1 - 24" RCP AT 35' - (CH-7B)	REMV 4' JNT & SET, EXT 8' RCP, PLACE SET (4:1)	1				8						1					1
437+79	LT			REMV 4' JNT & SET, EXT 8' RCP, PLACE SET (4:1)	1				8						1					1
455+67	RT	10	2 - 30" RCP AT 44' - (CH-7B)	REMV 4' JNT & SET, EXT CLVRT 8' AT 16' RCP, PLACE SET (3:1)	2					16							1		1	1
455+67	LT			REMV 4' JNT & SET, EXT CLVRT 8' AT 16' RCP, PLACE SET (3:1)	2					16							1		1	1
468+78	RT	11	2 - 30" RCP AT 36' - (CH-7B)	REMV 4' JNT & SET, EXT 6' AT 12' RCP, PLACE SET (3:1)	2					12							1			1
468+78	LT			REMV 4' JNT & SET, EXT 6' AT 12' RCP, PLACE SET (3:1)	2					12							1			1
494+66	RT	12	1 - 18" RCP AT 34' - (CH-7B)	REMV HDWL AND 4' JNT, ADD COLLAR, 12' RCP, CONNECT TO PROP DRVWY JCTBOX	2	1		12												1
494+66	LT			REMV HDWL AND 4' JNT, ADD 4' RCP AND SET(4:1)	1			4					1							1
507+15	RT	13	1 - 36" RCP AT 36' - (CH-7B)	REMV 4' JNT & SET, EXT 6' RCP, PLACE SET (3:1)	1						6							1		1
507+15	LT			REMV 4' JNT & SET, EXT 8' RCP, PLACE SET (3:1)	1		10				8							1		1
PROJECT TOTAL					23	1	10	44	24	56	14	1	4	2	2	2	4	2	4	18

[1] QUANTITY PAID IN THE STRUCTURE SUMMARY.

[2] QUANTITY PAID IN THE GRADING SUMMARY.

[3] QUANTITY PAID IN THE RIPRAP SUMMARY.

FM 316
QUANTITY
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Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		16

SUMMARY OF CROSS-CULVERTS FOR RC BOX

LOCATION STA	CUL NO.	EXISTING CONDITION	PROPOSED WORK	ITEM 104 REMOVING CONC (RIPRAP) SY	ITEM 132 [2] EMBANK (VEHICLE) (ORD COMP) (TY C) CY	ITEM 401 [1] FLOWABLE BACKFILL CY	ITEM 403 TEMP SPL SHORING SF	ITEM 432 [3] RIPRAP (STONE COMMON) (DRY) (18 IN) CY	ITEM 462 CONC BOX CULV (6FTX5FT) (EXTEND) LF	ITEM 462 CONC BOX CULV (6FTX8FT) (EXTEND) (MOD) LF	ITEM 466 WINGWALL (PW-2) (HW= 10 FT) (2:1) EA	ITEM 467 SET (TY I) (S= 6 FT) (HW= 6 FT) (4:1)(C) EA	ITEM 658 [1] INSTL OM ASSM (OM-2Z) (WFLX)GND EA
CSJ 0646-07-009													
291+61 RT	1	1 - 9' X 2' RCB AT 38' - (FMC-2)	NO WORK										2
291+61 LT													2
315+78 RT	2	1 - 9' X 2' RCB AT 38' - (FMC-2)	NO WORK										2
315+78 LT													2
364+84 RT	4	1 - 7' X 5' RCB AT 36' - (FMC-2)	NO WORK					12					2
364+84 LT			NO WORK										2
410+74 RT	6	2 - 6' x 5' RCB AT 34' (MC6-1)(HCW-F1)	REMV RIPRAP, EXT 25' (2) 6'x5' RCB, PLACE SETB (3:1)	57	340	5	140	67		50	1		2
410+74 LT			REMV CONC, EXT 4' (2) 6'X5' RCB, PLACE SETB (3:1)		60		100	25	8			2	2
PROJECT TOTAL				**57**	**400**	**5**	**240**	**104**	**8**	**50**	**1**	**2**	**16**

[1] QUANTITY PAID IN THE STRUCTURE SUMMARY.

[2] QUANTITY PAID IN THE GRADING SUMMARY.

[3] QUANTITY PAID IN THE RIPRAP SUMMARY.

STRUCTURE SUMMARY

LOCATION	ITEM 401 FLOWABLE BACKFILL CY	ITEM 464 RC PIPE (CL III) 18 IN LF	ITEM 464 RC PIPE (CL III) 24 IN LF	ITEM 464 RC PIPE (CL III) 30 IN LF	ITEM 464 RC PIPE (CL III) 36 IN LF	ITEM 465 INLET(COMPL) (PSL)(FG) (3FTX3FT-3FTX3FT) EA	ITEM 465 INLET(COMPL) (PSL)(RC) (3FTX3FT) EA	ITEM 467 (TY II) (18 IN) (RCP) (6:1)(P) (6:1) (P) EA	ITEM 467 (TY II) (24 IN) (RCP) (6:1)(P) (6:1) (P) EA	ITEM 467 SET (TY II) (18 IN) (RCP) (3:1) (C) EA	ITEM 467 SET (TY II) (18 IN) (RCP) (4:1) (C) EA	ITEM 467 SET (TY II) (18 IN) (RCP) (6:1) (C) EA	ITEM 467 SET (TY II) (24 IN) (RCP) (4:1) (C) EA	ITEM 467 SET (TY II) (24 IN) (RCP) (6:1) (C) EA	ITEM 467 SET (TY II) (30 IN) (RCP) (3:1) (C) EA	ITEM 467 SET (TY II) (36 IN) (RCP) (3:1) (C) EA	ITEM 658 INSTL OM ASSM (OM-2Z) (WFLX) GND EA
FROM DRIVEWAY & INTERSECTION SUMMARY	7	*** 1436	*** 178			1	1	123	11								
FROM SUMMARY OF CROSS-CULVERTS FOR RC PIPE		44	24	56	14					1	4	2	2	2	4	2	18
FROM SUMMARY OF CROSS-CULVERTS FOR RC BOX	5																16
PROJECT TOTAL	**12**	**1480**	**202**	**56**	**14**	**1**	**1**	**123**	**11**	**1**	**4**	**2**	**2**	**2**	**4**	**2**	**34**

[***] BASE BID.

[***] ITEM 4122 QUANTITY SUBJECT TO ALT BID FROM DRIVEWAY SUMMARY.

FM 316
QUANTITY SUMMARY SHEET

Texas Department of Transportation

SHEET 8 OF 14

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
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TYL	HENDERSON		17

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CK:
DW:
CK:
DN:

RIPRAP SUMMARY

LOCATION	DESCRIPTION	ITEM 432		
		RIPRAP (STONE COMMON DRY) (12 IN) CY	RIPRAP (STONE COMMON DRY) (18 IN) CY	RIPRAP (MOW STRIP) (4") CY
507+15 LT	1-36" RCP AT 36' (CH-7B)	10		
364+84 RT	1-7X5 RCB AT 36' (FMC-2)		12	
410+74 RT	2-6X5 RCB AT 34' (MCS-6)(HCW-F1)		67	
410+74 LT	2-6X5 RCB AT 34' (MCS-6)(HCW-F1)		25	
FM 316 - CSJ 0646-07-009 (MILLS CREEK)				
DEPARTURE	LEFT SIDE			7
APPROACH	RIGHT SIDE			13
BRIDGE				
APPROACH	LEFT SIDE			12
DEPARTURE	RIGHT SIDE			6
				0
PROJECT TOTAL		**10**	**104**	**38**

BRIDGE SUMMARY

LOCATION	REMARKS	ITEM 438
		CLEANING & SEALING EXIST JOINTS (CL3) LF
CSJ 0646-07-009 MILLS CREEK BRIDGE		
NBI# 10-108-0-0646-07-033 FROM 381+20 TO 381+70	**6 JOINTS AT 38'**	**228**
PROJECT TOTAL		**228**

FM 316 QUANTITY SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		18

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MAILBOX SUMMARY

LOCATION STATION	LOCATION LEFT/RIGHT	ITEM 530	ITEM 560		
		TURNOUTS (ACP)	MAILBOX INSTALL-S (TWG-POST) TY 2	MAILBOX INSTALL-D (TWG-POST) TY 2	MAILBOX SIZE S / M / L
		SY	EA	EA	
286+30	LEFT	5	1		MEDIUM
292+93	LEFT	8	1		MEDIUM
294+15	LEFT	8	1		MEDIUM
295+49	LEFT	5	1		MEDIUM
302+67	LEFT	8	1		MEDIUM
308+82	LEFT	5	1		MEDIUM
323+87	LEFT	8	1		MEDIUM
343+82	LEFT	10	1		MEDIUM
345+23	LEFT	8	1		MEDIUM
356+59	LEFT	10	1		MEDIUM
372+02	LEFT	5	1		MEDIUM
375+37	LEFT	8	1		MEDIUM
385+59	LEFT	0	1		MEDIUM
389+83	RIGHT	5	1		MEDIUM
397+41	RIGHT	6	1		MEDIUM
399+71	LEFT	8	1		MEDIUM
407+34	LEFT	10	1		MEDIUM
423+40	LEFT	8	1		MEDIUM
432+07	LEFT	8	1		MEDIUM
442+09	LEFT	8	1		MEDIUM
445+04	LEFT	8	1		MEDIUM
452+11	LEFT	8	1		MEDIUM
458+51	LEFT	8	1		MEDIUM
462+27	LEFT	7	1		MEDIUM
466+03	LEFT	8	1		MEDIUM
467+84	LEFT	8	1		MEDIUM
477+45	LEFT	8	1		MEDIUM
481+39	LEFT	8	1		MEDIUM
489+83	RIGHT	10	1		MEDIUM
490+79	RIGHT	8	1		MEDIUM
491+76	RIGHT	8	1		MEDIUM
493+63	RIGHT	8	1		MEDIUM
498+02	RIGHT	10		2	MEDIUM
503+40	RIGHT	8	1		MEDIUM
PROJECT TOTAL		256	33	2	

EROSION CONTROL SUMMARY

PROJECT LAYOUT SHEET NUMBER	ITEM 506								ITEM 5129
	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	EARTHWORK (EROSN & SEDMT CONT, IN VEH)	BACKHOE WORK (EROSION & SEDMT CONT)	TRACKHOE WORK (EROSION & SEDMT CONT)	FLOATING TURBIDITY BARRIER
	LF	LF	LF	LF	LF	CY	HR	HR	LF
1 OF 9	650	650	40	180	220				100
2 OF 9			40	270	310				
3 OF 9	350	350	40	225	265				
4 OF 9	600	600	40	150	190				
5 OF 9	945	945	40	225	265				
6 OF 9	440	440	40	195	235				
7 OF 9	800	800	40	300	340				100
8 OF 9	240	240	40	150	190				100
9 OF 9	1650	1650	40	150	190				
AS DIRECTED	2500	2500		1000	1000	150	100	100	
PROJECT TOTAL	**8175**	**8175**	**360**	**2845**	**3205**	**150**	**100**	**100**	**300**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE VEGETATION IN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT

SMALL SIGN TABULATION

LOCATION CSJ 0646-07-009	ITEM 644					
	IN SM RD SN SUP & AM TY S80 (1)SA(U)	IN SM RD SN SUP & AM TY 10BWG (1)SA(T)	IN SM RD SN SUP & AM TY 10BWG (1)SA(U)	IN SM RD SN SUP & AM TY10BWG (1)SA(P)	REMOVE SM RD SN SUP&AM	{1} RELOCATE SM RD SN SUP & AM (SIGN ONLY)
	EA	EA	EA	EA	EA	EA
FM 316	1	21	1	48	3	8
PROJECT TOTAL	**1**	**21**	**1**	**48**	**3**	**8**

NOTE: MULTIPLE MOVE-INS MAY BE REQUIRED FOR PLACEMENT OF PERMANENT SIGNS

[1] RELOCATE EXIST STREET SIGN TO PROPOSED STOP SIGN. THIS WILL BE SUBSIDIARY TO ITEM 644.

FM 316 QUANTITY SUMMARY SHEET

Texas Department of Transportation

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0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		19

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SUMMARY OF WORK ZONE PAVEMENT MARKINGS (TABLE 1 OF 2)

LOCATION	TYPE	RATE	LENGTH	ITEM 662								
				WK ZN PAV MRK NON-REMOV				WK ZN PAV MRK SHORT TERM REMOV			WK ZN PAV MRK SHORT TERM (TAB)	
				WHITE		YELLOW			YELLOW			YELLOW
				24 IN (SOLID)	4 IN (SOLID)	4 IN (SOLID)	4 IN (BROKEN)	RATE	4 IN (SOLID)	4 IN (BROKEN)	RATE	TY Y-2
			LF	LF	LF	LF	LF		LF	LF		EA
PROJECT LAYOUT 1 OF 10												
STA 265+00 TO STA 287+00	EDGE LINE	SOLID	4400		4400							
STA 265+00 TO STA 287+00	BARRIER LINE	SOLID	3170			3170		4.5FT/20FT	714		1 EA/20 FT	160
STA 265+00 TO STA 287+00	BARRIER LINE	10 FT / 40 F	1108				278	4.5FT/40FT		32	3 EA/40 FT	84
STA 265+00 TO STA 287+00	STOP BAR	SOLID	30	30								
FM 1861	EDGE LINE	SOLID	640		1280							
FM 1861	BARRIER LINE	SOLID	640			640		4.5FT/20FT	144		1 EA/20 FT	32
FM 1861	BARRIER LINE	SOLID	640			640		4.5FT/20FT	144		1 EA/20 FT	32
PROJECT LAYOUT 2 OF 10												
STA 287+00 TO STA 313+00	EDGE LINE	SOLID	5200		5200							
STA 287+00 TO STA 313+00	BARRIER LINE	SOLID	1100			1100		4.5FT/20FT	248		1 EA/20 FT	56
STA 287+00 TO STA 313+00	BARRIER LINE	10 FT / 40 F	2600				650	4.5FT/40FT		74	3 EA/40 FT	196
PROJECT LAYOUT 3 OF 10												
STA 313+00 TO STA 339+00	EDGE LINE	SOLID	5200		5200							
STA 313+00 TO STA 339+00	BARRIER LINE	SOLID	5200			5200		4.5FT/20FT	1170		1 EA/20 FT	260
STA 313+00 TO STA 339+00	BARRIER LINE	10 FT / 40 F	0				0	4.5FT/40FT		0	3 EA/40 FT	0
STA 313+00 TO STA 339+00	STOP BAR	SOLID	38	38								
PROJECT LAYOUT 4 OF 10												
STA 339+00 TO STA 365+00	EDGE LINE	SOLID	5200		5200							
STA 339+00 TO STA 365+00	BARRIER LINE	SOLID	5200			5200		4.5FT/20FT	1170		1 EA/20 FT	260
STA 339+00 TO STA 365+00	BARRIER LINE	10 FT / 40 F	0				0	4.5FT/40FT		0	3 EA/40 FT	0
PROJECT LAYOUT 5 OF 10												
STA 365+00 TO STA 380+84	EDGE LINE	SOLID	3168		3168							
STA 365+00 TO STA 380+84	BARRIER LINE	SOLID	1632			1632		4.5FT/20FT	368		1 EA/20 FT	82
STA 365+00 TO STA 380+84	BARRIER LINE	10 FT / 40 F	1302				326	4.5FT/40FT		38	3 EA/40 FT	98
STA 380+84 TO STA 382+34	EDGE LINE	SOLID	300		300							
STA 380+84 TO STA 382+34	BARRIER LINE	SOLID	150			150		4.5FT/20FT	34		1 EA/20 FT	8
STA 380+84 TO STA 382+34	BARRIER LINE	10 FT / 40 F	150				38	4.5FT/40FT		4	3 EA/40 FT	12
STA 382+34 TO STA 391+00	EDGE LINE	SOLID	1732		1732							
STA 382+34 TO STA 391+00	BARRIER LINE	SOLID	866			866		4.5FT/20FT	196		1 EA/20 FT	44
STA 382+34 TO STA 391+00	BARRIER LINE	10 FT / 40 F	866				218	4.5FT/40FT		26	3 EA/40 FT	66
PROJECT LAYOUT 6 OF 10												
STA 391+00 TO STA 417+00	EDGE LINE	SOLID	5200		5200							
STA 391+00 TO STA 417+00	BARRIER LINE	SOLID	5054			5054		4.5FT/20FT	1138		1 EA/20 FT	254
STA 391+00 TO STA 417+00	BARRIER LINE	10 FT / 40 F	146				38	4.5FT/40FT		4	3 EA/40 FT	4
STA 391+00 TO STA 417+00	STOP BAR	SOLID	12	12								
PROJECT LAYOUT 7 OF 10												
STA 417+00 TO STA 443+00	EDGE LINE	SOLID	5200		5200							
STA 417+00 TO STA 443+00	BARRIER LINE	SOLID	4200			4200		4.5FT/20FT	946		1 EA/20 FT	210
STA 417+00 TO STA 443+00	BARRIER LINE	10 FT / 40 F	1000				250	4.5FT/40FT		28	3 EA/40 FT	76
WORK ZONE PAVEMENT MARKINGS (TABLE 1 OF 2) SUBTOTAL				**80**	**36880**	**27852**	**1798**		**6272**	**206**		**1934**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		20

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SUMMARY OF WORK ZONE PAVEMENT MARKINGS (TABLE 2 OF 2)

LOCATION	TYPE	RATE	LENGTH	ITEM 662								
				WK ZN PAV MRK NON-REMOV				WK ZN PAV MRK SHORT TERM REMOV			WK ZN PAV MRK SHORT TERM (TAB)	
				WHITE		YELLOW			YELLOW			YELLOW
				24 IN (SOLID)	4 IN (SOLID)	4 IN (SOLID)	4 IN (BROKEN)	RATE	4 IN (SOLID)	4 IN (BROKEN)	RATE	TY Y-2
			LF	LF	LF	LF	LF		LF	LF		EA
PROJECT LAYOUT 8 OF 10												
STA 443+00 TO STA 469+00	EDGE LINE	SOLID	5200		5200							
STA 443+00 TO STA 469+00	BARRIER LINE	SOLID	1562			1562		4.5FT/20FT	352		1 EA/20 FT	78
STA 443+00 TO STA 469+00	BARRIER LINE	10 FT / 40 F	2322				582	4.5FT/40FT		66	3 EA/40 FT	174
PROJECT LAYOUT 9 OF 10												
STA 469+00 TO STA 487+00	EDGE LINE	SOLID	3600		3600							
STA 469+00 TO STA 487+00	BARRIER LINE	SOLID	3600			3600		4.5FT/20FT	810		1 EA/20 FT	180
STA 469+00 TO STA 487+00	BARRIER LINE	10 FT / 40 F	0				0	4.5FT/40FT		0	3 EA/40 FT	0
STA 487+00 TO STA 495+00	EDGE LINE	SOLID	1600		1600							
STA 487+00 TO STA 495+00	BARRIER LINE	SOLID	1600			1600		4.5FT/20FT	360		1 EA/20 FT	80
STA 487+00 TO STA 495+00	BARRIER LINE	10 FT / 40 F	0				0	4.5FT/40FT		0	3 EA/40 FT	0
FM 2709	EDGE LINE	SOLID	640		1280							
FM 2709	BARRIER LINE	SOLID	640			640		4.5FT/20FT	144		1 EA/20 FT	32
FM 2709	BARRIER LINE	SOLID	640			640		4.5FT/20FT	144		1 EA/20 FT	32
STA 469+00 TO STA 495+00	STOP BAR	SOLID	28	28								
PROJECT LAYOUT 10 OF 10												
STA 495+00 TO STA 508+75	EDGE LINE	SOLID	2682		2682							
STA 495+00 TO STA 508+75	BARRIER LINE	SOLID	2682			2682		4.5FT/20FT	604		1 EA/20 FT	134
STA 495+00 TO STA 508+75	BARRIER LINE	10 FT / 40 F	0				0	4.5FT/40FT		0	3 EA/40 FT	0
STA 495+00 TO STA 508+75	STOP BAR	SOLID	50	50								
WORK ZONE PAVEMENT MARKINGS (TABLE 2 OF 2) SUBTOTAL				**78**	**14362**	**10724**	**582**		**2414**	**66**		**710**
WORK ZONE PAVEMENT MARKINGS (TABLE 1 OF 2) SUBTOTAL				**80**	**36880**	**27852**	**1798**		**6272**	**206**		**1934**
PROJECT TOTAL				**158**	**51242**	**38576**	**2380**		**8686**	**272**		**2644**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

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SUMMARY OF PERMANENT PAVEMENT MARKINGS (TABLE 1 OF 2)

LOCATION	TYPE	RATE	LENGTH	ITEM 666										ITEM 677		ITEM 672		
				REFL PAV MRK TY I	RE PM W/RET REQ TY I			REF PROF PAV MRK TY I			REFL PAV MRK TY II					REFL PAV MRKR		
				WHITE	WHITE	YELLOW		WHITE	YELLOW		WHITE	YELLOW						
				24 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (BROKEN) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (BROKEN) 100 MIL	[1] 4 IN (SOLID)	[1] 4 IN (BROKEN)	[1] 4 IN (SOLID)	ELIM EXT PAV MRK & MRKS 24"	ELIM EXT PAV MRK & MRKS 4"	RATE	TY I-A	TY II-A-A
			LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF		EA	EA
PROJECT LAYOUT 1 OF 10																		
STA 265+00 TO STA 287+00	EDGE LINE	SOLID	4400		4400													
STA 265+00 TO STA 287+00	BARRIER LINE	SOLID	3170			3170										1 / 40 FT		80
STA 265+00 TO STA 287+00	BARRIER LINE	10 FT / 40 F	1108				278									1 / 80 FT		14
STA 265+00 TO STA 287+00	STOP BAR	SOLID	30	30														
FM 1861	EDGE LINE	SOLID	640		1280													
FM 1861	BARRIER LINE	SOLID	640			640										2 / 20 FT	66	
FM 1861	BARRIER LINE	SOLID	640			640										1 / 80 FT		8
PROJECT LAYOUT 2 OF 10																		
STA 287+00 TO STA 313+00	EDGE LINE	SOLID	5200		5200													
STA 287+00 TO STA 313+00	BARRIER LINE	SOLID	1100			1100										1 / 40 FT		28
STA 287+00 TO STA 313+00	BARRIER LINE	10 FT / 40 F	2600				650									1 / 80 FT		34
PROJECT LAYOUT 3 OF 10																		
STA 313+00 TO STA 339+00	EDGE LINE	SOLID	5200		5200													
STA 313+00 TO STA 339+00	BARRIER LINE	SOLID	5200			5200										1 / 40 FT		130
STA 313+00 TO STA 339+00	BARRIER LINE	10 FT / 40 F	0				0									1 / 80 FT		0
STA 313+00 TO STA 339+00	STOP BAR	SOLID	38	38														
PROJECT LAYOUT 4 OF 10																		
STA 339+00 TO STA 365+00	EDGE LINE	SOLID	5200		5200													
STA 339+00 TO STA 365+00	BARRIER LINE	SOLID	5200			5200										1 / 40 FT		130
STA 339+00 TO STA 365+00	BARRIER LINE	10 FT / 40 F	0				0									1 / 80 FT		0
PROJECT LAYOUT 5 OF 10																		
STA 365+00 TO STA 380+84	EDGE LINE	SOLID	3168		3168													
STA 365+00 TO STA 380+84	BARRIER LINE	SOLID	1632			1632										1 / 40 FT		42
STA 365+00 TO STA 380+84	BARRIER LINE	10 FT / 40 F	1302				326									1 / 80 FT		16
STA 380+84 TO STA 382+34	EDGE LINE	SOLID	300		300			300			300				300			
STA 380+84 TO STA 382+34	BARRIER LINE	SOLID	150			150			150			150			150	1 / 40 FT		4
STA 380+84 TO STA 382+34	BARRIER LINE	10 FT / 40 F	150				38			38			38		38	1 / 80 FT		2
STA 382+34 TO STA 391+00	EDGE LINE	SOLID	1732		1732													
STA 382+34 TO STA 391+00	BARRIER LINE	SOLID	866			866										1 / 40 FT		22
STA 382+34 TO STA 391+00	BARRIER LINE	10 FT / 40 F	866				218									1 / 80 FT		12
PROJECT LAYOUT 6 OF 10																		
STA 391+00 TO STA 417+00	EDGE LINE	SOLID	5200		5200													
STA 391+00 TO STA 417+00	BARRIER LINE	SOLID	5054			5054										1 / 40 FT		126
STA 391+00 TO STA 417+00	BARRIER LINE	10 FT / 40 F	146				38									1 / 80 FT		2
STA 391+00 TO STA 417+00	STOP BAR	SOLID	12	12														
PROJECT LAYOUT 7 OF 10																		
STA 417+00 TO STA 443+00	EDGE LINE	SOLID	5200		5200													
STA 417+00 TO STA 443+00	BARRIER LINE	SOLID	4200			4200										1 / 40 FT		106
STA 417+00 TO STA 443+00	BARRIER LINE	10 FT / 40 F	1000				250									1 / 80 FT		14
PERMANENT PAVEMENT MARKINGS (TABLE 1 OF 2) SUBTOTAL				**80**	**36880**	**27852**	**1798**	**300**	**150**	**38**	**300**	**150**	**38**	**0**	**488**		**66**	**770**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

[1] TY II PAVEMENT MARKINGS TO BE USED AS A SEALER FOR (TY I) PERMANENT PAVEMENT MARKINGS.

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QUANTITY SUMMARY SHEET

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CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		22

SUMMARY OF PERMANENT PAVEMENT MARKINGS (TABLE 2 OF 2)

LOCATION	TYPE	RATE	LENGTH	ITEM 666											ITEM 677		ITEM 672		
				REFL PAV MRK TY I	RE PM W/RET REQ TY I			REF PROF PAV MRK TY I			REFL PAV MRK TY II						REFL PAV MRKR		
				WHITE	WHITE	YELLOW		WHITE	YELLOW		WHITE		YELLOW						
				24 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (BROKEN) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (SOLID) 100 MIL	4 IN (BROKEN) 100 MIL	[1] 24 IN (SOLID)	[1] 4 IN (SOLID)	[1] 4 IN (BROKEN)	[1] 4 IN (SOLID)	ELIM EXT PAV MRK & MRKS 24"	ELIM EXT PAV MRK & MRKS 4"	RATE	TY I-A	TY II-A-A
			LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF		EA	EA
PROJECT LAYOUT 8 OF 10																			
STA 443+00 TO STA 469+00	EDGE LINE	SOLID	5200		5200														
STA 443+00 TO STA 469+00	BARRIER LINE	SOLID	1562			1562											1 / 40 FT		40
STA 443+00 TO STA 469+00	BARRIER LINE	10 FT / 40 F	2322				582										1 / 80 FT		30
PROJECT LAYOUT 9 OF 10																			
STA 469+00 TO STA 487+00	EDGE LINE	SOLID	3600		3600														
STA 469+00 TO STA 487+00	BARRIER LINE	SOLID	3600			3600											1 / 40 FT		46
STA 469+00 TO STA 487+00	BARRIER LINE	10 FT / 40 F	0				0										1 / 80 FT		0
STA 487+00 TO STA 495+00	EDGE LINE	SOLID	1600		1600														
STA 487+00 TO STA 495+00	BARRIER LINE	SOLID	1600			1600											1 / 40 FT		40
STA 487+00 TO STA 495+00	BARRIER LINE	10 FT / 40 F	0				0										1 / 80 FT		0
FM 2709	EDGE LINE	SOLID	640		1280														
FM 2709	BARRIER LINE	SOLID	640			640											2 / 20 FT	66	
FM 2709	BARRIER LINE	SOLID	640			640											1 / 80 FT		8
STA 469+00 TO STA 495+00	STOP BAR	SOLID	28	28															
PROJECT LAYOUT 10 OF 10																			
STA 495+00 TO STA 508+75	EDGE LINE	SOLID	2682		2682														
STA 495+00 TO STA 502+35	BARRIER LINE	SOLID	1402			1402											1 / 40 FT		36
STA 495+00 TO STA 508+75	BARRIER LINE	10 FT / 40 F	0				0										1 / 80 FT		0
STA 495+00 TO STA 508+75	STOP BAR	SOLID	50	50							50				50				
STA 502+35 TO STA 508+75	BARRIER LINE	SOLID	640			640						75		75		75	2 / 20 FT	66	
STA 502+35 TO STA 508+75	BARRIER LINE	SOLID	640			640						75		75		75	1 / 80 FT		8
PERMANENT PAVEMENT MARKINGS (TABLE 2 OF 2) SUBTOTAL				**78**	**14362**	**9444**	**582**	**0**	**0**	**0**	**50**	**150**	**0**	**150**	**50**	**150**		**66**	**200**
PERMANENT PAVEMENT MARKINGS (TABLE 1 OF 2) SUBTOTAL				**80**	**36880**	**27852**	**1798**	**300**	**150**	**38**	**0**	**300**	**150**	**38**	**0**	**488**		**66**	**770**
PROJECT TOTAL				**158**	**51242**	**37296**	**2380**	**300**	**150**	**38**	**50**	**450**	**150**	**188**	**50**	**638**		**132**	**970**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

[1] TY II PAVEMENT MARKINGS TO BE USED AS A SEALER FOR (TY I) PERMANENT PAVEMENT MARKINGS.

FM 316
QUANTITY
SUMMARY SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		23

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CK:
DW:
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DN:

SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	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
268+75	LT		1	I-2dT	Van Zandt COUNTY LINE	78 X 24	13.00	X		10BWG	1	SA	T		
268+75	RT		2	I-2dT	Henderson COUNTY LINE	84 X 24	14.00	X		10BWG	1	SA	T		
268+75	RT		3	M1-6F	FARM 316 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				D10-7aT	294A 294A	3 X 12	.25	X							
				D10-7aT		3 X 12	.25	X							
271+22	LT		4	R1-1	STOP	36 X 36	9.00	X		10BWG	1	SA	T		
271+70	RT		5	M1-6F	FARM 1861 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1		21 X 15	2.19	X							
271+81	RT		6	M1-6F	FARM 316 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-4		21 X 15	2.19	X							
272+11	RT		7	D7-2TL	← Purtis Creek State Park	84 X 24	14.00	X		10BWG	1	SA	T		
272+69	LT		8	M1-6F	FARM 1861 ROAD →	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1		21 X 15	2.19	X							
272+33	RT		9	W1-7T	↔	96 X 36	24.00	X		10BWG	1	SA	T		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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8-16	TYL	HENDERSON		24

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SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	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
277+65	RT		10	R2-1	SPEED LIMIT 55	30 X 36	7.50	X		10BWG	1	SA	P		
279+93	LT		11	D1-2	↑ Phalba Walton →	72 X 30	15.00	X		10BWG	1	SA	T		
280+90	RT		12	D2-2	Eustace 4 Payne Springs 10	114 X 30	23.75	X		10BWG	1	SA	T		
282+42	LT		13	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	16.00	X		10BWG	1	SA	P		
				W13-1P	35 MPH	18 X 18	2.25	X							
288+44	LT		14	M2-1	JCT	21 X 15	2.19	X		10BWG	1	SA	P		
				M1-6F	FARM 1861 ROAD	24 X 24	4.00	X							
322+45	RT		15	W1-2L		36 X 36	9.00	X		10BWG	1	SA	P		
				W13-1P	45 MPH	18 X 18	2.25	X							
324+13	RT		16	D7-2TR	Purtis Creek State Park →	72 X 24	12.00	X		10BWG		SA	T		
326+82	RT		17	D9-3a		24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1B		21 X 15	2.19	X							

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7.5 to 15	0.100"
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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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REVISIONS 4-16 8-16	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		25

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SUMMARY OF SMALL SIGNS

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	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		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	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	TY N TY S
333+26	RT		18	D3-3bTR	Goshen Cemetery →	54 X 36	13.50	X		10BWG	1	SA	T		
329+85	LT		19	D2-3	PRAIRIES AND PINEYWOODS WILDLIFE TRAIL EAST	126 X 36	31.50	X		10BWG	1	SA	U		
				D3-1	SITE PPWE-061	84 X 18	10.50	X							
330+13	RT		20	R1-1	STOP	36 X 36	9.00	X		10BWG	1	SA	T		
330+45	LT		21	D9-3a		24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1B	←	21 X 15	2.19	X							
333+74	LT		22	D7-2TL	← Purtis Creek State Park	78 X 24	13.00	X		10BWG	1	SA	T		
334+53	RT		23	D20-1TR	CO RD 2938 ↗	24 X 24	4.00	X		10BWG	1	SA	P		
335+46	RT		24	W1-8R W1-8L	❯ ❮	12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
337+00	RT		25	W1-8R W1-8L	❯ ❮	12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
338+17	RT		26	D21-1T	CR 2938	48 X 18	6.00	X		10BWG	1	SA	T		
				R1-1	STOP	36 X 36	9.00	X							

ALUMINUM SIGN BLANKS THICKNESS	
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SUMMARY OF SMALL SIGNS

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4-16 8-16	DIST	COUNTY		SHEET NO.
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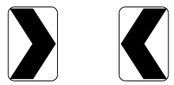
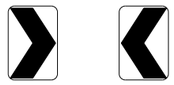
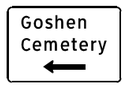
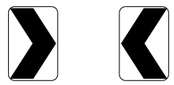
SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	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
338+84	RT		27	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
340+23	RT		28	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
341+16	LT		29	D3-3bTL		54 X 36	13.50	X		10BWG	1	SA	T		
341+68	RT		30	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
342+37	LT		31	D20-1TL		24 X 24	4.00	X		10BWG	1	SA	P		
365+42	LT		32	W1-2R W13-1P	 	36 X 36 18 X 18	9.00 2.25	X X		10BWG	1	SA	P		
373+82	RT		33	W8-13aT		36 X 36	9.00	X		10BWG	1	SA	P		
398+50	RT		34	D20-1TR		24 X 24	4.00	X		10BWG	1	SA	P		
377+53	LT		35	M1-6F		24 X 24	4.00	X		10BWG	1	SA	P		
				D10-7aT D10-7aT		3 X 10 3 X 10	4.8 4.8	X X							
389+37	LT		36	W8-13aT		36 X 36	9.00	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
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Less than 7.5	0.080"
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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION: PREFABRICATED	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										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 = TYPE TY N TY S
400+52	RT		37	D21-1T	CR 2915	48 X 18	6.00	X		10BWG	1	SA	T		
400+98	RT		38	R1-1	STOP	36 X 36	9.00	X		10BWG	1	SA	T		
402+46	LT		39	D20-1TL	CO RD 2915 ←	24 X 24	4.00	X		10BWG	1	SA	P		
405+60	RT		40	W1-2L		36 X 36	9.00	X		10BWG	1	SA	P		
				W13-1P	50 MPH	18 X 18	2.25	X							
415+48	RT		41	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
417+05	RT		42	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
418+65	RT		43	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
420+22	RT		44	W1-8R W1-8L		12 X 18 12 X 18	1.50	X		10BWG	1	SA	P		
428+45	LT		45	W1-2R		36 X 36	9.00	X		10BWG	1	SA	P		
				W13-1P	50 MPH	18 X 18	2.25	X							
451+80	LT		46	D3-1	PR 12220	84 X 18	10.50	X		10BWG	1	SA	T		

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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SUMMARY OF SMALL SIGNS

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	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
470+17	RT		47	M2-1	JCT	21 X 15	2.19	X		10BWG	1	SA	P		
				M1-6F	FARM 2709 ROAD	24 X 24	4.00	X							
482+11	RT		48	R5-4aT	NO ENGINE BRAKE BY CITY ORDINANCE	36 X 48	12.00	X		10BWG	1	SA	T		
482+15	LT		49	M3-1	NORTH	24 X 12	2.00	X		10BWG	1	SA	P		
				M1-6F	FARM 316 ROAD	24 X 24	4.00	X							
485+34	RT		50	R2-1	SPEED LIMIT 45	30 X 36	7.50	X		10BWG	1	SA	P		
485+34	RT		51	I-2aT I-2aT	Eustace CITY LIMIT POP 1137 / Eustace CITY LIMIT POP 1137	48 X 24 48 X 24	8.00	X		10BWG	1	SA	T		
485+38	LT		52	R2-1	SPEED LIMIT 55	30 X 36	7.50	X		10BWG	1	SA	P		
486+95	RT		53	M1-6F	FARM 2709 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1	←	21 X 15	2.19	X							
487+32	RT		54	M1-6F	FARM 316 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-4	↔	21 X 15	2.19	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0646	07	009	FM 316
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	HENDERSON		29

18

DATE: 8/3/2022 1:22:28 PM
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SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	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
487+32	LT		55	R1-1	STOP	36 X 36	9.00	X		10BWG	1	SA	T		
487+42	RT		56	W1-7		24 X 12	2.00	X		10BWG	1	SA	P		
487+60	RT		57	R2-1	SPEED LIMIT 20	30 X 36	7.50	X		10BWG	1	SA	P		
				R5-4aT	NO THRU TRUCK TRAFFIC	30 X 36	7.50	X							
487+95	RT		58	D21-1T	COUNTY FM 316	48 X 18	6.00	X		10BWG	1	SA	T		
				R1-1	STOP	36 X 36	9.00	X							
488+03	LT		59	M1-6F	FARM 2709 ROAD	24 X 24	4.00	X		10BWG	1	SA	P		
				M6-1		21 X 15	6.19	X							
488+95	RT		60	M3-3	SOUTH	24 X 12	2.00	X		10BWG	1	SA	P		
				M1-6F	FARM 316 ROAD	24 X 24	4.00	X							
				D10-7aT	2 9 6	3 X 10	0.21	X							
				D10-7aT	2 9 6	3 X 10	0.21	X							
492+53	RT		61	M2-1	JCT 175	21 X 15	2.19	X		10BWG	1	SA	P		
				M1-4		30 X 24	5.00	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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Greater than 15	0.125"

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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4-16	DIST	COUNTY		SHEET NO.
8-16	TYL	HENDERSON		30

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SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	SIGN DIMENSIONS	TOTAL SQ. FT.	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
499+21	LT		62	M2-1	JCT	21 X 15	2.19	X		10BWG	1	SA	P		
				M1-6F	FARM 2709 ROAD	24 X 24	4.00	X							
500+25	RT		63	D21-1T	COOK FM 316	48 X 18	6.00	X		10BWG	1	SA	T		
				R1-1	STOP	36 X 36	9.00	X							
501+49	RT		64	D1-2	← Athens Mabank →	78 X 30	16.25	X		10BWG	1	SA	T		
502+72	LT		65	D2-1	Phalba 10	72 X 18	9.00	X		10BWG	1	SA	P		
504+63	RT		66	D21-1T	CHURCH FM 316	48 X 18	6.00	X		10BWG	1	SA	T		
				R1-1	STOP	36 X 36	9.00	X							
505+01	LT		67	R2-1	SPEED LIMIT 45	30 X 36	7.50	X		10BWG	1	SA	P		
506+62	LT		68	M3-1	NORTH	24 X 12	2.00	X		10BWG	1	SA	P		
				M1-6F	FARM 316 ROAD	24 X 24	4.00	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
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SHEET 8 OF 8

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0646	07	009	FM 316
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	HENDERSON		31

18

DATE: 8/3/2022 1:22:28 PM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0407391\FM 316_GEN_SUM_SMSGN.dgn

CONSTRUCTION SEQUENCE FM 316

1. INSTALL PROJECT SIGNS AND MESSAGE BOARDS ANNOUNCING FM 316 ROAD WORK.
2. INSTALL EROSION CONTROL MEASURES FOR CULVERT EXTENSIONS AS SHOWN IN PLANS. MULTIPLE MOVE-INS WILL BE REQUIRED. INSTALL EROSION CONTROL MEASURES AS WORK PROGRESSES.
3. GRADE DITCHES TO DRAIN PRIOR TO EXTENDING CROSS DRAINAGE STRUCTURES. LIMIT WORK TO 1 SIDE OF THE ROADWAY AT A TIME. DRAINAGE STRUCTURES SHALL BE COMPLETED AND BACKFILLED ON BOTH SIDES OF THE ROADWAY BEFORE THE ROADWORK OUTLINED IN (4.) BEGINS. DRAINAGE STRUCTURE WORK SHALL CONTINUE DURING THE WINTER SEASONS AS APPROVED.
4. UNDER TRAFFIC, ON A ONE MILE SEGMENT, OR LENGTH APPROVED BY THE ENGINEER:
   * MILL 2" OF ACP SURFACE MATERIAL AS SHOWN IN THE PLANS.
   * REWORK BASE MATERIAL WITH SUBGRADE WIDENING - SCARIFY THE EXISTING MATERIAL AND SPREAD FULL WIDTH TO A DEPTH OF 6 INCHES.
   * CEMENT TREAT EXISTING MATERIAL.
   * BACKFILL PAVEMENT EDGES AND ESTABLISH VEGETATION.
   * PLACE PRIME COURSE (RC 250 AND GR 5 AGGR.) AT THE END OF EACH WEEK.
   * PERFORM IRI - MAKE NECESSARY CORRECTIONS IN ACCORDENCE WITH THE SPECIFICATIONS. CORRECTIVE WORK WILL NOT BE PAID FOR, BUT WILL BE SUBSIDARY TO PERTINENT ITEMS.
   * PLACE VERTICAL PANELS FOR CENTERLINE DELINEATION IN ACCORDANCE WITH BC(9).
   * PLACE 4" ACP BASE AND ONE COURSE SURFACE TREATMENT.
   * PLACE TEMPORARY STRIPING - COMPLETE WORKZONE NON-REMOVABLE STRIPING ON THE CENTERLINE AND EDGELINE WITH 11 DAYS OF EXPIRATION OF THE THREE DAY CURING PERIOD.
   * PLACE BOND FIBER MATRIX SEED AND EMULSION.
   * REPEAT ON NEXT ONE MILE SEGMENT UNTIL FULL LENGTH OF ROADWAY HAS BEEN RESTORED.
   * INSTALL SIGNS AND MAILBOXES
5. PLACE FINAL ACP SURFACE ON FULL LENGTH OF PROJECT.
6. PLACE MAILBOX TURNOUTS, DRIVEWAYS AND INTERSECTIONS.
7. PLACE PERMANENT PAVEMENT MARKING AND REFLECTORS.

NOTES:

1. THE SEASONAL WINDOW FOR ALLOWING ROADWAY REHABILITATION OPERATIONS IS FROM APRIL 1 TO AUGUST 31. AT THE END OF EACH SEASON THE ENGINEER WILL MAKE A DETERMINATION AS TO WHETHER ROADWAY REHAB OPERATIONS WILL BE ALLOWED TO CONTINUE BEYOND AUGUST 31, FOR HOW LONG, AND AT WHAT POINT OPERATIONS AND TIME CHARGES WILL BE SUSPENDED UNTIL THE FOLLOWING SEASON.
2. TIME WILL BE CHARGED OUTSIDE SEASONAL WINDOW FOR CULVERT WORK. ONCE CULVERT WORK IS COMPLETED, TIME WILL BE SUSPENDED AS DIRECTED BY THE ENGINEER.
3. IMMEDIATELY AFTER CENTERLINE PAVEMENT MARKINGS ARE OBLITERATED DUE TO REWORKING BASE, PLACE APPROVED CHANNELIZING DEVICES AT 100 FT SPACING ON BOTH SIDES OF THE ROADWAY UNTIL THE CENTERLINE PAVEMENT MARKINGS ARE IN PLACE.
4. PCMS AND RUMBLE STRIPS TO BE USED DURING LANE CLOSURES.
5. LIMIT WORK TO ONE SIDE OF THE ROAD AT A TIME.
6. DURING NON-WORKING HOURS THE PAVEMENT EGDE WILL BE SHOULDERED UP TO INCLUDE A LINEAR BENCH WIDTH SECTION WIDE ENOUGH TO FACILITATE THE LEVEL PLACEMENT OF A 42" TWO-PIECE CONE. THIS WILL BE IN ADDITION TO PROVIDING A 3:1 MINIMUM SLOPE. MATERIALS AND LABOR FOR THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO VARIOUS BID ITEMS OF THE CONTRACT.
7. HAUL OFF REMOVED PIPES AND APPURTENANCES FROM THE RIGHT OF WAY WEEKLY.
8. STORAGE OF MATERIALS ON RIGHT OF WAY WILL REQUIRE APPROVAL FROM THE ENGINEER.
9. LANE CLOSURES THAT EFFECT THE INTERSECTION AT US 175 WILL BE RESTRICTED TO THE HOURS BETWEEN 8:30 A.M. AND 3:30 P.M., UNLESS OTHERWISE DIRECTED.
10. REMOVE TOPSOIL AND PREPLACE EMBANKMENT THAT WILL BE NEEDED DURING SHOULDER-UP.
11. SHOULDER-UP WITH LIKE MATERIALS (I.E. SUBGR TREAT W/EMBANKMENT, FLEX BASE/FLEX BASE).
12. OUTSIDE SEAL COAT SEASON, THE UNDERSEAL AND SURFACE MIX MAY BE PLACED THE DAY, AS APPROVED.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316 CONSTRUCTION SEQUENCE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		32

DATE: 8/3/2022 1:21:29 PM
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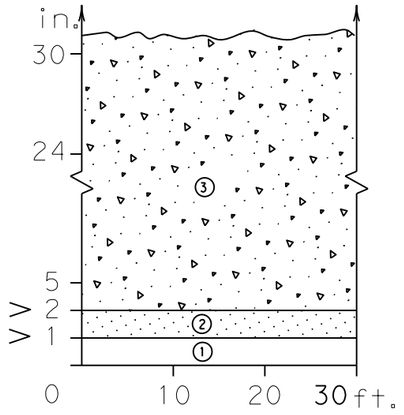
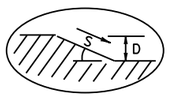
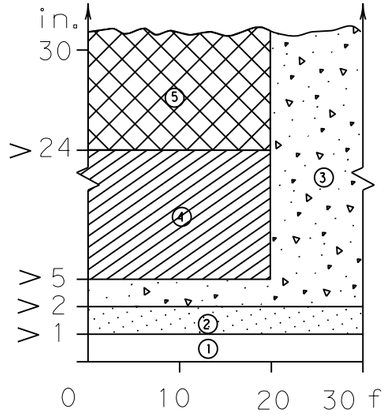
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

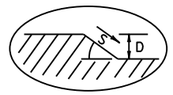


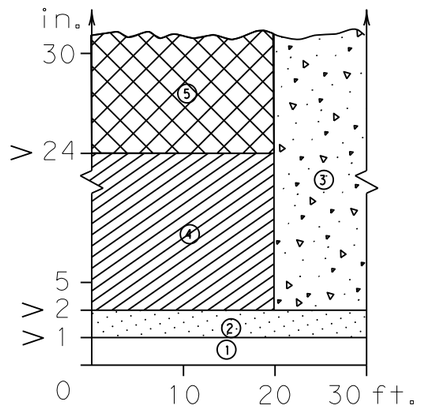
Edge Condition I
S = (3:1) (or flatter)



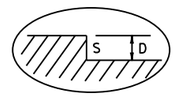


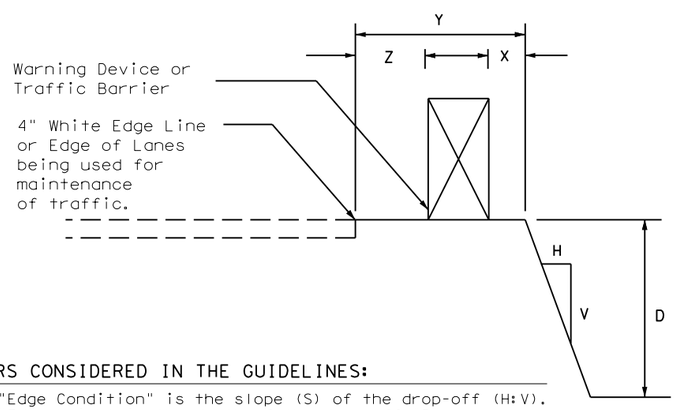
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

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

Edge Condition Notes:

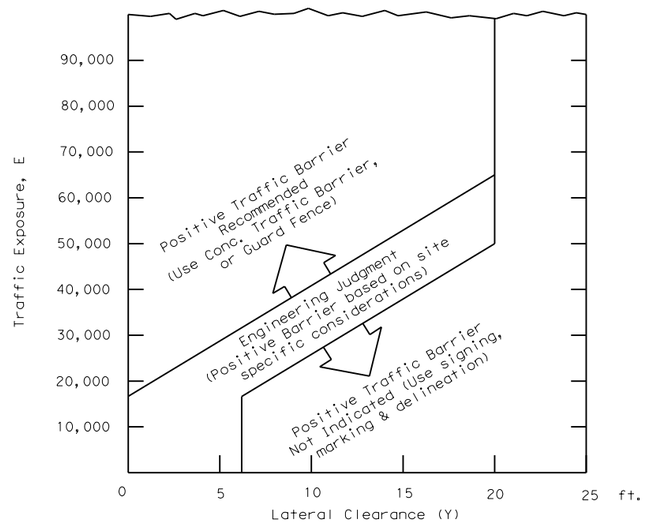
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

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



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

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

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

Engineer's Seal

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

Date _____

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
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	TYL	HENDERSON		33

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0646	07	009	FM 316
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	TYL	HENDERSON		34
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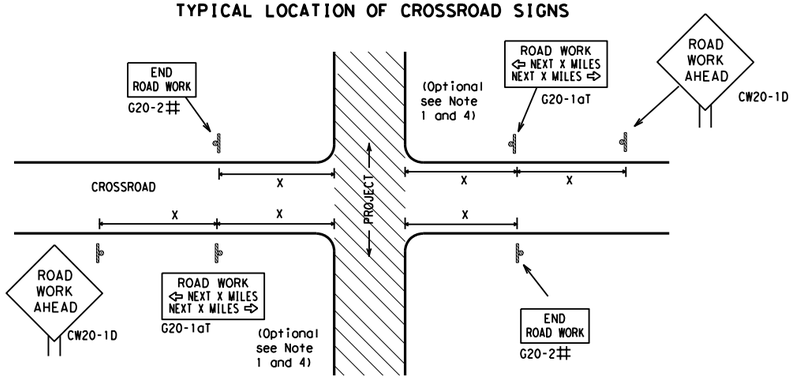
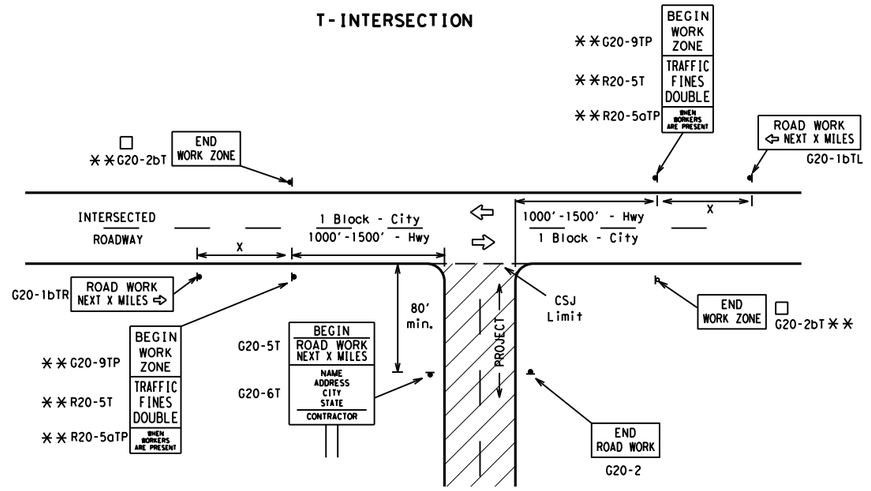
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

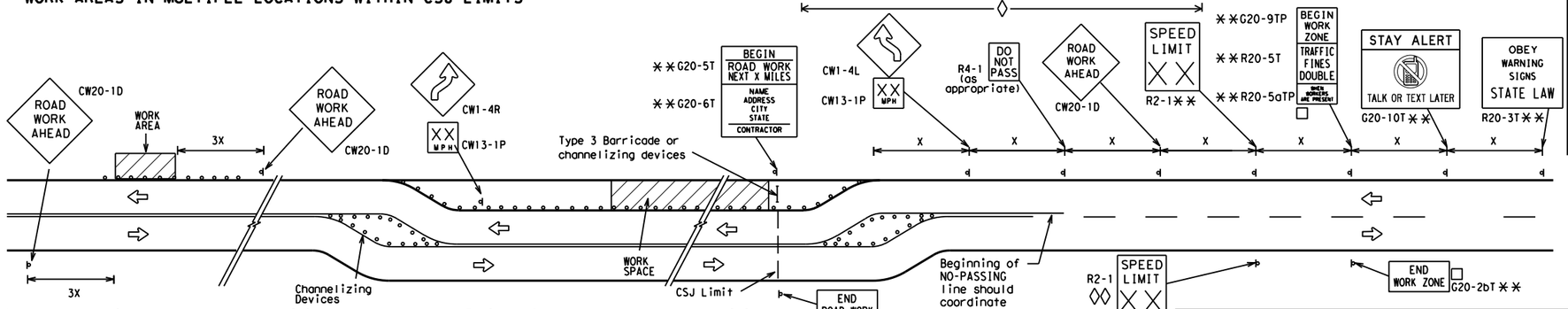
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

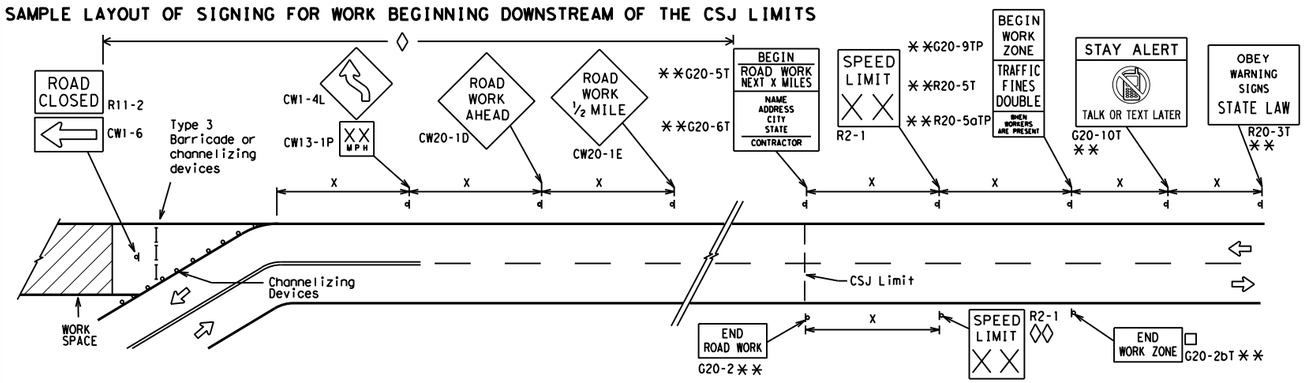
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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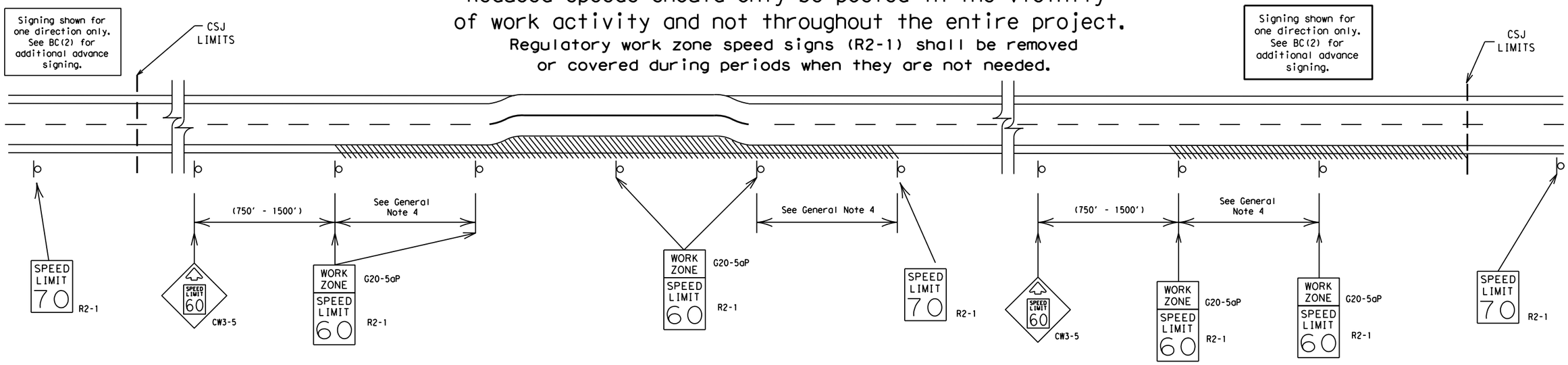
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

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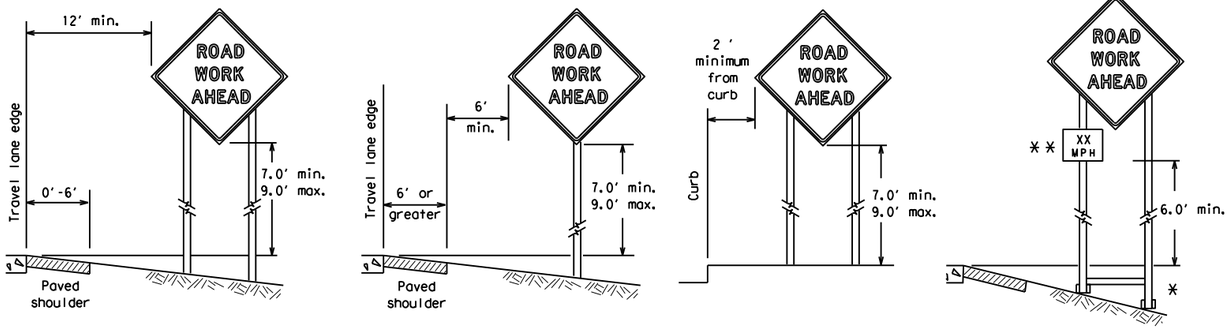
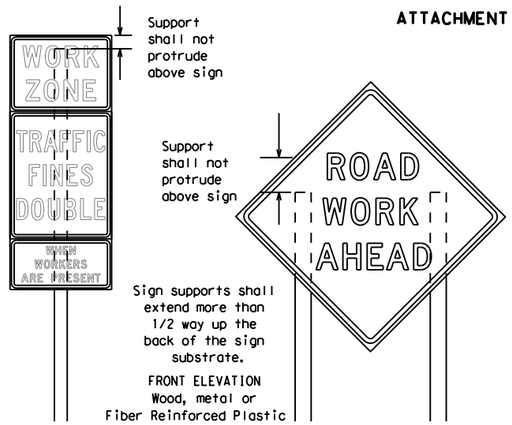
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

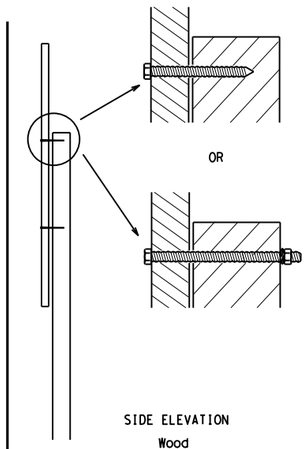


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





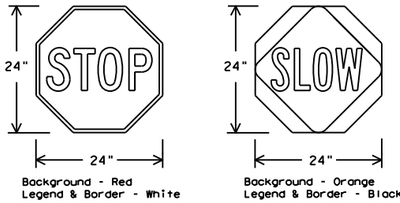
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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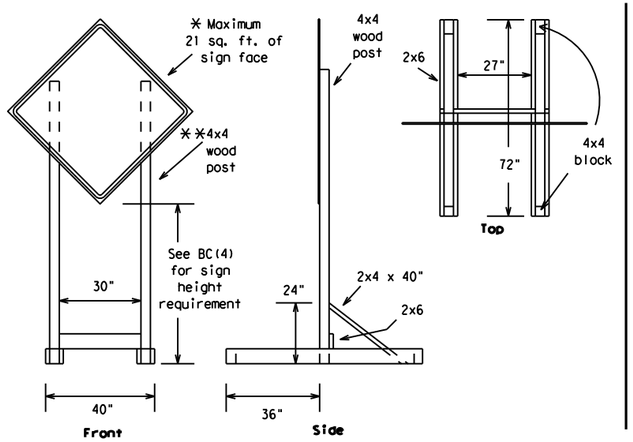
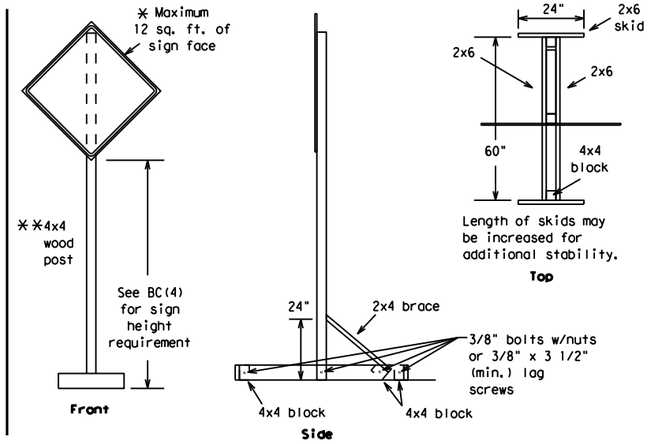
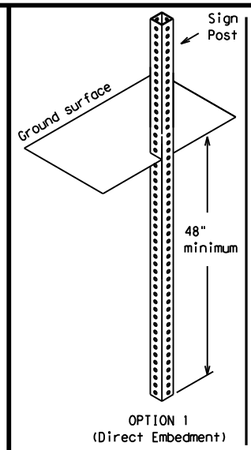
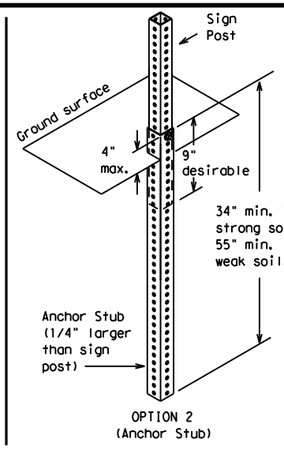


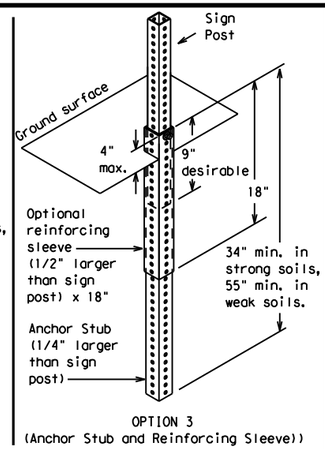


SKID MOUNTED WOOD SIGN SUPPORTS

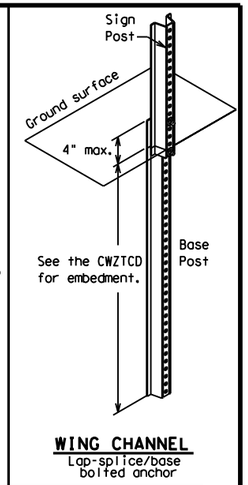
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







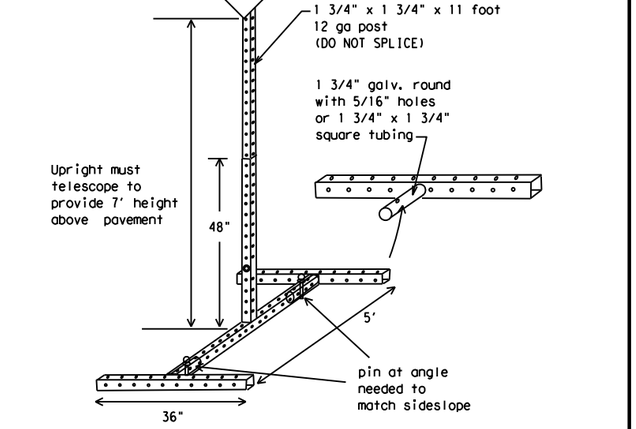
PERFORATED SQUARE METAL TUBING

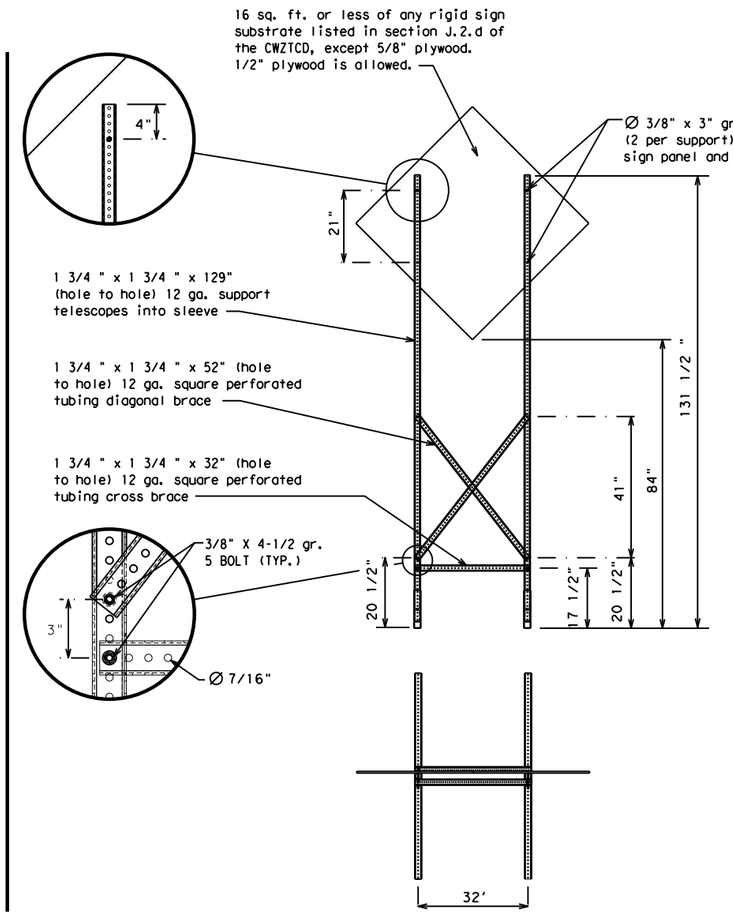


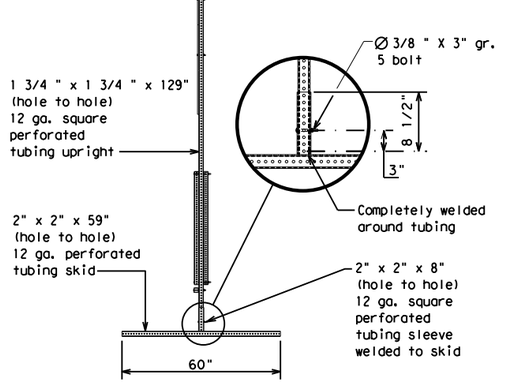
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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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
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

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BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0646	07	009	FM 316
9-07 8-14	DIST	COUNTY		SHEET NO.
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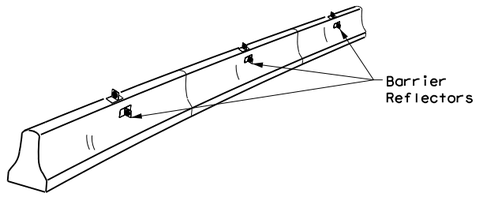
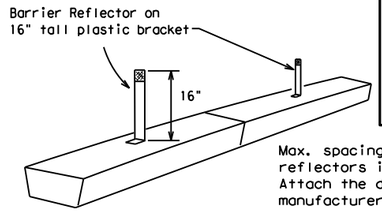
100

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



CONCRETE TRAFFIC BARRIER (CTB)

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

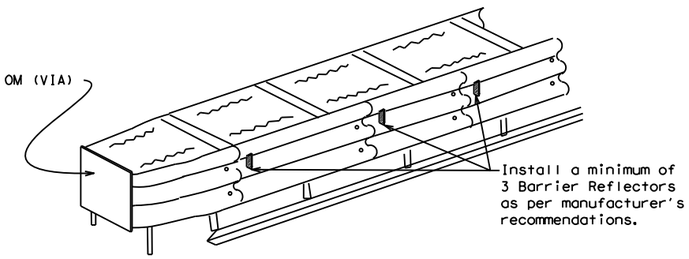


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

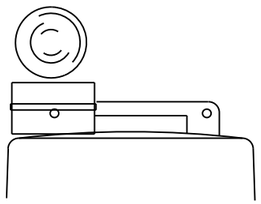


DELINEATION OF END TREATMENTS

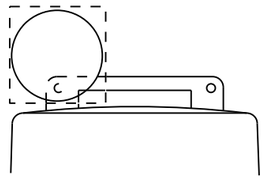
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

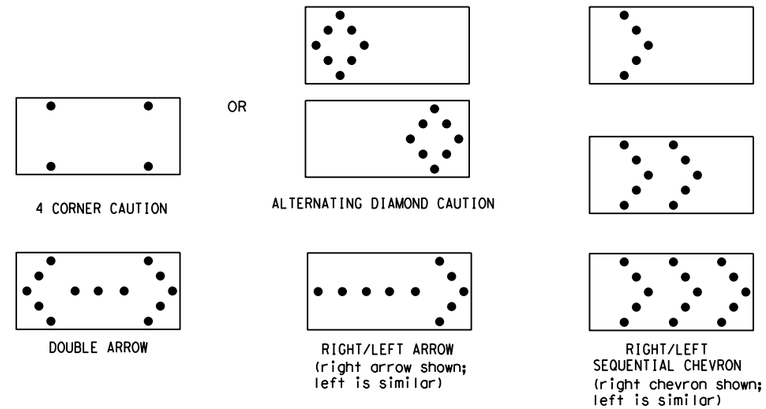
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	HENDERSON		40

DATE: 8/3/2022 8:03:22 AM
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

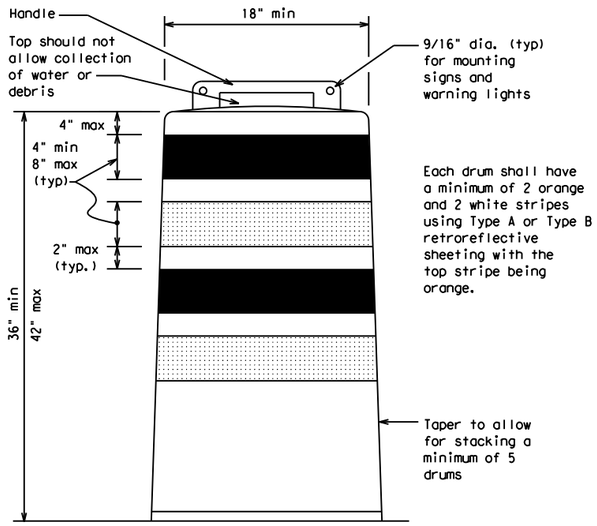
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

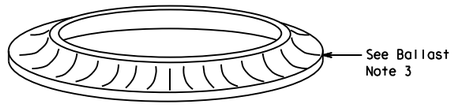
RETROREFLECTIVE SHEETING

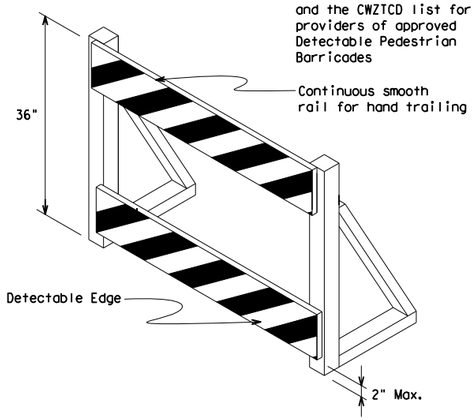
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

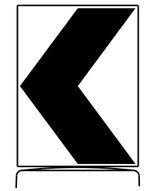




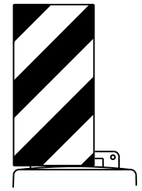


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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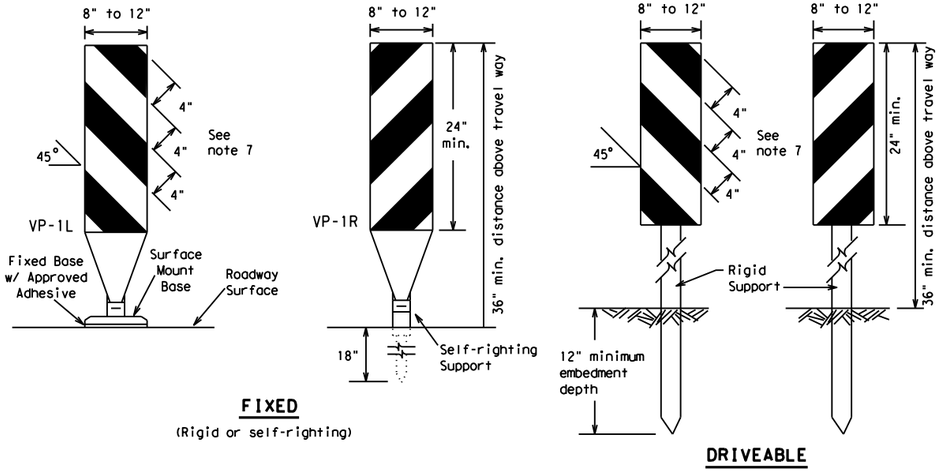
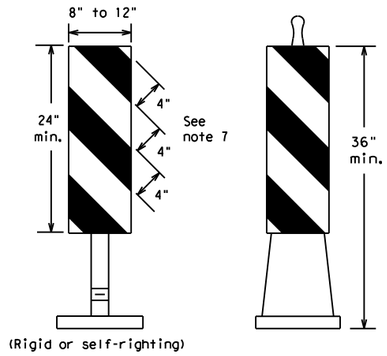


