FHWA TEXAS DIVISION			SHEET NO.
			1
STATE	DISTRICT	COUNTY	
TEXAS	PAR	FANNIN	
CONTROL	SECTION	JOB	HIGHWAY NO.
0690	01	016, ETC	FM 271

DESIGN SPEED= 30
A.D.T.(2020)= 850
A.D.T.(2040)= 1300

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT.

F 2023(063)

FM 271
FANNIN COUNTY

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

FINAL PLANS

LETTING DATE:

DATE CONTRACTOR BEGAN WORK:

DATE WORK WAS COMPLETED:

DATE WORK WAS ACCEPTED:

ORIGINAL CONTRACT WORKING DAYS:

USED OF WORKING DAYS

NO. OF CHANGE ORDERS:

FINAL CONTRACT COST:

PERCENT OVER/UNDER RUN:

CONTRACTOR:

CSJ: 0690-01-016	CSJ: 0690-02-015
NET LENGTH OF ROADWAY= 10,181.00 FT.= 1.929 MI.	NET LENGTH OF ROADWAY= 37,200.00 FT.= 7.045 MI.
NET LENGTH OF BRIDGE = 181.00 FT.= 0.034 MI.	NET LENGTH OF BRIDGE = 0.00 FT.= 0.000 MI.
NET LENGTH OF PROJECT= 10,362.00 FT.= 1.963 MI.	NET LENGTH OF PROJECT= 37,200.00 FT.= 7.045 MI.
LIMITS: SH 78 TO PR 24	LIMITS: PR 24 TO FM 68

TOTAL LENGTH OF PROJECT: 9.008 MI.

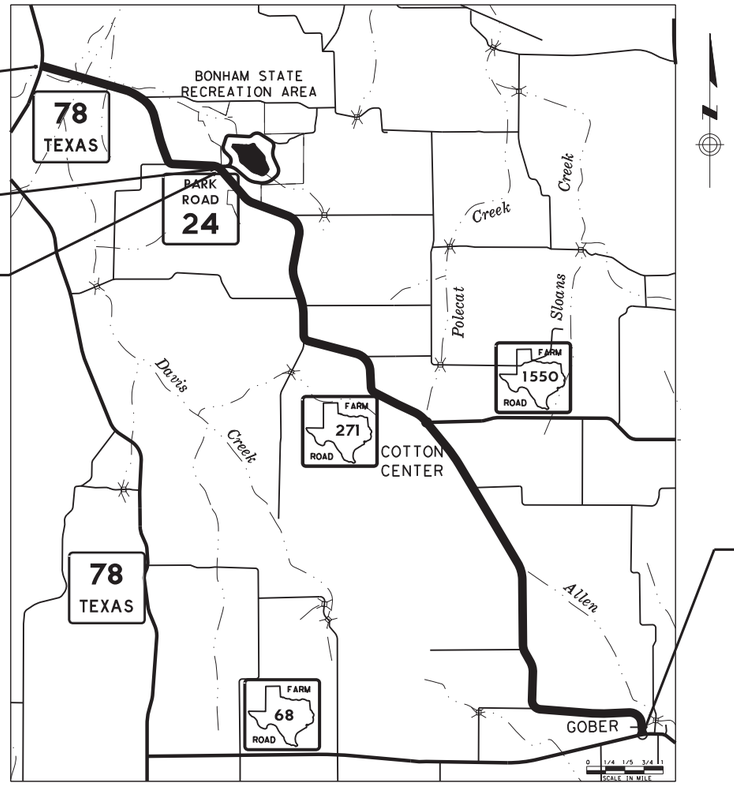
FOR THE REHABILITATION OF EXISTING ROADWAY

CONSISTING OF CULVERT REPLACEMENT, REHAB PAVEMENT, 2 COURSE SURFACE TREATMENT, AND PAVEMENT MARKINGS

BEGIN PROJECT
BEGIN CSJ: 0690-01-016
STA: 4+18
REF MRK: 212-0.079

END CSJ
CSJ: 0690-01-016
STA: 107+80
REF MRK: 212+1.865

BEGIN CSJ
CSJ: 0690-02-015
STA: 107+80
REF MRK: 212+1.872



END PROJECT
END CSJ: 0690-02-015
STA: 479+80
REF MRK: 222+0.052

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE
BRIDGE: BOIS D'ARC BRIDGE

I CERTIFY THAT THIS PROJECT WAS BUILT IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

AREA ENGINEER DATE

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND 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: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)

SUBMITTED FOR LETTING: July 7, 2022

Monte R. Pitts P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING: 7/7/2022

DocuSigned by:
Aaron R Bloom
2F03D019E58F45F...
AREA ENGINEER

APPROVED FOR LETTING: 7/8/2022

DocuSigned by:
Kool Paramanantham
AF7AF41AFE6049E...
DISTRICT ENGINEER

DATE: 7/7/2022 9:04:12 AM
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6,6A-6B	ESTIMATE & QUANTITY
7-15	QUANTITY SUMMARIES
	TRAFFIC CONTROL PLAN
16	SEQUENCE OF WORK
	TRAFFIC CONTROL PLAN STANDARDS
# 17-28	BC(1)-21 THRU BC(12)-21
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# 30	TCP(1-1)-18
# 31	TCP(1-2)-18
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# 35	TCP(3-1)-13
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	DRAINAGE DETAILS
83-108	CULVERT LAYOUT
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	SIGNING STANDARDS
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#141	D&OM(2)-20
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#144	D&OM(5)-20
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	ENVIRONMENTAL ISSUES
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#169	EC(1)-16
#170	EC(2)-16

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A '#' HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Monte R. Rater P.E. July 7, 2022

NAME DATE

FM 271
INDEX OF SHEETS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		2

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PAVEMENT CORE DATA

PAVEMENT CORES PROVIDED BY EST, INC.

NO. B-01	HWY: FM 271 LOCATION: 0.45 MI SE OF SH 78 POSITION: SB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 45	2" ACP 5.5" BASE 2' ACP 5.5" TREATED BASE SUBGRADE
NO. B-02	HWY: FM 271 LOCATION: 0.69 MI SE OF CR 3100 POSITION: SB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 30	1.5" ACP 12.5" BASE SUBGRADE
NO. B-03	HWY: FM 271 LOCATION: 0.18 MI S OF CR 3035 POSITION: SB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 41	3.5" ACP 4" BASE 6.5" PATCH SUBGRADE
NO. B-04	HWY: FM 271 LOCATION: 0.56 MI S OF CR 3300 POSITION: SB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 27	1.5" ACP 5.5" BASE 5" PATCH SUBGRADE
NO. B-05	HWY: FM 271 LOCATION: 500 FT N OF FM 68 POSITION: SB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 35	1.5" ACP 5.5" BASE 8.75" SAND SUBGRADE
NO. B-06	HWY: FM 271 LOCATION: 175 FT N OF CR 3135 POSITION: NB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 35	1.5" ACP 7" BASE 4.5" PATCH 10" SAND SUBGRADE
NO. B-07	HWY: FM 271 LOCATION: 0.16 MI N OF CR 3300 POSITION: NB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 31	1.75" ACP 7.25" BASE 7" SAND SUBGRADE
NO. B-08	HWY: FM 271 LOCATION: 0.10 MI N OF CR 3030 POSITION: NB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 28	2" ACP 5.5" PATCH SUBGRADE
NO. B-09	HWY: FM 271 LOCATION: 0.16 MI N OF CR 3100 POSITION: NB LANE	SULPHATE CONTENT(PPM): <100 PLASTICITY INDEX: 16	5" ACP 8.5" PATCH 4" ACP 7.5" PATCH SUBGRADE

FM 271
PAVEMENT CORE DATA

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		3

DATE: 7/7/2022 1:51:54 PM
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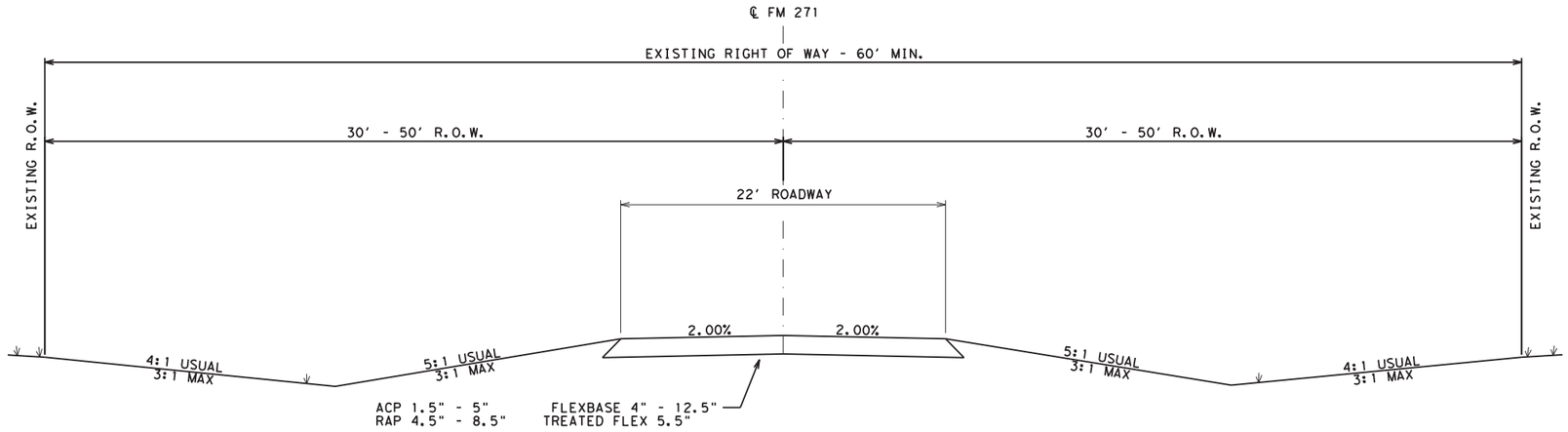
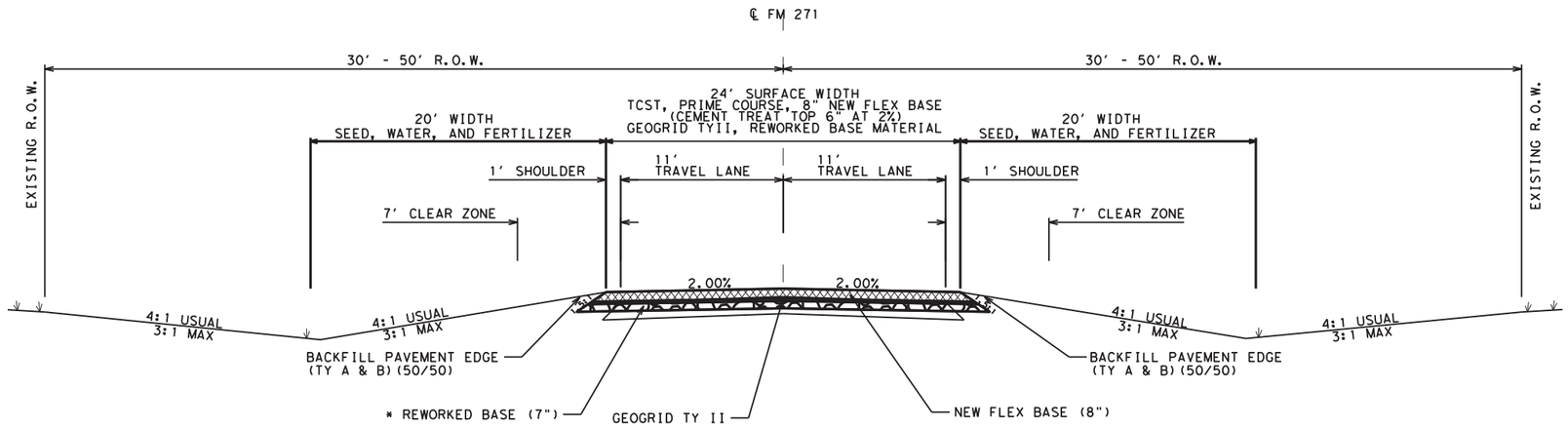


EXISTING TYPICAL SECTION
STATION 4+18 TO 479+80
FM 271



PROPOSED TYPICAL SECTION
STATION 4+18 TO 479+80
BRIDGE: 23+54 TO 25+35
FM 271

* SCARIFY AND REWORK EXISTING ACP SURFACING AND FLEXBASE FROM A 7" DEPTH @ 22' WIDTH TO A BASE OF 6" DEPTH @ 26' WIDTH.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
TYPICAL SECTIONS

0 2 4 6 8 10
SCALE IN FEET

SHEET OF

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		4

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DN: CK: DW: CK:

GENERAL NOTES

General:

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

Sherman Area Office
Aaron Bloom, P.E. – Aaron.Bloom@txdot.gov
Colby Shelton, P.E. – Colby.Shelton@txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Dispose of waste materials at an approved site. Furnish written approval from the property owner before disposal of waste materials.

Locate equipment a minimum of 30 feet from roadway when possible. Place signs and barricades as approved.

Stockpile sites for construction materials must be approved. Give at least 48 hours notification prior to stockpiling material.

Item 5 Control of the Work:

The responsibility for the construction surveying on this contract will be in accordance with Section 5.9.3, Method C.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Work Week.

Right and left are determined based upon the forward direction of stationing in the specific control section.

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

additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 7 Legal Relations and Responsibilities:

No significant traffic generator events identified.

Item 8 Prosecution and Progress:

Before beginning work on this project submit in writing, for approval, a plan of construction operations outlining in detail a sequence of work to be followed.

Provide a Bar Chart progress schedule for this project.

This project includes SP 008---003 which allows up to a 90-day delay to begin work on the project to allow for Contractor Mobilization.

Item 9 Measurement and Payment:

Items of work for the Monthly Estimate will be cut off on the 25th of each month. Items of work performed after the 25th will be processed and paid on the following month's estimate. Material On Hand (MOH) will cut off on the 20th of each month. Special circumstances will be considered on a case-by-case basis.

Item 100 Preparing Right of Way:

Remove all trees 40 foot from centerline on both sides of roadway. At cross structures, remove trees to ROW line and within 100' of the structure, parallel to the roadway. Remove underbrush and neatly trim trees and overhanging branches to produce a 60' vertical clear area within the limits of Prep ROW. Remove any trees or underbrush that interferes with any construction operation, including relocation of ditches or other drainage elements. Receive approval of equipment used to trim limbs. A boom axe will not be allowed. Remove all trimmed debris from the ROW or mulch all debris and incorporate into the topsoil on State ROW to the satisfaction of the Engineer.

Item 110 Excavation:

Before excavation operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

Item 112 Subgrade Widening:

Limit daily subgrade widening operations to the amount of base widening (proposed depth) that can be completed daily.

All pavement edge drop-offs, at end of day, shall be backfilled in accordance with Edge Treatment Condition I on the "Treatment for Various Edge Conditions" sheet. Backfill material shall be approved by the Engineer.

Item 132 Embankment:

Test potential embankment sources using Tex-145-E to determine the presence and concentration of sulfates. Do not bring soil with greater than 3000 ppm sulfates into project.

Embankment sources containing sulfates that meet specification requirements may be used as fill material provided it is placed with at least one foot of separation from materials to be treated with lime, cement, or other calcium-based stabilizers. When soils are to be placed with less than one foot of separation from material to be treated with lime, cement, or other calcium-based stabilizers, process and treat such soils according to the Soil Sulfates Mitigation General Notes.

Excavation pits for project embankment made within 250 feet of State Right of Way must be approved.

Before embankment operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

Item 134 Backfilling Pavement Edges:

Type A backfill material shall consist of topsoil free of vegetation and other objectionable material with a Plasticity Index between 15 and 30.

Dirt driveway shaping/construction will be subsidiary to Item 134.

Item 152 Road Grader Work:

Use road grader work to windrow sod (6" depth), construct slopes, construct/repair dirt driveways, prepare driveways for surfacing, grade ditches as necessary to establish drainage and redistribute sod on finished slopes.

Cut ditches to proposed grade in the immediate vicinity of cross drain structures prior to placing Storm Water BMP devices at the early stages of the project.

If excess material is generated under this item, it may be utilized to construct slopes, or wasted as approved.

County: FANNIN **Control:** 0690-01-016, Etc.

Item 164 Seeding for Erosion Control, 166 Fertilizer:

Apply fertilizer with a ratio of 3-1-2 (N-P-K) over the areas to be seeded. This work will not be paid for directly, but will be considered subsidiary.

Item 168 Vegetative Watering:

Use water trucks equipped with a sprinkler system adequate to permit coverage of the entire seeded area from the roadbed. This equipment must be available to perform watering throughout the duration of vegetative establishment.

Water all seeded areas the day seed is applied. Thereafter, maintain the seeded areas in a well-watered condition throughout the duration of vegetative establishment.

Item 247 Flexible Base:

Grading requirements

Tests to be in accordance with TxDOT Standard Test Methods

	Soil Constants			
Item Desc.	Linear Shrinkage	LL	Wet Ball	WBMV(incr. passing #40 sieve)
Item 247 Flex Base	6.0 max.	40 max.	40 max.	20% max.

PERCENT RETAINED ON SIEVE:

1-3/4"	7/8"	3/8"	No. 4	No. 40
0	10-35	30-50	45-65	70-85

Flexible Base will not contain more than 1% by weight of clay balls.

Place blue top hubs for alignment and elevations of new base at centerline and edge of pavement.

Measure roadway profile smoothness prior to the cover prime or prime course application.

Provide all profile measurements to the Engineer in electronic data files prior to the placement of the prime/cover prime coat using the format specified in Tex-1001-S. The Engineer will use Department software to evaluate longitudinal profiles to determine areas requiring corrective action. Correct 0.1-mi.sections having an average international roughness index (IRI) value greater than 100.0 in. per mile to an IRI value of 100.0 in. per mile or less. The average IRI for the left and right wheel paths will be used to determine acceptance for each 0.1-mi. section. However, the Engineer reserves the right to have the contractor correct isolated imperfections even if the 0.1-mi. section has a passing IRI. This work will be performed at the contractor's expense. Once all corrections have been made, the prime/cover prime coat may be applied.

Re-profile and correct sections that fail to maintain ride quality until placement of the first seal coat, as directed. Correct re-profiled sections until specification requirements are met, as approved. In the spirit of partnering, the department will participate in 50% of an agreed upon cost of repair for any section that has to be subjected to traffic throughout the winter with only a cover prime coat.

Item 251 Reworking Base Courses:

Full depth HMAC patching and stabilized areas of various depths are to be expected and are to be reworked into existing base. Stabilized areas may include but are not limited to cement, fly ash, or asphalt treated base.

Areas with deep asphaltic patching or widening will require processing and relocation operations to incorporate additional flex base to reduce the asphaltic material ration to a 50% maximum by volume. This work will be subsidiary to this Item.

The finished roadway must match existing grades at project limits, highway intersections and bridges. In these areas, salvage existing base and remove sufficient subgrade material to construct the full-depth proposed pavement section, according to the transition details shown in the plans. This removal will not be paid for directly, but will be considered subsidiary to the various bid items. Excess subgrade material generated by these transitions may be utilized to construct slopes or wasted as approved by the Engineer.

Item 275 Cement Treatment (Road Mixed):

Microcracking is required where flexible base widths accept full roller width. When temperatures during curing period average below 60 degrees F, perform microcracking operations between 48 and 72 hours.

Subgrade, embankment or backfill suspected of containing sulfates will be tested in accordance with Tex-145-E by the Department. Subgrade, embankment or backfill material within one foot of any area to be treated using cement is subject to the following restriction:

Greater than 7,000 ppm sulfates – Do not treat with any cement or other calcium-based stabilizers. Material within one foot of any area to be treated with cement or other calcium-based stabilizers must be removed or processed as directed.

Item 300 Asphalts, Oils, and Emulsions:

Provide 1L (1qt.) clean and dry screw top or friction-lid sampling cans as directed.

Furnish at least one sample of each type of asphalt used on the project for QA/QC purposes.

Item 302 Aggregates for Surface Treatments:

Grade 5 Modified Grading Requirements
CUMULATIVE PERCENT RETAINED ON SIEVE:

1/2”	3/8”	No. 4	No. 8	No. 200
0	0-5	30-80	85-100	95-100

The decantation requirement for Grade 5 Modified aggregate is 4% maximum.

The requirements for Flakiness Index, Magnesium Sulfate Soundness, and Los Angeles Abrasion are waived for the Grade 5 Modified aggregate.

Use unmodified AC or PG for pre-coating aggregate. Emulsion pre-coating will not be allowed.

Use liquid antistrip or other approved antistrip agent complying with the requirements of Item 301 Asphalt Antistripping Agents. The aggregate will be evaluated for moisture susceptibility using test method TEX-530-C.

Item 316 Surface Treatments:

Unless otherwise permitted by the Engineer in writing, the open season for asphalt placement will be:

May 15- August 31 for AC

Permission to place asphalt outside of the open season may require the contractor to place a fog seal at the contractor’s expense.

***Rates For Construction Projects**

First Course

ITEM	APPLICATION	
	Cover Prime	1st Course
*Asphalt Type	RC-250	AC-20-5TR or AC-20XP
*Asph. Rate (Gal/SY)	0.28	0.46
Aggregate Type	B	B
Aggregate Grade	5 or Mod 5	3
Aggr. Rate (CY/SY)	1:140	1:105
Min. Cure Time	14 days **	

Second Course

ITEM	APPLICATION
	2nd Course
*Asphalt Type	AC-20-5TR or AC-20XP
*Asph. Rate (Gal/SY)	0.36
Aggregate Type	PB
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

* The information above is intended to provide general guidance and as a basis of estimate. Based on the season and weather conditions at the time, the engineer will determine the asphalt type and rates to be used at the time of application.
** Or as approved by the Engineer

Item 400 Excavation and Backfill for Structures:

Excavation and backfill for bridge, culvert and Safety End Treatment construction/installation will be subsidiary to Item 464, 466, 467 and 472.

Pavement markings and RPM replacement will be subsidiary to “Cut and Restore Pavement”.

Cut and Restore Pavement: Backfill to top of pipe using HES flowable fill. Use an accelerator that produces a minimum strength of 250 psi in 4 hours. Provide rheofill or equivalent to ensure flowability. Anchor pipes to ensure no movement or displacement by the flowable fill. Furnish paper type cylinder test molds. Place flowable fill from the top of the pipe to within 10” of the existing pavement surface. Place Type B or C HMAC from the top of the flowable fill to the existing roadway surface. These items will be subsidiary to this item and will not be paid for directly.

Item 402 Trench Excavation Protection

Submit a Trench Excavation Protection Plan to the Engineer a minimum of three weeks prior to use. The excavation support plan shall address excavation/protection methods, work sequencing, traffic control, backfill operations, etc.

Item 403 Temporary Special Shoring

Submit a Temporary Special Shoring Plan to the Engineer a minimum of three weeks prior to use. The excavation support plan shall address excavation/protection methods, work sequencing, traffic control, backfill operations, etc.

Item 420 ~ Concrete Structures:

Do not use membrane curing for structural elements.

Item 432 Riprap:

The Engineer may adjust placement of riprap in the field.

Filter fabric is required for stone riprap.

Item 464 Reinforced Concrete Pipe:

Required excavation and backfill will be subsidiary to this Item.

Item 466 Headwalls and Wingwalls:

Unless shown in plans to obtain from offsite source, obtain headwall and wingwall backfill from ROW and perform grading to shape ditch to headwall/wingwall, per Engineers directions. This work will be subsidiary to this Item.

Riprap apron, between wingwalls, will be subsidiary to this Item.

Required excavation, backfill and pipe saw cutting will be subsidiary to this Item.

Removed headwalls and wingwalls may be broken into riprap size pieces (12” average diameter) for use as stone riprap on the project. Cut protruding steel reinforcement flush with concrete pieces. Broken concrete and riprap must be stored according to the requirements for material stockpiles indicated on the BC standards.

Item 467 Safety End Treatment:

Parallel pipe culverts ~ 30" diameter and smaller require precast SET unless directed by the Engineer to use cast-in-place SETs when precast SETs would project over 3" above surrounding ground surface or when otherwise indicated in the plans. Additional work to install cast in place SETs will be subsidiary to this Item.

Cross pipe culverts ~ 30" diameter and smaller require precast SET unless indicated otherwise in the plans.

Repair damage culvert ends prior to SET installation. Straighten CMP ends by straightening or cutting off damaged ends. Paint cut off ends with zinc paint. Repair minor damaged RCP ends with epoxy mortar. This work will be subsidiary to this Item.

When necessary to close connection gaps, grout precast SETs to culvert ends. Materials, labor and equipment will be subsidiary to this item.

On existing CMP parallel culverts with mitered metal ends, construct concrete cast in place SETs or remove the mitered ends and install precast or cast-in-place SETs. Replace/remove existing mitered metal ends that are not 6:1 or flatter.

Required excavation, backfill and pipe saw cutting will be subsidiary to this Item.

Unless shown in the plans to obtain backfill from offsite source, obtain SET backfill from the Right-of-Way. This work will be subsidiary to this Item.

Placement of concrete Riprap between multiple SETs on multiple barrel culverts will be subsidiary to this Item.

During SET installation, unless indicated otherwise in the plans, match SET flow line grade with the culvert flow line grade.

Removal and disposal of existing headwalls for parallel culverts will be subsidiary to this Item. Removed concrete headwalls and wingwalls may be broken into riprap size pieces (12" average diameter) for use as stone riprap. Cut protruding steel reinforcement. Broken concrete and riprap must be stored according to the requirements for material stockpiles indicated on BC(10)-21.

Item 472 Removing and Re-Laying Culvert:

Seal reinforced concrete pipe joints with either the original manufacturers seal or cementitious mortar per DMS-4675.

Required excavation and backfilling will be subsidiary to this Item. Obtain backfill from Right-of-way unless indicated otherwise in the plans.

Item 502 Barricades, Signs and Traffic Handling:

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

The following items will be required for flagger on this project:

1. Flaggers are required to wear a white hard hat while performing flagging operations.
2. Flaggers will be required at the intersection of all State maintained roadways.
3. Flaggers may be required at other high traffic generating intersections as deemed necessary by the Area Engineer.

The traffic control plan for this contract consists of the installation and maintenance of warning signs and other traffic control devices shown in 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 in the plans, standard BC sheets and Item 502 of the Standard Specifications.

Do not begin Item 502, Barricades, Signs, and Traffic Handling, on the roadway until both of the following conditions are met:

1. The work schedule is approved.
2. No more than 5 workdays will pass between the beginning of Item 502 and the actual commencement of roadway work bid items.

The final estimate will be withheld until all disturbed areas are covered with at least 70% perennial vegetative cover.

Correct all deficiencies within the time frame noted on the Traffic Control Device Inspection Form 599. Failure to make corrections within time frame specified may result in no payment for this Item for the month of the noted deficiency.

Provide shadow vehicles equipped with Truck Mounted Attenuators (TMA) as shown on Traffic Control Plan (TCP) standards.

Ensure that all travel lanes are open at night.

Provide pilot car during one lane/two-way traffic operations.

The total months of barricades includes the number of working days plus the winterization period.

Item 506 Temporary Erosion, Sedimentation & Environmental Controls:

The Temporary Erosion Control measures for this project will consist of using the following items, as directed:

1. Temporary Silt Fence
2. Rock Filter Dams: All rock filter dams shall be installed with 6:1 slopes regardless of their location on the project. Failure to do so will result in no payment for the dam.

Silt fences will remain the property of the Contractor upon completion of the project. The final estimate will not be released until all silt fences have been properly removed, or as directed and 70% establishment of vegetative cover is obtained.

Acquire approval for any change to the location of temporary sediment fence, as shown in the plans, prior to installation. Placement of erosion protection devices may be altered, as directed, to satisfy the requirements of the SW3P.

The pay item to remove rock filter dams will require only a partial removal after 70 percent perennial vegetation has been established and approved. When removing the rock filter dams, leave the lower layer of rock adjacent to the ground in place so as not to disturb the soil.

Refer to the SW3P sheet for the total disturbed area for the project.

The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs) within one mile of the project limits 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 construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within one mile of the project limits exceeds five acres, provide a copy of the Contractors NOI for PSLs on the ROW (to the appropriate MS4 operator when on an off-system route).

Item 540 Metal Beam Guard Fence:

Reinstall removed MBGF and SGT's on the same day.

MBGF delineation shall be installed within ten (10) working days of the completion of each MBGF section. Concrete mow strip is not considered to be a part of this work.

Item 542 Removing Metal Beam Guard Fence:

All removed MBGF rail shall be retained by the Contractor.

Item 560 Mailbox Assemblies:

Install new mailboxes unless the property owner chooses to have an existing, compliant mailbox reinstalled. Return all custom non-compliant mailboxes to the property owner.

All new mailboxes furnished and installed by the contractor will display the address number using one inch (1") adhesive back numbering. The color, type, and style of numbering shall be consistent throughout the project.

Item 644 Small Roadside Sign Support and Assemblies:

Upon removal of sign assemblies, deliver sign faces to TxDOT office at 3904 US 75 South, Sherman TX. Dispose of foundations, posts, and hardware.

Use the Southern Plains style triangular slip base for all post types.

Once the cover prime is completed, the Paris District Traffic Operations office will field verify the need and spacing of chevrons. If this verification results in fewer materials, the Paris District will purchase the excess signs at invoice price.

Remove the existing city street and county road topper from city and county signs and install on the new city street and county road stop sign assemblies. This work will be subsidiary to Item 644.

Stake proposed sign locations and obtain Engineer's approval of locations prior to placing foundations.

Contact the Engineer to obtain updated curve travel speeds before manufacture of curve speed warning signs.

Item 662 Work Zone Pavement Markings:

Non-removable markings may be paint and beads.

Place flexible reflective roadway tabs in accordance with the current WZ (STPM) prior to seal coat operations. Place tabs to indicate the beginning and ending of no passing zones.

Cut, remove and properly dispose of the upright portions of all work zone tabs prior to acceptance of any roadway. Remove entire tab when located on HMAC or concrete surfaces.

Item 666 Reflectorized Pavement Markings:

No stripe will be placed unless the inspector is present and at least 24 hours advance notice has been given by the Contractor.

Lay out pilot lines for approval 24 hours prior to all final pavement marking applications.

Use equipment with footage counters capable of measuring the linear footage placed. Calibrate counters prior to the beginning of striping operations.

Due to problems in traffic handling, do not place a dash center stripe and edge line at the same time.

Contact the Engineer 7 days before pavement marking placement for re-establishment of no-pass zones.

Item 5001 Geogrid Base Reinforcement:

Install Geogrid with at least a 1 ft. overlap along the longest joint when construction sequencing allows as determined by the Engineer.

Install Geogrid per manufacturer's specifications as well with the following exceptions / inclusions:

1. Cascade Base onto Geogrid using a bulldozer to a depth of at least six inches so that no equipment has direct contact with Geogrid. Raise dozer blade gradually as each lift is pushed out over the Geogrid.

2. Do not operate rubber-tired equipment directly on Geogrid unless allowed by the Engineer. Should operating rubber-tired equipment directly on Geogrid be allowed, operate at no more than 5 mph, do not turn tires on the Geogrid or make sudden stops and starts which causes excessive deformation waves. Keep Geogrid taut and flat. Adjustments to Geogrid installation or construction methods may be directed by the Engineer to minimize deformation waves.

3. Sufficiently compact unbound buffer layer directly above Geogrid to achieve the required density in all subsequently constructed pavement layers.

Item 6001 Portable Changeable Message Board:

Two (2) portable changeable message boards are required for advance warning.

Item 6185 Truck Mounted Attenuators:

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.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0690-01-016 **DISTRICT** Paris **COUNTY** Fannin
HIGHWAY FM 271

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	100-6002	PREPARING ROW	STA	475.620	
	104-6009	REMOVING CONC (RIPRAP)	SY	14.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	66.000	
	104-6045	REMOVE CONC (MISC)	EA	2.000	
	110-6002	EXCAVATION (CHANNEL)	CY	50.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	475.620	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	253.000	
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY	30.000	
	134-6001	BACKFILL (TY A)	STA	237.810	
	134-6002	BACKFILL (TY B)	STA	237.810	
	152-6001	ROAD GRADER WORK (ORD COMP)	STA	475.620	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	105,696.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	105,696.000	
	164-6015	STRAW/HAY MLCH SEED(PERM)(RURAL)(CLAY)	SY	211,391.000	
	168-6001	VEGETATIVE WATERING	MG	1,268.000	
	216-6001	PROOF ROLLING	HR	26.000	
	247-6248	FL BS (CMP IN PL)(TY D GR 4)(8")	SY	126,832.000	
	251-6125	REWORK BS MATL (TY C)(7")(ORD COMP)	SY	116,262.000	
	275-6001	CEMENT	TON	770.900	
	275-6003	CEMENT TREAT (NEW BASE) (6")	SY	126,832.000	
	316-6029	ASPH (RC-250)	GAL	35,513.000	
	316-6405	ASPH (AC-20-5TR OR AC-20XP)	GAL	104,003.000	
	316-6414	AGGR (TY-B GR-5)	CY	906.000	
	316-6415	AGGR (TY-B GR-3)	CY	1,208.000	
	316-6431	AGGR (TY-PB GR-4)	CY	1,057.000	
	400-6008	CUT & RESTORE ASPH PAVING	SY	44.000	
	401-6001	FLOWABLE BACKFILL	CY	300.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	164.000	
	403-6001	TEMPORARY SPL SHORING	SF	758.000	
	420-6009	CL A CONC (COLLAR)	EA	3.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	17.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	2.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	124.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	118.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY	72.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	193.000	
	464-6001	RC PIPE (CL III)(12 IN)	LF	4.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	78.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	278.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	138.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	34.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0690-01-016 **DISTRICT** Paris **COUNTY** Fannin
HIGHWAY FM 271

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	466-6130	HEADWALL (CH - PW - S) (DIA= 24 IN)	EA	7.000	
	466-6132	HEADWALL (CH - PW - S) (DIA= 30 IN)	EA	1.000	
	466-6136	HEADWALL (CH - PW - S) (DIA= 48 IN)	EA	2.000	
	467-6319	SET (TY II) (12 IN) (CMP) (6: 1) (P)	EA	4.000	
	467-6326	SET (TY II) (12 IN) (RCP) (6: 1) (P)	EA	2.000	
	467-6348	SET (TY II) (18 IN) (CMP) (6: 1) (P)	EA	10.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	2.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	2.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	6.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	4.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	8.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	5.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	2.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	9.000	
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)	EA	2.000	
	472-6006	REMOV & RE - LAY PIPE (24 IN)	LF	20.000	
	472-6011	REMOV & RE - LAY PIPE (36 IN)	LF	6.000	
	472-6013	REMOV & RE - LAY PIPE (48 IN)	LF	8.000	
	496-6004	REMOV STR (SET)	EA	25.000	
	496-6016	REMOV STR (PIPE)	EA	10.000	
	500-6001	MOBILIZATION	LS	1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	23.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	1,800.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	1,800.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	2,010.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	2,010.000	
	530-6004	DRIVEWAYS (CONC)	SY	66.000	
	530-6005	DRIVEWAYS (ACP)	SY	3,623.000	
	530-6008	TURNOUTS (ACP)	SY	2,427.000	
	530-6016	DRIVEWAYS (BASE)	SY	708.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	2,500.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	3.000	
	540-6014	SHORT RADIUS	LF	125.000	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA	5.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	150.000	
	540-6037	MTL BM GD FEN TRANS (ANCHOR PLATE)	EA	3.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,700.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	8.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	17.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	8.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0690-01-016 **DISTRICT** Paris **COUNTY** Fannin
HIGHWAY FM 271

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	60.000	
	560-6005	MAILBOX INSTALL-D (TWG-POST) TY 2	EA	4.000	
	560-6006	MAILBOX INSTALL-M (TWG-POST) TY 2	EA	2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	108.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	9.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	4.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	2.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	83.000	
	644-6073	RELOCATE SM RD SN SUP&AM(HIST MRKR)	EA	1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	114.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	156.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	95,080.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	7,050.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	59,339.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	5,085.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	165.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	95,080.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	7,050.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	59,339.000	
	5001-6002	GEOGRID BASE REINFORCEMENT (TY II)	SY	137,402.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000	
	6185-6002	TMA (STATIONARY)	DAY	184.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	120.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000	

SUMMARY OF ROADWAY ITEMS							
					216	275	275
					6001	6001	6003
LOCATION		LENGTH	EXISTING WIDTH	PROPOSED SURFACE WIDTH	PROOF ROLLING	CEMENT	CEMENT TREAT (NEW BASE) (6")
FROM	TO	LF	LF	LF	HR	TON	SY
CSJ: 0690-01-016							
4+18	107+80	10,362	22	24	6	167.9	27,632
				SUBTOTALS	6	167.9	27,632
CSJ: 0690-02-015							
107+80	479+80	37,200	22	24	20	603	99,200
				SUBTOTALS	20	603	99,200
				PROJECT TOTALS	26	770.9	126832

CEMENT & BASED ON AN ASSUMED DRY COMPACTED UNIT WEIGHT OF 135 LBS/CF @ 2% BY WEIGHT

PROOF ROLLING BASED ON 5,000 SY/HR

SUMMARY OF ROADWAY ITEMS													
						100	112	134	134	152			
						6002	6001	6001	6002	6001			
LOCATION		LENGTH				PREPARING ROW	SUBGRADE WIDENING (ORD COMP)	BACKFILL (TY A)	BACKFILL (TY B)	ROAD GRADER WORK (ORD COMP)			
FROM	TO	LF				STA	STA	STA	STA	STA			
CSJ: 0690-01-016													
4+18	107+80	10,362				103.62	103.62	51.81	51.81	103.62			
					SUBTOTALS	103.62	103.62	51.81	51.81	103.62			
CSJ: 0690-02-015													
107+80	479+80	37,200				372.00	372.00	186.00	186.00	372.00			
					SUBTOTALS	372.00	372.00	186.00	186.00	372.00			
					PROJECT TOTALS	475.62	475.62	237.81	237.81	475.62			

SUMMARY OF ROADWAY ITEMS							PRIME COURSE		FIRST COURSE		SECOND COURSE			
						247	251	316	316	316	316	316	316	5001
						6248	6125	6029	6414	6405	6415	6405	6431	6002
LOCATION		LENGTH	EXISTING WIDTH	PROPOSED SURFACE WIDTH	GEOGRID WIDTH	FL BS (CMP IN PL) (TY D GR 4) (8")	REWORK BS MATL (TY C) (7") (ORD	ASPH (RC-250)	AGGR (TY-B GR-5)	ASPH (AC-20-5TR OR AC-20XP)	AGGR (TY-B GR-3)	ASPH (AC-20-5TR OR AC-20XP)	AGGR (TY-PB GR-4)	GEOGRID BASE REINFORCEMENT (TY II)
FROM	TO	LF	LF	LF	LF	SY	SY	GAL	CY	GAL	CY	GAL	CY	SY
CSJ: 0690-01-016														
4+18	107+80	10,362	22	24	26	27,632	25,329	7,737	197	12,711	263	9,948	230	29,935
					SUBTOTALS	27,632	25,329	7,737	197	12,711	263	9,948	230	29,935
CSJ: 0690-02-015														
107+80	479+80	37,200	22	24	26	99,200	90,933	27,776	709	45,632	945	35,712	827	107,467
					SUBTOTALS	99,200	90,933	27,776	709	45,632	945	35,712	827	107,467
					PROJECT TOTALS	126,832	116,262	35,513	906	58,343	1,208	45,660	1,057	137,402

PRIME COURSE:
ASPH: RC-250 @ 0.28 GAL/SY
AGGR: GR 5 OR MOD 5 B OR L @ 1:140 CY/SY
FIRST COURSE:
ASPH: AC-20-5TR or AC-20XP @ 0.46 GAL/SY
AGGR: GR 3 B OR L @ 1:105 CY/SY
SECOND COURSE:
ASPH: AC-20-5TR or AC-20XP @ 0.36 GAL/SY
AGGR: GR 4 PB OR PL @ 1:120 CY/SY

FM 271
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		7

DATE: 7/8/2022 3:22:41 PM
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DN: CK: DW: CK:

SUMMARY OF MBGF ITEMS															
LOCATION		LT/RT	132 6019 EMBANKMENT (VEHICLE) (ORD COMP) (TY B)	432 6045 RIPRAP (MOW STRIP) (4 IN)	540 6002 MTL W-BEAM GD FEN (STEEL POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 6014 SHORT RADIUS	540 6015 DRIVEWAY TERMINAL ANCHOR SECTION	540 6020 MTL W-BEAM GD FEN (LOW FILL CULVERT)	540 6037 MLT BEAM GD FEN TRANS (ANCHOR PLATE)	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6003 REMOVE DOWNSTREAM ANCHOR TERMINAL	544 6003 GUARDRAIL END TREATMENT (REMOVE)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
FROM	FROM		CY	CY	LF	EA	LF	EA	LF	EA	LF	EA	EA	EA	EA
CSJ: 0690-01-016			30												
18+39	22+35	RT		22	287.5		25	1	37.5					1	12
19+44	22+54	LT		12	237.5		25	1	37.5						12
22+68	23+57	RT		7	50	1	25	1		1	50	1		1	12
23+57	23+57	LT		4	12.5		25	1			50	1			12
25+39	26+33	RT		5	25	1				1	50	1		1	12
25+39	26+15	LT		4	12.5	1				1	50	1		1	12
33+41	37+73	RT		15	212.5		25	1	37.5					1	12
34+41	39+35	LT		26	362.5				37.5					2	12
85+31	89+99	RT		18	225						250		2	2	12
86+31	90+99	LT		18	225						250		2	2	12
95+91	100+59	RT		18	225						250	2		2	12
96+91	101+59	LT		18	225						250	2		2	12
PROJECT SUBTOTALS			30	167	2100	3	125	5	150	3	1200	8	4	15	144
CSJ: 0690-02-015															
274+27	279+21	LT		26	400						250		2	2	12
273+27	278+21	RT									250		2		
PROJECT SUBTOTALS				26	400						500		4	2	12
PROJECT TOTAL			30	193	2500	3	125	5	150	3	1700	8	8	17	156

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS			
LOCATION	6001 PORTABLE CHANGEABLE MESSAGE SIGN	6185 TMA (STATIONARY)	6185 TMA (MOBILE OPERATION)
	EA	DAY	HR
FM 271	2	184	120
PROJECT TOTALS	2	184	120

SUMMARY OF EROSION CONTROL ITEMS									
LOCATION		LENGTH	WIDTH		164 6015 STRAW/HAY MLCH SEED(PERM)(RURAL)(CLAY)	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2 *
FROM	TO	LF	LEFT	RIGHT	SY	SY	SY	MG	LBS
CSJ: 0690-01-016									
4+17	107+80	10,363	20	20	46,058	23,029	23,029	276	4,532
CSJ: 0690-02-015									
107+80	479+80	37,200	20	20	165,333	82,667	82,667	992	16,269
				PROJECT TOTALS	211,391	105,696	105,696	1,268	20,801

SUMMARY OF SIGNING ITEMS								
LOCATION	644 6001 IN SM RD SN SUP&AM TY10BWG(1)SA(P)	644 6004 IN SM RD SN SUP&AM TY10BWG(1)SA(T)	644 6007 IN SM RD SN SUP&AM TY10BWG(1)SA(U)	644 6076 REMOVE SM RD SN SUP&AM	644 6068 RELOCATE SM RD SN SUP&AM TY 10BWG	644 6073 RELOCATE SM RD SN SUP&AM(HIST MRKR)	644 6030 IN SM RD SN SUP&AM TYS80(1)SA(T)	644 6033 IN SM RD SN SUP&AM TYS80(1)SA(U)
	EA	EA	EA	EA	EA	EA	EA	EA
CSJ:0690-01-016								
FM 271	33	1	1	34	13		2	
CSJ:0690-02-015								
FM 271	75	8	3	80	70	1		2
PROJECT TOTALS	108	9	4	114	83	1	2	2

* FOR CONRACTORS INFORMATION ONLY: 2 CYCLES AT 50 LBS. NITROGEN PER ACRE
AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE
WATERING: BASED ON 2 APPLICATIONS: 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

FM 271
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		8

CK:
DW:
CK:
DN:

SUMMARY OF DRAINAGE ITEMS

LOCATION	EXISTING	PROPOSED	104 6009 REMOVING CONC (RIPRAP) SY	110 6002 EXCAVATION (CHANNEL) CY	132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B) CY	400 6008 CUT & RESTORE ASPH PAVING SY	401 6001 FLOWABLE BACKFILL CY	402 6001 TRENCH EXCAVATION PROTECTION LF	403 6001 TEMPORARY SPL SHORING SF	420 6009 CL A CONC (COLLAR) EA	429 6009 CONC STR REPAIR (STANDARD) SF	432 6001 RIPRAP (CONC) (4 IN) CY	432 6031 RIPRAP (STONE PROTECTION) (12 IN) CY	432 6033 RIPRAP (STONE PROTECTION) (18 IN) CY	432 6035 RIPRAP (STONE PROTECTION) (24 IN) CY	464 6003 RC PIPE (CL III) (18 IN) LF	464 6005 RC PIPE (CL III) (24 IN) LF	464 6007 RC PIPE (CL III) (30 IN) LF	464 6008 RC PIPE (CL III) (36 IN) LF
CSJ: 0690-01-016																			
15+74	1 - 48" x 52' RCP	1 - 48" x 52' RCP							603										
18+29	1 - 36" x 53' RCP	1 - 36" x 53' RCP						6											
80+68	1 - 24" x 46' RCP	1 - 24" x 46' RCP			4							2	6						
88+15	1 - 30" x 53' RCP	NO WORK																	
98+75	1 - 30" x 48' RCP	1 - 30" x 48' RCP			12								25						
		CSJ: 0690-01-016 TOTALS			16			6	603			2	31						
CSJ: 0690-02-015																			
130+94	1 - 24" x 51' RCP	1 - 24" x 51' RCP											16						
136+96	1 - 24" x 39' RCP	NO WORK																	
148+05	1 - 24" x 38' RCP	1 - 24" x 42' RCP															4		
160+50	1 - 4'x4' BOX x 39'	1 - 4'x4' BOX x 39'			3		5								72				
182+80	1 - 24" x 42' RCP	1 - 24" x 42' RCP	14							1							4		
215+56	2 - 6'x6' BOX x 53'	2 - 6'x6' BOX x 53'			4		16				15			97					
229+40	1 - 24" x 43' RCP	1 - 24" x 43' RCP																	
234+72	1 - 24" x 46' RCP	1 - 24" x 52' RCP			8								4				6		
238+15	1 - 24" x 46' RCP	1 - 24" x 46' RCP			3								9						
249+72	1 - 24" x 47' RCP	1 - 24" x 53' RCP			40				155				4				4		
262+48	1 - 30" x 44' RCP	1 - 30" x 50' RCP											12					4	
276+24*	1 - 6'x6' BOX x 46'	1 - 6'x6' BOX x 46'			50														
281+04	1 - 24" x 45' RCP	1 - 24" x 45' RCP		50									10						
291+53	1 - 24" x 51' RCP	1 - 24" x 51' RCP											8						
358+26	2 - 7'x7' BOX x 61'	NO WORK			60						2								
359+80	2 - 30" x 63' CMP	2 - 30" x 63' RCP			10	24	38	53						21				128	
384+21	3 - 36" x 43' RCP	3 - 36" x 47' RCP																	12
397+38	1 - 36" x 55' RCP	1 - 36" x 61' RCP											17						6
402+82	2 - 36" x 41' RCP	2 - 36" x 49' RCP																	16
424+25	1 - 24" x 43' RCP	1 - 24" x 47' RCP								1							4		
436+83	1 - 30" x 49' RCP	1 - 30" x 49' RCP			32					1			13					6	
456+02	1 - 30" x 41' RCP	1 - 30" x 41' RCP																	
461+02	1 - 24" x 35' RCP	1 - 24" x 39' RCP															4		
465+12	1 - 24" x 50' RCP	1 - 24" x 50' RCP																	
473+24	2 - 24" x 57' PP	2 - 24" x 57' RCP			27	16	205	57									128		
476+30	1 - 18" x 38' PP	1 - 18" x 38' RCP				4	36	48								48			
		CSJ: 0690-02-015 TOTALS	14	50	237	44	300	158	155	3	17		93	118	72	48	154	138	34
		PROJECT TOTALS	14	50	253	44	300	164	758	3	17	2	124	118	72	48	154	138	34

SUMMARY OF DRAINAGE ITEMS CONT.

LOCATION	EXISTING	PROPOSED	466 6130 HEADWALL (CH - PW - S) (DIA= 24 IN) EA	466 6132 HEADWALL (CH - PW - S) (DIA= 30 IN) EA	466 6136 HEADWALL (CH - PW - S) (DIA= 48 IN) EA	467 6395 SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C) EA	467 6390 SET (TY II) (24 IN) (RCP) (4: 1) (C) EA	467 6417 SET (TY II) (30 IN) (RCP) (3: 1) (C) EA	467 6419 SET (TY II) (30 IN) (RCP) (4: 1) (C) EA	467 6423 SET (TY II) (30 IN) (RCP) (6: 1) (P) EA	467 6356 SET (TY II) (18 IN) (RCP) (3: 1) (C) EA	467 6448 SET (TY II) (36 IN) (RCP) (3: 1) (C) EA	467 6450 SET (TY II) (36 IN) (RCP) (4: 1) (C) EA	472 6006 REMOV & RE - LAY PIPE (24 IN) LF	472 6011 REMOV & RE - LAY PIPE (36 IN) LF	472 6013 REMOV & RE - LAY PIPE (48 IN) LF	496 6004 REMOV STR (SET) EA	496 6016 REMOV STR (PIPE) EA	104 6045 REMOVE CONC (MISC) EA
CSJ: 0690-01-016																				
15+74	1 - 48" x 52' RCP	1 - 48" x 52' RCP			2												8			
18+29	1 - 36" x 53' RCP	1 - 36" x 53' RCP											2			6		2		
80+68	1 - 24" x 46' RCP	1 - 24" x 46' RCP	1				1								6			1		
88+15	1 - 30" x 53' RCP	NO WORK																		
98+75	1 - 30" x 48' RCP	1 - 30" x 48' RCP																		
		CSJ: 0690-01-016 TOTALS	1		2		1						2		6	6	8	3		
CSJ: 0690-02-015																				
130+94	1 - 24" x 51' RCP	1 - 24" x 51' RCP	2												6					
136+96	1 - 24" x 39' RCP	NO WORK																		
148+05	1 - 24" x 38' RCP	1 - 24" x 42' RCP					1											1		
160+50	1 - 4'x4' BOX x 39'	1 - 4'x4' BOX x 39'																		
182+80	1 - 24" x 42' RCP	1 - 24" x 42' RCP				2														
215+56	2 - 6'x6' BOX x 53'	2 - 6'x6' BOX x 53'																		
229+40	1 - 24" x 43' RCP	1 - 24" x 43' RCP																		
234+72	1 - 24" x 46' RCP	1 - 24" x 52' RCP					1	1										1		
238+15	1 - 24" x 46' RCP	1 - 24" x 46' RCP					1											1		
249+72	1 - 24" x 47' RCP	1 - 24" x 53' RCP	2												8			1		
262+48	1 - 30" x 44' RCP	1 - 30" x 50' RCP		1														1		
276+24*	1 - 6'x6' BOX x 46'	1 - 6'x6' BOX x 46'																		2
281+04	1 - 24" x 45' RCP	1 - 24" x 45' RCP						1										1		
291+53	1 - 24" x 51' RCP	1 - 24" x 51' RCP																		
358+26	2 - 7'x7' BOX x 61'	NO WORK																		
359+80	2 - 30" x 63' CMP	2 - 30" x 63' RCP								4									2	
384+21	3 - 36" x 43' RCP	3 - 36" x 47' RCP											3					3		
397+38	1 - 36" x 55' RCP	1 - 36" x 61' RCP												2				2		
402+82	2 - 36" x 41' RCP	2 - 36" x 49' RCP											4					4		
424+25	1 - 24" x 43' RCP	1 - 24" x 47' RCP					1											1		
436+83	1 - 30" x 49' RCP	1 - 30" x 49' RCP							1		2							2		
456+02	1 - 30" x 41' RCP	1 - 30" x 41' RCP								1								1		
461+02	1 - 24" x 35' RCP	1 - 24" x 39' RCP					1											1		
465+12	1 - 24" x 50' RCP	1 - 24" x 50' RCP						2										2		
473+24	2 - 24" x 57' PP	2 - 24" x 57' RCP	2																2	
476+30	1 - 18" x 38' PP	1 - 18" x 38' RCP										2							1	
		CSJ: 0690-02-015 TOTALS	6	1		2	5	4	1	5	2	2	7	2	14			22	5	2
		PROJECT TOTALS	7	1	2	2	6	4	1	5	2	2	9	2	20	6	8	25	5	2

* NOTE: SAW CUT UPSTREAM PW CORNERS TO PW-2 SLOPE
AND ADD EMBANKMENT TO ALL 4 CORNERS

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FM 271
QUANTITY SUMMARY

SHEET 3 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		9

CK1
DW1
CK2
DW2

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
CSJ: 0690-01-016					
5+00	LT			15	15
5+00	RT			15	15
10+15	LT			15	15
10+15	RT			15	15
15+25	LT	15	15		
15+25	RT	15	15		
16+25	LT	15	15		
16+25	RT	15	15		
17+80	LT	15	15		
17+80	RT	15	15		
18+80	LT	15	15		
18+80	RT	15	15		
21+00	LT			15	15
21+00	RT			15	15
26+00	LT			15	15
26+00	RT			15	15
31+00	LT			15	15
31+00	RT			15	15
35+87	LT			15	15
35+87	RT			15	15
41+00	LT			15	15
41+00	RT			15	15
46+00	LT			15	15
46+00	RT			15	15
52+64	LT			15	15
52+64	RT			15	15
58+00	LT			15	15
58+00	RT			15	15
63+05	LT			15	15
63+05	RT			15	15
73+00	LT			15	15
73+00	RT			15	15
78+00	LT			15	15
78+00	RT			15	15
80+19	LT	15	15		
80+19	RT	15	15		
81+19	LT	15	15		
81+19	RT	15	15		
84+00	LT			15	15
84+00	RT			15	15
87+66	LT	15	15		
87+66	RT	15	15		
88+66	LT	15	15		
88+66	RT	15	15		
96+00	LT			15	15
96+00	RT			15	15
98+25	LT	15	15		
98+25	RT	15	15		
99+25	LT	15	15		
99+25	RT	15	15		
101+00	LT			15	15
101+00	RT			15	15
106+00	LT			15	15
106+00	RT			15	15
CSJ: 0690-01-016 SUBTOTALS		300	300	510	510
CSJ: 0690-02-015					
111+00	LT			15	15
111+00	RT			15	15
116+00	LT			15	15
116+00	RT			15	15
121+00	LT			15	15
121+00	RT			15	15
126+00	LT			15	15
126+00	RT			15	15
130+45	LT	15	15		
130+45	RT	15	15		
131+45	LT	15	15		
131+45	RT	15	15		
134+00	LT			15	15
134+00	RT			15	15
136+47	LT	15	15		
136+47	RT	15	15		
137+47	LT	15	15		
137+47	RT	15	15		
140+00	LT			15	15
140+00	RT			15	15
145+00	LT			15	15
145+00	RT			15	15
147+56	LT	15	15		
147+56	RT	15	15		
148+56	LT	15	15		
148+56	RT	15	15		
151+88	LT			15	15
151+88	RT			15	15
157+00	LT			15	15
157+00	RT			15	15
160+00	LT	15	15		
160+00	RT	15	15		
CSJ: 0690-02-015 SUBTOTALS		210	210	270	270
PROJECT SUBTOTALS		510	510	780	780

SUMMARY OF EROSION CONTROL ITEMS CONTINUED

LOCATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
CSJ: 0690-02-015 CONTINUED					
161+00	LT	15	15		
161+00	RT	15	15		
163+27	LT			15	15
163+27	RT			15	15
168+43	LT			15	15
168+43	RT			15	15
174+50	LT			15	15
174+50	RT			15	15
179+50	LT			15	15
179+50	RT			15	15
182+50	LT	15	15		
182+50	RT	15	15		
183+50	LT	15	15		
183+50	RT	15	15		
186+00	LT			15	15
186+00	RT			15	15
191+00	LT			15	15
191+00	RT			15	15
196+00	LT			15	15
196+00	RT			15	15
201+00	LT			15	15
201+00	RT			15	15
206+00	LT			15	15
206+00	RT			15	15
211+00	LT			15	15
211+00	RT			15	15
215+10	LT	15	15		
215+10	RT	15	15		
216+10	LT	15	15		
216+10	RT	15	15		
219+00	LT			15	15
219+00	RT			15	15
224+00	LT			15	15
224+00	RT			15	15
228+93	LT	15	15		
228+93	RT	15	15		
229+93	LT	15	15		
229+93	RT	15	15		
234+00	LT	15	15		
234+00	RT	15	15		
235+00	LT	15	15		
235+00	RT	15	15		
237+64	LT	15	15		
237+64	RT	15	15		
238+64	LT	15	15		
238+64	RT	15	15		
245+31	LT			15	15
245+31	RT			15	15
249+23	LT	15	15		
249+23	RT	15	15		
250+23	LT	15	15		
250+23	RT	15	15		
255+00	LT			15	15
255+00	RT			15	15
262+00	LT	15	15		
262+00	RT	15	15		
263+00	LT	15	15		
263+00	RT	15	15		
268+00	LT			15	15
268+00	RT			15	15
273+00	LT			15	15
273+00	RT			15	15
275+76	LT	15	15		
275+76	RT	15	15		
276+76	LT	15	15		
276+76	RT	15	15		
280+50	LT	15	15		
280+50	RT	15	15		
281+50	LT	15	15		
281+50	RT	15	15		
287+00	LT			15	15
287+00	RT			15	15
291+05	LT	15	15		
291+05	RT	15	15		
292+05	LT	15	15		
292+05	RT	15	15		
298+00	LT			15	15
298+00	RT			15	15
303+00	LT			15	15
303+00	RT			15	15
308+00	LT			15	15
308+00	RT			15	15
313+00	LT			15	15
313+00	RT			15	15
318+00	LT			15	15
318+00	RT			15	15
323+00	LT			15	15
323+00	RT			15	15
329+00	LT			15	15
CSJ: 0690-02-015 SUBTOTALS		630	630	705	705
PROJECT SUBTOTALS		1140	1140	1485	1485

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FM 271
QUANTITY SUMMARY

SHEET 4 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		10

CK:
DW:
CK:
DN:

DATE: 7/8/2022 3:22:46 PM
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SUMMARY OF EROSION CONTROL ITEMS CONTINUED

LOCATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
CSJ: 0690-02-015 CONTINUED					
329+00	RT			15	15
334+00	LT			15	15
334+00	RT			15	15
339+00	LT			15	15
339+00	RT			15	15
344+00	LT			15	15
344+00	RT			15	15
349+00	LT			15	15
349+00	RT			15	15
354+00	LT			15	15
354+00	RT			15	15
359+28	LT	15	15		
359+28	RT	15	15		
360+28	LT	15	15		
360+28	RT	15	15		
365+00	LT			15	15
365+00	RT			15	15
370+00	LT			15	15
370+00	RT			15	15
377+00	LT			15	15
377+00	RT			15	15
383+74	LT	15	15		
383+74	RT	15	15		
384+74	LT	15	15		
384+74	RT	15	15		
390+00	LT			15	15
390+00	RT			15	15
397+00	LT	15	15		
397+00	RT	15	15		
398+00	LT	15	15		
398+00	RT	15	15		
402+33	LT	15	15		
402+33	RT	15	15		
403+33	LT	15	15		
403+33	RT	15	15		
407+00	LT			15	15
407+00	RT			15	15
412+00	LT			15	15
412+00	RT			15	15
417+00	LT			15	15
417+00	RT			15	15
423+25	LT	15	15		
423+25	RT	15	15		
424+35	LT	15	15		
424+35	RT	15	15		
430+00	LT			15	15
430+00	RT			15	15
436+34	LT	15	15		
436+34	RT	15	15		
437+34	LT	15	15		
437+34	RT	15	15		
441+00	LT			15	15
441+00	RT			15	15
447+00	LT			15	15
447+00	RT			15	15
452+00	LT			15	15
452+00	RT			15	15
455+53	LT	15	15		
455+53	RT	15	15		
456+53	LT	15	15		
456+53	RT	15	15		
460+54	LT	15	15		
460+54	RT	15	15		
461+54	LT	15	15		
461+54	RT	15	15		
464+64	LT	15	15		
464+64	RT	15	15		
465+64	LT	15	15		
465+64	RT	15	15		
471+00	LT			15	15
471+00	RT			15	15
472+76	LT	15	15		
472+76	RT	15	15		
473+76	LT	15	15		
473+76	RT	15	15		
475+81	LT	15	15		
475+81	RT	15	15		
476+81	LT	15	15		
476+81	RT	15	15		
CSJ: 0690-02-015 SUBTOTALS		660	660	525	525
CSJ: 0690-02-015 TOTALS		1500	1500	1500	1500
PROJECT TOTALS		1800	1800	2010	2010

SUMMARY OF MAILBOX ITEMS

LOCATION	LOCATION LT/RT	560 6007 MAILBOX INSTALL-S (WC-POST) TY 3	560 6008 MAILBOX INSTALL-D (WC-POST) TY 3	560 6003 MAILBOX INSTALL-M (TWG-POST) TY 1	530 6008 TURNOUTS (ACP)
		EA	EA	EA	SY
CSJ: 0690-01-016					
5+82	RT		1		39
5+82	LT	1			37
7+82	LT	1			37
12+55	RT	1			37
61+07	LT	1			37
61+52	RT	1			37
63+22	RT	1			37
75+99	RT	1			37
93+21	RT	1			37
101+98	RT	1			37
106+76	LT	1			37
107+05	RT	1			
CSJ: 0690-01-016 SUBTOTALS		11	1	0	409
CSJ: 0690-02-015					
108+65	RT	1			37
112+26	RT	1			37
113+25	RT	1			37
116+15	RT	1			37
119+25	RT	1			37
120+95	RT	1			37
128+38	RT	1			37
141+10	RT	1			37
147+06	RT	1			37
152+95	RT		1		39
158+70	RT	1			37
161+35	RT	1			37
168+20	RT	1			37
169+65	RT	1			37
171+45	RT	1			37
175+08	RT	1			37
176+25	RT	1			37
177+50	RT	1			37
184+19	RT	1			37
185+37	RT	1			37
189+65	RT	1			37
191+35	RT	1			37
193+65	LT	1			37
195+60	LT	1			37
198+68	LT	1			37
199+25	RT	1			37
200+40	LT	1			37
203+10	LT			1	44
207+90	LT	1			37
210+95	LT	1			37
216+76	LT	1			37
241+42	LT	1			37
244+75	LT	1			37
249+95	LT	1			37
252+22	LT	1			37
257+60	LT	1			37
263+00	LT	1			37
266+00	LT	1			37
281+50	RT	1			37
285+55	RT	1			37
382+00	LT	1			37
384+70	LT	1			37
397+65	LT			1	44
415+75	LT	1			37
442+50	LT	1			37
458+90	LT		1		39
461+60	RT	1			37
462+70	LT		1		39
466+60	LT	1			37
466+85	RT	1			37
467+38	RT	1			37
468+55	LT	1			37
471+52	LT	1			37
477+12	LT	1			37
CSJ: 0690-02-015 SUBTOTALS		49	3	2	2018
PROJECT TOTALS		60	4	2	2427

FM 271
QUANTITY SUMMARY

SHEET 5 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		11

DN: | CK: | DW: | CK:

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION		LENGTH	662 6111 WK ZN PAV MRK SHT TERM (TAB)TY Y-2	662 6004 WK ZN PAV MRK NON-REMOV (W)4"(SLD)	662 6032 WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	662 6034 WK ZN PAV MRK NON-REMOV (Y)4"(SLD) (LF)		666 6342 REF PROF PAV MRK TY I(W)4"(SLD)(100 MIL)	666 6344 REF PROF PAV MRK TY I(Y)4"(BRK)(100 MIL)	666 6345 REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)		666 6048 REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
CSJ: 0690-01-016		LF	EA	LF	LF	LT	RT	LF	LF	LT	RT	LF
FROM	TO											
4+30	6+23	193	20	386		193	193	386		193	193	11
6+23	13+46	723	90	1,446	180		726	1,446	180		726	
13+46	15+28	182	15	364	50			364	50			
15+28	24+50	922	115	1,844	230	922		1,844	230	922		
24+50	33+66	916	115	1,832	230		916	1,832	230		916	
33+66	40+40	674	51	1,348	170			1,348	170			
40+40	48+51	811	101	1,622	200	811		1,622	200	811		
48+51	107+20	5,869	586	11,738	0	5,869	5,869	11,738	0	5,869	5,869	22
	CSJ: 0690-01-016 SUBTOTALS		1093	20580	1060	15,499		20,580	1,060	15,499		33
CSJ:0690-02-015												
107+20	113+95	675	85	1,350	170		675	1,350	170		675	11
113+95	116+14	219	22	438	0	219	219	438	0	219	219	
116+14	122+65	651	81	1,302	160	651		1,302	160	651		
122+65	175+10	5,245	524	10,490	0	5,245	5,245	10,490	0	5,245	5,245	11
175+10	182+38	728	90	1,456	180		728	1,456	180		728	
182+38	183+91	153	16	306	0	153	153	306	0	153	153	
183+91	191+70	779	96	1,558	190	779		1,558	190	779		22
191+70	197+21	551	70	1,102	140		551	1,102	140		551	
197+21	201+06	385	38	770	0	385	385	770	0	385	385	
201+06	206+30	524	65	1,048	130	524		1,048	130	524		11
206+30	207+75	145	14	290	0	145	145	290	0	145	145	11
207+75	215+93	818	101	1,636	200		818	1,636	200		818	
215+93	224+60	867	109	1,734	220	867		1,734	220	867		
224+60	251+70	2,710	272	5,420	0	2,710	2,710	5,420	0	2,710	2,710	11
251+70	260+78	908	114	1,816	230		908	1,816	230		908	
260+78	262+85	207	15	414	50			414	50			
262+85	272+35	950	120	1,900	240	950		1,900	240	950		
272+35	274+81	246	24	492	0	246	246	492	0	246	246	
274+81	285+05	1,024	129	2,048	260		1,024	2,048	260		1,024	11
285+05	289+30	425	54	850	110	425		850	110	425		
289+30	298+65	935	94	1,870	0	935	935	1,870	0	935	935	
298+65	310+77	1,212	151	2,424	300	1,212		2,424	300	1,212		
310+77	350+74	3,997	300	7,994	1000			7,994	1000			11
350+74	358+89	815	101	1,630	200	815		1,630	200	815		
358+89	360+08	119	12	238	0	119	119	238	0	119	119	
360+08	369+18	910	115	1,820	230		910	1,820	230		910	
369+18	386+44	1,726	129	3,452	430			3,452	430			
386+44	395+19	875	110	1,750	220	875		1,750	220	875		
395+19	404+51	932	94	1,864	0	932	932	1,864	0	932	932	11
404+51	410+66	615	76	1,230	150	615		1,230	150	615		
410+66	412+96	230	24	460	0	230	230	460	0	230	230	
412+96	418+71	575	71	1,150	140		575	1,150	140		575	
418+71	425+80	709	70	1,418	0	709	709	1,418	0	709	709	11
425+80	433+30	750	95	1,500	190	750		1,500	190	750		
433+30	442+14	884	110	1,768	220		884	1,768	220		884	
442+14	443+38	124	9	248	30			248	30			
443+38	452+44	906	114	1,812	230	906		1,812	230	906		
452+44	458+73	629	48	1,258	160			1,258	160			
458+73	467+25	852	106	1,704	210		852	1,704	210		852	
467+25	479+70	1,245	124	2,490	0	1,245	1,245	2,490	0	1,245	1,245	11
	CSJ:0690-02-015 SUBTOTALS		3992	74500	5990	43,840		74,500	5,990	43,840		132
	PROJECT TOTALS		5,085	95,080	7,050	59,339		95,080	7,050	59,339		165

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FM 271
QUANTITY SUMMARY

SHEET 6 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		12

SUMMARY OF PARALLEL DRAINAGE

LOCATION	LT/RT	EXISTING DRIVEWAY SURFACE	PIPE	LENGTH	WIDTH	RADIUS 1	RADIUS 2	104 6017 REMOVING CONC (DRIVEWAYS)	530 6004 DRIVEWAYS (CONC)	530 6005 DRIVEWAYS (ACP)	530 6016 DRIVEWAYS (BASE)	464 6001 RC PIPE (CL III) (12 IN)	464 6003 RC PIPE (CL III) (18 IN)	464 6005 RC PIPE (CL III) (24 IN)	467 6319 SET (TY II) (12 IN) (CMP) (6:1) (P)	467 6326 SET (TY II) (12 IN) (RCP) (6:1) (P)	467 6348 SET (TY II) (18 IN) (CMP) (6:1) (P)	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P)	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P)	496 6016 REMOV STR (PIPE)
			TYPE	LF	LF	LF	LF	SY	SY	SY	SY	LF	LF	LF	EA	EA	EA	EA	EA	EA
CSJ: 0690-01-016																				
5+99	RT	ASPH	RCP	10	12	10	10			18										
7+05	RT	GRAV	RCP	10	15	10	10				21									
7+56	LT	ASPH	RCP	10	15	10	10			21										
8+42	LT	ASPH	RCP	10	14	10	10			20										
8+75	RT	ASPH	RCP	10	12	10	10			18										
9+90	RT	ASPH	CMP	10	14	10	10			20							2			
10+40	RT	ASPH	CMP	10	14	10	10			20							2			
11+27	RT	ASPH	RCP	10	14	10	10			20										
12+30	RT	ASPH	RCP	10	14	10	10			20										
18+20	RT	DIRT	RCP	10	14	10	10				20									
22+50	RT	DIRT	RCP	10	14	10	10				20									
23+05	LT	ASPH	DITCH	10	18	10	15			26										
26+30	LT	ASPH	RCP	10	14	10	10			20										
31+80	RT	ASPH	RCP	10	12	10	10			18										
36+05	RT	ASPH	RCP	10	12	10	10			18										
43+51	LT	ASPH	BOX	10	21	10	10			28										
48+61	RT	ASPH	RCP	10	12	10	10			18										
51+12 (CR 3070)	LT	ASPH		10	20	30	20			39										
60+50	LT	ASPH	RCP	10	12	10	10			18										
60+91	LT	ASPH	RCP	10	18	10	10			24										
62+84	LT	ASPH	RCP	10	18	10	10			24										
63+80	LT	ASPH	RCP	10	14	10	10			20										
67+22	RT	ASPH	RCP	10	12	10	10			18										
68+00	RT	ASPH	RCP	10	12	10	10			18										
68+72	RT	ASPH	RCP	10	12	10	10			18										
72+63	RT	ASPH	RCP	10	12	10	10			18										
75+73	RT	GRAV	DITCH	10	12	10	10				18									
76+51	RT	GRAV	DITCH	10	12	10	10				18									
84+36 (CR 3100)	RT	ASPH	DITCH	10	18	20	20			32										
85+53	RT	ASPH	RCP	10	12	10	10			18										
91+14	LT	ASPH	RCP	10	16	10	10			22										
93+09	RT	ASPH	DITCH	10	12	10	10			18										
98+20	RT	ASPH	RCP	10	12	10	10			18										
101+22	RT	ASPH	URCP	10	16	10	10			22										
101+98	RT	ASPH	RCP	10	16	10	10			22										
106+20	LT	ASPH	DITCH	10	16	10	10			22										
106+50	RT	ASPH	DITCH	10	12	10	10			18										
107+00	RT	ASPH	DITCH	10	12	10	10			18										
107+80 (LAKE RD 24)	LT	ASPH	DITCH	10	18	20	40			41										
						CSJ: 0690-01-016 SUBTOTAL		0	0	733	97	0	0	0	0	0	4	0	0	0
CSJ: 0690-02-015																				
108+45	RT	ASPH	DITCH	10	18	10	10			24										
108+93	RT	ASPH	DITCH	10	12	10	10			18										
112+00	RT	ASPH	RCP	10	16	10	10			22										
112+66	RT	ASPH	RCP	10	18	10	10			24										
113+81	RT	ASPH	RCP	10	12	10	10			18										
116+31	RT	ASPH	RCP	10	18	10	10			24										
121+36	RT	ASPH	RCP	10	14	10	10			20										
128+88	RT	ASPH	RCP	10	14	10	10			20										
131+01	RT	ASPH	RCP	10	14	10	10			20										
132+70	RT	ASPH	RCP	10	12	10	10			18										1
138+12	RT	ASPH	RCP	10	12	10	10			18										
139+02	RT	ASPH	RCP	10	12	10	10			18										
141+65	RT	ASPH	DITCH	10	14	10	10			20										
144+46	LT	ASPH	RCP	10	14	10	10			20										
146+00	RT	ASPH	RCP	10	18	10	10			24										
147+36	RT	ASPH	RCP	10	14	10	10			20										
147+67 (CR 3020)	LT	ASPH	RCP	10	18	20	20			32										
152+07	LT	ASPH	DITCH	10	18	10	10			24										
153+17	RT	ASPH	RCP	10	12	10	10			18										
153+42	RT	ASPH	RCP	10	12	10	10			18										
158+71	RT	ASPH	RCP	10	16	10	10			22										
161+55	RT	ASPH	RCP	10	18	10	10			24										
						CSJ: 0690-02-015 SUBTOTAL		**0**	**0**	**466**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

FM 271
QUANTITY SUMMARY

SHEET 7 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		13

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CK:
DW:
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SUMMARY OF PARALLEL DRAINAGE CONTINUED

LOCATION	LT/RT	EXISTING DRIVEWAY SURFACE	PIPE	LENGTH	WIDTH	RADIUS 1	RADIUS 2	104 6017 REMOVING CONC (DRIVEWAYS)	530 6004 DRIVEWAYS (CONC)	530 6005 DRIVEWAYS (ACP)	530 6016 DRIVEWAYS (BASE)	464 6001 RC PIPE (CL III) (12 IN)	464 6003 RC PIPE (CL III) (18 IN)	464 6005 RC PIPE (CL III) (24 IN)	467 6319 SET (TY II) (12 IN) (CMP) (6:1) (P)	467 6326 SET (TY II) (12 IN) (RCP) (6:1) (P)	467 6348 SET (TY II) (18 IN) (CMP) (6:1) (P)	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P)	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P)	496 6016 REMOV STR (PIPE)
			TYPE	LF	LF	LF	LF	SY	SY	SY	SY	LF	LF	LF	EA	EA	EA	EA	EA	EA
163+01	RT	ASPH	RCP	10	16	10	10			22										
168+13	LT	ASPH	RCP	10	14	10	10			20										
168+90	RT	ASPH	RCP	10	20	10	10			27										
169+88	RT	ASPH	RCP	10	12	10	10			18										
170+80	LT	ASPH	RCP	10	18	10	10			24										
171+09	RT	ASPH	DITCH	10	14	10	10			20										
171+52	LT	ASPH	RCP	10	20	10	10			27										
174+10	RT	ASPH	DITCH	10	12	10	10			18										
174+90	RT	ASPH	DITCH	10	16	10	10			22										
176+28	LT	ASPH	RCP	10	22	10	10			29										
177+68	LT	ASPH	RCP	10	16	10	10			22		4				2				
183+99	RT	ASPH	RCP	10	16	10	10			22										
184+75	RT	ASPH	RCP	10	12	10	10			18										
185+16	RT	ASPH	RCP	10	16	10	10			22										
187+42 (CR 3105)	RT	ASPH	DITCH	10	18	20	20			32										
189+90	RT	ASPH	DITCH	10	14	10	10			20										
191+53	RT	ASPH	DITCH	10	12	10	10			18										
191+60 (CR 3030)	LT	ASPH	DITCH	10	18	20	20			32										
193+88	RT	ASPH	DITCH	10	14	10	10			20										
195+77	RT	ASPH	RCP	10	16	10	10			22										
196+86	RT	ASPH	RCP	10	16	10	10			22										
199+01	RT	CONC	DITCH	20	24	20	20	66	66				30					2		1
199+29	LT	ASPH	RCP	10	12	10	10			18										
200+59	LT	ASPH	RCP	10	12	10	10			18										
203+40	RT	ASPH	RCP	10	14	10	10			20										
206+22 (CR 3106)	RT	ASPH	DITCH	10	14	0	15			18										
207+10 (CR 3106)	RT	ASPH	DITCH	10	12	15	15			21										
207+39 (CR 3106)	RT	ASPH	DITCH	10	12	10	10			18										
208+24	RT	ASPH	DITCH	10	12	10	10			18										
209+22	RT	ASPH	RCP	10	18	10	10			24										
211+13	RT	ASPH	RCP	10	18	10	10			24										
216+21	RT	ASPH	RCP	10	14	10	10			20										
216+69	RT	ASPH	RCP	10	14	10	10			20										
218+45	RT	ASPH	RCP	10	14	10	10			20										
222+21	LT	ASPH	RCP	10	16	10	10			22										
223+37	RT	ASPH	RCP	10	12	10	10			18										
224+35	RT	ASPH	RCP	10	12	10	10			18										
229+85	RT	ASPH	RCP	10	12	10	10			18										
231+21	RT	ASPH	DITCH	10	12	10	10			18										
234+50 (CR 3035)	LT	ASPH	DITCH	10	16	20	30			34										
241+68	RT	GRAV	CMP	10	12	10	10				18						2			
244+80	RT	ASPH	DITCH	10	14	10	10			20										
245+87	RT	ASPH	RCP	10	14	10	10			20										
250+17	RT	ASPH	DITCH	10	14	15	10			22										
252+45	RT	ASPH	DITCH	10	18	10	10			24										
257+23	RT	ASPH	DITCH	10	12	10	10			18										
257+35	LT	ASPH	RCP	10	14	10	10			20										
258+64	RT	GRAV	DITCH	10	16	10	10				22									
261+71	RT	GRAV	RCP	10	14	10	10				20									
262+98	RT	ASPH	RCP	10	16	10	10			22										
266+00	RT	ASPH	RCP	10	16	10	10			22										
271+91	RT	ASPH	DITCH	10	16	10	10			22										
273+80	RT	ASPH	RCP	10	12	10	10			18										
273+81	LT	ASPH	RCP	10	14	10	10			20										
278+80 (CR 1550)	LT	ASPH	DITCH	10	44	40	60			88										
279+10	RT	ASPH	RCP	10	16	10	10			22										
280+67	RT	ASPH	RCP	10	14	10	10			20										
285+38	RT	ASPH	RCP	10	16	10	10			22										
292+87	LT	GRAV	CMP	10	28	10	10				35									
296+90	RT	ASPH	RCP	10	14	10	10			20										
299+02	LT	ASPH	RCP	10	12	10	10			18										
300+98	RT	ASPH	RCP	10	12	10	10			18										
315+15	RT	ASPH	RCP	10	26	10	10			33										
316+24 (CR 3300)	LT	ASPH	DITCH	10	20	20	20													
CSJ: 0690-02-015 SUBTOTALS								**66**	**66**	**1,313**	**95**	**4**	**30**	**0**	**0**	**2**	**2**	**2**	**0**	**1**

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CK:
DW:
CK:
DN:

FM 271
QUANTITY SUMMARY

SHEET 8 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		14

CK:
DW:
CK:
DN:

SUMMARY OF PARALLEL DRAINAGE CONTINUED

LOCATION	LT/RT	EXISTING DRIVEWAY SURFACE	PIPE	LENGTH	WIDTH	RADIUS 1	RADIUS 2	104 6017 REMOVING CONC (DRIVEWAYS)	530 6004 DRIVEWAYS (CONC)	530 6005 DRIVEWAYS (ACP)	530 6016 DRIVEWAYS (BASE)	464 6001 RC PIPE (CL III)(12 IN)	464 6003 RC PIPE (CL III)(18 IN)	464 6005 RC PIPE (CL III)(24 IN)	467 6319 SET (TY II) (12 IN) (CMP) (6:1) (P)	467 6326 SET (TY II) (12 IN) (RCP) (6:1) (P)	467 6348 SET (TY II) (18 IN) (CMP) (6:1) (P)	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P)	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P)	496 6016 REMOV STR (PIPE)
			TYPE	LF	LF	LF	LF	SY	SY	SY	SY	LF	LF	LF	EA	EA	EA	EA	EA	EA
316+57	RT	ASPH	RCP	10	20	10	10			27										
343+70	LT	GRAV	CMP	20	44	10	10				102			50					2	1
343+80	RT	GRAV	CMP	20	44	10	10				102			50					2	1
355+90	LT	ASPH	RCP	10	14	10	10			20										
356+99	RT	ASPH	RCP	10	14	10	10			20										
362+00	RT	ASPH	RCP	10	14	10	10			20										
368+11	LT	ASPH	RCP	10	14	10	10			20										
372+05	LT	ASPH	RCP	10	14	10	10			20										
381+85	LT	ASPH	DITCH	10	16	20	20			30										
384+35	LT	ASPH	RCP	10	16	20	20			30										
385+71	LT	ASPH	RCP	10	15	20	20			29										
386+37	RT	ASPH	DITCH	10	22	10	10			29										
390+88	LT	ASPH	RCP	10	20	10	10			27										
396+65 (CR 3130)	RT	ASPH	DITCH	10	18	30	50			50										
398+15	LT	GRAV	CMP	10	15	20	20				29				2					
398+75	RT	ASPH	RCP	10	18	20	20			32										
399+37	LT	GRAV	CMP	20	36	20	20				92			24					2	1
403+63	LT	GRAV	CMP	25	12	10	10				38						2			
408+92	LT	GRAS	CMP	10	22	20	20				37						2			
411+12	RT	ASPH	RCP	10	12	10	10			18										
413+48	LT	ASPH	RCP	10	12	10	10			18										
415+54	LT	ASPH	DITCH	10	18	20	20			32										
420+21	RT	ASPH	RCP	10	12	10	10			18										
424+48 (CR 3135)	RT	ASPH	DITCH	10	16	30	50			48										
426+25	RT	ASPH	RCP	10	18	20	20			32										
437+60	RT	ASPH	RCP	10	16	20	20			30										
438+33	RT	ASPH	RCP	10	16	20	20			30										
443+91	LT	ASPH	RCP	10	16	20	20			30										
454+98	LT	ASPH	RCP	10	12	10	10			18										
455+86	RT	ASPH	RCP	10	16	20	20			30										
457+66	RT	ASPH	RCP	10	15	20	20			29										
458+96	RT	ASPH	DITCH	10	15	20	20			29										
459+11	LT	ASPH	RCP	10	15	20	20			29										
459+36	RT	GRAV	DITCH	10	10	10	10				15									
461+33	RT	ASPH	RCP	10	16	10	10			22					2					
461+83	LT	ASPH	RCP	10	16	10	10			22										
462+45	LT	ASPH	DITCH	10	10	10	10			15										
463+04	RT	GRAV	RCP	10	15	10	10				21									
465+54	RT	GRAV	CMP	10	18	10	10				24									
466+37	LT	ASPH	RCP	10	15	10	10			21										
467+13	RT	ASPH	RCP	10	12	10	10			18										
467+50	LT	ASPH	DITCH	10	12	10	10			18										
467+55	RT	ASPH	RCP	10	14	10	10			20										
468+42	RT	ASPH	RCP	10	16	10	10			22										
468+76	LT	ASPH	RCP	10	16	10	10			22										
470+10	RT	ASPH	RCP	10	12	10	10			18										
471+72	LT	ASPH	RCP	10	12	10	10			18										
473+31	LT	ASPH	RCP	10	12	10	10			18										
475+05	RT	ASPH	RCP	10	12	10	10			18										
476+47	RT	ASPH	RCP	10	26	10	10			33										
477+49	RT	GRAV	RCP	10	18	10	10				24									
478+12	RT	GRAV	RCP	10	18	20	20				32									
478+50	LT	ASPH	RCP	10	12	10	10			18										
478+82 (CR 3136)	RT	ASPH	RCP	10	12	20	20			25										
479+12	LT	ASPH	RCP	10	14	10	10			20										
479+30	LT	ASPH	DITCH	10	12	10	10			18										
CSJ: 0690-02-015 SUBTOTALS								0	0	1,111	516	0	0	124	4	0	4	0	6	3
CSJ: 0690-02-015 TOTALS								66	66	2,890	611	4	30	124	4	2	6	2	6	5
PROJECT TOTALS								66	66	3,623	708	4	30	124	4	2	10	2	6	5

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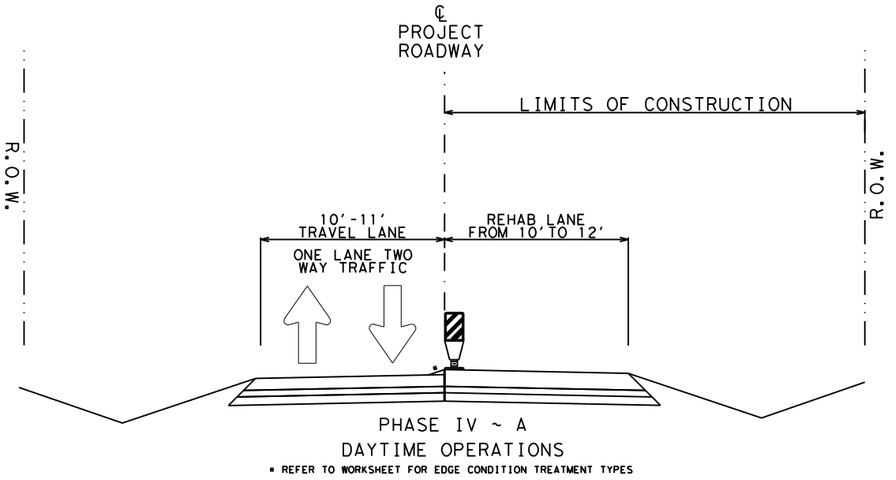
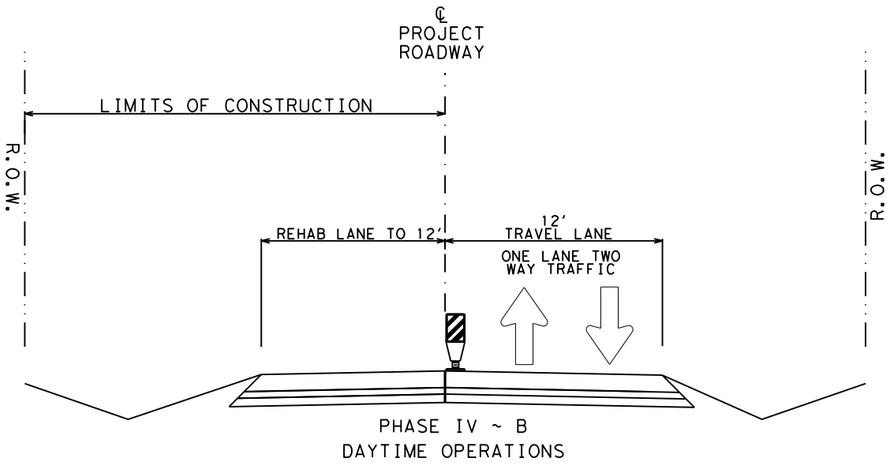
FM 271
QUANTITY SUMMARY

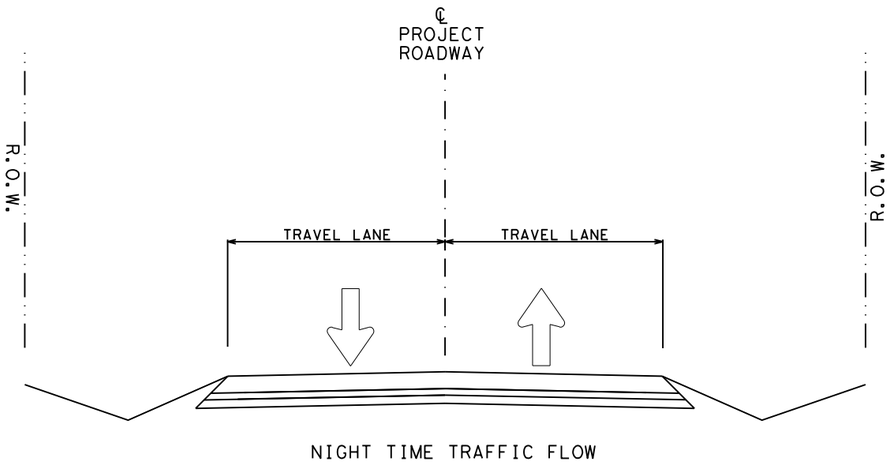
SHEET 9 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		15







Phase I ~ Initial Traffic Control

Install project limit traffic control devices (TCD) per the BC standard sheets. Utilize the applicable TCP (2-1)-18 or TCP (2-2b)-18 layout for TCD installation.

Phase II ~ Erosion Control

Install erosion control devices utilizing the applicable TCP (2-1)-18 layout or TCP (2-2b)-18.

Phase III ~ Culvert Work (Cross and Parallel Culverts)

Perform off-pavement culvert operations utilizing the applicable TCP (2-1)-18 layout.

Perform on-pavement culvert operations utilizing TCP(2-2b)-18.

Culvert work may proceed in advance of roadway rehabilitation when approved by the Engineer. Adhere to the Worksheet for Edge Condition Treatment Types.

During culvert construction, ensure trench and slope stability to prtotect workers and roadway traffic.

Phase IV ~ Roadway Rehabilitation

Refer to the Traffic Control Plan (TCP) Typical Sections for construction work area and traffic flow.

Perform pavement rehabilitation operations and install work zone pavement markings utilizing TCP(2-2b)-18.

Limit roadway rehabilitation operations to two mile sections. Prior to advancement to the next section, all backfilling and temporary seeding must be completed and the section be approved by the Engineer. Adhere to the Worksheet for Edge Condition Treatment Types.

Phase V ~ Final Pavement Markings

Install final pavement markings using TCP(3-1)-13 and TCP(3-3)-14.

Phase VI ~ MBGF Work

Remove and install MBGF utilizing standard TCP (2-2b)- 18.

Phase VII ~ Backfill, Sign and Seeding Operations

Perform pavement backfill operations, sign installation and seeding, utilizing the appopriate TCP standard.

Phase VIII ~ Project Clean Up

Remove erosion control devices, construction debris and waste material, utilizing the appropriate TCP standard.

