STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	C 1671-2-12		1
STATE	STATE DIST.	COUNTY	
TEXAS	TYL	VAN ZANDT	
CONT.	SECT.	JOB	HIGHWAY
1671	02	012	FM 1651

PROJECT NO.: C 1671-2-12
CSJ 1671-02-012
NET LENGTH OF PROJECT = 32,057.33 FEET = 6.071 MILES

FM 1651
VAN ZANDT COUNTY
LIMITS: FROM SH 198 E. TO SH 19

FOR THE REHABILITATION OF EXISTING ROAD
CONSISTING OF REHAB ROADWAY AND WIDEN TO 28 FEET

FUNCTIONAL CLASS: MINOR COLLECTOR

DESIGN SPEED = 35 MPH

ADT:
FM 1651 AT SH 198 (2022) = 460
(2042) = 681
FM 1651 AT SH 19 (2022) = 949
(2042) = 1158

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 WAS COMPLETED & ACCEPTED:_____

CONTRACTOR:_____

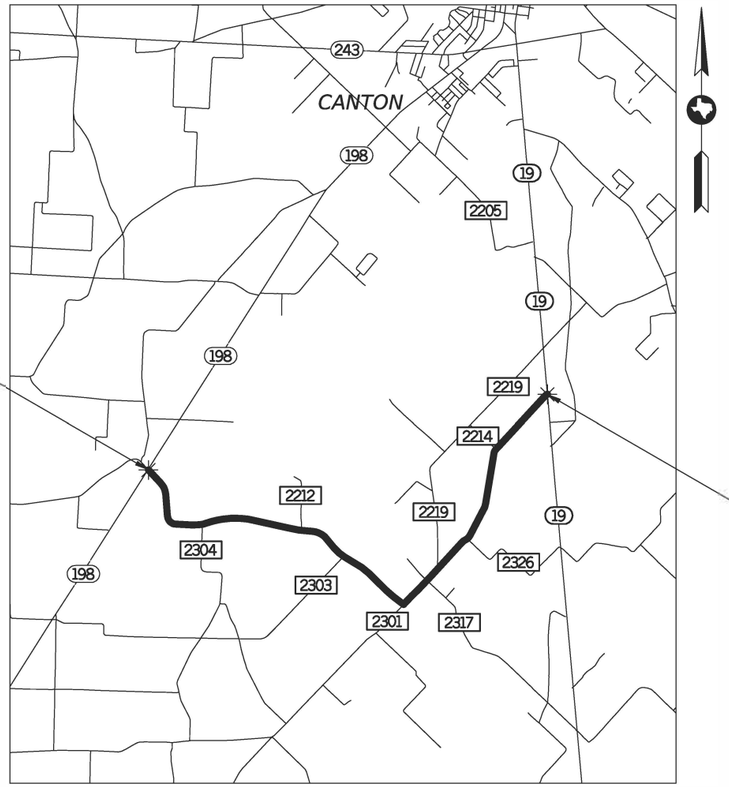
USED_____OF_____ALLOTTED DAYS_____

FINAL CONTRACT COST: $_____

FINAL AS BUILT PLANS

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

_____ _____
DATE AREA ENGINEEER



BEGIN PROJECT
CSJ 1671-02-012
STA 000+00.00
REF MRK 638+0.847
LAT: +32.481810°
LONG: -95.930474°

END PROJECT
CSJ 1671-02-012
STA 320+66.36
REF MRK 644+1.024
LAT: +32.491622°
LONG: -95.858997°

SCALE: N.T.S.

EXCEPTIONS: NONE
EQUATION: STA 176+86.80 (BK) = STA 176+95.80 (AH) = -9.00'
RAILROAD CROSSINGS: NONE

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

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008).

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

PREPARED FOR LETTING: 2/16/2024

Trevor L. Castilla
PROJECT MANAGER

Texas Department of Transportation

SUBMITTED FOR LETTING: 2/27/2024

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

APPROVED FOR LETTING: 2/27/2024

DocuSigned by:
Kevin M Wolff
6149184A8C65461...
DISTRICT ENGINEER

LATEST REVISION: 5/19/2023
DATE: 2/16/2024 5:21:17 PM
FILE: FM1651_TITLE.dgn

CK:
DW:
CK:
DW:

GENERAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX OF SHEETS
3-5	TYPICAL SECTION
6,6A-6I	GENERAL NOTES
7,7A-7B	ESTIMATE & QUANTITY SHEET
8-15	QUANTITY SUMMARIES
16-20	SUMMARY OF SMALL SIGNS

TRAFFIC CONTROL PLAN

SHEET NO.	DESCRIPTION
21	CONSTRUCTION SEQUENCE OF WORK

SHEET NO.	STANDARDS
22	MISCELLANEOUS TCP DETAILS
* 23-34	BC(1)-21 THRU BC(12)-21
* 35	EDGECON-21
* 36	TCP(1-3)-18
* 37-38	TCP(2-1)-18 THRU TCP(2-2)-18
* 39	TCP(3-1)-13
* 40	TCP(3-3)-14
* 41	TCP(7-1)-13
* 42	TCP(S-1)-08A
* 43	WZ(STPM)-23
* 44	WZ(RS)-22
* 45	WZ(UL)-13

ROADWAY DETAILS

SHEET NO.	DESCRIPTION
46-60	PROJECT LAYOUT

SHEET NO.	STANDARDS
61-64	MISCELLANEOUS ROADWAY DETAILS
* 65-68	MB (1) - 21 THRU MB (4) - 21
* 69	TE(HMAC)-11
* 70	PCF-05

DRAINAGE DETAILS

SHEET NO.	STANDARDS
71	MISCELLANEOUS DRAINAGE DETAILS
* 72	BCS
* 73	PSET-SC
* 74	PW
* 75-76	SCC-3&4 (MOD)
* 77-78	SCC-5&6
* 79-80	MC-7-10
* 81-82	SCC-8

TRAFFIC ITEMS

SHEET NO.	DESCRIPTION
83	SIGN DETAILS

SHEET NO.	STANDARDS
84	MISCELLANEOUS TRAFFIC DETAILS
* 85-88	D & OM(1)-20 THRU D & OM(4)-20
* 89	SMD(GEN)-08
* 90-92	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
* 93-94	PM(1)-22 THRU PM(2)-22
* 95	RS(2)-23
* 96	RS(4)-23
* 97	RS(6)-23

ENVIRONMENTAL ISSUES

SHEET NO.	DESCRIPTION
98-112	ENVIRONMENTAL LAYOUT
113	EPIC
114-115	STORMWATER POLLUTION PREVENTION PLAN (SWP3)

SHEET NO.	STANDARDS
116	MISCELLANEOUS ENVIRONMENTAL DETAILS
# 117-118	EC(1)-16 THRU EC(2)-16
# 119-121	EC(9)-16

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

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

Trevor L. Castilla — 2/16/2024
TREVOR L. CASTILLA — DATE

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER

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

IN S. HWANG — 2/16/2024
IN S. HWANG — DATE

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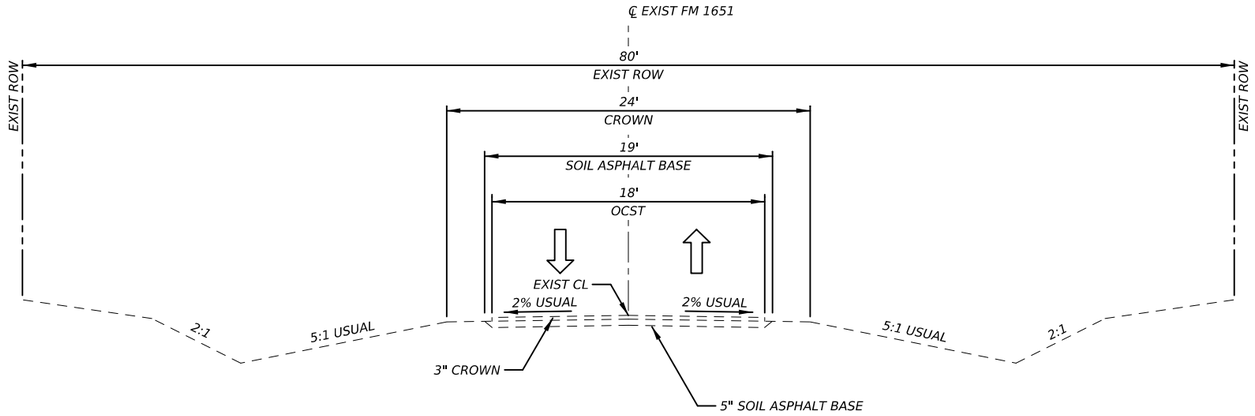
TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

SUPPLEMENTAL INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		2



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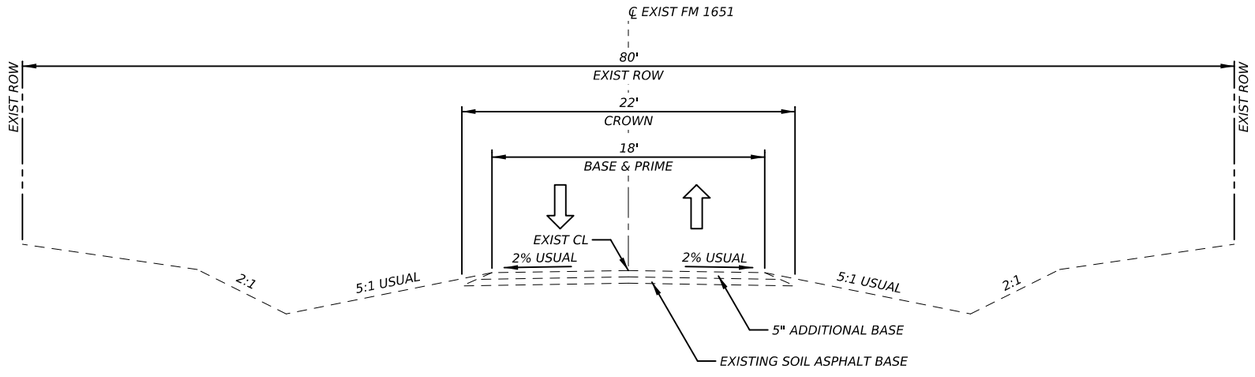

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STA 114+00 TO STA 127+00
STA 131+00 TO STA 137+00
STA 139+00 TO STA 146+00
STA 151+00 TO STA 159+00
STA 165+00 TO STA 176+86.80

DATE: 2/16/2024 5:22:15 PM
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STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

0 5' 10'
SCALE IN FEET

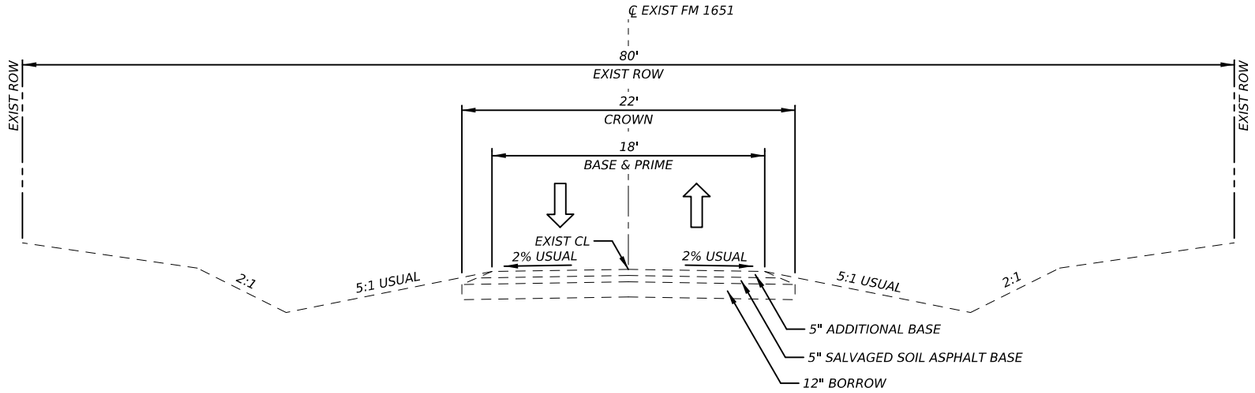
TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

TYPICAL SECTION

 SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		3



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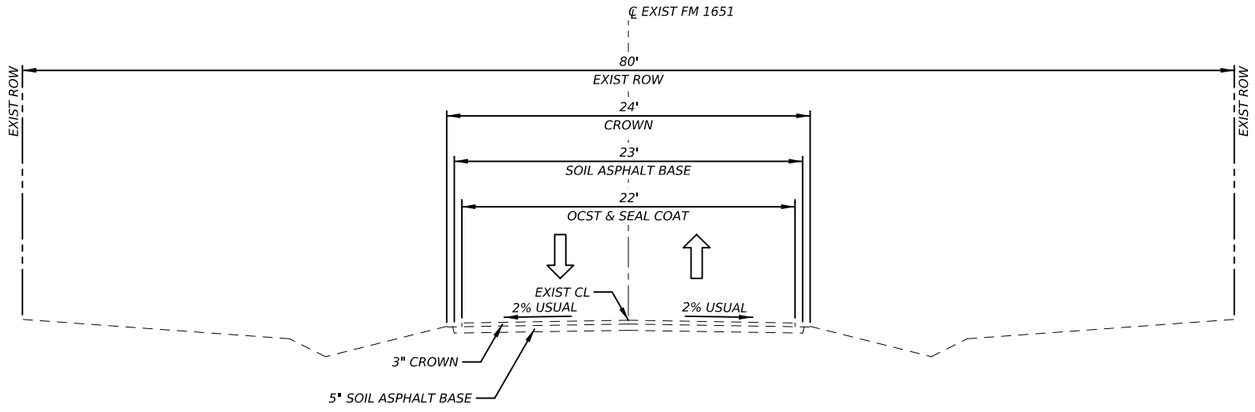
STA 137+00 TO STA 139+00
STA 146+00 TO STA 151+00
STA 159+00 TO STA 165+00



EXIST TYPICAL SECTION

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STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

0 5' 10'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

TYPICAL SECTION

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		4

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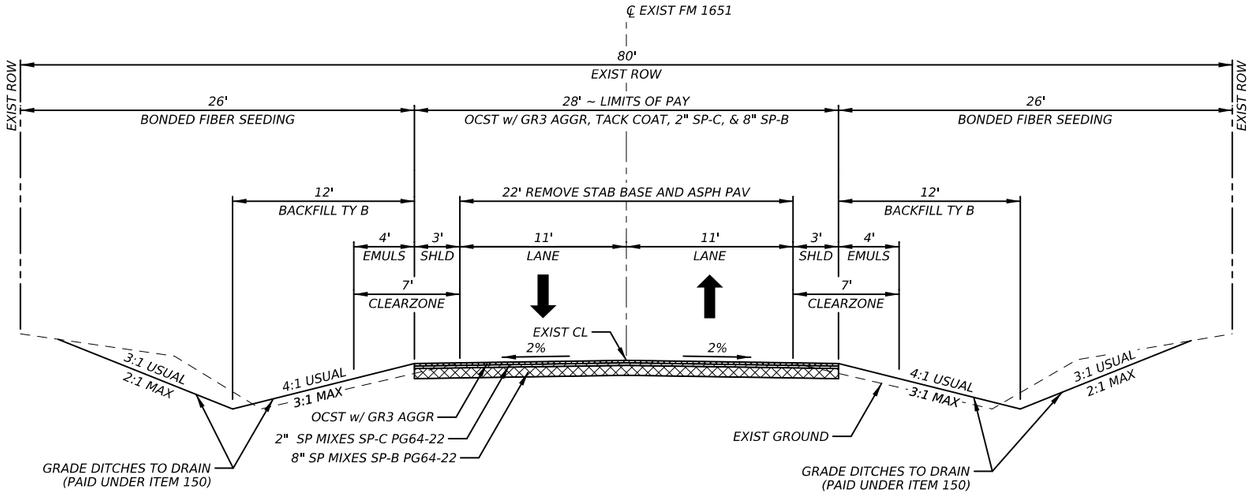

PROPOSED TYPICAL SECTION 1

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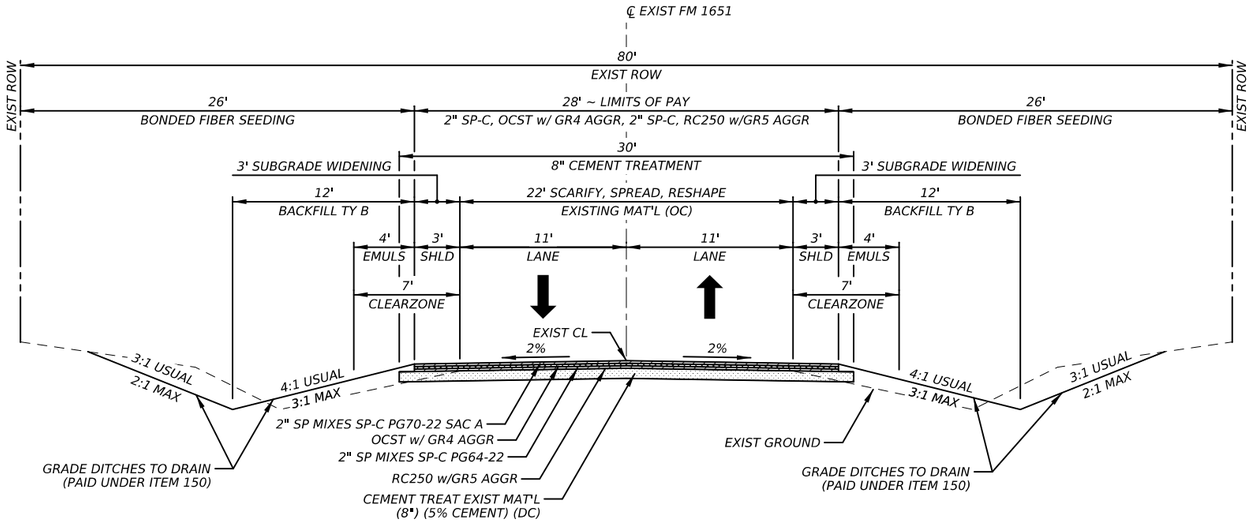
STA 172+85.00 TO STA 180+95.00
STA 316+60.00 TO 320+66.36



PROPOSED TYPICAL SECTION 2

STA 4+00.00 TO STA 172+85.00
STA 180+95.00 TO STA 316+60.00

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

0 5' 10'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

TYPICAL SECTION

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		5

DATE: 2/16/2024 5:23:13 PM
FILE: FM1651_TYP01.dgn

GENERAL NOTES:

GENERAL.

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

Lance Pomykal lance.pomykal@txdot.gov

Josh Fulton josh.fulton@txdot.gov

For Q&A on Proposals navigate to:

https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project and click on the link in the window that pops up to view the Q&A.

All relevant project documentation including Contract Time Determinations and cross-sections will still be posted to the districts FTP website.

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Tyler%20District/Construction%20Projects

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

SCC -3 & 4 (MOD)

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

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

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

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

Project Number: **Sheet 6**

County: Van Zandt **Control:** 1671-02-012

Highway: FM 1651

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.

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.

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.

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.

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

Before beginning work, profile the centerline of the existing roadway. Set horizontal and vertical control points to provide for the required thickness of materials.

Prior to beginning driveway and intersection work, submit a detailed construction sequence to be approved by the Engineer. Driveway and intersection completion includes existing surface removal, structure removal, removal of debris from the project site, installing the new RCP and SETs, backfilling, grading ditches to drain, and installing the permanent driveway or intersection surface (or all-weather drive surface as allowed).

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

Project Number: **Sheet 6A**

County: Van Zandt **Control:** 1671-02-012

Highway: FM 1651

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 travel way. 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 travel way 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 38.8 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).

In accordance with Article 7.9, provide and maintain adequate, neat, and sanitary toilet accommodations within the project limits for employees, including State employees.

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.

Do not use a forestry type mulcher for grinding. Tub grinders will be allowed.

Dispose of trees from the right of way within 24 hours of removal.

ITEM 104. REMOVING CONCRETE

Blasting will not be permitted on this project.

ITEM 105. REMOVING TREATED & UNTREATED BASE & ASPHALT PAVEMENT

Material removed by this operation will become the property of the Contractor.

Project Number: **Sheet 6B**

County: Van Zandt **Control:** 1671-02-012

Highway: FM 1651

ITEMS 110 & 132. EXCAVATION & EMBANKMENT

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

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

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

ITEM 112. SUBGRADE WIDENING

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

ITEM 132. EMBANKMENT

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

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

ITEM 134. BACKFILLING PAVEMENT EDGES

Place (TY B) material for backfilling pavement edges using an approved road widener. The use of this machine will allow mulch sod for backfilling the pavement edge to be placed from the final roadway surface. Use a self-propelled machine capable of transferring mulch sod from a dump truck located on the pavement surface to the front slope along the pavement edge. This machine may have a strike-off that will spread the mulch sod 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 approved equipment. This compaction will not be paid for directly, but will be subsidiary to Item 134.

ITEM 150. BLADING

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

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

Compact blading material as directed.

ITEM 152. ROAD GRADER WORK

Use a road grader for the following: subgrade widening, cement treated subgrade, blading, backfilling pavement edges, and grading work.

ITEM 164. SEEDING FOR EROSION CONTROL

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

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

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

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

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

Project Number: **Sheet 6C**

County: Van Zandt **Control:** 1671-02-012

Highway: FM 1651

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 204. SPRINKLING

Apply water for dust control as directed. When dust control is not being maintained, cease operations until proper resources have been utilized to adequately minimize dust during earthwork, base construction. This Item will not be paid directly, but will be subsidiary to pertinent Items.

ITEM 251. REWORKING BASE COURSES

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

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

After cement treatment of the scarified base material, perform a ride quality profile in accordance with Item 585.2.2. Provide the profile measurements to the Engineer in electronic data files within 3 days after the cement treatment. Correct 0.1-mile sections having an average

Project Number: **Sheet 6D**

County: Van Zandt **Control:** 1671-02-012

Highway: FM 1651

IRI value greater than 100.0 in. per mile to an IRI value of 100.0 in. per mile or less for each wheel path with an approved corrective action. Perform the ride quality profile and any corrective actions at no additional expense to the Department.

ITEM 314. EMULSIFIED ASPHALT TREATMENT

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

ITEM 316. SEAL COAT

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

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

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

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

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

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

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

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 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 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 will be subsidiary to Item 462.

De-watering at box culverts, is subsidiary to Item 462.

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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 467. SAFETY END TREATMENT

Reshape embankment side slopes and provide embankment as required.

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.

Removal for SETs are considered appurtenances when removing driveway pipe by the each.

ITEM 502. BARRICADES, SIGNS, AND TRAFFIC HANDLING

The traffic control plan for this Contract consists of: the installation and maintenance of warning signs and other traffic control devices shown on the plans; specification data, which may be included in the general notes; applicable provisions of the Texas Manual on Uniform Traffic Control Devices (TMUTCD); traffic control plan sheets included on the plans; standard BC sheets; Compliant Work Zone Traffic Control Device List, and Item 502 of the standard specifications.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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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 travel way as approved.

The Contractor Force Account "Safety Contingency" is intended to be used for work zone enhancements that could not be foreseen in the project planning and design stage for the purpose of improving the effectiveness of the Traffic Control Plan. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

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

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

Lane closures will not be allowed Thursday 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.

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

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

Provide a pilot vehicle.

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

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

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

ITEM 504. FIELD OFFICE AND LABORATORY

Provide a facility at the asphalt concrete pavement plant for use by the Engineer as a laboratory. This is an existing requirement of Item 6, Article 5, "Plant Inspection and Testing," of the Standard Specifications. Provide a facility meeting the requirements of Item 504. At a minimum meet the requirements of 504.2.2.4, "Ty D Structure (Asphalt Mix Control Laboratory)" and 504.2.2.4.1, "Asphalt Content by Ignition Method." In addition, provide the following: At least one exterior door opening with a 48-in. minimum width. If steps are required to gain access to the facility's 48-in. door, provide a landing dock with minimum dimensions of 60 in. wide by 60 in. deep. The strong floor and landing of the facility should support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer. Provide a printer/fax/scan copier capable of printing 8.5" x 11" and 11" x 17" paper sizes and internet connectivity with a minimum of 100 mbps. This facility will be required of all projects with plant produced asphalt concrete pavement.

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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 38.8 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 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.

For temporary sediment control fence, use steel posts with a minimum weight of 1.25 lb/ft.

ITEM 533. MILLED RUMBLE STRIPS

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

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

Provide a sweeper that meets the requirements of Section 354.2.3.

ITEM 560. MAILBOX ASSEMBLIES

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

Provide new metal mailboxes and place the existing mailboxes at the front door of the homeowner. Ensure the new mailbox is not smaller than the existing. The following mailbox quantities are for Contractor's information only: 58 small mailboxes, 10 medium mailboxes, and 5 large mailboxes.

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

ITEM 585. RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type B pay adjustment schedule 2 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Use Surface Test Type A to evaluate ride quality of 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 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.

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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.

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.

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 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.

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

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Tack coat is not required if paving over a fresh seal coat.

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.

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1671-02-012 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY FM 1651

			CONTROL SECTION JOB		**1671-02-012**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00201544**		
			COUNTY		**Van Zandt**		
			HIGHWAY		**FM 1651**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	173.250		173.250	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	4,665.000		4,665.000	
	110-6001	EXCAVATION (ROADWAY)	CY	1,541.000		1,541.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	305.000		305.000	
	132-6021	EMBANKMENT (VEHICLE)(ORD COMP)(TY C)	CY	12,973.000		12,973.000	
	134-6002	BACKFILL (TY B)	STA	320.700		320.700	
	150-6001	BLADING	STA	320.700		320.700	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	2,888.000		2,888.000	
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY	172,712.000		172,712.000	
	164-6055	BONDED FBR MTRX SEED (TEMP)(WARM)	SY	86,356.000		86,356.000	
	164-6056	BONDED FBR MTRX SEED (TEMP)(COOL)	SY	86,356.000		86,356.000	
	168-6001	VEGETATIVE WATERING	MG	3,800.000		3,800.000	
	251-6065	REWORK BS MTL (TY B) (4") (ORD COMP)	SY	74,434.000		74,434.000	
	275-6001	CEMENT	TON	2,132.000		2,132.000	
	275-6011	CEMENT TREAT(EXIST MATL)(8")	SY	101,501.000		101,501.000	
	314-6012	EMULS ASPH (EROSN CONT)(CSS-1)	GAL	1,604.000		1,604.000	
	316-6029	ASPH (RC-250)	GAL	18,947.000		18,947.000	
	316-6406	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	GAL	35,916.000		35,916.000	
	316-6407	AGGR (TY-PD GR-3 OR TY-PL GR-3)	CY	44.000		44.000	
	316-6408	AGGR(TY-PD GR-4 OR TY-PL GR-4)	CY	758.000		758.000	
	316-6449	AGGR (TY-PD GR-5 OR TY-PL GR-5)	CY	654.000		654.000	
	401-6001	FLOWABLE BACKFILL	CY	14.000		14.000	
	420-6071	CL C CONC (COLLAR)	EA	2.000		2.000	
	420-6077	CL E CONC (SEAL SLAB)(NON-REINF)	CY	8.000		8.000	
	429-6001	CONC STR REPAIR(CLEAN & COAT WTH EPOXY)	SF	588.000		588.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	25.000		25.000	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)	CY	605.000		605.000	
	462-6023	CONC BOX CULV (8 FT X 8 FT)	LF	5.000		5.000	
	462-6045	CONC BOX CULV (3 FT X 2 FT)(EXTEND)	LF	31.000		31.000	
	462-6049	CONC BOX CULV (4 FT X 4 FT)(EXTEND)	LF	62.000		62.000	
	462-6057	CONC BOX CULV (6 FT X 6 FT)(EXTEND)	LF	13.000		13.000	
	462-6062	CONC BOX CULV (7 FT X 7 FT)(EXTEND)	LF	14.000		14.000	
	462-6064	CONC BOX CULV (8 FT X 5 FT)(EXTEND)	LF	8.000		8.000	
	462-6214	CONC BOX CULV (2FT-8IN X 2FT-8IN)EXTEND	LF	31.000		31.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	2,663.000		2,663.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	143.000		143.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	95.000		95.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1671-02-012 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY FM 1651

			CONTROL SECTION JOB		**1671-02-012**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00201544**		
			COUNTY		**Van Zandt**		
			HIGHWAY		**FM 1651**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	464-6008	RC PIPE (CL III)(36 IN)	LF	38.000		38.000	
	464-6009	RC PIPE (CL III)(42 IN)	LF	25.000		25.000	
	466-6185	WINGWALL (PW - 2) (HW=10 FT)	EA	4.000		4.000	
	466-6186	WINGWALL (PW - 2) (HW=11 FT)	EA	2.000		2.000	
	466-6193	WINGWALL (PW - 2) (HW=4 FT)	EA	2.000		2.000	
	466-6194	WINGWALL (PW - 2) (HW=5 FT)	EA	2.000		2.000	
	466-6195	WINGWALL (PW - 2) (HW=6 FT)	EA	4.000		4.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	5.000		5.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	134.000		134.000	
	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	6.000		6.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	7.000		7.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	1.000		1.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	4.000		4.000	
	467-6461	SET (TY II) (42 IN) (RCP) (3: 1) (C)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	1.000		1.000	
	496-6072	REMOVING ROCK RIPRAP	LF	75.000		75.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000		13.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	2,175.000		2,175.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	2,175.000		2,175.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,402.000		3,402.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,402.000		3,402.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	540.000		540.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	540.000		540.000	
	530-6002	INTERSECTIONS (ACP)	SY	940.000		940.000	
	530-6005	DRIVEWAYS (ACP)	SY	7,900.000		7,900.000	
	530-6008	TURNOUTS (ACP)	SY	943.000		943.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	781.000		781.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	63,116.000		63,116.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	32,058.000		32,058.000	
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	55.000		55.000	
	560-6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	7.000		7.000	
	560-6023	MAILBOX INSTALL-M (TWG-POST) TY 4	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	73.000		73.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	6.000		6.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1671-02-012 **DISTRICT** Tyler **COUNTY** Van Zandt
HIGHWAY FM 1651

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1671-02-012**			
		PROJECT ID		**A00201544**			
		COUNTY		**Van Zandt**			
		HIGHWAY		**FM 1651**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	80.000		80.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	38.000		38.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	63,116.000		63,116.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	198.000		198.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	2,840.000		2,840.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	51,752.000		51,752.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	5,499.000		5,499.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	198.000		198.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	63,116.000		63,116.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	2,840.000		2,840.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	51,752.000		51,752.000	
	672-6006	REFL PAV MRKR TY I-A	EA	198.000		198.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	785.000		785.000	
	730-6107	FULL - WIDTH MOWING	CYC	4.000		4.000	
	772-6003	POST AND CABLE FENCE (NEW INSTALLATION)	LF	462.000		462.000	
	3077-6001	SP MIXES SP-B PG64-22	TON	2,213.200		2,213.200	
	3077-6011	SP MIXES SP-C PG64-22	TON	10,974.150		10,974.150	
	3077-6022	SP MIXES SP-C SAC-A PG70-22	TON	10,420.850		10,420.850	
	3077-6075	TACK COAT	GAL	9,977.000		9,977.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	146.000		146.000	
	6185-6002	TMA (STATIONARY)	DAY	100.000		100.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	100.000		100.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	

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GRADING SUMMARY

FROM	TO	ITEM 134 BACKFILL (TY B)	ITEM 150 BLADING	ITEM 168 [1] [2] VEGETATIVE WATERING	ITEM 314 [1] [2] EMULS ASPH (EROSN CONT) (CSS-1)	ITEM 730 [1] FULL - WIDTH MOWING	REMARKS
STA	STA	STA	STA	SY	SY	CYC	
0+00.00	320+66.36	320.7					PAVEMENT EDGE
0+00.00	320+66.36		320.7				DITCH LINE
0+00.00	320+66.36			28,504			
0+00.00	320+66.36				28,504	4	4' EACH SIDE OF ROADBED
PROJECT TOTAL		**320.7**	**320.7**	**28,504**	**28,504**	**4**	

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE
[2] CONTRACTORS INFORMATION ONLY

EARTHWORK SUMMARY

LOCATION	ITEM 110 EXCAVATION (ROADWAY)	ITEM 112 SUBGRADE WIDENING (ORD COMP)	ITEM 132 EMBANKMENT (VEHICLE) (ORD COMP) (TY C)	ITEM 314 [1] EMULS ASPH (EROSN CONT) (CSS-1)	REMARKS
	CY	STA	CY	SY	
FROM TAB OF ROADWAY	520	305			
FROM CULVERT SUMMARY			762	712	
FROM SUPERELEVATION TABLE	1,021		12,211	9,978	
PROJECT TOTAL	**1,541**	**305**	**12,973**	**10,690**	

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE

PORTABLE CHANGEABLE MESSAGE SIGN

SIGN	LOCATION	ITEM 6001 PORTABLE CHANGEABLE MESSAGE SIGN
		DAY
LOC #1	TO BE LOCATED AS DIRECTED	73
LOC #2	TO BE LOCATED AS DIRECTED	73
PROJECT TOTAL		**146**

TRUCK MOUNTED ATTENUATORS

WORK PHASE	NUMBER OF TRUCKS	ITEM 6185 [1] TMA (STATIONARY)	ITEM 6185 [1] TMA (MOBILE OPERATION)
	EA	DAY	DAY
CSJ 1671-02-012	1	100	100
PROJECT TOTAL	**1**	**100**	**100**

[1] TOTAL DAYS FOR NUMBER OF TRUCKS SHOWN

BASIS OF ESTIMATE

	ITEM		DESCRIPTION	RATE	DESIGN UNITS	QUANTITY	PAY UNIT
[1]	166	6002	FERTILIZER	1 LB/9 SY	172,712	9.60	TON
	168	6001	VEGETATIVE WATERING	11 GAL/SY	345,424	3,800	MG
[1]	168	6001	VEGETATIVE WATERING-SUBSIDIARY TO ITEM 314	11 GAL/SY	28,504	314	MG
	275	6001	CEMENT (5% BASED ON 140LBS/CF)	42 LB/SY	101,501	2,132.00	TON
	314	6012	EMULS ASPH (EROSN CONT)(CSS-1)	0.15 GAL/SY	10,690	1,604	GAL
[1]	314	6012	EMULS ASPH (EROSN CONT)(CSS-1)-SUBSIDIARY TO ITEM 134	0.15 GAL/SY	28,504	4,276	GAL
	316	6029	ASPH (RC-250)	0.20 GAL/SY	94,735	18,947	GAL
	316	6406	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	0.36 GAL/SY	99,765	35,916	GAL
	316	6407	AGGR (TY-PD GR-3 OR TY-PL GR-3)	1 CY/115 SY	5,030	44	CY
	316	6408	AGGR(TY-PD GR-4 OR TY-PL GR-4)	1 CY/125 SY	94,735	758	CY
	316	6449	AGGR(TY-PD GR-5 OR TY-PL GR-5)	1 CY/145 SY	94,735	654	CY
	500	6001	MOBILIZATION			1	LS
	502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING			15	MO
	730	6107	FULL - WIDTH MOWING	2 CYC/YEAR	2	4	CYC
	3077	6075	TACK COAT	0.1 GAL/SY	99,765	9,977	GAL
	3077	6001	SP MIXES SP-B PG64-22	880 LB/SY	5,030	2,213.20	TON
	3077	6011	SP MIXES SP-C PG64-22	220 LB/SY	99,765	10,974.15	TON
	3077	6022	SP MIXES SP-C SAC-A PG70-22	220 LB/SY	94,735	10,420.85	TON

[1] CONTRACTORS INFORMATION ONLY

PREP ROW SUMMARY

LOCATION	ITEM 100 PREPARING ROW
	STA
1+50 TO 2+00	0.50
16+00 TO 17+00	1.00
22+50 TO 23+50	1.00
31+50 TO 32+00	0.50
49+00 TO 60+00	11.00
62+00 TO 70+50	8.50
74+00 TO 76+00	2.00
77+00 TO 78+00	1.00
96+00 TO 99+00	3.00
98+00 TO 99+00	1.00
104+25 TO 104+75	0.50
106+00 TO 162+00	56.00
163+00 TO 164+00	1.00
166+00 TO 168+00	2.00
169+00 TO 170+00	1.00
175+00 TO 178+00	3.00
180+00 TO 183+00	3.00
187+00 TO 195+00	8.00
201+00 TO 203+00	2.00
213+00 TO 214+00	1.00
216+00 TO 218+00	2.00
222+00 TO 223+00	1.00
230+00 TO 231+00	1.00
235+00 TO 236+00	1.00
247+00 TO 248+00	1.00
249+50 TO 252+50	3.00
253+00 TO 255+00	2.00
259+00 TO 265+00	6.00
267+00 TO 276+00	9.00
277+00 TO 302+25	25.25
303+00 TO 304+00	1.00
305+00 TO 313+00	8.00
314+50 TO 320+50	6.00
PROJECT TOTAL	**173.25**

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TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 1 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		8

CK:
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TABULATION OF SURFACE AREAS

FROM	TO	LOCATION	PROPOSED ROADWAY WIDTH	ITEM 316		ITEM 530				ITEM 3076	REMARKS
				[1] PRIME (RC-250)	[1] ONE COURSE SURF TREAT	INTERSECTIONS (ACP)	DRIVEWAYS (ACP)	TURNOUTS (ACP)	DRIVEWAYS (CONC) (HES)	[1] TACK COAT	
STA	STA		FT	SY	SY	SY	SY	SY	SY	SY	
0+00.00	4+00.00	MAIN LANES/SHLDR	28		1,245					1,245	
4+00.00	172+85.00	MAIN LANES/SHLDR	28	52,532	52,532					52,532	
172+85.00	180+95.00	MAIN LANES/SHLDR	28		2,520					2,520	
180+95.00	316+60.00	MAIN LANES/SHLDR	28	42,203	42,203					42,203	
316+60	320+66.36	MAIN LANES/SHLDR	28		1,265					1,265	
0+00.00	320+66.36	EDGE OF PAV									
		COUNTY ROAD INT				940					
		DRIVEWAYS					7,900		781		
		MB TURNOUTS						943			55 TOTAL TURNOUTS
PROJECT TOTAL				**94,735**	**99,765**	**940**	**7,900**	**943**	**781**	**99,765**	

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE

TABULATION OF ROADWAY

FROM	TO	LOCATION	PROPOSED ROADWAY WIDTH	ITEM 105	ITEM 110	ITEM 112	ITEM 251	ITEM 275		ITEM 772	ITEM 3077		
				REMOVING STAB BASE AND ASPH PAV (2"-6")	[2] EXCAVATION (ROADWAY)	[2] SUBGRADE WIDENING (ORD COMP)	REWORK BS MTL (TY B) (4") (ORD COMP)	[1] CEMENT	CEMENT TREAT (EXIST MATL) (8")	POST AND CABLE FENCE (NEW INSTALLATION)	[1] SP MIXES SP-B PG64-22	[1] SP MIXES SP-C PG64-22	[1] SP MIXES SP-C SAC-A PG70-22
STA	STA		FT	SY	CY	STA	SY	SY	SY	LF	SY	SY	SY
0+00.00	4+00.00	MAIN LANES/SHLDR	28	1,171	131						1,245	1,245	
4+00.00	172+85.00	MAIN LANES/SHLDR	28			169	41,275	56,284	56,284			52,532	52,532
172+85.00	180+95.00	MAIN LANES/SHLDR	28	2,182	243						2,520	2,520	
180+95.00	316+60.00	MAIN LANES/SHLDR	28			136	33,159	45,217	45,217	431		42,203	42,203
316+60.00	320+66.36	MAIN LANES/SHLDR	28	1,312	146					31	1,265	1,265	
PROJECT TOTAL				**4,665**	**520**	**305**	**74,434**	**101,501**	**101,501**	**462**	**5,030**	**99,765**	**94,735**

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE
[2] QUANTITY INCLUDED IN EARTHWORK SUMMARY

SUPERELEVATION CORRECTION TABLE

FROM STA	SIDE	EXIST SUPERELEVATIONS	PROPOSED SUPERELEVATIONS	TO STA	RADIUS	CURVE DESIGN SPEED	ITEM 132 [1] EMBANKMENT (VEHICLE) (ORD COMP) (TY C)	ITEM 110 [1] EXCAVATION ROADWAY
STA				STA	FT	MPH	CY	CY
8+25.00	LEFT	3.43%	6.00%	18+55.00	1,145.92	55	854	64
9+15.00	RIGHT	-7.95%		17+65.00				
28+55.00	LEFT	-2.48%	6.00%	36+15.00	477.47	35	1,255	
27+65.00	RIGHT	4.87%		37+05.00				
45+25.00	LEFT	-0.82%	5.00%	52+30.00	1,909.86	55	1,615	
44+40.00	RIGHT	0.00%		53+15.00				
53+40.00	LEFT	3.48%	2.80%	80+45.00	4,911.07	55	1,391	908
54+30.00	RIGHT	-7.38%		79+55.00				
102+15.00	LEFT	-2.97%	3.40%	107+40.00	3,819.72	55	689	
101+30.00	RIGHT	1.60%		108+25.00				
110+60.00	LEFT	2.20%	6.00%	122+35.00	1,145.92	55	1,701	
111+50.00	RIGHT	-4.20%		121+45.00				
126+00.00	LEFT	-3.04%	4.00%	135+85.00	2,864.79	55	1,481	
125+10.00	RIGHT	1.18%		136+75.00				
142+75.00	LEFT	2.82%	3.40%	153+05.00	3,819.72	55	834	32
143+60.00	RIGHT	-4.12%		152+20.00				
164+25.00	LEFT	-1.78%	2.40%	170+90.00	5,729.58	55	935	
163+35.00	RIGHT	0.43%		171+80.00				
221+75.00	LEFT	2.87%	6.00%	226+37.50	881.47	35	416	
222+65.00	RIGHT	-5.72%		226+37.50				
226+37.50	LEFT	-4.77%	6.00%	229+40.00	358.10	35	325	
226+37.50	RIGHT	3.85%		230+30.00				
246+40.00	LEFT	-4.67%	6.00%	248+80.00	545.67	40	369	
245+65.00	RIGHT	2.03%		249+55.00				
275+65.00	LEFT	5.87%	6.00%	281+20.00	572.96	40	346	17
276+40.00	RIGHT	-6.63%		280+45.00				

[1] QUANTITY INCLUDED IN EARTHWORK SUMMARY

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TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		9

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DW:

DRIVEWAYS & INTERSECTION CULVERT SUMMARY (1 OF 2)

LOCATION	DRIVEWAY/ INTERSECTION NUMBER	DESCRIPTION OF EXISTING STRUCTURE	EXISTING DRIVEWAY TYPE	EXISTING DRIVEWAY WIDTH	PROPOSED DRIVEWAY WIDTH	PROPOSED DRIVEWAY LENGTH	ITEM 530			ITEM 464		ITEM 467		PROJECT LAYOUT SHEET
							[1] INTERSECTIONS (ACP)	[1] DRIVEWAYS (ACP)	[1] DRIVEWAYS (CONC) (HES)	[2] RC PIPE (CL III)		[2] SET (TY II) (RCP) (6:1) (P)		
										18 IN	24 IN	18 IN	24 IN	
STA				LF	LF	LF	SY	SY	SY	LF	LF	EA	EA	
1+14.00	1	NO PIPE	GRAVEL	14	14	15		33						1
6+25.00	2	2-18in X 26FT CMP	ASPHALT	12	14	26		66		100		4		1
9+26.00	3	18in X 32FT CMP	CONCRETE	12	14	26			66	52		2		1
10+50.00	4	18in X 29FT CMP	GRAVEL	16	16	26		72		30		2		1
10+75.00	5	18in X 29FT CMP	GRAVEL	16	16	26		72		30		2		1
13+42.00	6	18in X 28FT CMP	GRAVEL	16	16	26		70		28		2		1
15+29.00	7	18in X 20FT CMP	ASPHALT	14	14	26		66		20		2		1
16+36.00	8	18in X 46FT CMP	CONCRETE	30	30	26			112	68		2		1
23+52.00	9	18in X 31FT CMP	ASPHALT	21	21	26		86		58		2		2
24+51.00	10	18in X 14FT CMP	GRAVEL	12	14	27		66		26		2		2
25+00.00	11	18in X 19FT CMP	GRAVEL	12	14	26		66		26		2		2
28+93.00	12	18in X 33FT CMP	GRAVEL	16	16	26		72		34		2		2
30+89.00	13	NO PIPE	GRAVEL	15	15	26		142						2
31+05.00	14	18in X 14FT CMP	SOIL	12	14	26		66		28		2		2
34+16.00	15	18in X 36FT RCP	ASPHALT	11	14	27		66		52		2		2
41+41.00	16	NO PIPE	GRAVEL	12	14	26		66						2
42+06.00	17	NO PIPE	GRAVEL	12	14	26		66						2
43+96.00	18	18in X 23FT RCP	GRAVEL	11	14	26		66		28		2		3
47+81.00	19	18in X 24FT CMP	GRAVEL	11	14	26		66		28		2		3
50+40.00	20	NO PIPE	ASPHALT	26	26	26	133							3
50+59.00	21	NO PIPE	SOIL	12	14	26		66						3
55+80.00	22	NO PIPE	SOIL	12	14	26		66						3
57+37.00	23	18in X 12FT RCP	GRAVEL	12	14	26		66		50		2		3
63+93.00	24	18in X 21FT RCP	SOIL	12	14	26		66		28		2		3
64+46.00	25	18in X 14FT RCP	GRAVEL	12	14	26		66		30		2		3
67+69.00	26	NO PIPE	GRAVEL	22	22	27		90						4
78+18.00	27	18in X 38FT RCP	GRAVEL	17	17	26		75		60		2		4
78+24.00	28	15in X 20FT CMP	GRAVEL	15	15	26		69		30		2		4
79+00.00	29	18in X 20FT RCP	GRAVEL	15	15	26		69		30		2		4
81+84.00	30	18in X 29FT RCP	ASPHALT	13	14	26		66		30		2		4
85+01.00	31	18in X 22FT RCP	GRAVEL	12	14	26		66		30		2		4
88+78.00	32	NO PIPE	GRAVEL	12	14	26		65						5
90+82.00	33	NO PIPE	GRAVEL	22	22	26		82						5
91+13.00	34	18in X 26FT CMP	GRAVEL	16	16	26		72		32		2		5
97+00.00	35	18in X 31FT CMP	GRAVEL	12	14	26		66		32		2		5
101+88.00	36	18in X 26FT CMP	ASPHALT	13	14	26		66		28		2		5
102+93.00	37	15in X 36FT CMP	GRAVEL	16	16	26		72		36		2		5
105+80.00	38	24in X 29FT CMP	ASPHALT	20	20	26	78				36		2	5
110+26.00	39	18in X 30FT CMP	GRAVEL	21	21	26		86		60		2		6
116+76.00	40	NO PIPE	SOIL	17	17	26		75						6
126+71.00	41	18in X 21FT RCP	ASPHALT	12	14	26		66		30		2		6
126+71.00	42	15in X 13FT RCP	GRAVEL	10	14	26		66		30		2		6
134+18.00	43	18in X 24FT RCP	ASPHALT	17	17	26	60			24		2		7
134+77.00	44	18in X 21FT RCP	GRAVEL	12	14	26		66		52		2		7
137+18.00	45	18in X 24FT RCP	ASPHALT	15	15	26		69		26		2		7
137+86.00	46	18in X 19FT RCP	ASPHALT	12	14	26		66		52		2		7
138+31.00	47	18in X 18FT RCP	SOIL	14	14	26		66		52		2		7
139+21.00	48	18in X 26FT CMP	GRAVEL	13	14	26		66		52		2		7
145+57.00	49	18in X 44FT CMP	SOIL	17	17	26		75		44		2		7
152+08.00	50	NO PIPE	ASPHALT	11	14	26		66						7
157+06.00	51	18in X 33FT CMP	GRAVEL	12	14	26		66		54		2		8
157+52.00	52	15in X 25FT CMP	GRAVEL	14	14	26		66		52		2		8
160+64.00	53	15in X 44FT CMP	GRAVEL	14	14	26		66		44		2		8
163+72.00	54	NO PIPE	GRAVEL	17	17	26		75						8
170+74.00	55	18in X 33FT CMP	GRAVEL	15	15	26		69		56		2		8
173+98.00	56	NO PIPE	ASPHALT	12	14	26		66						8
175+84.00	57	NO PIPE	ASPHALT	17	17	26		75						9
178+91.00	58	NO PIPE	ASPHALT	18	18	26		77						9
180+13.00	59	NO PIPE	ASPHALT	18	18	26		77						9
180+13.00	60	NO PIPE	GRAVEL	18	18	26		78						9
182+60.00	61	NO PIPE	SOIL	22	22	26		89						9
188+19.00	62	NO PIPE	ASPHALT	196	196	26		587						10
191+78.00	63	18in X 20FT RCP	CONCRETE	12	14	26			66	30		2		10
192+58.00	64	18in X 29FT RCP	SOIL	16	16	26		72		30				10
192+60.00	65	NO PIPE	SOIL	14	14	26		66						10
195+32.00	66	NO PIPE	ASPHALT	15	15	26	63							10
195+46.00	67	NO PIPE	ASPHALT	40	40	26	189							10
197+27.00	68	18in X 21FT CMP	ASPHALT	18	18	26		77		32		2		10
200+05.00	69	NO PIPE	GRAVEL	14	14	26		66						10
203+16.00	70	18in X 20FT CMP	GRAVEL	14	14	26		66		52		2		10
SHEET TOTAL							**523**	**4,900**	**244**	**1,796**	**36**	**90**	**2**	

[1] QUANTITY INCLUDED IN TABULATION OF SURFACE AREAS
[2] QUANTITY INCLUDED IN STORM STRUCTURE SUMMARY

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TBPE REGISTRATION NO: F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 3 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		10

CK:
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DRIVEWAYS & INTERSECTION CULVERT SUMMARY (2 OF 2)

LOCATION	DRIVEWAY/ INTERSECTION NUMBER	DESCRIPTION OF EXISTING STRUCTURE	EXISTING DRIVEWAY TYPE	EXISTING DRIVEWAY WIDTH	PROPOSED DRIVEWAY WIDTH	PROPOSED DRIVEWAY LENGTH	ITEM 530			ITEM 464		ITEM 467		PROJECT LAYOUT SHEET
							[1] INTERSECTIONS (ACP)	[1] DRIVEWAYS (ACP)	[1] DRIVEWAYS (CONC) (HES)	[2] RC PIPE (CL III)		[2] SET (TY II) (RCP) (6:1) (P)		
										18 IN	24 IN	18 IN	24 IN	
STA				LF	LF	LF	SY	SY	SY	LF	LF	EA	EA	
204+35.00	71	NO PIPE	ASPHALT	30	30	29	154							10
206+91.00	72	18in X 18FT RCP	ASPHALT	14	14	26		66		52		2		10
208+22.00	73	18in X 15FT RCP	SOIL	12	14	26		66		30		2		10
210+85.00	74	18in X 25FT RCP	CONCRETE	19	19	27			66	26		2		11
211+47.00	75	18in X 24FT RCP	CONCRETE	19	19	27			66	26		2		11
212+10.00	76	18in X 31FT RCP	ASPHALT	12	14	26		66		32		2		11
217+49.00	77	18in X 28FT CMP	GRAVEL	18	18	26		77		32		2		11
224+07.00	78	18in X 27FT RCP	CONCRETE	13	14	26			66	28		2		11
225+09.00	79	24in X 21FT RCP	CONCRETE	14	14	27			66		26		2	11
225+55.00	80	18in X 24FT RCP	ASPHALT	20	20	27		85						11
225+55.00	81	18in X 11FT RCP	SOIL	10	14	26		66		18		2		11
226+12.00	82	NO PIPE	GRAVEL	18	18	26		77						11
227+43.00	83	NO PIPE	ASPHALT	28	28	26	130							11
227+88.00	84	NO PIPE	SOIL	16	16	27		60						11
240+90.00	85	NO PIPE	SOIL	17	17	26		75						12
240+95.00	86	NO PIPE	SOIL	16	16	26		72						12
243+09.00	87	18in X 18FT CMP	SOIL	14	14	26		66		22		2		12
243+61.00	88	18in X 17FT CMP	SOIL	13	14	26		66		22		2		12
247+28.00	89	NO PIPE	ASPHALT	16	16	26		72						12
248+77.00	90	NO PIPE	ASPHALT	15	15	26		69						12
249+59.00	91	NO PIPE	SOIL	16	16	26		72						12
251+13.00	92	NO PIPE	GRAVEL	10	14	27		66						12
252+15.00	93	NO PIPE	GRAVEL	10	14	27		66						12
254+71.00	94	NO PIPE	GRAVEL	19	19	26		80						13
257+18.00	95	18in X 22FT CMP	GRAVEL	17	17	27		76		34		2		13
258+95.00	96	NO PIPE	CONCRETE	12	14	26			66					13
265+68.00	97	NO PIPE	GRAVEL	17	17	26		75						13
265+68.00	98	NO PIPE	GRAVEL	43	43	26		162						13
268+00.00	99	NO PIPE	SOIL	14	14	26		66						13
273+80.00	100	24in X 34FT CMP	GRAVEL	19	19	26		80			56		2	13
277+76.00	101	18in X 28FT RCP	ASPHALT	16	16	26		72		54		2		14
277+92.00	102	12in X 22FT CMP	GRAVEL	15	15	26		69		30		2		14
279+85.00	103	NO PIPE	ASPHALT	28	28	26	133							14
279+85.00	104	NO PIPE	SOIL	18	18	26		78						14
280+45.00	105	NO PIPE	SOIL	18	18	26		77						14
292+00.00	106	15in X 20FT RCP	SOIL	12	14	26		66		30		2		14
297+10.00	107	15in X 24FT RCP	ASPHALT	12	14	26		66		52		2		15
297+12.00	108	18in X 22FT RCP	SOIL	14	14	26		66		30		2		15
298+30.00	109	18in X 42FT CMP	GRAVEL	24	24	26		95		64		2		15
299+22.00	110	18in X 18FT RCP	ASPHALT	10	14	26		66		50		2		15
301+63.00	111	18in X 15FT RCP	SOIL	11	14	26		66		48		2		15
304+52.00	112	NO PIPE	GRAVEL	12	14	28		68						15
305+44.00	113	NO PIPE	GRAVEL	12	14	28		68						15
305+44.00	114	NO PIPE	SOIL	14	14	26		66						15
309+87.00	115	NO PIPE	ASPHALT	12	14	26		66						15
309+92.00	116	NO PIPE	ASPHALT	14	14	27		59						15
310+18.00	117	NO PIPE	ASPHALT	10	14	26		59						15
312+36.00	118	15in X 30FT CMP	CONCRETE	28	28	26			106	44		2		15
314+00.00	119	15in X 31FT CMP	SOIL	25	20	26		98		40		2		15
317+35.00	120	NO PIPE	ASPHALT	15	15	26		69						15
317+40.00	121	15in X 30FT CMP	CONCRETE	26	26	26			101	42		2		15
SHEET TOTAL							**417**	**3,000**	**537**	**806**	**82**	**44**	**4**	
PROJECT TOTAL							**940**	**7,900**	**781**	**2,602**	**118**	**134**	**6**	

[1] QUANTITY INCLUDED IN TABULATION OF SURFACE AREAS
[2] QUANTITY INCLUDED IN STORM STRUCTURE SUMMARY

DATE: 2/16/2024 5:25:46 PM
FILE: FM1651_SUM04.dgn

TBPE REGISTRATION NO: F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 4 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		11

CK:
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CROSS CULVERT SUMMARY (1 OF 2)

LOCATION		CROSS CULVERT NUMBER	DESCRIPTION OF EXISTING STRUCTURE	DESCRIPTION OF PROPOSED IMPROVEMENTS	ITEM 100 [3] PREPARING ROW	ITEM 132 [2] EMBANK (VEHICLE) (ORD) COMP (TY C)	ITEM 401 FLOWABLE BACKFILL	ITEM 420 CL C CONC (COLLAR)	ITEM 420 CL E CONC (SEAL SLAB) (NON-REINF)	ITEM 429 CONC STR REPAIR (CLEAN & COAT WTH EPOXY)	ITEM 429 CONC STR REPAIR (VERTICAL & OVERHEAD)	ITEM 432 RIPRAP (STONE COMMON) (DRY) (18 IN)	ITEM 462 [1] CONC BOX CULV (2FT-8IN X 2FT-8IN) (EXTEND)	ITEM 462 [1] CONC BOX CULV (3 FT X 2 FT) (EXTEND)	ITEM 462 [1] CONC BOX CULV (4 FT X 4 FT) (EXTEND)	ITEM 462 [1] CONC BOX CULV (6 FT X 6 FT) (EXTEND)	ITEM 462 [1] CONC BOX CULV (7 FT X 7 FT) (EXTEND)	ITEM 462 [1] CONC BOX CULV (8 FT X 5 FT) (EXTEND)	ITEM 462 [1] CONC BOX CULV (8 FT X 8 FT)	ITEM 464 [1] RC PIPE (CL III) (18 IN)	ITEM 464 [1] RC PIPE (CL III) (24 IN)	ITEM 464 [1] RC PIPE (CL III) (30 IN)	ITEM 464 [1] RC PIPE (CL III) (36 IN)	ITEM 464 [1] RC PIPE (CL III) (42 IN)	PROJECT LAYOUT SHEET
STA					STA	CY	CY	EA	CY	SF	SF	CY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	
1+74.00	LT	1	1 - 18" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 18 IN (4:1)	0.5	14.4	1.1													13					1
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (3:1)		14.3	0.8													10					
31+75.00	LT	2	1 - 30" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 9'; PLACE PSET-SC 30 IN (4:1)	0.5	7.3	0.2															9			2
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 8'; PLACE PSET-SC 30 IN (3:1)		30.1																8			
49+38.00	LT	3	2 - 30" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 30 IN (3:1)	0.5	22.7	1.4															26			3
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 30 IN (3:1)		41.1	0.8															26			
59+45.00	LT	4	1 - 42" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 15'; PLACE PSET-SC 42 IN (3:1)	0.5	29.4	2.4																	15	3
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 10'; PLACE PSET-SC 42 IN (3:1)		12.1	0.9																	10	
70+00.00	LT	5	1 - 24" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 15'; PLACE PSET-SC 24 IN (4:1)	0.5	36.8	0.7														15				4
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 10'; PLACE PSET-SC 24 IN (4:1)		14.1	0.4														10				
104+42.00	LT	6	2 - 36" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 8'; PLACE PSET-SC 36 IN (3:1)	0.5	7.3	0.4																16		5
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 11'; PLACE PSET-SC 36 IN (3:1)		23.6	0.8																22		
143+42.00	LT	7	2 - 7' X 7' X 28' MBC	REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=10 (3:1)	0.5	21.1			2.0	588	25	71					7								7
	RT			REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=10 (3:1)		14.6			2.0			75					7								
167+06.00	LT	8	1 - 30" X 28' RCP	REMOVE HEADWALL; EXTEND RCP 11'; PLACE PSET-SC 30 IN (3:1)	0.5	19.3	0.8															11			8
	RT			REMOVE HEADWALL; EXTEND RCP 15'; PLACE PSET-SC 30 IN (3:1)		38.1	1.7	1														15			
177+19.00	LT	9	1 - 18" X 38' RCP	REMOVE HEADWALL; EXTEND 5' RCP; PLACE PSET-SC 18 IN (4:1)	0.5	6.6		1												5					9
	RT			REMOVE HEADWALL & 3' RCP; EXTEND 9' RCP; PLACE PSET-SC 18 IN (4:1)		14.3	0.2													9					
189+53.00	LT	10	1 - 4' X 4' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=6 (3:1)	0.5	35						24			16										10
	RT			REMOVE HEADWALL; EXTEND SBC 14'; PLACE PW-2 HW=6 (3:1)		39.2						23			15										
216+79.00	LT	11	1 - 8' X 5' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 6'; PLACE PW-2 HW=12 (3:1)	0.5	12.2			0.7			79						6							11
	RT			REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=12 (3:1)		14.8			1.1			77						2	5						
235+69.00	LT	12	1 - 2'-8" X 2'-8" X 26' SBC	REMOVE HEADWALL; EXTEND SBC 16'; PLACE PW-2 HW=5 (3:1)	0.5	32.3						19	16												12
	RT			REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=5 (3:1)		43.5						18	15												
260+29.00	LT	13	1 - 3' X 2' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 14'; PLACE PW-2 HW=4 (3:1)	0.5	32.3						18		15											13
	RT			REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=4 (3:1)		41.4						17		16											
272+64.00	LT	14	1 - 6' X 6' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-1 HW=10 (3:1)	0.5	13.9			1.1			69				7									13
	RT			REMOVE HEADWALL; EXTEND SBC 6'; PLACE PW-1 HW=10 (3:1)		16.8			0.7			68				6									
289+98.00	LT	15	1 - 4' X 4' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 16'; PLACE FW-0 HW=6 (3:1)	0.5	31.1						23			17										14
	RT			REMOVE HEADWALL; EXTEND SBC 13'; PLACE FW-0 HW=6 (3:1)		32.7						24			14										
301+91.00	LT	16	1 - 18" X 34' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (4:1)	0.5	28.6	0.2													12					15
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (4:1)		20.8	0.6													12					
PROJECT TOTAL					8.00	762	14	2	8	588	25	605	31	31	62	13	14	8	5	61	25	95	38	25	

[1] QUANTITY INCLUDED IN STORM STRUCTURE SUMMARY
[2] QUANTITY INCLUDED IN EARTHWORK SUMMARY
[3] QUANTITY INCLUDED IN PREP ROW SUMMARY
NOTE: LEAVE EXISTING WINGWALLS IN PLACE DURING BOX CULVERT EXTENSION. UNLESS OTHERWISE DIRECTED.

TBPE REGISTRATION NO.: F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		12

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CROSS CULVERT SUMMARY (2 OF 2)

LOCATION		CROSS CULVERT NUMBER	DESCRIPTION OF EXISTING STRUCTURE	DESCRIPTION OF PROPOSED IMPROVEMENTS	ITEM 466					ITEM 467							ITEM 480	ITEM 496	ITEM 658	PROJECT LAYOUT SHEET
					[1] WINGWALL (PW - 2) (HW=10 FT)	[1] WINGWALL (PW - 2) (HW=11 FT)	[1] WINGWALL (PW - 2) (HW=4 FT)	[1] WINGWALL (PW - 2) (HW=5 FT)	[1] WINGWALL (PW - 2) (HW=6 FT)	[1] SET (TY II) (18 IN) (RCP) (3: 1) (C)	[1] SET (TY II) (18 IN) (RCP) (4: 1) (C)	[1] SET (TY II) (24 IN) (RCP) (4: 1) (C)	[1] SET (TY II) (30 IN) (RCP) (3: 1) (C)	[1] SET (TY II) (30 IN) (RCP) (4: 1) (C)	[1] SET (TY II) (36 IN) (RCP) (3: 1) (C)	[1] SET (TY II) (42 IN) (RCP) (3: 1) (C)	CLEAN EXIST CULVERTS	REMOVING ROCK RIPRAP	[2] INSTL OM ASSM (OM-2Z) (WFLX)GND (BI)	
STA					EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	EA	
1+74.00	LT	1	1 - 18" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 18 IN (4:1)							1								1	1
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (3:1)						1									1	
31+75.00	LT	2	1 - 30" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 9'; PLACE PSET-SC 30 IN (4:1)										1					1	2
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 8'; PLACE PSET-SC 30 IN (3:1)									1						1	
49+38.00	LT	3	2 - 30" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 30 IN (3:1)									2						1	3
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 13'; PLACE PSET-SC 30 IN (3:1)									2						1	
59+45.00	LT	4	1 - 42" X 28' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 15'; PLACE PSET-SC 42 IN (3:1)												1			1	3
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 10'; PLACE PSET-SC 42 IN (3:1)												1			1	
70+00.00	LT	5	1 - 24" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 15'; PLACE PSET-SC 24 IN (4:1)								1							1	4
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 10'; PLACE PSET-SC 24 IN (4:1)								1							1	
104+42.00	LT	6	2 - 36" X 32' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 8'; PLACE PSET-SC 36 IN (3:1)											2				1	5
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 11'; PLACE PSET-SC 36 IN (3:1)											2				1	
143+42.00	LT	7	2 - 7' X 7' X 28' MBC	REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=10 (3:1)	1														2	7
	RT			REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=10 (3:1)	1														2	
167+06.00	LT	8	1 - 30" X 28' RCP	REMOVE HEADWALL; EXTEND RCP 11'; PLACE PSET-SC 30 IN (3:1)									1						1	8
	RT			REMOVE HEADWALL; EXTEND RCP 15'; PLACE PSET-SC 30 IN (3:1)									1						1	
177+19.00	LT	9	1 - 18" X 38' RCP	REMOVE HEADWALL; EXTEND 5' RCP; PLACE PSET-SC 18 IN (4:1)							1						1		1	9
	RT			REMOVE HEADWALL & 3' RCP; EXTEND 9' RCP; PLACE PSET-SC 18 IN (4:1)							1								1	
189+53.00	LT	10	1 - 4' X 4' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=6 (3:1)					1										1	10
	RT			REMOVE HEADWALL; EXTEND SBC 14'; PLACE PW-2 HW=6 (3:1)					1										1	
216+79.00	LT	11	1 - 8' X 5' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 6'; PLACE PW-2 HW=12 (3:1)		1												25	2	11
	RT			REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-2 HW=12 (3:1)		1												25	2	
235+69.00	LT	12	1 - 2'-8" X 2'-8" X 26' SBC	REMOVE HEADWALL; EXTEND SBC 16'; PLACE PW-2 HW=5 (3:1)				1											1	12
	RT			REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=5 (3:1)				1											1	
260+29.00	LT	13	1 - 3' X 2' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 14'; PLACE PW-2 HW=4 (3:1)			1												1	13
	RT			REMOVE HEADWALL; EXTEND SBC 15'; PLACE PW-2 HW=4 (3:1)			1												1	
272+64.00	LT	14	1 - 6' X 6' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 7'; PLACE PW-1 HW=10 (3:1)	1														2	13
	RT			REMOVE HEADWALL; EXTEND SBC 6'; PLACE PW-1 HW=10 (3:1)	1													25	2	
289+98.00	LT	15	1 - 4' X 4' X 26' SBC	REMOVE HEADWALL; EXTEND SBC 16'; PLACE FW-0 HW=6 (3:1)					1										1	14
	RT			REMOVE HEADWALL; EXTEND SBC 13'; PLACE FW-0 HW=6 (3:1)					1										1	
301+91.00	LT	16	1 - 18" X 34' RCP	REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (4:1)							1								1	15
	RT			REMOVE HEADWALL & 3' RCP; EXTEND RCP 12'; PLACE PSET-SC 18 IN (4:1)							1								1	
PROJECT TOTAL					4	2	2	2	4	1	5	2	7	1	4	2	1	75	38	

[1] QUANTITY INCLUDED IN STORM STRUCTURE SUMMARY
[2] QUANTITY INCLUDED IN PERMANENT PAVEMENT MARKINGS
NOTE: LEAVE EXISTING WINGWALLS IN PLACE DURING BOX CULVERT EXTENSION. UNLESS OTHERWISE DIRECTED.

STORM STRUCTURE SUMMARY (1 OF 2)

LOCATION	ITEM 462							ITEM 464				
	CON BOX CULV (EXTEND)						CON BOX CULV	RC PIPE (CL III)				
	CONC BOX CULV (2FT-8IN X 2FT-8IN) (EXTEND)	CONC BOX CULV (3 FT X 2 FT) (EXTEND)	CONC BOX CULV (4 FT X 4 FT) (EXTEND)	CONC BOX CULV (6 FT X 6 FT) (EXTEND)	CONC BOX CULV (7 FT X 7 FT) (EXTEND)	CONC BOX CULV (8 FT X 5 FT) (EXTEND)	CONC BOX CULV (8 FT X 8 FT)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (36 IN)	RC PIPE (CL III) (42 IN)
	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
FROM DRIVEWAYS & INTERSECTION SUMMARY								2,602	118			
FROM CROSS CULVERT-CULVERT SUMMARY	31	31	62	13	14	8	5	61	25	95	38	25
PROJECT TOTAL	**31**	**31**	**62**	**13**	**14**	**8**	**5**	**2,663**	**143**	**95**	**38**	**25**

STORM STRUCTURE SUMMARY (2 OF 2)

LOCATION	ITEM 466					ITEM 467								
	WINGWALLS					SET (TY II) (RCP) (C)							SET (TY II) (RCP) (P)	
	WINGWALL (PW - 2) (HW=10 FT)	WINGWALL (PW - 2) (HW=11 FT)	WINGWALL (PW - 2) (HW=4 FT)	WINGWALL (PW - 2) (HW=5 FT)	WINGWALL (PW - 2) (HW=6 FT)	SET (TY II) (18 IN) (RCP) (3: 1) (C)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (30 IN) (RCP) (3: 1) (C)	SET (TY II) (30 IN) (RCP) (4: 1) (C)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	SET (TY II) (42 IN) (RCP) (3: 1) (C)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
FROM DRIVEWAYS & INTERSECTION SUMMARY													134	6
FROM CROSS CULVERT-CULVERT SUMMARY	4	2	2	2	4	1	5	2	7	1	4	2		
PROJECT TOTAL	**4**	**2**	**2**	**2**	**4**	**1**	**5**	**2**	**7**	**1**	**4**	**2**	**134**	**6**

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 6 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		13

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DW:

SUMMARY OF WORKZONE PAVEMENT MARKINGS

LOCATION	TYPE	RATE	ITEM 662 WK ZN PAV MRK NON-REMOV WHITE 6 IN (SOLID) LF	WHITE 24 IN (SOLID) LF	YELLOW 6 IN (BRK) LF	YELLOW 6 IN (SOLID) LF	SHORT TERM TABS RATE	SHORT TERM TABS YELLOW TAB TY Y2 EA
MAINLANES	BARRIER LINE	SOLID				51,752	1/20FT	4,648
MAINLANES	EDGE LINE	SOLID	63,116					
MAINLANES	BARRIER LINE	10FT/40FT			2,840		3/40FT	851
INTERSECTIONS	STOP BAR	SOLID		198				
PROJECT TOTAL			**63,116**	**198**	**2,840**	**51,752**		**5,499**

NOTE: 1. MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.
2. SHORT TERM TABS ALLOWED ON OCST APPLICATION ONLY.
3. PLACE 6" WHITE EDGE LINE AFTER FIRST SEAL COAT.

