FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	STP 2B24(087)HES	US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

SEE SHEET 2
FOR INDEX OF SHEETS
AND SHEET 3 FOR
PROJECT LOCATION MAP

DESIGN SPEED: 70 MPH

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FINAL PLANS

PROJECT NUMBER: STP 2B24(087)HES

US 190
ROBERTSON COUNTY

TOTAL LENGTH OF PROJECT = 29,853 FT = 5.654 MILES

CONTRACTOR:
LETTING DATE:
DATE CONTRACTOR BEGAN WORK:
DATE WORK WAS COMPLETED:
DATE WORK WAS ACCEPTED:
FINAL CONTRACT COST: $

FOR THE CONSTRUCTION OF WIDEN ROAD - ADD SHOULDERS.

LOCATION NO.	HIGHWAY	CONTROL NO.	LIMITS	2022/2042 ADT	REFERENCE MARKERS		TOTAL LENGTH (FT)	BRIDGE LENGTH (FT)	RDWY LENGTH (FT)
					BEGIN	END			
1	US 190	0049-08-076	FROM: 0.15 MI. N OF SPRING OAKS DR TO: 0.1 MI. S OF SADBERRY	19,967/35,541	RM 660+0.915 MI (4.754 MI)	RM 666+0.567 MI (10.408 MI)	29,853	0	29,853

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT:

REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2022)

TEXAS DEPARTMENT OF TRANSPORTATION®

SUBMITTED FOR LETTING: 2/28/2024
DocuSigned by: Jeff Miles
589D3E0B31FA414...
DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 2/29/2024
DocuSigned by: Doug Jamison, P.E.
DAA3B0624EE3419...
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 2/29/2024
DocuSigned by: Chad Bohne
60E5537715D24EA...
DISTRICT ENGINEER

FILENAME:
REV DATE:
CSJ: 0049-08-076

INDEX OF SHEETS

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

02/23/2024

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH (~), STATE STANDARD HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION, AS BEING APPLICABLE TO THIS PROJECT.

PRINT DATE	REVISION DATE
2/23/2024	

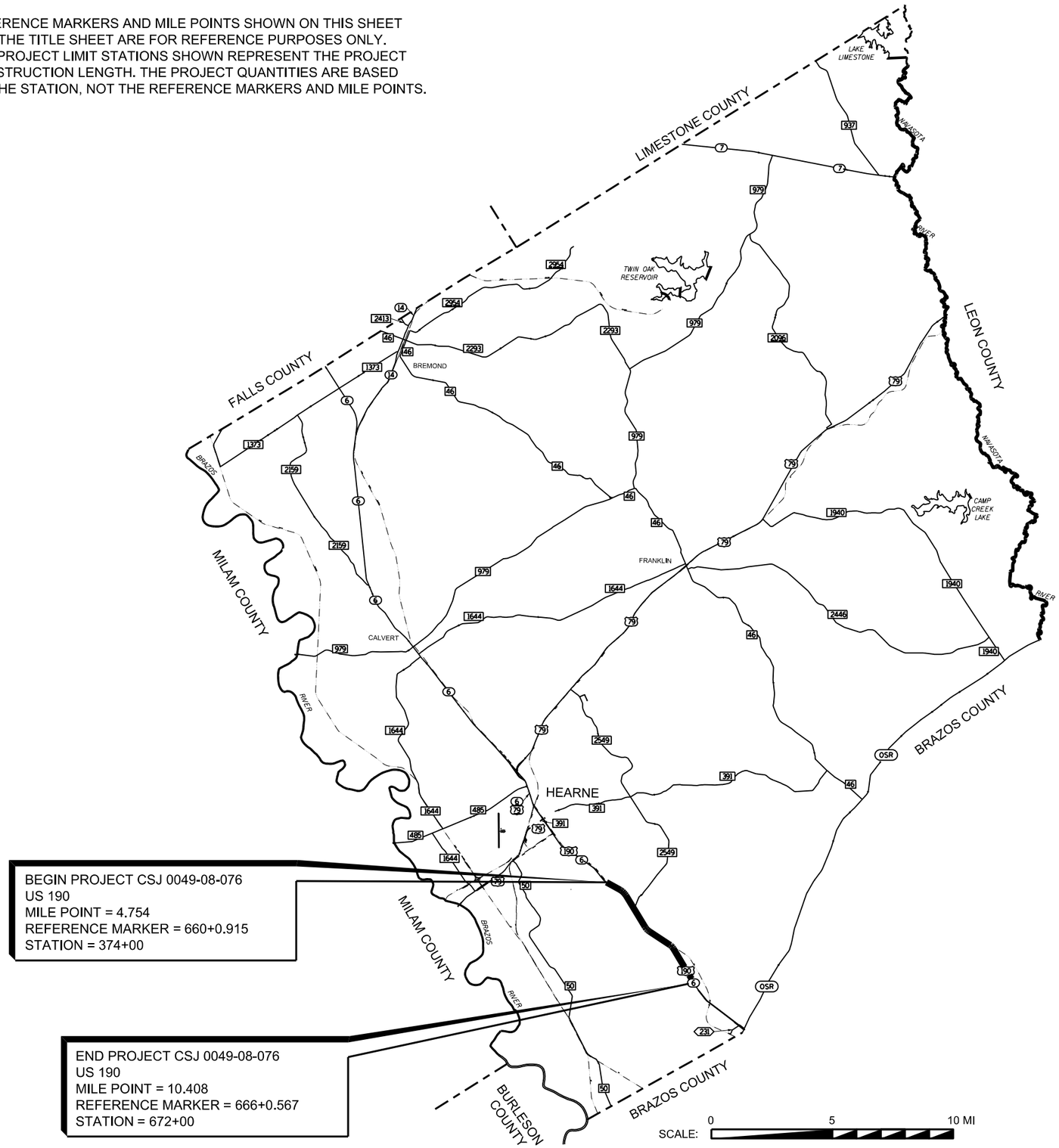
Texas Department of Transportation
Bryan District

INDEX OF SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	2

REV DATE: 2/23/2024
CSJ: 0049-08-076
FILENAME:

NOTE: REFERENCE MARKERS AND MILE POINTS SHOWN ON THIS SHEET AND THE TITLE SHEET ARE FOR REFERENCE PURPOSES ONLY. THE PROJECT LIMIT STATIONS SHOWN REPRESENT THE PROJECT CONSTRUCTION LENGTH. THE PROJECT QUANTITIES ARE BASED ON THE STATION, NOT THE REFERENCE MARKERS AND MILE POINTS.



STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

PROJECT LOCATION MAP

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
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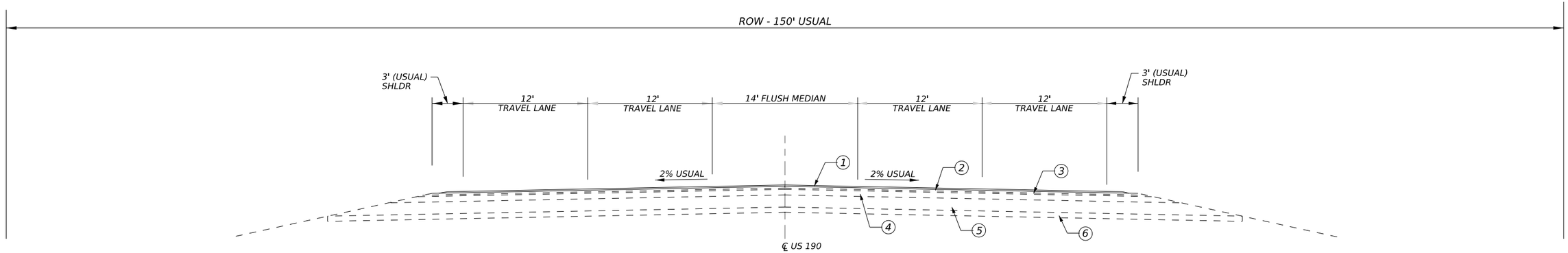
FILENAME:
REV DATE:
CSJ: 0049-08-076



US 190/SH 6
EXISTING SECTION

① 1.5" TY PG76 PFC

② 2" TY SMA-D SMA

③ 1.5" TY C HMAC

④ 6.5" TY B HMAC

⑤ 14" FLEX BASE

⑥ 6" STABILIZED SUBGRADE

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

TYPICAL SECTIONS (EXISTING)

SHEET 1 OF 2 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
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REV DATE:
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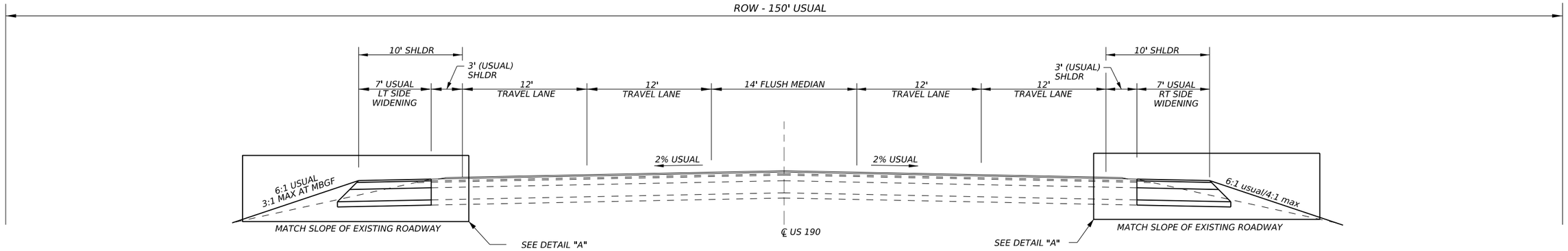
FILENAME:



US 190
PROPOSED
TYPICAL SECTION FOR SHOULDER WIDENING
AT VARIOUS LOCATIONS

LOCATIONS:

NB 1 (0.42 miles) - Extend 2549 accel lane to the start of the SH 6 curve.
STA 425+43 TO STA 447+65 (7' WIDENING)

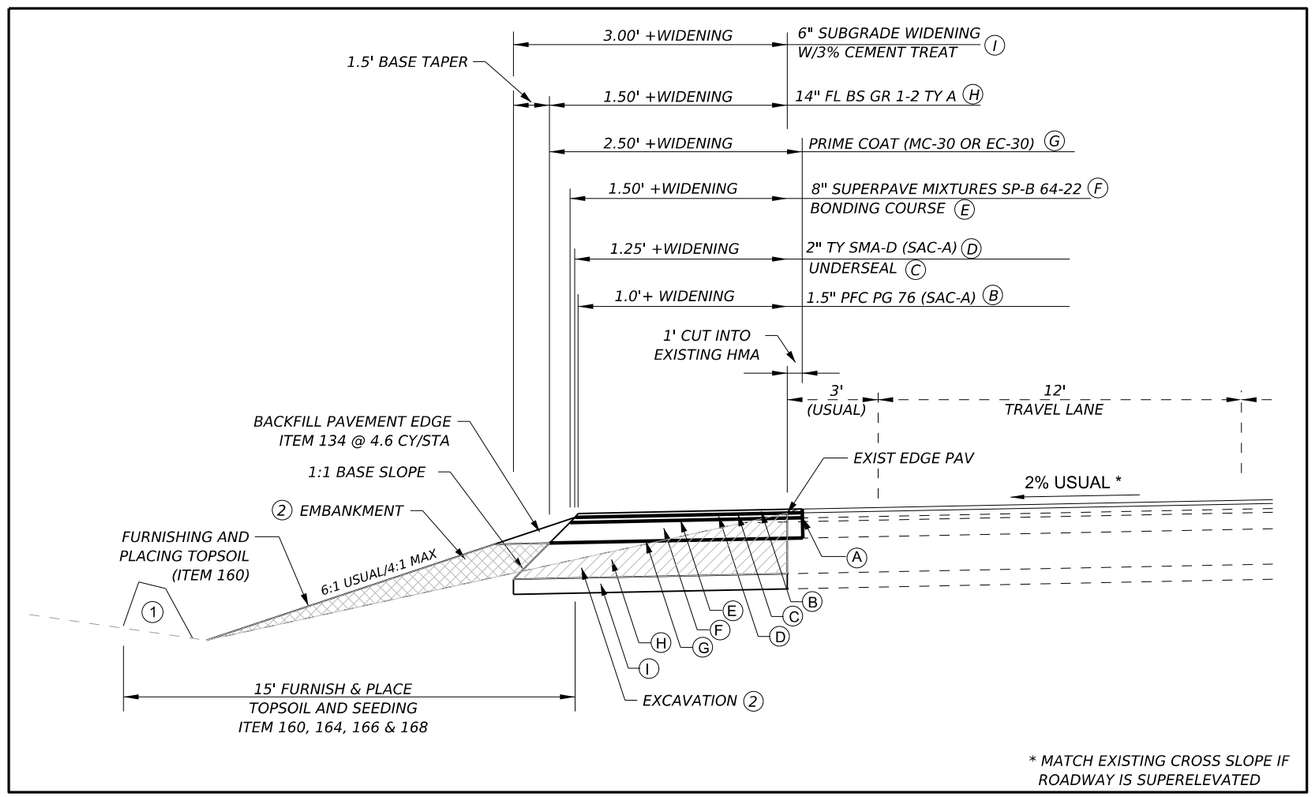
NB 2 (0.31 miles) - Connect Lakeway Dr accel lane to Heath Ln decel Lane.
STA 617+10 TO STA 633+74 (6' WIDENING)

LOCATIONS:

SB 1 (1.07 miles) - Connect Spring Oaks Rd accel lane to Sutton Rd
STA 382+86 TO STA 391+89 (7' WIDENING)
STA 391+89 TO STA 392+86 (TRANS 7' TO 6.5' WIDENING)
STA 392+86 TO STA 398+71 (6.5' WIDENING)
STA 422+64 TO STA 439+48 (6' WIDENING)

SB 2 (0.71 miles) - Connect Sutton Rd accel lane to Spring Creek Rd decel lane.
STA 467+61 TO STA 505+25 (3.5' WIDENING)

SB 3 (0.77 miles) - Connect the RV Source accel lane to Sadberry Rd decel lane.
STA 616+26 TO STA 657+04 (5' WIDENING)



DETAIL "A"
N.T.S.

LEGEND

(A) SAWCUT

(B) 1.5" PFC PG 76 (SAC-A)

(C) UNDERSEAL

(D) 2" TY SMA-D (SAC-A)

(E) BONDING COURSE

(F) 8" SUPERPAVE MIXTURES SP-B PG 64-22

(G) PRIME COAT (MC-30 OR EC-30)

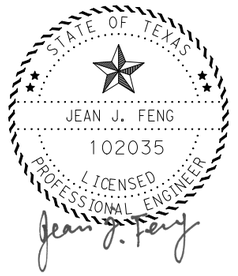
(H) 14" FL BS GR 1-2 TY A

(I) 6" SUBGRADE WIDENING W/3% CEMENT

GENERAL NOTES

(1) ITEM 160: FURNISHING AND PLACING TOPSOIL (4")

(2) SEE SHEET "ROADWAY SUMMARY (WIDENING)" FOR MORE INFORMATION.



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Texas Department of Transportation
Bryan District

TYPICAL SECTIONS (PROPOSED)

SHEET 2 OF 2 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
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STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
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FILENAME:
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BASIS OF ESTIMATE					
ITEM	DESCRIPTION	COURSE	RATE	AMOUNT	QUANTITY
168	Vegetative Watering		10 GAL/SY	24,993 SY	250 MG
275-6001	Cement (6")(3%)		0.0074 TON/SY	13,885 SY	103 TON
310-6028	Prime Coat (MC-30 or EC-30)	Prime	0.20 GAL/SY	13,051 SY	2,610 GAL
3079-6007	PFC (ASPHALT) (PG76 MIX)SAC-A (1)	1.5"	139.50 LB/SY	10,554 SY	736 TON
3077-6001	SP Mixes SP-B PG 64-22		880 LB/SY	11,386 SY	5,010 TON
3080-6007	STONE-MTRX-ASPH SMA-D SAC-A PG76-22		220 LB/SY	10,970 SY	1,207 TON
3084-6001	BONDING COURSE		0.1 GAL/SY	22,356 SY	2,236 GAL

(1) PFC estimated at 93 LB/SY/IN.

BASIS OF ESTIMATE * for contractor's information only					
ITEM	DESCRIPTION	COURSE	RATE	AMOUNT	QUANTITY
166*	FERTILIZER **		60 LBS/AC	5.164 AC	0.155 TON
530*	Prime Coat (MC-30 or EC-30)	Prime	0.20 GAL/SY	583 SY	117 GAL
530*	STONE-MTRX-ASPH SMA-D SAC-A PG76-22		220 LB/SY	583 SY	64 TON

Note: Rates are for estimating purposes only. Actual Rates will be determined in the field.
** Tonnage represents Nitrogen content only.

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GENERAL:

Contractor questions on this project are to be addressed to the following individual(s):
James Robbins, P.E., A.E., James.Robbins@txdot.gov
Joseph Greive, P.E., A.A.E., Joseph.Greive@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors
All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Send eligible shop plan submittals with PDF attachments directly to the reviewing office.

ITEM 5 "CONTROL OF THE WORK"

Prior to letting, earthwork construction cross-section data is available at the Area Engineer's office in *Bryan* for inspection by prospective bidders. In addition, bidders may request electronic earthwork construction cross-section data by sending an email to: *James.Robbins*@txdot.gov.

Earthwork files will be provided by email or by using TxDOT's FTP Service. These cross-sections are for non-construction purposes only, and it is the responsibility of the prospective bidder to validate the data for this project.

After letting, the Engineer will provide final earthwork construction cross-section data necessary for the contractor to establish and control the work.

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/business/resources/highway/bridge/bridge-publications.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 6 "CONTROL OF MATERIALS"

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link. https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

ITEM 7 "LEGAL RELATIONS AND RESPONSIBILITIES"

State contract mowers will mow the right of way during the growing season. The Contractor will be notified by the Engineer one week in advance of the anticipated time when mowers will be in the limits of the project. Clean the right of way to such a condition that allows the mowing contractors to safely mow.

In accordance with Item 7.2.5, Contractor equipment equipped with blue warning lights shall be wired so that operation of blue lights is independent of any other lights.

This project is on a hurricane evacuation route. Furnish at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site and safely handle traffic through and across the project in the event of a hurricane evacuation.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he can provide labor, equipment, material, work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface within three days of receiving written or verbal notice but no later than 3 days prior to hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid in accordance with Article 9.7, "Payment for Extra Work and Force Account Method".

In addition to lane closures, cease work 3 days prior to hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Prohibit the Contractor's, sub-contractors' or material suppliers' vehicles from entering or exiting the stream of traffic including material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

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In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

The following roadways are recognized evacuation routes in the Bryan District:
Primary Evacuation Routes: IH 45, US 77 (S of US 79), US 84 (E of IH 45), US 79, US 287, US 290, SH 6.
Secondary Evacuation Routes: US 190 (E of IH 45), SH 7, SH 21, SH 30 (SH 6 to IH 45), SH 36, SH 105 (E of SH 6).

Other routes may be designated.

Roadway closures during the following key dates and/or special events are prohibited:

- Day before and day of Texas A&M home football games
  - Day before and day of:
    - SH6 in Brazos/Grimes/Robertson County
    - US 190 in Robertson/Brazos County
    - SH 21 in Brazos County
    - SH30 in Brazos County
    - SH40
    - SH47
    - FM2818
    - FM60
    - BS6R (Texas Ave in Bryan/College Station)
    - FM2347
    - FM2154 (north of SH40)
  - Day of:
    - FM 1179
    - FM158
    - SH308
- Texas A&M graduation
- Texas A&M Family Weekend

The Engineer may decide to restrict construction operations or lane closures on these key dates and/or special events.

HOUSTON TOAD

This project is subject to the following restrictions/requirements due to the possible presence of the endangered Houston Toad (*Anaxyrus= Bufo houstonensis*). Please note the below conditions for the project:

General Voluntary Conservation Measures

As part of the preconstruction conference, TxDOT environmental staff will meet with the construction contractor and staff to explain the rationale for the conservation measures, the proper implementation of those measures, and the consequences to the project from failing to ensure full compliance with the measures. The importance of immediately reporting any toad sightings and proper on-site waste management to reduce the potential of attracting Houston toad's predators such as raccoons will be presented.

Proposed locations for Project Specific Locations (PSLs) such as staging areas, equipment storage, contractor parking, or fill material borrow sites must be approved by District environmental staff before the contractor may move into the selected site.

All work adjacent to suitable Houston toad habitat will be conducted during daylight hours from one hour after sunrise to one hour before sunset. Suitable Houston toad habitat has been defined between stations as follow:

STA 383+00 TO STA 392+00 RT
STA 423+50 TO STA 441+50 RT
STA 463+50 TO STA 470+50 RT
STA 494+00 TO STA 509+00 RT

If any species of toad is found in the project area during construction, construction activities will be immediately suspended (Within 300 feet radius of the location), a photograph will be taken and sent to TxDOT environmental staff, and construction activities will remain suspended until identification can be confirmed. If TxDOT environmental staff are unable to properly identify the species, work will remain suspended until a Service permitted 10(a)(1)(A) Houston toad biologist confirms the species is not a Houston toad. If the species in the project area is confirmed to be a Houston toad, work would remain suspended until guidance is received from the Service.

No trees with a diameter at breast height (dbh) of 4 inches or greater will be removed from areas within 200 feet of suitable Houston toad habitat, or from the riparian area of water features in suitable Houston toad habitat.

If limited trimming of canopy tree branches is necessary to facilitate equipment access within the ROW, all trimmed branches will be removed and disposed of outside of the ROW daily. Trimmed branch disposal areas will not be in suitable Houston toad habitat cannot be placed within 200 feet of any suitable Houston toad habitat. In the event there is no practical alternative to placement of a PSL beyond 200 feet of suitable Houston toad habitat, that PSL and the

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methods for managing ingress and egress from that PSL must be approved in writing by the U.S. Fish and Wildlife Service.

If work is projected to occur within suitable Houston toad habitat January 1, 2025 – June 30, 2025, the following must take place for work to occur:

No work will occur within the project area where suitable Houston toad habitat (Service 2020b) is adjacent to the project ROW during the Houston toad breeding season (January 1- June 30) unless the project area has been separated from adjacent suitable habitat by the installation of Amphibian and Reptile Exclusion Fence (AREF). AREF would be installed prior to the beginning of Houston toad breeding season (January 1). To impede Houston toads from entering the project area and to direct toads away from those areas AREF will be placed. AREF will be clearly marked to distinguish it from sediment control fence placed for stormwater management.

The AREF will be inspected and maintained daily from January 1 to June 30 in areas adjacent to suitable Houston toad habitat, and weekly during the remainder of the year, or after a storm event to ensure the exclusion of Houston toad. A 24-hour work stoppage would occur following a cumulative rain event of 2 inches or more within the previous 48 hours as shown on National Weather Service's cumulative precipitation website (https://water.weather.gov/precip/). Rain gauge(s) located on-site at area(s) of construction would be used to determine rainfall amounts and confirm two inches of rainfall within 48 hours.

If the integrity of AREF is compromised by natural or construction related impacts, work in the area will stop until the AREF is restored to original design specifications. The project area must be inspected by a Service 10(a)(1)(A) permitted biologist to ensure no Houston toads entered the project area prior to work resuming.

Following the completion of construction, disturbed areas would be smoothed to avoid the creation of undesirable breeding sites within the ROW. Permanent seeding for erosion control abide by the seed mixture described in ITEM 164 of these General Notes.

Pre-project mowing within existing and maintained TxDOT ROW will only be performed during the Houston toad non-breeding season (July 1-December 31).

A TxDOT construction inspector will be on site regularly to ensure that the conservation measures are being implemented and followed.

ITEM 8 "PROSECUTION AND PROGRESS"

At the end of each work day, remove all grade differentials transverse to centerline. See TREATMENT FOR VARIOUS EDGE CONDITIONS FOR DETAILS sheet.

At the end of each work day, provide 100 foot minimum grade tapers longitudinal to the centerline to transition differences in the profile grade line or roadway grade.

By noon of each Wednesday, provide the Engineer a written outline of the daily work schedule for the following week. Include in the outline the times and places for proposed traffic control changes, lane and shoulder closures, and moving operations or other operations that affect traffic on the roadway. Unless otherwise authorized by the Engineer, prosecute the work on this project in accordance with the following sequence of work:

1) Set advance signing and barricades.
2) Place temporary erosion control devices as shown in plans and as directed by the Engineer prior to beginning any other work.
3) Widen one side of road according to proposed typical sections:
    Sawcut at existing edge of pavement
    Subgrade widening;
    Cement treat 6" subgrade;
    Place 14" flex base;
    Place 8" superpave mixtures;
    Place 2" SMA-D
    Add 1.5" PFC
    Backfill pavement edge;
4) Work each section up to placing the MC-30/EC-30 which requires a 21 day curing. May move to the next section after prime is placed.
    After prime is placed on SB1 then onto SB2.
    After prime is placed on SB2 then onto SB3.
    After prime is placed on SB3 then onto NB1.
    After prime is placed on NB1 then onto NB2.
5) Place MBGF and Mowstrip.
6) Place signing and striping.
7) Final cleanup.

Some of these operations may be performed simultaneously.

Prepare Progress Schedule Bar Chart.

Work is allowed to be performed during the nighttime.

Work that interferes with traffic is required to be performed during off-peak hours, 8:30AM until 4:30PM. Work restrictions are from 7:00-8:30AM and 4:30-6:00PM.

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Equipment and material may be pre-staged at approved locations. When staging equipment and materials, they shall be marked/protected by type 3 barricades or appropriate TCP standards (includes overnight).

The road-user cost liquidated damages are $ 19,305 per day.

The 90 day delayed start that is a convenience delay allowed after authorization under SP008-056 is for Contractor mobilization.

ITEM 100 "PREPARING RIGHT OF WAY"

Limits of the Prep ROW to be confirmed in the field by the Engineer.

During burn bans obtain written approval from the respective County Commissioners Court prior to burning brush.

Prevent ashes from burned vegetation to be transported into any stream.

If burning is not allowed, all trees and brush will be disposed of by shredding, logging or other methods approved by the Engineer. Create a windrow, stockpile, or topdress biomass on disturbed areas along the project at locations approved by necessary permits and the Engineer.

ITEM 132 "EMBANKMENT"

Provide Embankment material for areas within the limits of the Pavement Structure that meet one of the following requirements:

- Sources outside the ROW provide material with a plasticity index between 10 and 25 and with less than 30% silt.
- Sources within the ROW provide material with a plasticity index between 10 and 25 and with less than 30% silt.

Provide Embankment material for areas outside the limits of the Pavement Structure with a plasticity index between 10 and 35.

ITEM 134 "BACKFILLING PAVEMENT EDGES"

Furnish Type A or B material meeting one of the following requirements:
Item 247, Type D Grade 3;
Reclaimed Asphalt Pavement (RAP) with 95% of the RAP passing the 2 inch sieve.

Place emulsified asphalt (SS-1, CSS-1, or as approved by the Engineer) at an application rate of 0.15 gal/SY.

ITEM 160 "TOPSOIL"

All slopes requiring topsoil will be tracked immediately upon final grading to prevent erosion per standard sheet EC(1)-16. Tracking slopes to prevent erosion will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Topsoil may be obtained from the right of way at sites of proposed excavation and embankment.

ITEM 164 "SEEDING FOR EROSION CONTROL"

Using the Austin rural seed mix for sandy soils.

ITEM 166 "FERTILIZER"

Fertilize all areas of project that are being seeded or sodded.

ITEM 168 "VEGETATIVE WATERING"

Vegetative watering is required for all areas of the project that are being seeded or sodded.

ITEM 247 "FLEXIBLE BASE"

Place flexible base in equal lifts of 4 to 8 in. in depth unless otherwise approved by the Engineer in writing.

ITEM 301 "ASPHALT ANTISTRIPPING AGENT"

When the Contractor adds lime as an anti-stripping agent (or an equivalent anti-stripping agent) the lime or equivalent shall be added to the asphaltic concrete in the methods specified in this

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item unless otherwise approved by the Engineer. If an alternate method is proposed, the Engineer's approval will be based on test method Tex-242-F performed on the asphaltic concrete produced through the plant.

ITEM 310 "PRIME COAT"

Cure MC-30/ EC-30 for up to 7 days before placing subsequent surface courses unless otherwise directed by the Engineer.

ITEM 320 "EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT"

Unless otherwise approved by the Engineer, provide a Material Transfer Device with remixing capabilities as specified in Item 320.2.3.3 Placement and Compaction Equipment for all asphaltic concrete pavement.

ITEM 432 "RIPRAP"

The fifty foot (50') approach taper to the MBGF end treatment will be concrete Mow Strip unless otherwise shown in the plans or otherwise directed by the Engineer.

ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING"

Removal of ground mounted temporary signs and supports as specified on standard sheet BC(5), shall include the immediate backfilling of support holes with Type B embankment material and the compaction of the backfill material. The signs must also be removed within two weeks once construction ends.

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.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Complete the weekly tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case-by-case basis at a maximum of 2 hours per officer.

ITEM 504 "FIELD OFFICE AND LABORATORY"

Furnish a Type D Structure (Asphalt Mix Control Laboratory).

ITEM 506 "TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS"

Prior to starting construction, review the SWP3 with the Engineer to confirm the type and placement of the devices. Device locations may be added, deleted, or modified by the Engineer.

ITEM 540 "METAL BEAM GUARD FENCE"

Furnish and Install only one type of timber post.

ITEM 544 "GUARDRAIL END TREATMENTS"

Furnish and install only MASH compliant guardrail end treatments.

ITEM 560 "MAILBOX ASSEMBLIES"

Notify the postmaster prior to installation for approval of type and temporary and permanent locations.

Retain and re-use newspaper holders removed or relocated during construction for placement on new mailbox assemblies in accordance with mailbox standard sheets.

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ITEM 644 "SMALL ROADSIDE SIGN ASSEMBLIES"

Prior to taking elevations to determine lengths for fabrication of sign posts, obtain verification of all proposed locations.

Salvage and deliver all aluminum sign faces to the local TxDOT maintenance office.

ITEM 662 "WORK ZONE PAVEMENT MARKINGS"

Paint and beads may be used for non-removable work zone pavement markings.

All striping limits must be approved by the Engineer before striping operations may begin.

ITEM 666 "REFLECTORIZED PAVEMENT MARKINGS"

Unless authorized by the Engineer, the Contractor will not place the pavement markings on the resurfaced roadway until it has cured for 3 days.

All striping limits must be approved by the Engineer before striping operations may begin.

ITEM 672 "RAISED PAVEMENT MARKERS"

Use flexible bituminous adhesive for applications on all pavement types.

ITEM 678 "PAVEMENT SURFACE PREPARATION FOR MARKINGS"

It is not anticipated that pavement surface preparation for markings will be needed. If the Engineer determines that it is needed, payment for work will be determined in accordance with Article 9.7 "Payment for Extra Work and Force Account Method".

ITEM 3077 "SUPERPAVE MIXTURES"

Hydrated lime, commercial lime slurry or an equivalent anti-stripping agent may be used. If hydrated lime or commercial lime slurry is used up to 1.0 percent may be added. If an equivalent anti-stripping agent is used, add according to manufacturers recommendations. Provide hydrated lime or commercial lime slurry in accordance with DMS-6350, "Lime and Lime Slurry". Add hydrated lime, commercial lime slurry, or an equivalent anti-stripping agent in accordance with Section 301.4.2.

Apply tack coat through a distributor spray bar in accordance with Section 316.3.1. Distributor. If residual from emulsion tack is not tacky, then the Engineer can require the use of PG binder.

RAS is not permitted.

ITEM 3079 "PERMEABLE FRICTION COURSE"

Use aggregate that meets the SAC requirement of class A.

Blending is not allowed.

Apply tack coat through a distributor spray bar in accordance with Article 316.3 Distributor. If residual from emulsion tack is not tacky, then the Engineer can require the use of PG binder.

No RAP or RAS is allowed.

ITEM 3080 "STONE MATRIX ASPHALT"

Use aggregate that meets the SAC requirement of class A.

Hydrated lime, commercial lime slurry or an equivalent anti-stripping agent may be used. If hydrated lime or commercial lime slurry is used up to 1.0 percent may be added. If an equivalent anti-stripping agent is used, add according to manufacturers recommendations. Provide hydrated lime or commercial lime slurry in accordance with DMS-6350, "Lime and Lime Slurry". Add hydrated lime, commercial lime slurry, or an equivalent anti-stripping agent in accordance with Section 301.4.2.

Apply tack coat through a distributor spray bar in accordance with Section 316.3.1. Distributor. If residual from emulsion tack is not tacky, then the Engineer can require the use of PG binder.

No RAS allowed.

ITEM 6001 "PORTABLE CHANGEABLE MESSAGE SIGN"

Furnish, install, and operate up to 3 Portable Changeable Message Signs (PCMS) for this project. The signs can be used both on the project and within a ten (10) mile radius of the project. Locations, messages, and durations of use will be specified by the Engineer. The primary uses will be to inform the public of special events, lane and road closures, and changes in traffic control. Signs will be paid for only when used as directed by the Engineer.

Sheet: 6F
Highway: US 190 Control: 0049-08-076
County: Robertson

ITEM 6185 "TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)"

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project.

Provide one (1) shadow vehicle with TMA for TCP (1-4)-18 as detailed on General Note 5 of this standard sheet.

Provide one (1) shadow vehicle with TMA for TCP (2-4)-18 as detailed on General Note 6 of this standard sheet.

Provide one (1) shadow vehicle with TMA for TCP (2-5)-18 as detailed on General Note 3 of this standard sheet.

Provide two (2) (shadow and trail) vehicles with TMA for TCP (3-1)-13 as detailed on General Note 3 of this standard sheet.

Provide one (1) shadow vehicles with TMA for TCP (S-3)-08 as detailed on General Note 3 of this standard sheet.

101 (One Hundred One) TMA days are provided in the project estimate for stationary operations. 4 (Four) TMA days are provided in the project estimate for mobile operations.

ITEM 6302 "TEMPORARY QUEUE DETECTION SYSTEM"

Furnish, install, relocate, operate, service, and remove various components for one "Temporary Queue Detection System" for this project. The system shall be deployed as directed by the Engineer. The estimated quantity is for 50 days of construction in the northbound direction (one system) and then relocated for 50 days of construction in the southbound direction (same system), for a total of 100 days.

ITEM 6506 "TRAFFIC DATA COLLECTION SYSTEM"

Coordinate with the Engineer and Roy Morris of TPP (512-658-2474) on the date of installation and any questions on the requirements of SS6506. TPP must have a 30-day notice prior to installation and a representative from TPP must be on-site during installation per SS6506.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0049-08-076 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY US 190

			CONTROL SECTION JOB		**0049-08-076**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184768**		
			COUNTY		**Robertson**		
			HIGHWAY		**US 190**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.000		5.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	796.000		796.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	149.960		149.960	
	134-6004	BACKFILL (TY A OR B)	STA	149.960		149.960	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	24,993.000		24,993.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	24,993.000		24,993.000	
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)	SY	24,993.000		24,993.000	
	168-6001	VEGETATIVE WATERING	MG	250.000		250.000	
	247-6235	FL BS (CMP IN PLACE)(TY A GR 1-2)(14")	SY	11,386.000		11,386.000	
	275-6001	CEMENT	TON	103.000		103.000	
	275-6019	CEMENT TREAT (SUBGRADE)(6")	SY	13,885.000		13,885.000	
	310-6028	PRIME COAT (MC-30 OR EC-30)	GAL	2,610.000		2,610.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	22.000		22.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	480.000		480.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	480.000		480.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,426.000		3,426.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,426.000		3,426.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	123.000		123.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	123.000		123.000	
	530-6005	DRIVEWAYS (ACP)	SY	583.000		583.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	625.000		625.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000		1.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	587.500		587.500	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	2.000		2.000	
	560-6014	MAILBOX INSTALL-S (TWG-POST) TY 4	EA	7.000		7.000	
	618-6016	CONDT (PVC) (SCH 40) (1")	LF	48.000		48.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	100.000		100.000	
	624-6004	GROUND BOX TY B (122322)W/APRON	EA	2.000		2.000	
	624-6028	REMOVE GROUND BOX	EA	2.000		2.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1.000		1.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	4.000		4.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	6.000		6.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	15,540.000		15,540.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	14,450.000		14,450.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0049-08-076 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY US 190

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0049-08-076**			
		PROJECT ID		**A00184768**			
		COUNTY		**Robertson**			
		HIGHWAY		**US 190**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	57,800.000		57,800.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	13,500.000		13,500.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	59,000.000		59,000.000	
	672-6007	REFL PAV MRKR TY I-C	EA	777.000		777.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	72.000		72.000	
	684-6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	976.000		976.000	
	685-6002	RELOCATE RDSD FLASH BEACON ASSEMBLY	EA	4.000		4.000	
	3077-6001	SP MIXES SP-B PG64-22	TON	5,010.000		5,010.000	
	3079-6007	PFC-C (PG76 MIX) SAC-A	TON	736.000		736.000	
	3080-6007	STONE-MTRX-ASPH SMA-D SAC-A PG76-22	TON	1,207.000		1,207.000	
	3084-6001	BONDING COURSE	GAL	2,236.000		2,236.000	
	5116-6001	AMPHIBIAN/REPTILE EXCLUSION FENCE INST	LF	4,920.000		4,920.000	
	5116-6002	AMPHIBIAN/REPTILE EXCLUSION FENCE REM	LF	4,920.000		4,920.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3.000		3.000	
	6185-6002	TMA (STATIONARY)	DAY	101.000		101.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	4.000		4.000	
	6302-6001	TEMP Q-DETECT (TY1) (1 SYS)	DAY	100.000		100.000	
	6516-6001	VEH LOOP SENSOR (14 AWG)(BLK)	LF	800.000		800.000	
	6516-6002	VEH CLASS II SENSOR (INSTALL ONLY)	LF	204.000		204.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

ROADWAY SUMMARY (WIDENING)

COMMENTS	STA	STA	LENGTH	ITEM 100	ITEM 112	ITEM 134	ITEM 275		ITEM 247		ITEM 310		ITEM 3079		8" DEPTH ITEM 3077		2" DEPTH ITEM 3080		ITEM 3084			
				6002	6001	6004		6019		6235		6028		6007		6001		6025		6001		
				PREPARING ROW	SUBGRADE WIDENING (ORD COMP)	BACKFILL (TY A OR B)	WIDTH	CEMENT TREAT (SUB-GRADE) (6") (1)	WIDTH	FL BS (CMP IN PLC) (TYA GR 1-2) (14")	WIDTH	PRIME COAT (MC-30 OR EC-30) (1)	WIDTH	PFC-C (PG76 MIX) SAC-A (1)	WIDTH	SUPER-PAVE MIXTURES SP-B SAC-B PG 64-22 (1)	WIDTH	STONE-MTRX-ASPH SMA-D PG76-22 (1)	WIDTH	BONDING COURSE (BETWEEN PFC AND SMA) (1)	WIDTH	BONDING COURSE (BETWEEN SMA AND SP) (1)
			FT	STA	STA	STA	FT	SY	FT	SY	FT	SY	FT	SY	FT	SY	FT	SY	FT	SY	FT	SY
SB1																						
7' WIDENING	382+86	391+89	903		9.03	9.03	10.00	1,003	8.50	853	9.50	953	8.00	803	8.50	853	8.25	828	8.25	828	8.50	853
6.75' WIDENING	391+89	392+86	97		0.97	0.97	9.75	105	8.25	89	9.25	100	7.75	84	8.25	89	8.00	86	8.00	86	8.25	89
6.5' WIDENING	392+86	398+71	585		5.85	5.85	9.50	618	8.00	520	9.00	585	7.50	488	8.00	520	7.75	504	7.75	504	8.00	520
6' WIDENING	422+64	439+48	1,684		16.84	16.84	9.00	1,684	7.50	1,403	8.50	1,590	7.00	1,310	7.50	1,403	7.25	1,357	7.25	1,357	7.50	1,403
SB2																						
3.5' WIDENING	467+61	505+25	3,764		37.64	37.64	6.50	2,718	5.00	2,091	6.00	2,509	4.50	1,882	5.00	2,091	4.75	1,987	4.75	1,987	5.00	2,091
SB3																						
5' WIDENING	616+26	657+04	4,078		40.78	40.78	8.00	3,625	6.50	2,945	7.50	3,398	6.00	2,719	6.50	2,945	6.25	2,832	6.25	2,832	6.50	2,945
NB1																						
7' WIDENING	425+44	447+65	2,221		22.21	22.21	10.00	2,468	8.50	2,098	9.50	2,344	8.00	1,974	8.50	2,098	8.25	2,036	8.25	2,036	8.50	2,098
NB2																						
6' WIDENING	617+10	633+74	1,664		16.64	16.64	9.00	1,664	7.50	1,387	8.50	1,572	7.00	1,294	7.50	1,387	7.25	1,340	7.25	1,340	7.50	1,387
SPRING CR BRIDGE	539+00	544+00	500	5.00															TOTAL	10,970	TOTAL	11,386
PROJECT TOTALS:				**5.00**	**149.96**	**149.96**		**13,885**		**11,386**		**13,051**		**10,554**		**11,386**		**10,970**		**22,356**		

(1) FOR CONTRACTOR'S INFORMATION ONLY.
REFER TO "BASIS OF ESTIMATE" FOR APPLICATION RATES AND QUANTITIES.

SUMMARY OF MBGF QUANTITIES

MBGF LAYOUT	BEGIN STA	END STA	LENGTH (FT)	ITEM 104 6054 REMOVING CONCRETE (MOW STRIP)	ITEM 542 6001 REMOVE METAL BEAM GUARD FENCE	ITEM 432 6045 RIPRAP (MOW STRIP) (4 IN)	ITEM 540 6001 MTL W-BEAM GD FEN (TIM POST)	ITEM 540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION	ITEM 544 6001 GUARDRAIL END TREATMENT (INSTALL)	ITEM 544 6003 GUARDRAIL END TREATMENT (REMOVE)	ITEM 658 6061 INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF 2
				LF	LF	CY	LF	EA	EA	EA	EA
RIGHT SIDE	383+35	390+23	687.5	796	587.50	22	625	1	1	2	6
PROJECT TOTALS:				**796**	**587.50**	**22**	**625**	**1**	**1**	**2**	**6**

EARTHWORK (2)

STA	STA	EXCAVATION	EMBANKMENT	EMBANKMENT - EXCAVATION
		CY	CY	CY
382+86	398+71	3,445	938	(2,507)
422+64	447+65	893	1,118	225
467+61	505+25	1,590	981	(609)
616+26	657+04	2,656	3,421	765
TOTAL		**8,584**	**6,458**	**(2,126)**

(2) FOR CONTRACTOR'S INFORMATION ONLY.

FILENAME:
REV DATE:
CSJ: 0049-08-076

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

SUMMARY OF CONSOLIDATED QUANTITIES

SHEET 1 OF 4 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190
STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON
CONTROL	SECTION	JOB / SHEET NO.
0049	08	076 / 8

SUMMARY OF SW3P QUANTITIES

SW3P LAYOUT NO.	BEGIN STA	END STA	LENGTH (FT)	WIDTH (FT)	ITEM 160	ITEM 164		ITEM 168	ITEM 506						ITEM 5116	
					6003	6001	6071	6001	6002	6011	6038	6039	6040	6043	6001	6002
					FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	BROADCAST SEED (TEMP) (WARM OR COOL)	VEGETATIVE WATERING (1)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTALL) (8")	BIODEG EROSN CONT LOGS (REMOVE)	AMPHIBIAN / REPTILE EXCLUSION FENCE	
															INST	REM
					SY	SY	SY	SY	LF	LF	LF	LF	LF	LF	LF	LF
1 (RT)	382+86	388+00	514	15	857	857	857	857			516	516			520	520
2 (RT)	388+00	394+00	600	15	1000	1000	1000	1000	20	20	388	388			400	400
3 (RT)	394+00	398+71	471	15	785	785	785	785								
4 (LT)	425+44	428+00	256	15	427	427	427	427	20	20	30	30				
4 (RT)	422+64	428+00	536	15	893	893	893	893			40	40	58	58	450	450
5 (LT)	428+00	434+00	600	15	1000	1000	1000	1000								
5 (RT)	428+00	434+00	600	15	1000	1000	1000	1000	20	20					600	600
6 (LT)	434+00	440+00	600	15	1000	1000	1000	1000								
6 (RT)	434+00	439+48	548	15	913	913	913	913	20	20	550	550			600	600
7 (LT)	440+00	446+00	600	15	1000	1000	1000	1000	40	40			65	65		
7 (RT)	440+00	446+00	600												150	150
8 (LT)	446+00	447+65	165	15	275	275	275	275								
9 (RT)	467+61	473+00	539	15	898	898	898	898							700	700
10 (RT)	473+00	479+00	600	15	1000	1000	1000	1000	20	20						
11 (RT)	479+00	485+00	600	15	1000	1000	1000	1000	20	20						
12 (RT)	485+00	491+00	600	15	1000	1000	1000	1000	20	20						
13 (RT)	491+00	497+00	600	15	1000	1000	1000	1000	20	20					300	300
14 (RT)	497+00	503+00	600	15	1000	1000	1000	1000	20	20					600	600
15 (RT)	503+00	505+25	225	15	375	375	375	375	20	20					600	600
16 (LT)	617+10	622+00	490	15	817	817	817	817	40	40	60	60				
16 (RT)	616+26	622+00	574	15	957	957	957	957	40	40	480	480				
17 (LT)	622+00	628+00	600	15	1000	1000	1000	1000			600	600				
17 (RT)	622+00	628+00	600	15	1000	1000	1000	1000			20	20				
18 (LT)	628+00	633+74	574	15	957	957	957	957			572	572				
18 (RT)	628+00	634+00	600	15	1000	1000	1000	1000	40	40	60	60				
19 (RT)	634+00	640+00	600	15	1000	1000	1000	1000								
20 (RT)	640+00	646+00	600	15	1000	1000	1000	1000			20	20				
21 (RT)	646+00	652+00	600	15	1000	1000	1000	1000	40	40	40	40				
22 (RT)	652+00	657+04	504	15	840	840	840	840	80	80	50	50				
PROJECT TOTALS:					24993	24993	24993	24993	480	480	3426	3426	123	123	4920	4920

(1) FOR CONTRACTORS INFORMATION ONLY. SEE BASIS OF ESTIMATE FOR RATES AND QUANTITIES.

SUMMARY OF SIGN ITEMS

SIGN DESCRIPTION	STA START	STA END	ITEM 644 6068 RELOCATE SM RD SN SUP&AM TY 10BWG	ITEM 644 6030 IN SM RD SN SUP&AM TY S80(T)	ITEM 685 6002 RELOCATE RDSD FLASH BEACON ASSEMBLY
			EA	EA	EA
ROADWAY LAYOUT SHEET 3 OF 22	394+00	400+00		1	
ROADWAY LAYOUT SHEET 5 OF 22	428+00	434+00	1		
ROADWAY LAYOUT SHEET 6 OF 22	434+00	440+00		1	
ROADWAY LAYOUT SHEET 9 OF 22	467+00	473+00	1		
ROADWAY LAYOUT SHEET 14 OF 22	497+00	503+00		1	
ROADWAY LAYOUT SHEET 19 OF 22	634+00	640+00	1		
ROADWAY LAYOUT SHEET 20 OF 22	640+00	646+00	1	1	
ROADWAY LAYOUT SHEET 22 OF 22	652+00	658+00			1
PROJECT TOTALS:			**4**	**4**	**1**

REV DATE:
CSJ: 0049-08-076
FILENAME:

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

SUMMARY OF CONSOLIDATED QUANTITIES

SHEET 2 OF 4 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190
STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON
CONTROL	SECTION	JOB / SHEET NO.
0049	08	076 / 9

SUMMARY OF PAVEMENT MARKINGS AND MARKERS

DESCRIPTION STATION				LENGTH	ITEM 666					ITEM 672	
					6305	6308	6317	6320	6035	6009	6007
					RE PM W/RET REQ TY I					REFL PAV MRKR	
					(W) 6" (BRK) (90 MIL)	(W) 6" (SLD) (90 MIL)	(Y) 6" (BRK) (90 MIL)	(Y) 6" (SLD) (90 MIL)	REFL PAV MRK TY I (W) 8" (SLD)(90 MIL)	TY II-A-A	TY I-C
				FT	LF	LF	LF	LF	LF	LF	LF
US 190											
	374+00	-	382+00	800	400	1,600	400	1,600			
SHEET 1 OF 22	382+00	-	388+00	600	300	1,200	300	1,200			
SHEET 2 OF 22	388+00	-	394+00	600	300	1,200	300	1,200			
SHEET 3 OF 22	394+00	-	400+00	600	300	1,200	300	1,200			
	400+00	-	422+00	2200	1,100	4,400	1,100	4,400			
SHEET 4 OF 22	422+00	-	428+00	600	300	1,200	300	1,200			
SHEET 5 OF 22	428+00	-	434+00	600	300	1,200	300	1,200			
SHEET 6 OF 22	434+00	-	440+00	600	300	1,200	300	1,200			
SHEET 7 OF 22	440+00	-	446+00	600	300	1,200	300	1,200			
SHEET 8 OF 22	446+00	-	452+00	600	300	1,200	300	1,200			
	452+00	-	456+00	400	200	800	200	800			
FM 2549 INTERSECTION	456+00	-	457+00	100							
	457+00	-	467+00	1000	500	2,000		2,000		26	
SHEET 9 OF 22	467+00	-	473+00	600	300	1,200		1,200		16	
SHEET 10 OF 22	473+00	-	479+00	600	300	1,200		2,400		30	
SHEET 11 OF 22	479+00	-	485+00	600	300	1,200	300	1,200			
SHEET 12 OF 22	485+00	-	491+00	600	300	1,200	300	1,200			
SHEET 13 OF 22	491+00	-	497+00	600	300	1,200	300	1,200			
SHEET 14 OF 22	497+00	-	503+00	600	300	1,200	300	1,200			
SHEET 15 OF 22	503+00	-	509+00	600	300	1,200	300	1,200			
	509+00	-	616+00	10700	5,350	21,400	5,350	21,400			
SHEET 16 OF 22	616+00	-	622+00	600	300	1,200	300	1,200			
SHEET 17 OF 22	622+00	-	628+00	600	300	1,200	300	1,200			
SHEET 18 OF 22	628+00	-	634+00	600	300	1,200	300	1,200			
SHEET 19 OF 22	634+00	-	640+00	600	300	1,200	300	1,200			
SHEET 20 OF 22	640+00	-	646+00	600	300	1,200	300	1,200			
SHEET 21 OF 22	646+00	-	652+00	600	300	1,200	300	1,200			
SHEET 22 OF 22	652+00	-	658+00	600	300	1,200	300	1,200			
	658+00	-	672+00	1400	700	2,800	700	2,800			
8" STRIPING FOR ACCEL/DECEL LNS									15,540		777
PROJECT TOTALS:					14,450	57,800	13,350	59,000	15,540	72	777

QUANTITIES ARE FOR UPGRADING THE 4" STRIPING ON THE MAINLANES TO 6" STRIPING.
APPLYS TO THE WHITE BREAK LINES AND THE CONTINIOUS LEFT TURN TURN LANE.

SUMMARY OF DRIVEWAYS

STATION		EXISTING MATERIAL	L (LENGTH) ①	W (WIDTH) ①	R1/R2 (RADII) ①		ITEM 530 6005 DRIVEWAYS (ACP)	REMARKS
			FT	FT	FT		SY	
SECTION SB1								
392+07	RT	ASPHALT	18	15	15	20	45	WINDSONG DRIVE
433+20	RT	ASPHALT	15	16	15	15	37	
SECTION SB2								
480+00	RT	ASPHALT	33	30	15	15	121	COMMERICAL
SECTION SB3								
623+07	RT	ASPHALT	20	30	20	20	86	RESIDENTIAL
625+55	RT	ASPHALT	20	21	20	20	66	RESIDENTIAL
629+56	RT	ASPHALT	20	26	20	20	77	RESIDENTIAL
634+48	RT	ASPHALT	15	17	15	15	39	RESIDENTIAL
641+65	RT	ASPHALT	15	17	15	15	39	RESIDENTIAL
SECTION NB1								
646+50	LT	ASPHALT	15	16	15	15	37	UP RAILROAD
SECTION NB2								
627+30	LT	ASPHALT	15	15	15	15	36	RESIDENTIAL
TOTAL PROJECT:							**583**	

① SEE SHEET "DRIVEWAY DETAILS"

SUMMARY OF MAILBOXES

STATION	LT/RT	NUMBER OF MAILBOXES	ITEM 560 MAILBOX INSTALL 6011 MAILBOX INSTALL-S (TWW-POST) TY 4 EA
392+90	RT	1	1
398+47	RT	1	1
616+26	RT	1	1
617+40	LT	1	1
625+88	RT	1	1
634+76	RT	1	1
641+95	RT	1	1
PROJECT TOTALS:			**7**

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

SUMMARY OF CONSOLIDATED QUANTITIES

SHEET 3 OF 4 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	10

FILENAME:
REV DATE:
CSJ: 0049-08-076

SUMMARY OF CONDUIT AND CONDUCTORS

TRAFFIC DATA COLLECTION SYSTEM	STA	ITEM 618		ITEM 684	ITEM 624	ITEM 624	ITEM 6516	ITEM 6516
		6016	6024	6080	6004	6028	6001	6002
		CONDUIT (PVC) (SCH 40) (1")	CONDUIT (PVC) (SCH 40) (2") (BORE)	TRF SIG CBL (TY C) (14 AWG) (2 CONDR)	GROUND BOX TY B (122322) W/APRON	REMOVE GROUND BOX	VEH LOOP SENSOR (14 AWG) (BLK)	VEH CLASS SENSOR (INSTALL ONLY)
		LF	LF	LF	EA	EA	LF	EA
	436+15	48	100	976	2	2	400	160
PROJECT TOTALS:		48	100	976	2	2	400	160

SCHEDULE OF CONDUIT AND CONDUCTORS

LABEL	ITEM 618 CONDUIT		ITEM 684 TRF SIG CBL (TY C) (14AWG)(2 CONDR)
	1" PVC SCH 40	2" PVC SCH 40	1C-#14
	TRENCH	BORE	INSULATED
	LF	LF	LF
1	12		2 (12)+88' = 112'
2	12		2 (12)+112' = 136'
3		100	4 (100) =400'
4	12		2 (12)+112= 136'
5	12		2 (12)+88' = 112'
6			8 (10) = 80'
PROJ TOTALS:	48	100	976

FILENAME:

REV DATE:
CSJ: 0049-08-076

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

SUMMARY OF CONSOLIDATED QUANTITIES

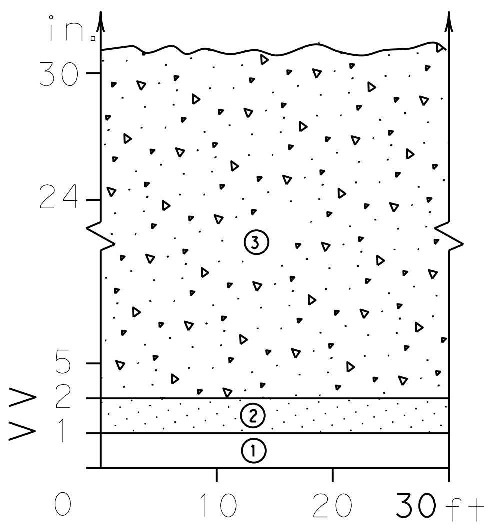
SHEET 4 OF 4 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

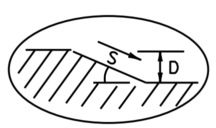
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	11

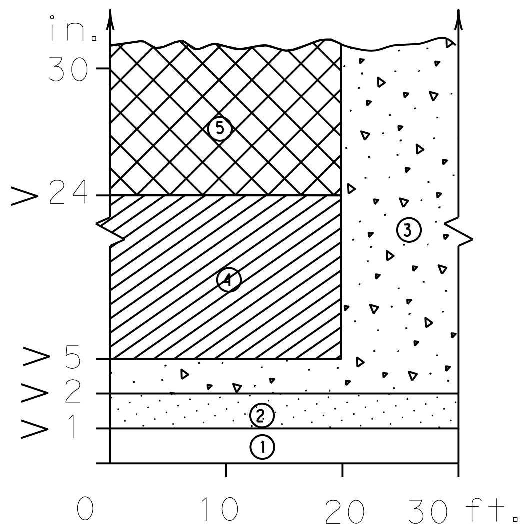
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

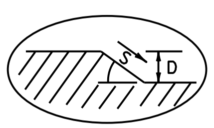


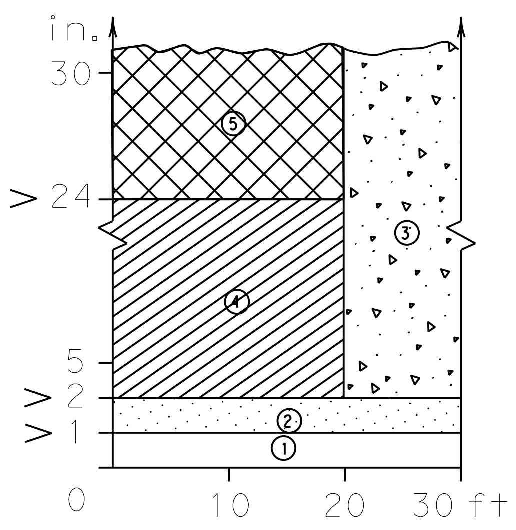
Edge Condition I
S = (3:1) (or flatter)





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





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

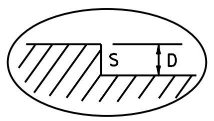
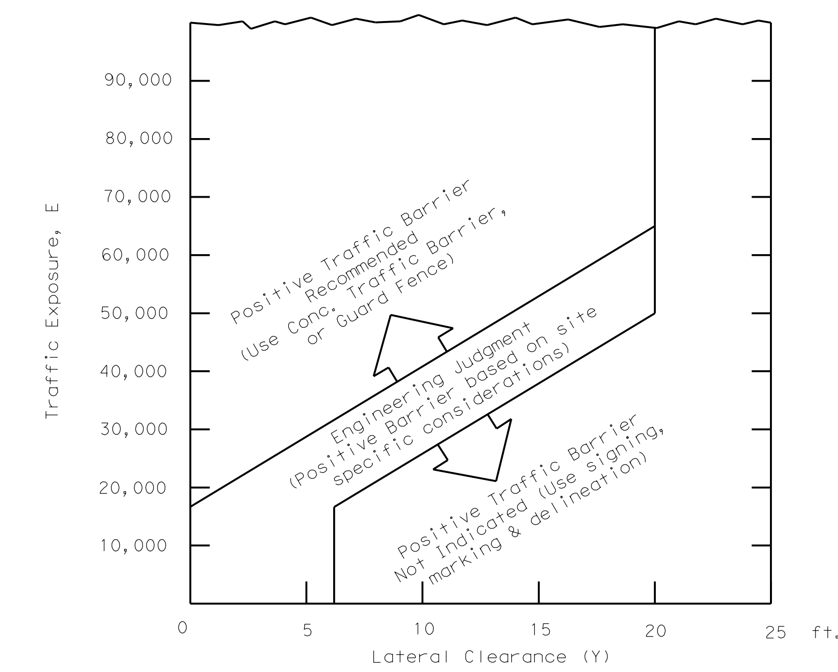


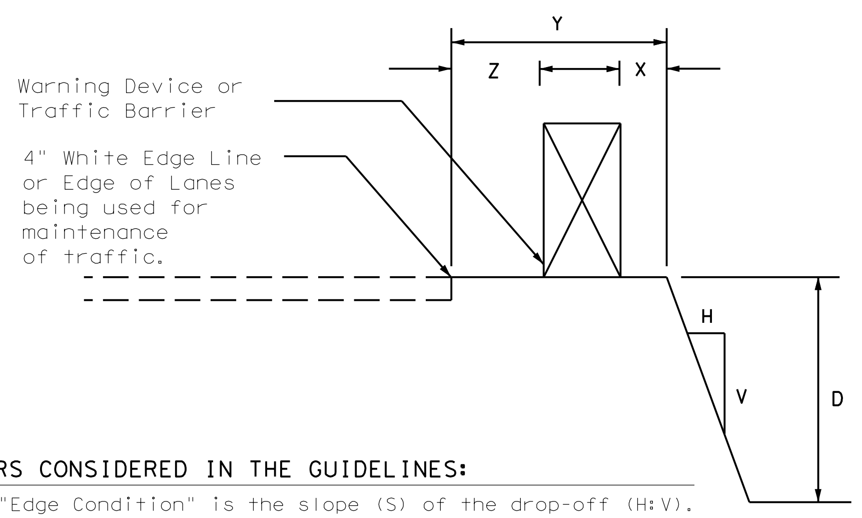
FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ( )



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

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

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



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

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.

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.

Edge Condition Notes:

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

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

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

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

Engineer's Seal

Date 1/31/2024

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT 0049	SECT 08	JOB 076	HIGHWAY US 190
REVISIONS 03-01 08-01 9-21	DIST BRYAN		COUNTY ROBERTSON	SHEET NO. 12

DATE: 1/31/2024 10:23:38 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/... EDGECON-21.dgn

DATE: 1/31/2024 10:23:53 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/00490807674 - Design/Plan Set/8. Traffic/8H. Traffic Standards/BC-21.dgn

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

SHEET 1 OF 12

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	0049	08	076	US 190
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	BRYAN	ROBERTSON		13
5-10 5-21				

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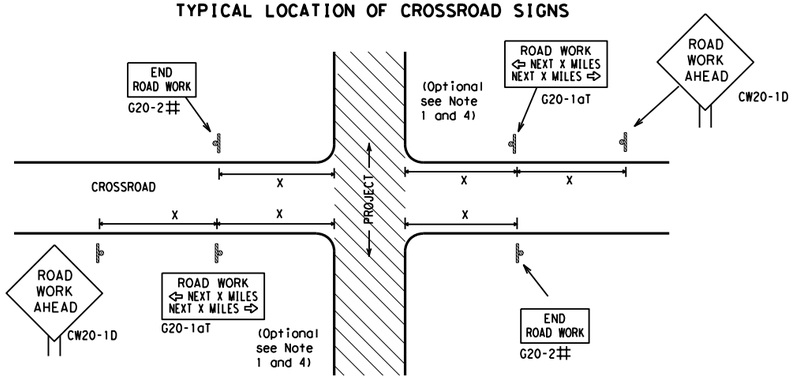
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764/Design/Plan Set/8. Traffic/8H. TrafficStandards/BC-21.dgn

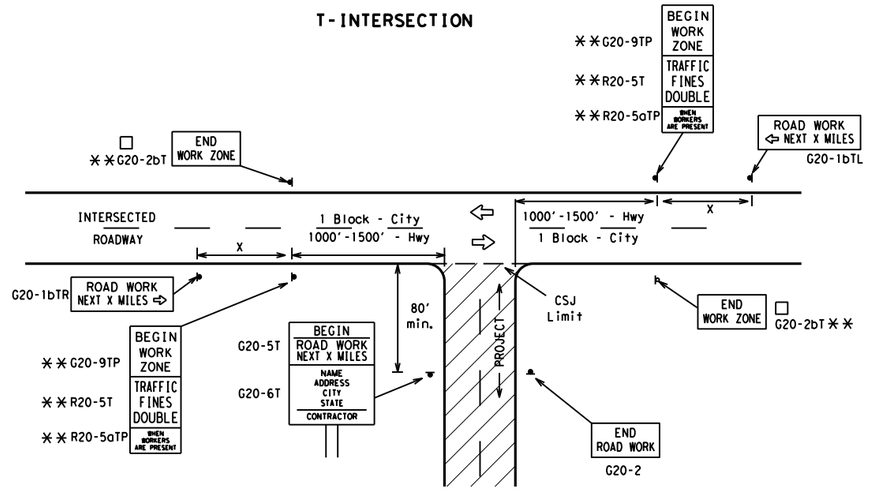
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

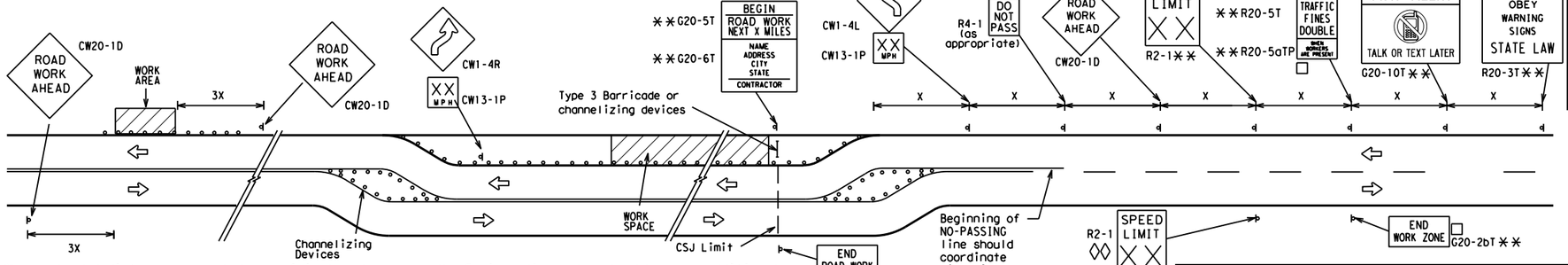
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

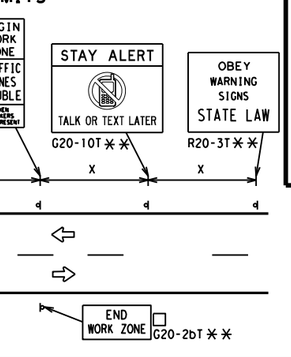
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

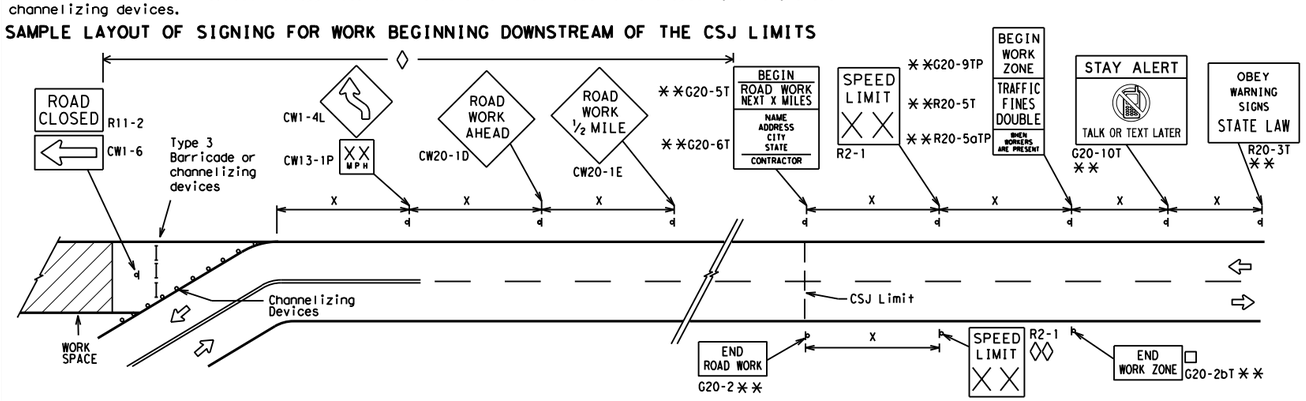


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

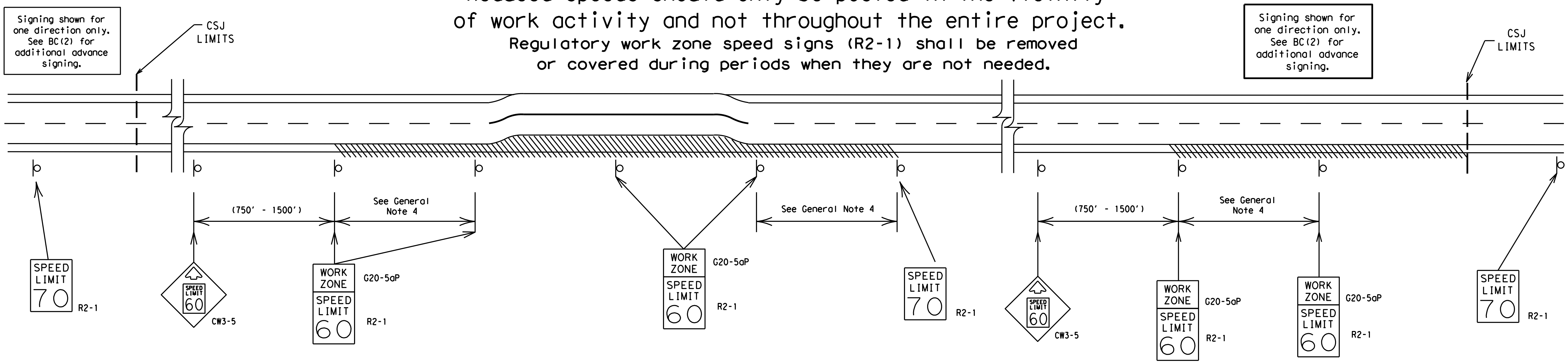
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRYAN	ROBERTSON		14

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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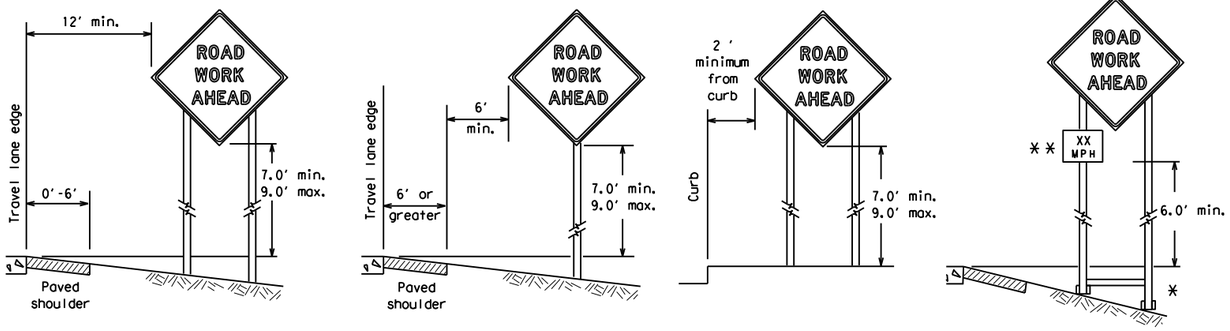
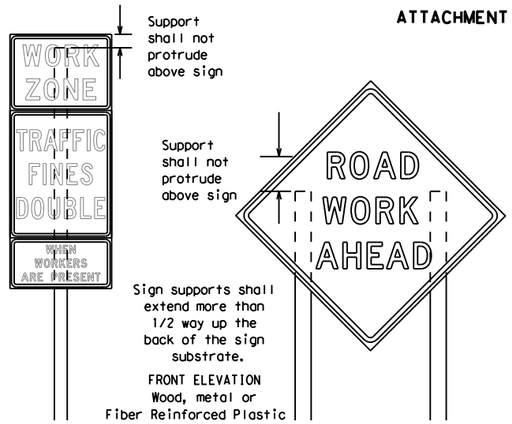
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

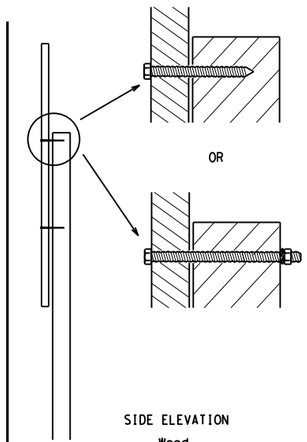


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





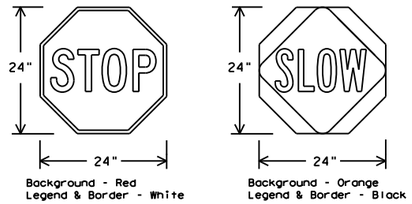
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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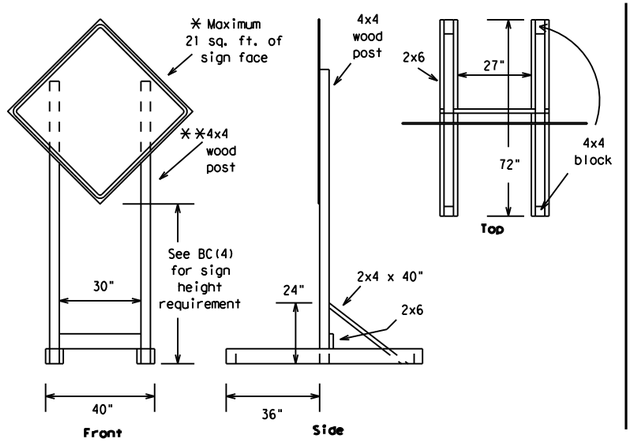
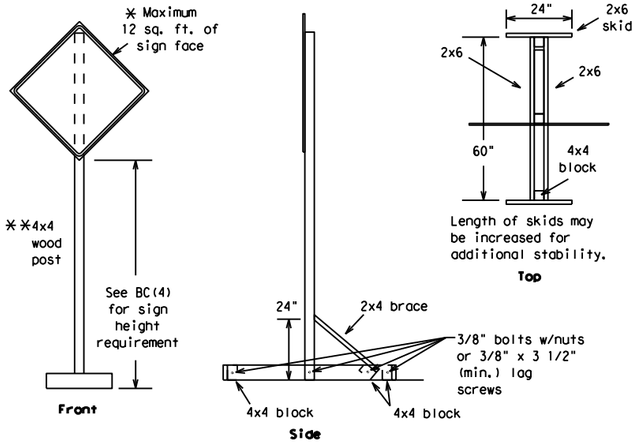
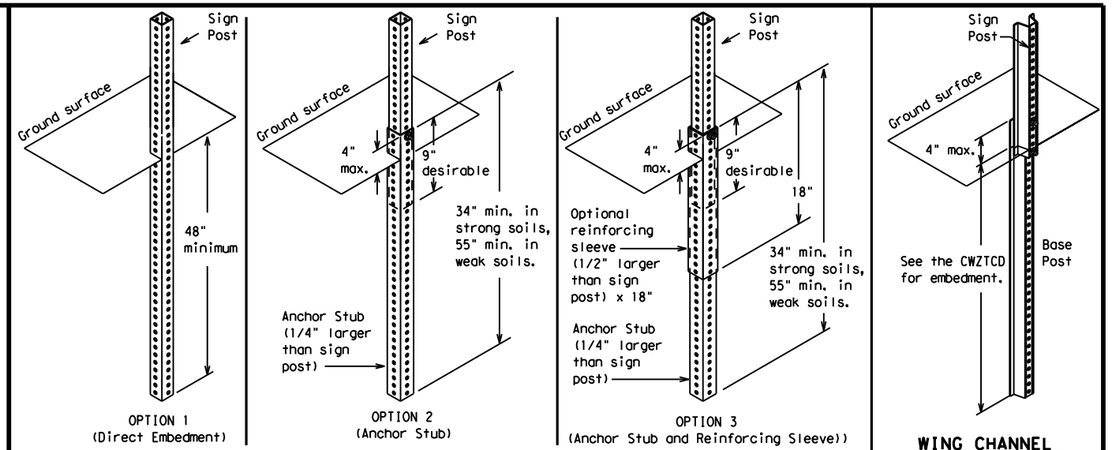




SKID MOUNTED WOOD SIGN SUPPORTS

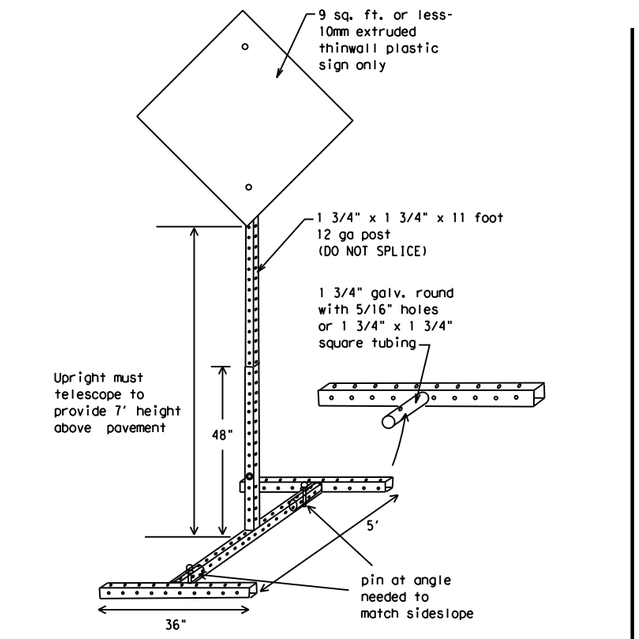
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

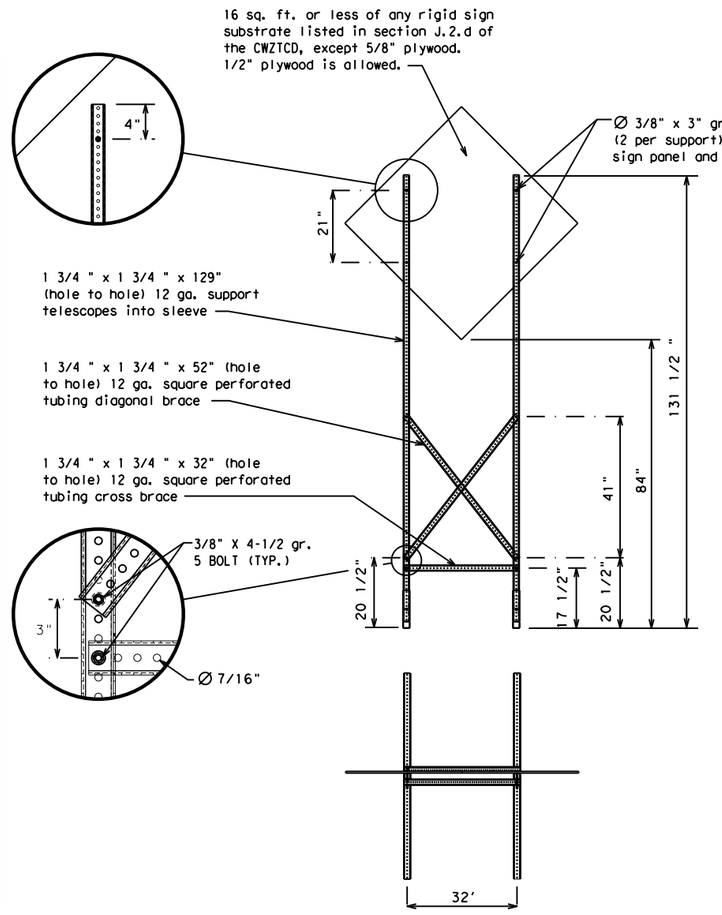


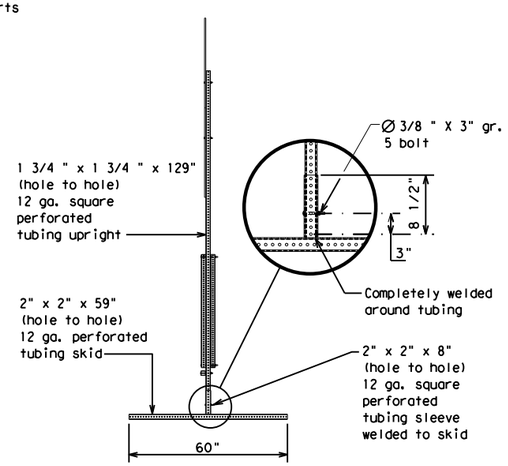
PERFORATED SQUARE METAL TUBING

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.