Notes: Prior to a specific construction operation, the traffic control standard specified for the construction phase in this narrative must be evaluated thoroughly for appropriateness. All traffic control operations must adhere to the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and the applicable Traffic Control Standards. Construction phase order may be varied when approved by the Engineer. Submit a Work and Traffic Control Sequence plan to the Engineer for approval. Ensure that both travel lanes are open at night. Provide access to private property and Public Roads at all times. Provide pilot car during one lane/two way traffic operations. Road closures must be approved by the Engineer.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
SEQUENCE OF WORK

NOT TO SCALE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
PAR	FANNIN		16

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	PAR	FANNIN		17
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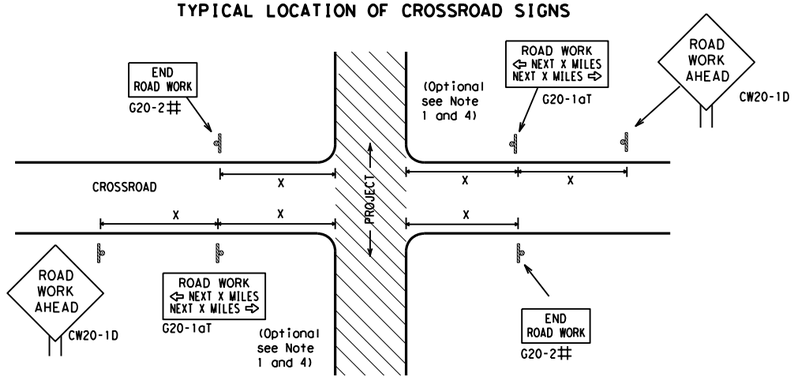
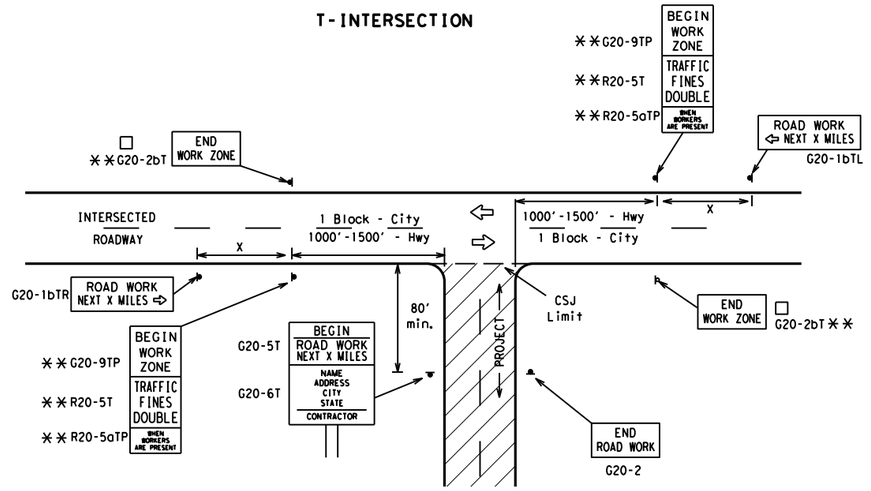
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

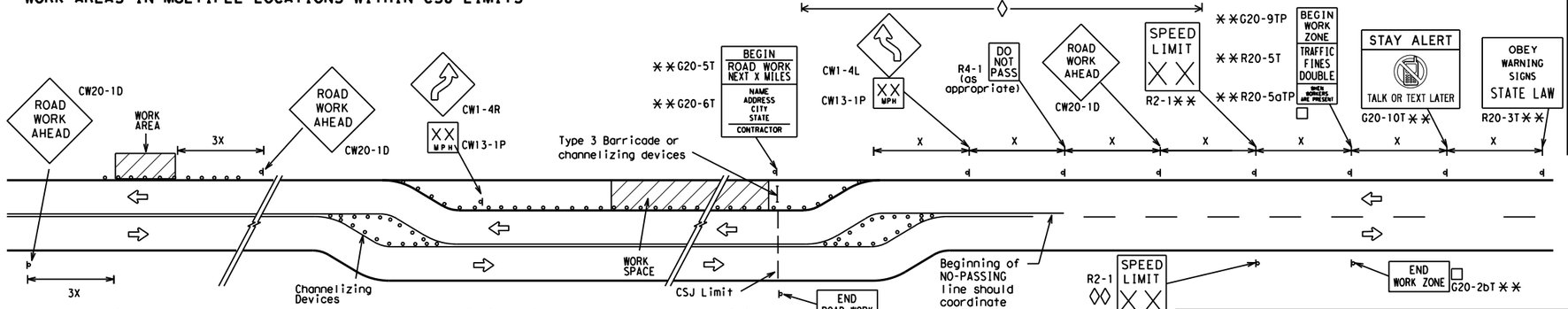
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

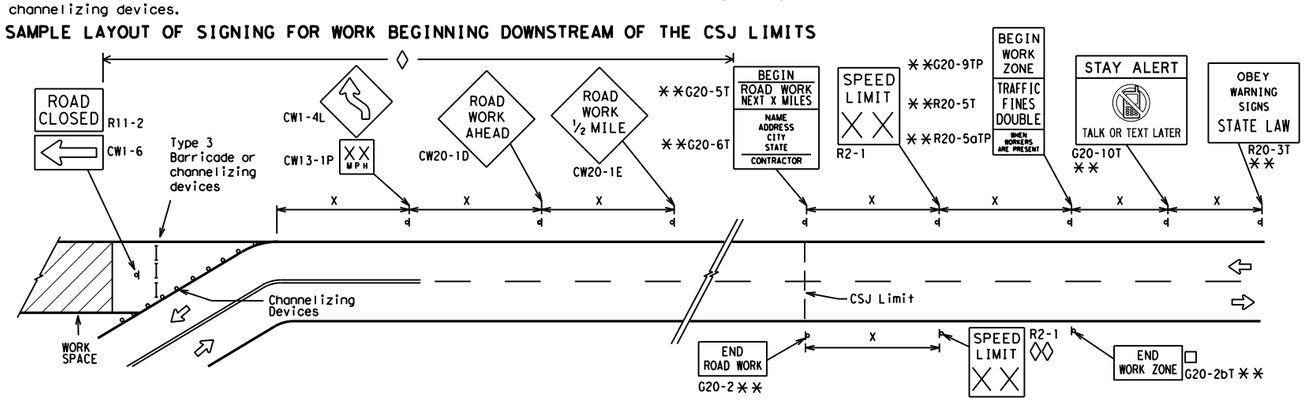
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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REVISIONS	0690	01	016, ETC	FM 271
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PAR	FANNIN		18

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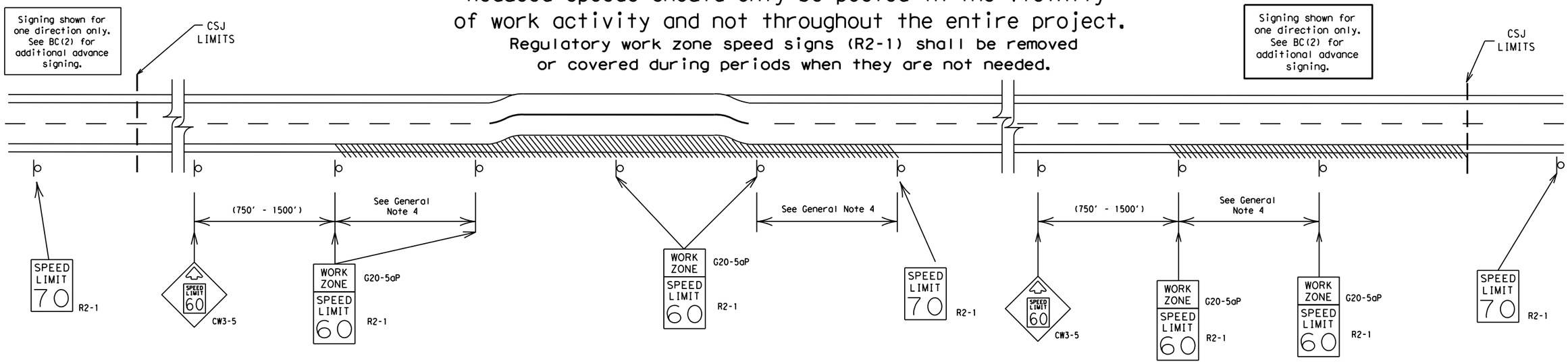
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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7-13 5-21	PAR	FANNIN		19

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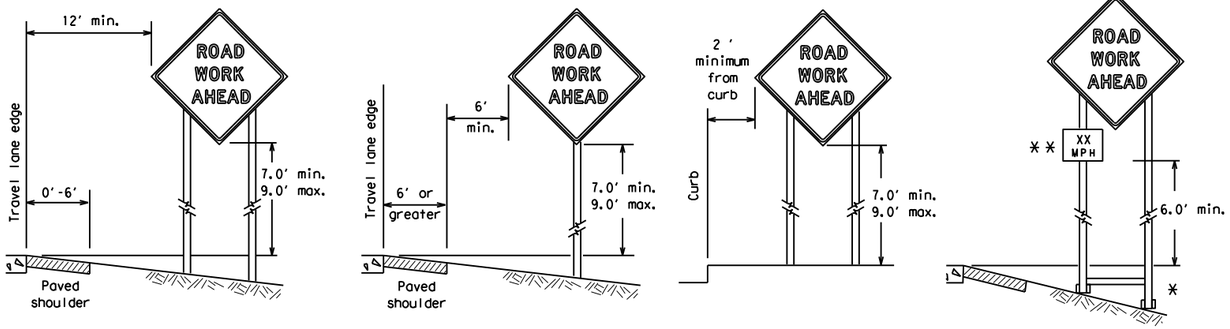
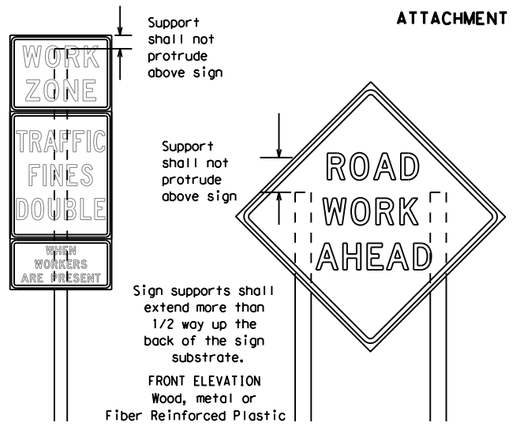
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

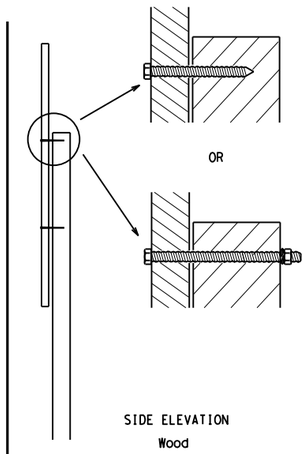


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





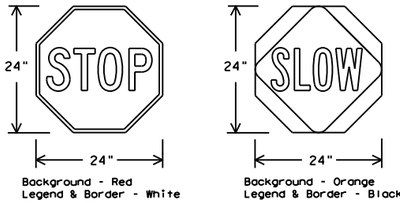
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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REVISIONS	0690	01	016, ETC	FM 271
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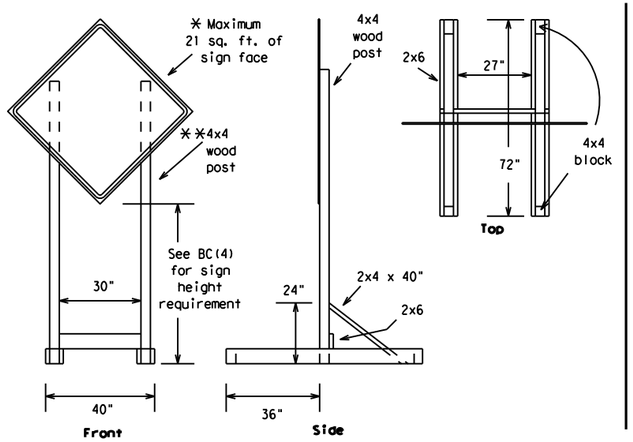
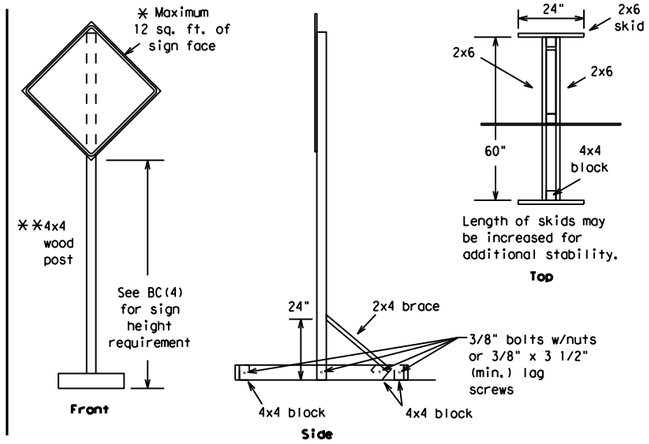
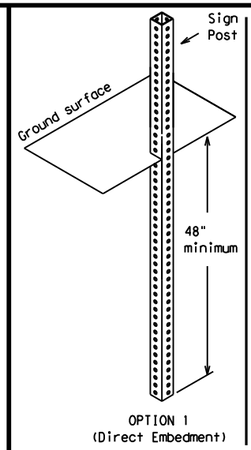
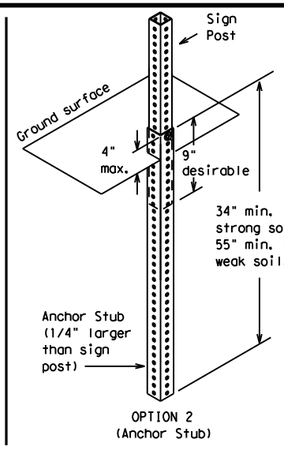


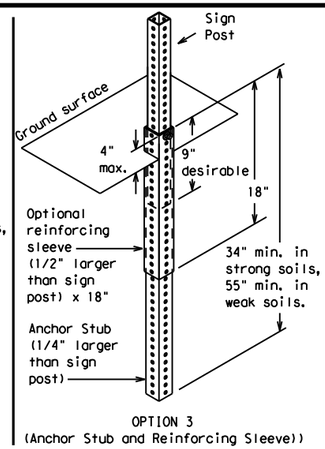


SKID MOUNTED WOOD SIGN SUPPORTS

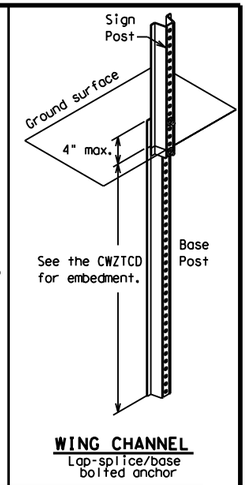
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







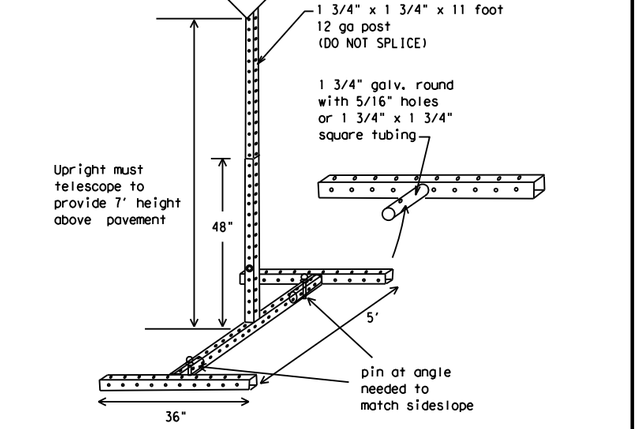
PERFORATED SQUARE METAL TUBING

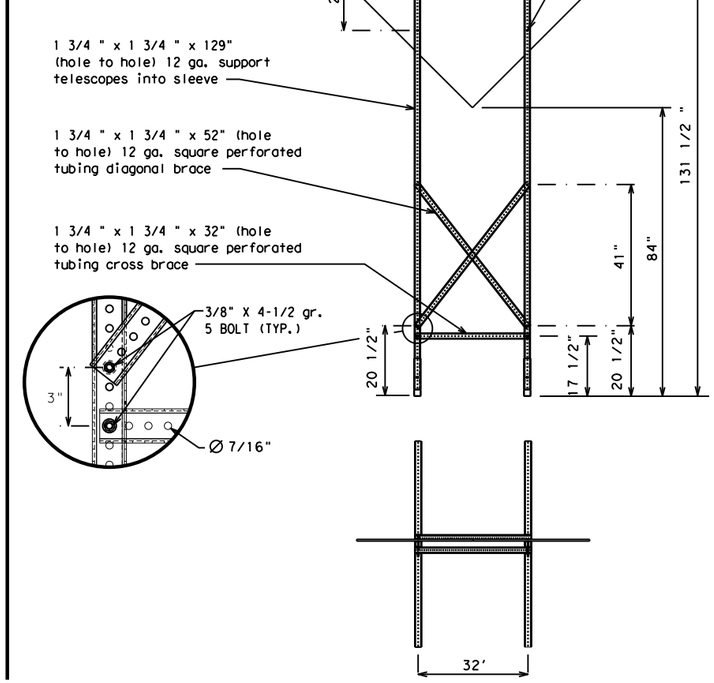


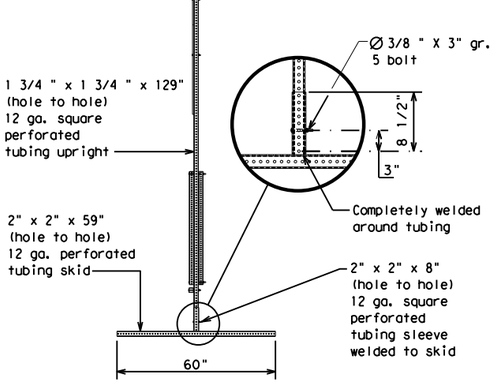
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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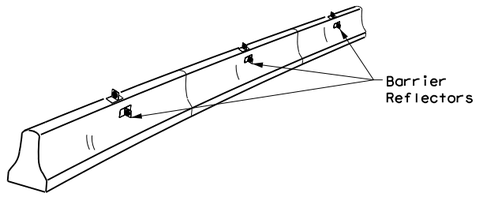
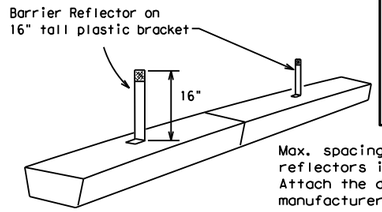
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

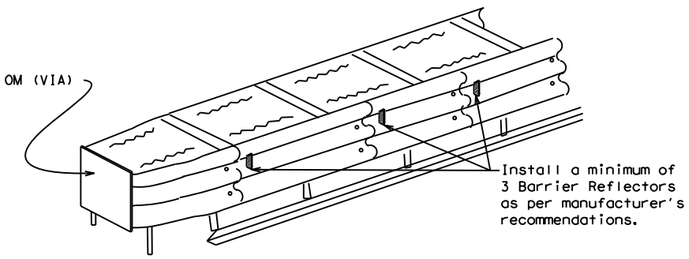


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

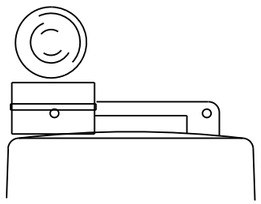


DELINEATION OF END TREATMENTS

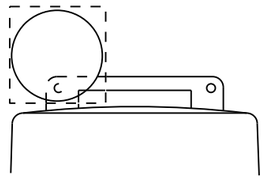
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

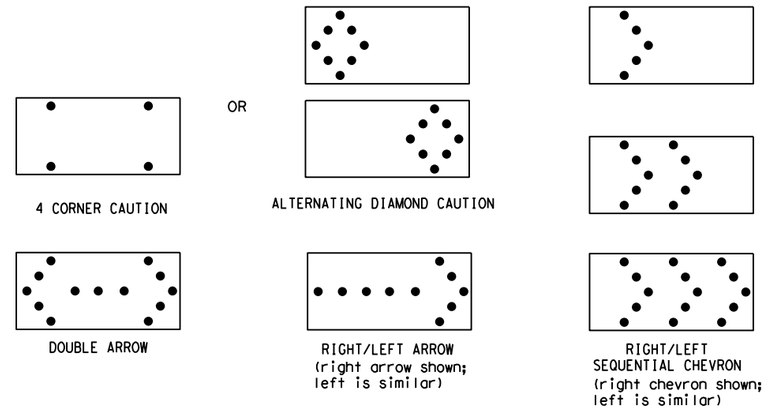
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PAR	FANNIN		23

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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:

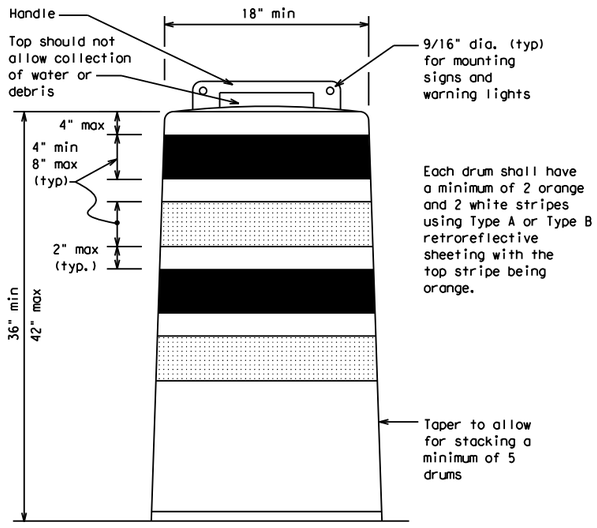
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

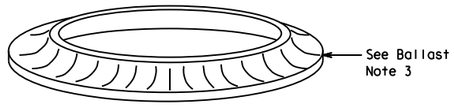
RETROREFLECTIVE SHEETING

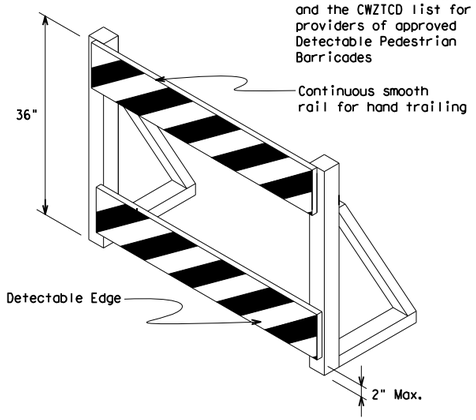
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

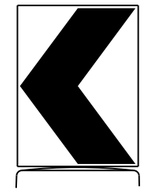




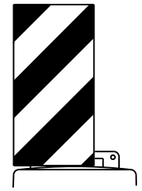


DETECTABLE PEDESTRIAN BARRICADES

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

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
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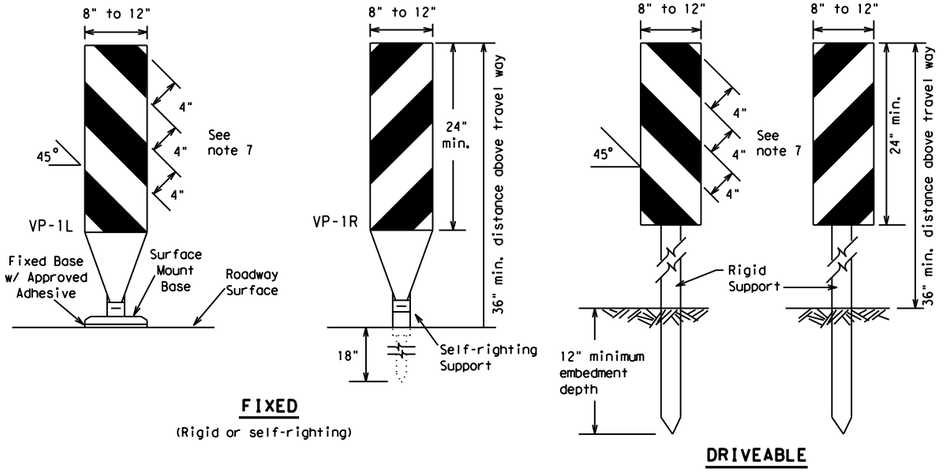
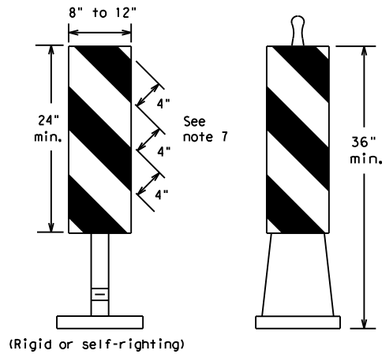


FIXED
(Rigid or self-righting)

DRIVEABLE

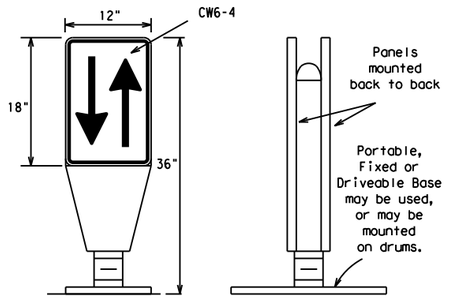


(Rigid or self-righting)

PORTABLE

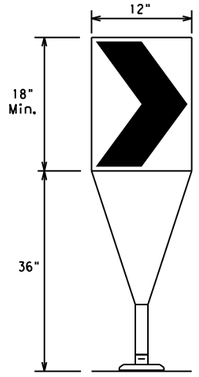
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

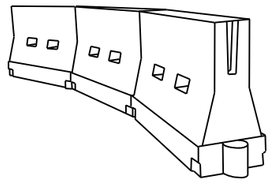
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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

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

CHEVRONS



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

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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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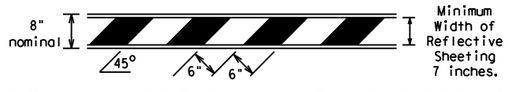
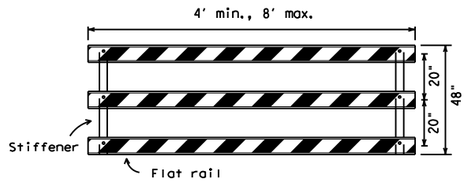
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



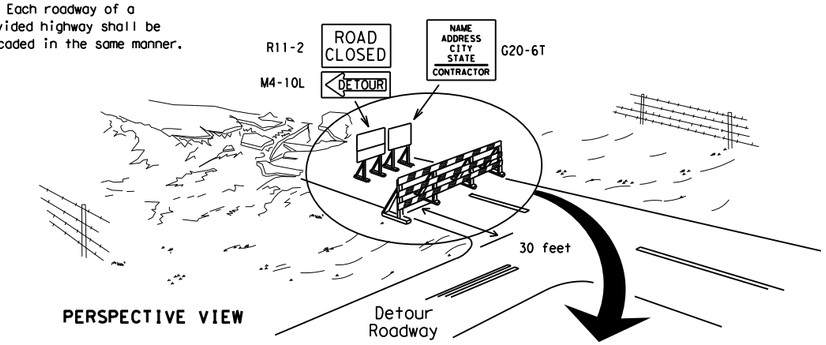
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

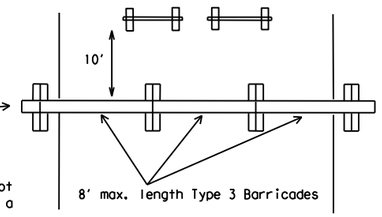
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

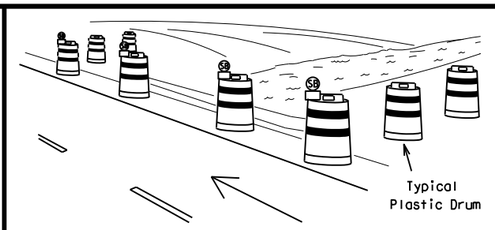
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

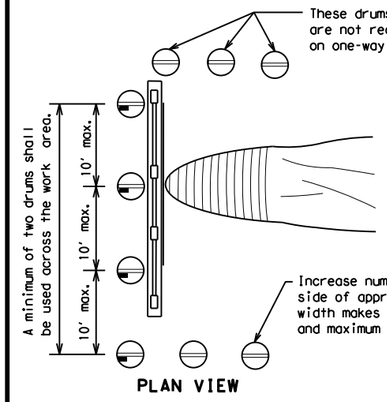
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

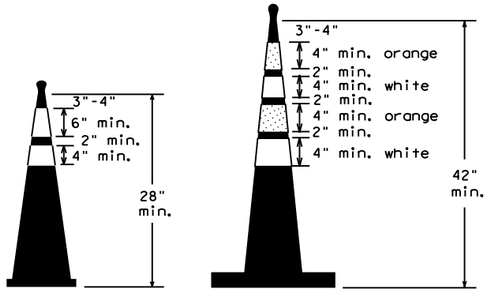
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



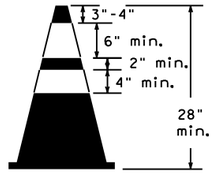
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

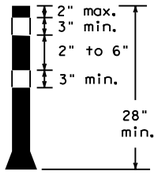
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

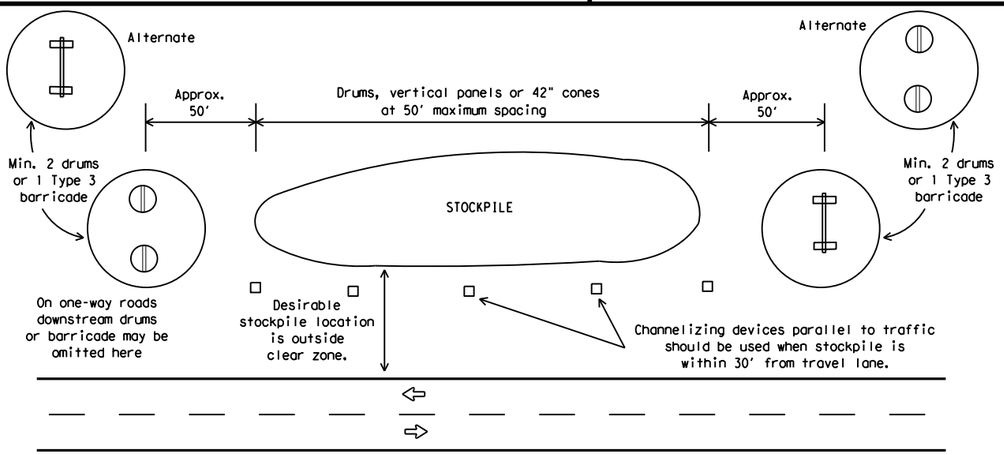


Tubular Marker

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PAR	FANNIN		26

104

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

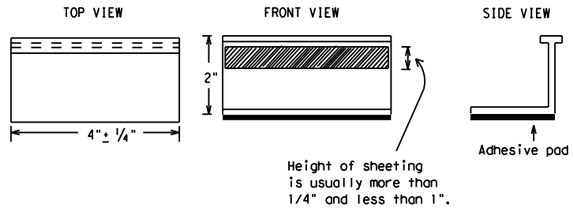
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	PAR	FANNIN		27
11-02 8-14				

105

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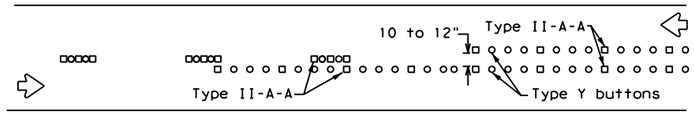
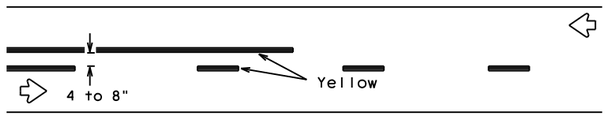
PAVEMENT MARKING PATTERNS

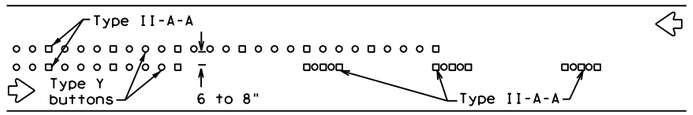
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



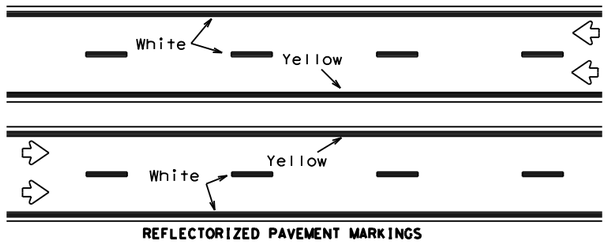
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



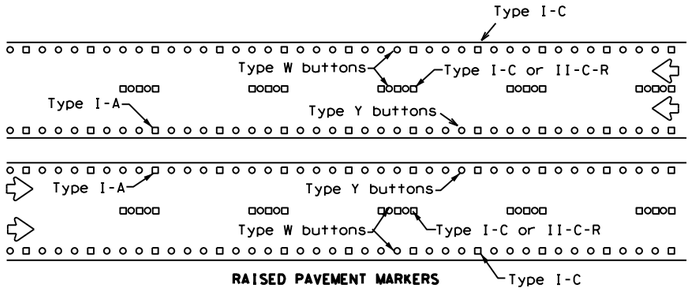
RAISED PAVEMENT MARKERS - PATTERN B

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



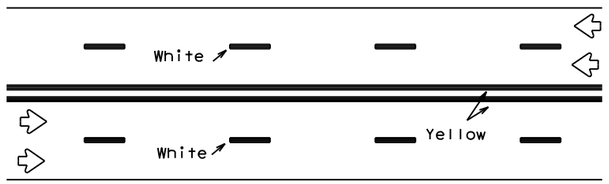
REFLECTORIZED PAVEMENT MARKINGS



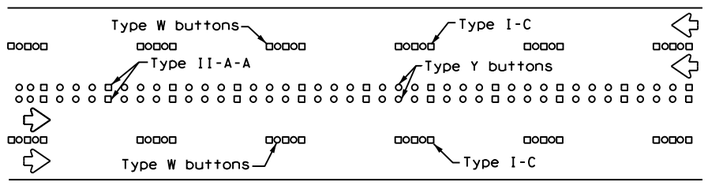
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



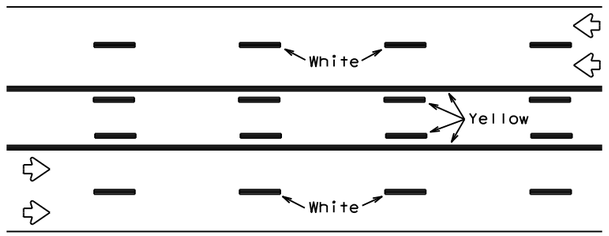
REFLECTORIZED PAVEMENT MARKINGS



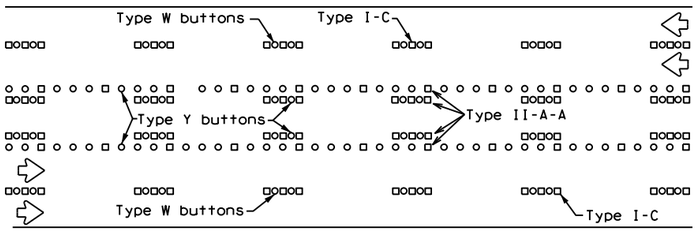
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

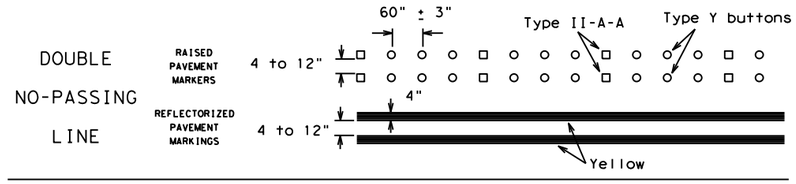
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

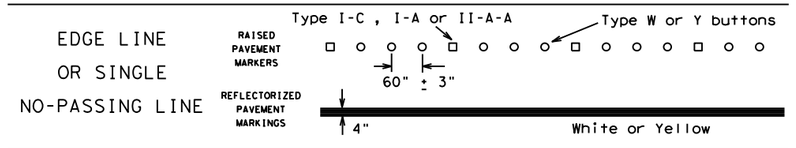
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

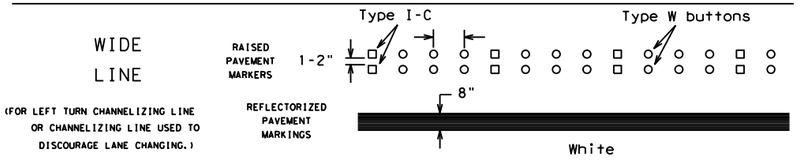


EDGE LINE OR SINGLE NO-PASSING LINE



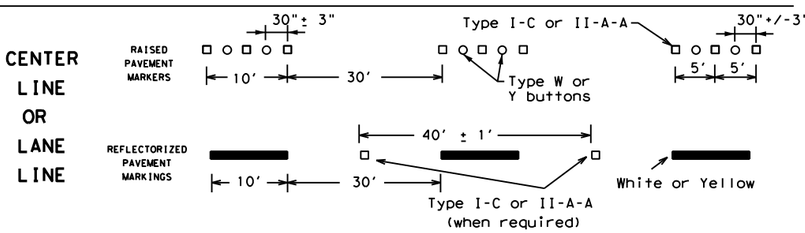
WIDE LINE

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

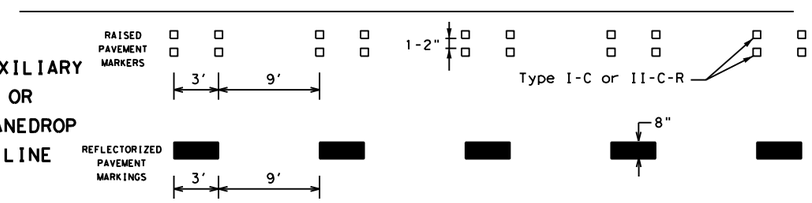


BROKEN LINES

CENTER LINE OR LANE LINE

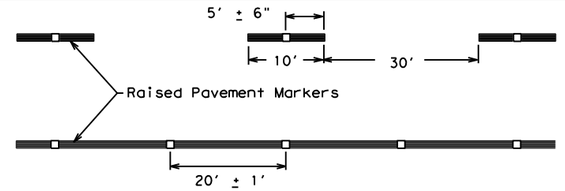


AUXILIARY OR LANEDROP LINE



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 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		28

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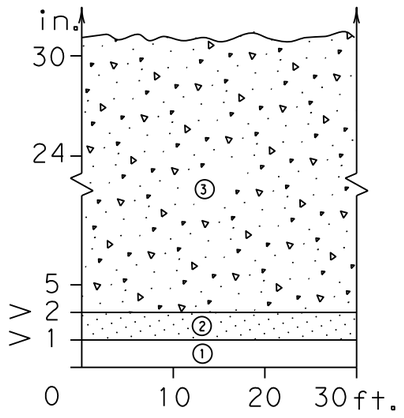
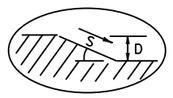
DATE: 7/7/2022 8:49:27 AM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\029 TREATMENT FOR VARIOUS EDGE CONDITIONS.dgn

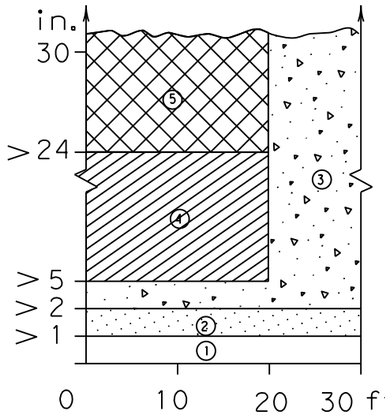
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

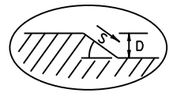


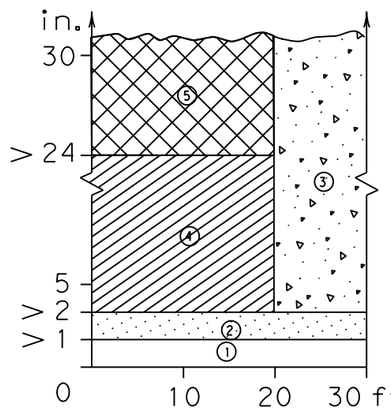
Edge Condition I
S = (3:1) (or flatter)



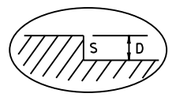


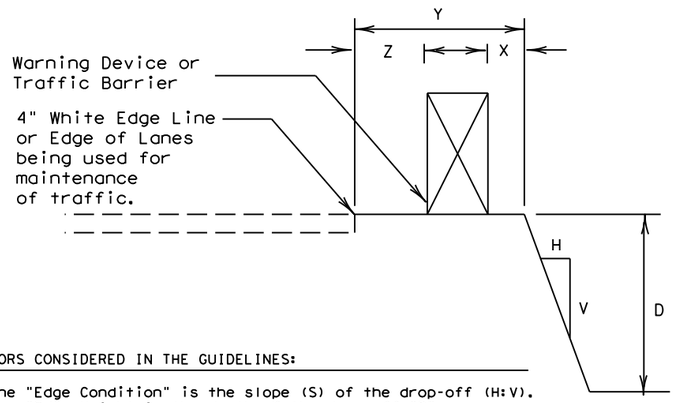
Edge Condition II
S = ((2.99):1) to (1:1)





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	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone- 4 may be used after consideration of other applicable factors.

Edge Condition Notes:

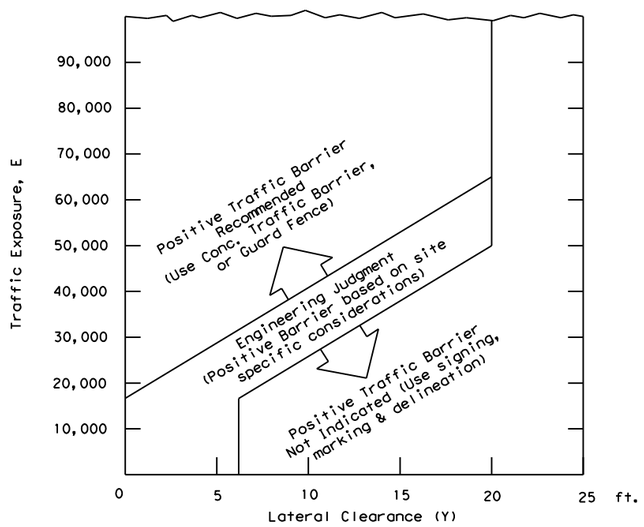
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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



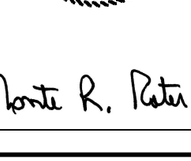
1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

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

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

Engineer's Seal



07.0.22

Monte R. Rater P.E.

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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

REVISIONS
03-01
08-01 correct typos

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		29

DATE: 7/7/2022 8:49:29 AM
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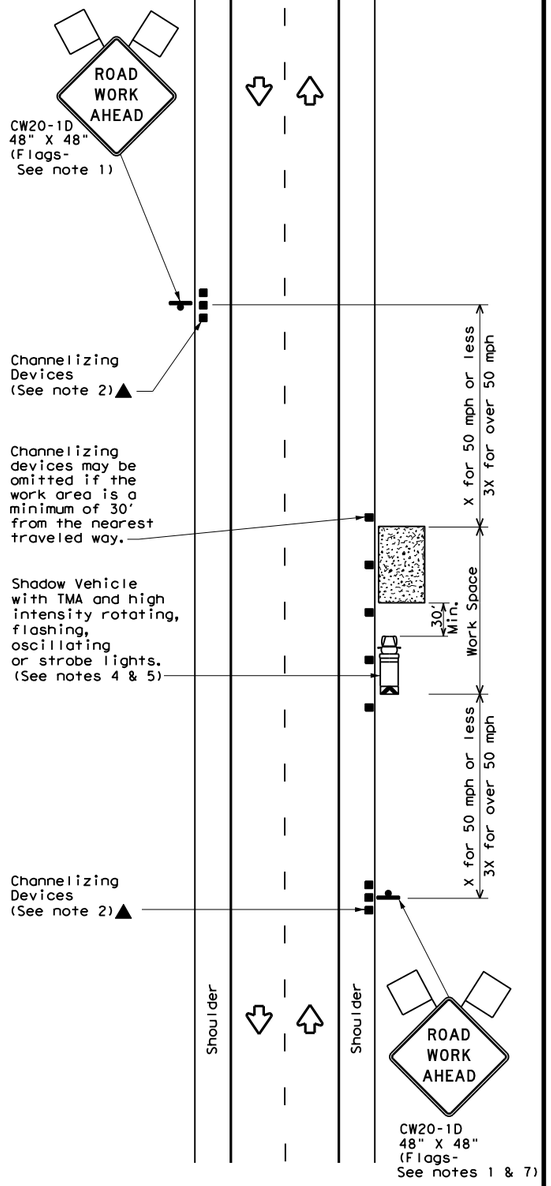
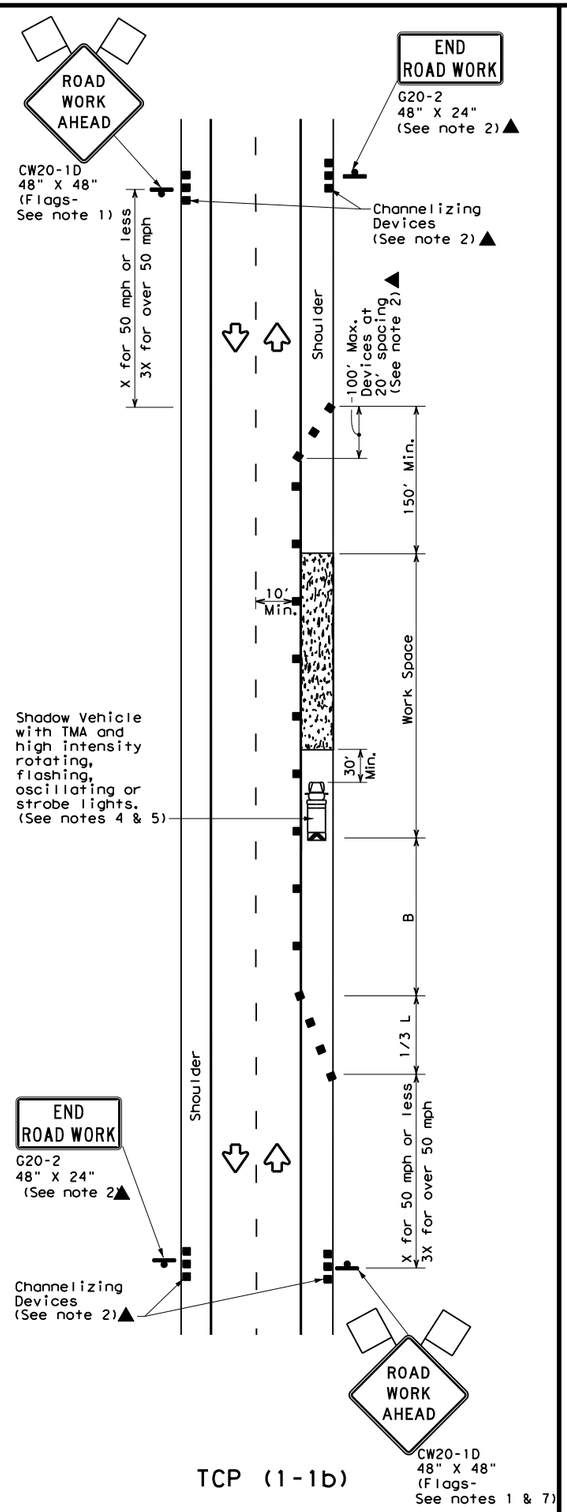


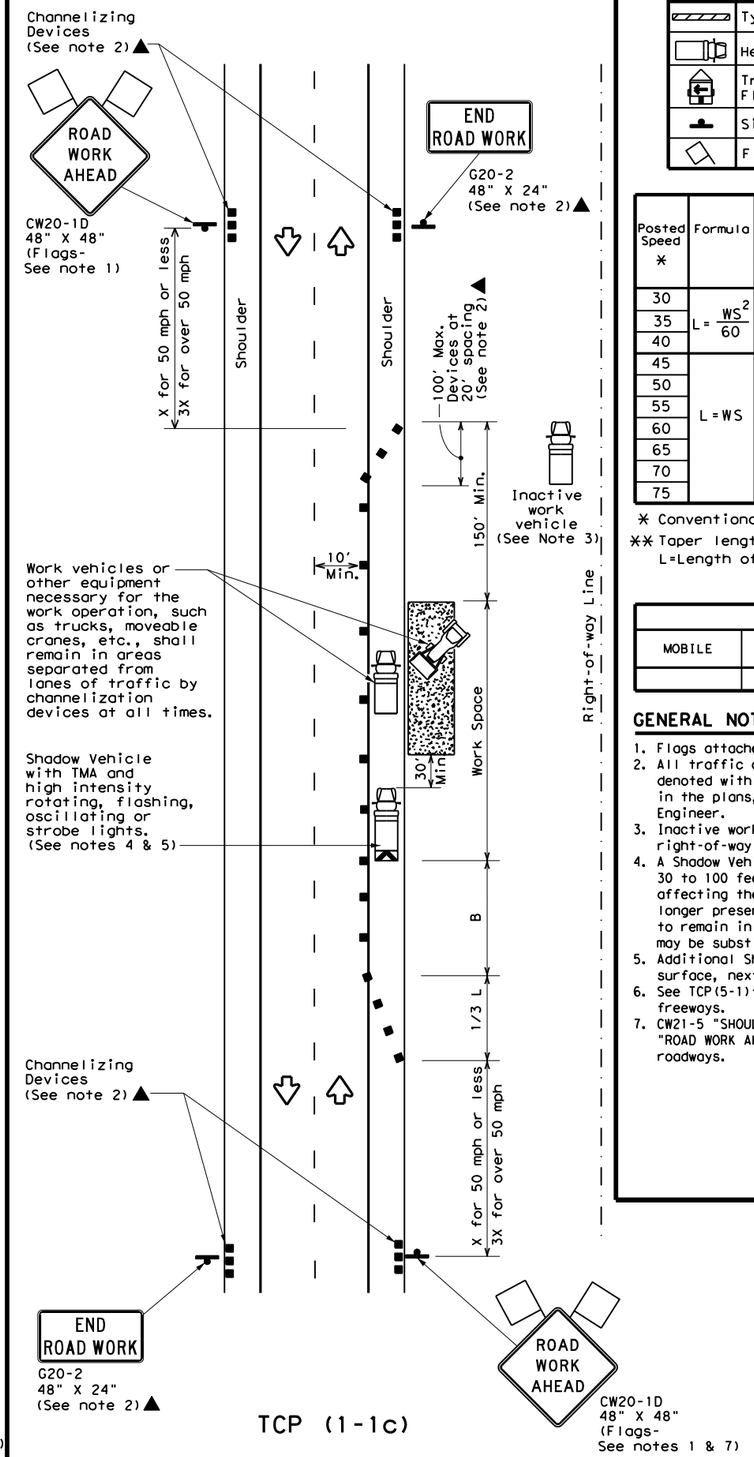
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	PAR	FANNIN		30

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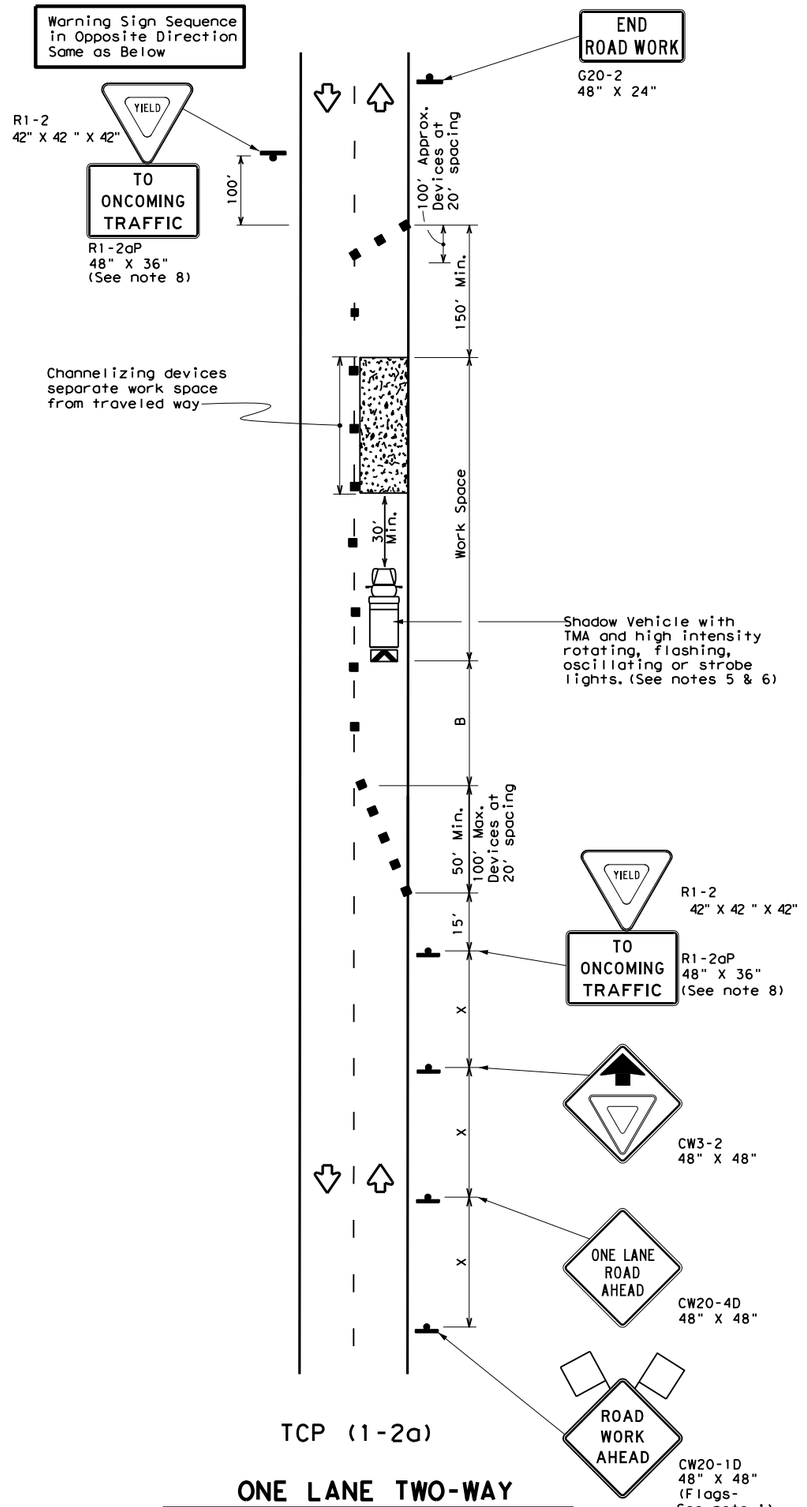
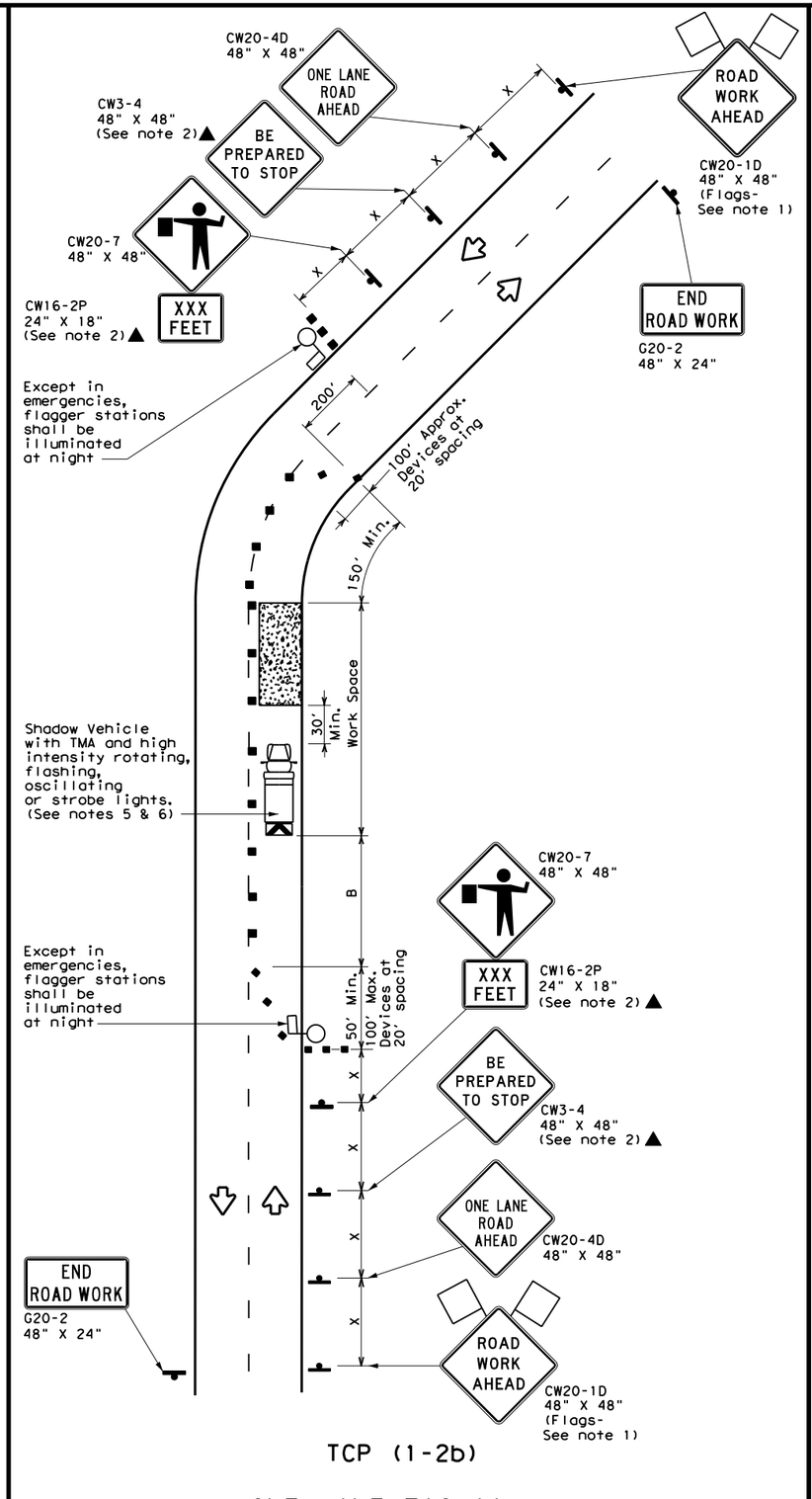


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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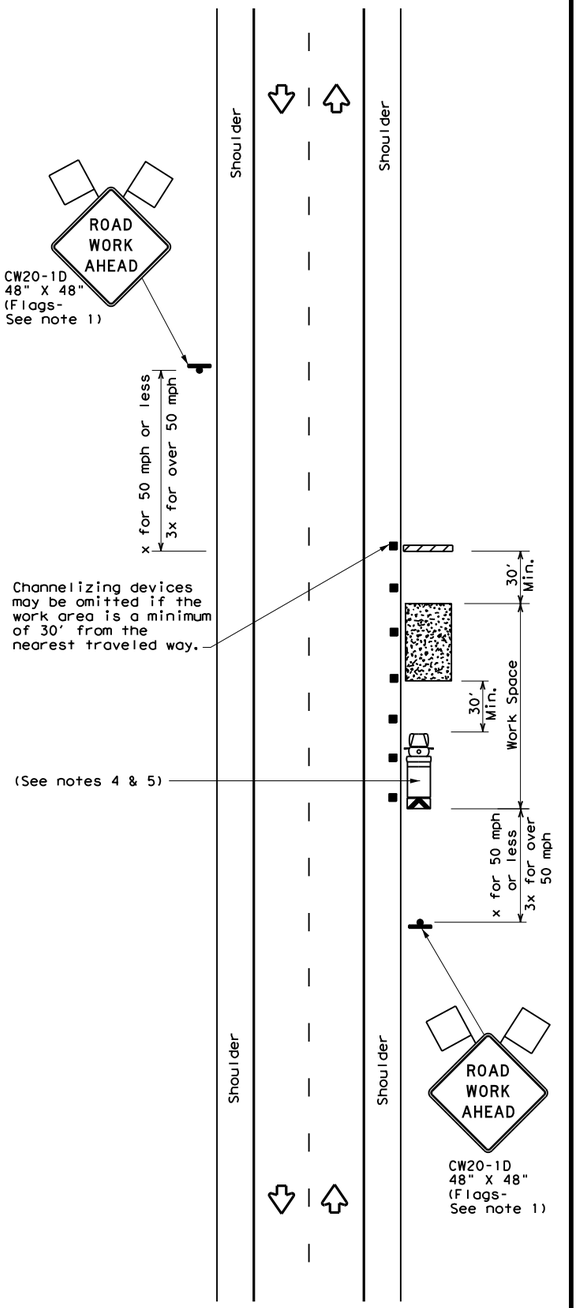
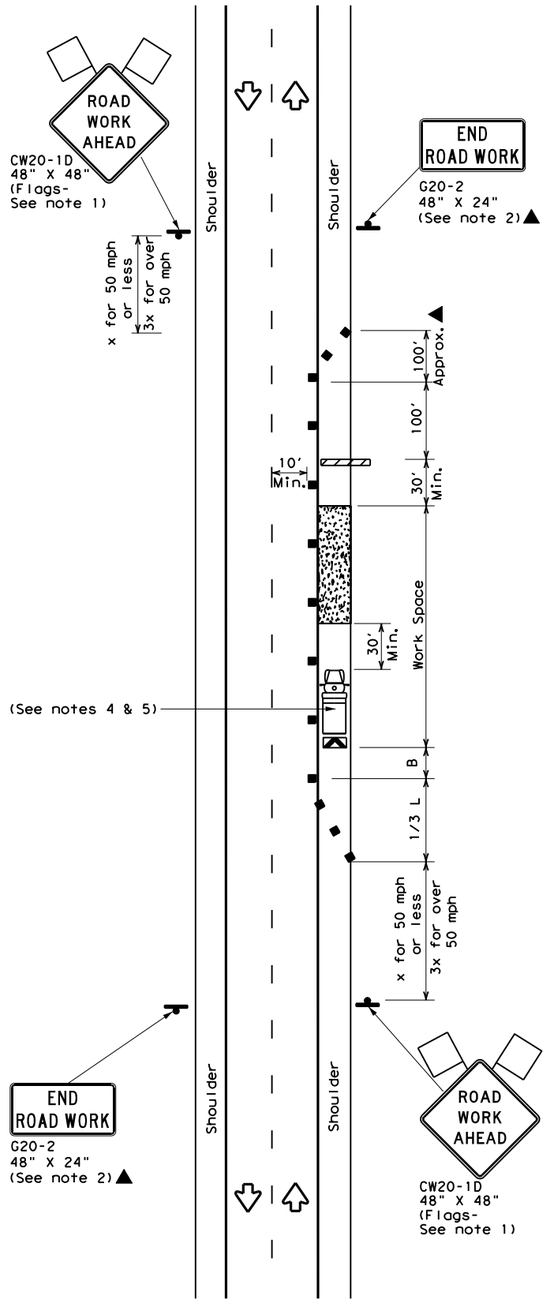


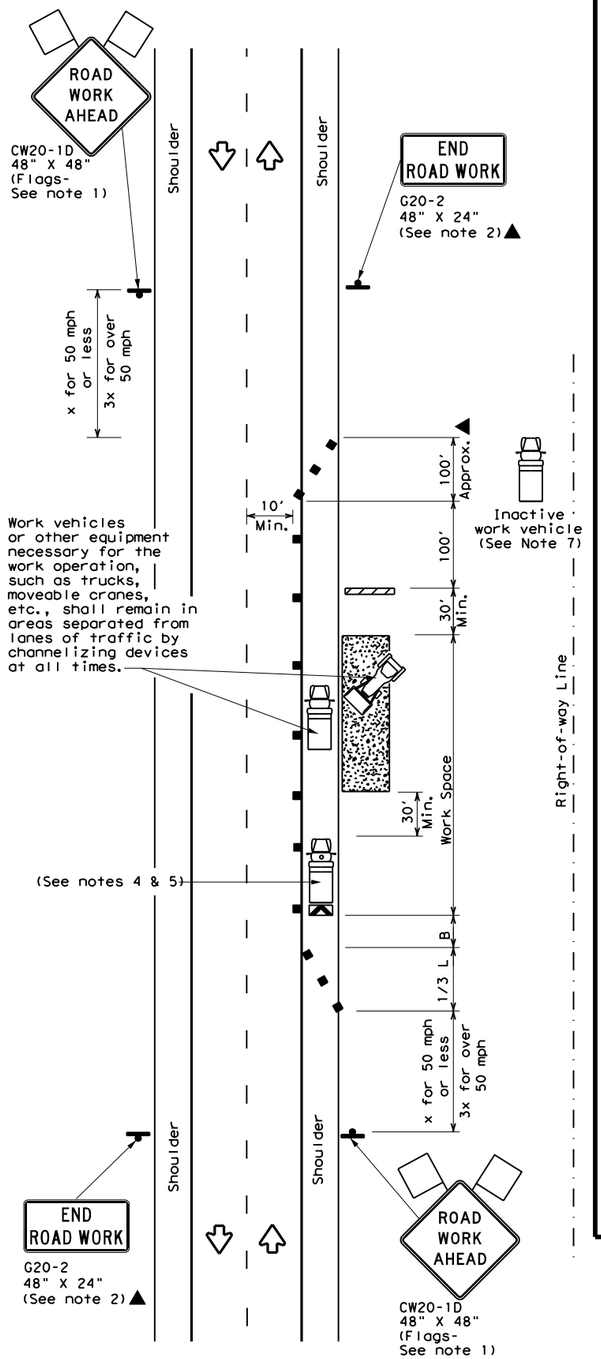
TCP (2-1a)

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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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	PAR	FANNIN		32
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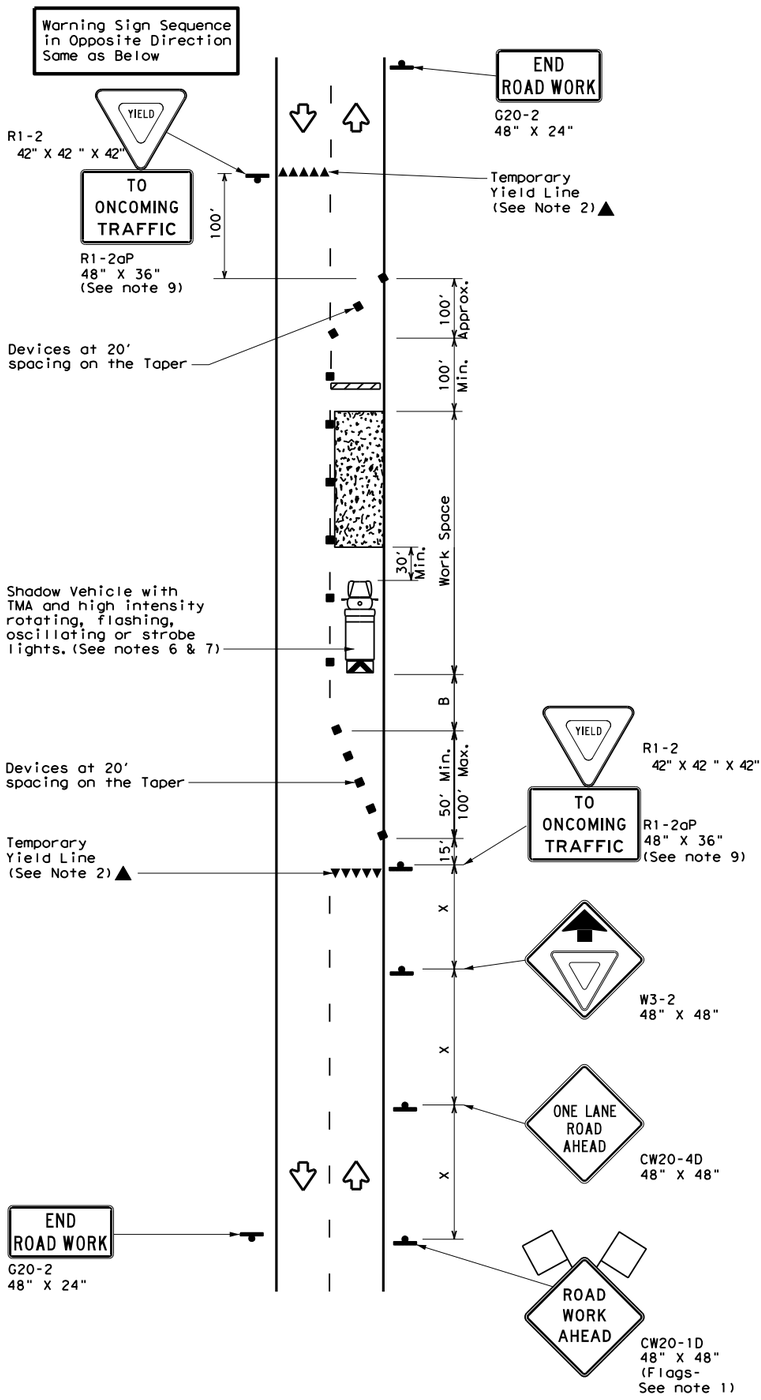
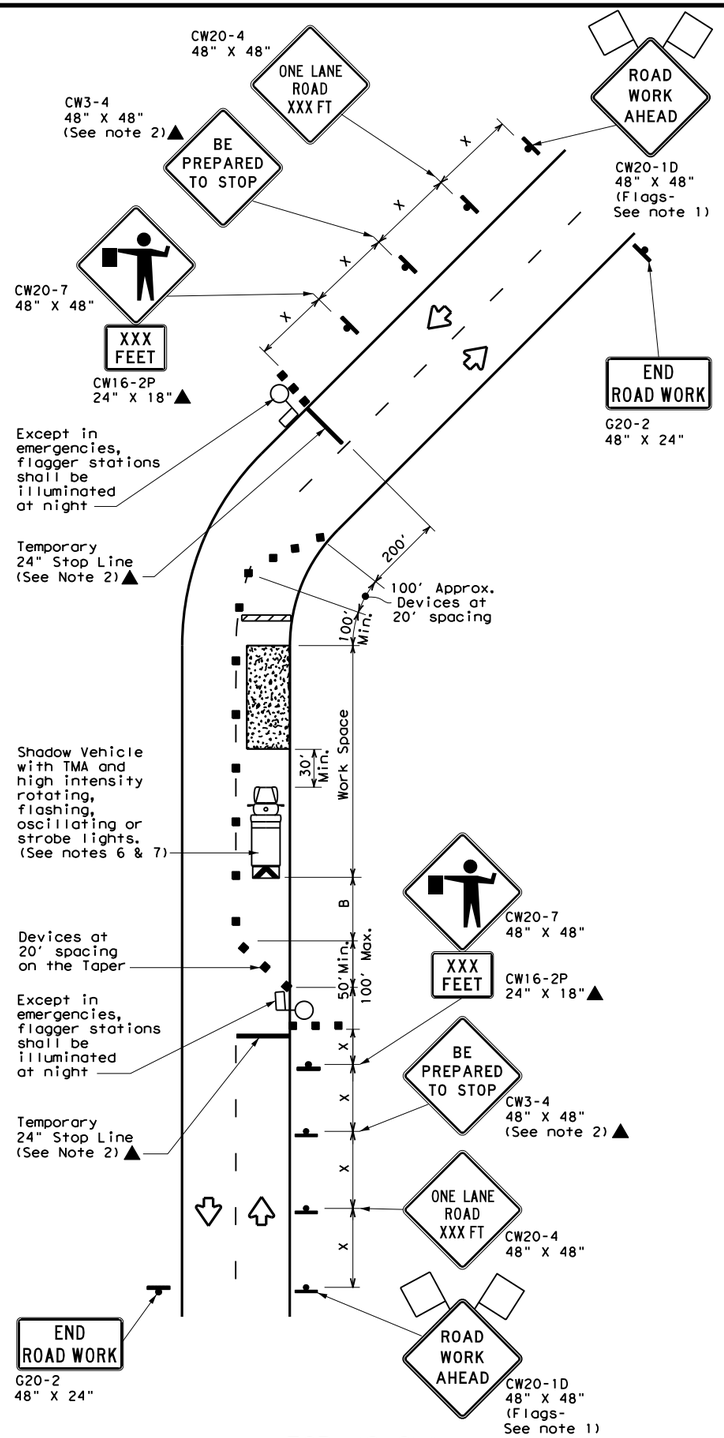


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0690	01	016, ETC	FM 271
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4-98 2-18	PAR	FANNIN		33

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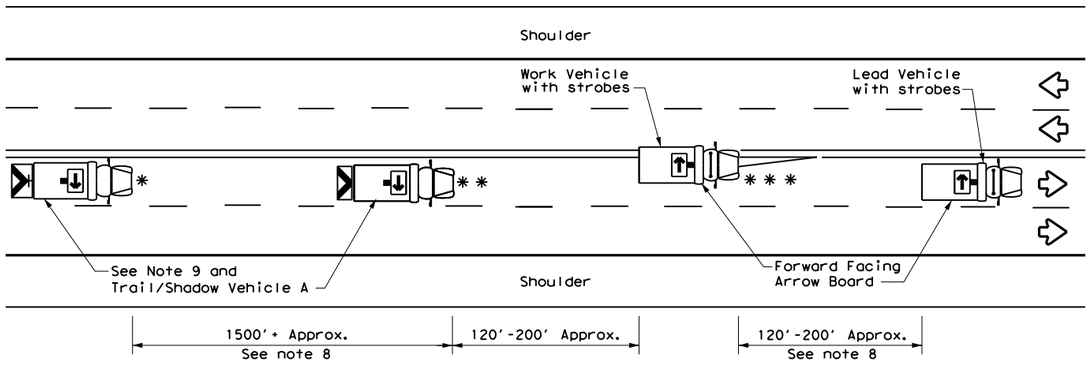
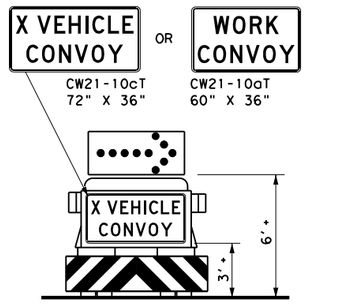


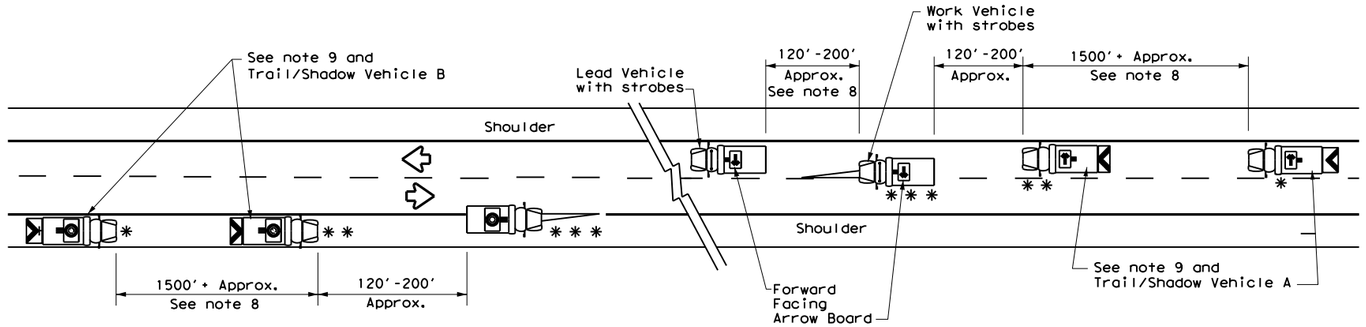
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

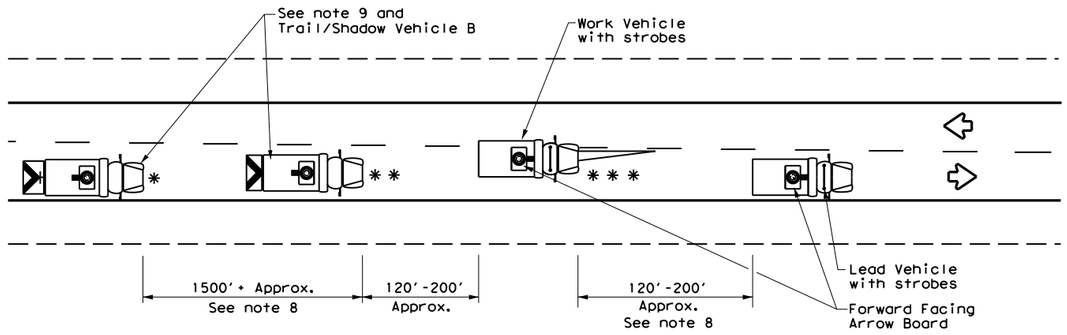
with RIGHT Directional display Flashing Arrow Board



WORK ON SHOULDER — WORK ON TRAVEL LANE

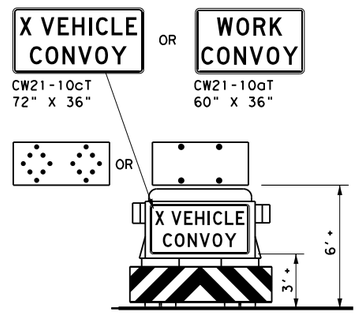
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

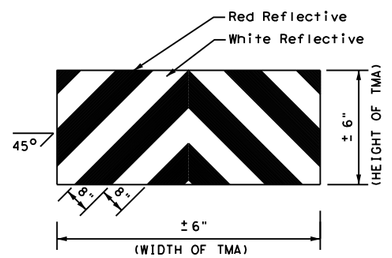
with Flashing Arrow Board in CAUTION display

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

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0690	01	016, ETC	FM 271
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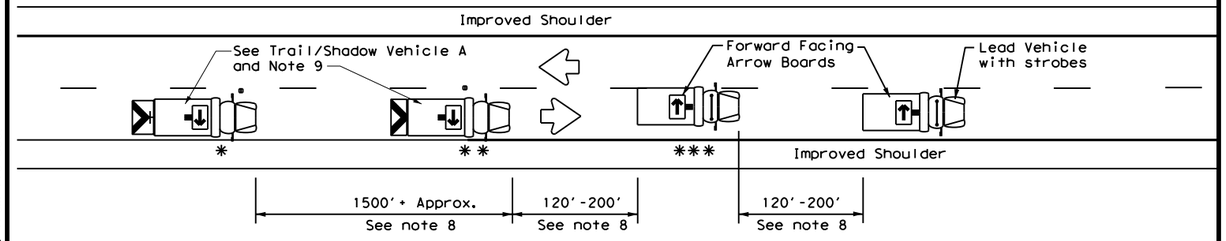
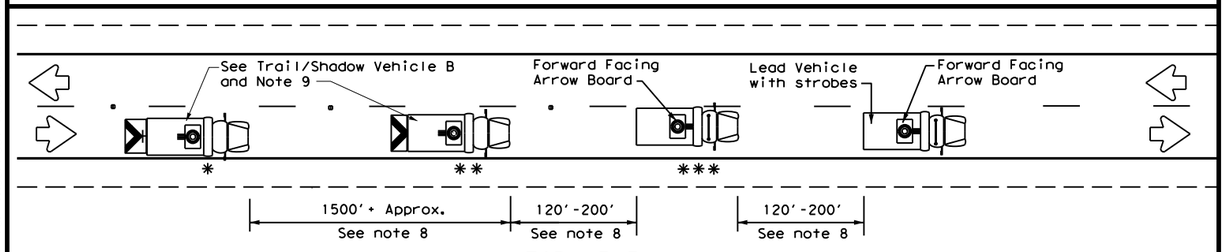


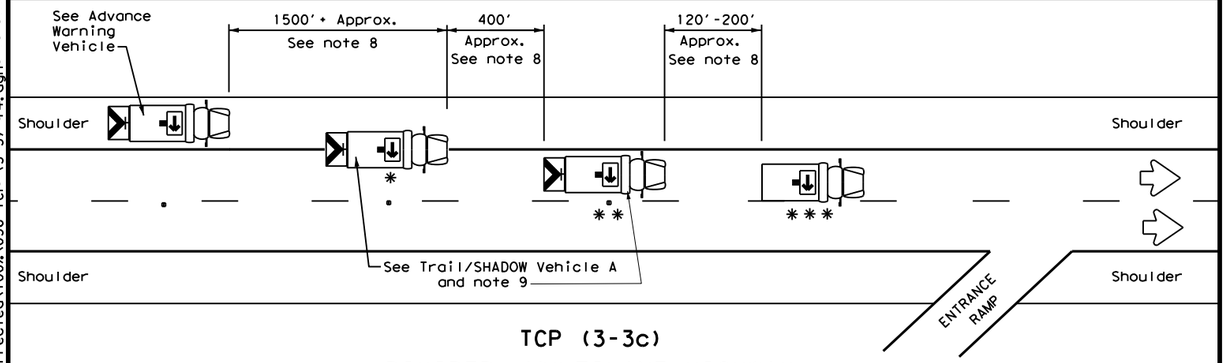
TCP (3-3a)

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



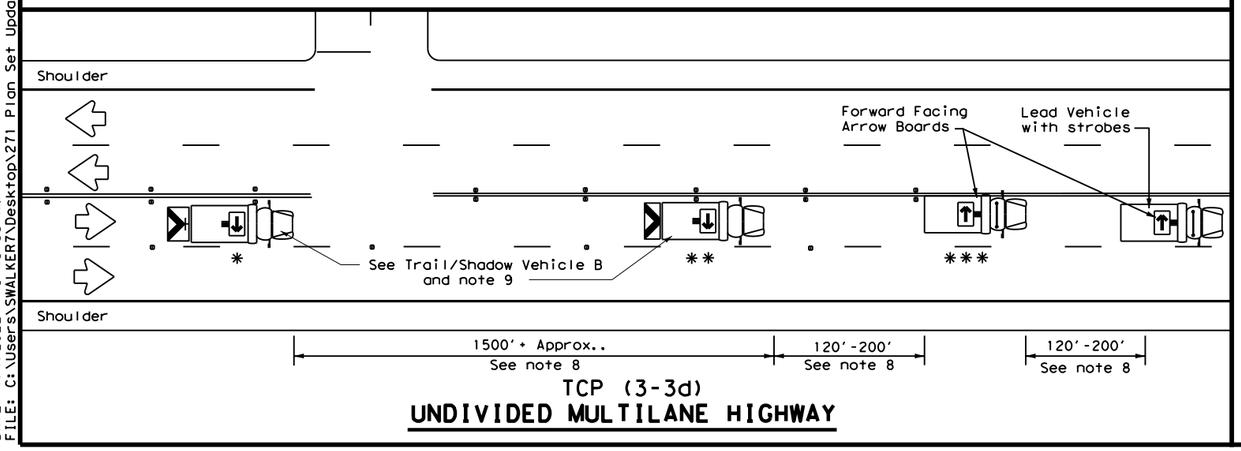
TCP (3-3b)

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



TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY

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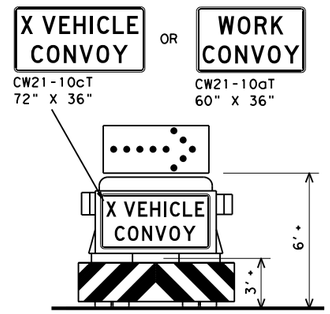
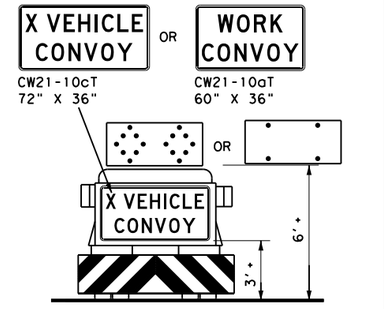


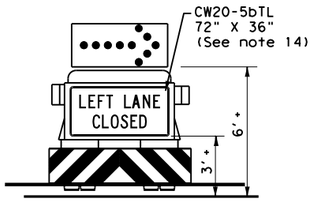
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

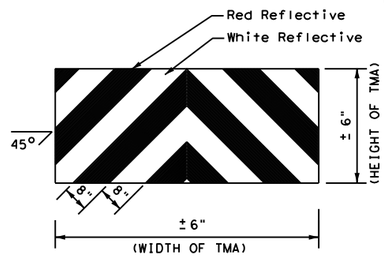


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	PAR	FANNIN		36
1-97 7-14				

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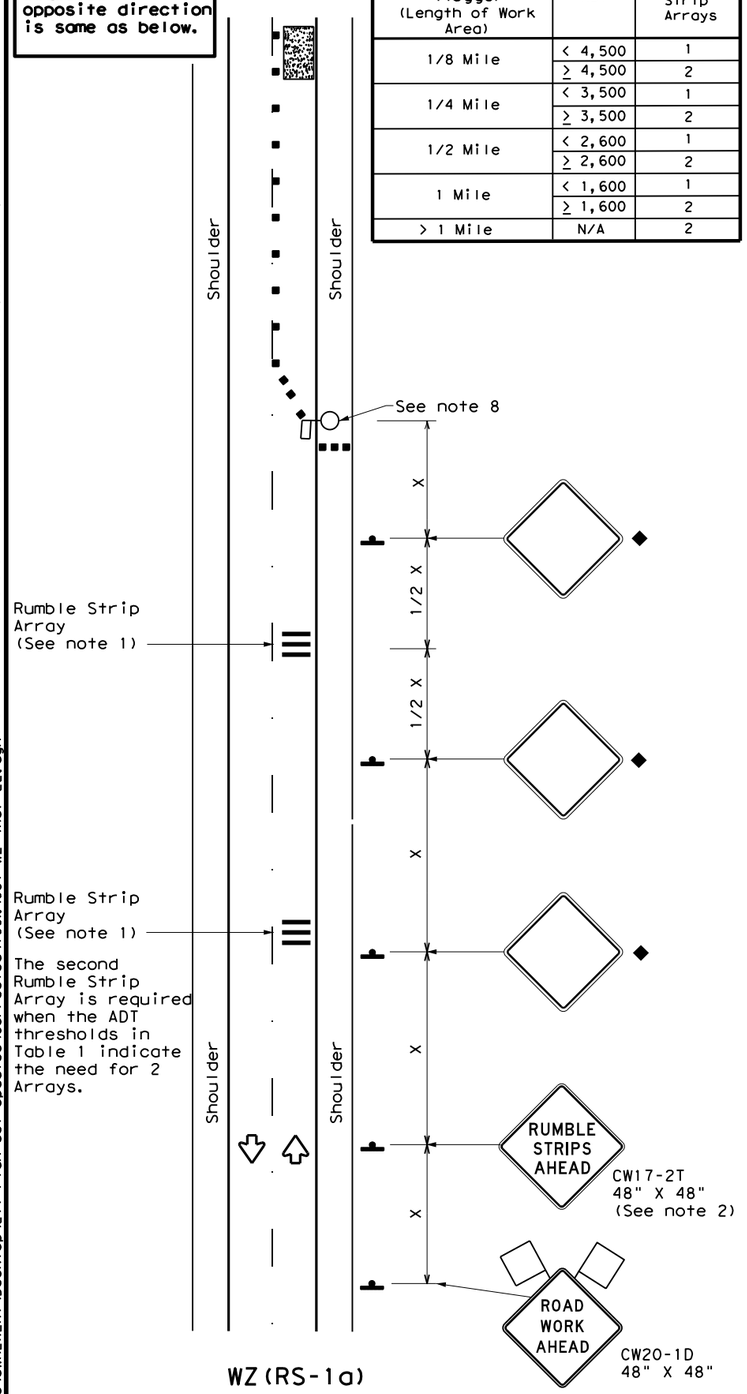
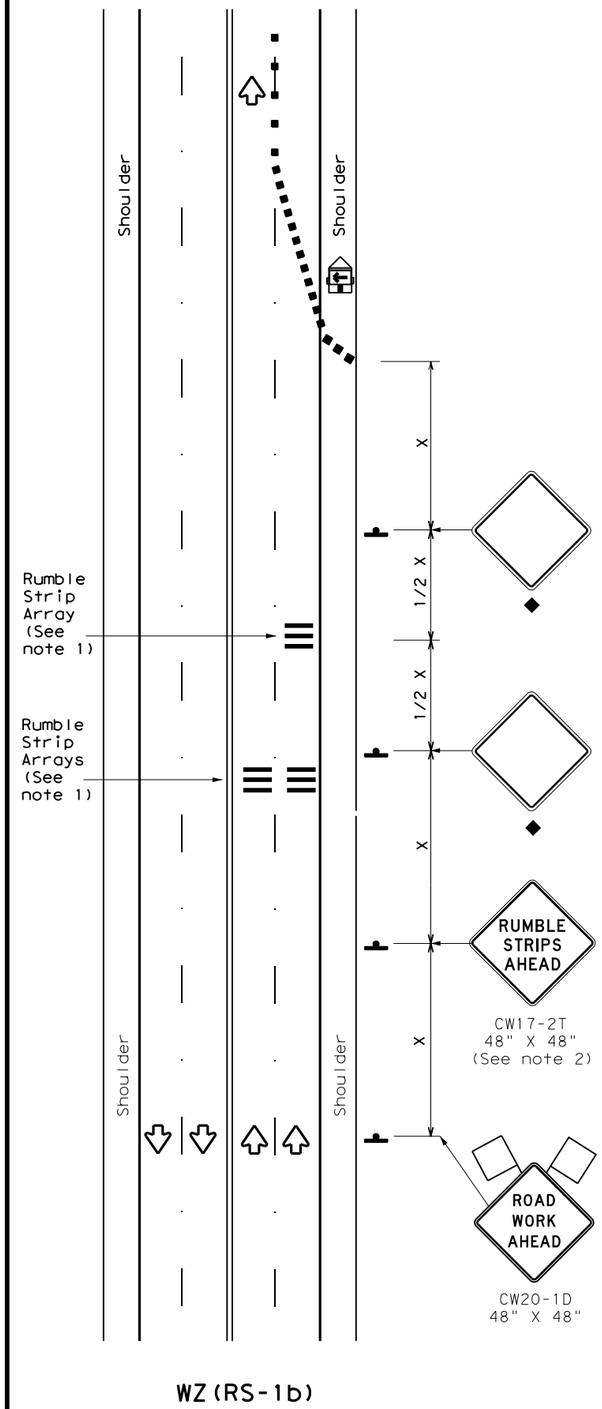
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

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	0690	01	016, ETC	FM 271
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117

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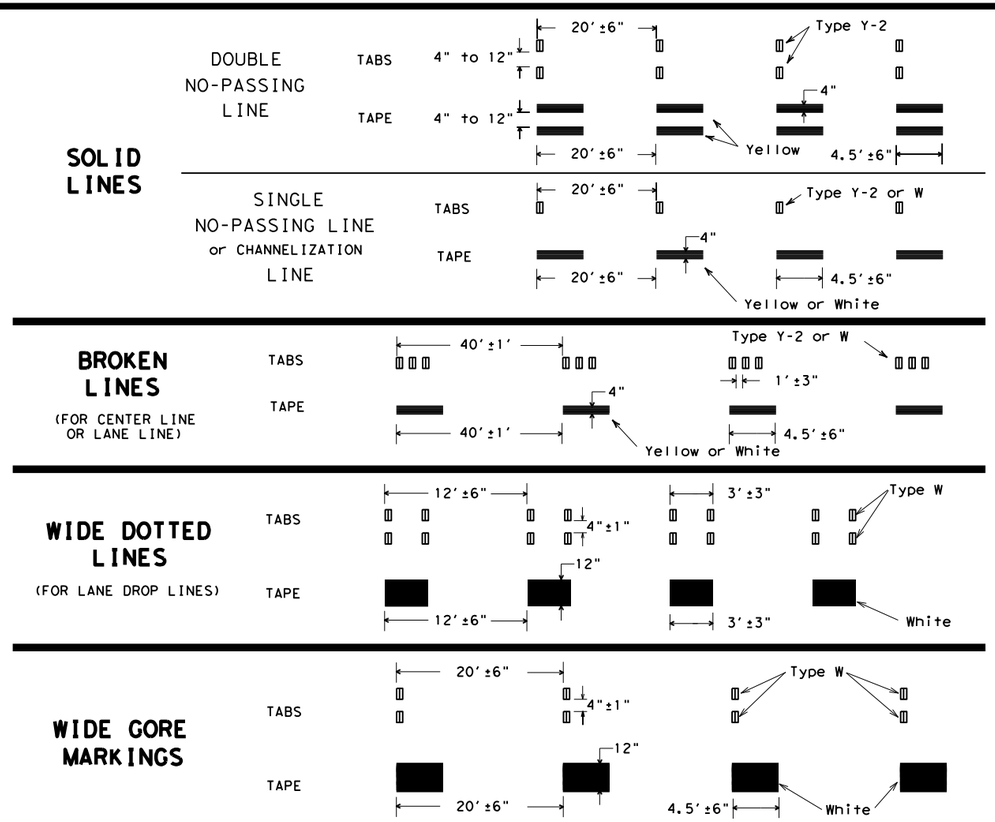
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



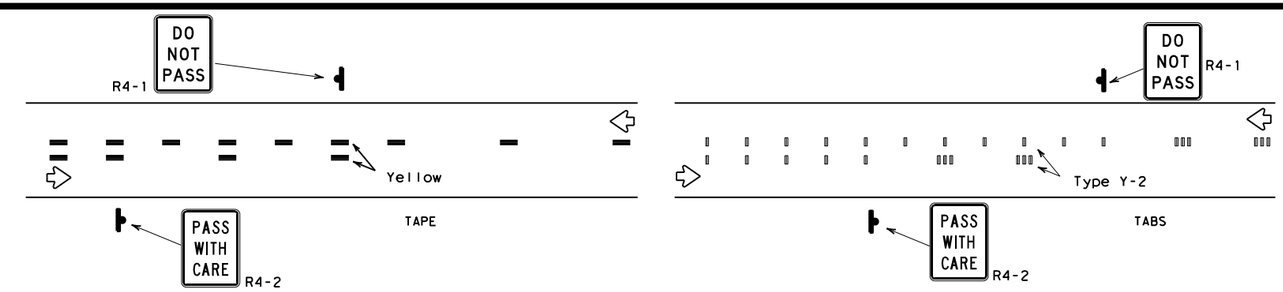
NOTES:

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

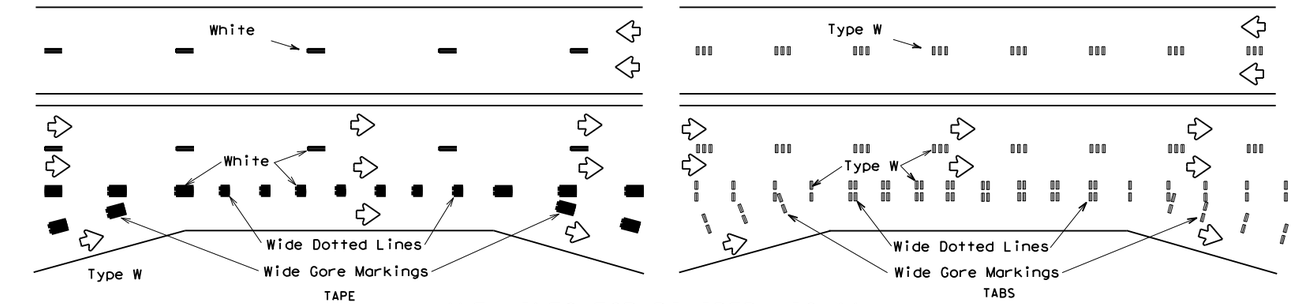
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

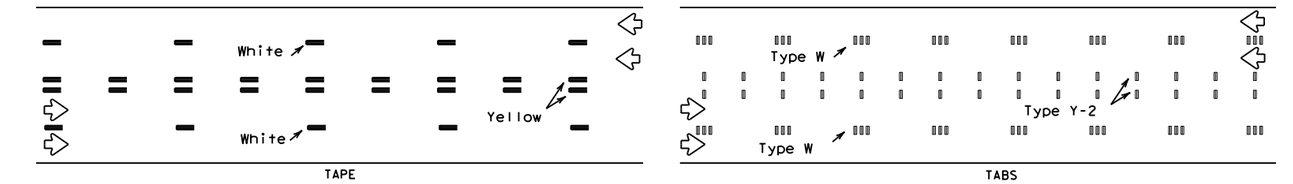
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



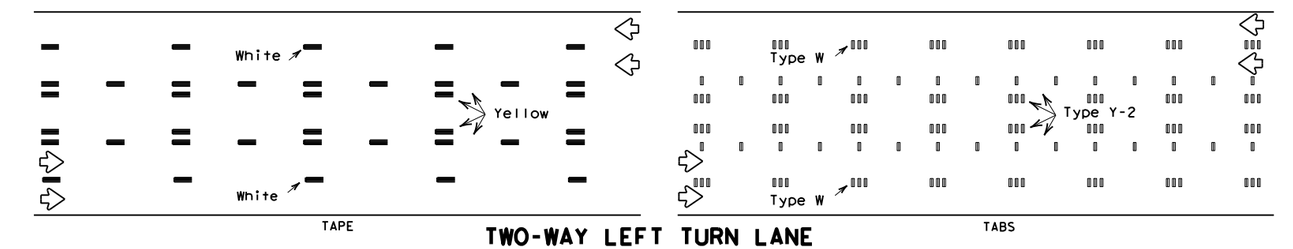
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



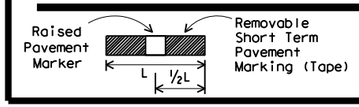
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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3-03		PAR	FANNIN		38
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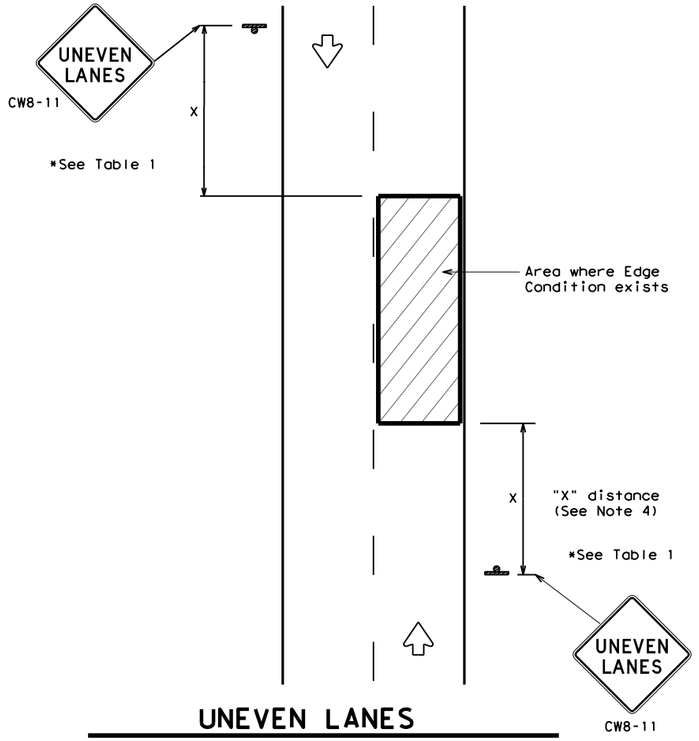
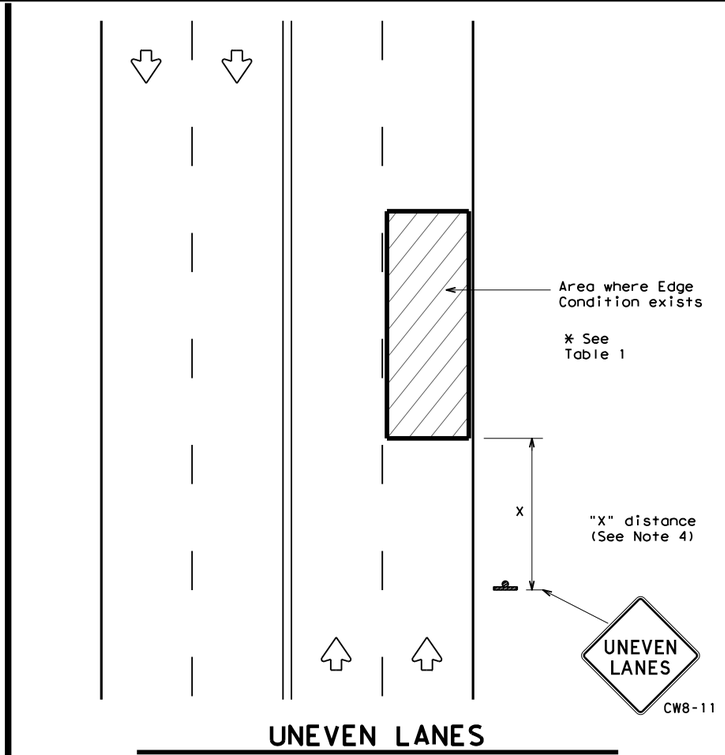
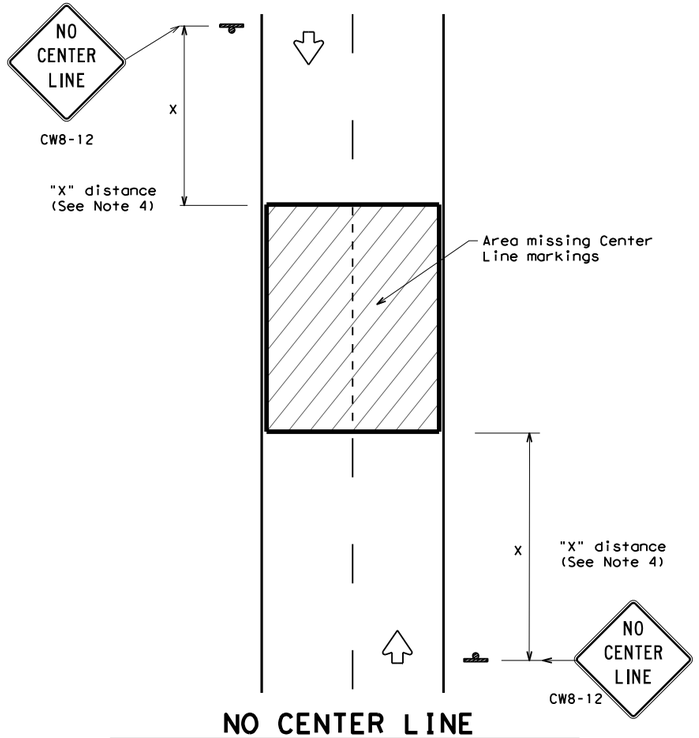


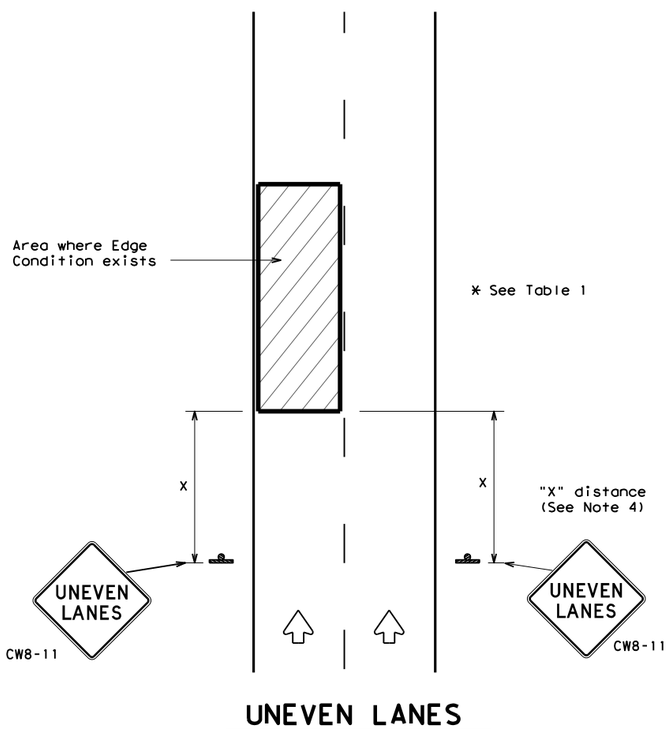
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

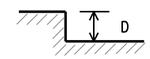
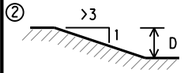
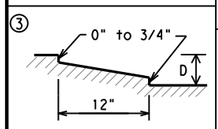
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

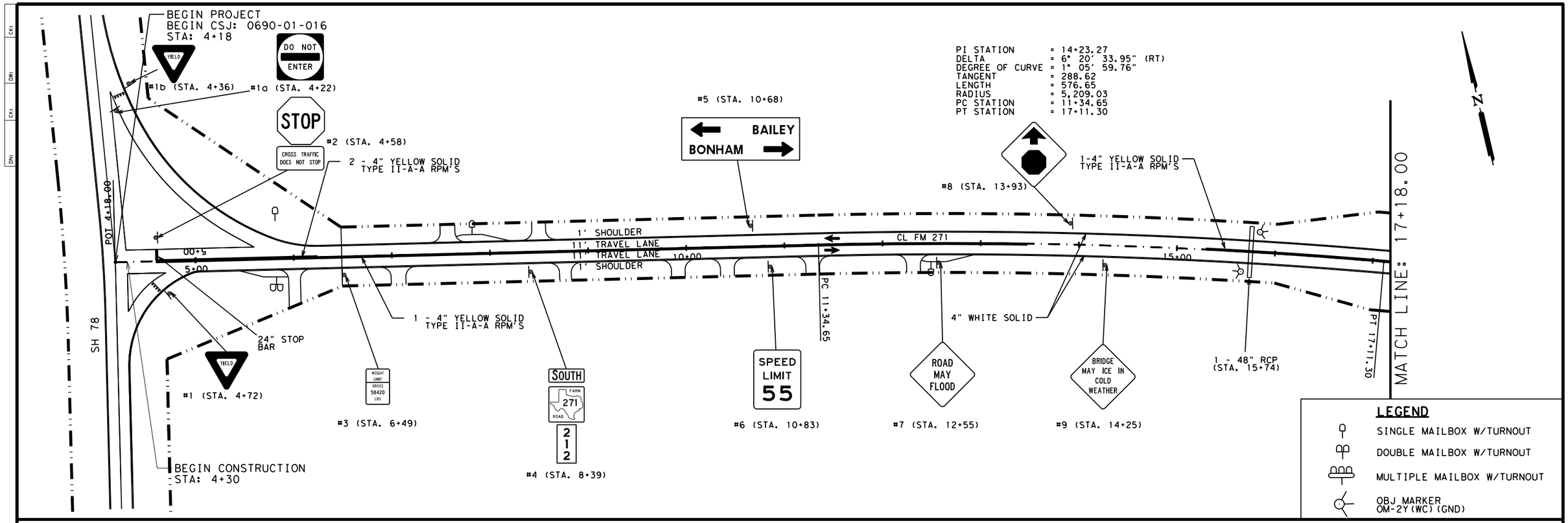
Texas Department of Transportation

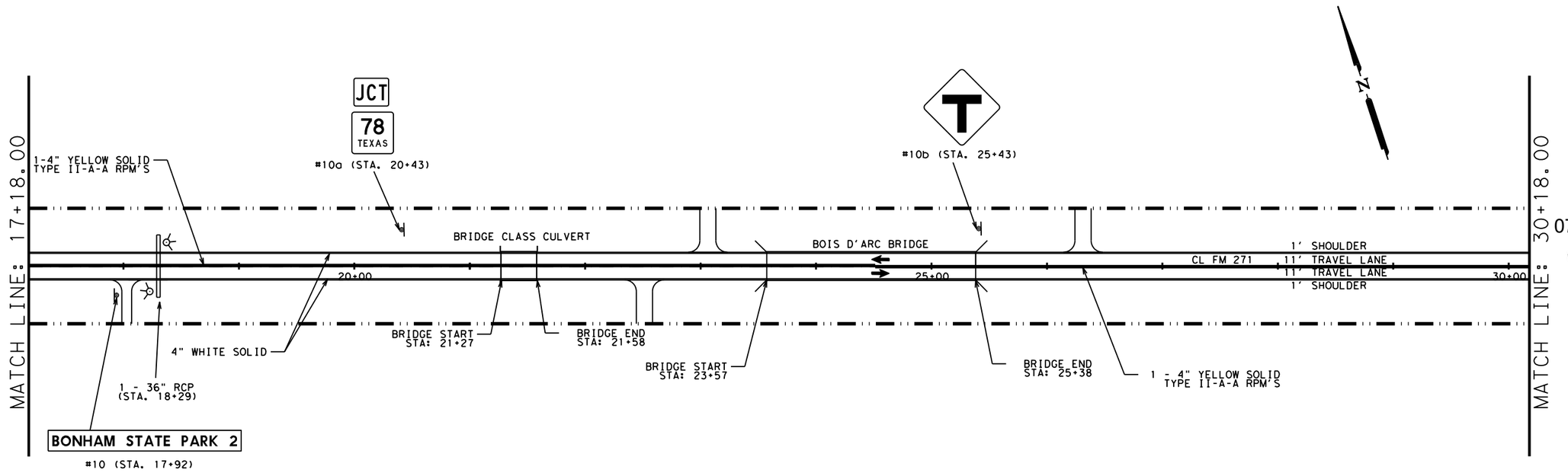
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	PAR	FANNIN		39