PERMANENT PAVEMENT MARKINGS

LOCATION	TYPE	RATE	ITEM 533 RUMBLE STRIPS RUMBLE STRIPS (SHOULDER) ASPHALT LF	RUMBLE STRIPS (CENTERLINE) ASPHALT LF	ITEM 658 DEL AND OM INSTL OM ASSM (OM-2Z) (WFLX)GND(BI) EA	ITEM 666 REFLECTORIZED PAV MARKINGS TY 1 WHITE RE PM W/RET REQ 6 IN SOLID 100 MIL LF	WHITE REFL PAV MRK 24 IN SOLID 100 MIL LF	YELLOW RE PM W/ RET REQ 6 IN BRK 100 MIL LF	YELLOW RE PM W/RET REQ 6 IN SOLID 100 MIL LF	ITEM 672 RAISED PVMT MARKERS RATE	REFL PAV MRKR TY I-A EA	REFL PAV MRKR TY II-A-A EA
MAIN LANES	EDGE LINE	SOLID	63,116			63,116						
MAIN LANES	CENTER LINE	10FT/40FT						200		1/80FT		30
MAIN LANES	CENTER LINE	10FT/40FT						2,640	10,546	1/40FT		264
MAIN LANES	CENTER LINE	SOLID		32,057					41,206	1/40FT		491
INTERSECTIONS	STOP BAR	SOLID					198			2/20FT	198	
FROM CROSS CULVERT SUMMARY	OBJ MKR	AS DIRECTED			38							
PROJECT TOTAL			**63,116**	**32,058**	**38**	**63,116**	**198**	**2,840**	**51,752**		**198**	**785**

NOTE: 1. MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE STRIPING.

SMALL SIGN TABULATION

LOCATION	ITEM 644 IN SM RD SN SUP&AM TY10BWG(1)SA(P) EA	IN SM RD SN SUP&AM TY10BWG(1)SA(T) EA	IN SM RD SN SUP&AM TY10BWG(1)SA(U) EA	REMOVE SM RD SN SUP&AM EA
FROM SUMMARY OF SMALL SIGNS	73	6	1	80
PROJECT TOTAL	**73**	**6**	**1**	**80**

MAILBOX SUMMARY

LOCATION	ITEM 530 [1] TURNOUTS (ACP) SY	ITEM 560 MAILBOX INSTALL-S (TWG-POST) TY 2 EA	MAILBOX INSTALL-D (TWG-POST) TY 2 EA	MAILBOX INSTALL-M (TWG-POST) TY 4 EA	REMARKS
FM 1653	943	55	7	2	55 TOTAL TURNOUTS
PROJECT TOTAL	**943**	**55**	**7**	**2**	

[1] QUANTITY INCLUDED IN TABULATION OF SURFACE AREAS

DATE: 2/16/2024 5:27:17 PM
FILE: FM1651_SUM07.dgn

TBPE REGISTRATION NO: F-16341

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 7 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		14

CK:
DW:
CK:
DW:

VEGETATION SUMMARY

LOCATION	ITEM 160	ITEM 164			ITEM 166	ITEM 168
	FURNISHING AND PLACING TOPSOIL (4")	BOND FBR MTRX SEED (PERM) (RURAL) (SAND)	BONDED FBR MTRX SEED (TEMP) (WARM)	BONDED FBR MTRX SEED (TEMP) (COOL)	[1] [2] FERTILIZER	[1] VEGETATIVE WATERING
	SY	SY	SY	SY	SY	SY
STA 0+00.00 TO STA 320+66.36		169,824	84,912	84,912	169,824	339,648
CROSS-CULVERT SUMMARY	2,888	2,888	1,444	1,444	2,888	5,776
PROJECT TOTAL	2,888	172,712	86,356	86,356	172,712	345,424

[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE
[2] CONTRACTORS INFORMATION ONLY

EROSION CONROL SUMMARY

LOCATION	ITEM 506					
	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF	LF	LF	LF	LF
STA 0+00.00 TO STA 320+66.36	2,175	2,175	3,402	3,402	540	540
PROJECT TOTAL	2,175	2,175	3,402	3,402	540	540

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OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 8 OF 8

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		15

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	R1-1	STOP	36 x 36	X		10BWG	1	SA	T		
		W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
		W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
	2	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24								
	3	D1-3	UP ARROW WHITTON	78 x 42	X		10BWG	1	SA	U		
			LEFT ARROW MABANK									
			CANTON RIGHT ARROW									
	4	R2-1	SPEED LIMIT 55	30 x 36	X		10BWG	1	SA	P		
	5	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
	6	D2-1	TUNDRA 4 <1 LINE>	66 x 18	X		10BWG	1	SA	T		
	7	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6T	198 TEXAS	24 x 24								
2	1	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	35 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	2	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	4	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	5	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	6	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	7	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	8	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	9	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	10	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	11	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	35 MPH <ADVISORY SPEED PLAQUE>	18 x 18								

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		16

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DATE: 2/16/2024 5:28:11 PM
FILE: FM1651_SOSS01.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
3	1	D20-1TR	CO RD 2304 RIGHT ARROW	24 x 24	X		10BWG	1	SA	P		
	2	COUNTY SIGN	VZ 2304	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	3	D20-1TL	CO RD 2304 LEFT ARROW	24 x 24	X		10BWG	1	SA	P		
	4	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		D10-7AT	640	3 x 10								
		D10-7AT	640	3 x 10								
5	1	D20-1TL	CO RD 2212 LEFT ARROW	24 X 24	X		10BWG	1	SA	P		
	2	COUNTY SIGN	VZ 2212	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	3	D20-1TR	CO RD 2212 RIGHT ARROW	24 x 24	X		10BWG	1	SA	P		
6	1	D20-1TR	CO RD 2303 RIGHT ARROW	24 X 24	X		10BWG	1	SA	P		
7	1	COUNTY SIGN	VZ 2303	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	2	D20-1TL	CO RD 2303 LEFT ARROW	24 x 24	X		10BWG	1	SA	P		
8	1	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		D10-7AT	642	3 x 10								
		D10-7AT	642	3 x 10								
	2	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
	3	D20-1TR	CO RD 2301 RIGHT ARROW	24 X 24	X		10BWG	1	SA	P		
9	1	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
		W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
	2	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		M6-1	LEFT ARROW <AUXILIARY SIGN>	21 x 15								
	3	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		10BWG	1	SA	T		
	4	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24								
	5	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
	6	D20-4T	CO RD 2301 UP ARROW	24 x 24	X		10BWG	1	SA	P		
	7	I-2CT	TUNDRA	40 x 12	X		10BWG	1	SA	T		
	8	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		M5-1R	STRAIGHT THEN RIGHT ARROW <AUX. SIGN>	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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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		1671	02	012	FM 1651
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	VAN ZANDT		17

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DATE: 2/16/2024 5:28:42 PM
FILE: FM1651_SOSS02.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
10	1	D20-5T	CO RD 2217 LEFT ARROW	24 X 42	X		10BWG	1	SA	P		
			2317 RIGHT ARROW									
	2	COUNTY SIGN	VZ 2217	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	3	COUNTY SIGN	VZ 2317	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	4	I-2CT	TUNDRA	40 x 12	X		10BWG	1	SA	T		
	5	D20-5T	CO RD 2317 LEFT ARROW	24 X 42	X		10BWG	1	SA	P		
			2217 RIGHT ARROW									
	6	D20-3T	CO RD 2219 ANGLED UP LEFT ARROW	24 x 24	X		10BWG	1	SA	P		
	7	COUNTY SIGN	VZ 2219	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	8	D20-1TR	CO RD 2219 RIGHT ARROW	24 X 24	X		10BWG	1	SA	P		
11	1	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	2	W1-4R	SYMBOL - REVERSE CURVE RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	35 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	4	D20-1TR	CO RD 2326 RIGHT ARROW	24 X 24	X		10BWG	1	SA	P		
	5	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	6	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	7	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	8	COUNTY SIGN	VZ 2326	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	9	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	10	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	11	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	12	D20-1TL	CO RD 2326 LEFT ARROW	24 X 24	X		10BWG	1	SA	P		

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		1671	02	012	FM 1651
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	VAN ZANDT		18

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DATE: 2/16/2024 5:29:10 PM
FILE: FM1651_SOSS03.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
12	1	W1-4R	SYMBOL - REVERSE CURVE RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	35 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	2	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	40 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	4	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	5	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	6	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	7	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	8	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	40 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
13	1	M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24	X		10BWG	1	SA	P		
		D10-7AT	644	3 x 10								
		D10-7AT	644	3 x 10								
	2	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	40 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
14	1	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	2	D20-1TL	CO RD 2214 LEFT ARROW	24 X 24	X		10BWG	1	SA	P		
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	4	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	5	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	6	COUNTY SIGN	VZ 2214	TO BE REUSED	X		10BWG	1	SA	P		
		R1-1	STOP	36 x 36								
	7	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	8	W1-8R	<CHEVRON RIGHT>	18 x 24	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24								
	9	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	40 MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	10	D20-1TR	CO RD 2214 RIGHT ARROW	24 X 24	X		10BWG	1	SA	P		

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

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http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		1671	02	012	FM 1651
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	VAN ZANDT		19

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FILE: FM1651_SOSS04.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE 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
15	1	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6T	19 TEXAS	24 x 24								
	2	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
	3	R2-1	SPEED LIMIT 55	30 x 36	X		10BWG	1	SA	P		
	4	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD 1651	24 x 24								
	5	R1-1	STOP	36 x 36	X		10BWG	1	SA	T		
		W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
	6	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		10BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1671	02	012	FM 1651
4-16 8-16	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		20

CK:
DW:
CK:
DW:

CONSTRUCTION SEQUENCE OF WORK FM 1651

1. INSTALL PROJECT SIGNS AND MESSAGE BOARDS ANNOUNCING FM 1651 ROAD WORK.
2. INSTALL EROSION CONTROL MEASURES FOR CULVERT EXTENSIONS AS SHOWN IN PLANS. MULTIPLE MOVE-INS WILL BE REQUIRED. INSTALL EROSION CONTROL MEASURES AS WORK PROGRESSES.
3. PREPARE ROW PER STATIONS. SEE SUMMARY TABLE FOR STATION RANGES.
4. FIELD VERIFICATIONS AND MEASUREMENTS FOR PROPOSED DITCHES TO BE PERFORMED.
5. GRADE DITCHES TO DRAIN PRIOR TO EXTENDING CROSS DRAINAGE STRUCTURES AND REPLACE DRIVEWAY CULVERTS. LIMIT WORK TO ONE SIDE OF THE ROADWAY AT A TIME. DRAINAGE STRUCTURES SHALL BE COMPLETED AND BACKFILLED ON BOTH SIDES OF THE ROADWAY BEFORE THE ROADWORK OUTLINED IN (6.) BEGINS. DRAINAGE STRUCTURE WORK SHALL CONTINUE DURING THE WINTER SEASON AS DIRECTED. TIME WILL BE SUSPENDED UPON COMPLETION OF STRUCTURE WORK, UNTIL APRIL 1.
6. UNDER TRAFFIC, CONTRACTOR TO LIMIT WORK TO ONE MILE SEGMENT, OR LENGTH APPROVED BY THE ENGINEER:
   a. TO BE PERFORMED FOR ONLY ONE HALF ROADWAY PER SECTION
      * REWORK BASE MATERIAL WITH SUBGRADE WIDENING TO 15’ FROM CENTERLINE.
      * SCARIFY & SALVAGE (WINDROW) EXISTING MATERIAL AND SPREAD FULL WIDTH TO A DEPTH OF 8 INCHES.
      * CEMENT TREAT EXISTING MATERIAL CEMENT TREAT AT 5% TO A DEPTH OF 8 INCHES TO 30’ PROPOSED WIDTH.
      * SPREAD, RESHAPE, AND RE-INLAY 8 INCHES OF EXISTING ROADWAY MATERIAL AT PROPOSED 28’ WIDTH.
      * BACKFILL PAVEMENT EDGES
      * PLACE PRIME COURSE (RC-250 w/GR 5 AGGR) AT THE END OF EACH WEEK.
      * PERFORM IRI - MAKE NECESSARY CORRECTIONS IN ACCORDANCE WITH THE SPECIFICATIONS. CORRECTIVE WORK WILL NOT BE PAID FOR, BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.
      * PLACE VERTICAL PANELS FOR CENTERLINE DELINEATION IN ACCORDANCE WITH BC(9).
      * PLACE 2" SP-C PG64-22
      * PLACE ONE COURSE SURFACE TREATMENT w/GR4 AGGR.
      * PLACE 2" SP-C PG70-22 SAC-A
      * PLACE TEMPORARY STRIPING - COMPLETE WORKZONE NON REMOVABLE STRIPING ON THE CENTERLINE AND EDGELINE WITHIN 11 DAYS OF EXPIRATION OF THE THREE-DAY CURING PERIOD.
      * CONSTRUCT MAILBOX TURNOUT, DRIVEWAYS, AND INTERSECTIONS.
      * PLACE BONDED FIBER SEEDING AND EMULSION.
   b. REPEAT ON NEXT ONE MILE SEGMENT UNTIL FULL LENGTH OF ROADWAY HAS BEEN RESTORED.
   c. INSTALL SIGNS AND MAILBOXES.
   7. UTILIZE TABS FOR WORKZONE TEMPORARY STRIPING.
8. PLACE PERMANENT PAVEMENT MARKINGS AND REFLECTORS. COMPLETE STRIPING WITHIN 11 DAYS OF EXPIRATION OF THE THREE-DAY CURING PERIOD.

NOTES:

1. WORK ZONE SPEED LIMIT SHALL BE 45 MPH.
2. THE SEASONAL WINDOW FOR ALLOWING ROADWAY REHABILITATION OPERATIONS IS FROM APRIL 1 TO AUGUST 31. AT THE END OF EACH OF SEASON THE ENGINEER WILL MAKE A DETERMINATION AS TO WHETHER ROADWAY REHAB OPERATIONS WILL BE ALLOWED TO CONTINUE BEYOND AUGUST 31, FOR HOW LONG, AND AT WHAT POINT OPERATIONS AND TIME CHARGES WILL BE SUSPENDED UNTIL THE FOLLOWING SEASON. CONTRACTOR TO OPEN ROADWAY TO 2 LANE TRAFFIC OPERATIONS AT END OF THE SEASONAL WINDOW.
3. TIME WILL BE CHARGED OUTSIDE SEASONAL WINDOW FOR CULVERT WORK. ONCE CULVERT WORK IS COMPLETED, TIME WILL BE SUSPENDED AS DIRECTED BY THE ENGINEER.
4. IMMEDIATELY AFTER CENTERLINE PAVEMENT MARKINGS ARE OBLITERATED DUE TO REWORKING BASE, PLACE APPROVED CHANNELIZING DEVICES AT 100 FT SPACING ON BOTH SIDES OF THE ROADWAY UNTIL THE CENTERLINE PAVEMENT MARKINGS ARE IN PLACE.
5. PLACE MAILBOX TURNOUTS, DRIVEWAYS INTERSECTIONS, AND INSTALL SIGNS AND MAILBOXES AT THE END OF EACH SEASON. THIS WORK MUST BE COMPLETED BY AUGUST 31.
6. LIMIT WORK TO ONE SIDE OF THE ROAD AT A TIME.
7. DURING NON-WORKING HOURS THE PAVEMENT EDGE 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.
8. HAUL OFF REMOVED PIPES AND APPURTENANCES FROM THE RIGHT OF WAY WEEKLY.
9. STORAGE OF MATERIALS ON RIGHT OF WAY WILL REQUIRE APPROVAL FROM THE ENGINEER.
10. REMOVE TOPSOIL AND PLACE EMBANKMENT THAT WILL BE NEEDED DURING SHOULDER-UP.
11. SHOULDER-UP WITH LIKE MATERIALS (I.E. SUBGR TREAT W/EMBANKMENT).
12. MAINTAIN ACCESS TO ALL SIDE STREETS AND DRIVEWAYS THROUGH THE WORK ZONE.
13. OUTSIDE SEAL COAT SEASON, THE UNDERSEAL AND SURFACE MIX MAY BE PLACED DURING THE DAY, AS APPROVED.
14. CONTRACTOR TO VERIFY UTILITIES BEFORE CONSTRUCTION.

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
Trevor L. Castilla 2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

CONSTRUCTION SEQUENCE OF WORK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		21

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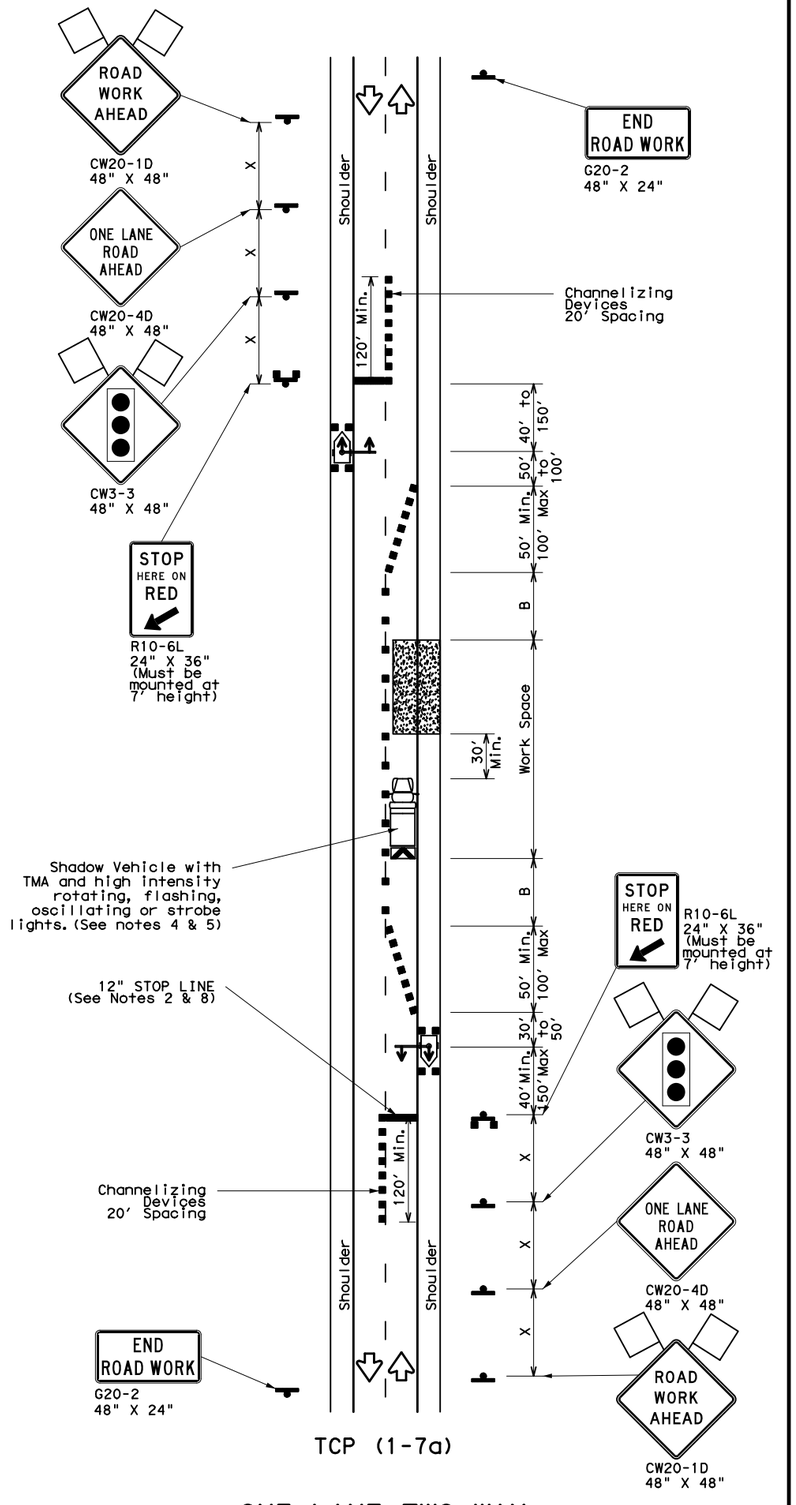
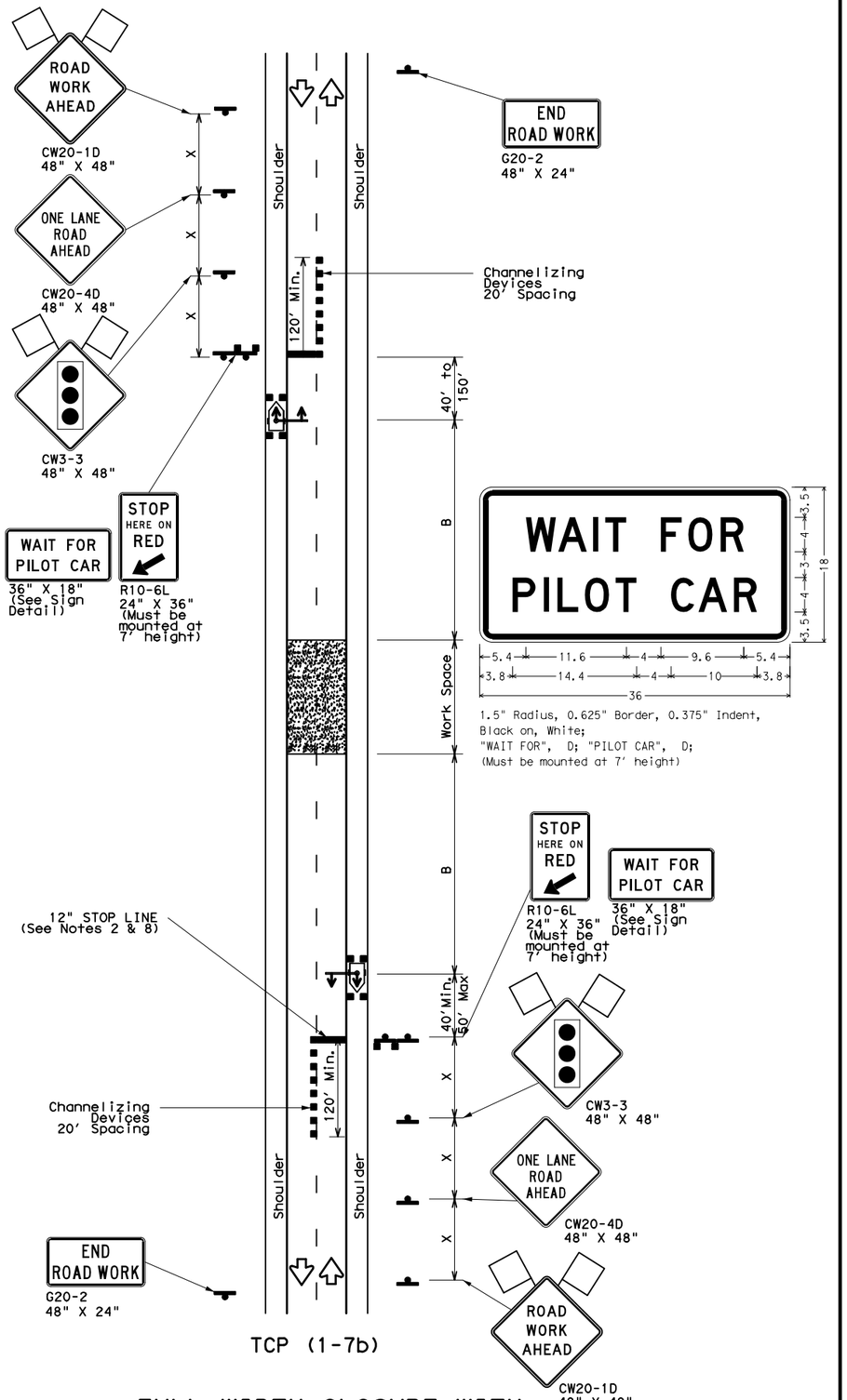


TCP (1-7a)

ONE LANE TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNALS



TCP (1-7b)

FULL WIDTH CLOSURE WITH TRAFFIC SIGNALS AND PILOT CAR

LEGEND

	Sign		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Temporary or Portable Traffic Signal	M	Portable Changeable Message Sign (PCMS)
	Flag		Traffic Flow

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. Unless otherwise stated in the plans, flags attached to signs 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 BE PREPARED TO STOP sign may be installed after the ONE LANE ROAD AHEAD sign, but pproper sign spacing shall be maintained.
4. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.
5. Pilot car shall be used to guide vehicles through traffic control zone, vehicle shall have an identification name displayed and "PILOT CAR, FOLLOW ME"(G20-4) sign or message board mounted in a conspicuous position on rear.
6. Channelizing devices are recommended for all applications. Devices may beoffset as needed for maintinence operations
7. See "Recommended Work Zone Settings" chart in the control box for preset programming.
8. A temporary STOP line may be used in conjunction with "Stop here on Red"(R10-6).
9. Proper alignment of overhead signal with on-coming lane should be ensured.
10. A Shadow Vehicle with a TMA should be used anytime it can be positioned approximately 30' to 100' in advance of workers exposed to traffic 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 remian in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER
Trevor L. Castilla 2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS TCP DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		22

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		23

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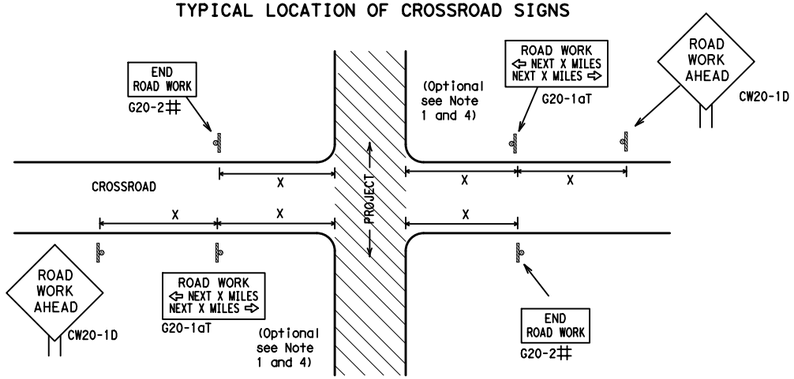
FILE: bc-21.dgn

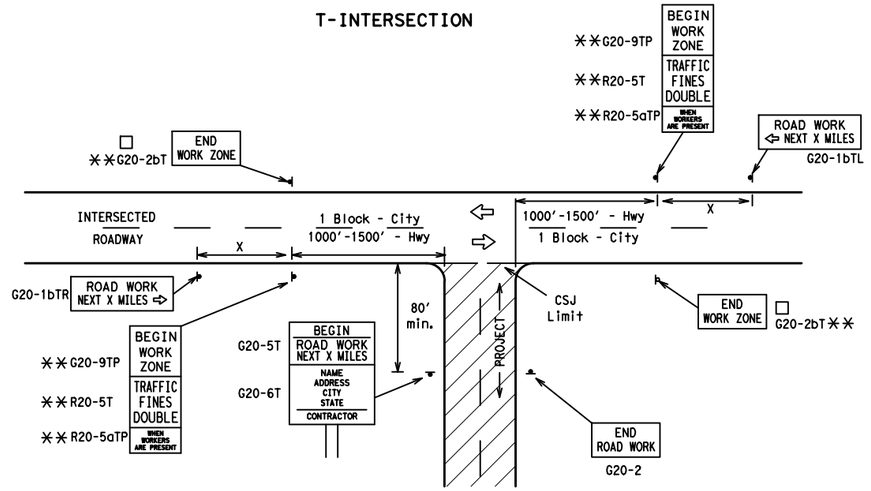
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

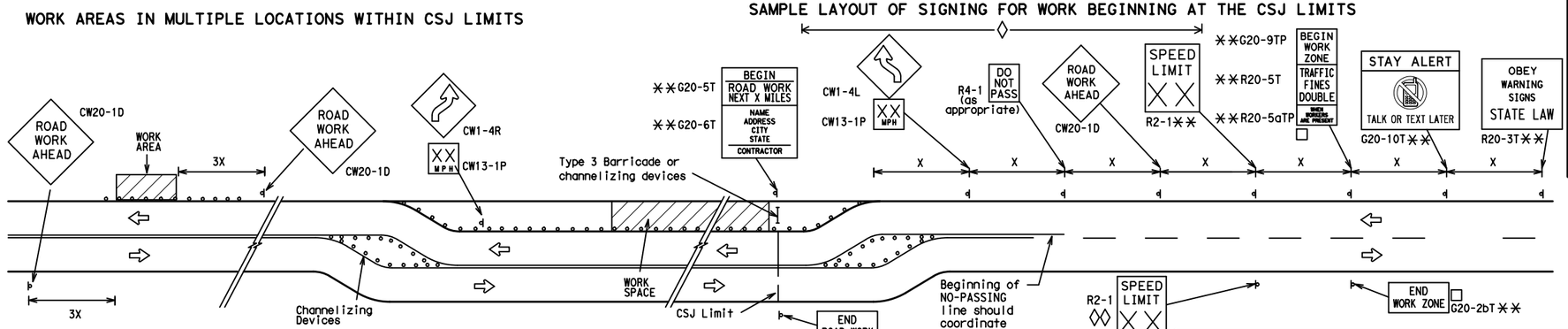
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

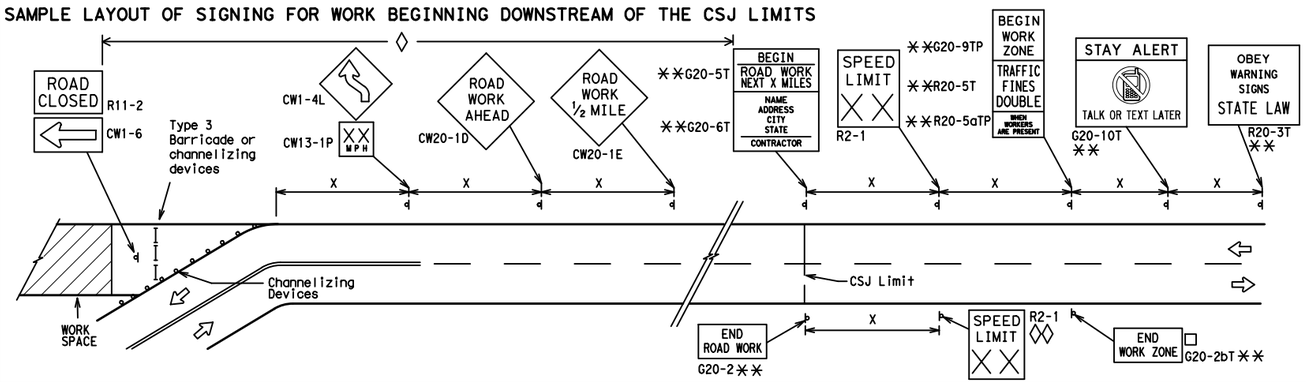
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1671	02	012	FM 1651
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		24

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DATE: 2/16/2024 5:31:43 PM
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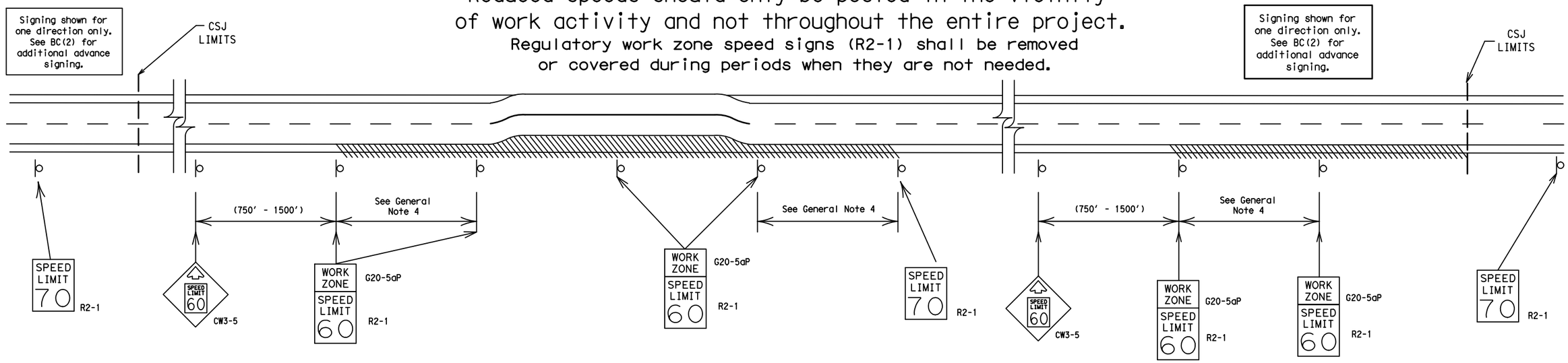
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		25

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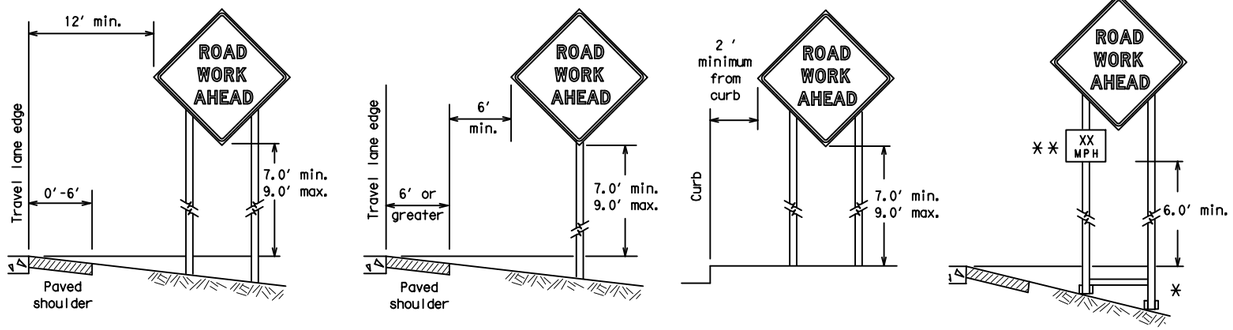
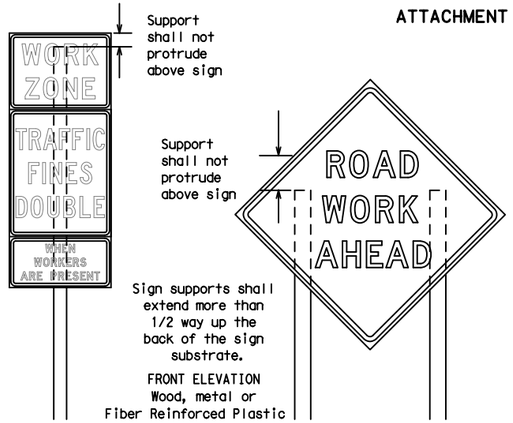
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

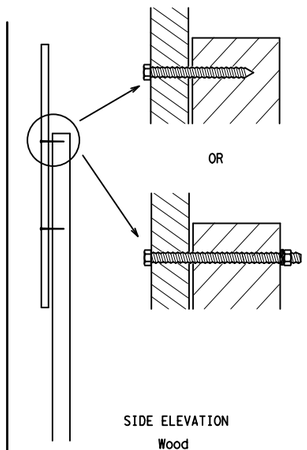


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





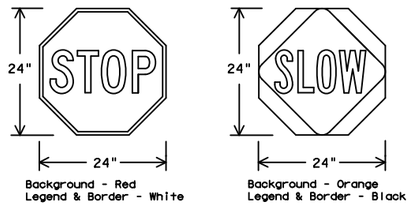
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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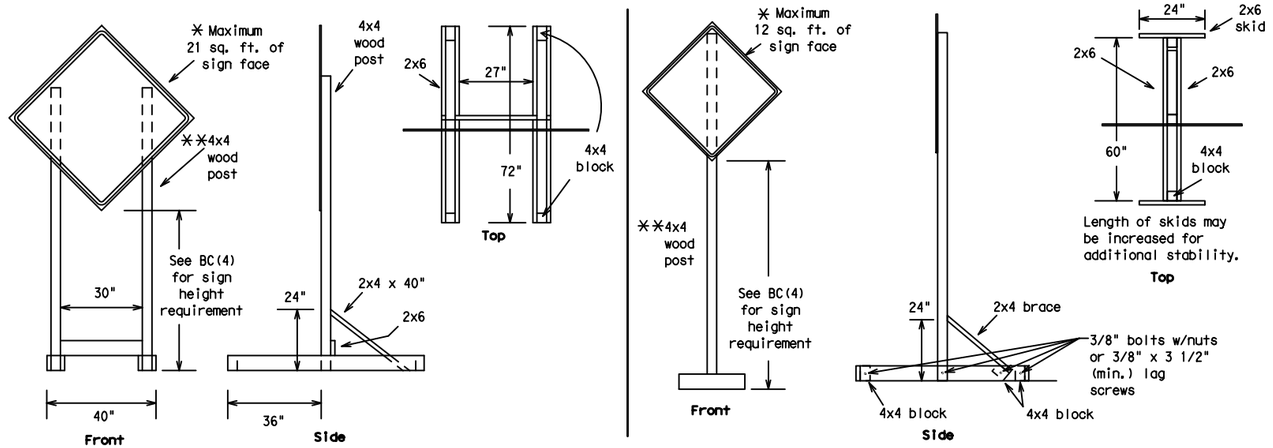
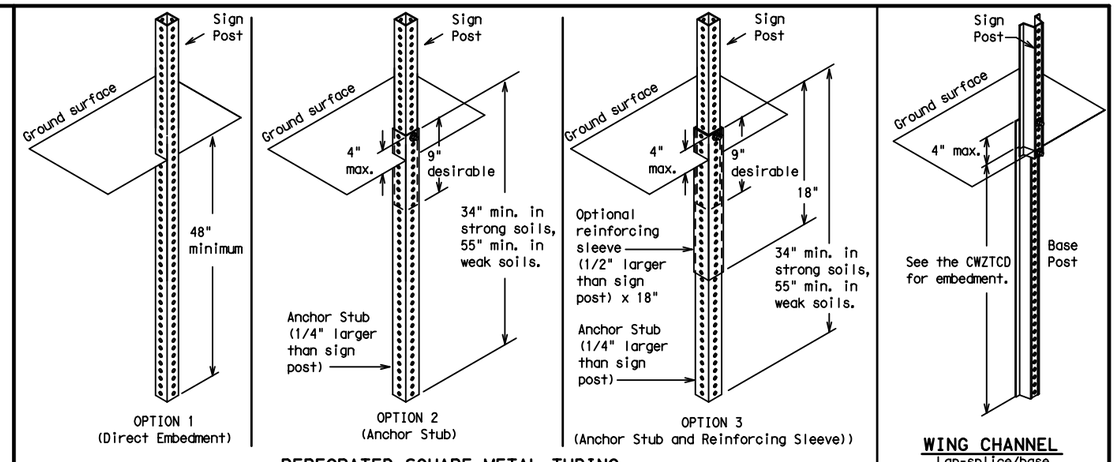


SKID MOUNTED WOOD SIGN SUPPORTS

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

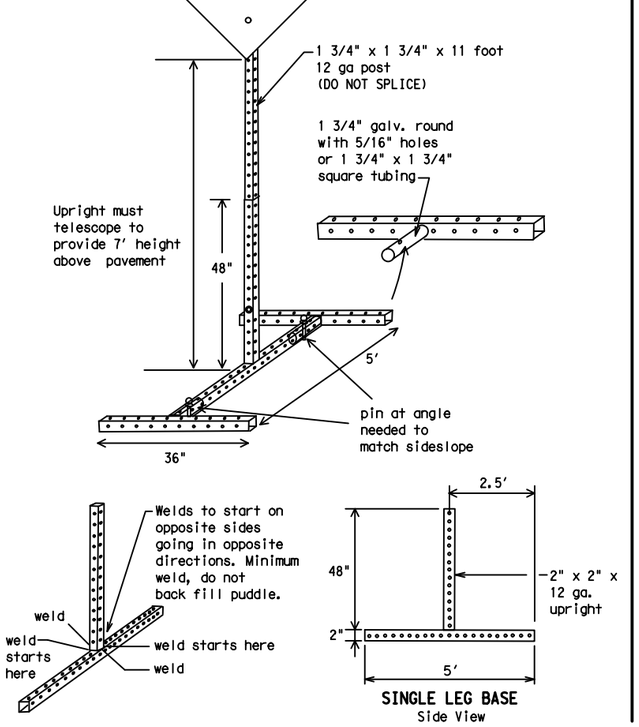


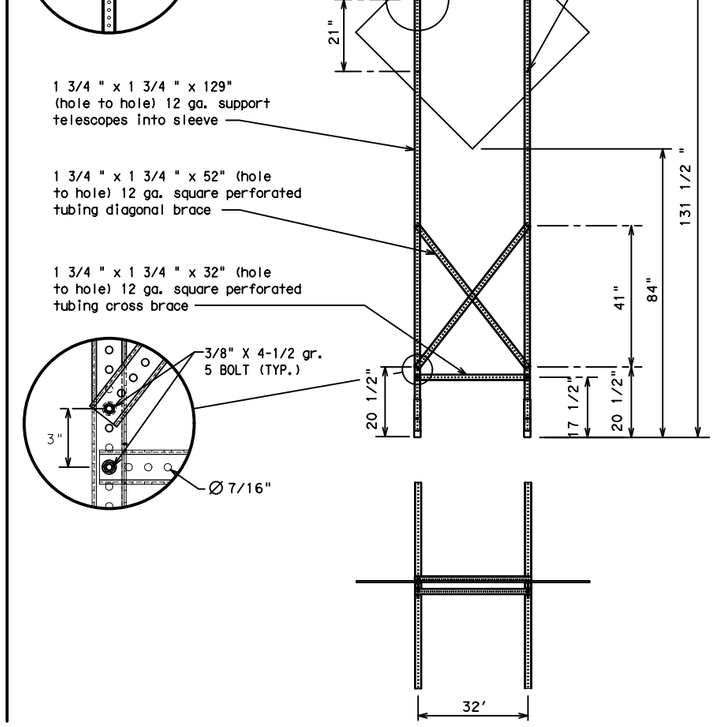
PERFORATED SQUARE METAL TUBING

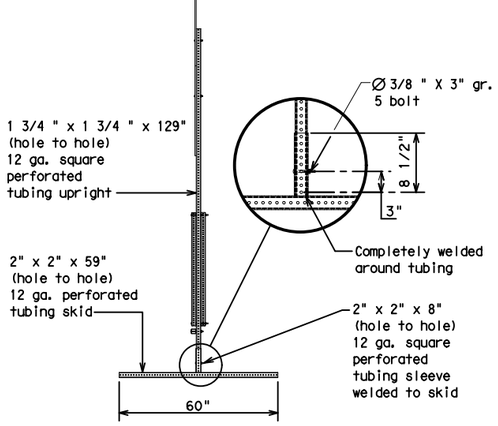
WING CHANNEL
Lap-splice/base bolted anchor

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

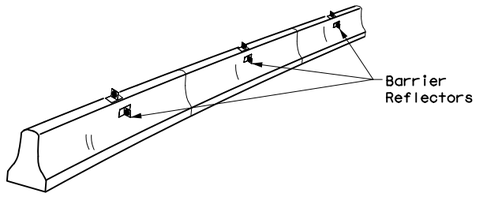
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		28

100

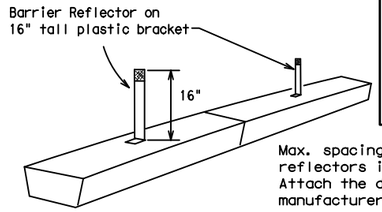
DATE: 2/16/2024 5:31:45 PM
FILE: bc-21.dgn

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.



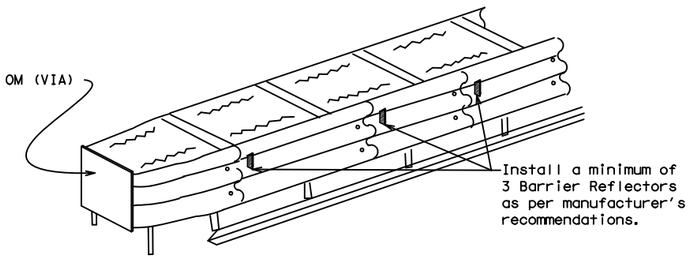
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

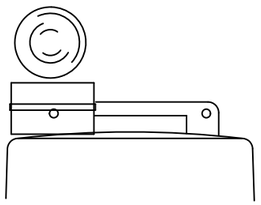
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

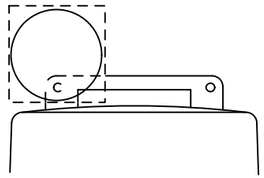
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

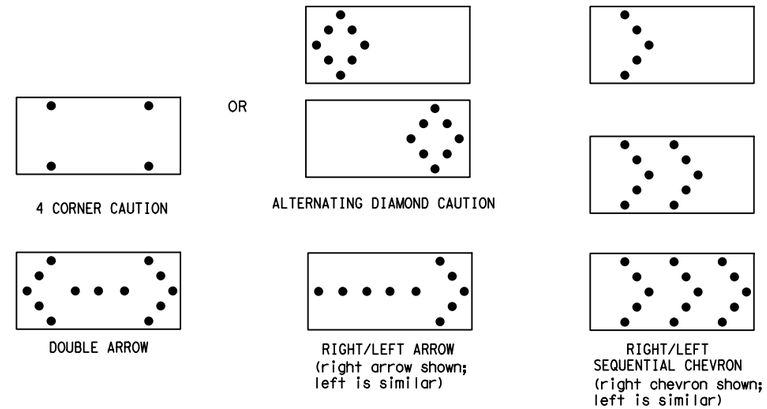
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	VAN ZANDT		29

DATE: 2/16/2024 5:31:46 PM
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

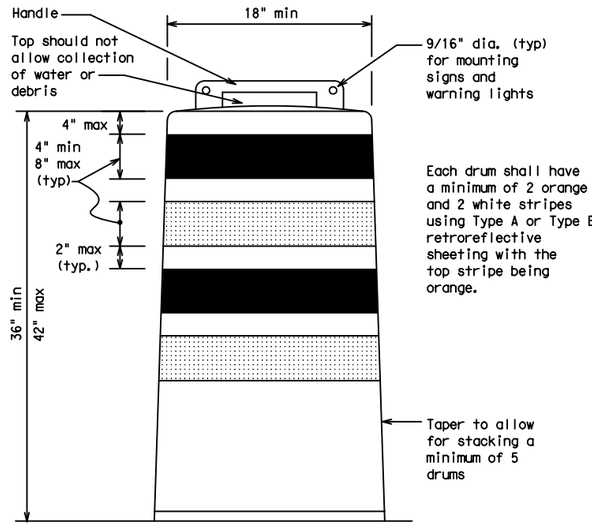
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

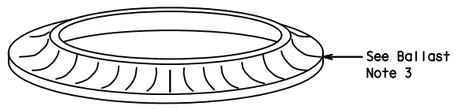
RETROREFLECTIVE SHEETING

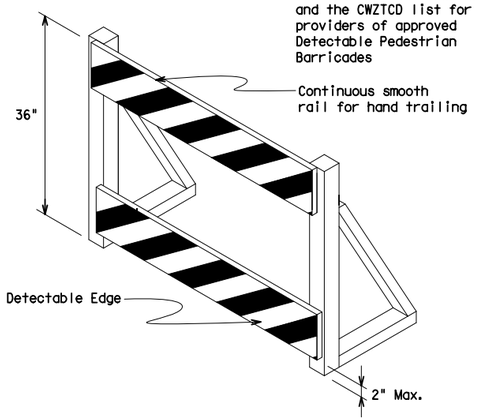
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

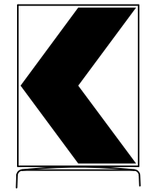




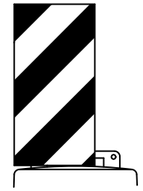


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	TYL	VAN ZANDT		30
7-13				

102

DATE: 2/16/2024 5:31:47 PM
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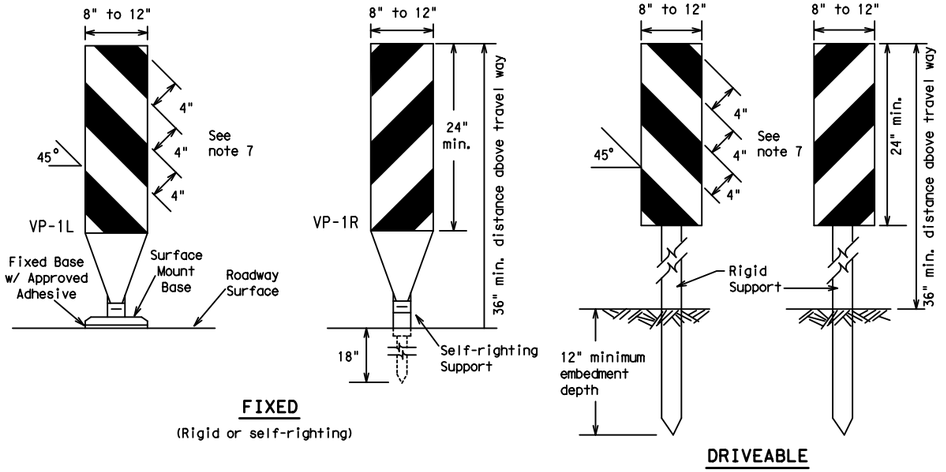
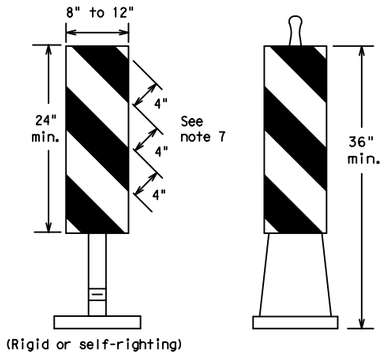


FIXED

(Rigid or self-righting)

DRIVEABLE

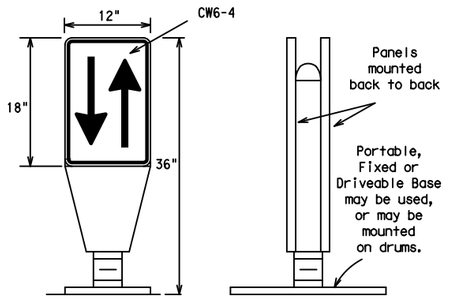


(Rigid or self-righting)

PORTABLE

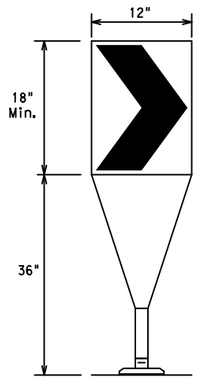
VERTICAL PANELS (VPs)

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)



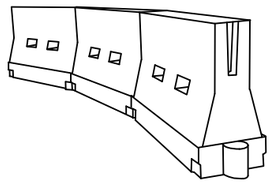
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1671	02	012	FM 1651
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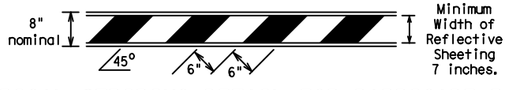
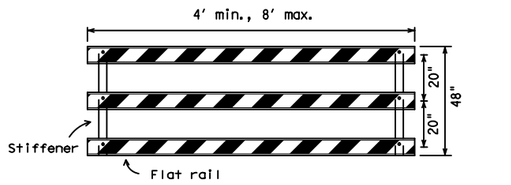
TYPE 3 BARRICADES

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.



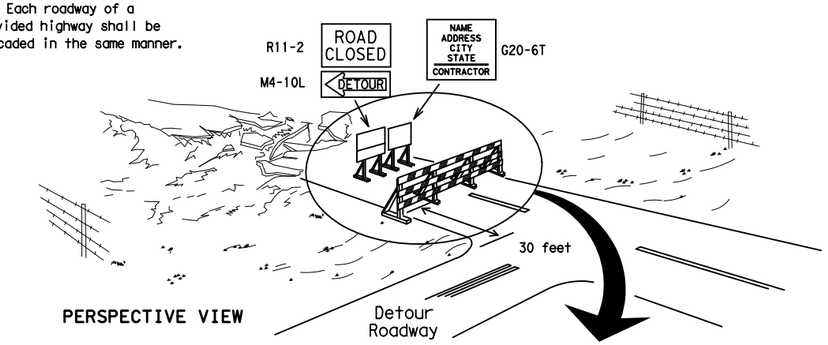
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

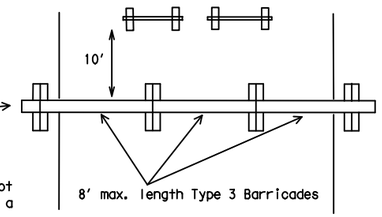
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

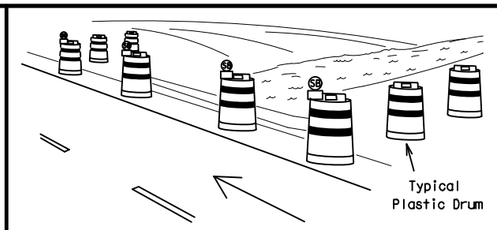
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

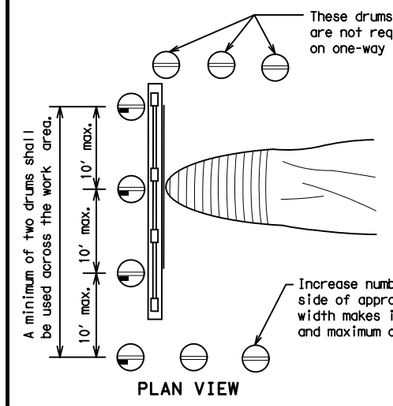
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

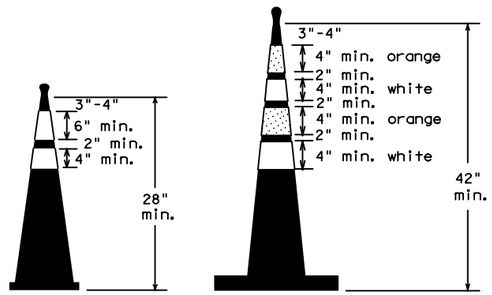
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

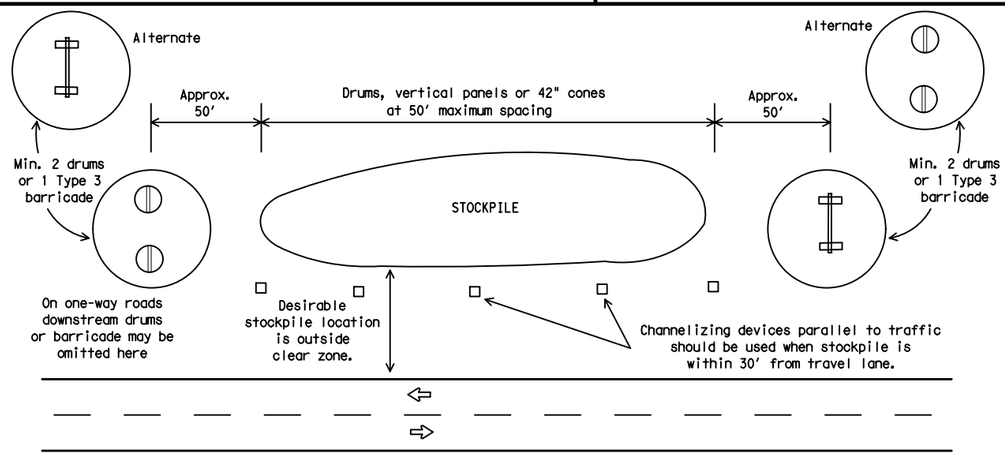
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

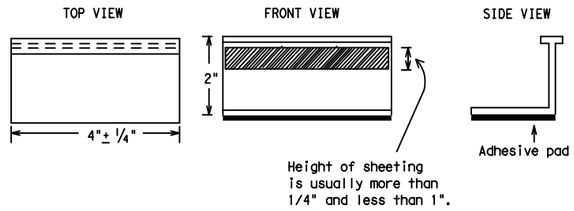
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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	TYL	VAN ZANDT		33

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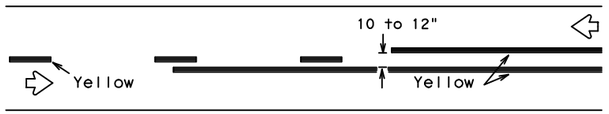
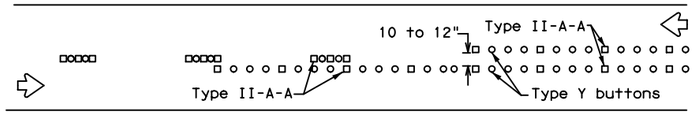
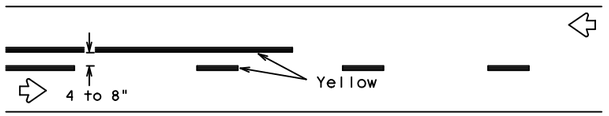
PAVEMENT MARKING PATTERNS



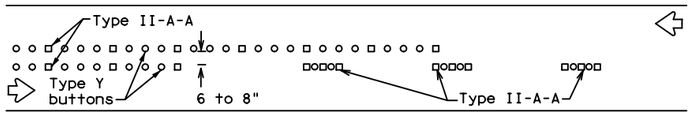
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



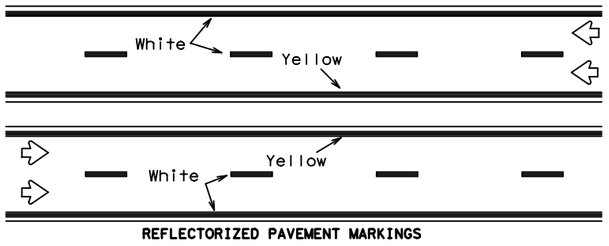
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



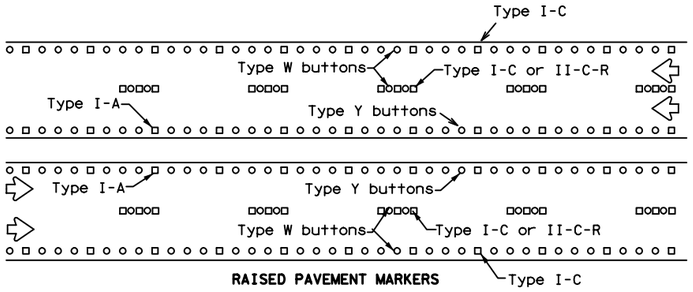
RAISED PAVEMENT MARKERS - PATTERN B

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



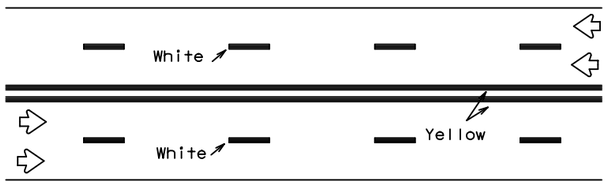
REFLECTORIZED PAVEMENT MARKINGS



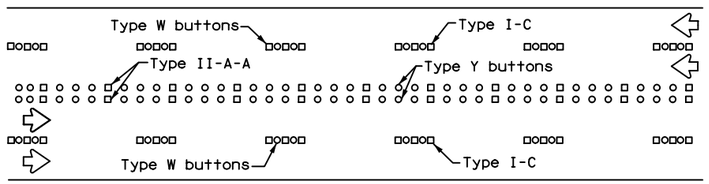
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



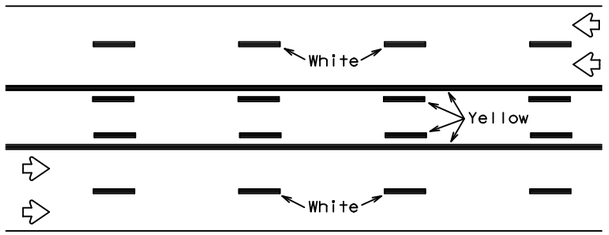
REFLECTORIZED PAVEMENT MARKINGS



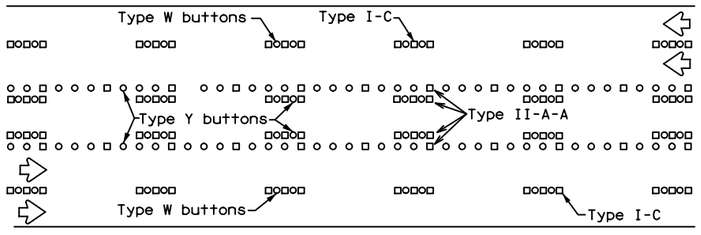
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

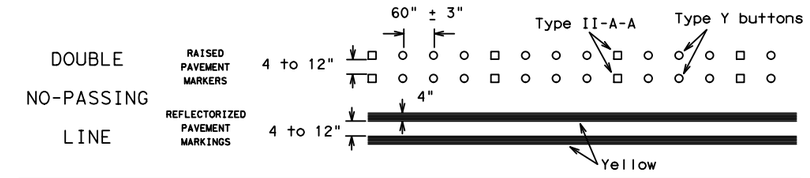
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

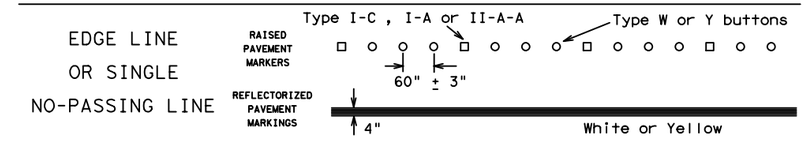
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

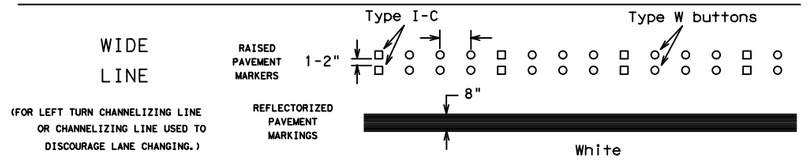


EDGE LINE OR SINGLE NO-PASSING LINE



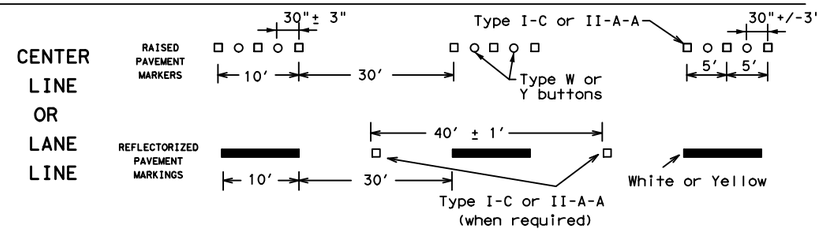
WIDE LINE

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

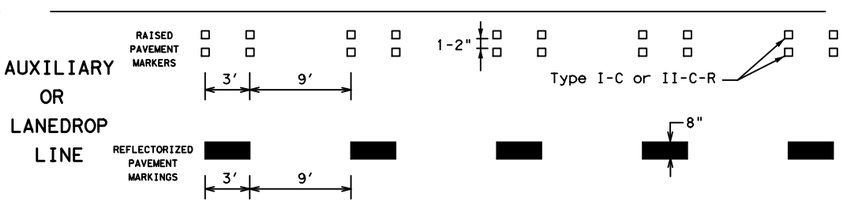


BROKEN LINES

CENTER LINE OR LANE LINE

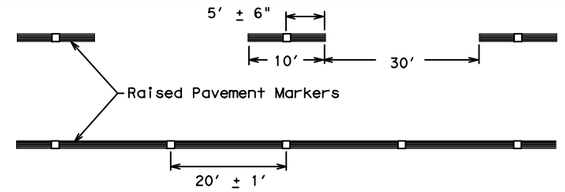


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

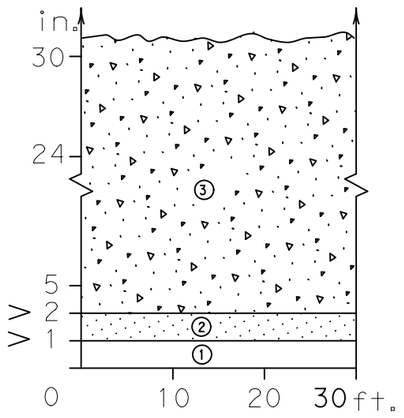
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	TYL	VAN ZANDT		34
11-02 8-14				

106

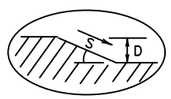
DATE: 2/16/2024 5:31:49 PM
FILE: bc-21.dgn

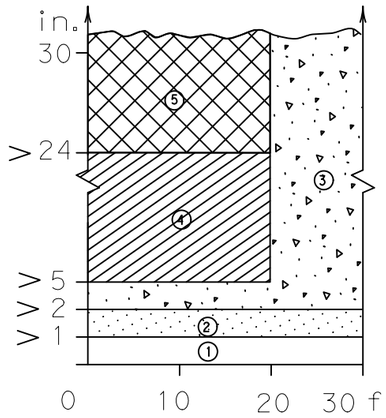
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

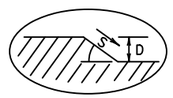


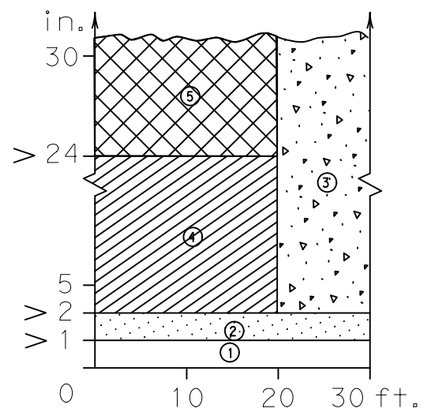
Edge Condition I
S = (3:1) (or flatter)



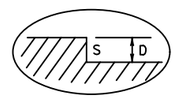


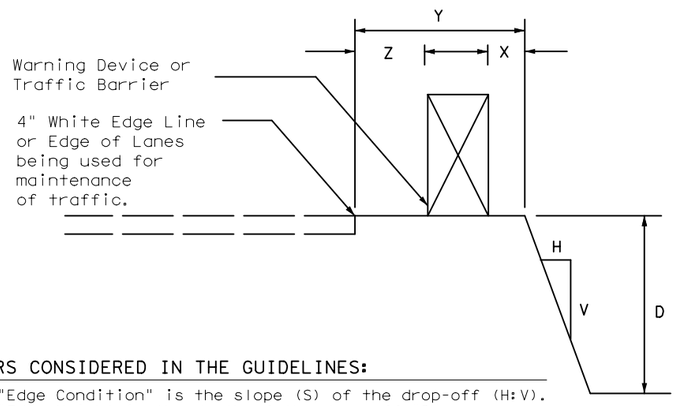
Edge Condition II
S = ((2.99):1) to (1:1)





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:

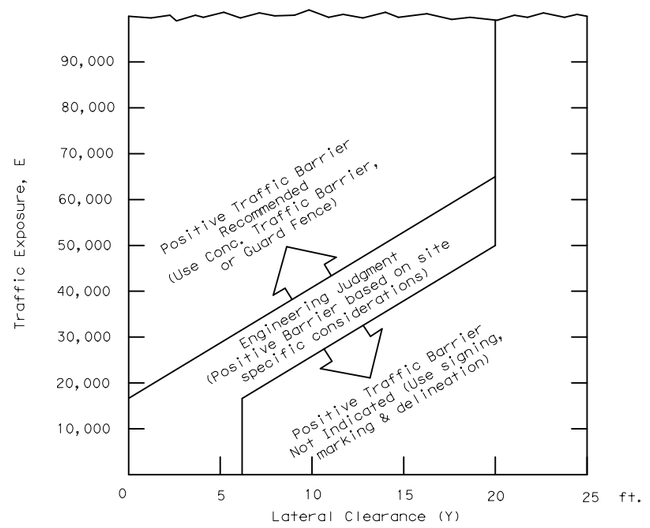
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Date 2/16/2024

Trevor L. Castilla

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	1671	02	012	FM 1651
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		35