SHEET 5 OF 12

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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
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)

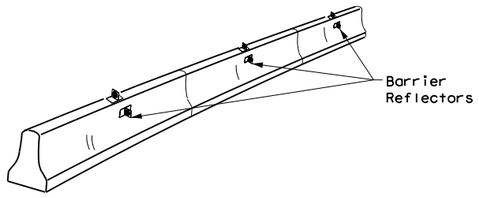
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRYAN	ROBERTSON		18

100

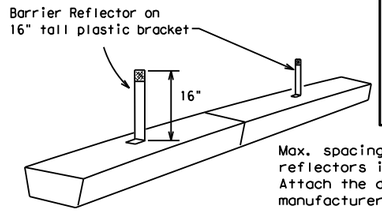
DATE: 1/31/2024 10:23:58 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764 - Design/Plan Set/8. Traffic/8H. TrafficStandards/BC-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

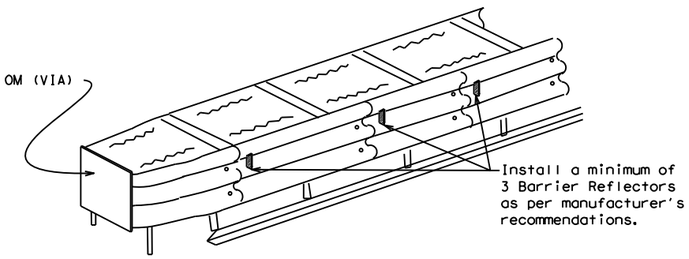


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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)

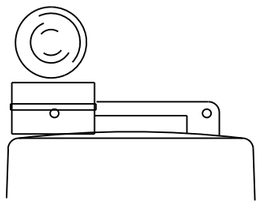


DELINEATION OF END TREATMENTS

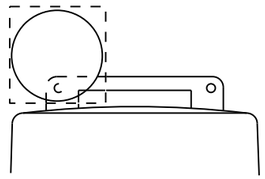
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

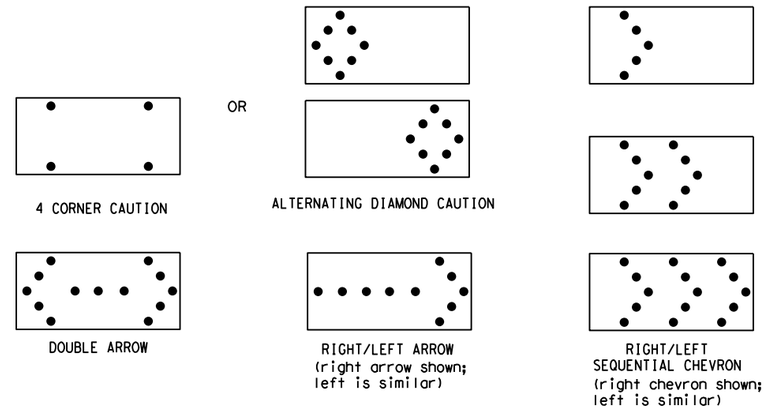
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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

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	0049	08	076	US 190
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRYAN	ROBERTSON		19

DATE: 1/31/2024 10:23:58 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764 - Design/Plan Set/8. Traffic/8H. TrafficStandards/BC-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

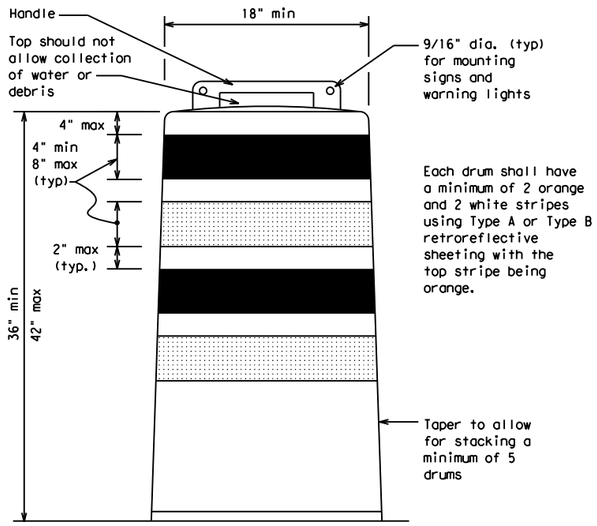
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

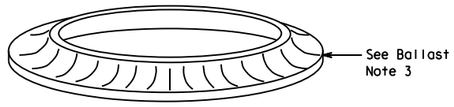
RETROREFLECTIVE SHEETING

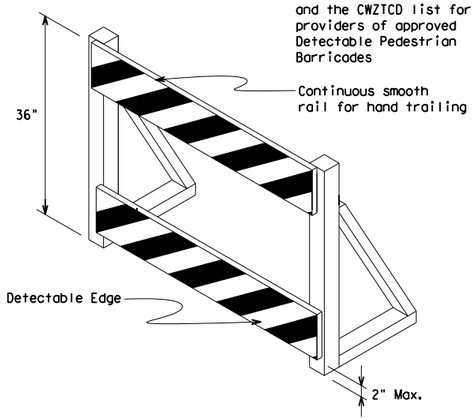
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

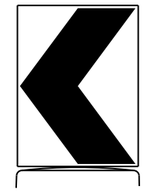




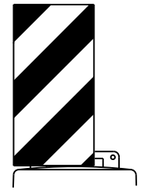


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	BRYAN	ROBERTSON		20
7-13				

102

DATE: 1/31/2024 10:23:59 AM
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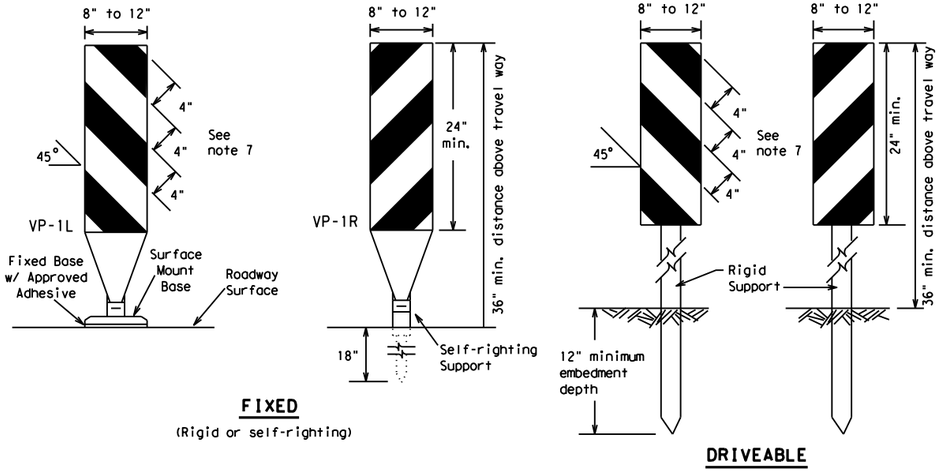
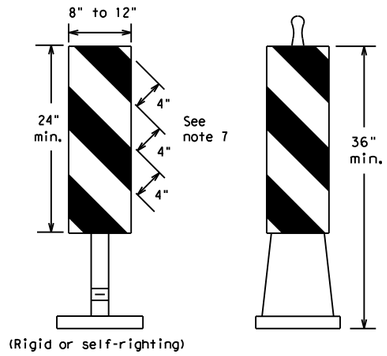


FIXED
(Rigid or self-righting)

DRIVEABLE

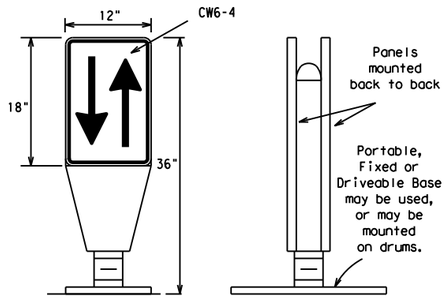


(Rigid or self-righting)

PORTABLE

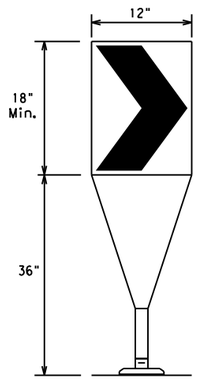
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



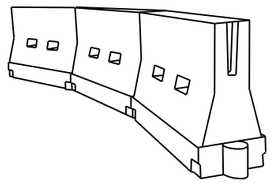
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
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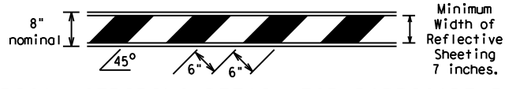
DATE: 1/31/2024 10:24:00 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049807/6/4 - Design/Plan Set/8. Traffic/8H. TrafficStandards/BC-21.dgn

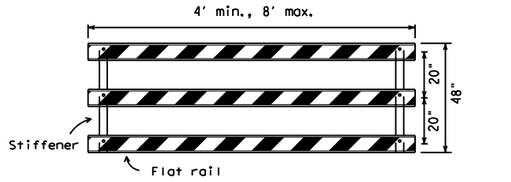
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



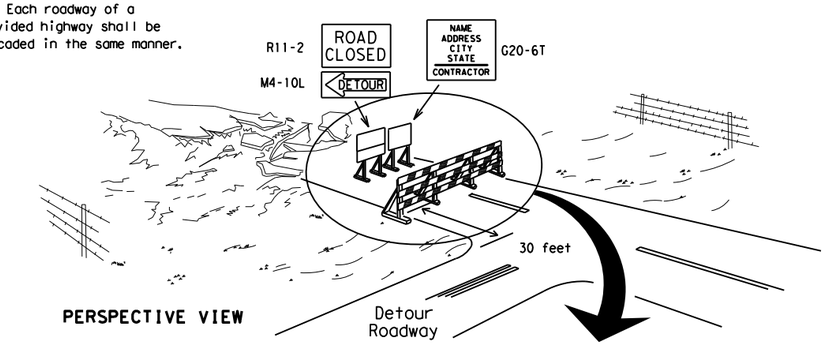
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

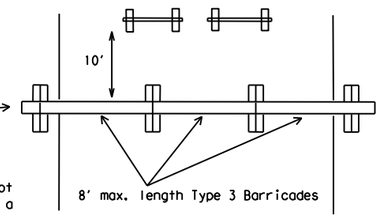
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

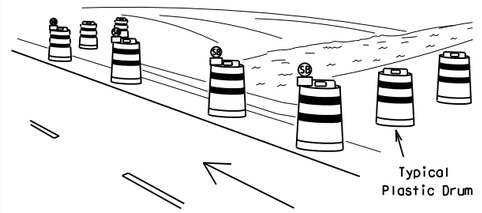
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

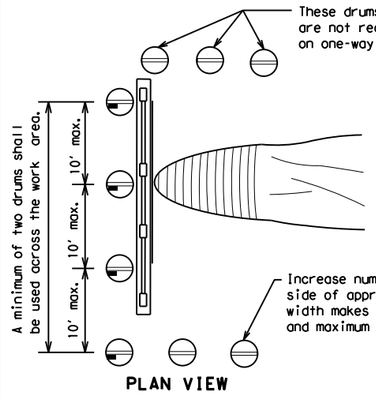
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

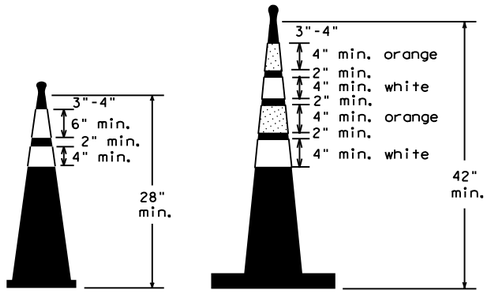
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

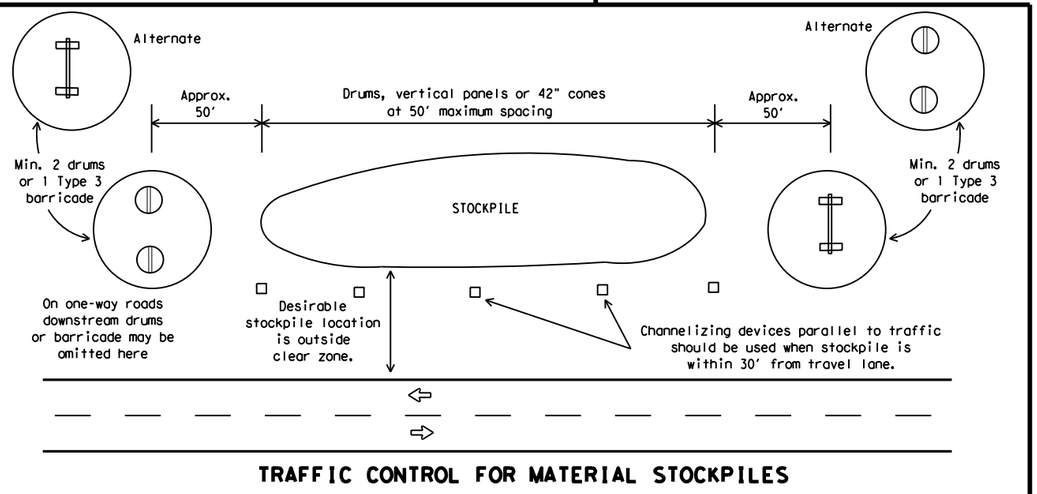
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

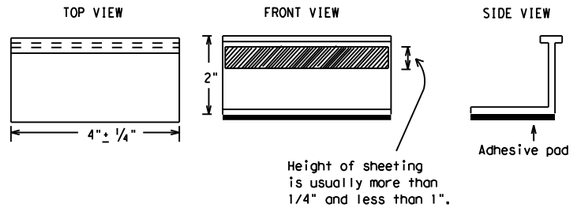
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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11-02 8-14				

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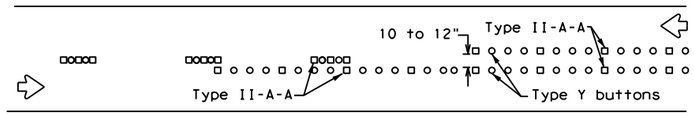
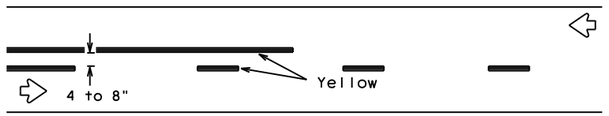
PAVEMENT MARKING PATTERNS

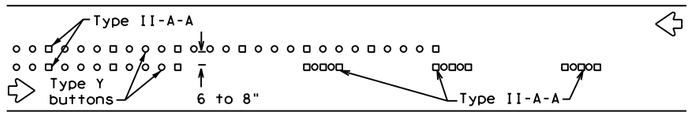
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



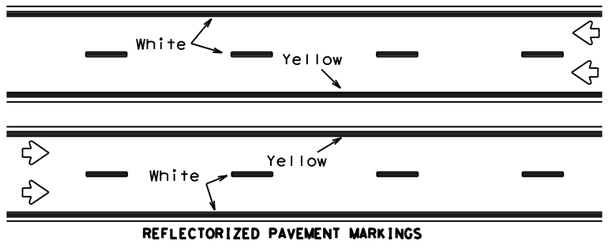
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



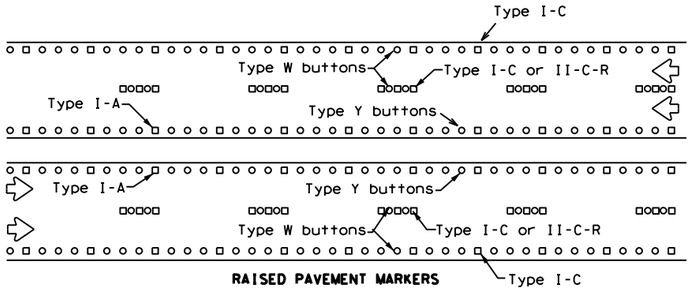
RAISED PAVEMENT MARKERS - PATTERN B

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

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



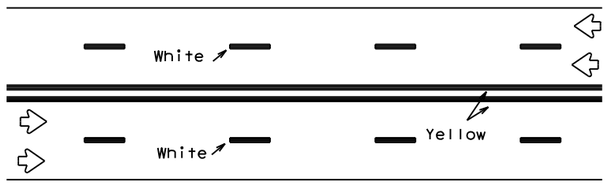
REFLECTORIZED PAVEMENT MARKINGS



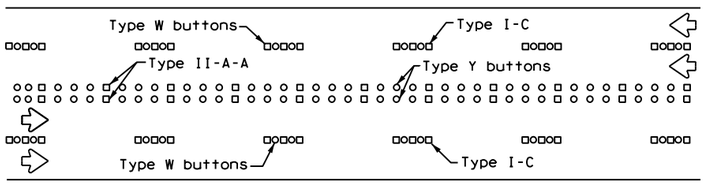
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



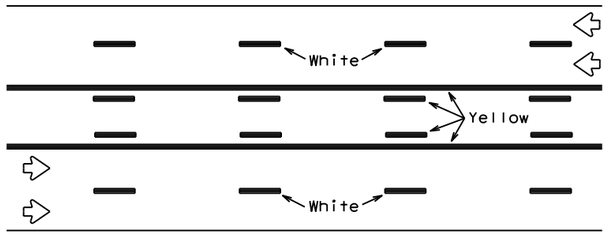
REFLECTORIZED PAVEMENT MARKINGS



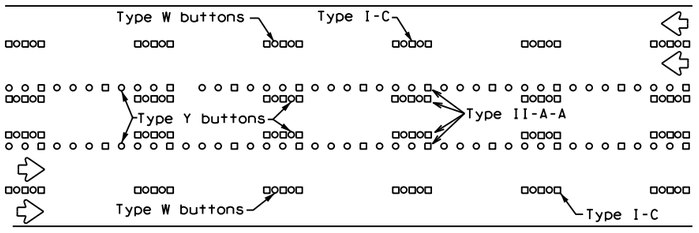
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

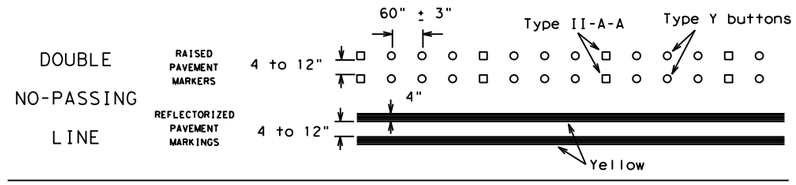
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

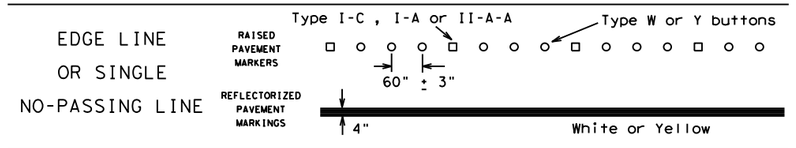
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

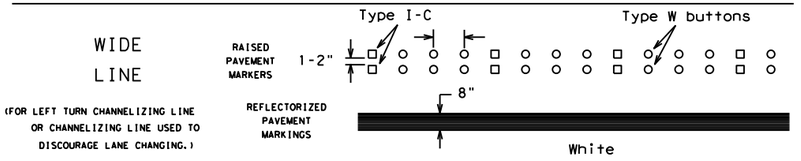


EDGE LINE OR SINGLE NO-PASSING LINE



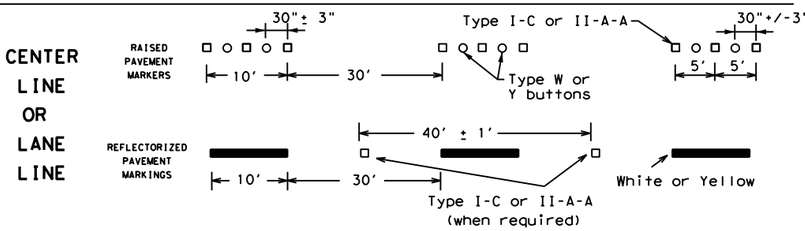
WIDE LINE

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

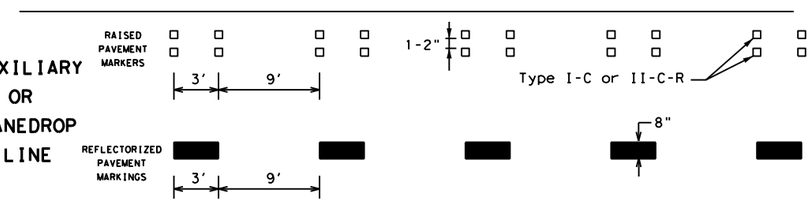


BROKEN LINES

CENTER LINE OR LANE LINE

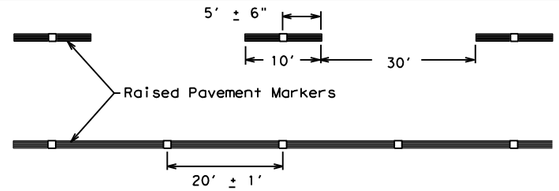


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	BRYAN	ROBERTSON		24
11-02 8-14				

DATE: 1/31/2024 10:24:16 AM
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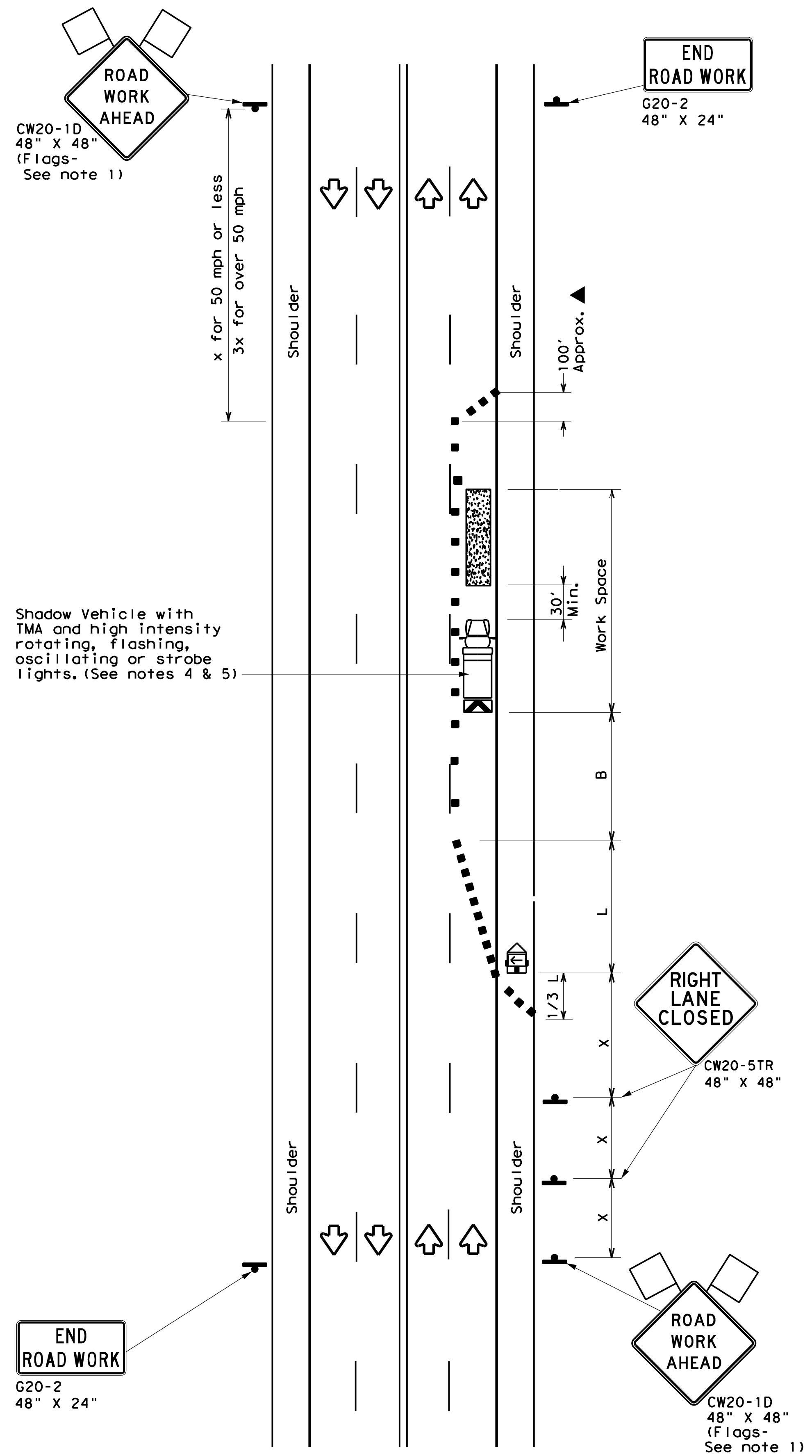
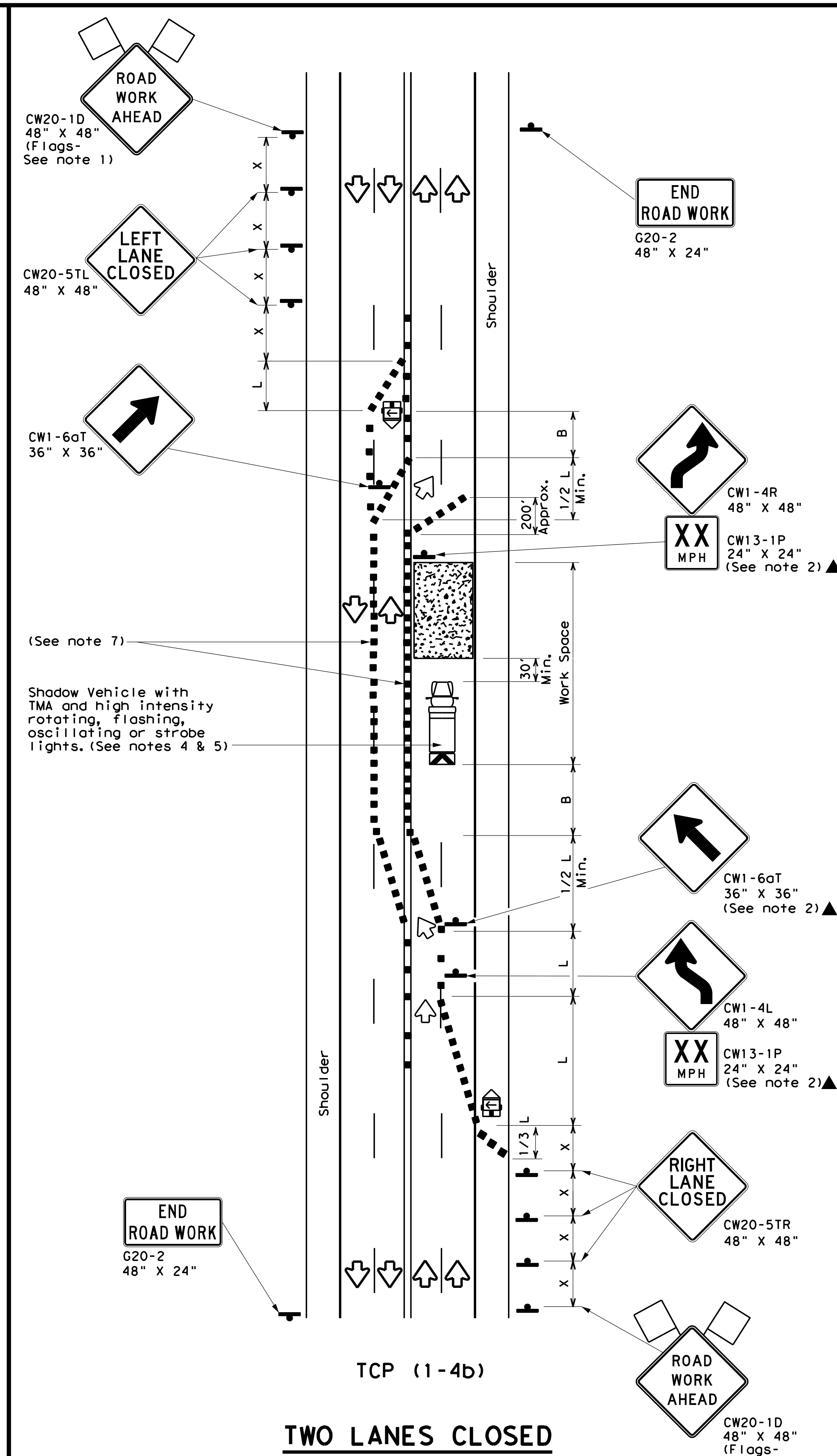


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
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.

TCP (1-4a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0049	08	076	US 190
	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	25

154

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DATE: 1/31/2024 10:24:32 AM
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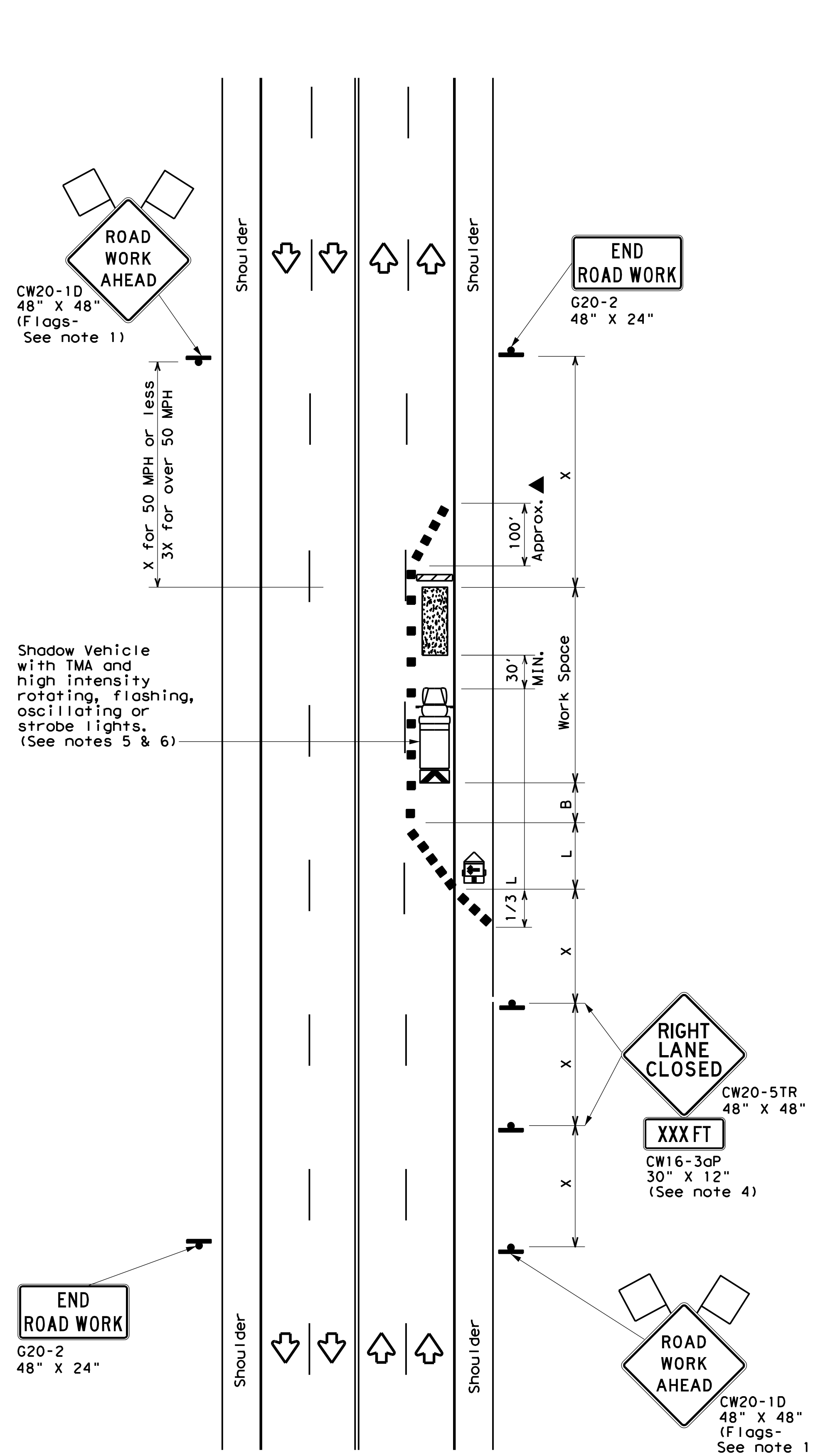
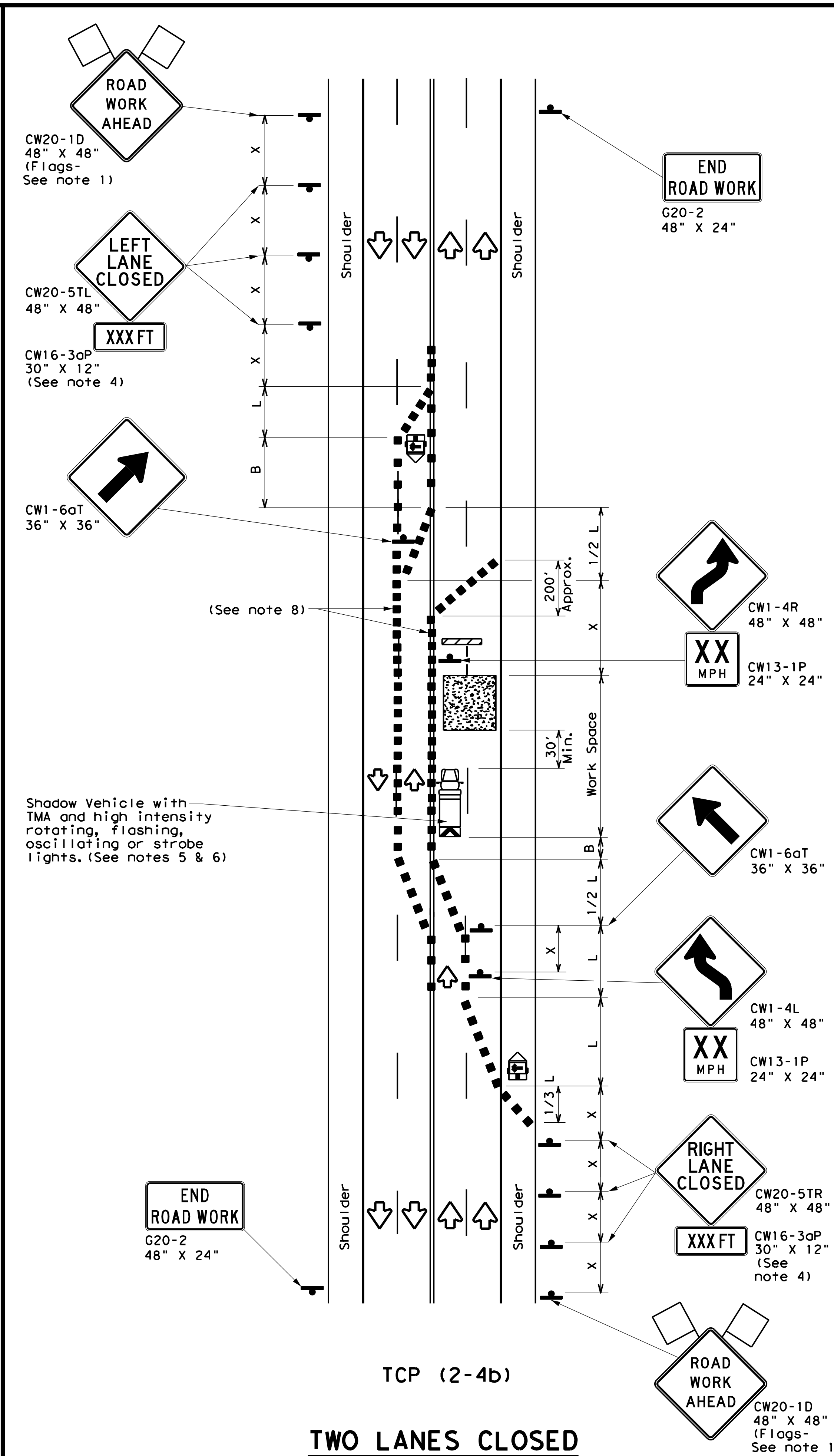


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
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 in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn		DN:		CK:	DW:	CK:
© TxDOT December 1985		CONT	SECT	JOB		HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18		0049	08	076		US 190
		DIST		COUNTY		SHEET NO.
		BRY		ROBERTSON		26

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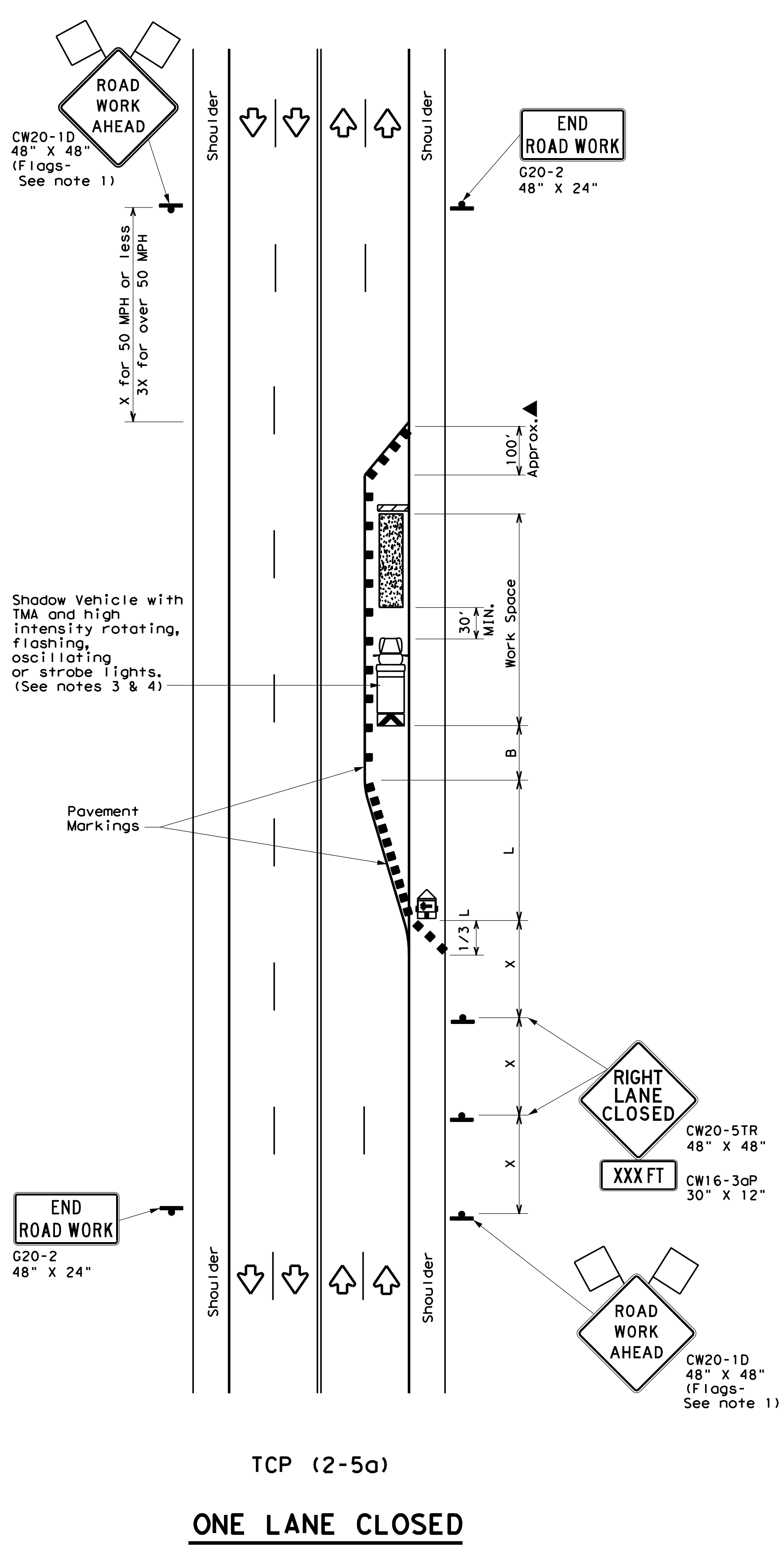
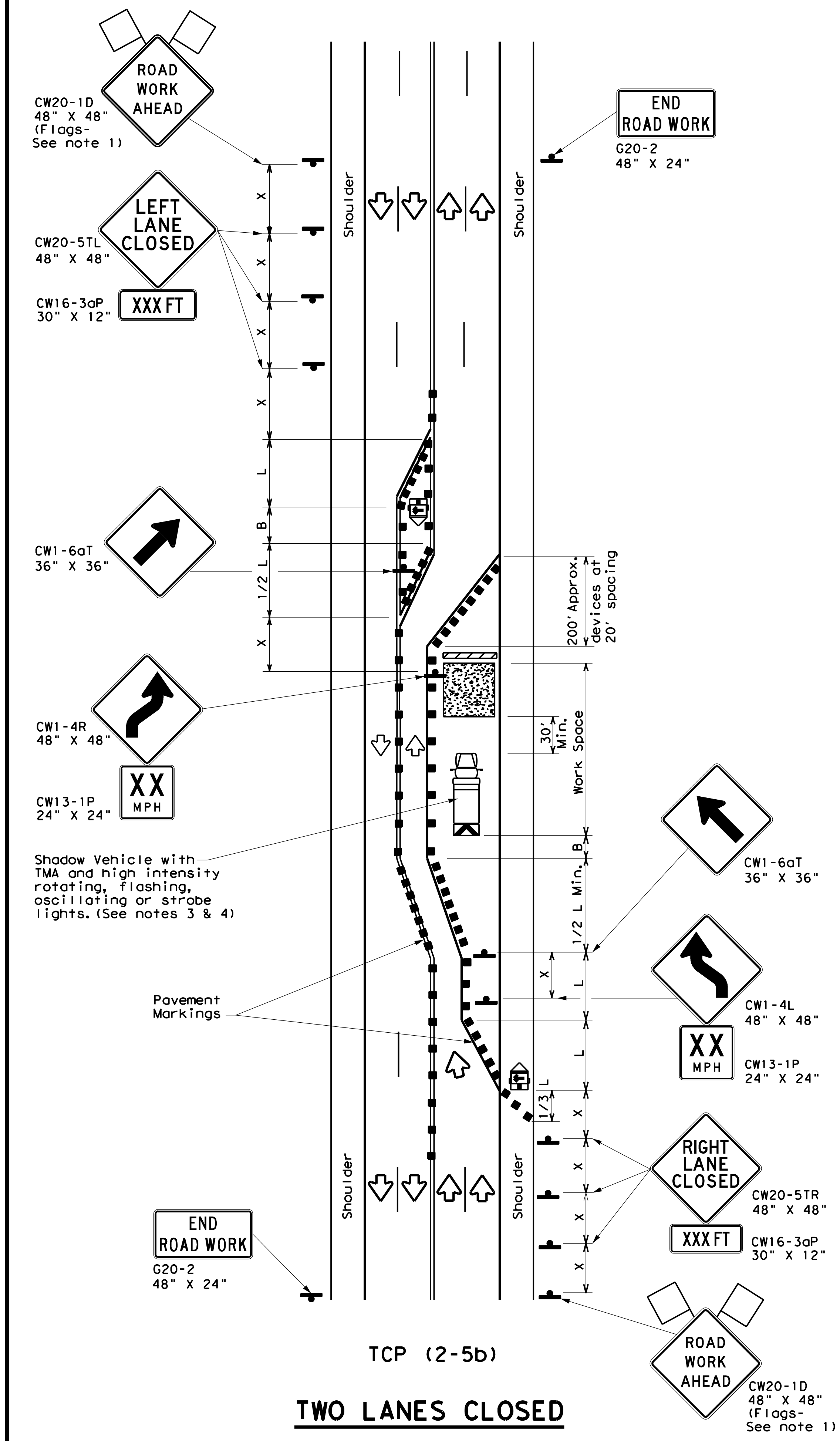


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. 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 eposure 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 substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT 0049	SECT 08	JOB 076	HIGHWAY US 190
REVISIONS 8-95 2-12, 1-97 3-03, 4-98 2-18	DIST BRYAN		COUNTY ROBERTSON	SHEET NO. 27

DATE: 1/31/2024 10:25:03 AM
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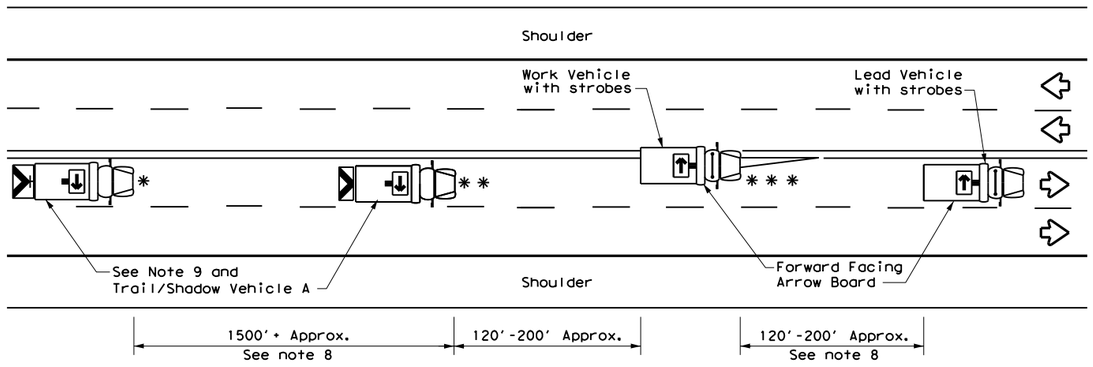
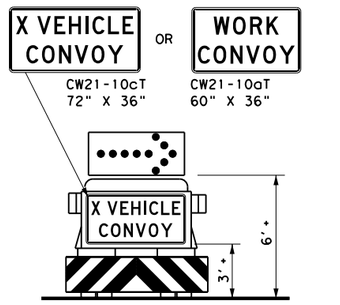


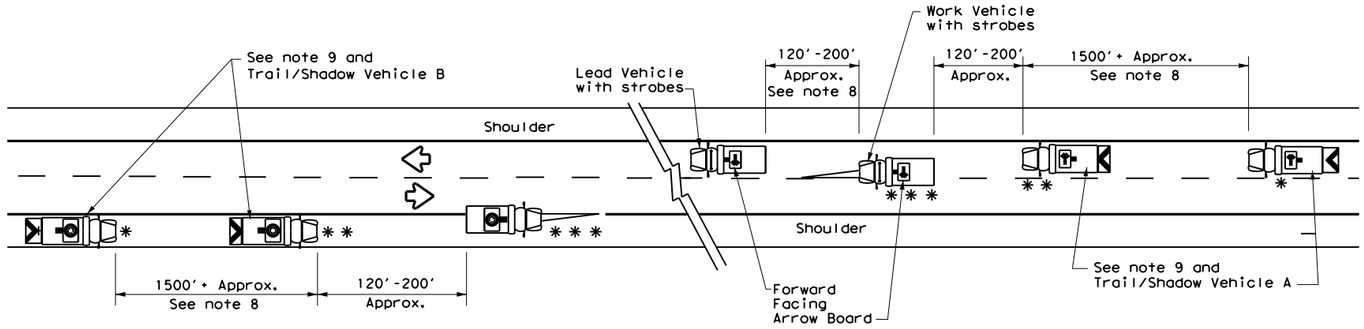
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

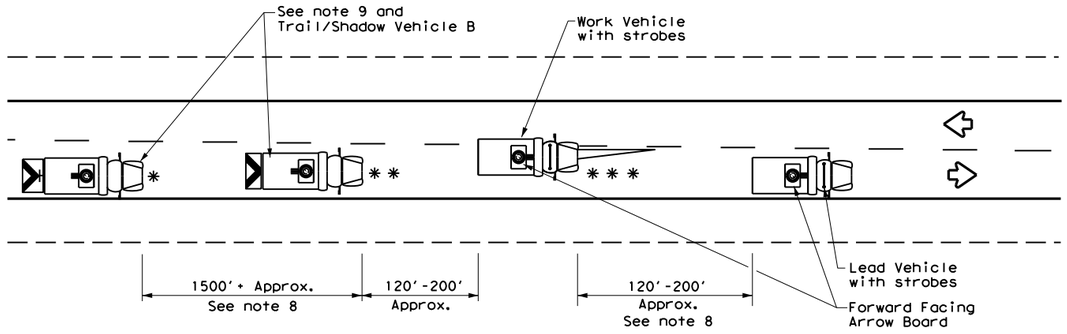


WORK ON SHOULDER

WORK ON TRAVEL LANE

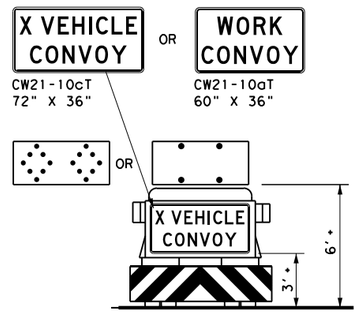
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

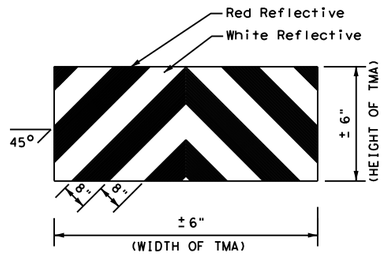
with Flashing Arrow Board in CAUTION display

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

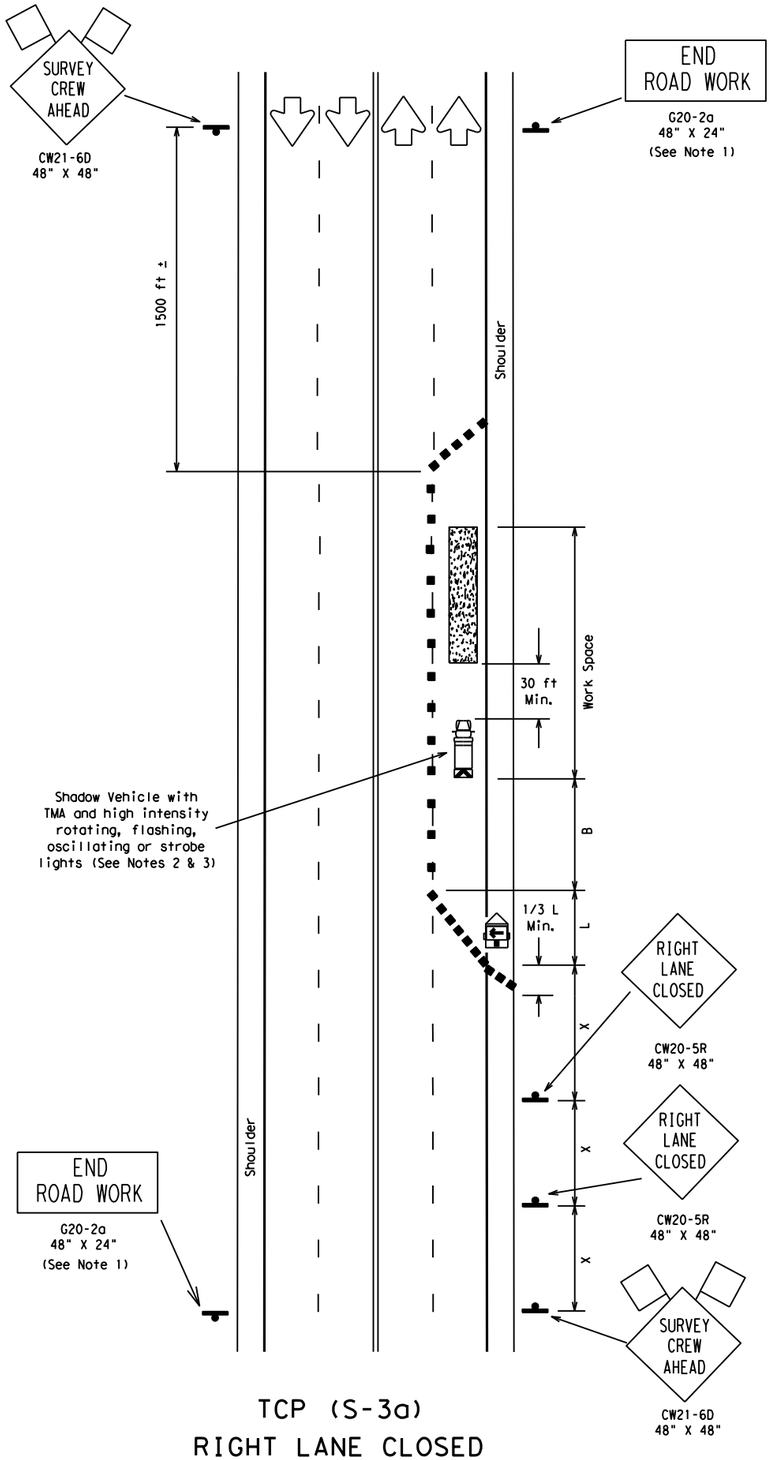
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

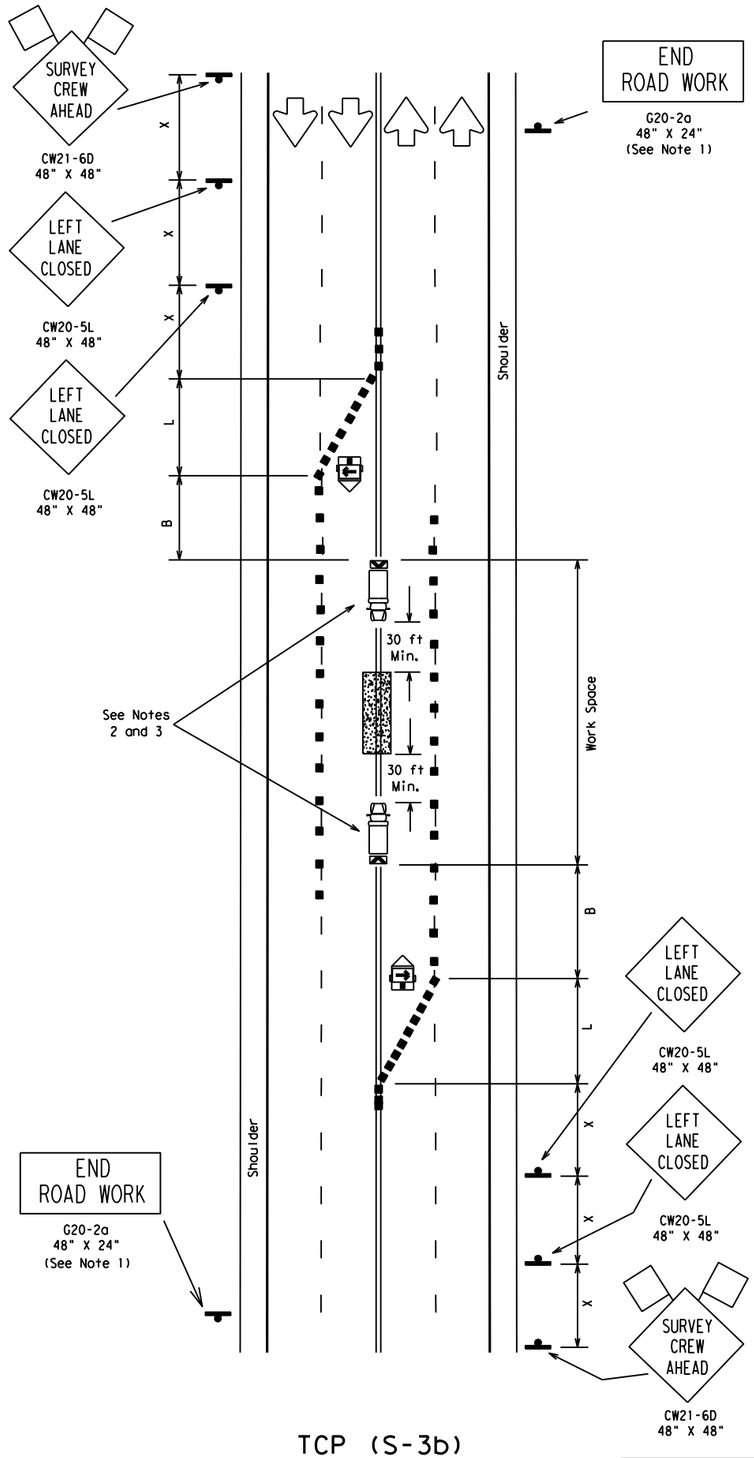
TCP(3-1)-13

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	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		28

DATE:
FILE:



TCP (S-3a)
RIGHT LANE CLOSED
WITH OR WITHOUT SHOULDERS



TCP (S-3b)
WORK ON CENTERLINE

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

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

✳ Conventional Roads Only

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

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

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

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-3a)

6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP(S-3b)

7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less then 2000 ADT.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-3)-08

REVISIONS

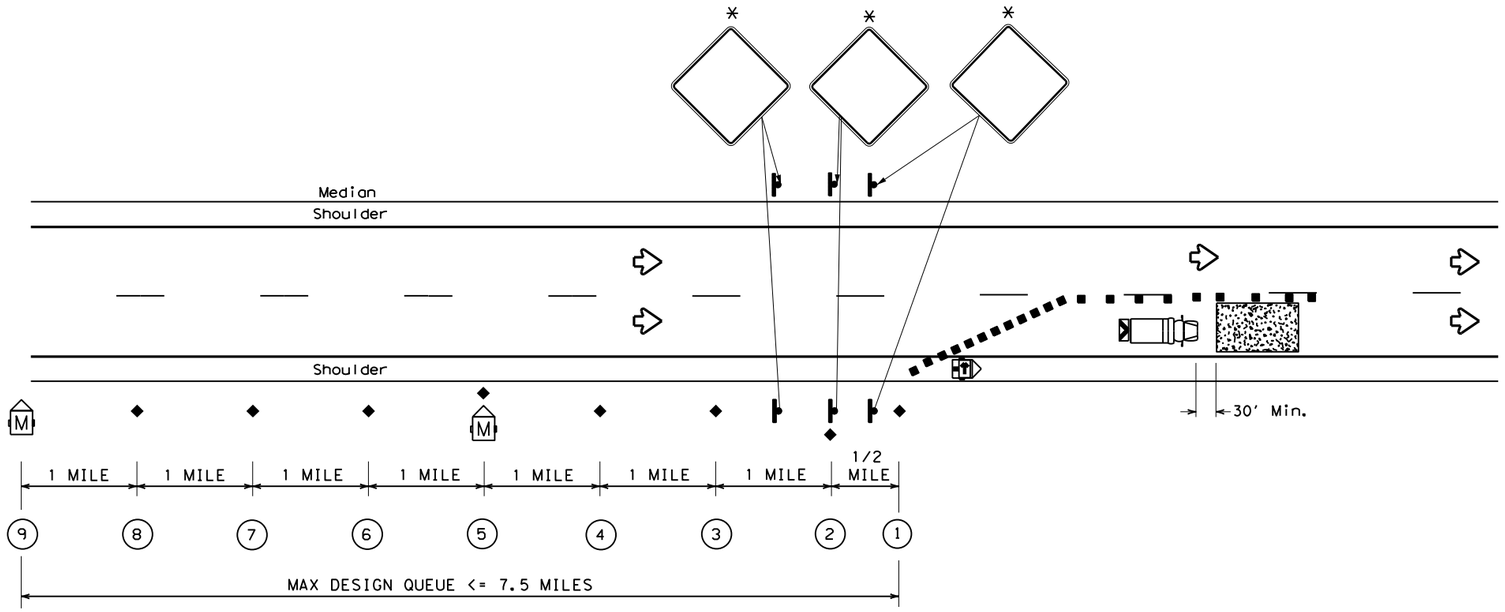
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190

DIST	COUNTY	SHEET NO.
BRYAN	ROBERTSON	29

DATE: 1/3/2024 3:26:25 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080676

* Signs are for illustrative purposes only. Signs type and placement will vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.



Type I - QUEUE DETECTION SYSTEM

(Max Design Queue <= 7.5 Miles)

LEGEND			
	Work Area		Traffic Flow
	Sign		Portable Traffic Sensor
	Channelizing Devices		Truck Mounted Attenuator (TMA)
(1)	Location		Flag
	Heavy Work Vehicle		Trailer Mounted Flashing Arrow Board
M	Portable Changeable Message Sign (PCMS)		

GENERAL NOTES

1. Unless project conditions and manufacturer's specifications dictate otherwise, the number of PCMS, static signs and spacing of sensors will be as shown in the plans.
2. Temporary Queue Detection System devices shall be operational only while work is actually in progress or a definite need exists.
3. Refer to TCP and BC Traffic Engineering Standard sheets for additional information regarding the type and placement of temporary traffic control devices.
4. The viewing angle of the sensors should not be blocked.
5. Sensor at location (1) may be mounted on the Flashing Arrow Board Trailer in the taper if spacing is adequate.
6. Pay item should be paid under Special Specification "Temporary Queue Detection System".
7. See Standard sheet WZ-ITS(2) for operational guidelines for PCMS messages.

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY QUEUE DETECTION SYSTEM TYPE 1

(Queue <= 7.5 Miles)

WZ-ITS(1)-19

FILE: wz-its(1)-19.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		30

OPERATIONAL GUIDELINES FOR PCMS MESSAGES

Message at (9)	Last 5 MIN Speed Averages V(MPH)				Message at (5)	Last 5 MIN Speed Averages V(MPH)			
	Sensor at (8)	Sensor at (7)	Sensor at (6)	Sensor at (5)		Sensor at (4)	Sensor at (3)	Sensor at (2)	Sensor at (1)
ROAD WORK AHEAD	> 45	> 45	> 45	> 45	ROAD WORK AHEAD	> 45	> 45	> 45	> 45
ROAD WORK AHEAD	> 45	> 45	> 45	> 45	SLOW TRAFFIC 3 MILES	> 45	> 45	> 45	25 < V < 45
ROAD WORK AHEAD	> 45	> 45	> 45	> 45	SLOW TRAFFIC 2 MILES	> 45	> 45	25 < V < 45	25 < V < 45
ROAD WORK AHEAD	> 45	> 45	> 45	> 45	SLOW TRAFFIC 1 MILE	> 45	25 < V < 45	25 < V < 45	25 < V < 45
ROAD WORK AHEAD	> 45	> 45	> 45	> 45	SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45
SLOW TRAFFIC 3 MILES	> 45	> 45	> 45	25 < V < 45	SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45
SLOW TRAFFIC 2 MILES	> 45	> 45	25 < V < 45	25 < V < 45	SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45
SLOW TRAFFIC 1 MILE	> 45	25 < V < 45	25 < V < 45	25 < V < 45	SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45
SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45	SLOW TRAFFIC AHEAD	25 < V < 45	25 < V < 45	25 < V < 45	25 < V < 45
SLOW TRAFFIC AHEAD	> 25	> 25	> 25	> 25	STOPPED TRAFFIC 3 MILES	> 25	> 25	> 25	<= 25
SLOW TRAFFIC AHEAD	> 25	> 25	> 25	> 25	STOPPED TRAFFIC 2 MILES	> 25	> 25	<= 25	<= 25
SLOW TRAFFIC AHEAD	> 25	> 25	> 25	> 25	STOPPED TRAFFIC 1 MILE	> 25	<= 25	<= 25	<= 25
SLOW TRAFFIC AHEAD	> 25	> 25	> 25	> 25	STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25
STOPPED TRAFFIC 3 MILES	> 25	> 25	> 25	<= 25	STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25
STOPPED TRAFFIC 2 MILES	> 25	> 25	<= 25	<= 25	STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25
STOPPED TRAFFIC 1 MILE	> 25	<= 25	<= 25	<= 25	STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25
STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25	STOPPED TRAFFIC AHEAD	<= 25	<= 25	<= 25	<= 25

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Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY QUEUE DETECTION SYSTEM TYPE 1
(Queue <= 7.5 Miles)
WZ-ITS(2)-19

FILE: wz-its(1)-19.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2019	CONT	SECT	JOB	HIGHWAY
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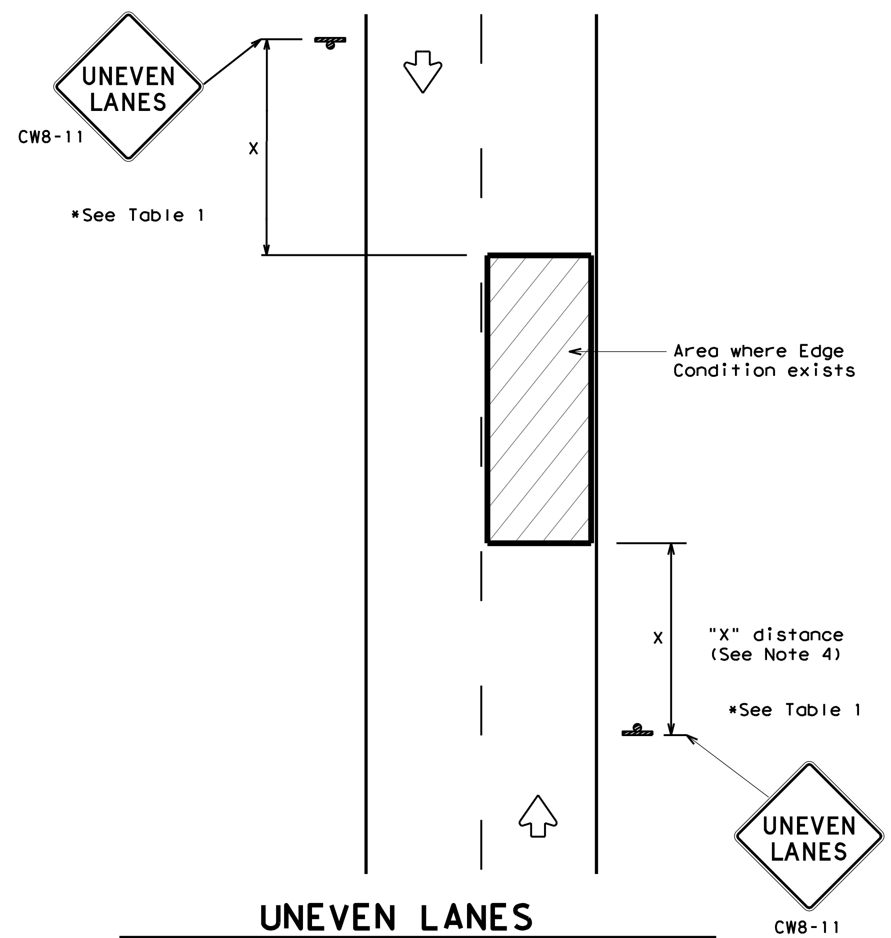
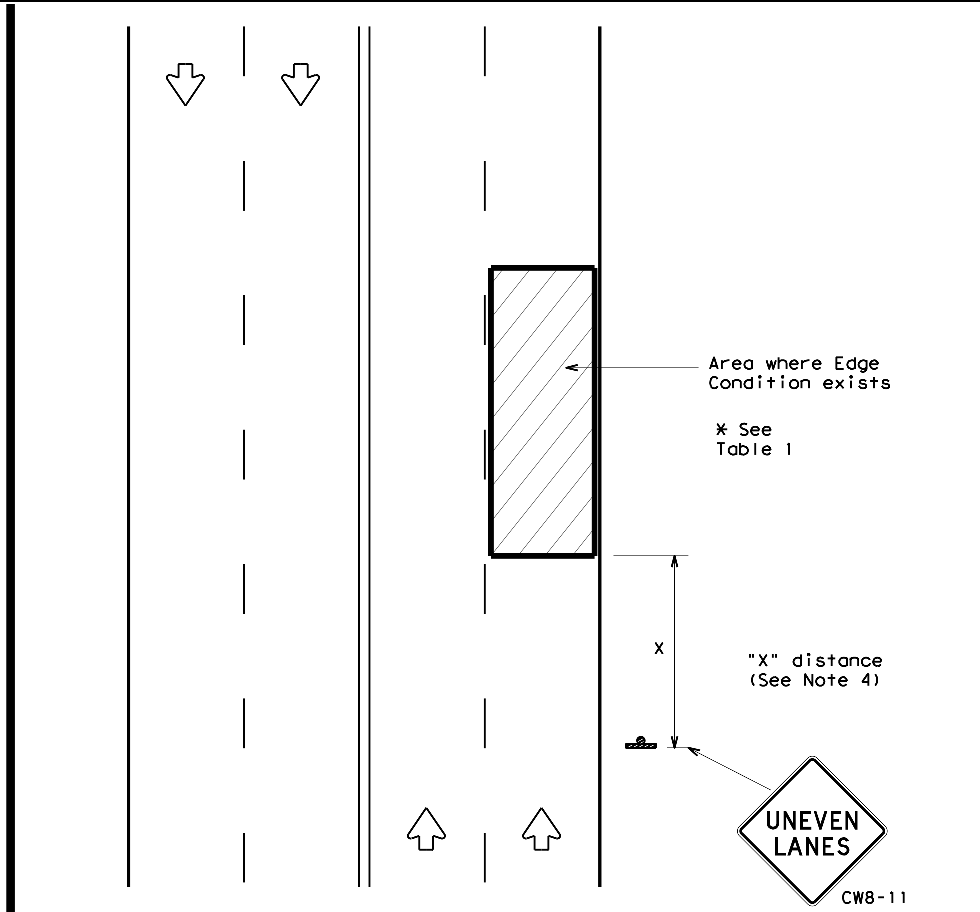
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		31

119



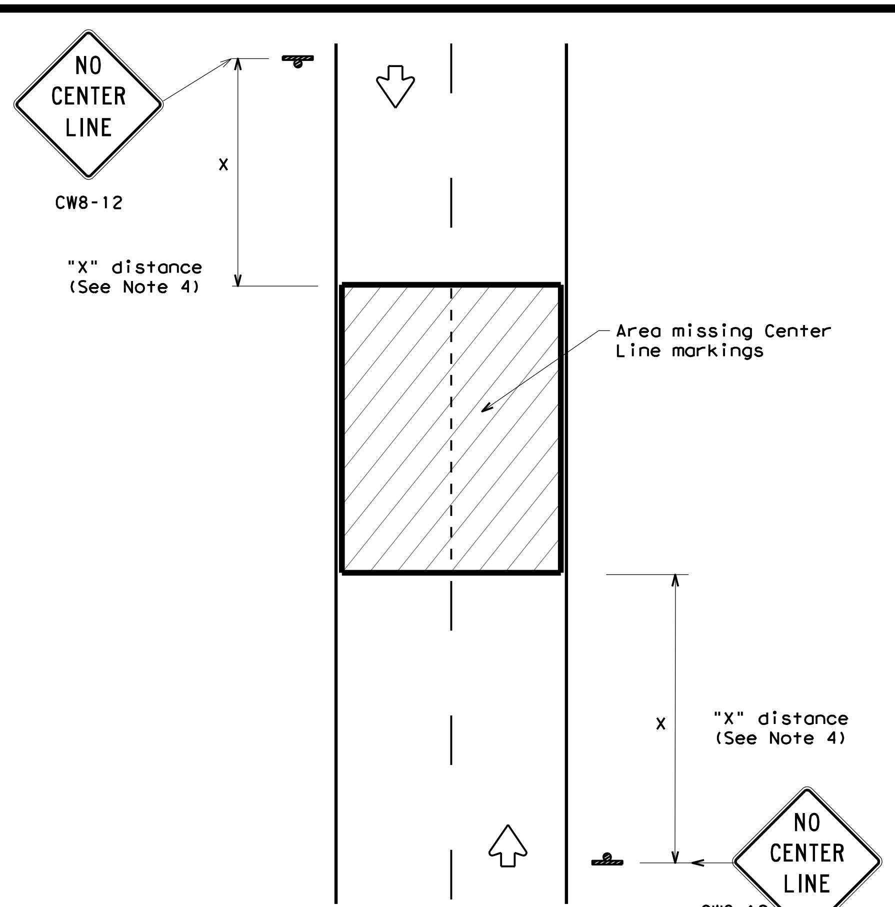
UNEVEN LANES

TWO LANE CONVENTIONAL ROAD



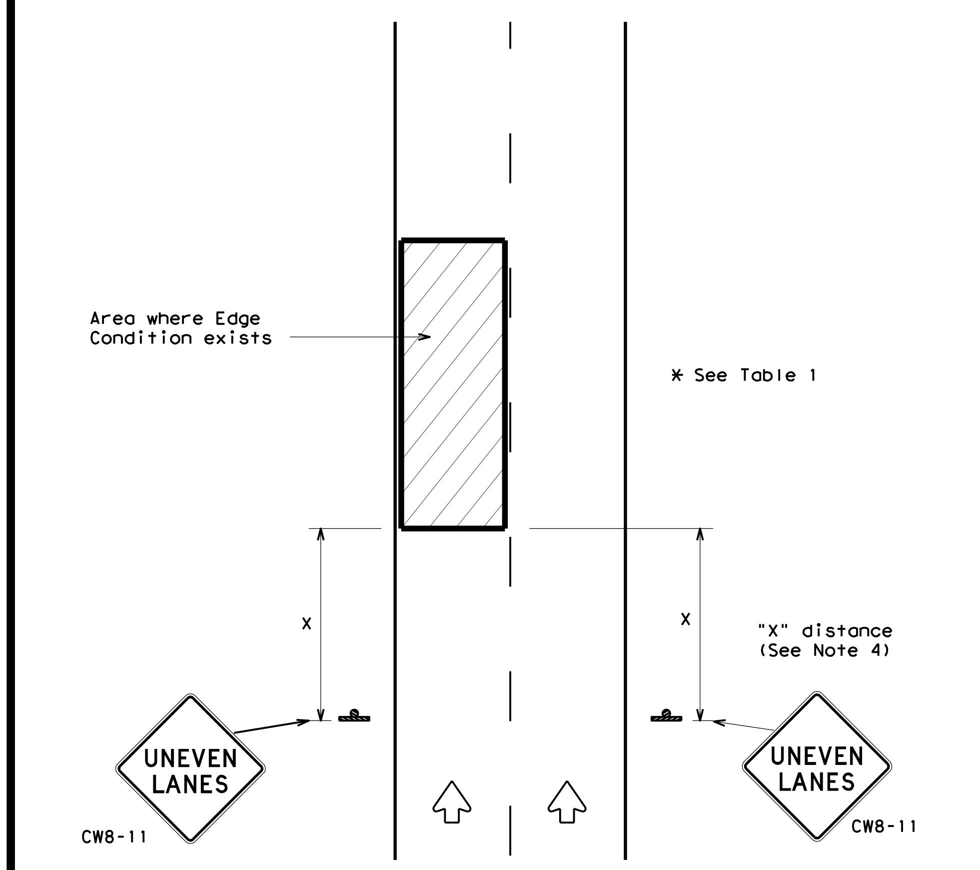
UNEVEN LANES

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 (D)	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 (>3, 1, D)	Less than or equal to 3"	Sign: CW8-11
③ (0" to 3/4", D, 12") 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	0049	08	076	US 190
8-95 2-98 7-13 1-97 3-03	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	32

DATE: 1/3/2024 3:23:27 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049...

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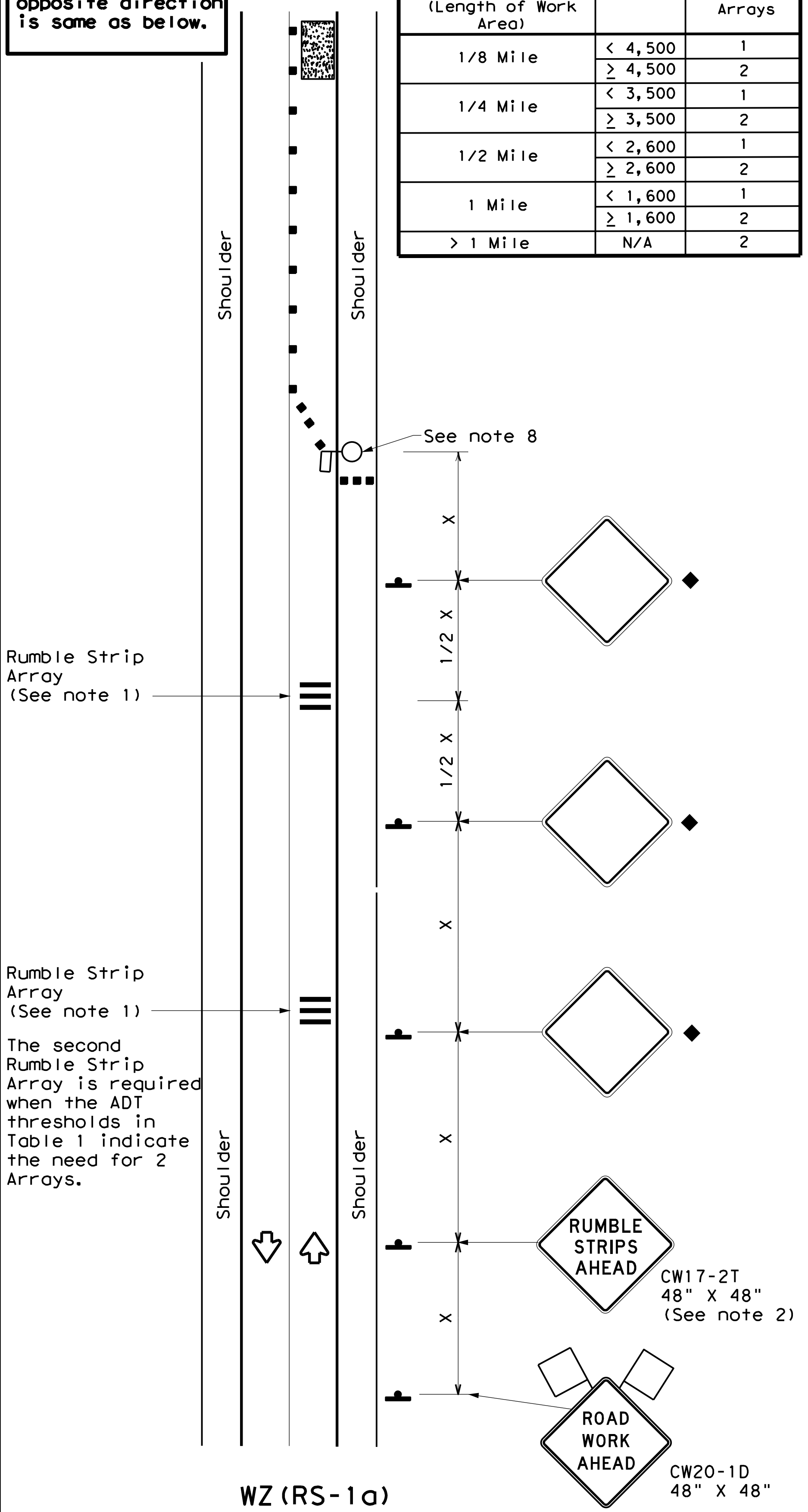
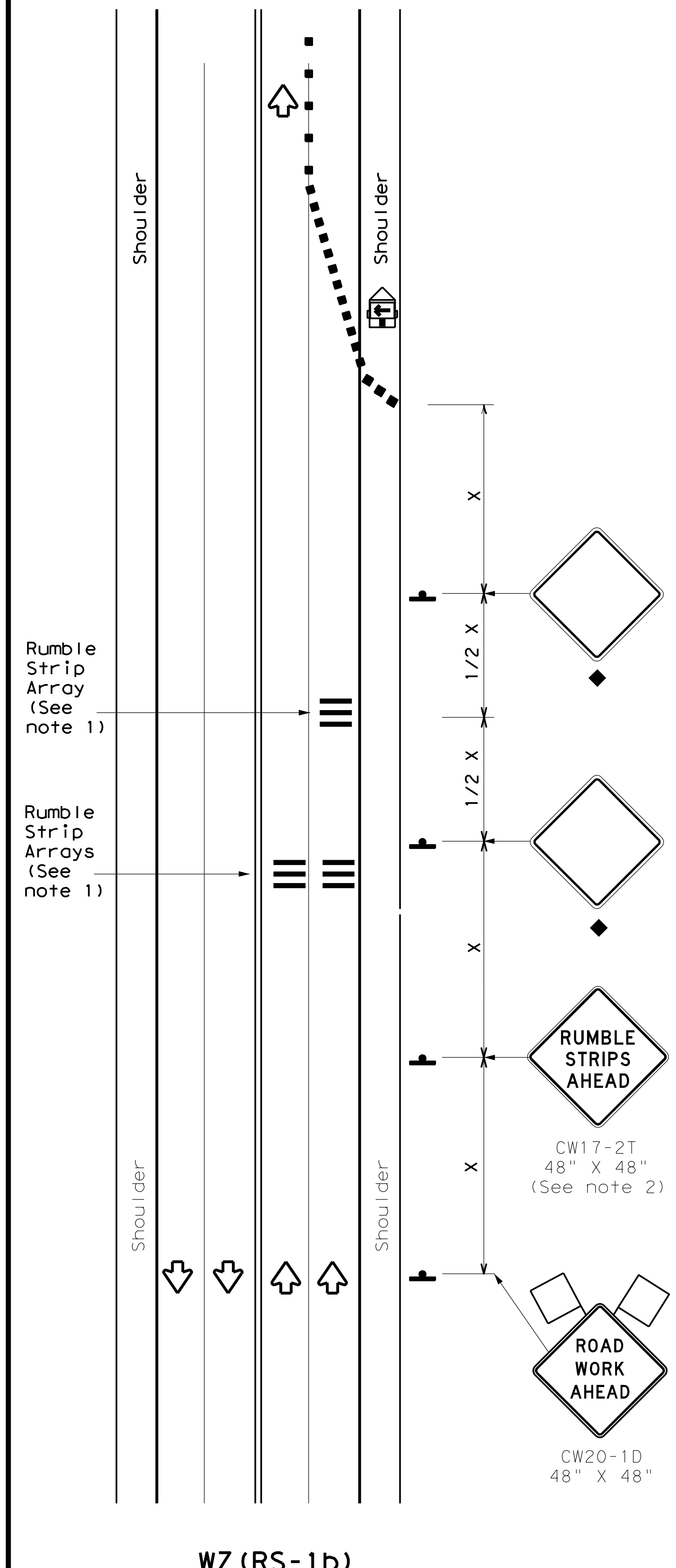
Warning sign and rumble strip sequence in opposite direction is same as below.