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

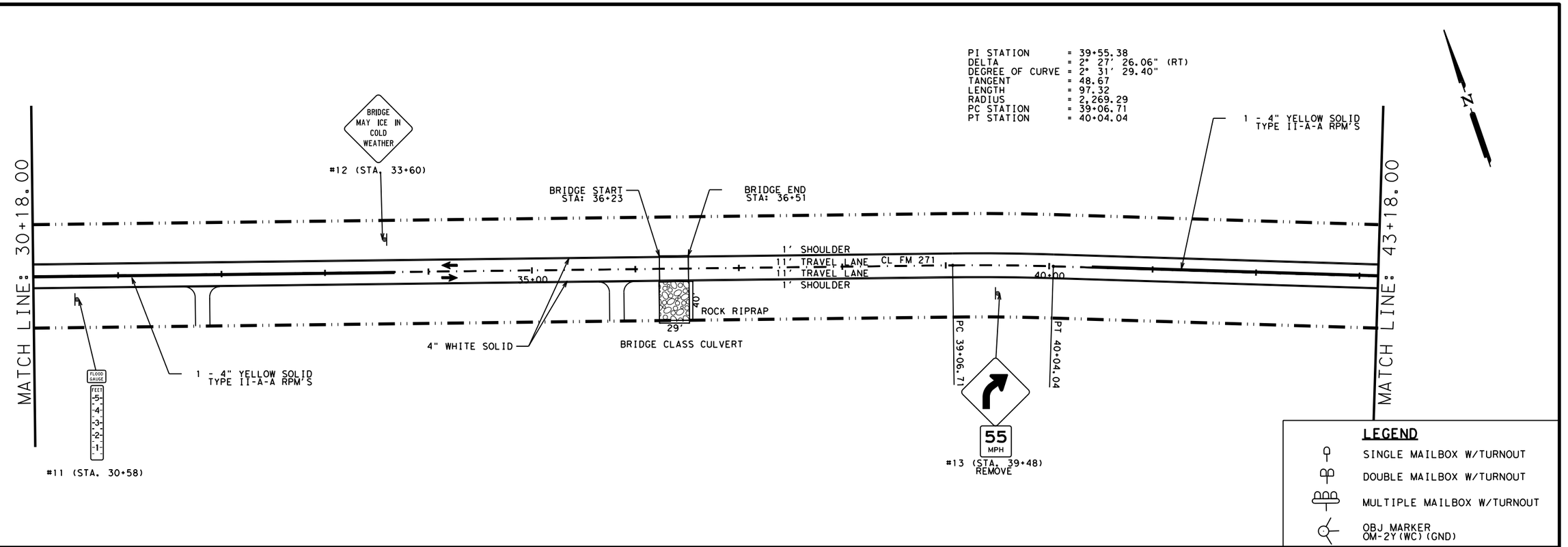
SCALE: 1"=100'

SHEET 1 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		40

DATE: 7/7/2022 8:49:41 AM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\040 PLAN LAYOUT.dgn


PI STATION = 39+55.38
DELTA = 2° 27' 26.06" (RT)
DEGREE OF CURVE = 2° 31' 29.40"
TANGENT = 48.67
LENGTH = 97.32
RADIUS = 2,269.29
PC STATION = 39+06.71
PT STATION = 40+04.04
BRIDGE MAY ICE IN COLD WEATHER
#12 (STA. 33+60)
BRIDGE START STA: 36+23
BRIDGE END STA: 36+51
1 - 4" YELLOW SOLID TYPE II-A-A RPM'S
MATCH LINE: 30+18.00
MATCH LINE: 43+18.00
1' SHOULDER
11' TRAVEL LANE CL FM 271
11' TRAVEL LANE
1' SHOULDER
35+00
40+00
40'
29'
ROCK RIPRAP
4" WHITE SOLID
BRIDGE CLASS CULVERT
PC 39+06.71
PT 40+04.04
FLOOD GAUGE
FEET
#11 (STA. 30+58)
55 MPH
#13 (STA. 39+48) REMOVE
N
LEGEND
SINGLE MAILBOX W/TURNOUT
DOUBLE MAILBOX W/TURNOUT
MULTIPLE MAILBOX W/TURNOUT
OBJ MARKER OM-2Y(WC)(GND)
ROAD MAY FLOOD
#15 (STA. 49+94)
STOP
#16 (STA. 51+17)
24" STOP BAR
CR 3070
1-4" YELLOW SOLID TYPE II-A-A RPM'S
CL FM 271
50+00
45+00
55+00
PC 48+29.32
PT 52+93.55
4" WHITE SOLID
CO RD 3070
#14 (STA. 46+18)
2 - 4" YELLOW SOLID TYPE II-A-A RPM'S
PI STATION = 50+64.28
DELTA = 21° 49' 10.52" (RT)
DEGREE OF CURVE = 4° 42' 00.49"
TANGENT = 234.96
LENGTH = 464.23
RADIUS = 1,219.02
PC STATION = 48+29.32
PT STATION = 52+93.55
NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.
STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER
07.07.22
Monte R. Rater P.E.
FM 271
PLAN LAYOUT
SCALE: 1"=100'
SHEET 2 OF 19
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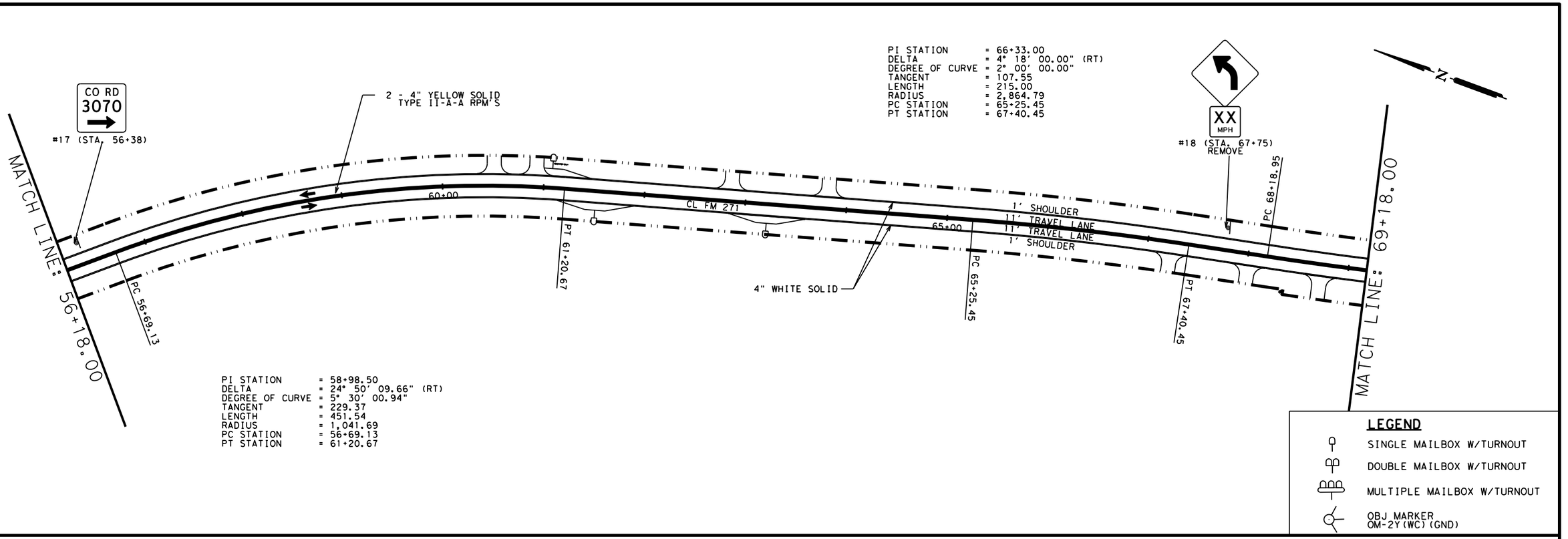
Texas Department of Transportation
CONT SECT JOB HIGHWAY
0690 01 016, ETC FM 271
DIST COUNTY SHEET NO.
PAR FANNIN 41
DATE: 7/7/2022 8:49:42 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\041 PLAN LAYOUT.dgn



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
95859
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07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

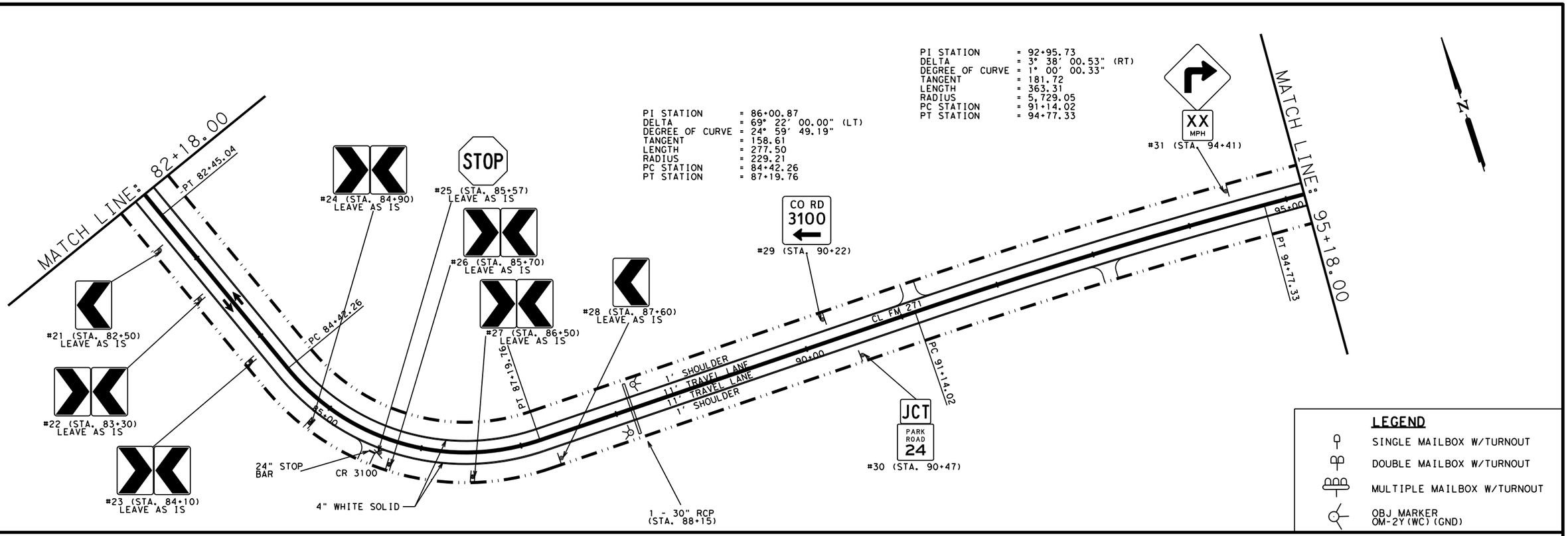
SCALE: 1"=100'

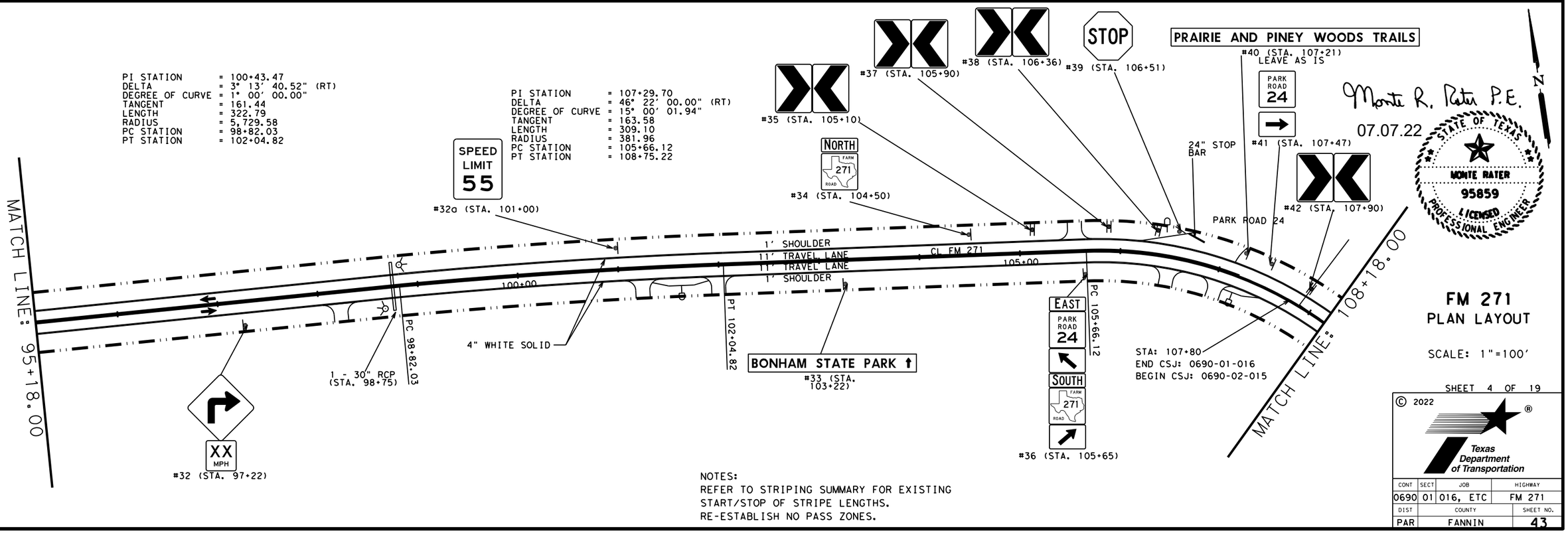
SHEET 3 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		42

DATE: 7/7/2022 8:49:43 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\042 PLAN LAYOUT.dgn





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

FM 271
PLAN LAYOUT

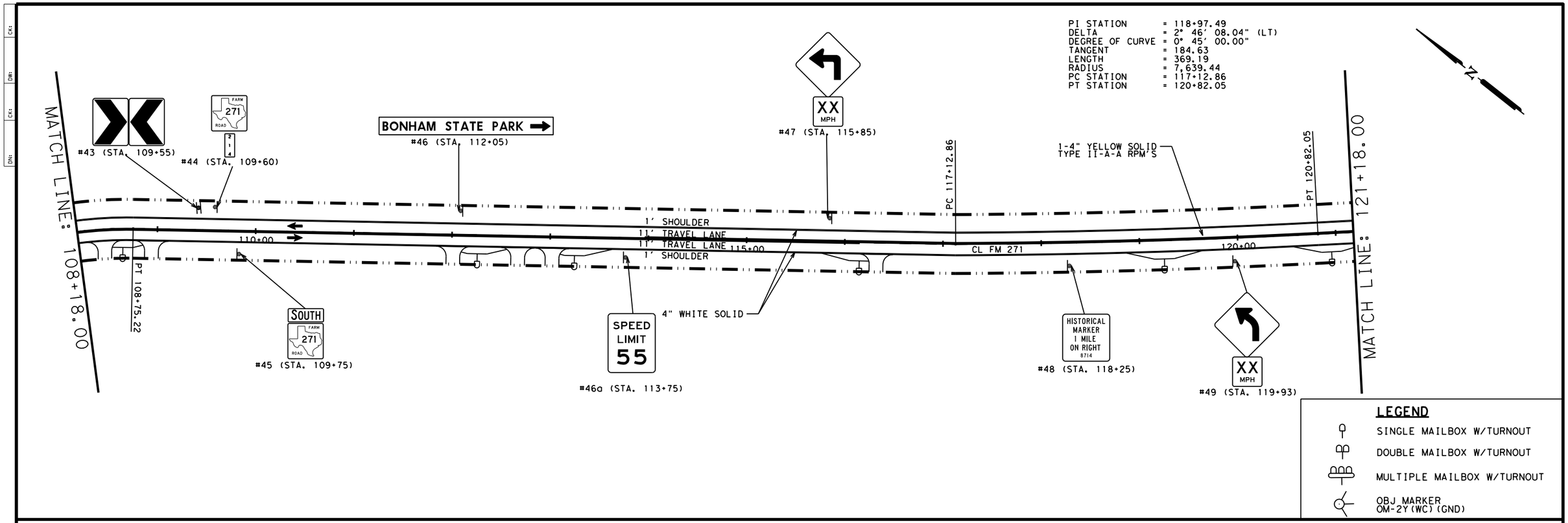
SCALE: 1"=100'

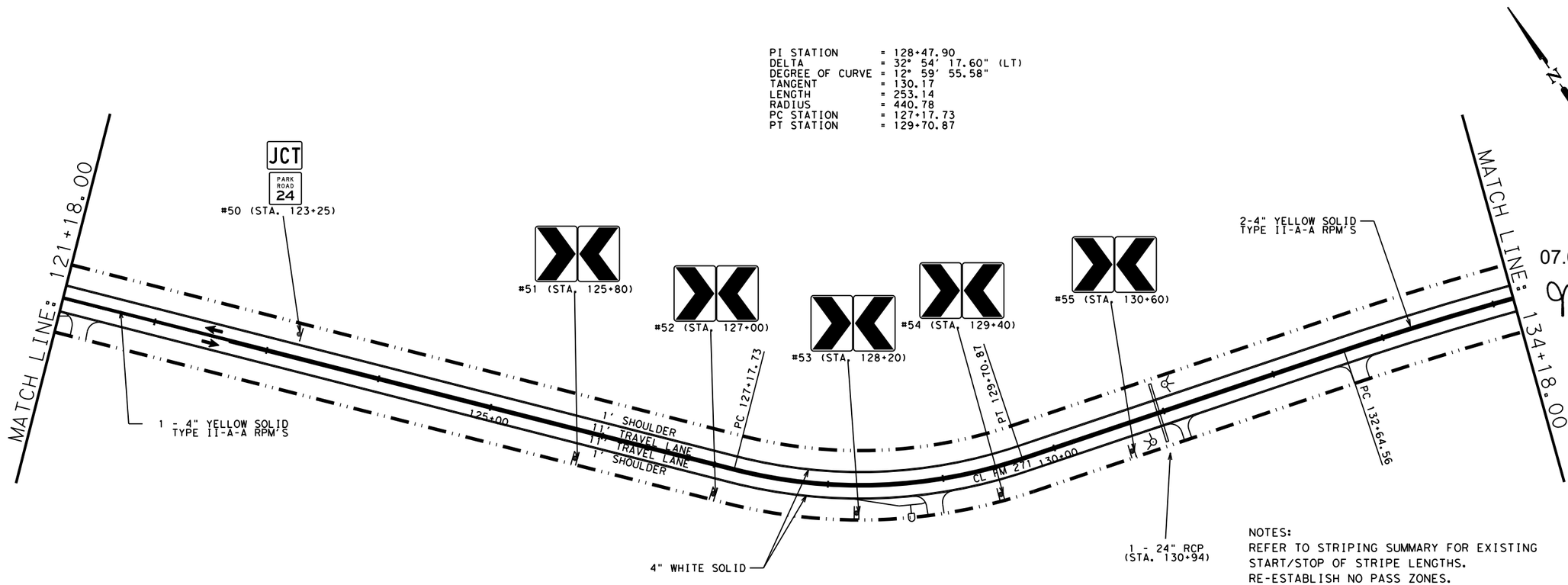
SHEET 4 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		43

DATE: 7/7/2022 8:49:44 AM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\043 PLAN LAYOUT.dgn





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

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Monte R. Rater P.E.

FM 271
PLAN LAYOUT

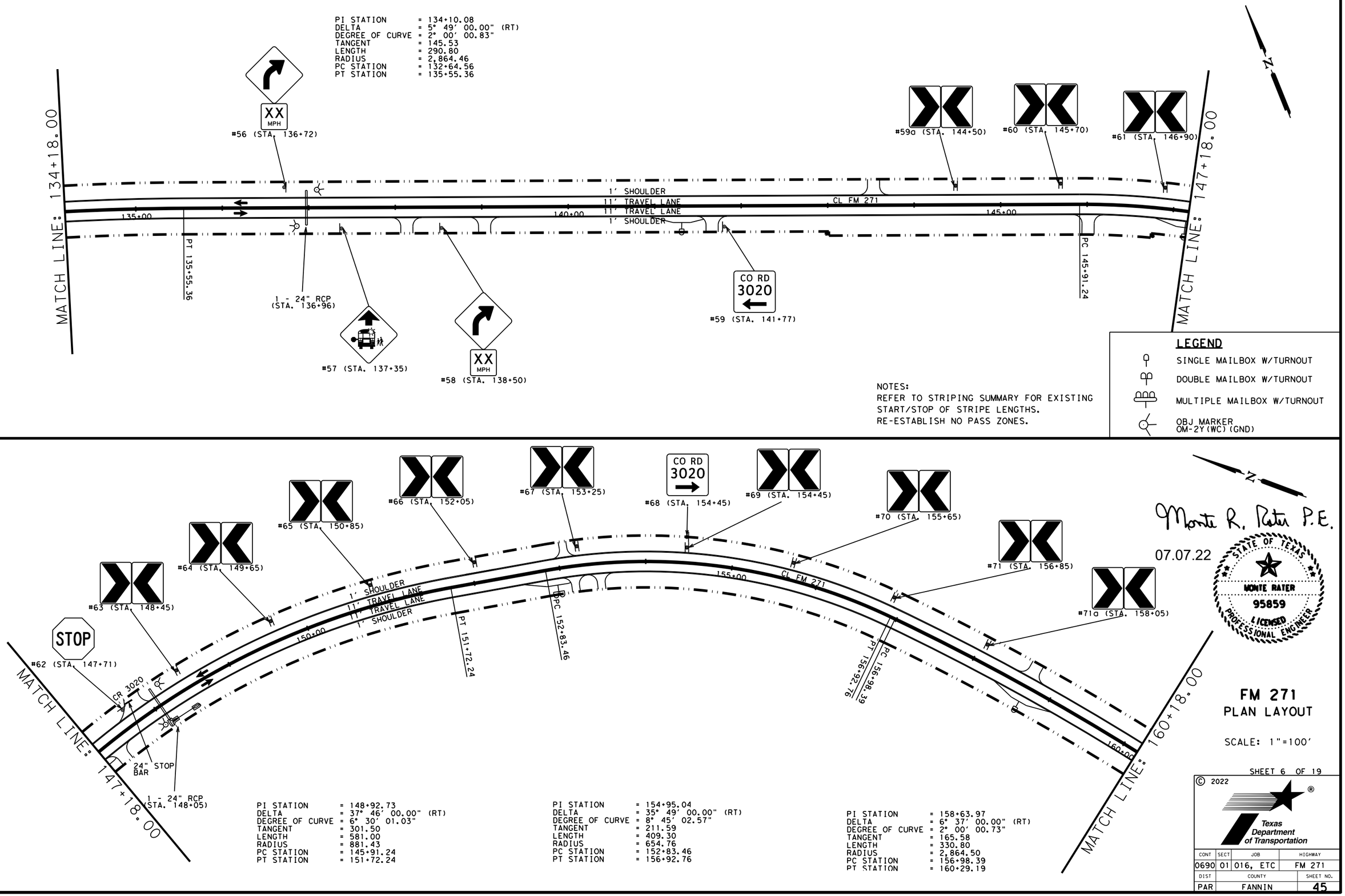
SCALE: 1"=100'

SHEET 5 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		44

DATE: 7/7/2022 8:49:45 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\044 PLAN LAYOUT.dgn



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FM 271
PLAN LAYOUT

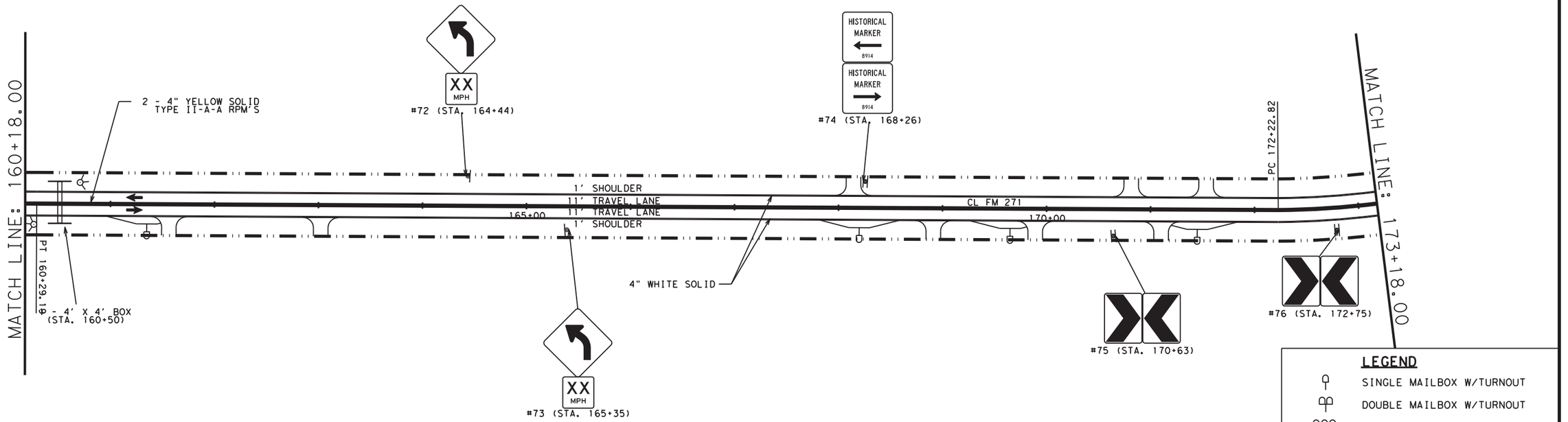
SCALE: 1"=100'

SHEET 6 OF 19

Texas Department of Transportation

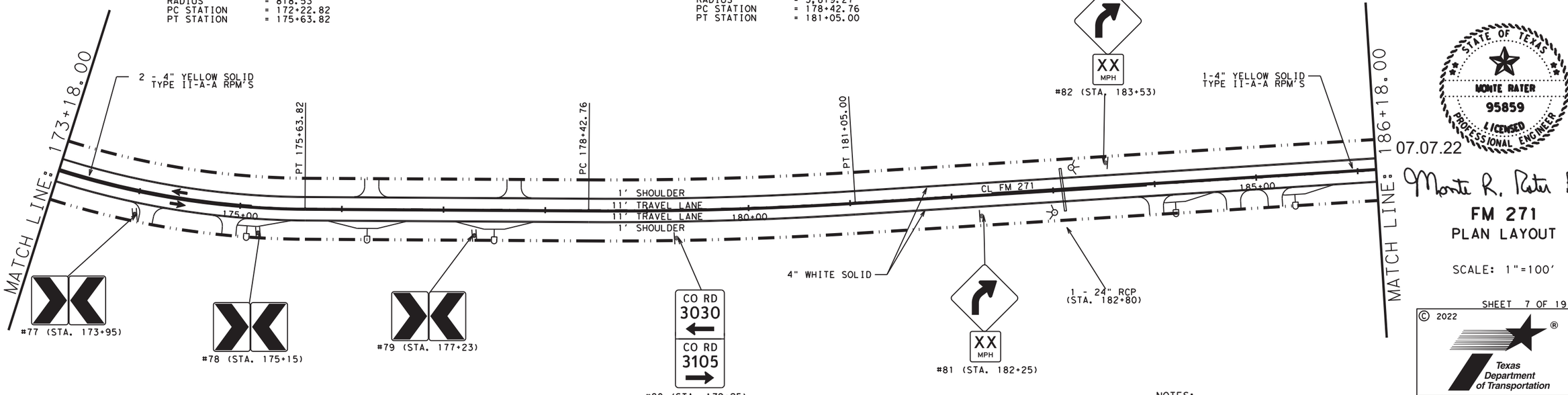
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		45

DATE: 7/7/2022 8:49:47 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\045 PLAN LAYOUT.dgn



PI STATION = 173+95.83
DELTA = 23° 52' 10.07" (LT)
DEGREE OF CURVE = 6° 59' 59.32"
TANGENT = 173.01
LENGTH = 341.00
RADIUS = 818.53
PC STATION = 172+22.82
PT STATION = 175+63.82

PI STATION = 179+73.93
DELTA = 3° 56' 02.61" (LT)
DEGREE OF CURVE = 1° 30' 00.64"
TANGENT = 131.17
LENGTH = 262.24
RADIUS = 3,819.27
PC STATION = 178+42.76
PT STATION = 181+05.00



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
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07.07.22
Monte R. Rater P.E.

FM 271
PLAN LAYOUT

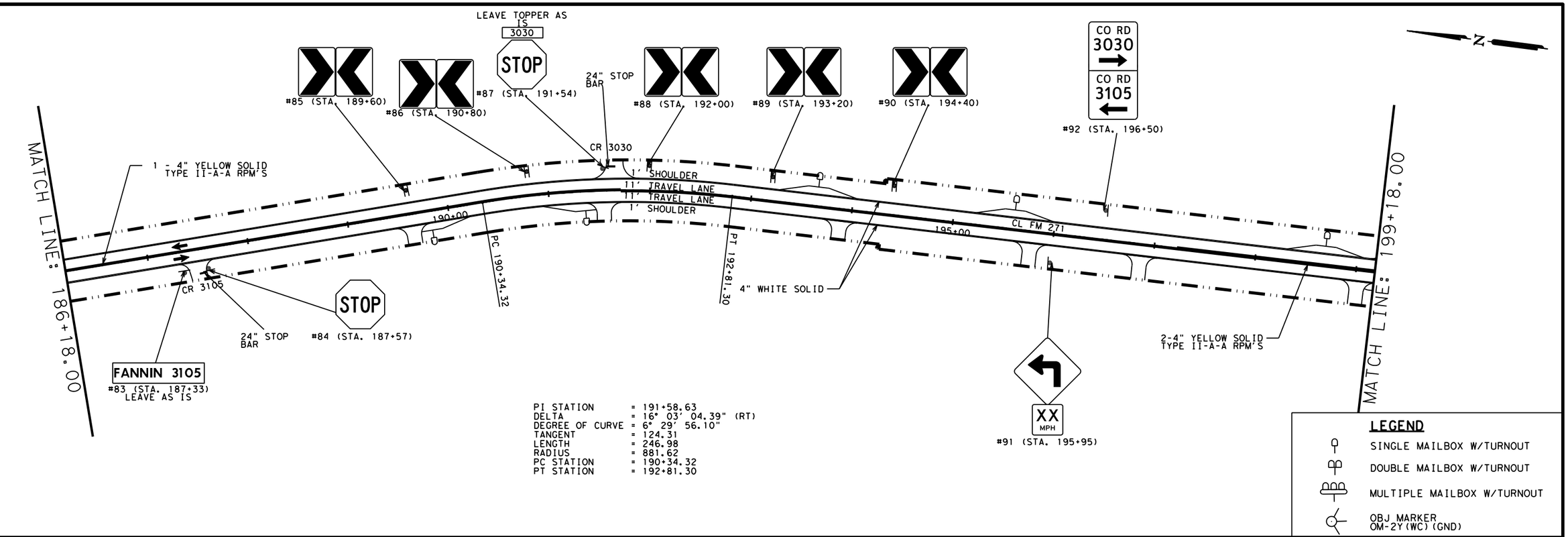
SCALE: 1"=100'

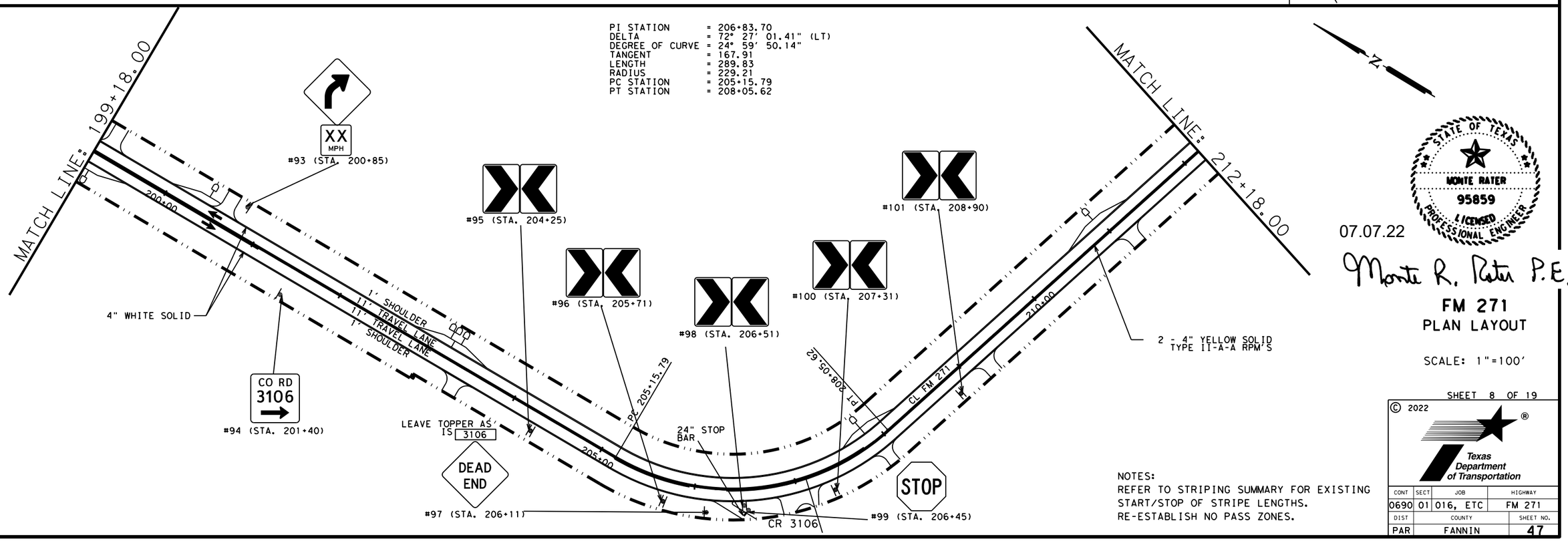
SHEET 7 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		46

DATE: 7/7/2022 8:49:48 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\046 PLAN LAYOUT.dgn





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
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07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

SCALE: 1"=100'

SHEET 8 OF 19

Texas Department of Transportation

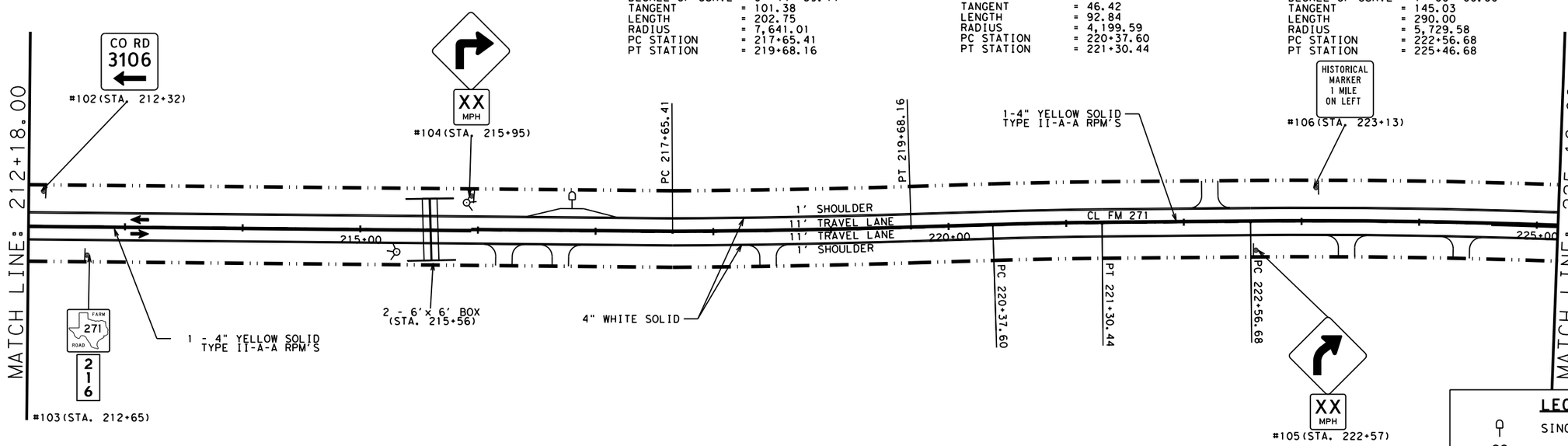
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		47

DATE: 7/7/2022 8:49:49 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\047 PLAN LAYOUT.dgn

PI STATION = 218+66.79
DELTA = 1° 31' 13.24" (LT)
DEGREE OF CURVE = 0° 44' 59.44"
TANGENT = 101.38
LENGTH = 202.75
RADIUS = 7,641.01
PC STATION = 217+65.41
PT STATION = 219+68.16

PI STATION = 220+84.02
DELTA = 1° 16' 00.00" (RT)
DEGREE OF CURVE = 1° 21' 51.55"
TANGENT = 46.42
LENGTH = 92.84
RADIUS = 4,199.59
PC STATION = 220+37.60
PT STATION = 221+30.44

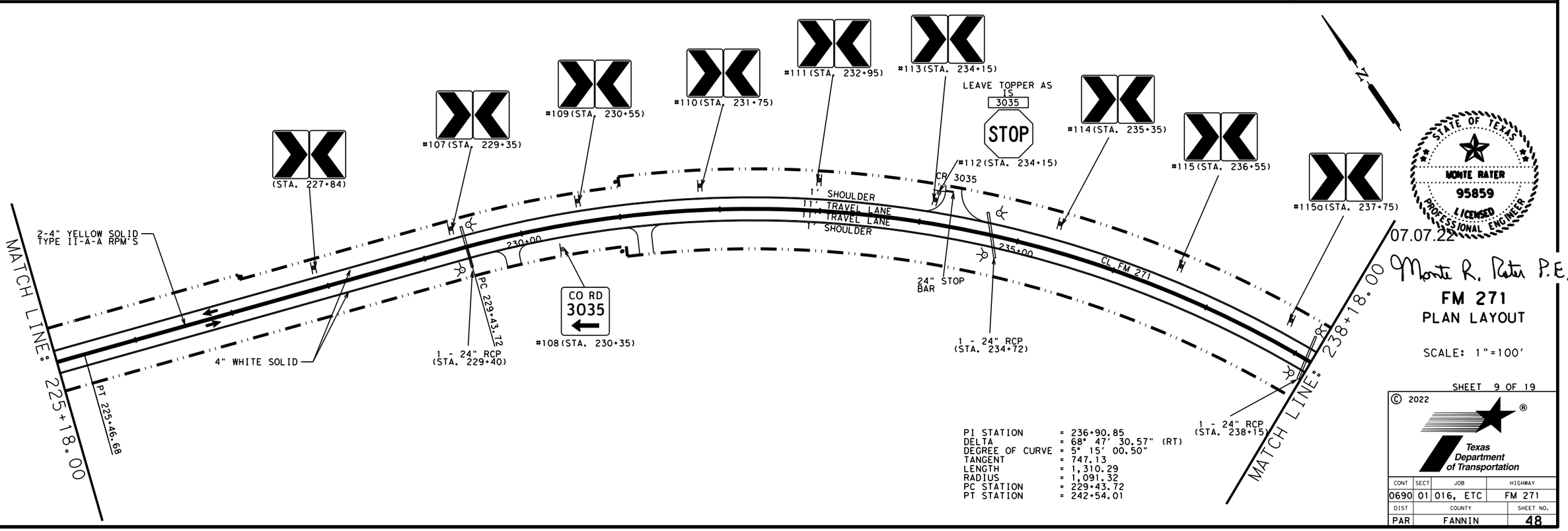
PI STATION = 224+01.71
DELTA = 2° 54' 00.00" (RT)
DEGREE OF CURVE = 1° 00' 00.00"
TANGENT = 145.03
LENGTH = 290.00
RADIUS = 5,729.58
PC STATION = 222+56.68
PT STATION = 225+46.68



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)



PI STATION = 236+90.85
DELTA = 68° 47' 30.57" (RT)
DEGREE OF CURVE = 5° 15' 00.50"
TANGENT = 747.13
LENGTH = 1,310.29
RADIUS = 1,091.32
PC STATION = 229+43.72
PT STATION = 242+54.01

STATE OF TEXAS
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07.07.22
Monte R. Rater P.E.

FM 271
PLAN LAYOUT

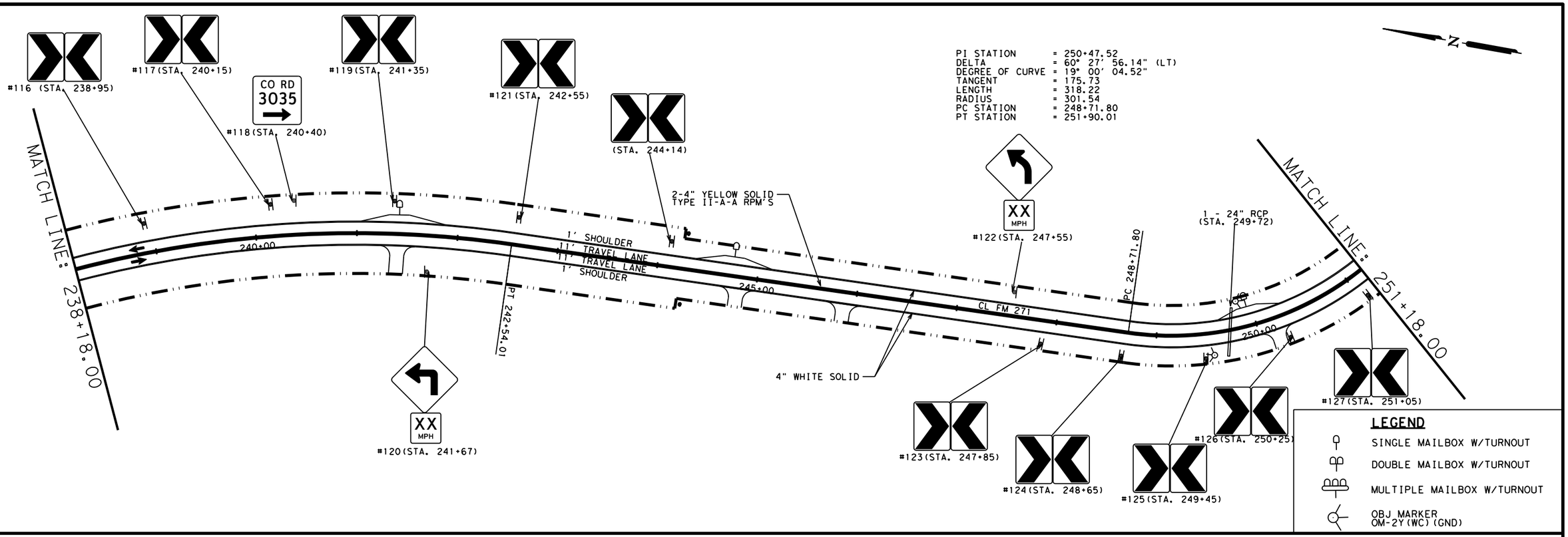
SCALE: 1"=100'

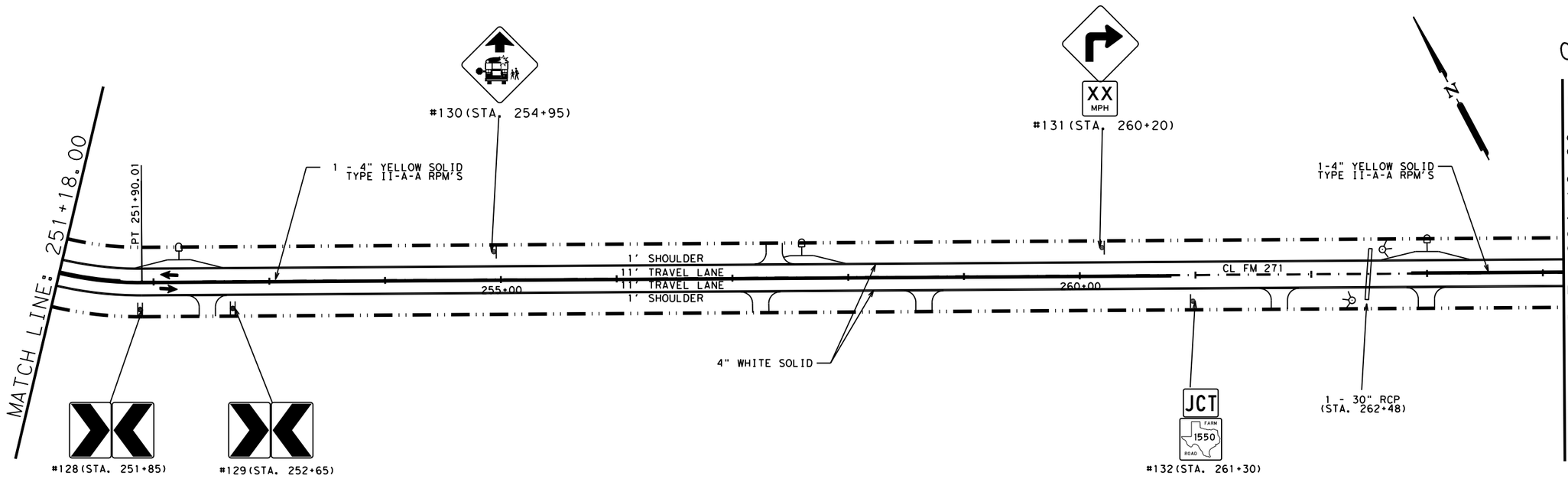
SHEET 9 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		48

DATE: 7/7/2022 8:49:50 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\048 PLAN LAYOUT.dgn





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

Monte R. Rater P.E.
07.07.22

STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER

FM 271
PLAN LAYOUT

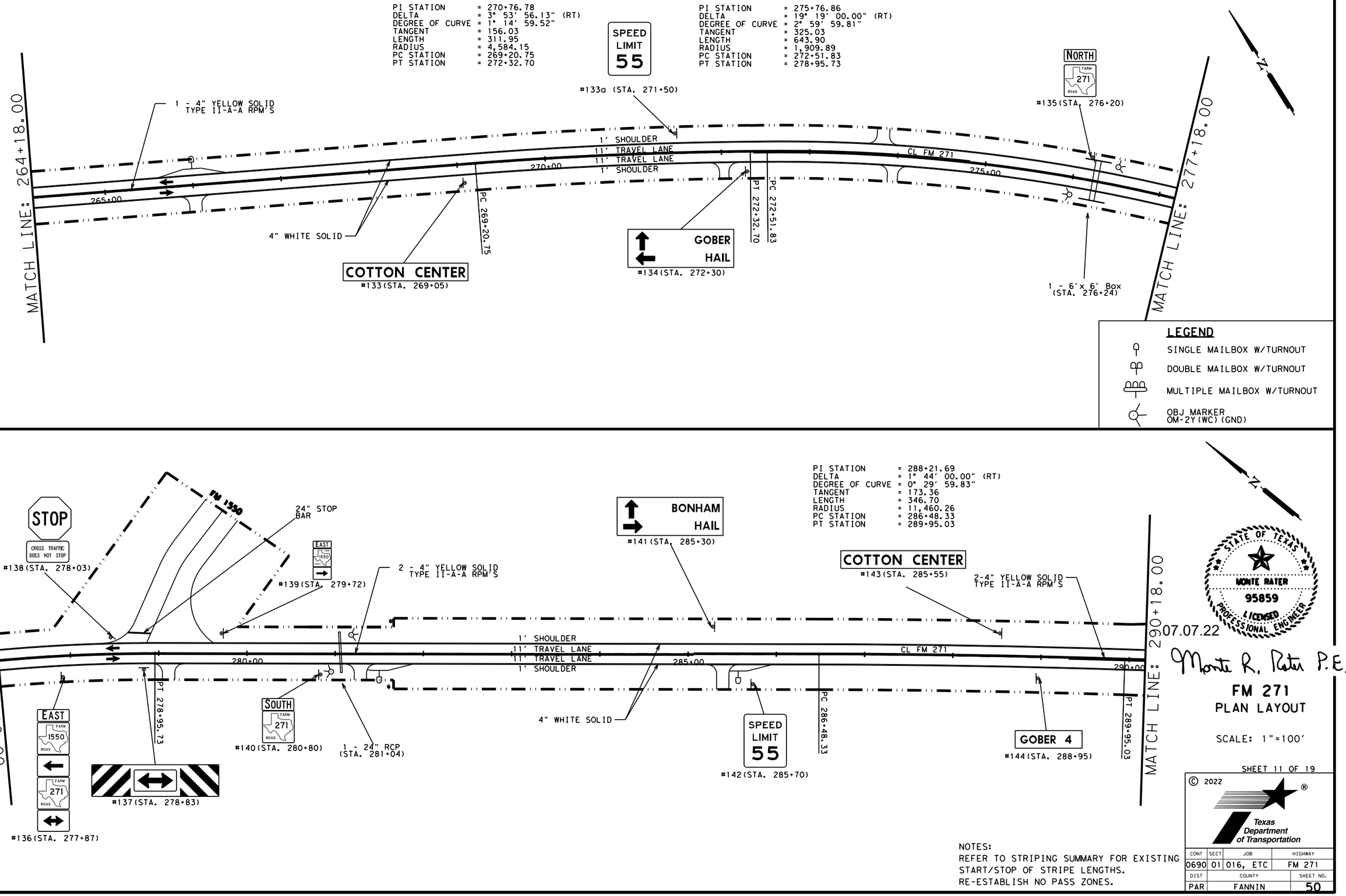
SCALE: 1"=100'

SHEET 10 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		49

DATE: 7/7/2022 8:49:56 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\049 PLAN LAYOUT.dgn



FM 271
PLAN LAYOUT

SCALE: 1"=100'

SHEET 11 OF 19

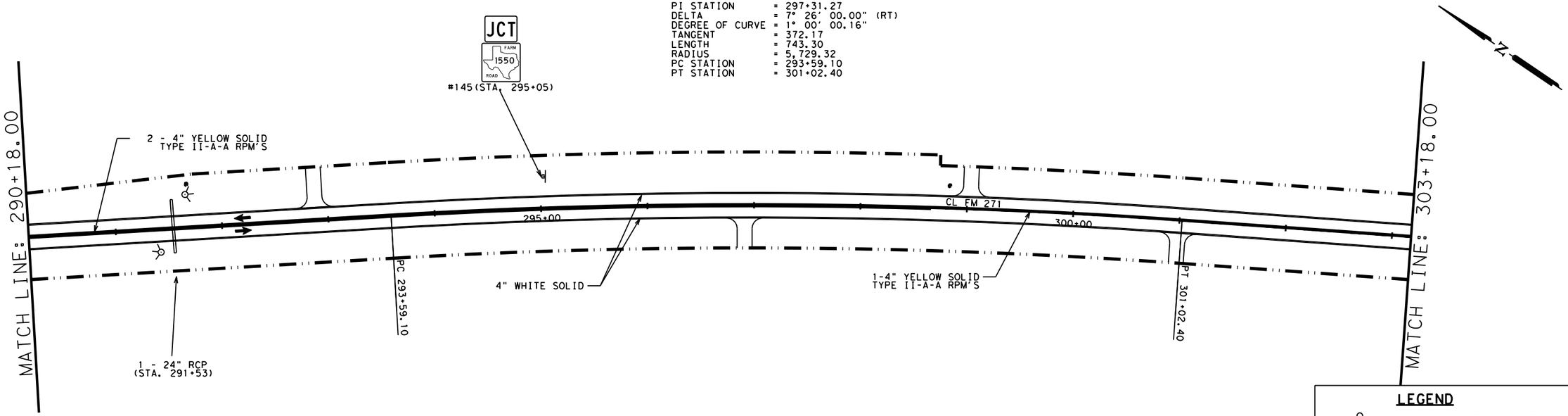
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		50

NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

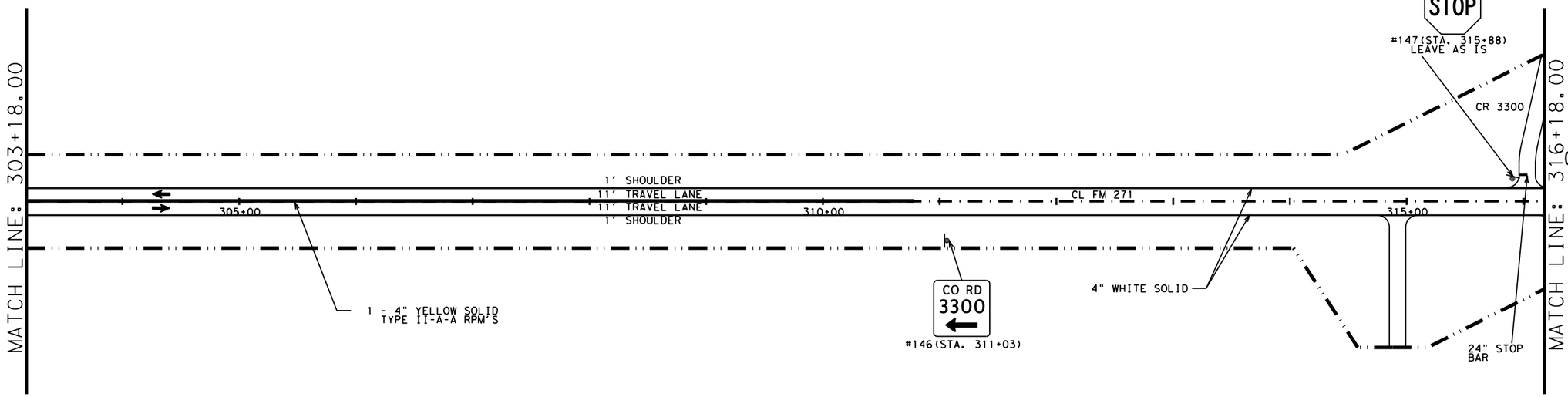
DATE: 7/7/2022 8:49:57 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\050 PLAN LAYOUT.dgn

PI STATION = 297+31.27
DELTA = 7° 26' 00.00" (RT)
DEGREE OF CURVE = 1° 00' 00.16"
TANGENT = 372.17
LENGTH = 743.30
RADIUS = 5,729.32
PC STATION = 293+59.10
PT STATION = 301+02.40



LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
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07.07.22
Monte R. Rater P.E.

FM 271
PLAN LAYOUT

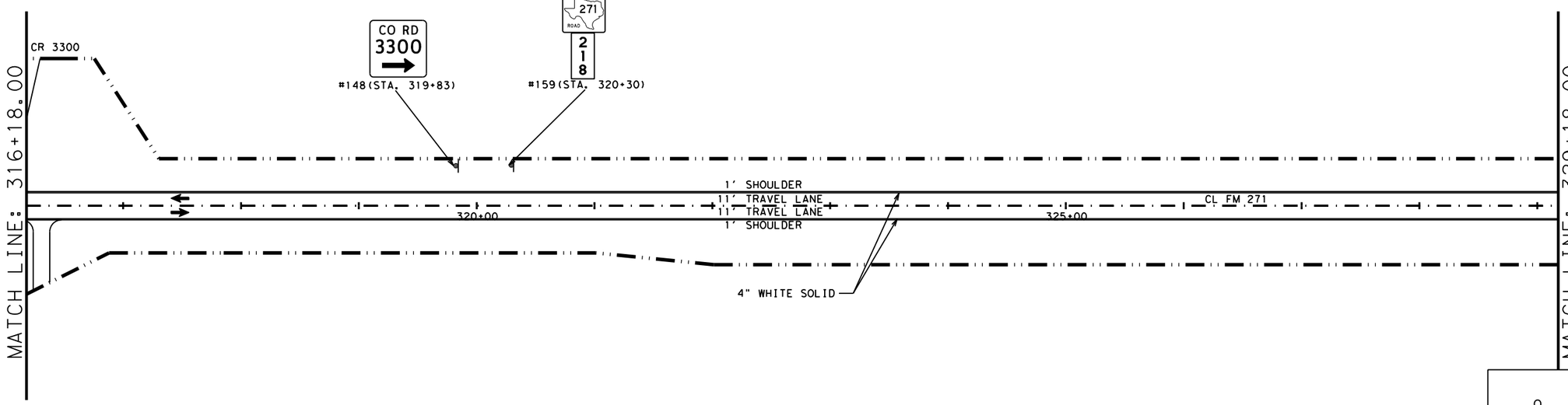
SCALE: 1"=100'

SHEET 12 OF 19

Texas Department of Transportation

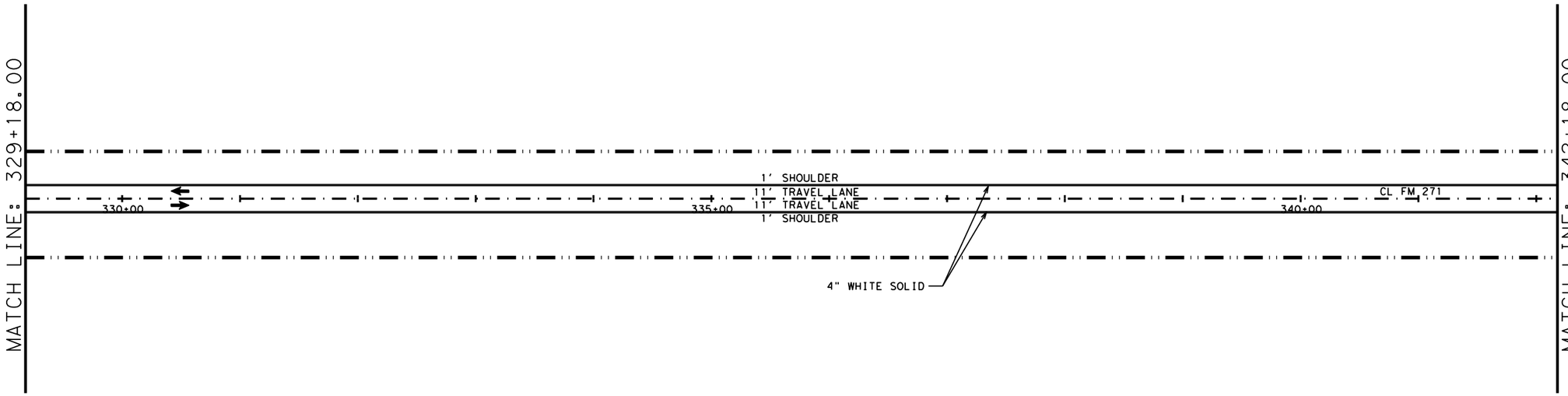
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		51

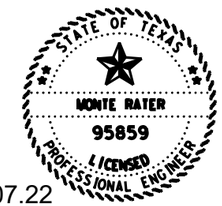
DATE: 7/7/2022 8:49:58 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\051 PLAN LAYOUT.dgn



LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)





07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

SCALE: 1"=100'

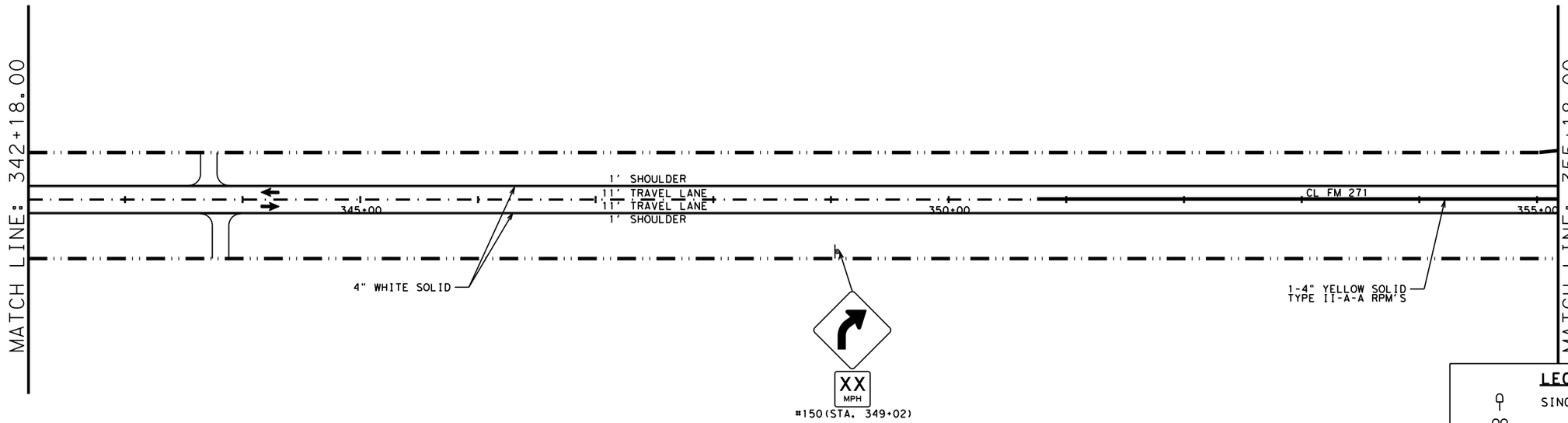
SHEET 13 OF 19

NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

Texas Department of Transportation

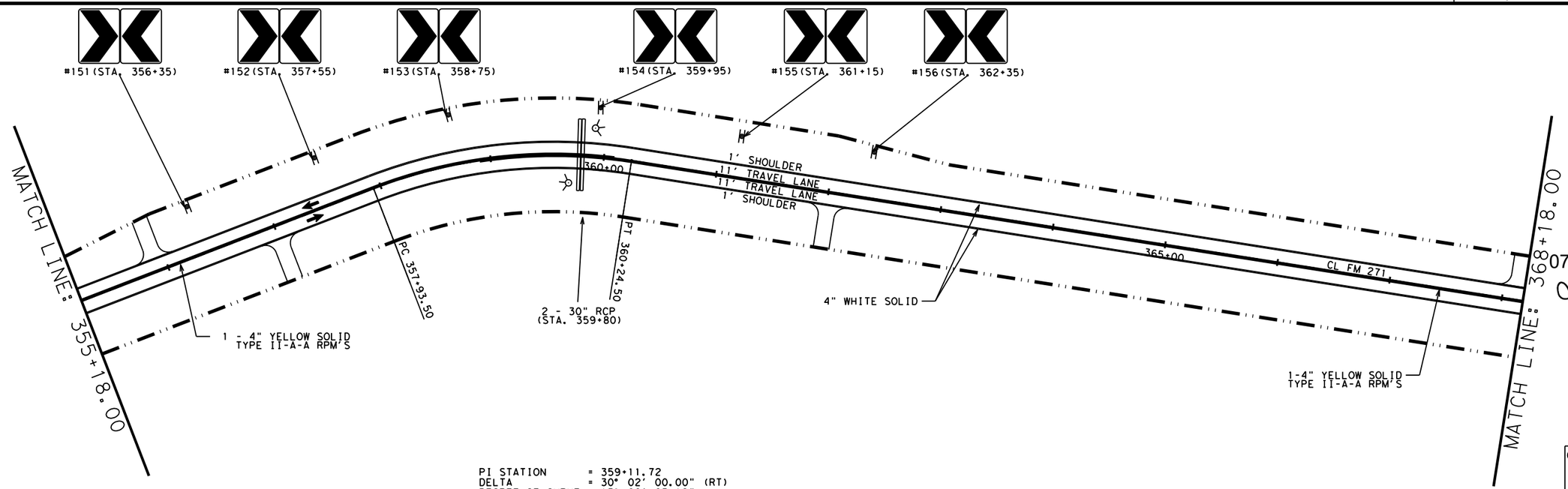
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		52

DATE: 7/7/2022 8:49:59 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\052 PLAN LAYOUT.dgn



LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)



PI STATION = 359+11.72
DELTA = 30° 02' 00.00" (RT)
DEGREE OF CURVE = 13° 00' 05.19"
TANGENT = 118.22
LENGTH = 231.00
RADIUS = 440.69
PC STATION = 357+93.50
PT STATION = 360+24.50

NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER
07.07.22
Monte R. Rater P.E.

FM 271
PLAN LAYOUT

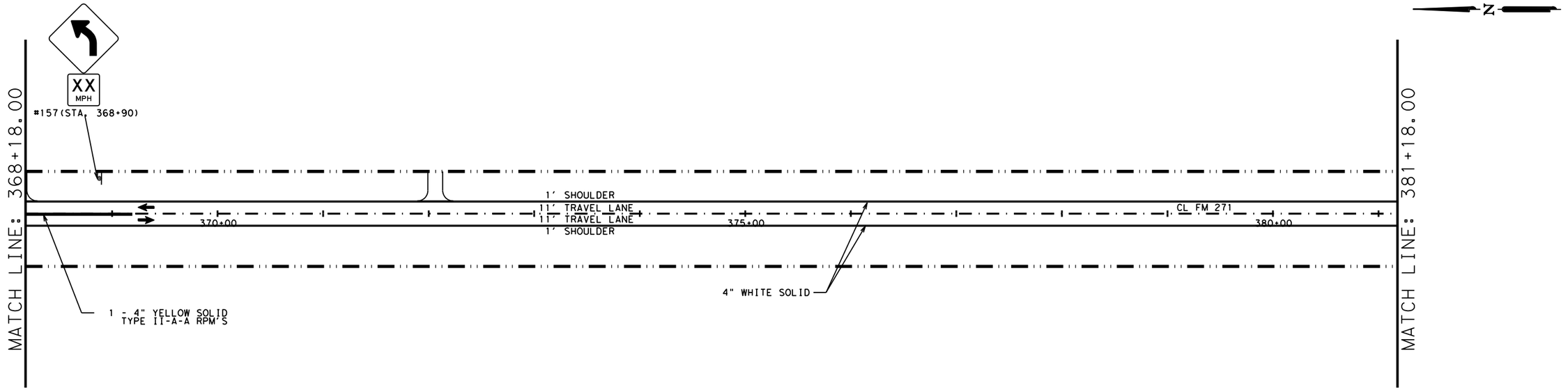
SCALE: 1"=100'

SHEET 14 OF 19

Texas Department of Transportation

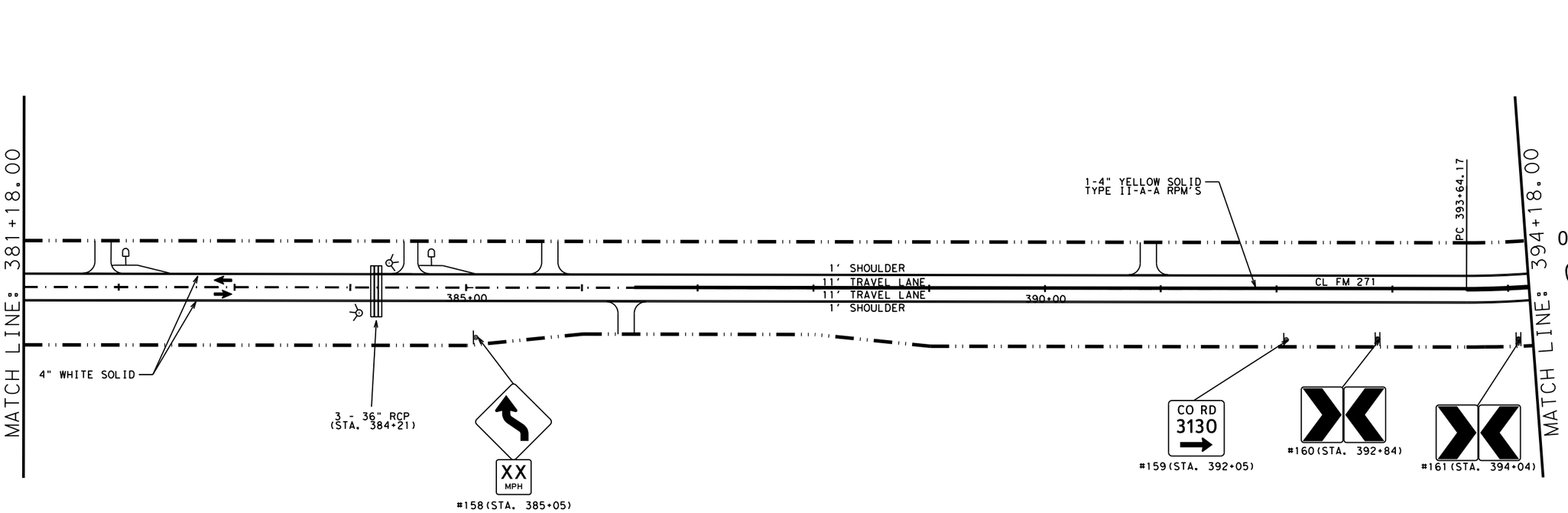
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		53

DATE: 7/7/2022 8:50:00 AM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\053 PLAN LAYOUT.dgn



LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

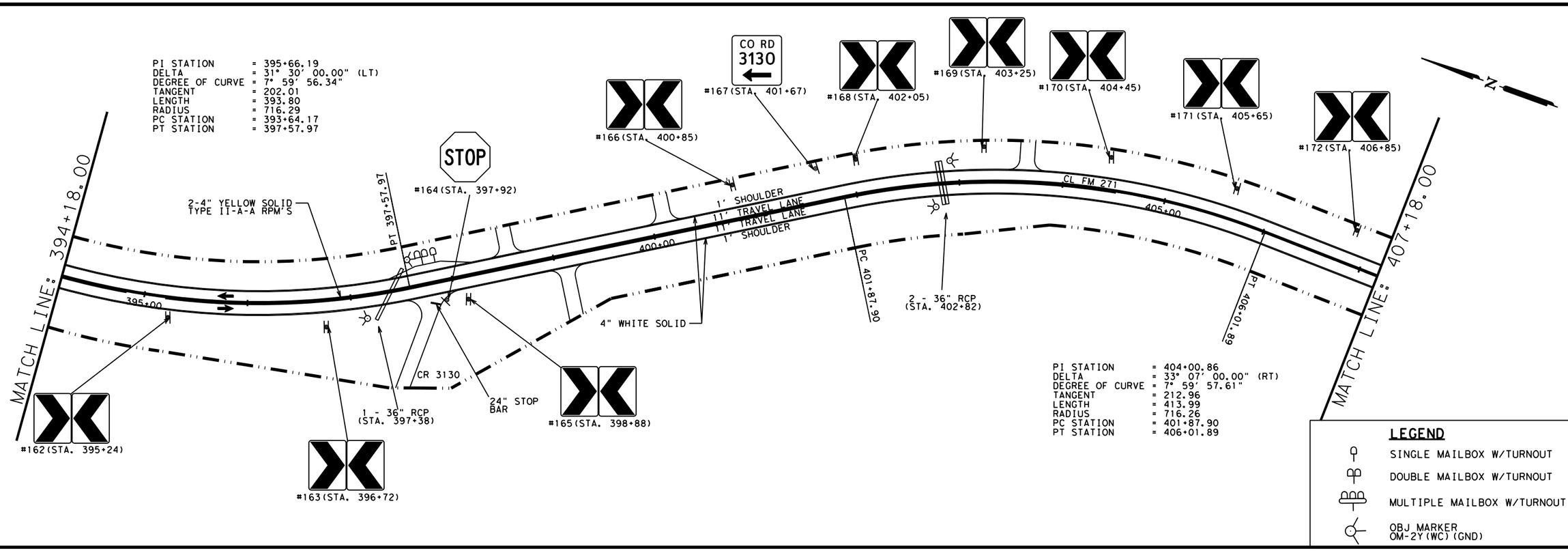
SCALE: 1"=100'

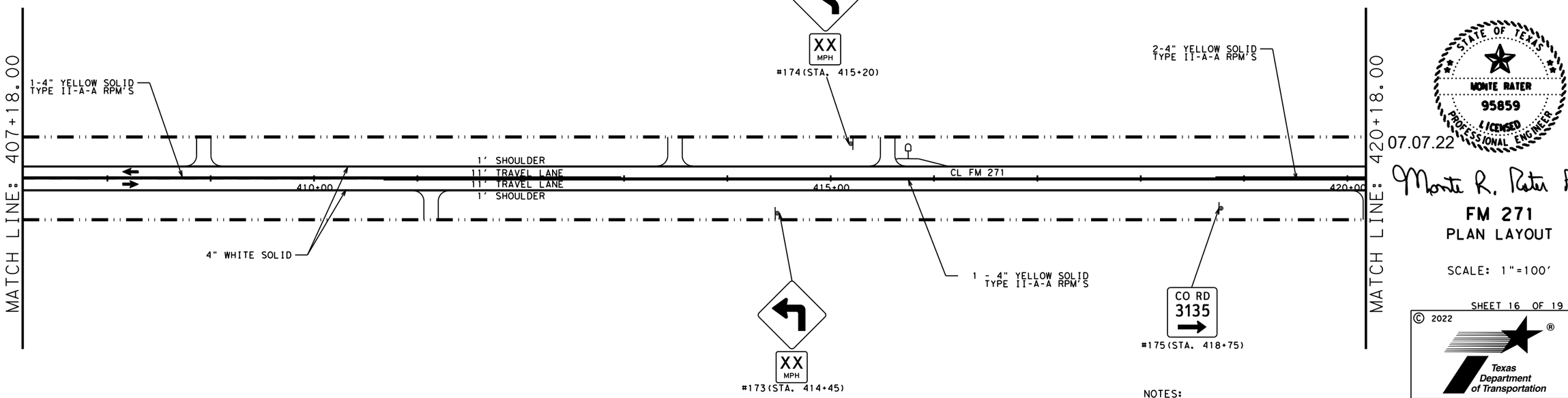
SHEET 15 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		54

DATE: 7/7/2022 8:50:02 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\054 PLAN LAYOUT.dgn





NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER
07.07.22
Monte R. Rater P.E.

FM 271
PLAN LAYOUT

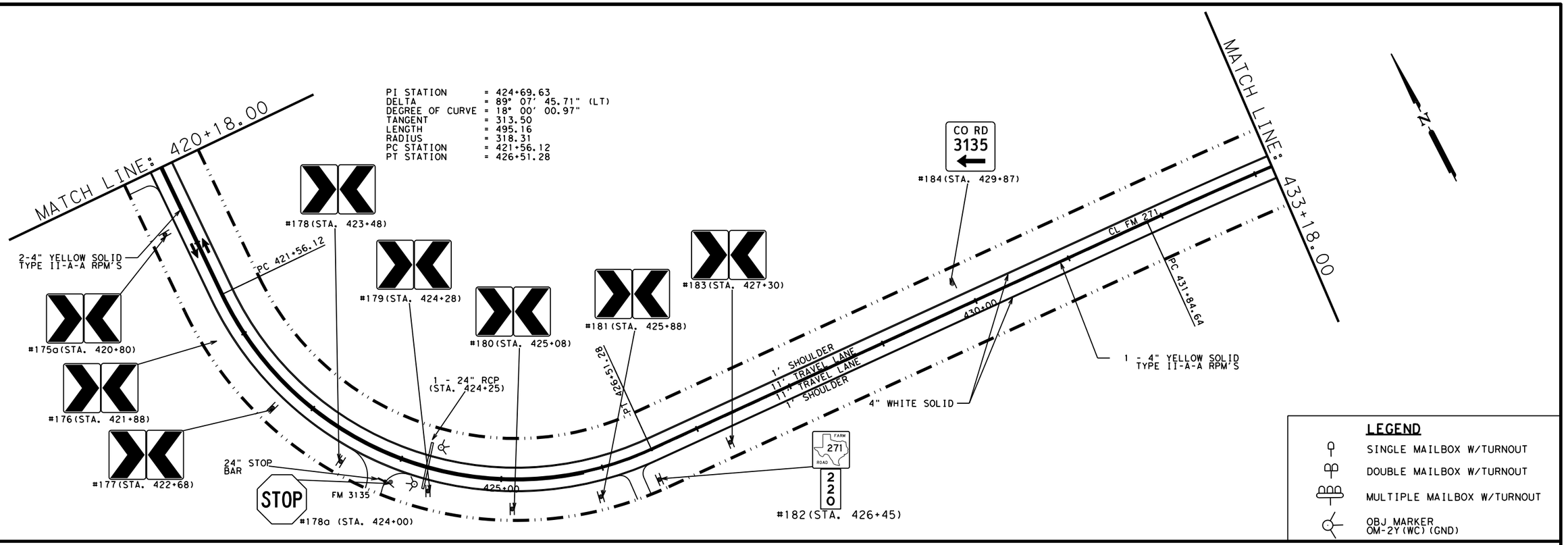
SCALE: 1"=100'

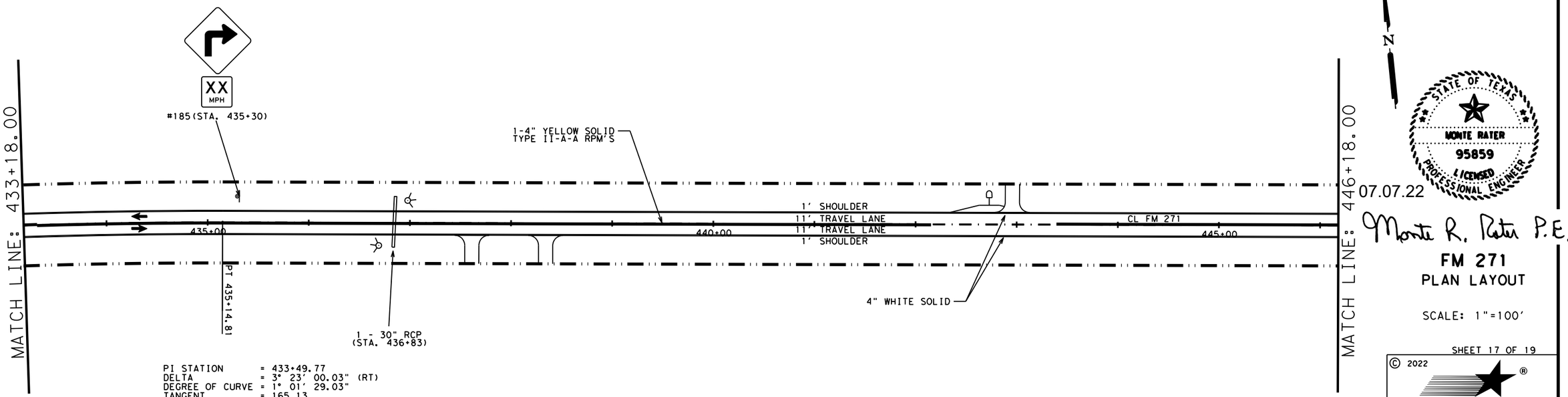
SHEET 16 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		55

DATE: 7/7/2022 8:50:03 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\055 PLAN LAYOUT.dgn





PI STATION = 433+49.77
DELTA = 3° 23' 00.03" (RT)
DEGREE OF CURVE = 1° 01' 29.03"
TANGENT = 165.13
LENGTH = 330.17
RADIUS = 5,591.30
PC STATION = 431+84.64
PT STATION = 435+14.81

NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
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95859
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

SCALE: 1"=100'

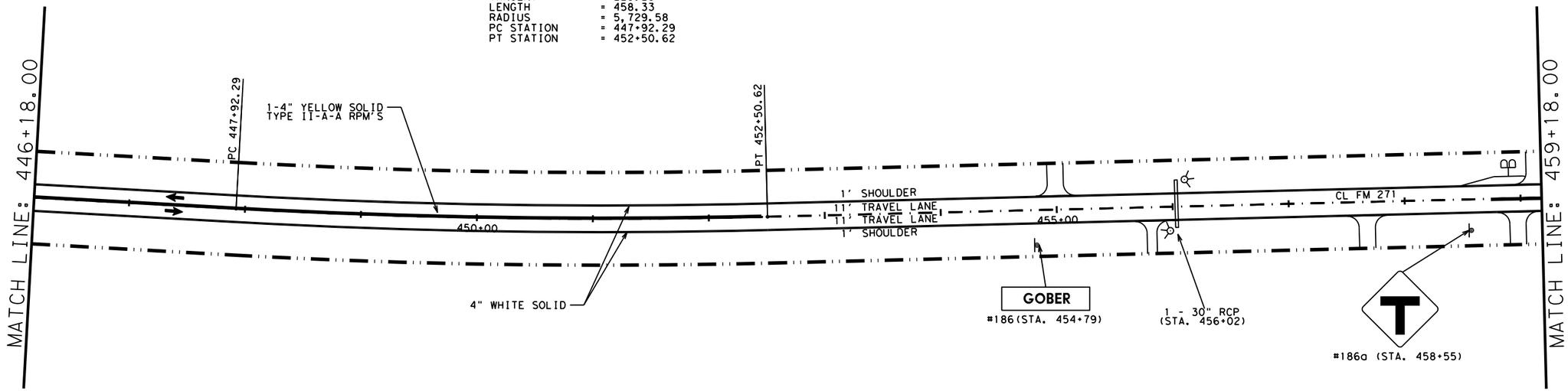
SHEET 17 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		56

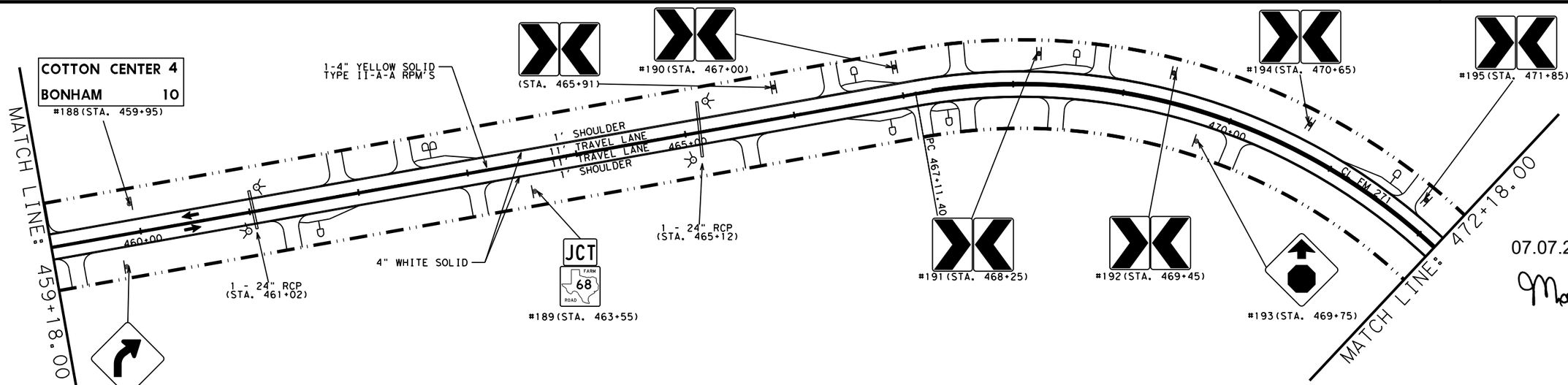
DATE: 7/7/2022 8:50:04 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\056 PLAN LAYOUT.dgn

PI STATION = 450+21.57
DELTA = 4° 35′ 00.00" (LT)
DEGREE OF CURVE = 1° 00′ 00.00"
TANGENT = 229.29
LENGTH = 458.33
RADIUS = 5,729.58
PC STATION = 447+92.29
PT STATION = 452+50.62



LEGEND

- SINGLE MAILBOX W/TURNOUT
- DOUBLE MAILBOX W/TURNOUT
- MULTIPLE MAILBOX W/TURNOUT
- OBJ MARKER OM-2Y(WC)(GND)



PI STATION = 472+68.83
DELTA = 91° 13′ 23.84" (RT)
DEGREE OF CURVE = 10° 30′ 01.31"
TANGENT = 557.43
LENGTH = 868.76
RADIUS = 545.66
PC STATION = 467+11.40
PT STATION = 475+80.16

NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

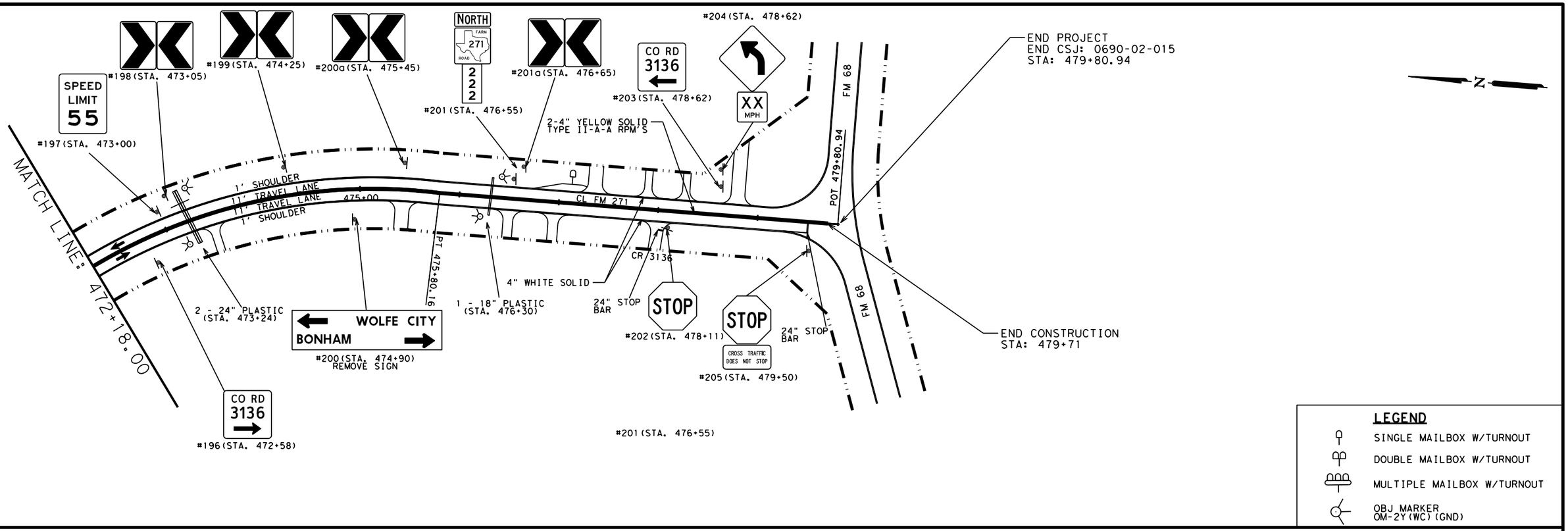
SCALE: 1"=100'

SHEET 18 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		57

DATE: 7/7/2022 8:50:05 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\057 PLAN LAYOUT.dgn



NOTES:
REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
RE-ESTABLISH NO PASS ZONES.

STATE OF TEXAS
MONTE RATER
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
PLAN LAYOUT

SCALE: 1"=100'

SHEET 19 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		58

DATE: 7/7/2022 8:50:06 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\058 PLAN LAYOUT.dgn

FM 271 SUPERELEVATION

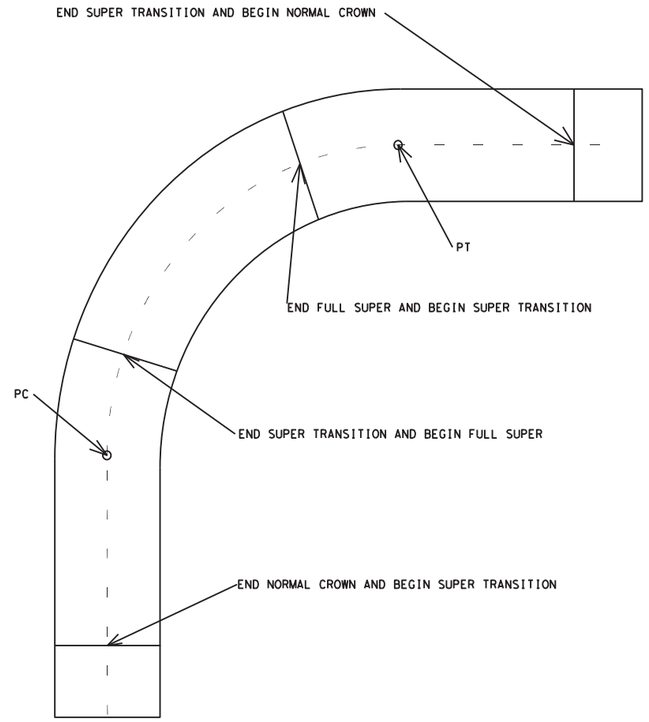
STATION		SHOULDER CROSS SLOPE LEFT (%)	TRAVEL LANE CROSS SLOPE LEFT (%)	TRAVEL LANE CROSS SLOPE RIGHT (%)	SHOULDER CROSS SLOPE RIGHT (%)
BEGIN PROJECT					
	>	-2.00	-2.00	-2.00	-2.00
47+60	END NC				
SUPERELEVATION TRANSITION					
48+46	BEGIN FS				
	>	3.20	3.20	-3.20	-3.20
52+76	END FS				
SUPERELEVATION TRANSITION					
53+62	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
55+94	END NC				
SUPERELEVATION TRANSITION					
56+88	BEGIN FS				
	>	3.60	3.60	-3.60	-3.60
61+01	END FS				
SUPERELEVATION TRANSITION					
61+95	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
83+35	END NC				
SUPERELEVATION TRANSITION					
84+69	BEGIN FS				
	>	-6.00	-6.00	6.00	6.00
86+92	END FS				
SUPERELEVATION TRANSITION					
88+26	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
104+67	END NC				
SUPERELEVATION TRANSITION					
105+91	BEGIN FS				
	>	5.40	5.40	-5.40	-5.40
108+50	END FS				
SUPERELEVATION TRANSITION					
109+74	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
126+21	END NC				
SUPERELEVATION TRANSITION					
127+41	BEGIN FS				
	>	-5.20	-5.20	5.20	5.20
129+46	END FS				
SUPERELEVATION TRANSITION					
130+66	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
145+14	END NC				
SUPERELEVATION TRANSITION					
146+10	BEGIN FS				
	>	3.80	3.80	-3.80	-3.80
151+53	END FS				
SUPERELEVATION TRANSITION					
152+49	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
151+98	END NC				
SUPERELEVATION TRANSITION					
153+04	BEGIN FS				
	>	4.40	4.40	-4.40	-4.40
156+71	END FS				
SUPERELEVATION TRANSITION					
157+77	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
171+42	END NC				
SUPERELEVATION TRANSITION					
172+42	BEGIN FS				
	>	-4.00	-4.00	4.00	4.00
175+43	END FS				
SUPERELEVATION TRANSITION					
176+43	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
189+57	END NC				
SUPERELEVATION TRANSITION					
190+53	BEGIN FS				
	>	3.80	3.80	-3.80	-3.80
192+62	END FS				
SUPERELEVATION TRANSITION					
193+58	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
204+08	END NC				
SUPERELEVATION TRANSITION					
205+42	BEGIN FS				
	>	-6.00	-6.00	6.00	6.00
207+78	END FS				
SUPERELEVATION TRANSITION					
209+12	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
228+71	END NC				
SUPERELEVATION TRANSITION					
229+61	BEGIN FS				
	>	3.40	3.40	-3.40	-3.40
242+36	END FS				
SUPERELEVATION TRANSITION					
243+26	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
247+67	END NC				
SUPERELEVATION TRANSITION					
248+97	BEGIN FS				
	>	-5.80	-5.80	5.80	5.80
251+64	END FS				
SUPERELEVATION TRANSITION					
252+94	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
271+92	END NC				
SUPERELEVATION TRANSITION					
272+66	BEGIN FS				
	>	2.40	2.40	-2.40	-2.40
278+80	END FS				
SUPERELEVATION TRANSITION					
279+54	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
356+97	END NC				
SUPERELEVATION TRANSITION					
358+17	BEGIN FS				
	>	5.20	5.20	-5.20	-5.20
360+00	END FS				
SUPERELEVATION TRANSITION					
361+20	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00

NC = NORMAL CROWN
FS = FULL SUPERELEVATION

FM 271 SUPERELEVATION

STATION		SHOULDER CROSS SLOPE LEFT (%)	TRAVEL LANE CROSS SLOPE LEFT (%)	TRAVEL LANE CROSS SLOPE RIGHT (%)	SHOULDER CROSS SLOPE RIGHT (%)
CONTINUE PROJECT					
	>	-2.00	-2.00	-2.00	-2.00
392+81	END NC				
SUPERELEVATION TRANSITION					
393+85	BEGIN FS				
	>	-4.20	-4.20	4.20	4.20
397+36	END FS				
SUPERELEVATION TRANSITION					
398+40	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
401+04	END NC				
SUPERELEVATION TRANSITION					
402+08	BEGIN FS				
	>	4.20	4.20	-4.20	-4.20
405+80	END FS				
SUPERELEVATION TRANSITION					
406+84	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
420+52	END NC				
SUPERELEVATION TRANSITION					
421+82	BEGIN FS				
	>	-5.80	-5.80	5.80	5.80
426+25	END FS				
SUPERELEVATION TRANSITION					
427+55	BEGIN NC				
	>	-2.00	-2.00	-2.00	-2.00
466+20	END NC				
SUPERELEVATION TRANSITION					
467+34	BEGIN FS				
	>	4.80	4.80	-4.80	-4.80
475+57	END FS				
SUPERELEVATION TRANSITION					
476+71	BEGIN NC				
END PROJECT					

NC = NORMAL CROWN
FS = FULL SUPERELEVATION



* CONTRACTOR IS TO CONFIRM EXISTING SUPERELEVATION SLOPE AND NOTIFY AREA ENGINEER BEFORE ROADWAY REHABILITATION STARTS.

