

INDEX OF SHEETS
SEE SHEET 2

NO TDLR REQUIRED

STATE OF TEXAS

DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

PROJECT NO. F 2025 (280)
CONTROL CSJ 0271-15-099

IH 610
HARRIS COUNTY

IH 610
FUNCTIONAL CLASSIFICATION:
URBAN FREEWAY

DESIGN SPEED			
MAIN LANES.....		N/A	
RAMPS.....		45 MPH	
FRONTAGE ROADS.....		N/A	

DESIGN ADT			
MAIN LANES		RAMP	
0271-15-099		0271-15-099	
2025	N/A	2025	37,600
2045	N/A	2045	51,500

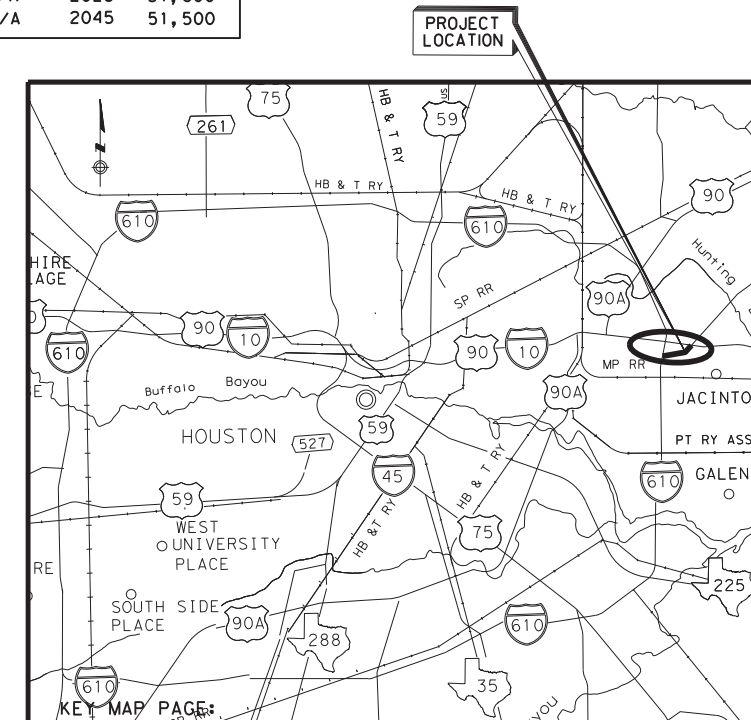
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
6	F 2025 (280)	1	
STATE	DIST.	COUNTY	
TEXAS	HOUSTON	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	15	099	IH 610

CSJ	LIMIT	STATION	ROADWAY		BRIDGE		TOTAL	
			FT	MI	FT	MI	FT	MI
0271-15-099	FROM MARKET ST. TO W OF MERCURY DR.	Sta 121+01.66 to 173+32.05	5,230.39	0.991	*	*	5,230.39	0.991

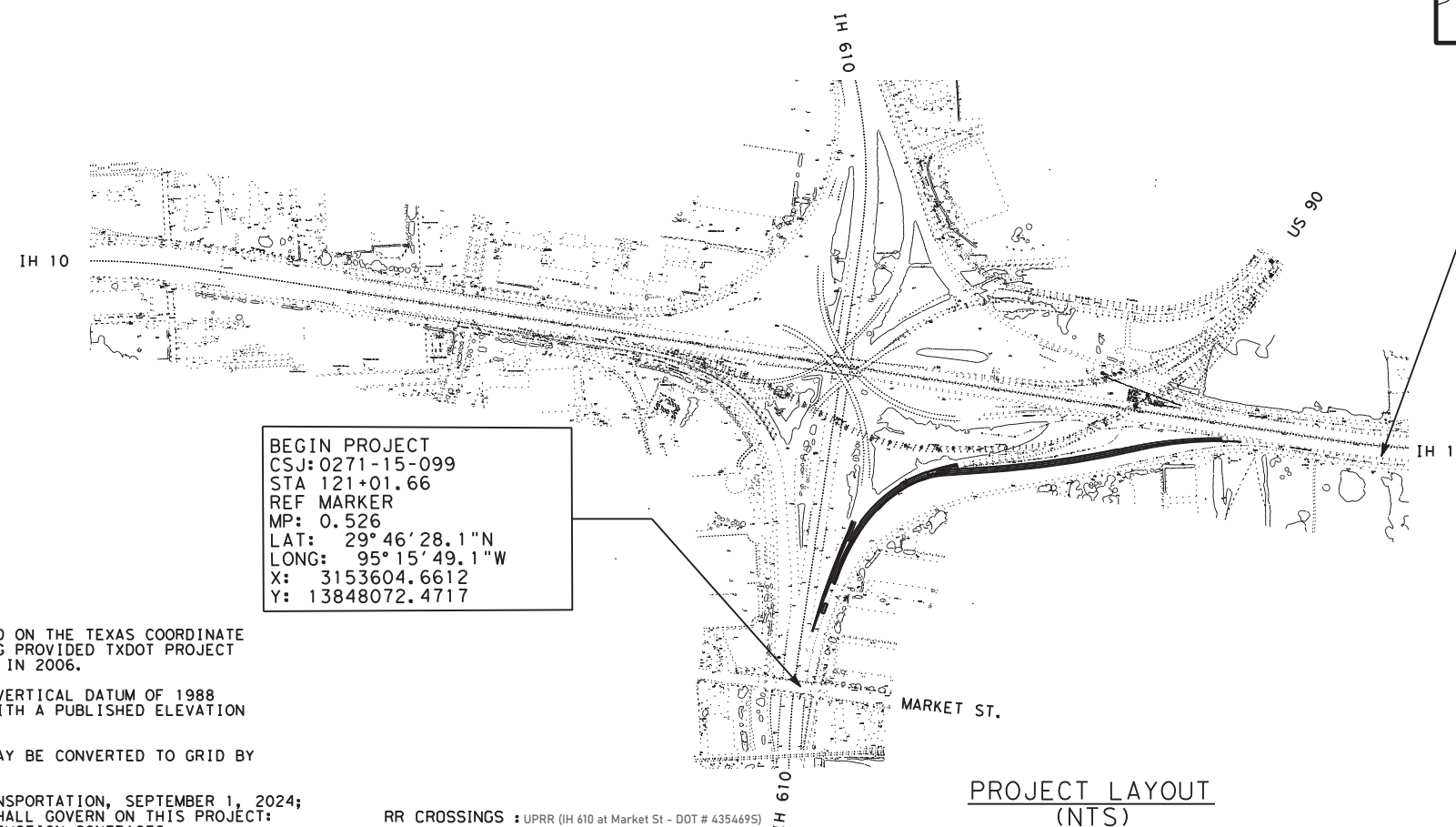
NET LENGTH OF PROJECT

RDWY	=	5,230.39 FT	=	0.991 MI
BRIDGE	=	* FT	=	* MI
TOTAL	=	5,230.39 FT	=	0.991 MI

FOR THE CONSTRUCTION OF FREEWAY OPERATIONAL IMPROVEMENTS
CONSISTING OF GRADING, CEMENT TREATED BASE, CONCRETE PAVEMENT,
SIGNING AND PAVEMENT MARKINGS, ETC
LAYMAN'S DESC.: RECONSTRUCT AND WIDEN NB-EB DIRECT CONNECTOR
RAMP FROM 1 LANE TO 2 LANES



VICINITY MAP
(NTS)



END PROJECT
CSJ: 0271-15-099
STA 173+32.05
REF MARKER
MP: 0.947
LAT: 29° 46' 42.3"N
LONG: 95° 15' 00.2"W
X: 3157865.1384
Y: 13849649.2242

BEGIN PROJECT
CSJ: 0271-15-099
STA 121+01.66
REF MARKER
MP: 0.526
LAT: 29° 46' 28.1"N
LONG: 95° 15' 49.1"W
X: 3153604.6612
Y: 13848072.4717



DocuSigned by:
SUBMITTED FOR LETTING 9/17/2024
Pat Nwachukwu, P.E.
SUPERVISING DESIGN ENGINEER
32C86996739A4BB...

RECOMMENDED FOR LETTING 09/17/2024
Muhammad J. Elahi, P.E.
AREA ENGINEER

APPROVED FOR LETTING 10/1/2024
DocuSigned by:
Brett McLeod, P.E.
For DIS FE9C2D7C24E543D...

ALL HORIZONTAL CONTROL POINT VALUES AS SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM OF NAD 83 - SOUTH CENTRAL ZONE (4204) UTILIZING PROVIDED TXDOT PROJECT CONTROL DATA AS ESTABLISHED BY UNITED ENGINEERS, INC. IN 2006.

ALL ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND HOLDING PROVIDED TXDOT PROJECT CONTROL N1020029 WITH A PUBLISHED ELEVATION OF 31.22 FEET AS ESTABLISHED BY UNITED ENGINEERS, INC.

ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A TXDOT COMBINED SCALE FACTOR OF 1.00013

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024; AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISION FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023)

RR CROSSINGS : UPRR (IH 610 at Market St - DOT # 4354695)
EQUATIONS : NONE
EXCEPTIONS : NONE

COUNTY HARRIS PROJ. NO. F 2025 (280) HWY. NO. IH 610 LETTING DATE DECEMBER 2024 DATE ACCEPTED

CK: DW: CK: DW:

GENERAL

- 1 TITLE SHEET
- 2 IH 610 INDEX OF SHEETS
- 3 IH 610 PROJECT LAYOUT
- 4,5 IH 610 EXISTING TYPICAL SECTIONS
- 6,7 IH 610 PROPOSED TYPICAL SECTIONS
- 8,8A-8M GENERAL NOTES
- 9,9A-9B ESTIMATE & QUANTITY SHEET

QUANTITY SUMMARY SHEETS

- 10 IH 610 SUMMARY OF TCP QUANTITIES
- 11 IH 610 SUMMARY OF DEMOLITION QUANTITIES
- 12 IH 610 SUMMARY OF ROADWAY QUANTITIES
- 13 IH 610 SUMMARY OF SWP3 QUANTITIES
- 14 SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES
- 15 SUMMARY OF SMALL SIGNS
- 16 SUMMARY OF LARGE SIGNS
- 17 IH 610 SUMMARY OF CTMS QUANTITIES

TRAFFIC CONTROL DETAILS

- 18 IH 610 TRAFFIC CONTROL CONSTRUCTION SEQUENCE OVERVIEW
- 19 IH 610 TRAFFIC CONTROL - ADVANCE WARNING SIGNS
- 20 IH 610 PHASE 1 STEP 1 DETOUR PLAN
- 21 IH 610 PHASE 3 STEP 2 DETOUR PLAN
- 22 IH 610 TCP PHASING NARRATIVE
- 23 IH 610 TRAFFIC CONTROL PLAN PHASE 1 STEP 2
- 24-25 IH 610 TRAFFIC CONTROL PLAN PHASE 2
- 26-28 IH 610 TRAFFIC CONTROL PLAN PHASE 3 STEP 1

TRAFFIC CONTROL STANDARD SHEET

- # 29-40 BC(1)-21 THRU BC(12) - 21
- # 41 EGPM TC6001 - 04
- # 42 TEGS TC6000 - 96
- # 43-43A PSSCB- JJ
- # 44 TS-CD-22
- # 45 TCP (3-3)-14
- # 46 TCP (6 - 1) - 12
- # 46A TCP (6 - 3) - 12
- # 47 TCP (6 - 4) - 12
- # 48 TREATMENT FOR VARIOUS EDGE CONDITIONS
- # 49 TCP (6-8) - 14
- # 50 REACT (M)- 21
- # 51 WZ (BRK) - 13
- # 52 WZ (STPM)-13
- # 53 QGELITE (M10) (N) - 20
- # 54 SMT(N)-16
- # 55 TAU-II-R(N)-16
- # 56 TAU (M)(N)-19

ROADWAY DETAILS

- 57 SURVEY CONTROL INDEX SHEET
- 58-60 HORIZONTAL AND VERTICAL CONTROL SHEET
- 61-62 IH 610 HORIZONTAL ALIGNMENT DATA
- 63-64 IH 610 SUPERELEVATION TRANSITION TABLES
- 65-66 IH 610 DEMOLITION LAYOUT
- 67-70 IH 610 RAMP D PLAN AND PROFILE
- 71 IH 610 RAMP F PLAN AND PROFILE
- 72 IH 610 RAMP K PLAN AND PROFILE

ROADWAY STANDARD SHEETS

- # 73 BED-14
- # 74 CCG-22
- # 75-76 CPJ (HOU DIST)
- # 77-78 CRCP(1)-23
- # 79-80 CRCP-HS (HOU DIST)
- # 81-82 GF(31)TR TL3-20
- # 83 GF(31)-19
- # 84 GF(31) DAT-19
- # 85 GF(31) MS-19
- # 86 JS-14
- # 87 SGT(10S) 31-16
- # 88 SGT(11S) 31-18
- # 89 SGT(12S) 31-18
- # 90 SGT(15) 31-20
- # 91 SSCB(1)-16

SIGNING AND PAVEMENT MARKING DETAILS

- 92-95 IH 610 SIGNING & PAVEMENT MARKINGS LAYOUT
- 96 IH 610 LARGE GUIDE SIGN DETAILS

SIGNING AND PAVEMENT MARKING STANDARD SHEETS

- # 97-100 D & OM (1)-20 THRU D & OM (6)-20, D & OM (VIA)-20
- # 101-105 FPM(1)-22 THRU FPM (5)-22
- # 106 CPM (1)-23
- # 107 PM(WAS)-07 (HOU DIST)
- # 108 PM(SHIELD-1)-17 (HOU DIST)
- # 109-113 TSR(1)-13 THRU TSR(5)-13
- # 114 SMD(GEN)-08
- # 115-117 SMD(SLIP-1)-08 THRU SMD (SLIP-3)-08
- # 118-120 SMD(2-1)-08 THRU SMD (2-4)-08

ITS ITEMS

- 121-124 IH 610 PLAN LAYOUT PROPOSED NB-EB RAMP

ITS STANDARD SHEETS

- # 125 ITS (27)-16
- # 126 ITS (28)-16
- # 127 ITS (29)-22
- # 128 ITS (30)-16
- # 129 ITS (32)-16
- # 130 ITS (33)-16
- # 131 ITS (34)-16
- # 132 ITS (35)-16
- # 133 ITS (36)-16
- # 134 ITS (37)-22
- # 135 ITS (38)-17
- # 136 ITS (39)-16
- # 137 ITS (40)-17
- # 138 ITS (41)-16
- # 139 ITS (42)-16
- # 140 ITS (43)-16

ENVIRONMENTAL

- 141-142 STORMWATER POLLUTION PREVENTION PLAN (SWP3)
- 143-144 IH 610 STORMWATER POLLUTION PREVENTION PLAN
- 145-147 ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)

ENVIRONMENTAL STANDARDS

- # 148 FSSCW-15 (HOU DIST)

