PROJECT NO.			
F 2022(423)			
CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		1

INDEX OF SHEETS

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

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

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

PROJECT NO. F 2022(423)

NET LENGTH OF PROJECT= 35,335 FT. = 6.692 MI.

ROADWAY: = 34,790 FT. = 6.589 MI.
BRIDGE: = 545 FT. = 0.103 MI.
TOTAL = 35,335 FT. = 6.692 MI.

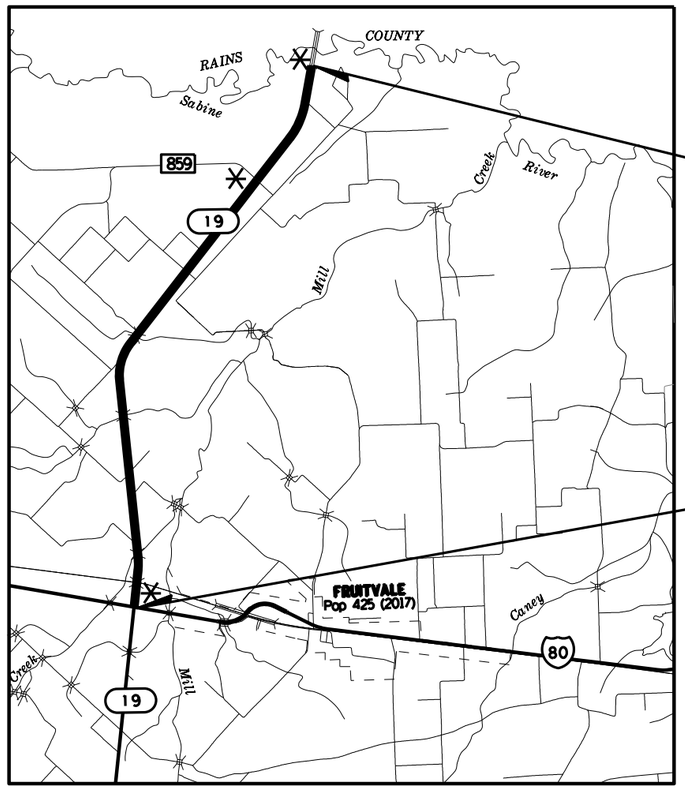
FUNCTIONAL CLASSIFICATION = RURAL MINOR ARTERIAL
DESIGN SPEED = 40 MPH
A.D.T. (2017) = 5,056
A.D.T. (2037) = 7,180

SH 19
VAN ZANDT COUNTY

LIMITS: 1.5 MI N OF FM 859 (RAINS C/L) TO US 80

FOR THE CONSTRUCTION OF SUPER 2 TYPE WORK.

CONSISTING OF BASE REPAIR, TREATED SUBGRADE, FLEX & ACP BASE, OCST, PFC SURFACE, STRUCTURES, MBGF, SIGNS AND PAVEMENT MARKINGS



BEGIN PROJECT
CSJ: 0108-12-018
STA: 0+35
REF MRK: 268+1.182

END PROJECT
CSJ: 0108-12-018
STA: 353+70
REF MRK: 276+0.663

Texas Department of Transportation

* 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: UPRR

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

SUBMITTED FOR LETTING: 1/24/2022

DocuSigned by: Gilbert Arteaga BF88CB5DCDAE4E8...
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 1/24/2022

DocuSigned by: Vernon M. Webb 6149184A8C65461...
DISTRICT ENGINEER

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CK:
DW:
CK:
DN:

GENERAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX OF SHEETS
3 - 4	TYPICAL SECTIONS
5, 5A-5K	GENERAL NOTES
6, 6A-6C	ESTIMATE AND QUANTITY SHEET
7 - 22	QUANTITY SUMMARY SHEETS
23 - 33	SUMMARY OF SMALL SIGNS

TRAFFIC CONTROL PLAN

SHEET NO.	DESCRIPTION
34	CONSTRUCTION SEQUENCE
35	TREATMENT FOR VARIOUS EDGE CONDITIONS
SHEET NO.	STANDARDS
36 - 47	BC (1)-21 THRU BC (12)-21
48 - 50	TCP (1-1)-18, TCP (1-2)-18, TCP (1-3)-18
51 - 53	TCP (2-1)-18, TCP (2-2)-18, TCP (2-3)-18
54 - 55	TCP (3-1)-13, TCP (3-3)-14
56	TCP (7-1)-13
57 - 58	TCP (S-1)-08A, TCP (S-2)-08A
59	WZ (STPM)-13
60	WZ (UL)-13
61	WZ (RS)-16

ROADWAY DETAILS

SHEET NO.	DESCRIPTION
62	HORIZONTAL ALIGNMENT DATA
63	SURVEY CONTROL INDEX SHEET
64	SURVEY AERIAL TARGETS
65	SURVEY HORIZONTAL & VERTICAL CONTROL
66 - 79	PROJECT LAYOUT SHEETS
80 - 82	MBGF-PLANING PLAN DETAILS
83 - 87	MISCELLANEOUS DETAILS
SHEET NO.	STANDARDS
88 - 91	MB (1)-21
92	MB-14(2)
93	GF (31)-19
94	GF (31)DAT-19
95 - 96	GF (31)TR TL3-20
97	GF (31)MS-19
98	SGT (10S)31-16
99	SGT (11S)31-18
100	SGT (12S)31-18
101	SGT (15)31-20
102	TE (HMAC)-11

DRAINAGE DETAILS

SHEET NO.	DESCRIPTION
103 - 109	CULVERT LAYOUTS
110	MISCELLANEOUS DRAINAGE DETAILS
111	BCS
SHEET NO.	STANDARDS
112	PSET-SC
113	PSET-SP
114 - 115	SETB-CD
116 - 117	SCC-3&4
118 - 119	SCC-5&6
120 - 121	SCC-7
122	SCC-MD
123	PW
124	ECD
125 - 126	SRR

BRIDGE ITEMS

SHEET NO.	DESCRIPTION
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TRAFFIC ITEMS

SHEET NO.	DESCRIPTION
128 - 129	SIGN DETAILS
130	INTERSECTION PAVEMENT MARKING LAYOUT
SHEET NO.	STANDARDS
131	D&OM (1)-20
132	D&OM (2)-20
133	D&OM (4)-20
134	D&OM (5)-20
135	D&OM (VIA)-20
136 - 138	PM (1)-20, PM (2)-20, PM (3)-20
139 - 141	TSR (3)-13, TSR (4)-13, TSR (5)-13
142	SMD (GEN)-08
143 - 145	SMD (SLIP-1)-08, SMD (SLIP-2)-08, SMD (SLIP-3)-08
146	SMD (TWT)-08
147	RS (3)-13
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149	TS2 (PL-1)-18

RAILROAD

SHEET NO.	DESCRIPTION
150	RAILROAD SCOPE OF WORK
SHEET NO.	STANDARDS
151 - 152	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

ENVIRONMENTAL ISSUES

SHEET NO.	DESCRIPTION
153	(EPIC) ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
154	(SW3P) STORMWATER POLLUTION PREVENTION PLAN
SHEET NO.	STANDARDS
155	EC (1)-16
156	EC (2)-16

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER

Gilbert Arteaga 01/18/2022

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

SH 19
SUPPLEMENTAL INDEX OF SHEETS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		2

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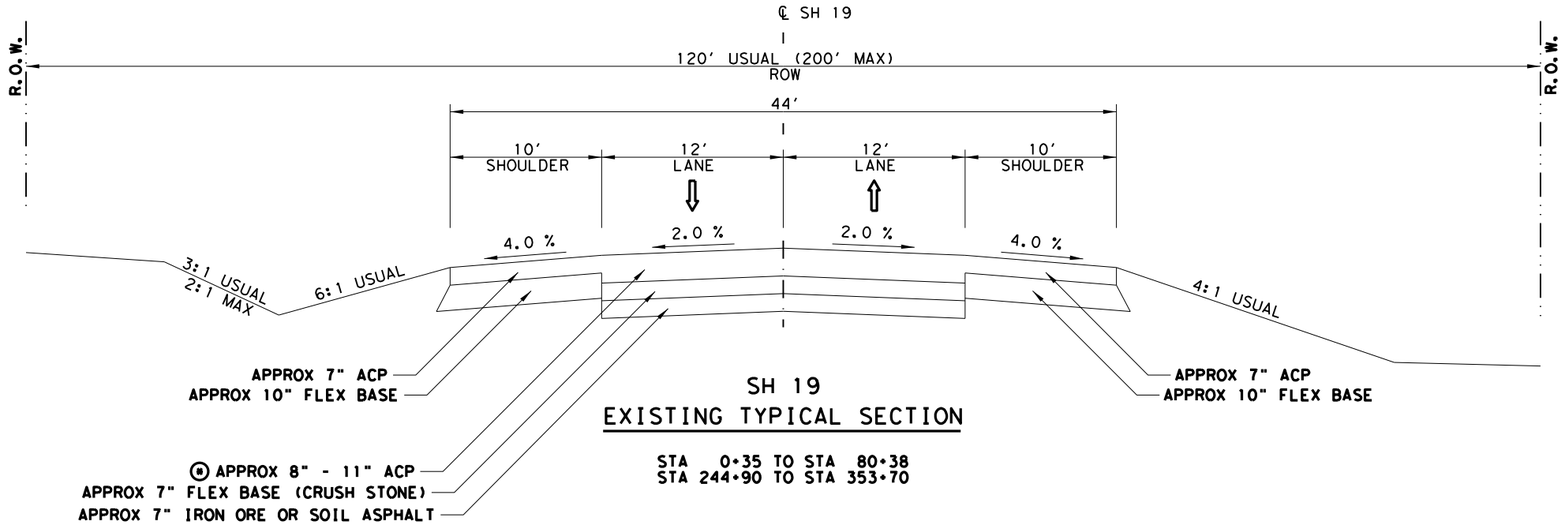
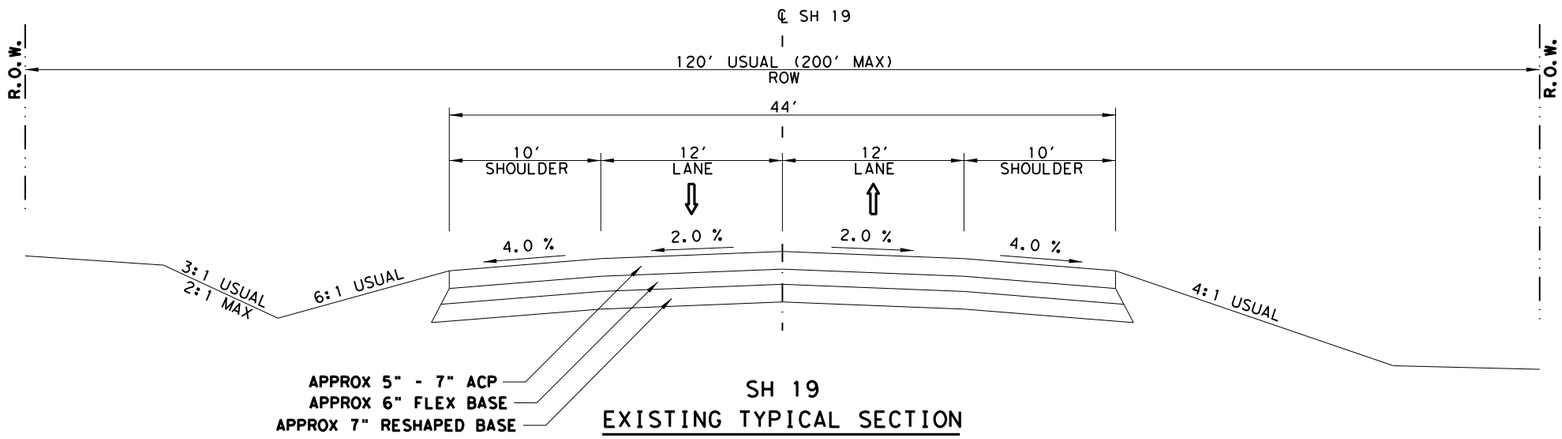


SH 19
EXISTING TYPICAL SECTION

STA 0+35 TO STA 80+38
STA 244+90 TO STA 353+70

0 5 10
SCALE: 1" = 10' H

Ⓡ APPROX 5" - 6" ACP IN AREAS AROUND GILADON CR BRIDGE, CROOKED CR BRIDGE, AND THE UPRR OVERPASS



SH 19
EXISTING TYPICAL SECTION

STA 80+38 TO STA 244+90

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		3

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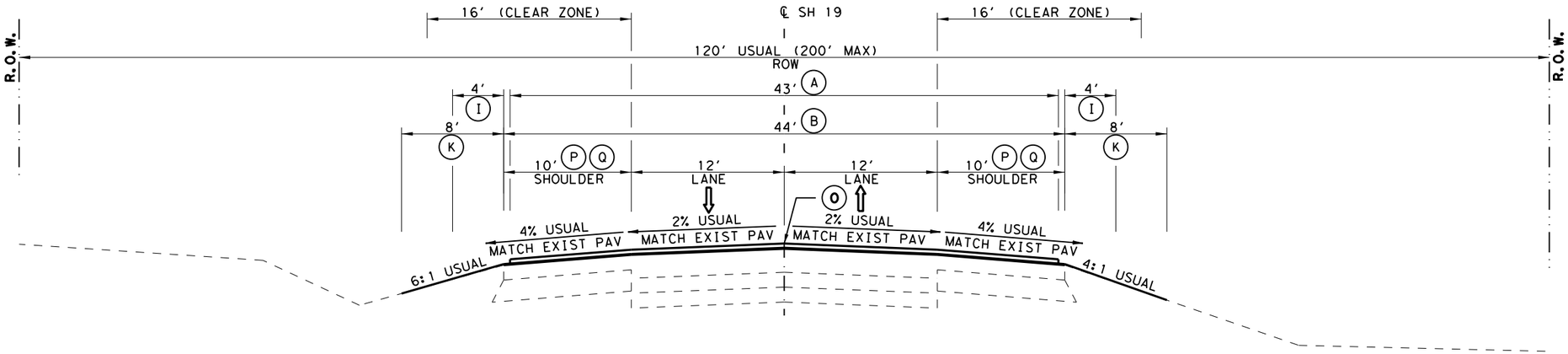
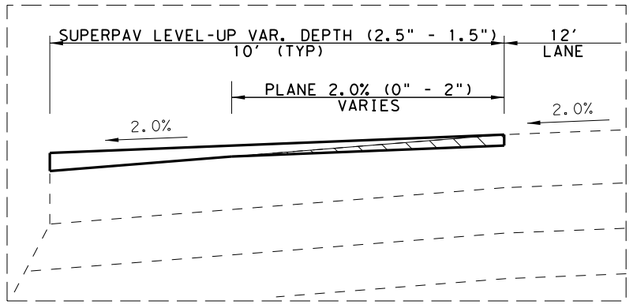


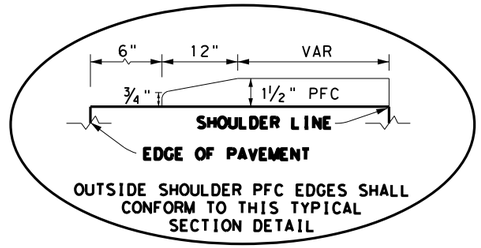
SH 19

PROPOSED TYPICAL SECTION (NON-WIDEN)

STA 0+35 TO STA 66+20 (EXISTING SECTION 1)
STA 237+20 TO STA 244+90 (EXISTING SECTION 2)
STA 244+90 TO STA 353+70 (EXISTING SECTION 1)



DETAIL A (SHOULDER PLANING & LEVEL-UP)



OUTSIDE SHOULDER PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

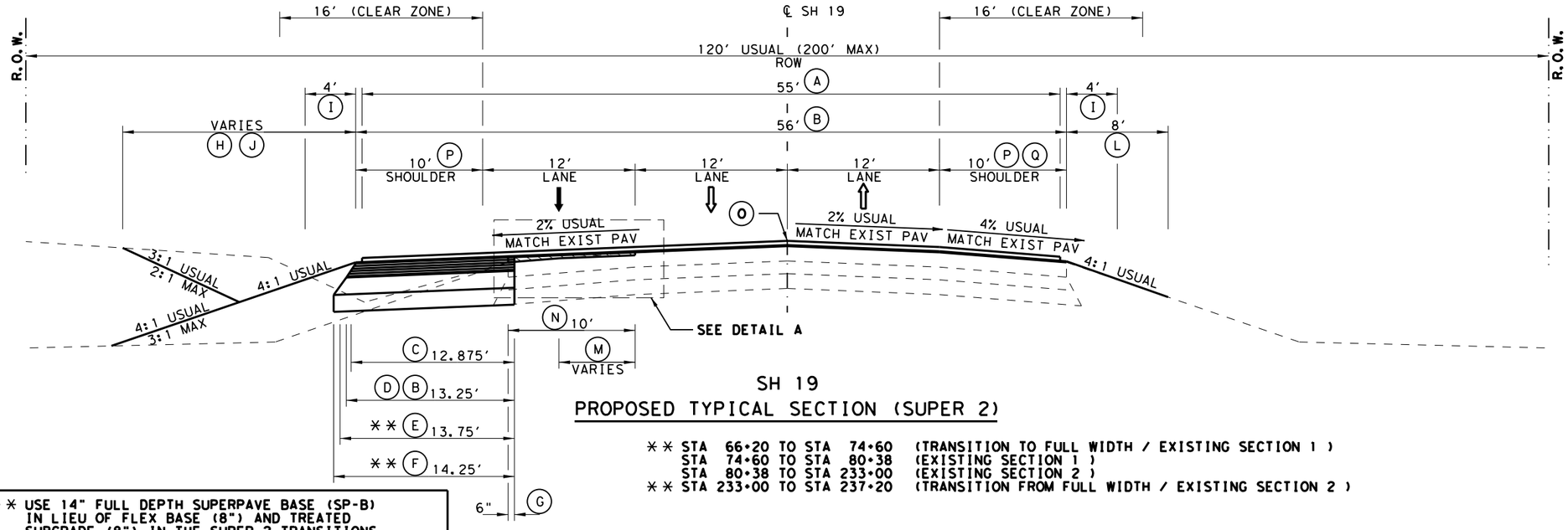
PAVEMENT DETAIL

LEGEND

- (A) 1.5" PFC SURFACE
- (B) OCST
- (C) 6" SUPERPAVE BASE (SP-C)
- (D) PRIME COAT
- (E) 8" FLEX BASE, LIMITS OF PAY
- (F) 8" TREATED SUBGRADE
- (G) SAWCUT 6" INTO EXISTING BASE TO PROVIDE A SMOOTH VERTICAL JOINT
- (H) EMBANKMENT (TY C)
- (I) EMULSION
- (J) 4" TOP SOIL & BONDED FIBER MATRIX
- (K) BACKFILL (TY A), PAID BY THE STATION & BONDED FIBER MATRIX
- (L) BACKFILL (TY A), PAID BY THE LINEAR FT. & BONDED FIBER MATRIX
- (M) VARIABLE PLANING (ESTABLISH 2% SLOPE)
- (N) LEVEL-UP (SP-D) (VARIES 2" TO 2.5")
- (O) MILLED RUMBLE STRIPS (CENTER - OPT 1)
- (P) MILLED RUMBLE STRIPS (EDGE - OPT 4)
- (Q) SEE MISCELLANEOUS DETAILS FOR SUPER-ELEVATION CORRECTIONS.

NOTE: PROFILE PAVEMENT MARKINGS TO BE USED ACROSS BRIDGES

0 5 10
SCALE: 1" = 10' H



SH 19

PROPOSED TYPICAL SECTION (SUPER 2)

** STA 66+20 TO STA 74+60 (TRANSITION TO FULL WIDTH / EXISTING SECTION 1)
STA 74+60 TO STA 80+38 (EXISTING SECTION 1)
STA 80+38 TO STA 233+00 (EXISTING SECTION 2)
** STA 233+00 TO STA 237+20 (TRANSITION FROM FULL WIDTH / EXISTING SECTION 2)

** USE 14" FULL DEPTH SUPERPAVE BASE (SP-B) IN LIEU OF FLEX BASE (8") AND TREATED SUBGRADE (8") IN THE SUPER 2 TRANSITIONS. 14"(SP-B)BASE SHALL BE PLACED IN 4 EQUAL LIFTS.

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED PROFESSIONAL ENGINEER
Gilbert Arteaga
01/18/2022

SH 19 TYPICAL SECTIONS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
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TYL	VAN ZANDT		4

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GENERAL NOTES:

GENERAL.

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

Preston Friend	Preston.Friend@txdot.gov
Kyle Dykes	Kyle.Dykes@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.

All stockpiles within TxDOT right of way, must not exceed 12 ft. in height and must have 3:1 slopes 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.

ATTN: Provide a 20-ft. length per 1-in. depth temporary taper 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.

Project Number: **Sheet 5**

County: Van Zandt **Control:** 0108-12-018

Highway: SH 19

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.

Preserve the integrity of all right of way monuments within project limits. Right of way monuments damaged or destroyed during construction must be replaced by a registered professional land surveyor (RPLS), at the Contractor's expense.

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.

Place and maintain construction hubs near the right of way line in accordance with Article 5.9., "Construction Surveying" on both sides of the roadway until the final item of work is complete.

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.

Verify survey control for accuracy before beginning construction.

Notify the Engineer if there are conflicts with survey control accuracy.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of

Project Number: **Sheet 5A**

County: Van Zandt **Control:** 0108-12-018

Highway: SH 19

an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional cost resulting from the use of alternates are the sole responsibility of the "Contractor".

ITEM 7. LEGAL RELATIONS AND RESPONSIBILITIES

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (COE) permit area that has not been previously evaluated by the COE as part of the permit review of this project. Such activities include haul roads, equipment staging areas, borrow pits, and disposal sites. "Associated," defined here, means "materials are delivered to or from the PSL." The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for this work. The Contractor is responsible for all consultations with the COE regarding activities (including PSL) that have not been previously evaluated by the COE. Provide the Department with a copy of all consultations or approvals from the COE before initiating activities.

Proceed with activities in PSL that do not affect a COE permit area if Contractor determines that the PSL is non-jurisdictional or proper COE clearances have been obtained in jurisdictional areas or have been previously evaluated by the COE as part of the permit review of this project. The Contractor is responsible for documenting his determination that his activities do not affect a COE permit area. Maintain copies of determination for review by the Department or any regulatory agency.

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.

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 8.09 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

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.

Project Number: **Sheet 5B**

County: Van Zandt **Control:** 0108-12-018

Highway: SH 19

ITEMS 110 & 132. EXCAVATION & EMBANKMENT

Before Contract letting, prospective bidders may review the earthwork cross-sections at the Area Engineer's office. The computer data is for non-construction purposes only and is the prospective bidder's responsibility to validate the data with the accompanying plans, specifications, and estimates for this Contract.

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 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.

ITEM 134. BACKFILLING PAVEMENT EDGES

Backfill pavement edges by using an approved road widener. The use of this machine will allow approved material for backfilling the pavement edge to be placed from the final roadway surface. Use a self-propelled machine capable of transferring approved 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 approved 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

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

Project Number: **Sheet 5C**

County: Van Zandt **Control:** 0108-12-018

Highway: SH 19

(Season: September 1 to February 1)	
Bermuda (unhulled)	12
Crimson Clover	10

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 247. FLEXIBLE BASE

Blade and sprinkle flexible base for a minimum of 7 days after it achieves density unless otherwise approved or directed.

Flex base material must meet the minimum compressive strength requirements.

Furnish base material with a minimum bar linear shrinkage of 2 percent as determined by Tex-107-E, Part II.

ITEM 310. PRIME COAT

A minimum curing time of 10 days is required before application of Item 316 when using bituminous material unless otherwise authorized or directed in writing.

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.

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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.

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 320. EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT

Provide either a material transfer vehicle or material transfer paver for the surface course of this project. The material transfer vehicle must be self-propelled, wheel mounted and capable of receiving material from haul trucks separate from the paver. The 20-ton minimum capacity hopper must be equipped with a pivoting discharge conveyor and must have a means of remixing the asphaltic material before placement. The material transfer paver, if supplied, must consist of a mobile, self-propelled asphalt paver incorporating an integral mix loadout elevator (conveyor) having a minimum rated capacity of 750 ton per hour. The conveyor system must have a means of remixing the asphaltic concrete material before discharging into the paver hopper and must be equipped with either a truck dump hopper attachment or a minimum 20-ton capacity surge hopper. If a material transfer paver utilizing the truck dumper hopper attachment is used, the haul trucks must stop a minimum of 1 foot into the truck. In addition, paving will not be allowed to begin until the paver has reached its full storage capacity.

ITEM 3079. PERMEABLE FRICTION COURSE (PFC)

Cease production of mixture if the asphalt content from any sublot drops below 6%. Resume production following tests showing appropriate adjustments have been made to the satisfaction of the Engineer.

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

Warm Mix Asphalt (WMA) is not allowed.

The use of Reclaimed Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS) is not allowed.

ITEM 351. FLEXIBLE PAVEMENT STRUCTURE REPAIR

Replace the unstable pavement structure with 6 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 1.3 miles south of FM 1256. 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.

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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 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 is considered 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

Reshape embankment side slopes and provide embankment as required. Add mulch sod to achieve a smooth uniform finish around the installation of the safety end treatments and culvert extensions as directed.

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.

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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 9 A.M. or after 3 P.M. unless otherwise directed.

Unless otherwise approved, lane closures for minor or major construction operations will not be allowed on Good Friday, Easter weekend, Memorial Day, Memorial Day weekend, July 4th, Labor Day, Labor Day weekend, 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.

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.

Lane closures will not be allowed Friday thru Sunday of Canton's First Monday Weekend.

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.

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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.

Provide a pilot vehicle.

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

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

The use of Law Enforcement Officers (LEOs) will be required for this project. Before the preconstruction meeting, coordinate with local agencies to be prepared for staffing needs.

Provide uniformed LEOs with marked vehicles during work zone activities. The officer in marked vehicle will be located as approved to monitor or direct traffic during the closure. The Engineer will approve the method used to direct traffic at signalized intersections. Additional officers and vehicles may be provided when directed.

Complete the daily tracking form provided by the Department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided. Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case by case basis.

All law enforcement personnel used in work zone traffic control must be trained for performing duties in work zones and are required to take "Safe and Effective Use of Law Enforcement Personnel in Work Zones" (Course #133119) which can be found online at the following site: www.nhi.fhwa.dot.gov.

Certificates of completion should be available to all who finish the course. These should be kept by the officers to verify completion when reporting to the work site.

Provide the Engineer 72-hour notice of lane or ramp closures to provide advance notice to the traveling public by way of media and for any dynamic message sign programing. Place Portable Changeable Message Signs (PCMS) at locations as directed a minimum of 3 days in advance of entrance ramp closures on the affected crossroad. These signs are to remain in place during the ramp closures.

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 18.9 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 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

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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 540. METAL BEAM GUARD FENCE

Do not paint treated timber posts.

Use round wood posts on all metal beam guard fence except where steel posts are required in accordance with "Low Fill Culvert Post Mounting" details shown on standard sheet MBGF.

Length of steel posts for low fill culvert post mounting will be determined in the field to ensure proper metal beam guard fence height.

ITEMS 540 & 542. METAL BEAM GUARD FENCE & REMOVING METAL BEAM GUARD FENCE

Prior to removal of existing MBGF and associated appurtenances, submit to the Engineer for approval a work plan, including a detailed timeline, outlining removal and reinstallation of safety features. It is the intent that the Contractor has the necessary materials and labor force available to reinstall the safety features prior to beginning the removal process.

Regardless of when the Contractor installs proposed MBGF, set the rail height to account for any subsequent surfacing work in order to be in accordance with standard MBGF upon completion of the Contract.

When replacing guard rail, ensure that all segments of guard rail removed are replaced the same work day before opening to traffic.

ITEM 542. REMOVING METAL BEAM GUARD FENCE

The Engineer will determine the metal beam guard fence to be salvaged and location of stockpile sites.

All metal beam guard fence is non-salvageable and will become the property of the Contractor.

Removal of existing ACP mow strips is incidental to removal of the existing guard rail.

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, 9 medium mailboxes, 0 large mailboxes.

Place 2-in. address location numbers on each mailbox in accordance with Placement of Emergency Location Number notes on MB-15(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 3 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 Canton Maintenance Section located at 15500 FM 1255, Canton Texas 75103.

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

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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.

The relocation of existing street signs to proposed stop sign will be subsidiary to Item 644.

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.

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.

Static lane closures are required for all profile stripe operations. These operations will require a pilot car for all two-lane roadways, unless otherwise directed.

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 3076 DENSE-GRADED HOT-MIX ASPHALT (EXEMPT PRODUCTION)

The Engineer may accept a previously approved design if prior experience using the design was satisfactory. Unless waived by the Engineer, a trial batch will be required as outlined in Item 3076. The Hamburg Wheel Tracking requirements are waived for driveways.

Give the TxDOT inspector at the spreading and finishing machine 1 weight ticket for each load of material. When directed, weigh asphaltic concrete loads on public scales to ensure the proper weight of material.

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

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For driveways designated by the Engineer to be reconstructed, scarify, blade smooth, sprinkle, and compact to the extent necessary to produce a firm, stable foundation prior to placement of ACP. This work will not be paid for directly, but will be subsidiary to Item 3076.

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

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

Apply a tack coat with a rate of 0.12 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

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.

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.

CONTROLLING PROJECT ID 0108-12-018 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY SH 19

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0108-12-018**			
		PROJECT ID					
		COUNTY		**Van Zandt**			
		HIGHWAY		**SH 19**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	19.990		19.990	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	55.000		55.000	
	110-6001	EXCAVATION (ROADWAY)	CY	9,828.600		9,828.600	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	10,065.000		10,065.000	
	132-6021	EMBANKMENT (VEHICLE)(ORD COMP)(TY C)	CY	46.000		46.000	
	134-6001	BACKFILL (TY A)	STA	131.890		131.890	
	134-6006	BACKFILL (TY A)	LF	17,646.000		17,646.000	
	150-6001	BLADING	STA	6.000		6.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	53,762.000		53,762.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	46,448.000		46,448.000	
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY	92,895.000		92,895.000	
	164-6055	BONDED FBR MTRX SEED (TEMP)(WARM)	SY	46,448.000		46,448.000	
	164-6056	BONDED FBR MTRX SEED (TEMP)(COOL)	SY	46,448.000		46,448.000	
	168-6001	VEGETATIVE WATERING	MG	2,044.000		2,044.000	
	247-6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	24,200.000		24,200.000	
	260-6001	LIME (HYDRATED LIME (DRY))	TON	188.000		188.000	
	260-6027	LIME TRT (EXST MATL)(8")	SY	12,540.000		12,540.000	
	275-6001	CEMENT	TON	213.000		213.000	
	275-6011	CEMENT TREAT(EXIST MATL)(8")	SY	12,540.000		12,540.000	
	310-6009	PRIME COAT (MC-30)	GAL	6,996.000		6,996.000	
	314-6012	EMULS ASPH (EROSN CONT)(CSS-1)	GAL	1,461.000		1,461.000	
	316-6406	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	GAL	94,600.000		94,600.000	
	316-6407	AGGR (TY-PD GR-3 OR TY-PL GR-3)	CY	2,252.000		2,252.000	
	342-6002	PFC (ASPHALT) PG76-22	TON	854.000		854.000	
	342-6006	PFC-C (AGGREGATE)(PG76 MIX) SAC-A	TON	13,377.000		13,377.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	2,000.000		2,000.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	5,868.000		5,868.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	2,886.000		2,886.000	
	354-6045	PLANE ASPH CONC PAV (2")	SY	10,242.000		10,242.000	
	354-6049	PLANE ASPH CONC PAV (6")	SY	12,170.000		12,170.000	
	354-6051	PLANE ASPH CONC PAV (0" TO 1 1/2")	SY	13,172.000		13,172.000	
	403-6001	TEMPORARY SPL SHORING	SF	120.000		120.000	
	420-6071	CL C CONC (COLLAR)	EA	12.000		12.000	
	420-6077	CL E CONC (SEAL SLAB)(NON-REINF)	CY	5.400		5.400	
	432-6009	RIPRAP (CONC) (CL B) (4")	CY	16.000		16.000	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)	CY	153.000		153.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	171.000		171.000	

ESTIMATE AND QUANTITY SHEET

DISTRICT	COUNTY	CCSJ	SHEET
Tyler	Van Zandt	0108-12-018	6

CONTROLLING PROJECT ID 0108-12-018 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY SH 19

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0108-12-018**			
		PROJECT ID					
		COUNTY		**Van Zandt**			
		HIGHWAY		**SH 19**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	438-6006	CLEANING AND SEALING JOINTS (CL 3)	LF	572.000		572.000	
	462-6048	CONC BOX CULV (4 FT X 3 FT)(EXTEND)	LF	18.000		18.000	
	462-6051	CONC BOX CULV (5 FT X 3 FT)(EXTEND)	LF	8.000		8.000	
	462-6060	CONC BOX CULV (7 FT X 5 FT)(EXTEND)	LF	11.000		11.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	936.000		936.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	92.000		92.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	36.000		36.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	18.000		18.000	
	466-6182	WINGWALL (PW - 1) (HW=7 FT)	EA	3.000		3.000	
	467-6253	SET (TY I)(S= 7 FT)(HW= 6 FT)(3:1) (C)	EA	1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	50.000		50.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	4.000		4.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	3.000		3.000	
	480-6001	CLEAN EXIST CULVERTS	EA	6.000		6.000	
	496-6016	REMOV STR (PIPE)	EA	26.000		26.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	16.000		16.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	210.000		210.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	1,200.000		1,200.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	1,410.000		1,410.000	
	506-6029	EARTHWORK (EROSN & SEDMT CONT, IN VEH)	CY	1,000.000		1,000.000	
	506-6030	BACKHOE WORK (EROSION & SEDMT CONT)	HR	100.000		100.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	10,000.000		10,000.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	10,000.000		10,000.000	
	506-6046	TRACKHOE WORK (EROSION & SEDMT CONT)	HR	100.000		100.000	
	530-6002	INTERSECTIONS (ACP)	SY	300.000		300.000	
	530-6005	DRIVEWAYS (ACP)	SY	2,074.000		2,074.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	46.000		46.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	67,474.000		67,474.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	33,237.000		33,237.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,388.000		1,388.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	12.000		12.000	
	540-6014	SHORT RADIUS	LF	25.000		25.000	

ESTIMATE AND QUANTITY SHEET

DISTRICT	COUNTY	CCSJ	SHEET
Tyler	Van Zandt	0108-12-018	6A

CONTROLLING PROJECT ID 0108-12-018 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY SH 19

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0108-12-018**			
		PROJECT ID					
		COUNTY		**Van Zandt**			
		HIGHWAY		**SH 19**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000		1.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	87.500		87.500	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	900.000		900.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	12.000		12.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	15.000		15.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	12.000		12.000	
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	13.000		13.000	
	560-6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	3.000		3.000	
	560-6006	MAILBOX INSTALL-M (TWG-POST) TY 2	EA	2.000		2.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	23.000		23.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	2.000		2.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	3.000		3.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	42.000		42.000	
	644-6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	14.000		14.000	
	644-6071	RELOCATE SM RD SN SUP&AM TY TWT	EA	3.000		3.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	79.000		79.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	24.000		24.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	54.000		54.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	58.000		58.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	87,780.000		87,780.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	40.000		40.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	79,240.000		79,240.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	40.000		40.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	3,534.000		3,534.000	
	662-6113	WK ZN PAV MRK SHT TERM RMV (Y)(4")	LF	15,903.000		15,903.000	
	666-6006	REFL PAV MRK TY I (W)4"(DOT)(100MIL)	LF	295.000		295.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	888.000		888.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	3,728.000		3,728.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	68,494.000		68,494.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	2,635.000		2,635.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	53,824.000		53,824.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	1,900.000		1,900.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	768.000		768.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	300.000		300.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	230.000		230.000	
	668-6083	PREFAB PAV MRK TY C (W) (LNDP ARROW)	EA	4.000		4.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	10.000		10.000	

ESTIMATE AND QUANTITY SHEET

DISTRICT	COUNTY	CCSJ	SHEET
Tyler	Van Zandt	0108-12-018	6B

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0108-12-018 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY SH 19

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0108-12-018**			
		PROJECT ID		**A00059356**			
		COUNTY		**Van Zandt**			
		HIGHWAY		**SH 19**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	672-6009	REFL PAV MRKR TY II-A-A	EA	827.000		827.000	
	3076-6035	D-GR HMA TY-D PG64-22	TON	101.000		101.000	
	3077-6001	SP MIXESSP-BPG64-22	TON	701.000		701.000	
	3077-6011	SP MIXESSP-CPG64-22	TON	11,669.000		11,669.000	
	3077-6044	SP MIXESSP-DPG64-22 (LEVEL-UP)	TON	3,307.000		3,307.000	
	3077-6051	SP MIXESSP-DPG70-22	TON	216.000		216.000	
	3077-6075	TACK COAT	GAL	6,882.000		6,882.000	
	3079-6007	PFC-C (PG76 MIX) SAC-A	TON	14,231.000		14,231.000	
	3079-6023	TACK COAT	GAL	18,975.000		18,975.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	28.000		28.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6056-6002	PREFORMED CENTERLINE RUMBLE STRIP	LF	488.000		488.000	
	6185-6002	TMA (STATIONARY)	DAY	220.000		220.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	30.000		30.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

BASIS OF ESTIMATE

	ITEM	DESCRIPTION	RATE	DESIGN QUANTITY	DESIGN UNIT	PAY QUANTITY	PAY UNIT
[1]	166	FERTILIZER	1 LB/9 SY	185790	SY	10.32	TON
[2]	168	VEGETATIVE WATERING	11 GAL/SY	185790	SY	2044	MG
	260	LIME (HYDRATED LIME)(DRY)(5%)(115 LB/CF)	30 LB/SY	12540	SY	188	TON
[3]	275	CEMENT(5%)(115 LB/CF)	0.017 TON/SY	12540	SY	213	TON
	310	PRIME COAT (MC-30)	0.3 GAL/SY	23320	SY	6996	GAL
	314	EMULS ASPH (EROSN CONT)(CSS-1)	0.15 GAL/SY	9740	SY	1461	GAL
[1]	314	EMULS ASPH (EROSN CONT)(CSS-1) (BACKFILL PAVEMENT EDGES)	0.15 GAL/SY	19564	SY	2935	GAL
	316	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	0.42 GAL/SY	225239	SY	94600	GAL
	316	AGGR (TY-PD GR-3 OR TY-PL GR-3)	1 CY/100 SY	225239	SY	2252	CY
	3076	D-GR HMA TY-D PG64-22 (CTY RD INTERSECTIONS)(1.5")	165 LB/SY	1229	SY	101	TON
	3079	PF-C (PG76 MIX) SAC-A	150 LB/SY	189748	SY	14231	TON
	3079	TACK COAT	0.1 GAL/SY	189748	SY	18975	GAL
	3077	SP MIXES SP-D PG70-22 (SURFACE)(1.5")	165 LB/SY	2615	SY	216	TON
	3077	SP MIXES SP-B PG64-22 (BASE)(14")	1540 LB/SY	910	SY	701	TON
	3077	SP MIXES SP-C PG64-22 (BASE)(6")	660 LB/SY	35360	SY	11669	TON
	3077	SP MIXES SP-D PG64-22 (LEVEL-UP)(VARIES)	3960 LB/CY	1670	CY	3307	TON
	3077	TACK COAT	0.1 GAL/SY	68820	SY	6882	GAL
	500	MOBILIZATION				1	LS
	502	BARRICADES, SIGNS AND TRAFFIC HANDLING				16	MO

[1] FOR INFORMATION ONLY.
[2] FOR TWO APPLICATIONS.
[3] 0.017 TONS/SY = (EST 115 LBS/CU FT)(8/12 FT)(9 SF/SY)(1 TON/2000 LBS)(5%)

PORTABLE CHANGEABLE MESSAGE SIGN

SIGN	LOCATION	NUMBER OF SIGNS	ITEM 6001 PORTABLE CHANGEABLE MESSAGE SIGN DAYS	ITEM 6001 PORTABLE CHANGEABLE MESSAGE SIGN EA
BEGIN PROJECT (RAINS C/L)	TO BE LOCATED AS DIRECTED	1	7	1
US 80 INTERSECTION	EB & WB	2	14	
END PROJECT (US 80)	TO BE LOCATED AS DIRECTED	1	7	1
TOTALS			28	2

NOTE: TO BE PLACED 7 DAYS PRIOR TO START DATE.

PAVEMENT REPAIR SUMMARY

LOCATION	ITEM 351 FLEXIBLE PAVEMENT STRUCTURE REPAIR (6") SY	REMARKS
AS DIRECTED	2000	APPROX. 12' WIDE AT LOCATIONS AS DIRECTED
TOTALS	2000	

TRUCK MOUNTED ATTENUATOR SUMMARY

STAGE OF PROJECT	NUMBER OF TRUCKS	ITEM 6185 TMA (STATIONARY) DAY	ITEM 6185 TMA (MOBILE OPERATIONS) DAY
WIDENING / PAVEMENT OPERATIONS	1	220	
STRIPING OPERATIONS	2		15
TOTALS		220	30

NOTE: MOBILE OPERATIONS TOTAL IS COMBINED DAYS OF TOTAL TRUCKS.

SH 19
QUANTITY
SUMMARY

Texas Department of Transportation
SHEET 1 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		7

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GRADING SUMMARY

LOCATION STA			LENGTH FT	ITEM 100 PREP ROW STA	ITEM 134 [1] BACKFILL (TY A) STA	ITEM 134 [1] [2] BACKFILL (TY A) LF	ITEM 160 FURNISHING AND PLACING TOPSOIL (4") SY	ITEM 314 [3] EMULS ASPH (EROSN CONT) (CSS-1) SY	ITEM 314 [4] EMULS ASPH (EROSN CONT) (CSS-1) SY	REMARKS
0+35	3+05	LT	270							TIE TO EXISTING CONCRETE MOWSTRIP (NO EDGE WORK)
		RT								
3+05	32+78	LT	2973		29.73			1321		PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT						1321		
32+78	49+66	LT	1688				1876		750	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT				1688		750		PROPOSED TYPICAL SECTION (NON-WIDEN)
49+66	66+20	LT	1654		16.54			735		PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT						735		
66+20	200+23	LT	13403				38956		5957	PROPOSED TYPICAL SECTION (SUPER 2)
		RT				13403		5957		PROPOSED TYPICAL SECTION (NON-WIDEN)
200+23	221+58	LT	2135				4797		949	PROPOSED TYPICAL SECTION (SUPER 2)
		RT					2373		949	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
221+58	237+20	LT	1562				3509		694	PROPOSED TYPICAL SECTION (SUPER 2)
		RT				1562		694		PROPOSED TYPICAL SECTION (NON-WIDEN)
237+20	239+23	LT	203		2.03			90		PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT						90		
239+23	241+80	LT	257				300			MBGF / CONCRETE MOWSTRIP AREA
		RT								
241+80	243+80		200							GILADON CREEK BRIDGE
243+80	246+37	LT	257				200			MBGF / CONCRETE MOWSTRIP AREA
		RT								
246+37	318+23	LT	7186		71.86			3194		PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT						3194		
318+23	320+80	LT	257				100			MBGF / CONCRETE MOWSTRIP AREA
		RT								
320+80	322+60		180							CROOKED CREEK BRIDGE
322+60	323+60	LT	100				60			MBGF / CONCRETE MOWSTRIP AREA
		RT								
323+60	325+16	LT	156				104			LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT					90			MBGF / CONCRETE MOWSTRIP AREA
325+16	335+09	LT	993				662		441	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT				993		441		PROPOSED TYPICAL SECTION (NON-WIDEN)
335+09	335+61	LT	52				35			LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT					60			MBGF / CONCRETE MOWSTRIP AREA
335+61	337+71	LT	210				240			MBGF / CONCRETE MOWSTRIP AREA
		RT								
337+71	339+36		165							UPRR OVERPASS
339+36	341+97	LT	261				400			MBGF / CONCRETE MOWSTRIP AREA
		RT								
341+97	353+70	LT	1173		11.73			521		PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT						521		
TOTALS				**19.99**	**131.89**	**17646**	**53762**	**19564**	**9740**	

[1] WIDTH OF BACKFILL = 6'
[2] PLACE BACKFILL (TY A) BY THE FOOT ON OPPOSITE SIDE OF PROPOSED PASSING LANES.
[3] QUANTITY INCLUDED IN BASIS OF ESTIMATE (SUBSIDIARY TO ITEM 134).
[4] QUANTITY INCLUDED IN BASIS OF ESTIMATE.

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SH 19 QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		8

ROADWAY SUMMARY

FROM	TO	LENGTH	ITEM 247		ITEM 260				ITEM 275				ITEM 310		REMARKS
			FL BS (CMP IN PLC) (TY A GR 1-2) (8")		[1] [2] LIME (HYDRATED LIME) (DRY)		[2] LIME TRT (EXIST MTL) (8")		[1] [2] CEMENT		[2] CEMENT TRT (EXIST MTL) (8")		[1] PRIME COAT (MC-30)		
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)	
74+60	233+00	15840	13.75	24200	14.25	12540	14.25	12540	14.25	12540	14.25	12540	13.25	23320	
TOTALS				24200		12540		12540		12540		12540		23320	

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

PLANING SUMMARY

FROM	TO	LENGTH	ITEM 354										REMARKS
			PLANE ASPH CONC PAV (0" TO 1 1/2")		PLANE ASPH CONC PAV (1.5")		PLANE ASPH CONC PAV (0" TO 2")		PLANE ASPH CONC PAV (2")		PLANE ASPH CONC PAV (6")		
STA	STA	FT	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	WIDTH (FT)	AREA (SY)	
0+35	3+05	270			44	1320					24	720	TIE TO BRIDGE APPROACH SLAB & EXIST CONCRETE MOWSTRIPS
3+05	4+55	150	44	733									SEE MBGF / PLANING PLAN DETAILS
66+20	74+60	840	6	560							3.5	327	SUPER2 TRANSITION - SEE PROPOSED TYPICAL SECTION
74+60	233+00	15840	6	10560							3.5	6160	SEE PROPOSED TYPICAL SECTION
233+00	237+20	420	6	280							3.5	163	SUPER2 TRANSITION - SEE PROPOSED TYPICAL SECTION
237+23	239+23	200					44	978					SEE MBGF / PLANING PLAN DETAILS
239+23	241+80	257							44	1256	24	685	SEE MBGF / PLANING PLAN DETAILS
241+80	243+80	200							44	978			GILADON CREEK BRIDGE
243+80	246+37	257							44	1256	24	685	SEE MBGF / PLANING PLAN DETAILS
246+37	248+37	200					44	978					SEE MBGF / PLANING PLAN DETAILS
316+23	318+23	200					44	978					SEE MBGF / PLANING PLAN DETAILS
318+23	320+80	257							44	1256	24	685	SEE MBGF / PLANING PLAN DETAILS
320+80	322+60	180							44	880			CROOKED CREEK BRIDGE
322+60	325+16	256							44	1252	24	683	SEE MBGF / PLANING PLAN DETAILS
325+16	327+16	200					44	978					SEE MBGF / PLANING PLAN DETAILS
333+09	335+09	200					44	978					SEE MBGF / PLANING PLAN DETAILS
335+09	337+71	262							44	1281	24	699	SEE MBGF / PLANING PLAN DETAILS
337+71	339+36	165							44	807			UPRR OVERPASS
339+36	341+97	261							44	1276	24	696	SEE MBGF / PLANING PLAN DETAILS
341+97	343+97	200					44	978					SEE MBGF / PLANING PLAN DETAILS
348+70	350+50	180									12	240	SEE MBGF / PLANING PLAN DETAILS
350+50	352+00	150	55	917							12	200	SEE MBGF / PLANING PLAN DETAILS
352+00	353+70	170			VARIES	1566					12	227	US 80 INTERSECTION
FM 859		50	22	122									50' BUTT JOINT
TOTALS				13172		2886		5868		10242		12170	

SH 19
QUANTITY
SUMMARY

Texas Department of Transportation
SHEET 3 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		9

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TABULATION OF SURFACE AREAS

FROM	TO	LENGTH	ITEM 316				ITEM 3076		ITEM 3079			ITEM 3077									REMARKS
			[1] OCST		[1] OCST		[1] D-GR HMA TY-D PG64-22 (1.5")		[1] PFC		[1] PFC TACK COAT	[1] SP MIXES SP-D PG70-22 (SAC-A) (SURFACE) (1.5")		[1] SP MIXES SP-B PG64-22 (BASE) (14")		[1] SP MIXES SP-C PG64-22 (BASE) (6")		[1] SP MIXES SP-D PG64-22 (LEVEL-UP) (VARIES)		[1] TACK COAT		
			WIDTH	AREA	WIDTH	AREA	WIDTH	AREA	WIDTH	AREA	AREA	WIDTH	AREA	WIDTH	AREA	WIDTH	AREA	WIDTH	VOLUME	WIDTH	AREA	
STA	STA	FT	(FT)	(SY)	(FT)	(SY)	(FT)	(SY)	(FT)	(SY)	(SY)	(FT)	(SY)	(FT)	(SY)	(FT)	(SY)	(FT)	(CY)	(FT)	(SY)	
0+35	3+05	270	44	1320								44	1320			24	720			NA	2040	TIE TO BRIDGE APPROACH SLAB
3+05	4+55	150	44	733								44	733								167	
4+55	66+20	6165	44	30140					43	29455	29455											
66+20	74+60	840	50 AVG	4667	10 AVG	933			49 AVG	4573	4573			6.50 AVG	607	12 AVG	1120	10	49	NA	5786	SUPER2 TRANSITION
74+60	233+00	15840	56	98560	16	28160			55	96800	96800					16	28160	10	922		45760	
233+00	237+20	420	50 AVG	2333	10 AVG	467			49	2287	2287			6.50 AVG	303	12 AVG	560	10	24	NA	2894	SUPER2 TRANSITION
237+20	237+23	3	44	15					43	14	14											
237+23	239+23	200	44	978					43	956	956											
239+23	241+80	257	44	1256					43	1228	1228					24	685			24	685	APPROACH
241+80	243+80	200	44	978					43	956	956											GILADON CREEK BRIDGE
243+80	246+37	257	44	1256					43	1228	1228					24	685			24	685	DEPARTURE
246+37	248+37	200	44	978					43	956	956											
248+37	316+23	6786	44	33176					43	32422	32422											
316+23	318+23	200	44	978					43	956	956											
318+23	320+80	257	44	1256					43	1228	1228					24	685			24	685	APPROACH
320+80	322+60	180	44	880					43	860	860											CROOKED CREEK BRIDGE
322+60	325+16	256	44	1252					43	1223	1223					24	683			24	683	DEPARTURE
325+16	327+16	200	44	978					43	956	956											
327+16	333+09	593	44	2899					43	2833	2833											
333+09	335+09	200	44	978					43	956	956											
335+09	337+71	262	44	1281					43	1252	1252					24	699			24	699	APPROACH
337+71	339+36	165	44	807					43	788	788											UPRR OVERPASS
339+36	341+97	261	44	1276					43	1247	1247					24	696			24	696	DEPARTURE
341+97	343+97	200	44	978					43	956	956											
343+97	348+70	473	44	2312					43	2260	2260											
348+70	350+50	180	VAR	938					VAR	918	918					12	240			12	240	
350+50	352+00	150	VAR	910					VAR	893	893					12	200			12	200	
352+00	353+70	170	VAR	1566					VAR	1547	1547					12	227			12	227	US 80 INTERSECTION
32+78	49+66	1688																10	268	10	1876	SUPER CORRECTION SHOULDER (LT)
200+23	221+58	2135																10	290	10	2372	SUPER CORRECTION SHOULDER (RT)
323+60	335+61	1201																10	117	10	1334	SUPER CORRECTION SHOULDER (LT)
FM 859												22	562							22	562	
COUNTY ROAD INTERSECTIONS							VAR	1229												VAR	1229	
TOTALS				**195679**		**29560**		**1229**		**189748**	**189748**		**2615**		**910**		**35360**		**1670**		**68820**	

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE.

SH 19 QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		10

VEGETATION SUMMARY

LOCATION STA			LENGTH FT	ITEM 164 BOND FBR MTRX SEED (PERM) (RURAL) (SAND) SY	ITEM 164 [1] BONDED FBR MTRX SEED (TEMP) (WARM) SY	ITEM 164 [1] BONDED FBR MTRX SEED (TEMP) (COOL) SY	ITEM 164 BROADCAST SEED (PERM) (RURAL) (SANDY) SY	ITEM 168 [2] VEGETATIVE WATERING SY	REMARKS
0+35	3+05	LT	270						TIE TO EXISTING CONCRETE MOWSTRIP (NO EDGE WORK)
		RT							
3+05	32+78	LT	2973	2643	1322	1322	1322	5286	PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT		2643	1322	1322	1322	5286	
32+78	49+66	LT	1688	1876	938	938	938	3752	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT		1500	750	750	750	3000	PROPOSED TYPICAL SECTION (NON-WIDEN)
49+66	66+20	LT	1654	1470	735	735	735	2940	PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT		1470	735	735	735	2940	
66+20	200+23	LT	13403	38956	19478	19478	19478	77912	PROPOSED TYPICAL SECTION (SUPER 2)
		RT		11914	5957	5957	5957	23828	PROPOSED TYPICAL SECTION (NON-WIDEN)
200+23	221+58	LT	2135	4797	2399	2399	2399	9594	PROPOSED TYPICAL SECTION (SUPER 2)
		RT		2373	1187	1187	1187	4746	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
221+58	237+20	LT	1562	3509	1755	1755	1755	7018	PROPOSED TYPICAL SECTION (SUPER 2)
		RT		1388	694	694	694	2776	PROPOSED TYPICAL SECTION (NON-WIDEN)
237+20	239+23	LT	203	180	90	90	90	360	PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT		180	90	90	90	360	
239+23	241+80	LT	257	300	150	150	150	600	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0		0	
241+80	243+80		200						GILADON CREEK BRIDGE
243+80	246+37	LT	257	200	100	100	100	400	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0		0	
246+37	318+23	LT	7186	6388	3194	3194	3194	12776	PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT		6388	3194	3194	3194	12776	
318+23	320+80	LT	257	100	50	50	50	200	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0	0	0	
320+80	322+60		180						CROOKED CREEK BRIDGE
322+60	323+60	LT	100	60	30	30	30	120	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0	0	0	
323+60	325+16	LT	156	104	52	52	52	208	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT		90	45	45	45	180	MBGF / CONCRETE MOWSTRIP AREA
325+16	335+09	LT	993	662	331	331	331	1324	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT		883	442	442	442	1766	PROPOSED TYPICAL SECTION (NON-WIDEN)
335+09	335+61	LT	52	35	18	18	18	70	LEVEL-UP FOR SUPERELEVATION CORRECTION ON SHOULDER
		RT		60	30	30	30	120	MBGF / CONCRETE MOWSTRIP AREA
335+61	337+71	LT	210	240	120	120	120	480	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0	0	0	
337+71	339+36		165						UPRR OVERPASS
339+36	341+97	LT	261	400	200	200	200	800	MBGF / CONCRETE MOWSTRIP AREA
		RT			0	0	0	0	
341+97	353+70	LT	1173	1043	522	522	522	2086	PROPOSED TYPICAL SECTION (NON-WIDEN)
		RT		1043	522	522	522	2086	
TOTALS				**92895**	**46448**	**46448**	**46448**	**185790**	

[1] MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE VEGETATION IN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT.
[2] QUANTITY INCLUDED IN BASIS OF ESTIMATE.

SH 19
QUANTITY
SUMMARY

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		11

METAL BEAM GUARD FENCE SUMMARY

LOCATION	STATION	ITEM 132	ITEM 432	ITEM 540					ITEM 542		ITEM 544		ITEM 658	
		EMBANK (VEHICLE) (ORD COMP) (TY C)	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	SHORT RADIUS	MTL W-BEAM GD FEN (LOW FILL CULVERT)	DOWNSTREAM ANCHOR TERMINAL SECTION	MTL BM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)	INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)
		CY	CY	LF	LF	EA	EA	EA	LF	EA	EA	EA	EA	EA
MILL CREEK DRAW AREA (LT)	STA 190+10 - STA 194+85		28	325.0		50.0					2		8	
MILL CREEK DRAW AREA (RT)	STA 192+10 - STA 194+85		17	162.5	25	37.5	1				1		4	
APPROACH (LT)	STA 240+80 - STA 241+80	15	8	25				1	25	1	1	1	3	
APPROACH (RT)	STA 239+80 - STA 241+80		13	125				1	125	1	1	1	4	
GILADON CREEK BRIDGE	STA 241+80 - STA 243+80													8
DEPARTURE (LT)	STA 243+80 - STA 245+85	7	13	125				1	125	1	1	1	4	
DEPARTURE (RT)	STA 243+80 - STA 244+85		8	25				1	25	1	1	1	3	
APPROACH (LT)	STA 319+80 - STA 320+80	6	8	25				1	25	1	1	1	3	
APPROACH (RT)	STA 318+80 - STA 320+80		13	125				1	125	1	1	1	4	
CROOKED CREEK BRIDGE	STA 320+80 - STA 322+60													8
DEPARTURE (LT)	STA 322+60 - STA 324+65	8	13	125				1	125	1	1	1	4	
DEPARTURE (RT)	STA 322+60 - STA 323+65		8	25				1	25	1	1	1	3	
APPROACH (LT)	STA 336+60 - STA 337+71	6	8	25				1	25	1	1	1	3	
APPROACH (RT)	STA 335+60 - STA 337+71		13	125				1	125	1	1	1	4	
UPRR OVERPASS	STA 337+71 - STA 339+36													8
DEPARTURE (LT)	STA 339+36 - STA 341+45	4	13	125				1	125	1	1	1	4	
DEPARTURE (RT)	STA 339+36- STA 340+45		8	25				1	25	1	1	1	3	
TOTALS		**46**	**171**	**1388**	**25**	**87.5**	**1**	**12**	**900**	**12**	**15**	**12**	**54**	**24**

BRIDGE JOINT SUMMARY

LOCATION		ITEM 438	REMARKS
		CLEANING AND SEALING EXIST JOINTS (CL 3)	
FROM STA	TO STA	LF	
241+80	243+80	220	GILADON CREEK (5 JOINTS)
320+80	322+60	176	CROOKED CREEK (4 JOINTS)
337+71	339+36	176	UPRR (4 JOINTS)
TOTALS		**572**	

SH 19
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		12

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EROSION CONTROL SUMMARY

	ITEM 506							
PROJECT LAYOUT SHEET STA	[1] TEMP SEDMT CONT FENCE (INSTALL) LF	[1] TEMP SEDMT CONT FENCE (REMOVE) LF	EARTHWORK (EROSN & SEDMT CONT, IN VEH) CY	BACKHOE WORK (EROSION & SEDMT CONT) HR	TRACKHOE WORK (EROSION & SEDMT CONT) HR	[1] ROCK FILTER DAMS (INSTALL) (TY 1) LF	[1] ROCK FILTER DAMS (INSTALL) (TY 2) LF	[1] ROCK FILTER DAMS (REMOVE) LF
1 OF 14						60		60
2 OF 14	650	650					180	180
3 OF 14	300	300					60	60
4 OF 14	750	750				30	60	90
5 OF 14	200	200					90	90
6 OF 14	750	750					120	120
7 OF 14	500	500				60	180	240
8 OF 14	1350	1350					420	420
9 OF 14	2000	2000					90	90
10 OF 14	1700	1700				30		30
11 OF 14								
12 OF 14								
13 OF 14	1100	1100				30		30
14 OF 14	700	700						
TOTALS	**10000**	**10000**	**1000**	**100**	**100**	**210**	**1200**	**1410**

[1] TO BE PLACED AT LOCATIONS AS DIRECTED.

MAILBOX SUMMARY

			ITEM 560			
PROJECT LAYOUT SHEET NUMBER	LOCATION	SIDE OF ROAD	MAILBOX INSTALL S (TWG-POST) TY 2 EA	MAILBOX INSTALL D (TWG-POST) TY 2 EA	MAILBOX INSTALL M (TWG-POST) TY 2 EA	[2] MAILBOX SIZE S / M / L EA
1 OF 14	18+10	RT	1		2	MEDIUM
	18+90	LT	1			MEDIUM
	22+00	RT		1		MEDIUM
2 OF 14	26+00	RT	1			MEDIUM
	36+25	LT	1			MEDIUM
	38+80	LT	1			MEDIUM
3 OF 14	60+35	LT	1			MEDIUM
5 OF 14	106+60	RT	1			MEDIUM
	128+75	LT	1			MEDIUM
6 OF 14	139+05	RT	1			MEDIUM
7 OF 14	173+40	LT		1		MEDIUM
9 OF 14	215+35	RT	1			MEDIUM
	224+90	LT	1			MEDIUM
13 OF 14	327+30	LT	1			LARGE
14 OF 14	348+05	LT		1		MEDIUM
	348+05	RT	1			MEDIUM
TOTALS			**13**	**3**	**2**	

[2] FOR CONTRACTOR'S INFORMATION ONLY.

SIGN SUMMARY

	ITEM 644						
LOCATION	IN SM RD SN SUP&AM TY10BWG(1) SA(T) EA	IN SM RD SN SUP&AM TY10BWG(1) SA(U) EA	IN SM RD SN SUP&AM TYS80(1) SA(U) EA	IN SM RD SN SUP&AM TYTWT(1) WS(P) EA	IN SM RD SN SUP&AM TYTWT(1) WS(T) EA	RELOCATE SM RD SN SUP&AM TY TWT EA	REMOVE SM RD SN SUP&AM EA
AS SHOWN IN THE PLANS	23	2	3	42	14	3	79
TOTALS	**23**	**2**	**3**	**42**	**14**	**3**	**79**

NOTE: SEE SOSS SHEETS FOR MORE DETAILS. SEE PROJECT LAYOUT SHEETS FOR LOCATIONS.

SH 19 QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		13

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SUMMARY OF DRIVEWAYS AND INTERSECTIONS - PART 1 OF 2

PROJECT LAYOUT SHEET NUMBER	LOCATION	DESCRIPTION OF EXISTING STRUCTURE	ITEM 150	ITEM 464		ITEM 467		ITEM 496	EXIST DRVWY TYPE	EXIST WIDTH	PROP WIDTH	PROP LENGTH	ITEM 104	ITEM 530			ITEM 3076	REMARKS
			BLADING	[1] RC PIPE (CL III) 18"	[1] RC PIPE (CL III) 24"	[1] SET (TY II) (RCP)(6:1) (P) 18"	[1] SET (TY II) (RCP)(6:1) (P) 24"	REMOV STR (PIPE)					REMOVING CONC (DRIVEWAYS)	DRVWYS CONC (HES)	DRVWYS (ACP)	INTER-SECTIONS (ACP)	[2] D-GR HMA TY-D PG64-22	
SHT	STA		STA	LF	LF	EA	EA	EA		FT	FT	FT	SY	SY	SY	SY	SY	
1 OF 14	10+60 RT								GRASS	12								NO WORK
	17+70 RT								ACP	18								NO WORK
	18+60 LT								ACP	14								NO WORK
	19+85 LT	18"x32' CMP	1	32		2		1	ACP	19	19	19			51			REPLACE CMP
	22+40 RT	18"x21' CMP	1	24		2		1	ACP	12	12	60			91			REPLACE CMP
2 OF 14	26+20 RT								ACP	12								NO WORK
	34+15 RT								ACP	12								NO WORK
	36+50 LT	18"x26' CMP		28		2		1	ACP	12	12	40			64			REPLACE CMP
	39+10 LT	18"x22' CMP		24		2		1	ACP	14	14	40			73			REPLACE CMP
3 OF 14	53+25 RT								ACP	12								NO WORK
	53+30 LT								ACP	12								NO WORK
	60+60 LT								CONC	16								NO WORK
	68+30 RT								ACP	14								NO WORK
4 OF 14	82+70 RT	24"x40' CMP	1		40		2	1	ACP	20	20	38			96			REPLACE CMP
	83+50 LT	18"x40'		40		2		1	ACP	20	20	26			69			IN SUPER2 WIDEN
	86+15 LT	18"x44'		56		2		1	GRAVEL	36	36	26			115			IN SUPER2 WIDEN
	89+40 LT	18"x38' CMP		40		1		1	GRASS	16	16	26			57			IN SUPER2 WIDEN
	89+55 LT					1			CONC	12	12	26	55	46				IN SUPER2 WIDEN
	91+80 RT								ACP	16								NO WORK
5 OF 14	106+30 RT								GRAVEL	16								NO WORK
	110+80 RT								GRASS	16								NO WORK
	114+05 LT	18"x26' CMP		28		2		1	ACP	12	12	26			46			IN SUPER2 WIDEN
	123+20 LT								ACP	40	40	26			127			IN SUPER2 WIDEN
	124+30 RT								ACP	12								NO WORK
	129+00 LT	18"x42.5' RCP		44		2		1	ACP	12	11	26			43			IN SUPER2 WIDEN
6 OF 14	135+05 LT	18"x26' RCP		28		2		1	ACP	16	16	26			57			IN SUPER2 WIDEN
	139+35 RT								ACP	12								NO WORK
	140+30 RT								ACP	12								NO WORK
	142+30 LT	18"x32' RCP		34		2		1	ACP	12	12	26			46			IN SUPER2 WIDEN
	150+00 LT	18"x26' CMP		28		2		1	ACP	12	12	26			46			IN SUPER2 WIDEN
	154+85 LT	18"x27'		28		2		1	ACP	14	14	26			52			IN SUPER2 WIDEN
7 OF 14	156+00 RT								ACP	45								NO WORK
	173+60 LT	18"x41' RCP		42		2		1	ACP	14	14	26			52			IN SUPER2 WIDEN
	174+70 RT	18"x61' RCP	1	64		2		1	ACP	14	14	38			70			REPLACE CMP
	179+15 LT	18"x46.5' RCP		48		2		1	ACP	14	14	26			52			IN SUPER2 WIDEN
8 OF 14	182+65 RT									12								NO WORK
SHEET TOTALS			4	588	40	32	2	17					55	46	1207	0	0	

[1] QUANTITY INCLUDED IN PIPE CROSS CULVERT SUMMARY.

[2] QUANTITY INCLUDED IN BASIS OF ESTIMATE.

SH 19
QUANTITY
SUMMARY

Texas Department of Transportation

SHEET 8 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		14

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CK1: DW1: CK2: DN1:

SUMMARY OF DRIVEWAYS AND INTERSECTIONS - PART 2 OF 2

PROJECT LAYOUT SHEET NUMBER	LOCATION	DESCRIPTION OF EXISTING STRUCTURE	ITEM 150	ITEM 464		ITEM 467		ITEM 496					ITEM 104	ITEM 530			ITEM 3076	REMARKS
			BLADING	[1] RC PIPE (CL III) 18"	[1] RC PIPE (CL III) 24"	[1] SET (TY II) (RCP)(6:1) (P) 18"	[1] SET (TY II) (RCP)(6:1) (P) 24"	REMOV STR (PIPE)	EXIST DRVWY TYPE	EXIST WIDTH	PROP WIDTH	PROP LENGTH	REMOVING CONC (DRIVEWAYS)	DRVWYS CONC (HES)	DRVWYS (ACP)	INTER-SECTIONS (ACP)	[2] D-GR HMA TY-D PG64-22	
SHT	STA		STA	LF	LF	EA	EA	EA		FT	FT	FT	SY	SY	SY	SY	SY	
9 OF 14	215+15 RT	18"x25'		28		2		1	ACP	14	14	38			70			IN CURVE LEVEL-UP
	216+85 RT	18"x22' CMP		24		2		1	ACP	12	12	38			62			IN CURVE LEVEL-UP
	217+65 RT	18"x24' CMP		24		2		1	ACP	14	14	42			76			IN CURVE LEVEL-UP
	218+80 RT								ACP	16	16	54			107			IN CURVE LEVEL-UP
	225+05 LT	18"x31' RCP		32		2		1	ACP	14	14	24			48			IN SUPER2 WIDEN
	230+80 RT								ACP	14								NO WORK
10 OF 14	238+20 RT								ACP	14								NO WORK
11 OF 14	274+90 LT								GRASS	12								NO WORK
	275+00 RT								ACP	44								NO WORK
	278+80 LT								ACP	12								NO WORK
12 OF 14	286+05 LT								ACP	14								NO WORK
	289+15 RT								ACP	16								NO WORK
	299+95 RT								ACP	16								NO WORK
13 OF 14	327+90 LT	18"x59'		64		2		1	ACP	26	26	48			150			IN CURVE LEVEL-UP
	330+75 LT								ACP	16	16	76			146			IN CURVE LEVEL-UP
14 OF 14	341+00 RT								ACP	16								NO WORK
	344+80 LT								ACP	16								NO WORK
	348+40 RT	18"X45' CMP	1	48		2		1	ACP	12	12	51			79			REPLACE CMP
	348+45 LT	18"X44' CMP	1	48		2		1	ACP	26	28	38			129			REPLACE CMP
	350+15 LT								ACP	20								NO WORK
	351+30 LT								ACP	45								NO WORK
	351+40 RT								ACP	26								NO WORK
2 OF 14	28+80 LT									24	24	80					276	CR 1925
4 OF 14	81+50 LT									24	24	26				97		CR 1911
	81+55 RT									SEE TABULATION OF SURFACES AREAS								FM 859
6 OF 14	130+35 RT									18	18	38					90	CR 3613
	148+15 RT									16	16	38					107	CR 3611
	148+20 LT	18"x38' RCP		40		2		1		18	18	26				58		CR 1908
8 OF 14	191+90 RT									20	20	38					165	CR 3608
	195+45 LT	18"x37' RCP		40		2		1		14	14	25				63		CR 1929
9 OF 14	209+60 LT									26	26	26				82		CR 1929
	212+35 RT									20	38	42					197	CR 3606
11 OF 14	275+55 LT									14	14	45					79	CR 1907
	277+85 RT									16	16	42					104	CR 3605
12 OF 14	288+35 LT									16	16	34					85	CR 1905
13 OF 14	316+30 RT									20	20	42					126	CR 3601
SHEET TOTALS			**2**	**348**	**0**	**18**	**0**	**9**					**0**	**0**	**867**	**300**	**1229**	
PROJECT TOTALS			**6**	**936**	**40**	**50**	**2**	**26**					**55**	**46**	**2074**	**300**	**1229**	

[1] QUANTITY INCLUDED IN PIPE CROSS CULVERT SUMMARY.

[2] QUANTITY INCLUDED IN BASIS OF ESTIMATE.

SH 19 QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		15

PIPE CROSS CULVERT SUMMARY - PART 1 OF 2

LOCATION STA		CLVT NO.	EXISTING CONDITION	SKEW	PROPOSED WORK	ITEM 420	ITEM 432	ITEM 464			
						CL C CONC (COLLAR) EA	[1] RIPRAP (STONE COMMON)(DRY) (18 IN) CY	RC PIPE (CL III) (18 IN) LF	RC PIPE (CL III) (24 IN) LF	RC PIPE (CL III) (30 IN) LF	RC PIPE (CL III) (36 IN) LF
35+55	LT	P1	36" X 106.7 RCP	30 RFS	NO WORK						
	RT				NO WORK						
42+09	LT	P2	2 - 36" X 82.7 RCP		REMOVE SET. EXTEND 2-36" RCP 4 FT AND PLACE 2-3:1 SET	2					8
	RT				NO WORK		3				
48+29	LT	P3	36" X 109.6 RCP		NO WORK						
	RT				NO WORK						
57+90	LT	P4	24" X 87.5 RCP		NO WORK						
	RT				NO WORK						
62+60	LT	P5	24" X 91.9 RCP		NO WORK						
	RT				NO WORK						
70+20	LT	P6	36" X 84.9 RCP		REMOVE SET. EXTEND 36" RCP 10 FT AND PLACE 3:1 SET	1					10
	RT				NO WORK						
90+38	LT	P7	30" X 61.3 RCP		REMOVE SET. EXTEND 30" RCP 12 FT AND PLACE 4:1 SET	1				12	
	RT				NO WORK						
111+83	LT	P8	30" X 53.4 RCP		REMOVE SET. EXTEND 30" RCP 12 FT AND PLACE 4:1 SET	1				12	
	RT				NO WORK						
126+32	LT	P9	24" X 69.4 RCP		REMOVE SET. EXTEND 24" RCP 6 FT AND PLACE 3:1 SET	1			6		
	RT				NO WORK						
155+73	LT	P10	30" X 59.4 RCP		REMOVE SET. EXTEND 30" RCP 12 FT AND PLACE 3:1 SET	1				12	
	RT				NO WORK						
182+20	LT	P11	24" X 73.8 RCP		REMOVE SET. EXTEND 24" RCP 8 FT AND PLACE 3:1 SET	1			8		
	RT				NO WORK						
187+30	LT	P12	24" X 65.4 RCP		REMOVE SET. EXTEND 24" RCP 8 FT AND PLACE 4:1 SET	1			8		
	RT				NO WORK						
202+30	LT	P13	24" X 92.8 RCP		REMOVE SET. EXTEND 24" RCP 14 FT AND PLACE 3:1 SET	1			14		
	RT				REMOVE SET. EXTEND 24" RCP 4 FT AND PLACE 3:1 SET	1			4		
218+28	LT	P14	24" X 60.2 RCP		REMOVE SET. EXTEND 24" RCP 12 FT AND PLACE 4:1 SET	1			12		
	RT				NO WORK						
258+28	LT	P15	24" X 66.4 RCP		NO WORK						
	RT				NO WORK						
265+66	LT	P16	24" X 80 RCP		NO WORK						
	RT				NO WORK						
276+50	LT	P17	24" X 145.2 RCP	45 RFS	NO WORK						
	RT				NO WORK						
303+31	LT	P18	24" X 85.8 RCP		NO WORK						
	RT				NO WORK						
305+30	LT	P19	30" X 79.3 RCP		NO WORK						
	RT				NO WORK						
332+30	LT	P20	24" X 146.5 RCP		NO WORK						
	RT				NO WORK						
343+79	LT	P21	24" X 102.9 RCP		NO WORK						
	RT				NO WORK						
FROM SUMMARY OF DRIVEWAYS & INTERSECTIONS						0	0	936	40	0	0
TOTALS						**12**	**3**	**936**	**92**	**36**	**18**

[1] QUANTITY INCLUDED IN RC BOX CROSS CULVERT SUMMARY.

GENERAL HYDRAULIC STATEMENT: EXISTING STRUCTURES HAVE BEEN ANALYZED IN PREVIOUS PLANS AND/OR HAVE BEEN HISTORICALLY PROVEN TO BE HYDRAULICALLY ADEQUATE. THE EXTENSION OF THESE STRUCTURES SHOULD NOT ADVERSELY AFFECT THE SURROUNDING PROPERTIES (MOSTLY RURAL/AGRICULTURAL) IN REGARDS TO DAMAGE FROM BACKWATER OR HIGH VELOCITIES.

SH 19
QUANTITY
SUMMARY

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		16

PIPE CROSS CULVERT SUMMARY - PART 2 OF 2

CLVT NO.		ITEM 467							ITEM 480	ITEM 658
		SET (TY II) (18 IN)(RCP) (6:1) (P) EA	SET (TY II) (24 IN)(RCP) (3:1) (C) EA	SET (TY II) (24 IN)(RCP) (4:1) (C) EA	SET (TY II) (24 IN)(RCP) (6:1) (P) EA	SET (TY II) (30 IN)(RCP) (3:1) (C) EA	SET (TY II) (30 IN)(RCP) (4:1) (C) EA	SET (TY II) (36 IN)(RCP) (3:1) (C) EA	[1] CLEAN EXISTING CULVERTS EA	[1] INSTL OM ASSM(OM-2Z) (WFLX)GND(BI) EA
P1	LT									1
	RT									1
P2	LT							2		1
	RT									1
P3	LT									1
	RT									1
P4	LT									1
	RT									1
P5	LT									1
	RT									1
P6	LT							1		1
	RT									1
P7	LT						1		1	1
	RT									1
P8	LT						1			1
	RT									1
P9	LT		1							1
	RT									1
P10	LT					1				1
	RT									1
P11	LT		1							1
	RT									1
P12	LT			1						1
	RT									1
P13	LT		1						1	1
	RT		1							1
P14	LT			1						1
	RT									1
P15	LT									1
	RT									1
P16	LT									1
	RT									1
P17	LT									1
	RT									1
P18	LT									1
	RT									1
P19	LT									1
	RT									1
P20	LT									1
	RT									1
P21	LT									1
	RT									1
FROM SUMMARY OF DRIVEWAYS & INTERSECTIONS		50	0	0	2	0	0	0	0	0
TOTALS		**50**	**4**	**2**	**2**	**1**	**2**	**3**	**2**	**42**

[1] QUANTITY INCLUDED IN RC BOX CROSS CULVERT SUMMARY.

SH 19 QUANTITY SUMMARY

Texas Department of Transportation

SHEET 11 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		17

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RC BOX CROSS CULVERT SUMMARY - PART 1 OF 2

LOCATION STA		CLVT NO.	EXISTING CONDITION	SKEW	PROPOSED WORK	ITEM 403 TEMP SPL SHORING SF	ITEM 420 CL E CONC (SEAL SLAB) (NON-REINF) CY	ITEM 432 [1] RIPRAP (CONC) (CL B) (4 IN) CY	ITEM 432 RIPRAP (STONE COMMON) (DRY)(18 IN) CY
131+33	LT	B1	4' X 3' - 86.4' RC BOX		REMOVE EXIST HEADWALL/WINGWALLS. EXTEND 4' X 3' RC BOX 6 FT. PLACE PW-1				
	RT				NO WORK				
140+63	LT	B2	5' X 3' - 103.9' RC BOX	30 RFS	REMOVE EXIST HEADWALL/WINGWALLS. EXTEND 5' X 3' RC BOX 8 FT. PLACE PW-1		1.0		
	RT				NO WORK - ADD ROCK RIPRAP (1 LAYER)				5
162+14	LT	B3	4' X 3' - 84.9' RC BOX		REMOVE EXIST SET. EXTEND 4' X 3' RC BOX 12 FT. PLACE PW-1		1.3		
	RT				NO WORK				
168+07	LT	B4	7' X 5' - 57.1' RC BOX		REMOVE EXIST SET. EXTEND 7' X 5' RC BOX 11 FT. PLACE 3:1 SET	120	3.1		
	RT				NO WORK				
191+20	LT	B5	9' X 5' - 86.6' RC BOX		NO WORK - ADD ROCK RIPRAP (2 LAYERS)			4	27
	RT				NO WORK - ADD ROCK RIPRAP (1 LAYER)				10
192+96	LT	B6	2 - 10' X 8' X 123.74' RC BOX	45 RFS	NO WORK - ADD ROCK RIPRAP (2 LAYERS)			12	78
	RT				NO WORK - ADD ROCK RIPRAP (1 LAYER)				30
293+32	LT	B7	7' X 4' - 107.9' RC BOX	45 LFS	NO WORK				
	RT				NO WORK				
FROM PIPE CROSS CULVERT SUMMARY						0	0	0	3
TOTALS						**120**	**5.4**	**16**	**153**

[1] RIPRAP BETWEEN MOWSTRIP AND HEADWALL (SEE MISCELLANEOUS DRAINAGE DETAILS).

GENERAL HYDRAULIC STATEMENT: EXISTING STRUCTURES HAVE BEEN ANALYZED IN PREVIOUS PLANS AND/OR HAVE BEEN HISTORICALLY PROVEN TO BE HYDRAULICALLY ADEQUATE. THE EXTENSION OF THESE STRUCTURES SHOULD NOT ADVERSELY AFFECT THE SURROUNDING PROPERTIES (MOSTLY RURAL/AGRICULTURAL) IN REGARDS TO DAMAGE FROM BACKWATER OR HIGH VELOCITIES.

RC BOX CROSS CULVERT SUMMARY - PART 2 OF 2

CLVT NO.		ITEM 462 CONC BOX CULVERT (4 FT X 3 FT) (EXTEND) LF	ITEM 462 CONC BOX CULVERT (5 FT X 3 FT) (EXTEND) LF	ITEM 462 CONC BOX CULVERT (7 FT X 5 FT) (EXTEND) LF	ITEM 466 WINGWALL (PW - 1) (HW=7) EA	ITEM 467 SET (TY I) (S=7 FT) (HW=6 FT) (3:1)(C) EA	ITEM 480 CLEAN EXISTING CULVERTS EA	ITEM 658 INSTL OM ASSM(OM-2Z) (WFLX)GND (BI) EA
B1	LT	6			1		1	1
	RT							1
B2	LT		8		1		1	1
	RT							1
B3	LT	12			1		1	1
	RT							1
B4	LT			11		1	1	1
	RT							1
B5	LT							1
	RT							1
B6	LT							2
	RT							2
B7	LT							1
	RT							1
FROM PIPE CROSS CULVERT SUMMARY		0	0	0	0	0	2	42
TOTALS		**18**	**8**	**11**	**3**	**1**	**6**	**58**

SH 19 QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		18

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PERMANENT PAVEMENT MARKINGS

LOCATION	TYPE	RATE	ITEM 666 REFLECTORIZED PAV MARKINGS TY I WHITE 4" (DOT) (100 MIL) LF	WHITE W/RET REQ 4" (BRK) (100 MIL) LF	WHITE W/RET REQ 4" (SLD) (100 MIL) LF	WHITE REFL PAV MRK TY I (W)8"(SLD) (100MIL) LF	WHITE [1] REF PROF PAV MRK TY I(W) 4"(SLD) (100MIL) LF	YELLOW W/RET REQ 4" (BRK) (100 MIL) LF	YELLOW W/RET REQ 4" (SLD) (100 MIL) LF	YELLOW [1] REF PROF PAV MRK TY I(Y) 4"(BRK) (100MIL) LF	YELLOW [1] REF PROF PAV MRK TY I(Y) 4"(SLD) (100MIL) LF	ITEM 6056 [2] PREFORMED CENTERLINE RUMBLE STRIPS LF	ITEM 668 PREFAB PAV MRK TY C WHITE 24" (SLD) LF	(LNDP ARROW) EA	(36") (YLD TRI) EA	ITEM 672 REFL PAV MRKR RATE	TY I-A EA	TY I-C EA	TY II-A-A EA
MAIN LANES	DOTS	3FT/12FT	295																
MAIN LANES	SKIPS	10FT/40FT		3728				1125		88		488				1/80 FT		187	61
MAIN LANES	EDGE LINE	SOLID			68494		1900												
MAIN LANES	BARRIER (MEDIAN)	SOLID																	
MAIN LANES	CHANNELIZING LINES	SOLID														1/20 FT			
MAIN LANES	DOUBLE YELLOW	SOLID							47770	600						1/40 FT			606
MAIN LANES	SINGLE W/SKIPS	VARIOUS						1510	6054	80	300					1/40 FT			160
INTRSCTNS/SUPER2	VARIOUS	SOLID / RATE				888							230	4	10	SEE DETAIL	66		
TOTALS			**295**	**3728**	**68494**	**888**	**1900**	**2635**	**53824**	**768**	**300**	**488**	**230**	**4**	**10**		**66**	**187**	**827**

[1] PROFILE STRIPING IS TO BE USED 50 FEET BEFORE AND AFTER BRIDGES IN LIEU OF MILLED RUMBLE STRIPS.
[2] USE TRANSVERSE RUMBLE STRIPS FOR PREFORMED THERMOPLASTIC STRIPS. CUT TO LENGTH AND SPACE AS SHOWN ON "CENTERLINE RUMBLE STRIPS ON TWO LANE TWO WAY HIGHWAYS" STANDARD.
NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

SUMMARY OF WORK ZONE PAVEMENT MARKINGS

LOCATION	TYPE	ITEM 662 WK ZN PAV MRK SHT TERM RMV RATE	WHITE 24 IN (SLD) LF	YELLOW 4 IN LF	WK ZN PAV MRK NON-REMOV RATE	WHITE 24 IN (SLD) LF	WHITE 4 IN (SLD) LF	YELLOW 4 IN (SLD) LF	SHORT TERM TABS RATE	YELLOW [3] TAB TY Y-2 EA
MAIN LANES	CENTERLINE	4.5 FT/20 FT		15903	SOLID	40	87780	79240	1 EA/20 FT	3534
INTERSECTIONS	STOP BAR	SOLID	40		SOLID					
TOTALS			**40**	**15903**		**40**	**87780**	**79240**		**3534**

[3] SHORT TERM TABS ALLOWED ON OCST APPLICATION ONLY.
NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

MILLED RUMBLE STRIPS

LOCATION	ITEM 533 RUMBLE STRIPS (SHOULDER) LF	(CENTERLINE) LF
MAIN LANES	67474	33237
TOTALS	**67474**	**33237**

NOTE: MILLED RUMBLE STRIPS NOT TO BE USED ON BRIDGES OR AT INTERSECTIONS (REFLECTED IN QUANTITIES). SEE STANDARDS FOR DETAILS.