FIXED
(Rigid or self-righting)

DRIVEABLE

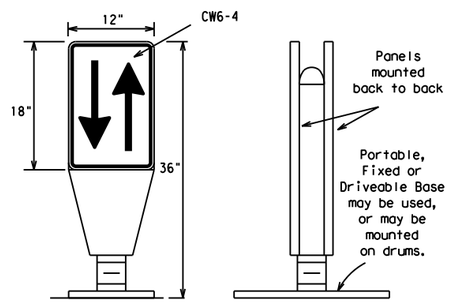


(Rigid or self-righting)

PORTABLE

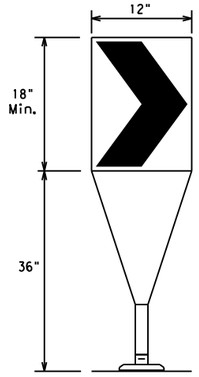
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



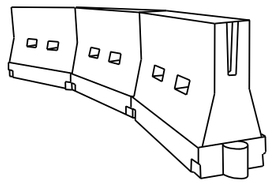
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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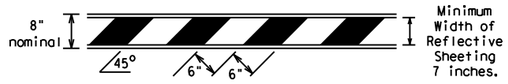
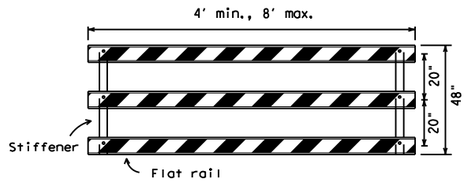
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



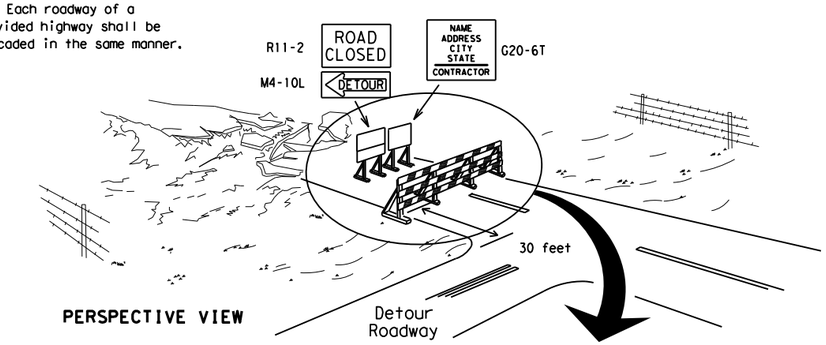
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

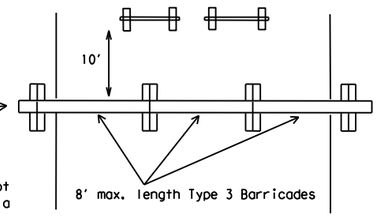
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

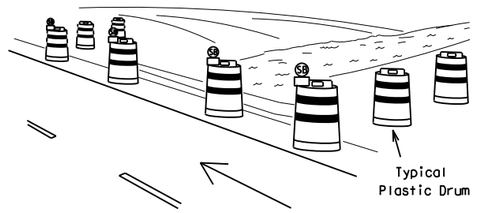
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

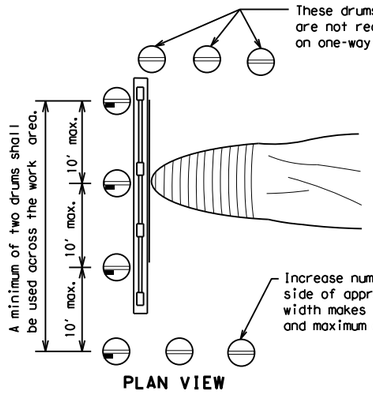
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

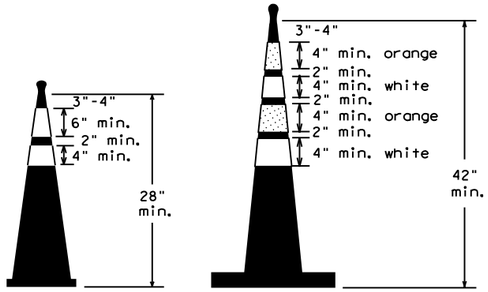
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

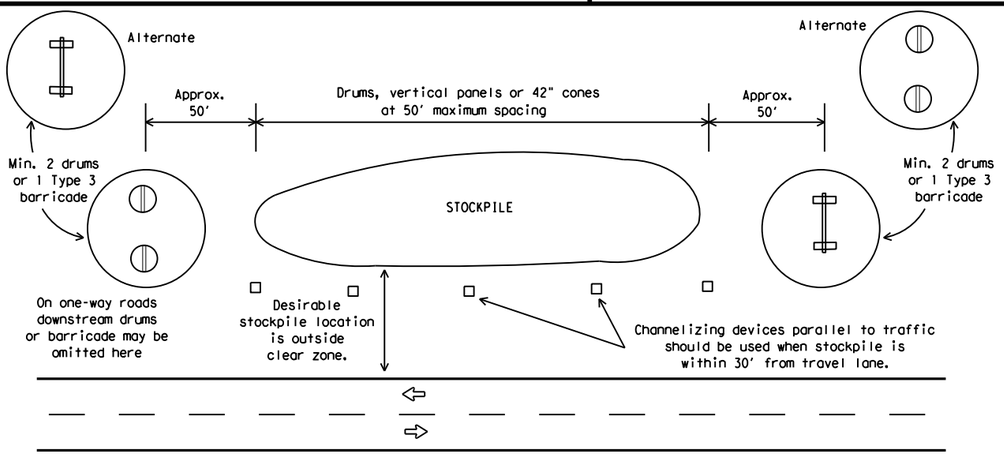
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

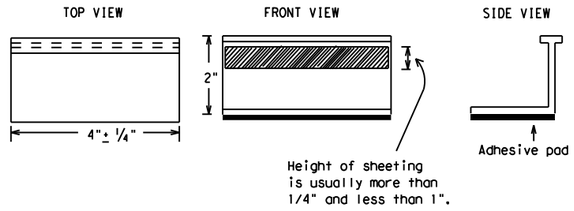
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	TYL	HENDERSON		44
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105

DATE: 8/3/2022 8:03:25 AM
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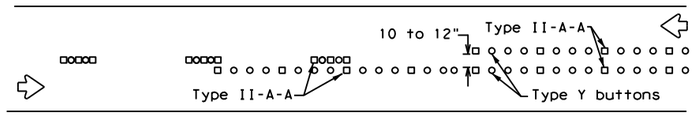
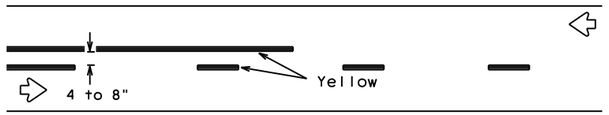
PAVEMENT MARKING PATTERNS

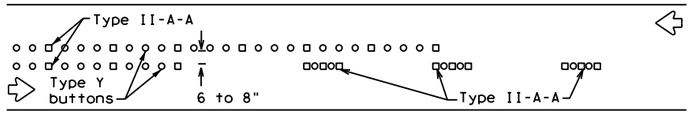
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



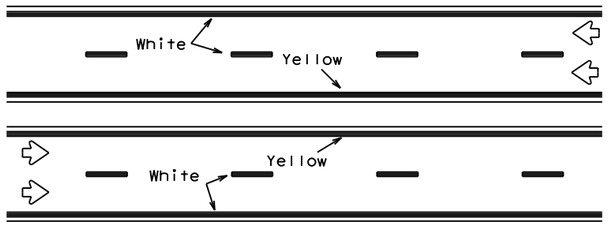
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



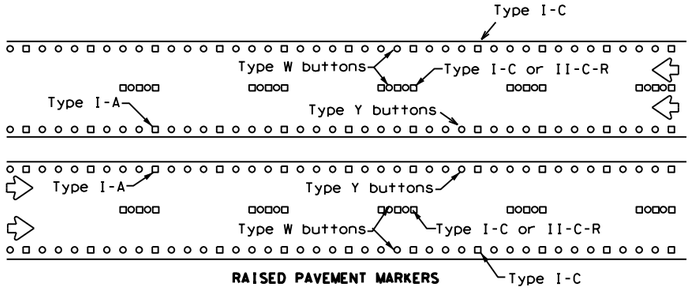
RAISED PAVEMENT MARKERS - PATTERN B

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

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



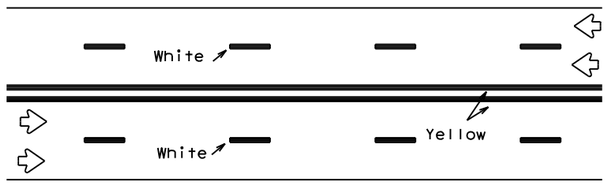
REFLECTORIZED PAVEMENT MARKINGS



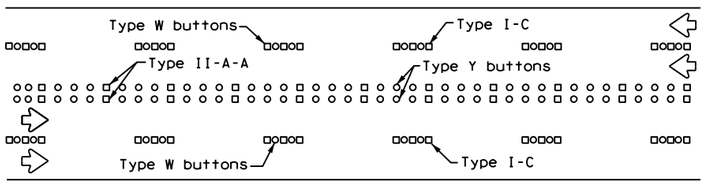
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



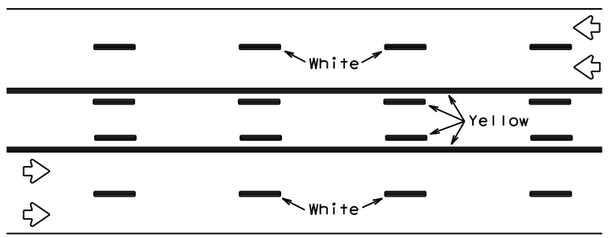
REFLECTORIZED PAVEMENT MARKINGS



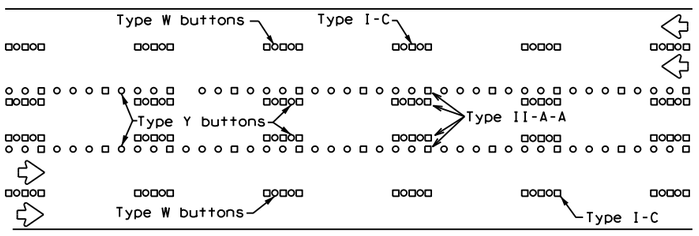
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

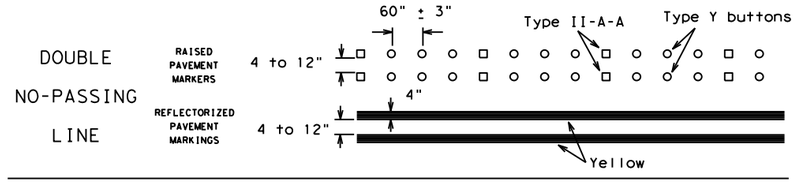
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

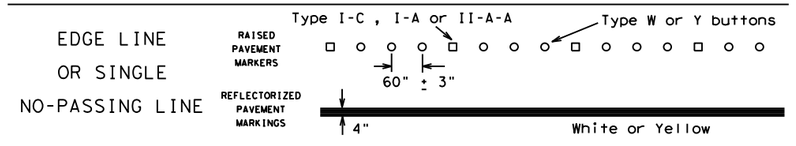
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

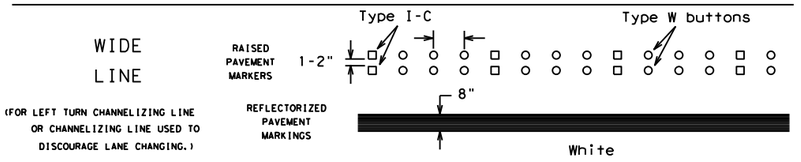


EDGE LINE OR SINGLE NO-PASSING LINE



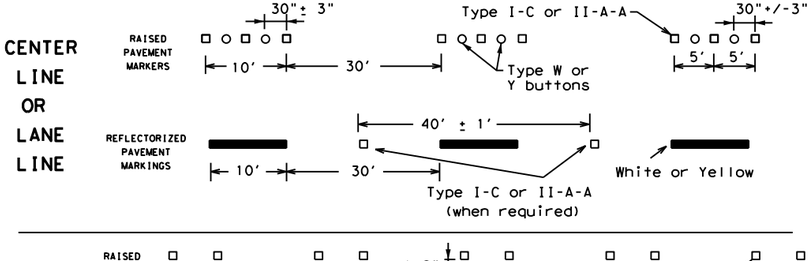
WIDE LINE

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

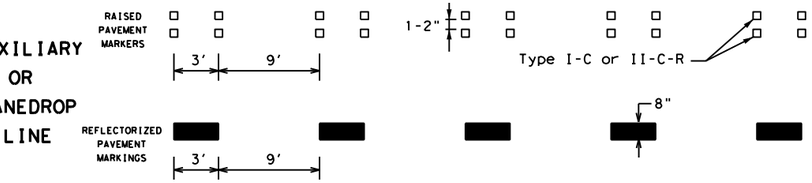


BROKEN LINES

CENTER LINE OR LANE LINE

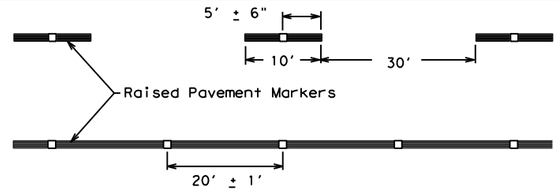


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 7-13	TYL	HENDERSON		45
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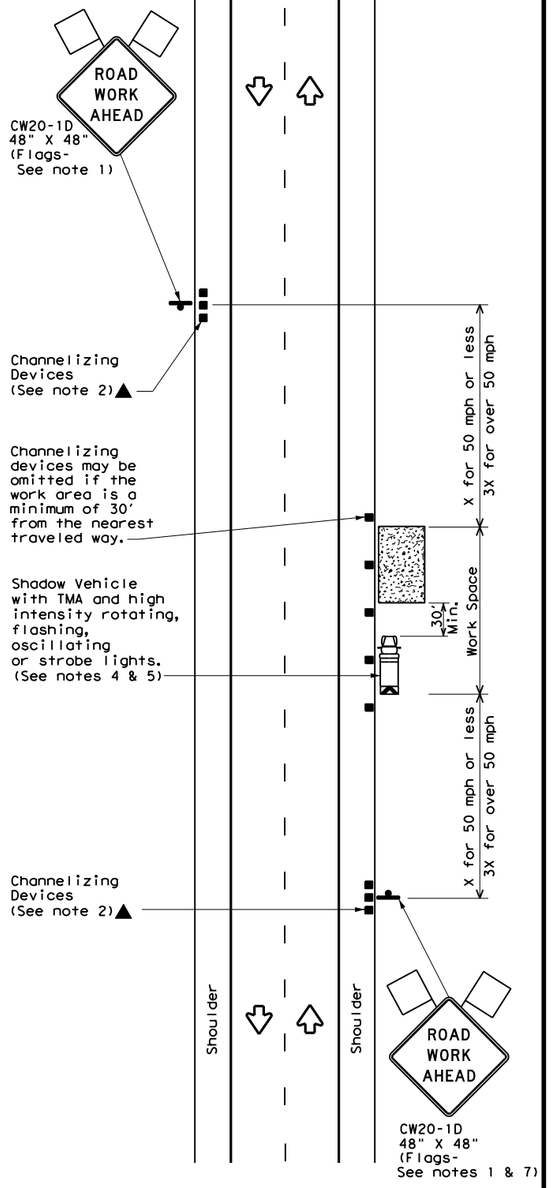
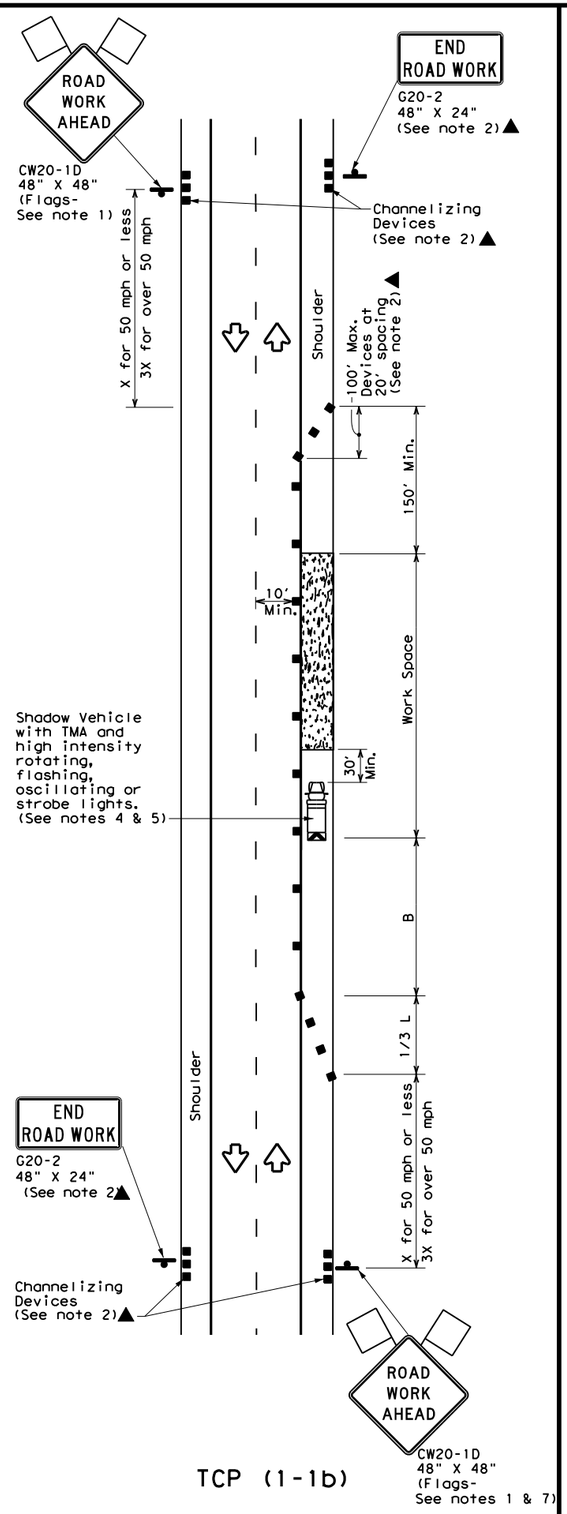


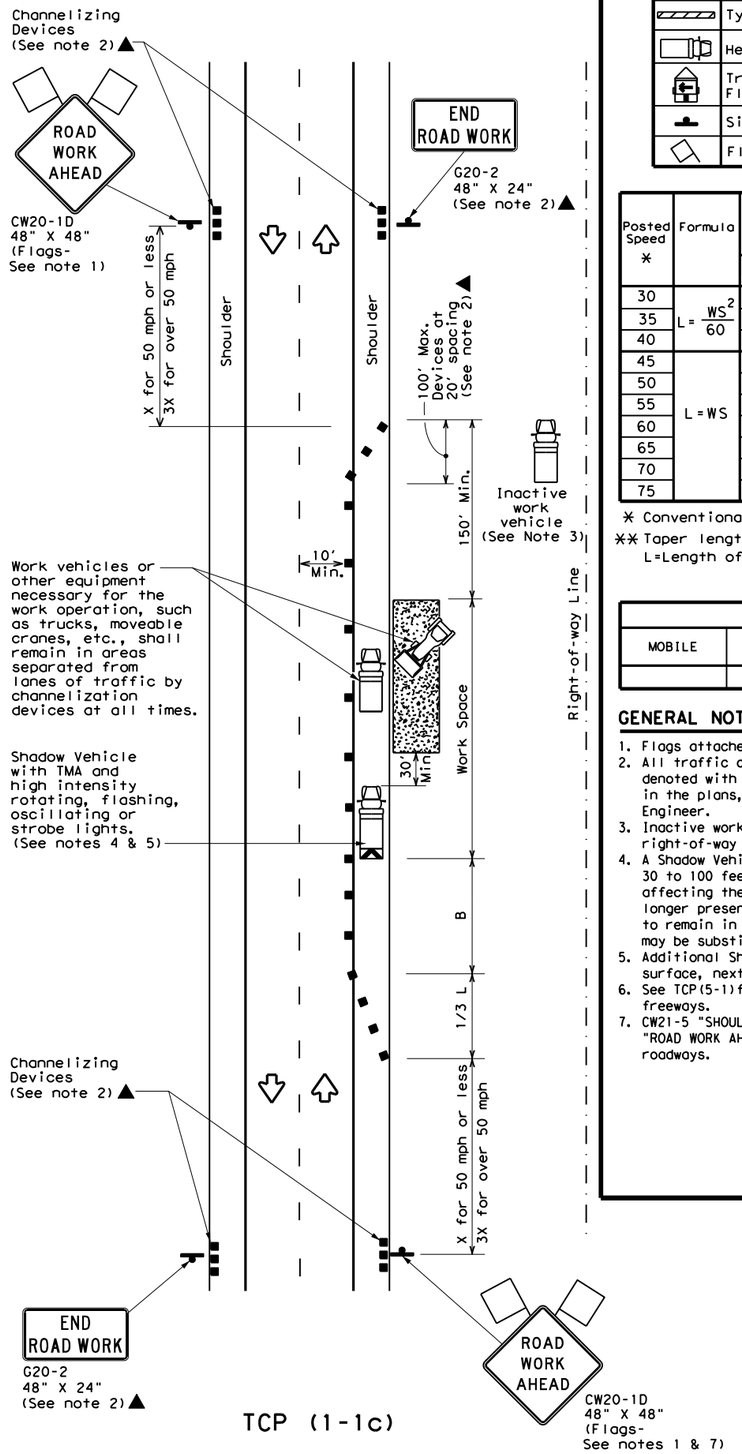
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 2-18				

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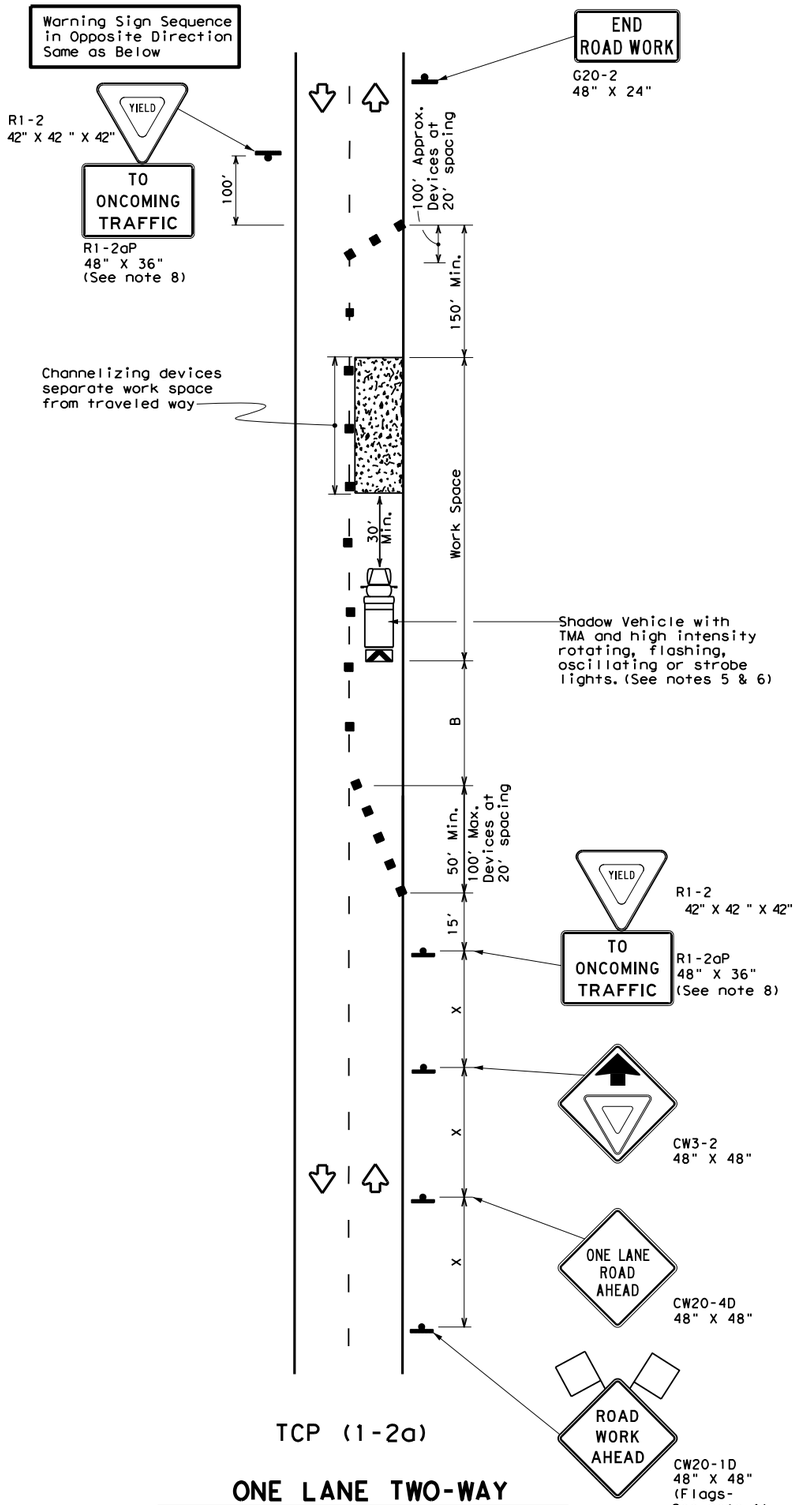
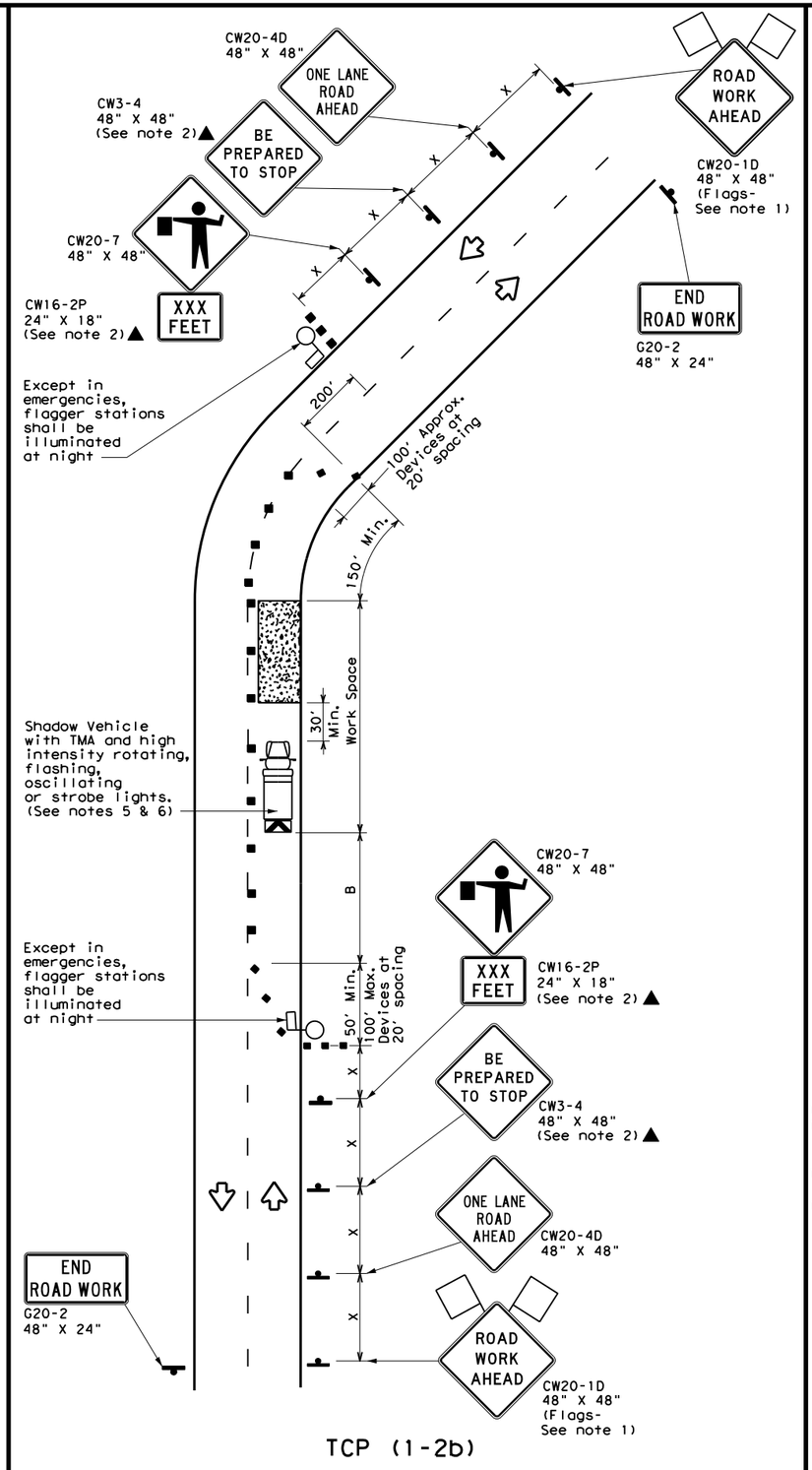


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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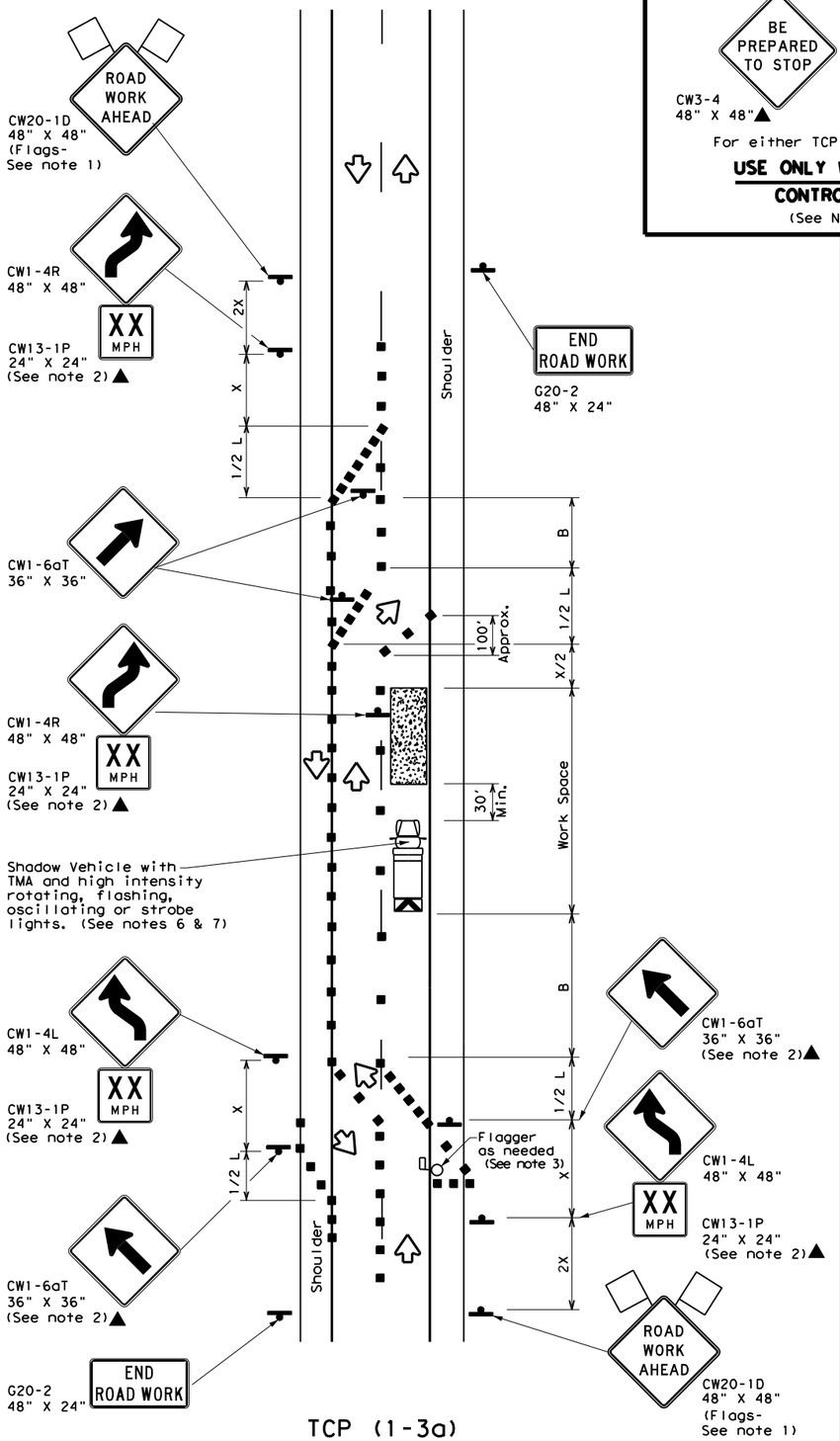
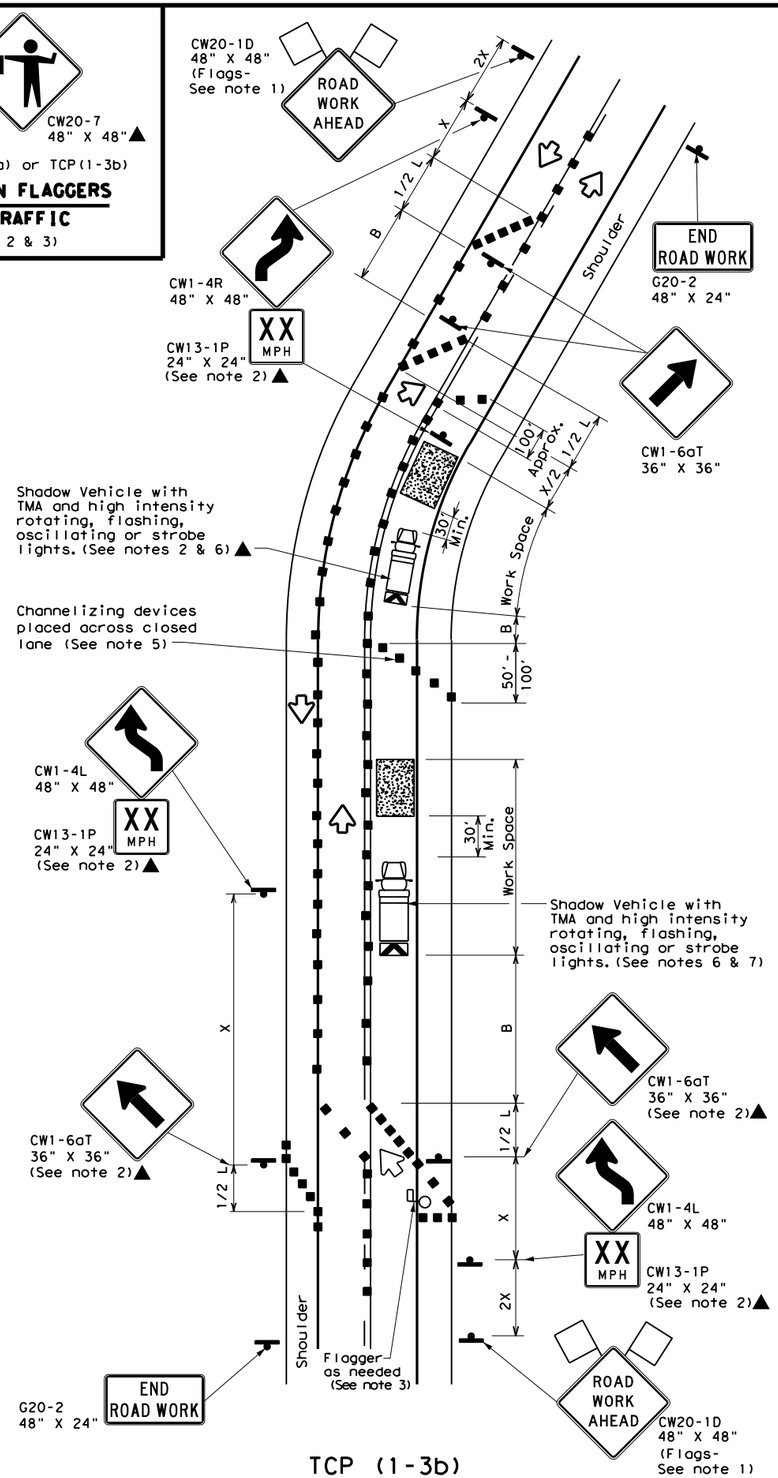


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade	■ ■	Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	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. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	TYL	HENDERSON		48
1-97 2-18				

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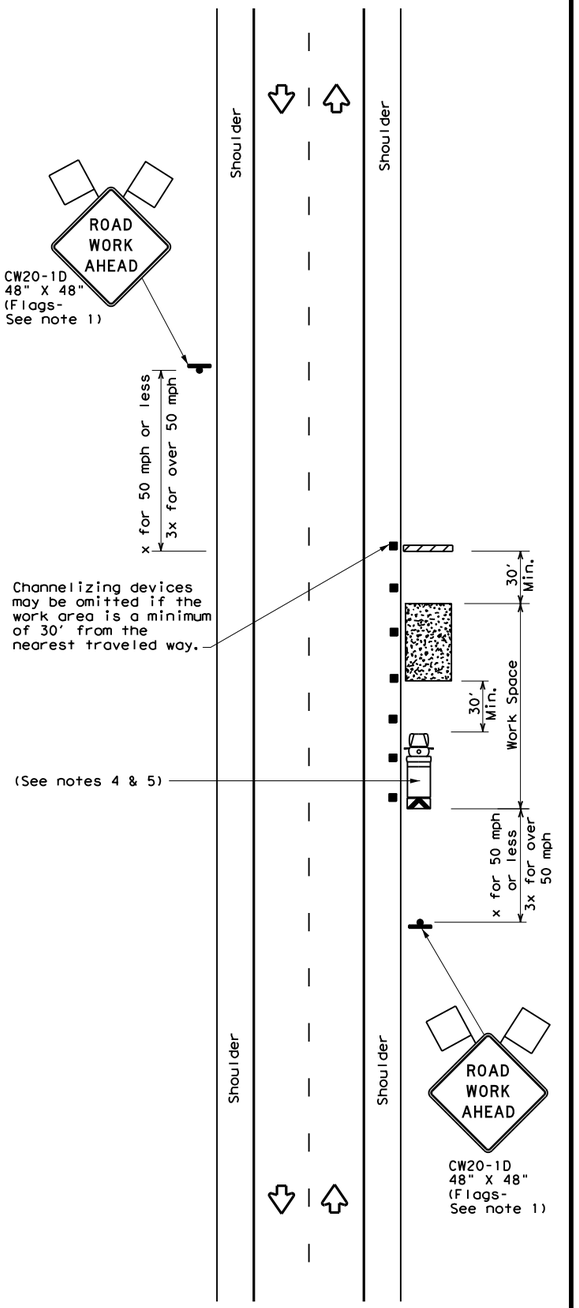
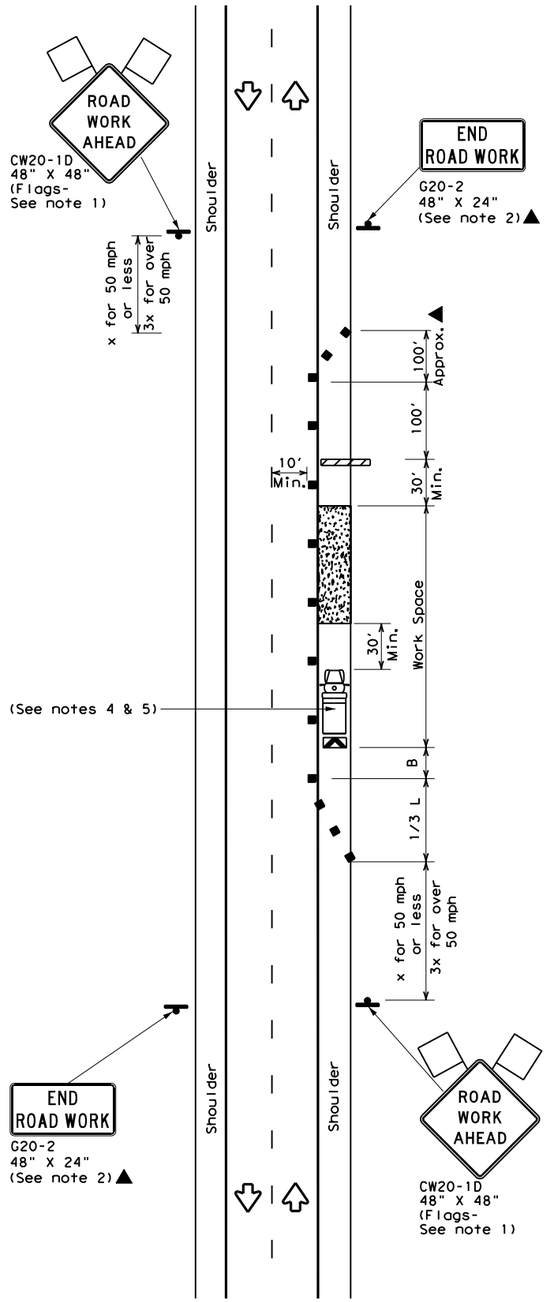


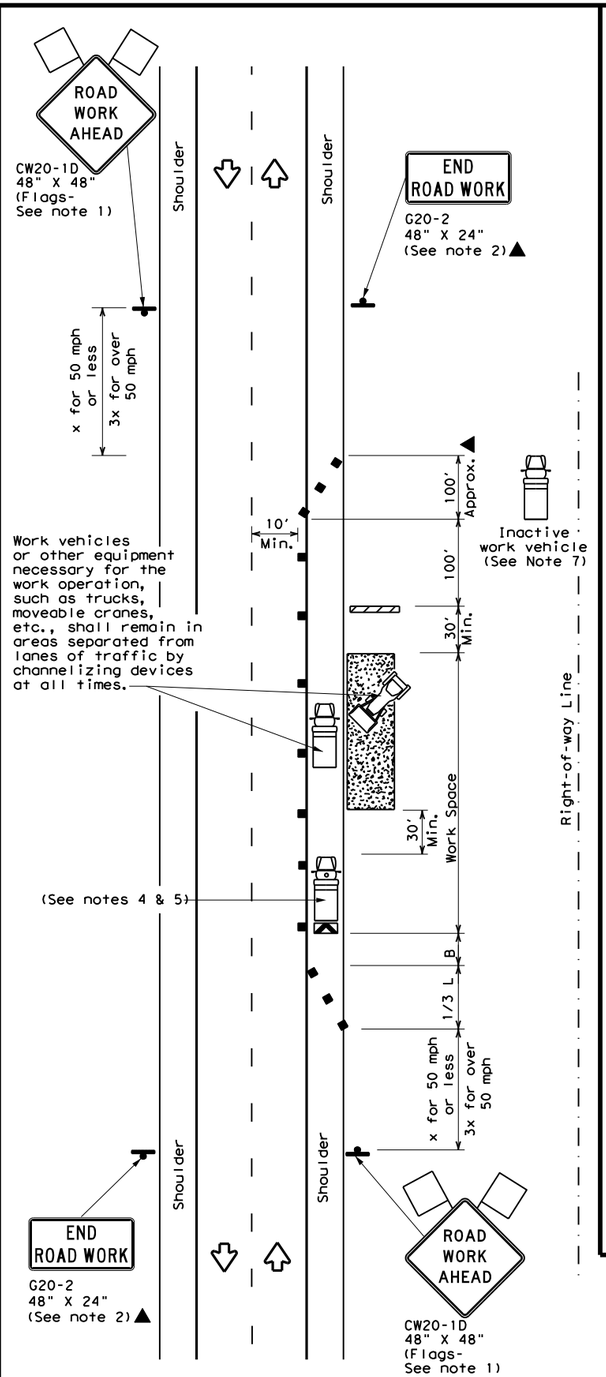
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	TYL	HENDERSON		49
1-97 2-18				

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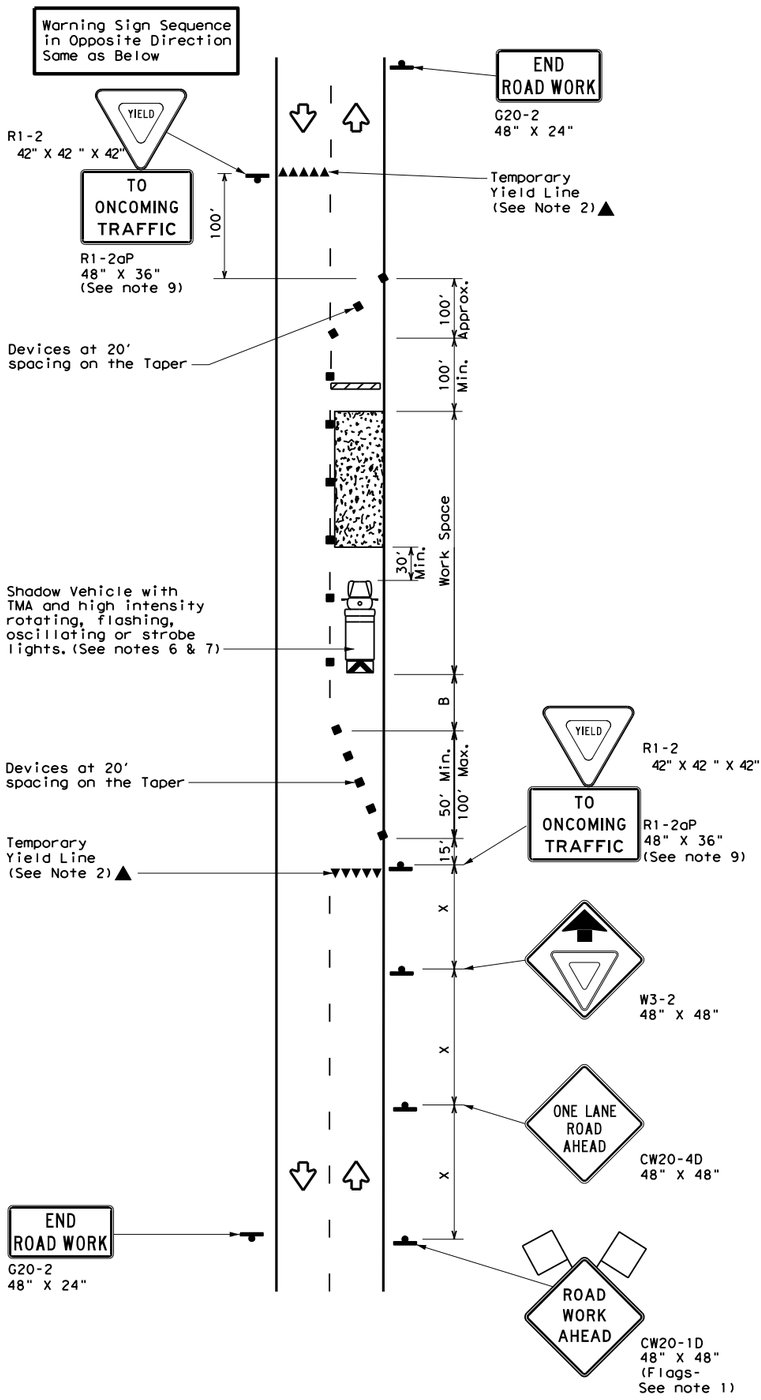
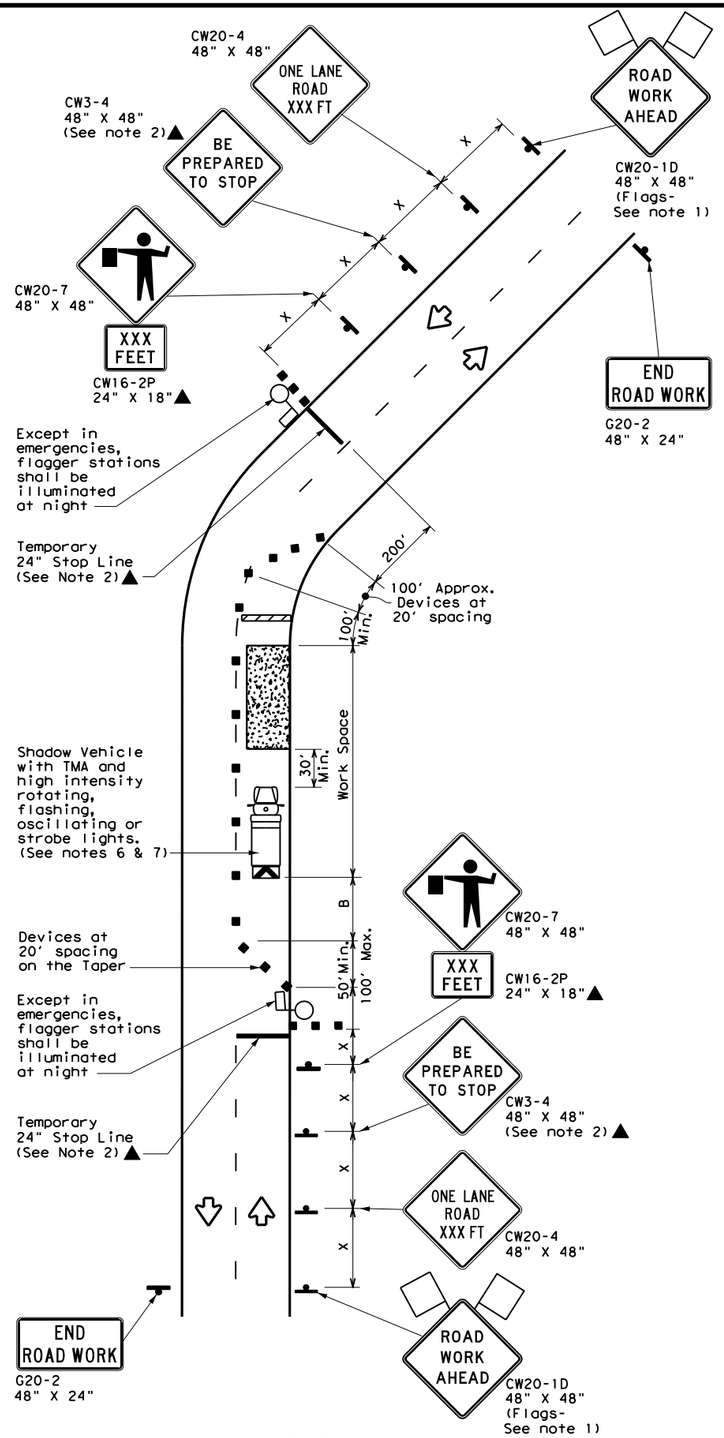


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		50

DATE: 8/3/2022 8:05:38 AM
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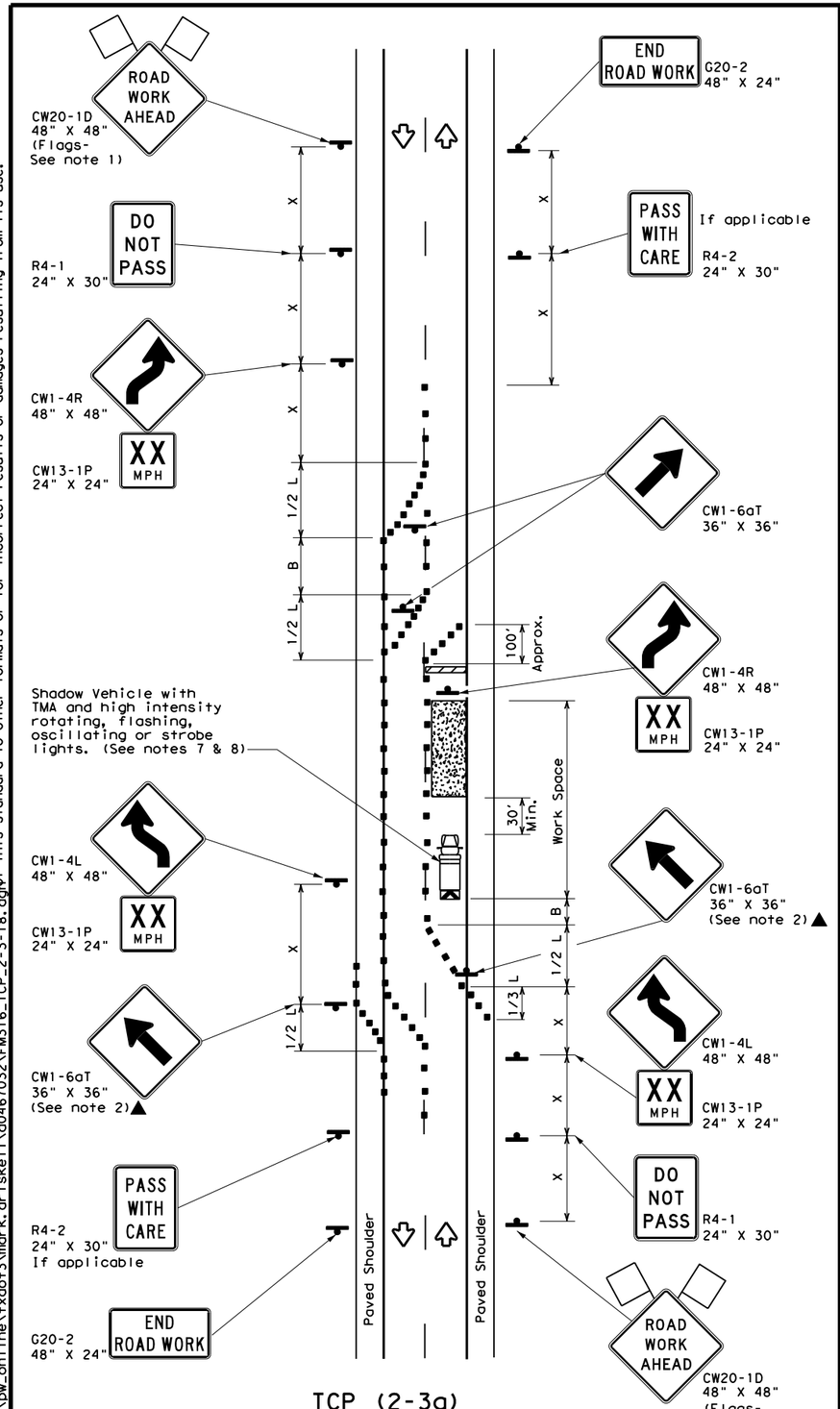
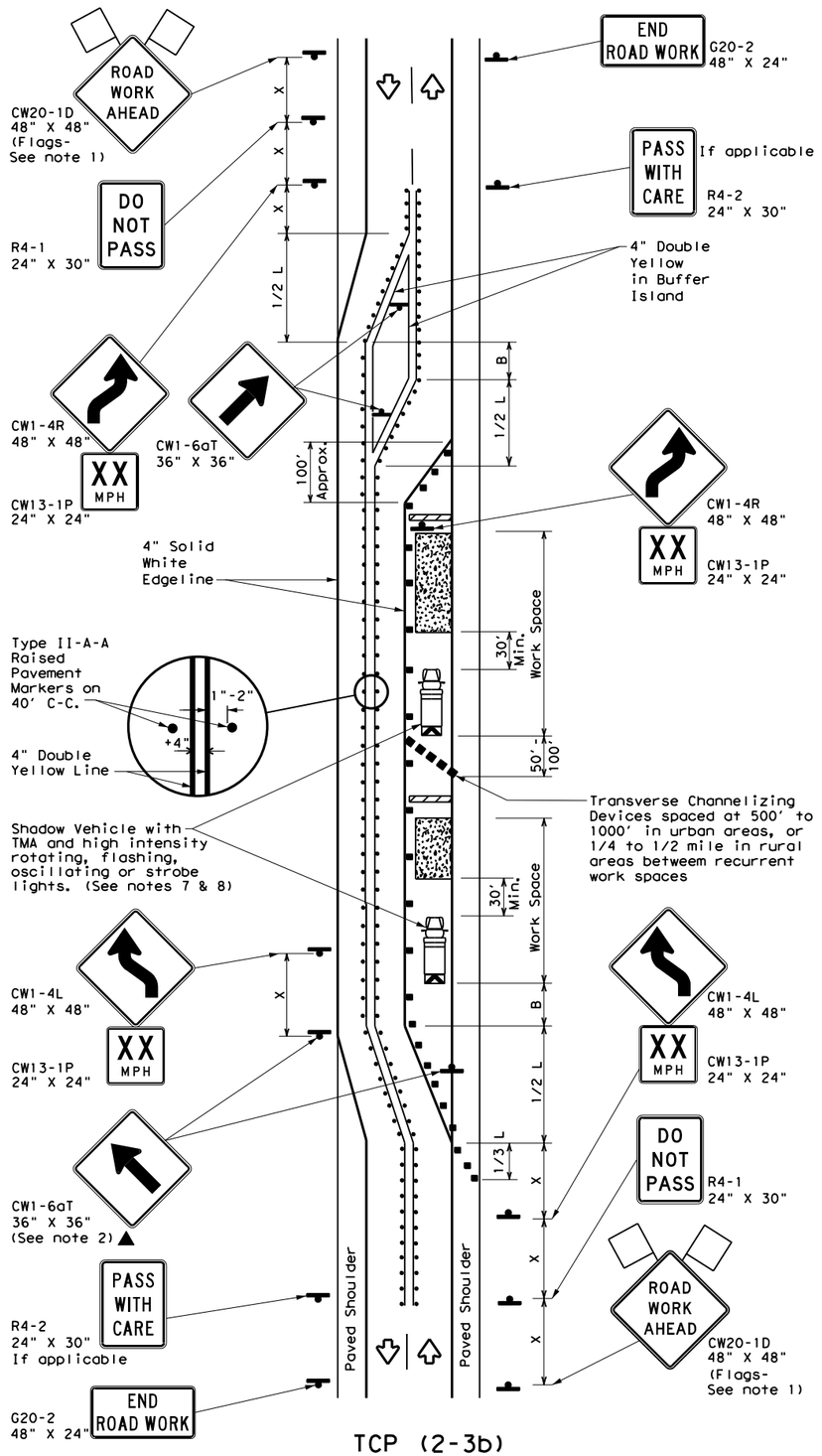


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

	Type 3 Barricade	■ ■	Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	• • • •	Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

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

* Conventional Roads Only

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

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	TYL	HENDERSON		51
4-98 2-18				

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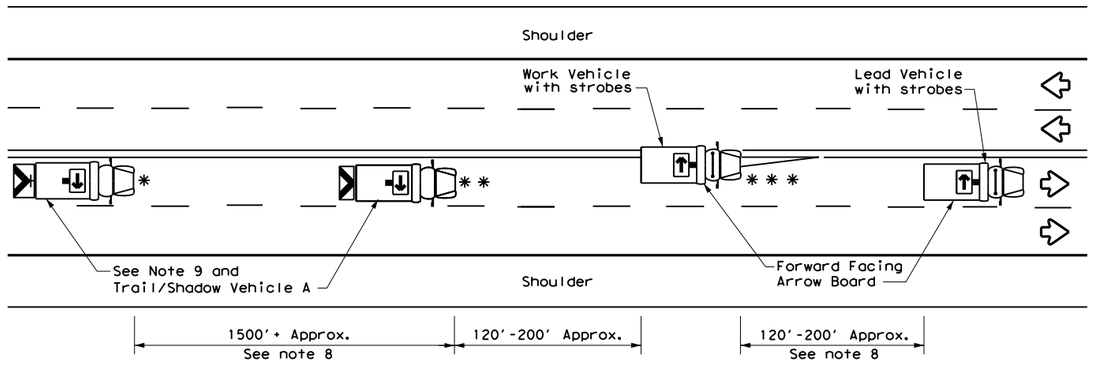
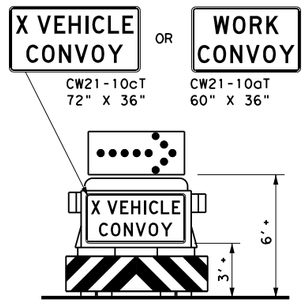


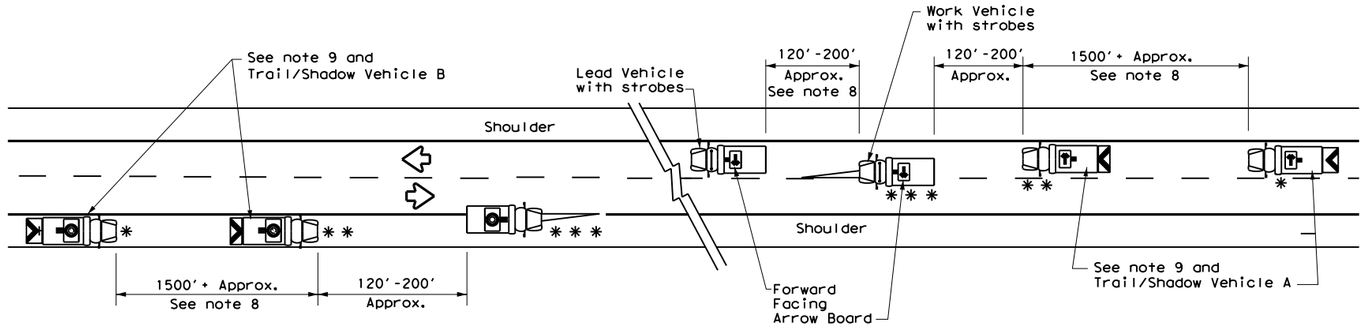
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

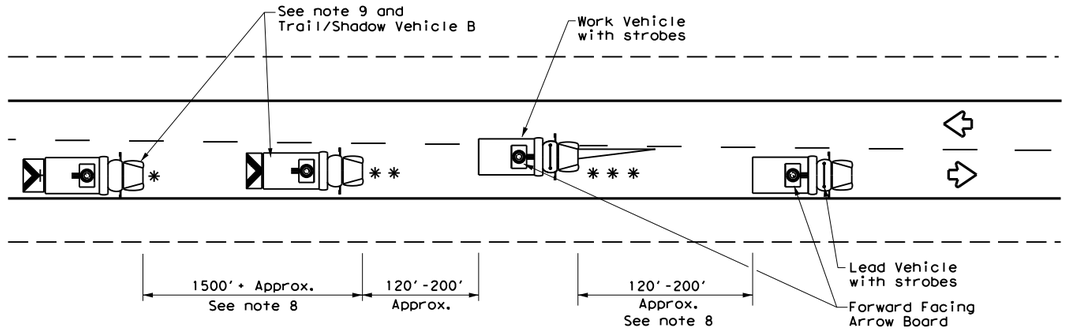


WORK ON SHOULDER

WORK ON TRAVEL LANE

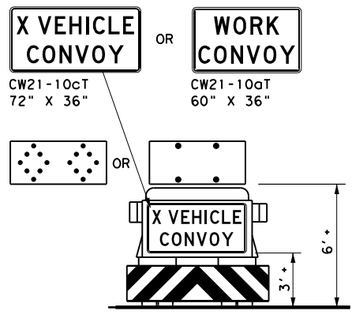
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

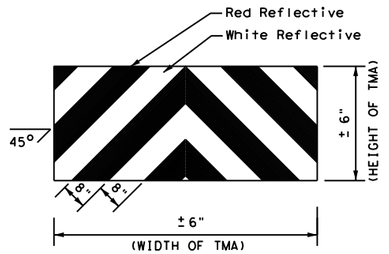
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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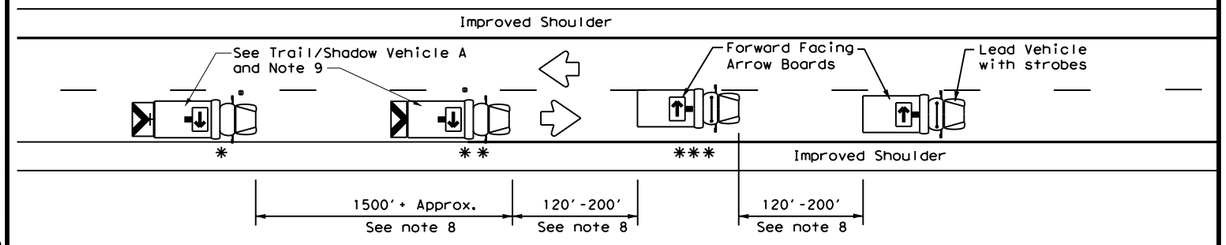
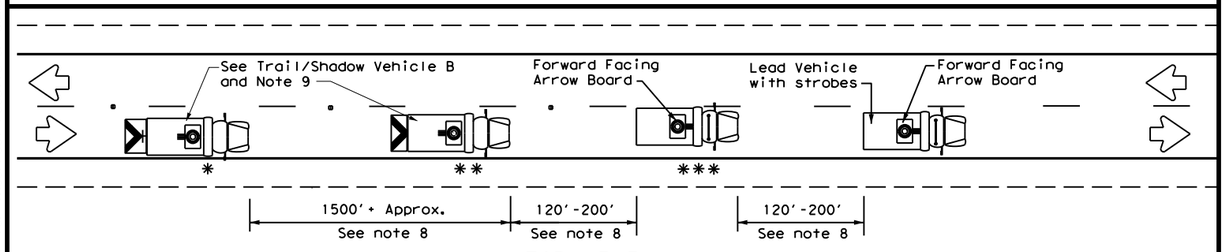
	TYL	HENDERSON		52



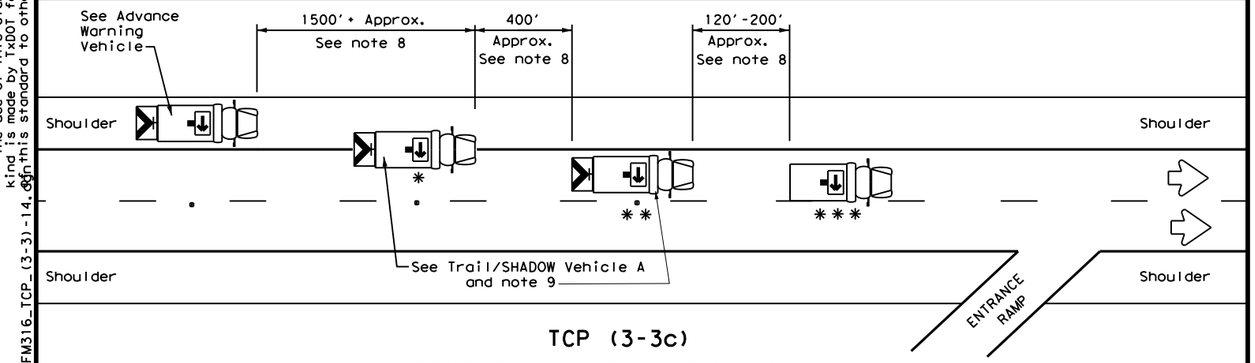
TCP (3-3a)

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



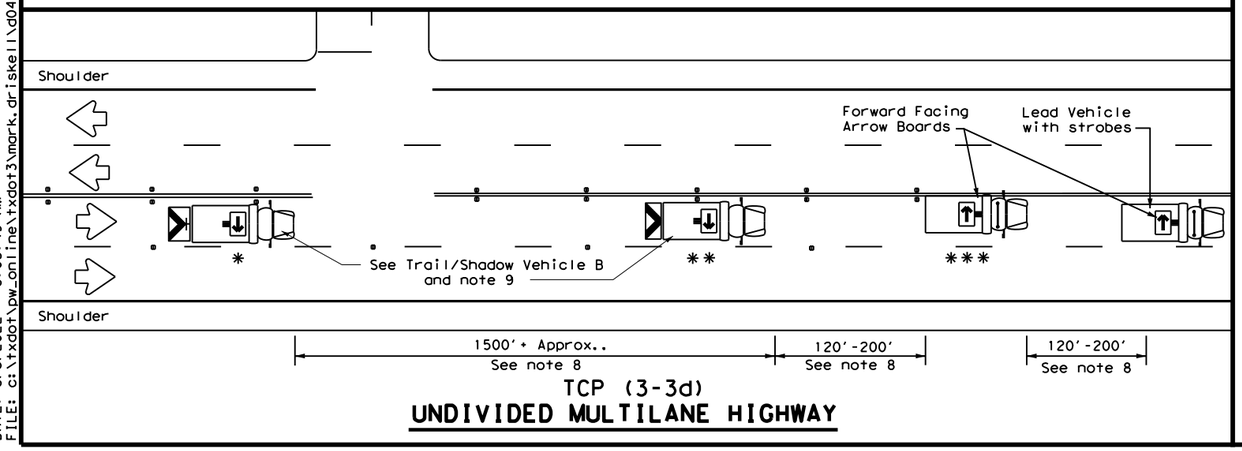
TCP (3-3b)

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



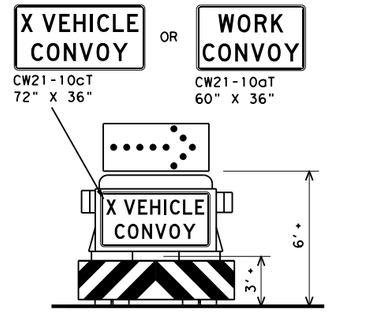
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



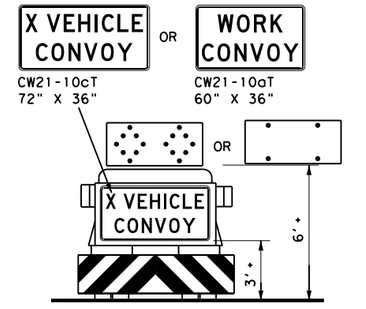
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



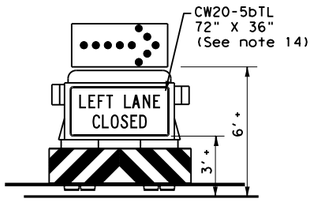
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