ILLUMINATION

- 149 SUMMARY OF ILLUMINATION QUANTITIES AND NOTES
- 150 ILLUMINATION LAYOUT IH 610

ILLUMINATION STANDARDS

- # 151-154 ED(1)-14 THRU ED(4)-14

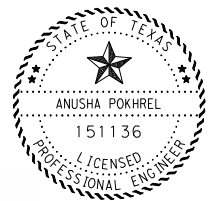
RAILROAD

- 155 RAILROAD SCOPE OF WORK PROJECT SPECIFIC DETAILS

RAILROAD STANDARDS

- # 156-157 RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

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



Anusha Pokhrel
08

9/18/2024

ANUSHA POKHREL, P.E. DATE



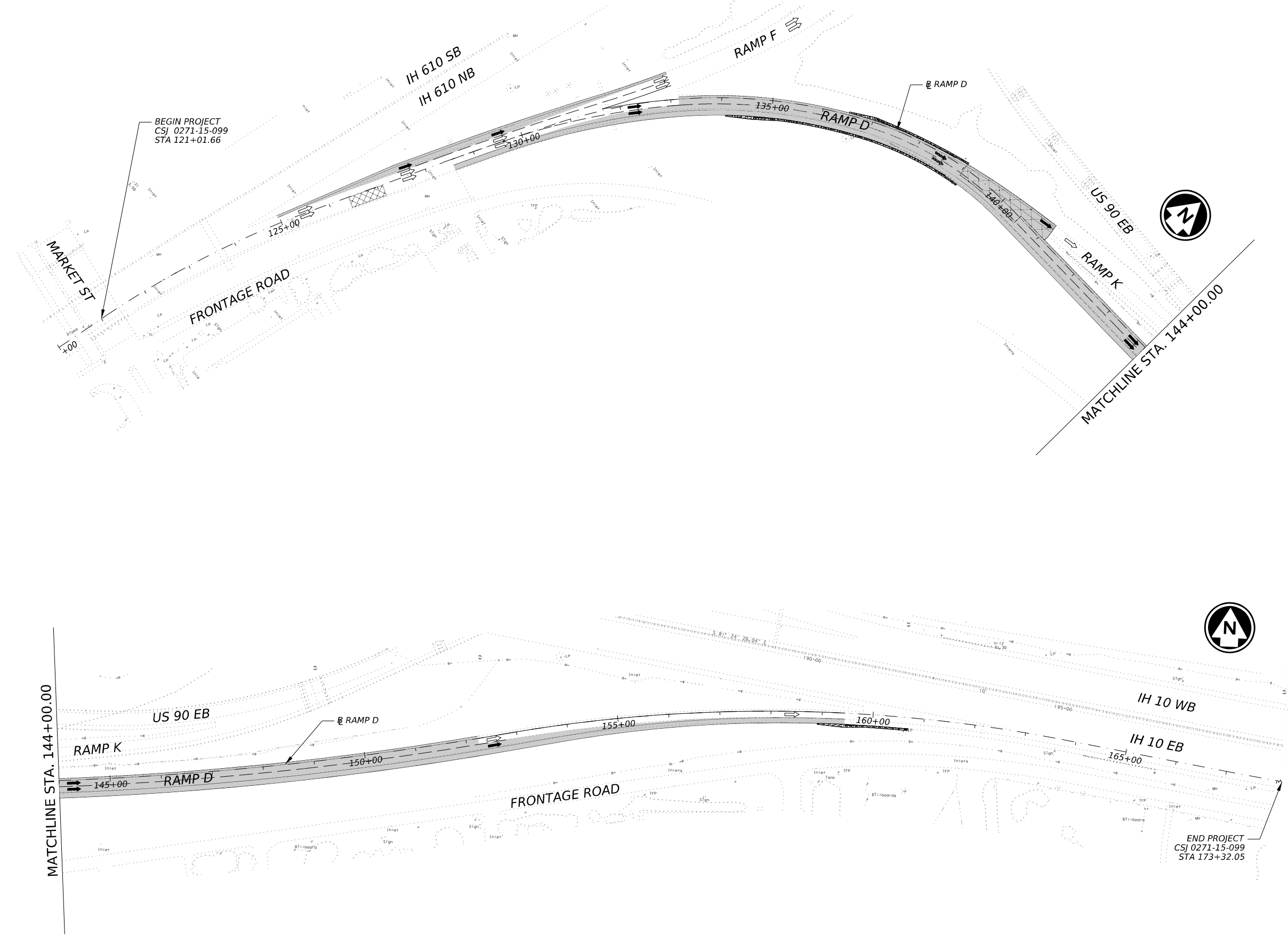
IH 610 INDEX OF SHEETS

© TxDOT © 2024		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	2	

DATE: \$DATES\$
FILE: \$FILES\$

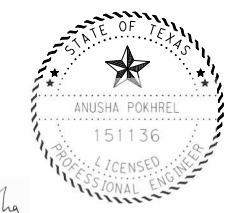
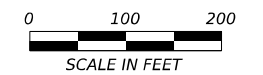
DATE: 5/15/2024 09:53:48 AM
 FILE: S:\HOU\dot\projectwiseonline.com\TXDOT\3\Documents\12 - HOU\Design Projects\027115099\4 - Design\Plan Set\1 - General\3 - Project Layout\PRJ_LAYOUT.dgn

CK: DW: CK: DW:



LEGEND

SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT



Anusha Pokhrel
 ANUSHA POKHREL, P.E.

9/6/2024
 DATE

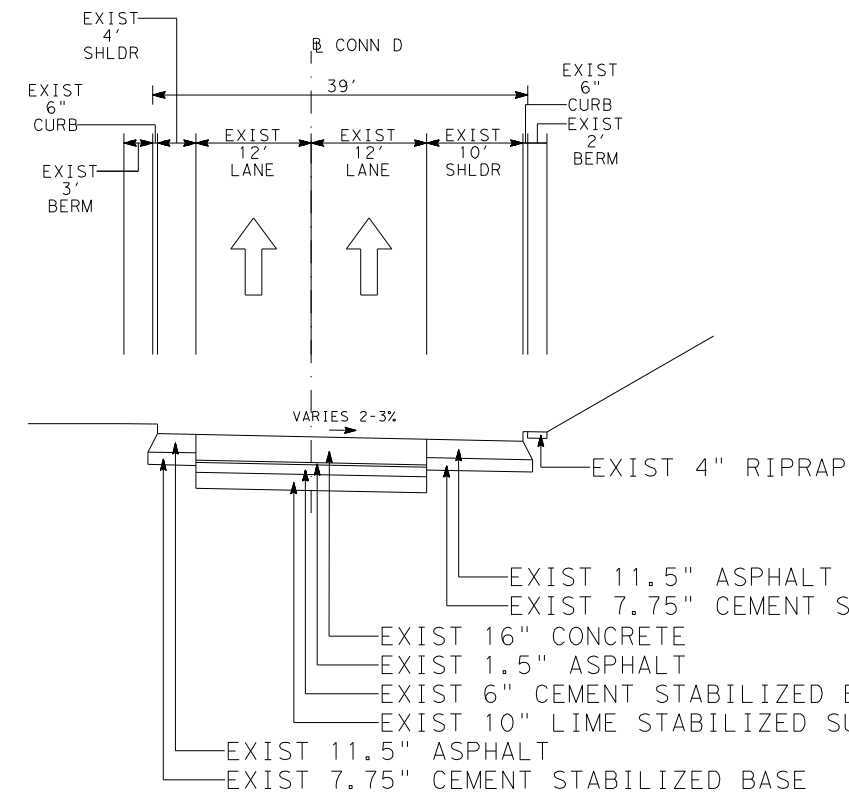


**IH 610
 PROJECT LAYOUT**

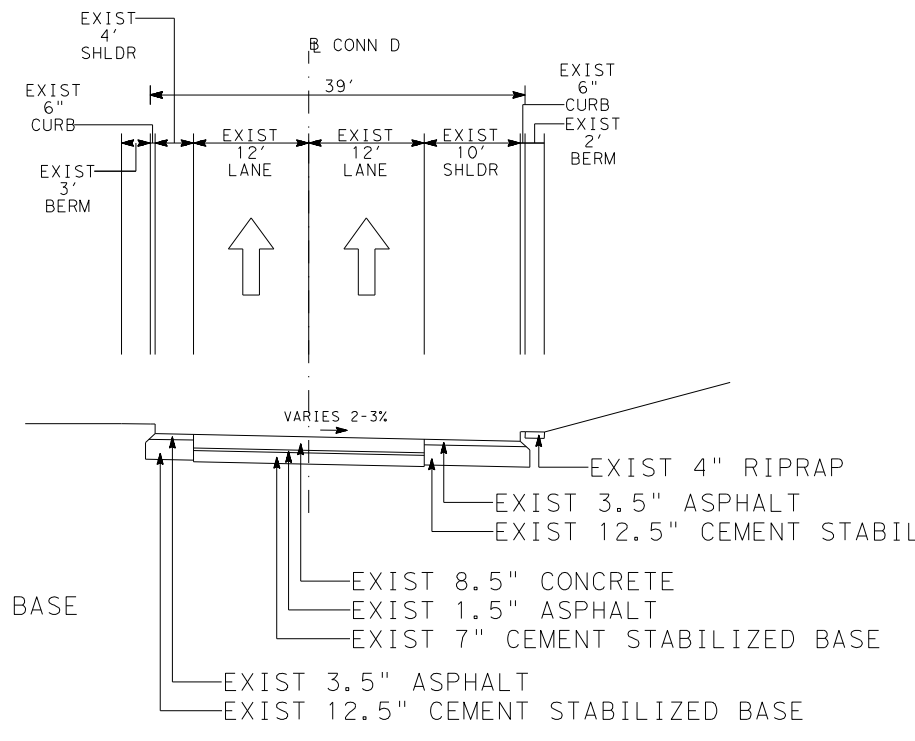
TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	3	

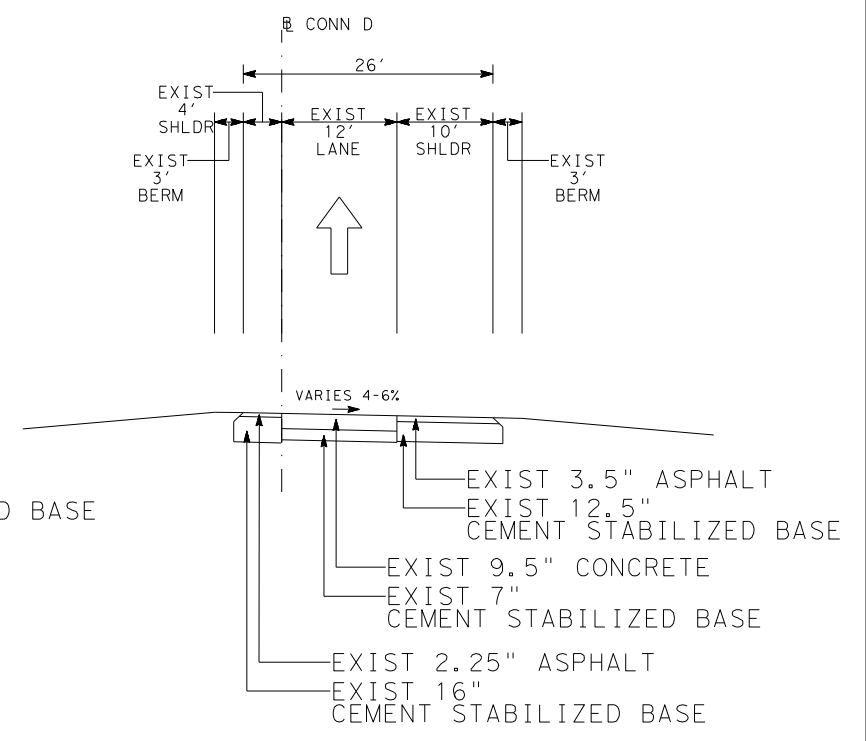
CK: DW: CK: DW:



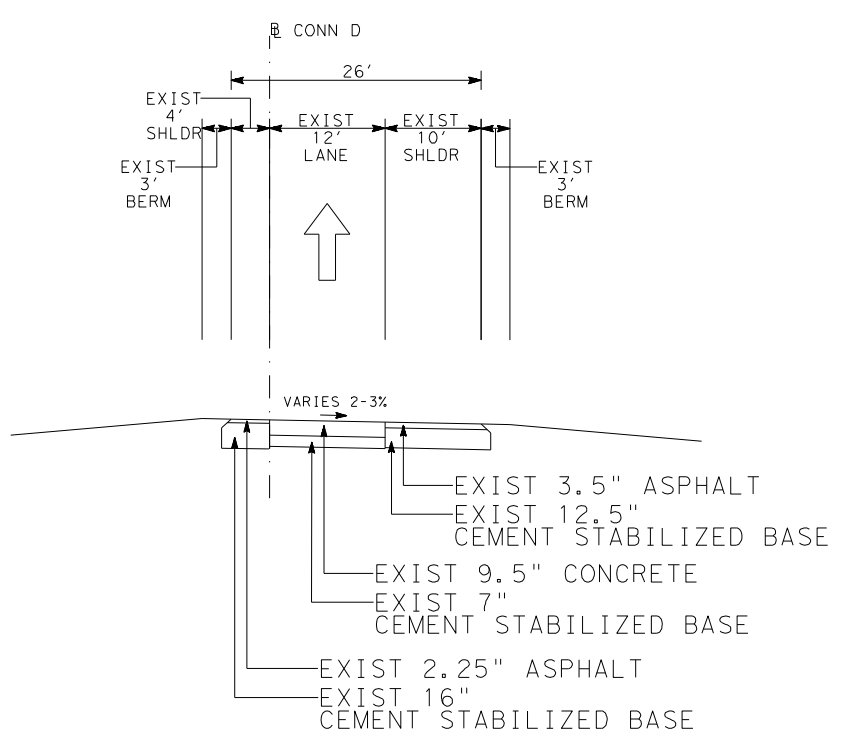
EXISTING TYPICAL SECTION
STA 124+96.94 TO STA 128+54.40



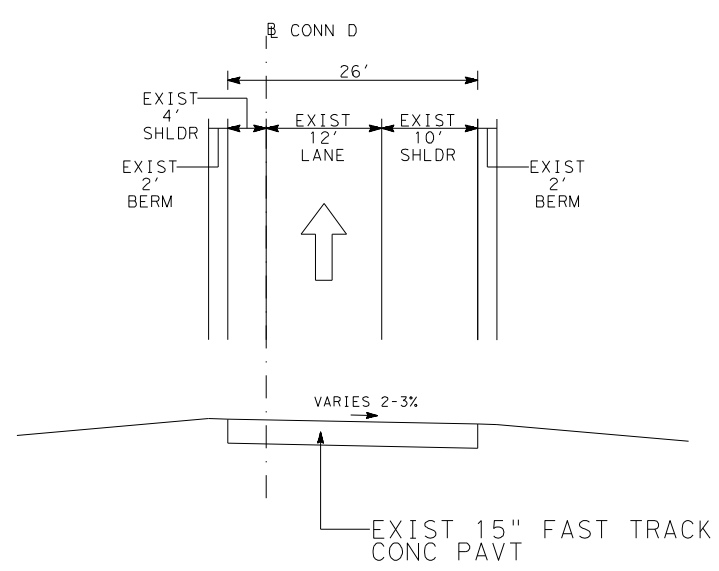
EXISTING TYPICAL SECTION
STA 128+54.40 TO STA 129+56.54