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DATE: 2/16/2024 5:32:49 PM
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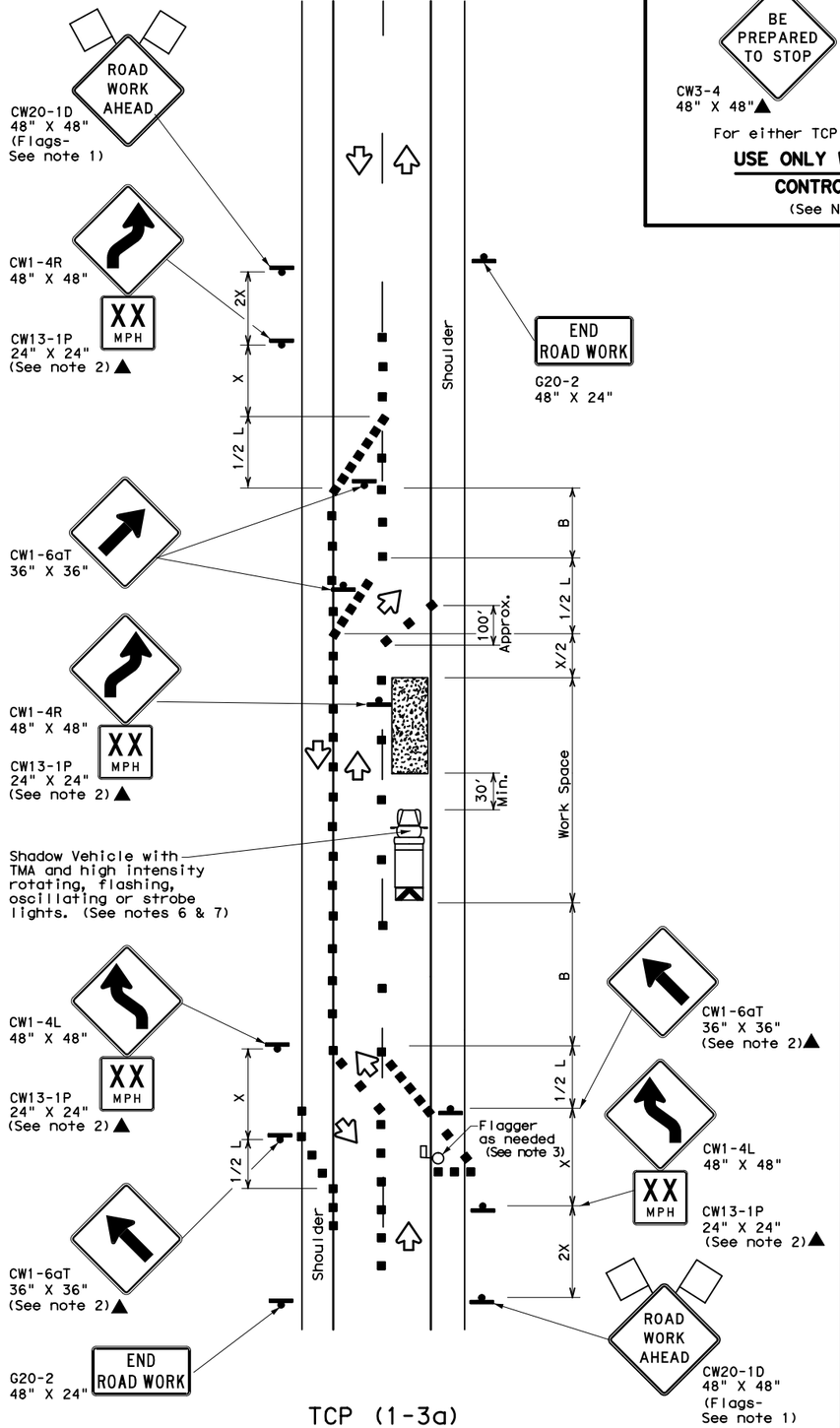
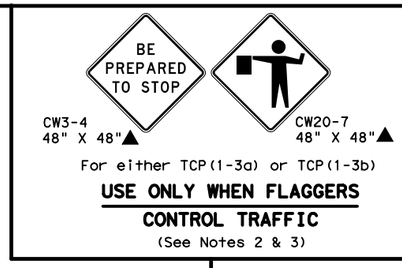
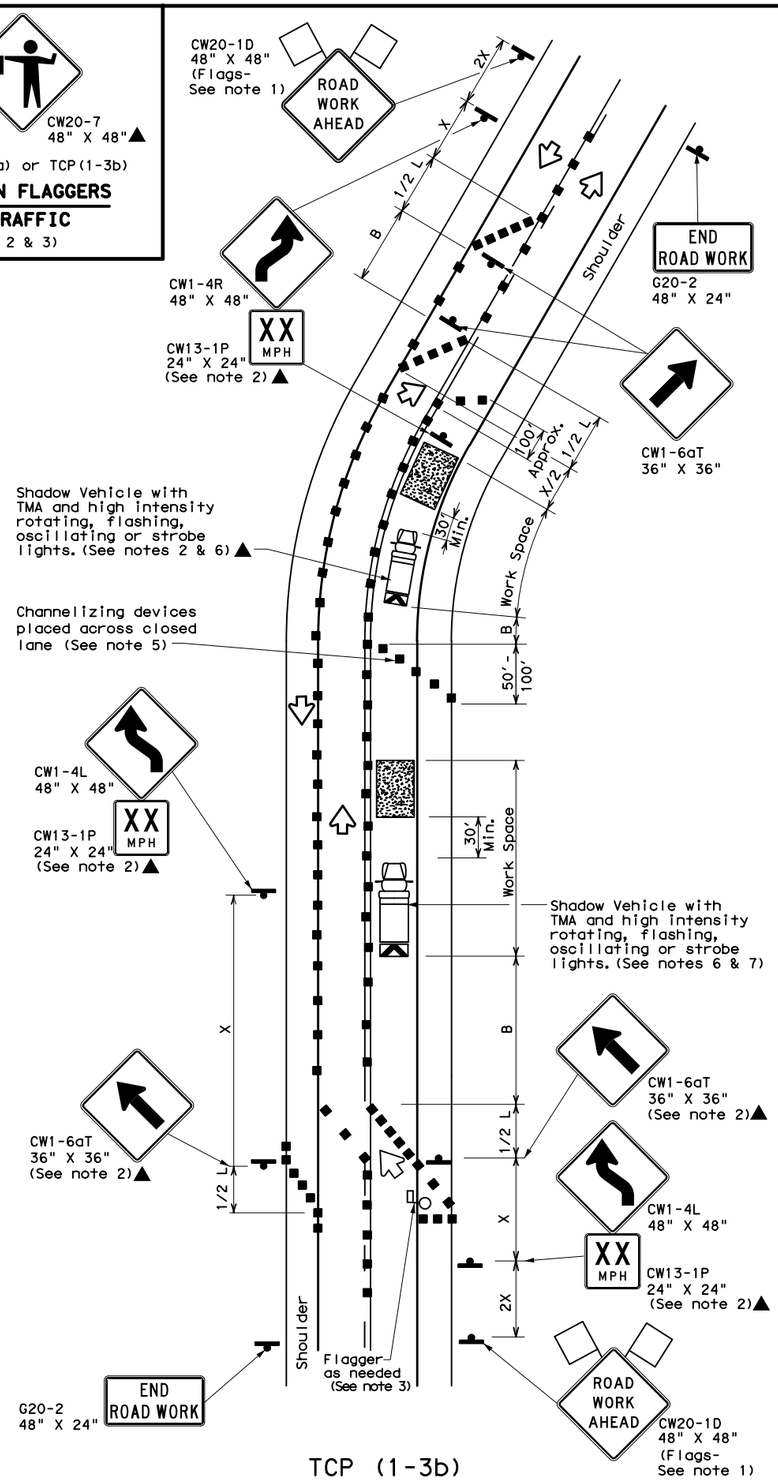


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW





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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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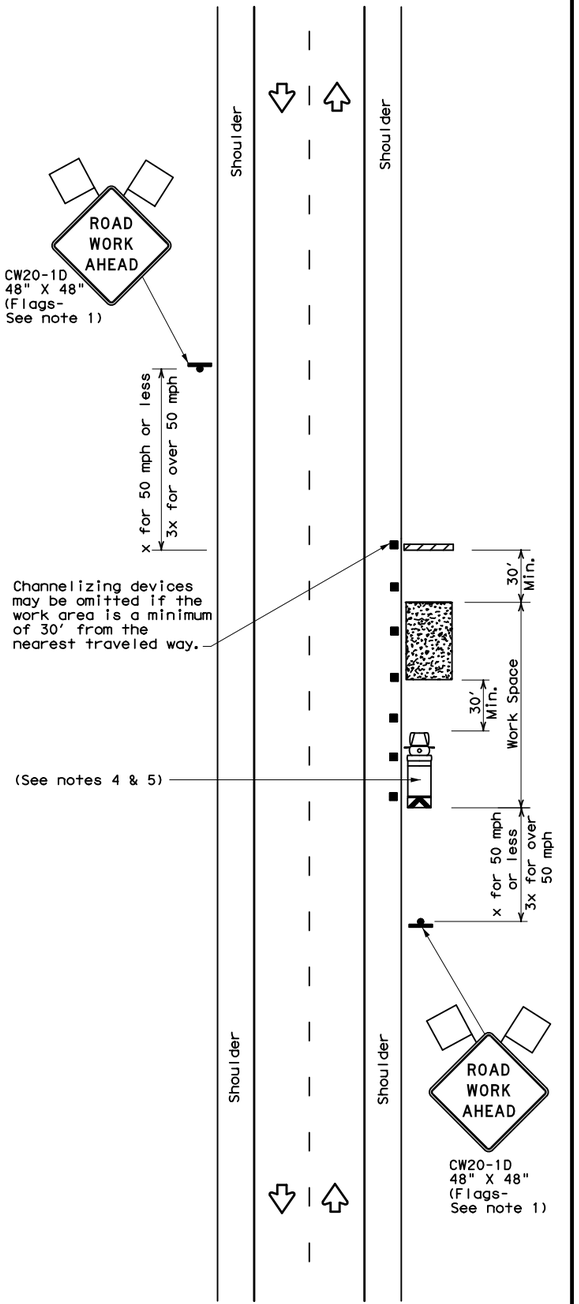
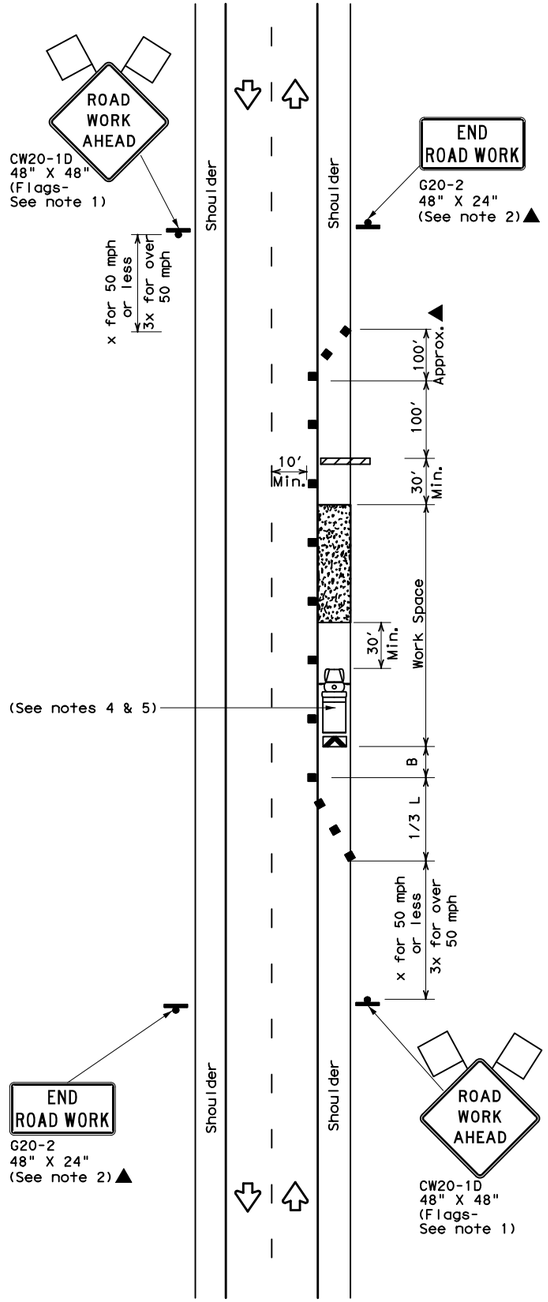
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18	TYL	VAN ZANDT		36



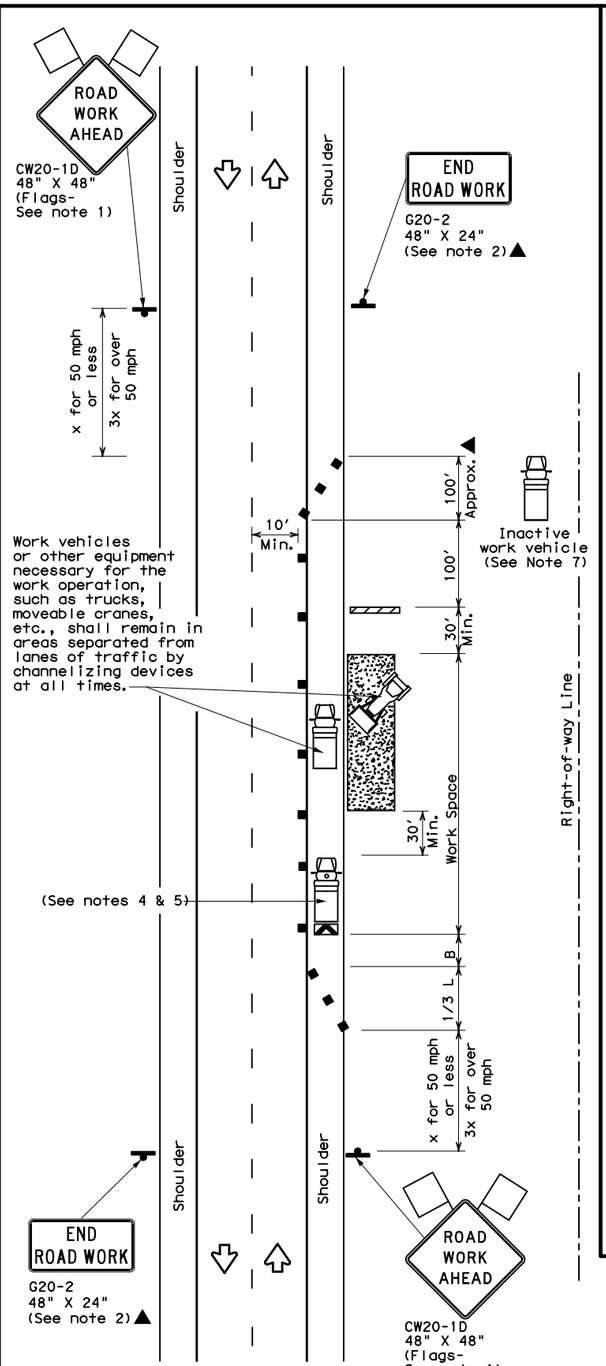
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 2-12	TYL	VAN ZANDT		37
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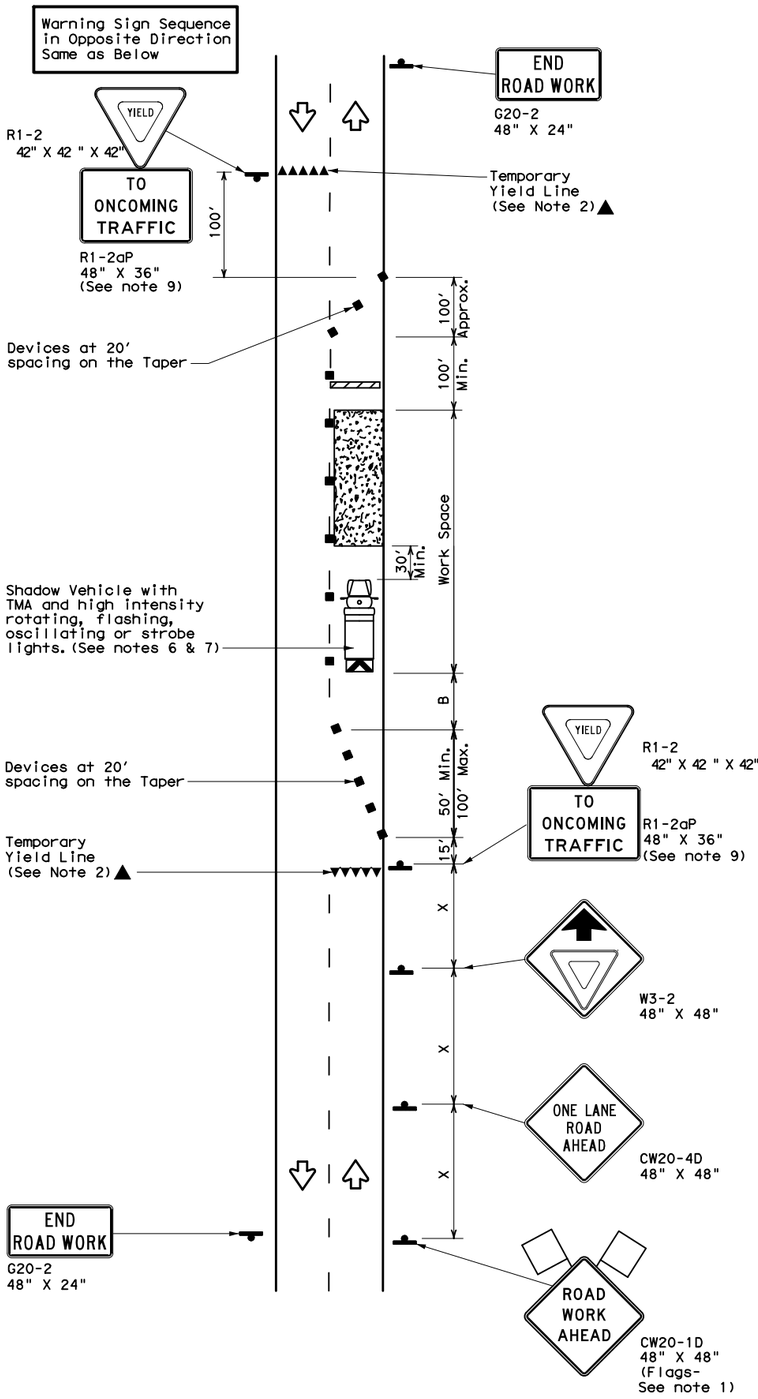
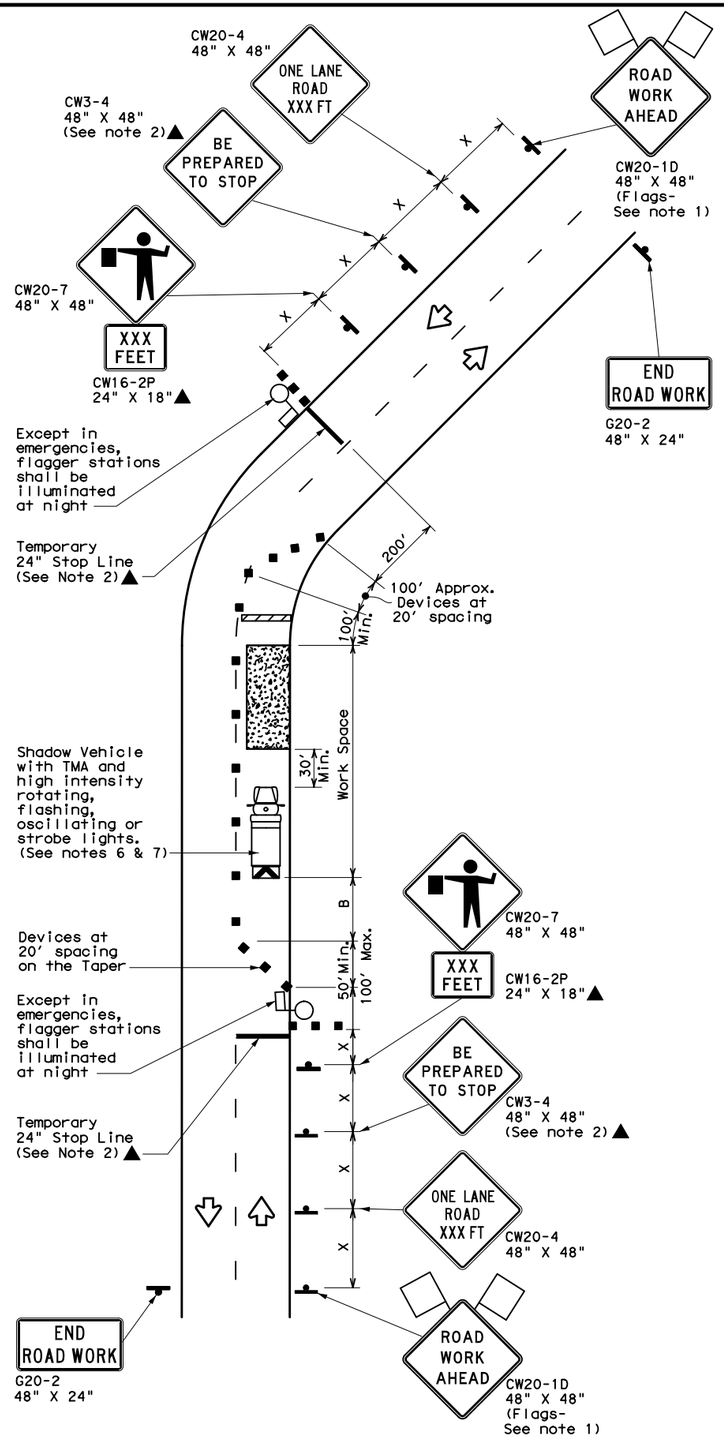


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	TYL	VAN ZANDT		38
4-98 2-18				

162

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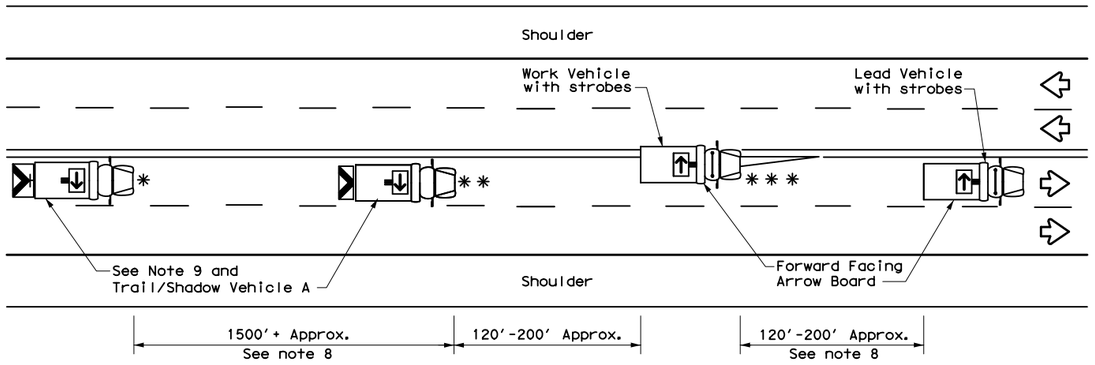
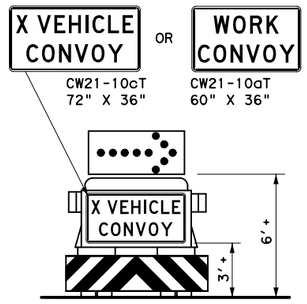


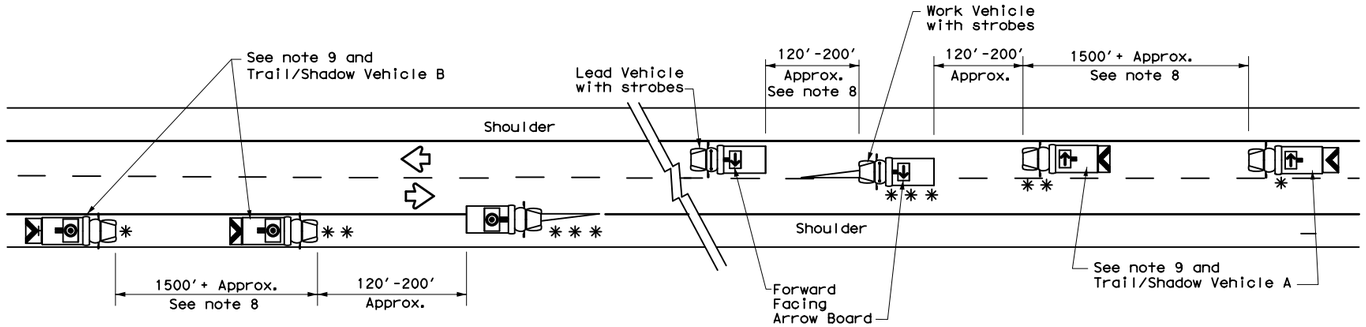
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

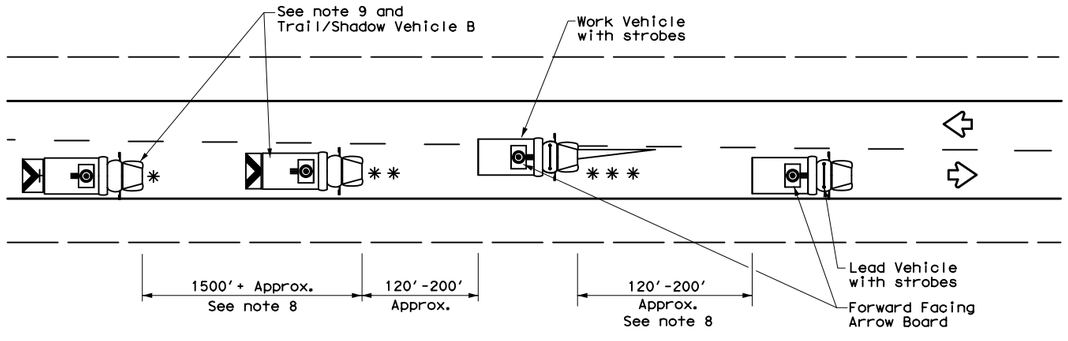


WORK ON SHOULDER

WORK ON TRAVEL LANE

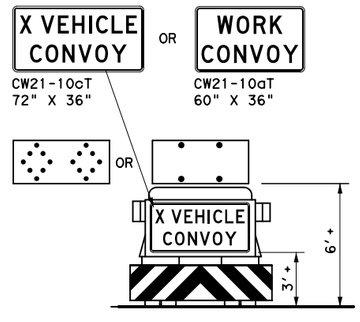
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

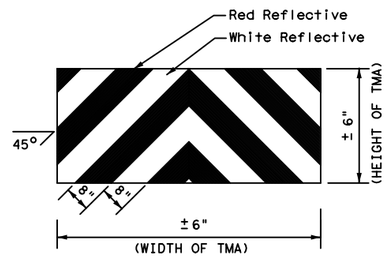
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 7-13	TYL	VAN ZANDT		39
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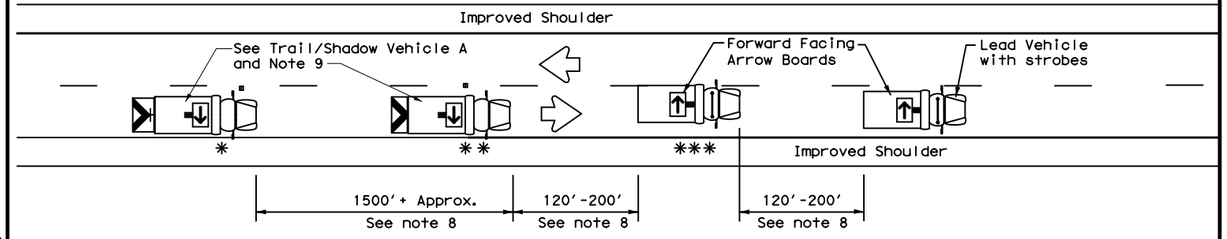
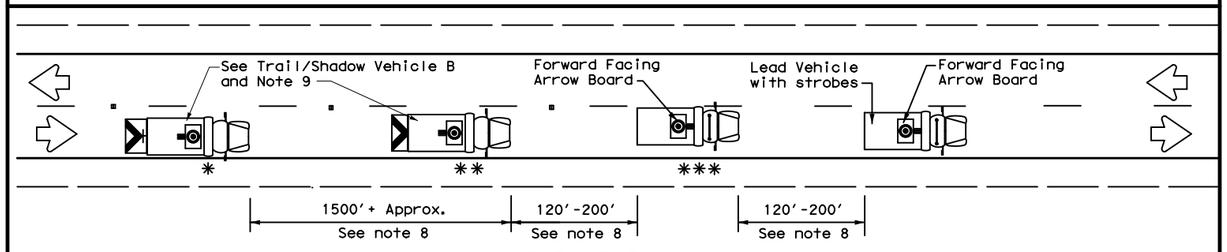


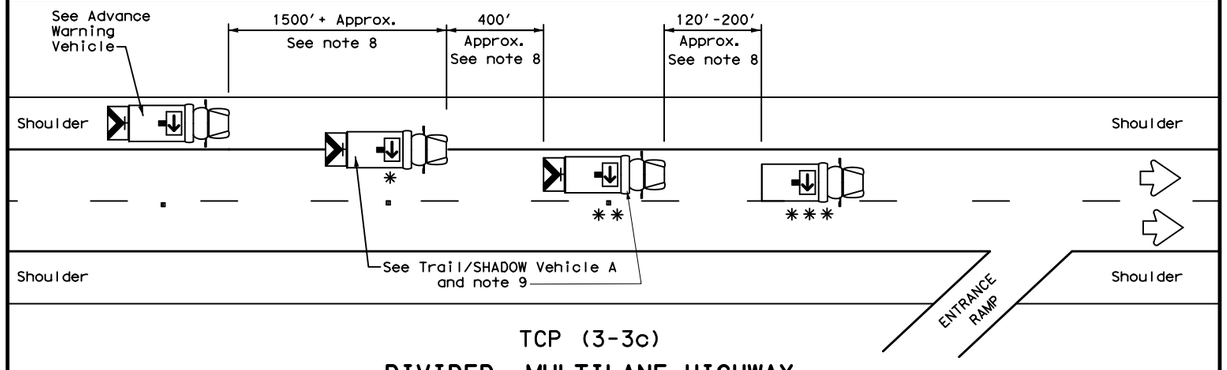
TCP (3-3a)

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



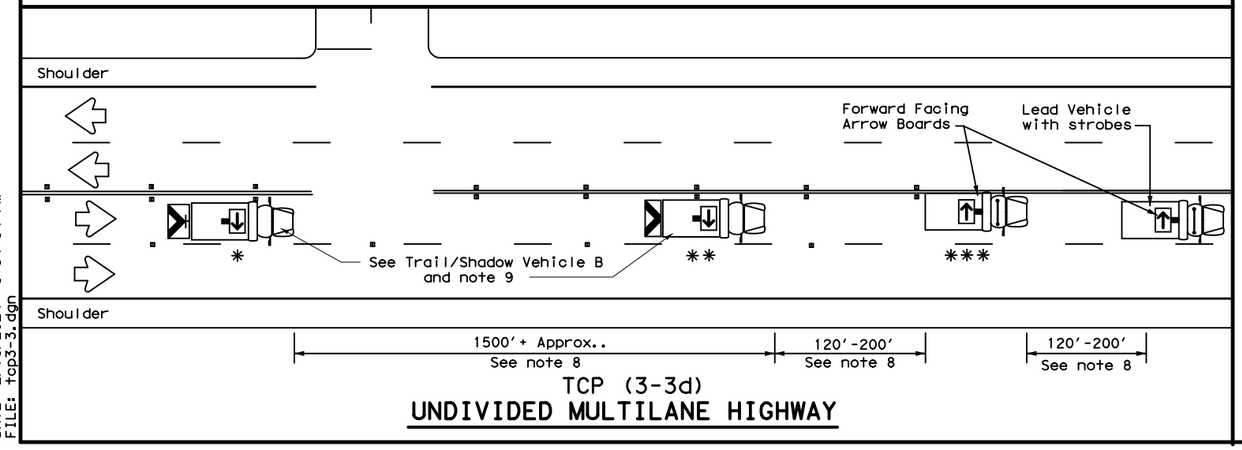
TCP (3-3b)

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



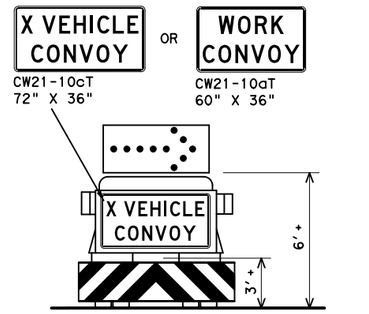
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



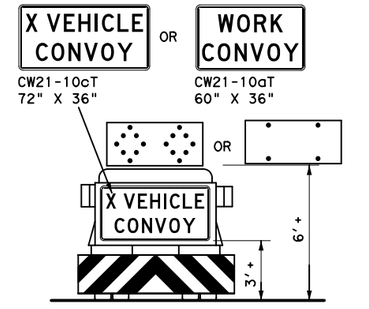
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



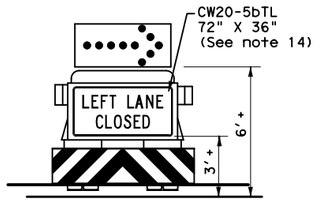
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

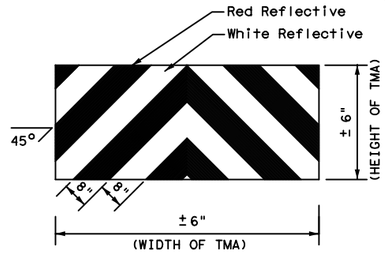


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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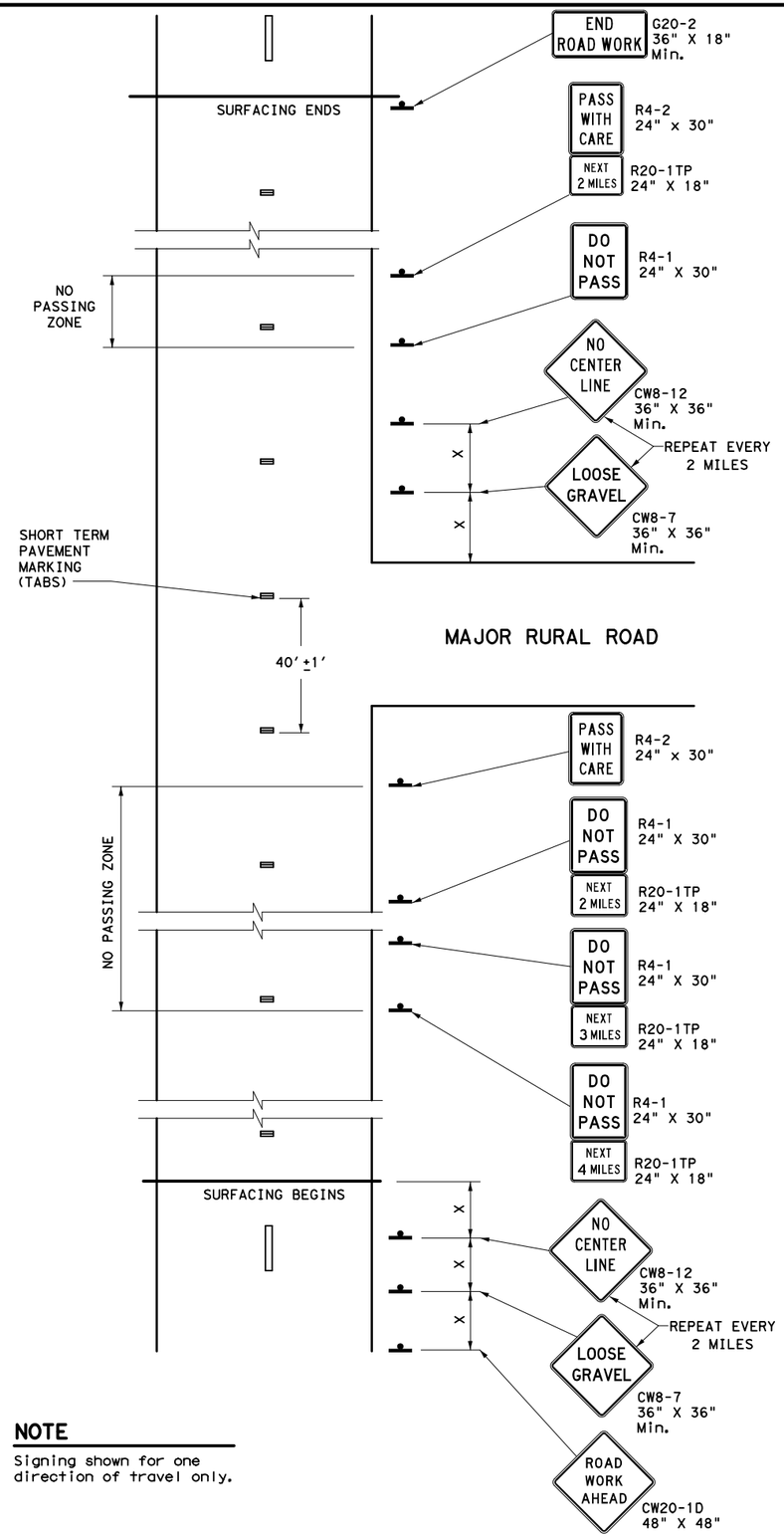
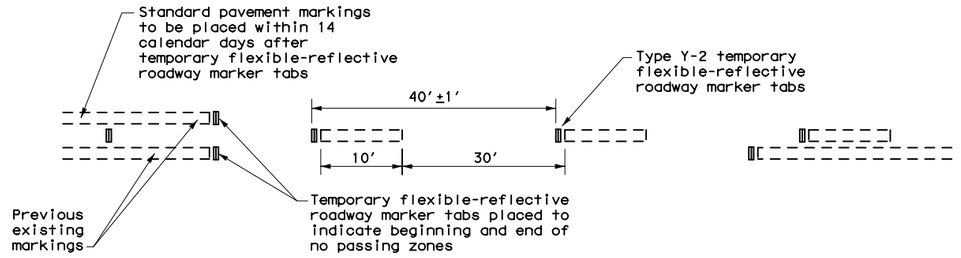


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

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©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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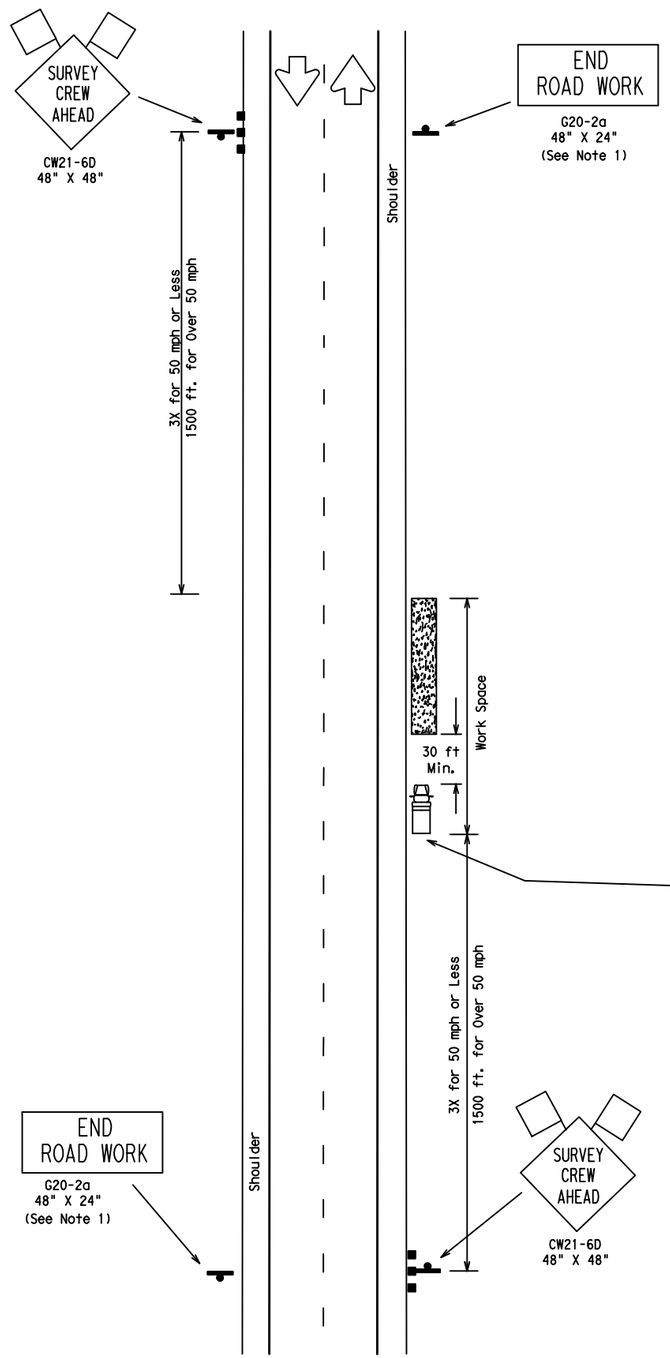
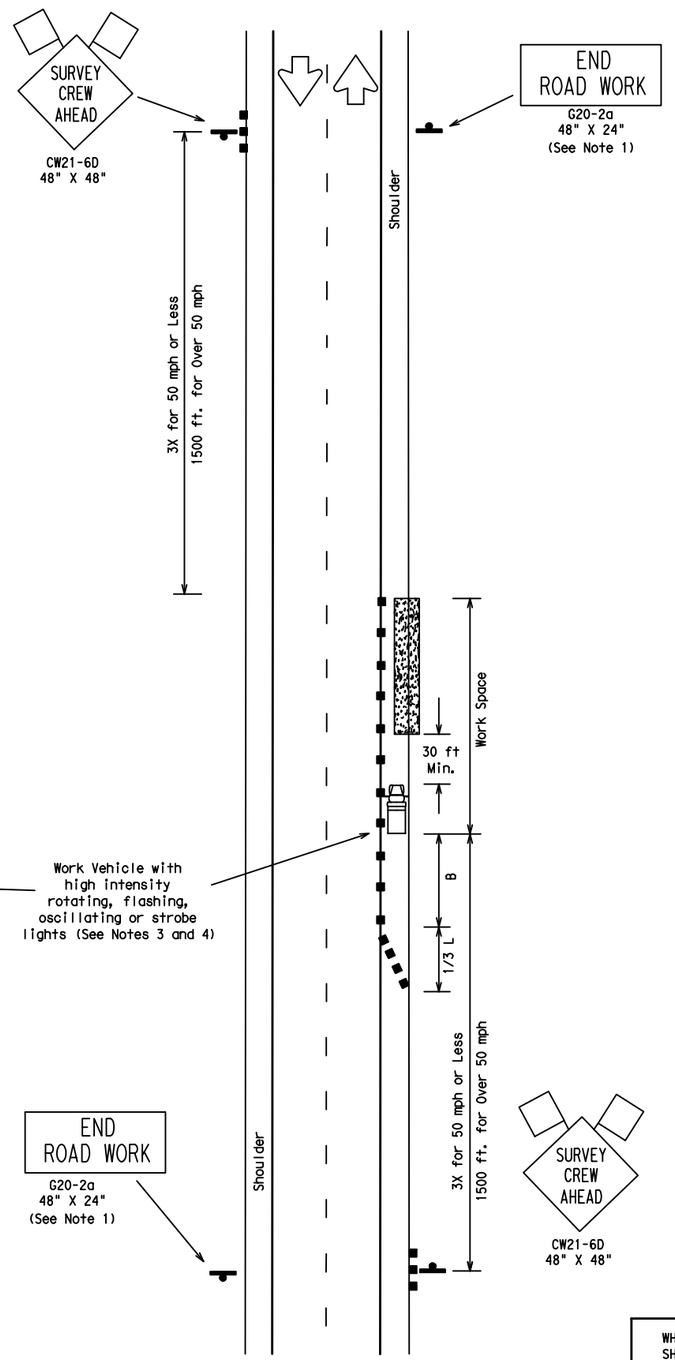
1-97 7-13	TYL	VAN ZANDT		41



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.
1. 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
1 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
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		42

DATE: 2/16/2024 5:35:49 PM
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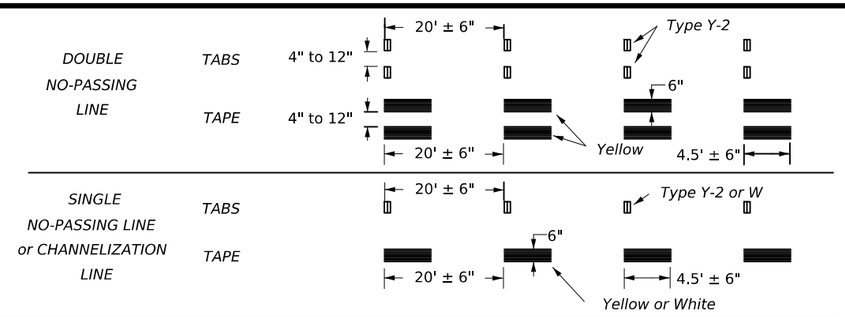
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



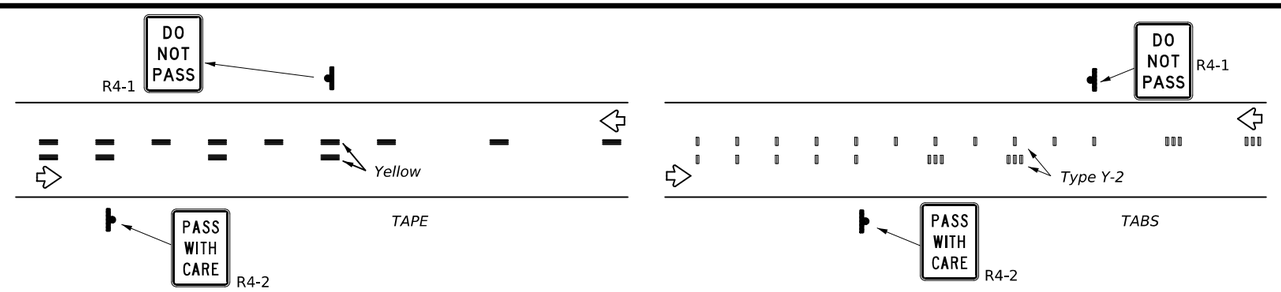
NOTES:

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

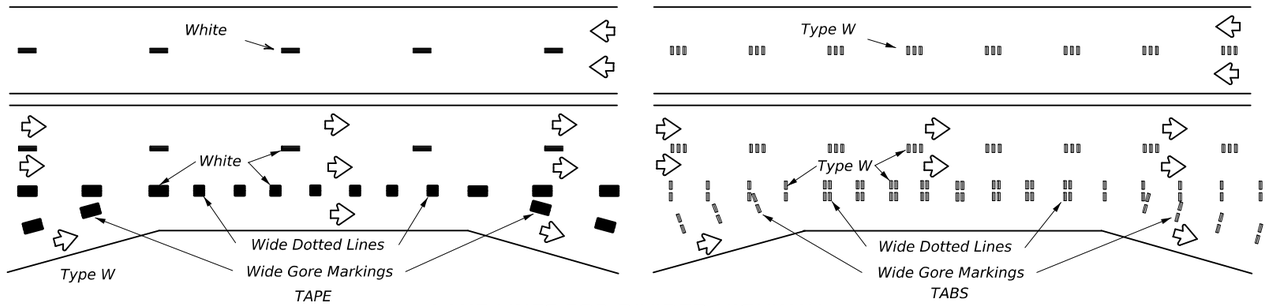
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

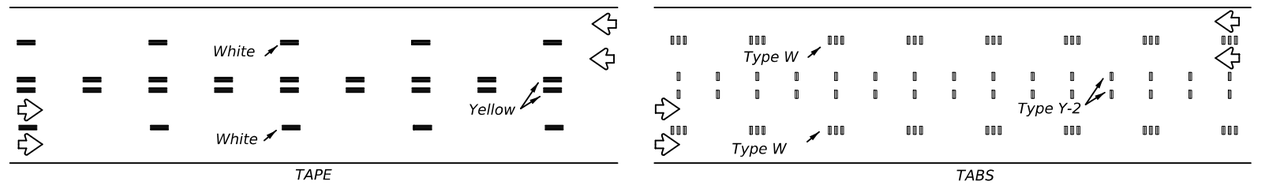
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



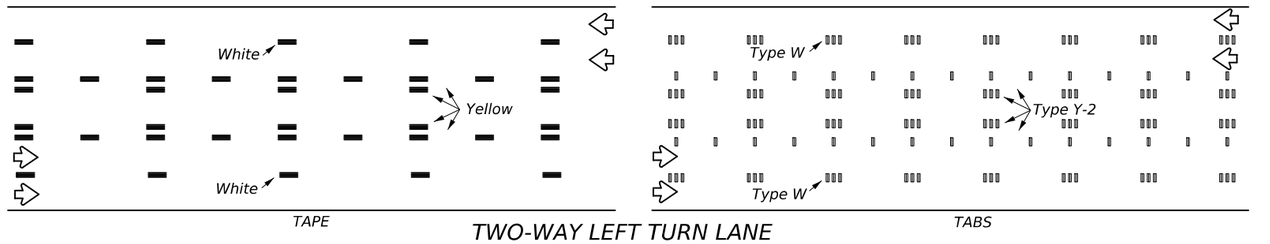
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



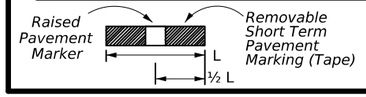
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

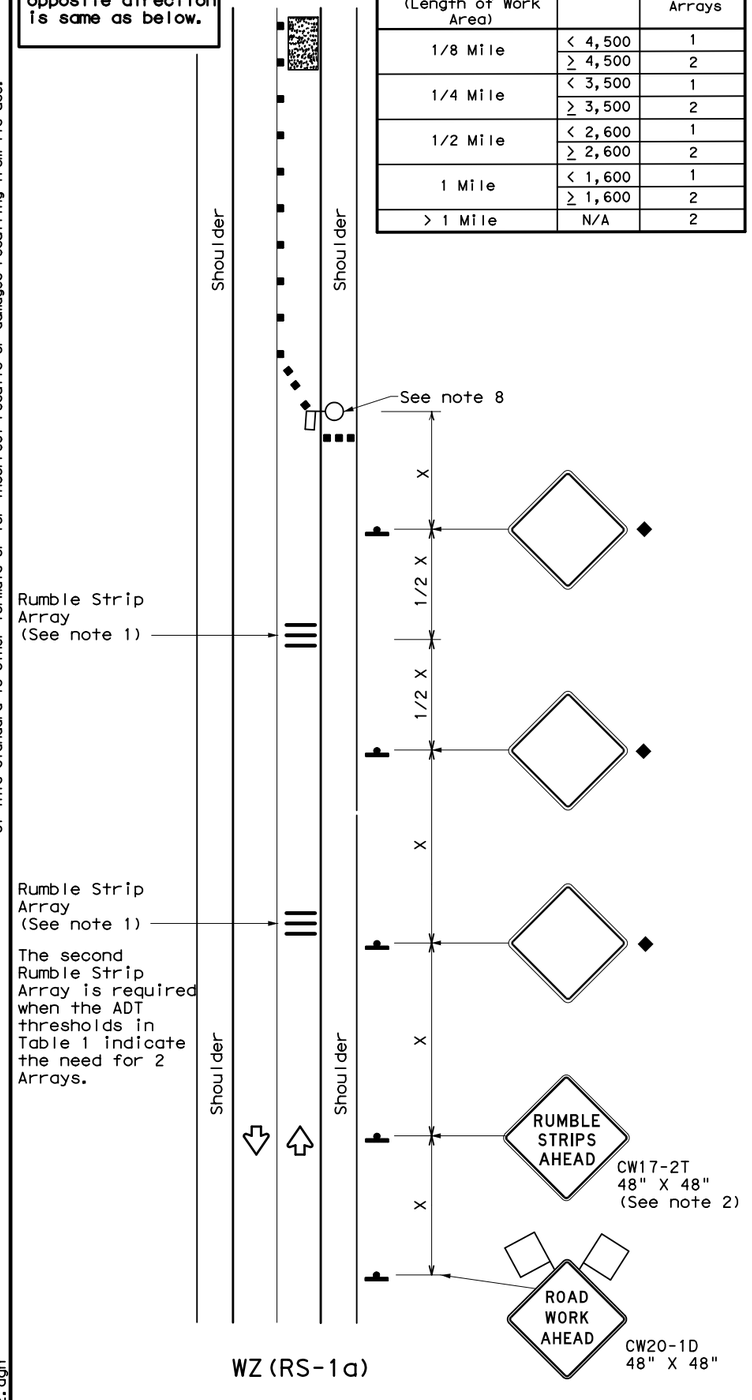
WZ(STPM)-23

FILE: wzstptm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	TYL	VAN ZANDT		43
3-03				

DATE: 2/16/2024 5:36:21 PM
FILE: wz(stpm)-23.dgn

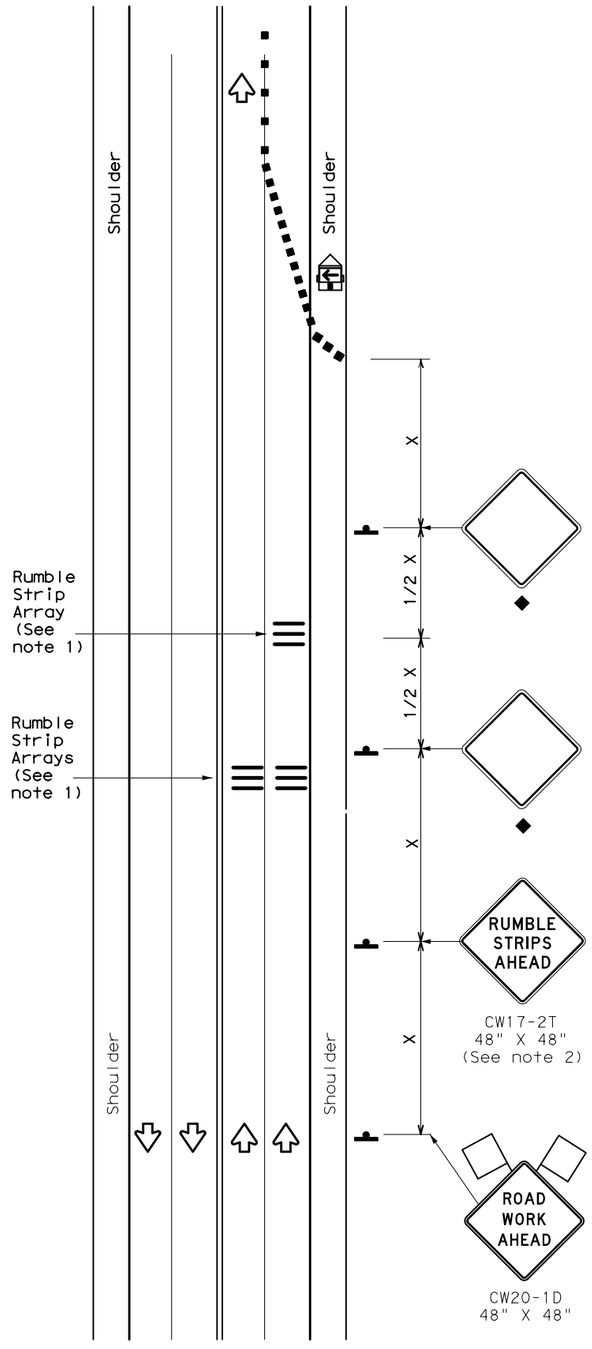
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		44

117

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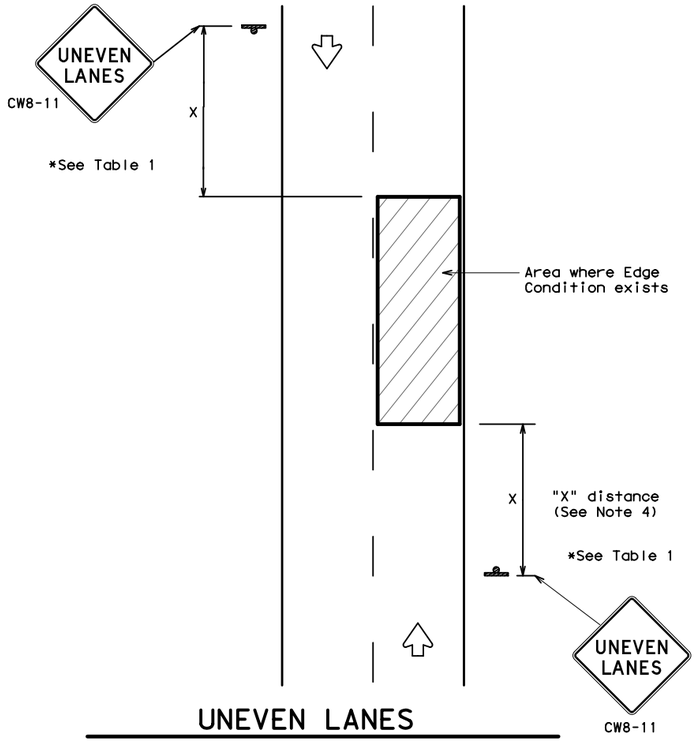
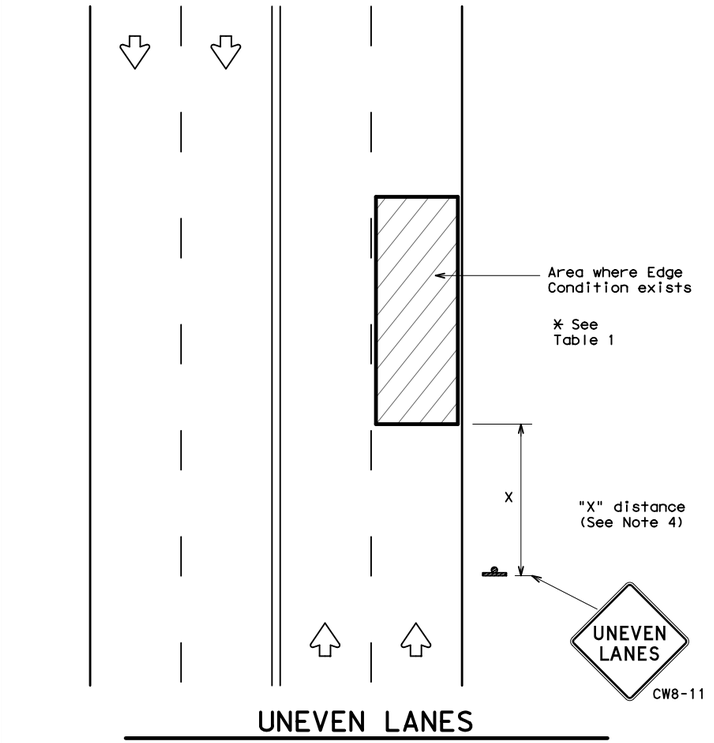
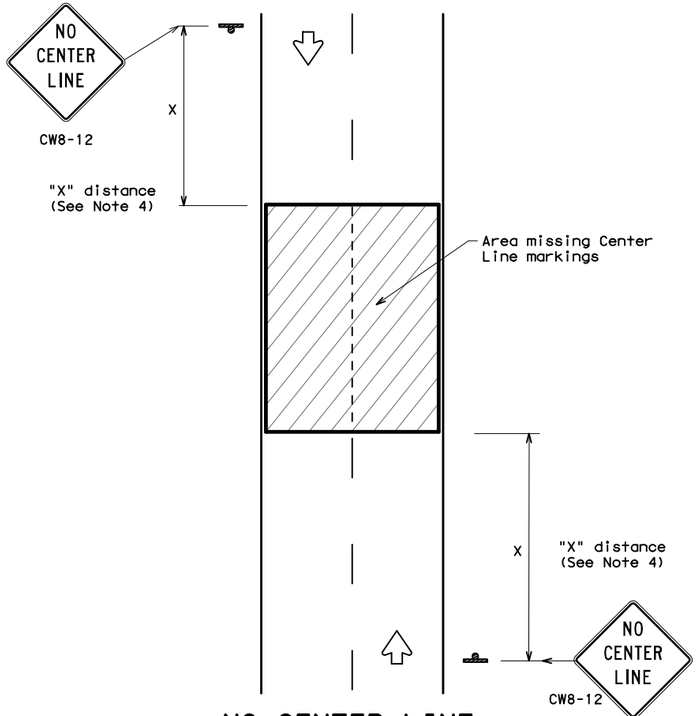


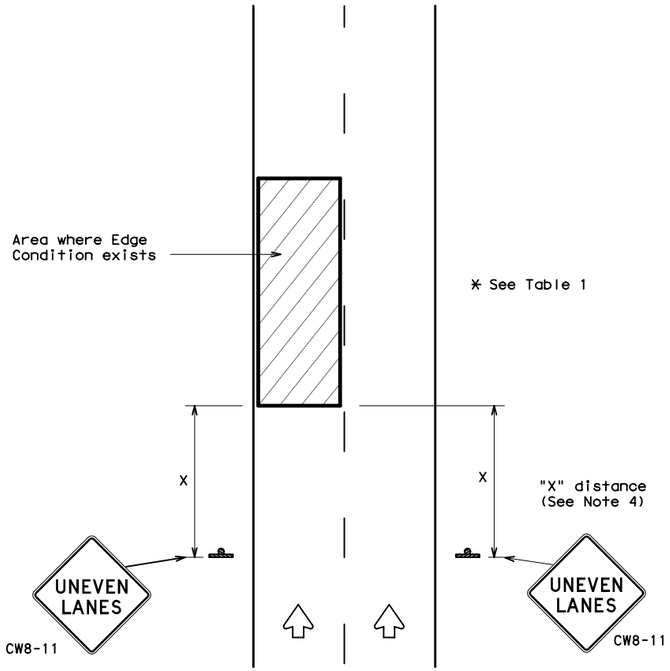
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

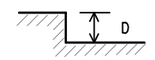
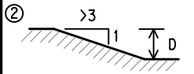
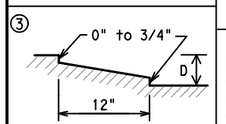
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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
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8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	TYL	VAN ZANDT		45

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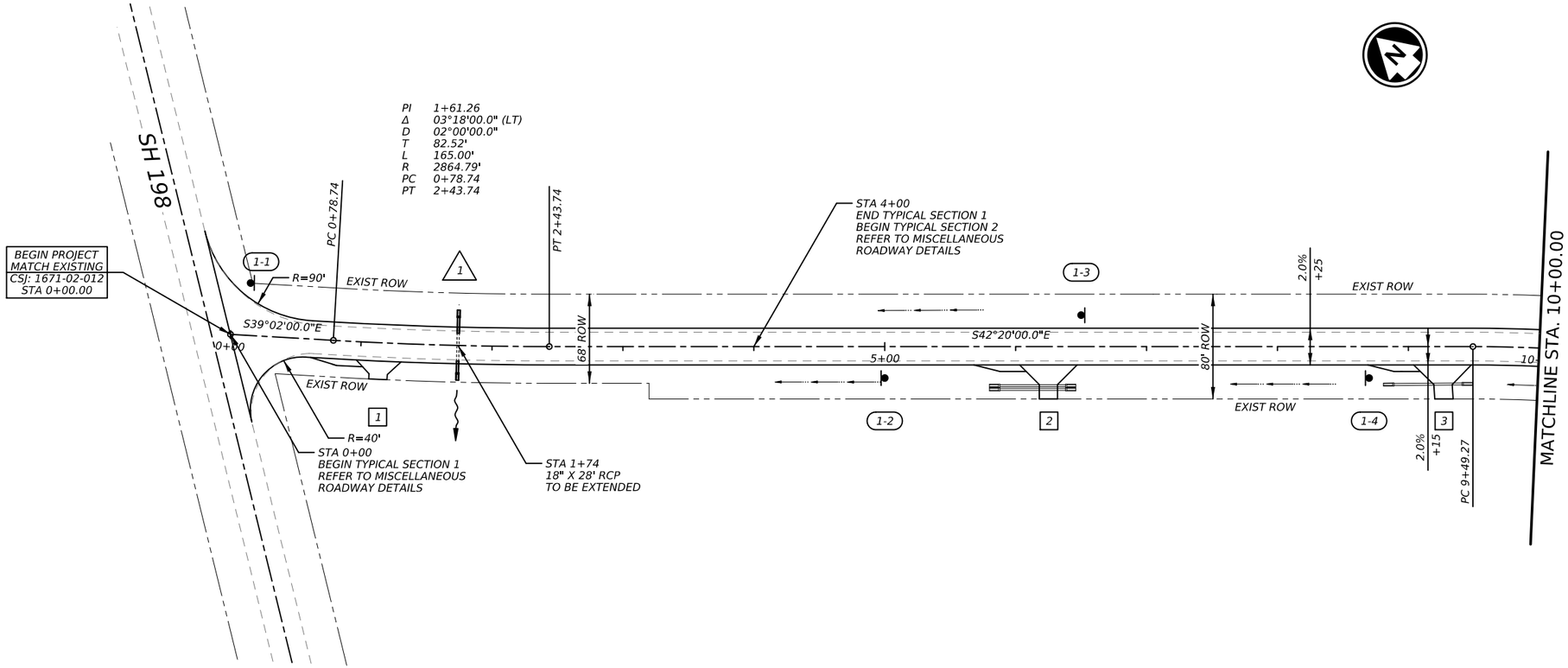

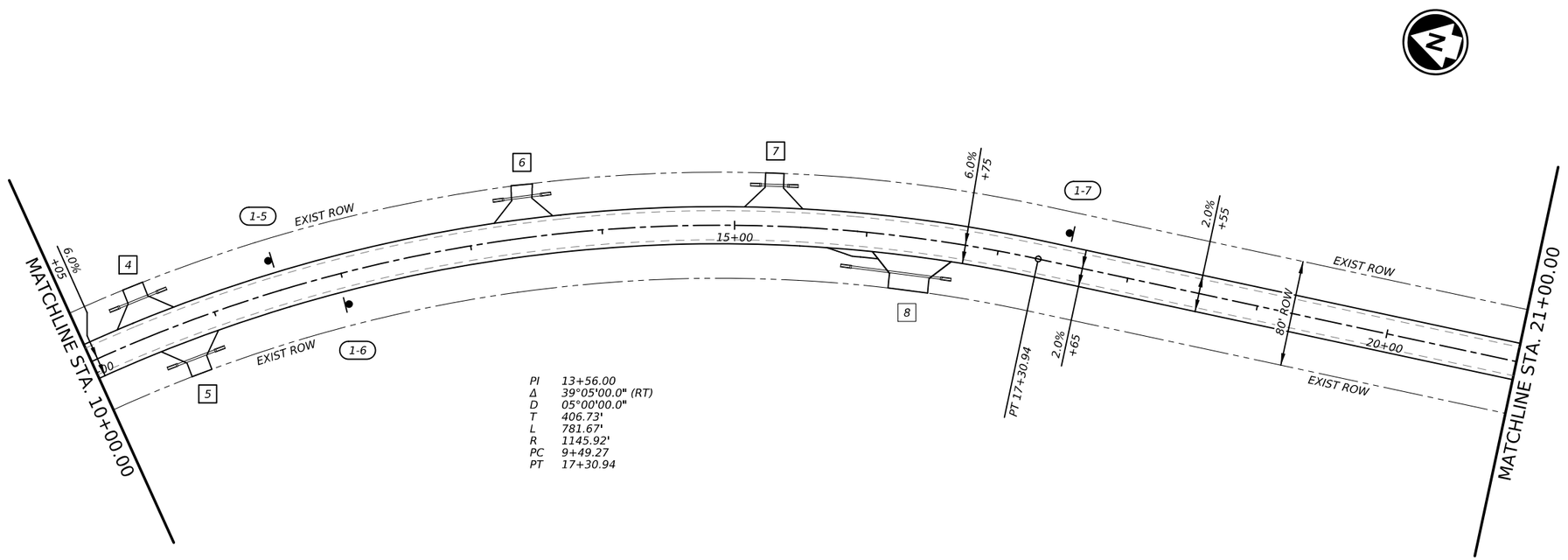

DATE: 2/16/2024 5:37:49 PM
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TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 1 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		46

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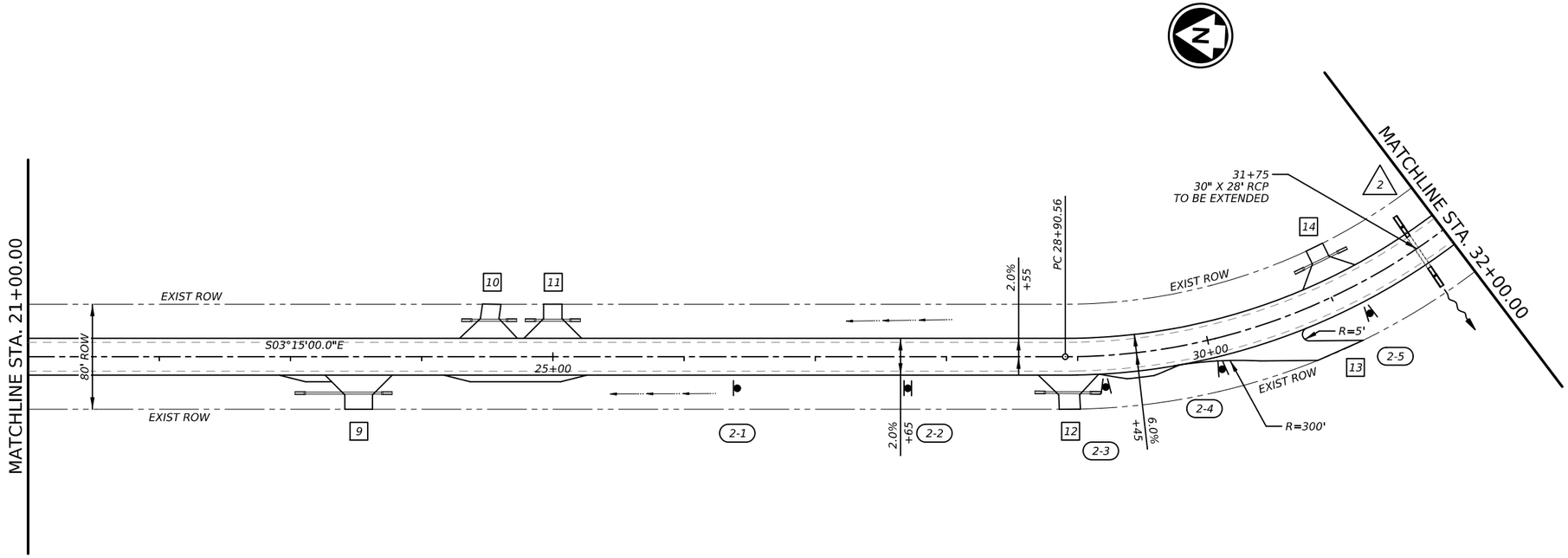