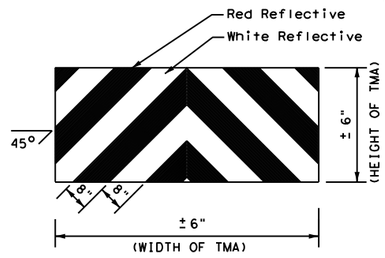


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

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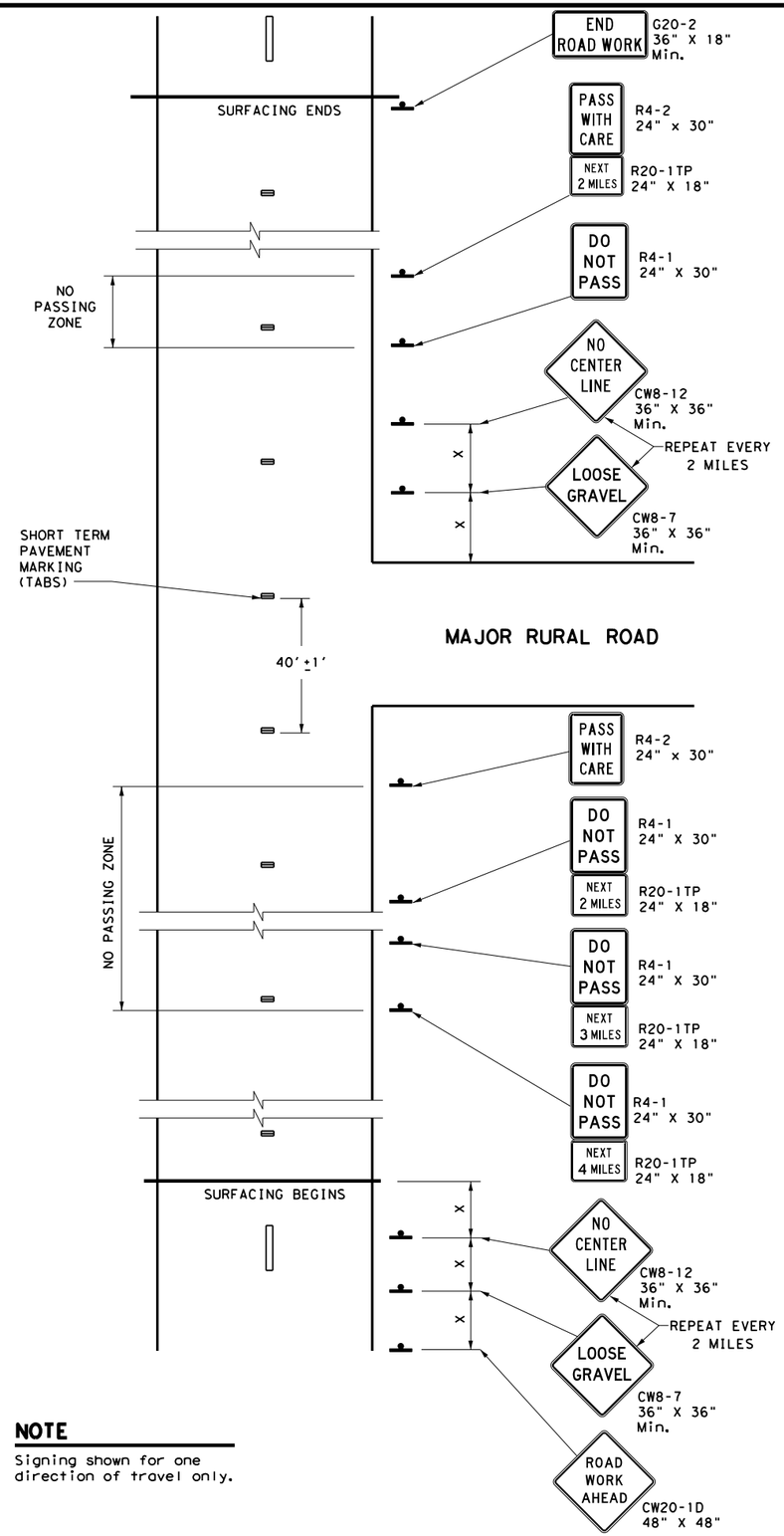
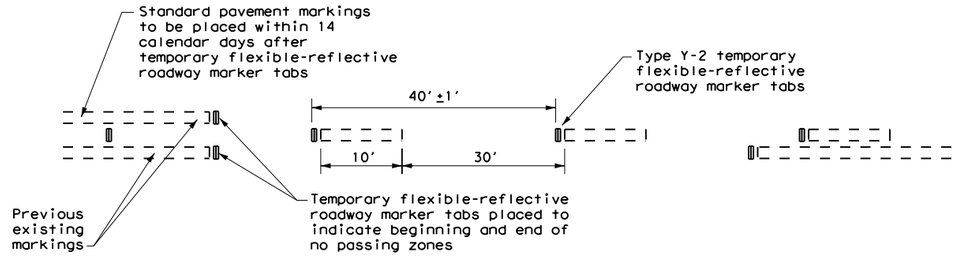


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

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1-97 7-13		TYL	HENDERSON		54

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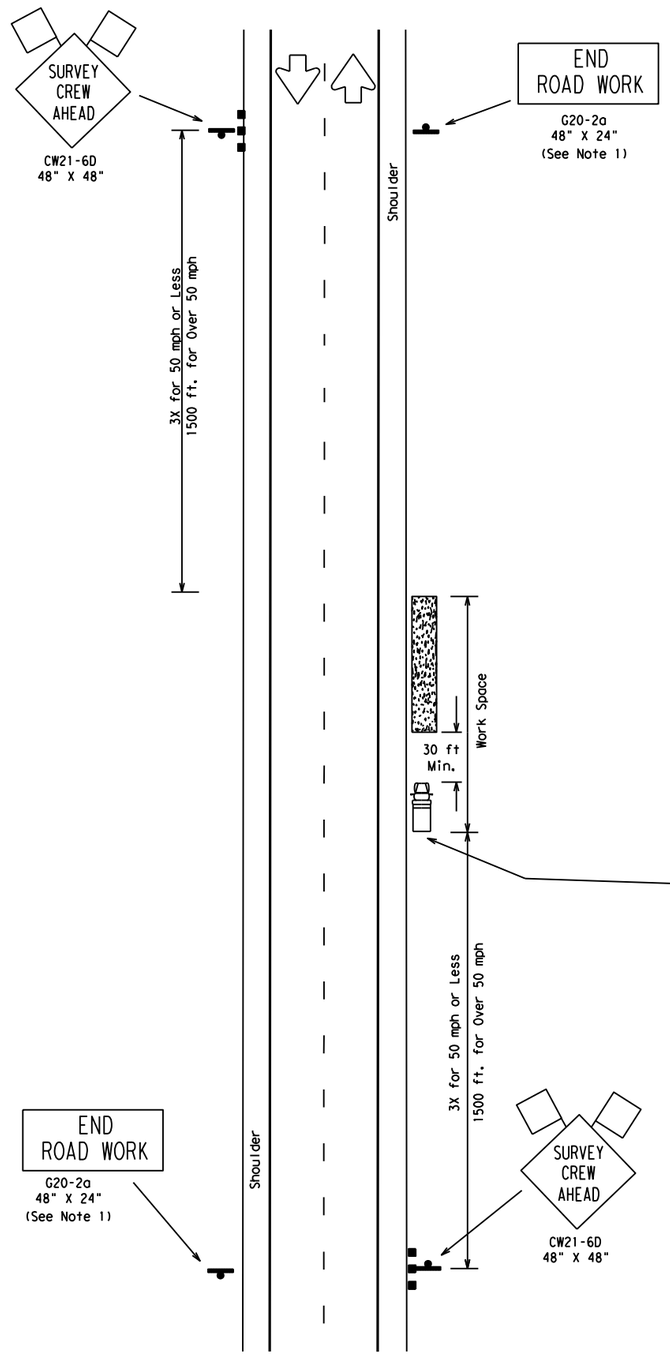
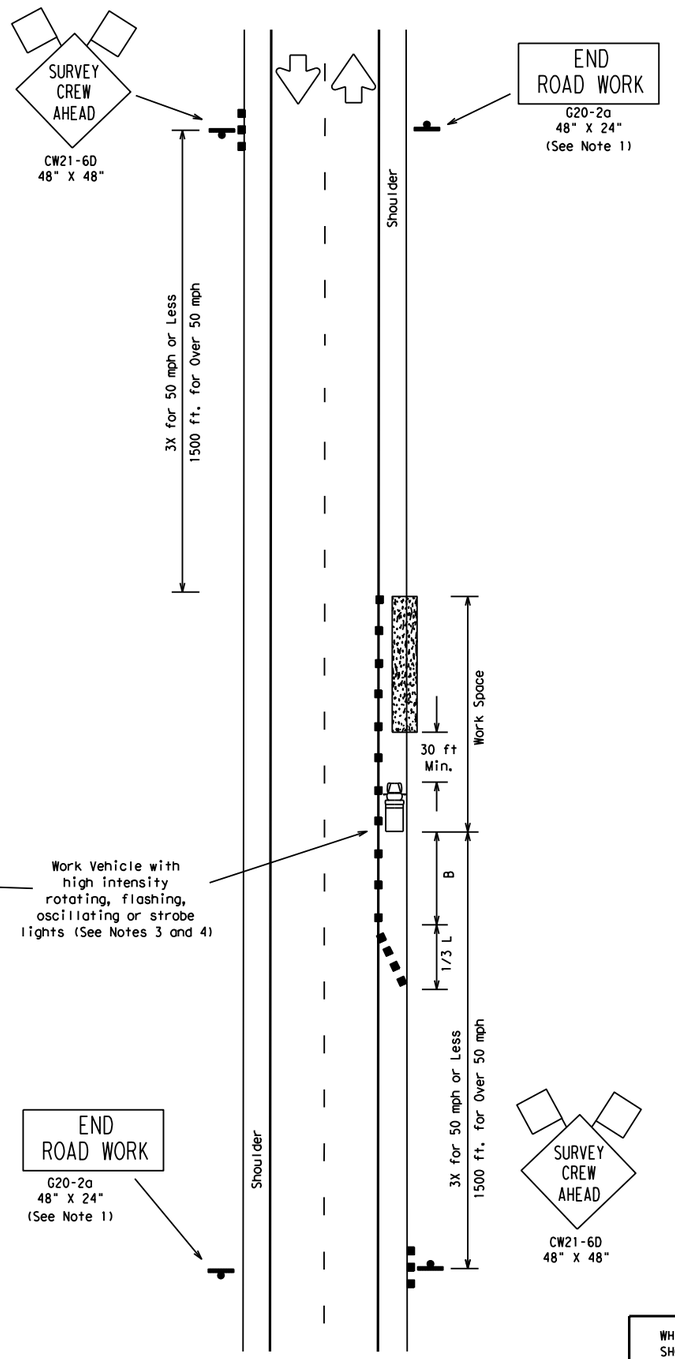


TCP (S-1a)
WORK OFF SHOULDER
OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
⚠ 4. A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-1a)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
⚠ Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

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

REVISIONS
8-08

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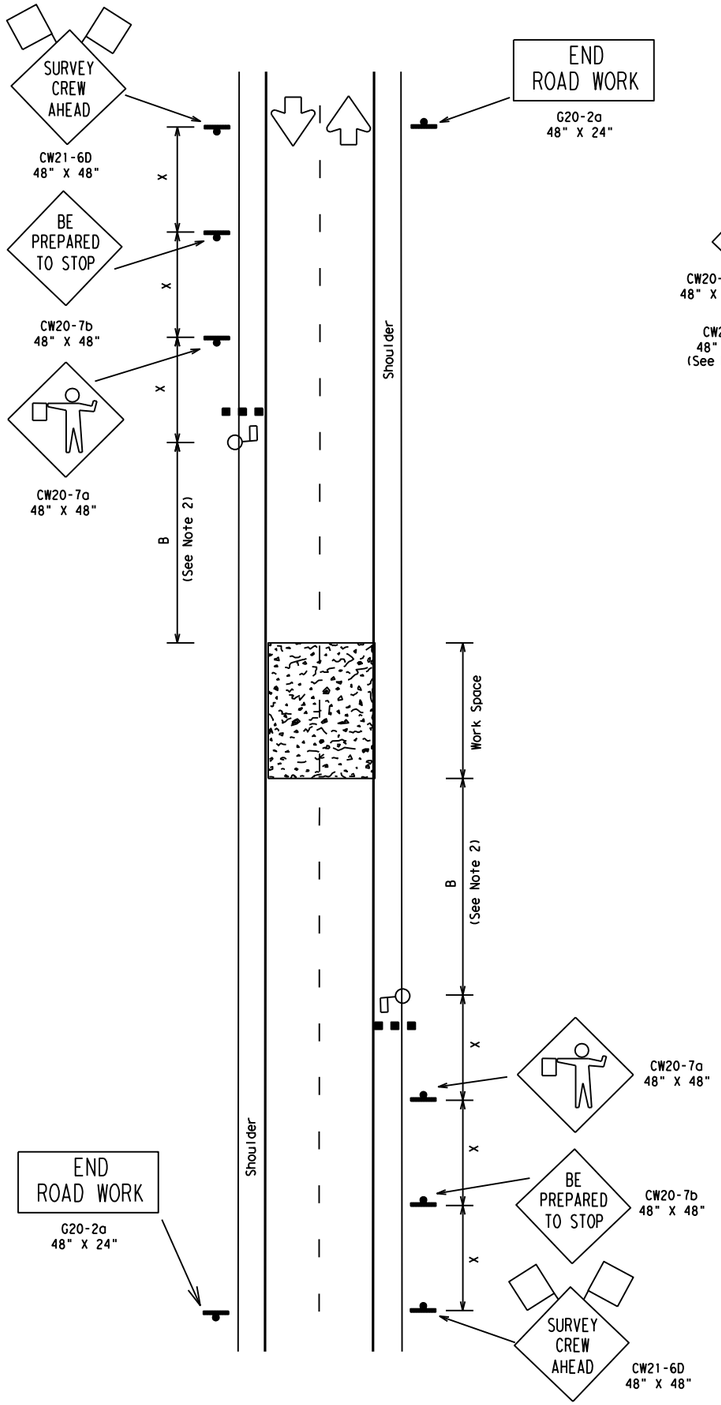
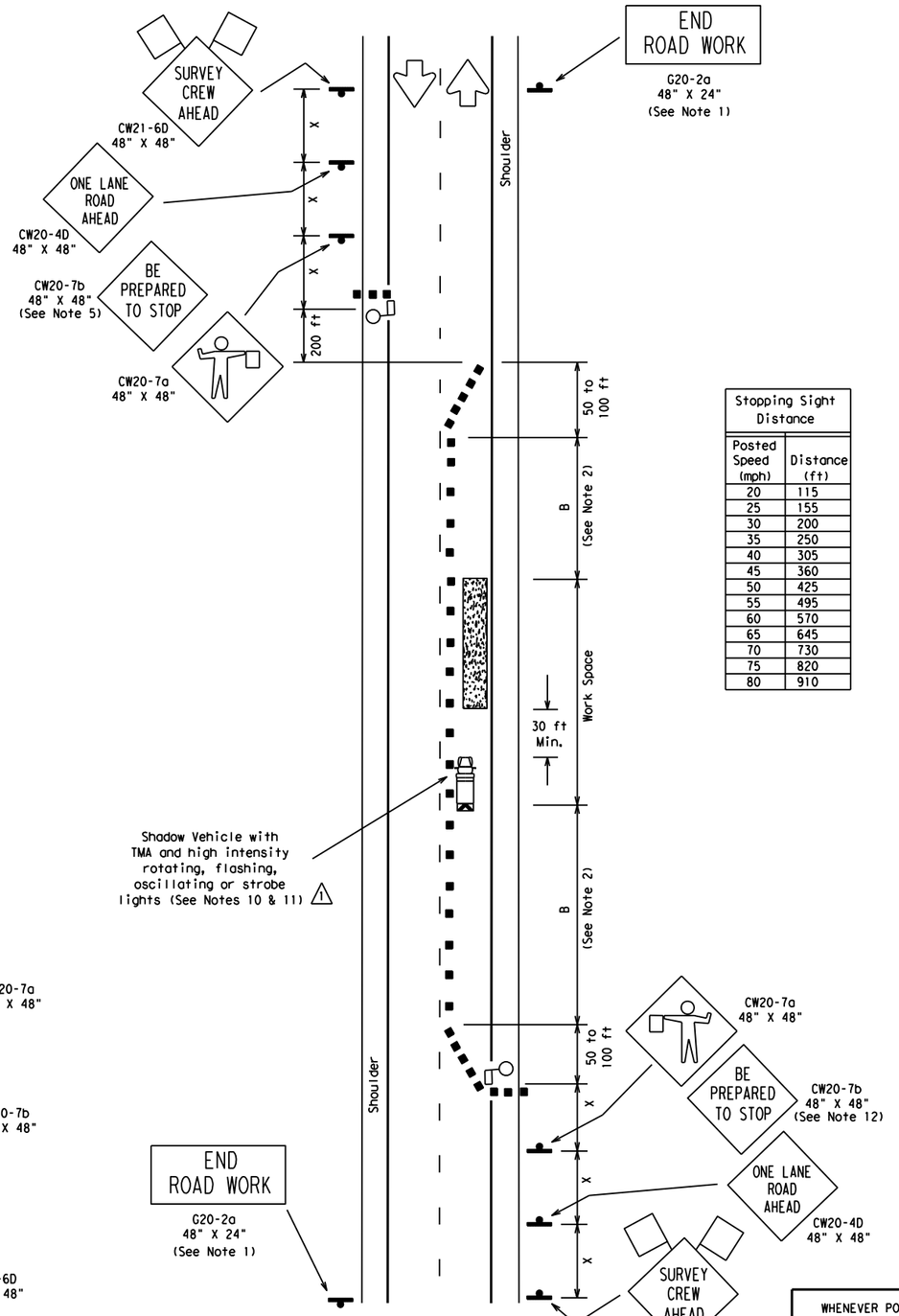


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



TCP (S-2b)
WORK IN ROADWAY
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-2a)

7. Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
8. Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
9. The surveying instrument should not be located on the paved surface.

TCP (S-2B)

10. For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
11. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
12. The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected referrence to notes.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

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

REVISIONS
8-08

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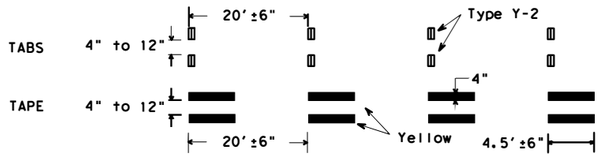
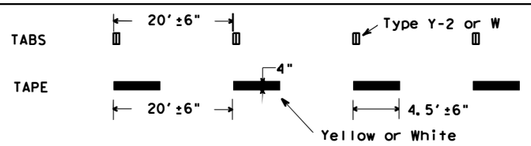
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

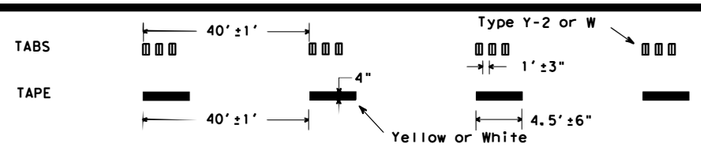


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



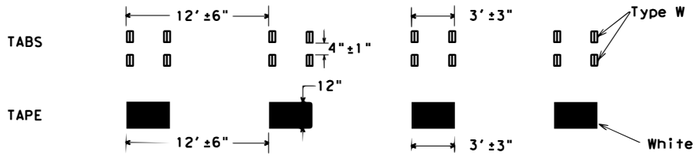
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

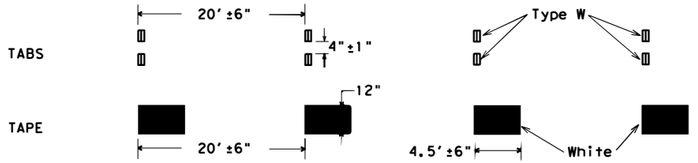


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



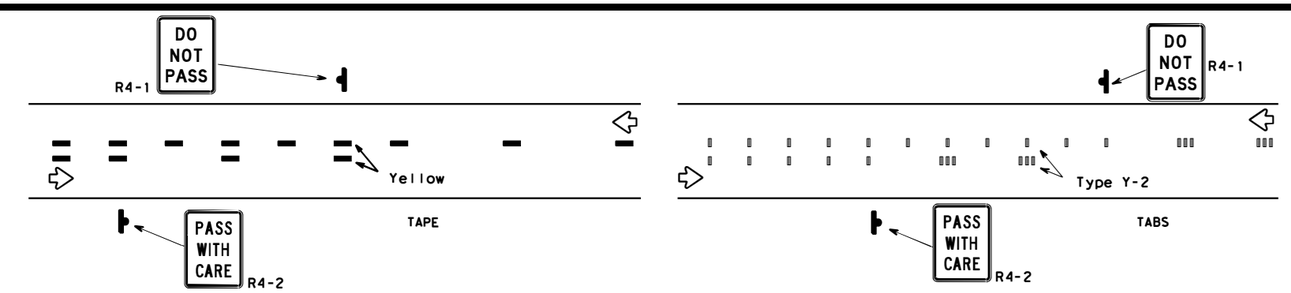
NOTES:

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

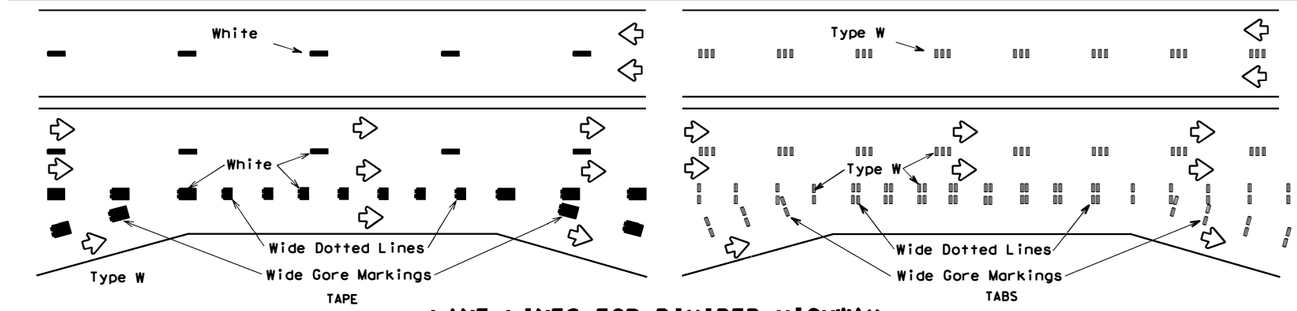
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

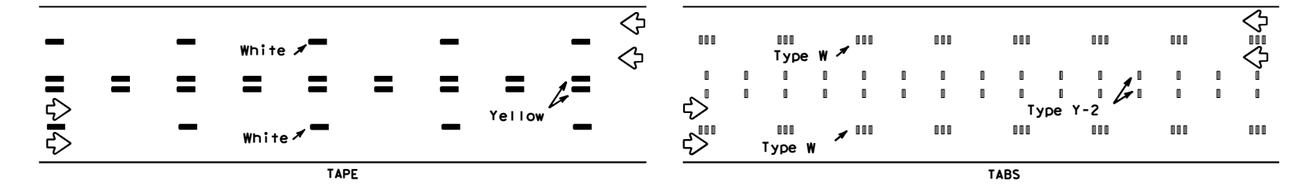
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



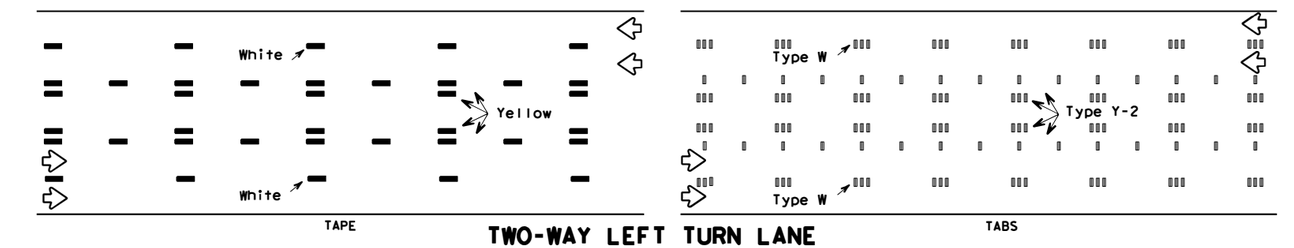
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



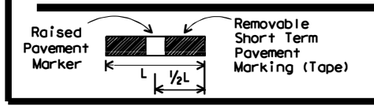
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

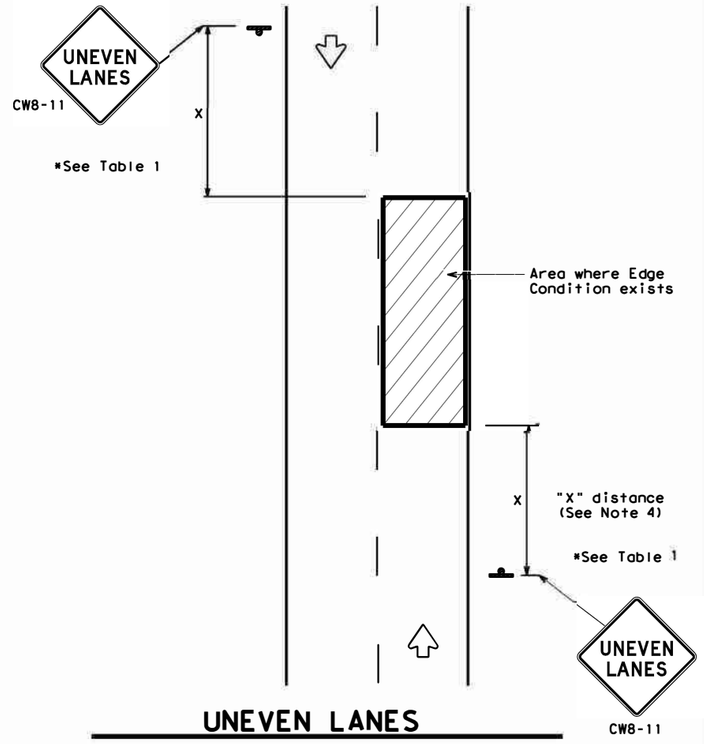
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

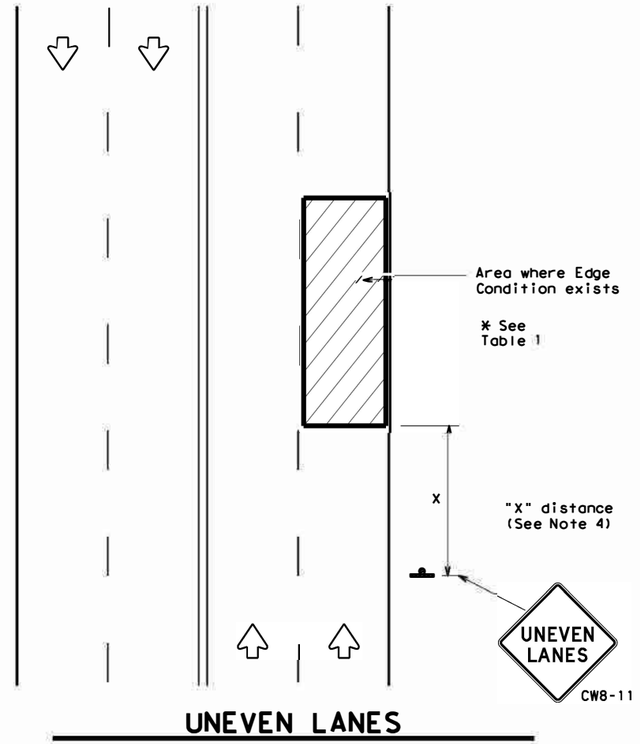
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0646	07	009	FM 316
1-97		DIST	COUNTY		SHEET NO.
3-03		TYL	HENDERSON		57
7-13					

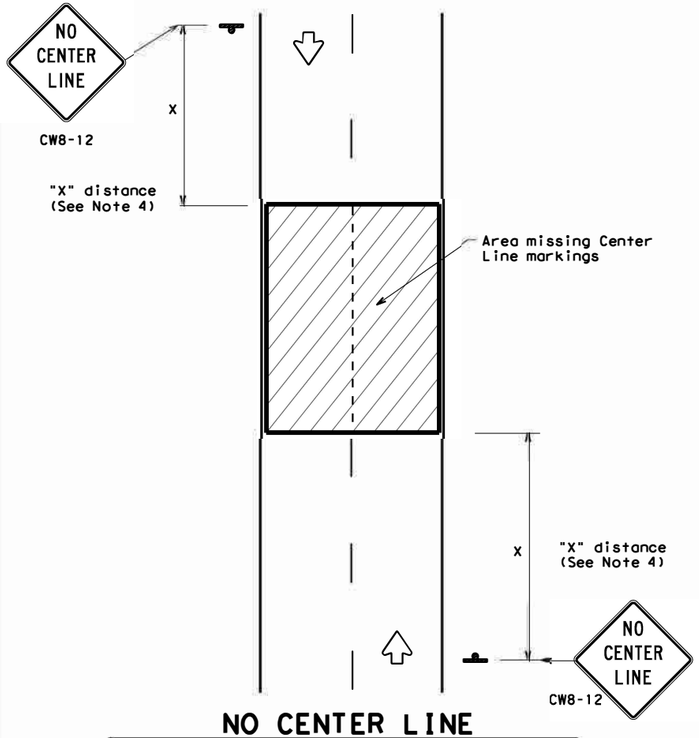
DATE: 11/4/2021 11:42:23 AM
FILE: c:\txdot\pw_online\txdot3\mark.cincar\d0374758\TCP wzul-13.dgn



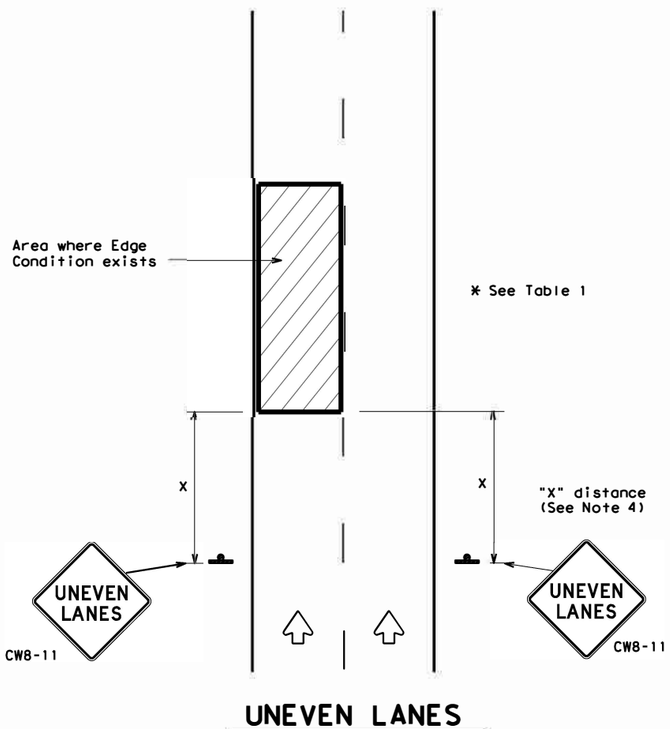
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

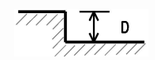
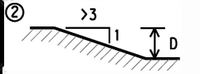
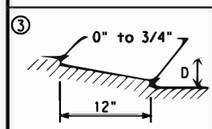
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

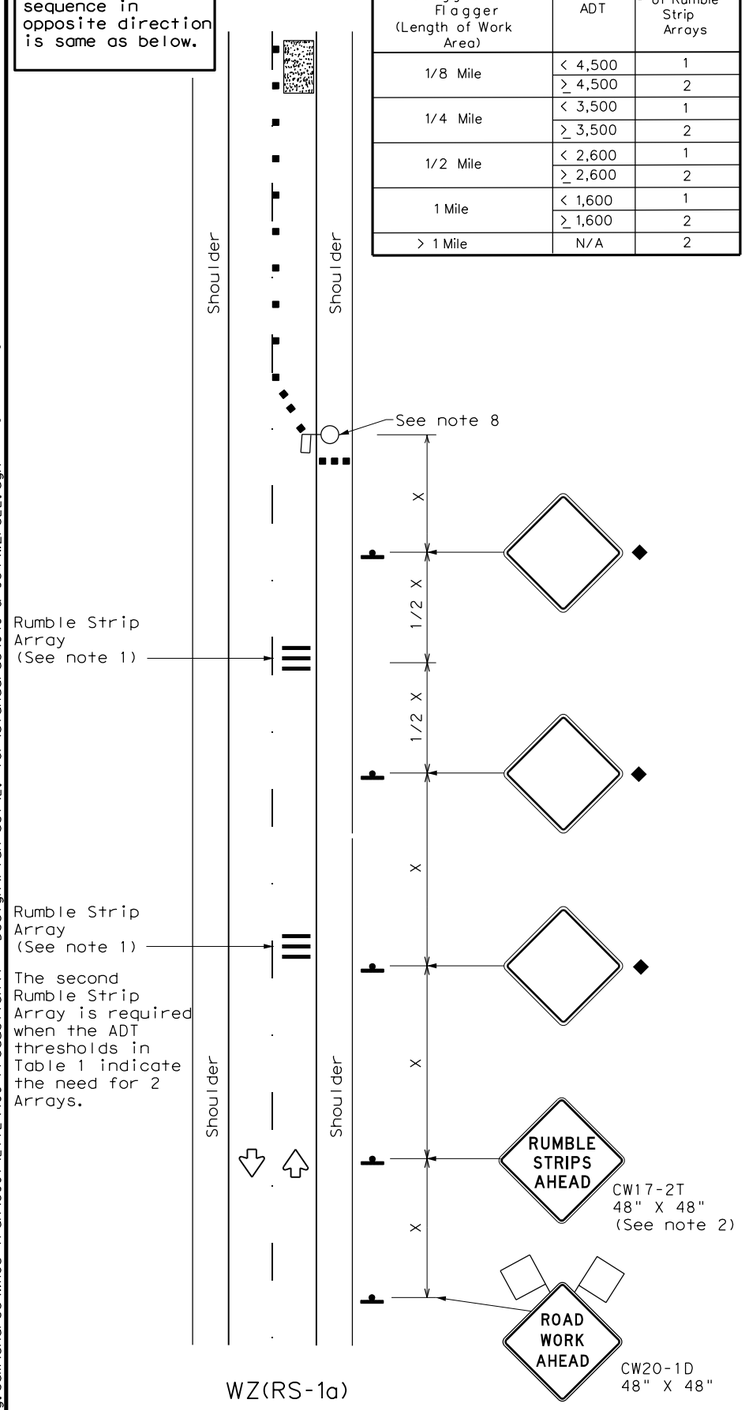
WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	TYL	HENDERSON		58

DATE: 10/31/2022 $TIME$
FILE: \\Tjdeng.com\shares\WHOU-Tran\8007\2112\400 Production\4 - Design\Plan Sheet\wzrs22.dgn

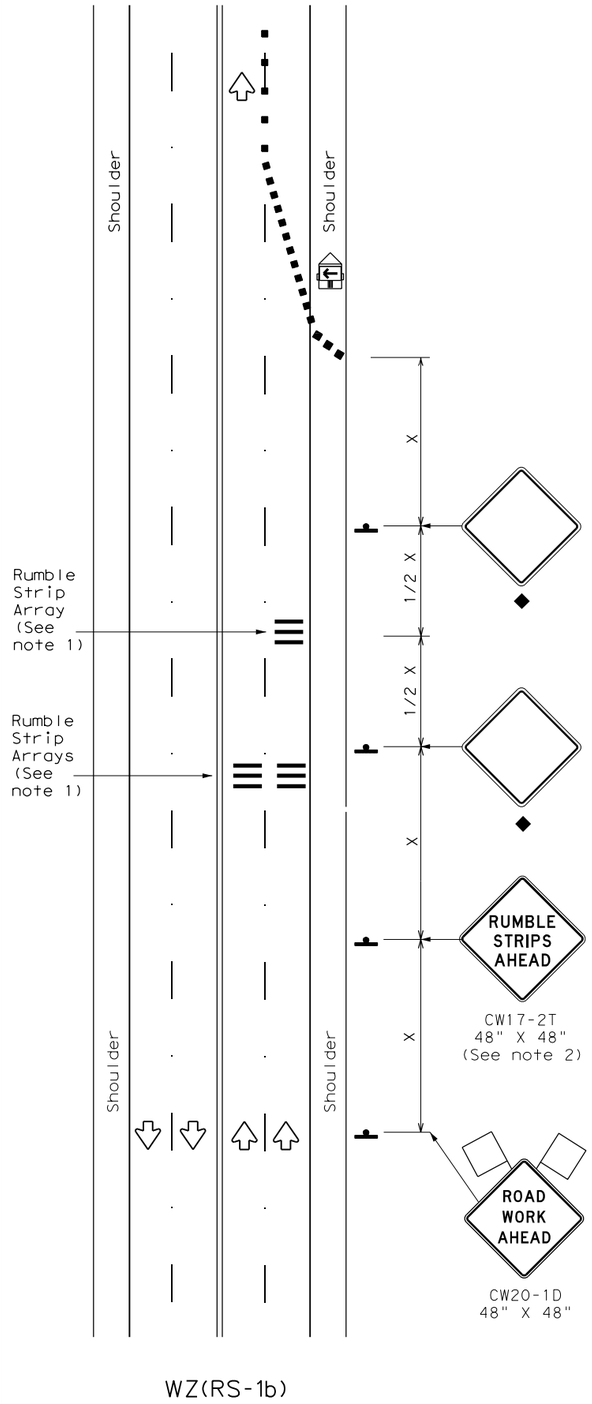
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		59

VERTICAL CURVE DATA

VPI - LOCATION STATION	ELEVATION	VC LENGTH FT	TYPE OF CURVE SAG/CREST	G1 %	G2 %	A	K	E	DESIGN SPEED MPH
266+50	432.00								**45.00**
270+00	432.70	200	C	0.2000	-0.6524	0.85	234.64	-0.21	
291+00	419.00	200	S	-0.6524	-0.2653	0.39	516.7	0.10	
315+50	412.50	300	S	-0.2653	0.1500	0.42	722.36	0.16	
325+50	414.00	200	C	0.1500	-0.6087	0.76	263.62	-0.19	
337+00	407.00	200	S	-0.6087	-0.1379	0.47	424.85	0.12	
351+50	405.00	200	S	-0.1379	0.1000	0.24	840.58	0.06	
358+00	405.65	700	C	0.1000	-3.3909	3.49	200.53	-3.05	
363+50	387.00	400	S	-3.3909	0.1818	3.57	111.96	1.79	
369+00	388.00	200	C	0.1818	-1.1425	1.32	151.03	-0.33	
377+00	378.86	400	S	-1.1425	0.0000	1.14	350.11	0.57	
384+00	378.86	400	S	0.0000	3.0175	3.02	132.57	1.51	
392+00	403.00	600	C	3.0175	0.3529	2.66	225.18	-2.00	
400+50	406.00	500	C	0.3529	-2.7333	3.09	162.01	-1.93	
408+00	385.50	300	S	-2.7333	1.1333	3.87	77.59	1.45	
415+50	394.00	200	C	1.1333	-4.8000	5.93	33.71	-1.48	
418+00	382.00	300	S	-4.8000	0.0000	4.80	62.5	1.80	
425+00	382.00	700	S	0.0000	4.6154	4.62	151.67	4.04	
431+50	412.00	300	C	4.6154	0.8571	3.76	79.83	-1.41	
435+00	415.00	300	C	0.8571	0.0000	0.86	350	-0.32	
439+00	415.00	300	S	0.0000	0.9100	0.91	329.68	0.34	
444+00	419.55	300	C	0.9100	-0.2650	1.18	255.32	-0.44	
450+00	417.96	300	C	-0.2650	-1.1920	0.93	323.63	-0.35	
455+00	412.00	300	S	-1.1920	1.6316	2.82	106.25	1.06	
464+50	427.50	500	C	1.6316	0.0000	1.63	306.46	-1.02	
470+50	427.50	400	S	0.0000	3.0833	3.08	129.73	1.54	
476+50	446.00	200	C	3.0833	-0.6429	3.73	53.68	-0.93	
490+50	437.00	300	C	-0.6429	-0.7143	0.07	4200	-0.03	
501+00	429.50	200	C	-0.7143	-1.9167	1.20	166.34	-0.30	
507+00	418.00	200	S	-1.9167	2.3500	4.27	46.88	1.07	
509+00	422.70	50							

G1 AND G2 = TANGENT GRADES, %
K=LENGTH OF VERTICAL CURVE PER PERCENT CHANGE IN "A"
A=ALGEBRAIC DIFFERENCE IN GRADES, %
L=LENGTH OF VERTICAL CURVE IN FT.
E=VERTICAL OFFSET AT VPI, FT.
Y=ORDINATE FROM TANGENT TO CURVE, FT.
D=DISTANCE FROM NEAREST VPC OR VPT TO ANY POINT ON CURVE, FT.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
3R COMPLLIANCE DATA SHEET

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		60

DATE: 8/3/2022 8:52:49 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0407391\FM 316 3R COMPLIANCE SHEET.dgn

Beginning chain FM316 description
Feature: Road*Centerline

Point FM3161 N 6,825,603.1947 E 2,748,177.7345 Sta 235+00.00

Course from FM3161 to FM3163 S 1° 26′ 05.05" E Dist 570.1834

Point FM3163 N 6,825,033.1901 E 2,748,192.0109 Sta 240+70.18

Course from FM3163 to FM3165 S 1° 36′ 38.10" E Dist 329.4155

Point FM3165 N 6,824,703.9047 E 2,748,201.2696 Sta 243+99.60

Course from FM3165 to FM3167 S 1° 36′ 38.10" E Dist 1,478.5057

Point FM3167 N 6,823,225.9831 E 2,748,242.8249 Sta 258+78.10

Course from FM3167 to FM3169 S 1° 28′ 40.41" E Dist 753.9841

Point FM3169 N 6,822,472.2498 E 2,748,262.2711 Sta 266+32.09

Course from FM3169 to PC FM316*11 S 0° 14′ 28.74" E Dist 58.5456

Curve Data

Curve FM316*11		(Chord Definition)				
P.I. Station		272+12.70	N	6,821,891.6408	E	2,748,264.7164
Delta	=	72° 07′ 08.07"	(RT)			
Degree	=	7° 59′ 51.12"				
Tangent	=	522.0686				
Length	=	901.7643				
Radius	=	717.0000				
External	=	169.9299				
Long Chord	=	844.0874				
Mid. Ord.	=	137.3724				
P.C. Station		266+90.63	N	6,822,413.7047	E	2,748,262.5176
P.T. Station		275+92.40	N	6,821,729.2523	E	2,747,768.5455
C.C.			N	6,822,410.6849	E	2,747,545.5240
Back	= S	0° 14′ 28.74" E				
Ahead	= S	71° 52′ 39.33" W				
Chord Bear	= S	35° 49′ 05.30" W				

Course from PT FM316*11 to PC FM316*14 S 73° 01′ 21.60" W Dist 1,661.3749

Curve Data

Curve FM316*14						
P.I. Station		294+35.79	N	6,821,191.0128	E	2,746,005.4806
Delta	=	3° 47′ 27.39"	(LT)			
Degree	=	1° 02′ 30.27"				
Tangent	=	182.0186				
Length	=	363.9043				
Radius	=	5,500.0000				
External	=	3.0111				
Long Chord	=	363.8379				
Mid. Ord.	=	3.0094				
P.C. Station		292+53.77	N	6,821,244.1418	E	2,746,179.5727
P.T. Station		296+17.68	N	6,821,126.4897	E	2,745,835.2821
C.C.			N	6,815,983.6531	E	2,747,784.9570
Back	= S	73° 01′ 44.31" W				
Ahead	= S	69° 14′ 16.92" W				
Chord Bear	= S	71° 08′ 00.62" W				

Course from PT FM316*14 to PC FM316*17 S 69° 14′ 16.92" W Dist 1,305.8024

Curve Data

Curve FM316*17						
P.I. Station		311+96.32	N	6,820,566.8832	E	2,744,359.1567
Delta	=	10° 23′ 35.00"	(RT)			
Degree	=	1° 54′ 35.49"				
Tangent	=	272.8381				
Length	=	544.1791				
Radius	=	3,000.0000				
External	=	12.3812				
Long Chord	=	543.4333				
Mid. Ord.	=	12.3303				
P.C. Station		309+23.48	N	6,820,663.6006	E	2,744,614.2770
P.T. Station		314+67.66	N	6,820,517.7764	E	2,744,090.7743
C.C.			N	6,823,468.7842	E	2,743,550.8180
Back	= S	69° 14′ 16.92" W				
Ahead	= S	79° 37′ 51.92" W				
Chord Bear	= S	74° 26′ 04.42" W				

Course from PT FM316*17 to PC FM316*20 S 79° 42′ 39.67" W Dist 858.4248

Curve Data

Curve FM316*20						
P.I. Station		325+05.38	N	6,820,332.4265	E	2,743,069.7437
Delta	=	3° 25′ 23.60"	(RT)			
Degree	=	0° 57′ 17.75"				
Tangent	=	179.2929				
Length	=	358.4791				
Radius	=	6,000.0000				
External	=	2.6782				
Long Chord	=	358.4258				
Mid. Ord.	=	2.6770				
P.C. Station		323+26.08	N	6,820,364.4505	E	2,743,246.1534
P.T. Station		326+84.56	N	6,820,310.9932	E	2,742,891.7365
C.C.			N	6,826,267.9670	E	2,742,174.4755
Back	= S	79° 42′ 39.67" W				
Ahead	= S	83° 08′ 03.27" W				
Chord Bear	= S	81° 25′ 21.47" W				

Course from PT FM316*20 to PC FM316*23 S 83° 11′ 50.81" W Dist 781.0696

Curve Data

Curve FM316*23		(Chord Definition)				
P.I. Station		339+25.30	N	6,820,164.0298	E	2,741,659.7317
Delta	=	64° 02′ 37.67"	(LT)			
Degree	=	7° 48′ 04.93"				
Tangent	=	459.6697				
Length	=	820.9302				
Radius	=	735.0000				
External	=	131.9032				
Long Chord	=	779.4577				
Mid. Ord.	=	111.8336				
P.C. Station		334+65.63	N	6,820,218.4769	E	2,742,116.1654
P.T. Station		342+86.56	N	6,819,729.8065	E	2,741,508.9129
C.C.			N	6,819,488.6511	E	2,742,203.2249
Back	= S	83° 11′ 50.81" W				
Ahead	= S	19° 09′ 13.14" W				
Chord Bear	= S	51° 10′ 31.98" W				

Course from PT FM316*23 to PC FM316*26 S 18° 41′ 52.74" W Dist 354.2028

Curve Data

Curve FM316*26						
P.I. Station		351+85.86	N	6,818,877.9769	E	2,741,220.6179
Delta	=	22° 49′ 39.04"	(LT)			
Degree	=	2° 07′ 19.44"				
Tangent	=	545.0901				
Length	=	1,075.7211				
Radius	=	2,700.0000				
External	=	54.4733				
Long Chord	=	1,068.6205				
Mid. Ord.	=	53.3960				
P.C. Station		346+40.77	N	6,819,394.2980	E	2,741,395.3627
P.T. Station		357+16.49	N	6,818,334.3019	E	2,741,259.8706
C.C.			N	6,818,528.7329	E	2,743,952.8609
Back	= S	18° 41′ 52.74" W				
Ahead	= S	4° 07′ 46.30" E				
Chord Bear	= S	7° 17′ 03.22" W				

Course from PT FM316*26 to PC FM316*29 S 4° 20′ 01.42" E Dist 1,066.0190

Curve Data

Curve FM316*29						
P.I. Station		369+80.31	N	6,817,074.0895	E	2,741,355.3725
Delta	=	5° 39′ 43.69"	(RT)			
Degree	=	1° 25′ 56.62"				
Tangent	=	197.8068				
Length	=	395.2917				
Radius	=	4,000.0000				
External	=	4.8880				
Long Chord	=	395.1309				
Mid. Ord.	=	4.8820				
P.C. Station		367+82.51	N	6,817,271.3308	E	2,741,340.4251
P.T. Station		371+77.80	N	6,816,876.3358	E	2,741,350.7868
C.C.			N	6,816,969.0679	E	2,737,351.8618
Back	= S	4° 20′ 01.42" E				
Ahead	= S	1° 19′ 42.27" W				
Chord Bear	= S	1° 30′ 09.57" E				

Course from PT FM316*29 to PC FM316*32 S 1° 19′ 42.27" W Dist 1,995.3843

STATE OF TEXAS
ROLANDO MENDEZ
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FM 316
HORIZONTAL ALIGNMENT SHEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		61

DATE: 8/3/2022 8:52:53 AM
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Curve Data

Curve FM316*32		(Chord Definition)				
P.I. Station		395+08.52	N	6,814,546.2403	E	2,741,296.7534
Delta	=	38° 19′ 28.88" (RT)				
Degree	=	5° 56′ 24.17"				
Tangent	=	335.3376				
Length	=	645.1917				
Radius	=	965.0000				
External	=	56.6048				
Long Chord	=	633.5146				
Mid. Ord.	=	53.4684				
P.C. Station		391+73.18	N	6,814,881.4878	E	2,741,304.5277
P.T. Station		398+18.37	N	6,814,288.0566	E	2,741,082.7617
C.C.			N	6,814,903.8599	E	2,740,339.7871
Back	= S 1° 19′ 42.36" W					
Ahead	= S 39° 39′ 11.24" W					
Chord Bear	= S 20° 29′ 26.80" W					

Course from PT FM316*32 to PC FM316*35 S 39° 39′ 11.24" W Dist 458.2018

Curve Data

Curve FM316*35						
P.I. Station		404+88.06	N	6,813,772.4499	E	2,740,655.4089
Delta	=	10° 30′ 25.78" (LT)				
Degree	=	2° 29′ 28.04"				
Tangent	=	211.4852				
Length	=	421.7844				
Radius	=	2,300.0000				
External	=	9.7026				
Long Chord	=	421.1937				
Mid. Ord.	=	9.6618				
P.C. Station		402+76.58	N	6,813,935.2770	E	2,740,790.3657
P.T. Station		406+98.36	N	6,813,587.7425	E	2,740,552.4080
C.C.			N	6,812,467.5594	E	2,742,561.1861
Back	= S 39° 39′ 11.24" W					
Ahead	= S 29° 08′ 45.46" W					
Chord Bear	= S 34° 23′ 58.35" W					

Course from PT FM316*35 to PC FM316*38 S 29° 08′ 45.46" W Dist 804.5120

Curve Data

Curve FM316*38		(Chord Definition)				
P.I. Station		417+76.83	N	6,812,645.8281	E	2,740,027.1550
Delta	=	30° 56′ 09.65" (LT)				
Degree	=	5° 47′ 23.70"				
Tangent	=	273.9561				
Length	=	534.3085				
Radius	=	990.0000				
External	=	37.2059				
Long Chord	=	528.0665				
Mid. Ord.	=	35.8583				
P.C. Station		415+02.87	N	6,812,885.0963	E	2,740,160.5815
P.T. Station		420+37.18	N	6,812,372.0057	E	2,740,035.7126
C.C.			N	6,812,402.9305	E	2,741,025.2295
Back	= S 29° 08′ 45.46" W					
Ahead	= S 1° 47′ 24.19" E					
Chord Bear	= S 13° 40′ 40.64" W					

Course from PT FM316*38 to PC FM316*41 S 1° 49′ 19.43" E Dist 1,017.3547

Curve Data

Curve FM316*41						
P.I. Station		431+87.93	N	6,811,221.8424	E	2,740,072.3013
Delta	=	1° 31′ 42.42" (RT)				
Degree	=	0° 34′ 22.65"				
Tangent	=	133.3903				
Length	=	266.7649				
Radius	=	10,000.0000				
External	=	0.8896				
Long Chord	=	266.7570				
Mid. Ord.	=	0.8895				
P.C. Station		430+54.54	N	6,811,355.1653	E	2,740,068.0601
P.T. Station		433+21.30	N	6,811,088.4538	E	2,740,072.9849
C.C.			N	6,811,037.2088	E	2,730,073.1162
Back	= S 1° 49′ 19.43" E					
Ahead	= S 0° 17′ 37.01" E					
Chord Bear	= S 1° 03′ 28.22" E					

Course from PT FM316*41 to FM31644 S 0° 17′ 37.01" E Dist 4,215.3879

Point FM31644 N 6,806,873.1212 E 2,740,094.5867 Sta 475+36.69

Course from FM31644 to FM31645 S 0° 46′ 11.34" E Dist 3,384.7466

Point FM31645 N 6,803,488.6802 E 2,740,140.0622 Sta 509+21.43

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Ending chain FM316 description

STATE OF TEXAS
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FM 316
HORIZONTAL ALIGNMENT SHEET

Texas Department of Transportation

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		62

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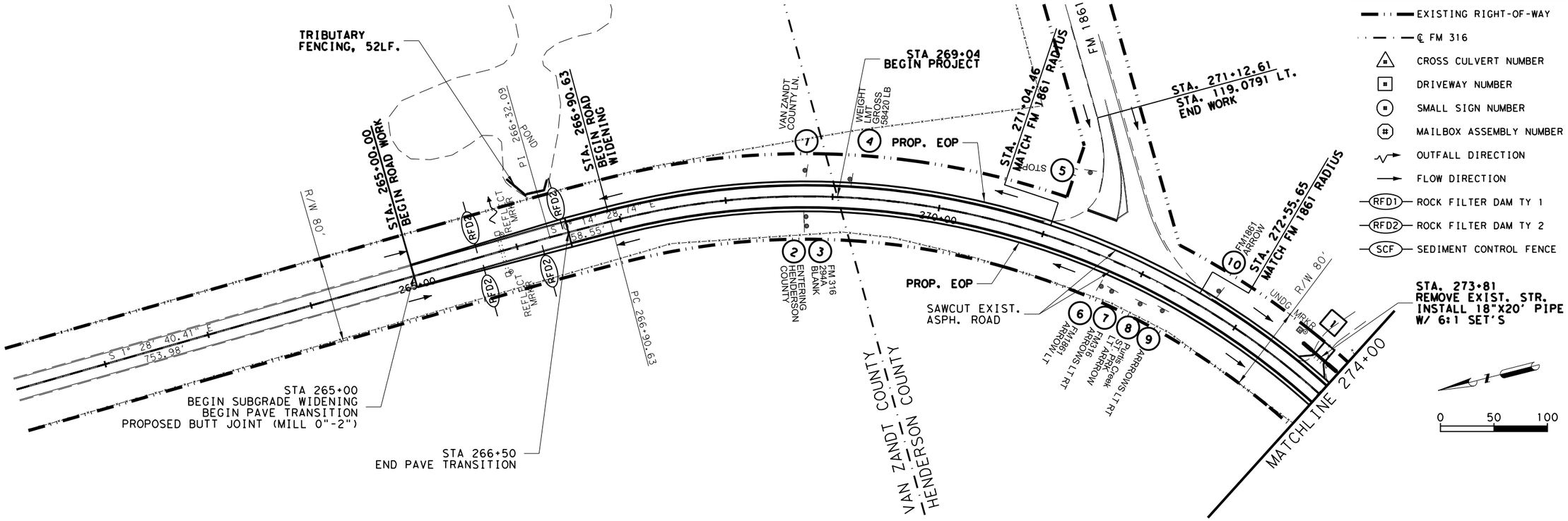

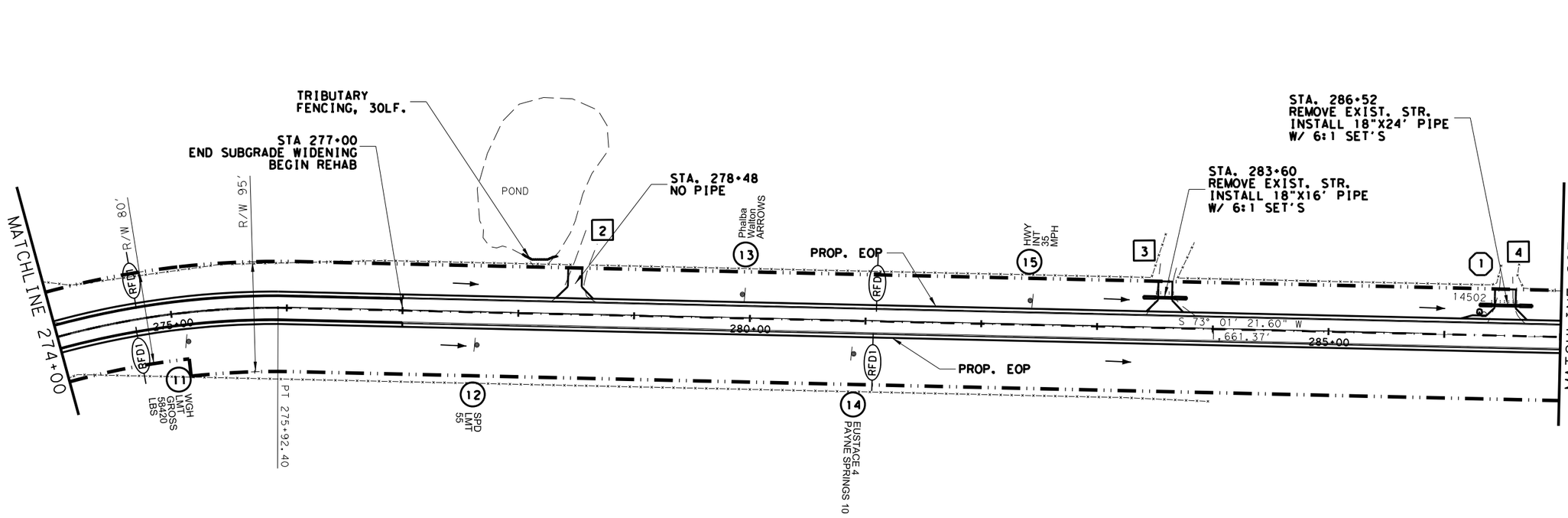

STATE OF TEXAS
ROLANDO MENDEZ
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PROFESSIONAL ENGINEER

09/16/2022

FM 316
PROJECT LAYOUT

SHEET 1 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		63

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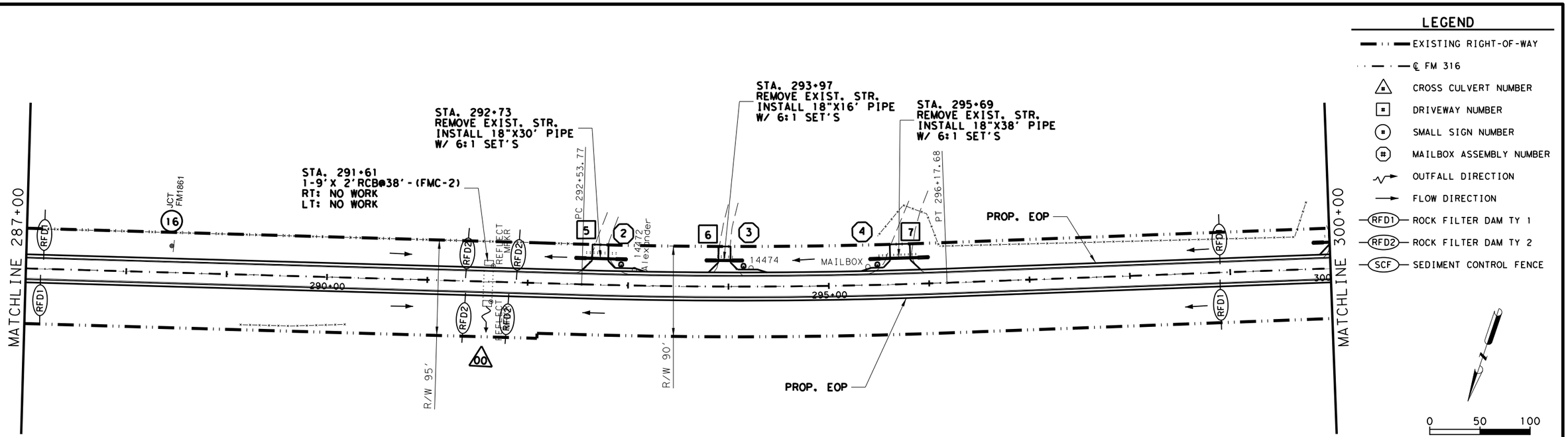

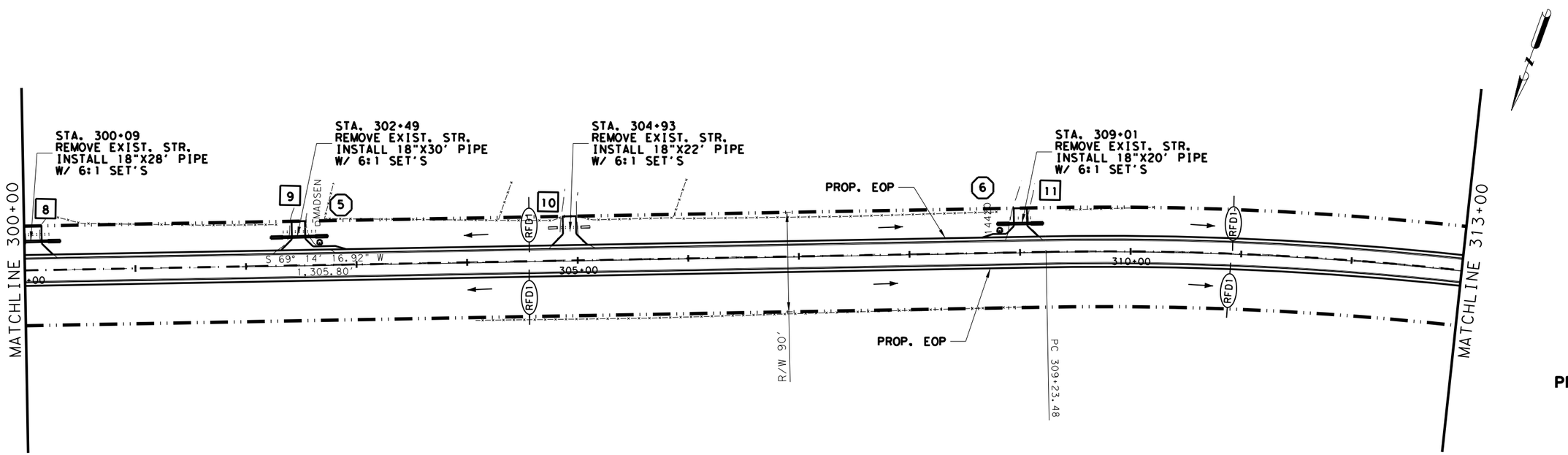

09/16/2022

FM 316
PROJECT LAYOUT

SHEET 2 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		64

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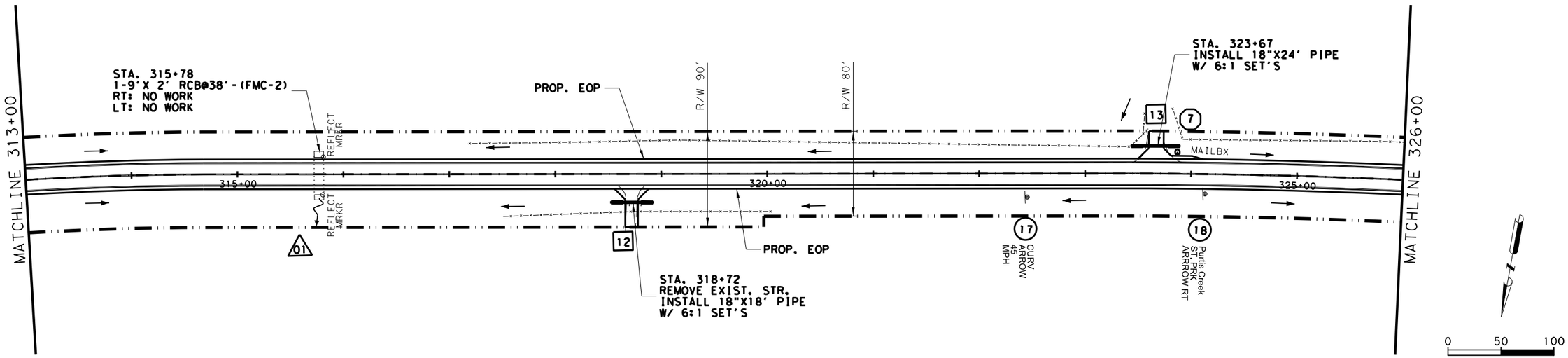

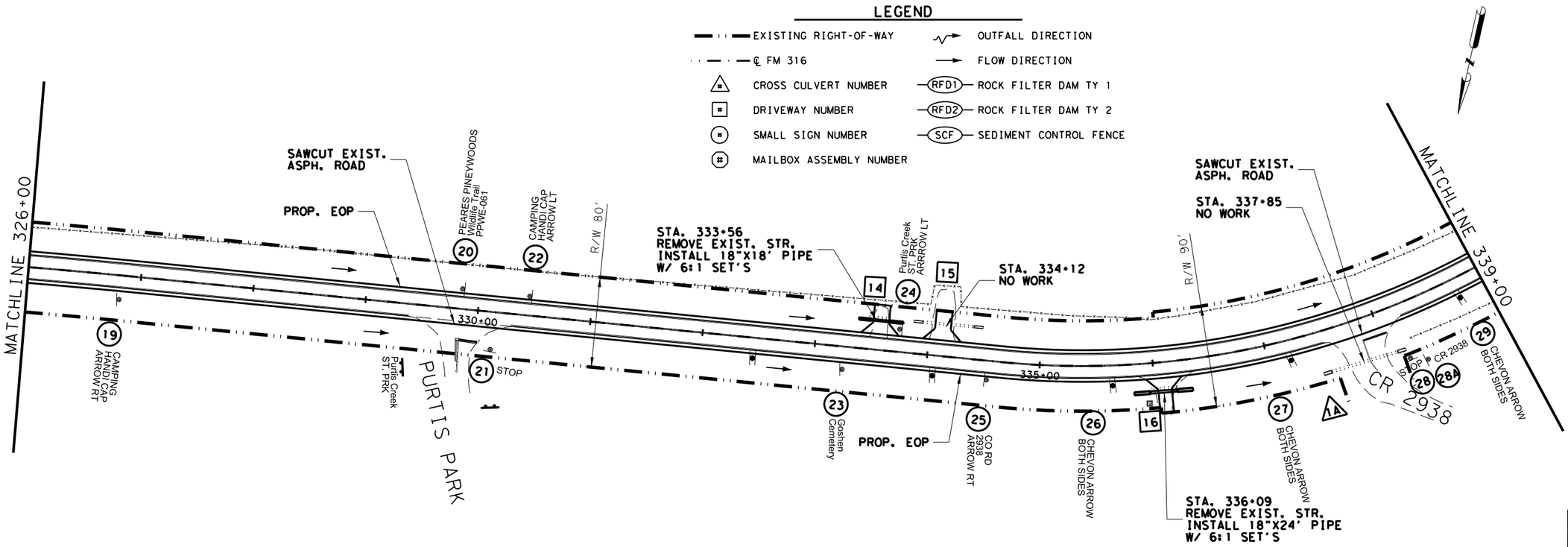

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FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 3 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		65

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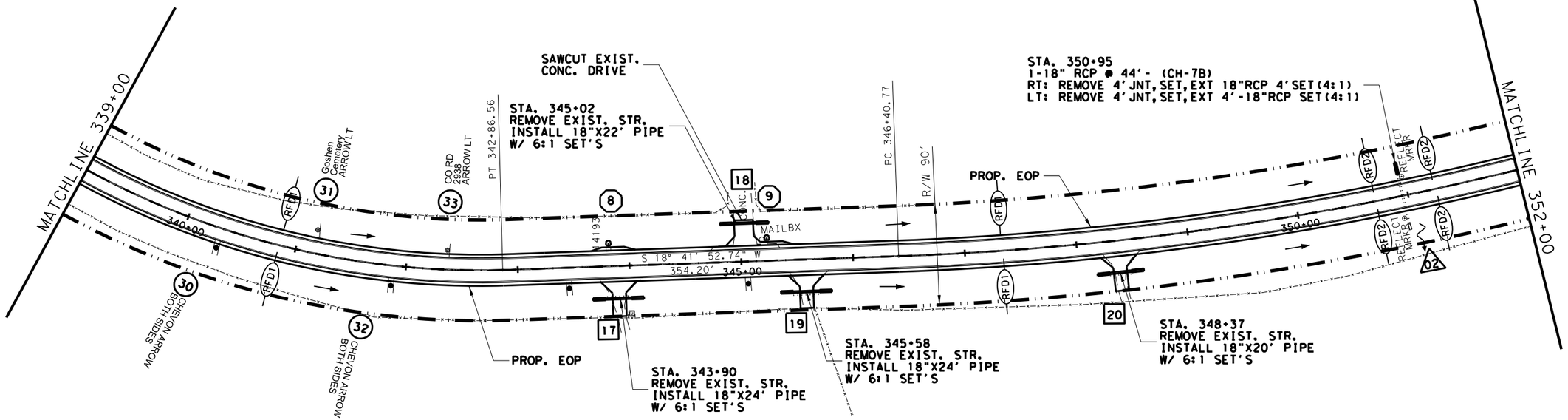

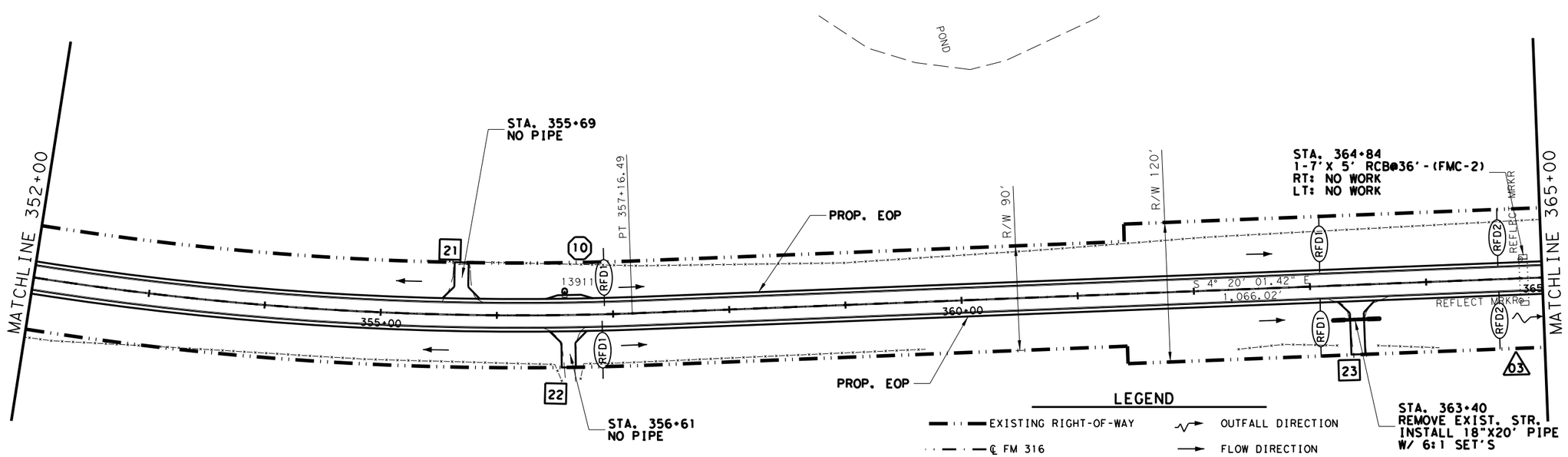

LEGEND

- EXISTING RIGHT-OF-WAY
- ℄ FM 316
- CROSS CULVERT NUMBER
- DRIVEWAY NUMBER
- SMALL SIGN NUMBER
- MAILBOX ASSEMBLY NUMBER
- OUTFALL DIRECTION
- FLOW DIRECTION
- RFD1 — ROCK FILTER DAM TY 1
- RFD2 — ROCK FILTER DAM TY 2
- SCF — SEDIMENT CONTROL FENCE

09/16/2022

FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 4 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		66

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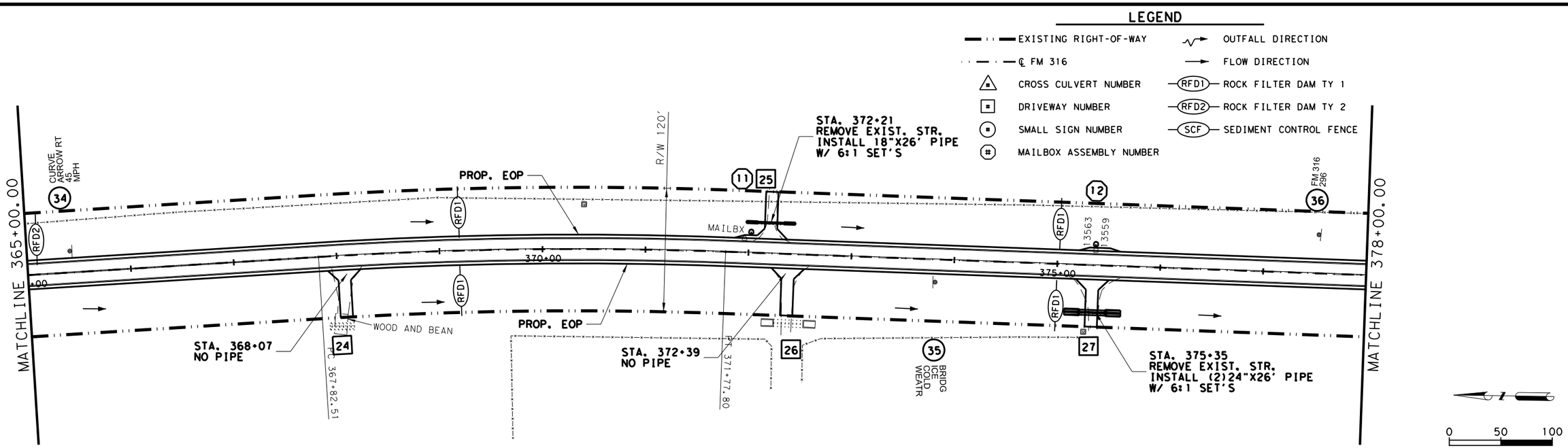