EXISTING TYPICAL SECTION
STA 133+15.77 TO STA 137+87.70



EXISTING TYPICAL SECTION
STA 141+12.21 TO STA 152+23.63



EXISTING TYPICAL SECTION
STA 152+23.63 TO STA 159+44.52



Anusha Pokhrel
CP

ANUSHA POKHREL, P.E. DATE 9/6/2024



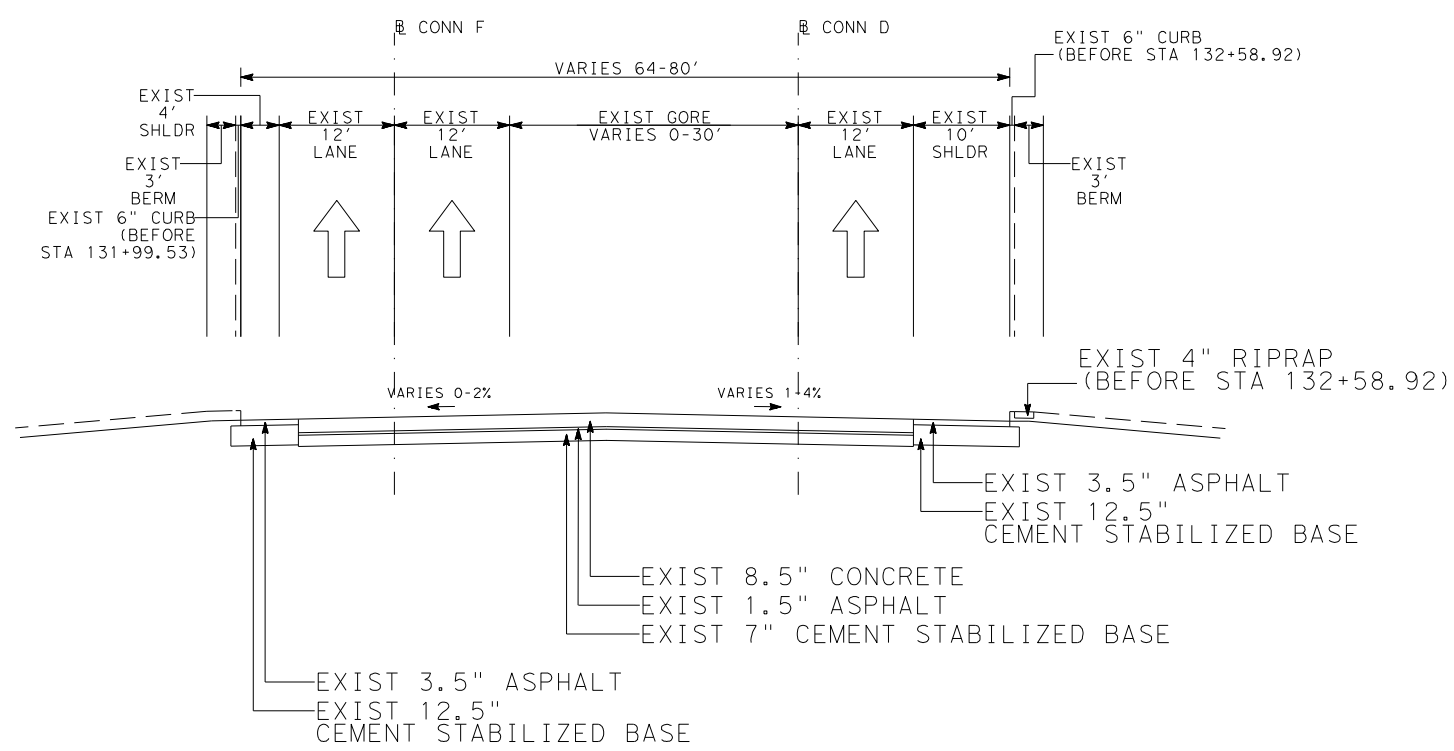
IH 610
EXISTING
TYPICAL
SECTIONS

TxDOT © 2024 SHEET 1 OF 2

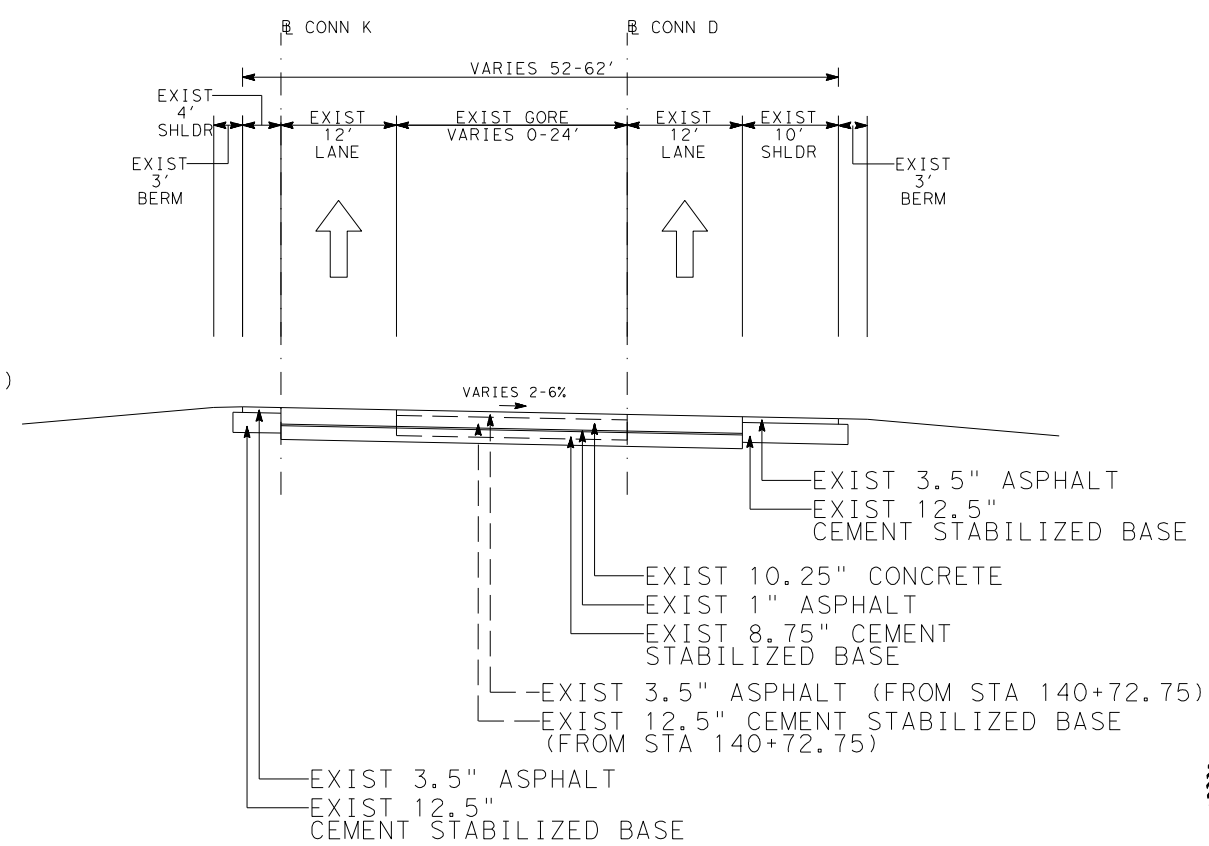
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	4	

DATE: \$DATE\$ FILE: \$FILES\$

CK: DW: CK: DW:



EXISTING TYPICAL SECTION
STA 129+56.54 TO STA 133+15.77



EXISTING TYPICAL SECTION
STA 137+87.70 TO STA 141+12.21



Anusha Pokhrel
P.E.

ANUSHA POKHREL, P.E. 9/6/2024 DATE

DATE: \$DATE\$
FILE: \$FILES\$

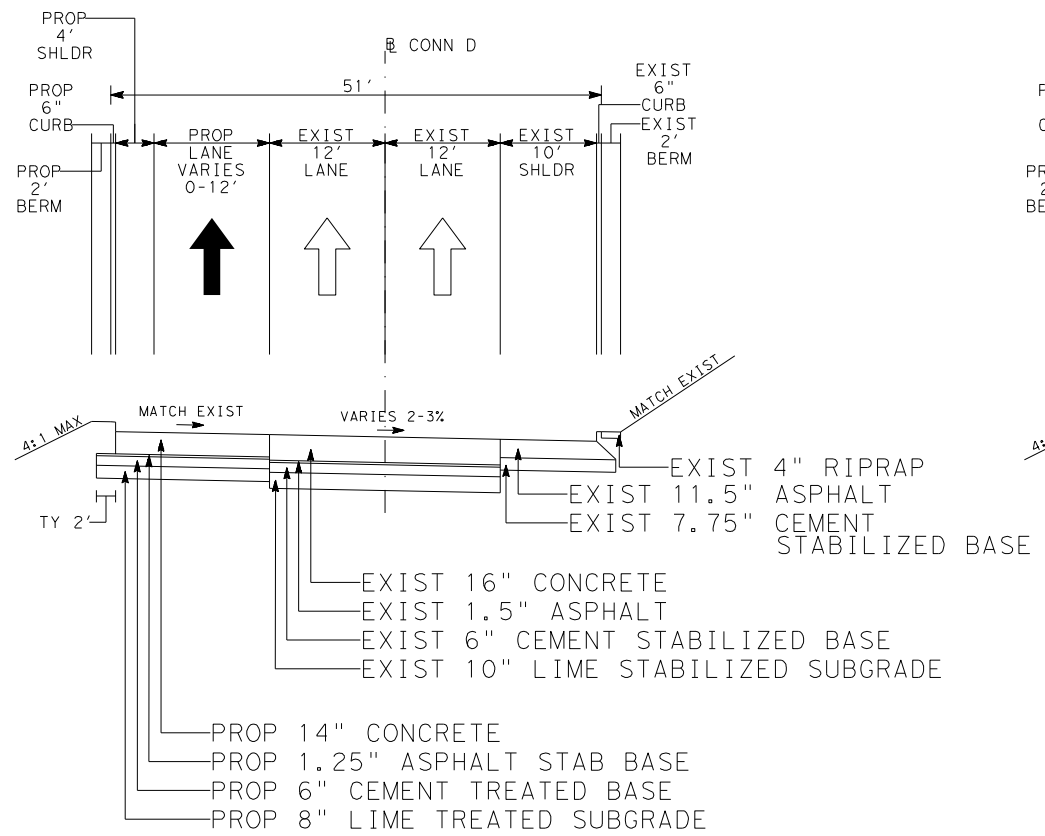


IH 610
EXISTING
TYPICAL
SECTIONS

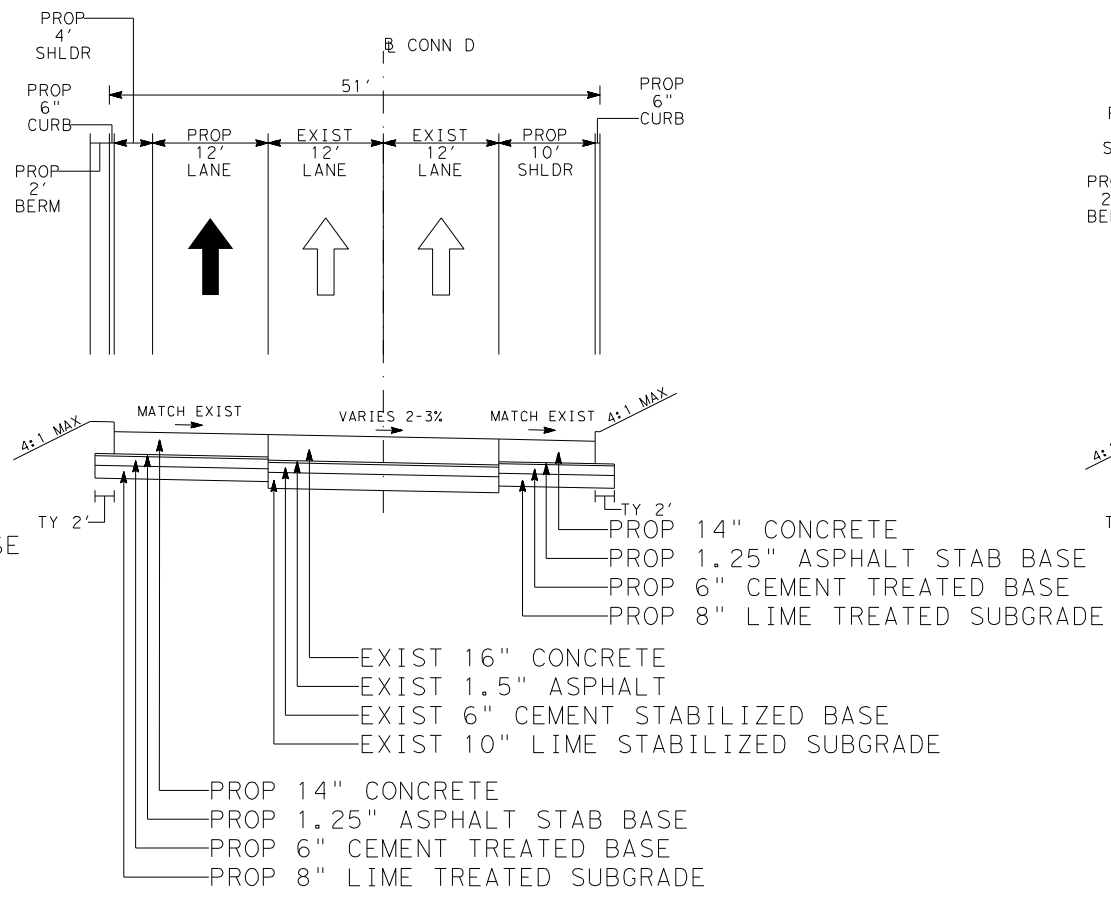
TxDOT © 2024 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	5	

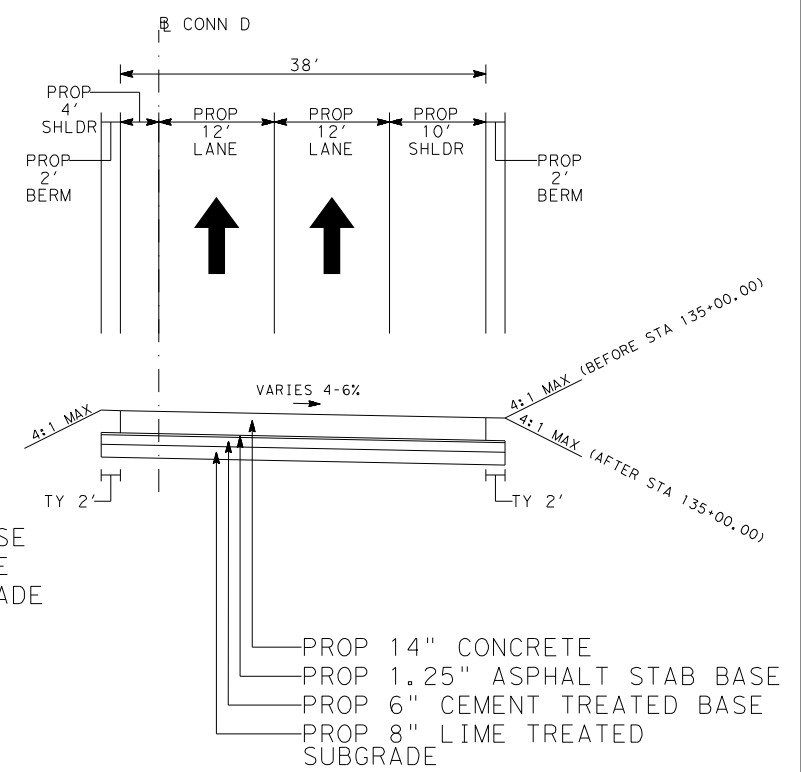
CK: DW: CK: DW:



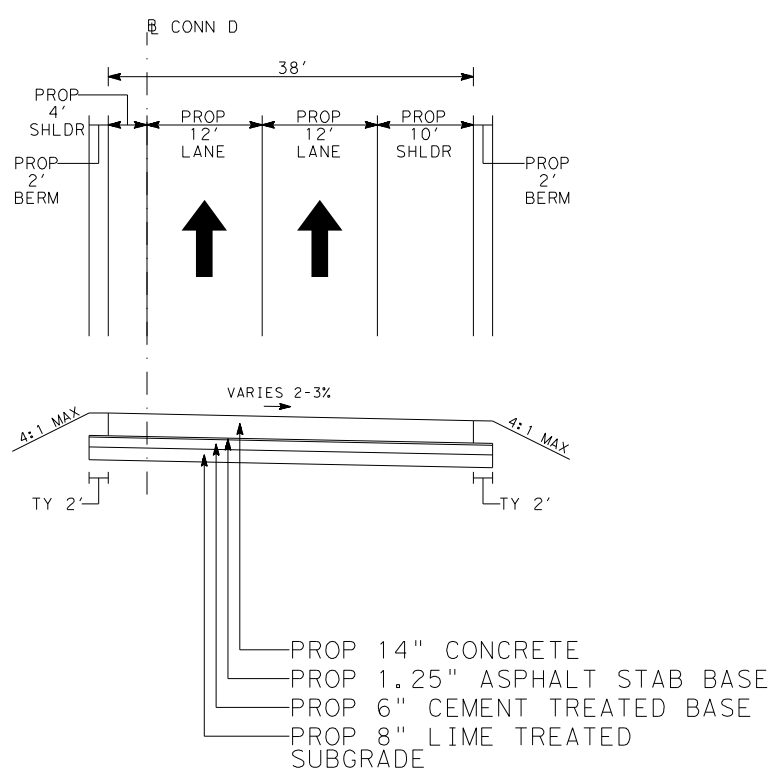
PROPOSED TYPICAL SECTION
STA 124+96.94 TO STA 128+54.40



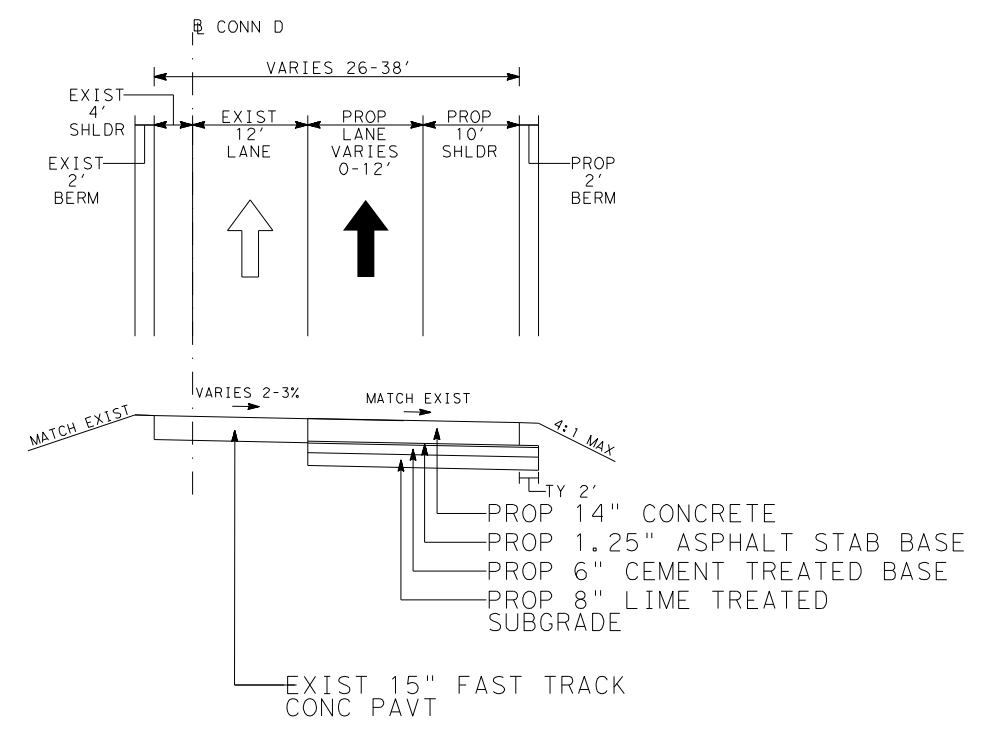
PROPOSED TYPICAL SECTION
STA 128+54.40 TO STA 129+56.54