SH 19 QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		19

EXCAVATION AND EMBANKMENT SUMMARY - PART 1 OF 6

LOCATION	ITEM 110 EXCAVATION (RDWY) CY	ITEM 132 EMBANKMENT (FINAL) (ORD COMP) (TY C) CY	REMARKS
SUPER2 WIDENING SECTION			
STA 66+20 TO STA 67+00	21	4	BEGIN SUPER2 WIDENING
STA 67+00 TO STA 68+00	73	5	
STA 68+00 TO STA 69+00	127	8	
STA 69+00 TO STA 70+00	104	83	
STA 70+00 TO STA 71+00	92	100	
STA 71+00 TO STA 72+00	73	43	
STA 72+00 TO STA 73+00	22	39	
STA 73+00 TO STA 74+00	22	31	
STA 74+00 TO STA 75+00	37	27	
STA 75+00 TO STA 76+00	56	28	
STA 76+00 TO STA 77+00	67	24	
STA 77+00 TO STA 78+00	63	16	
STA 78+00 TO STA 79+00	69	28	
STA 79+00 TO STA 80+00	74	47	
STA 80+00 TO STA 81+00	43	32	
STA 81+00 TO STA 82+00	41	11	
STA 82+00 TO STA 83+00	53	17	
STA 83+00 TO STA 84+00	41	35	
STA 84+00 TO STA 85+00	41	39	
STA 85+00 TO STA 86+00	43	34	
STA 86+00 TO STA 87+00	35	46	
STA 87+00 TO STA 88+00	35	53	
STA 88+00 TO STA 89+00	39	59	
STA 89+00 TO STA 90+00	43	70	
STA 90+00 TO STA 91+00	43	68	
STA 91+00 TO STA 92+00	42	61	
STA 92+00 TO STA 93+00	53	54	
STA 93+00 TO STA 94+00	52	54	
STA 94+00 TO STA 95+00	48	56	
STA 95+00 TO STA 96+00	39	61	
STA 96+00 TO STA 97+00	40	64	
STA 97+00 TO STA 98+00	49	53	
STA 98+00 TO STA 99+00	39	58	
STA 99+00 TO STA 100+00	32	78	
STA 100+00 TO STA 101+00	33	82	
STA 101+00 TO STA 102+00	39	71	
STA 102+00 TO STA 103+00	48	58	
STA 103+00 TO STA 104+00	43	48	
STA 104+00 TO STA 105+00	48	32	
STA 105+00 TO STA 106+00	51	28	
STA 106+00 TO STA 107+00	38	57	
STA 107+00 TO STA 108+00	26	88	
STA 108+00 TO STA 109+00	21	79	
STA 109+00 TO STA 110+00	35	59	
STA 110+00 TO STA 111+00	45	51	
STA 111+00 TO STA 112+00	28	78	
PART 1 TOTALS	**2206**	**2217**	

EXCAVATION AND EMBANKMENT SUMMARY - PART 2 OF 6

LOCATION	ITEM 110 EXCAVATION (RDWY) CY	ITEM 132 EMBANKMENT (FINAL) (ORD COMP) (TY C) CY	REMARKS
STA 112+00 TO STA 113+00	20	96	
STA 113+00 TO STA 114+00	58	48	
STA 114+00 TO STA 115+00	61	35	
STA 115+00 TO STA 116+00	35	63	
STA 116+00 TO STA 117+00	36	67	
STA 117+00 TO STA 118+00	39	61	
STA 118+00 TO STA 119+00	36	60	
STA 119+00 TO STA 120+00	33	51	
STA 120+00 TO STA 121+00	29	49	
STA 121+00 TO STA 122+00	21	53	
STA 122+00 TO STA 123+00	36	24	
STA 123+00 TO STA 124+00	56	14	
STA 124+00 TO STA 125+00	73	48	
STA 125+00 TO STA 126+00	61	70	
STA 126+00 TO STA 127+00	29	60	
STA 127+00 TO STA 128+00	38	49	
STA 128+00 TO STA 129+00	155	26	
STA 129+00 TO STA 130+00	149	24	
STA 130+00 TO STA 131+00	27	139	
STA 131+00 TO STA 132+00	20	188	
STA 132+00 TO STA 133+00	24	100	
STA 133+00 TO STA 134+00	16	84	
STA 134+00 TO STA 135+00	75	58	
STA 135+00 TO STA 136+00	113	23	
STA 136+00 TO STA 137+00	83	36	
STA 137+00 TO STA 138+00	70	19	
STA 138+00 TO STA 139+00	47	20	
STA 139+00 TO STA 140+00	17	200	
STA 140+00 TO STA 141+00	4	284	
STA 141+00 TO STA 142+00	24	144	
STA 142+00 TO STA 143+00	36	71	
STA 143+00 TO STA 144+00	78	40	
STA 144+00 TO STA 145+00	134	36	
STA 145+00 TO STA 146+00	140	51	
STA 146+00 TO STA 147+00	154	44	
STA 147+00 TO STA 148+00	162	19	
STA 148+00 TO STA 149+00	131	23	
STA 149+00 TO STA 150+00	116	27	
STA 150+00 TO STA 151+00	105	23	
STA 151+00 TO STA 152+00	73	32	
STA 152+00 TO STA 153+00	49	28	
STA 153+00 TO STA 154+00	61	30	
STA 154+00 TO STA 155+00	54	26	
STA 155+00 TO STA 156+00	15	66	
STA 156+00 TO STA 157+00	19	68	
STA 157+00 TO STA 158+00	34	31	
STA 158+00 TO STA 159+00	55	43	
PART 2 TOTALS	**2901**	**2851**	

SH 19
QUANTITY
SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		20

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EXCAVATION AND EMBANKMENT SUMMARY - PART 3 OF 6

LOCATION	ITEM 110	ITEM 132	REMARKS
	EXCAVATION (RDWY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	
	CY	CY	
STA 159+00 TO STA 160+00	94	33	
STA 160+00 TO STA 161+00	63	49	
STA 161+00 TO STA 162+00	8	230	
STA 162+00 TO STA 163+00	8	301	
STA 163+00 TO STA 164+00	9	161	
STA 164+00 TO STA 165+00	44	60	
STA 165+00 TO STA 166+00	54	29	
STA 166+00 TO STA 167+00	48	35	
STA 167+00 TO STA 168+00	41	103	
STA 168+00 TO STA 169+00	37	113	
STA 169+00 TO STA 170+00	63	43	
STA 170+00 TO STA 171+00	77	39	
STA 171+00 TO STA 172+00	53	53	
STA 172+00 TO STA 173+00	22	63	
STA 173+00 TO STA 174+00	81	35	
STA 174+00 TO STA 175+00	190	26	
STA 175+00 TO STA 176+00	204	42	
STA 176+00 TO STA 177+00	144	40	
STA 177+00 TO STA 178+00	119	30	
STA 178+00 TO STA 179+00	116	12	
STA 179+00 TO STA 180+00	65	27	
STA 180+00 TO STA 181+00	13	60	
STA 181+00 TO STA 182+00	22	84	
STA 182+00 TO STA 183+00	27	71	
STA 183+00 TO STA 184+00	79	36	
STA 184+00 TO STA 185+00	103	43	
STA 185+00 TO STA 186+00	64	63	
STA 186+00 TO STA 187+00	55	66	
STA 187+00 TO STA 188+00	47	48	
STA 188+00 TO STA 189+00	50	50	
STA 189+00 TO STA 189+55	50	27	SECTION ENDS AT MBGF
STA 189+55 TO STA 190+00	10.0	16.5	MBGF SECTION BEGIN
STA 190+00 TO STA 191+00	20.9	42.8	
STA 191+00 TO STA 192+00	21.9	33.1	
STA 192+00 TO STA 193+00	19.9	9.6	
STA 193+00 TO STA 194+00	30.4	22.1	
STA 194+00 TO STA 195+00	14.3	70.7	
STA 195+00 TO STA 195+40	13.2	19.1	MBGF SECTION END
STA 195+40 TO STA 196+00	45	18	SECTION BEGINS AFTER MBGF
STA 196+00 TO STA 197+00	87	66	
STA 197+00 TO STA 198+00	182	62	
STA 198+00 TO STA 199+00	163	43	
STA 199+00 TO STA 200+00	82	25	
STA 200+00 TO STA 201+00	68	26	
STA 201+00 TO STA 202+00	44	122	
STA 202+00 TO STA 203+00	11	198	
STA 203+00 TO STA 204+00	7	191	
STA 204+00 TO STA 205+00	35	118	
STA 205+00 TO STA 206+00	94	28	
STA 206+00 TO STA 207+00	79	26	
STA 207+00 TO STA 208+00	50	28	
STA 208+00 TO STA 209+00	52	12	
STA 209+00 TO STA 210+00	34	4	
PART 3 TOTALS	**3213.6**	**3252.9**	

EXCAVATION AND EMBANKMENT SUMMARY - PART 4 OF 6

LOCATION	ITEM 110	ITEM 132	REMARKS
	EXCAVATION (RDWY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	
	CY	CY	
STA 210+00 TO STA 211+00	47	0	
STA 211+00 TO STA 212+00	64	6	
STA 212+00 TO STA 213+00	66	22	
STA 213+00 TO STA 214+00	82	26	
STA 214+00 TO STA 215+00	83	23	
STA 215+00 TO STA 216+00	84	23	
STA 216+00 TO STA 217+00	80	28	
STA 217+00 TO STA 218+00	67	50	
STA 218+00 TO STA 219+00	82	55	
STA 219+00 TO STA 220+00	118	42	
STA 220+00 TO STA 221+00	140	56	
STA 221+00 TO STA 222+00	98	72	
STA 222+00 TO STA 223+00	60	57	
STA 223+00 TO STA 224+00	66	53	
STA 224+00 TO STA 225+00	62	31	
STA 225+00 TO STA 226+00	62	23	
STA 226+00 TO STA 227+00	59	47	
STA 227+00 TO STA 228+00	31	54	
STA 228+00 TO STA 229+00	18	47	
STA 229+00 TO STA 230+00	18	39	
STA 230+00 TO STA 231+00	33	44	
STA 231+00 TO STA 232+00	30	46	
STA 232+00 TO STA 233+00	23	44	
STA 233+00 TO STA 234+00	18	55	
STA 234+00 TO STA 235+00	6	59	
STA 235+00 TO STA 236+00	6	33	
STA 236+00 TO STA 237+00	5	12	
STA 237+00 TO STA 237+20	0	1	END SUPER2 WIDENING
PART 4 TOTALS	**1508**	**1048**	
SUPER2 WIDENING TOTALS	**9828.6**	**9368.9**	

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SH 19
QUANTITY
SUMMARY

Texas Department of Transportation
SHEET 15 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		21

EXCEDVATION AND EMBANKMENT SUMMARY - PART 5 OF 6

LOCATION	ITEM 110 EXCAVATION (RDWY) CY	ITEM 132 EMBANKMENT (FINAL) (ORD COMP) (TY C) CY	REMARKS
SUPERELEVATION LEVEL-UP (STA 32+78 - STA 66+49) EAST SIDE ONLY			
STA 32+78 TO STA 33+00		1.1	
STA 33+00 TO STA 34+00		5.3	
STA 34+00 TO STA 35+00		11.0	
STA 35+00 TO STA 36+00		7.8	
STA 36+00 TO STA 37+00		8.0	
STA 37+00 TO STA 38+00		8.6	
STA 38+00 TO STA 39+00		11.3	
STA 39+00 TO STA 40+00		13.7	
STA 40+00 TO STA 41+00		13.7	
STA 41+00 TO STA 42+00		49.6	
STA 42+00 TO STA 43+00		58.2	
STA 43+00 TO STA 44+00		10.9	
STA 44+00 TO STA 45+00		5.4	
STA 45+00 TO STA 46+00		4.6	
STA 46+00 TO STA 47+00		5.8	
STA 47+00 TO STA 48+00		11.3	
STA 48+00 TO STA 49+00		10.4	
STA 49+00 TO STA 50+00		3.4	
STA 32+78 - STA 66+49 TOTALS		**240.1**	
SUPERELEVATION LEVEL-UP (STA 200+23 - STA 221+58) WEST SIDE ONLY			
STA 200+23 TO STA 201+00		4.7	
STA 201+00 TO STA 202+00		54.7	
STA 202+00 TO STA 203+00		134.5	
STA 203+00 TO STA 204+00		19.5	
STA 204+00 TO STA 205+00		9.2	
STA 205+00 TO STA 206+00		8.4	
STA 206+00 TO STA 207+00		8.7	
STA 207+00 TO STA 208+00		13.1	
STA 208+00 TO STA 209+00		20.4	
STA 209+00 TO STA 210+00		26.3	
STA 210+00 TO STA 211+00		18.1	
STA 211+00 TO STA 212+00		10.7	
STA 212+00 TO STA 213+00		7.5	
STA 213+00 TO STA 214+00		6.9	
STA 214+00 TO STA 215+00		7.0	
STA 215+00 TO STA 216+00		8.1	
STA 216+00 TO STA 217+00		8.8	
STA 217+00 TO STA 218+00		7.9	
STA 218+00 TO STA 219+00		7.3	
STA 219+00 TO STA 220+00		5.6	
STA 220+00 TO STA 221+00		6.1	
STA 221+00 TO STA 221+58		1.1	
STA 200+23 - STA 221+58 TOTALS		**394.6**	

EXCEDVATION AND EMBANKMENT SUMMARY - PART 6 OF 6

LOCATION	ITEM 110 EXCAVATION (RDWY) CY	ITEM 132 EMBANKMENT (FINAL) (ORD COMP) (TY C) CY	REMARKS
SUPERELEVATION LEVEL-UP (STA 323+60 - STA 335+61) EAST SIDE ONLY			
STA 323+60 TO STA 324+00		0.2	
STA 324+00 TO STA 325+00		4.1	
STA 325+00 TO STA 326+00		4.3	
STA 326+00 TO STA 327+00		6.1	
STA 327+00 TO STA 328+00		3.7	
STA 328+00 TO STA 329+00		9.2	
STA 329+00 TO STA 330+00		6.8	
STA 330+00 TO STA 331+00		7.1	
STA 331+00 TO STA 332+00		8.3	
STA 332+00 TO STA 333+00		4.4	
STA 333+00 TO STA 334+00		4.1	
STA 334+00 TO STA 335+00		2.4	
STA 335+00 TO STA 335+61		0.7	
STA 323+60 - STA 335+61 TOTALS	**0.0**	**61.4**	
LEVEL-UP AREA TOTALS	**0.0**	**696.1**	
SUPER2 WIDENING TOTALS	**9828.6**	**9368.9**	
PROJECT TOTALS	**9828.6**	**10065.0**	

SH 19
QUANTITY
SUMMARY

Texas Department of Transportation

SHEET 16 OF 16

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		22

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1-1	0+50	RT	R2-1	SPEED LIMIT 70	30 X 36	✓		TWT	1	WS	P		
1	1-2	0+50	RT	I-2	Van Zandt County Line	78 X 24	✓		10BWG	1	SA	T		
1	1-3	0+50	LT	R2-1	SPEED LIMIT 65	30 X 36	✓		TWT	1	WS	P		
1	1-4	0+50	LT	I-2	Rains County Line	48 X 24	✓		TWT	1	WS	P		
1	1-5	3+50	RT	M1-6T	19 TEXAS	24 X 24	✓		TWT	1	WS	P		
				D10-7aT	270	3 X 10	✓							
				D10-7aT	270	3 X 10	✓							
1	1-6	6+75	RT		WARNING CRIME WATCH COUNTY SUSPICIOUS ACTIVITY REPORTED	NO WORK								
1	1-7	9+90	LT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
1	1-8	10+10	RT		John H. Reagan Memorial Highway	NO WORK								
1	1-9	24+00	RT	D20-1TL	CO RD 1925 ←	24 X 24	✓		TWT	1	WS	P		
2	2-1	27+75	LT	CR SIGN	CR 1925	NO WORK								
2	2-2	27+75	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

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2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 1 OF 11

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		23

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
2	2-3	31+35	LT	D20-1TR	CO RD 1925 →	24 X 24	✓		TWT	1	WS	P		
3	3-1	61+05	RT	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	✓		10BWG	1	SA	T		
3	3-2	63+20	LT	D15-11T	NEXT PASSING LANE 4 MILES	54 X 48	✓		10BWG	1	SA	T		
3	3-3	64+80	RT	M2-1	JCT	21 X 15	✓		TWT	1	WS	P		
				M1-6F	FARM 859 ROAD	24 X 24	✓							
3	3-4	71+55	LT	D2-2	Emory 8 Sulphur Springs 31	120 X 30	✓		S80	1	SA	U		
3	3-5	74+00	RT	D1-1	Edgewood →	90 X 18	✓		TWT	1	WS	T		
3	3-6	75+25	LT	R2-1	SPEED LIMIT 70	30 X 36	✓		TWT	1	WS	P		
3	3-7	75+50	RT	D20-1TL	CO RD 1911 ←	24 X 24	✓		TWT	1	WS	P		
4	4-1	78+75	LT	W9-2TL	LANE ENDS MERGE LEFT	36 X 36	✓		TWT	1	WS	T		
4	4-2	78+75	LT	M3-1	NORTH	24 X 12	✓		TWT	1	WS	P		
				M1-6T	19 TEXAS	24 X 24	✓							

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

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

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NOTE:

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2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 2 OF 11

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0108	12	018	SH 19
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		24

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
4	4-3	81+00	RT	M1-6F	FARM 859 ROAD	24 X 24	✓		TWT	1	WS	P		
				M6-1	→	21 X 15	✓							
4	4-4	81+25	LT	M1-6T	19 TEXAS	24 X 24	✓		TWT	1	WS	P		
				M6-4	↔	21 X 15	✓							
4	4-5	81+40	LT	CR SIGN	CR 1911	NO WORK								
4	4-6	81+40	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
4	4-7	81+75	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
4	4-8	82+00	LT	M1-6F	FARM 859 ROAD	24 X 24	✓							
				M6-1	←	21 X 15	✓		TWT	1	WS	P		
4	4-9	82+80	LT	W9-1R	RIGHT LANE ENDS	36 X 36	✓		TWT	1	WS	T		
4	4-10	84+00	RT	M3-3	SOUTH	24 X 12	✓		TWT	1	WS	P		
				M1-6T	19 TEXAS	24 X 24	✓							

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:

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2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 3 OF 11

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0108	12	018	SH 19
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		25

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SUMMARY OF SMALL SIGNS

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
									FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
4	4-11	85+60	LT	D20-1TR	CO RD 1911 →	24 X 24	✓		TWT	1	WS	P		
4	4-12	88+00	RT	R2-1	SPEED LIMIT 70	30 X 36	✓		TWT	1	WS	P		
4	4-13	88+35	LT	D1-1	← Edgewood	90 X 18	✓		TWT	1	WS	T		
4	4-14	91+40	RT	D2-2	Jct US 80 5 Canton 14	78 X 30	✓		S80	1	SA	T		
4	4-15	98+60	LT	M2-1	JCT	21 X 15	✓		TWT	1	WS	P		
				M1-6F	FARM 859 ROAD	24 X 24	✓							
4	4-16	102+00	LT	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	✓		10BWG	1	SA	T		
5	5-1	108+25	LT	M1-6T	19 TEXAS	24 X 24	✓		TWT	1	WS	P		
				D10-7aT	2 7 2	3 X 10								
				D10-7aT	2 7 2	3 X 10	✓							
5	5-2	127+00	RT	D20-1TR	CO RD 3613 →	24 X 24	✓		TWT	1	WS	P		
6	6-1	130+60	RT	CR SIGN	CR 3613	NO WORK								
6	6-2	130+60	RT	R1-1	STOP	36 X 36	✓		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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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 4 OF 11

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0108	12	018	SH 19
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		26

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
6	6-3	134+70	LT	D20-1TL	CO RD 3613 ←	24 X 24	✓		TWT	1	WS	P		
6	6-4	144+35	RT	D20-5T	CO RD 3611 → 1908 ←	24 X 42	✓		TWT	1	WS	P		
6	6-5	148+00	LT	CR SIGN	CR 1908	SALVAGE AND RELOCATE			TWT	1	WS	P		
6	6-6	148+00	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
6	6-7	148+30	RT	CR SIGN	CR 3611	NO WORK								
6	6-8	148+30	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
6	6-9	151+85	LT	D20-5T	CO RD 3611 ← 1908 →	24 X 42	✓		TWT	1	WS	P		
7	7-1	175+25	RT	S3-1	LATEST SIGN UPDATE USES SYMBOLS - IMAGE NOT AVAILABLE	36 X 36	✓		TWT	1	WS	T		
8	8-1	188+35	RT	D20-5T	CO RD 1929 ← 3608 →	24 X 42	✓		TWT	1	WS	P		
8	8-2	192+20	RT	CR SIGN	CR 3608	NO WORK								
8	8-3	192+20	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
8	8-4				OMITTED									

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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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS SHEET 5 OF 11

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0108	12	018	SH 19
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		27

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
8	8-5	195+25	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
8	8-6	199+30	LT	D20-5T	CO RD 3608 ← / 1929 →	24 X 42	✓		TWT	1	WS	P		
8	8-7	205+65	RT	D20-5T	CO RD 1929 ← / 3606 →	24 X 42	✓		TWT	1	WS	P		
9	9-1	209+35	LT	CR SIGN	1929	SALVAGE AND RELOCATE			TWT	1	WS	P		
9	9-2	209+35	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
9	9-3	211+95	LT		BARRET CEMETARY → / BARRET CEMETARY ←	SALVAGE AND RELOCATE			TWT	1	WS	P		
9	9-4	212+65	RT	CR SIGN	3606	NO WORK								
9	9-5	212+65	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
9	9-6	213+10	RT	M1-6T	19 TEXAS	24 X 24	✓		TWT	1	WS	P		
				D10-7aT	2 7 4	3 X 10	✓							
				D10-7aT	2 7 4	3 X 10	✓							
9	9-7	216+00	LT	D20-5T	CO RD 3606 ← / 1929 →	24 X 42	✓		TWT	1	WS	P		
9	9-8	232+50	RT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	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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SUMMARY OF SMALL SIGNS

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
10	10-1	233+00	LT	R4-3	SLOWER TRAFFIC KEEP RIGHT	24 x 30	✓		TWT	1	WS	P		
10	10-2	256+90	LT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
11	11-1	274+40	RT	D20-5T	CO RD 3605 → / 1907 ←	24 X 42	✓		TWT	1	WS	P		
11	11-2	275+40	LT	CR SIGN	1907	NO WORK								
11	11-3	275+40	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
11	11-4	278+00	RT	CR SIGN	3605	NO WORK								
11	11-5	278+00	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
11	11-6	281+40	LT	D20-5T	CO RD 3605 ← / 1907 →	24 X 42	✓		TWT	1	WS	P		
11	11-7	284+45	RT	D20-1TL	CO RD 1905 ←	24 X 24	✓		TWT	1	WS	P		
12	12-1	288+15	LT	CR SIGN	CR 1905	NO WORK								
12	12-2	288+15	LT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
12	12-3	291+60	LT	D20-1TR	CO RD 1905 →	24 X 24	✓		TWT	1	WS	P		

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SUMMARY OF SMALL SIGNS

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
12	12-4	310+00	RT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
13	13-1	313+00	RT	D20-1TR	CO RD 3601 →	24 X 24	✓		TWT	1	WS	P		
13	13-2	316+50	RT	CR SIGN	CR 3601	NO WORK								
13	13-3	316+50	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
13	13-4	318+65	LT	M1-6T	19 TEXAS	24 X 24			TWT	1	WS	P		
				D10-7aT	2 7 6	3 X 10								
				D10-7aT	2 7 6	3 X 10								
13	13-5	324+50	LT	D20-1TL	CO RD 3601 ←	24 X 24	✓		TWT	1	WS	P		
13	13-6	329+80	RT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
13	13-7	332+35	LT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
13	13-8	333+45	RT	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	✓		10BWG	1	SA	T		
13	13-9	336+50	RT	M2-1	JCT	21 X 15	✓		TWT	1	WS	P		
				M1-4	80	24 X 24	✓							

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
14	14-1	342+80	LT	D15-10T	PASSING LANE 2 MILES	54 X 42	✓		10BWG	1	SA	T		
14	14-2	343+30	RT	W3-1		36 X 36	✓		TWT	1	WS	T		
14	14-3	343+50	LT	D2-2	Emory 14 Sulphur Springs 36	126 X 30	✓		S80	1	SA	U		
14	14-4	346+25	LT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	✓		TWT	1	WS	T		
14	14-5	346+55	RT	D1-3	← Grand Saline Edgewood → Wills Point →	108 X 42	✓		S80	1	SA	U		
14	14-6	348+00	LT	R2-1	SPEED LIMIT 70	30 X 36	✓		TWT	1	WS	P		
14	14-7	349+40	LT	R8-3a	NO PARKING	24 X 30	✓		TWT	1	WS	P		
14	14-8	349+40	RT	R8-3a	NO PARKING	24 X 30	✓		TWT	1	WS	P		
14	14-9	352+00	LT	M3-1	NORTH	24 X 12	✓		TWT	1	WS	P		
				M1-6T	19 TEXAS	24 X 24	✓							
14	14-10	353+00	LT	R1-2	YIELD	48 X 48 X 48	✓		10BWG	1	SA	P		
14	14-11	353+50	RT	R1-2	YIELD	48 X 48 X 48	✓		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
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SUMMARY OF SMALL SIGNS

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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE (TY N, TY S)
14	14-12	353+50	RT	R1-1	STOP	36 X 36	✓		10BWG	1	SA	T		
				R1-3P	ALL WAY	18 X 6	✓							
14	14-13	353+65	RT	M3-4	WEST	24 X 12	✓		10BWG	1	SA	U		
				M1-4	80	24 X 24	✓							
				M6-3	↑	21 X 15	✓							
				M1-6T	19 TEXAS	24 X 24	✓							
				M6-4	↔	21 X 15	✓							
14	14-14	353+65	LT	M1-4	80	24 X 24	✓		10BWG	1	SA	U		
				M6-4	↔	21 X 15	✓							
				M3-1	NORTH	24 X 12	✓							
				M1-6T	19 TEXAS	24 X 24	✓							
				M6-3	↑	21 X 15	✓							

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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SUMMARY OF SMALL SIGNS

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

PJT LAYOUT SHEET NO.	SIGN NO.	STATION	OFFSET	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
14	14-15	353+70	LT	R1-1	STOP	36 X 36	✔		10BWG	1	SA	T		
				R1-3P	ALL WAY	18 X 6	✔							

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CONSTRUCTION SEQUENCE

1. INSTALL PROJECT SIGNS
2. PLACE EROSION CONTROL DEVICES AS WORK PROGRESSES AT THE LOCATIONS SHOWN IN THE PLANS OR AS DIRECTED. MULTIPLE MOVE-INS WILL BE REQUIRED.
3. EXTEND ALL CROSS DRAINAGE STRUCTURES (SEE CULVERT LAYOUTS)

PHASE 1 - WIDEN FOR NORTHBOUND SUPER 2 LANE STA 66+20 TO STA 237+20 (LT)

4. BEGIN GRADING OPERATIONS AND INSTALL DRIVEWAY PIPES
5. PLANE SHOULDER (LT) AS SHOWN ON PROPOSED TYPICAL SECTIONS
6. PLACE SUPERPAVE LEVEL-UP (SP-D) ON SHOULDER (LT) TO ESTABLISH 2.0% CROSS SLOPE
7. SAW CUT INTO THE EXISTING PAVEMENT 6" TO THE DEPTH SHOWN ON PROPOSED TYPICAL SECTIONS. BACKFILL PAVEMENT DROP-OFFS AT THE END OF EACH DAY. (SEE NOTE BELOW)
8. TREAT SUBGRADE 8" (LIME OR CEMENT AS DIRECTED)
9. PLACE 8" FLEX BASE AND PRIME COAT
10. PLANE SHOULDER 6" (3.5' WIDE) AND PLACE OCST & 6" SUPERPAVE (SP-C) BASE ACROSS JOINT
11. CONSTRUCT DRIVEWAYS & COUNTY ROAD INTERSECTIONS AS SHOWN IN MISCELLANEOUS DETAILS
12. INSTALL MBGF, SGTS, DAT AND CONCRETE MOWSTRIPS AT MILL CREEK DRAW
13. PLACE TOPSOIL AND VEGETATIVE MEASURES.
14. PLACE NON-REMOVABLE WORKZONE PAVEMENT MARKINGS (EDGELINE) AS DIRECTED

PHASE 1, NOTES:
1. INSTALL 2-PIECE 42" CONES @ 100 FT. SPACING ALONG NB SHLDR TO ALLOW THE USE OF SHLDR DURING NON WORK HOURS.
2. LANE CLOSURES WILL BE REQUIRED WITH ANY WIDENING ACTIVITY NEAR OR ON THE EXISTING SHOULDER, MILLING WORK, AND HOT MIX OPERATIONS.

PHASE 2 - PLACE LEVEL-UP ON SHOULDERS FOR SUPERELEVATION CORRECTION IN CURVES

15. FROM STA 32+78 TO STA 49+66 (LT), STA 200+23 TO STA 221+58 (RT), STA 323+60 TO STA 335+61 (LT):
    - PLACE SUPERPAVE LEVEL-UP (SP-D) ON SHOULDER TO MATCH TRAVEL LANE CROSS SLOPE
    - PLACE EMBANKMENT, TOPSOIL AND VEGETATIVE MEASURES.
    - RECONSTRUCT DRIVEWAYS AND COUNTY ROAD INTERSECTIONS TO TIE TO NEW PAVEMENT EDGE
    - PLACE NON-REMOVABLE WORKZONE PAVEMENT MARKINGS (EDGELINE) AS DIRECTED

PHASE 2, NOTE:
1. LANE CLOSURES WILL BE REQUIRED WITH ANY WIDENING ACTIVITY NEAR OR ON THE EXISTING SHOULDER, MILLING WORK, AND HOT MIX OPERATIONS.

PHASE 3 - MBGF WORK AT GILADON CREEK, CROOKED CREEK AND UPRR OVERPASS

16. INSTALL MBGF, THRIE BEAMS, SGTS AND CONCRETE MOWSTRIPS (SET RAIL HEIGHT TO ACCOUNT FOR PROPOSED RESURFACING AT BRIDGES AND APPROACHES)
17. PLACE EMBANKMENT, TOPSOIL AND TEMPORARY SEEDING ON SLOPES

PHASE 4 - PAVEMENT REPAIR AT BRIDGE APPROACHES AND AT US 80 (SEE MBGF-PLANING PLAN DETAILS)

18. AT SABINE RIVER BRIDGE:
    - PLANE 1.5" (FULL WIDTH) FROM BRIDGE APPROACH SLAB TO END OF CONCRETE MOWSTRIP
    - PLANE 1.5" TO 0" (FULL WIDTH) AT LIMITS SHOWN FOR VERTICAL TRANSITION
    - PLANE 6" (TRAVEL LANES) FROM BRIDGE APPROACH SLAB TO END OF CONCRETE MOWSTRIP
    - PLACE 6" SUPERPAVE (SP-C) IN TRAVEL LANES
19. AT GILADON CREEK, CROOKED CREEK AND UPRR OVERPASS:
    - PLANE 2" (FULL WIDTH) ACROSS BRIDGE AND APPROACHES (TO END OF CONCRETE MOWSTRIP)
    - PLANE 0" TO 2" (FULL WIDTH) AT LIMITS SHOWN FOR VERTICAL TRANSITIONS
    - PLANE 6" (TRAVEL LANES) IN APPROACHES TO END OF CONCRETE MOWSTRIPS
    - PLACE 6" SUPERPAVE (SP-C) IN TRAVEL LANES
20. AT US 80 (END OF PROJECT):
    - PLANE 1.5" (FULL WIDTH) FROM STA 352+00 TO STA 353+70
    - PLANE 0" TO 1.5" (FULL WIDTH) FROM STA 350+50 TO STA 352+00 FOR VERTICAL TRANSITION
    - PLANE 6" (SB TRAVEL LANE ONLY) FROM STA 348+70 TO STA 353+70
    - PLACE 6" SUPERPAVE (SP-C) IN SB TRAVEL LANE
21. PLACE NON-REMOVABLE WORKZONE PAVEMENT MARKINGS AT ALL LOCATIONS AS DIRECTED

PHASE 4, NOTES:
1. DO NOT MILL MORE THAN WHAT CAN BE PLACED BACK IN ONE DAY.
2. FACILITATE TEMPORARY DRAINAGE.
3. EQUIPMENT, LABOR AND MATERIALS ARE INCIDENTAL TO VARIOUS BID ITEMS.

PHASE 5 - FINAL SURFACING (STA 0+35 TO STA 353+70)

22. PLACE BACKFILL PAVEMENT EDGES IN NON-WIDEN AREAS TO ADDRESS EXISTING DROP-OFFS
23. PLACE PERMANENT SEEDING THROUGHOUT PROJECT
24. PERFORM PAVEMENT REPAIR AT LOCATIONS AS DIRECTED
25. PLANE 0" TO 1.5" BUTT JOINT ON FM 859
26. PLACE OCST AND SHORT TERM WORKZONE PAVEMENT MARKINGS (TABS)
27. PLACE 1.5" SUPERPAVE (SP-D) AND SHORT TERM MARKINGS (TAPE) FROM STA 0+35 TO STA 4+55
28. PLACE 1.5" PFC-C AND SHORT TERM MARKINGS (TAPE) FROM STA 4+55 TO STA 353+70
29. PLACE 1.5" SUPERPAVE (SP-D) ON FM 859
30. PLACE HMAC ON COUNTY ROAD INTERSECTIONS TO TIE TO SH 19 FINAL SURFACE
31. CLEAN AND SEAL EXISTING CONSTRUCTION JOINTS ON ALL BRIDGES
32. PLACE CENTERLINE AND EDGELINE MILLED RUMBLE STRIPS
33. PLACE PERMANENT PAVEMENT MARKINGS AND PROFILE MARKINGS (ON BRIDGES ONLY)
34. PERFORM FINAL CLEANUP AND REMOVE PROJECT SIGNS

GENERAL NOTES:
1. LIMIT THE LENGTH OF THE WORK ZONE AREA TO 1 MILE OR AS DIRECTED.
2. PCMS AND RUMBLE STRIPS TO BE USED DURING LANE CLOSURES.
3. LIMIT WORK TO ONE SIDE OF THE ROAD AT A TIME.
4. 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.
5. THE PROPOSED SUPER 2 LANE CONFIGURATION WILL NOT BE STRIPED UNTIL AFTER THE FINAL SURFACE IS PLACED.
6. HAUL OFF REMOVED PIPES AND APPURTENANCES FROM THE RIGHT OF WAY AT LEAST WEEKLY.
7. STORAGE OF MATERIALS ON RIGHT OF WAY WILL REQUIRE APPROVAL FROM THE ENGINEER.
8. LANE CLOSURES THAT EFFECT THE INTERSECTION AT US 80 WILL BE RESTRICTED TO THE HOURS BETWEEN 8:30 A.M. AND 3:30 P.M., UNLESS OTHERWISE DIRECTED.
9. REMOVE TOPSOIL AND PREPLACE EMBANKMENT THAT WILL BE NEEDED DURING SHOULDER-UP.
10. SHOULDER-UP WITH LIKE MATERIALS (I.E. SUBGR TREAT W/EMBANKMENT, FLEX BASE/FLEX BASE).

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19 CONSTRUCTION SEQUENCE

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		34

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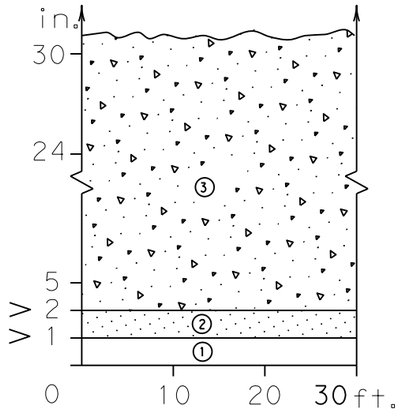
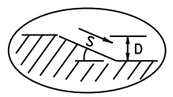
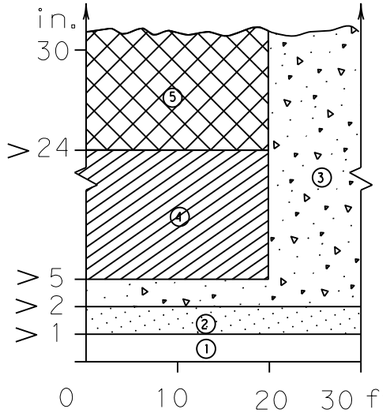
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

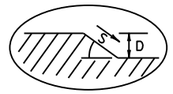


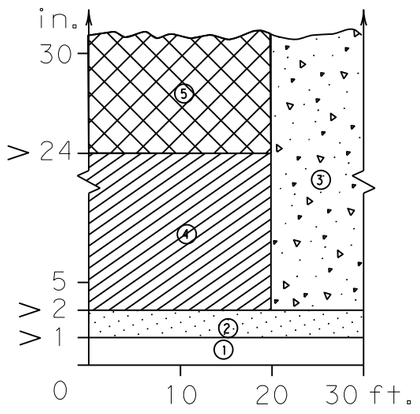
Edge Condition I
S = (3:1) (or flatter)



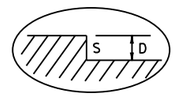


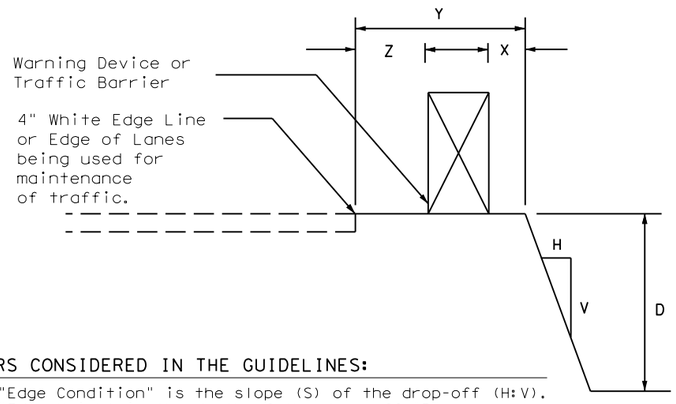
Edge Condition II
S = ((2.99):1) to (1:1)





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:

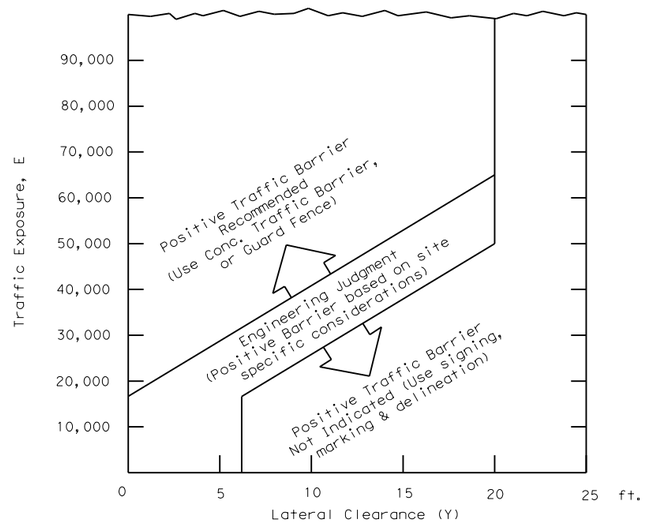
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER

Date 01/18/2022

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		35

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		36

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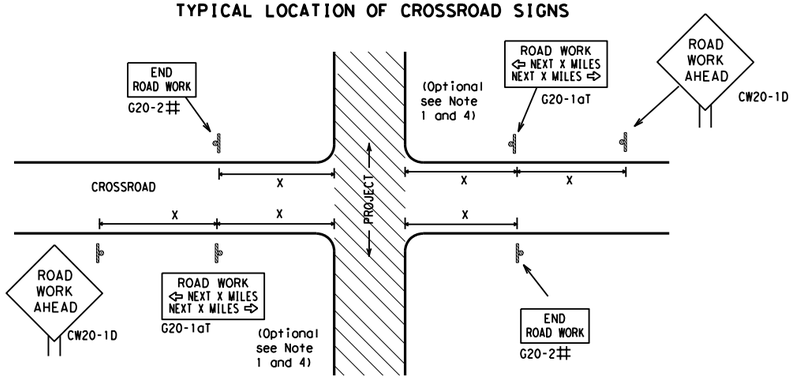
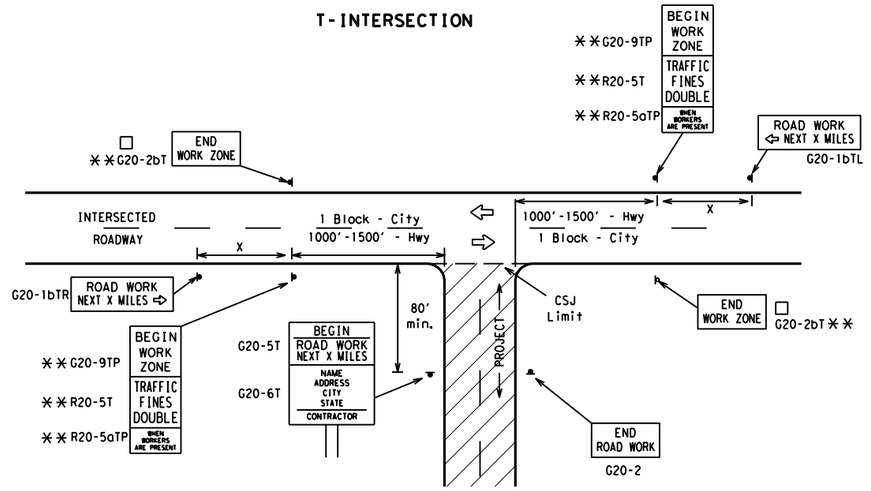
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

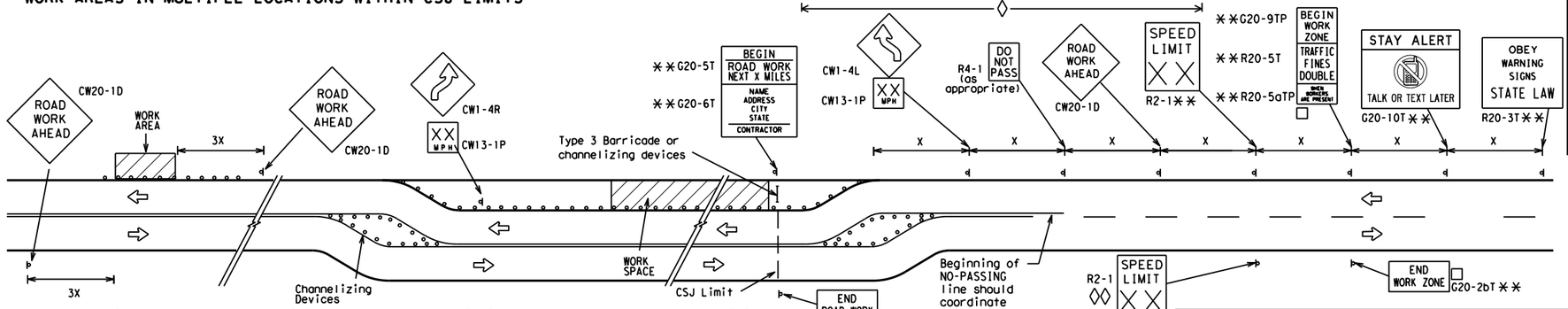
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

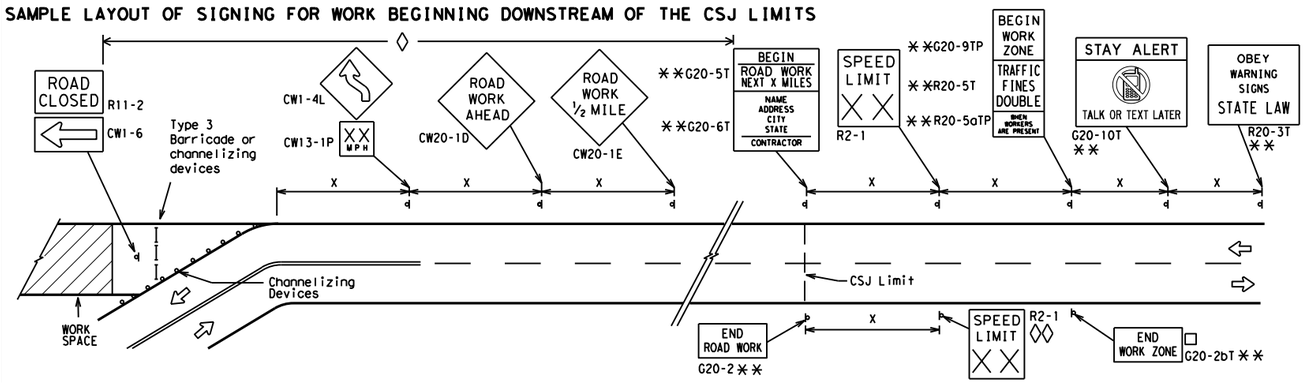
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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REVISIONS	0108	12	018	SH 19
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		37

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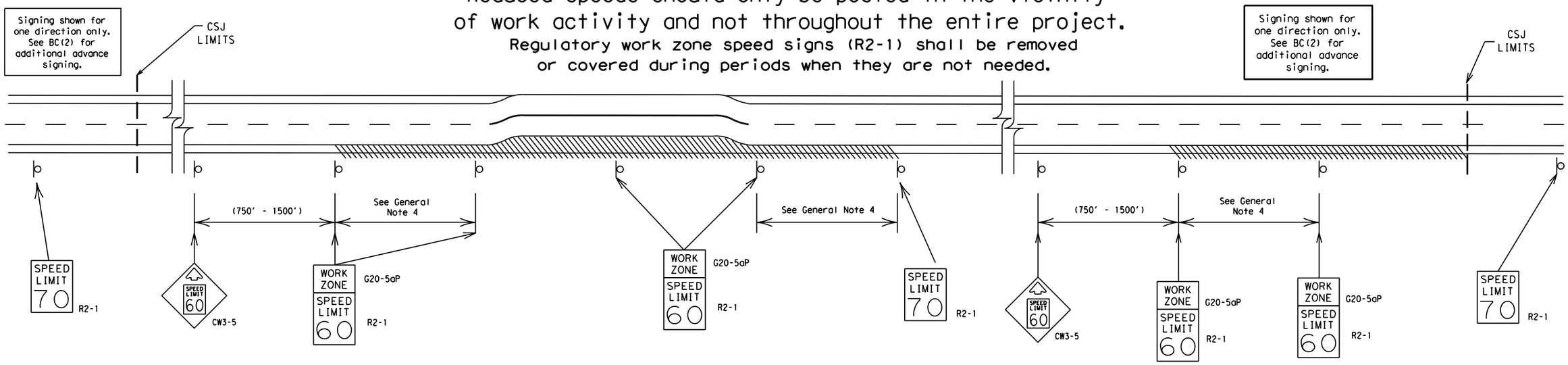
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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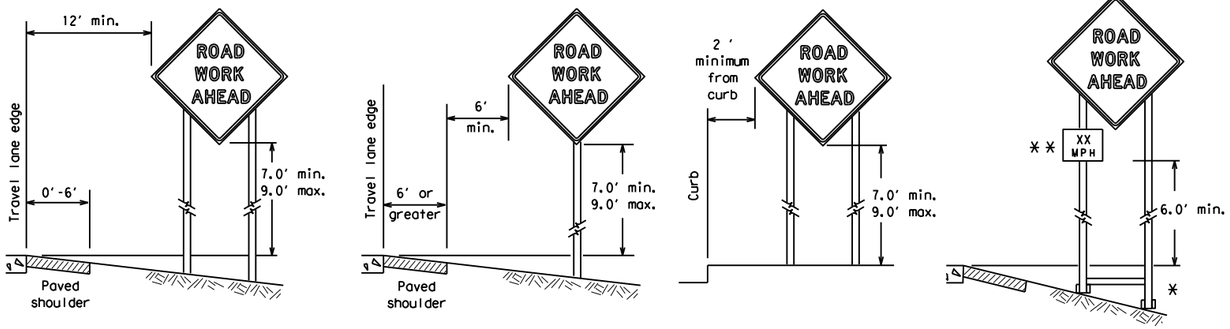
REVISIONS 9-07 8-14 7-13 5-21	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		38

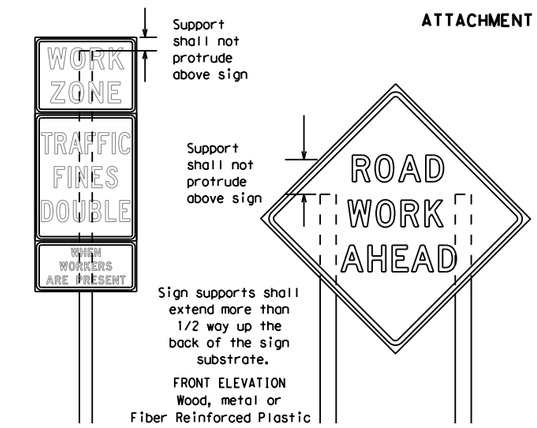
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

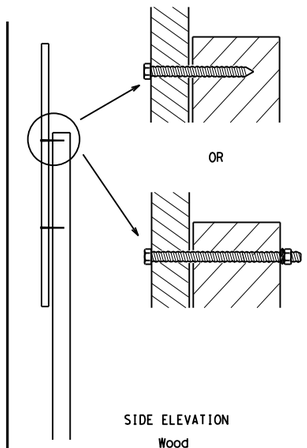


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





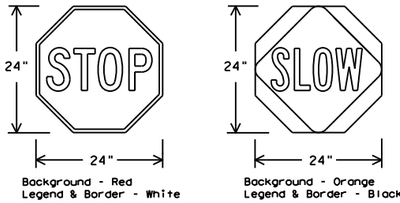
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		39

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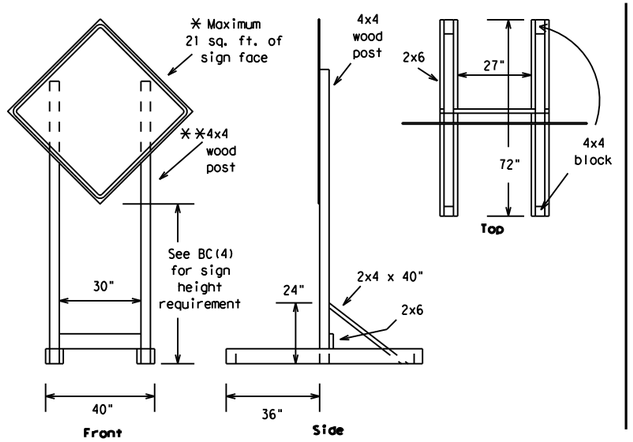
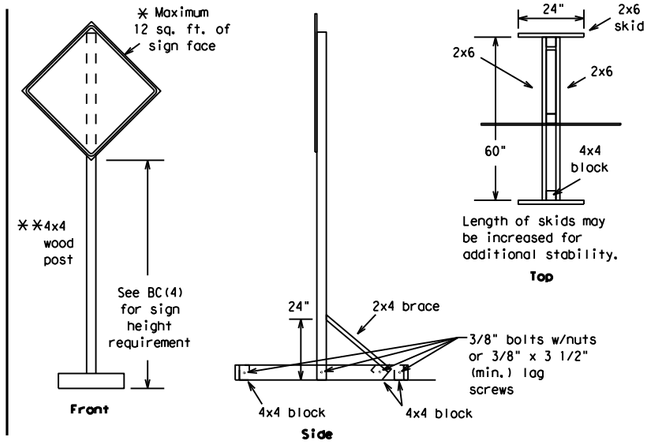
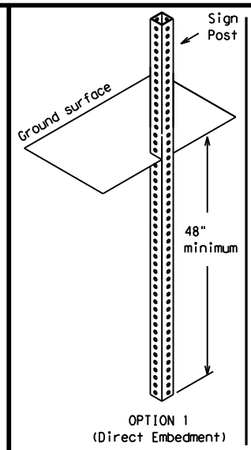
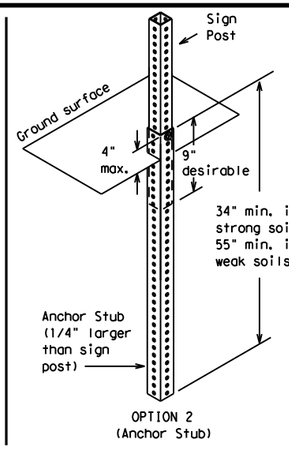


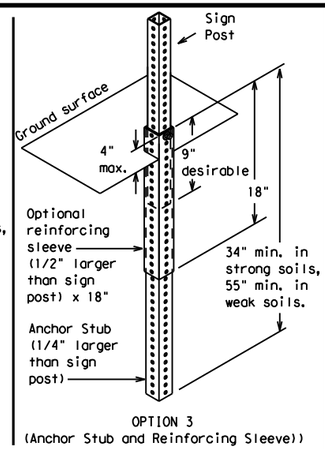


SKID MOUNTED WOOD SIGN SUPPORTS

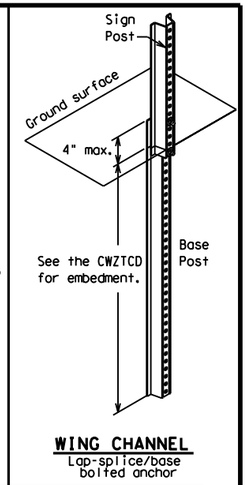
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







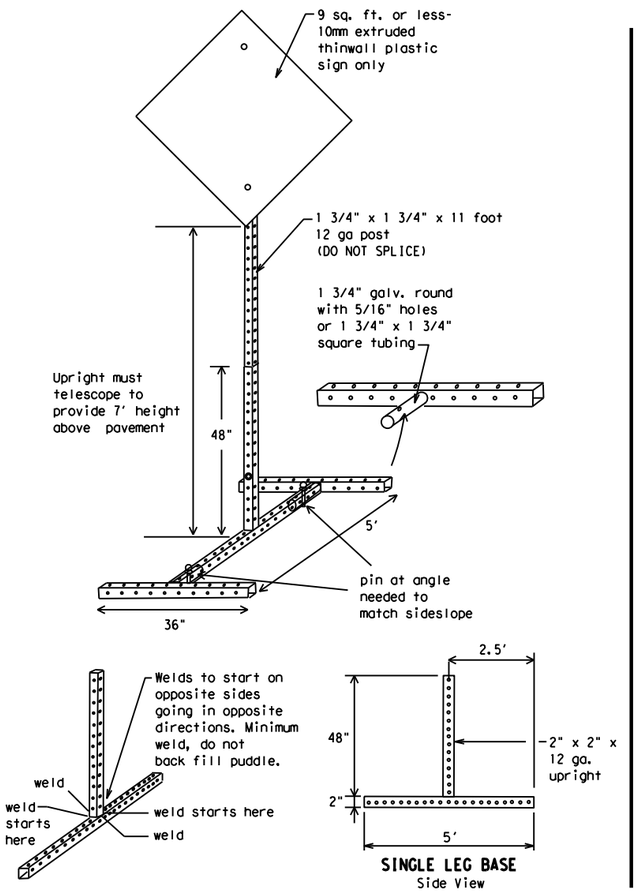
PERFORATED SQUARE METAL TUBING

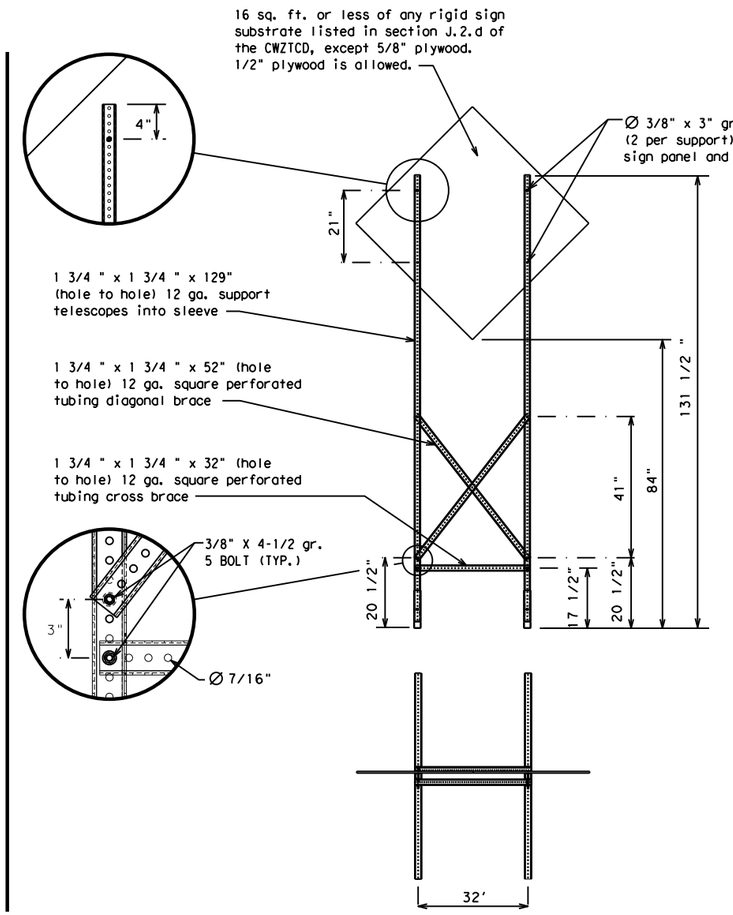


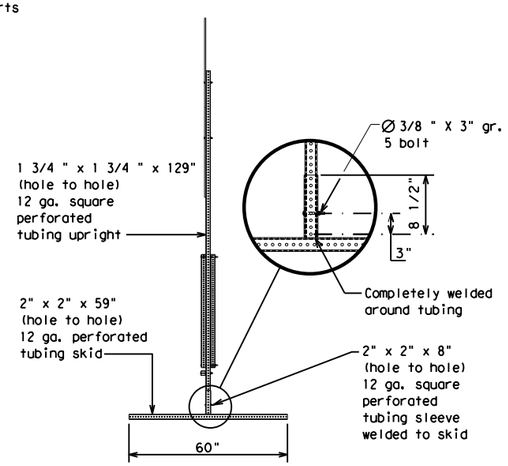
WING CHANNEL
Lap-splice/base bolted anchor

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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REVISIONS	0108	12	018	SH 19
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		40

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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

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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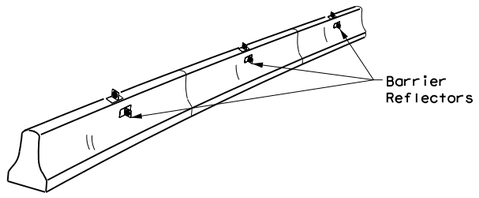
REVISIONS	0108	12	018	SH 19
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		41

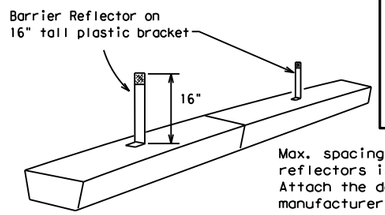
100

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.

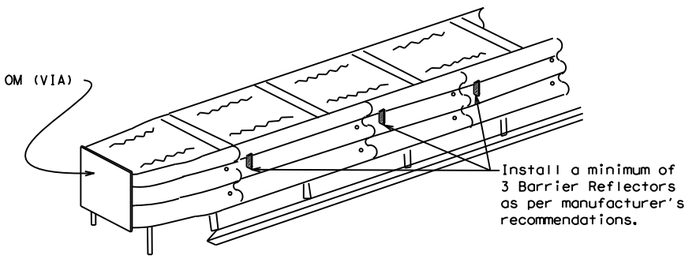


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

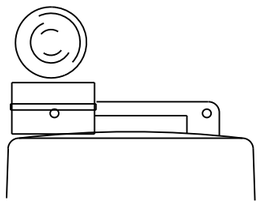


DELINEATION OF END TREATMENTS

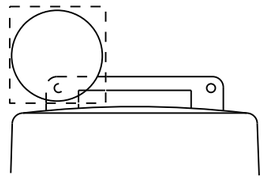
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

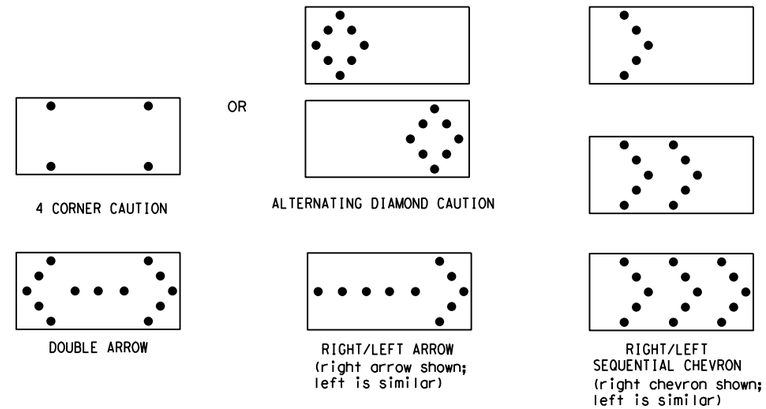
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	0108	12	018	SH 19
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		42

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

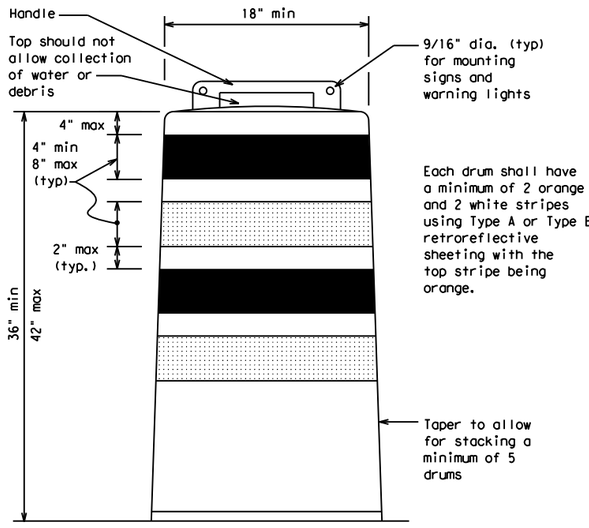
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

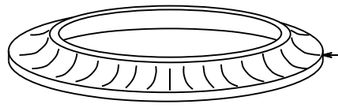
RETROREFLECTIVE SHEETING

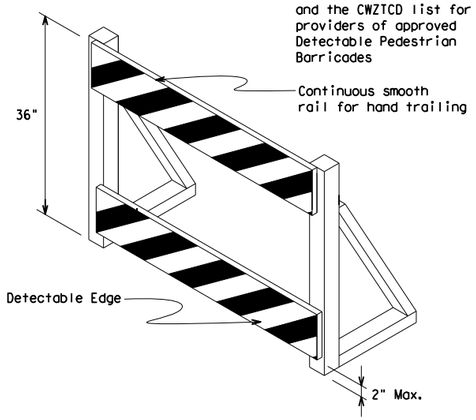
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

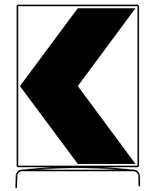




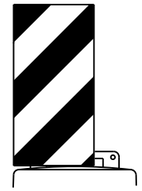


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	TYL	VAN ZANDT		43
7-13				

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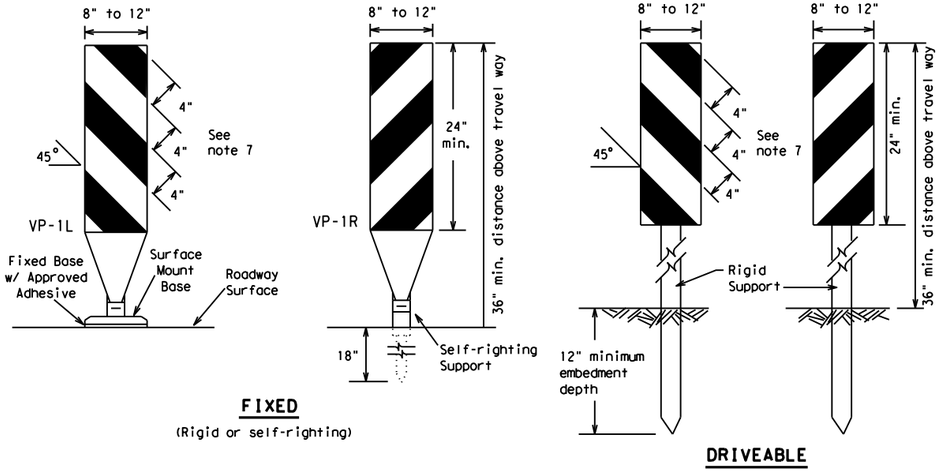
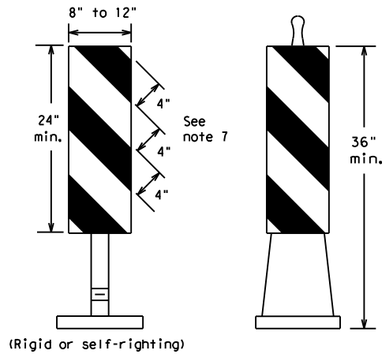


FIXED
(Rigid or self-righting)

DRIVEABLE

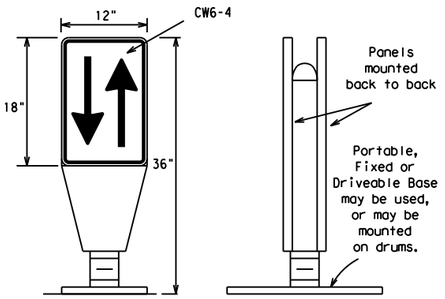


(Rigid or self-righting)

PORTABLE

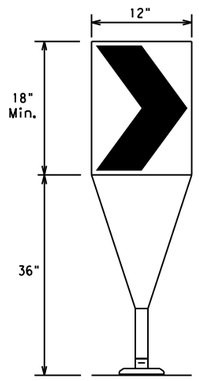
VERTICAL PANELS (VPs)

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.



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



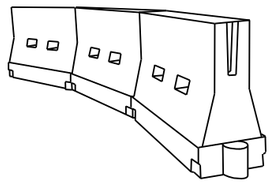
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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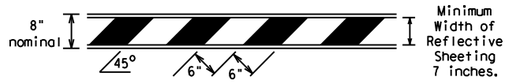
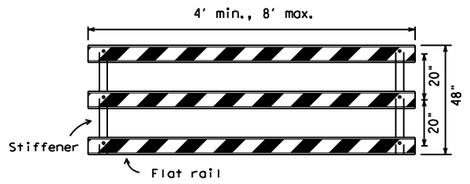
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



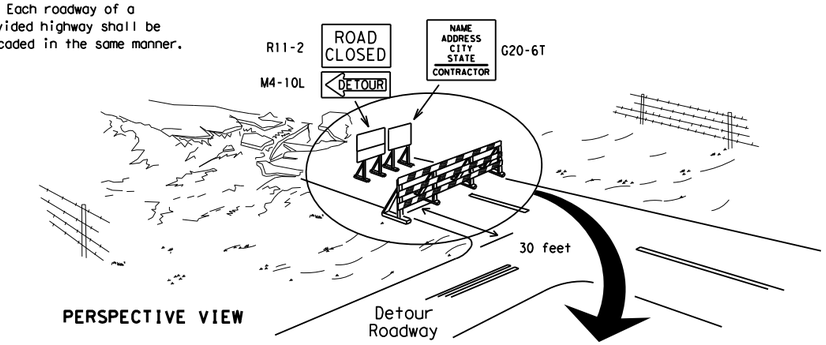
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

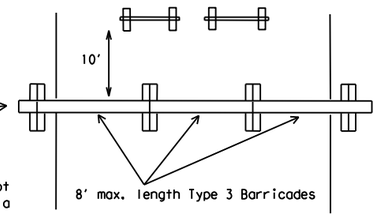
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

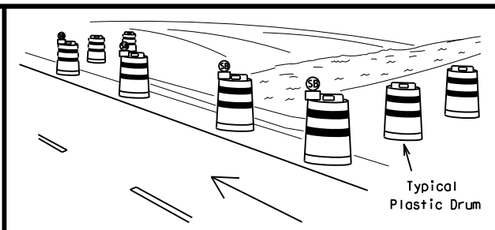
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

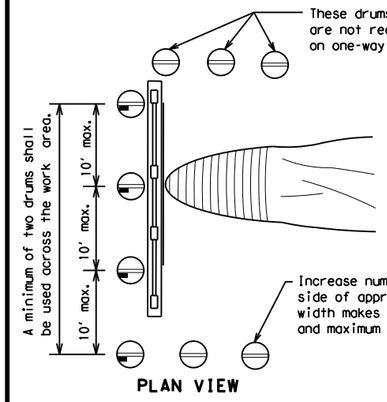
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

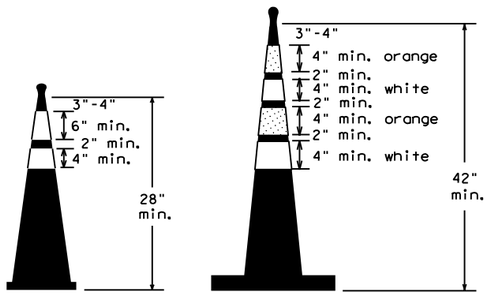
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

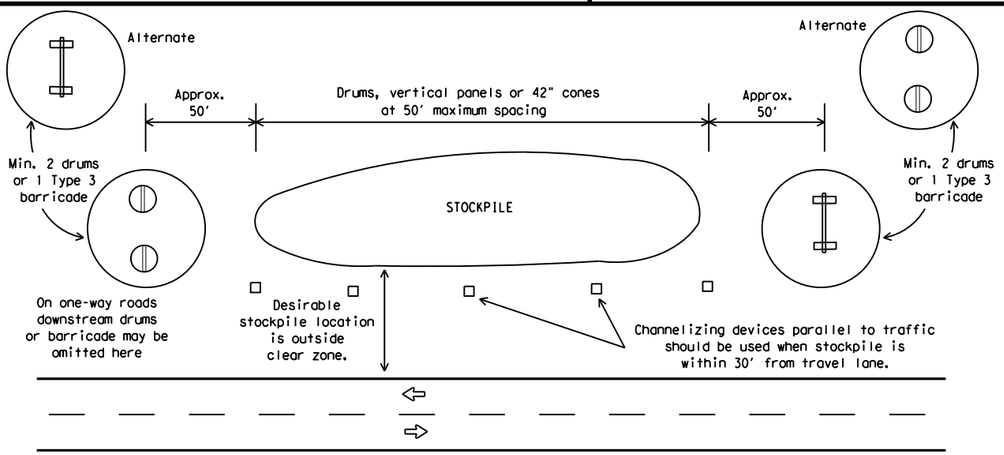
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

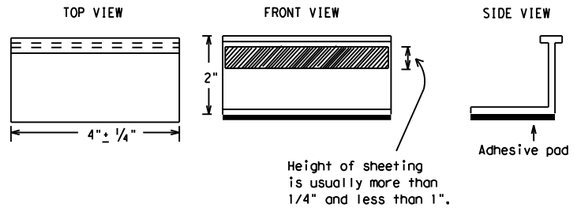
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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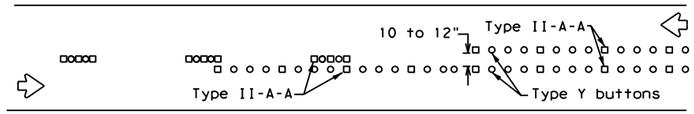
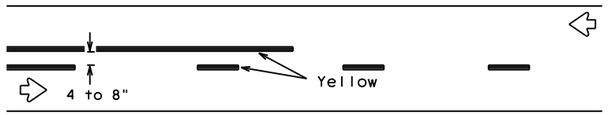
PAVEMENT MARKING PATTERNS

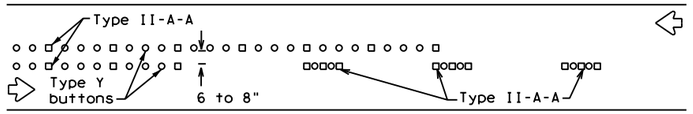
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



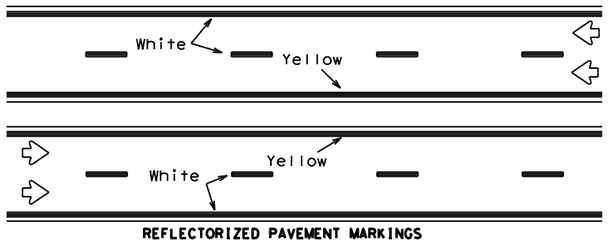
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



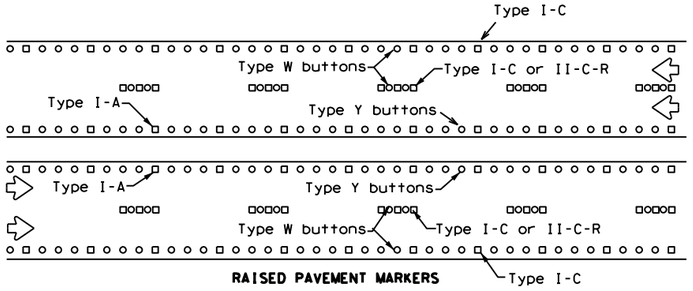
RAISED PAVEMENT MARKERS - PATTERN B

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

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



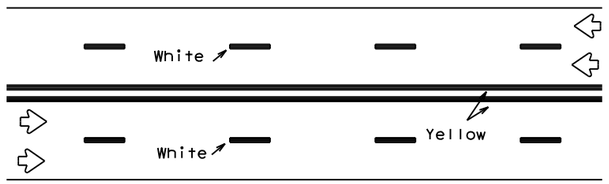
REFLECTORIZED PAVEMENT MARKINGS



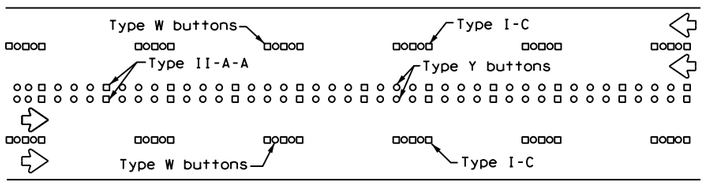
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



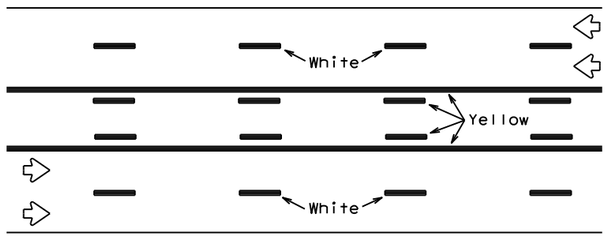
REFLECTORIZED PAVEMENT MARKINGS



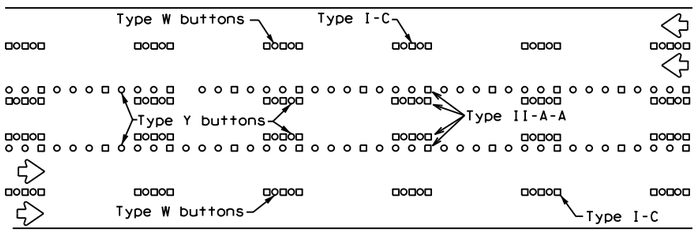
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

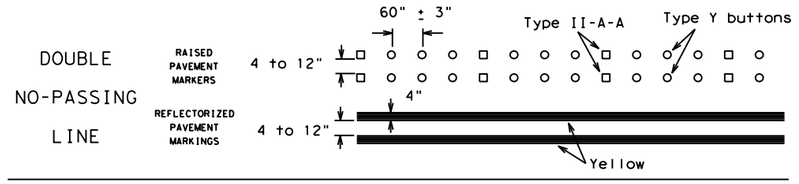
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

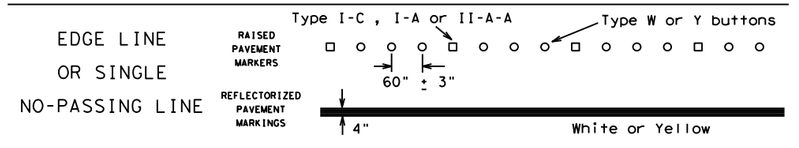
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

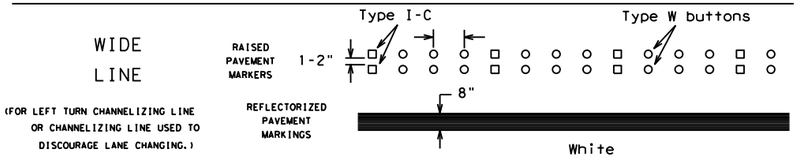


EDGE LINE OR SINGLE NO-PASSING LINE



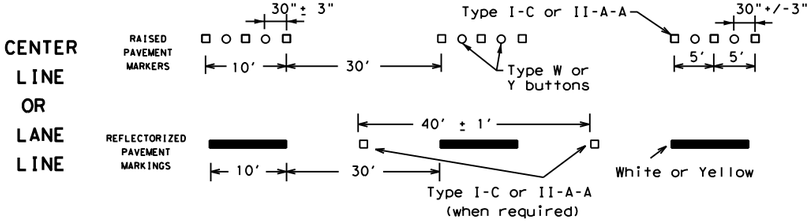
WIDE LINE

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

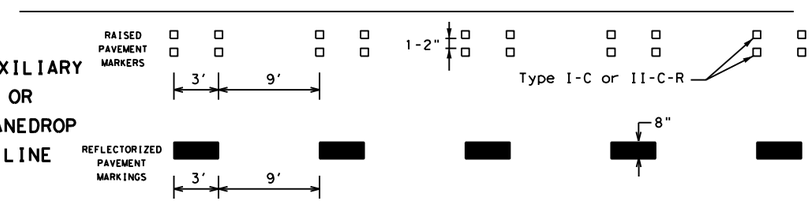


BROKEN LINES

CENTER LINE OR LANE LINE

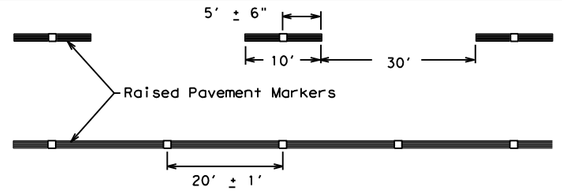


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		47

106

DATE: 1/12/2022 3:41:21 PM
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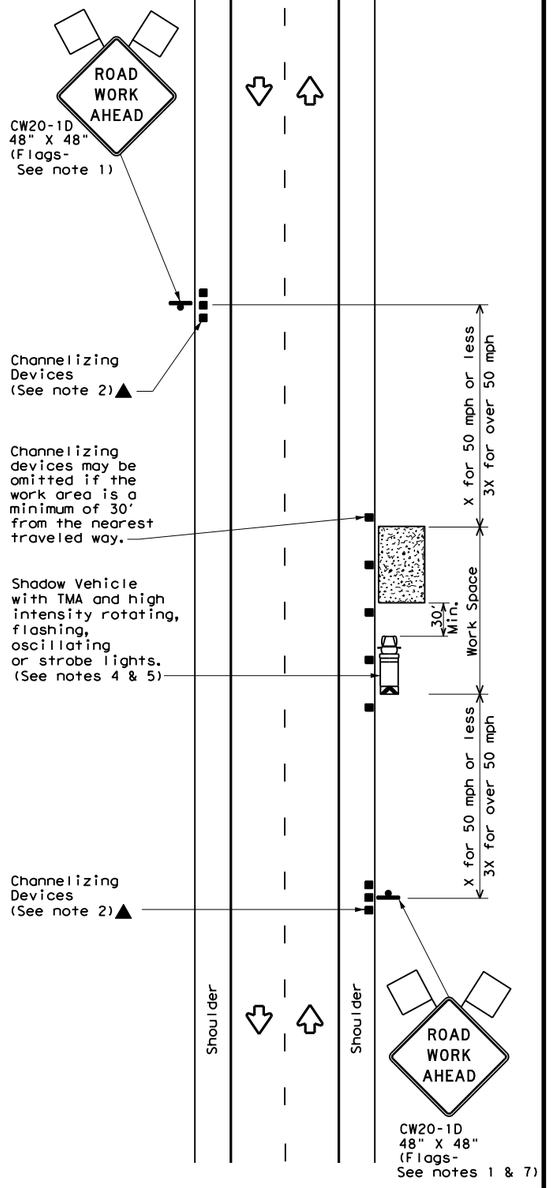
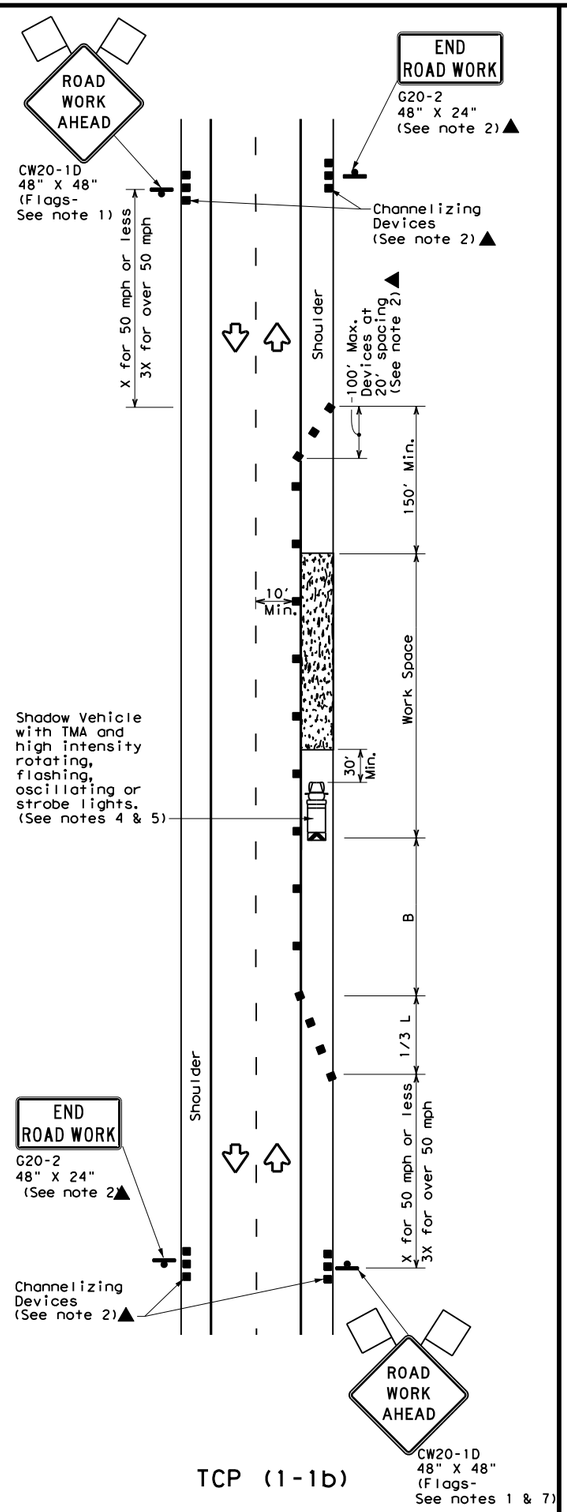


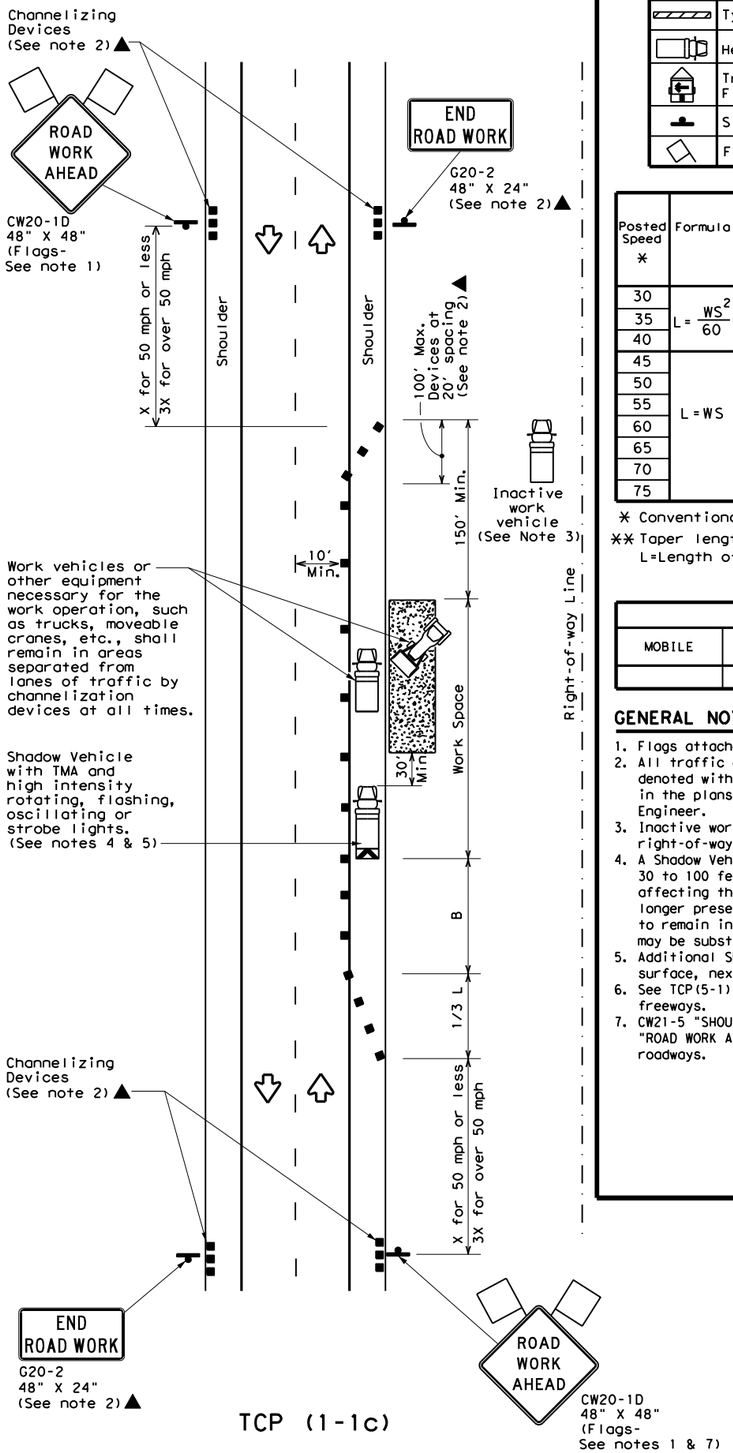
TCP (1-1a)

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

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	0108	12	018	SH 19
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	TYL	VAN ZANDT		48

DATE: 1/12/2022 3:41:26 PM
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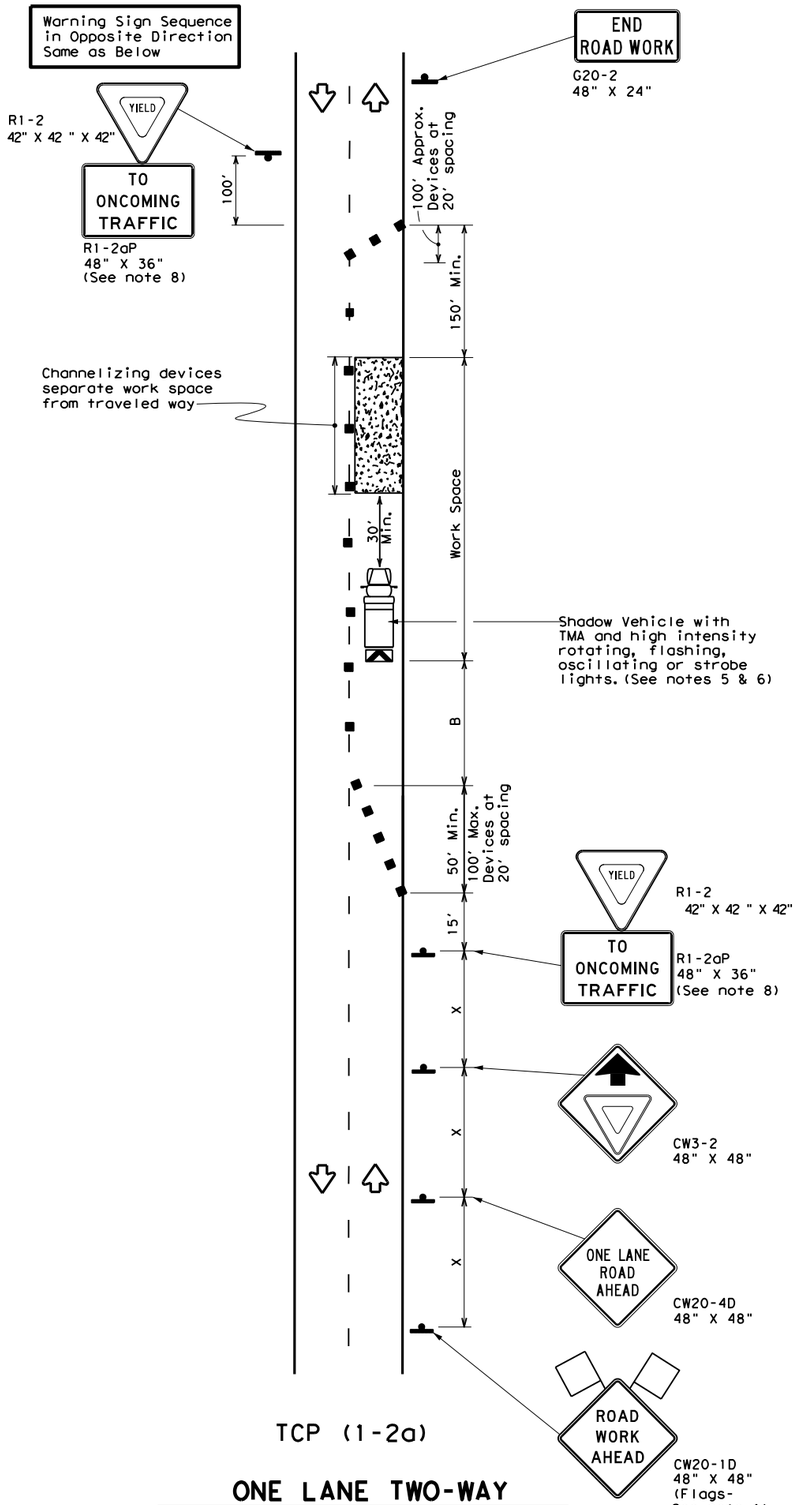
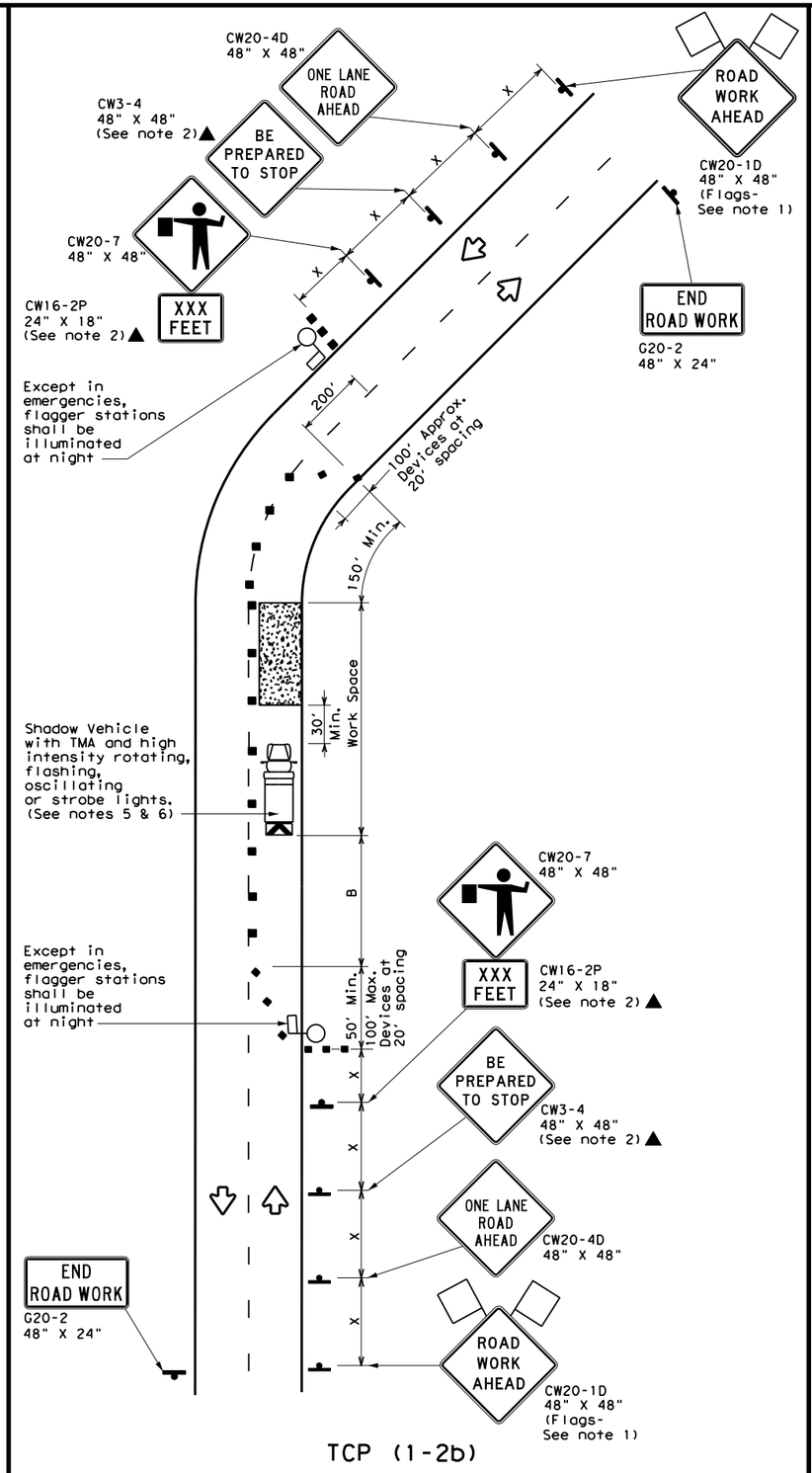