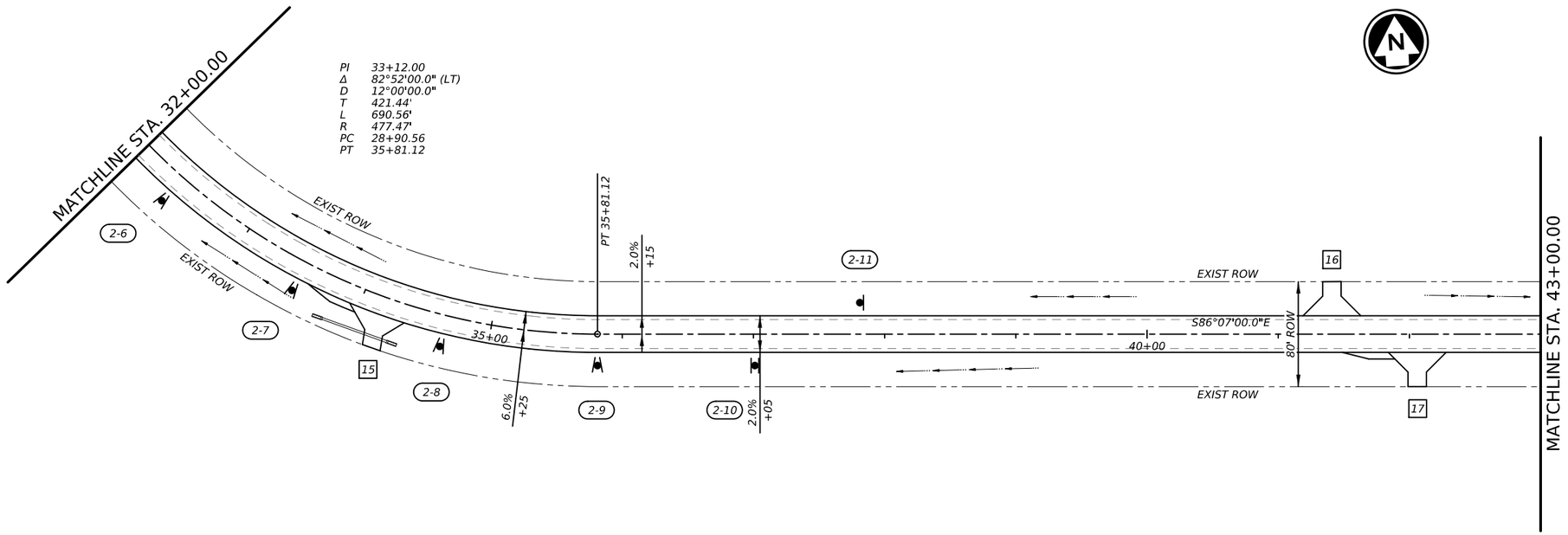

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # — DRIVEWAY/INT. ROAD NUMBER
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 2 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
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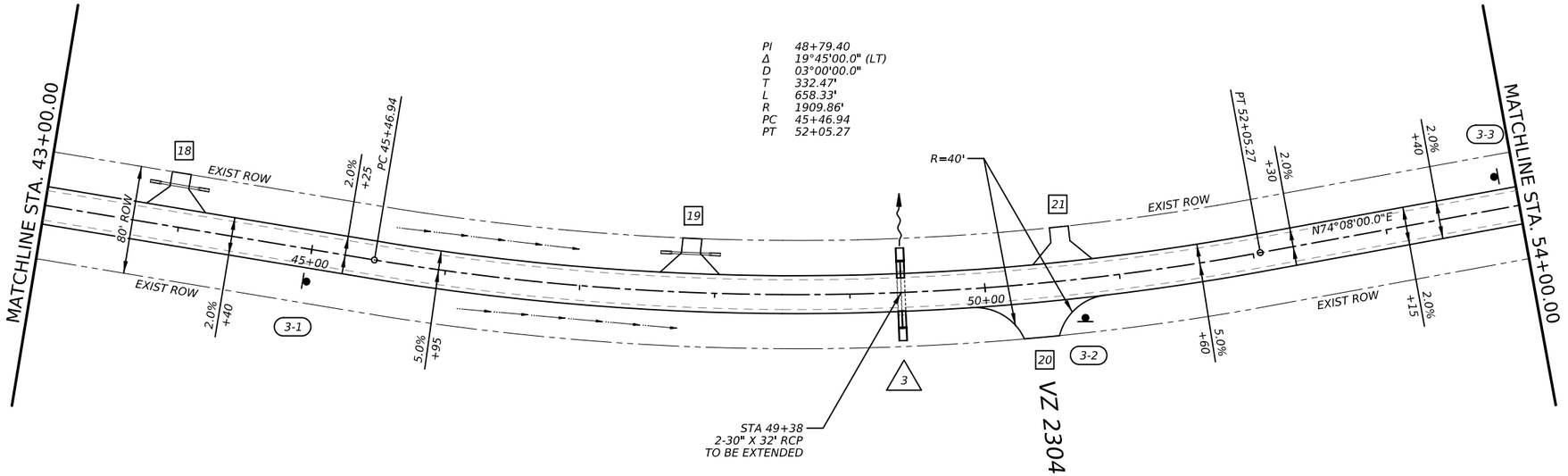

PI 48+79.40
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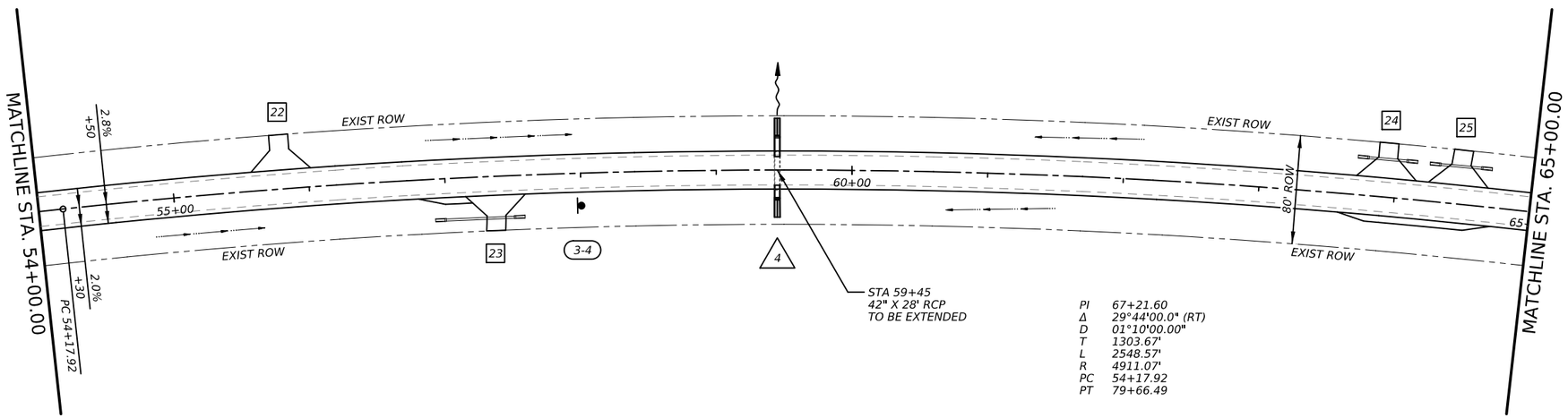
D 03°00'00.0"
T 332.47'
L 658.33'
R 1909.86'
PC 45+46.94
PT 52+05.27



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D 01°10'00.00"
T 1303.67'
L 2548.57'
R 4911.07'
PC 54+17.92
PT 79+66.49

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 3 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
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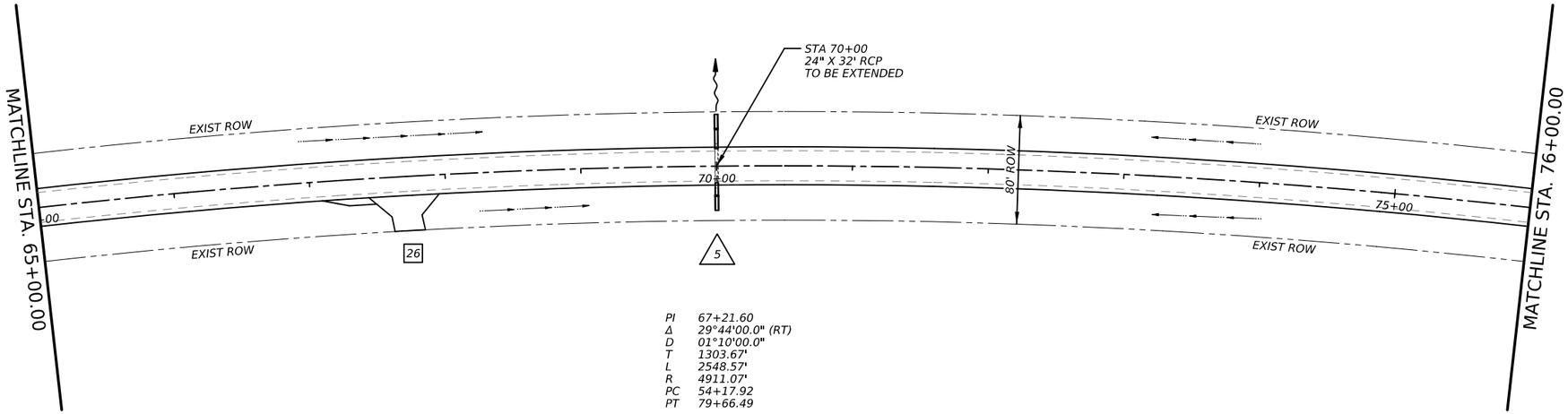
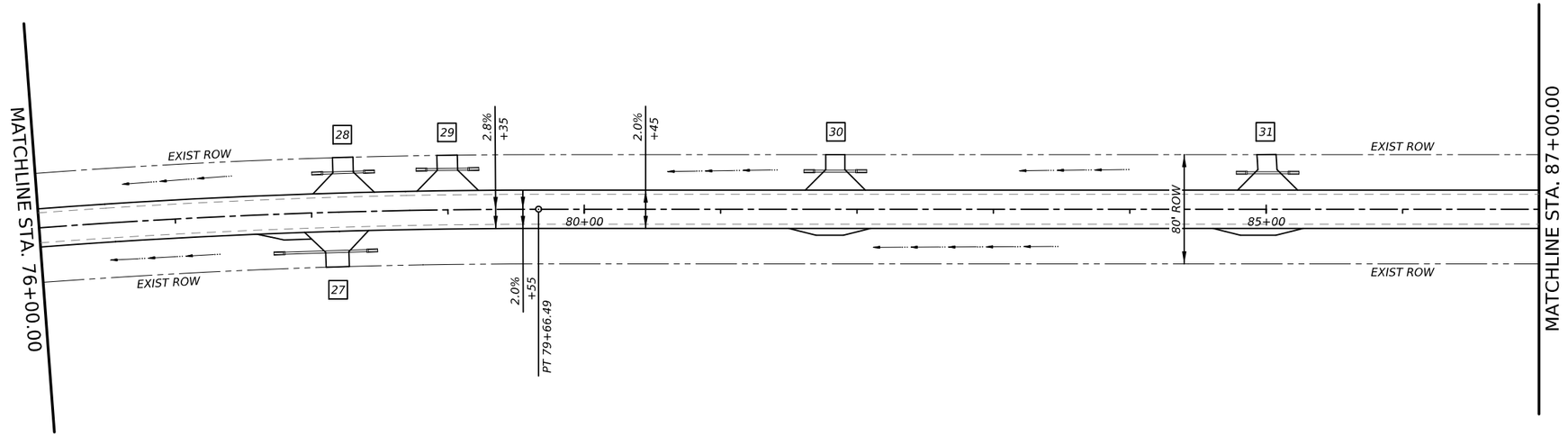


PI 67+21.60
Δ 29°44'00.0" (RT)
D 01°10'00.0"
T 1303.67'
L 2548.57'
R 4911.07'
PC 54+17.92
PT 79+66.49



LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 4 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
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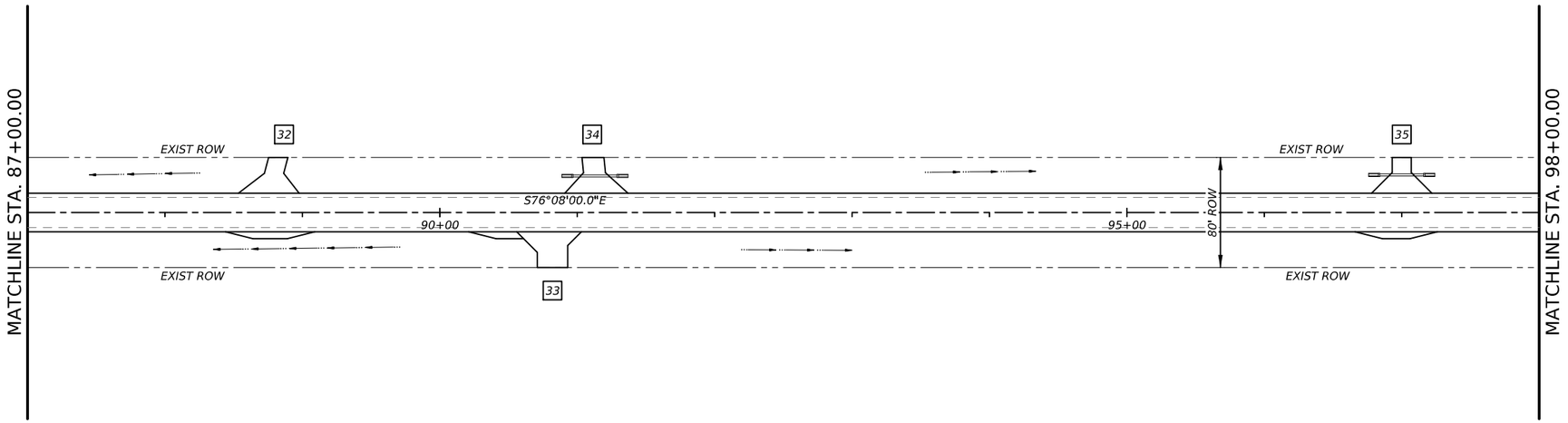

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
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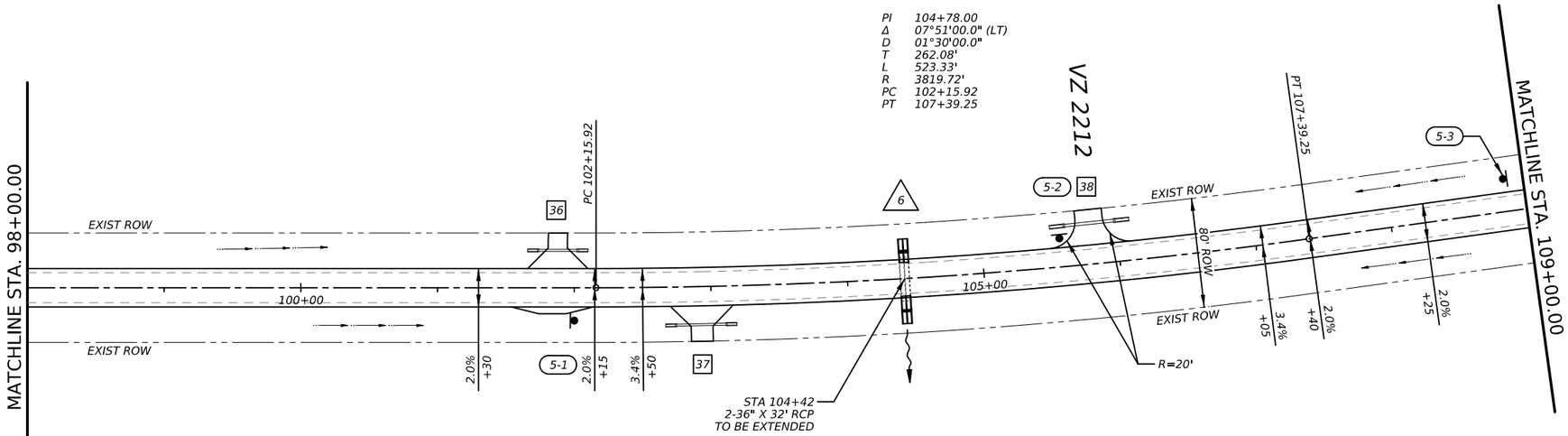
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW



TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 5 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		50

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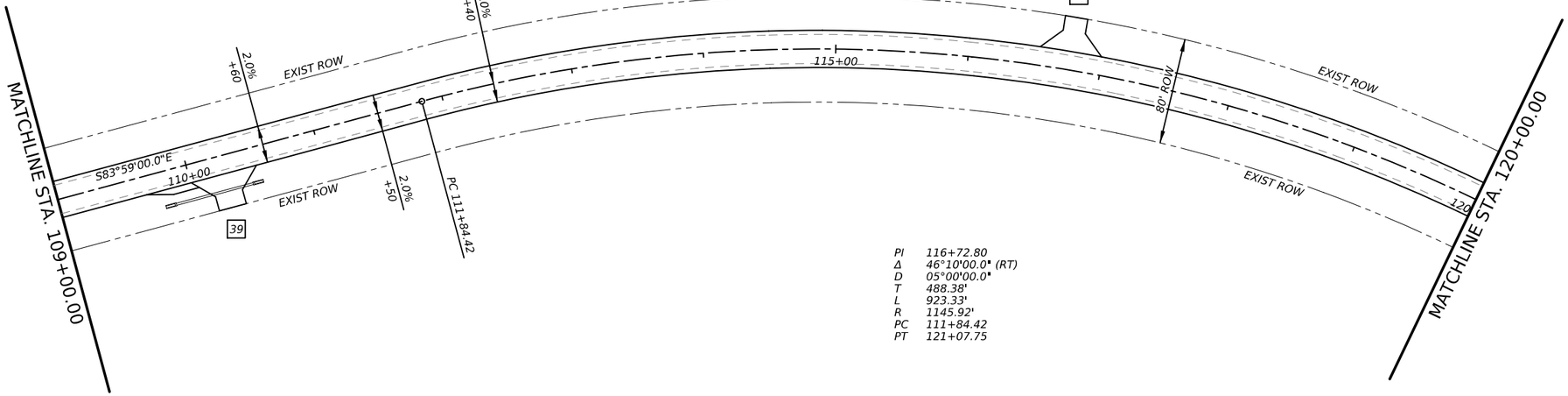
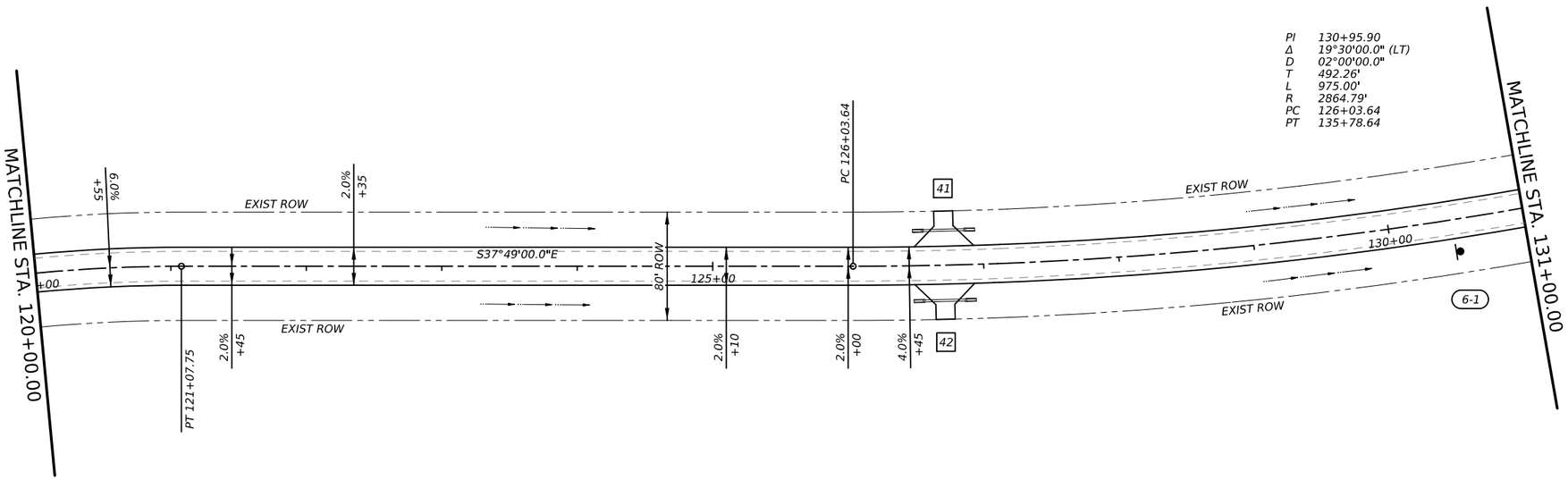


PI 116+72.80
Δ 46°10'00.0" (RT)
D 05°00'00.0"
T 488.38'
L 923.33'
R 1145.92'
PC 111+84.42
PT 121+07.75



PI 130+95.90
Δ 19°30'00.0" (LT)
D 02°00'00.0"
T 492.26'
L 975.00'
R 2864.79'
PC 126+03.64
PT 135+78.64

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 6 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		51

DATE: 2/16/2024 5:40:58 PM
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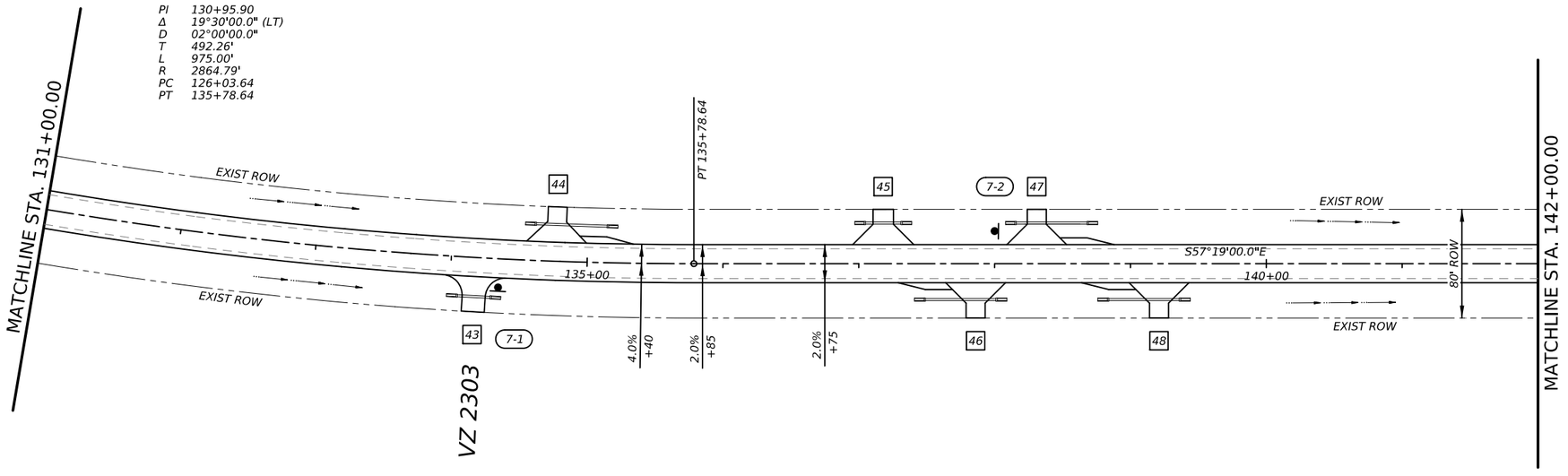

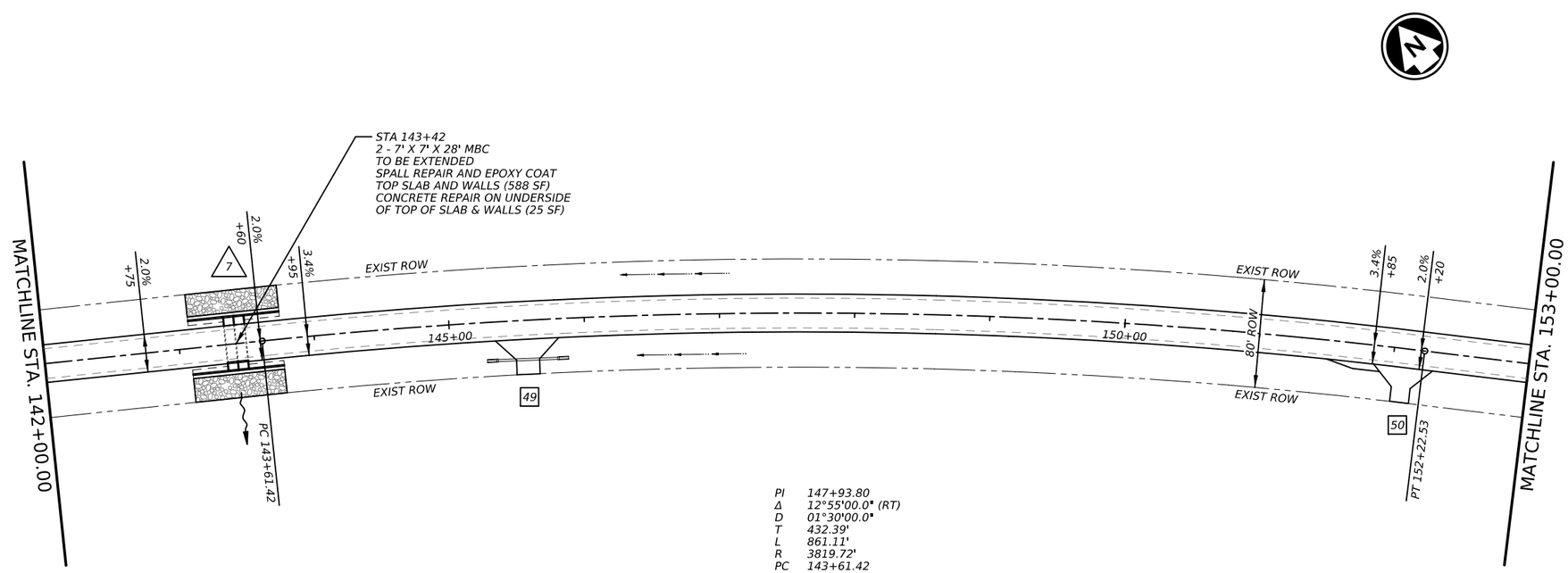

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # — DRIVEWAY/INT. ROAD NUMBER
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 7 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		52

DATE: 2/16/2024 5:41:29 PM
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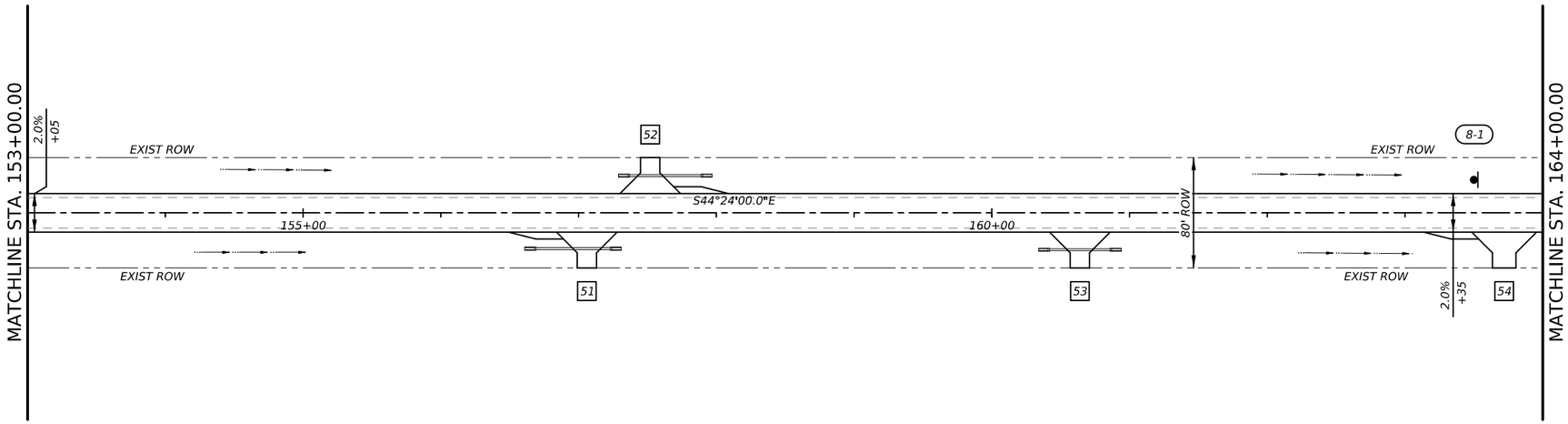

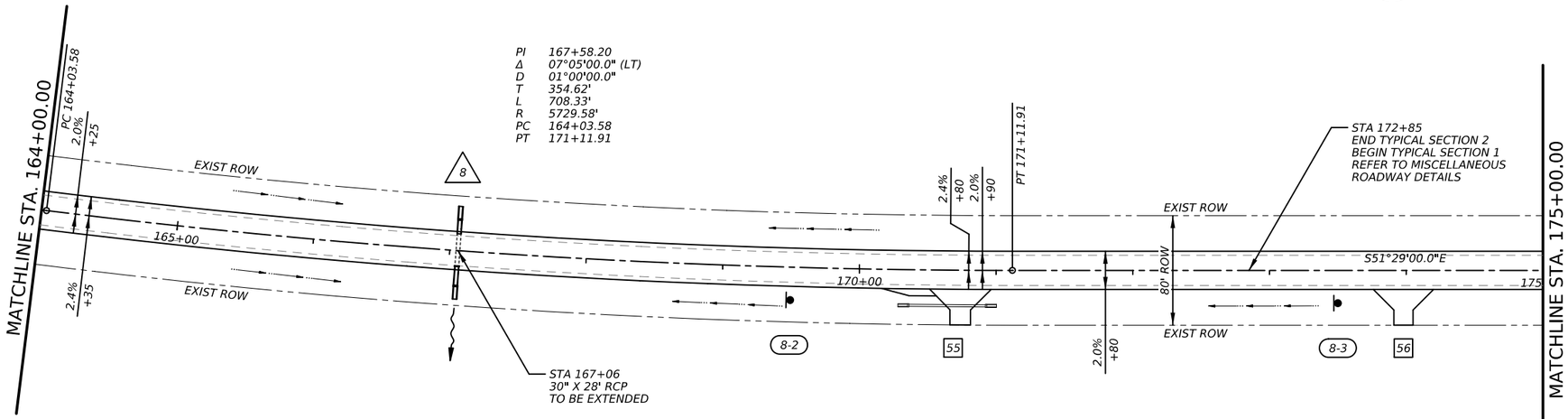

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # — DRIVEWAY/INT. ROAD NUMBER
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
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LICENSED
PROFESSIONAL ENGINEER

2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 8 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		53

DATE: 2/16/2024 5:42:02 PM
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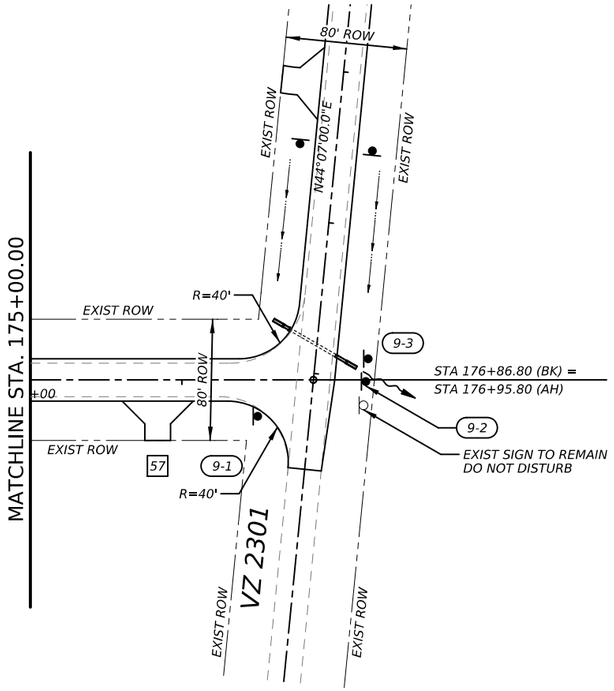

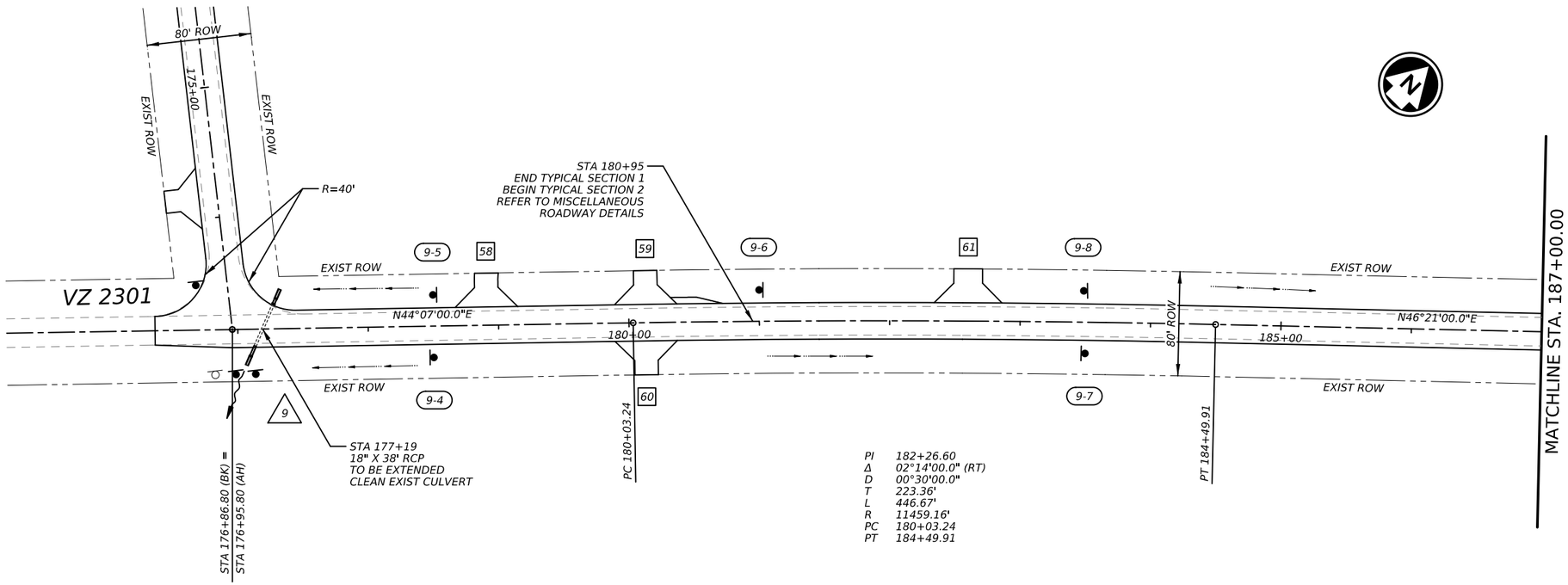

PI 182+26.60
Δ 02°14'00.0" (RT)
D 00°30'00.0"
T 223.36'
L 446.67'
R 11459.16'
PC 180+03.24
PT 184+49.91

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # — DRIVEWAY/INT. ROAD NUMBER
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
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Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 9 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		54

DATE: 2/16/2024 5:42:41 PM
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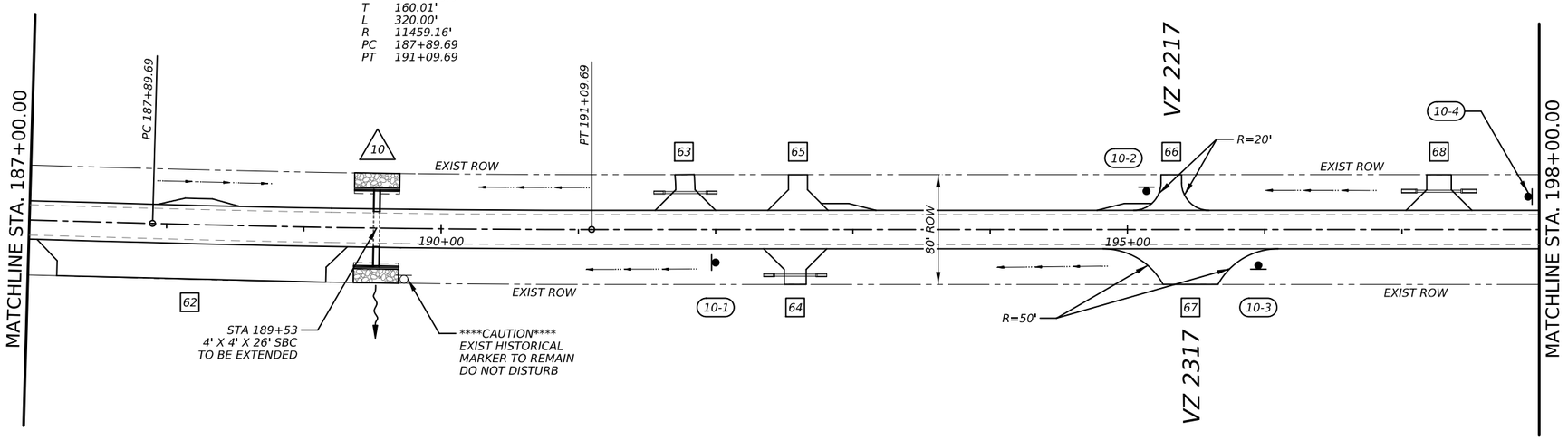

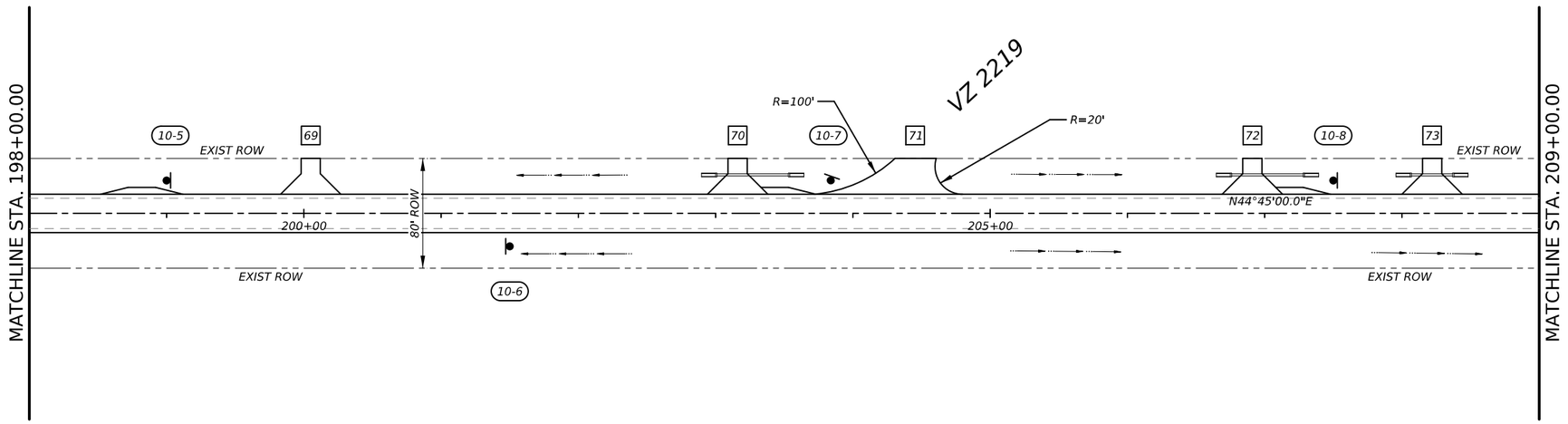

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
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Trevor L. Castilla 2/16/2024

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Texas Department of Transportation

PROJECT LAYOUT

SHEET 10 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		55

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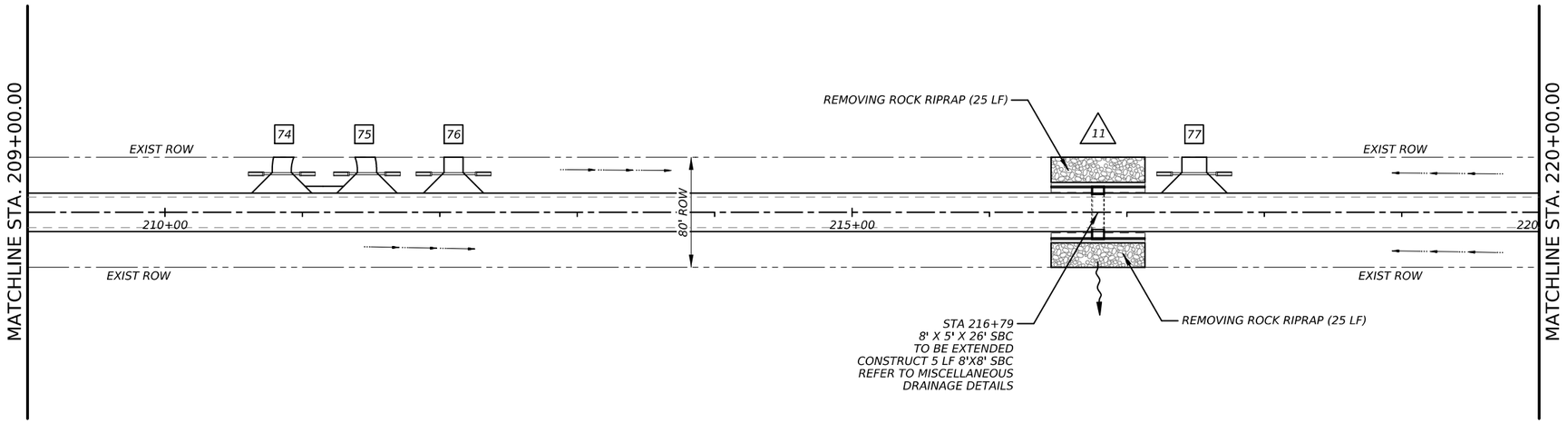
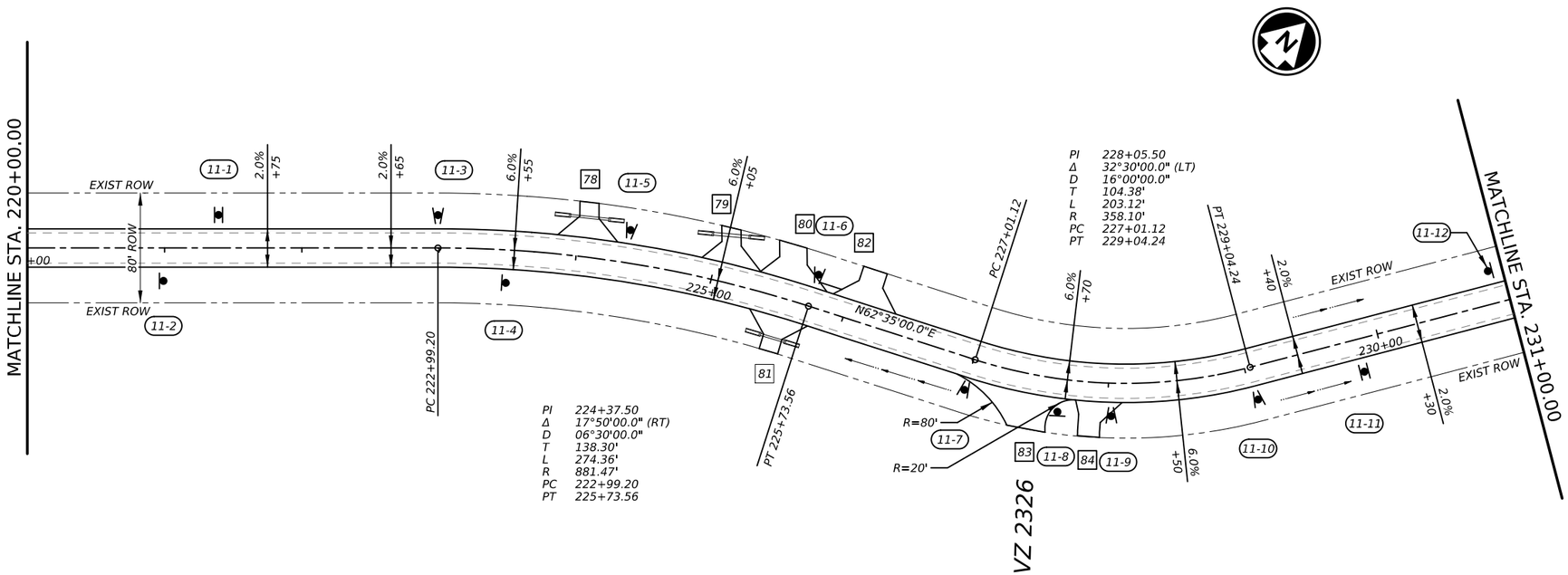


LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW



PI 224+37.50
Δ 17°50'00.0" (RT)
D 06°30'00.0"
T 138.30'
L 274.36'
R 881.47'
PC 222+99.20
PT 225+73.56

PI 228+05.50
Δ 32°30'00.0" (LT)
D 16°00'00.0"
T 104.38'
L 203.12'
R 358.10'
PC 227+01.12
PT 229+04.24

STATE OF TEXAS
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85405
LICENSED
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2/16/2024

0 50' 100'
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Texas Department of Transportation

PROJECT LAYOUT

SHEET 11 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		56

DATE: 2/16/2024 5:43:55 PM
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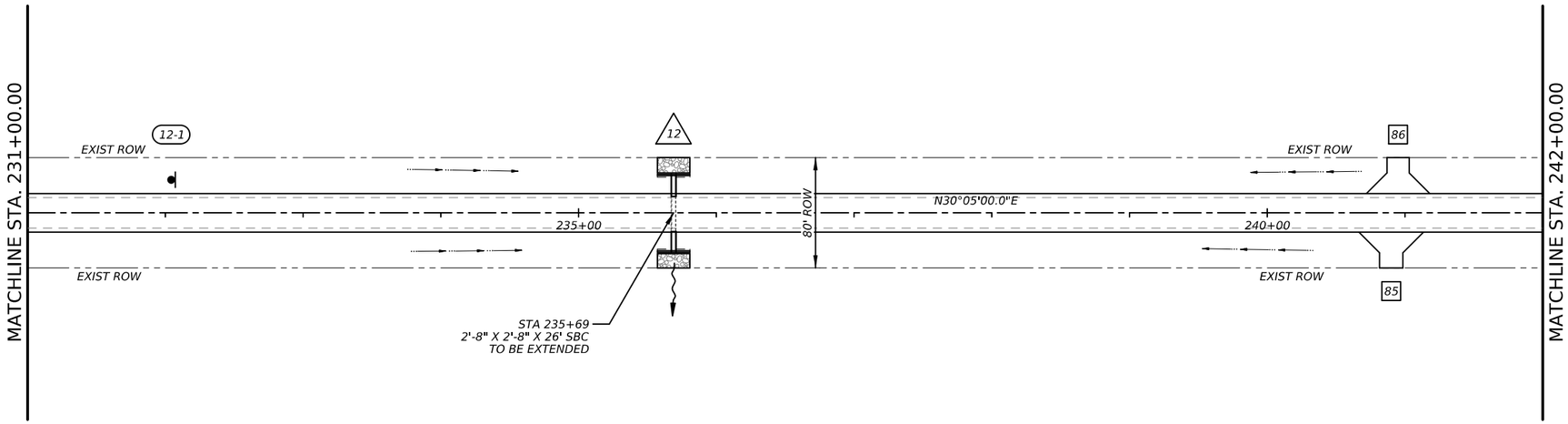

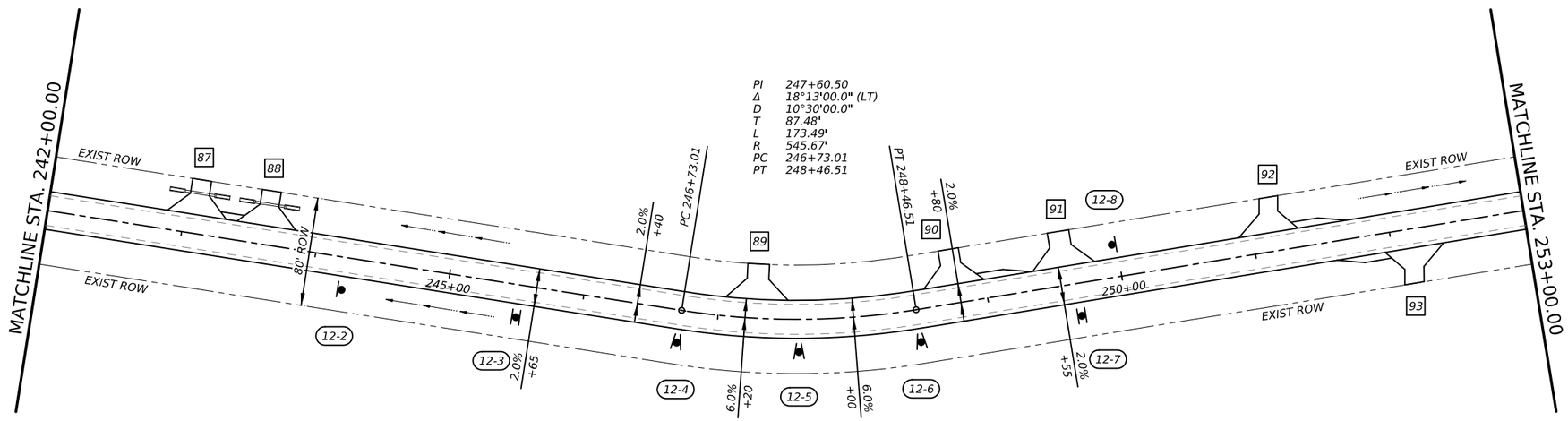

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
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2/16/2024

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Texas Department of Transportation

PROJECT LAYOUT

SHEET 12 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		57

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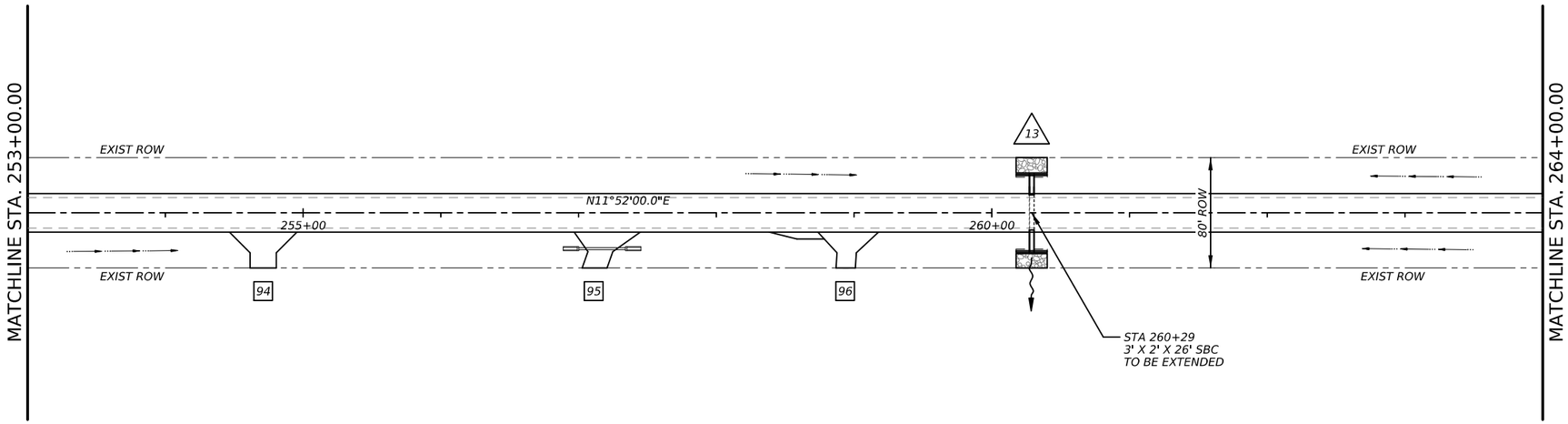
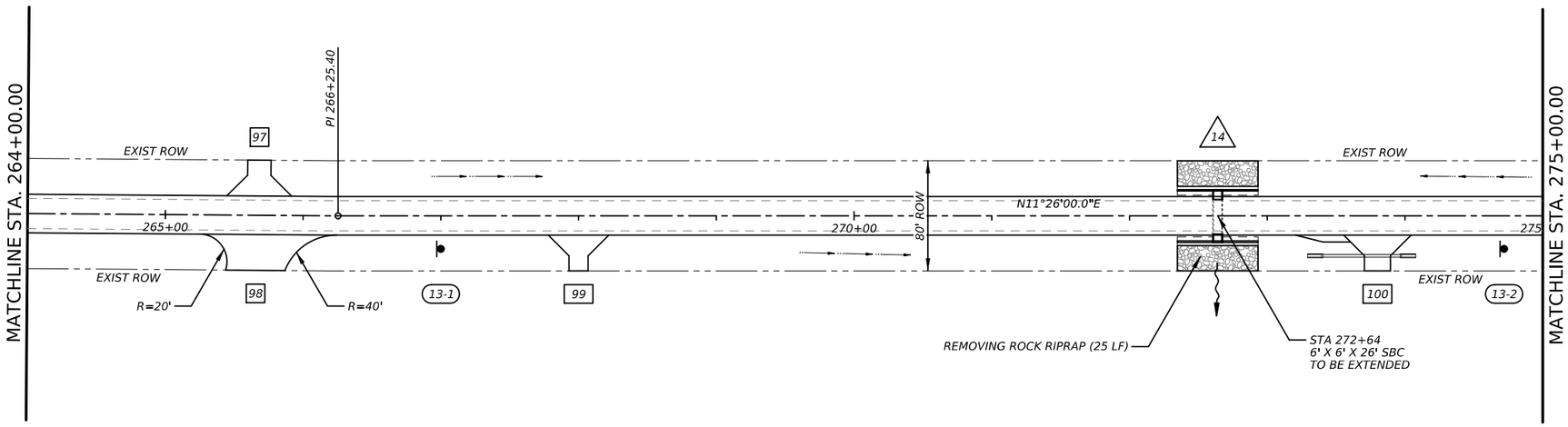


LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW



STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 13 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		58

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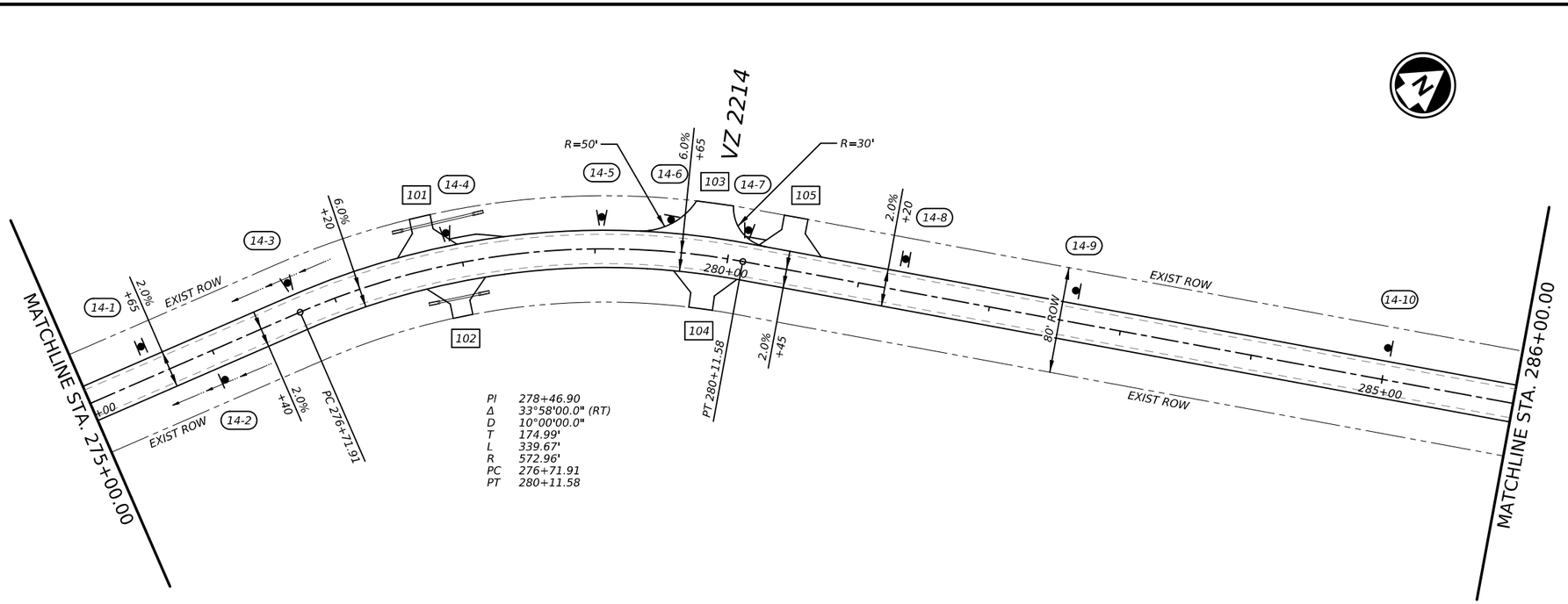

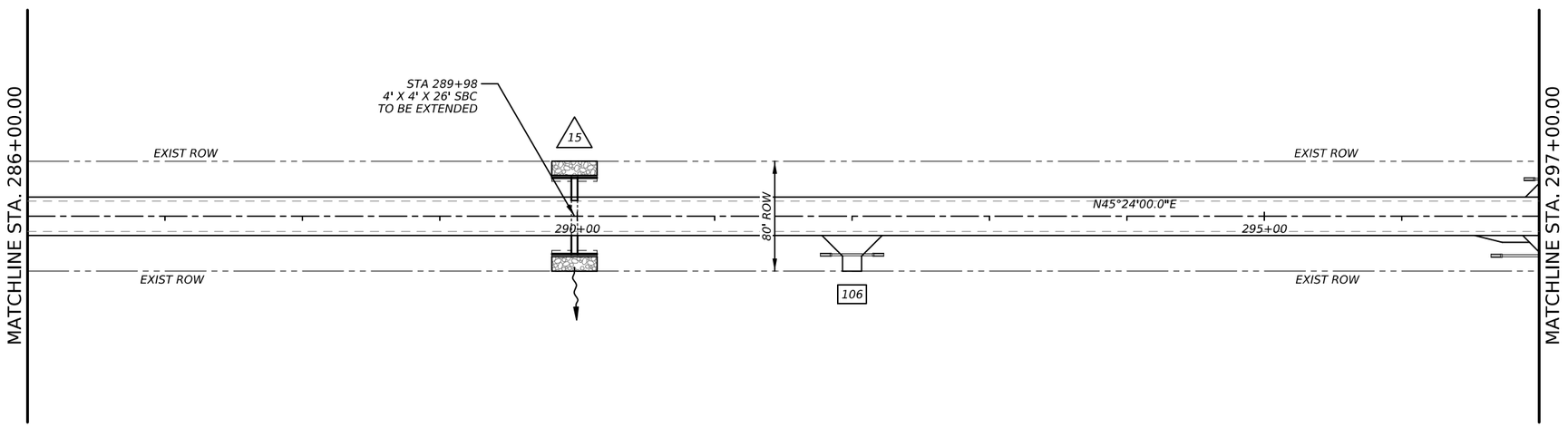

LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # — DRIVEWAY/INT. ROAD NUMBER
- #-# — SMALL SIGN NUMBER
- # — CROSS CULVERT NUMBER
- DITCH FLOW

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 14 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		59

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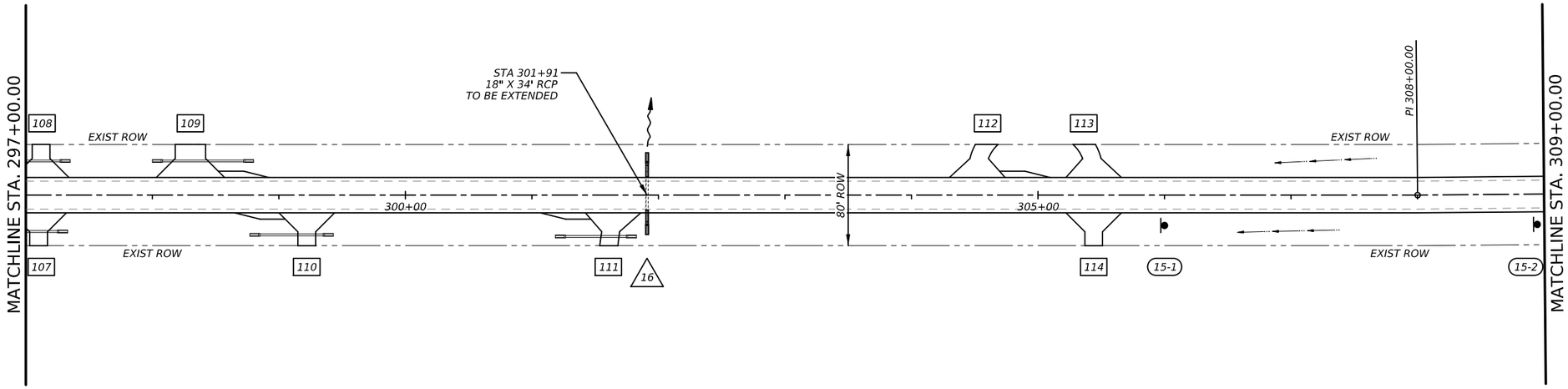
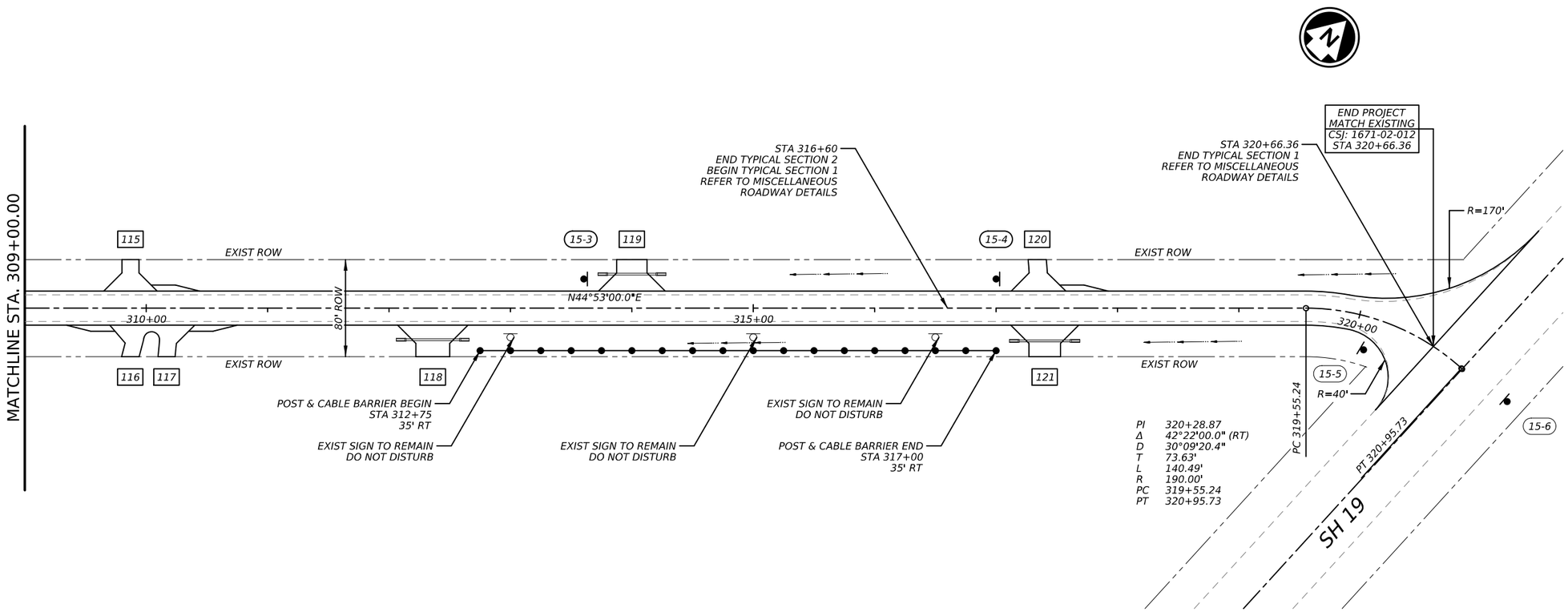


LEGEND

- ℄ ROAD - FM 1651
- EXISTING ROAD
- EXISTING ROW
- PROPOSED ROAD/DRIVEWAY
- OUTFALL DIRECTION
- # DRIVEWAY/INT. ROAD NUMBER
- #-# SMALL SIGN NUMBER
- # CROSS CULVERT NUMBER
- DITCH FLOW



PI	320+28.87
Δ	42°22'00.0" (RT)
D	30°09'20.4"
T	73.63'
L	140.49'
R	190.00'
PC	319+55.24
PT	320+95.73

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

0 50' 100'
SCALE IN FEET

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

PROJECT LAYOUT

SHEET 15 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		60

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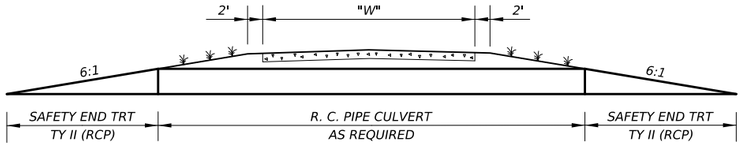
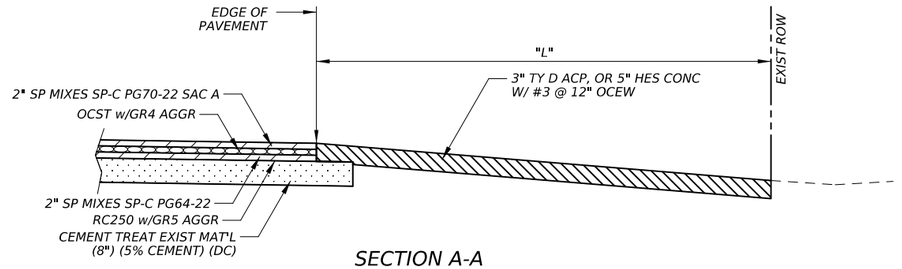


TYPICAL SECTION
FOR DRIVEWAY INSTALLATION (RURAL)
N.T.S.



SECTION A-A
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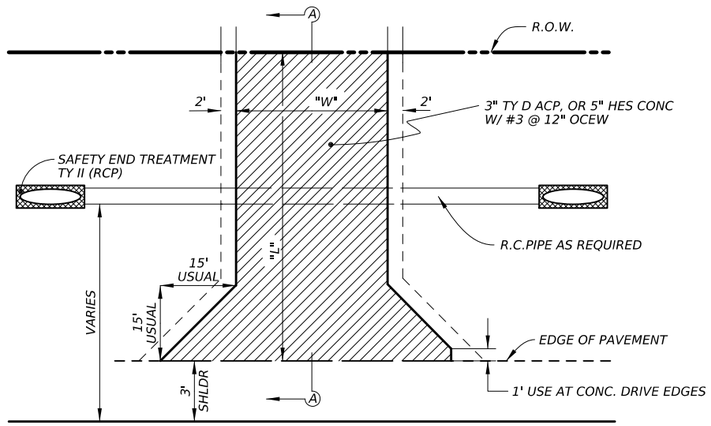
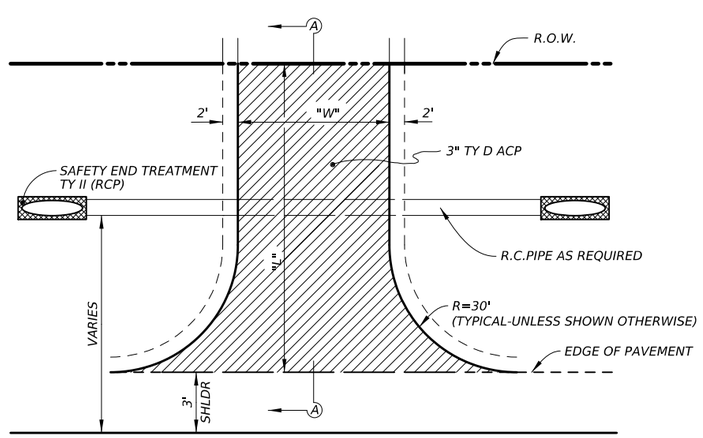


TYPICAL DRIVEWAY DETAIL
(FOR UNCURBED PAVEMENT)(RURAL)
N.T.S.

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



TYPICAL COUNTY ROAD INTERSECTION LAYOUT DETAIL
(FOR UNCURBED PAVEMENT)(RURAL)
N.T.S.

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

STATE OF TEXAS
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2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS ROADWAY DETAILS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		61

DATE: 2/16/2024 5:46:46 PM
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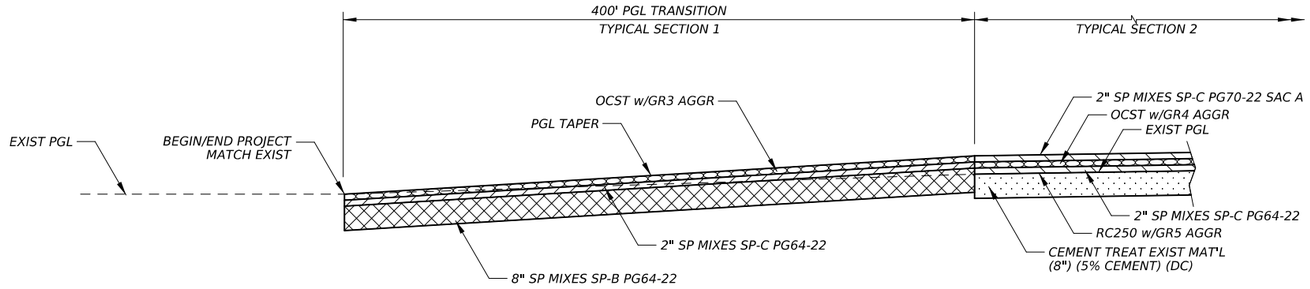

PGL TAPER AT BEGIN, END, & VZ 2301 INTERSECTION

N.T.S.