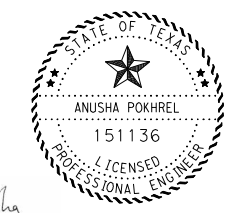
PROPOSED TYPICAL SECTION
STA 133+15.77 TO STA 137+87.70



PROPOSED TYPICAL SECTION
STA 141+12.21 TO STA 152+23.63



PROPOSED TYPICAL SECTION
STA 152+23.63 TO STA 159+44.52



Anusha Pokhrel
08

ANUSHA POKHREL, P.E. DATE 9/6/2024



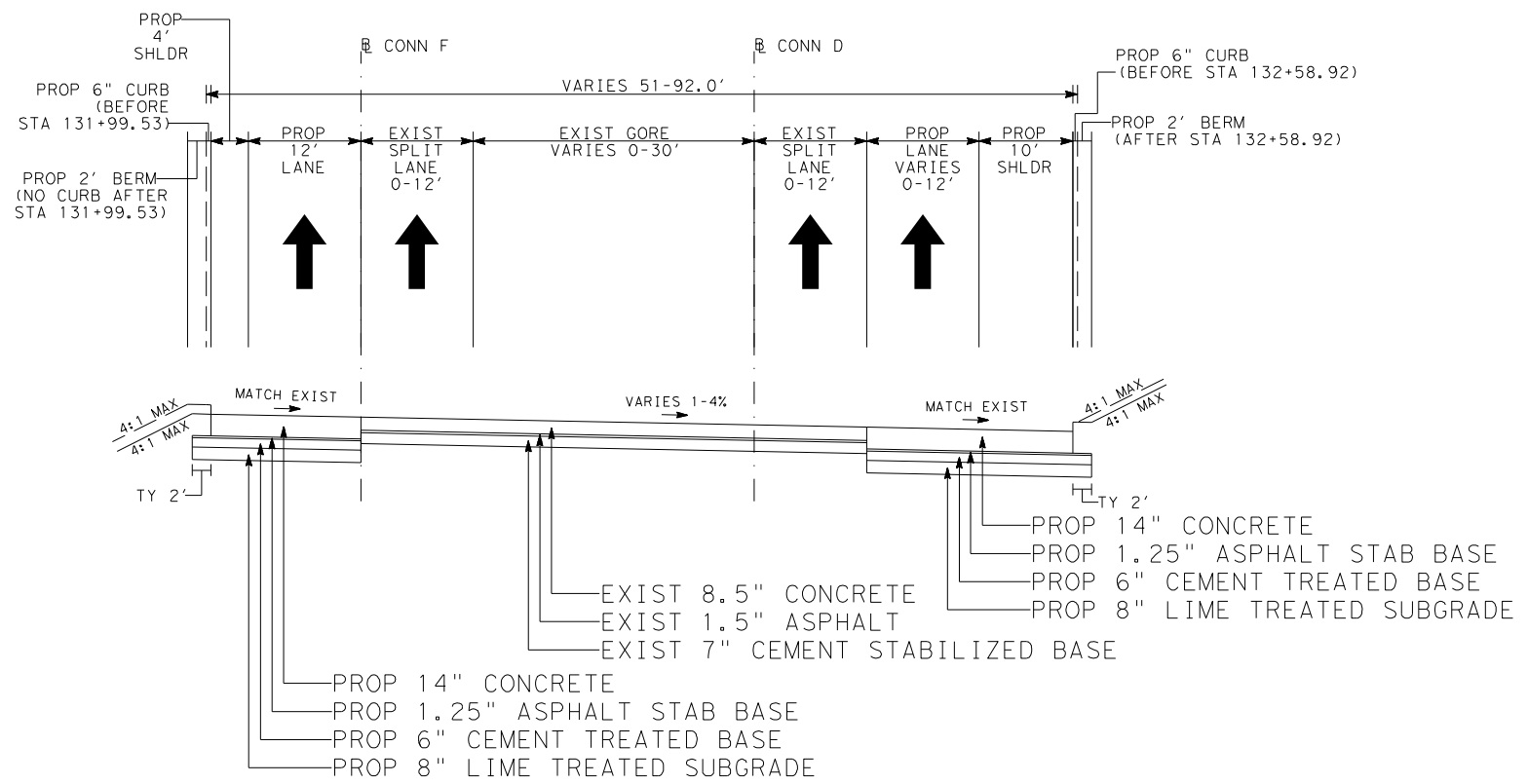
IH 610
PROPOSED
TYPICAL
SECTIONS

TxDOT © 2024 SHEET 1 OF 2

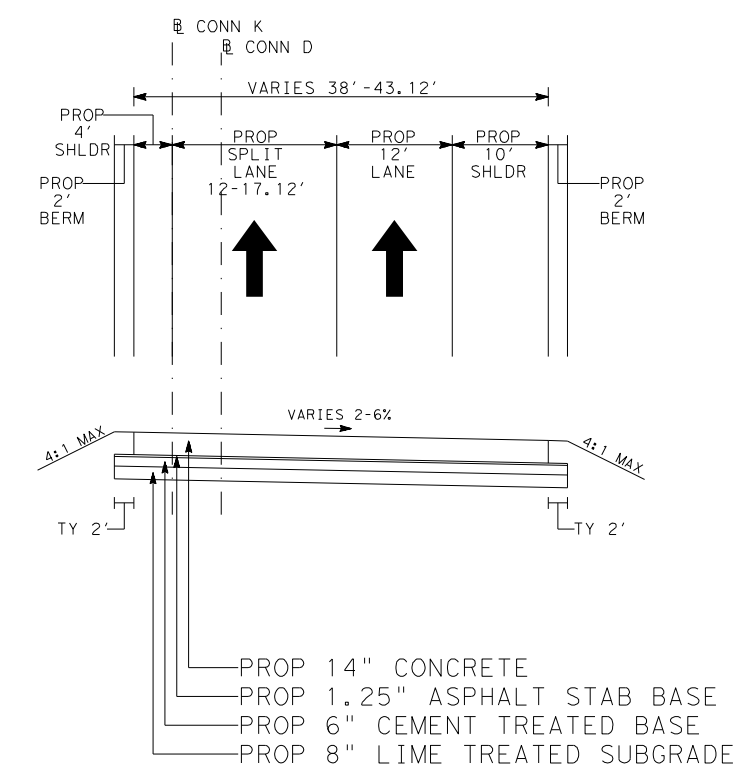
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	6	

DATE: \$DATE\$ FILE: \$FILES\$

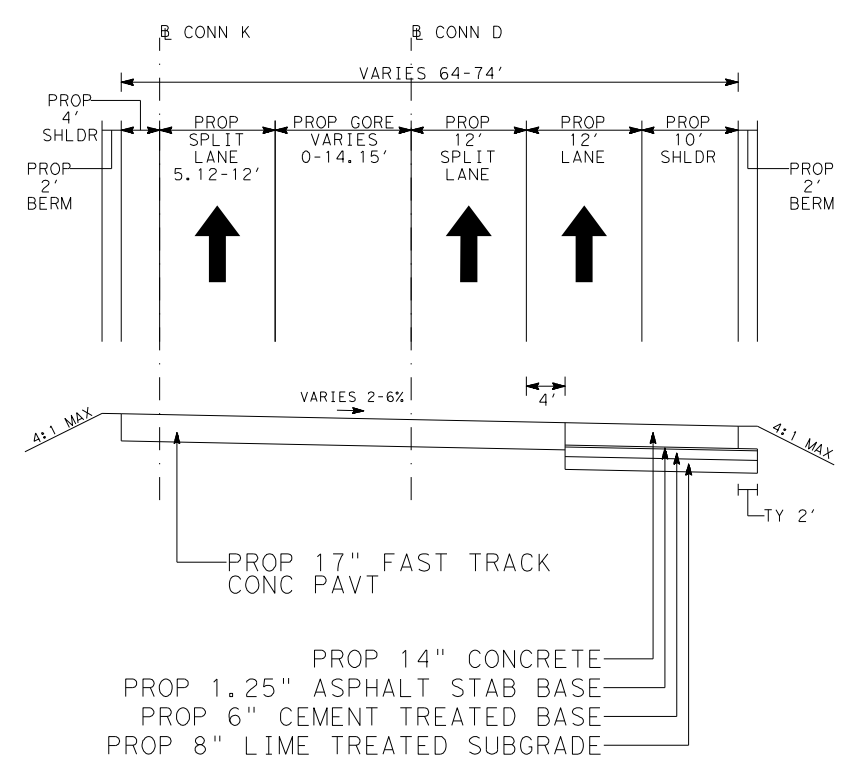
DATE: \$DATE\$ \$TIMES\$
 FILE: \$FILES\$



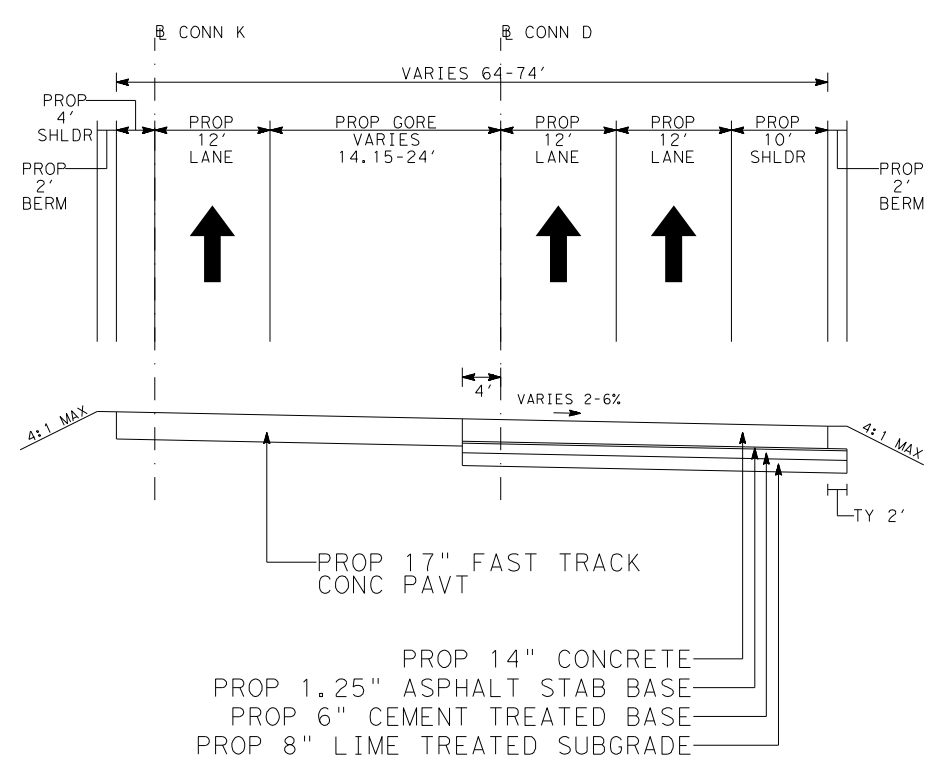
PROPOSED TYPICAL SECTION
 STA 129+56.54 TO STA 133+15.77



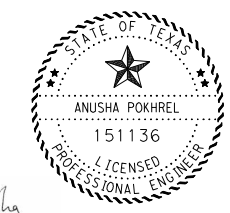
PROPOSED TYPICAL SECTION
 STA 137+87.70 TO STA 139+02.46



PROPOSED TYPICAL SECTION
 STA 139+02.46 TO STA 140+46.75



PROPOSED TYPICAL SECTION
 STA 140+46.45 TO STA 141+12.21




 ANUSHA POKHREL, P.E. DATE 9/6/2024



IH 610
PROPOSED
TYPICAL
SECTIONS

TxDOT © 2024 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	7	

Highway: IH 610

Control: 0271-15-099

General Notes:**General:**

Area Engineer contact information for this project follows:

(Jamal Elahi, (281) 464-5501, and jamal.elahi@txdot.gov)

(Vanessa Bosques, (281)464-5503, and vanessa.bosques@txdot.gov)

Submit any questions about this project via the “Letting Pre-Bid Q&A” web page, located at:

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

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

Large files with relevant project documentation, such as geotechnical reports, as-built plans, and cross-sections will continue to be provided on the following FTP site:

<https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Houston%20District/>

Unless otherwise shown on the plans, Reclaimed Asphalt Pavement (RAP) generated by this project will become the property of the Contractor for use in the current construction project or in future projects.

If fixed features require, the governing slopes shown may vary between the limits shown and to the extent determined by the Engineer.

Superelevate the curves to match the existing surface.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

References to manufacturer’s trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Grade street intersections and median openings for surface drainage.

If a foundation is to be placed where a riprap surface or an asphalt concrete surface presently exists, use caution in breaking out the existing surface for placement. Break out no greater area than is required to place the foundation. After placing the foundation, wrap the periphery with

Highway: IH 610

Control: 0271-15-099

0.5 in. pre-molded mastic expansion joint. Then replace the remaining portion of the broken-out surface with Class A or Class C concrete or cold mix asphalt concrete to the exact slope, pattern, and thickness of the existing riprap or asphalt. Payment for breaking out the existing surface, wrapping the foundation, and replacing the surface is subsidiary to the various bid items.

The lengths of the posts for ground mounted signs and the tower legs for the overhead sign supports are approximate. Verify the lengths before ordering these materials to meet the existing field conditions and to conform to the minimum sign mounting heights shown in the plans.

Furnish aluminum Type A signs instead of plywood signs for signs shown on the Summary of Small Signs sheet.

Stencil the National Bridge Inventory (NBI) number on each existing bridge shown on these plans. The NBI number is shown above the title block for each bridge layout.

Clearly mark or highlight on the shop drawings, the items being furnished for this project. Submit required shop drawings in accordance with the shop drawing distribution list shown in the note for Item 5 for review and distribution.

General: Roadway Illumination and Electrical

For roadway illumination and electrical items, use materials from pre-qualified producers as shown on the Construction Division (CST) of the Department’s material producers list. Check the latest link on the Department’s website for this list. The category/item is “Roadway Illumination and Electrical Supplies.” No substitutions will be allowed for materials found on this list.

Perform electrical work in conformance with the National Electrical Code (NEC) and the Department’s standard sheets.

The Contractor may make the electrical grounding connections and permissible splices using the thermal fusion process, Cadweld, ThermOweld, or approved equal, instead of bolted connections and splices.

The Area Engineer will arrange with the Contractor, an inspection of the completed electrical systems for the highway lighting systems before final acceptance for compliance with plans and specifications. The inspection will be made with personnel from the electrical section of the Department’s District Transportation Operations Office. The city’s electrical division personnel will also inspect lighting systems within the city limits. Portions of the work found to be deficient during this inspection will not be accepted.

General: Computerized Transportation Management Systems (CTMS)

Locate the underground utilities within the project limits. Provide the equipment necessary for locating these utilities, locate, and mark them before starting any excavation work in the area. This work is subsidiary to the various bid items. If the Contractor damages or cause damage to any existing underground utilities, repair such damage at no cost to the Department.

Highway: IH 610

Control: 0271-15-099

Ensure the interconnection of new equipment to the existing system does not interfere with the operation of the remaining system components. Ensure the system remains completely operational between the hours of 6:00 a.m. Monday and 12:00 a.m. (midnight) Saturday.

Do not interrupt system operation without coordinating with the Department’s operations personnel at Houston Transtar at (713) 881-3285.

Perform work to be done on cables during weekends only.

General: Traffic Signals

For traffic signal items, use materials from the Pre-Qualified Producers List (located at <http://www.dot.state.tx.us/GSD/purchasing/supps.htm>) and the materials pre-qualified for illumination and electrical items (located at <https://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/archive/>) as shown on the Department’s Material Producers List and the Roadway Illumination and Electrical Supplies List. Check the latest links on the Department’s website for these lists. No substitutions will be allowed for materials found on these lists.

General: Site Management

Mark stations every 100 ft. and maintain the markings for the project duration. Remove the station markings at the completion of the project. This work is subsidiary to the various bid items.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor’s office, equipment, and materials storage yard sites.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type

Wayne Series 900
Elgin White Wing
Elgin Pelican

Truck Type - 4 Wheel

M-B Cruiser II
Wayne Model 945
Mobile TE-3
Mobile TE-4
Murphy 4042

Highway: IH 610

Control: 0271-15-099

General: Traffic Control and Construction

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.