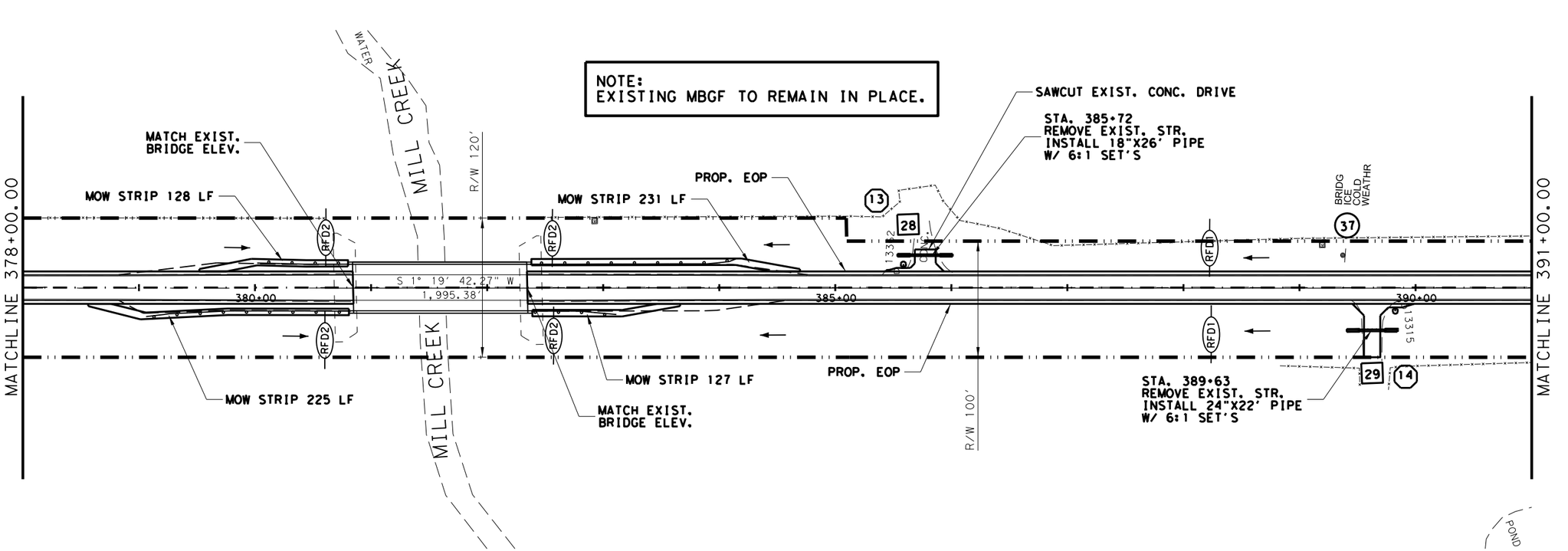

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FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 5 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		67

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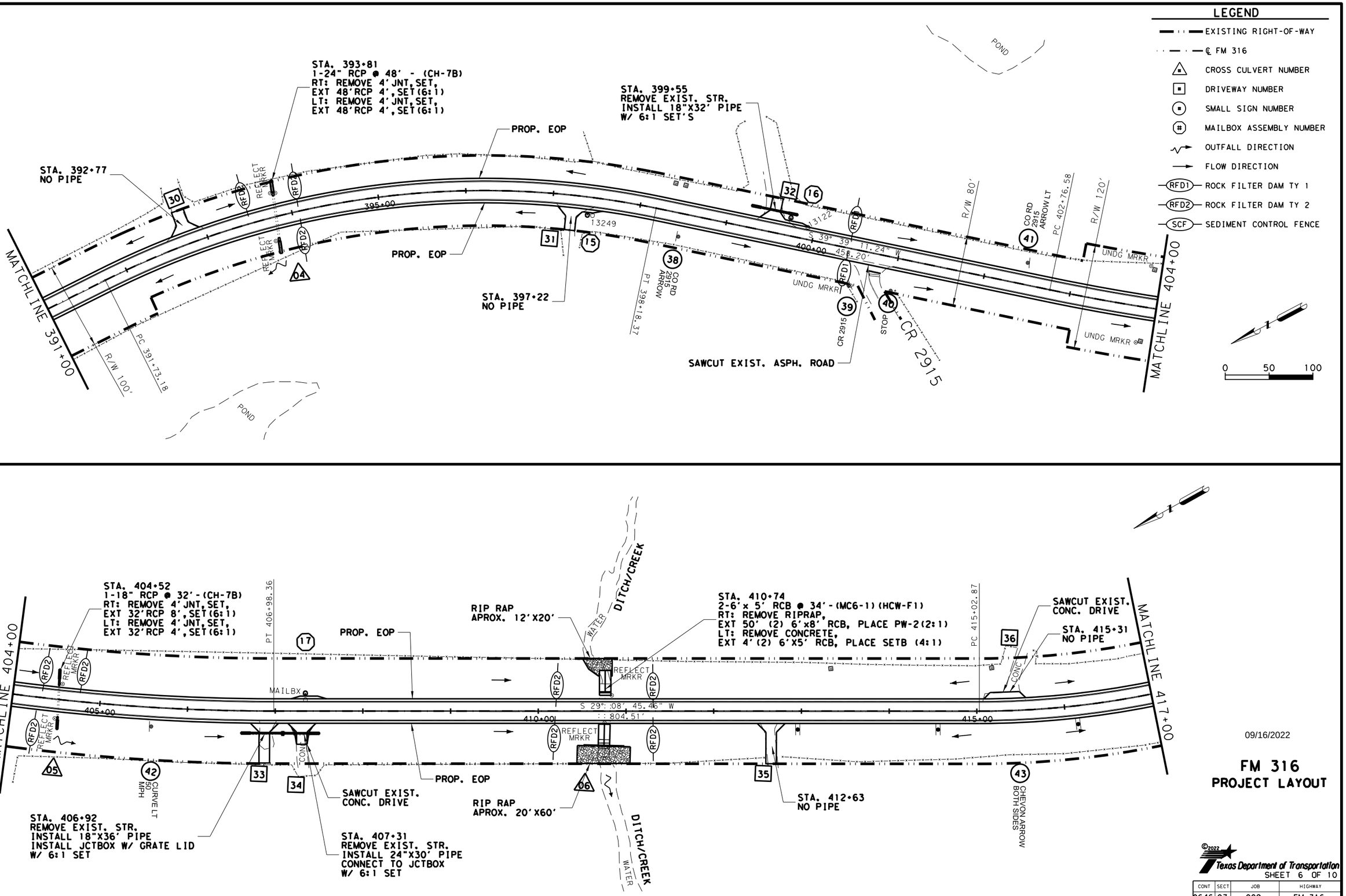

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FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 6 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		68

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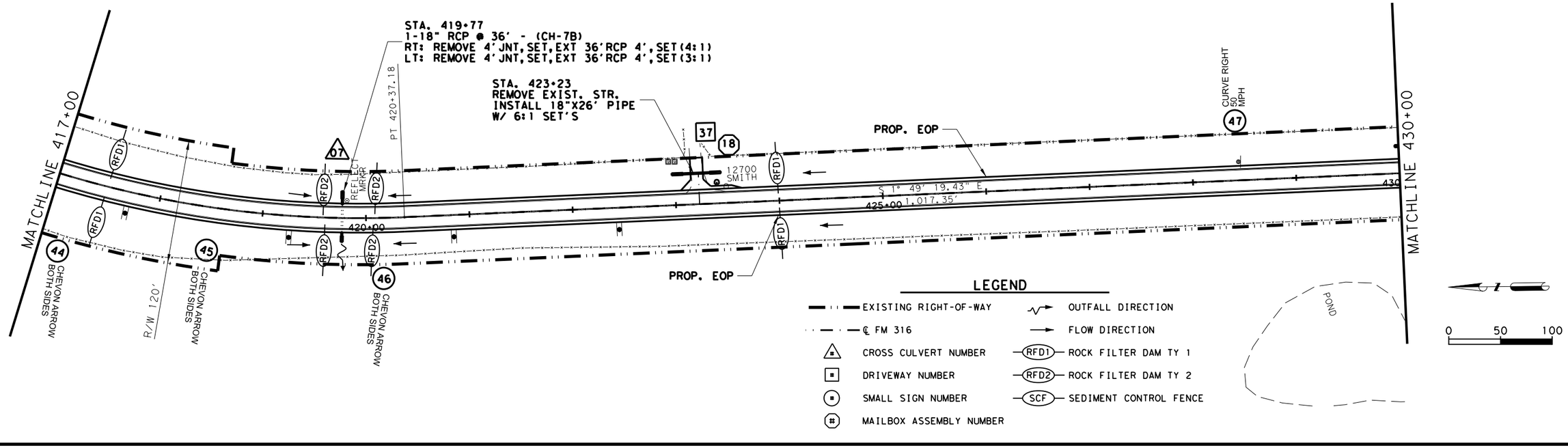

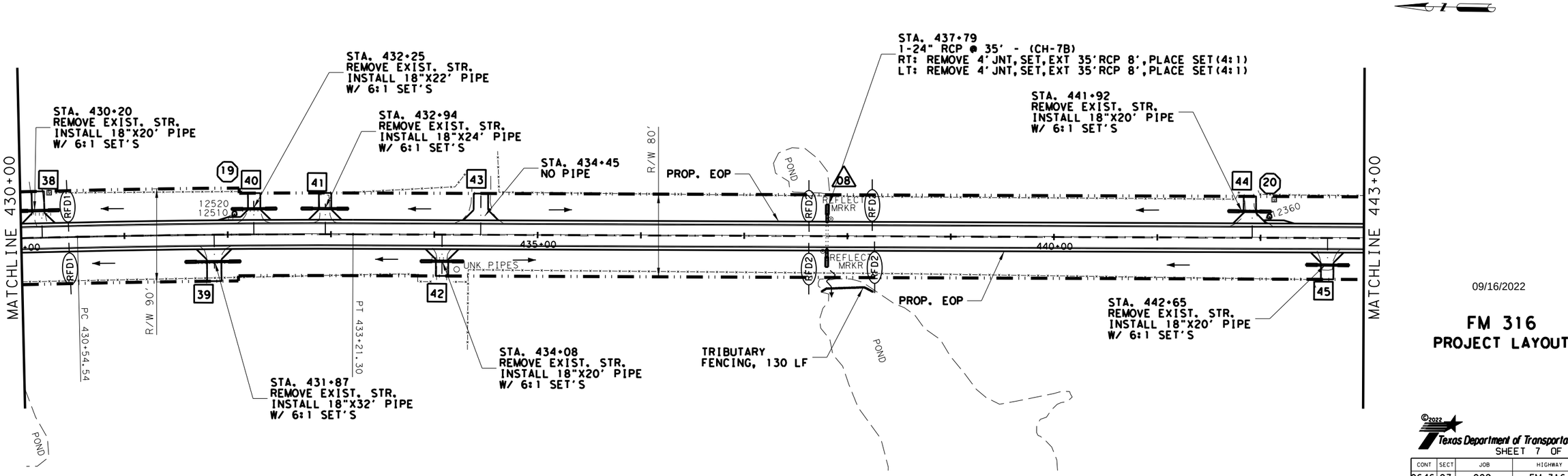

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FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 7 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		69

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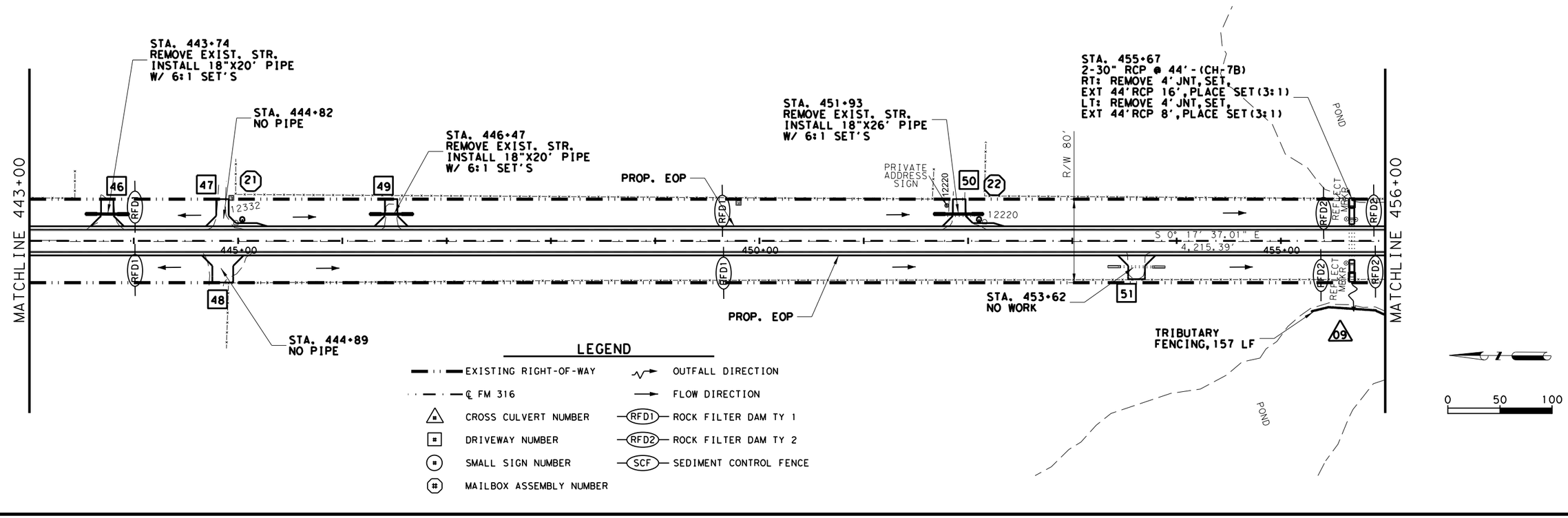

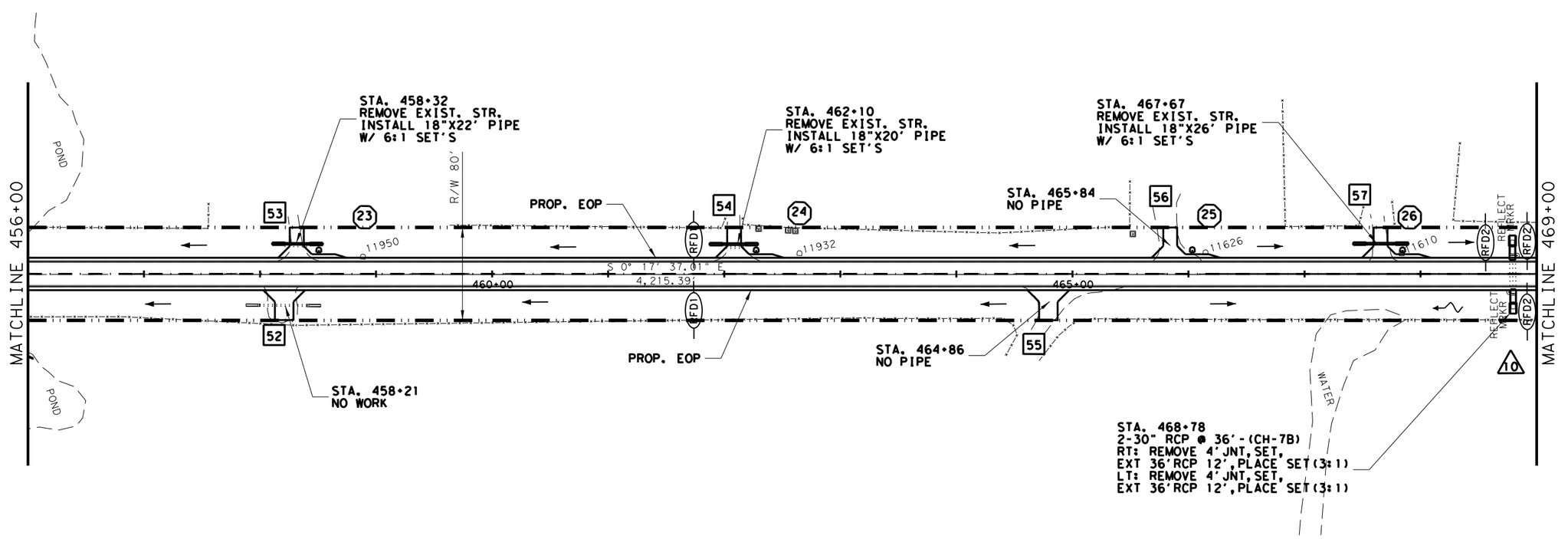

09/16/2022

FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 8 OF 10

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		70

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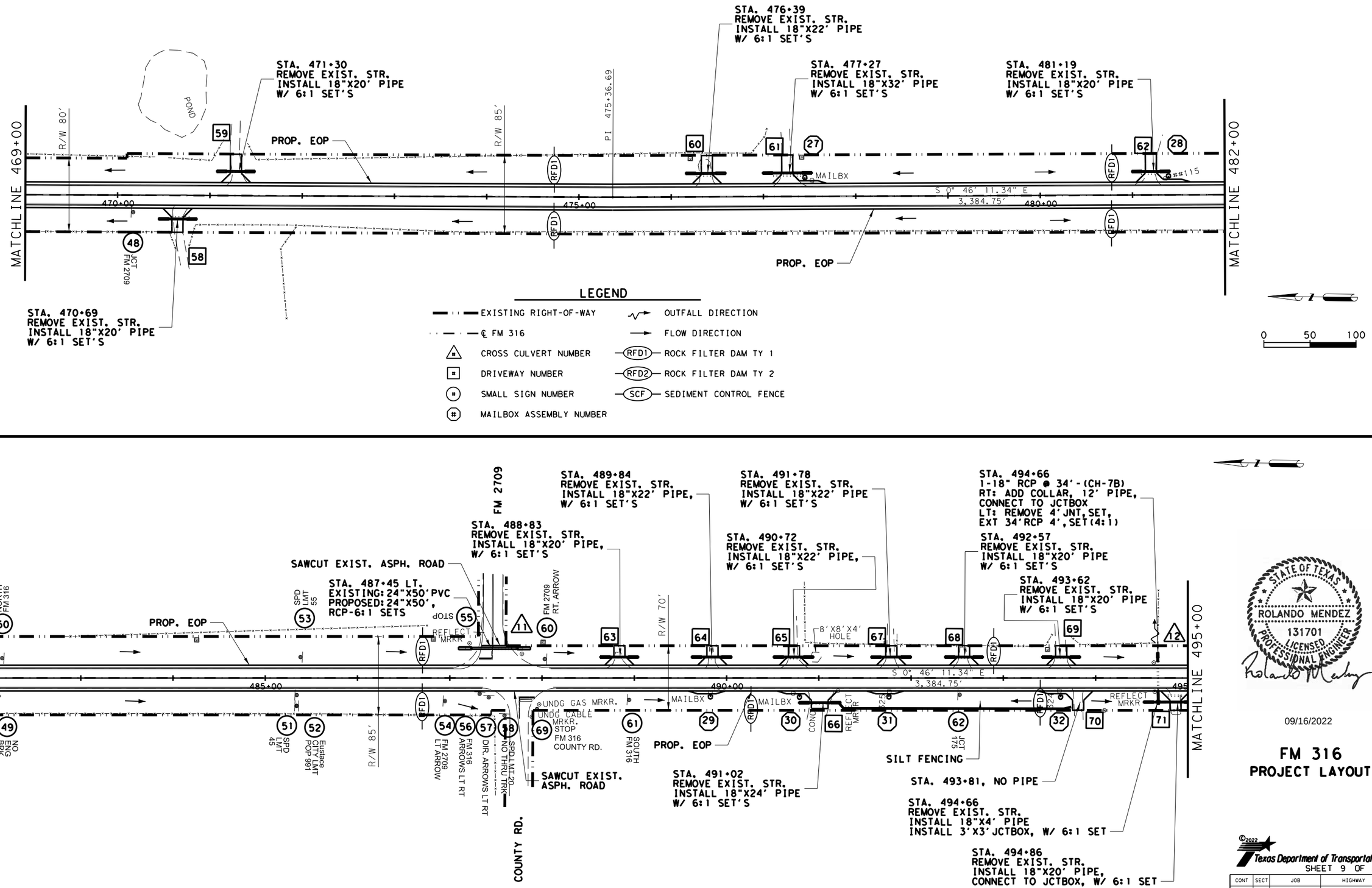

STATE OF TEXAS
ROLANDO MENDEZ
131701
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PROFESSIONAL ENGINEER

09/16/2022

FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 9 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		71

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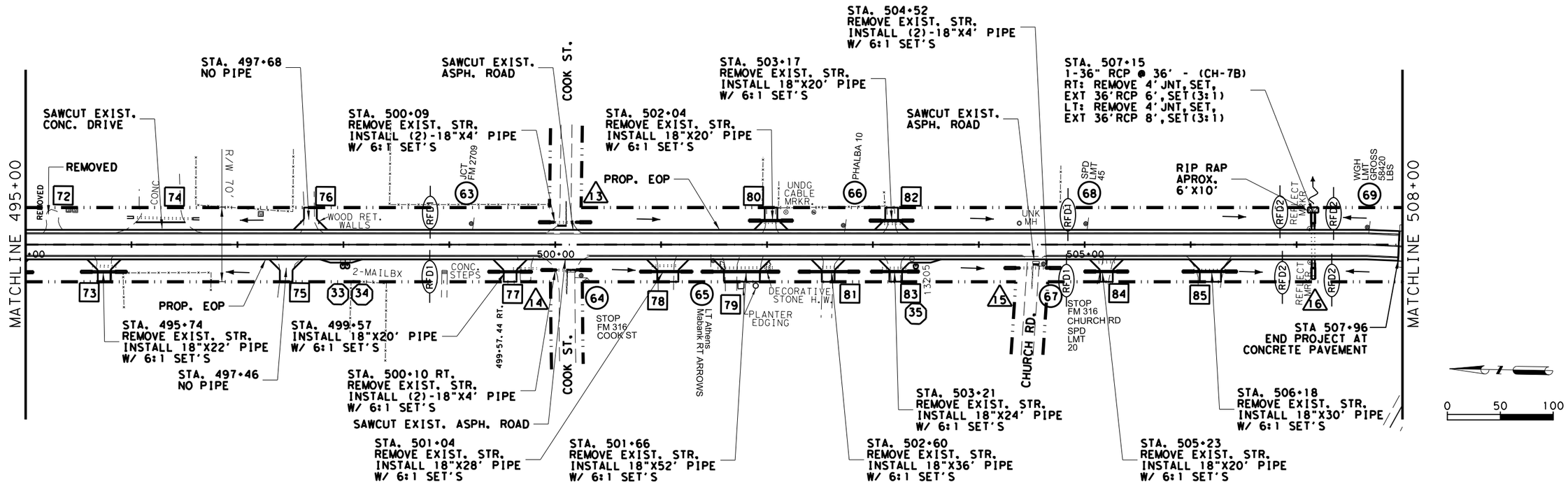

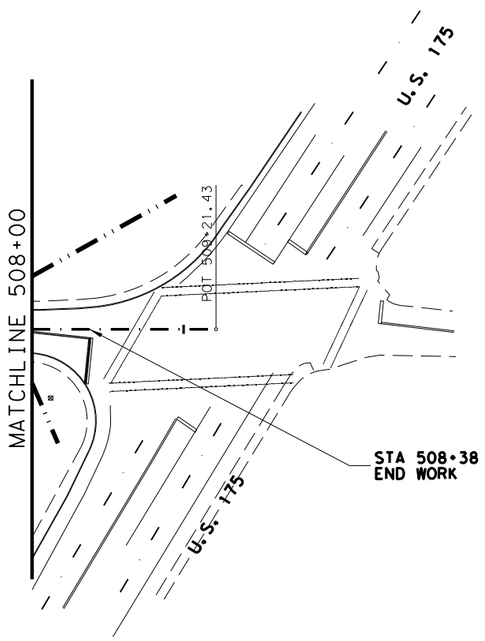

LEGEND

- EXISTING RIGHT-OF-WAY
- ℄ FM 316
- CROSS CULVERT NUMBER
- DRIVEWAY NUMBER
- SMALL SIGN NUMBER
- MAILBOX ASSEMBLY NUMBER
- OUTFALL DIRECTION
- FLOW DIRECTION
- RFD1 — ROCK FILTER DAM TY 1
- RFD2 — ROCK FILTER DAM TY 2
- SCF — SEDIMENT CONTROL FENCE

STATE OF TEXAS
ROLANDO MENDEZ
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09/16/2022

FM 316
PROJECT LAYOUT

Texas Department of Transportation

SHEET 10 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		72

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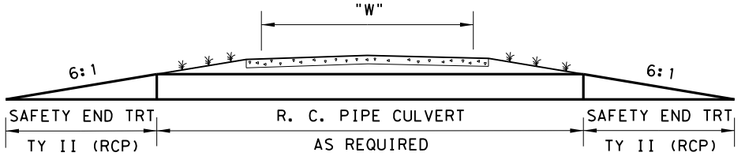
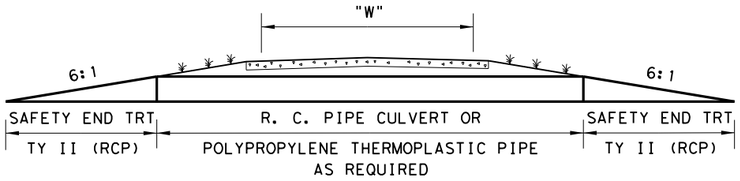
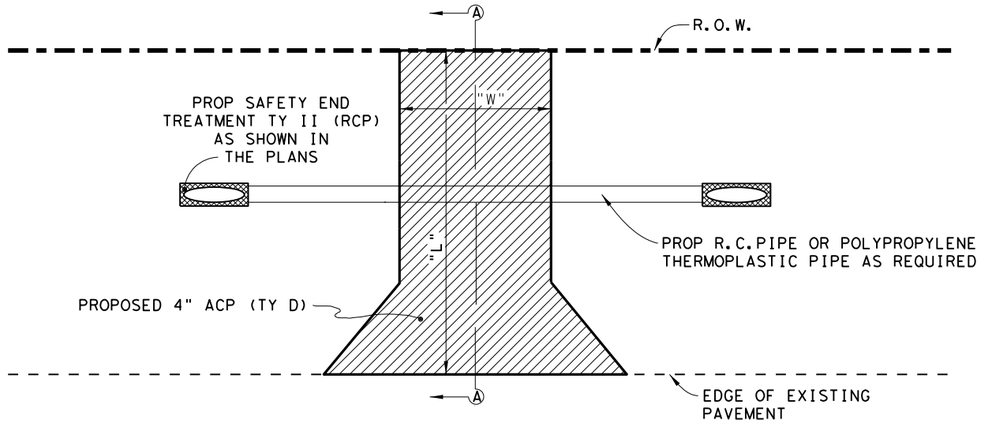


STATE MAINTAINED INTERSECTION
FM 2709

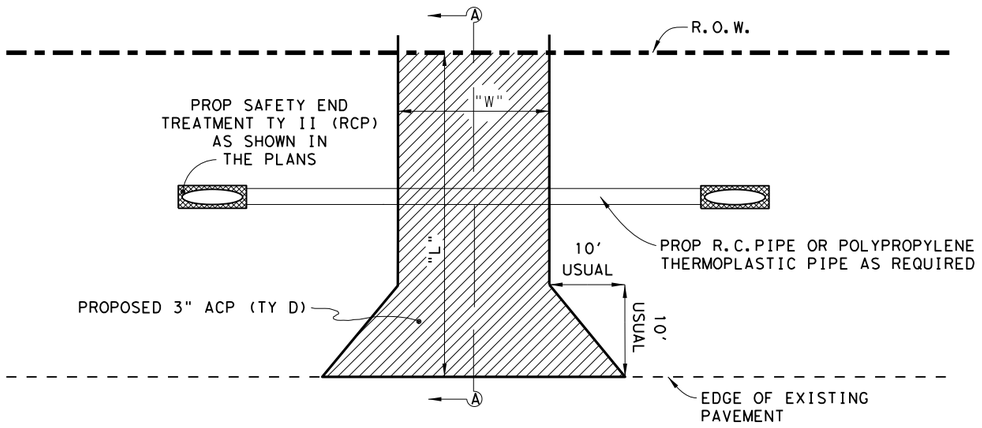


DRIVEWAY AND INTERSECTION TYPICAL SECTION



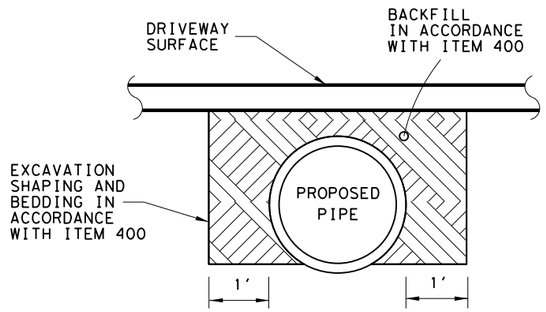
INTERSECTION DETAILS
EXIST ASPHALT SIDE STREETS
NTS

NOTE: SEE DRIVEWAY SUMMARY TABLE
FOR "W" & "L" DIMENSION



DRIVEWAY DETAILS
EXIST ASPHALT, GRAVEL, DIRT DRIVEWAYS
N.T.S.

NOTE: SEE DRIVEWAY SUMMARY TABLE
FOR "W" & "L" DIMENSION



BACKFILL
DETAIL FOR DRIVEWAYS
AND INTERSECTIONS
N.T.S.

PIPE BACKFILL DETAIL

NOTE: EXCAVATION, SHAPING, BEDDING, AND BACKFILL ARE SUBSIDIARY TO ITEM 464 OR ITEM 4122.

STATE OF TEXAS
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09/16/2022

FM 316
MISCELLANEOUS
DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		73

DATE: 8/3/2022 8:09:25 AM
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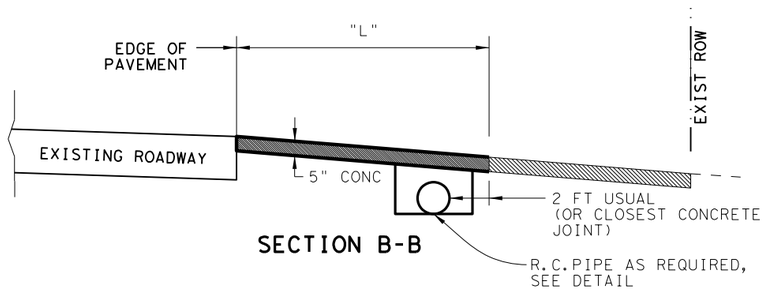

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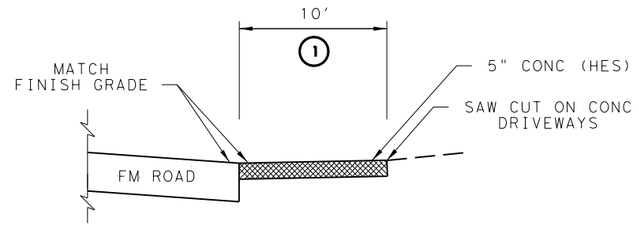

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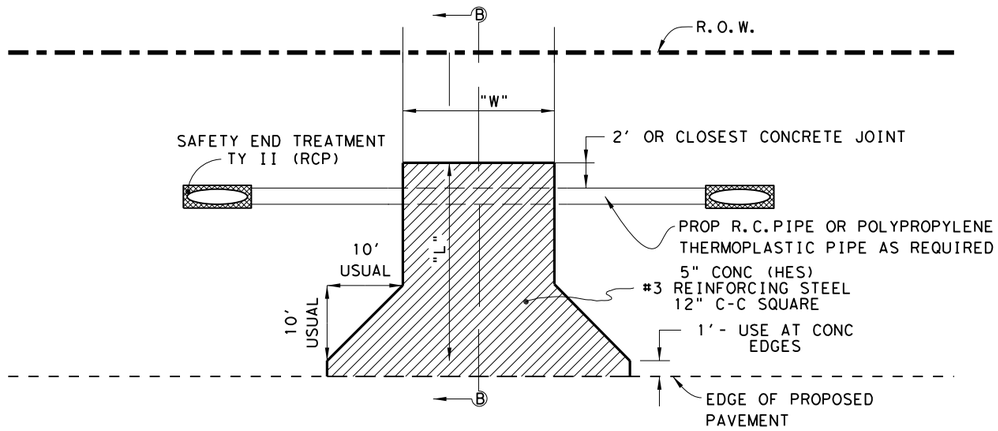
SECTION A-A



DRIVEWAY DETAILS
CONCRETE DRIVEWAYS
NTS

NOTE: SEE DRIVEWAY SUMMARY TABLE FOR "W" & "L" DIMENSION

STATE OF TEXAS
ROLANDO MENDEZ
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09/16/2022

FM 316
MISCELLANEOUS DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		74

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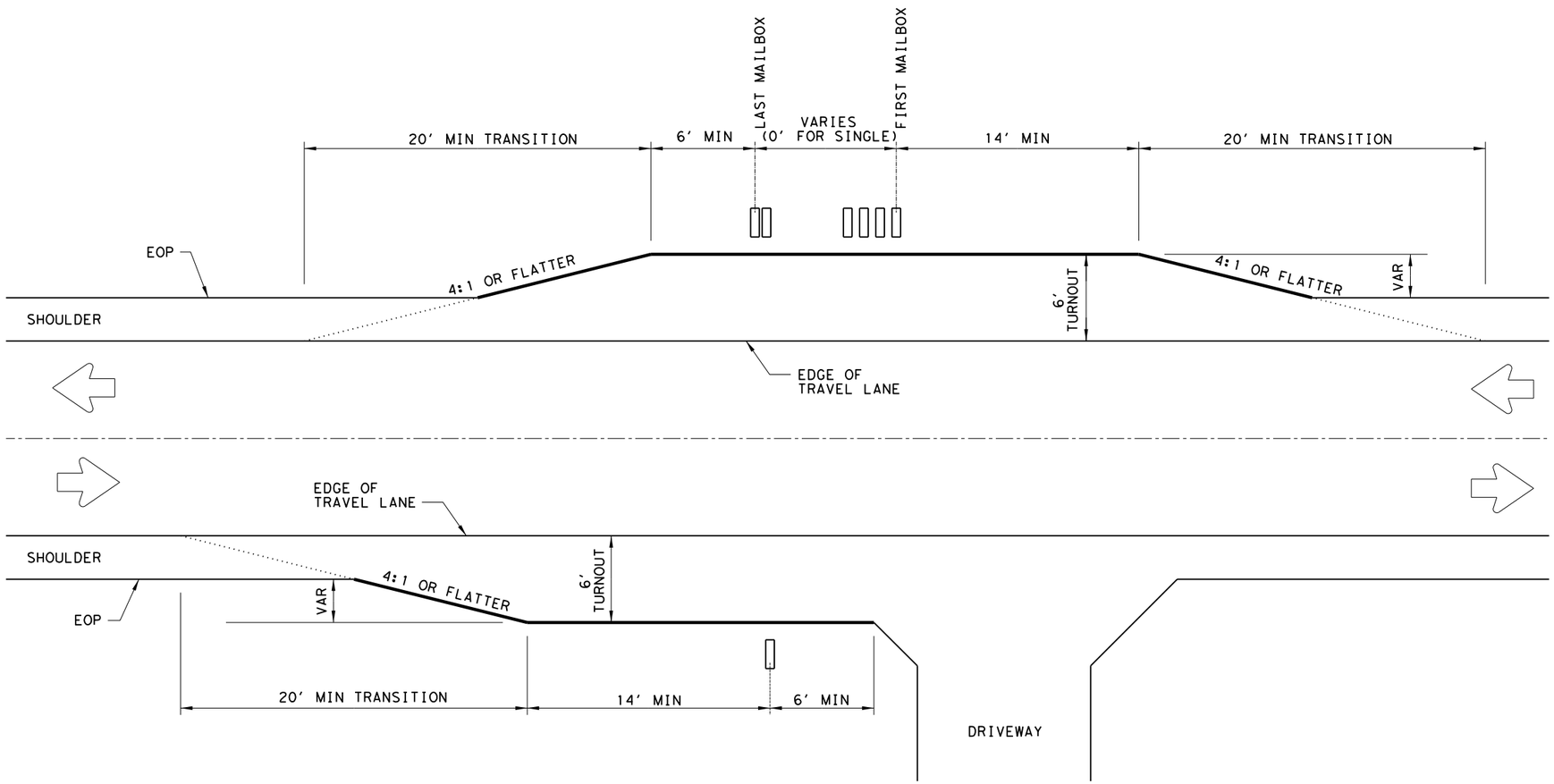
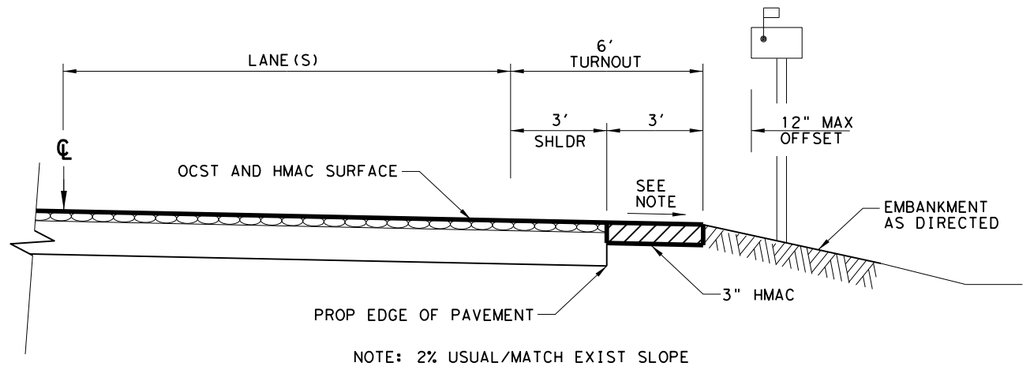


TYPICAL MAILBOX TURNOUT

NOT TO SCALE



NOTE: 2% USUAL/MATCH EXIST SLOPE

TYPICAL SECTION

NOT TO SCALE

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316 MISCELLANEOUS DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		75

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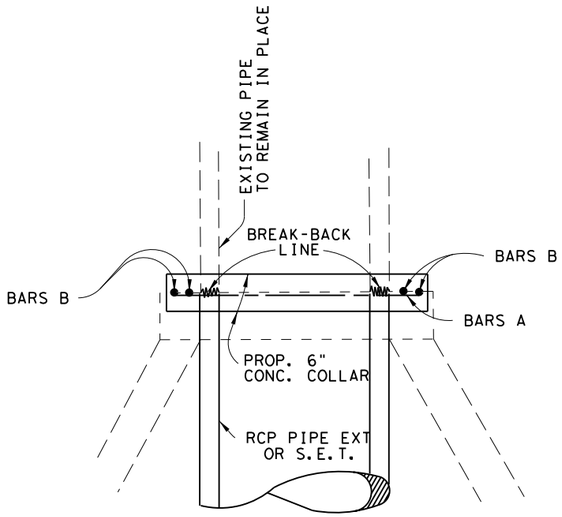
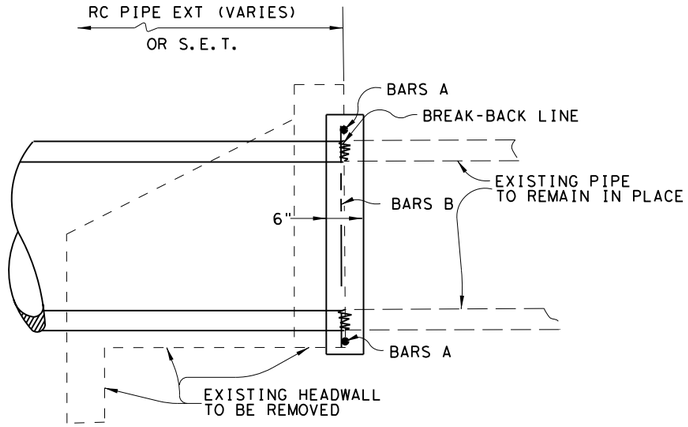
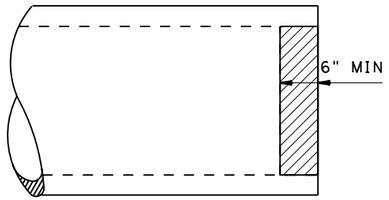


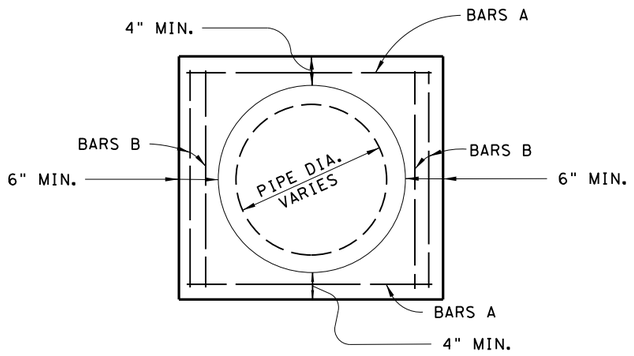


LONGITUDINAL ELEVATION



CONCRETE PIPE PLUG TO BE USED TO SEAL ABANDONED PIPE AT VARIOUS LOCATIONS AS INDICATED ON PLANS.

TYPICAL PIPE PLUG DETAIL



END VIEW

NOTE:

A CL C CONCRETE COLLAR SHALL BE USED AT LOCATIONS AS SHOWN ON THE PLANS WHERE ONLY THE EXISTING HEADWALL OR LESS THAN A FULL JOINT OF PIPE IS TO BE REMOVED PRIOR TO THE INSTALLATION OF THE CULVERT EXTENSION.
A CONCRETE COLLAR SHALL BE USED AT LOCATIONS WHERE AN EXISTING METAL PIPE CULVERT IS BEING EXTENDED WITH R.C. PIPE OR A SAFETY END TREATMENT.
A CONCRETE COLLAR SHALL BE USED AT ALL 15, 30, & 45 DEGREE PIPE BEND JOINT CONNECTIONS.
REINFORCING STEEL (BARS A & B) SHALL BE #4 BARS CUT IN THE FIELD TO FIT.
CONCRETE COLLAR SHALL CONFORM TO INSIDE DIAMETER OF PIPE CULVERTS.

NOT TO SCALE

STATE OF TEXAS
ROLANDO MENDEZ
131701
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PROFESSIONAL ENGINEER

09/16/2022

FM 316 MISCELLANEOUS DETAILS

Texas Department of Transportation

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		76

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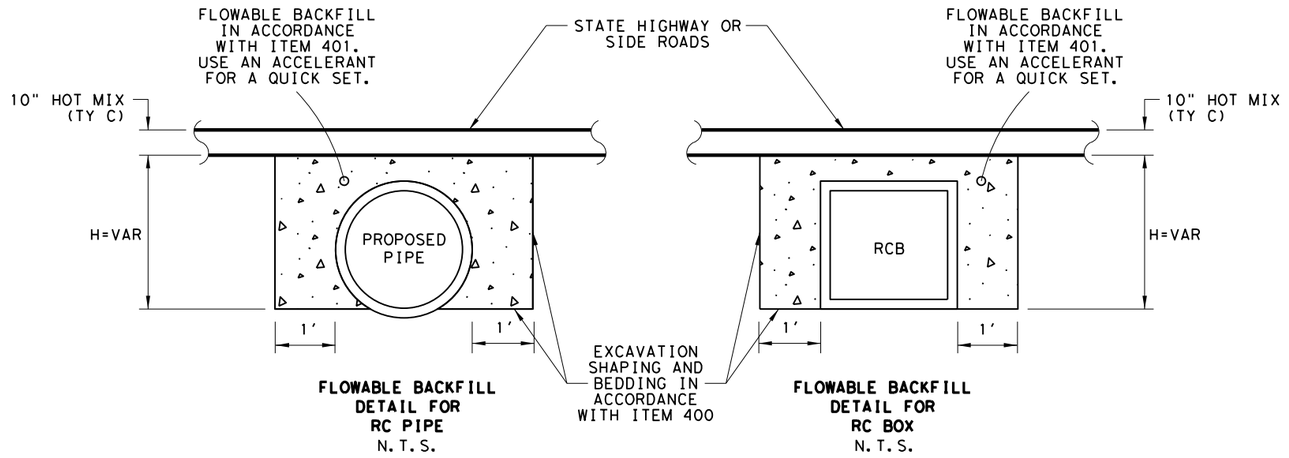
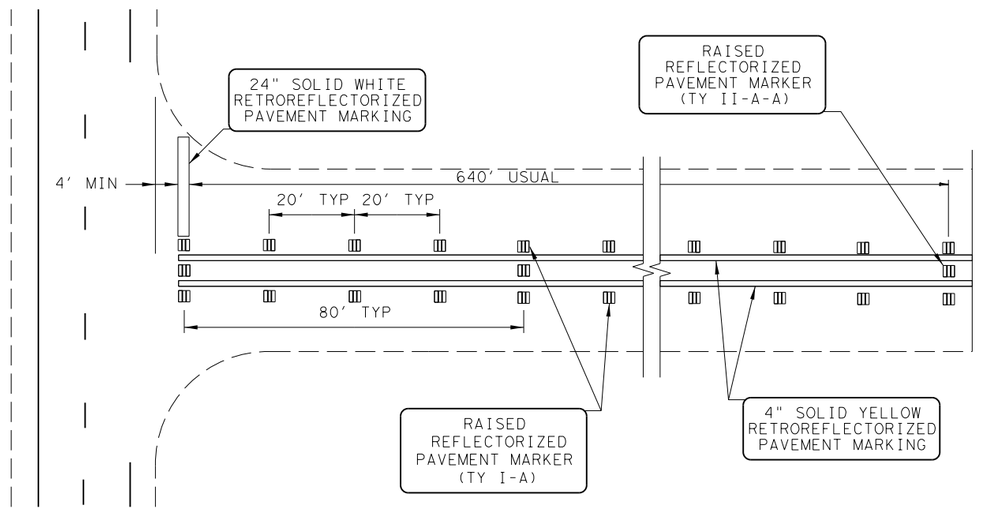


FLOWABLE BACKFILL DETAIL FOR RC PIPE
N.T.S.

FLOWABLE BACKFILL DETAIL FOR RC BOX
N.T.S.

FM 2709
CUT & RESTORE PAVE

NOTE: EXCAVATION, SHAPING, BEDDING, AND BACKFILL ARE SUBSIDIARY TO ITEM 464.
FLOWABLE BACKFILL WILL BE PAID FOR AS PROVIDED IN ITEM 401, "FLOWABLE BACKFILL".



PAVEMENT MARKING TREATMENT
AT STATE MAINTAINED HIGHWAY INTERSECTIONS

NTS REVISED: 05/2018

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED PROFESSIONAL ENGINEER

09/16/2022

FM 316
MISCELLANEOUS DETAILS

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		77

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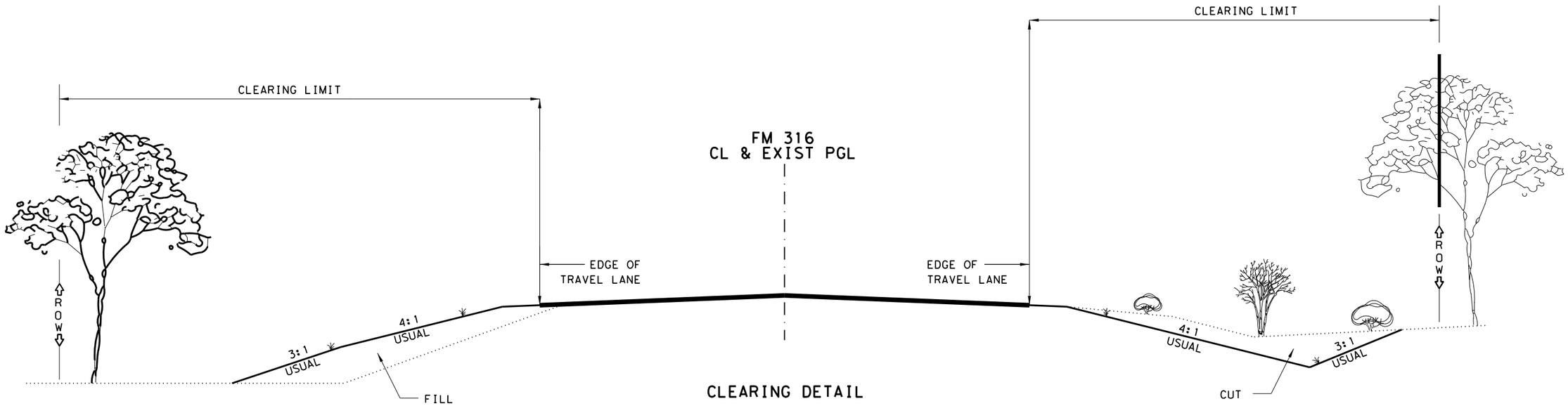

CLEARING DETAIL

PREPARING ROW DETAILS

NOTES:

1) PAYMENT WILL BE MADE AT THE UNIT BID PRICE FOR PREPARING RIGHT OF WAY BY THE STATION. STATION LIMITS WILL BE SHOWN ELSEWHERE IN THE PLANS. ALL TRIMMING APPLIES TO BOTH SIDES OF THE ROADWAY.

2) ALL TREE LIMBS EXTENDING INTO THE ROW SHALL BE REMOVED, UNLESS OTHERWISE SHOWN ON PLANS. VIRTICLE CLEARING LIMITS ARE FROM NATURAL GROUND THROUGH TOP OF TREE OR AS DIRECTED.

3) CLEARING OPERATIONS SHALL BE PERFORMED IN ACCORDANCE TO ITEM 100, "PREPARING RIGHT OF WAY", EXCEPT THOSE SHOWN BY THESE DETAILS.

4) WHERE STEEP SLOPES MAKE GRINDING OPERATIONS IMPRACTICAL, AND THE ENGINEER APPROVES IN WRITING, THE CONTRACTOR MAY CUT STUMPS OFF EVEN WITH THE GROUND.

STATE OF TEXAS
ROLANDO MENDEZ
131701
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PROFESSIONAL ENGINEER

09/16/2022

FM 316
MISCELLANEOUS
DETAILS

Texas Department of Transportation

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		78

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DATE: 8/3/2022 8:13:44 AM
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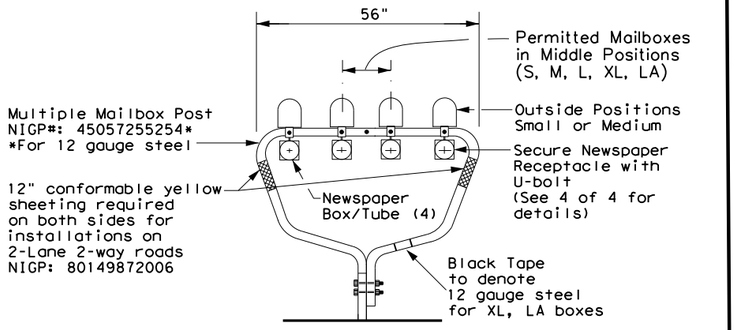
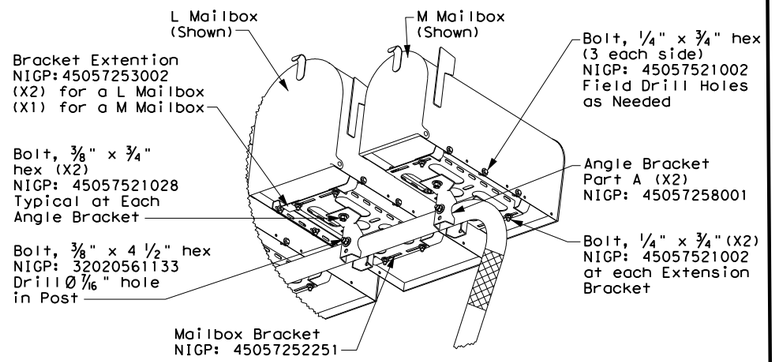
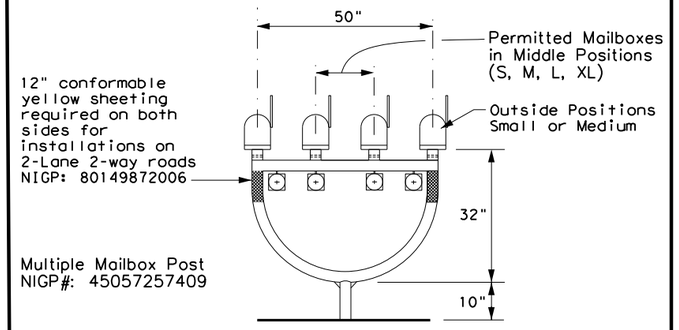
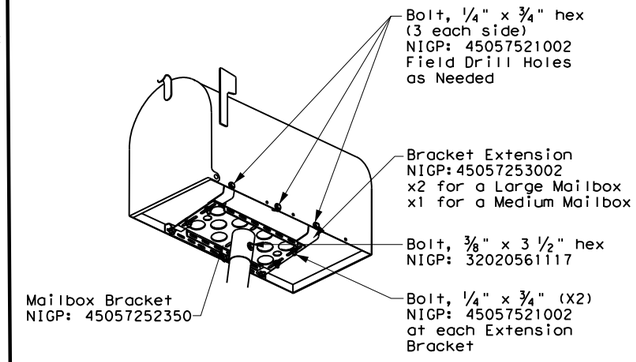
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

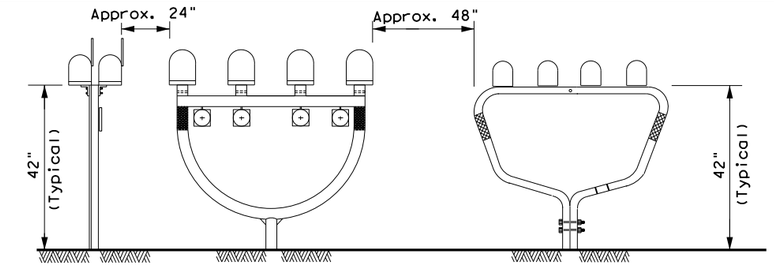
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

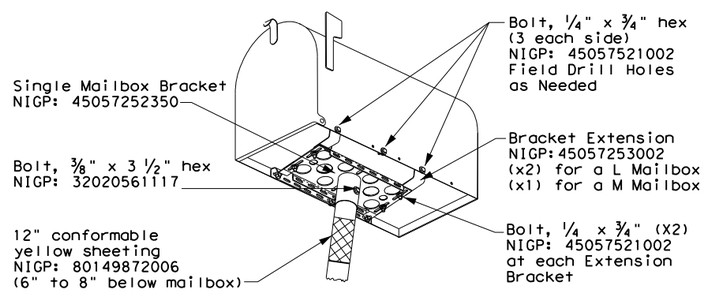
TYPICAL INSTALLATION MEASUREMENTS

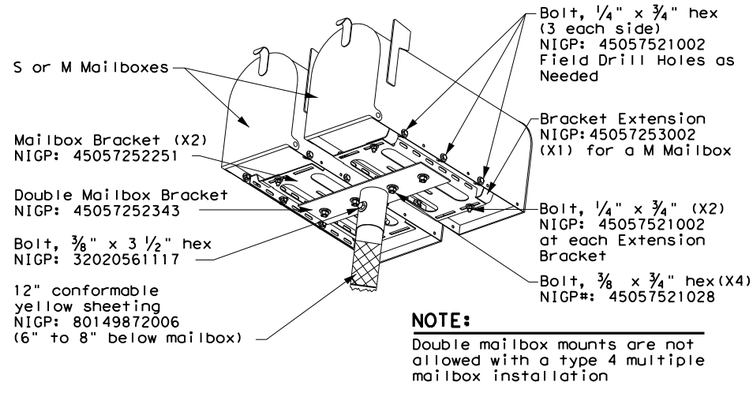


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

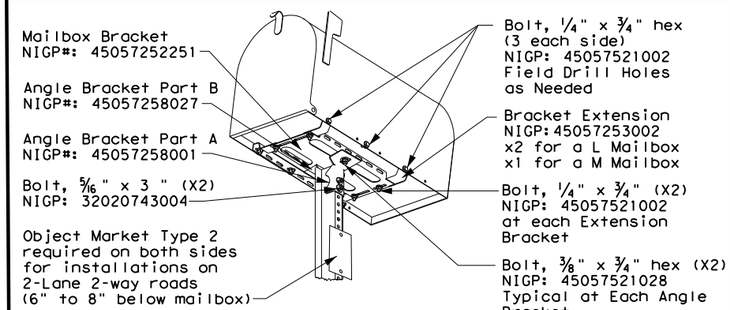


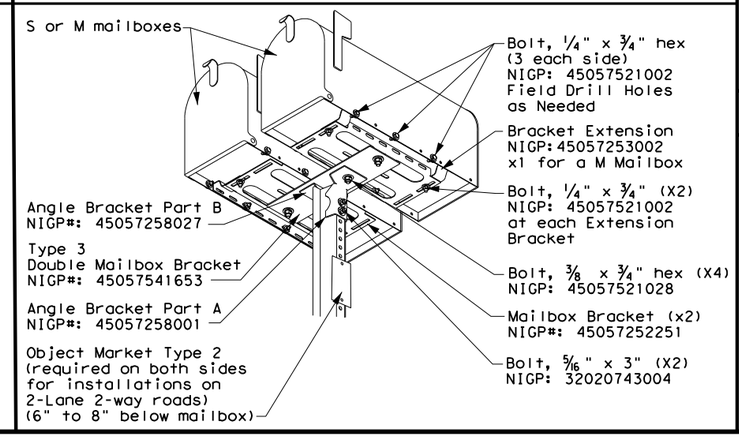


NOTE:

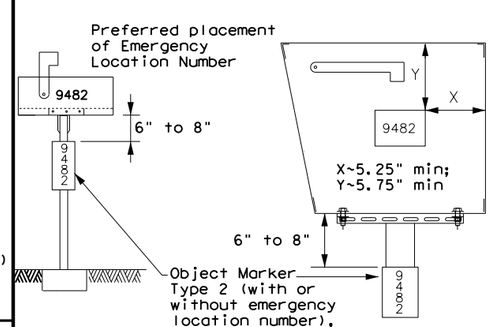
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

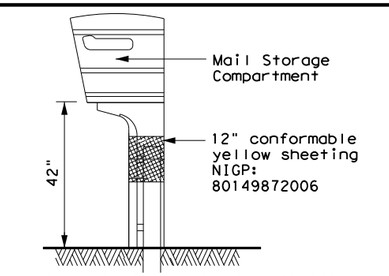


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		79

DATE: 8/3/2022 8:13:45 AM
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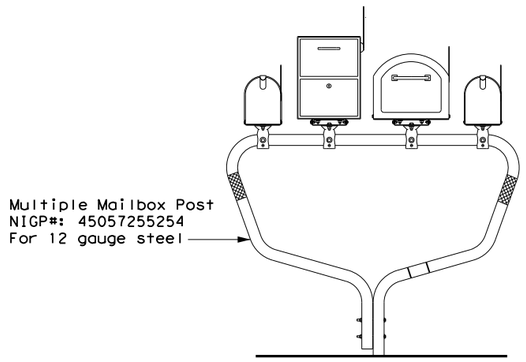
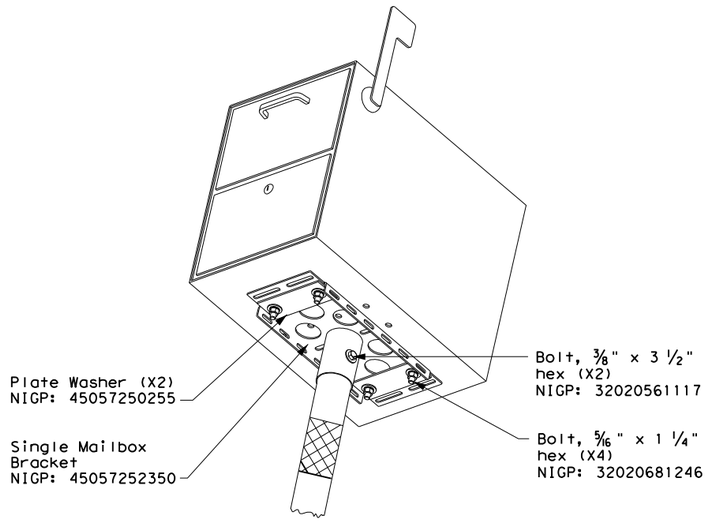
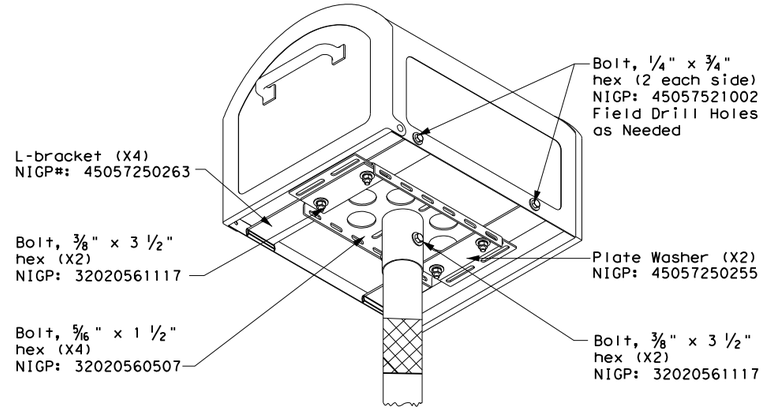
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

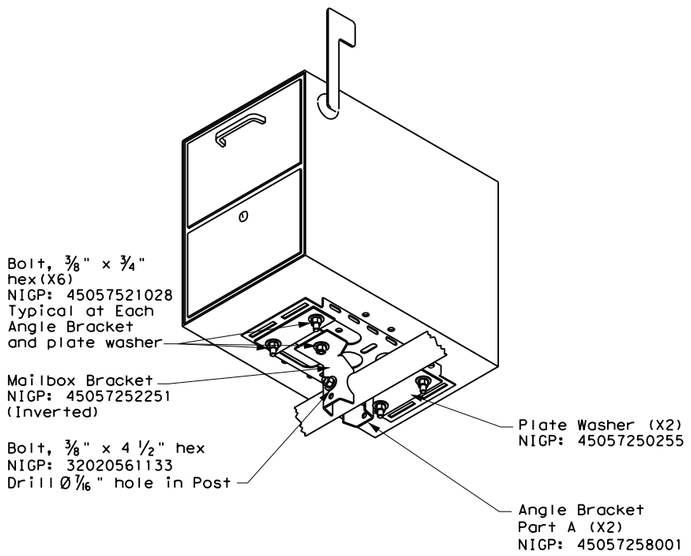


TYPE 2/4 - SINGLE XL MAILBOX

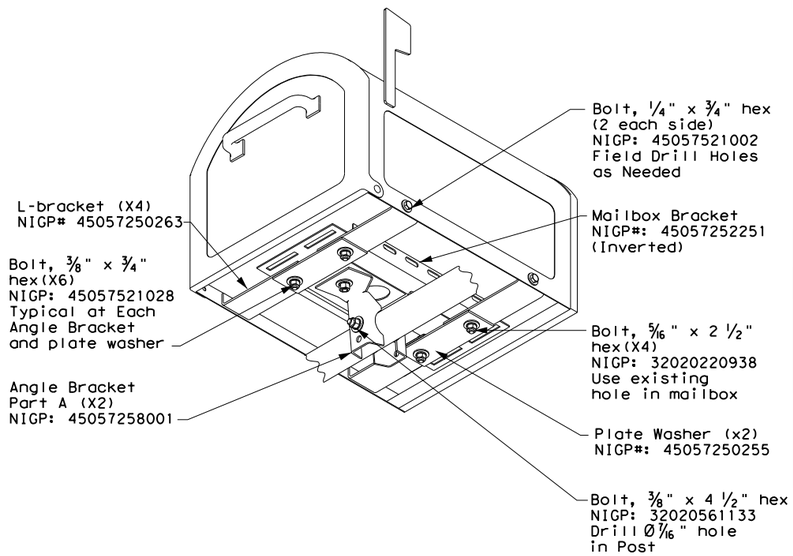


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

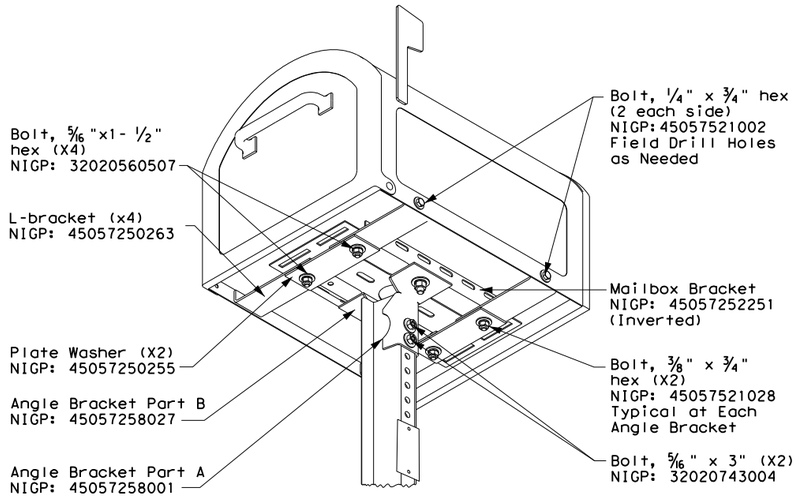
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation — Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		80

DATE: 8/3/2022
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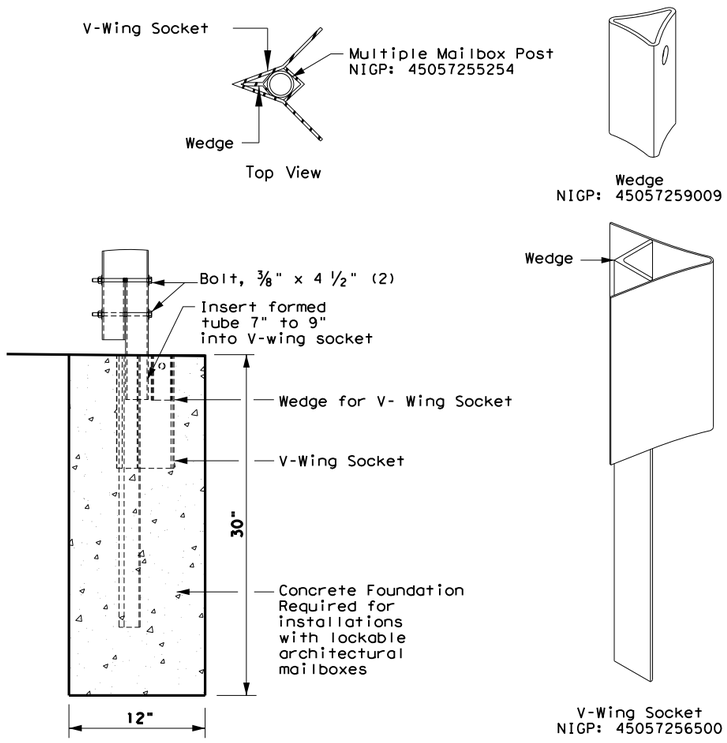
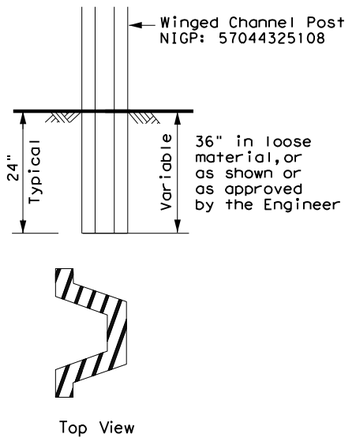
TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

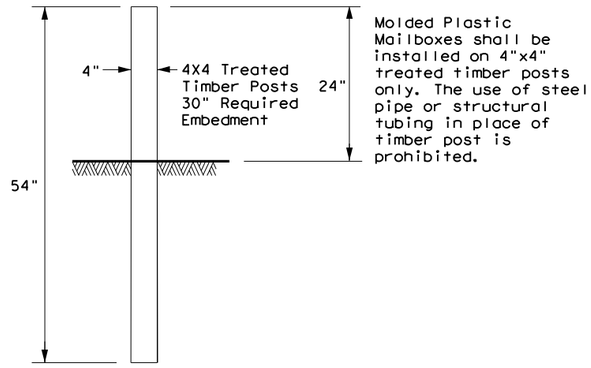


TYPE 3 - SUPPORT/FOUNDATION

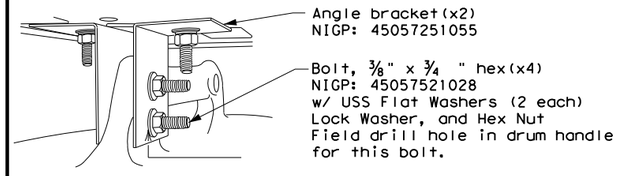


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

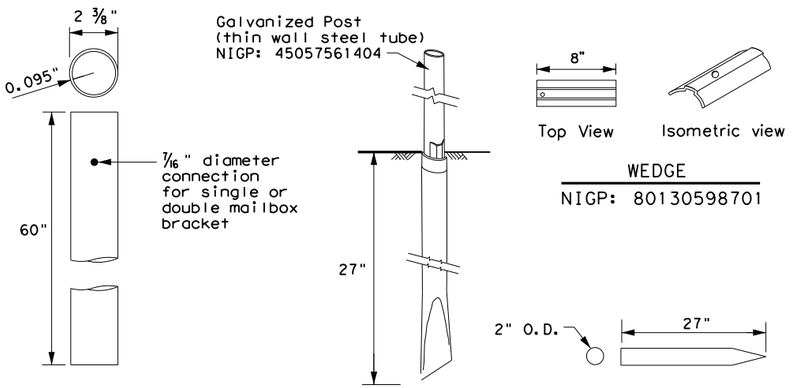


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

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

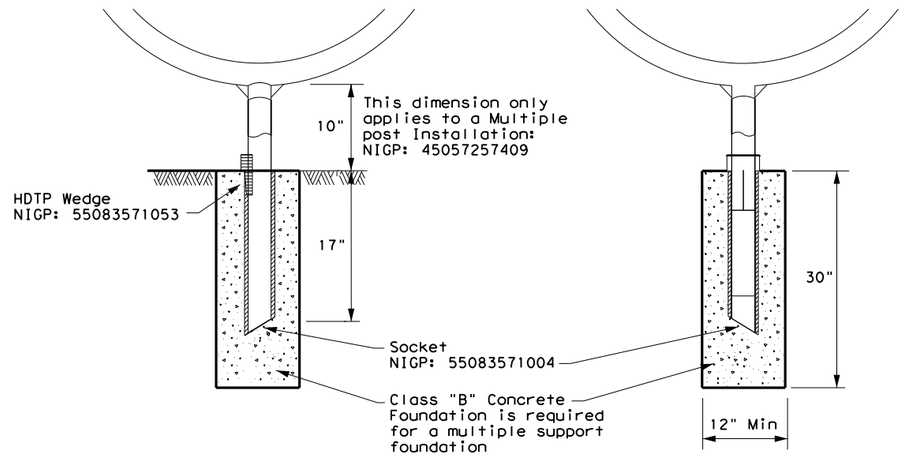
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

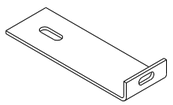
Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

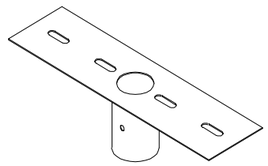
FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		81

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



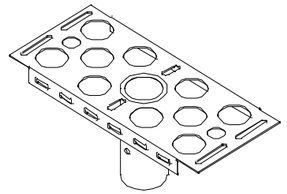
NIGP: 45057250263

L-Bracket x4 for
XL sized mailboxes



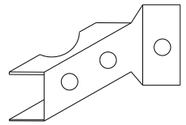
NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4
double mount



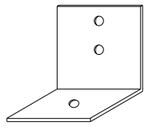
NIGP: 45057252350

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



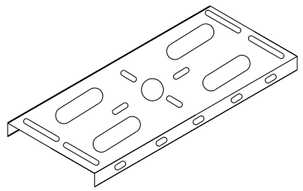
NIGP: 45057258001

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



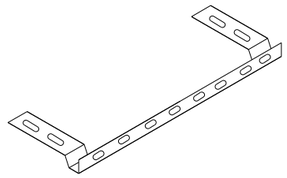
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



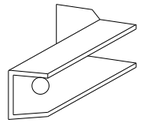
NIGP: 45057252251

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



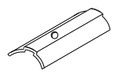
NIGP: 45057253002

Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



NIGP: 45057258027

Part "B" Angle Bracket
For Type 3 single
and double



NIGP: 80130598701

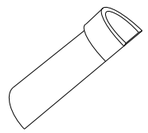
Wedge for Type 2

NIGP: 45057250255

Plate Washer for Architecural
and XL Mailboxes

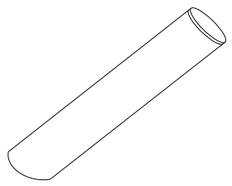
NIGP: 45057541653

Type 3 double mailbox bracket



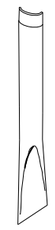
NIGP: 55083571053

Type 4 Mailbox Wedge



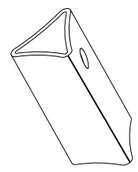
NIGP: 55083571004

Type 4 Mailbox Socket



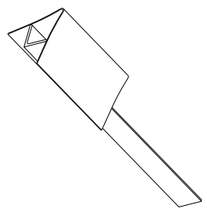
NIGP: 80130238407

Type 2 Wedge Anchor



NIGP: 45057259009

Wedge for Type 1 V-wing Socket



NIGP: 45057256500

V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

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

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

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

DATE: 8/3/2022 8:13:46 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0467950\FM316_RDW_MB-21(1).dgn