* EXCESS MATERIAL GENERATED IS PROPERTY OF CONTRACTOR.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
SUPERELEVATION TABLE

SHEET 1 OF 1

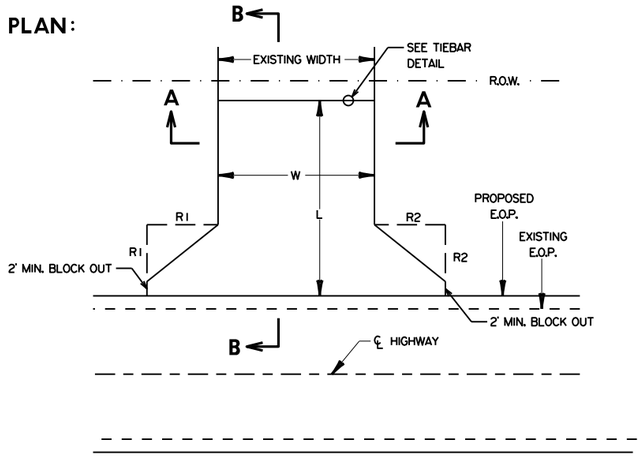
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		59

DATE: 7/7/2022 8:50:07 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100X\059 SUPERELEVATION TABLE.dgn

CK:
DW:
CK:
DN:

PLAN:



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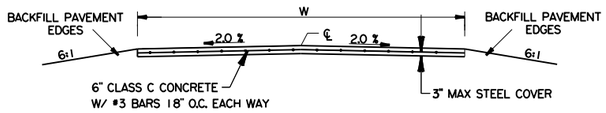

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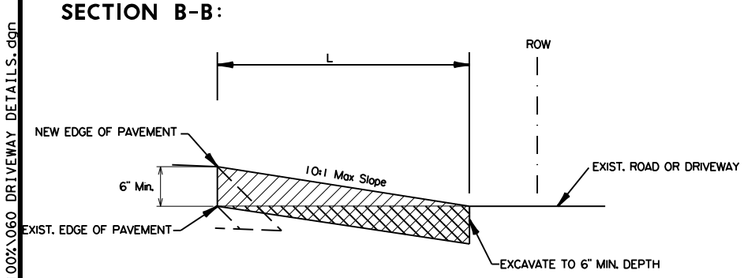
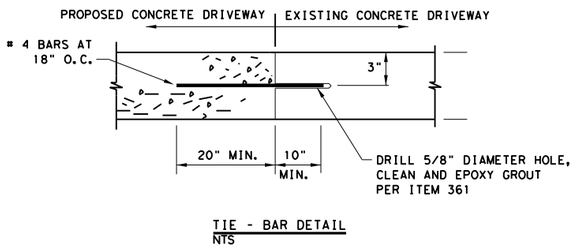


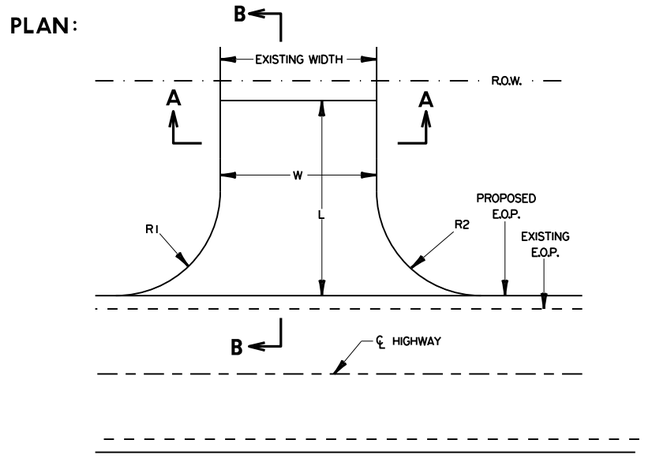


TIE - BAR DETAIL
NTS

NOTES:
1. THIS WORK WILL BE MEASURED AND PAID FOR AS: DRIVEWAYS (CONC)
2. DIMENSIONS W, L, R1 AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

CONCRETE DRIVEWAY
NTS

PLAN:



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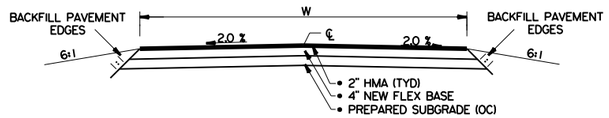
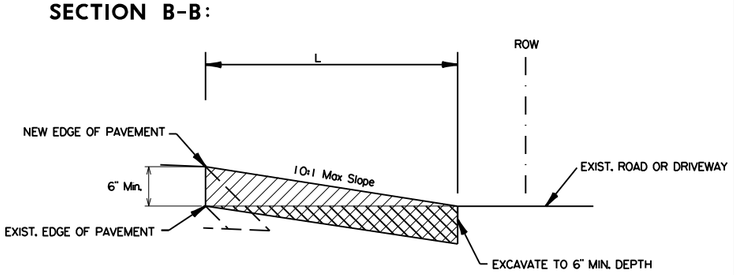


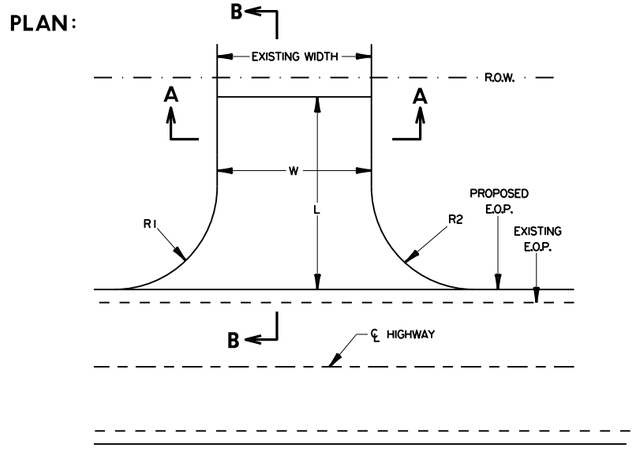
SECTION B-B:



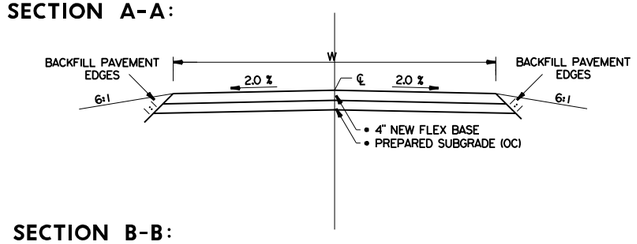
NOTES:
1. THIS WORK WILL BE MEASURED AND PAID FOR AS: "DRIVEWAYS (ACP)"
2. DIMENSIONS W, L, R1 AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

HMA SURFACE DRIVEWAY
NTS

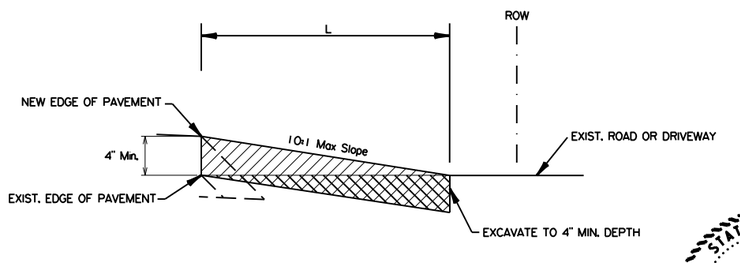
PLAN:



SECTION A-A:



SECTION B-B:



NOTES:
1. THIS WORK WILL BE MEASURED AND PAID FOR AS: "DRIVEWAYS (BASE)"
2. DIMENSIONS W, L, R1 AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

GRAVEL SURFACE DRIVEWAY
NTS

NOTE: EXCAVATION FOR ALL DRIVEWAY TYPES WILL BE CONSIDERED SUBSIDIARY TO DRIVEWAY BID ITEMS.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

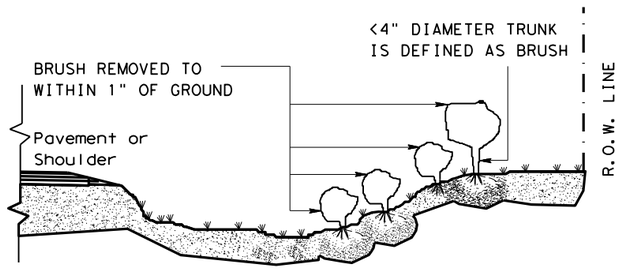
FM 271
DRIVEWAY DETAILS

SHEET 1 OF 1

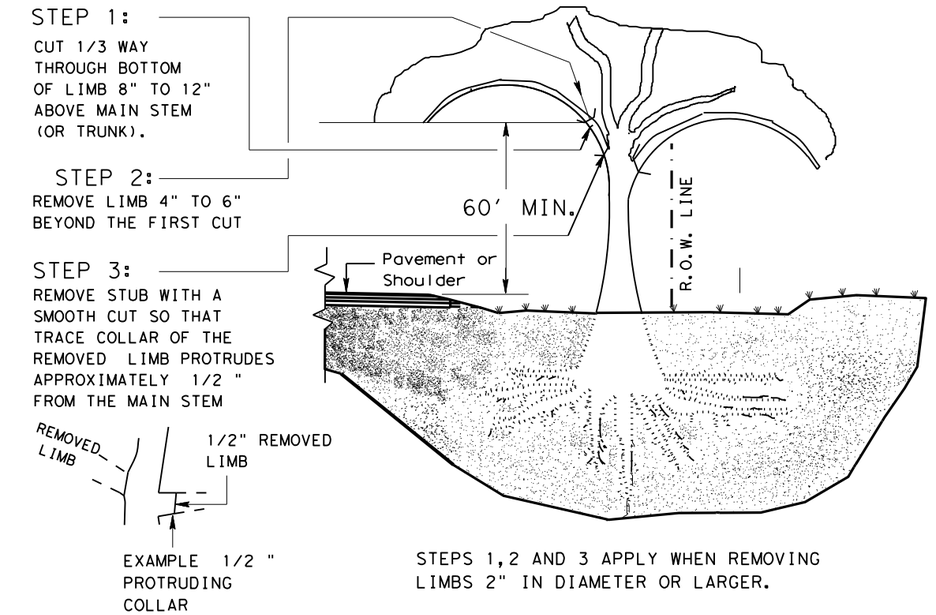
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		60

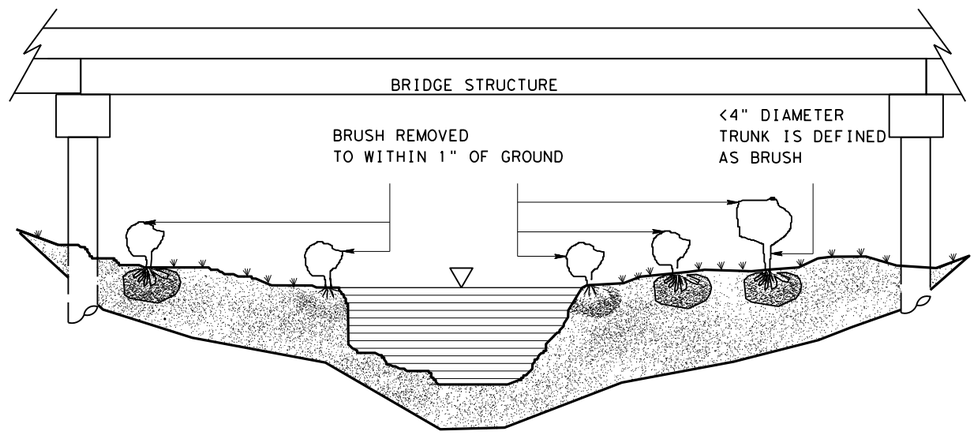
DATE: 7/7/2022 8:50:08 AM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\060 DRIVEWAY DETAILS.dgn



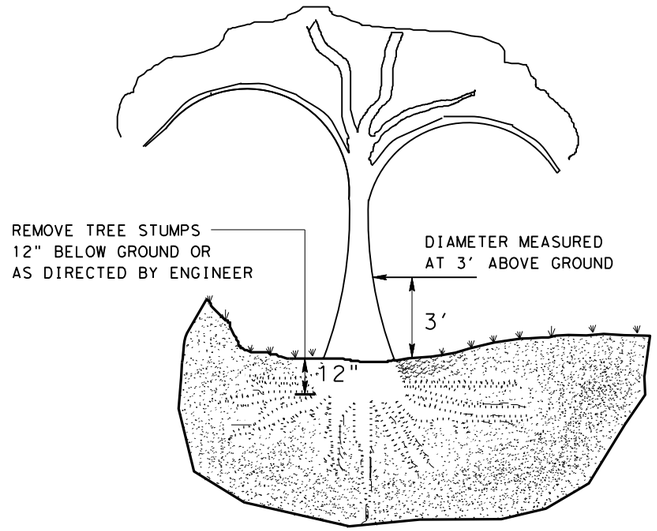
BRUSH REMOVAL



TREE TRIMMING



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL



TREE REMOVAL

SPECIFIC LOCATION SPECIFIED IN PLANS

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271

TREE TRIMMING AND BRUSH REMOVAL

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		61

DATE: 7/7/2022 8:50:09 AM
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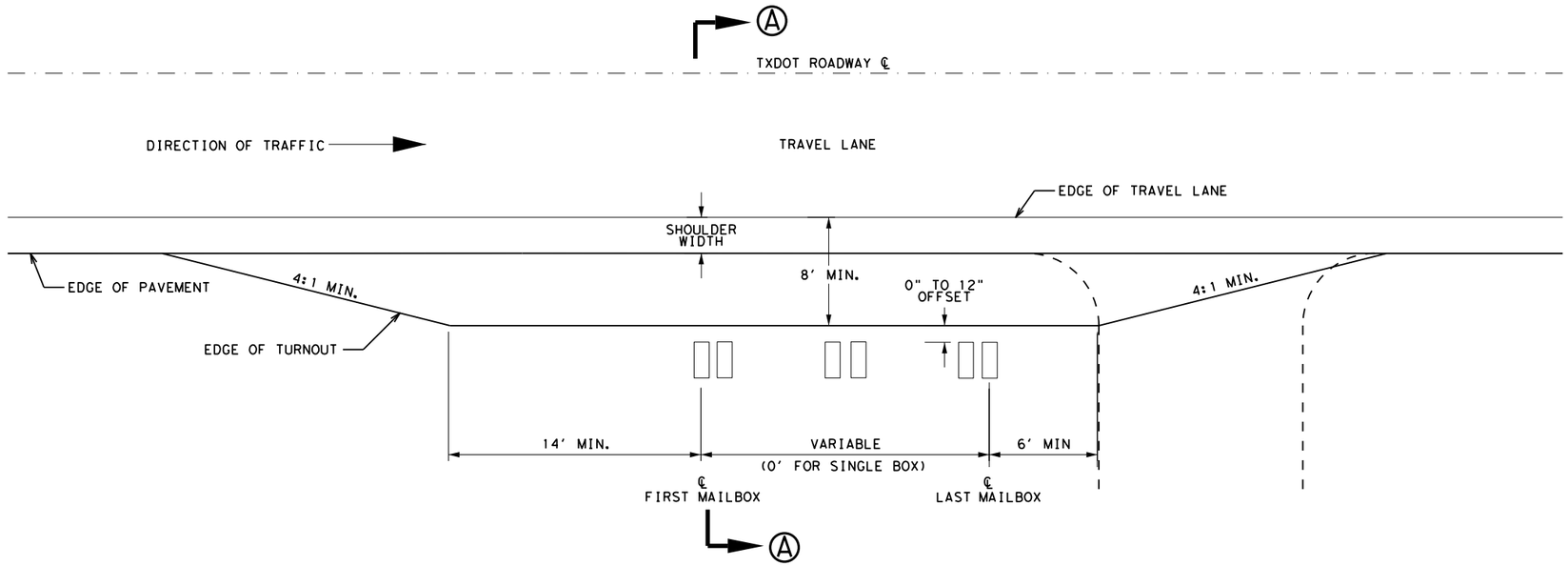
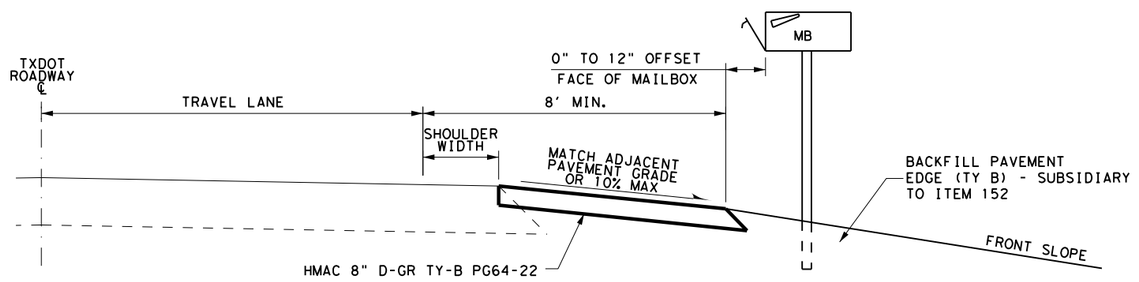


MAILBOX TURNOUT
PLAN



MAILBOX TURNOUT
SECTION A-A

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

MAILBOX TURNOUT DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		62

DATE: 7/7/2022 8:50:10 AM
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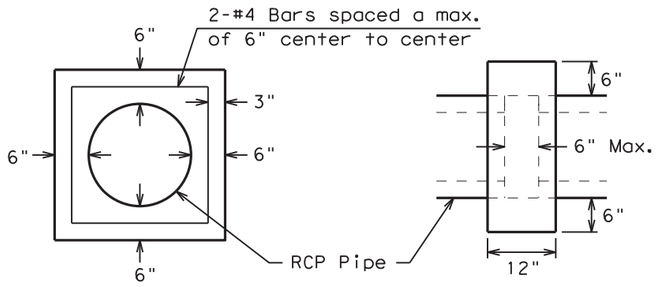
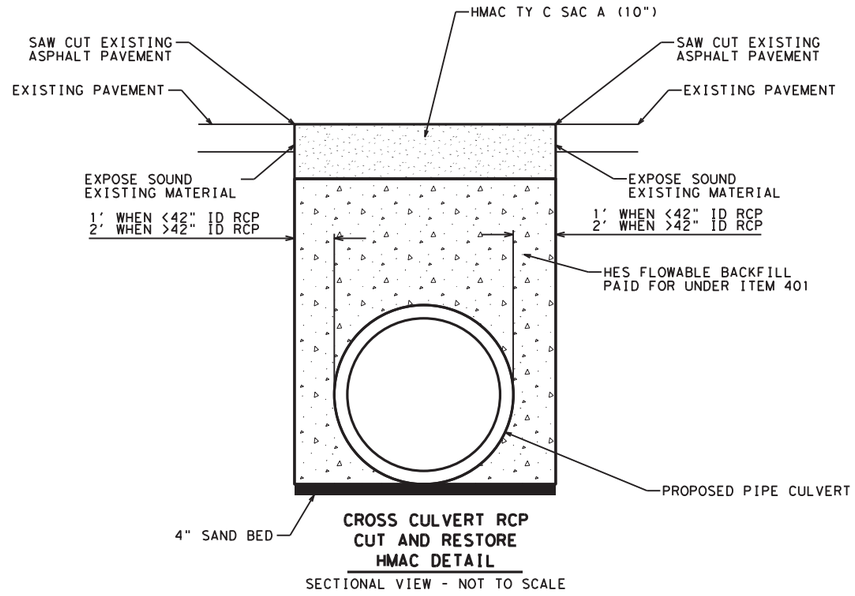


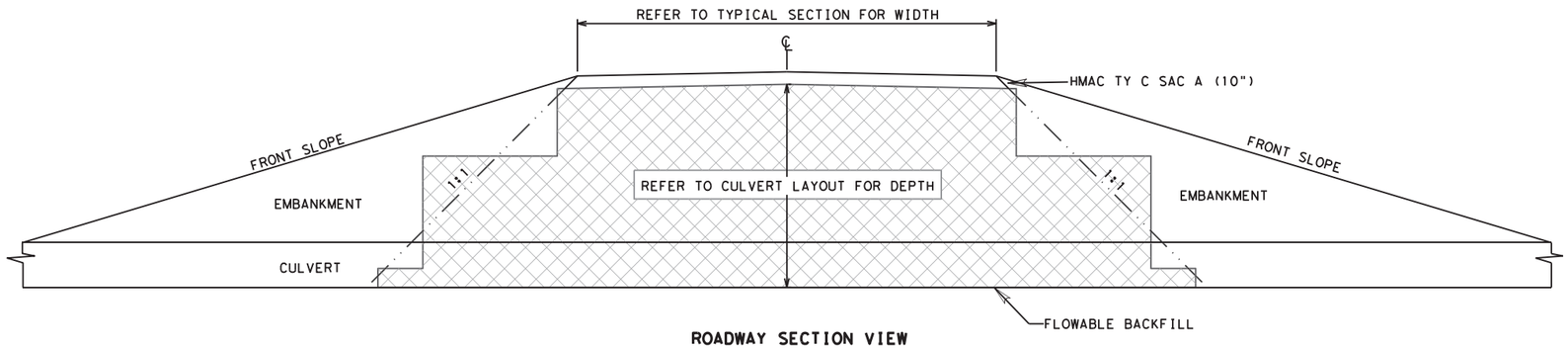
CONCRETE PIPE COLLAR DETAIL

Concrete for collar shall be Class A
Pipe collars will be subsidiary to Item 464
COLLAR DETAIL - NOT TO SCALE



CROSS CULVERT RCP CUT AND RESTORE HMAC DETAIL

SECTIONAL VIEW - NOT TO SCALE



ROADWAY SECTION VIEW FLOWABLE FILL CALCULATION

ROADWAY SECTION - NOT TO SCALE

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FM 271
MISCELLANEOUS DETAILS

NOT TO SCALE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		63

DATE: 7/7/2022 8:50:11 AM
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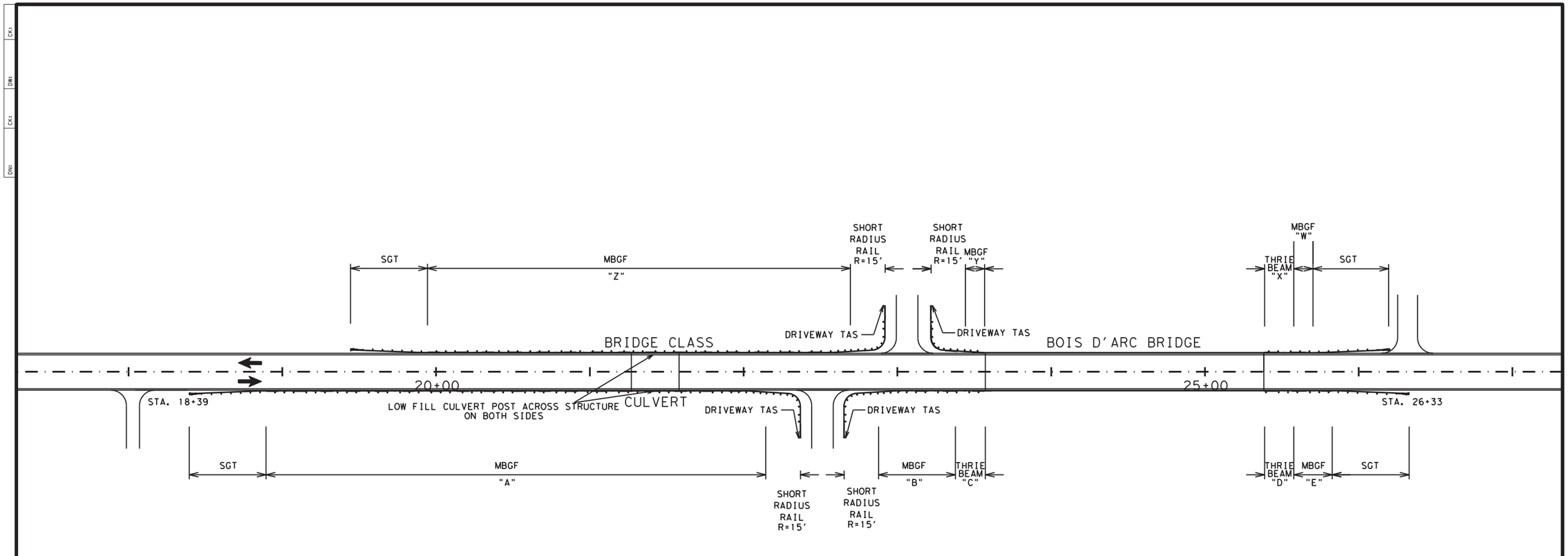

MBGF LAYOUT	START STA.	END STA.	A	B	C	D	E	W	X	Y	Z
FM 271	18+39	26+33	325	50	18.75	18.75	25	12.5	18.75	12.5	275

CREEK: BOIS D'ARC BRANCH
NBI: 01-075-0-0690-01-009
3 - 10' X 8' BOX

CREEK: BOIS D'ARC BRIDGE
NBI: 01-075-0-0690-01-008

ALL MBGF RADIUS RAIL ARE FOR CONTRACTOR FABRICATION

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FM 271
MBGF LAYOUT

NOT TO SCALE

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		64

DATE: 7/7/2022 1:51:58 PM
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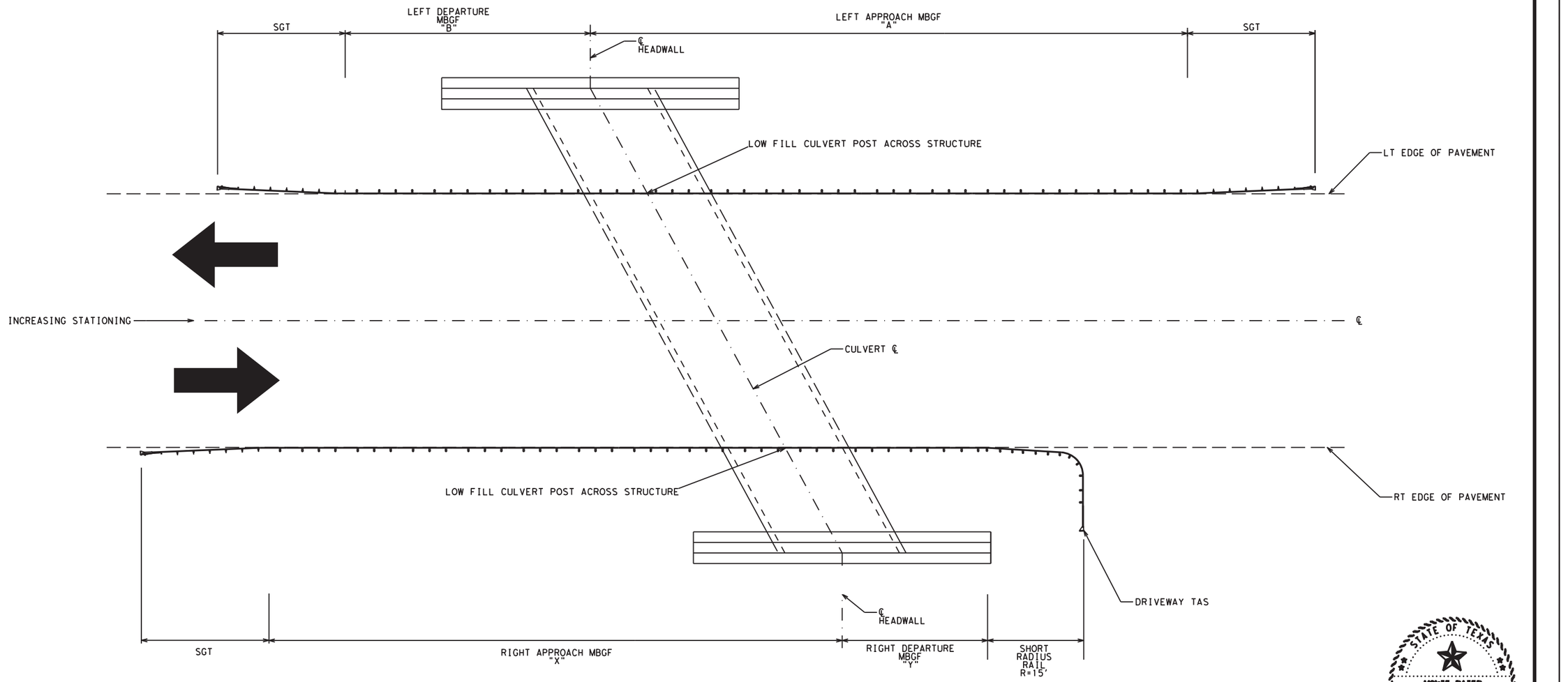

CULVERT STATION	CULVERT DESCRIPTION	A	B	X	Y
STA 36+38	3 - 9' X 6' BOX	225	175	225	25

CREEK: BOIS D'ARC BRANCH
NBI: 01-075-0-0690-01-010

ALL MBGF RADIUS RAIL ARE FOR CONTRACTOR FABRICATION

DATE: 7/7/2022 1:52:00 PM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\065 MBGF LAYOUT.dgn

CK:
DW:
CK:
DN:

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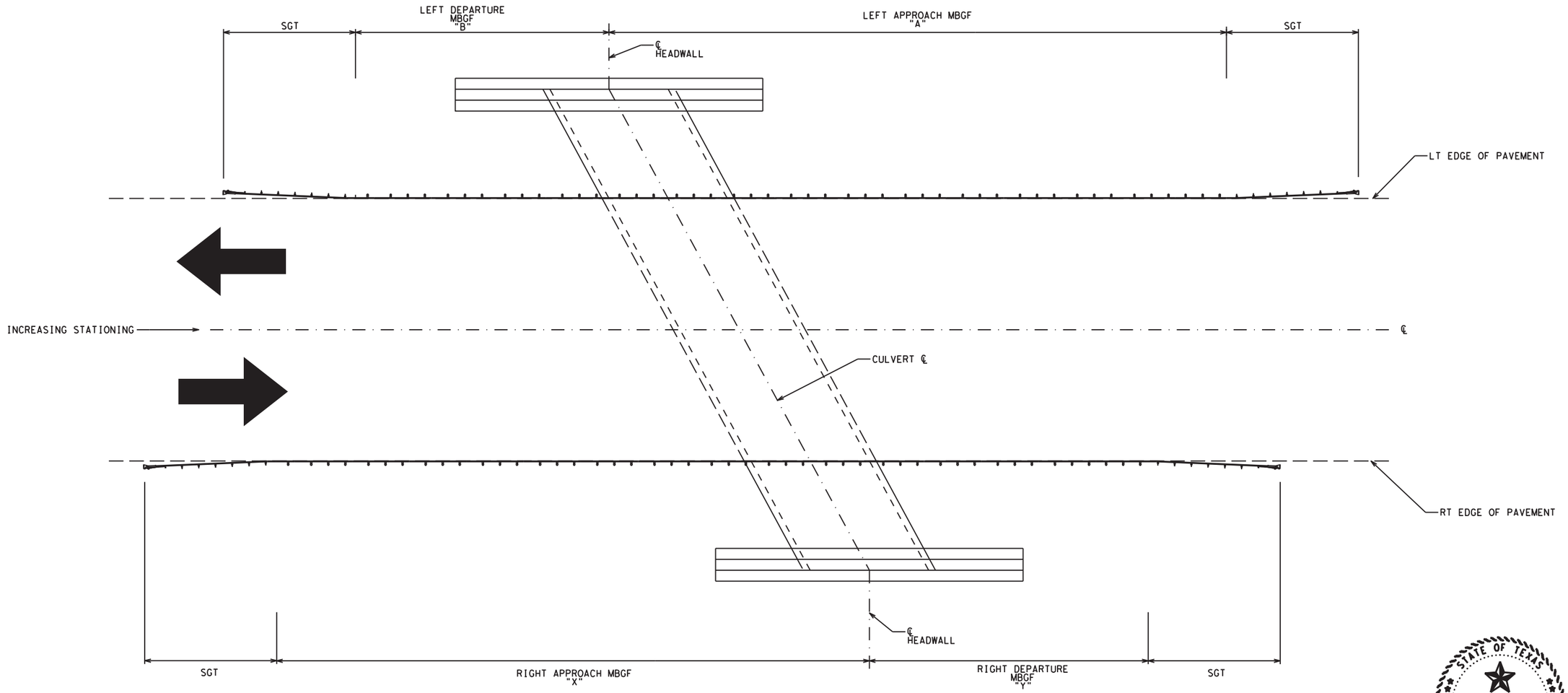
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		65



CULVERT STATION	CULVERT DESCRIPTION	A	B	X	Y
STA 88+15	1 - 30" X 53' RCP	200	25	200	25
STA 98+75	1 - 30" X 48' RCP	200	25	200	25
STA 276+24	1 - 6' X 6' BOX x 46'	250	150		

DATE: 7/7/2022 1:52:01 PM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\066 MBGF LAYOUT.dgn

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07.07.22

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FM 271
MBGF LAYOUT

NOT TO SCALE

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		66

DATE: 7/8/2022 3:22:51 PM
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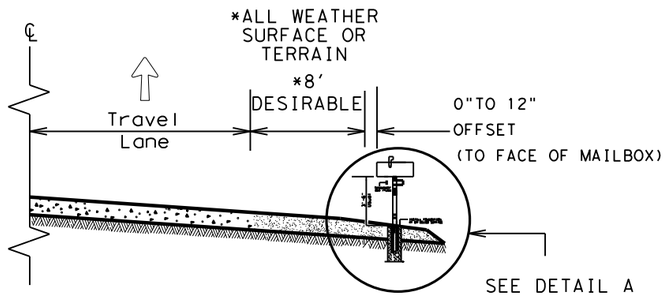
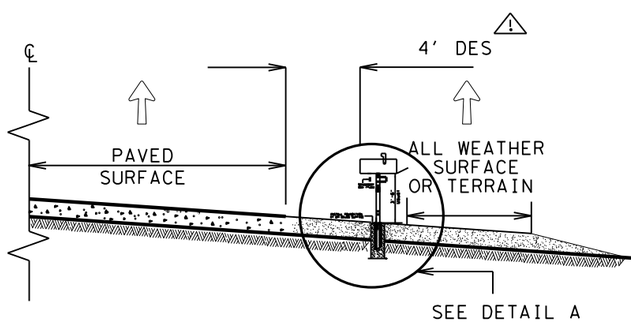
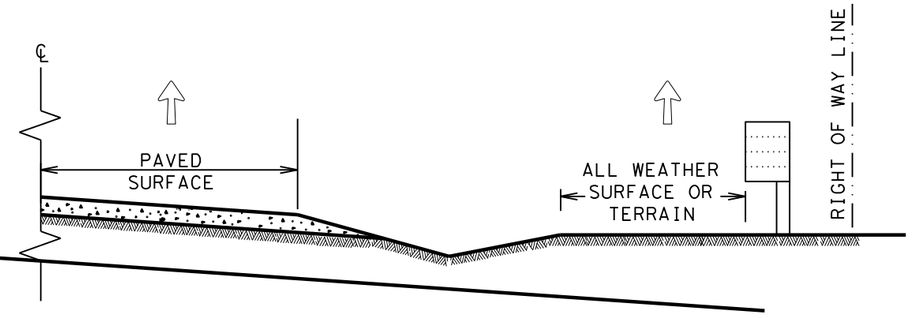


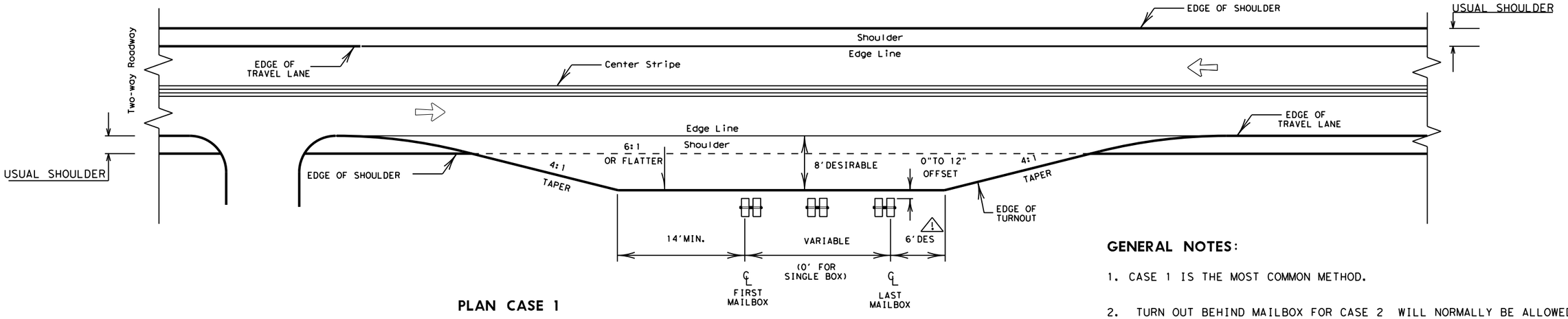
CASE 1. OFF TRAVEL WAY DELIVERY



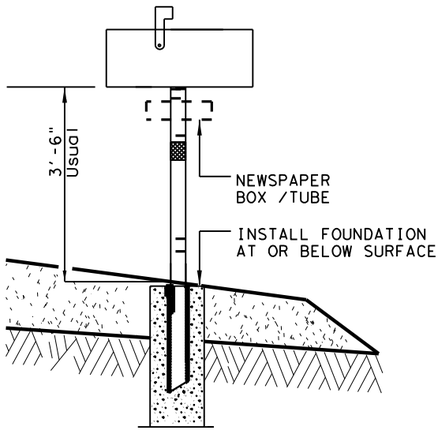
CASE 2. BACK SIDE DELIVERY



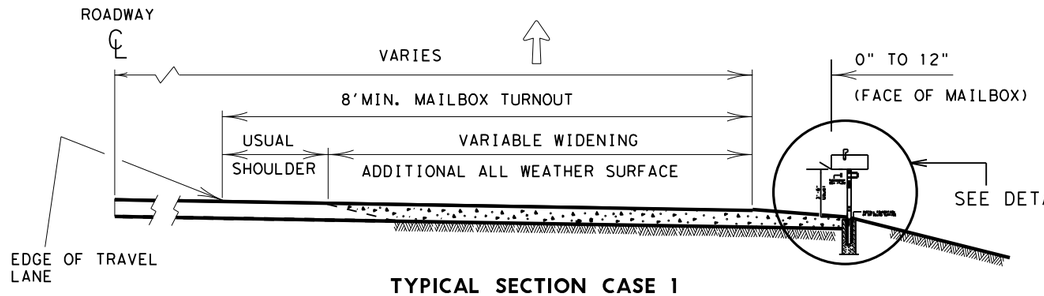
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

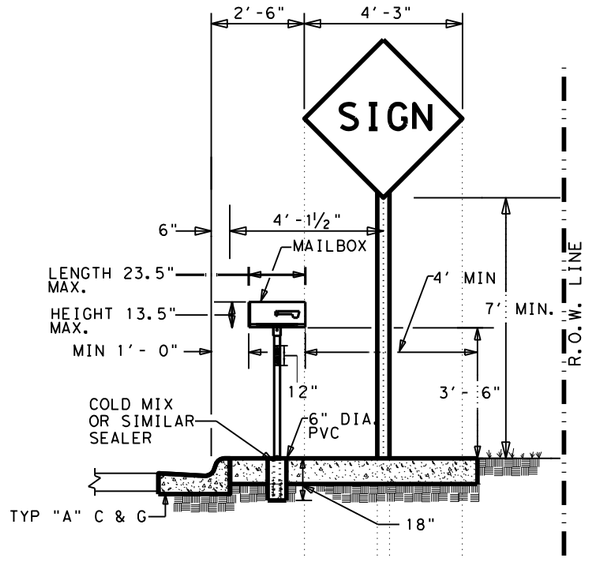
1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS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

Texas Department of Transportation | Maintenance Division Standard

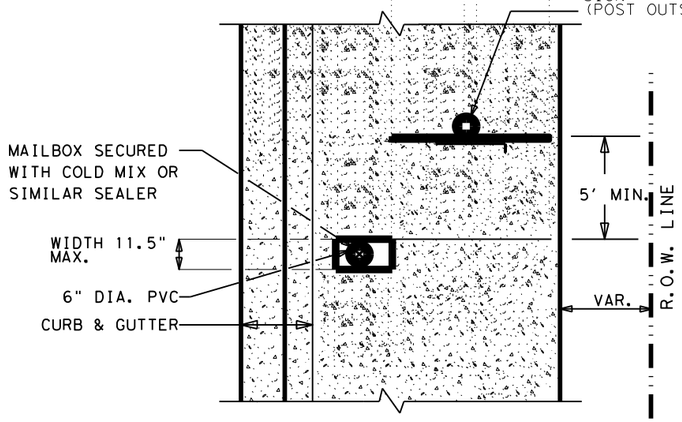
Guideline

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

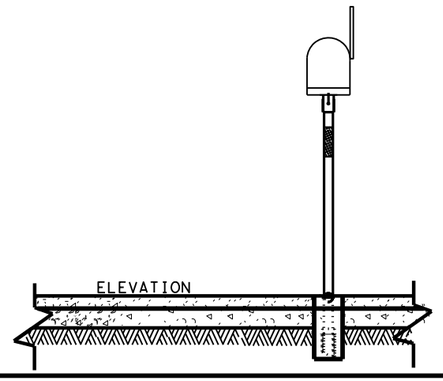
FILE: MB14(2).DGN	DN: JEO		CK:	DW: JEO		CK:	
©TxDOT MAY 2014	CONT	SECT	JOB		HIGHWAY		
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	0690	01	016, ETC		FM 271		
	DIST	COUNTY			SHEET NO.		
	PAR	FANNIN			67		

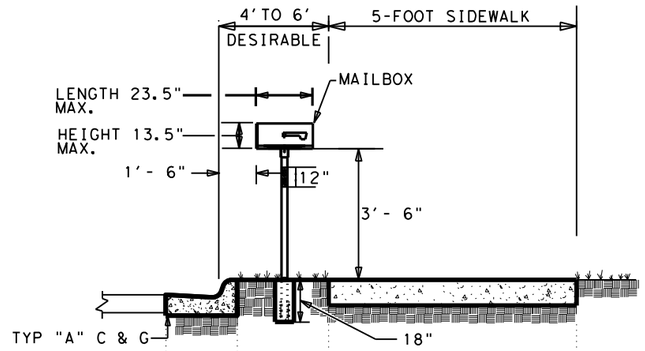


MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

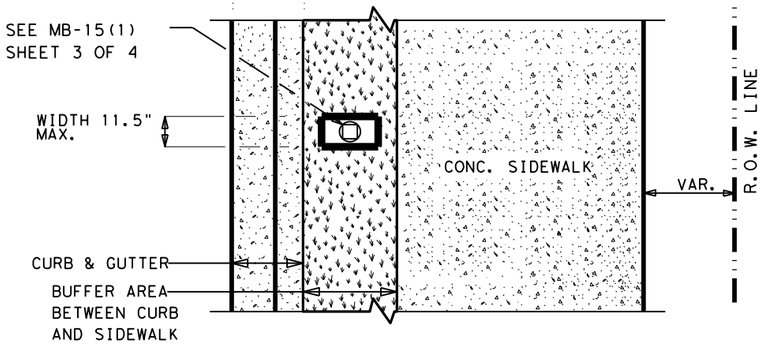


PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

DATE: 7/8/2022 3:22:52 PM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\067 MB-14 (2A).dgn

SHEET 2 OF 3

Texas Department of Transportation | Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2A)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		68

DATE: 7/8/2022 3:22:53 PM
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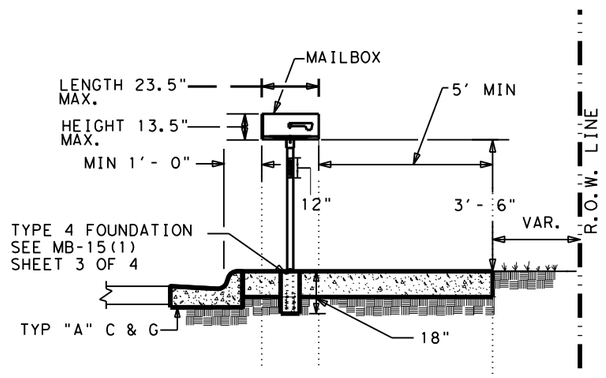
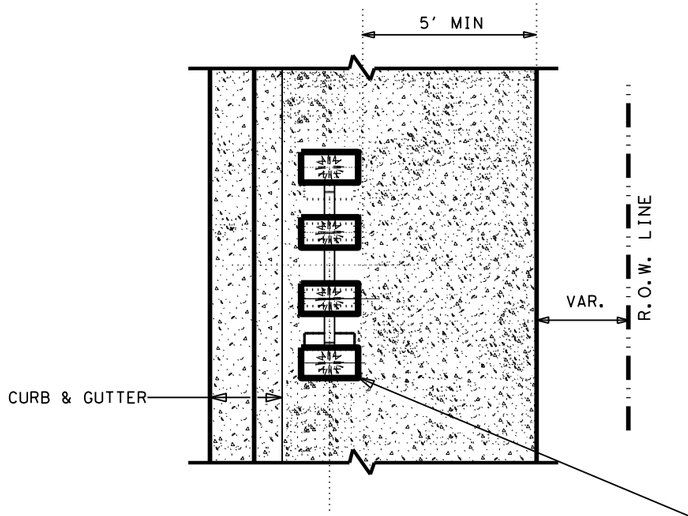
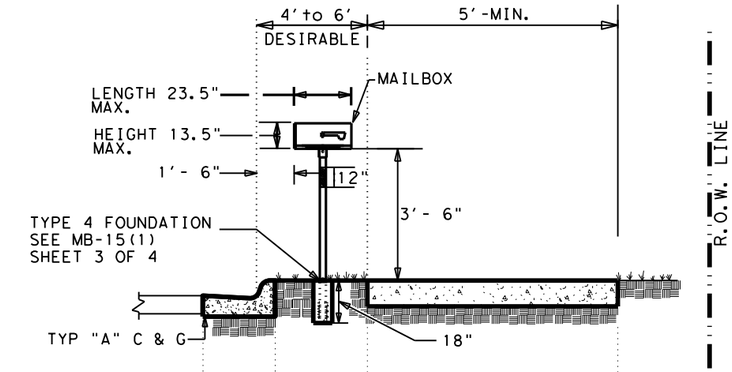


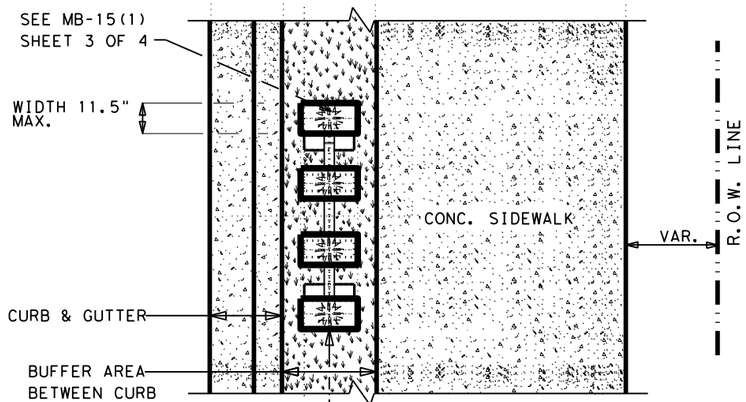
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



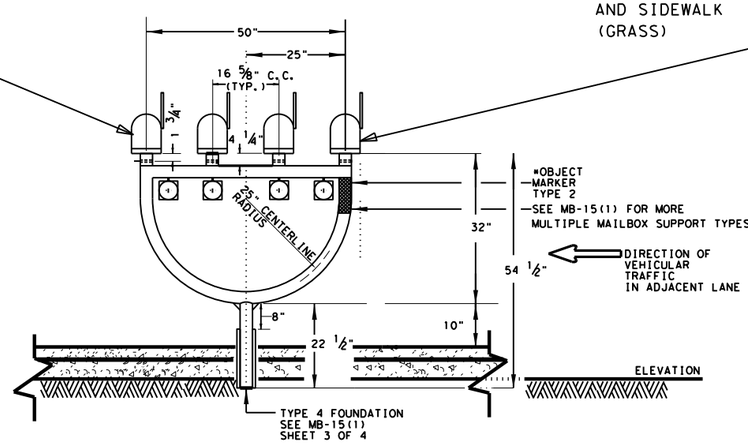
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



SHEET 3 OF 3

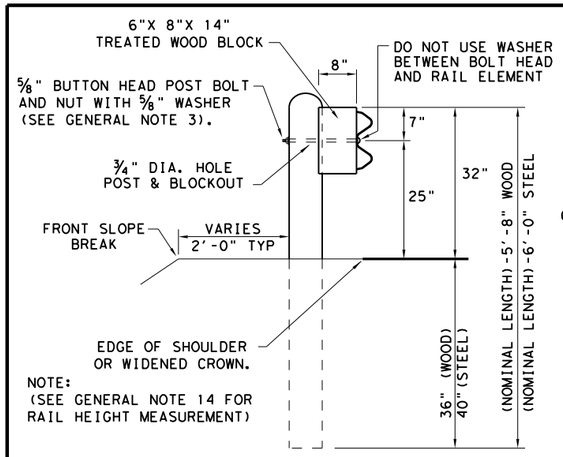
Texas Department of Transportation | Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

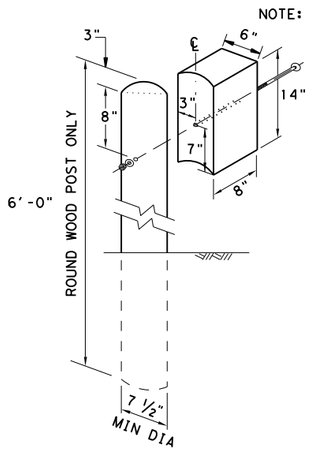
MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		69

DATE: 7/7/2022
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\070 GF (31)-19.dgn

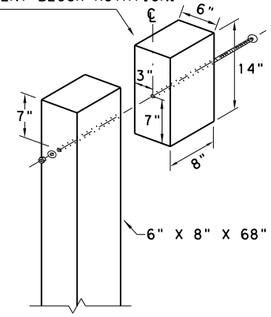


TYPICAL POST PLACEMENT

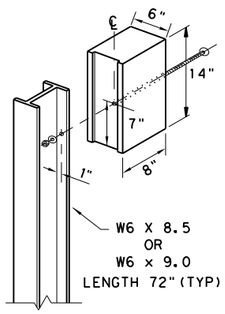


WOOD BLOCK TO ROUND WOOD POST

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

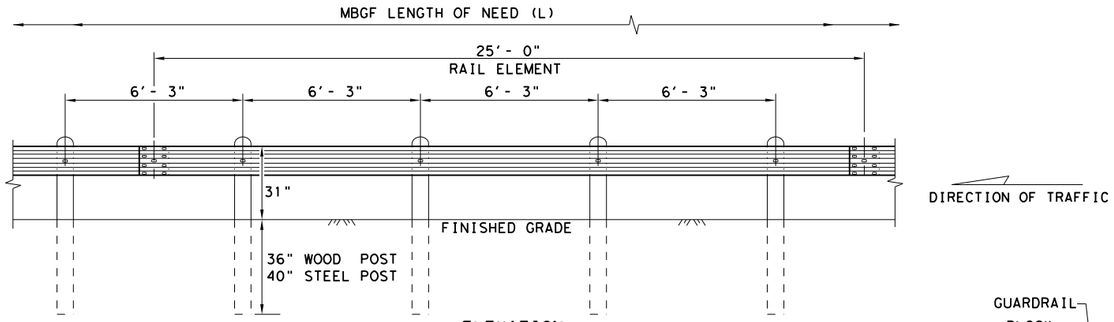


WOOD BLOCK TO RECTANGULAR WOOD POST



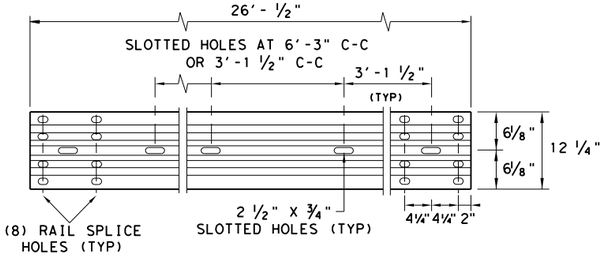
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

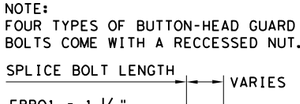
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

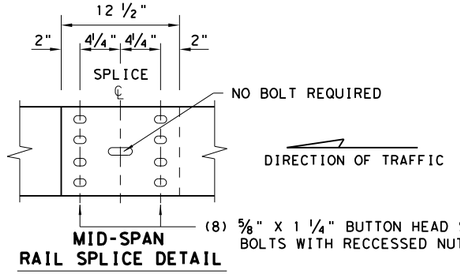
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.



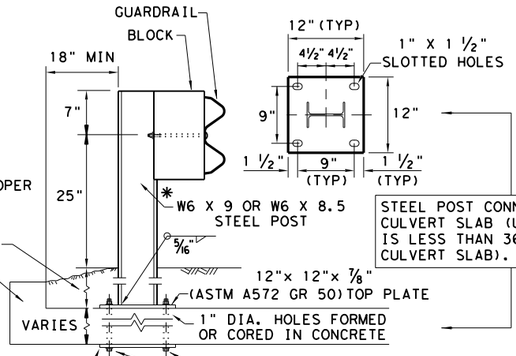
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		70

DATE: 7/8/2022
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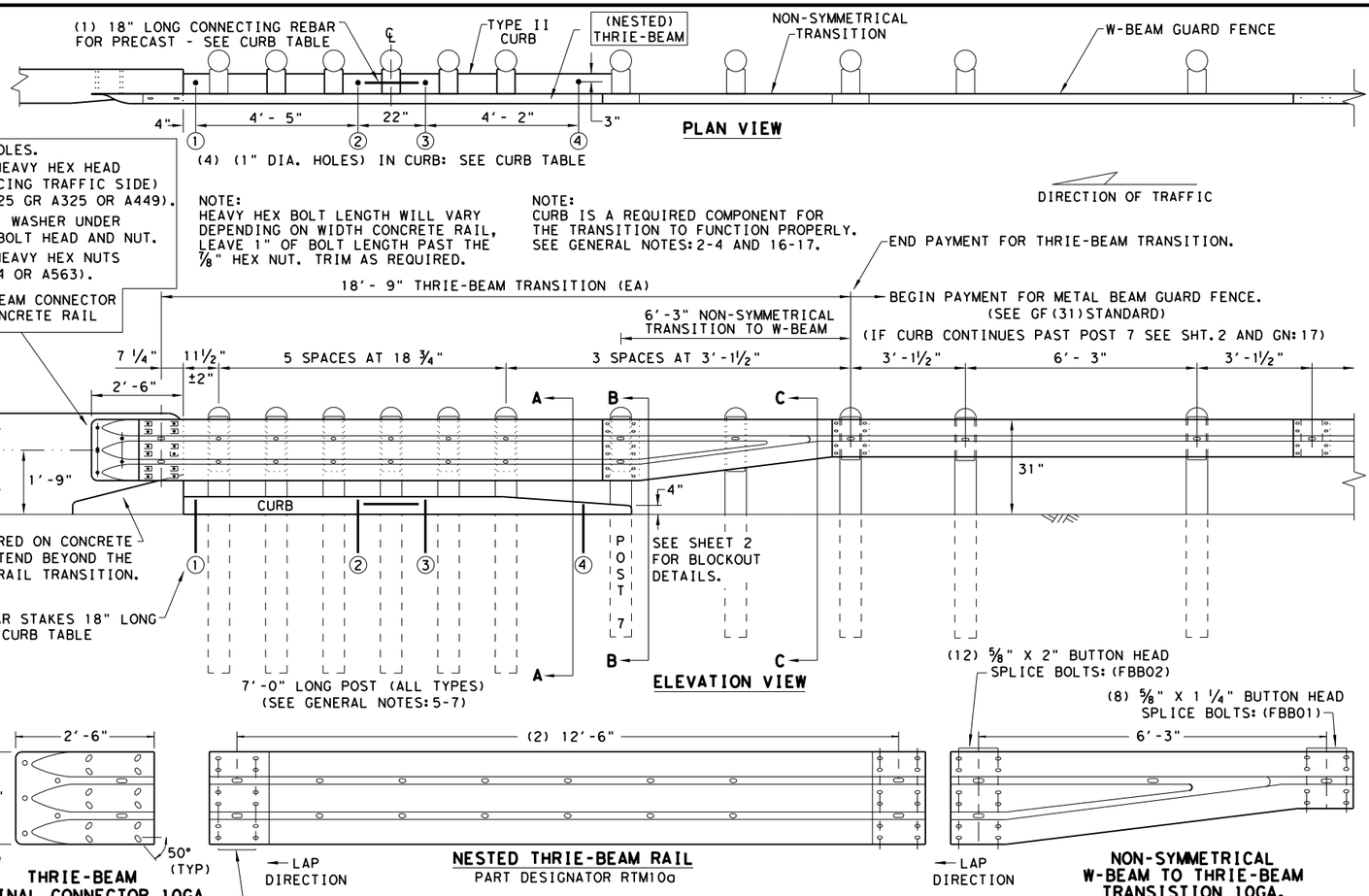


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

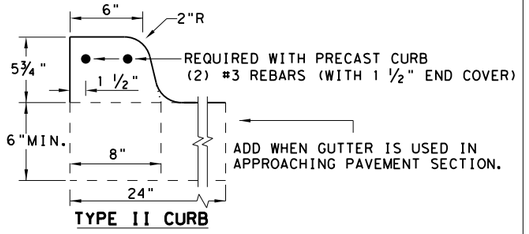
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0690	01	016, ETC	FM 271	
	DIST	COUNTY		SHEET NO.	
	PAR	FANNIN		72	

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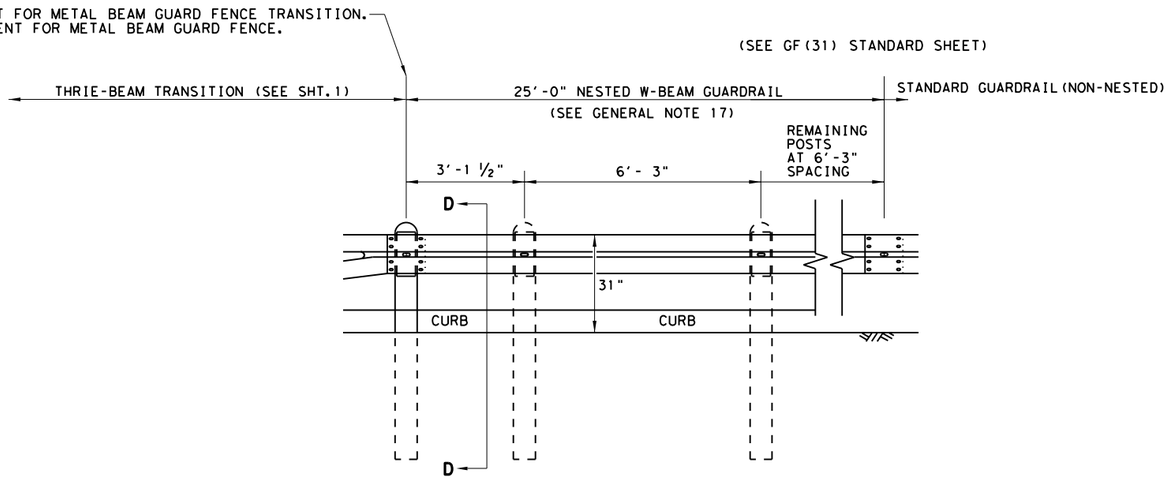
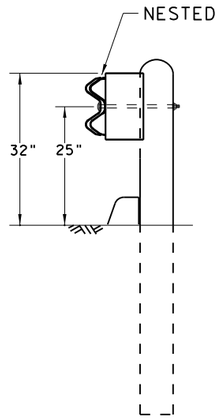
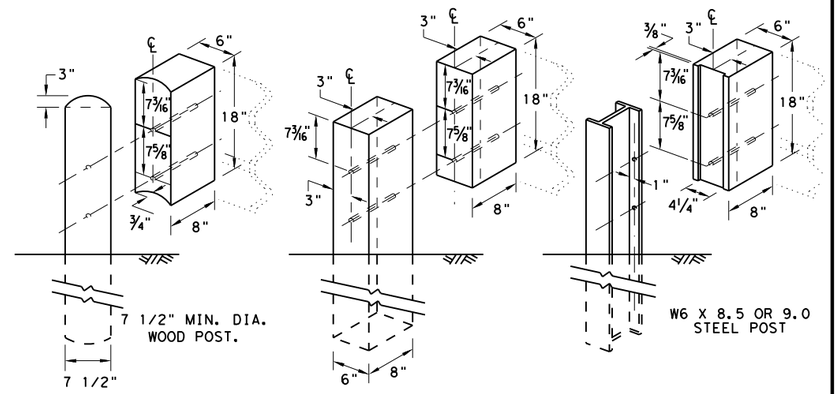
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
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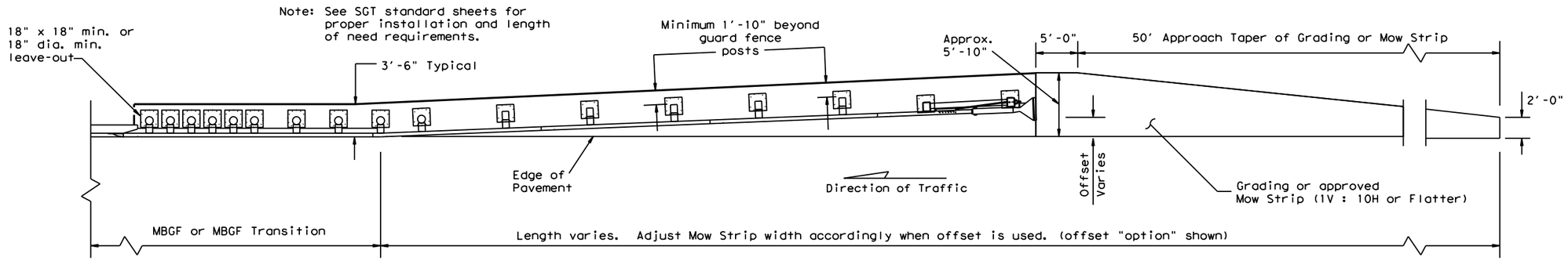
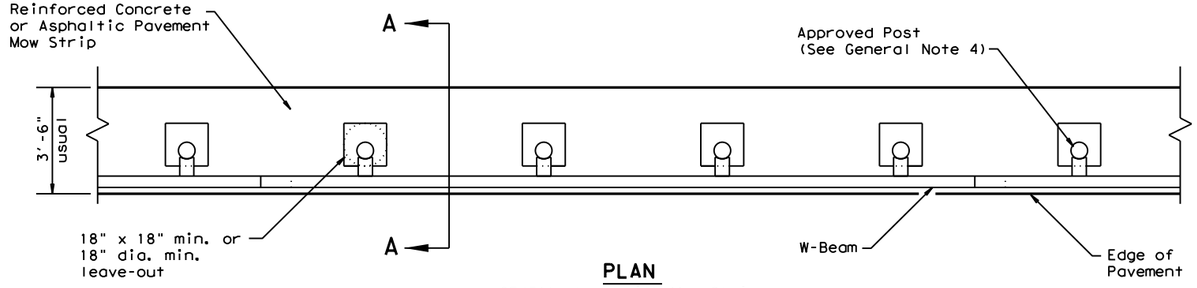
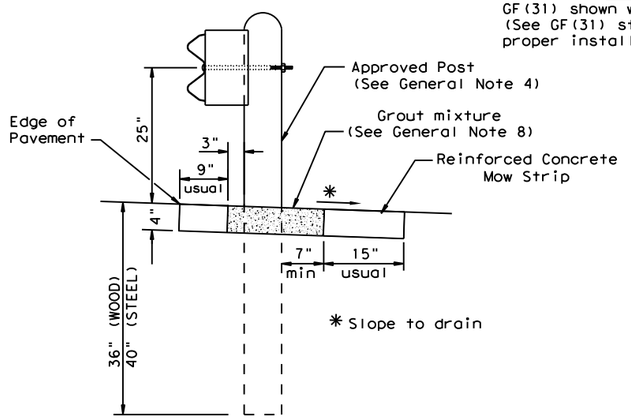


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



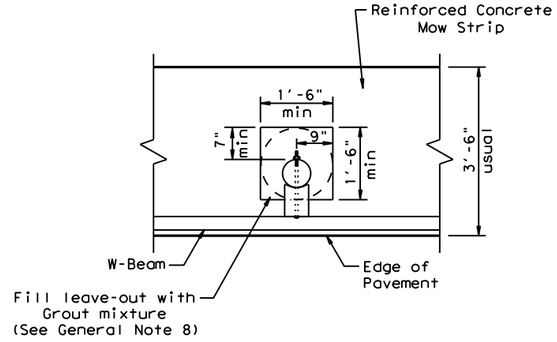
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

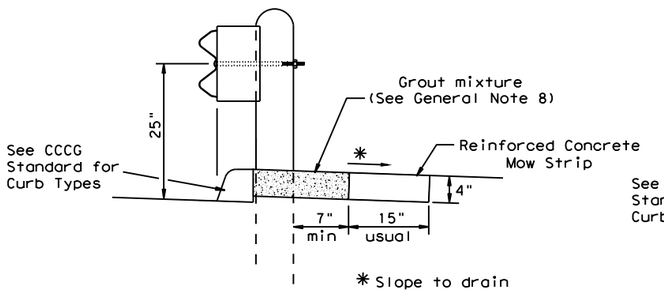
Note: Site Condition(s)

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

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

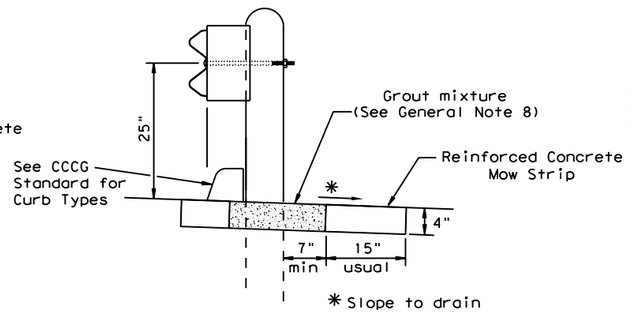
GENERAL NOTES

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



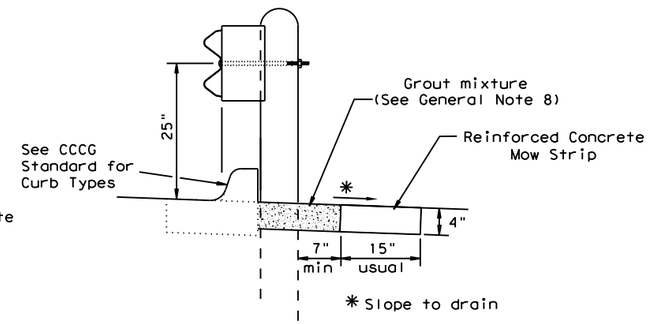
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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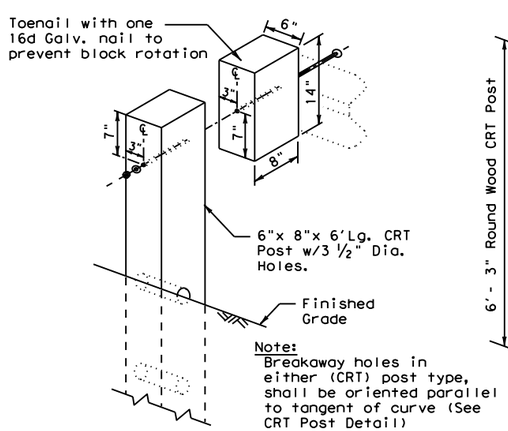
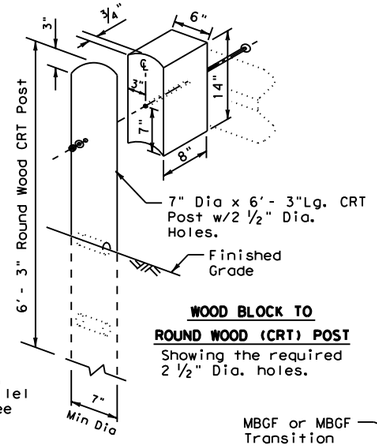
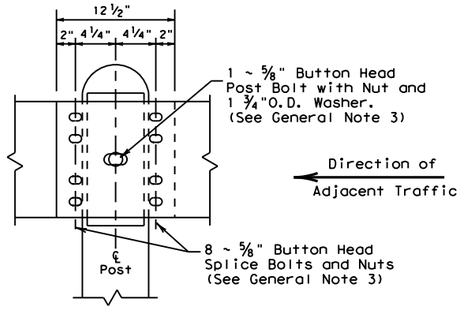


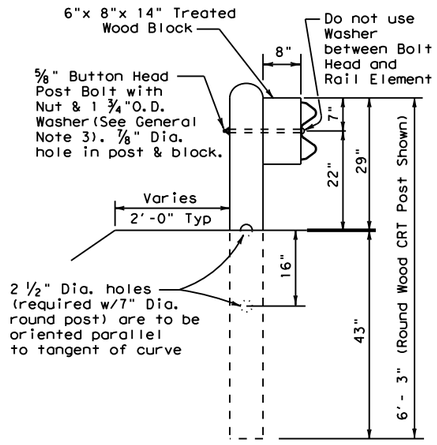
WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3 ½" Dia. holes.



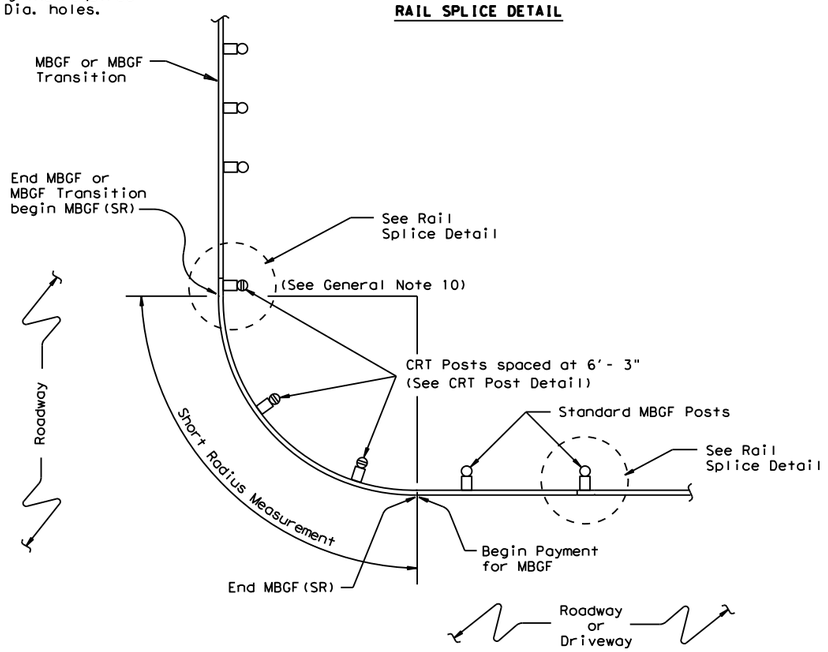
WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 ½" Dia. holes.



RAIL SPLICE DETAIL



(CRT) POST DETAIL
CONTROLLED RELEASE TERMINAL POST
Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



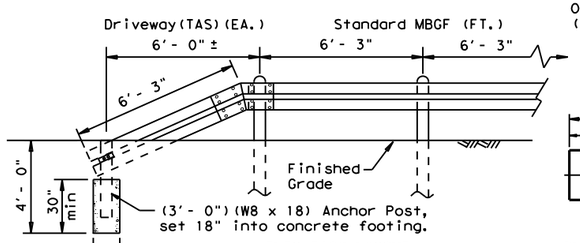
PLAN VIEW
SHOWING TYPICAL RADIUS
The required radius is shown elsewhere on the plans.

GENERAL NOTES

1. The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
2. Steel posts are not permitted at CRT post positions.
3. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
4. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
5. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
6. Crown shall be widened to accommodate the Metal Beam Guard Fence.
7. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Guardrail posts shall not be set in concrete, of any depth.
11. Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
12. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
13. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.

"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



ELEVATION LAYOUT

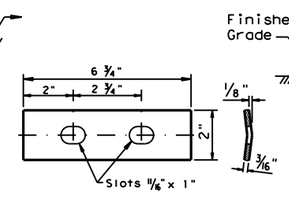
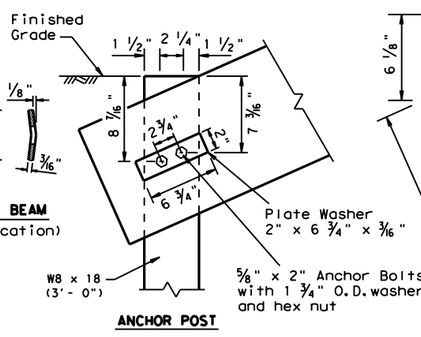
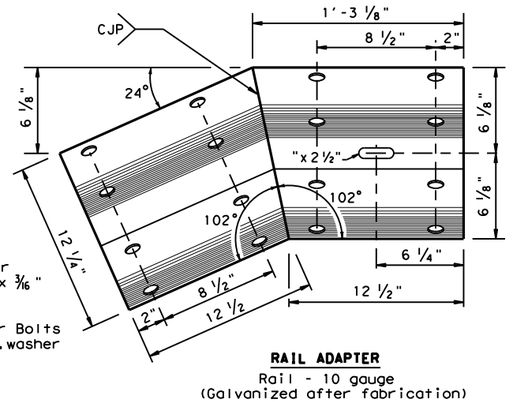


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)



ANCHOR POST



RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

GENERAL NOTES

1. The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft. (TAS) Terminal Anchor Section, is too long.
2. Terminal anchor post shall be set in Class A concrete.
3. All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(SHORT RADIUS)
MBGF (SR) - 19

FILE: mbgfsr19.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
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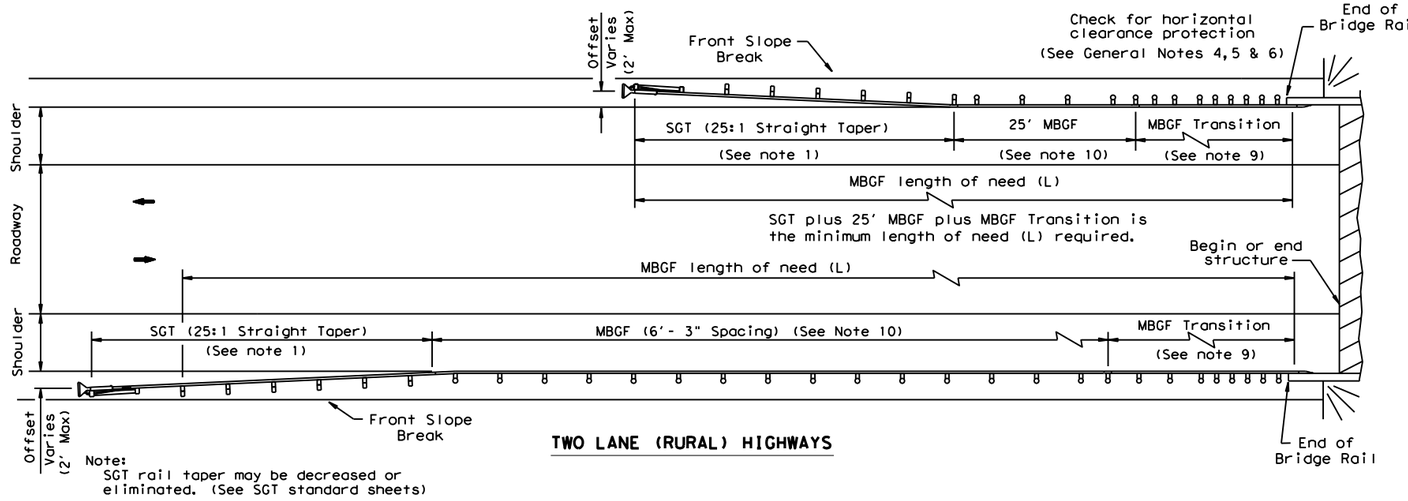
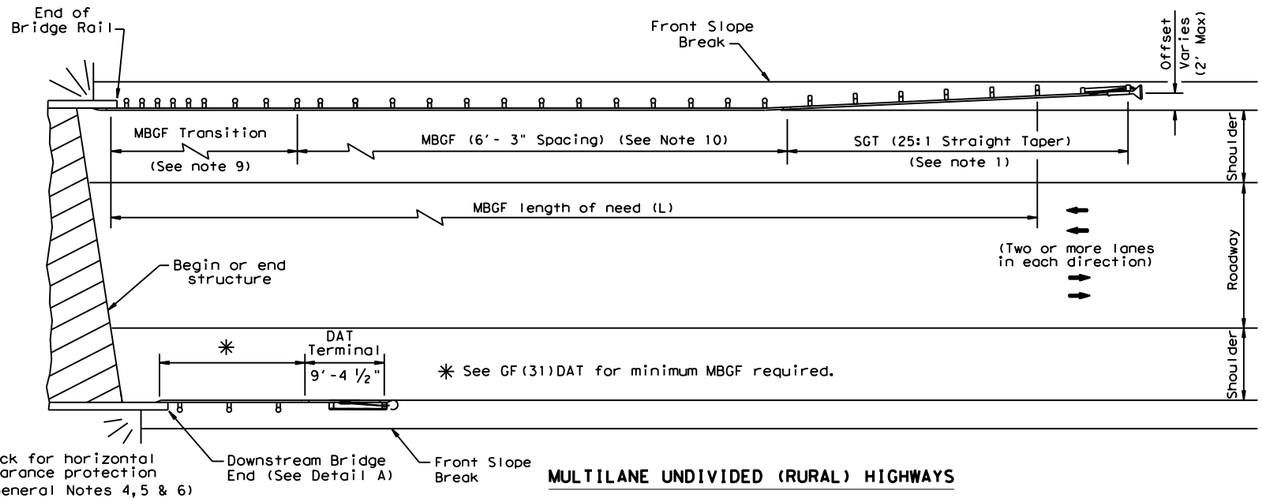
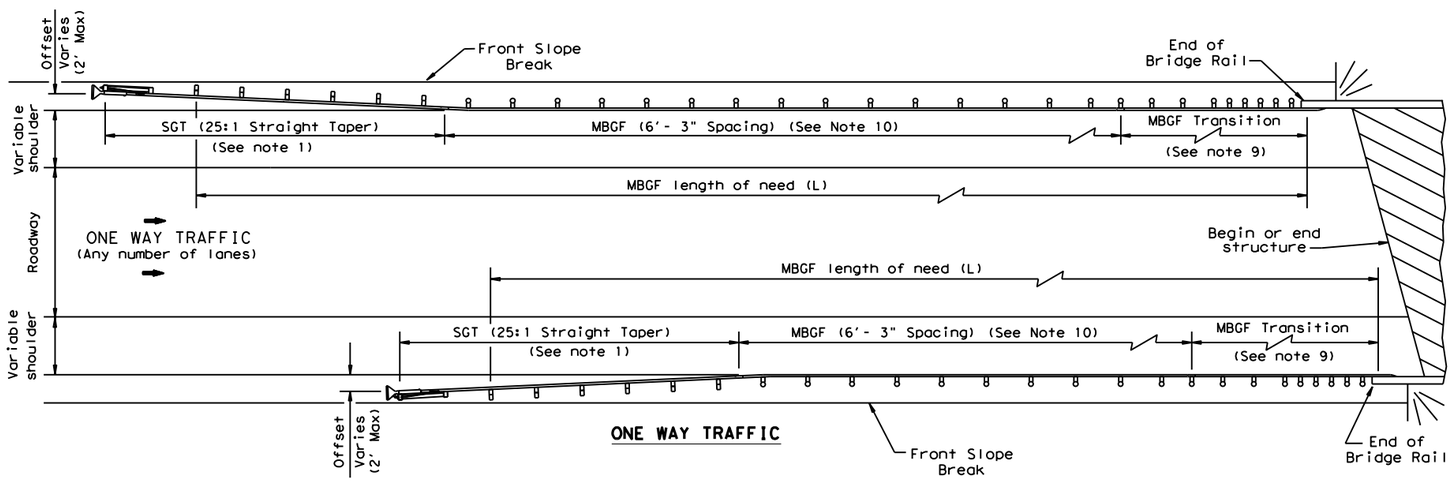


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



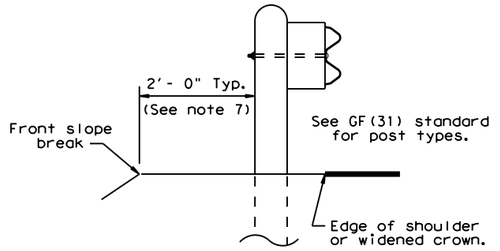
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF

Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation — Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		79

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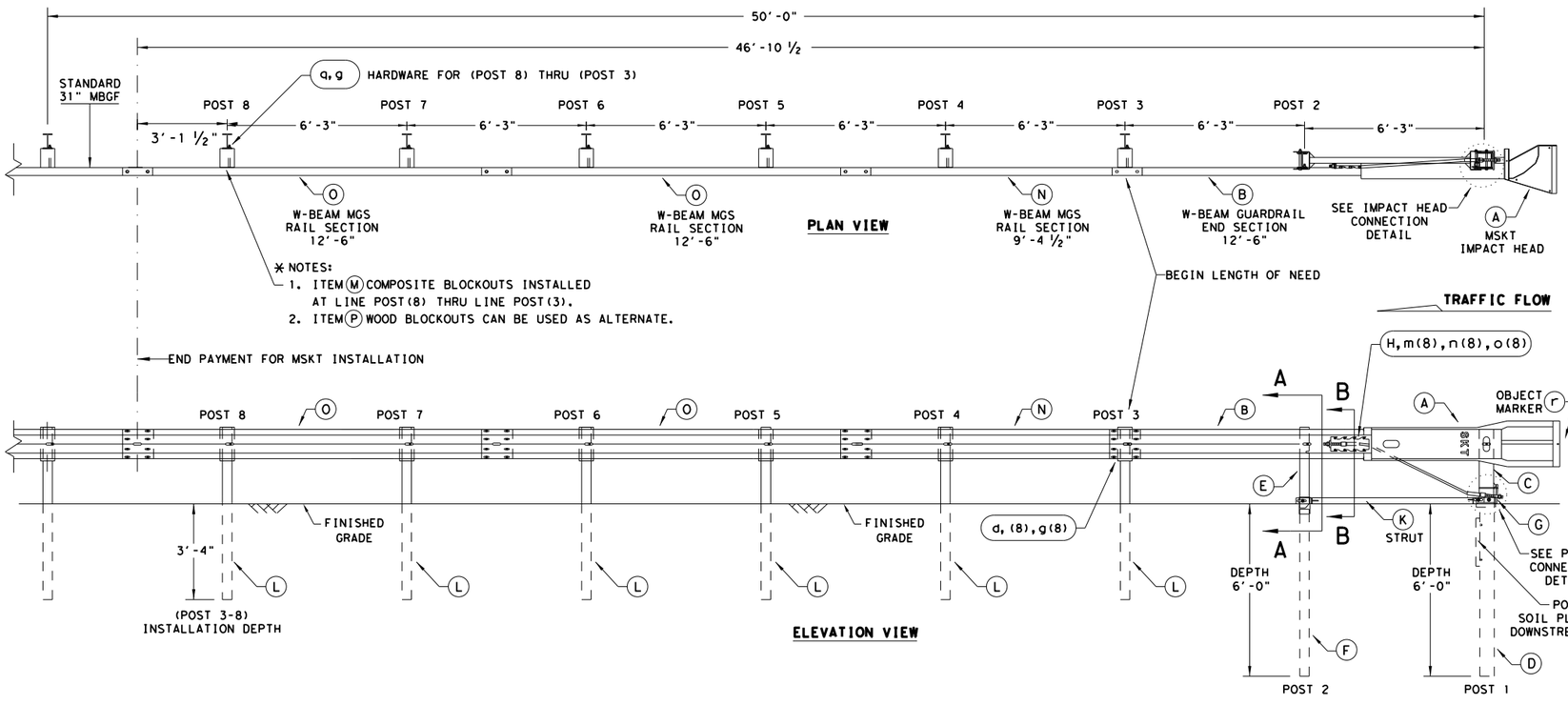


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

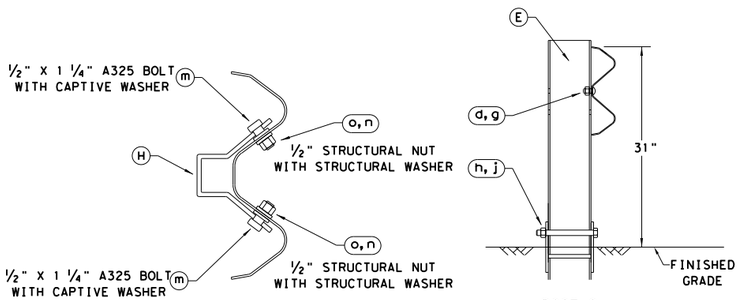
GENERAL NOTES

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

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

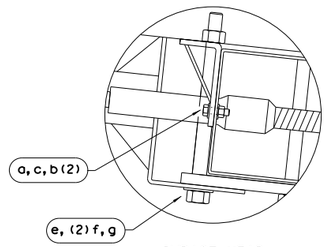
SEE NOTES: * —

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

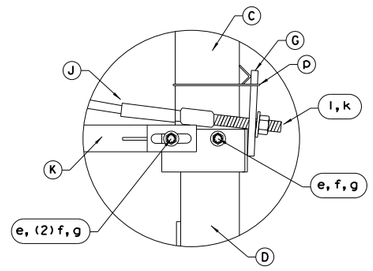


SECTION B-B
ANCHOR BRACKET

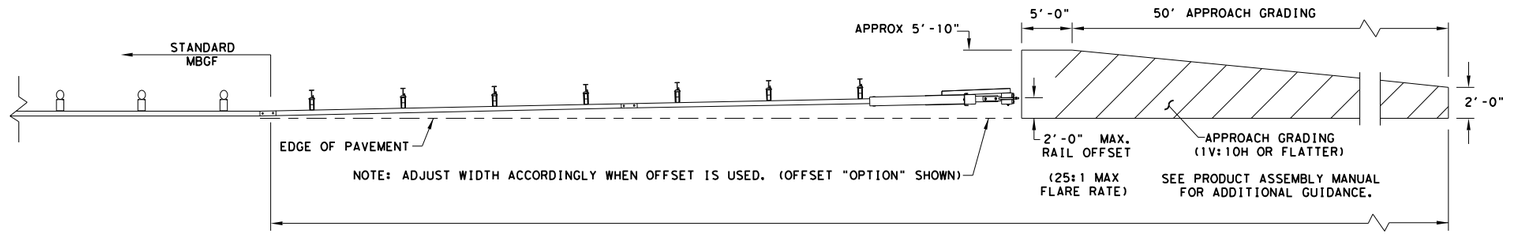
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

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

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© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
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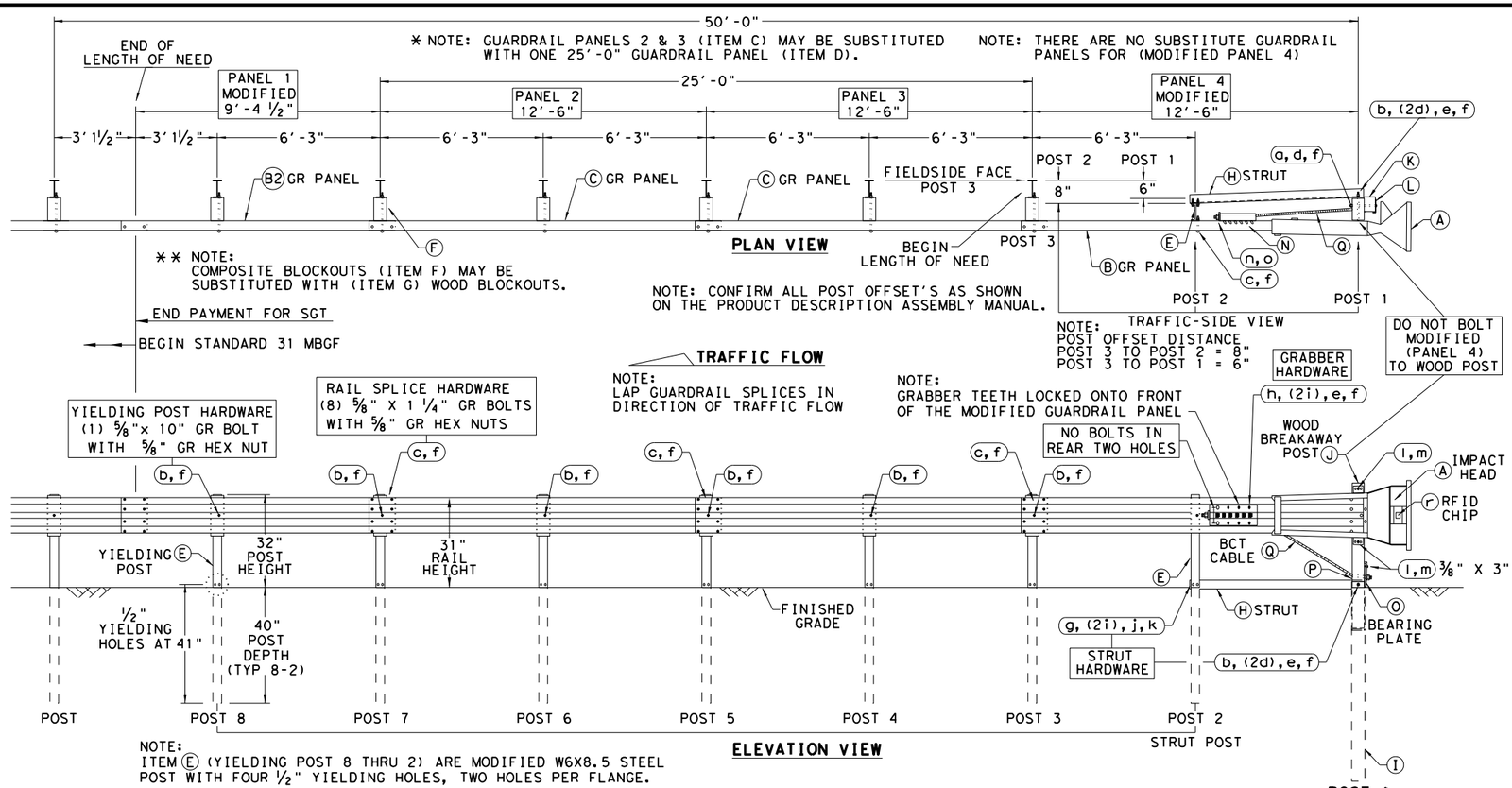
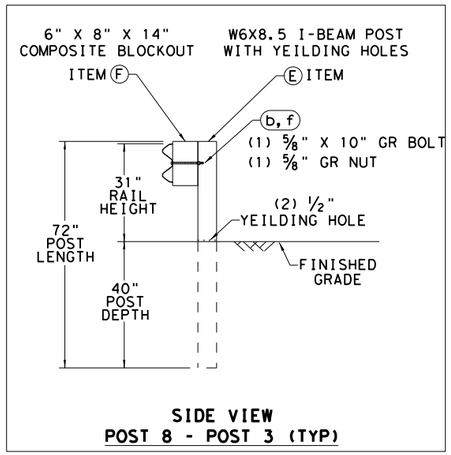


GENERAL NOTES

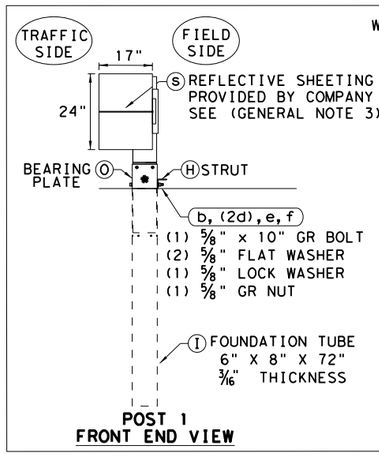
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

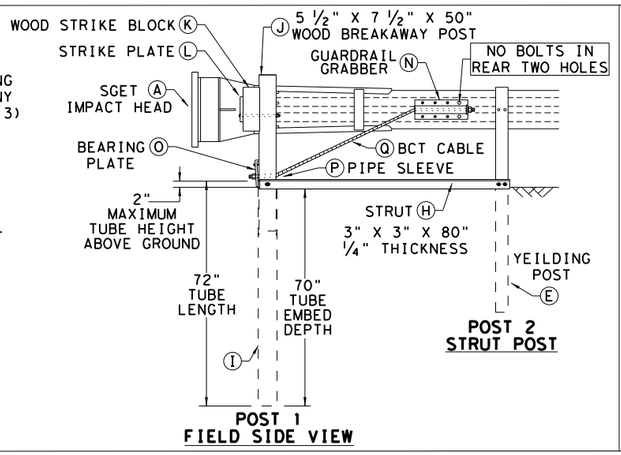
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

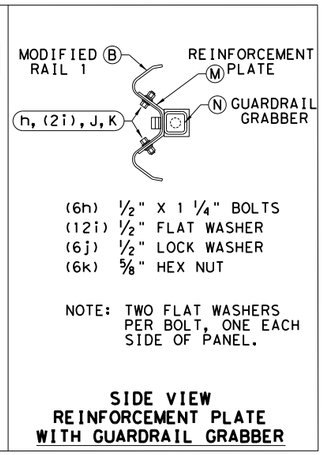


POST 1
FRONT END VIEW

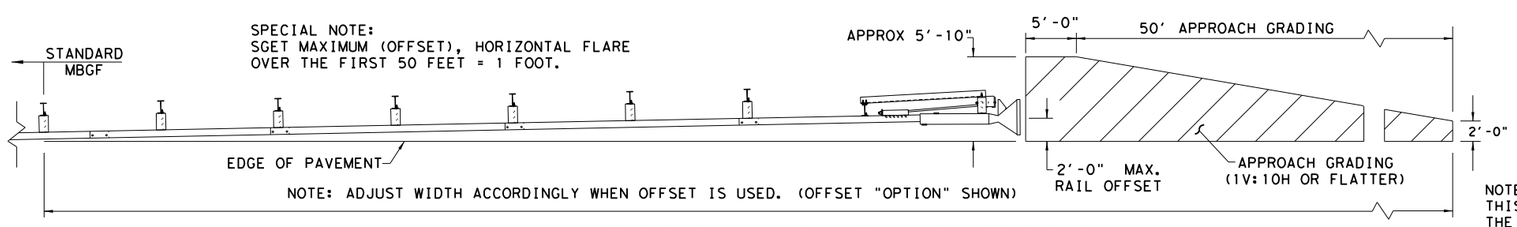


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation
Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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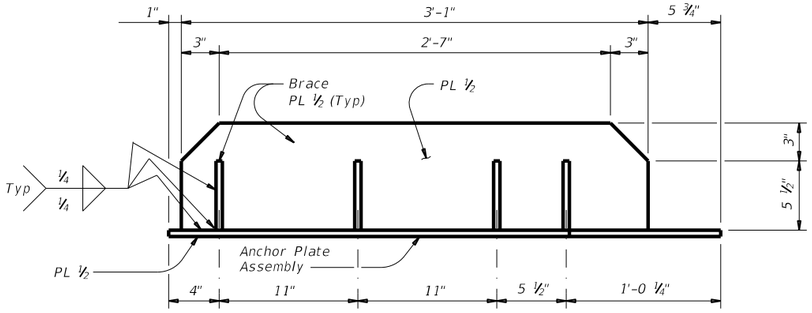
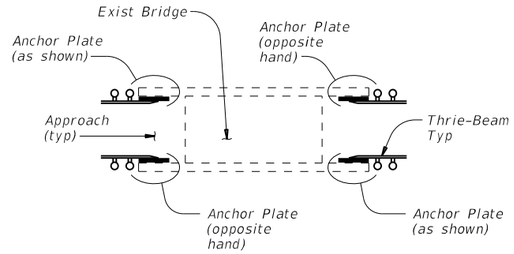
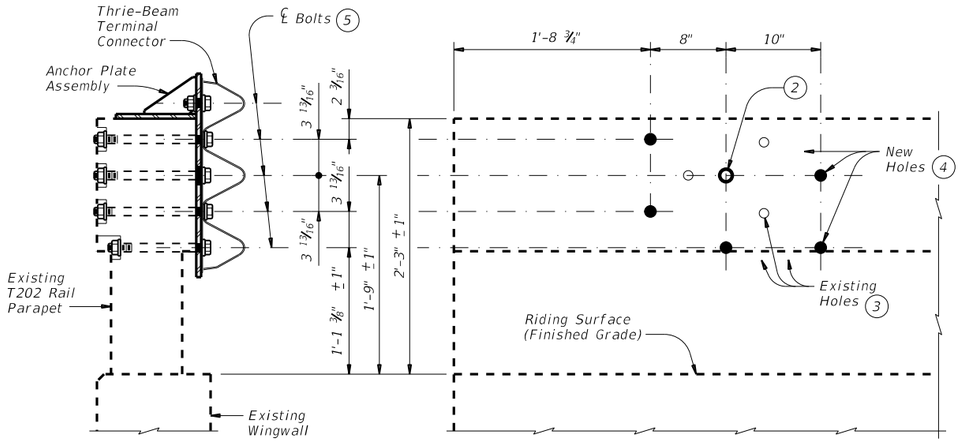


PLAN



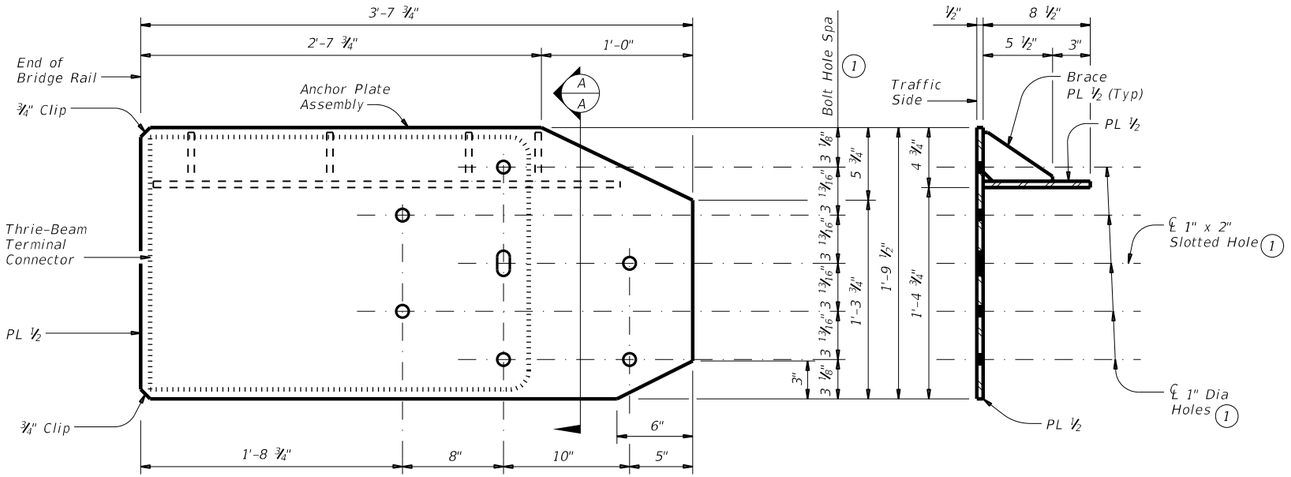
LOCATION DETAILS



SECTION
Showing completed installation

ROADSIDE ELEVATION
Anchor Plate assembly and Thrie-Beam Terminal Connector not shown for clarity

DETAILS OF BOLTS AND HOLES (1)

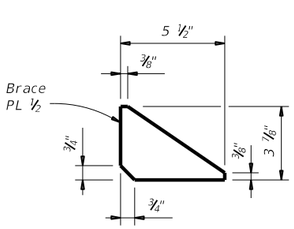


ROADSIDE ELEVATION

SECTION A-A

ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only.
For other side, Anchor Plate must be built opposite hand.



BRACE PLATE DETAILS

CONSTRUCTION NOTES:

Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.

Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection to the Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld splatter. Grind edges and corners to a 1/16" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

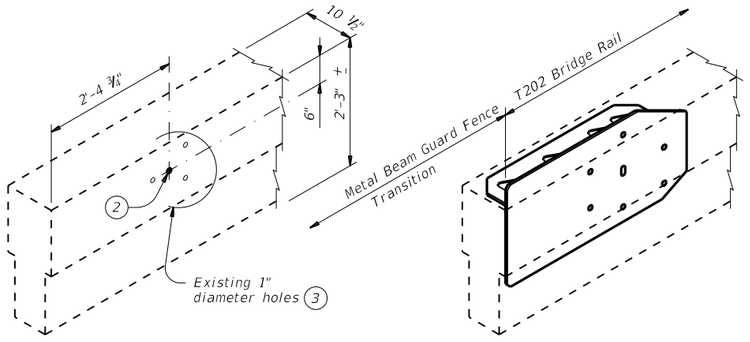
GENERAL NOTES:

These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.

Shop drawings are not required for this installation.

Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "Mtl Bm Gd Fen Trans (Anchor Plate)".

Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.



EXISTING PARAPET
Shown after removal of existing MBGF Transition connector and prior to coring new bolt holes

ANCHOR PLATE PLACEMENT

This sheet is intended as a guide in preparing job-specific details to retrofit existing T202 rails with a Thrie-Beam terminal connector. This sheet may not be used without modification. The details shown may need to be amended if the exact existing conditions are not covered. In all cases, details and notes not required are to be removed or crossed out, "(MOD)" added, and the phrase "(Not to be used as a standard)" removed from the title block. This sheet must be signed, sealed, and dated by a registered Professional Engineer.

The effective height of the existing rail (at the Anchor Plate location) above the finished riding surface, as seen by an errant vehicle, must be between 2'-2" and 2'-4". Alternate methods of retrofit must be used for effective heights beyond these limits. Dimensions of existing rail height (traffic side) should be shown. Particular care should be taken in identifying existing rail conditions and providing for proper Anchorage Plate and MBGF transition positioning.

(1) The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location prior to fabrication of the Anchor Plate assembly and prior to coring bolt holes in the existing T202 parapet.

(2) If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.

(3) If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.

(4) Drill new 1" diameter holes, each with a 2 ½" diameter x 1" deep recess, through existing railing parapet. Recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the contractor's expense.

(5) 7 ~ ⅞" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 ~ 1 ¾" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of ½" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.