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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

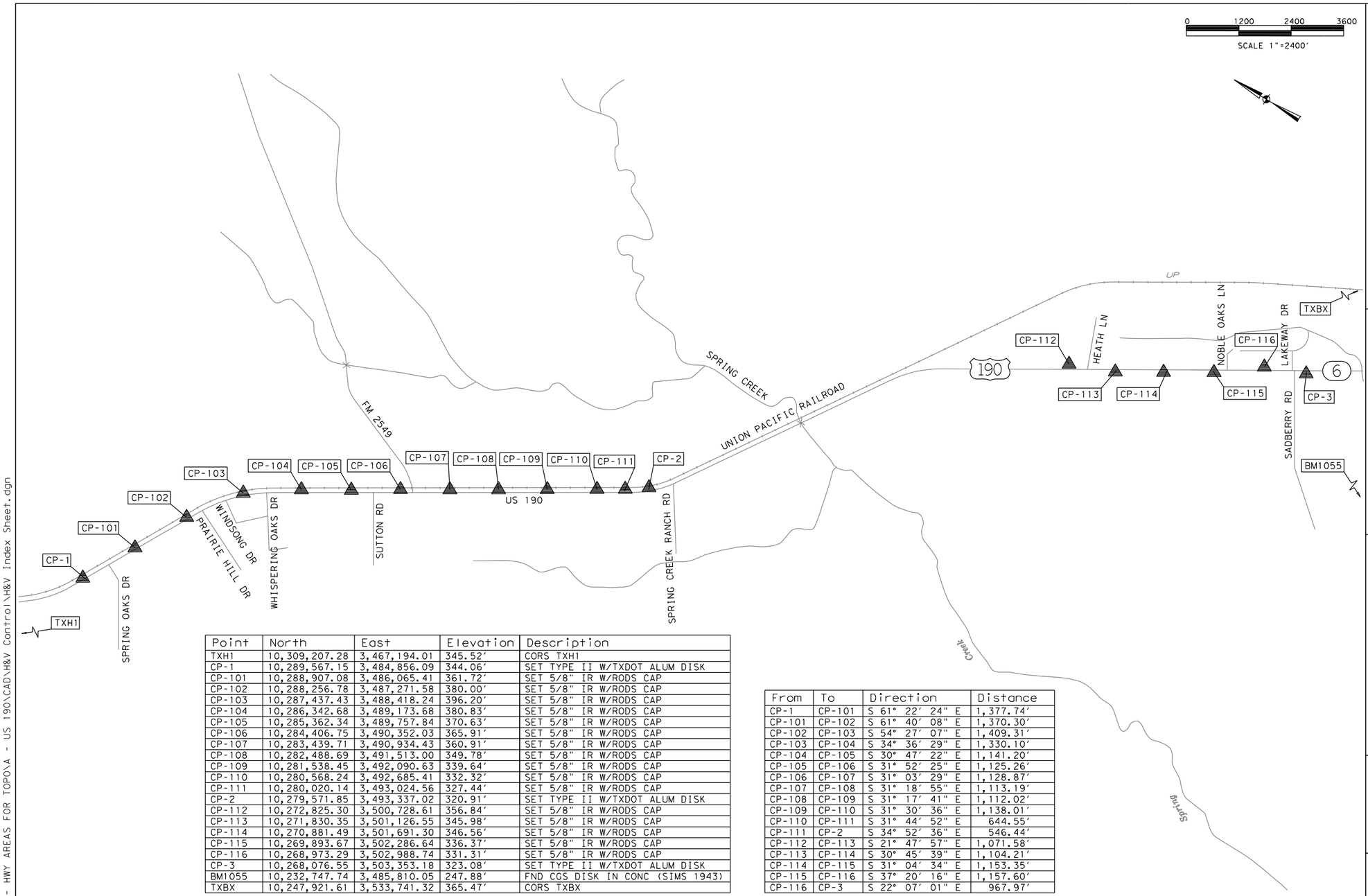
Traffic Safety Division Standard

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	0049	08	076	US 190
2-14 1-22 4-16	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	33

117



Point	North	East	Elevation	Description
TXH1	10,309,207.28	3,467,194.01	345.52′	CORS TXH1
CP-1	10,289,567.15	3,484,856.09	344.06′	SET TYPE II W/TXDOT ALUM DISK
CP-101	10,288,907.08	3,486,065.41	361.72′	SET 5/8" IR W/RODS CAP
CP-102	10,288,256.78	3,487,271.58	380.00′	SET 5/8" IR W/RODS CAP
CP-103	10,287,437.43	3,488,418.24	396.20′	SET 5/8" IR W/RODS CAP
CP-104	10,286,342.68	3,489,173.68	380.83′	SET 5/8" IR W/RODS CAP
CP-105	10,285,362.34	3,489,757.84	370.63′	SET 5/8" IR W/RODS CAP
CP-106	10,284,406.75	3,490,352.03	365.91′	SET 5/8" IR W/RODS CAP
CP-107	10,283,439.71	3,490,934.43	360.91′	SET 5/8" IR W/RODS CAP
CP-108	10,282,488.69	3,491,513.00	349.78′	SET 5/8" IR W/RODS CAP
CP-109	10,281,538.45	3,492,090.63	339.64′	SET 5/8" IR W/RODS CAP
CP-110	10,280,568.24	3,492,685.41	332.32′	SET 5/8" IR W/RODS CAP
CP-111	10,280,020.14	3,493,024.56	327.44′	SET 5/8" IR W/RODS CAP
CP-2	10,279,571.85	3,493,337.02	320.91′	SET TYPE II W/TXDOT ALUM DISK
CP-112	10,272,825.30	3,500,728.61	356.84′	SET 5/8" IR W/RODS CAP
CP-113	10,271,830.35	3,501,126.55	345.98′	SET 5/8" IR W/RODS CAP
CP-114	10,270,881.49	3,501,691.30	346.56′	SET 5/8" IR W/RODS CAP
CP-115	10,269,893.67	3,502,286.64	336.37′	SET 5/8" IR W/RODS CAP
CP-116	10,268,973.29	3,502,988.74	331.31′	SET 5/8" IR W/RODS CAP
CP-3	10,268,076.55	3,503,353.18	323.08′	SET TYPE II W/TXDOT ALUM DISK
BM1055	10,232,747.74	3,485,810.05	247.88′	FND CGS DISK IN CONC (SIMS 1943)
TXBX	10,247,921.61	3,533,741.32	365.47′	CORS TXBX

From	To	Direction	Distance
CP-1	CP-101	S 61° 22′ 24" E	1,377.74′
CP-101	CP-102	S 61° 40′ 08" E	1,370.30′
CP-102	CP-103	S 54° 27′ 07" E	1,409.31′
CP-103	CP-104	S 34° 36′ 29" E	1,330.10′
CP-104	CP-105	S 30° 47′ 22" E	1,141.20′
CP-105	CP-106	S 31° 52′ 25" E	1,125.26′
CP-106	CP-107	S 31° 03′ 29" E	1,128.87′
CP-107	CP-108	S 31° 18′ 55" E	1,113.19′
CP-108	CP-109	S 31° 17′ 41" E	1,112.02′
CP-109	CP-110	S 31° 30′ 36" E	1,138.01′
CP-110	CP-111	S 31° 44′ 52" E	644.55′
CP-111	CP-2	S 34° 52′ 36" E	546.44′
CP-112	CP-113	S 21° 47′ 57" E	1,071.58′
CP-113	CP-114	S 30° 45′ 39" E	1,104.21′
CP-114	CP-115	S 31° 04′ 34" E	1,153.35′
CP-115	CP-116	S 37° 20′ 16" E	1,157.60′
CP-116	CP-3	S 22° 07′ 01" E	967.97′

Control Name	Held		Published Coordinate Information			Measured Coordinate Information			Residuals (Published - Measured)		
	H	V	North	East	Elev.	North	East	Elev.	North	East	Elev.
BM1055			10,232,747.81	3,485,810.17	249	10,232,747.74	3,485,810.05	247.88	0.00	0.11	1.12
TXBX	✓	✓	10,247,921.61	3,533,741.32	365.47						

Notes:
1. Measured values are established with redundant GPS VRS observations constrained to CORS TXBX, an applied project surface adjustment factor for Robertson County of 1.00012, and are based on NAD83 (2011), NAVD88 (Geoid 18).

2. NGS Monument BM1055 is of Secondary Horizontal Order; published values are based on NAD83(1993 Adj), NAVD88; The orthometric height (elevation) was scaled from a topographic map.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (GEOID 18).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO GRID VALUES BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR FOR ROBERTSON COUNTY OF 1.00012.

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXBX & TXH1 DURING FEBRUARY 2023.

5. ELEVATIONS ARE BASED ON SAID REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

11-3-2023

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Sheet 1 of 1
Survey Date: FEBRUARY, 2023

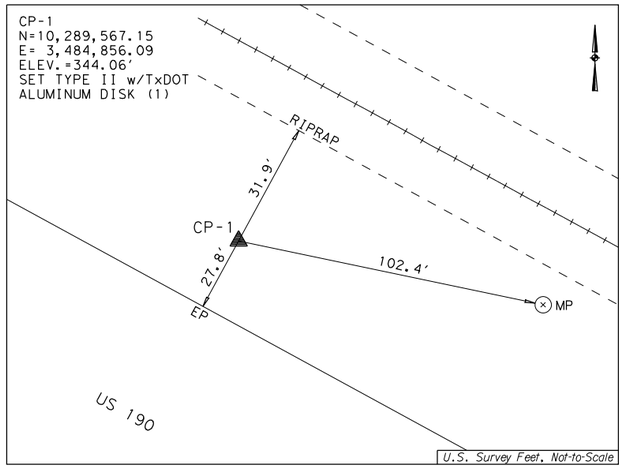
RODS
Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700
Control Infrastructure Transportation Land Development

Texas Department of Transportation

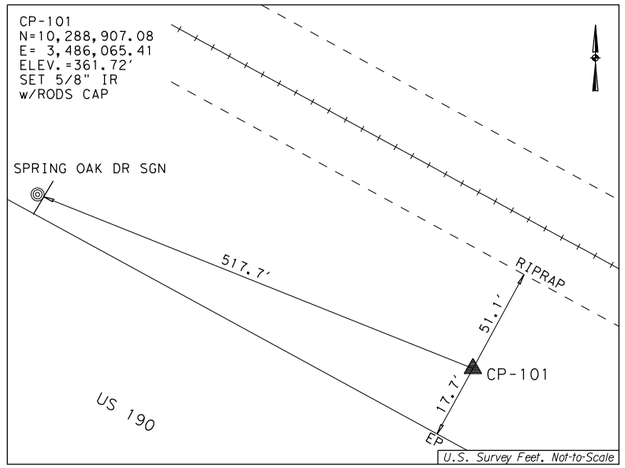
US 190
SURVEY CONTROL INDEX SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				34
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	BRY		ROBERTSON
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
17	0049	08	076	US 190

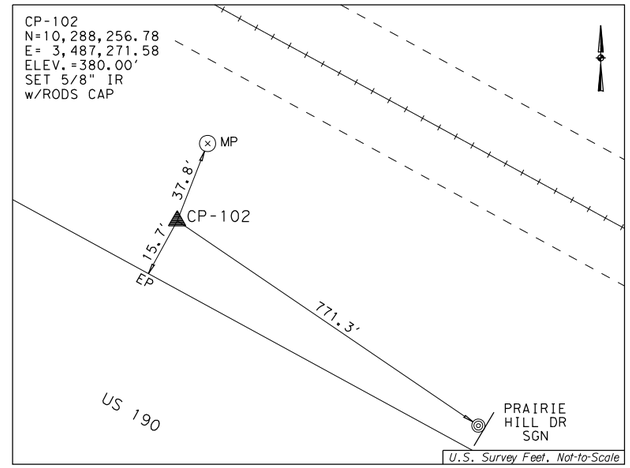
N:\LJA 339\22043004\TASK ORDER 2 - HWY AREAS FOR TOPO\A - US 190\CAD\H&V Control\H&V Index Sheet.dgn



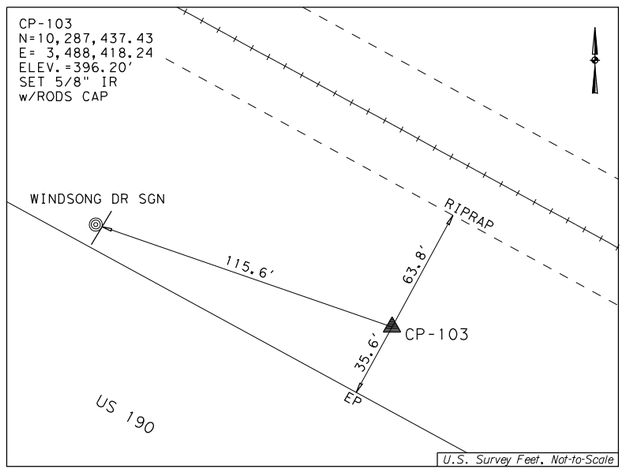
STATION IS LOCATED ON THE NORTH SIDE OF US 190, AND LYING 0.92 MILE EAST OF OLD HEARNE RD.



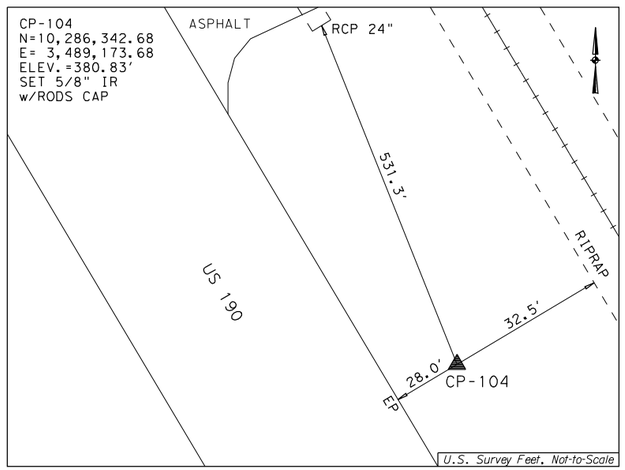
STATION IS LOCATED ON THE NORTH SIDE OF US 190, AND LYING 0.14 MILE EAST OF SPRING OAKS DR.



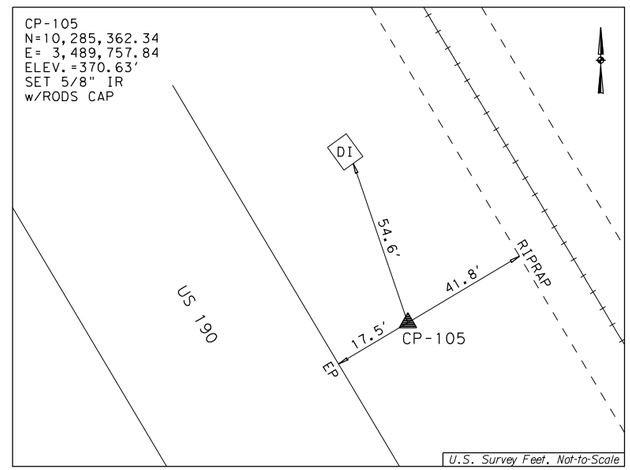
STATION IS LOCATED ON THE NORTH SIDE OF US 190, AND LYING 0.40 MILE EAST OF SPRING OAKS DR.



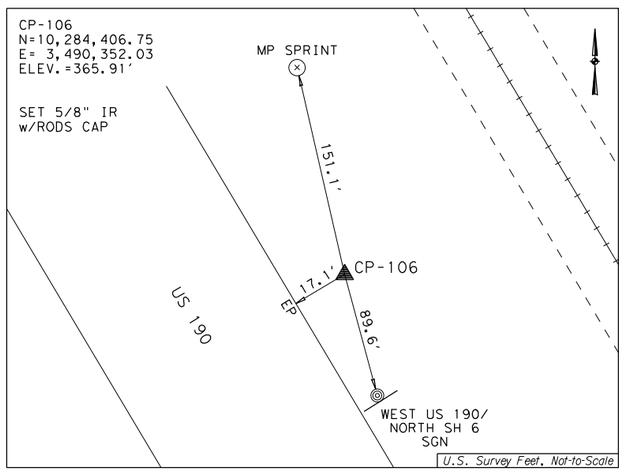
STATION IS LOCATED ON THE NORTH SIDE OF US 190, AND LYING 322' EAST OF WINDSONG DR.



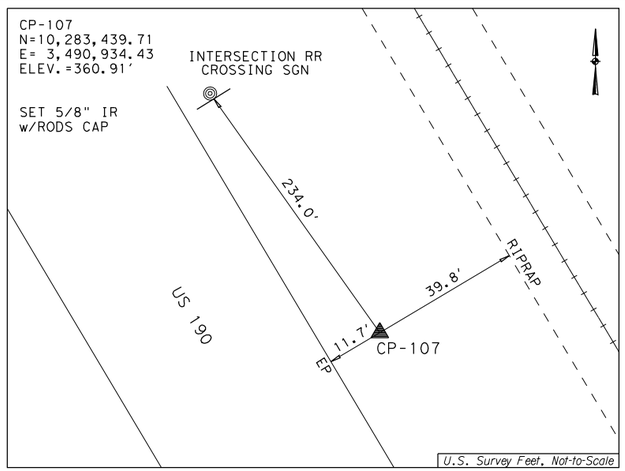
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.16 MILE SOUTH OF WHISPERING OAKS DR.



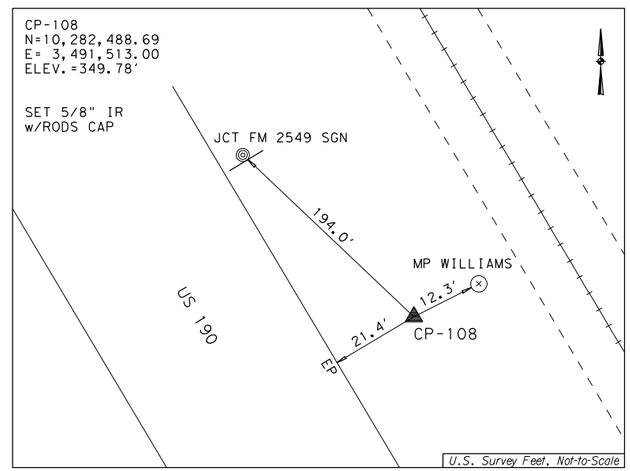
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.38 MILE SOUTH OF WHISPERING OAKS DR.



STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 466' SOUTH OF SUTTON RD.



STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.16 MILE SOUTH OF FM 2549.



STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.37 MILE SOUTH OF FM 2549.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (GEOID 18).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO GRID VALUES BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR FOR ROBERTSON COUNTY OF 1.00012.

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXBX & TXH1 DURING FEBRUARY 2023.

5. ELEVATIONS ARE BASED ON SAID REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

11-3-2023

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Sheet 1 of 3
Survey Date: FEBRUARY, 2023

RODS
Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

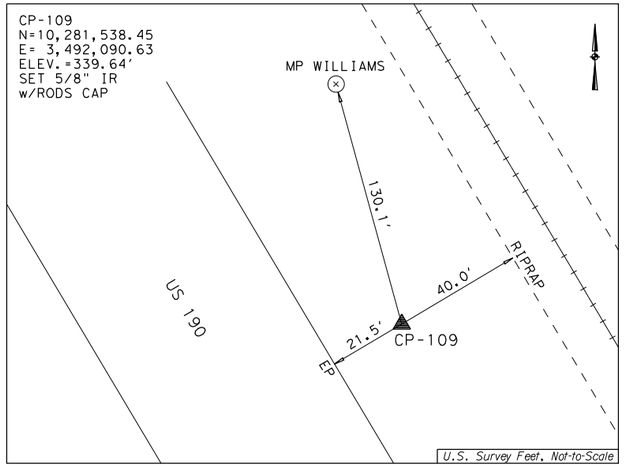
Central Infrastructure Transportation Land Development

Texas Department of Transportation

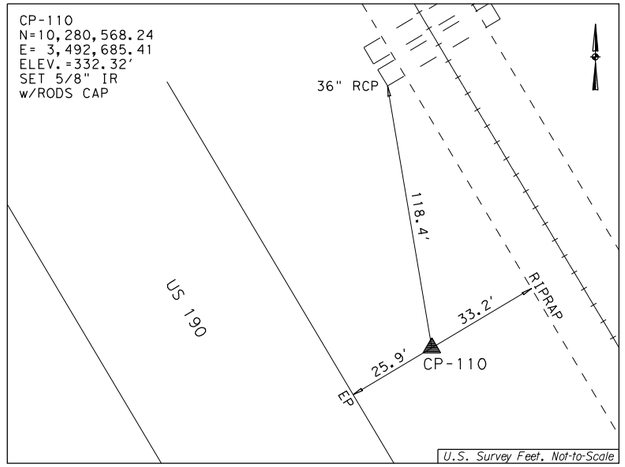
US 190
HORIZONTAL & VERTICAL CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				35
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	BRY		ROBERTSON
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
17	0049	08	076	US 190

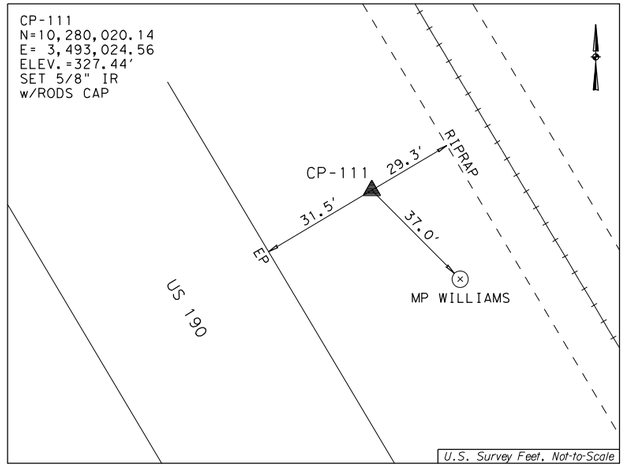
N:\LJA 339\22043004\TASK ORDER 2 - HWY AREAS FOR TOPO\A - US 190\CAD\H&V Control\H&V Sketches.dgn



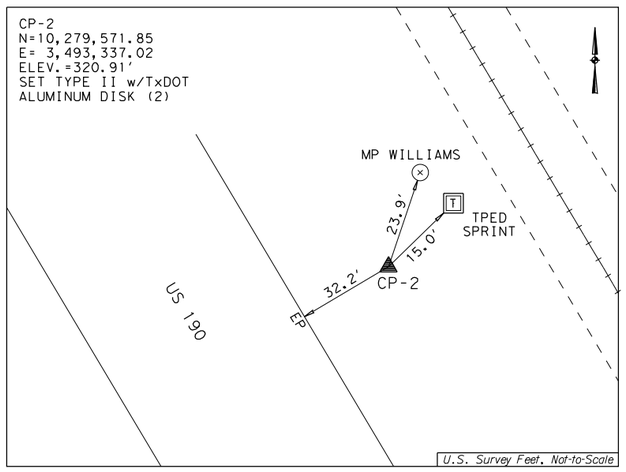
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.58 MILE SOUTH OF FM 2549.



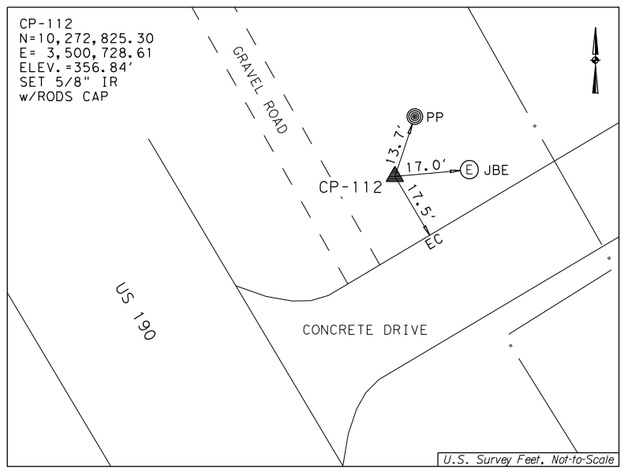
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.80 MILE SOUTH OF FM 2549.



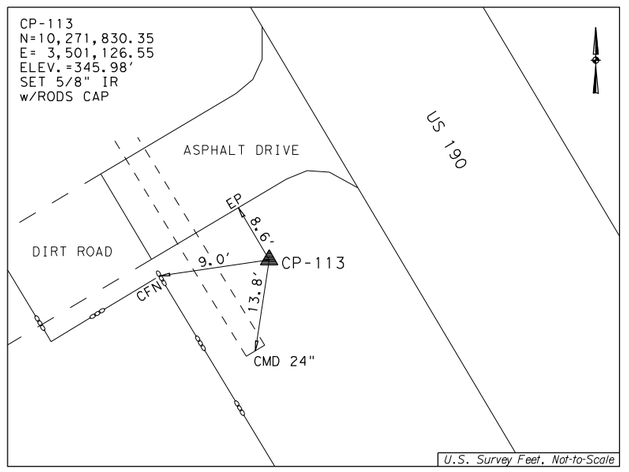
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.92 MILE SOUTH OF FM 2549.



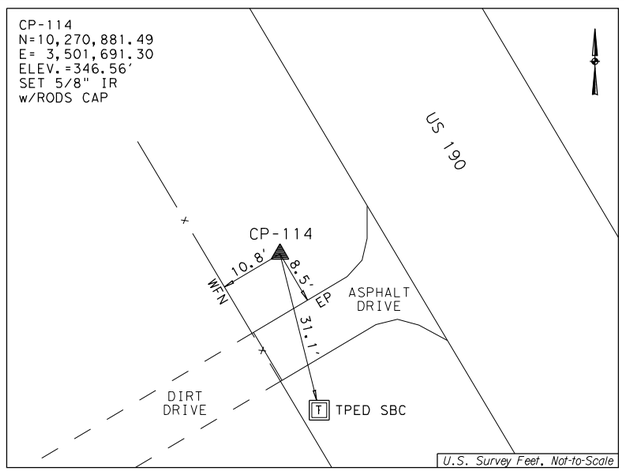
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 1.03 MILE SOUTH OF FM 2549.



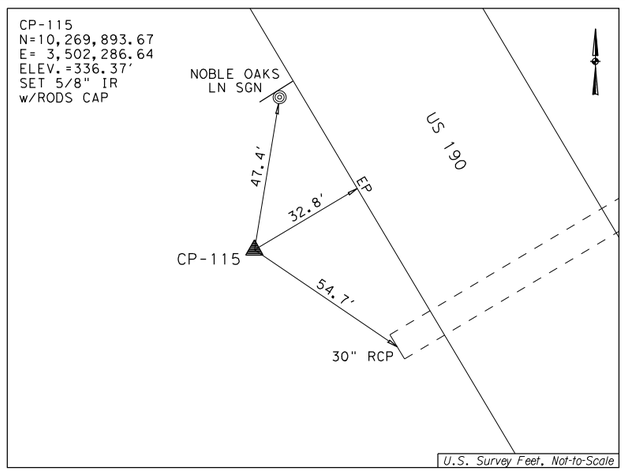
STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.64 MILE SOUTH OF OLD BRYAN HWY.



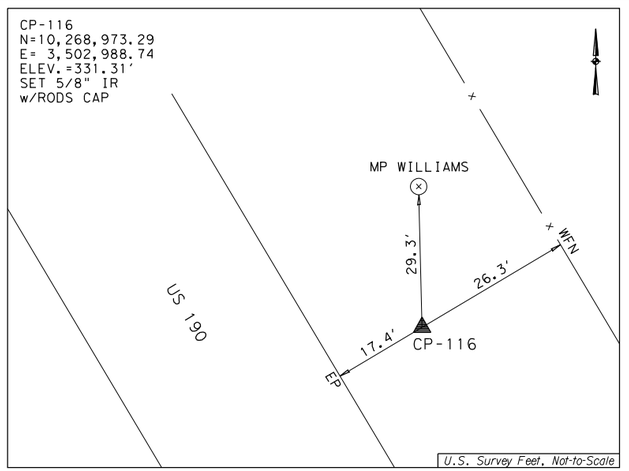
STATION IS LOCATED ON THE WEST SIDE OF US 190, AND LYING 0.12 MILE SOUTH OF HEATH LN.



STATION IS LOCATED ON THE WEST SIDE OF US 190, AND LYING 0.33 MILE SOUTH OF HEATH LN.



STATION IS LOCATED ON THE WEST SIDE OF US 190, AND LYING 0.55 MILE SOUTH OF HEATH LN.



STATION IS LOCATED ON THE EAST SIDE OF US 190, AND LYING 0.18 MILE SOUTH OF NOBLE OAKS LN.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (GEOID 18).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO GRID VALUES BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR FOR ROBERTSON COUNTY OF 1.00012.

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXBX & TXH1 DURING FEBRUARY 2023.

5. ELEVATIONS ARE BASED ON SAID REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

11-3-2023

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Sheet 2 of 3
Survey Date: FEBRUARY, 2023

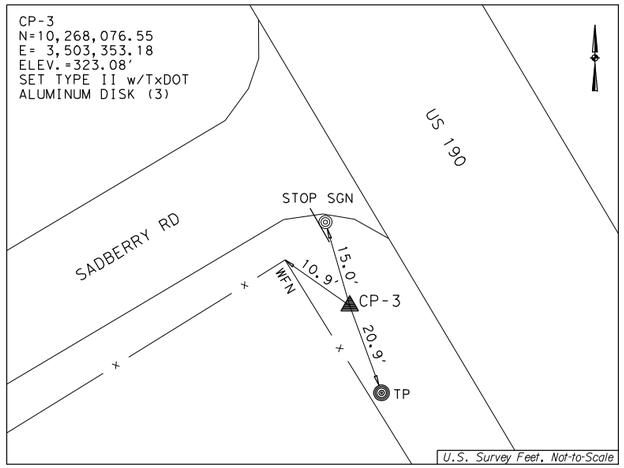
RODS
Surveying, Inc.
Control Infrastructure Transportation Land Development
6810 LEE ROAD, STE. 100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Texas Department of Transportation

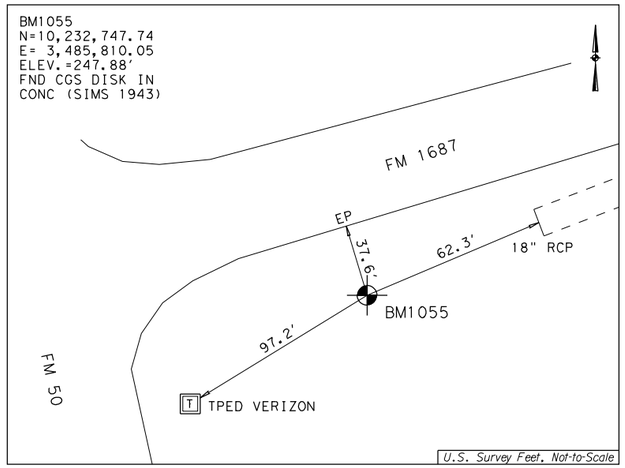
US 190
HORIZONTAL & VERTICAL
CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				36
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	BRY		ROBERTSON
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
17	0049	08	076	US 190

N:\LJA 339\2204300A\TASK ORDER 2 - HWY AREAS FOR TOPO\A - US 190\CAD\H&V Control\H&V Sketches.dgn



STATION IS LOCATED ON THE SOUTHWEST CORNER OF THE INTERSECTION OF US 190 AND SADBERRY RD.



STATION IS LOCATED ON THE SOUTHEAST CORNER OF THE INTERSECTION OF FM 50 AND FM 1687.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

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STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

11-3-2023

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Sheet 3 of 3
Survey Date: FEBRUARY, 2023

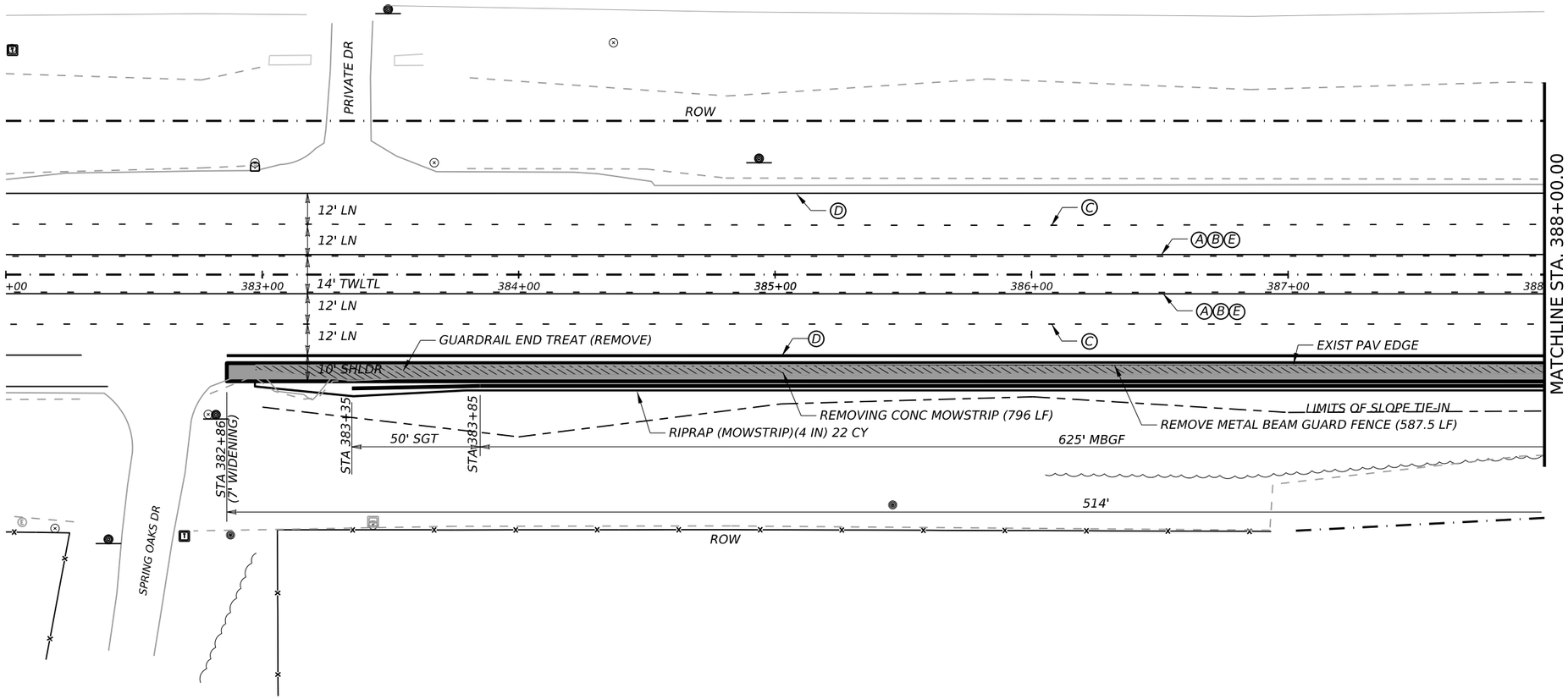
RODS
Surveying, Inc.
Control
Infrastructure
Transportation
Land Development
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Texas Department of Transportation

US 190
HORIZONTAL & VERTICAL CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				37
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	BRY		ROBERTSON
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
17	0049	08	076	US 190

N:\LJA 339\2204300\TASK ORDER 2 - HWY AREAS FOR TOPO\A - US 190\CAD\H&V Control\H&V Sketches.dgn



LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 1 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	38

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
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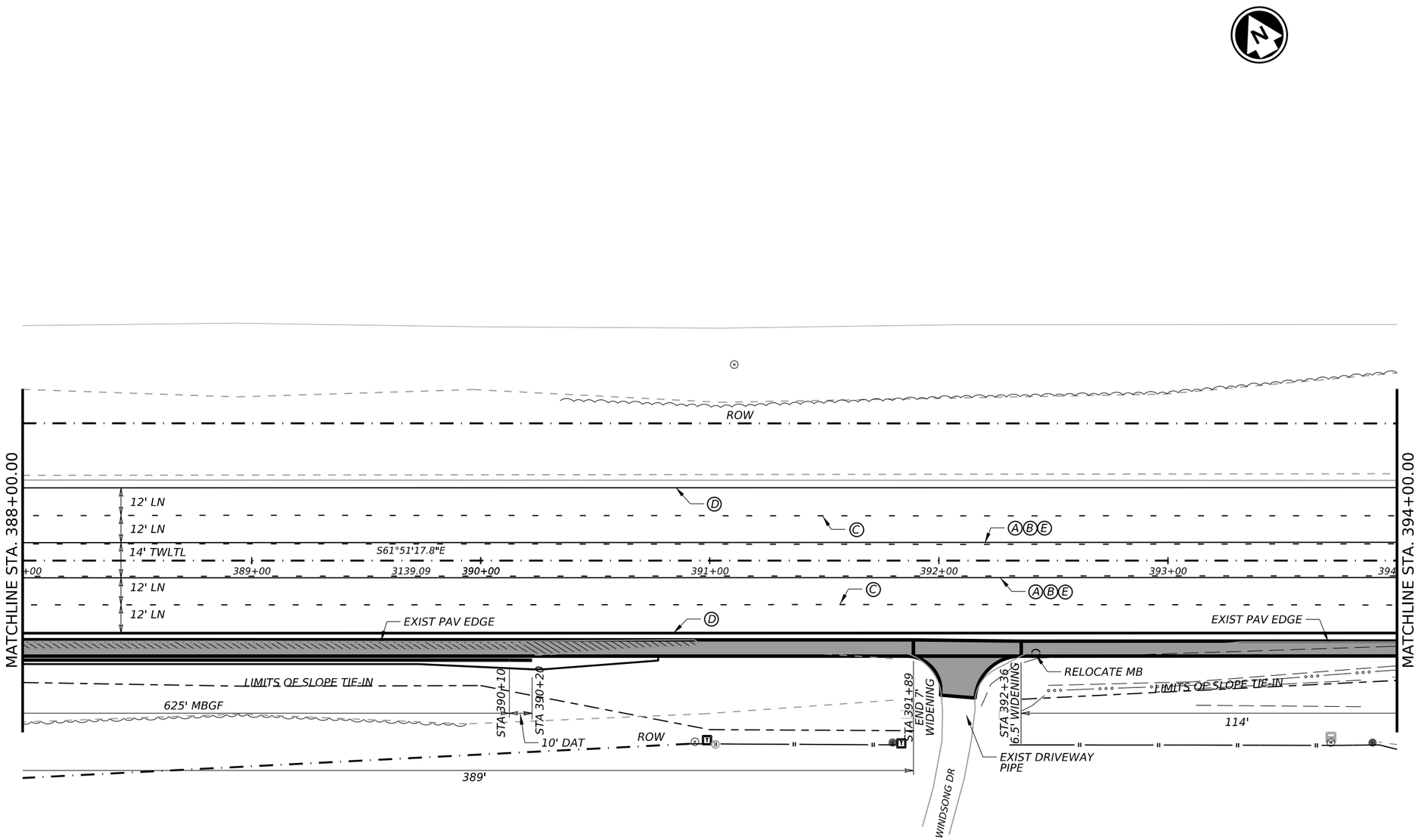

LEGEND
Ⓐ (Y)(6")(SLD)
Ⓑ (Y)(6")(BRK)
Ⓒ (W)(6")(BRK)
Ⓓ (W)(6")(SLD)
Ⓔ REFL PAV MRKR TY II-A-A
Ⓕ (W)(8")(SLD)
SHOULDER WIDENING
RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 2 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	39

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
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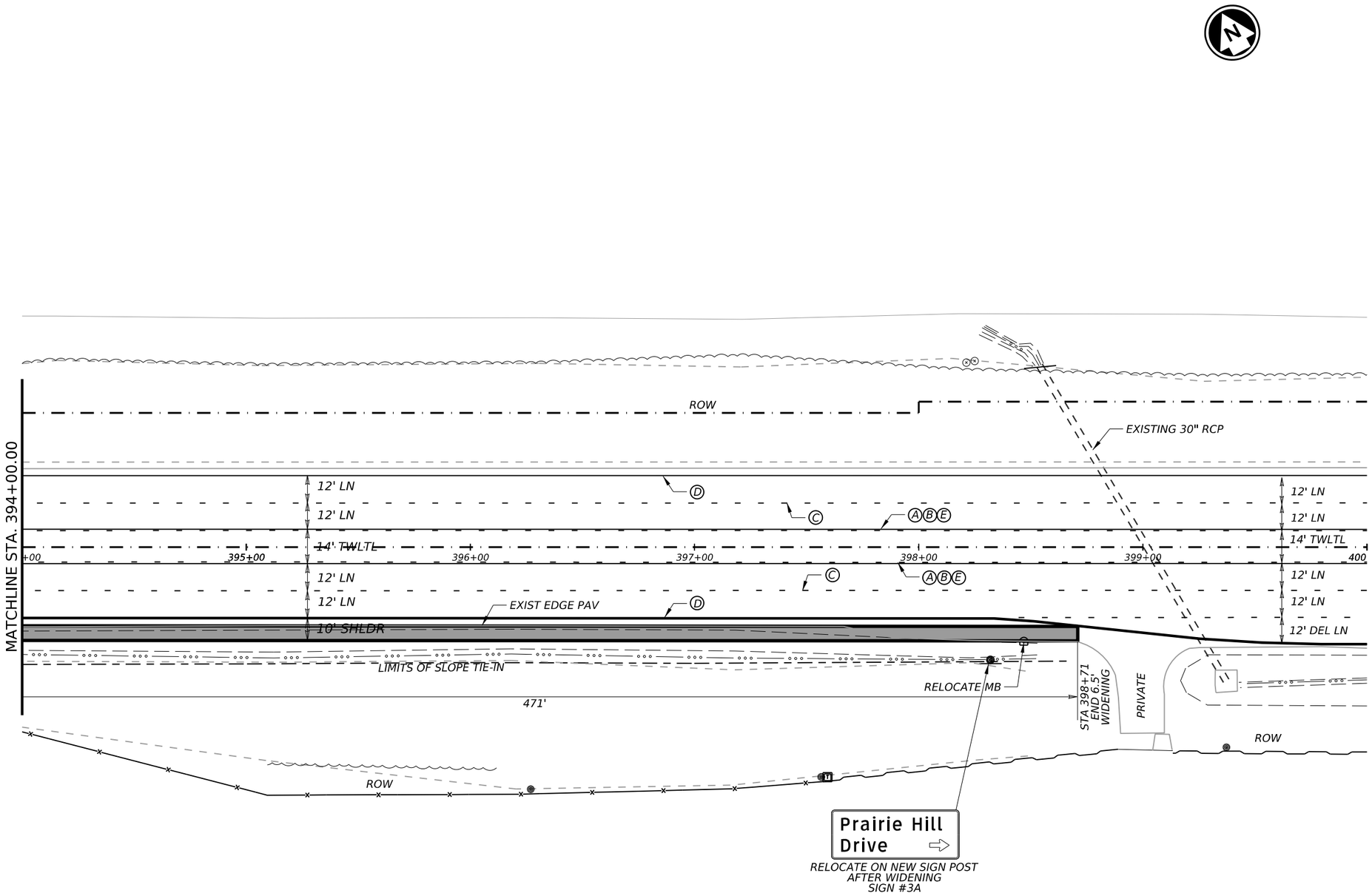


LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

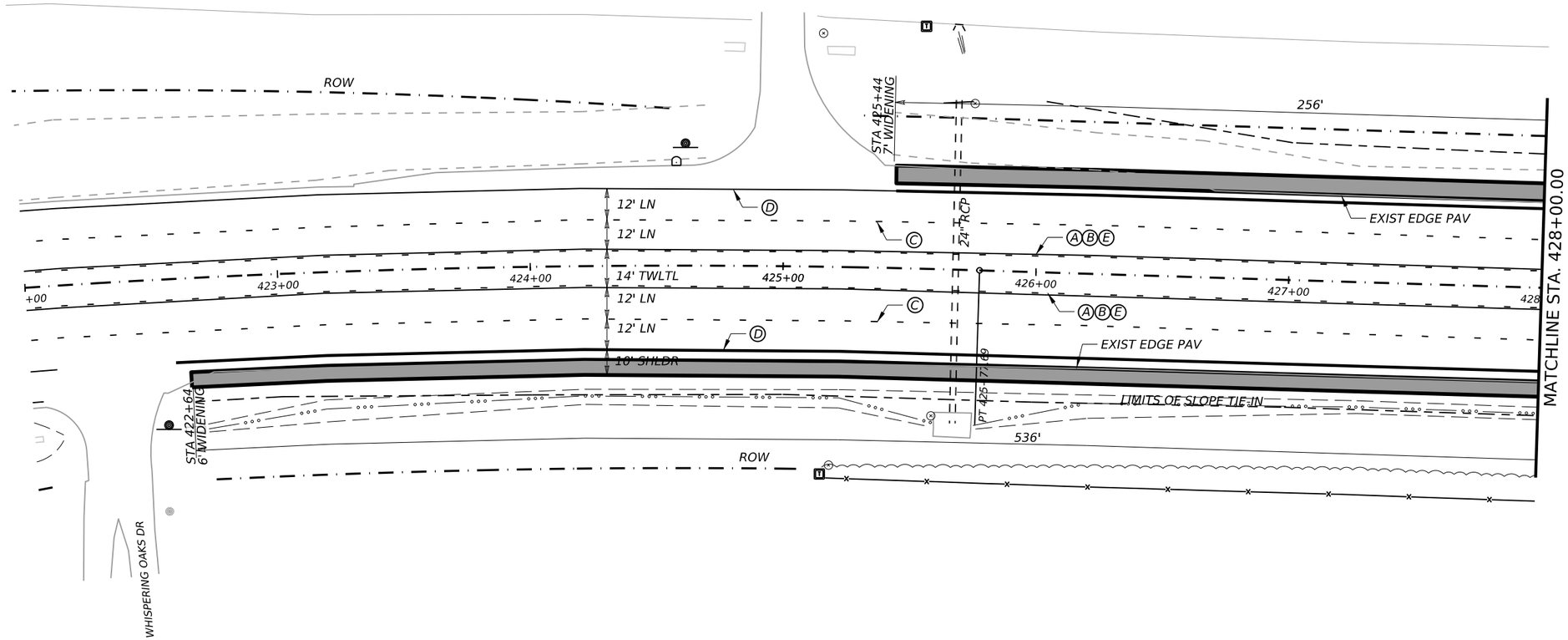
ROADWAY LAYOUT

SHEET 3 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	FPN	US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	40

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
FILENAME:



LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 4 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	41

REV DATE: 01/30/2024 04:22 PM
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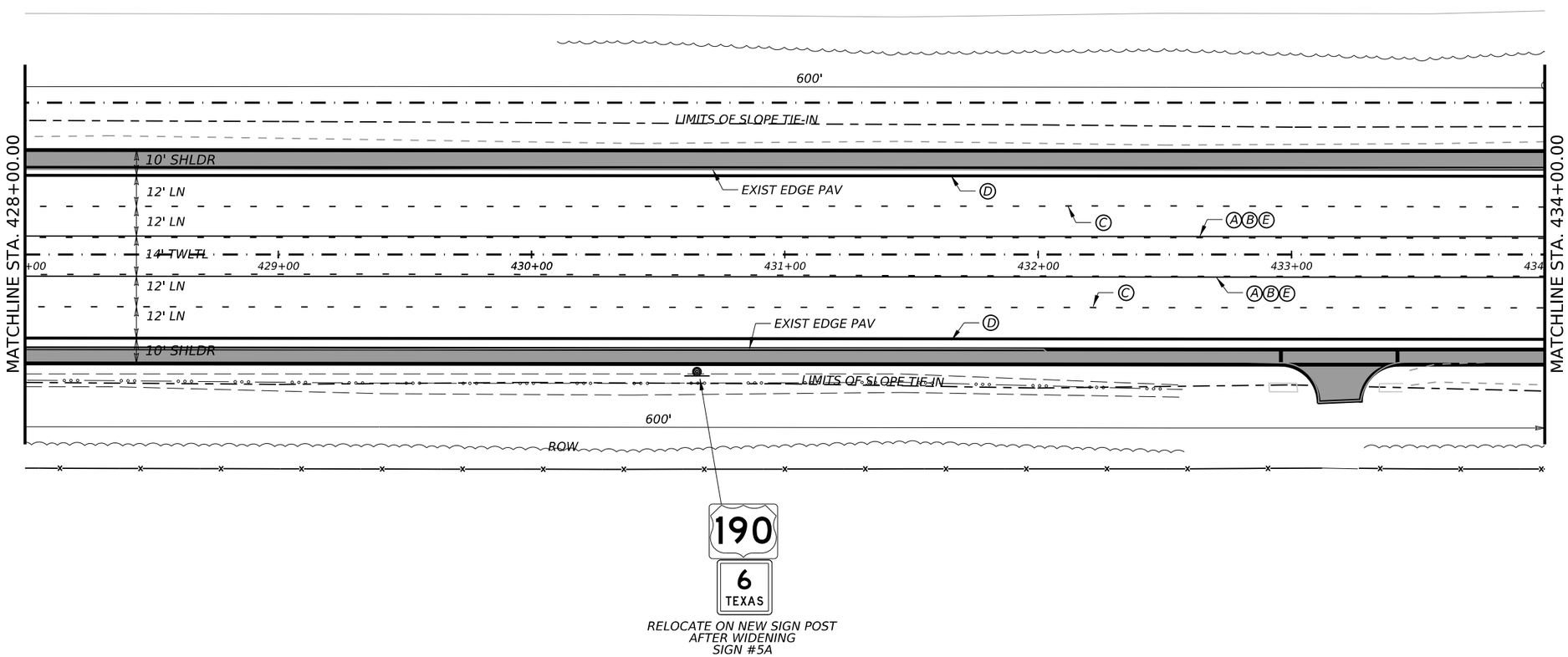
FILENAME:



RELOCATE ON NEW SIGN POST
AFTER WIDENING
SIGN #5A

LEGEND
Ⓐ (Y)(6")(SLD)
Ⓑ (Y)(6")(BRK)
Ⓒ (W)(6")(BRK)
Ⓓ (W)(6")(SLD)
Ⓔ REFL PAV MRKR TY II-A-A
Ⓕ (W)(8")(SLD)
SHOULDER WIDENING
RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 5 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	42

REV DATE: 01/30/2024 04:22 PM
CS: 0049-08-076
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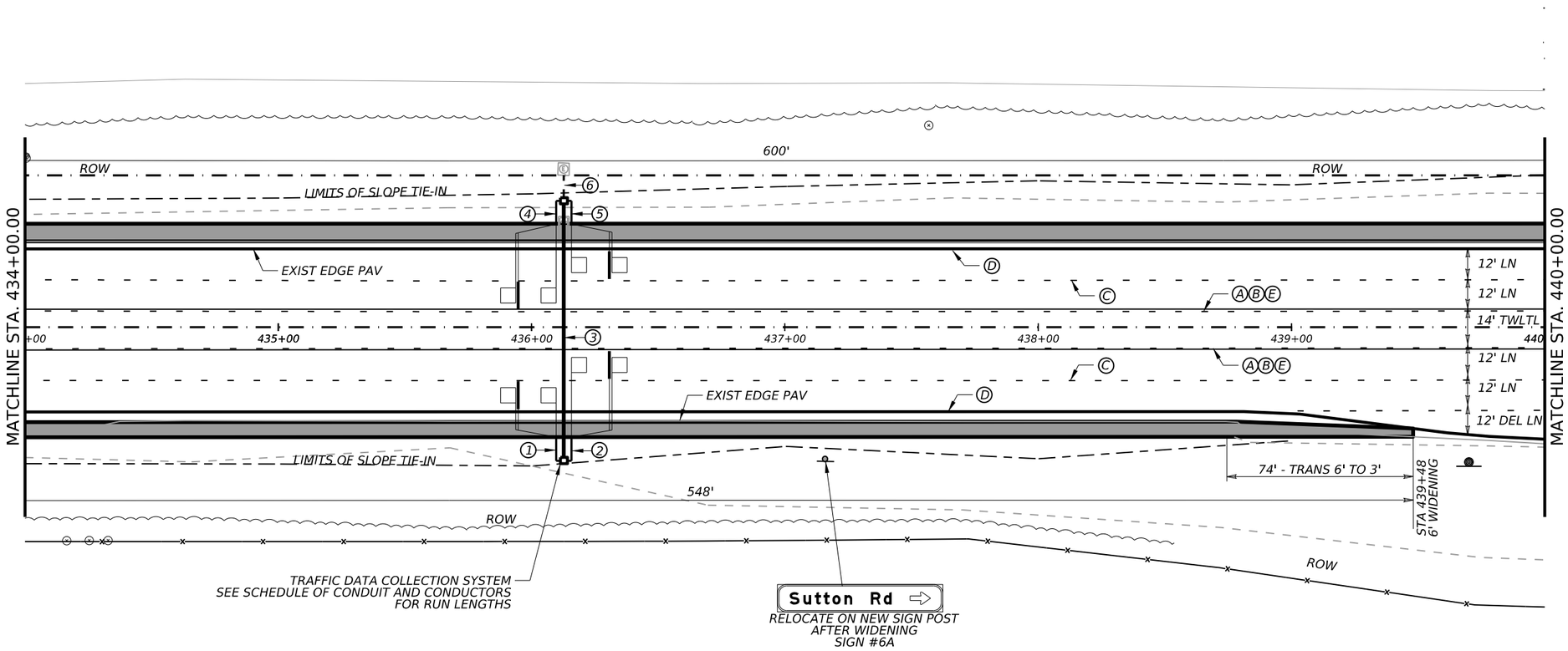

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 6 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	43

REV DATE: 01/30/2024 04:22 PM
CS: 0049-08-076
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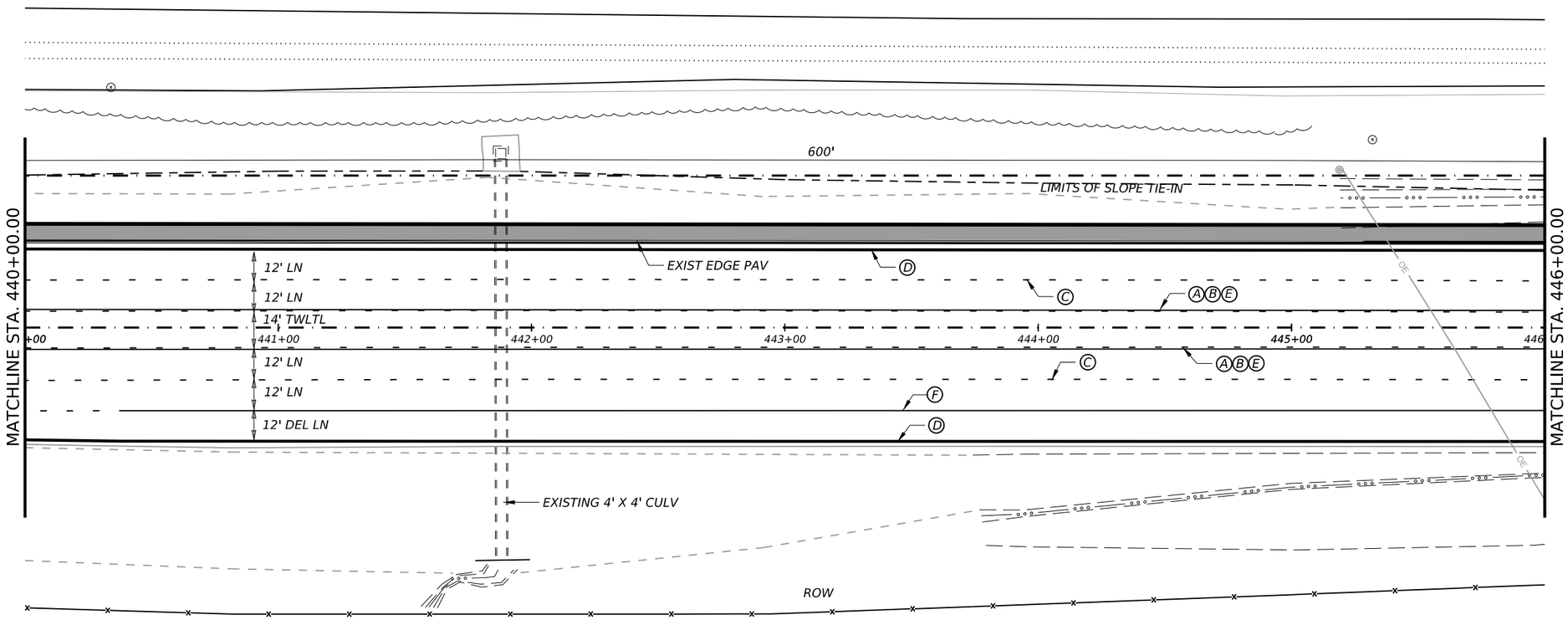

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 7 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	44

REV DATE: 01/30/2024 04:22 PM
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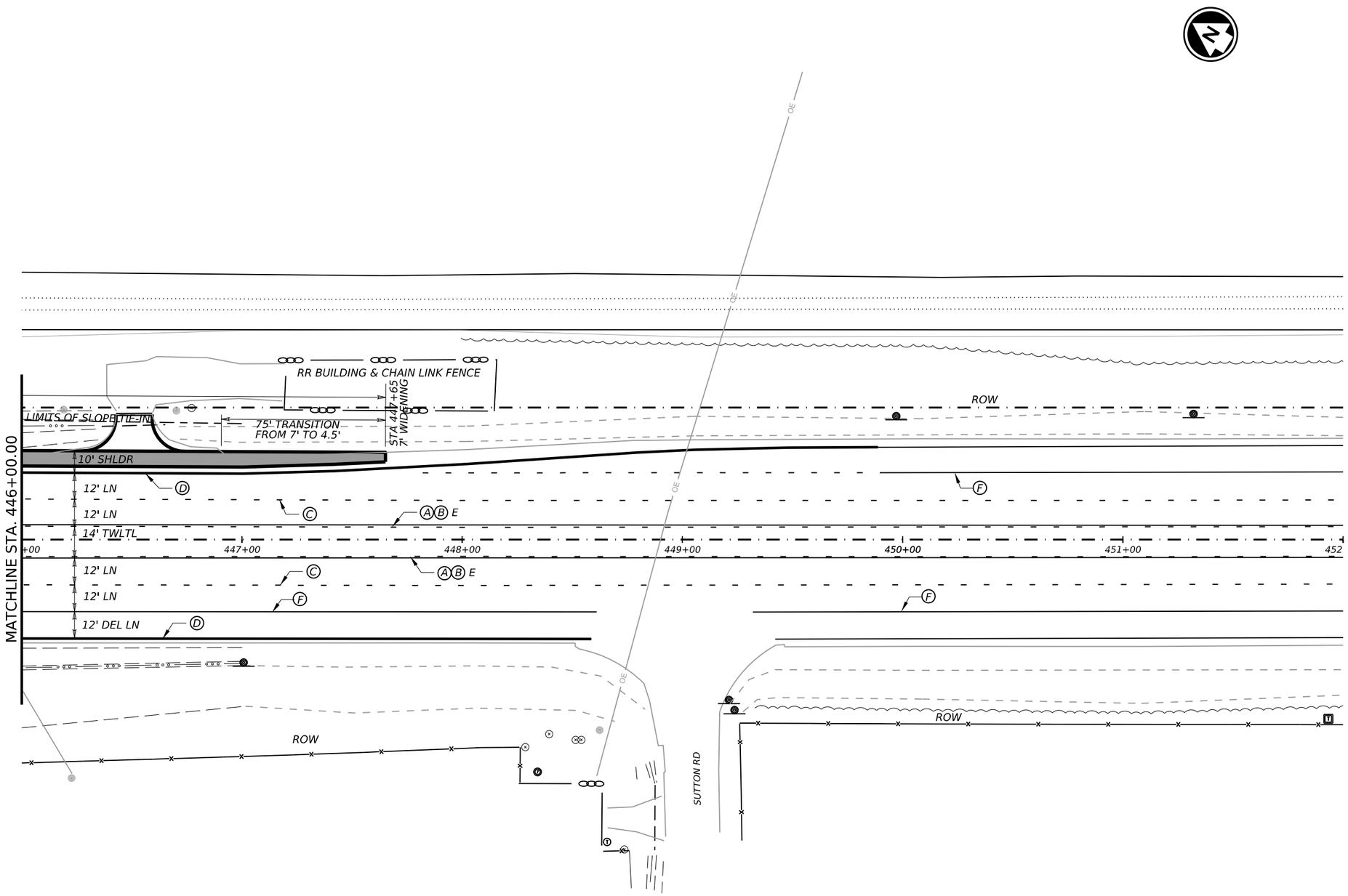
CS: 0049-08-076



LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 8 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	45

REV. DATE: 01/30/2024 04:22 PM
CSJs: 0049-08-076
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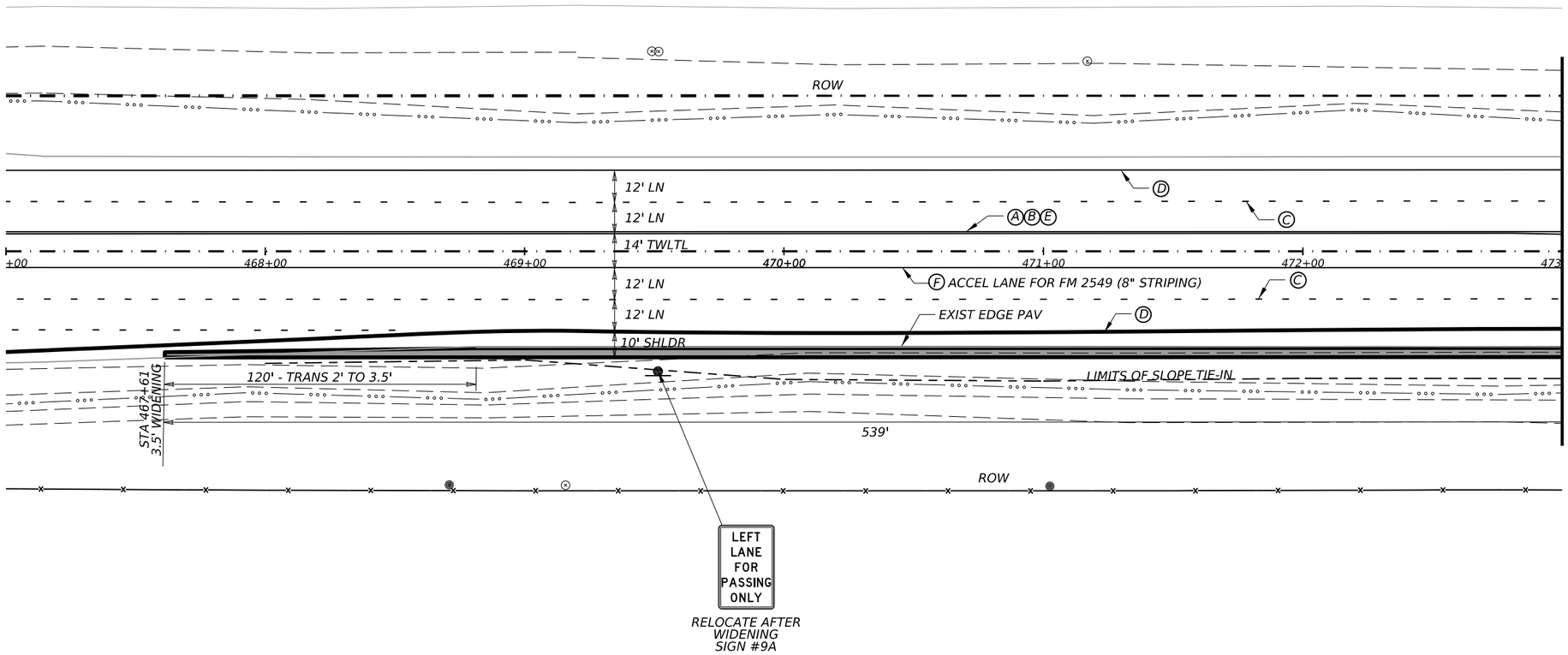

LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 9 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	46

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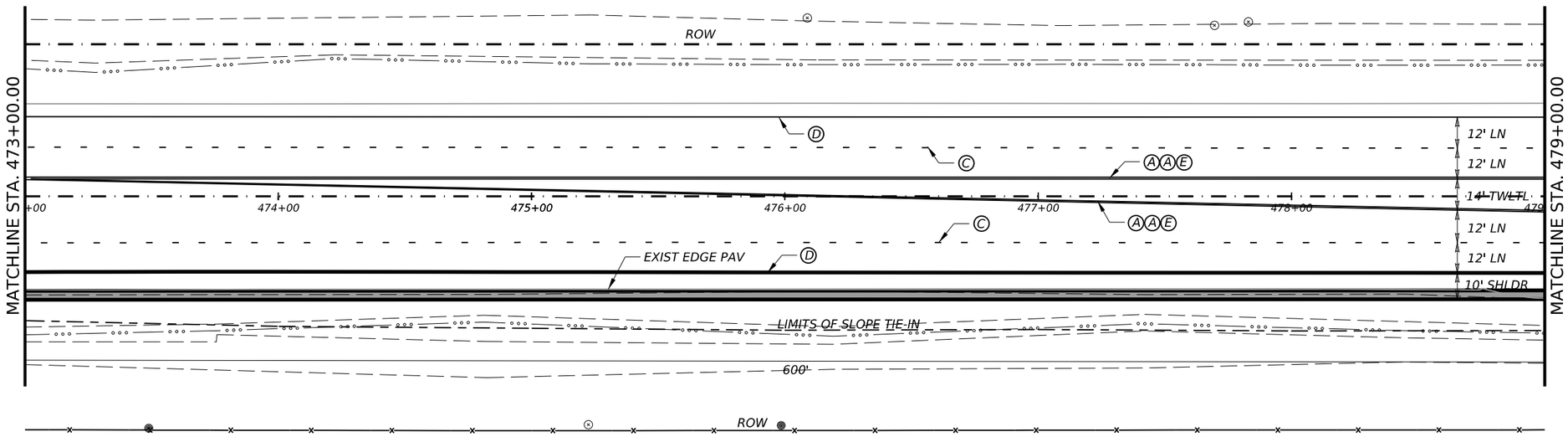

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 10 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	47

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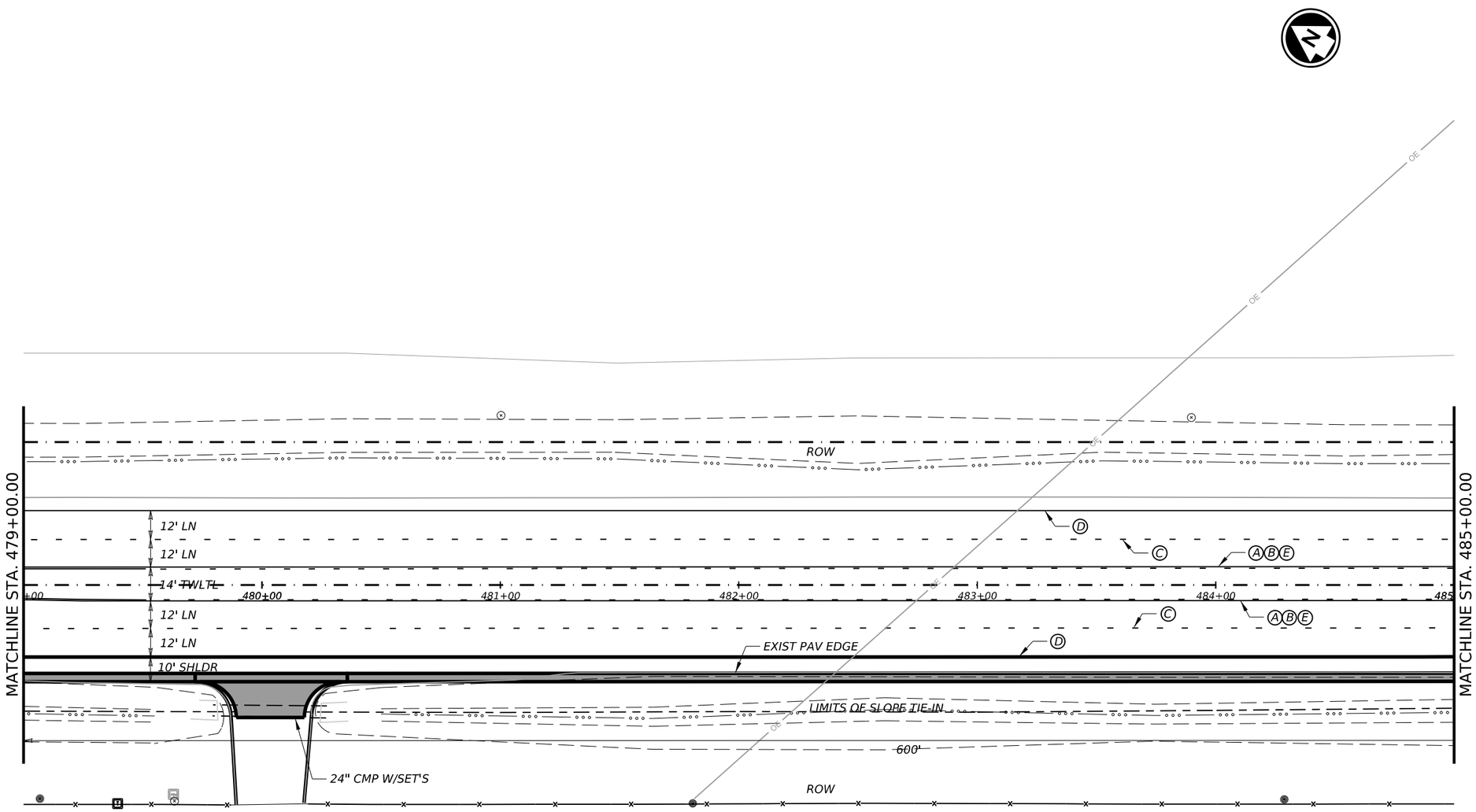
CS: 0049-08-076



LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 11 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	48

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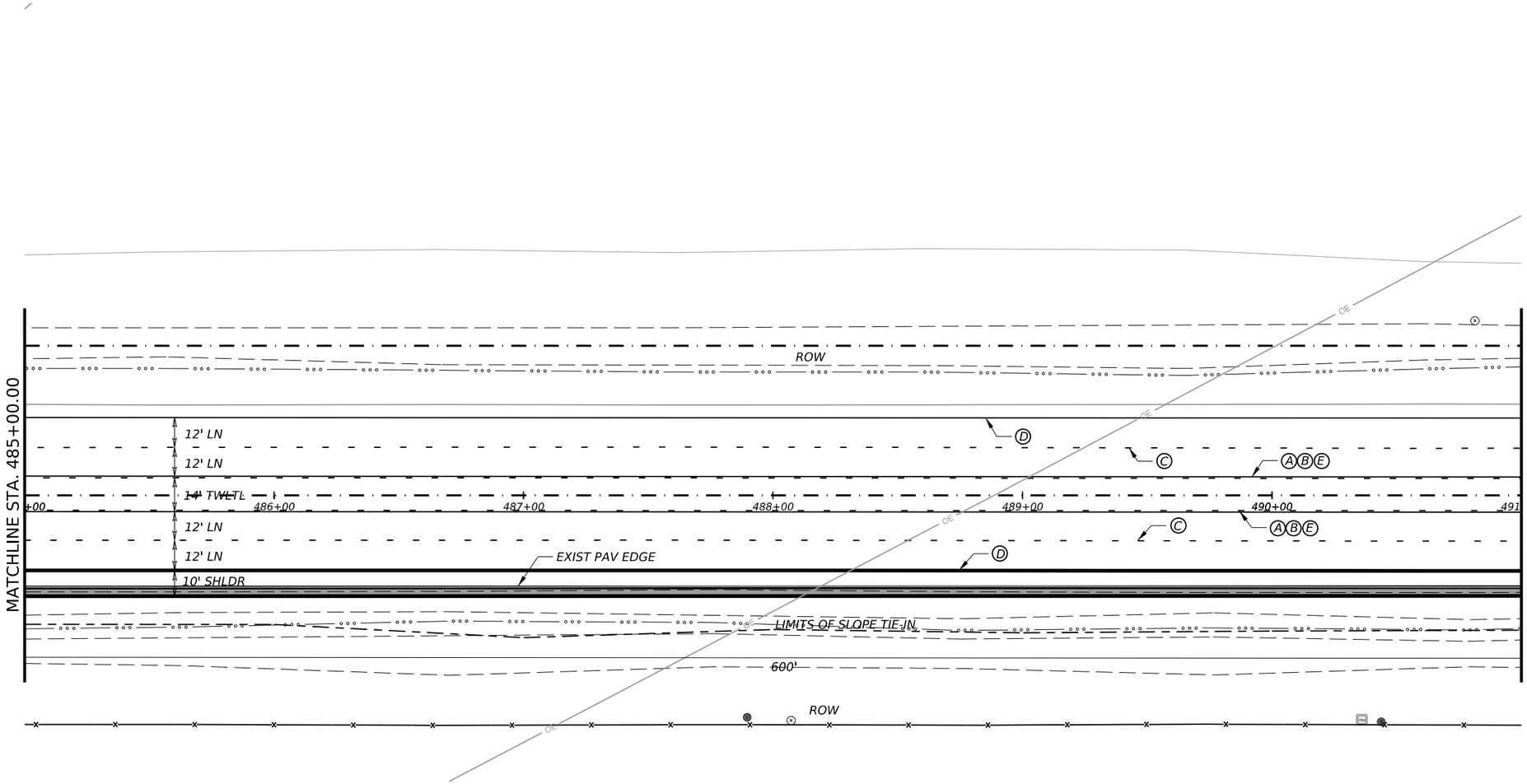

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 12 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	49

REV DATE: 01/30/2024 04:22 PM
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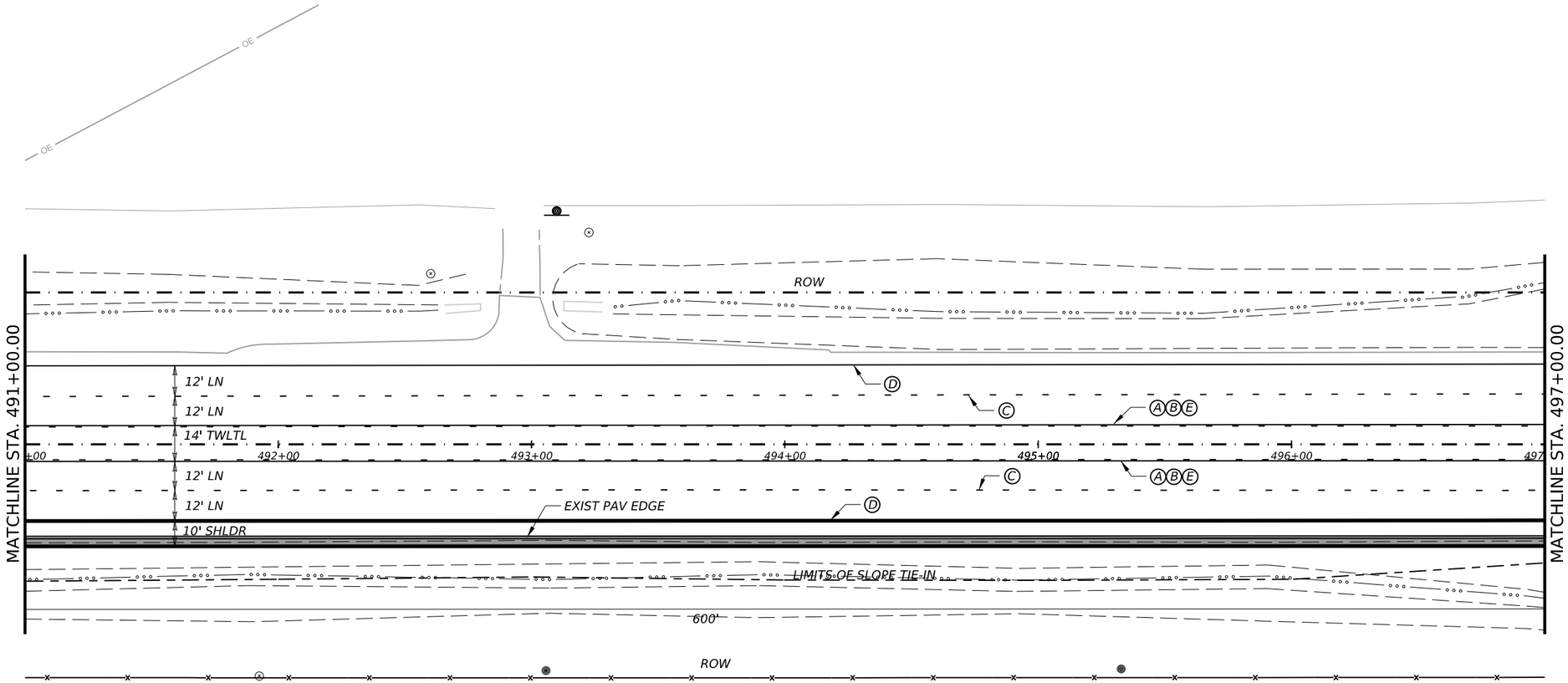

LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 13 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	50

REV DATE: 01/30/2024 04:22 PM
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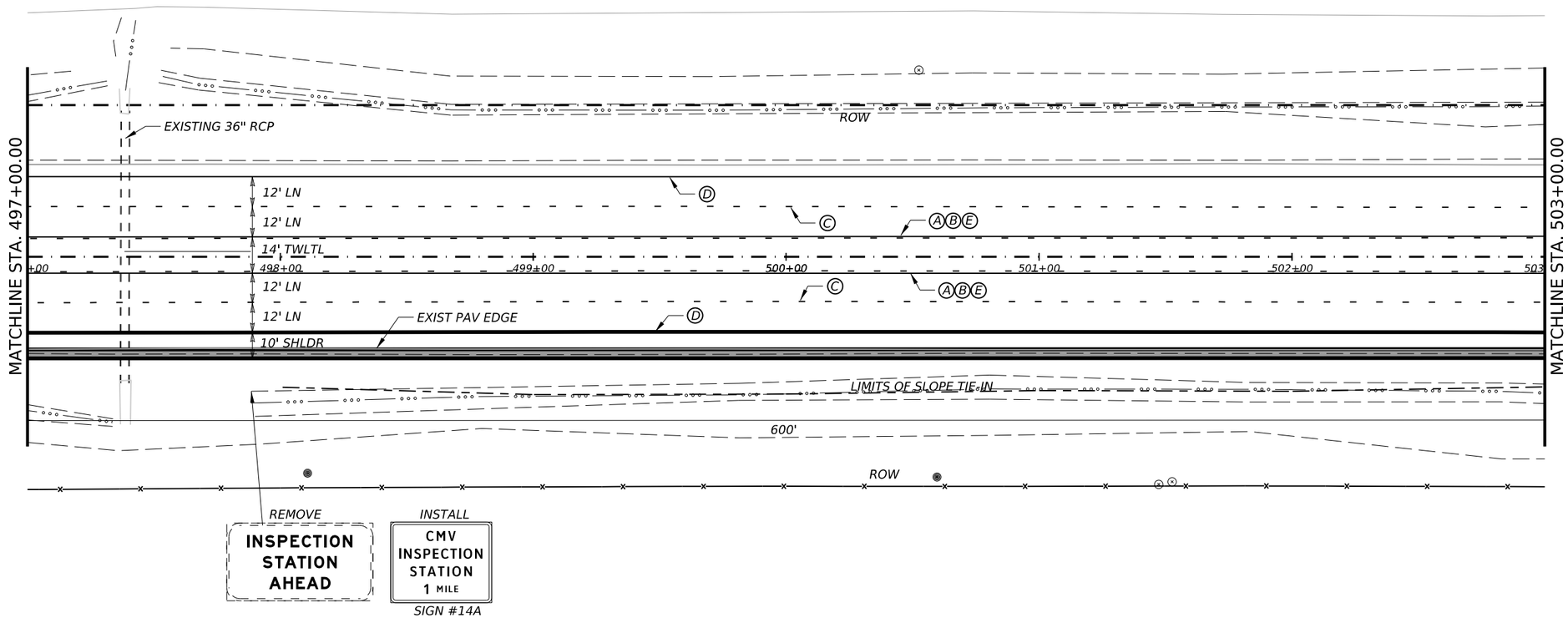

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 14 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	51

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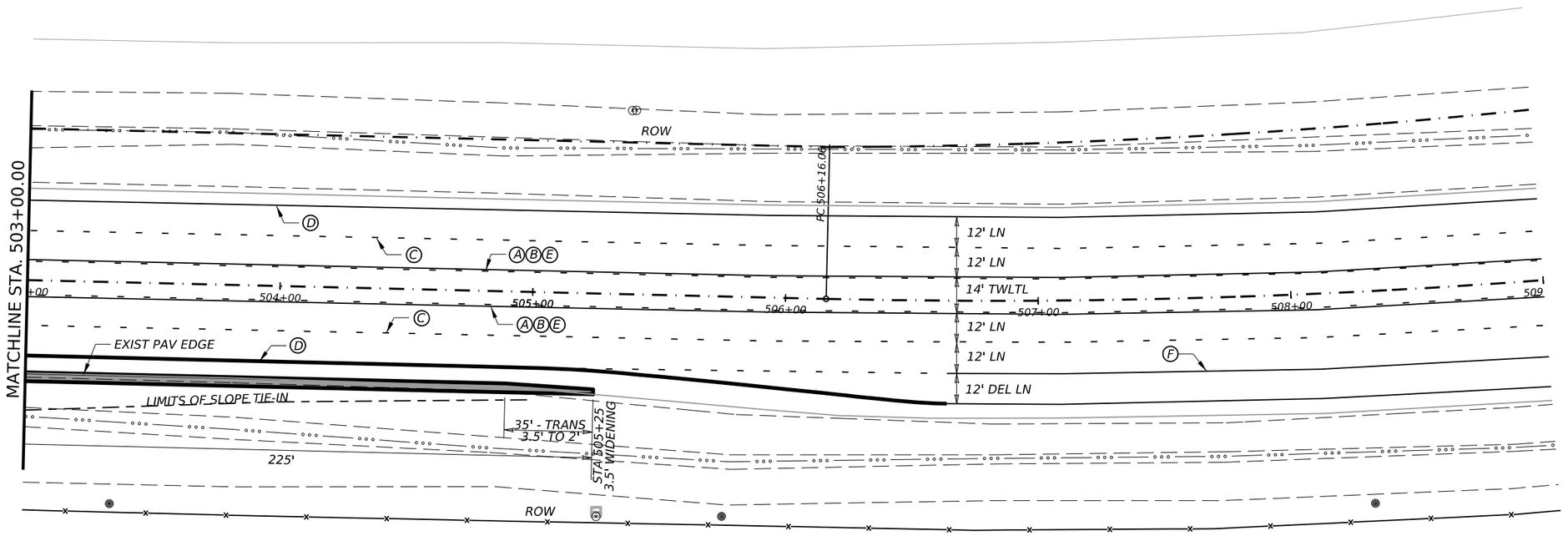

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 15 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	52

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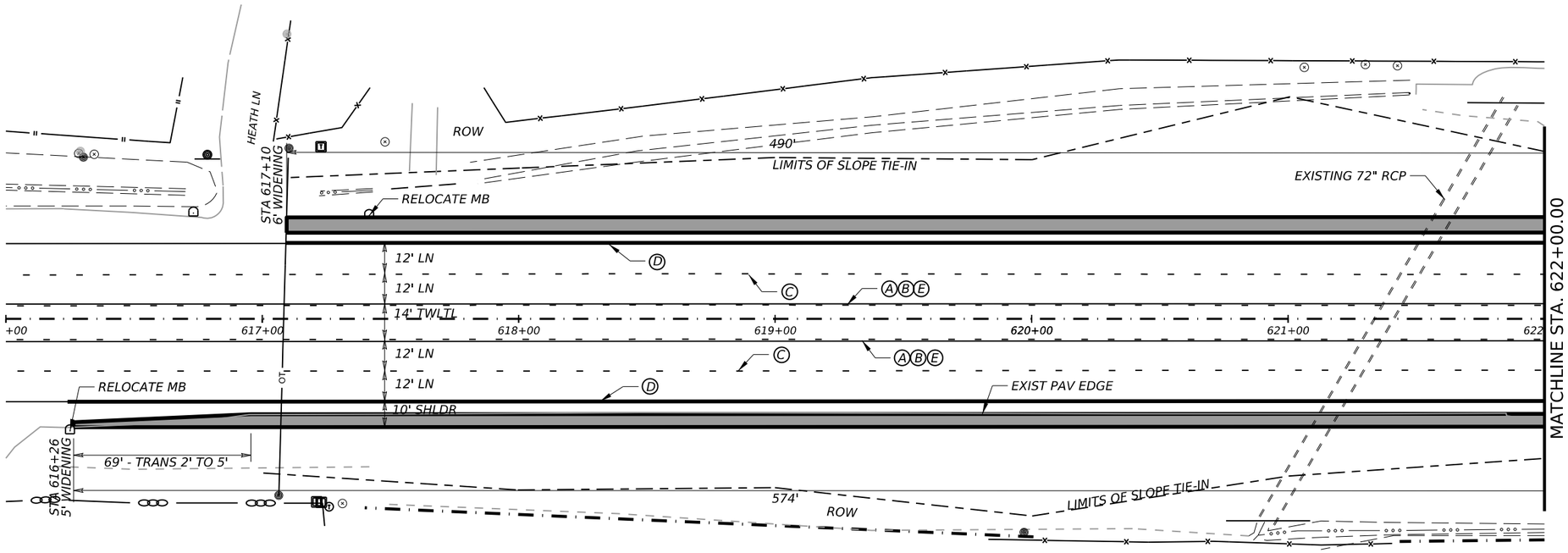

LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 16 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	53

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
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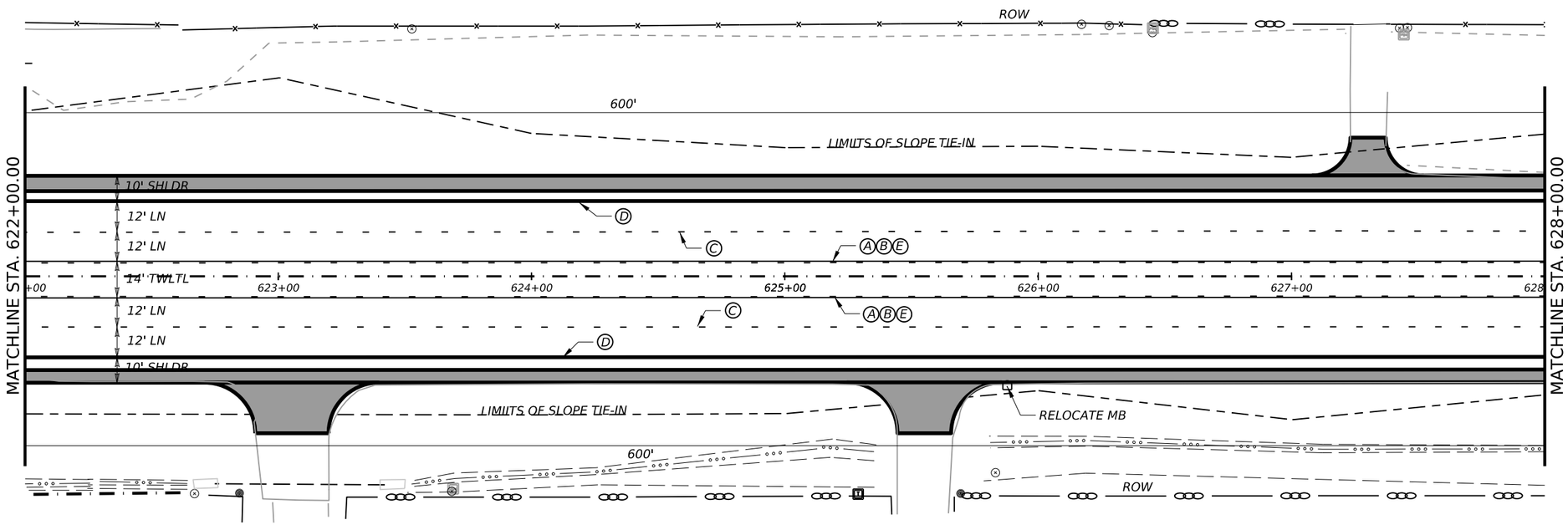

LEGEND

- Ⓐ (Y)(6")(SLD)
- Ⓑ (Y)(6")(BRK)
- Ⓒ (W)(6")(BRK)
- Ⓓ (W)(6")(SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 17 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	54

REV DATE: 01/30/2024 04:22 PM
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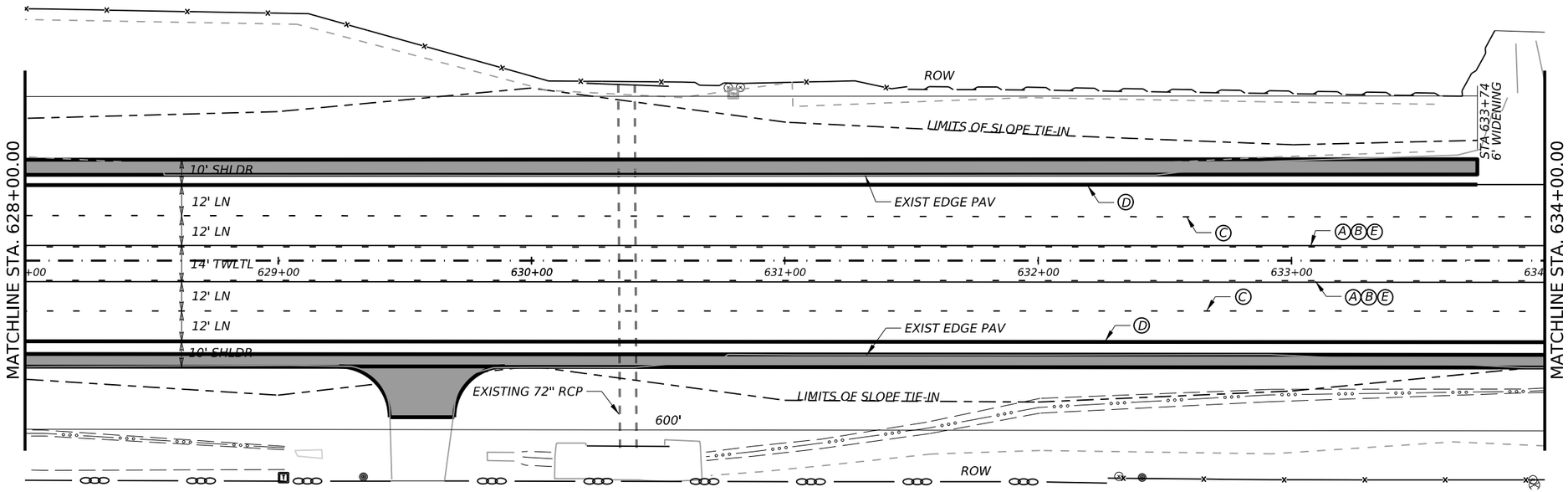

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 18 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	55

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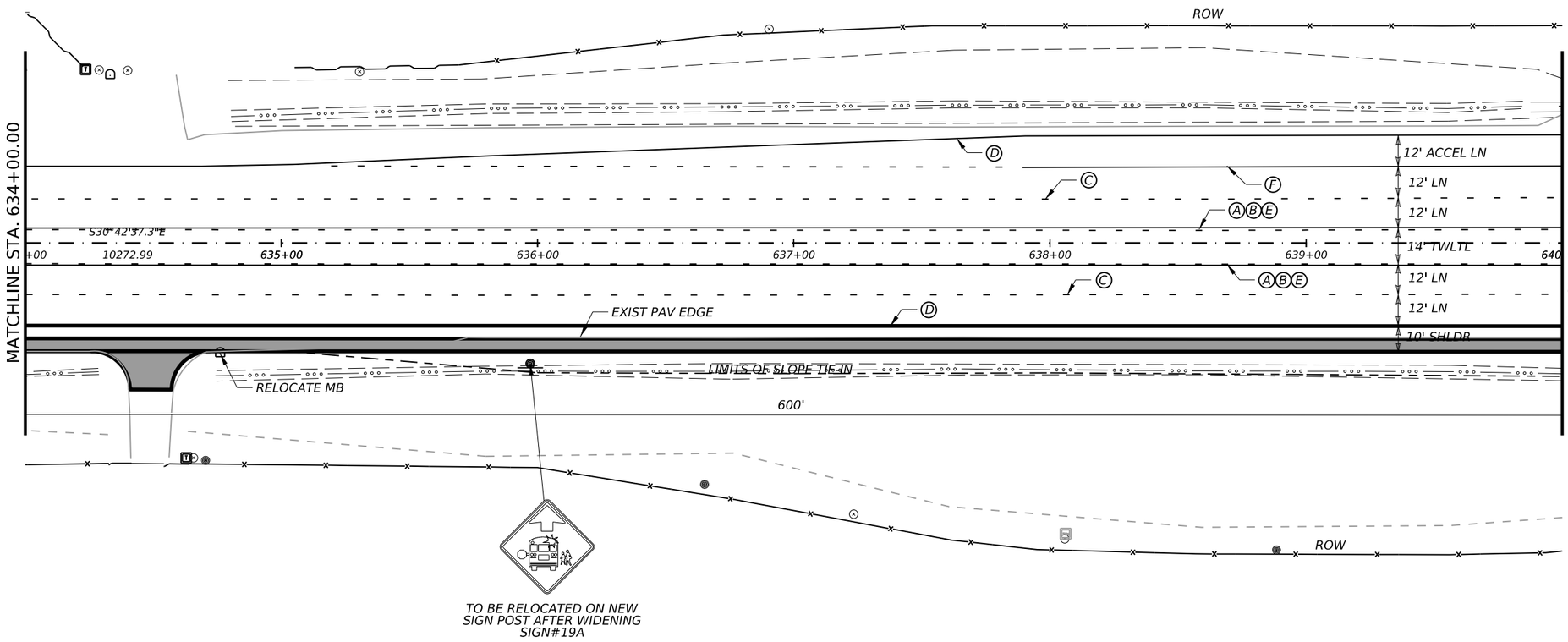

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 19 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	56

REV DATE: 01/30/2024 04:22 PM
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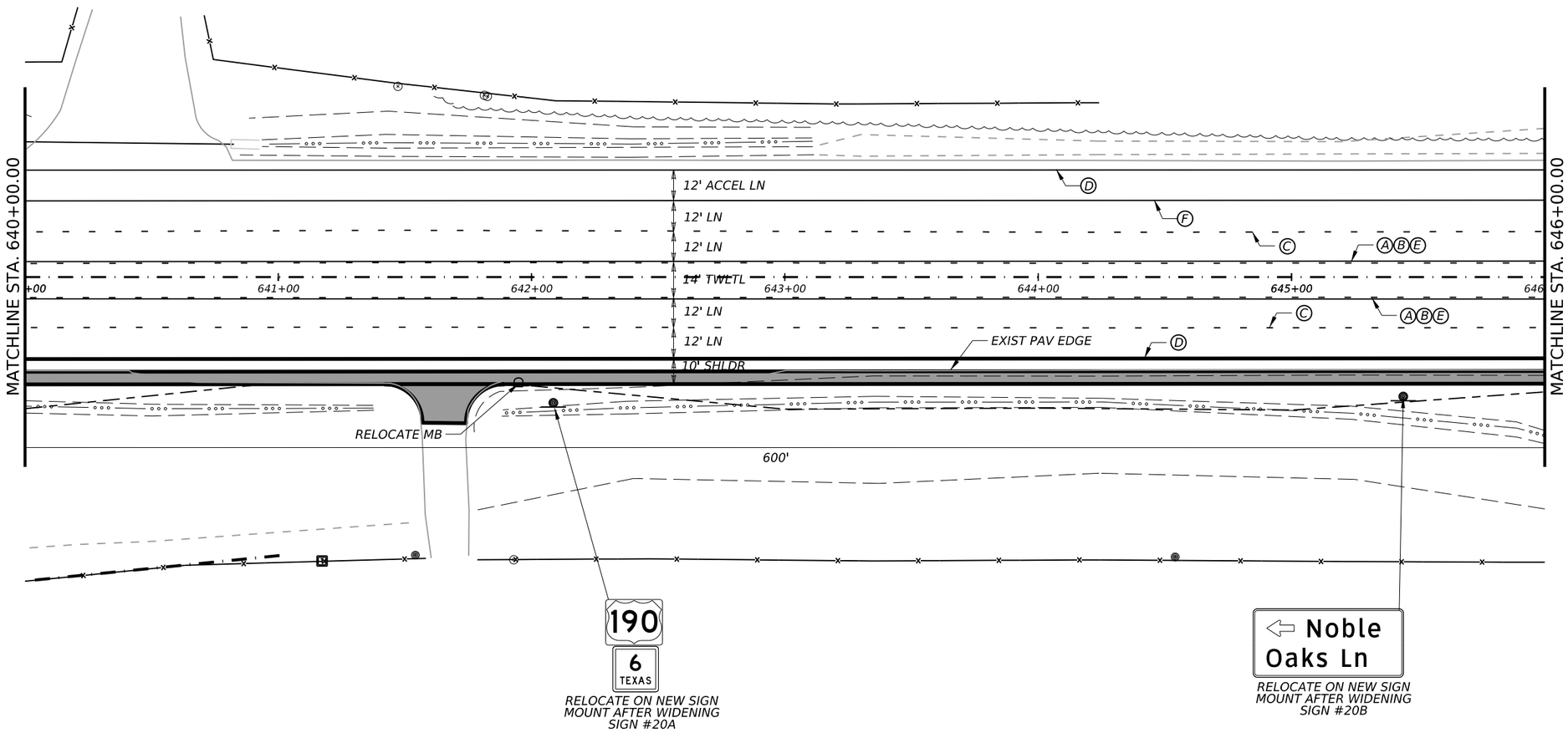

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 20 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	57

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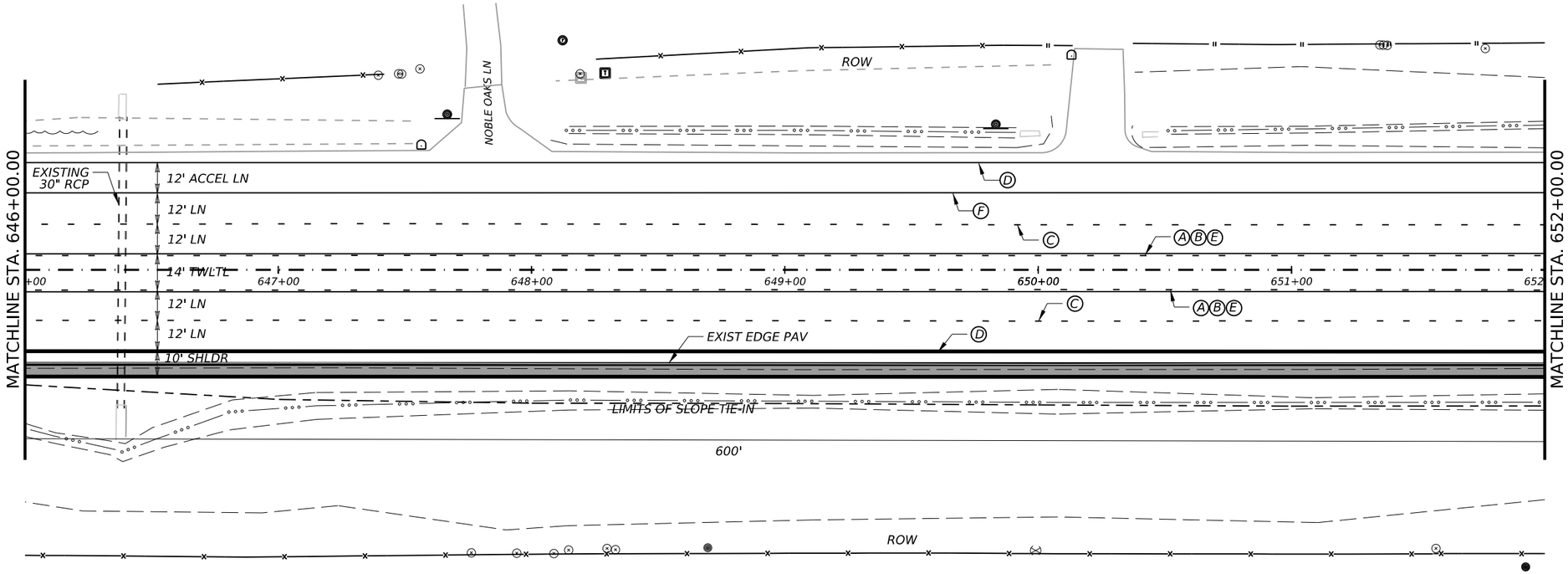

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL

0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 21 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	58

REV DATE: 01/30/2024 04:22 PM
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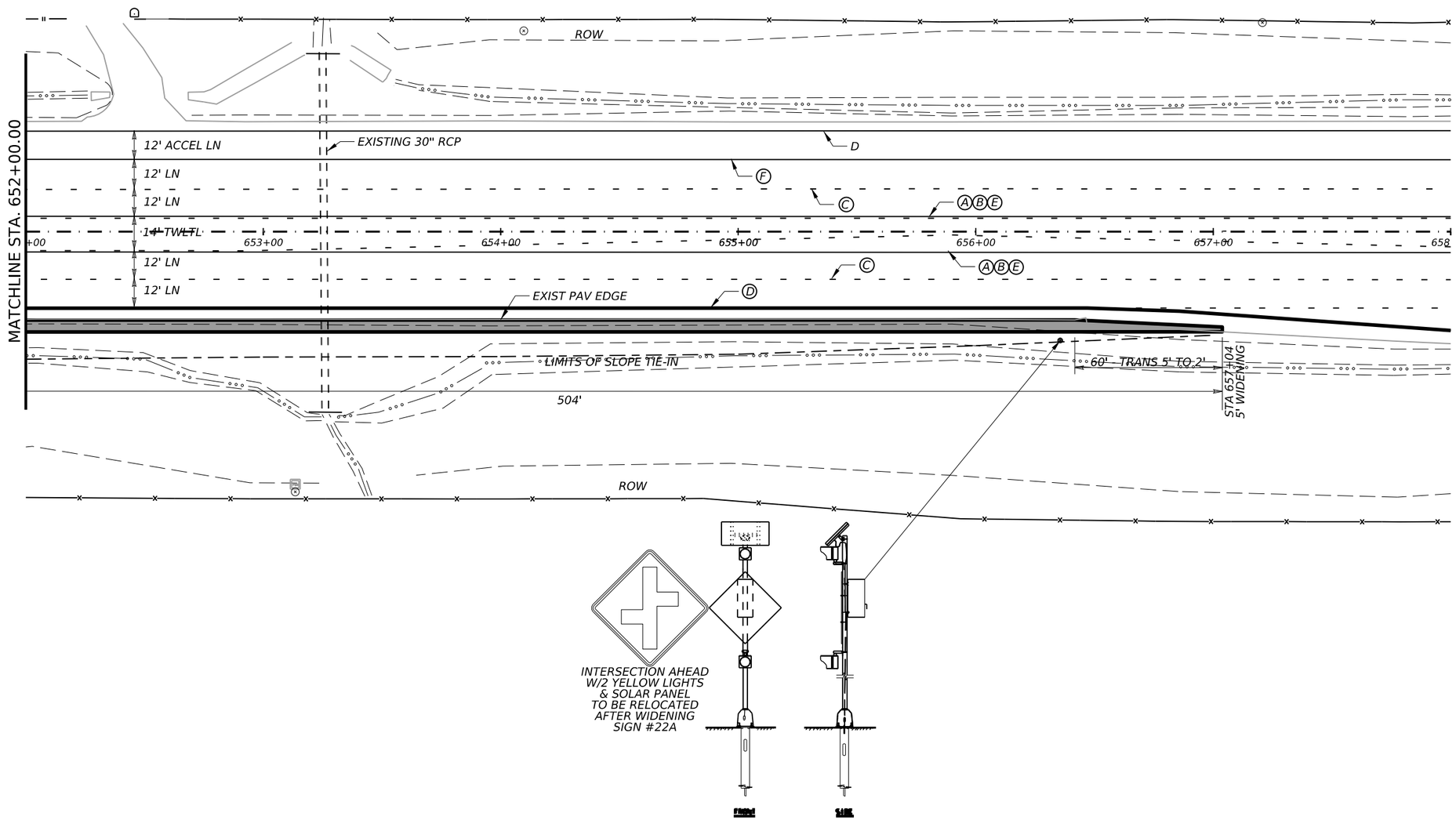

LEGEND

- (A) (Y)(6")(SLD)
- (B) (Y)(6")(BRK)
- (C) (W)(6")(BRK)
- (D) (W)(6")(SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) (W)(8")(SLD)
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

ROADWAY LAYOUT

SHEET 22 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	59

REV. DATE: 01/30/2024 04:22 PM
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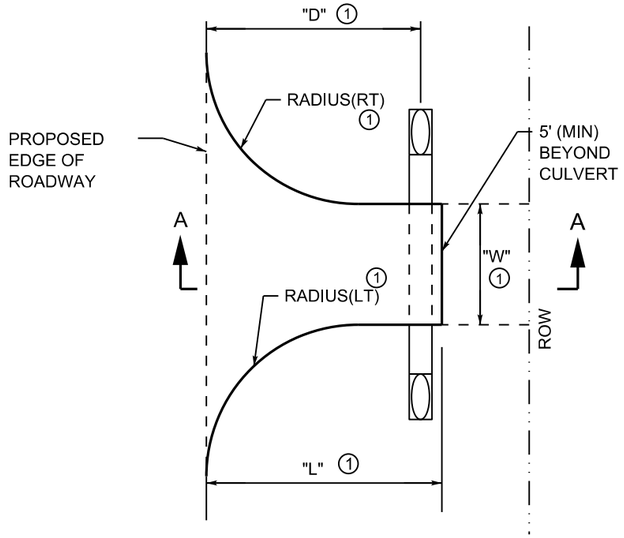
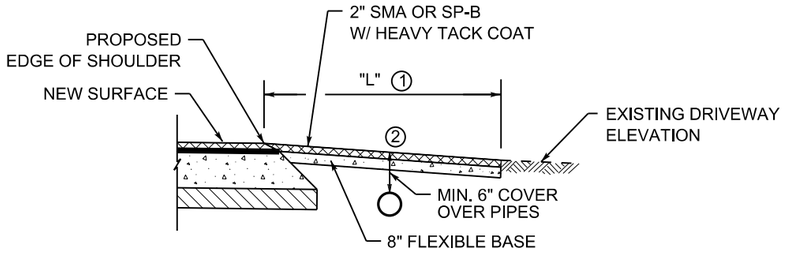


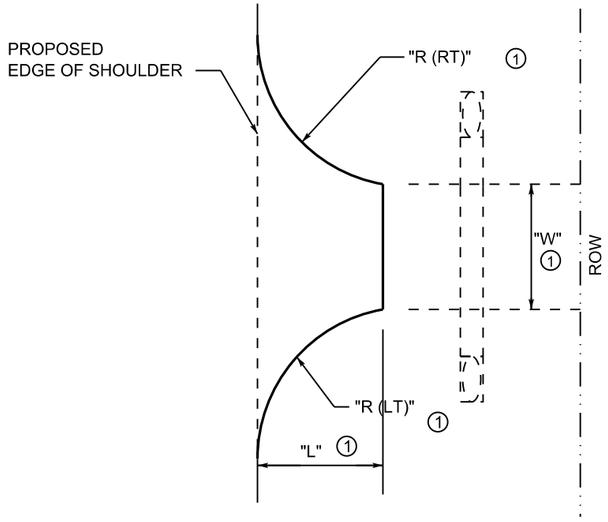
PLAN VIEW

PRIVATE/PUBLIC DRIVEWAYS
(WITH CULVERT REPLACEMENT)



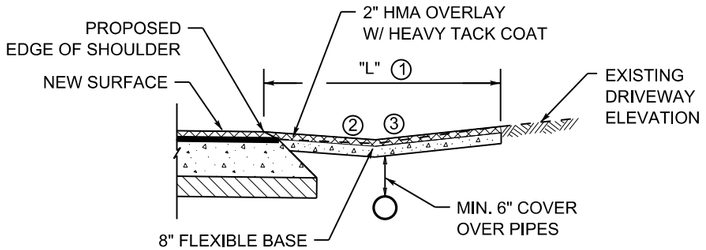
SECTION A-A

PRIVATE/PUBLIC (IN FILL AREAS)
DRIVEWAY (HMA)



PLAN VIEW

PRIVATE/PUBLIC DRIVEWAYS
(WITHOUT CULVERT REPLACEMENT)

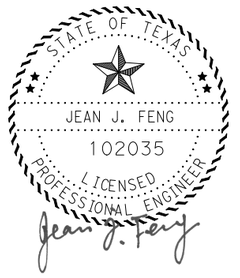


SECTION A-A

PRIVATE/PUBLIC (IN CUT AREAS)
DRIVEWAY (HMA)

NOTES:

(1) SEE "SUMMARY OF DRIVEWAYS" FOR LENGTH, WIDTH, AND RADII.
(2) PRIVATE DRIVE: 12% MAX GRADE PUBLIC/COMMERCIAL: 8% MAX GRADE
(3) IN CUT AREA, FORM A DIP ON DRIVEWAY TO PREVENT WATER DRAINED TO ROADWAY. SEE DETAIL FOR SECTION A-A "IN CUT AREA". MAKE SURE AT DIP AREA THE PAVEMENT SLOPES OFF THE DRIVEWAY SO THAT FLOW WILL NOT POND ON DRIVEWAY.



01/31/2024

PRINT DATE	REVISION DATE

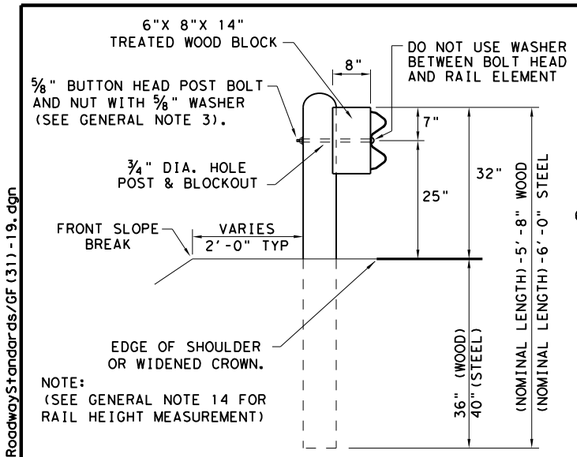
Texas Department of Transportation
Bryan District

DRIVEWAY DETAILS

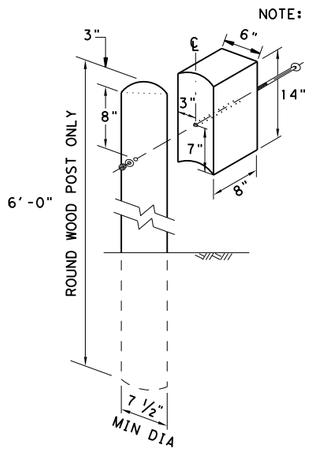
FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	60

FILENAME:
REV DATE:
CSJ: 0049-08-076

DATE: 1/31/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/004908076/4 - Design/Plan Set/3. Roadway/3H. RoadwayStandards/GF(31)-19.dgn

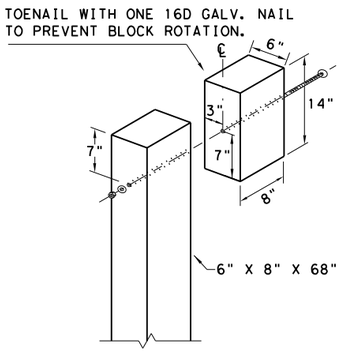


TYPICAL POST PLACEMENT

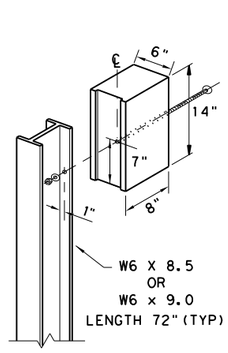


WOOD BLOCK TO ROUND WOOD POST

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

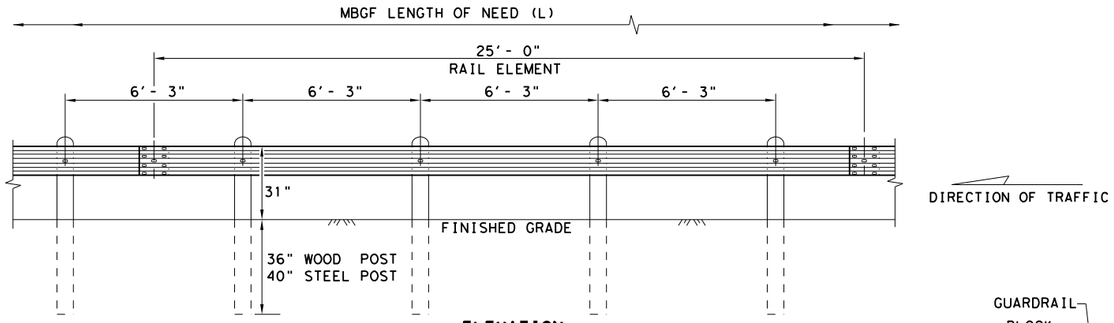


WOOD BLOCK TO RECTANGULAR WOOD POST



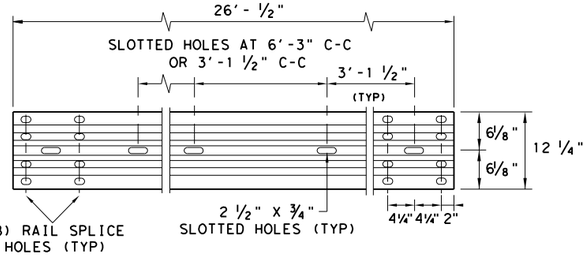
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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.

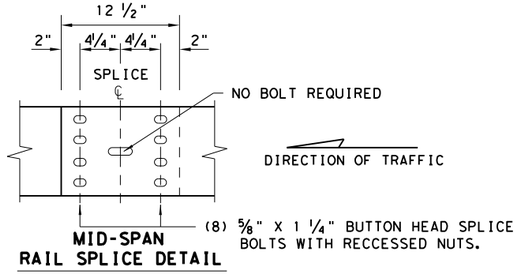
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

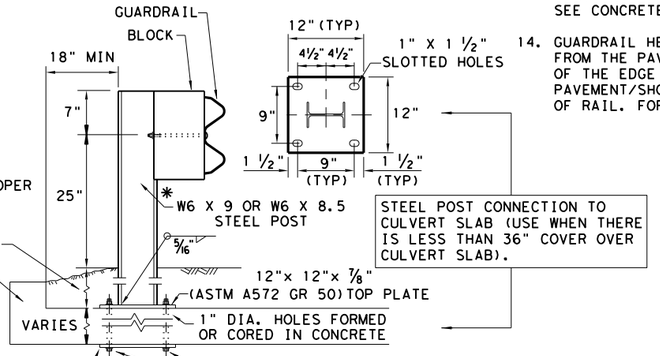
BUTTON HEAD BOLT

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.



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

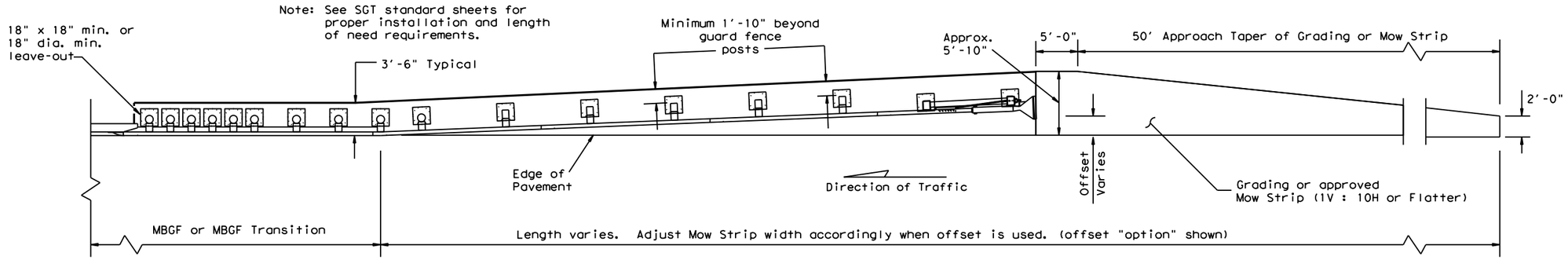
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS 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

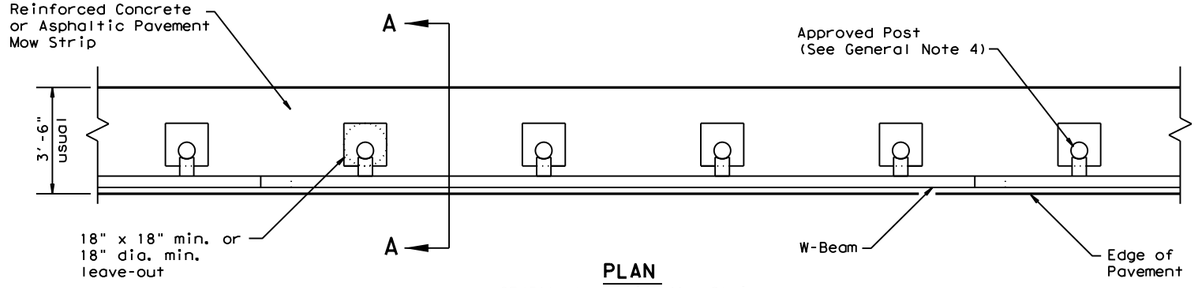
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		61

DATE: 1/31/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764 - Design/Plan Set/3. Roadway/3H. RoadwayStandards/GF(31)MS-19.dgn

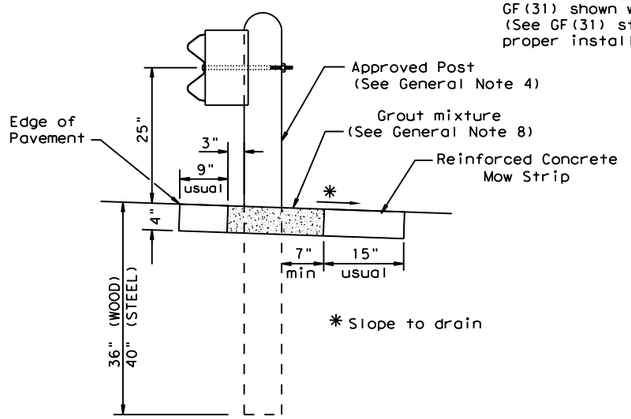


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



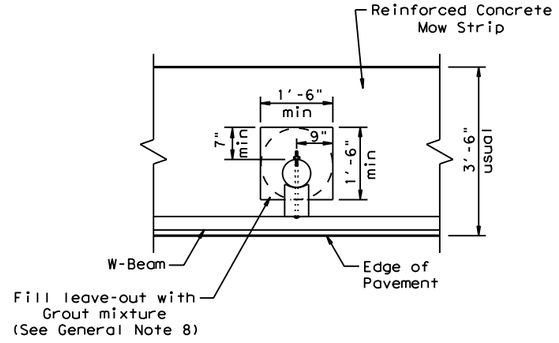
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

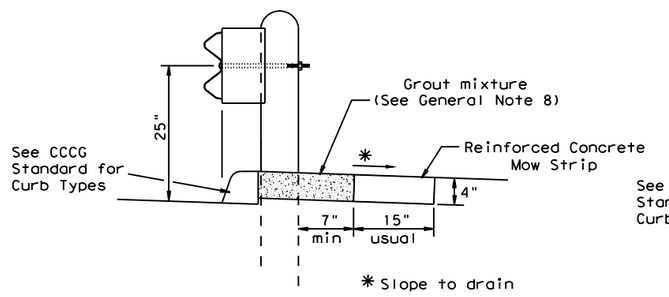
Note: Site Condition(s)

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

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

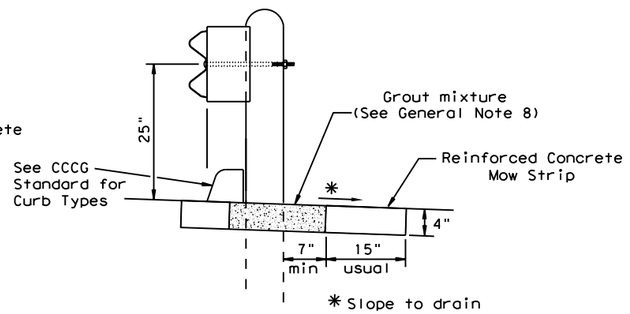
GENERAL NOTES

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



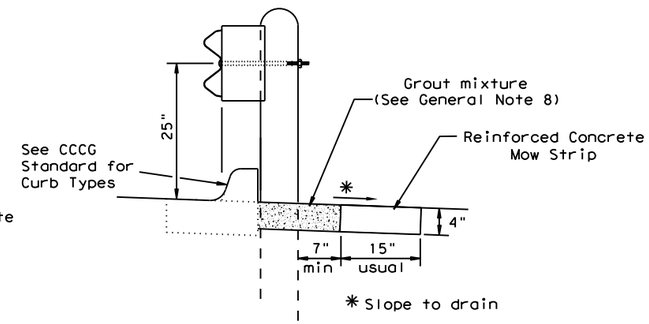
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

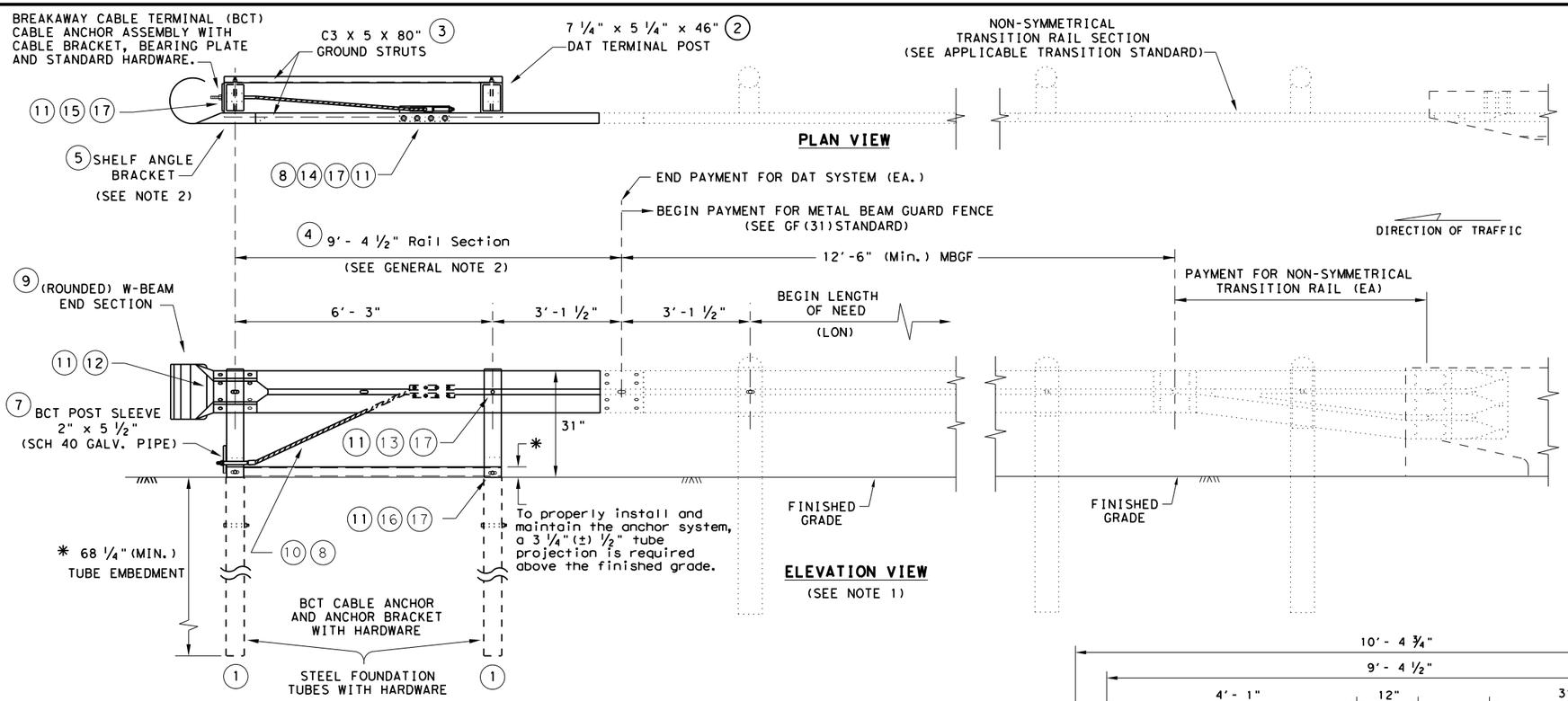
Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	0049	ROBERTSON		62

DATE: 1/31/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/00490807 6/4 - Design/Plan Set/3. Roadway/3H. RoadwayStandards/GF(31)DAT-19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

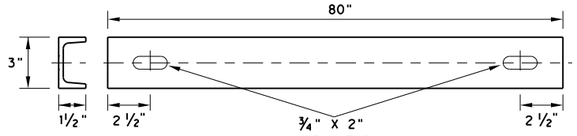
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

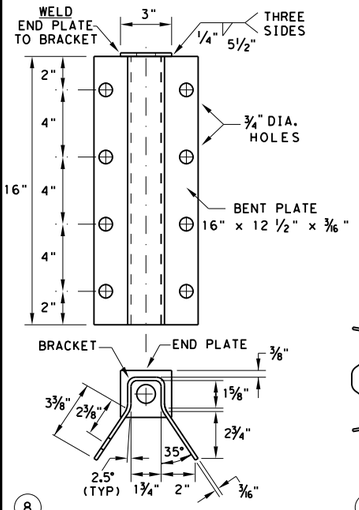
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

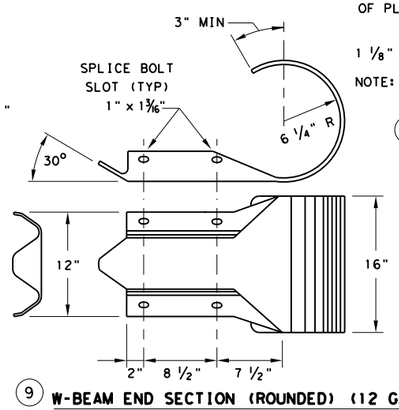
(4) TERMINAL RAIL ELEMENT FOR DAT



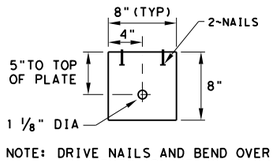
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

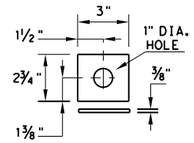


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

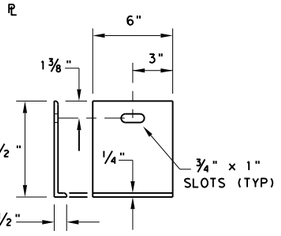


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

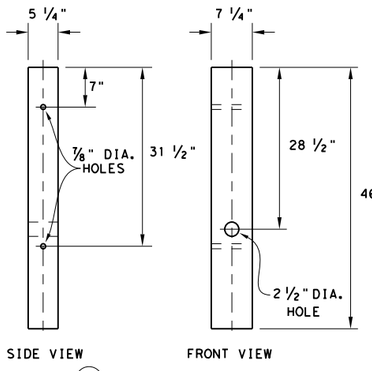
(6) BEARING PLATE
8"x 8"x 5/8" ℄



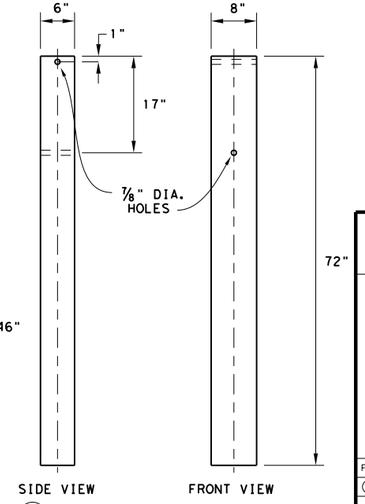
END PLATE



(5) SHELF ANGLE BRACKET



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



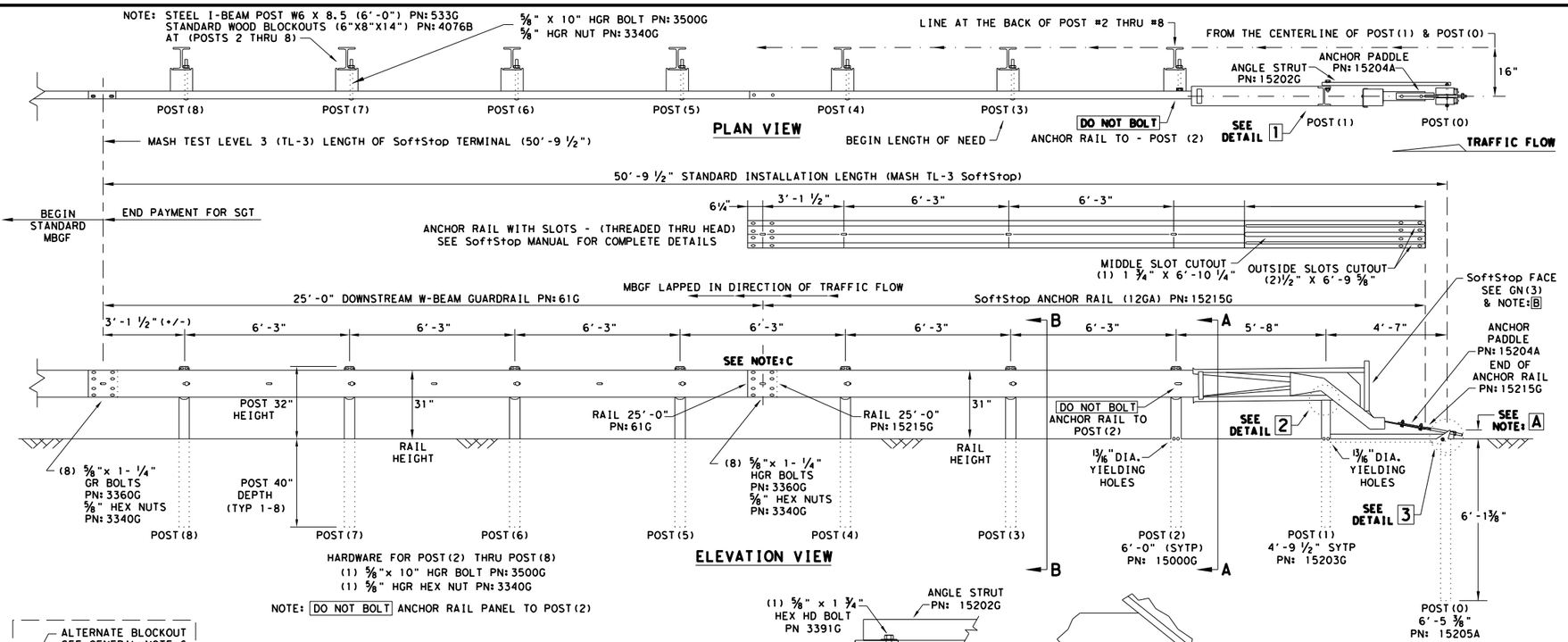
(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		63

DATE: 1/3/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/00490807 6/4 - Design/Plan Set/3. Roadway/3H. RoadwayStandards/SGT(10S)31-16.dgn



GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		64

DATE: 1/31/2024
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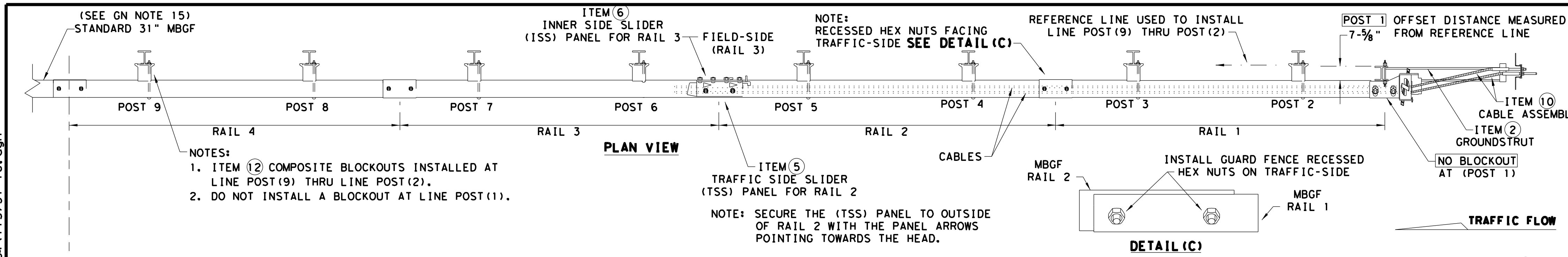
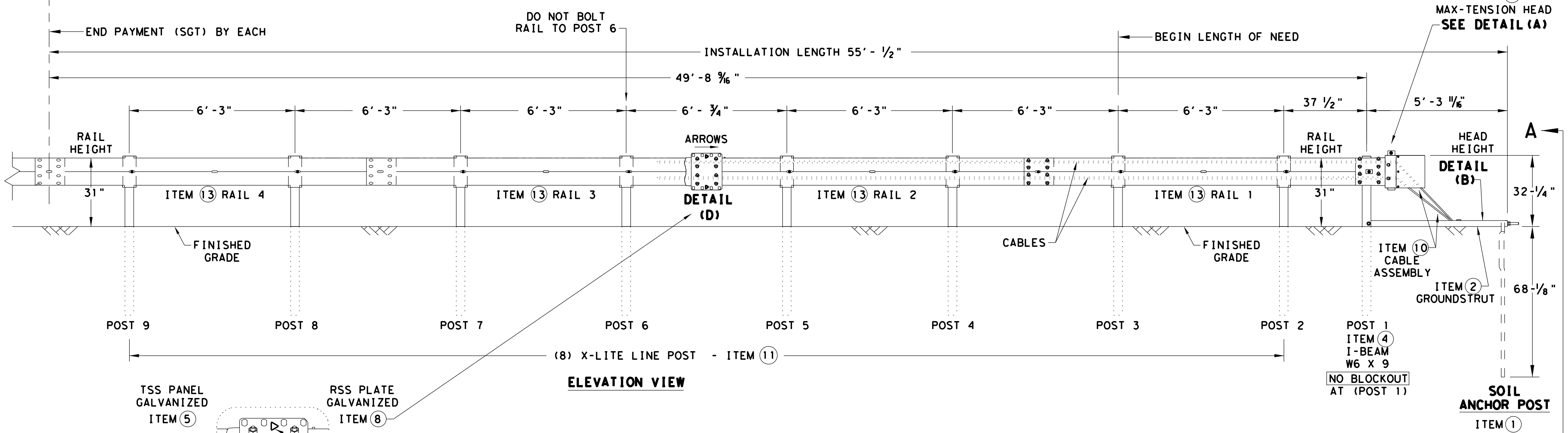
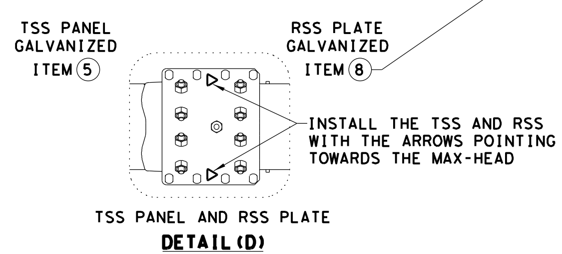
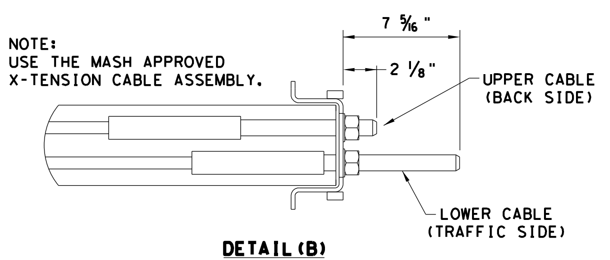
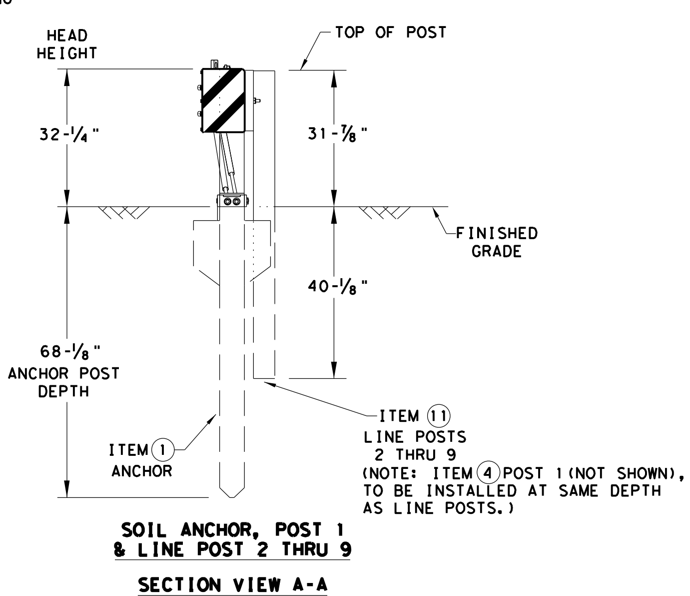
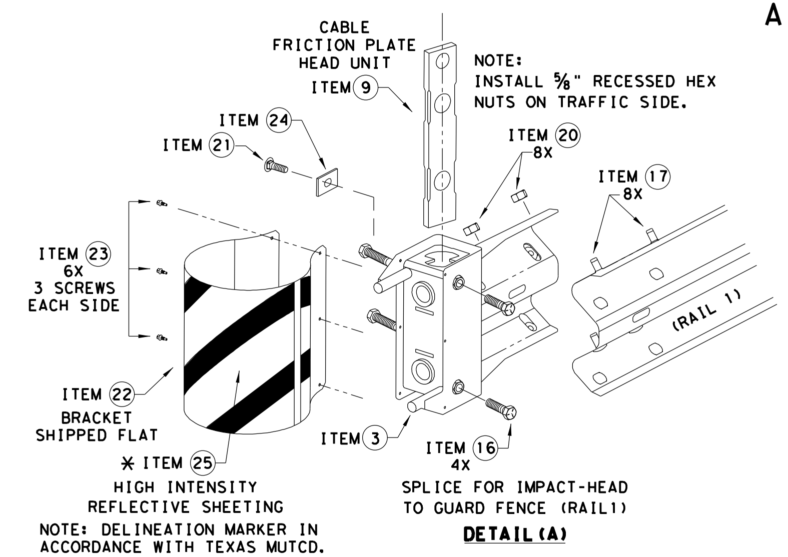












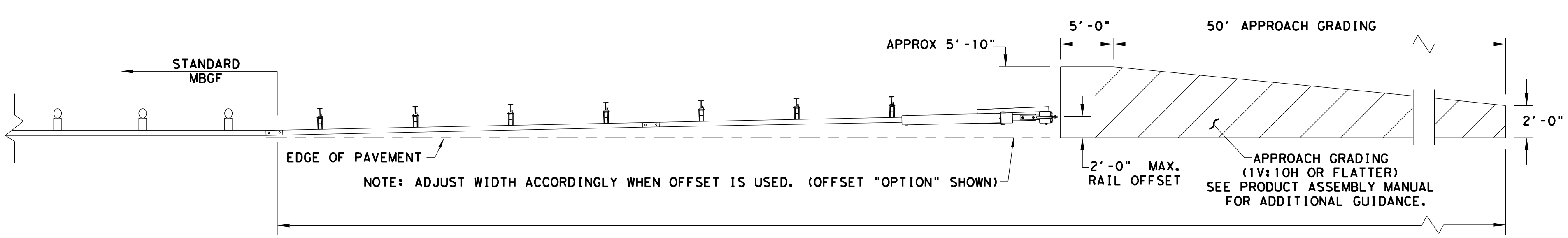
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



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 MAX-TENSION END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation | Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	65

DATE: 1/31/2024
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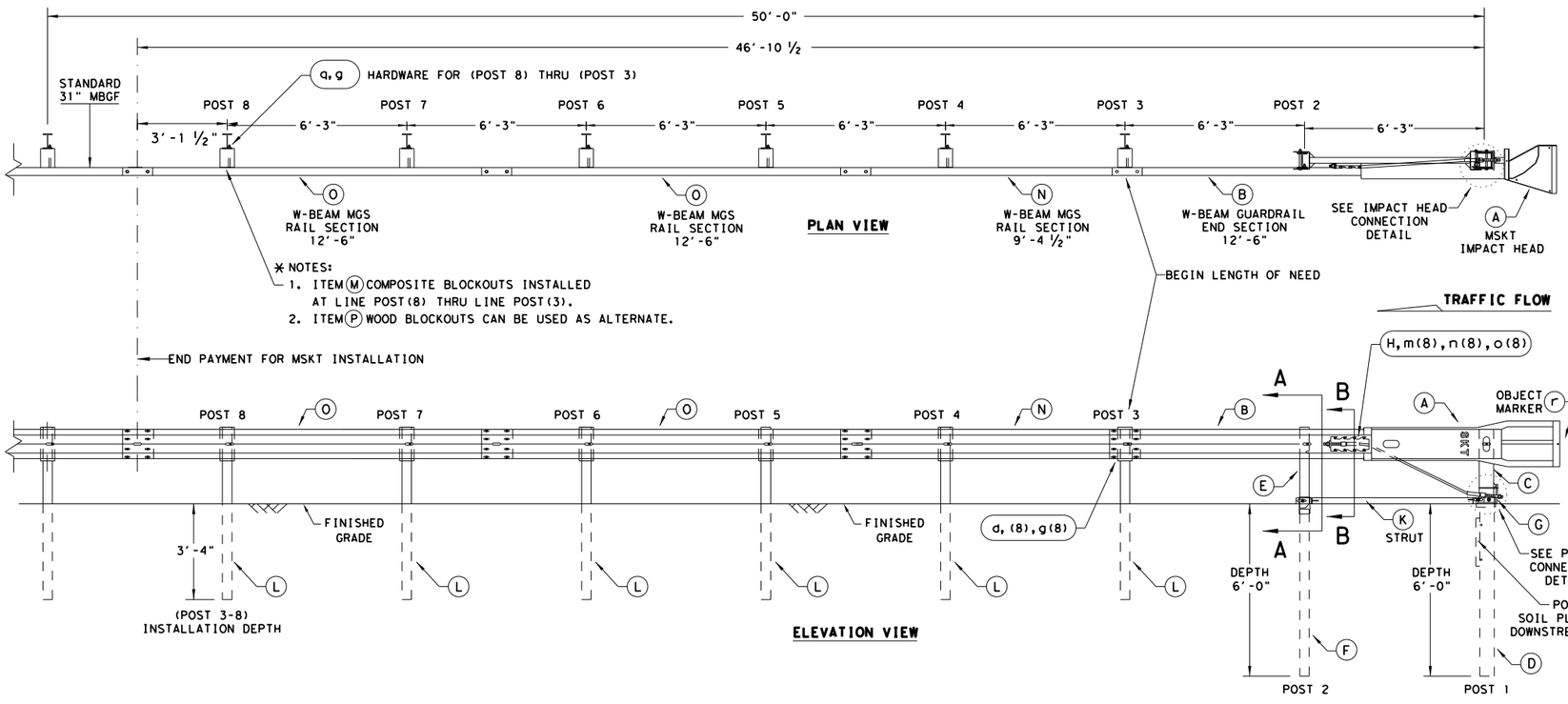
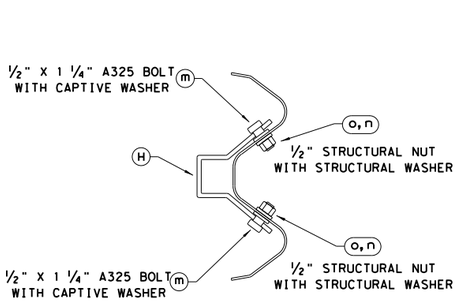
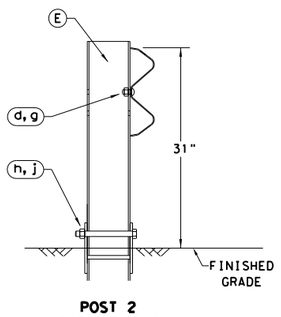


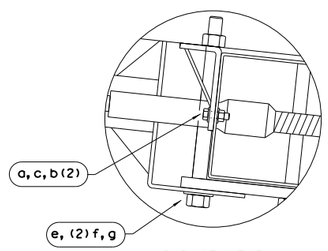
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



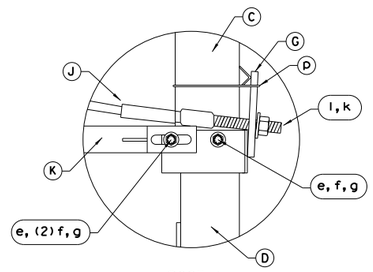
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

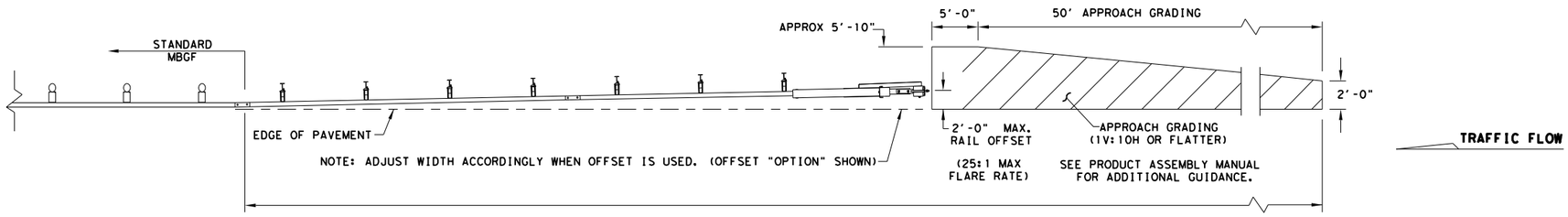
SEE NOTES: *

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" 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 1/2")	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	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 5/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL			
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY			
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	DIST	COUNTY		SHEET NO.			
	BRYAN	ROBERTSON		66			

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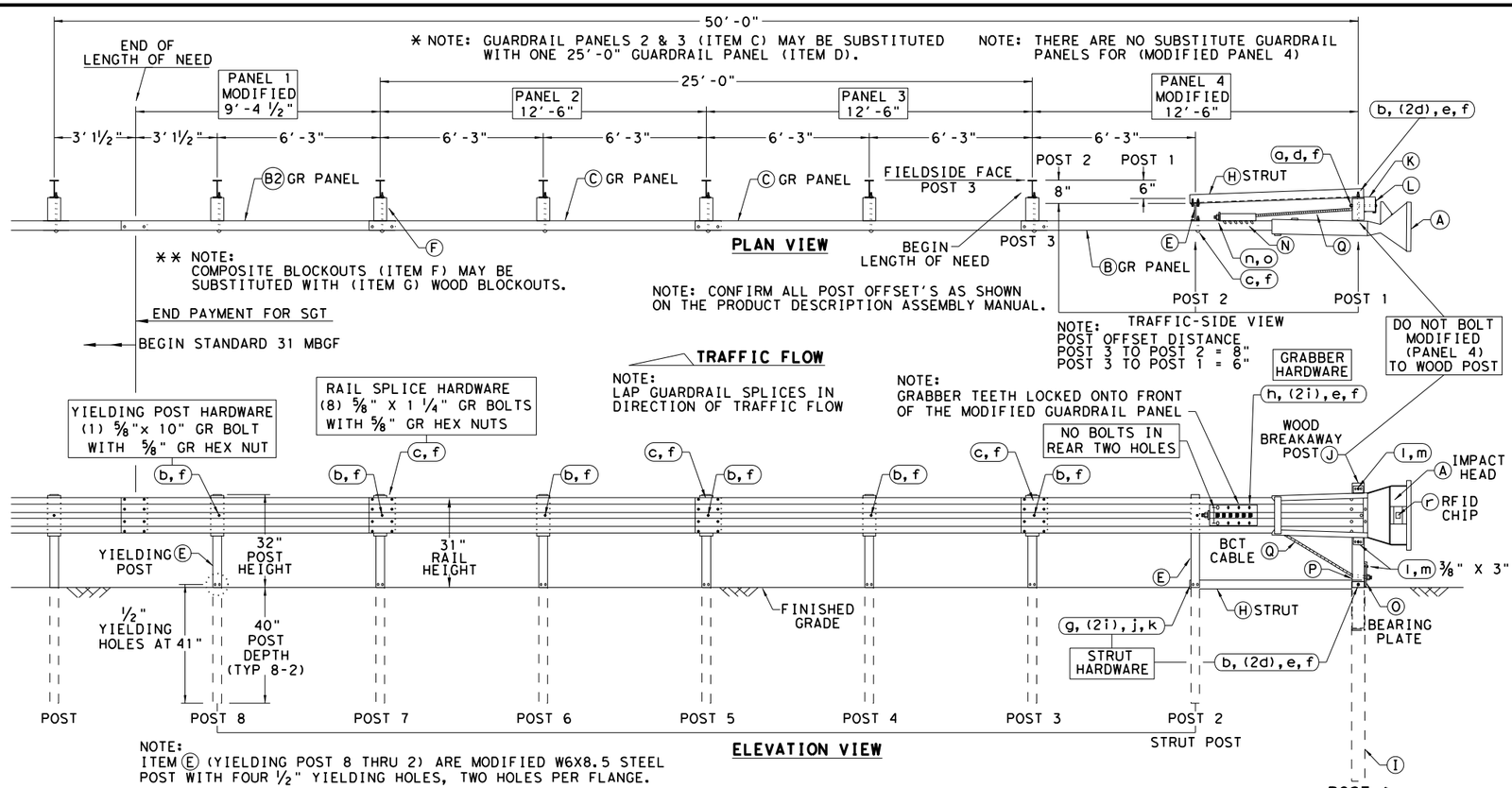
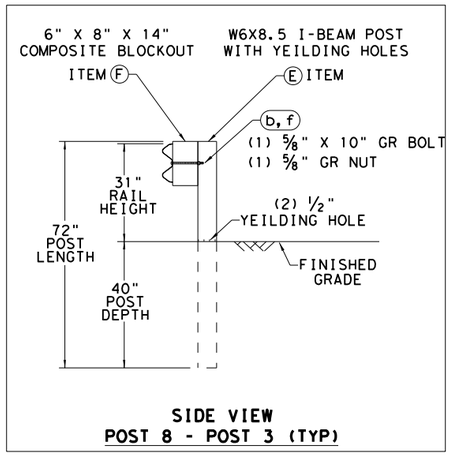


GENERAL NOTES

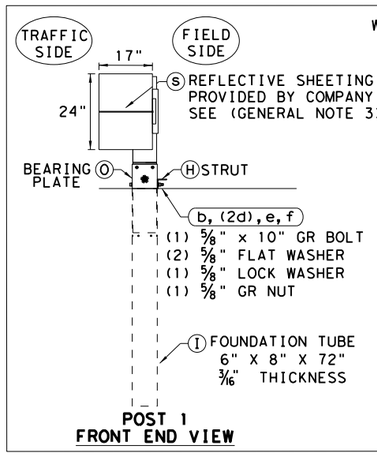
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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)



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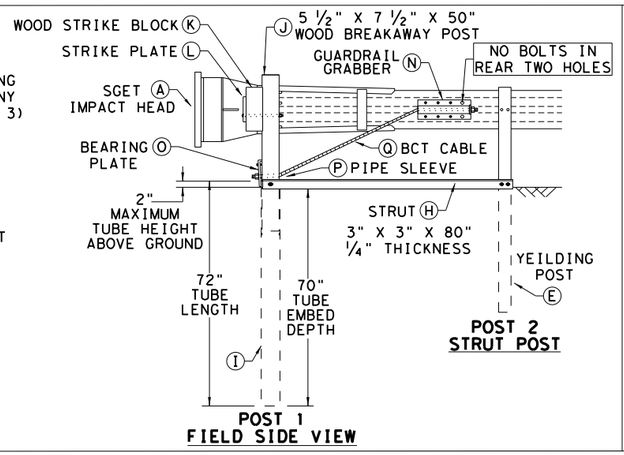
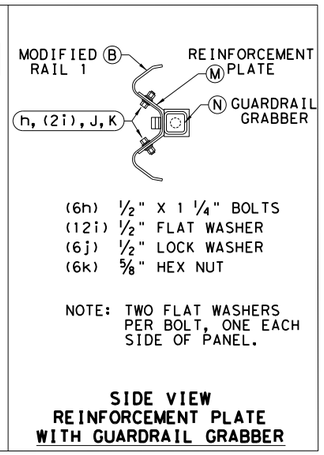
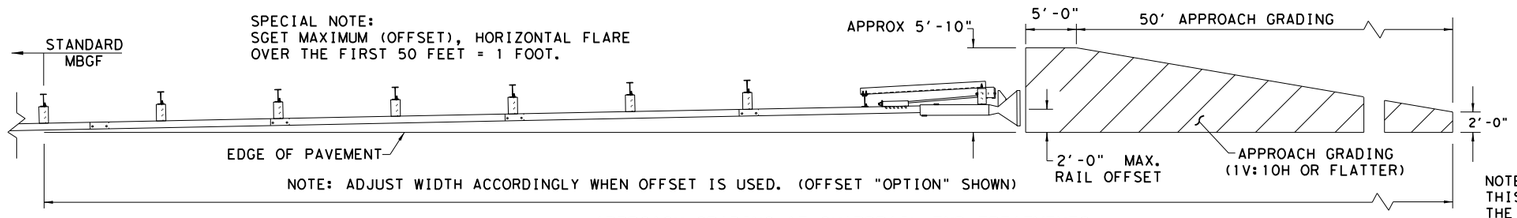
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation
Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0049	08	076	US 190		
	DIST	COUNTY		SHEET NO.		
	BRYAN	ROBERTSON		67		

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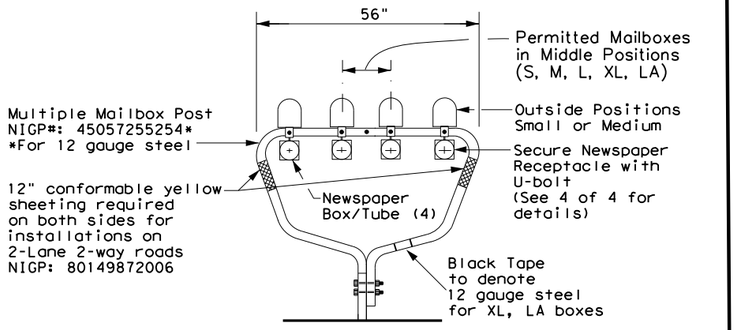
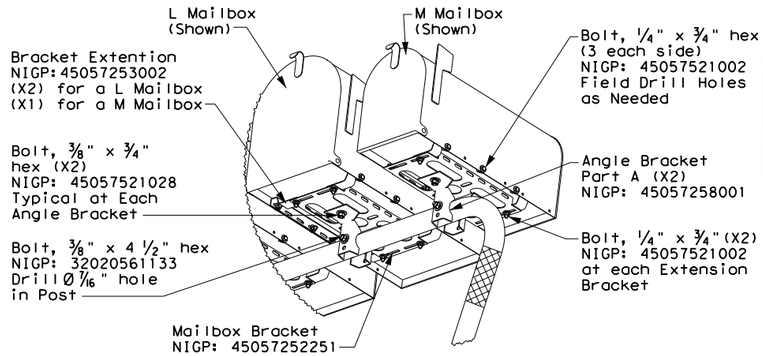
TYPE 1 - MULTIPLE