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DATE: 2/16/2024 5:47:15 PM
FILE: FM1651_DET_TAPER.dgn

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS ROADWAY DETAILS

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		62

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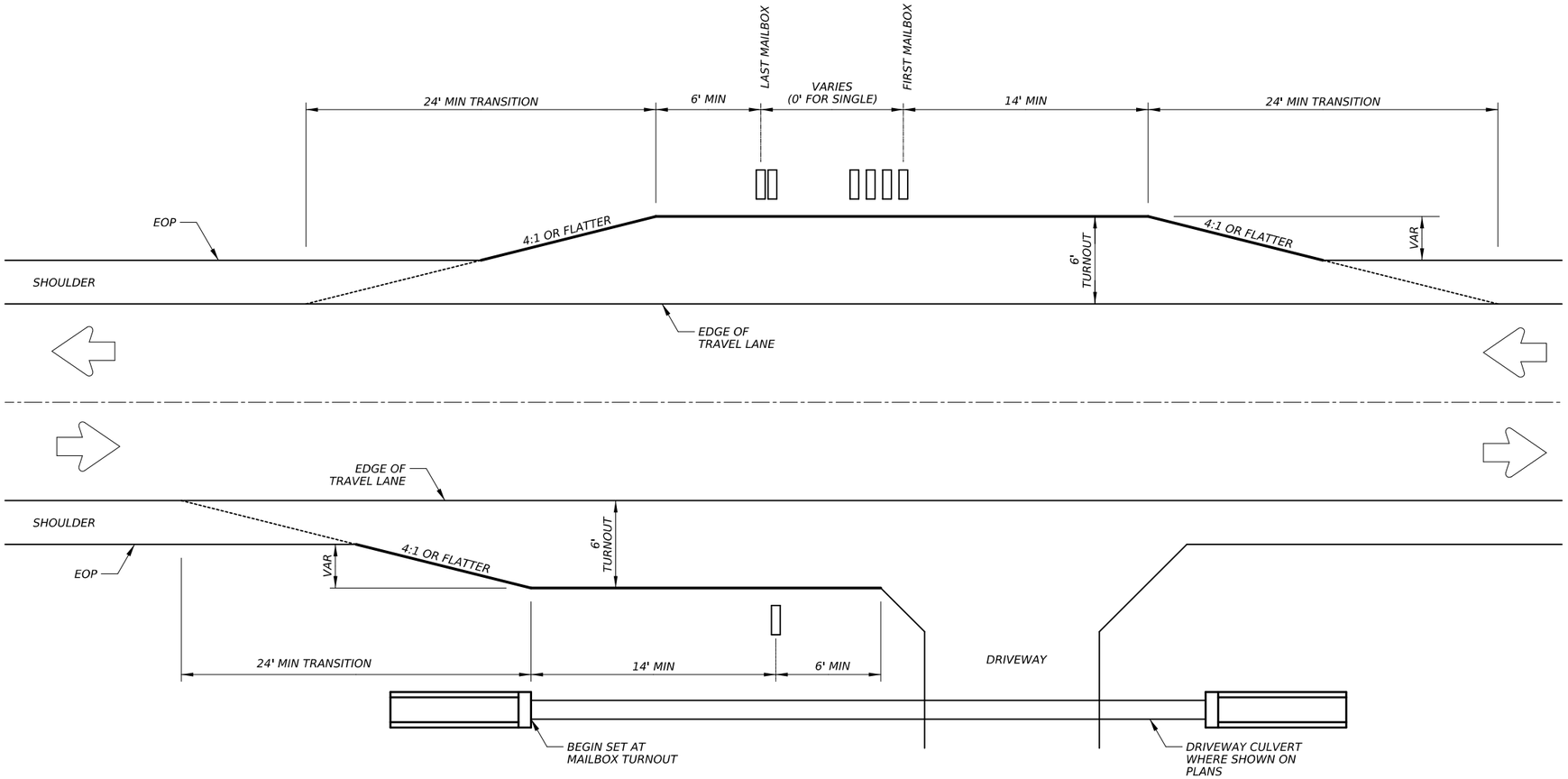
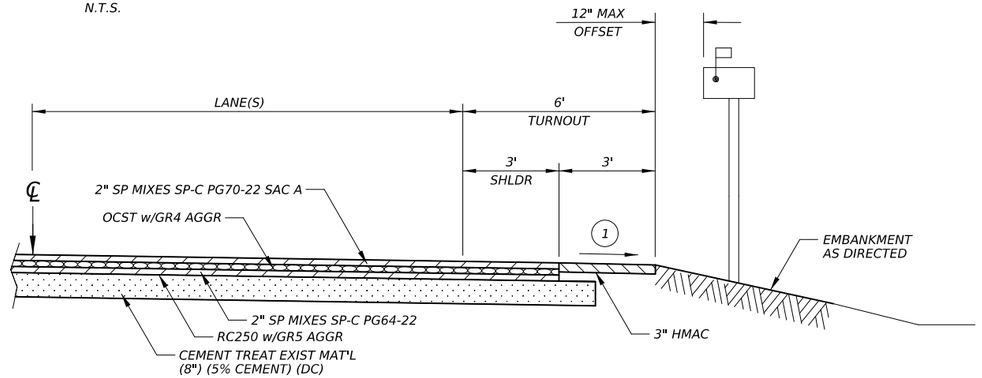


TYPICAL MAILBOX TURNOUT

N.T.S.



(1) MATCH SHOULDER SLOPE

TYPICAL SECTION

N.T.S.

DATE: 2/16/2024 5:47:49 PM
FILE: FM1651_DET_MBTO.dgn

STATE OF TEXAS
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85405
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2/16/2024

TBPE REGISTRATION NO. F-16341

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MISCELLANEOUS ROADWAY DETAILS

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		63

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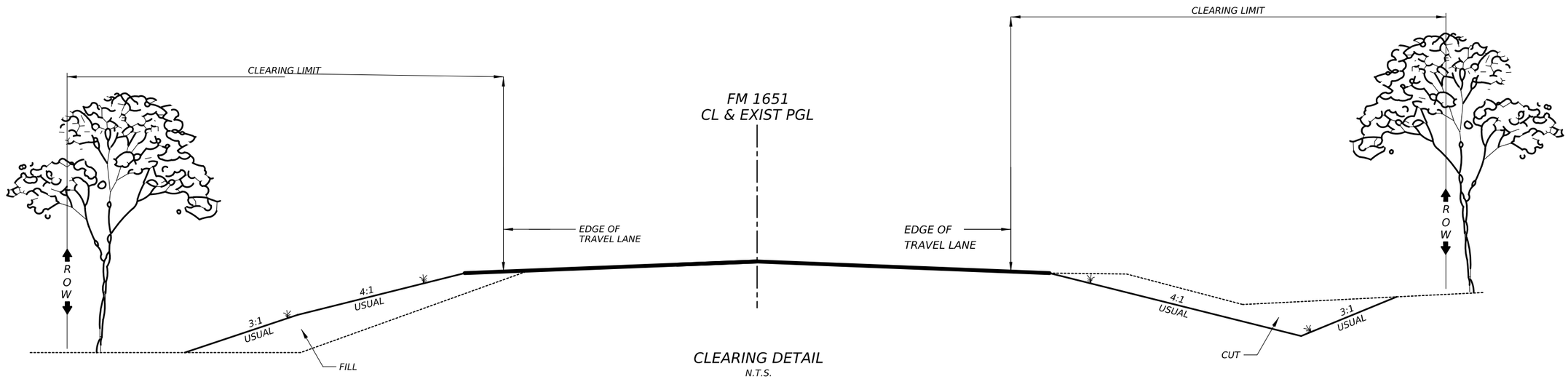
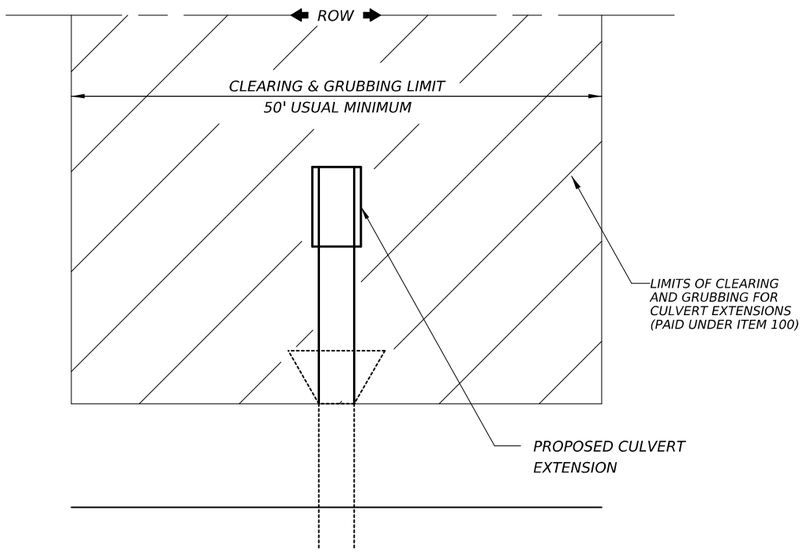


CLEARING DETAIL
N.T.S.



FM 1651

CLEARING AND GRUBBING DETAIL
N.T.S.

PREPARING ROW DETAILS

NOTES

1) PAYMENTS WILL BE MADE AT THE UNIT BID PRICE FOR PREPARING RIGHT OF WAY BY THE STATION. STATION LIMITS WILL BE SHOWN ELSEWHERE IN THE PLANS. ALL TRIMMING APPLIES TO BOTH SIDES OF THE ROADWAY
2) ALL TREE LIMBS EXTENDING INTO THE ROW SHALL BE REMOVED, UNLESS OTHERWISE SHOWN IN PLANS. VERTICAL CLEARING LIMITS ARE FROM NATURAL GROUND THROUGH TOP OF TREE OR AS DIRECTED.
3) CLEARING OPERATIONS SHALL BE PERFORMED IN ACCORDANCE TO ITEM 100, "PREPARING RIGHT OF ROW", EXCEPT THOSE SHOWN BY THESE DETAILS.
4) REMOVE OBSTRUCTIONS NOT DESIGNATED FOR PRESERVATIONS TO 2 FT BELOW NATURAL GROUND IN AREAS FOR EMBANKMENT.
5) REMOVE OBSTRUCTION TO 2 FT BELOW THE EXCAVATION LEVEL IN AREAS TO BE EXCAVATED.
6) WHERE STEEP SLOPES MAKE GRINDING OPERATIONS IMPRACTICAL, THE CONTRACTOR MAY CUT THE OBSTRUCTION AT GROUND LEVEL WITH WRITTEN APPROVAL FROM THE ENGINEER.
7) LOG STOCKPILES WITHIN TxDOT ROW ARE NOT ALLOWED.
8) NO MORE THAN 4" OF MULCH TO REMAIN.

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

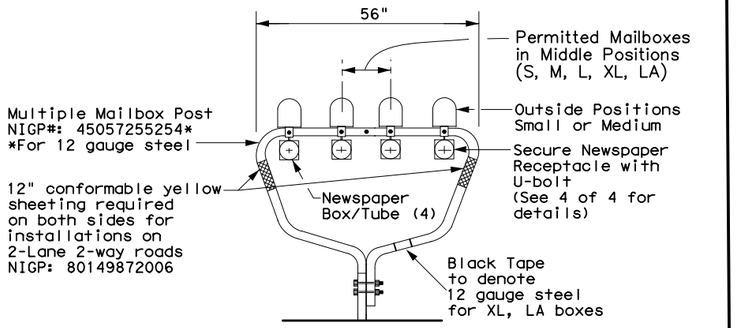
MISCELLANEOUS ROADWAY DETAILS

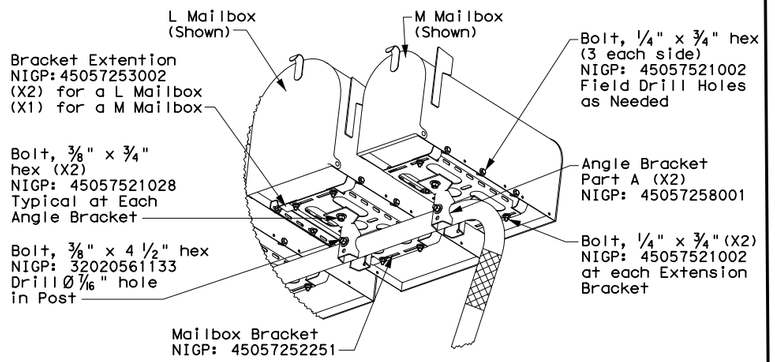
SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		64

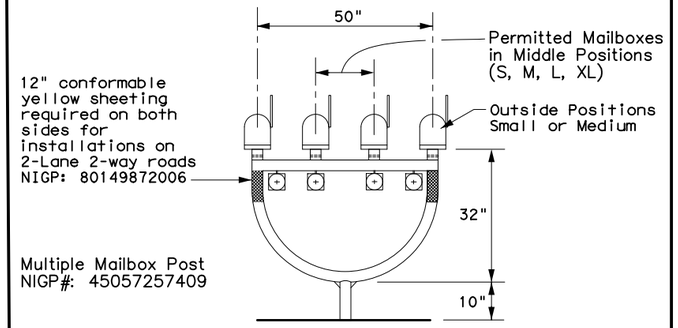
DATE: 2/16/2024 5:48:18 PM
FILE: FM1651_DET_PREP ROW.dgn

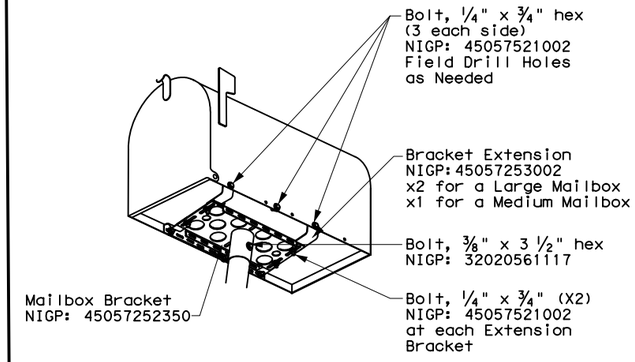
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

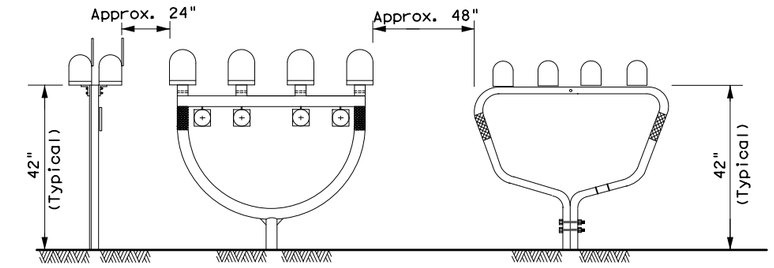
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

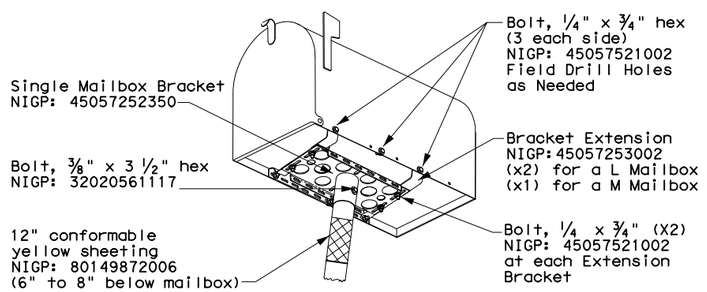
TYPICAL INSTALLATION MEASUREMENTS

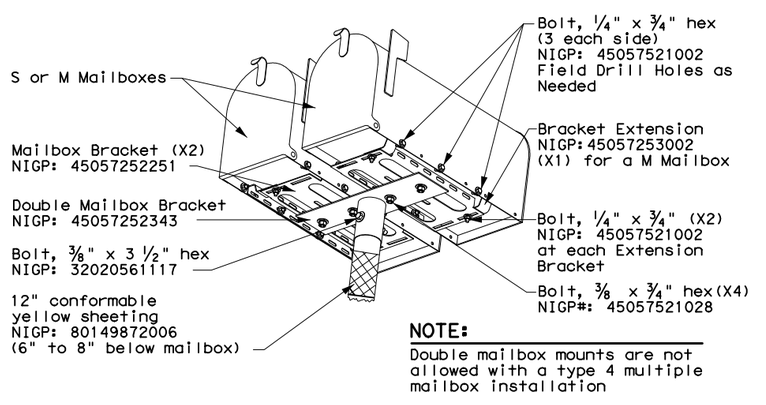


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

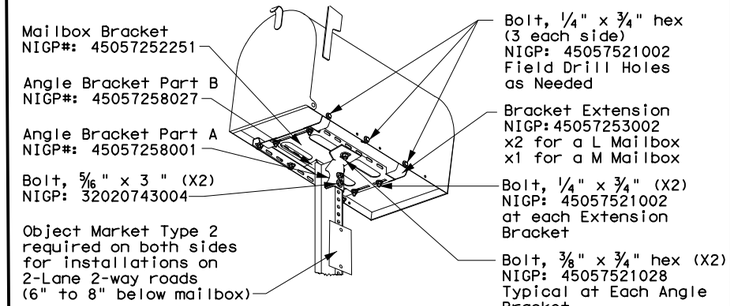


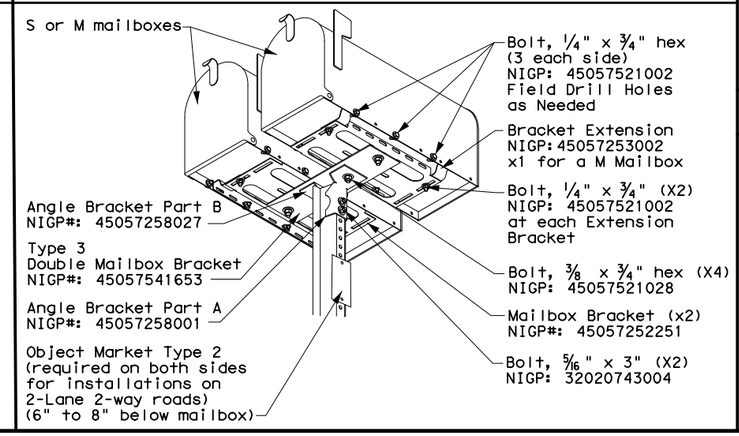


NOTE:

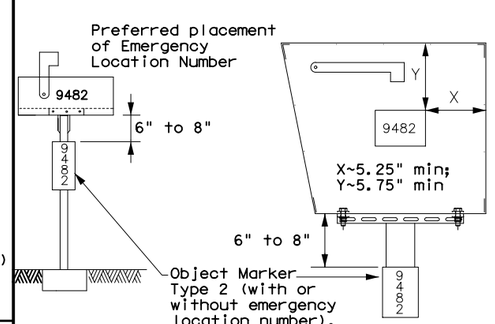
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

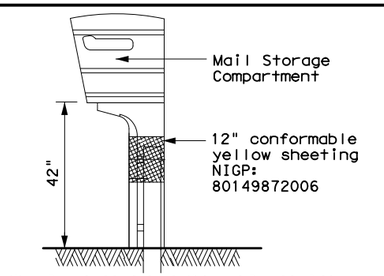


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

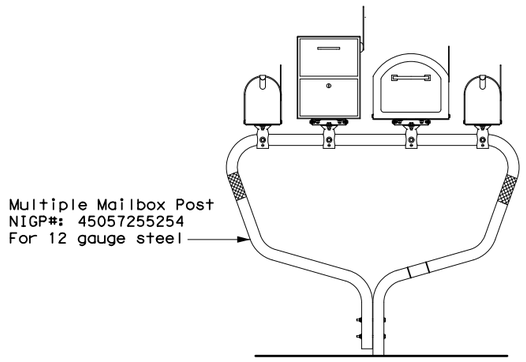
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

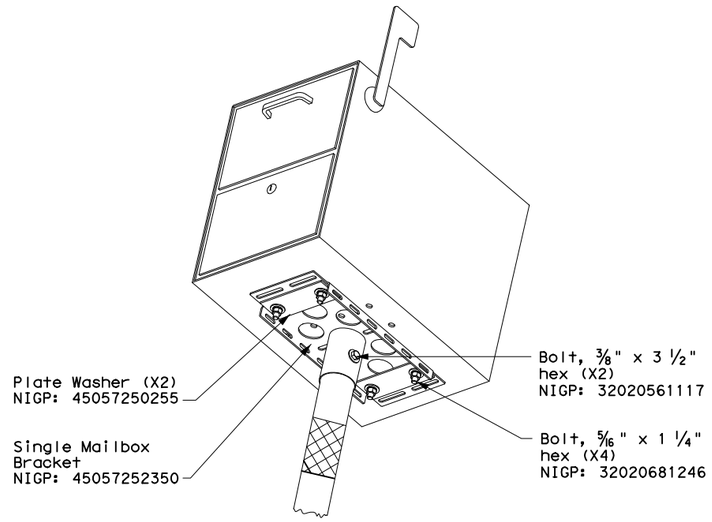
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		65

DATE: 2/16/2024 5:48:48 PM
FILE: mb-21(1).dgn

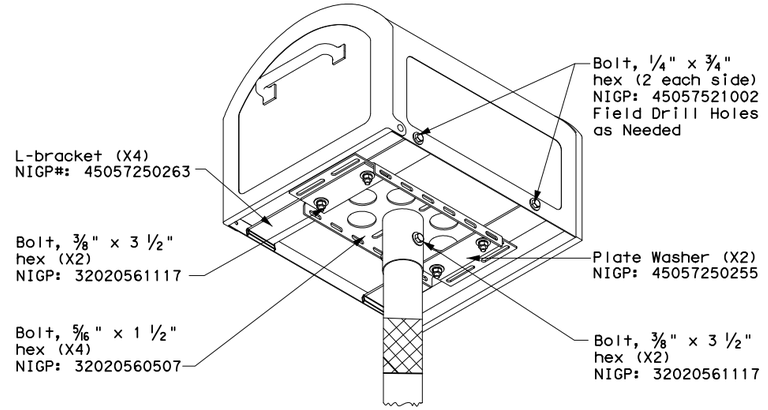
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

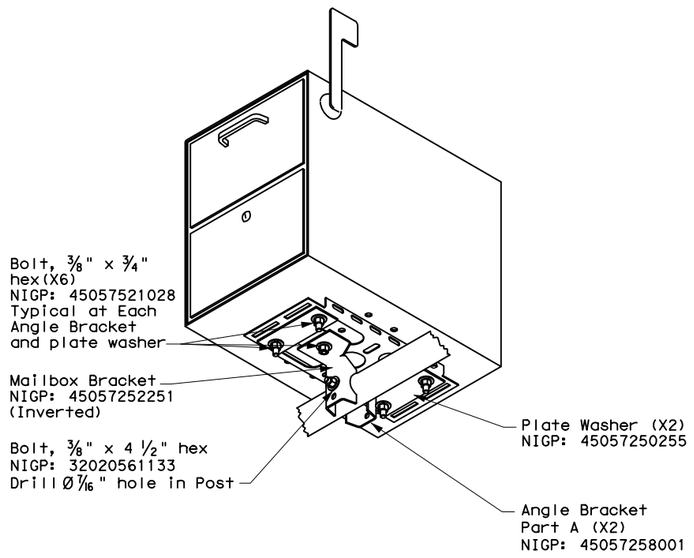


TYPE 2/4 - SINGLE XL MAILBOX

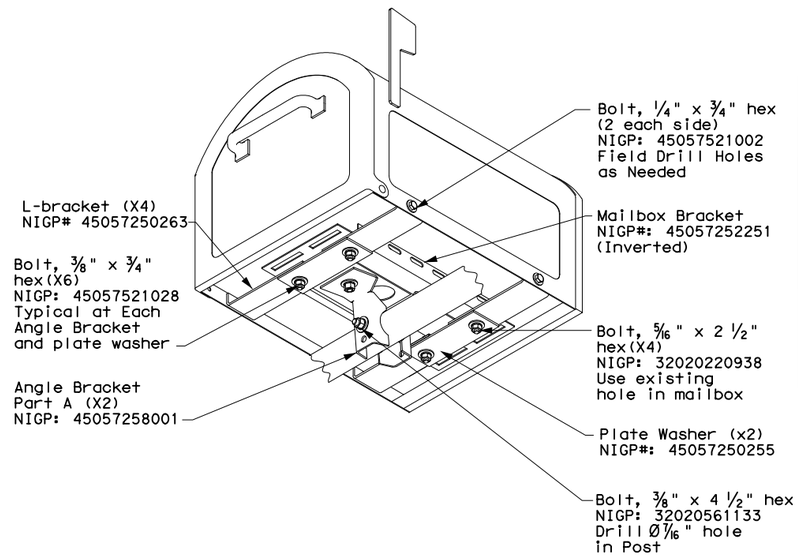


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

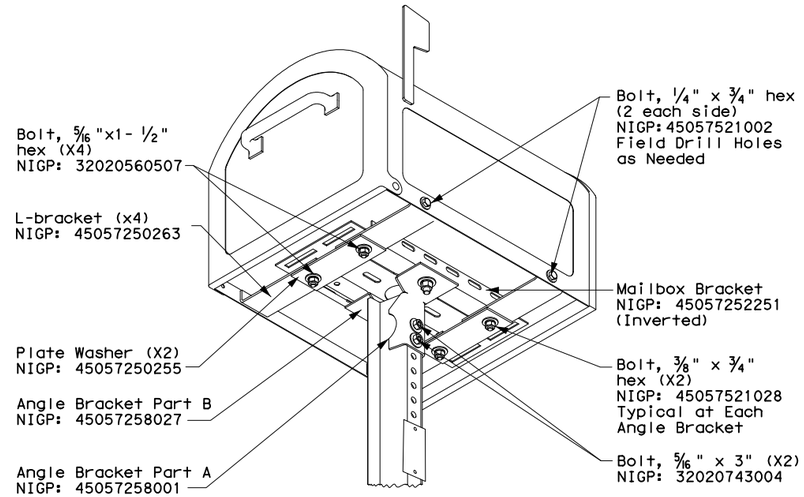
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation — Maintenance Division Standard

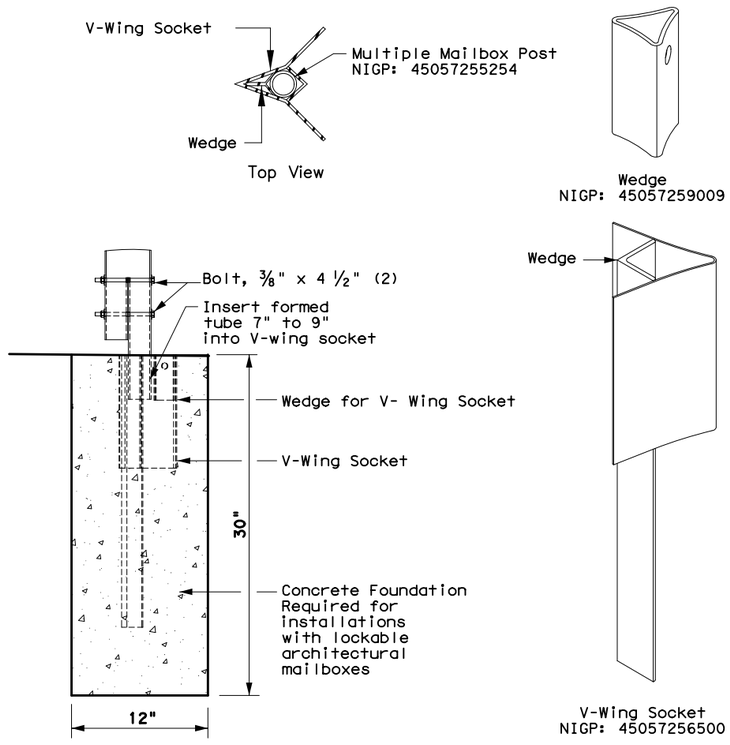
XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

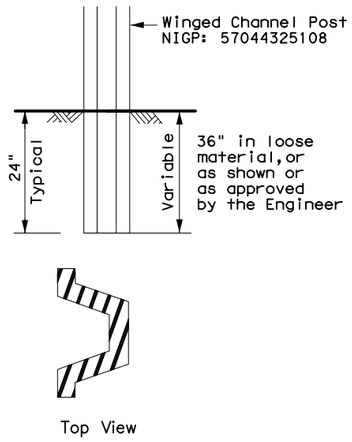
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		66

DATE: 2/16/2024 5:48:48 PM
FILE: mb-21(1).dgn

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

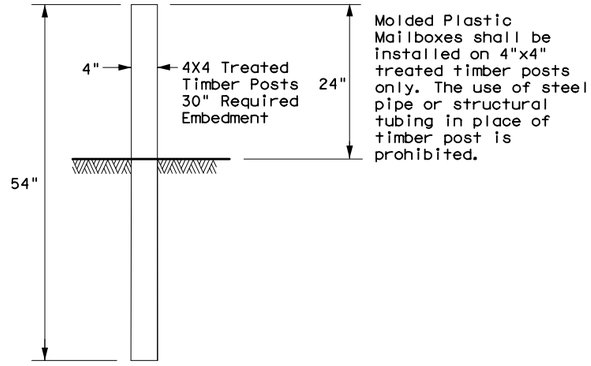


TYPE 3 - SUPPORT/FOUNDATION

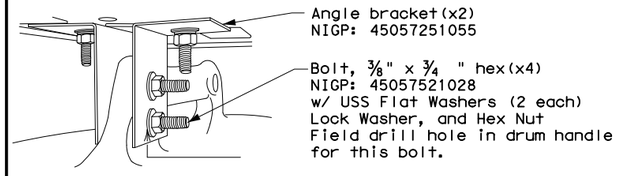


NOTES:
1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

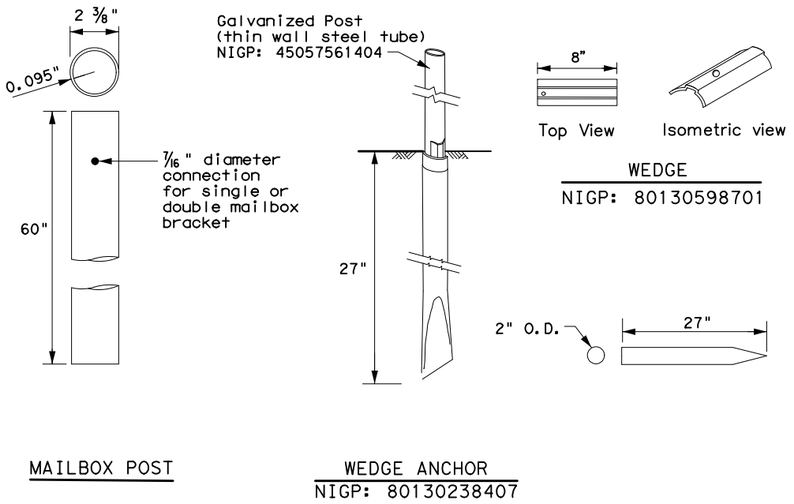


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

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

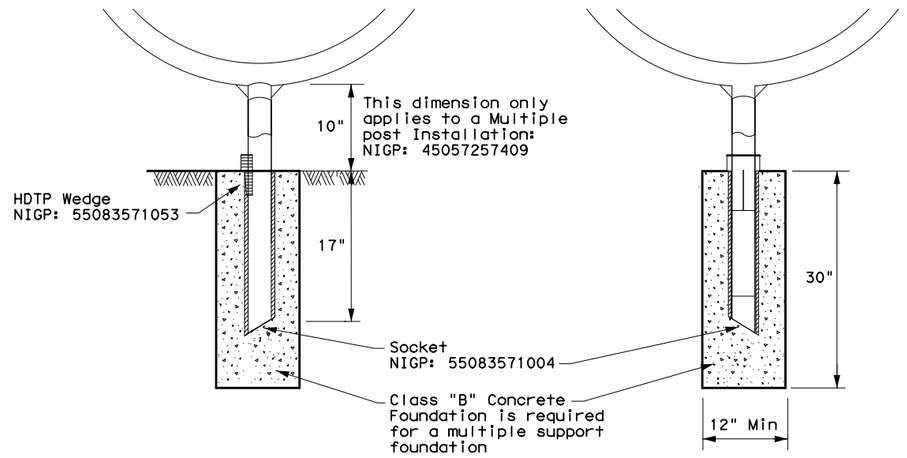
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

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



SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

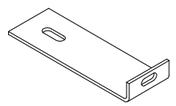
MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

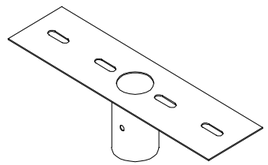
FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		67

DATE: 2/16/2024 5:48:49 PM
FILE: mb-21(1).dgn

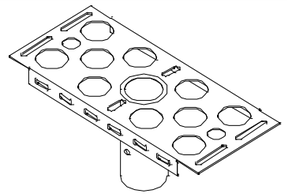
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



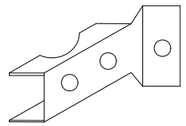
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



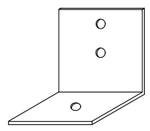
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



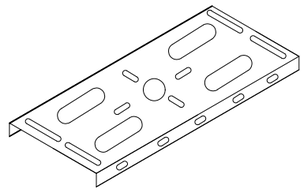
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



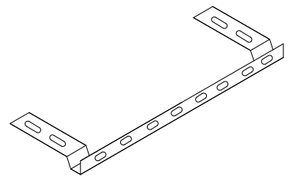
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



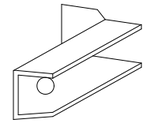
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



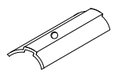
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



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



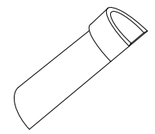
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



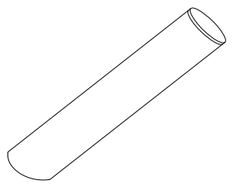
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

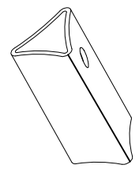


NIGP: 55083571053
Type 4 Mailbox Wedge

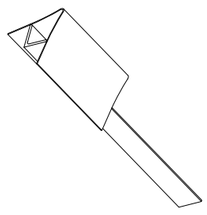


NIGP: 55083571004
Type 4 Mailbox Socket

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

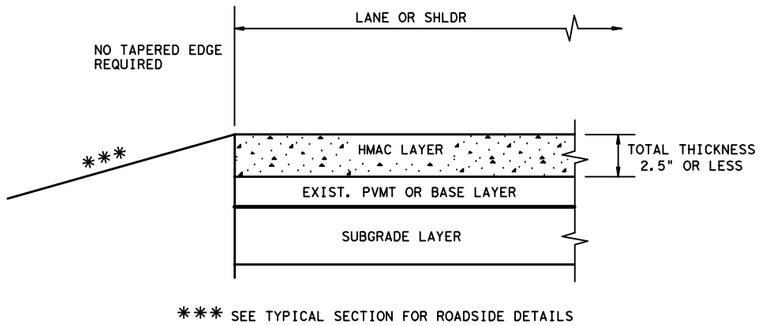
DATE: 2/16/2024 5:48:49 PM
FILE: mb-21(1).dgn

Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

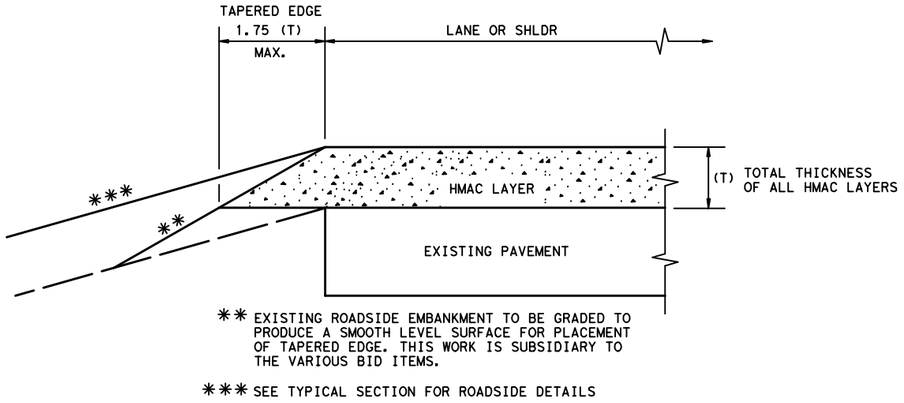
MB(4)-21

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	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		68



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

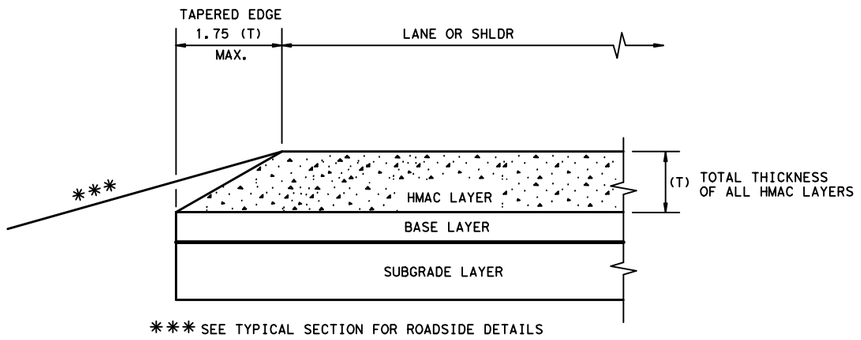
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

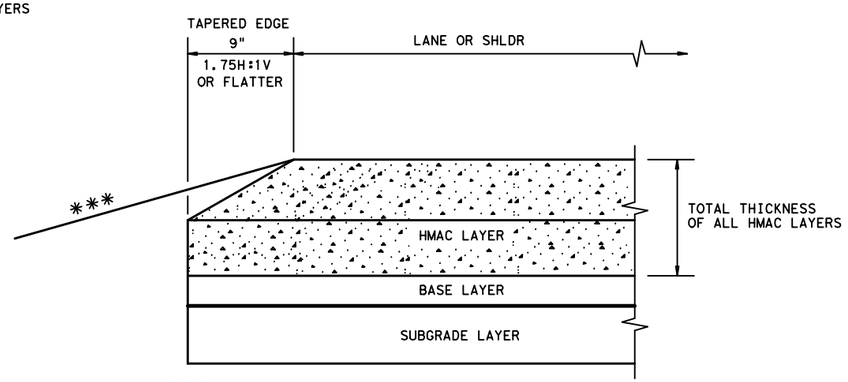
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

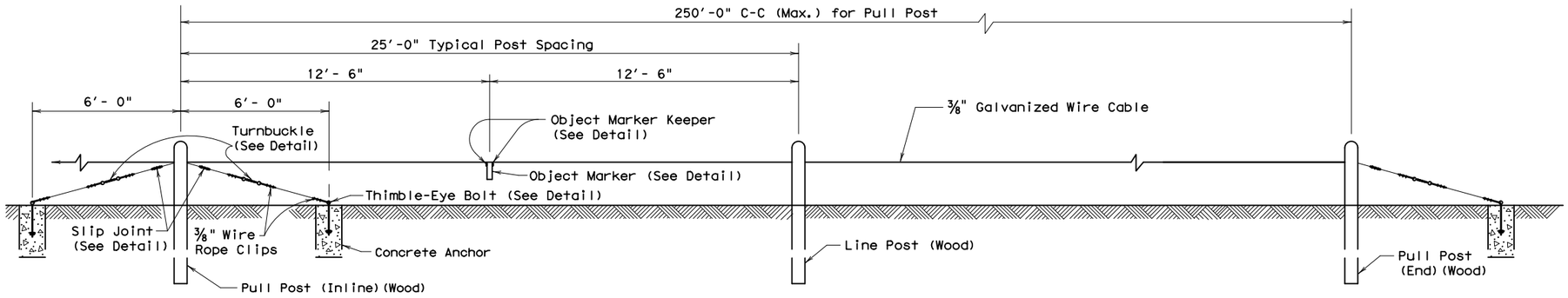
Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

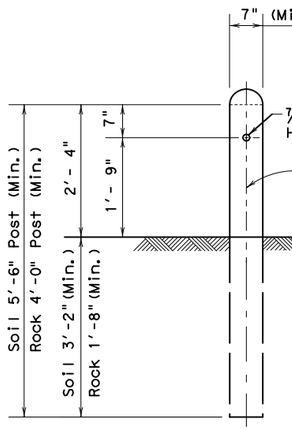
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		69

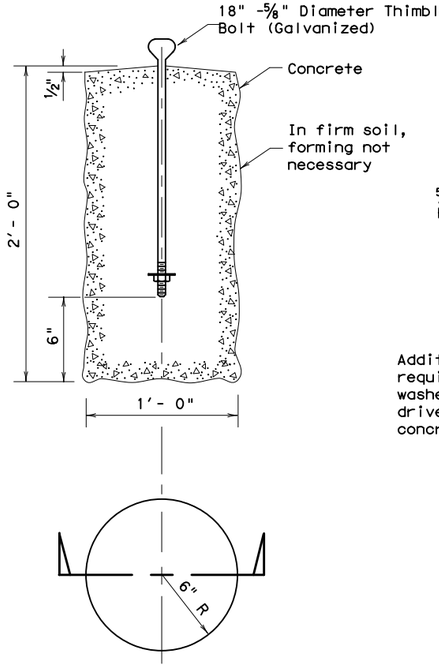
DATE: 2/16/2024
FILE: tehmac11.dgn



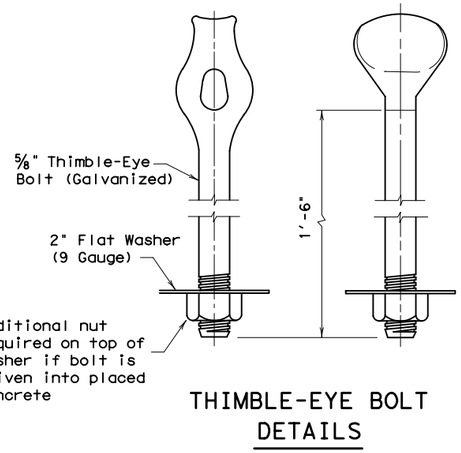
WOOD POST & CABLE UNIT



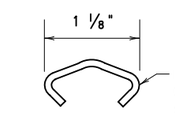
WOOD POST DETAIL



CONCRETE ANCHOR DETAILS

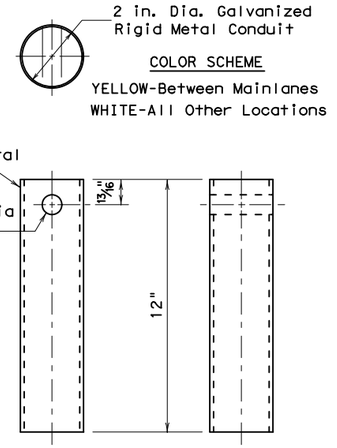


THIMBLE-EYE BOLT DETAILS



Clamp keepers on both sides of Reflector as shown above.

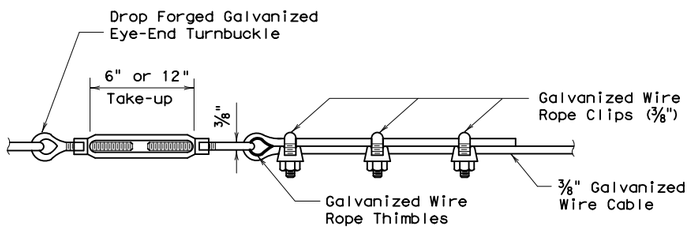
OBJECT MARKER KEEPER DETAIL



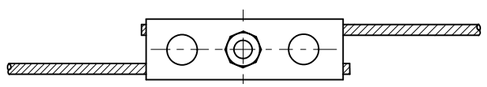
OBJECT MARKER (Reflector Detail)

GENERAL NOTES

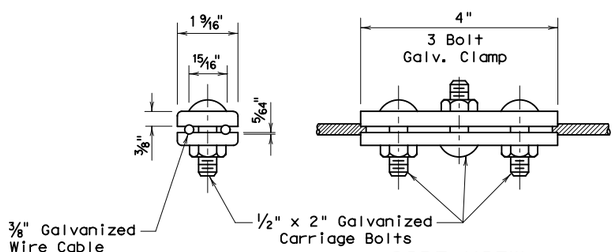
1. Furnish Class "B" or better concrete in accordance with Item 421, "Hydraulic Cement Concrete". Cure concrete anchors at least five (5) days before attaching the cable.
2. Furnish galvanized cable fittings in accordance with the Item 445, Galvanizing.
3. Furnish posts meeting the requirements of DMS 7200, "Timer Posts and Blocks for Metal Beam Guard Fence." Do not use painted timber posts.
4. Cover the entire surface of object marker (reflector) with a reflectorized sheeting material conforming to Departmental Material Specification DMS 8300, "Sign Face Materials", Type C.
5. Furnish cable conforming to ASTM designation A475.



WIRE CABLE CONNECTION (at turnbuckles & eyebolts) DETAIL



TOP VIEW



SIDE VIEW

SLIP JOINT DETAIL

LEVELS DISPLAYED

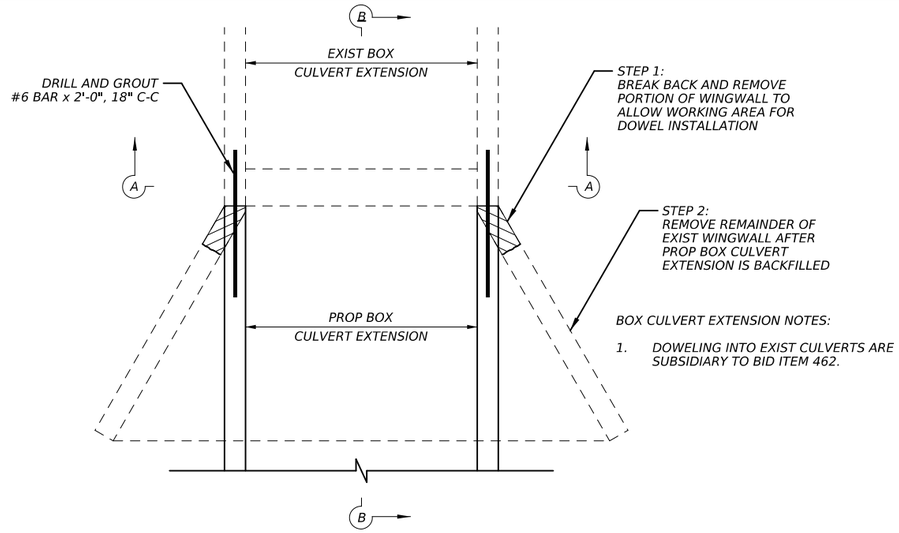
1	3	4	5	6	7	8	9	10	11	21	31	41	51	61		
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

Texas Department of Transportation
Maintenance Division

POST & CABLE FENCE

PCF-05

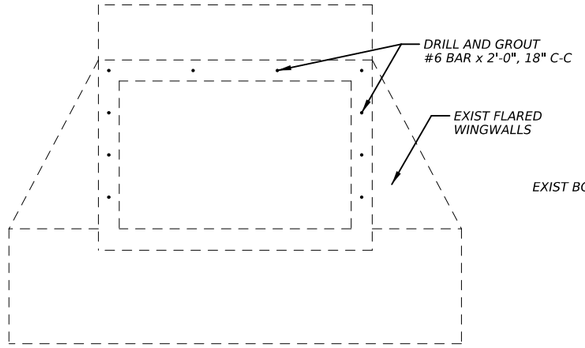
FILE: pcf05.dgn	DN:	CK:	DW: LJB	CK: JG	NEG:	
© TxDOT FEB. 2005	DIST	FED REG	FEDERAL AID PROJECT #			SHEET
REVISIONS 2/02 Rev.Design Div. PCF-99	TYL	6				70
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	VAN ZANDT		1671	02	012	FM 1651



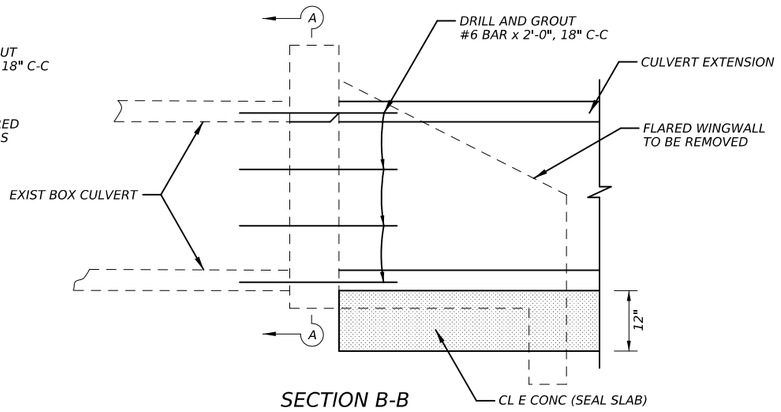
BOX CULVERT EXTENSION NOTES:

1. DOWELING INTO EXIST CULVERTS ARE SUBSIDIARY TO BID ITEM 462.

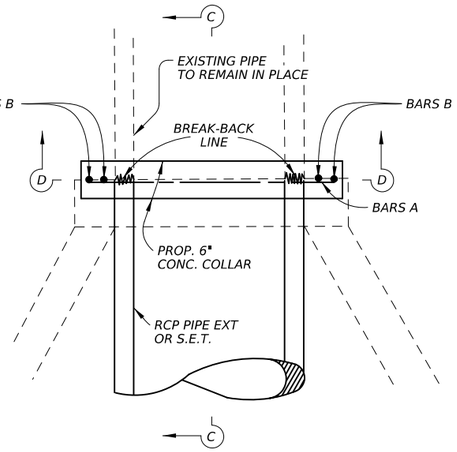
BOX CULVERT EXTENTION DETAIL
N.T.S.



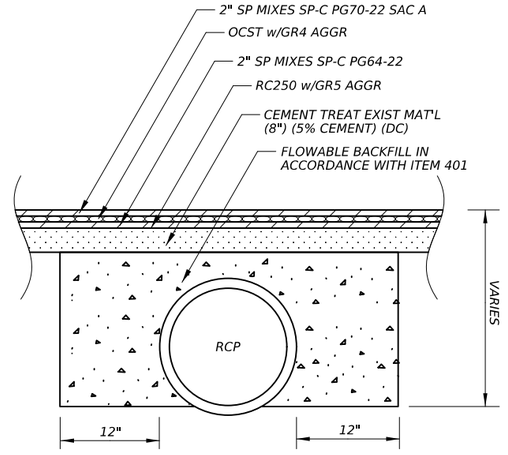
SECTION A-A
N.T.S.



SECTION B-B
N.T.S.



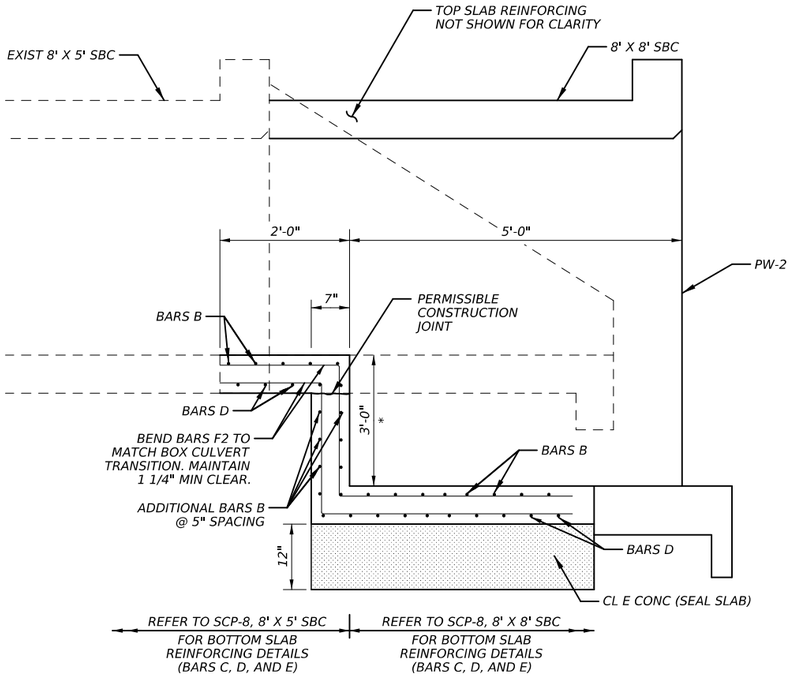
CONCRETE COLLAR DETAIL
N.T.S.



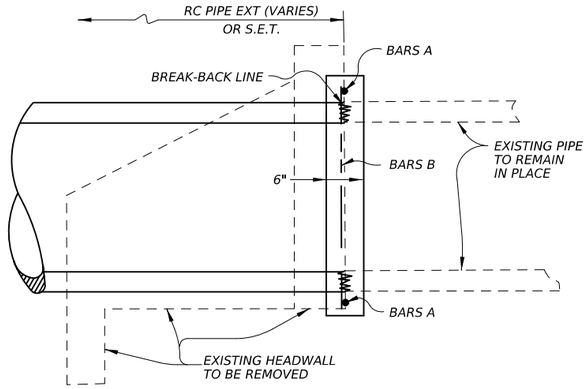
FLOWABLE BACK FILL DETAIL FOR RCP
N.T.S.

CONCRETE COLLAR NOTES:

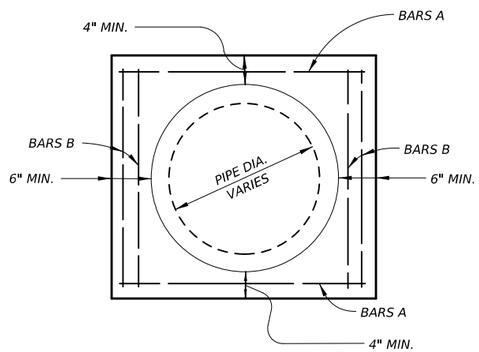
1. A CL C CONCRETE COLLAR SHALL BE USED AT LOCATIONS AS SHOWN ON THE PLANS WHERE ONLY THE EXISTING HEADWALL OR LESS THAN A FULL JOINT OF PIPE IS TO BE REMOVED PRIOR TO THE INSTALLATION OF THE CULVERT EXTENSION.
2. A CONCRETE COLLAR SHALL BE USED AT LOCATIONS WHERE AN EXISTING METALPIPE CULVERT IS BEING EXTENDED WITH R.C. PIPE OR A SAFETY END TREATMENT.
3. A CONCRETE COLLAR SHALL BE USED AT ALL 15, 30, & 45 DEGREE PIPE BEND JOINT CONNECTIONS.
4. 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.



STA 216+79 CULVERT EXTENSION DETAIL
N.T.S.
* DROP STRUCTURE SUBSIDIARY TO PERTINENT BID ITEM



SECTION C-C
N.T.S.



SECTION D-D
N.T.S.

DATE: 2/16/2024 5:50:20 PM
FILE: FM1651_DET_COLLAR.dgn

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS DRAINAGE DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		71

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)
143+42 BOTH	2 ~ 7' x 7'	10'	MC-7-10	PW-2	0°	3:1	8"	7"	2.00'	9.667'	N/A	N/A	26.000'	15.750'	N/A	0.0	2.4	67.4	994
189+53 BOTH	1 ~ 4' x 4'	30'	SCC-3&4	PW-2	0°	3:1	8"	7"	1.00'	5.667'	N/A	N/A	14.000'	5.167'	N/A	0.0	0.4	20.8	306
216+79 BOTH	1 ~ 8' x 8'	20'	SCC-8	PW-2	0°	3:1	10"	8"	2.00'	10.833'	N/A	N/A	29.500'	9.333'	N/A	0.0	1.4	87.0	1266
235+69 BOTH	1 ~ 2'-8" x 2'-8"	30'	SCC-3&4 (MOD)	PW-2	0°	3:1	8"	7"	1.00'	4.334'	N/A	N/A	10.002'	3.833'	N/A	0.0	1.8	7.3	195
260+29 BOTH	1 ~ 3' x 2'	30'	SCC-3&4	PW-2	0°	3:1	8"	7"	1.00'	3.667'	N/A	N/A	9.500'	4.167'	N/A	0.0	0.4	10.4	136
272+64 BOTH	1 ~ 6' x 6'	30'	SCC-5&6	PW-2	0°	3:1	10"	8"	2.75'	9.583'	N/A	N/A	25.750'	7.333'	N/A	0.0	1.4	64.8	976
289+98 BOTH	1 ~ 4' x 4'	30'	SCC-3&4	PW-2	0°	3:1	8"	7"	1.00'	5.667'	N/A	N/A	14.000'	5.167'	N/A	0.0	0.4	20.8	306

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
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

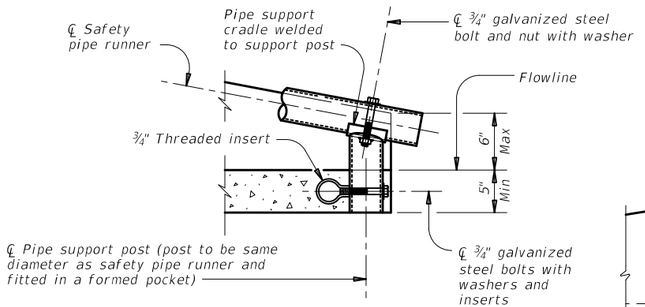
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		72

DATE: 2/16/2024 5:50:50 PM
FILE: CD-BCS-20.dgn

DATE: 2/16/2024 5:51:19 PM
FILE: CD-PSET-SC-21.dgn

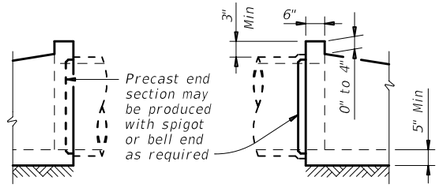
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



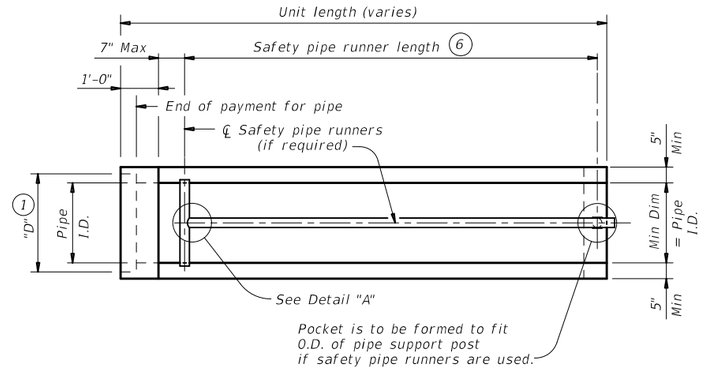
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



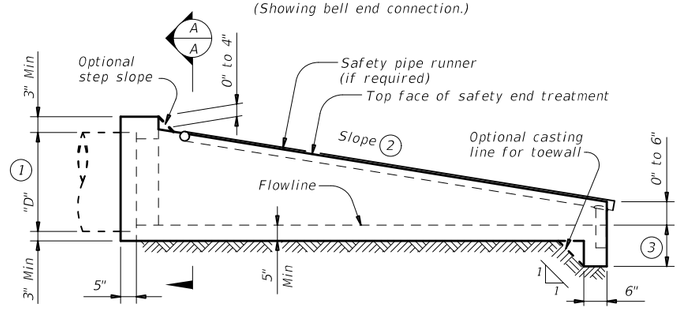
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



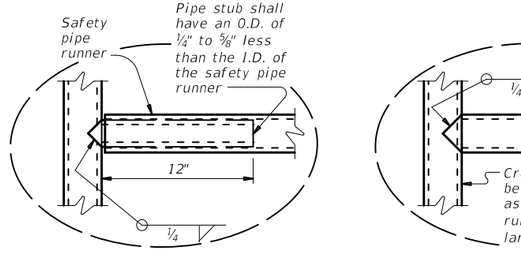
PLAN

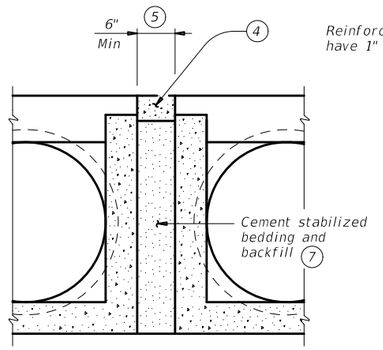
(Showing bell end connection.)



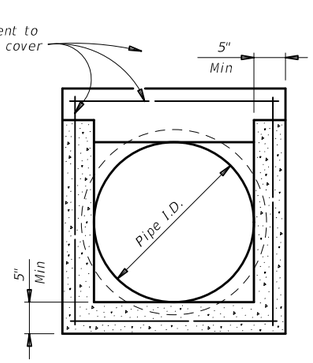
LONGITUDINAL ELEVATION

(Showing bell end connection.)

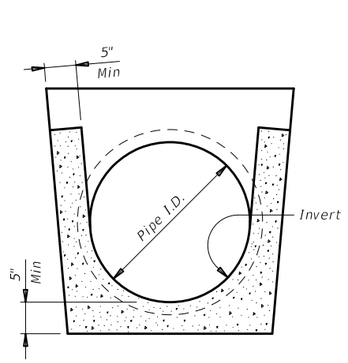




MULTIPLE PIPE INSTALLATION

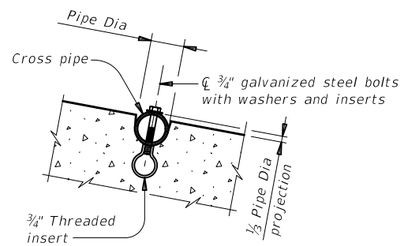


OPTION WITH SQUARE BOTTOM



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:

When 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 Pipe and Box Grouted Connections (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

FILE: CD-PSET-SC-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		73

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

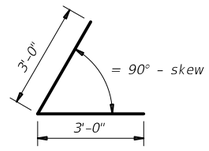
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#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)

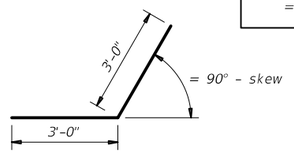
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

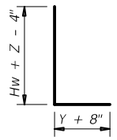
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



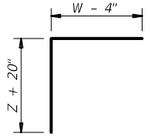
BARS D1



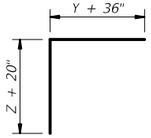
BARS D2



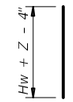
BARS J1



BARS J2



BARS J3



BARS V

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

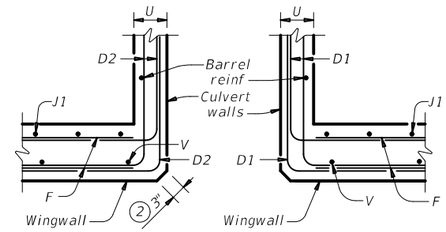
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

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

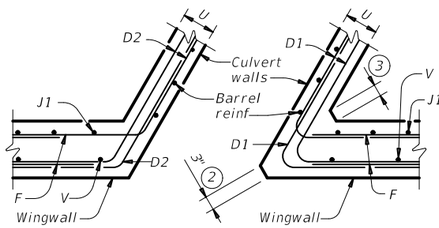
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

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

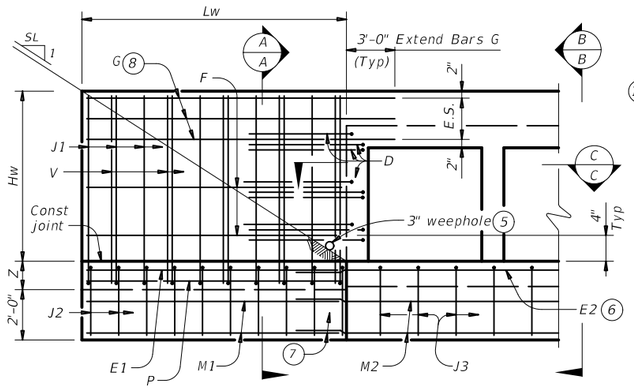
See applicable box culvert standard sheet for S, H, T, and U values.



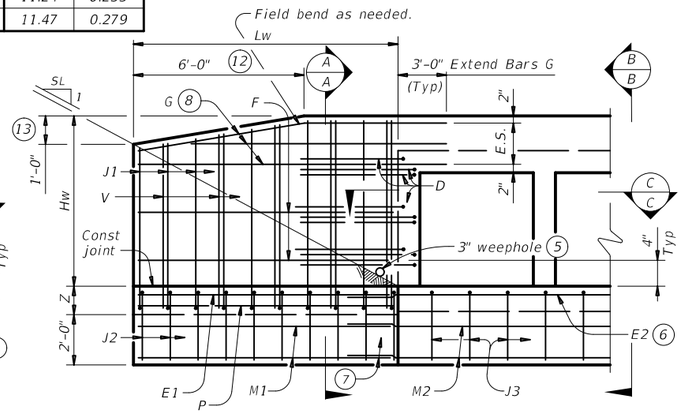
SECTION C-C - PW-1



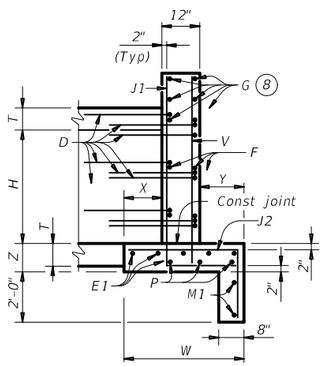
SECTION C-C - PW-2



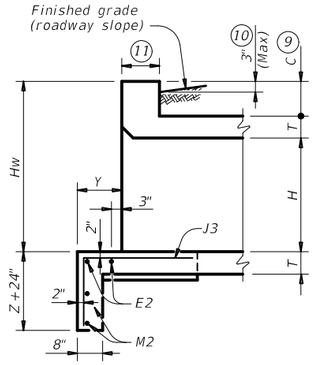
PARTIAL ELEVATION - PW-1



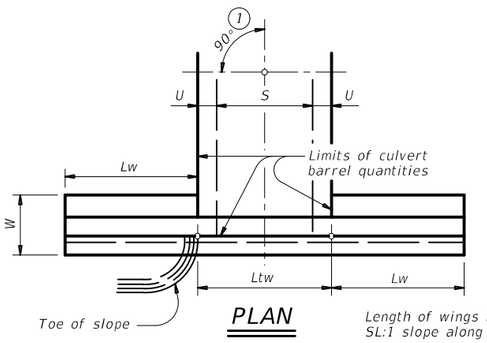
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

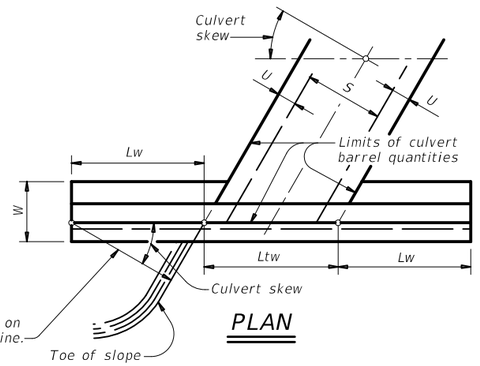


SECTION B-B
(Showing wing reinforcement.)



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 elsewhere 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 reinforcing 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: CD-PW-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		74

DATE: 2/16/2024 5:51:50 PM
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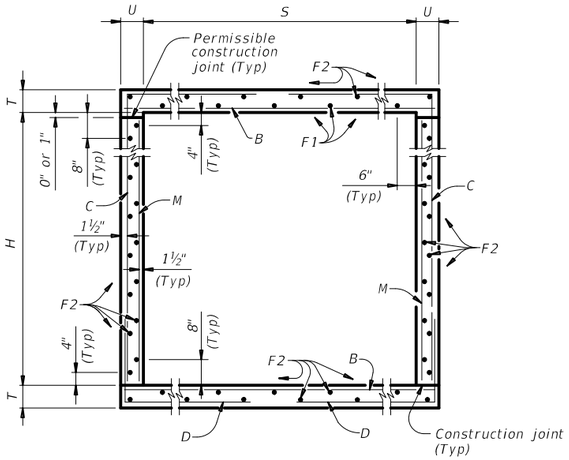
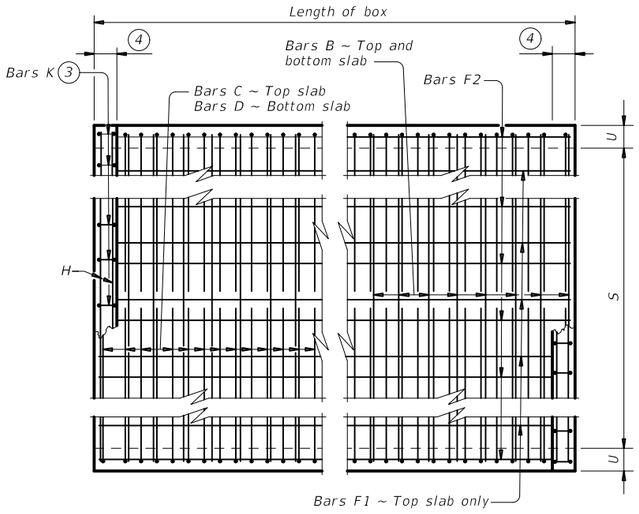


TYPICAL SECTION



PLAN OF REINF STEEL

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.

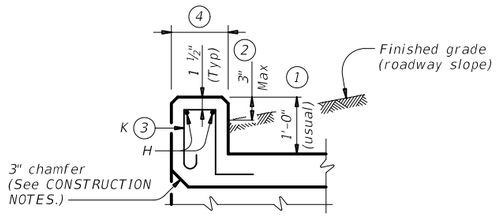
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

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).



SECTION THRU CURB

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:

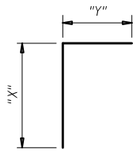
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts 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

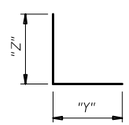
GENERAL NOTES:

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.

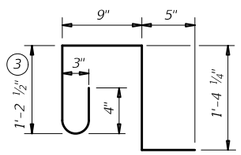
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

2/16/2024

1 ADD 2'-8" X 2'-8" SECTION DIMENSIONS

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 (MOD)

FILE:	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		75

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FILE: CD-SCC34-21.dgn

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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' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049
2' – 8"	2' – 8"	8"	7"	30'	108	#5	9"	3' – 7"	404	108	#4	9"	6' – 0"	433	3' – 2"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 8"	193	3	39' – 9"	80	23	39' – 9"	611	3' – 7"	10	10	28	0.304	52.2	0.3	38	12.5	2,126

(1)

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

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

(1) ADD 2'-8" X 2'-8" SECTION DIMENSIONS

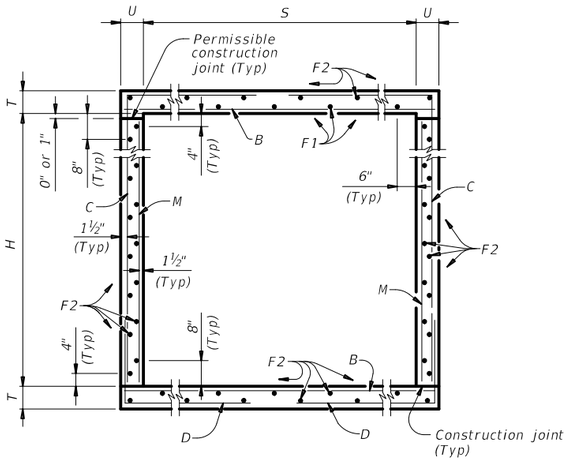
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

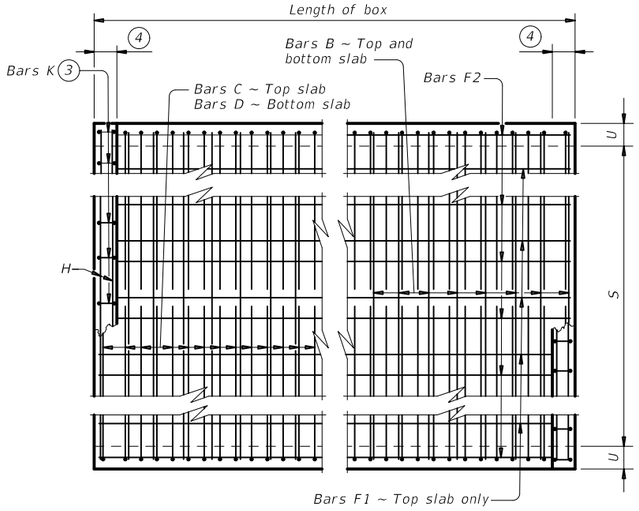
SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL

SCC-3 & 4 (MOD)

FILE:	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		76



TYPICAL SECTION



PLAN OF REINF STEEL

(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.