INSTALLATION DETAILS

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

Texas Department of Transportation

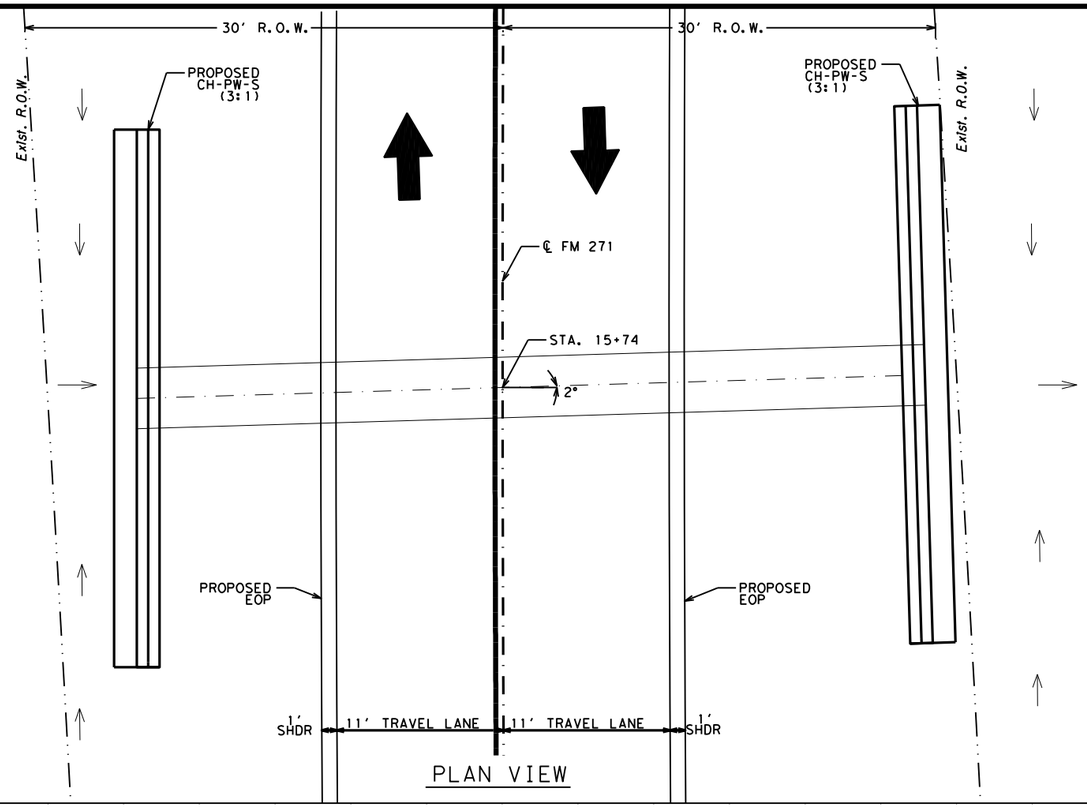
Bridge Division Standard

T202 TRANSITION RETROFIT GUIDE

(NOT TO BE USED AS A STANDARD)

T202TR

FILE: rlstd026-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		82

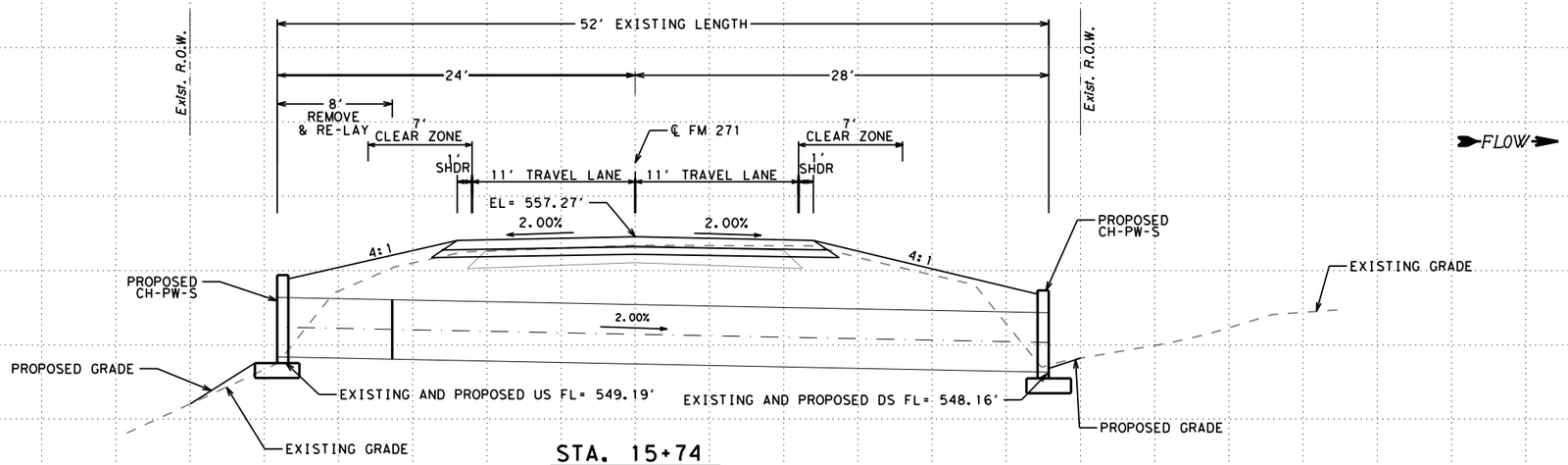


PLAN VIEW

ESTIMATED QUANTITIES	
0403 6001 TEMPORARY SPL SHORING	603 SF
0466 6136 HEADWALL (CH - PW -S) (DIA= 48 IN)	2 EA
0472 6013 REMOV & RE-LAY PIPE (48 IN)	8 LF

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: CH-PW-S



STA. 15+74

EXISTING ~ 1 - 48" x 52' RCP

PROPOSED ~ 1 - 48" X 52' RCP
WITH CH-PW-S US & DS

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIKE IN ELM STUMP
39' LT @ STA. 17+43
ELEV= 555.35

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 15+74

SHEET 1 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		83

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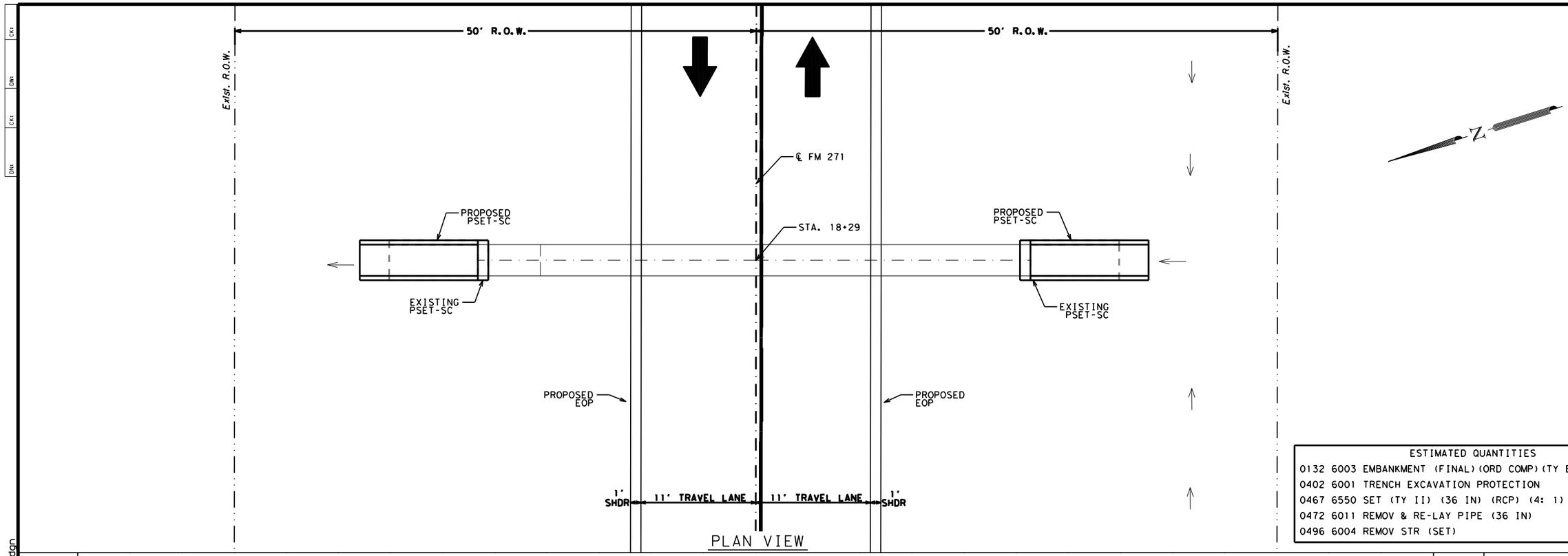
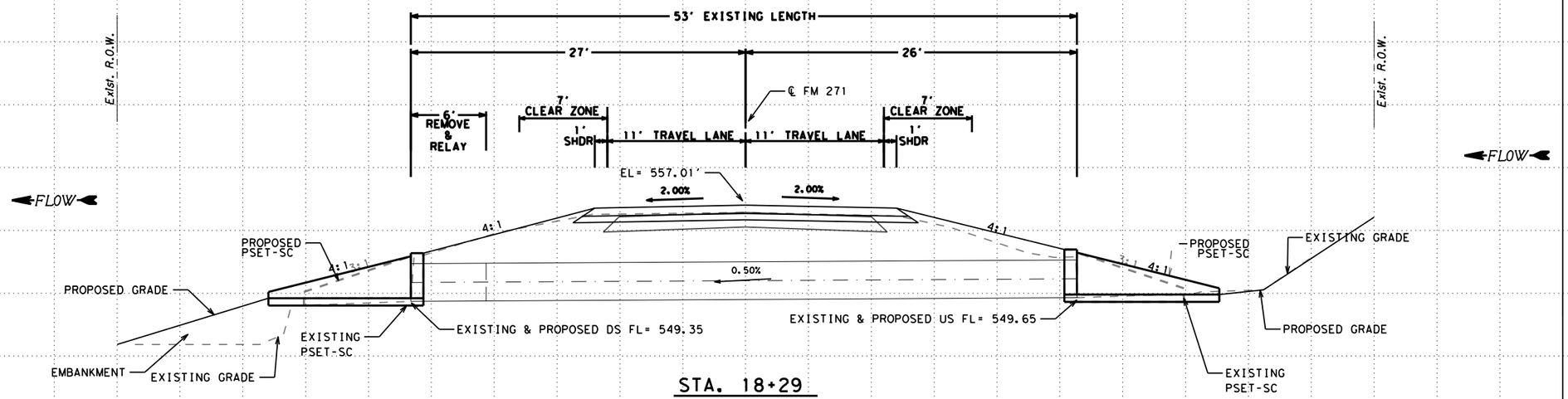


PLAN VIEW

ESTIMATED QUANTITIES	
0132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	4 CY
0402 6001 TRENCH EXCAVATION PROTECTION	6 LF
0467 6550 SET (TY II) (36 IN) (RCP) (4: 1) (C)	2 EA
0472 6011 REMOV & RE-LAY PIPE (36 IN)	6 LF
0496 6004 REMOV STR (SET)	2 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 18+29

EXISTING ~ 1 - 36" x 53' RCP

PROPOSED ~ 1 - 36" X 53' RCP
WITH PSET-SC US & DS

BM RR SPIKE IN ELM STUMP
39' LT @ STA. 17+43
ELEV= 555.35

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 18+29

SHEET 2 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		84

DATE: 7/7/2022 8:50:30 AM
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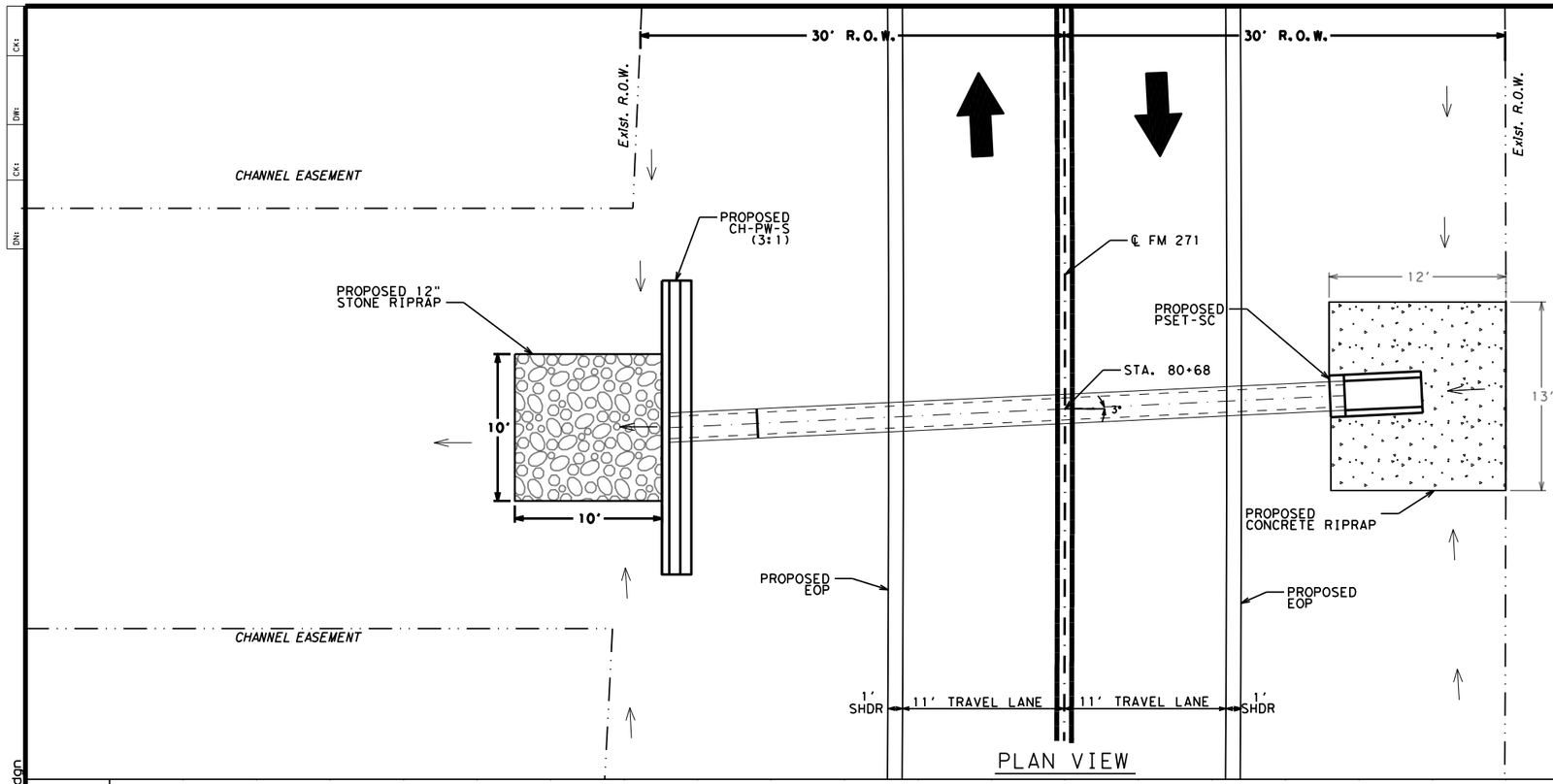
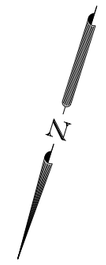
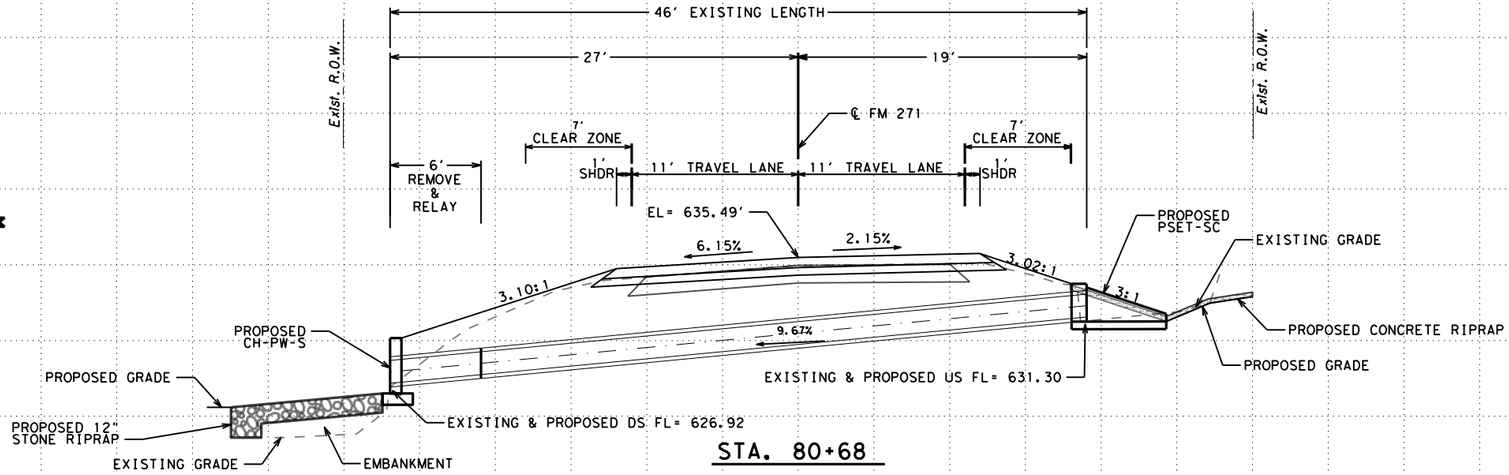




ESTIMATED QUANTITIES	
0432 6001 RIPRAP (CONC)(4IN)	2 CY
0132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	4 CY
0432 6031 RIPRAP (STONE PROTECTION)(12 IN)	6 CY
0466 6130 HEADWALL (CH - PW -S) (DIA= 24 IN)	1 EA
0467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	1 EA
0472 6006 REMOV & RE-LAY PIPE (24 IN)	6 LF
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC, CH-PW-S & SRR



STA. 80+68

EXISTING ~ 1 - 24" x 46' RCP

PROPOSED ~ 1 - 24" X 46' RCP
WITH PSET-SC US & CH-PW-S DS

BM RR IN 18" CEDAR FENCE CORNER POST
25' RT @ STA. 91+93
ELEV= 637.45

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 80+68

SHEET 3 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		85

DATE: 7/7/2022 8:50:31 AM
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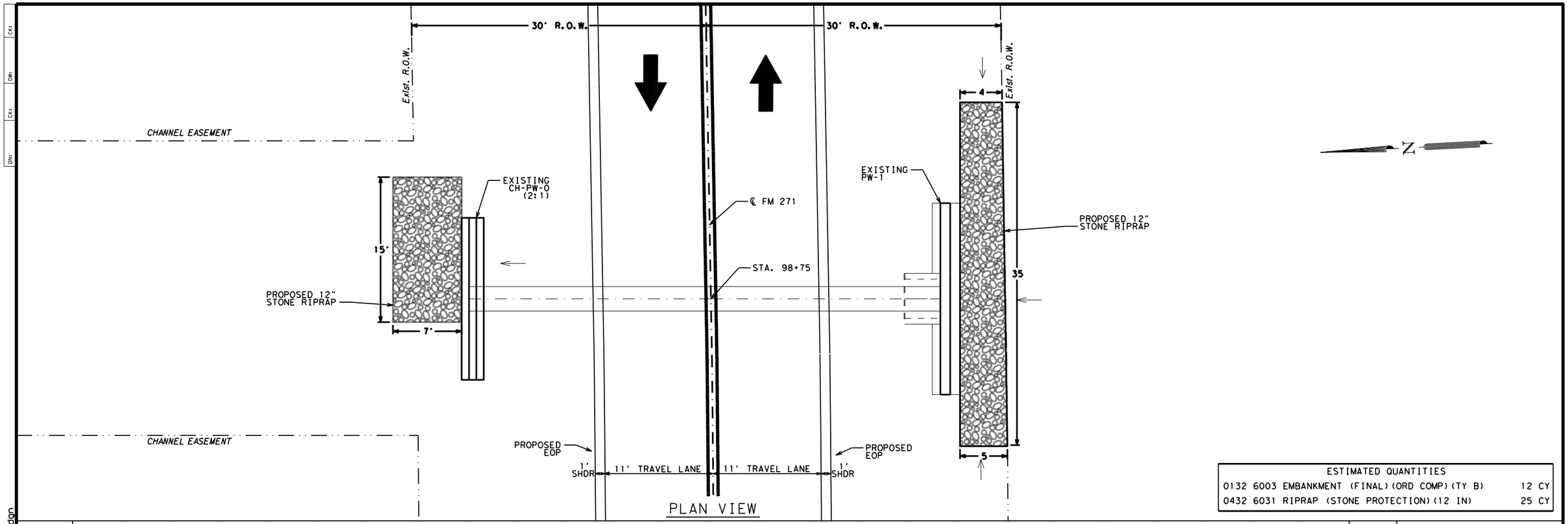
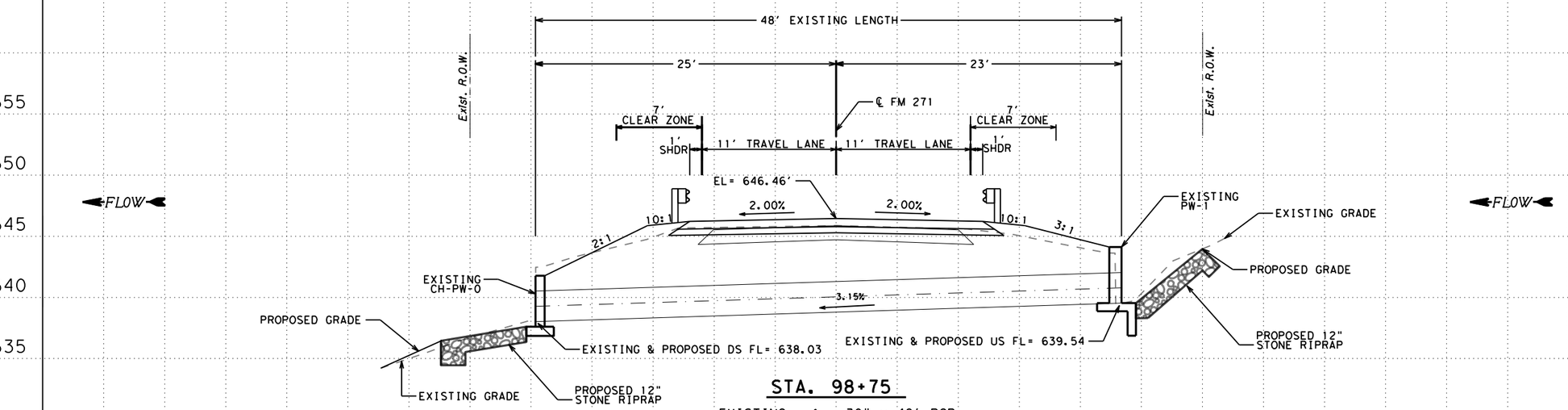


ESTIMATED QUANTITIES	
0132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	12 CY
0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	25 CY

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: SRR



STA. 98+75

EXISTING ~ 1 - 30" x 48' RCP

PROPOSED ~ 1 - 30" X 48' RCP
WITH 4'X3' BOX US & CH-PW-0 DS

ADD EMBANKMENT BEHIND MBGF FOR 10:1 SLOPE

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIKE IN CUT OFF POWER POLE IN FENCE
29' LT @ STA. 97+71
ELEV= 647.48

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 98+75

SHEET 4 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		86

DATE: 7/7/2022 8:50:32 AM
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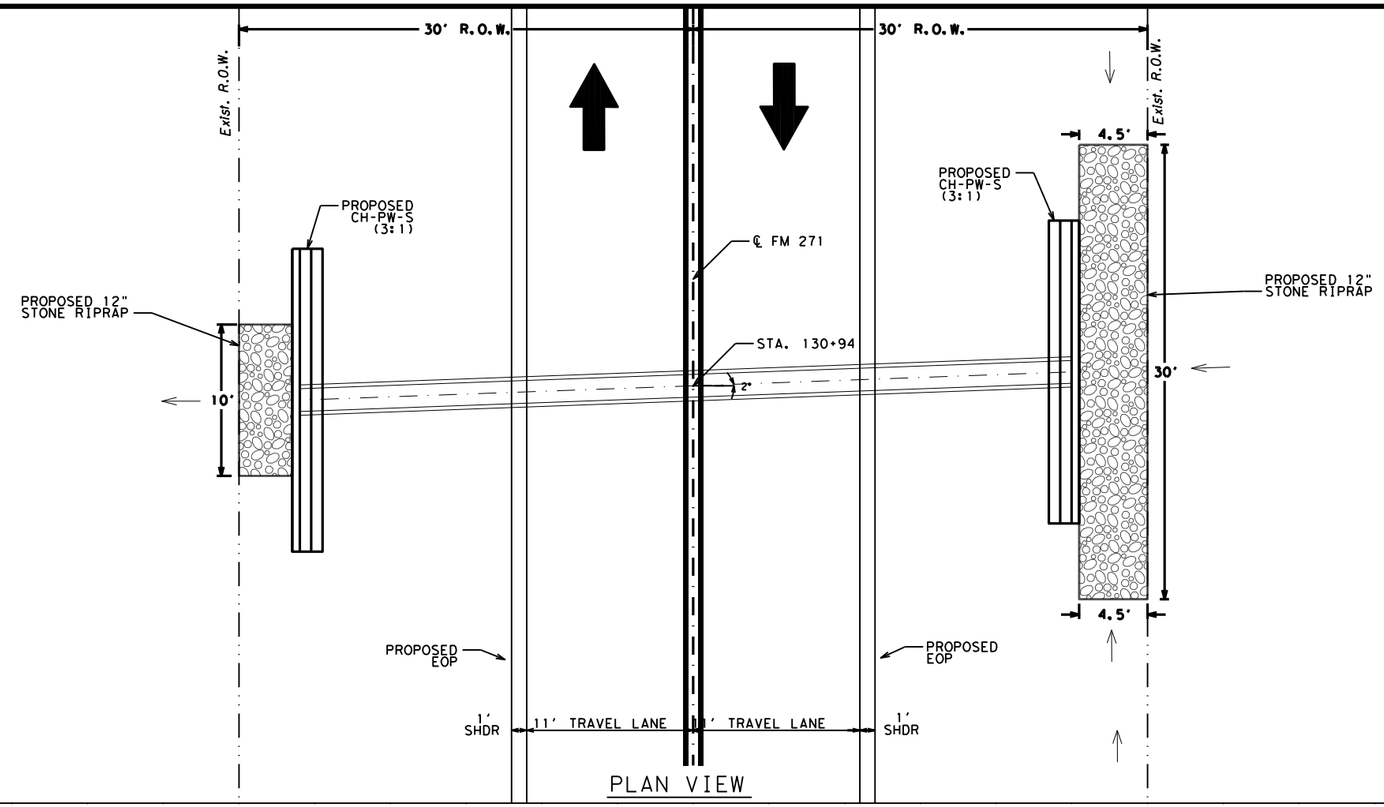
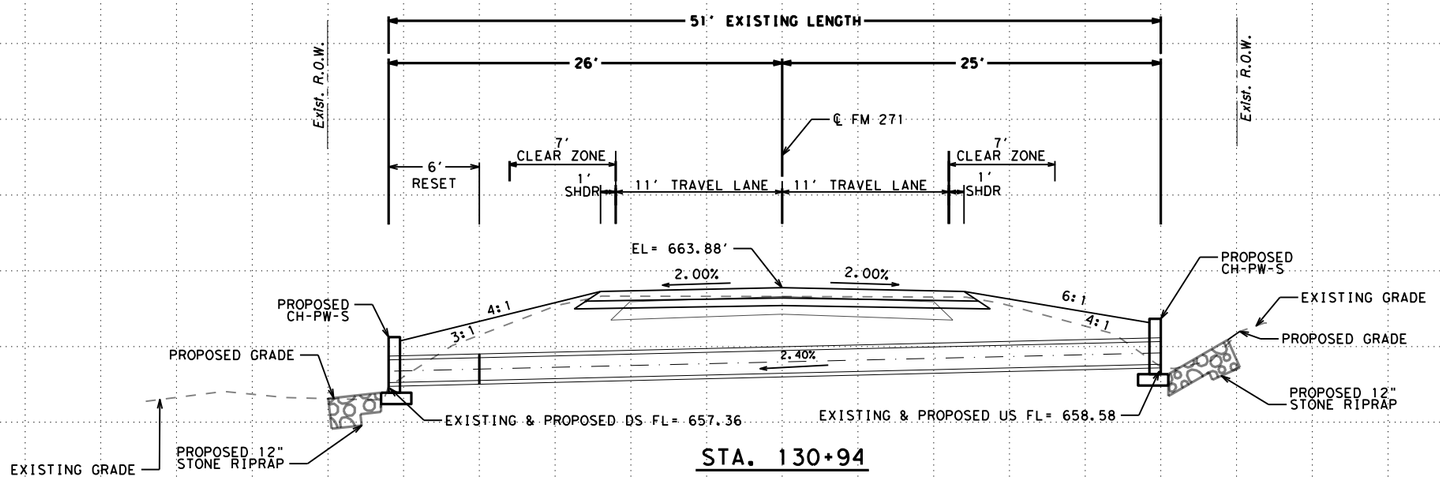


PLAN VIEW

ESTIMATED QUANTITIES	
0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	16 CY
0466 6130 HEADWALL (CH - PW -S) (DIA= 24 IN)	2 EA
0472 6006 REMOV & RE-LAY PIPE (24 IN)	6 LF

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: CH-PW-S & SRR



STA. 130+94

EXISTING ~ 1 - 24" x 51' RCP

PROPOSED ~ 1 - 24" X 51' RCP
WITH CH-PW-S US & DS

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIE IN WOOD
R.O.W. MONUMENT
28' RT @ STA. 130+46
ELEV= 666.01

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 130+94

SHEET 5 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		87

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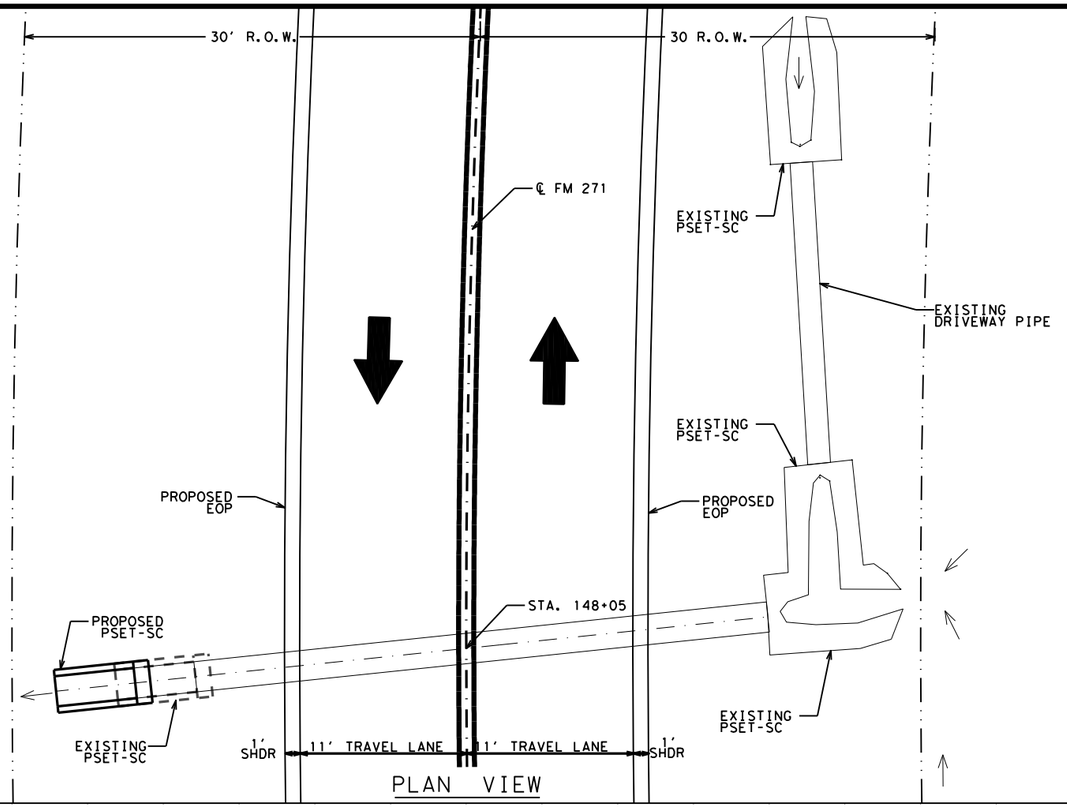
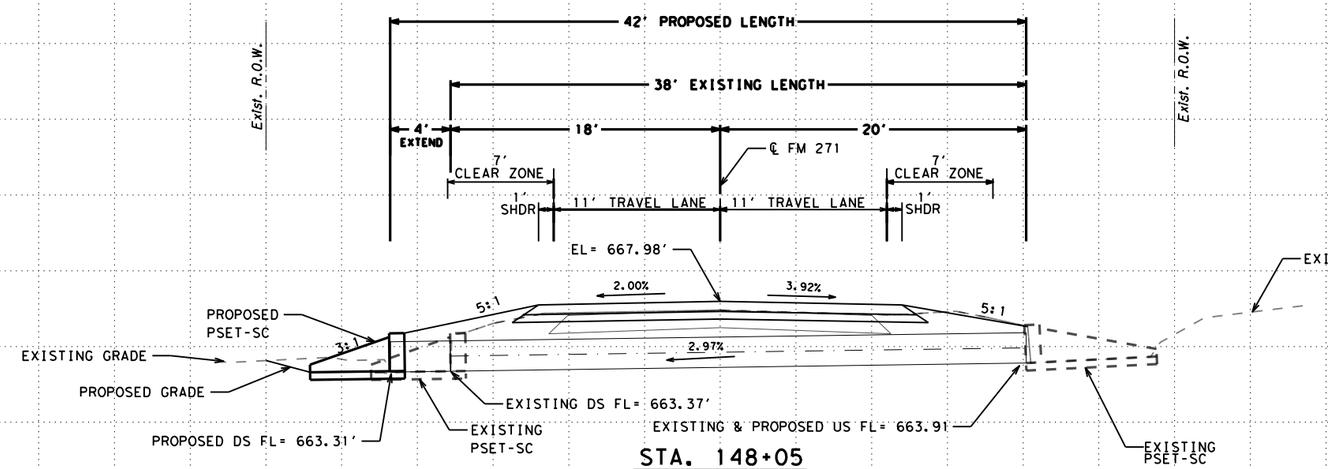


PLAN VIEW

ESTIMATED QUANTITIES	
0464 6005 RC PIPE (CL III)(24 IN)	4 LF
0467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	1 EA
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 148+05

EXISTING ~ 1 - 24" x 38' RCP

PROPOSED ~ 1 - 24" X 42' RCP
WITH PSET-SC US & DS

BM RR SPIKE IN
POWER POLE
35' RT @ STA. 147+66
ELEV= 669.76

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 148+05

SHEET 6 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		88

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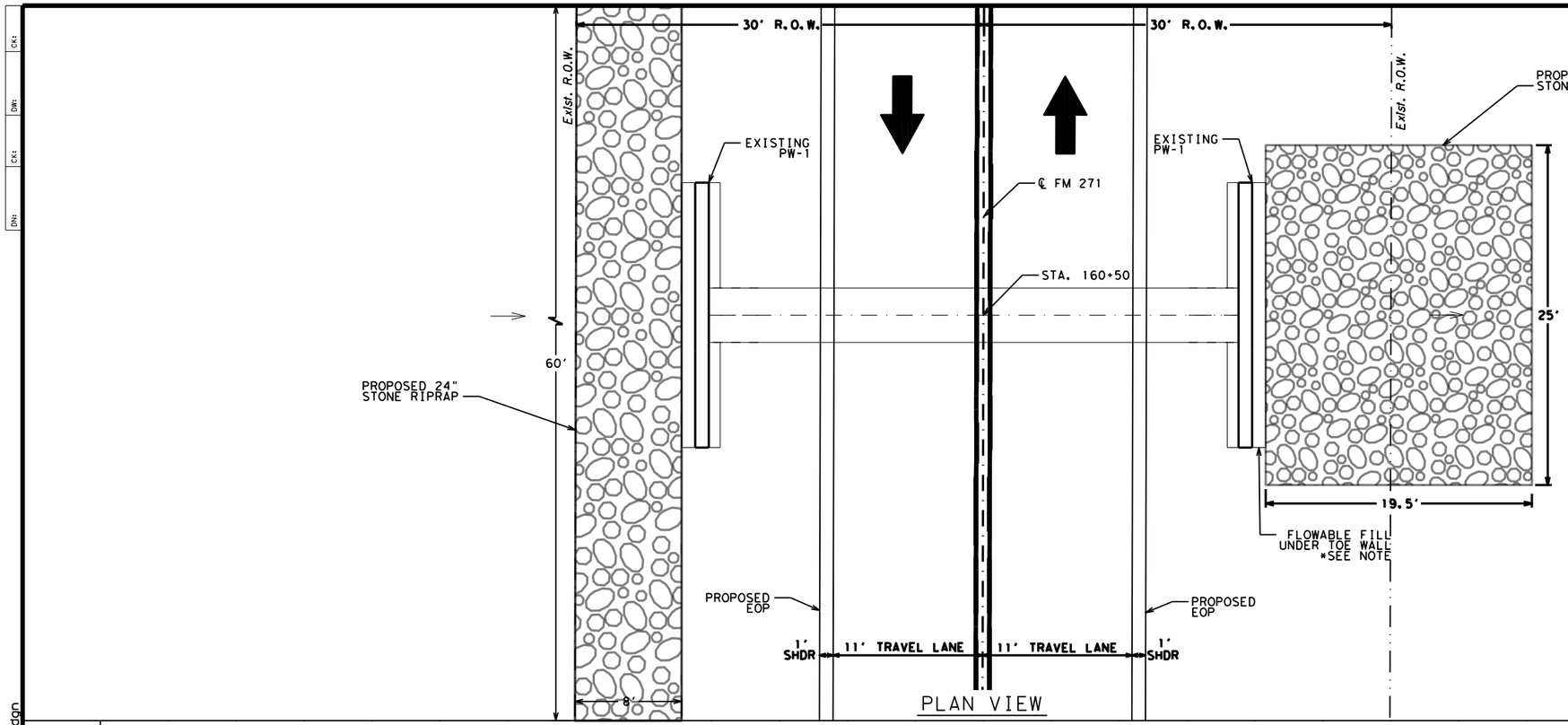
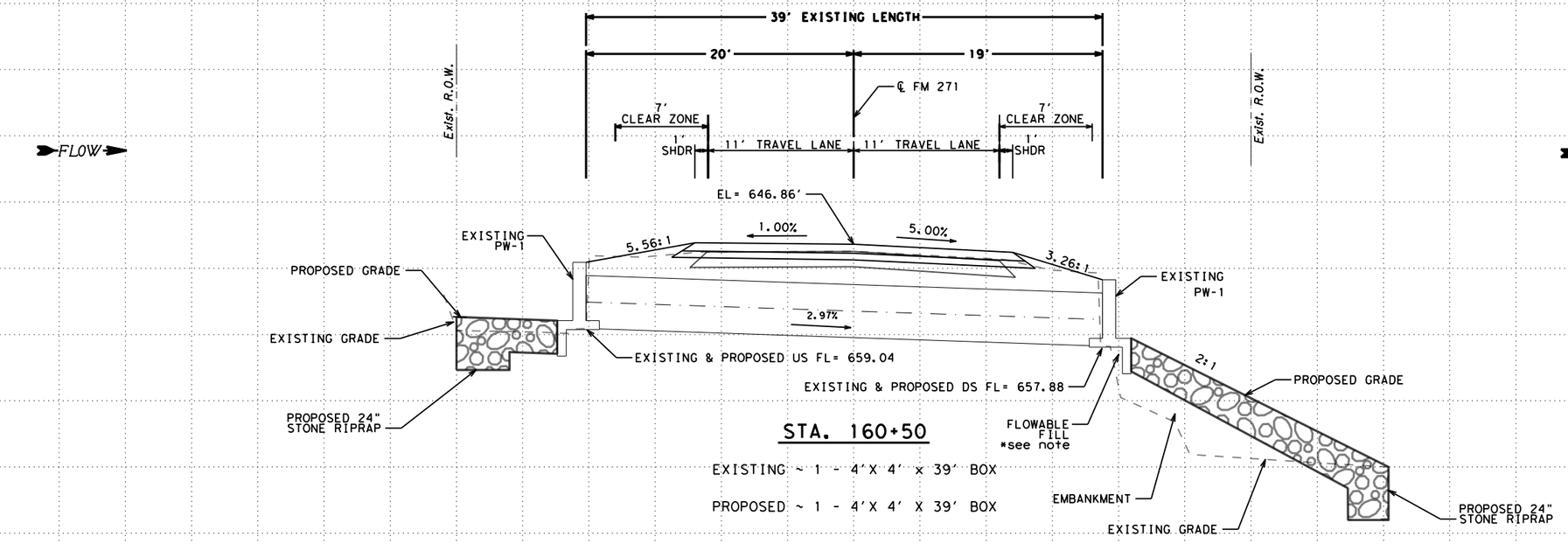


*NOTE: FLOWABLE FILL PLACEMENT- CONSTRUCT FLOW FILL FORMS PARALLEL AND TWO FEET FROM FACE OF TOE WALL WITH UPPER FORM EDGE AT BOX CULVERT ELEVATION. PLACE LOW SLUMP FLOW FILL WITHIN FORMS AN VIBRATE FILL TO FILL VOID BEHIND WALL.

ESTIMATED QUANTITIES	
0132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	3 CY
0401 6001 FLOWABLE BACKFILL	5 CY
0432 6035 RIPRAP (STONE PROTECTION) (24 IN)	72 CY

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: SRR



BM RR SPIKE IN
CUT OFF POWER POLE
25' LT @ STA. 160+10
ELEV= 647.14

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
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PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 160+50

SHEET 7 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		89

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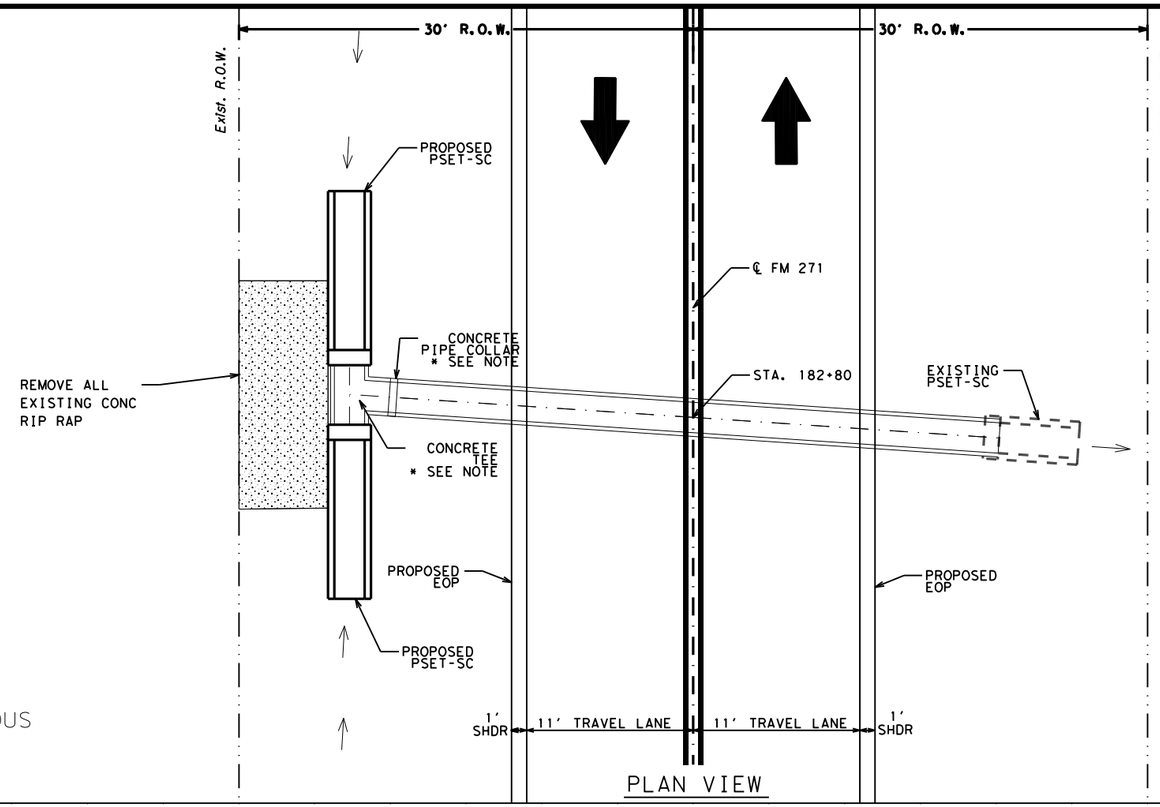


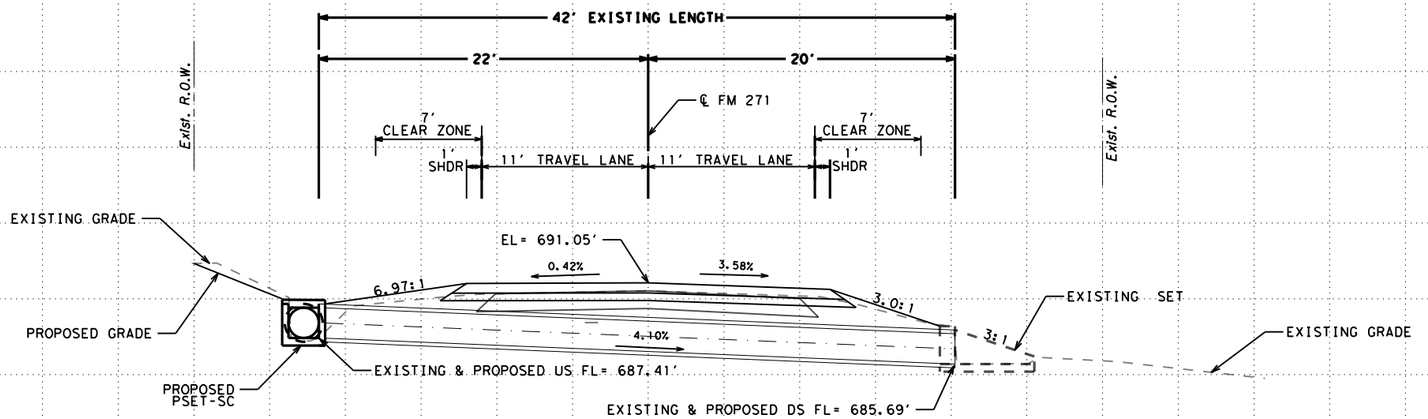
PLAN VIEW

*NOTE: SEE MISCELLANIOUS SHEET FOR DETAILS

ESTIMATED QUANTITIES	
0104 6009 REMOVING CONC (RIPRAP)	14 SY
0420 6009 CONC (COLLAR)	1 EA
0464 6005 RC PIPE (CL III)(24 IN)	4 LF
0467 6395 SET (TY II) (24 IN) (RCP) (6: 1) (P)	2 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 182+80

EXISTING ~ 1 - 24" x 42' RCP

PROPOSED ~ 1 - 24" X 42' RCP WITH PSET-SC US & DS

BM RR SPIKE
IN POWER POLE
18' LT @ STA. 183+55
ELEV= 693.85

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 182+80

SHEET 8 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		90

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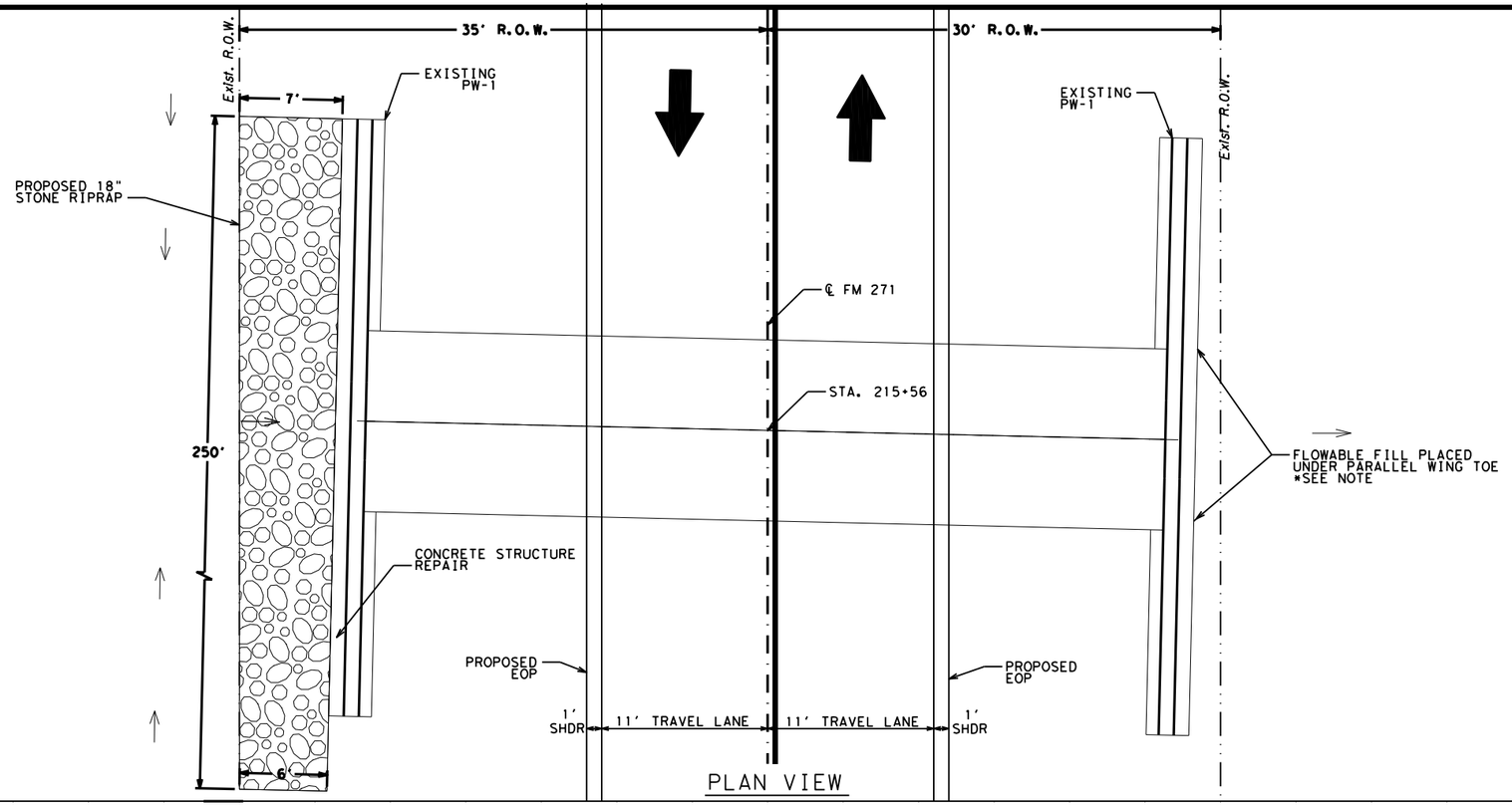


PLAN VIEW

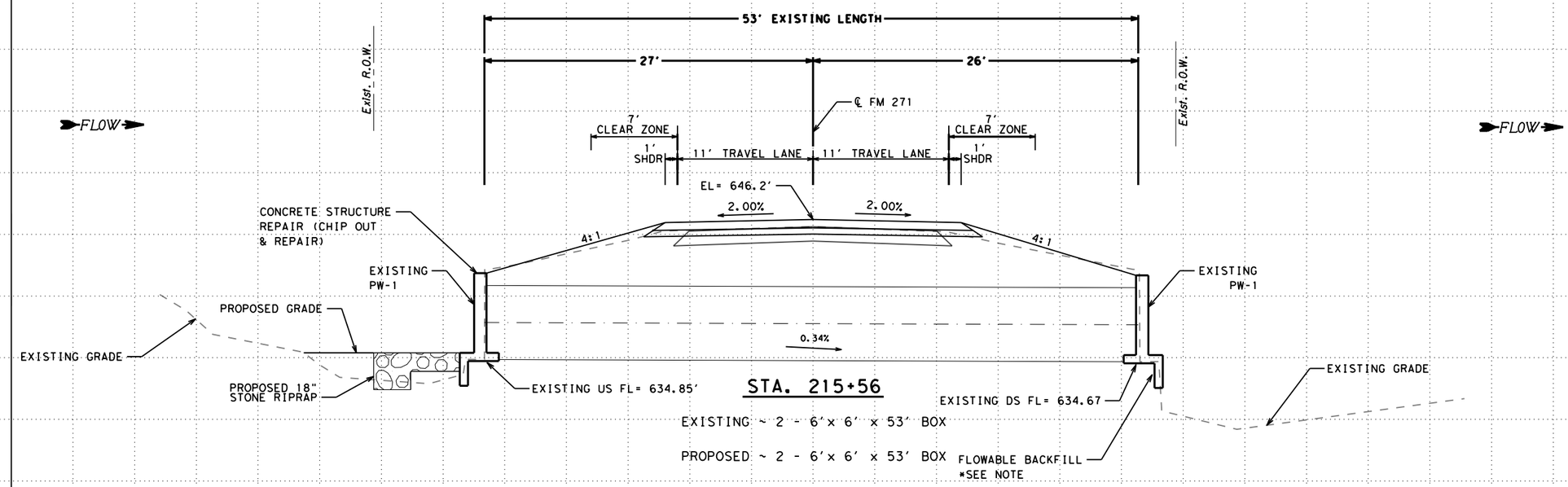
N

*NOTE: FLOWABLE FILL PLACEMENT- CONSTRUCT FLOW FILL FORMS PARALLEL AND TWO FEET FROM FACE OF TOE WALL WITH UPPER FORM EDGE AT BOX CULVERT ELEVATION. PLACE LOW SLUMP FLOW FILL WITHIN FORMS AN VIBRATE FILL TO FILL VOID BEHIND WALL.

ESTIMATED QUANTITIES	
0132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	4 CY
0401 6001 FLOWABLE BACKFILL	16 CY
0432 6033 RIPRAP (STONE PROTECTION) (18 IN)	97 CY
0429 6009 CONC STR REPAIR (STANDARD)	15 SF

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: SRR



STA. 215+56

BM RR SPIKE
IN POWER POLE
26' LT @ STA. 216+28
ELEV= 643.39

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 215+56

SHEET 9 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		91

DATE: 7/7/2022 8:50:37 AM
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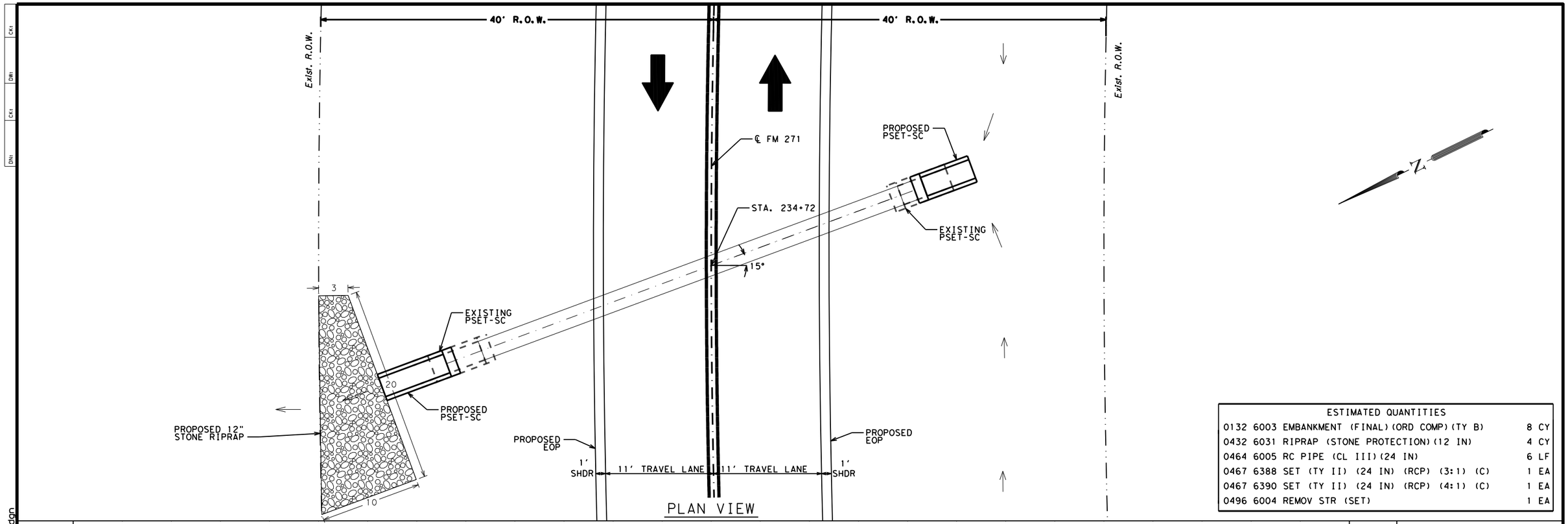
DW:
CK:
DN:

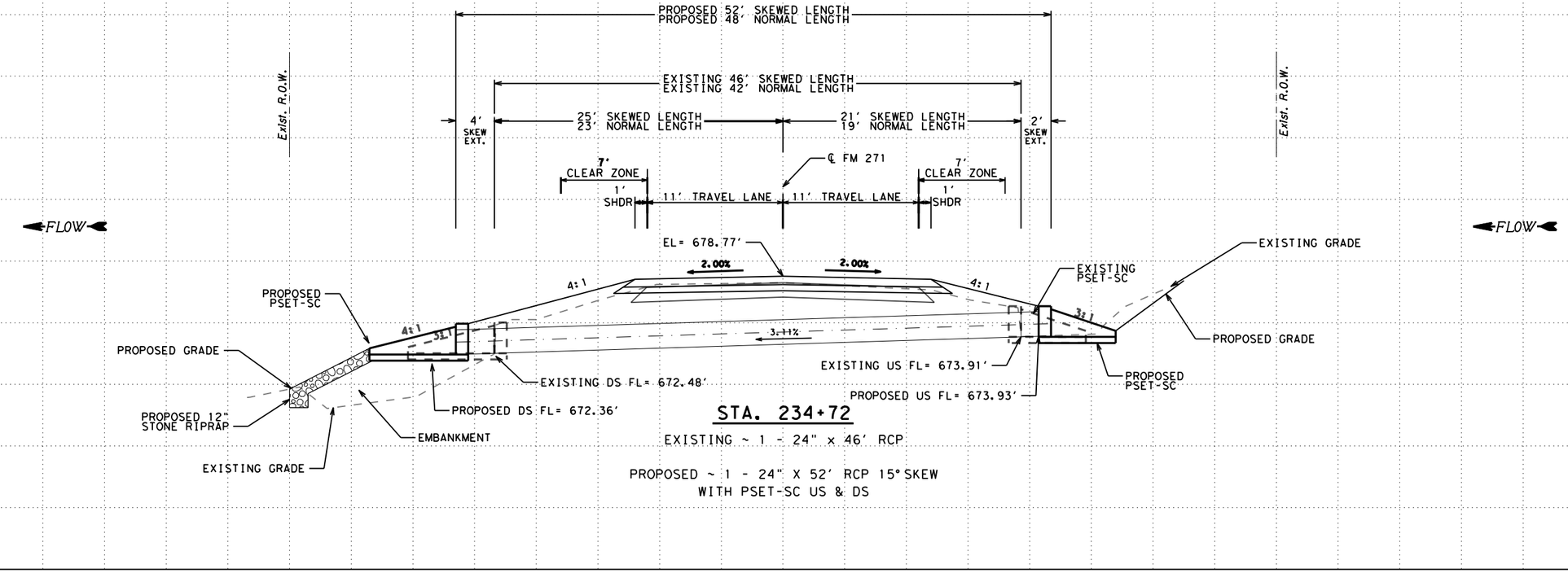


PLAN VIEW

ESTIMATED QUANTITIES		
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	8 CY
0432 6031	RIPRAP (STONE PROTECTION)(12 IN)	4 CY
0464 6005	RC PIPE (CL III)(24 IN)	6 LF
0467 6388	SET (TY II) (24 IN) (RCP) (3:1) (C)	1 EA
0467 6390	SET (TY II) (24 IN) (RCP) (4:1) (C)	1 EA
0496 6004	REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC & SRR



STA. 234+72

EXISTING ~ 1 - 24" x 46' RCP

PROPOSED ~ 1 - 24" X 52' RCP 15° SKEW
WITH PSET-SC US & DS

BM SPIKE IN
POWER POLE
27' LT @ STA. 236+11
ELEV= 678.32

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 234+72

SHEET 10 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		92

DATE: 7/7/2022 8:50:39 AM
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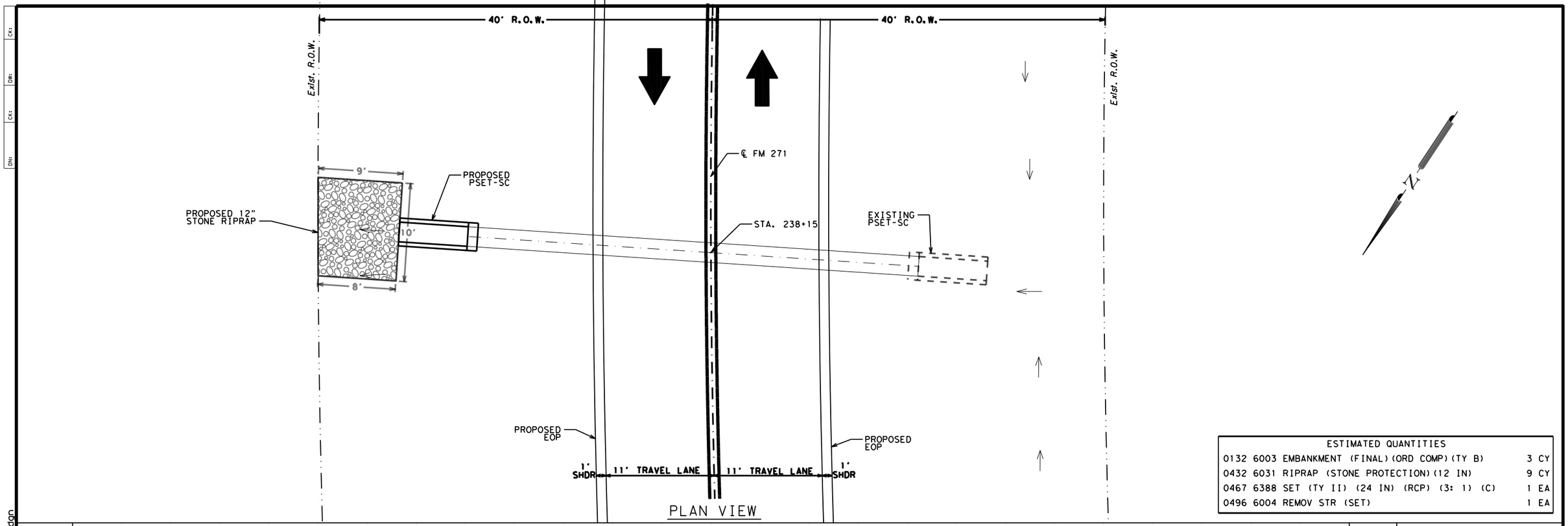
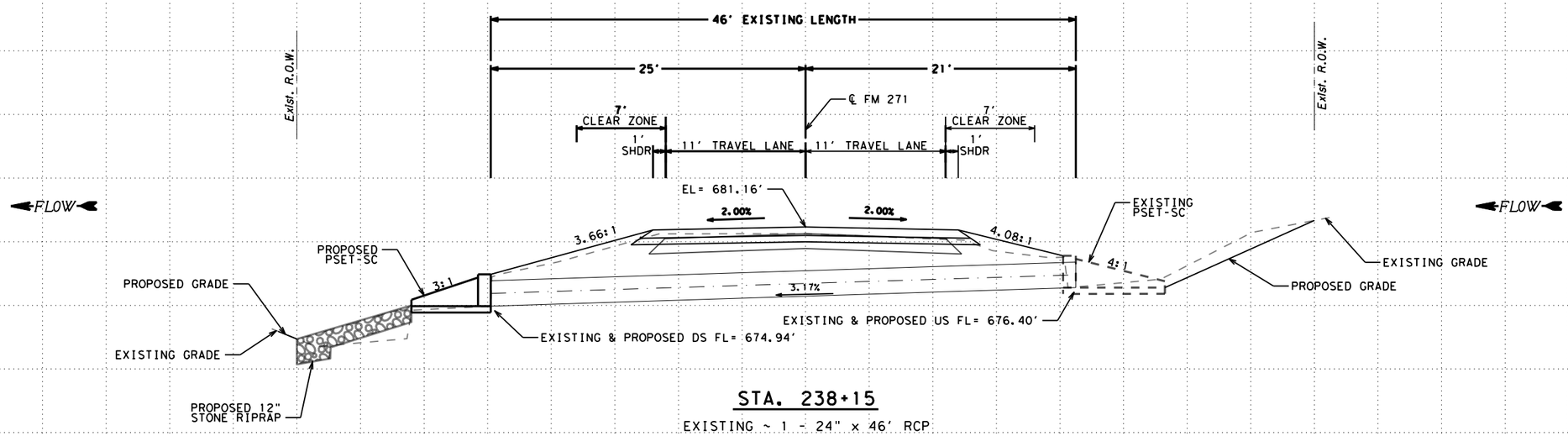


PLAN VIEW

ESTIMATED QUANTITIES	
0132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	3 CY
0432 6031 RIPRAP (STONE PROTECTION)(12 IN)	9 CY
0467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	1 EA
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC & SRR



STA. 238+15

EXISTING ~ 1 - 24" x 46' RCP

PROPOSED ~ 1 - 24" X 46' RCP
WITH PSET-SC US & DS

BM SPIKE IN
POWER POLE
27' LT @ STA. 236+11
ELEV= 678.32

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 238+15

SHEET 11 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		93

DATE: 7/7/2022 8:50:40 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\093 CULVERT LAYOUT.dgn

CK:
DW:
CK:
DN:

30' R.O.W.
30' R.O.W.
Exist. R.O.W.
Exist. R.O.W.
℄ FM 271
PROPOSED CH-PW-S (3:1)
PROPOSED CH-PW-S (3:1)
8'
PROPOSED 12" STONE RIPRAP
5'
15°
STA. 249+72
EXISTING PSET-SC
PROPOSED EOP
PROPOSED EOP
1' SHDR
11' TRAVEL LANE
11' TRAVEL LANE
1' SHDR

PLAN VIEW

N

ESTIMATED QUANTITIES		
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	40 CY
0403 6001	TEMPORARY SPL SHORING	155 SF
0432 6031	RIPRAP (STONE PROTECTION)(12 IN)	4 CY
0464 6005	RC PIPE (CL III)(24 IN)	4 LF
0466 6130	HEADWALL (CH - PW - S)(DIA= 24 IN)	2 EA
0472 6006	REMOV & RE-LAY PIPE (24 IN)	8 LF
0496 6004	REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: CH-PW-S & SRR

PROPOSED 51' SKEWED LENGTH
PROPOSED 49' NORMAL LENGTH
EXISTING 47' SKEWED LENGTH
EXISTING 45' NORMAL LENGTH
21'
26'
4' EXTEND
7' CLEAR ZONE
7' CLEAR ZONE
1' SHDR
11' TRAVEL LANE
11' TRAVEL LANE
1' SHDR
8' RESET
Exist. R.O.W.
Exist. R.O.W.
℄ FM 271
FLOW
FLOW
EL= 696.88'
2.00%
2.00%
EXISTING GRADE
PROPOSED CH-PW-S
5:1
4:1
PROPOSED CH-PW-S
0.5%
2.94%
PROPOSED GRADE
PROPOSED GRADE
EXISTING GRADE
PROPOSED US FL= 691.36'
EXISTING US FL= 691.24'
EXISTING PSET-SC
EXISTING & PRPOSED DS FL= 689.86'
PROPOSED 12" STONE RIPRAP

705
700
695
690
685

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

STA. 249+72

EXISTING ~ 1 - 24" x 47' RCP

PROPOSED ~ 1 - 24" X 51' RCP 15° Skew
WITH CH-PW-S US & DS

BM RR SPIKE
IN POWER POLE
29' LT @ STA. 246+99
ELEV= 696.91

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 249+72

SHEET 12 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		94

DATE: 7/7/2022 8:50:41 AM
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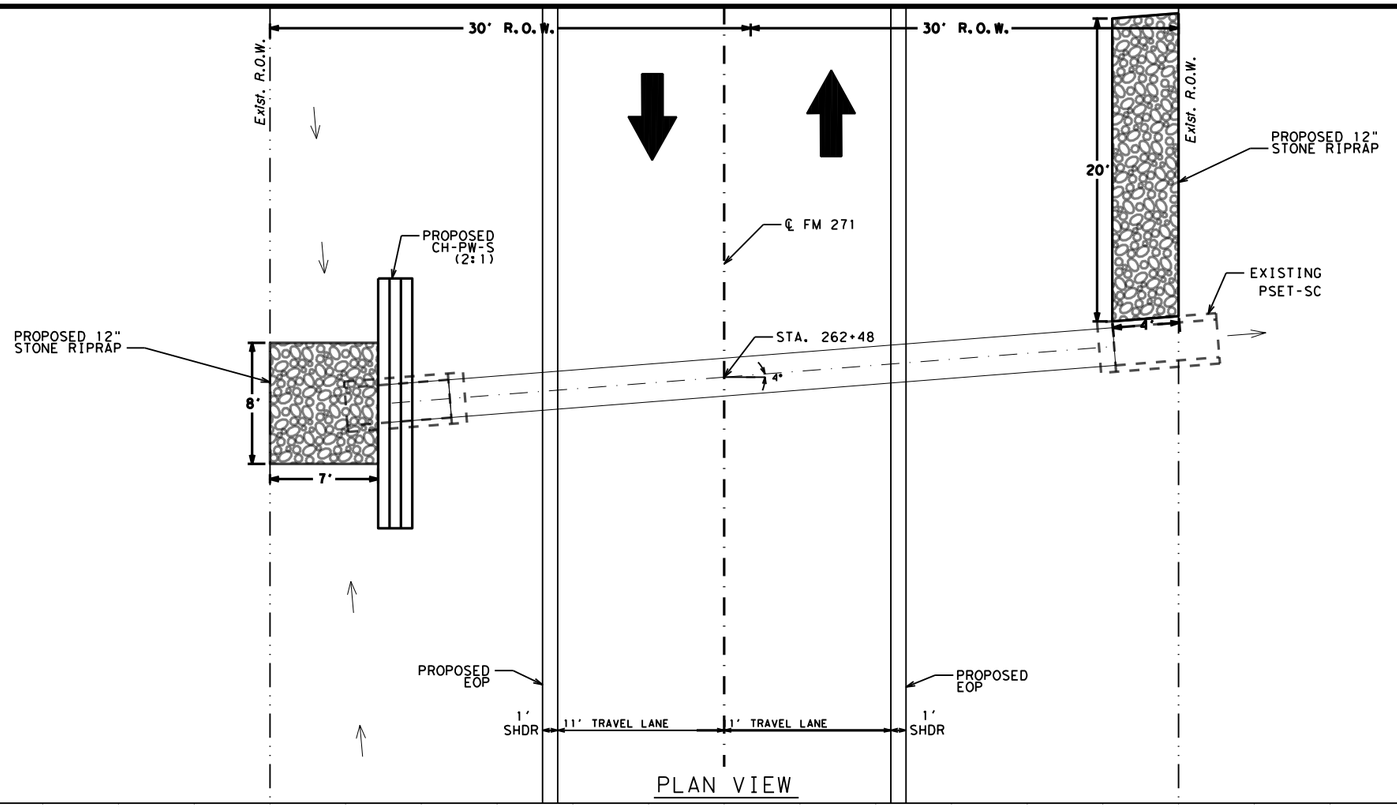
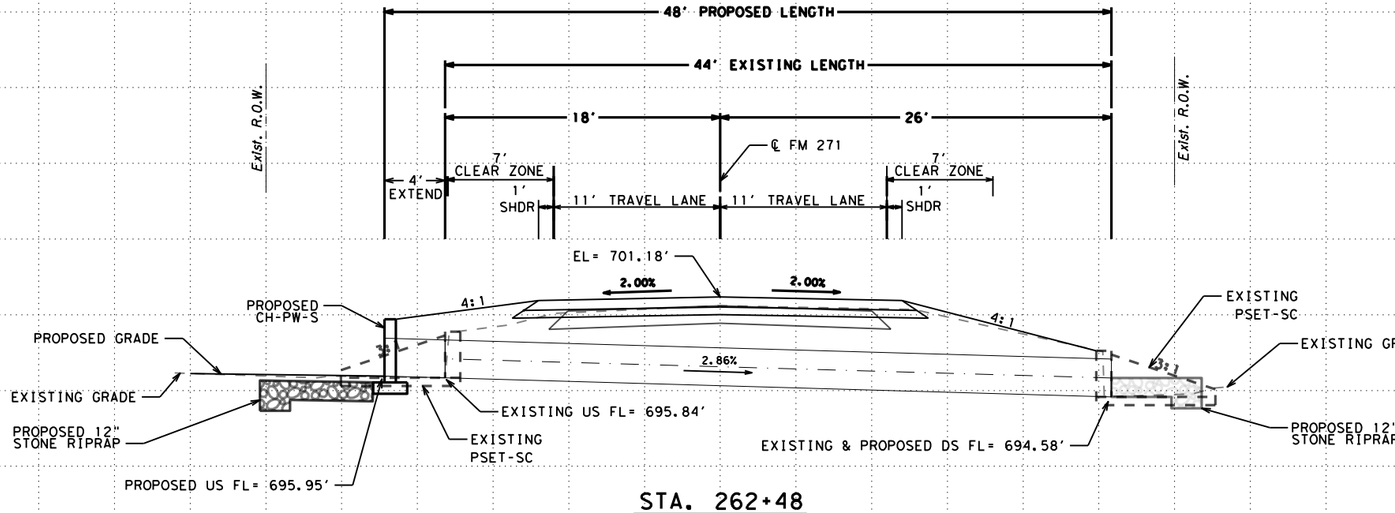


PLAN VIEW

ESTIMATED QUANTITIES	
0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	12 CY
0464 6007 RC PIPE (CL III) (30 IN)	4 LF
0466 6132 HEADWALL (CH - PW - S) (DIA= 30 IN)	1 EA
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: CH-PW-S & SRR



STA. 262+48

EXISTING ~ 1 - 30" x 44' RCP

PROPOSED ~ 1 - 30" X 48' RCP
WITH CH-PW-S US & EXISTING SET DS

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIKE
IN POWER POLE
28' LT @ STA. 262+28
ELEV= 700.41

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

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Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 262+48

SHEET 13 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		95

DATE: 7/7/2022 8:50:42 AM
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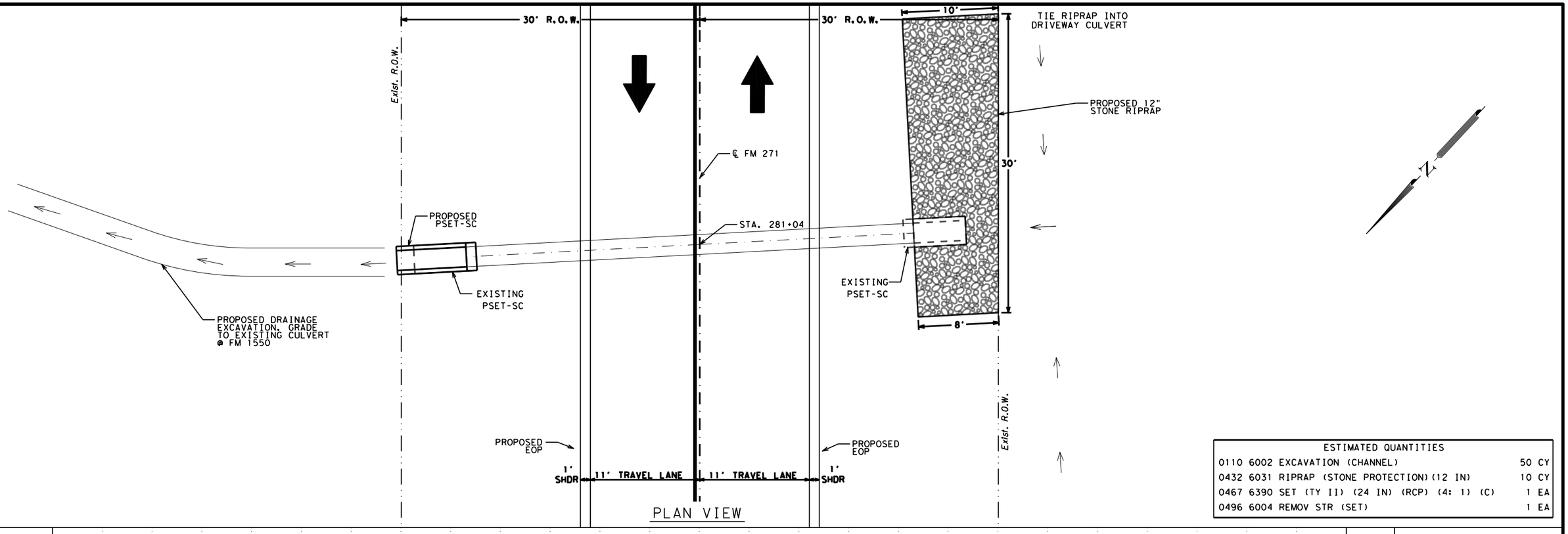
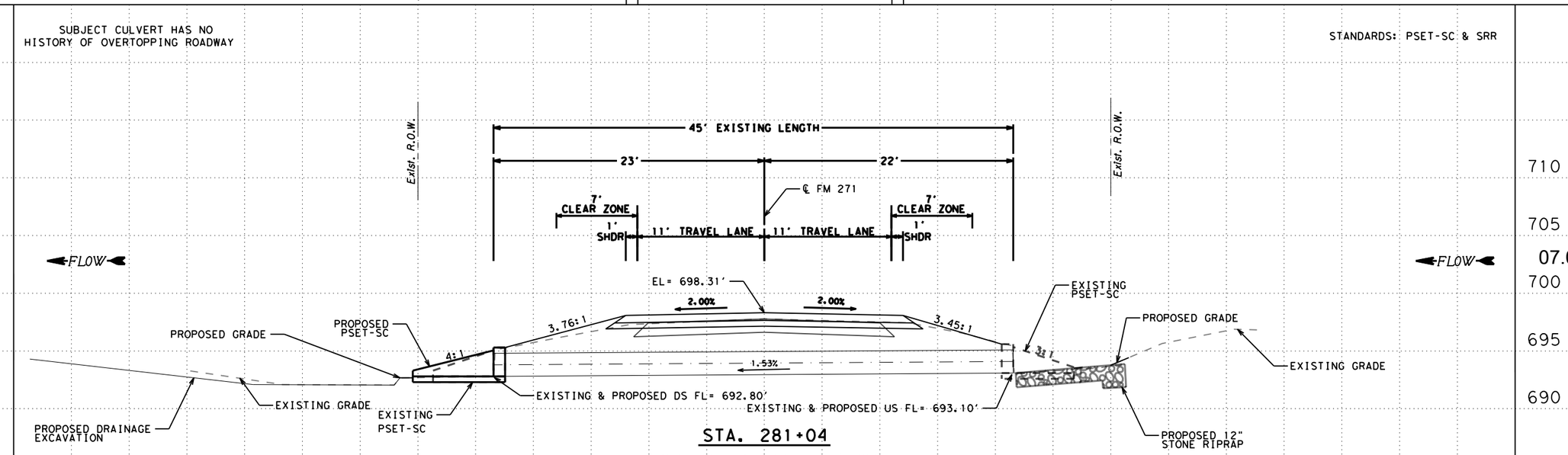


PLAN VIEW

ESTIMATED QUANTITIES	
0110 6002 EXCAVATION (CHANNEL)	50 CY
0432 6031 RIPRAP (STONE PROTECTION)(12 IN)	10 CY
0467 6390 SET (TY II) (24 IN) (RCP) (4: 1) (C)	1 EA
0496 6004 REMOV STR (SET)	1 EA



STA. 281+04

EXISTING ~ 1 - 24" x 45' RCP

PROPOSED ~ 1 - 24" X 45' RCP
WITH PSET-SC US & DS

BM RR SPIKE
IN POWER POLE
33' LT @ STA. 282+45
ELEV= 696.52

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

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Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 281+04

SHEET 14 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		96

DATE: 7/7/2022 8:50:43 AM
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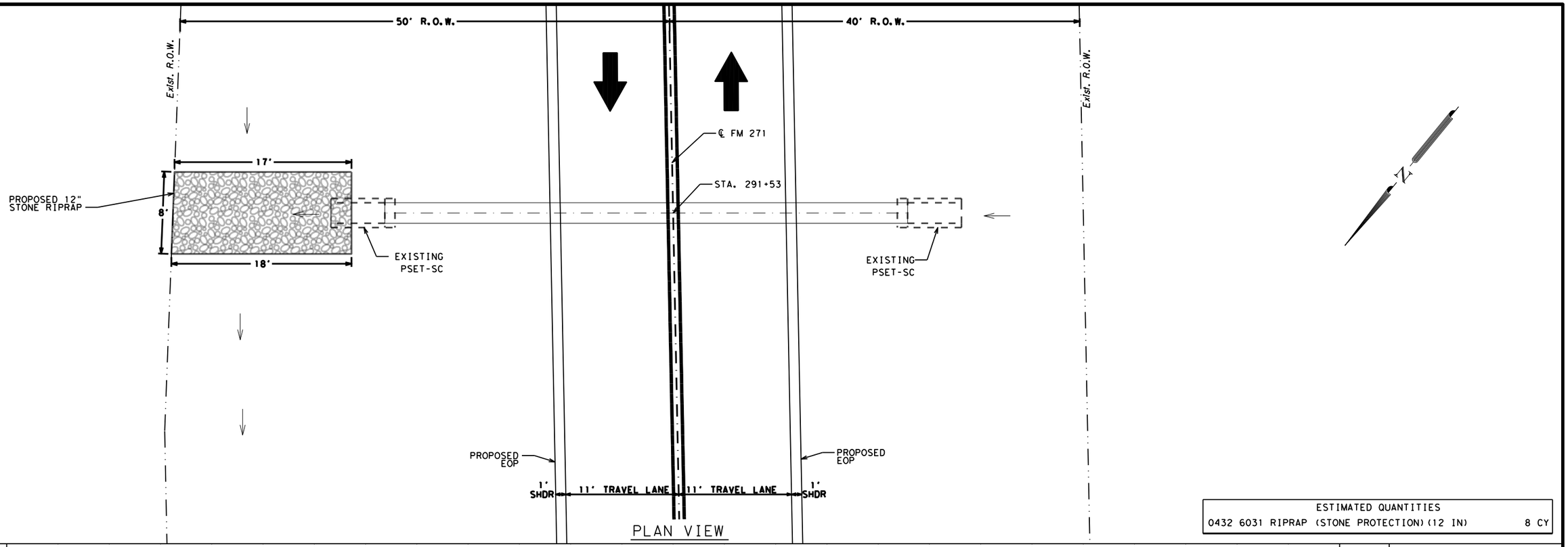
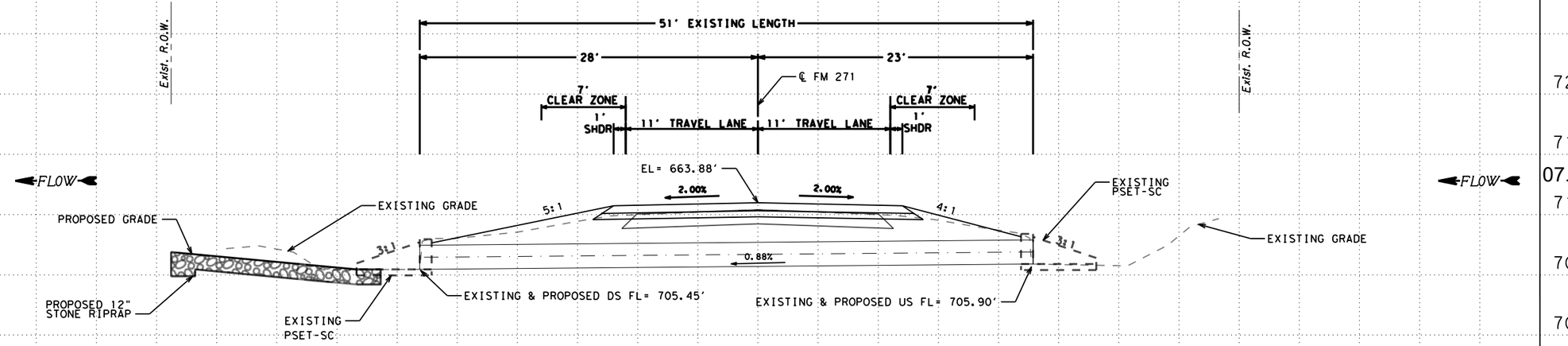


PLAN VIEW

ESTIMATED QUANTITIES	
0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	8 CY



STA. 291+53

EXISTING ~ 1 - 24" x 51' RCP

PROPOSED ~ 1 - 24" X 51' RCP
WITH PSET-SC US & DS

STANDARDS: SRR

BM RR SPIKE IN CUT
OFF HACKBERRY TREE
43' LT @ STA. 290.54
ELEV= 710.36

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

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CULVERT LAYOUT
STA. 291+53

SHEET 15 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		97

DATE: 7/7/2022 8:50:44 AM
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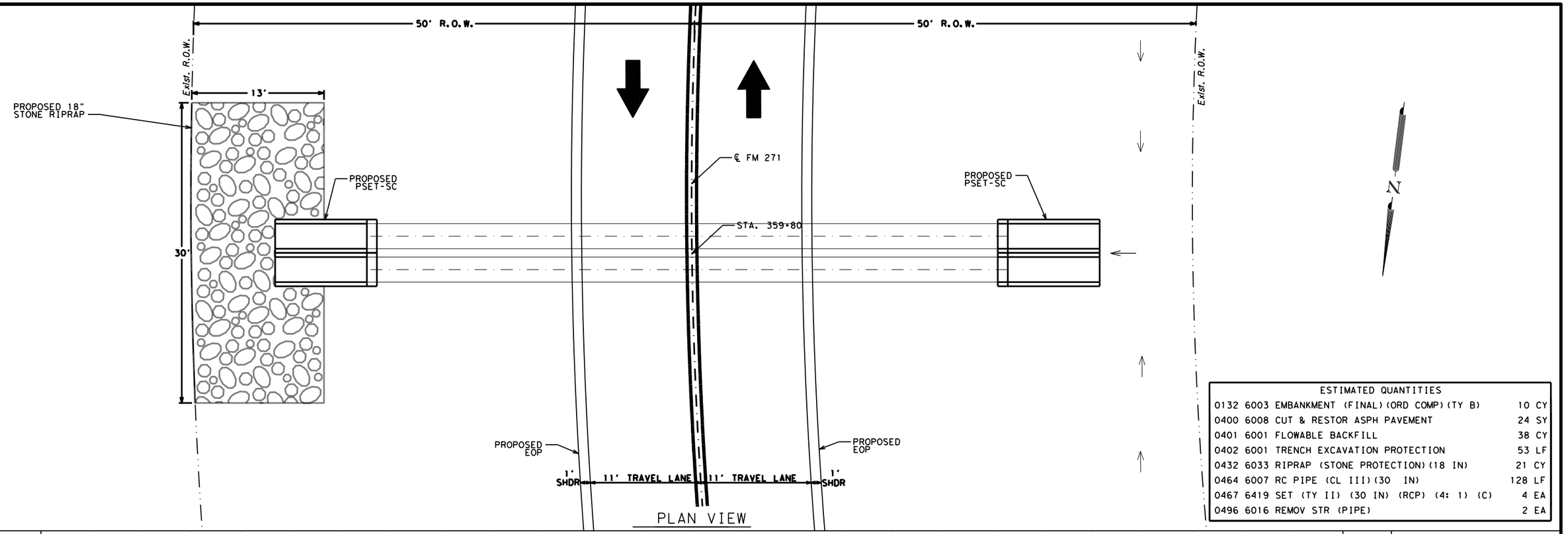
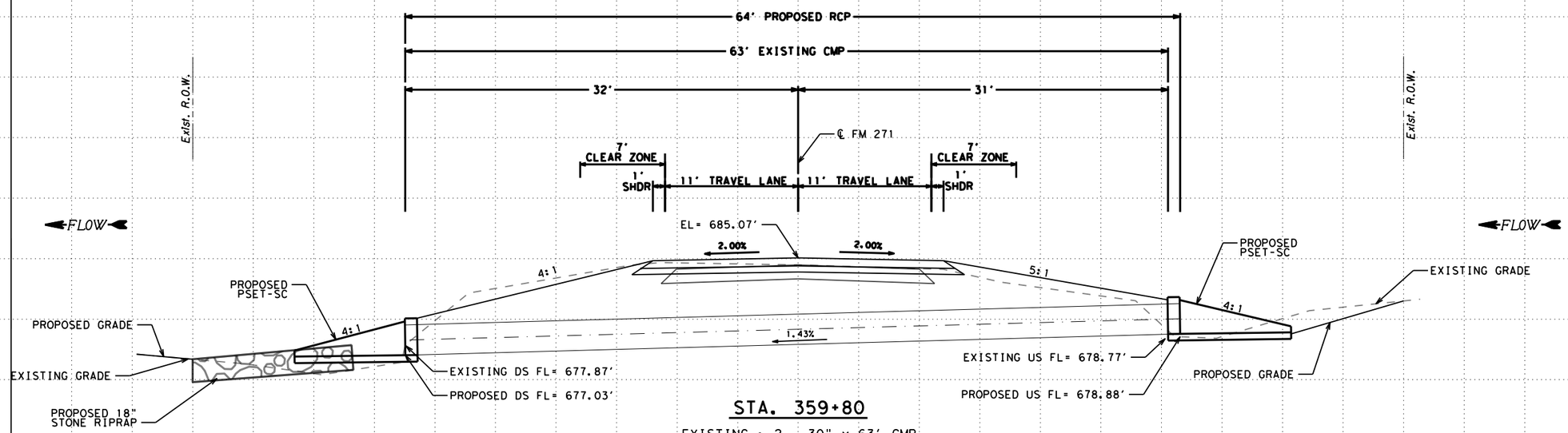


PLAN VIEW

ESTIMATED QUANTITIES		
0132 6003	EMBANKMENT (FINAL) (ORD COMP) (TY B)	10 CY
0400 6008	CUT & RESTOR ASPH PAVEMENT	24 SY
0401 6001	FLOWABLE BACKFILL	38 CY
0402 6001	TRENCH EXCAVATION PROTECTION	53 LF
0432 6033	RIPRAP (STONE PROTECTION) (18 IN)	21 CY
0464 6007	RC PIPE (CL III) (30 IN)	128 LF
0467 6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	4 EA
0496 6016	REMOV STR (PIPE)	2 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC & SRR



STA. 359+80

EXISTING ~ 2 - 30" x 63' CMP

PROPOSED ~ 2 - 30" X 64' RCP
WITH PSET-SC US & DS

BM RR SPIKE
IN POWER POLE
43' LT @ STA. 360+26
ELEV= 681.39

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

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CULVERT LAYOUT
STA. 359+80

SHEET 16 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		98

DATE: 7/7/2022 8:50:45 AM
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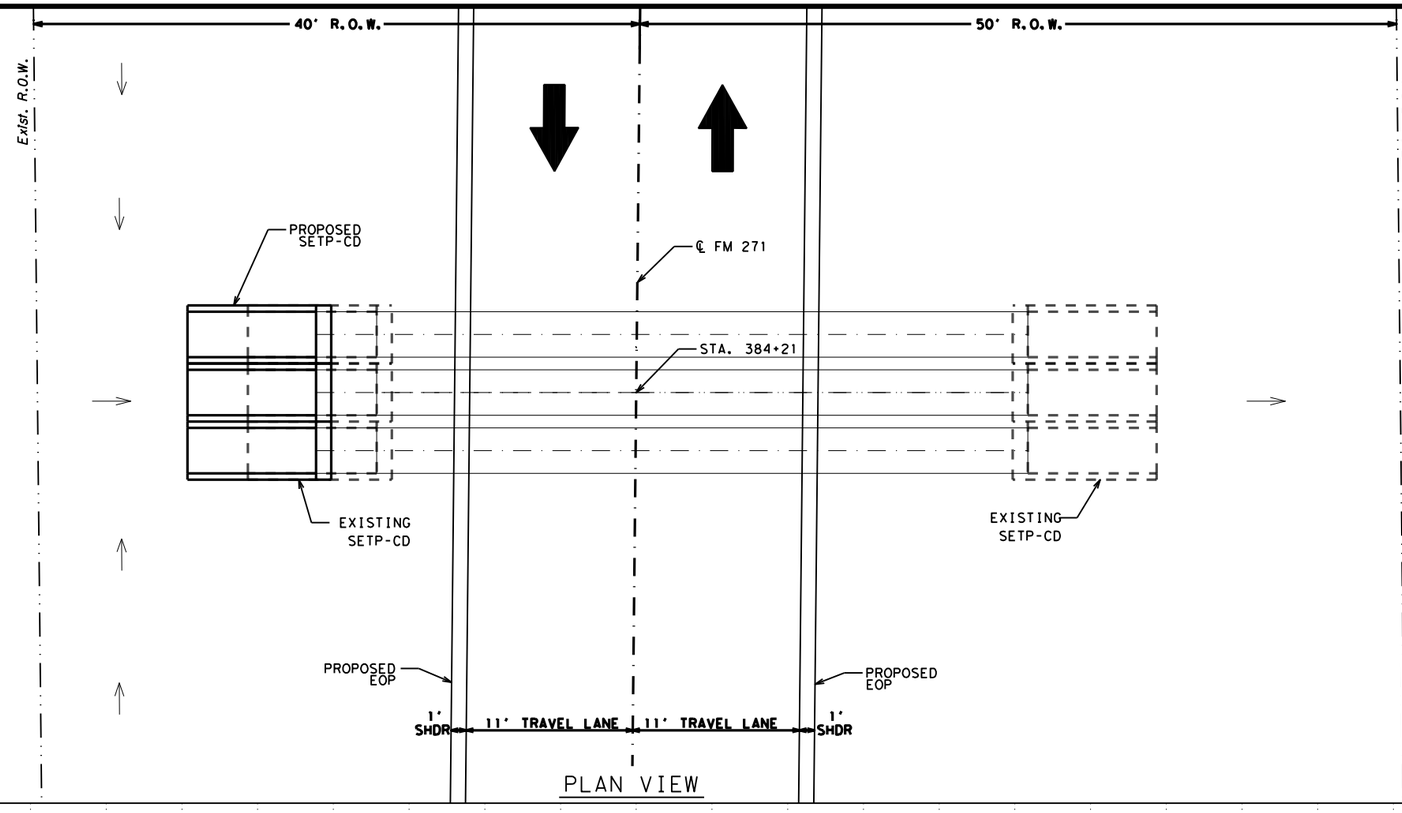
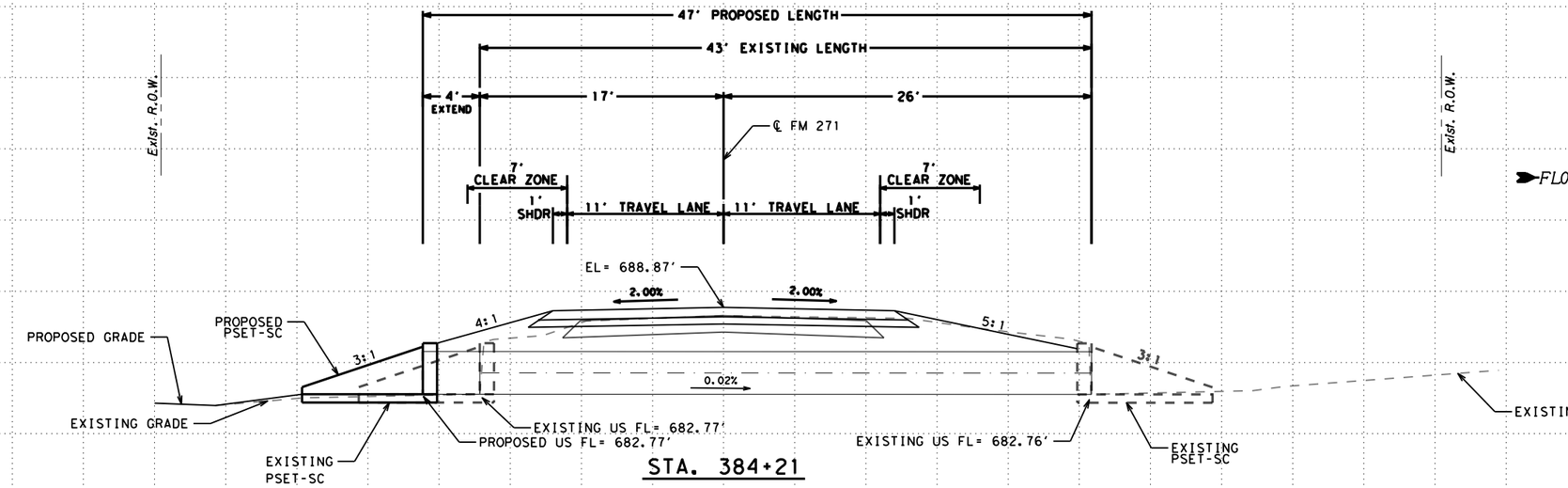


PLAN VIEW

ESTIMATED QUANTITIES	
0496 6004 REMOV STR (SET)	3 EA
0467 6448 SET (TY II) (36 IN) (RCP) (3: 1) (C)	3 EA
0464 6008 RC PIPE (CL III) (36 IN)	12 LF