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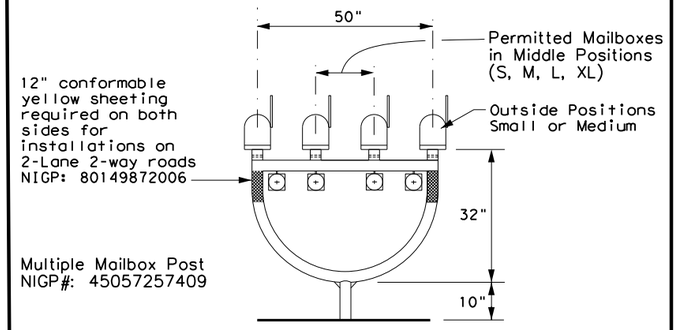
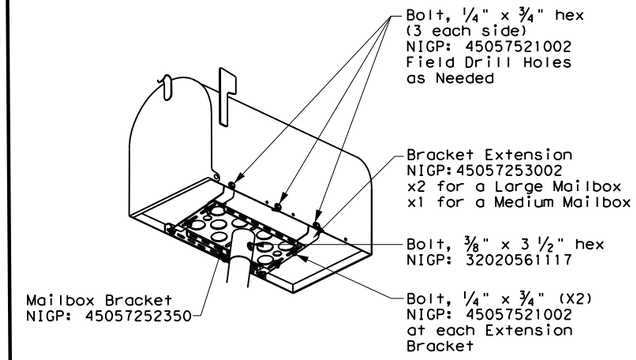




MAILBOX SIZES

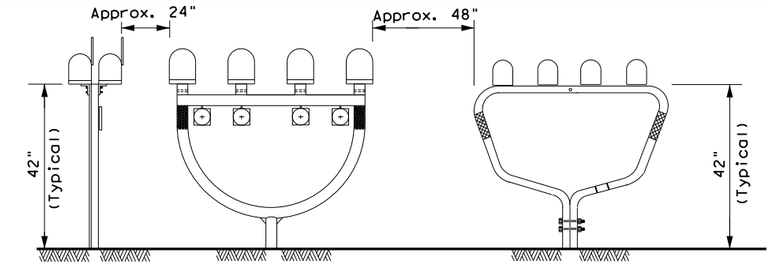
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

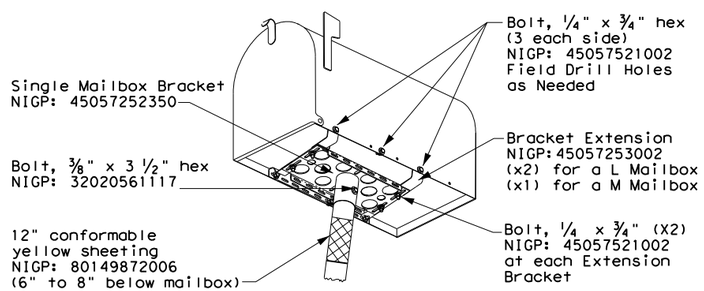
TYPICAL INSTALLATION MEASUREMENTS

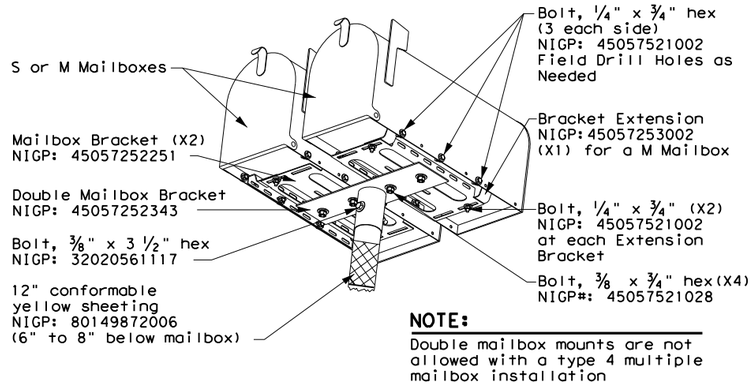


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

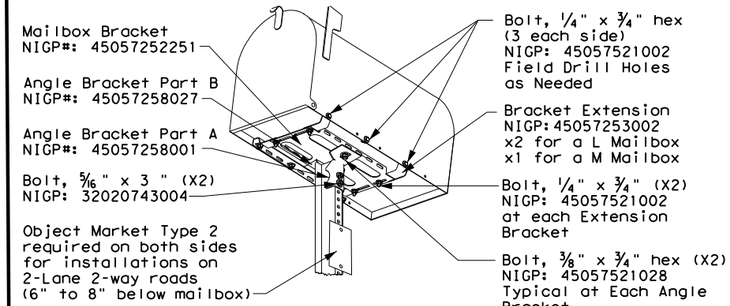


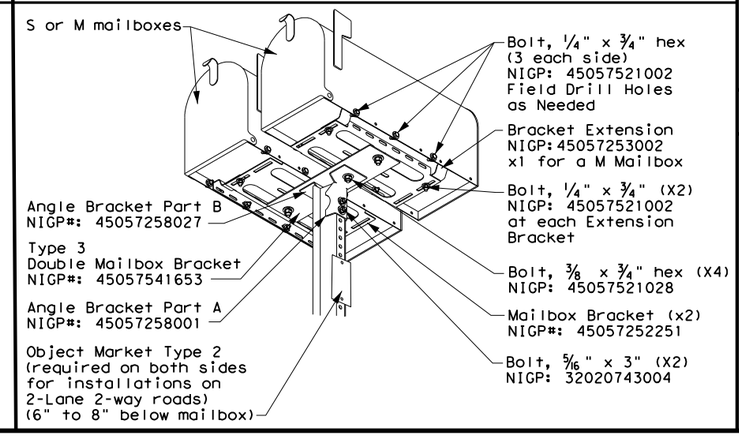


NOTE:

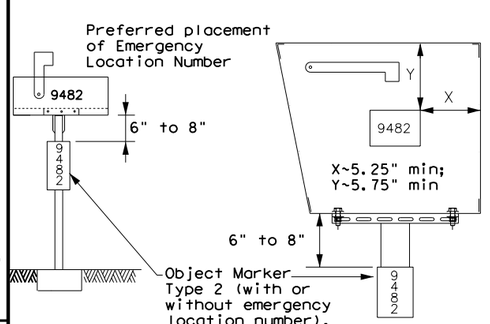
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

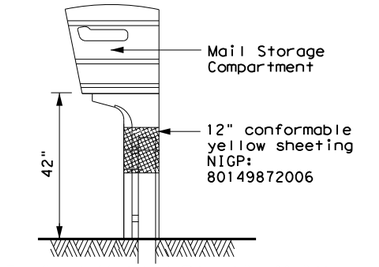


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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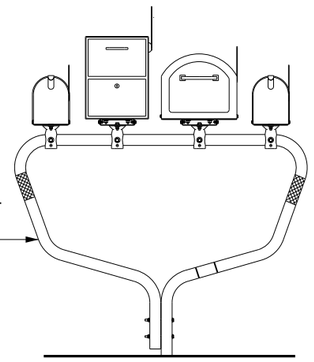
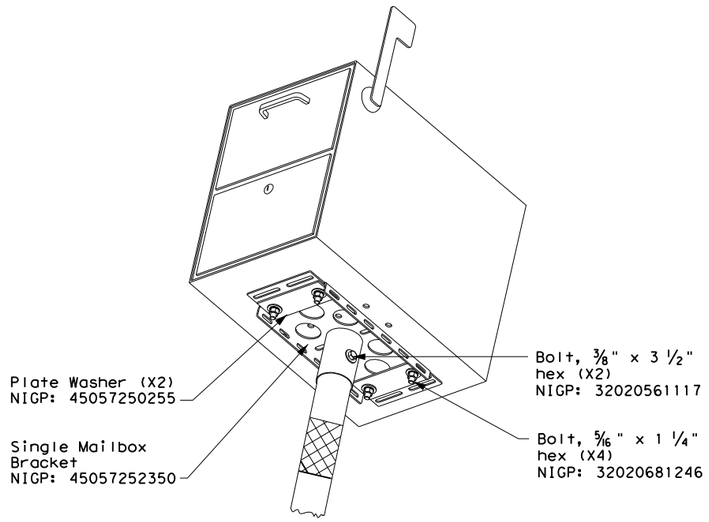
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		68

DATE:
FILE:

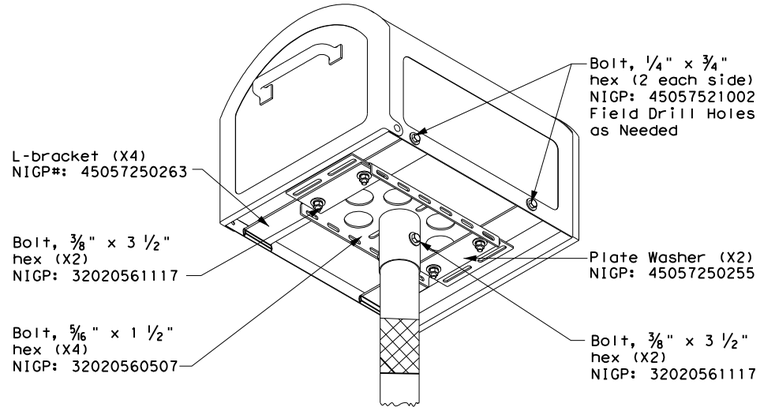
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

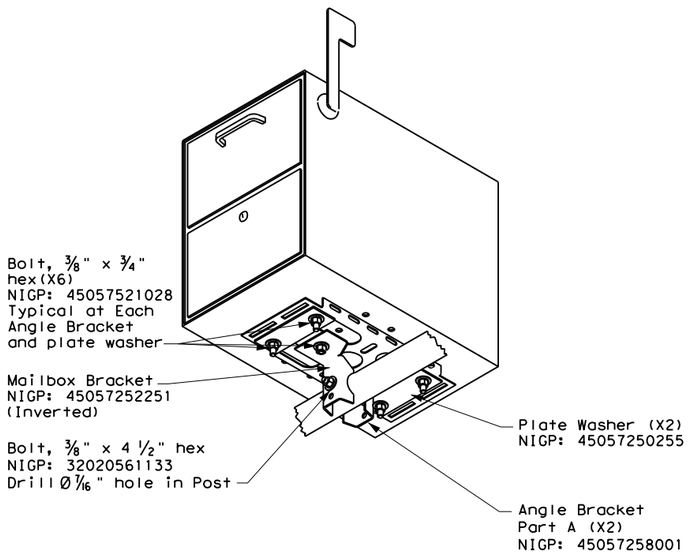


TYPE 2/4 - SINGLE XL MAILBOX

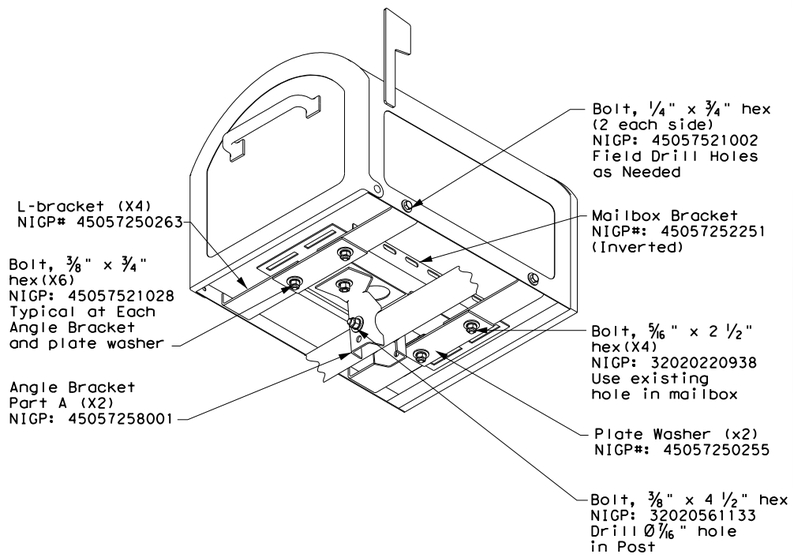


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

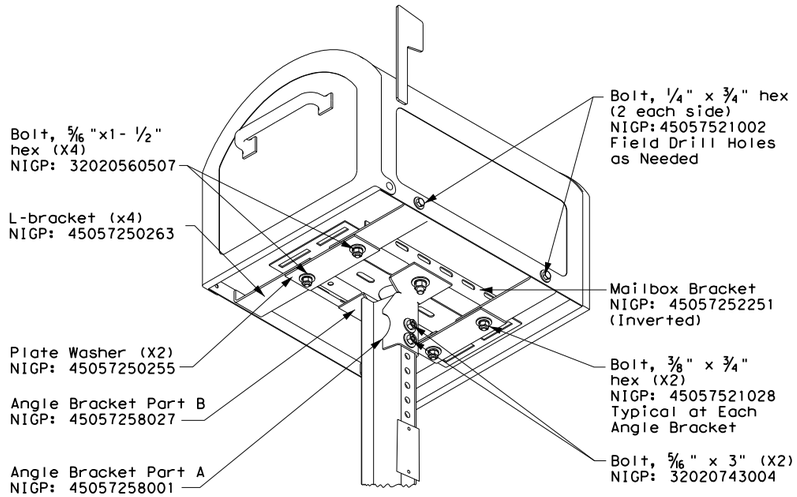
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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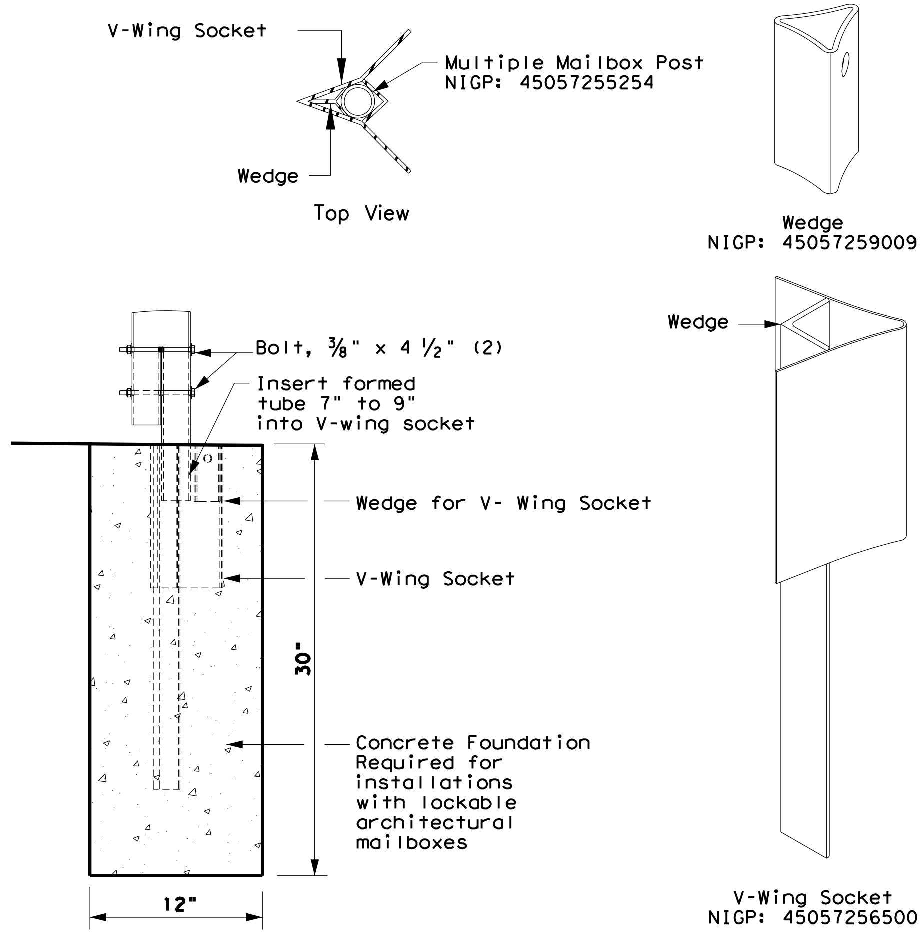
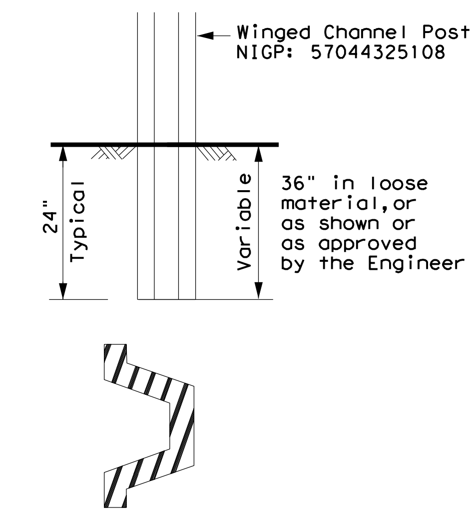
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		69

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



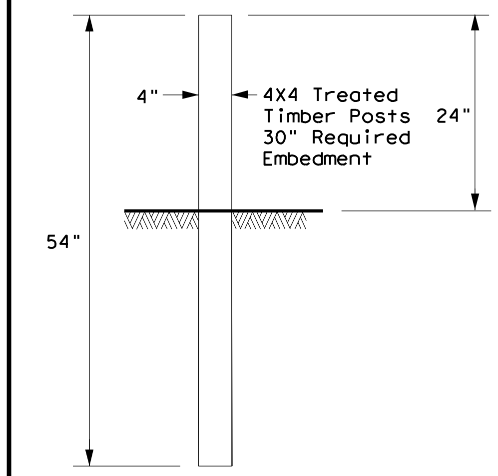
TYPE 3 - SUPPORT/FOUNDATION



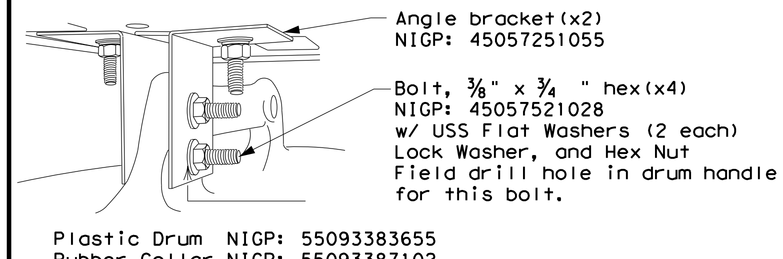
NOTES:

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

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

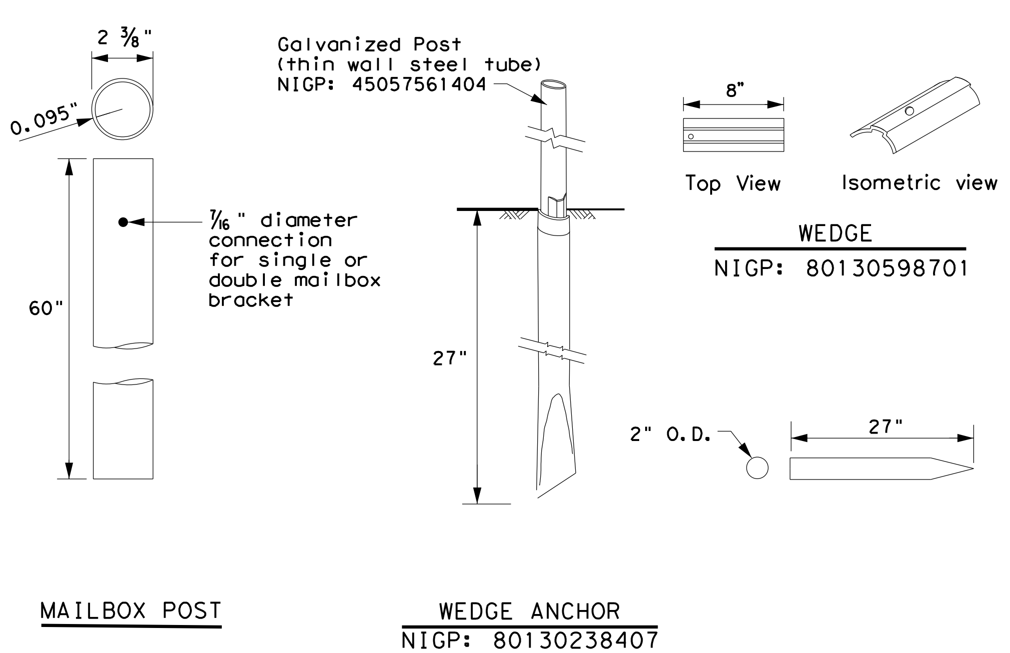
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

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

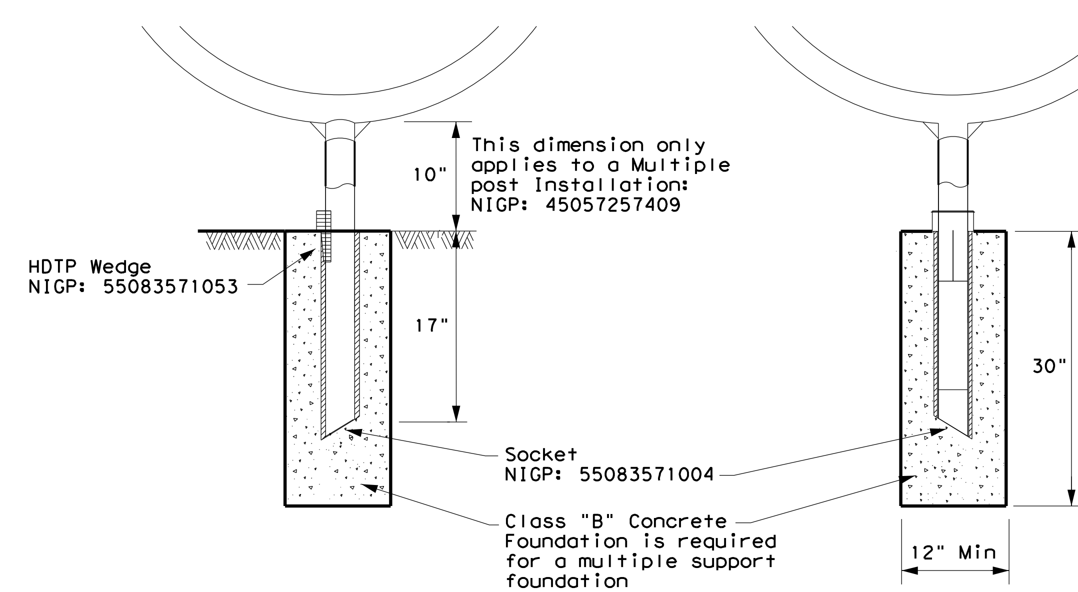
TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System



TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



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Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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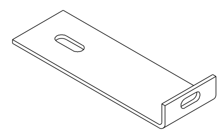
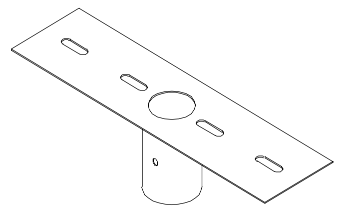
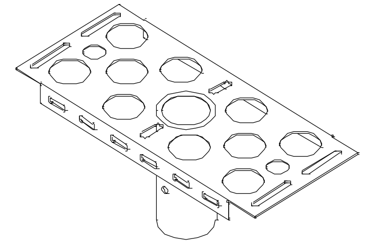
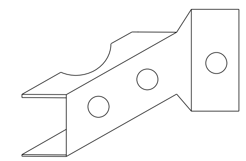
	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	70

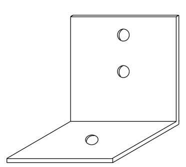
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: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

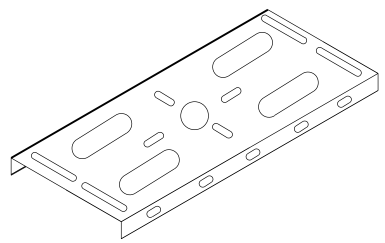

NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes

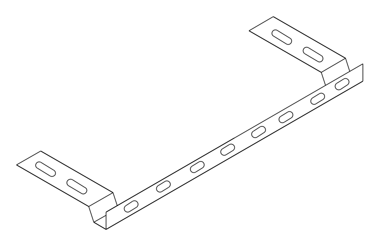

NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount

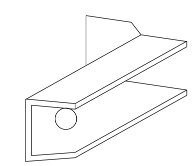

NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount

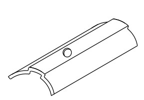

NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double

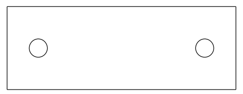

NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)

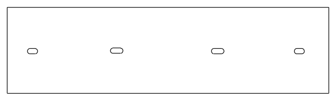

NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)

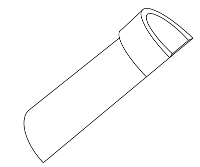

NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox

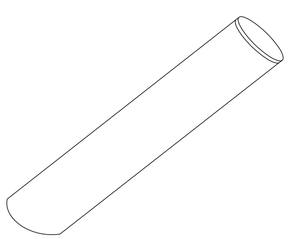

NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double

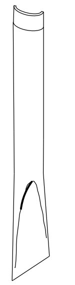

NIGP: 80130598701
Wedge for Type 2

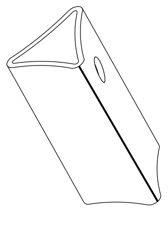

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

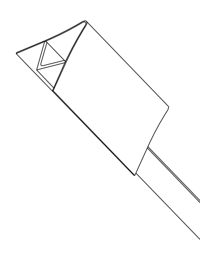

NIGP: 45057541653
Type 3 double mailbox bracket


NIGP: 55083571053
Type 4 Mailbox Wedge


NIGP: 55083571004
Type 4 Mailbox Socket


NIGP: 80130238407
Type 2 Wedge Anchor


NIGP: 45057259009
Wedge for Type 1 V-wing Socket


NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

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

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

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

SHEET 4 OF 4

Texas Department of Transportation

Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	71

DATE: 1/31/2024 10:29:36 AM
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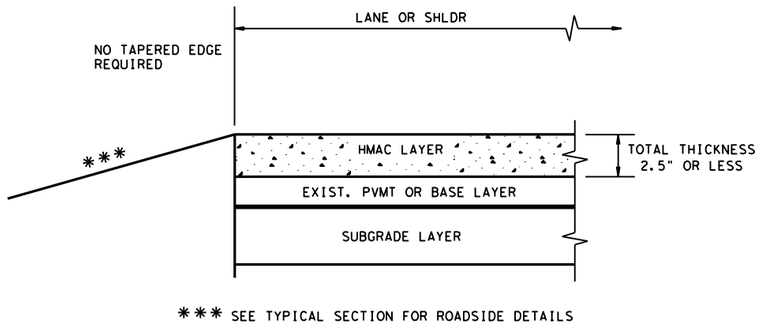
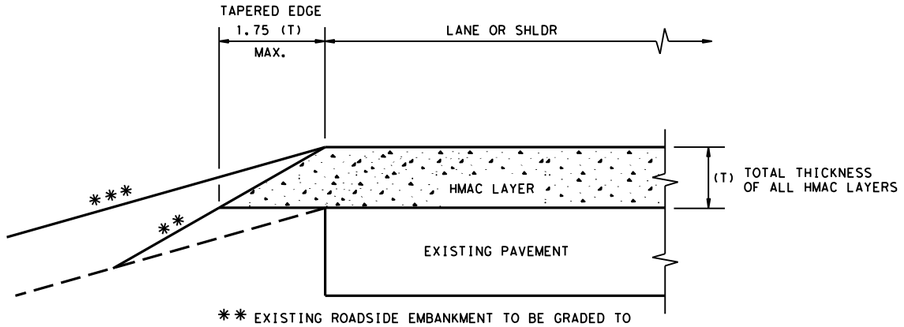
DATE: 1/31/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/00490807 6/4 - Design/Plan Set/3. Roadway/3H. RoadwayStandards/TE(HMAC)-11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

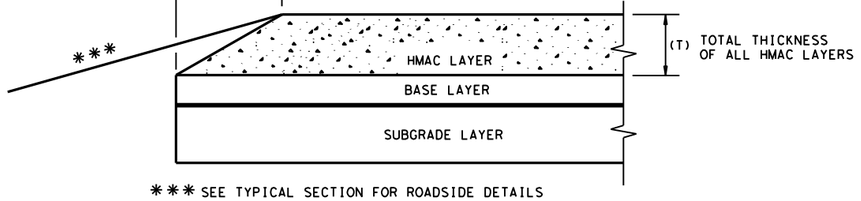
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

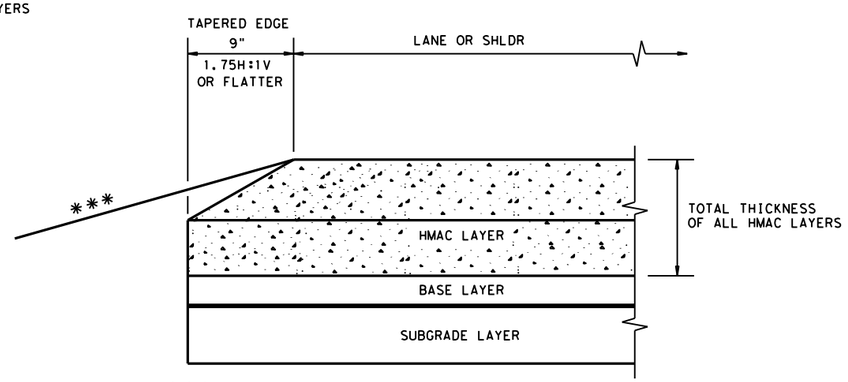
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		72

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U" 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
3	3A	D1-2	Prairie Hill Drive ⇨ RELOCATE ON NEW SIGN POSTS	78 X 30	✓		S80	1	SA	T	
5	5A	M1-4	190 RELOCATE ON NEW SIGN POSTS	30 X 24	✓		10 BWG	1	SA	P	
		M1-6T-2	6 TEXAS	24 X 24							
6	6A	D1-2	⇦ Sutton Rd RELOCATE ON NEW SIGN POSTS		✓		S80	1	SA	T	
9	9A	R4-2aT	LEFT LANE FOR PASSING ONLY RELOCATE ON NEW SIGN POSTS	24 X 36	✓		10BWG	1	SA	P	
14	14A	D8-1T	INSPECTION STATION AHEAD (REMOVE) / CMV INSPECTION STATION 1 MILE (INSTALL)	60 X 48	✓		S80	1	SA	T	
19	19A	S3-1	RELOCATE ON NEW SIGN POSTS	48 X 48	✓		10BWG	1	SA	P	
20	20A	M1-4	190 RELOCATE ON NEW SIGN POSTS	30 X 24	✓		10 BWG	1	SA	P	
		M1-6T-2	6 TEXAS	24 X 24							
20	20B	D1-2	⇦ Noble Oaks Ln RELOCATE ON NEW SIGN POSTS	66 X 30	✓		S80	1	SA	T	
22	22A	W2-7L	RELOCATE RDSD FLASH BEACON ASSEMBLY	48 X 48							

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

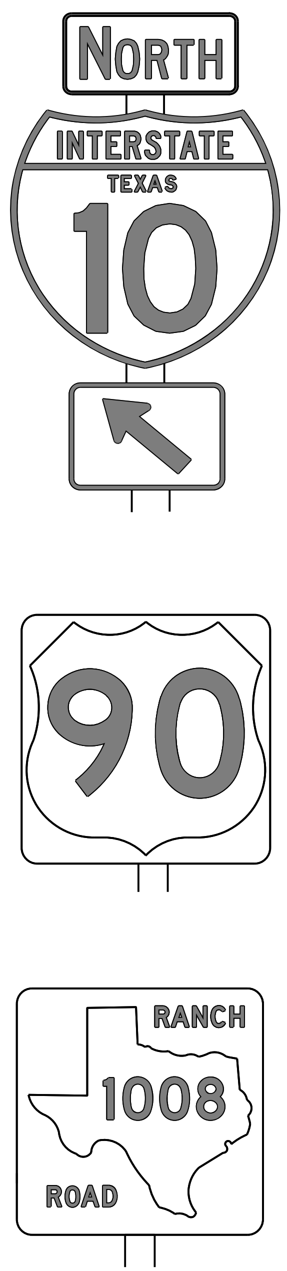
SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
4-16	DIST	COUNTY		SHEET NO.
8-16	BRYAN	ROBERTSON		73

DATE: 1/31/2024 10:30:08 AM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764 sheets of SMALL SIGNS.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

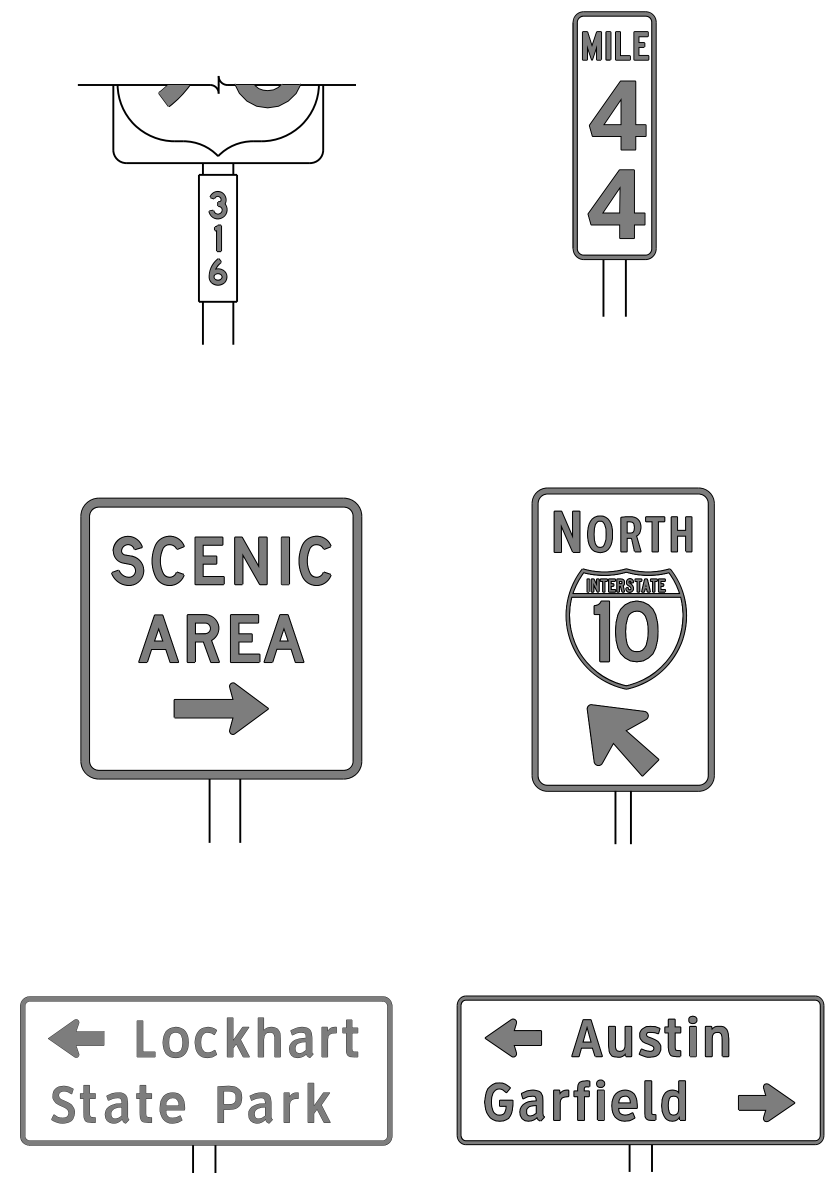
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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	0049	08	076	US 190
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	74

3

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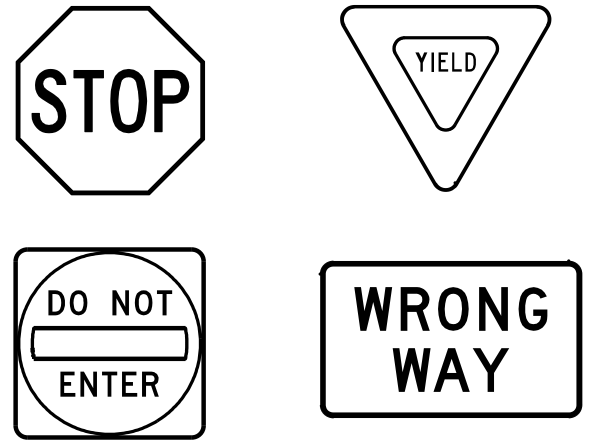
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

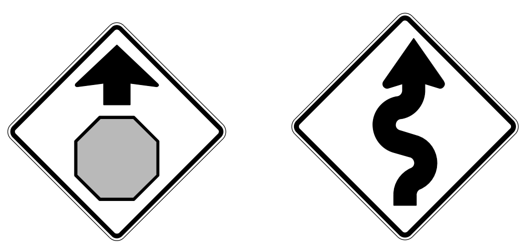
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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 12-03 7-13 9-08		0049	08	076	US 190		
		DIST		COUNTY	SHEET NO.		
		BRY		ROBERTSON	75		

4

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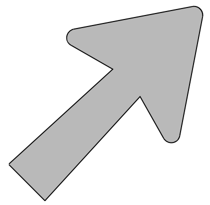
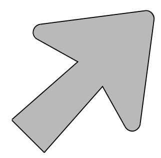
ARROW DETAILS

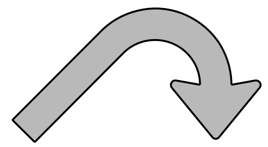
for Large Ground-Mounted and Overhead Guide Signs



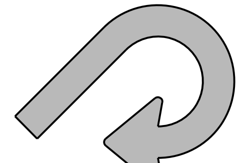
Type A



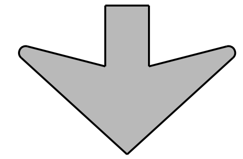
Type B



E-3



E-4



Down Arrow

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

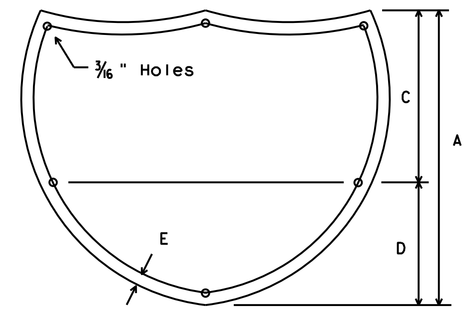
NOTE

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.

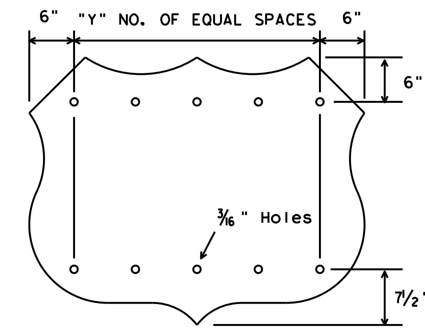
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



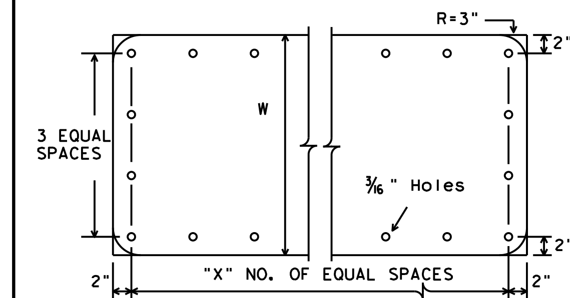
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



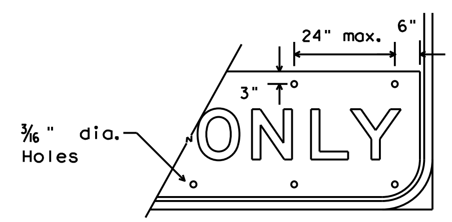
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



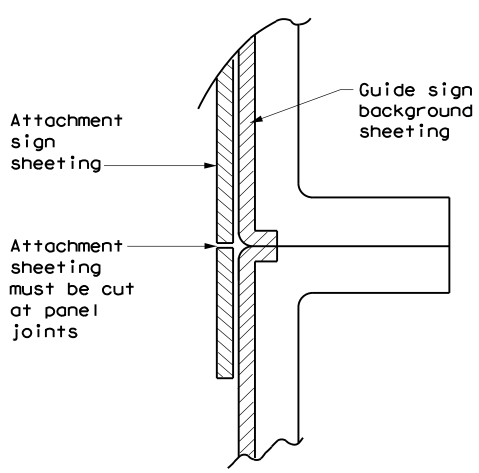
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

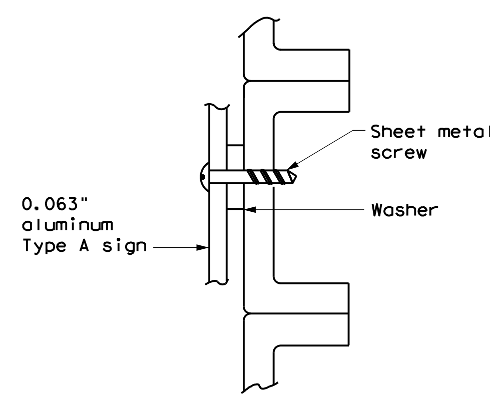


EXIT ONLY PANEL

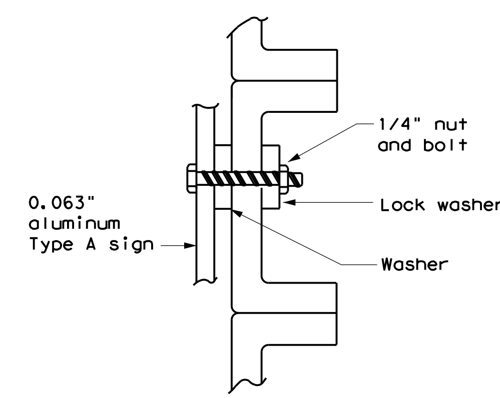
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

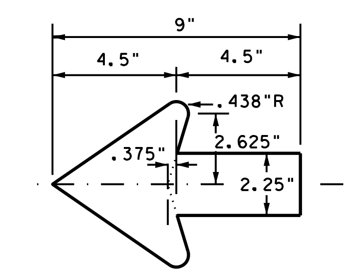
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

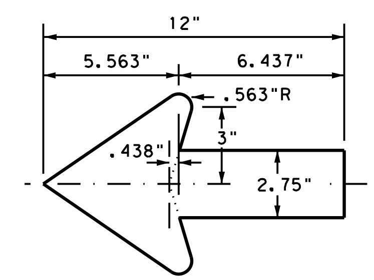
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	76

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

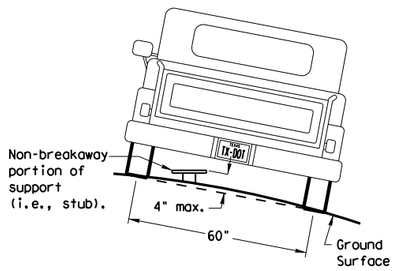
Anchor Type

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

Sign Mounting Designation

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

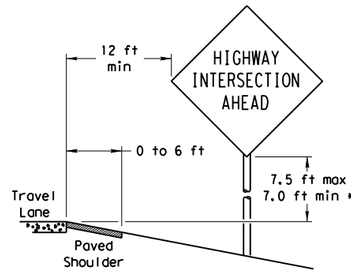
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

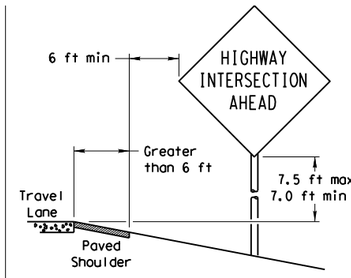
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

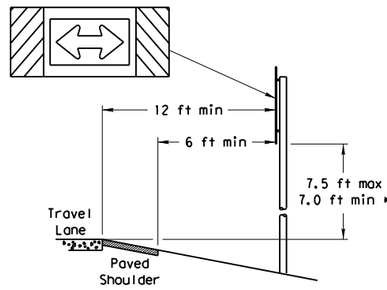
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



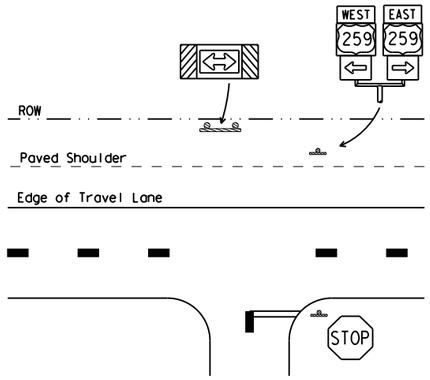
GREATER THAN 6 FT. WIDE

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

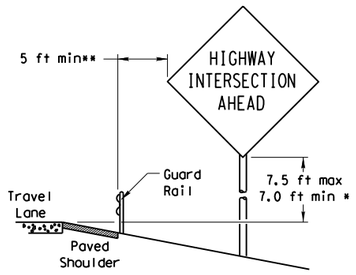
T-INTERSECTION



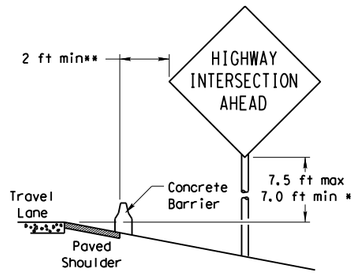
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



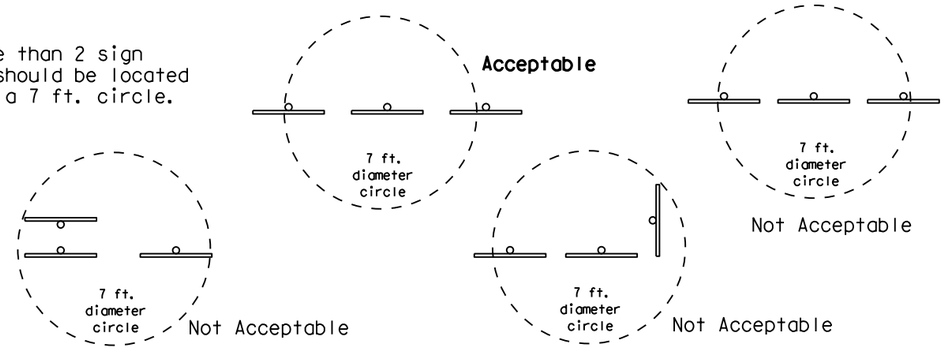
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

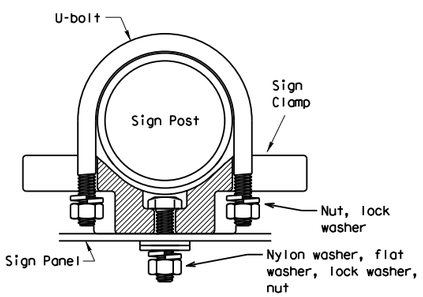
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

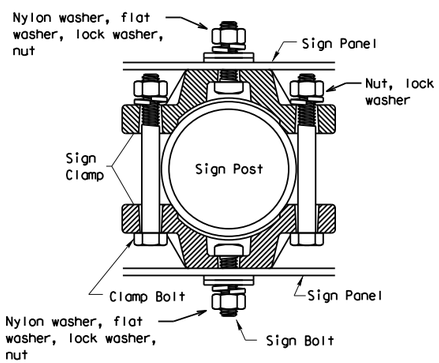


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

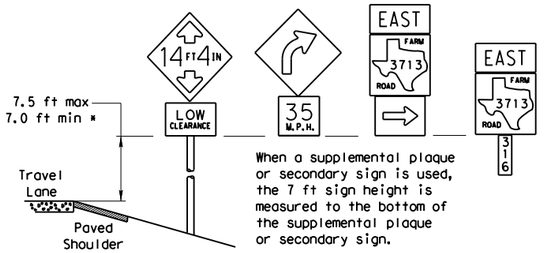
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



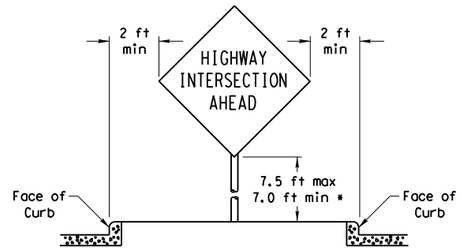
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



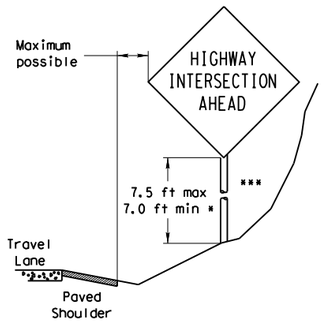
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

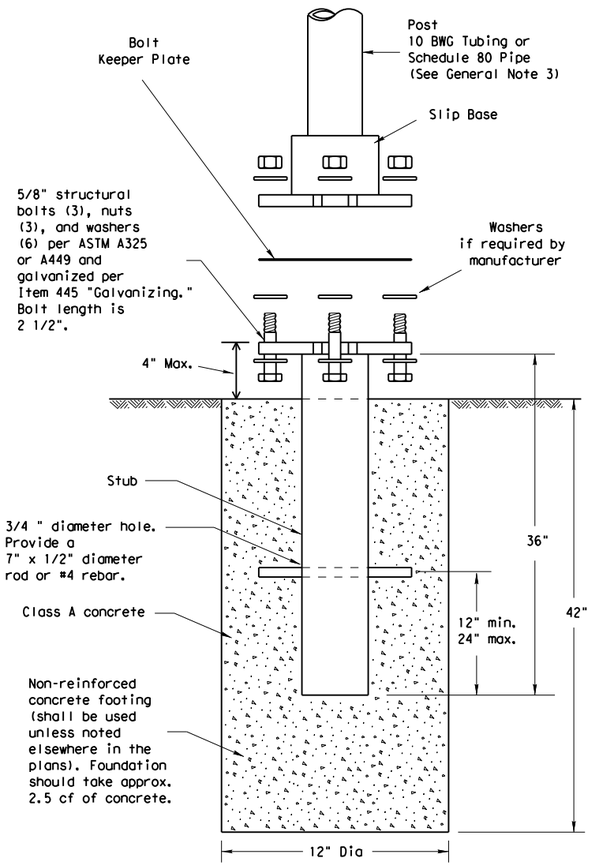
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190

DIST	COUNTY	SHEET NO.
BRYAN	ROBERTSON	77

DATE:
FILE:

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.

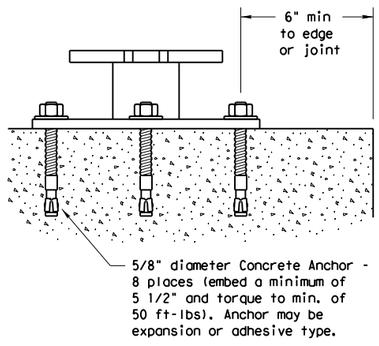
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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.

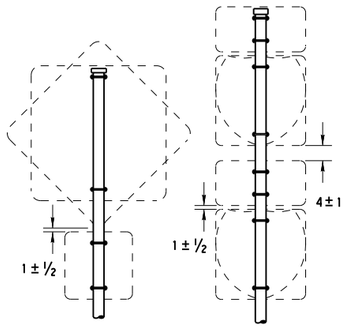
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

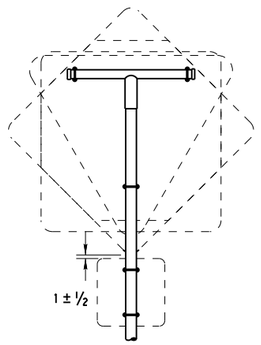
SMD(SLIP-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		78

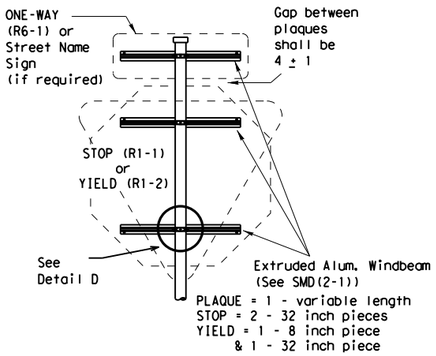
DATE:
FILE:



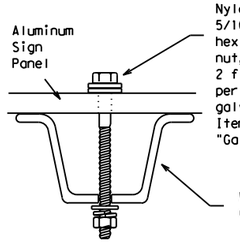
SM RD SGN ASSM TY XXXXX(1)XX(P)



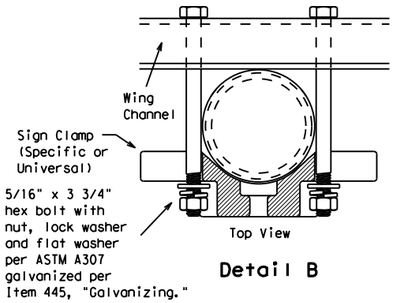
SM RD SGN ASSM TY XXXXX(1)XX(T)



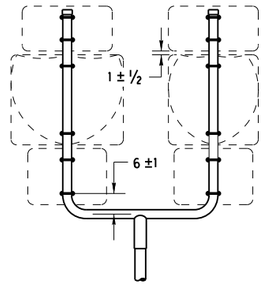
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



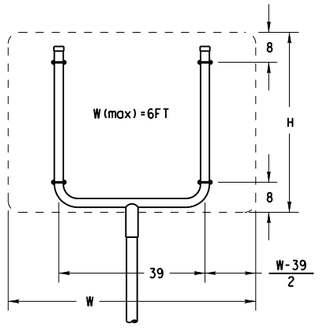
Detail A



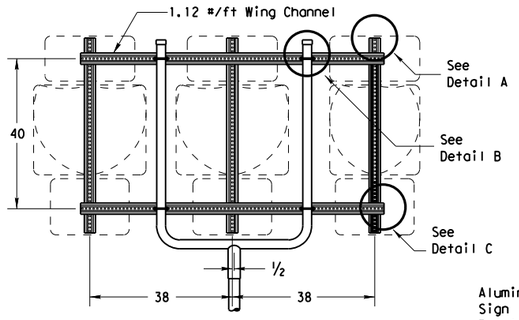
Detail B



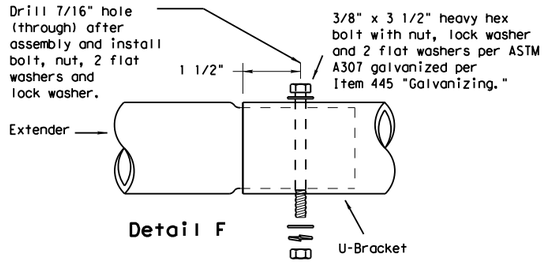
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

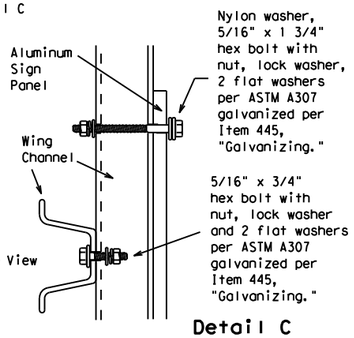


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

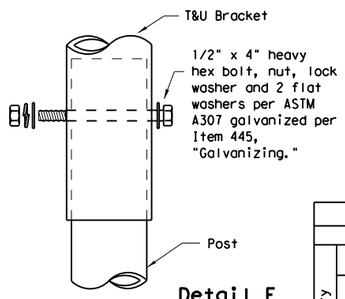


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C

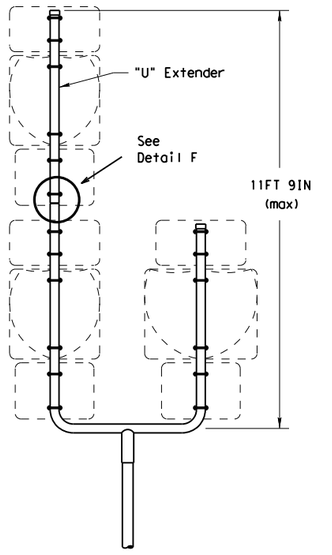


Detail E

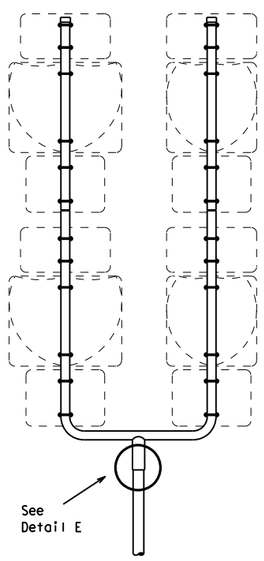
GENERAL NOTES:

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

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



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



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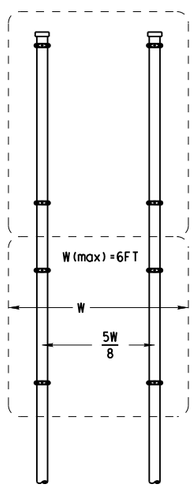
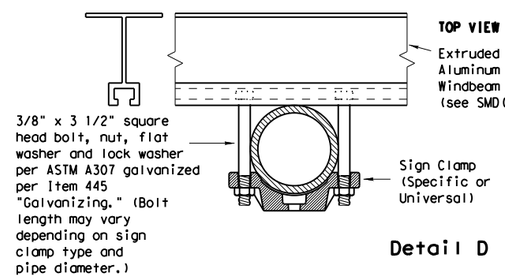
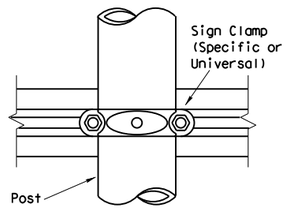


SM RD SGN ASSYM TY XXXXX(2)XX(P)

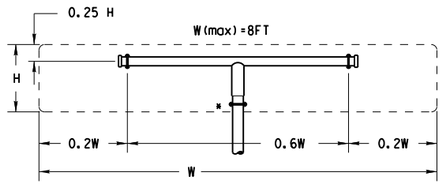


SIDE VIEW

Detail D



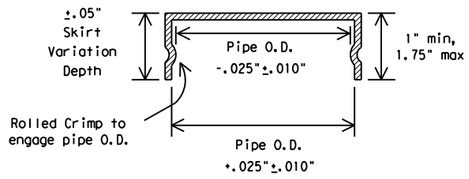
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

Texas Department of Transportation
Traffic Operations Division

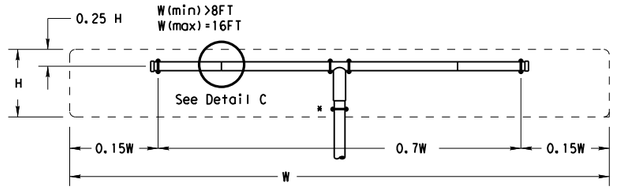
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

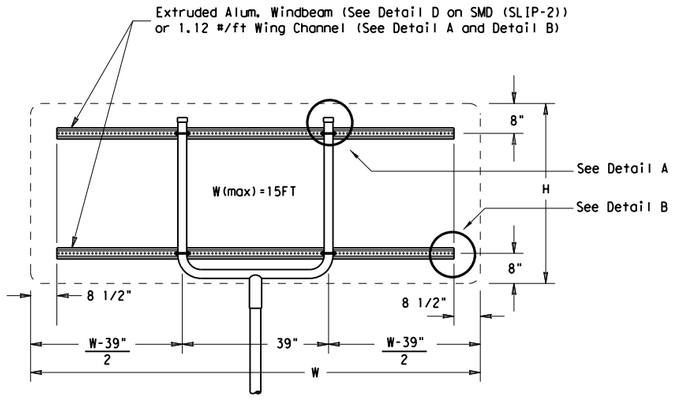
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		79

9-08 REVISIONS

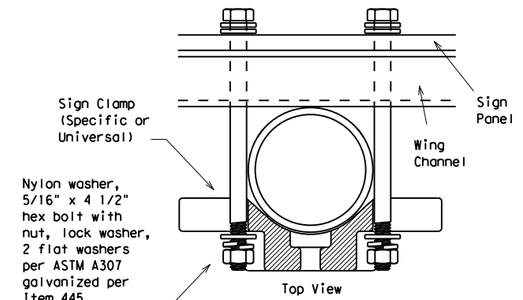
DATE:
FILE:



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

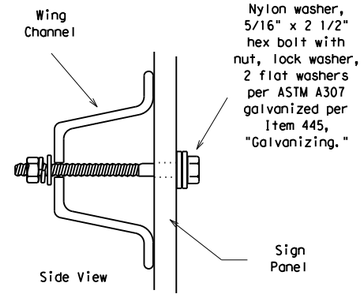


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

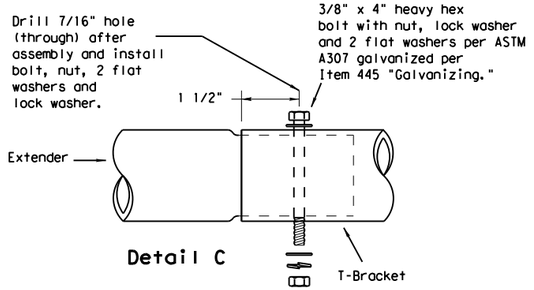


Top View

Detail A



Detail B



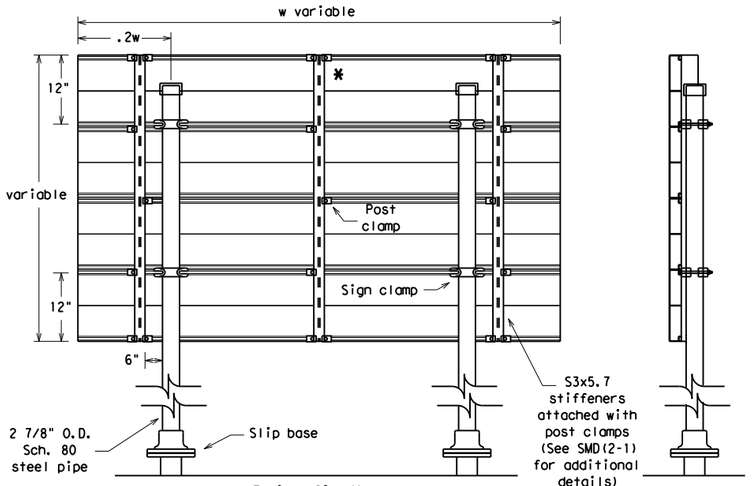
Detail C

Splices shall only be allowed behind the sign substrate.

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.

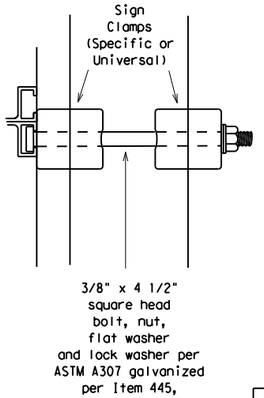


Typical Sign Mount

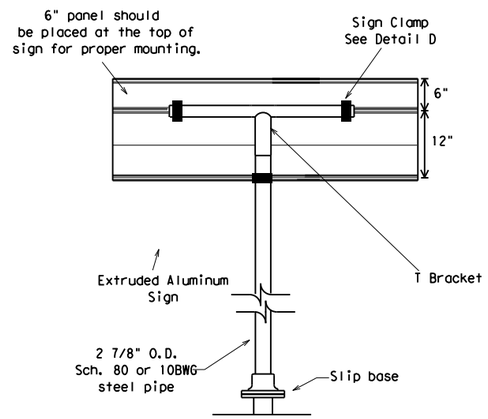
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

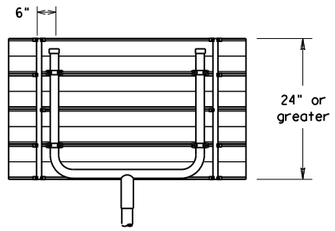
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

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

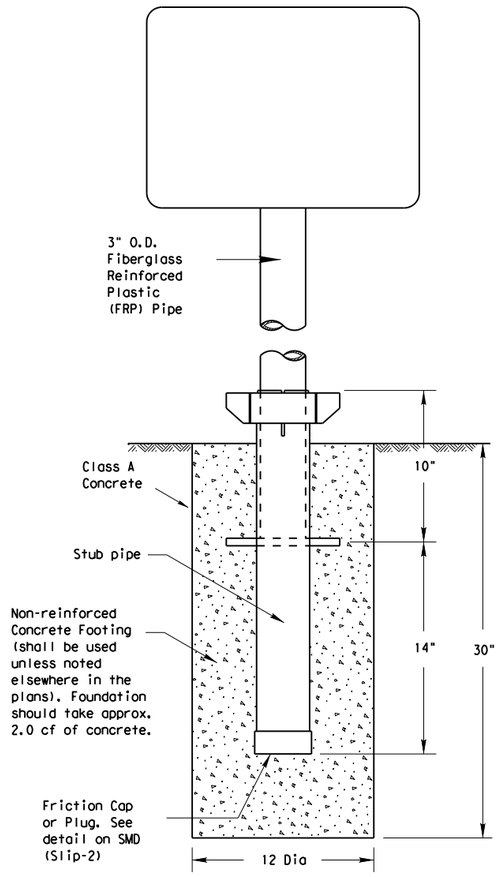
CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190

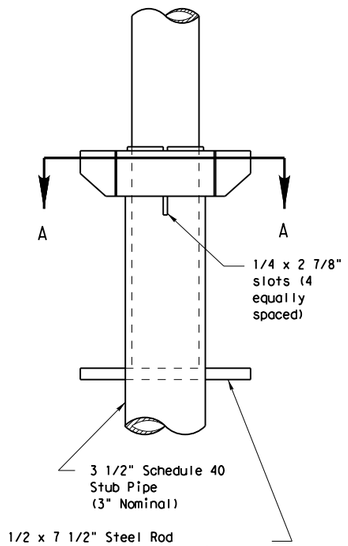
DIST	COUNTY	SHEET NO.
BRYAN	ROBERTSON	80

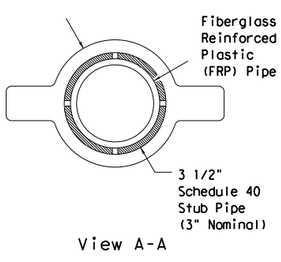
DATE:
FILE:

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.

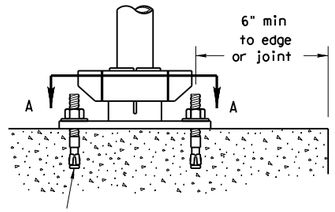
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post





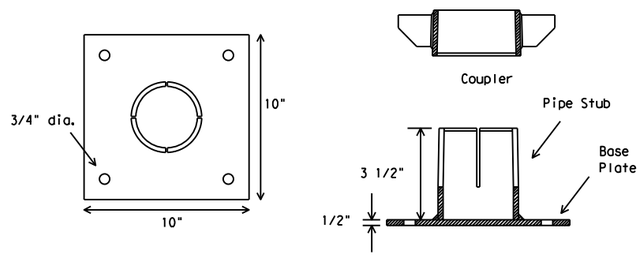


SM RD SGN ASSM TY FRP(X)UA(P)



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

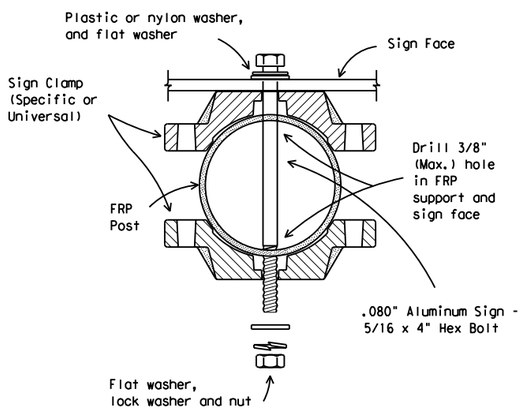
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

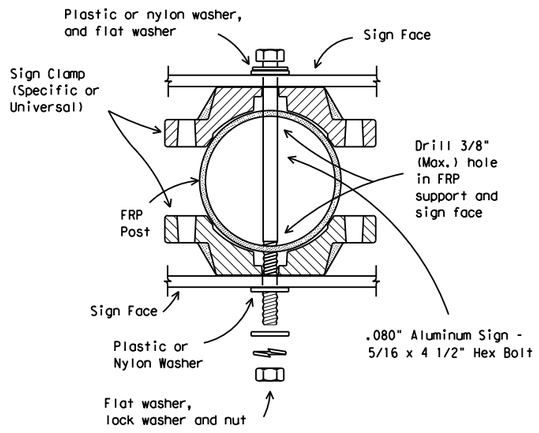
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



DATE:
FILE:

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

REVISIONS

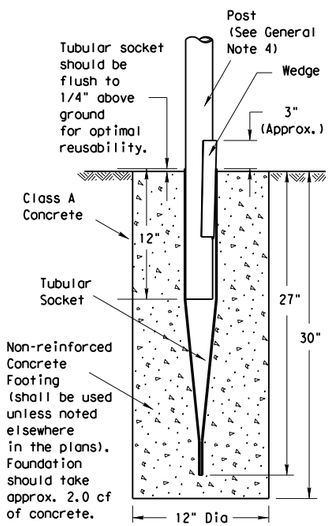
9-08

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

CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190

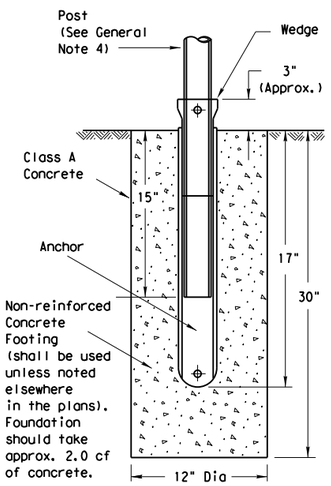
DIST	COUNTY	SHEET NO.
BRYAN	ROBERTSON	81

Wedge Anchor Steel System



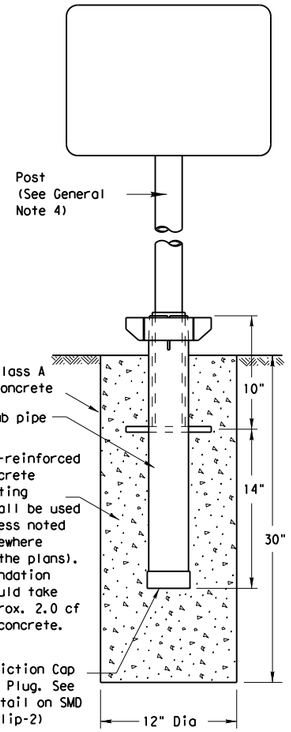
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

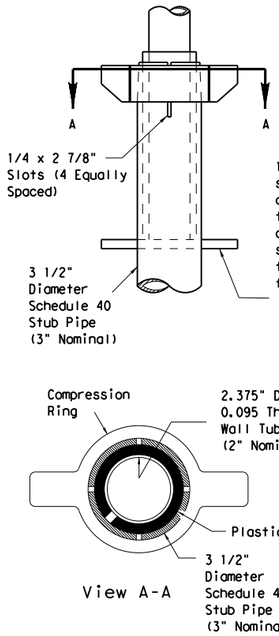


SMD RD SGN ASSM TY TWT(X)WP(X)

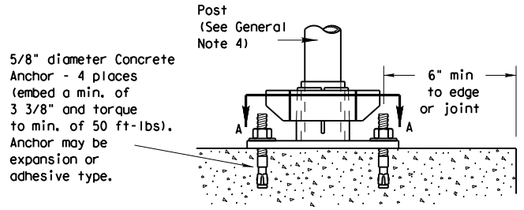
Universal Anchor System with Thin-Walled Tubing Post



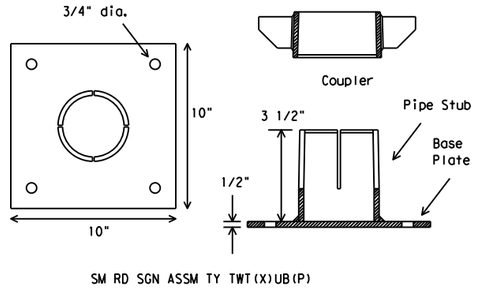
SM RD SGN ASSM TY TWT(X)UA(P)



Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

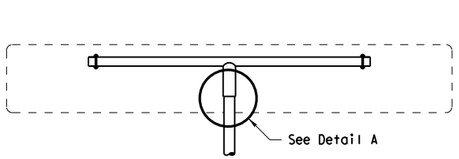


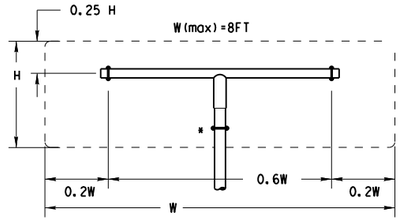
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

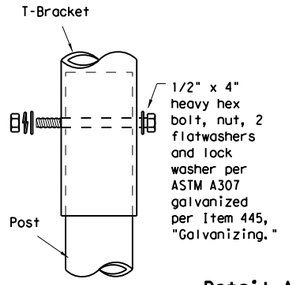
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

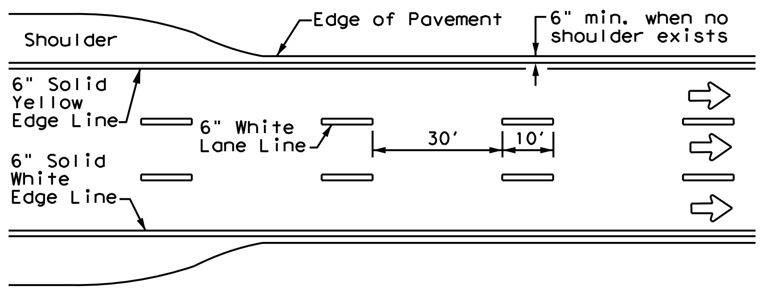
9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0049	08	076	US 190

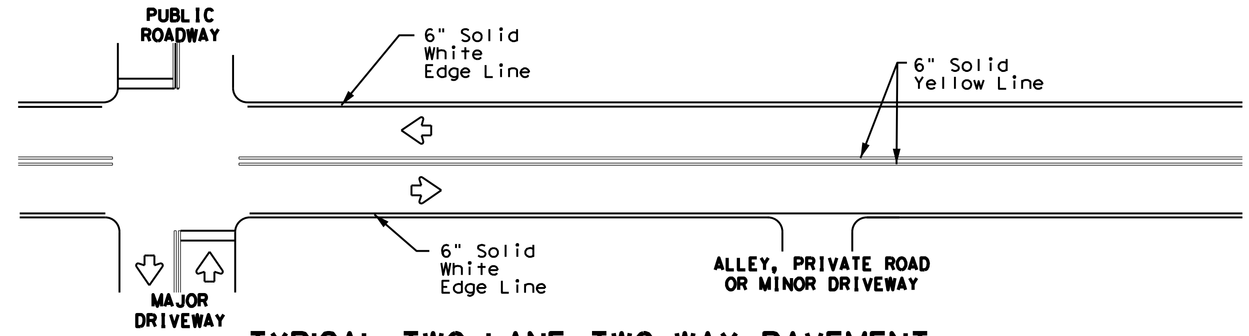
DIST	COUNTY	SHEET NO.
BRYAN	ROBERTSON	82

DATE:
FILE:

26E



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



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

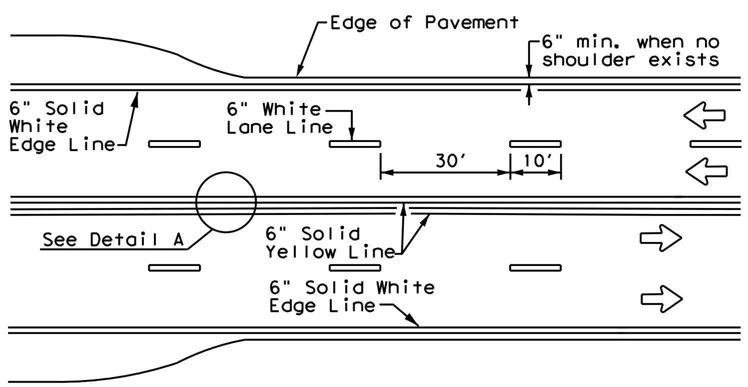
GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.

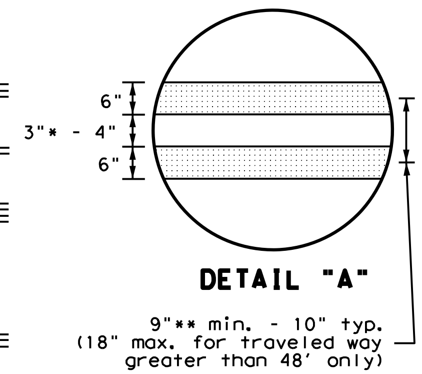
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



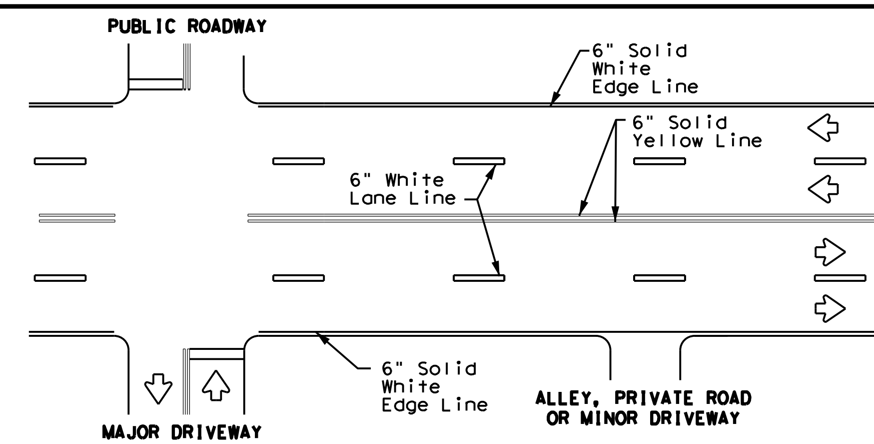
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



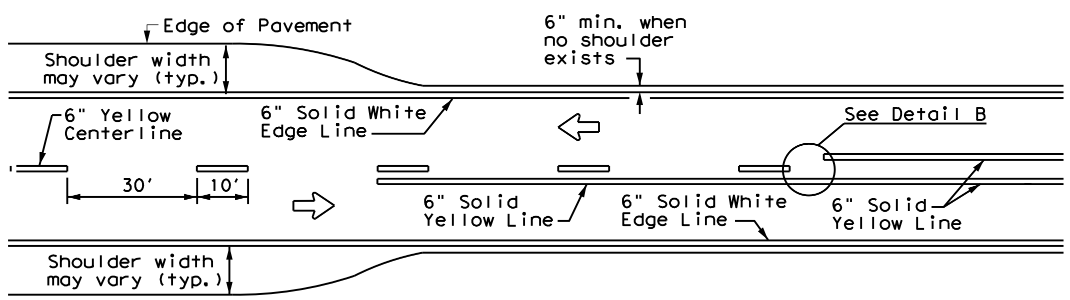
DETAIL "A"

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

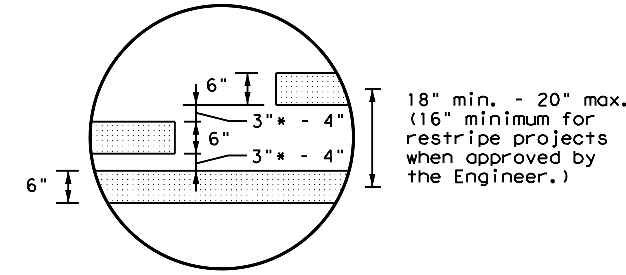
** 8" minimum for restripe projects when approved by the Engineer.