Schedule work so that the base placement operations follow the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

This project requires extensive grading operations in an environmentally sensitive area.

If relocating mailboxes, place them with the post firmly in the ground at nearby locations. Upon completing the project, the Engineer will locate the final mailbox placement. Perform this work in accordance with the requirements of the Item, “Mailbox Assemblies,” except for measurement and payment. This work is subsidiary to the various bid items.

If fences cross construction easements shown on the plans and work is required beyond the fences, remove and replace the fences as directed. This work and the materials are subsidiary to the various bid items.

When design details are not shown on the plans, provide signs and arrows conforming to the latest “Standard Highway Sign Designs for Texas” manual.

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department’s Houston District Traffic Signal Operations Office at 713-802-5662, or by e-mailing the Department’s Houston District Traffic Signal Operations Office at: HOU-LocateRequest@txdot.gov, to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

Notify the Engineer at least 48 hours before constructing junction boxes at storm drain and utility intersections.

Install or remove poles and luminaires located near overhead or underground electrical lines using established industry and utility safety practices. Consult the appropriate utility company before beginning such work.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 5: Control of Work

Before contract letting, cross-section data for this project will be available to the prospective bidders in PDF format on the Department's Houston District website located at:

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

The cross-section data provided above is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the data with the appropriate plans, specifications, and estimates for the projects.

Submit shop drawings electronically for the fabrication of items as documented in Table 1 or Table 2 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, https://ftp.txdot.gov/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations	Y	Y	Y	B	SD

	(Prstrs Bms)					
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs req'd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs req'd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs req'd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD

SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

A - Area Office	
Area Office	Email Address
Southeast Area Office	HOU-SEHShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
C - Construction Office	
Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov
T - Traffic Engineer	
Traffic Operations	HOU-TrfShpDrwgs@txdot.gov
TMS – Traffic Management System	
Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

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

Item 6: Control of Materials

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

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or if proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The Contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of their determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

1. Restricted Use of Materials for the Previously Evaluated Permit Areas.

- Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
- a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, “Excavation” is used for permanent or temporary fill (under the Item, “Embankment”) within a USACE permit area.
 - b. Suitable embankment (under the Item, “Embankment”) from within the USACE permit area is used as fill within a USACE evaluated area.
 - c. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of at a location approved within a USACE evaluated area.

2. Contractor Materials from Areas Other than Previously Evaluated Areas.

- Provide the Department with a copy of USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
- a. The Item, “Embankment” used for temporary or permanent fill within a USACE permit area.
 - b. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of outside a USACE evaluated area.

Highway: IH 610

Control: 0271-15-099

The total area disturbed for this project is 3.43 acres. The disturbed area in this project, the project locations in the contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer (to the appropriate MS4 operator when on an off-state system route) and to the local government that operates a separate storm drain system.

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

This project requires *formal consultation* with environmental resource agencies. There is a high probability of encountering environmentally sensitive areas on Contractor designated project specific locations (PSLs) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). This Item provides listings of regulatory agencies the Contractor may need to contact for this project.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

This project is on a hurricane evacuation route. Provide 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.

Highway: IH 610

Control: 0271-15-099

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

In addition to lane closures, cease work 3 days before the predicted hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Vehicles of the Contractor, subcontractors, or material suppliers will not be allowed to enter or exit the traffic stream, including those for the purpose of 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.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on a six-day workweek in accordance with Section 8.3.1.2.

The maximum number of days the time charges on this contract may be suspended for contractor convenience is 60 days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee is \$ 1,500.00. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling." The time increment for the Lane Closure Assessment fee for this project is one hour.

Item 100: Preparing Right of Way

Obtain a City of Houston plumbing permit and a demolishing permit or removing permit before demolishing or removing existing houses or commercial buildings.

Clean existing ditches under fill sections of undesirable materials including grass, muck, and trash. Perform this work in accordance with the Construction section of the Item, "Preparing Right of Way." This work is subsidiary to this bid Item.

The Item, "Preparing Right of Way" will be measured for payment only in those designated areas shown on the plans. Preparing right of way necessary to perform construction that is outside designated areas is subsidiary to this bid Item.

Highway: IH 610

Control: 0271-15-099

Remove abandoned utilities that are in conflict with the new utilities, at no expense to the Department.

Reestablish and maintain right of way stakes after completing the right of way preparation activities and until the new utilities are in place.

Remove and assume ownership of the existing ground mounted signs within the limits of roadway construction unless otherwise noted or directed. This work is subsidiary to the Item, "Preparing Right of Way."

Item 104: Removing Concrete

Removing concrete curb is paid as a separate bid item if the existing pavement on which it rests is not removed at the same time.

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

Removing curb on cement-treated and untreated base or on cement treatment being removed at the same time is subsidiary to this bid Item.

Obtain a secured site for the stockpile of the treated material to be salvaged from this project. Haul and stockpile the unused material as directed. This work is subsidiary to this bid Item.

Store the treated material salvaged from this project at the project sites designated by the Engineer.

Item 110: Excavation

If manipulating the excavated material requires moving the same material more than once to accomplish the desired results, the excavation is measured and paid for only once regardless of the manipulation required.

Transition the ditch grades and channel bottom widths at structure locations. Use only approved channel excavation in the embankment.

Item 132: Embankment

If salvaged base is used for the embankment material, break it into small pieces to achieve the required density and to facilitate placing in the embankment. Obtain approval of the material before placing in the embankment.

Furnish Type C material with a maximum Liquid Limit (LL) of 65, a minimum Plasticity Index (PI) of 5, and composed of suitable earth material such as loam, clay, or other materials that form a suitable embankment.

The embankment material used on the project which has a Liquid Limit exceeding 45 will be tested for Liquid Limits at the rate of one test per 20,000 cu. yd. or per total quantity less than 20,000 cu. yd., unless otherwise directed. Only use material that passes the above tests.

Highway: IH 610

Control: 0271-15-099

For unpaved areas, provide a finished grade with the top 4 in. capable of sustaining vegetation. Use fertile soil that is easily cultivated, free from objectionable material and highly resistant to erosion.

Furnish material with a maximum Liquid Limit (LL) of 65.

Item 162: Sodding for Erosion Control**Item 164: Seeding for Erosion Control****Item 166: Fertilizer****Item 168: Vegetative Watering**

Refer to the "Fertilizer, Seed, Sod, Straw, Compost, and Water" plan sheet for material specifications, application rates, and for watering requirements.

Item 204: Sprinkling

Perform subsidiary sprinkling as required under various other items in accordance with the Item, "Sprinkling."

Sprinkling for dust control is subsidiary to the various bid items.

Item 210: Rolling

Use a medium pneumatic roller meeting the requirements of Item 210 as directed. This work is subsidiary to the various bid items. On every asphalt shot, use a minimum of 3 pneumatic rollers or as directed. Use approved rolling patterns. Successive asphalt shots will not be allowed until acceptable rolling has been accomplished on the preceding asphalt shot.

Item 260: Lime Treatment (Road-Mixed)

For slurry placing, before discharging through the distributors, sufficiently agitate or mix the lime and water to place the lime in suspension and to obtain a uniform mixture.

The Engineer will observe the lime treatment that the Contractor elects to open to construction traffic immediately after compaction. If the construction traffic damages the subgrade, route the traffic off the damaged section in accordance with the standard specification. If the construction traffic does not damage the subgrade, cure the subgrade until other courses of material cover it. Apply these courses within 14 days with a maximum curing period of 7 days.

Place the hydrated and the commercial lime as a water suspension or slurry according to the slurry placing method shown in Section 260.4.3.2, "Slurry Placement."

Use the type of lime at particular locations as directed.

Place the quicklime dry or as a slurry.

For the dry quicklime, a spreader box is not required if the lime material is evenly distributed.

Highway: IH 610

Control: 0271-15-099

In limited areas, the Contractor may construct the lime slurry subgrade under a sequence of work in which the application, mixing, and compaction are completed in the same working day, if approved by the Engineer.

Provide documentation from certified public scales showing gross, tare, and net weights. Provide producer's delivery tickets also showing gross, tare, and net weights. Completely empty the lime trailers at the project site. The Engineer may direct the Contractor to reweigh any shipment of lime on certified scales. The cost of this operation is subsidiary to the Item, "Lime Treatment (Road-Mixed)."

The percentage of lime shown on the plans is estimated on the basis of engineering tests. If soil tests made during construction indicate properties different than those originally anticipated, the Engineer may vary the percentage of the lime to provide soil characteristics similar to those of the preliminary tests.

Mix the lime with the new base material in an approved pug mill type stationary mixer.

If using Type A aggregate in accordance with the Item, "Flexible Base," use only crushed stone, Grade 1.

Item 276: Cement Treatment (Plant-Mixed)

Before placing the new base, wet and coat the vertical construction joints between the new base and the previously placed base with dry cement.

If the total thickness of the cement treatment is greater than 8 in., compact it in multiple lifts in accordance with Section 276.4.3, "Compaction." Place the courses in the same working day unless otherwise approved.

Use Class N Cement Treatment containing 4.5 percent cement based on the dry weight of the aggregate. There is no minimum compressive strength requirement for this Item.

The requirement for core drilling to determine the thickness of cement treatment is waived if using less than 500 sq. yd. at one location.

For widening the existing pavement, the Engineer may waive the requirements for preparing the subgrade by scarifying and compacting if the as-cut subgrade can be maintained to the density of the natural ground and to a uniform consistency when placing the base course. Keep the subgrade wet.

Compact in accordance with the standard specifications and complete the finishing operations within a period of 5 hours after adding the cement to the base material.

Cure the final course of cement treatment using an asphalt distributor that distributes the approved curing material and water mixture material at a rate of 0.25 gallons per square-yard evenly and smoothly or as recommended by the manufacturer at the recommended dilution rate, under a pressure necessary for proper distribution. Provide a curing material meeting the requirements of the Item, "Asphalts, Oils, and Emulsions" for curing the cement treatment. Use the following materials for curing the courses of cement treatment:

Highway: IH 610

Control: 0271-15-099

Curing Material

Water
PCE

Application

All courses, except final course
Final course

Continue curing until placing another course or opening the finished section to traffic.

Spread the material so that the layers of base are uniform in depth and in loose density before compacting.

Type E material consists of Type A material, crushed concrete (except under flexible pavement), or Reclaimed Asphalt Pavement (RAP) meeting the requirements of the Item, "Flexible Base." If approved, the 50 percent maximum RAP limitation may be waived.

Unless otherwise directed, place the next pavement layer within 7 working days of placing the base.

If using crushed stone for the Type E material under this Item, ensure it meets the requirements for the Item, "Flexible Base," Type A, Grade 1-2. Texas Test Method TEX-117-E is not required for this Item.

If using recycled Type E cement treatment under proposed flexible pavement, produce it using the existing base salvaged from within this project or from other approved Department projects and salvaged Asphalt Concrete Pavement (ACP). Do not use crushed concrete under flexible pavement.

If using recycled Type E cement treatment under proposed concrete pavement, produce it using the existing base salvaged from within this project or from other approved Department projects, salvaged asphalt concrete pavement, or crushed concrete. If using crushed concrete as an aggregate, ensure it meets the requirements of Grade 3.

If using salvaged existing base and asphalt concrete pavement as described above, size it so that all the material, except the existing individual aggregate, passes the 2-in. sieve and is of a gradation that allows satisfactory compaction. Provide salvaged material that does not contain deleterious material such as clay or organic material. Provide material passing the No. 40 sieve, defined as soil binder, with a maximum Plasticity Index (PI) of 10 and a maximum Liquid Limit (LL) of 35 when tested in accordance with test method Tex-106-E.

Meet the following additional requirements if the base and ACP are salvaged from other Department projects:

1. Obtain written approval before using the material.
2. Salvage and stockpile by approved methods.
3. Stockpile the material for exclusive use by the Department.

Item 292: Asphalt Treatment (Plant-Mixed)

If using the iron ore topsoil as the primary aggregate, meaning 80 percent or more by weight of the total mixture, the requirements for the water susceptibility test are waived.

Mixtures containing the iron ore topsoil are exempted from test methods Tex-217-F (Part I, separation of deleterious material and Part II, decantation test for coarse aggregate) and Tex-203-F (Sand Equivalent Test).

Assume responsibility for proportioning the materials entering the asphalt mixture, regardless of the type of plant used.

Furnish the mix designs for approval.

Compact the courses to a minimum density of 95 percent of the maximum density as determined using test method Tex-126-E.

Meet the following grading requirements:

Sieve Size	Percent Passing Grade 4 (Bondbreaker)
1-3/4 in.	-
1 in.	-
1/2 in.	100
No. 4	30 - 70
No. 40	15 - 45

Physical requirements are as follows:

- Maximum Plasticity Index (PI) = 8
- Maximum Liquid Limit (LL) = 35
- Maximum Wet Ball Mill = 50 (crushed stone)
- Maximum LA Abrasion = 50 (iron ore)

If blending the materials, perform the Wet Ball Mill test for the composite aggregate.

Form bituminous mix incorporating 3.5 to 7 percent asphaltic binder by dry weight.

For nominal aggregate size less than 0.5 in., design the mix in accordance with test method Tex-204-F.

If the layer thickness after placing is 1.25 in. or less, the bondbreaker is exempt from the in-place density control described in Section 292.4.5, "Compaction."

Item 360: Concrete Pavement

Where the pavement curb is left off for a later tie, provide the dowels or the tie bars as indicated on the paving detail sheets. The dowel bars and tie bars are subsidiary to the various bid items.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before that area receives permanent pavement markings and opens to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with the adjacent undamaged areas. Do not repair by grouting onto the surface.

On pavement widening, hand finishing in place of the longitudinal float will be permitted.

Where existing pavement is widened with new pavement, place the new pavement a minimum of 2 ft. wide.

Equip the batching plants to proportion by weight, aggregates, and bulk cement, using approved proportioning devices and approved automatic scales.

For mono curb, the curb height transitions will be paid at the contract unit price of the larger curb height in the transition. The 2.5-in. laydown curbs for driveways will be paid at the unit price bid for the Item, "Conc Curb (Mono) (Ty II)."

High-early strength cement may be used for frontage road and city street intersection construction.

Do not use limestone dust of fracture as fine aggregate.

If the concrete design requires greater than 5.5 sacks of cementitious material per cubic yard, obtain written approval. If placing concrete pavement mixes from April 1 to October 31, inclusive, use Mix Design Option 1 as specified in Section 421.4.2.6.1.

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

Complete the entire Fast Track concrete construction process, from the time the Fast Track Work Area is closed to traffic, to the time the Fast Track Work Area is opened to traffic. The Fast Track operation includes, but is not limited to, traffic control, existing pavement and subgrade removal, preparation of subgrade, placement of steel, placement of Fast Track concrete pavement, cure time, striping, etc. Perform work in the Fast Track Work Area in an expeditious manner, within the allowable time period for any area shown below:

- | Fast Track Work Area | Allowable Duration |
|--|--------------------|
| 1. IH 610 Travel Lane and Right shoulder Sta. 126+40.48 to Sta. 127+10.48: | 2 weekend days |
| 2. IH 610 Left Lane and shoulder Sta. 139+04.05 to Sta. 141+12.21: | 2 weekend days |

Failure to perform any Fast Track Work Area construction within the above time frames will be cause for the Engineer to require the Contractor to shut down all other construction operations to ensure all resources are directed toward the completion of the Fast Track operation. This shutdown will remain in force until the Fast Track operation is complete. Such a shutdown will not warrant additional time, time suspension, or any additional costs to the Department.

Highway: IH 610

Control: 0271-15-099

Unless otherwise directed in writing, provide High Early Strength (Class HES) concrete with a minimum average flexural strength of 425 psi or a minimum average compressive strength of 3,000 psi in 16 hours.

When directed in writing, open the pavement to traffic before the minimum requirements have been attained.

When needed, place and remove forms in accordance with Section 360.4.5, except do not remove forms until at least 6 hours after concrete has been placed. The time for the form removal may be extended with the direction of the Engineer if weather or other conditions make it advisable.

Sprinkling and rolling, required for the compaction of the rough subgrade in advance of fine grading are subsidiary to this Item. Maintenance of a moist condition of the subgrade in advance of fine-grading and concrete is subsidiary work, as provided above.

Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest “Texas Manual on Uniform Traffic Control Devices” and the latest Barricade and Construction (BC) Standard Sheets. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest “Texas Manual on Uniform Traffic Control Devices” for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, “Barricades, Signs, and Traffic Handling.”

Erect temporary signs when exit ramps are closed or moved to new locations during construction.

If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted.