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: SETP-CD



STA. 384+21

EXISTING ~ 3 - 36" x 43' RCP

PROPOSED ~ 3 - 36" X 47' RCP
WITH SETP-CD US & DS

BM RR SPIKE
IN POWER POLE
37' LT @ STA. 384+27
ELEV= 686.30

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

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07.07.22

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CULVERT LAYOUT
STA. 384+21

SHEET 17 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		99

DATE: 7/7/2022 8:50:46 AM
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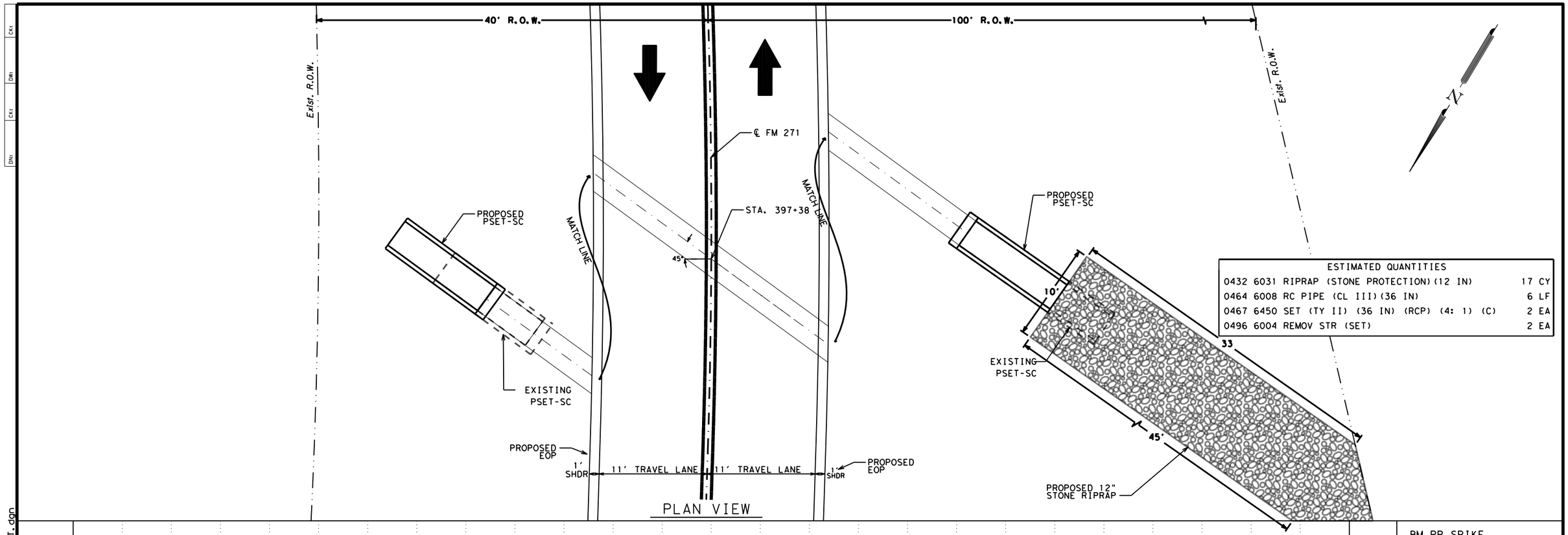
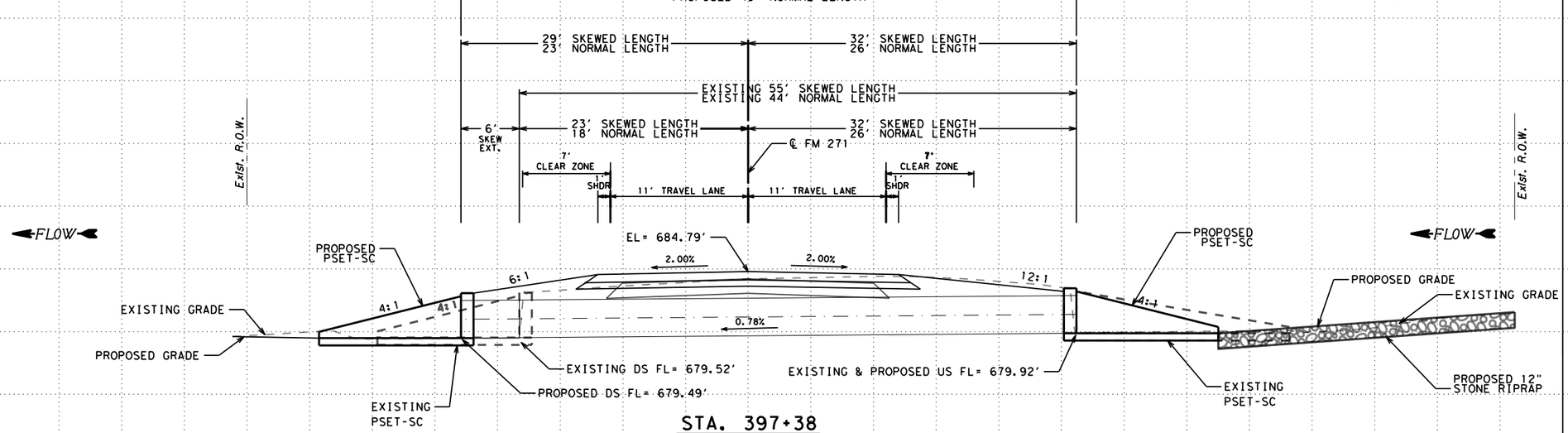


ESTIMATED QUANTITIES	
0432 6031 RIPRAP (STONE PROTECTION) (12 IN)	17 CY
0464 6008 RC PIPE (CL III) (36 IN)	6 LF
0467 6450 SET (TY II) (36 IN) (RCP) (4: 1) (C)	2 EA
0496 6004 REMOV STR (SET)	2 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC & SRR



STA. 397+38

EXISTING ~ 1 - 36" x 55' RCP 45° SKEW

PROPOSED ~ 1 - 36" X 61' RCP 45° SKEW
WITH PSET-SC US & DS

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIKE
IN POWER POLE
75' RT @ STA. 397+15
ELEV= 685.59

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 397+38

SHEET 18 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		100

DATE: 7/7/2022 8:50:47 AM
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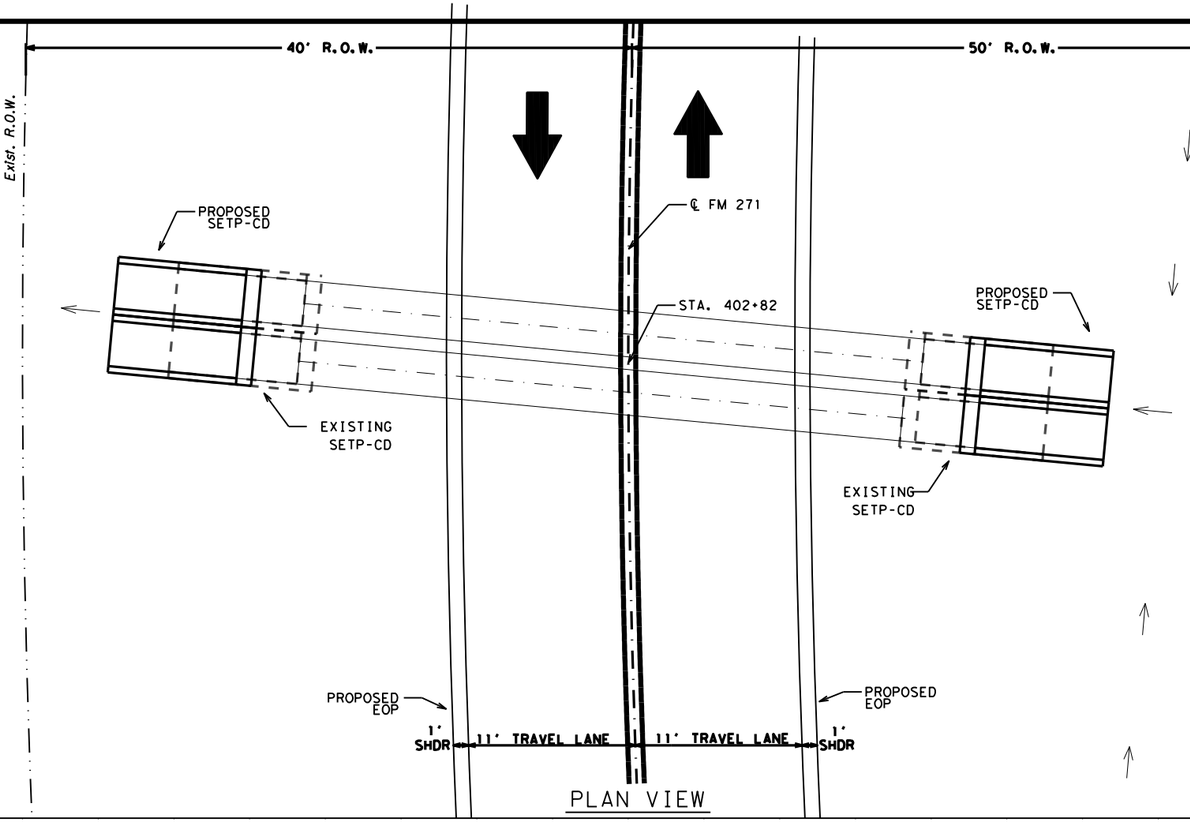
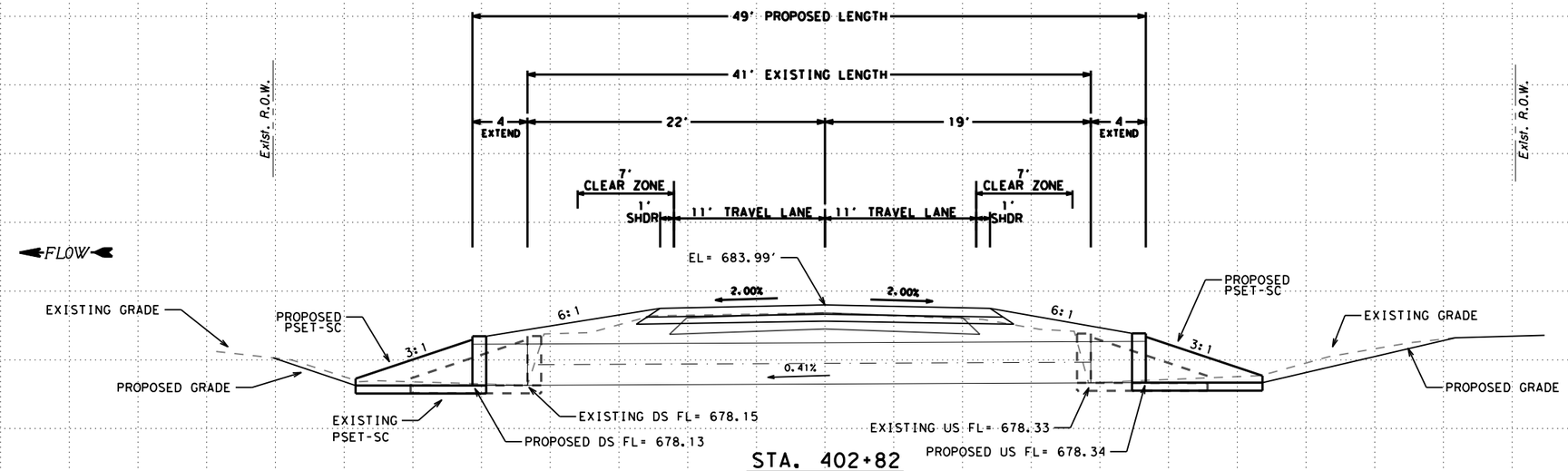


PLAN VIEW

ESTIMATED QUANTITIES	
0464 6008 RC PIPE (CL III)(36 IN)	16 LF
0496 6004 REMOV STR (SET)	4 EA
0467 6448 SET (TY II) (36 IN) (RCP) (3: 1) (C)	4 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: SETP-CD



STA. 402+82

EXISTING ~ 2 - 36" x 41' RCP

PROPOSED ~ 2 - 36" X 49' RCP
WITH PSET-CD US & DS

BM RR SPIKE IN
NW BOLT ON ARROW
CAUTION SIGN
24' LT @ STA. 403.89
ELEV= 681.28

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 402+82

SHEET 19 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		101

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

DATE: 7/7/2022 8:50:48 AM
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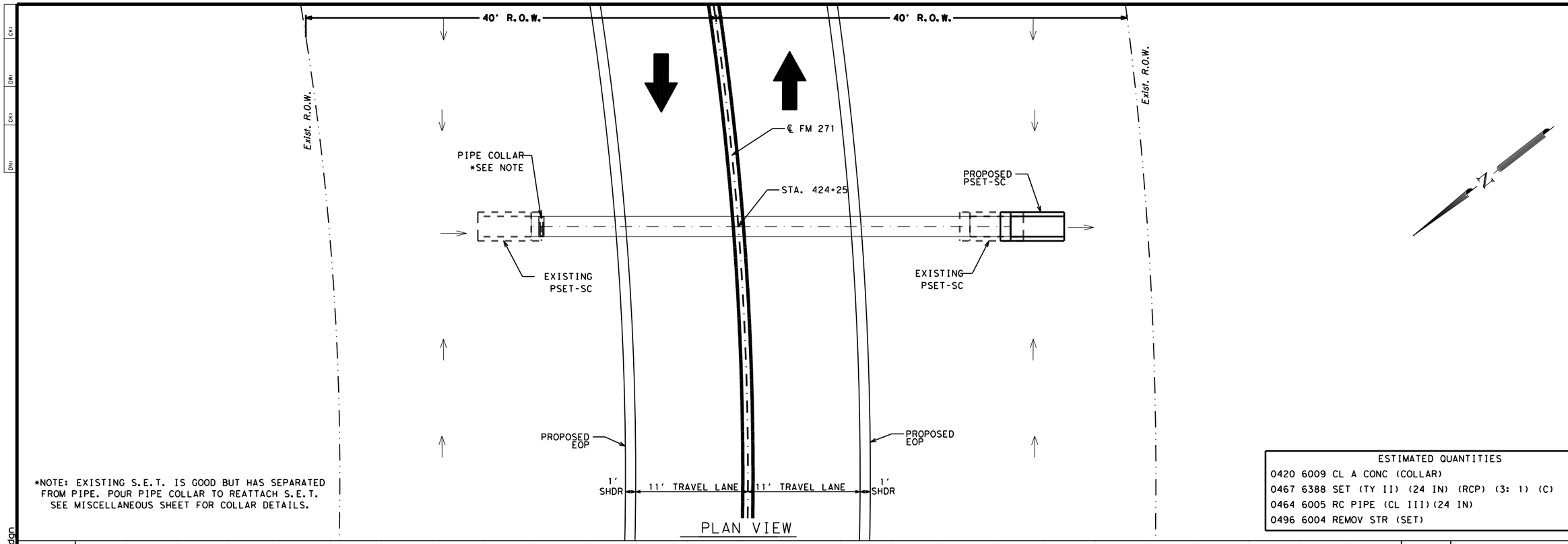


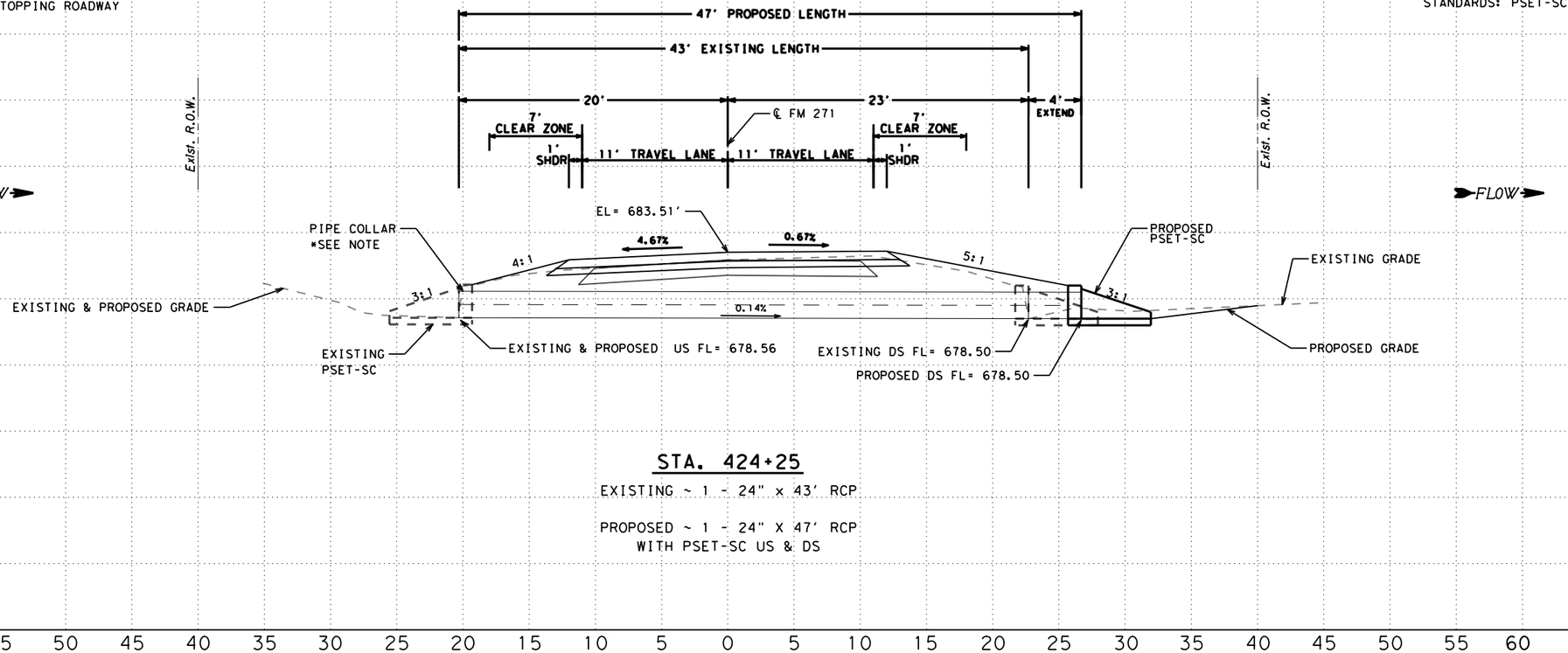
PLAN VIEW

*NOTE: EXISTING S.E.T. IS GOOD BUT HAS SEPARATED FROM PIPE. POUR PIPE COLLAR TO REATTACH S.E.T. SEE MISCELLANEOUS SHEET FOR COLLAR DETAILS.

ESTIMATED QUANTITIES	
0420 6009 CL A CONC (COLLAR)	1 EA
0467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	1 EA
0464 6005 RC PIPE (CL III)(24 IN)	4 LF
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 424+25

EXISTING ~ 1 - 24" x 43' RCP

PROPOSED ~ 1 - 24" X 47' RCP
WITH PSET-SC US & DS

BM RR SPIKE
IN POWER POLE
36' LT @ STA. 424+49
ELEV= 683.63

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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CULVERT LAYOUT
STA. 424+25

SHEET 20 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		102

DATE: 7/7/2022 8:50:49 AM
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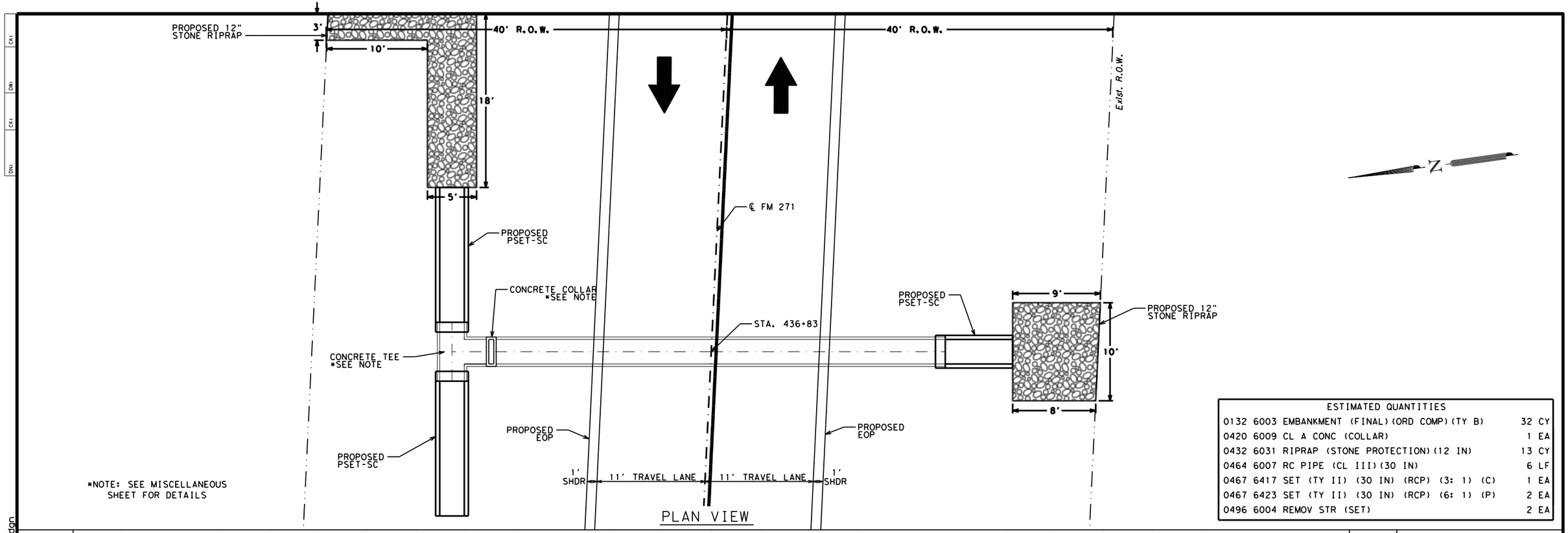
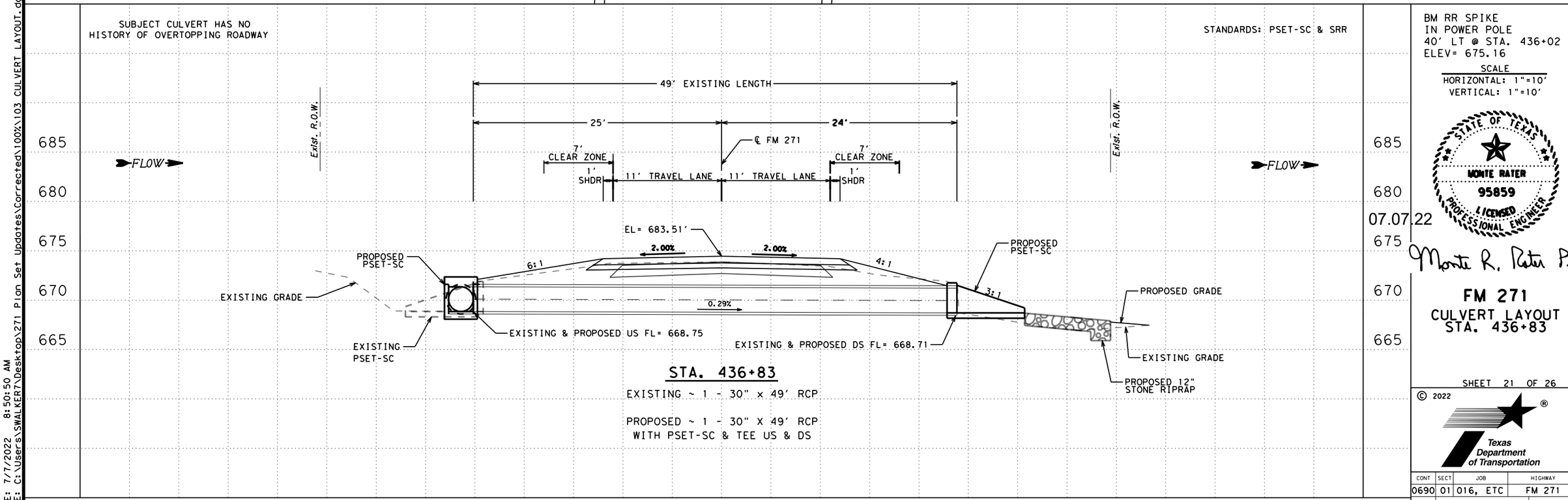


ESTIMATED QUANTITIES		
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	32 CY
0420 6009	CL A CONC (COLLAR)	1 EA
0432 6031	RIPRAP (STONE PROTECTION)(12 IN)	13 CY
0464 6007	RC PIPE (CL III)(30 IN)	6 LF
0467 6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	1 EA
0467 6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	2 EA
0496 6004	REMOV STR (SET)	2 EA



STA. 436+83

EXISTING ~ 1 - 30" x 49' RCP

PROPOSED ~ 1 - 30" X 49' RCP
WITH PSET-SC & TEE US & DS

BM RR SPIKE
IN POWER POLE
40' LT @ STA. 436+02
ELEV= 675.16

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT STA. 436+83

SHEET 21 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		103

DATE: 7/7/2022 8:50:50 AM
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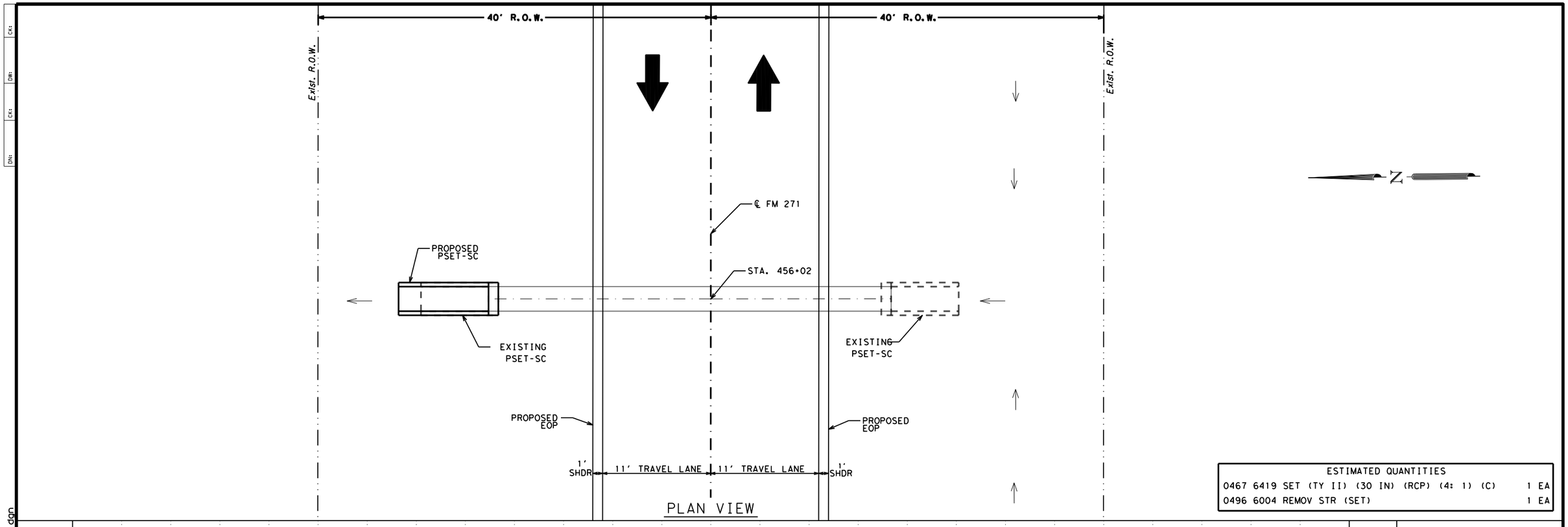
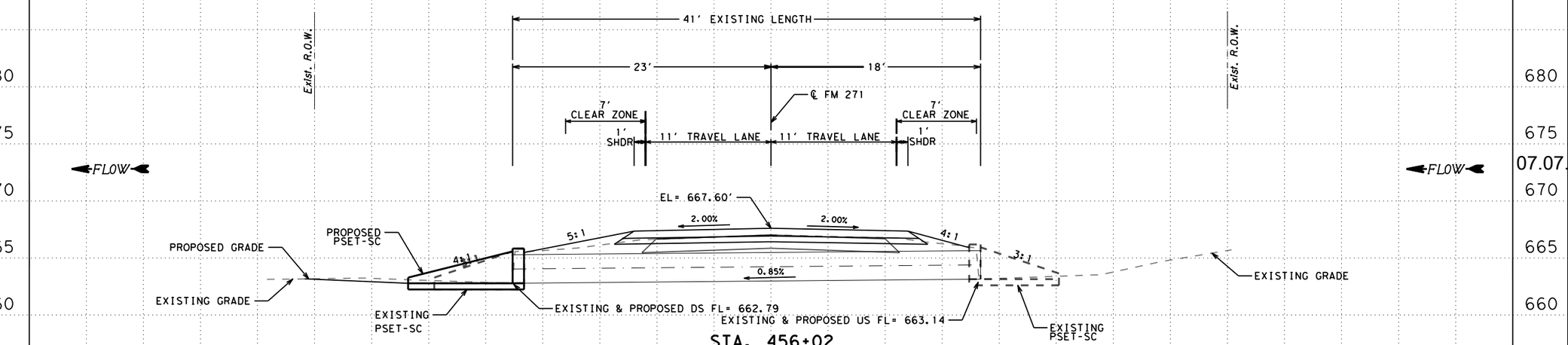


PLAN VIEW

ESTIMATED QUANTITIES	
0467 6419 SET (TY II) (30 IN) (RCP) (4: 1) (C)	1 EA
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 456+02

EXISTING ~ 1 - 30" x 41' RCP

PROPOSED ~ 1 - 30" X 41' RCP
WITH PSET-SC US & DS

BM RR SPIKE
IN POWER POLE
41' LT @ STA. 457+18
ELEV= 666.20

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

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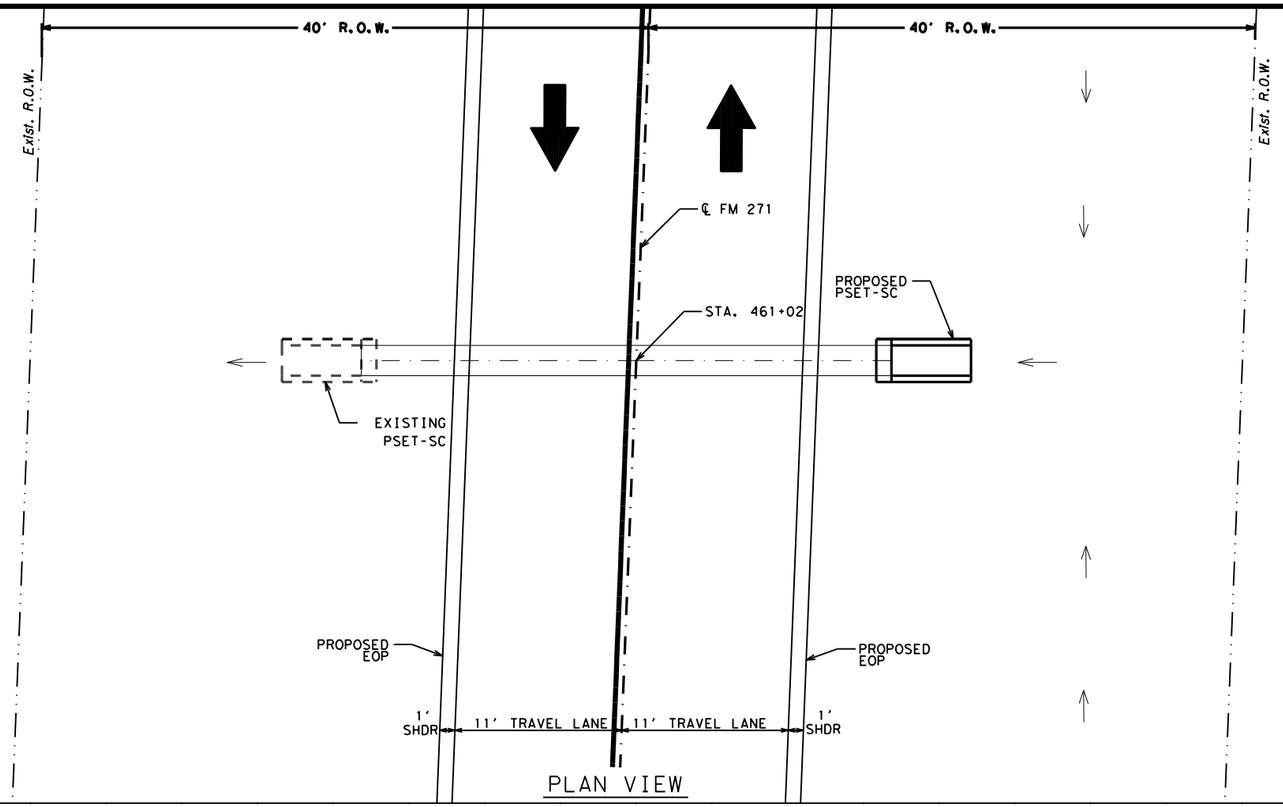
FM 271
CULVERT LAYOUT
STA. 456+02

SHEET 22 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		104

DATE: 7/7/2022 8:50:51 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\104 CULVERT LAYOUT.dgn



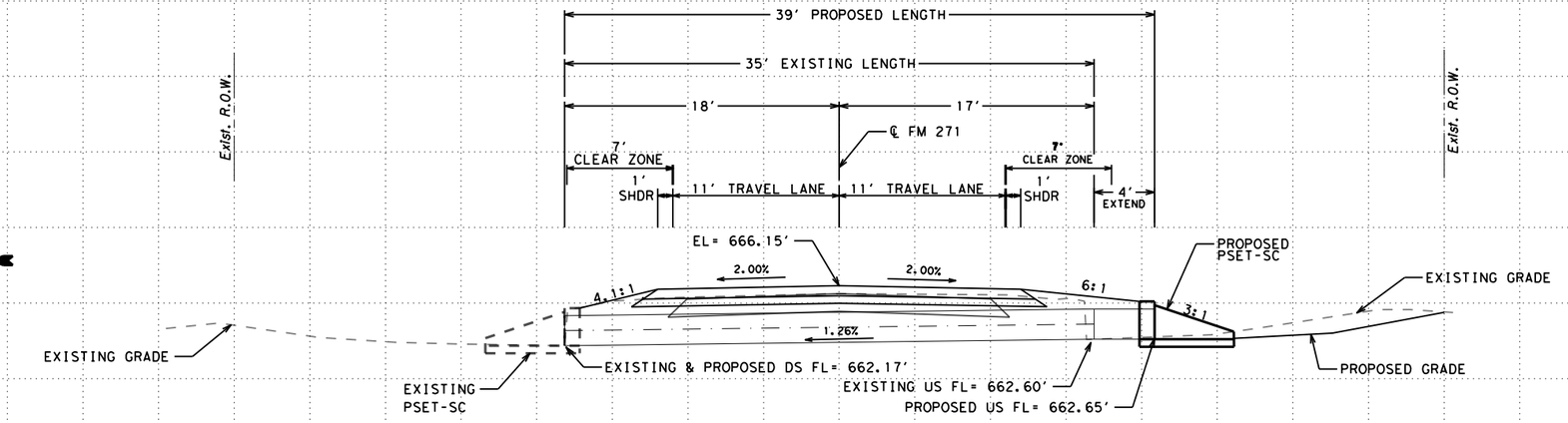
PLAN VIEW

N

ESTIMATED QUANTITIES	
0464 6005 RC PIPE (CL III)(24 IN)	4 LF
0467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	1 EA
0496 6004 REMOV STR (SET)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 461+02

EXISTING ~ 1 - 24" x 35' RCP

PROPOSED ~ 1 - 24" X 39' RCP
WITH PSET-SC US & DS

BM RR SPIKE IN
WOOD GATE POST
45' LT @ STA. 459+69
ELEV= 666.21

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 461+02

SHEET 23 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		105

DATE: 7/7/2022 8:50:52 AM
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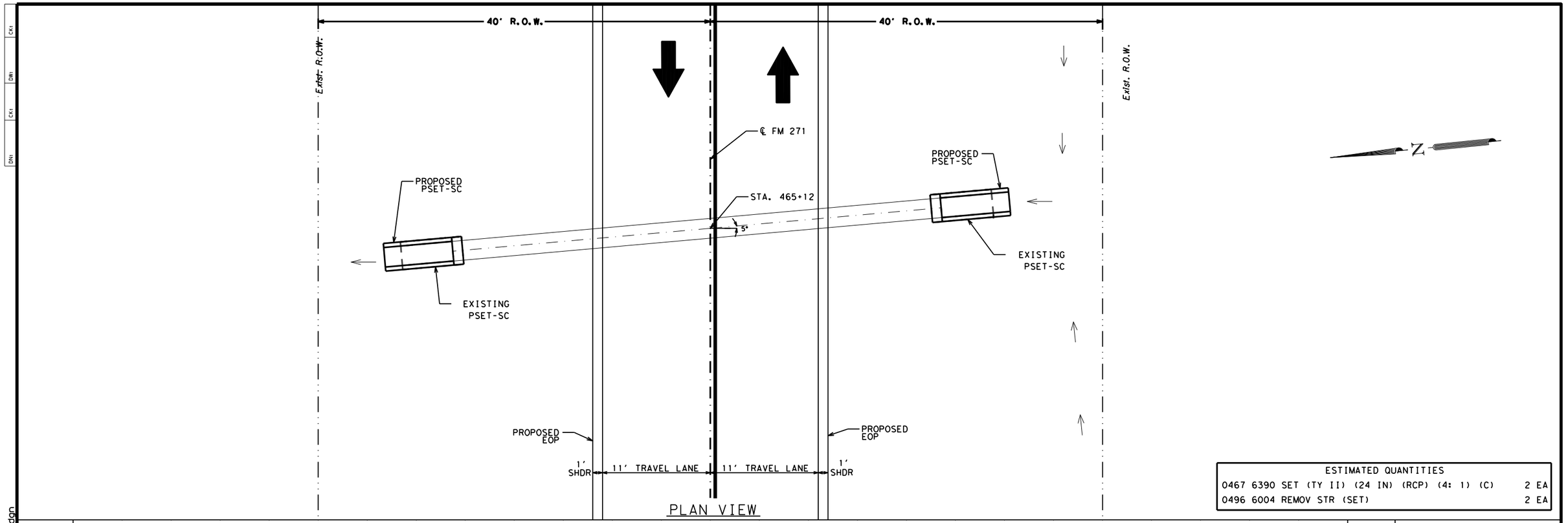
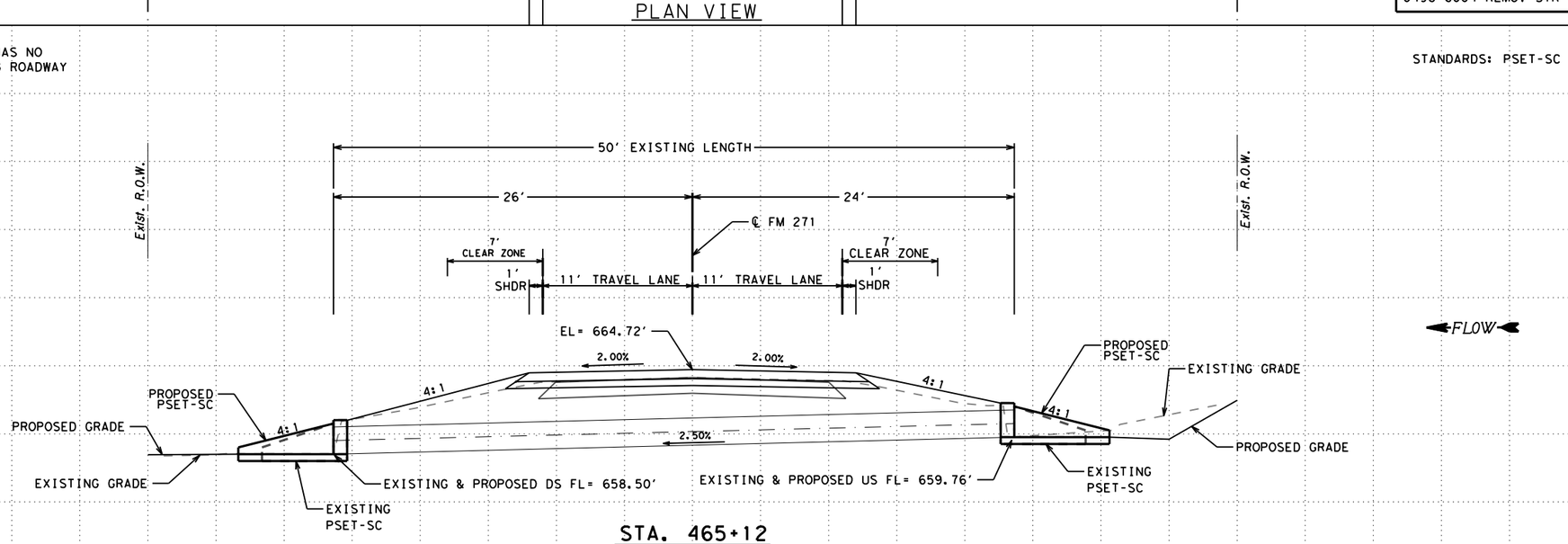


PLAN VIEW

ESTIMATED QUANTITIES	
0467 6390 SET (TY II) (24 IN) (RCP) (4: 1) (C)	2 EA
0496 6004 REMOV STR (SET)	2 EA



STA. 465+12

EXISTING ~ 1 - 24" x 50' RCP

PROPOSED ~ 1 - 24" X 50' RCP
WITH PSET-SC US & DS

BM RR SPIKE IN
CUT OFF POWER POLE
37' LT @ STA. 465+71
ELEV= 659.61

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
CULVERT LAYOUT
STA. 465+12

SHEET 24 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		106

DATE: 7/7/2022 8:50:54 AM
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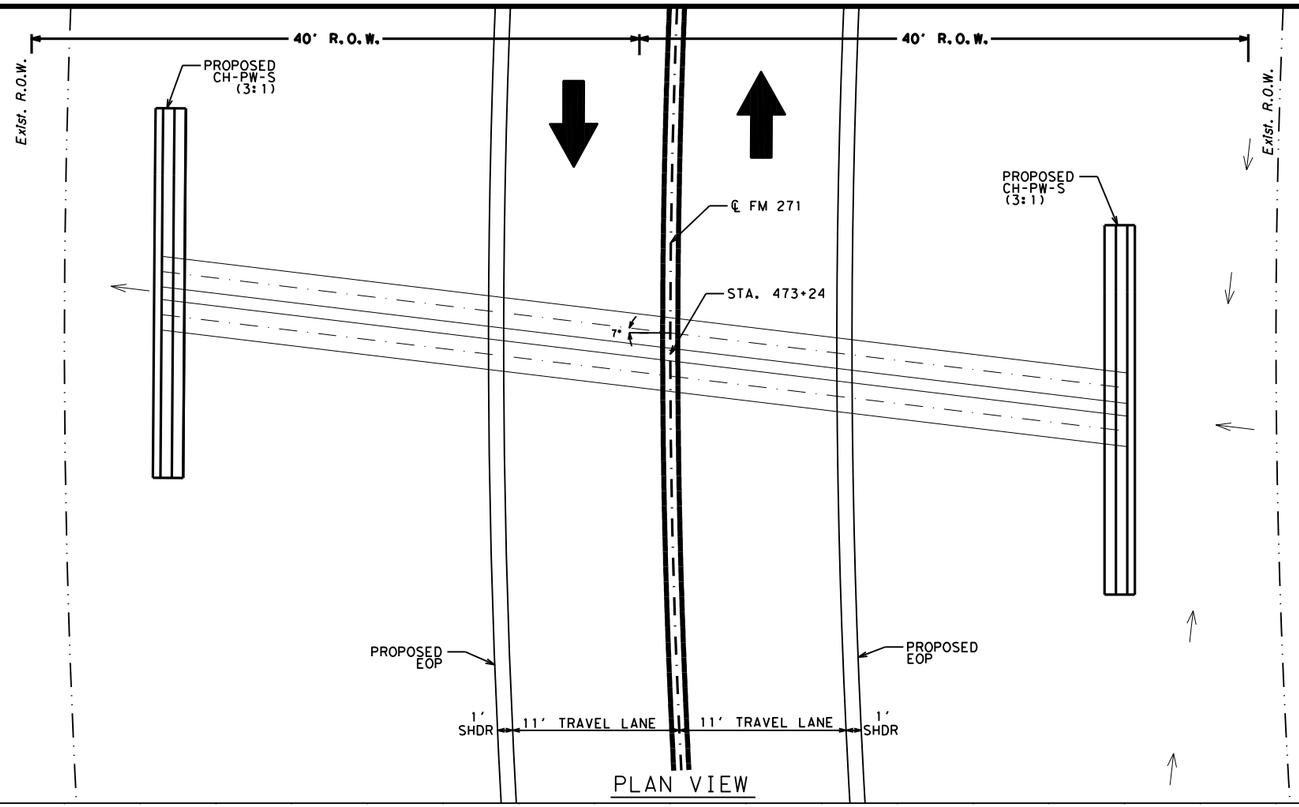
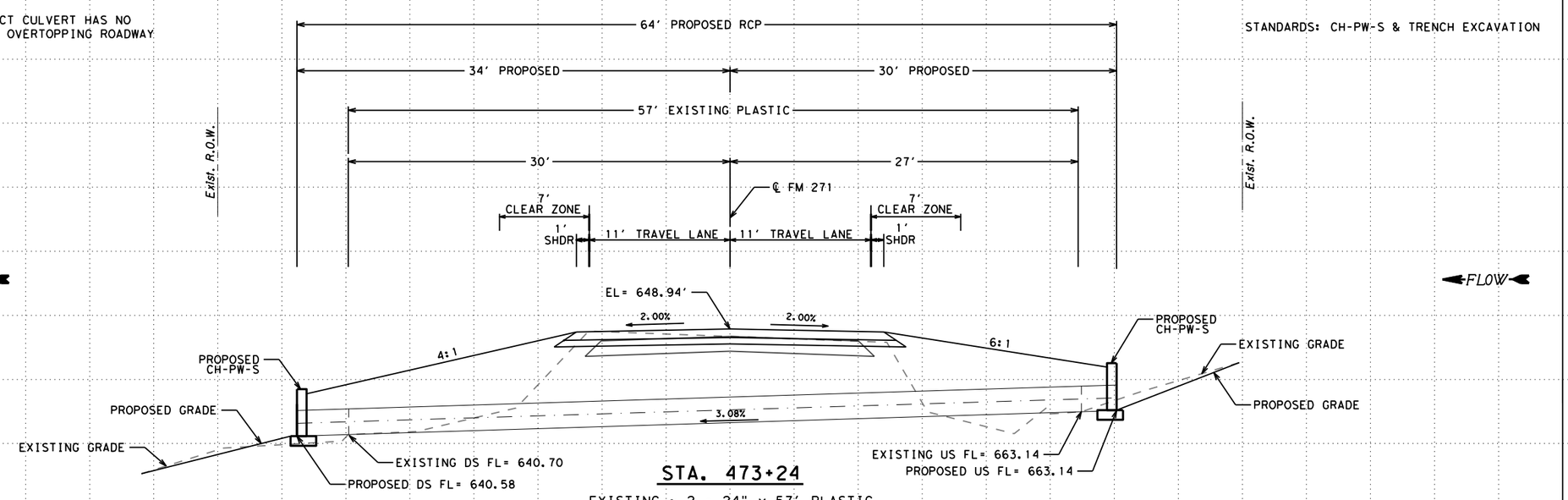


PLAN VIEW

ESTIMATED QUANTITIES		
0132 6003	EMBANKMENT	27 CY
0400 6008	CUT & RESTOR ASPH PAVEMENT	16 SY
0401 6001	FLOWABLE BACKFILL	205 CY
0402 6001	TRENCH EXCAVATION PROTECTION	57 LF
0464 6005	RC PIPE (CL III)(24 IN)	128 LF
0466 6130	HEADWALL (CH-PW-S)(DIA = 24 IN)	2 EA
0496 6016	REMOV STR (PIPE)	114 LF

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: CH-PW-S & TRENCH EXCAVATION



STA. 473+24

EXISTING ~ 2 - 24" x 57' PLASTIC

PROPOSED ~ 2 - 24" X 64' RCP
WITH CH-PW-S US & DS

BM RR SPIKE
IN POWER POLE
42' LT @ STA. 471+99
ELEV= 647.49

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

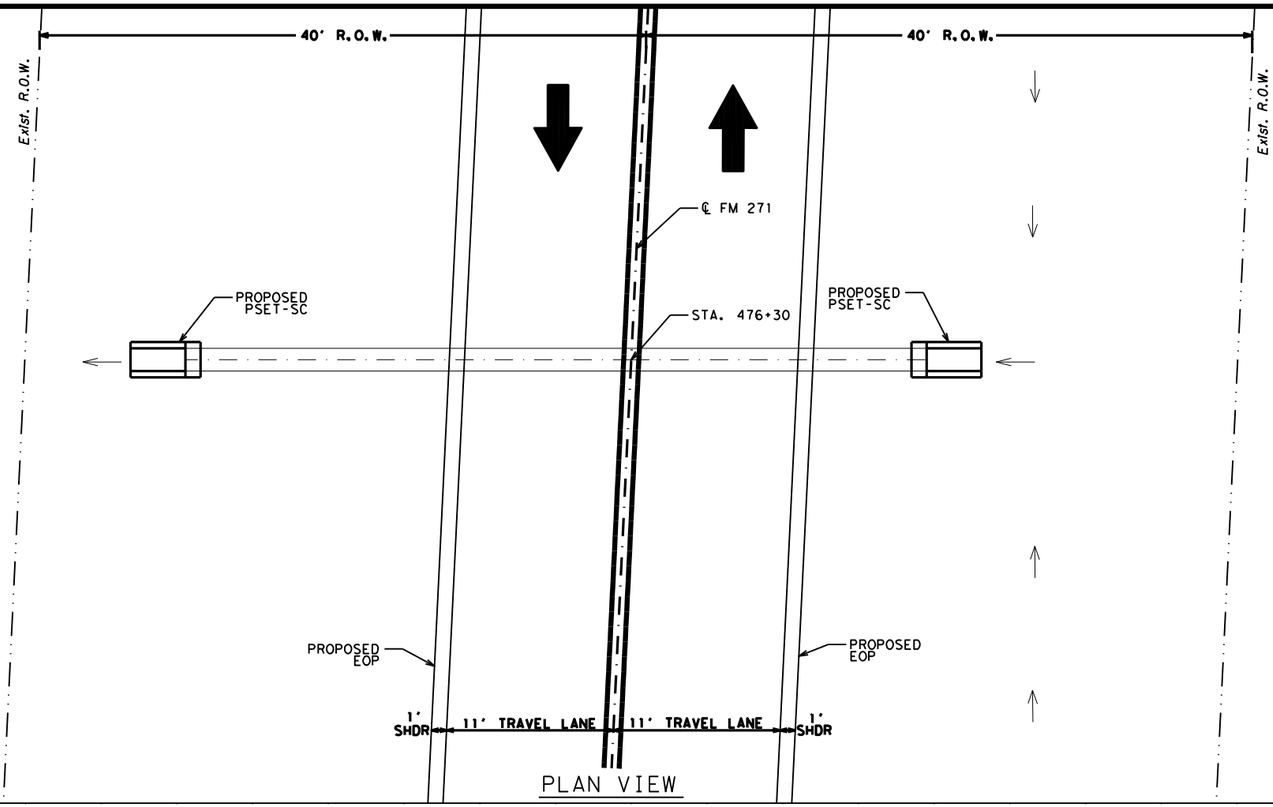
FM 271
CULVERT LAYOUT
STA. 473+24

SHEET 25 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		107

DATE: 7/7/2022 8:50:55 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\107 CULVERT LAYOUT.dgn



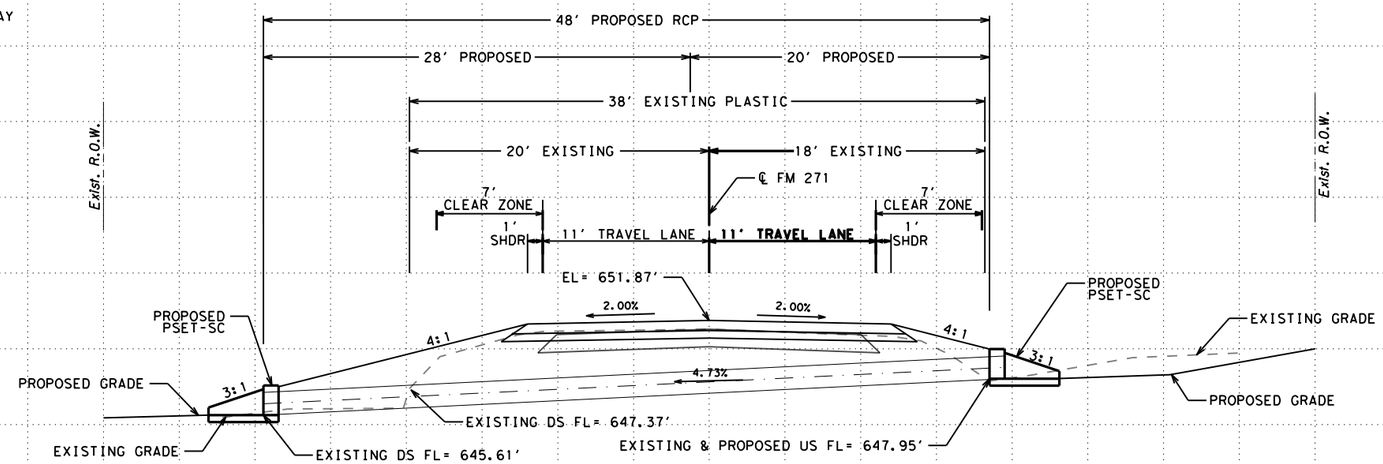
PLAN VIEW

N

ESTIMATED QUANTITIES		
0400 6008	CUT & RESTOR ASPH PAVEMENT	4 SY
0401 6001	FLOWABLE BACKFILL	36 CY
0402 6001	TRENCH EXCAVATION PROTECTION	48 LF
0464 6003	RC PIPE (CL III)(18 IN)	48 LF
0467 6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	2 EA
0496 6016	REMOV STR (PIPE)	1 EA

SUBJECT CULVERT HAS NO HISTORY OF OVERTOPPING ROADWAY

STANDARDS: PSET-SC



STA. 476+30

EXISTING ~ 1 - 18" x 38' PLASTIC

PROPOSED ~ 1 - 18" X 48' RCP
WITH PSET-SC US & DS

65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

BM RR SPIKE
IN POWER POLE
29' LT @ STA. 476+38
ELEV= 650.78

SCALE
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

STATE OF TEXAS
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07.07.22

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FM 271
CULVERT LAYOUT
STA. 476+30

SHEET 26 OF 26

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		108

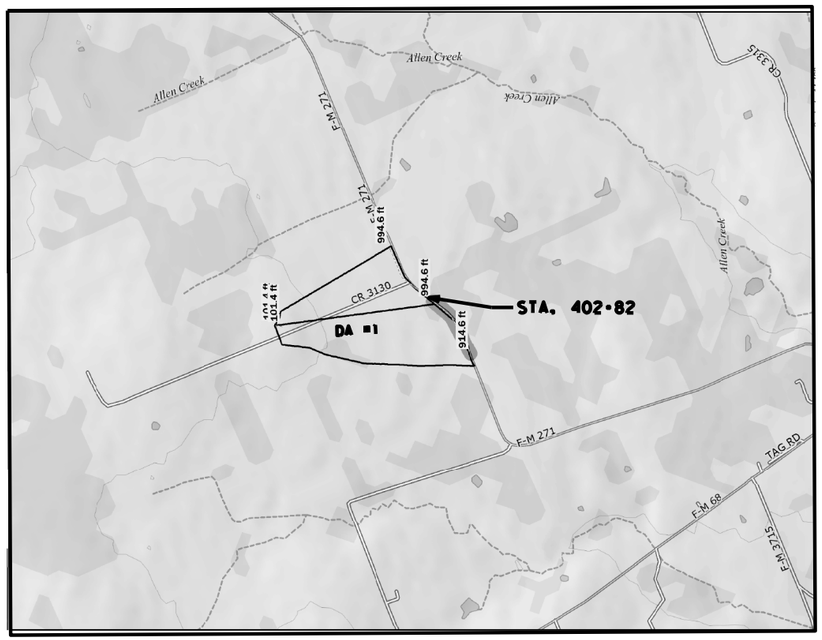
DATE: 7/7/2022 8:50:56 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\108 CULVERT LAYOUT.dgn

CROSS CULVERT HYDROLOGIC AND HYDRAULIC DATA (RATIONAL METHOD)

STRUCTURE INLET STA.	DRAINAGE AREA IDENTIFIER	AREA (AC)	CHANNEL SLOPE (FT/FT)	CHANNEL n	CHANNEL TYPE	HYDRAULIC CONDITION	STRUCTURE DESCRIPTION	STRUCTURE MANNINGS n	STRUCTURE SLOPE (FT/FT)	ENTRANCE / EXIT TYPE	RUNOFF COEFFICIENT	Tc (MIN)	FLOOD FREQUENCY	FLOW (Q) (CFS)	HEADWATER ELEV (FT)	TAILWATER ELEV (FT)	TAILWATER VELOCITY	DEPTH OVER ROADWAY (FT)	ROADWAY ELEV OVERTOP (FT)
402+82	1	62.08	0.0100	0.030	TRAPEZOIDAL	EXISTING	2 - 36" X 41' RCP	0.012	0.0044	LEFT SET RIGHT SET	0.32	68	10 YEAR	47.1	680.66	679.71	4.54	-	683.41
													100 YEAR	68.7	681.35	679.98	4.99	-	
						PROPOSED	2 - 36" X 49' RCP	0.012	0.0043	LEFT SET RIGHT SET	0.32	68	10 YEAR	47.1	680.67	679.69	4.54	-	683.99
													100 YEAR	68.7	681.36	679.96	4.99	-	

DESIGN OF DRAINAGE FACILITIES BASED UPON THE TXDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.
PEAK FLOWS WERE DETERMINED USING THE RATIONAL METHOD.
CULVERTS ANALYZED FOR NO PONDING ON ROADWAY PAVEMENT DURING A 10 YEAR FLOOD EVENT.
SOFTWARE EMPLOYED FOR HYDROLOGIC ANALYSIS: HY-8 (VER.7.50 FHWA).
PER CUSTOMARY TXDOT ENGINEERING PROCEDURE, CULVERTS EXTENDED LESS THAN TEN PERCENT ARE
NOT ANALYZED WHEN CULVERT HISTORY INDICATES ADEQUATE STORM FLOW CAPACITY AND FLOOD RISKS HAVE NOT CHANGED.

PROJ = PROJECTING END
FW = FLARED WING
PW = PARALLEL WING
SET = SAFETY END TREATMENT



SCALE (FEET):
0 500 1000 2000

DETERMINATION OF PEAK DISCHARGES

ID No.	AREA (acres)	COEFFICIENT C	Tc (Min)		5-year	10-year	25-year	100-year
1	62.08	0.32	68	Intensity (in/hr)	2	2.37	2.8	3.46
				Discharges (cfs)	39.7	47.1	55.6	68.7

NOTES:

DESIGN OF DRAINAGE FACILITIES BASED ON THE TXDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.

DRAINAGE AREAS DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS, AS-BUILT PLANS AND FIELD OBSERVATIONS. THE RATIONAL METHOD WAS USED FOR HYDROLOGIC ANALYSIS OF DRAINAGE AREAS.

STATE OF TEXAS
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07.07.22

Monte R. Rater P.E.

FM 271

HYDRAULIC DATA

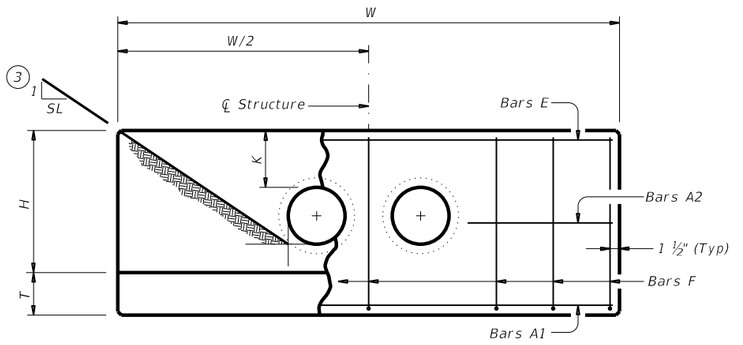
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		109

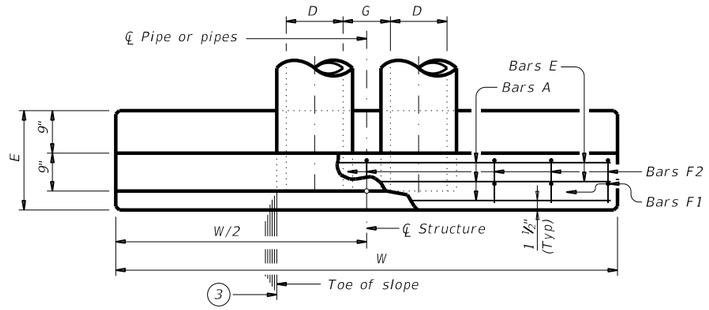
DATE: 7/7/2022 2:49:01 PM
FILE: C:\Users\SWALKER\Desktop\271 Plan Set Updates\Corrected\100%\109 HYDRAULIC DATA.dgn

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

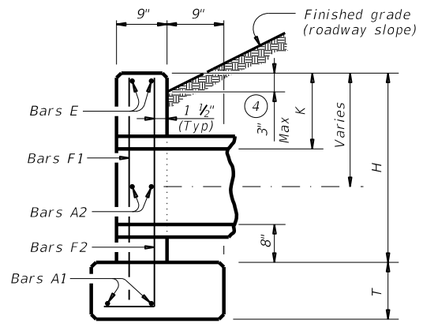
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3



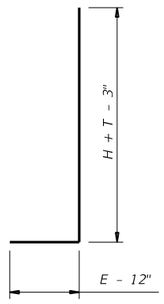
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

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

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

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

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

(5) Dimensions shown are usual and maximum.

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

TABLE OF CONSTANT DIMENSIONS

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

TABLE OF REINFORCING STEEL (6)

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		110

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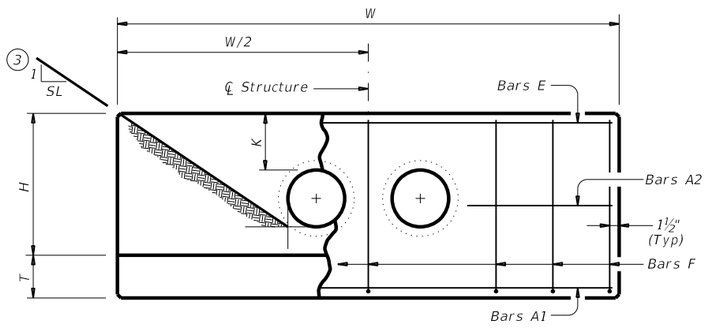
FILE: C:\Users\SMALKER7\Desktop\271 Plan Set Updates\Corrected\100%\110 CH-PW-0.dgn

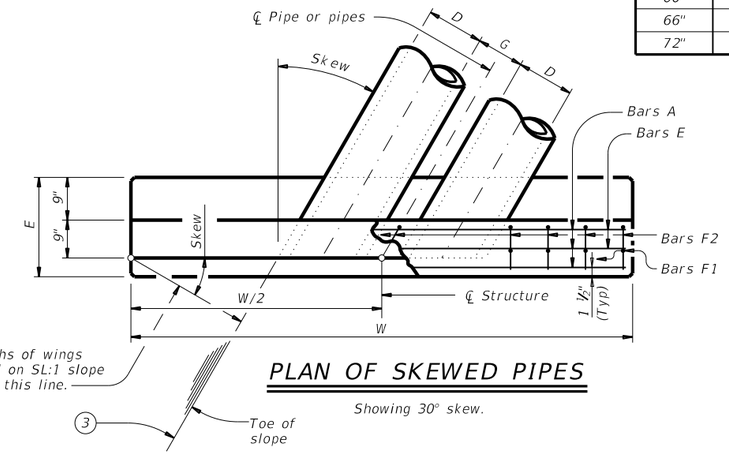
DATE: 7/7/2022 8:51:00 AM
C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\111 CH-PW-S.dgn

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

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

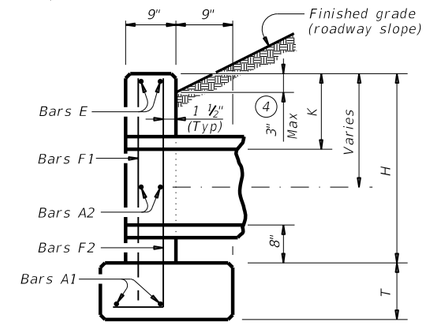


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° skew.



SECTION AT CENTER OF PIPE

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

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

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

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

(5) Dimensions shown are usual and maximum.

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

TABLE OF CONSTANT DIMENSIONS

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

TABLE OF (6) REINFORCING STEEL

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

BARS F2

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

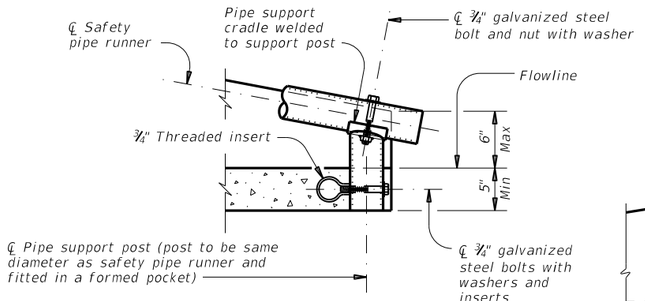
CH-PW-S

FILE: chpwsste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		111

DATE: 7/25/2022 3:05:23 PM
FILE: C:\Users\SWALKER\Desktop\112 PSET-SC.dgn

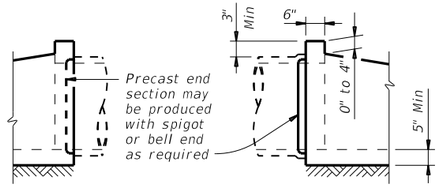
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	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"				



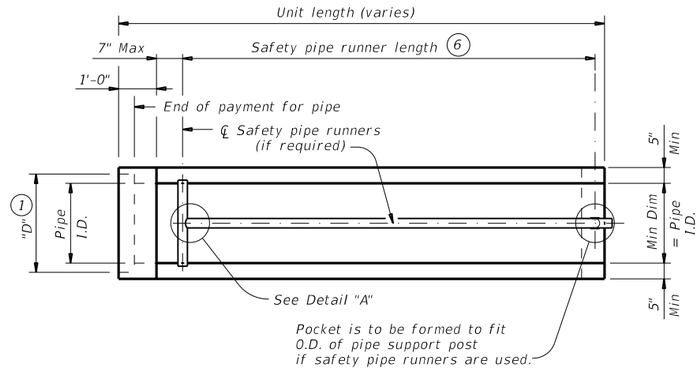
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



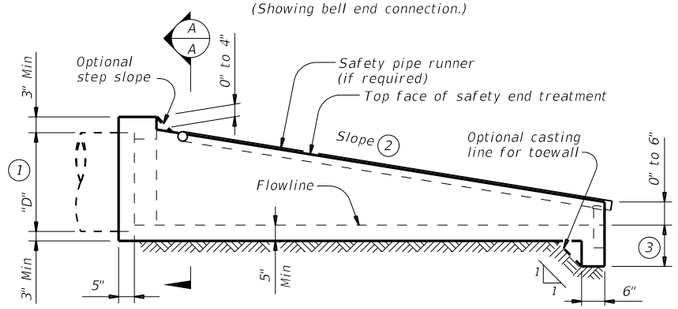
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



PLAN

(Showing bell end connection.)



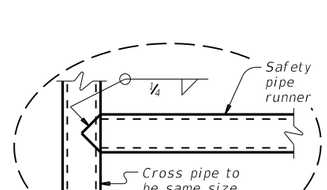
LONGITUDINAL ELEVATION

(Showing bell end connection.)

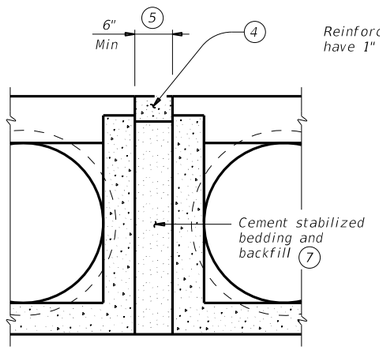
OPTION A

DETAIL A

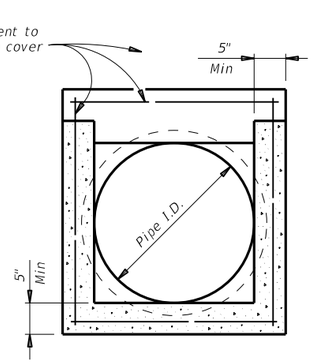
(If required)



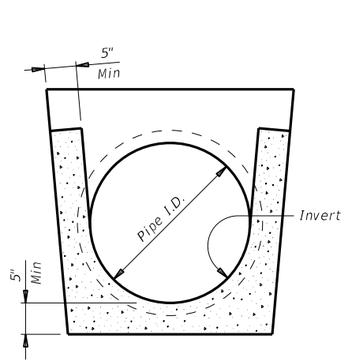
OPTION B



MULTIPLE PIPE INSTALLATION

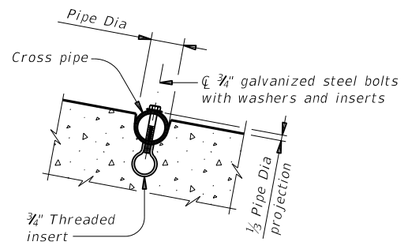


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

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

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

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

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

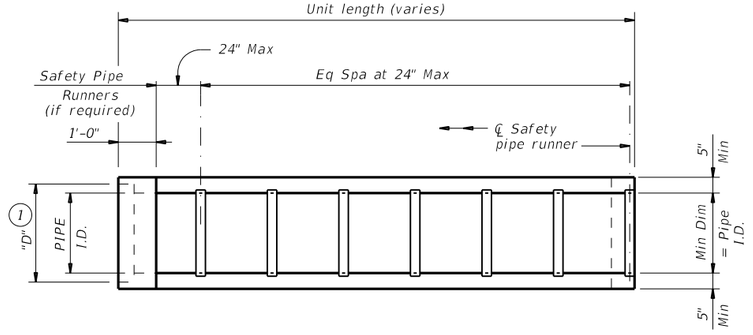
Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

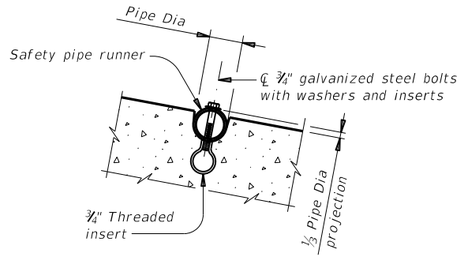
PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		112



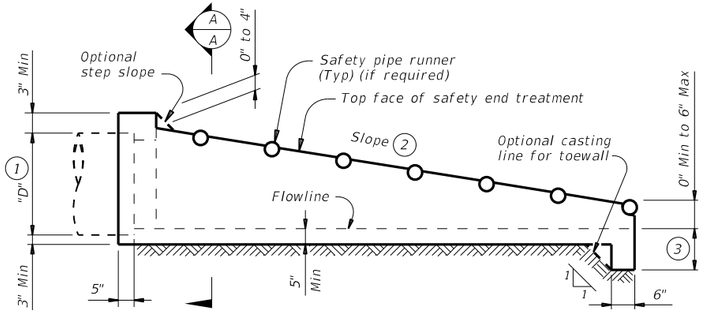
PLAN

(Showing bell end connection.)



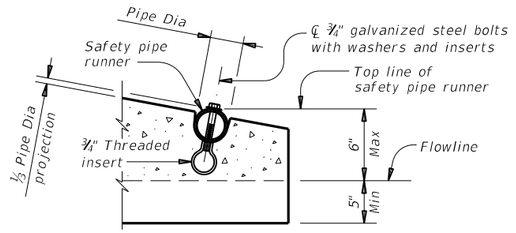
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

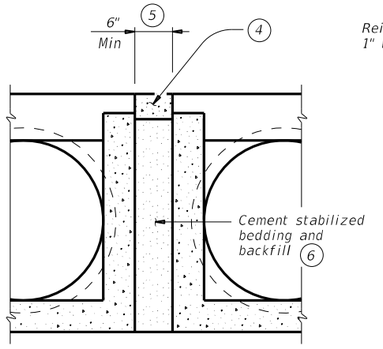


OPTION A

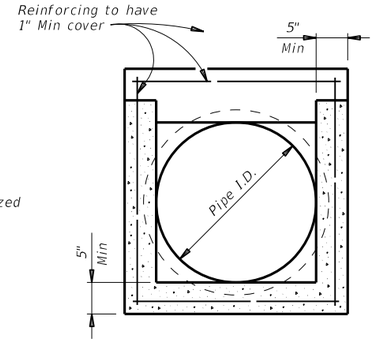
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

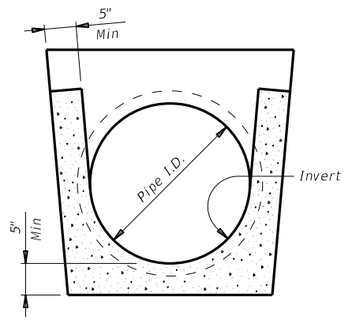
(If required)



MULTIPLE PIPE INSTALLATION

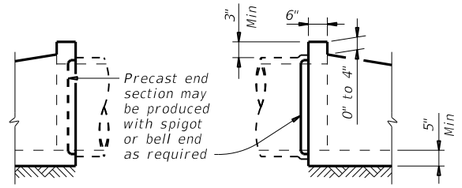


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See 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 ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		113

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

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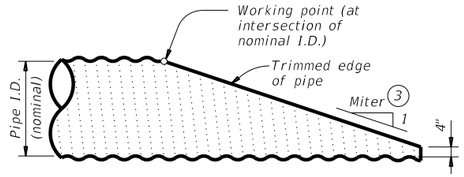
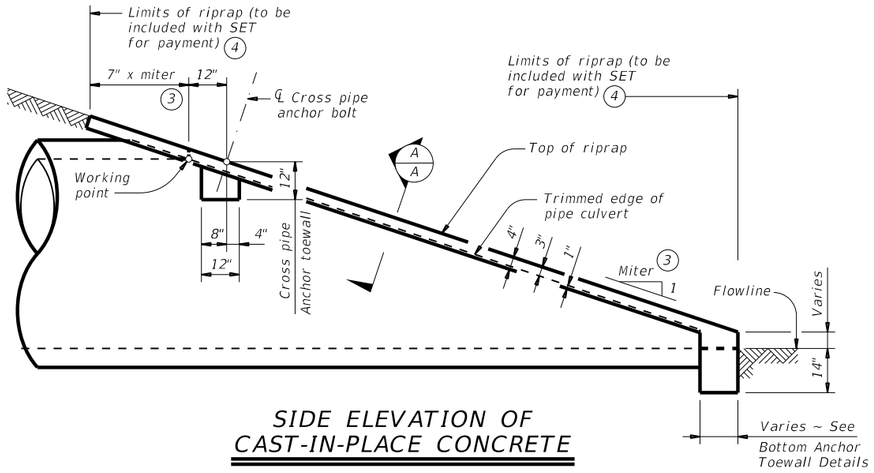


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

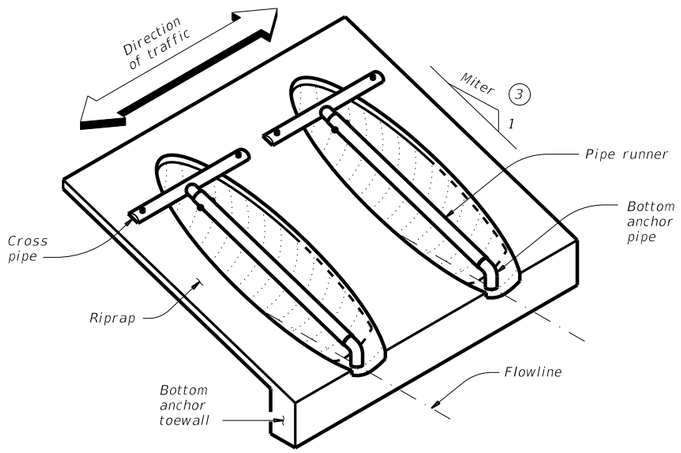
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

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

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

TYPICAL PIPE CULVERT MITERS (3)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

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

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

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

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

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

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

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

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

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		114

DATE: 7/7/2022 8:51:05 AM
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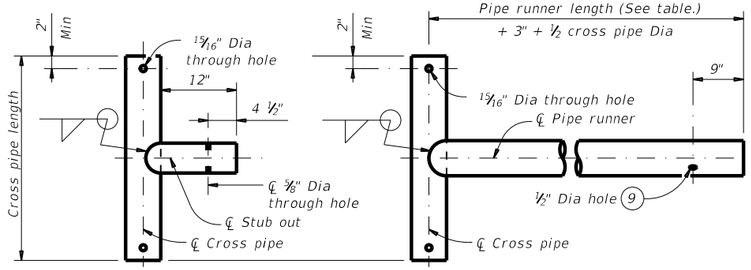
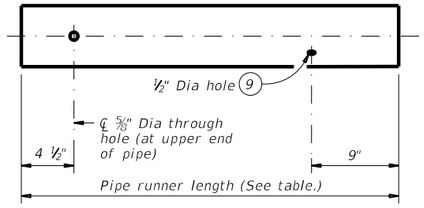


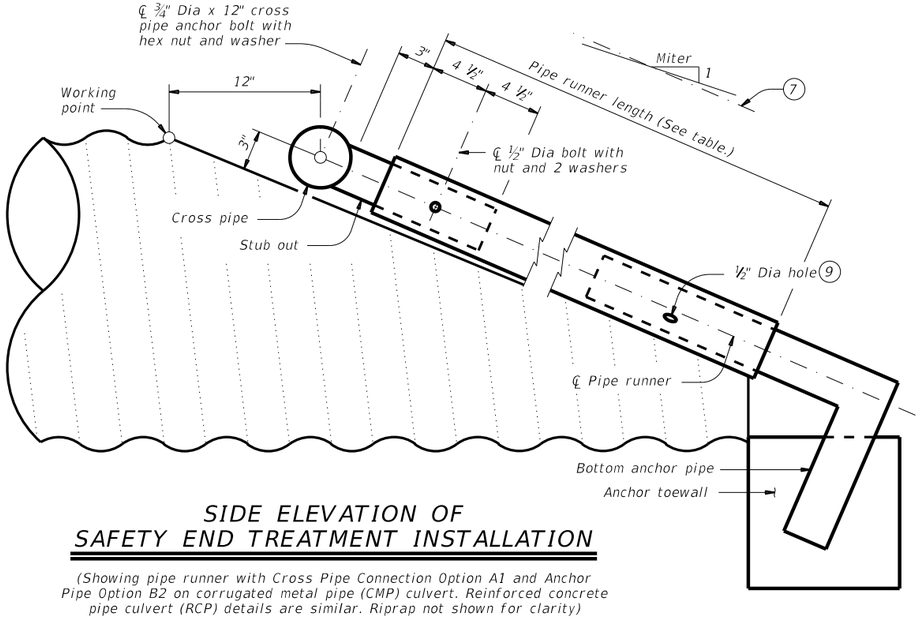
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



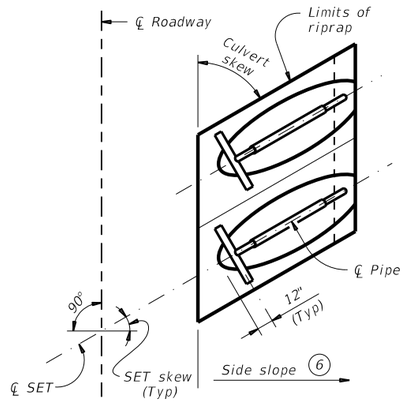
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

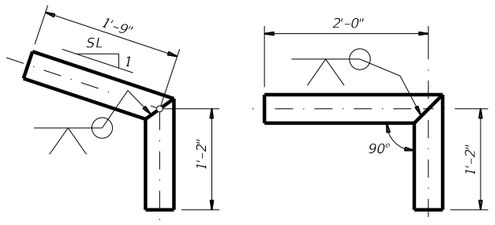


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

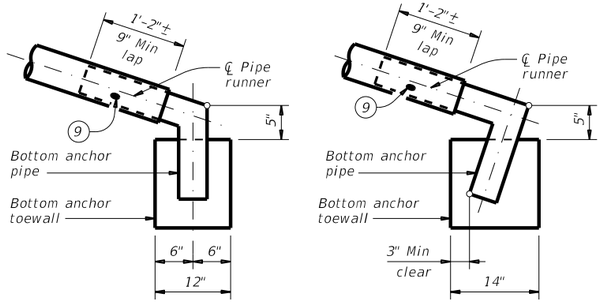


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

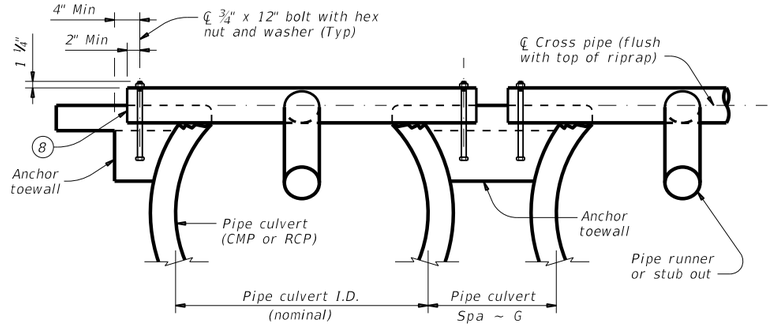
BOTTOM ANCHOR PIPE DETAILS (10)



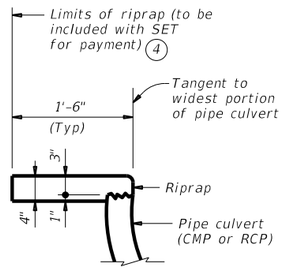
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

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

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

MATERIAL NOTES:

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

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

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

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

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

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		115

DATE: 7/7/2022 8:51:07 AM
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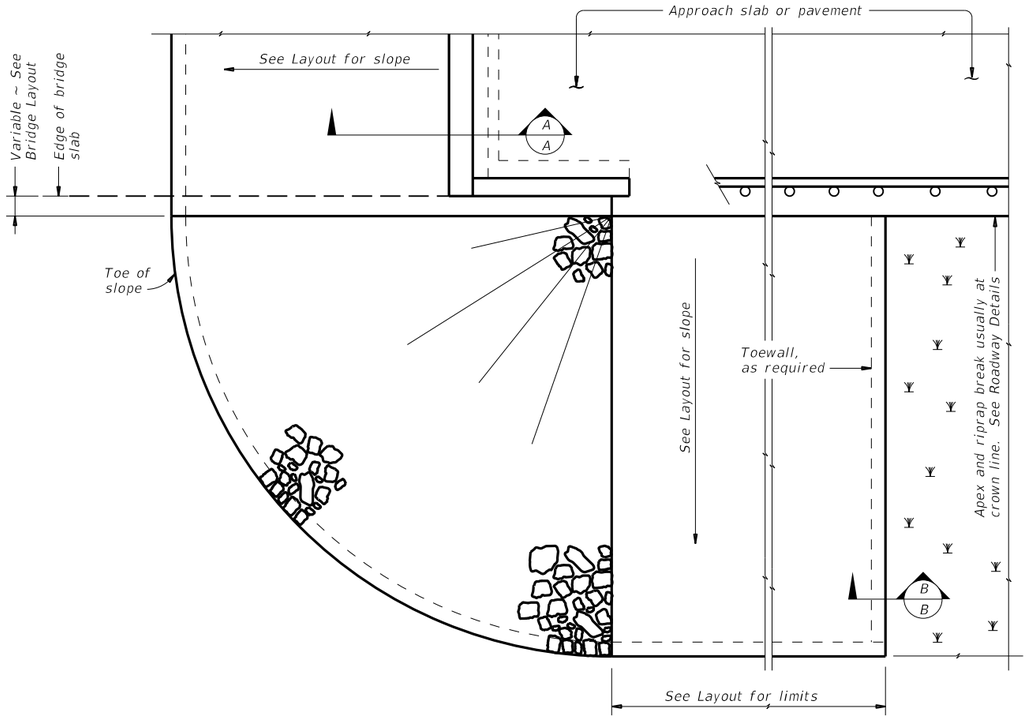
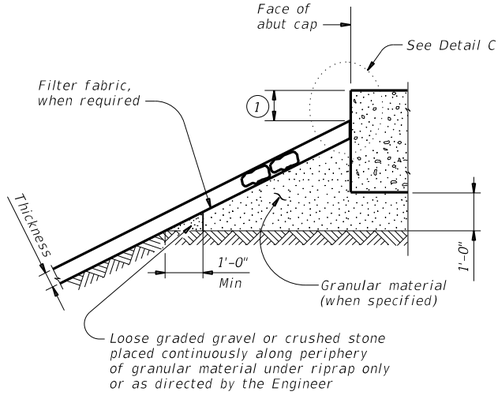
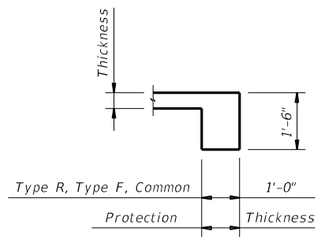


PLAN

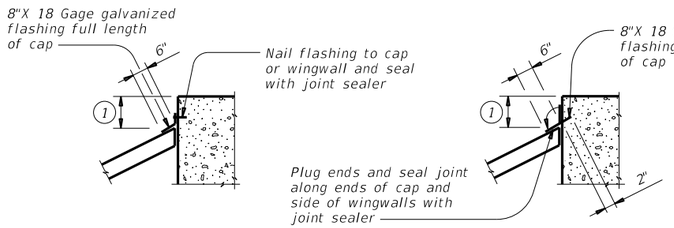


SECTION A-A AT CAP



SECTION B-B

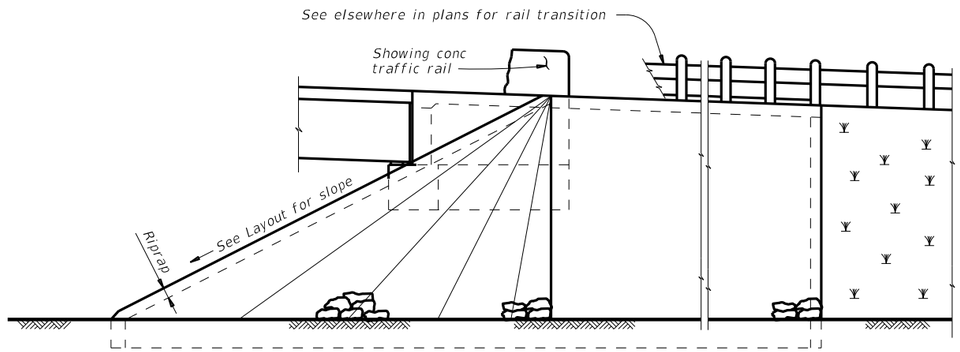
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		116

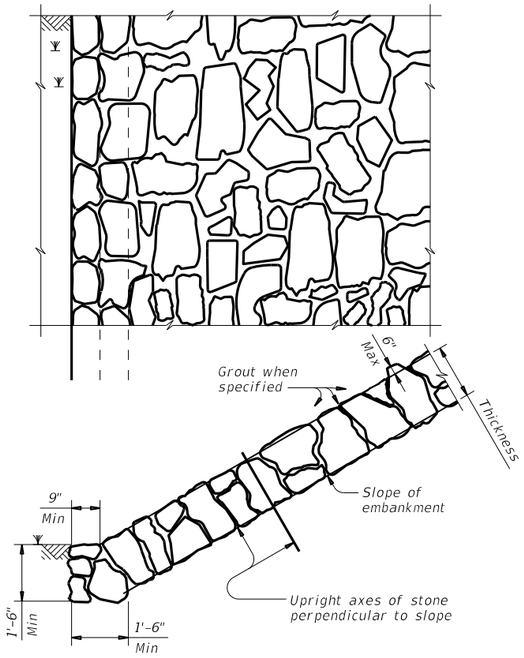


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

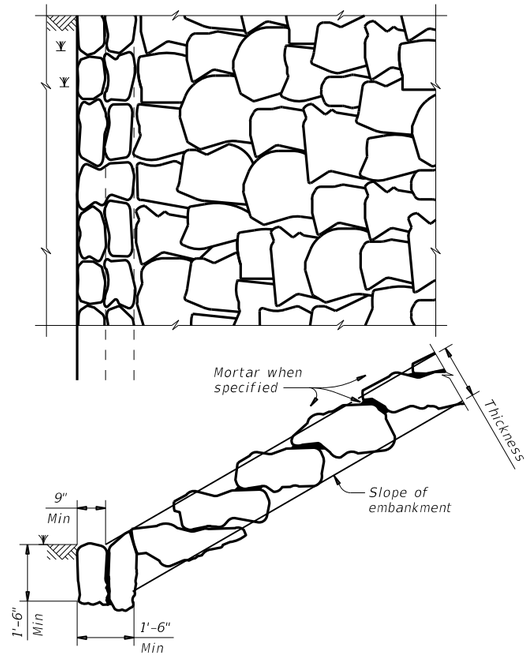


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

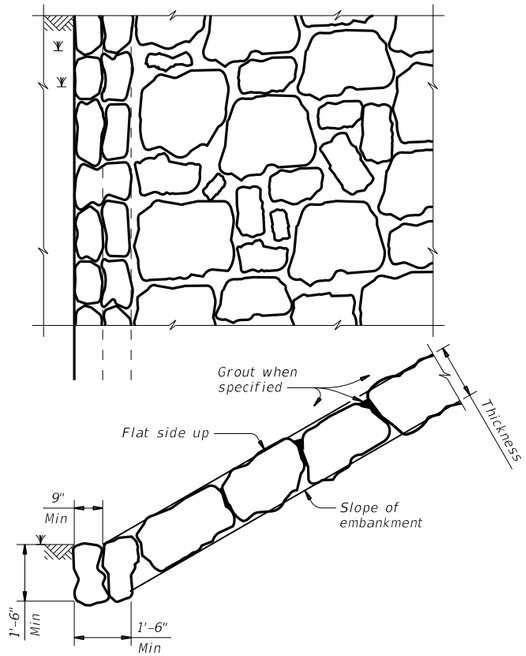


FIGURE 3 ~ TYPE F STONE RIPRAP

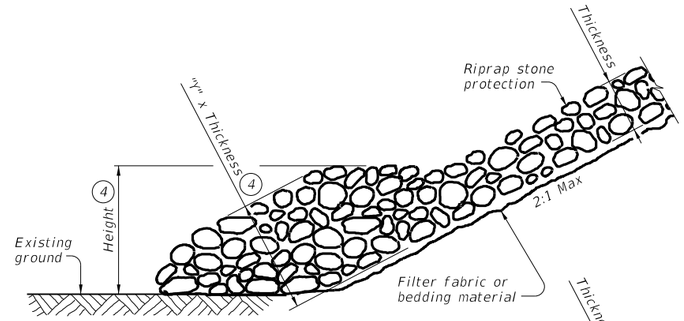
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

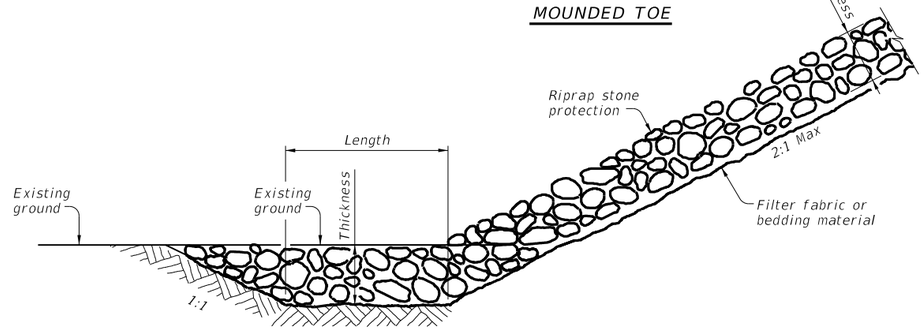
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

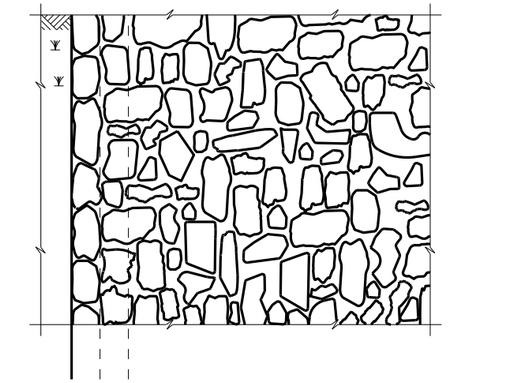


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

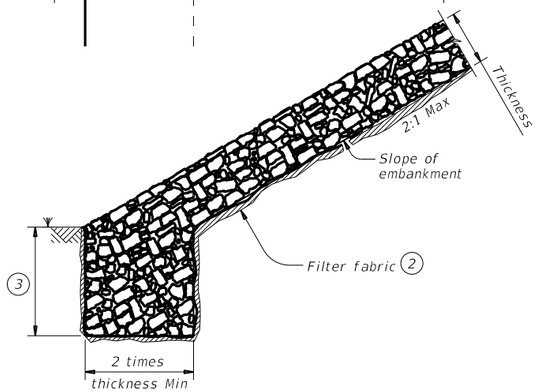


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

DATE: 7/7/2022 8:51:08 AM
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SHEET 2 OF 2

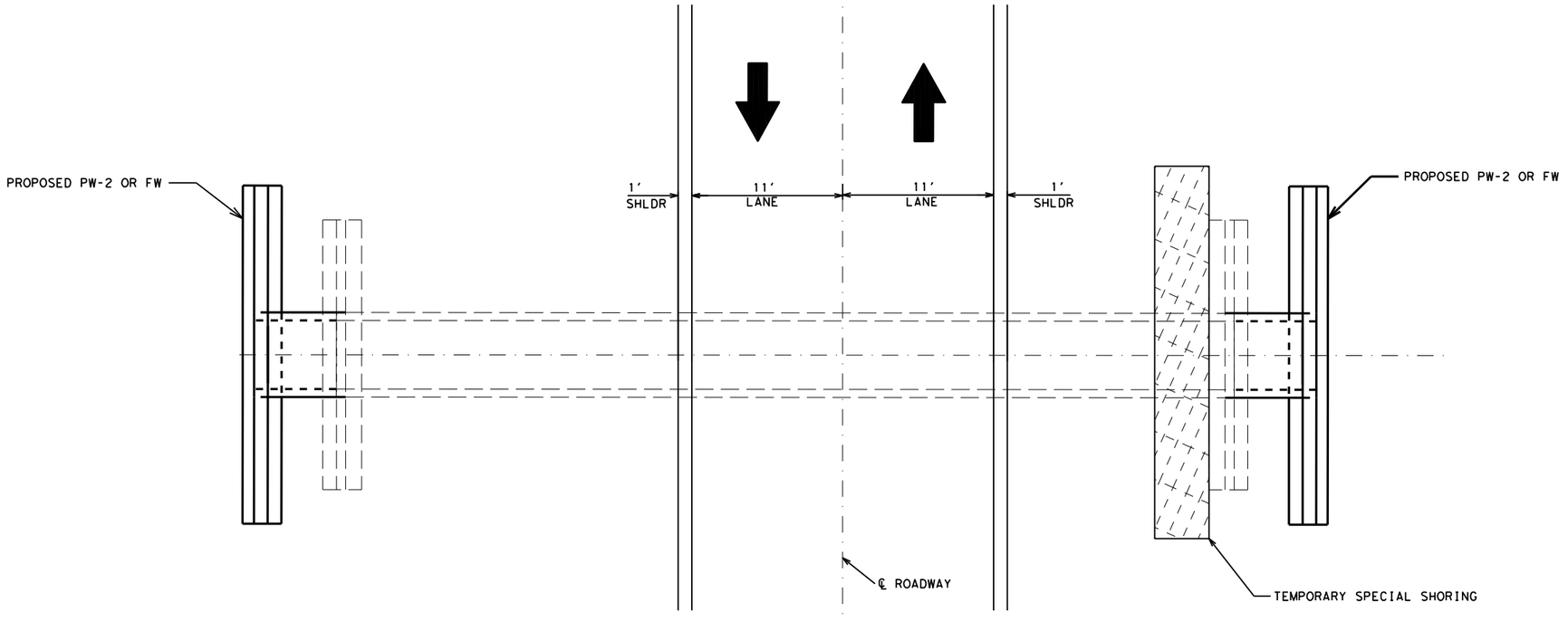
Texas Department of Transportation

Bridge Division Standard

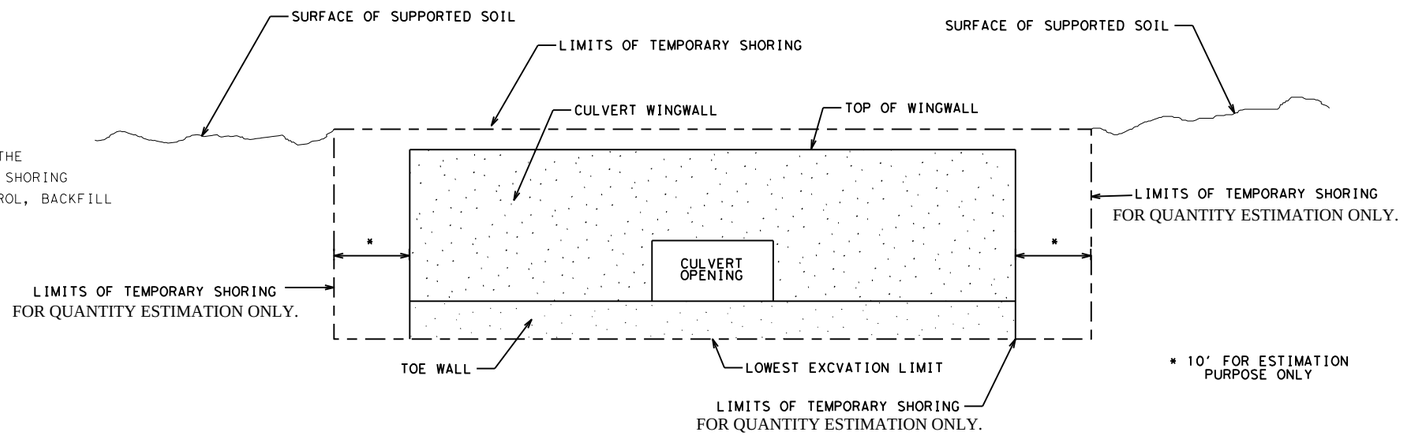
STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		117



PLAN VIEW



PROFILE VIEW OF WINGWALL
DEPICTING TYPICAL CALCULATION AREA FOR TEMPORARY SHORING

NOTES:

SUBMIT A TEMPORARY SHORING PLAN TO THE ENGINEER A MINIMUM OF THREE WEEKS PRIOR TO CONSTRUCTION. THE EXCAVATION SUPPORT PLAN SHOULD INCLUDE TEMPORARY SHORING DETAILED DRAWINGS, WORK SEQUENCING, TRAFFIC CONTROL, BACKFILL OPERATIONS, ETC.

ENSURE THAT OPEN ROADWAY LANES AND SHOULDERS ARE PROTECTED/SUPPORTED.

REFER TO THE "TREATMENT FOR VARIOUS EDGE CONDITIONS" SHEET.

ADHERE TO ALL REQUIREMENTS STATED UNDER STANDARD SPECICATION 403 (TEMPORARY SPECIAL SHORING).

REQUIRED SHORING AREA SHALL BE BASED UPON FIELD CONDITIONS AT EACH CULVERT LOCATION.

THIS DETAIL SHEET SHALL NOT BE USED AS TEMPORARY SHORING PLANS. SHORING AREA AND DETAILS SHALL BE DETERMINED BY A LICENSED GEOTECH ENGINEER THAT PREPARES SEALED TEMPORARY SHORING PLANS.