TCP (1-2a)

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

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		49

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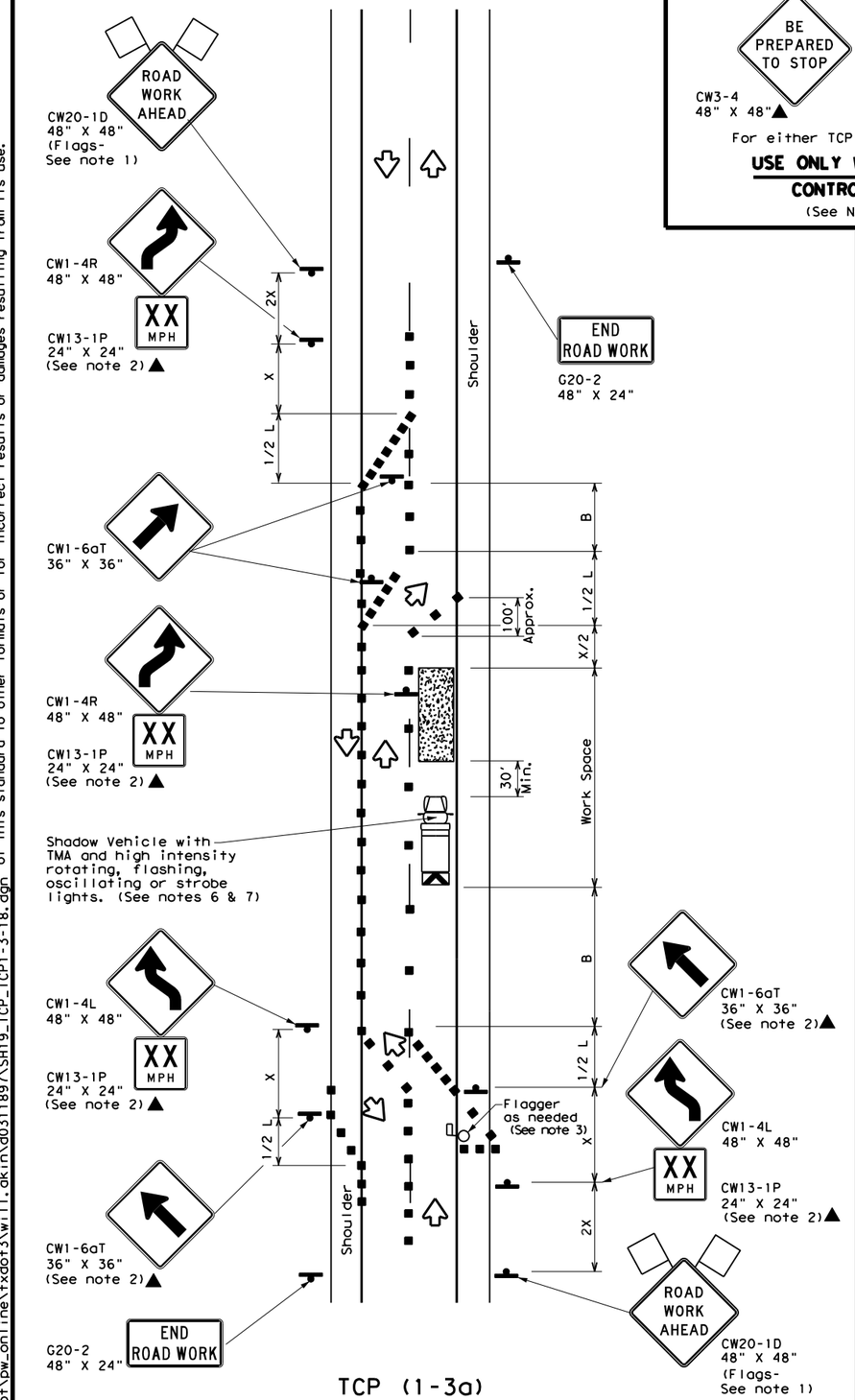
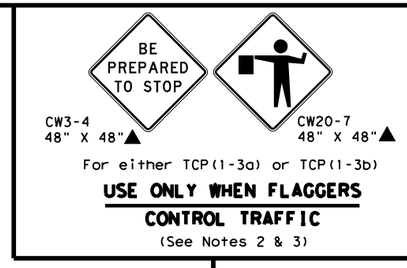


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

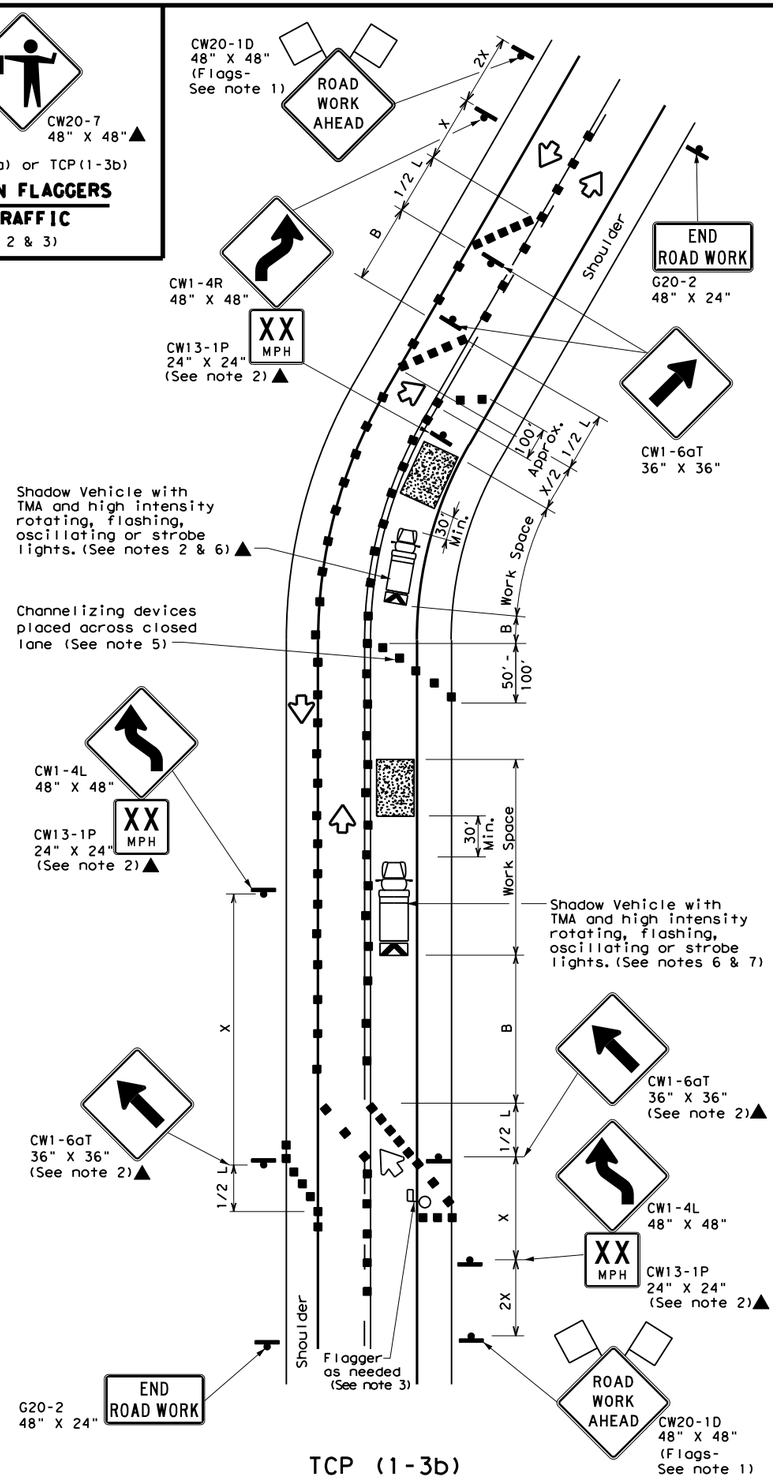
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS CONTROL TRAFFIC

(See Notes 2 & 3)



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

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	TYL	VAN ZANDT		50
1-97 2-18				

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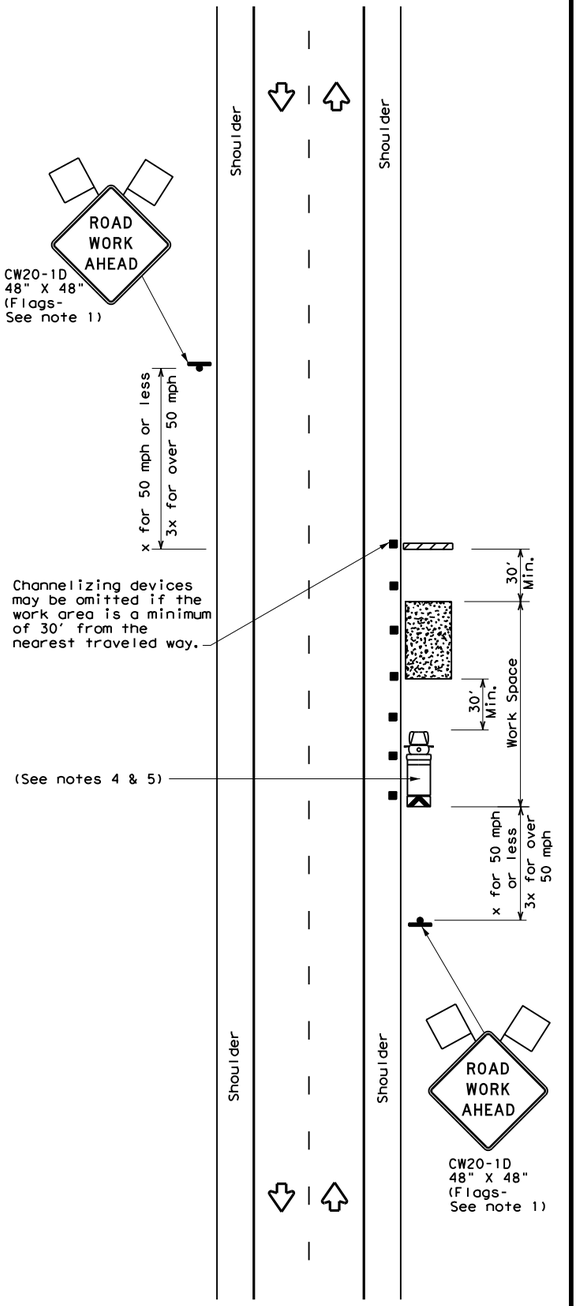
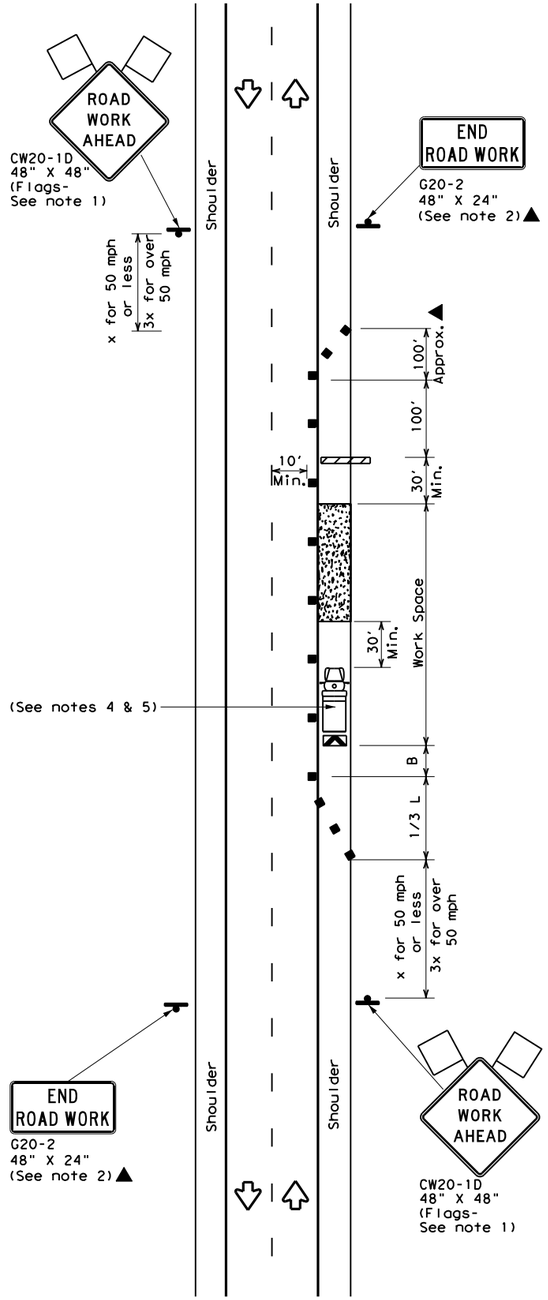


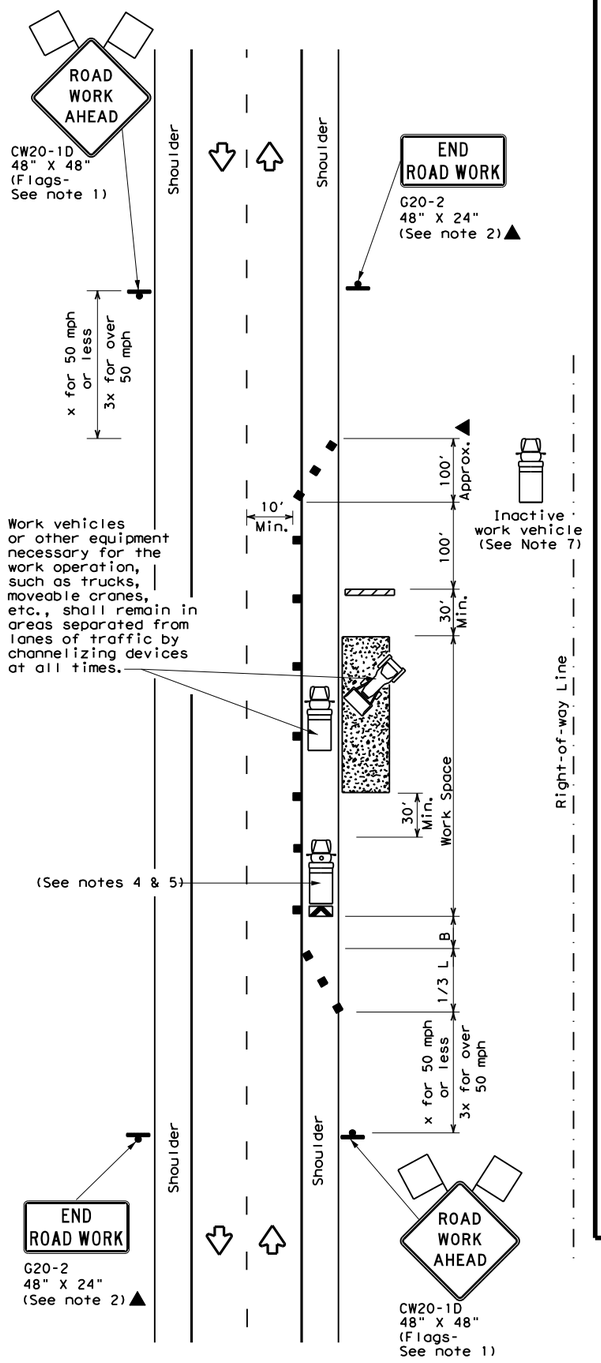
TCP (2-1a)

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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REVISIONS	0108	12	018	SH 19
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	TYL	VAN ZANDT		51
1-97 2-18				

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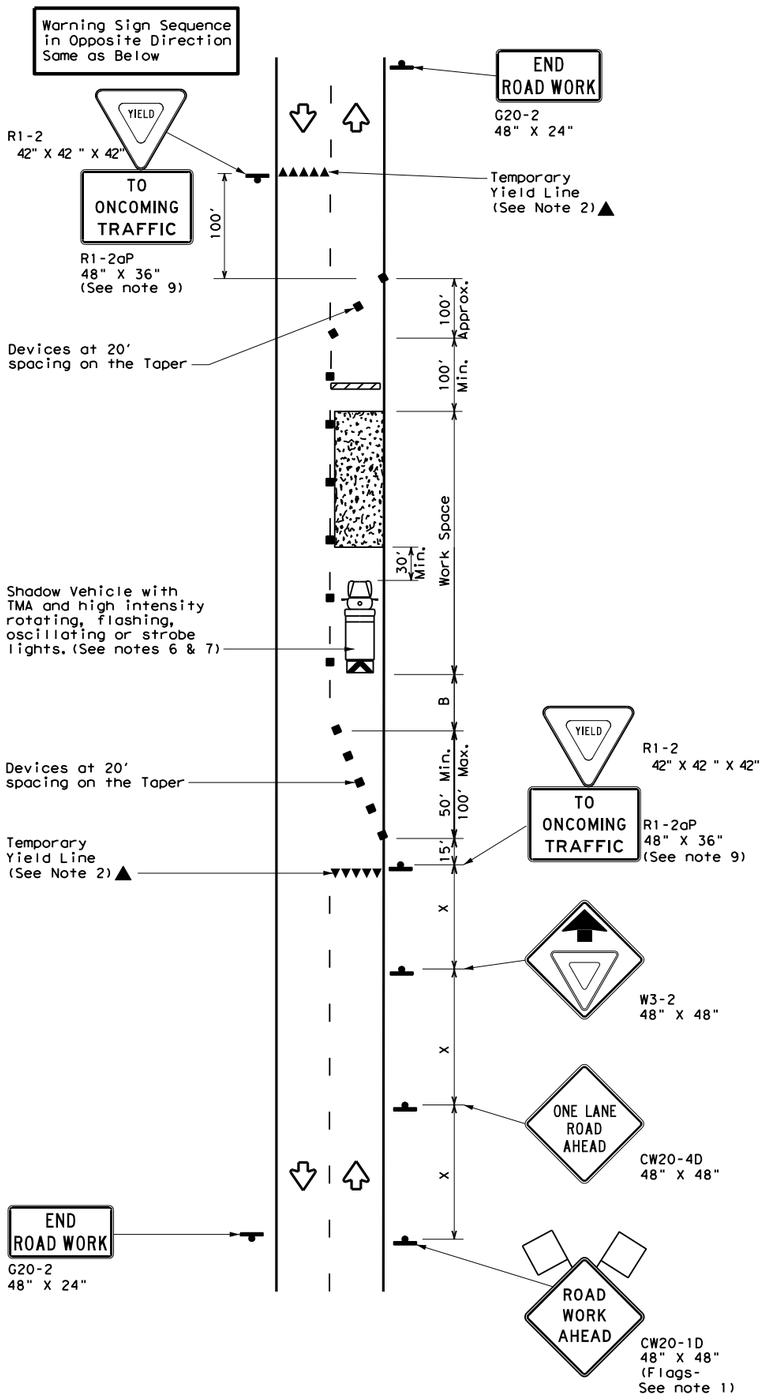
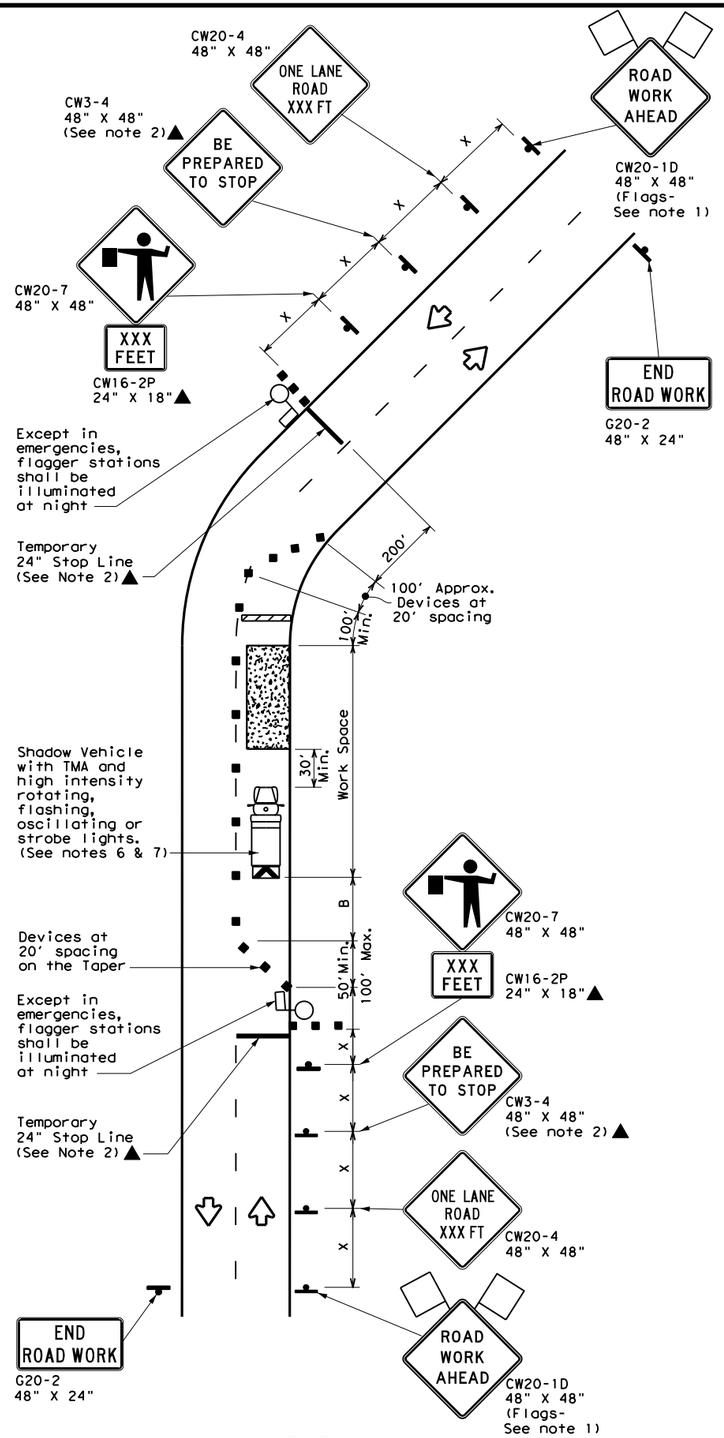


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		52

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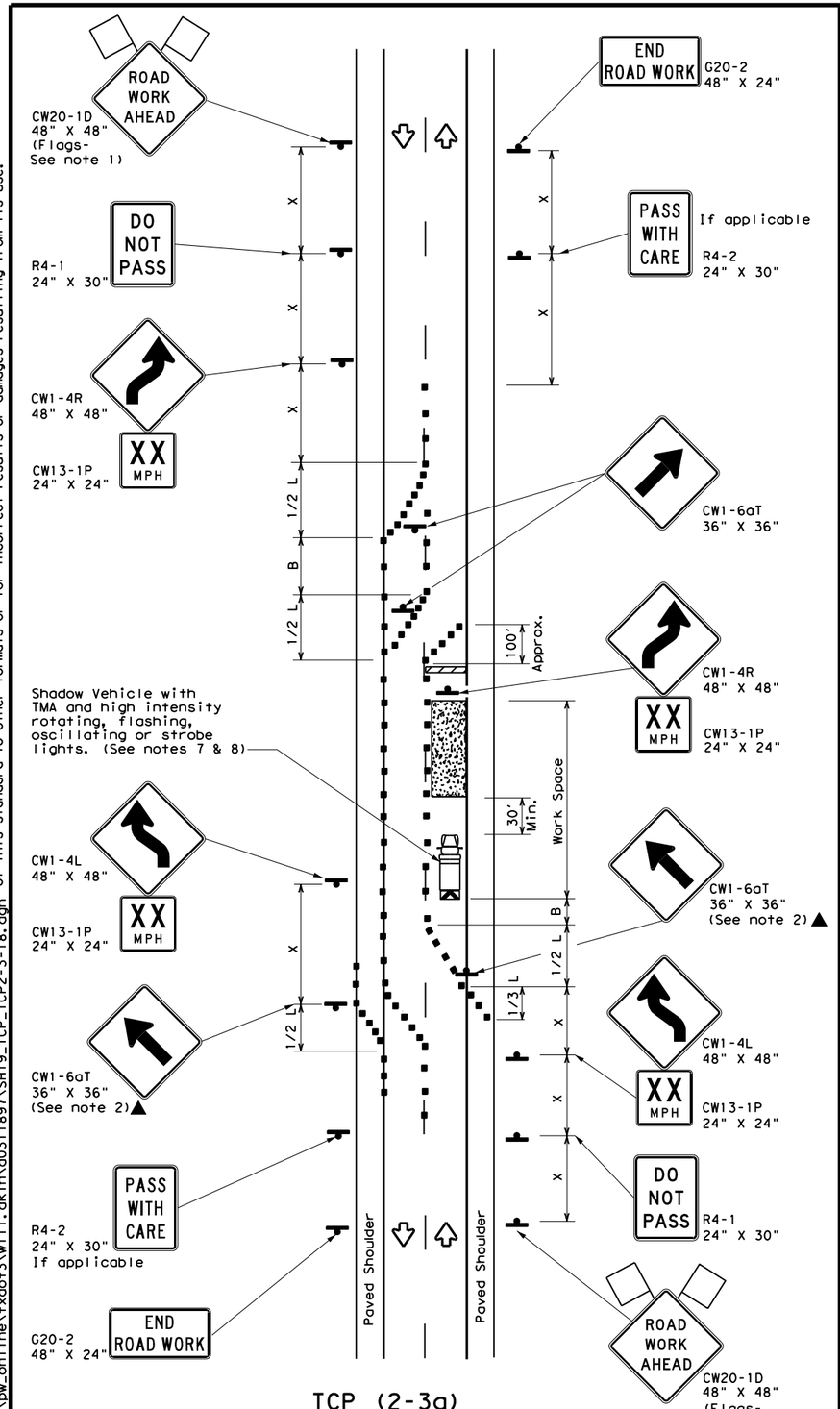
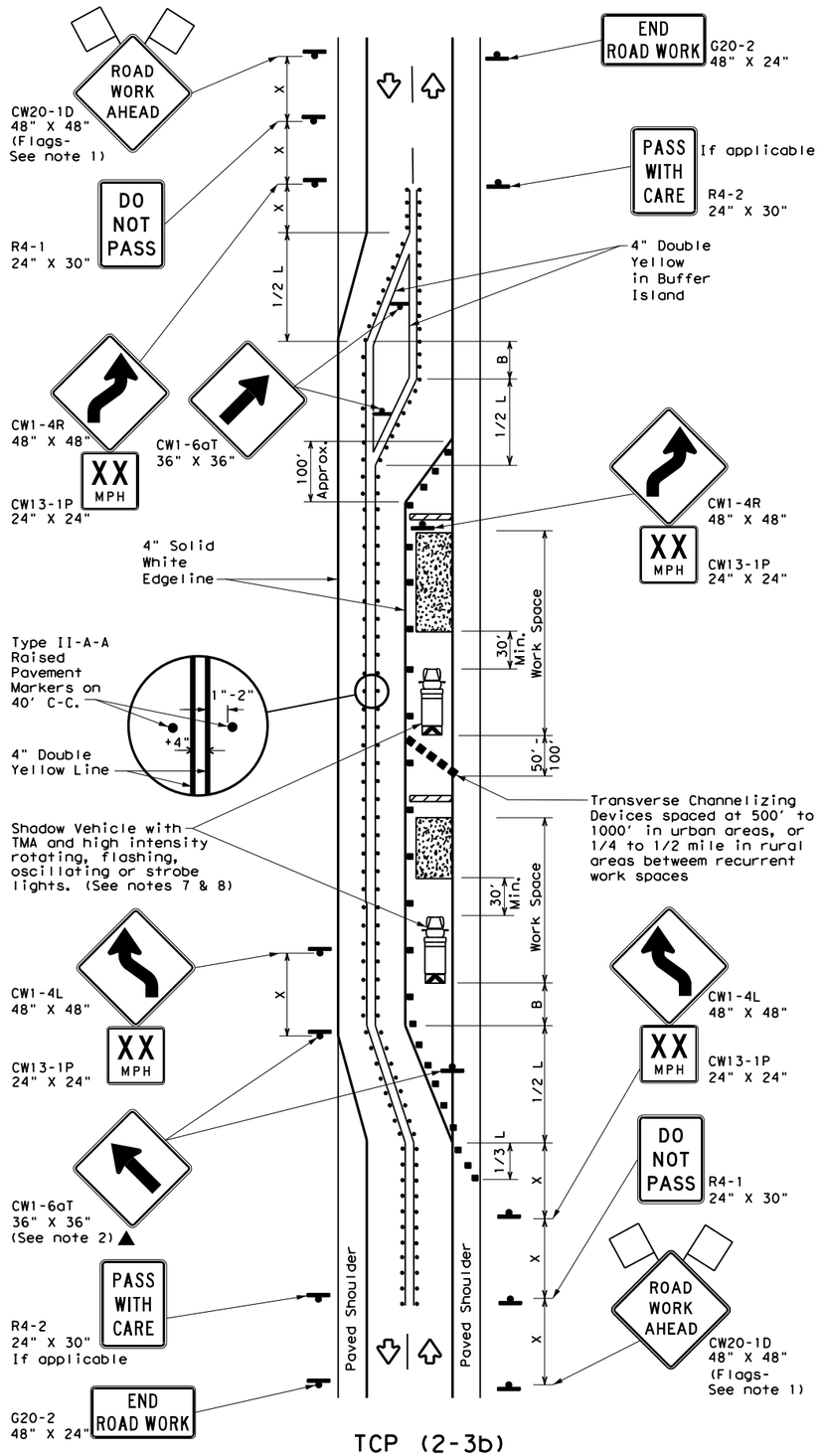


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

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)

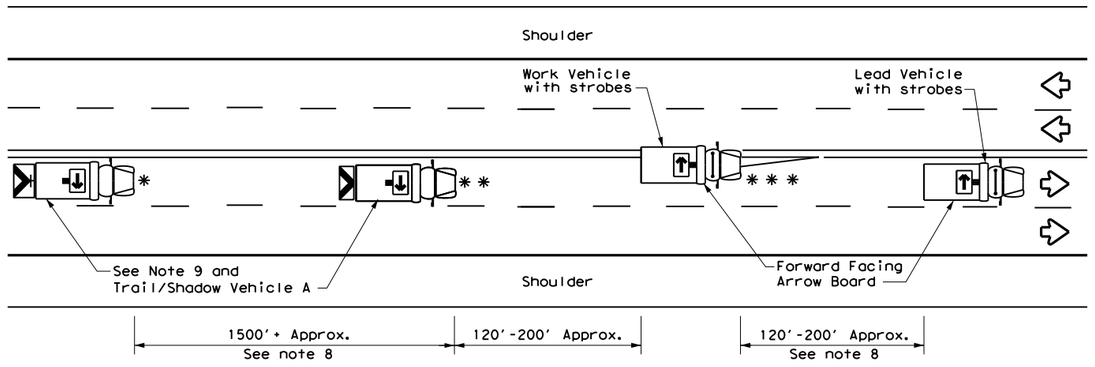
9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, 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

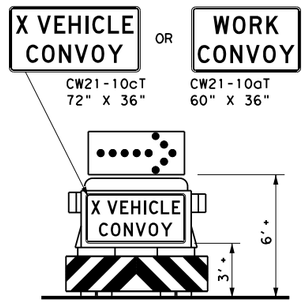
TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	TYL	VAN ZANDT		53
4-98 2-18				



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

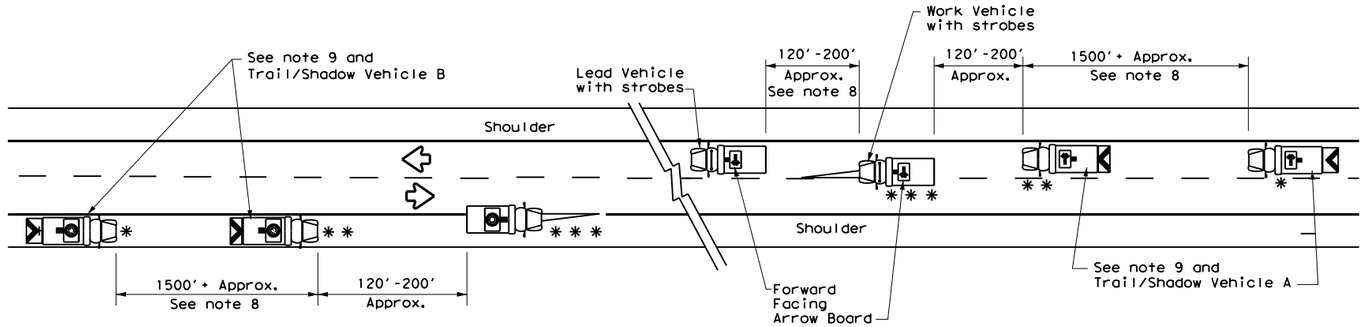
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

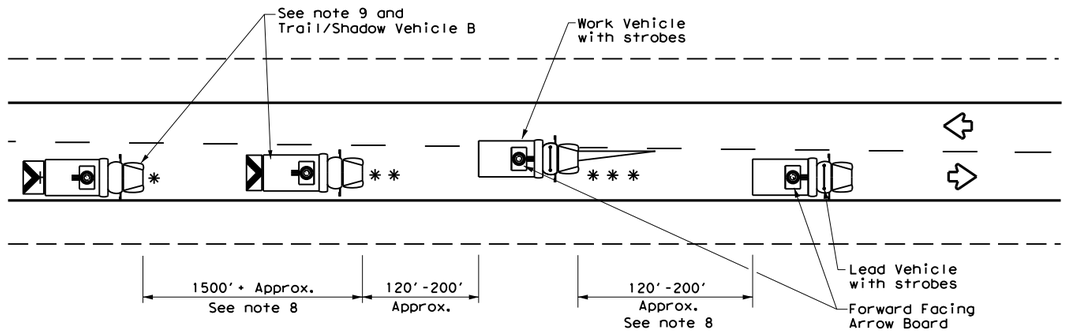


WORK ON SHOULDER

WORK ON TRAVEL LANE

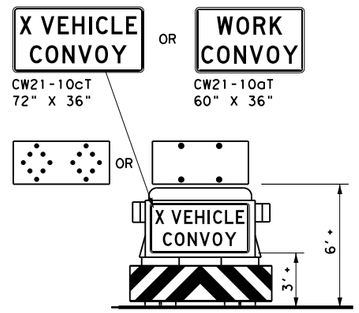
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



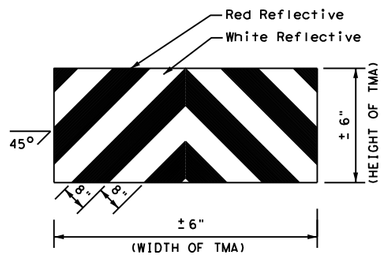
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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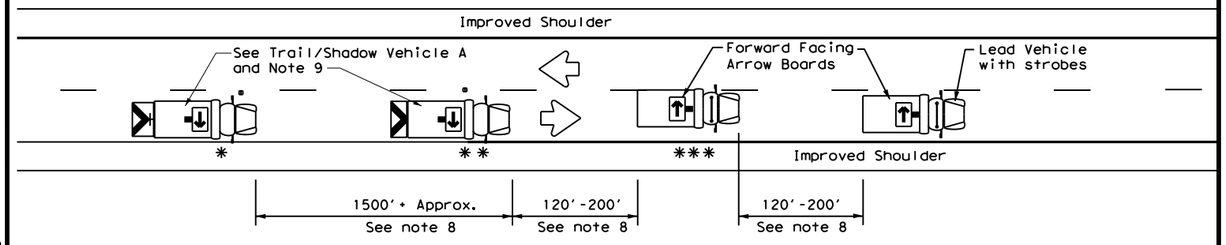
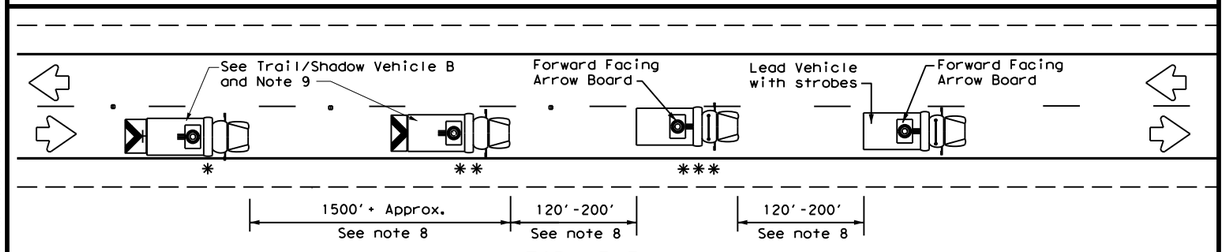
	TYL	VAN ZANDT		54



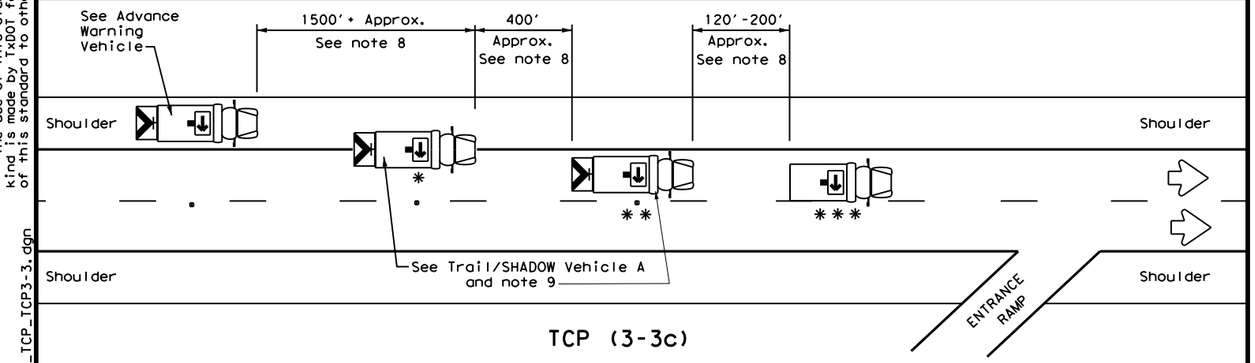
TCP (3-3a)

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



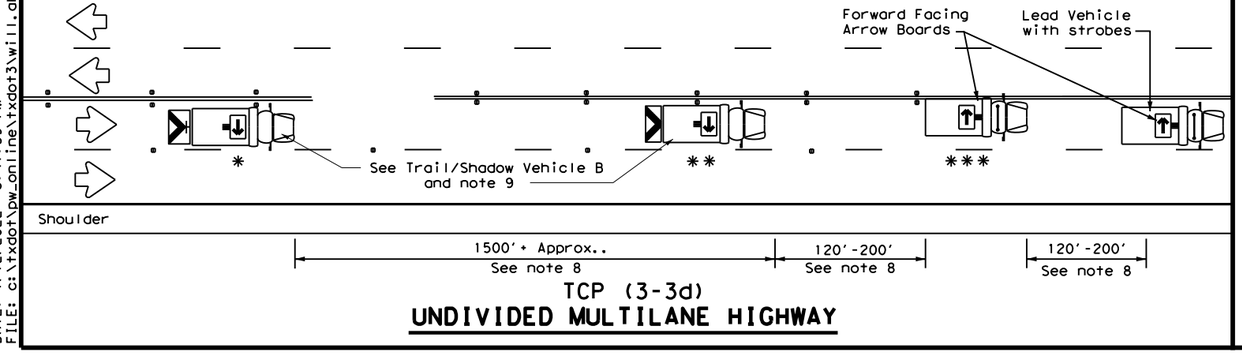
TCP (3-3b)

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



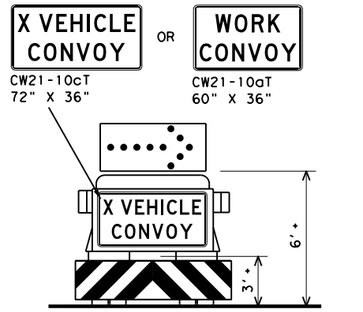
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



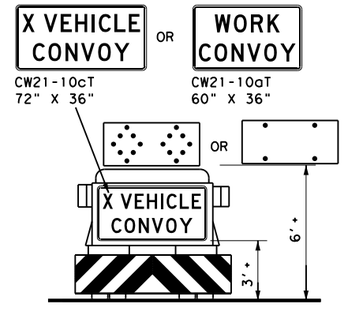
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



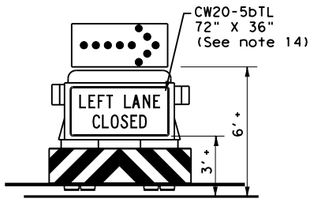
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

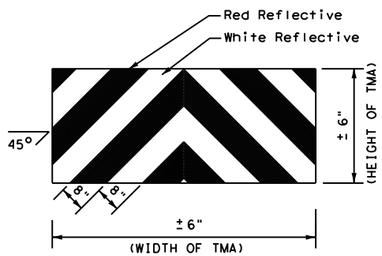


TRAIL/SHADOW VEHICLE B

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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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	TYL	VAN ZANDT		55
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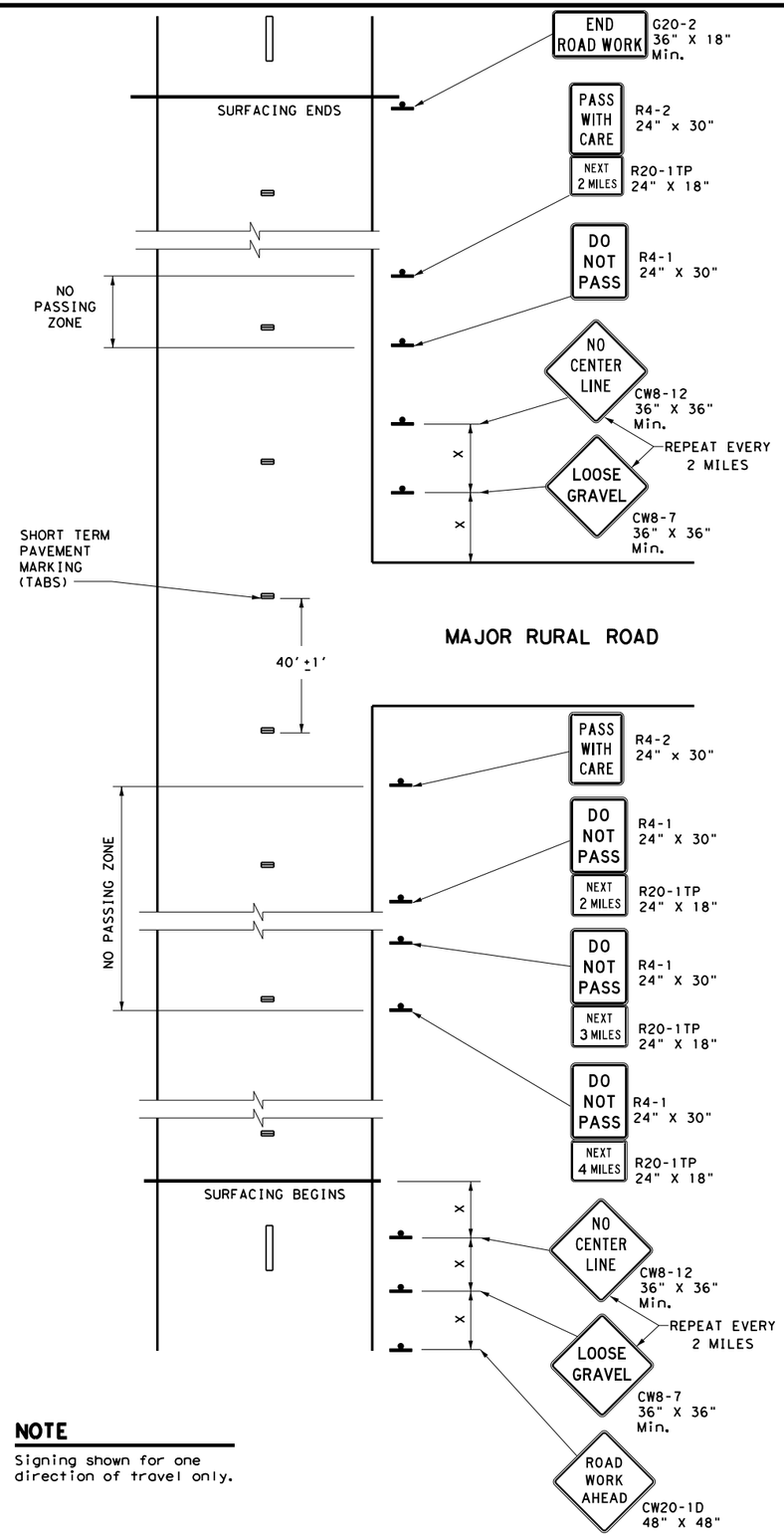
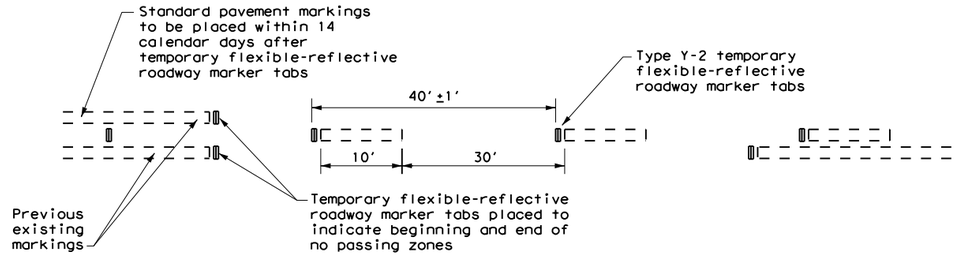


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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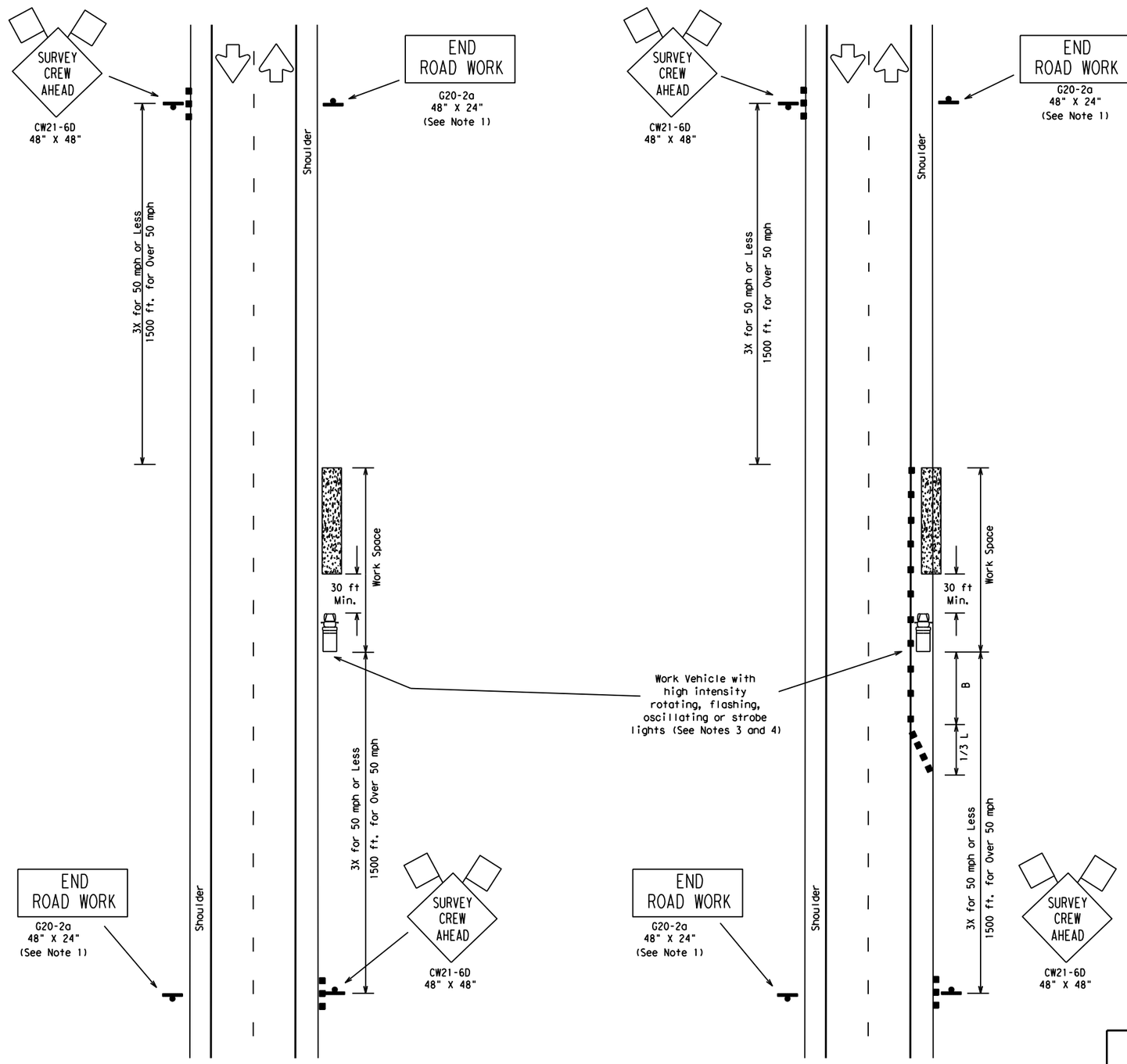
1-97 7-13	TYL	VAN ZANDT		56

210



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 (M) 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

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19

DIST	COUNTY	SHEET NO.
TYL	VAN ZANDT	57

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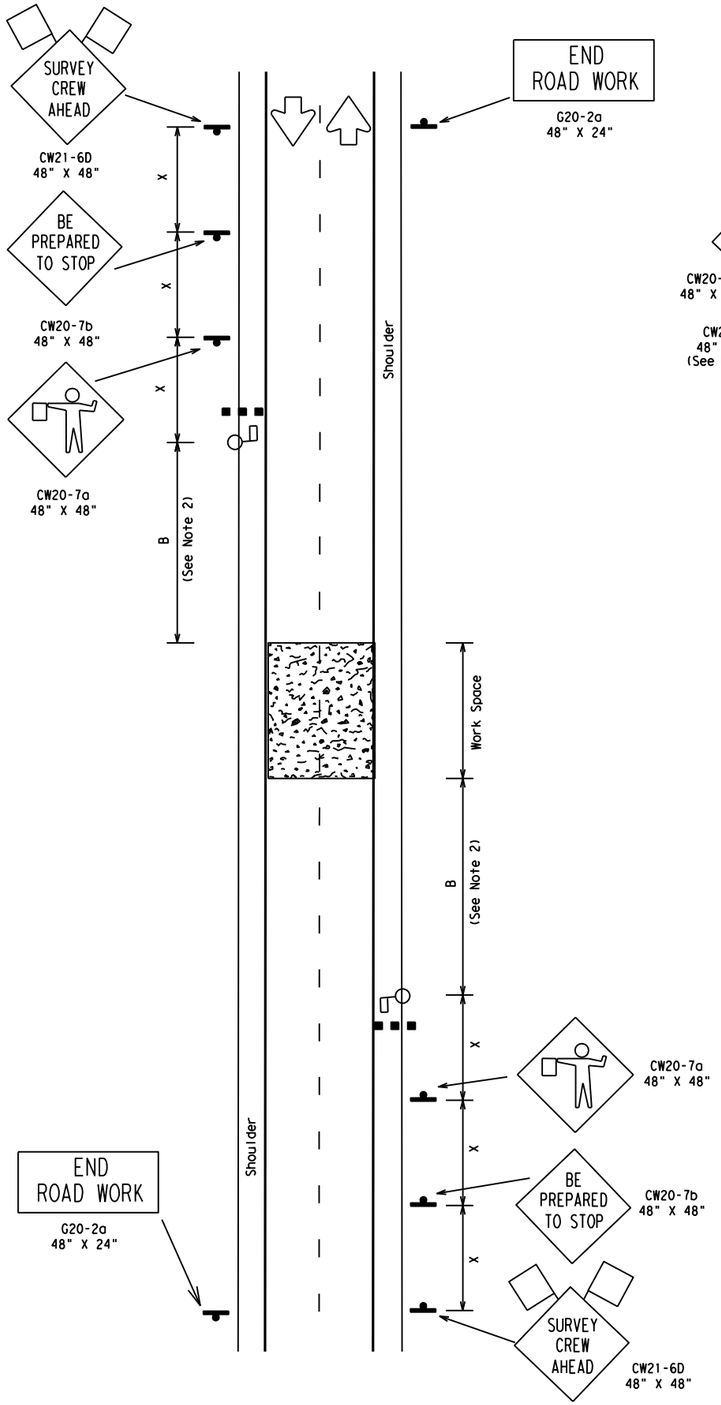
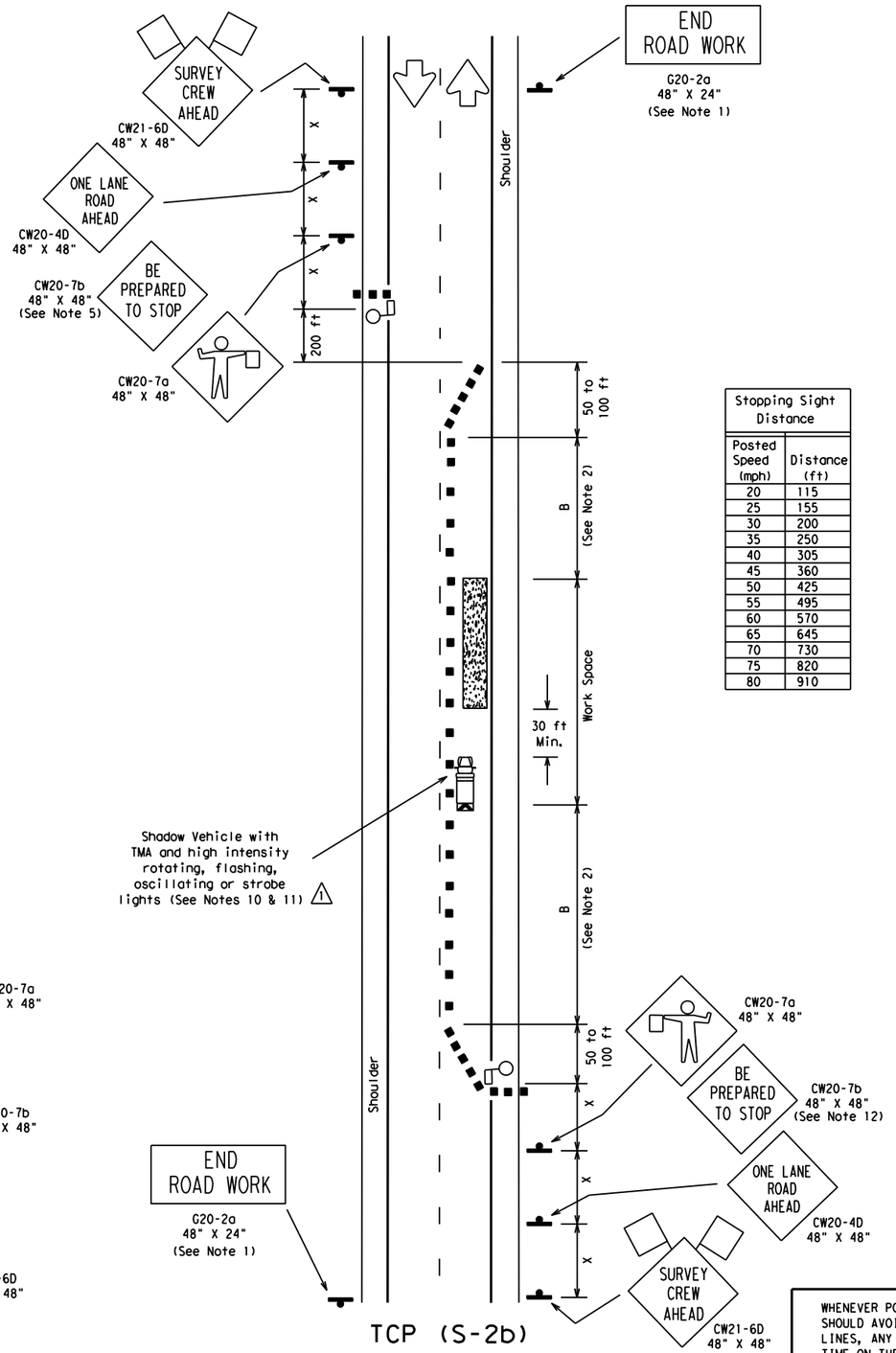


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		58

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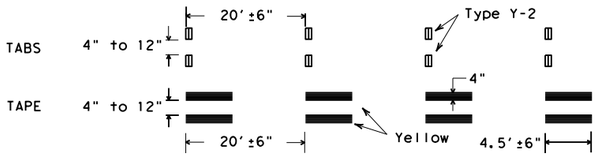
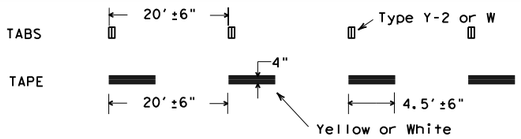
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

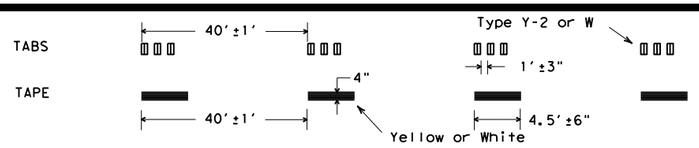


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



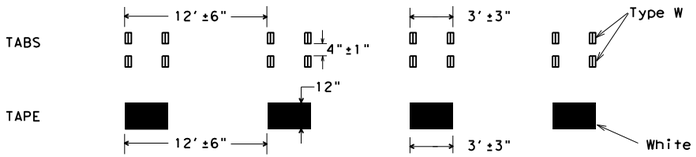
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

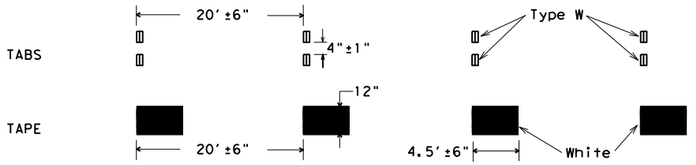


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



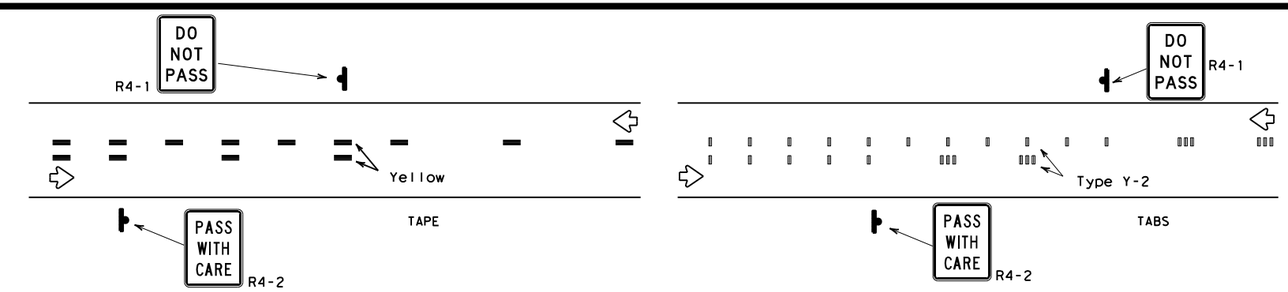
NOTES:

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

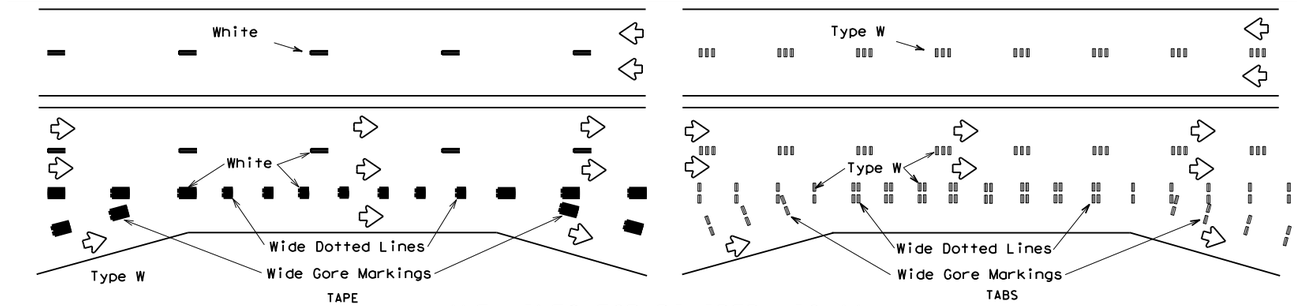
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

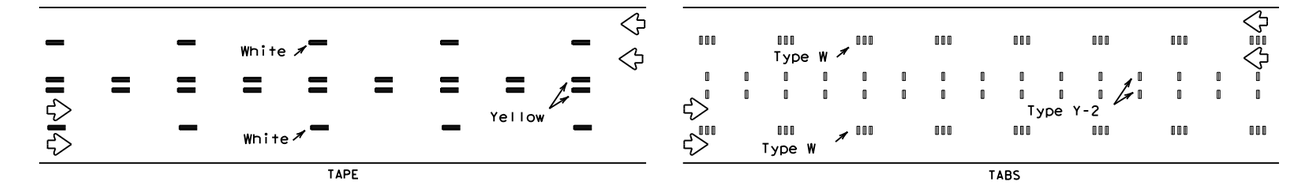
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



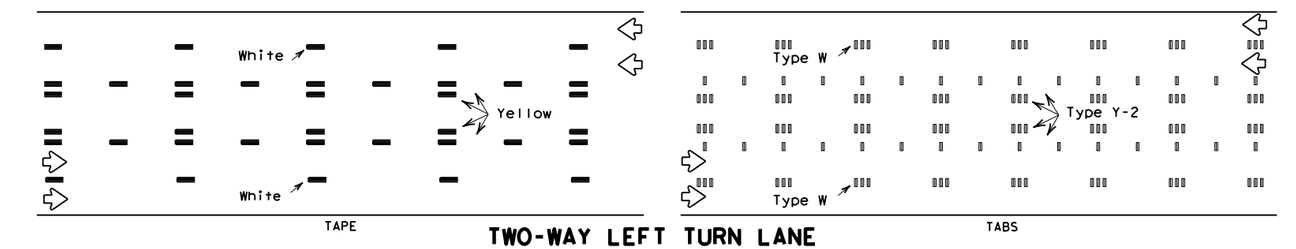
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



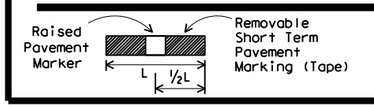
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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1-97		DIST	COUNTY		SHEET NO.
3-03		TYL	VAN ZANDT		59
7-13					

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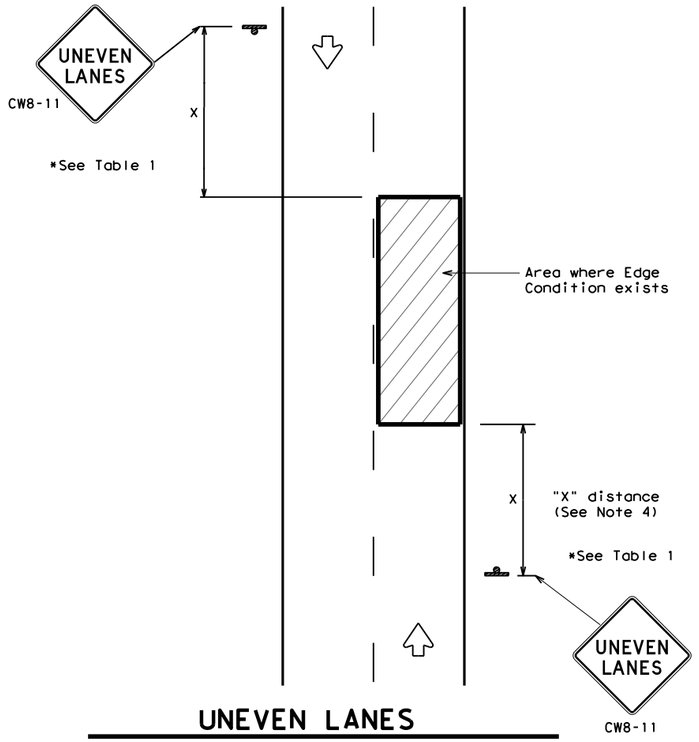
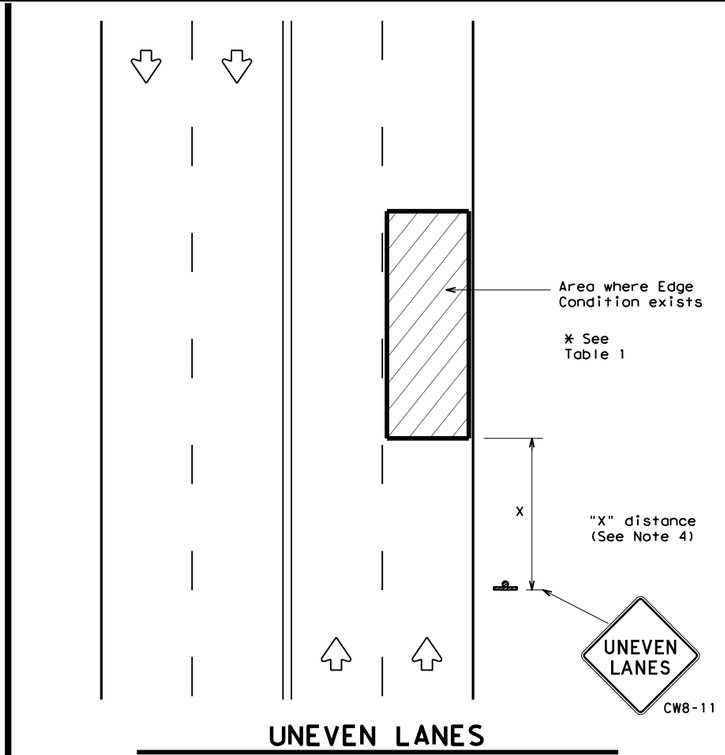
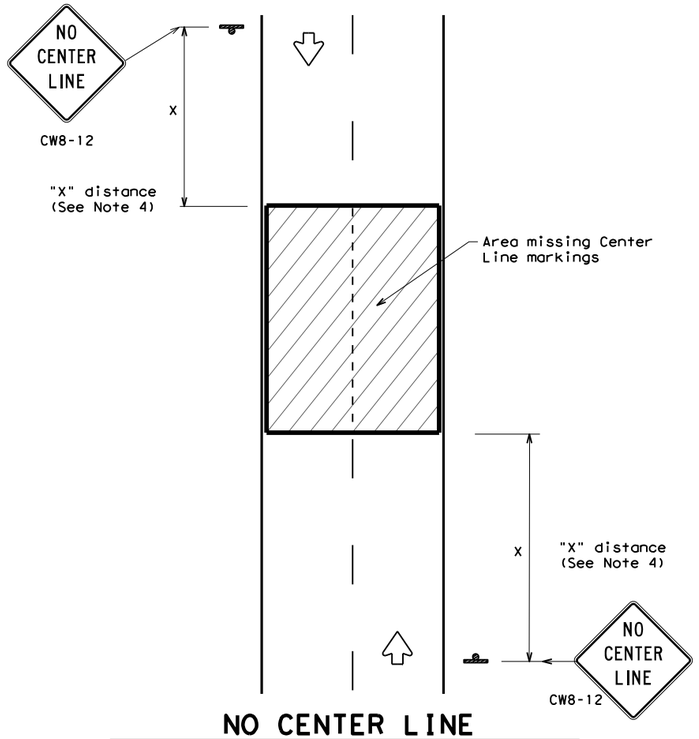


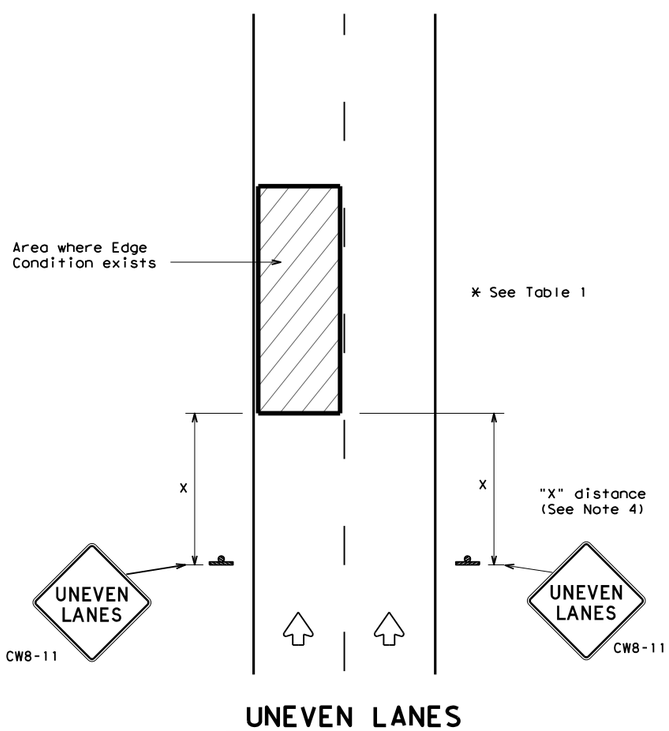
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

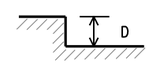
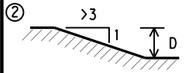
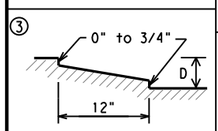
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE:	wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0108	12	018	SH 19
8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		TYL	VAN ZANDT		60

DATE: 1/12/2022 3:42:31 PM
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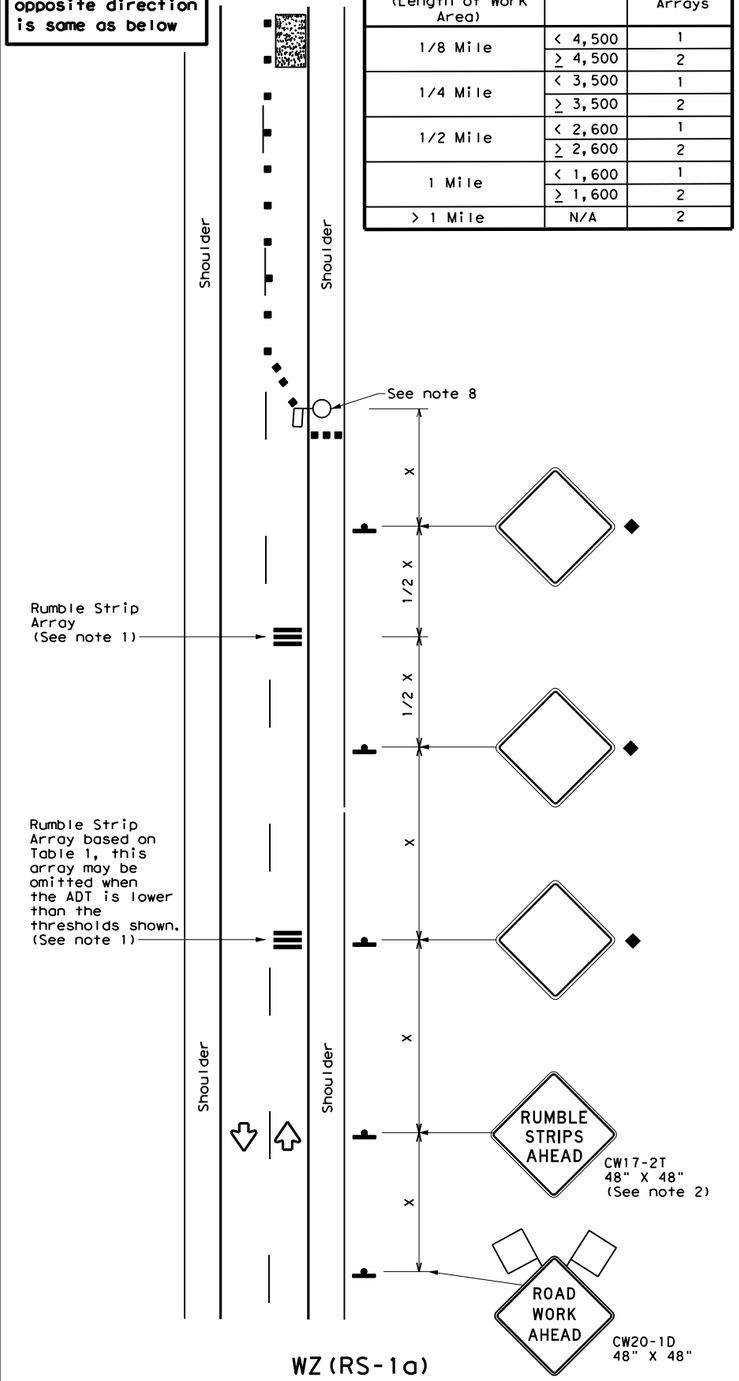
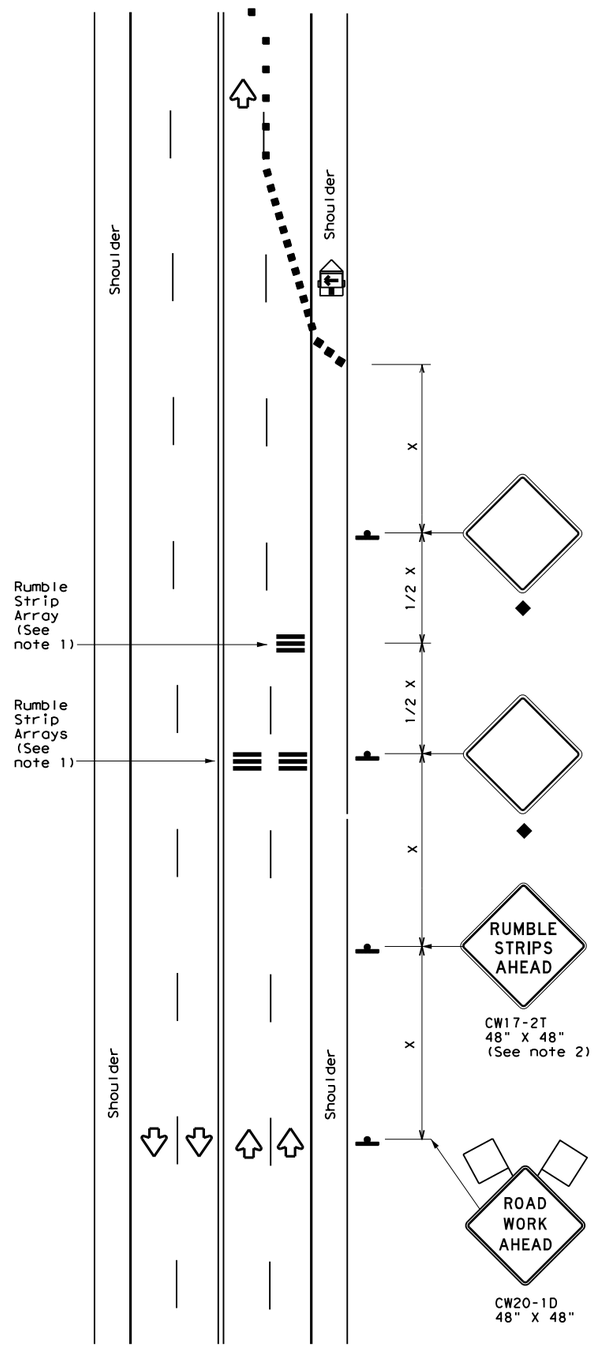
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

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. Removal of the Temporary Rumble Strips should be accomplished before removing the advance 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 AFAD or a portable traffic signal.
9. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

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.**

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
2-14	DIST	COUNTY		SHEET NO.
4-16	TYL	VAN ZANDT		61

SH 19 - 0108-12-018

Beginning chain PR_SH19_1 description
Feature: Road_Centerline

Point 5 N 6,975,670.7272 E 2,798,816.4739 Sta 0+00.00

Course from 5 to PC PR_SH19_1_3 S 11° 02′ 26.25" W Dist 167.7699

Curve Data					
Curve PR_SH19_1_3					
P.I. Station	2+50.12	N	6,975,425.2388	E	2,798,768.5751
Delta =	2° 28′ 12.18" (RT)				
Degree =	1° 30′ 00.00"				
Tangent =	82.3478				
Length =	164.6700				
Radius =	3,819.7190				
External =	0.8875				
Long Chord =	164.6573				
Mid. Ord. =	0.8873				
P.C. Station	1+67.77	N	6,975,506.0624	E	2,798,784.3451
P.T. Station	3+32.44	N	6,975,345.1699	E	2,798,749.3365
C.C.		N	6,976,237.5575	E	2,795,035.3228
Back = S	11° 02′ 26.25" W				
Ahead = S	13° 30′ 38.43" W				
Chord Bear = S	12° 16′ 32.34" W				

Course from PT PR_SH19_1_3 to PC PR_SH19_1_6 S 13° 30′ 38.43" W Dist 263.2390

Curve Data					
Curve PR_SH19_1_6					
P.I. Station	6+78.02	N	6,975,009.1505	E	2,798,668.5991
Delta =	2° 28′ 11.77" (LT)				
Degree =	1° 30′ 00.00"				
Tangent =	82.3439				
Length =	164.6624				
Radius =	3,819.7190				
External =	0.8875				
Long Chord =	164.6496				
Mid. Ord. =	0.8873				
P.C. Station	5+95.68	N	6,975,089.2157	E	2,798,687.8369
P.T. Station	7+60.34	N	6,974,928.3306	E	2,798,652.8297
C.C.		N	6,974,196.8280	E	2,802,401.8505
Back = S	13° 30′ 38.43" W				
Ahead = S	11° 02′ 26.66" W				
Chord Bear = S	12° 16′ 32.54" W				

Course from PT PR_SH19_1_6 to PC PR_SH19_1_9 S 11° 02′ 26.66" W Dist 2,656.4402

Curve Data					
Curve PR_SH19_1_9					
P.I. Station	41+42.11	N	6,971,609.1545	E	2,798,005.1977
Delta =	27° 43′ 59.83" (RT)				
Degree =	1° 56′ 59.99"				
Tangent =	725.3282				
Length =	1,422.2221				
Radius =	2,938.2500				
External =	88.2024				
Long Chord =	1,408.3788				
Mid. Ord. =	85.6318				
P.C. Station	34+16.78	N	6,972,321.0578	E	2,798,144.1031
P.T. Station	48+39.00	N	6,971,043.6727	E	2,797,550.9606
C.C.		N	6,972,883.7530	E	2,795,260.2364
Back = S	11° 02′ 26.66" W				
Ahead = S	38° 46′ 26.49" W				
Chord Bear = S	24° 54′ 26.57" W				

Course from PT PR_SH19_1_9 to PC PR_SH19_1_12 S 38° 46′ 26.49" W Dist 15,357.0294

Curve Data					
Curve PR_SH19_1_12					
P.I. Station	211+34.85	N	6,958,339.0712	E	2,787,345.6786
Delta =	44° 00′ 52.98" (LT)				
Degree =	2° 28′ 00.01"				
Tangent =	938.8191				
Length =	1,784.3789				
Radius =	2,322.8000				
External =	182.5505				
Long Chord =	1,740.8255				
Mid. Ord. =	169.2491				
P.C. Station	201+96.03	N	6,959,070.9952	E	2,787,933.6145
P.T. Station	219+80.41	N	6,957,404.1766	E	2,787,431.4302
C.C.		N	6,957,616.3407	E	2,789,744.5204
Back = S	38° 46′ 26.49" W				
Ahead = S	5° 14′ 26.49" E				
Chord Bear = S	16° 46′ 00.00" W				

Course from PT PR_SH19_1_12 to PC PR_SH19_1_15 S 5° 14′ 26.49" E Dist 10,427.6237

Curve Data					
Curve PR_SH19_1_15					
P.I. Station	329+61.37	N	6,946,469.1207	E	2,788,434.4292
Delta =	11° 56′ 43.69" (RT)				
Degree =	1° 05′ 00.00"				
Tangent =	553.3350				
Length =	1,102.6584				
Radius =	5,288.8400				
External =	28.8670				
Long Chord =	1,100.6624				
Mid. Ord. =	28.7103				
P.C. Station	324+08.04	N	6,947,020.1426	E	2,788,383.8877
P.T. Station	335+10.69	N	6,945,919.5700	E	2,788,369.8254
C.C.		N	6,946,537.0608	E	2,783,117.1562
Back = S	5° 14′ 26.49" E				
Ahead = S	6° 42′ 17.20" W				
Chord Bear = S	0° 43′ 55.35" W				

Course from PT PR_SH19_1_15 to 6 S 6° 42′ 17.20" W Dist 42,283.1994

Point 6 N 6,903,925.5488 E 2,783,433.1125 Sta 757+93.89

Ending chain PR_SH19_1 description

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
HORIZONTAL ALIGNMENT DATA

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		62

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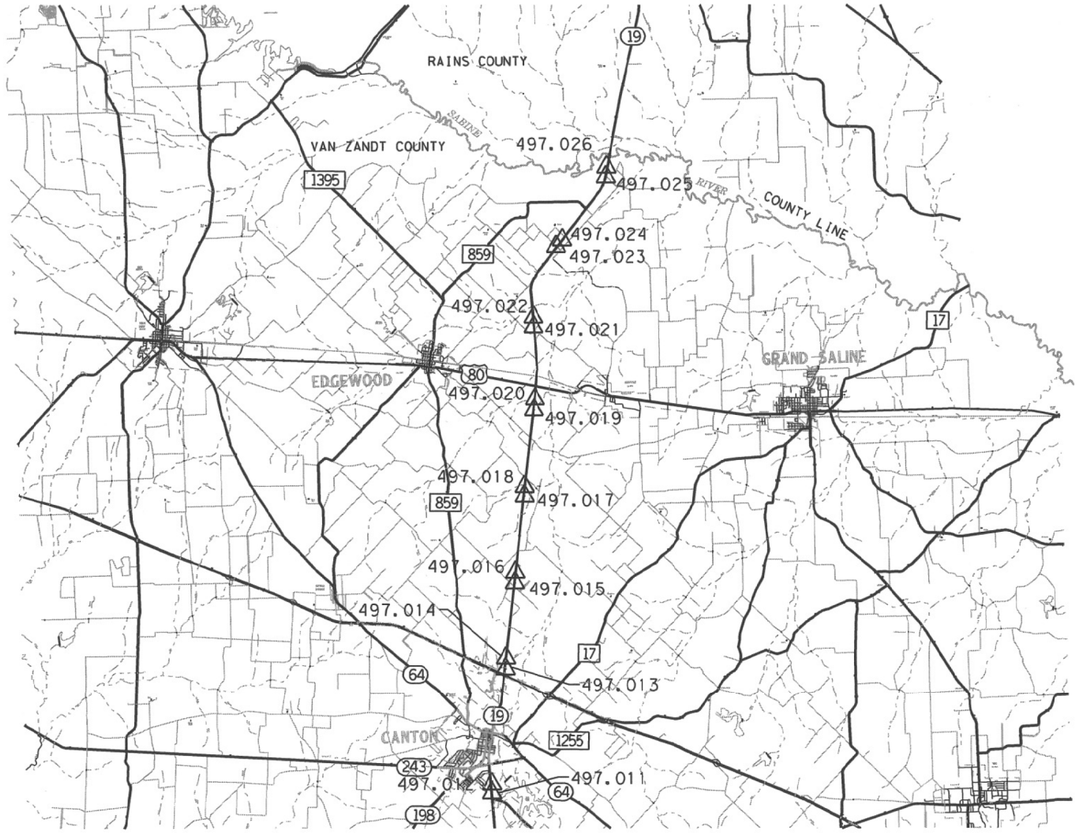
CONTROL MONUMENTATION				
POINT DESC.	NORTHING (Y)	EASTING (X)	ELEV.	TYPE SET
497.011	6,888,177.286	2,781,626.355	537.97	SET TXDOT TYPE II MON. W CAP
497.012	6,889,392.806	2,781,633.853	516.39	SET TXDOT TYPE II MON. W CAP
497.013	6,905,242.950	2,783,646.569	481.04	SET TXDOT TYPE II MON. W CAP
497.014	6,906,741.408	2,783,703.294	450.17	SET TXDOT TYPE II MON. W CAP
497.015	6,917,038.389	2,785,030.865	489.22	SET TXDOT TYPE II MON. W CAP
497.016	6,918,495.643	2,785,089.961	490.12	SET TXDOT TYPE II MON. W CAP
497.017	6,928,954.171	2,786,436.668	461.56	SET TXDOT TYPE II MON. W CAP
497.018	6,930,241.780	2,786,445.856	425.46	SET TXDOT TYPE II MON. W CAP
497.019	6,940,782.683	2,787,856.556	395.27	SET TXDOT TYPE II MON. W CAP
497.020	6,942,272.289	2,787,998.957	395.78	SET TXDOT TYPE II MON. W CAP
497.021	6,952,153.197	2,787,849.270	432.23	SET TXDOT TYPE II MON. W CAP
497.022	6,953,476.577	2,787,844.802	408.95	SET TXDOT TYPE II MON. W CAP
497.023	6,963,155.209	2,791,141.183	427.57	SET TXDOT TYPE II MON. W CAP
497.024	6,964,052.788	2,792,006.933	423.13	SET TXDOT TYPE II MON. W CAP
497.025	6,972,688.826	2,798,303.718	410.75	SET TXDOT TYPE II MON. W CAP
497.026	6,974,039.568	2,798,386.903	381.23	SET TXDOT TYPE II MON. W CAP



SEE SHEET 1

SCALE: 1"=10,000' (22" x 34" SHEET)
SCALE: 1"=20,000' (11" x 17" SHEET)

NOTES:

1. BEARINGS AND COORDINATES ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.,EPOCH 2010). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO STATE PLANE VALUES BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000120.

2. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

3. HORIZONTAL SURVEY METHOD: STATIC GPS HOLDING CORS STATIONS: GREENVILLE (TXGE), MOUNT VERNON (TXMV),PALESTINE (TXPI) AND TYLER (TXTY).

4. VERTICAL SURVEY METHOD: STATIC GPS HOLDING CORS STATIONS: GREENVILLE (TXGE), MOUNT VERNON (TXMV),PALESTINE (TXPI) AND TYLER (TXTY).

5. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88 GEOID12B).