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		82

DATE: 8/3/2022
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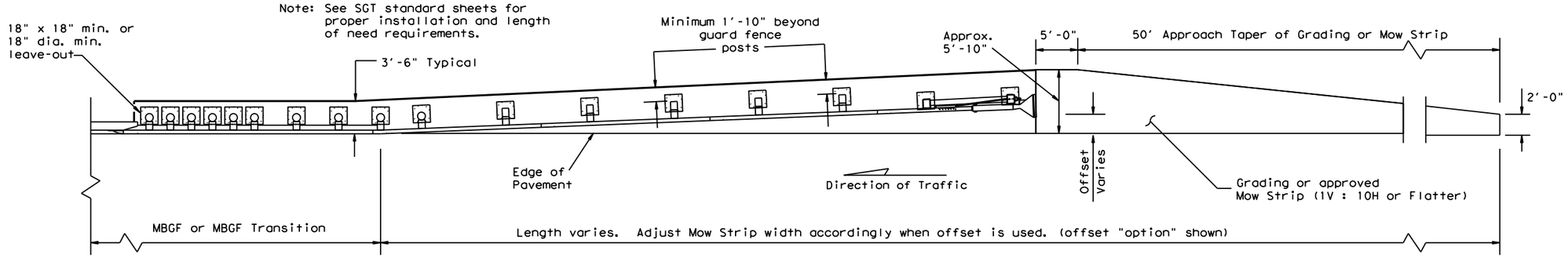
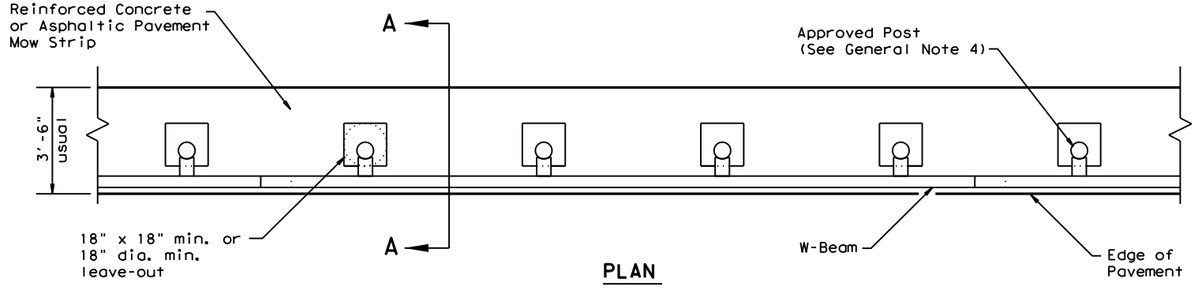
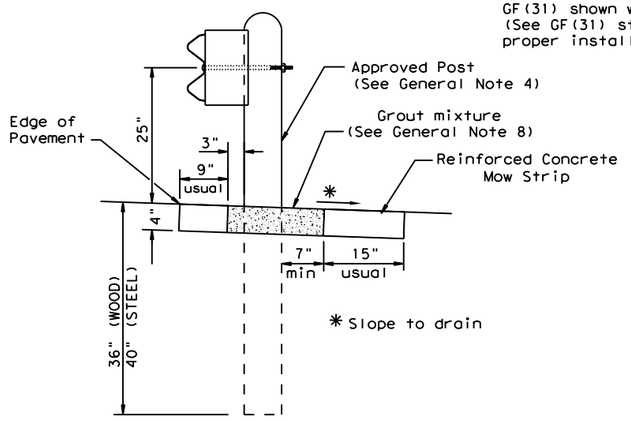


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



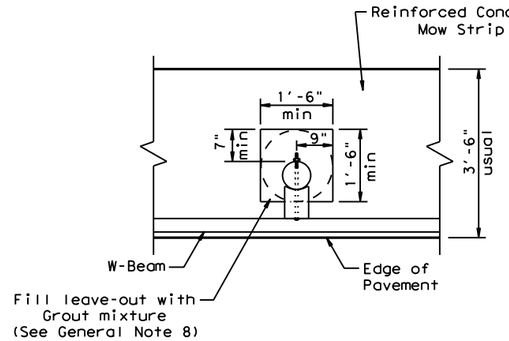
PLAN

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



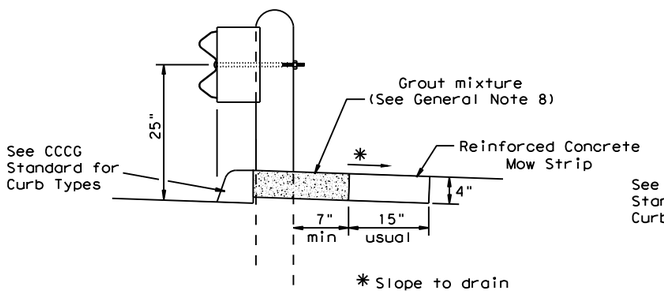
SECTION A-A

Typical



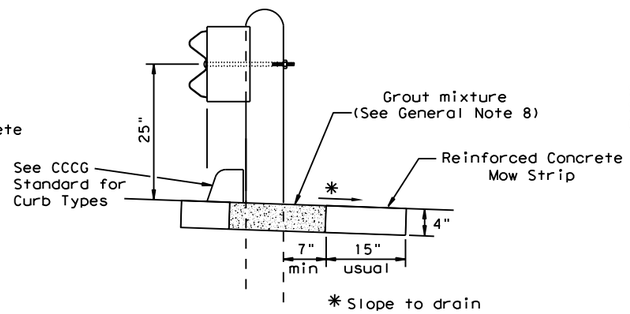
MOW STRIP DETAIL

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



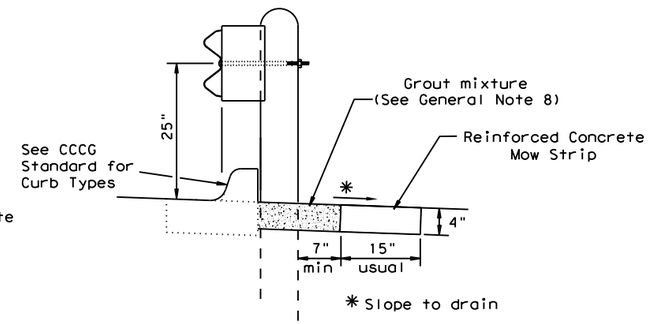
CURB OPTION (1)

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	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		83

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" (2) Conc (Curb) (CY)	Class "C" (3) Conc (Wingwall) (CY)	Total Wingwall Area (SF)
STA 410+74 (Rt)	2 ~ 6' X 8'	16'	MC6-16(MOD)	PW-2	0	2:1	9"	7"	1.000	9.750	N/A	N/A	17.500	13.750	N/A	0.0	0.5	23.0	335
STA 410+74 (Lt)	2 ~ 6' X 5'	16'	MC-6-16	SETBC	0	4:1	9"	7"	1.000	6.500	N/A	N/A	24.667	N/A	13.750	0.0	0.5	13.1	N/A

DATE: 8/3/2022 8:36:23 AM
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NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

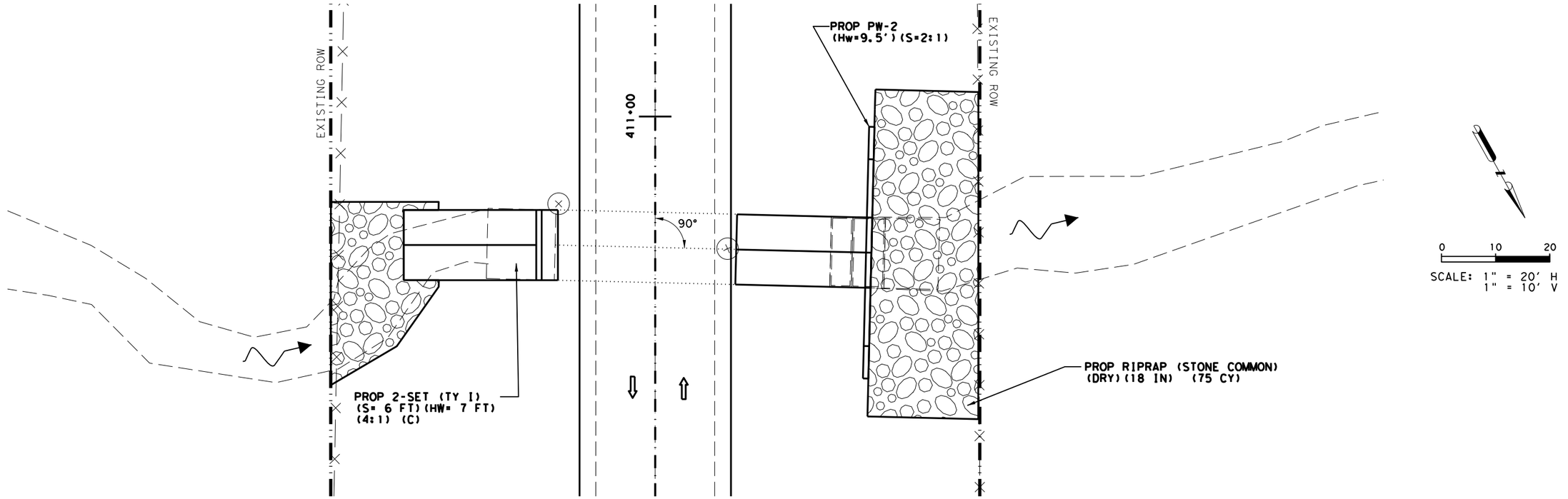
Texas Department of Transportation

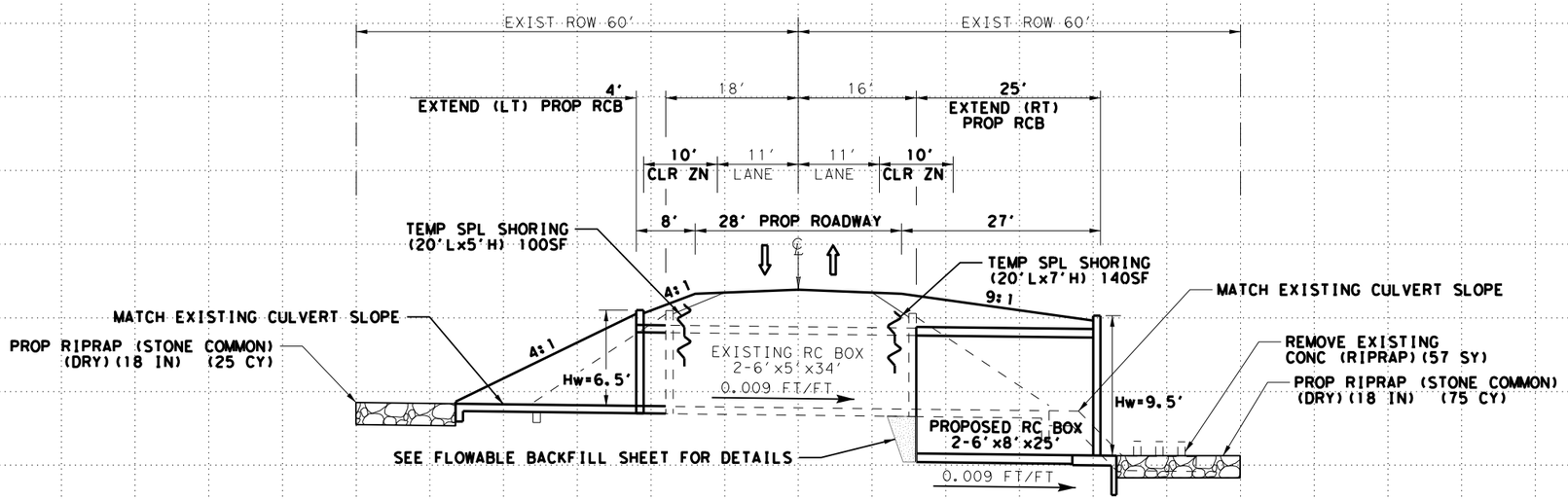
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		84





STA 410+74
CULVERT LAYOUT

EXISTING RC BOX = 2-6'x5'x34', 2-SETB-CD (3:1)
PROPOSED RC BOX (RT) = EXTEND 2-6'x8'RCB @ 25' FOR A TOTAL=50', PW-2(Hw=9.5')(S=2:1)
ROCK RIPRAP 18", STD = MC-6-16 (MOD
PROPOSED RC BOX (LT) = EXTEND 2 RCB @ 4' FOR A TOTAL=8', 2-SET (TY I)(S= 6 FT)(HW= 7 FT)(4:1)(C), ROCK RIPRAP 18"
STD = MC-6-16, SETB-CD
REMOVABLE ITEMS = 4-SETB-CD (3:1), CONCRETE RIPRAP

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
CULVERT LAYOUT
STA 410+74

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		85

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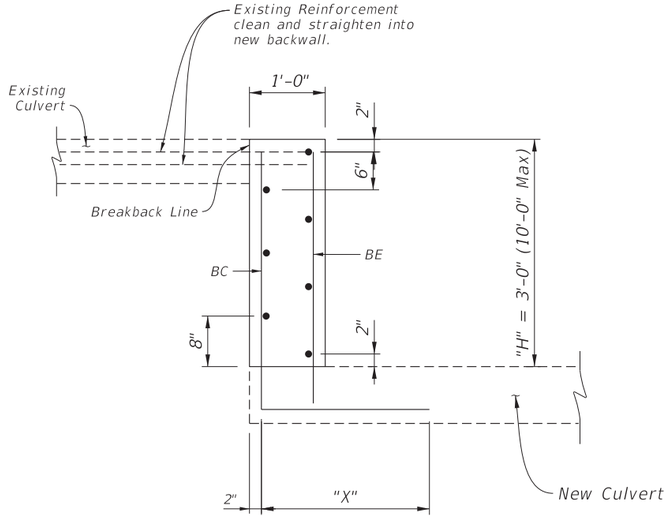
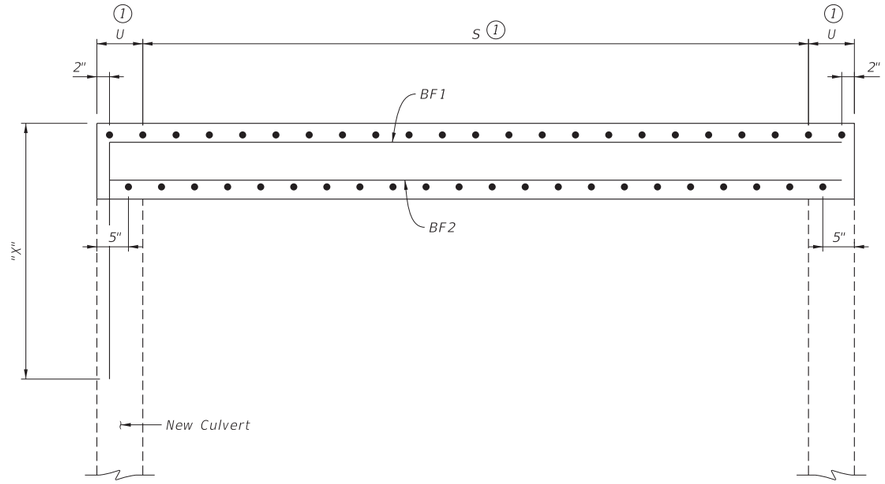
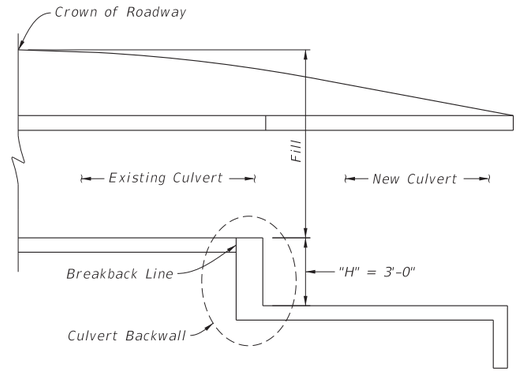


ELEVATION



PLAN



CULVERT DETAIL

FILL ≤ 10' (X = 2'-9")		
Bar	Size	Spa
BC	#4	6"
BE	#4	6"
BF1	#4	12"
BF2	#4	12"

(1) Based on culvert size and details.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications 9th Edition.
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" and shall have minimum compressive strength of 3600 psi.
No bridge rails of any type may be mounted directly to these culvert backwalls.

STATE OF TEXAS
LAURA M. ORTIZ
137207
LICENSED
PROFESSIONAL ENGINEER

04/22/2022

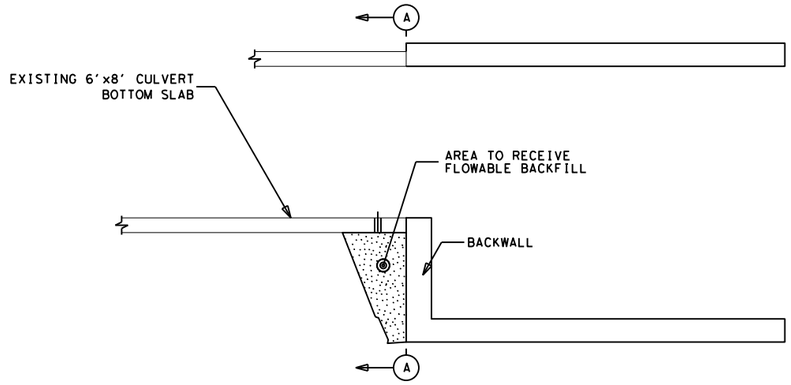
Texas Department of Transportation

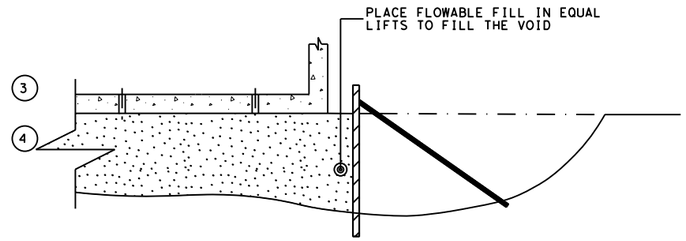
Bridge Division

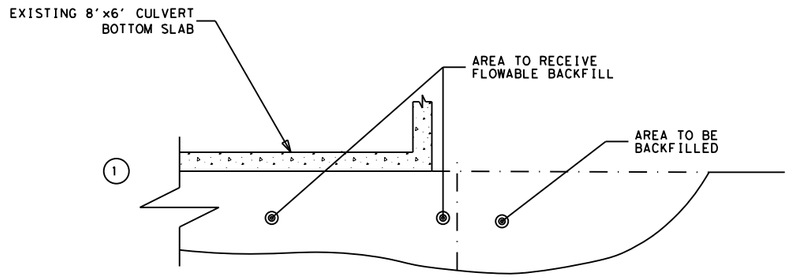
CULVERT BACKWALL DETAILS

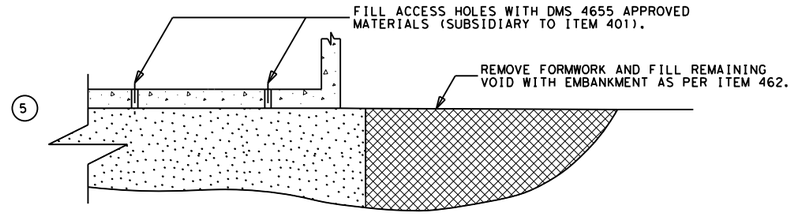
FILE:	DN: LMO	CK: RY	DW: ESE	CK: LMO
©TxDOT APR, 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		86

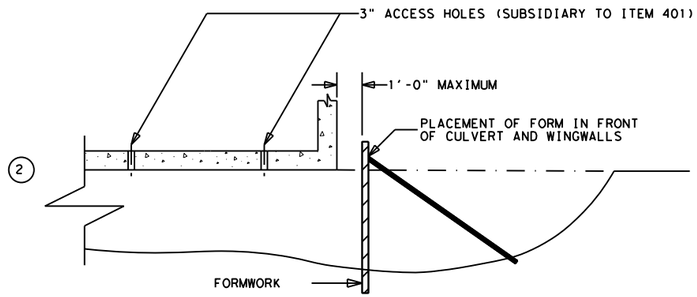
DATE:
FILE:











1. REMOVE ANY WATER, SOFT SOIL, SILT, AND/OR DEBRIS FROM ALL AREAS TO RECEIVE FLOWABLE FILL OR BACKFILL. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS.

2. PLACE FORMWORK TO DEFINE VOID AREA IN FRONT OF CULVERT AND WINGWALLS. CORING THROUGH CULVERT BOTTOM SLAB MAY BE REQUIRED TO PROVIDE ACCESS HOLES FOR PLACING FLOWABLE FILL.

3. PLACE FLOWABLE FILL INTO VOID AREA; HEIGHT OF FILL IN ANY SINGLE LIFT SHALL NOT EXCEED 2 FEET. PUMPING OF FLOWABLE FILL MAY BE REQUIRED TO FILL ALL VOIDS. ALLOW PREVIOUS FILL TO SET BEFORE PLACING SUBSEQUENT LIFT.

4. REPEAT STEP 3 UNTIL PLACEMENT IS COMPLETE TO THE BASE OF THE CLUVERT AND WINGWALLS.

5. REMOVE FORMS AFTER FINAL LIFT HAS CURED. BACKFILL REMAINING AREA WITH SELECTED MATERIAL AS PER ITEM 462. FILL ACCESS HOLES IN CULVERT BOTTOM SLAB WITH AN APPROVED MATERIAL FROM DMS 4655 AS DIRECTED.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316 FLOWABLE BACKFILL DETAIL

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		87

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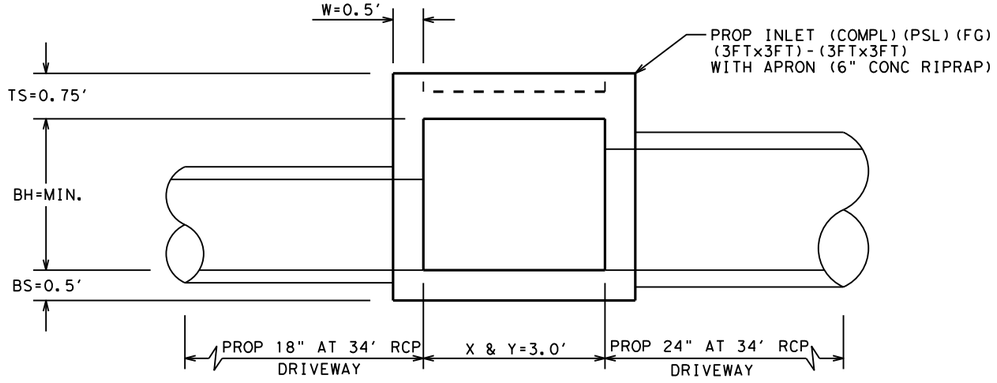
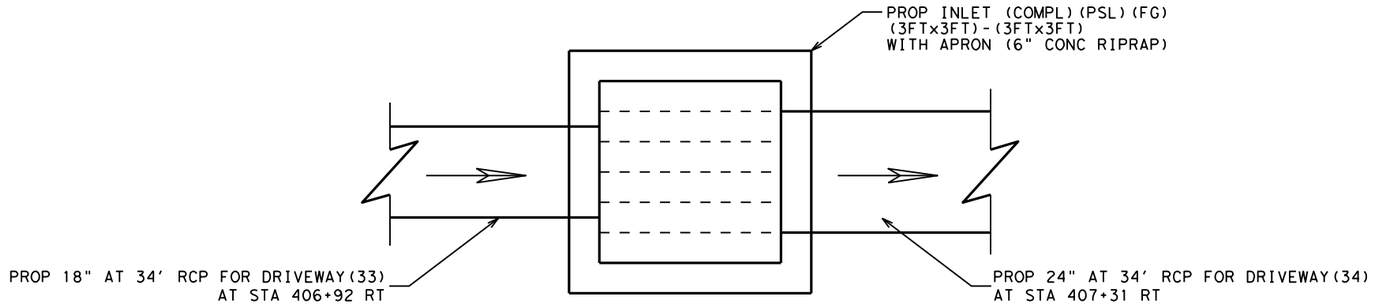


NOTE: APRON (6" CONC RIPRAP) IS SUBSIDIARY TO PAY ITEM.



PRECAST JUNCTION BOX STA 406+92 RT
SEE PSL STANDARD

NTS

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
MISCELLANEOUS DRAINAGE DETAILS

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		88

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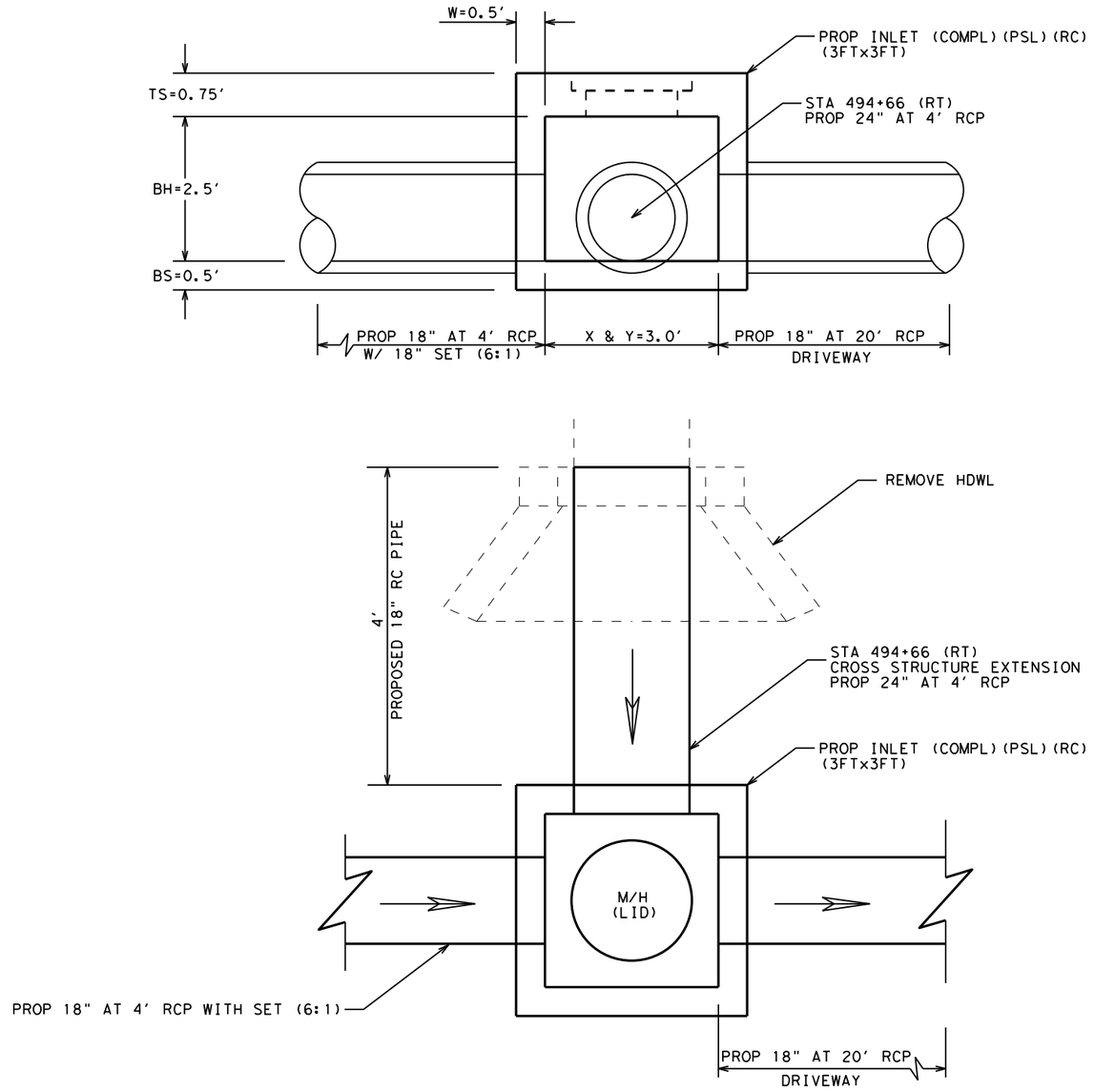

PRECAST JUNCTION BOX STA 494+66 RT
SEE PSL STANDARD
NTS

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
MISCELLANEOUS DRAINAGE DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		89

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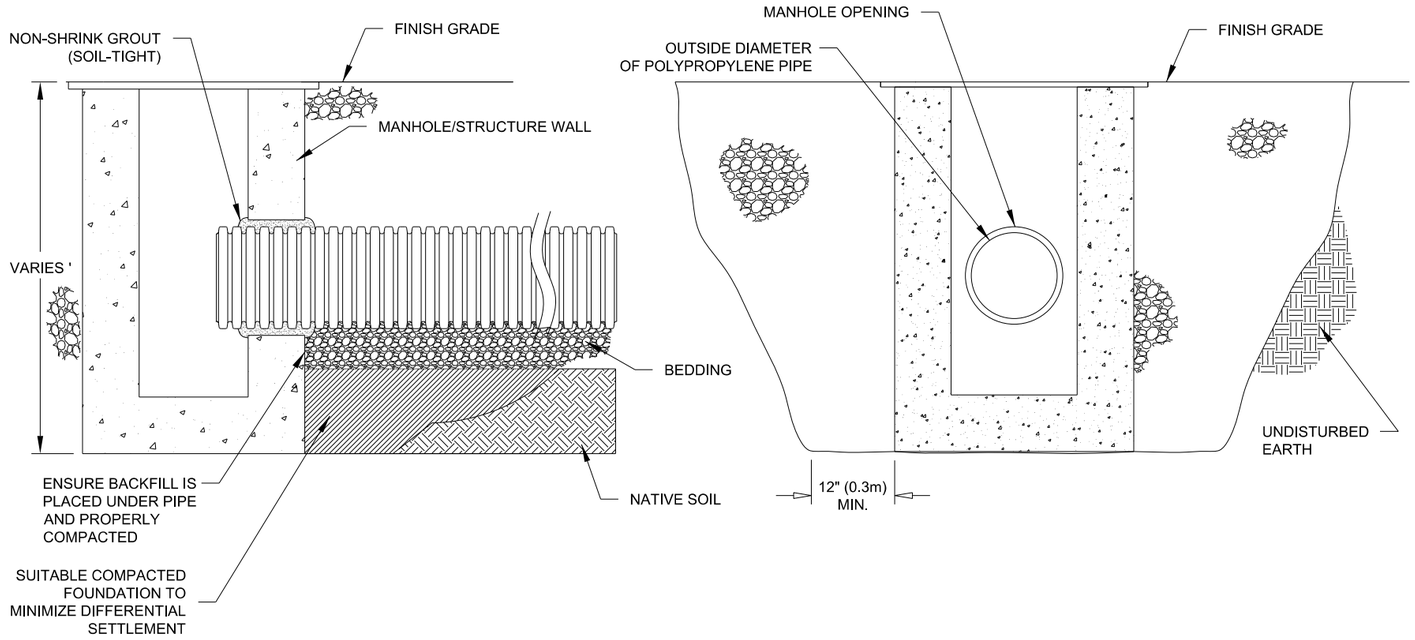

NOTES:

1.PERFORMANCE HIGHLY DEPENDENT ON BACKFILL COMPACTION SURROUNDING PIPE ENVELOPE AT THE MANHOLE CONNECTION INTERFACE. EXTRA PRECAUTIONS MUST BE TAKEN TO PREVENT DIFFERENTIAL SETTLEMENT BETWEEN THE PIPE AND MANHOLE.

2. PIPE AT AND AROUND STRUCTURE CONNECTION TO BE INSTALLED PER ASTM 2321 AND TXDOT SPECIAL SPECIFICATION 4122.

3. CARE SHOULD BE TAKEN TO KNIFE, OR SHOVEL BACKFILL MATERIAL UNDER AND AROUND HAUNCH AREA OF PIPE.

4. APPROVED BACKFILL MATERIALS ARE LISTED IN TXDOT SPECIAL SPECIFICATION 4122.

DETAIL NTS

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
GROUTED MANHOLE CONNECTION INSTALLATION DETAIL

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		90

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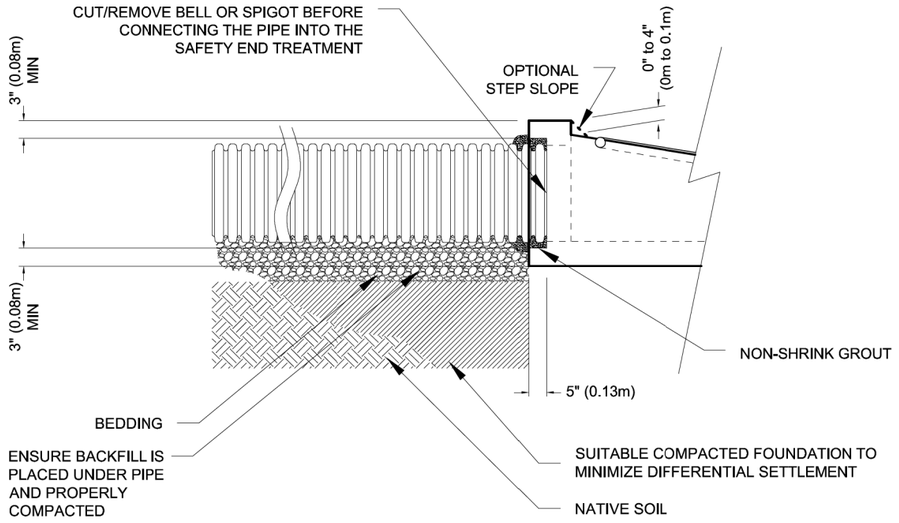

NOTES:

1. FROM THE PIPE SIDE, USE NON-SHRINK GROUT TO CONNECT THE PIPE TO THE SAFETY END TREATMENT BEFORE BACKFILLING AROUND THE PIPE.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
HP STORM-SAFETY END TREATMENT

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		91

DN: CK: DW: CK:

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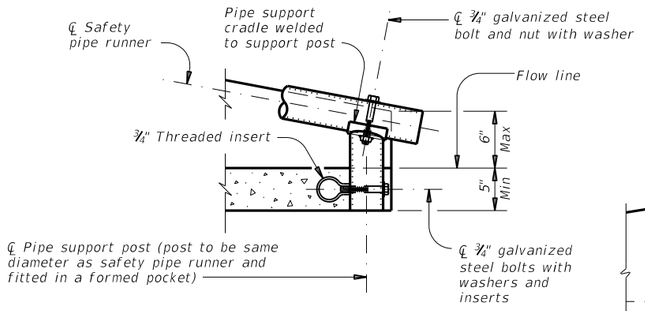
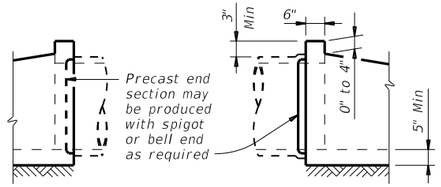
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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"				



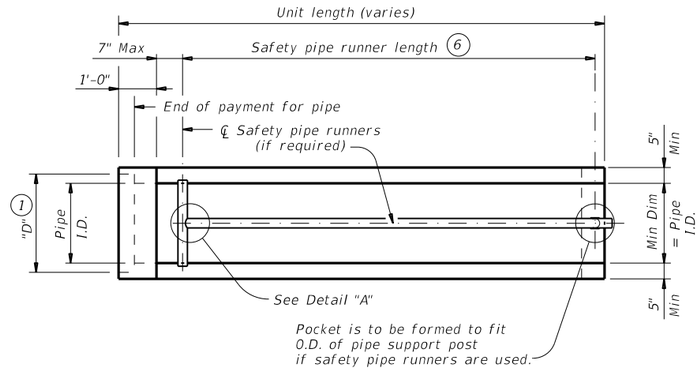
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



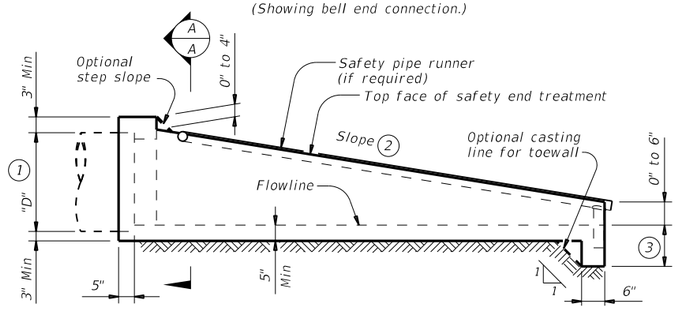
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



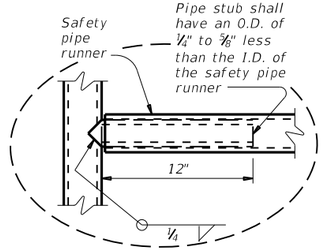
PLAN

(Showing bell end connection.)

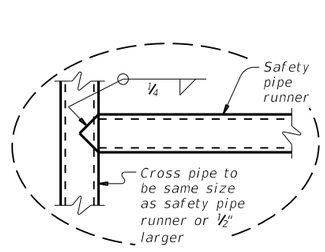


LONGITUDINAL ELEVATION

(Showing bell end connection.)



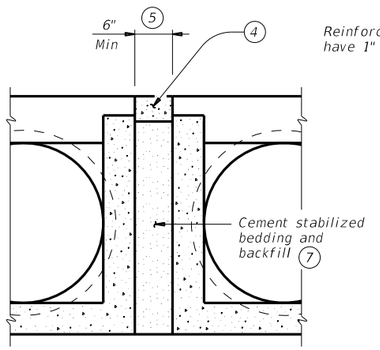
OPTION A



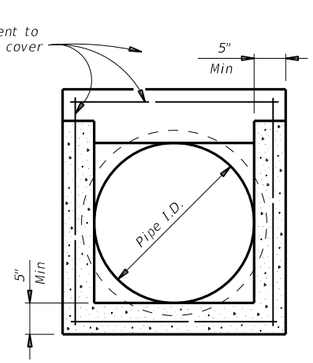
OPTION B

DETAIL A

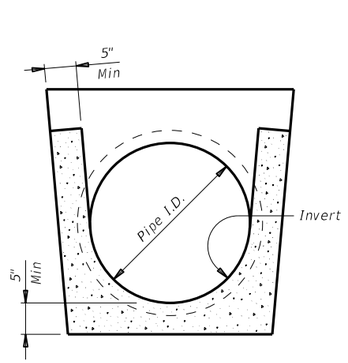
(If required)



MULTIPLE PIPE INSTALLATION

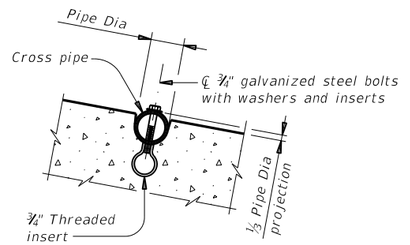


OPTION WITH SQUARE BOTTOM



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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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		92

DATE: 8/3/2022 8:43:00 AM
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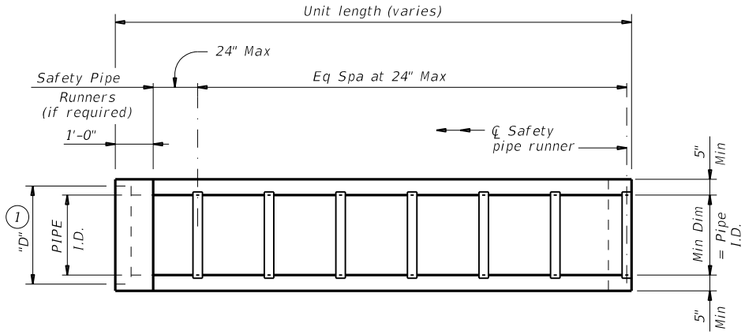
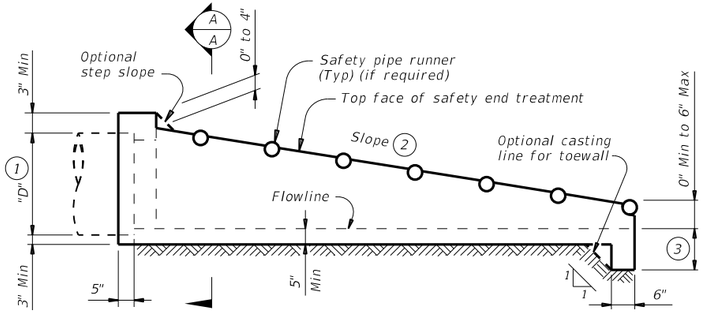


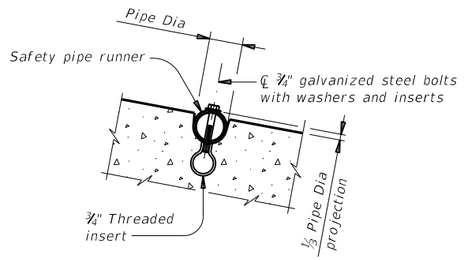
PLAN

(Showing bell end connection.)



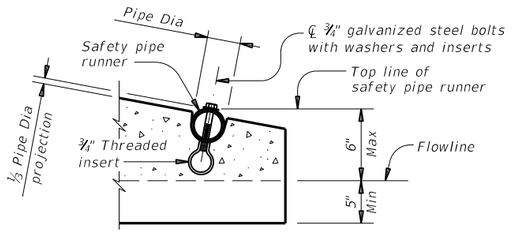
LONGITUDINAL ELEVATION

(Showing bell end connection.)

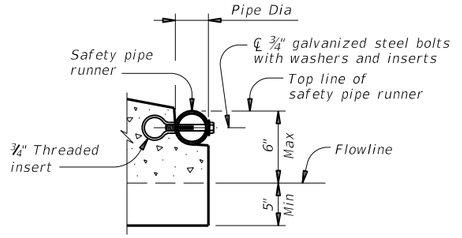


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



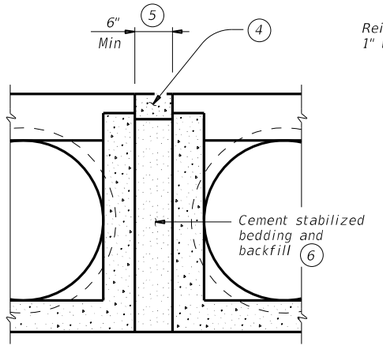
OPTION A



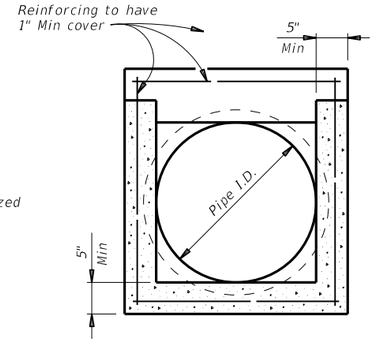
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

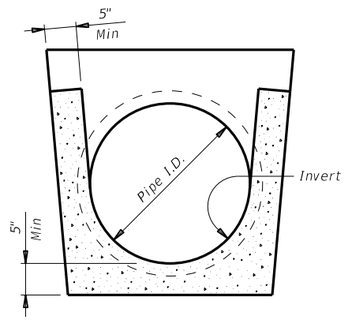
(If required)



MULTIPLE PIPE INSTALLATION

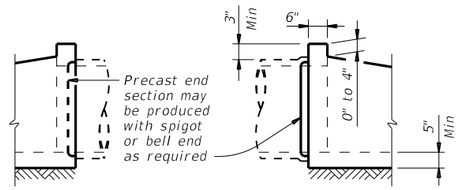


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		93

DATE: 8/3/2022 8:43:04 AM
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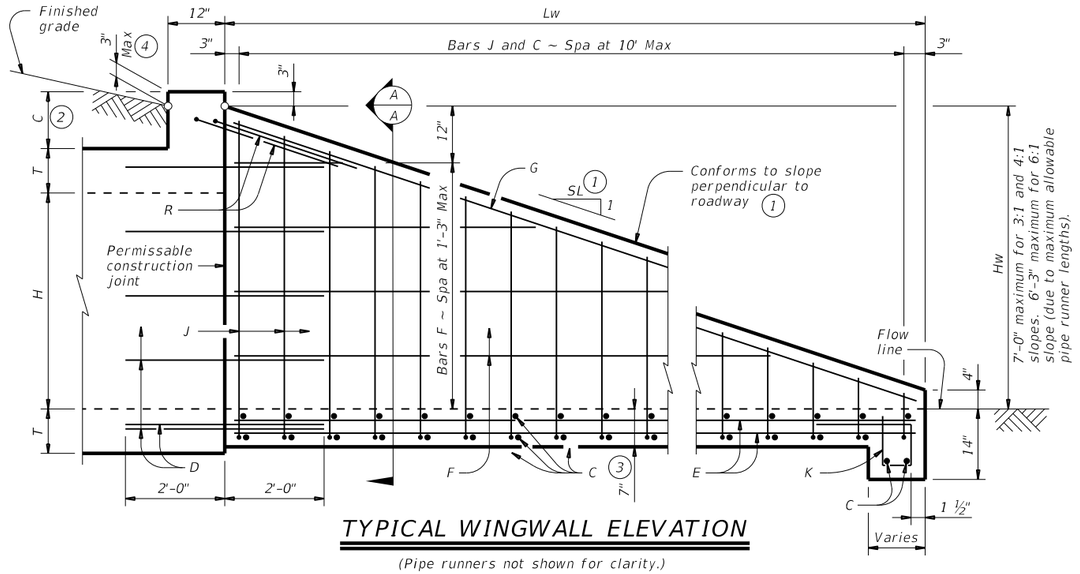
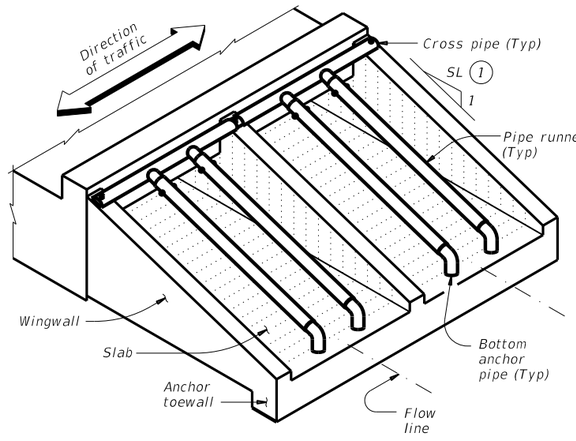


TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$

$Lw = (Hw - 0.333') (SL)$

For cast-in-place culverts:

$Atw = (N) (S) + (N + 1) (U)$

For precast culverts:

$Atw = (N) (2U + S) + (N - 1) (0.500')$

Total Wingwall Area (SF)
$= (0.5) (Hw + 0.333') (Lw) (N + 1)$

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

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
$= (Lw) (K1) - (1.917')$

Total Reinforcing (Lb)
$= (1.55) (Lw) (Atw) + (4.43) (Atw) + (K2) (Hw) (N + 1) (\sqrt{Lw})$

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

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

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

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

Provide ASTM A307 bolts.

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

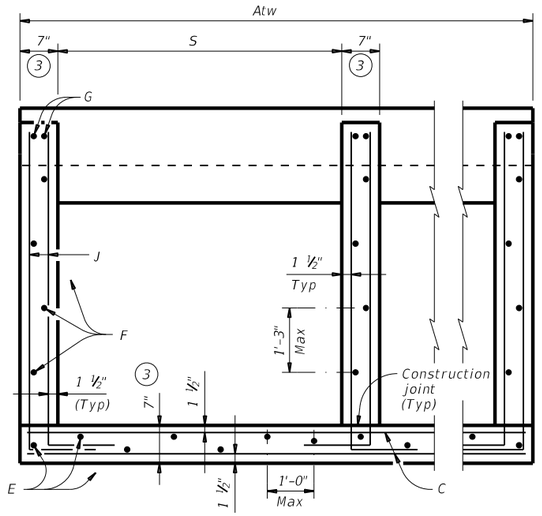
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

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

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

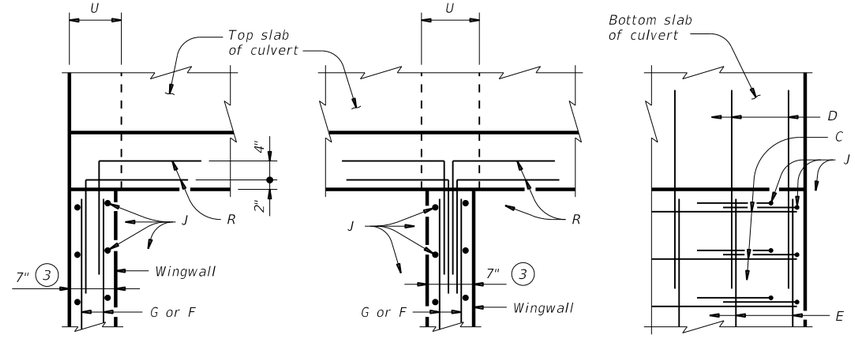
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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



SECTION A-A

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



AT TOP OF EXTERIOR WINGWALL

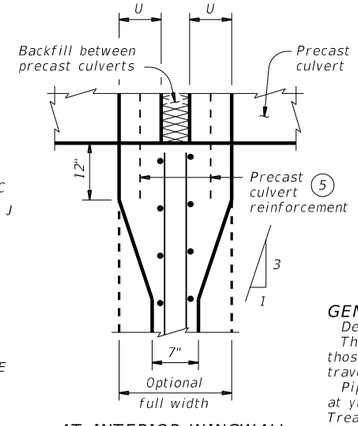
(Cast-in-place culvert)

AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)

AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

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

(2) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.

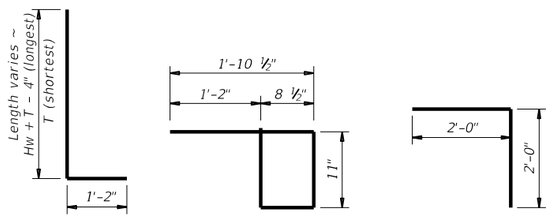
(3) Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.

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

(5) For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

TABLE OF REINFORCING BAR SIZES AND SPACING

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



SHEET 1 OF 2

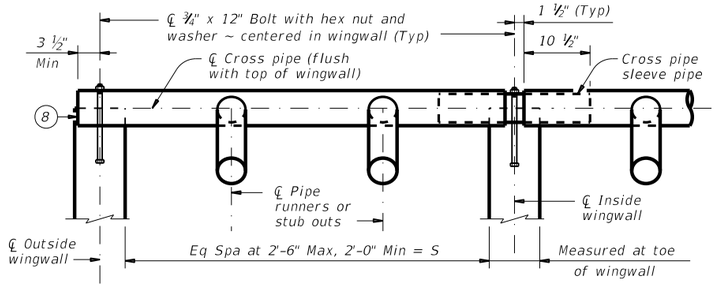
Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ CROSS DRAINAGE

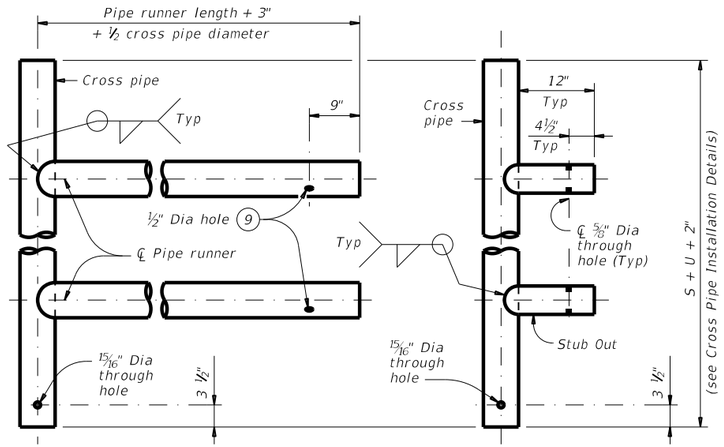
SETB-CD

FILE: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		94

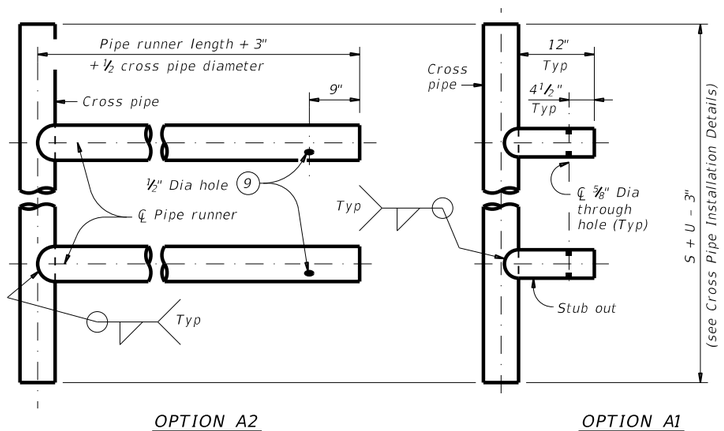


NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a 15⁄16" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS

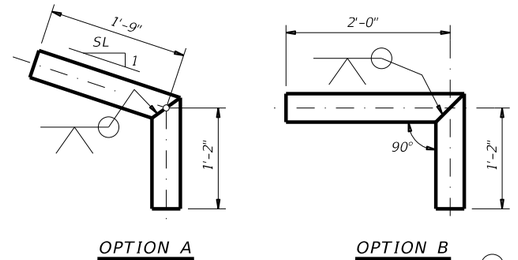


FOR USE IN OUTSIDE CULVERT BAY



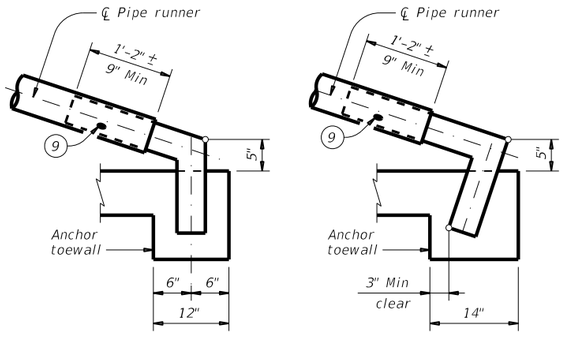
FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



OPTION A OPTION B

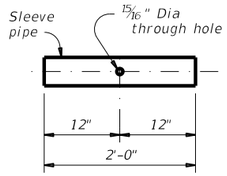
BOTTOM ANCHOR PIPE DETAILS (10)



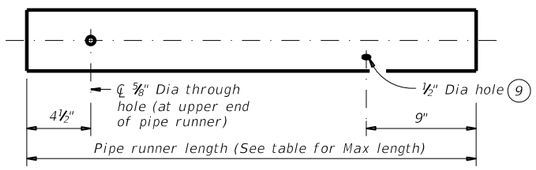
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

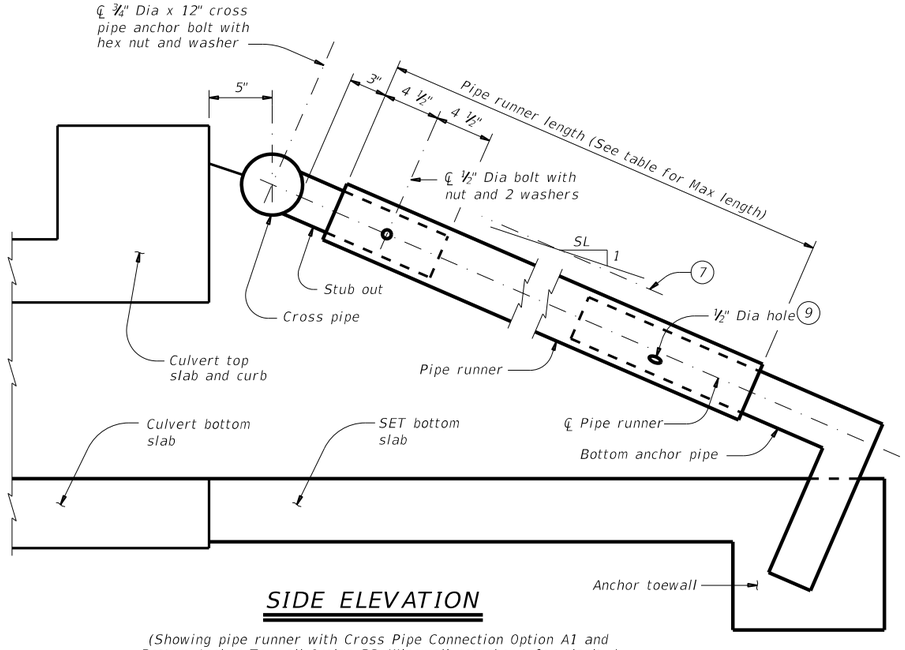


CROSS PIPE SLEEVE PIPE DETAILS



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

PIPE RUNNER DETAILS



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

(6) Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

(7) Note that actual slope of safety pipe runner may vary slightly from side slope.

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

(9) After installation, inspect the 1#2" hole to ensure that the lap of the safety 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.

MAXIMUM PIPE RUNNER LENGTHS AND (6) REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES

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

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

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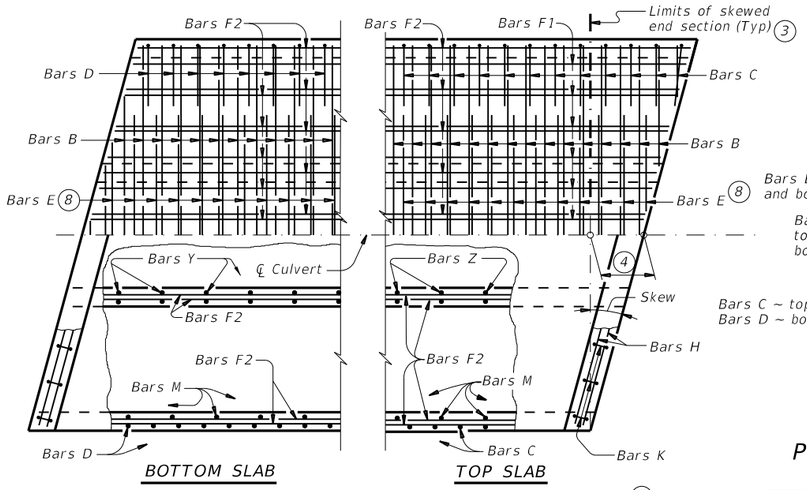
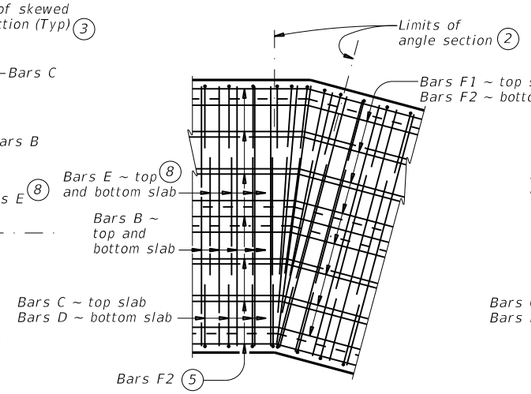
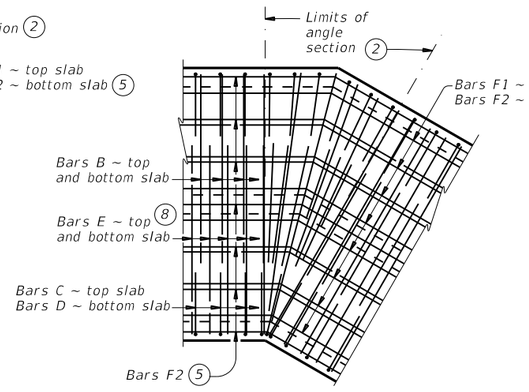


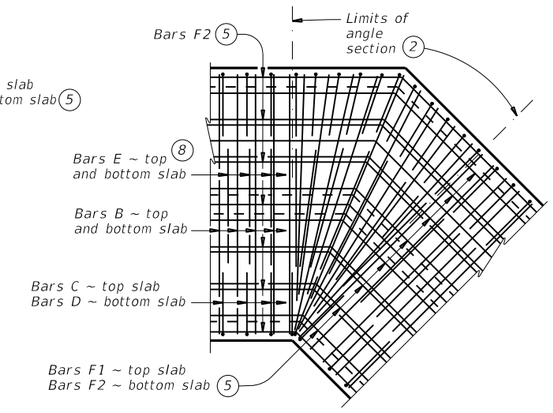
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



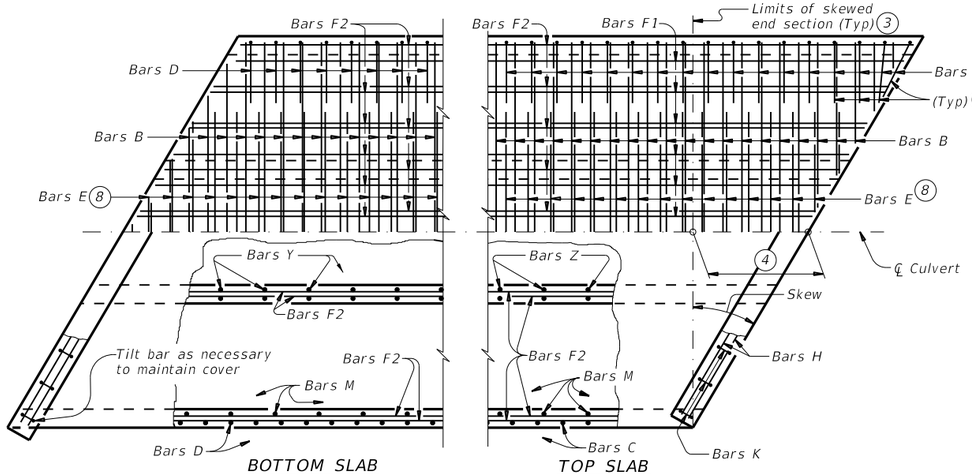
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



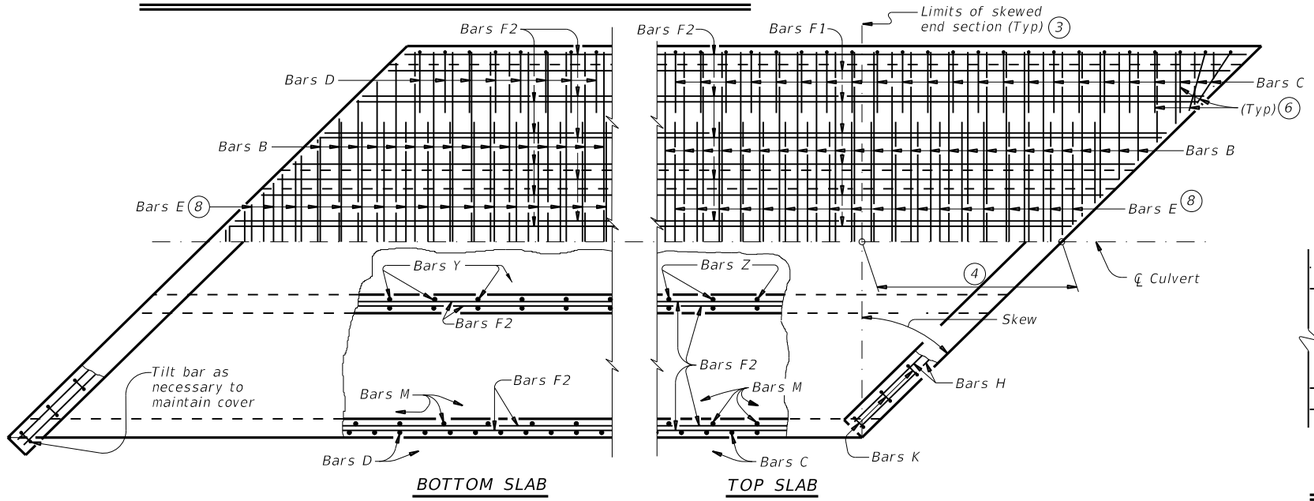
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

1 For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

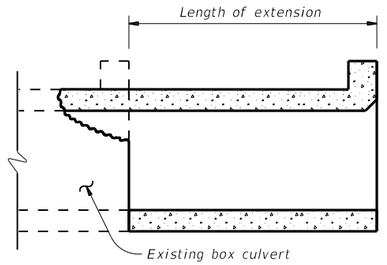
For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

2 When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

3 The length of Bars B and Bars E will vary in the skewed end sections.

4 [One half of overall width] x [tangent of the skew angle]



LENGTHENING DETAIL 1

5 Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

6 When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

7 At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

8 Extend Bars E as shown on the MC standard sheet for direct traffic culverts.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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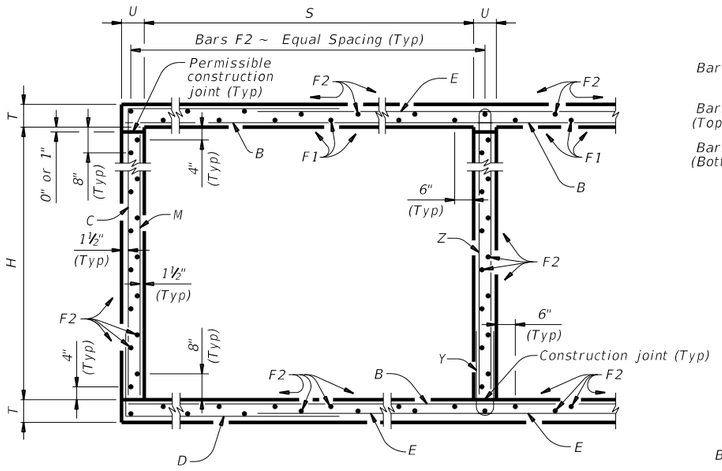
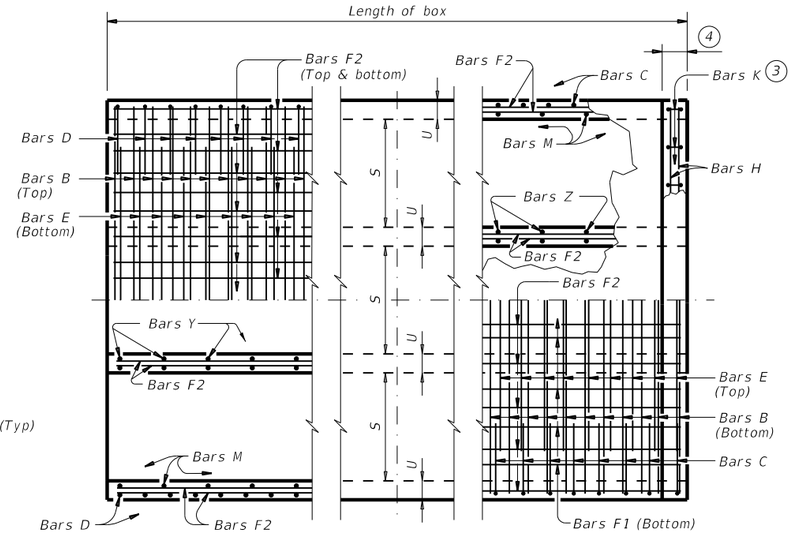
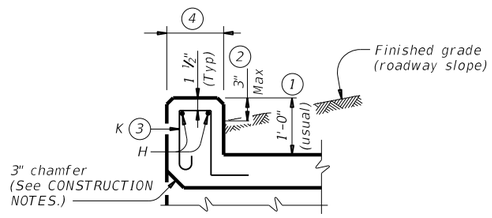


TYPICAL SECTION



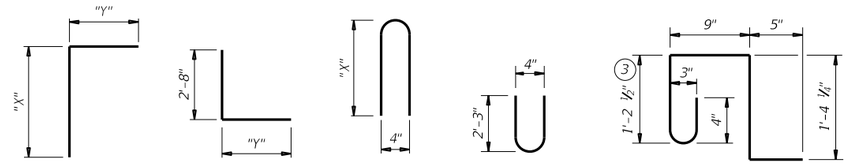
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



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

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(4) 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 6'-0" SPAN 0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		97

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B					Bars C & D								Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		QUANTITIES					
													Bars C		Bars D																						Bars Y		Bars Z								Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	Length	Wt	No.	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6' – 0"	2' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	44	18"	39' – 9"	1,168	108	9"	2' – 0"	144	54	9"	4' – 9"	171	5' – 5"	195	13' – 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' – 0"	2' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	63	18"	39' – 9"	1,673	108	9"	2' – 0"	144	108	9"	4' – 9"	343	5' – 5"	391	20' – 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' – 0"	2' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	82	18"	39' – 9"	2,177	108	9"	2' – 0"	144	162	9"	4' – 9"	514	5' – 5"	586	26' – 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' – 0"	2' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	101	18"	39' – 9"	2,682	108	9"	2' – 0"	144	216	9"	4' – 9"	685	5' – 5"	782	33' – 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' – 0"	2' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	120	18"	39' – 9"	3,186	108	9"	2' – 0"	144	270	9"	4' – 9"	857	5' – 5"	977	39' – 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' – 0"	3' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	3' – 0"	216	54	9"	4' – 9"	171	7' – 5"	268	13' – 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' – 0"	3' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	3' – 0"	216	108	9"	4' – 9"	343	7' – 5"	535	20' – 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' – 0"	3' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	3' – 0"	216	162	9"	4' – 9"	514	7' – 5"	803	26' – 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' – 0"	3' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	3' – 0"	216	216	9"	4' – 9"	685	7' – 5"	1,070	33' – 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' – 0"	3' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	3' – 0"	216	270	9"	4' – 9"	857	7' – 5"	1,338	39' – 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' – 0"	4' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	4' – 0"	289	54	9"	4' – 9"	171	9' – 5"	340	13' – 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' – 0"	4' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	4' – 0"	289	108	9"	4' – 9"	343	9' – 5"	679	20' – 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' – 0"	4' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	4' – 0"	289	162	9"	4' – 9"	514	9' – 5"	1,019	26' – 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' – 0"	4' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	4' – 0"	289	216	9"	4' – 9"	685	9' – 5"	1,359	33' – 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' – 0"	4' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	4' – 0"	289	270	9"	4' – 9"	857	9' – 5"	1,698	39' – 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' – 0"	5' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	56	18"	39' – 9"	1,487	108	9"	5' – 0"	361	54	9"	4' – 9"	171	11' – 5"	412	13' – 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' – 0"	5' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	79	18"	39' – 9"	2,098	108	9"	5' – 0"	361	108	9"	4' – 9"	343	11' – 5"	824	20' – 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' – 0"	5' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	102	18"	39' – 9"	2,708	108	9"	5' – 0"	361	162	9"	4' – 9"	514	11' – 5"	1,235	26' – 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' – 0"	5' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	125	18"	39' – 9"	3,319	108	9"	5' – 0"	361	216	9"	4' – 9"	685	11' – 5"	1,647	33' – 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' – 0"	5' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	148	18"	39' – 9"	3,930	108	9"	5' – 0"	361	270	9"	4' – 9"	857	11' – 5"	2,059	39' – 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' – 0"	6' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	62	18"	39' – 9"	1,646	108	9"	6' – 0"	433	54	9"	4' – 9"	171	13' – 5"	484	13' – 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' – 0"	6' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	87	18"	39' – 9"	2,310	108	9"	6' – 0"	433	108	9"	4' – 9"	343	13' – 5"	968	20' – 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' – 0"	6' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	112	18"	39' – 9"	2,974	108	9"	6' – 0"	433	162	9"	4' – 9"	514	13' – 5"	1,452	26' – 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' – 0"	6' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	137	18"	39' – 9"	3,638	108	9"	6' – 0"	433	216	9"	4' – 9"	685	13' – 5"	1,936	33' – 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' – 0"	6' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	162	18"	39' – 9"	4,302	108	9"	6' – 0"	433	270	9"	4' – 9"	857	13' – 5"	2,420	39' – 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

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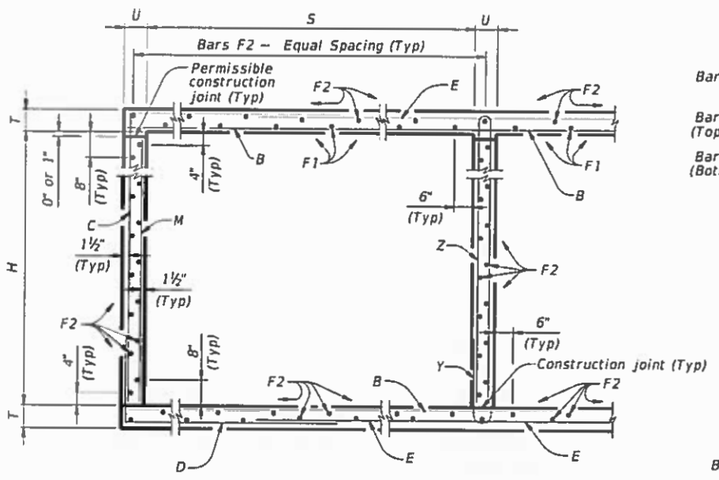
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