Monte R. Rater P.E.
07.25.22

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

FM 271
TEMP SHORING DETAIL

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		118

DRAWINGS NOT TO SCALE

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FILE: C:\Users\SWALKER\Desktop\Projects\Finished Projects\FM271_3R\271 Plan Set Updates\Corrected\100%\118 TEMP SHORING DETAIL.dgn

SUMMARY OF SMALL SIGNS

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

STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION: PREFABRICATED	MOUNTING DESIGNATION	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
4+72 RT	1	R1-2	YIELD	48 x 48 x 48	X		10BWG	1	SA	P		
4+58 LT	2	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
6+49 RT	3	R12-1T	WEIGHT LIMIT GROSS 58420 LBS	24 x 36	X		10BWG	1	SA	P		
8+39 RT	4	M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	212	3 x 10								
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
9+95 LT	5	D1-2	* BAILEY	78 X30	X		S80	1	SA	T		
			* BONHAM									
10+83 RT	6	R2-1	SPEED LIMIT (55)	30 x 36	X		10BWG	1	SA	P		
12+55 RT	7	W8-18	ROAD MAY FLOOD	36 x 36	X		10BWG	1	SA	P		
13+05 LT	8	W3-1	SYMBOL - STOP AHEAD	36 x 36	X		10BWG	1	SA	P		
14+25 RT	9	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		10BWG	1	SA	P		
17+92 RT	10	D7-3T	BONHAM STATE PARK 2	60 x 36	X		10BWG	1	SA	T		
30+58 RT	11	W8-19aTP	FLOOD GAUGE	18 x 12	X		10BWG	1	SA	P		
		W8-19	(FLOOD GAUGE)	12 x 72								
33+60 LT	12	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		10BWG	1	SA	P		
39+48 RT	13	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	(REMOVE)			10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	(REMOVE)								
46+18 RT	14	D20-1TL	* CO RD 3070	24 X 24	X		10BWG	1	SA	P		
49+94 LT	15	W8-18	ROAD MAY FLOOD	36 x 36	X		10BWG	1	SA	P		
51+17 LT	16	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
56+38 LT	17	D20-1TR	CO RD 3070 *	24 X 24	X		10BWG	1	SA	P		
67+75 LT	18	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
75+07 RT	19	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1L	SYMBOL - HORIZ ALN TURN LEFT	36 x 36								
79+18 RT	20	D20-1TR	CO RD 3100 *	24 X 24	X		10BWG	1	SA	P		
82+50 RT	21	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
83+30 RT	22	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
84+10 RT	23	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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

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

NOTE:

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

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	0690	01	016, ETC	FM 271
	DIST		COUNTY	SHEET NO.
	PAR		FANNIN	119

DATE: 7/7/2022 8:51:18 AM

SUMMARY OF SMALL SIGNS

STATION	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	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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
84+68 RT	24	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
85+11 RT	25	R1-1	STOP	(RELOCATE)								
85+70 RT	26	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
86+50 RT	27	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
87+30 RT	28	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
			(SEQUENTIAL FLASHING									
90+22 LT	29	D20-1TL	* CO RD 3100	24 X 24	X		10BWG	1	SA	P		
90+47 RT	30	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6P	PARK ROAD 24	24 x 24								
94+41 LT	31	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-1R	SYMBOL - HORIZ ALN TURN RIGHT	36 x 36								
97+22 RT	32	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-1R	SYMBOL - HORIZ ALN TURN RIGHT	36 x 36								
103+22 RT	33	D7-1TUP	BONHAM STATE PARK *	108 x 12	X		10BWG	1	SA	T		
104+50 RT	34	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
105+10 LT	35	W1-8L	<CHEVRON LEFT>	18 x 24	X		10BWG	1	SA	P		
		W1-8R	<CHEVRON RIGHT>	18 x 24								
105+65 RT	36	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	U		
		M1-6P	PARK ROAD 24	24 x 24								
		M6-2L	<ARROW - ANGLED UP LEFT> <AUXILIARY SIGN>	21 x 15								
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
		M6-2R	<ARROW - ANGLED UP RIGHT> <AUXILIARY SIGN>	21 x 15								
105+90 LT	37	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
106+36 LT	38	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
106+51 LT	39	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
107+21 LT	40	D1-1	PRAIRIES AND PINEY WOODS TRAILS	(RELOCATE)								
107+47 LT	41	M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6P	PARK ROAD 24	24 x 24								

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

SHEET 2 of 11

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	0690	01	016, ETC	FM 271
4-16 8-16	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		120

18

DATE: 7/7/2022 8:51:17 AM
FILE:

SUMMARY OF SMALL SIGNS

STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
107+50 LT	42	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
108+30 LT	43	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
109+60 LT	44	M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	<3 DIGIT VERTICAL NUMBER> (214)	3 x 10								
109+75 RT	45	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
112+05 LT	46	D7-1Tr	BONHAM STATE PARK *	108 x 12	X		10BWG	1	SA	T		
115+85 LT	47	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-1L	SYMBOL - HORIZ ALN TURN LEFT	36 x 36								
118+25 RT	48	D7-6aTR	HISTORICAL MARKER 1 MILE ON RIGHT 8714	48 x 48	X		10BWG	1	SA	T		
119+93 RT	49	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
120+85 LT	50	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6P	PARK ROAD 24	24 x 24								
125+80 RT	51	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
127+00 RT	52	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
128+20 RT	53	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
129+40 RT	54	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
130+60 RT	55	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
136+72 LT	56	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
137+35 RT	57	S3-1	<SYMBOL - SCHOOL BUS STOP AHEAD>	36 x 36	X		10BWG	1	SA	P		
138+50 RT	58	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
141+77 RT	59	D20-1TL	* CO RD 3020	24 X 24	X		10BWG	1	SA	P		
145+70 LT	60	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
146+90 LT	61	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
147+29 LT	62	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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
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REVISIONS		0690	01	016, ETC	FM 271
4-16		DIST	COUNTY		SHEET NO.
8-16		PAR	FANNIN		121

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SUMMARY OF SMALL SIGNS

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

STATION	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
148+45 LT	63	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
149+65 LT	64	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
150+85 LT	65	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
152+05 LT	66	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
154+03 LT	67	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
154+57 LT	68	D20-1TR	CO RD 3020 *	24 X 24	X		10BWG	1	SA	P		
155+23 LT	69	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
156+43 LT	70	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
157+63 LT	71	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
164+44 LT	72	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
165+35 RT	73	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
168+26 LT	74	D7-7aTR	HISTORICAL MARKER <ARROW RIGHT>(8914)	48 x 48	X		10BWG	1	SA	T		
		D7-7aTL	HISTORICAL MARKER <ARROW LEFT>(8914)	48 x 48								
171+55 RT	75	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
172+75 RT	76	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
173+95 RT	77	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
175+15 RT	78	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
176+35 RT	79	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
179+25 RT	80	D20-5T	* CO RD 3030	24 X 42	X		10BWG	1	SA	P		
			CO RD 3105 *									
182+25 RT	81	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
183+53 LT	82	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
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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 4-16 8-16	DIST PAR	COUNTY FANNIN		SHEET NO. 122

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SUMMARY OF SMALL SIGNS

STATION	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
187+33 RT	83	D3-3	CO RD 3105 (STREET)	MOUNT ON STOP								
				SIGN @ 187+57								
187+57 RT	84	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
189+60 LT	85	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
190+80 LT	86	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
191+54 LT	87	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
		D3-1	FANNIN 3030 TOPPER	LEAVE AS IS								
192+00 LT	88	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
193+20 LT	89	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
194+40 LT	90	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
195+95 RT	91	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1L	SYMBOL - HORIZ ALN TURN LEFT	36 x 36								
196+50 LT	92	D20-5T	* CO RD 3105	24 x 42	X		10BWG	1	SA	P		
			CO RD 3030 *									
200+85 LT	93	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
201+40 RT	94	D20-1TR	CO RD 3106 *	24 X 24	X		10BWG	1	SA	P		
204+35 RT	95	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
205+15 RT	96	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
206+11 RT	97	W14-1	DEAD END	36 x 36	X		10BWG	1	SA	P		
		D3-1	FANNIN 3106 TOPPER	LEAVE AS IS								
206+45 RT	98	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
206+45 RT	99	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
207+25 RT	100	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
208+05 RT	101	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
212+32 LT	102	D20-1TL	* CO RD 3106	24 X 24	X		10BWG	1	SA	P		
212+65 RT	103	M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	216	3 x 10								
215+95 LT	104	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1R	SYMBOL - HORIZ ALN TURN RIGHT	36 x 36								

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ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
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Texas Department of Transportation — Traffic Operations Division Standard

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SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS		0690	01	016, ETC	FM 271
4-16		DIST	COUNTY		SHEET NO.
8-16		PAR	FANNIN		123

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SUMMARY OF SMALL SIGNS

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

STATION	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
222+57 RT	105	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
223+13 LT	106	D7-6aTL	HISTORICAL MARKER 1 MILE ON LEFT	48 x 48	X		10BWG	1	SA	T		
230+04 LT	107	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
230+35 RT	108	D20-1TL	* CO RD 3035	24 X 24	X		10BWG	1	SA	P		
231+24 LT	109	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
232+44 LT	110	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
233+64 LT	111	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
234+05 LT	112	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
		D3-1	FANNIN 3035 TOPPER	LEAVE AS IS								
234+84 LT	113	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
236+04 LT	114	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
237+24 LT	115	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
238+44 LT	116	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
239+64 LT	117	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
240+40 LT	118	D20-1TR	CO RD 3035 *	24 X 24	X		10BWG	1	SA	P		
240+84 LT	119	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
241+67 RT	120	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1L	SYMBOL - HORIZ ALN TURN LEFT	36 x 36								
242+04 LT	121	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
247+55 LT	122	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
247+85 RT	123	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
248+65 RT	124	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
249+45 RT	125	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								

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Square Feet	Minimum Thickness
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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		0690	01	016, ETC	FM 271
4-16		DIST	COUNTY		SHEET NO.
8-16		PAR	FANNIN		124

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SUMMARY OF SMALL SIGNS

STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
250+25 RT	126	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
251+05 RT	127	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
251+85 RT	128	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
252+65 RT	129	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
254+95 LT	130	S3-1	<SYMBOL - SCHOOL BUS STOP AHEAD>	36 x 36	X		10BWG	1	SA	P		
260+20 LT	131	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1R	SYMBOL - HORIZ ALN TURN RIGHT	36 x 36								
263+30 RT	132	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1550)	24 x 24								
271+85 RT	133	D1-1	COTTON CENTER	96 x 18	X		10BWG	1	SA	T		
273+70 RT	134	D1-2	* GOBER * HAIL	66 x 30	X		10BWG	1	SA	U		
276+20 LT	135	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
277+87 RT	136	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	U		
		M1-6F	<FM SHIELD> FARM ROAD (1550)	24 x 24								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
278+03 RT	137	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		S80	1	SA	U		
278+03 LT	138	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
279+72 LT	139	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1550)	24 x 24								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
280+80 RT	140	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
283+63 LT	141	D1-2	* BONHAM HAIL *	72 X 30	X		10BWG	1	SA	U		
285+70 RT	142	R2-1	SPEED LIMIT (55)	30 x 36	X		10BWG	1	SA	P		
285+96 LT	143	D1-1	COTTON CENTER	96 X 18	X		10BWG	1	SA	T		
287+44 RT	144	D1-1	GOBER 4	48 X 18	X		10BWG	1	SA	T		
293+86 LT	145	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1550)	24 x 24								
311+03 RT	146	D20-1TL	CO RD 3300 *	24 X 24	X		10BWG	1	SA	P		
315+88 LT	147	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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/

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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		0690	01	016, ETC	FM 271
4-16 8-16		DIST	COUNTY		SHEET NO.
		PAR	FANNIN		125

DATE: 7/7/2022 8:51:13 AM
FILE: C:\USERS\SWILKER\Desktop\271 Plans Set Updates\Corrected\100%\110 SOSS.dgn

SUMMARY OF SMALL SIGNS

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

STATION	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
319+83 LT	148	D20-1TR	CO RD 3300 *	24 X 24	X		10BWG	1	SA	P		
320+30 LT	149	M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	<3 DIGIT VERTICAL NUMBER> (218)	3 x 10								
349+02 RT	150	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
356+35 LT	151	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
357+55 LT	152	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
358+75 LT	153	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
359+95 LT	154	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
361+55 LT	155	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
362+35 LT	156	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
368+90 LT	157	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
385+05 RT	158	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 X 24	X		10BWG	1	SA	P		
		W1-4L	SYMBOL - REVERSE CURVE LEFT	36 x 36								
392+05 RT	159	D20-1TR	CO RD 3130 *	24 X 24	X		10BWG	1	SA	P		
392+84 RT	160	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
394+04 RT	161	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
395+24 RT	162	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
396+72 RT	165	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
397+92 RT	164	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
398+88 RT	165	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
400+85 LT	166	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
401+67 LT	167	D20-1TL	* CO RD 3130	24 X 24	X		10BWG	1	SA	P		
402+05 LT	168	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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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SHEET 8 of 11

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 4-16 8-16	0690	01	016, ETC	FM 271
	DIST		COUNTY	SHEET NO.
	PAR		FANNIN	126

DATE: 7/7/2022 8:51:12 AM

SUMMARY OF SMALL SIGNS

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

STATION	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
403+25 LT	169	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
404+45 LT	170	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
405+65 LT	171	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
406+85 LT	172	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
414+45 RT	173	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1L	SYMBOL - HORIZ ALN TURN LEFT	36 x 36								
415+20 LT	174	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-4L	SYMBOL - REVERSE CURVE LEFT	36 x 36								
418+75 LT	175	D20-1TR	CO RD 3135 *	24 x 24	X		10BWG	1	SA	P		
421+88 RT	176	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
422+68 RT	177	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
423+48 RT	178	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
424+28 RT	179	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
425+08 RT	180	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
425+88 RT	181	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
426+45 RT	182	M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	<3 DIGIT VERTICAL NUMBER> (220)	3 x 10								
426+68 RT	183	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
429+87 LT	184	D20-1TL	* CO RD 3135	24 x 24	X		10BWG	1	SA	P		
435+30 LT	185	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-1R	SYMBOL - HORIZ ALN TURN RIGHT	36 x 36								
454+79 RT	186	D1-1	GOBER	48 x 18	X		10BWG	1	SA	T		
459+79 RT	187	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SA	P		
		W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36								
459+95 LT	188	R2-1	SPEED LIMIT (55)	30 x 36	X		10BWG	1	SA	P		
466+26 RT	189	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (68)	24 x 24								

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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 4-16 8-16	0690	01	016, ETC	FM 271
	DIST		COUNTY	SHEET NO.
	PAR		FANNIN	127

DATE: 7/7/2022 8:51:11 AM

SUMMARY OF SMALL SIGNS

STATION	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
467+25 LT	190	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
468+45 LT	191	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
469+65 LT	192	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
470+55 RT	193	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
470+85 LT	194	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
472+05 LT	195	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
472+58 RT	196	D20-1TR	CO RD 3136 *	24 X 24	X		10BWG	1	SA	P		
473+00 LT	197	D2-2	COTTON CENTER 4	108 x 30	X		S80	1	SA	U		
			BONHAM 10									
473+25 LT	198	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
474+45 LT	199	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
474+90 RT	200	D1-2	* WOLFE CITY	REMOVE SIGN								
			BAILEY *									
476+99 LT	201	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (271)	24 x 24								
		D10-7aT	<3 DIGIT VERTICAL NUMBER> (222)	3 x 10								
479+50 RT	202	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
478+41 LT	203	D20-1TL	* CO RD 3136	24 X 24	X		10BWG	1	SA	P		
478+62 LT	204	W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE>	24 x 24	X		10BWG	1	SB	P		
		W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36								
479+50 RT	205	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		

*NOTE: SEE SOSS #11 FOR ADDITIONAL SIGNS THAT WERE ADDED LATER

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		0690	01	016, ETC	FM 271
4-16		DIST	COUNTY		SHEET NO.
8-16		PAR	FANNIN		128

DATE: 7/7/2022 8:51:10 AM
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SUMMARY OF SMALL SIGNS

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

STATION	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
4+22	1a	R5-1	DO NOT ENTER	36 x 36	X		10BWG	1		P		
4+36	1b	R1-2	YIELD	48 x 48 x 48	X		10BWG	1		P		
4+58	2a	W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
				ADD TO STOP								
				SIGN POLE								
20+43	10a	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1		P		
		M1-6T	ROUTE 78 TEXAS	24 x 24								
25+43	10b	W2-4	SYMBOL - TEE INTERSECTION AHEAD	30 x 30	X		10BWG	1		P		
101+00	32a	R2-1	SPEED LIMIT(55)	30 x 36	X		10BWG	1		P		
113+75	46a	R2-1	SPEED LIMIT(55)	30 x 36	X		10BWG	1		P		
144+50	59a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
158+05	71a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
237+75	115a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
271+50	133a	R2-1	SPEED LIMIT (55)	30 x 36	X		10BWG	1		P		
278+03	138a	W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12	X		10BWG	1		P		
421+08	175a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
424+00	178a	R1-1	STOP	36 x 36	X		10BWG	1		P		
475+45	200a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
476+65	201a	W1-8L	<CHEVRON LEFT>	(RELOCATE)								
		W1-8R	<CHEVRON RIGHT>	(RELOCATE)								
479+50	205a	W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 x 12								
				ADD TO STOP								
				SIGN POLE								

ADDITIONAL SIGNS THAT WERE ADDED LATER

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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SHEET 11 of 11

Texas Department of Transportation — Traffic Operations Division Standard

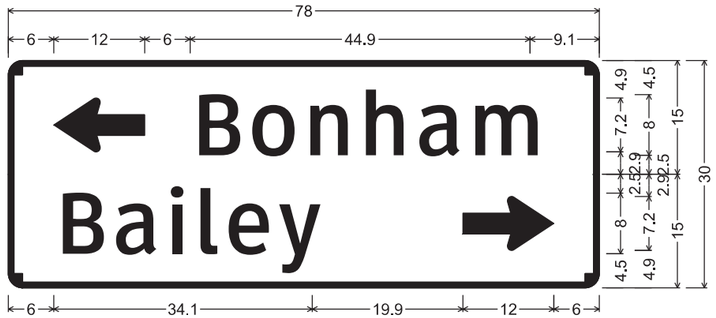
SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0690	SECT 01	JOB 016, ETC	HIGHWAY FM 271
REVISIONS 4-16 8-16	DIST PAR		COUNTY FANNIN	SHEET NO. 129

18

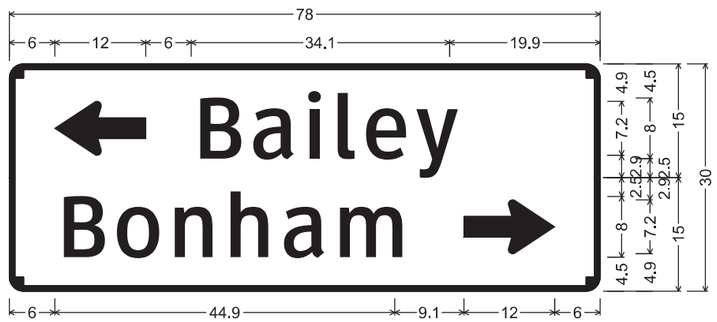
DATE: 7/7/2022 8:51:19 AM



D1-2 8in LT-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Bonham", ClearviewHwy-3-W;

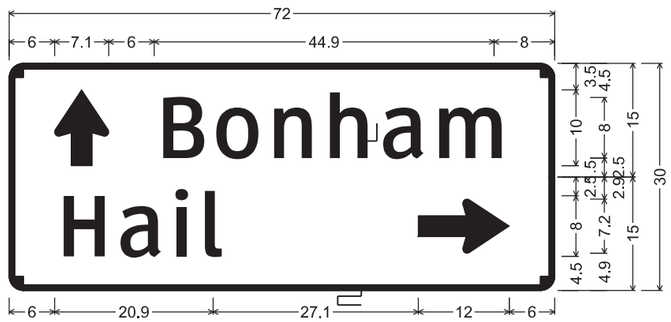
1.9" Radius, 0.8" Border, White on, Green;
"Bailey", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';



D1-2 8in LT-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Bailey", ClearviewHwy-3-W;

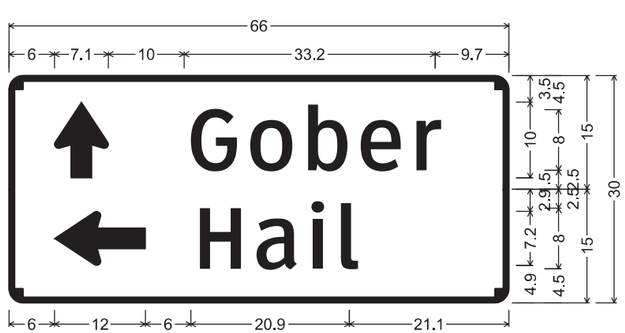
1.9" Radius, 0.8" Border, White on, Green;
"Bonham", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';



D1-2 8in UP-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90';
"Bonham", ClearviewHwy-3-W;

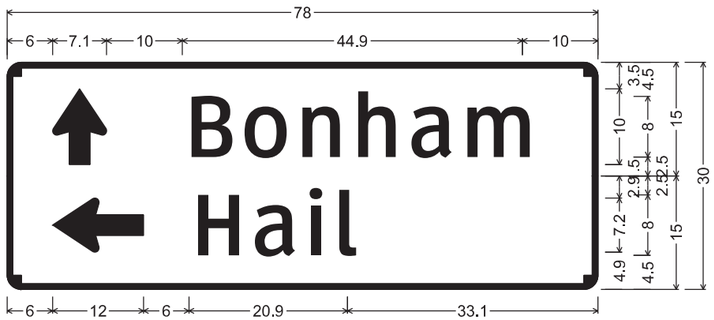
1.9" Radius, 0.8" Border, White on, Green;
"Hail", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';



D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90';
"Gober", ClearviewHwy-3-W;

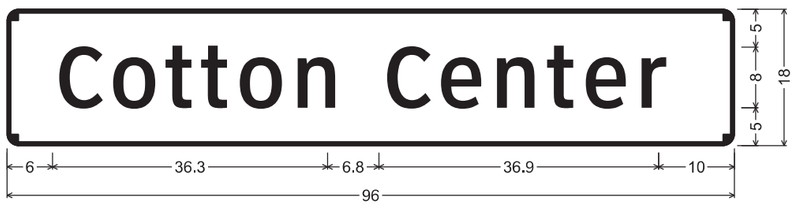
1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180';
"Hail", ClearviewHwy-3-W;



D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90'; "Bonham", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Hail", ClearviewHwy-3-W;



D1-1 8in RT;
1.5" Radius, 0.5" Border, White on, Green;
"Cotten Center", ClearviewHwy-3-W;

DATE: $DATE$ $TIME$
FILE: $FILE$

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FM 271
SIGN DETAILS

SHEET 1 OF 3

Texas Department of Transportation

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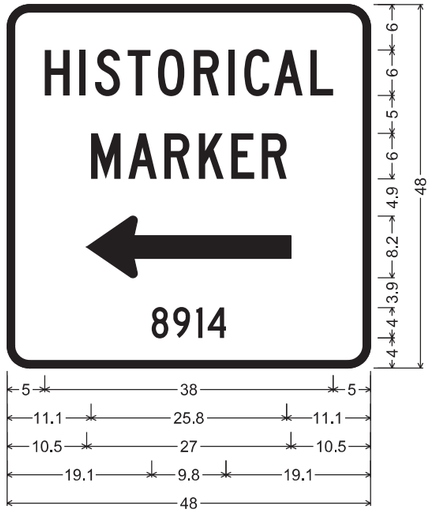
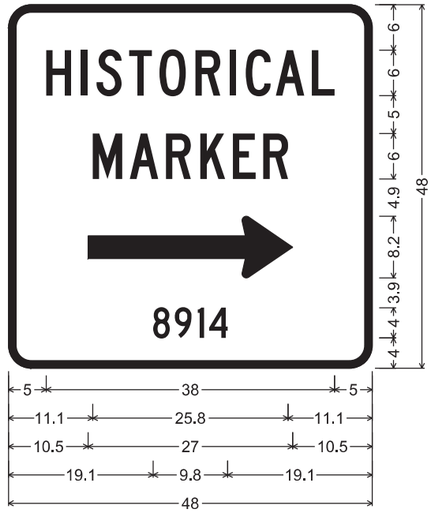
DIST	COUNTY		SHEET NO.
PAR	FANNIN		130



D7-7aTL_48x48;
3.0" Radius, 1.0" Border, White on, Brown;
"HISTORICAL", C; "MARKER", C;
Standard Arrow Custom 27.0" X 8.1" 180';
"8914", C;



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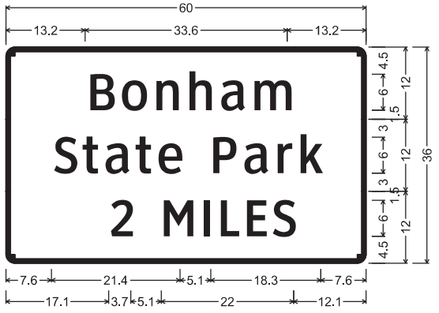
3.0" Radius, 1.0" Border, White on, Brown;
"HISTORICAL", C; "MARKER", C;
Standard Arrow Custom 27.0" X 8.1" 0';
"8914", C;

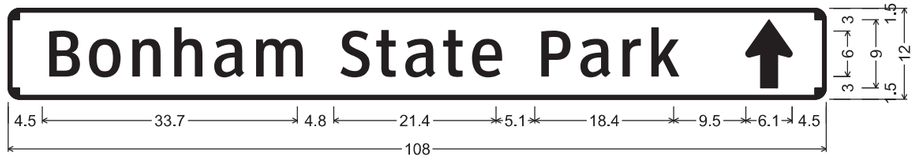


D7-3T_VARx36;

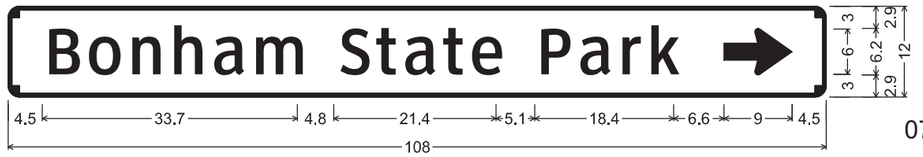
1.5" Radius, 0.8" Border, White on, Brown;
"Bonham", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"State Park", ClearviewHwy-3-W;

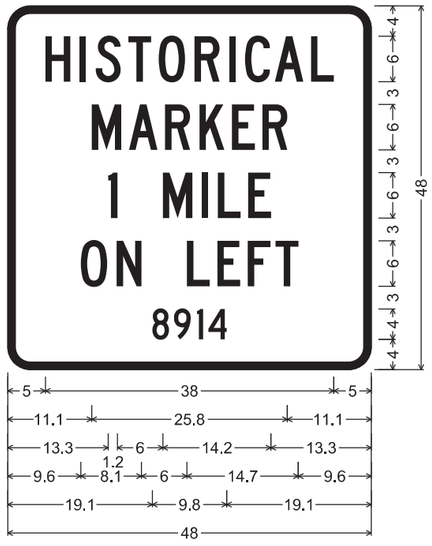
1.5" Radius, 0.8" Border, White on, Brown;
"2 MILES", ClearviewHwy-3-W;



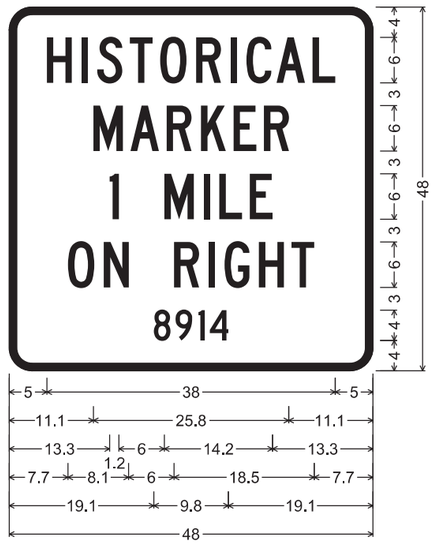
D7-1TUP_VARx12;
1.5" Radius, 0.5" Border, White on, Brown;
"Bonham State Park", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 90';



D7-1TR_VARx12;
1.5" Radius, 0.5" Border, White on, Brown;
"Bonham State Park", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';



D7-6aTL_48x48;
3.0" Radius, 1.0" Border, White on, Brown;
"HISTORICAL", C; "MARKER", C;
"1 MILE", C; "ON LEFT", C; "8914", C;



D7-6aTR_48x48;
3.0" Radius, 1.0" Border, White on, Brown;
"HISTORICAL", C; "MARKER", C;
"1 MILE", C; "ON RIGHT", C; "8914", C;

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FM 271
SIGN DETAILS

SHEET 2 OF 3

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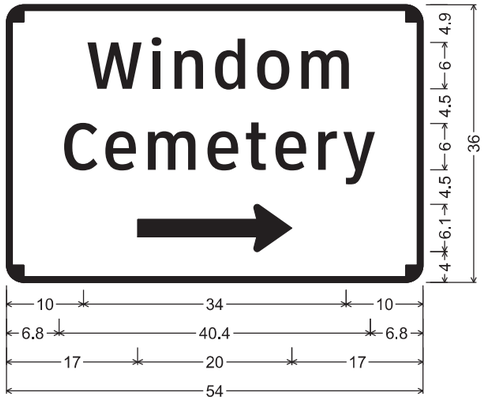
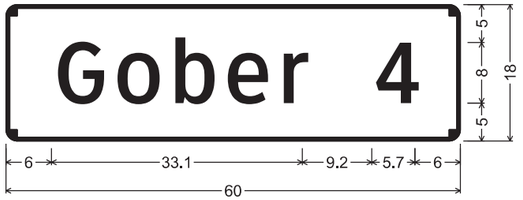
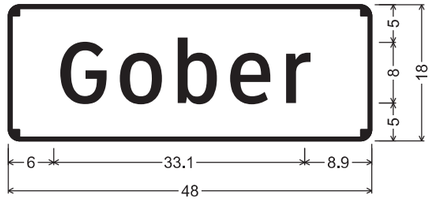
FILE: $FILE$



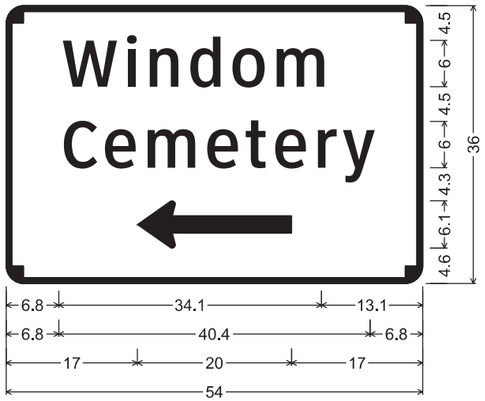
D3-3bTR_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Windom", ClearviewHwy-3-W;
"Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0';



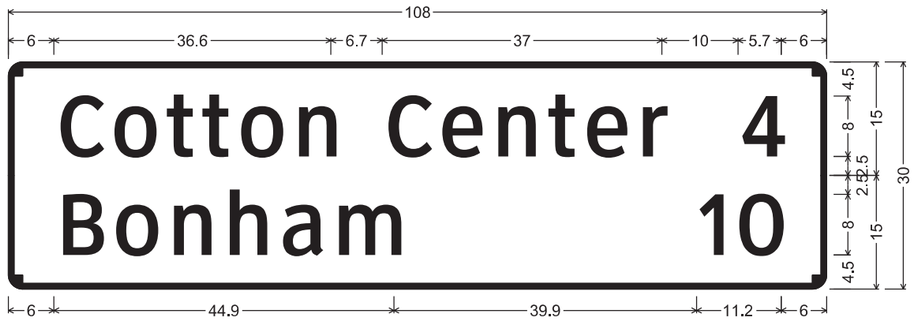
D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Gober", ClearviewHwy-3-W; "4", ClearviewHwy-3-W;



D1-1 8in LT;
1.5" Radius, 0.5" Border, White on, Green;
"Gober", ClearviewHwy-3-W;



D3-3bTL_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Windom", ClearviewHwy-3-W;
"Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 180';



D2-2 8in;

1.9" Radius, 0.8" Border, White on, Green;
"Cotton Center", ClearviewHwy-3-W; "4", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Bonham", ClearviewHwy-3-W; "10", ClearviewHwy-3-W;

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FM 271
SIGN DETAILS

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
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FILE: $FILE$

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)

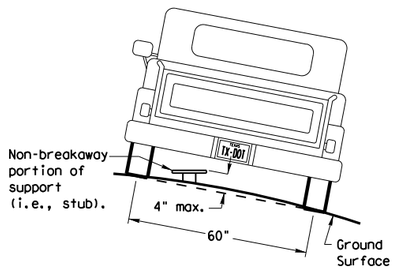
Anchor Type

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))

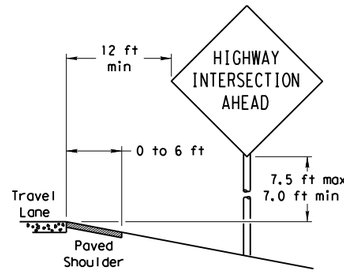
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

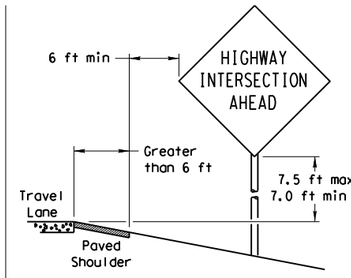
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

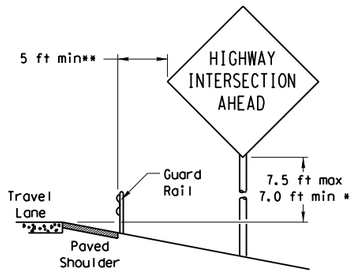
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



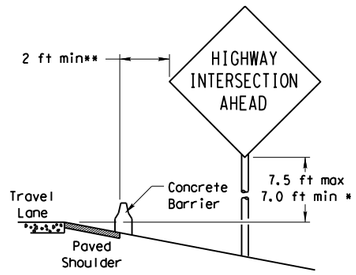
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



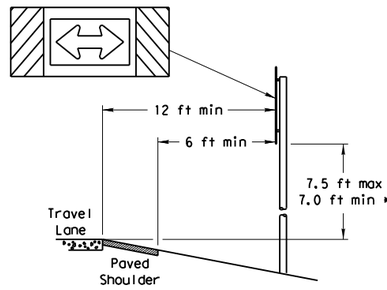
BEHIND GUARDRAIL



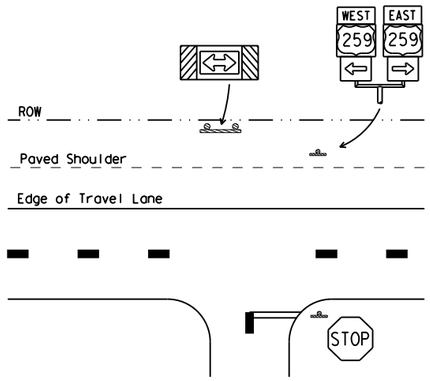
BEHIND CONCRETE BARRIER

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

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.



* 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

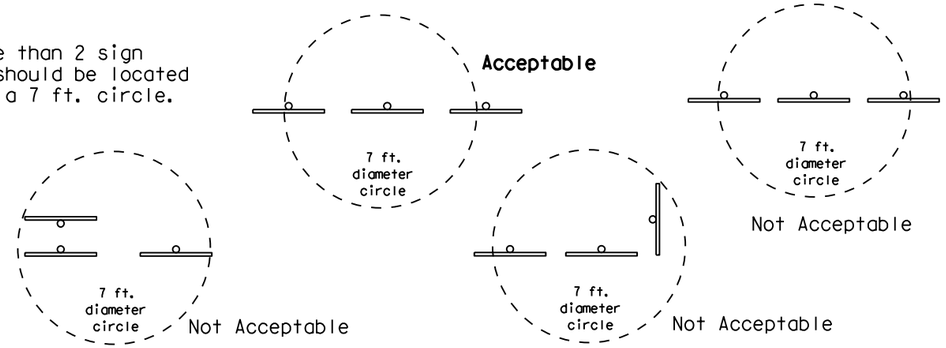
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

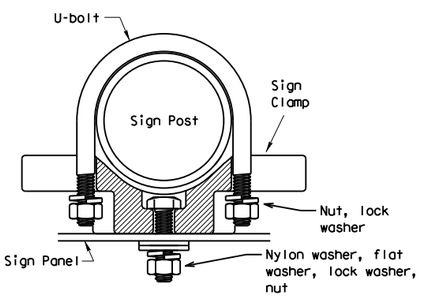
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

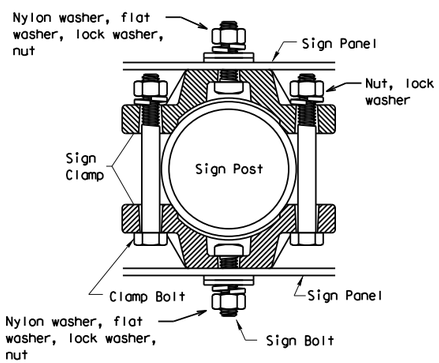


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

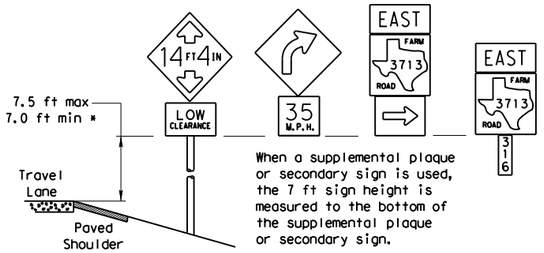
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



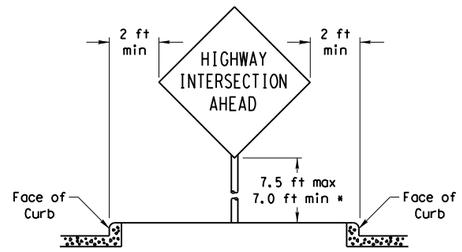
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



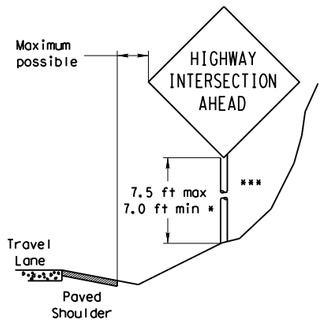
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		133

DATE: 7/7/2022 8:51:20 AM
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DATE: 7/7/2022 8:51:21 AM
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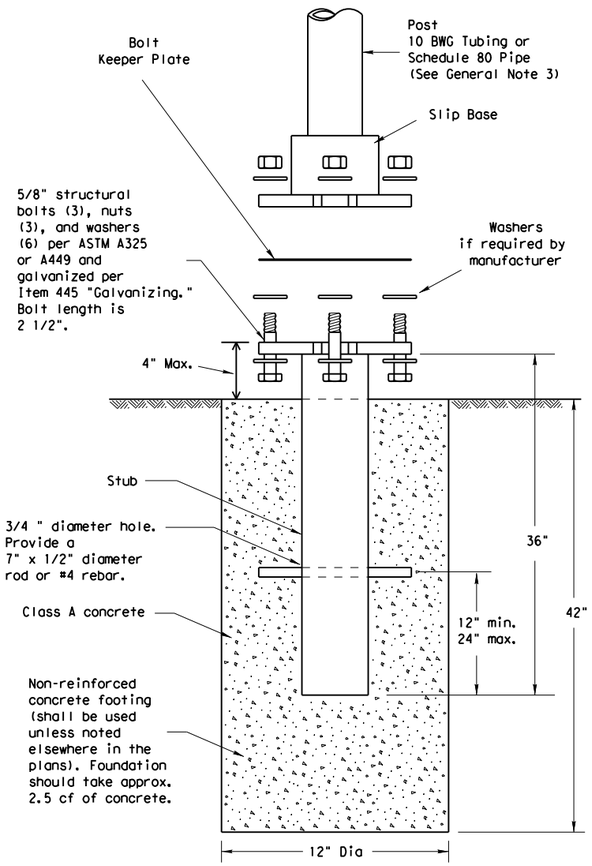
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

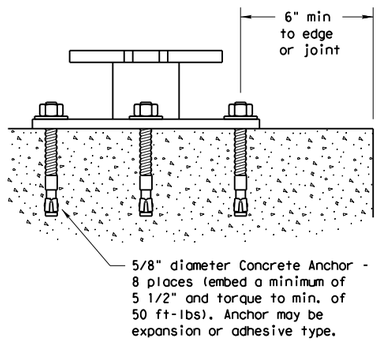
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

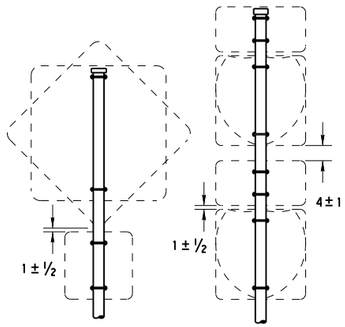
SMD(SLIP-1)-08

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

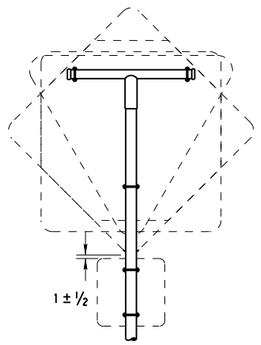
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271

DIST	COUNTY	SHEET NO.
PAR	FANNIN	134



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



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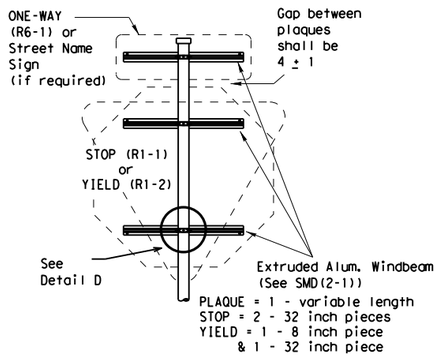

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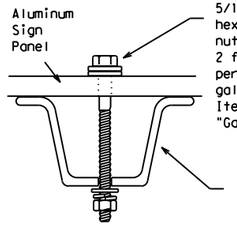
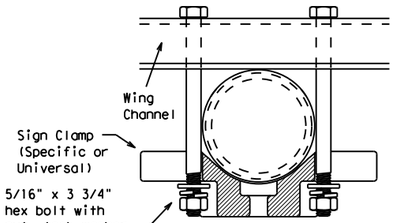


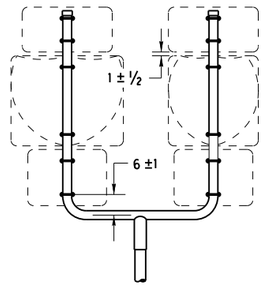
Top View

Detail A



Top View

Detail B



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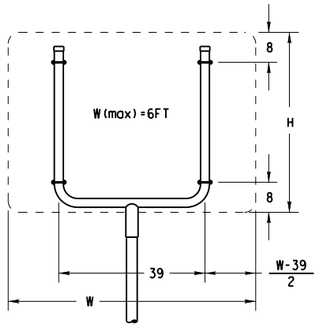

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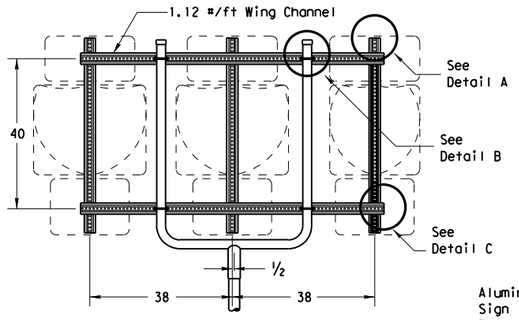
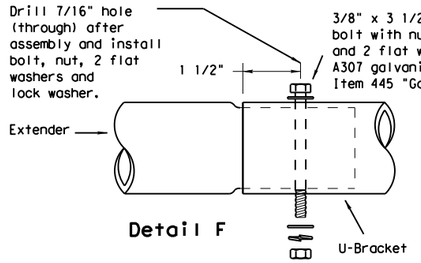
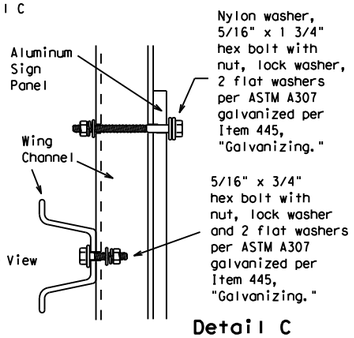


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

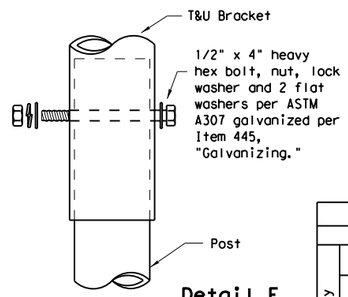


Detail F

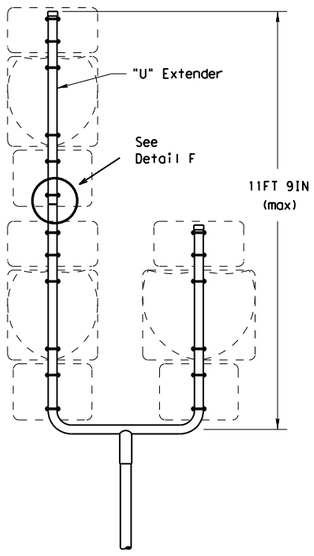
Splices shall only be allowed behind the sign substrate.



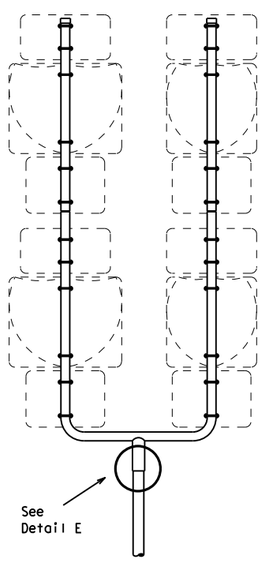
Detail C



Detail E



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



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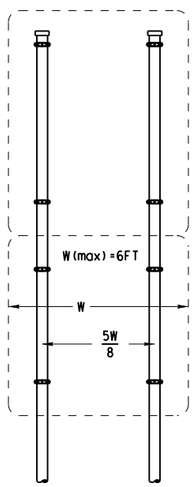
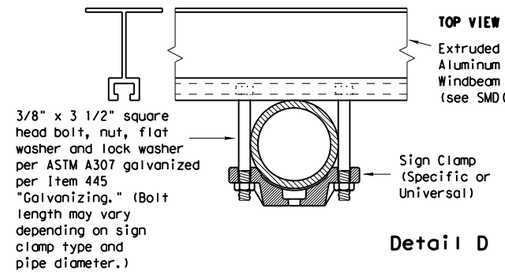
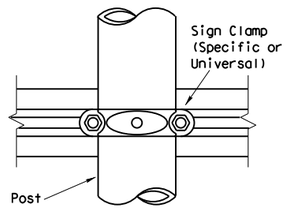


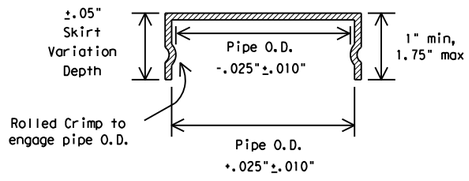
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



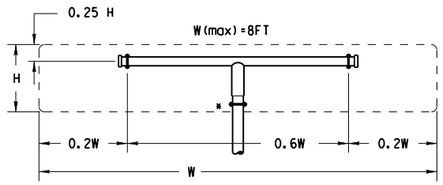
FRICTION CAP DETAIL



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.



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

All dimensions are in english unless detailed otherwise.

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		135

DATE: 7/7/2022 8:51:22 AM
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DATE: 7/7/2022 8:51:23 AM
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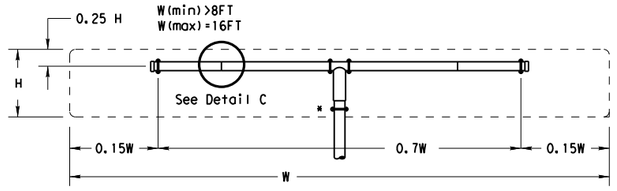
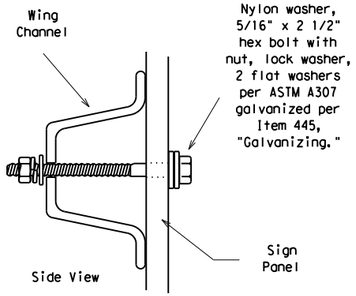
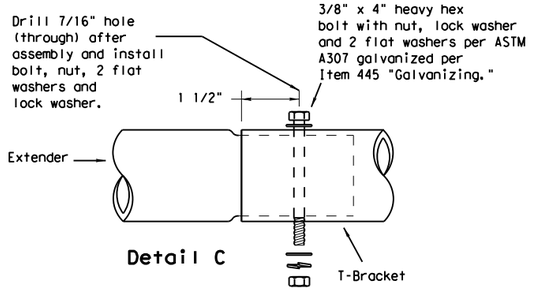


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



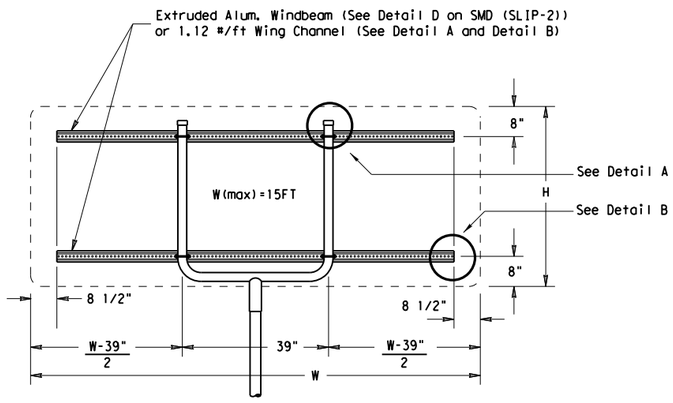
Detail C

Splices shall only be allowed behind the sign substrate.

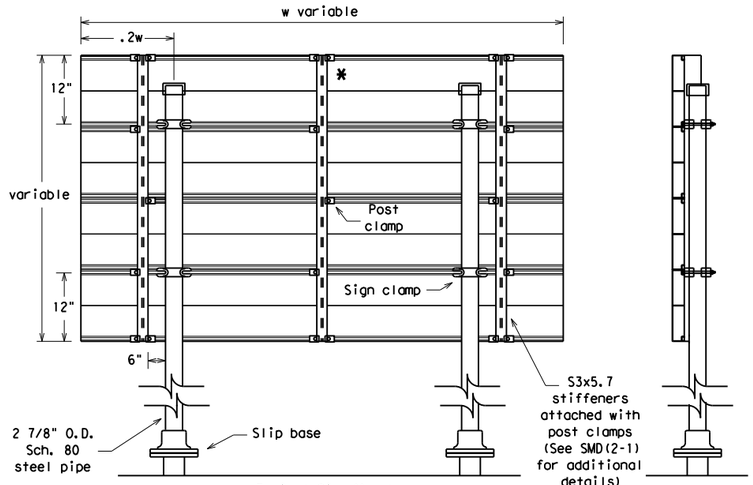
GENERAL NOTES:

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

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



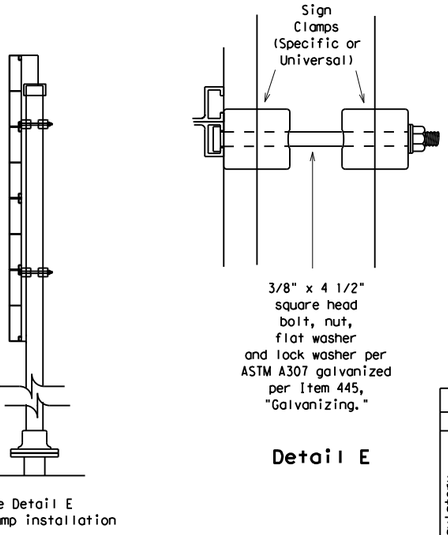
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

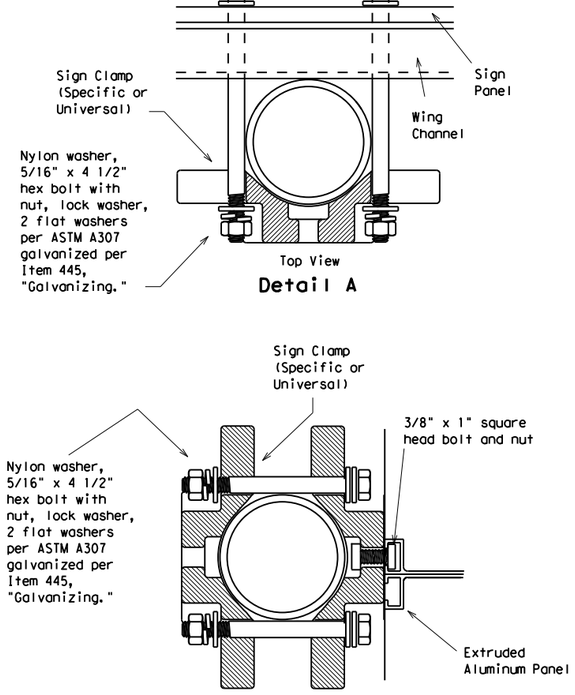
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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



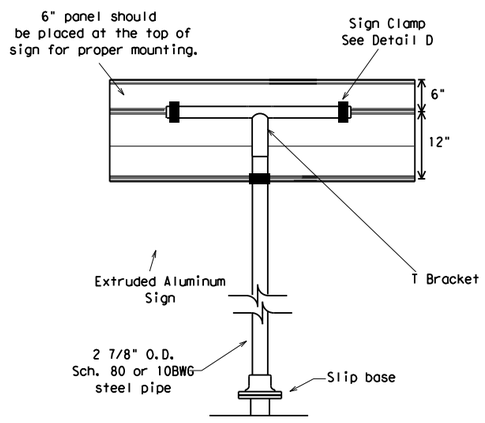
Detail E

See Detail E for clamp installation

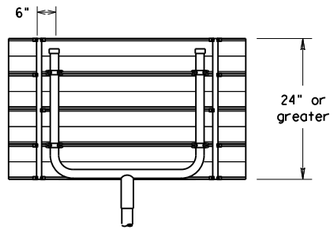


Detail A

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

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

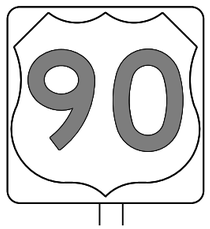
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271

DIST	COUNTY	SHEET NO.
PAR	FANNIN	136

DATE: 7/7/2022 8:51:24 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\137 TSR(3)13 Standard.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

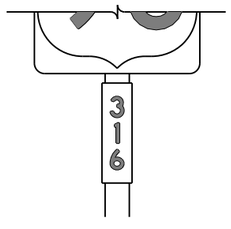
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

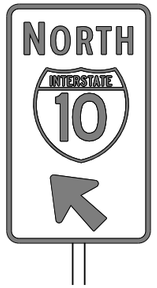


TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING





TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	FANNIN		137

DATE: 7/7/2022 8:51:25 AM
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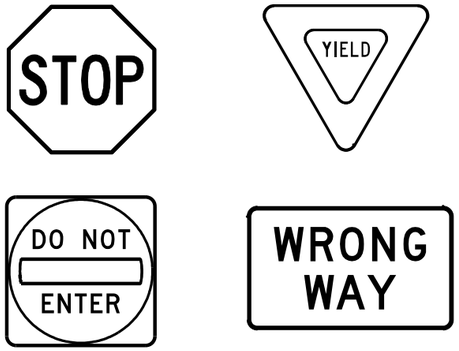
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

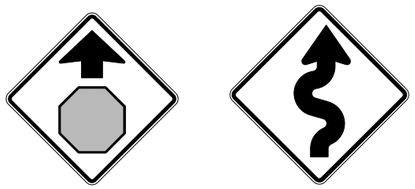
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

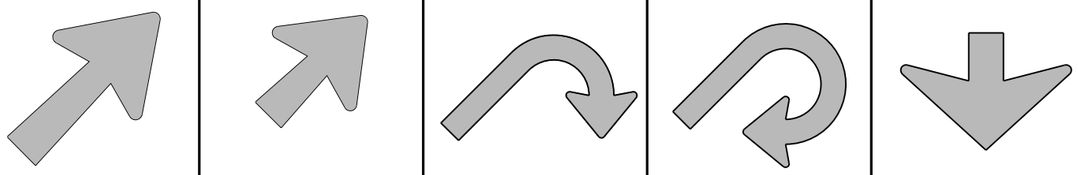
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	FANNIN		138

DATE: 7/7/2022 8:51:26 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\139 TSR(5)-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

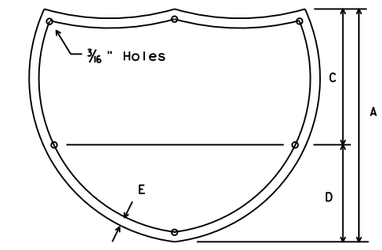
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

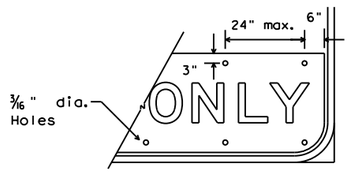
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

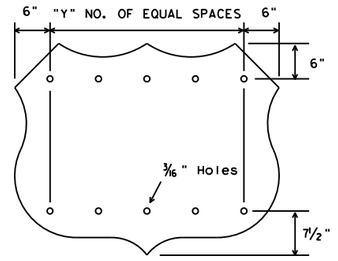


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

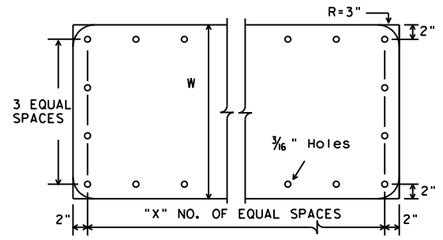


EXIT ONLY PANEL



U.S. ROUTE MARKERS

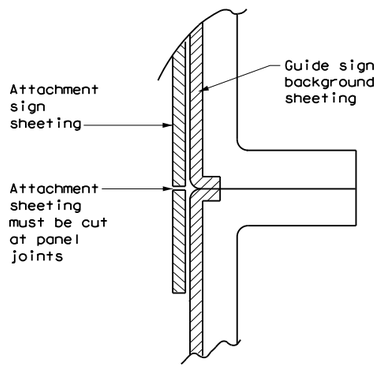
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

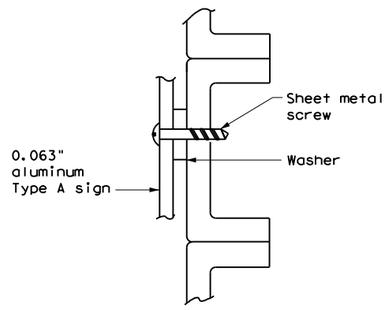
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



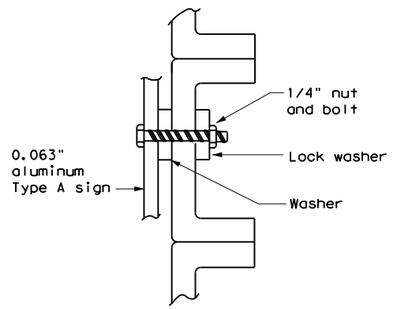
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



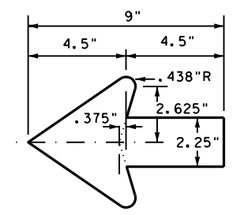
NUT/BOLT ATTACHMENT

NOTE:

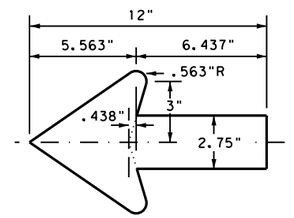
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

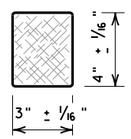
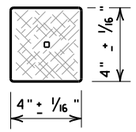
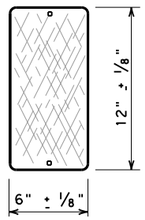
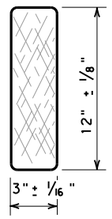
TYPICAL SIGN REQUIREMENTS

TSR(5)-13

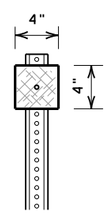
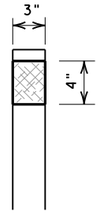
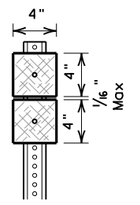
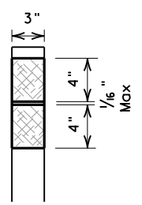
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	FANNIN		139

DATE: 7/7/2022 8:51:27 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\140 D&OM (1)-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

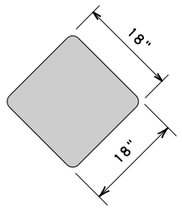
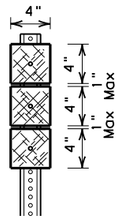
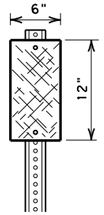
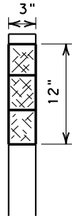
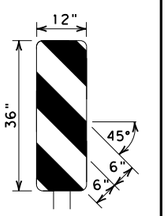
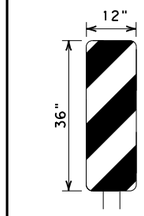
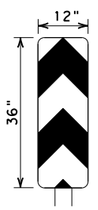
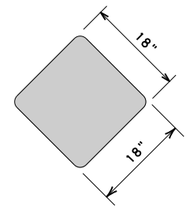
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

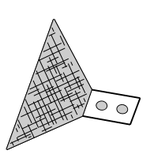
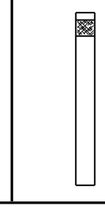
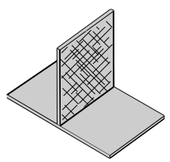
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

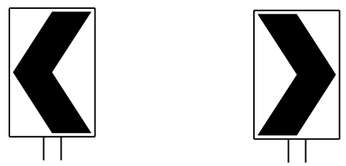
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting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

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE



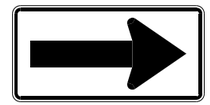
W1-8

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

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

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

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	0690	01	016, ETC	FM 271
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PAR	FANNIN		140

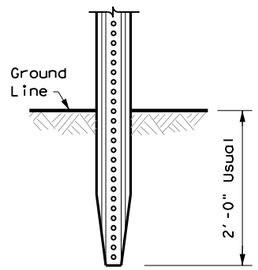
20A

DATE: 7/7/2022 8:51:28 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\141 D&OM (2)-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

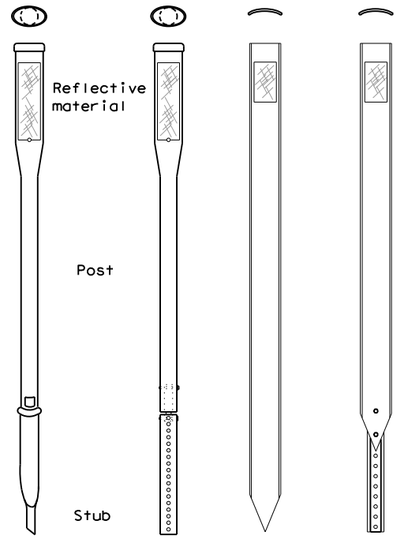


NOTES

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.

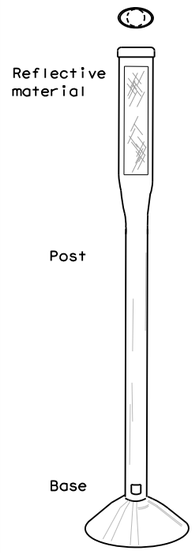
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



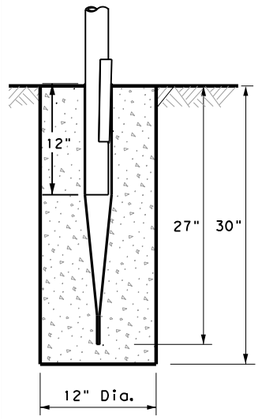
SURFACE MOUNT

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.

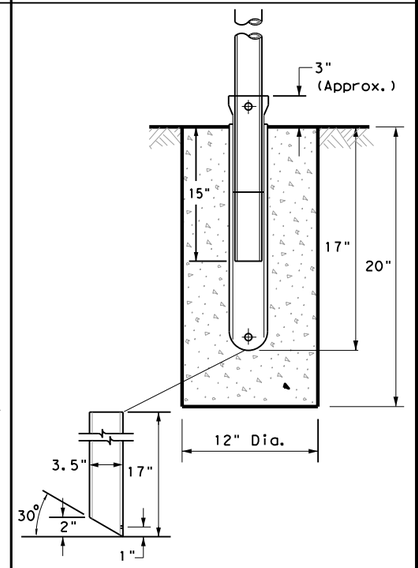
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

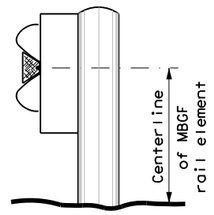
NOTE

1. Install per manufacturer's recommendations.

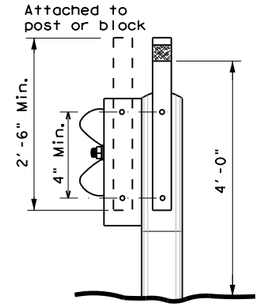
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

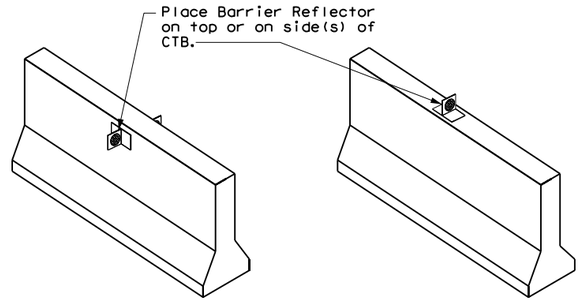
GF1



GF2



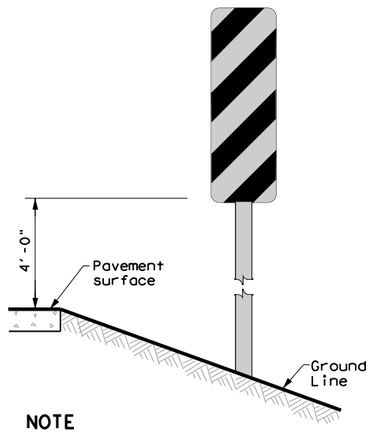
CONCRETE TRAFFIC BARRIER (CTB)



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.

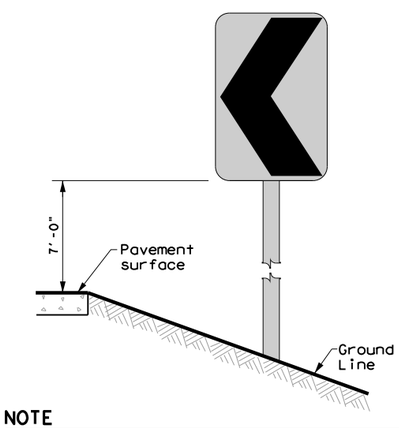
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

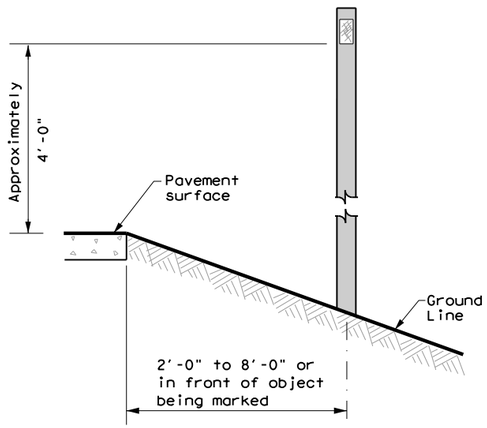
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
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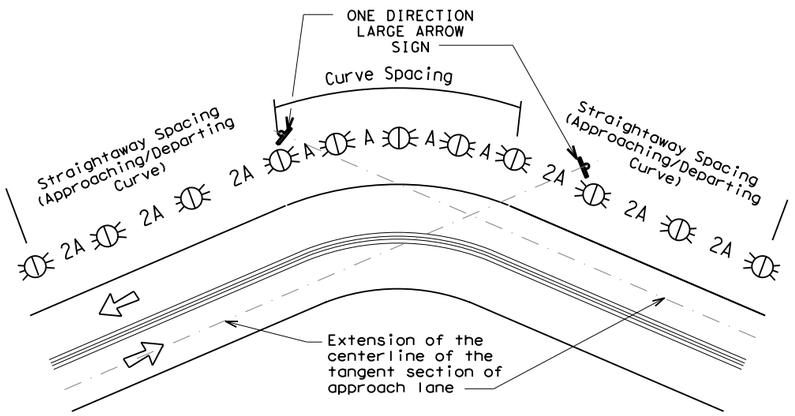
REVISIONS	0690	01	016, ETC	FM 271
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PAR	FANNIN		141

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

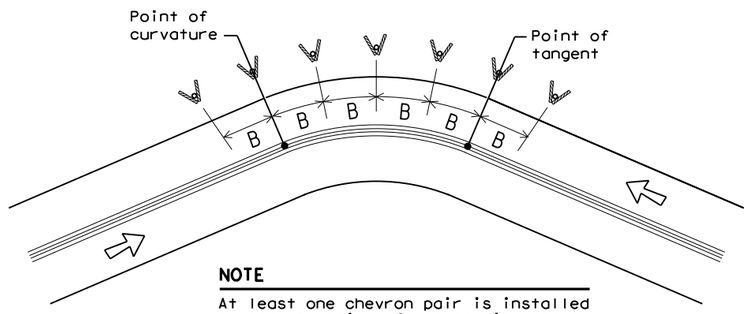
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0690	01	016, ETC	FM 271
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	PAR	FANNIN		142

20C

DATE: 7/7/2022 8:51:31 AM
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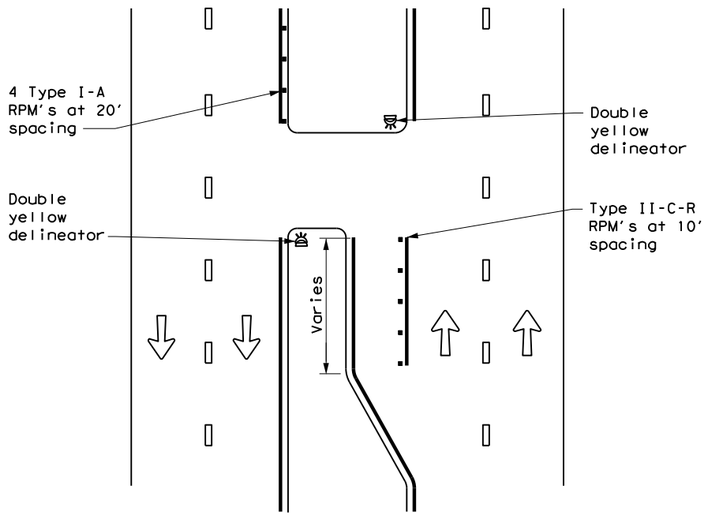
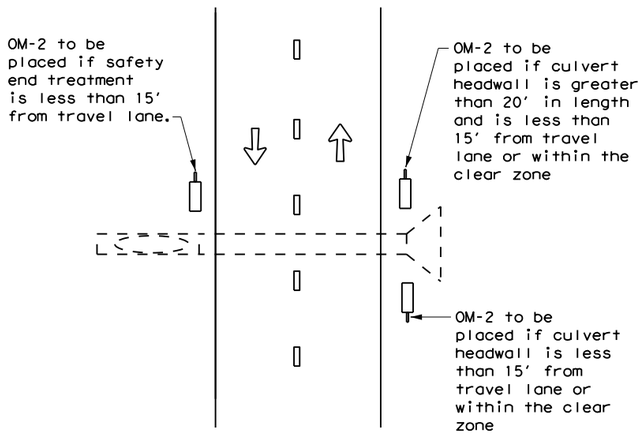
CROSSOVERS



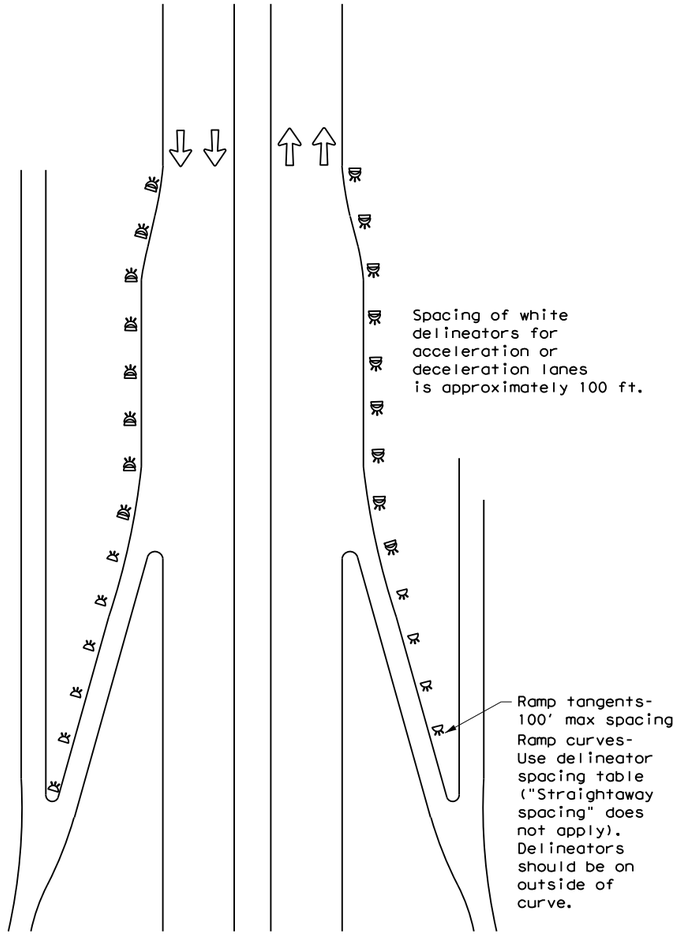
DETAIL 1

FOR CULVERTS WITHOUT MBGF



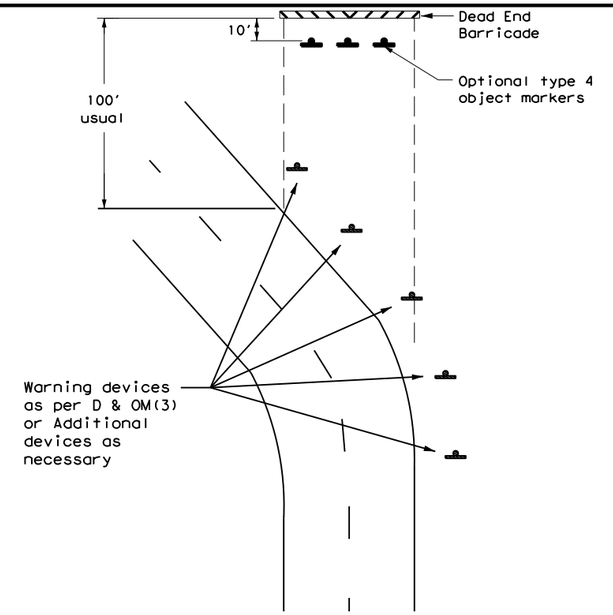
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



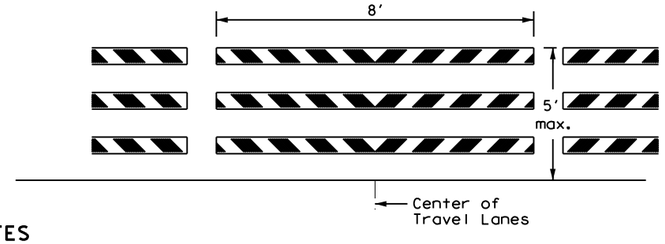
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0690	01	016, ETC	FM 271
3-15	DIST	COUNTY		SHEET NO.
7-20	PAR	FANNIN		143

20D

DATE: 7/7/2022 8:51:32 AM
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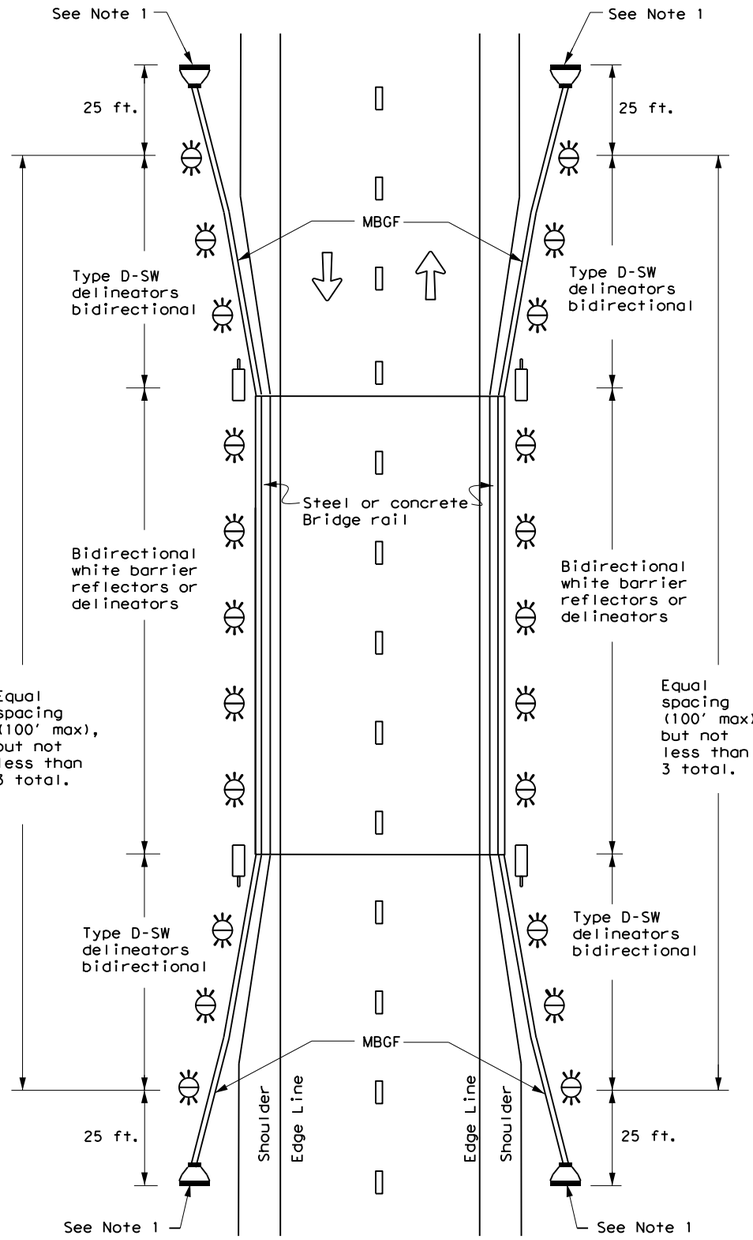
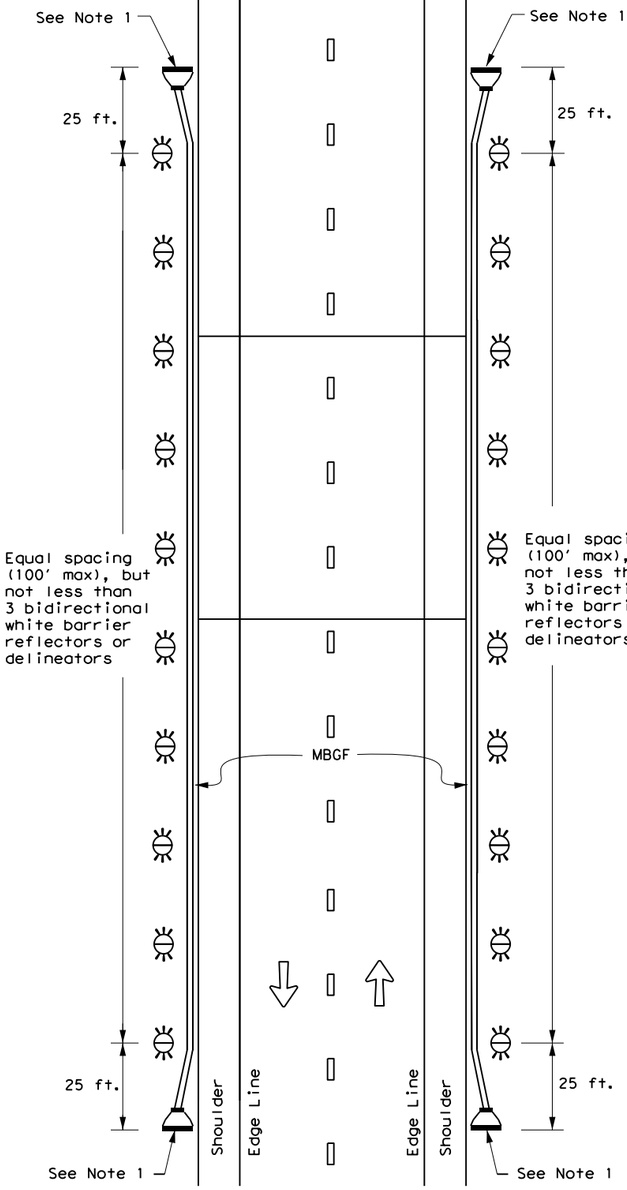
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

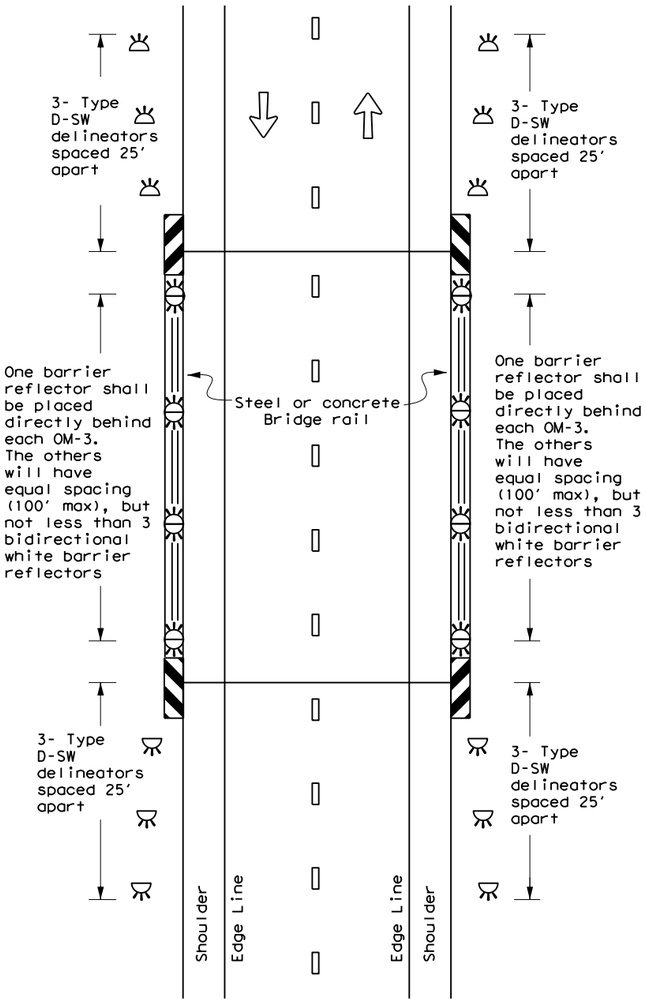
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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7-20	DIST	COUNTY		SHEET NO.
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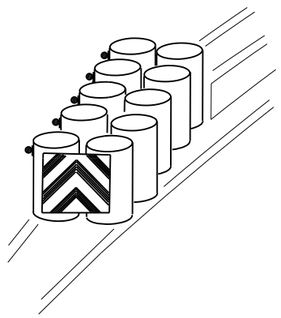
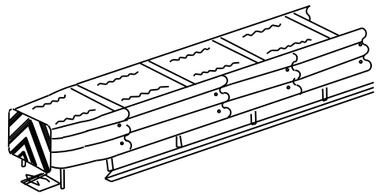
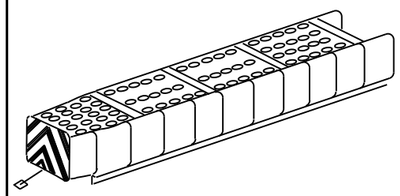
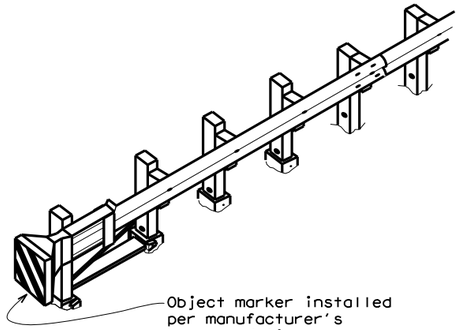
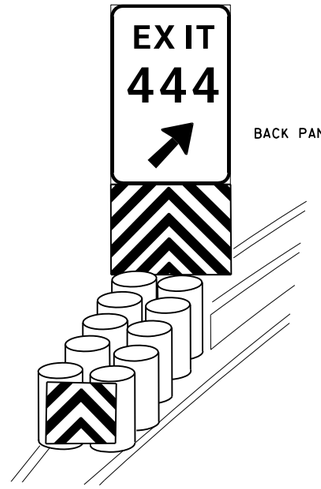
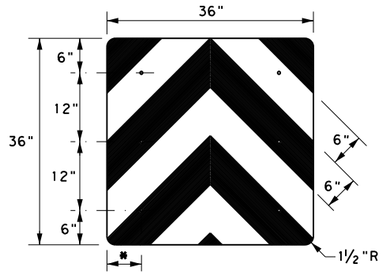


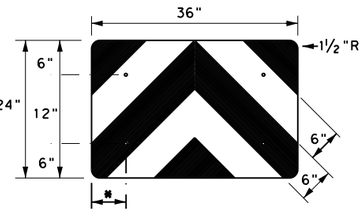




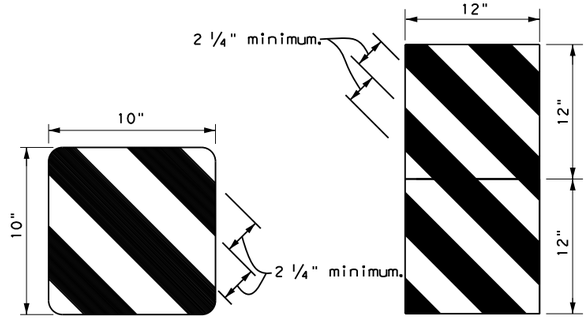




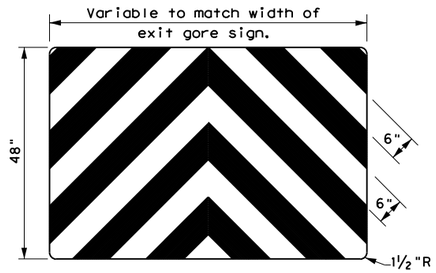


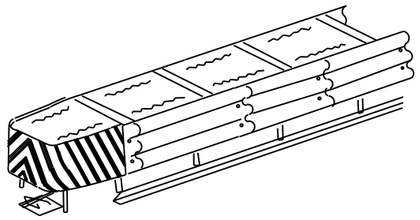


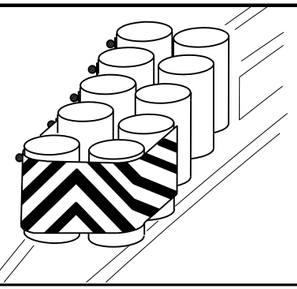
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

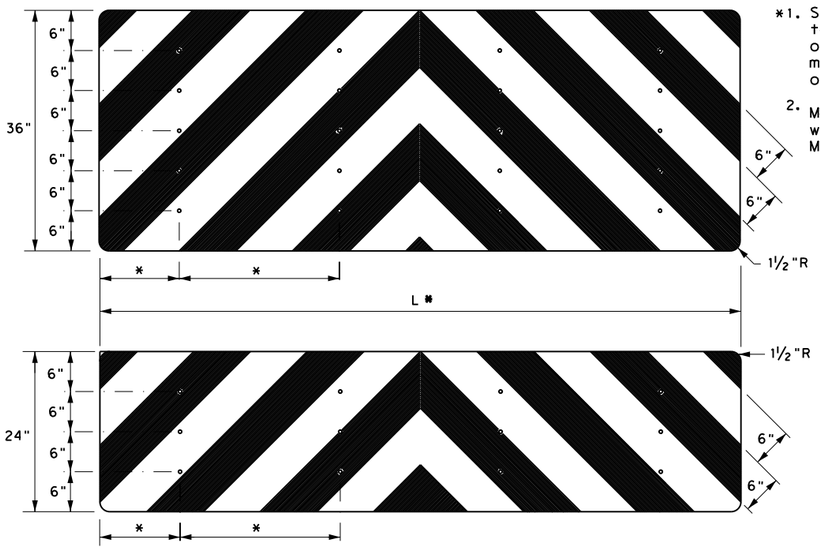


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

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DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0690	01	016, ETC	FM 271
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	PAR	FANNIN		145
4-98 7-20				

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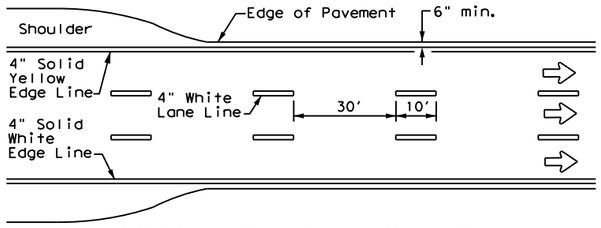
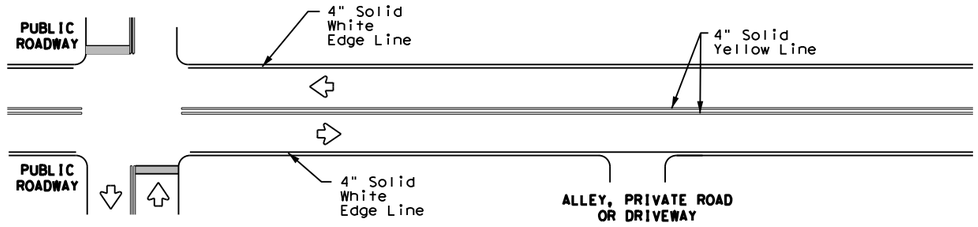
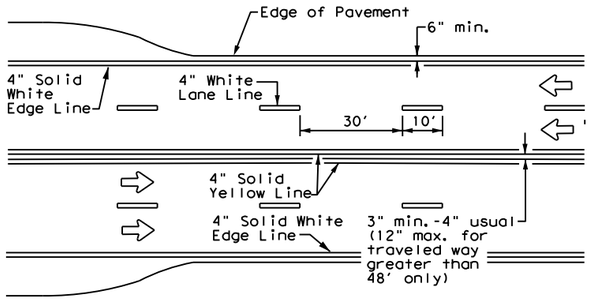


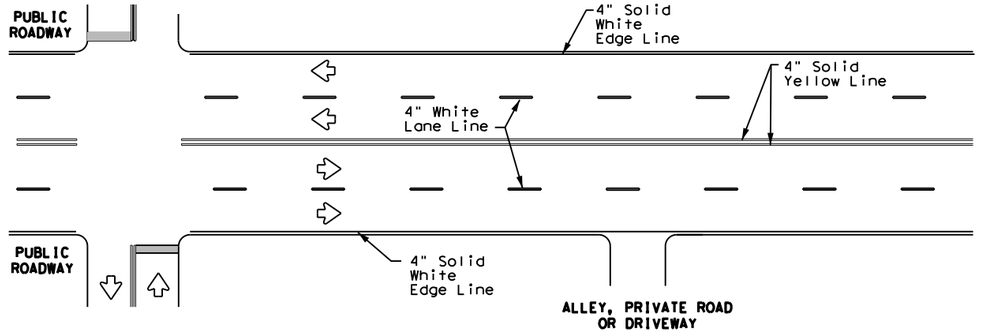
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



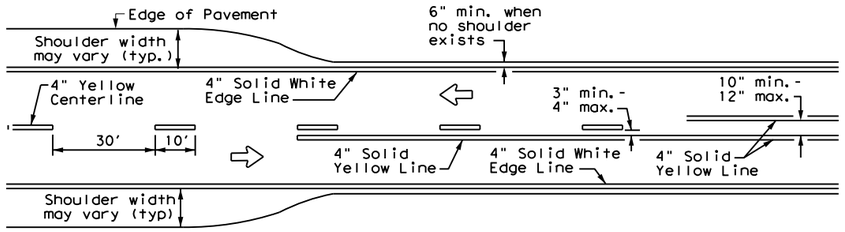
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



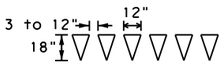
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



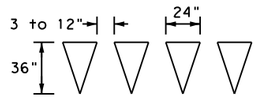
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

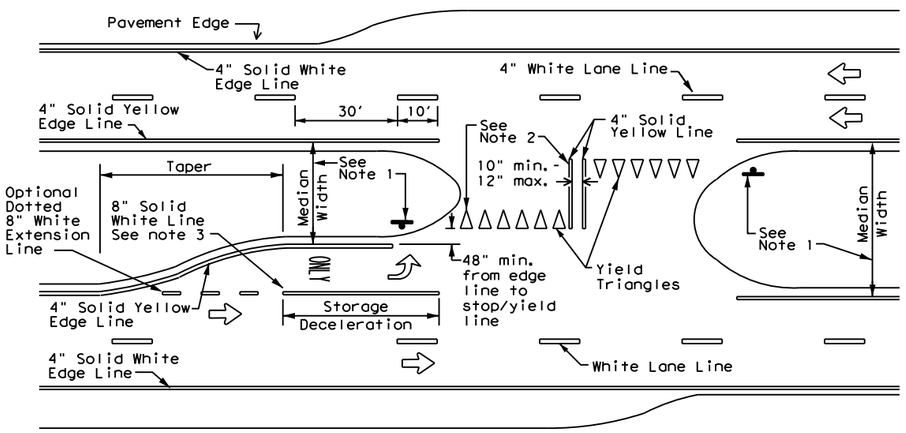


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

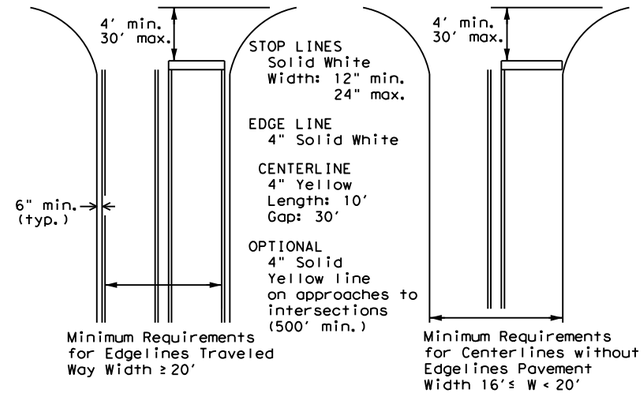
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

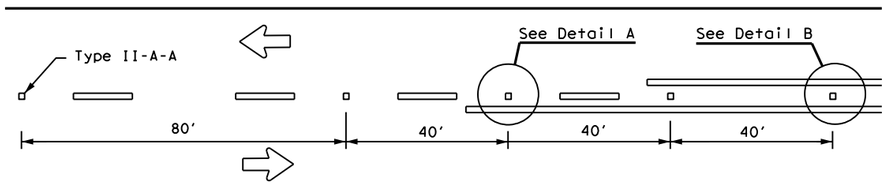
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

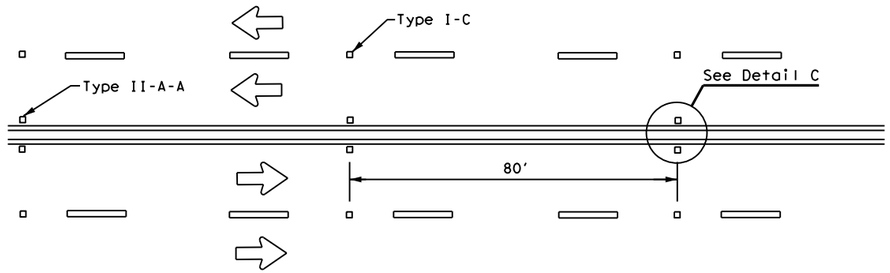
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0690	01	016, ETC	FM 271
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	PAR	FANNIN		146

22A

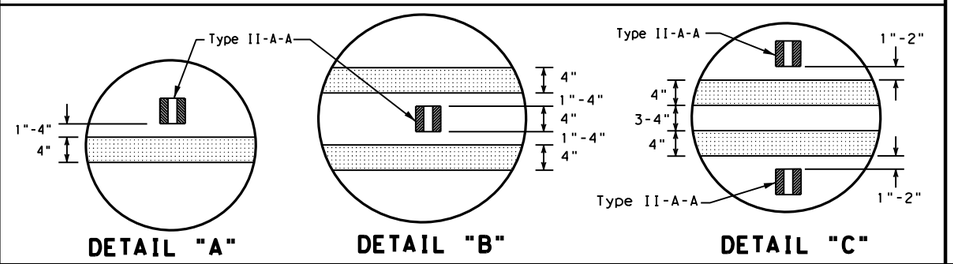
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



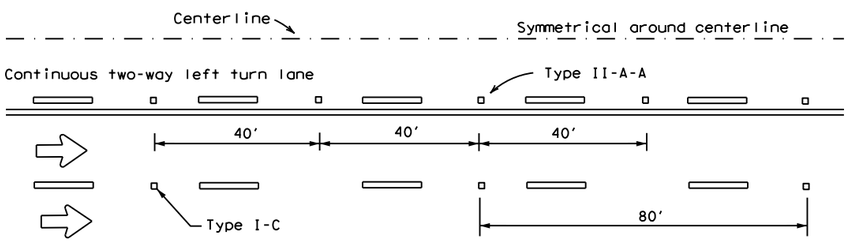
CENTERLINE FOR ALL TWO LANE ROADWAYS



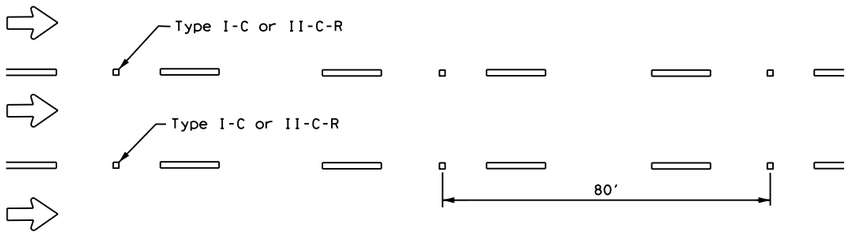
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

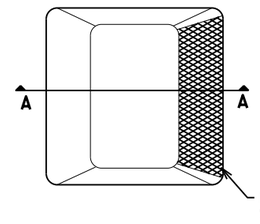


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

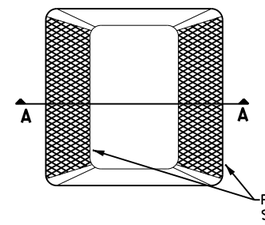
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

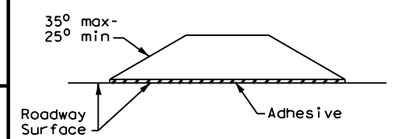
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

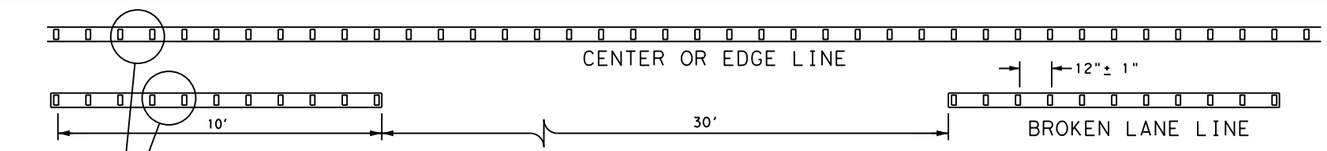


Type II (Top View)



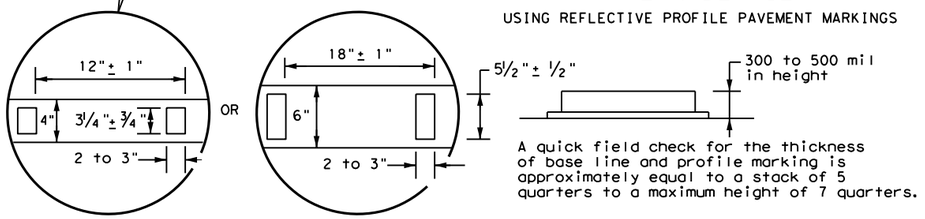
SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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

NOTE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		147

22B

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CK:
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SITE DESCRIPTION

PROJECT LIMITS: *THIS PROJECT IS IN SOUTHCENTRAL FANNIN COUNTY ON FM 271 FROM SH 78 TO FM 68*

PROJECT DESCRIPTION: *REHABILITATION OF AN EXISTING ROAD*

MAJOR SOIL DISTURBING ACTIVITIES:

INCLUDES PREP ROW, EMBANKMENT, CULVERT, MODIFICATIONS, SUBGRADE WIDENING, DITCH GRADING, EROSION AND SEDIMENTARY CONTROLS, TEMPORARY AND PERMANENT SEEDING.