6. FIELD SURVEY PERFORMED ON MARCH, 2017.

STATE OF TEXAS
REGISTERED
ADAM N. DIEHL
6346
PROFESSIONAL
LAND SURVEYOR

08/04/2017

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 19
CONTROL INDEX

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
10	TX					SH 19
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.		JOB NO.	SHEET NO.
TYLER	VAN ZANDT	0108	12		018	63

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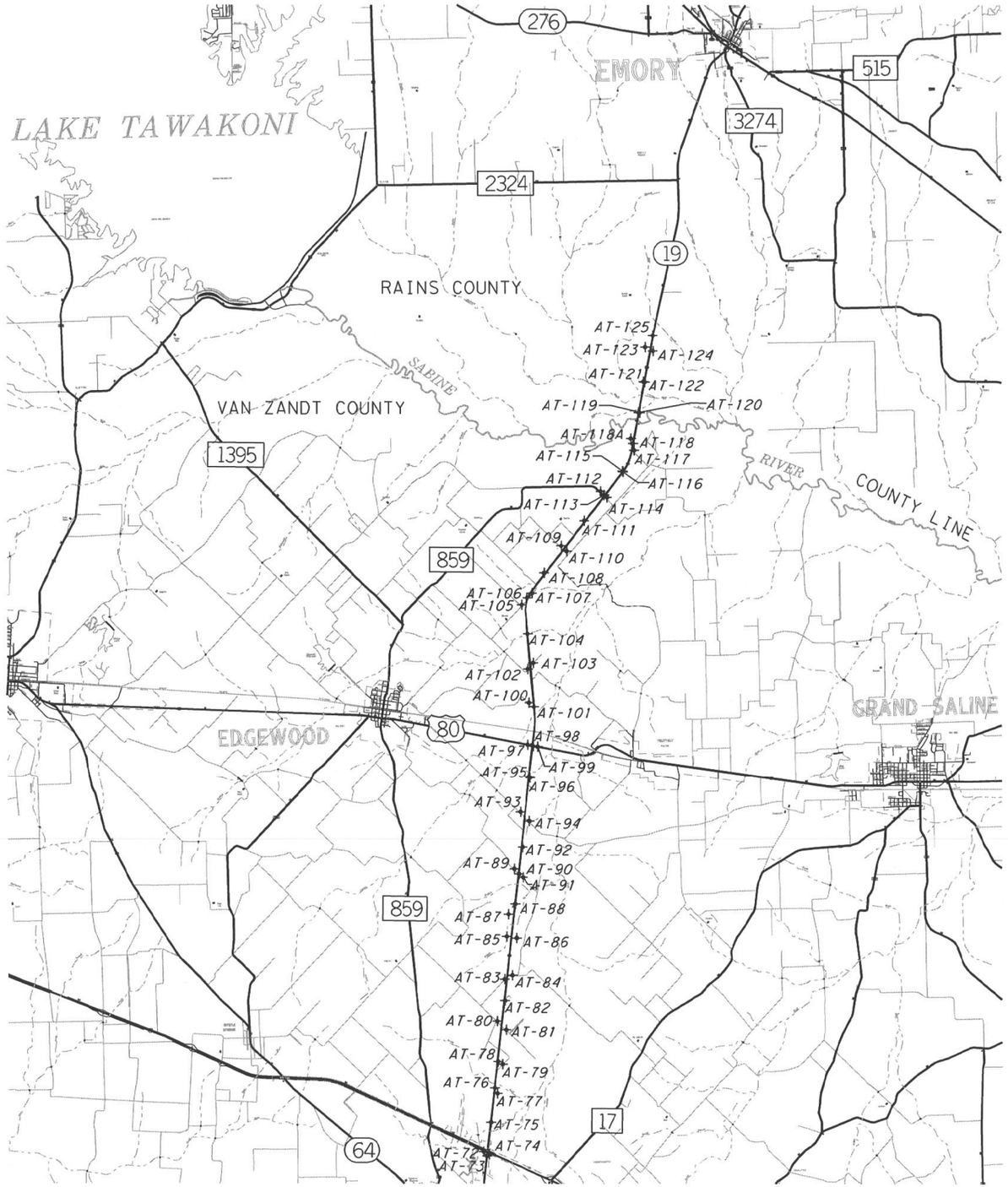
AERIAL TARGETS				
AERIAL TARGET	NORTHING (Y)	EASTING (X)	ELEV.	TYPE
AT-72	6,904,346.004	2,783,049.968	491.89	SET "X" IN CONC.
AT-73	6,903,927.808	2,783,391.002	496.26	SET CONC.NAIL
AT-74	6,904,101.870	2,783,597.475	498.47	SET "X" IN CONC.
AT-75	6,907,219.575	2,783,799.811	467.82	SET CONC.NAIL
AT-76	6,910,571.855	2,784,193.126	467.75	SET CONC.NAIL
AT-77	6,910,035.058	2,784,459.315	463.38	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-78	6,913,144.357	2,784,534.801	481.23	SET CONC.NAIL
AT-79	6,912,875.958	2,784,991.188	478.23	SET CONC.NAIL
AT-80	6,917,073.246	2,784,460.330	491.72	SET CONC.NAIL
AT-81	6,916,233.998	2,785,350.350	487.79	SET CONC.NAIL
AT-82	6,919,072.126	2,785,230.249	486.50	SET CONC.NAIL
AT-83	6,921,156.950	2,785,202.967	497.50	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-84	6,921,545.320	2,786,004.413	489.52	SET CONC.NAIL
AT-85	6,925,358.932	2,785,419.705	439.07	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-86	6,925,208.479	2,786,433.902	459.65	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-87	6,927,521.709	2,785,615.805	460.81	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-88	6,928,528.228	2,786,301.684	452.47	SET CONC.NAIL
AT-89	6,931,951.890	2,786,216.809	475.06	SET CONC.NAIL
AT-90	6,931,442.647	2,786,681.197	434.30	SET CONC.NAIL
AT-91	6,931,116.343	2,787,103.881	421.71	SET CONC.NAIL
AT-92	6,934,069.981	2,787,069.660	462.59	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-93	6,937,489.328	2,786,843.338	482.13	SET CONC.NAIL
AT-94	6,936,606.856	2,787,777.808	422.37	SET CONC.NAIL
AT-95	6,940,940.551	2,787,764.231	395.97	SET CONC.NAIL
AT-96	6,940,855.608	2,787,869.698	394.45	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-97	6,944,091.013	2,787,640.905	434.25	SET CONC.NAIL
AT-98	6,943,945.101	2,788,182.151	443.09	SET "X" IN CONC.
AT-99	6,943,898.410	2,788,662.257	439.88	SET CONC.NAIL
AT-100	6,948,184.110	2,787,782.826	402.61	SET CONC.NAIL
AT-101	6,947,778.753	2,788,283.800	391.75	SET CONC.NAIL
AT-102	6,951,476.027	2,787,669.152	442.68	SET CONC.NAIL
AT-103	6,952,070.136	2,788,205.815	417.25	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-104	6,954,908.454	2,787,641.660	389.08	SET CONC.NAIL
AT-105	6,957,732.203	2,787,009.022	428.01	SET CONC.NAIL
AT-106	6,958,407.654	2,787,583.234	427.15	SET CONC.NAIL
AT-107	6,958,874.658	2,788,100.457	421.81	SET CONC.NAIL
AT-108	6,960,853.974	2,789,340.171	418.98	SET CONC.NAIL
AT-109	6,963,489.043	2,791,067.601	427.63	SET CONC.NAIL
AT-110	6,962,969.523	2,791,622.424	426.25	SET CONC.NAIL
AT-111	6,965,938.490	2,793,425.036	424.37	SET CONC.NAIL
AT-112	6,968,803.841	2,795,093.977	421.39	SET CONC.NAIL
AT-113	6,968,463.818	2,795,440.241	421.36	SET CONC.NAIL
AT-114	6,968,217.251	2,795,737.517	419.88	SET CONC.NAIL
AT-115	6,970,774.032	2,797,310.644	399.64	SET CONC.NAIL
AT-116	6,970,723.770	2,797,362.165	400.91	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-117	6,972,806.166	2,798,496.526	415.16	SET CONC.NAIL
AT-118	6,973,469.669	2,798,383.649	394.68	SET CONC.NAIL
AT-118A	6,973,959.033	2,798,160.444	392.51	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-119	6,976,489.288	2,798,955.511	379.44	SET CONC.NAIL
AT-120	6,976,469.969	2,799,072.609	363.93	SET 5/8" IR W/ CAP STAMPED "LANDTECH"
AT-121	6,979,501.467	2,799,455.345	378.04	SET CONC.NAIL
AT-122	6,979,463.427	2,799,562.499	378.08	SET CONC.NAIL
AT-123	6,982,873.099	2,799,628.061	410.24	SET CONC.NAIL
AT-124	6,982,505.420	2,800,404.677	408.68	SET CONC.NAIL
AT-125	6,983,998.536	2,800,397.277	416.09	SET CONC.NAIL



SEE SHEET 4

SCALE: 1"=6,000' (22" x 34" SHEET)
SCALE: 1"=12,000' (11" x 17" SHEET)

NOTES:

1. BEARINGS AND COORDINATES ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.,EPOCH 2010). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO STATE PLANE VALUES BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000120.

2. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

3. HORIZONTAL SURVEY METHOD:
GPS (TXDOT VRS)

4. VERTICAL SURVEY METHOD:
GPS (TXDOT VRS)

5. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88 GEOID12B).

6. FIELD SURVEY PERFORMED ON MARCH, 2017.

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 19
AERIAL TARGETS

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
10	TX					SH 19
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.		JOB NO.	SHEET NO.
TYLER	VAN ZANDT	0108	12		018	64

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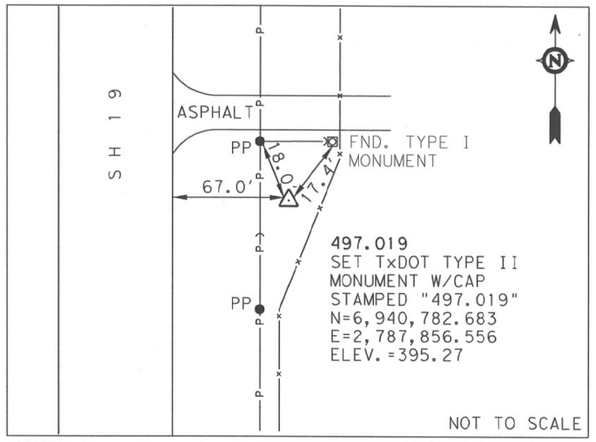
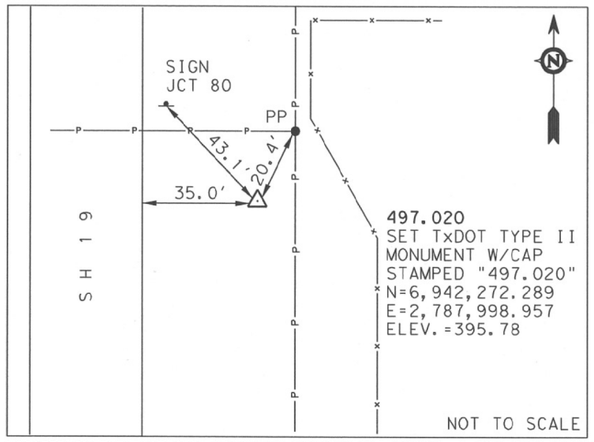


LOCATED ON THE EAST SIDE OF STATE HIGHWAY 19, APPROX. 3,300 FEET SOUTH OF US 80.



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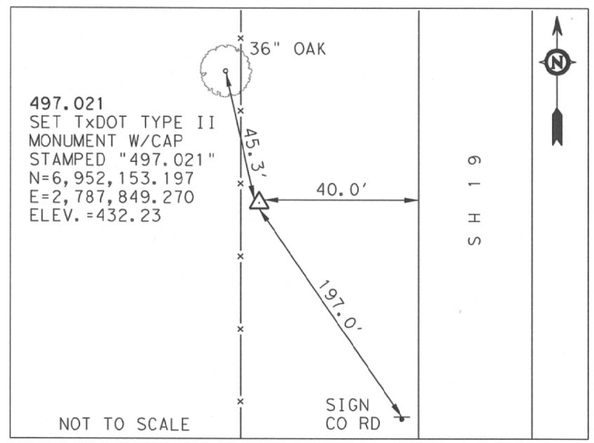
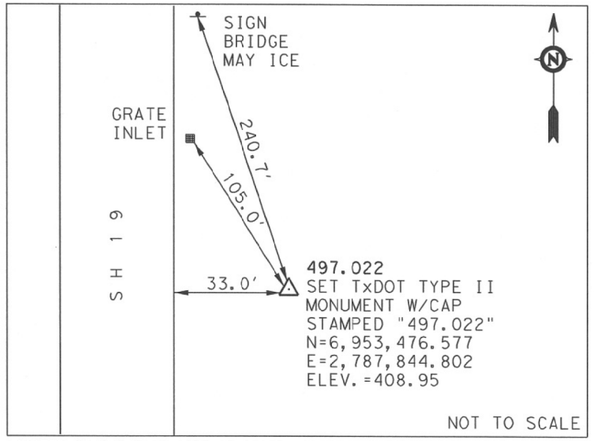


LOCATED ON THE WEST SIDE OF STATE HIGHWAY 19, APPROX. 1.5 MILES NORTH OF US 80.



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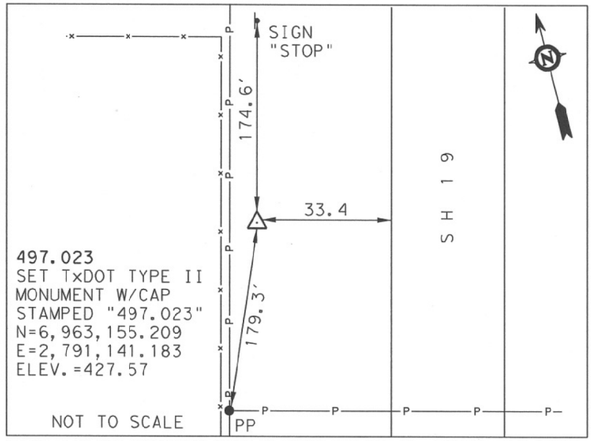

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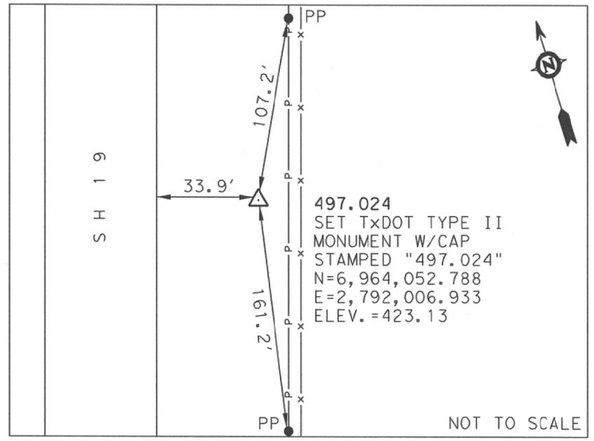
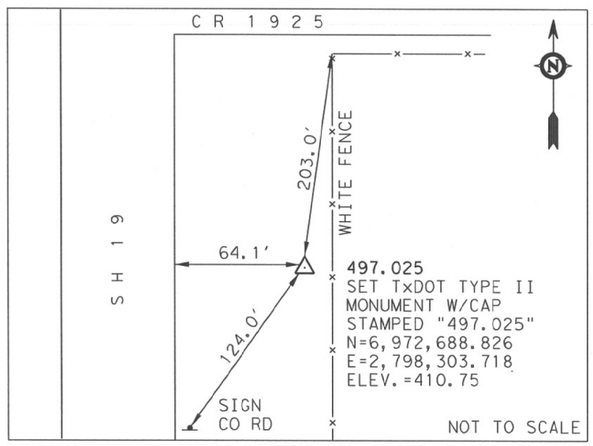
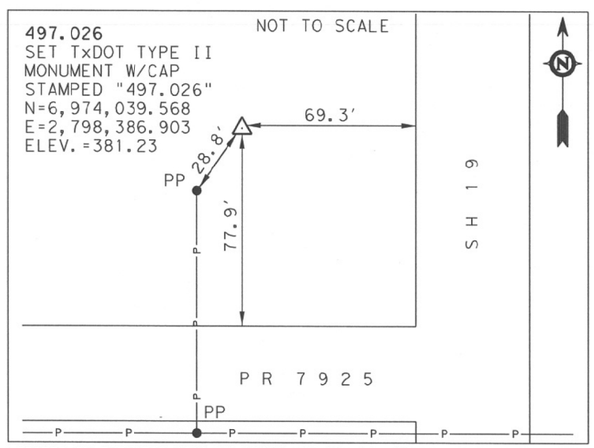


LOCATED ON THE SOUTHEAST SIDE OF STATE HIGHWAY 19, APPROX. 4.1 MILES NORTH OF US 80.



LOCATED ON THE EAST SIDE OF STATE HIGHWAY 19, APPROX. 6.1 MILES NORTH OF US 80.



LOCATED ON THE WEST SIDE OF STATE HIGHWAY 19, APPROX. 6.4 MILES NORTH OF US 80.

NOTES:

1. BEARINGS AND COORDINATES ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.,EPOCH 2010). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO STATE PLANE VALUES BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000120.

2. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

3. HORIZONTAL SURVEY METHOD: STATIC GPS HOLDING CORS STATIONS: GREENVILLE (TXGE), MOUNT VERNON (TXMV),PALESTINE (TXPI) AND TYLER (TXTY).

4. VERTICAL SURVEY METHOD: STATIC GPS HOLDING CORS STATIONS: GREENVILLE (TXGE), MOUNT VERNON (TXMV),PALESTINE (TXPI) AND TYLER (TXTY).

5. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88 GEOID12B).

6. FIELD SURVEY PERFORMED ON MARCH, 2017.

08/04/2017

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 19
HORIZONTAL AND VERTICAL CONTROL

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
10	TX					SH 19
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.		JOB NO.	SHEET NO.
TYLER	VAN ZANDT	0108	12		018	65

$FILE$

DN: DW: CK: CK:

1/12/2022 3:32:35 PM
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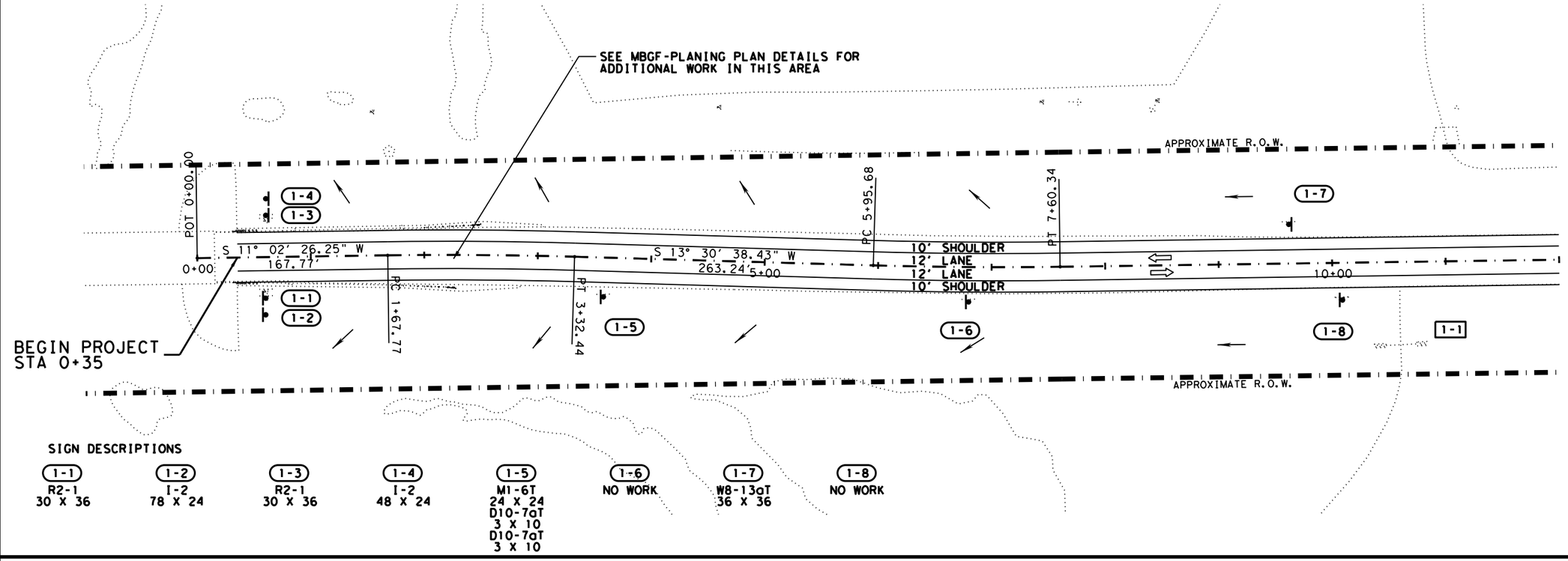

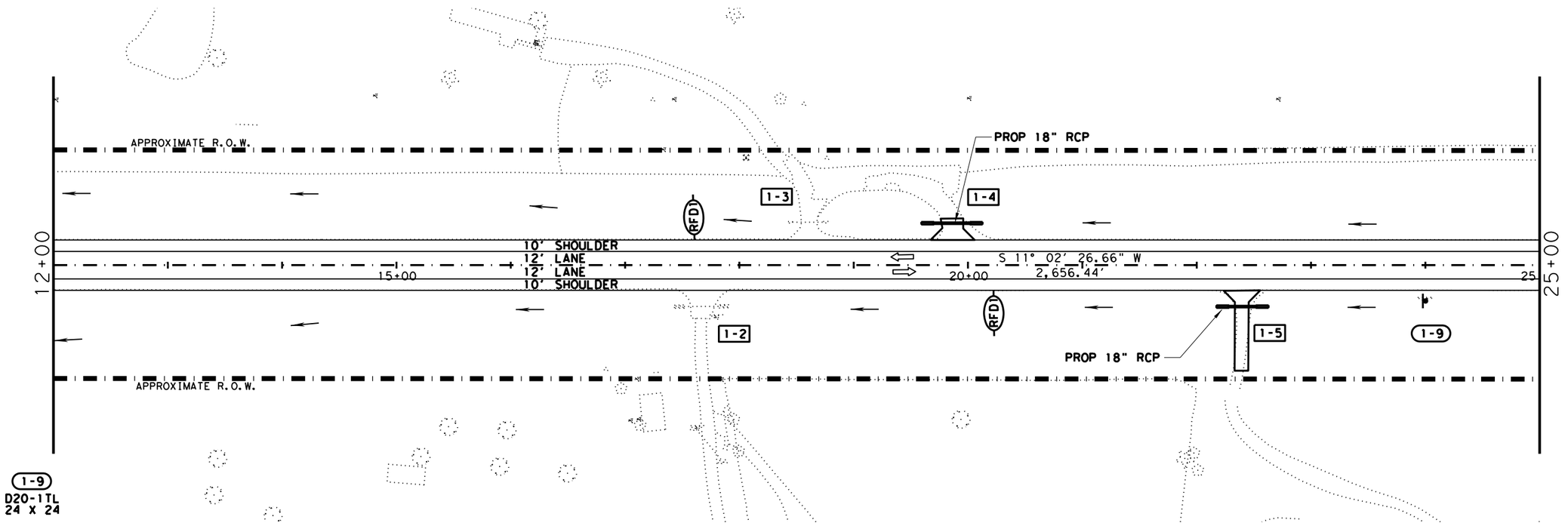

GILBERT ARTEAGA
87953
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		66

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BEGIN SUPERELEVATION LEVEL-UP
ON SHOULDER (LT) - STA 32+78
(SEE MISCELLANEOUS DETAILS)

PROP 18" RCP

CR 1925

APPROXIMATE R.O.W.

2-1
2-2
2-3

RFD2

10' SHOULDER
12' LANE
12' LANE
10' SHOULDER

25+00
30+00
35+00
38+00

PC: 34+16.78

APPROXIMATE R.O.W.

P1
STA 35+55
EXIST 36"X106.7' RCP
30° RFS
NO WORK

SIGN DESCRIPTIONS

2-1	2-2	2-3
NO WORK	R1-1 36 X 36	D20-1TR 24 X 24

LEGEND

- EXIST RIGHT-OF-WAY
- ℄ FM 241
- CROSS CULVERT NUM.
- DRIVEWAY NUMBER
- SMALL SIGN NUMBER
- SED. CONTROL FENCE
- OUTFALL DIRECTION
- FLOW DIRECTION
- RFD1 ROCK FILTER DAM TY 1 (15' TYP)
- RFD2 ROCK FILTER DAM TY 2 (15' TYP)

0 50 100
SCALE: 1" = 100'

P2
STA 42+09
EXIST 2-36"X82.7' RCP
EXTEND LEFT AND
SAFETY TREAT

PROP 18" RCP

2-4

10' SHOULDER
12' LANE
12' LANE
10' SHOULDER

38+00
40+00
45+00
50+00
51+00

STONE RIPRAP

P3
STA 48+29
EXIST 36"X109.6' RCP
NO WORK

PT 48+39.00

APPROXIMATE R.O.W.

END SUPERELEVATION LEVEL-UP
ON SHOULDER (RT) - STA 49+66
(SEE MISCELLANEOUS DETAILS)

STATE OF TEXAS
GILBERT ARTEAGA
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01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		67

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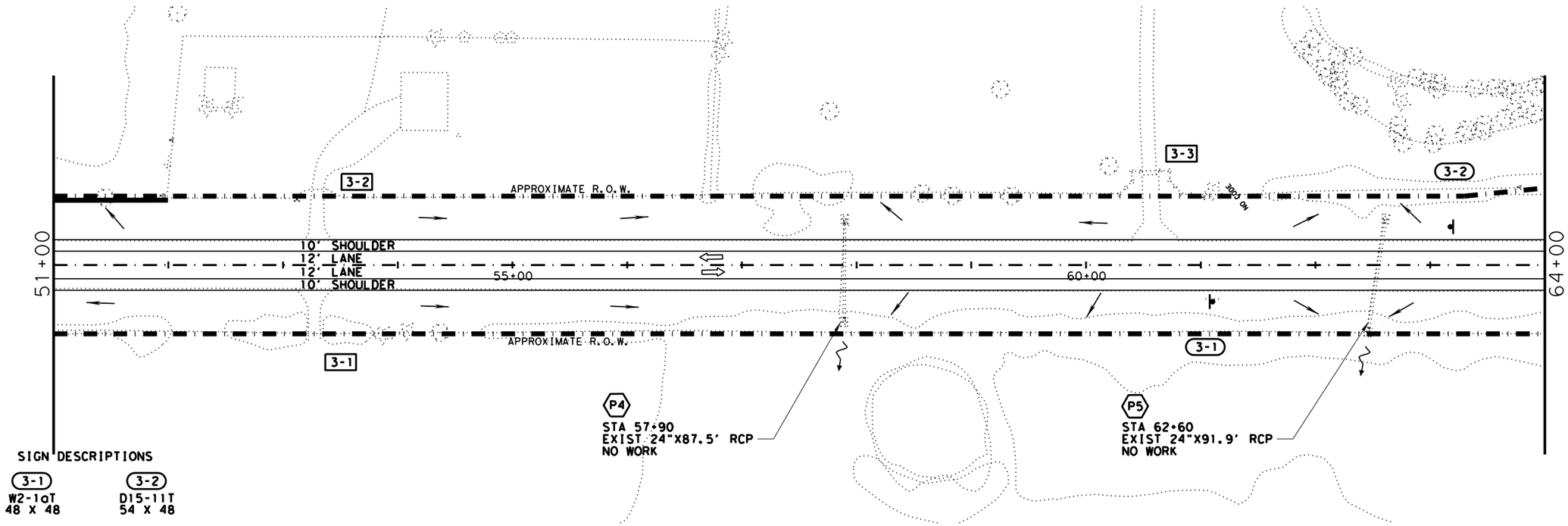

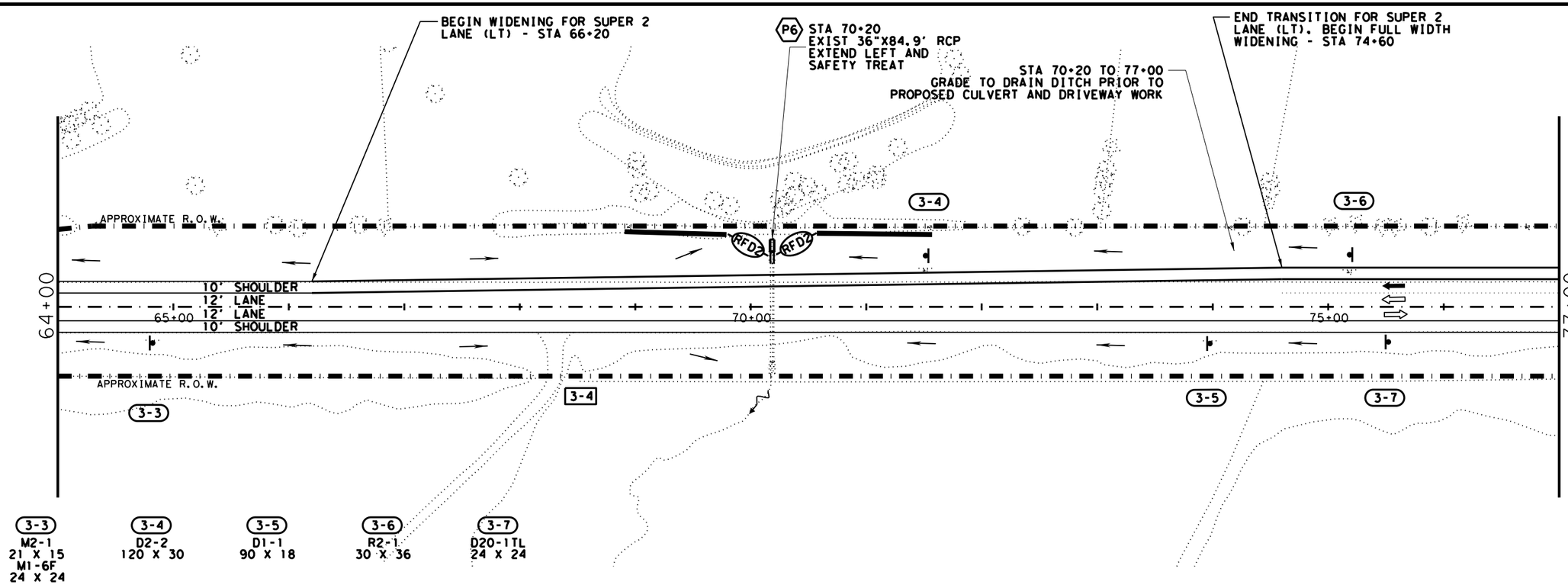

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GILBERT ARTEAGA
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PROFESSIONAL ENGINEER
01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 3 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		68

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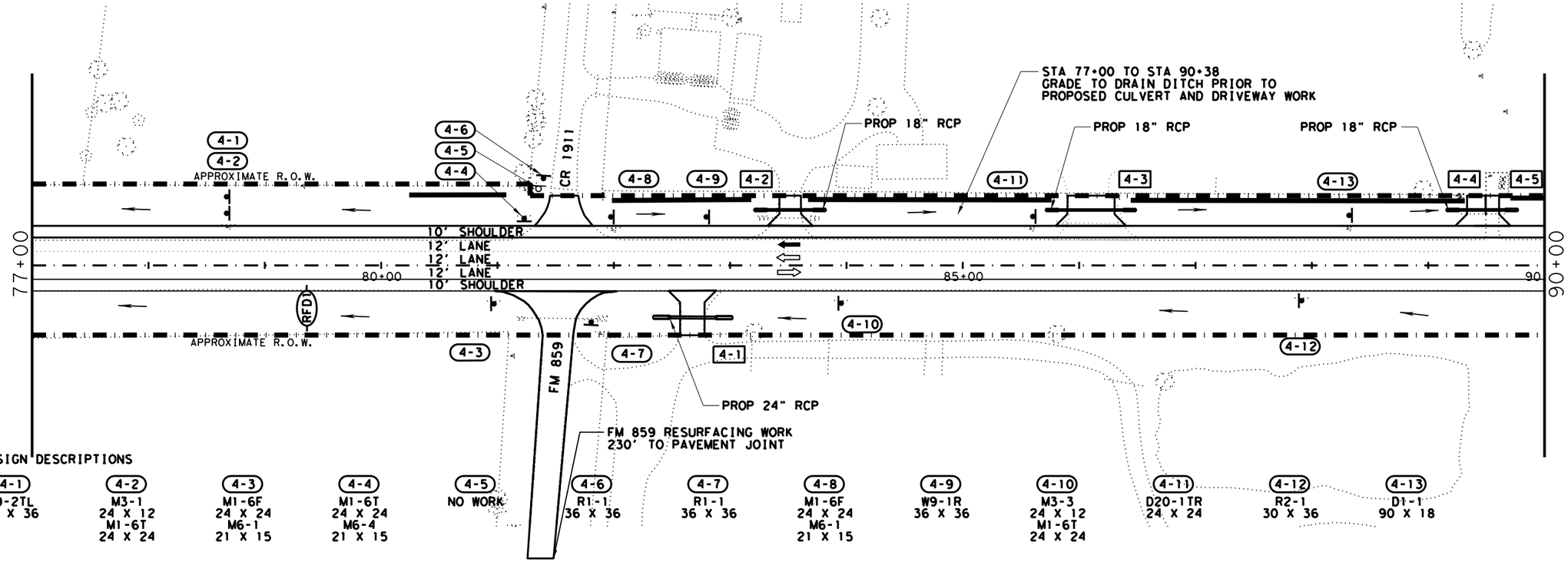
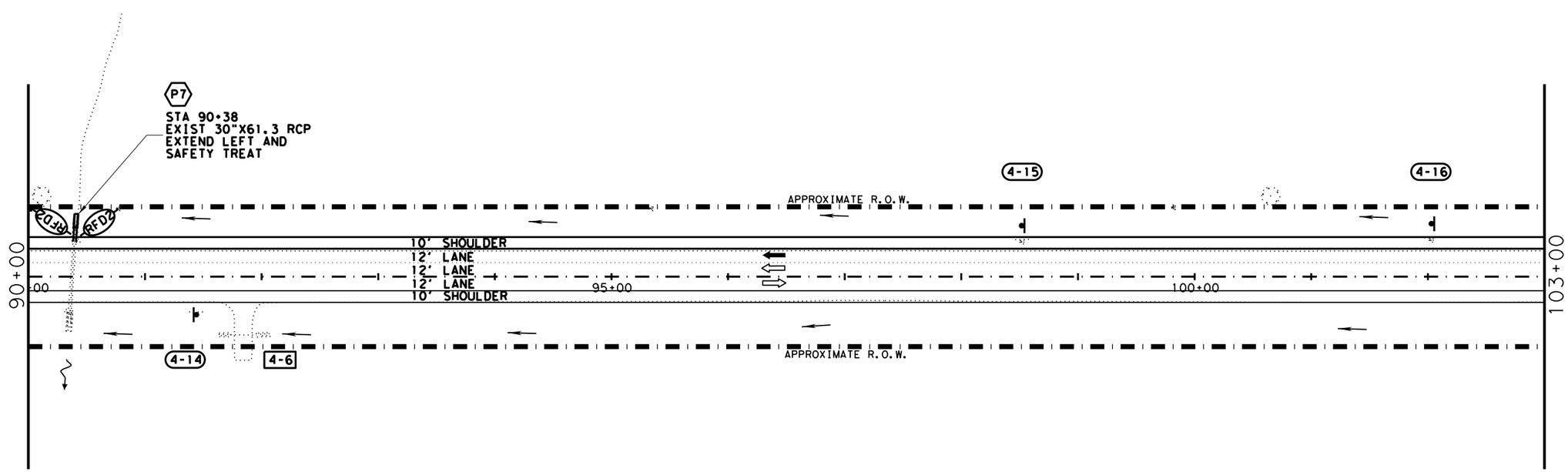


SIGN DESCRIPTIONS

4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9	4-10	4-11	4-12	4-13
W9-2TL 36 X 36	M3-1 24 X 12 M1-6T 24 X 24	M1-6F 24 X 24 M6-1 21 X 15	M1-6T 24 X 24 M6-4 21 X 15	NO WORK	R1-1 36 X 36	R1-1 36 X 36	M1-6F 24 X 24 M6-1 21 X 15	W9-1R 36 X 36	M3-3 24 X 12 M1-6T 24 X 24	D20-1TR 24 X 24	R2-1 30 X 36	D1-1 90 X 18



4-14	4-15	4-16
D2-2 78 X 30	M2-1 21 X 15 M1-6F 24 X 24	W2-1aT 48 X 48

LEGEND

- EXIST RIGHT-OF-WAY
- ℄ FM 241
- CROSS CULVERT NUM.
- DRIVEWAY NUMBER
- SMALL SIGN NUMBER
- SED. CONTROL FENCE
- OUTFALL DIRECTION
- FLOW DIRECTION
- RFD1 ROCK FILTER DAM TY 1 (15' TYP)
- RFD2 ROCK FILTER DAM TY 2 (15' TYP)

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GILBERT ARTEAGA
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Gilbert Arteaga 01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 4 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		69

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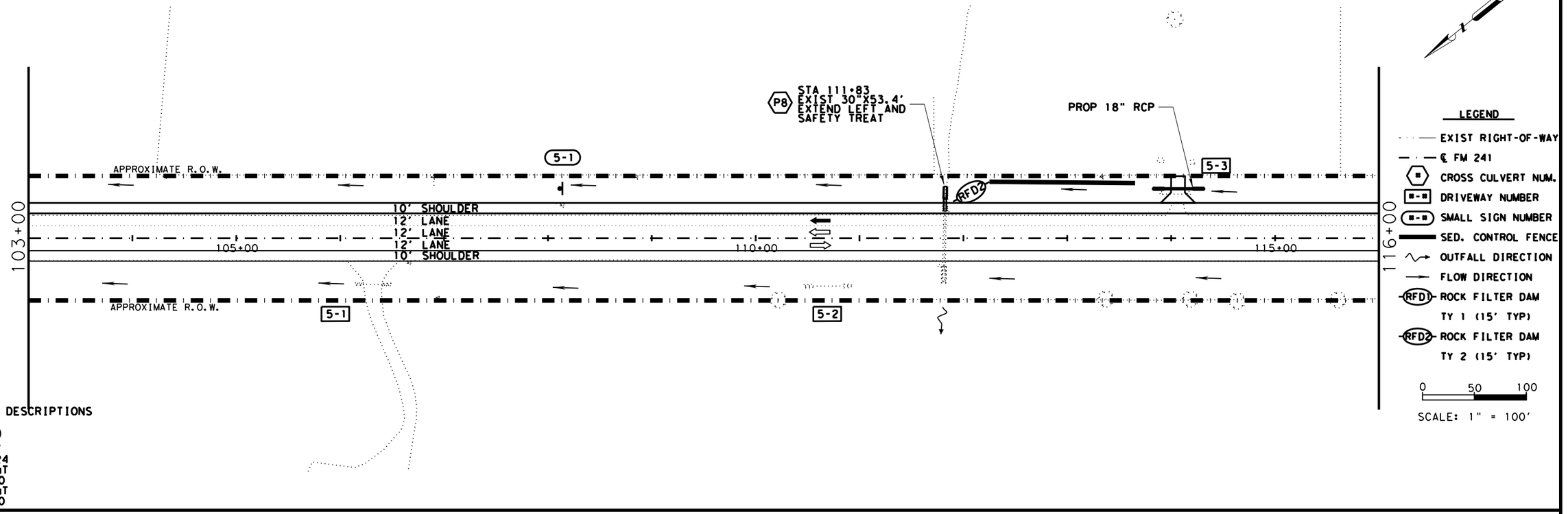
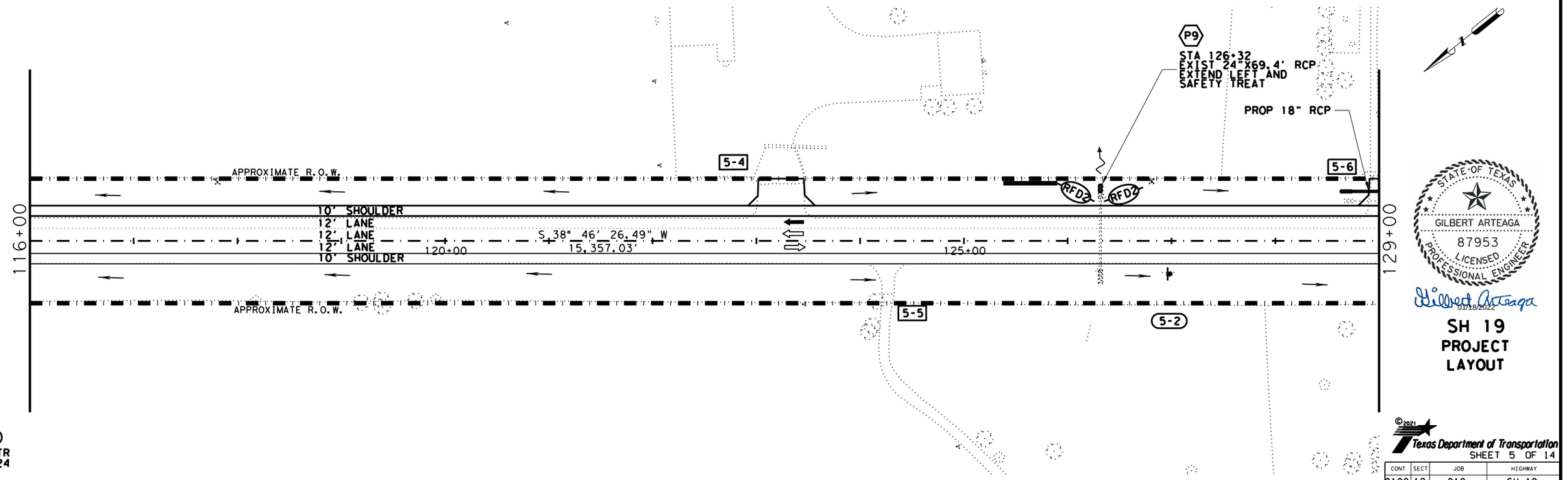


SIGN DESCRIPTIONS

5-1
M1-6T
24 X 24
D10-7aT
3 X 10
D10-7aT
3 X 10



5-2
D20-1TR
24 X 24

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SHEET 5 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		70

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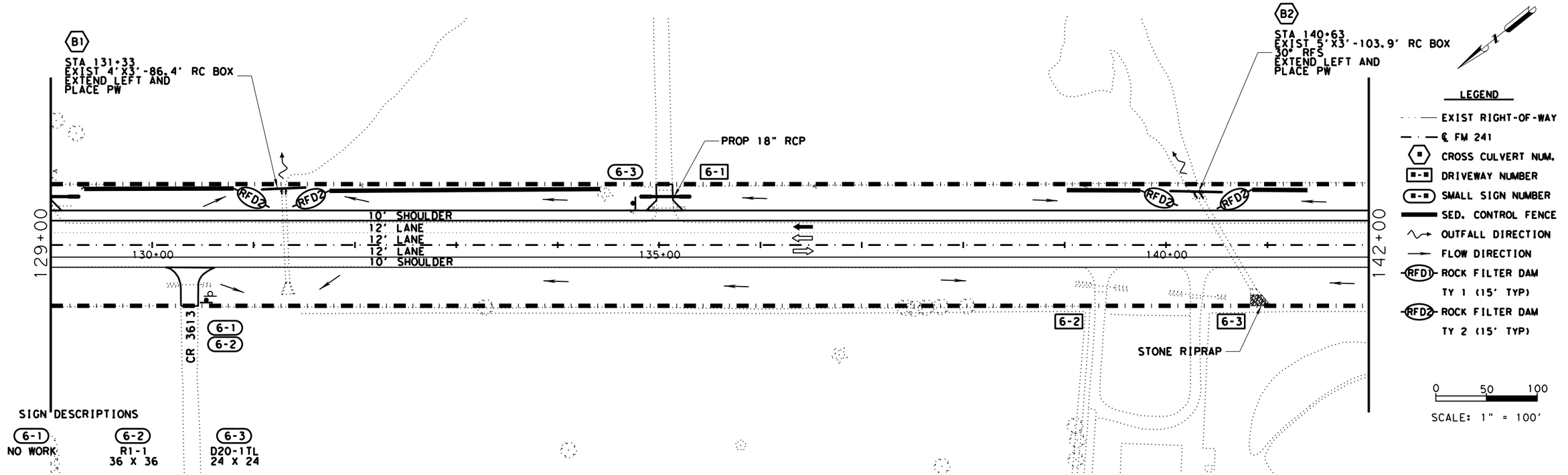

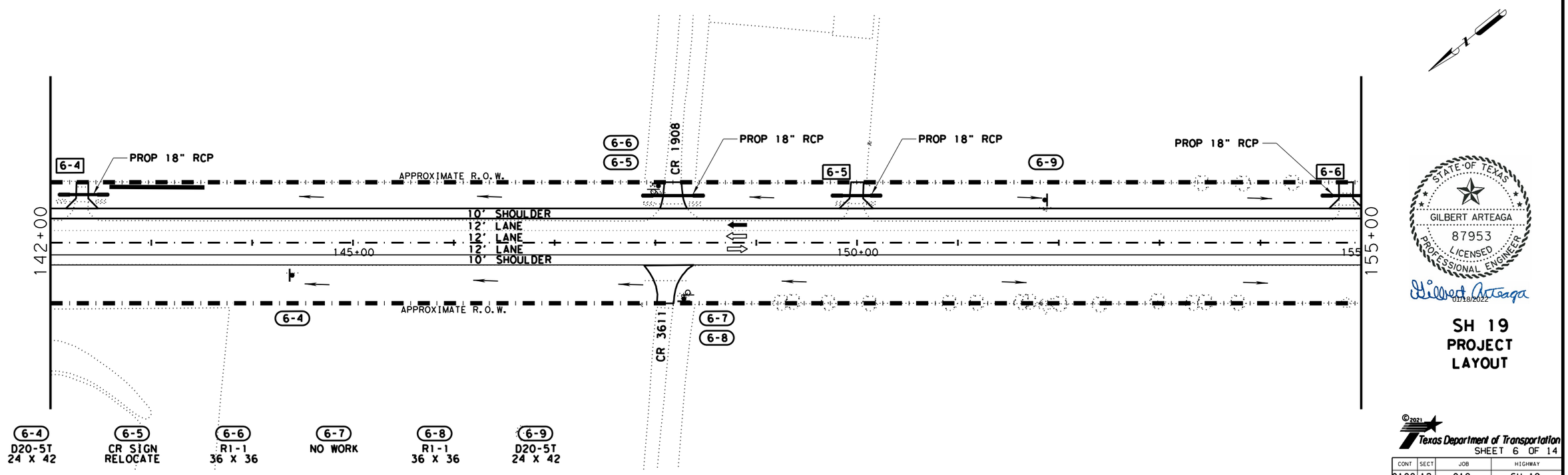

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SH 19 PROJECT LAYOUT

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SHEET 6 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		71

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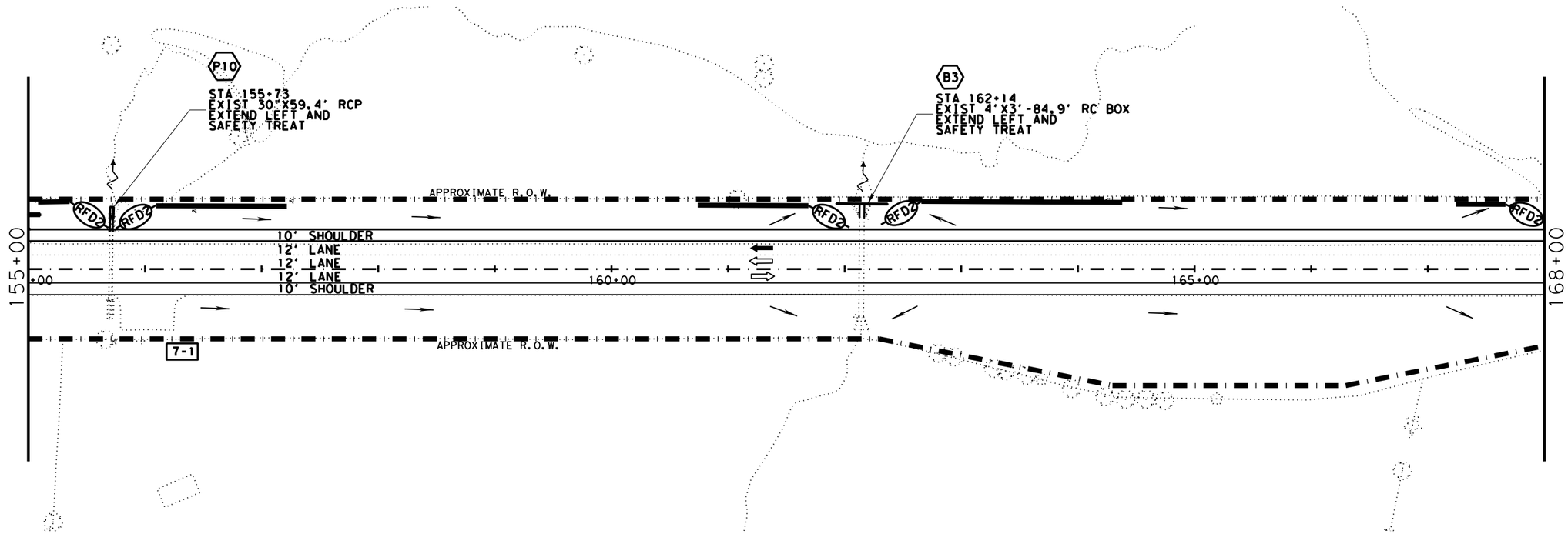
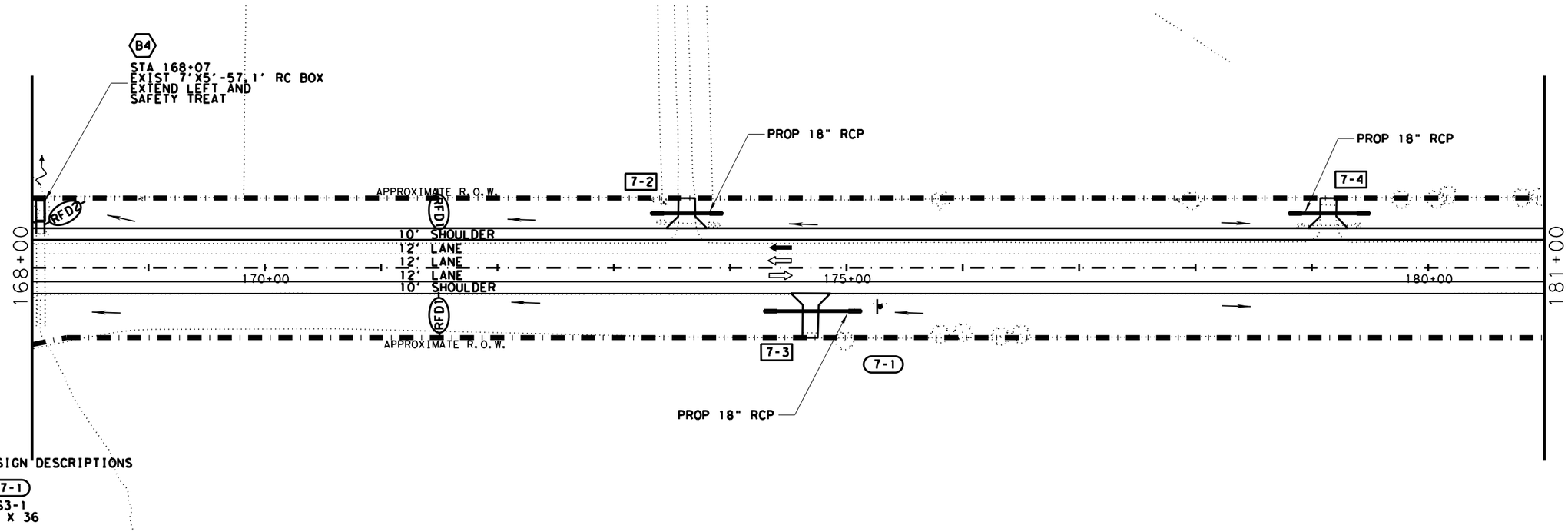


LEGEND

- EXIST RIGHT-OF-WAY
- ℄ FM 241
- CROSS CULVERT NUM.
- DRIVEWAY NUMBER
- SMALL SIGN NUMBER
- SED. CONTROL FENCE
- OUTFALL DIRECTION
- FLOW DIRECTION
- RFD1 ROCK FILTER DAM TY 1 (15' TYP)
- RFD2 ROCK FILTER DAM TY 2 (15' TYP)

0 50 100

SCALE: 1" = 100'



SIGN DESCRIPTIONS

7-1
S3-1
36 X 36

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SH 19 PROJECT LAYOUT

SHEET 7 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		72

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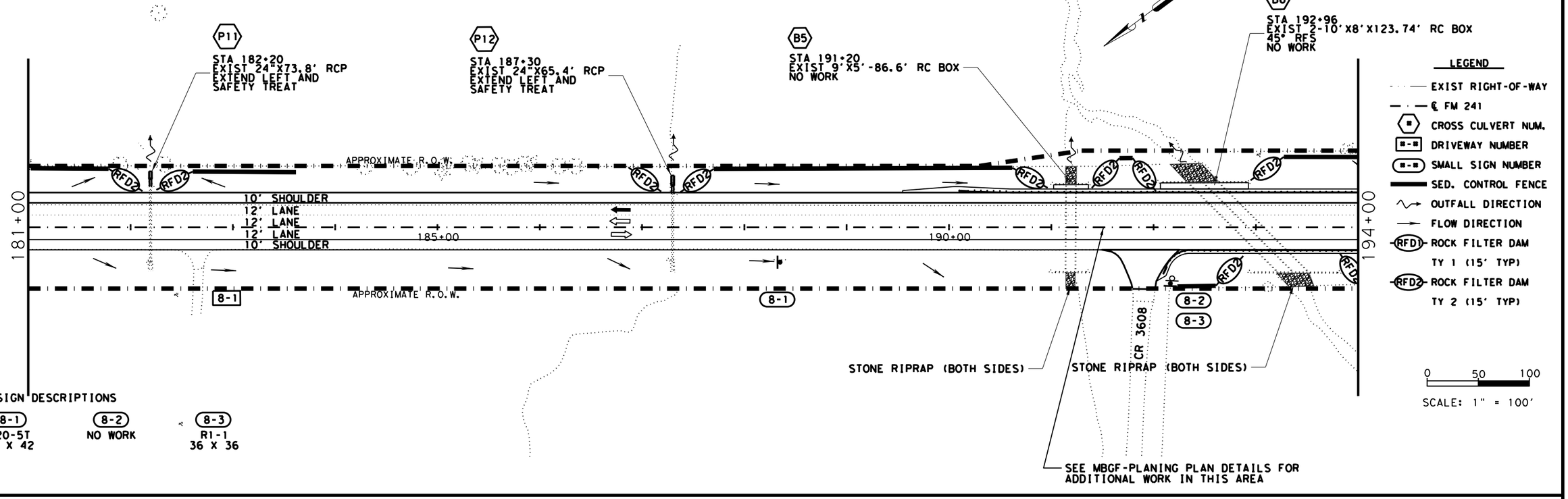

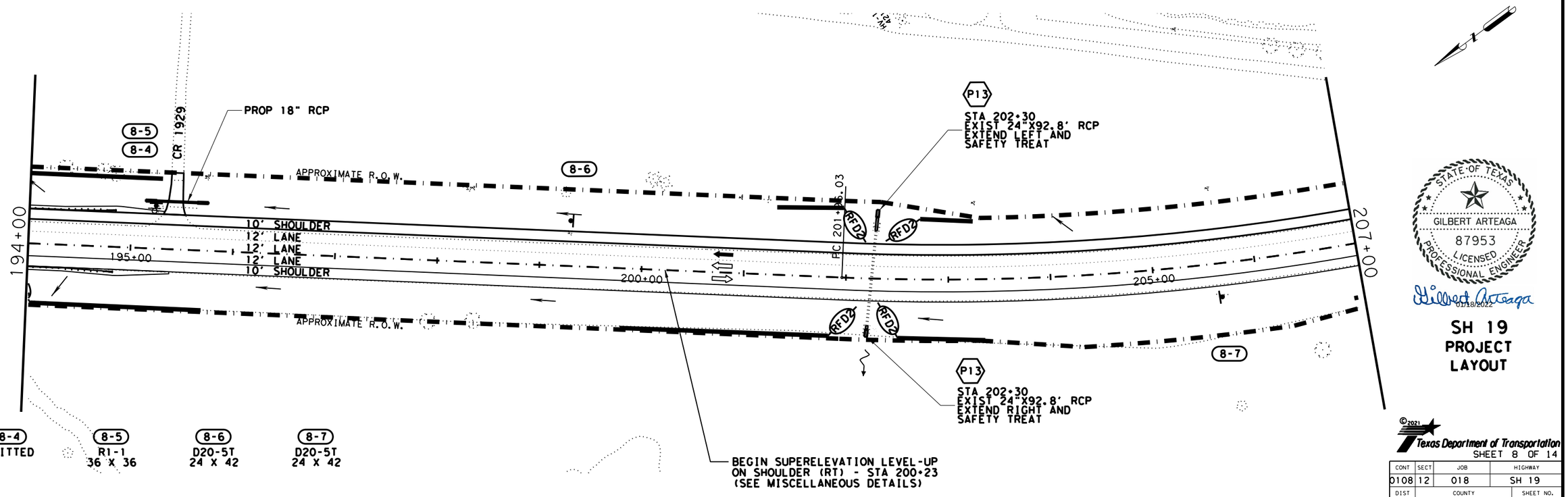

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01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		73

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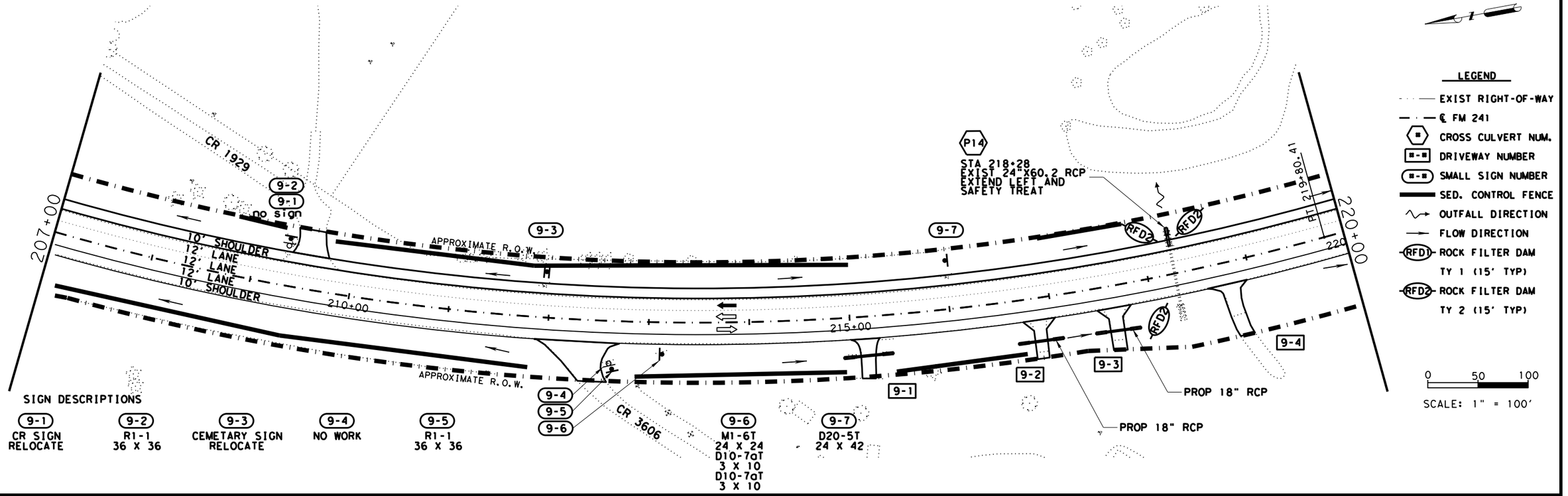
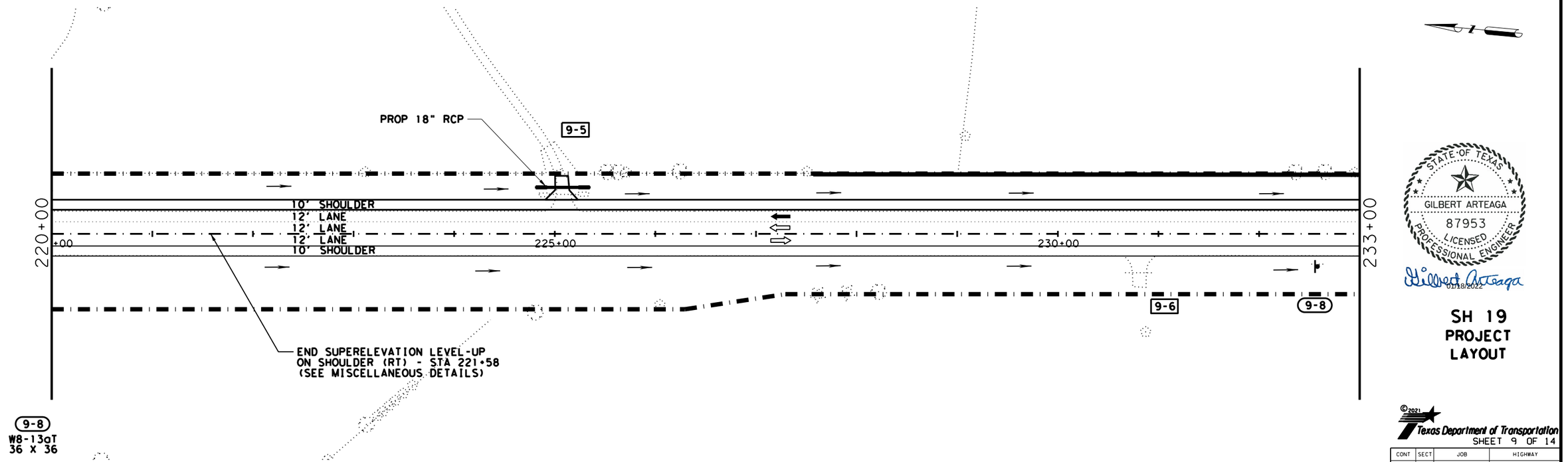


SIGN DESCRIPTIONS

9-1	9-2	9-3	9-4	9-5	9-6	9-7
CR SIGN RELOCATE	R1-1 36 X 36	CEMETARY SIGN RELOCATE	NO WORK	R1-1 36 X 36	M1-6T 24 X 24 D10-7aT 3 X 10 D10-7aT 3 X 10	D20-5T 24 X 42



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GILBERT ARTEAGA
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PROFESSIONAL ENGINEER
01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 9 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		74

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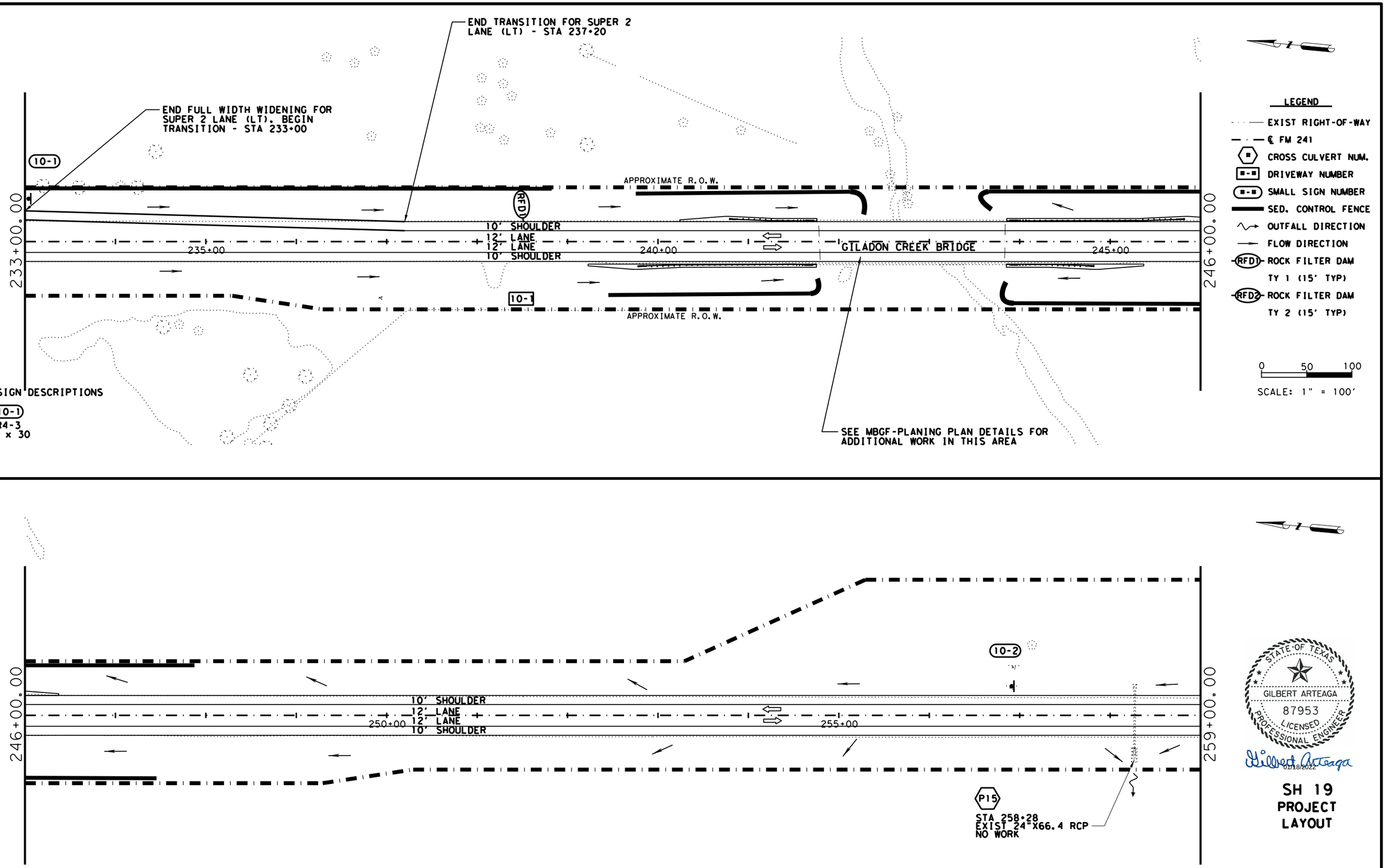

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STATE OF TEXAS
GILBERT ARTEAGA
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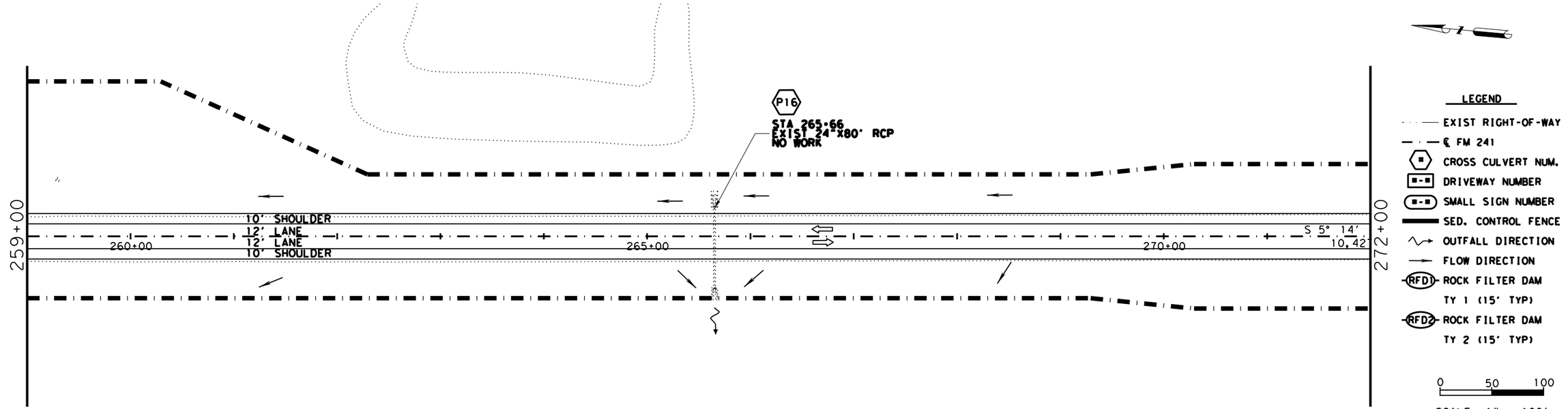
Gilbert Arteaga
01/18/2022

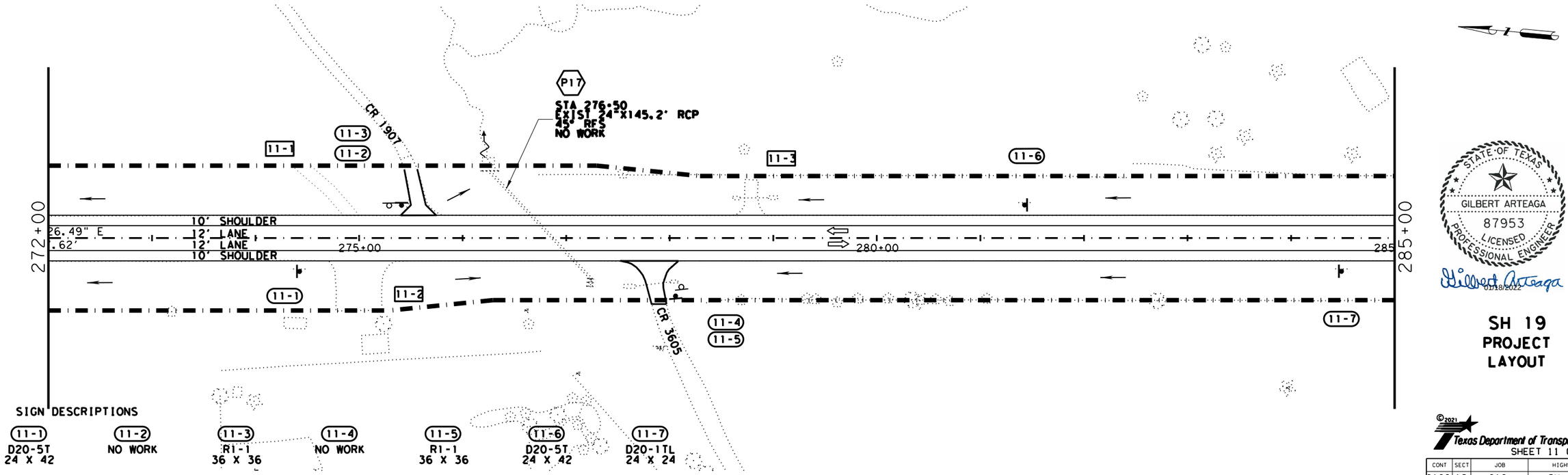
SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 10 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		75





GILBERT ARTEAGA
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STATE OF TEXAS
01/18/2022

SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 11 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		76

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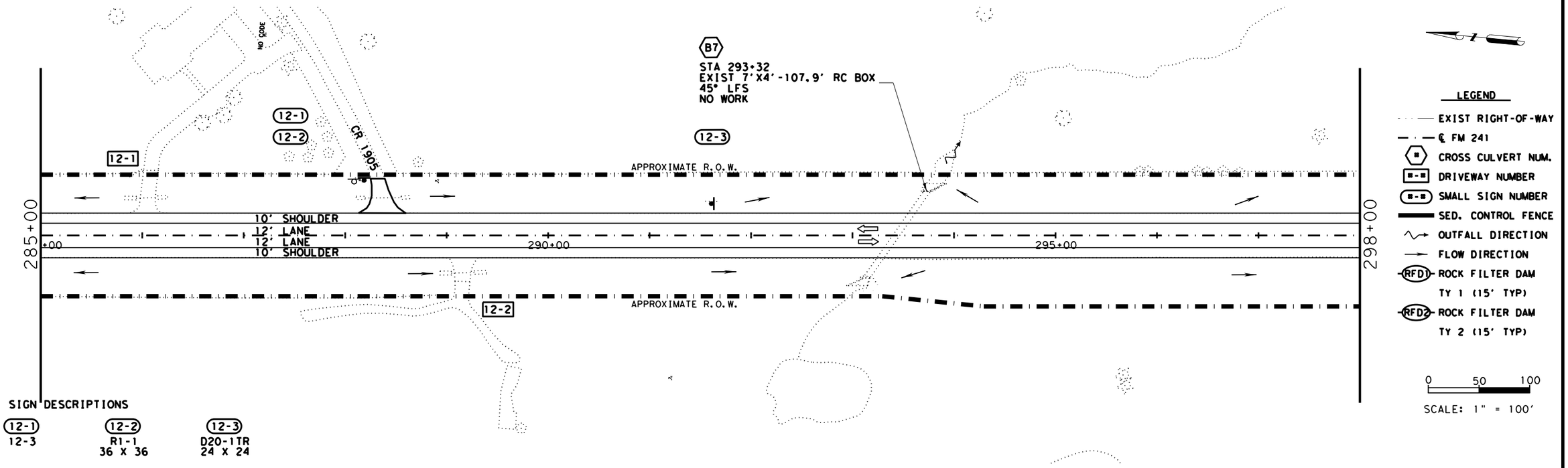
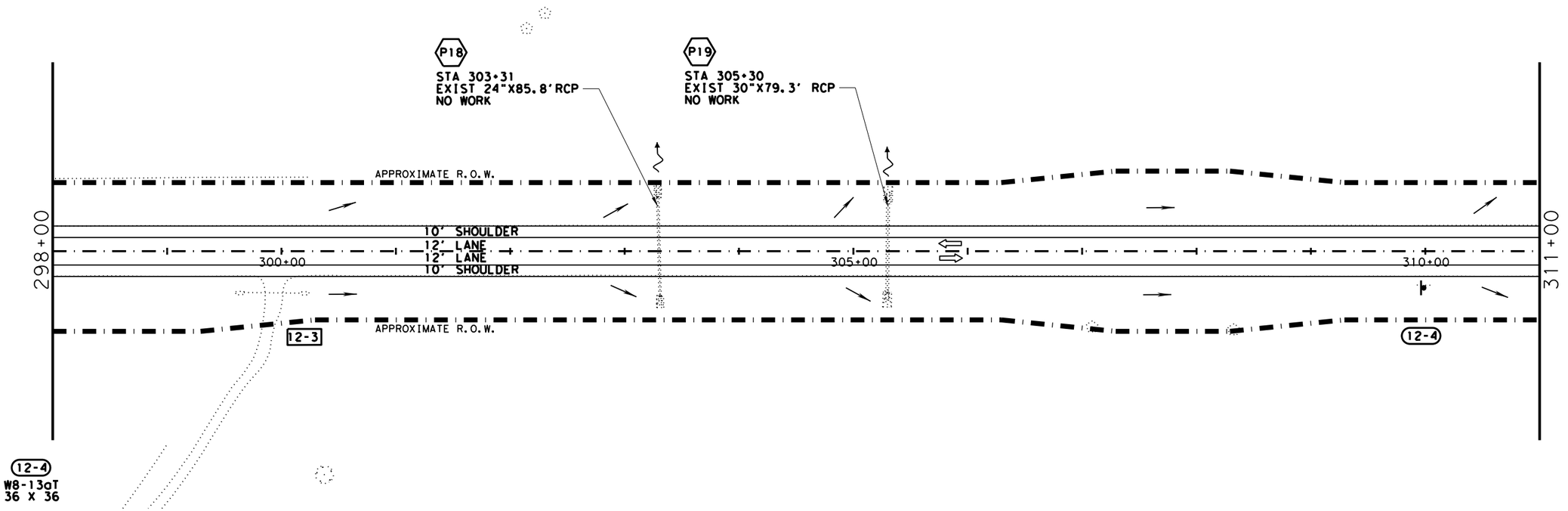


SIGN DESCRIPTIONS

12-1	12-2	12-3
12-3	R1-1 36 X 36	D20-1TR 24 X 24



12-4
W8-13aT
36 X 36

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SH 19 PROJECT LAYOUT

Texas Department of Transportation
SHEET 12 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		77

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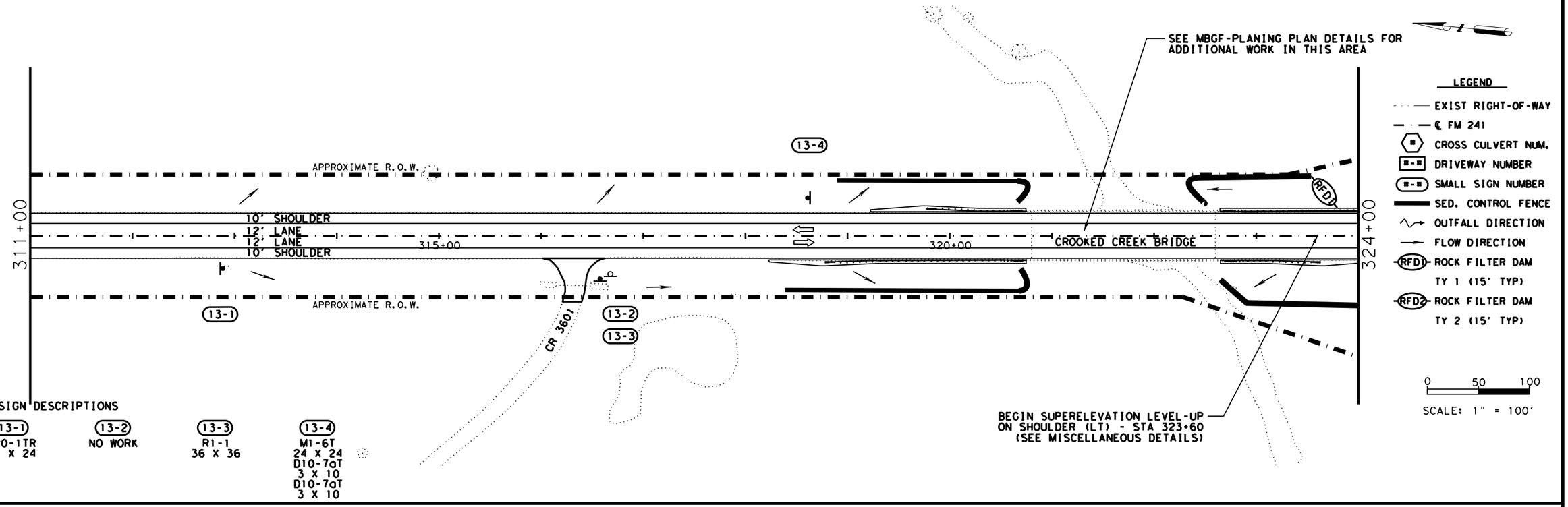

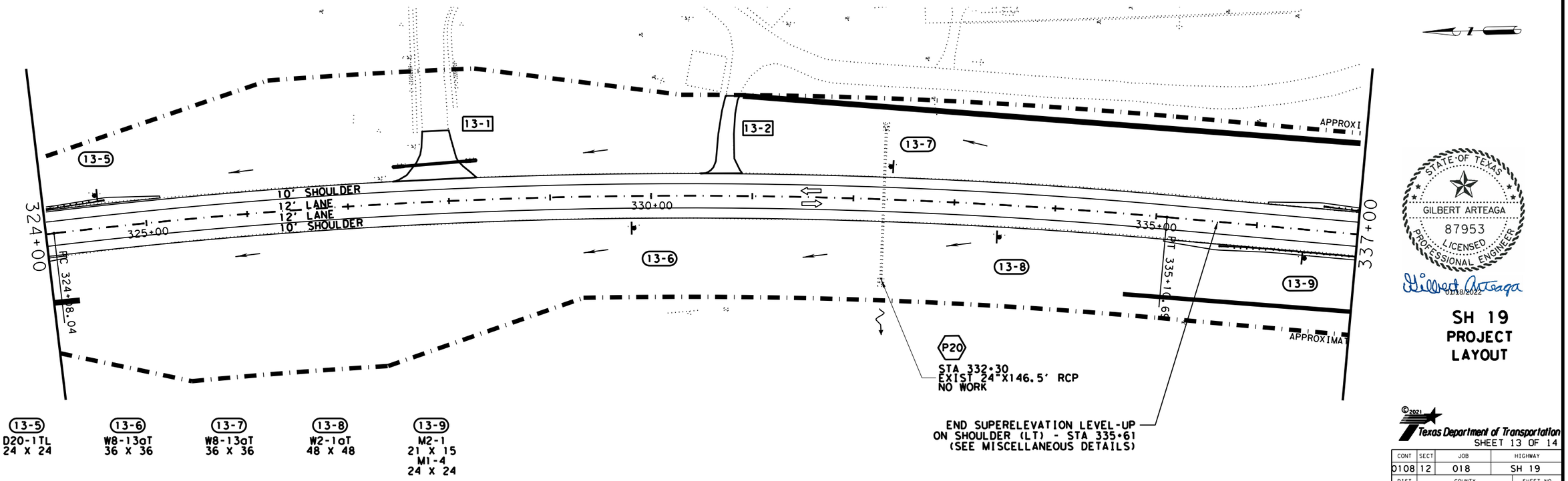

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SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 13 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		78

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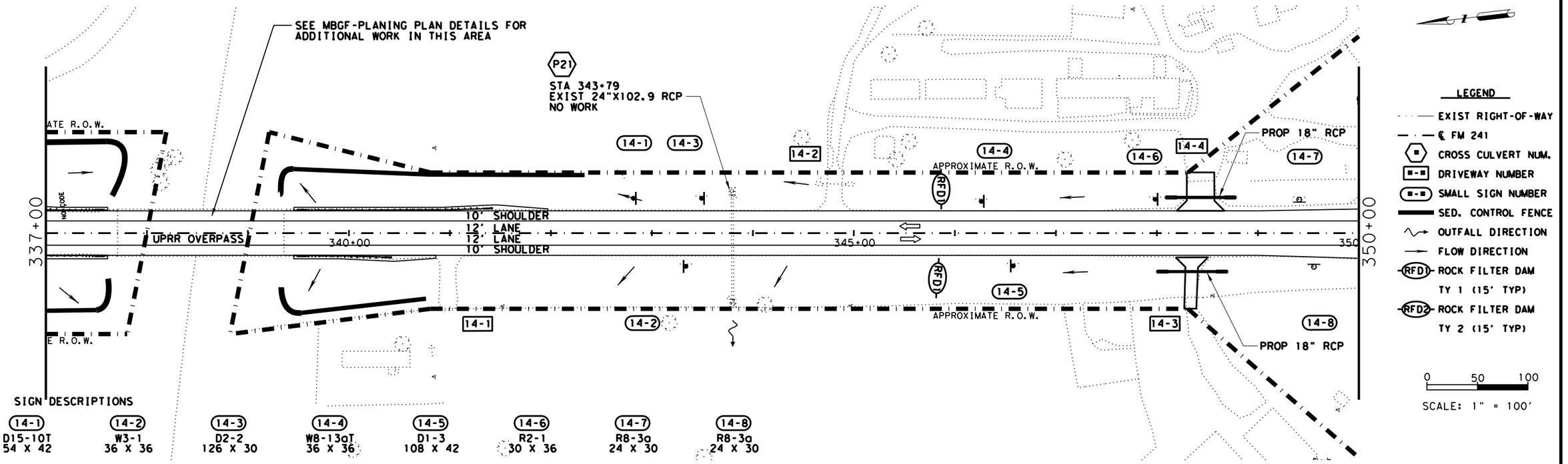

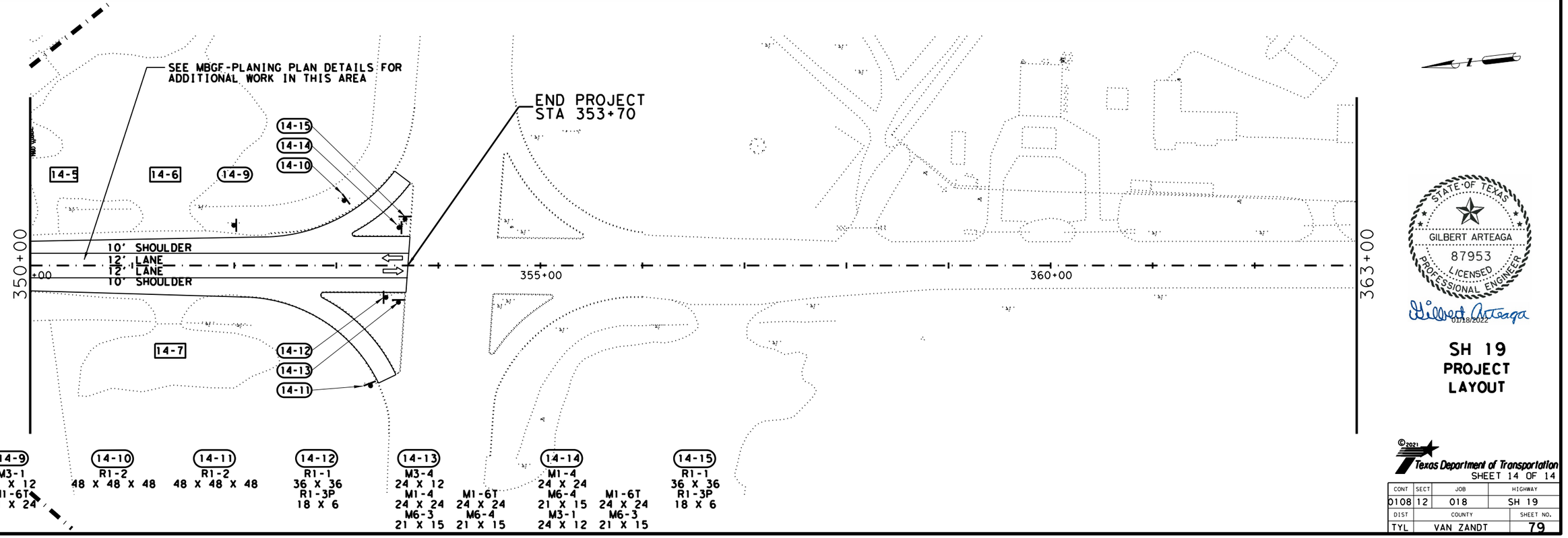

STATE OF TEXAS
GILBERT ARTEAGA
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SH 19 PROJECT LAYOUT

Texas Department of Transportation

SHEET 14 OF 14

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		79

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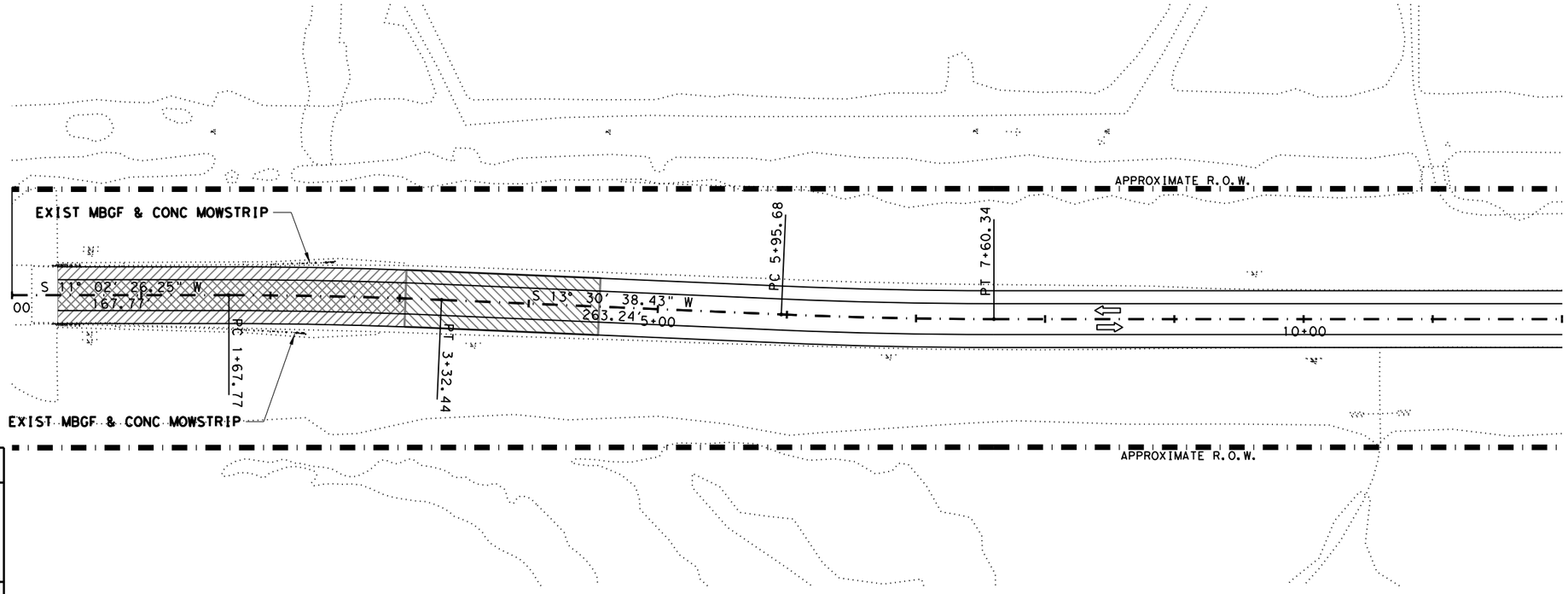
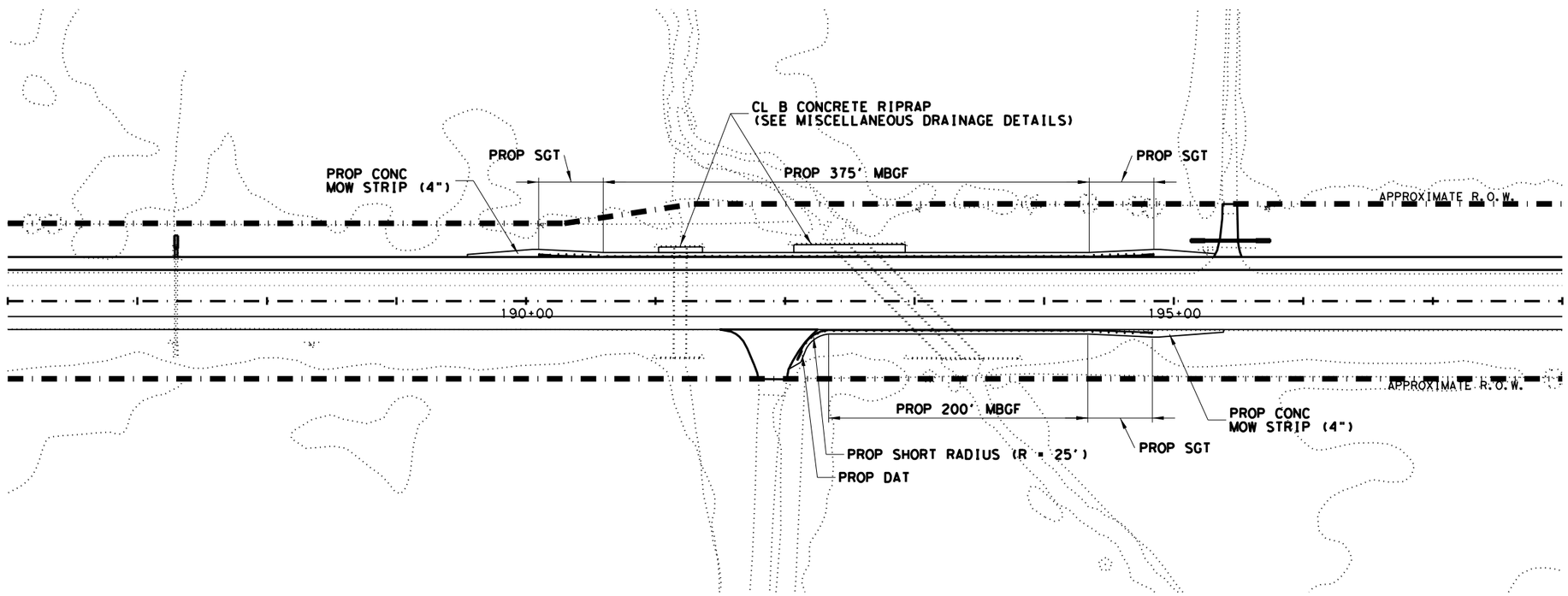