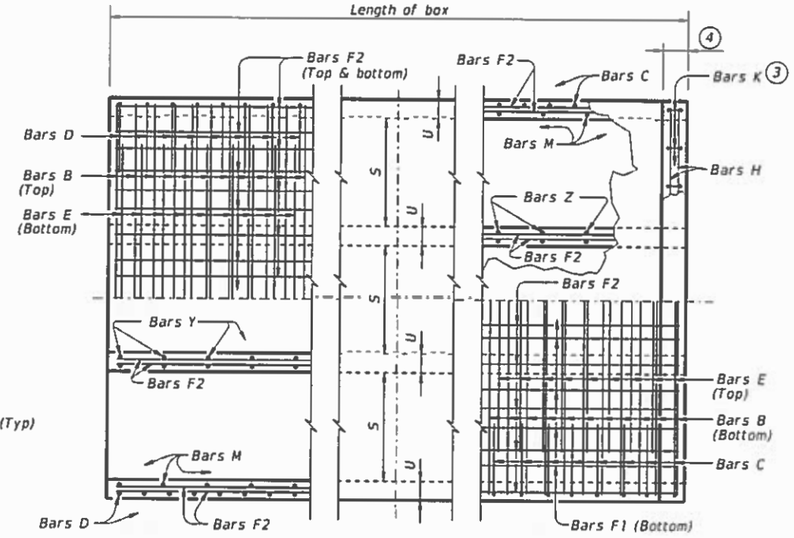
MULTIPLE BOX CULVERTS
CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		98

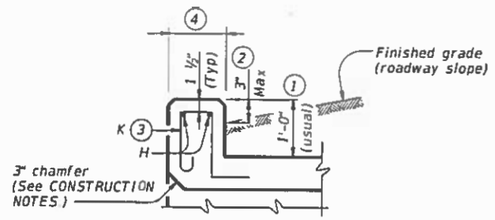


TYPICAL SECTION



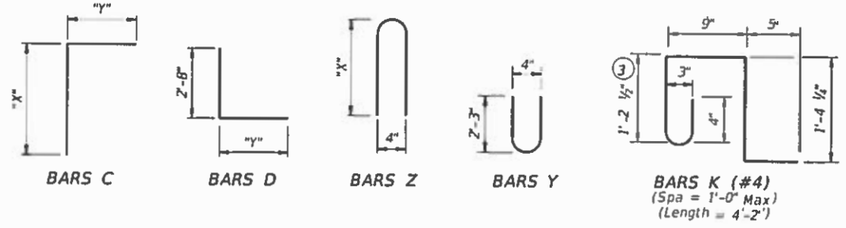
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"
8'-0"	8'-7 ½"	4'-1"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'_c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized – #4 = 1'-8" Min
- Uncoated or galvanized – #5 = 2'-1" Min
- Uncoated or galvanized – #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

STATE OF TEXAS
LAURA M. ORTIZ
137207
LICENSED PROFESSIONAL ENGINEER

04/22/2022

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 6'-0" SPAN 0' TO 16' FILL

MC-6-16 (MOD)

FILE: mc6l6ste-20dgn	DN: LMO	CK: RT	DW: ESE	CK: LMO
© TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 03/2021 LMO/ESE – Added 6'x8' box	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		99

DATE: 04/11/2022 07:07 AM
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DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4						Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6'-0"	2'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	6'-8"	751	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	44	18"	39'-9"	1,168	108	9"	2'-0"	144	54	9"	4'-9"	171	5'-5"	195	13'-6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6'-0"	2'-0"	9"	7"	108	#6	9"	20'-1"	3,258	108	#5	9"	6'-8"	751	6'-9"	760	108	#6	9"	16'-9"	2,717	15	18"	39'-9"	398	63	18"	39'-9"	1,673	108	9"	2'-0"	144	108	9"	4'-9"	343	5'-5"	391	20'-1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6'-0"	2'-0"	9"	7"	108	#6	9"	26'-8"	4,326	108	#5	9"	6'-8"	751	6'-9"	760	108	#6	9"	23'-4"	3,785	20	18"	39'-9"	531	82	18"	39'-9"	2,177	108	9"	2'-0"	144	162	9"	4'-9"	514	5'-5"	586	26'-8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6'-0"	2'-0"	9"	7"	108	#6	9"	33'-3"	5,394	108	#5	9"	6'-8"	751	6'-9"	760	108	#6	9"	29'-11"	4,853	25	18"	39'-9"	664	101	18"	39'-9"	2,682	108	9"	2'-0"	144	216	9"	4'-9"	685	5'-5"	782	33'-3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6'-0"	2'-0"	9"	7"	108	#6	9"	39'-10"	6,462	108	#5	9"	6'-8"	751	6'-9"	760	108	#6	9"	36'-6"	5,921	30	18"	39'-9"	797	120	18"	39'-9"	3,186	108	9"	2'-0"	144	270	9"	4'-9"	857	5'-5"	977	39'-10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6'-0"	3'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	7'-8"	864	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	50	18"	39'-9"	1,328	108	9"	3'-0"	216	54	9"	4'-9"	171	7'-5"	268	13'-6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6'-0"	3'-0"	9"	7"	108	#6	9"	20'-1"	3,258	108	#5	9"	7'-8"	864	6'-9"	760	108	#6	9"	16'-9"	2,717	15	18"	39'-9"	398	71	18"	39'-9"	1,885	108	9"	3'-0"	216	108	9"	4'-9"	343	7'-5"	535	20'-1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6'-0"	3'-0"	9"	7"	108	#6	9"	26'-8"	4,326	108	#5	9"	7'-8"	864	6'-9"	760	108	#6	9"	23'-4"	3,785	20	18"	39'-9"	531	92	18"	39'-9"	2,443	108	9"	3'-0"	216	162	9"	4'-9"	514	7'-5"	803	26'-8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6'-0"	3'-0"	9"	7"	108	#6	9"	33'-3"	5,394	108	#5	9"	7'-8"	864	6'-9"	760	108	#6	9"	29'-11"	4,853	25	18"	39'-9"	664	113	18"	39'-9"	3,000	108	9"	3'-0"	216	216	9"	4'-9"	685	7'-5"	1,070	33'-3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6'-0"	3'-0"	9"	7"	108	#6	9"	39'-10"	6,462	108	#5	9"	7'-8"	864	6'-9"	760	108	#6	9"	36'-6"	5,921	30	18"	39'-9"	797	134	18"	39'-9"	3,558	108	9"	3'-0"	216	270	9"	4'-9"	857	7'-5"	1,338	39'-10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6'-0"	4'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	8'-8"	976	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	50	18"	39'-9"	1,328	108	9"	4'-0"	289	54	9"	4'-9"	171	9'-5"	340	13'-6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6'-0"	4'-0"	9"	7"	108	#6	9"	20'-1"	3,258	108	#5	9"	8'-8"	976	6'-9"	760	108	#6	9"	16'-9"	2,717	15	18"	39'-9"	398	71	18"	39'-9"	1,885	108	9"	4'-0"	289	108	9"	4'-9"	343	9'-5"	679	20'-1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6'-0"	4'-0"	9"	7"	108	#6	9"	26'-8"	4,326	108	#5	9"	8'-8"	976	6'-9"	760	108	#6	9"	23'-4"	3,785	20	18"	39'-9"	531	92	18"	39'-9"	2,443	108	9"	4'-0"	289	162	9"	4'-9"	514	9'-5"	1,019	26'-8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6'-0"	4'-0"	9"	7"	108	#6	9"	33'-3"	5,394	108	#5	9"	8'-8"	976	6'-9"	760	108	#6	9"	29'-11"	4,853	25	18"	39'-9"	664	113	18"	39'-9"	3,000	108	9"	4'-0"	289	216	9"	4'-9"	685	9'-5"	1,359	33'-3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6'-0"	4'-0"	9"	7"	108	#6	9"	39'-10"	6,462	108	#5	9"	8'-8"	976	6'-9"	760	108	#6	9"	36'-6"	5,921	30	18"	39'-9"	797	134	18"	39'-9"	3,558	108	9"	4'-0"	289	270	9"	4'-9"	857	9'-5"	1,698	39'-10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6'-0"	5'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	9'-8"	1,089	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	56	18"	39'-9"	1,487	108	9"	5'-0"	361	54	9"	4'-9"	171	11'-5"	412	13'-6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6'-0"	5'-0"	9"	7"	108	#6	9"	20'-1"	3,258	108	#5	9"	9'-8"	1,089	6'-9"	760	108	#6	9"	16'-9"	2,717	15	18"	39'-9"	398	79	18"	39'-9"	2,098	108	9"	5'-0"	361	108	9"	4'-9"	343	11'-5"	824	20'-1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6'-0"	5'-0"	9"	7"	108	#6	9"	26'-8"	4,326	108	#5	9"	9'-8"	1,089	6'-9"	760	108	#6	9"	23'-4"	3,785	20	18"	39'-9"	531	102	18"	39'-9"	2,708	108	9"	5'-0"	361	162	9"	4'-9"	514	11'-5"	1,235	26'-8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6'-0"	5'-0"	9"	7"	108	#6	9"	33'-3"	5,394	108	#5	9"	9'-8"	1,089	6'-9"	760	108	#6	9"	29'-11"	4,853	25	18"	39'-9"	664	125	18"	39'-9"	3,319	108	9"	5'-0"	361	216	9"	4'-9"	685	11'-5"	1,647	33'-3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6'-0"	5'-0"	9"	7"	108	#6	9"	39'-10"	6,462	108	#5	9"	9'-8"	1,089	6'-9"	760	108	#6	9"	36'-6"	5,921	30	18"	39'-9"	797	148	18"	39'-9"	3,930	108	9"	5'-0"	361	270	9"	4'-9"	857	11'-5"	2,059	39'-10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6'-0"	6'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	10'-8"	1,202	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	62	18"	39'-9"	1,646	108	9"	6'-0"	433	54	9"	4'-9"	171	13'-5"	484	13'-6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6'-0"	6'-0"	9"	7"	108	#6	9"	20'-1"	3,258	108	#5	9"	10'-8"	1,202	6'-9"	760	108	#6	9"	16'-9"	2,717	15	18"	39'-9"	398	87	18"	39'-9"	2,310	108	9"	6'-0"	433	108	9"	4'-9"	343	13'-5"	968	20'-1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6'-0"	6'-0"	9"	7"	108	#6	9"	26'-8"	4,326	108	#5	9"	10'-8"	1,202	6'-9"	760	108	#6	9"	23'-4"	3,785	20	18"	39'-9"	531	112	18"	39'-9"	2,974	108	9"	6'-0"	433	162	9"	4'-9"	514	13'-5"	1,452	26'-8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6'-0"	6'-0"	9"	7"	108	#6	9"	33'-3"	5,394	108	#5	9"	10'-8"	1,202	6'-9"	760	108	#6	9"	29'-11"	4,853	25	18"	39'-9"	664	137	18"	39'-9"	3,638	108	9"	6'-0"	433	216	9"	4'-9"	685	13'-5"	1,936	33'-3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6'-0"	6'-0"	9"	7"	108	#6	9"	39'-10"	6,462	108	#5	9"	10'-8"	1,202	6'-9"	760	108	#6	9"	36'-6"	5,921	30	18"	39'-9"	797	162	18"	39'-9"	4,302	108	9"	6'-0"	433	270	9"	4'-9"	857	13'-5"	2,420	39'-10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488
2	6'-0"	8'-0"	9"	7"	108	#6	9"	13'-6"	2,190	108	#5	9"	12'-8"	1,427	6'-9"	760	108	#6	9"	10'-2"	1,649	10	18"	39'-9"	266	66	18"	39'-9"	1,752	108	9"	7'-9"	559	54	9"	4'-9"	171	17'-5"	628	13'-6"	36	30	84	1.280	376.1	1.0	120	52.2	15,166

04/22/2022

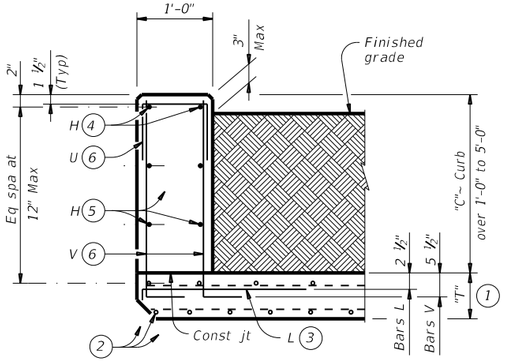
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

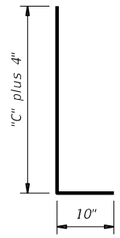
MC-6-16 (MOD)

FILE: mc616ste-20.dgn	DN: LMO	CK: RY	DW: ESE	CK: LMO
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
03/2021 LMO/ESE – Added 6x8 box	DIST	COUNTY		SHEET NO
	TYL	HENDERSON		100



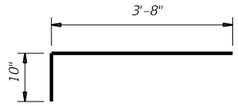
TYPICAL SECTION

Used for curbs over 1'–0" to 5'–0"



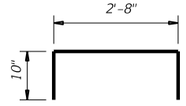
BARS V (#5) (6)

Spaced at 12" Max



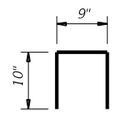
BARS L (#5) (3)

Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)

Spaced at 12" Max



BARS U (#4) (6)

Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'–0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'–0"	0.037	10.4
1'–6"	0.056	14.5
2'–0"	0.074	15.6
2'–6"	0.093	18.0
3'–0"	0.111	19.0
3'–6"	0.130	21.3
4'–0"	0.148	22.4
4'–6"	0.167	24.8
5'–0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'–8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

FILE: ecdstde1-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		101

DATE: 8/3/2022 8:43:23 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0467951\ECD-20.dgn

DATE: 8/3/2022 8:43:28 AM
FILE: c:\txdot\pw_online\txdot3\mark.dr\ske11\d0467951\PW-20.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

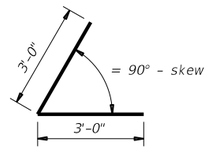
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

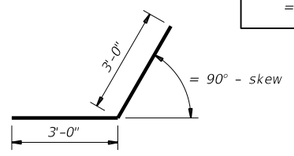
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

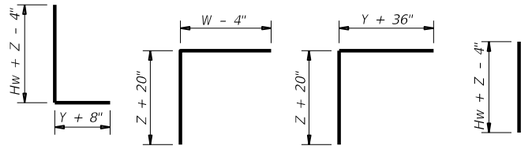
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

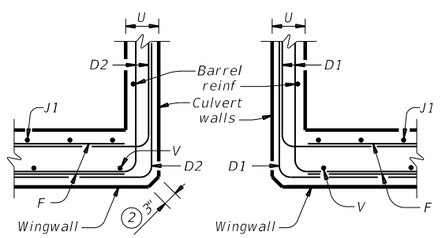
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

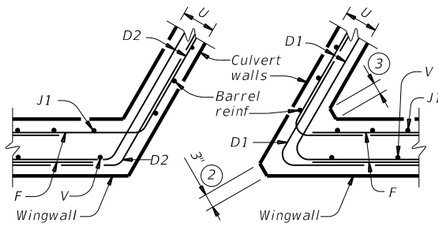
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

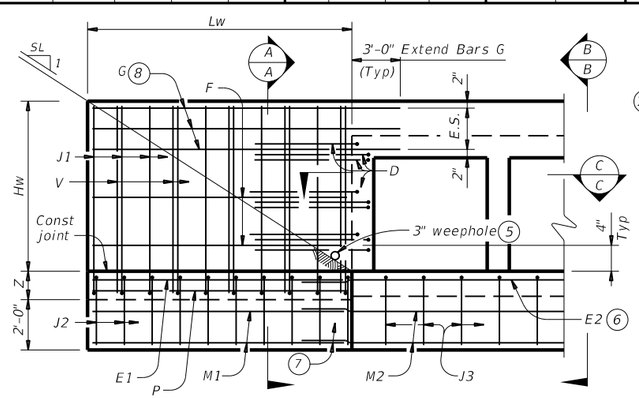
See applicable box culvert standard sheet for S, H, T, and U values.



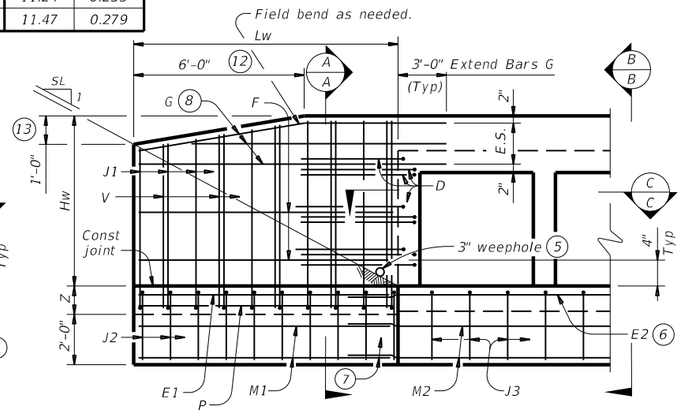
SECTION C-C - PW-1



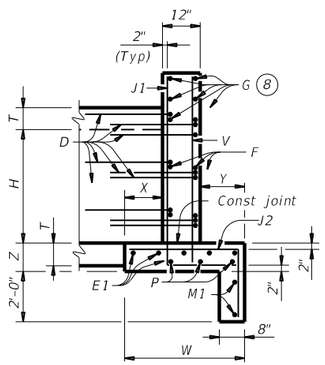
SECTION C-C - PW-2



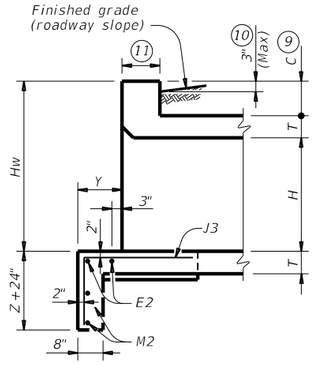
PARTIAL ELEVATION - PW-1



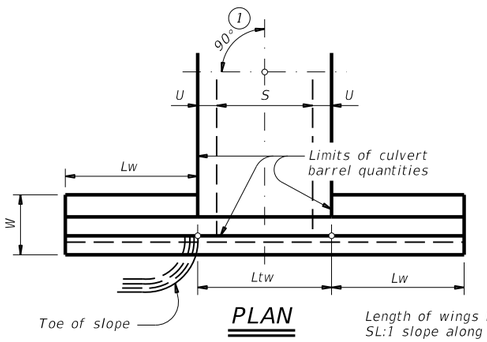
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

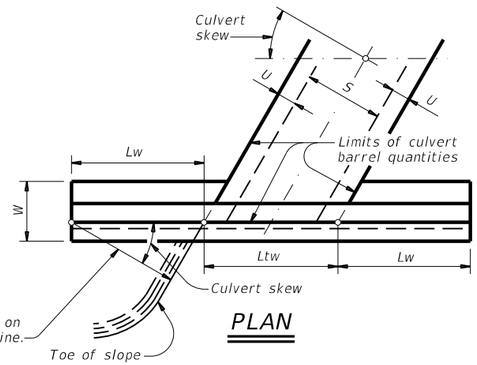


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

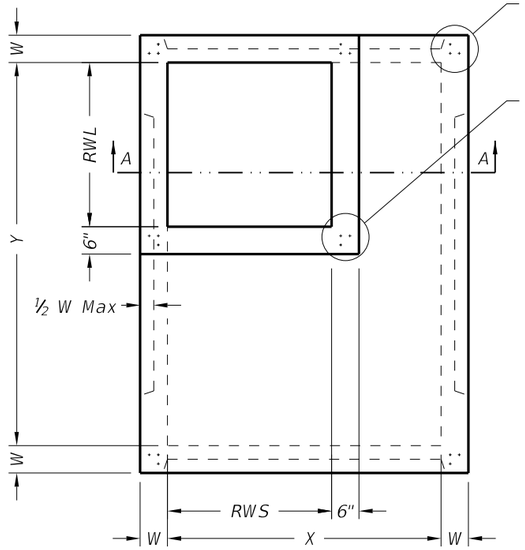
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

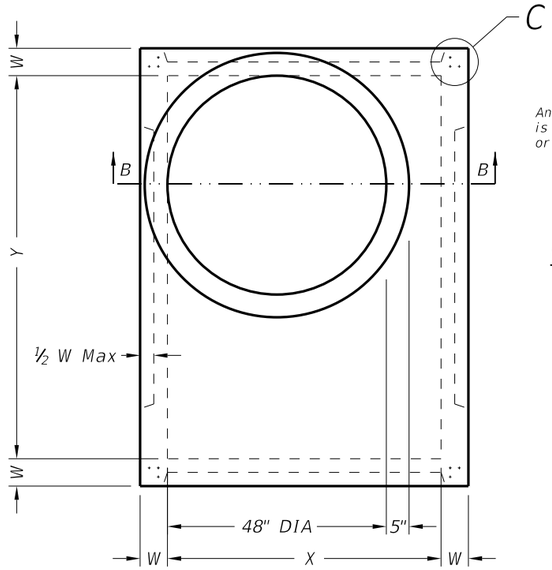
PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		102



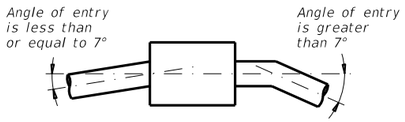
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



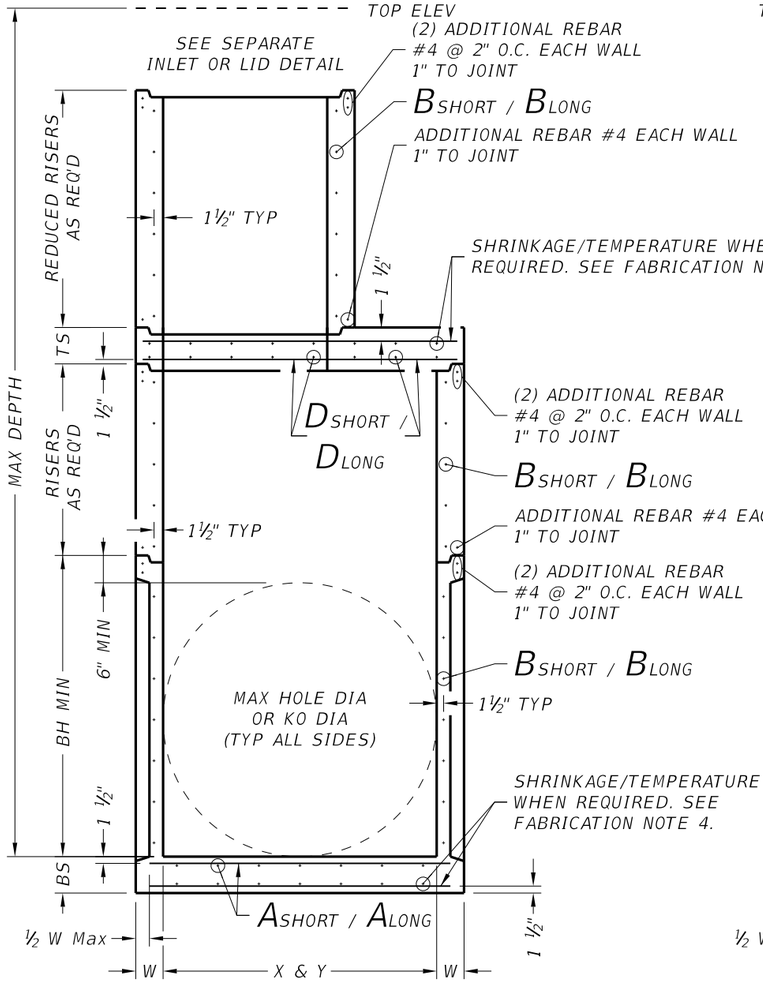
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



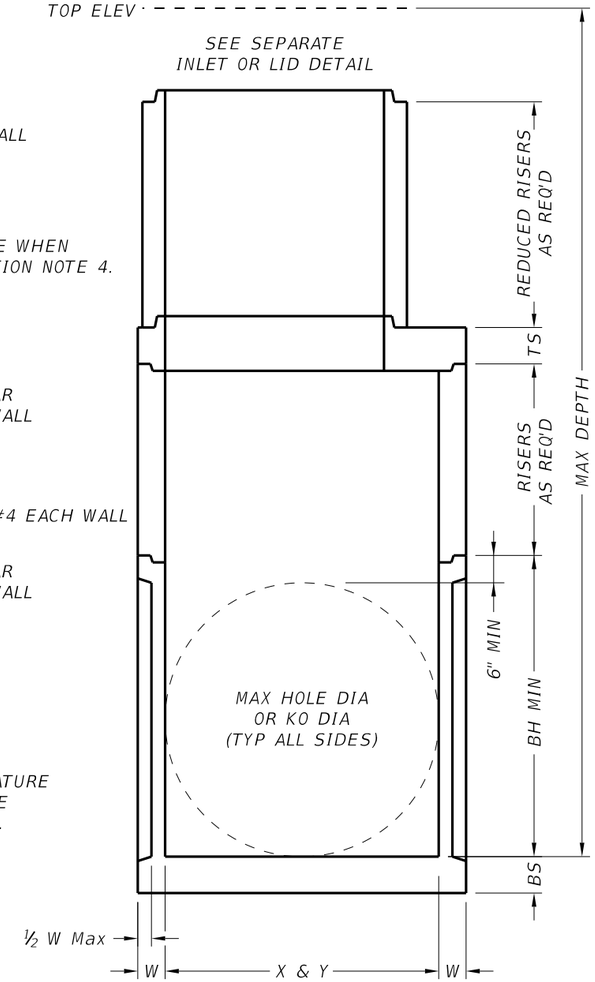
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

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 typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
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.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST BASE

PB

FILE: prestd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
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	TYL	HENDERSON		103

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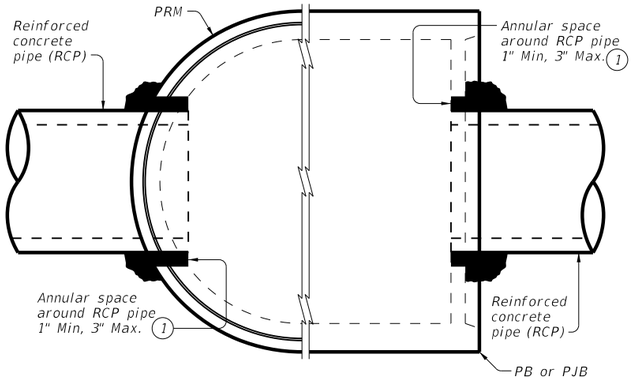
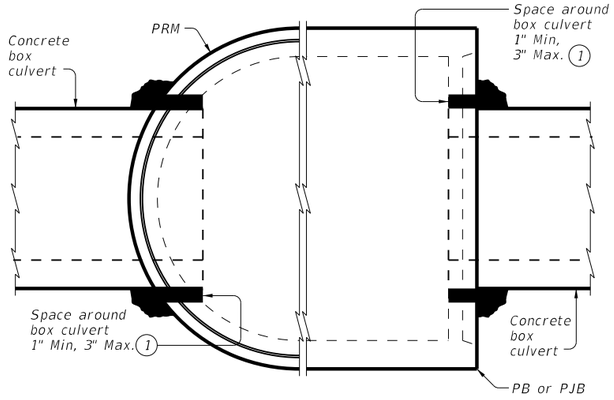


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

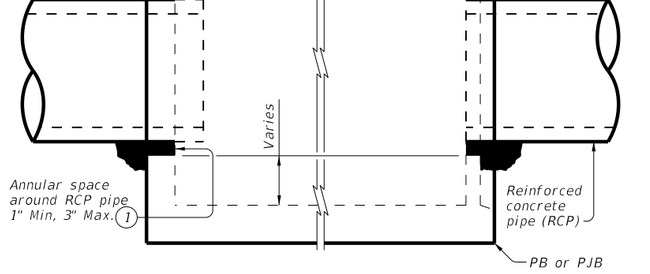
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

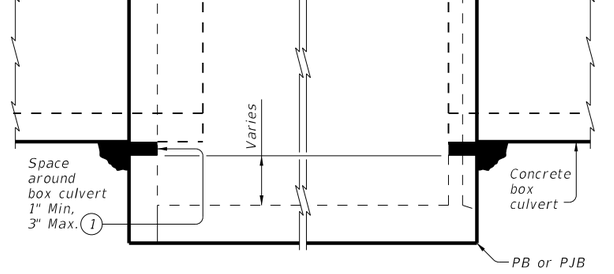
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

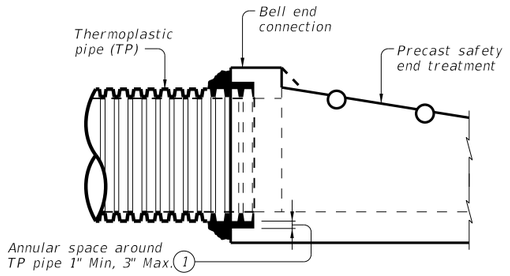
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		104

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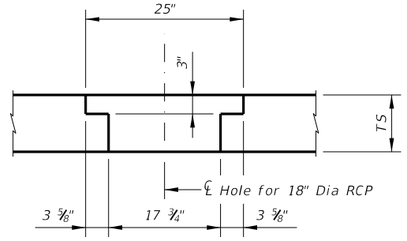
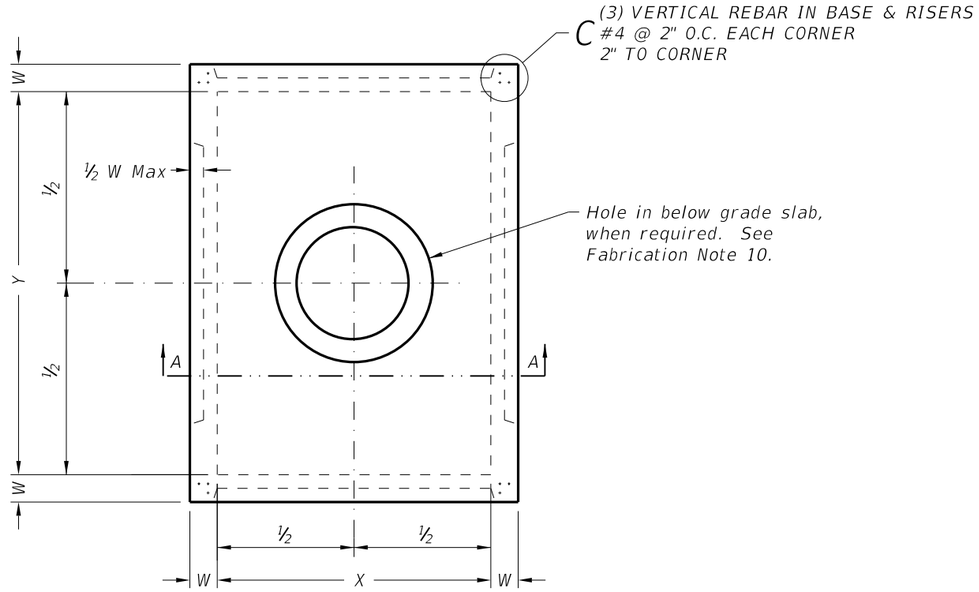
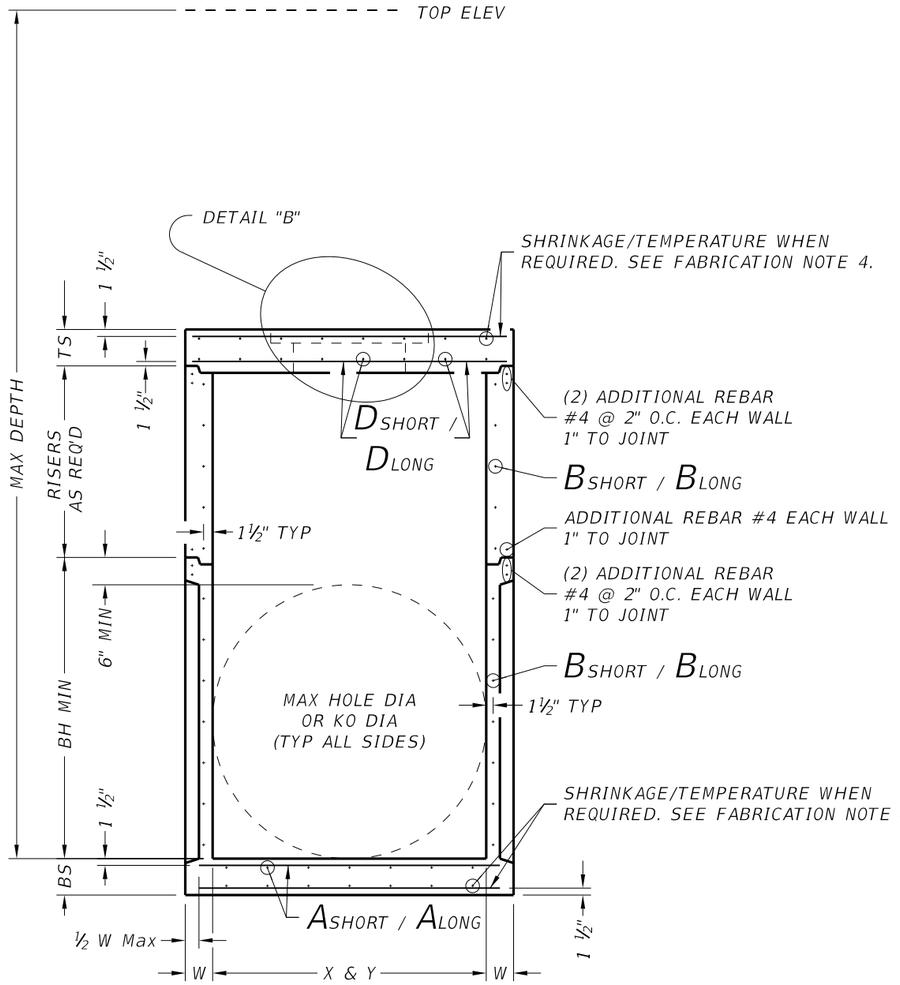


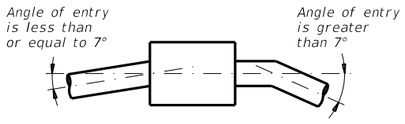
DETAIL "B"



PLAN VIEW



SECTION A-A



PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PJB wall.
If necessary, use pipe elbow or curved approach
alignment to stay within this limit.

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 typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.
10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

INSTALLATION NOTES:

1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to junction box.
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.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE: prestd09-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		105

	Size	MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB										Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)						
		Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72

** Unless otherwise indicated.

FABRICATION NOTES:
1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

PDD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	TYL	HENDERSON		106

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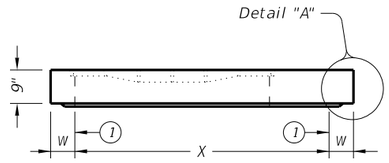
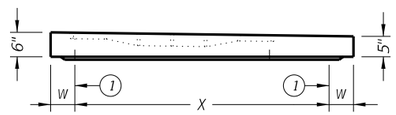
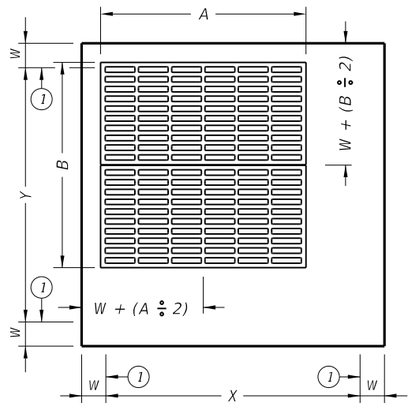


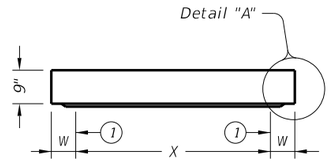
STYLE 'FG'



STYLE 'SFG'
ELEVATION VIEW

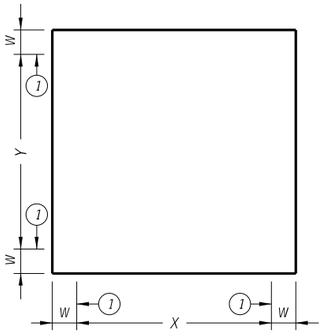


PLAN VIEW
CAST-IN FRAME & GRATE
STYLES 'FG' & 'SFG'

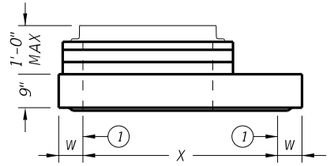


ELEVATION VIEW

STYLE 'SL'

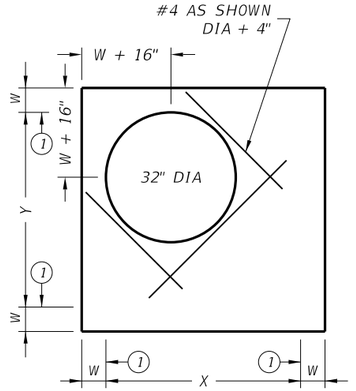


PLAN VIEW
NO OPENINGS

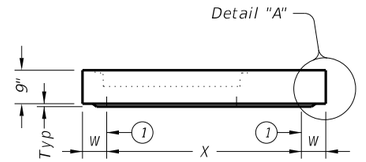


ELEVATION VIEW

STYLE 'RH'

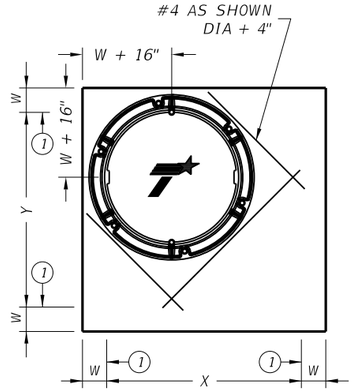


PLAN VIEW
SHIP LOOSE RING & COVER

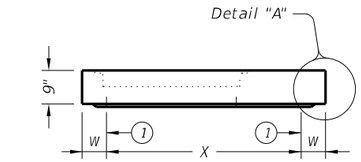


ELEVATION VIEW

STYLE 'RC'

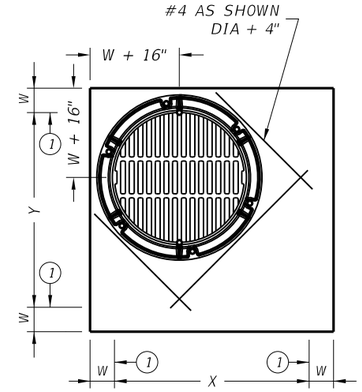


PLAN VIEW
32" DIA CAST-IN RING & COVER



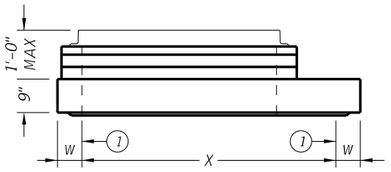
ELEVATION VIEW

STYLE 'RG'



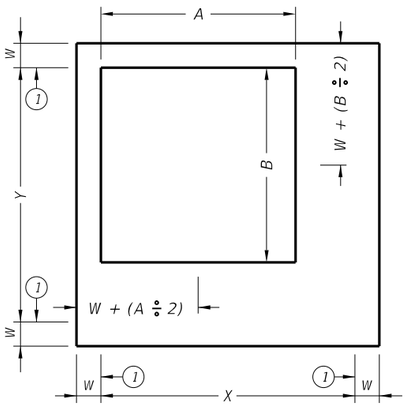
PLAN VIEW
32" DIA CAST-IN RING & GRATE

STYLE 'RG'



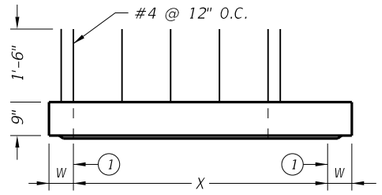
ELEVATION VIEW

STYLE 'SH'



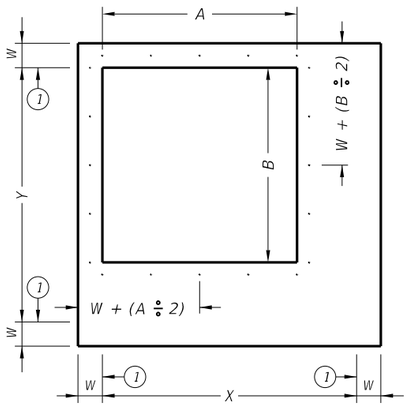
PLAN VIEW
SHIP LOOSE FRAME & GRATE

STYLE 'SH'



ELEVATION VIEW

STYLE 'S1'



PLAN VIEW
EXPOSED REBAR

STYLE 'S1'

(1) Matches inside face of wall of precast base or riser below inlet.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	TYL	HENDERSON		107

DATE: 8/3/2022 8:44:06 AM
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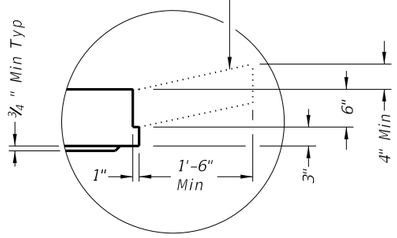
Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in²/ft	0.37 in²/ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in²/ft	0.37 in²/ft
SFG	3'x3'	6"	3'x3'	0.32 in²/ft	0.32 in²/ft
SL	4'x4'	6"	n/a	0.34 in²/ft	0.34 in²/ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in²/ft	0.41 in²/ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in²/ft	0.41 in²/ft
SFG	4'x4'	6"	4'x4'	0.32 in²/ft	0.32 in²/ft
SL	3'x5'	6"	n/a	0.39 in²/ft	0.39 in²/ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in²/ft	0.48 in²/ft
SFG	3'x5'	6"	3'x5'	0.32 in²/ft	0.32 in²/ft
SL	4'x5'	6"	n/a	0.42 in²/ft	0.42 in²/ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in²/ft	0.42 in²/ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in²/ft	0.66 in²/ft
SL	5'x5'	6"	n/a	0.36 in²/ft	0.36 in²/ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in²/ft	0.43 in²/ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in²/ft	0.63 in²/ft
SL	5'x6'	6"/8"	n/a	0.48 in²/ft	0.48 in²/ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in²/ft	0.60 in²/ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in²/ft	0.60 in²/ft
SL	6'x6'	6"/8"	n/a	0.43 in²/ft	0.43 in²/ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in²/ft	0.59 in²/ft
SL	8'x8'	8"/10"	n/a	0.45 in²/ft	0.45 in²/ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in²/ft	0.45 in²/ft

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of ¾" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct traffic and may be placed in 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.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for lid 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.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

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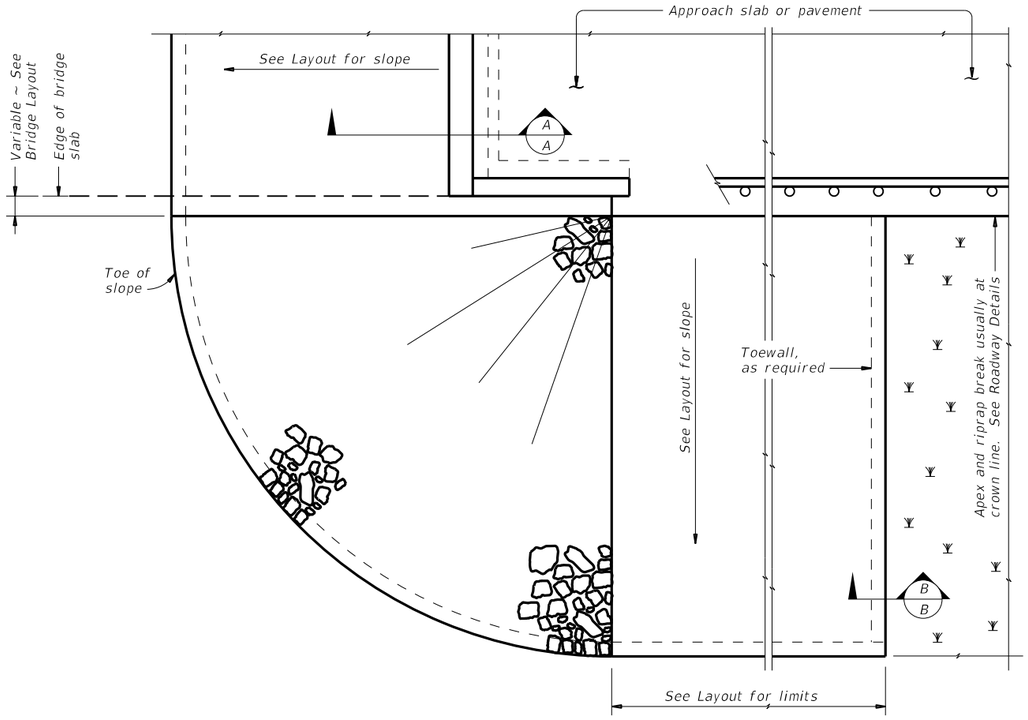
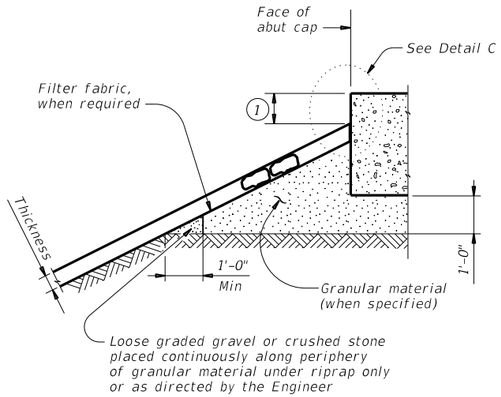
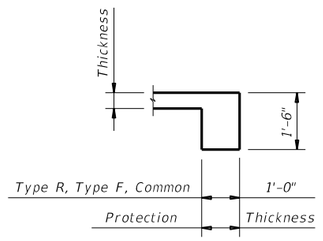


PLAN

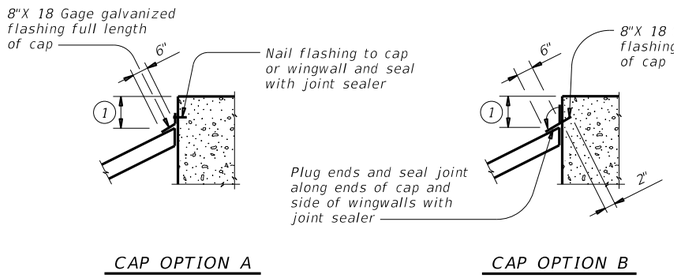


SECTION A-A AT CAP



SECTION B-B

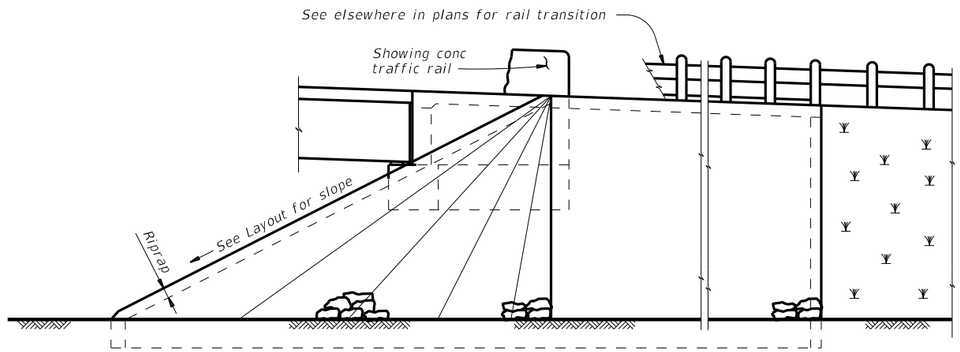
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

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Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
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REVISIONS	0646	07	009	FM 316
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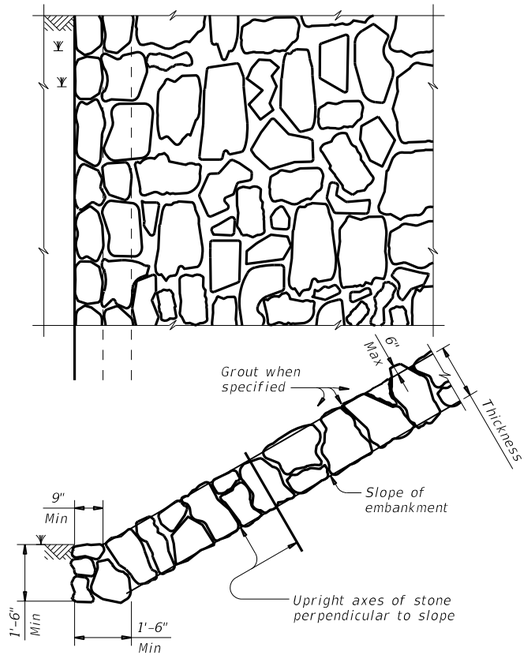


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

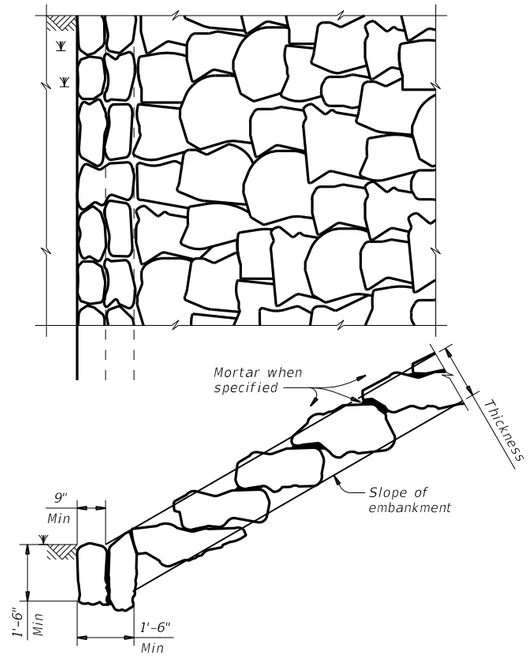


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

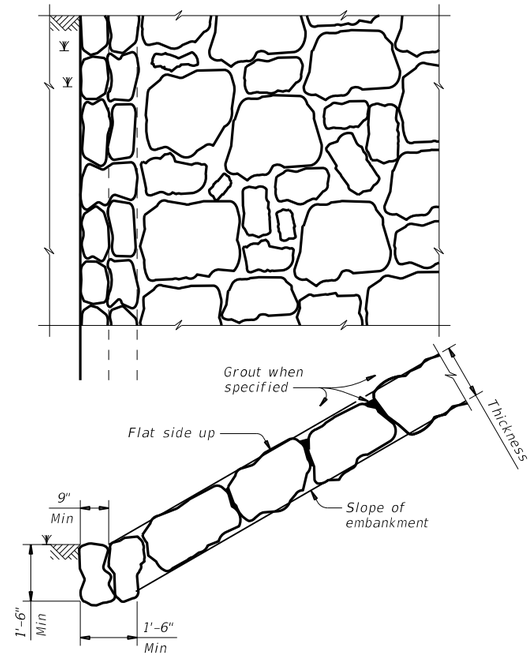


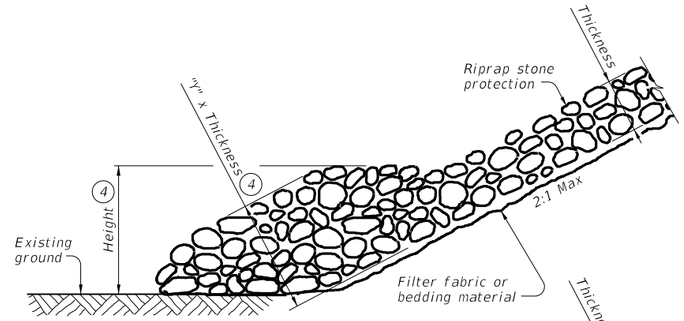
FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

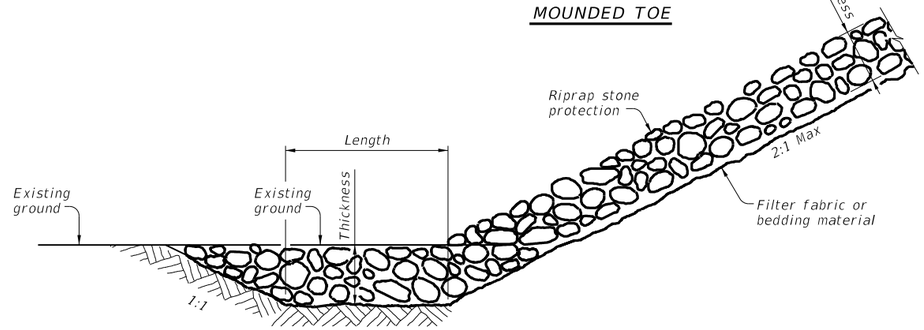
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.

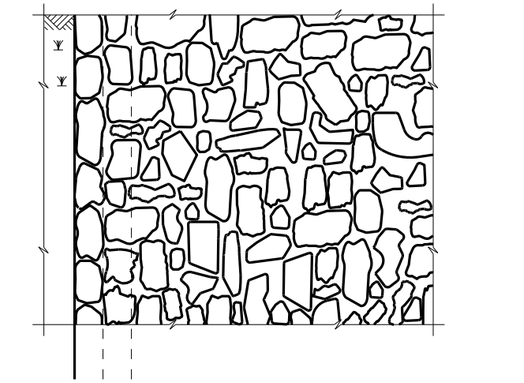


MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)



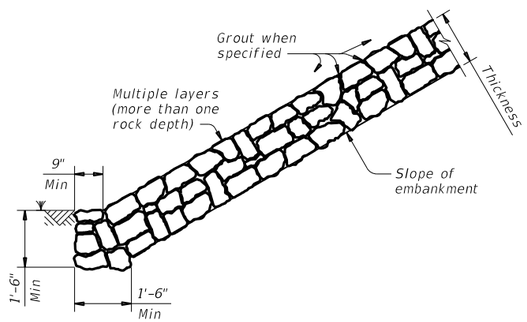
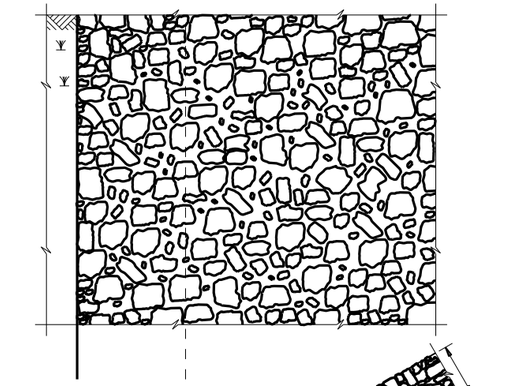


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted



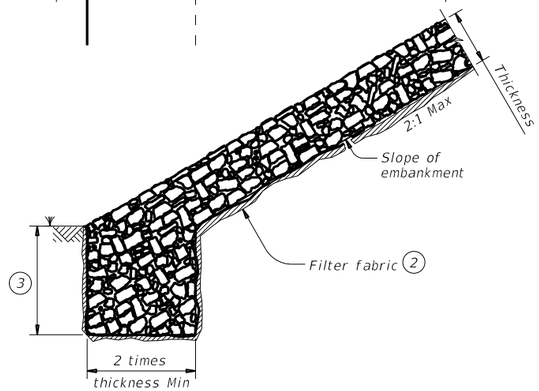


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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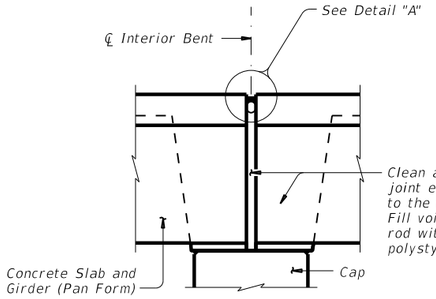
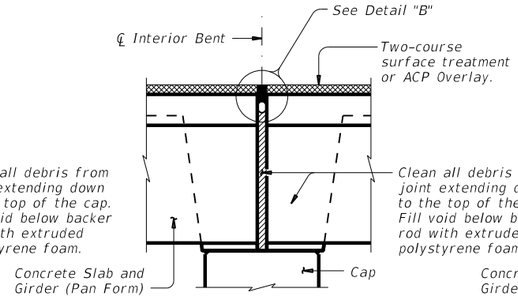
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		110



JOINT WITH SILICONE SEAL
(used without ACP Overlay)



JOINT WITH HOT POURED RUBBER SEAL
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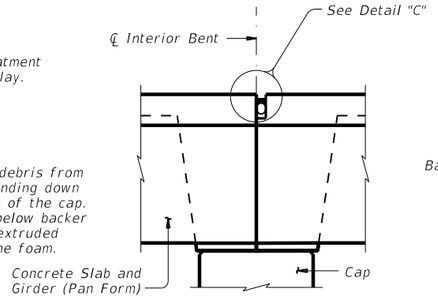
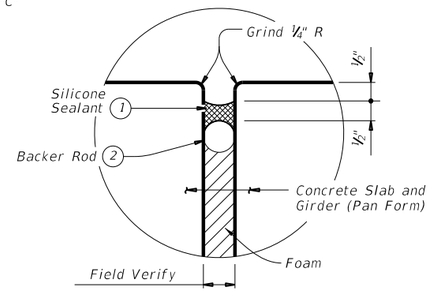
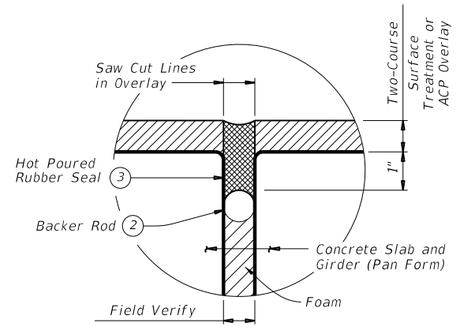


FIXED JOINT

EXISTING CONCRETE SLAB & GIRDER JOINT REPAIR

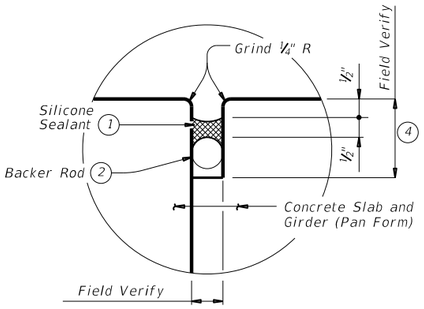


DETAIL "A"



DETAIL "B"

1. Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."
2. Backer rod must be 25% larger than joint opening and must be compatible with the sealant.
3. Use Class 3 hot poured rubber seal. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."
4. Backer rod may be omitted if existing joint depth is less than 1½".



DETAIL "C"

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH SILICONE SEAL:

1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.
2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
3) Place backer rod into joint opening 1" below the top of concrete. The backer rod must be 25% larger than the joint opening. Fill void below backer rod with extruded polystyrene foam.
4) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

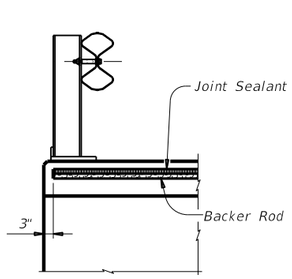
PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH HOT POURED RUBBER SEAL:

1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
3) Place backer rod into joint opening 1" below the top of concrete. Backer rod must be compatible with the hot poured rubber sealant and rated for a minimum of 400°F. The backer rod must be 25% larger than the joint opening. Fill void below backer rod with extruded polystyrene foam.
4) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement.

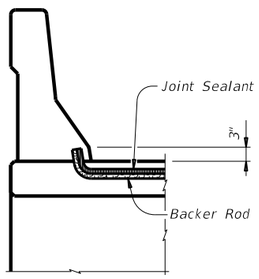
PROCEDURE FOR CLEANING AND SEALING EXISTING FIXED JOINTS:

1) Remove existing seal and debris from recess.
2) Abrasive blast clean existing surfaces where silicone seal is to be placed.
3) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
4) Place backer rod into joint opening 1" below the top of concrete. The backer rod must be 25% larger than the joint opening.
5) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

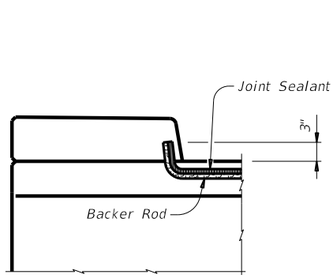
NOTE:
DURING LANE CLOSURES AND PRIOR TO MILLING OPERATIONS, THE CONTRACTOR SHALL MARK BRIDGE JOINT LOCATIONS.



SHOWN AT STEEL RAIL



SHOWN AT BARRIER RAIL



SHOWN AT CURB

JOINT SEALANT TERMINATION DETAILS

GENERAL NOTES

Cleaning existing joint opening (full depth) of all debris, providing and placing backer rod, saw-cutting asphalt overlay, and sealing joint is paid for by Item 438, "Cleaning and Sealing Joints" and measured by the linear foot.

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

For Class 3 Hot Poured Rubber Seal, provide backer rod compatible with the hot poured rubber sealant and rated for a minimum of 400°F.

Provide Class 3 sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in asphalt overlay.

Provide Class 7 silicone sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in concrete.

Extend sealant up into rail or curb 3 inches on low side or sides of deck. If the Class 7 Sealant cannot be effectively placed in the vertical position, a Class 4 Sealant compatible with the Class 7 sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specifications.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED PROFESSIONAL ENGINEER

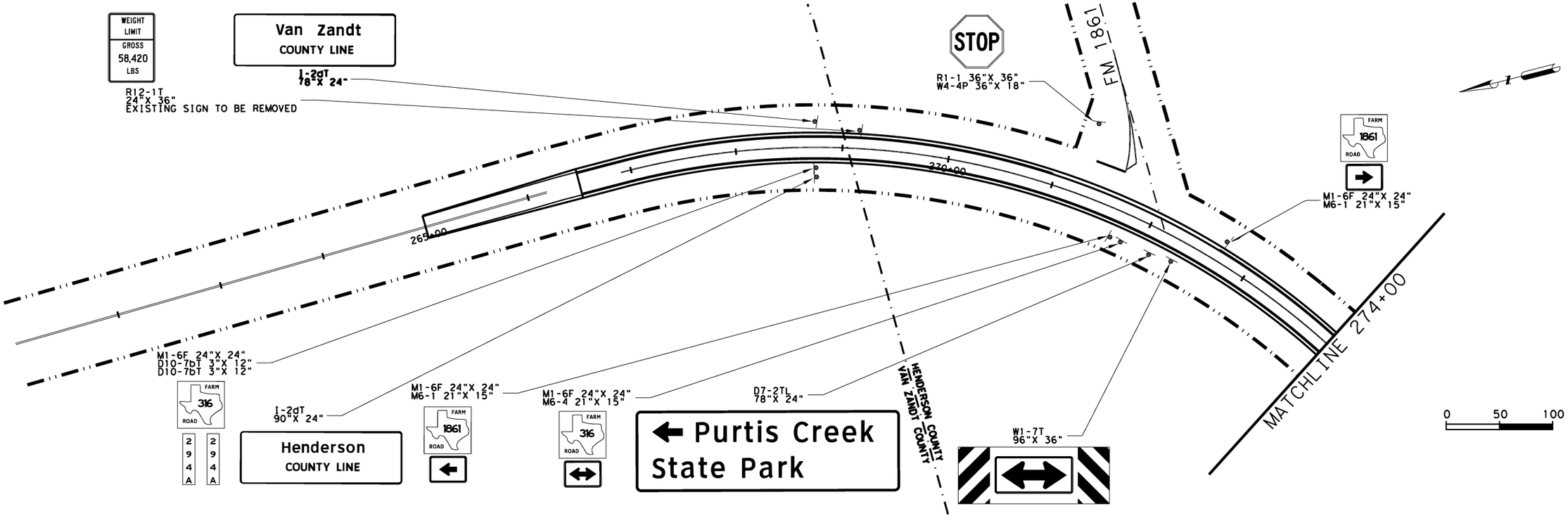
09/16/2022

Texas Department of Transportation — Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS
(PAN GIRDER BRIDGES)

FILE: cleansealjts pangirder.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT OCTOBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST.	COUNTY		SHEET NO.
	TYL	HENDERSON		111

DATE:
FILE:



FM 316
SIGN LAYOUT

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

Texas Department of Transportation
SHEET 1 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		112

DATE: 8/3/2022 8:38:30 AM
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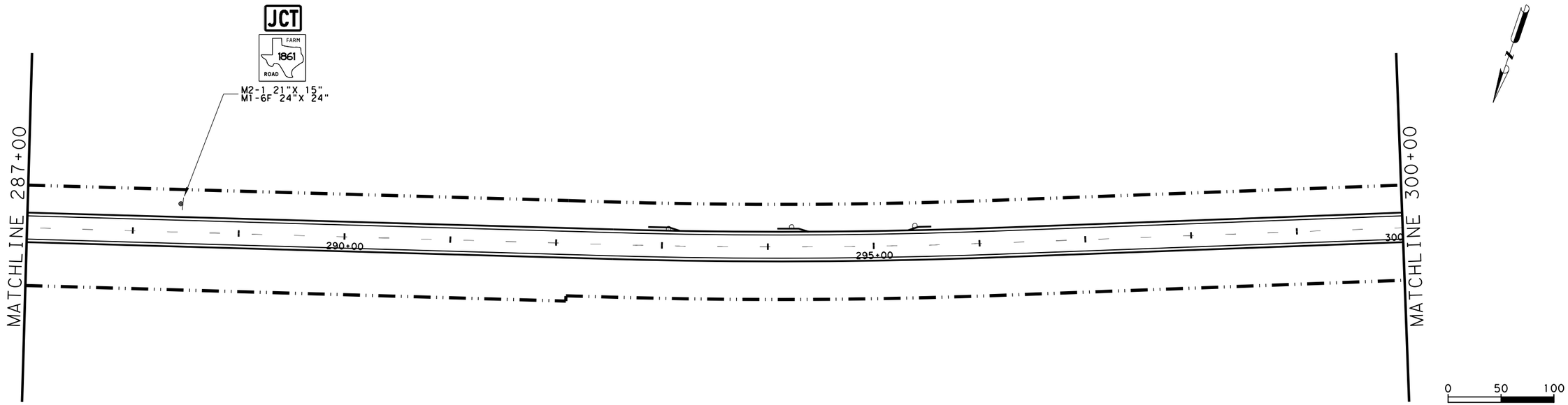
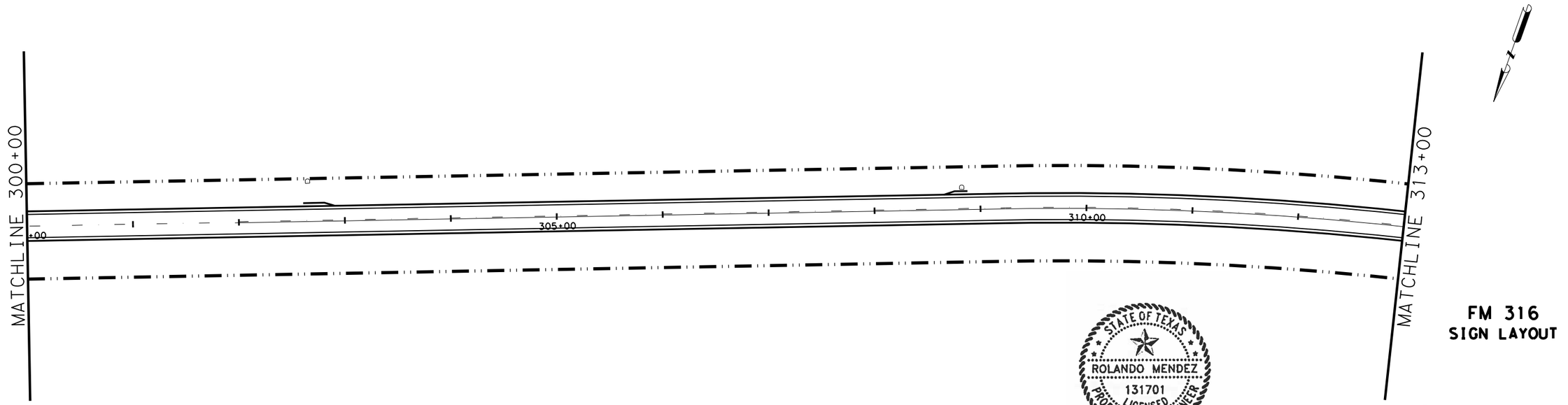
CK:
DN:





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CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		113

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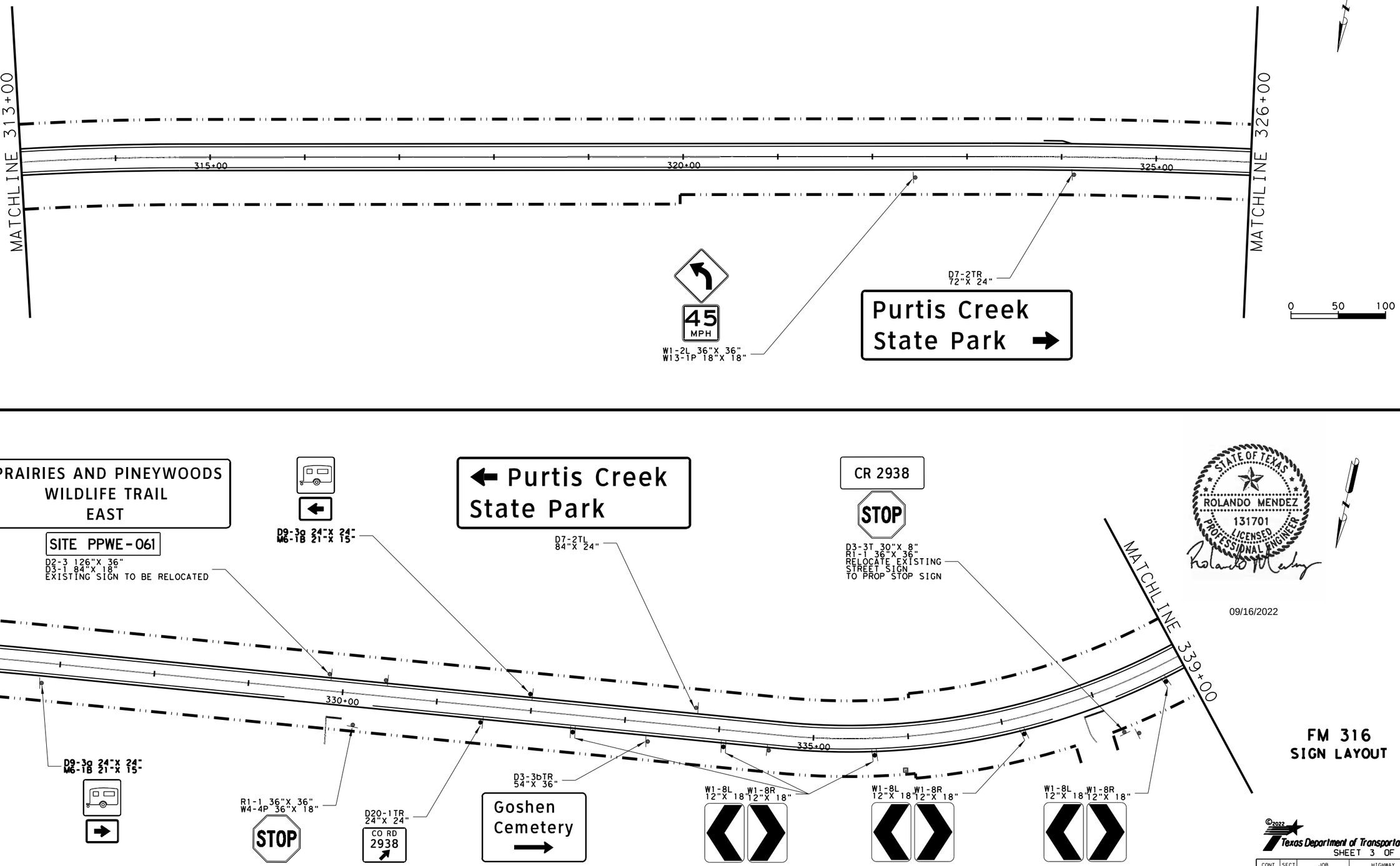

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SHEET 3 OF 10

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		114

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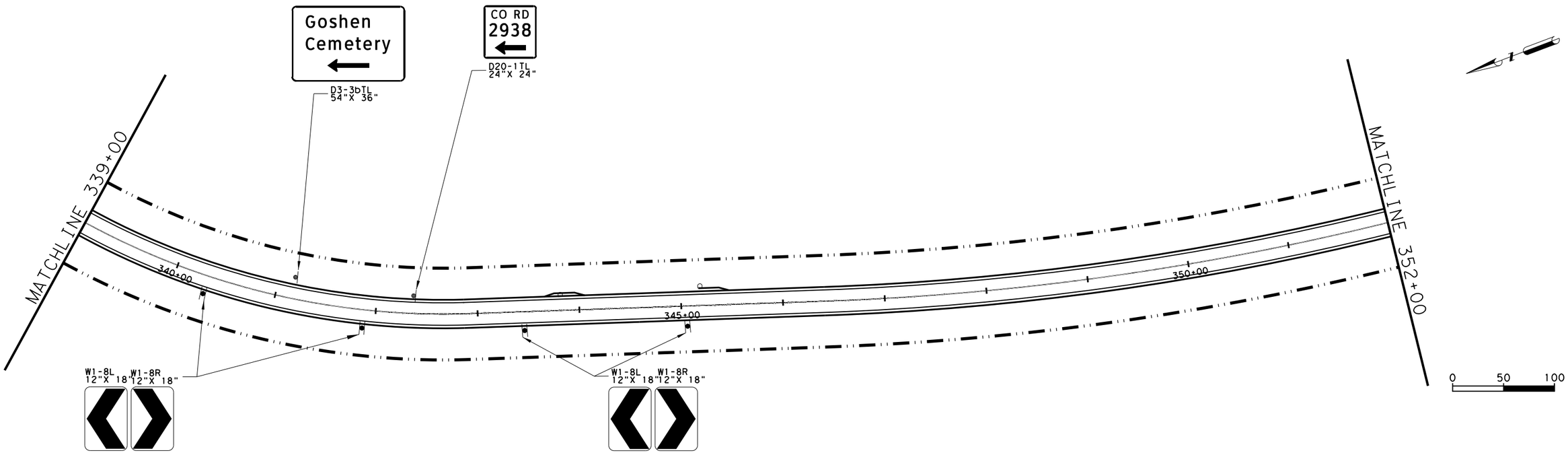