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

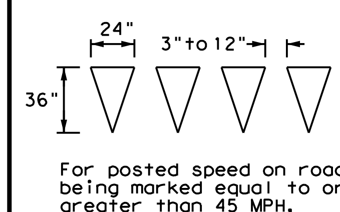


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

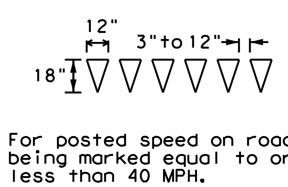


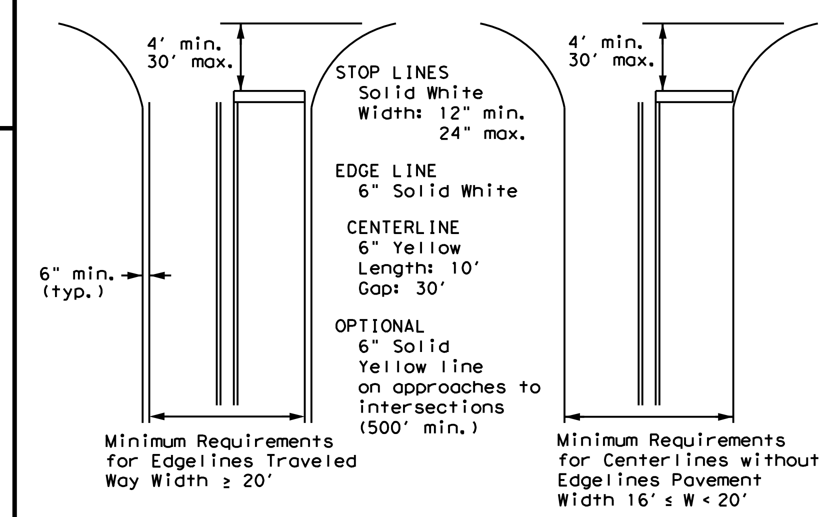
DETAIL "B"

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



YIELD LINES

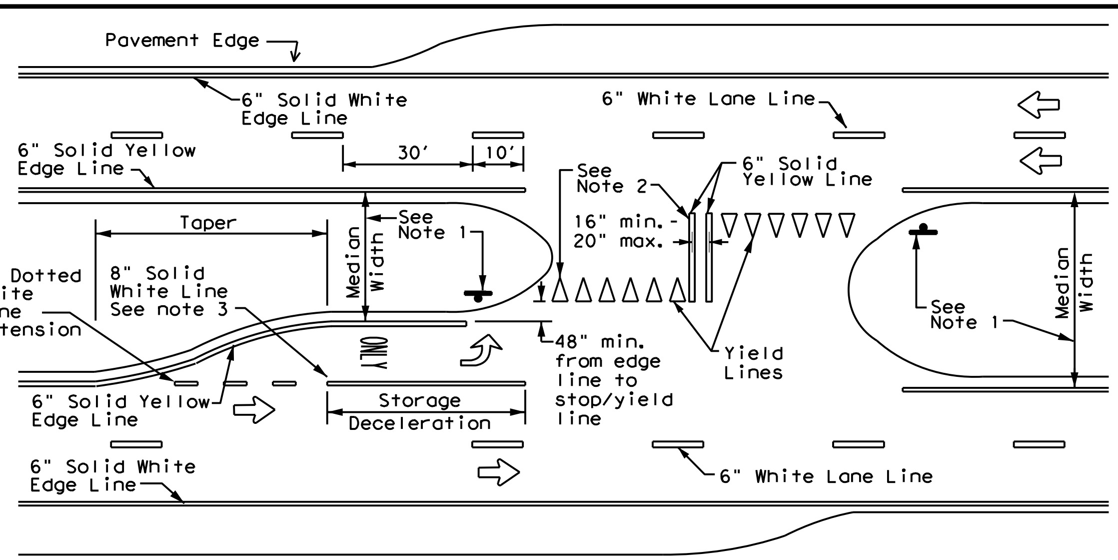




NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

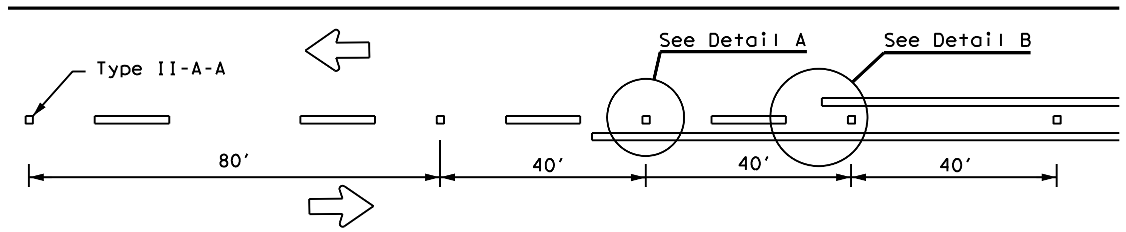
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 / 8-95 3-03 12-22 / 5-00 2-12	0049	08	076	US 190
	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	83

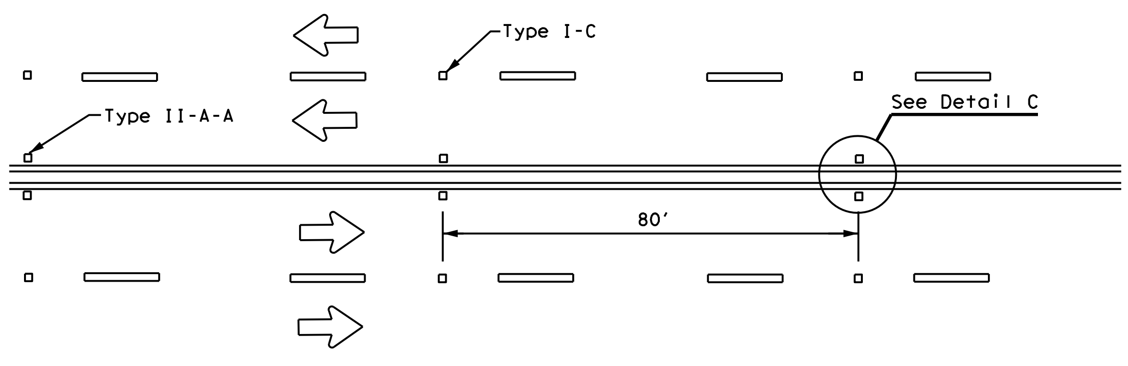
22A

DATE: 1/3/2024 3:13:56 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/...

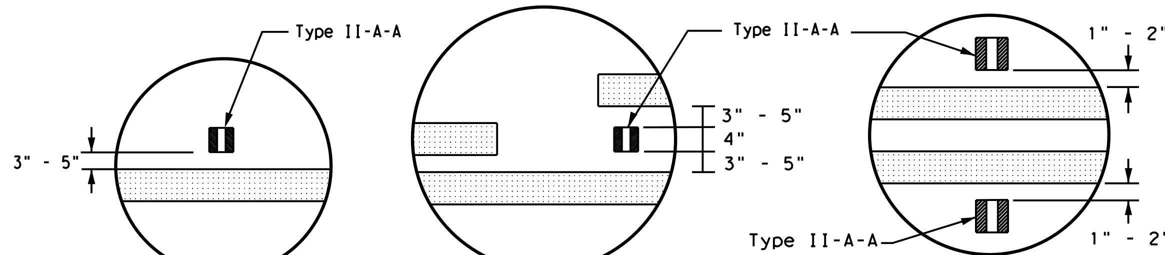
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



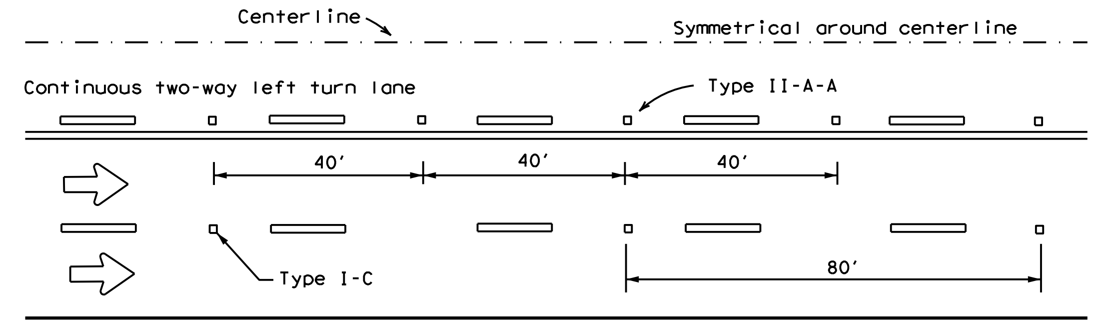
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



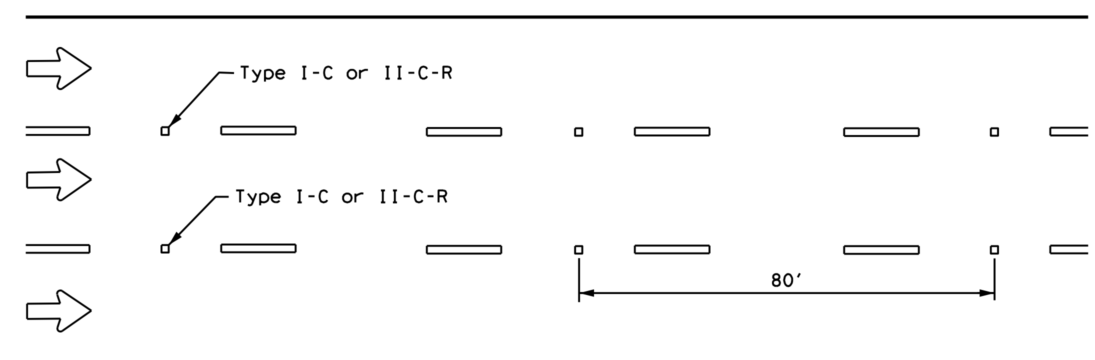
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



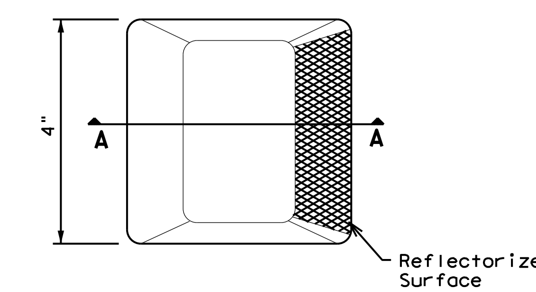
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

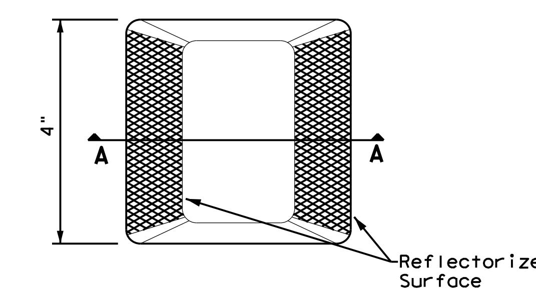
See Note 3.

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

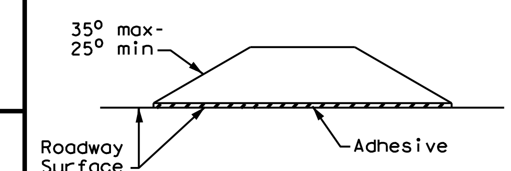
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

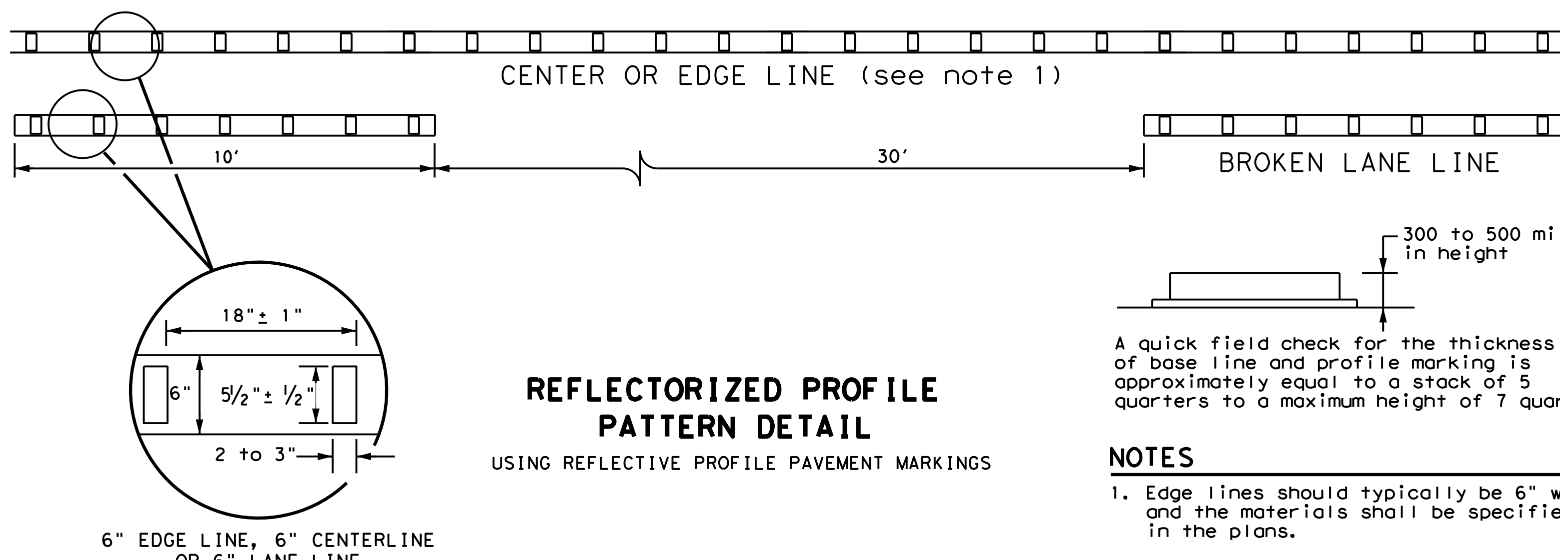


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

300 to 500 mil in height

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.

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT 0049	SECT 08	JOB 076	HIGHWAY US 190
REVISIONS 4-77 8-00 6-20; 4-92 2-10 12-22; 5-00 2-12	DIST BRY	COUNTY ROBERTSON		SHEET NO. 84

22B

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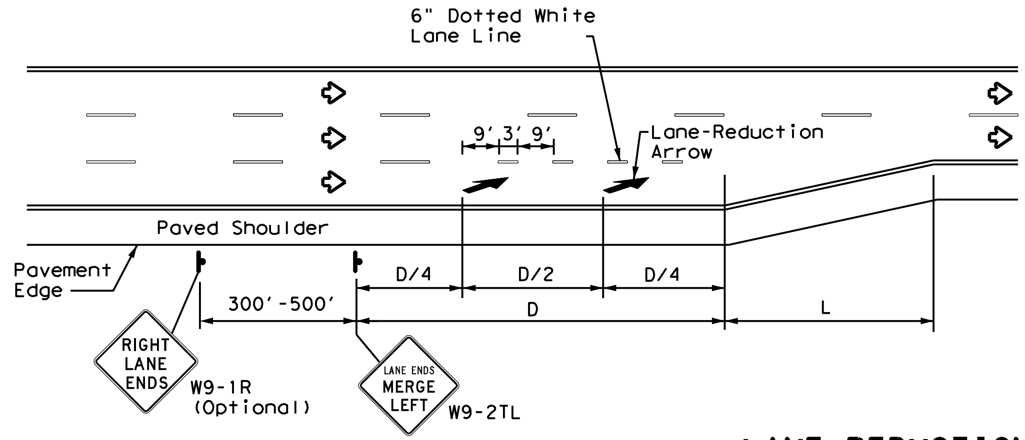


LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

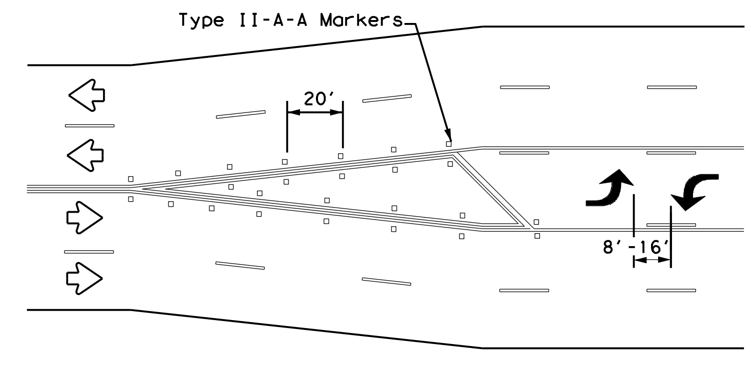
GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS

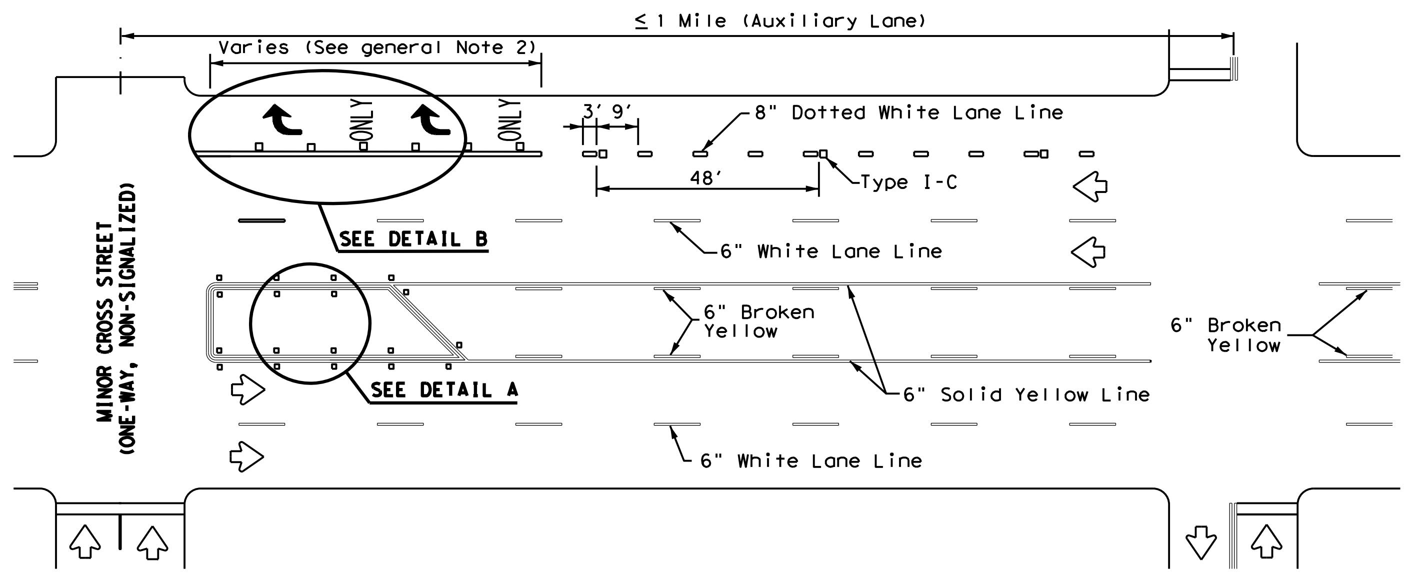
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

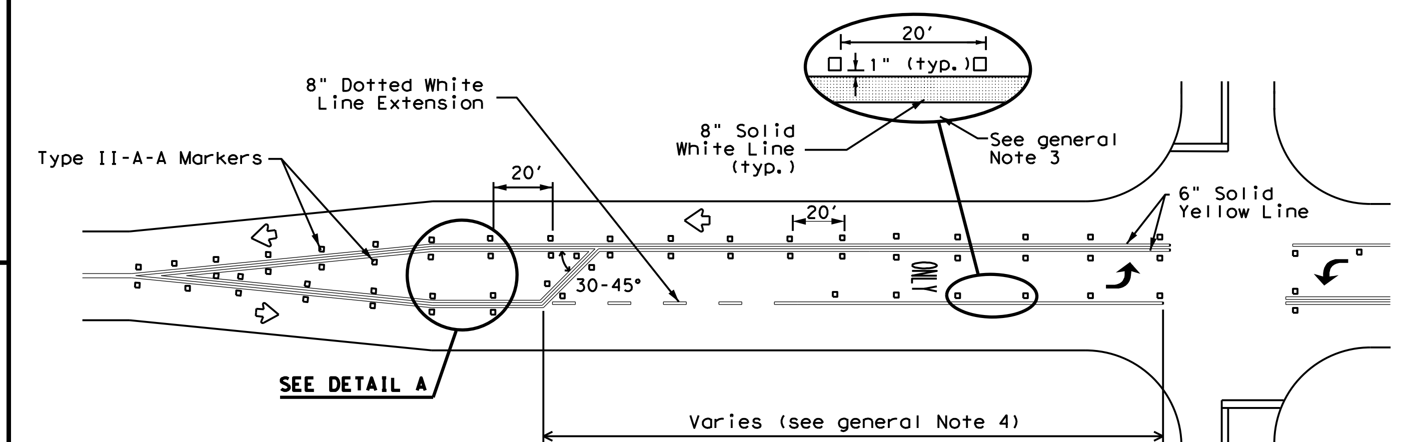


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

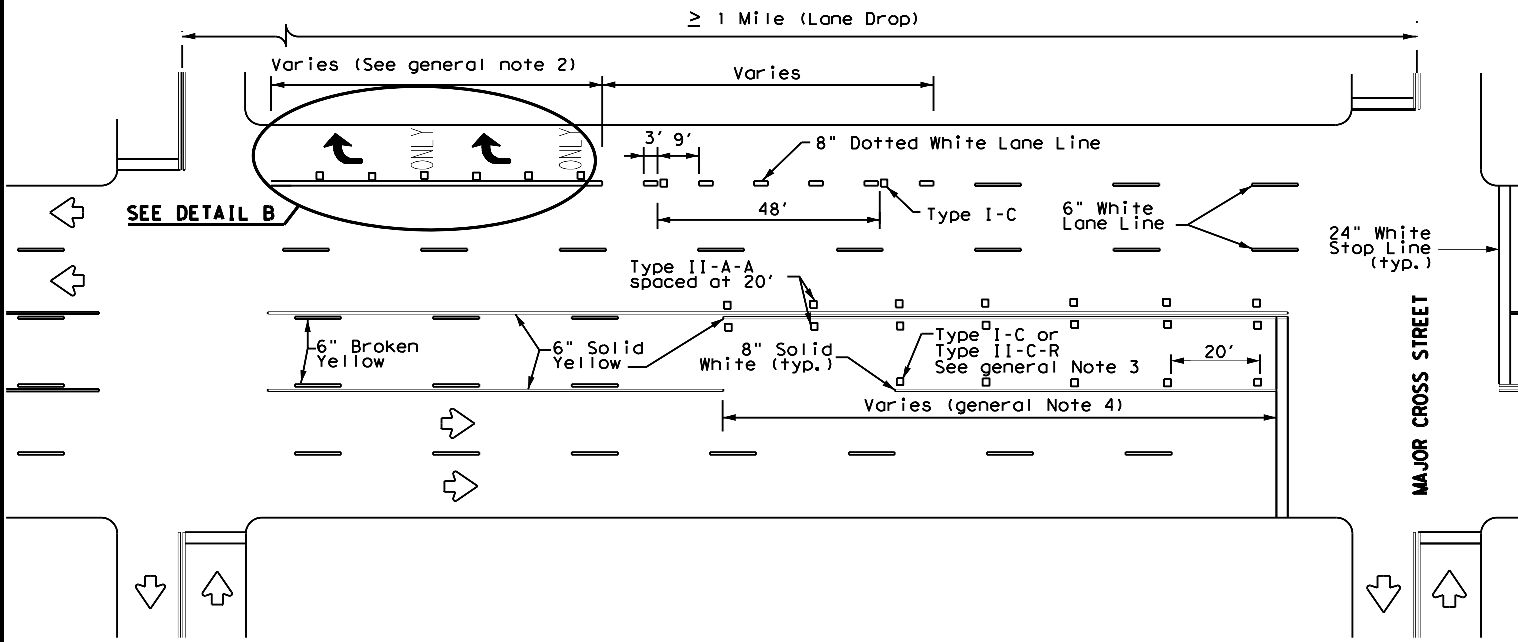
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



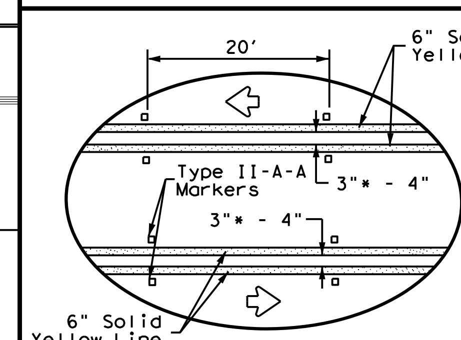
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



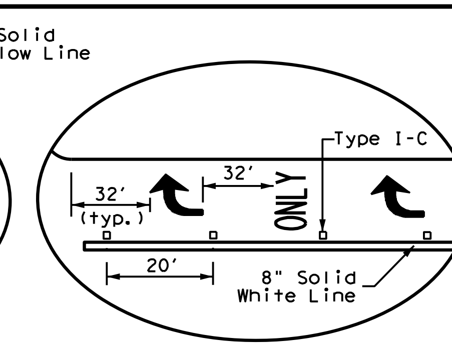
TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



DETAIL A



DETAIL B

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

Texas Department of Transportation

Traffic Safety Division Standard

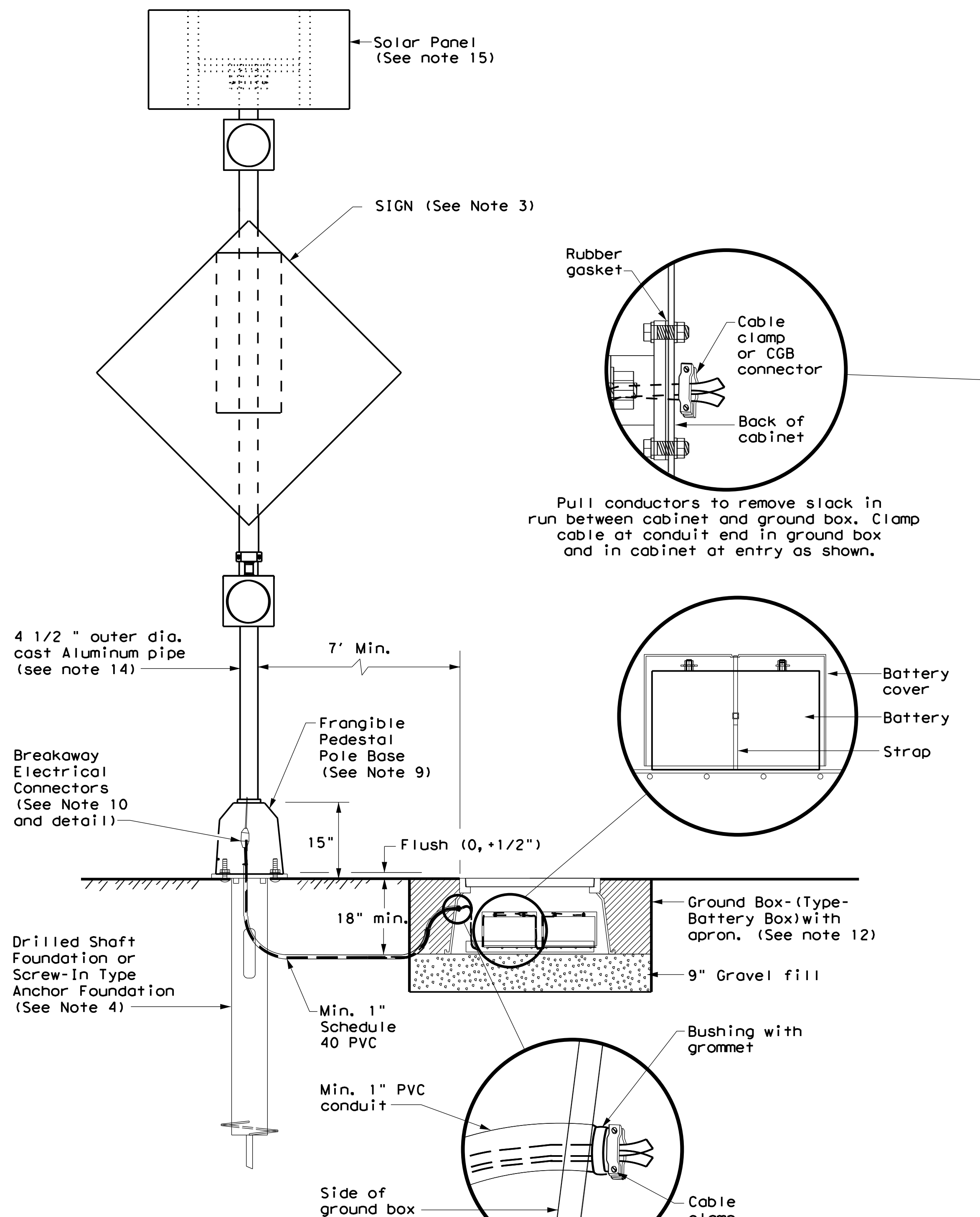
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

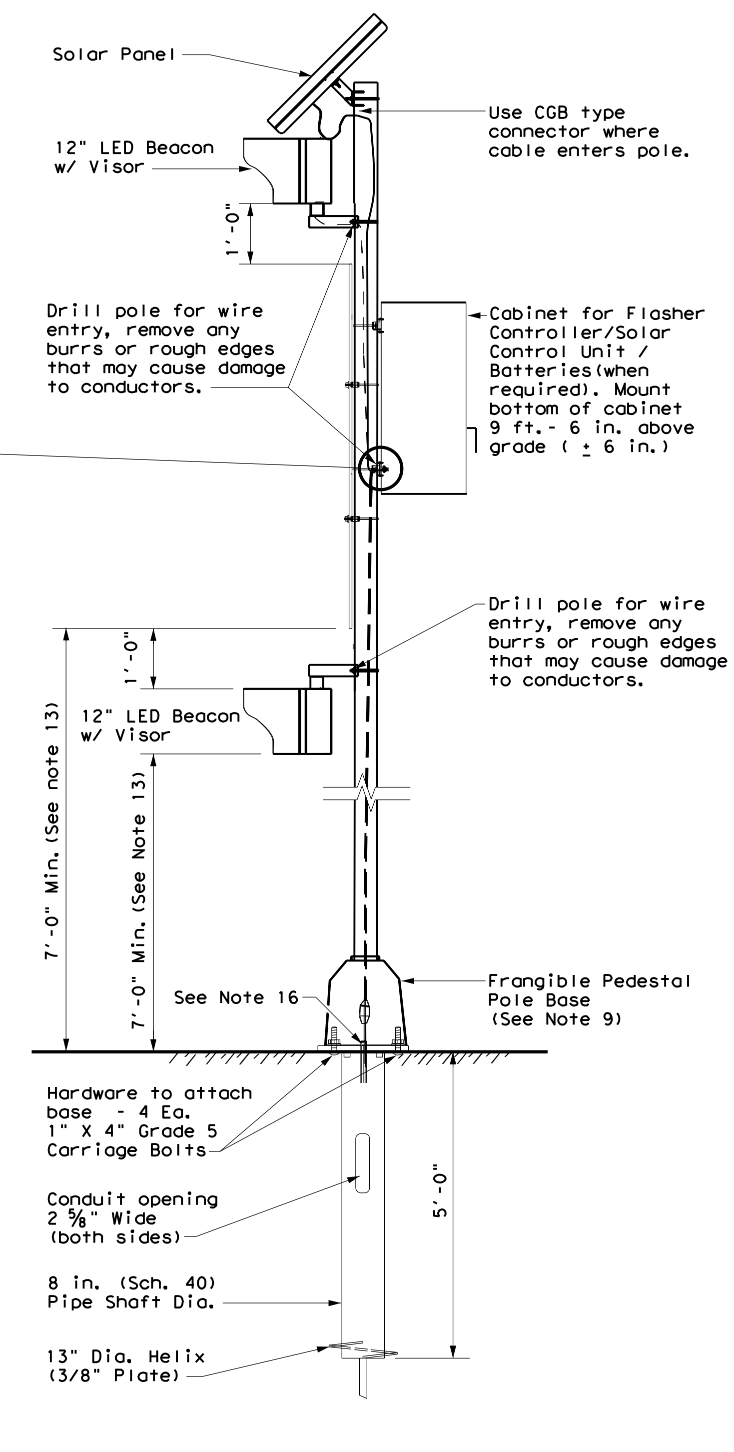
FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT 0049	SECT 08	JOB 076	HIGHWAY US 190
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	DIST BRY		COUNTY ROBERTSON	SHEET NO. 85

GENERAL NOTES:

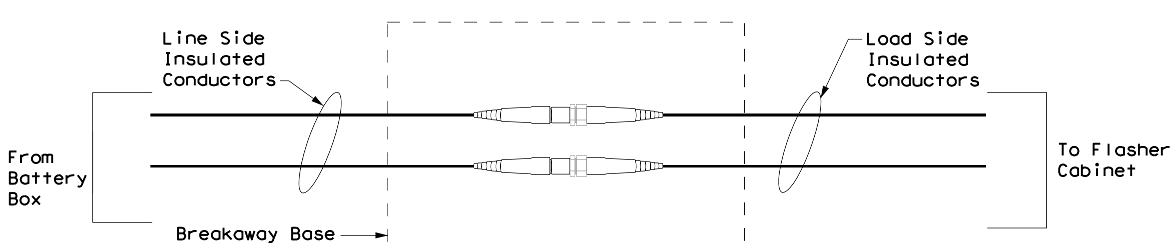
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.



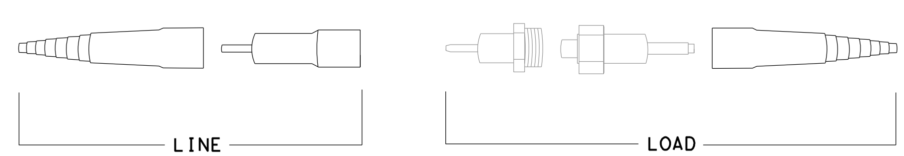
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
12-04 3-13	DIST		COUNTY	SHEET NO.
	BRY		ROBERTSON	86

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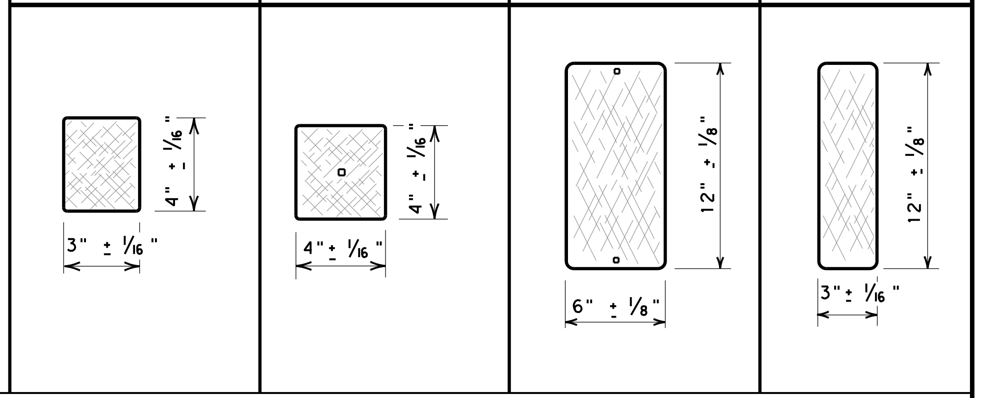
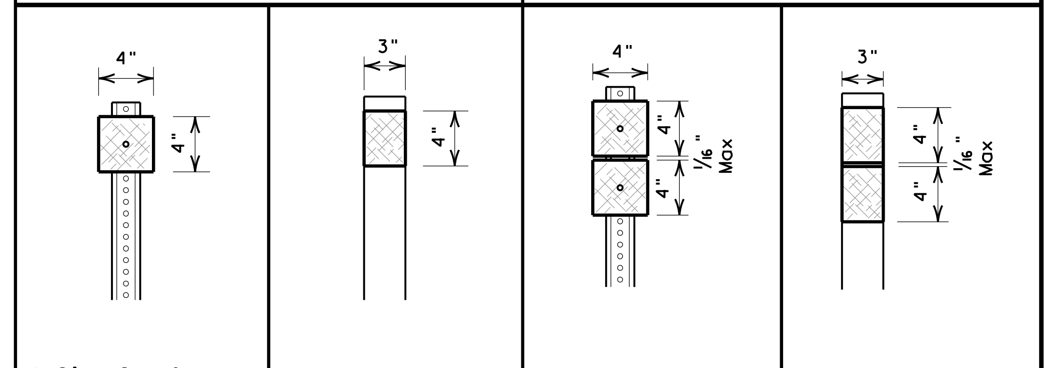
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080767 ... /Design/Plan Set/8 Traffic/SH... /Standards/D&OM(1)-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS



	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE	3" ± 1/16" x 4" ± 1/16"	4" ± 1/16" x 4" ± 1/16"	6" ± 1/8" x 12" ± 1/8"	3" ± 1/16" x 12" ± 1/8"
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS



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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

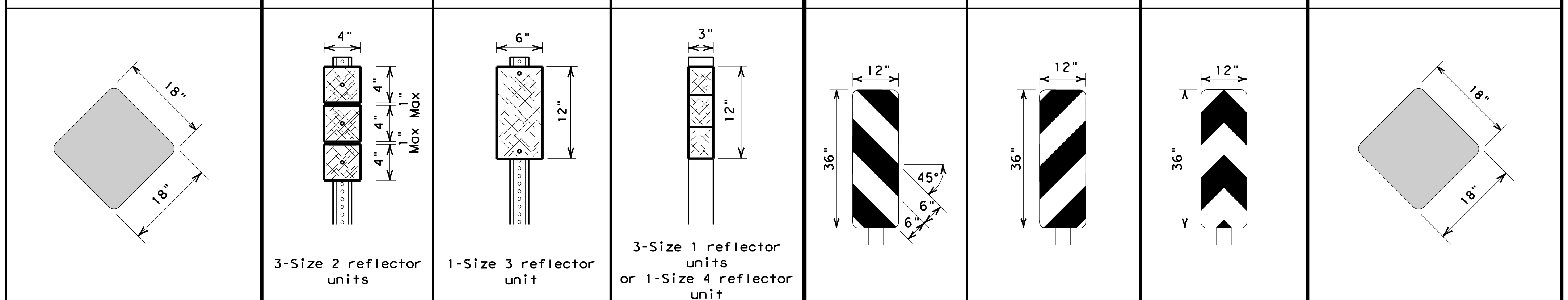
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

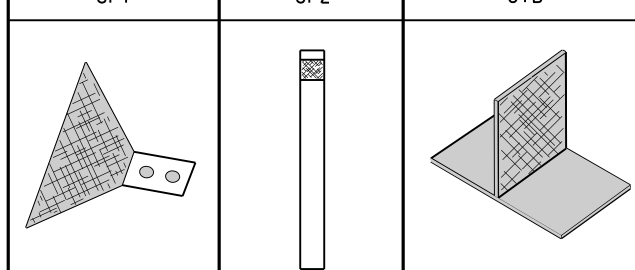


	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating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

DEPARTMENTAL MATERIAL SPECIFICATIONS

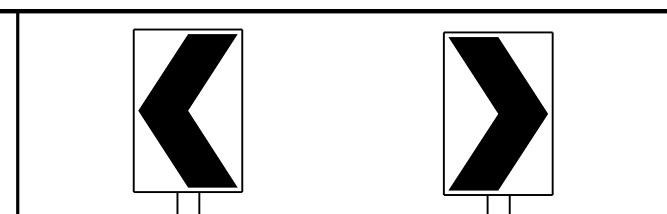
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)



	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

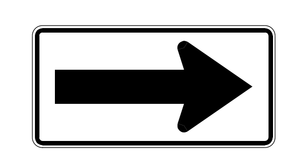
CHEVRONS



W1-8

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	

ONE DIRECTION LARGE ARROW



W1-6

DEVICE	W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

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).

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
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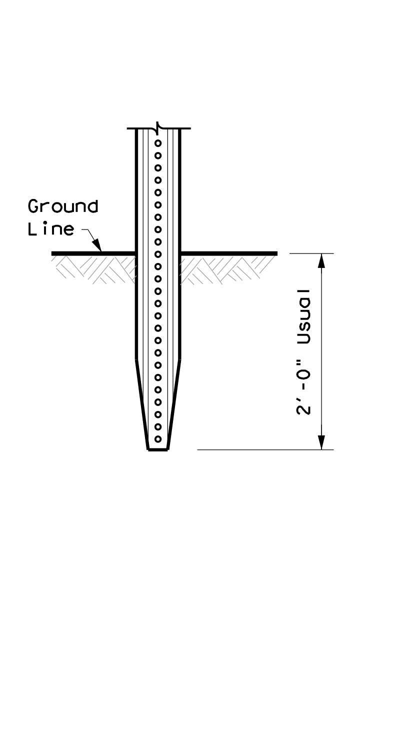
REVISIONS		0049	08	076	US 190
10-09 3-15 4-10 7-20		DIST		COUNTY	SHEET NO.
		BRY		ROBERTSON	87

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

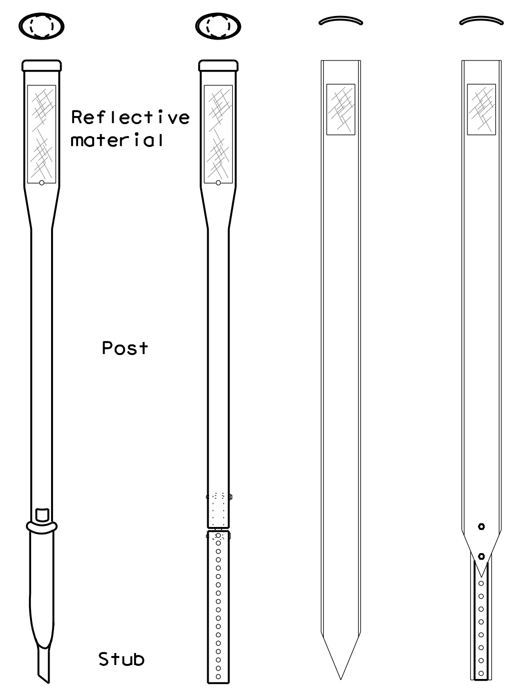


NOTES

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

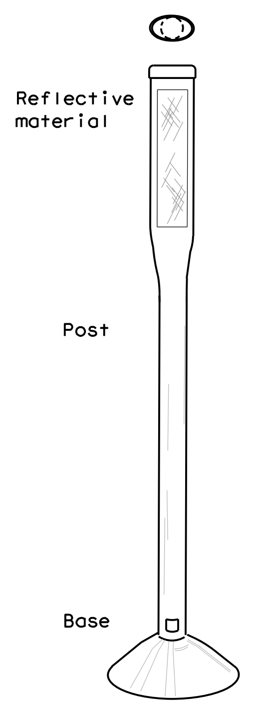
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



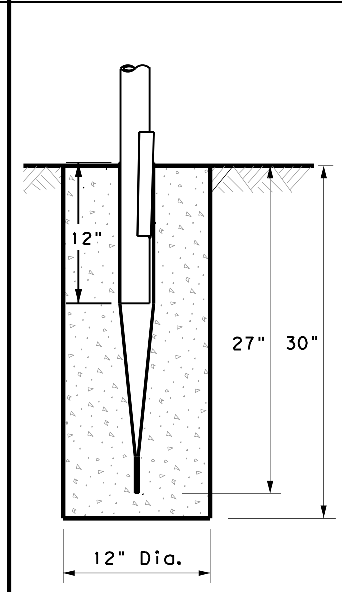
SURFACE MOUNT

NOTES

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

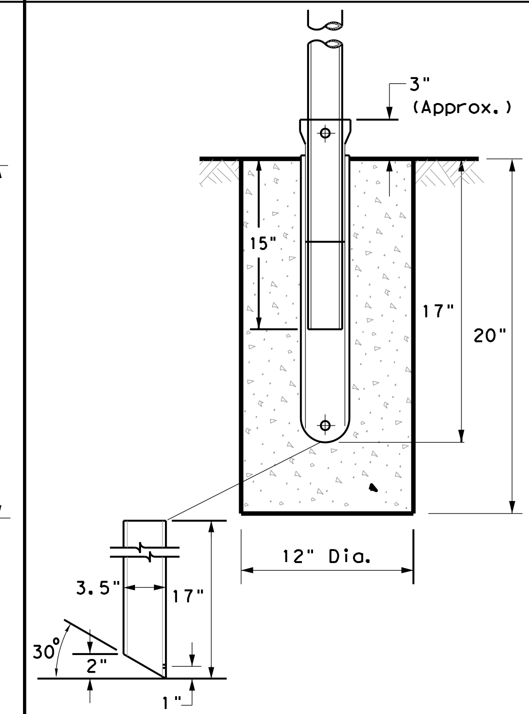
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

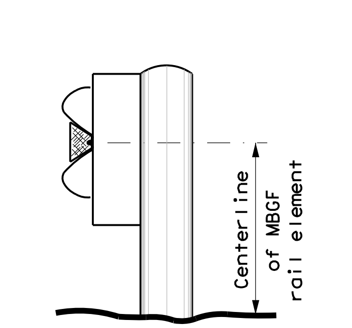
NOTE

1. Install per manufacturer's recommendations.

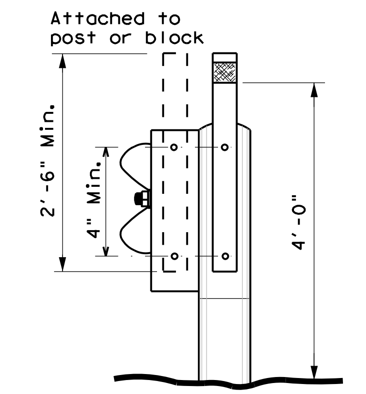
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

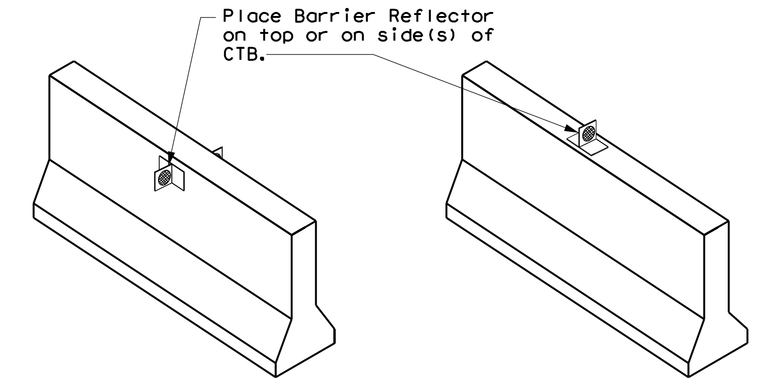
GF1



GF2



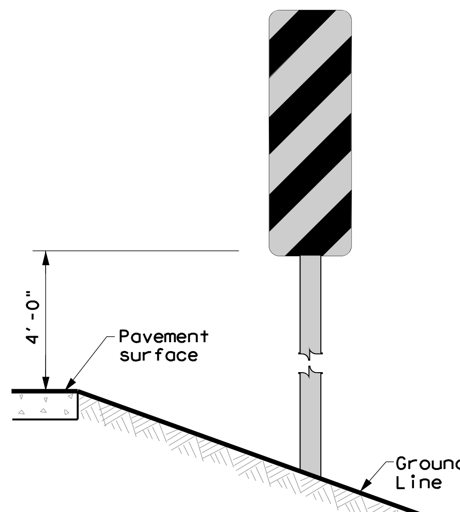
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

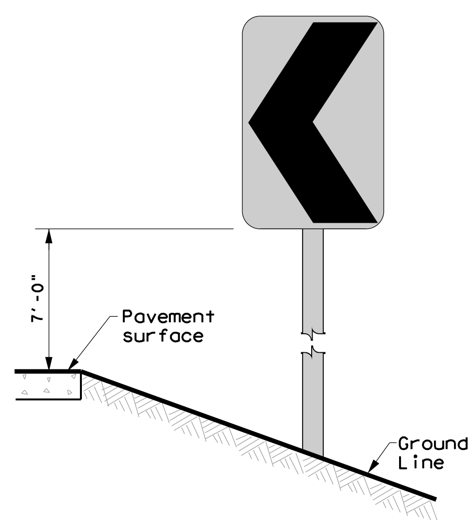
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

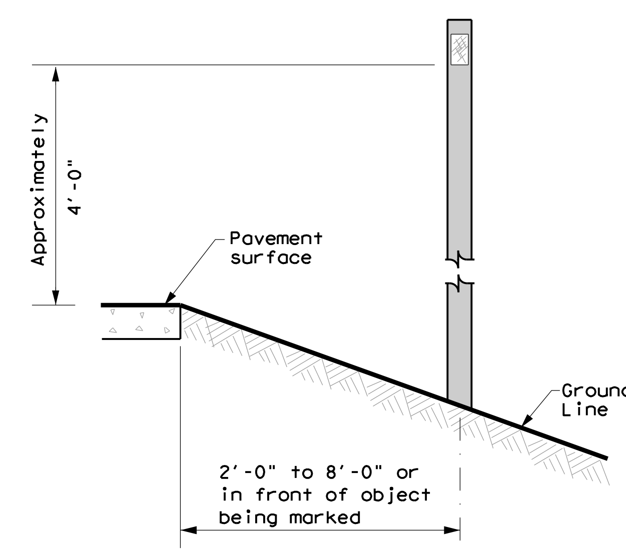
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0049	SECT 08	JOB 076	HIGHWAY US 190
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20B

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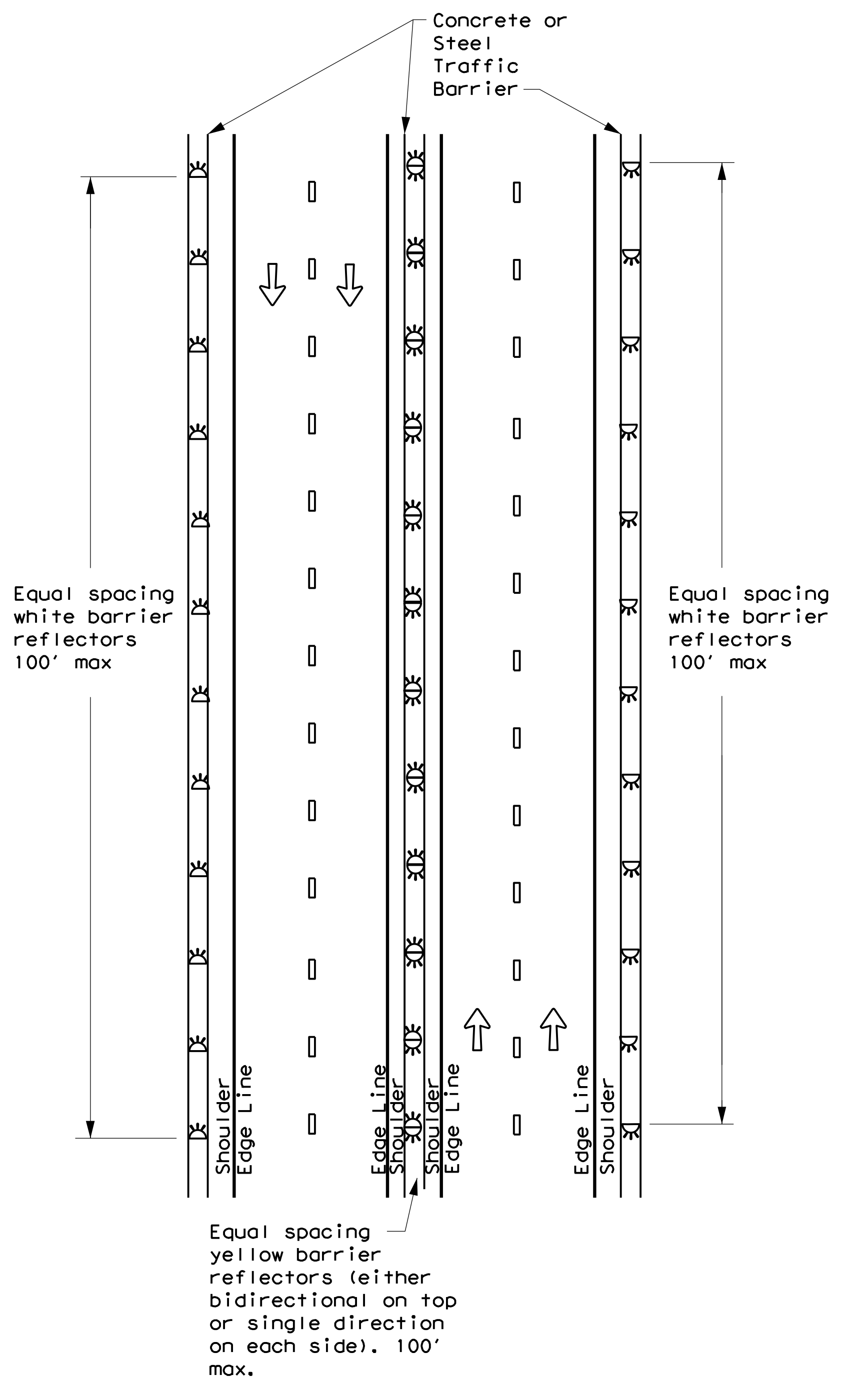
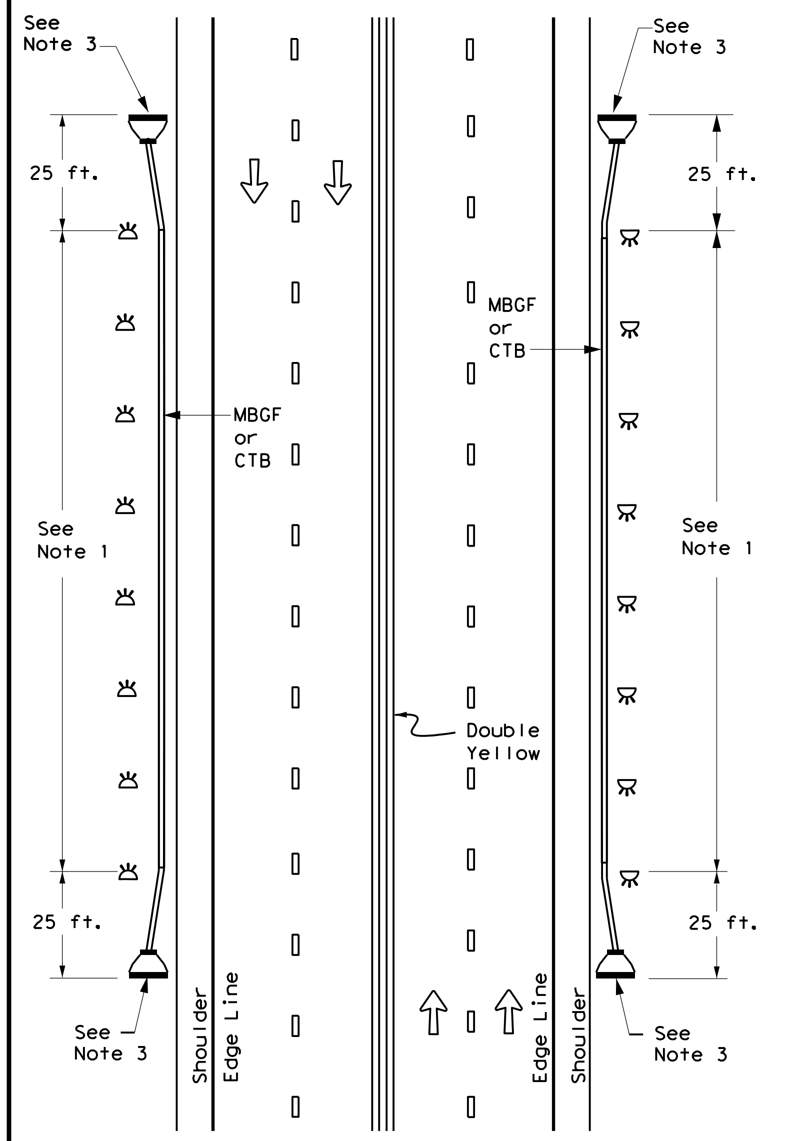
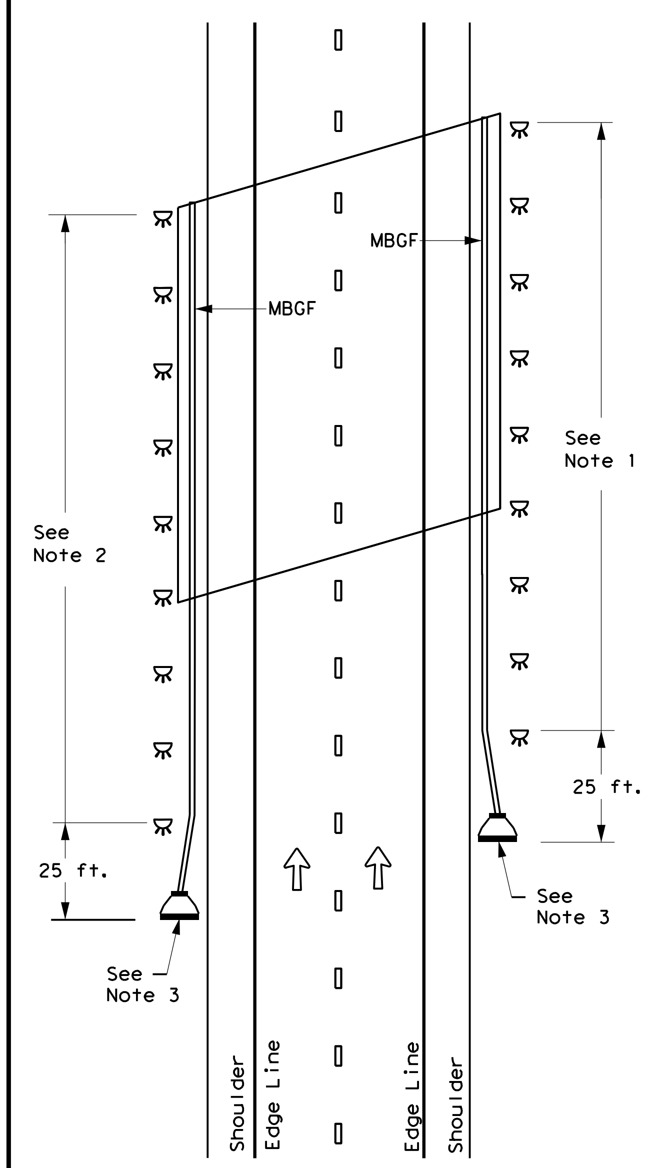
CONTINUOUS CONCRETE OR STEEL BARRIER



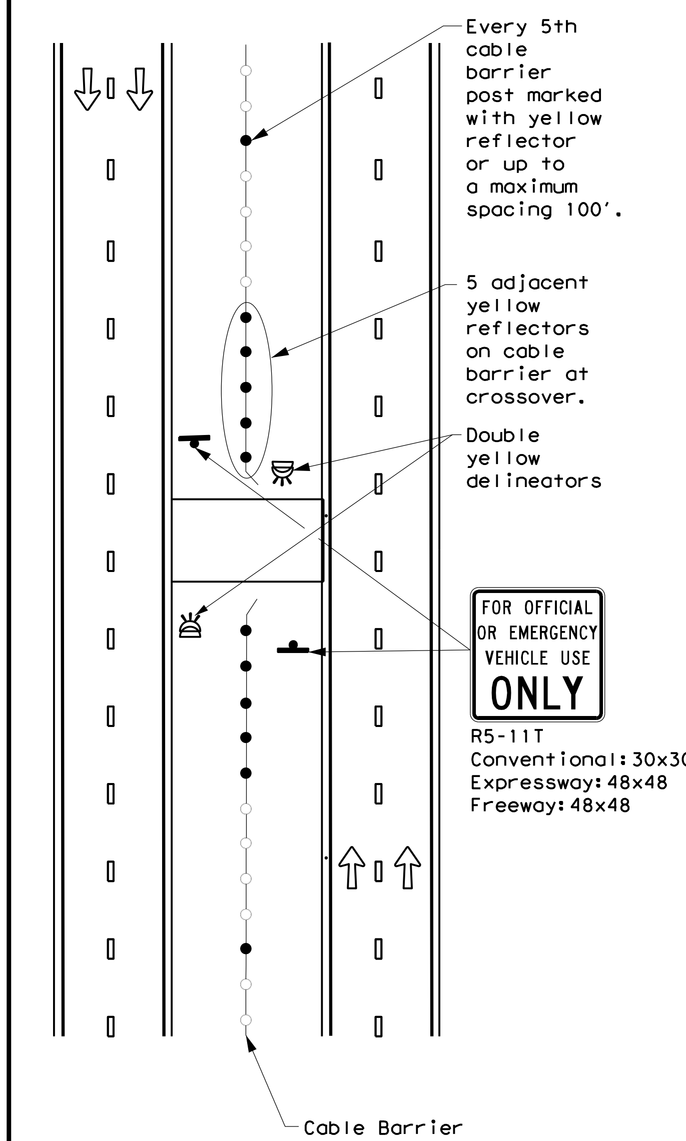
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)

2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.

3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0049	08	076	US 190
7-20	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	89

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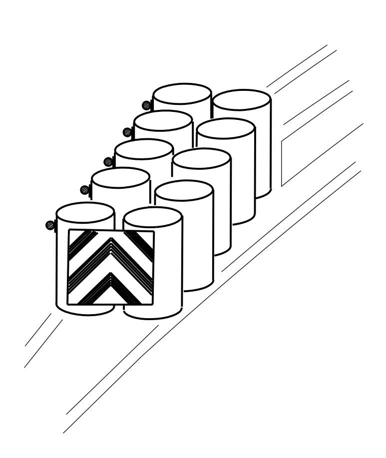
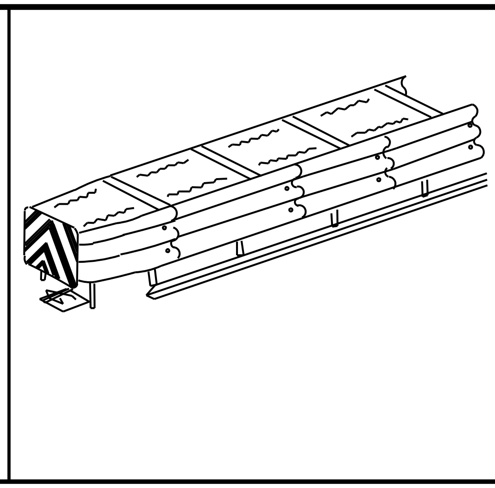
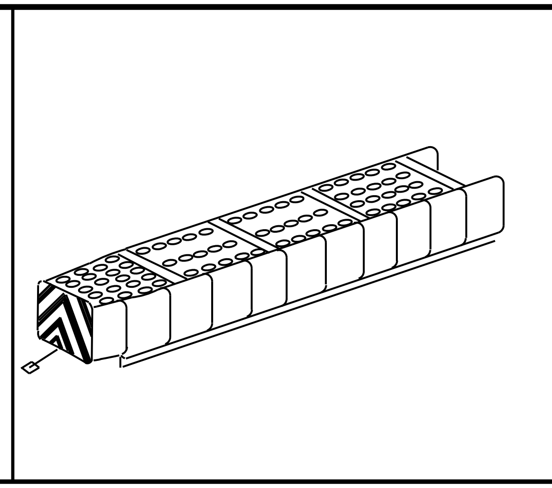
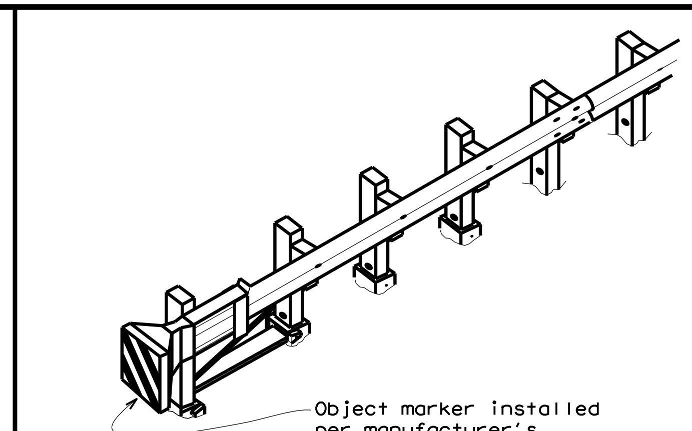
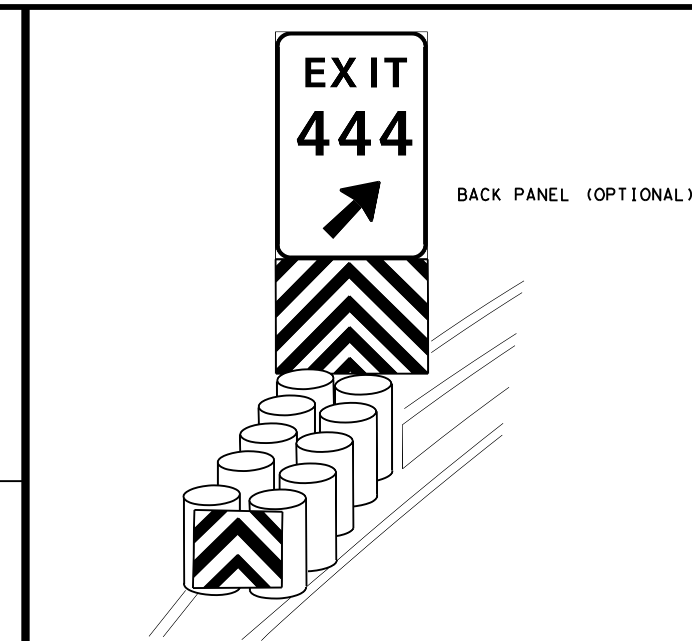
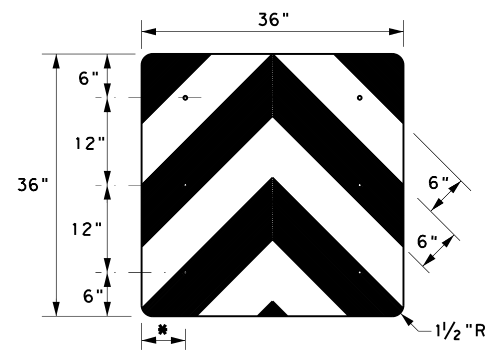


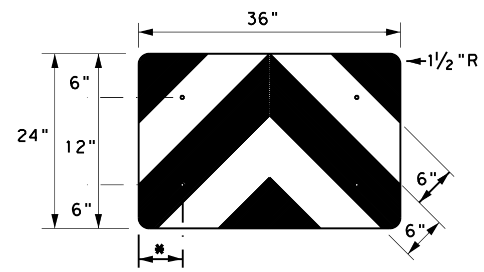




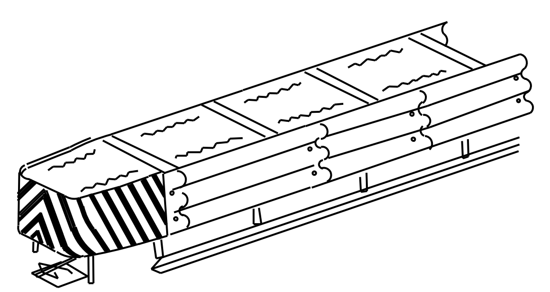


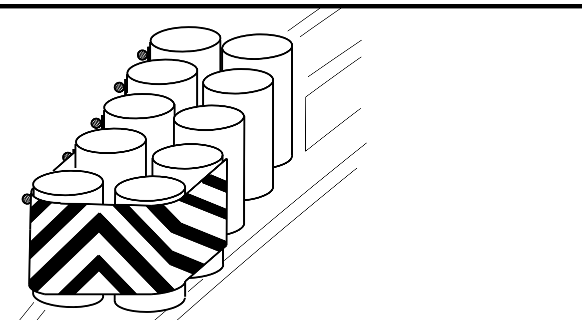


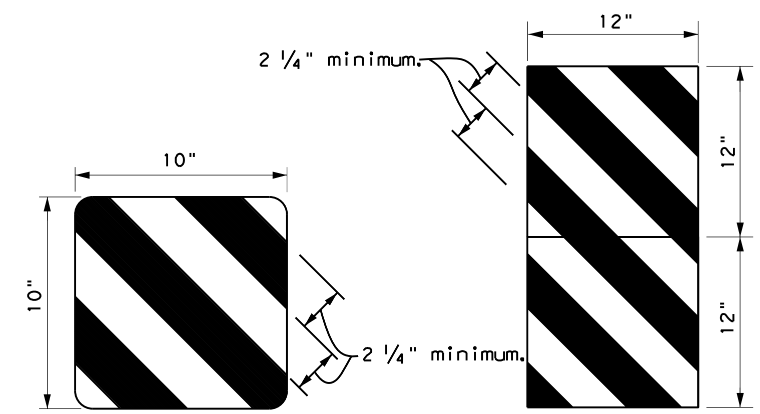




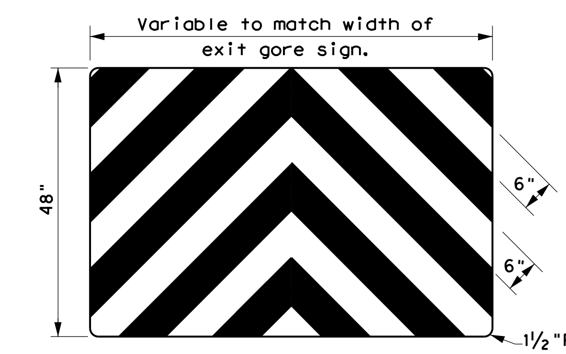
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

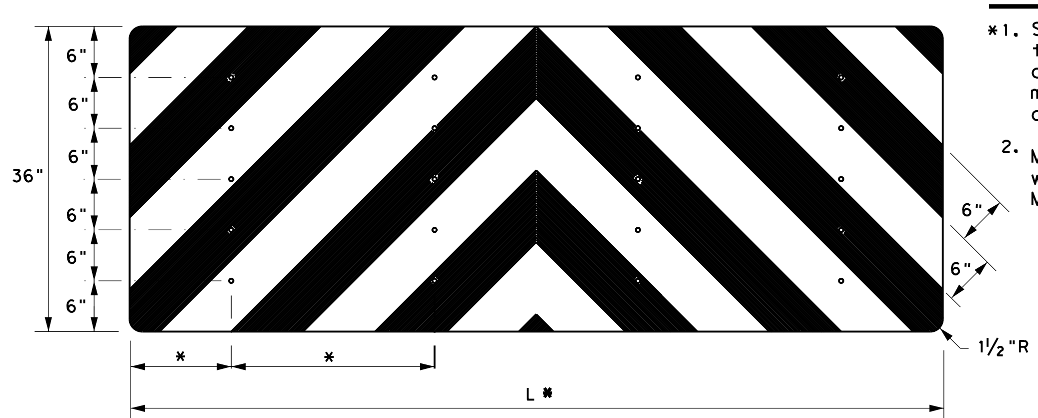


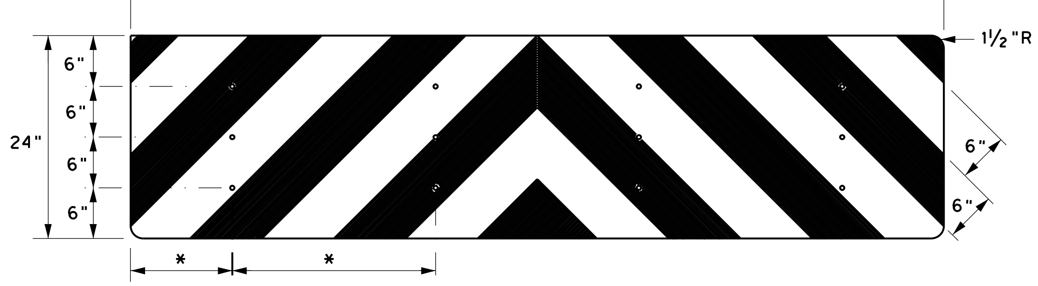




OBJECT MARKERS SMALLER THAN 3 FT²







NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT		CK: TXDOT	DW: TXDOT		CK: TXDOT
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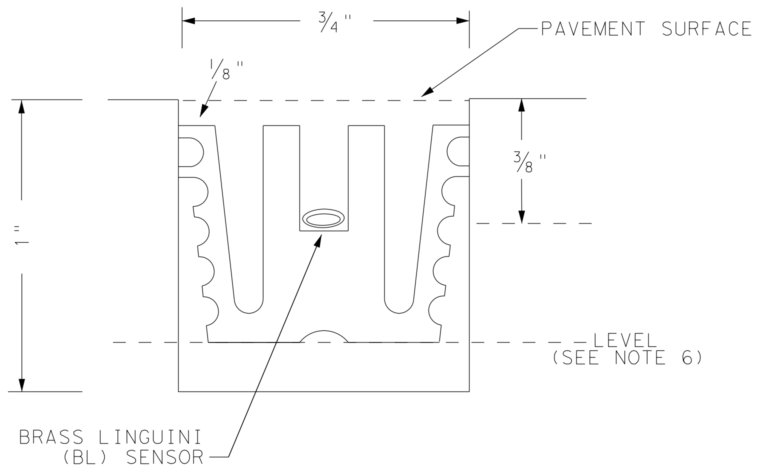
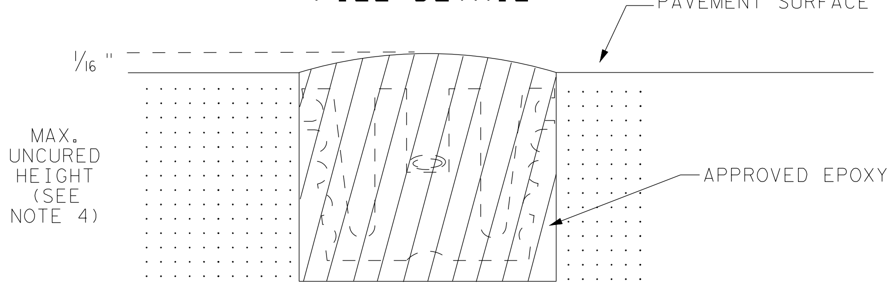
REVISIONS	0049	08	076		US 190	
4-92 8-04 / 8-95 3-15 / 4-98 7-20	DIST		COUNTY		SHEET NO.	
	BRY		ROBERTSON		90	

20G

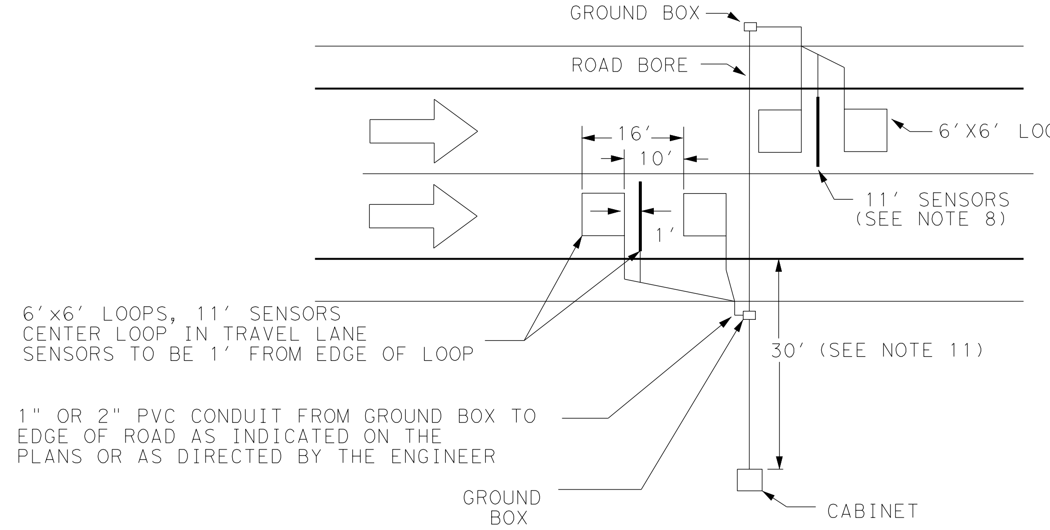
BRACKET DETAIL



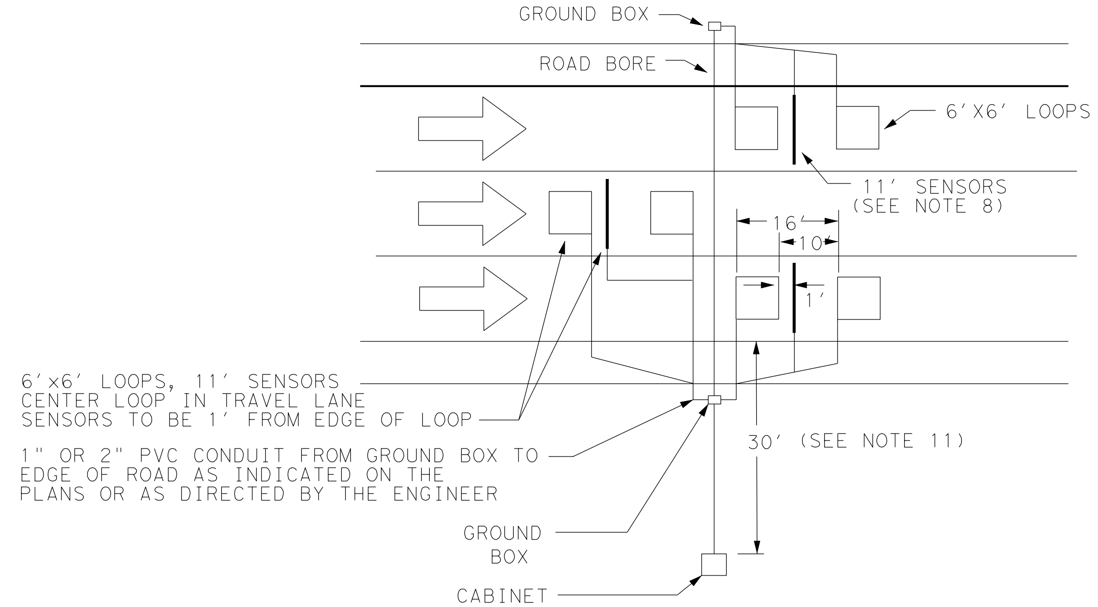
FILL DETAIL



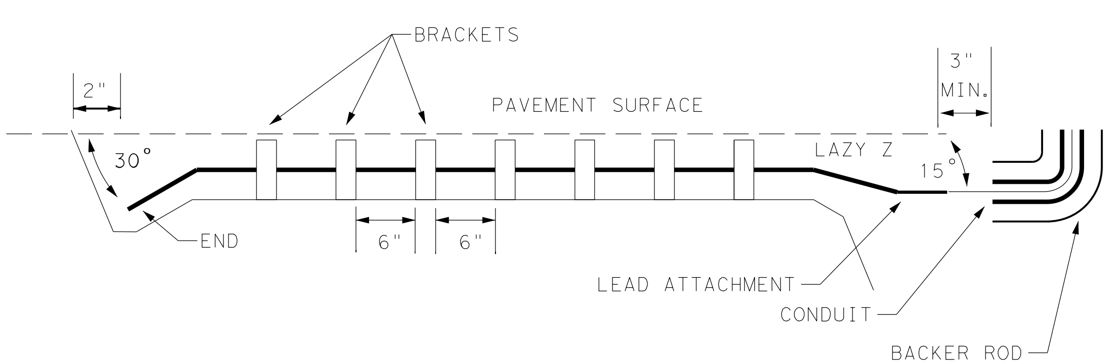
TYPICAL CLASS II PIEZOELECTRIC SITE EXAMPLE



TYPICAL CLASS II PIEZOELECTRIC MULTIPLE LANE SITE EXAMPLE



TYPICAL CLASS II (BRASS LINGUINI) CROSS SECTION PIEZOELECTRIC SENSOR



GENERAL NOTES:

1. Make pavement cuts with a concrete saw. Create neat lines and remove loose materials. Clean and dry the cut prior to placing the wire and sealing compound or sensor and epoxy.
2. Run wire into ground box and then directly to cabinet with only one splice between loop and cabinet. Sensors will not be spliced at any time.
3. Seal wire, lead in, and sensors in the saw cut by fully encapsulating in a sealant acceptable to the Engineer. Sealing compound shall be in accordance with DMS 6340. The sensors and epoxy will be provided by TxDOT.
4. The loop and sensor location, configuration, and number of turns for the loop shall be as indicated on the plans or as directed by Engineer. Center loops and sensors in lane unless otherwise directed by Engineer.
5. Make a separate saw cut from each loop to pavement edge or as specified by the Engineer. Run wire or lead in cable for each associated piezoelectric sensor and loop pair together in the same saw cut and then their own 1" or 2" PVC conduit from the edge of the roadway to the ground box or as directed by the Engineer. Install two 2" PVC conduits or one 3" PVC conduit from the ground box to the cabinet unless otherwise directed by Engineer. Consolidate wires from the ground box to the cabinet.
6. Epoxy cured level is flush with pavement +/- 10% tolerance.
7. Inspect the length of brass linguini (BL) piezoelectric sensor and ensure it is at uniform depth and level (not twisted, canted, or bent).
8. Diagrams shown for the Typical Class II Piezoelectric site include 11' sensors. If directed by the Engineer, install 6' Class II sensors.
9. Install sensors 1' from trailing edge of leading loop or as directed by Engineer.
10. Install Class II Piezoelectric Sensor as per manual furnished and supervised by TxDOT representive.
11. Set back cabinet 30' from edge of traveled lane unless otherwise directed by Engineer.