PAVEMENT PLANING LEGEND @ SABINE RIVER BRIDGE	
PLANING DEPTH	
1.5"	
0-1.5"	
6"	
SEE PLANING SUMMARY FOR STATION LIMITS	

* SEE CONSTRUCTION SEQUENCE FOR DESCRIPTION OF PROPOSED WORK

0 50 100

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



STATE OF TEXAS
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01/18/2022

SH 19
MBGF-PLANING PLAN DETAILS

Texas Department of Transportation

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		80

DATE: 1/12/2022 3:34:12 PM
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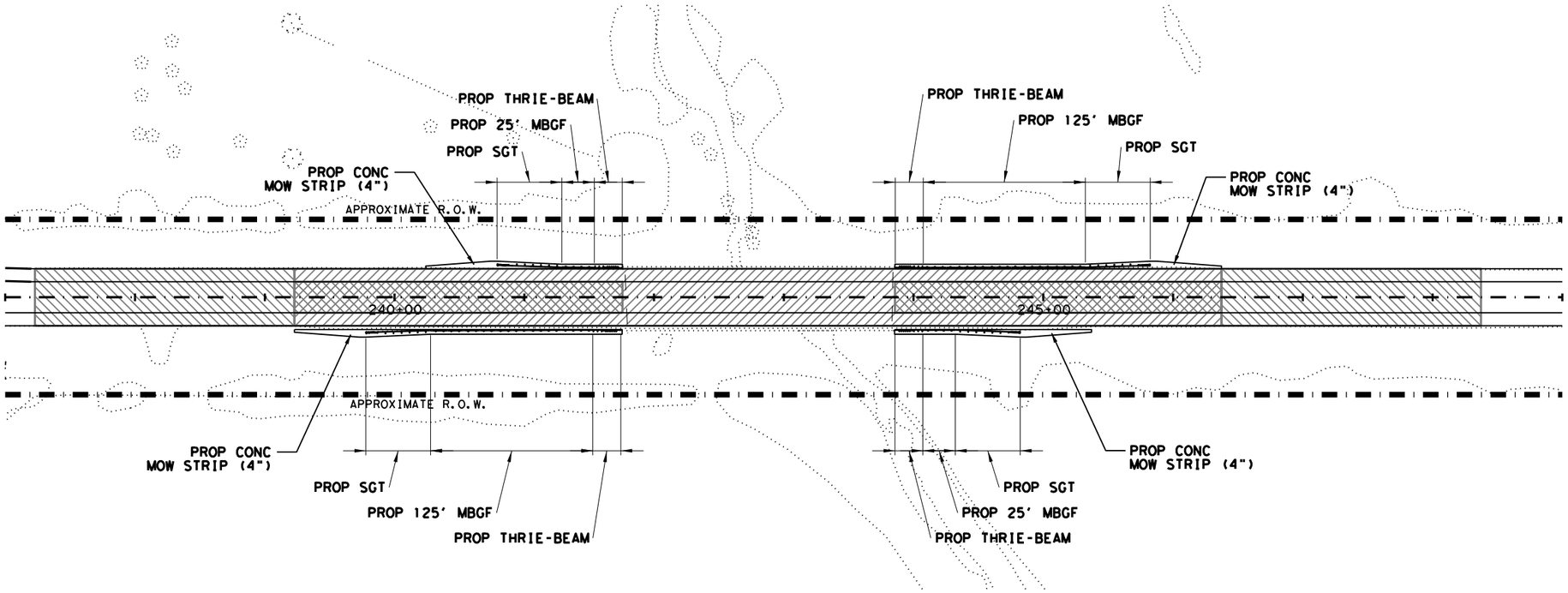


PAVEMENT PLANING LEGEND @ GILADON CREEK BRIDGE	
PLANING DEPTH	
2"	
0-2"	
6"	
SEE PLANING SUMMARY FOR STATION LIMITS	

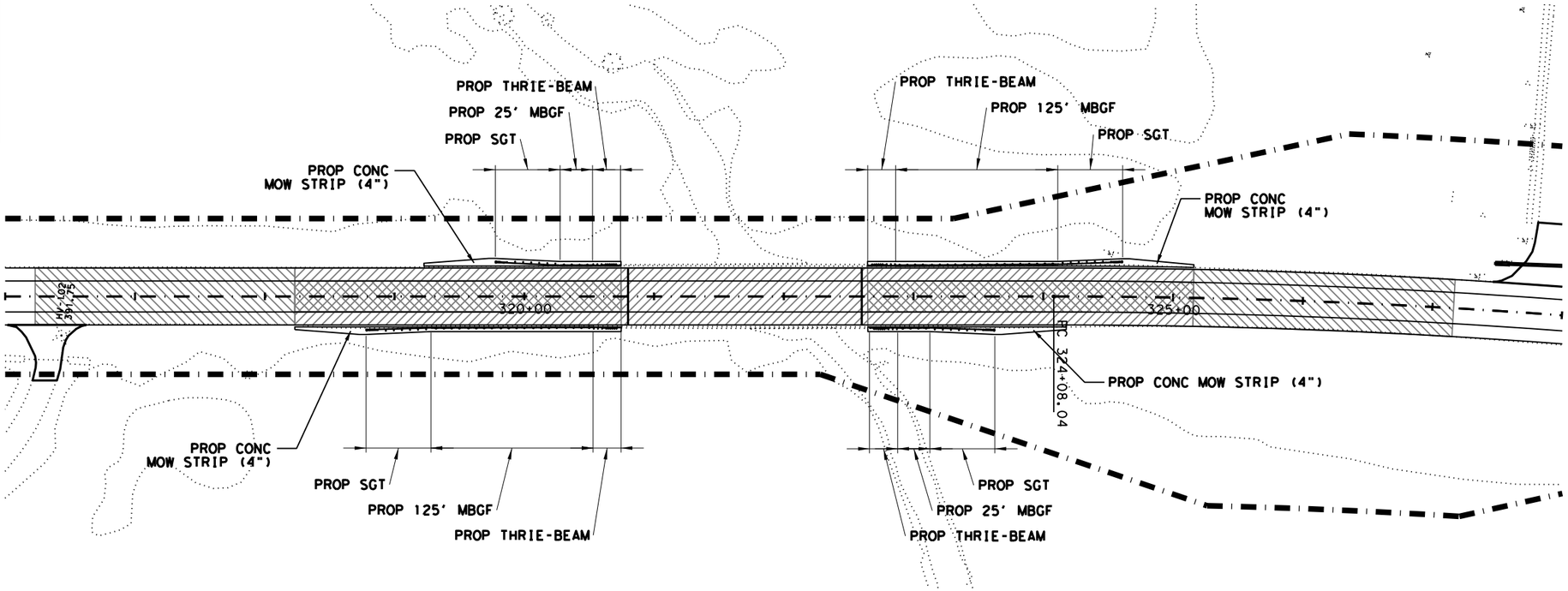
0 50 100

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

* SEE CONSTRUCTION SEQUENCE FOR DESCRIPTION OF PROPOSED WORK

PAVEMENT PLANING LEGEND @ CROOKED CREEK BRIDGE	
PLANING DEPTH	
2"	
0-2"	
6"	
SEE PLANING SUMMARY FOR STATION LIMITS	

* SEE CONSTRUCTION SEQUENCE FOR DESCRIPTION OF PROPOSED WORK



STATE OF TEXAS
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PROFESSIONAL ENGINEER
Gilbert Arteaga
01/18/2022

SH 19
MBGF-PLANING PLAN DETAILS

Texas Department of Transportation

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		81

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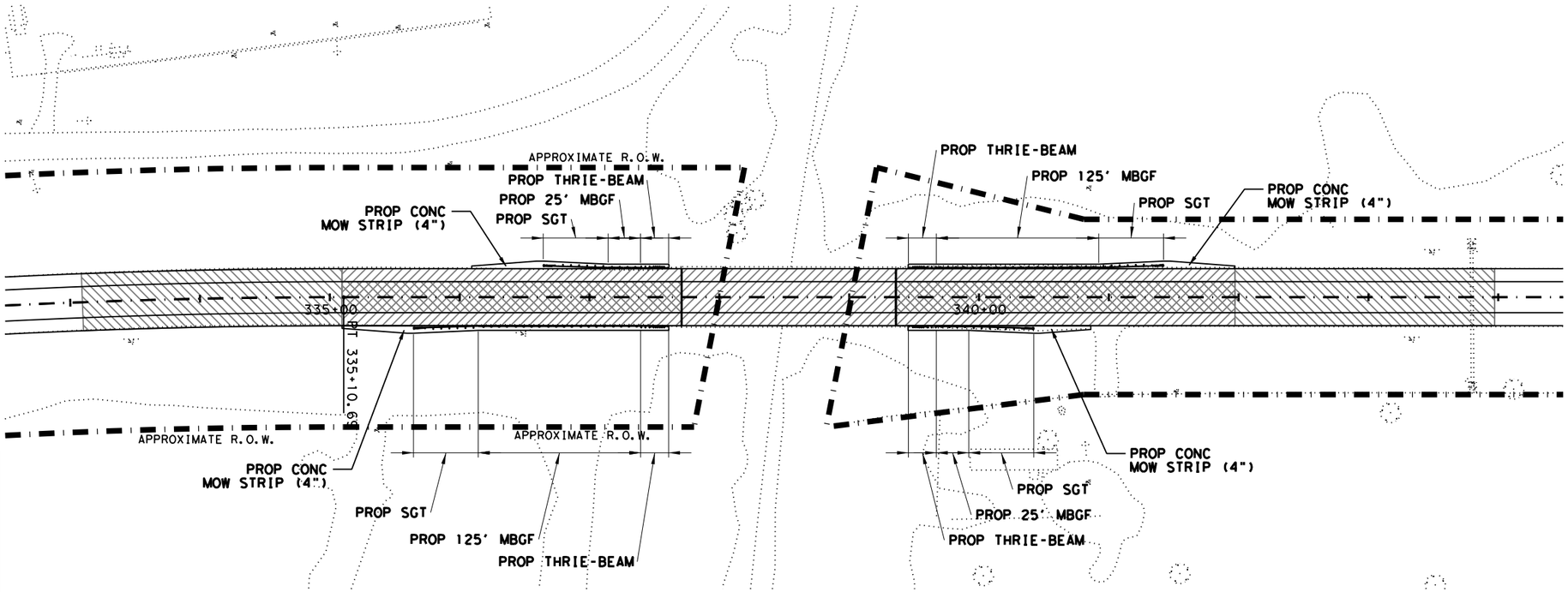


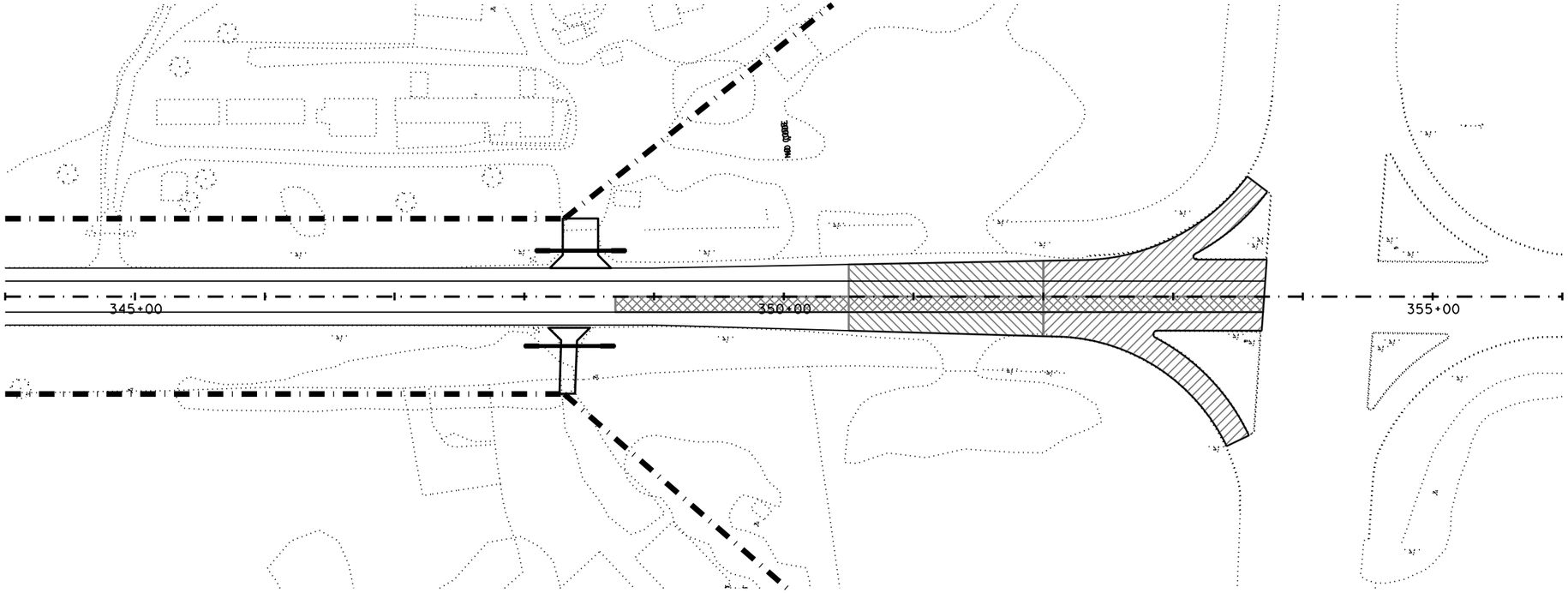
PAVEMENT PLANING LEGEND @ UPRR OVERPASS BRIDGE	
PLANING DEPTH	
2"	
0-2"	
6"	
SEE PLANING SUMMARY FOR STATION LIMITS	

* SEE CONSTRUCTION SEQUENCE FOR DESCRIPTION OF PROPOSED WORK

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

PAVEMENT PLANING LEGEND @ US 80 INTERSECTION	
PLANING DEPTH	
1.5"	
0-1.5"	
6"	
SEE PLANING SUMMARY FOR STATION LIMITS	

* SEE CONSTRUCTION SEQUENCE FOR DESCRIPTION OF PROPOSED WORK



STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
MBGF-PLANING PLAN DETAILS

Texas Department of Transportation
SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		82

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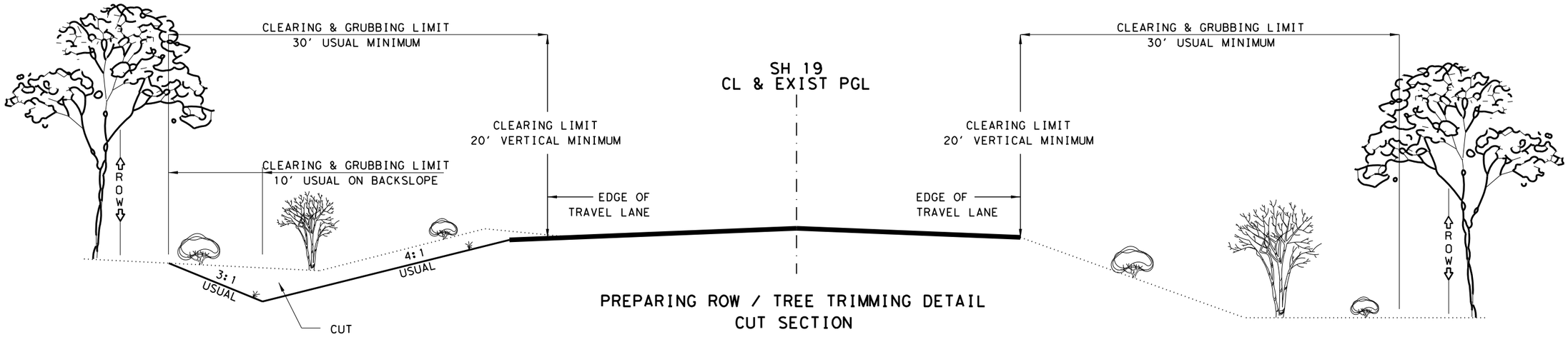
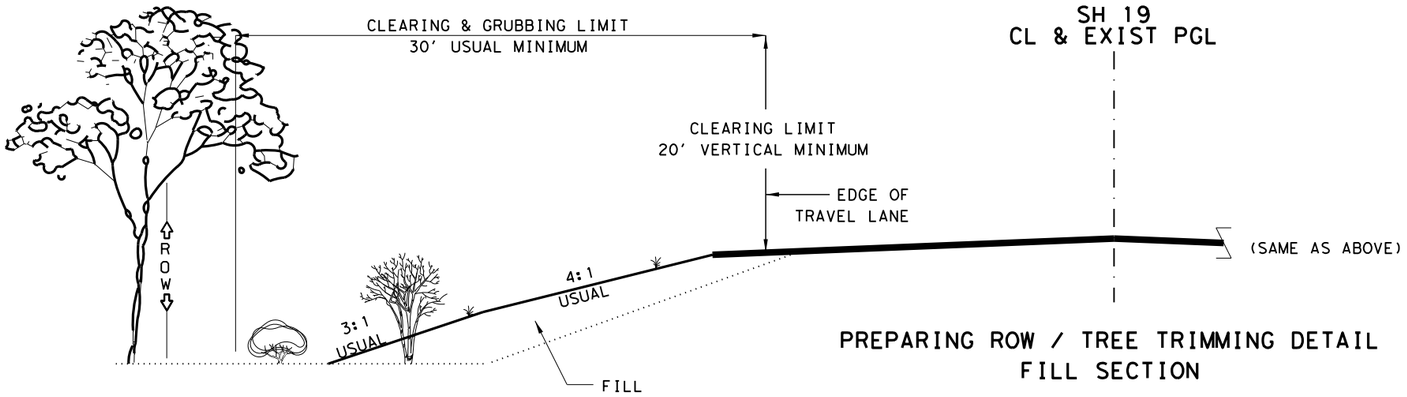


PREPARING ROW / TREE TRIMMING DETAIL
CUT SECTION

ALL TRIMMING APPLIES
TO BOTH SIDES OF ROADWAY



PREPARING ROW / TREE TRIMMING DETAIL
FILL SECTION

ALL TRIMMING APPLIES
TO BOTH SIDES OF ROADWAY

PREPARING ROW DETAILS

NOTES:

1) ALL TREE LIMBS EXTENDING INTO THE CLEARING LIMITS SHALL BE REMOVED TO A MINIMUM HEIGHT OF 20' ABOVE THE PAVEMENT SURFACE, UNLESS OTHERWISE SHOWN ON PLANS.
2) CLEARING OPERATIONS SHALL BE PERFORMED IN ACCORDANCE TO ITEM 100, "PREPARING RIGHT OF WAY", EXCEPT THOSE SHOWN BY THESE DETAILS.
3) PAYMENT WILL BE MADE AT THE UNIT PRICE BID FOR PREPARING RIGHT OF WAY BY THE STATION. STATION LIMITS WILL BE SHOWN ELSEWHERE IN THE PLANS.
4) IF FRONT SLOPE IS STEEPER THAN 4:1 IN FILL SECTION, THEN A MINIMUM OF 7' FROM THE TOE OF SLOPE SHALL BE CLEARED TO PROVIDE A SAFETY RECOVERY ZONE.
5) WHERE STEEP SLOPES MAKE GRINDING OPERATIONS IMPRACTICAL, AND THE ENGINEER APPROVES IN WRITING, THE CONTRACTOR MAY CUT STUMPS OFF EVEN WITH THE GROUND.

NOT TO SCALE

STATE OF TEXAS
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01/18/2022

SH 19
MISCELLANEOUS DETAILS

Texas Department of Transportation

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		83

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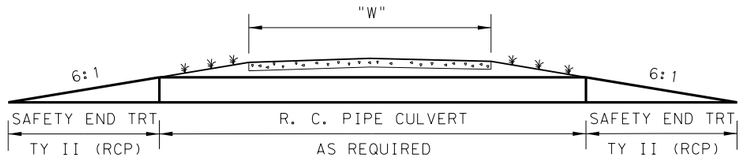
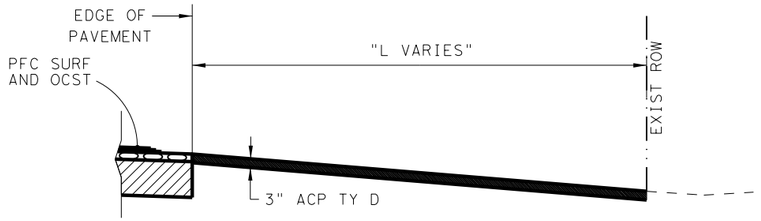
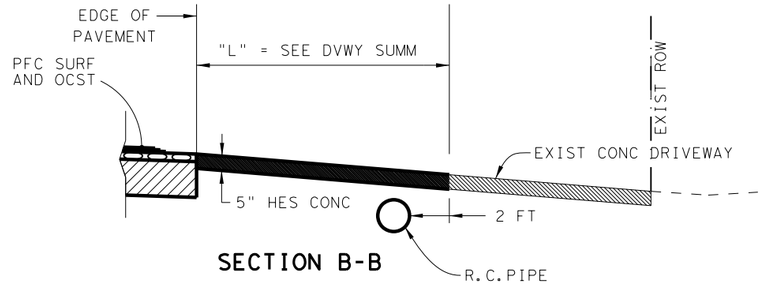


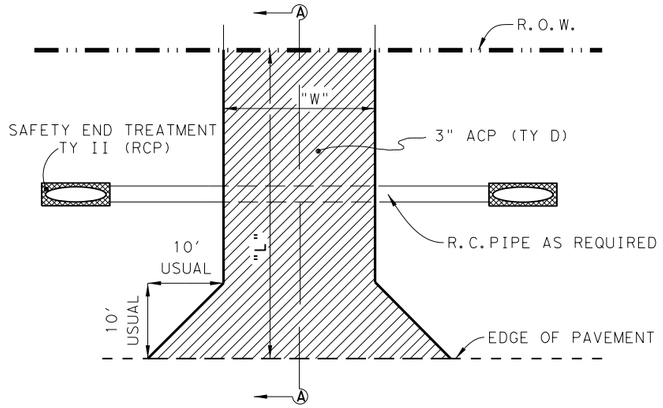
TYPICAL SECTION



SECTION A-A

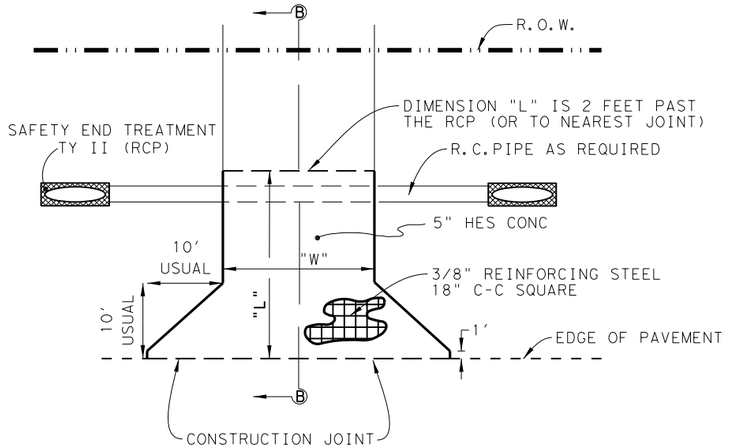


SECTION B-B



DRIVEWAY DETAILS
EXIST ASPHALT DRIVEWAYS
NOT TO SCALE

NOTE: SEE SUMMARY OF DRIVEWAYS & INTERSECTIONS TABLE FOR "L" DIMENSION



DRIVEWAY DETAILS
EXIST CONCRETE DRIVEWAYS
NOT TO SCALE

NOTE: SEE SUMMARY OF DRIVEWAYS & INTERSECTIONS TABLE FOR "L" DIMENSION

STATE OF TEXAS
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SH 19 MISCELLANEOUS DETAILS

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		84

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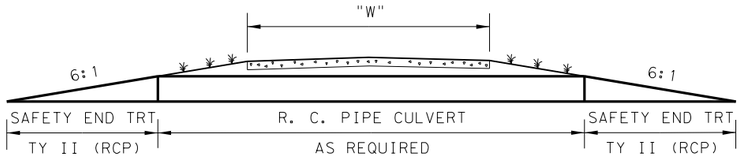
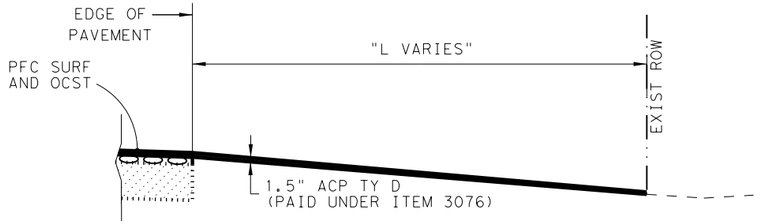
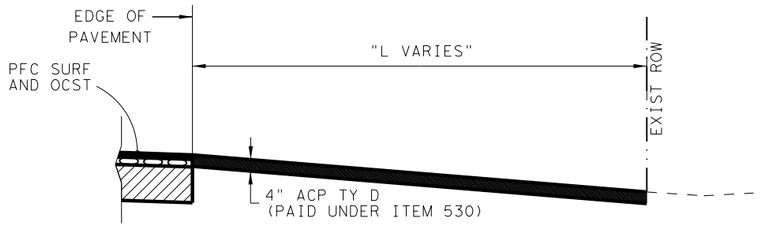


TYPICAL SECTION



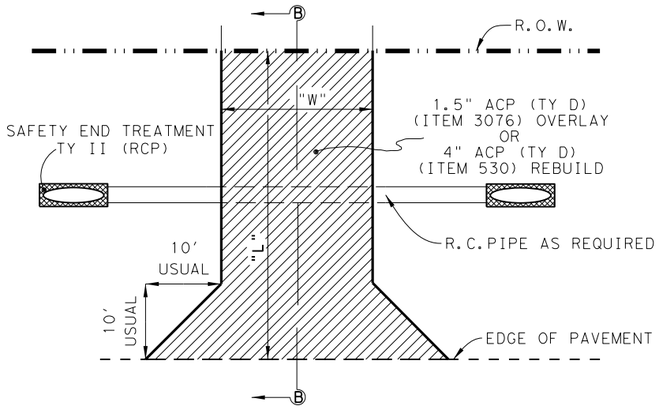
SECTION B-B

INTERSECTION RECEIVING OVERLAY ONLY



SECTION B-B

INTERSECTION REBUILT TO MATCH NEW EOP ELEVATION



INTERSECTION DETAILS
EXIST ASPHALT INTERSECTION

NOT TO SCALE

NOTE: SEE SUMMARY OF DRIVEWAYS & INTERSECTIONS TABLE FOR "L" DIMENSION

STATE OF TEXAS
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01/18/2022

SH 19
MISCELLANEOUS DETAILS

Texas Department of Transportation

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		85

DATE: 1/12/2022 3:34:26 PM
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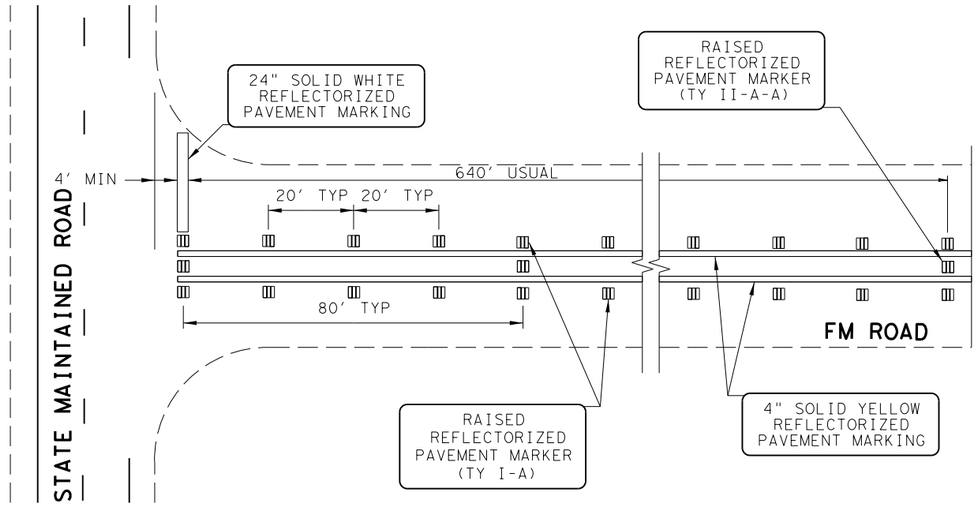
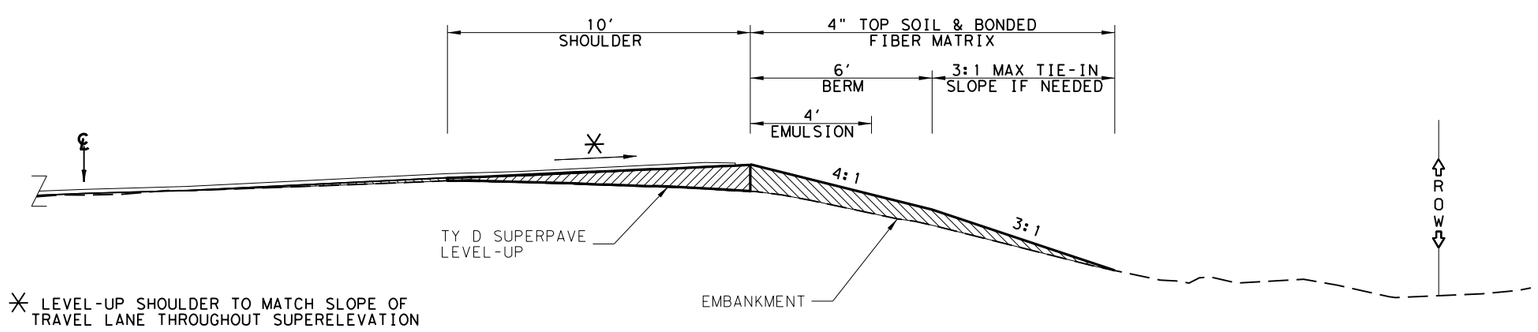


PAVEMENT MARKING TREATMENT AT STATE MAINTAINED ROADS

NOT TO SCALE



SUPERELEVATION LEVEL-UP & SLOPE CORRECTION DETAIL

SEE SUMMARY TABLES FOR LOCATIONS & QUANTITIES

ALL DRAWINGS NOT TO SCALE

STATE OF TEXAS
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PROFESSIONAL ENGINEER
01/18/2022

SH 19 MISCELLANEOUS DETAILS

Texas Department of Transportation

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		86

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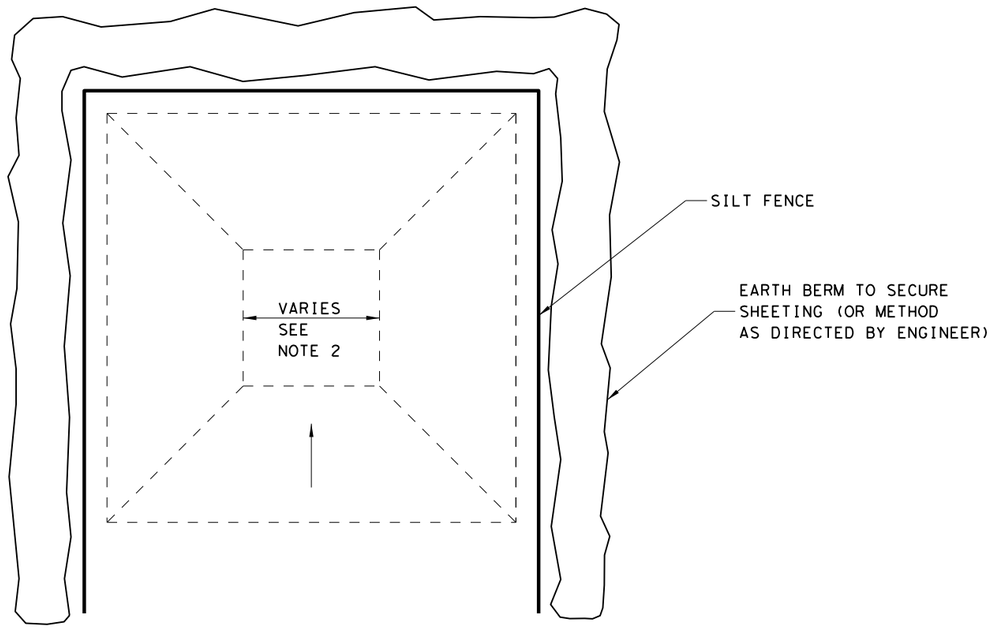

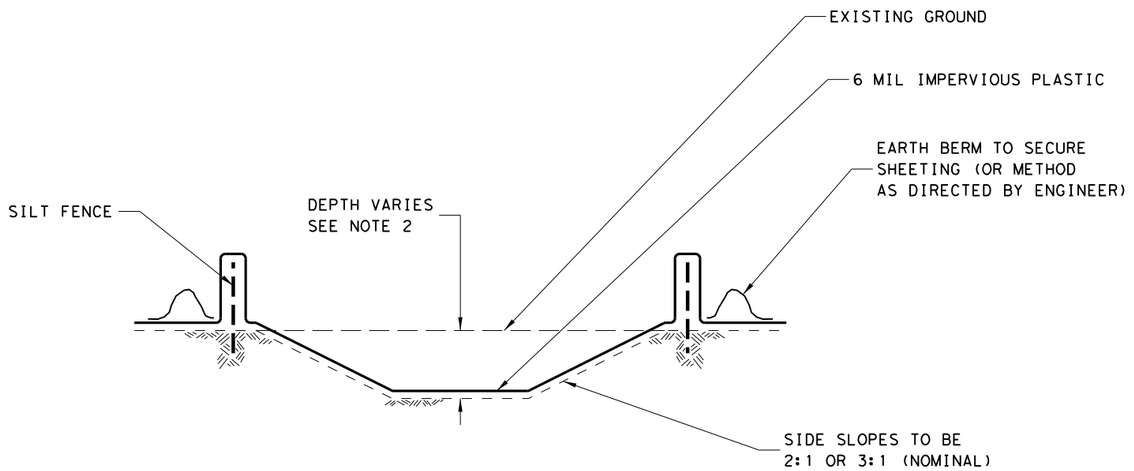

CONCRETE WASHOUT AREA

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.

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SH 19 MISCELLANEOUS DETAILS

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SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		87

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DATE: 1/12/2022 3:42:43 PM
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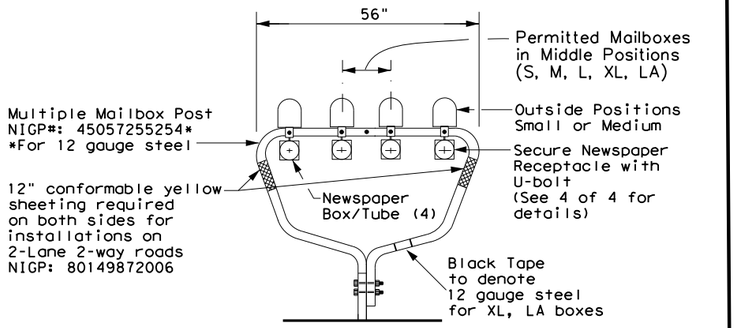
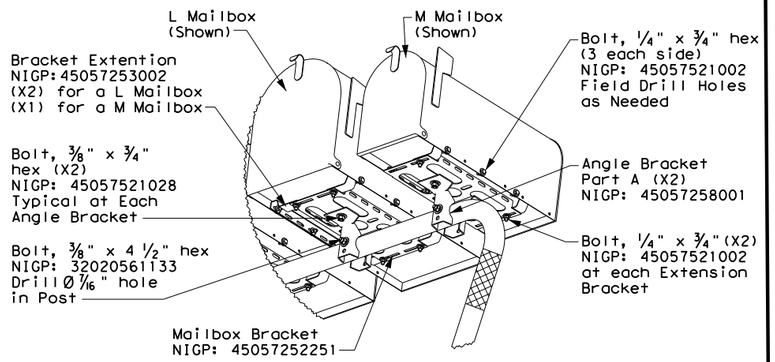
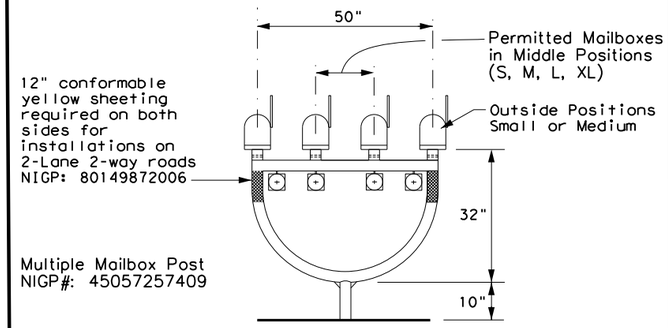
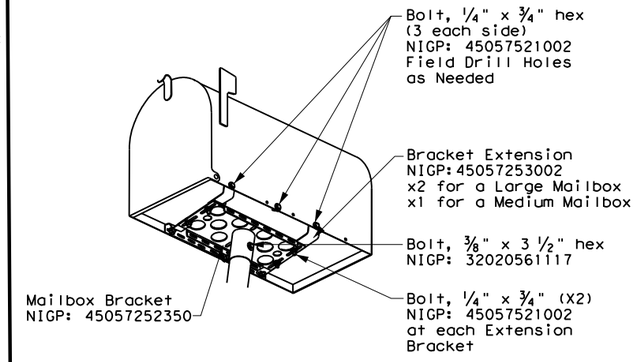
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

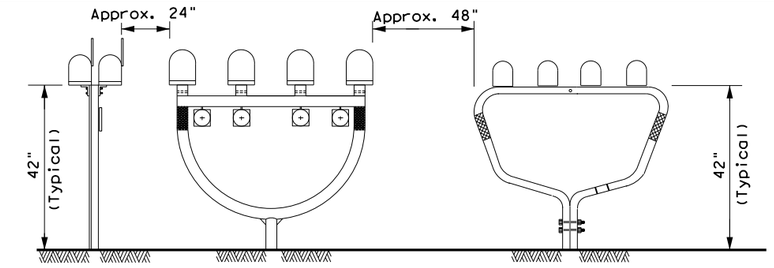
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

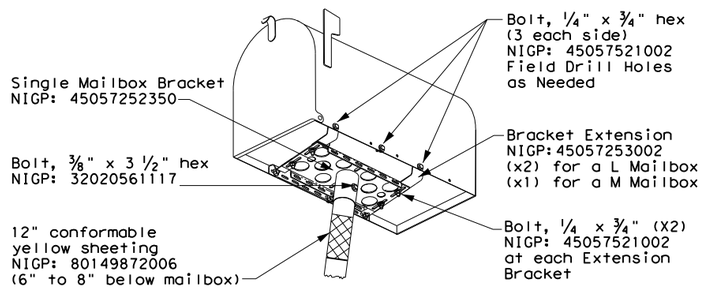
TYPICAL INSTALLATION MEASUREMENTS

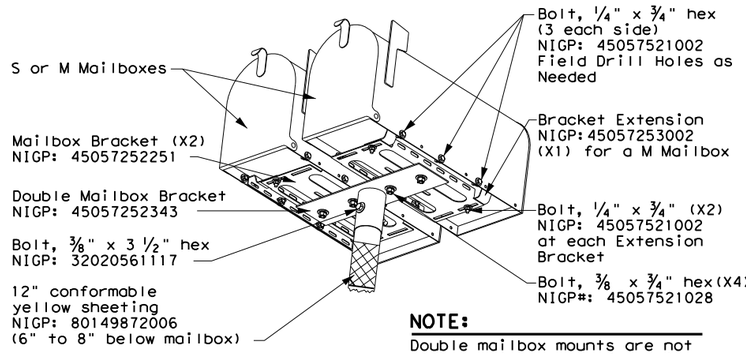


NOTE:

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

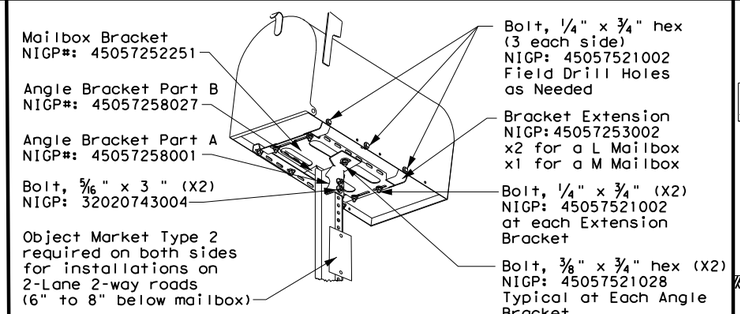


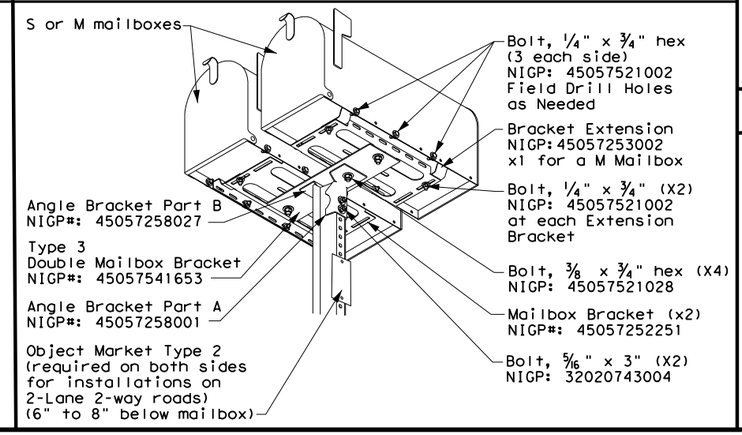


NOTE:

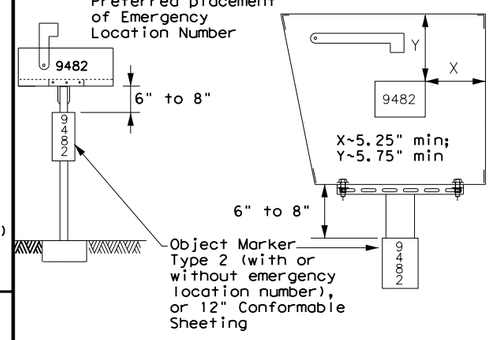
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

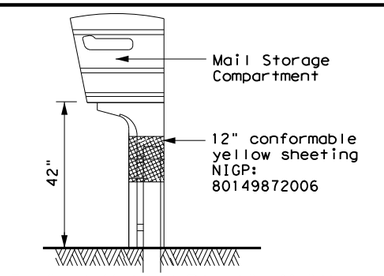


NOTES:

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

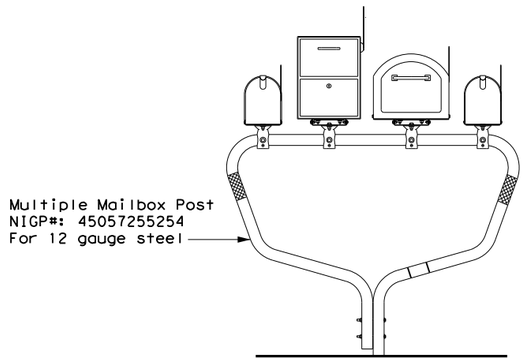
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

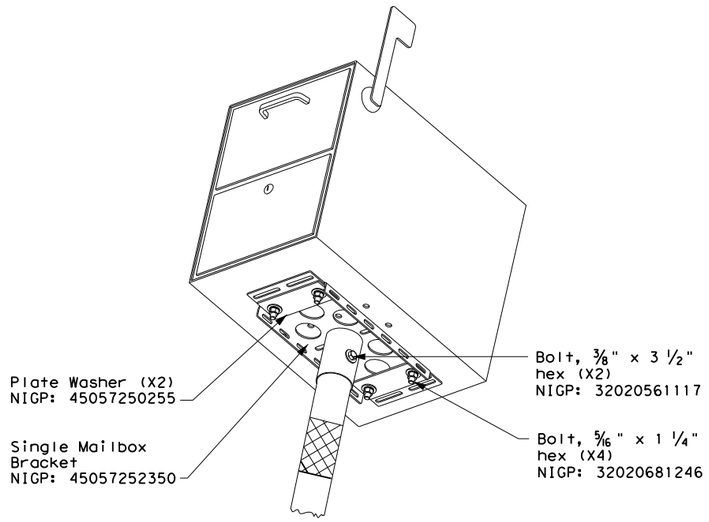
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		88

DATE: 1/12/2022 3:42:43 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0170455\SH19_RDW_MB-21(1).dgn

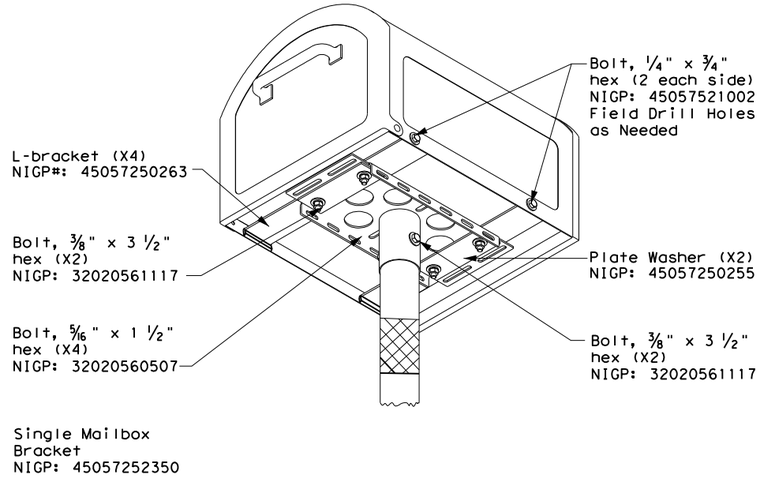
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

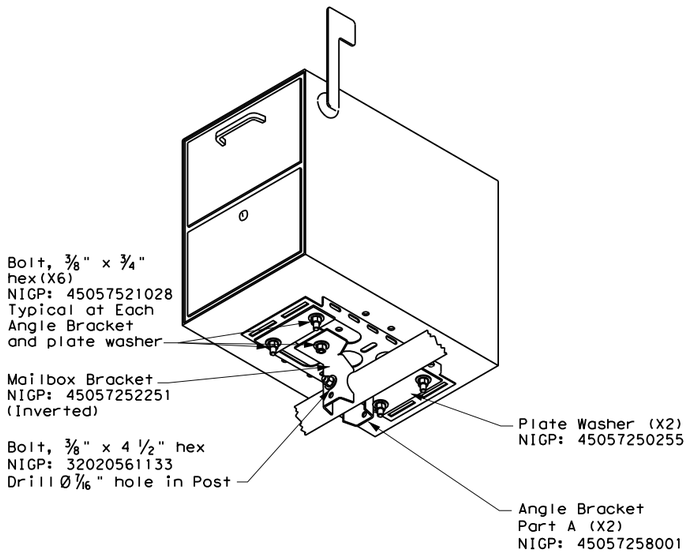


TYPE 2/4 - SINGLE XL MAILBOX

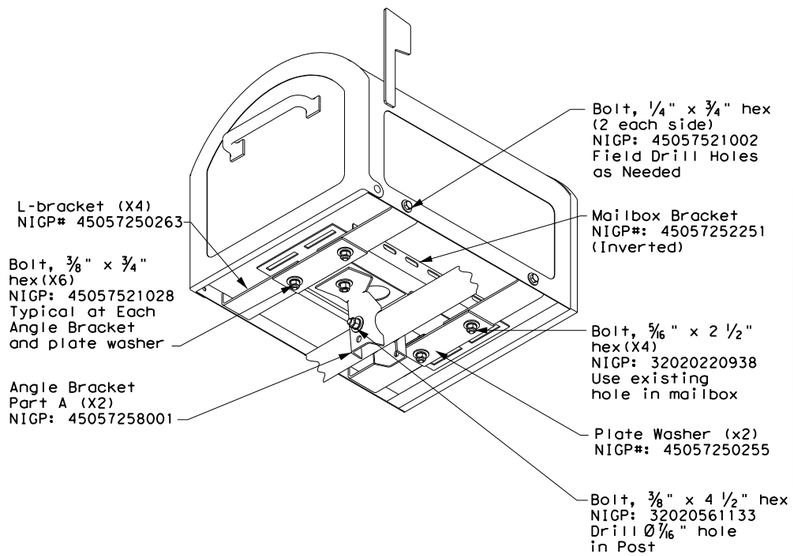


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

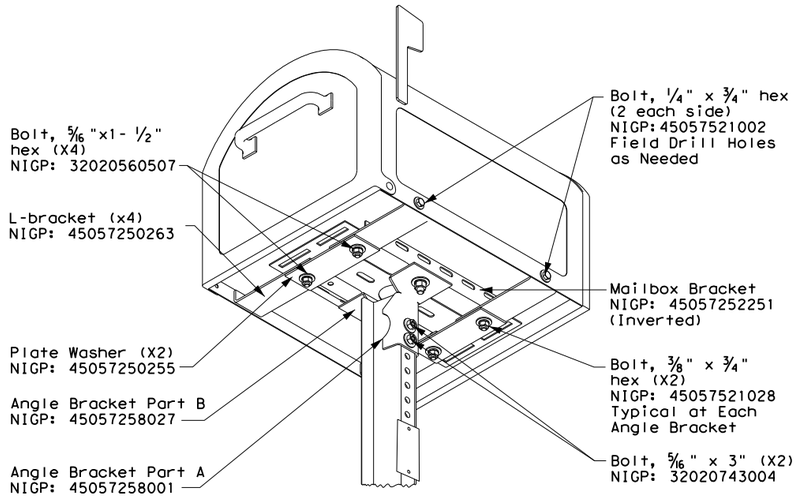
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



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
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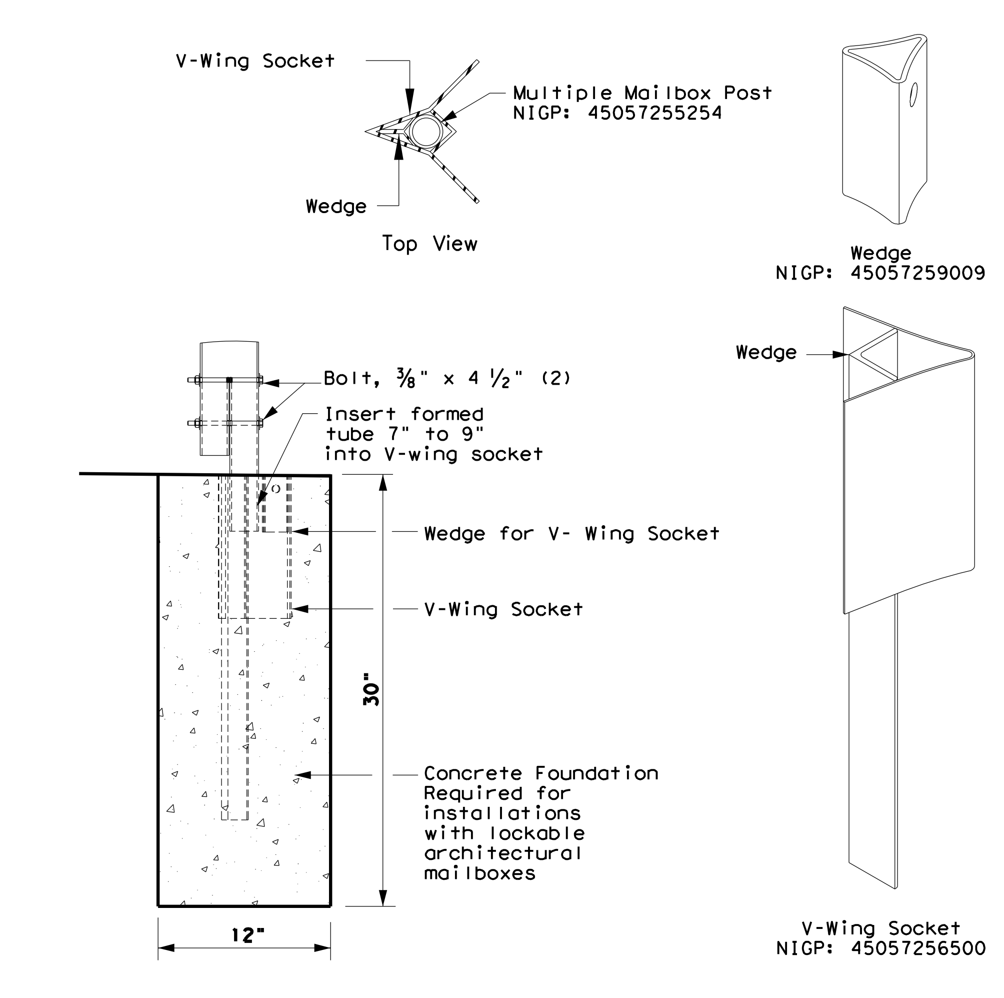
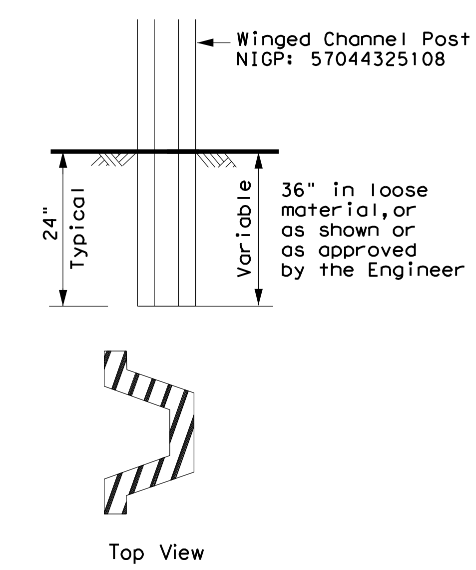
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		89

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage



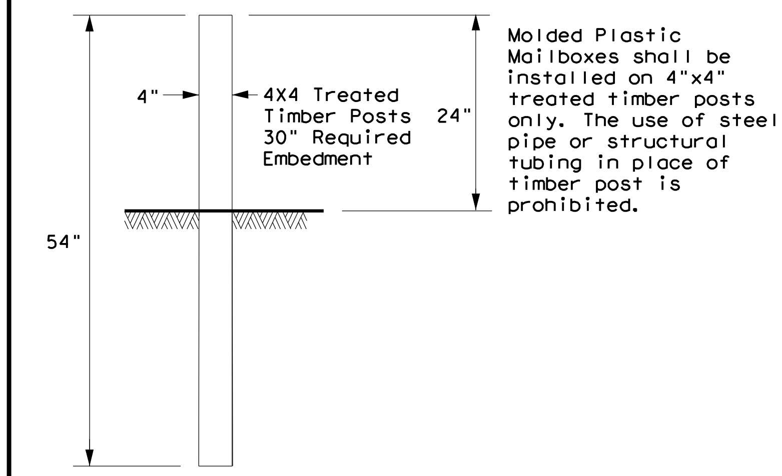
TYPE 3 - SUPPORT/FOUNDATION



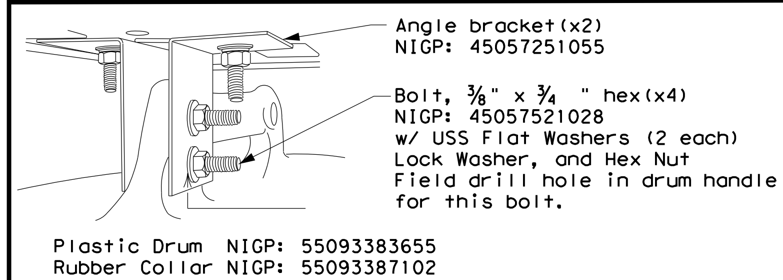
NOTES:

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



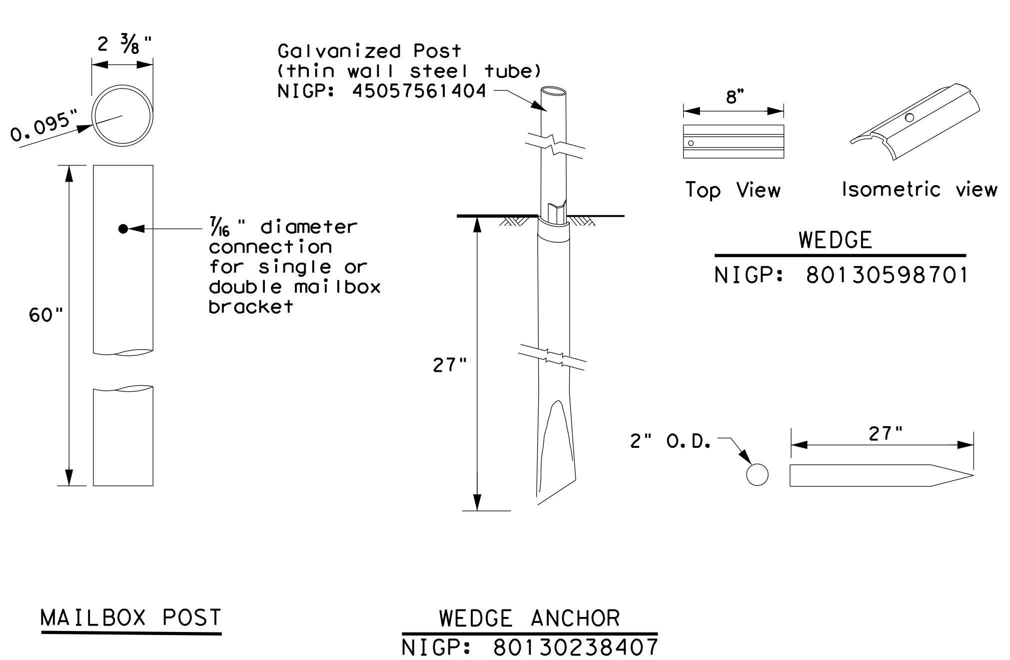
NOTES:

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.

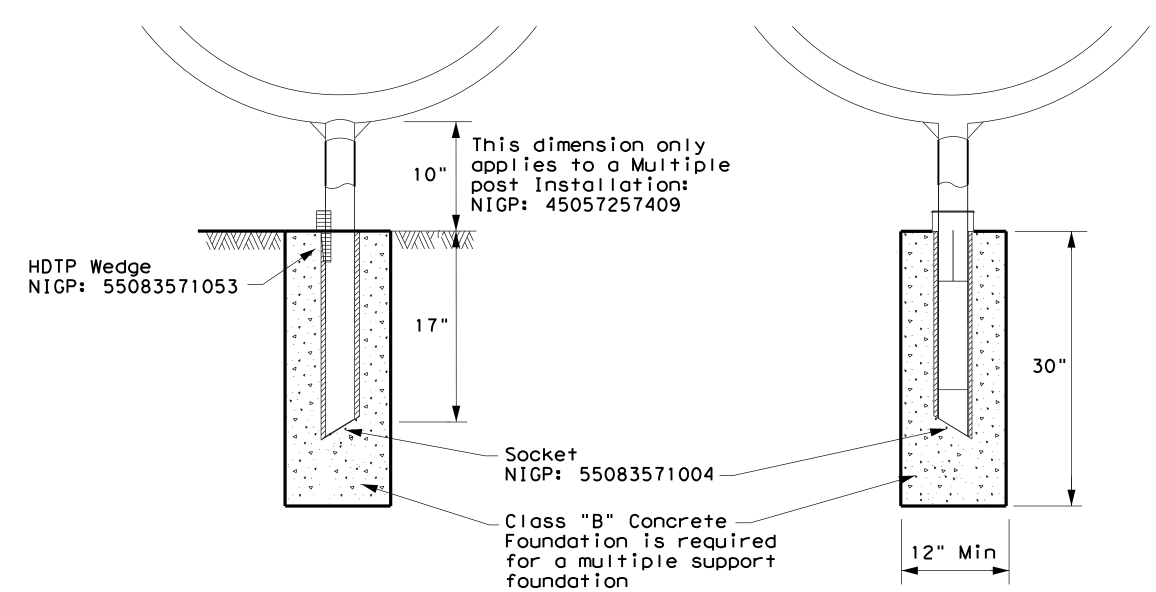
GENERAL NOTES:

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



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



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:

SHEET 3 OF 4

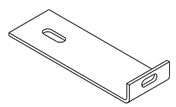
Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

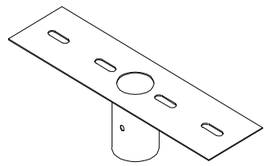
FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015	0108	12	018	SH 19
6/2005 1/2011	DIST		COUNTY	SHEET NO.
11/2006 7/2014	TYL		VAN ZANDT	90

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



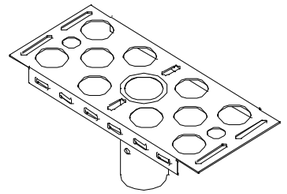
NIGP: 45057250263

L-Bracket x4 for
XL sized mailboxes



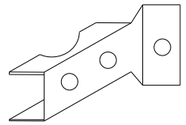
NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4
double mount



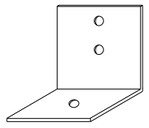
NIGP: 45057252350

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



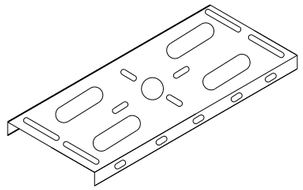
NIGP: 45057258001

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



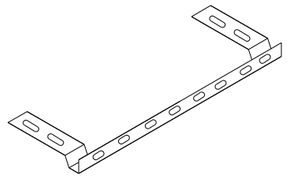
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



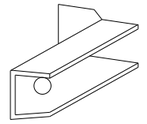
NIGP: 45057252251

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



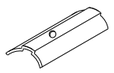
NIGP: 45057253002

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

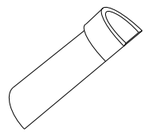
Wedge for Type 2

NIGP: 45057250255

Plate Washer for Architecural
and XL Mailboxes

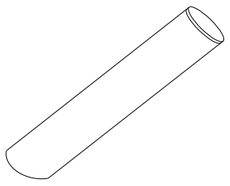
NIGP: 45057541653

Type 3 double mailbox bracket



NIGP: 55083571053

Type 4 Mailbox Wedge

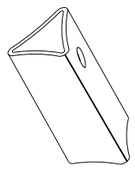


NIGP: 55083571004

Type 4 Mailbox Socket

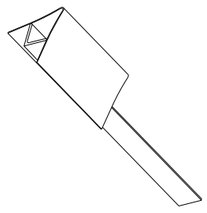
NIGP: 80130238407

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: 1/12/2022 3:42:44 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0170455\SH19_RDW_MB-21(1).dgn

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	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		91

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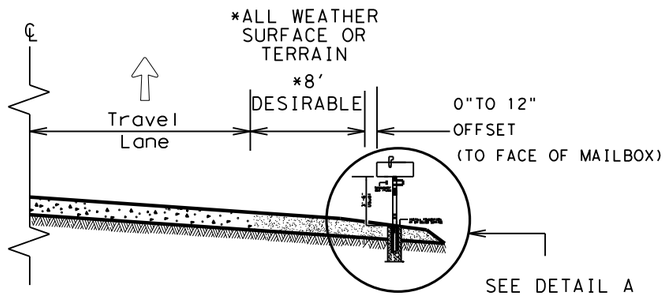
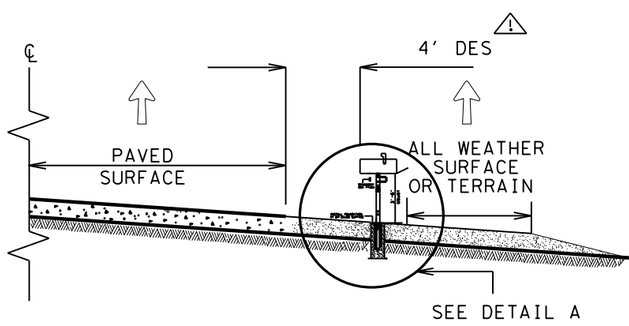
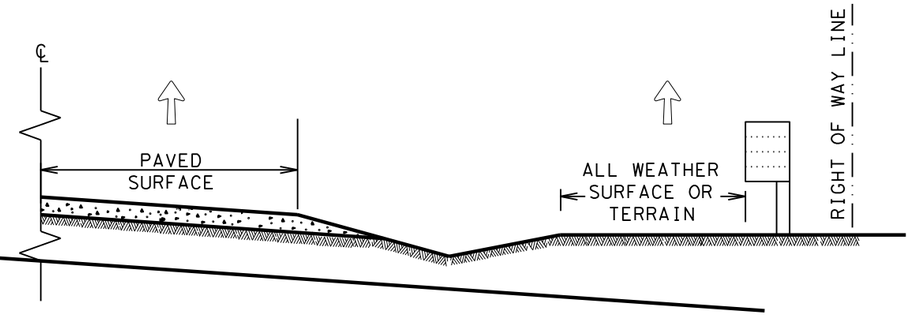


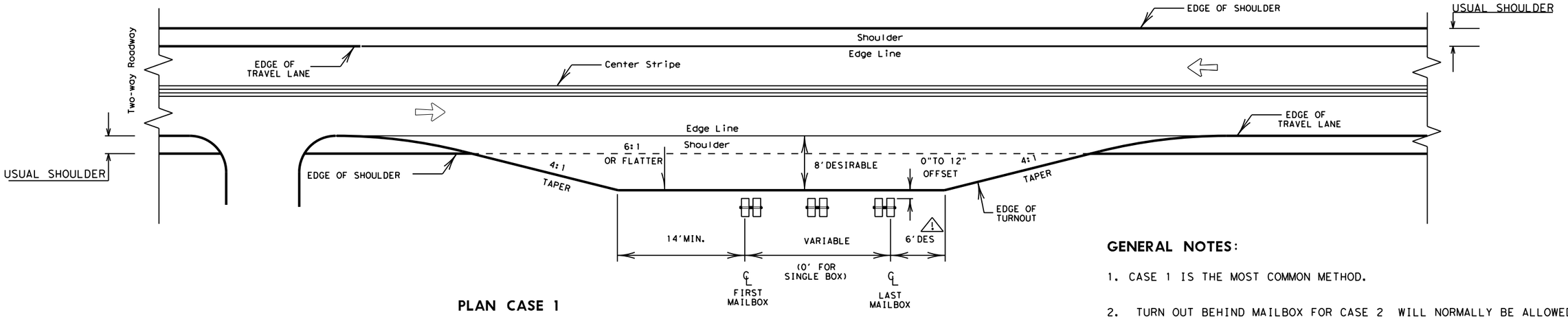
CASE 1. OFF TRAVEL WAY DELIVERY



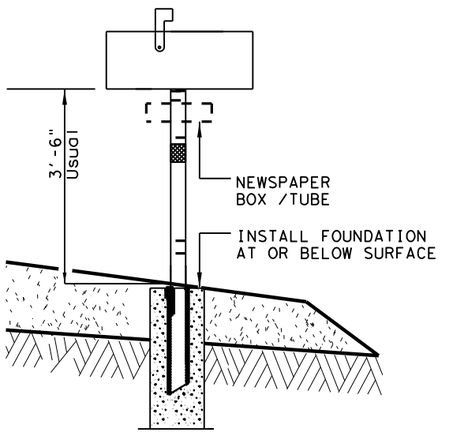
CASE 2. BACK SIDE DELIVERY



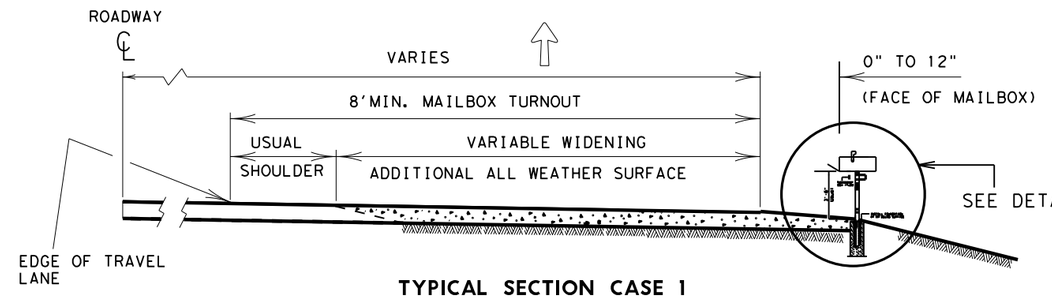
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. IF THE NUMBER OF MAILBOXES EXCEEDS FOUR, A COMMUNITY MAIL BOX SHOULD BE ENCOURAGED AT THESE LOCATIONS.

Texas Department of Transportation | Maintenance Division Standard

Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS
MB-14(2)

FILE: MB14(2).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		92

DATE: 1/12/2022
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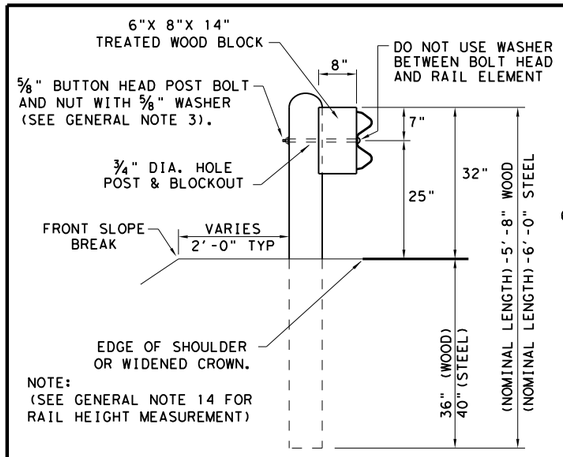
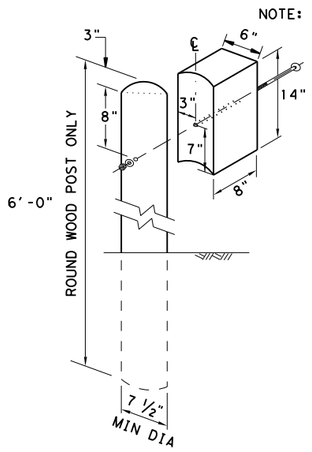
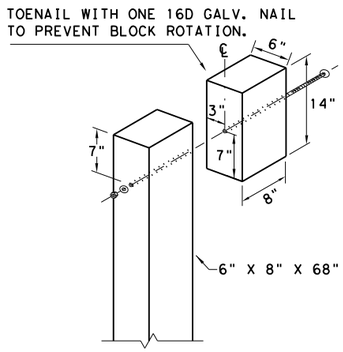


TYPICAL POST PLACEMENT

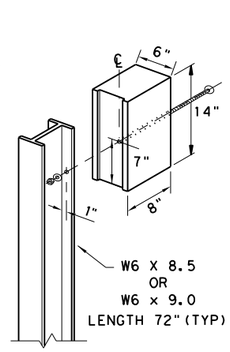


WOOD BLOCK TO ROUND WOOD POST

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

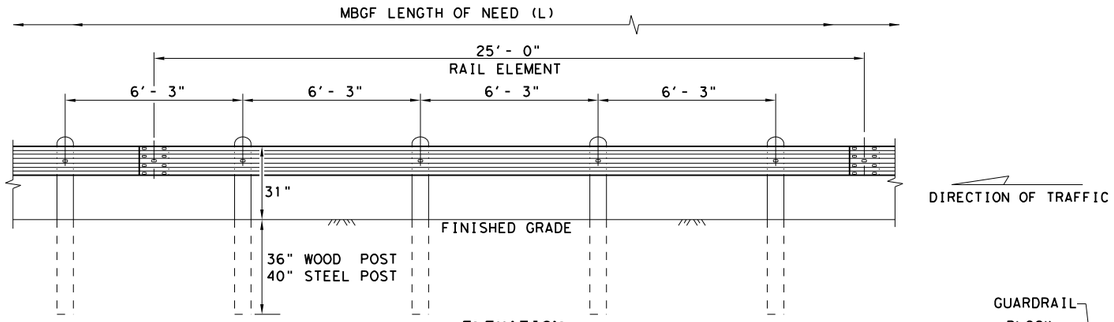


WOOD BLOCK TO RECTANGULAR WOOD POST



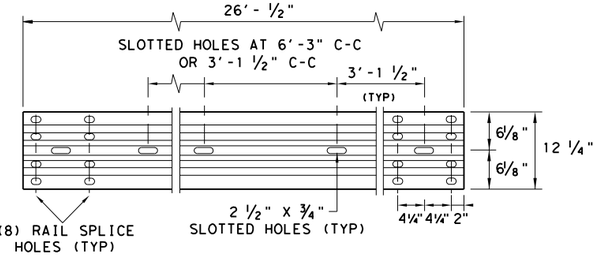
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



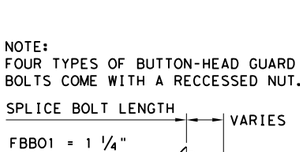
ELEVATION
MID-SPAN RAIL SPLICE

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



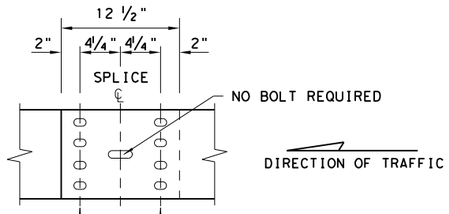
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



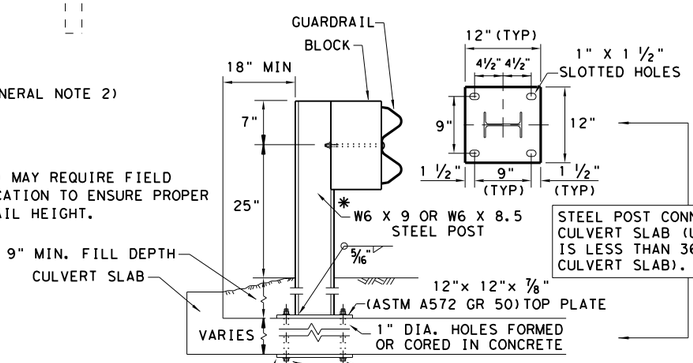
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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REVISIONS	0108	12	018	SH 19
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	TYL	VAN ZANDT		93

DATE: 1/12/2022
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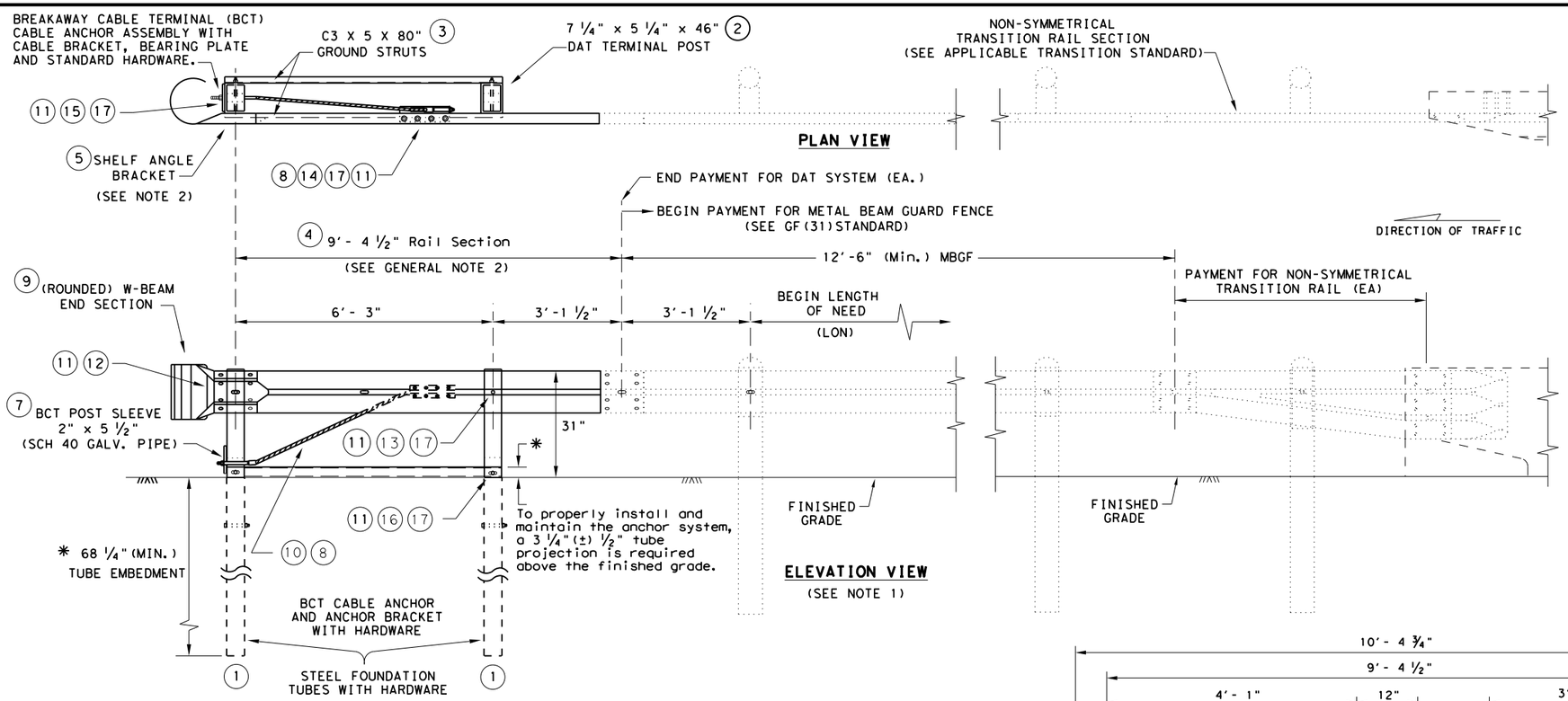


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

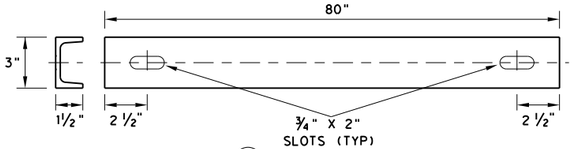
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

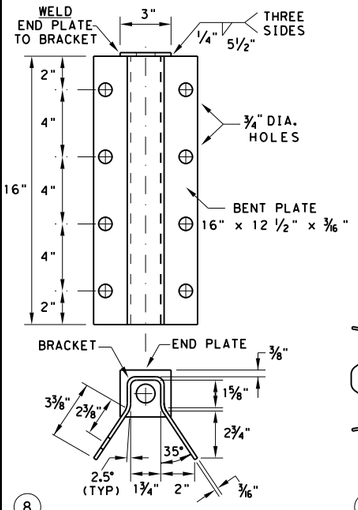
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

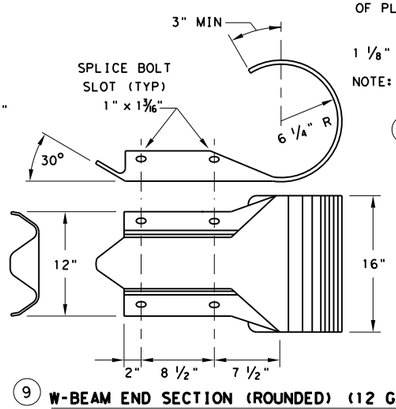
(4) TERMINAL RAIL ELEMENT FOR DAT



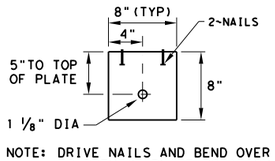
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

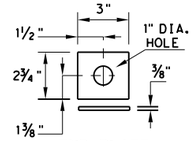


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

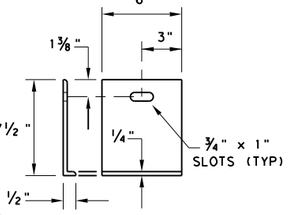


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

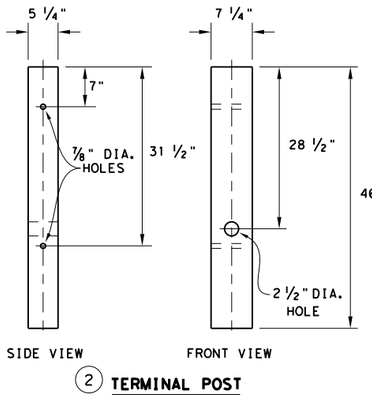
(6) BEARING PLATE
8"x 8"x 5/8" R



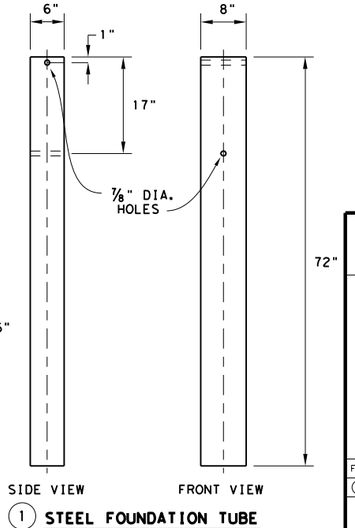
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation — Design Division Standard

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

GF(31)DAT-19

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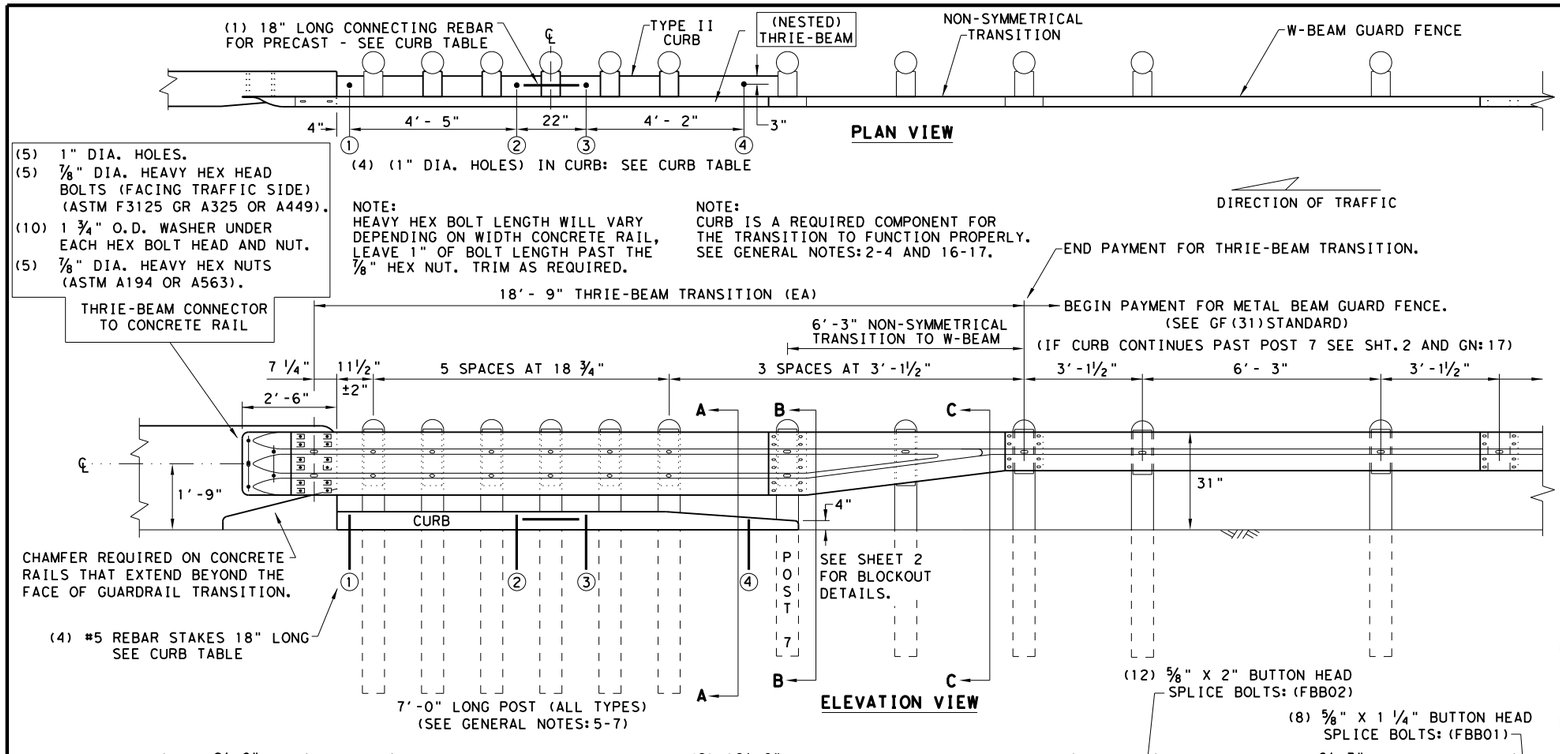
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		94



GENERAL NOTES

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

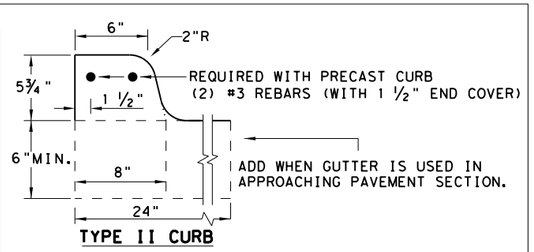
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

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HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
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DATE: 1/12/2022
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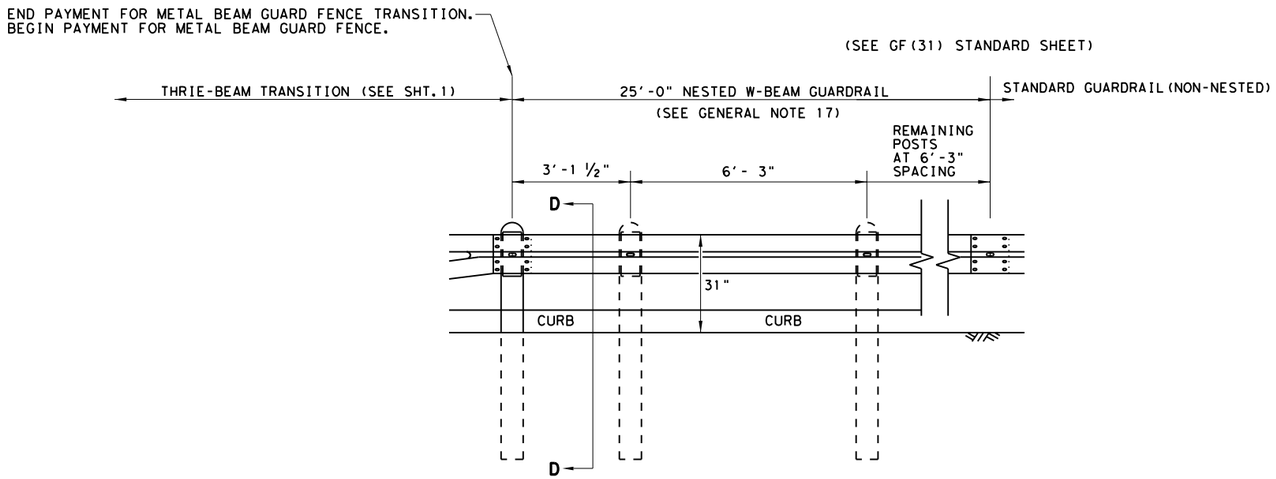
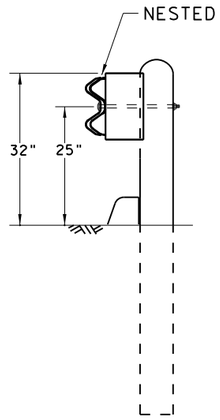
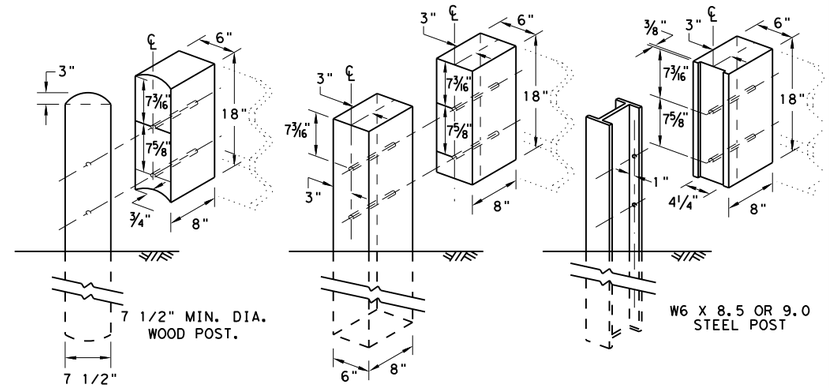
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
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	DIST	COUNTY		SHEET NO.
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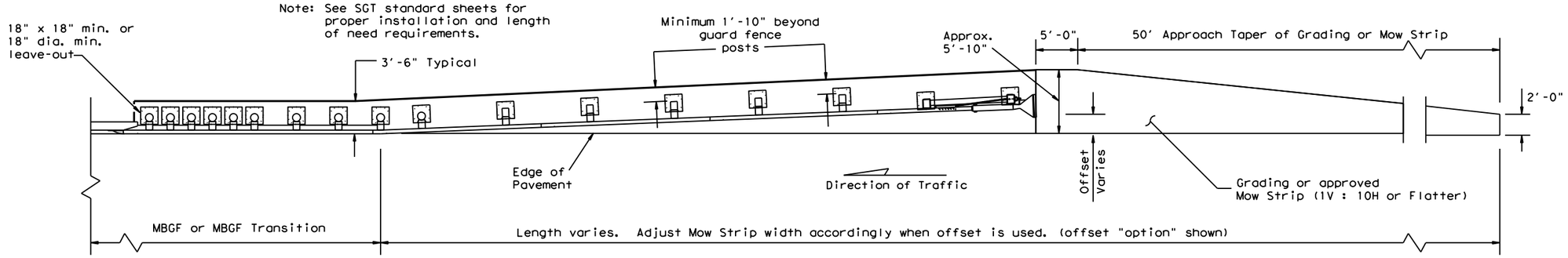
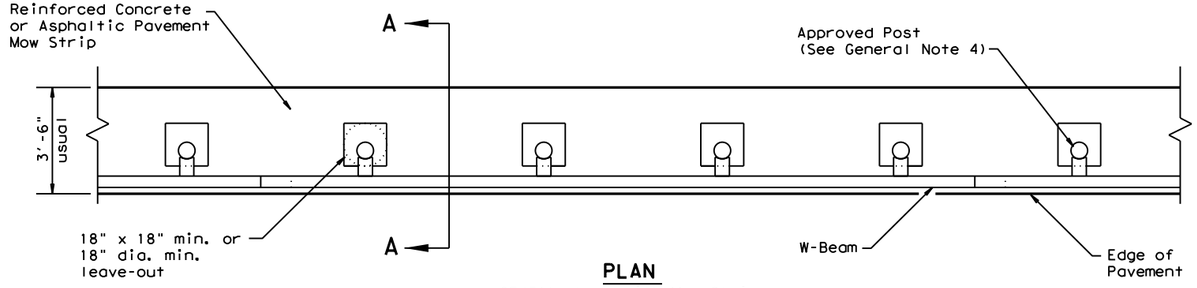
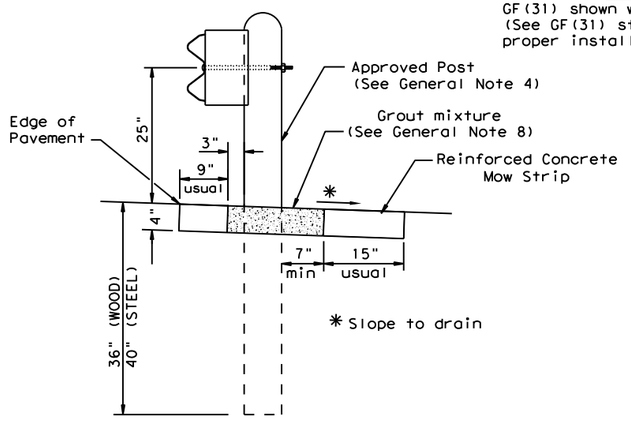


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



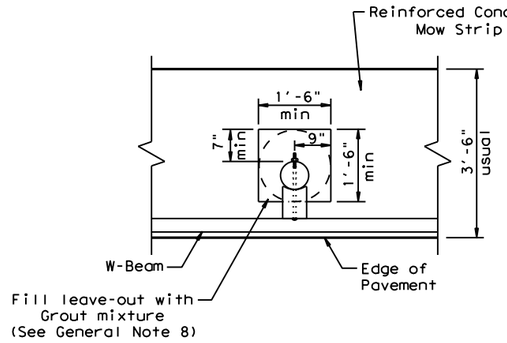
PLAN

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.