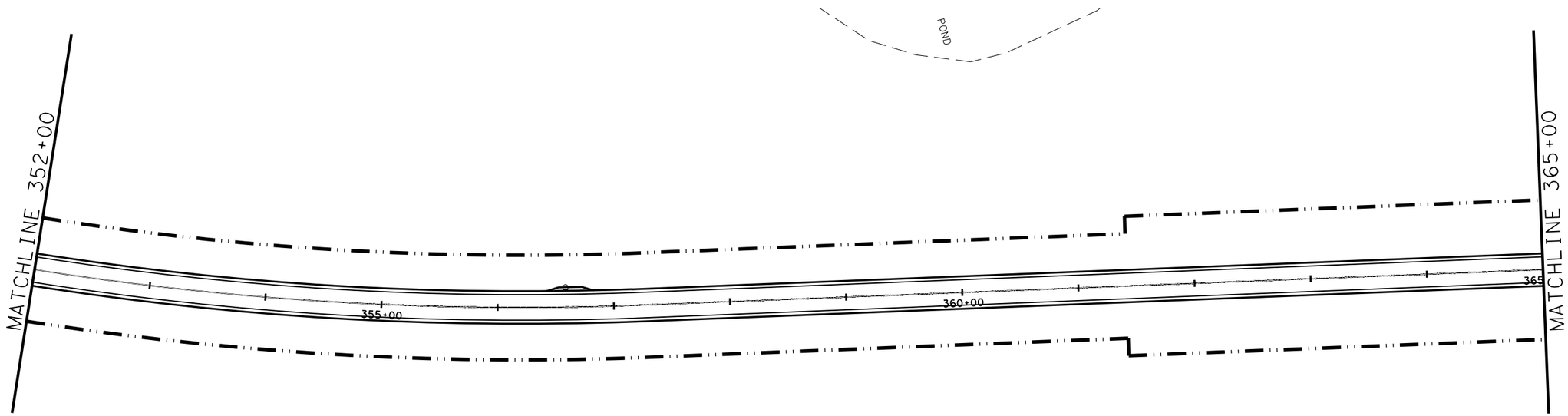

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SHEET 4 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		115

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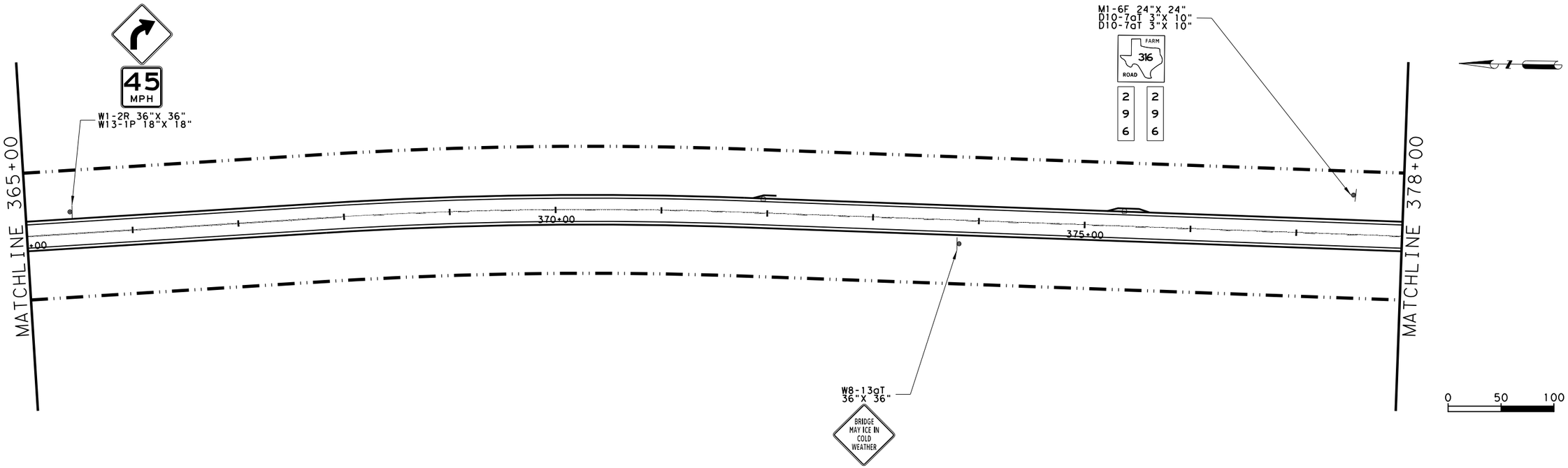

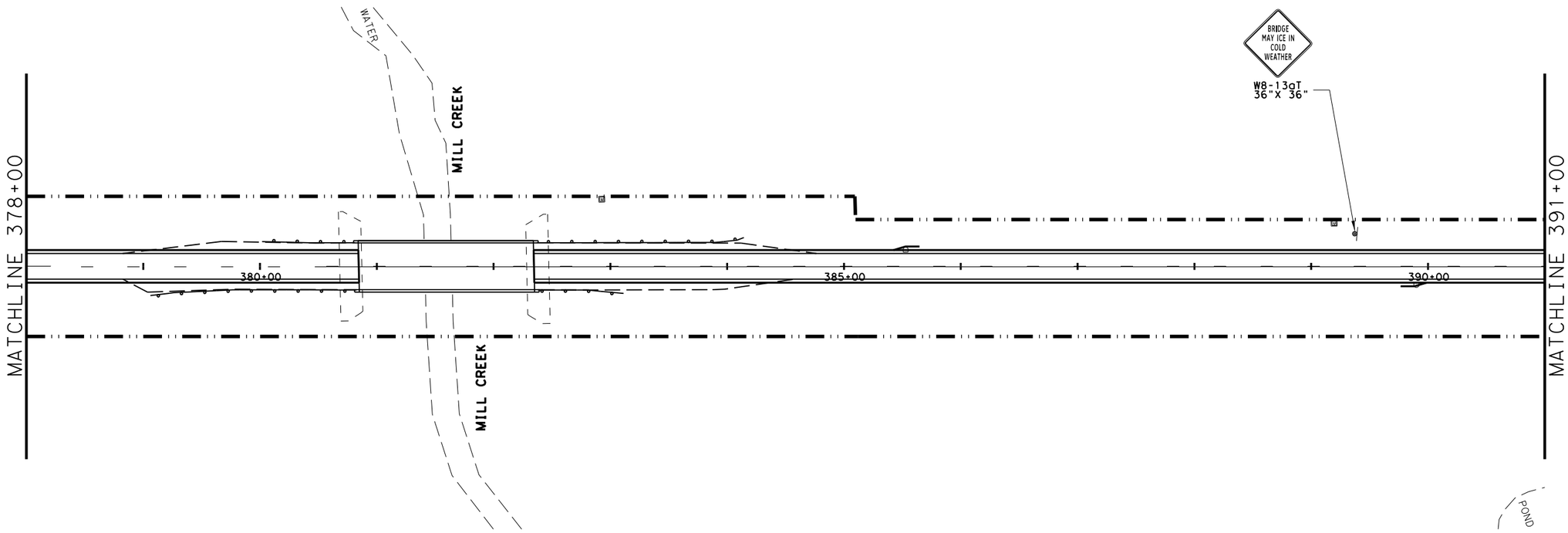

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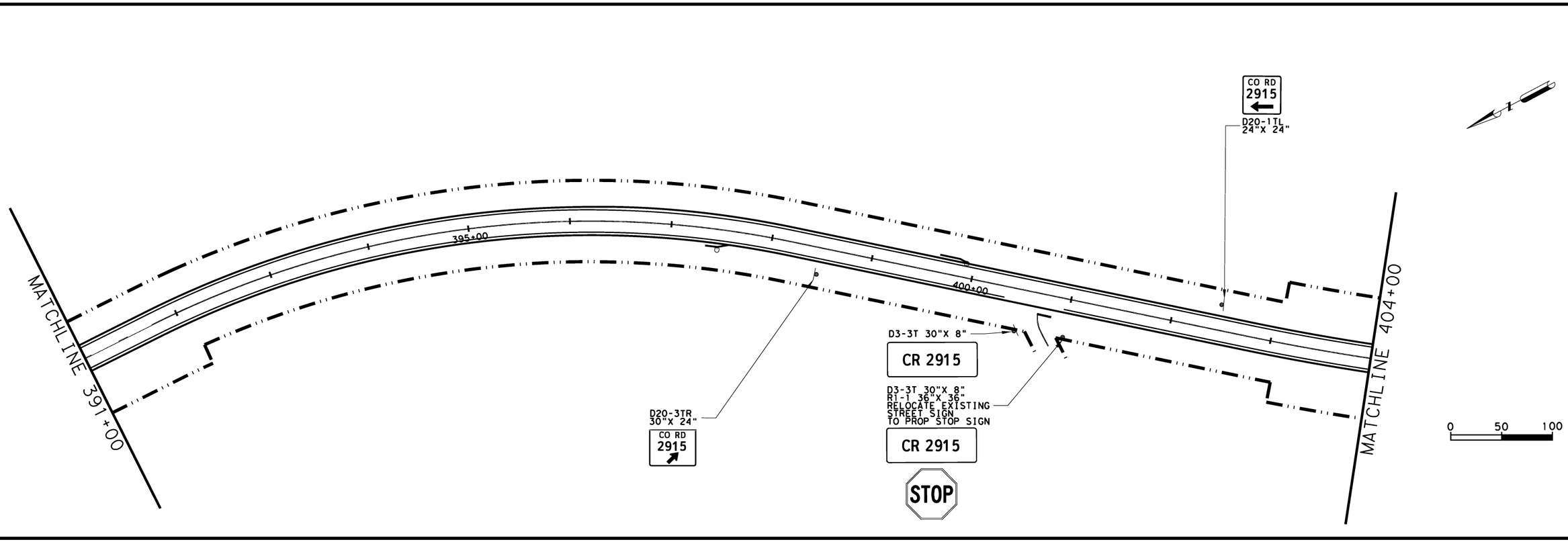
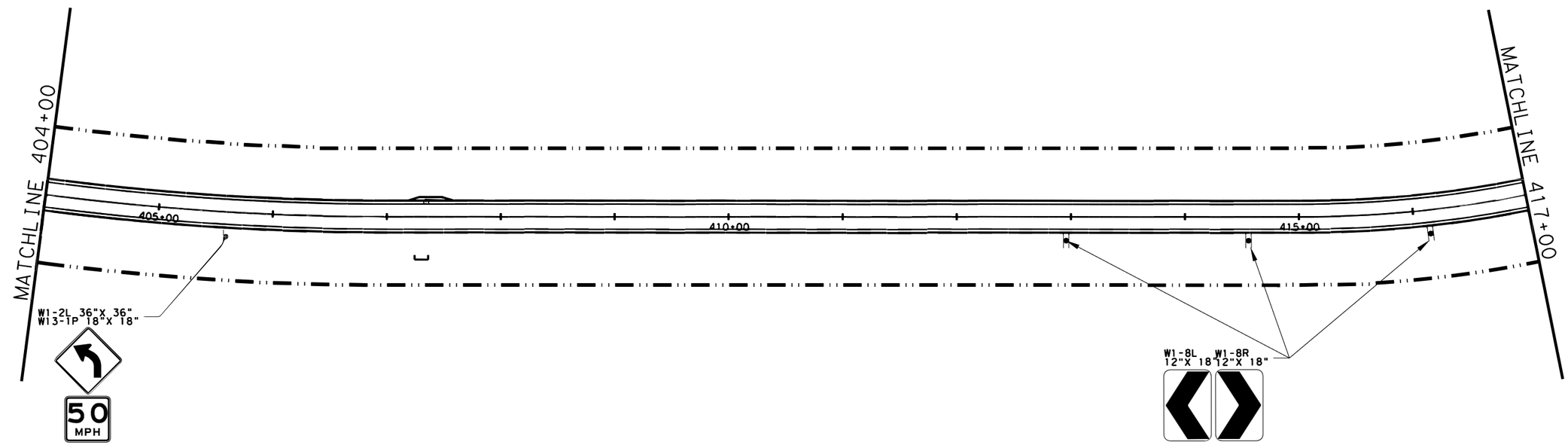
SHEET 5 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		116





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SHEET 6 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		117

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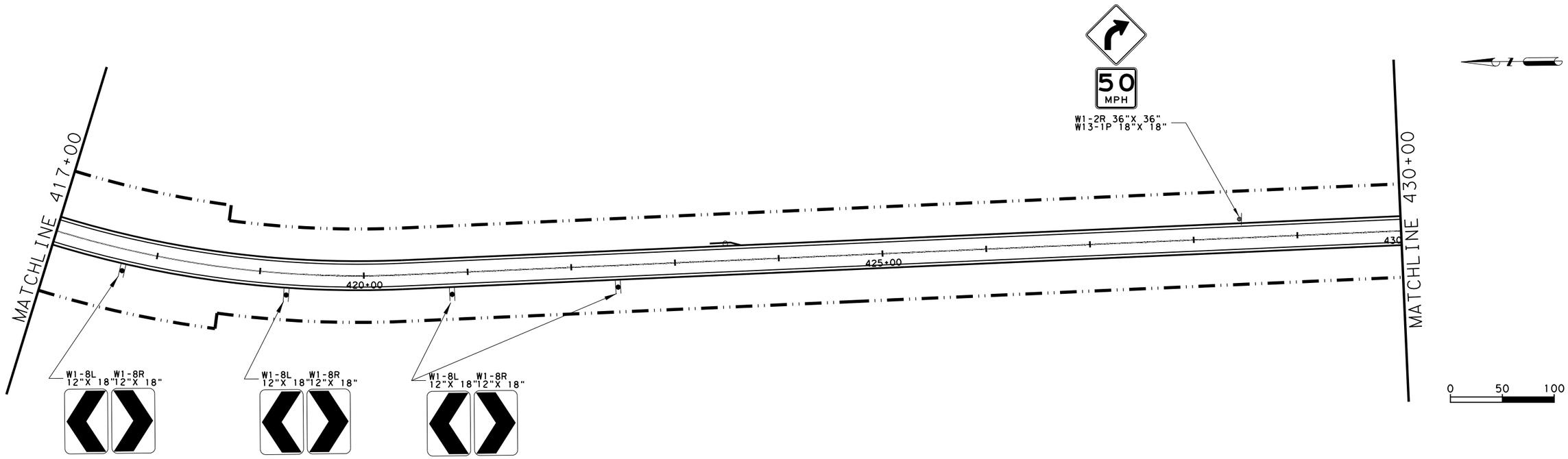

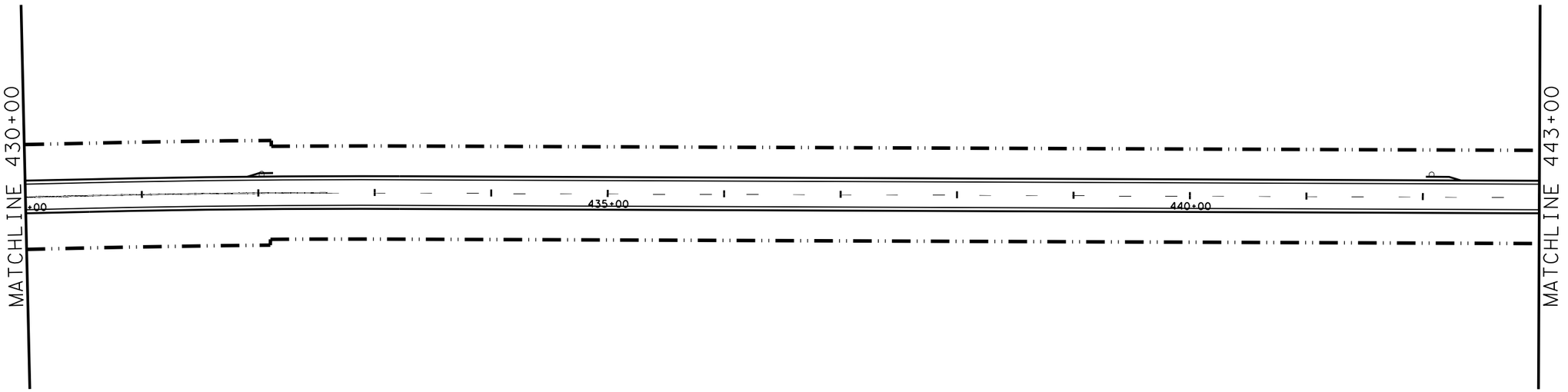

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SHEET 7 OF 10

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
TYL	HENDERSON		118

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CK:
DW:
CK:
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CK:
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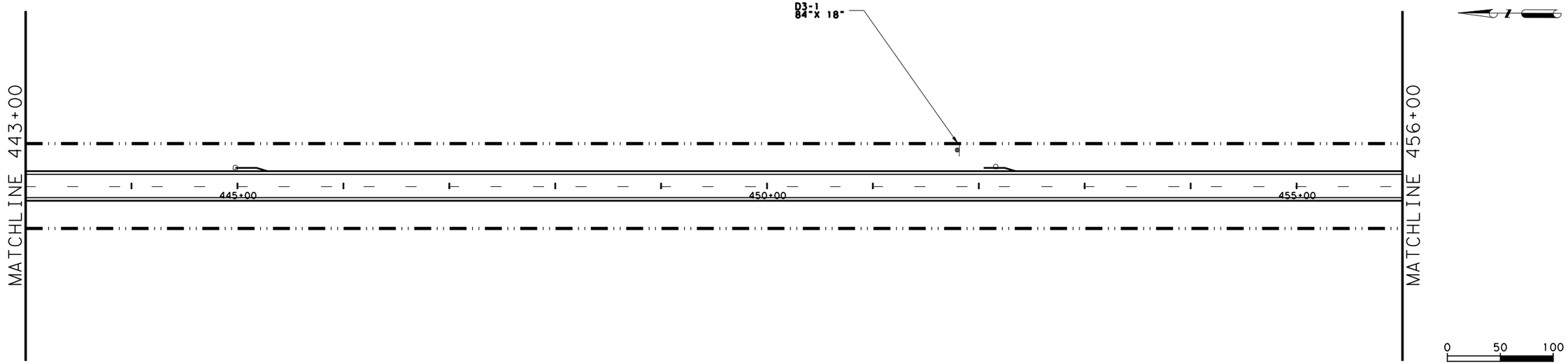
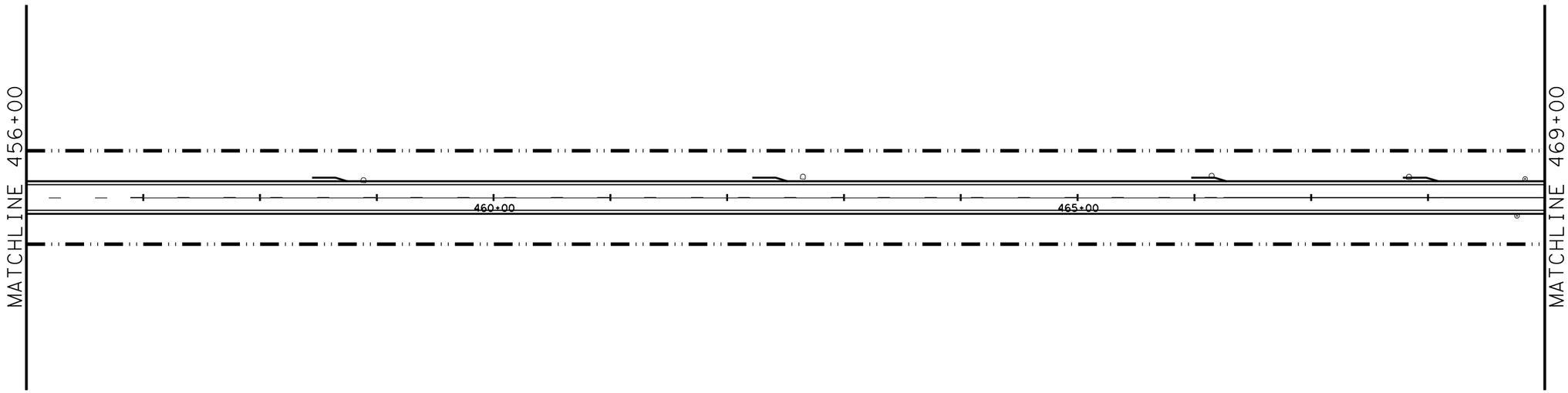
DN:

EXISTING SIGN TO BE RELOCATED

PR 12220

D3-1
84"X 18"





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CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		119

DATE: 8/3/2022 1:11:34 PM
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CK:
DW:
CK:
DN:

MATCHLINE 469+00

470+00

475+00

480+00

MATCHLINE 482+00

M2-1 21"X 15"
M1-6F 24"X 24"

JCT

FARM 2709 ROAD

0 50 100

MATCHLINE 482+00

NORTH

FARM 316 ROAD

M3-1 24"X 12"
M1-6F 24"X 24"

SPEED LIMIT 55

R2-1
30"X 36"

STOP

R1-1 36"X 36"
W4-4P 36"X 18"

FM 2709

FARM 2709 ROAD

M1-6F 24"X 24"
M6-1 21"X 15"

48+49.82 32.16 LT.

485+00

490+00

495

MATCHLINE 495+00

R2-1
30"X 36"

SPEED LIMIT 45

R5-4aT
36"X 48"

NO ENGINE BRAKE
BY CITY ORDINANCE

I-2aT
48"X 24"

Eustace
CITY LIMIT
POP 1137

I-2aT
48"X 24"

Eustace
CITY LIMIT
POP 1137

M1-6F 24"X 24"
M6-1 21"X 15"

FARM 2709 ROAD

M1-6F 24"X 24"
M6-4 21"X 15"

FARM 316 ROAD

W1-7
24"X 12"

COUNTY RD.

R2-1
30"X 36"

SPEED LIMIT 20

R5-4aT 30"X 36"
RELOCATE EXISTING
STREET SIGN

NO THRU TRUCK TRAFFIC

D3-3T 30"X 8"
R1-1 36"X 36"
RELOCATE EXISTING
STREET SIGNS
TO PROP STOP SIGN

COUNTY

FM 316

STOP

M3-3 24"X 12"
M1-6F 24"X 24"
D10-7aT 3"X 10"
D10-7aT 3"X 10"

SOUTH

FARM 316 ROAD

2 9 6

2 9 6

M2-1 21"X 15"
M1-4 30"X 24"

JCT

175

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CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		120

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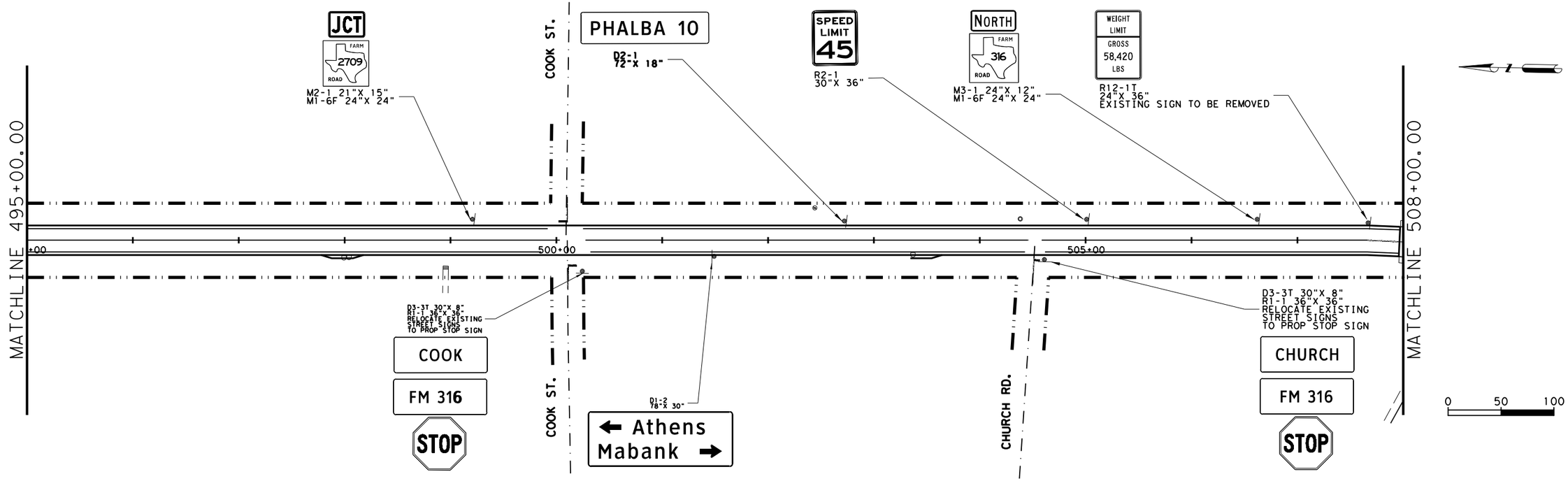

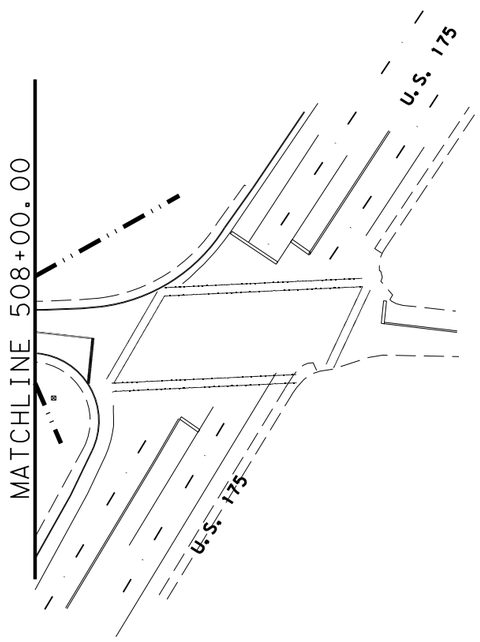

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SHEET 10 OF 10

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		121

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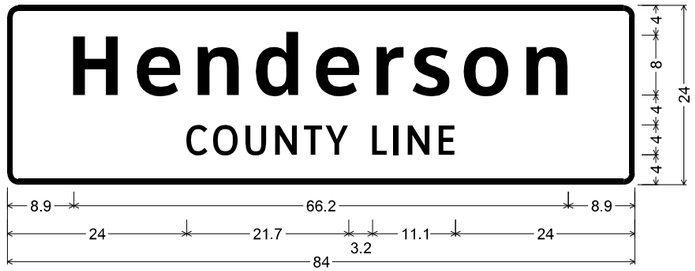
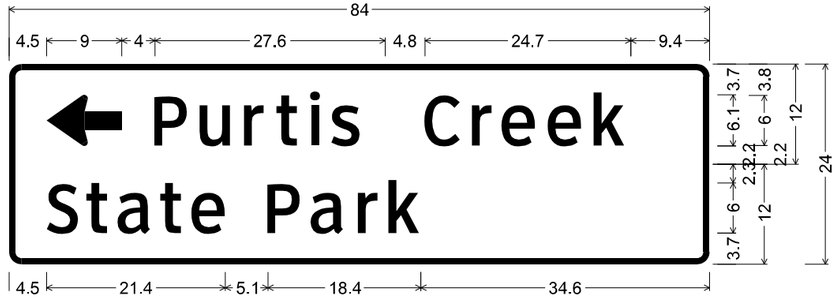


Identifier: I-2dT 8in;
1.5" Radius, 0.8" Border, White on Green;
"Henderson", ClearviewHwy-5-W-R; "COUNTY LINE", ClearviewHwy-3-W;
Table of distances between letter and object lefts

	H	e	n	d	e	r	s	o	n	
8.9	8.5	8.1	7.8	8.0	8.2	4.7	6.9	8.4	5.6	8.9

	C	O	U	N	T	Y	L	I	N	E	
24.0	3.6	4.3	4.0	3.8	2.9	6.3	2.9	1.8	4.2	2.2	24.0



Identifier: D7-2TL_VARx24;

1.5" Radius, 0.8" Border, White on, Brown;
Standard Arrow Custom 9.0" X 6.1" 180'; "PURTIS CREEK", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"State Park", ClearviewHwy-3-W;
Table of distances between letter and object lefts

	←	P	U	R	T	I	S	C	R	E	E	K	
4.5	13.0	5.4	6.0	4.9	5.1	2.3	8.7	5.6	5.5	4.7	4.7	4.2	9.4

	S	t	a	t	e	P	a	r	k		
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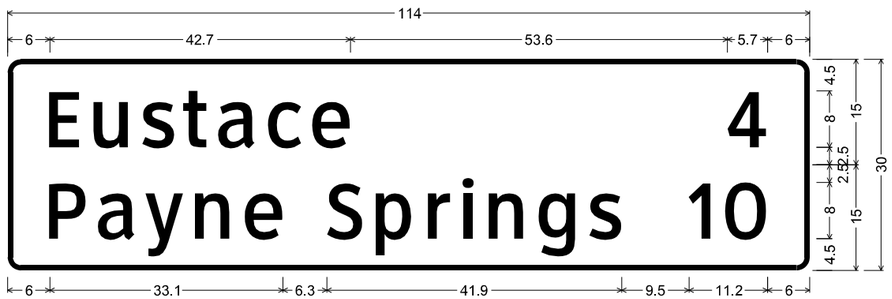


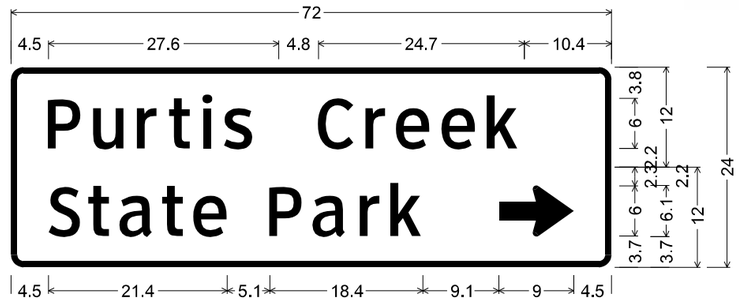
Identifier: D2-2 8in;

1.9" Radius, 0.8" Border, White on, Green;
"Eustace ", ClearviewHwy-3-W; "4", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Payne Springs", ClearviewHwy-3-W; "10", ClearviewHwy-3-W;
Table of distances between letter and object lefts

	E	u	s	t	a	c	e	4	
6.0	6.3	6.8	5.8	5.1	7.1	6.3	58.9	5.7	6.0

	P	a	y	n	e	S	p	r	i	n	g	s	1	0	
6.0	6.9	6.7	7.1	7.1	11.6	7.0	7.3	4.9	3.9	7.1	7.1	14.1	5.3	5.9	6.0



Identifier: D7-2TR_VARx24;

1.5" Radius, 0.8" Border, White on, Brown;
"PURTIS CREEK", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"State Park", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0';
Table of distances between letter and object lefts

	P	U	R	T	I	S	C	R	E	E	K	
4.5	5.4	6.0	4.9	5.1	2.3	8.7	5.6	5.5	4.7	4.7	4.2	10.4

	S	t	a	t	e	P	a	r	k	→		
4.5	4.8	3.8	5.0	3.8	9.1	5.2	5.6	3.8	12.9	9.0	4.5	

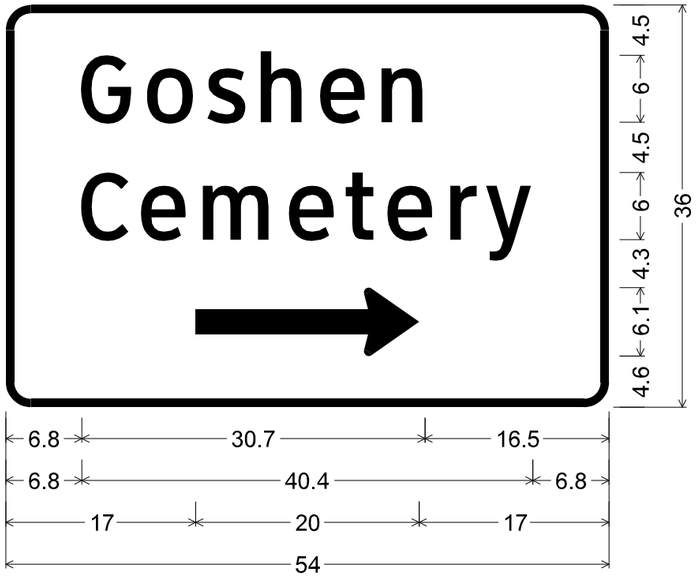
09/16/2022

FM 316 SIGN DETAILS

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		122

DATE: 8/3/2022 8:39:31 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0465106\FM 316_TYL_Sign _Details.dgn

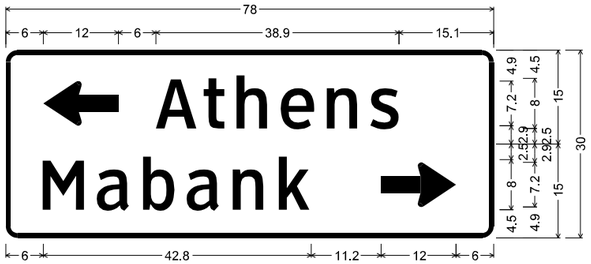


Identifier: D3-3bTR_VARx36;
2.3" Radius, 0.8" Border, White on Green;
"Goshen", ClearviewHwy-3-W;
"Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0°;
Table of distances between letter and object lefts

6.8	G 5.9	o 5.3	s 4.9	h 5.3	e 5.5	n 3.8	16.5

6.8	C 5.4	e 5.5	m 7.7	e 5.0	t 3.8	e 5.6	r 3.2	y 4.2	6.8

17.0	→ 20.0	17.0



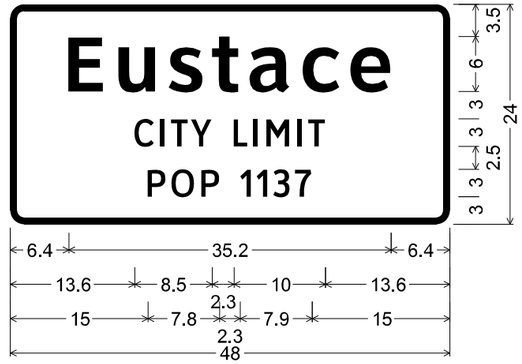
Identifier: D1-2 8in LT-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Athens", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Mabank", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';
Table of distances between letter and object lefts

6.0	← 18.0	A 7.6	t 5.4	h 7.1	e 7.3	n 6.9	s 4.6	15.1

6.0	M 8.6	a 7.4	b 7.0	a 7.4	n 7.4	k 16.2	→ 12.0	6.0

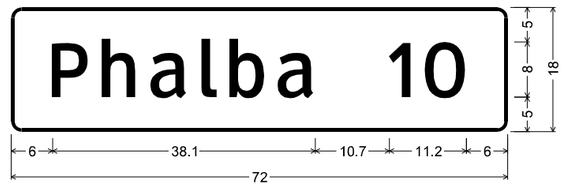


Identifier: I-2aT 6in;
1.5" Radius, 0.8" Border, White on Green;
"Eustace", ClearviewHwy-5-W-R;
"CITY LIMIT", ClearviewHwy-3-W;
"POP 1137", ClearviewHwy-3-W;
Table of distances between letter and object lefts

6.4	E 5.4	u 5.5	s 4.8	t 4.0	a 5.8	c 5.3	e 4.4	6.4

13.6	C 2.8	I 1.1	T 2.3	Y 4.6	L 2.2	I 1.4	M 3.4	I 1.1	T 1.9	13.6

15.0	P 2.6	O 3.3	P 4.2	1 1.8	1 1.8	3 2.4	7 1.9	15.0



Identifier: D2-1 8in;
1.5" Radius, 0.5" Border, White on Green;
"Phalba", ClearviewHwy-3-W; "10", ClearviewHwy-3-W;
Table of distances between letter and object lefts

6.0	P 7.2	h 7.1	a 7.4	l 4.1	b 6.9	a 16.1	1 5.3	0 5.9	6.0

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316
SIGN
DETAILS

Texas Department of Transportation
SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		123

DATE: 8/3/2022 8:39:32 AM
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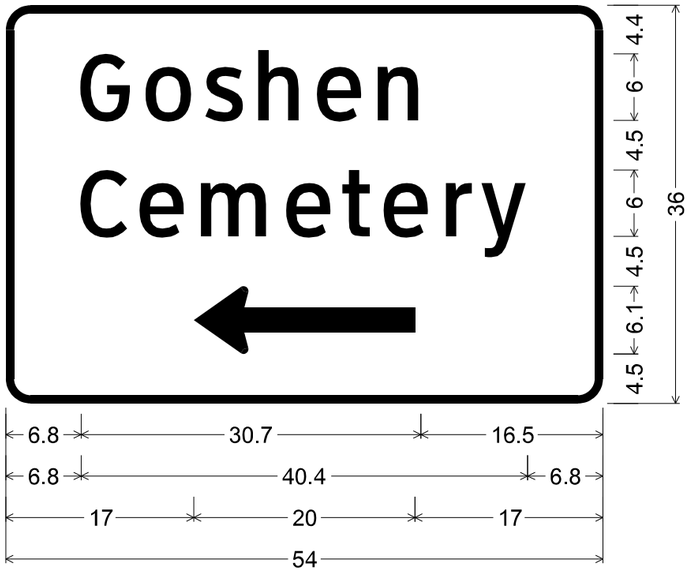
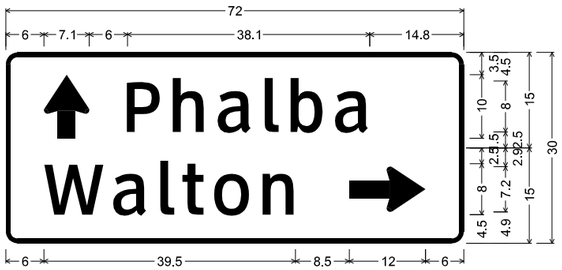


Identifier: D3-3bTL_VARx36;
2.3" Radius, 0.8" Border, White on Green;
"Goshen", ClearviewHwy-3-W;
"Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 180°;
Table of distances between letter and object lefts

6.8	G 5.9	o 5.3	s 4.9	h 5.3	e 5.5	n 3.8	16.5

6.8	C 5.4	e 5.5	m 7.7	e 5.0	t 3.8	e 5.6	r 3.2	y 4.2	6.8

17.0	← 20.0	17.0

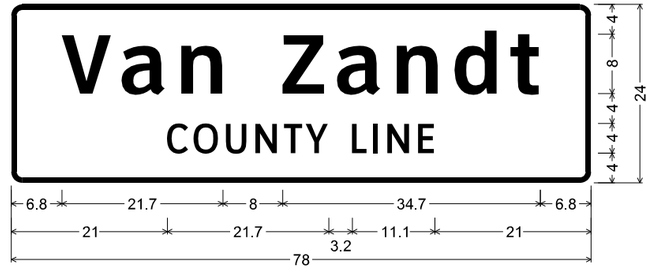


Identifier: D1-2 8in UP-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90';
"Phalba", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Walton", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';
Table of distances between letter and object lefts

6.0	↑ 13.1	P 7.3	h 7.0	a 7.4	l 4.1	b 6.9	a 5.4	14.8		
6.0	W 11.0	a 7.4	l 3.4	t 5.0	o 7.7	n 13.5	→ 12.0	6.0		



Identifier: I-2dT 8in;
1.5" Radius, 0.8" Border, White on, Green;
"Van Zandt", ClearviewHwy-5-W-R; "COUNTY LINE", ClearviewHwy-3-W;
Table of distances between letter and object lefts

6.8	V 8.1	a 8.0	n 13.6	Z 7.3	a 8.1	n 7.8	d 7.5	t 4.0	6.8	

21.0	C 3.6	O 4.3	U 4.0	N 3.8	T 2.9	Y 6.3	L 2.9	I 1.8	N 4.2	E 2.2	21.0

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

09/16/2022

FM 316 SIGN DETAILS

Texas Department of Transportation

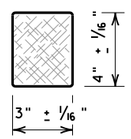
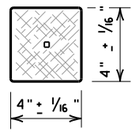
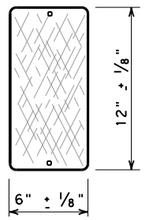
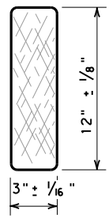
SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		124

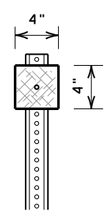
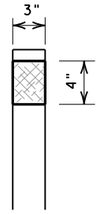
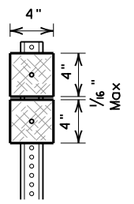
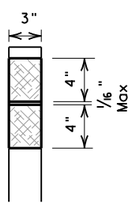
DATE: 8/3/2022 8:39:32 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0465106\FM 316_TYL_Sign _Details.dgn

DATE: 8/3/2022 9:01:35 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0466898\FM316_TRF_DOM (1)-20.dgn

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

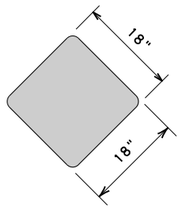
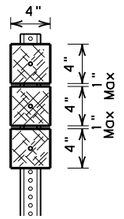
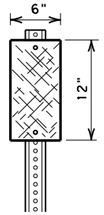
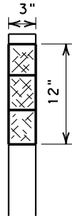
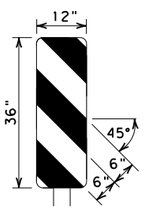
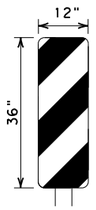
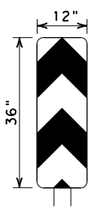
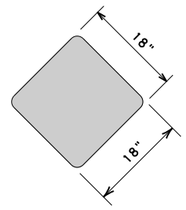
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

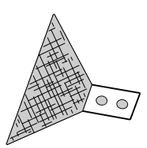
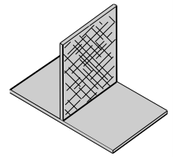
OBJECT MARKERS

	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

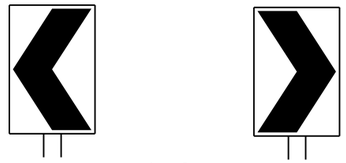
DEPARTMENTAL MATERIAL SPECIFICATIONS

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

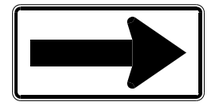
DEVICE: 

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

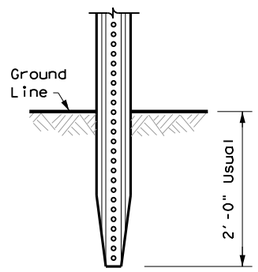
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	HENDERSON		125

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

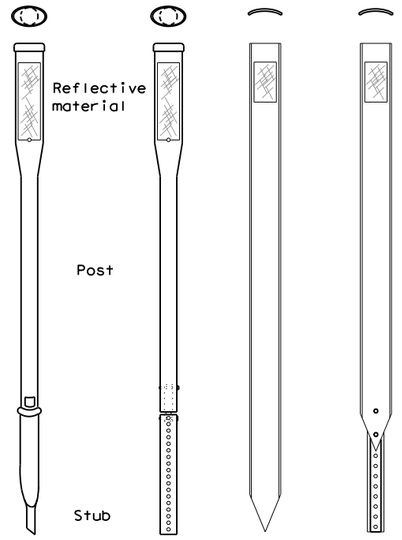


NOTES

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

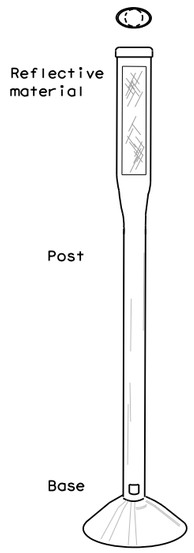
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



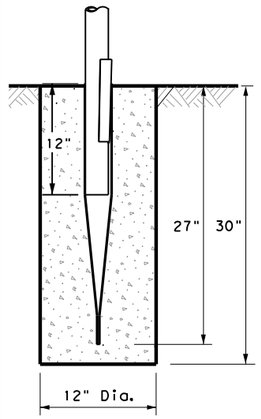
SURFACE MOUNT

NOTES

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

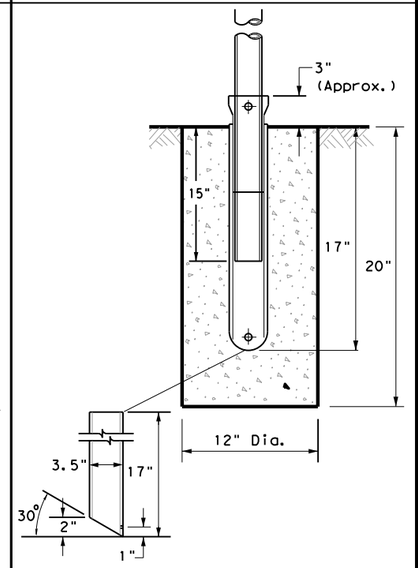
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

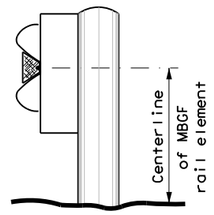
NOTE

1. Install per manufacturer's recommendations.

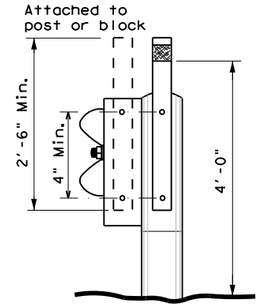
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

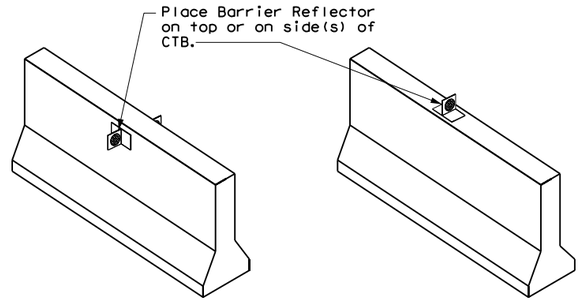
GF1



GF2



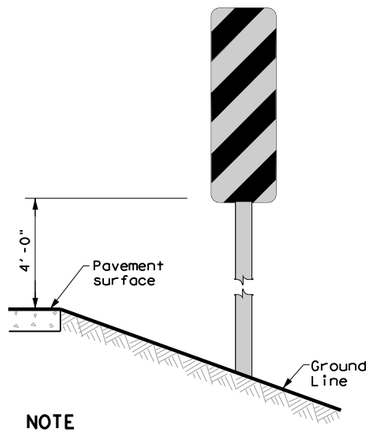
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

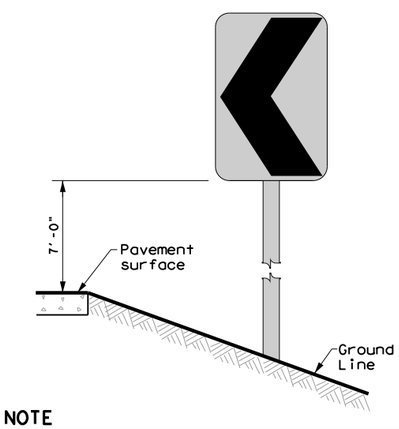
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

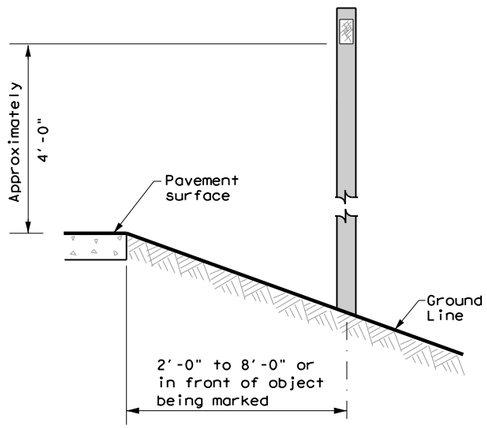
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

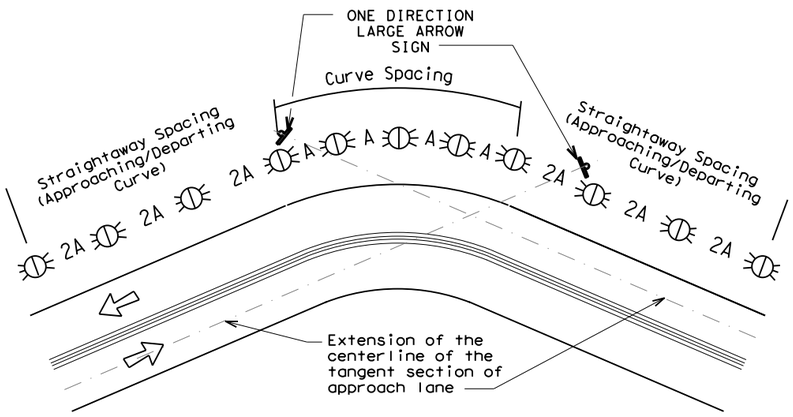
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	HENDERSON		126

20B

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

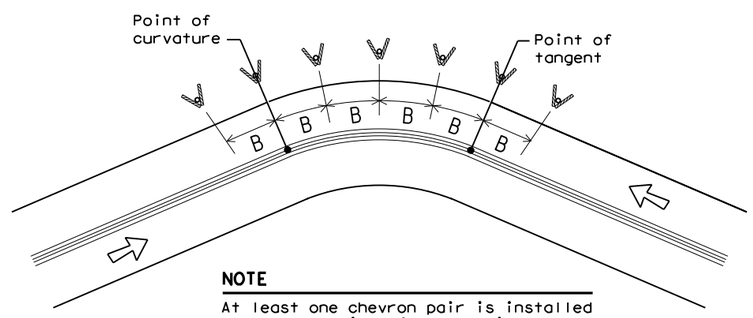
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	0646	07	009	FM 316
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	TYL	HENDERSON		127

20C

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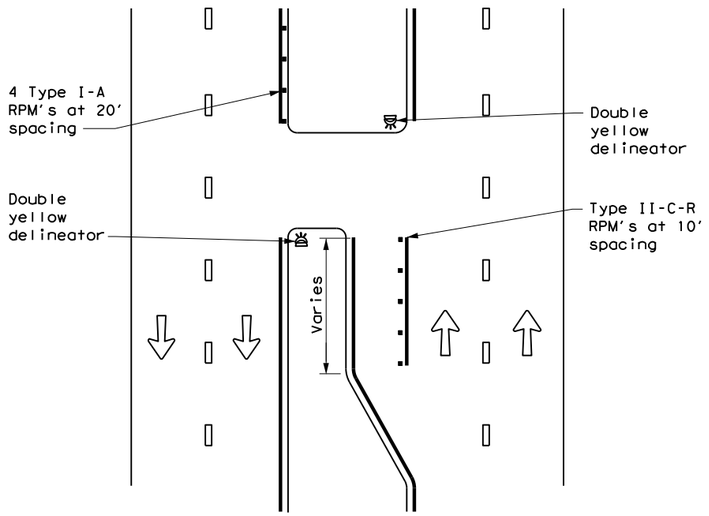
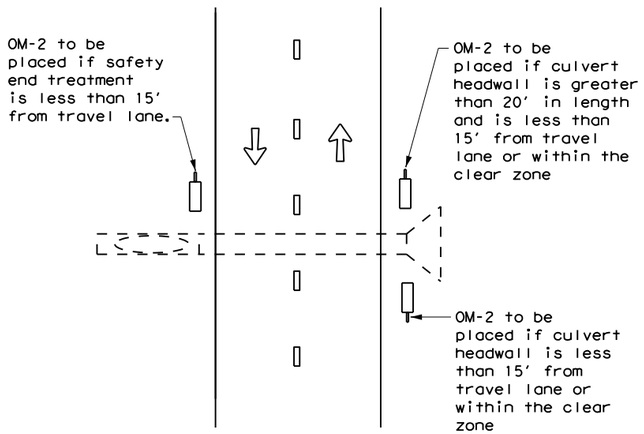
CROSSOVERS



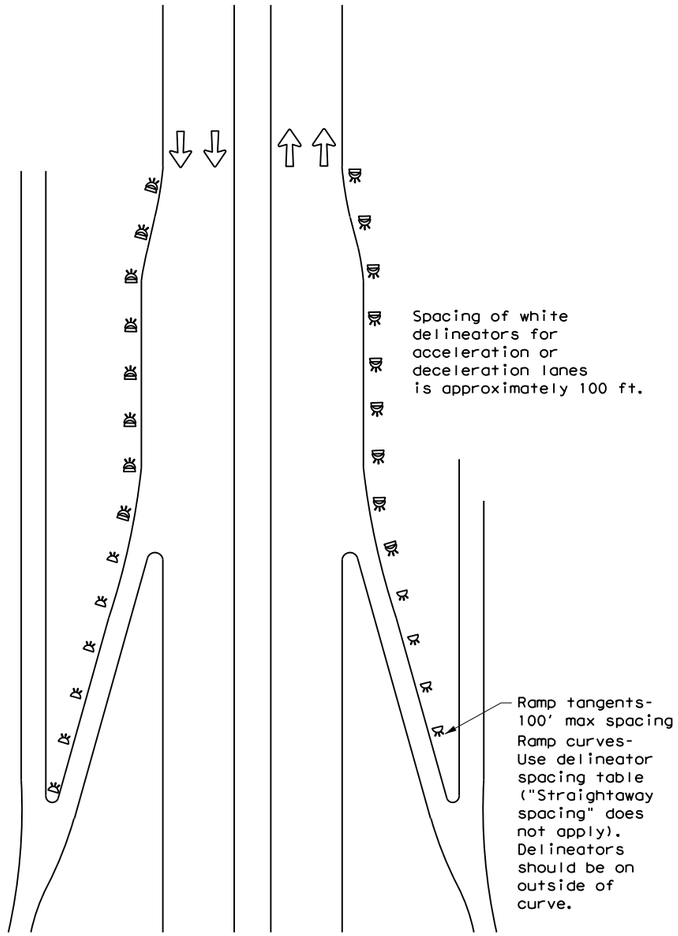
DETAIL 1

FOR CULVERTS WITHOUT MBGF



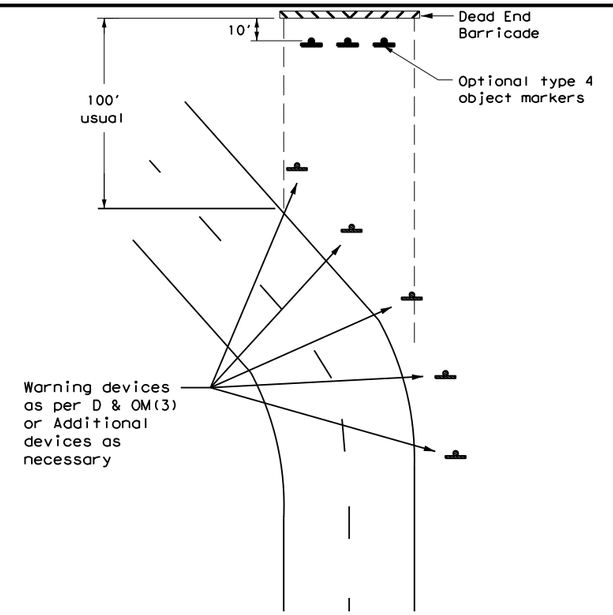
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



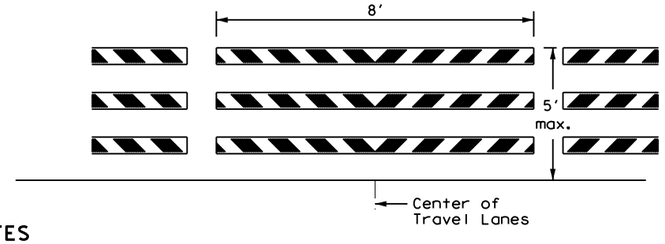
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
3-15	DIST	COUNTY		SHEET NO.
7-20	TYL	HENDERSON		128

20D

DATE: 8/3/2022 2:13:33 PM
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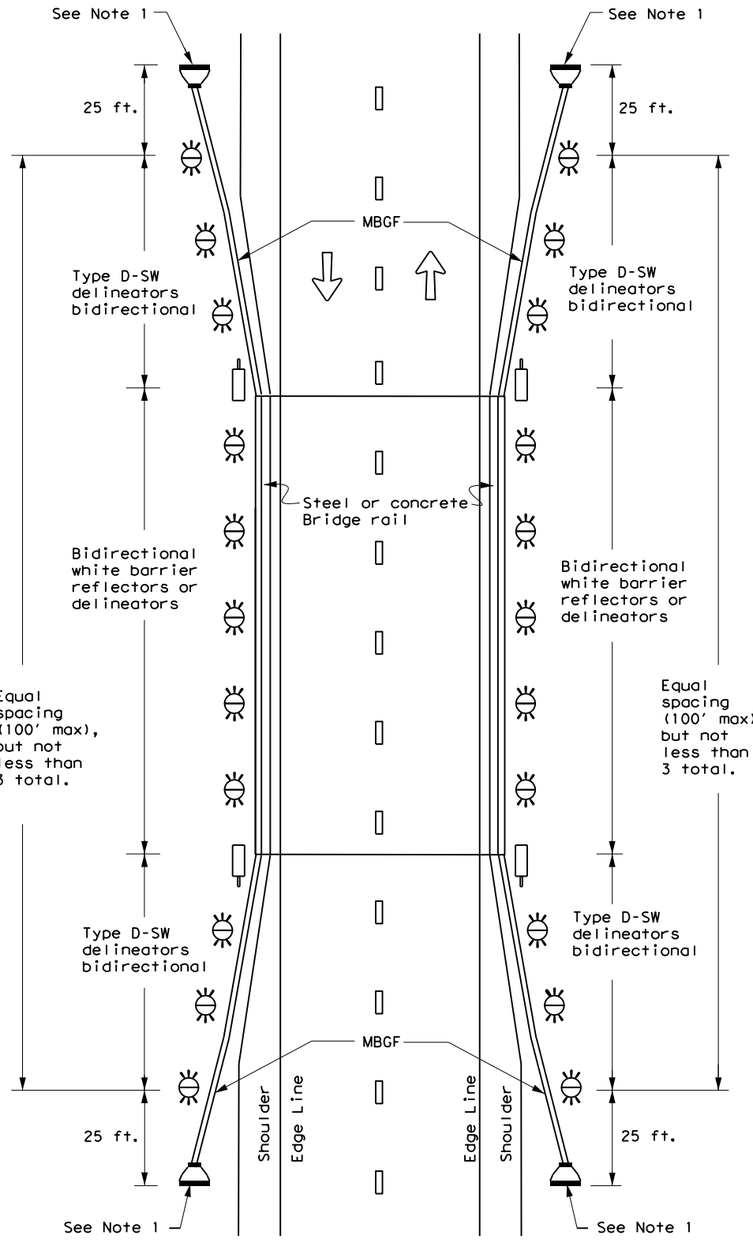
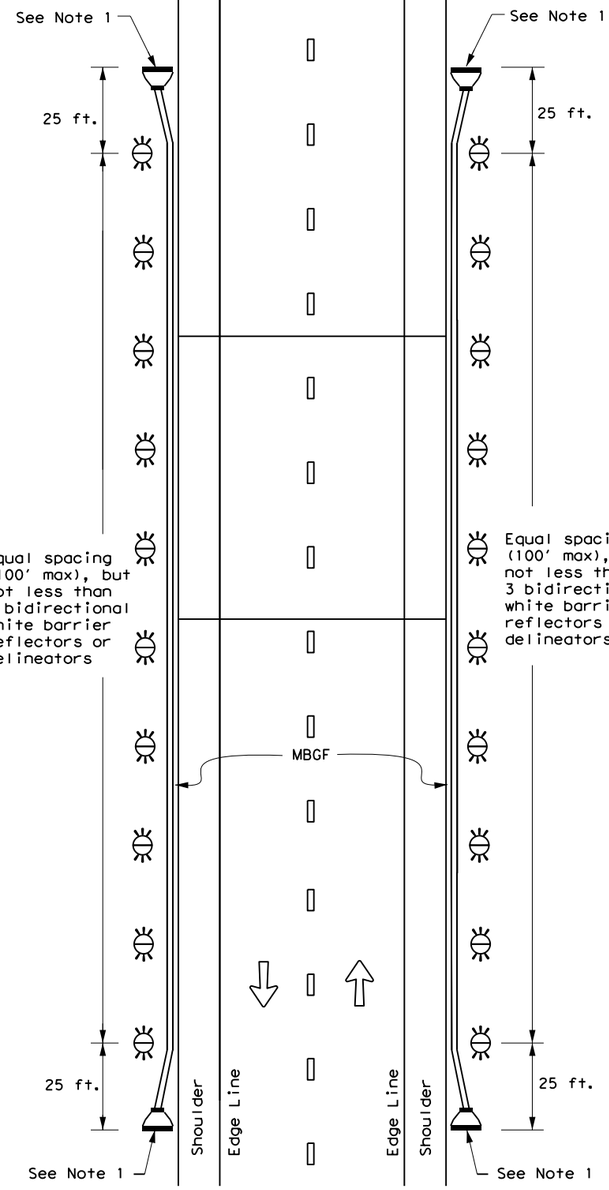
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

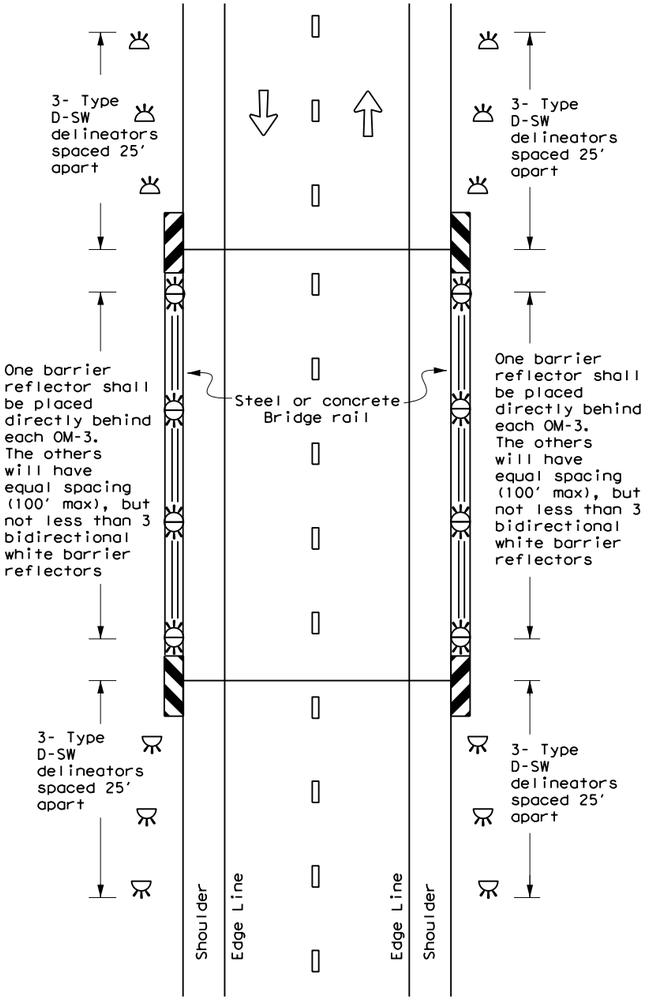
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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7-20	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		129

20E

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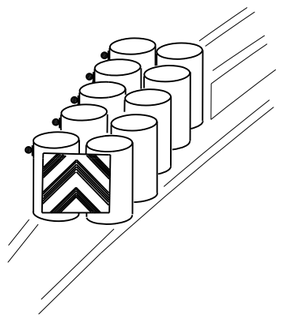
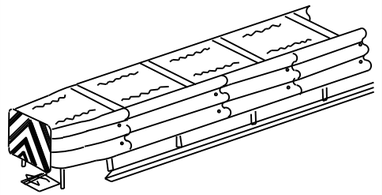
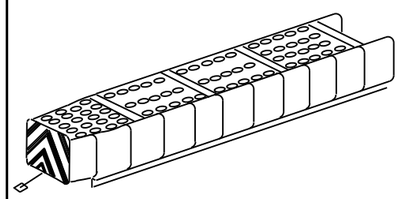
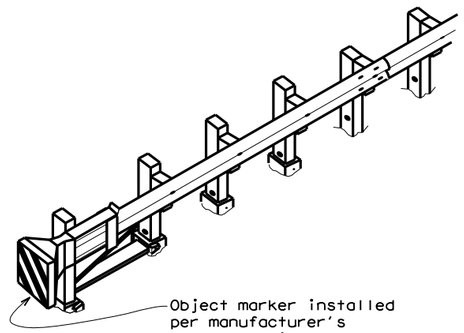
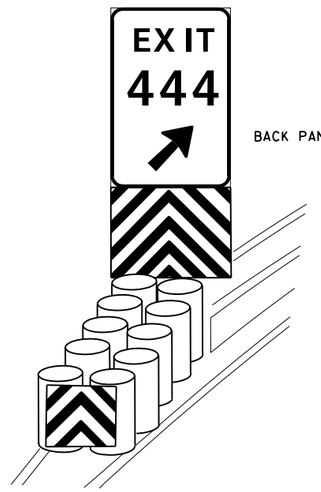
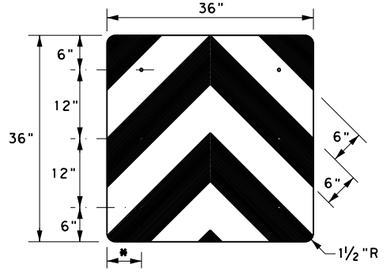


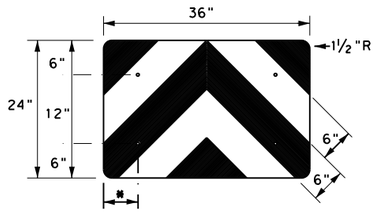




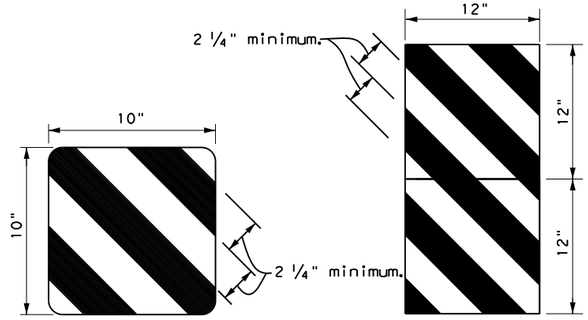




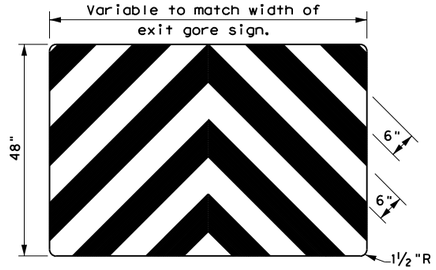


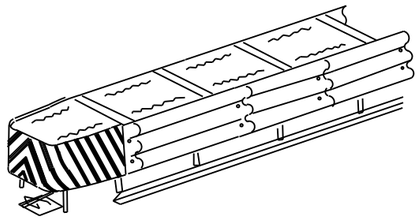


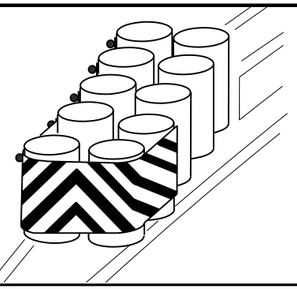
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

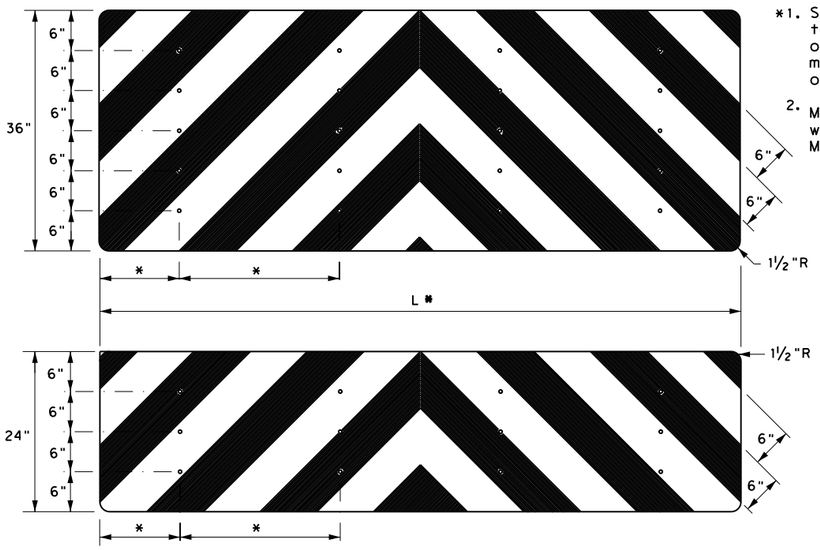


OBJECT MARKERS SMALLER THAN 3 FT^2









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	0646	07	009	FM 316
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	TYL	HENDERSON		130
4-98 7-20				

20G

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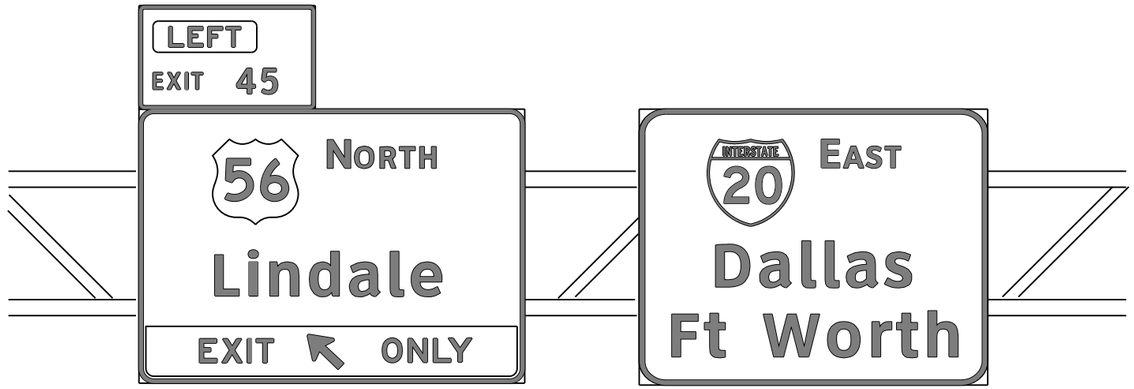
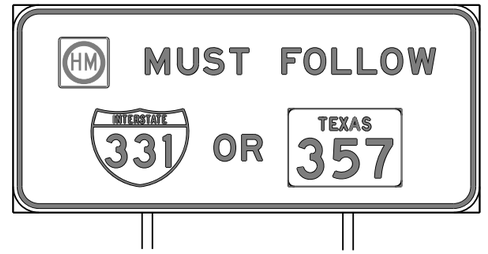
REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES





GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
   White legend shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

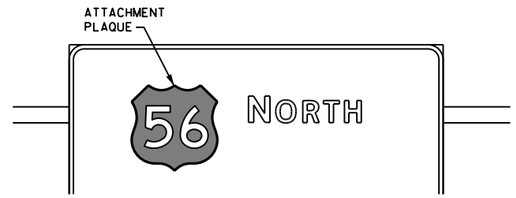
TYPICAL SIGN REQUIREMENTS

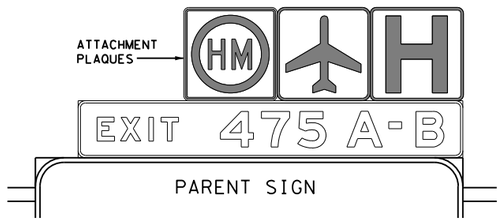
TSR(1)-13

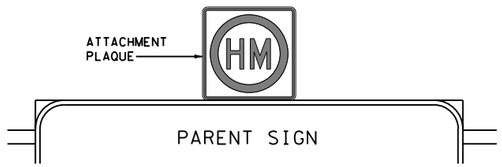
FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	HENDERSON		131

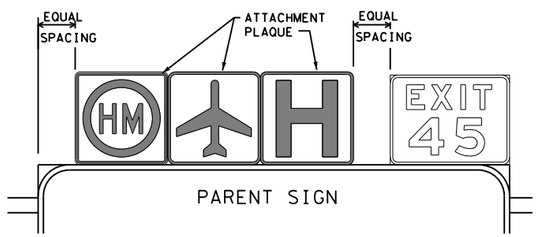
DATE: 8/3/2022 9:00:48 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0466898\FM316_TRF_TSR (2)-13.dgn

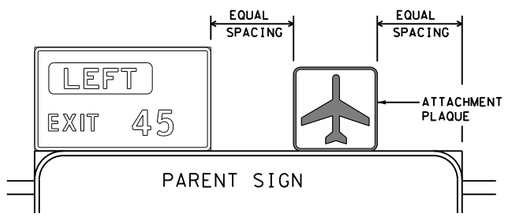
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS











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

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

GENERAL NOTES

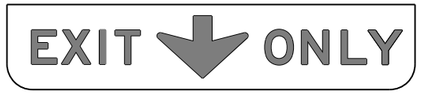
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

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

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(2)-13

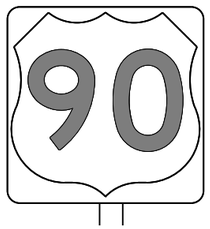
FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	HENDERSON		132

2

DATE: 8/3/2022 2:14:17 PM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0466898\FM316_TRF_TSR (3)-13_tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

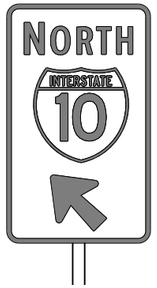
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

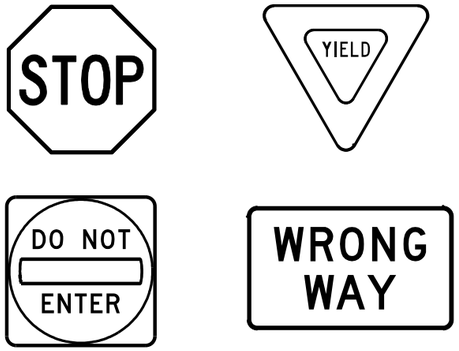
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		133

DATE: 8/3/2022 9:00:59 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0466898\FM316_TRF_TSR (4)-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

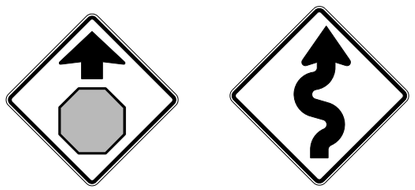
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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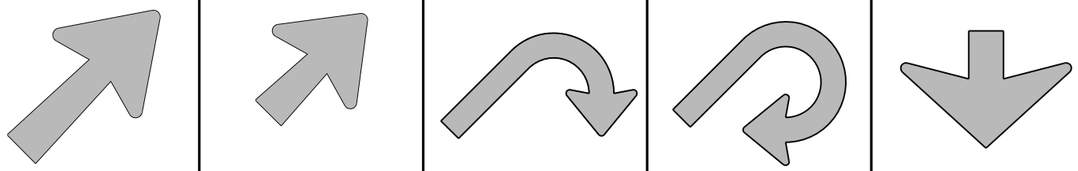
REVISIONS	0646	07	009	FM 316
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		134

4

DATE: 8/3/2022 9:01:04 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0466898\FM316_TRF_TSR (5)-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

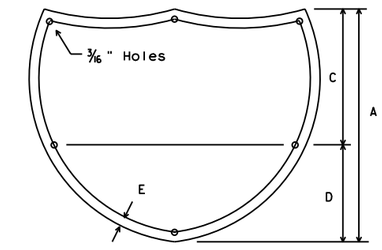
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

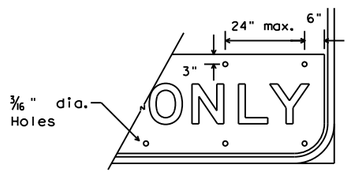
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

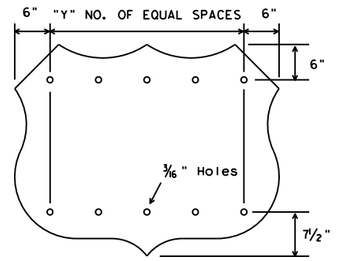


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

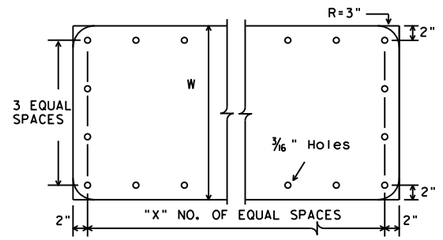


EXIT ONLY PANEL



U.S. ROUTE MARKERS

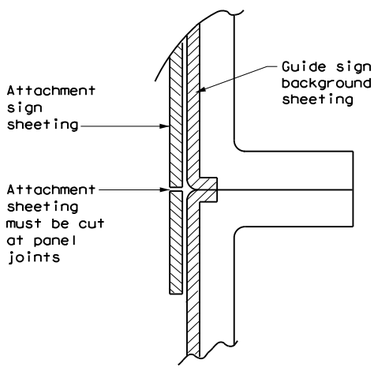
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



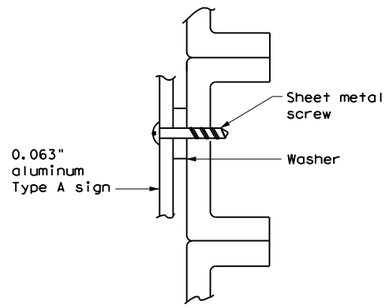
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

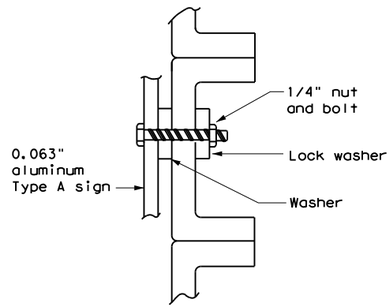
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

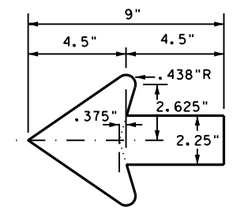
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

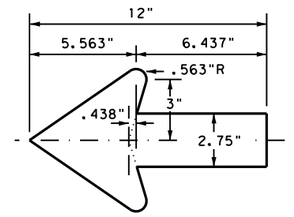
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0646	07	009	FM 316
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	HENDERSON		135

DATE: 8/3/2022 9:01:08 AM
FILE: c:\txdot\pw\online\txdot3\mark.driskell\d0466898\FM316*TRF*SMD (GEN)-08.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

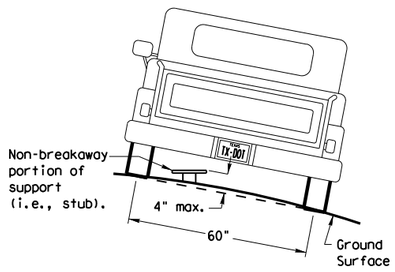
Anchor Type

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

Sign Mounting Designation

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

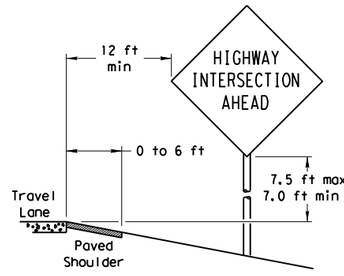
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

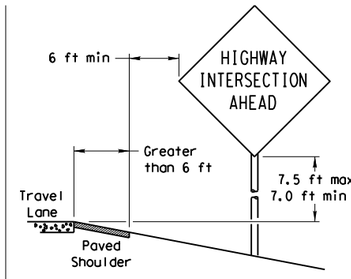
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

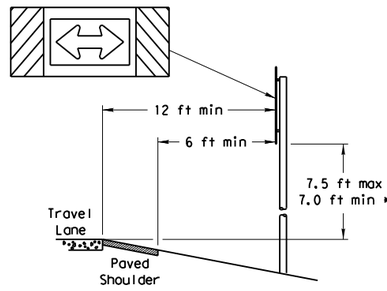
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



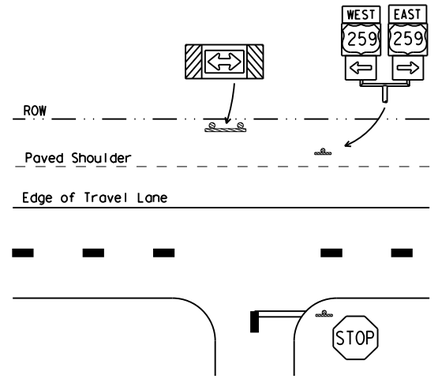
GREATER THAN 6 FT. WIDE

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.