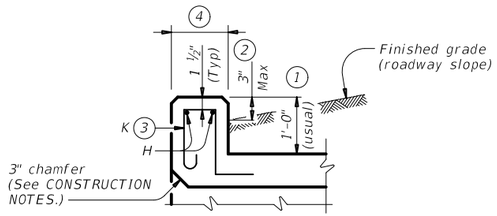
Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(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).



SECTION THRU CURB

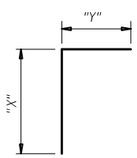
CONSTRUCTION NOTES:
Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

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.

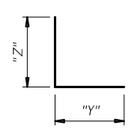
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

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.

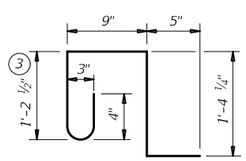
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



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

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	TYL	VAN ZANDT		77

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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)
5' – 0"	2' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 3"	704	2' – 6"	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	80.5	0.5	55	16.1	3,276
5' – 0"	2' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 4"	713	2' – 7"	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	81.0	0.5	55	17.6	3,294
5' – 0"	3' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 3"	817	3' – 6"	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	87.8	0.5	55	17.8	3,567
5' – 0"	3' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 4"	826	3' – 7"	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	88.3	0.5	55	19.3	3,585
5' – 0"	4' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 3"	929	4' – 6"	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	92.4	0.5	55	19.5	3,752
5' – 0"	4' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 4"	939	4' – 7"	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	92.9	0.5	55	21.1	3,771
5' – 0"	5' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 3"	1,042	5' – 6"	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	99.7	0.5	55	21.3	4,044
5' – 0"	5' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 4"	1,051	5' – 7"	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	100.2	0.5	55	22.8	4,062
6' – 0"	2' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	6' – 7"	742	2' – 6"	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	89.1	0.5	63	18.1	3,628
6' – 0"	2' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	6' – 8"	1,126	2' – 7"	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	108.6	0.5	63	19.9	4,407
6' – 0"	2' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	6' – 10"	1,155	2' – 8"	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	109.9	0.5	69	22.6	4,463
6' – 0"	3' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	7' – 7"	854	3' – 6"	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	96.4	0.5	63	19.9	3,918
6' – 0"	3' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	7' – 8"	1,295	3' – 7"	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	117.3	0.5	63	21.6	4,754
6' – 0"	3' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	7' – 10"	1,324	3' – 8"	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	118.1	0.5	69	24.6	4,792
6' – 0"	4' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	8' – 7"	967	4' – 6"	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	101.0	0.5	63	21.6	4,104
6' – 0"	4' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	8' – 8"	1,464	4' – 7"	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	123.3	0.5	63	23.4	4,996
6' – 0"	4' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	8' – 10"	1,493	4' – 8"	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	123.7	0.5	69	26.5	5,016
6' – 0"	5' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	9' – 7"	1,080	5' – 6"	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	108.3	0.5	63	23.3	4,395
6' – 0"	5' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	9' – 8"	1,633	5' – 7"	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	132.0	0.5	63	25.1	5,343
6' – 0"	5' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	9' – 10"	1,661	5' – 8"	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	131.9	0.5	69	28.5	5,345
6' – 0"	6' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	10' – 7"	1,192	6' – 6"	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	115.6	0.5	63	25.0	4,685
6' – 0"	6' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	10' – 8"	1,802	6' – 7"	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	140.7	0.5	63	26.8	5,690
6' – 0"	6' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	10' – 10"	1,830	6' – 8"	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	140.2	0.5	69	30.5	5,675

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

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

SCC-5 & 6

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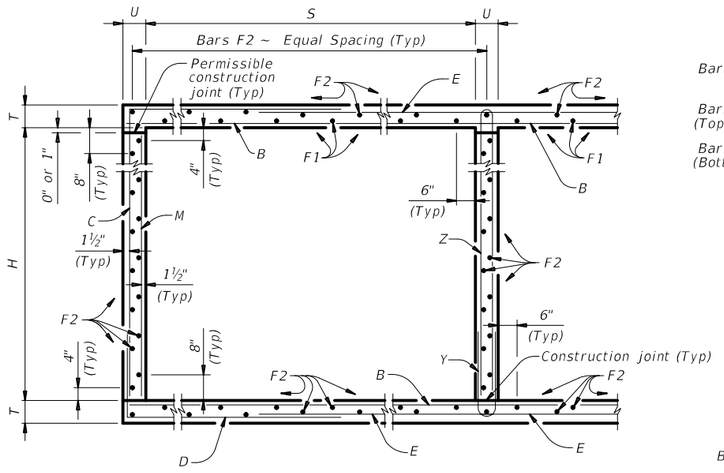
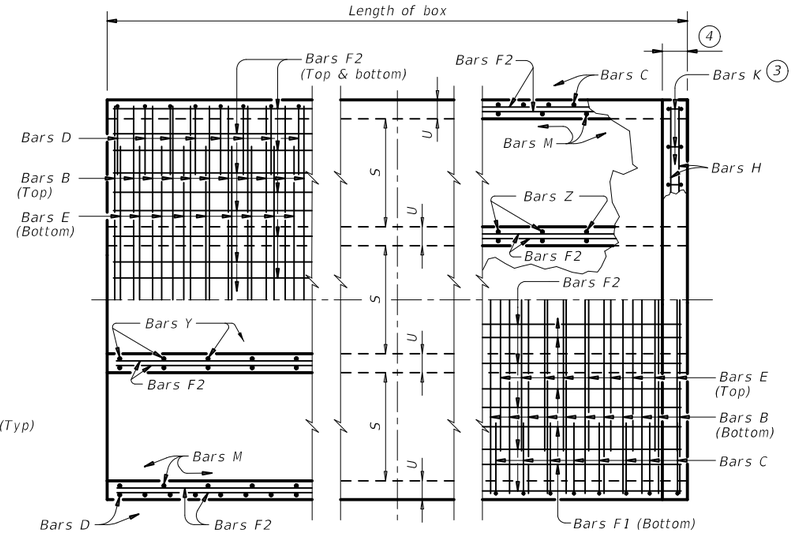
REVISIONS	1671	02	012	FM 1651
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		78

DATE: 2/13/2020 2:25:50 PM
FILE: CD-SCC56-21.dgn

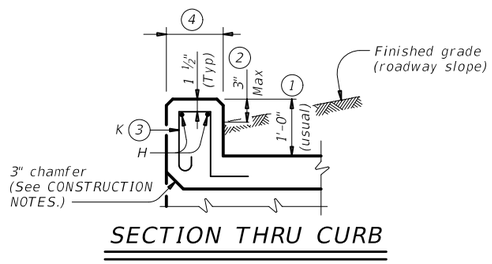


TYPICAL SECTION



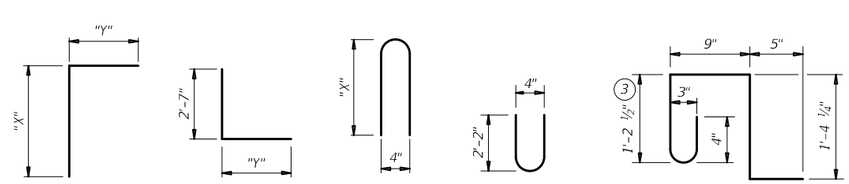
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
3'-0"	3'-6 ½"	4'-5"
4'-0"	4'-6 ½"	4'-5"
5'-0"	5'-6 ½"	4'-5"
6'-0"	6'-6 ½"	4'-5"
7'-0"	7'-6 ½"	4'-5"



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

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

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

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
7'-0" SPAN
0' TO 10' FILL
MC-7-10

FILE: CD-MC710-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		79

DATE: 2/16/2024 5:53:24 PM
FILE: CD-MC710-20.dgn

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FILE: CD-MC710-20.dgn

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4						Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																		Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	7' – 0"	3' – 0"	8"	7"	108	#6	9"	15' – 6"	2,514	162	#5	6"	7' – 11"	1,338	7' – 0"	1,183	108	#6	9"	11' – 5"	1,852	10	18"	39' – 9"	266	54	18"	39' – 9"	1,434	108	9"	3' – 0"	216	54	9"	4' – 7"	165	7' – 3"	262	15' – 6"	41	34	95	0.972	230.8	1.2	136	40.0	9,366
3	7' – 0"	3' – 0"	8"	7"	108	#6	9"	23' – 1"	3,744	162	#5	6"	7' – 11"	1,338	7' – 0"	1,183	108	#6	9"	19' – 0"	3,082	15	18"	39' – 9"	398	77	18"	39' – 9"	2,045	108	9"	3' – 0"	216	108	9"	4' – 7"	331	7' – 3"	523	23' – 1"	62	50	139	1.412	321.5	1.7	201	58.2	13,061
4	7' – 0"	3' – 0"	8"	7"	108	#6	9"	30' – 8"	4,975	162	#5	6"	7' – 11"	1,338	7' – 0"	1,183	108	#6	9"	26' – 7"	4,312	20	18"	39' – 9"	531	100	18"	39' – 9"	2,655	108	9"	3' – 0"	216	162	9"	4' – 7"	496	7' – 3"	785	30' – 8"	82	64	178	1.851	412.3	2.3	260	76.3	16,751
5	7' – 0"	3' – 0"	8"	7"	108	#6	9"	38' – 3"	6,205	162	#5	6"	7' – 11"	1,338	7' – 0"	1,183	108	#6	9"	34' – 2"	5,542	25	18"	39' – 9"	664	123	18"	39' – 9"	3,266	108	9"	3' – 0"	216	216	9"	4' – 7"	661	7' – 3"	1,046	38' – 3"	102	80	223	2.290	503.0	2.8	325	94.4	20,446
6	7' – 0"	3' – 0"	8"	7"	108	#6	9"	45' – 10"	7,435	162	#5	6"	7' – 11"	1,338	7' – 0"	1,183	108	#6	9"	41' – 9"	6,773	30	18"	39' – 9"	797	146	18"	39' – 9"	3,877	108	9"	3' – 0"	216	270	9"	4' – 7"	827	7' – 3"	1,308	45' – 10"	122	94	262	2.729	593.9	3.4	384	112.6	24,138
2	7' – 0"	4' – 0"	8"	7"	108	#6	9"	15' – 6"	2,514	162	#5	6"	8' – 11"	1,507	7' – 0"	1,183	108	#6	9"	11' – 5"	1,852	10	18"	39' – 9"	266	54	18"	39' – 9"	1,434	108	9"	4' – 0"	289	54	9"	4' – 7"	165	9' – 3"	334	15' – 6"	41	34	95	1.037	238.6	1.2	136	42.6	9,680
3	7' – 0"	4' – 0"	8"	7"	108	#6	9"	23' – 1"	3,744	162	#5	6"	8' – 11"	1,507	7' – 0"	1,183	108	#6	9"	19' – 0"	3,082	15	18"	39' – 9"	398	77	18"	39' – 9"	2,045	108	9"	4' – 0"	289	108	9"	4' – 7"	331	9' – 3"	667	23' – 1"	62	50	139	1.498	331.2	1.7	201	61.6	13,447
4	7' – 0"	4' – 0"	8"	7"	108	#6	9"	30' – 8"	4,975	162	#5	6"	8' – 11"	1,507	7' – 0"	1,183	108	#6	9"	26' – 7"	4,312	20	18"	39' – 9"	531	100	18"	39' – 9"	2,655	108	9"	4' – 0"	289	162	9"	4' – 7"	496	9' – 3"	1,001	30' – 8"	82	64	178	1.959	423.7	2.3	260	80.6	17,209
5	7' – 0"	4' – 0"	8"	7"	108	#6	9"	38' – 3"	6,205	162	#5	6"	8' – 11"	1,507	7' – 0"	1,183	108	#6	9"	34' – 2"	5,542	25	18"	39' – 9"	664	123	18"	39' – 9"	3,266	108	9"	4' – 0"	289	216	9"	4' – 7"	661	9' – 3"	1,335	38' – 3"	102	80	223	2.420	516.3	2.8	325	99.6	20,977
6	7' – 0"	4' – 0"	8"	7"	108	#6	9"	45' – 10"	7,435	162	#5	6"	8' – 11"	1,507	7' – 0"	1,183	108	#6	9"	41' – 9"	6,773	30	18"	39' – 9"	797	146	18"	39' – 9"	3,877	108	9"	4' – 0"	289	270	9"	4' – 7"	827	9' – 3"	1,668	45' – 10"	122	94	262	2.881	608.9	3.4	384	118.6	24,740
2	7' – 0"	5' – 0"	8"	7"	108	#6	9"	15' – 6"	2,514	162	#5	6"	9' – 11"	1,676	7' – 0"	1,183	108	#6	9"	11' – 5"	1,852	10	18"	39' – 9"	266	60	18"	39' – 9"	1,593	108	9"	5' – 0"	361	54	9"	4' – 7"	165	11' – 3"	406	15' – 6"	41	34	95	1.102	250.4	1.2	136	45.2	10,152
3	7' – 0"	5' – 0"	8"	7"	108	#6	9"	23' – 1"	3,744	162	#5	6"	9' – 11"	1,676	7' – 0"	1,183	108	#6	9"	19' – 0"	3,082	15	18"	39' – 9"	398	85	18"	39' – 9"	2,257	108	9"	5' – 0"	361	108	9"	4' – 7"	331	11' – 3"	812	23' – 1"	62	50	139	1.584	346.1	1.7	201	65.1	14,045
4	7' – 0"	5' – 0"	8"	7"	108	#6	9"	30' – 8"	4,975	162	#5	6"	9' – 11"	1,676	7' – 0"	1,183	108	#6	9"	26' – 7"	4,312	20	18"	39' – 9"	531	110	18"	39' – 9"	2,921	108	9"	5' – 0"	361	162	9"	4' – 7"	496	11' – 3"	1,217	30' – 8"	82	64	178	2.067	441.8	2.3	260	85.0	17,932
5	7' – 0"	5' – 0"	8"	7"	108	#6	9"	38' – 3"	6,205	162	#5	6"	9' – 11"	1,676	7' – 0"	1,183	108	#6	9"	34' – 2"	5,542	25	18"	39' – 9"	664	135	18"	39' – 9"	3,585	108	9"	5' – 0"	361	216	9"	4' – 7"	661	11' – 3"	1,623	38' – 3"	102	80	223	2.549	537.5	2.8	325	104.8	21,825
6	7' – 0"	5' – 0"	8"	7"	108	#6	9"	45' – 10"	7,435	162	#5	6"	9' – 11"	1,676	7' – 0"	1,183	108	#6	9"	41' – 9"	6,773	30	18"	39' – 9"	797	160	18"	39' – 9"	4,248	108	9"	5' – 0"	361	270	9"	4' – 7"	827	11' – 3"	2,029	45' – 10"	122	94	262	3.032	633.2	3.4	384	124.7	25,713
2	7' – 0"	6' – 0"	8"	7"	108	#6	9"	15' – 6"	2,514	162	#5	6"	10' – 11"	1,845	7' – 0"	1,183	108	#6	9"	11' – 5"	1,852	10	18"	39' – 9"	266	66	18"	39' – 9"	1,752	108	9"	6' – 0"	433	54	9"	4' – 7"	165	13' – 3"	478	15' – 6"	41	34	95	1.167	262.2	1.2	136	47.8	10,624
3	7' – 0"	6' – 0"	8"	7"	108	#6	9"	23' – 1"	3,744	162	#5	6"	10' – 11"	1,845	7' – 0"	1,183	108	#6	9"	19' – 0"	3,082	15	18"	39' – 9"	398	93	18"	39' – 9"	2,469	108	9"	6' – 0"	433	108	9"	4' – 7"	331	13' – 3"	956	23' – 1"	62	50	139	1.671	361.0	1.7	201	68.6	14,642
4	7' – 0"	6' – 0"	8"	7"	108	#6	9"	30' – 8"	4,975	162	#5	6"	10' – 11"	1,845	7' – 0"	1,183	108	#6	9"	26' – 7"	4,312	20	18"	39' – 9"	531	120	18"	39' – 9"	3,186	108	9"	6' – 0"	433	162	9"	4' – 7"	496	13' – 3"	1,434	30' – 8"	82	64	178	2.175	459.9	2.3	260	89.3	18,655
5	7' – 0"	6' – 0"	8"	7"	108	#6	9"	38' – 3"	6,205	162	#5	6"	10' – 11"	1,845	7' – 0"	1,183	108	#6	9"	34' – 2"	5,542	25	18"	39' – 9"	664	147	18"	39' – 9"	3,903	108	9"	6' – 0"	433	216	9"	4' – 7"	661	13' – 3"	1,912	38' – 3"	102	80	223	2.679	558.7	2.8	325	110.0	22,673
6	7' – 0"	6' – 0"	8"	7"	108	#6	9"	45' – 10"	7,435	162	#5	6"	10' – 11"	1,845	7' – 0"	1,183	108	#6	9"	41' – 9"	6,773	30	18"	39' – 9"	797	174	18"	39' – 9"	4,620	108	9"	6' – 0"	433	270	9"	4' – 7"	827	13' – 3"	2,390	45' – 10"	122	94	262	3.183	657.6	3.4	384	130.7	26,687
2	7' – 0"	7' – 0"	8"	7"	108	#6	9"	15' – 6"	2,514	162	#5	6"	11' – 11"	2,014	7' – 0"	1,183	108	#6	9"	11' – 5"	1,852	10	18"	39' – 9"	266	66	18"	39' – 9"	1,752	108	9"	7' – 0"	505	54	9"	4' – 7"	165	15' – 3"	550	15' – 6"	41	34	95	1.231	270.0	1.2	136	50.4	10,937
3	7' – 0"	7' – 0"	8"	7"	108	#6	9"	23' – 1"	3,744	162	#5	6"	11' – 11"	2,014	7' – 0"	1,183	108	#6	9"	19' – 0"	3,082	15	18"	39' – 9"	398	93	18"	39' – 9"	2,469	108	9"	7' – 0"	505	108	9"	4' – 7"	331	15' – 3"	1,100	23' – 1"	62	50	139	1.757	370.7	1.7	201	72.0	15,027
4	7' – 0"	7' – 0"	8"	7"	108	#6	9"	30' – 8"	4,975	162	#5	6"	11' – 11"	2,014	7' – 0"	1,183	108	#6	9"	26' – 7"	4,312	20	18"	39' – 9"	531	120	18"	39' – 9"	3,186	108	9"	7' – 0"	505	162	9"	4' – 7"	496	15' – 3"	1,650	30' – 8"	82	64	178	2.283	471.3	2.3	260	93.6	19,112
5	7' – 0"	7' – 0"	8"	7"	108	#6	9"	38' – 3"	6,205	162	#5	6"	11' – 11"	2,014	7' – 0"	1,183	108	#6	9"	34' – 2"	5,542	25	18"	39' – 9"	664	147	18"	39' – 9"	3,903	108	9"	7' – 0"	505	216	9"	4' – 7"	661	15' – 3"	2,200	38' – 3"	102	80	223	2.809	571.9	2.8	325	115.2	23,202
6	7' – 0"	7' – 0"	8"	7"	108	#6	9"	45' – 10"	7,435	162	#5	6"	11' – 11"	2,014	7' – 0"	1,183	108	#6	9"	41' – 9"	6,773	30	18"	39' – 9"	797	174	18"	39' – 9"	4,620	108	9"	7' – 0"	505	270	9"	4' – 7"	827	15' – 3"	2,750	45' – 10"	122	94	262	3.334	672.6	3.4	384	136.8	27,288

HL93 LOADING SHEET 2 OF 2

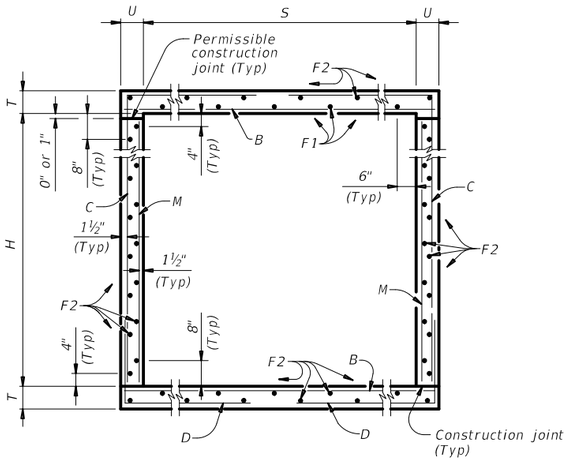
Texas Department of Transportation

Bridge Division Standard

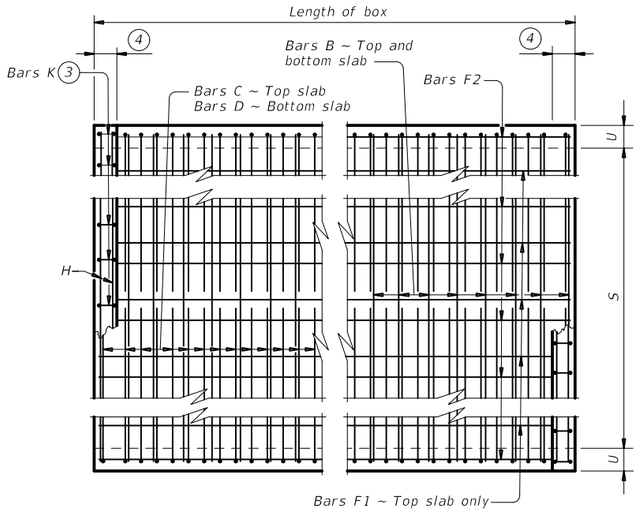
MULTIPLE BOX CULVERTS CAST-IN-PLACE

7'-0" SPAN
0' TO 10' FILL
MC-7-10

FILE: CD-MC710-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		80



TYPICAL SECTION



PLAN OF REINF STEEL

(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.

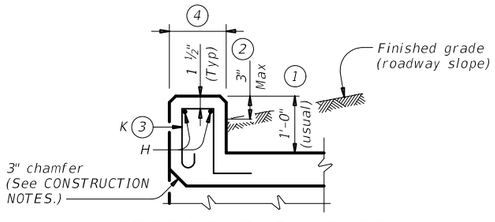
Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(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).



SECTION THRU CURB

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:

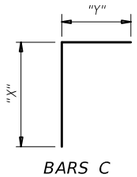
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts 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

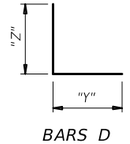
GENERAL NOTES:

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.

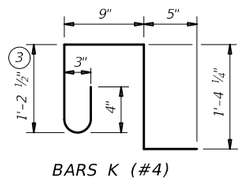
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



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-8

FILE: CD-SCC08-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		81

DATE: 2/16/2024 5:54:00 PM
FILE: CD-SCC08-21.dgn

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)
8' – 0"	3' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	8' – 8"	1,406	3' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.582	153.5	0.7	80	24.0	6,219
8' – 0"	3' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	8' – 8"	1,406	3' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.582	153.5	0.7	80	24.0	6,219
8' – 0"	3' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	8' – 10"	1,433	3' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	3' – 0"	164	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.724	154.5	0.7	85	29.6	6,266
8' – 0"	3' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	8' – 11"	1,446	3' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	3' – 0"	164	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.782	155.2	0.7	85	32.0	6,293
8' – 0"	3' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	9' – 2"	1,487	3' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	9' – 3"	25	22	61	0.929	159.6	0.7	86	37.9	6,468
8' – 0"	4' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	9' – 8"	1,568	4' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.626	159.4	0.7	80	25.7	6,454
8' – 0"	4' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	9' – 8"	1,568	4' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.626	159.4	0.7	80	25.7	6,454
8' – 0"	4' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	9' – 10"	1,595	4' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	4' – 0"	219	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.774	160.0	0.7	85	31.6	6,483
8' – 0"	4' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	9' – 11"	1,609	4' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	4' – 0"	219	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.831	160.7	0.7	85	33.9	6,511
8' – 0"	4' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	10' – 2"	1,649	4' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	9' – 3"	25	22	61	0.985	165.4	0.7	86	40.1	6,703
8' – 0"	5' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	10' – 8"	1,730	5' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	8' – 11"	24	20	56	0.669	167.9	0.7	80	27.4	6,794
8' – 0"	5' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	10' – 8"	1,730	5' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	8' – 11"	24	20	56	0.669	167.9	0.7	80	27.4	6,794
8' – 0"	5' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	10' – 10"	1,757	5' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	5' – 0"	274	6	39' – 9"	159	36	39' – 9"	956	9' – 1"	24	22	61	0.823	168.0	0.7	85	33.6	6,806
8' – 0"	5' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	10' – 11"	1,771	5' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	5' – 0"	274	6	39' – 9"	159	36	39' – 9"	956	9' – 1"	24	22	61	0.881	168.7	0.7	85	35.9	6,834
8' – 0"	5' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	11' – 2"	1,811	5' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	9' – 3"	25	22	61	1.040	173.9	0.7	86	42.3	7,043
8' – 0"	6' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	11' – 8"	1,893	6' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.712	176.4	0.7	80	29.2	7,135
8' – 0"	6' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	11' – 8"	1,893	6' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.712	176.4	0.7	80	29.2	7,135
8' – 0"	6' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	11' – 10"	1,920	6' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	6' – 0"	329	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.872	176.1	0.7	85	35.6	7,130
8' – 0"	6' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	11' – 11"	1,933	6' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	6' – 0"	329	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.930	176.8	0.7	85	37.9	7,157
8' – 0"	6' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	12' – 2"	1,974	6' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	9' – 3"	25	22	61	1.096	182.5	0.7	86	44.5	7,384
8' – 0"	7' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	12' – 8"	2,055	7' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.755	182.2	0.7	80	30.9	7,369
8' – 0"	7' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	162	#6	6"	12' – 8"	3,082	7' – 6"	5' – 2"	162	#6	6"	8' – 3"	2,007	5' – 2"	3' – 1"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.755	224.6	0.7	80	30.9	9,065
8' – 0"	7' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	162	#6	6"	12' – 10"	3,123	7' – 8"	5' – 2"	162	#6	6"	8' – 5"	2,048	5' – 2"	3' – 3"	82	12"	7' – 0"	383	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.922	224.6	0.7	85	37.6	9,070
8' – 0"	7' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	162	#6	6"	12' – 11"	3,143	7' – 9"	5' – 2"	162	#6	6"	8' – 6"	2,068	5' – 2"	3' – 4"	82	12"	7' – 0"	383	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.979	225.6	0.7	85	39.8	9,110
8' – 0"	7' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	162	#6	6"	13' – 2"	3,204	7' – 11"	5' – 3"	162	#6	6"	8' – 9"	2,129	5' – 3"	3' – 6"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	9' – 3"	25	22	61	1.151	232.8	0.7	86	46.7	9,396
8' – 0"	8' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	13' – 8"	2,217	8' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	8' – 11"	24	20	56	0.798	190.7	0.7	80	32.6	7,709
8' – 0"	8' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	162	#6	6"	13' – 8"	3,325	8' – 6"	5' – 2"	162	#6	6"	8' – 3"	2,007	5' – 2"	3' – 1"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	8' – 11"	24	20	56	0.798	235.2	0.7	80	32.6	9,486
8' – 0"	8' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	162	#6	6"	13' – 10"	3,366	8' – 8"	5' – 2"	162	#6	6"	8' – 5"	2,048	5' – 2"	3' – 3"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	9' – 1"	24	22	61	0.971	238.2	0.7	85	39.5	9,613
8' – 0"	8' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	162	#6	6"	13' – 11"	3,386	8' – 9"	5' – 2"	162	#6	6"	8' – 6"	2,068	5' – 2"	3' – 4"	162	6"	8' – 0"	866	6	39' – 9"	159	44	39' – 9"	1,168	9' – 1"	24	22	61	1.029	246.4	0.7	85	41.8	9,942
8' – 0"	8' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	162	#6	6"	14' – 2"	3,447	8' – 11"	5' – 3"	162	#6	6"	8' – 9"	2,129	5' – 3"	3' – 6"	162	6"	8' – 0"	866	6	39' – 9"	159	44	39' – 9"	1,168	9' – 3"	25	22	61	1.207	250.5	0.7	86	49.0	10,106

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE

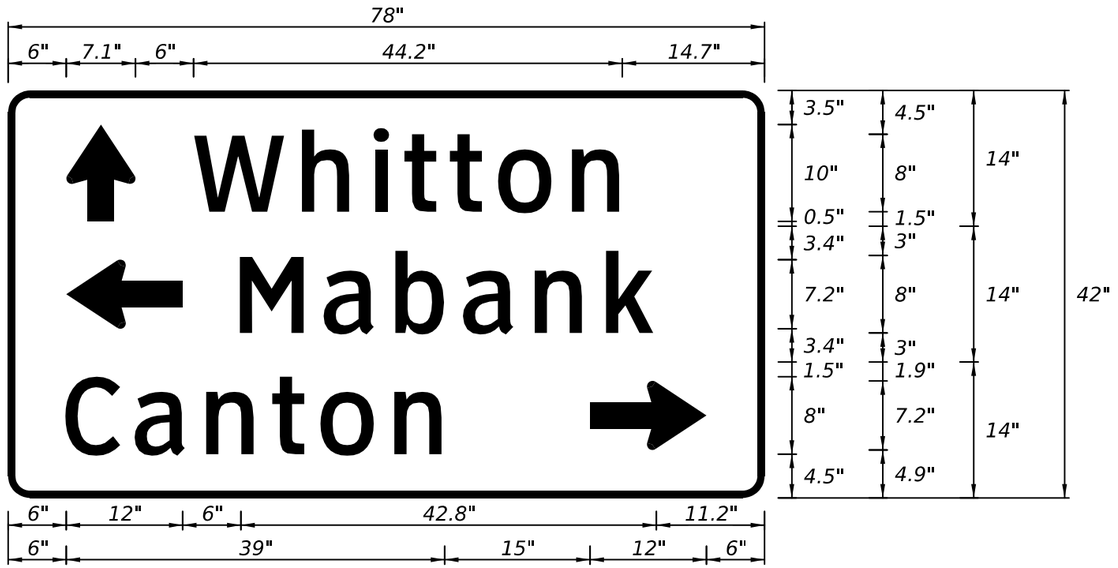
0' TO 30' FILL

SCC-8

FILE:	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		82

DATE: 2/16/2024 5:54:01 PM
FILE: CD-SCC08-21.dgn

#1-3 SIGN DETAIL



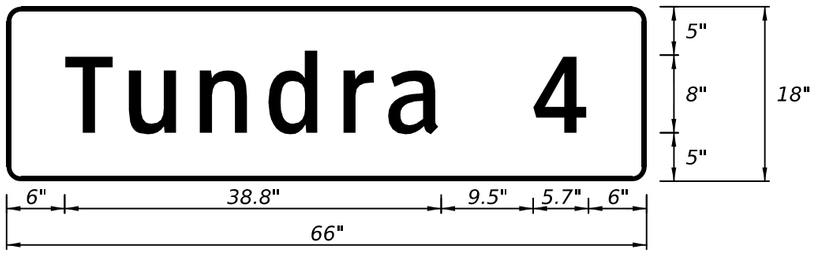
D1-3 8in UP-LT-RT;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90°; "Whitton", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Mabank", ClearviewHwy-3-W;

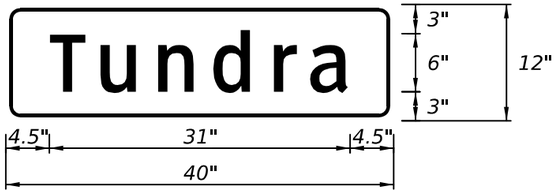
2.3" Radius, 0.8" Border, White on, Green;
"Canton", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;

#1-6 SIGN DETAIL



D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Tundra", ClearviewHwy-3-W; "4", ClearviewHwy-3-W;

#9-7 & #10-4 SIGN DETAIL



I-2cT 8in;
1.5" Radius, 0.4" Border, 0.4" Indent, Black on, White;
"Tundra", ClearviewHwy-3-W specified length;

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

N.T.S

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

SIGN DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		83

DATE: 2/16/2024 5:54:43 PM
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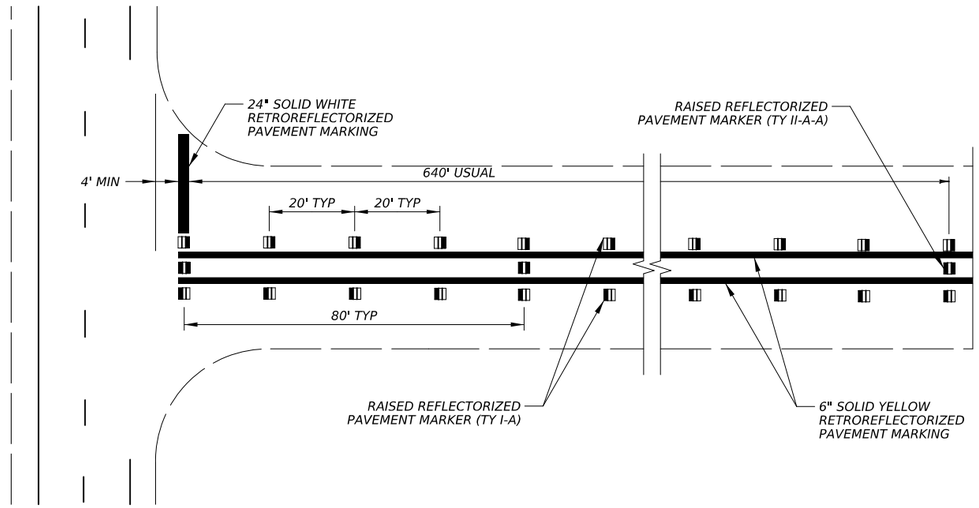

PAVEMENT MARKING TREATMENT AT STATE MAINTAINED HIGHWAY INTERSECTIONS

N.T.S.

REVISED: 05/2018

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS TRAFFIC DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		84

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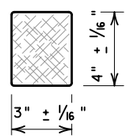
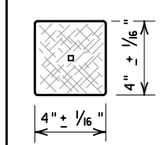
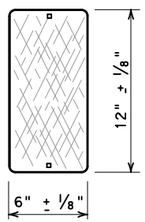
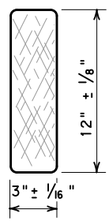
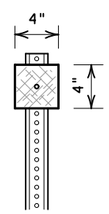
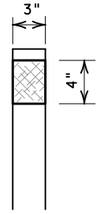
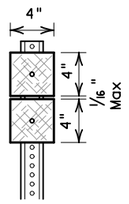
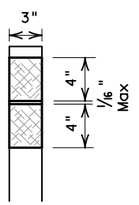
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

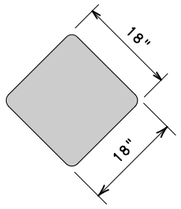
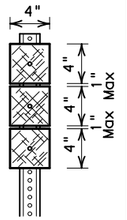
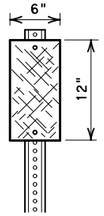
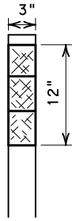
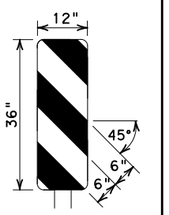
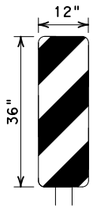
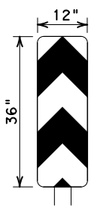
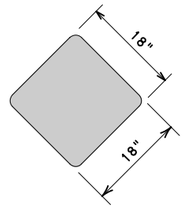
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

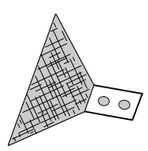
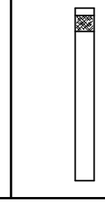
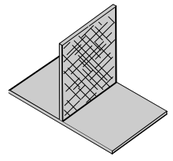
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

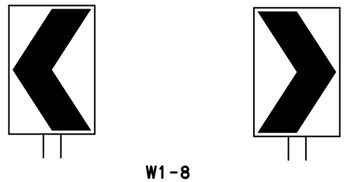
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting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

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



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

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	VAN ZANDT		85

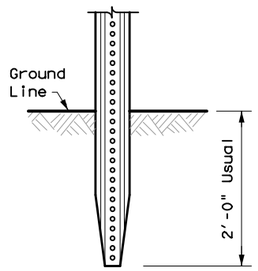
20A

DATE: 2/16/2024 5:55:49 PM
FILE: dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

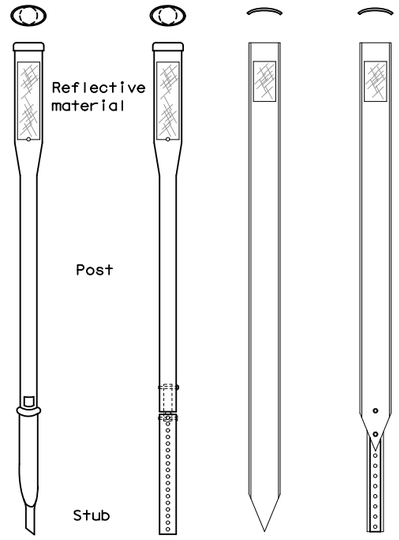


NOTES

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

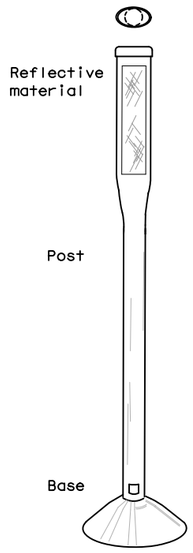
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



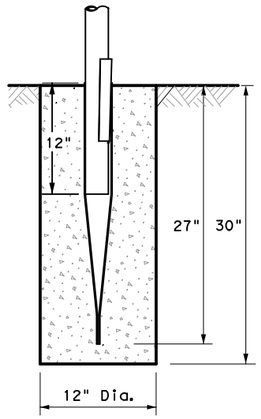
SURFACE MOUNT

NOTES

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

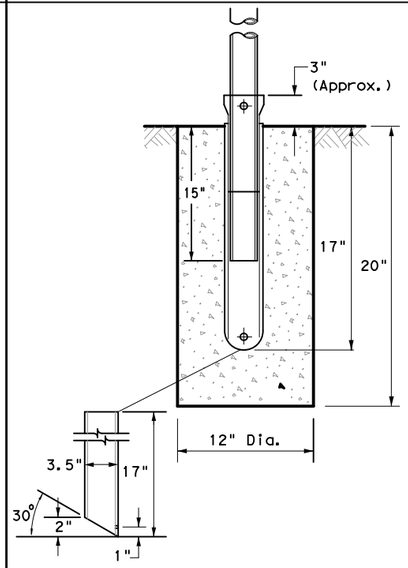
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

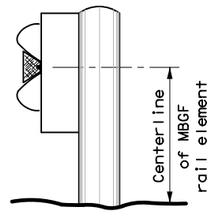
NOTE

1. Install per manufacturer's recommendations.

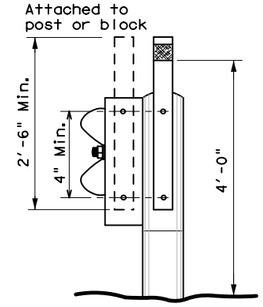
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

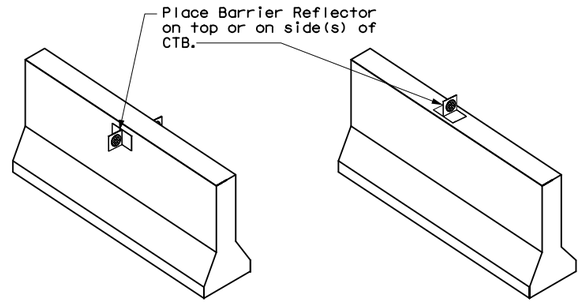
GF1



GF2



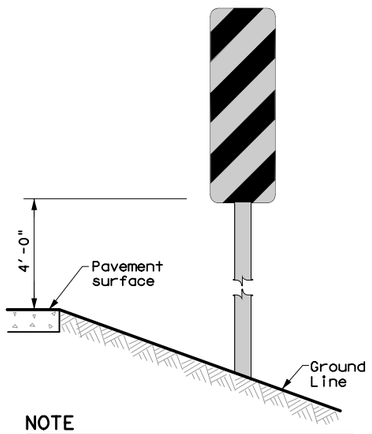
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

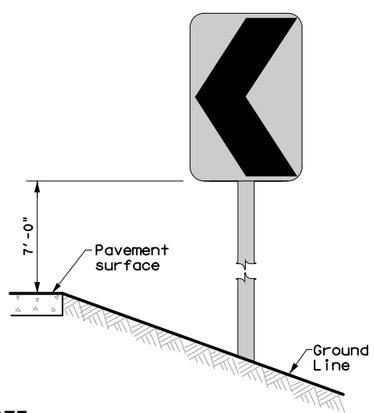
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

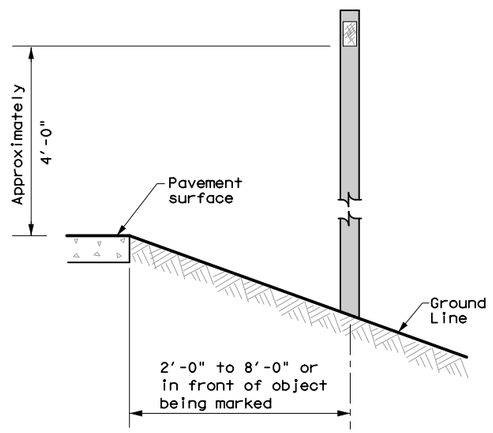
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	VAN ZANDT		86

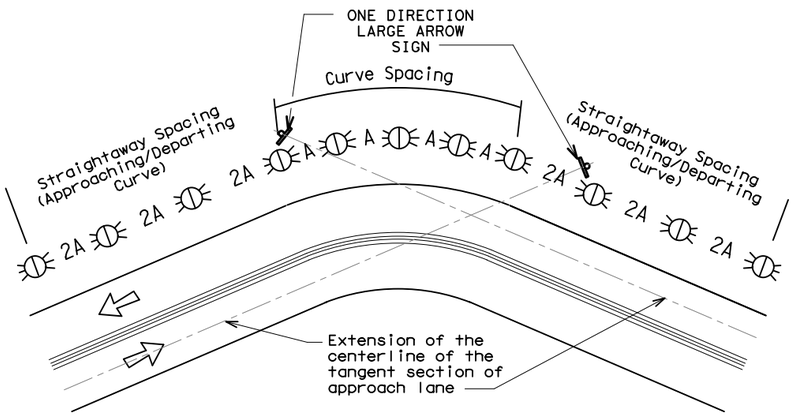
20B

DATE: 2/16/2024 5:56:17 PM
FILE: dom2-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

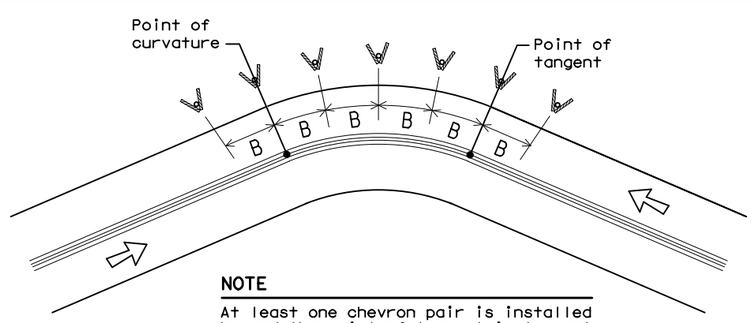
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2XA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

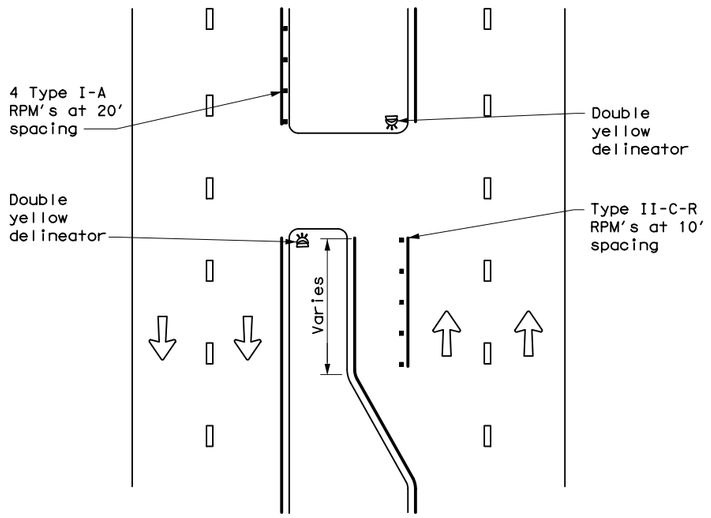
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	TYL	VAN ZANDT		87

20C

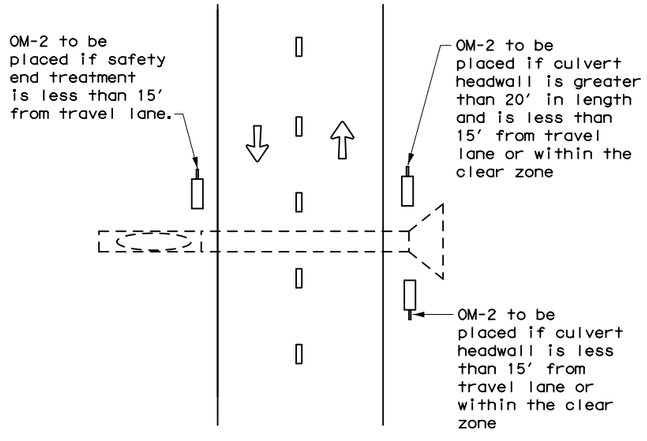
DATE: 2/16/2024 5:56:49 PM
FILE: dom3-20.dgn

CROSSOVERS



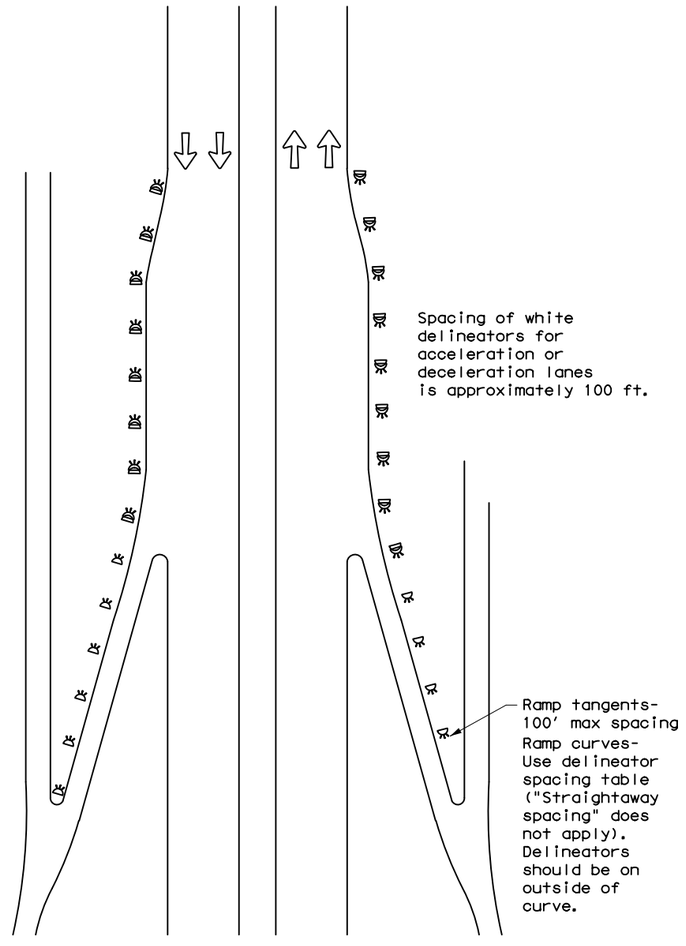
DETAIL 1

FOR CULVERTS WITHOUT MBGF



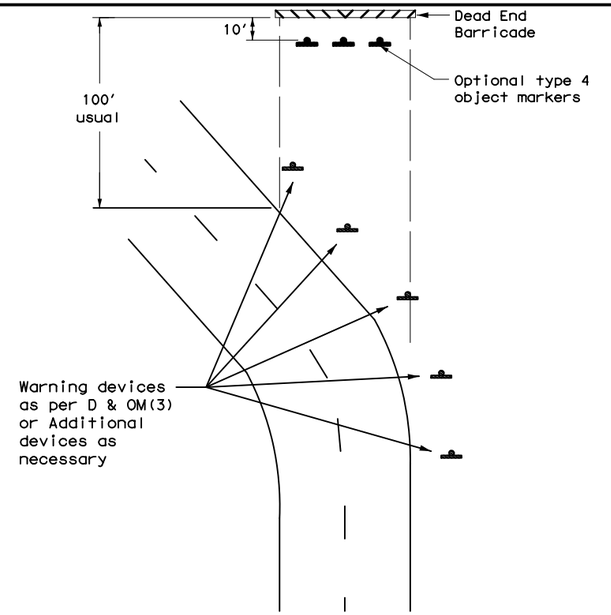
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



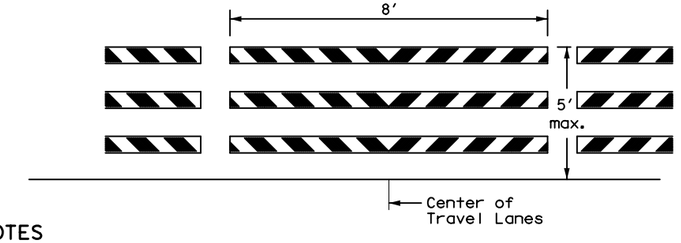
DETAIL 3

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
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REVISIONS	1671	02	012	FM 1651
3-15	DIST	COUNTY		SHEET NO.
7-20	TYL	VAN ZANDT		88

20D

DATE: 2/16/2024 5:57:22 PM
FILE: dom4-20.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

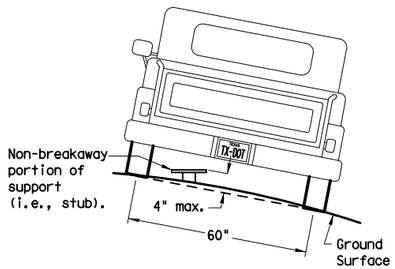
Anchor Type

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

Sign Mounting Designation

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

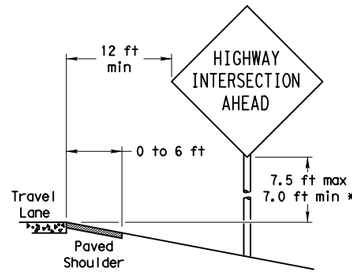
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

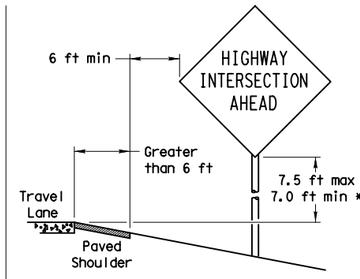
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

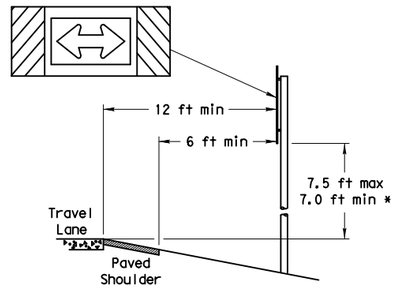
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



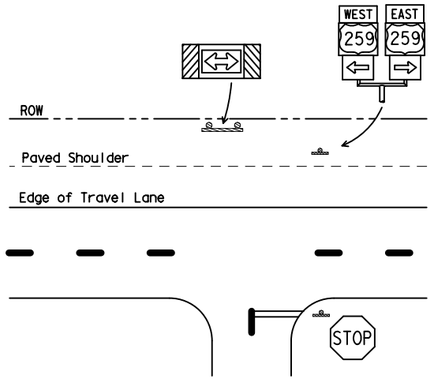
GREATER THAN 6 FT. WIDE

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

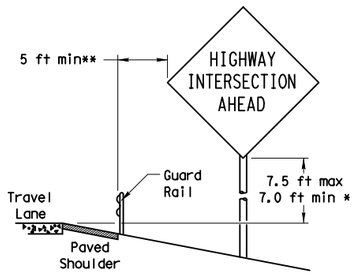
T-INTERSECTION



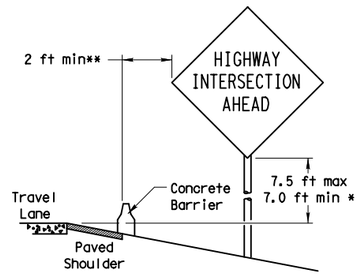
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



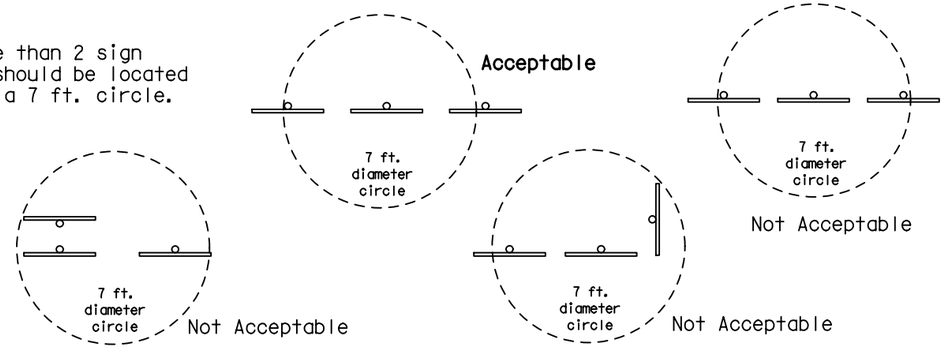
BEHIND GUARDRAIL



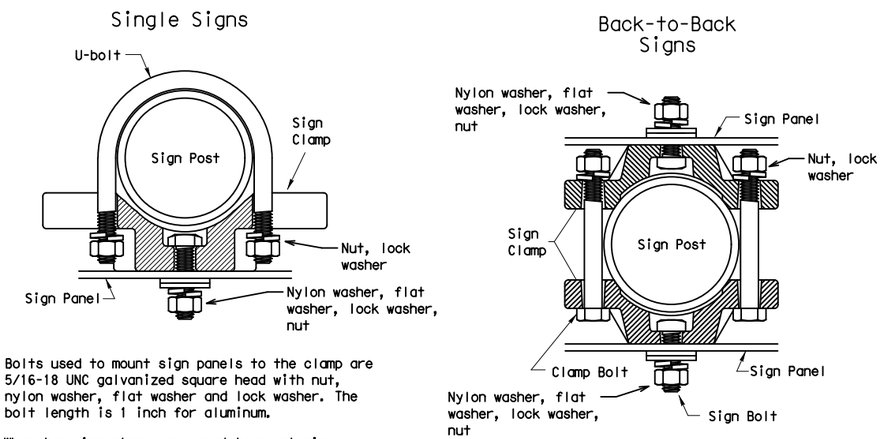
BEHIND CONCRETE BARRIER

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

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



TYPICAL SIGN ATTACHMENT DETAIL



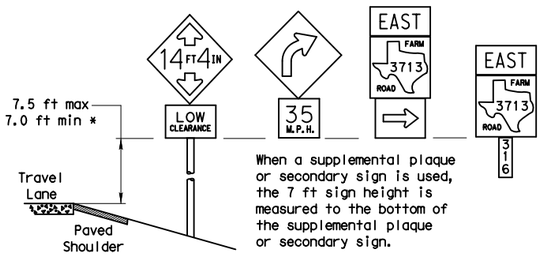
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

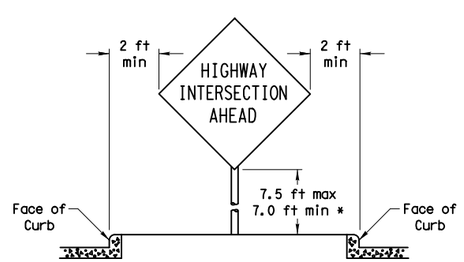
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



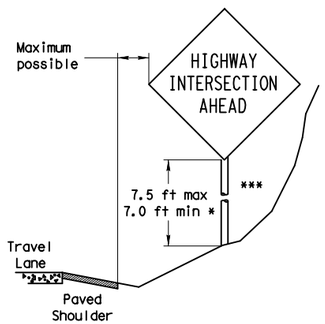
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

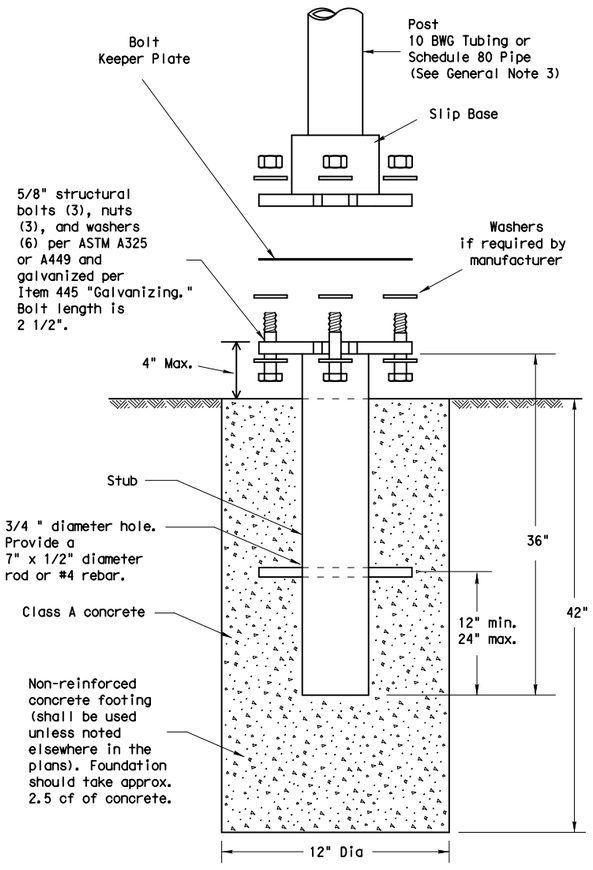
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		89

26A

DATE: 2/16/2024 5:57:51 PM
FILE: smdgen.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

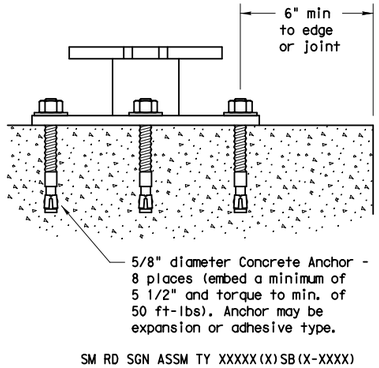
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   0.134" nominal wall thickness
   Seamless or electric-resistance welded steel tubing or pipe
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   20% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   Schedule 80 Pipe (2.875" outside diameter)
   0.276" nominal wall thickness
   Steel tubing per ASTM A500 Gr C
   Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
   46,000 PSI minimum yield strength
   62,000 PSI minimum tensile strength
   21% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		90

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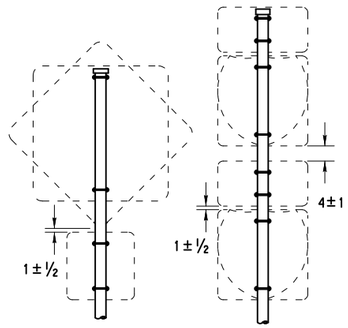
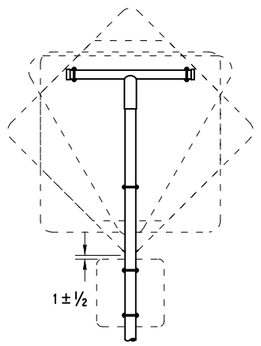


SM RD SGN ASSM TY XXXXX(1)XX(P)



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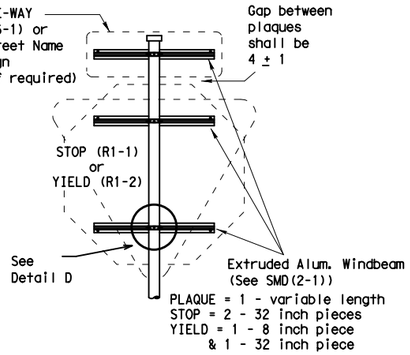
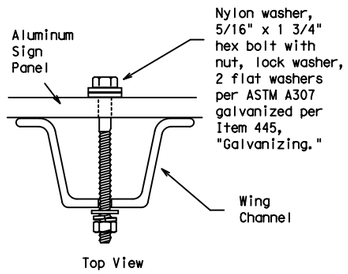
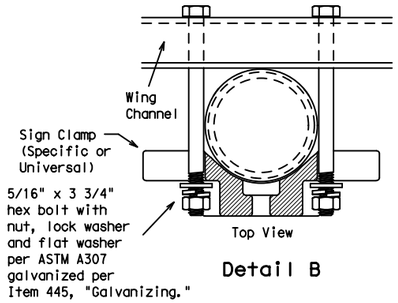


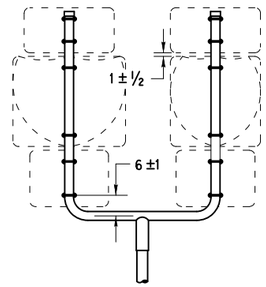
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



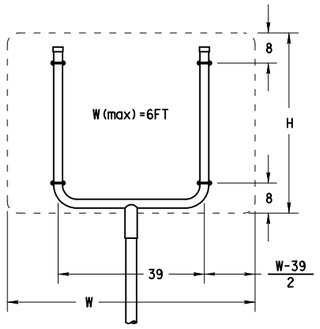
Detail A



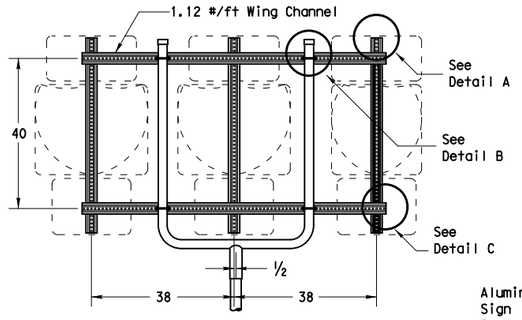
Detail B



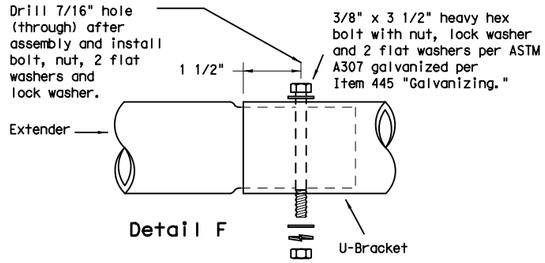
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

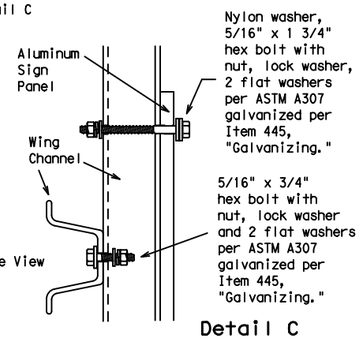


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

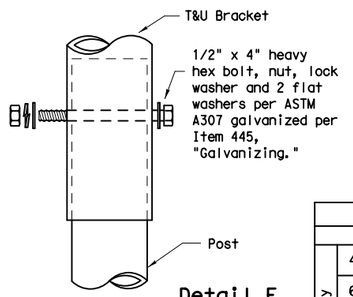


Detail F

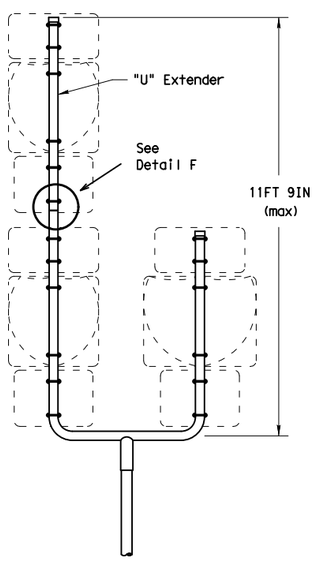
Splices shall only be allowed behind the sign substrate.



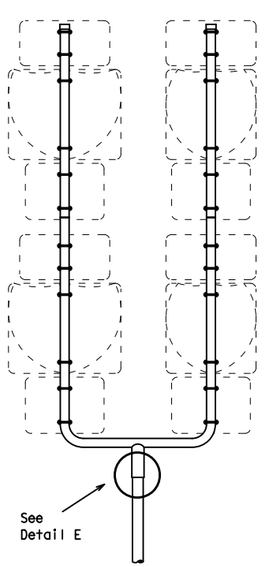
Detail C



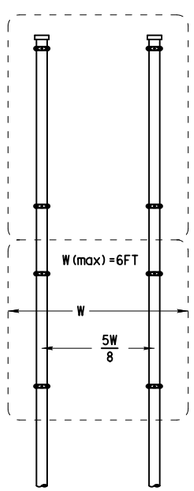
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

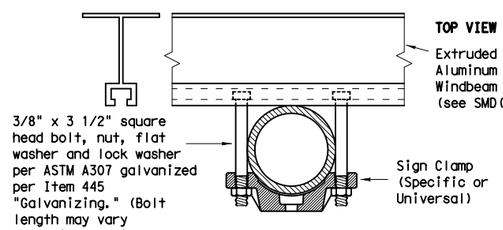


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

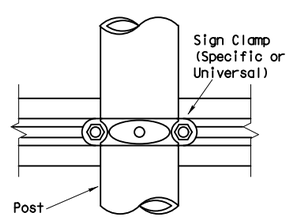


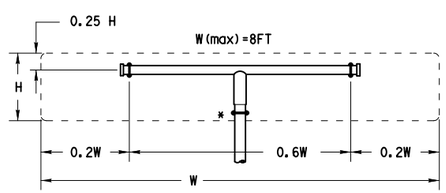
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

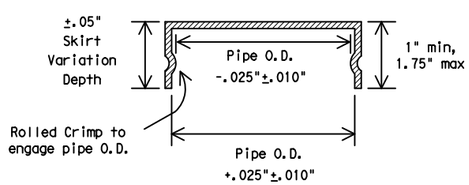




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		91

9-08 REVISIONS

26C

DATE: 2/16/2024 5:58:54 PM
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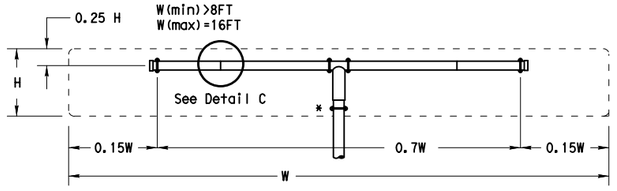
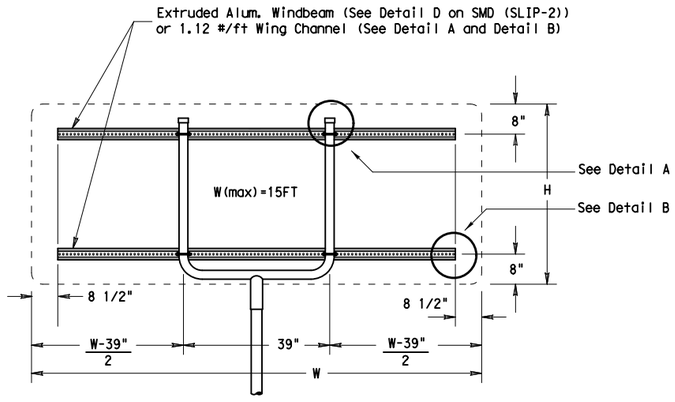
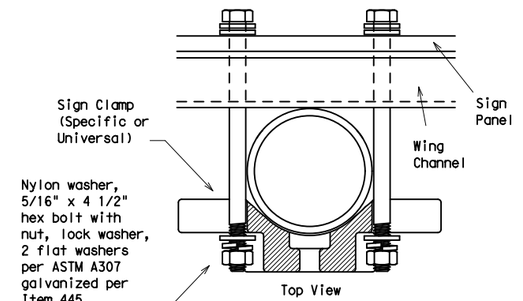


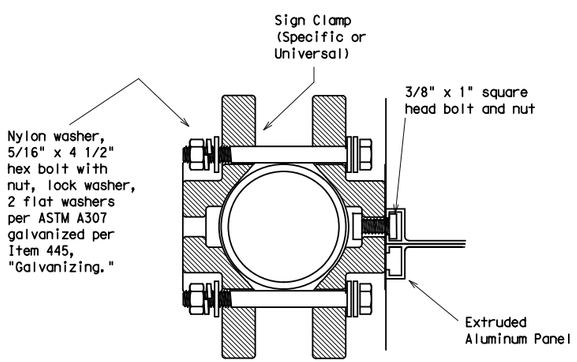
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



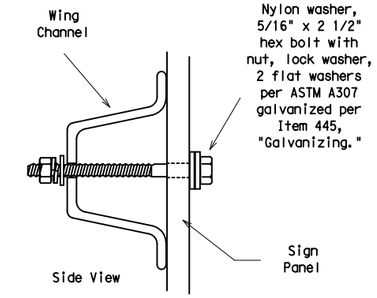
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



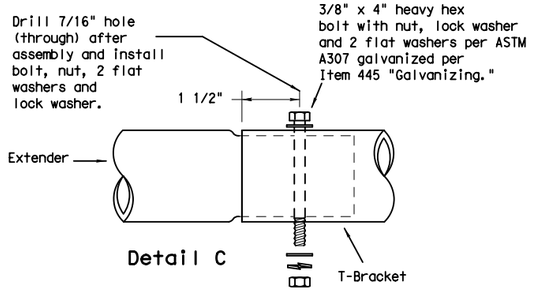
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

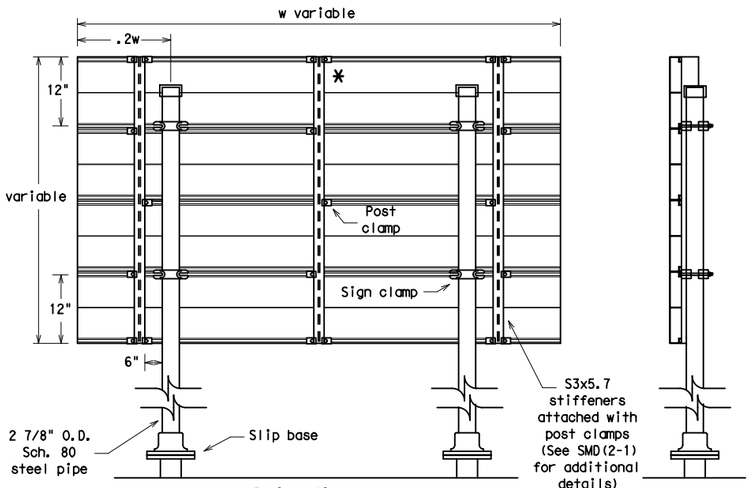


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

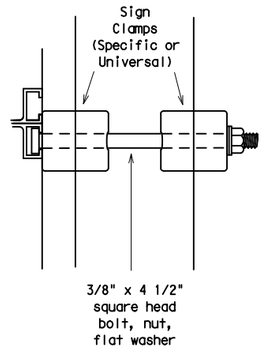


Typical Sign Mount

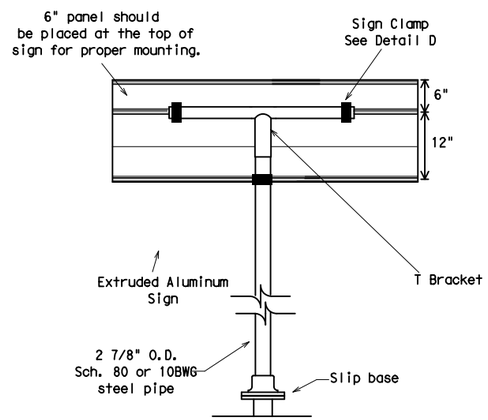
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

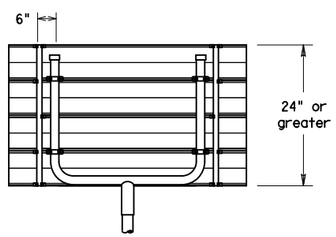
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		92

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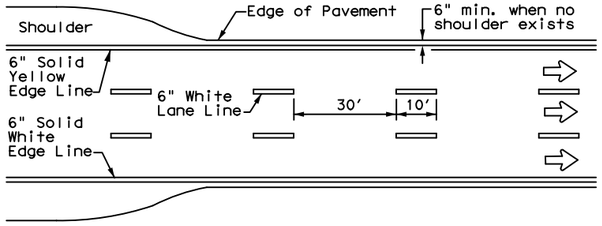
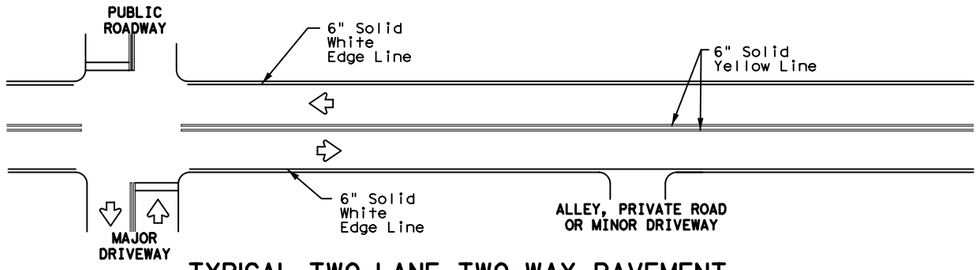
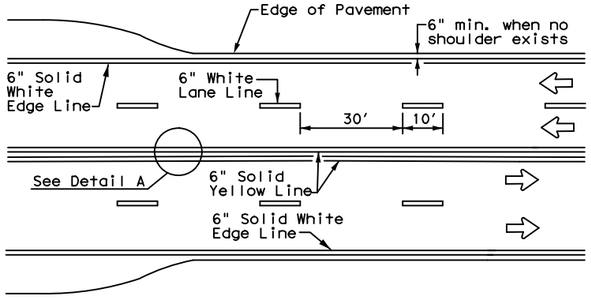
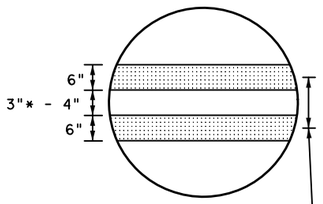


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





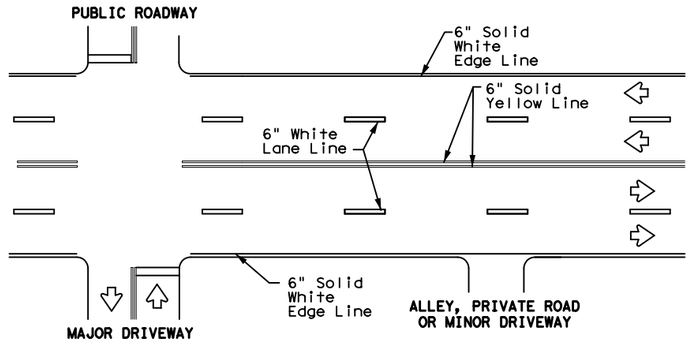
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

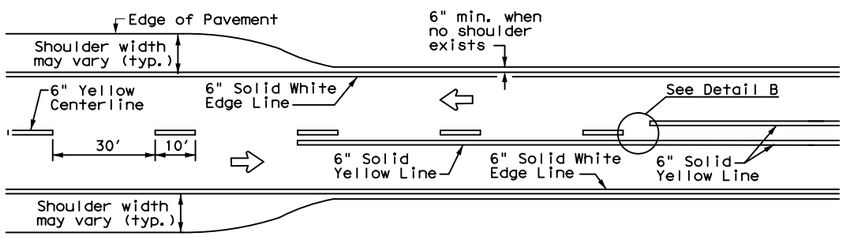
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

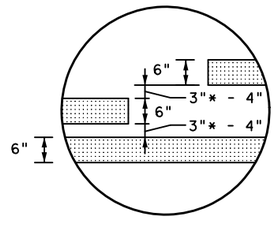
** 8" minimum for restripe projects when approved by the Engineer.