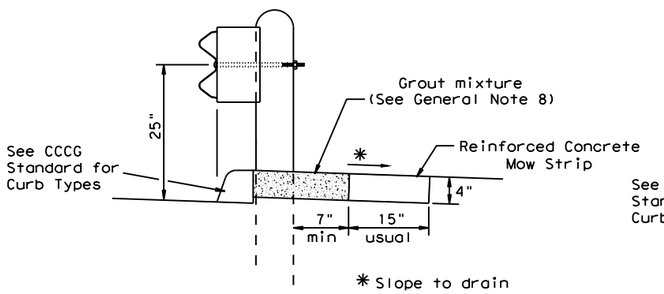
Note: Site Condition(s)

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

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

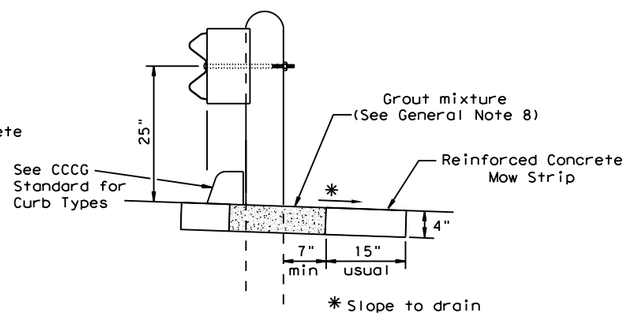
GENERAL NOTES

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



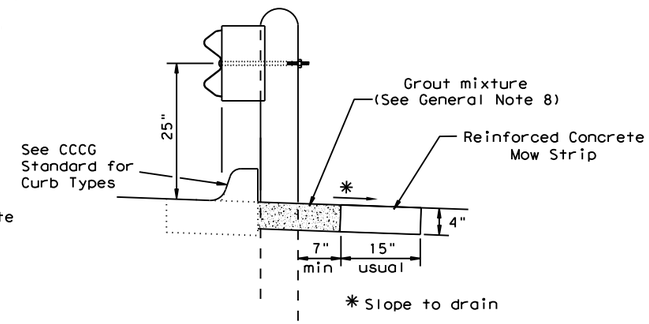
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		97

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\will.dkin\d0170455\SH19_RDW_SGT10S3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

PLAN VIEW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT
(2)½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE:B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE:C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE NOTE:A

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

POST 40" DEPTH (TYP 1-8)

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

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE:A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		98

DATE: 1/12/2022
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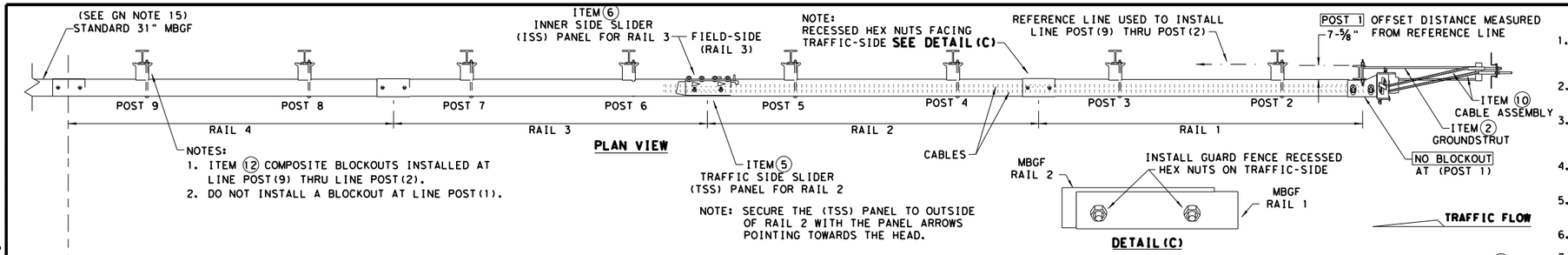

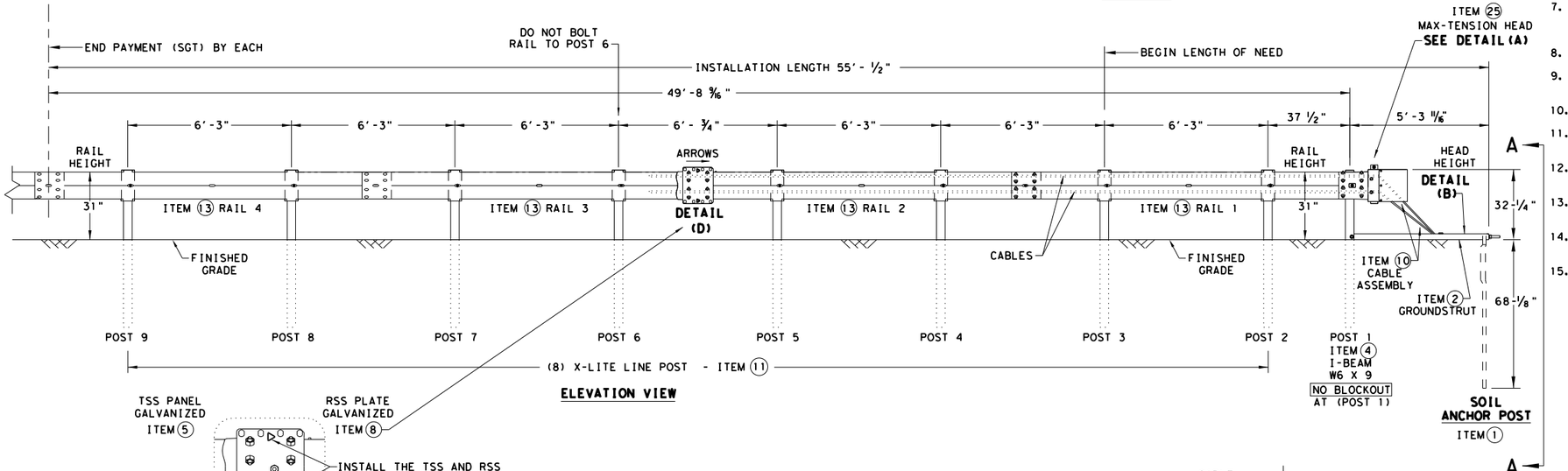

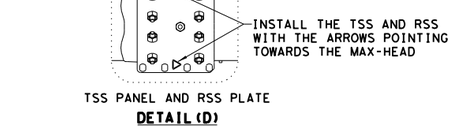

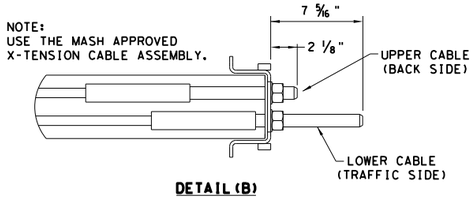

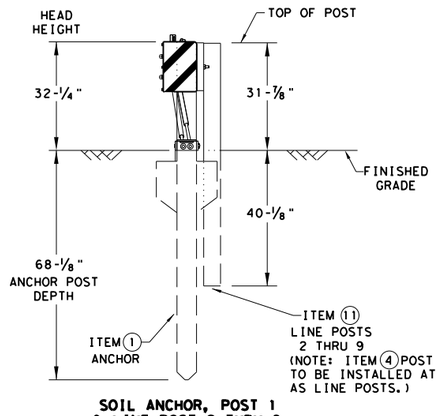

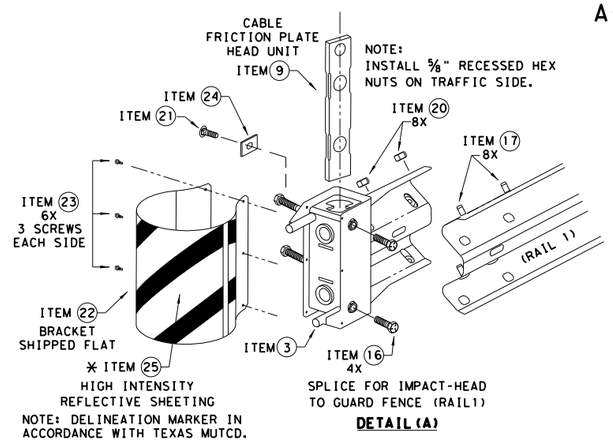

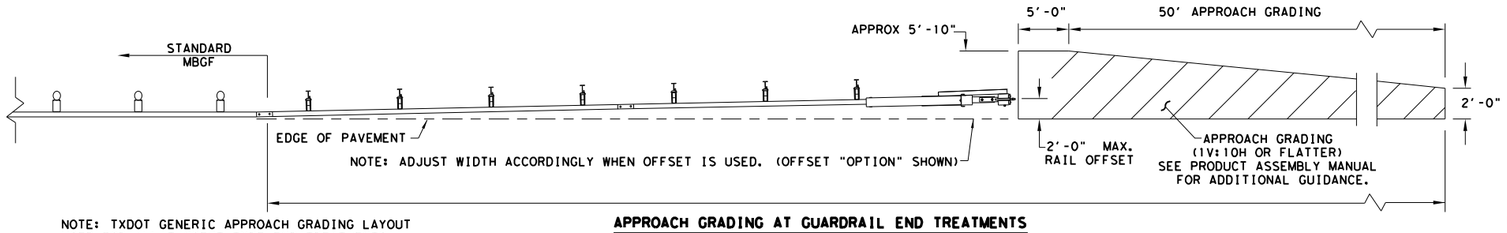

TRAFFIC FLOW

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		99

DATE: 1/12/2022
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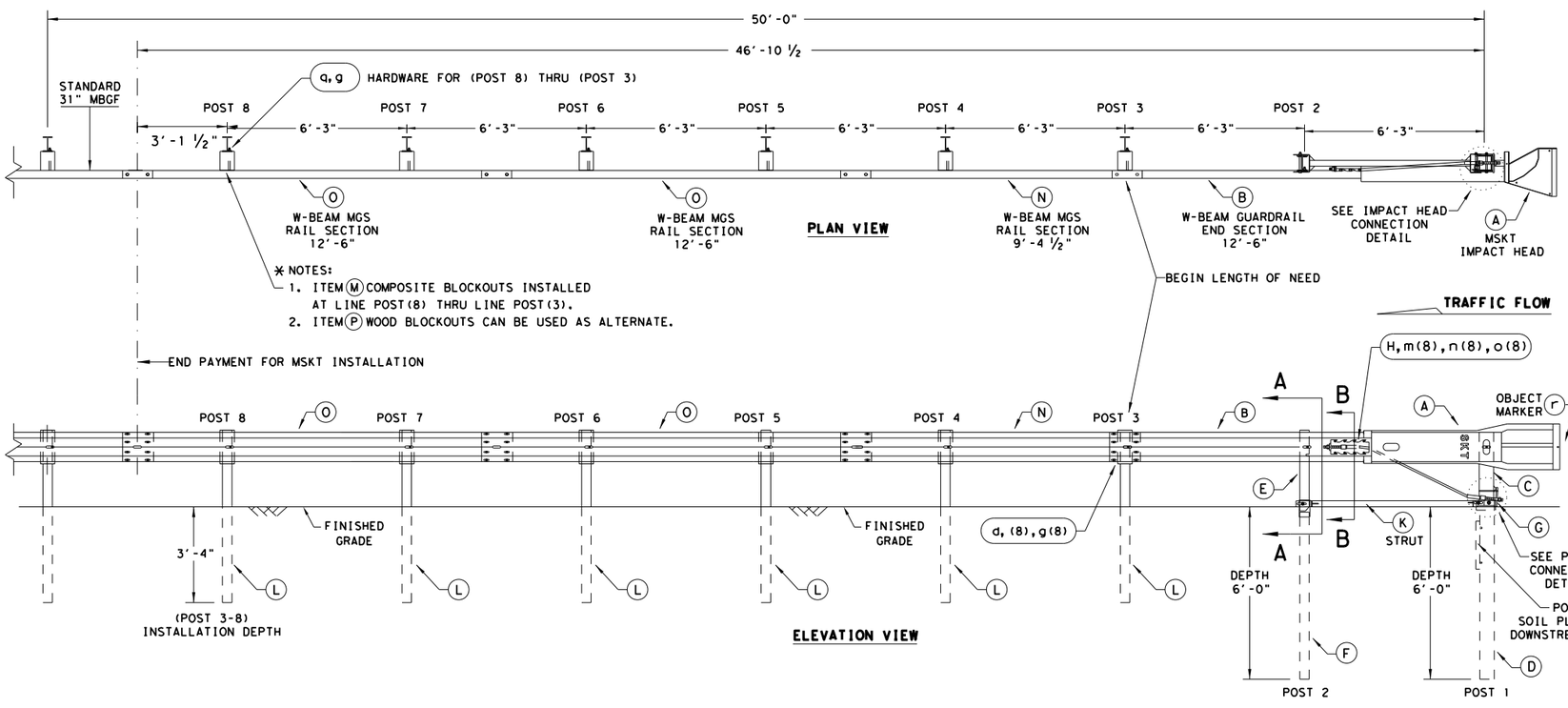
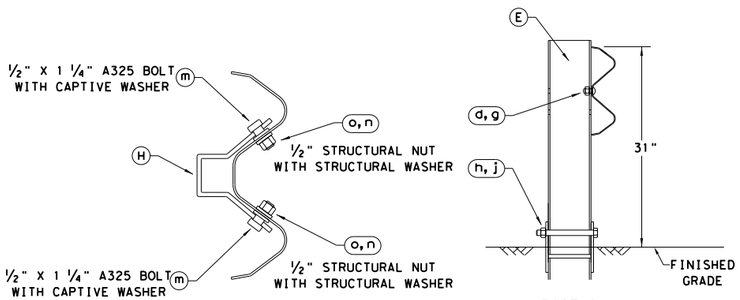
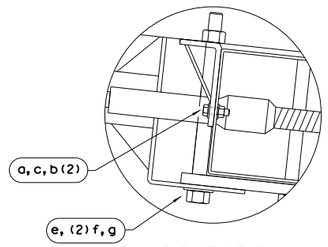


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

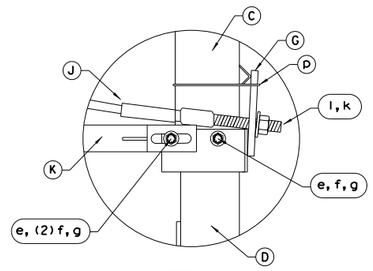


SECTION B-B
ANCHOR BRACKET

POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

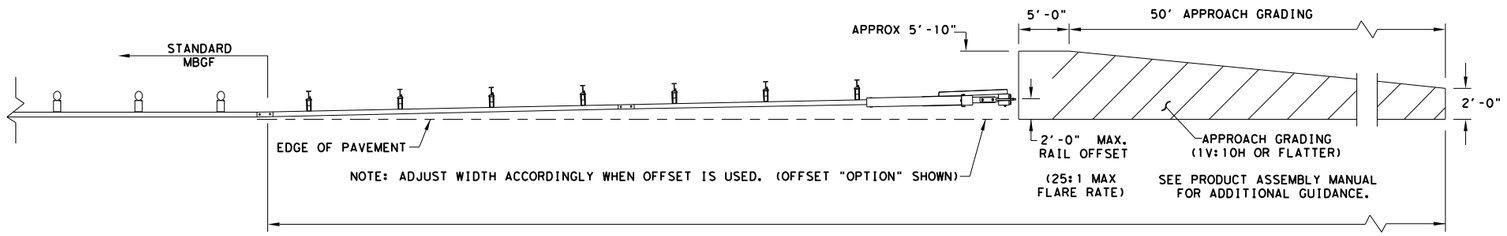
GENERAL NOTES

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

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

SEE NOTES: *

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



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0108	12	018	SH 19	
	DIST	COUNTY		SHEET NO.	
	TYL	VAN ZANDT		100	

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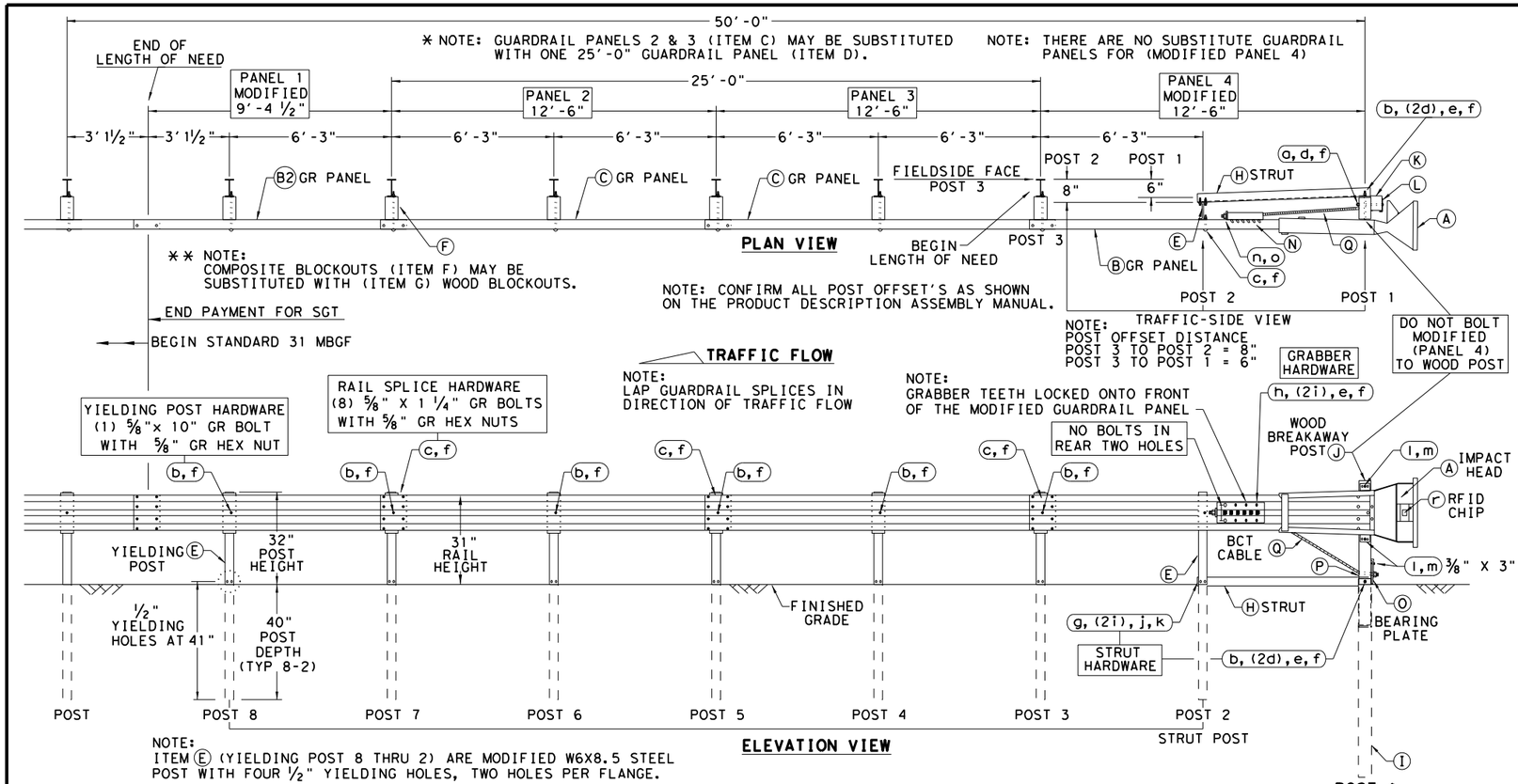
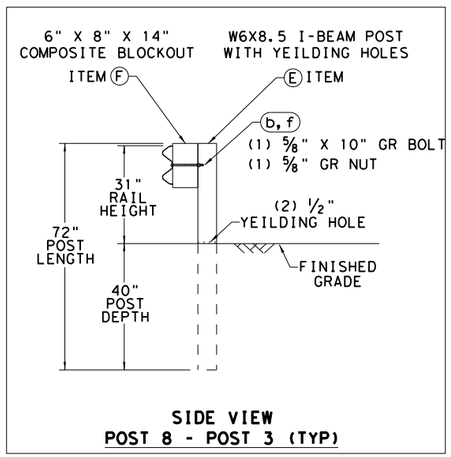


GENERAL NOTES

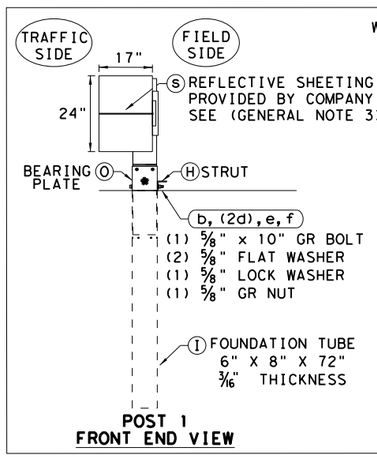
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

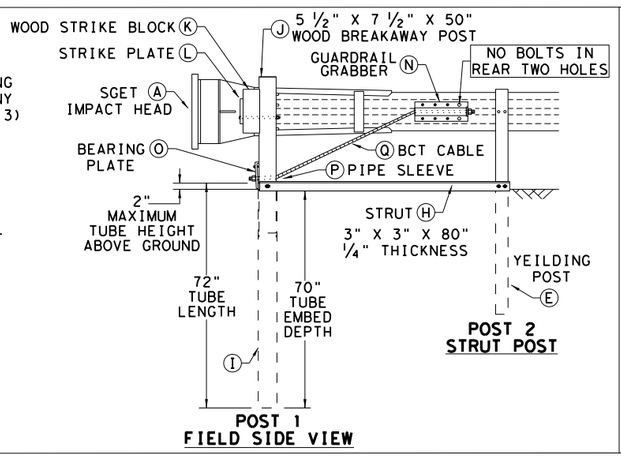
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



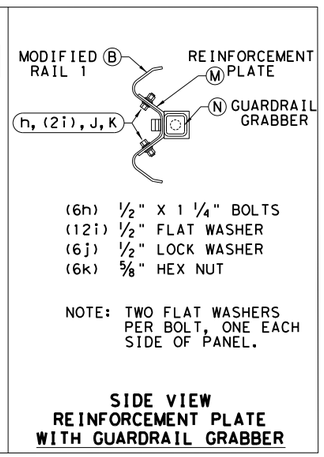
SIDE VIEW
POST 8 - POST 3 (TYP)



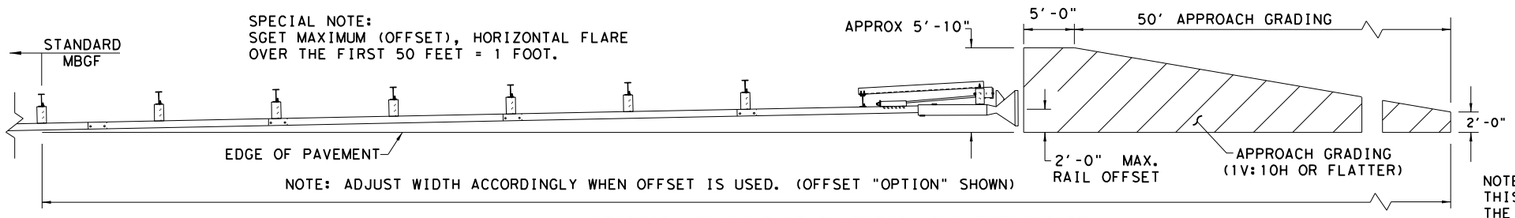
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation — Design Division Standard

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

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©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY	
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	DIST	COUNTY		SHEET NO.	
	TYL	VAN ZANDT		101	

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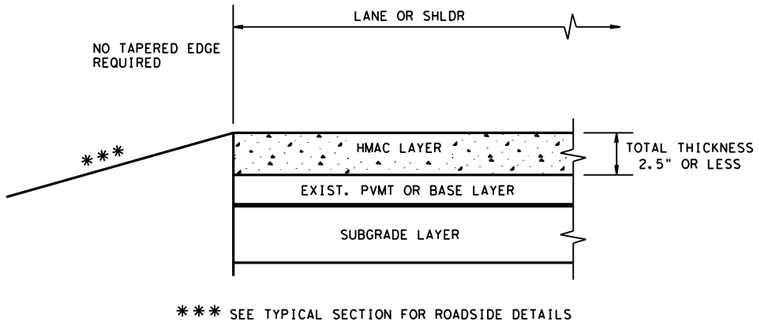
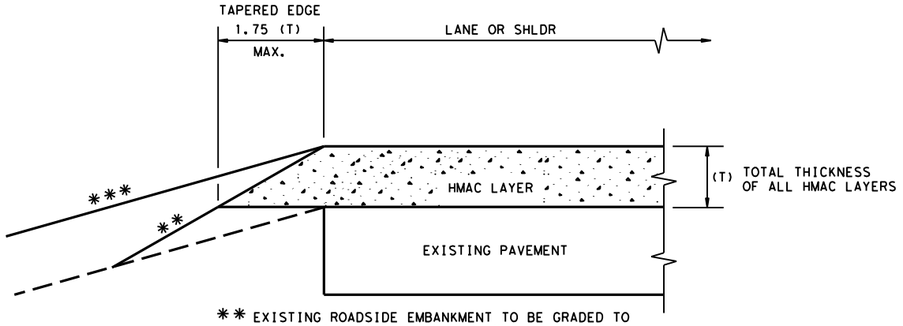


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

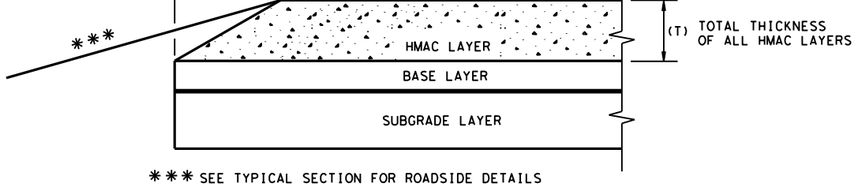
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

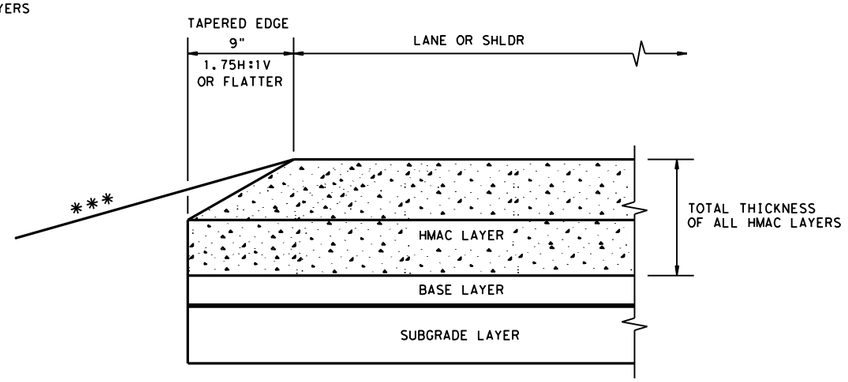
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:		
© TxDOT January 2011	CONT	SECT	JOB		HIGHWAY	
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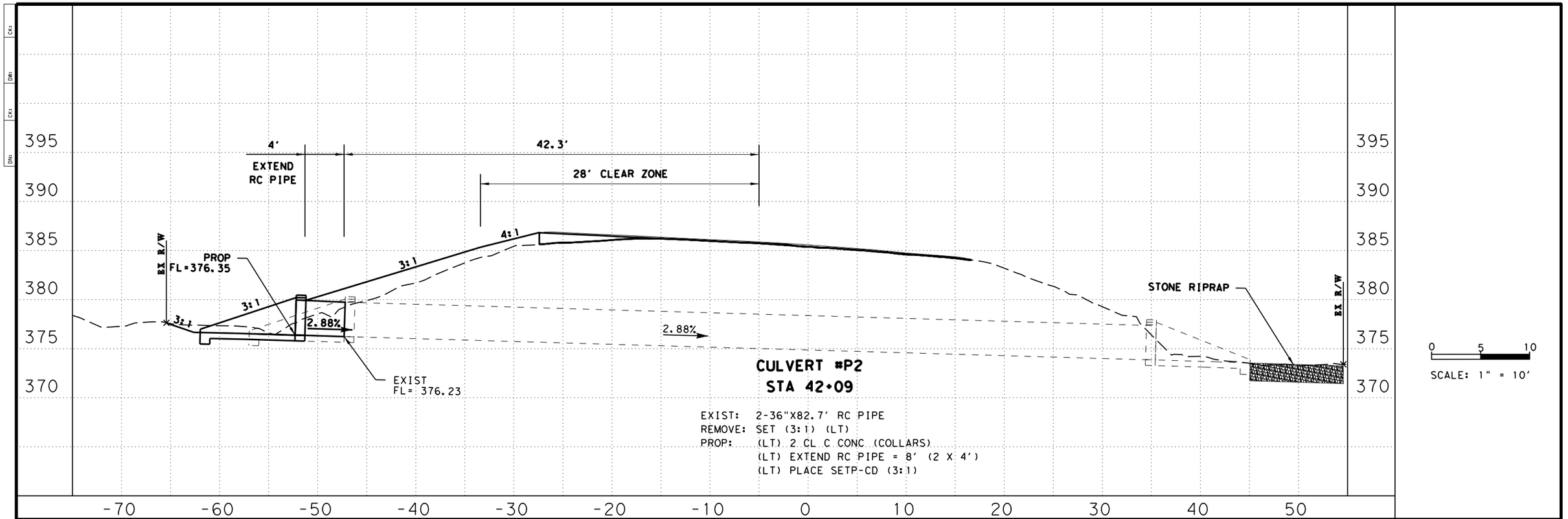
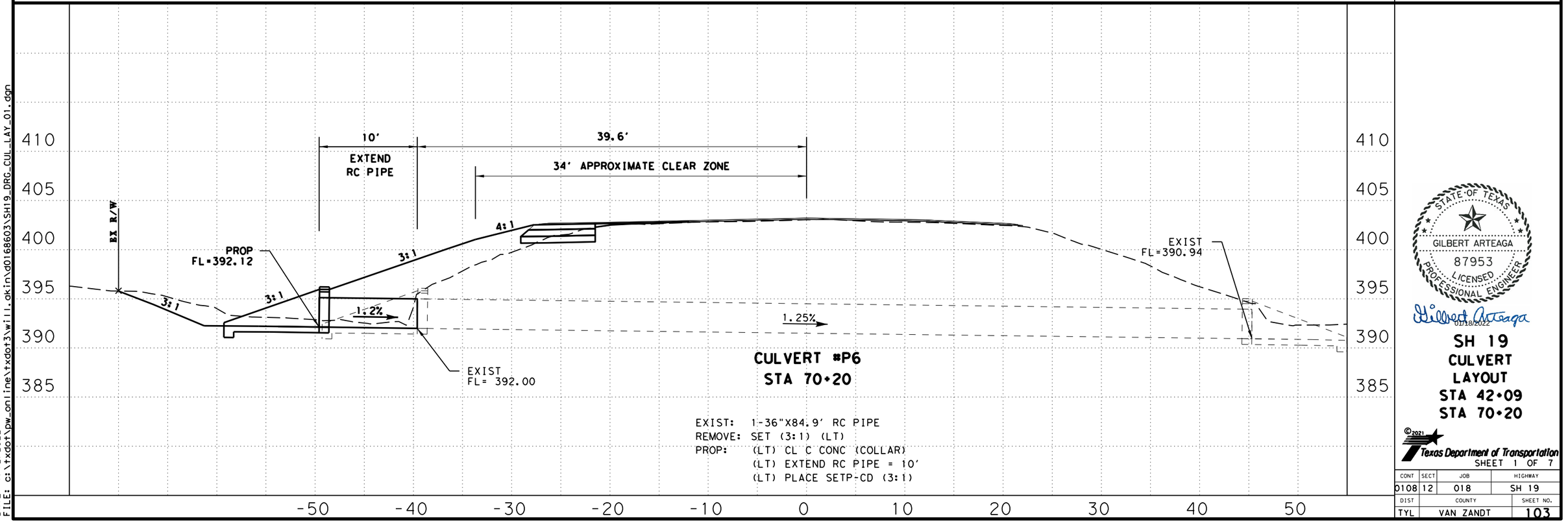
	DIST	COUNTY			SHEET NO.	
	TYL	VAN ZANDT			102	



CULVERT #P2
STA 42+09

EXIST: 2-36"X82.7' RC PIPE
REMOVE: SET (3:1) (LT)
PROP: (LT) 2 CL C CONC (COLLARS)
(LT) EXTEND RC PIPE = 8' (2 X 4')
(LT) PLACE SETP-CD (3:1)

0 5 10
SCALE: 1" = 10'



CULVERT #P6
STA 70+20

EXIST: 1-36"X84.9' RC PIPE
REMOVE: SET (3:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND RC PIPE = 10'
(LT) PLACE SETP-CD (3:1)

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SH 19
CULVERT LAYOUT
STA 42+09
STA 70+20

Texas Department of Transportation
SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		103

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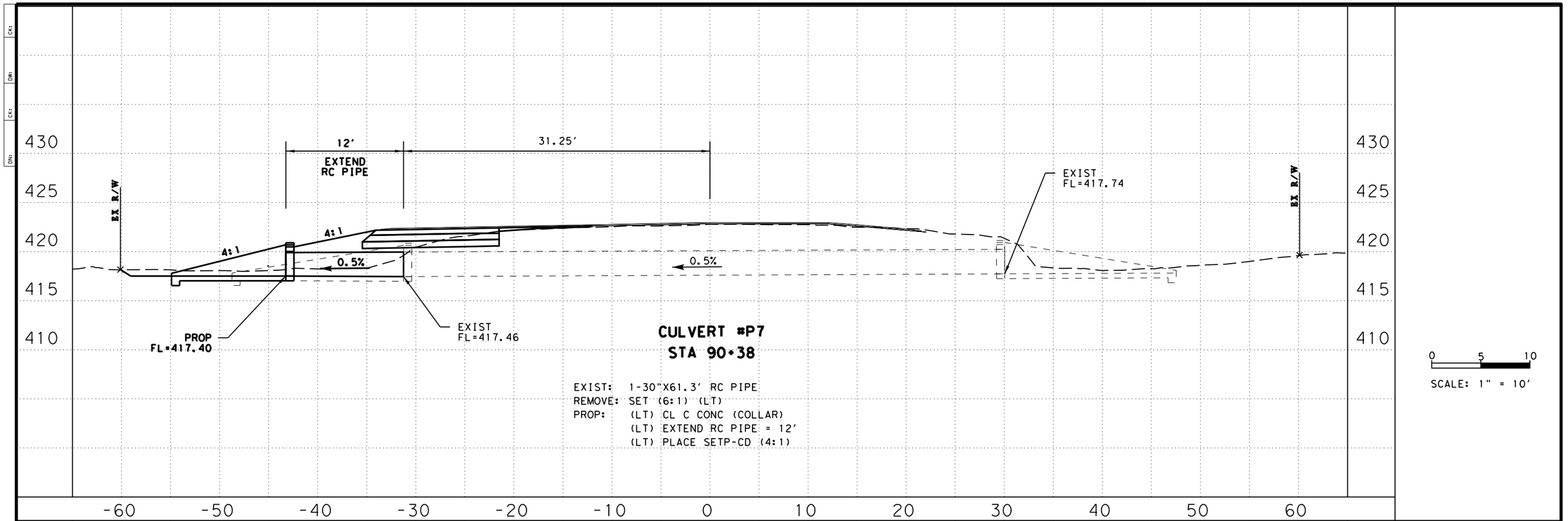
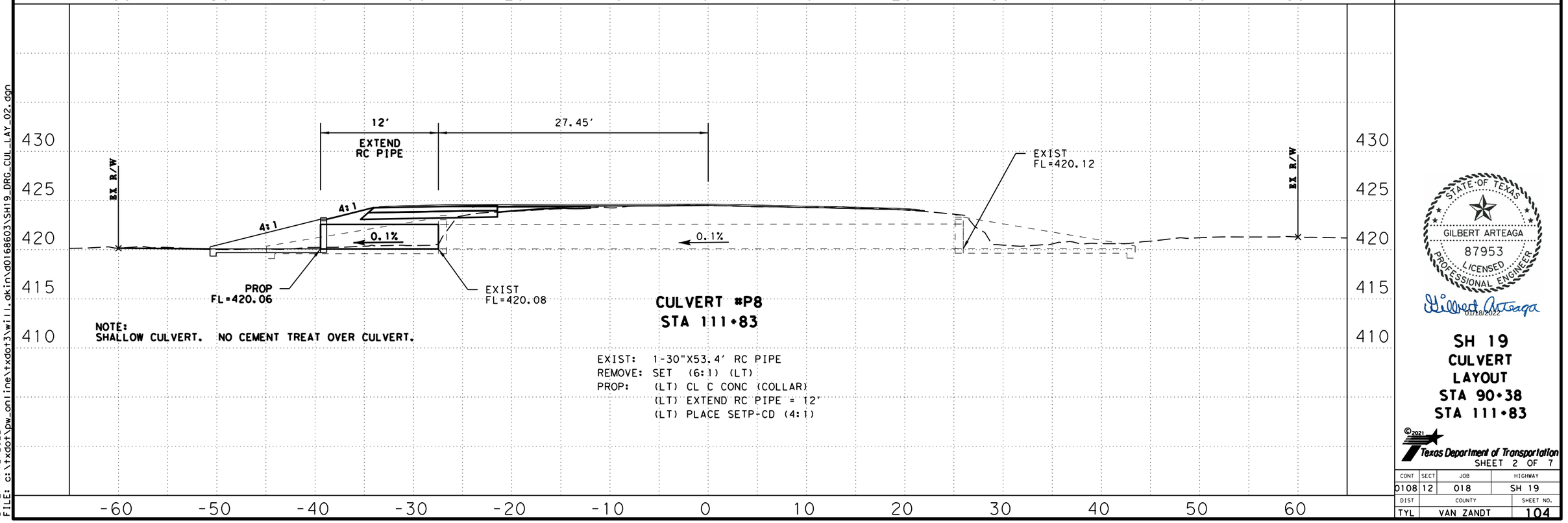


CULVERT #P7
STA 90+38

EXIST: 1-30"X61.3' RC PIPE
REMOVE: SET (6:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND RC PIPE = 12'
(LT) PLACE SETP-CD (4:1)

0 5 10
SCALE: 1" = 10'



NOTE:
SHALLOW CULVERT. NO CEMENT TREAT OVER CULVERT.

CULVERT #P8
STA 111+83

EXIST: 1-30"X53.4' RC PIPE
REMOVE: SET (6:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND RC PIPE = 12'
(LT) PLACE SETP-CD (4:1)

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SH 19
CULVERT LAYOUT
STA 90+38
STA 111+83

Texas Department of Transportation
SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
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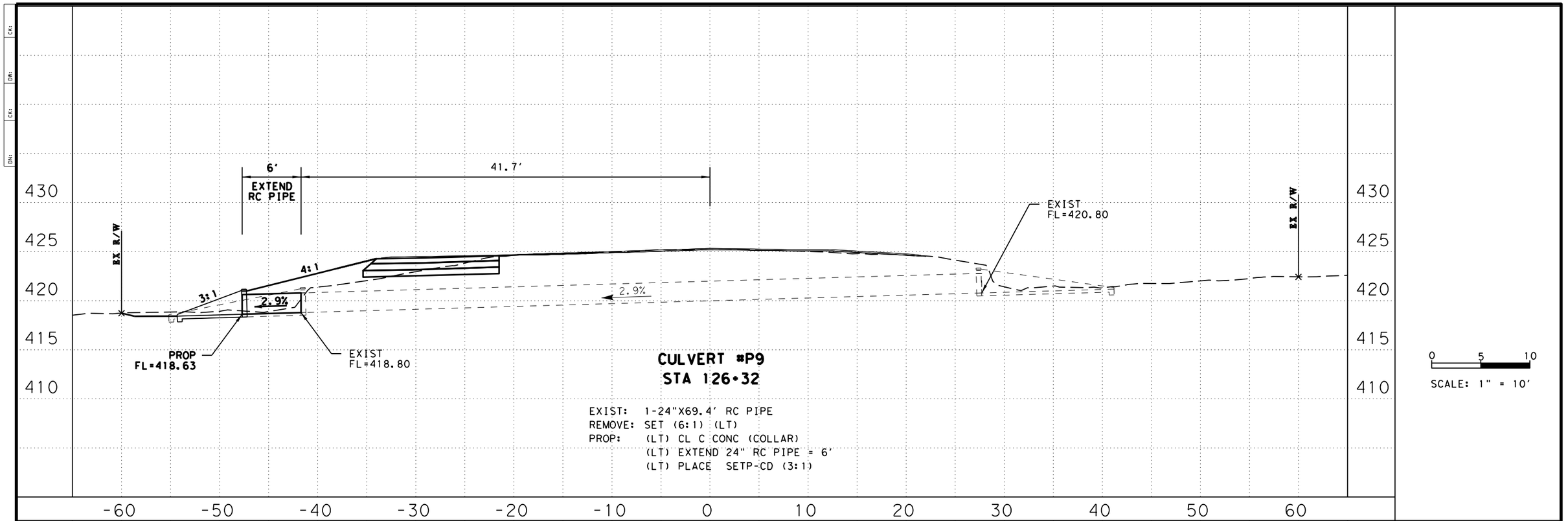
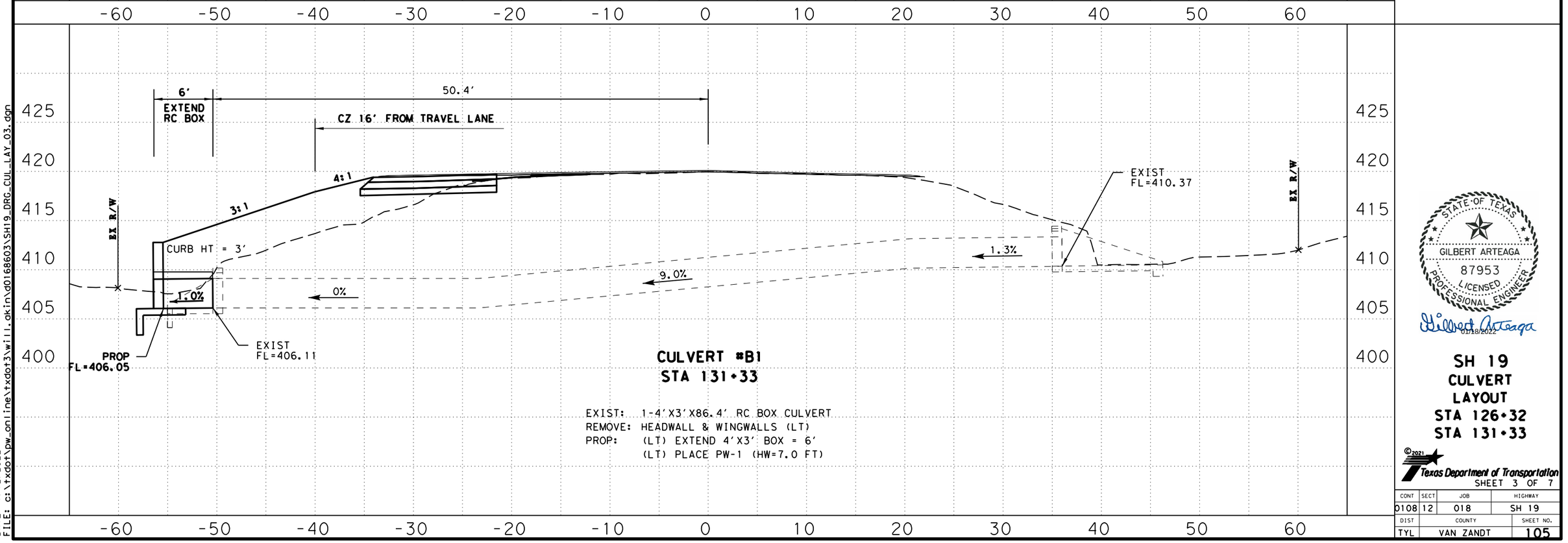


CULVERT #P9
STA 126+32

EXIST: 1-24"X69.4' RC PIPE
REMOVE: SET (6:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND 24" RC PIPE = 6'
(LT) PLACE SETP-CD (3:1)

0 5 10
SCALE: 1" = 10'



CULVERT #B1
STA 131+33

EXIST: 1-4'X3'X86.4' RC BOX CULVERT
REMOVE: HEADWALL & WINGWALLS (LT)
PROP: (LT) EXTEND 4'X3' BOX = 6'
(LT) PLACE PW-1 (HW=7.0 FT)

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SH 19
CULVERT LAYOUT
STA 126+32
STA 131+33

Texas Department of Transportation
SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		105

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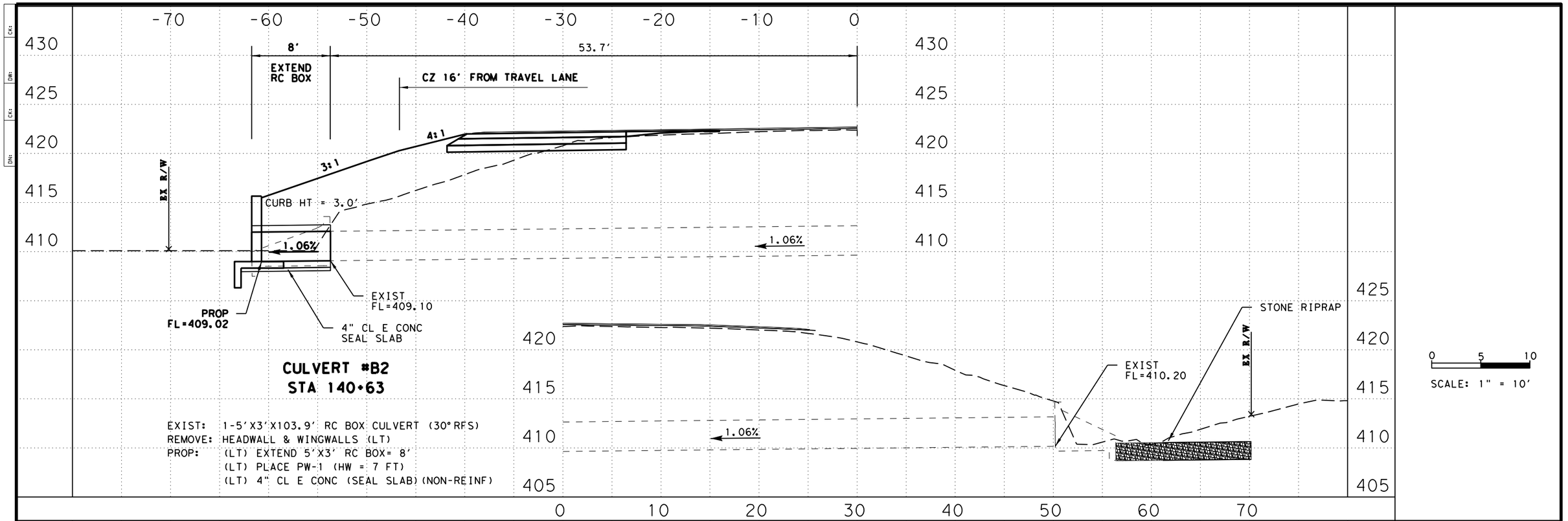

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STATE OF TEXAS
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SH 19
CULVERT LAYOUT
STA 140+63
STA 155+73

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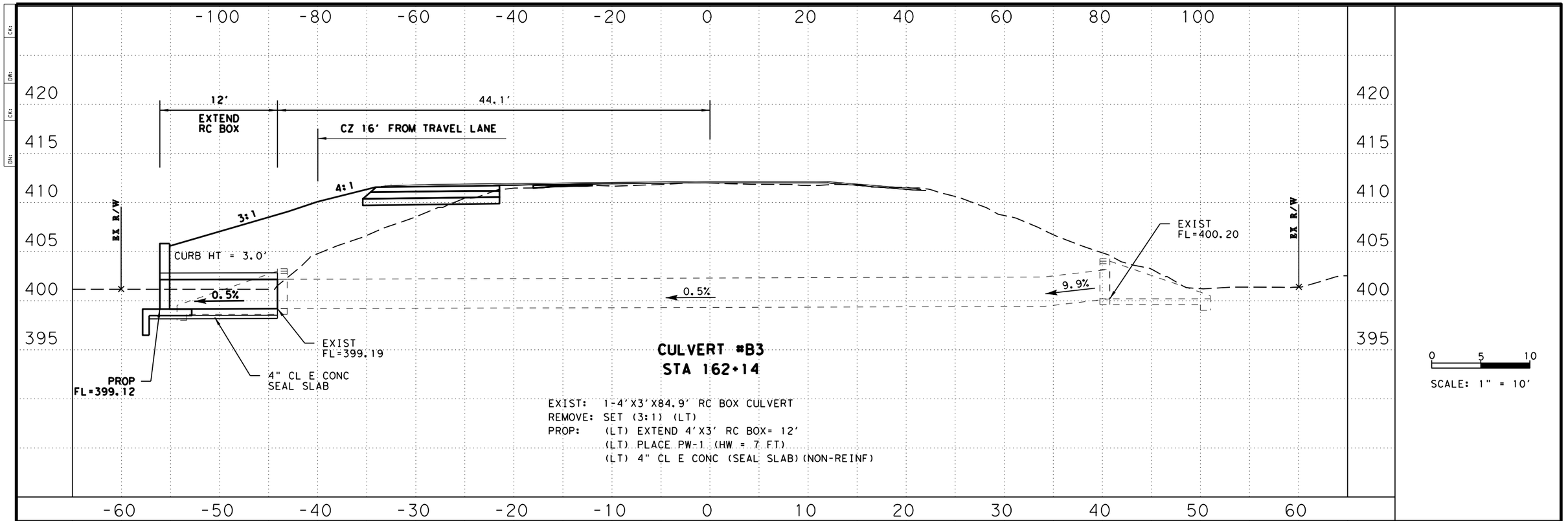
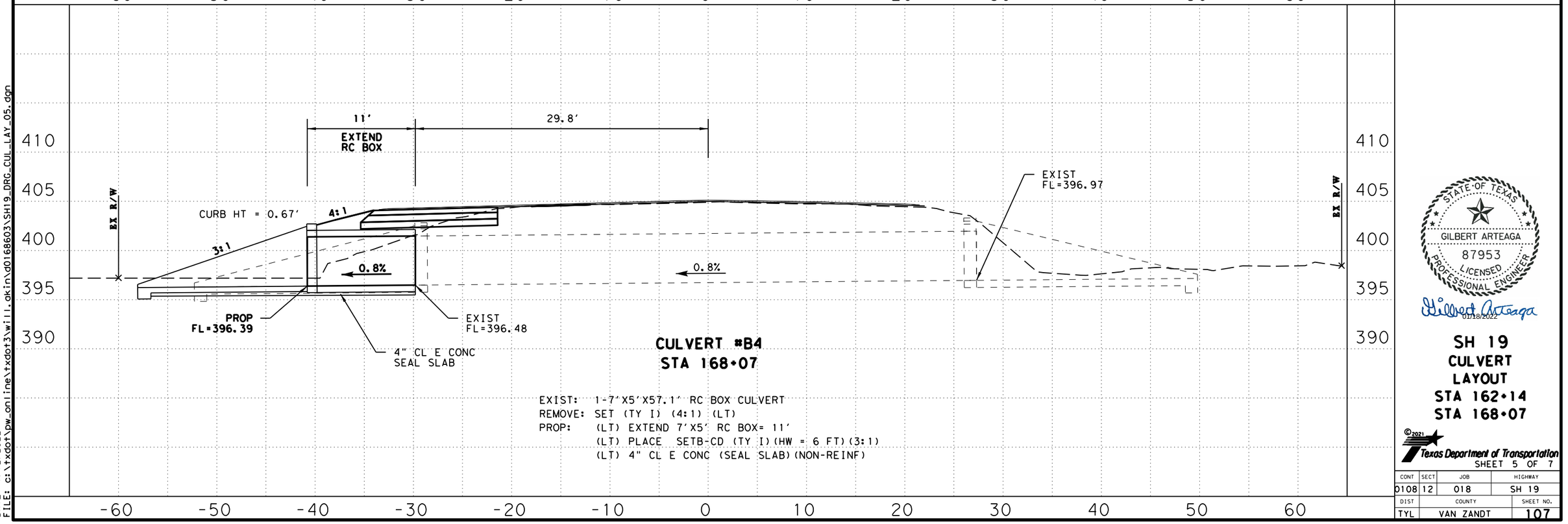
SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		106





STATE OF TEXAS
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01/18/2022

SH 19
CULVERT LAYOUT
STA 162+14
STA 168+07

Texas Department of Transportation

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
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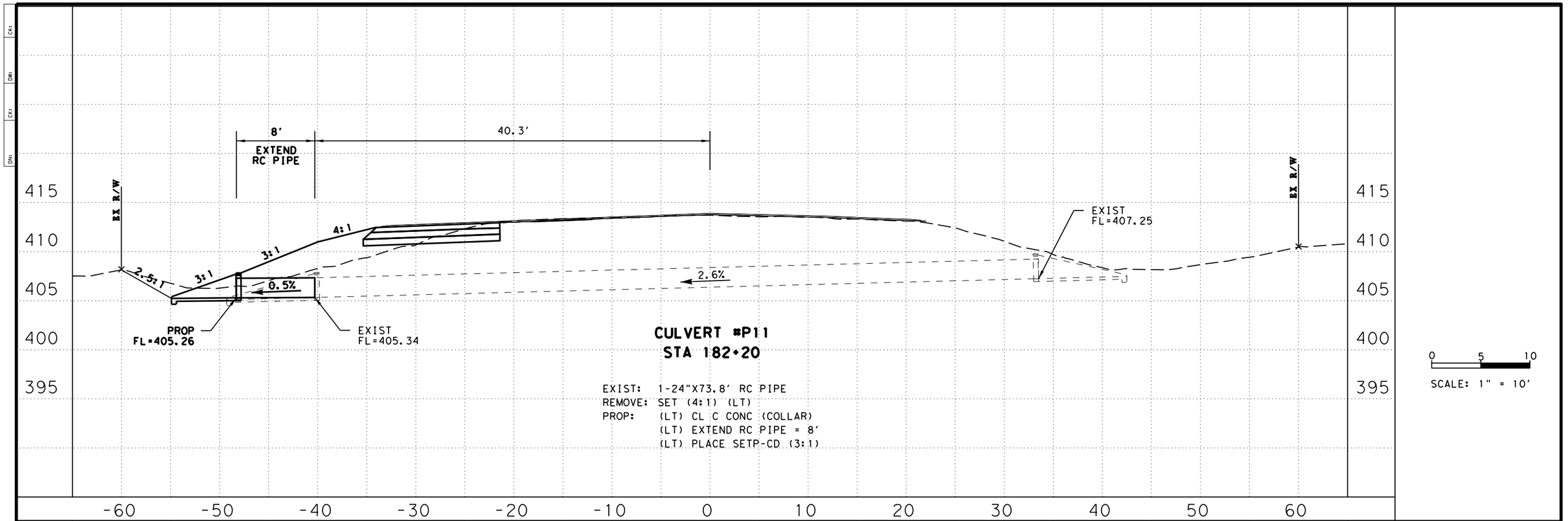
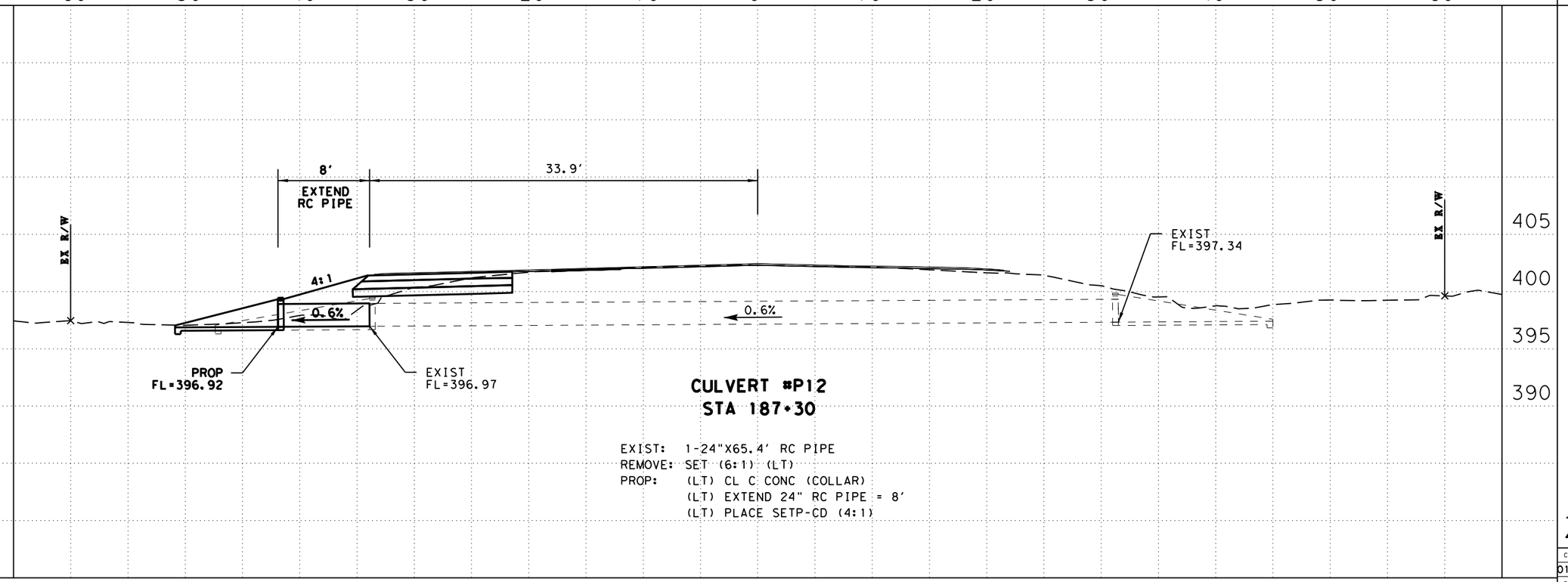


CULVERT #P11
STA 182+20

EXIST: 1-24"X73.8' RC PIPE
REMOVE: SET (4:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND RC PIPE = 8'
(LT) PLACE SETP-CD (3:1)

SCALE: 1" = 10'



CULVERT #P12
STA 187+30

EXIST: 1-24"X65.4' RC PIPE
REMOVE: SET (6:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND 24" RC PIPE = 8'
(LT) PLACE SETP-CD (4:1)

STATE OF TEXAS
GILBERT ARTEAGA
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PROFESSIONAL ENGINEER
01/18/2022

SH 19
CULVERT LAYOUT
STA 182+20
STA 187+30

Texas Department of Transportation
SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		108

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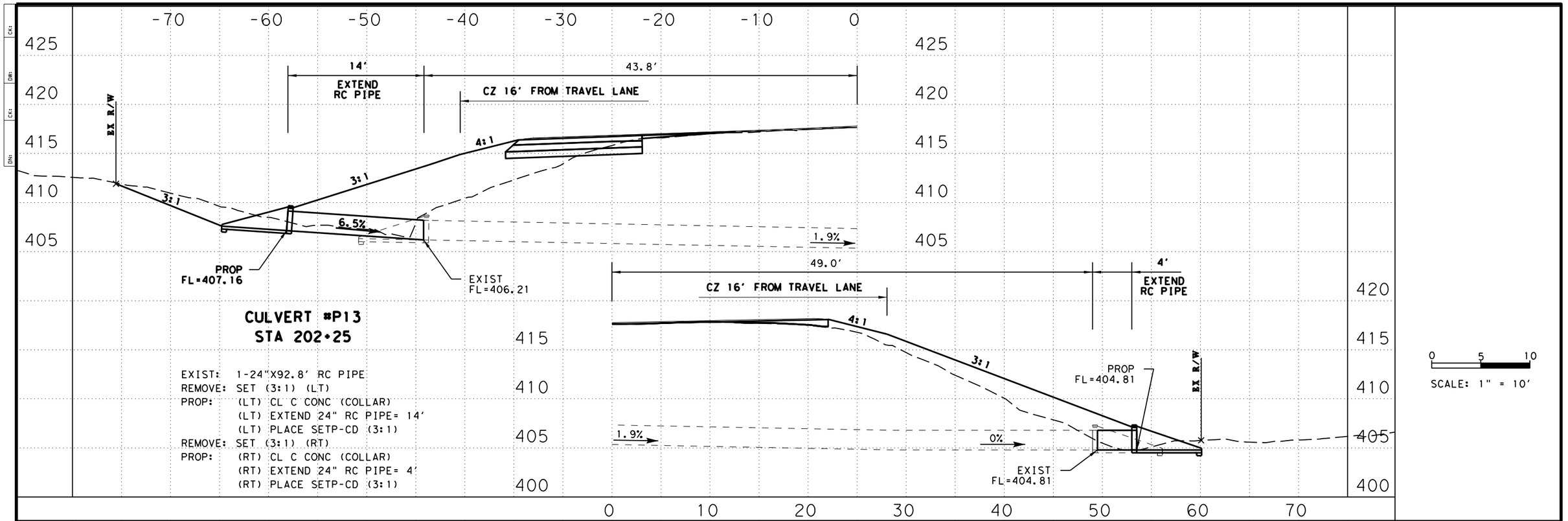
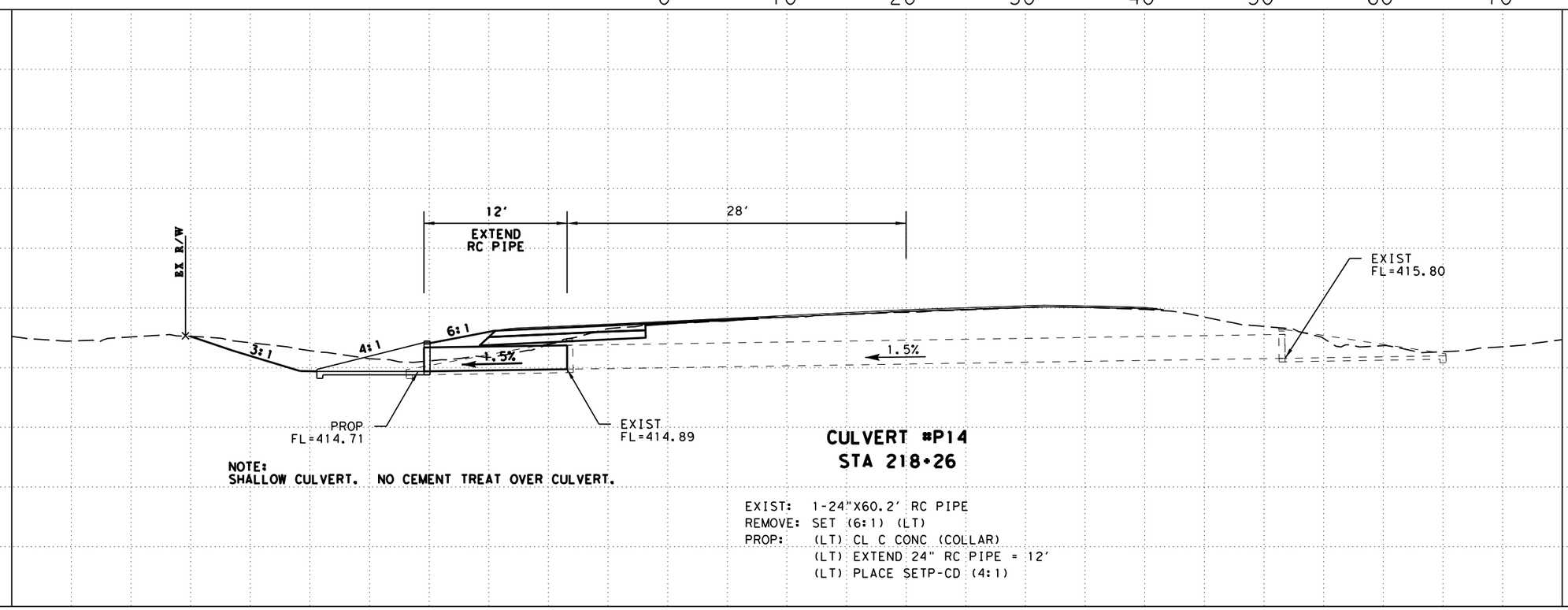


CULVERT #P13
STA 202+25

EXIST: 1-24"X92.8' RC PIPE
REMOVE: SET (3:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND 24" RC PIPE= 14'
(LT) PLACE SETP-CD (3:1)
REMOVE: SET (3:1) (RT)
PROP: (RT) CL C CONC (COLLAR)
(RT) EXTEND 24" RC PIPE= 4'
(RT) PLACE SETP-CD (3:1)



NOTE:
SHALLOW CULVERT. NO CEMENT TREAT OVER CULVERT.

CULVERT #P14
STA 218+26

EXIST: 1-24"X60.2' RC PIPE
REMOVE: SET (6:1) (LT)
PROP: (LT) CL C CONC (COLLAR)
(LT) EXTEND 24" RC PIPE = 12'
(LT) PLACE SETP-CD (4:1)

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
CULVERT LAYOUT
STA 202+25
STA 218+26

Texas Department of Transportation
SHEET 7 OF 7

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		109

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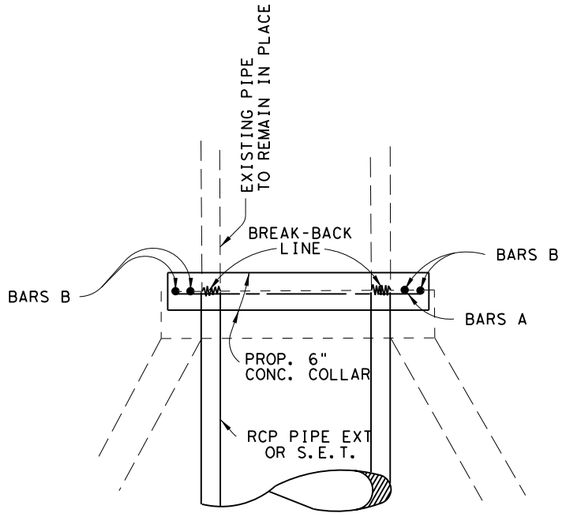
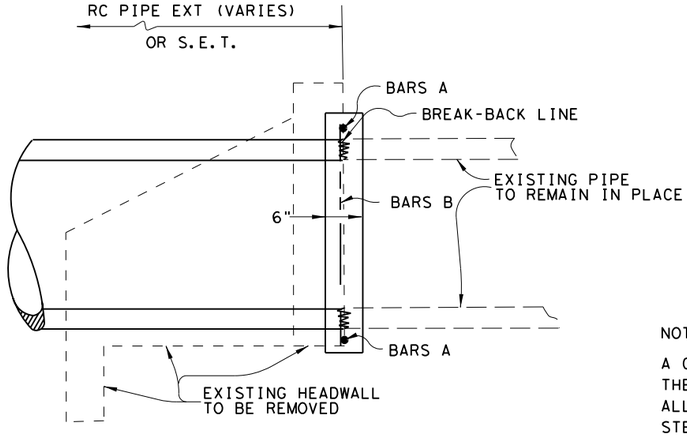
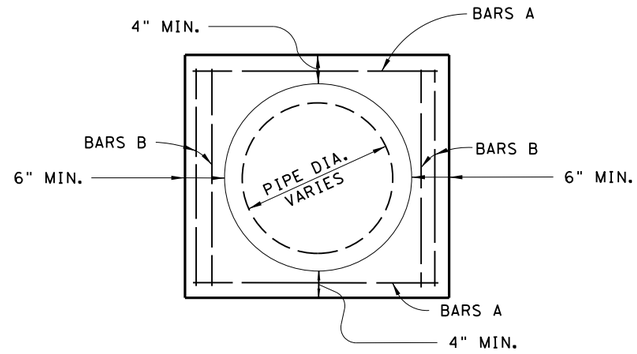




NOT TO SCALE

LONGITUDINAL ELEVATION

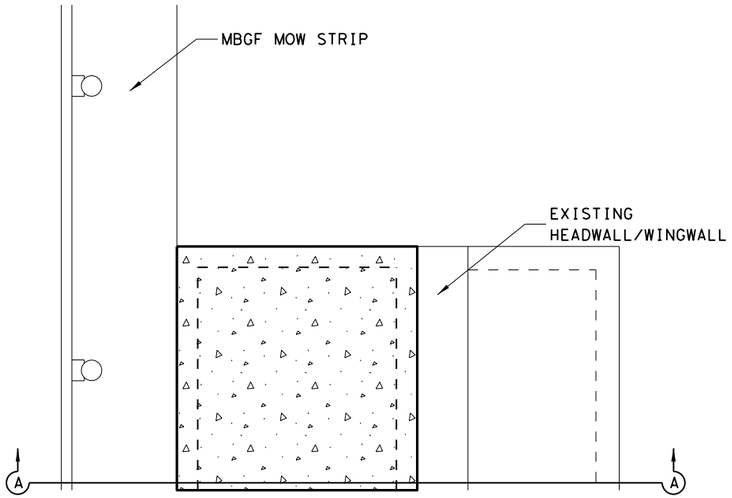


END VIEW

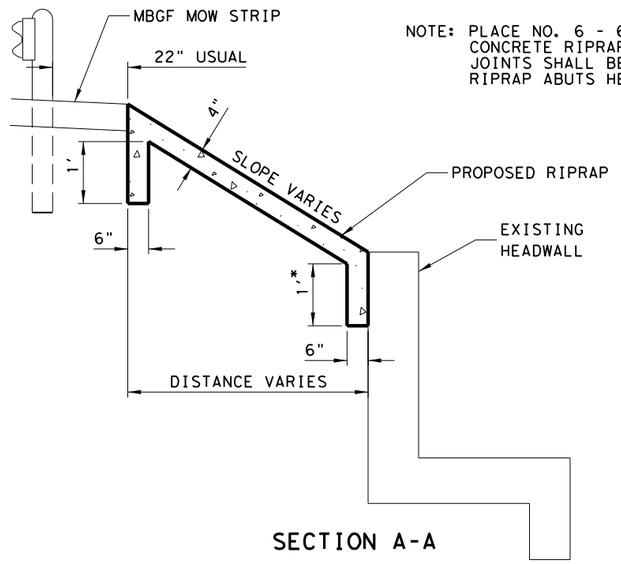
NOTE:

A CL C CONCRETE COLLAR SHALL BE USED AT LOCATIONS AS INDICATED IN THE PIPE CROSS CULVERT SUMMARY. 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.

CONCRETE COLLAR DETAIL



PARTIAL PLAN



SECTION A-A

NOTE: PLACE NO. 6 - 6" X 6" WIRE MESH IN ALL CL "B" CONCRETE RIPRAP. 3/4" PREMOLDED EXPANSION JOINTS SHALL BE PLACED WHERE CL "B" CONCRETE RIPRAP ABUTS HEADWALLS/WINGWALLS AND MOW STRIP.

RIPRAP DETAIL BETWEEN MBGF MOWSTRIP AND HEADWALL

N.T.S.

RIPRAP FOR CULVERTS AT STA 191+20 AND STA 192+96

STATE OF TEXAS
GILBERT ARTEAGA
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PROFESSIONAL ENGINEER
01/18/2022

SH 19
MISCELLANEOUS
DRAINAGE DETAILS

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		110

DATE: 1/12/2022 3:35:42 PM
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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA 131+33 - CULVERT NO. B1 (Lt)	1 ~ 4'x 3'	10'	SCC-3&4	PW-1	0°	3:1	8"	7"	3.000'	6.667'	N/A	N/A	20.000'	5.167'	N/A	0.0	0.6	17.8	267
STA 140+63 - CULVERT NO. B2 (Lt)	1 ~ 5'x 3'	10'	SCC-5&6	PW-1	30°	3:1	8"	7"	3.000'	6.667'	N/A	N/A	23.094'	7.121'	N/A	0.0	0.8	20.6	308
STA 162+14 - CULVERT NO. B3 (Lt)	1 ~ 4'x 3'	10'	SCC-3&4	PW-1	0°	3:1	8"	7"	3.000'	6.667'	N/A	N/A	20.000'	5.167'	N/A	0.0	0.6	17.8	267
STA 168+07 - CULVERT NO. B4 (Lt)	1 ~ 7'x 5'	10'	SCC-7	SETB-CD	0°	3:1	8"	7"	0.666'	6.083'	N/A	N/A	17.250'	N/A	8.167'	0.0	0.2	5.6	N/A

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

STATE OF TEXAS
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PROFESSIONAL ENGINEER
01/18/2022

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	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		111

DATE: 1/12/2022 3:35:48 PM
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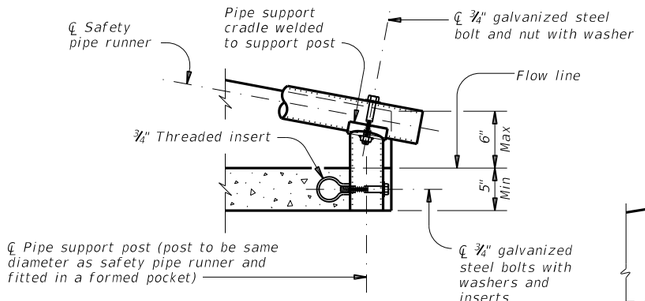
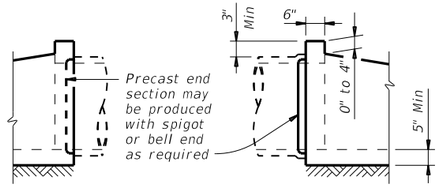
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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"				



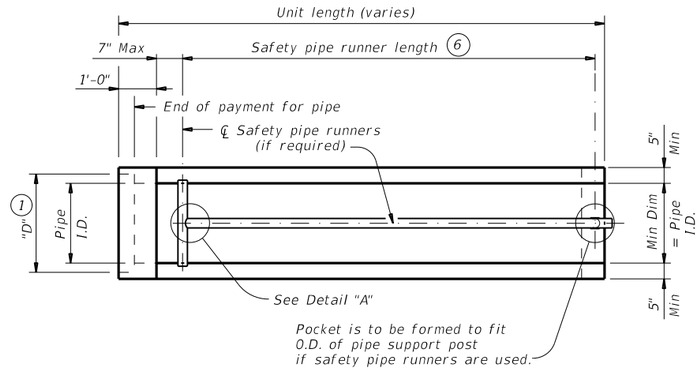
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



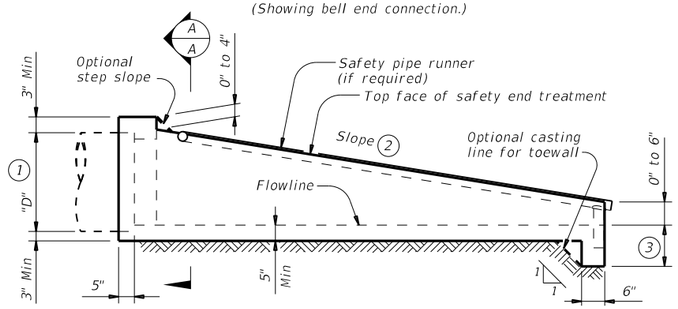
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



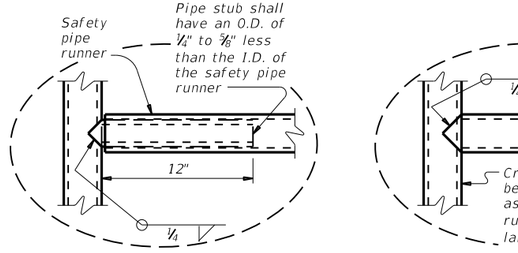
PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

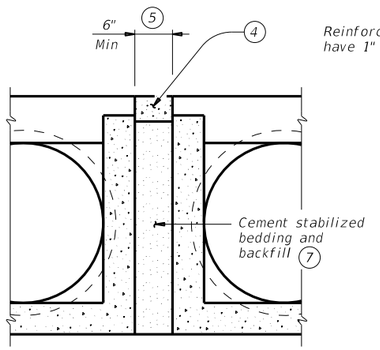


OPTION A

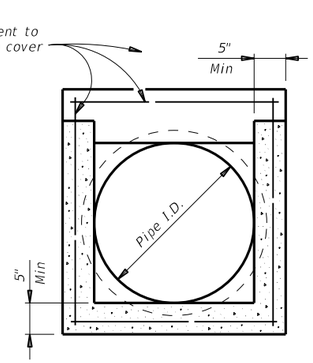
DETAIL A

(If required)

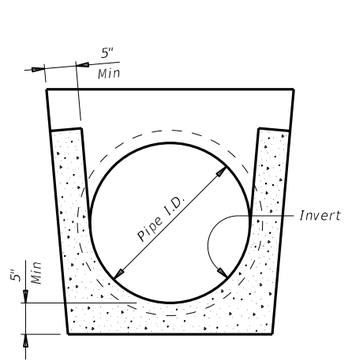
OPTION B



MULTIPLE PIPE INSTALLATION

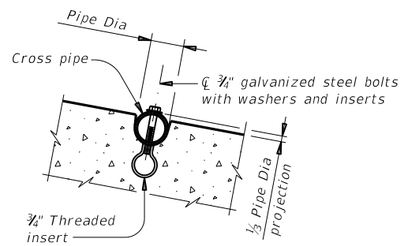


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

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

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

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

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

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

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

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

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

Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II ~ CROSS DRAINAGE

PSET-SC

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		112

DATE: 1/12/2022 3:43:53 PM
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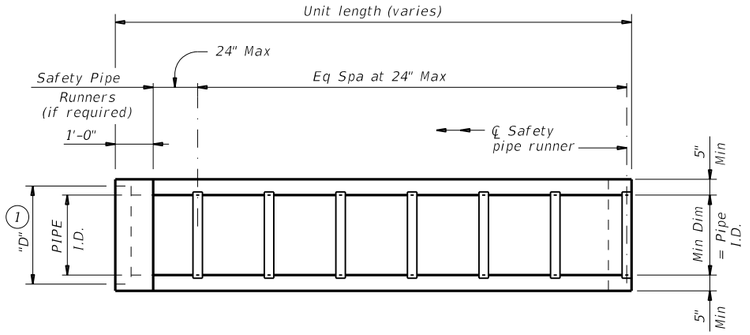
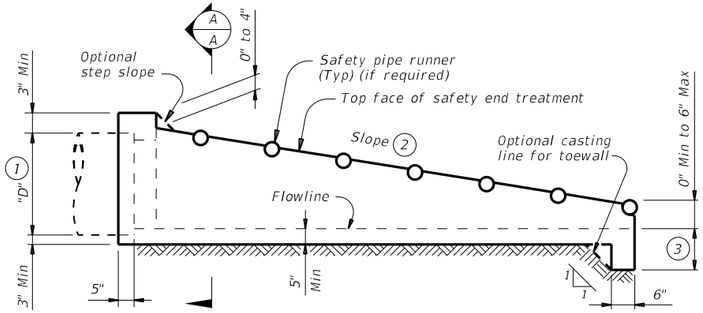


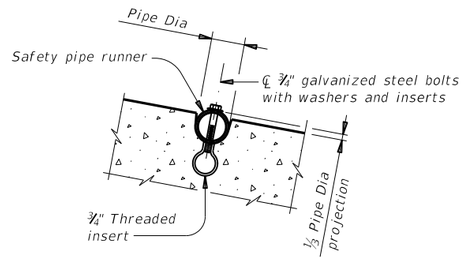
PLAN

(Showing bell end connection.)



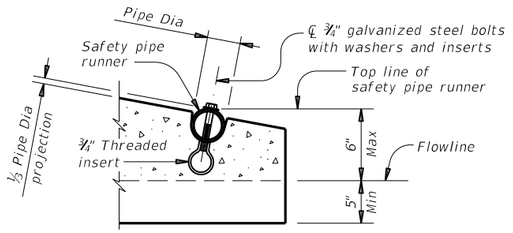
LONGITUDINAL ELEVATION

(Showing bell end connection.)

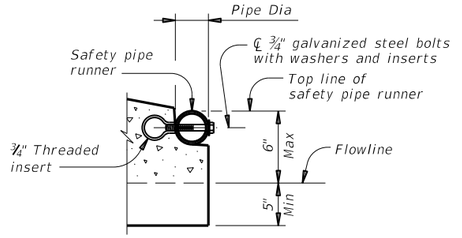


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



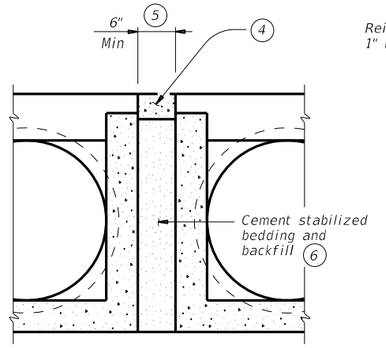
OPTION A



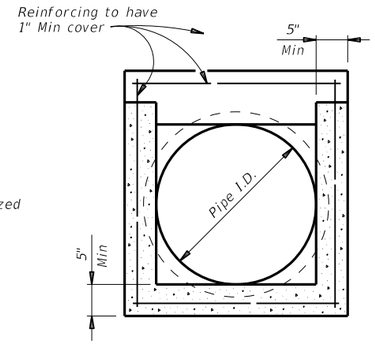
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

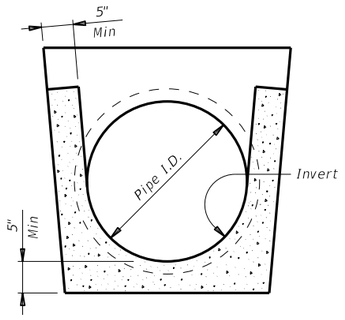
(If required)



MULTIPLE PIPE INSTALLATION

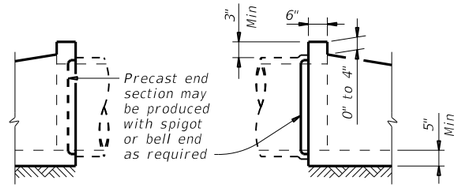


OPTION WITH SQUARE BOTTOM



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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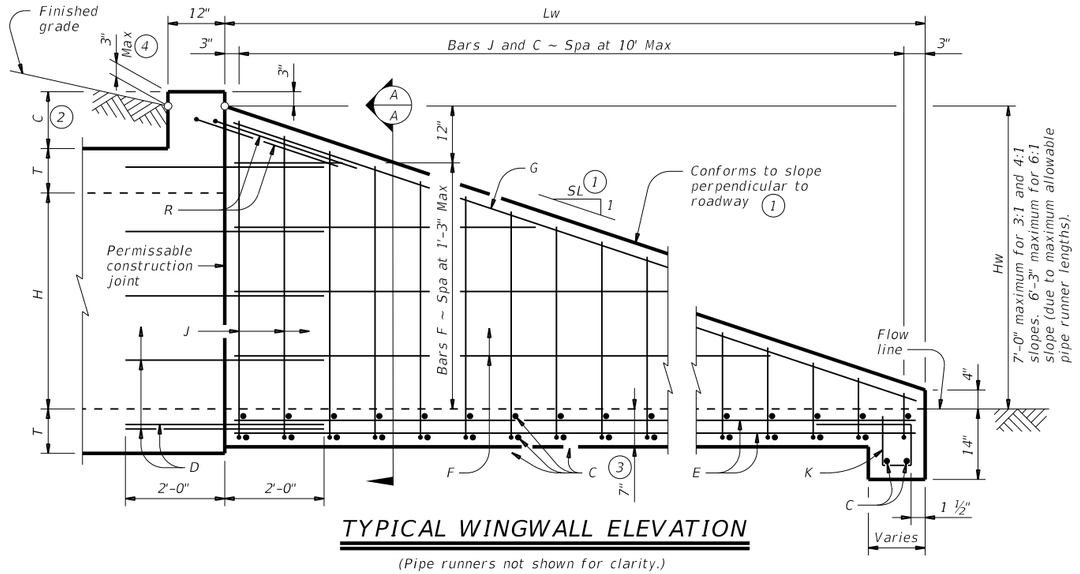
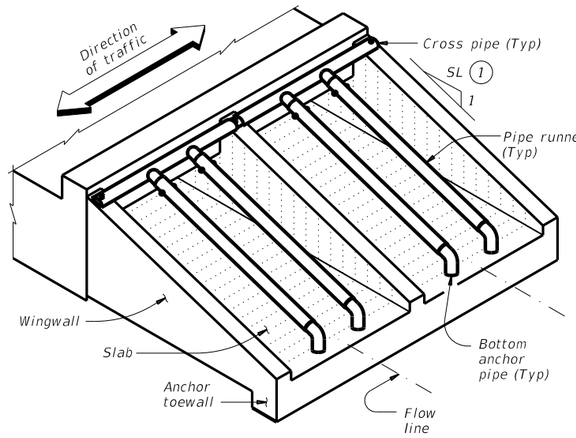
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		113



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)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' – 0.583')] ÷ (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) (√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.