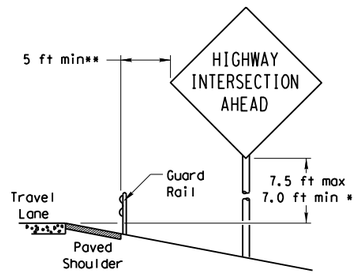
T-INTERSECTION



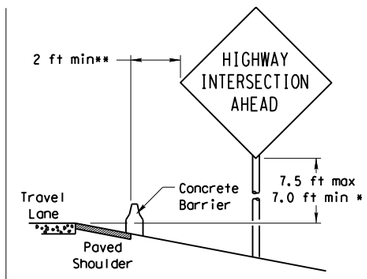
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



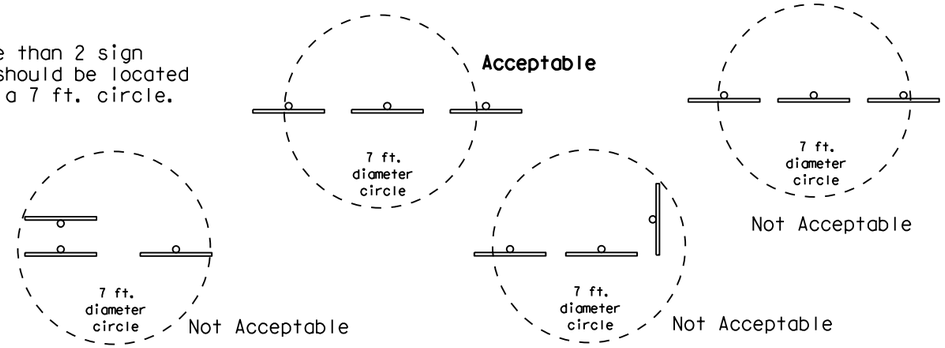
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

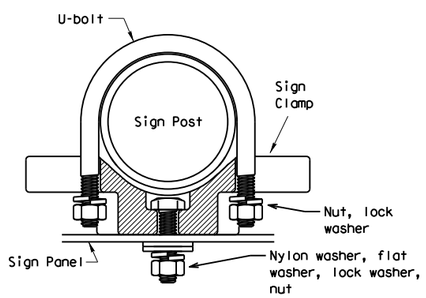
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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

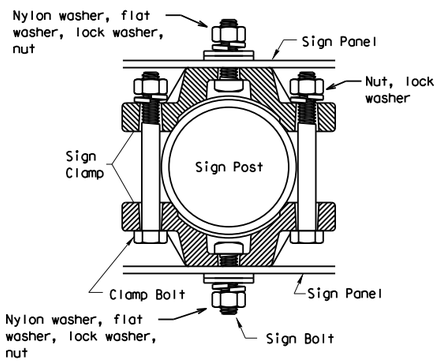


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



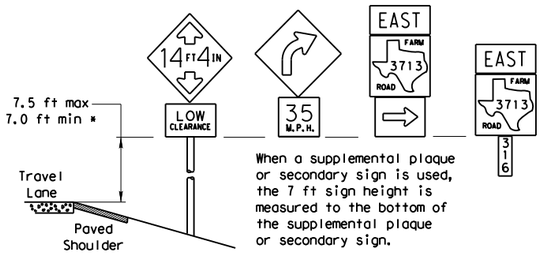
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

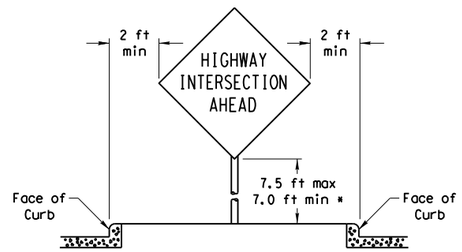
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



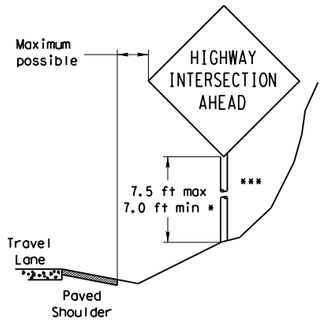
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316

DIST	COUNTY	SHEET NO.
TYL	HENDERSON	136

DATE: 8/3/2022 9:01:12 AM
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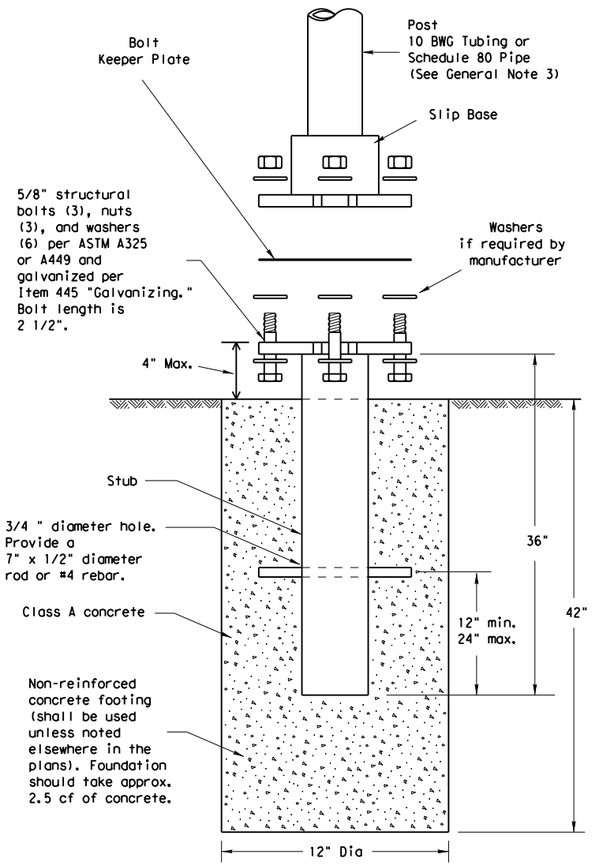
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

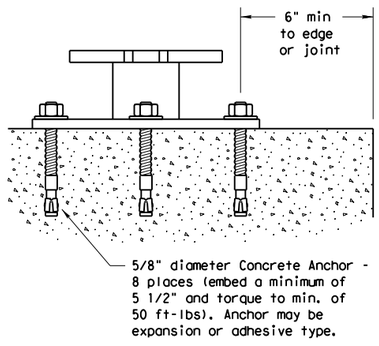
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08 REVISIONS			

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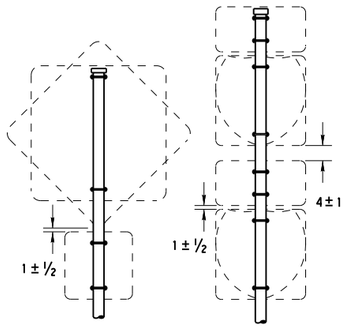
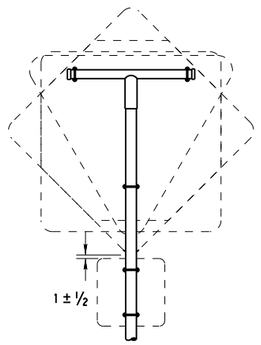
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		137



SM RD SGN ASSM TY XXXXX(1)XX(P)



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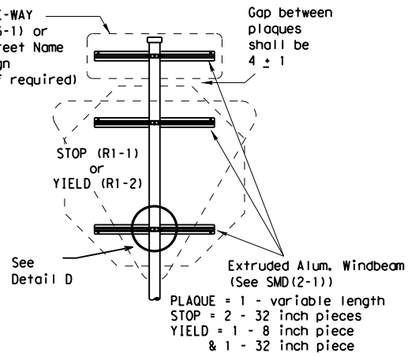

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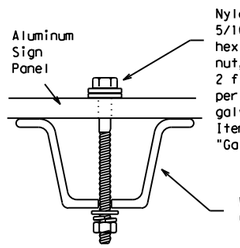
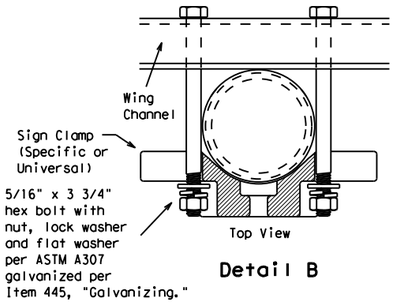
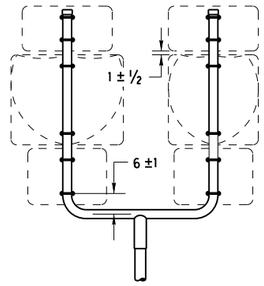


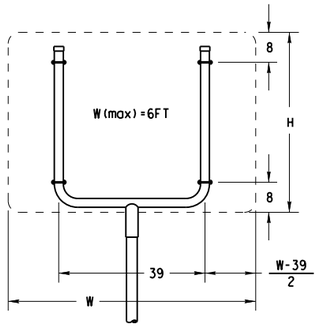
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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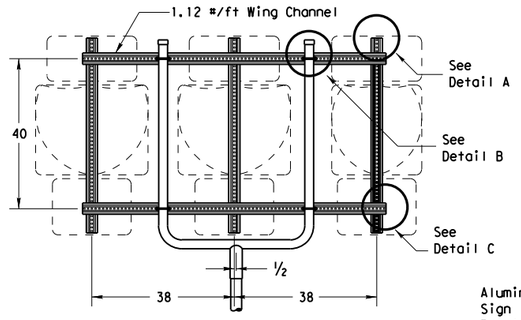
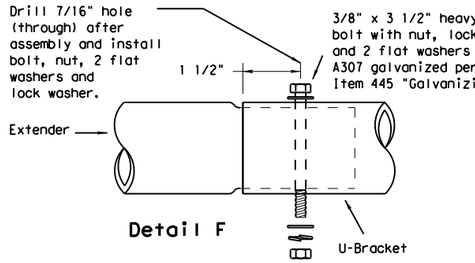
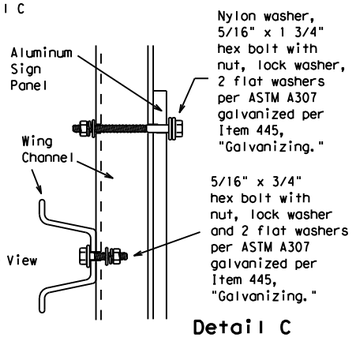


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

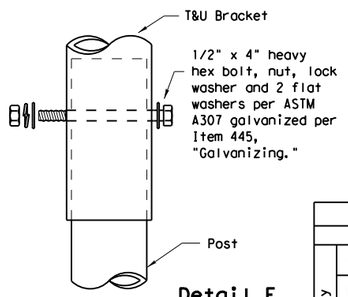


Detail F

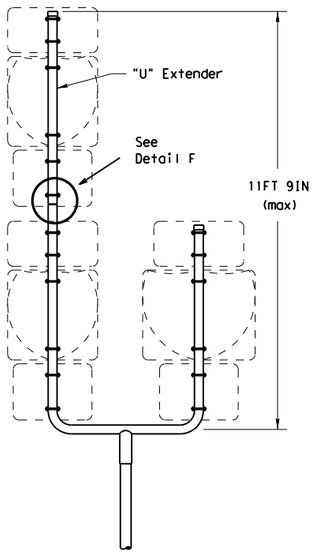
Splices shall only be allowed behind the sign substrate.



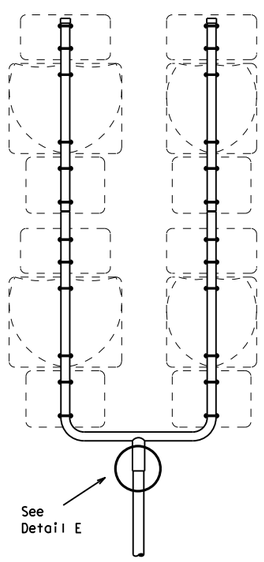
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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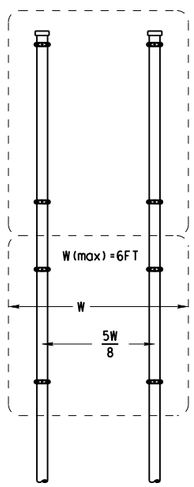
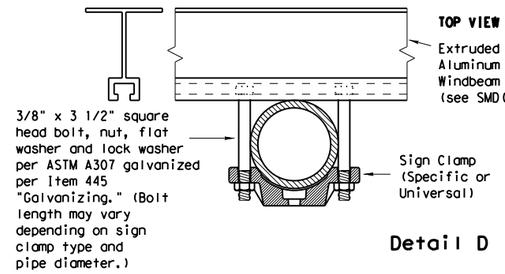
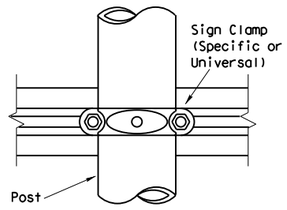


SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



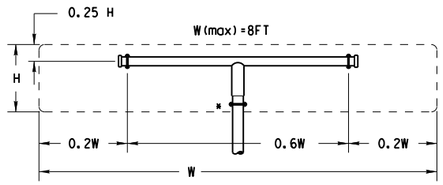


Detail D

GENERAL NOTES:

1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
   |---|---|---|
   | 10 BWG | 1 | 16 SF |
   | 10 BWG | 2 | 32 SF |
   | Sch 80 | 1 | 32 SF |
   | Sch 80 | 2 | 64 SF |
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

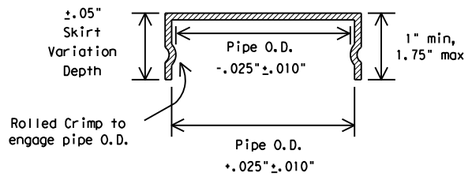
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



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

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		138

9-08 REVISIONS

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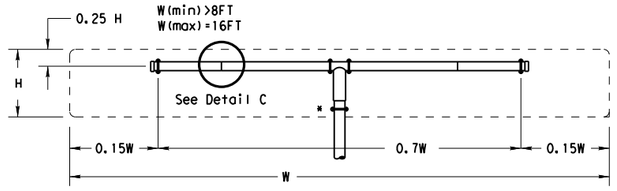
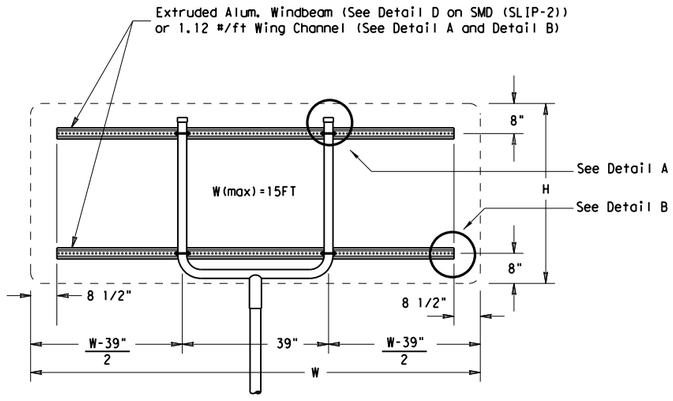
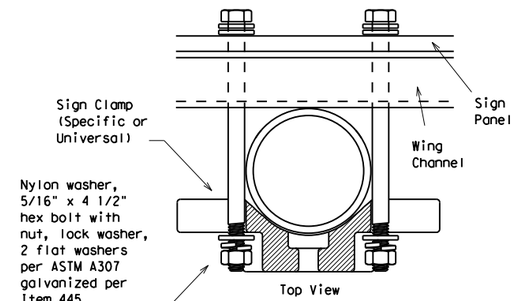


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

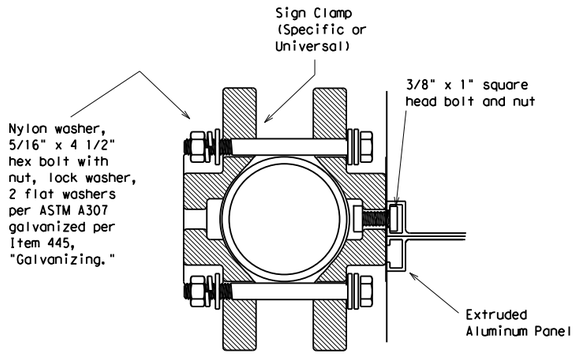


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

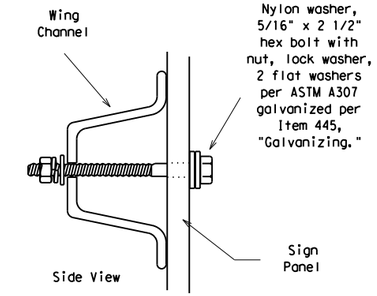


Top View

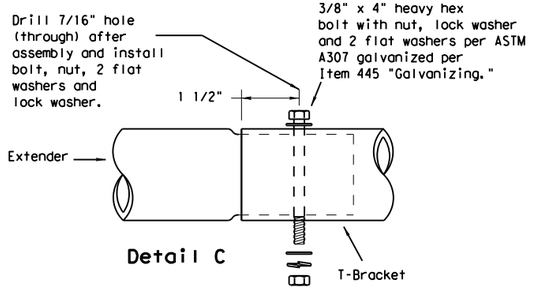
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

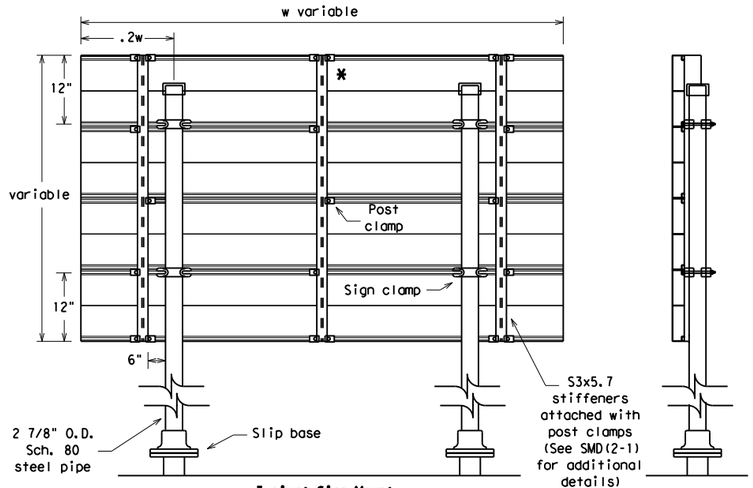


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

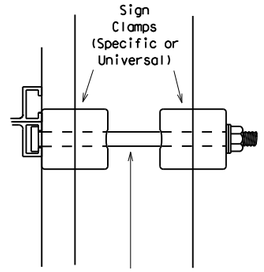


Typical Sign Mount

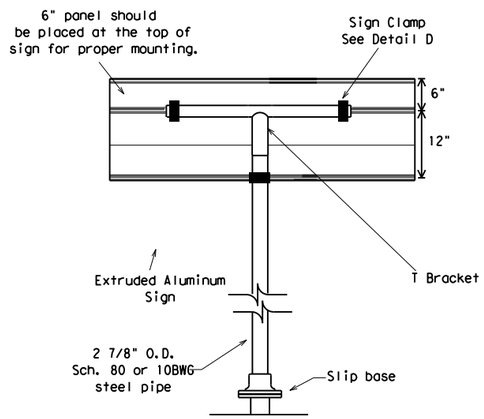
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

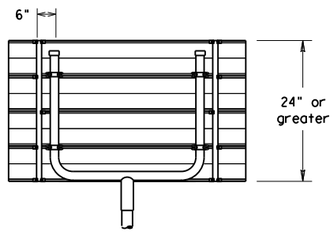
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

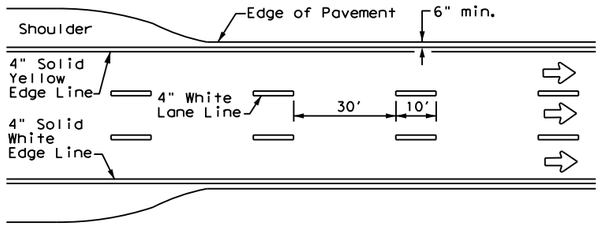
SMD(SLIP-3)-08

REVISIONS
9-08

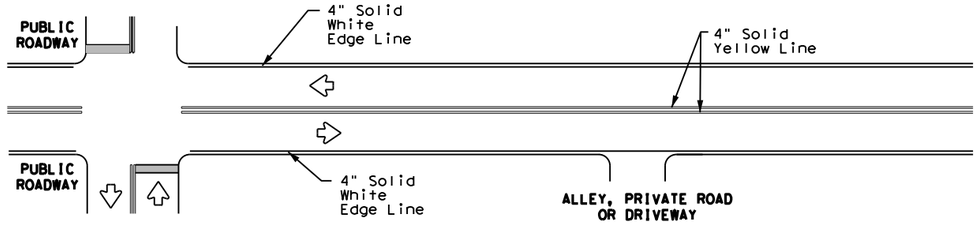
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316

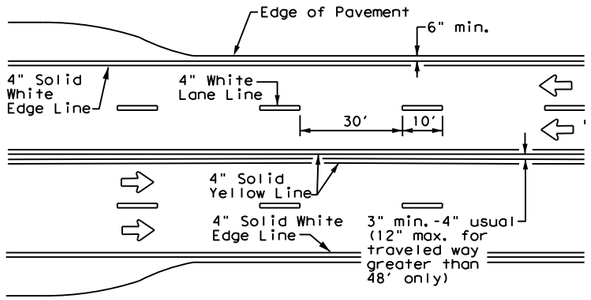
DIST	COUNTY	SHEET NO.
TYL	HENDERSON	139



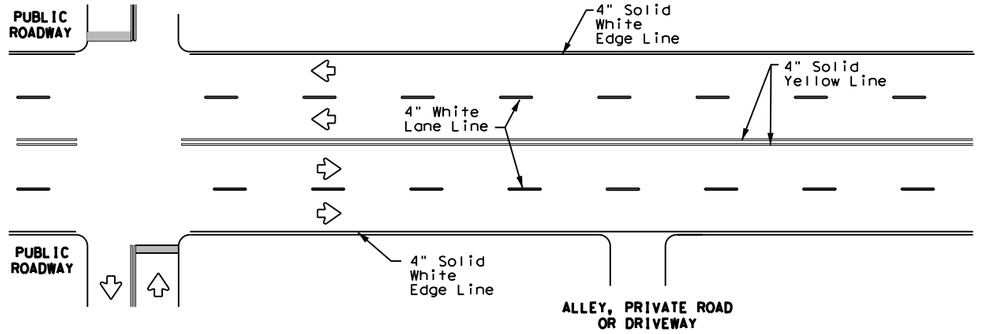
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



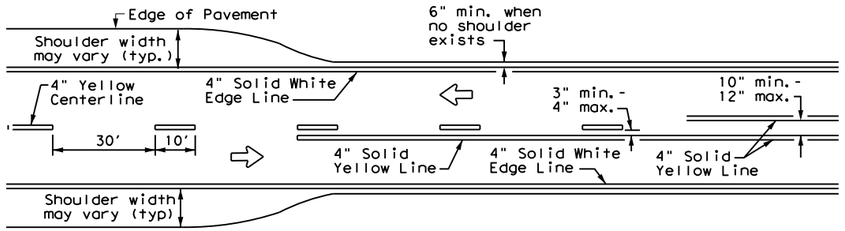
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



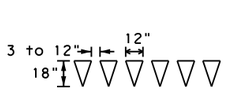
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



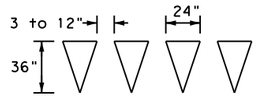
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

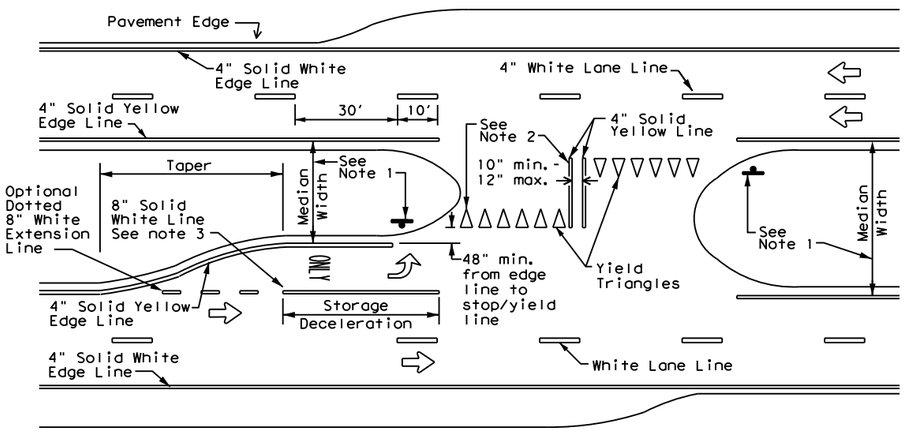


For posted speed on road being marked equal to or less than 40 MPH.



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.

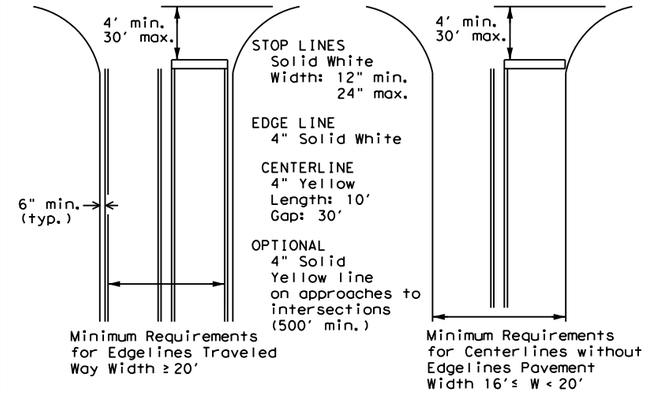
GENERAL NOTES

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	0646	07	009	FM 316
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	TYL	HENDERSON		140

22A

DATE: 8/3/2022 9:02:05 AM
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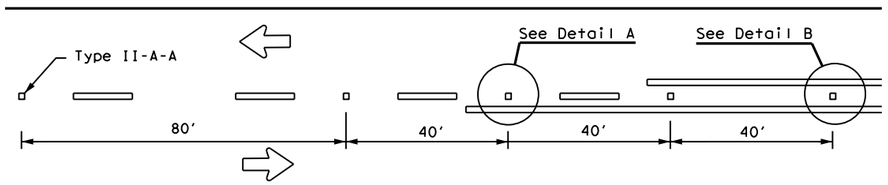
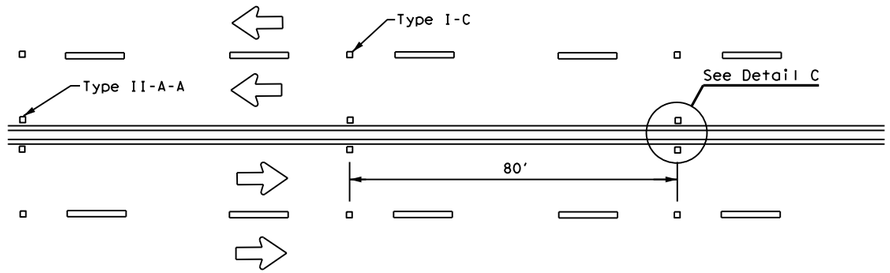
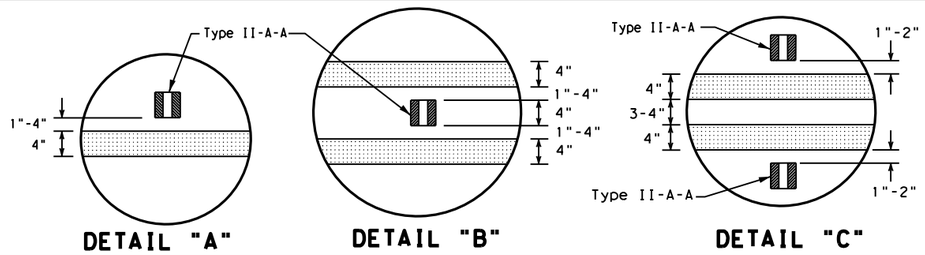
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



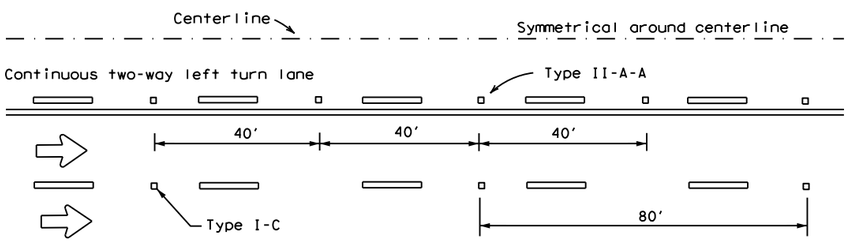
CENTERLINE FOR ALL TWO LANE ROADWAYS



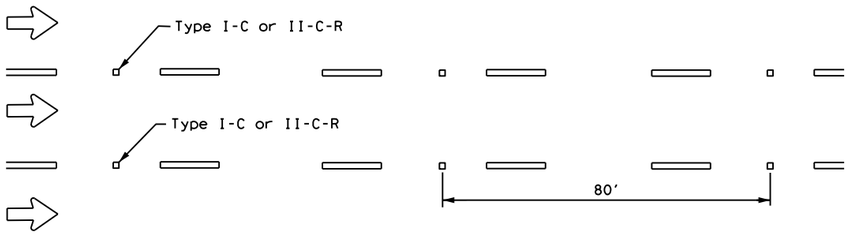
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

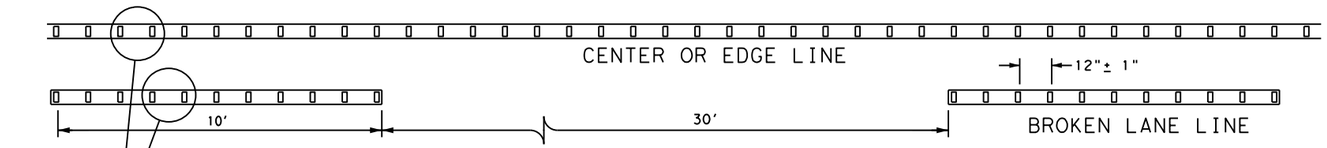


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



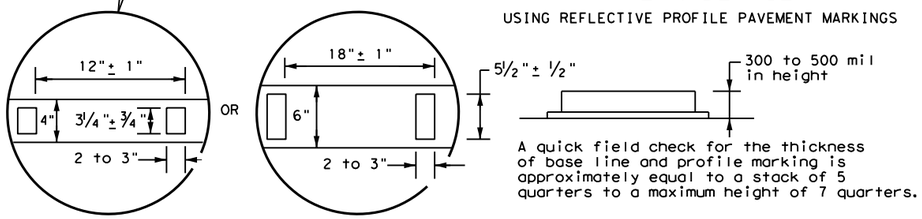
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

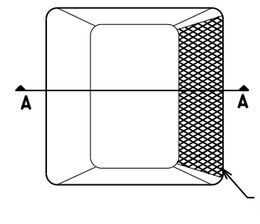
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

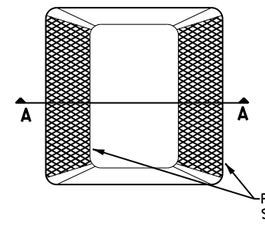
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

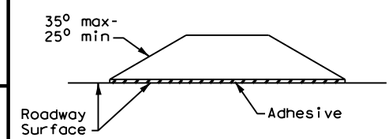
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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 5-00 2-12 8-00 6-20	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		141

22B

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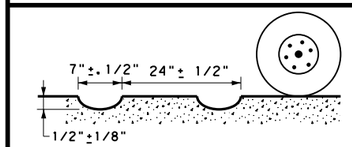
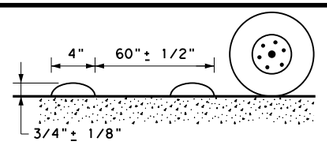
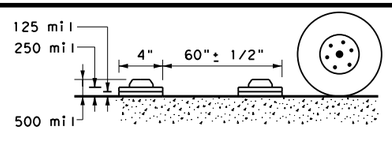
CENTERLINE RUMBLE STRIPS



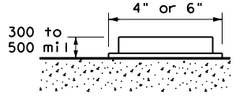
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

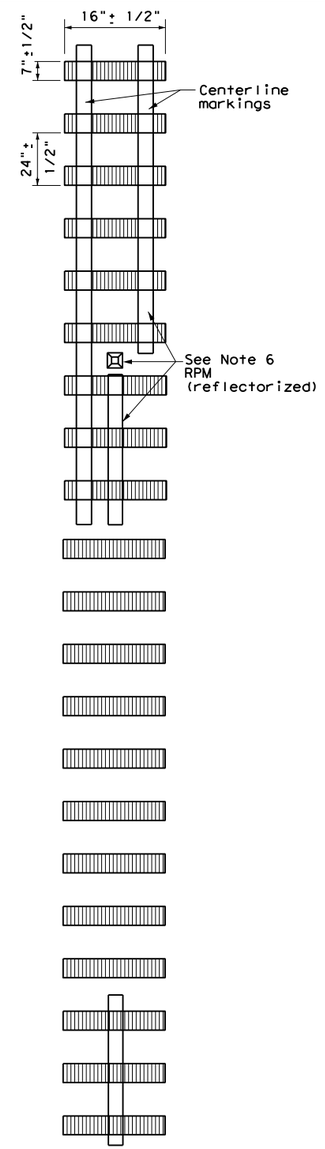


PREFORMED THERMOPLASTIC STRIPS



PROFILE MARKINGS

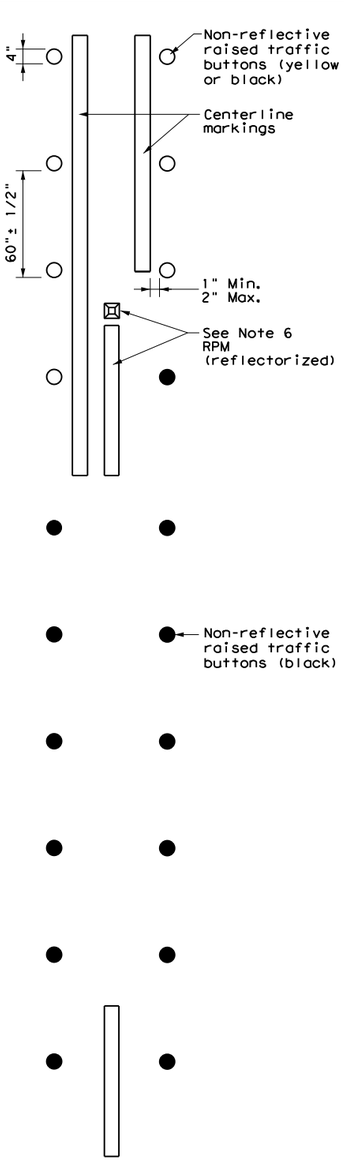
PROFILE VIEW



PLAN VIEW
OPTION 1

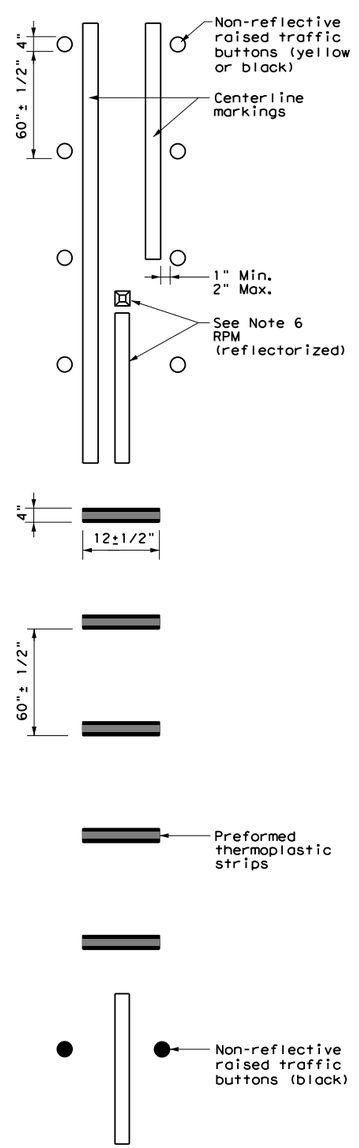
TWO LANE TWO-WAY ROADWAYS

MILLED CENTERLINE RUMBLE STRIPS



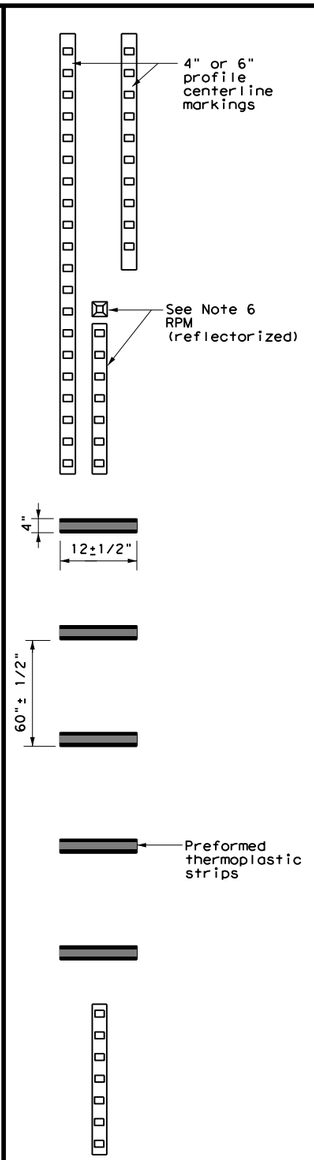
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(4).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		142

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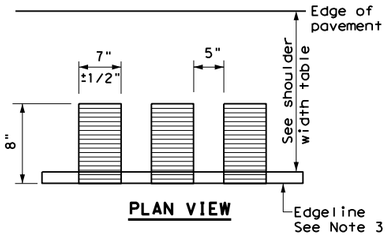
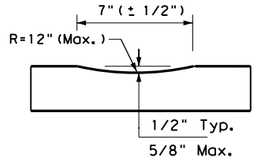
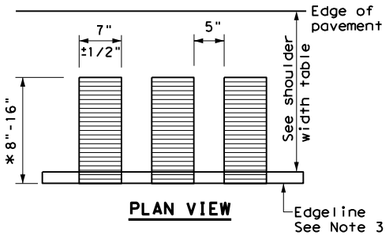


PLAN VIEW

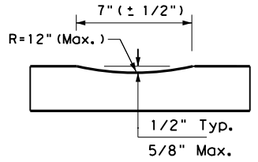


PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



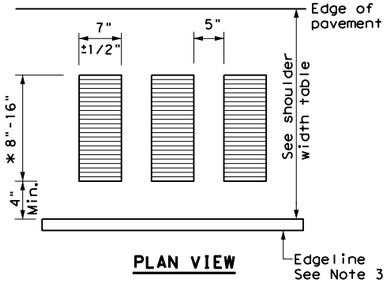
PLAN VIEW



* This distance may vary based on width of shoulder

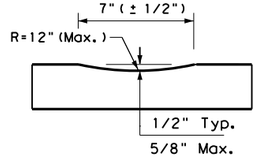
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



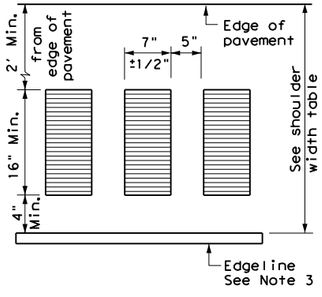
PLAN VIEW

* This distance may vary based on width of shoulder

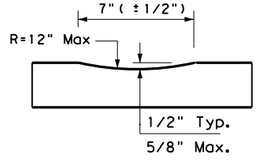


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

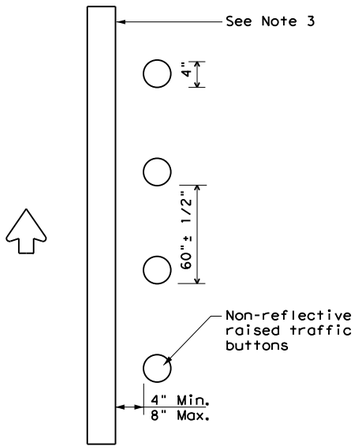


PLAN VIEW



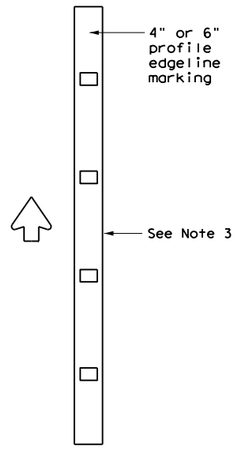
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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

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.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0646	07	009	FM 316
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		143

DATE:
FILE:

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. FOLLOW SW3P PER PLANS

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# 3(i)

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. No Action necessary above those required by the 2004 Texas Standard for Specifications Construction and Maintenance of Highways. Streets & Bridges.
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. ADHERE TO THE SPECS AS LISTED ABOVE
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. ADHERE TO DIRECTION CONCERNING MIGRATORY BIRDS LISTED BELOW
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.

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	0646	07	009	FM 316	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	TYL	HENDERSON		144	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					

FILE: c:\txdot\pw*online\txdot3\mark.driskell\d0407402\FM 316*ENV*SW3P.dgn
DATE: 8/3/2022 9:04:13 AM

A. GENERAL SITE DATA

1. PROJECT LIMITS:
VAN ZANDT C/L (FM 1861, S TO US 175, IN EUSTACE
PROJECT LENGTH = 20,008 FT. = 4.547 MILES
PROJECT LOCATION:
BEGIN PROJECT : R.M. 294A+00.000
END PROJECT : R.M. 296+02.494
PROJECT COORDINATES:
BEG LATITUDE: +32.3572229 BEG LONGITUDE: -95.9745745
END LATITUDE: +32.3061303 END LONGITUDE: -96.0022809

2. PROJECT SITE MAPS:
* PROJECT LOCATION MAP: **TITLE SHEET**
* DRAINAGE PATTERNS: **PROJECT LAYOUT SHEETS**
* SLOPES ANTICIPATED AFTER MAJOR GRADINGS OR AREAS OF SOIL DISTURBANCE: **EXISTING AND PROPOSED TYPICAL SECTIONS**
* LOCATION OF EROSION AND SEDIMENT CONTROLS: **PROJECT LAYOUT SHEETS**
* SURFACE WATERS AND DISCHARGE LOCATIONS: **PROJECT LAYOUTS/CULVERT LAYOUTS**
* PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY THE PROJECT FIELD OFFICE DURING CONSTRUCTION AND LOCATED IN THE PROJECT SW3P FILE. REFERENCE ITEM #10 BELOW

3. PROJECT DESCRIPTION: **RESTORATION / REHAB AND FM 316 TO WIDEN TO 28'**

4. MAJOR SOIL DISTURBING ACTIVITIES: **CULVERT EXTENSIONS AND ROADWAY WIDENING.**

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: **THE EXISTING SOIL CONSISTS OF SANDY LOAM AND THE VEGETATIVE COVER CONSISTS OF GRASS, BRUSH AND TREES.**

6. TOTAL PROJECT AREA: **55.096 ACRES**

7. TOTAL AREA TO BE DISTURBED: **22.966 ACRES**

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: **0.56**
AFTER CONSTRUCTION: **0.58**

9. NAME OF RECEIVING WATERS: (SEGMENT NUMBER OF RECEIVING WATERS)
THE RECEIVING WATERS FOR THIS PROJECT IS MILL CREEK, SOUTH TWIN CREEK TO CEDAR CREEK RESERVOIR TO THE TRINITY RIVER BASIN SEGMENT 0818.

10. PROJECT SW3P FILE: FOR PROJECTS DISTURBING ONE ACRE OR MORE, TXDOT WILL MAINTAIN AN SW3P FILE WITH ALL PERTINENT ENVIRONMENTAL DOCUMENTS, CORRESPONDENCE, ETC. AT THE PROJECT FIELD OFFICE. IF NO FIELD OFFICE IS AVAILABLE THEN THE SW3P FILE SHALL BE KEPT IN THE AREA OFFICE.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [X] PRESERVATION OF NATURAL RESOURCES

OTHER:

2. STRUCTURAL PRACTICES:

- [X] SILT FENCES
- [X] ROCK FILTER DAMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [X] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES

OTHER:

3. STORM WATER MANAGEMENT:

STORM WATER DRAINAGE WILL BE PROVIDED BY **V OR FLAT BOTTOM DITCHES**

THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO

VARIOUS STRUCTURES THROUGHOUT THE PROJECT LENGTH.

4. STORM WATER MANAGEMENT ACTIVITIES: (SEQUENCE OF CONSTRUCTION)

1. **ROCK FILTER DAMS WILL BE UTILITZED TO TRAP SEDIMENT AND WILL BE ROUTINELY MAINTAINED.**
2. **SILT FENCES WILL BE USED IN LOW FLOW AREAS AND MAINTAINED.**
3. **EXISTING NATURAL RESOURCES WILL BE PRESERVED TO FILTER STORM WATERS.**
4. **PLACE BONDED FIBER MATRIX SEED, FERTILIZER, AND EMULSION AS DIRECTED.**
5. **WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS STABILIZED AND APPROVED BY THE ENGINEER, REMOVE ALL TEMPORARY SEDIMENT CONTROLS AND RESEED ANY AREA DISTURBED DURING REMOVAL.**

5. NON-STORM WATER DISCHARGES:

FILTER NON-STORM WATER DISCHARGES, OR HOLD RETENTION BASINS, BEFORE BEING ALLOWED TO MIX WITH STORM WATER. THESE DISCHARGES CONSIST OF NON-POLLUTED GROUND WATER, SPRING WATER, FOUNDATION AND/OR FOOTING DRAIN WATER; AND WATER USED FOR DUST CONTROL, PAVEMENT WASHING AND VEHICLE WASHWATER CONTAINING NO DETERGENTS.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
MAINTENANCE WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

2. INSPECTION:
INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

3. WASTE MATERIALS:
ALL WASTE MATERIALS WILL BE COLLECTED, STORED IN A LIDDED DUMPSTER AND DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):
AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

5. 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.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: DISPOSAL AREAS, STOCKPILES AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED.

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED PROFESSIONAL ENGINEER

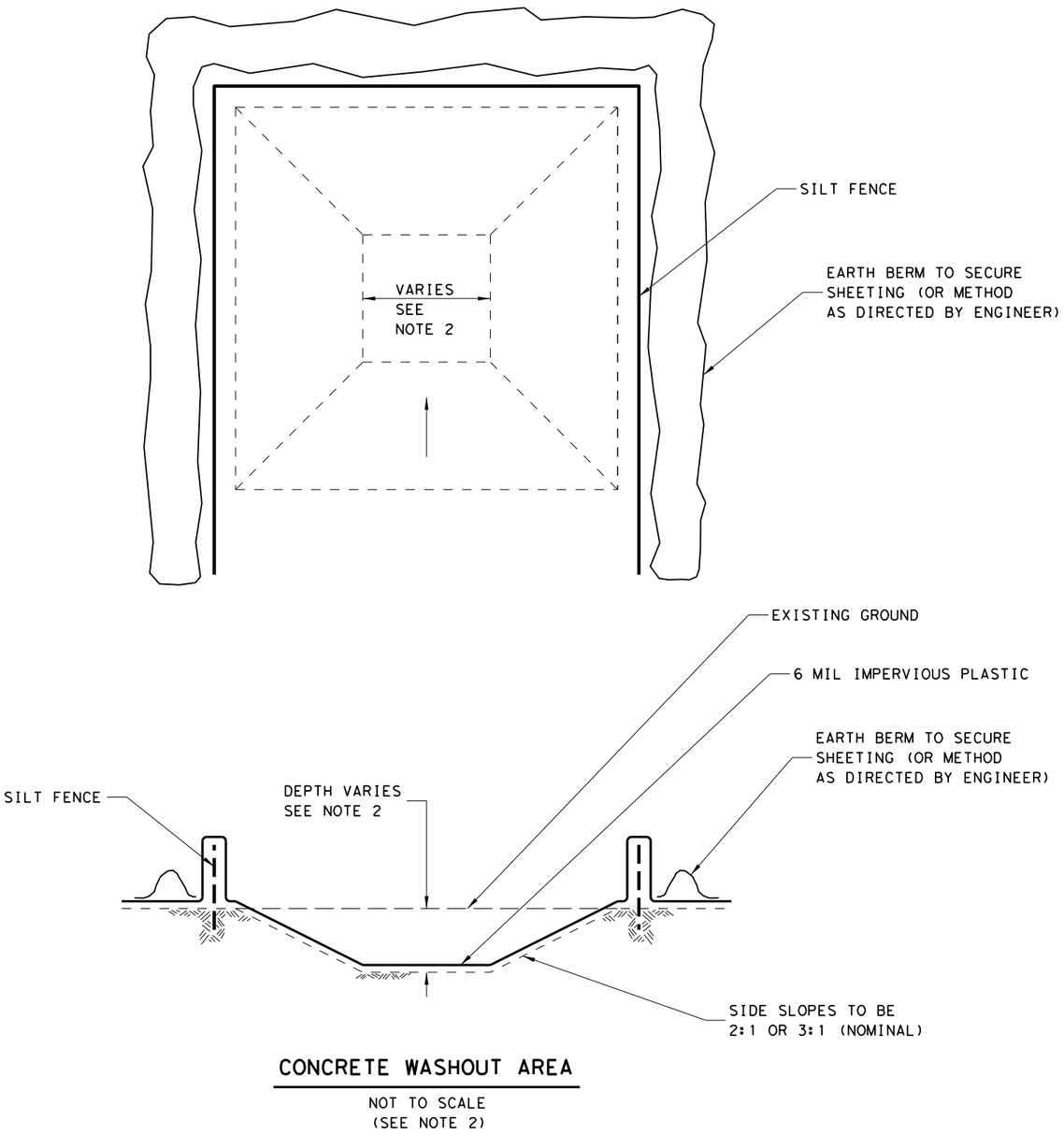
09/16/2022

FM 316 STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		145



CONCRETE WASHOUT AREA

NOT TO SCALE
(SEE NOTE 2)

NOTES

1. CONCRETE WASHOUT AREA(S) SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE. THE CONCRETE WASHOUT AREA SHALL BE ENTIRELY SELF-CONTAINED.

2. THE CONTRACTOR SHALL SUBMIT THE DESIGN, LOCATION AND SIZING OF OF THE CONCRETE WASHOUT AREA(S) WITH THE PROJECT'S EROSION AND SEDIMENTATION CONTROL PLAN AND SHALL BE APPROVED BY THE ENGINEER.

LOCATION: WASHOUT AREA(S) ARE TO BE LOCATED AT LEAST 50 FEET FROM ANY STREAM, WETLAND, STORM DRAINS, OR OTHER SENSITIVE RESOURCE. THE FLOOD CONTINGENCY PLAN MUST ADDRESS THE CONCRETE WASHOUT IF THE WASHOUT IS TO BE LOCATED WITHIN THE FLOODPLAN.

SIZE: THE WASHOUT MUST HAVE SUFFICIENT VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS INCLUDING, BUT NOT LIMITED TO, OPERATIONS ASSOCIATED WITH GROUT AND MORTAR.

3. SURFACE DISCHARGE IS UNACCEPTABLE, THERFORE EARTH BERM OR OTHER CONTROL MEASURES, AS APPROVED BY THE ENGINEER, SHOULD BE USED AROUND THE PERIMETER OF THE CONCRETE WASHOUT AREA FOR CONTAINMENT.

4. SIGNS SHOULD BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CONCRETE AREA(S) AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS. WASHOUT AREA(S) SHOULD BE FLAGGED WITH SAFETY FENCING OR OTHER APPROVED METHOD.

5. CONCRETE WASH-OUT AREAS SHALL BE LINED WITH IMPERVIOUS PLASTIC WITH A MINIMUM THICKNESS OF 6 MILS AND BE REPLACED IF DAMAGED DURING CLEAN-OUT OF HARDENED CONCRETE FROM THE WASH-OUT AREA.

6. WASHOUT AREA(S) ARE TO BE INSPECTED AT LEAST ONCE A WEEK FOR STRUCTURAL INTEGRITY, ADEQUATE HOLDING CAPACITY AND CHECKED FOR LEAKS, TEARS, OR OVERFLOWS. (AS DIRECTED BY THE CONSTRUCTION SITE ENVIRONMENTAL INSPECTION REPORT) WASHOUT AREA(S) SHOULD BE CHECKED AFTER HEAVY RAINS.

7. HARDENED CONCRETE WASTE SHOULD BE REMOVED AND DISPOSED OF WHEN THE WASTE HAS ACCUMULATED TO HALF OF THE CONCRETE WASHOUT'S HEIGHT. THE WASTE CAN BE STORED AT AN UPLAND LOCATION, AS APPROVED BY THE ENGINEER. ALL CONCRETE WASTE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL APPLICABLE LAWS, REGULATIONS, AND GUIDELINES.

8. PAYMENT FOR THIS ITEM IS TO BE INCLUDED UNDER THE GENERAL COST OF THE WORK FOR THE PROJECT, INCLUDING SITE RESTORATION.

STATE OF TEXAS
ROLANDO MENDEZ
131701
LICENSED
PROFESSIONAL ENGINEER

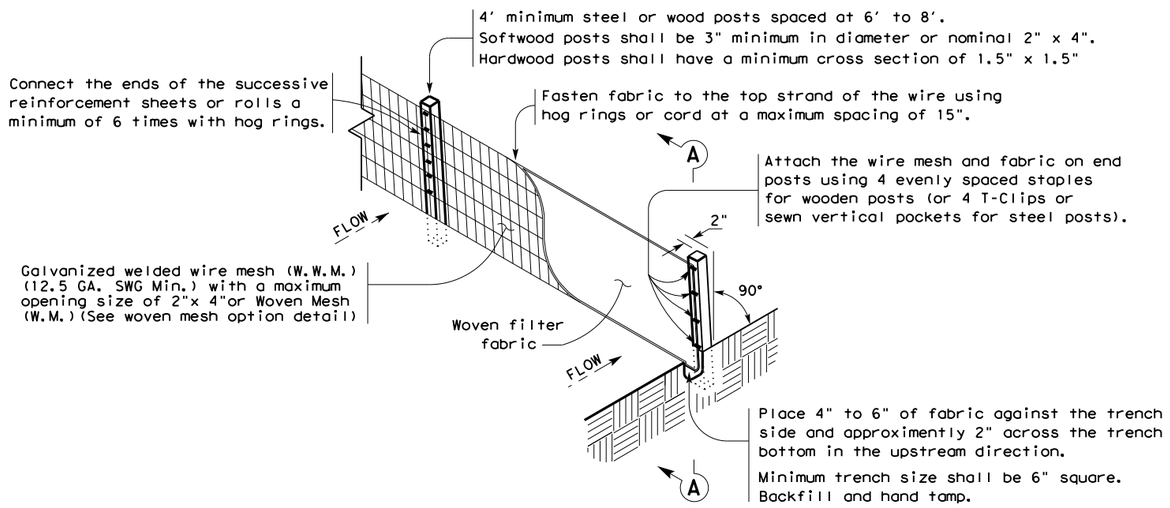
09/16/2022

FM 316
CONCRETE WASHOUT DETAIL

Texas Department of Transportation

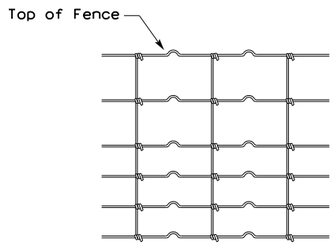
CONT	SECT	JOB	HIGHWAY
0646	07	009	FM 316
DIST	COUNTY		SHEET NO.
TYL	HENDERSON		146

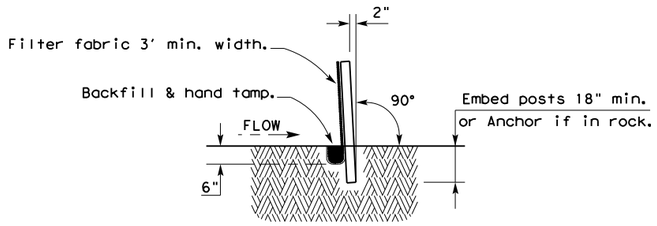
DATE: 8/3/2022 9:04:19 AM
FILE: c:\txdot\pw_online\txdot3\mark.driskell\d0407402\FM316 Concrete washout Det.dgn



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.

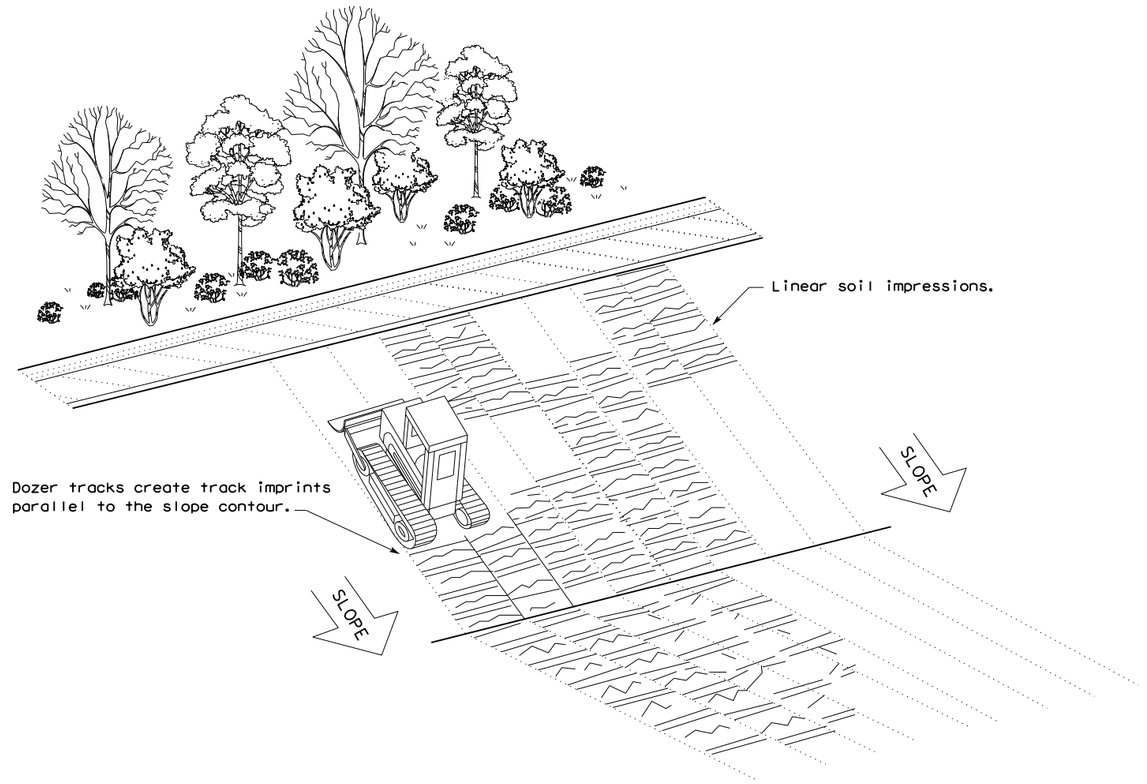
LEGEND

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
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	TYL	HENDERSON			147	

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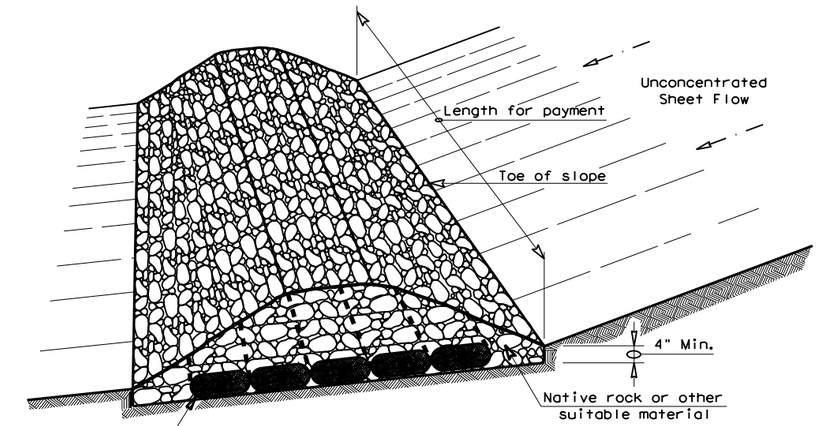
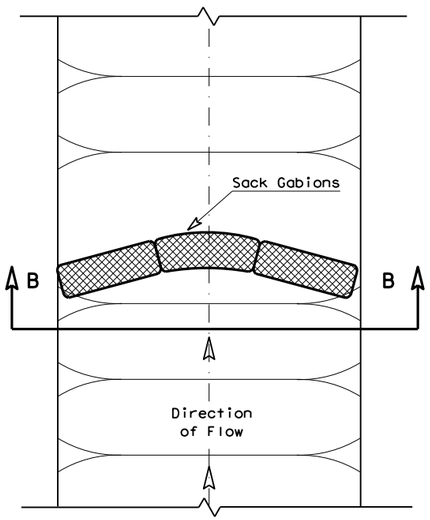
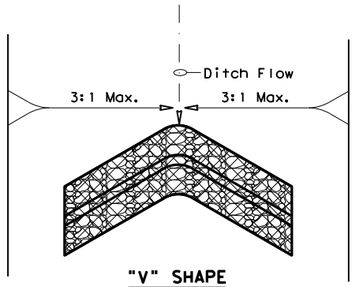


FILTER DAM AT TOE OF SLOPE

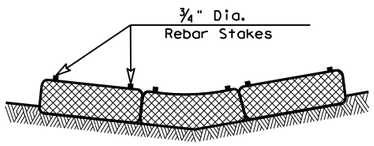
RFD1



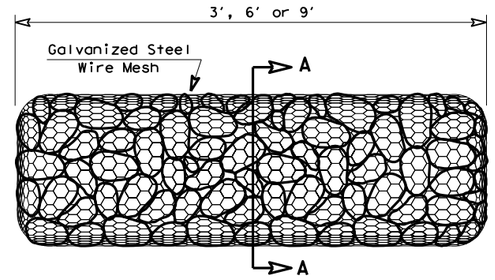
PLAN VIEW



"V" SHAPE
PLAN VIEW

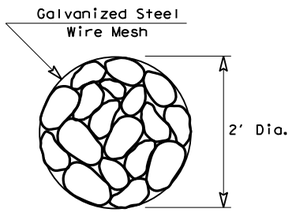


SECTION B-B

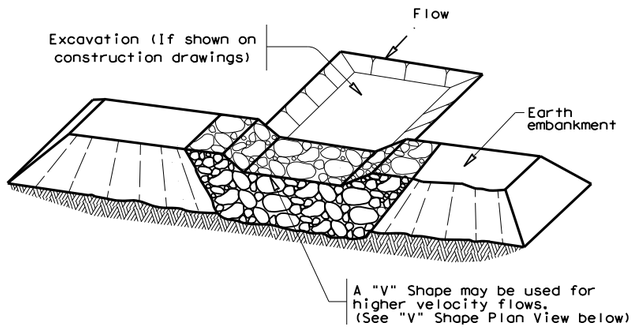


TYPE 4 (SACK GABIONS)

RFD4

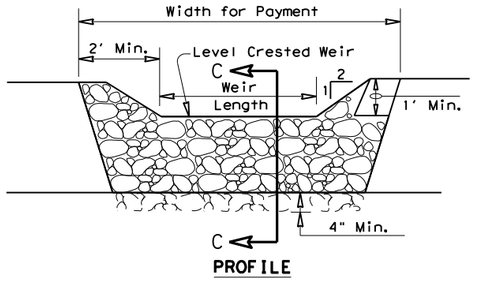


SECTION A-A

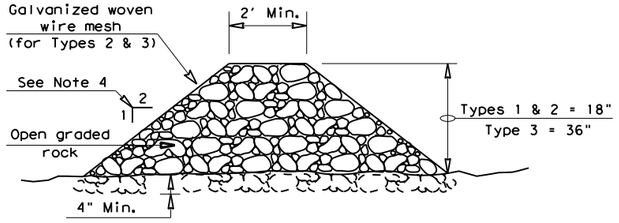


FILTER DAM AT SEDIMENT TRAP

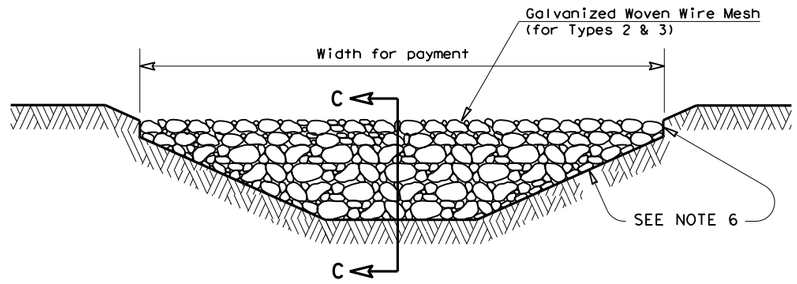
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

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

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

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

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

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

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

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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	TYL	HENDERSON		148