Highway: IH 610

Control: 0271-15-099

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Coordinate and schedule the work with the appropriate Metro representative if requiring access to the High Occupancy Vehicle lanes.

Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

Replace the overhead signs, informational signs, and exit signs to be removed, with temporary signs providing the correct information to the traveling public. Size the replacement signs and include them in the traffic control plan.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure			
Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Tuesday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Wednesday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Thursday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Friday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Saturday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Sunday	As approved by Area Engineer	As approved by Area Engineer	N/A

Full Closure (Ramps)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Tuesday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Wednesday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Thursday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Friday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Saturday	09:00 AM – 03:00 PM	09:00 PM – 05:00 AM	05:00 AM – 09:00AM 03:00 PM – 09:00 PM
Sunday	As approved by Area Engineer	As approved by Area Engineer	N/A

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

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. Before payment will be made, complete the “Daily Report on Law Enforcement Force Account Work” (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a Portable Changeable Message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

During construction, remove, cover, adjust, or replace overhead sign panels to correspond with each current traffic control phase. The desirable size of letters for freeways is 10 in., the minimum is 8 in. This work is subsidiary to Item 502.

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.

After satisfactory completion of tests, place the new lighting fixtures in operation. Final acceptance will be made after the fixtures operate satisfactorily for a minimum period of 14 days. The 14-day test period is included in the allowed working days.

Assume responsibility for the new lighting fixtures during the test period. Make adjustments or repairs as required and repair defects or damage at no expense to the Department.

Item 505: Truck-Mounted Attenuator (TMA) and Trailer Attenuator (TA)

A shadow vehicle with Truck-Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Schedule the seeding or sodding work as soon as possible. The project schedule provides for a vegetation management plan.

After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department’s specifications for permanent or temporary erosion control.

Highway: IH 610

Control: 0271-15-099

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way and protect environmental resources.

Immediately address chemical and hydrocarbon spills caused by the Contractor. Keep a spill kit onsite.

Item 512: Portable Traffic Barrier

Transport Standard Height Portable Traffic Barriers (including J-J Hook and Safety Shape) used for traffic handling from the Department's stockpile located on the south side of IH 610 at Cedar Crest Blvd. (located across IH 610 from Long Drive).

Use only the J-J Hook type connection between barriers.

After completing the project, return Standard Height Portable Traffic Barriers (including J-J Hook and Single Slope) used for traffic handling, to the Department's stockpile located on the south side of at IH 610 at Cedar Crest Blvd. (located across IH 610 from Long Drive). After completing the project, return the associated Single Slope barrier connecting hardware to the area office or as directed.

After completing the project, Standard Height Safety Shape Portable Traffic Barriers used for traffic handling and the associated connecting hardware will become the property of the Contractor.

If placing the portable traffic barrier on pre-stressed concrete box beams with exposed reinforcing steel, protect the reinforcing steel by supporting the portable traffic barrier on 4 in. by 4 in. timbers. Place the timbers transversely and space them on 4 ft. centers. The cost of the labor and materials to perform this work are subsidiary to the Item, "Portable Traffic Barrier."

Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

Use timber posts for galvanized steel metal beam guard fence, except for anchorage at turned down ends.

Furnish and install wood blocks between the rail elements and the timber posts as detailed on the plans. These block-outs are subsidiary to this bid Item.

The quantity of the metal beam guard fence is subject to change.

Provide a mow strip as shown on the plans, at metal beam guard fence locations, including any guardrail end treatments.

Galvanize the rail elements supplied for this project by using a Type II Zinc Coating.

Highway: IH 610

Control: 0271-15-099

At locations requiring attachment of Metal Beam Guard Fence (MBGF) to concrete railing or concrete traffic barrier, repair and fill any existing holes in the railing or barrier that are not in the correct location for attaching the new MBGF. Perform this work in accordance with the Item, "Concrete Structure Repair." Existing anchor bolt holes that cannot be utilized must be filled with an epoxy grout before drilling new holes. Then core-drill new holes in the correct locations and repair any resulting spalls at no expense to the Department. This work is considered subsidiary to the MBGF transition section (Item 540).

Item 542: Removing Metal Beam Guard Fence

Remove and assume ownership of unsalvageable metal beam guard fence rail elements and posts. Transport and store any functional, salvageable rail elements, including steel posts, which are not reused in this project to the Area Office Maintenance yard or as directed, at no cost to the department.

Replace removed wood posts which are unusable because of damage by the Contractor, at no expense to the Department.

Item 545: Crash Cushion Attenuators

After completing the project, return remaining unused crash cushion attenuators units to the Area Office Maintenance yard or as directed, at no cost to the Department.

A MASH compliant crash cushion attenuator is required for every temporary and permanent installation.

Item 585: Ride Quality for Pavement Surfaces

To eliminate the need for corrective action due to excessive deviations in the final surface layers, exercise caution to ensure satisfactory profile results in the intermediate paving layers (mixture).

Milling will not be allowed as a corrective action for excessive deviations in the final surface layer of hot-mix asphalt.

For Continuously Reinforced Concrete Pavement (CRCP) mainlanes and direct connectors, use Surface Test Type B and Pay Adjustment Schedule 2. For ramps use Surface Test Type A.

For concrete or asphalt curb and gutter sections or frontage roads, use Surface Test Type B and Pay Adjustment Schedule 2 except for the outside lane. Use Surface Test Type B and Pay Adjustment Schedule 3 for the outside lane.

For Jointed Reinforced Concrete Pavement (JRCP), use Surface Test Type A.

For all other roads (cross streets and intersections), use Surface Test Type A.

Item 618: Conduit

Item 620: Electrical Conductors

Item 628: Electrical Services

Highway: IH 610

Control: 0271-15-099

If the specifications for electrical items require UL-listed products, this means UL-listed or CSA-listed.

Item 618: Conduit

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in 3 equal lifts to the bottom of the conduit; or if using sand, place it 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

Construct bore pits a minimum of 5 ft. from the edge of the base or pavement. Close the bore pit holes overnight.

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable Department standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, the casing is subsidiary to the conduit.

If placing the conduit under existing pavement to reach the service poles, bore the conduit in place and extend it a minimum distance of 5 ft. beyond the edge of shoulder or the back of curb.

Where PVC, duct cable, and HDPE conduit 1 in. and larger is allowed and installed per Department standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Details standards. Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Use only a flat, high tensile strength polyester fiber pull tape to pull conductors through the PVC conduit system.

Remove conductor and conduit to be abandoned to 1 ft. below the ground level. This work is subsidiary to the various bid items.

Do not use cast iron junction boxes in concrete traffic barriers and single slope traffic barriers. Use polymer concrete junction boxes as shown on standard sheet ED(4)-14. Mount the junction boxes flush (+ 0 in., - 1/2 in.) with the concrete surface of the concrete barrier.

Use materials from pre-qualified producers as shown on the Department's Construction Division (CST) material producers list. Check the latest links on the Department's website for the list. The category is "Roadway Illumination and Electrical Supplies." The polymer concrete barrier box is subsidiary to Item 618, "Conduit."

Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at no expense to the Department. Also test the replacement cable after installation.

Highway: IH 610

Control: 0271-15-099

When pulling cables or conductors through the conduit, do not exceed the manufacturer's recommended pulling tensions. Lubricate the cables or conductors with a lubricant recommended by the cable manufacturer.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holders as shown on the Department's Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

Ensure that circuits test clear of faults, grounds, and open circuits.

Split bolt connectors are allowed only for splices on the grounding conductors.

For electrical licensing and electrical certification requirements for this project, see Item 7 of the Standard Specifications and any applicable special provisions to Item 7.

Item 623: Intelligent Transportation Systems Ground Boxes

Record Global Positioning System (GPS) location data for each ground box installed as part of this item and provide the data to the Engineer. Consider the work to be a part of this item.

Item 624: Ground Boxes

The ground box locations are approximate. Alternate ground box locations may be used as directed, to avoid placing in sidewalks or driveways.

Ground metal ground box covers. Bond the ground box cover and ground conductors to a ground rod located in the ground box and to the system ground.

Ground the existing metal ground box covers as shown on the latest standard sheet ED (4)-14.

During construction and until project completion, provide personnel and equipment necessary to remove ground box lids for inspection. Provide this assistance within 24 hours of notification.

Construct concrete aprons in accordance with the latest standard sheet ED (4)-14. Make the depth of the concrete apron the same as the depth of the ground box, except for Type 1 and Type 2 ground boxes. For Type 1 or Type 2 ground boxes, construct the concrete apron in accordance with details shown on the "Ground Box Details Installations" standard.

Item 628: Electrical Services

Verify and coordinate the electrical service location with the engineering section of the appropriate utility district or company.

Identify the electrical service pole with an address number assigned by the Utility Service Provider. Provide 2-in. numerals visible from the highway. Provide numbers cut out aluminum figures nailed to wood poles or painted figures on steel poles or service cabinets.

Highway: IH 610

Control: 0271-15-099

Item 636: Signs

The locations of sign panels on overhead structures are approximate. Verify in the field before installing.

For design details not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Item 644: Small Roadside Sign Assemblies

Sign locations shown on the plans are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Use the Texas Universal Triangular Slip Base with the concrete foundation for small ground mounted signs, unless otherwise shown in the plans.

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Use Type E Super High Specific Intensity (Fluorescent Prismatic) yellow green reflective sheeting background to fabricate school signs (S1-1, S3-1, S4-3, S5-1, W16-2, SW16-9p, and SW16-7pL(R)).

Assume ownership of the removed existing signposts. Store removed sign panels at the Contractor's field office, to be picked up by the maintenance office. This work is subsidiary to this item.

Locations of the relocated signs are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Replace existing signs that become damaged during relocation at no expense to the Department.

Item 662: Work Zone Pavement Markings

At the end of each workday, mark roadways that remain open to traffic during construction operations with standard pavement markings, in accordance with the latest "Texas Manual on Uniform Traffic Control Devices."

Using raised markers for removable work zone pavement markings on final concrete surfaces is optional.

For transition lane lines and detour lane lines, use raised pavement markers as shown for solid lines on the latest Barricade and Construction standard sheet for "Work Zone Pavement Marking Details."

Item 662: Work Zone Pavement Markings**Item 666: Retroreflectorized Pavement Markings****Item 668: Prefabricated Pavement Markings and Rumble Strips**

Use Type III glass beads for thermoplastic and multipolymer pavement markings.

Highway: IH 610

Control: 0271-15-099

Use a 0.100 in. (100 mil) thickness for thermoplastic pavement markings, measured to the top of the thermoplastic, not including the exposed glass beads.

Use a 0.022 in. (22 mil) thickness for multipolymer pavement markings, measured to the top of the multipolymer, not including the exposed glass beads.

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to the Department, until placing the thermoplastic markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

If using paint and bead markings as described above, purchase the traffic paint from the open market.

If the Type II markings become dirty and require cleaning by washing, brushing, compressed air, or other approved methods before applying the Type I thermoplastic markings, this additional cleaning is subsidiary to the Item, "Retroreflectorized Pavement Markings."

Establish the alignment and layout for work zone striping and permanent striping.

Stripe all roadways before opening them to traffic.

Place pavement markings under these items in accordance with details shown on the plans, the latest "Texas Manual on Uniform Traffic Control Devices," or as directed.

When design details are not shown on the plans, provide pavement markings for arrows, words, and symbols conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Item 672: Raised Pavement Markers

If other operations are complete on the project and if the curing time period is not yet elapsed, the contract time will be suspended until the curing is done.

Before placing the raised pavement markers on concrete pavement, blast clean the surface using an abrasive-blasting medium. This work is subsidiary to the Item, "Raised Pavement Markers."

Provide epoxy adhesive that is machine-mixed or nozzle-mixed and dispensed. Equip the machine or nozzle with a mechanism to ensure positive mix measurement control.

Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed. Do not use flail milling on grooved concrete or porous asphalt.

Highway: IH 610

Control: 0271-15-099

Item 678: Pavement Surface Preparation for Markings

Do not blast clean asphalt concrete pavement. Clean asphalt concrete pavement as required under the applicable specifications or as directed.

On new concrete pavement or on existing concrete pavement when placing a new stripe on a new location, remove the curing compounds and contamination from the pavement surface by flail milling or as directed. In addition, air-blast the surface with compressed air just before placing the new stripe.

On existing concrete pavement when placing a new stripe on an existing location, after removing the existing stripe under the Item, "Eliminating Existing Pavement Markings and Markers," air-blast the surface with compressed air just before placing the new stripe.

Do not clean concrete pavement by grinding.

Item 730: Roadside Mowing

Item 734: Litter Removal

Item 735: Debris Removal

Item 738: Cleaning and Sweeping Highways

Mow areas of existing vegetation, collect and dispose of litter, and sweep the roadway within the project limits according to the following chart for the duration of the project or as directed. This work is paid for under their respective bid items.

Roadside Mowing	Litter Removal		Cleaning and Sweeping Highways
3 cycles/year	12 cycles/year		12 cycles/year

Basis of Estimate

Item	Description	Limit and Rate	Unit
260	Lime Treatment (Road-Mixed) For materials used as subgrade * <ul style="list-style-type: none"> Lime(HYD, COM, or QK)(SLRY) or QK(DRY) 	6 % by weight based on 100 Lb. / Cu. Ft. subgrade	SY TON
275	Cement Treatment (Road-Mixed) For materials used as subgrade * <ul style="list-style-type: none"> Cement 	6 % by weight based on 100 Lb. / Cu. Ft. subgrade	SY TON
292	Asphalt Treatment (Plant-Mixed) <ul style="list-style-type: none"> Asphalt Aggregate 	110 Lb. / Sq. Yd.-In. 5 % by weight 95 % by weight	TON

* If used in existing roadway base, rate will be determined on a case-by-case basis.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-15-099

DISTRICT Houston
HIGHWAY IH 610

COUNTY Harris

CONTROL SECTION JOB				0271-15-099		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00140315			
COUNTY				Harris			
HIGHWAY				IH 610			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-7002	PREPARING ROW	STA	35.790		35.790	
	104-7001	REMOV CONC (PAV)	SY	4,095.650		4,095.650	
	104-7005	REMOV CONC (MOWSTRIP)	LF	532.680		532.680	
	104-7006	REMOV CONC (RIPRAP)	SY	101.670		101.670	
	104-7016	REMOV CONC (CURB)	LF	1,108.770		1,108.770	
	105-7007	RMV (7"-11") TRT/UNTRT BASE & ASPH PAV	SY	3,064.160		3,064.160	
	105-7016	RMV (16"-20") TRT/UNTRT BASE & ASPH PAV	SY	4,750.030		4,750.030	
	110-7001	EXCAV (ROADWAY)	CY	5,793.000		5,793.000	
	132-7006	EMBANK (FNL)(DC)(TY C)	CY	471.000		471.000	
	162-7002	BLOCK SODDING	SY	6,159.410		6,159.410	
	162-7003	STRAW OR HAY MULCH	SY	1,293.480		1,293.480	
	164-7005	BROADCAST SEED (TEMP_WARM)	SY	61.590		61.590	
	164-7015	DRILL SEED (TEMP_WARM_COOL)	SY	1,231.880		1,231.880	
	166-7001	FERTILIZER	AC	1.540		1.540	
	168-7001	VEGETATIVE WATERING	TGL	184.780		184.780	
	260-7001	LIME (COM OR QK)(SLURRY) OR QK(DRY)	TON	162.060		162.060	
	260-7007	LIME TRT (EXIST MATL)(8")	SY	12,004.310		12,004.310	
	276-7343	CEM TRT(PLNT MX)(CL N)(TY E)(GR 4)(6")	SY	12,004.310		12,004.310	
	292-7006	ASPHALT TRT BASE (GR 2)(PG 64)	TON	825.300		825.300	
	360-7008	CONC PVMT (CRCP) (14")	SY	10,707.400		10,707.400	
	360-7079	CONC PVMT (CRCP)(FAST TRK) (15")	SY	2,266.280		2,266.280	
	432-7013	RIPRAP (MOW STRIP)(4 IN)	CY	45.030		45.030	
	450-7024	RAIL (TY SSTR)	LF	60.000		60.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000		11.000	
	503-7001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	20.000		20.000	
	505-7003	TMA (MOBILE OPERATION)	DAY	20.000		20.000	
	506-7039	TEMP SEDMT CONT FENCE (INSTALL)	LF	5,734.590		5,734.590	
	506-7041	TEMP SEDMT CONT FENCE (REMOVE)	LF	5,734.590		5,734.590	
	506-7044	BIODEG EROSN CONT LOGS (IN STL) (12")	LF	29.000		29.000	
	506-7046	BIODEG EROSN CONT LOGS (REMOVE)	LF	29.000		29.000	
	508-7001	CONSTRUCTING DETOURS	SY	1,078.000		1,078.000	
	512-7013	PORT CTB (DES SOURCE)(SGL SLP)(TY 1)	LF	3,120.000		3,120.000	
	512-7025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	3,150.000		3,150.000	
	512-7037	PORT CTB (STKPL)(SGL SLP)(TY 1)	LF	3,120.000		3,120.000	