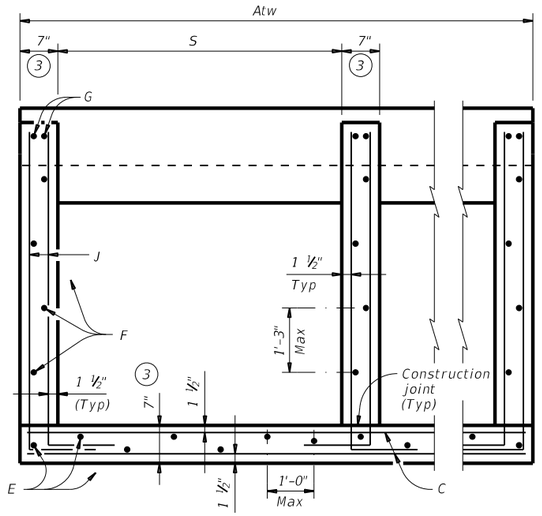
MATERIAL NOTES:

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:

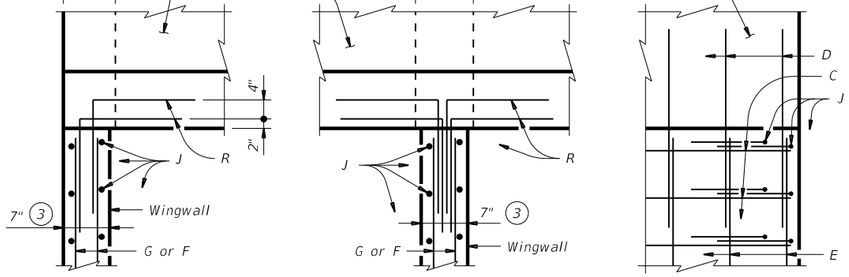
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing 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

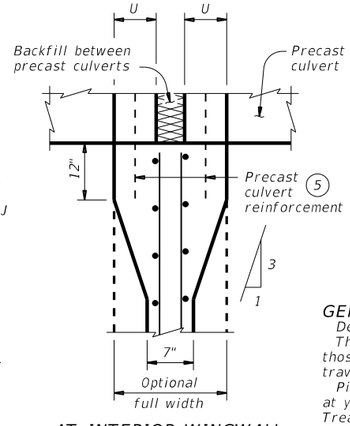
(Cast-in-place culvert)

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.*

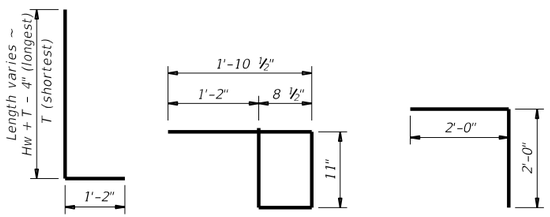
(3) *Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.*

(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



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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

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
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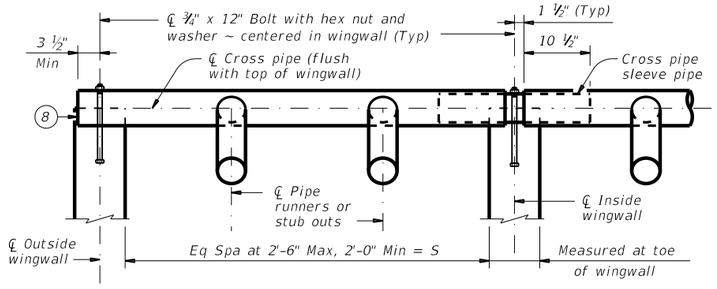
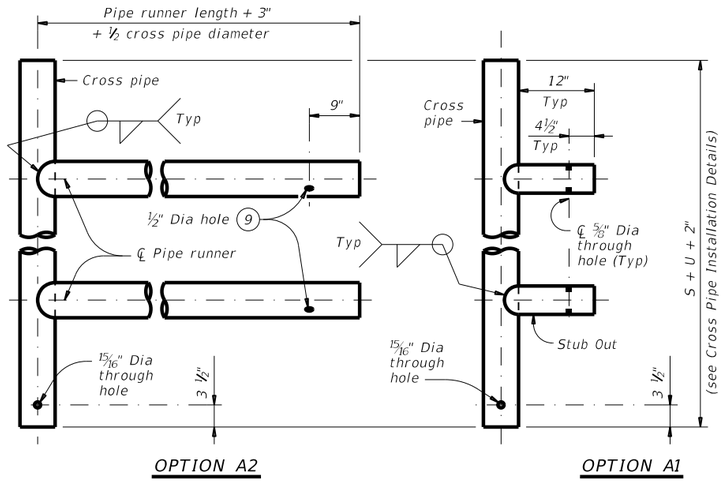
	TYL	VAN ZANDT		114

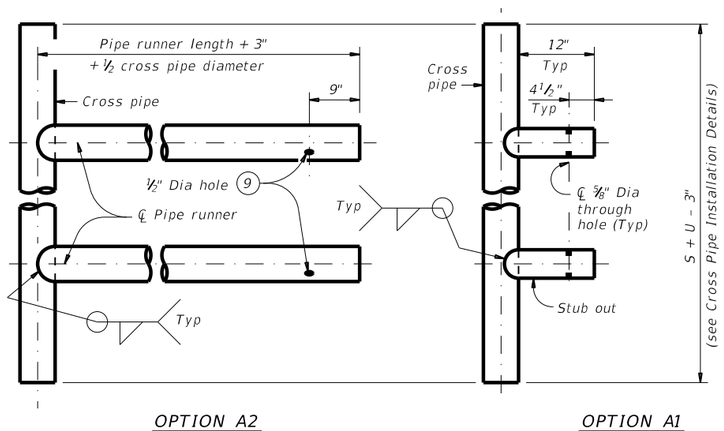


NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a $^{15}/_{16}$" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS

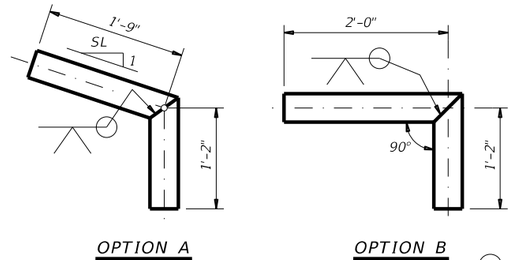


FOR USE IN OUTSIDE CULVERT BAY



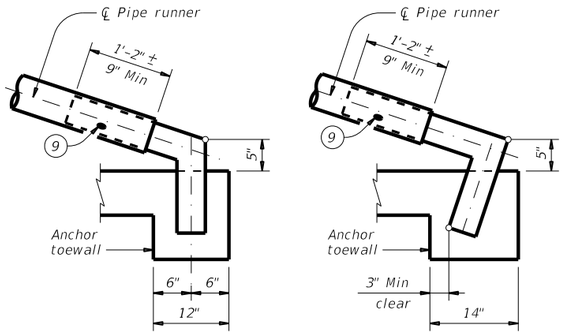
FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



OPTION A OPTION B

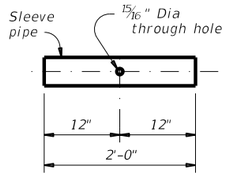
BOTTOM ANCHOR PIPE DETAILS (10)



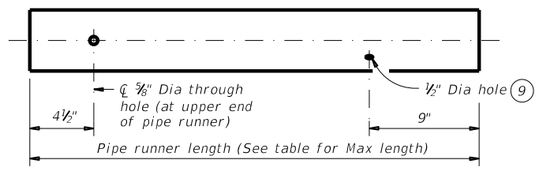
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

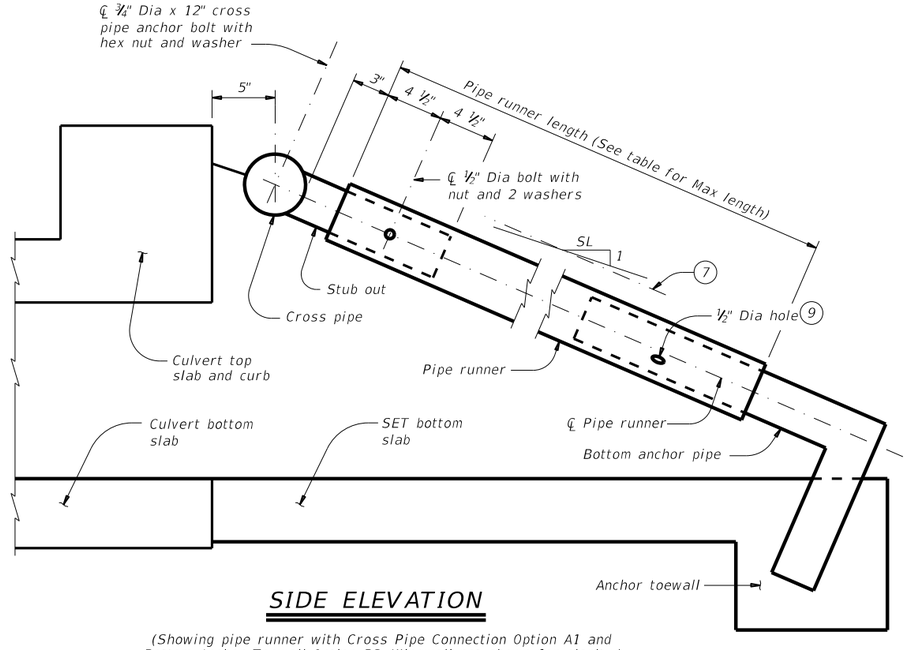


CROSS PIPE SLEEVE PIPE DETAILS



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"

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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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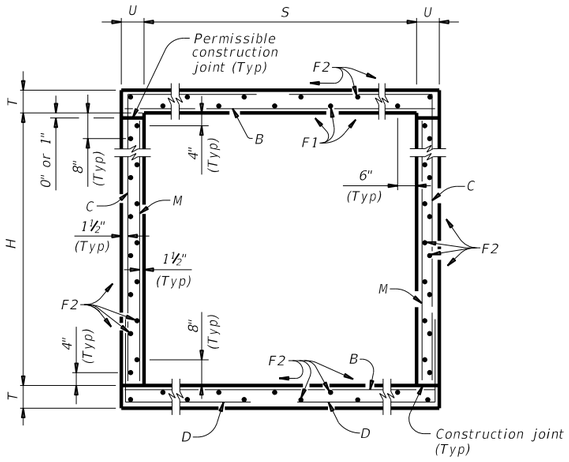
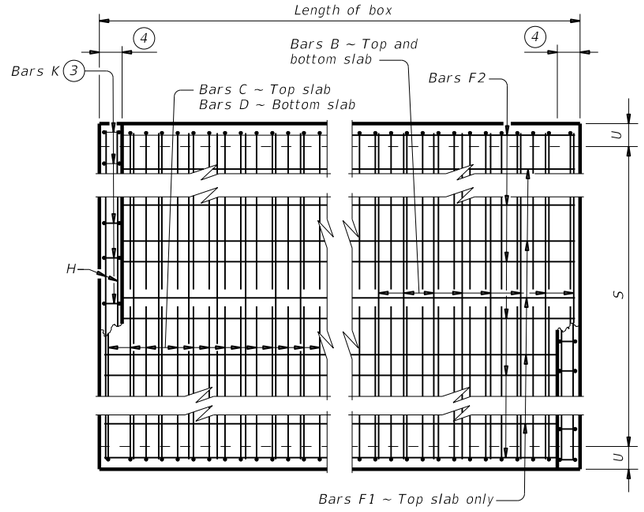
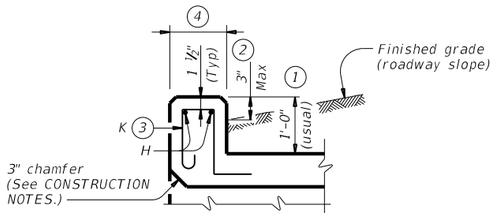


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.

Chamfer the bottom edge of the top slab 3" at the entrance.

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:

- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:

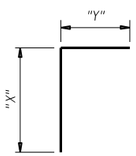
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

GENERAL NOTES:

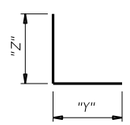
Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.

See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

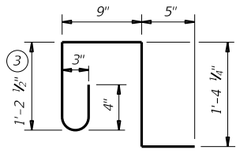
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

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REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		116

SECTION DIMENSIONS				(5) FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 5"	391	2' – 7"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.2	0.3	38	12.0	1,966
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 5"	463	3' – 7"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.5	0.3	38	13.7	2,216
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 9"	622	2' – 7"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.6	0.4	46	14.1	2,590
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 9"	730	3' – 7"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.8	0.4	46	15.8	2,876
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 9"	839	4' – 7"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.3	0.4	46	17.5	3,058

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		117

DATE: 1/12/2022 3:44:10 PM
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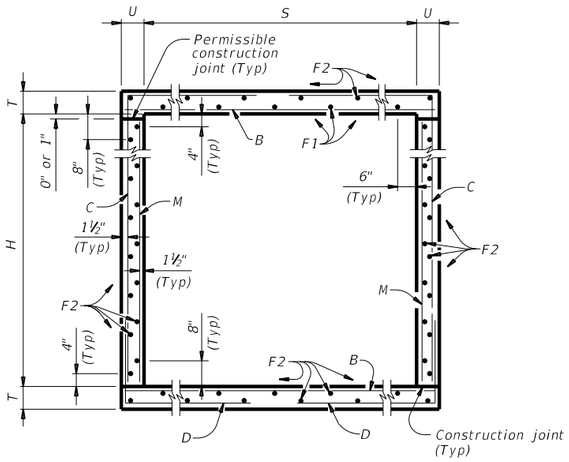
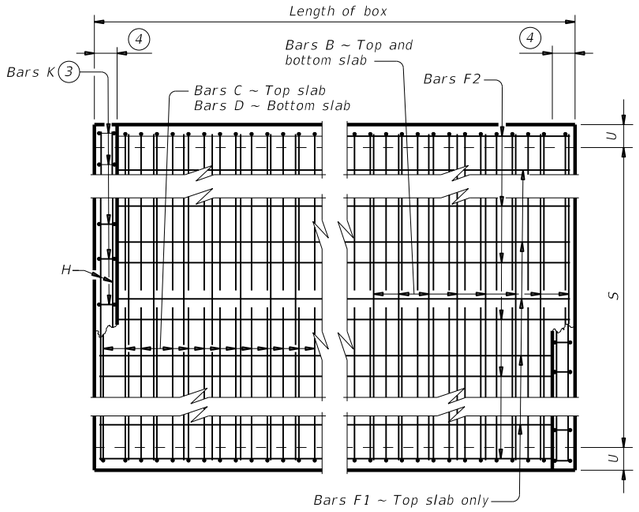
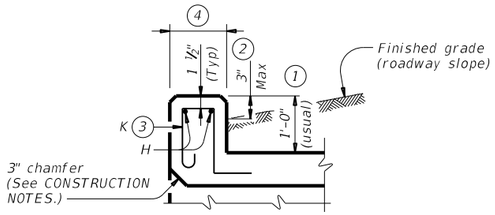


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(4) 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

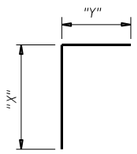
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'_c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

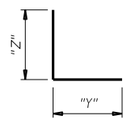
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

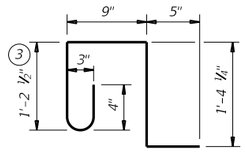
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-5 & 6

FILE: scc56ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		118

SECTION DIMENSIONS				⑤ FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
5' – 0"	2' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 4"	713	2' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.391	80.8	0.5	55	16.1	3,285
5' – 0"	2' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 5"	723	2' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.429	81.2	0.5	55	17.6	3,304
5' – 0"	3' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 4"	826	3' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.434	88.0	0.5	55	17.8	3,576
5' – 0"	3' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 5"	835	3' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.472	88.5	0.5	55	19.3	3,594
5' – 0"	4' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 4"	939	4' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.477	92.7	0.5	55	19.5	3,762
5' – 0"	4' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 5"	948	4' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.515	93.1	0.5	55	21.1	3,780
5' – 0"	5' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 4"	1,051	5' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.521	100.0	0.5	55	21.3	4,053
5' – 0"	5' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 5"	1,061	5' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.559	100.4	0.5	55	22.8	4,072
6' – 0"	2' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	6' – 8"	751	2' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.440	89.4	0.5	63	18.1	3,637
6' – 0"	2' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	6' – 9"	1,141	2' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.485	109.0	0.5	63	19.9	4,422
6' – 0"	2' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	6' – 11"	1,169	2' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	2' – 0"	110	5	39' – 9"	133	25	39' – 9"	664	7' – 1"	19	18	50	0.551	110.2	0.5	69	22.6	4,477
6' – 0"	3' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	7' – 8"	864	3' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.484	96.6	0.5	63	19.9	3,928
6' – 0"	3' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	7' – 9"	1,309	3' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.528	117.6	0.5	63	21.6	4,768
6' – 0"	3' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	7' – 11"	1,338	3' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	3' – 0"	164	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.601	118.4	0.5	69	24.6	4,806
6' – 0"	4' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	8' – 8"	976	4' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.527	101.3	0.5	63	21.6	4,113
6' – 0"	4' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	8' – 9"	1,478	4' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.571	123.7	0.5	63	23.4	5,010
6' – 0"	4' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	8' – 11"	1,507	4' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	4' – 0"	219	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.650	124.0	0.5	69	26.5	5,030
6' – 0"	5' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	9' – 8"	1,089	5' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.570	108.5	0.5	63	23.3	4,404
6' – 0"	5' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	9' – 9"	1,647	5' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.614	132.4	0.5	63	25.1	5,357
6' – 0"	5' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	9' – 11"	1,676	5' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	5' – 0"	274	5	39' – 9"	133	33	39' – 9"	876	7' – 1"	19	18	50	0.700	132.3	0.5	69	28.5	5,360
6' – 0"	6' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	10' – 8"	1,202	6' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.613	115.8	0.5	63	25.0	4,695
6' – 0"	6' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	10' – 9"	1,816	6' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.657	141.0	0.5	63	26.8	5,704
6' – 0"	6' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	10' – 11"	1,845	6' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	6' – 0"	329	5	39' – 9"	133	37	39' – 9"	982	7' – 1"	19	18	50	0.749	140.5	0.5	69	30.5	5,690

⑤ For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-5 & 6

FILE: scc56ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		119

DATE: 1/12/2022 3:44:18 PM
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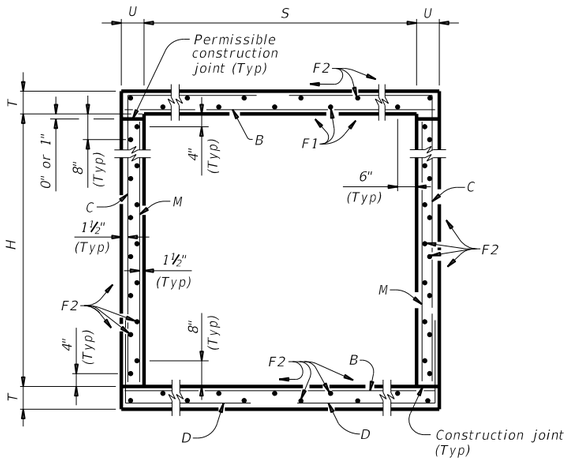
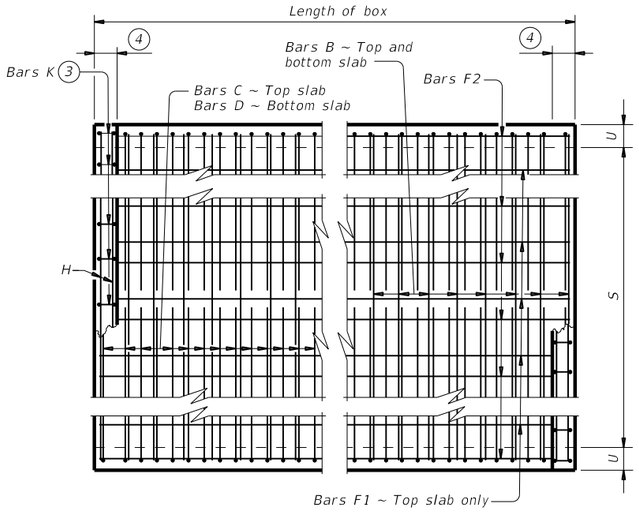
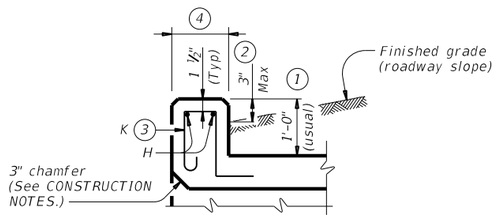


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

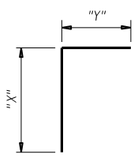
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete ($f'c$ = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete ($f'c$ = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

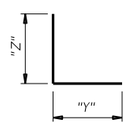
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

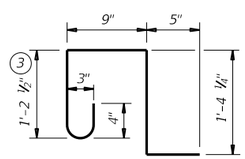
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-7

FILE: scc07ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		120

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
7' – 0"	3' – 0"	8"	7"	16'	108	#6	9"	7' – 11"	1,284	162	#5	6"	8' – 0"	1,352	3' – 7"	4' – 5"	162	#5	6"	7' – 1"	1,197	4' – 5"	2' – 8"	108	9"	3' – 0"	216	5	39' – 9"	133	31	39' – 9"	823	7' – 11"	21	18	50	0.533	125.1	0.6	71	21.9	5,076
7' – 0"	3' – 0"	9"	7"	20'	108	#6	9"	7' – 11"	1,284	162	#5	6"	8' – 1"	1,366	3' – 8"	4' – 5"	162	#5	6"	7' – 2"	1,211	4' – 5"	2' – 9"	108	9"	3' – 0"	216	5	39' – 9"	133	31	39' – 9"	823	7' – 11"	21	18	50	0.583	125.8	0.6	71	23.9	5,104
7' – 0"	3' – 0"	10"	8"	23'	108	#6	9"	8' – 1"	1,311	162	#5	6"	8' – 3"	1,394	3' – 9"	4' – 6"	162	#5	6"	7' – 4"	1,239	4' – 6"	2' – 10"	82	12"	3' – 0"	164	5	39' – 9"	133	31	39' – 9"	823	8' – 1"	22	20	56	0.663	126.6	0.6	78	27.1	5,142
7' – 0"	3' – 0"	11"	8"	30'	108	#6	9"	8' – 1"	1,311	162	#5	6"	8' – 4"	1,408	3' – 10"	4' – 6"	162	#5	6"	7' – 5"	1,253	4' – 6"	2' – 11"	82	12"	3' – 0"	164	5	39' – 9"	133	31	39' – 9"	823	8' – 1"	22	20	56	0.714	127.3	0.6	78	29.2	5,170
7' – 0"	4' – 0"	8"	7"	16'	108	#6	9"	7' – 11"	1,284	162	#5	6"	9' – 0"	1,521	4' – 7"	4' – 5"	162	#5	6"	7' – 1"	1,197	4' – 5"	2' – 8"	108	9"	4' – 0"	289	5	39' – 9"	133	31	39' – 9"	823	7' – 11"	21	18	50	0.576	131.2	0.6	71	23.6	5,318
7' – 0"	4' – 0"	9"	7"	20'	108	#6	9"	7' – 11"	1,284	162	#5	6"	9' – 1"	1,535	4' – 8"	4' – 5"	162	#5	6"	7' – 2"	1,211	4' – 5"	2' – 9"	108	9"	4' – 0"	289	5	39' – 9"	133	31	39' – 9"	823	7' – 11"	21	18	50	0.627	131.9	0.6	71	25.7	5,346
7' – 0"	4' – 0"	10"	8"	23'	108	#6	9"	8' – 1"	1,311	162	#5	6"	9' – 3"	1,563	4' – 9"	4' – 6"	162	#5	6"	7' – 4"	1,239	4' – 6"	2' – 10"	82	12"	4' – 0"	219	5	39' – 9"	133	31	39' – 9"	823	8' – 1"	22	20	56	0.712	132.2	0.6	78	29.1	5,366
7' – 0"	4' – 0"	11"	8"	30'	162	#6	6"	8' – 1"	1,967	162	#5	6"	9' – 4"	1,577	4' – 10"	4' – 6"	162	#5	6"	7' – 5"	1,253	4' – 6"	2' – 11"	82	12"	4' – 0"	219	5	39' – 9"	133	31	39' – 9"	823	8' – 1"	22	20	56	0.763	149.3	0.6	78	31.1	6,050
7' – 0"	5' – 0"	8"	7"	16'	108	#6	9"	7' – 11"	1,284	162	#5	6"	10' – 0"	1,690	5' – 7"	4' – 5"	162	#5	6"	7' – 1"	1,197	4' – 5"	2' – 8"	108	9"	5' – 0"	361	5	39' – 9"	133	35	39' – 9"	929	7' – 11"	21	18	50	0.619	139.9	0.6	71	25.4	5,665
7' – 0"	5' – 0"	9"	7"	20'	108	#6	9"	7' – 11"	1,284	162	#5	6"	10' – 1"	1,704	5' – 8"	4' – 5"	162	#5	6"	7' – 2"	1,211	4' – 5"	2' – 9"	108	9"	5' – 0"	361	5	39' – 9"	133	35	39' – 9"	929	7' – 11"	21	18	50	0.670	140.6	0.6	71	27.4	5,693
7' – 0"	5' – 0"	10"	8"	23'	108	#6	9"	8' – 1"	1,311	162	#5	6"	10' – 3"	1,732	5' – 9"	4' – 6"	162	#5	6"	7' – 4"	1,239	4' – 6"	2' – 10"	82	12"	5' – 0"	274	5	39' – 9"	133	35	39' – 9"	929	8' – 1"	22	20	56	0.761	140.5	0.6	78	31.1	5,696
7' – 0"	5' – 0"	11"	8"	30'	162	#6	6"	8' – 1"	1,967	162	#5	6"	10' – 4"	1,746	5' – 10"	4' – 6"	162	#5	6"	7' – 5"	1,253	4' – 6"	2' – 11"	82	12"	5' – 0"	274	5	39' – 9"	133	35	39' – 9"	929	8' – 1"	22	20	56	0.813	157.6	0.6	78	33.1	6,380
7' – 0"	6' – 0"	8"	7"	16'	108	#6	9"	7' – 11"	1,284	162	#5	6"	11' – 0"	1,859	6' – 7"	4' – 5"	162	#5	6"	7' – 1"	1,197	4' – 5"	2' – 8"	108	9"	6' – 0"	433	5	39' – 9"	133	39	39' – 9"	1,036	7' – 11"	21	18	50	0.663	148.6	0.6	71	27.1	6,013
7' – 0"	6' – 0"	9"	7"	20'	108	#6	9"	7' – 11"	1,284	162	#5	6"	11' – 1"	1,873	6' – 8"	4' – 5"	162	#5	6"	7' – 2"	1,211	4' – 5"	2' – 9"	108	9"	6' – 0"	433	5	39' – 9"	133	39	39' – 9"	1,036	7' – 11"	21	18	50	0.713	149.3	0.6	71	29.1	6,041
7' – 0"	6' – 0"	10"	8"	23'	108	#6	9"	8' – 1"	1,311	162	#5	6"	11' – 3"	1,901	6' – 9"	4' – 6"	162	#5	6"	7' – 4"	1,239	4' – 6"	2' – 10"	82	12"	6' – 0"	329	5	39' – 9"	133	39	39' – 9"	1,036	8' – 1"	22	20	56	0.811	148.7	0.6	78	33.1	6,027
7' – 0"	6' – 0"	11"	8"	30'	162	#6	6"	8' – 1"	1,967	162	#5	6"	11' – 4"	1,915	6' – 10"	4' – 6"	162	#5	6"	7' – 5"	1,253	4' – 6"	2' – 11"	82	12"	6' – 0"	329	5	39' – 9"	133	39	39' – 9"	1,036	8' – 1"	22	20	56	0.862	165.8	0.6	78	35.1	6,711
7' – 0"	7' – 0"	8"	7"	16'	108	#6	9"	7' – 11"	1,284	162	#5	6"	12' – 0"	2,028	7' – 7"	4' – 5"	162	#5	6"	7' – 1"	1,197	4' – 5"	2' – 8"	108	9"	7' – 0"	505	5	39' – 9"	133	39	39' – 9"	1,036	7' – 11"	21	18	50	0.706	154.6	0.6	71	28.8	6,254
7' – 0"	7' – 0"	9"	7"	20'	108	#6	9"	7' – 11"	1,284	162	#5	6"	12' – 1"	2,042	7' – 8"	4' – 5"	162	#5	6"	7' – 2"	1,211	4' – 5"	2' – 9"	108	9"	7' – 0"	505	5	39' – 9"	133	39	39' – 9"	1,036	7' – 11"	21	18	50	0.756	155.3	0.6	71	30.8	6,282
7' – 0"	7' – 0"	10"	8"	23'	108	#6	9"	8' – 1"	1,311	162	#5	6"	12' – 3"	2,070	7' – 9"	4' – 6"	162	#5	6"	7' – 4"	1,239	4' – 6"	2' – 10"	108	9"	7' – 0"	505	5	39' – 9"	133	39	39' – 9"	1,036	8' – 1"	22	20	56	0.860	157.4	0.6	78	35.0	6,372
7' – 0"	7' – 0"	11"	8"	30'	162	#6	6"	8' – 1"	1,967	162	#5	6"	12' – 4"	2,084	7' – 10"	4' – 6"	162	#5	6"	7' – 5"	1,253	4' – 6"	2' – 11"	108	9"	7' – 0"	505	5	39' – 9"	133	39	39' – 9"	1,036	8' – 1"	22	20	56	0.912	174.5	0.6	78	37.1	7,056

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-7

FILE: scc07ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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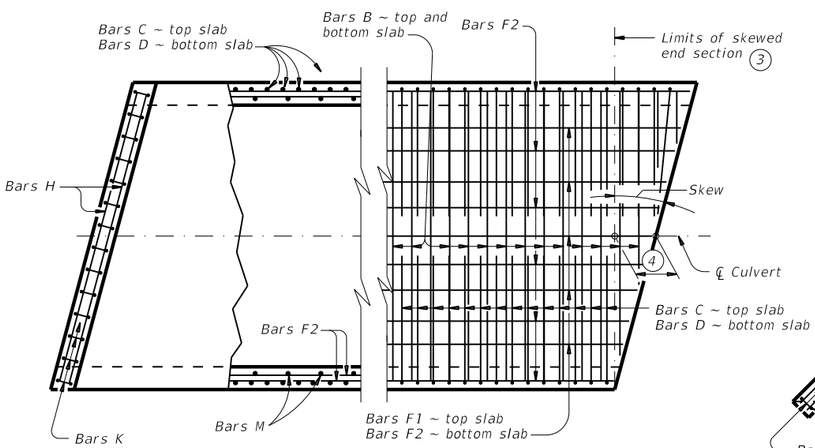
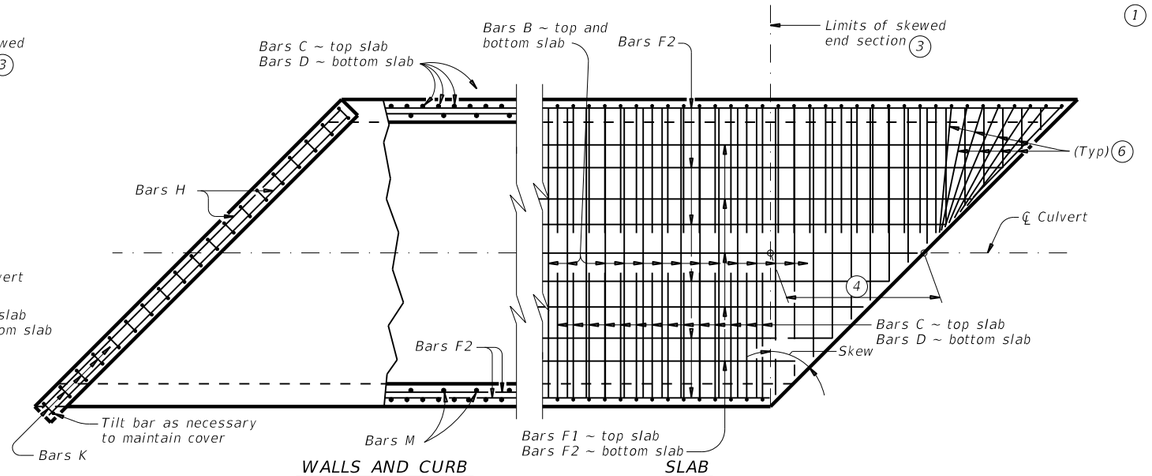
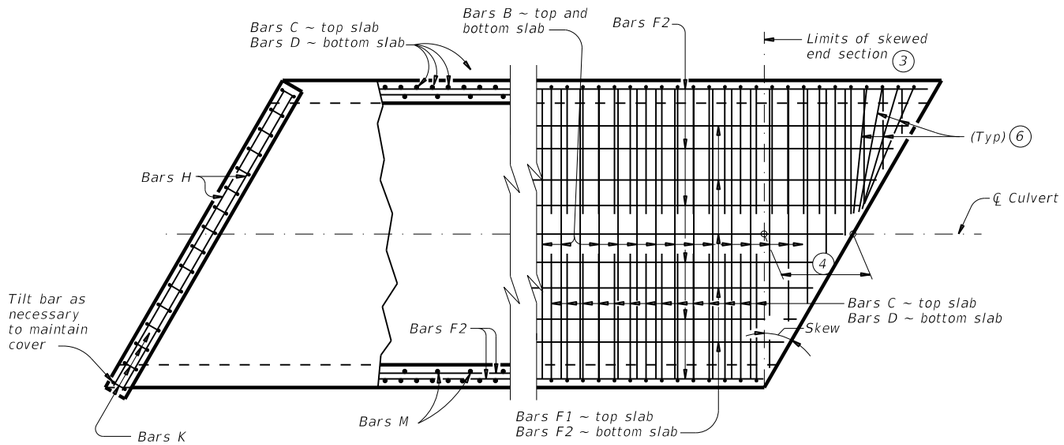
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		121



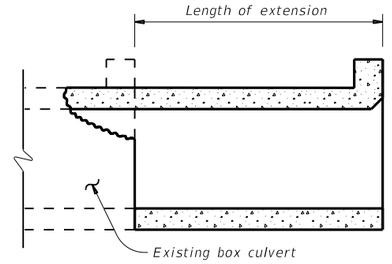
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



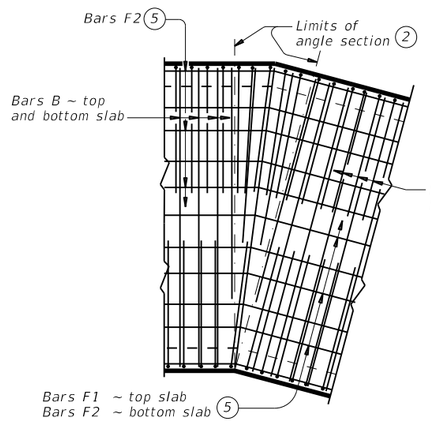
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



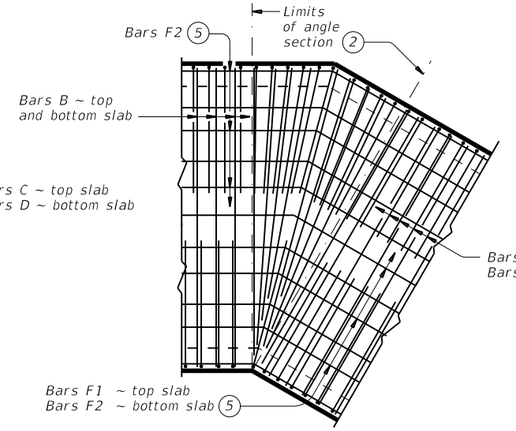
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



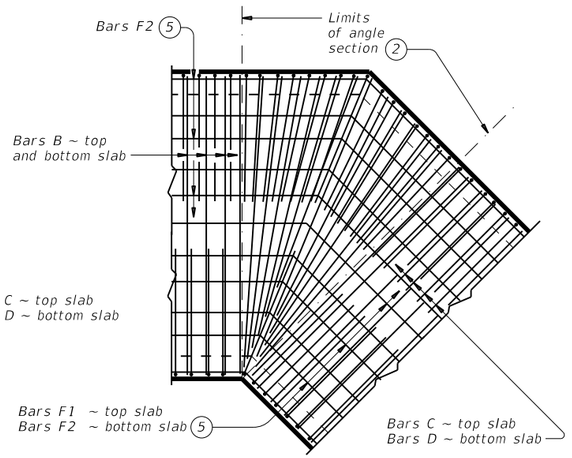
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars 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, C, D , E, or F ancher adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflictin acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.

For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		122

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

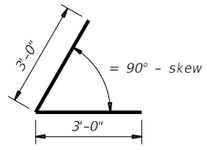
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2–wings) (4)		Estimated Quantities per ft of Toewall (1–toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	48.64	0.406	6.85	0.071
2'–9"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.31	0.424	6.85	0.071
3'–0"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.98	0.444	6.85	0.071
3'–3"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.32	0.462	6.85	0.071
3'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.98	0.480	6.85	0.071
4'–0"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	55.77	0.532	6.85	0.071
4'–6"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	59.77	0.568	6.85	0.071
5'–0"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	63.45	0.632	6.96	0.075
5'–6"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	67.46	0.668	6.96	0.075
6'–0"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	80.67	0.730	7.07	0.078
6'–6"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	85.05	0.768	7.07	0.078
7'–0"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	92.15	0.864	8.07	0.093
7'–6"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	96.54	0.902	8.07	0.093
8'–0"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'–6"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'–6"	6'–0"	2'–10"	2'–2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'–6"	6'–5"	3'–0"	2'–5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'–6"	7'–2"	3'–6"	2'–8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'–6"	7'–8"	3'–9"	2'–11"	1'–0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'–6"	8'–2"	4'–0"	3'–2"	1'–2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'–6"	8'–10"	4'–5"	3'–5"	1'–4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'–6"	9'–6"	4'–10"	3'–8"	1'–6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'–0"	9'–11"	5'–0"	3'–11"	1'–7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2–wings)

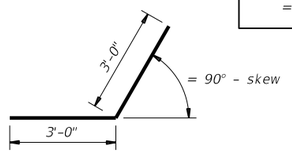
Bar	Size	No.	Spa
D1	#6	~	1'–0"
D2	#6	~	1'–0"
E1	#4	~	1'–0"
F	#4	~	1'–0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'–0"
V	#4	~	1'–0"

TABLE OF TOEWALL REINFORCING

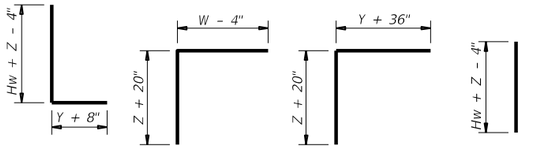
Bar	Size	No.	Spa
J3	#4	~	1'–0"
M2	#4	2	~
E2	#4	~	1'–0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

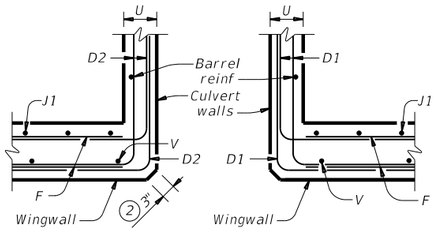
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW–1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW–2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW–2 and Hw < 4'

For cast–in–place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

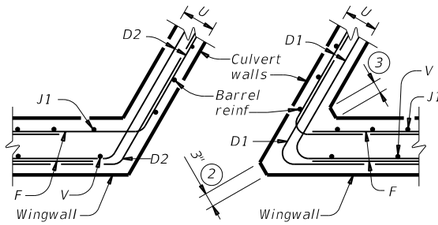
For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW–1
= (2)(Hw)(Lw) – 6 SF for Type PW–2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW–2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

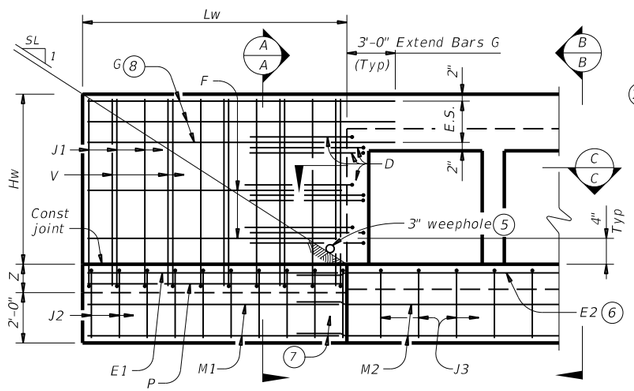
See applicable box culvert standard sheet for S, H, T, and U values.



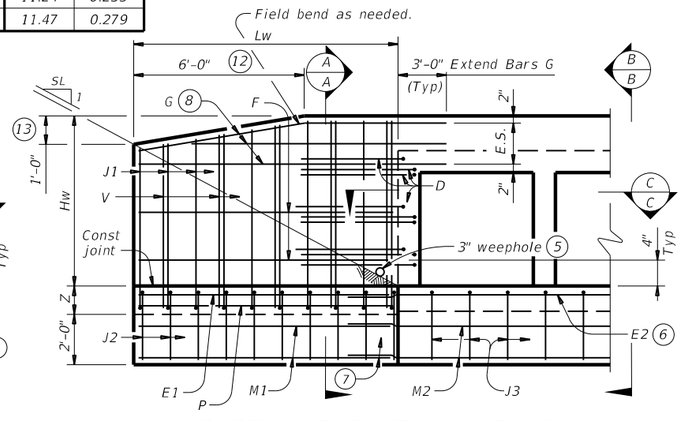
SECTION C-C - PW-1



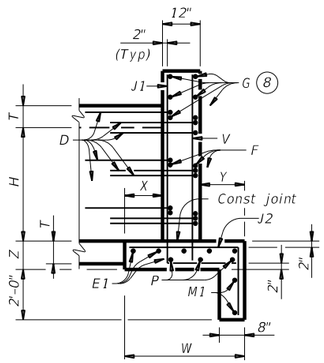
SECTION C-C - PW-2



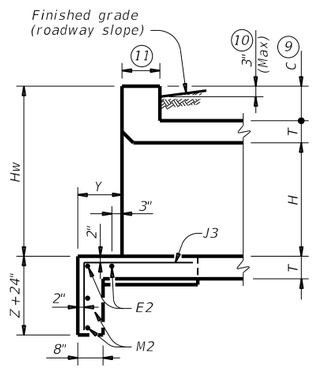
PARTIAL ELEVATION - PW-1



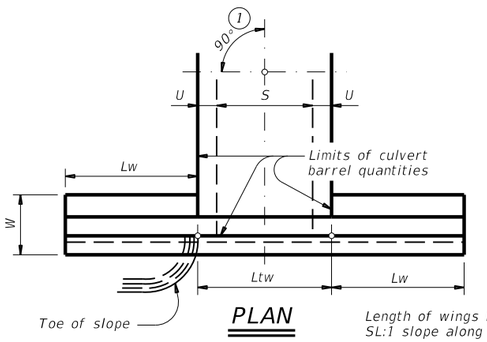
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

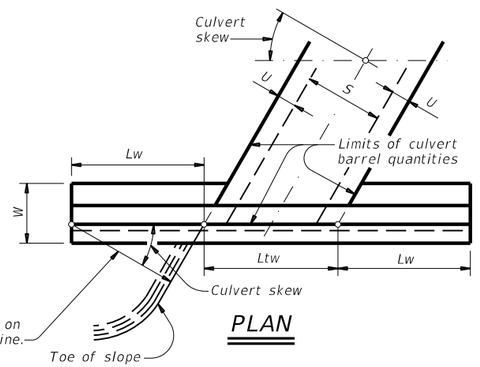


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW–1 wings. Adjust concrete volume for Type PW–2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'–0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'–6" minimum into the wingwall footing.
7. Lap Bars M1 1'–6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'–0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW–1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW–2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

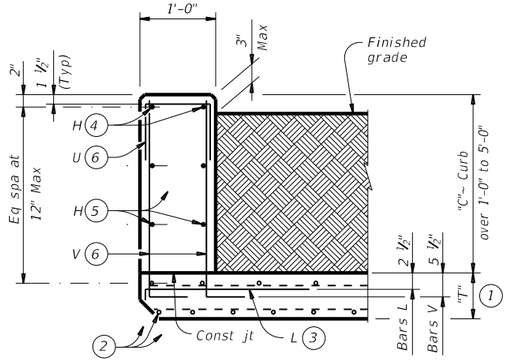
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out–to–out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

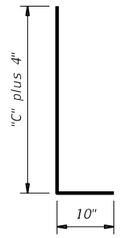
PW

FILE:	pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0108	12	018	SH 19
		DIST	COUNTY		SHEET NO.
		TYL	VAN ZANDT		123



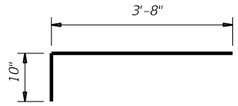
TYPICAL SECTION

Used for curbs over 1'–0" to 5'–0"



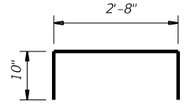
BARS V (#5) (6)

Spaced at 12" Max



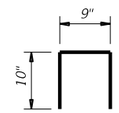
BARS L (#5) (3)

Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)

Spaced at 12" Max



BARS U (#4) (6)

Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'–0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'–0"	0.037	10.4
1'–6"	0.056	14.5
2'–0"	0.074	15.6
2'–6"	0.093	18.0
3'–0"	0.111	19.0
3'–6"	0.130	21.3
4'–0"	0.148	22.4
4'–6"	0.167	24.8
5'–0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'–8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		124

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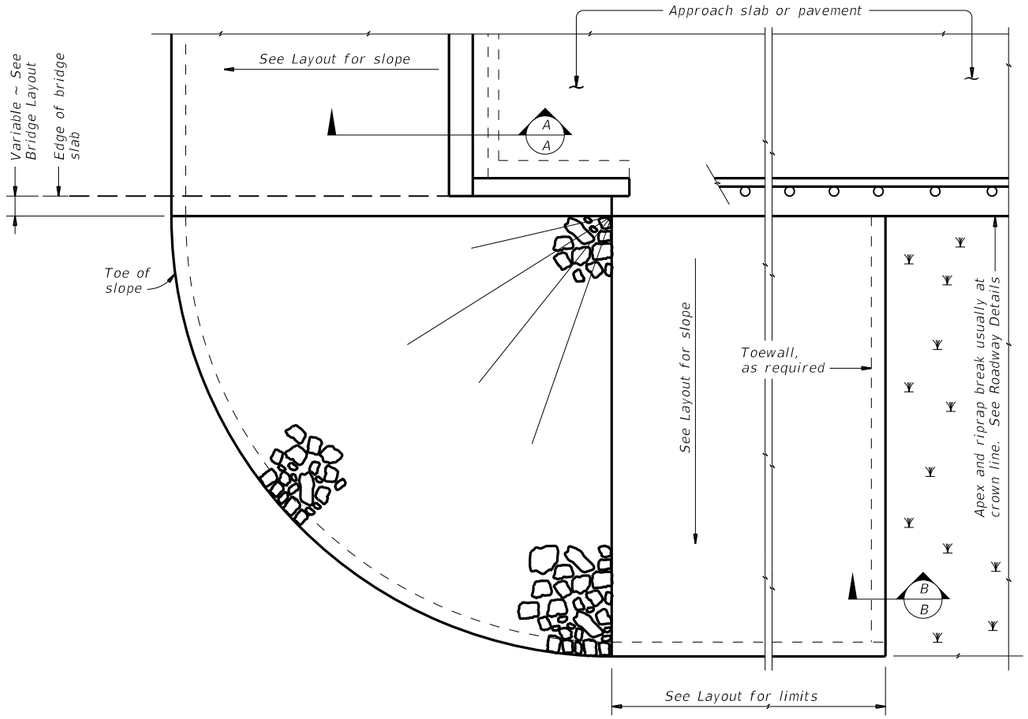
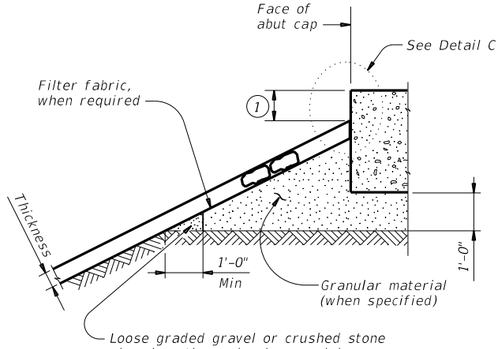
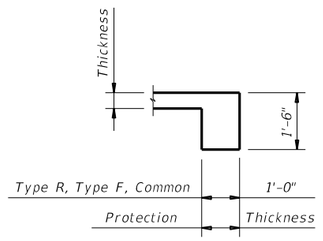


PLAN

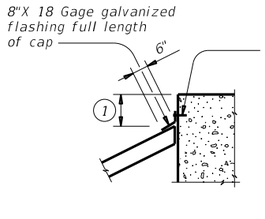


SECTION A-A AT CAP

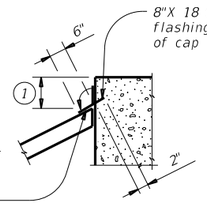


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

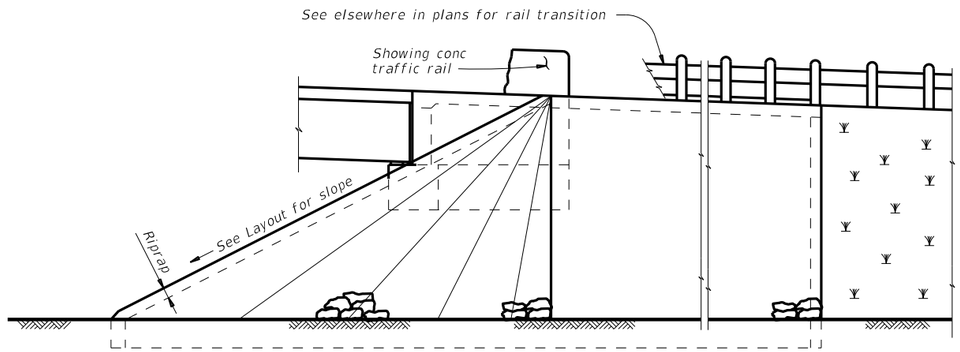


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

1 Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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REVISIONS	0108	12	018	SH 19		
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	TYL	VAN ZANDT		125		

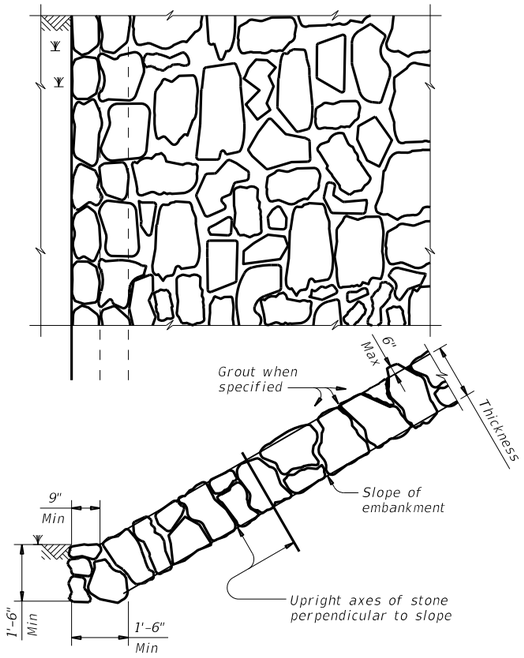


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

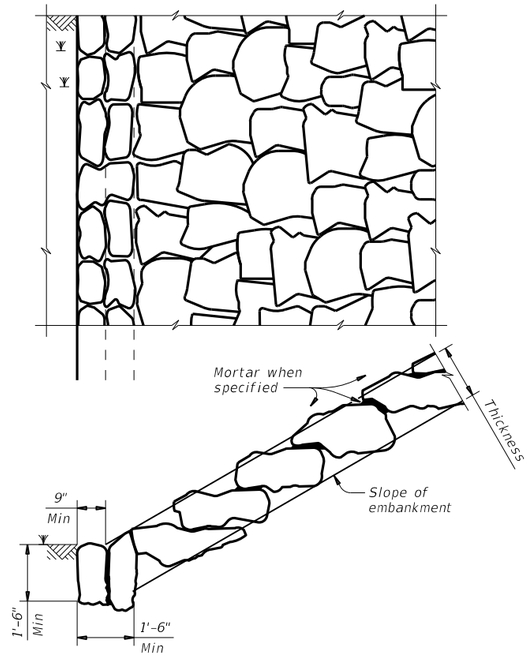


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

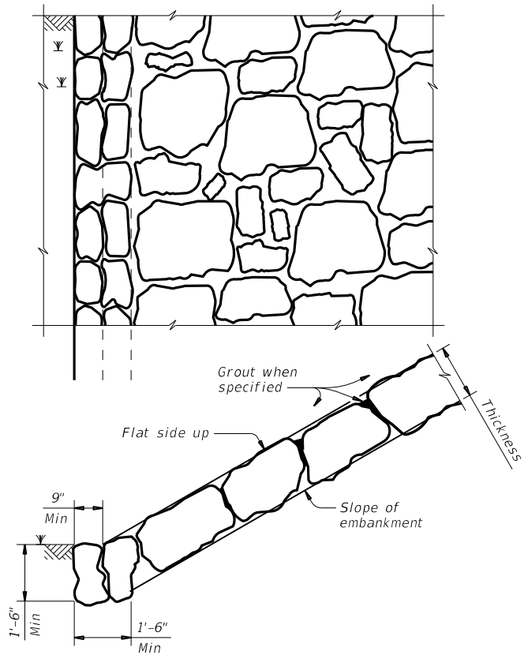


FIGURE 3 ~ TYPE F STONE RIPRAP

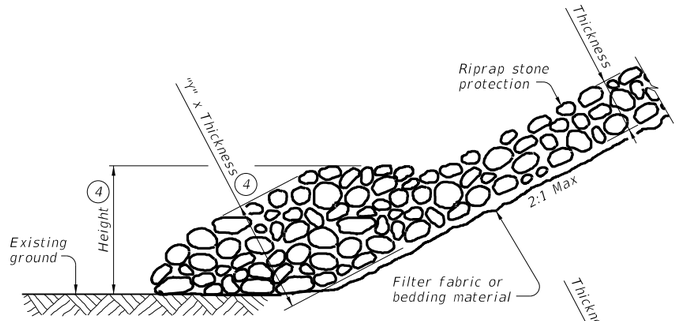
grouted

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

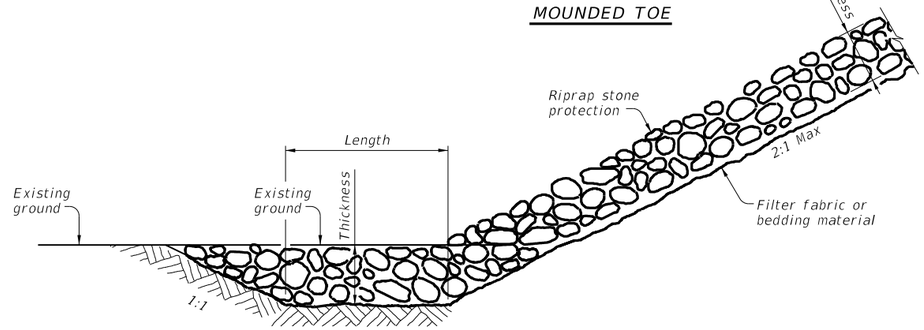
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

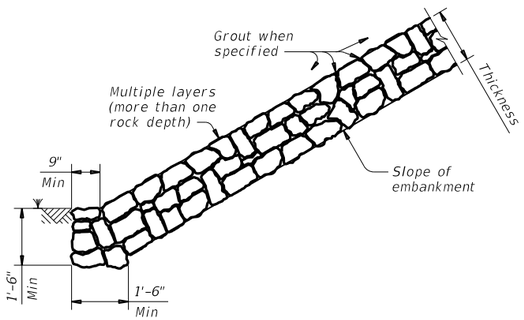


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

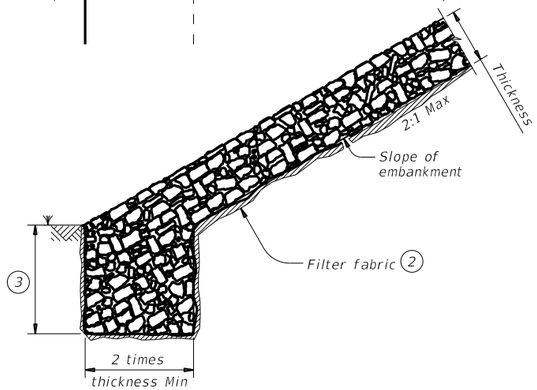


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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	TYL	VAN ZANDT		126

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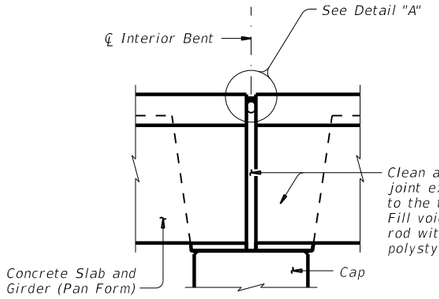
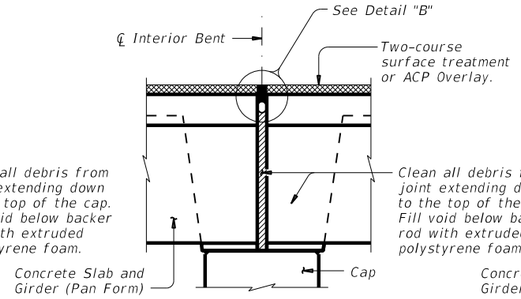


JOINT WITH SILICONE SEAL
(used without ACP Overlay)



JOINT WITH HOT POURED RUBBER SEAL
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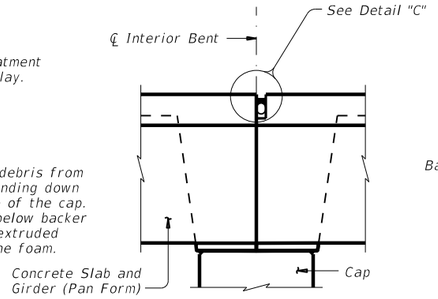
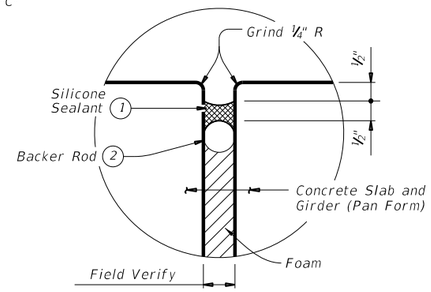
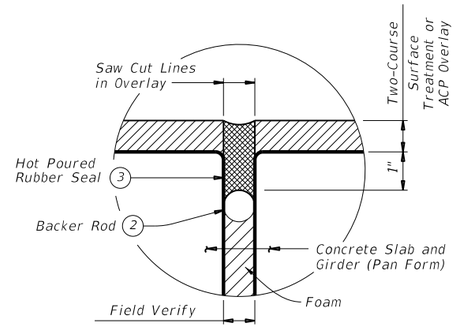


FIXED JOINT

EXISTING CONCRETE SLAB & GIRDER JOINT REPAIR

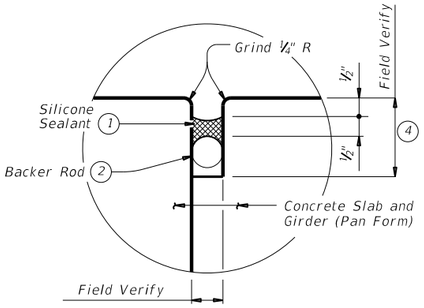


DETAIL "A"



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:

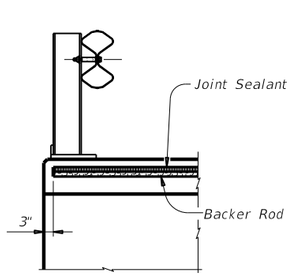
1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.
2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
3) Place 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:

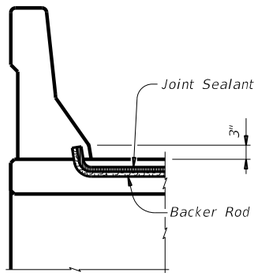
1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance 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:

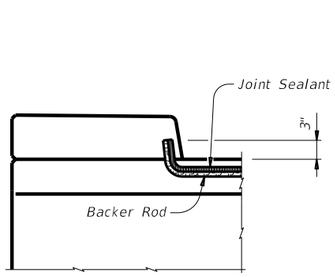
1) Remove existing seal and debris from recess.
2) Abrasive blast clean existing surfaces where silicone seal is to be placed.
3) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
4) Place backer rod into joint opening 1" below the top of concrete. The backer rod must 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.



SHOWN AT STEEL RAIL



SHOWN AT BARRIER RAIL



SHOWN AT CURB

JOINT SEALANT TERMINATION DETAILS

NOTE:
DURING LANE CLOSURES AND PRIOR TO MILLING OPERATIONS, THE CONTRACTOR SHALL MARK BRIDGE JOINT LOCATIONS.

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.

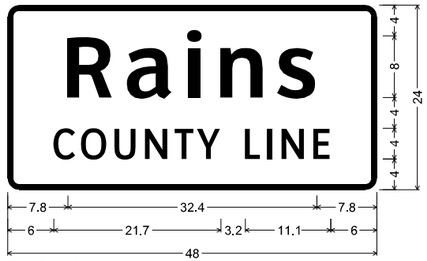
Texas Department of Transportation

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	0108	12	018	SH 19
	DIST.	COUNTY		SHEET NO.
	TYL	VAN ZANDT		127

DATE:
FILE:



Identifier : I-2dT 8in;
1.5" Radius, 0.8" Border, White on Green;
[Rains] ClearviewHwy-5-W-R;
[COUNTY LINE] ClearviewHwy-3-W;
Table of letter and object lefts.

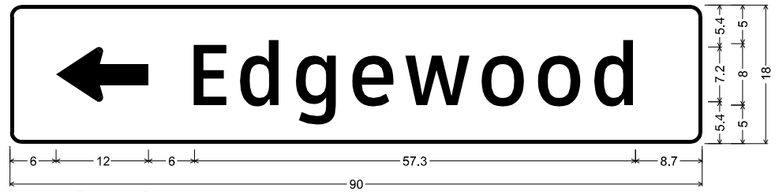
R	a	i	n	s
7.8	15.5	23.4	27.7	35.0

C	O	U	N	T	Y	L	I	N	E	
6.0	9.6	13.9	17.9	21.7	24.6	30.9	33.8	35.6	39.8	

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 letter and object lefts.

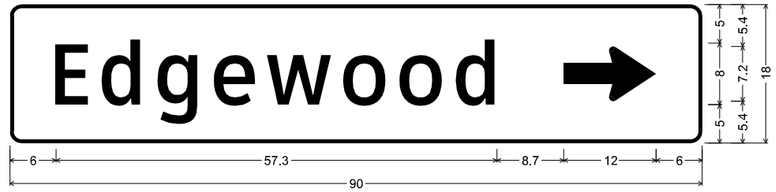
V	a	n	Z	a	n	d	t
6.8	14.9	22.9	36.5	43.8	51.9	59.7	67.2

C	O	U	N	T	Y	L	I	N	E
21.0	24.6	28.9	32.9	36.7	39.6	45.9	48.8	50.6	54.8



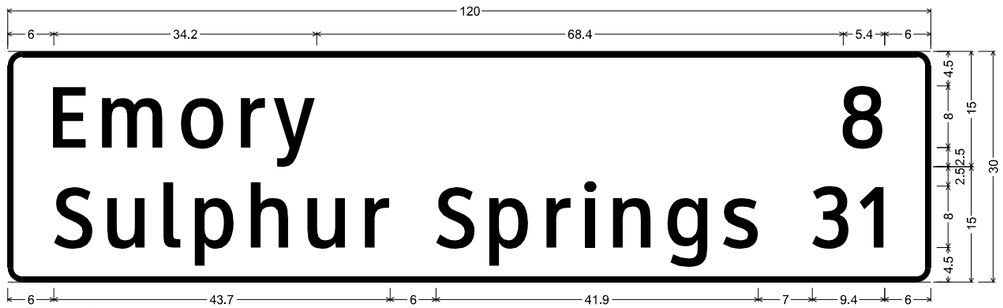
Identifier : D1-1 8in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; [Edgewood] ClearviewHwy-3-W;
Table of letter and object lefts.

←	E	d	g	e	w	o	o	d	
6.0	24.0	30.0	37.3	44.6	51.4	61.4	68.7	76.1	



Identifier : D1-1 8in RT;
1.5" Radius, 0.5" Border, White on Green;
[Edgewood] ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;
Table of letter and object lefts.

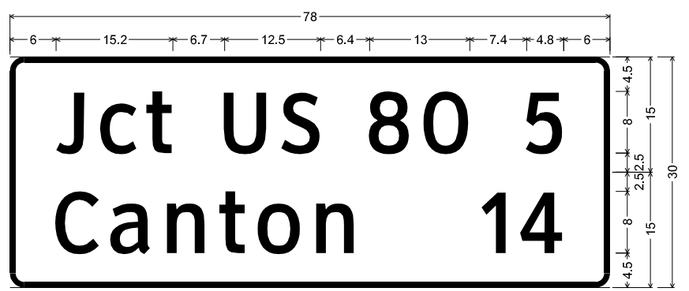
E	d	g	e	w	o	o	d	→
6.0	12.0	19.3	26.6	33.4	43.4	50.7	58.1	72.0



Identifier : D2-2 8in;
1.9" Radius, 0.8" Border, White on Green;
[Emory] ClearviewHwy-3-W; [8] ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
[Sulphur Springs] ClearviewHwy-3-W; [31] ClearviewHwy-3-W;
Table of letter and object lefts.

E	m	o	r	y		8	
6.0	12.4	22.6	30.3	34.6		108.6	

S	u	l	p	h	u	r	S	p	r	i	n	g	s	3	1
6.0	13.1	20.4	24.4	31.7	39.1	46.4	55.7	62.7	70.0	74.9	78.8	85.9	93.0	104.6	110.8



Identifier : D2-2 8in;
1.9" Radius, 0.8" Border, White on Green;
[Jct US 80] ClearviewHwy-3-W; [5] ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
[Canton] ClearviewHwy-3-W; [14] ClearviewHwy-3-W;
Table of letter and object lefts.

J	c	t	U	S	8	O	5
6.0	11.8	17.8	27.9	35.2	46.8	53.9	67.2

C	a	n	t	o	n	1	4
6.0	13.1	20.6	27.2	32.3	39.9	61.4	66.3

SH 19
SIGN DETAILS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		128

DATE: 1/12/2022 3:36:13 PM
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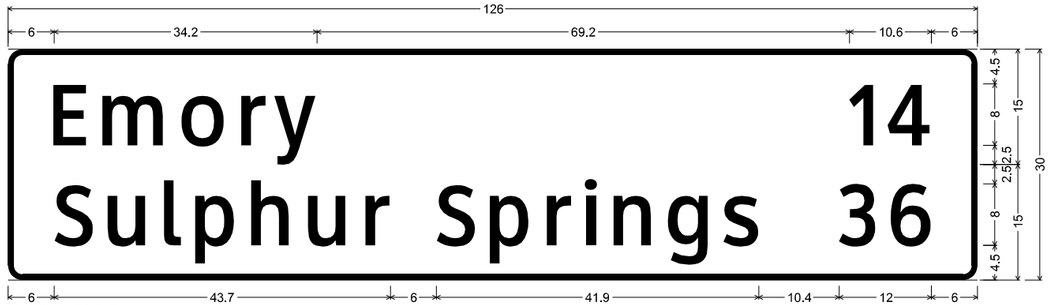
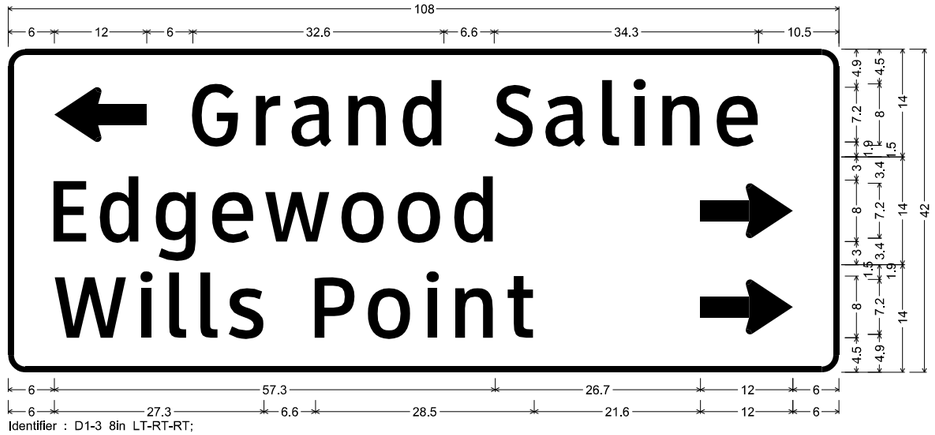


Identifier : D2-2 8in;
1.9" Radius, 0.8" Border, White on Green;
[Emory] ClearviewHwy-3-W; [14] ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
[Sulphur Springs] ClearviewHwy-3-W; [36] ClearviewHwy-3-W;
Table of letter and object lefts.

E 6.0	m 12.4	o 22.6	r 30.3	y 34.6	1 109.4	4 114.3

S 6.0	u 13.1	l 20.4	p 24.4	h 31.7	u 39.1	r 46.4	S 55.7	p 62.7	r 70.0	i 74.9	n 78.8	g 85.9	s 93.0	3 108.0	6 114.8



Identifier : D1-3 8in LT-RT-RT;
2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; [Grand Saline] ClearviewHwy-3-W;
2.3" Radius, 0.8" Border, White on Green;
[Edgewood] ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;
2.3" Radius, 0.8" Border, White on Green;
[Wills Point] ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;
Table of letter and object lefts.

← 6.0	G 24.0	r 32.2	a 36.9	n 44.3	d 51.4	S 63.2	a 69.9	l 77.3	l 81.3	n 85.2	e 92.2

E 6.0	d 12.0	g 19.3	e 26.6	w 33.4	o 43.4	o 50.7	d 58.1	→ 90.0

W 6.0	i 17.2	l 21.1	l 25.1	s 28.6	P 39.9	o 46.9	i 54.4	n 58.2	t 64.9	→ 90.0

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
SIGN DETAILS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		129

DATE: 1/12/2022 3:36:13 PM
FILE: c:\txdot\pw_online\txdot3\will.okin\d0168606\SH19_TRF_SIGN_DETAILS.dgn

CK:
DW:
CK:
DN:

4" SOLID DOUBLE YELLOW CENTERLINE
USE TY I-A AND TY II-A-A RAISED PAV MARKERS
(SEE MISCELLANEOUS DETAILS)

4" SOLID WHITE EDGELINE

36" YIELD TRIANGLES

8" SOLID WHITE BARRIER LINE
WITH TY I-C RAISED PAV MARKERS

24" SOLID WHITE STOP BAR

SH 19

350+00

355+00

US 80

8" SOLID WHITE BARRIER LINE
WITH TY I-C RAISED PAV MARKERS

36" YIELD TRIANGLES

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19
INTERSECTION
PAVEMENT MARKING
LAYOUT

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		130

DATE: 1/12/2022 3:36:18 PM
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DATE: 1/12/2022 3:44:58 PM
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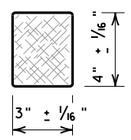
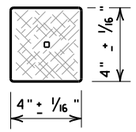
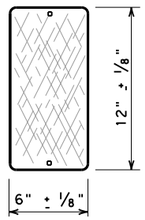
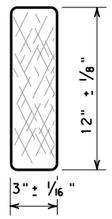
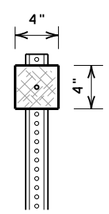
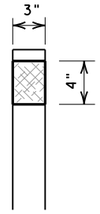
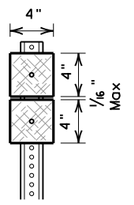
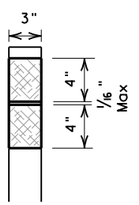
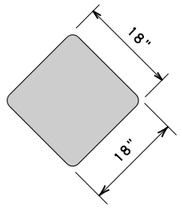
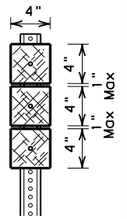
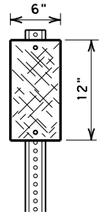
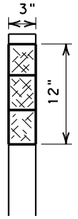
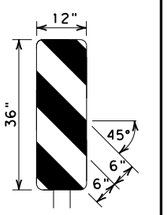
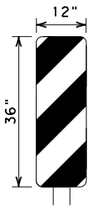
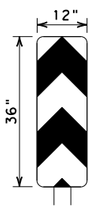
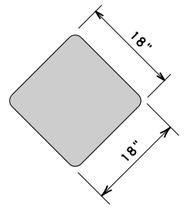
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

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

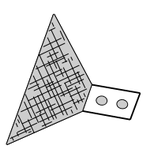
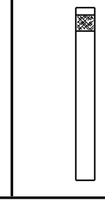
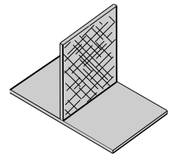
TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

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

DIRECTION
If Required
BI = Bi-Directional

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

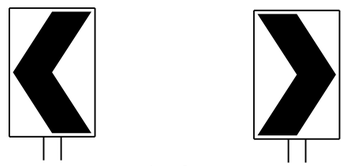
BARRIER REFLECTORS (BRF)

	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.

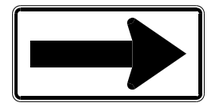
CHEVRONS

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

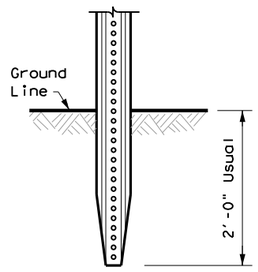
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	VAN ZANDT		131

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

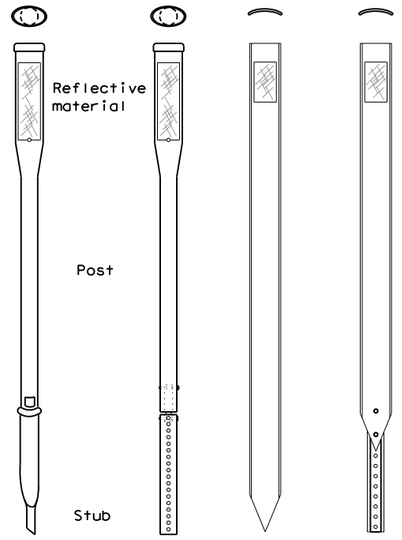


NOTES

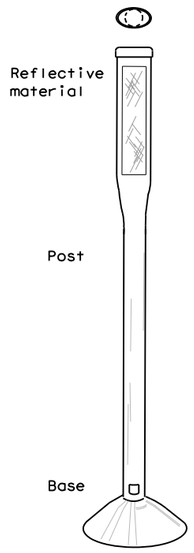
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND



SRF



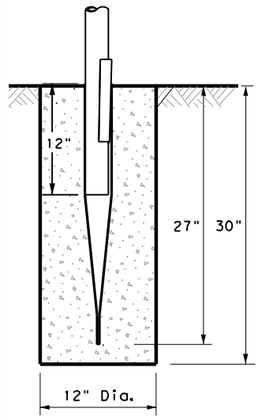
EMBEDDED | SURFACE MOUNT

NOTES

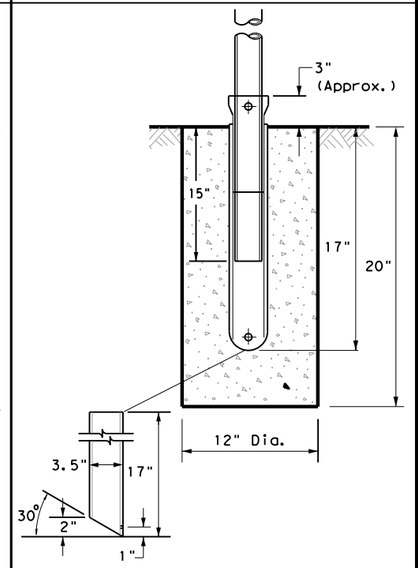
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline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

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

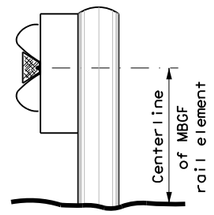
NOTE

1. Install per manufacturer's recommendations.

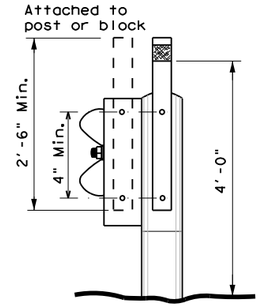
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

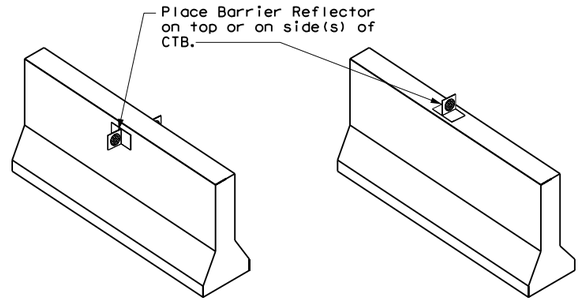
GF1



GF2



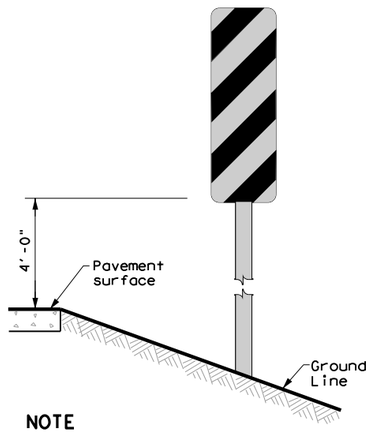
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

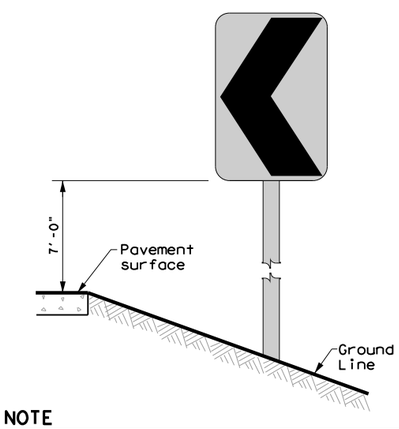
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

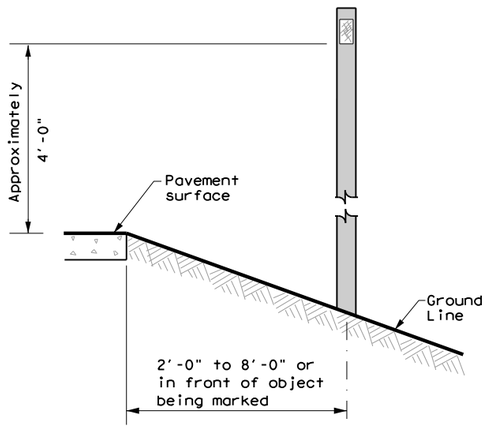
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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	0108	12	018	SH 19
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	VAN ZANDT		132

20B

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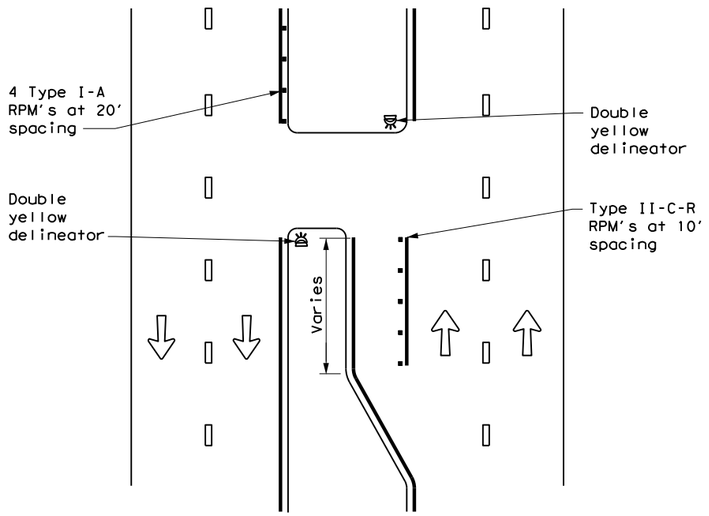
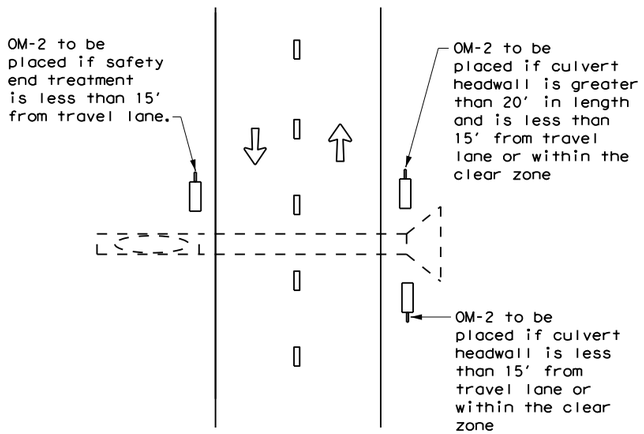
CROSSOVERS



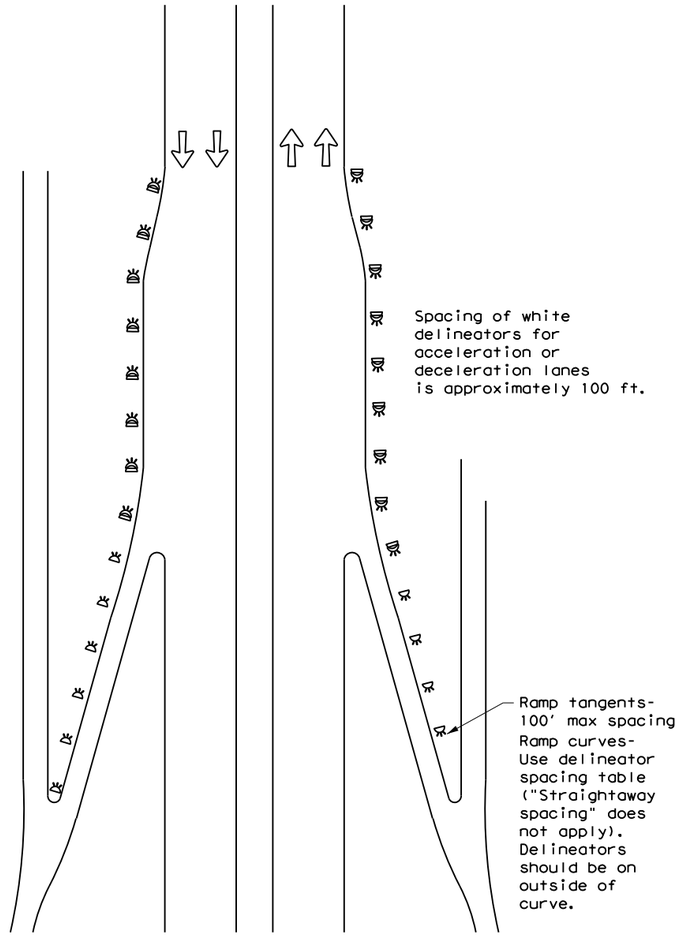
DETAIL 1

FOR CULVERTS WITHOUT MBGF



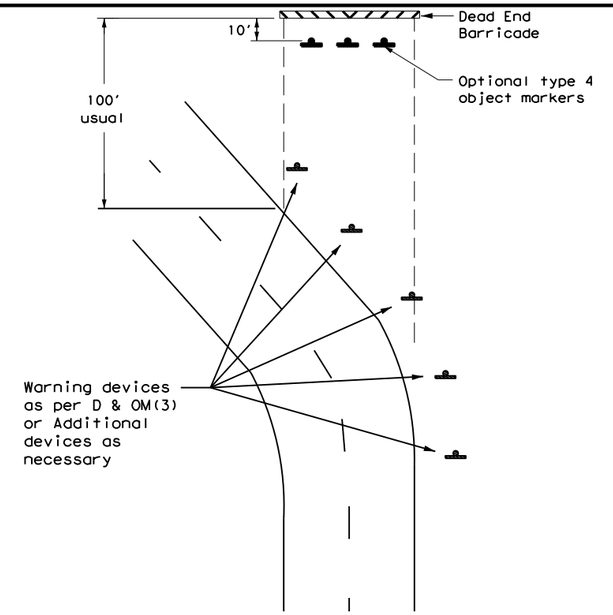
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



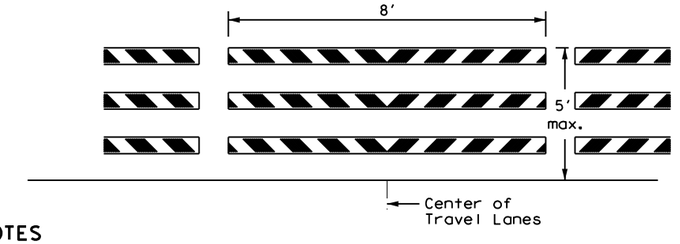
DETAIL 3

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	0108	12	018	SH 19
3-15	DIST	COUNTY		SHEET NO.
7-20	TYL	VAN ZANDT		133

20D

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DATE: 1/12/2022 3:45:11 PM
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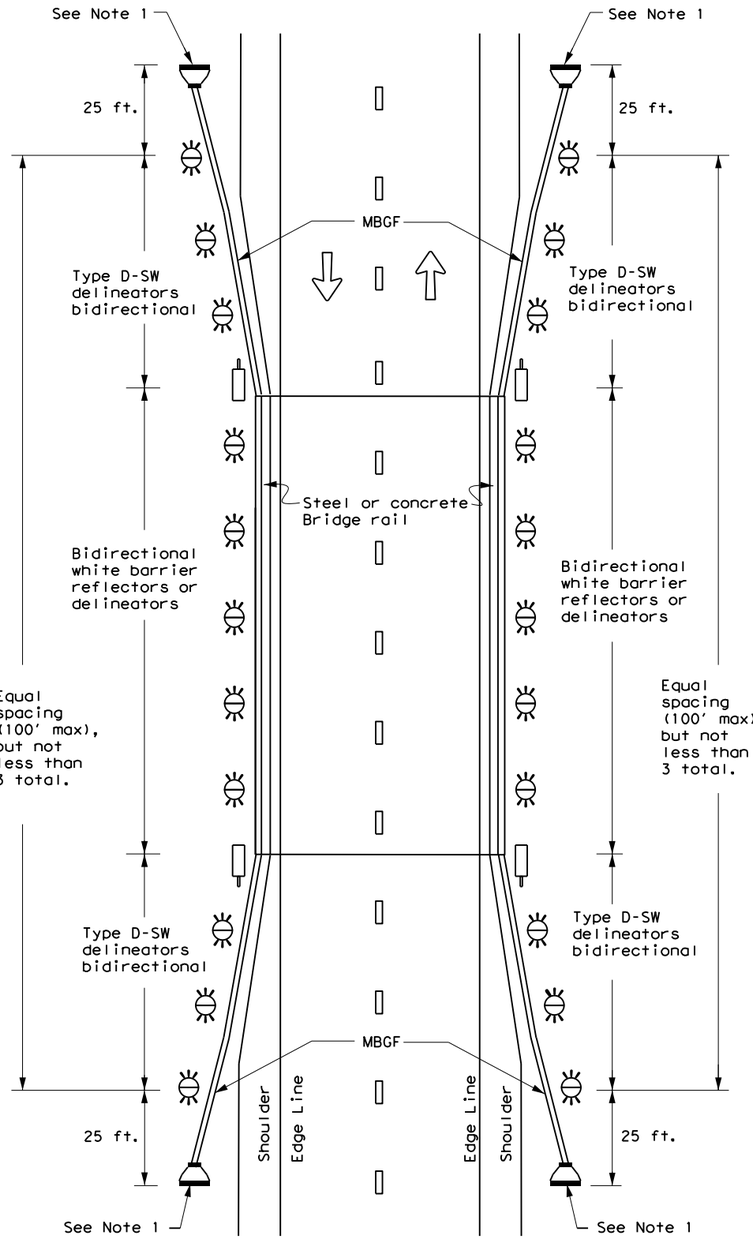
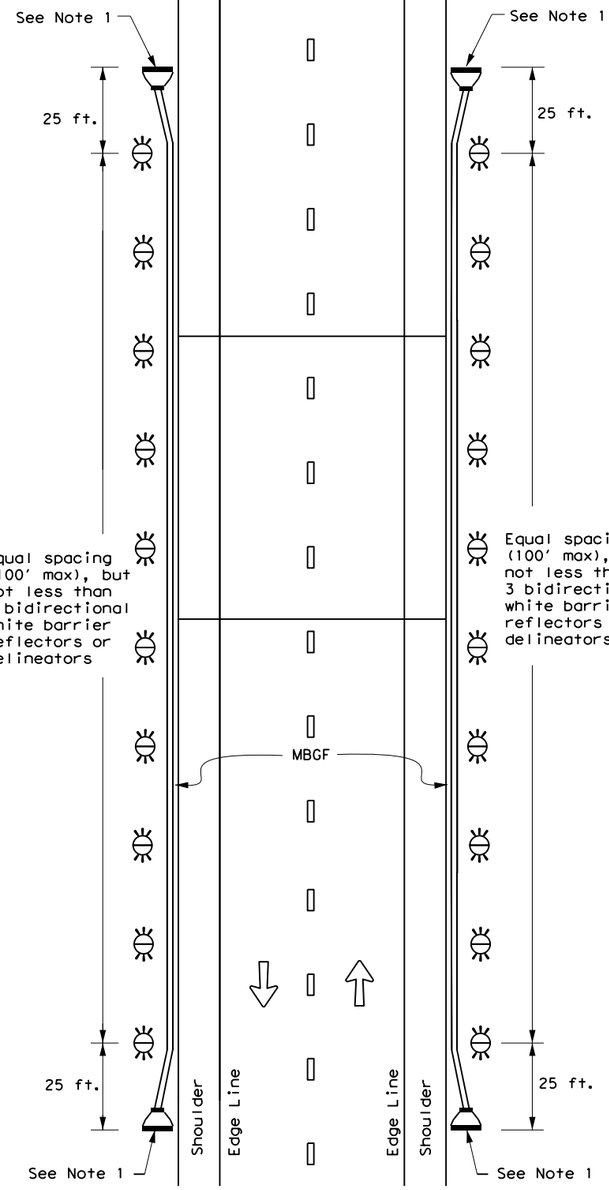
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