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



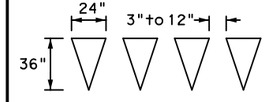
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

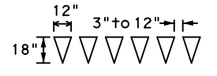
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

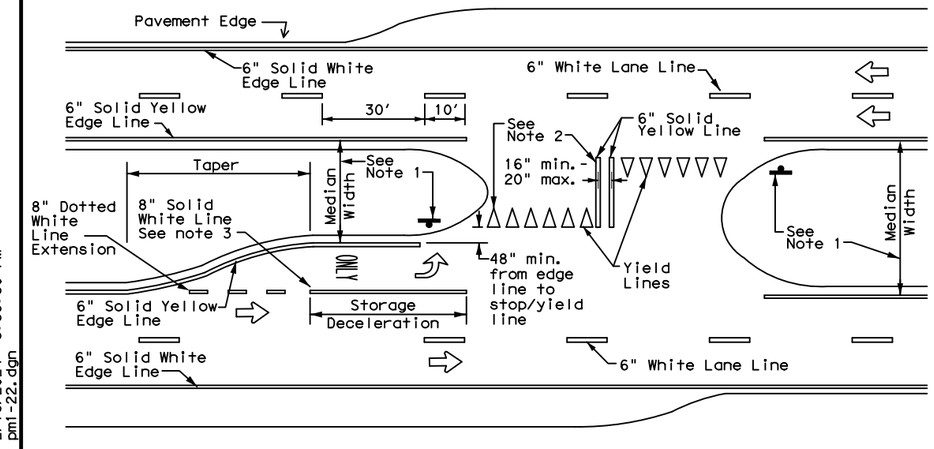


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

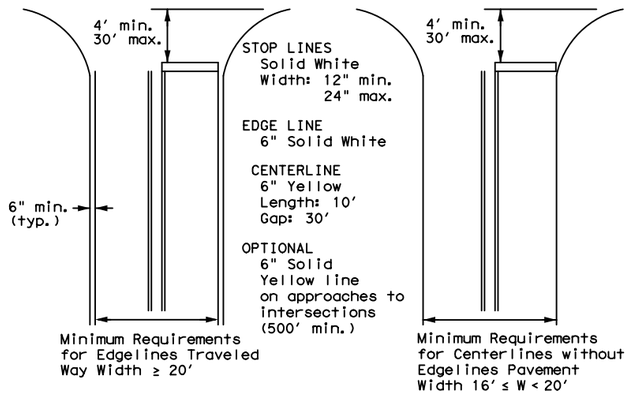
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		93

22A

DATE: 2/16/2024 5:59:50 PM
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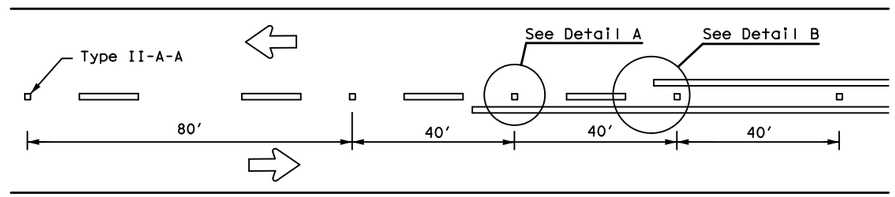
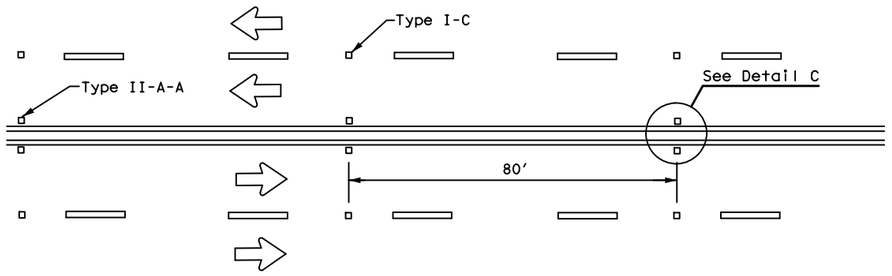
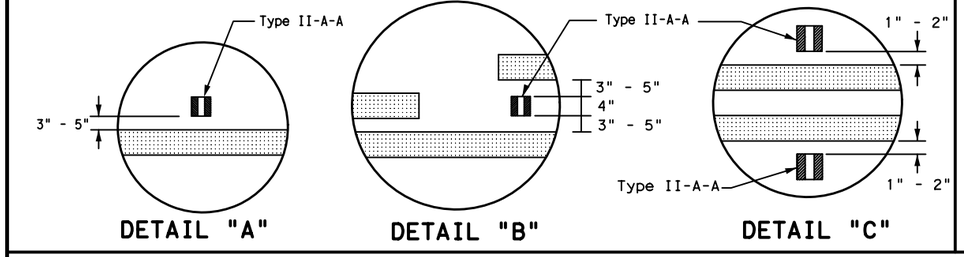
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

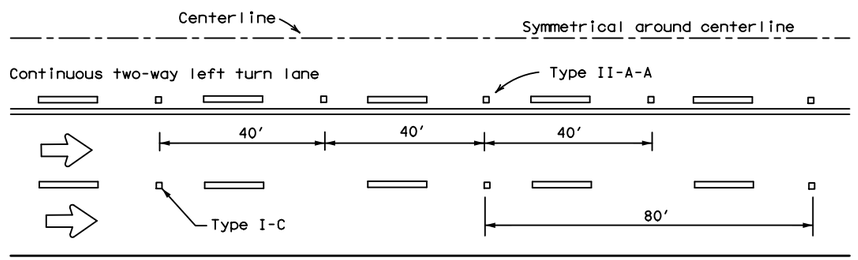


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

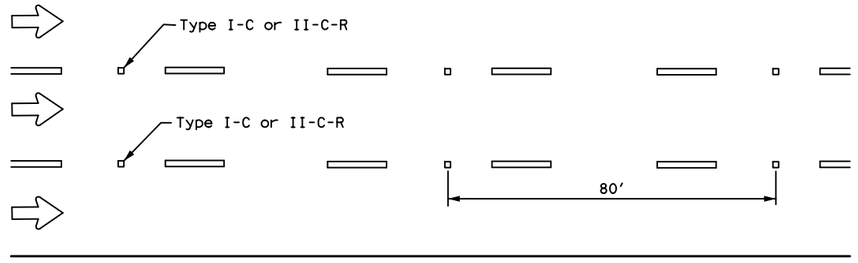


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



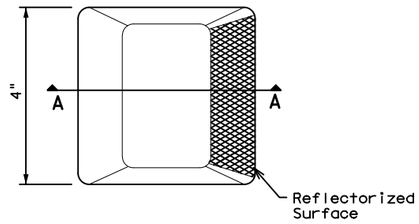
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

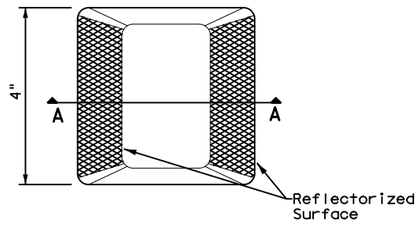
See Note 3.

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

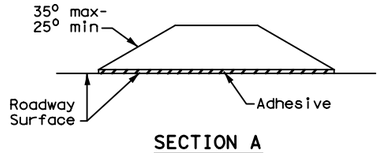
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

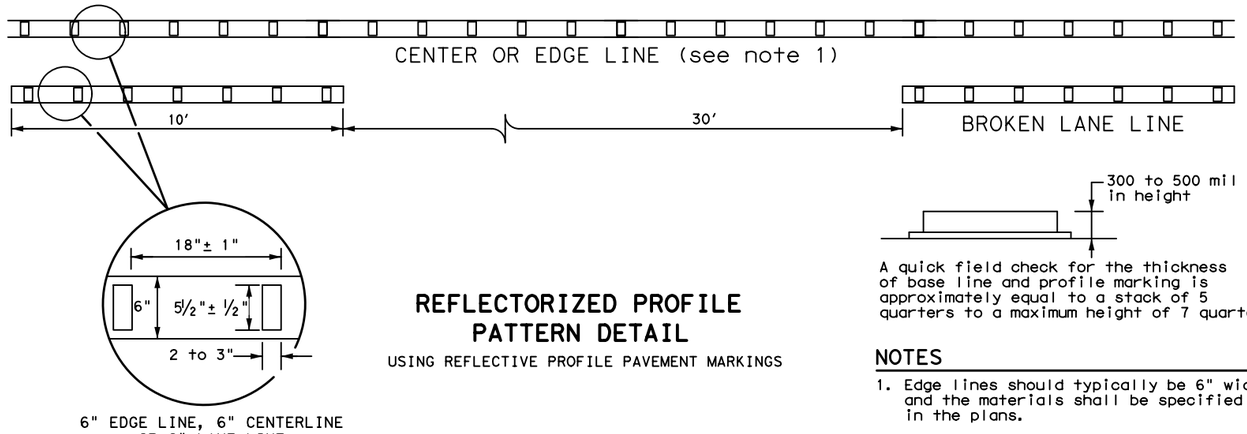


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" 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.

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	TYL	VAN ZANDT		94
5-00 2-12				

22B

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DATE: 2/16/2024 6:00:23 PM
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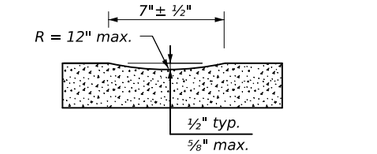
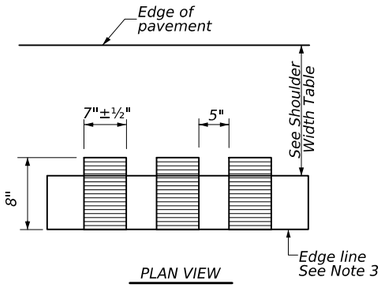
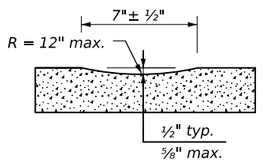


PROFILE VIEW
OPTION 1

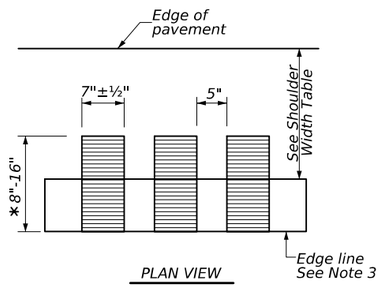


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



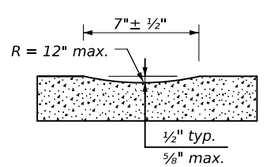
PROFILE VIEW
OPTION 2



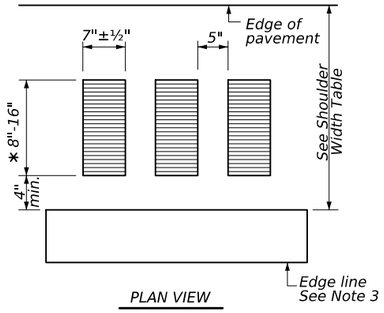
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



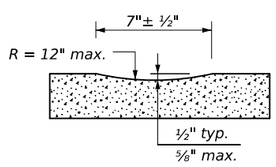
PROFILE VIEW
OPTION 3



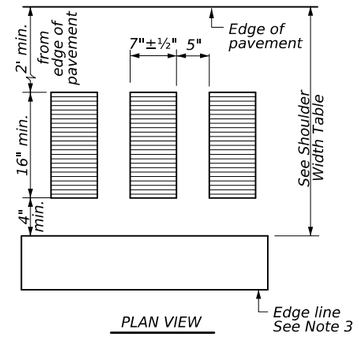
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

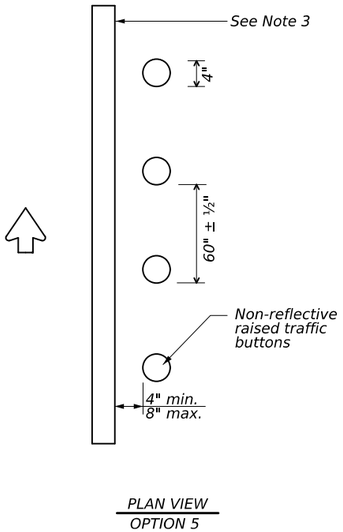


PROFILE VIEW
OPTION 4



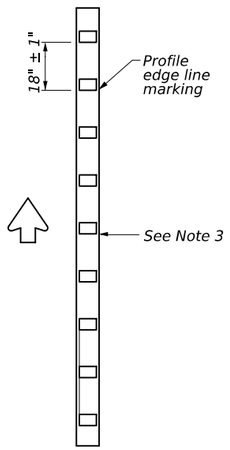
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



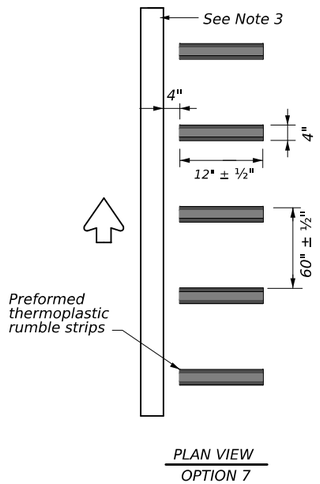
PLAN VIEW
OPTION 5

RAISED EDGE LINE
(Rumble Strips)



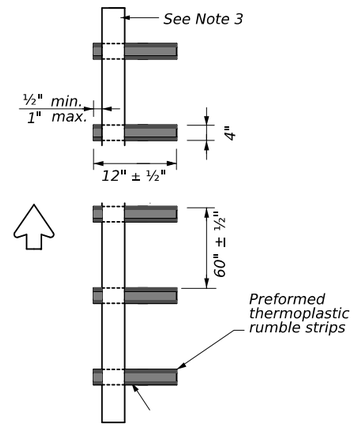
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS
(Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE
(Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE
(Rumble Strips)

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, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

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) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.*
4. *See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.*
5. *Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.*
6. *Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.*
7. *Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.*
8. *Consideration shall be given to bicyclists. See RS(6).*

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. *See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.*
10. *Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.*

WHEN INSTALLING RAISED OR PROFILE EDGE LINE 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 edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line 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. *The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.*
15. *Raised profile thermoplastic markings used as edge lines may substitute for buttons.*

Texas Department of Transportation

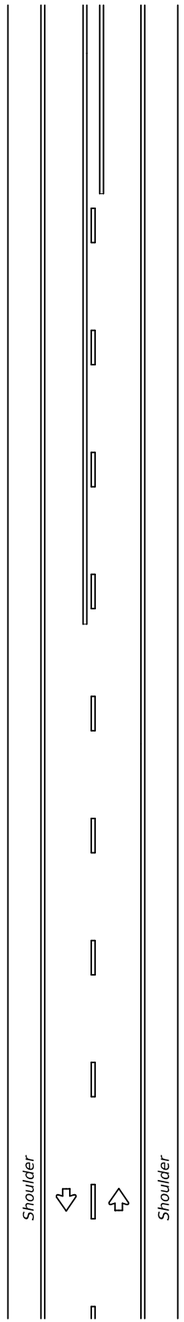
Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(2)-23

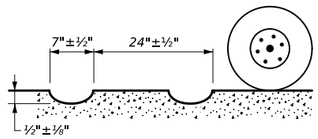
FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
10-13	DIST	COUNTY		SHEET NO.
1-23	TYL	VAN ZANDT		95

DATE: 2/16/2024 6:00:53 PM
FILE: rs(2)-23.dgn

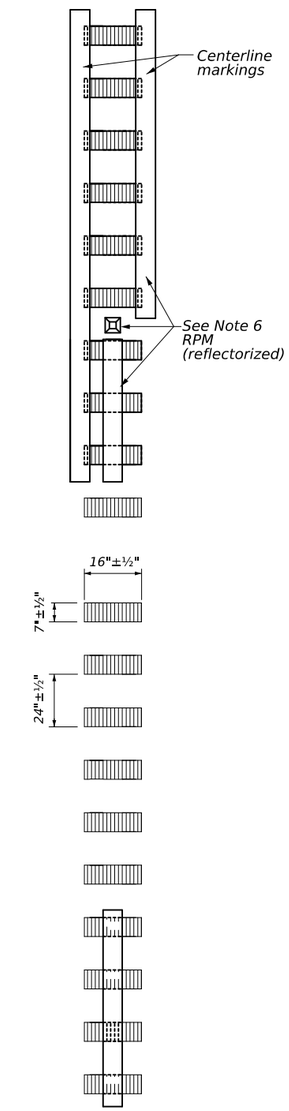
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

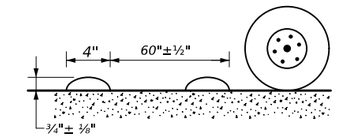


PROFILE VIEW

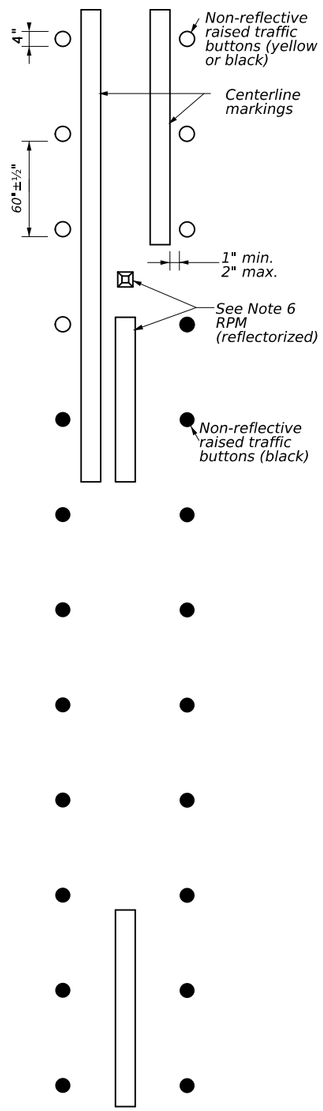


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

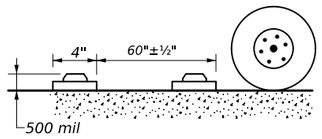


PROFILE VIEW

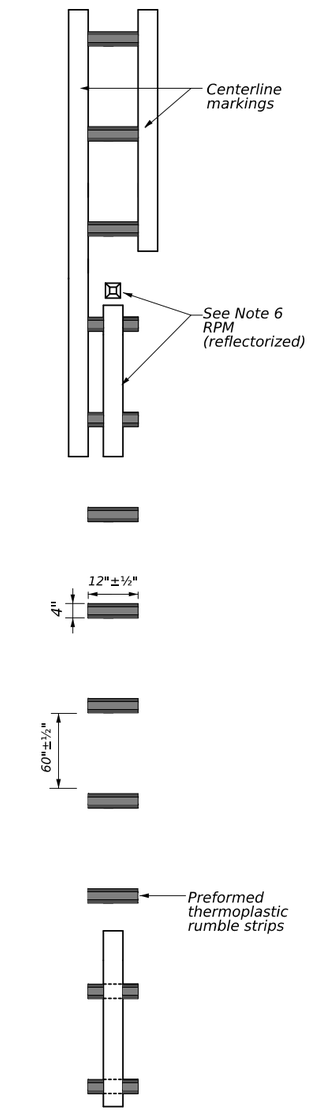


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

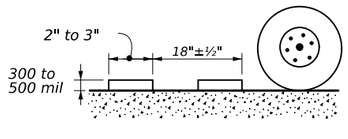


PROFILE VIEW

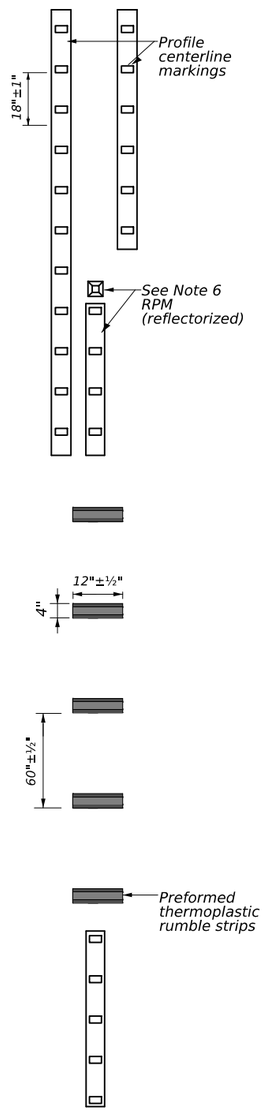


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE 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 edge line 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 Safety 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 or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) 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.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

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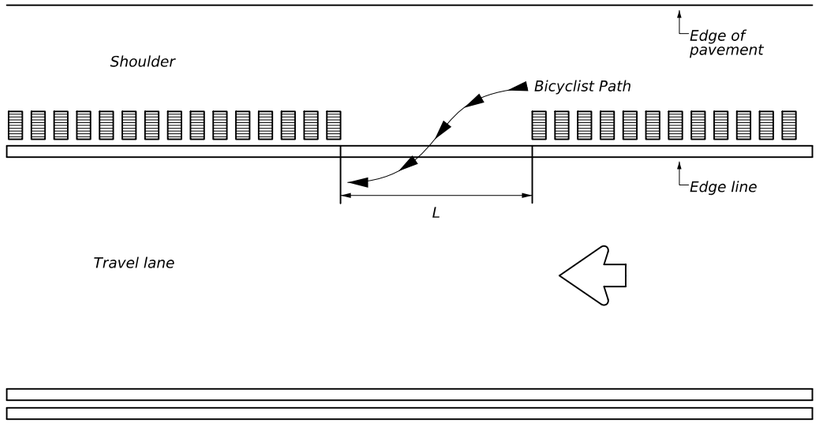
FILE: rs(4)-23.dgn

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
10-13 1-23	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		96



RUMBLE STRIP GAP SPACING

GAP LENGTH TABLE (L)	
BICYCLISTS OPERATING <= 20 MPH	>= 15 FEET
BICYCLISTS OPERATING > 20 MPH	>= 20 FEET*

* Or the rumble strips should be located on the right side of the shoulder to allow bicyclists to avoid them if they encounter a need to enter the travel lane (e.g. a downhill location).

GENERAL NOTES

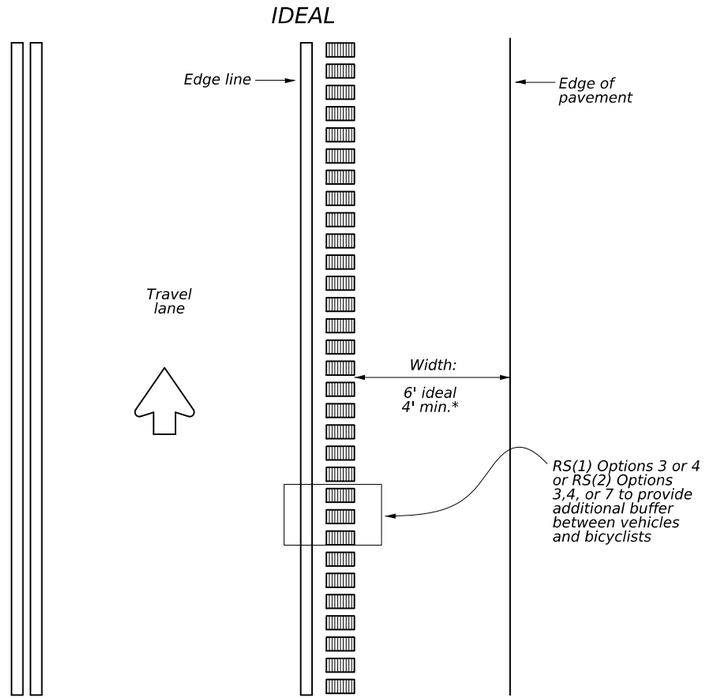
1. The Engineer must consider accomodating bicycles during the planning and implementation of all construction and rehabilitation projects. See the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references, and guidance; including additional detail regarding rumble strip gap and horizontal placement, as well as explanation of desirable, minimum, and constrained values.
2. For non-freeway facilities with bike lanes, buffered bike lanes, or bike-accessible shoulders, the Engineer shall place rumble strips considering the safety of and crash risk for bicyclists. The Engineer shall include a detail of rumble strip gap spacing, horizontal spacing from the edge line, and material / installation method in the plans.
3. See RS(5) General Note 8 regarding bicycle safety with transverse (in-line rumble strips.

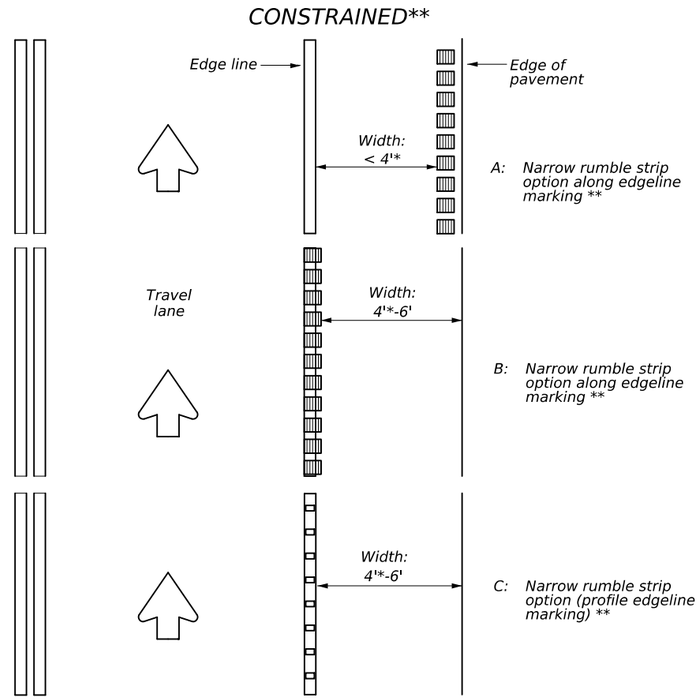
GAPS

4. Rumble strip gaps to allow bicyclists to safely enter or exit a shoulder, as needed. In addition to gaps provided for vehicles (e.g. at cross-streets), the Engineer shall ensure gaps are available every 40 to 60 feet. See Gap Spacing detail. The Engineer should consider significant grades as they affect bicycle speeds in applying the Gap Length Table, for example downhill versus uphill bicycle speeds.

HORIZONTAL SPACING

5. Rumble strip horizontal spacing considerations affect bicyclist safety and mobility. The Engineer shall consider desirable, minimum, and constrained widths, as shown in the horizonal placement detail. The Engineer shall apply engineering judgment to choose placement and material options in the Shoulder Width Tables on each RS sheet to optimize safety for all users. Horizontal width for bikes does not include standard drainage inlets, rumble strips, or raised pavement markers (RPMs).





* 5' minimum if adjacent to curb, guardrail, vertical element, or obstacle.
** Options A-C for consideration of horizontal placement using engineering judgment. See RS(1) and RS(2) for rumble strip device options. Care should be taken to consider bicycles in applying the tables by shoulder width. Narrow rumble strip options include RS(1) Options 1, 2, and 6 and RS(2) Options 1, 2, 6, and 8.

RUMBLE STRIP HORIZONTAL PLACEMENT

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FILE: rs(6)-23.dgn

Texas Department of Transportation

Traffic Safety Division Standard

RUMBLE STRIP BICYCLE CONSIDERATIONS FOR NON-FREEWAY FACILITIES RS(6)-23

FILE: rs(6)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1671	02	012	FM 1651
1-23	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		97

94A

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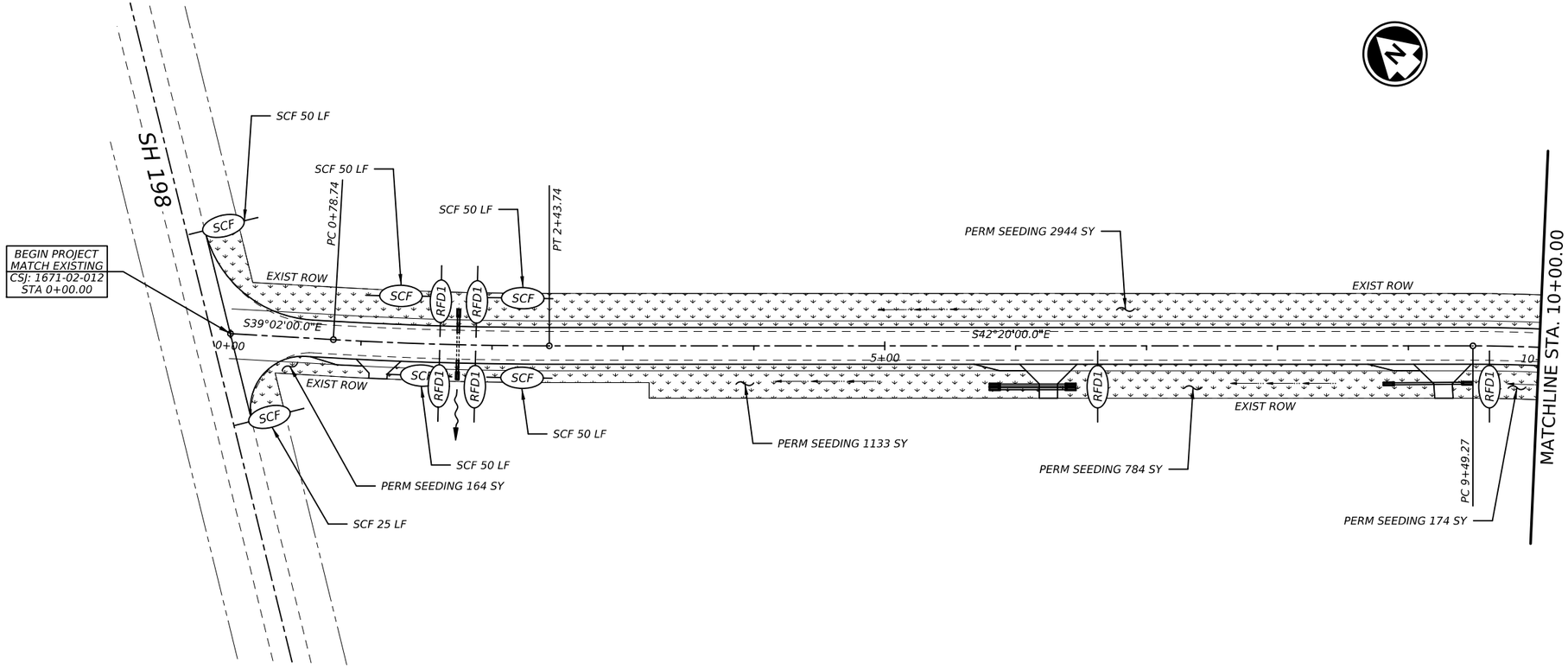

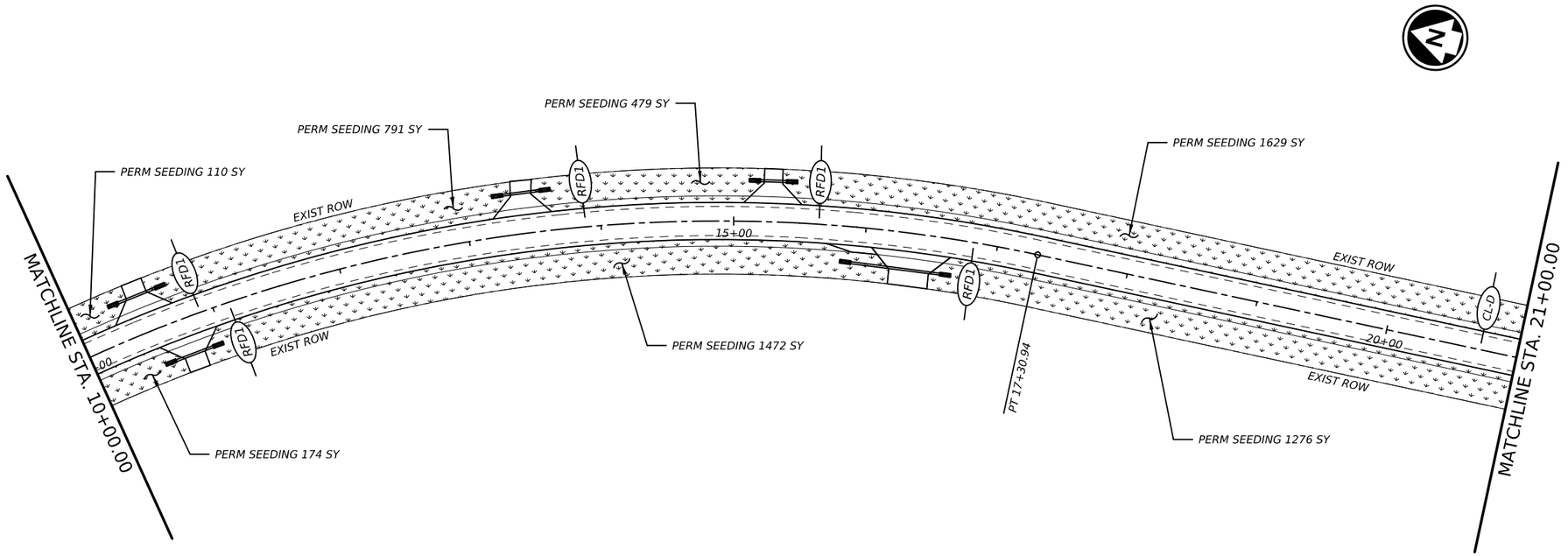

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
- CL-D — EROSION CONTROL LOG DAM (15 LF TYP)
- DITCH FLOW
- SHEET FLOW

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

0 50' 100'
SCALE IN FEET

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 1 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		98

DATE: 2/16/2024 6:02:39 PM
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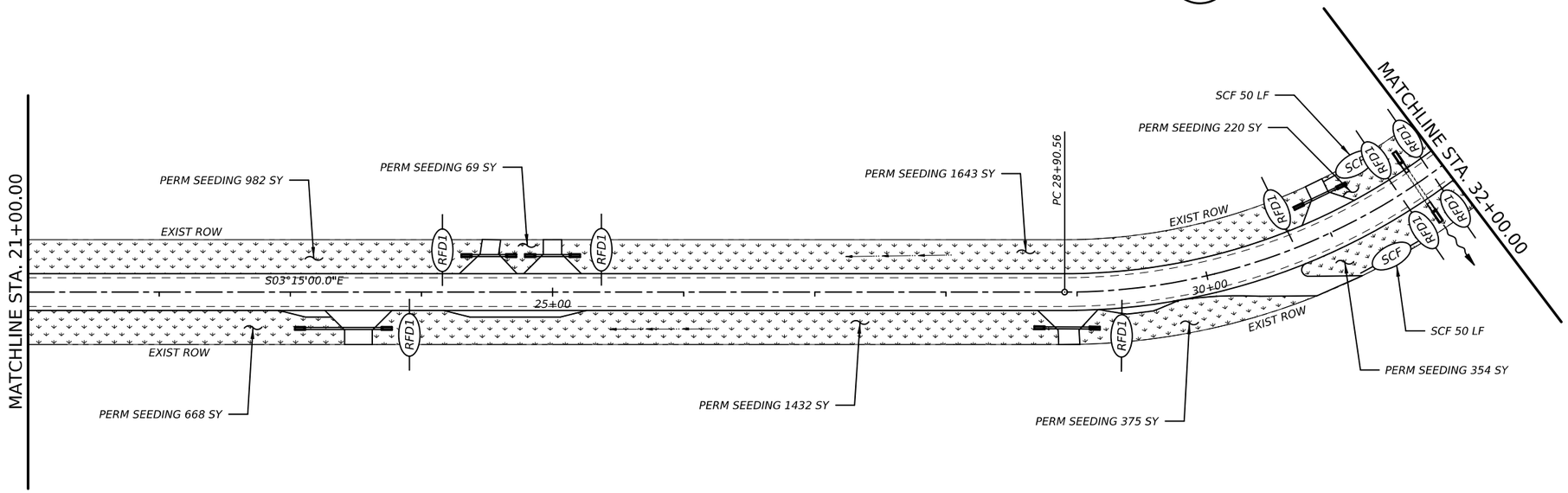

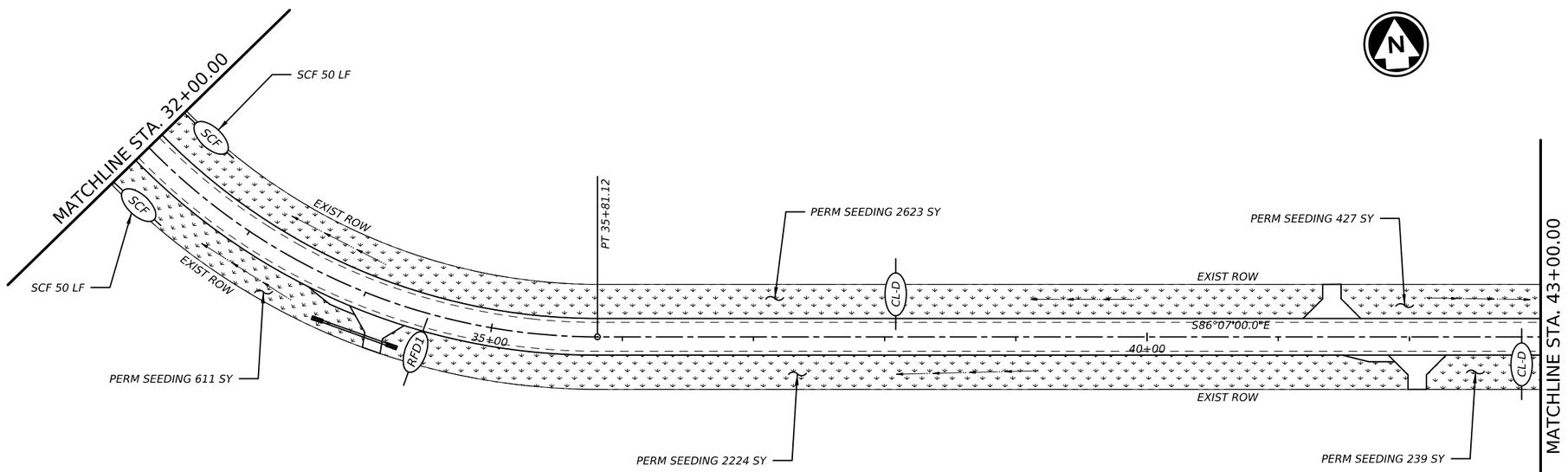

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
- CL-D — EROSION CONTROL LOG DAM (15 LF TYP)
- DITCH FLOW
- SHEET FLOW

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0 50' 100'
SCALE IN FEET

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 2 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		99

DATE: 2/16/2024 6:03:11 PM
FILE: FM1651_SW3P_02.dgn

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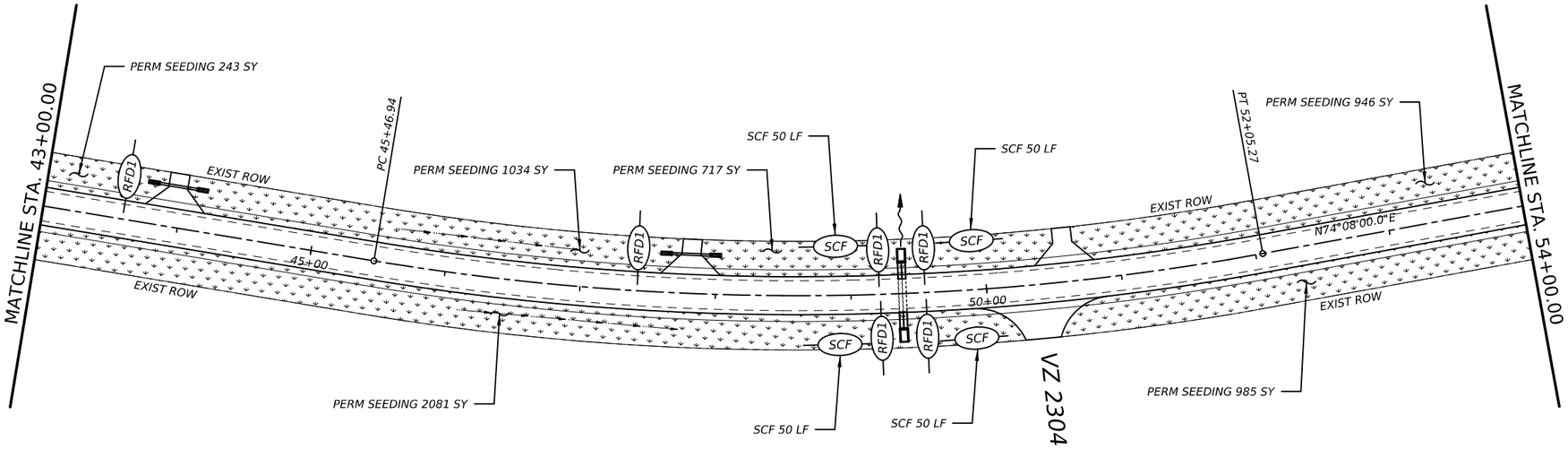
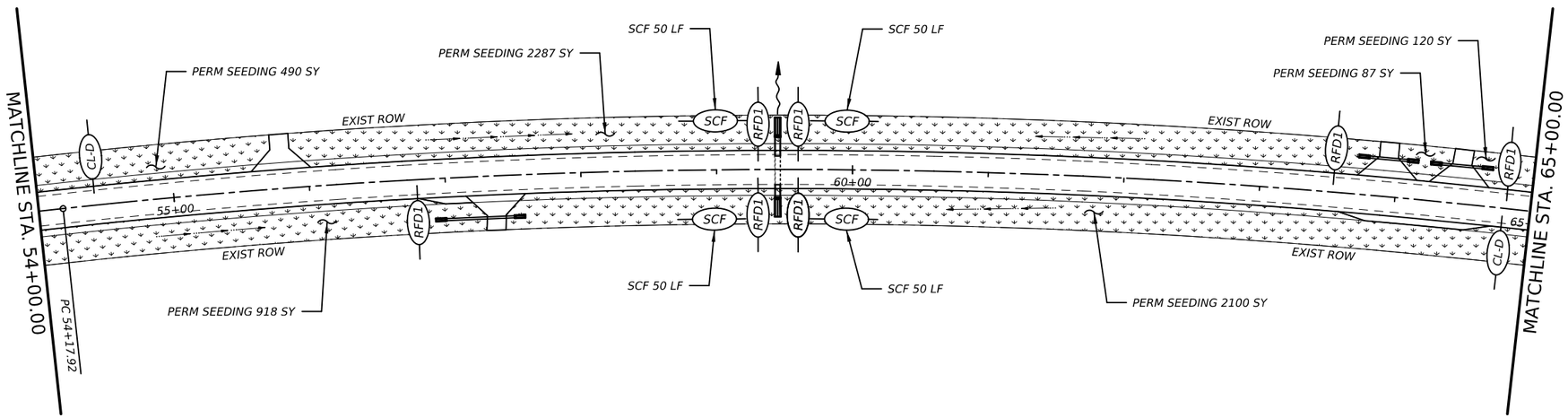
DW:
CK:
DW:

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
- CL-D — EROSION CONTROL LOG DAM (15 LF TYP)
- DITCH FLOW
- SHEET FLOW





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STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

0 50' 100'
SCALE IN FEET

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 3 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		100

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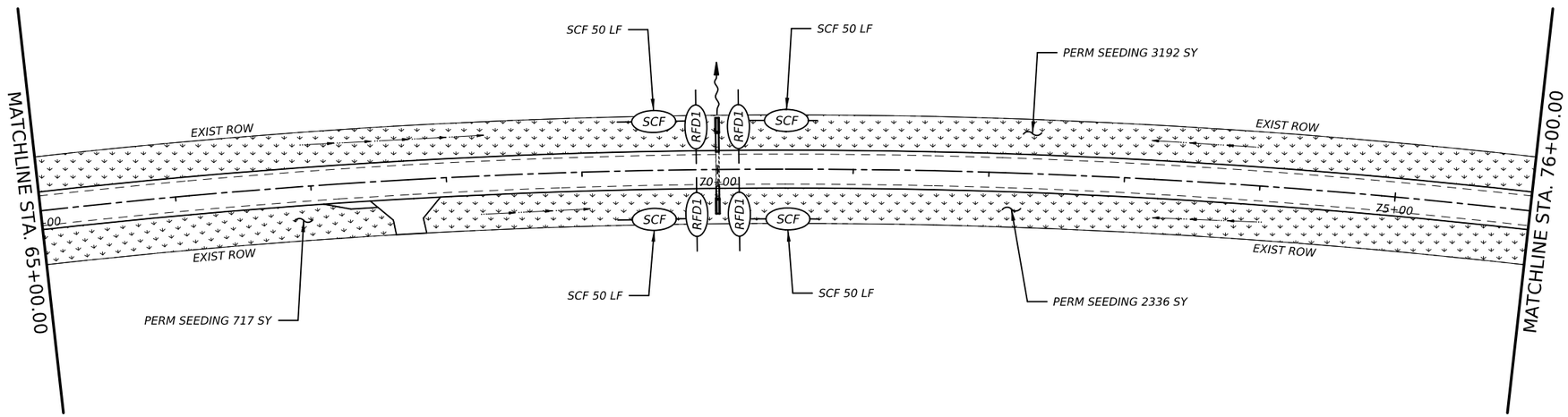
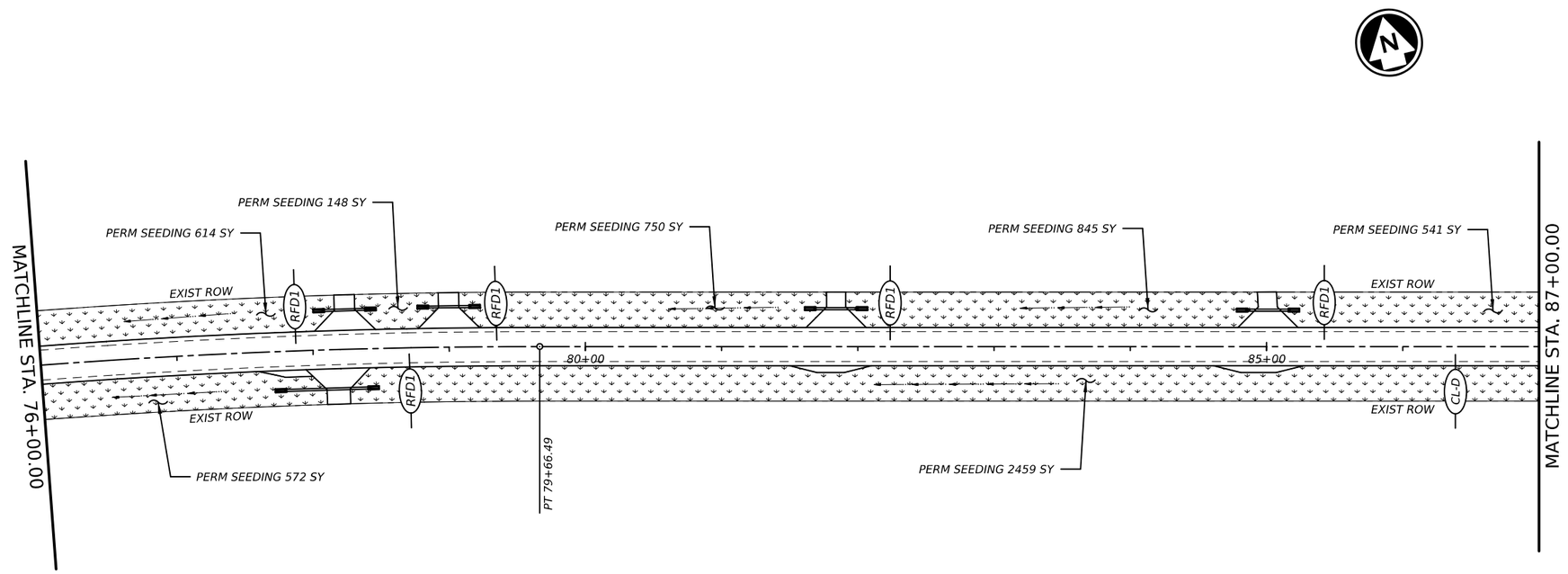
LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
- CL-D — EROSION CONTROL LOG DAM (15 LF TYP)
- DITCH FLOW
- SHEET FLOW





STATE OF TEXAS
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2/16/2024

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FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 4 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		101

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LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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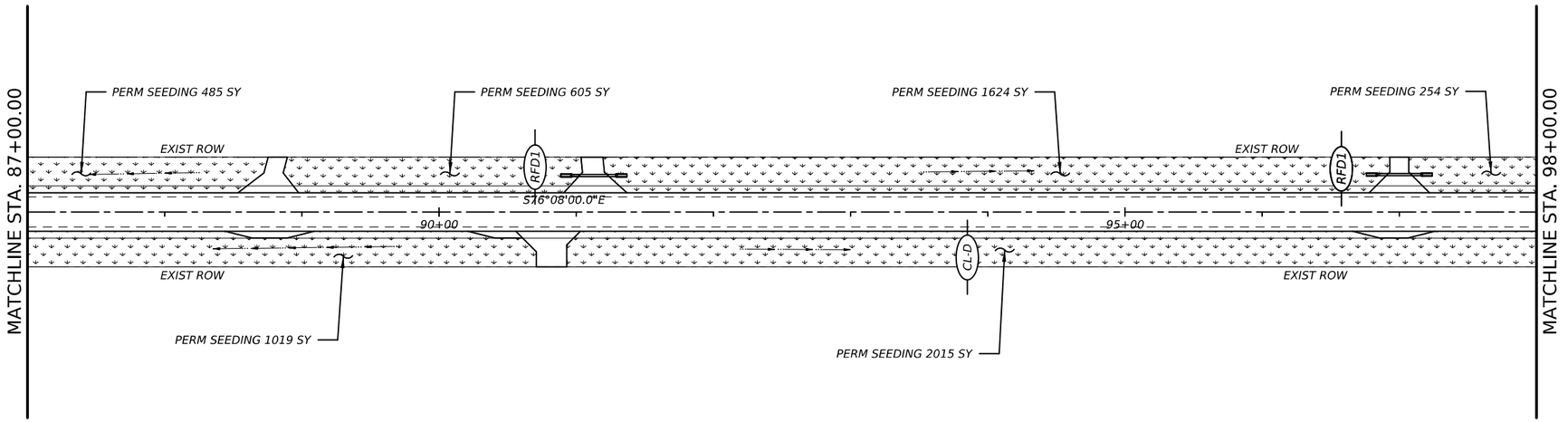
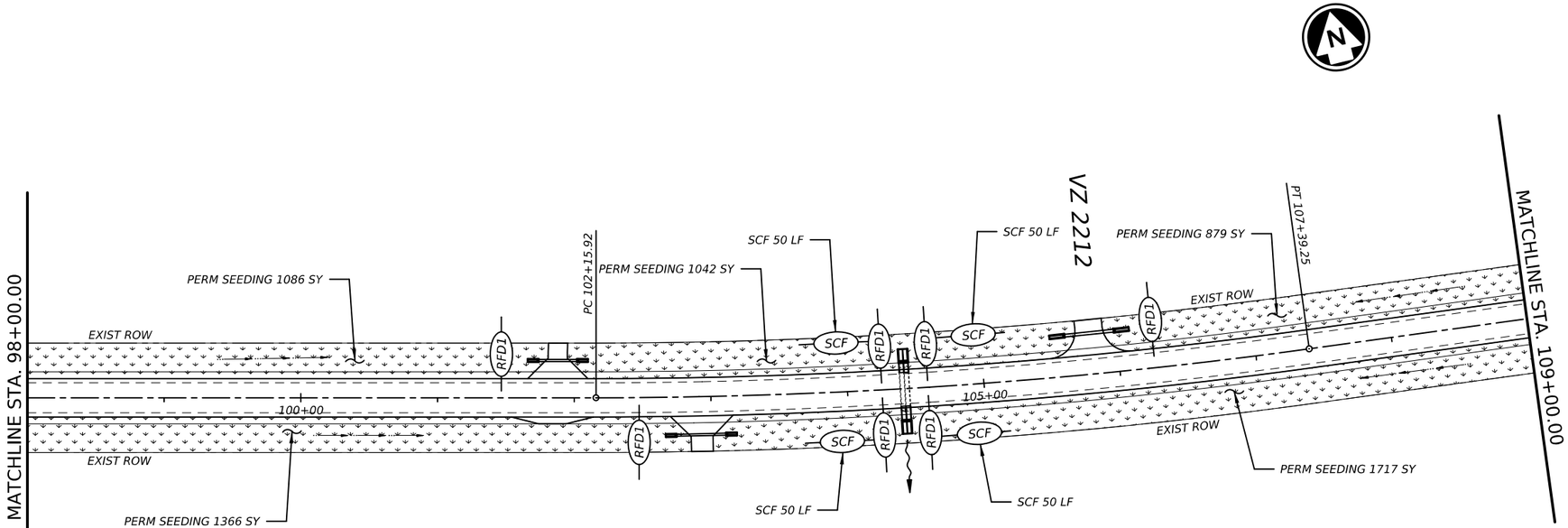
- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
- CL-D — EROSION CONTROL LOG DAM (15 LF TYP)
- DITCH FLOW
- SHEET FLOW





STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
2/16/2024

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Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 5 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
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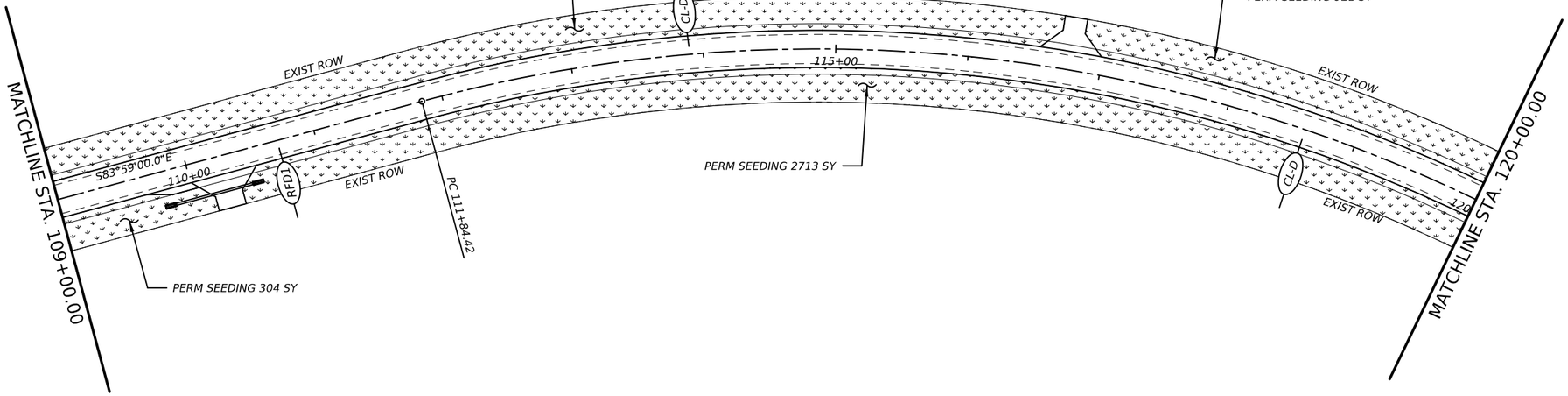

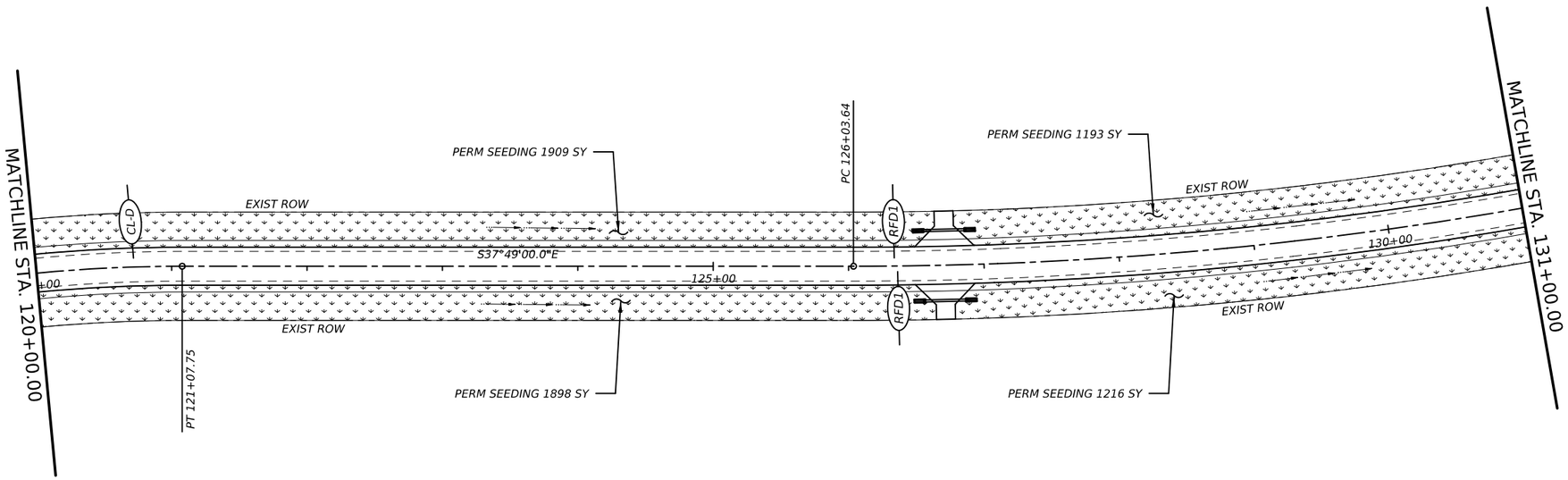

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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- RFD1 — ROCK FILTER DAM TY 1 (15 LF TYP)
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STATE OF TEXAS
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ENVIRONMENTAL LAYOUT

SHEET 6 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		103

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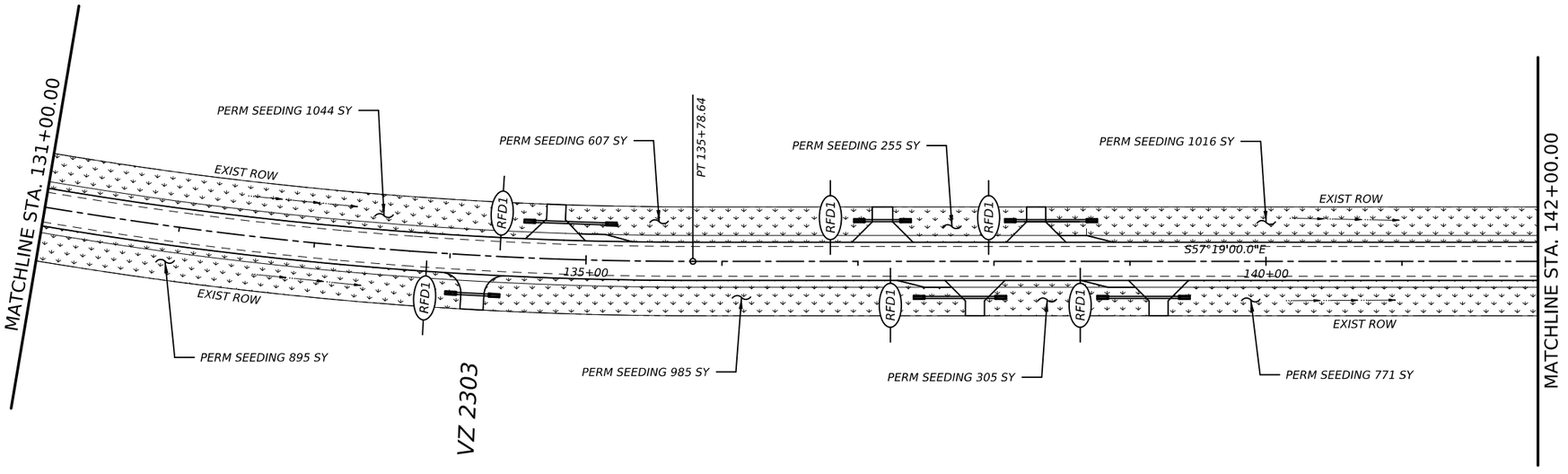

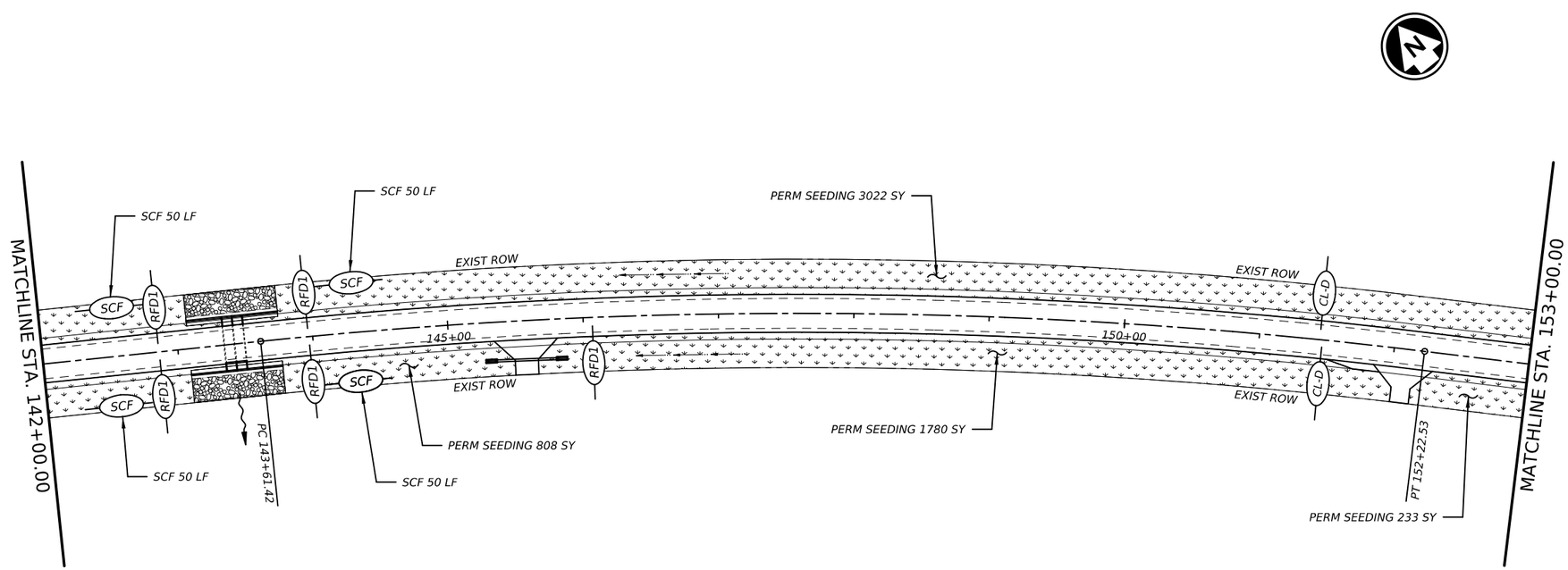

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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STATE OF TEXAS
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ENVIRONMENTAL LAYOUT

SHEET 7 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		104

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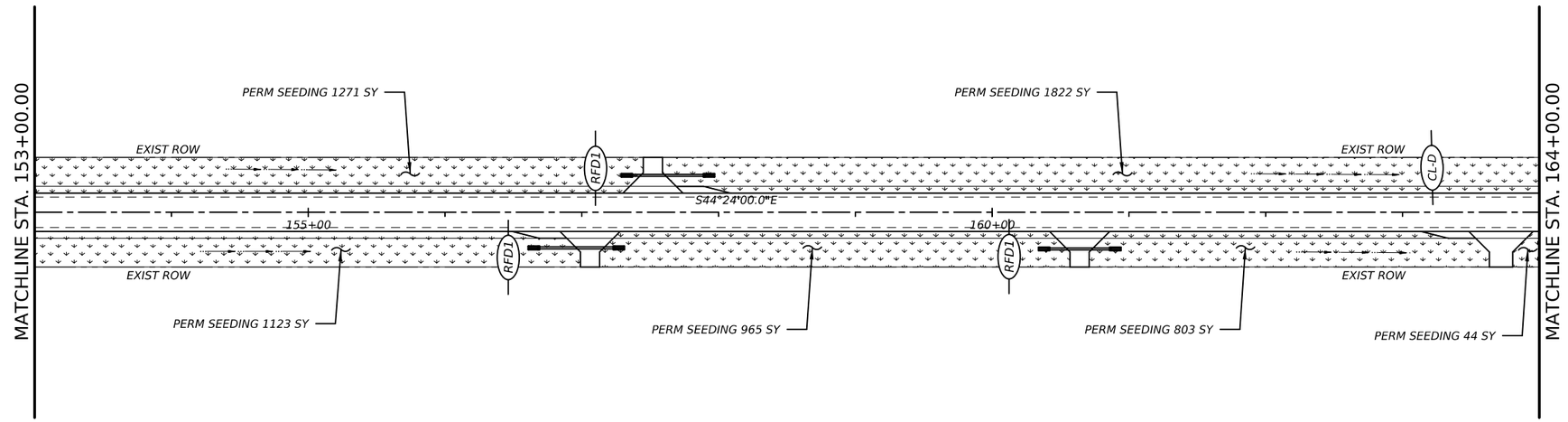