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Texas Department of Transportation | Transportation Planning Programming Division

TRAFFIC DATA COLLECTION PIEZOELECTRIC BRASS LINGUINI (BL)

TDC(2)-22

FILE: tdc(2)-21.dgn	DN:	CK:	DW:	CK:
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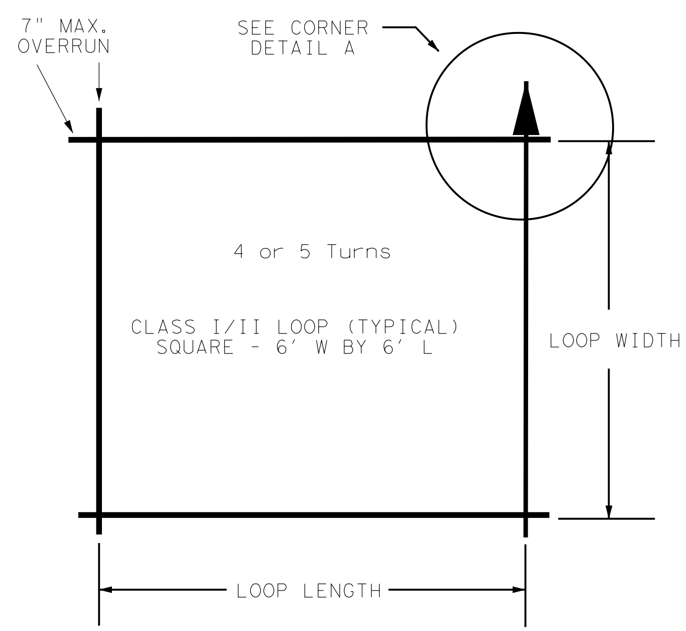
REVISIONS	0049	08	076	US 190
October 2022	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		91

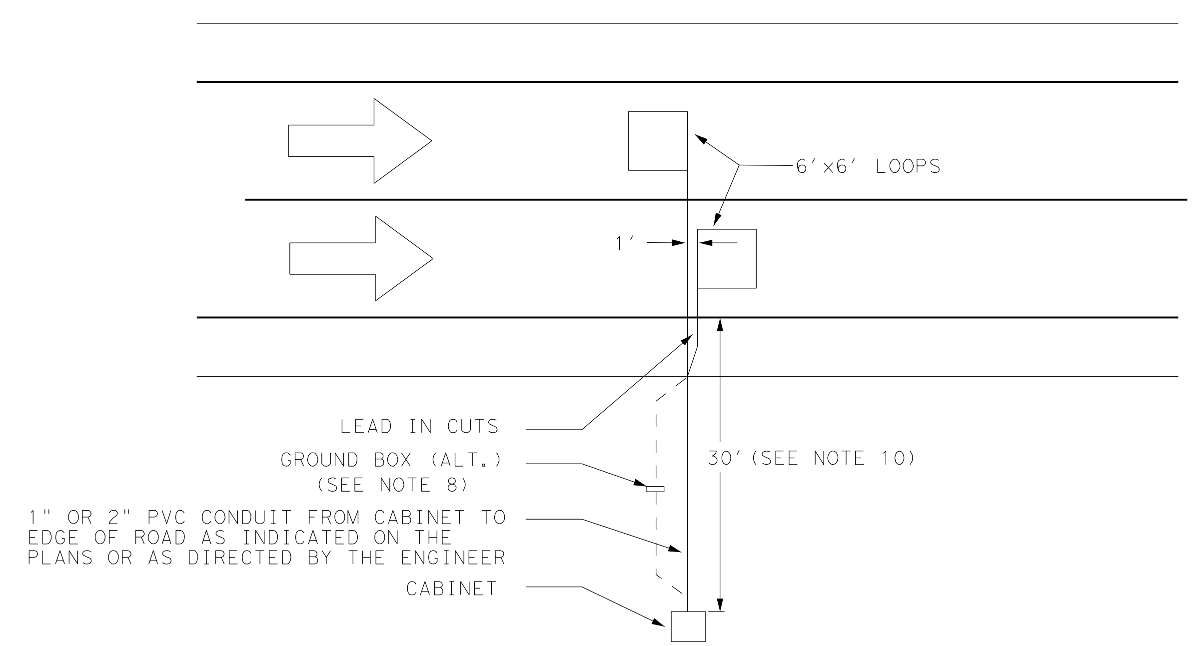
TYPICAL LOOP DETECTOR LAYOUTS

(AS SPECIFIED IN PLANS)



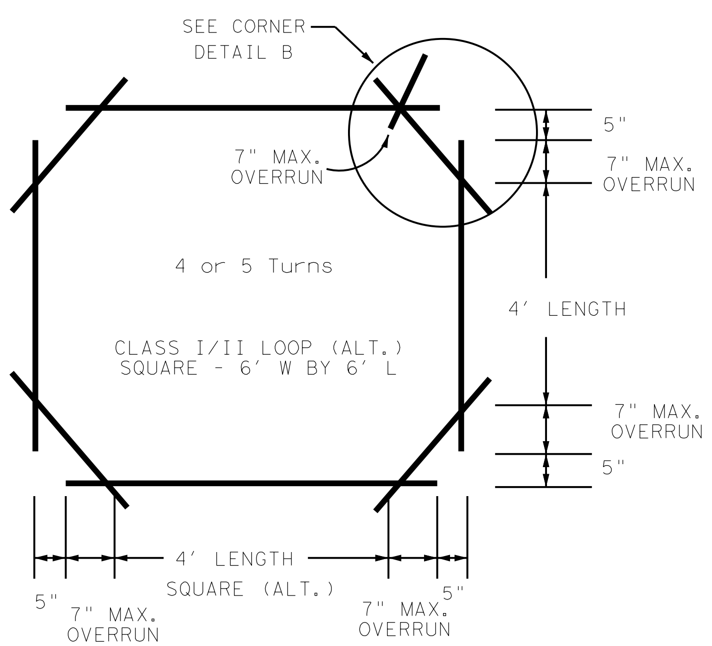
RECTANGULAR
OR SQUARE

TYPICAL VOLUME LOOP ONLY SITE EXAMPLE



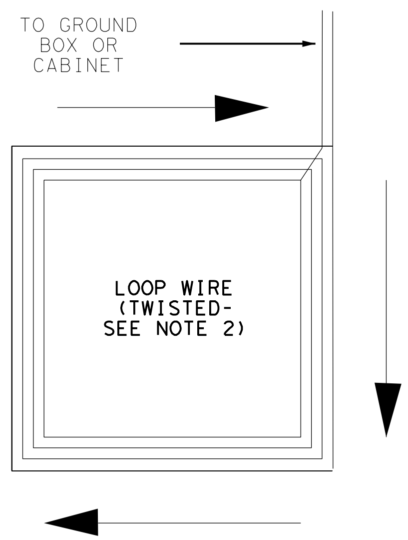
GENERAL NOTES:

1. Make pavement cuts with a concrete saw. Create neat lines and remove loose materials. Clean and dry cut prior to placing wire and sealing compound.
2. Fully encapsulate wires, lead ins, and sensors placed with acceptable sealants. Sealing compound shall be in accordance with DMS 6340. The sensors and epoxy will be provided by TxDOT.
3. Make separate saw cut from each loop to pavement edge or as directed by the Engineer. Run each cable in their own 1" or 2" PVC conduit from the pavement edge to either the ground box or cabinet or as directed by the Engineer. Install two 2" PVC conduits or one 3" PVC conduit at the cabinet unless otherwise directed by Engineer. Consolidate wires from the ground box to the cabinet.
4. Loop wire shall be 14 AWG IMSA 51-3 Stranded 600 v Type XHHW. Twist wire from the loop to the ground box or cabinet a minimum of five turns per foot. No splices are permitted in the loop wire to the ground box.
5. The lead in cable, if installed, from the ground box to the cabinet shall be 14 AWG Stranded Copper twisted shielded pair with 600 v polyethylene insulation and jacket. Solder the lead in cable to the loop wire and seal joints with Scotchcast or other method acceptable to the Engineer.
6. The loop location, configuration, and number of turns shall be as indicated on the plans or as directed by the Engineer.
7. Place four turns of cable for loops in asphalt and five turns in concrete unless otherwise directed by the Engineer.
8. Make splices between the loop wire and lead in cable only in the ground box or as directed by the Engineer. Run wire into ground box then directly to cabinet with a maximum of one splice between loop and cabinet.
9. Refer also to LD(1) Loop Detector Installation Details.
10. Set back cabinet 30' from edge of traveled lane unless otherwise directed by Engineer.



SQUARE (ALT.)

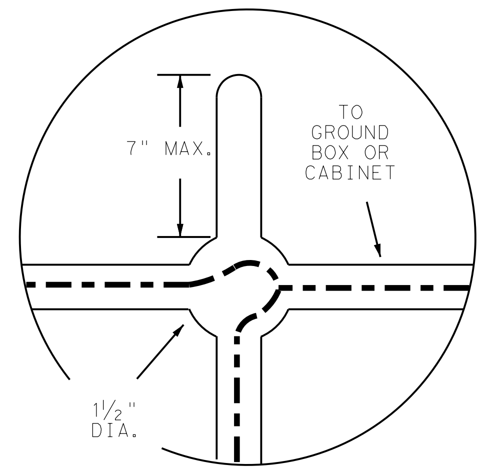
LOOP WINDING DETAILS



4 OR 5
CLOCKWISE
TURNS

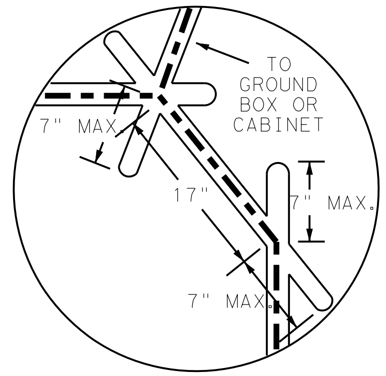
TYPICAL CORNER DETAILS

DETAIL A



RECTANGULAR & SQUARE LOOP
DRILLED CORNER DETAIL

DETAIL B



SQUARE LOOP (ALT.)
SAWCUT CORNER DETAIL

7" OVERRUN BASED ON
24" DIAMETER SAW BLADE

Texas Department of Transportation | Transportation Planning Programming Division

TRAFFIC DATA COLLECTION LOOP DETAILS

TDC(3)-22

FILE: tdc(3)-21.dgn	DN:	CK:	DW:	CK:
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REVISIONS October 2022	0049	08	076	US 190
	DIST		COUNTY	SHEET NO.
	BRYAN		ROBERTSON	92

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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REVISIONS	DIST BRY	COUNTY ROBERTSON		SHEET NO. 93

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

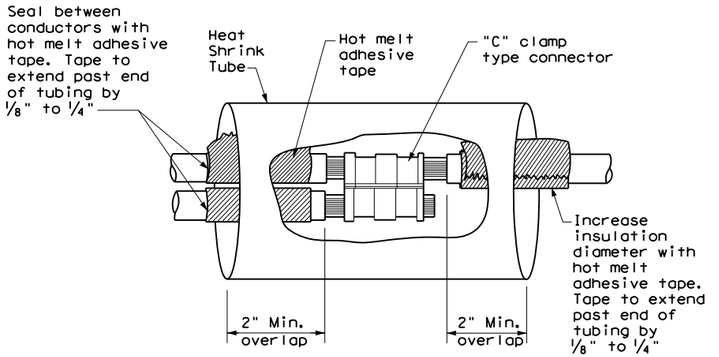
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

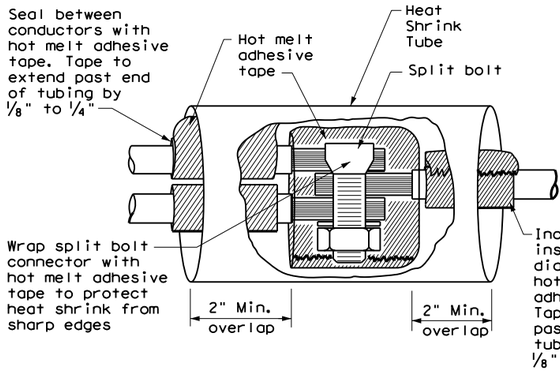
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

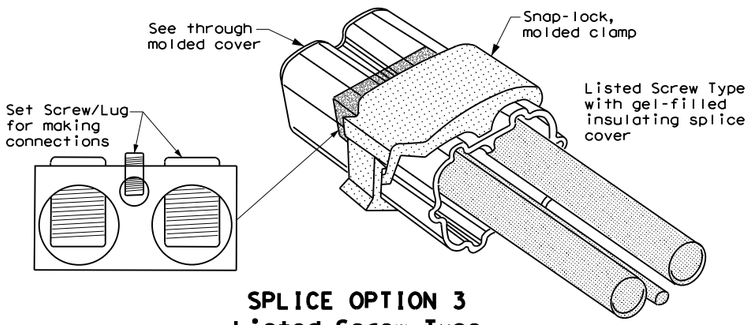
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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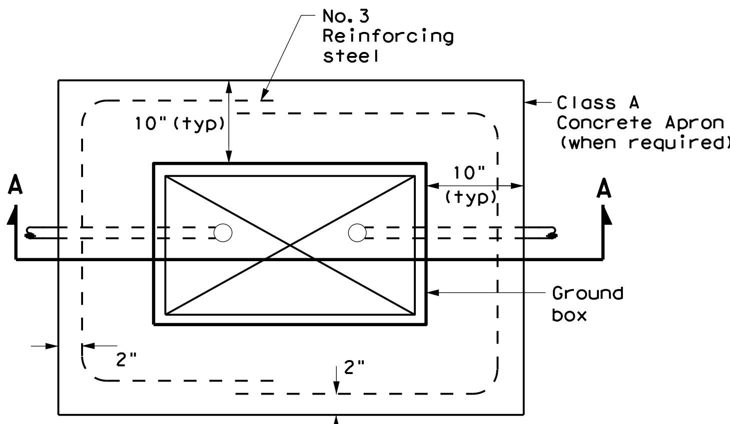
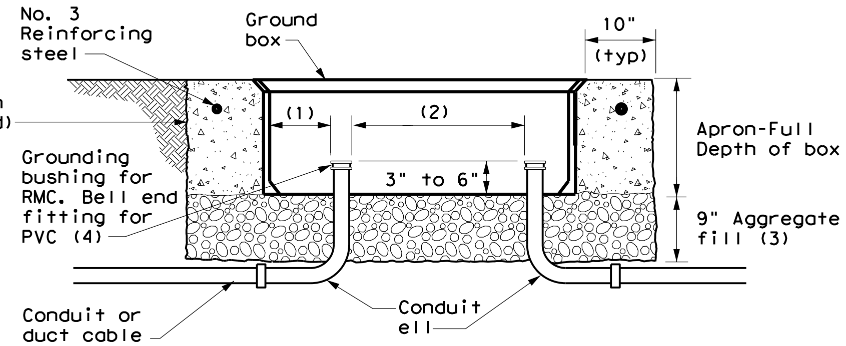


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOXES

A. MATERIALS

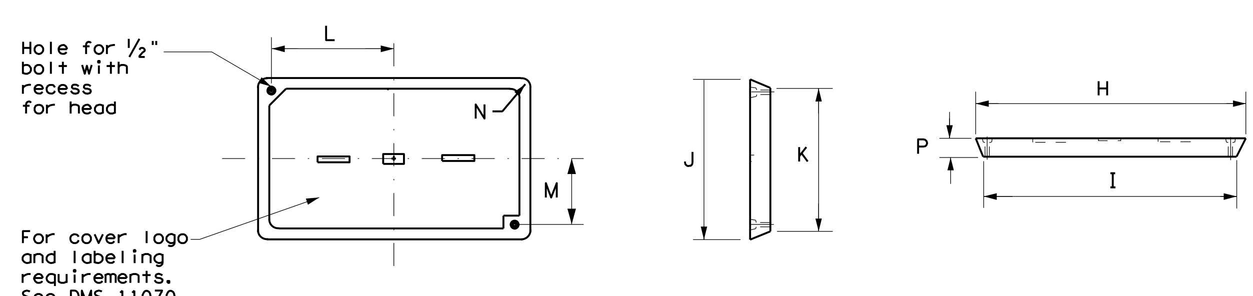
1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW　　END　　SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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	BRY		ROBERTSON	95

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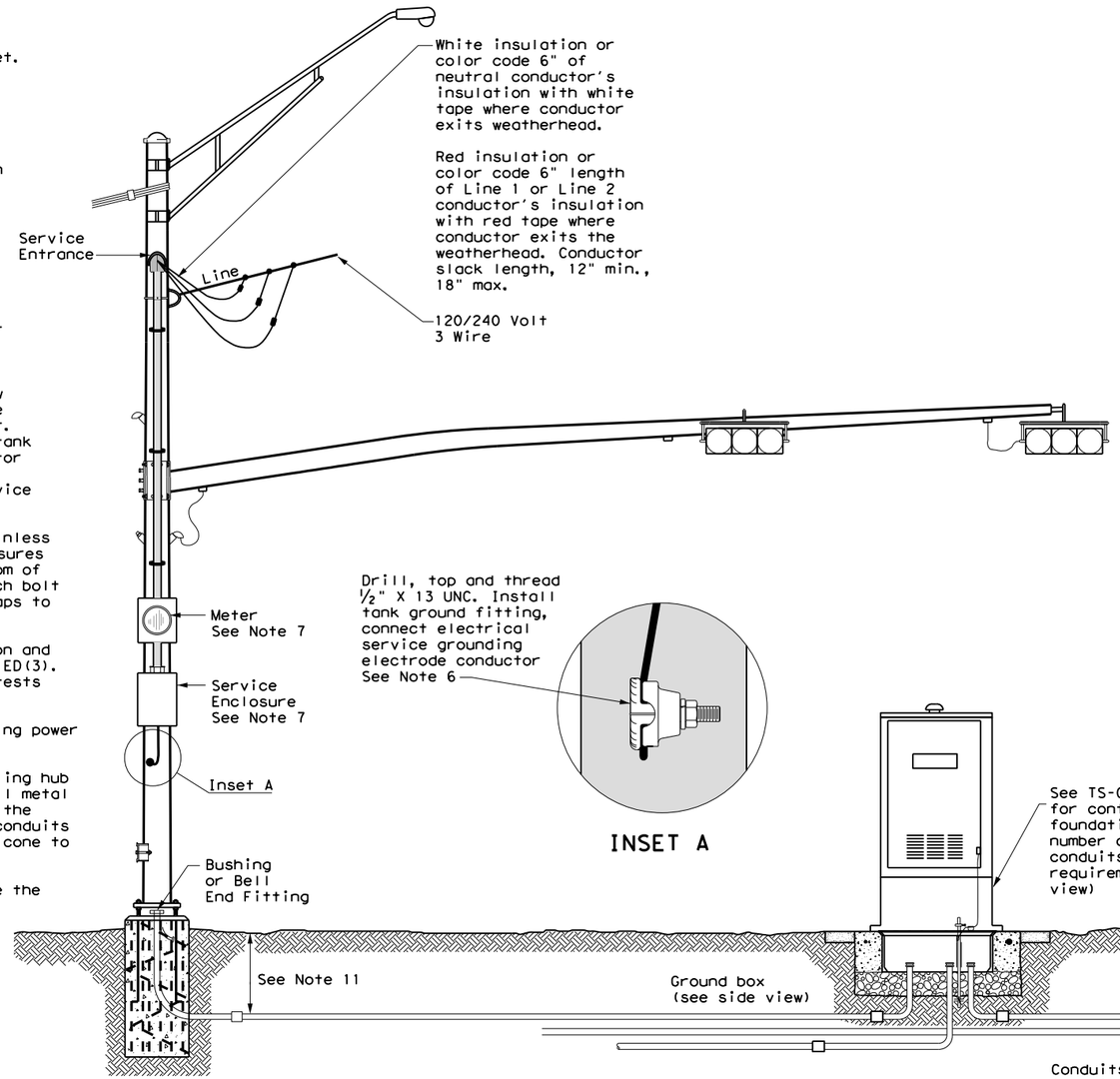
TRAFFIC SIGNAL NOTES

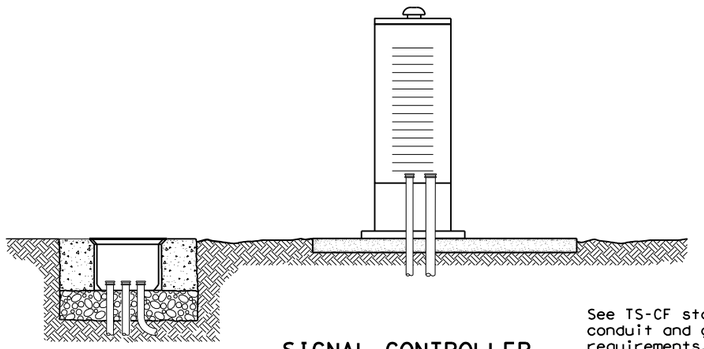
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

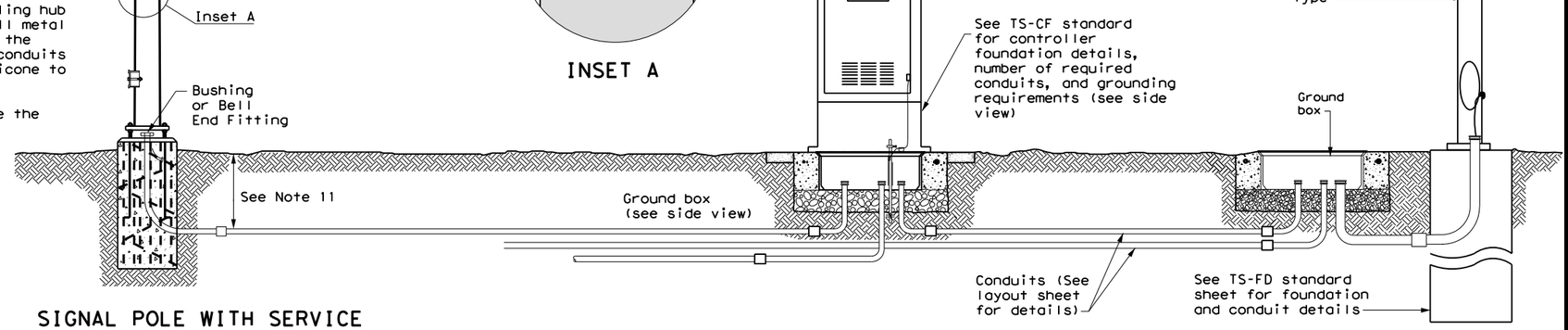
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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	BRYAN	ROBERTSON		96

DUCT CABLE & HDPE CONDUIT NOTES

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.

2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.

3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.

4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.

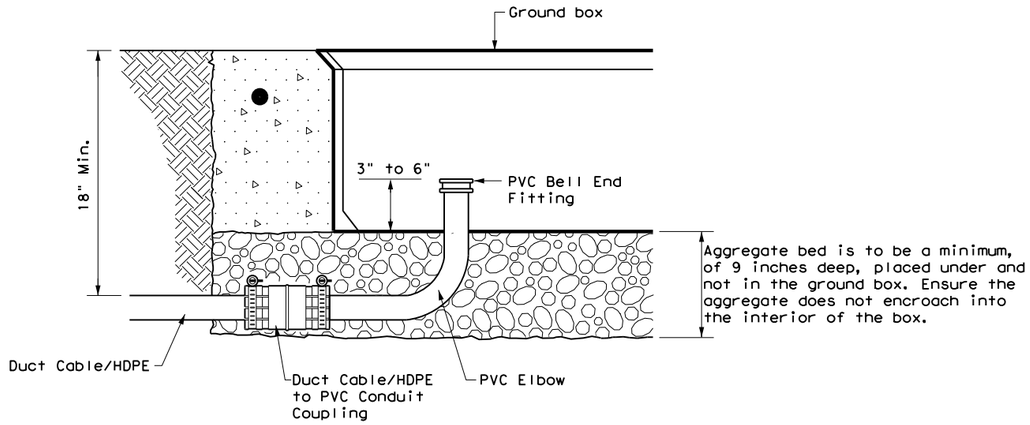
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.

7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.

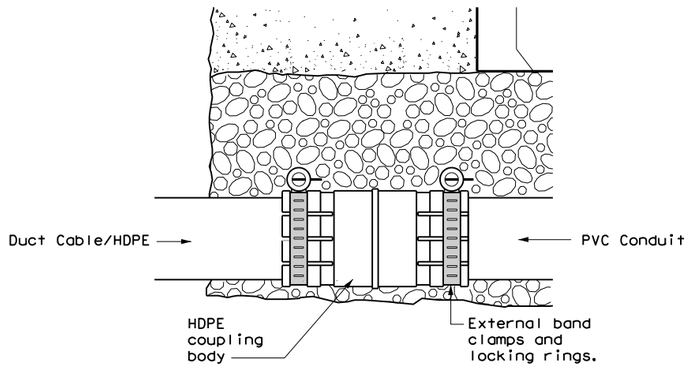
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.

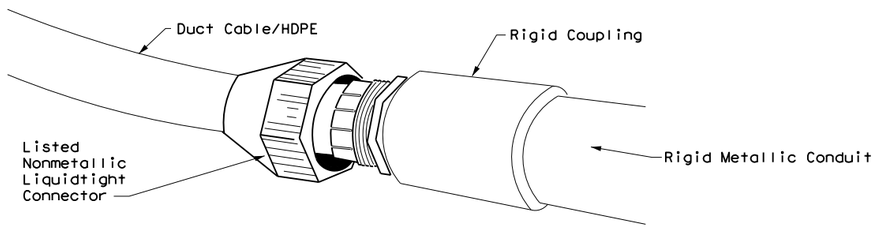


DUCT CABLE/HDPE AT GROUND BOX

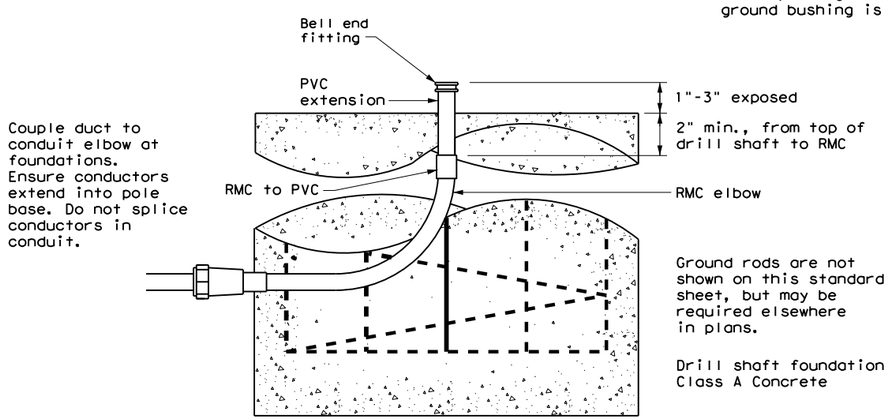
When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



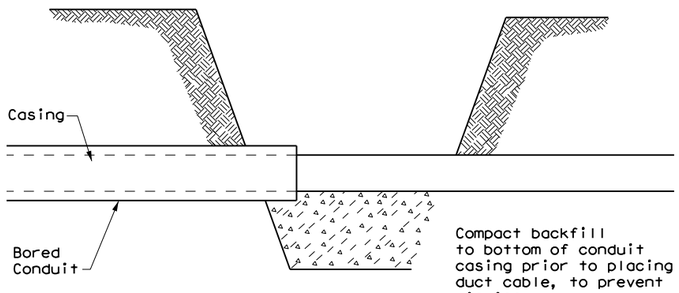
DUCT CABLE/HDPE TO PVC



DUCT CABLE/HDPE TO RMC



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS DUCT CABLE/ HDPE CONDUIT

ED(11)-14

FILE: ed11-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		97

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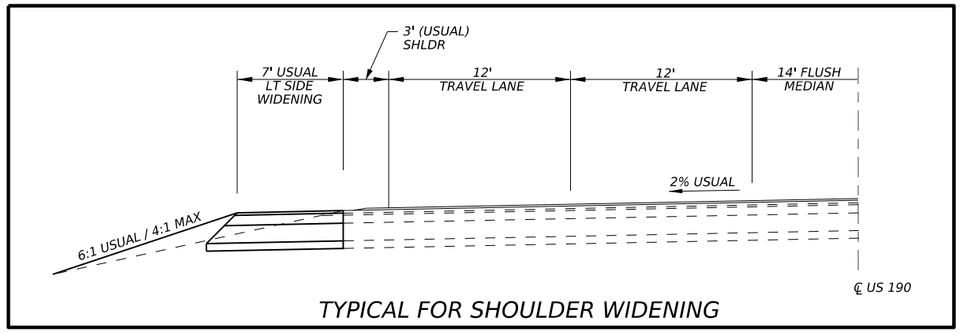
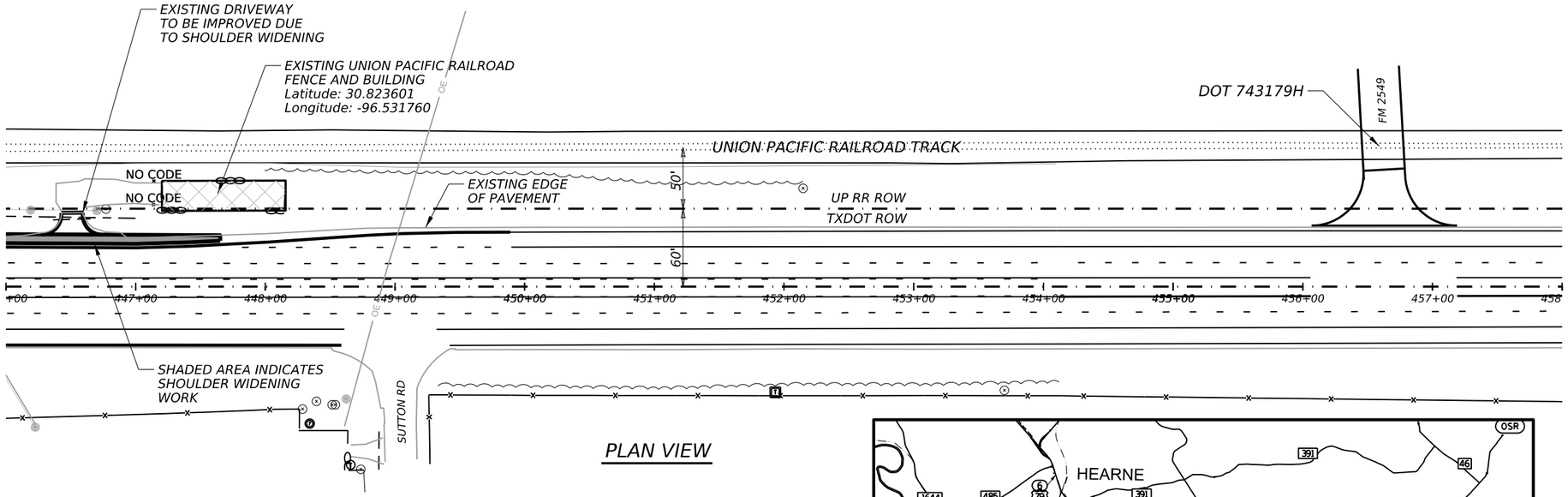
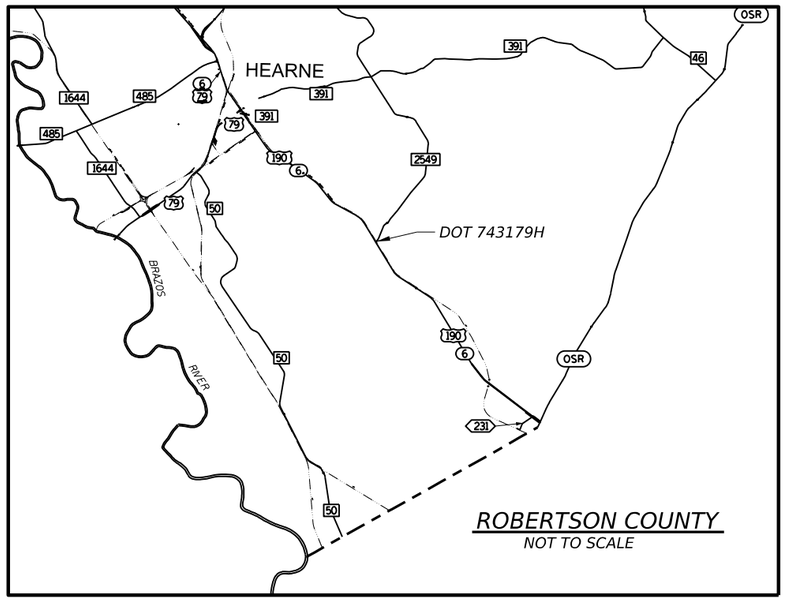


TYPICAL FOR SHOULDER WIDENING



PLAN VIEW



ROBERTSON COUNTY
NOT TO SCALE

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 50 100 200 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

RAILROAD EXHIBIT
US 190 CSJ: 0049-08-076

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	98

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
FILENAME:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 743179H
Crossing Type: AT-GRADE
RR Company Operating Track at Crossing: Union Pacific Railroad
RR Company Owning Track at Crossing: Union Pacific Railroad
RR MP: 114.710
RR Subdivision: Bryan
City: Hearne
County: Robertson
CSJ at this Crossing: 0049-08-076
Latitude: 30.823601 (RR Building and Fence)
Longitude: -96.531760 (RR Building and Fence)

Scope of Work, including any TCP, to be performed by State Contractor:

Providing nearest DOT number for location reference. Work not being performed near crossing. Work is being performed near RR building on ROW.

Thw work On TxDOT roadway is to widen shoulders to 10'. The shoulder work near building will only be widened an addition 2' to 3' more at this location. The work is approximate 800' North of FM 2549.

Scope of Work to be performed by Railroad Company:

None

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad
Railroad Emergency Line at: (800) 848-8715
Location: DOT 743179H
RR Milepost: 114.710
Subdivision: Bryan

RRD Review Only
Initials: KS
Date: 01-03-2024

Texas Department of Transportation — *Rail Division*

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS	6/2023	0049	08	076		US 190	
		DIST	COUNTY			SHEET NO.	
		BRY	ROBERTSON			99	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		100

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation — Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		101

During the planning phase of project development the following environmental permits, issues and commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities. As additional environmental clearances may be required.

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.

☒ Required Action ☐ No Action Required

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. Project disturbance will be more than 5 acres. Contractor to submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATER BODIES 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#

Information regarding the USACE Nationwide Permit Program can be found at:
http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/GeneralPermits.aspx

Refer to 2014 TxDOT Standard Specification Items:
7.7.3 Work in Waters of the United States
7.7.6 Project Specific Locations
496 Removing Structures
506 Temporary Erosion, Sedimentation and Environmental Controls
506.4.3.4 Restricted Activities and Required Precautions

III. CULTURAL RESOURCES

Refer to 2014 TxDOT Standard Specification Item 7.7.1 Cultural Resources, in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) immediately cease work in the vicinity and contact the Engineer.

☐ Required Action ☒ No Action Required

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.

☐ Required Action ☒ No Action Required

Refer to 2014 TxDOT Standard Specification Items:
160 Topsoil
161 Compost
162 Sodding for Erosion Control
164 Seeding for Erosion Control
166 Fertilizer
168 Vegetative Watering
169 Soil Retention Blankets
170 Irrigation System
180 Wildflower Seeding
192 Landscape Planting
193 Landscape Establishment
506 Temporary Erosion, Sedimentation, and Environmental Controls
730 Roadside Mowing
751 Landscape Maintenance
752 Tree and Brush Removal

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ Required Action ☐ No Action Required

Action No.

1. See Item 7, General notes for Houston Toad
2. Do not kill snakes or other animals!
3. Do not destroy nests on structures within the project limits.

   Temporarily prevent the building of nests on any structures that require work within the project limits during the construction timeframe.

   This can be accomplished by application of bird repellant gel, netting, or removal by hand every 3-4 days.

   The nesting/breeding season for migratory birds is March 1 - September 1.

Under the Migratory Bird Treaty Act (MBTA), it is unlawful by any means or manner, to pursue, hunt, take, capture, [or] kill any migratory birds except as permitted by regulation (16 U.S.C. 703-704). Neither the statute nor its implementing regulations (Title 50, Code of Federal Regulations, Parts 10, 13, 21) exempt unintentional take of migratory birds. The unauthorized take (e.g. killing, capturing, or collecting) of migratory birds is a strict liability criminal offense that does not require knowledge or specific intent on the part of the offender. Even when engaged in an otherwise lawful activity for which the intent is not the killing of migratory birds, a violation may be committed.

4. If caves or sinkholes are discovered, cease work in the immediate area to verify the presence or absence of wildlife.
5. BMPs for T and E species will be discussed at the preconstruction meeting.

The Bryan District Environmental Section can be contacted at (979) 778-9766 to assist with the removal of wildlife species on their own with gentle persuasion.

Refer to 2014 TxDOT Standard Specification Items:
7.7.6 Project Specific Locations

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 appropiate 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 Engineerimmediately. The Contractor shall be responsiblefor the proper containment and cleanup of all product spills.

Contact the Engineer if any of the follwing 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 notifiy 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 discoverd on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ Required Action ☐ No Action Required

Action No.

1. The Clean Water Act, in part, requires that any spill of oil that could enter a waterway, as defined by the Act, and that violates applicable water quality standards or causes a film or sheen on water require reporting to the TCEQ and local authorities.
   Contact the Bryan District Enviromental Section at 979-778-9766.

   If potentially hazardous material and/or contaminated media (i.e. soil, groudwater, surface water, sediment, building materials) are unexpectedly encountered during construction, immediately cease work in the vicinity and contact the Engineer.

   Refer to 2014 TxDOT Standard Specification Items:
   6.10 Hazardous Materials
   7.12 Responsibility for Hazardous Materials

VII. OTHER ENVIRONMENTAL ISSUES

☐ Required Action ☒ No Action Required

Refer to 2014 TxDOT Standard Specification Items:
7.7.6 Project Specific Locations
751 Landscape Maintenance

Contacts:

Mr. John D. Moravec
Environmental Coordinator
Texas Department of Transportation
Bryan District
2591 N. Earl Rudder Freeway
Bryan, TX 77803
Phone: (979) 778-9766
Fax: (979) 778-9702
e-mail: John.Moravec@txdot.gov

PRINT DATE	REVISION DATE
	02/12/2015

Texas Department of Transportation
Bryan District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190
STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON
CONTROL	SECTION	JOB / SHEET NO.
0049	08	076 / 102

FILENAME:
REV DATE:
CS J: 0049-08-076XX

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0049-08-076

1.2 PROJECT LIMITS:
From: 0.15 Mi. N. of Spring Oaks Dr.

To: 0.1 Mi. s. of Sadberry

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 30.8371942 ,(Long) -96.5485038

END: (Lat) 30.7750511 ,(Long) -96.4900573

1.4 TOTAL PROJECT AREA (Acres): 52 AC

1.5 TOTAL AREA TO BE DISTURBED (Acres): 8.04 AC

1.6 NATURE OF CONSTRUCTION ACTIVITY:
For the construction of widen road - Add shoulders

1.7 MAJOR SOIL TYPES:

Soil Type	Description
RoB Robco - Tanglewood complex	1 to 5 percent slopes
SnB Silstid loamy fine sand	1 to 5 percent slopes
BeB Benchley clay loam	3 to 5 percent slopes
TaA Tabor fine sandy loam	0 to 2 percent slopes
WzA Wilson loam	0 to 1 percent slopes

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

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

Type	Sheet #s

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

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

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody
Cross drainage structures collect into Spring Creek and flows 3 miles into the Little Brazos River and then flows another 27 miles into the Brazos River.	Brazos River Segment 1211.

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☐ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☐ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
N/A

Design engineer note:
Seal/Signature is only required if one or more of the following applies:

☐ No signed/sealed SWP3 Layout (or "Erosion Control Layout") is provided for the project.
☐ Calculations for a sediment trap or sediment basin are included in the SWP3.
☐ The third box is checked under Sedimentation Basin of Section 2.0: "Required (>10 acres), but not feasible due to:"

If signed/sealed SWP3 is required, it should be provided on both sheets in the bottom right corner.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

 July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			103
STATE	STATE DIST.	COUNTY	
TEXAS	BRYAN	ROBERTSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0049	08	076	US 190

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☒ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☒ ☐ Biodegradable Erosion Control Logs
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☒ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☒ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

Design engineer note:

Seal/Signature is only required if one or more of the following applies:

- ☐ No signed/sealed SWP3 Layout (or "Erosion Control Layout") is provided for the project.
- ☐ Calculations for a sediment trap or sediment basin are included in the SWP3.
- ☐ The third box is checked under Sedimentation Basin of Section 2.0: "Required (>10 acres), but not feasible due to:"

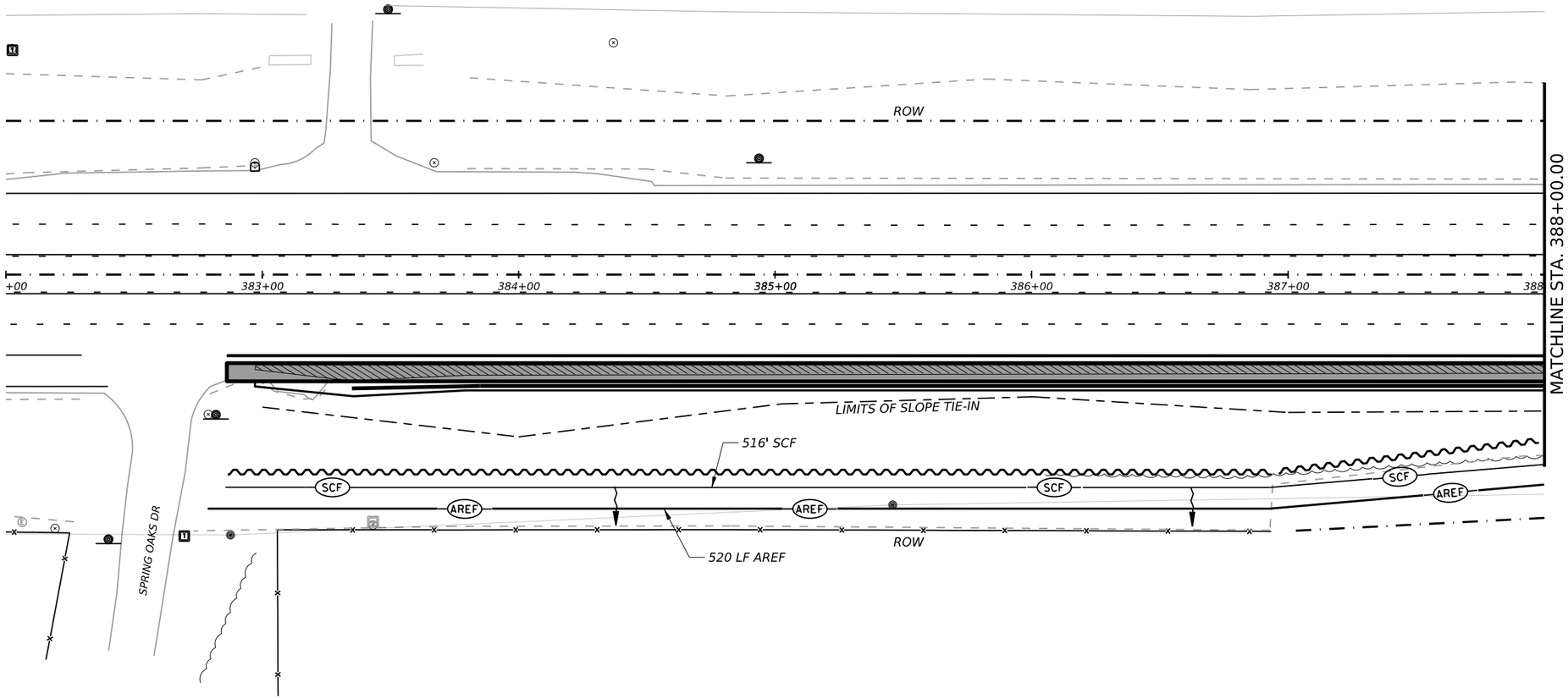
If signed/sealed SWP3 is required, it should be provided on both sheets in the bottom right corner.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			104
STATE	STATE DIST.	COUNTY	
TEXAS	BRYAN	ROBERTSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0049	08	076	US 190



LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 1 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	105

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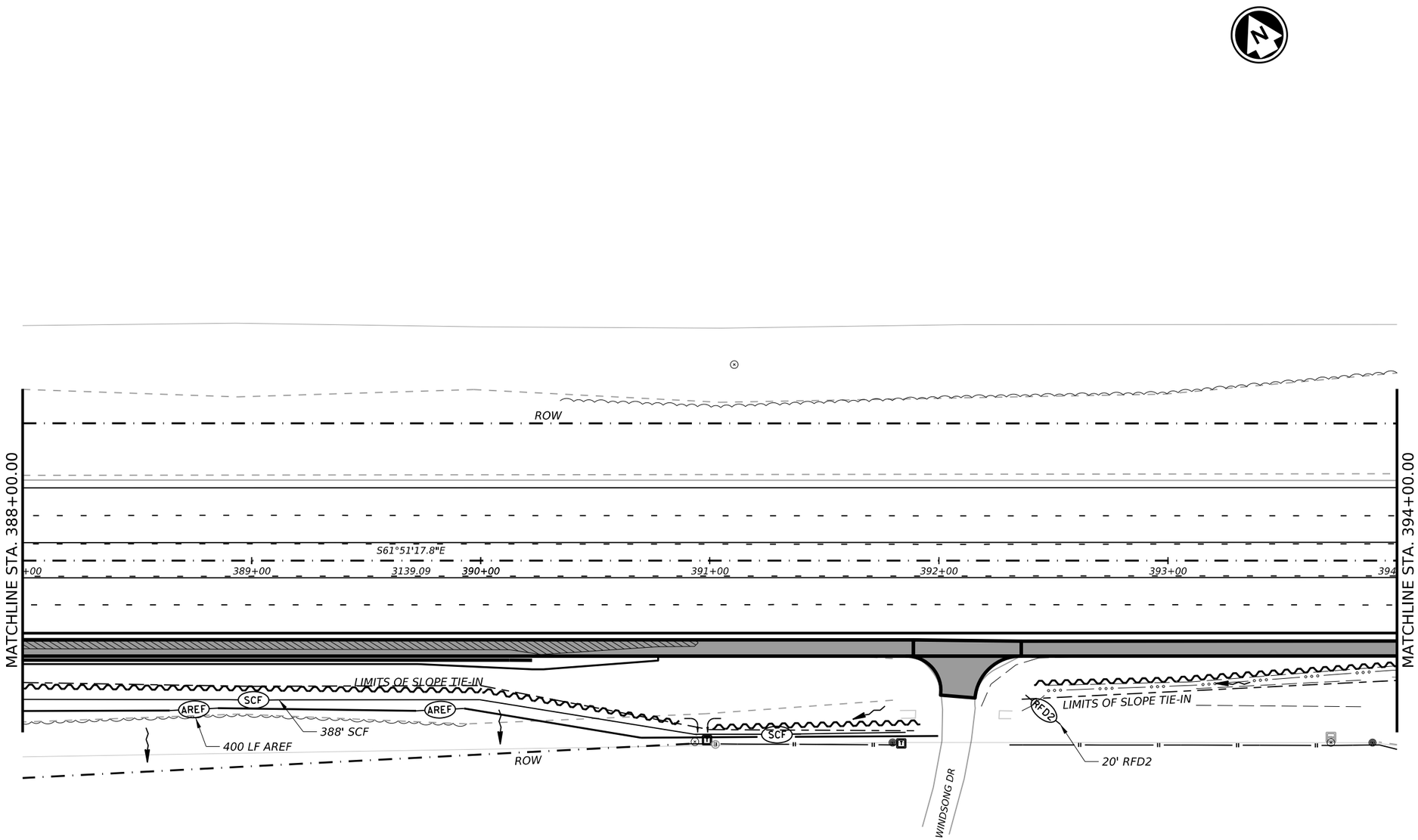

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0 25 50 100 FT

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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 2 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	106

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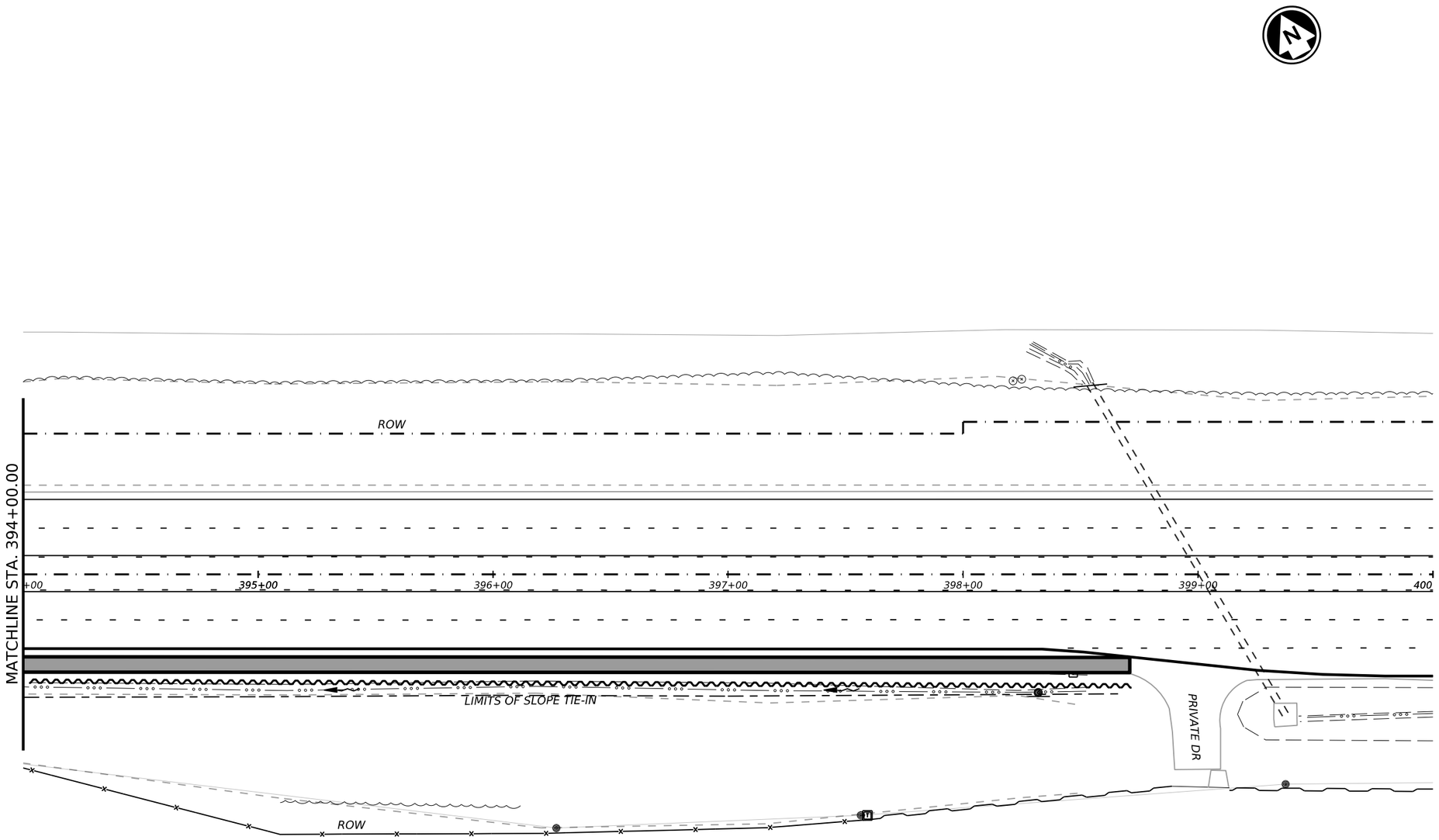

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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 3 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	107

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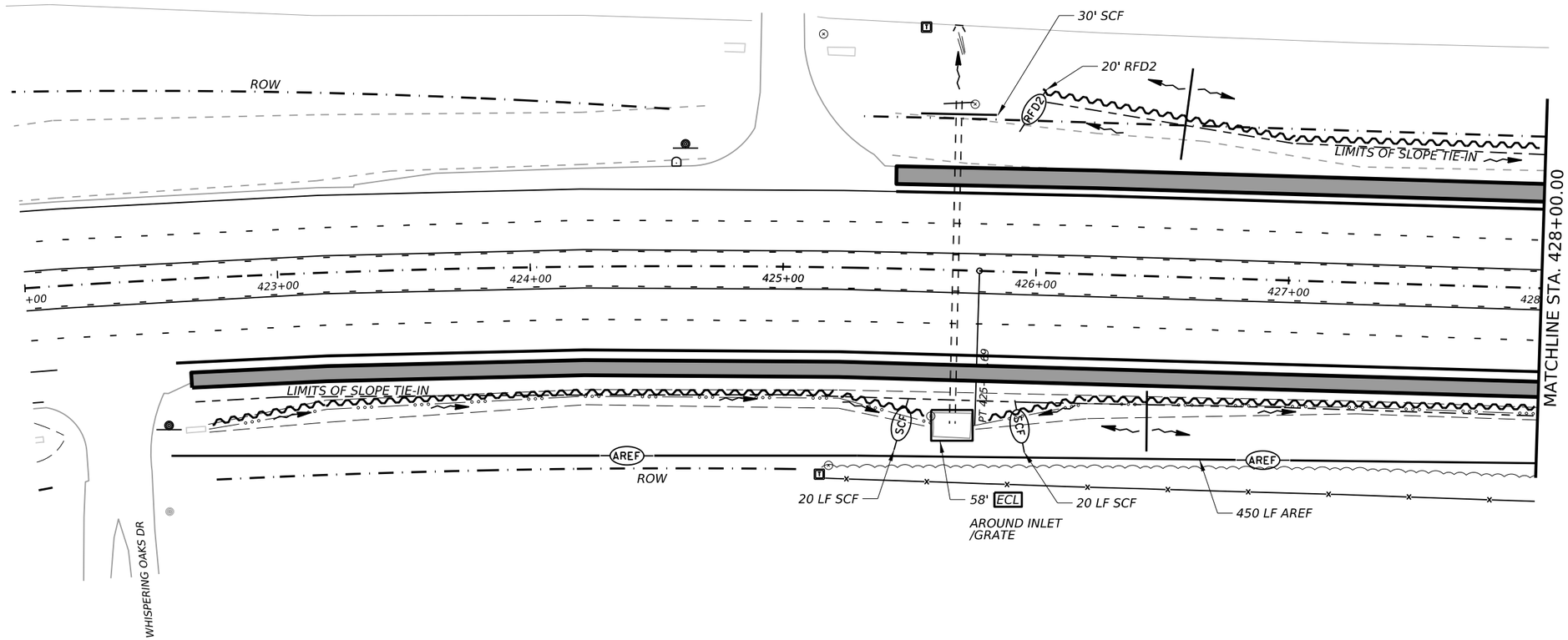

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01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 4 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	108

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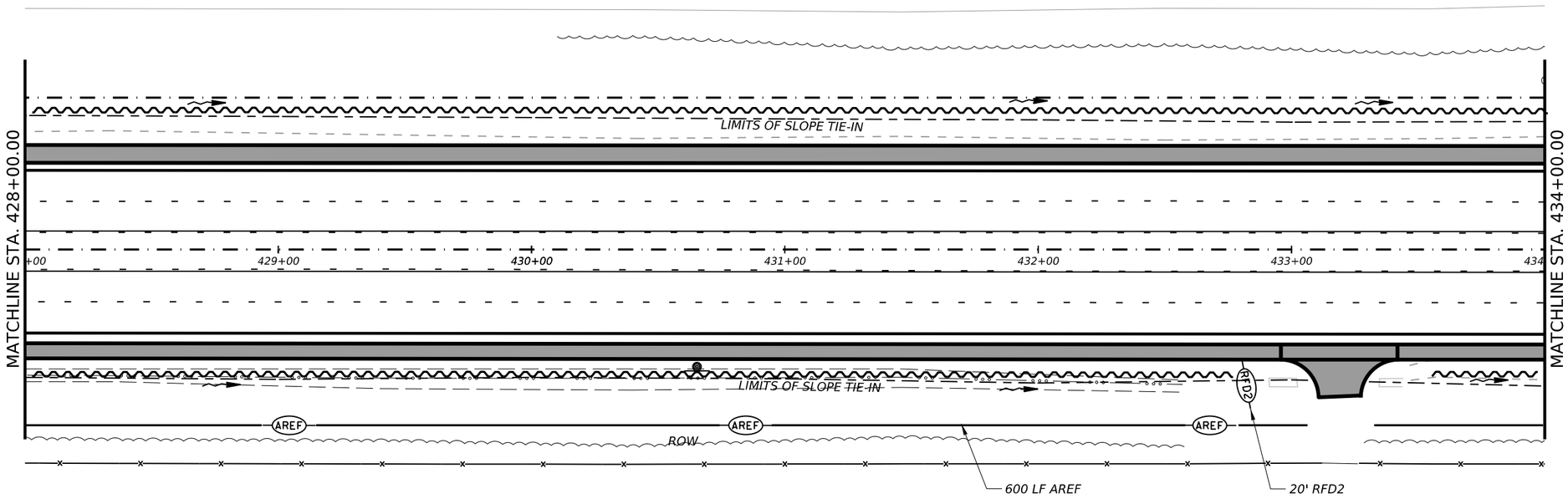

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HORIZONTAL
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 5 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	109

REV DATE: 01/30/2024 04:22 PM
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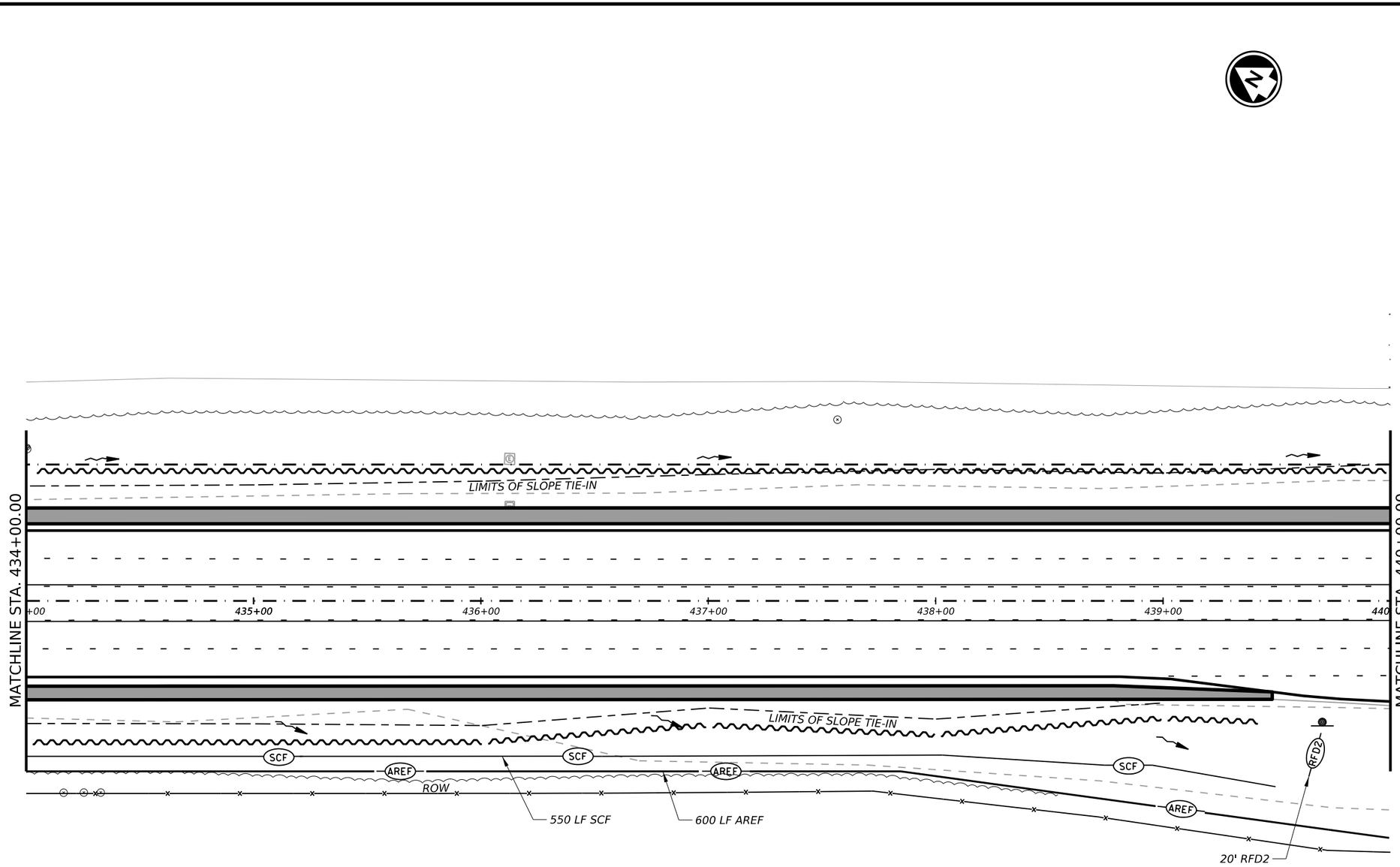

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
102035
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01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 6 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	110

REV DATE: 01/30/2024 04:22 PM
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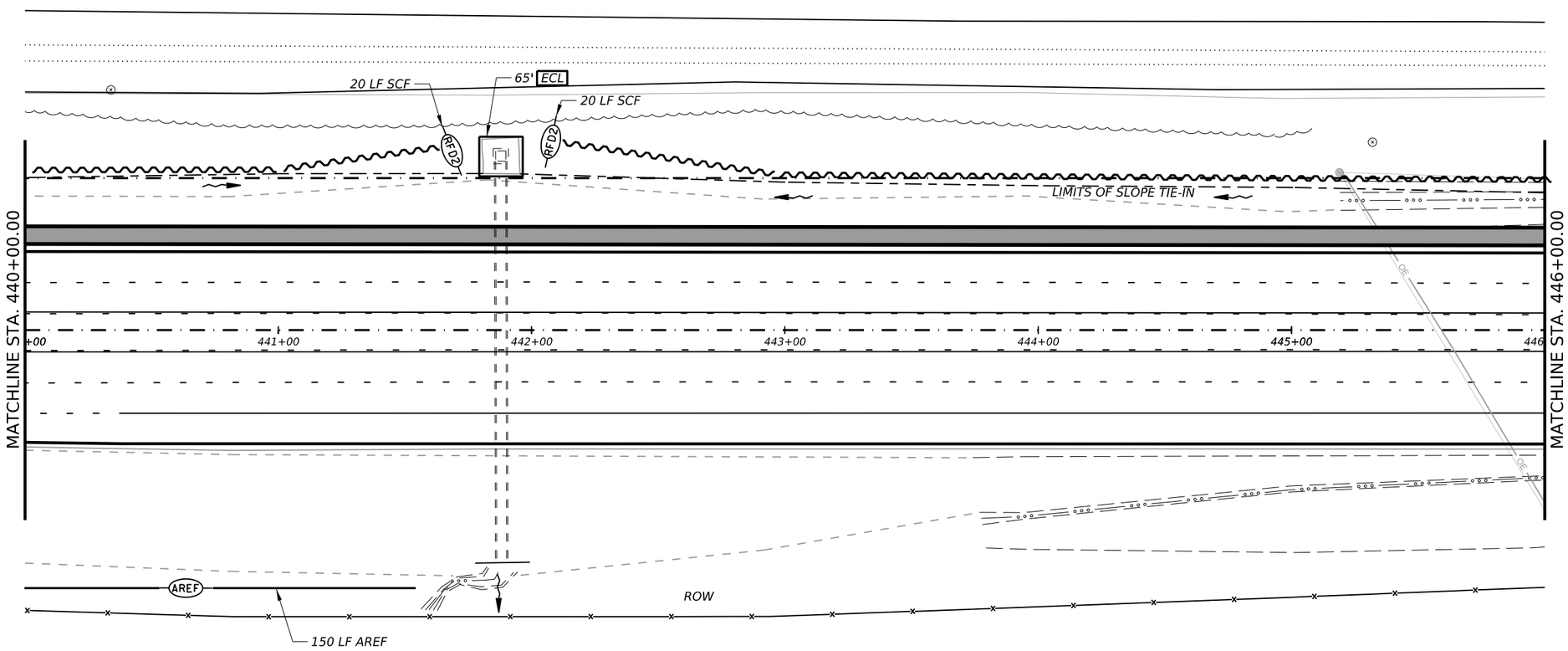

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
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01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 7 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	111

REV DATE: 01/30/2024 04:22 PM
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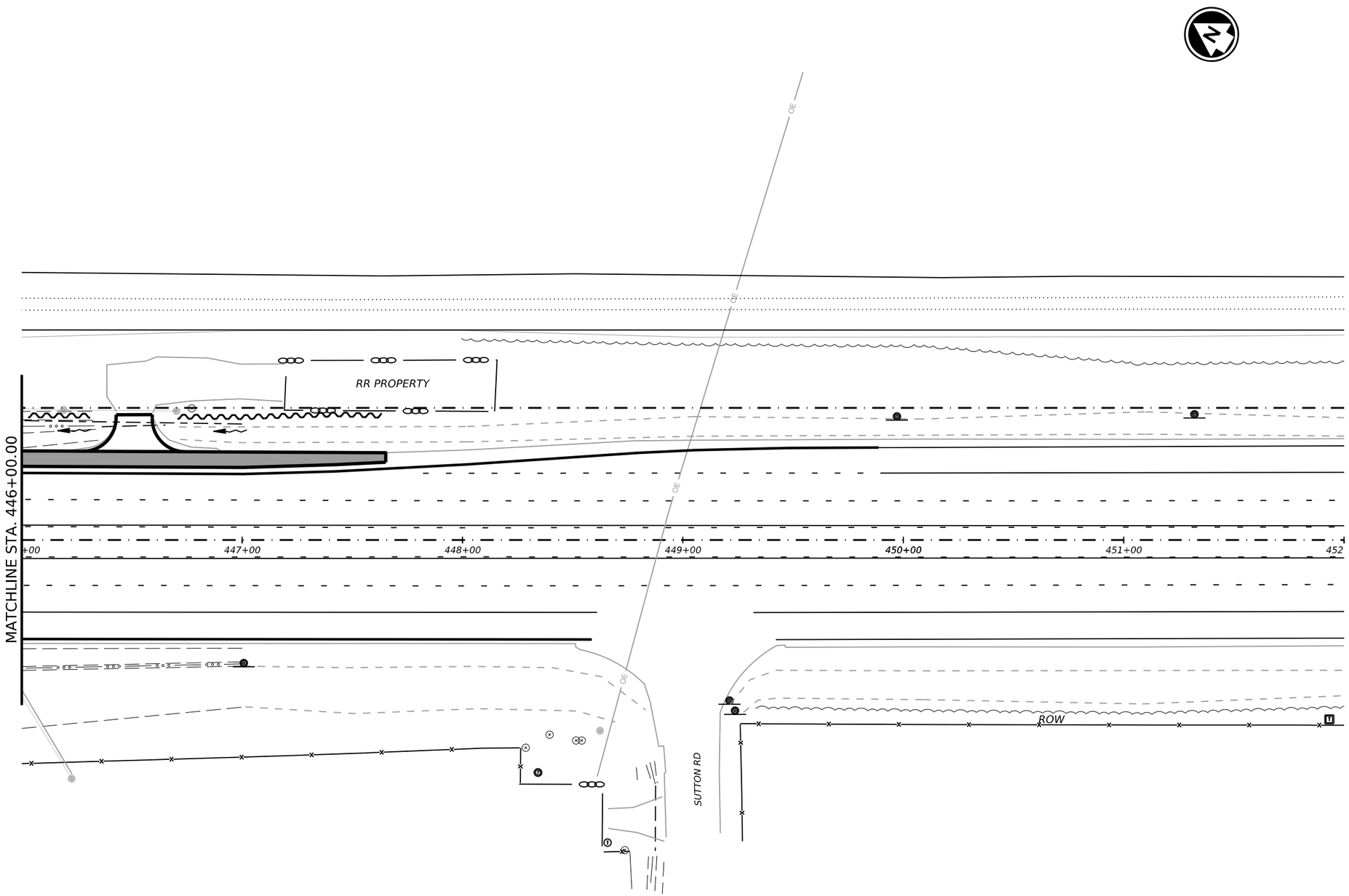

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
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- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 8 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	112

REV DATE: 01/30/2024 04:22 PM
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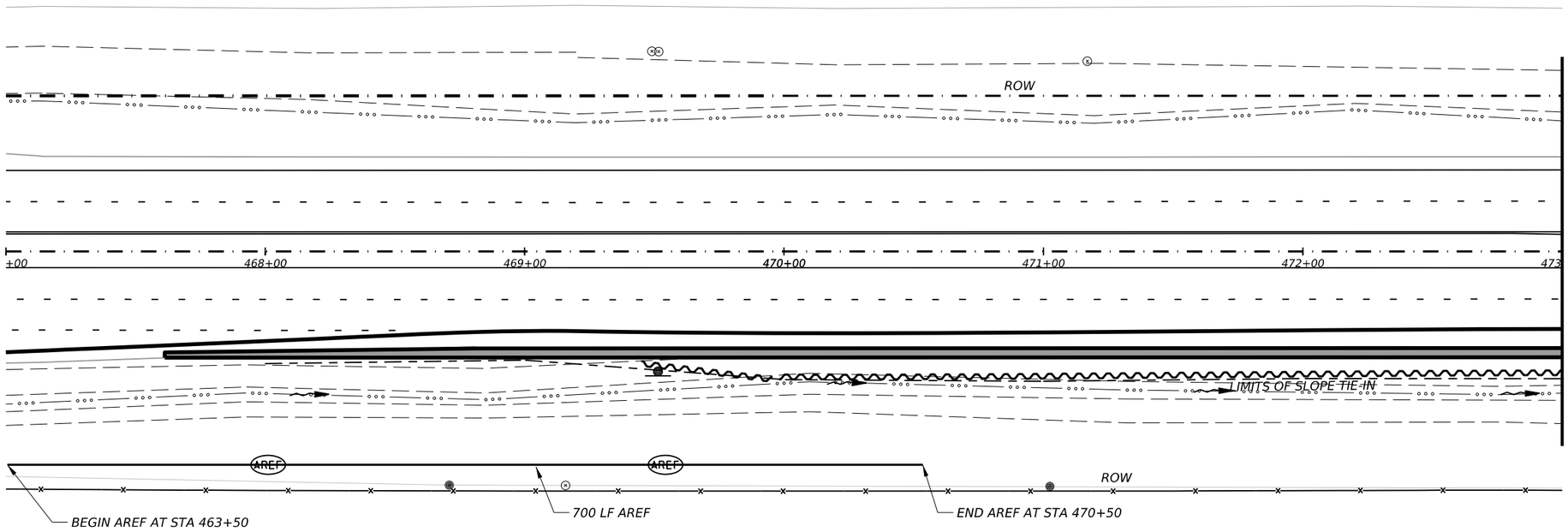

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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STATE OF TEXAS
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HORIZONTAL
0 25 50 100 FT

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SWP3 LAYOUT

SHEET 9 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	113

REV DATE: 01/30/2024 04:22 PM
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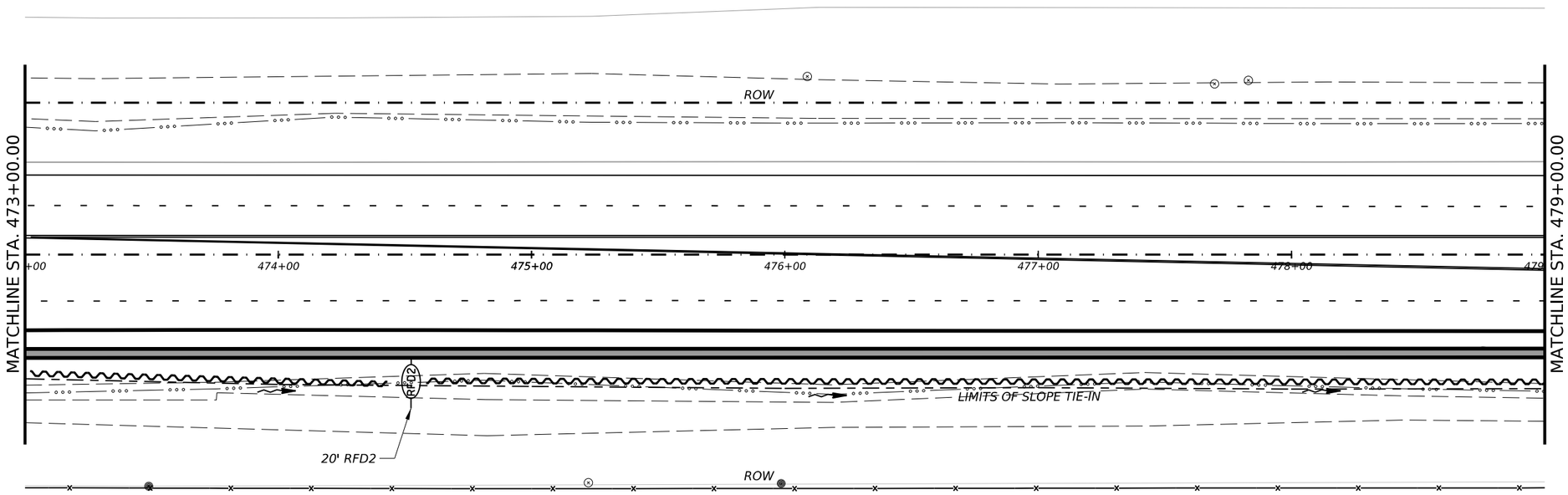

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 10 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	114

REV DATE: 01/30/2024 04:22 PM
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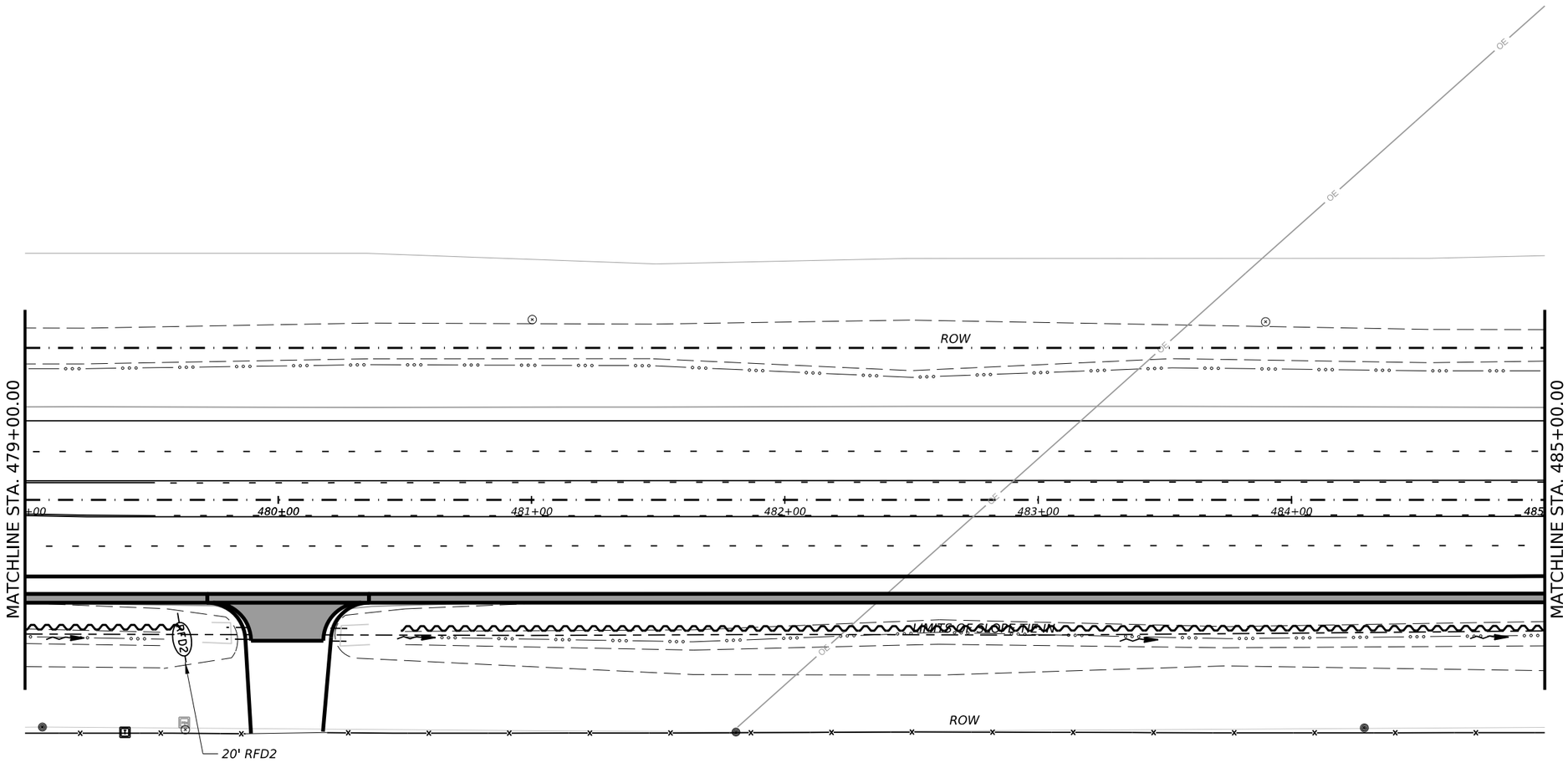