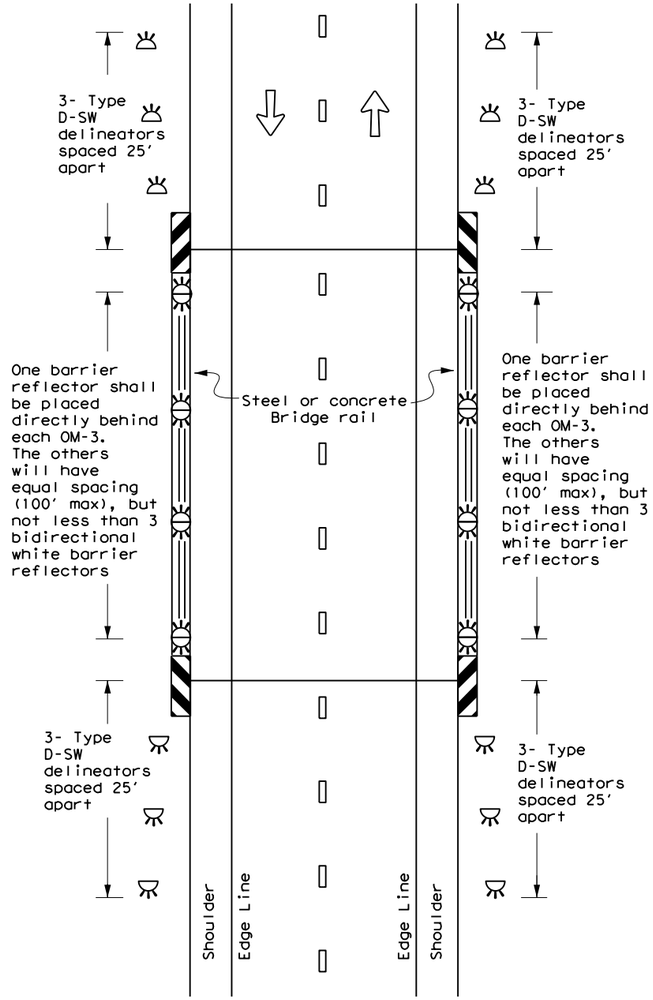
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

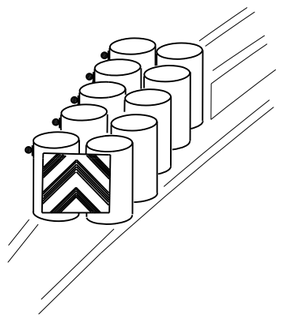
Traffic Safety Division Standard

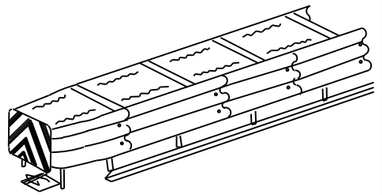
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

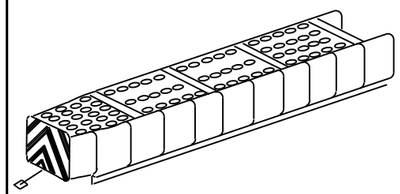
D & OM(5)-20

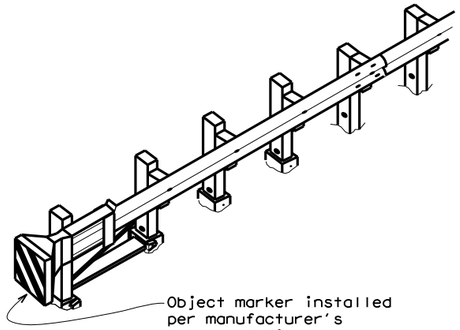
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
7-20	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		134

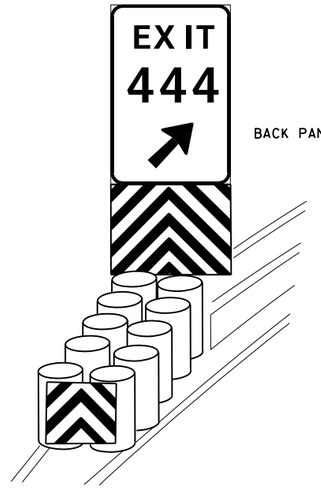
20E

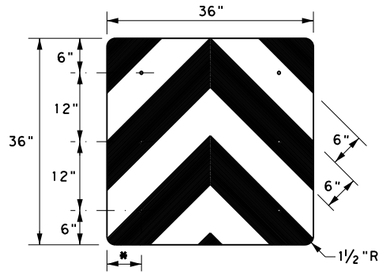


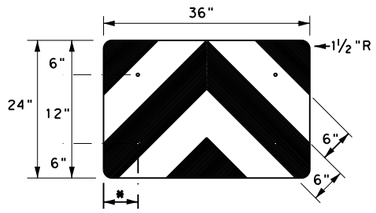




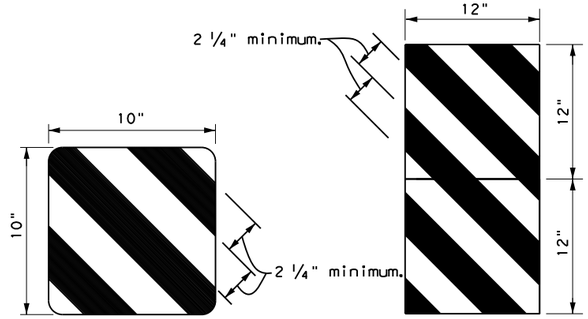




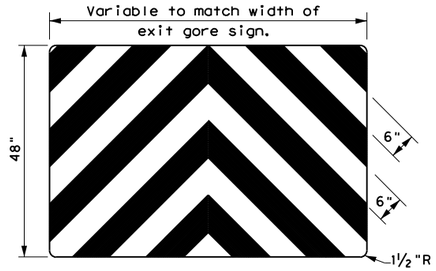


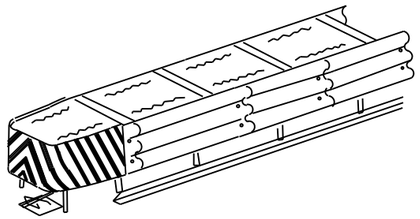


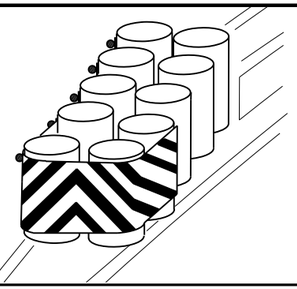
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

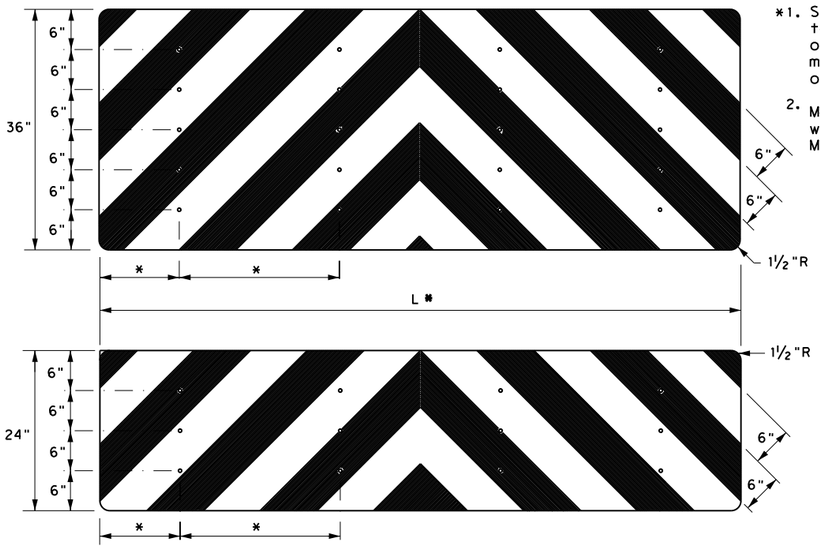


OBJECT MARKERS SMALLER THAN 3 FT^2









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	0108	12	018	SH 19
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	TYL	VAN ZANDT		135
4-98 7-20				

20G

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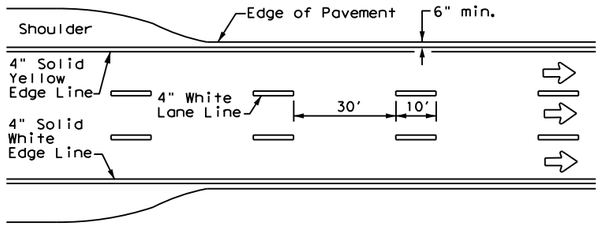
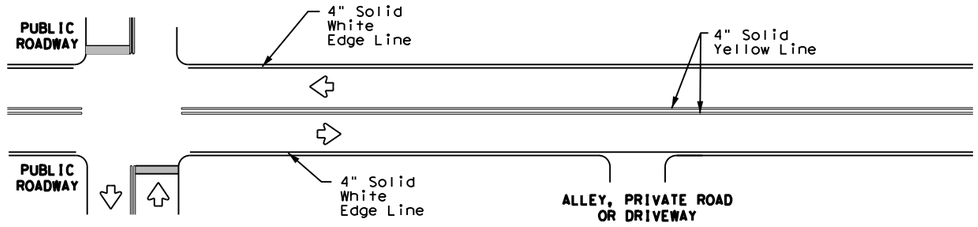
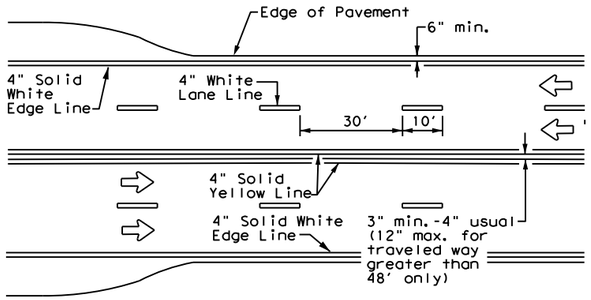


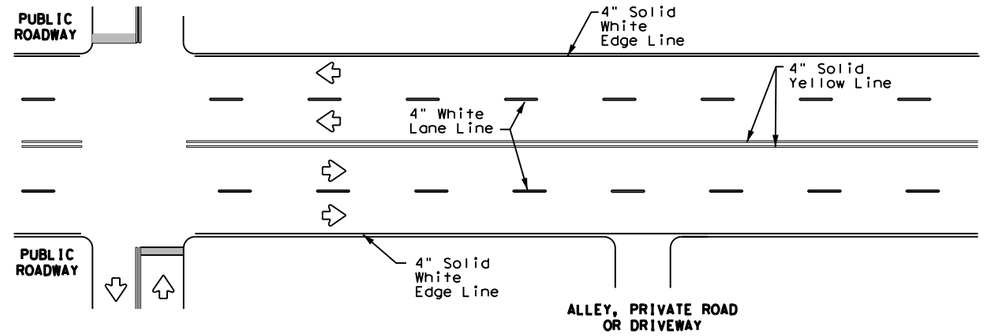
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



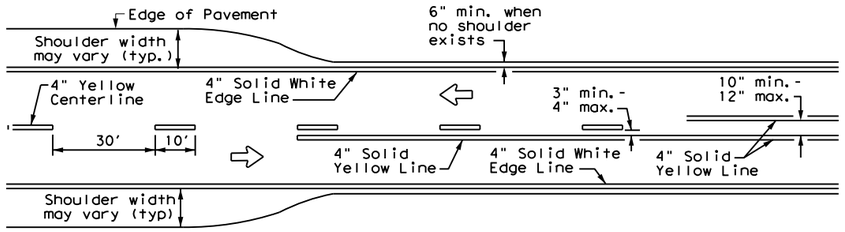
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



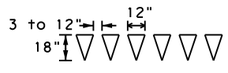
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



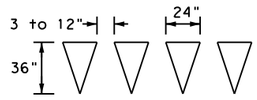
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

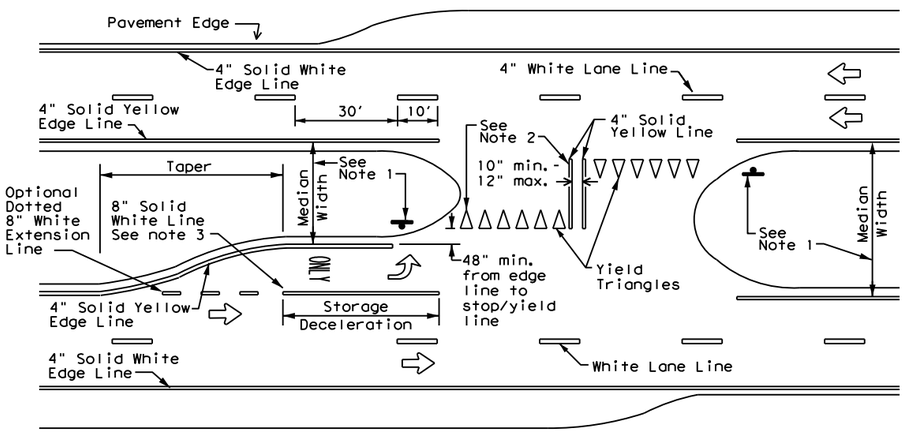


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

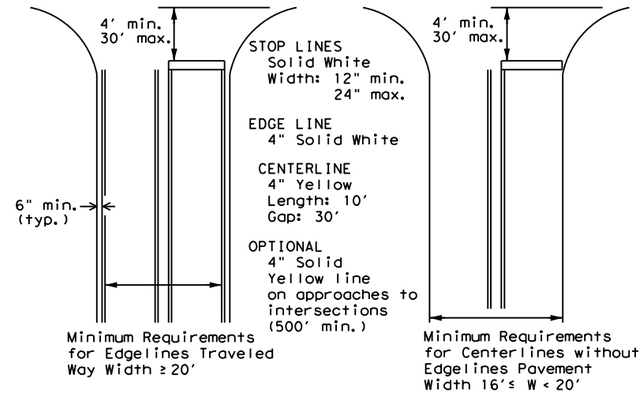
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

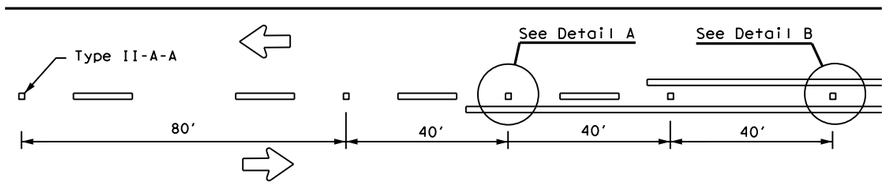
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0108	12	018	SH 19
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	TYL	VAN ZANDT		136

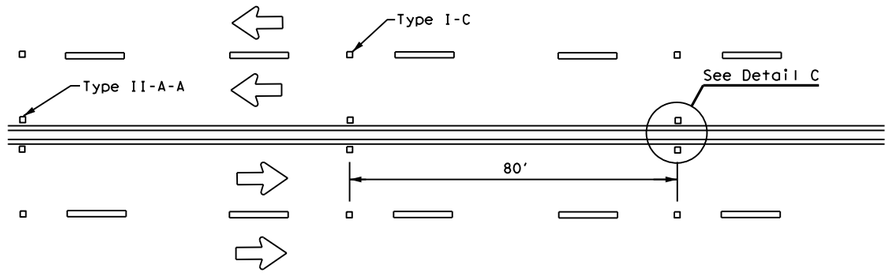
22A

DATE: 1/12/2022 3:45:20 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0170456\SH19_TRF_PM1-20.dgn

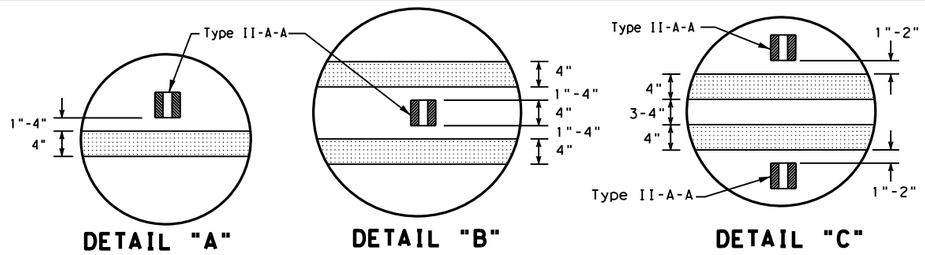
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



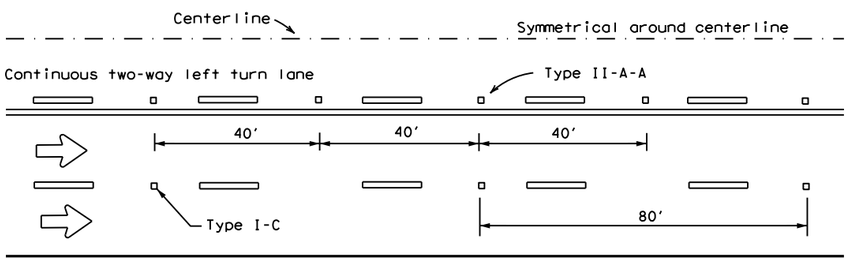
CENTERLINE FOR ALL TWO LANE ROADWAYS



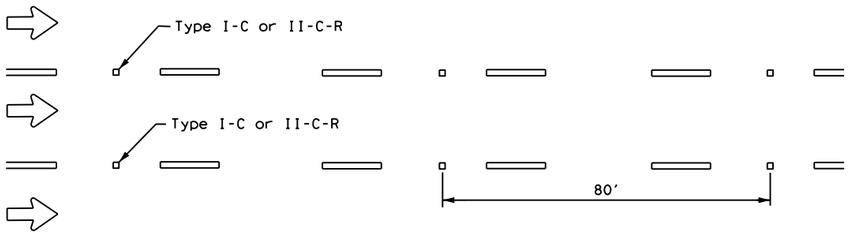
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

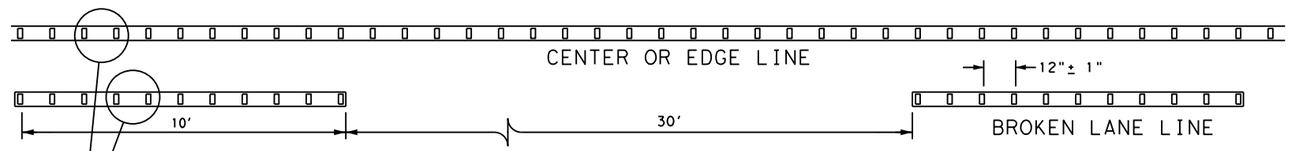


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



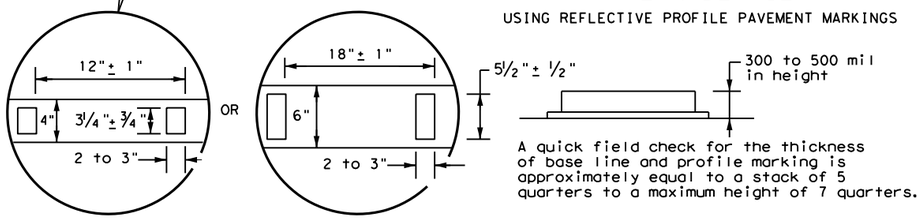
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



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

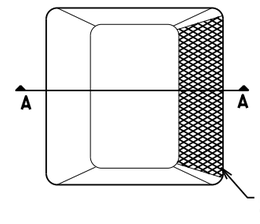
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

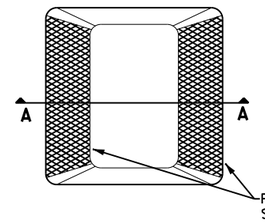
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

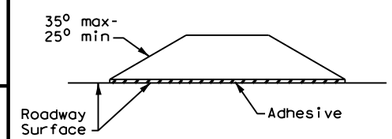
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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	0108	12	018	SH 19
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	TYL	VAN ZANDT		137

22B

DATE: 1/12/2022 3:45:24 PM
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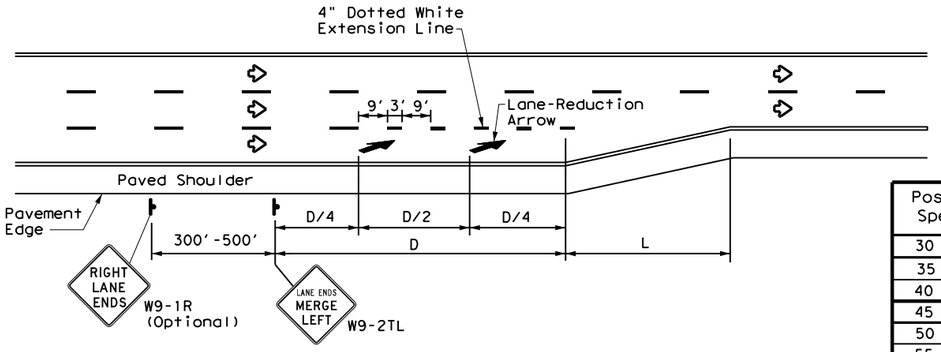
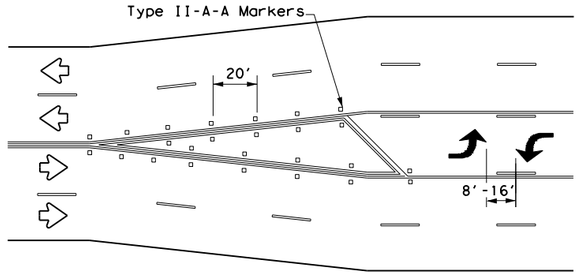


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

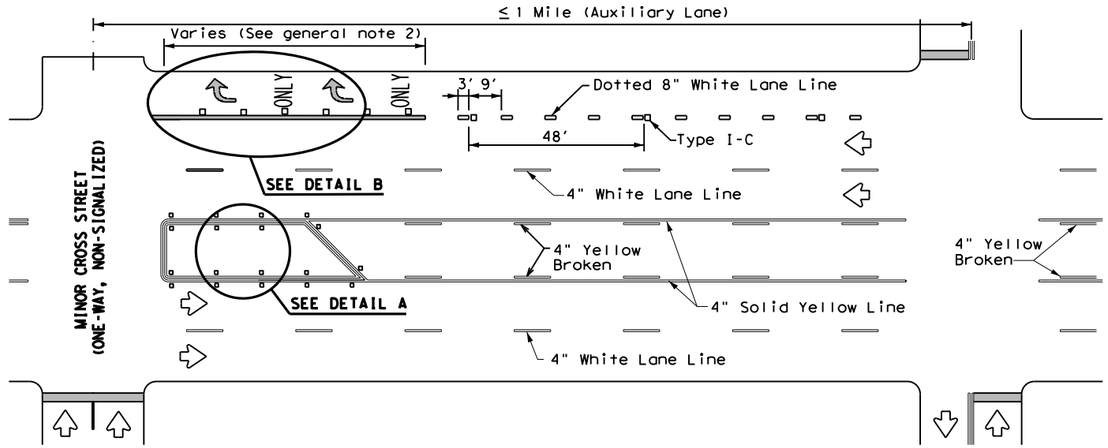
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

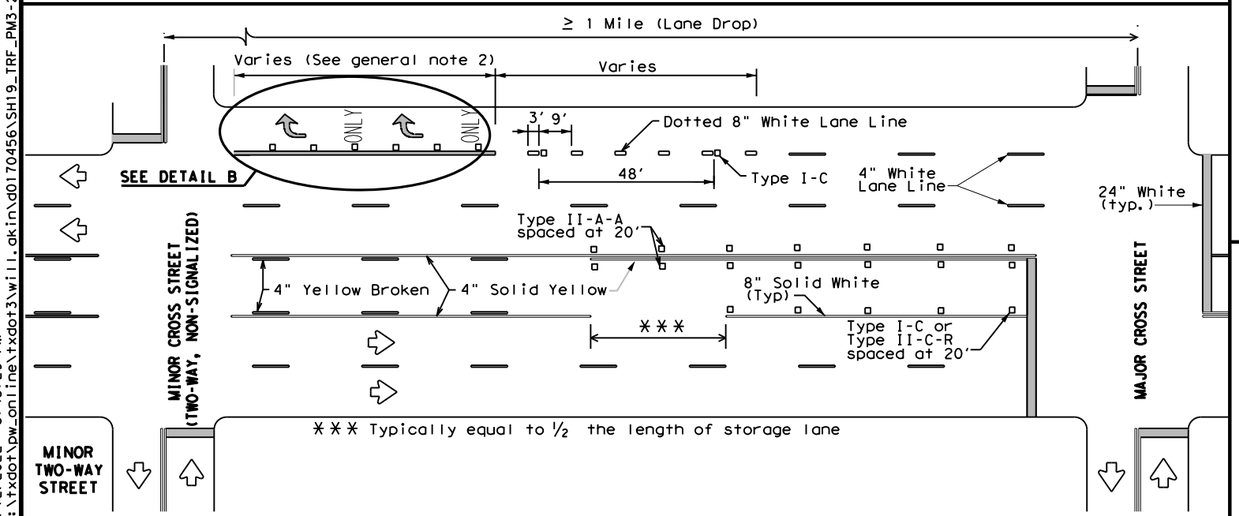
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

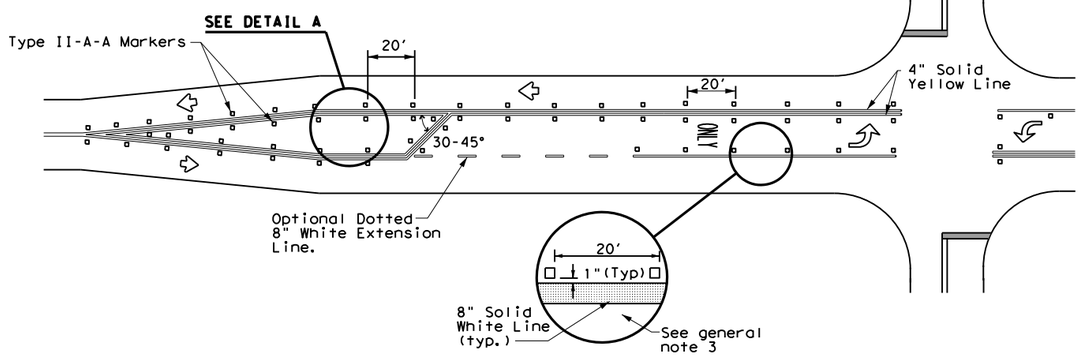
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



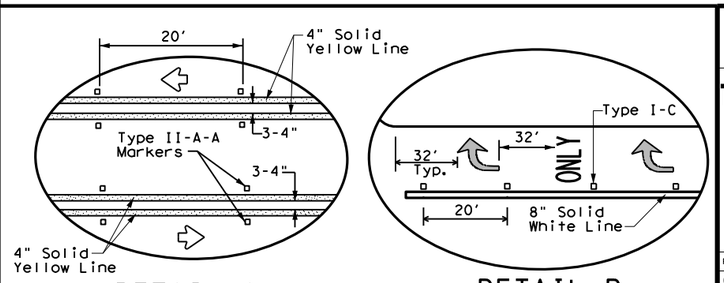
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-20

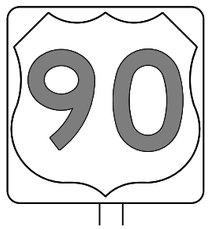
FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	TYL	VAN ZANDT		138
3-03 6-20				

220

DATE: 1/12/2022 3:45:34 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0170456\SH19_TRF_TSR3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

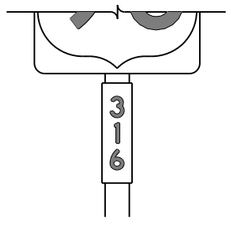
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

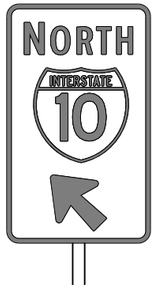


TYPICAL EXAMPLES

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

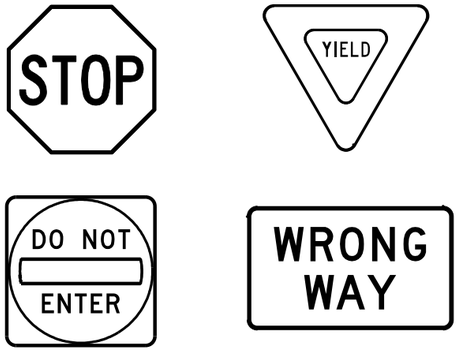
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	VAN ZANDT		139

DATE: 1/12/2022 3:45:40 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0170456\SH19_TRF_TSR4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

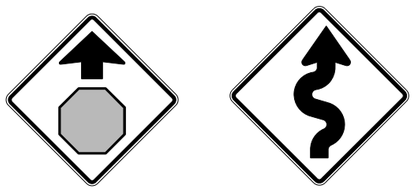
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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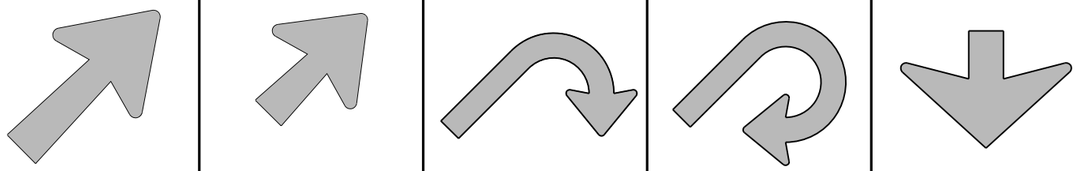
REVISIONS	0108	12	018	SH 19
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		140

DATE: 1/12/2022 3:45:45 PM
FILE: c:\txdot\pw_online\txdot3\will.okin\d0170456\SH19_TRF_TSR5-13.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

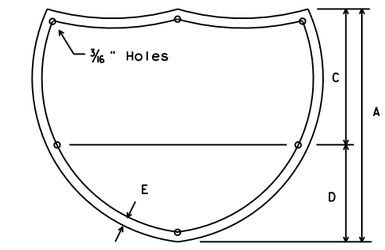
NOTE

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.

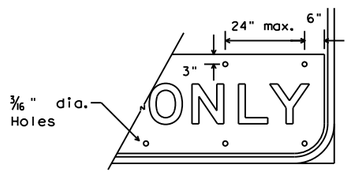
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

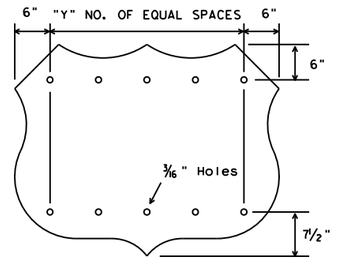


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

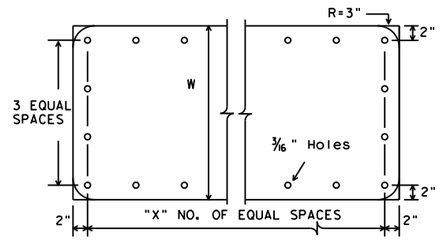


EXIT ONLY PANEL



U.S. ROUTE MARKERS

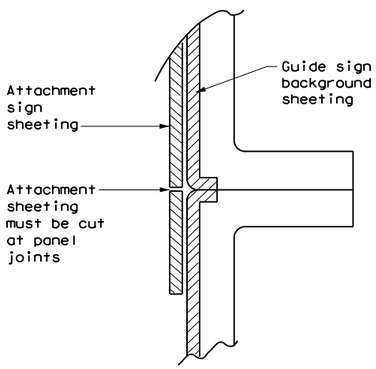
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



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

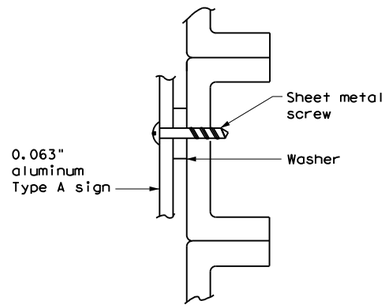
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



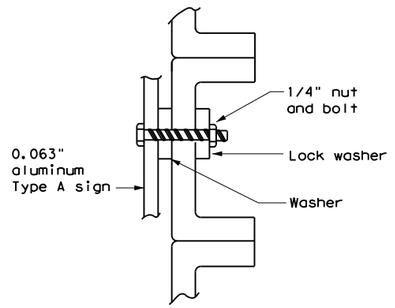
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



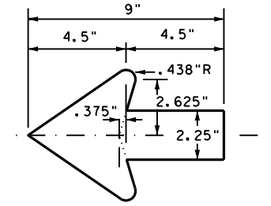
NUT/BOLT ATTACHMENT

NOTE:

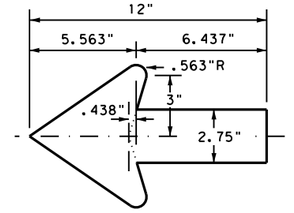
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	VAN ZANDT		141

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

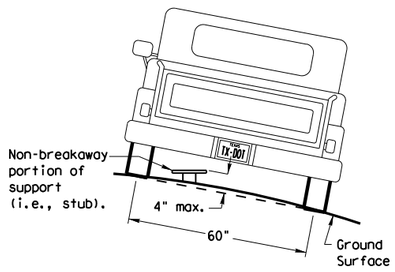
Anchor Type

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

Sign Mounting Designation

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

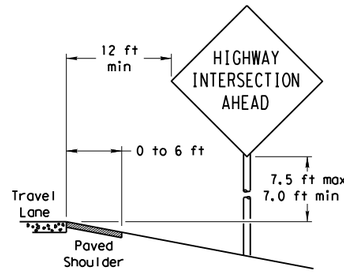
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

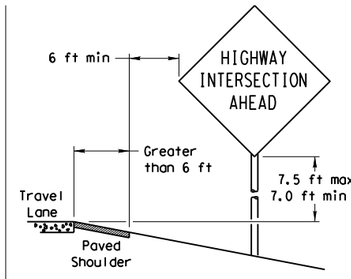
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

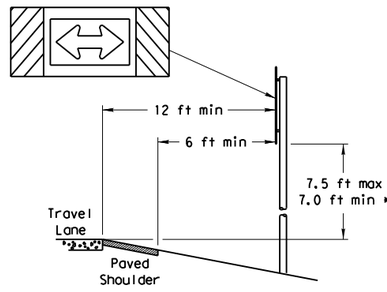
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



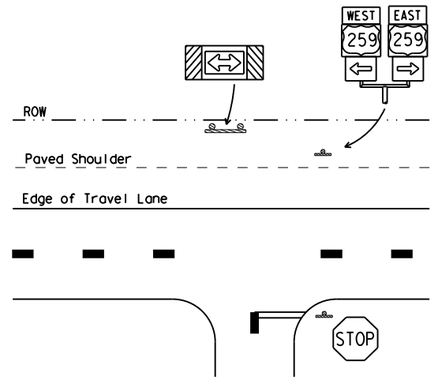
GREATER THAN 6 FT. WIDE

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

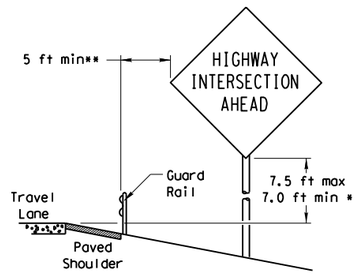
T-INTERSECTION



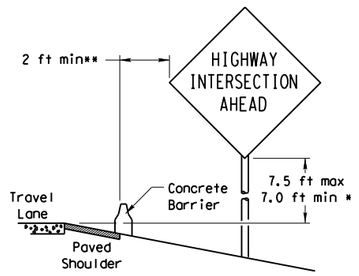
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



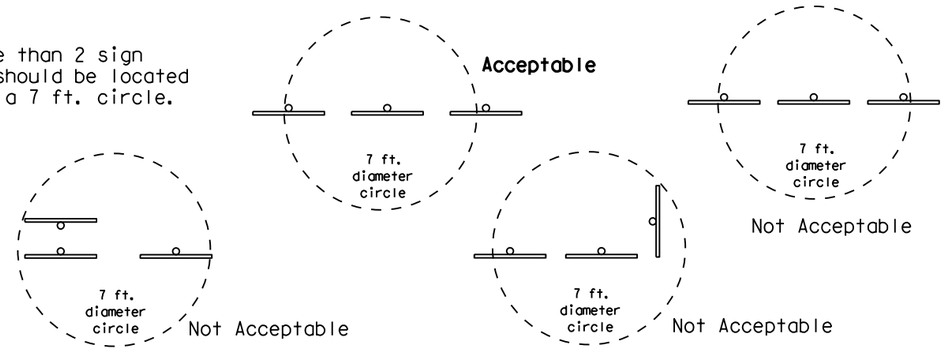
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

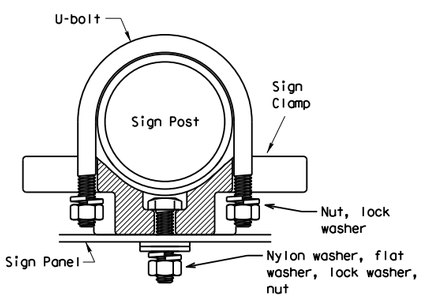
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

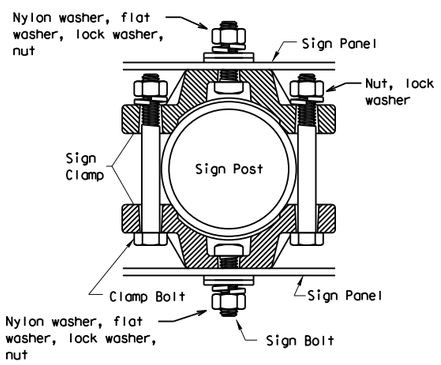


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

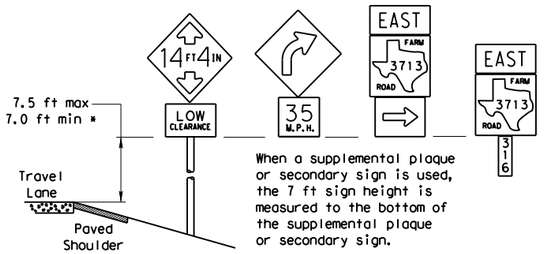
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



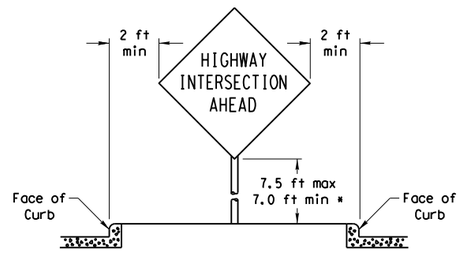
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



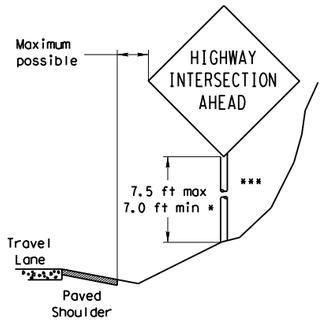
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		142

26A

DATE: 1/12/2022 3:45:50 PM
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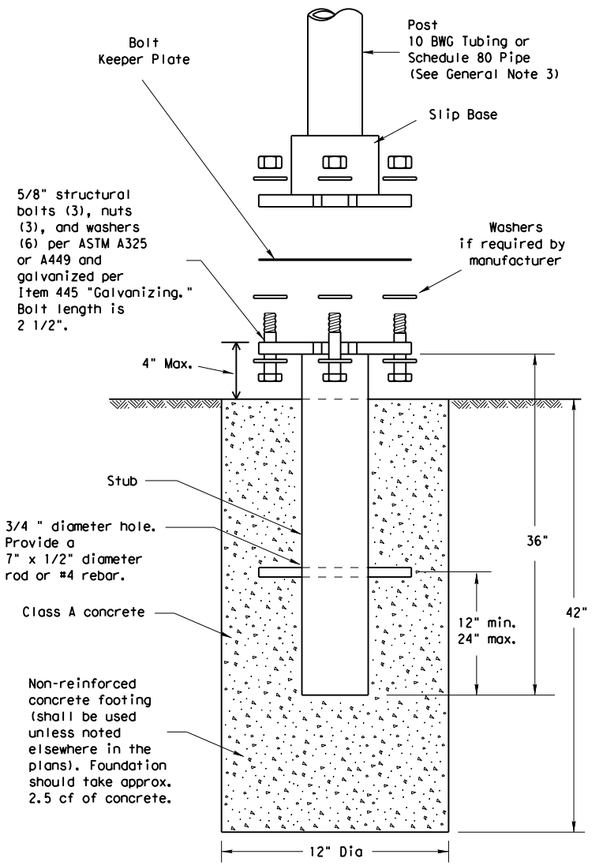
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

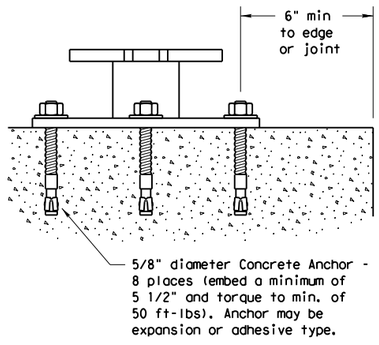
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19

DIST	COUNTY	SHEET NO.
TYL	VAN ZANDT	143

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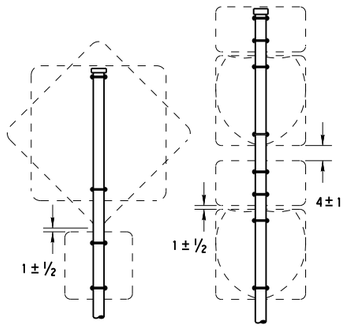
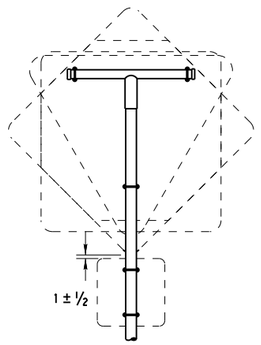
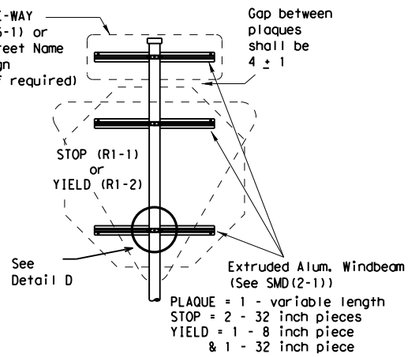


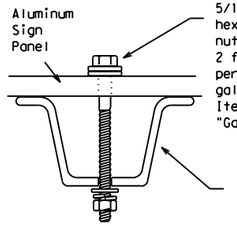
SM RD SGN ASSM TY XXXXX(1)XX(P)



SM RD SGN ASSM TY XXXXX(1)XX(T)

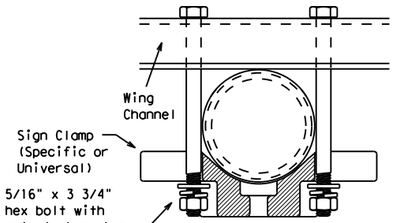


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



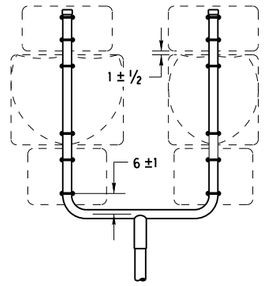
Top View

Detail A

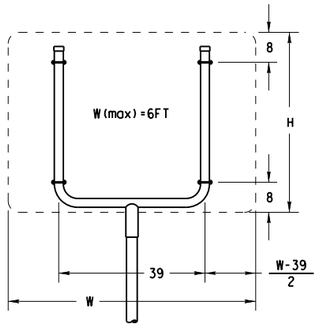


Top View

Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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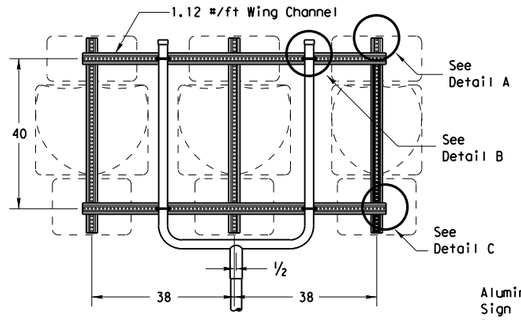
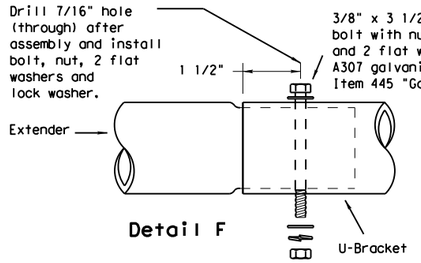
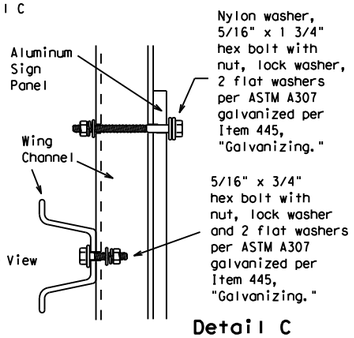


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

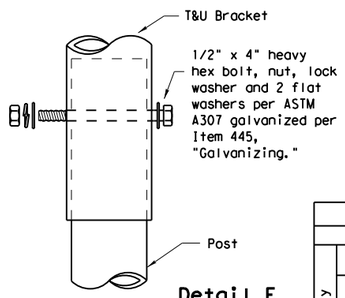


Detail F

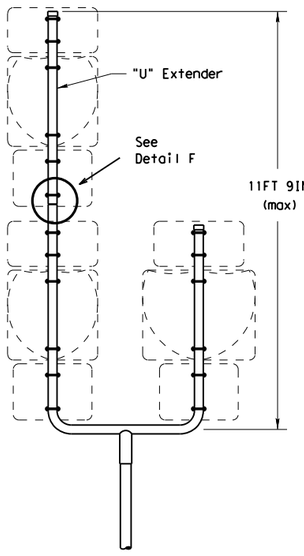
Splices shall only be allowed behind the sign substrate.



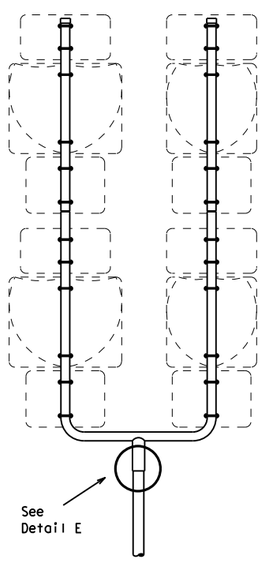
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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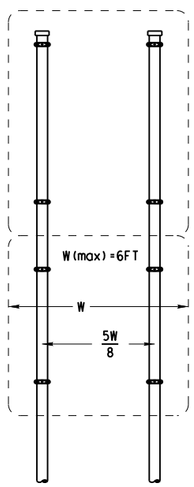
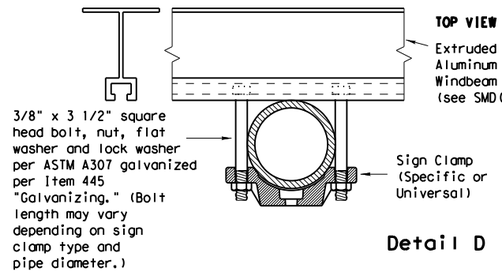
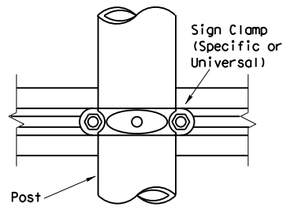


SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D



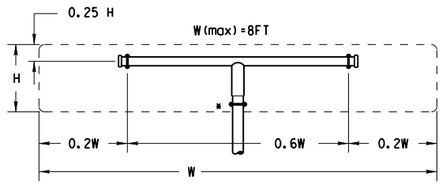
GENERAL NOTES:

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.

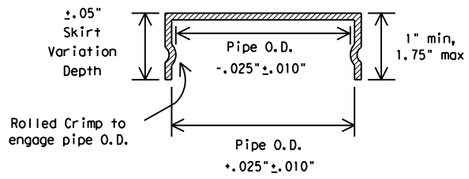
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		144

9-08 REVISIONS

DATE: 1/12/2022 3:46:00 PM
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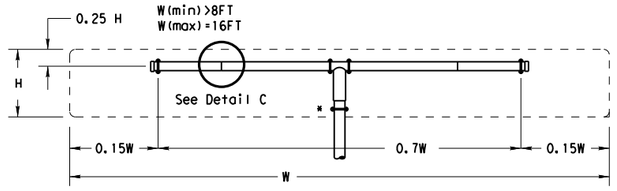
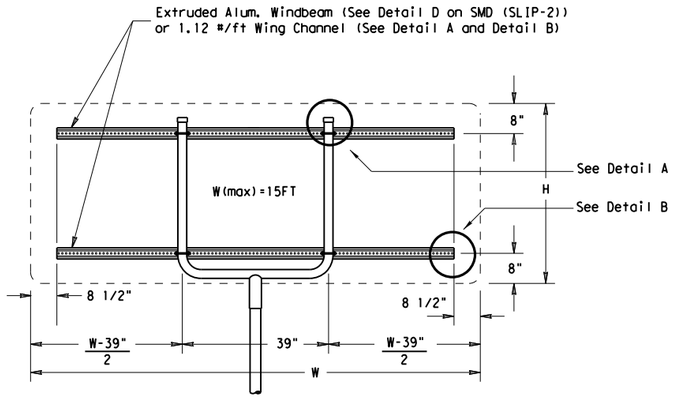
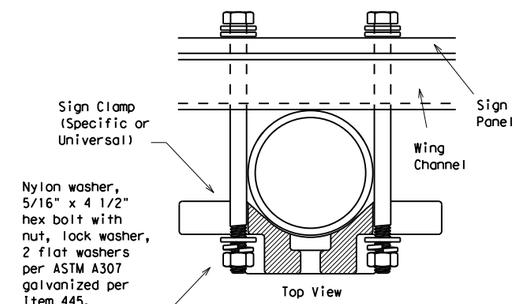


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

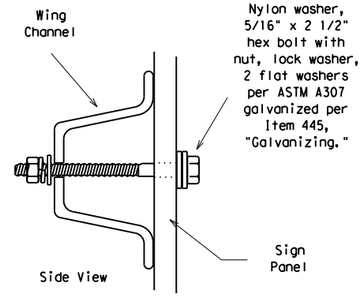


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

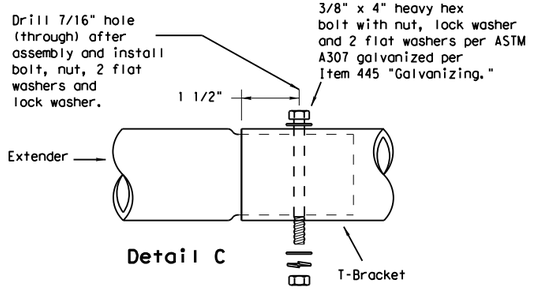


Top View

Detail A

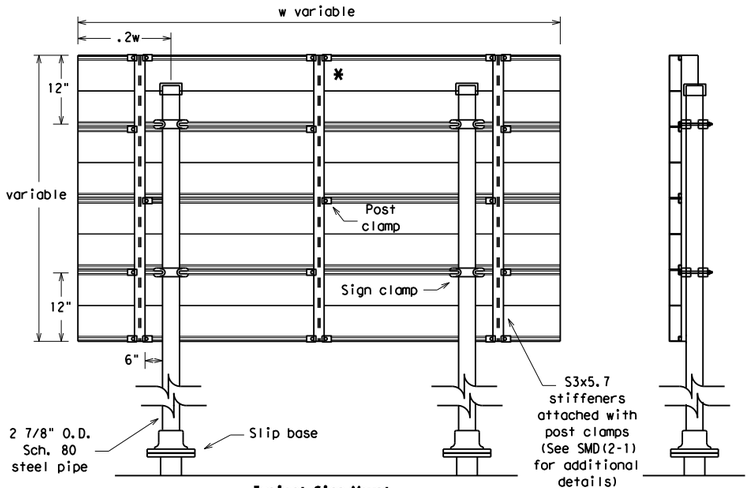


Detail B



Detail C

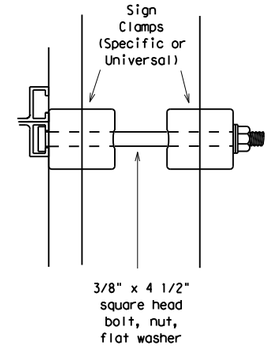
Splices shall only be allowed behind the sign substrate.



Typical Sign Mount

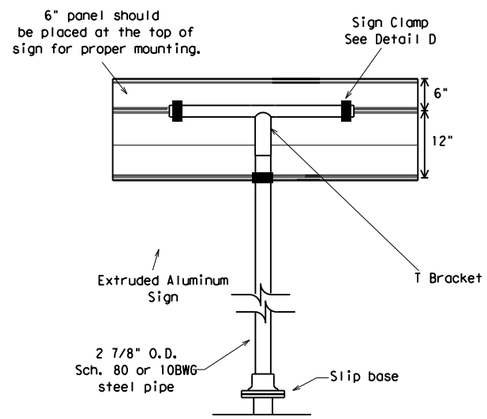
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

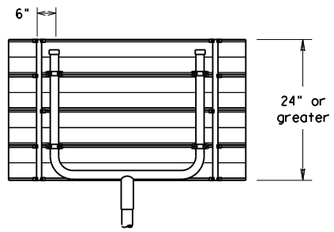


See Detail E
for clamp installation

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

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

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. See table above.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

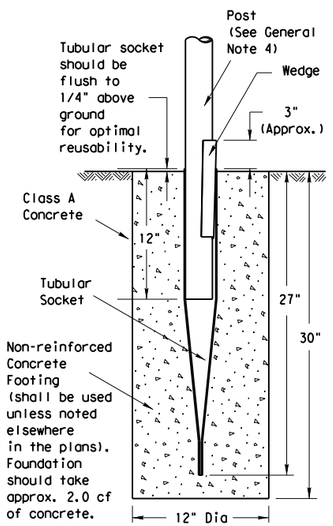
REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19

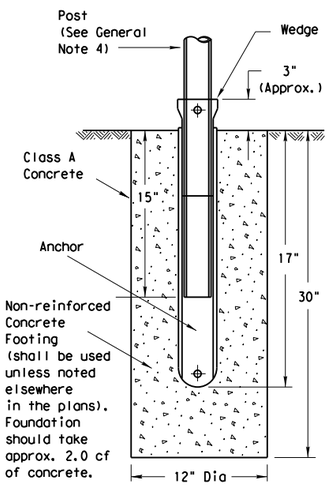
DIST	COUNTY	SHEET NO.
TYL	VAN ZANDT	145

Wedge Anchor Steel System



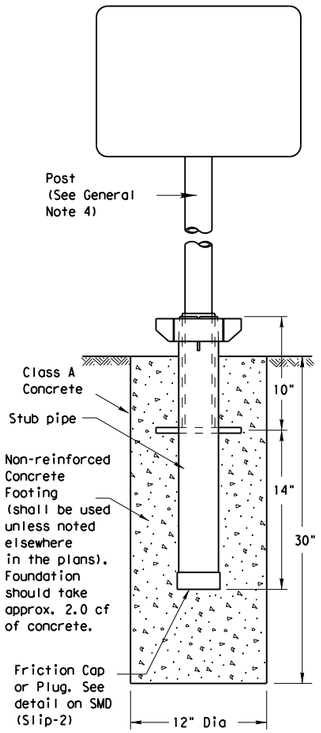
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

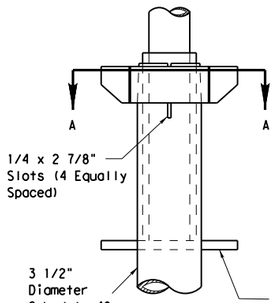


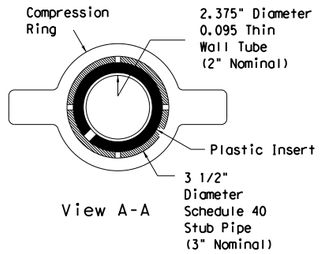
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



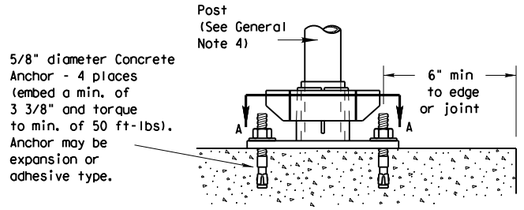
SM RD SGN ASSM TY TWT(X)UA(P)



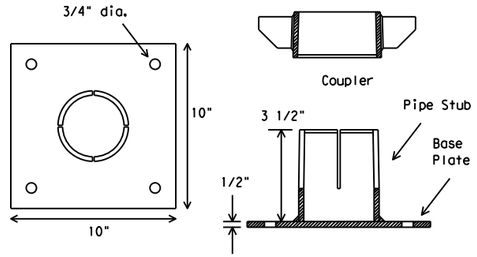


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

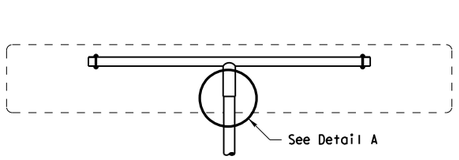


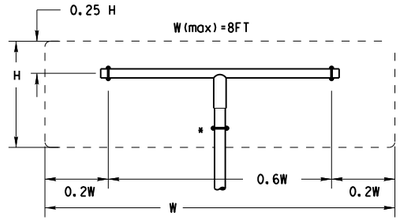
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

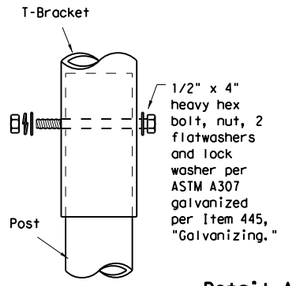
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19

DIST	COUNTY	SHEET NO.
TYL	VAN ZANDT	146

26E

DATE: 1/12/2022 3:46:11 PM
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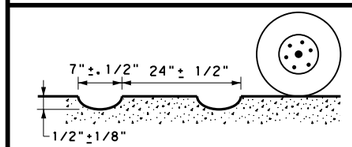
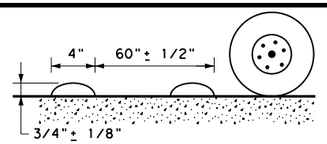
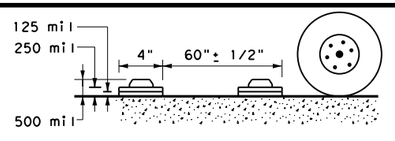
CENTERLINE RUMBLE STRIPS



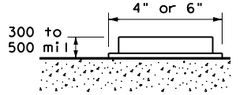
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

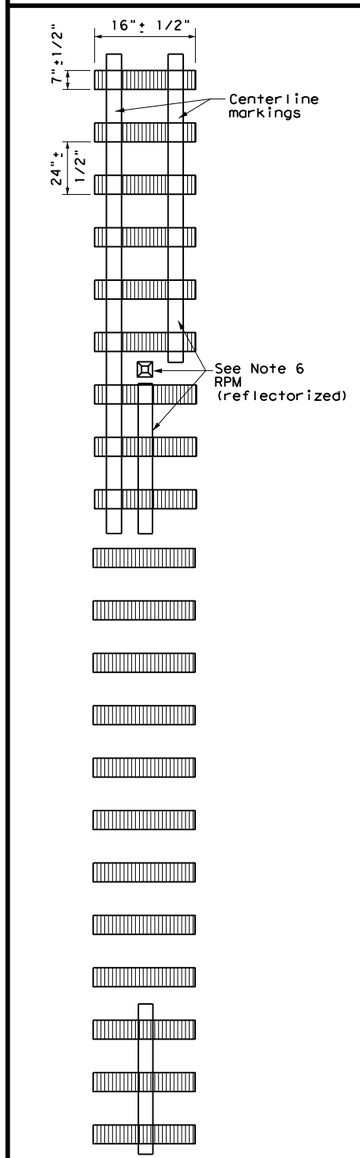


PREFORMED THERMOPLASTIC STRIPS



PROFILE MARKINGS

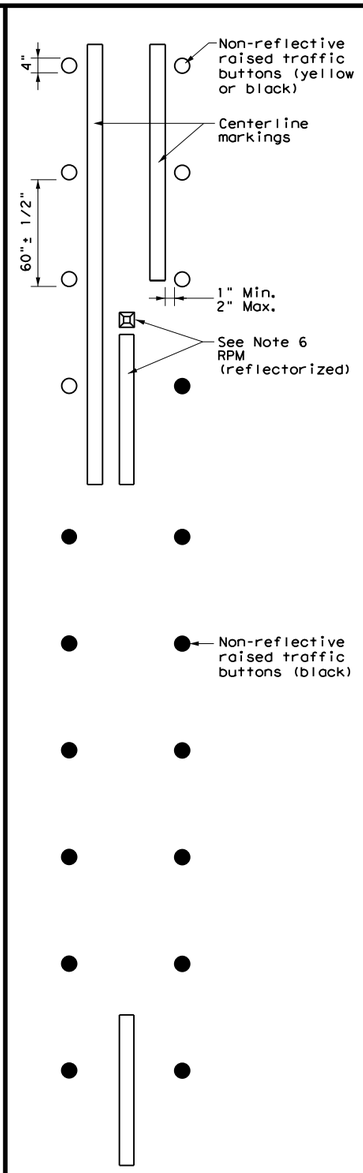
PROFILE VIEW



PLAN VIEW
OPTION 1

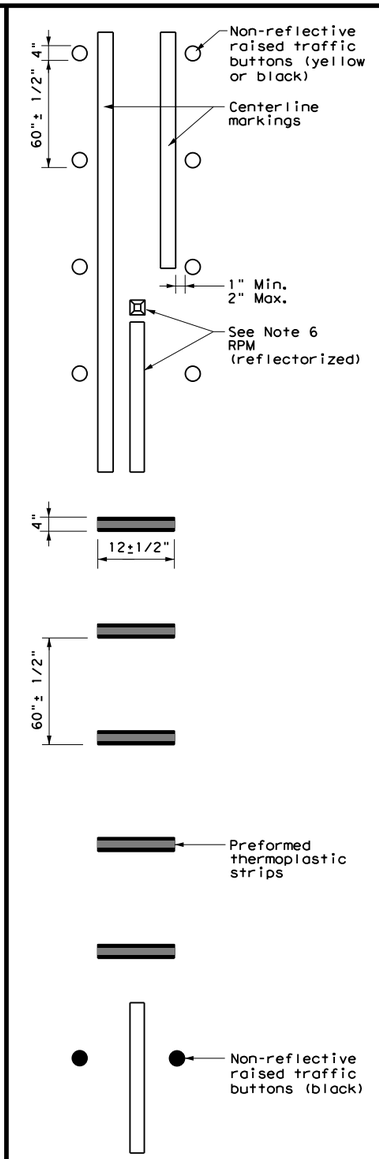
TWO LANE TWO-WAY ROADWAYS

MILLED CENTERLINE RUMBLE STRIPS



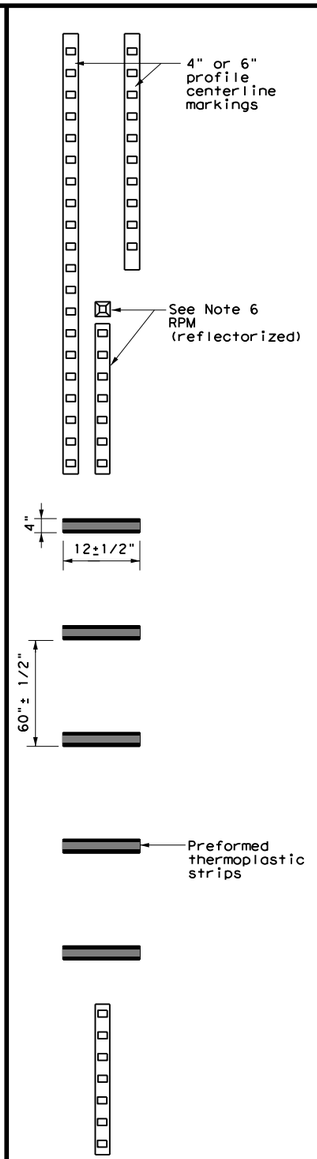
PLAN VIEW
OPTION 2

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	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		147

DATE: 1/12/2022 3:46:21 PM
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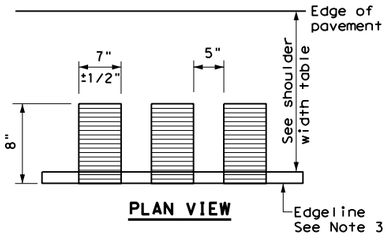
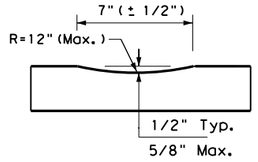
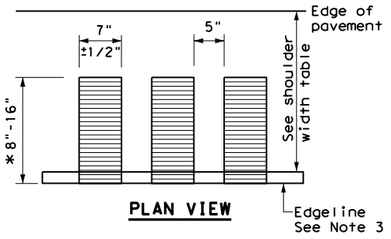


PLAN VIEW

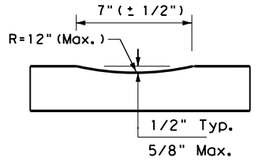


PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



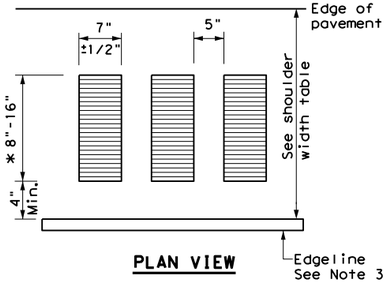
PLAN VIEW



* This distance may vary based on width of shoulder

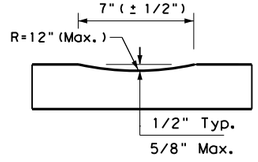
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



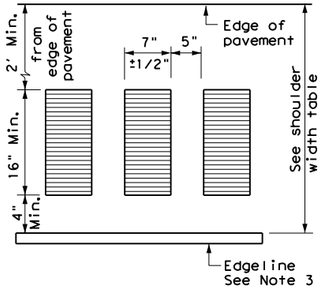
PLAN VIEW

* This distance may vary based on width of shoulder

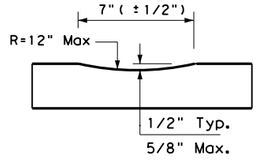


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

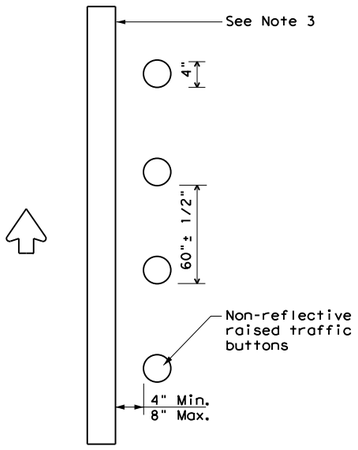


PLAN VIEW



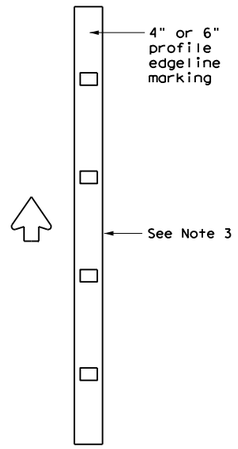
PROFILE VIEW
OPTION 4

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	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		148

DATE: 1/12/2022 3:46:27 PM
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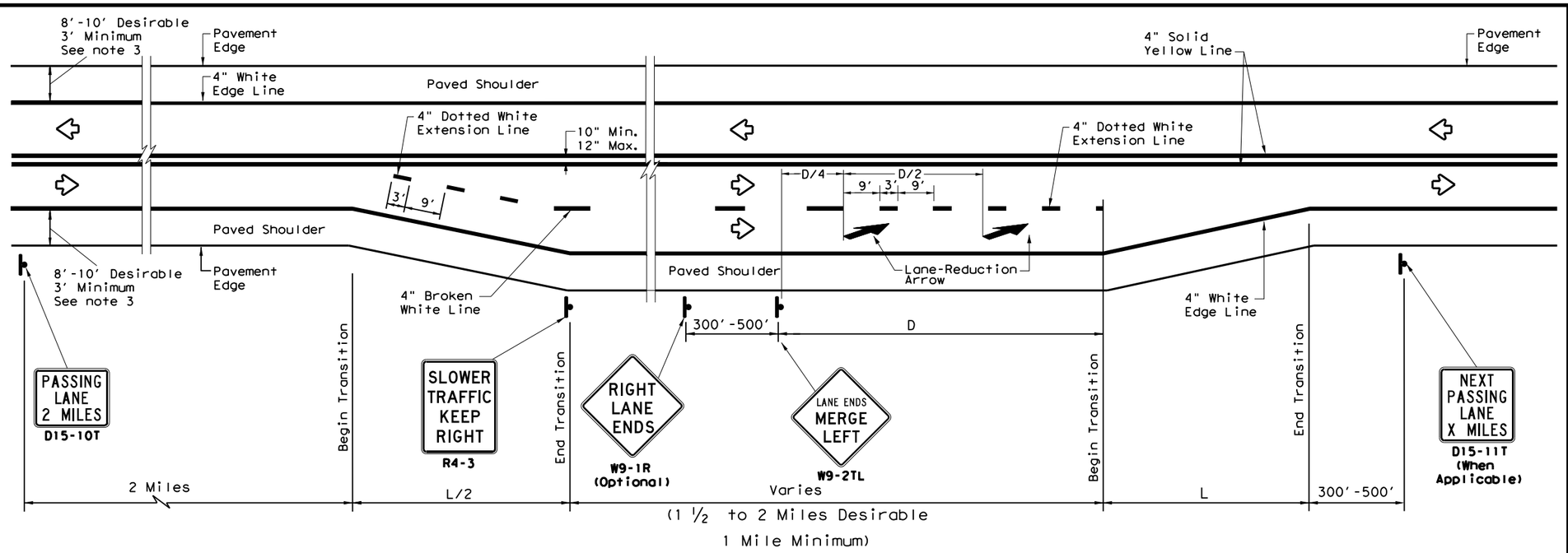

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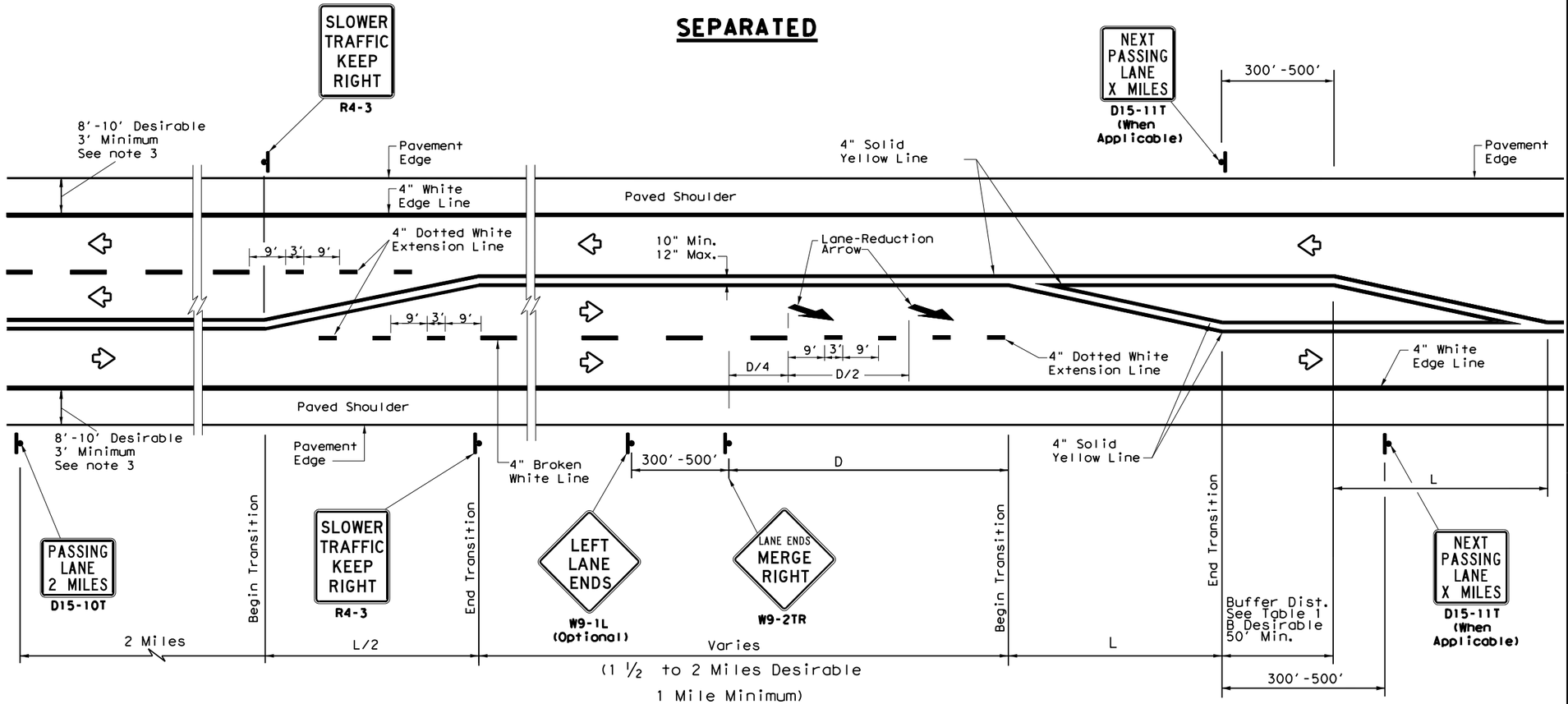

ALTERNATING

LEGEND	
	Sign
	Traffic Flow

TYPICAL TAPER LENGTH (L)	
Formula *	L = WS

* Transition length should be rounded up to nearest 5 foot increment.

L=Length of Transition (FT)
W=Width of Offset (FT)
S=Posted Speed (MPH)

EXAMPLE

A 12 foot lane is added on a 70 mph roadway. The length of the transition should be:

L=12x70=840 ft

TABLE 1
ADVANCE WARNING SIGN DISTANCE (D) AND BUFFER DISTANCE (B)

Posted Speed	D (FT)	B (FT)
40	670	305
45	775	360
50	885	425
55	990	495
60	1100	570
65	1200	645
70	1250	730
75	1350	820

GENERAL NOTES

1. For minimum and desirable design details, see the Roadway Design Manual, Chapter 4, Section 6, Super 2 Highways.
2. For Raised Pavement Markers(RPM)details, see Pavement Markings Standard sheet, PM(2). Note that RPMs are not recommended on the 4" dotted white extension lines.
3. For rumble strip options available for the designed shoulder width, see rumble strip standard sheet RS(4).

Texas Department of Transportation

Traffic Operations Division Standard

TEXAS SUPER 2 PASSING LANES

TS2(PL-1)-18

FILE: ts2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT May 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
2-12	DIST	COUNTY		SHEET NO.
3-12	TYL	VAN ZANDT		149
3-18				

DATE: 1/12/2022 3:36:29 PM
FILE: c:\txdot\pw_online\txdot3\will.akin\d0332768\SH_19_RR_SCOPE.dgn

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 794733L
Crossing Type: HIGHWAY OVERPASS (RR UNDER)
RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD COMPANY (UP)
Operating RR Company at Track: UP
RR MP: 156.640
RR Subdivision: MINEOLA
City: EDGEWOOD
County: VAN ZANDT
CSJ at this Crossing: 0108-12-018
Highway/Roadway name crossing the railroad: SH 19, HIGHWAY OVERPASS
# of regularly scheduled trains per day at this crossing: 23
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0

Scope of Work at this Crossing to Be Performed by State Contractor:

RESURFACING PAVEMENT ON BRIDGE DECK (MILL & INLAY) & STRIPING

Scope of Work at this Crossing to Be Performed by Railroad Company:

NONE

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

NONE

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 0

On this project, night or weekend flagging is:

☐ Expected
☒ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices
☐ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☒ UPRR - UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
☐ BNSF - BNSF.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
☐ KCS - KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
- Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required

☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

☐ Required
☒ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
☐ Not Required	
☒ Non - Bridge Projects	$2,000,000 / $6,000,000
☐ Bridge Projects	$5,000,000 / $10,000,000
☐ Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

☒ Not Required
☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
☐ Required: Contractor to obtain (see Item 5, Article 8.4)
With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☒ Not Required
☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call UNION PACIFIC RAILROAD (UPRR)
Railroad Emergency Line at 888-877-7267
Location: DOT 794733L
RR Milepost 156.640
Subdivision MINEOLA

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
3/2020	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		150

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SHEET 1 OF 2

Texas Department of Transportation — Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		151

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3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of $\frac{1}{4}$ inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

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LICENSED
PROFESSIONAL ENGINEER
Gilbert Arteaga
01/18/2022

SHEET 2 OF 2

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		152

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☒ Other Nationwide Permit Required: NWP# 3

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1.

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.

2.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

STATE OF TEXAS
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0108	12	018	SH 19
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	TYL	VAN ZANDT		153

FILE: c:\txdot\pw*online\txdot3\will.akin\d0168607\SH19*ENV*SW3P.dgn
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A. GENERAL SITE DATA

1. PROJECT LIMITS:
   FROM 1.5 MI N OF FM 859 (RAINS C/L), SOUTH TO US 80
   PROJECT LENGTH = 34,901 FT. = 6.610 MILES
   PROJECT LOCATION:
   BEGIN PROJECT : R.M. 268 +1.194
   END PROJECT : R.M. 276 +0.609
   PROJECT COORDINATES:
   BEG LATITUDE: +32.7727011 BEG LONGITUDE: -95.7993821
   END LATITUDE: +32.6877234 END LONGITUDE: -95.8364372

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: **WIDEN 2 LN ROADWAY FOR PASSING LANES-SUPER2. WITH CENTER AND EDGELINE PROFILE MARKINGS.**

4. MAJOR SOIL DISTURBING ACTIVITIES: **CULVERT EXTENSIONS AND SUBGRADE 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: **115.98 ACRES**

7. TOTAL AREA TO BE DISTURBED: **8.09 ACRES**

8. WEIGHTED RUNOFF COEFFICIENT
   BEFORE CONSTRUCTION: **0.433**
   AFTER CONSTRUCTION: **0.432**

9. NAME OF RECEIVING WATERS: (SEGMENT NUMBER OF RECEIVING WATERS)
   THE RECEIVING WATERS ARE THE SABINE RIVER BASIN SEGMENT 0506D.

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
GILBERT ARTEAGA
87953
LICENSED
PROFESSIONAL ENGINEER
01/18/2022

SH 19 STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0108	12	018	SH 19
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		154

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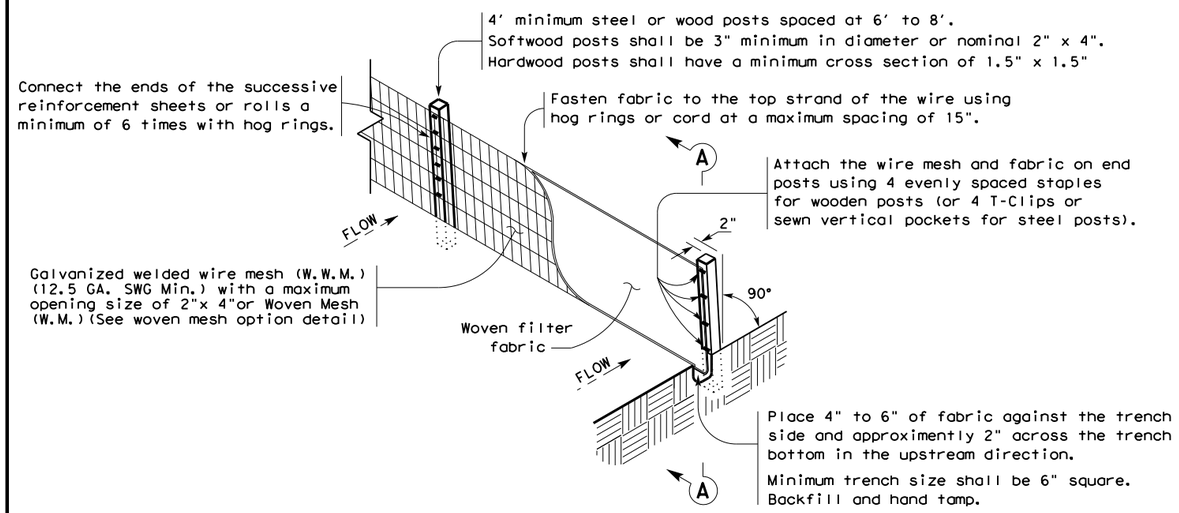
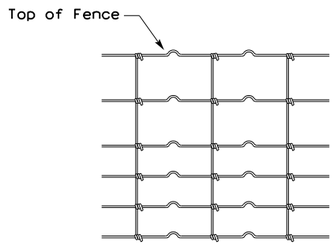
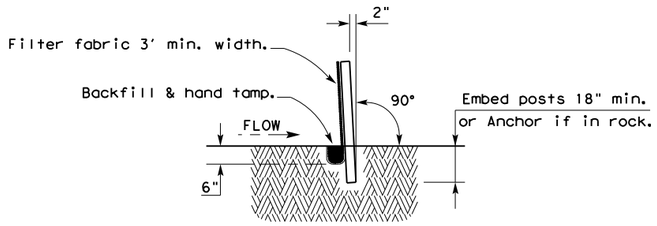


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

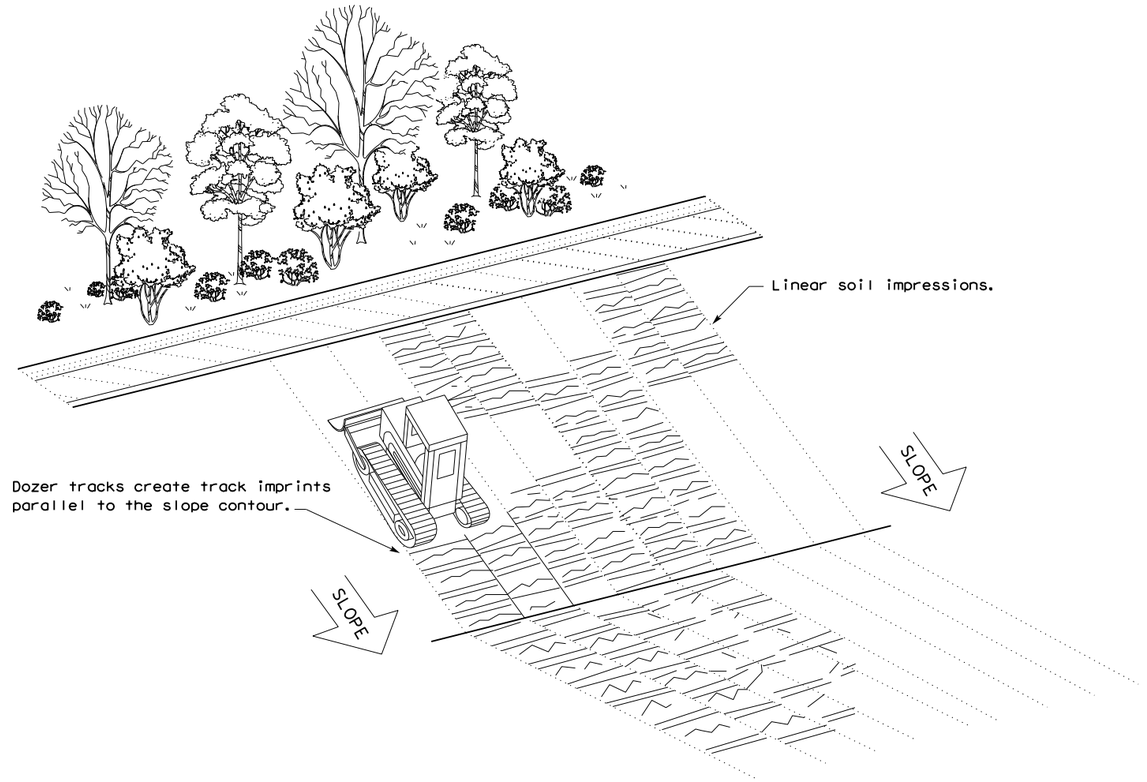
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0108	12	018	SH 19
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		155

DATE: 1/12/2022
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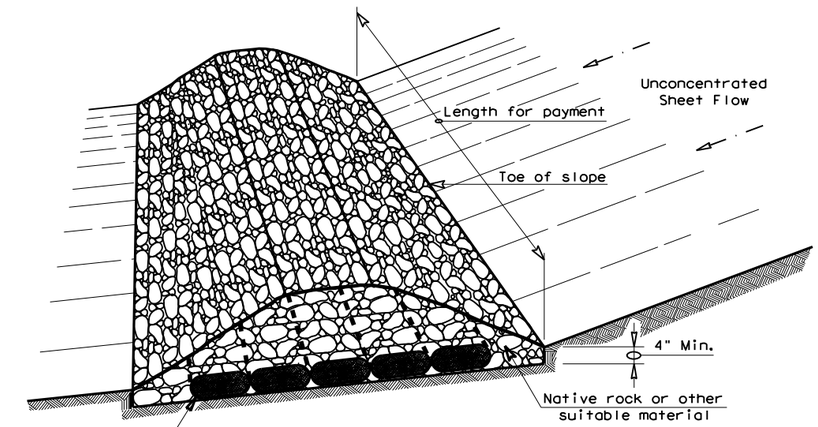
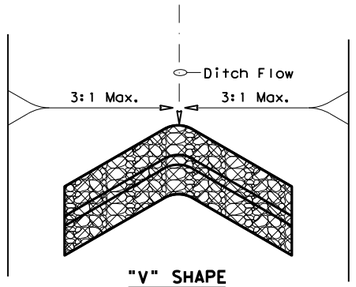
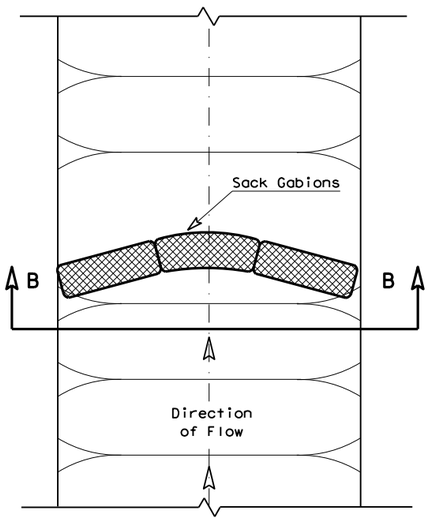


FILTER DAM AT TOE OF SLOPE

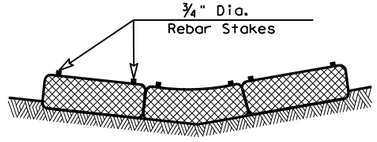
RFD1



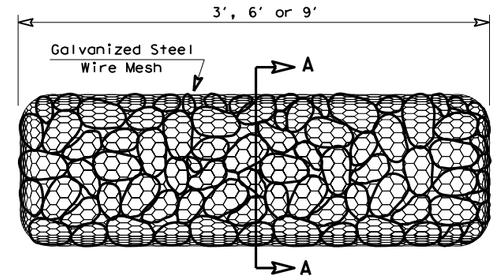
"V" SHAPE PLAN VIEW



PLAN VIEW

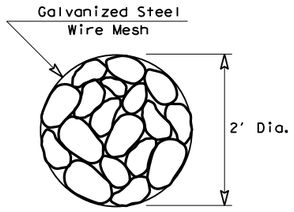


SECTION B-B

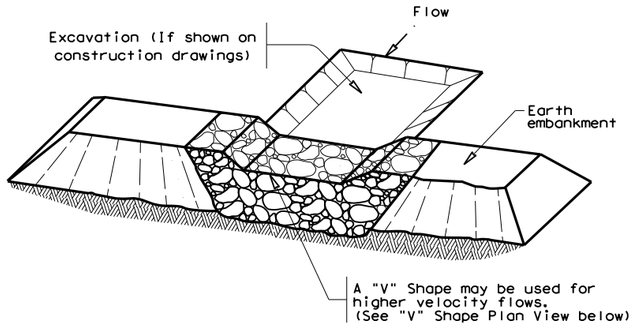


TYPE 4 (SACK GABIONS)

RFD4

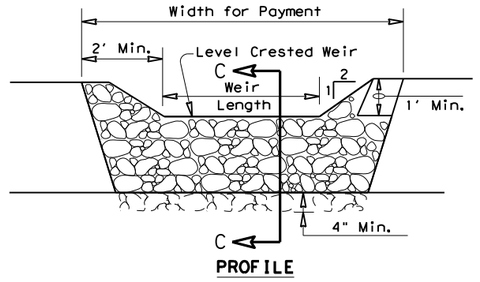


SECTION A-A

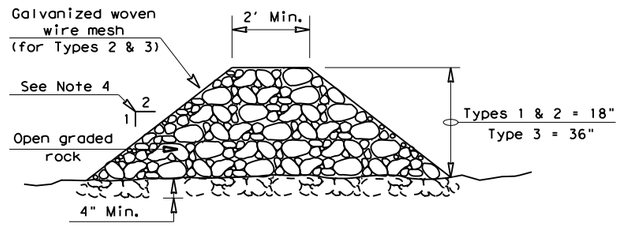


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

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.

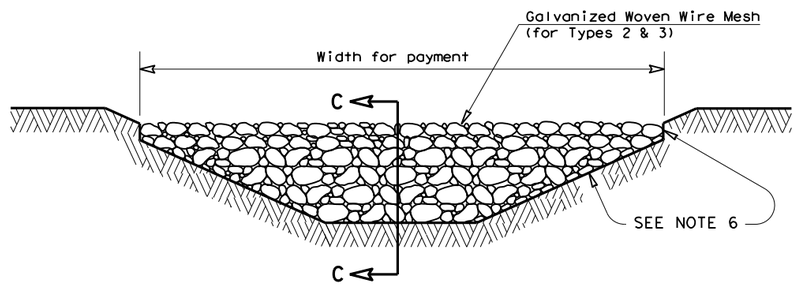
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

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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