TOTAL PROJECT AREA: *109.25 ACRES*

TOTAL AREA TO BE DISTURBED: *43.68 AC (39.98%)*

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

The existing soil consists of Fairlie-Dalco complex consisting of deep clay, moderately well drained, very high runoff. Slopes range from 1 to 5 percent. Native grasses, brush, and trees cover the existing soil.

NAME OF RECEIVING WATERS:

Bois D'Arc Creek flows approximately 0.5 miles and branches into Davis Creek. Davis Creek flows approximately 5.1 miles and empties into Davis Creek Pond in Fannin County, Texas.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES & STRUCTURAL PRACTICES:

EROSION CONTROL:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [X] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES

OTHER:

DISTURED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITIES ARE SCHEDULED TO RESUME AND DO WITHIN 21 DAYS.

SEDIMENTATION CONTROL:

- [X] SILT FENCES
- [ ] HAY BALES
- [X] ROCK BERMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES

POST-CONSTRUCTION CONTROLS:

- [ ] RETENTION / IRRIGATION
- [ ] EXTENDED DETENTION BASIN (ie: ROCK BERMS)
- [ ] VEGETATIVE FILTER STRIPS
- [ ] GRASSY SWALES
- [X] VEGETATIVE LINED DRAINAGE DITCHES
- [ ] CONSTRUCTED WET LANDS
- [ ] WET BASINS
- [ ] SAND FILTER SYSTEMS

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:

MAJOR SOIL DISTURBING ACTIVITIES SHALL NOT BE PERFORMED UNTIL EMBANKMENT PLACEMENT IS SCHEDULED TO BEGIN WITHIN FIVE (5) WORKING DAYS.

INSTALL EROSION AND SEDIMENTATION CONTROLS PRIOR TO SOIL DISTURBANCE WHENEVER POSSIBLE.

ONCE BEGUN, EARTHWORK ACTIVITIES SHALL BE PROGRESSED WITHOUT DELAY, UNLESS APPROVED BY THE ENGINEER, UNTIL FINAL GRADING IS ACCOMPLISHED.

EROSION CONTROL MEASURES SHALL BE APPLIED IMMEDIATELY UPON COMPLETION OF THE EMBANKMENT PLACEMENT TO MINIMIZE POTENTIAL WATER QUALITY IMPACTS.

REMARKS: *Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.*

The Contractor shall designate a location for, construct, and maintain an area for concrete mixing, handling and delivery equipment to wash out.

Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.

All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

MAINTENANCE: *All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.*

INSPECTION: *An inspection will be performed by a TxDOT inspector at least once every seven (7) calendar days. An inspection and maintenance report will be made per each inspection. Stormwater controls will be modified as directed by the Engineer based on these reports.*

OTHER EROSION AND SEDIMENT CONTROLS:

WASTE MATERIALS: *All trash and construction debris from the job site will be disposed of by the Contractor at a local dump. No construction materials will be buried on site.*

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): *Any hazardous waste spills shall be reported to the TxDOT Safety Officer in Paris. It shall be the responsibility of the waste owner to provide for the required clean-up. If the owner cannot be determined, the district laboratory shall direct in the clean-up operation.*

SANITARY WASTE: *Any sanitary waste shall be collected from portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor. All sanitary waste from permanent sites will be collected by local sanitary sewer systems.*

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL SUBCONTRACTORS ARE AWARE OF AND COMPLY WITH ALL COMPONENTS OF THE SW3P.

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
SW3P

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		148

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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# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☒ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

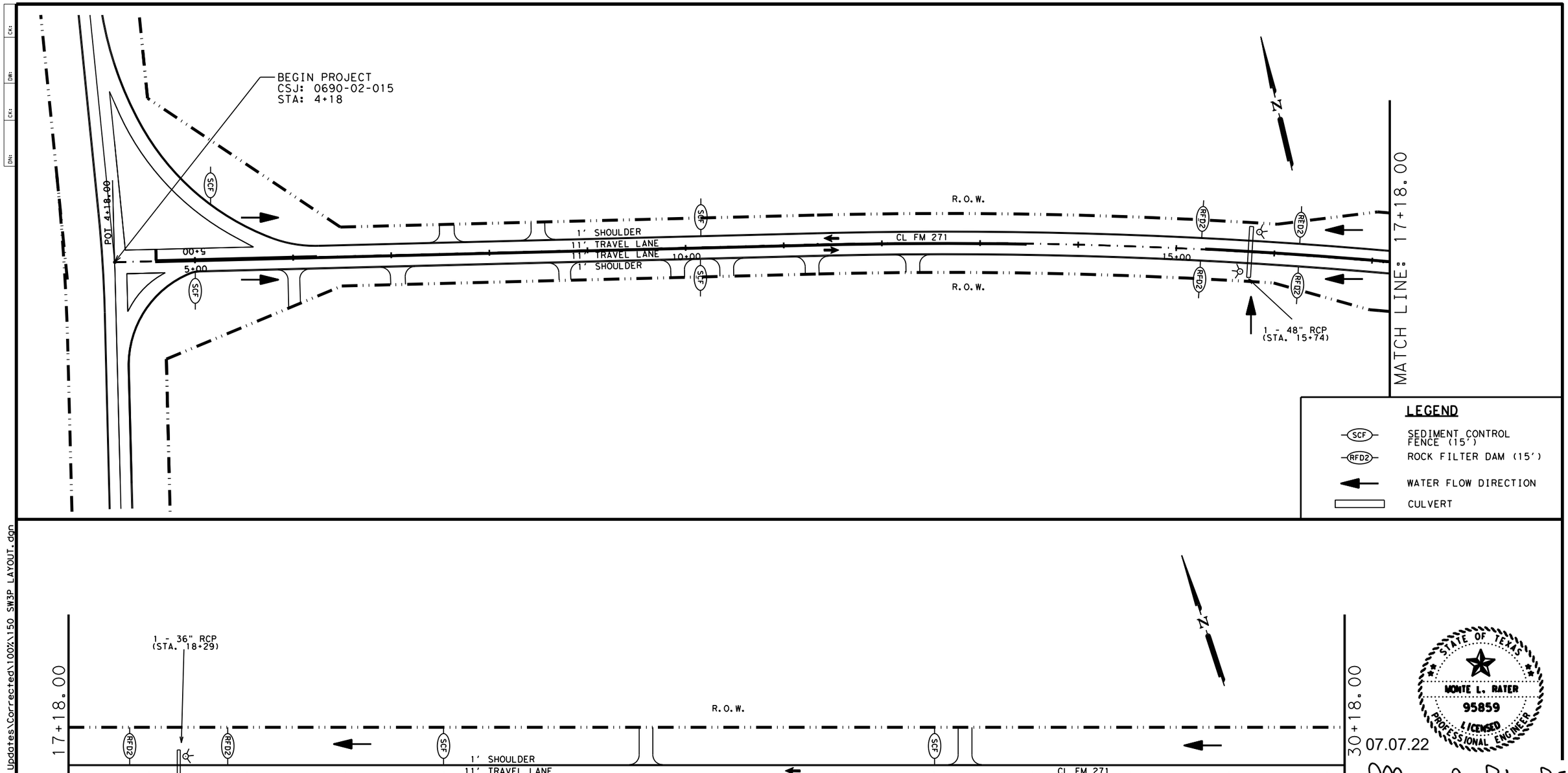
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0690	01	016, ETC	FM 271	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	PAR	FANNIN		149	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					



LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

07.07.22

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 1 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		150

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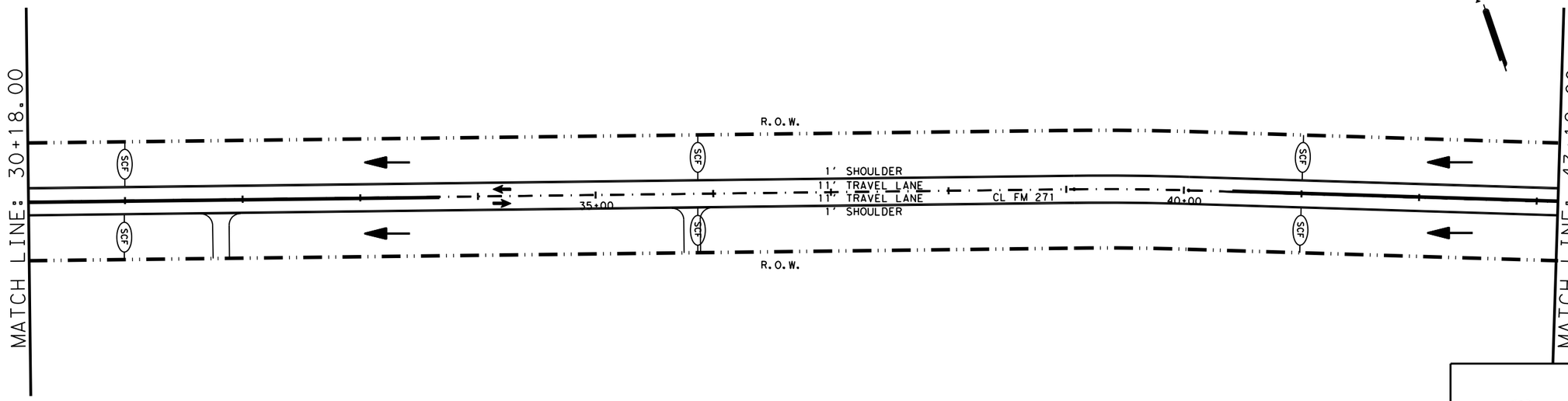
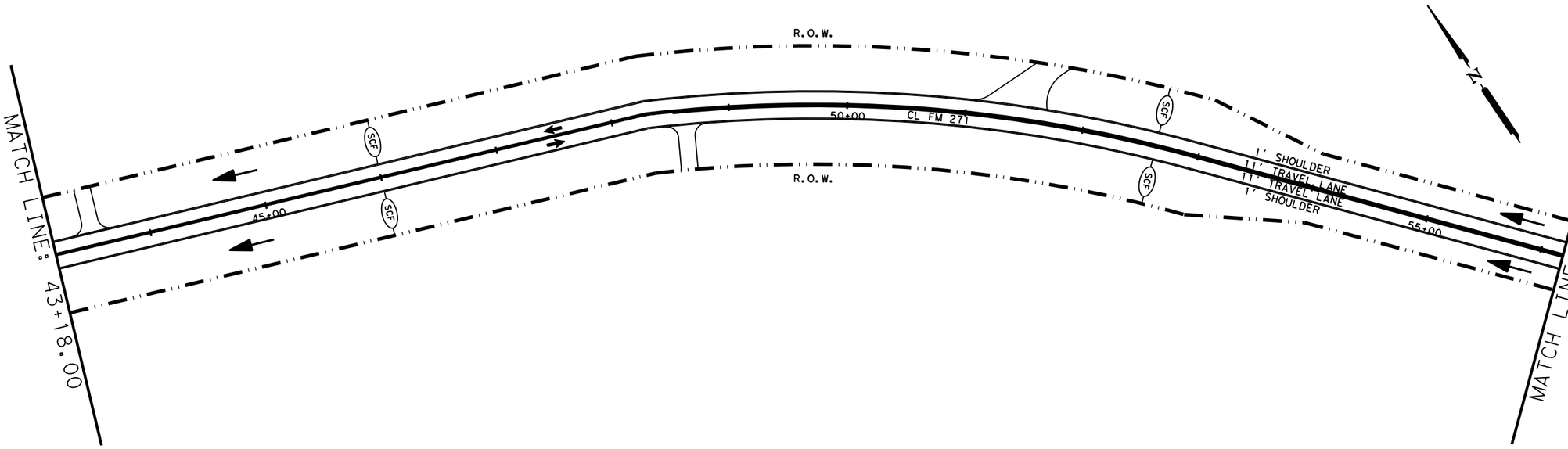


LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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MONTE RATER
95859
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07.07.22

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 2 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		151

DATE: 7/7/2022 8:51:39 AM
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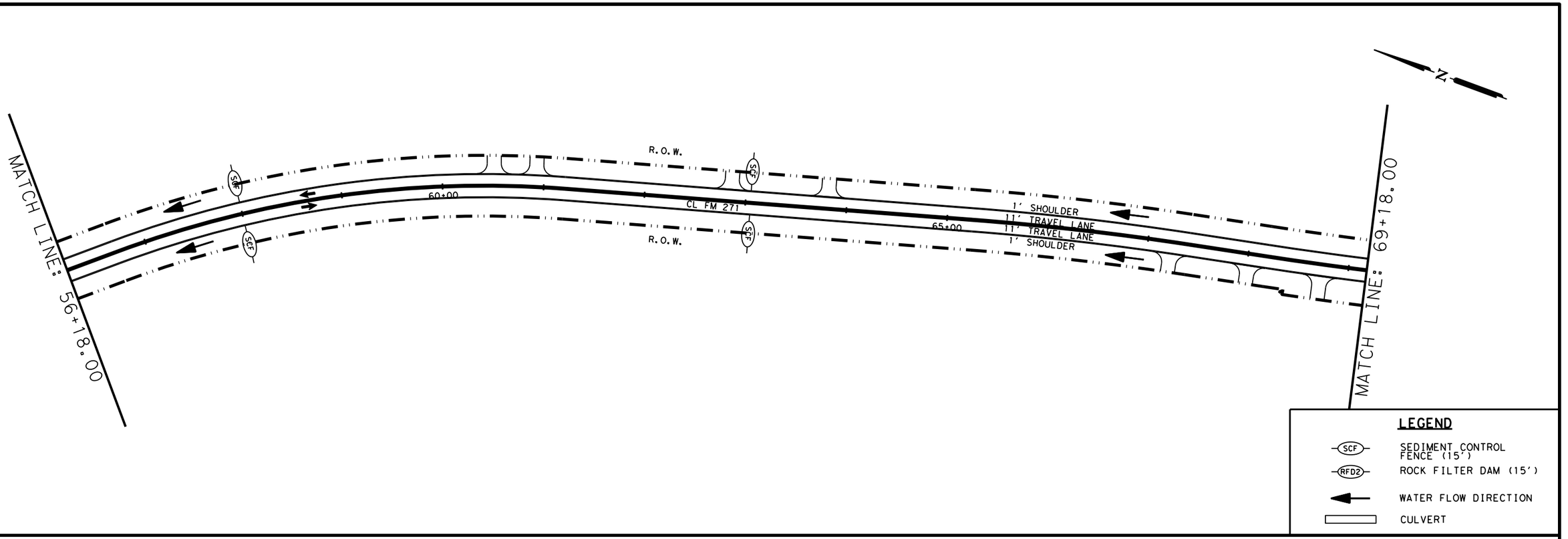

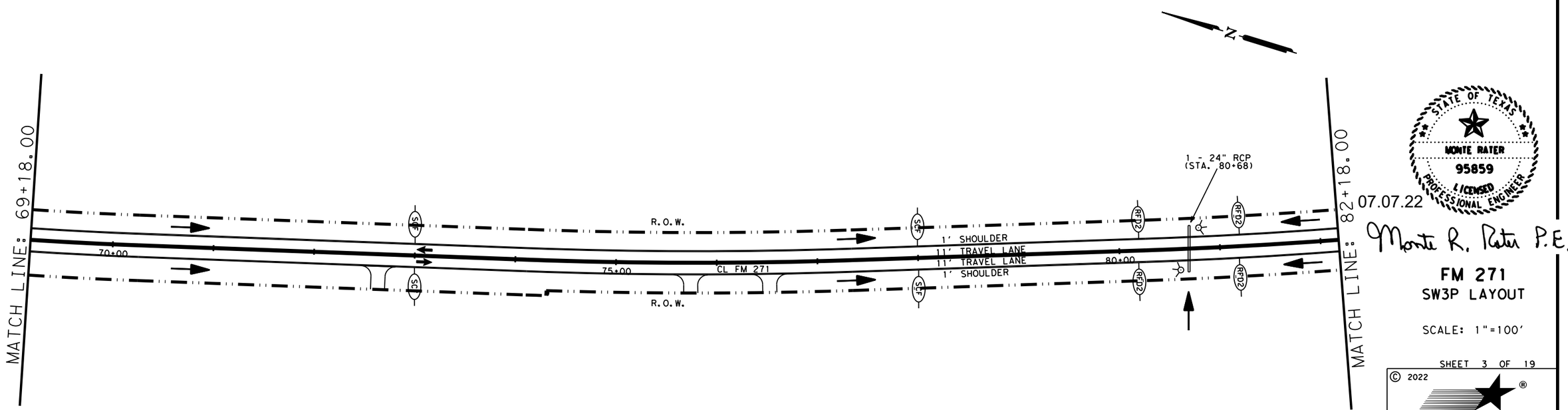

STATE OF TEXAS
MONTE RATER
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07.07.22

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 3 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		152

DATE: 7/7/2022 8:51:40 AM
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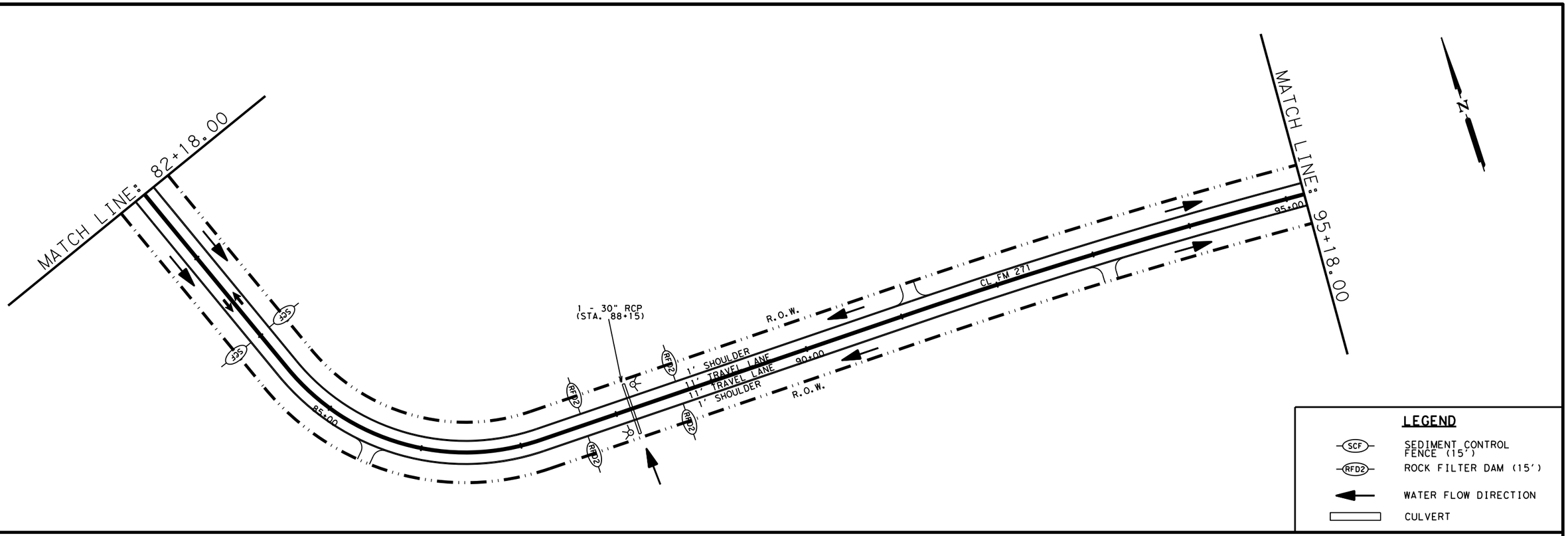

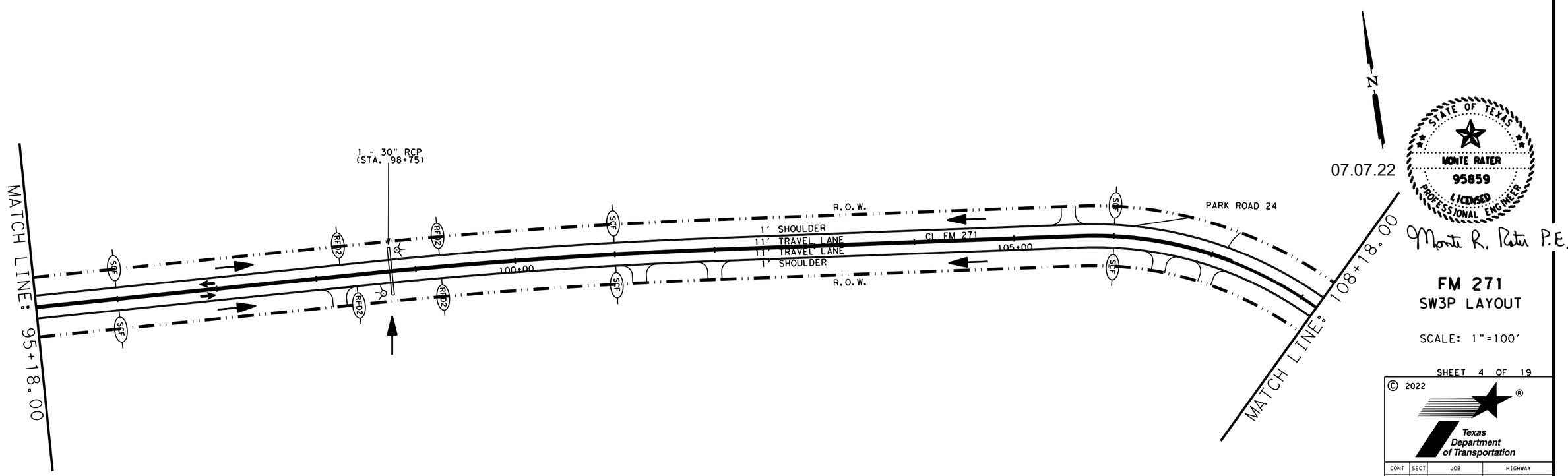

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PROFESSIONAL ENGINEER

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 4 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		153

DATE: 7/7/2022 8:51:41 AM
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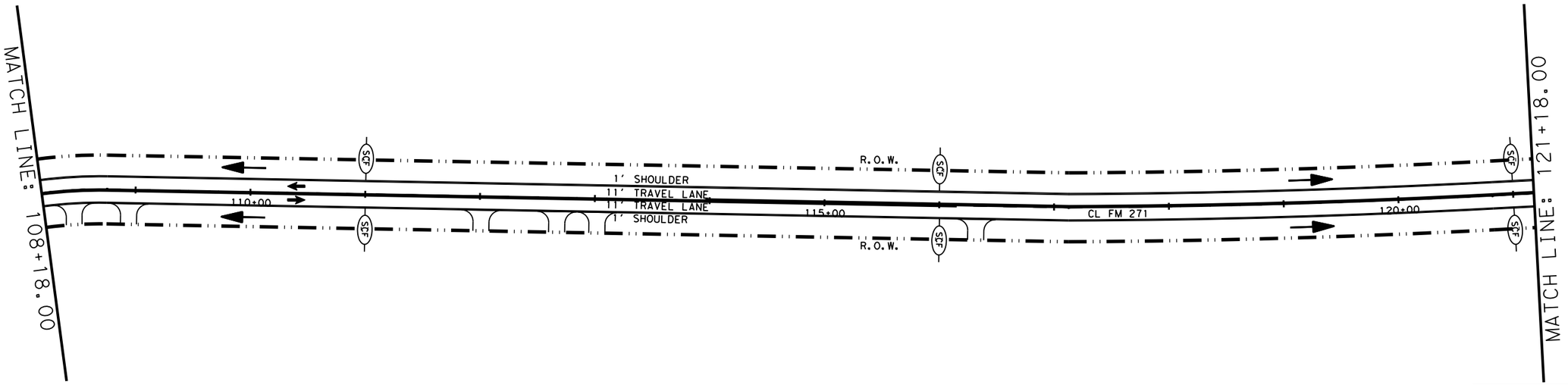
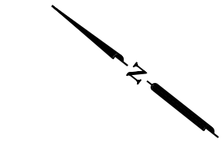
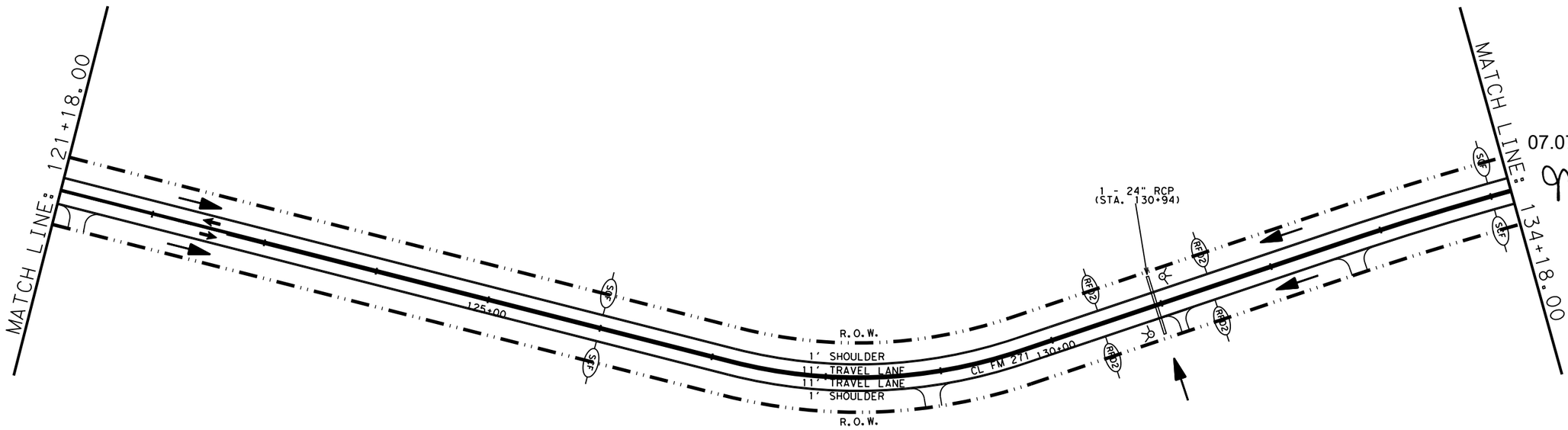




LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 5 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		154

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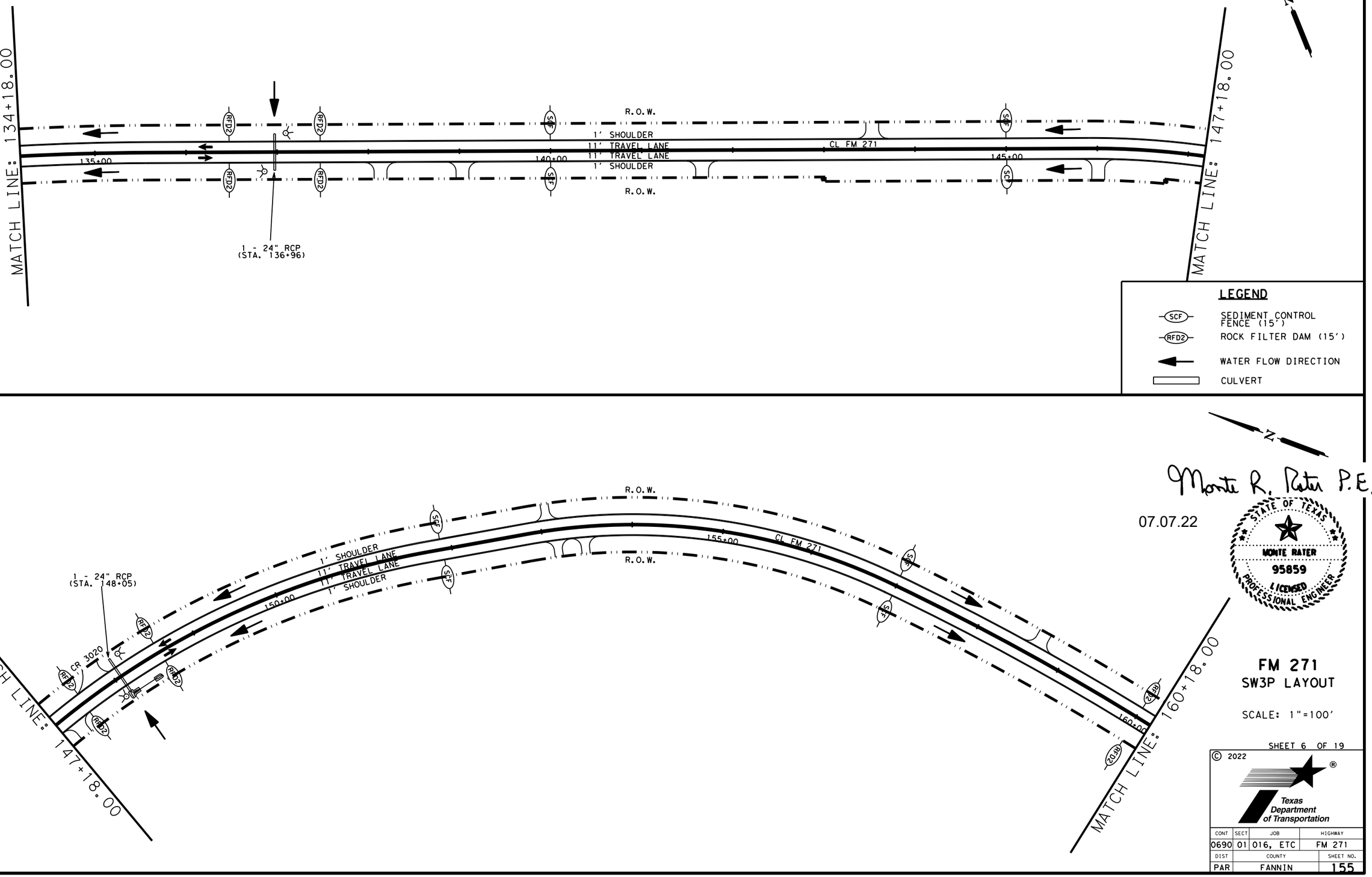

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FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 6 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		155

DATE: 7/7/2022 8:51:48 AM
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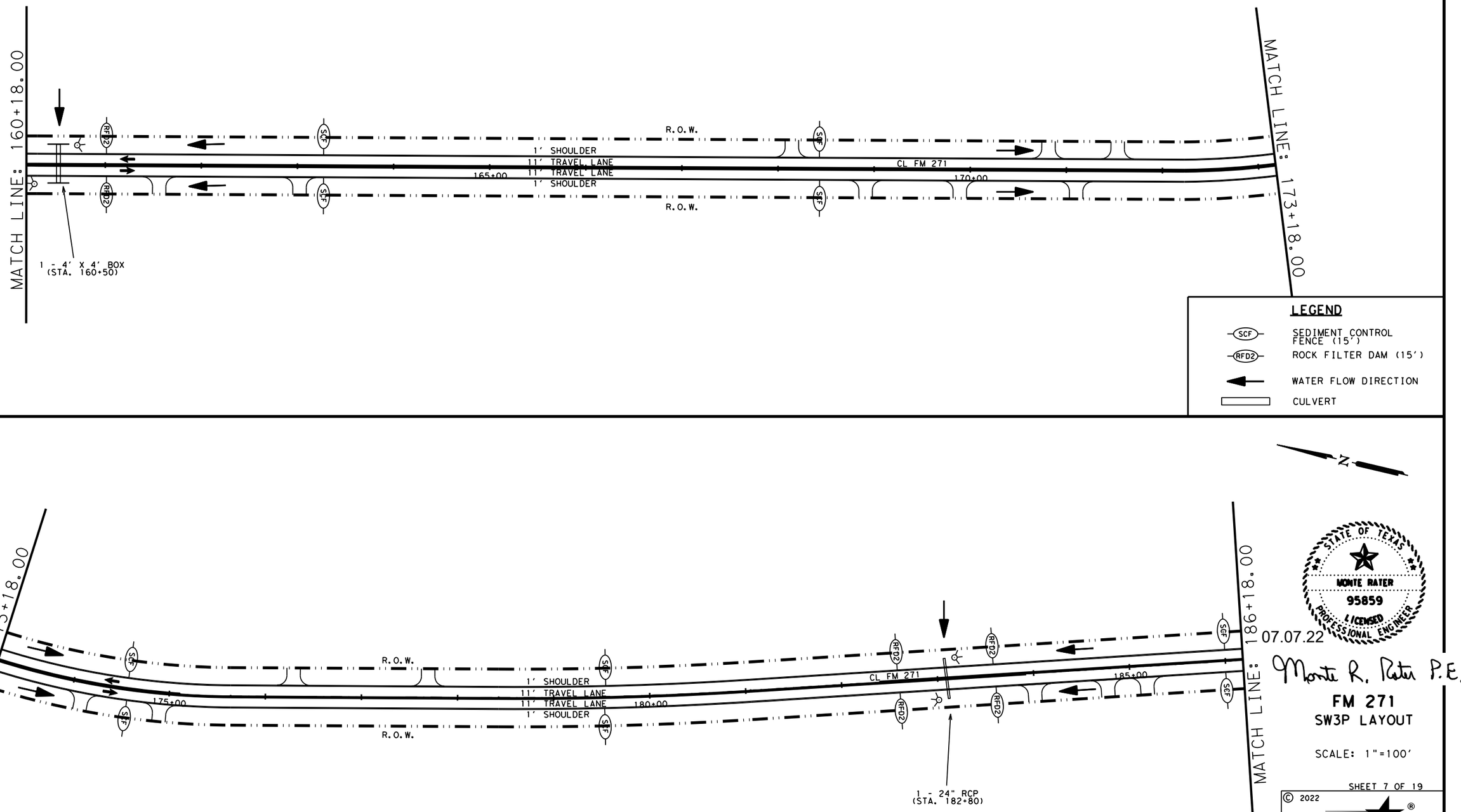

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FM 271
SW3P LAYOUT

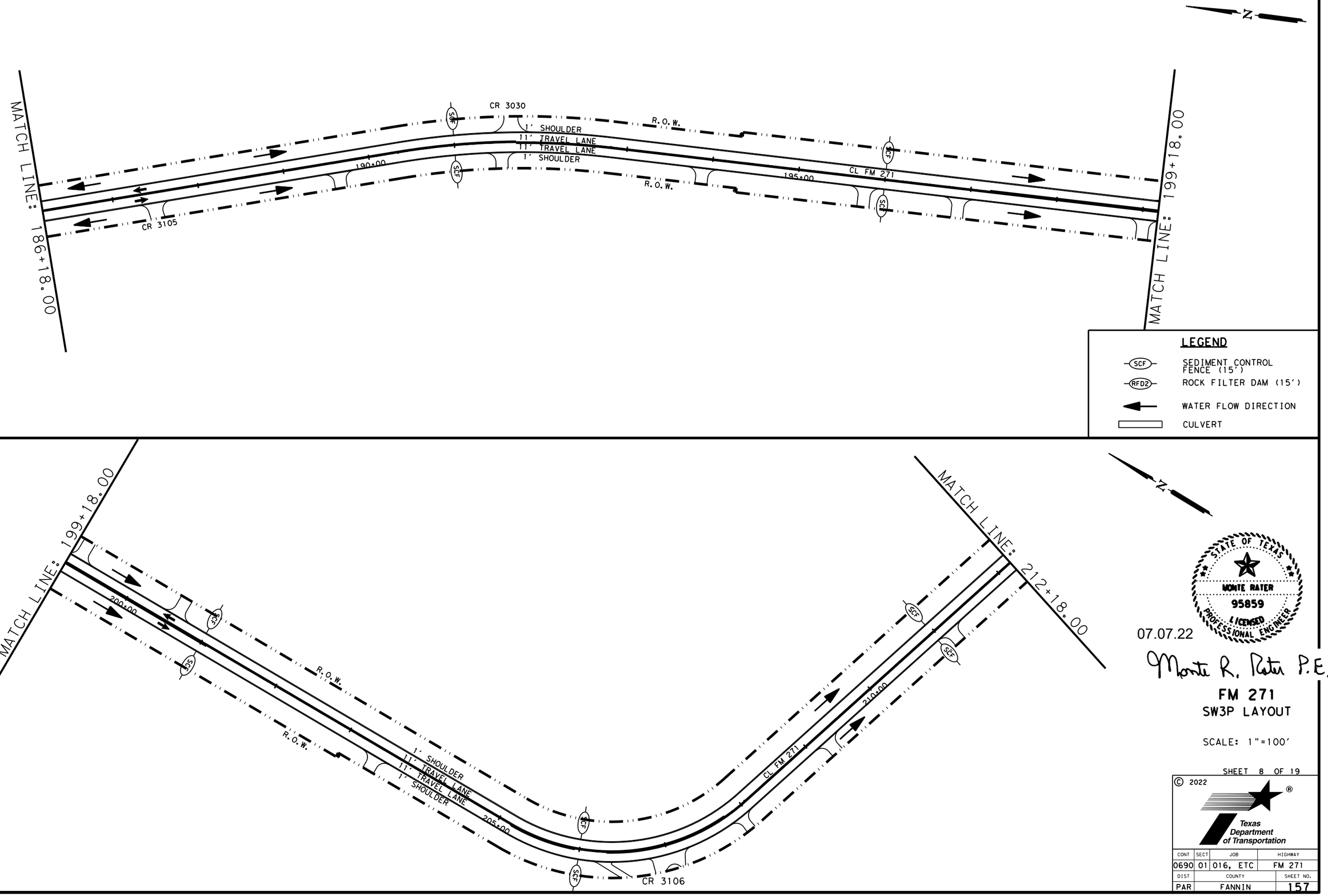
SCALE: 1"=100'

SHEET 7 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		156

DATE: 7/7/2022 8:51:50 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\156 SW3P LAYOUT.dgn



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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 8 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		157

DATE: 7/7/2022 8:51:51 AM
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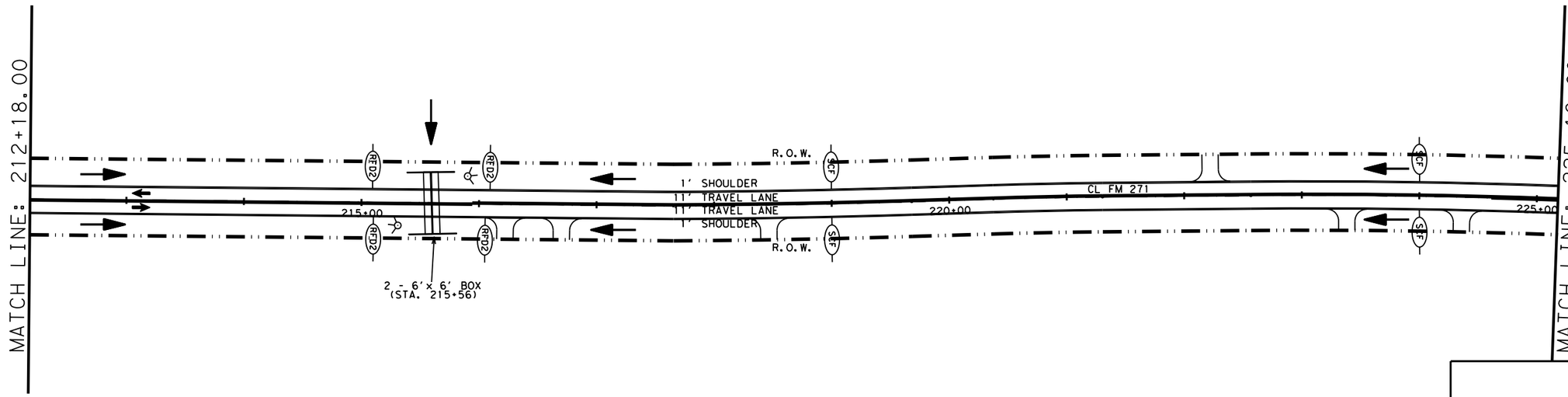

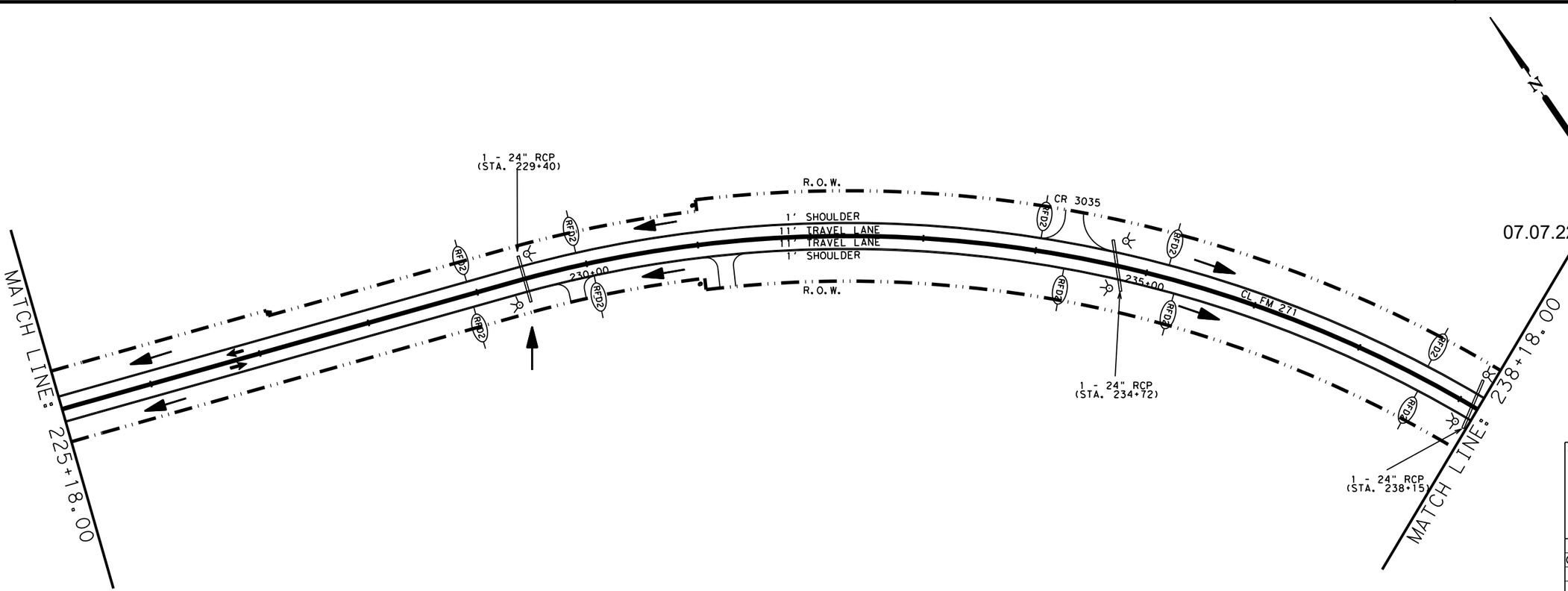

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT

07.07.22

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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 9 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		158

DATE: 7/7/2022 8:51:52 AM
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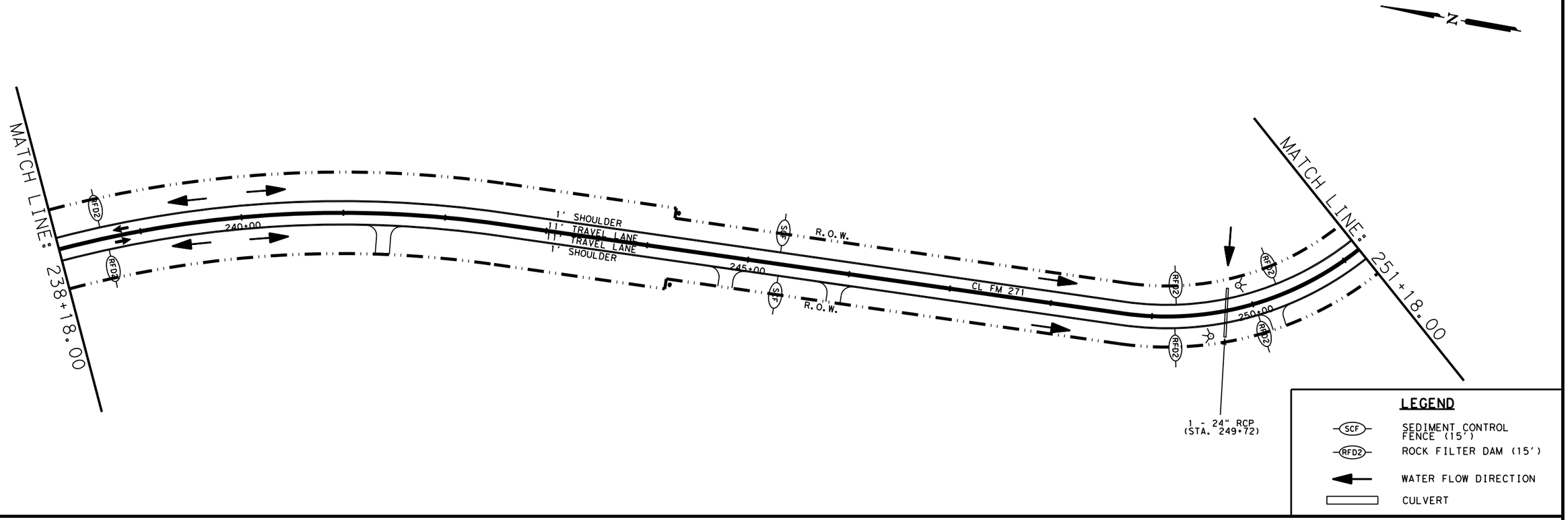

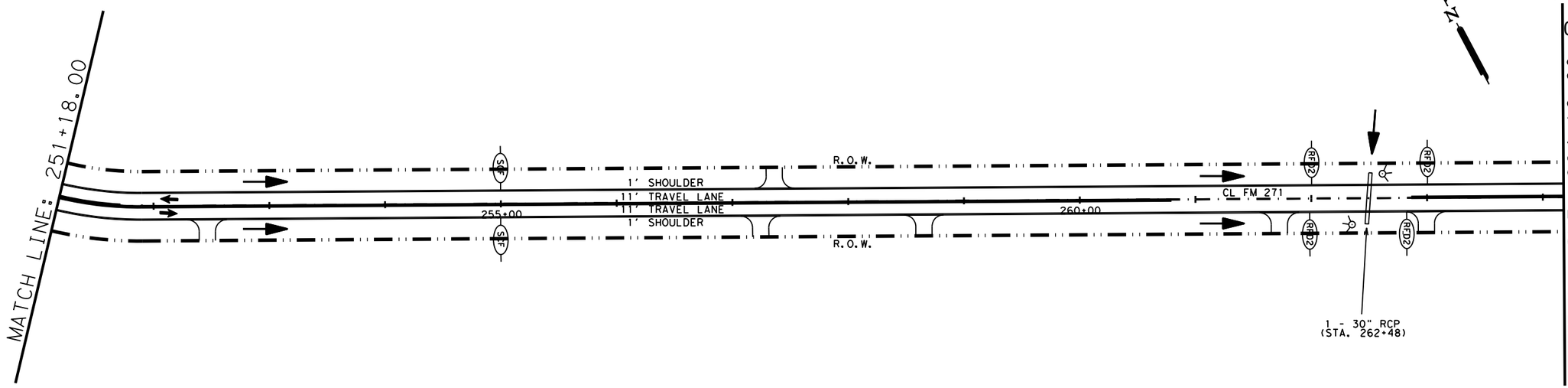

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PROFESSIONAL ENGINEER

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 10 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		159

DATE: 7/7/2022 8:51:53 AM
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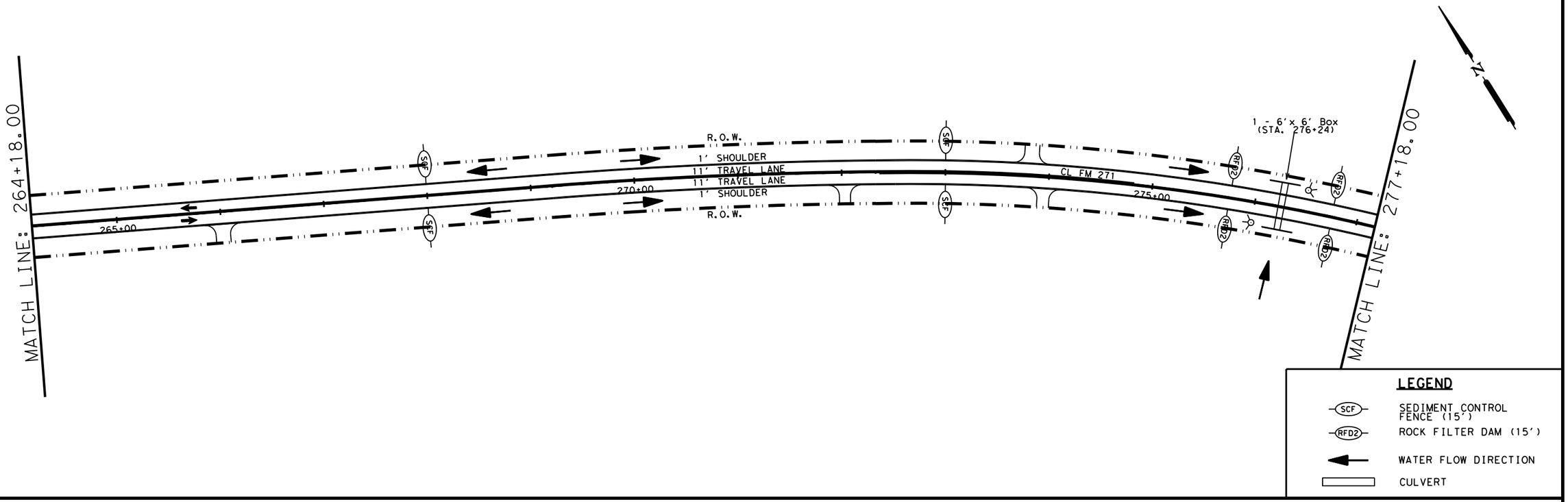

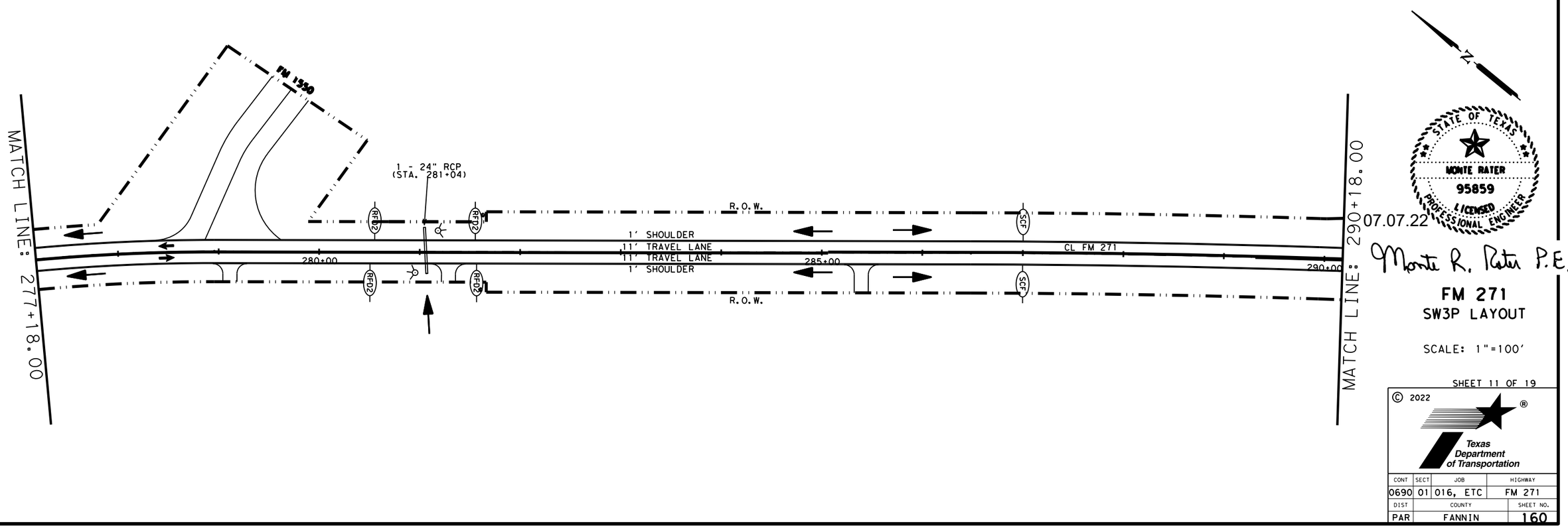

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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 11 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		160

DATE: 7/7/2022 8:51:54 AM
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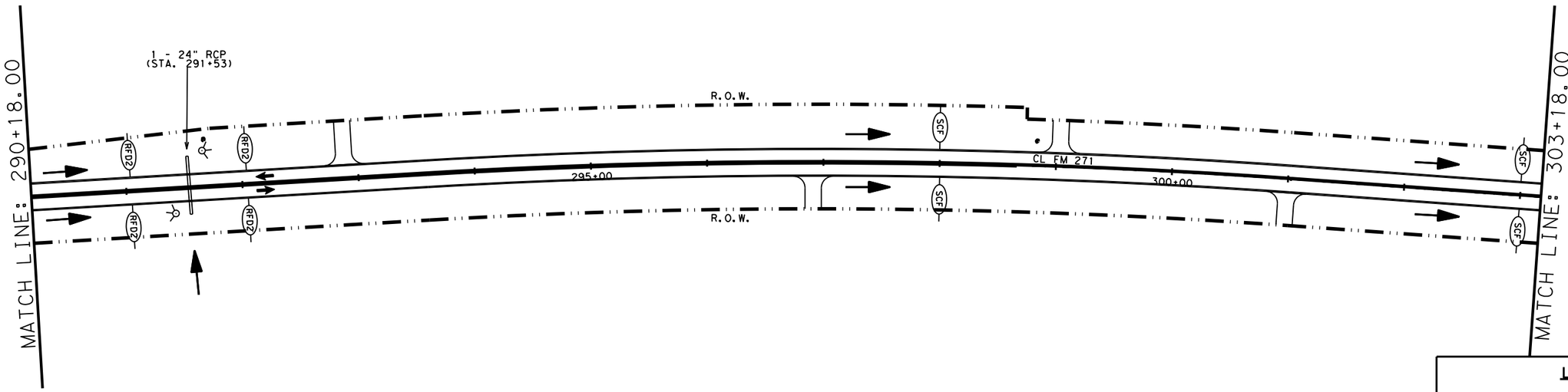
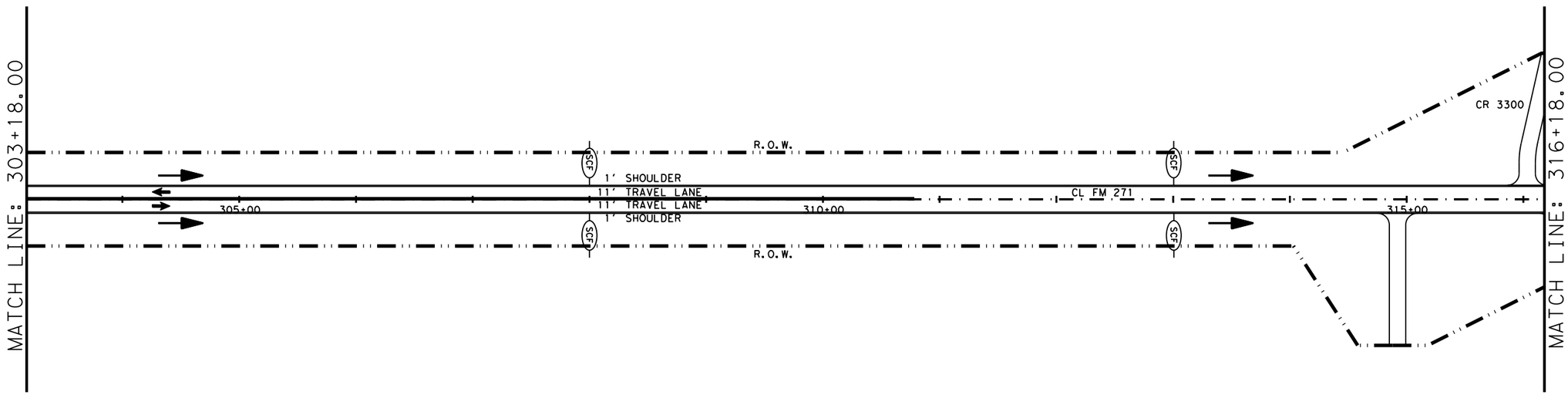


N

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



N

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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 12 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		161

DATE: 7/7/2022 8:51:55 AM
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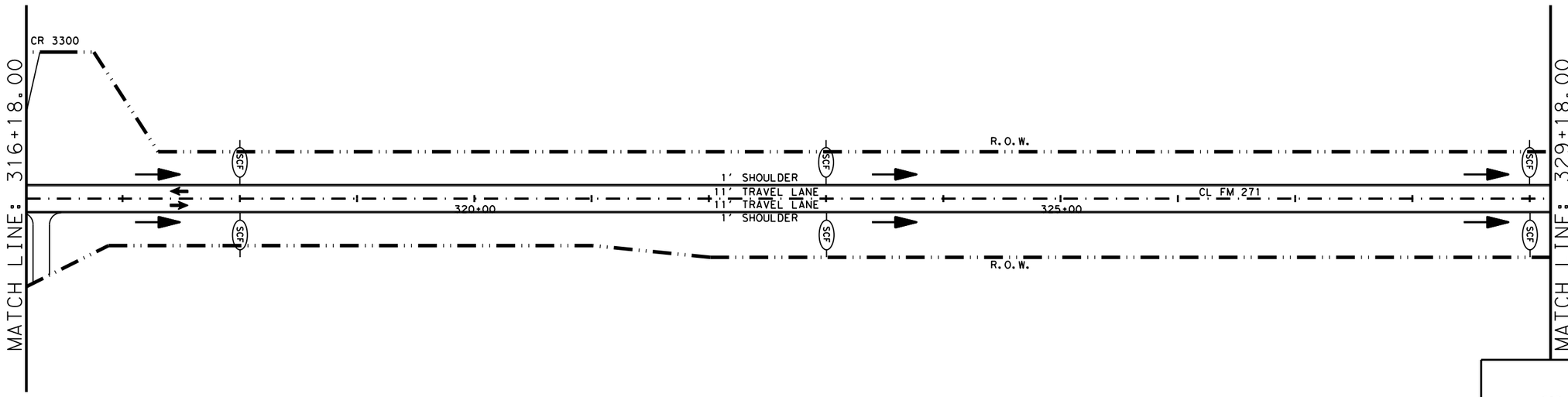

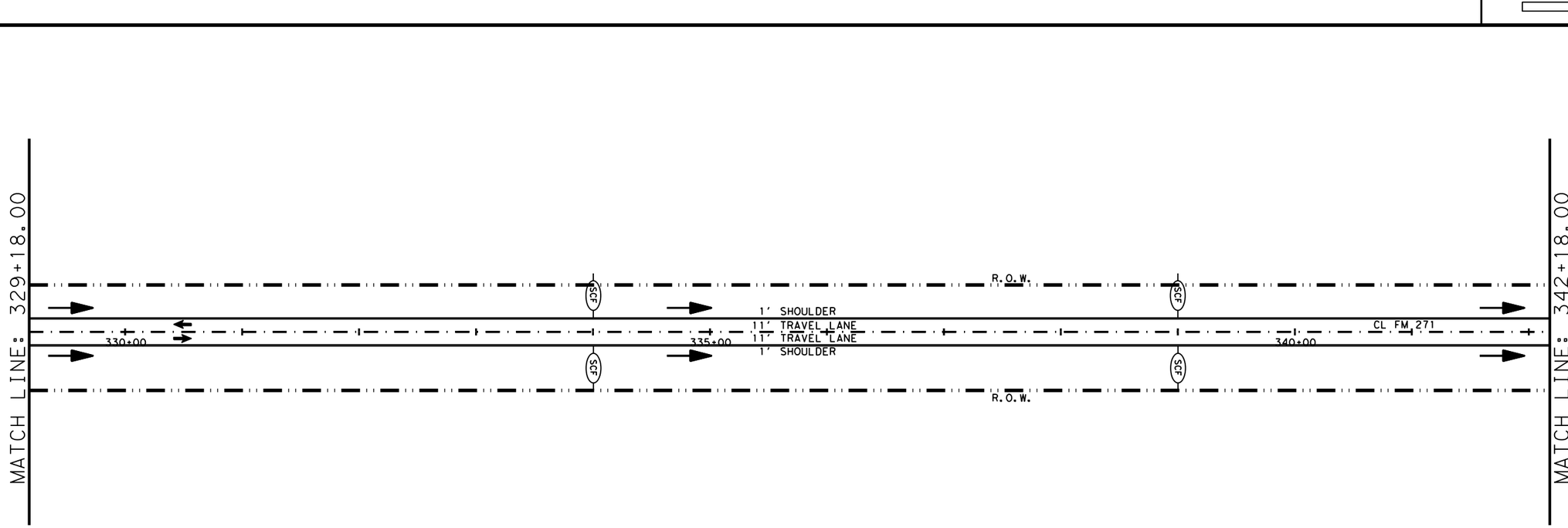

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT

STATE OF TEXAS
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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 13 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		162

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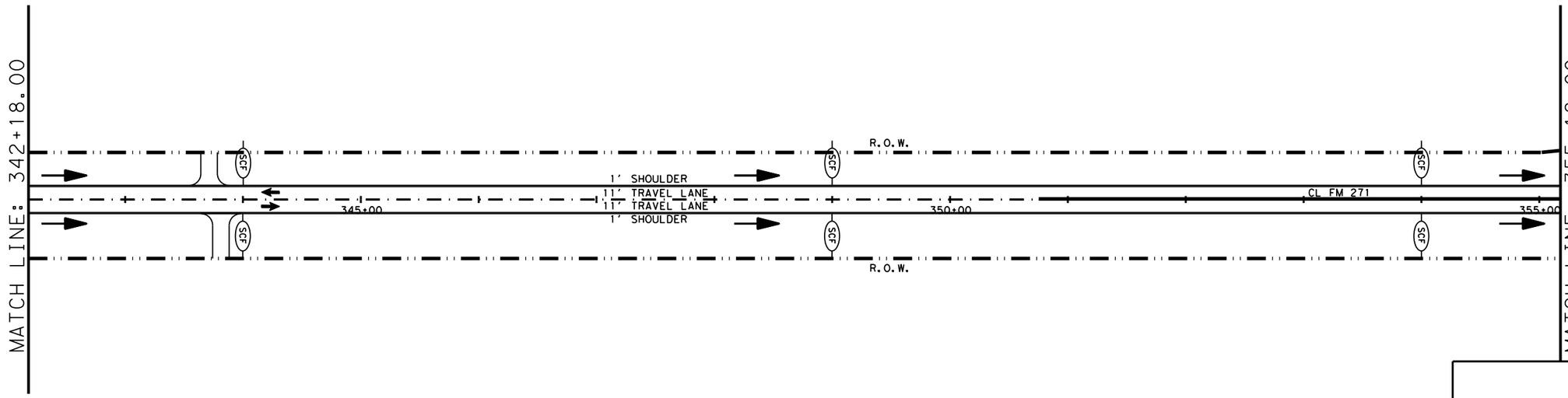
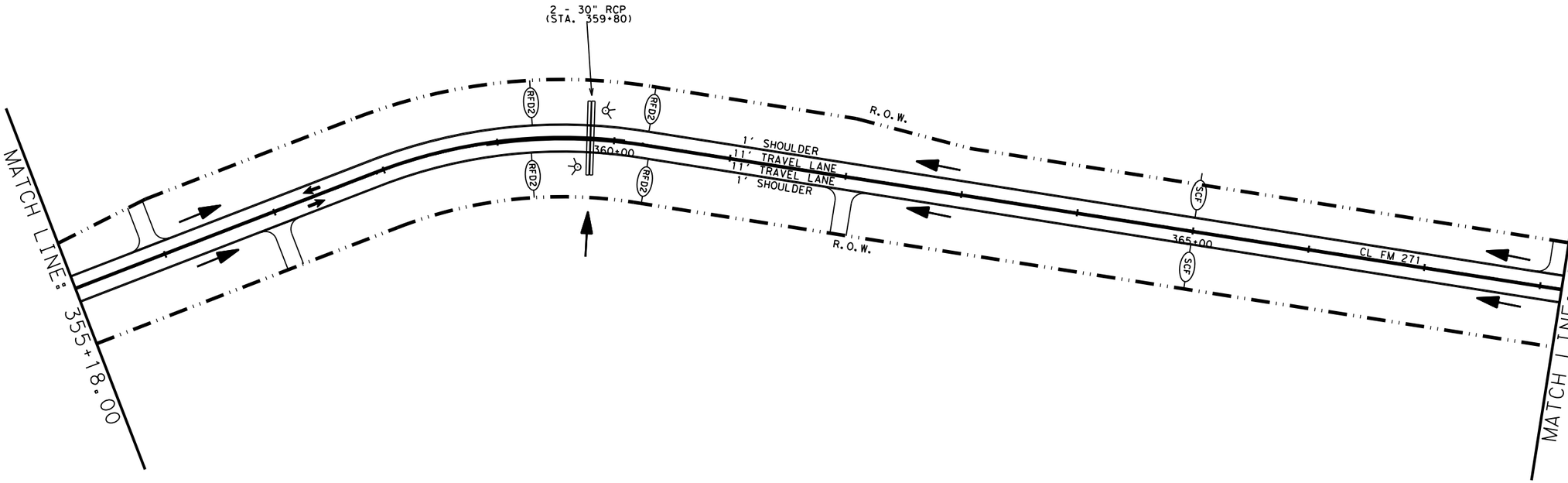


LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 14 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		163

DATE: 7/7/2022 8:51:57 AM
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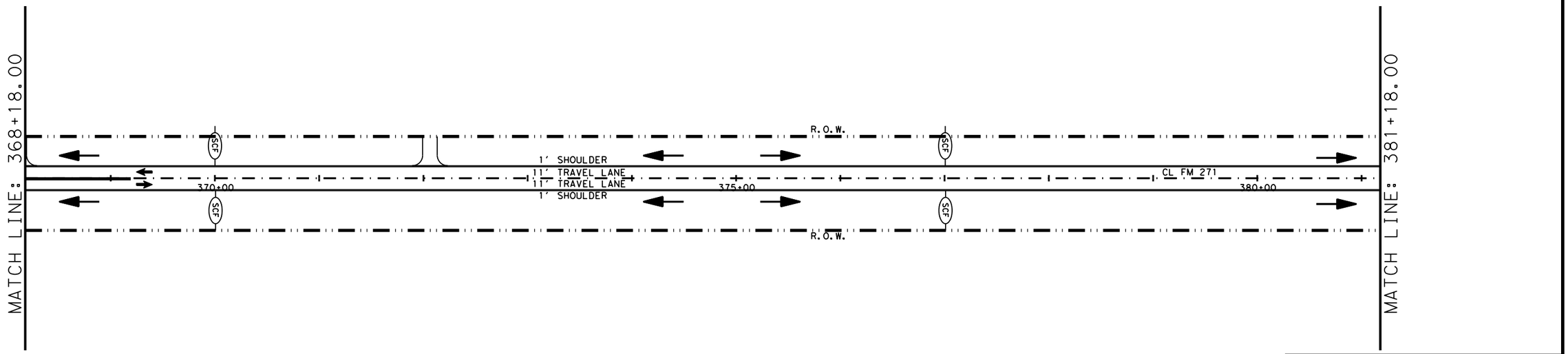

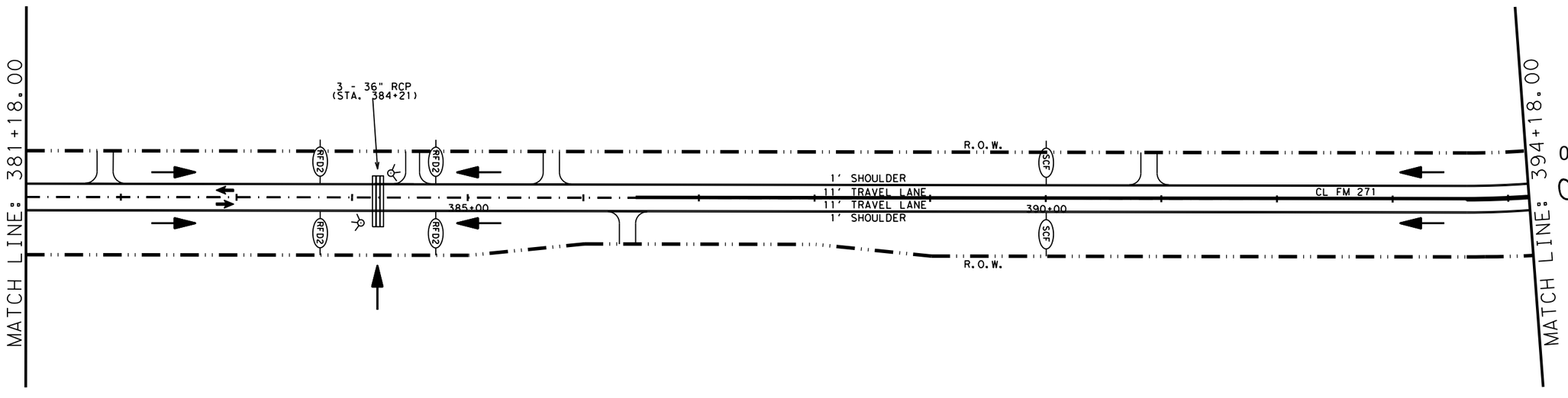

LEGEND

SCF	SEDIMENT CONTROL FENCE (15')
RFD2	ROCK FILTER DAM (15')
	WATER FLOW DIRECTION
	CULVERT

STATE OF TEXAS
MONTE RATER
95859
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07.07.22

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 15 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		164

DATE: 7/7/2022 8:51:58 AM
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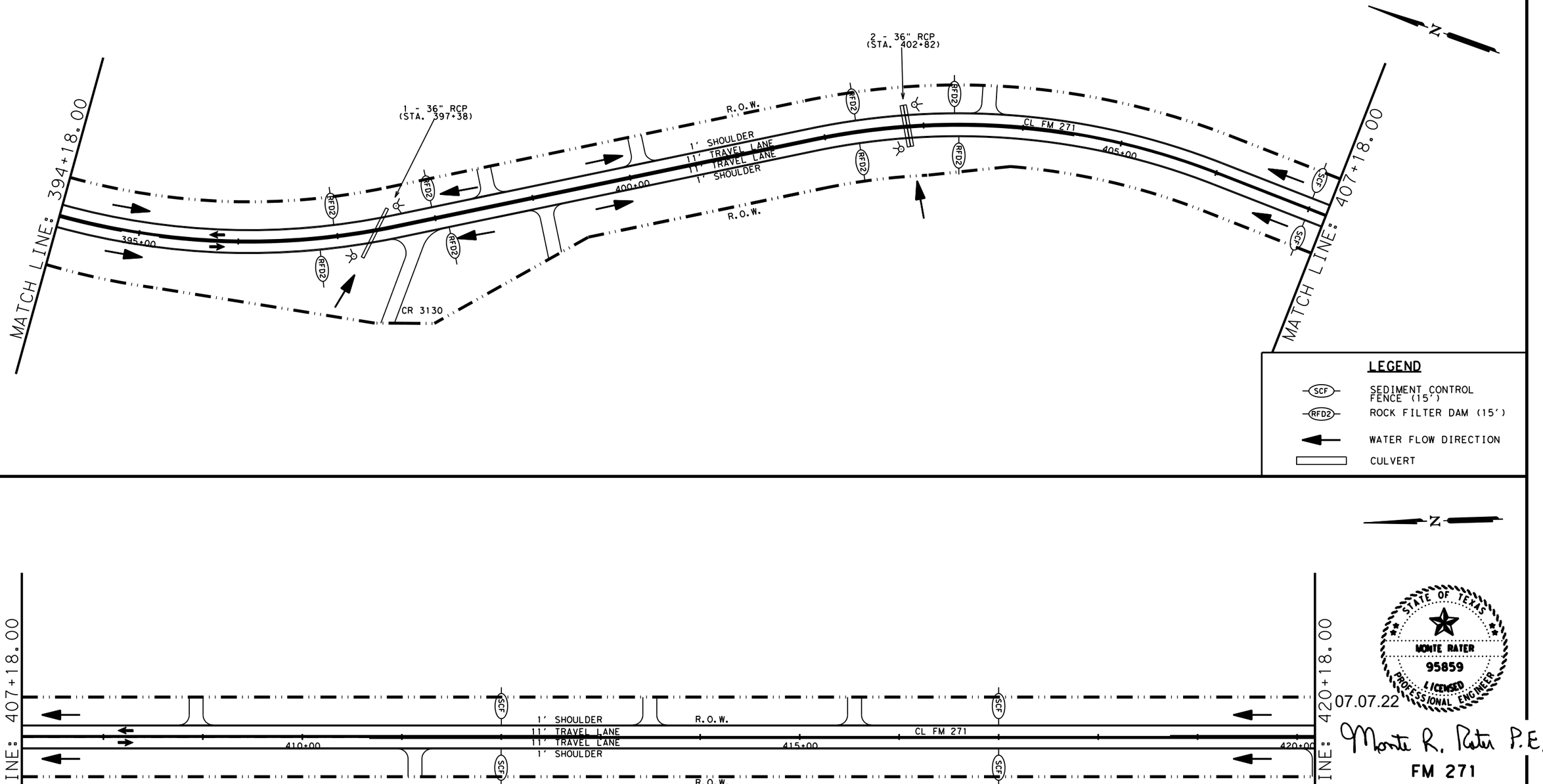

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07.07.22

Monte R. Rater P.E.

FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 16 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		165

DATE: 7/7/2022 8:52:00 AM
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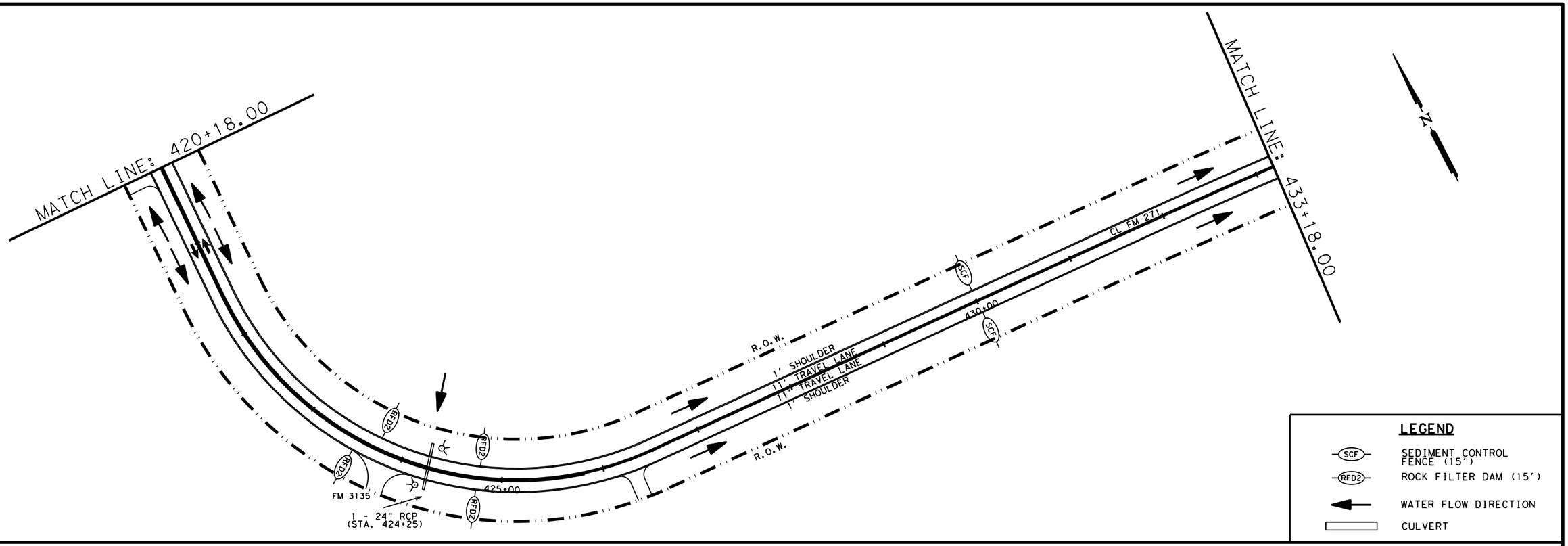

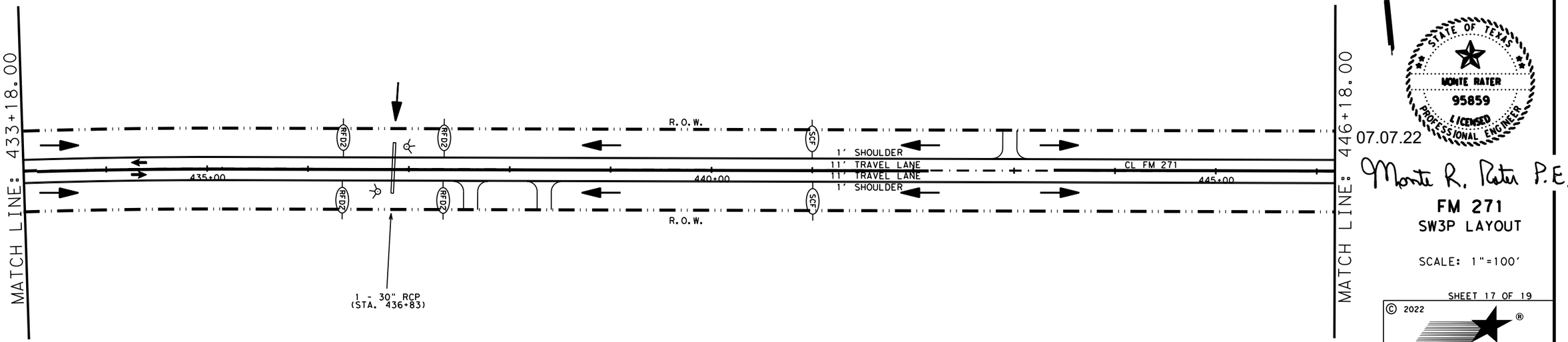

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FM 271
SW3P LAYOUT

SCALE: 1"=100'

SHEET 17 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		166

DATE: 7/7/2022 8:52:01 AM
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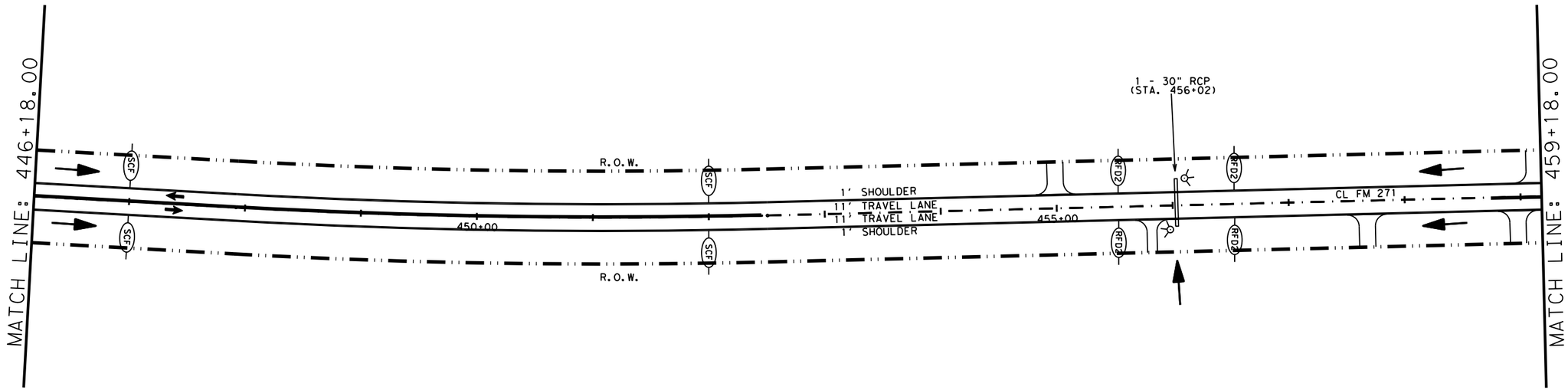
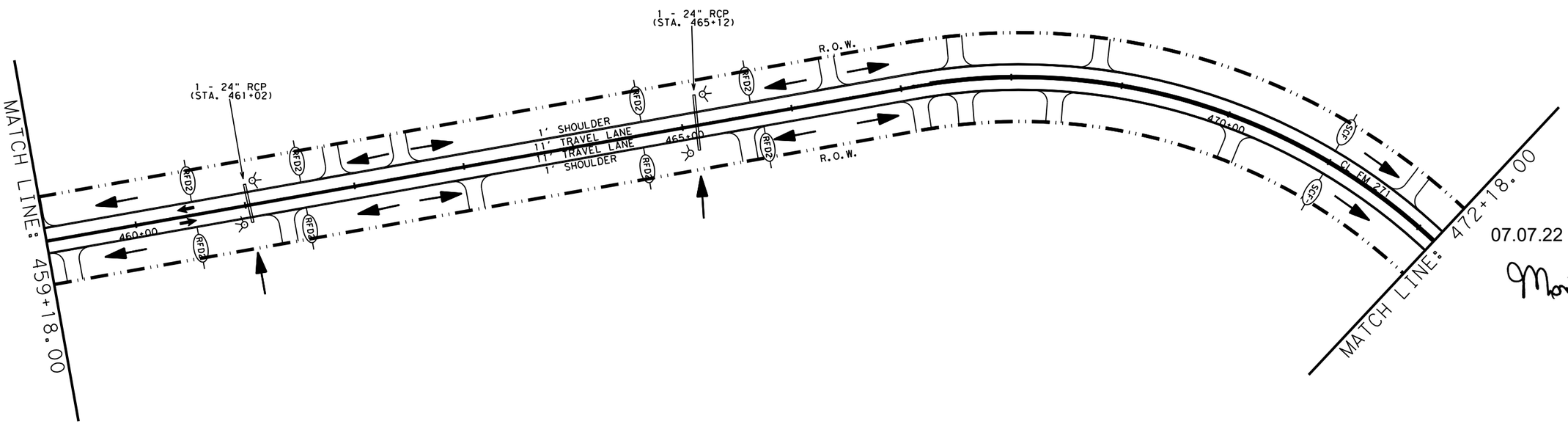


LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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Monte R. Rater P.E.

FM 271
SW3P LAYOUT

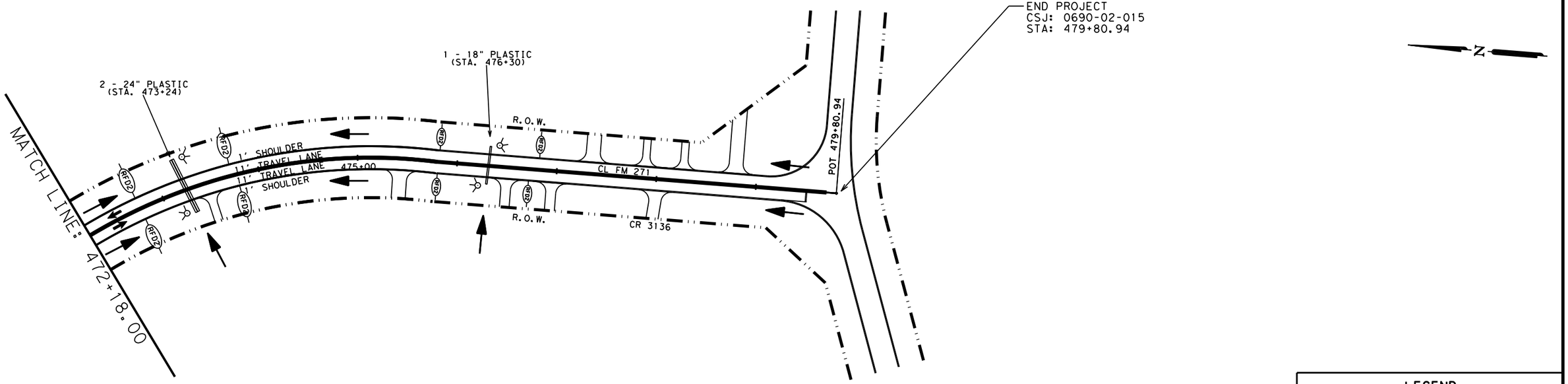
SCALE: 1"=100'

SHEET 18 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		167

DATE: 7/7/2022 8:52:02 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\167 SW3P LAYOUT.dgn



LEGEND

SCF	SEDIMENT CONTROL FENCE (15')
RFD2	ROCK FILTER DAM (15')
	WATER FLOW DIRECTION
	CULVERT

Monte R. Rater P.E.

07.07.22

STATE OF TEXAS
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FM 271
SW3P LAYOUT

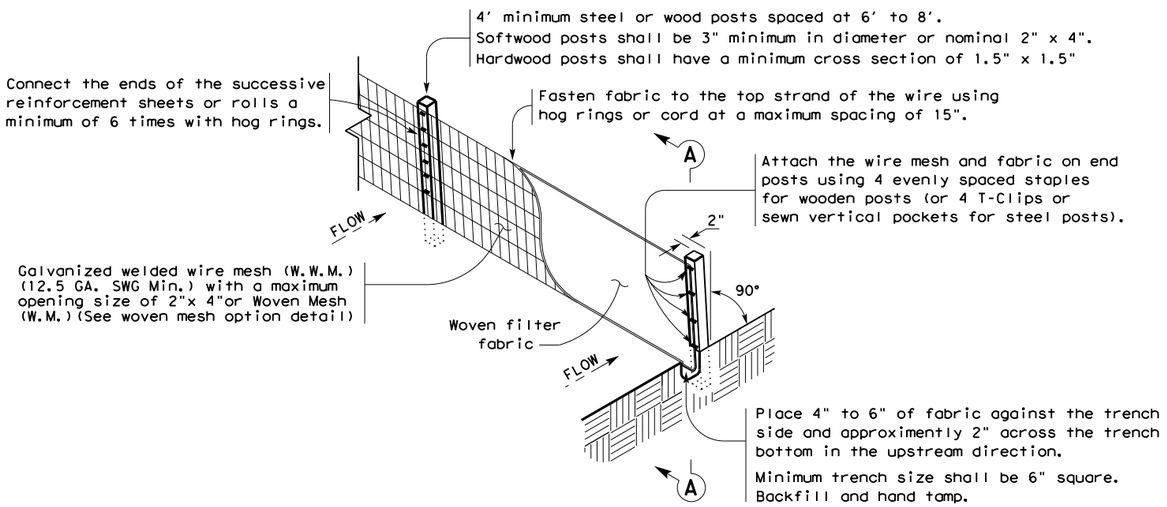
SCALE: 1"=100'

SHEET 19 OF 19

Texas Department of Transportation

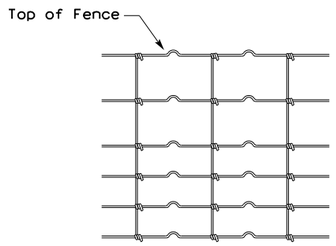
CONT	SECT	JOB	HIGHWAY
0690	01	016, ETC	FM 271
DIST	COUNTY		SHEET NO.
PAR	FANNIN		168

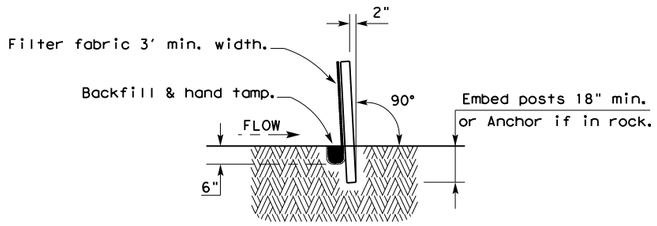
DATE: 7/7/2022 8:52:03 AM
FILE: C:\Users\SWALKER7\Desktop\271 Plan Set Updates\Corrected\100%\168 SW3P LAYOUT.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

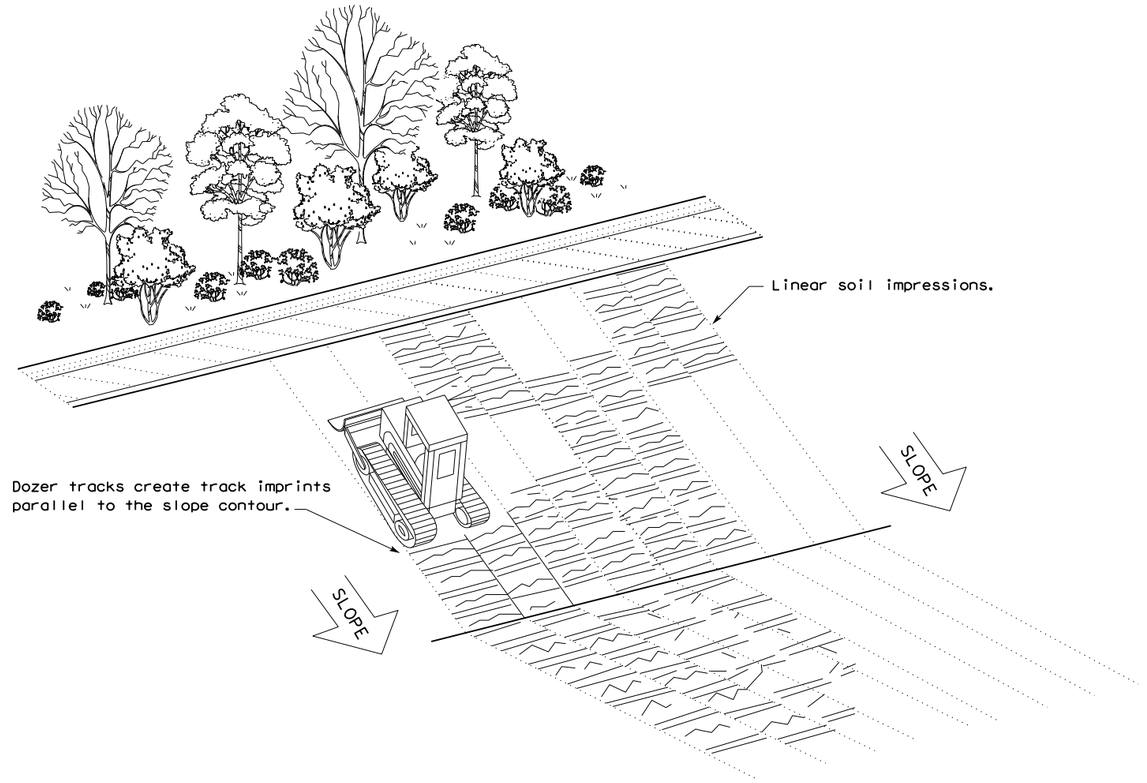
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0690	01	016, ETC		FM 271		
	DIST		COUNTY				SHEET NO.
	PAR		FANNIN				169

7/27/2022
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DATE: 7/7/2022
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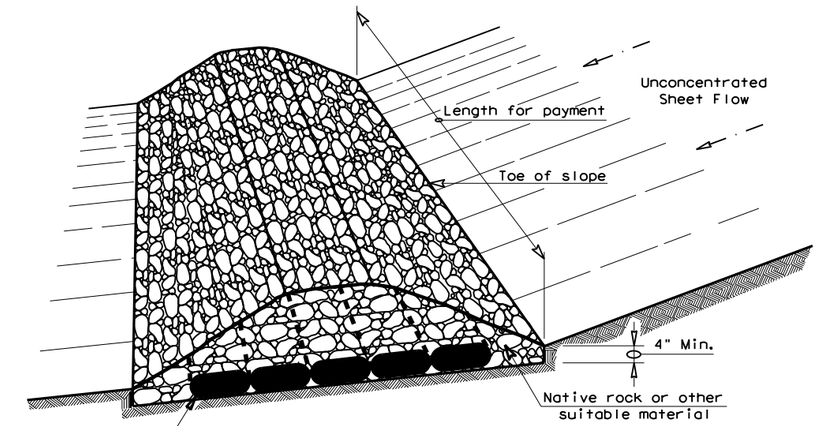
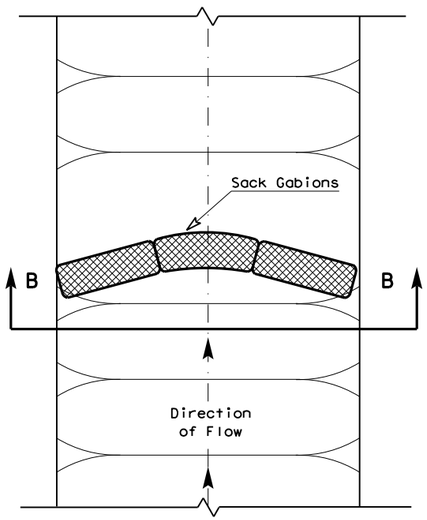
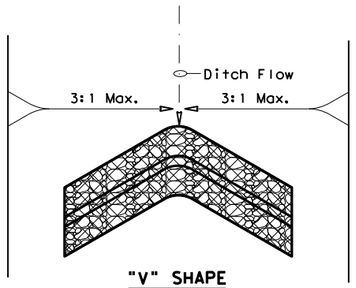


FILTER DAM AT TOE OF SLOPE

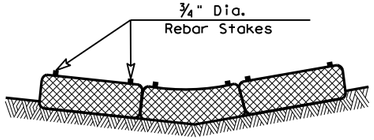
RFD1



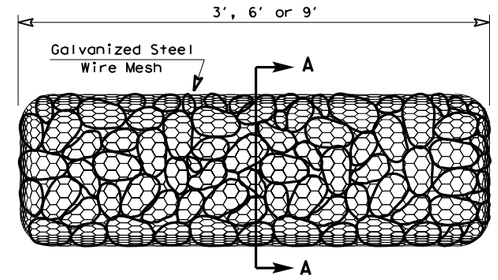
PLAN VIEW



"V" SHAPE
PLAN VIEW

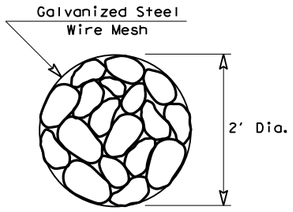


SECTION B-B

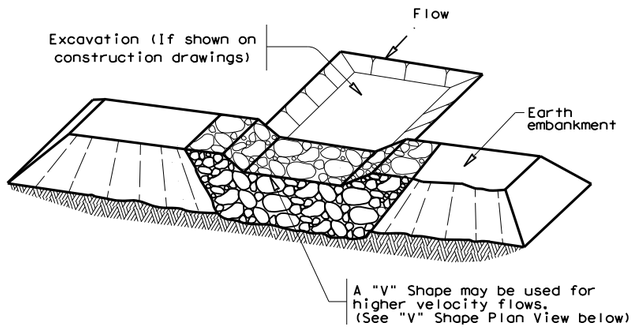


TYPE 4 (SACK GABIONS)

RFD4

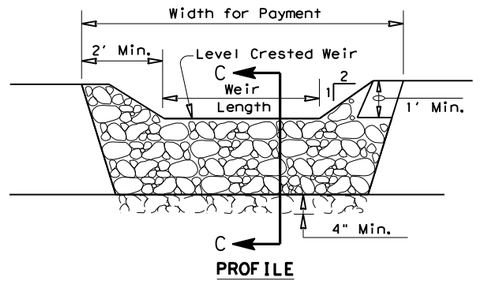


SECTION A-A

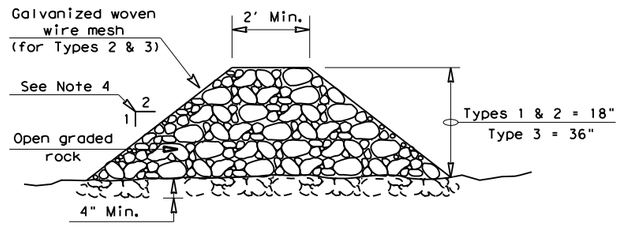


FILTER DAM AT SEDIMENT TRAP

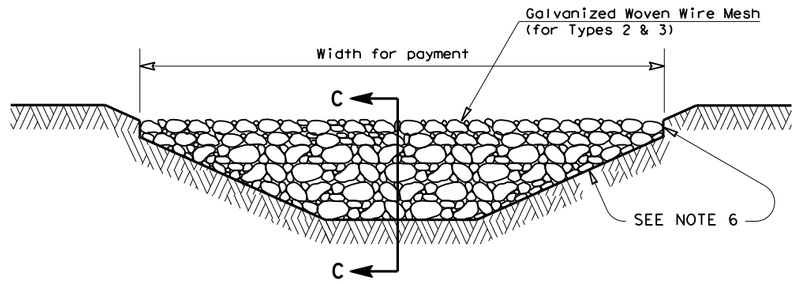
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

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.

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.

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	0690	01	016, ETC	FM 271
	DIST	COUNTY		SHEET NO.
	PAR	FANNIN		170