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

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01/31/2024

HORIZONTAL
0 25 50 100 FT

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SWP3 LAYOUT

SHEET 11 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	115

REV DATE: 01/30/2024 04:22 PM
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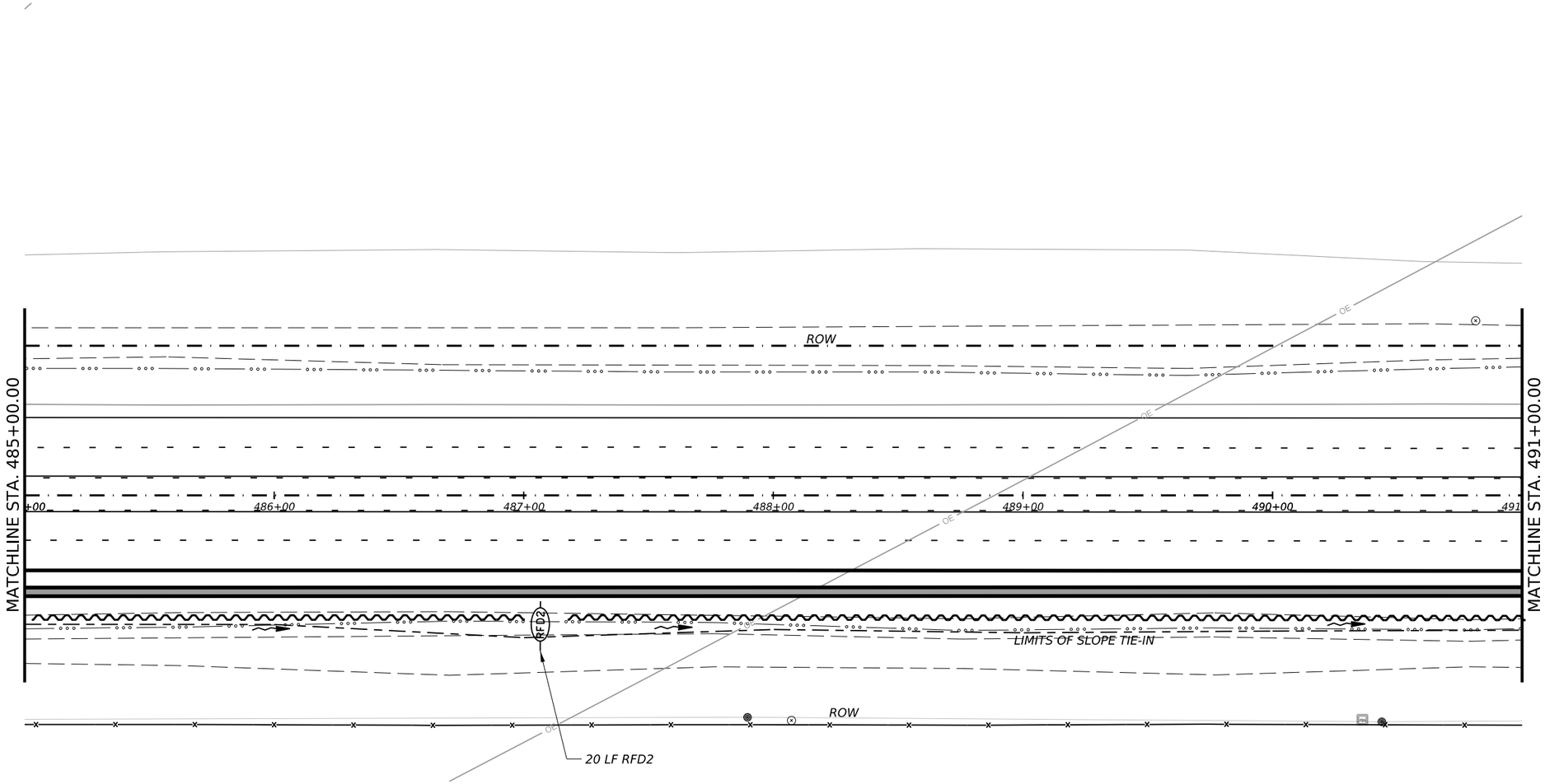

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 12 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	116

REV DATE: 01/30/2024 04:22 PM
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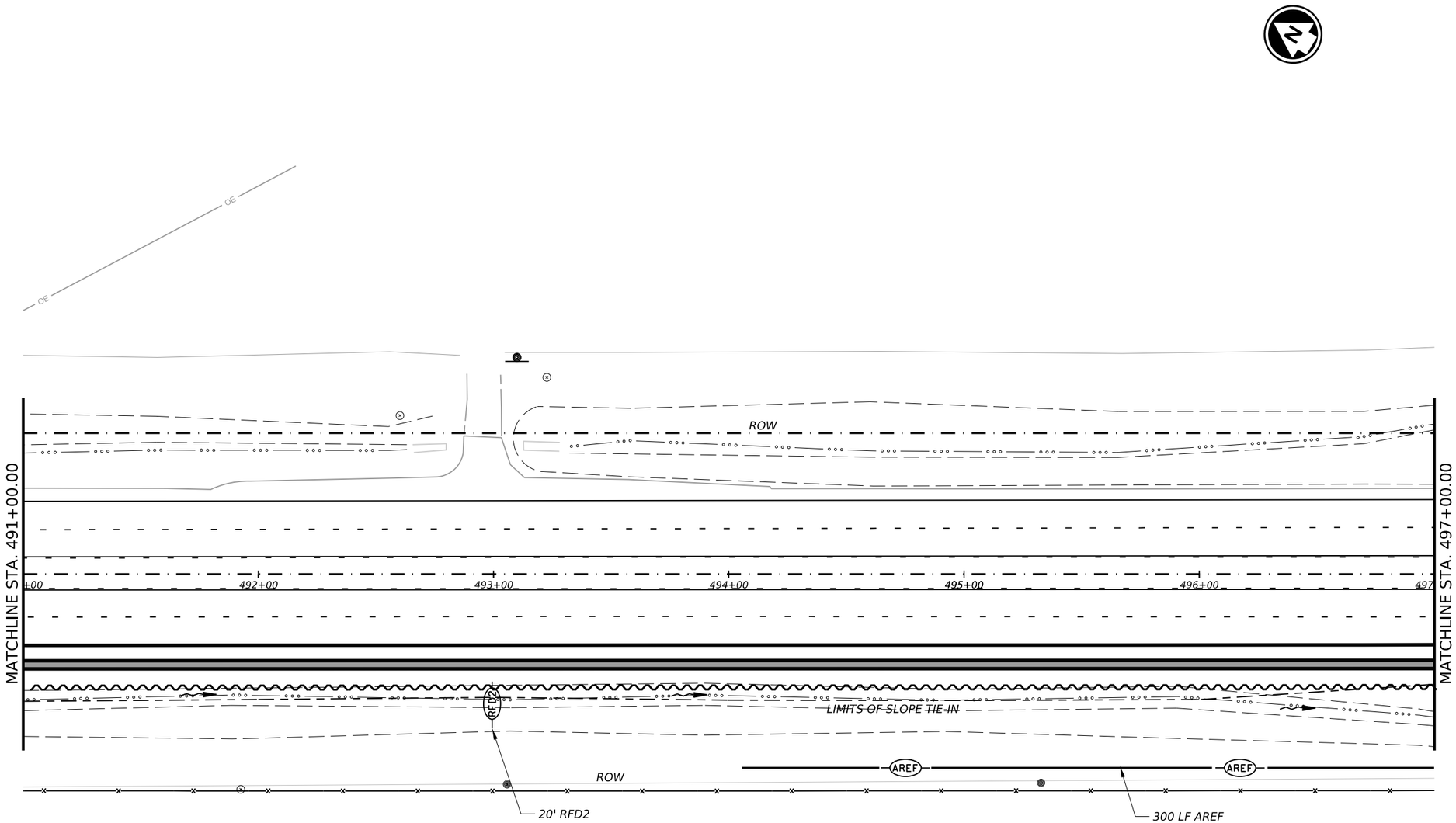

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
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01/31/2024

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0 25 50 100 FT

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Bryan District

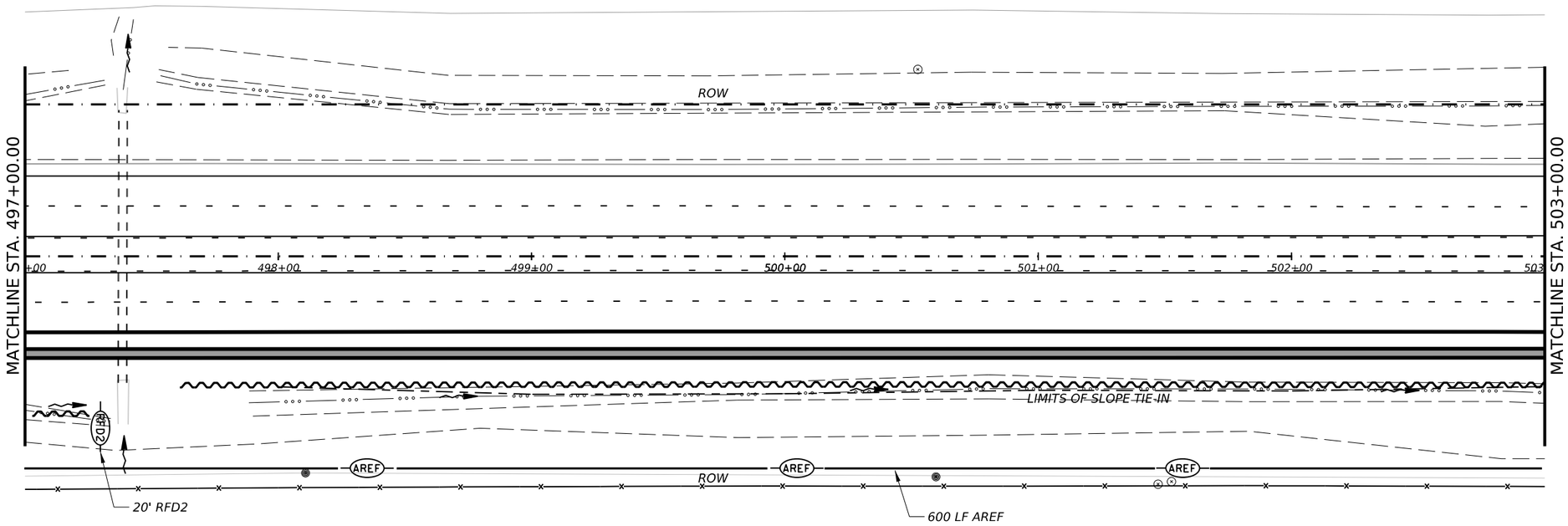
SWP3 LAYOUT

SHEET 13 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	117

REV DATE: 01/30/2024 04:22 PM
CSJ: 0049-08-076
FILENAME:



LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 14 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON

CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	118

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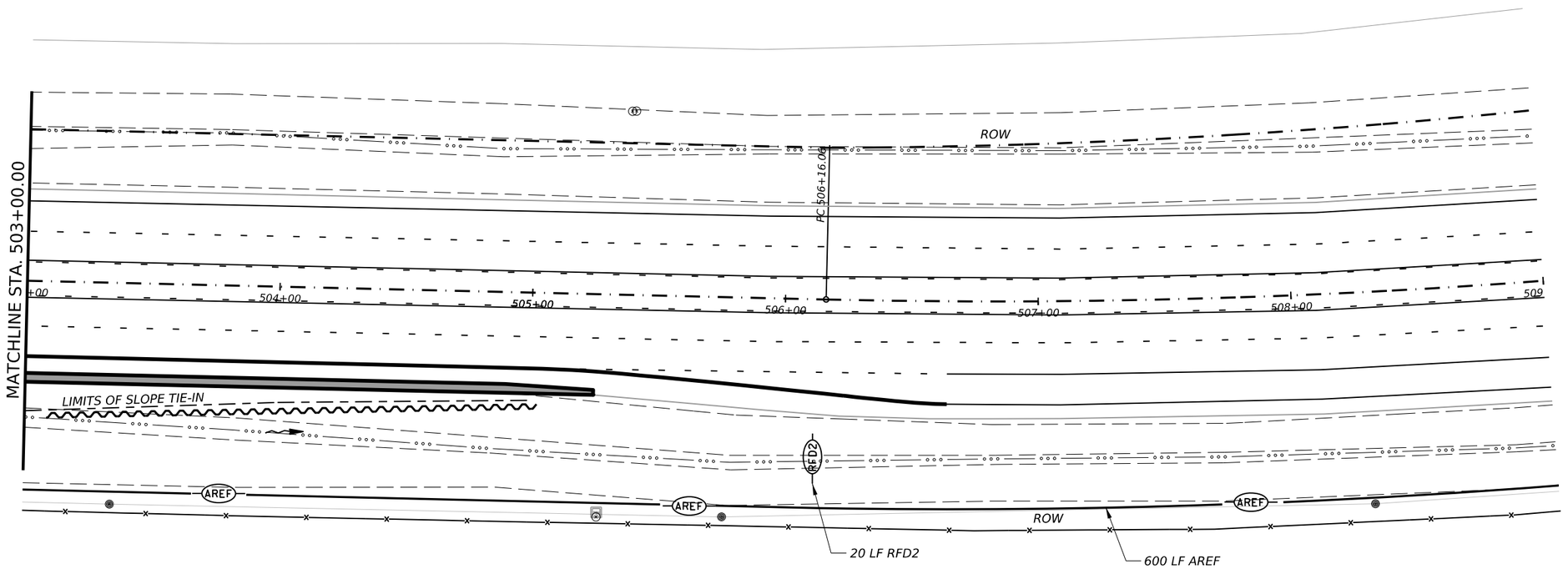

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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STATE OF TEXAS
JEAN J. FENG
102035
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PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 15 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	119

REV DATE: 01/30/2024 04:22 PM
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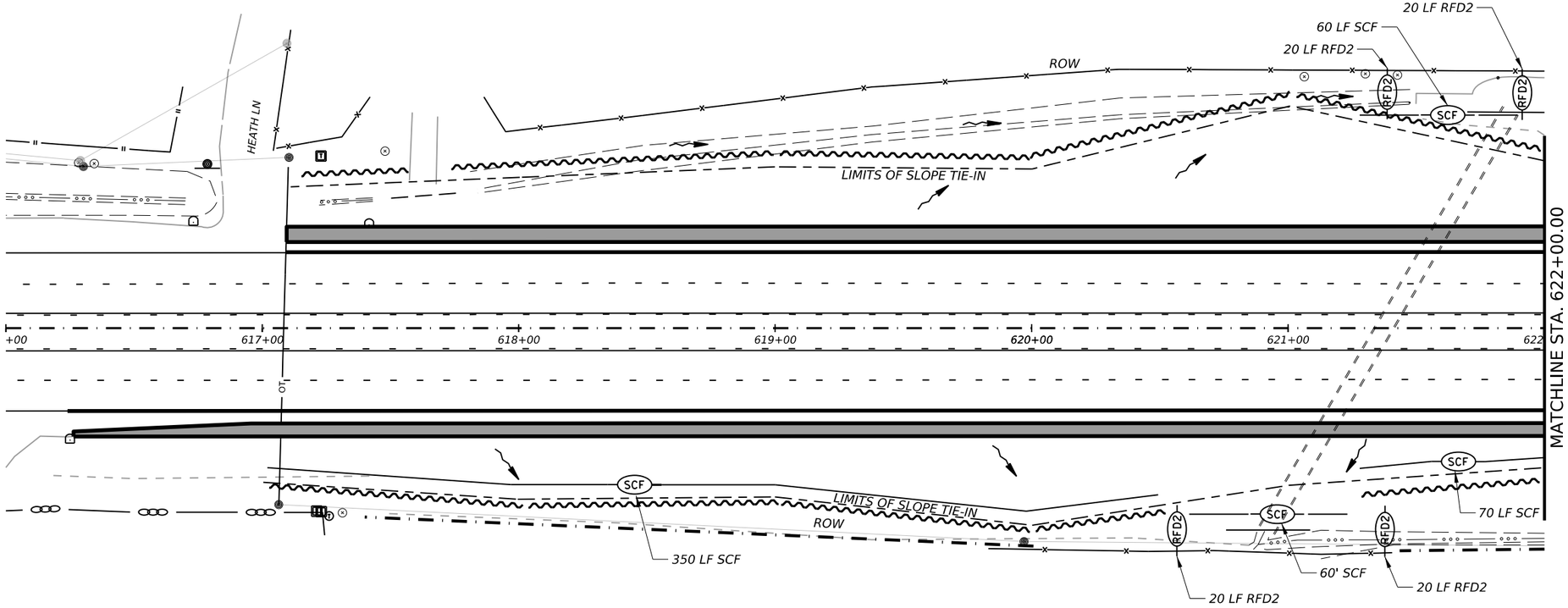

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
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PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 16 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	120

REV DATE: 01/30/2024 04:22 PM
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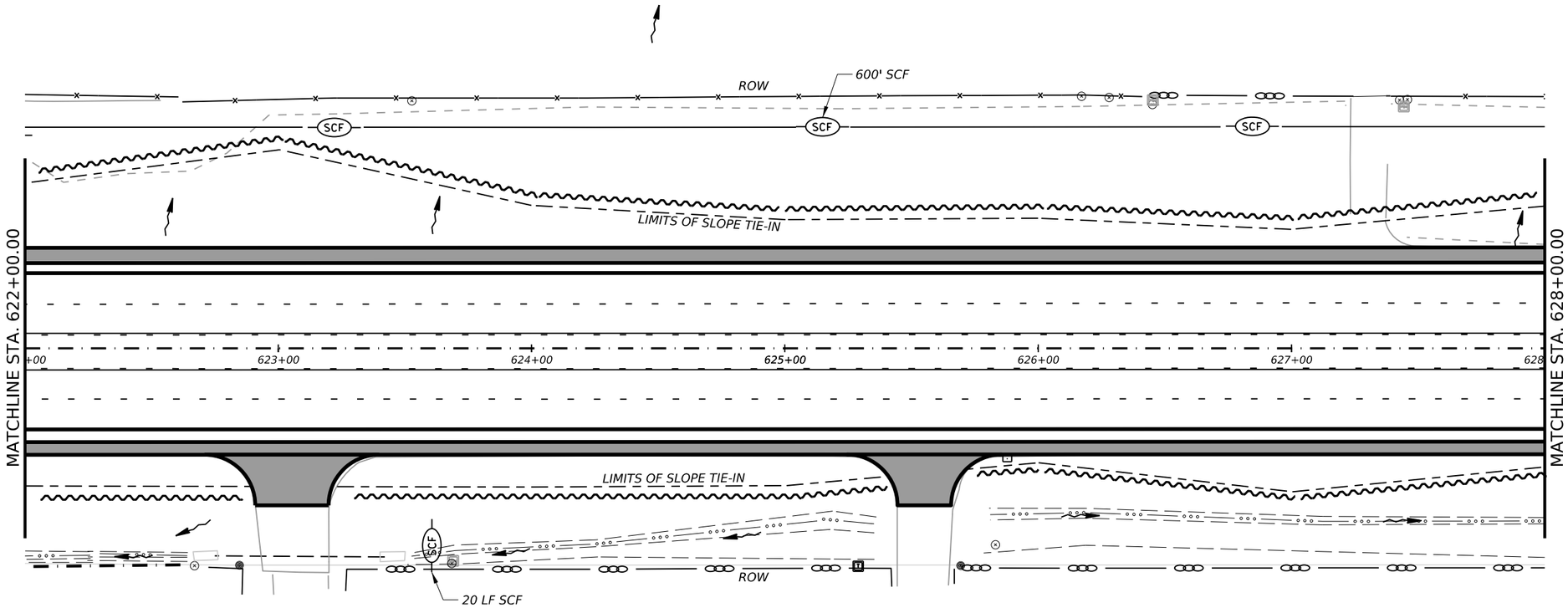

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
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HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 17 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	121

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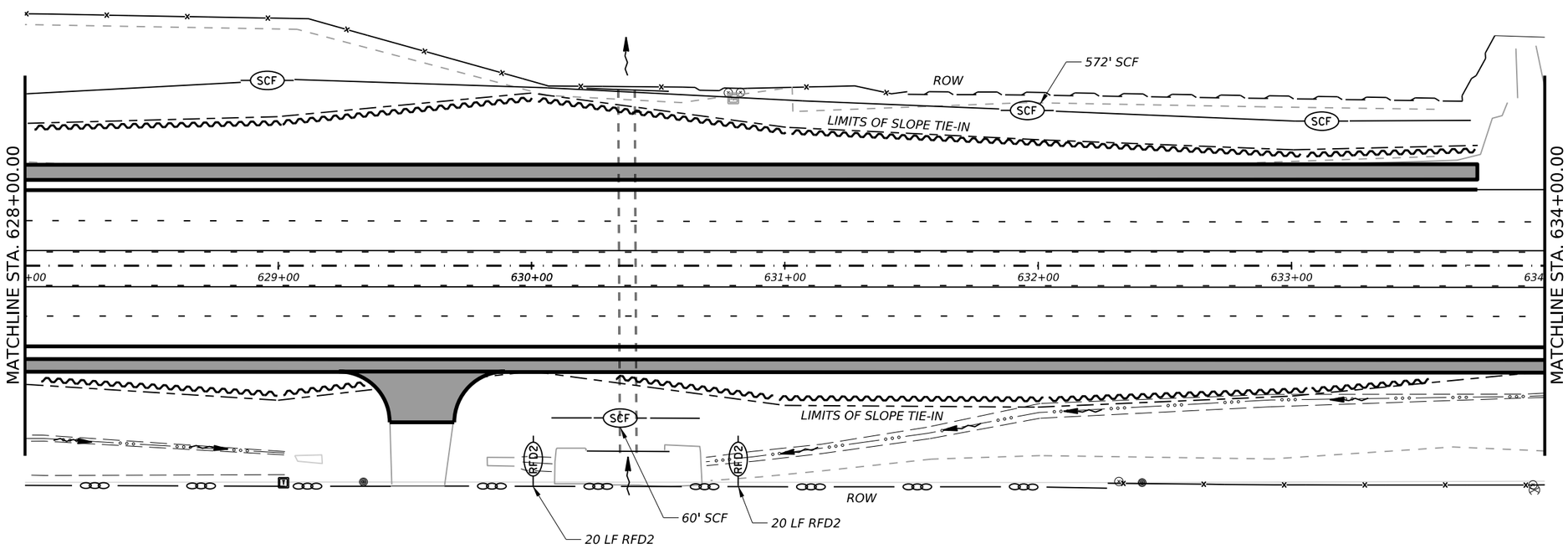

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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STATE OF TEXAS
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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 18 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	122

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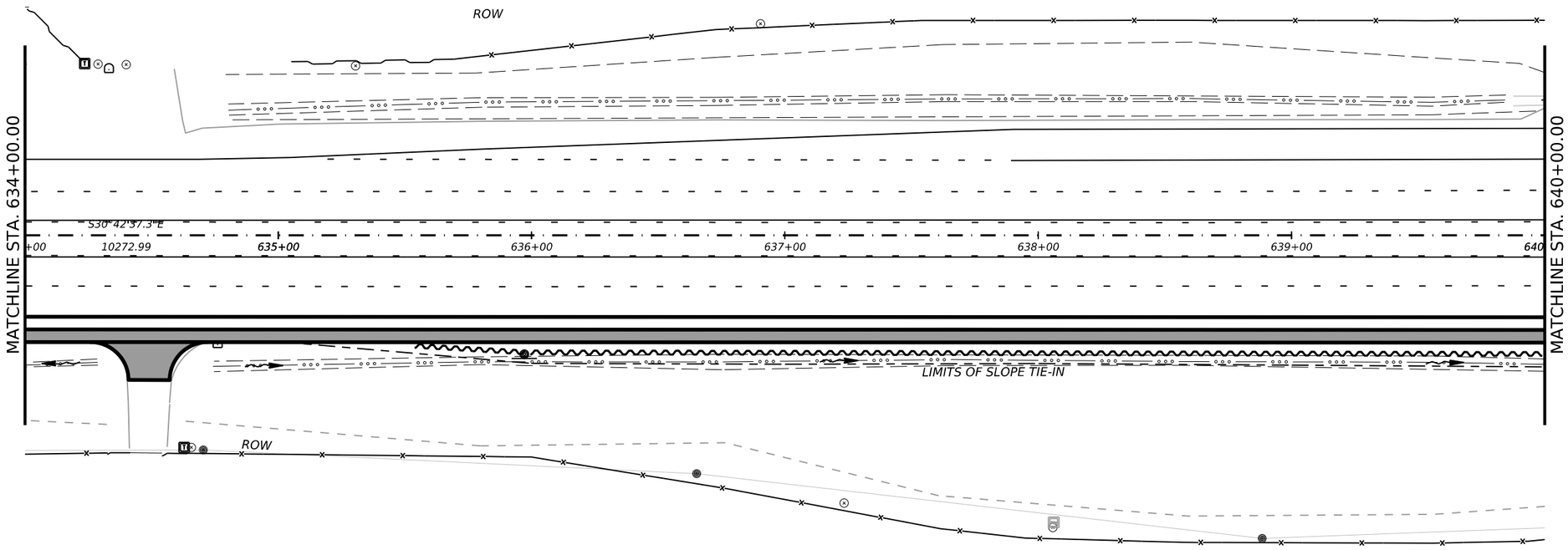

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
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TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 19 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	123

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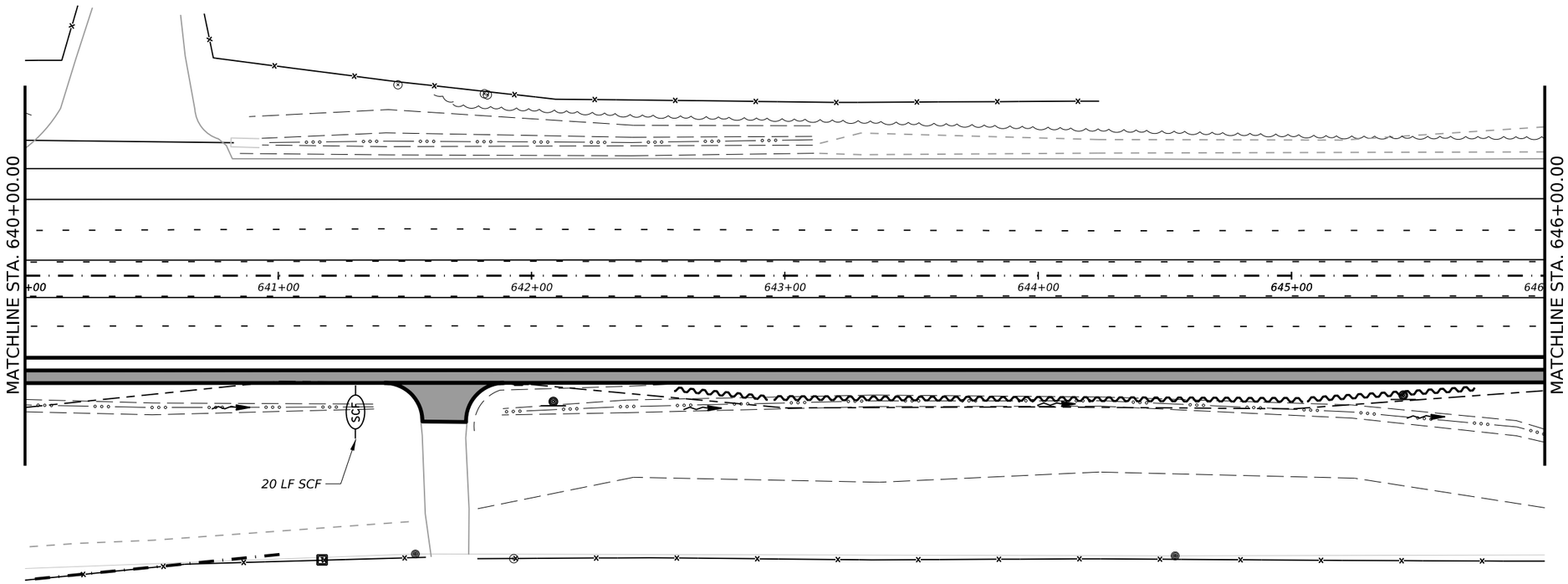

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

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STATE OF TEXAS
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01/31/2024

HORIZONTAL
0 25 50 100 FT

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Bryan District

SWP3 LAYOUT

SHEET 20 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	124

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CSJ: 0049-08-076
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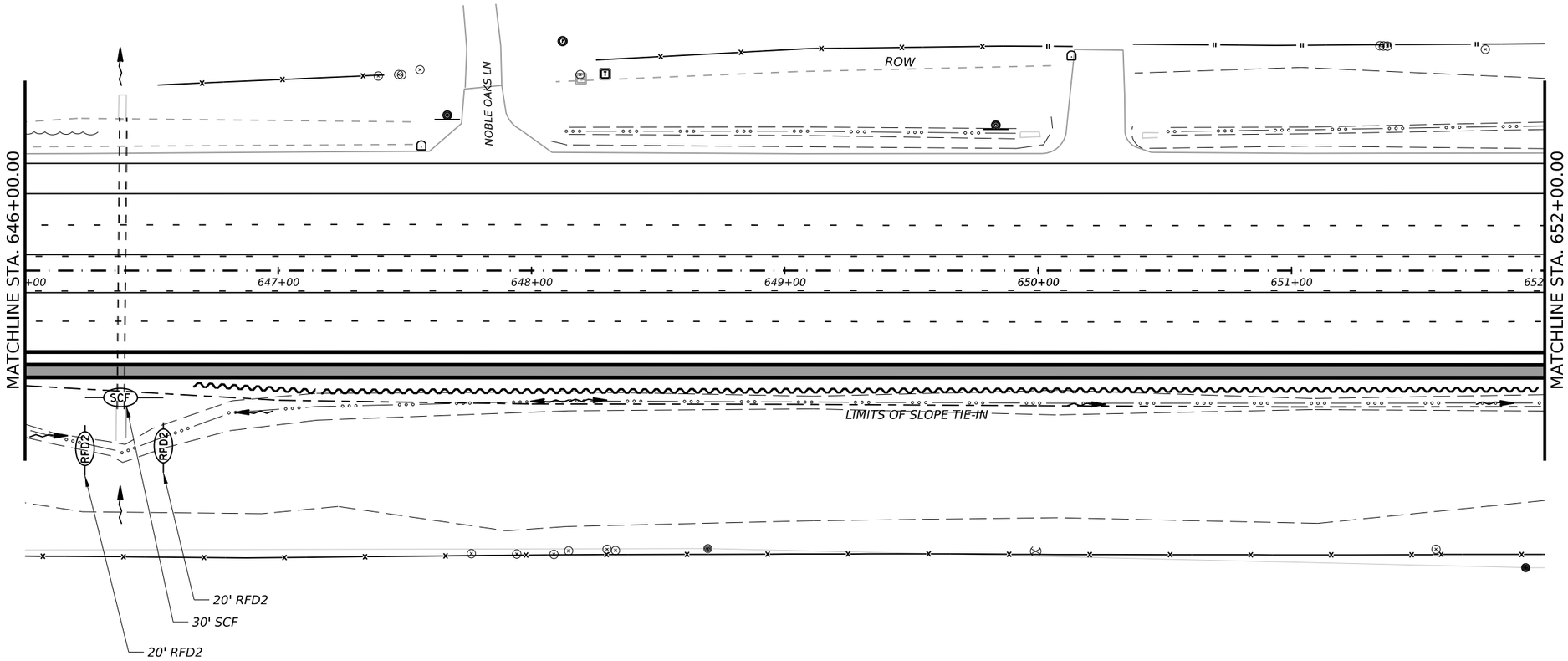

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
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Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 21 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
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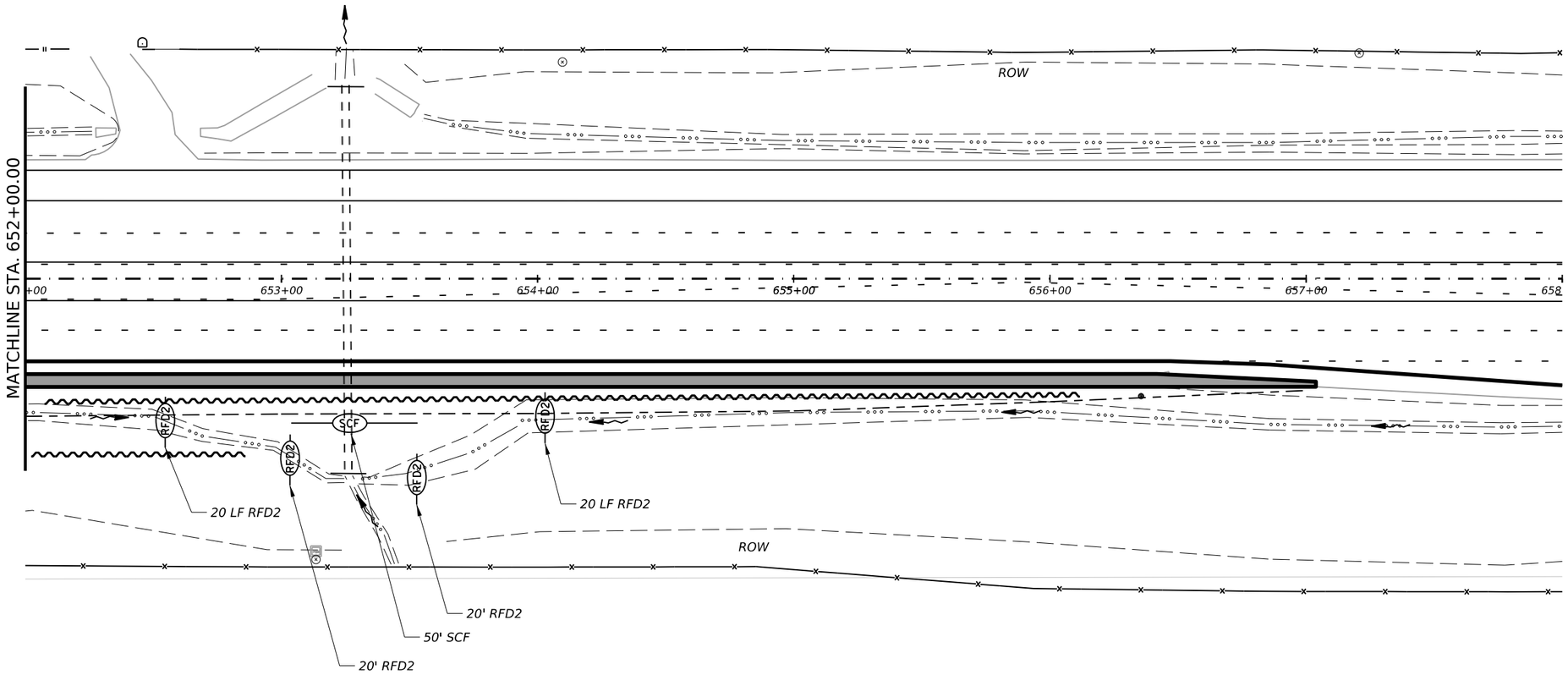

LEGEND

- DIRECTION OF FLOW
- TOPSOIL BERM
- BERM BREAK
- BLOCK SOD
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE
- ECL — BIODEG EROSN CONT LOGS
- SHOULDER WIDENING
- RIPRAP, MBGF REMOVAL

GENERAL NOTES:

SEDIMENT CONTROL FENCE ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.
TY 1 AND TY 2 ROCK FILTER DAM ESTIMATED AT 20' EACH, UNLESS OTHERWISE NOTED.

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER

01/31/2024

HORIZONTAL
0 25 50 100 FT

PRINT DATE	REVISION DATE
01/30/2024 04:22 PM	

Texas Department of Transportation
Bryan District

SWP3 LAYOUT

SHEET 22 OF 22 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6		US 190

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
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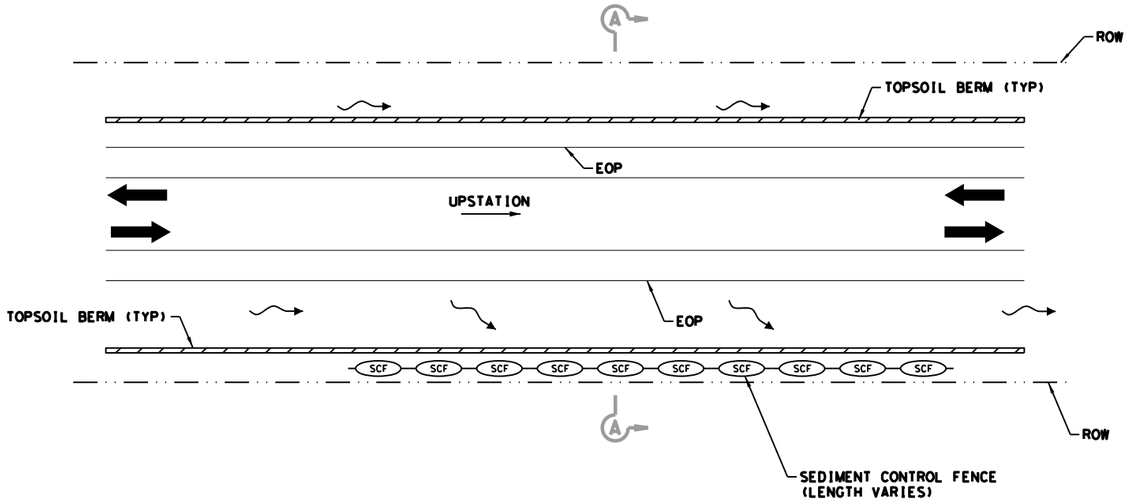
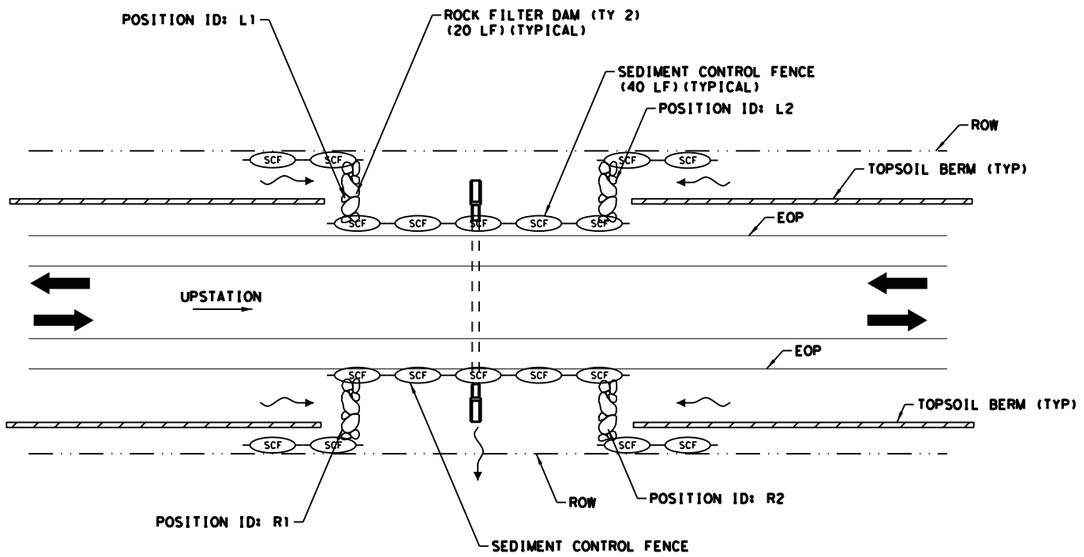
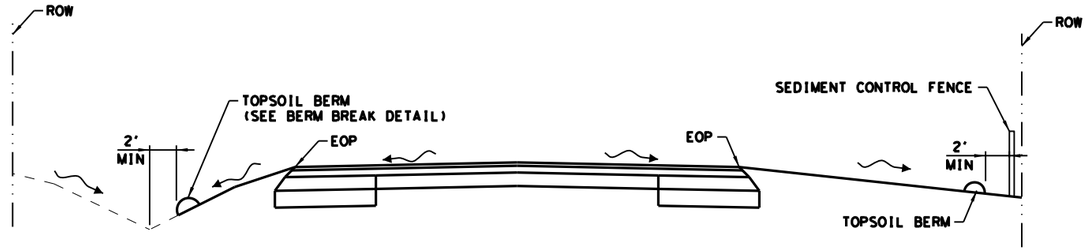


SEDIMENT CONTROL FENCE AT OFF-SITE FLOW

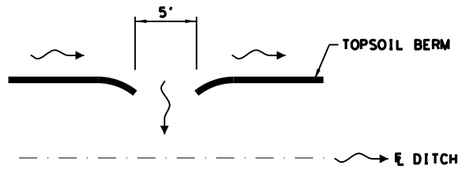


SW3P DEVICES AT CULVERTS

1. PLACE EACH END OF THE ROCK FILTER DAM SUFFICIENTLY HIGH TO PREVENT FLOW AROUND EITHER END OF THE DAM



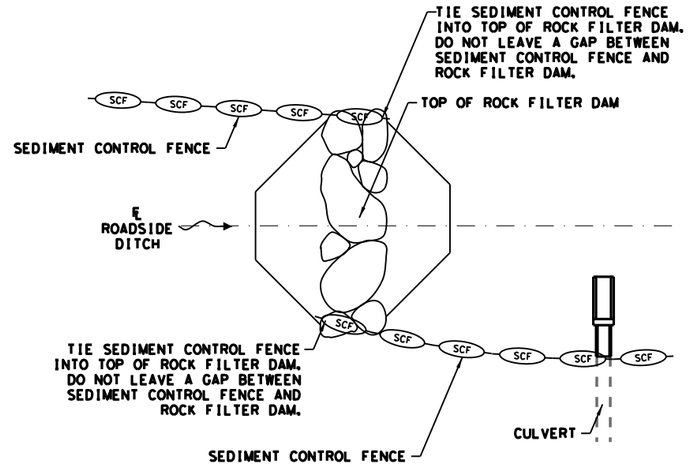
SECTION A-A



PLAN VIEW

BERM BREAK DETAIL

1. SHAPE THE BERM BREAK TO DIRECT FLOW TO THE ROADSIDE DITCH.
2. BREAK BERM SO THAT MAX FLOW LENGTH ALONG THE BERM IS LESS THAN 1000'.
3. BREAK BERM IN THE LOW AREAS WHERE FLOW MAY OVERTOP THE BERM.
4. DO NOT BREAK BERM ON HILLTOPS OR WHERE RUNOFF AND SEDIMENT FLOW DIRECTLY OFF THE ROW.



SEDIMENT CONTROL FENCE - ROCK FILTER DAM TIE-IN

NOTES

1. TOPSOIL BERM SHALL BE LOCATED THE ENTIRE LENGTH OF PROJECT (BOTH SIDES). WHERE THE SOIL DISTURBANCE EXTENDS TO THE ROW, THE TOPSOIL BERM WILL BE PLACED AT THE ROW.
2. LOCATIONS OF SWP3 DEVICES WILL BE APPROVED BY THE ENGINEER.
3. SEE "SWP3 SUMMARY" ON "QUANTITY SUMMARIES" SHEETS FOR LOCATION AND QUANTITIES OF SWP3 DEVICES.

STATE OF TEXAS
JEAN J. FENG
102035
LICENSED
PROFESSIONAL ENGINEER
Jean J. Feng
01/31/2024

PRINT DATE	REVISION DATE

Texas Department of Transportation
Bryan District

SWP3 DETAILS

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			US 190
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
0049	08	076	127

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CSJ: 0049-08-076
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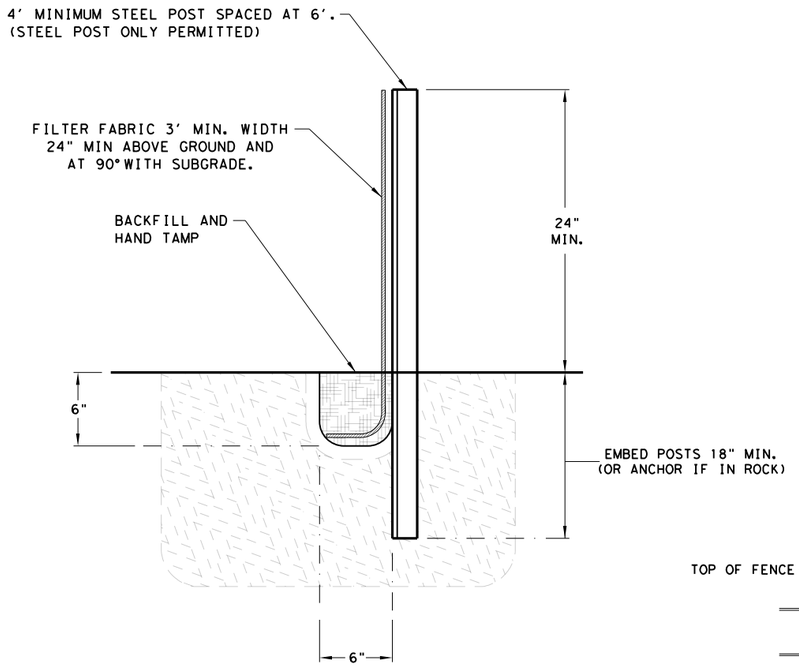
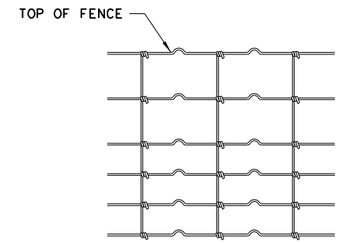


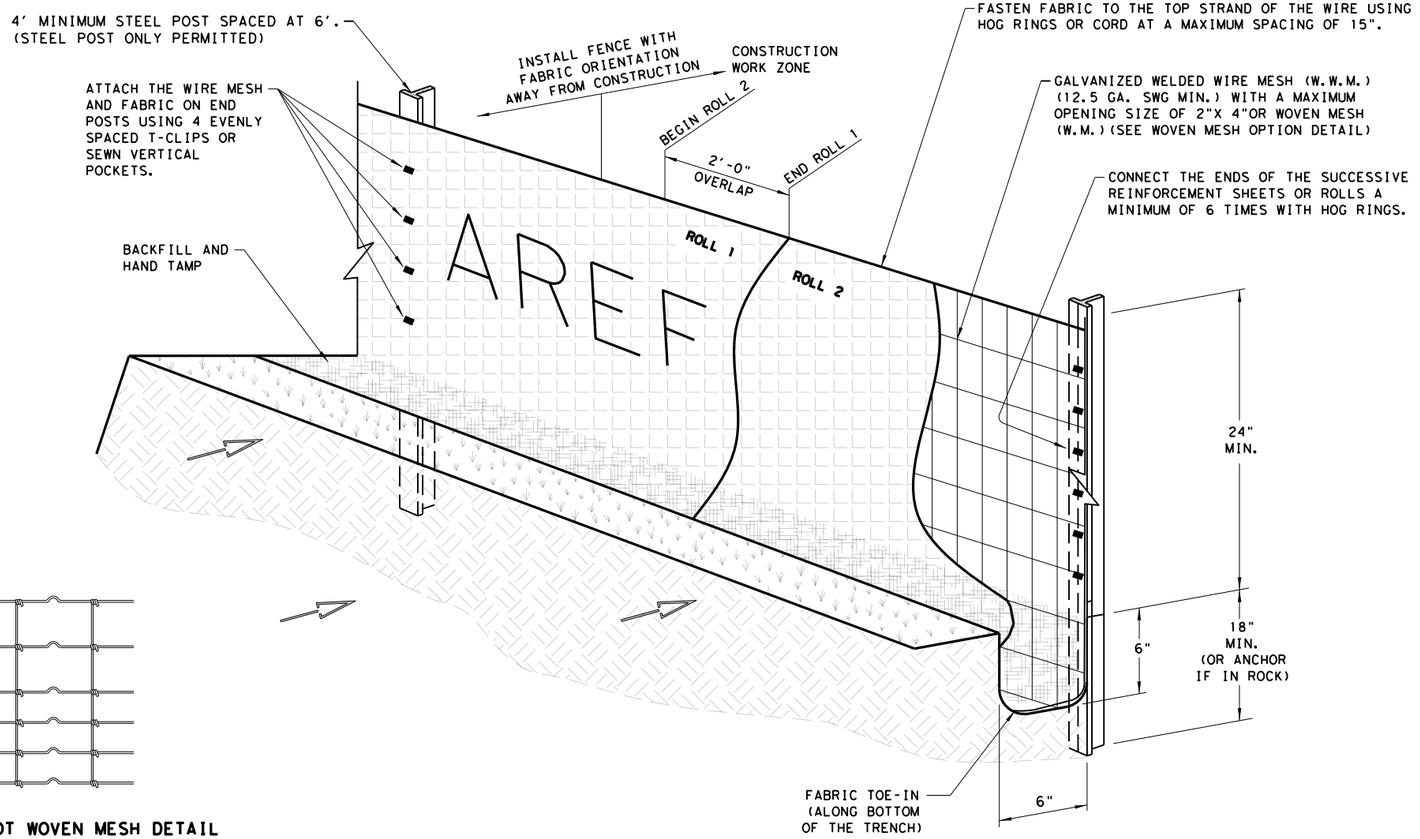
TRENCH SIDE VIEW DETAIL

FABRIC TOE-IN IS TO RUN DOWN THE TRENCH
AND ALONG THE BOTTOM OF THE TRENCH



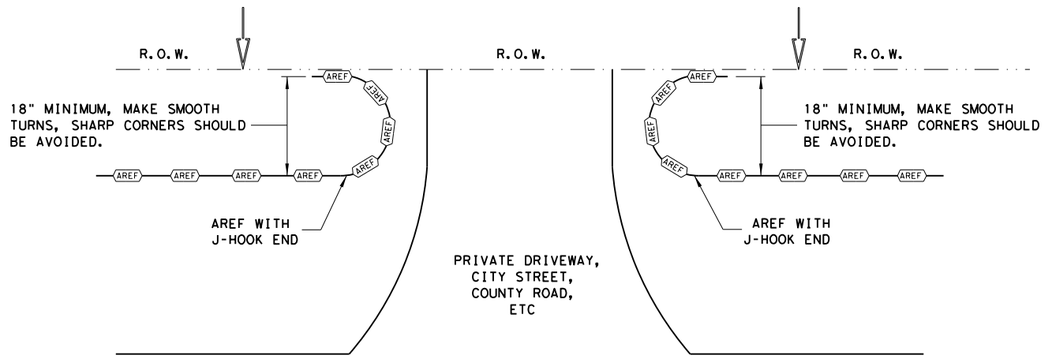
HINGE JOINT KNOT WOVEN MESH DETAIL

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.



GENERAL NOTES

1. REMOVE ALL ROOTS AND OTHER OBSTRUCTIONS FROM THE TRENCH BEFORE FABRIC PLACEMENT.
2. AMPHIBIAN AND REPTILE EXCLUSION FENCE MUST BE CHECKED DAILY, INCLUDING DAYS DURING RAINFALL SHUTDOWN PERIODS.
3. ANY DAMAGE TO FENCE, INCLUDING SMALL HOLES, MUST BE REPAIRED THE DAY IT IS OBSERVED BEFORE DARK.
4. SMALL HOLES (WITH THE ENGINEER'S DISCRETION) MAY BE REPAIRED WITH TAPE AS DIRECTED BY THE ENGINEER.
5. AS DIRECTED BY THE ENGINEER, SECTIONS OF FENCE WHERE THE DAMAGE IS DEEMED DETRIMENTAL TO THE FENCE WILL BE REPLACED RATHER THAN REPAIRED.
6. A MINIMUM OF 2' SHOULD BE OVERLAPPED WHEN JOINING FABRIC SECTIONS.
7. PAINT "AREF" OR "TEF" ON THE FABRIC IN BRIGHT COLOR EVERY 50' AND AT BREAKS.
8. REMOVE SEDIMENT, VEGETATION, OR OTHER DEBRIS TO MAINTAIN THE 24" AREF CLEARANCE.
9. FOR PAYMENT AND ADDITIONAL INFORMATION FOR AREF, SEE SPEC. 5116 (AMPHIBIAN AND REPTILE EXCLUSION FENCE).



J-HOOK END OF FENCE DETAIL (TOP VIEW)

TRENCH IS TO STAY 6 IN DEEP AND 6 IN WIDE WITH
FABRIC TOE-IN TO MATCH TRENCH DETAIL.

J-HOOK APPLIES AT DRIVEWAY BREAKS, ROADWAY
BREAKS, AND AT ANY LOCATION AS DIRECTED BY
THE ENGINEER.

LEGEND

AREF — AMPHIBIAN AND REPTILE EXCLUSION FENCE

AMPHIBIAN AND REPTILE DIRECTION OF TRAVEL

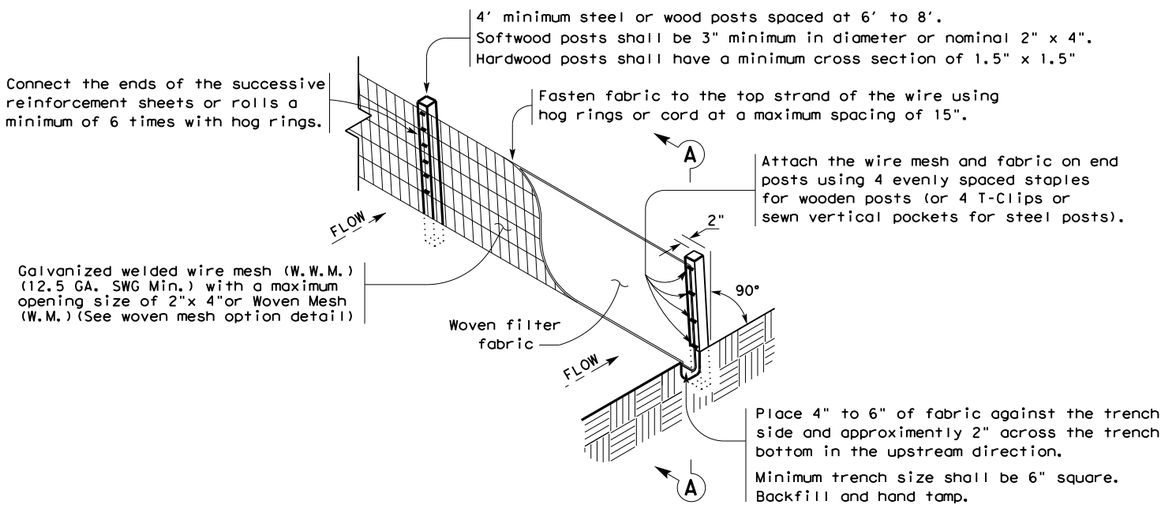
Texas Department of Transportation

Design Division Standard

AMPHIBIAN AND REPTILE EXCLUSION FENCE

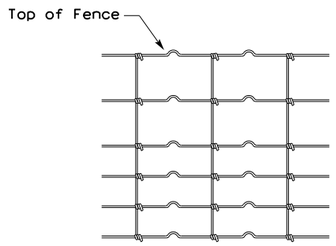
AREF-21

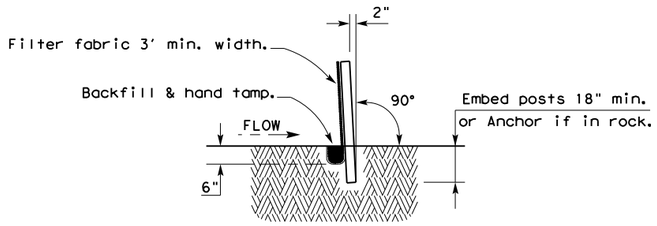
FILE: aref21.dgn	DN: TJ		CK: KM	DW: SS	CK: AG
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0049	08	076	US 190	
	DIST	COUNTY		SHEET NO.	
	BRY	ROBERTSON		128	



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.

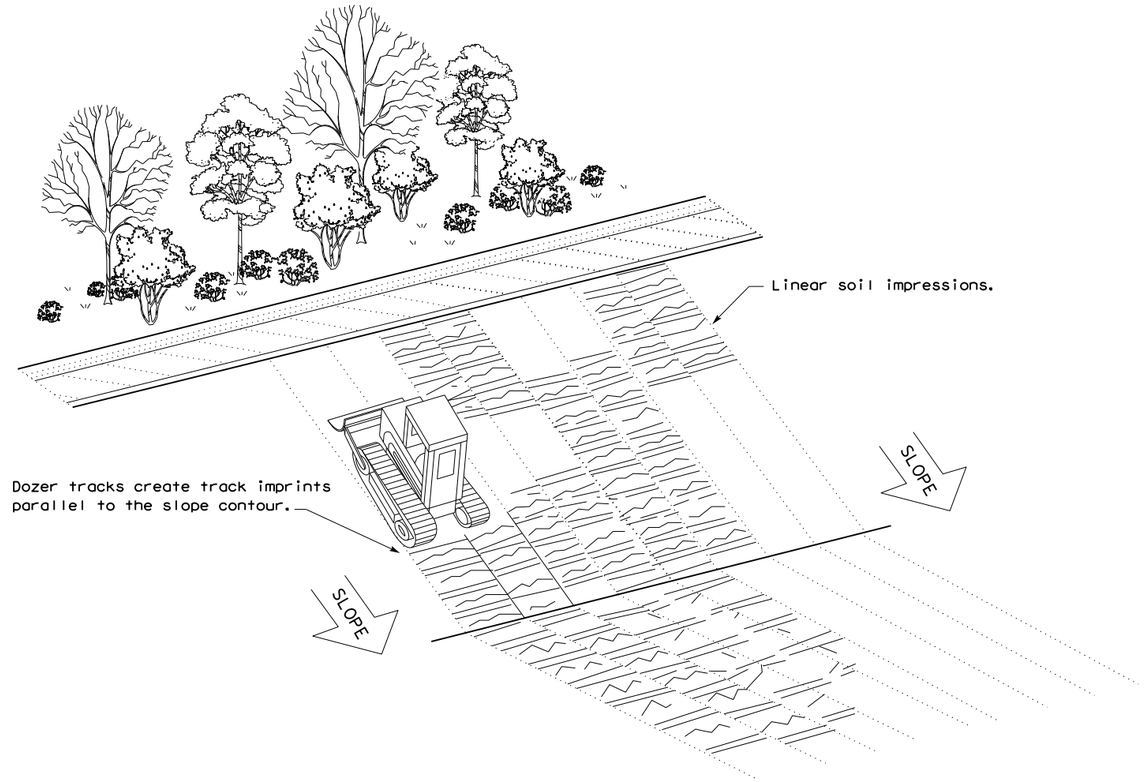
LEGEND

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	0049	08	076		US 190	
	DIST	COUNTY			SHEET NO.	
	BRYAN	ROBERTSON			129	

DATE
FILE

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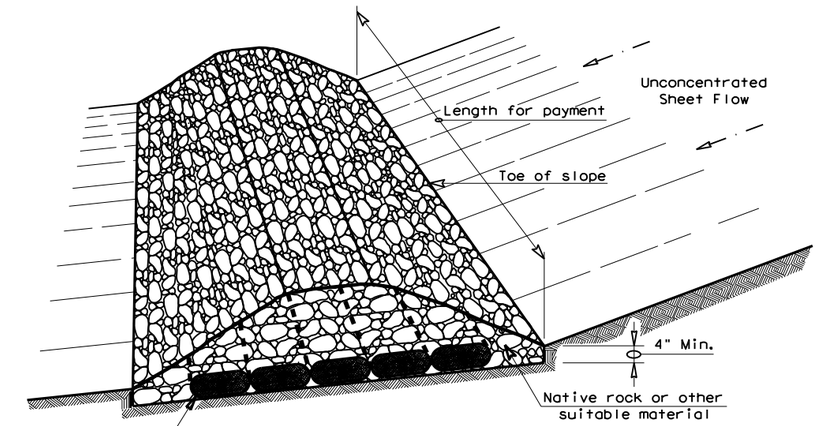
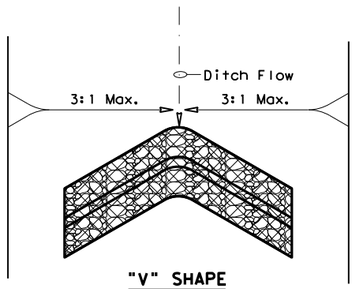
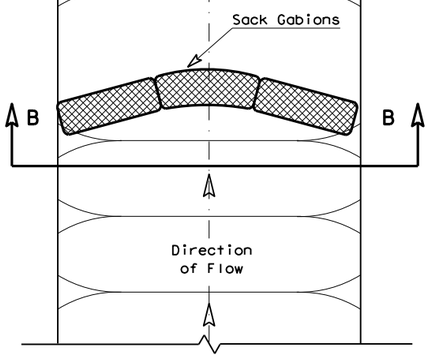


FILTER DAM AT TOE OF SLOPE

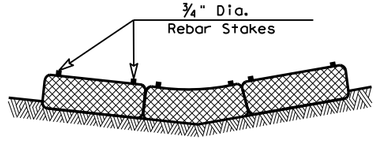
RFD1



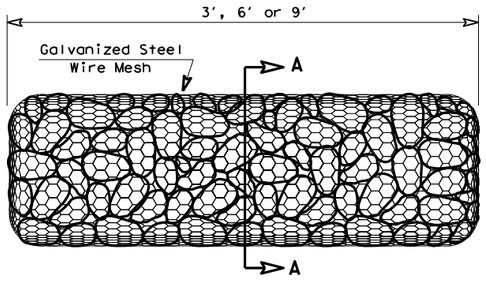
"V" SHAPE PLAN VIEW



PLAN VIEW

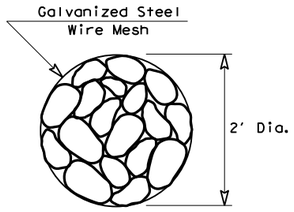


SECTION B-B

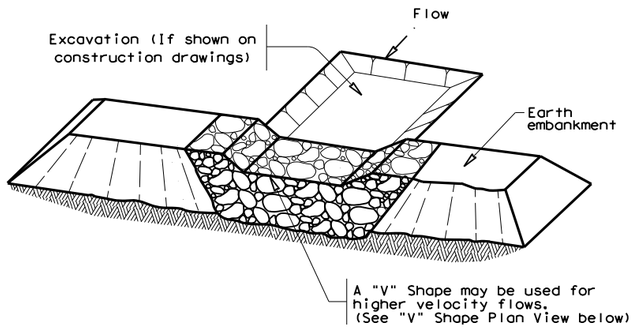


TYPE 4 (SACK GABIONS)

RFD4

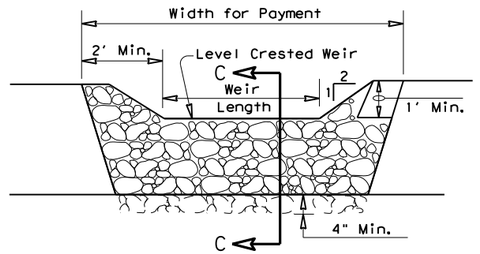


SECTION A-A

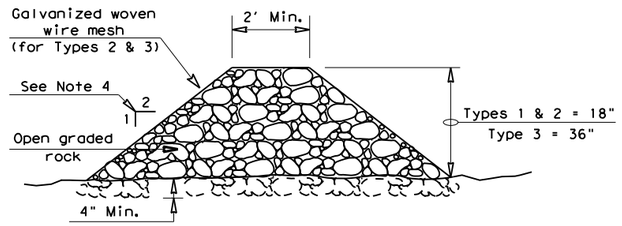


FILTER DAM AT SEDIMENT TRAP

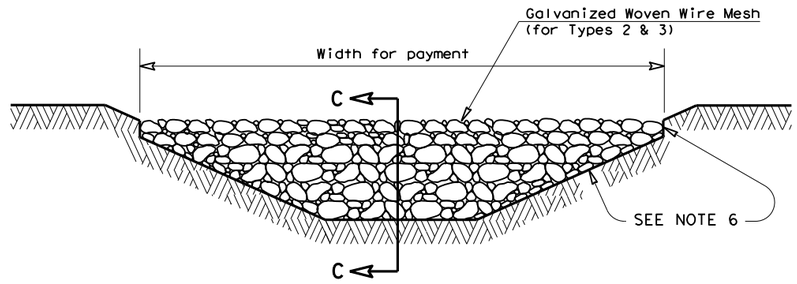
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

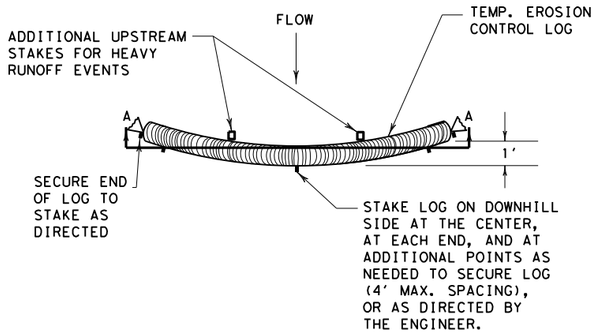
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

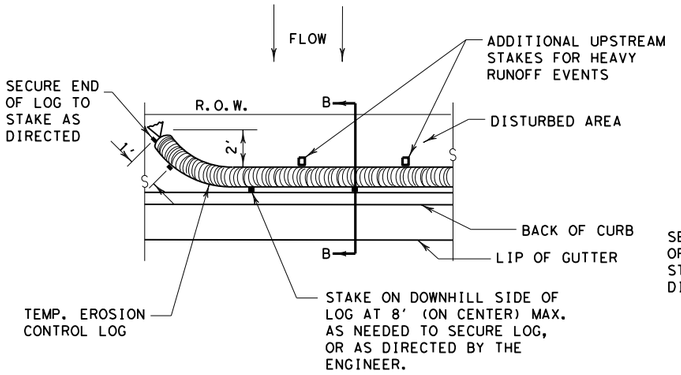
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0049	08	076	US 190
	DIST	COUNTY		SHEET NO.
	BRYAN	ROBERTSON		130

DATE: 1/31/2024
FILE: pw://txdot.projectwiseonline.com:TxDOT4/Documents/17 - BRY/Design Projects/0049080764 - Design/Plan Set/10. Environmental/10G. Environmental Standards/EC(9)-16.dgn



PLAN VIEW



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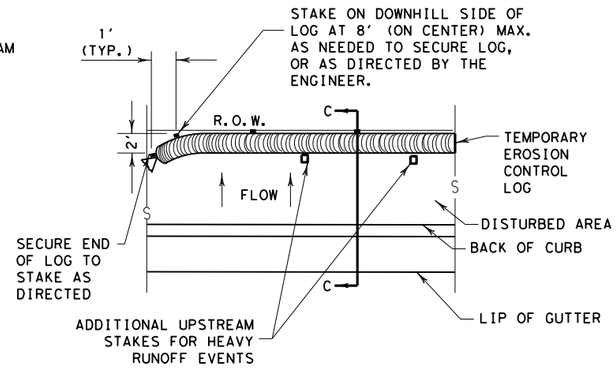

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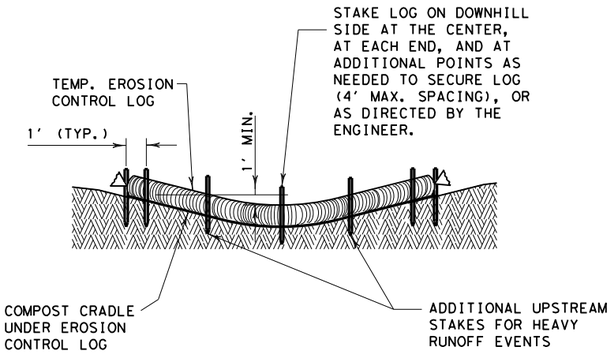
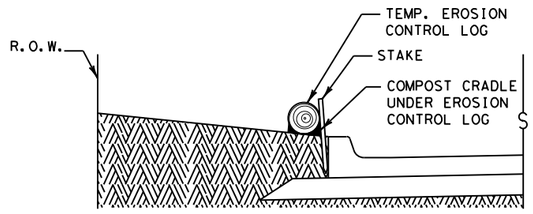


SECTION A-A

EROSION CONTROL LOG DAM

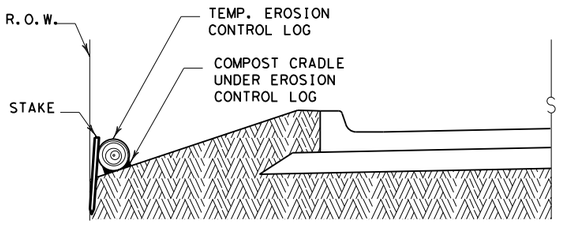
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

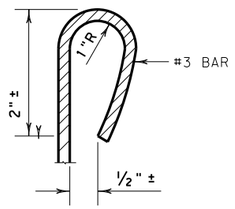
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

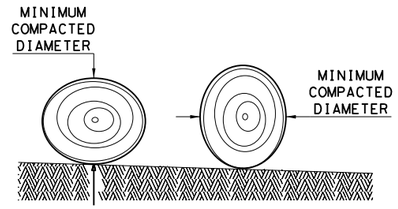
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
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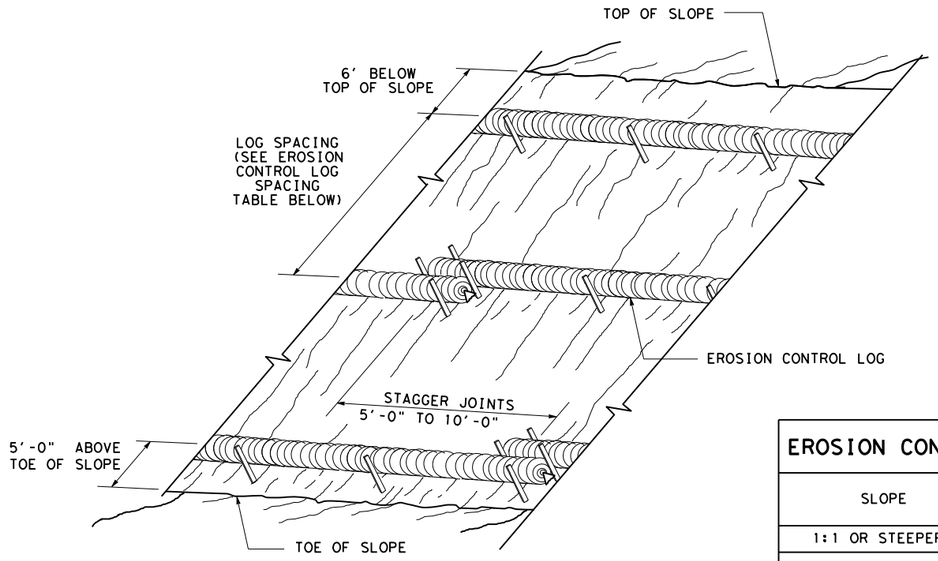
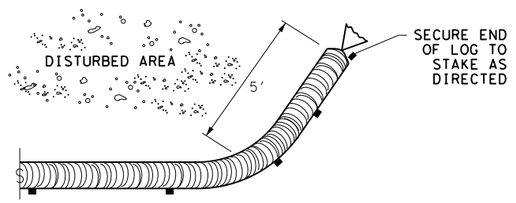


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

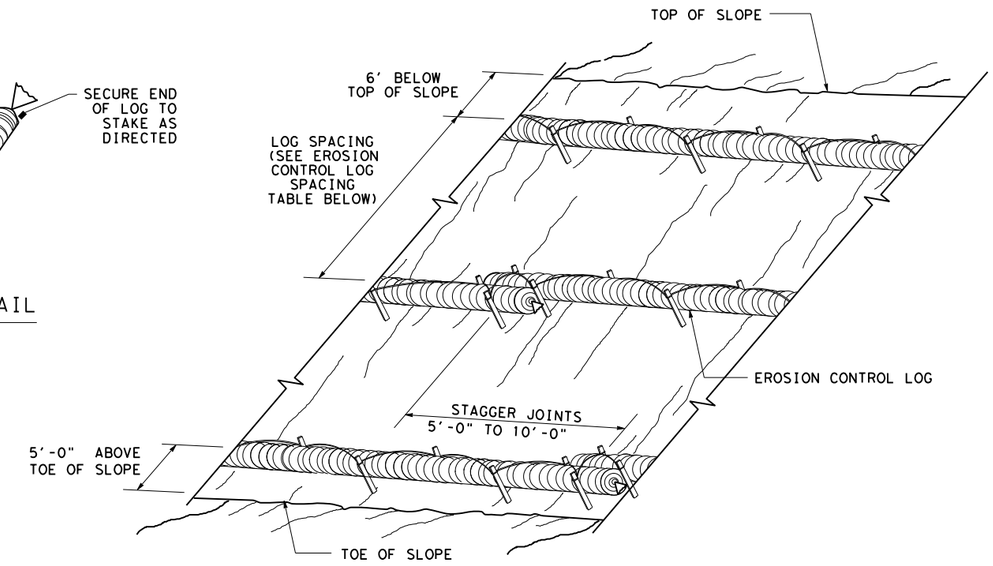
CL-SST



END SECTION RAP DETAIL

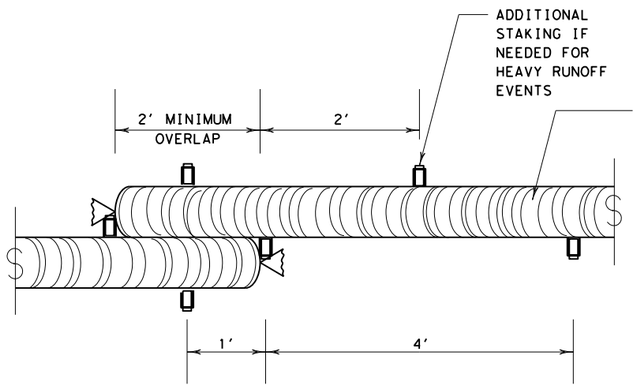
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

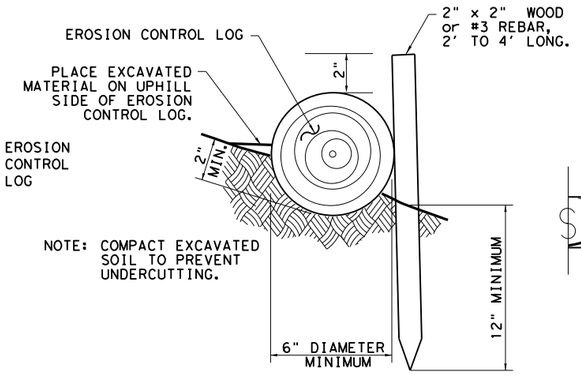
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

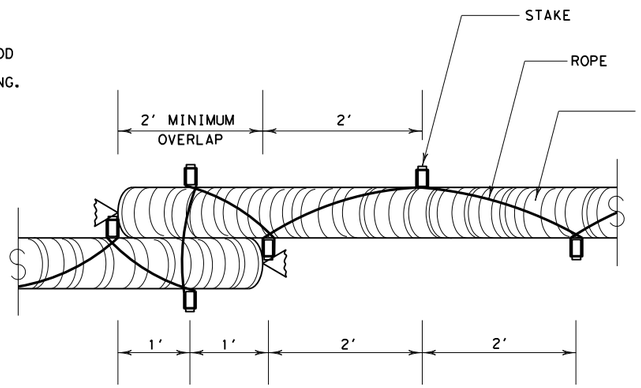


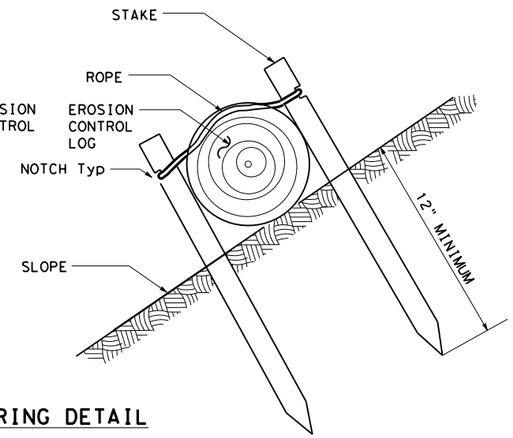


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

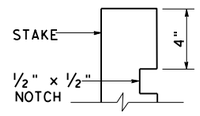
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

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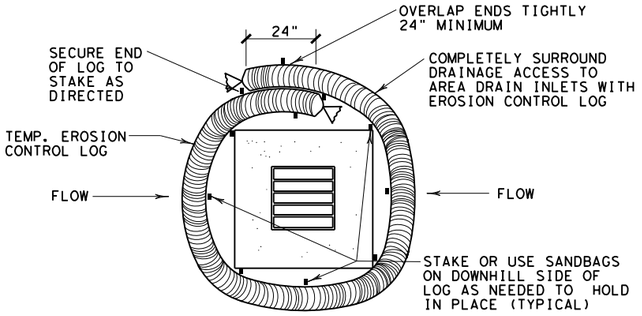
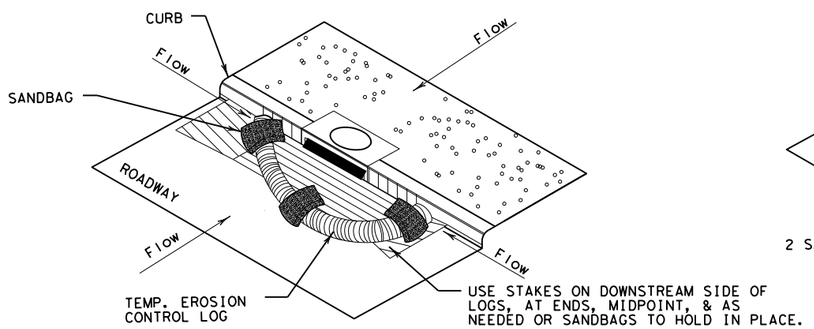


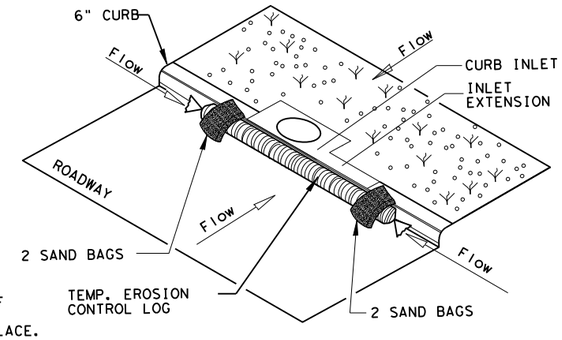
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

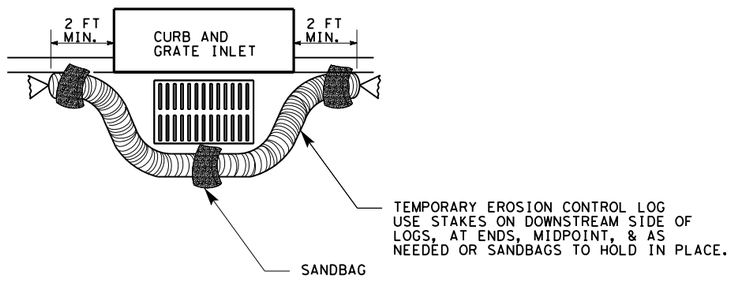
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

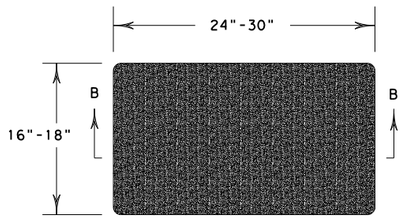
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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