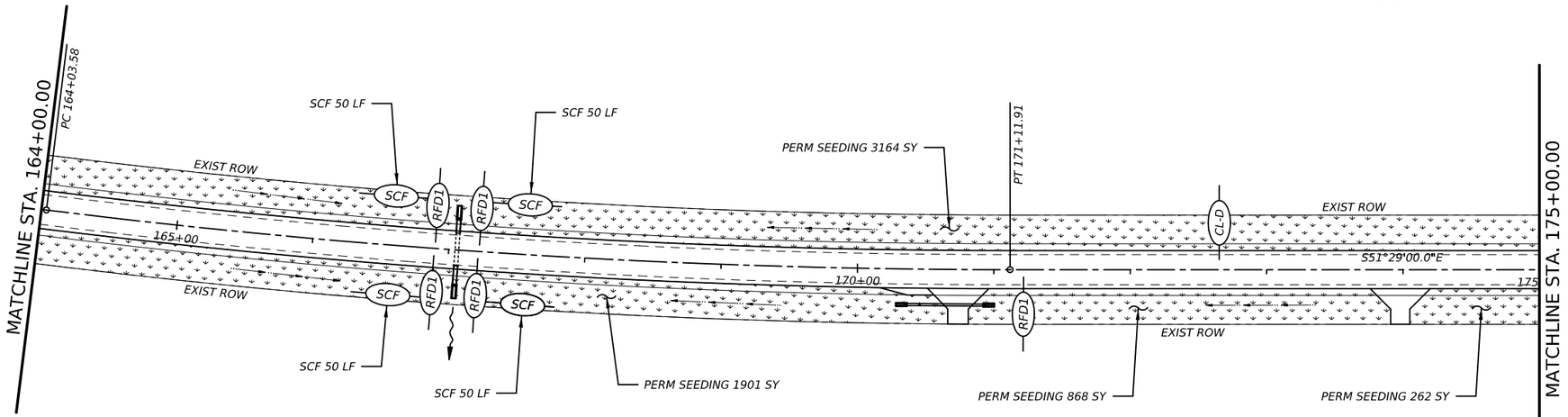

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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ENVIRONMENTAL LAYOUT

SHEET 8 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		105

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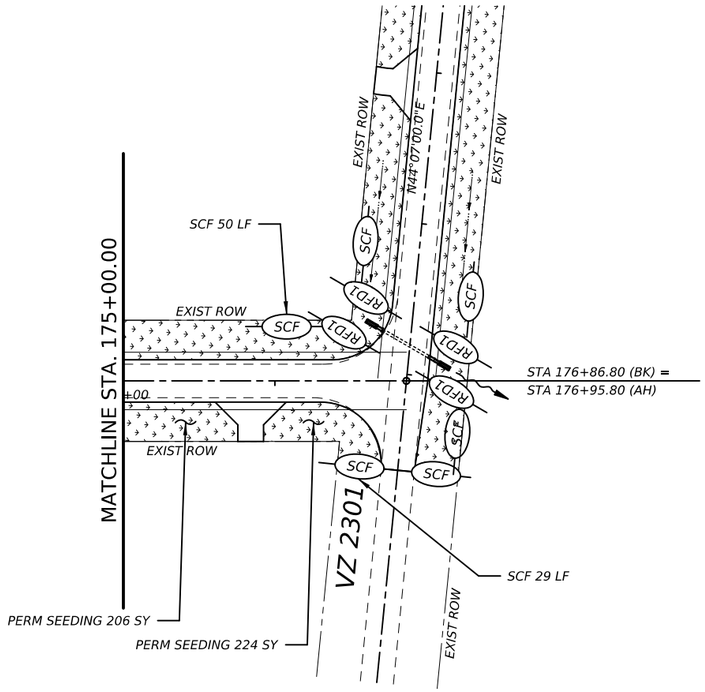

LEGEND

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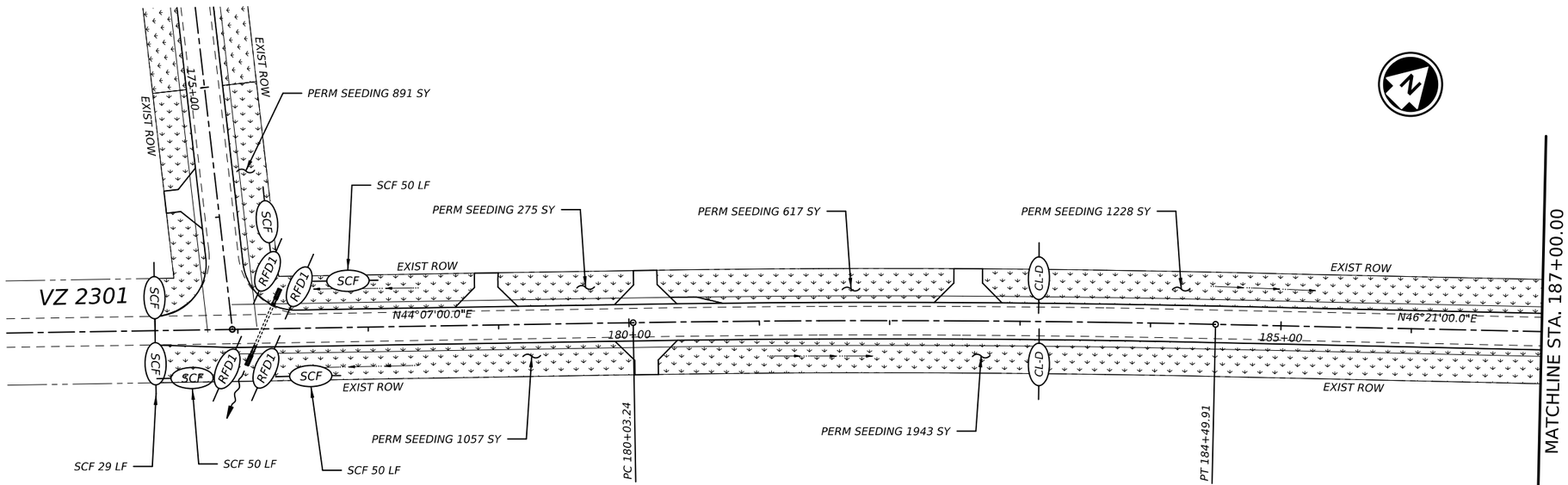
- SHEET FLOW



STATE OF TEXAS
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2/16/2024

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Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 9 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		106

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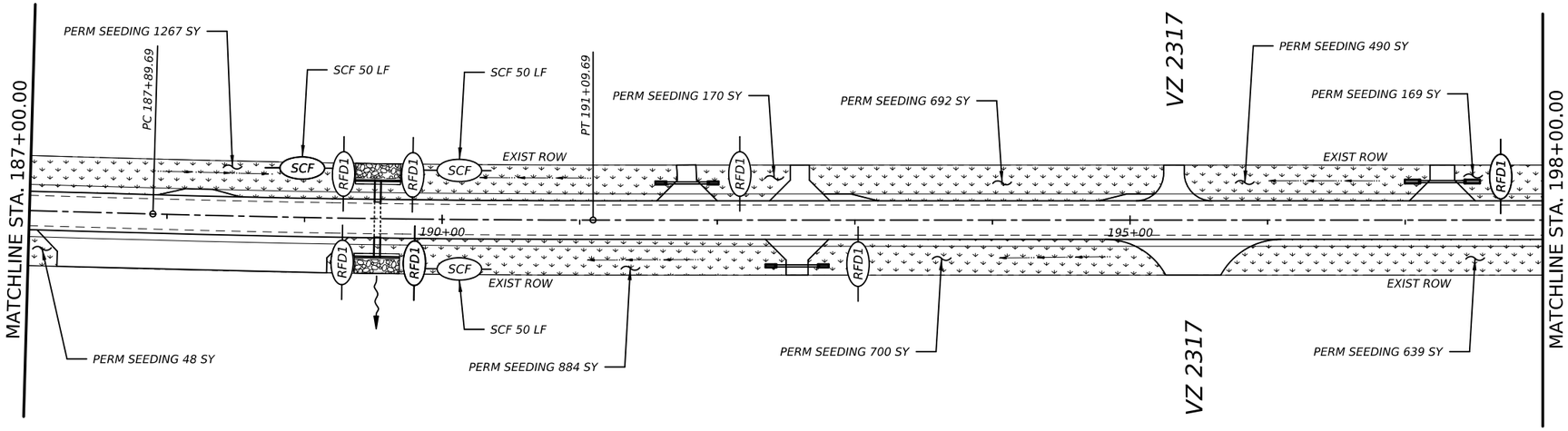

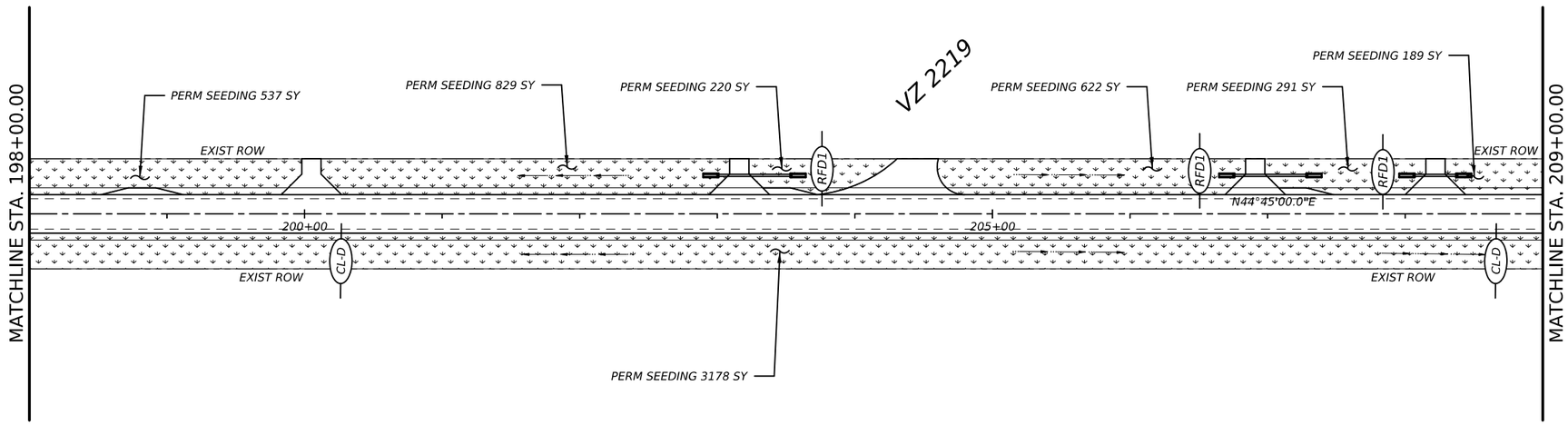

LEGEND

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STATE OF TEXAS
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Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 10 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		107

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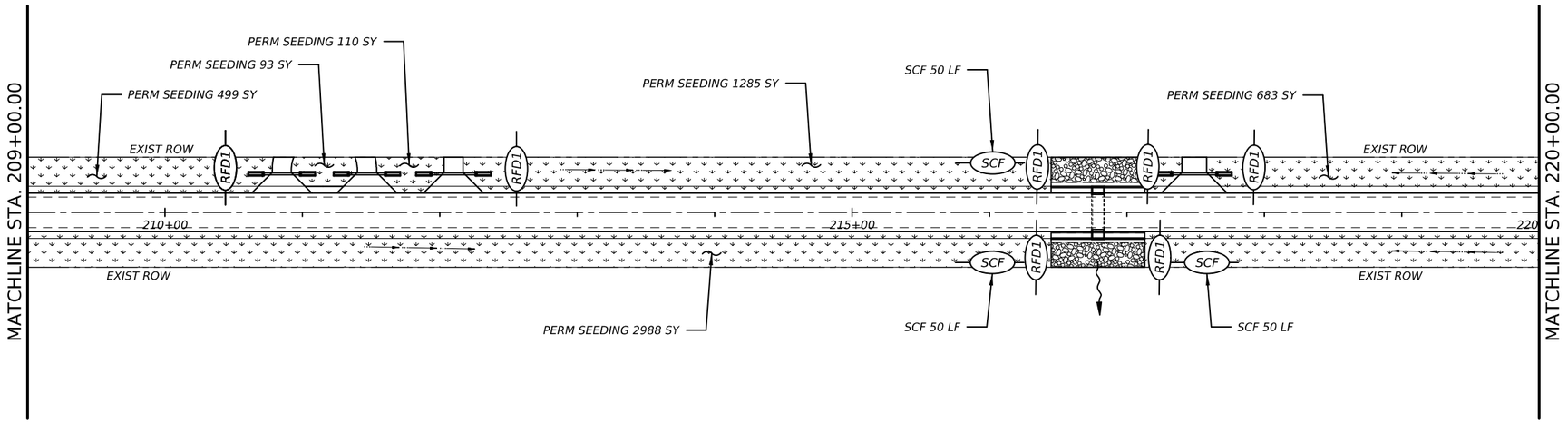

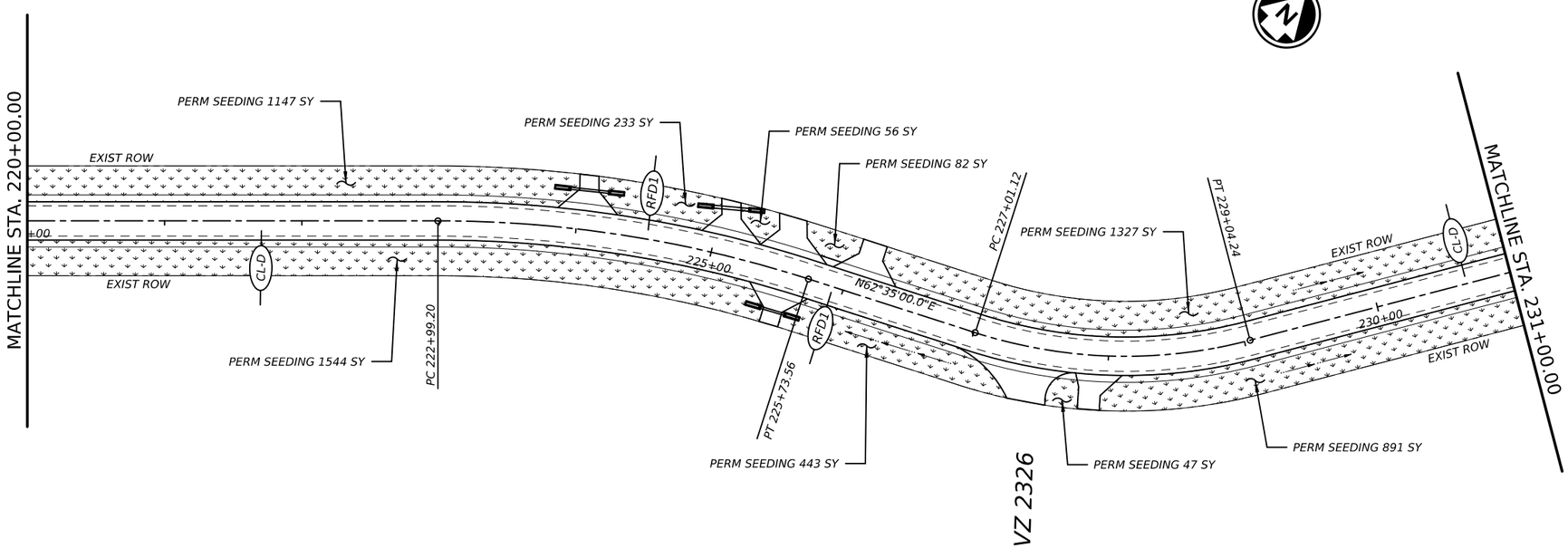

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
- SCF — SEDIMENT CONTROL FENCE
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- SHEET FLOW

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STATE OF TEXAS
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131159
LICENSED PROFESSIONAL ENGINEER
2/16/2024

0 50' 100'
SCALE IN FEET

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 11 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		108

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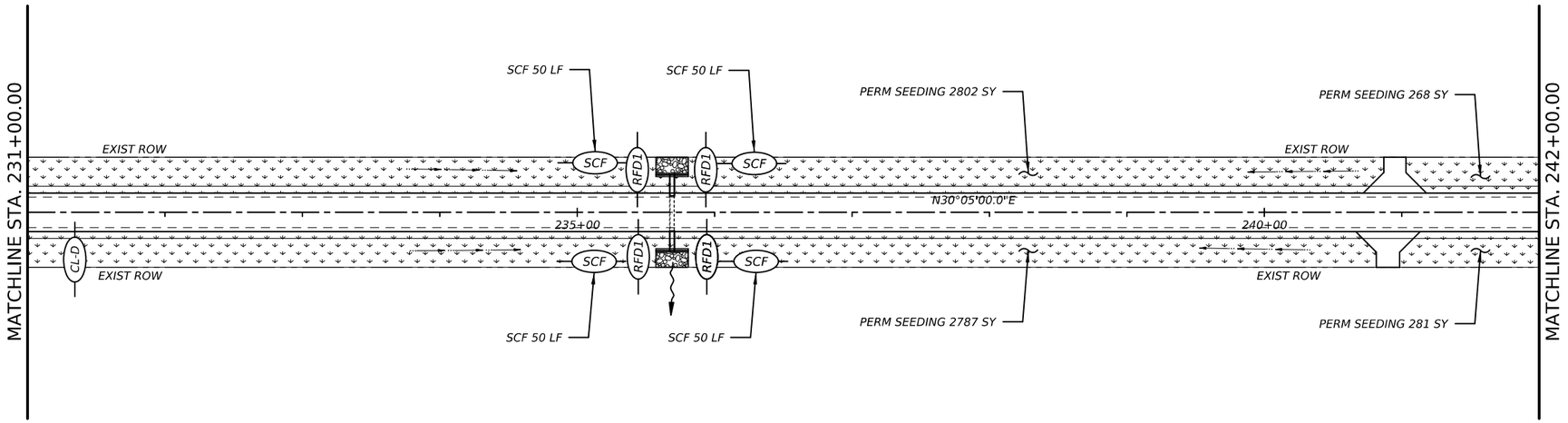

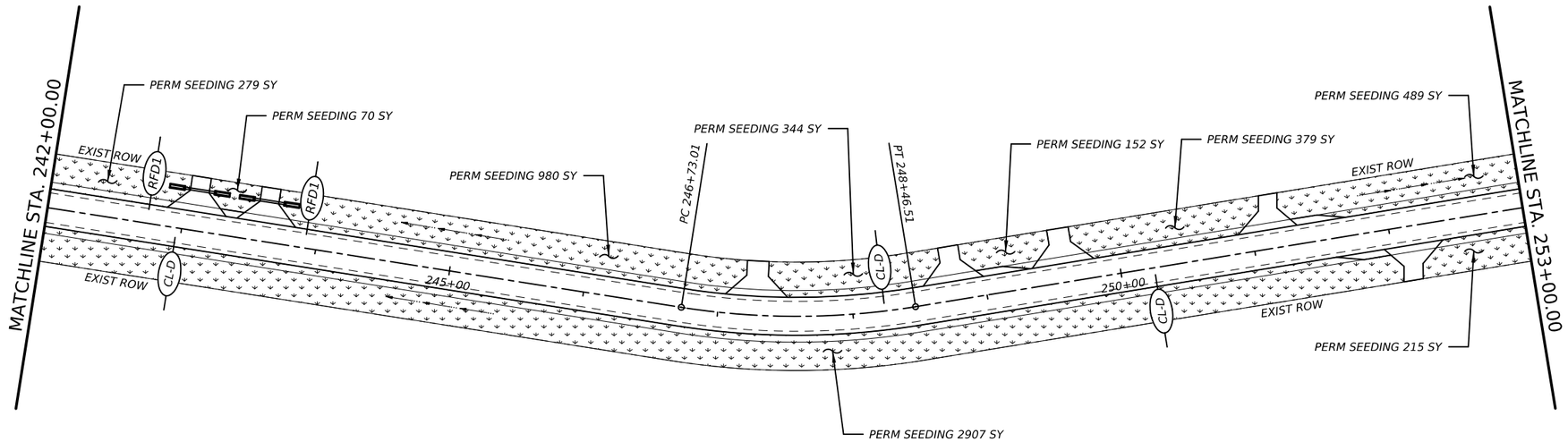

LEGEND

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2/16/2024

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Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 12 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		109

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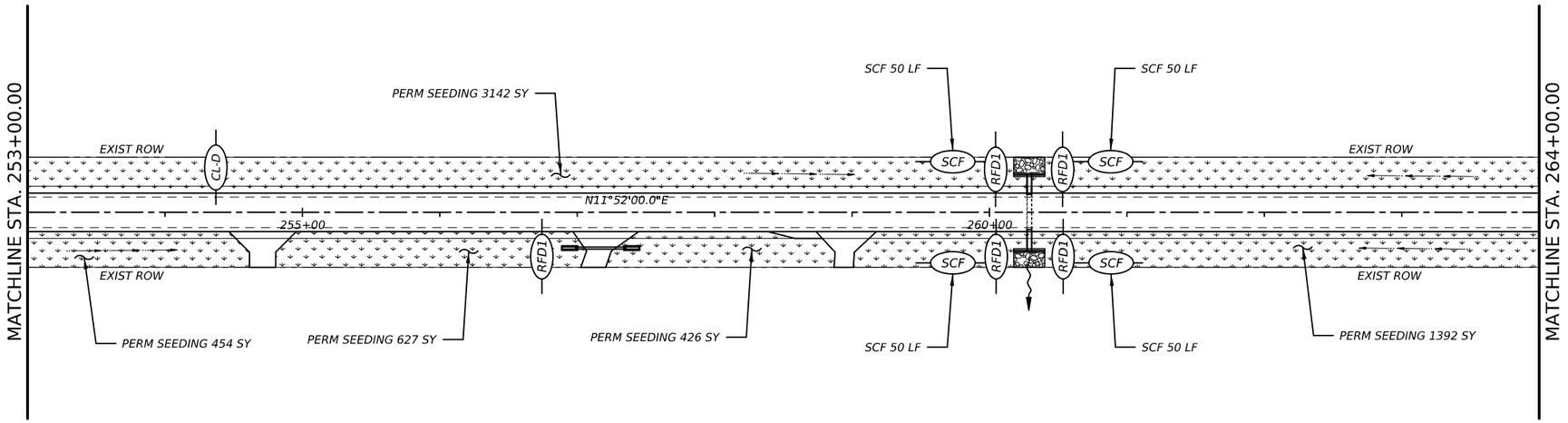

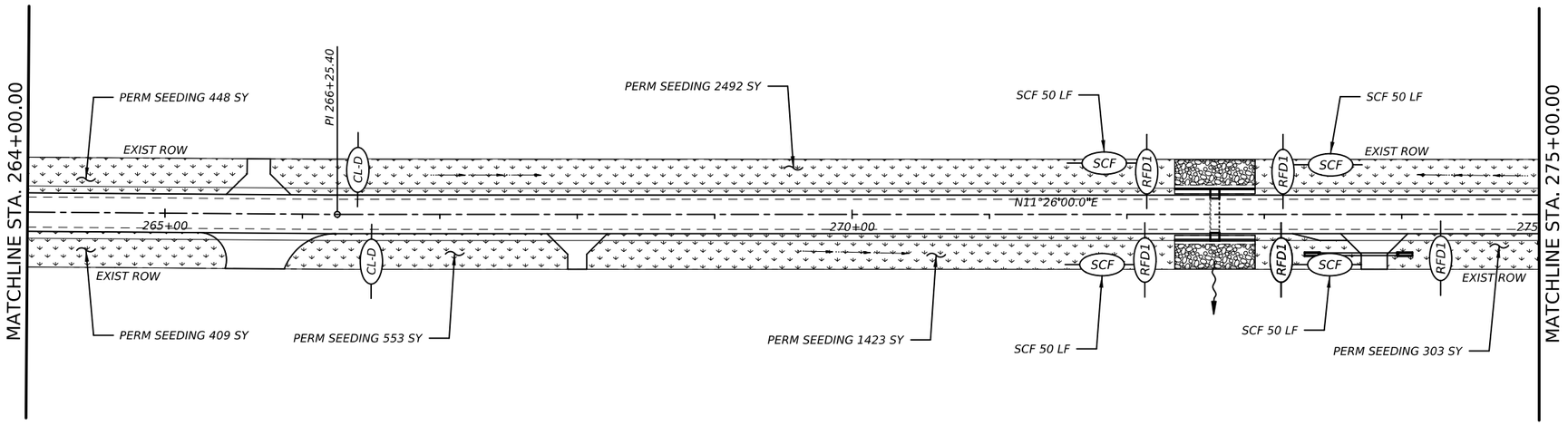

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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SCALE IN FEET

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Texas Department of Transportation

ENVIRONMENTAL LAYOUT

SHEET 13 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		110

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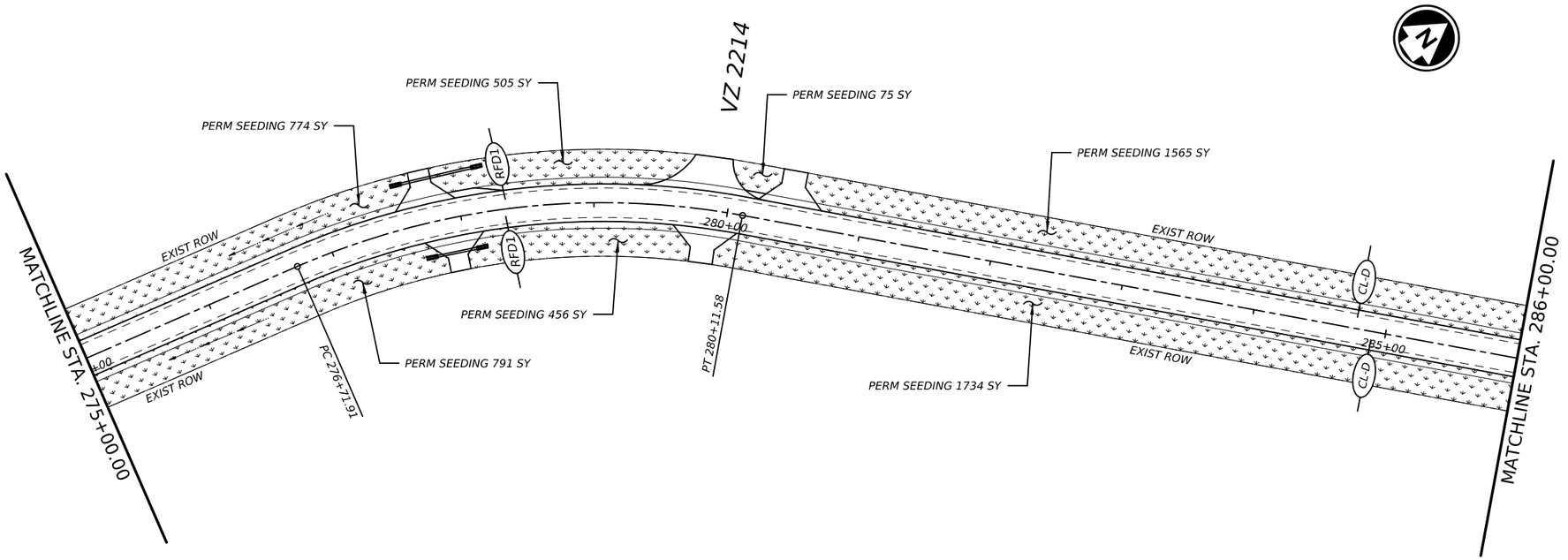

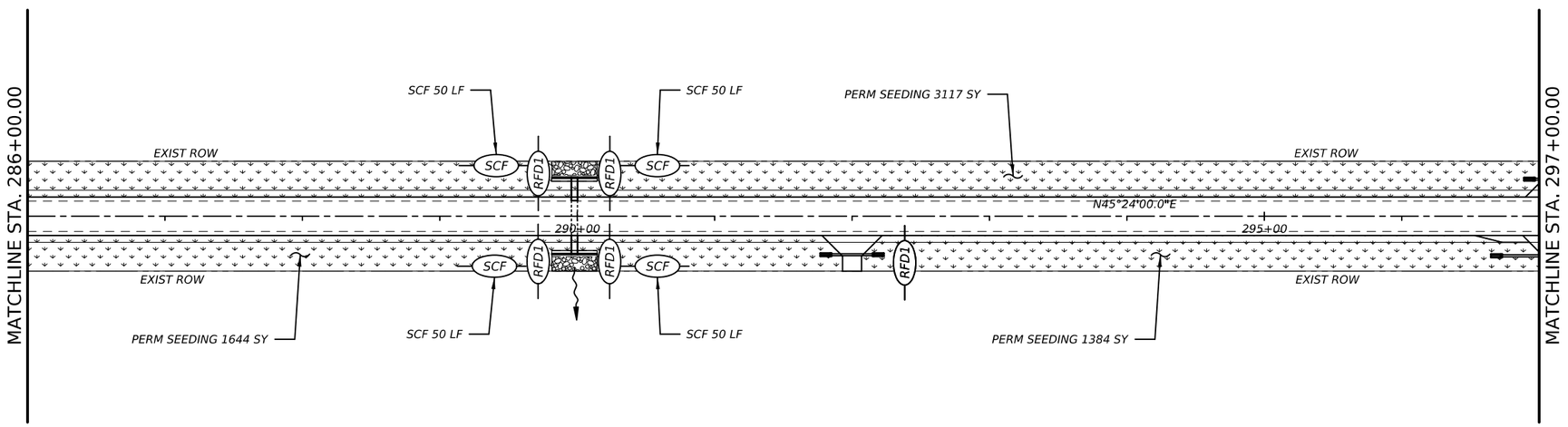

LEGEND

- BONDED FBR MTRX SEED AREA/AREA OF DISTURBANCE
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ENVIRONMENTAL LAYOUT

SHEET 14 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		111

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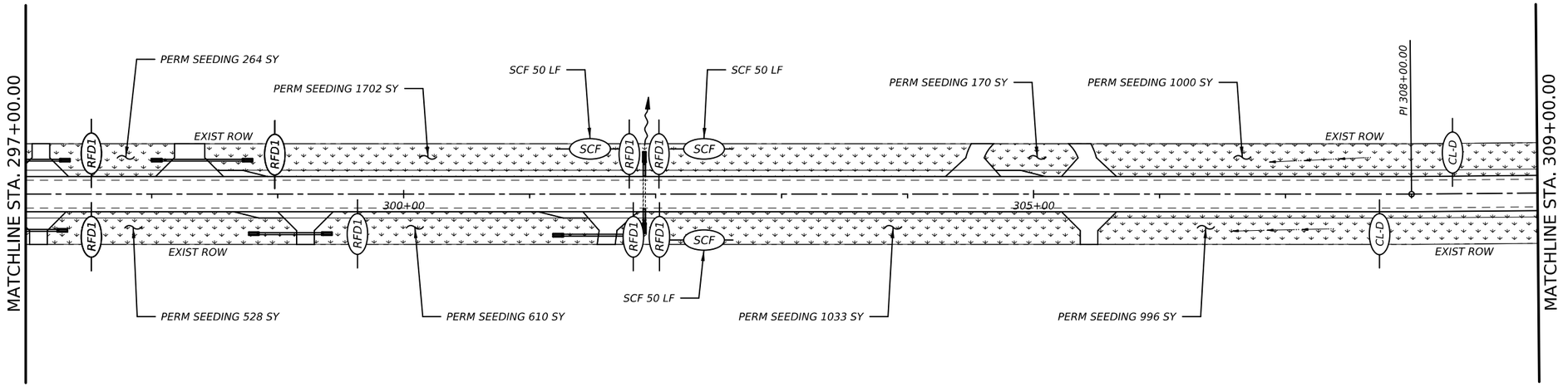

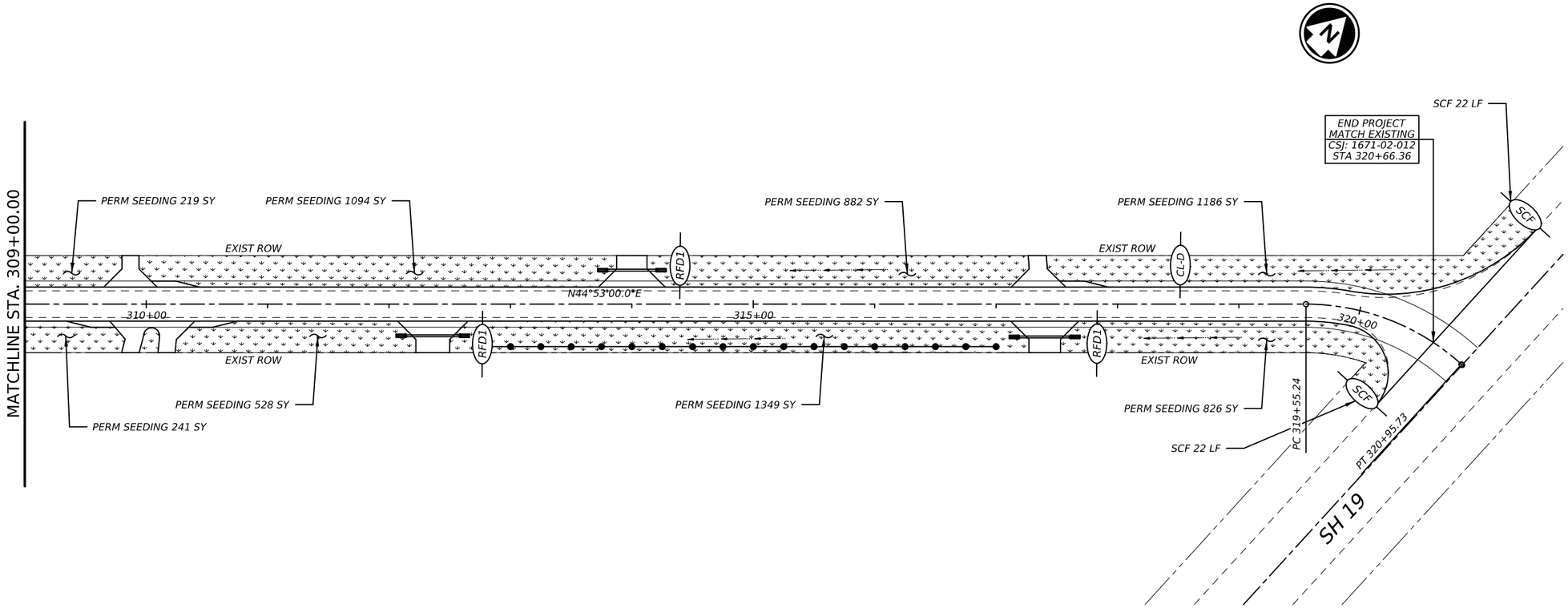

LEGEND

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ENVIRONMENTAL LAYOUT

SHEET 15 OF 15

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		112

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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. Adhere to direction concerning migratory birds as listed below.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Historical marker at Sta 189+53 should be left untouched.

2.

3.

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED
PROFESSIONAL ENGINEER
2/16/2024

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)	1671	02	012	FM 1651
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		113

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
1671-02-012

1.2 PROJECT LIMITS:
From: SH 198 E

To: SH 19

1.3 PROJECT COORDINATES:
BEGIN: (Lat) +32.481810 ,(Long) +32.491622

END: (Lat) -95.930474 ,(Long) -95.858997

1.4 TOTAL PROJECT AREA (Acres): 59.70

1.5 TOTAL AREA TO BE DISTURBED (Acres): 38.81

1.6 NATURE OF CONSTRUCTION ACTIVITY:
FOR THE REHABILITATION OF EXISTING ROAD
CONSISTING OF REHAB ROADWAY AND WIDEN TO 28 FT

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Pickton fine sand, 1 to 5% slopes	80% sand, well drainged, negligible runoff

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Alligator Creek then Kickapoo Creek	Lake Palestine (0605); Impaired for bacteria
NO TMDLs or I-PLANS WERE IDENTIFIED	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
IN SUNG HWANG
131159
LICENSED PROFESSIONAL ENGINEER
2/16/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

 July 2023

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		114
STATE	STATE DIST.	COUNTY	
TEXAS	TYL	VAN ZANDT	
CONT.	SECT.	JOB	HIGHWAY NO.
1671	02	012	FM 1651

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☒ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☒ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☒ ☐ Biodegradable Erosion Control Logs
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☒ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☒ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☒ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
Permanent Seeding	See Environmental Layout Sheet	

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☒ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

2.9 INSPECTIONS:

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		115
STATE	STATE DIST.	COUNTY	
TEXAS	TYL	VAN ZANDT	
CONT.	SECT.	JOB	HIGHWAY NO.
1671	02	012	FM 1651

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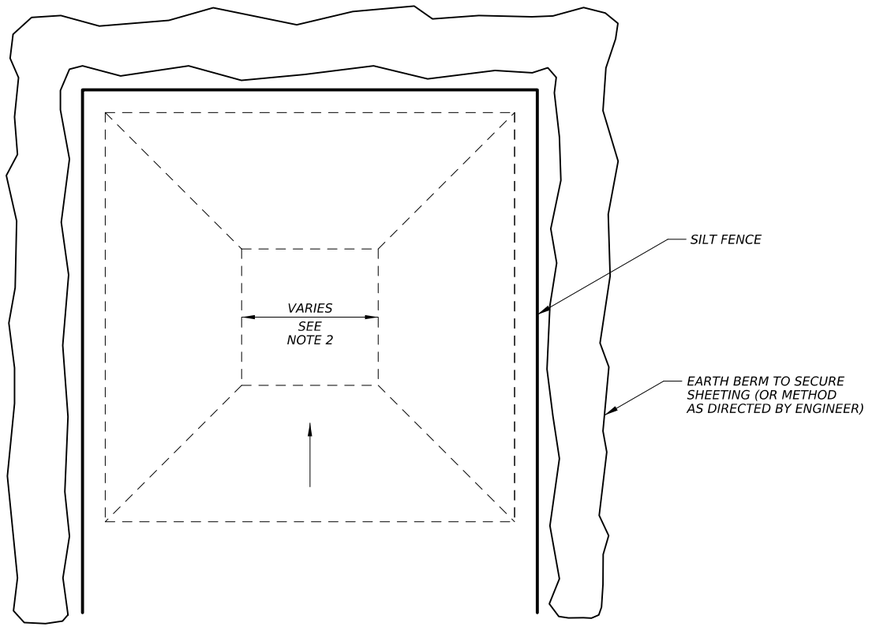
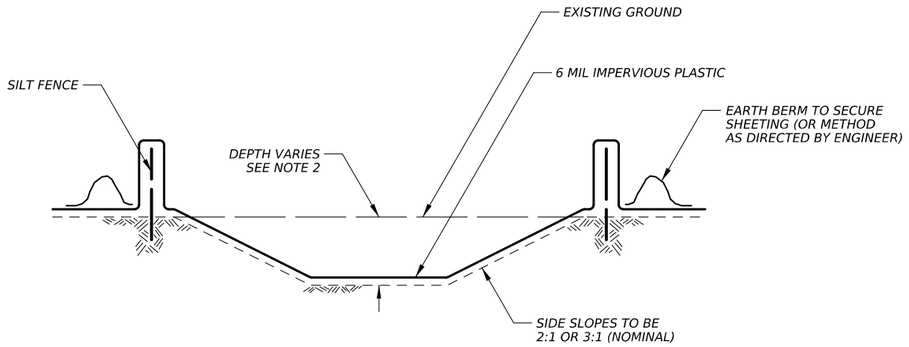
DW:
CK:
DW:





CONCRETE WASHOUT AREA

N.T.S.
(SEE NOTE 2)

NOTES

1. CONCRETE WASHOUT AREA(S) SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE. THE CONCRETE WASHOUT AREA SHALL BE ENTIRELY SELF-CONTAINED.

2. THE CONTRACTOR SHALL SUBMIT THE DESIGN, LOCATION AND SIZING OF OF THE CONCRETE WASHOUT AREA(S) WITH THE PROJECT'S EROSION AND SEDIMENTATION CONTROL PLAN AND SHALL BE APPROVED BY THE ENGINEER.

LOCATION: WASHOUT AREA(S) ARE TO BE LOCATED AT LEAST 50 FEET FROM ANY STREAM, WETLAND, STORM DRAINS, OR OTHER SENSITIVE RESOURCE. THE FLOOD CONTINGENCY PLAN MUST ADDRESS THE CONCRETE WASHOUT IF THE WASHOUT IS TO BE LOCATED WITHIN THE FLOODPLAN.

SIZE: THE WASHOUT MUST HAVE SUFFICIENT VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS INCLUDING, BUT NOT LIMITED TO, OPERATIONS ASSOCIATED WITH GROUT AND MORTAR.

3. SURFACE DISCHARGE IS UNACCEPTABLE, THERFORE EARTH BERM OR OTHER CONTROL MEASURES, AS APPROVED BY THE ENGINEER, SHOULD BE USED AROUND THE PERIMETER OF THE CONCRETE WASHOUT AREA FOR CONTAINMENT.

4. SIGNS SHOULD BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CONCRETE AREA(S) AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS. WASHOUT AREA(S) SHOULD BE FLAGGED WITH SAFETY FENCING OR OTHER APPROVED METHOD.

5. CONCRETE WASH-OUT AREAS SHALL BE LINED WITH IMPERVIOUS PLASTIC WITH A MINIMUM THICKNESS OF 6 MILS AND BE REPLACED IF DAMAGED DURING CLEAN-OUT OF HARDENED CONCRETE FROM THE WASH-OUT AREA.

6. WASHOUT AREA(S) ARE TO BE INSPECTED AT LEAST ONCE A WEEK FOR STRUCTURAL INTEGRITY, ADEQUATE HOLDING CAPACITY AND CHECKED FOR LEAKS, TEARS, OR OVERFLOWS. (AS DIRECTED BY THE CONSTRUCTION SITE ENVIRONMENTAL INSPECTION REPORT) WASHOUT AREA(S) SHOULD BE CHECKED AFTER HEAVY RAINS.

7. HARDENED CONCRETE WASTE SHOULD BE REMOVED AND DISPOSED OF WHEN THE WASTE HAS ACCUMULATED TO HALF OF THE CONCRETE WASHOUT'S HEIGHT. THE WASTE CAN BE STORED AT AN UPLAND LOCATION, AS APPROVED BY THE ENGINEER. ALL CONCRETE WASTE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL APPLICABLE LAWS, REGULATIONS, AND GUIDELINES.

8. PAYMENT FOR THIS ITEM IS TO BE INCLUDED UNDER THE GENERAL COST OF THE WORK FOR THE PROJECT, INCLUDING SITE RESTORATION.

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

Trevor L. Castilla 2/16/2024

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

MISCELLANEOUS ENVIRONMENTAL DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1671	02	012	FM 1651
DIST	COUNTY		SHEET NO.
TYL	VAN ZANDT		116

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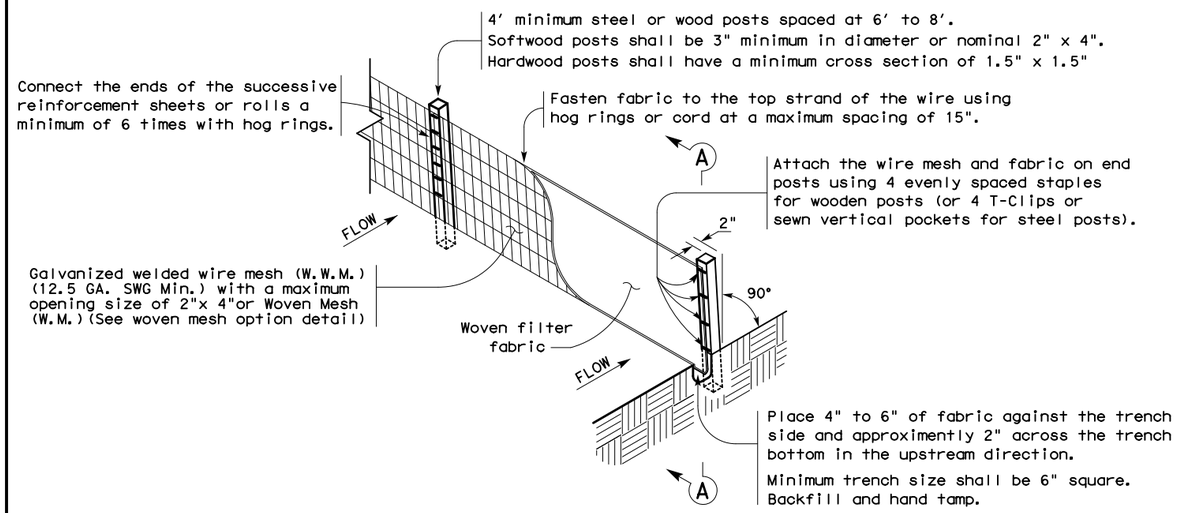
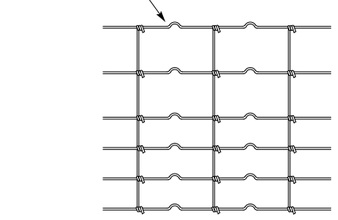
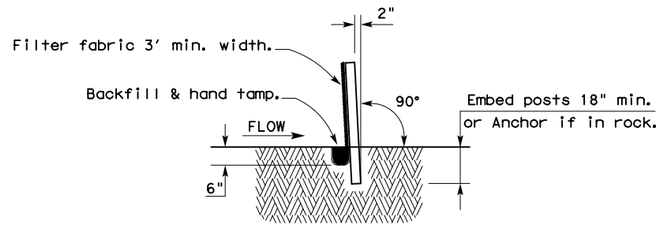


TEMPORARY SEDIMENT CONTROL FENCE

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.

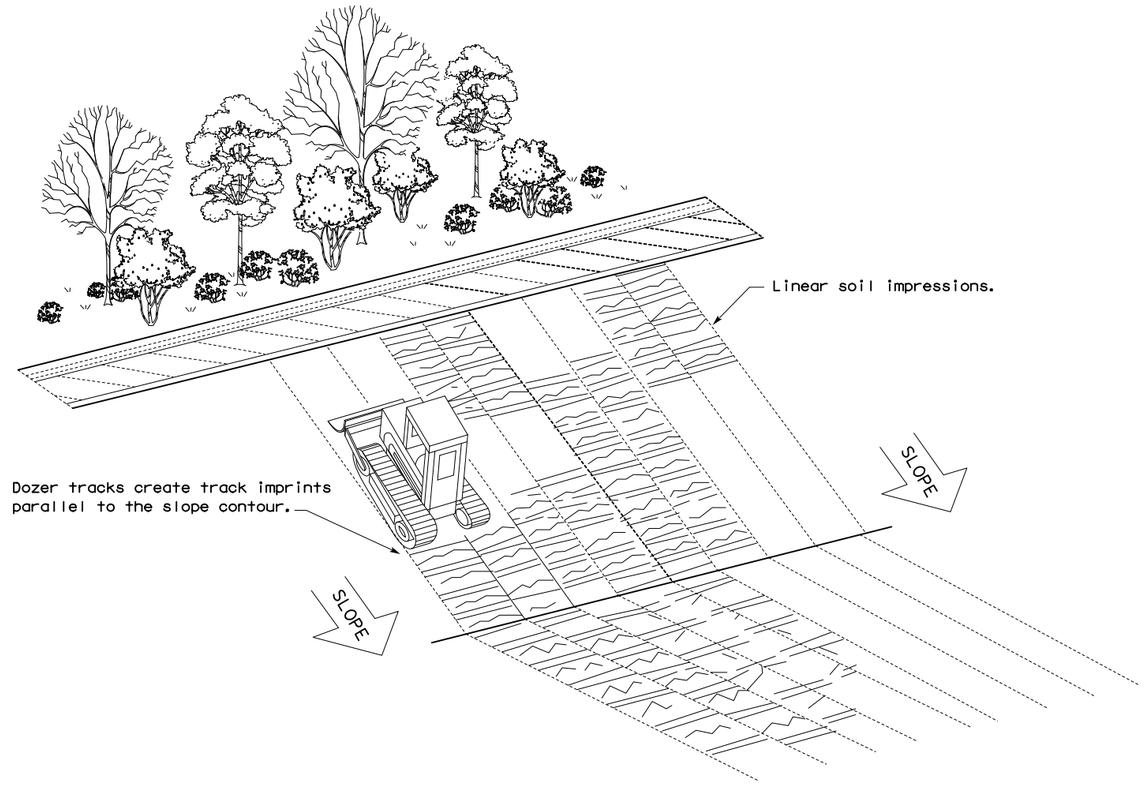
LEGEND

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	1671	02	012		FM 1651	
	DIST	COUNTY				SHEET NO.
	TYL	VAN ZANDT				117

2024
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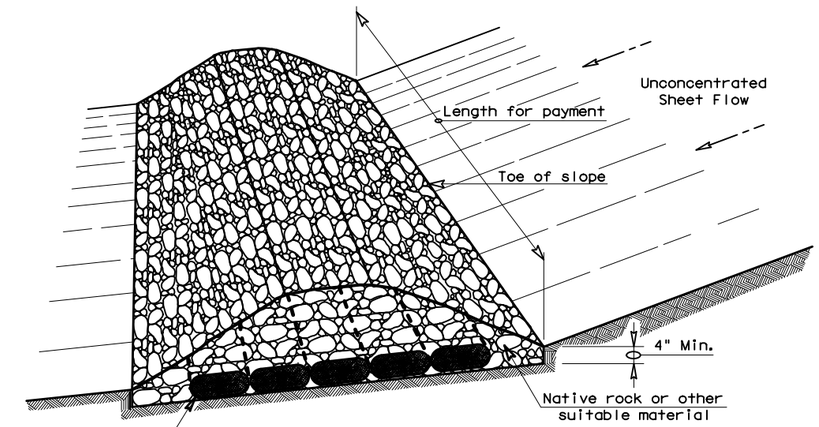
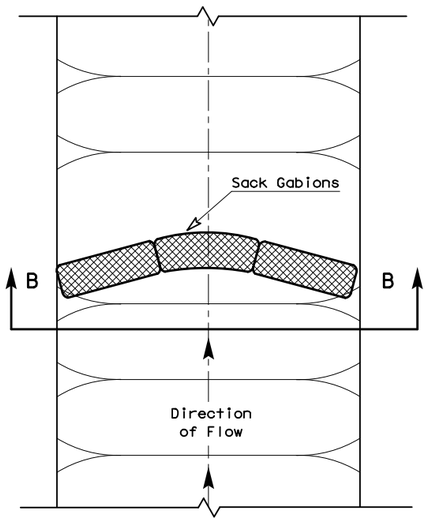
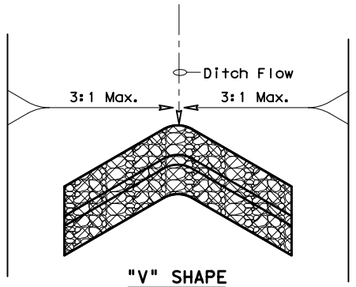


FILTER DAM AT TOE OF SLOPE

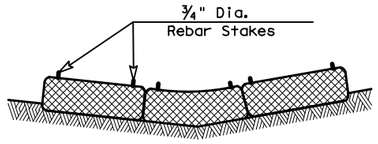
RFD1



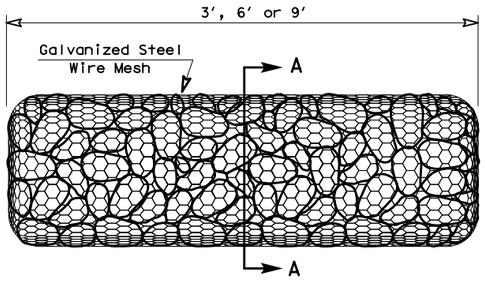
PLAN VIEW



"V" SHAPE PLAN VIEW

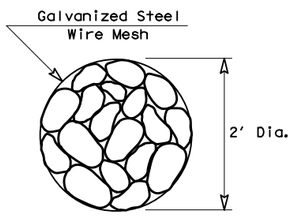


SECTION B-B

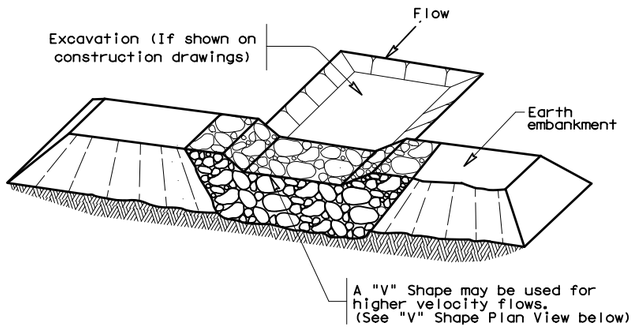


TYPE 4 (SACK GABIONS)

RFD4

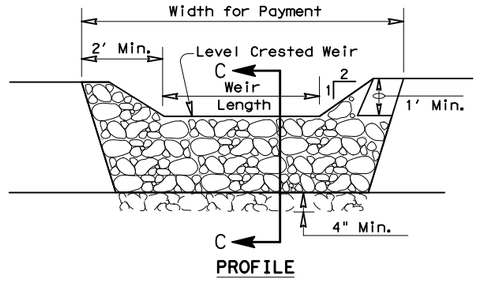


SECTION A-A

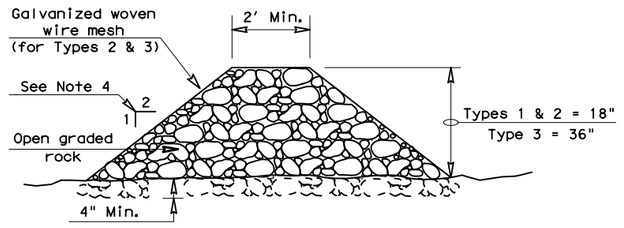


FILTER DAM AT SEDIMENT TRAP

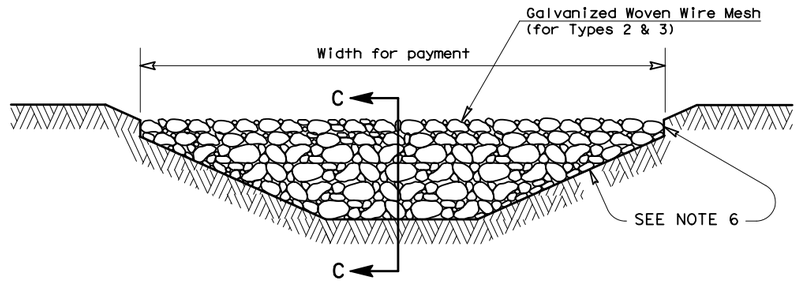
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

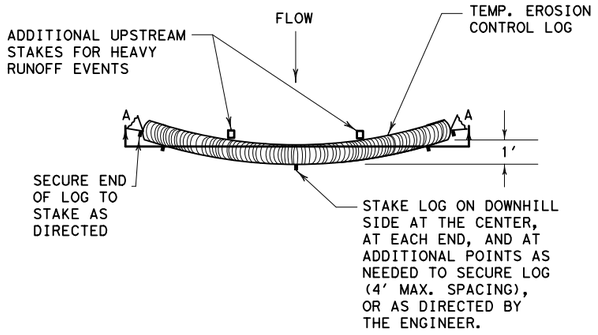
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

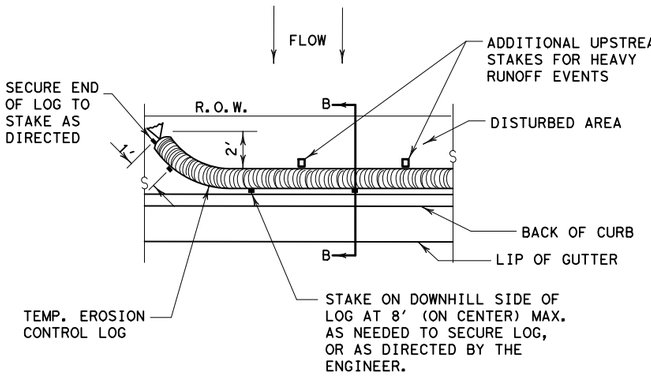
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1671	02	012		FM 1651	
	DIST	COUNTY			SHEET NO.	
	TYL	VAN ZANDT			118	

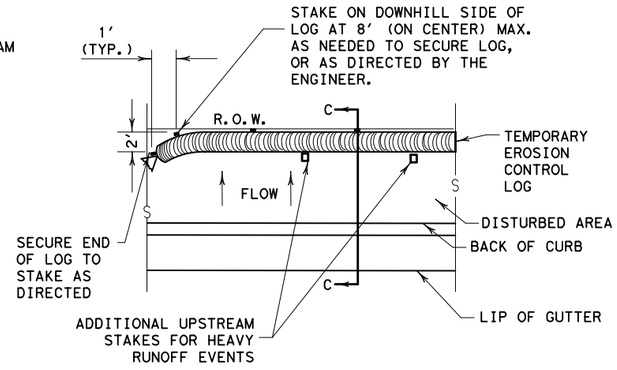
DATE: 2/16/2024
FILE: ec216.dgn



PLAN VIEW



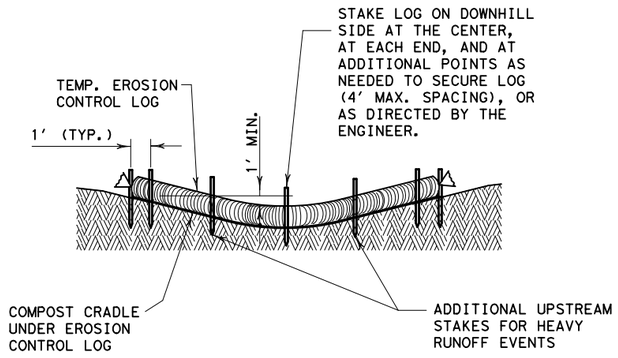
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

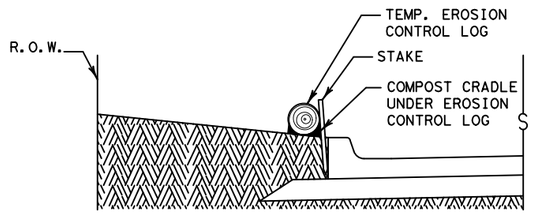
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



SECTION A-A

EROSION CONTROL LOG DAM

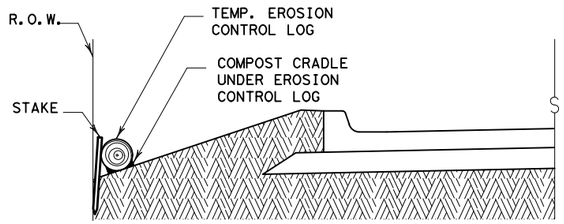
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

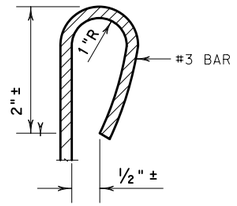
CL-BOC



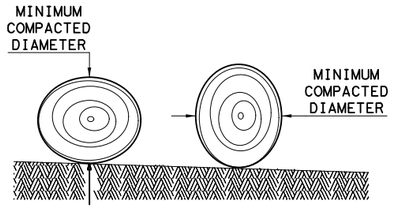
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

LEGEND

CL-D	EROSION CONTROL LOG DAM
CL-BOC	EROSION CONTROL LOG AT BACK OF CURB
CL-ROW	EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-SST	EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
CL-SSL	EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
CL-DI	EROSION CONTROL LOG AT DROP INLET
CL-CI	EROSION CONTROL LOG AT CURB INLET
CL-GI	EROSION CONTROL LOG AT CURB & GRATE INLET

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

SHEET 1 OF 3

Texas Department of Transportation | Design Division Standard

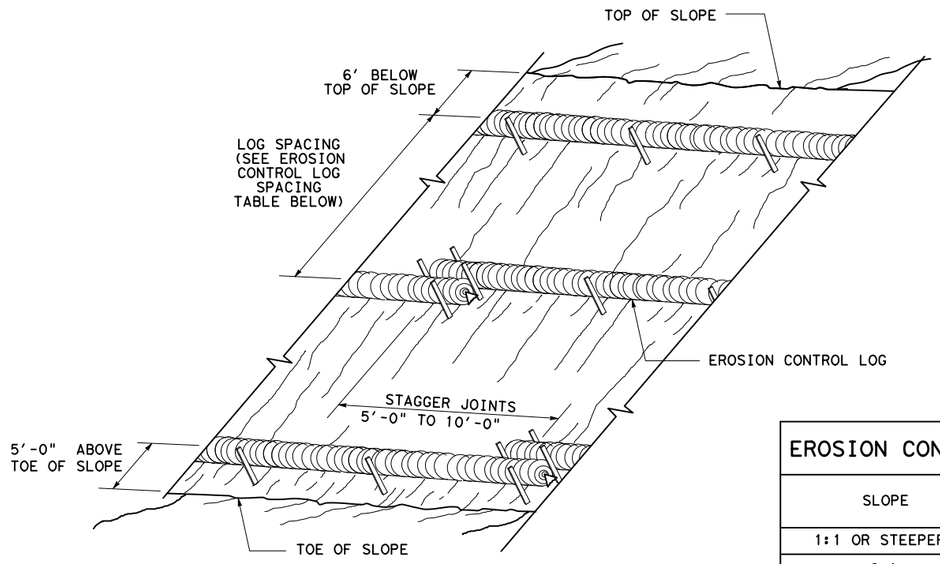
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

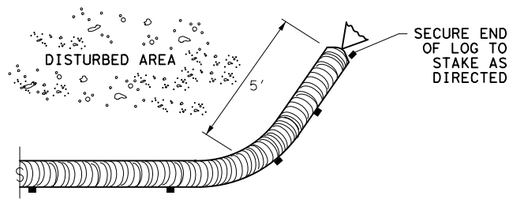
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1671	02	012	FM 1651	
	DIST	COUNTY		SHEET NO.	
	TYL	VAN ZANDT		119	

DATE: 2/16/2024
FILE: ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

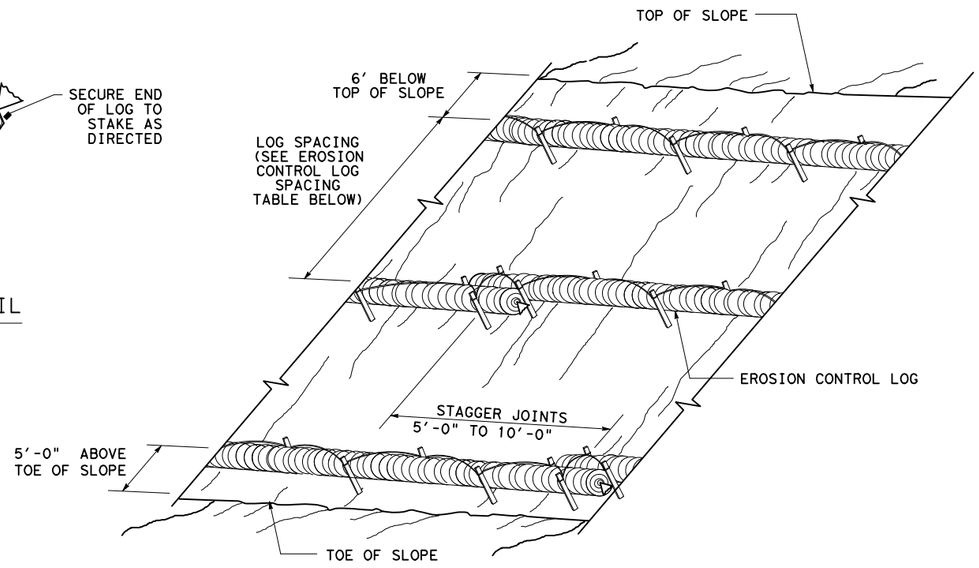
CL-SST



END SECTION RAP DETAIL

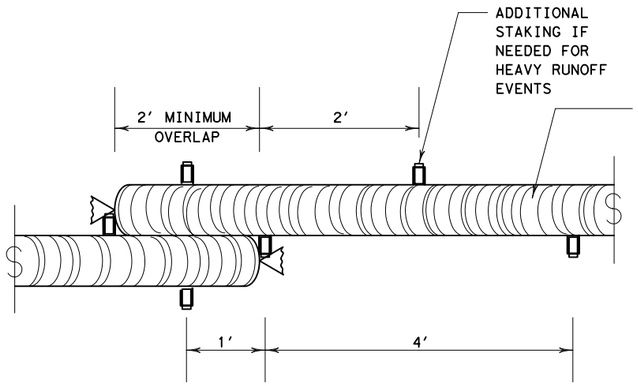
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

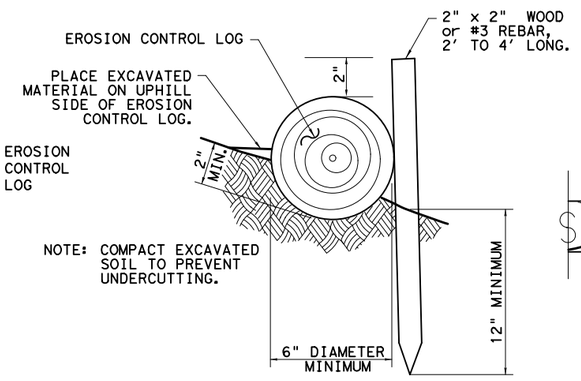
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

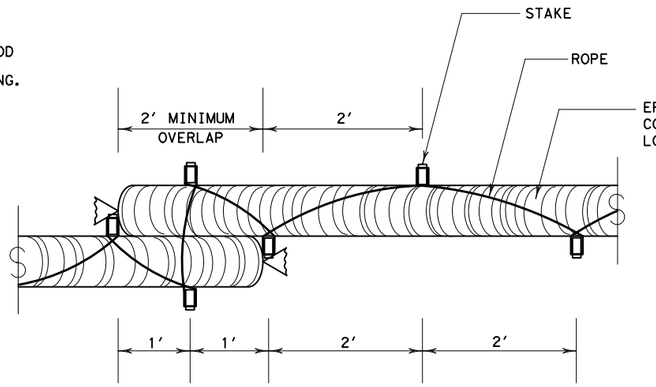


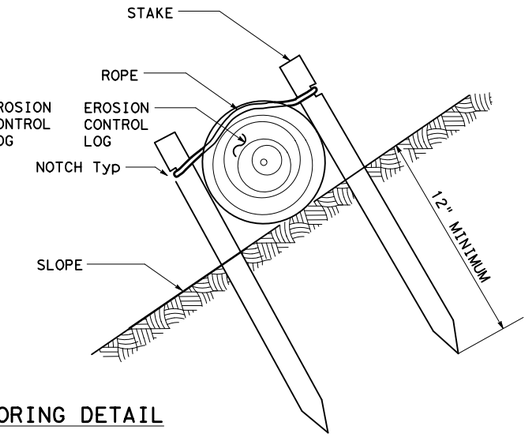


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

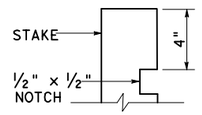
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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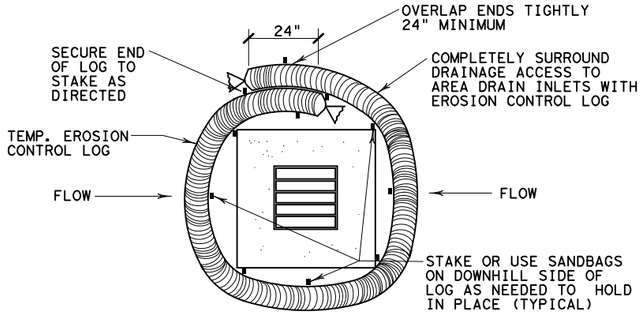
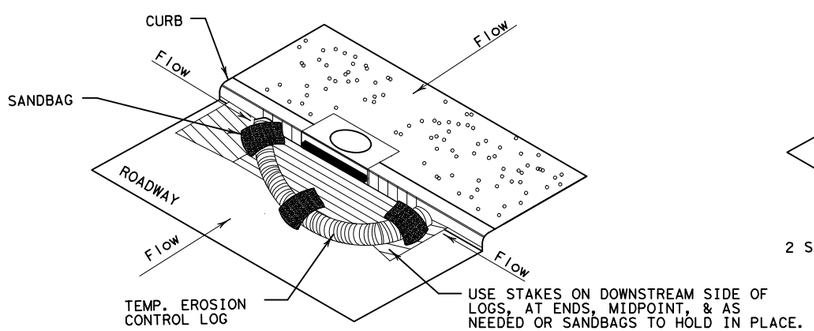
REVISIONS	1671	02	012	FM 1651
	DIST	COUNTY		SHEET NO.
	TYL	VAN ZANDT		120

DATE: 2/16/2024
FILE: ec916.dgn



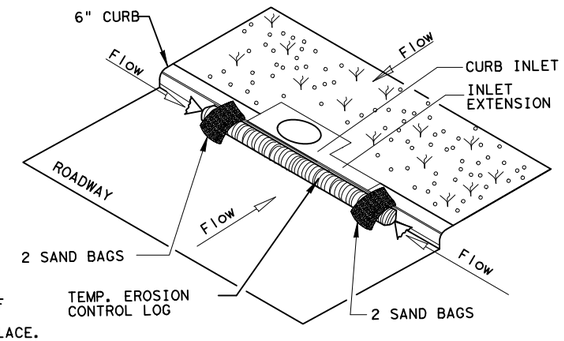
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

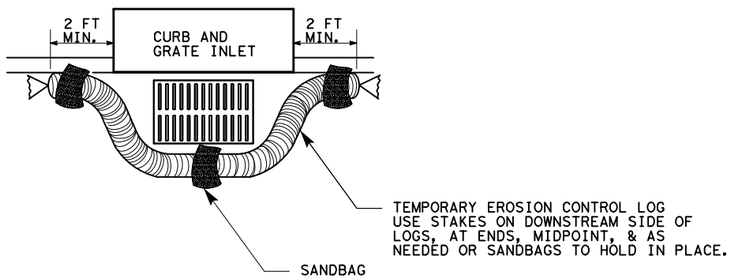
CL-CI



EROSION CONTROL LOG AT CURB INLET

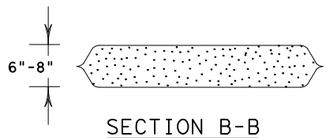
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

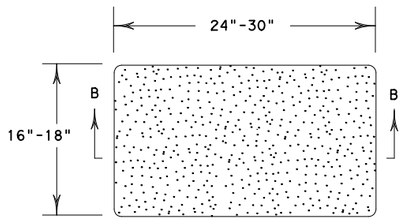


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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REVISIONS	1671	02	012	FM 1651
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	TYL	VAN ZANDT		121

DATE: 2/16/2024
FILE: ec916.dgn