DISTRICT	COUNTY	CCSJ	SHEET
Houston	Harris	0271-15-099	9



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-15-099

DISTRICT Houston
HIGHWAY IH 610

COUNTY Harris

CONTROL SECTION JOB				0271-15-099		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00140315			
COUNTY				Harris			
HIGHWAY				IH 610			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	512-7070	PORT CTB (CONNECTION HARDWARE)	EA	205.000		205.000	
	529-7007	CONC CURB (MONO) (TY II)	LF	1,106.910		1,106.910	
	540-7002	MTL W-BEAM GD FEN (STEEL POST)	LF	525.000		525.000	
	540-7005	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2.000		2.000	
	540-7015	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000		1.000	
	542-7001	REMOVE METAL BEAM GUARD FENCE	LF	532.680		532.680	
	542-7002	REMOVE TERMINAL ANCHOR SECTION	EA	3.000		3.000	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)	EA	3.000		3.000	
	544-7003	GUARDRAIL END TREATMENT (REMOVE)	EA	3.000		3.000	
	545-7002	CRASH CUSH ATTEN (MOVE & RESET)	EA	3.000		3.000	
	545-7004	CRASH CUSH ATTEN (REMOVE)	EA	4.000		4.000	
	545-7006	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	EA	4.000		4.000	
	618-7036	CONDT (PVC) (SCH 40) (3")	LF	930.000		930.000	
	618-7055	CONDT (PVC) (SCH 80) (2") (BORE)	LF	616.000		616.000	
	618-7061	CONDT (PVC) (SCH 80) (3") (BORE)	LF	520.000		520.000	
	618-7090	CONDUIT (PREPARE)	LF	4,900.000		4,900.000	
	620-7002	ELEC CONDR (NO.14) INSULATED	LF	6,150.000		6,150.000	
	620-7007	ELEC CONDR (NO.8) BARE	LF	620.000		620.000	
	620-7008	ELEC CONDR (NO.8) INSULATED	LF	1,240.000		1,240.000	
	623-7002	ITS GND BOX(PCAST) TY 1 (243636)W/APRN	EA	3.000		3.000	
	624-7008	GROUND BOX TY D (162922)W/APRON	EA	2.000		2.000	
	636-7005	REPLACE EXISTING ALUMINUM SIGNS(TY G)	SF	45.000		45.000	
	636-7006	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	747.000		747.000	
	644-7004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2.000		2.000	
	644-7028	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1.000		1.000	
	658-7018	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	11.000		11.000	
	658-7036	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	4.000		4.000	
	662-7064	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	9,231.000		9,231.000	
	662-7072	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	3,981.000		3,981.000	
	662-7075	WK ZN PAV MRK REMOV (W)12"(SLD)	LF	3,581.000		3,581.000	
	662-7097	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	7,855.000		7,855.000	
	666-7236	RE PM TY III (W)(6")(SLD)	LF	4,102.000		4,102.000	
	666-7237	RE PM TY III (W)(6")(BRK)	LF	340.000		340.000	
	666-7238	RE PM TY III (W)(6")(DOT)	LF	168.000		168.000	
	666-7239	RE PM TY III (W)(8")(SLD)	LF	1,242.000		1,242.000	



DISTRICT	COUNTY	CCSJ	SHEET
Houston	Harris	0271-15-099	9A



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-15-099

DISTRICT Houston
HIGHWAY IH 610

COUNTY Harris

CONTROL SECTION JOB				0271-15-099		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00140315			
COUNTY				Harris			
HIGHWAY				IH 610			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	666-7242	RE PM TY III (W)(12")(SLD)	LF	2,797.000		2,797.000	
	666-7248	RE PM TY III (Y)(6")(SLD)	LF	3,493.000		3,493.000	
	666-7262	RE PM TY III (BLK)(6")(SHADOW)	LF	340.000		340.000	
	668-7091	PREFAB PM TY C (W)(ARROW)	EA	5.000		5.000	
	668-7093	PREFAB PM TY C (W)(DBL ARROW)	EA	2.000		2.000	
	668-7103	PREFAB PM TY C (W)(WORD)	EA	6.000		6.000	
	668-7135	PREFAB PM TY C (MULTI)(SHIELD)	EA	3.000		3.000	
	672-7006	REFL PAV MRKR TY II-C-R	EA	216.000		216.000	
	677-7002	ELIM EXT PM & MRKS (6")	LF	19,960.000		19,960.000	
	677-7004	ELIM EXT PM & MRKS (8")	LF	4,617.000		4,617.000	
	677-7006	ELIM EXT PM & MRKS (12")	LF	5,045.000		5,045.000	
	678-7002	PAV SURF PREP FOR MRK (6")	LF	8,443.000		8,443.000	
	678-7004	PAV SURF PREP FOR MRK (8")	LF	1,242.000		1,242.000	
	678-7006	PAV SURF PREP FOR MRK (12")	LF	2,797.000		2,797.000	
	678-7009	PAV SURF PREP FOR MRK (ARROW)	EA	5.000		5.000	
	678-7010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	2.000		2.000	
	678-7016	PAV SURF PREP FOR MRK (WORD)	EA	6.000		6.000	
	678-7025	PAV SURF PREP FOR MRK (SHIELD)	EA	3.000		3.000	
	730-7019	FULL - WIDTH MOWING	CYC	3.000		3.000	
	734-7002	LITTER REMOVAL	CYC	11.000		11.000	
	738-7092	CLEANING / SWEEPING (DIRECT CONNECTOR)	CYC	11.000		11.000	
	6027-7006	FIBER OPTIC CBL(SINGLE-MODE)(144 FIBER)	LF	6,430.000		6,430.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	




DISTRICT	COUNTY	CCSJ	SHEET
Houston	Harris	0271-15-099	9B

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	512	512	512	512	545	545	545	662	662	662	662	677	677	677	503	505	508
	7013	7025	7037	7070	7002	7004	7006	7064	7072	7097	7075	7002	7004	7006	7001	7003	7001
	PORT CTB (DES SOURCE)(SGL SLP)(TY 1)	PORT CTB (MOVE)(SGL SLP)(TY 1)	PORT CTB (STKPL)(SGL SLP)(TY 1)	PORT CTB (CONNECTION HARDWARE)	CRASH CUSH ATTN (MOVE & RESET)	CRASH CUSH ATTN (REMOVE)	CRASH CUSH ATTN (INSTR)(L)(N)(TL3)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)8"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK REMOV (W)12"(SLD)	ELIM EXT PM & MRKS (6")	ELIM EXT PM & MRKS (8")	ELIM EXT PM & MRKS (12")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)	CONSTRUCTING DETOURS
	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	DAY	DAY	SY
PHASE 1 STEP 1															10	10	553
PHASE 1 STEP 2																	
STA 120+00.00 TO STA 135+00.00	1170			38			2	1218	720	811	1154	2029	720	1154			
PHASE 2																	
SHEET 1 OF 2, STA 120+00.00 TO 137+00.00		866		103	1			1521	1124	1234	1248	2755	1124	1248			62
SHEET 2 OF 2, STA 137+00.00 TO 161+00.00	1950	304	1170					2396	463	2279		4675	463				464
PHASE 3 STEP 1																	
SHEET 1 OF 3, STA 120+00.00 TO STA 134+00.00		178		64	2	2		1489	1344	919	1179	2408	1344	1179			
SHEET 2 OF 3, STA 134+00.00 TO STA 158+00.00		1802	1950			2	2	2434	330	2438		4872	330				
SHEET 3 OF 3, STA 158+00.00 TO STA 160+00.00								173		174		347					
PHASE 3 STEP 2															10	10	
PROJECT TOTALS	3,120	3,150	3,120	205	3	4	4	9,231	3,981	7,855	3,581	17,086	3,981	3,581	20	20	1,078

DATE: \$DATE\$
FILE: \$FILES\$



IH 610
SUMMARY OF
TCP
QUANTITIES


TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	010	

SUMMARY OF REMOVAL ITEMS

SHEET NO.	LOCATION	100	104	104	104	104	105	105	542	542	544
		7002	7001	7005	7006	7016	7007	7016	7001	7002	7003
		PREPARING ROW	REMOV CONC (PAV)	REMOV CONC (MOWSTRIP)	REMOV CONC (RIPRAP)	REMOV CONC (CURB)	RMV (7"-11") TRT/UNTRT BASE & ASPH PAV	RMV (16"-20") TRT/UNTRT BASE & ASPH PAV	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (REMOVE)
		STA	SY	LF	SY	LF	SY	SY	LF	EA	EA
1 OF 2	BEGIN TO STA 132+00.00	7.03	171		84.74	1050.38		897.39			
1 OF 2	STA 132+00.00 TO STA 144+00.00	12	2018.5	328.54	16.93	58.39	2018.5	2315.38	328.54	2	2
2 OF 2	STA 144+00.00 TO STA 156+00.00	12	1490.49				1045.66	1537.26			
2 OF 2	STA 156+00.00 TO END	4.76	415.66	204.14					204.14	1	1
	PROJECT TOTALS	35.79	4095.65	532.68	101.67	1108.77	3064.16	4750.03	532.68	3.00	3.00

DATE: \$DATE\$
FILE: \$FILES\$

 Texas Department of Transportation			
IH 610 SUMMARY OF DEMOLITION QUANTITIES			
TxDOT © 2024 SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		011

CK
DW
CK
DW

SUMMARY OF ROADWAY ITEMS												
SHEET NO.	LOCATION	110	132	260	260	276	292	360	360	432	450	529
		7001	7006	7001	7007	7343	7006	7008	7079	7013	7024	7007
		EXCAV (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	LIME (COM OR QK)(SLURRY) OR QK(DRY)	LIME TRT (EXIST MATL)(8")	CEM TRT(PLNT MX)(CL N)(TY E)(GR 4)(6")	ASPHALT TRT BASE (GR 2)(PG 64)	CONC PVMT (CRCP) (14")	CONC PVMT (CRCP)(FAST TRK) (15")	RIPRAP (MOW STRIP)(4 IN)	RAIL (TY SSTR)	CONC CURB (MONO) (TY II)
		CY	CY	TON	SY	SY	TON	SY	SY	CY	LF	LF
				6% 100 LBS/CF			110 LBS/SQ.YD.-IN					
1 OF 4	BEGIN TO STA 132+00.00	1317	108	23.63	1750.03	1750.03	120.31	1516.58	1489.87			1049.95
2 OF 4	STA 132+00.00 TO STA 144+00.00	2686	100	68.04	5040.04	5040.04	346.50	4502.46	776.41	32.29	60	56.96
3 OF 4	STA 144+00.00 TO STA 156+00.00	1552	259	63.58	4709.34	4709.34	323.77	4259.43				
4 OF 4	STA 156+00.00 TO END	238	4	6.82	504.9	504.9	34.71	428.93		12.74		
	PROJECT TOTALS	5793.00	471.00	162.06	12004.31	12004.31	825.30	10707.40	2266.28	45.03	60.00	1106.91

SUMMARY OF ROADWAY ITEMS								
SHEET NO.	LOCATION	540	540	540	544	730	734	738
		7002	7005	7015	7001	7019	7002	7092
		MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	FULL - WIDTH MOWING	LITTER REMOVAL	CLEANING / SWEEPING (DIRECT CONNECTOR)
		LF	EA	EA	EA	CYC	CYC	CYC
1 OF 4	BEGIN TO STA 132+00.00							
2 OF 4	STA 132+00.00 TO STA 144+00.00	475	2		2			
3 OF 4	STA 144+00.00 TO STA 156+00.00							
4 OF 4	STA 156+00.00 TO END	50		1	1			
	PROJECT TOTALS	525.00	2.00	1.00	3.00	3.00	10.00	10.00



IH 610
SUMMARY OF
ROADWAY
QUANTITIES

TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	012	

DATE: \$DATE\$
FILE: \$FILE\$

CK: DW: CK: DW:

SUMMARY OF SWP3 ITEMS

SHEET NO.	LOCATION	162	162	164	164	166	168	506	506	506	506
		7002	7003	7005	7015	7001	7001	7039	7041	7044	7046
		BLOCK SODDING	STRAW OR HAY MULCH	BROADCAST SEED (TEMP_WARM)	DRILL SEED (TEMP_WARM_COOL)	FERTILIZER	VEGETATIVE WATERING	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	SY	SY	AC	TGL	LF	LF	LF	LF
1 OF 2	BEGIN TO STA 132+00.00	1167.47	245.17	11.67	233.49	0.29	35.02	1052.16	1052.16	29.00	29.00
1 OF 2	STA 132+00.00 TO STA 144+00.00	2325.88	488.4348	23.2588	465.176	0.58	69.78	2171.60	2171.60		
2 OF 2	STA 144+00.00 TO STA 156+00.00	2248.96	472.28	22.49	449.79	0.56	67.47	2032.08	2032.08		
2 OF 2	STA 156+00.00 TO END	417.1	87.59	4.17	83.42	0.10	12.51	478.75	478.75		
	PROJECT TOTALS	6159.41	1293.48	61.59	1231.88	1.54	184.78	5734.59	5734.59	29.00	29.00

DATE: \$DATES\$
FILE: \$FILES\$



IH 610
SUMMARY OF SWP3 QUANTITIES

TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	013	

CK: DW: CK: DW:


SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

SIGNING & PAVEMENT MARKINGS LAYOUT SHEET NO.	658	658	666	666	666	666	666	666	666	668	668	668
	7018	7036	7236	7237	7238	7239	7242	7248	7262	7091	7093	7103
	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	RE PM TY III (W)(6")(SLD)	RE PM TY III (W)(6")(BRK)	RE PM TY III (W)(6")(DOT)	RE PM TY III (W)(8")(SLD)	RE PM TY III (W)(12")(SLD)	RE PM TY III (Y)(6")(SLD)	RE PM TY III (BLK)(6")(SHADOW)	PREFAB PM TY C (W)(ARROW)	PREFAB PM TY C (W)(DBL ARROW)	PREFAB PM TY C (W)(WORD)
	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA
1 OF 4	0	0	1,070	0	0	636	1,777	455	0	2	1	4
2 OF 4	8	4	1,100	180	36	478	930	1,106	180	1	1	0
3 OF 4	0	0	1,100	160	114	128	90	1,098	160	2	0	2
4 OF 4	3	0	832	0	18	0	0	834	0	0	0	0
PROJECT TOTALS	11	4	4,102	340	168	1,242	2,797	3,493	340	5	2	6

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

SIGNING & PAVEMENT MARKINGS LAYOUT SHEET NO.	668	672	677	677	677	678	678	678	678	678	678	678
	7135	7006	7002	7004	7006	7002	7004	7006	7009	7010	7016	7025
	PREFAB PM TY C (MULTI)(SHIELD)	REFL PAV MRKR TY II-C-R	ELIM EXT PM & MRKS (6")	ELIM EXT PM & MRKS (8")	ELIM EXT PM & MRKS (12")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (DBL ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (SHIELD)
	EA	EA	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA
1 OF 4	3	114	1,363	636	1,464	1,525	636	1,777	2	1	4	3
2 OF 4	0	74	0	0	0	2,602	478	930	1	1	0	0
3 OF 4	0	26	0	0	0	2,632	128	90	2	0	2	0
4 OF 4	0	2	1,511	0	0	1,684	0	0	0	0	0	0
PROJECT TOTALS	3	216	2,874	636	1,464	8,443	1,242	2,797	5	2	6	3

DATE: \$DATE\$
FILE: \$FILES\$



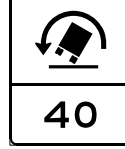
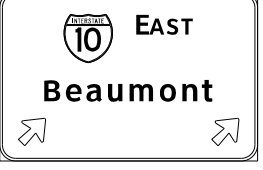

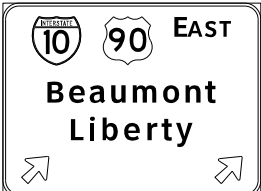



**SUMMARY OF
PERMANENT PAVEMENT
MARKING QUANTITIES**

© TxDOT 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	14

SUMMARY OF LARGE SIGNS

LAYOUT SHEET NO.	SIGN NO.	STATION	TYPE	BACKGROUND COLOR	TEXT	SIGN DIMENSIONS (FT)	636	636	647				416		LAYOUT SHEET NO.	SIGN NO.	STATION	TYPE	BACKGROUND COLOR	TEXT	SIGN DIMENSIONS (FT)	636	636	647				416									
							(7005)	(7006)	(7001)				DRILL SHAFT FOUNDATION									(7005)	(7006)	(7001)				DRILL SHAFT FOUNDATION									
							REPLACE EXIST ALUM SIGNS (TY G)	REPLACE EXIST ALUM SIGNS (TY O)	* INSTALL LRSS (STRUCT STEEL)				(7024)	(7028)								REPLACE EXIST ALUM SIGNS (TY G)	REPLACE EXIST ALUM SIGNS (TY O)	* INSTALL LRSS (STRUCT STEEL)				(7024)	(7028)								
							SF	SF	TYPE MOUNT	SIZE	LENGTH (FT)			TOTAL WEIGHT								(NON-REINF) (12")	(SIGN MTS) (24")	TYPE MOUNT	SIZE	LENGTH (FT)			TOTAL WEIGHT	(NON-REINF) (12")	(SIGN MTS) (24")						
									LEFT POST	CENTER POST	RIGHT POST	LBS	LF	LF									LEFT POST	CENTER POST	RIGHT POST	LBS	LF	LF									
1	R1	124+94.00	E5-1c	GREEN		6'-0" x 7'-6"	45.0		REPLACE EXISTING SIGN PANEL (EXISTING POST TO REMAIN)								GREEN		10'-0" x 10'-6"	105.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)															
2	R1	131+77.00		YELLOW		6'-0" x 7'-6"	45.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)								GREEN		16'-0" x 10'-6"	168.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)															
	R2	131+77.00		GREEN		16'-0" x 12'-0"	192.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)																												
	R3	131+77.00		GREEN		16'-0" x 12'-0"	192.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)																												
	R4	131+77.00		YELLOW		6'-0" x 7'-6"	45.0		REPLACE EXISTING SIGN PANEL (EXISTING OSB TO REMAIN)																												
SHEET TOTAL							45.0	474.0											SHEET TOTAL								273.0										
									PROJECT TOTALS										45.0	747.0																	

SUMMARY OF LARGE SIGNS

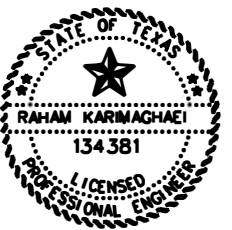
SHEET 1 OF 1

* POST LENGTHS SHOWN DO NOT INCLUDE STUB LENGTHS BUT THE TOTAL WEIGHT INCLUDES STUB POSTS, BASE CONNECTION PLATES AND STIFFENERS, FRICTION FUSE PLATES AND ALL HIGH STRENGTH BOLTS, NUTS, AND WASHERS.



CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		16

ITEM	CODE	DESCRIPTION	UNIT	PAGE 1	PAGE 2	PAGE 3	PAGE 4	TOTAL
618	7036	CONDT (PVC) (SCH 40) (3")	LF	930	0	0	0	930
618	7061	CONDT (PVC) (SCH 80) (3") (BORE)	LF	520	0	0	0	520
618	7090	CONDUIT (PREPARE)	LF	450	2030	1630	790	4900
620	7002	ELECTRIC CONDR (#14) (INSULATED)	LF	1700	2030	1630	790	6150
623	7002	ITS GND BOX (POLY) TY 1 (243636) W/APRN	EA	3	0	0	0	3
6027	7006	FIBER OPTIC CABLE (S/M) (144 FIBER)	LF	1930	2030	1630	840	6430



The seal appearing on this document was authorized by RAHAM KARIMAGHAEI P.E. 134381, on

MAY 10, 2024







Raham Karimaghahi

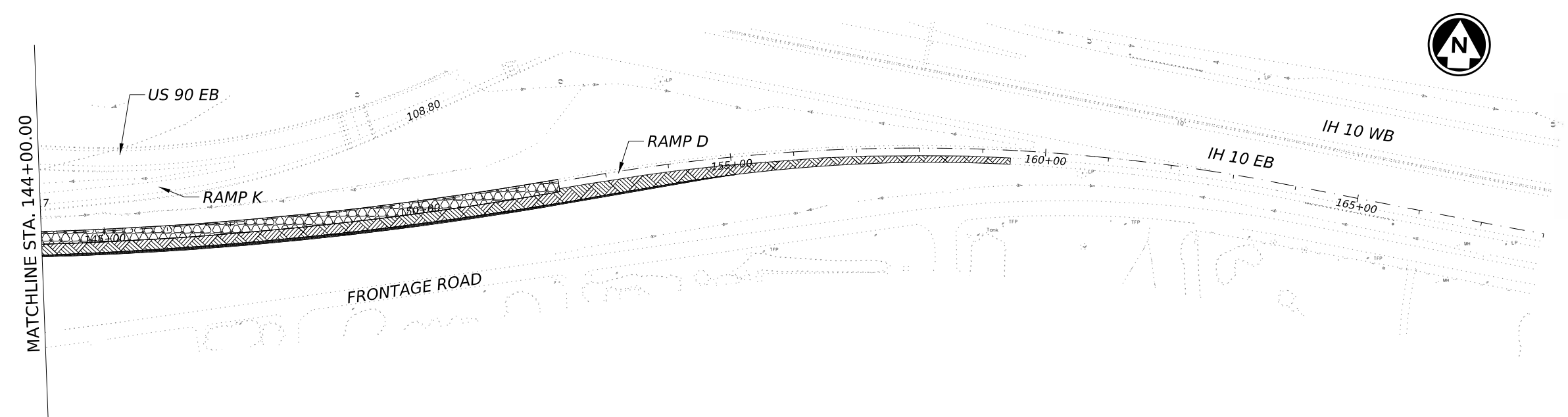
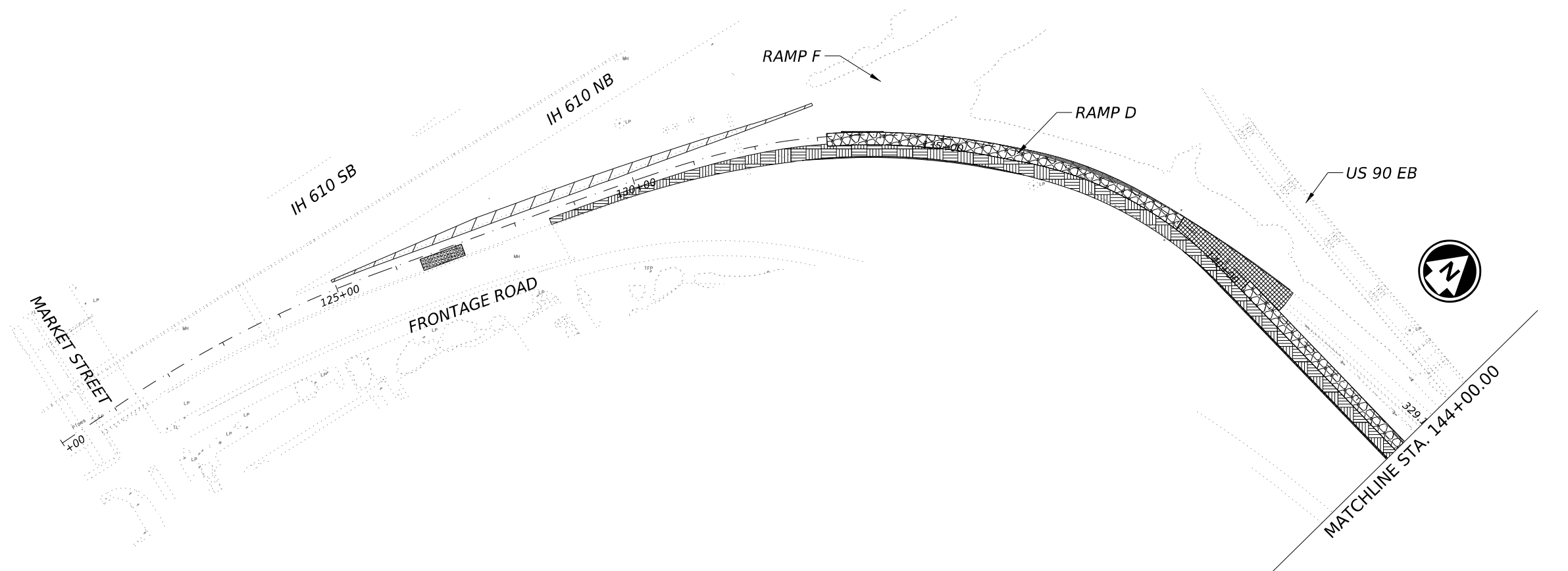


IH 610
SUMMARY OF CTMS
QUANTITIES

© TxDOT ©2024		SHEET		OF
CONT	SECT	JOB	HIGHWAY	
0271	15	099	IH 610	
DIST	COUNTY		SHEET NO.	
HOU	HARRIS		17	

CK: DW: CK: DW:

- LEGEND**
-  PHASE 1 STEP 1
 -  PHASE 1 STEP 2
 -  PHASE 2
 -  PHASE 3 STEP 1
 -  PHASE 3 STEP 2
 -  TEMPORARY PAVEMENT




 ANUSHA POKHREL, P.E. DATE 9/6/2024


Texas Department of Transportation

IH 610
TRAFFIC CONTROL
CONSTRUCTION SEQUENCE
OVERVIEW

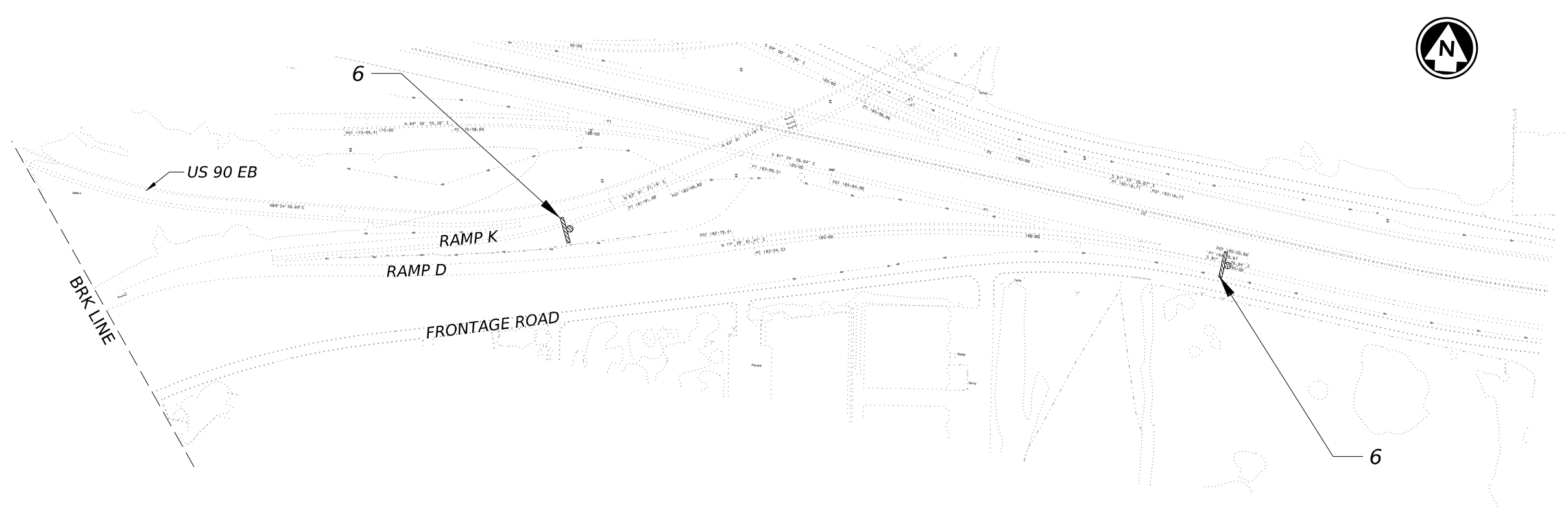
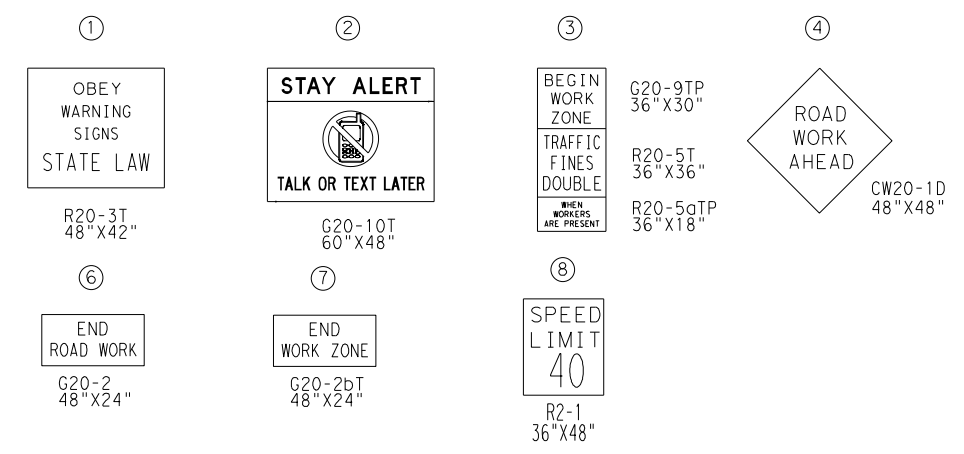
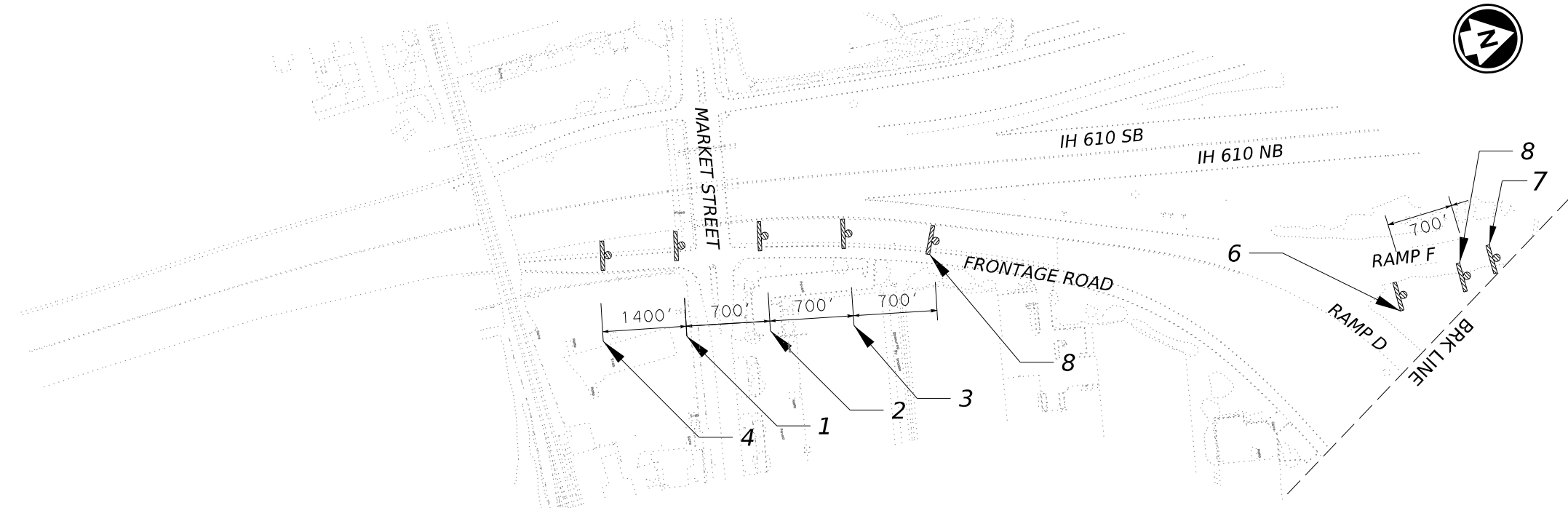
TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	18

DATE: 09/06/2024 03:11:18
FILE: \$PROJECT_NAME

CK:
DW:
CK:
DW:

- NOTES:
1. SEE BC AND TCP STANDARDS FOR SIGN SPACING AND DETAILS NOT SHOWN.
 2. ADVANCE WARNING SIGNS SHALL BE IN PLACE FOR ALL CONSTRUCTION PHASES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 3. ADJUST SIGNING LOCATIONS TO FIT FIELD CONDITIONS AS APPROVED BY THE ENGINEER.
 4. COVER OR REMOVE SIGNS WHEN NOT APPLICABLE.
 5. THE LAYOUT SHOWS TYPICAL ADVANCE WARNING SIGNS TO BE APPLIED AT THE PROJECT LIMITS AND ALL CROSS STREETS. SEE TCP LAYOUT SHEETS FOR ADDITIONAL SIGNS, DEVICES, AND MARKINGS.
 6. WARNING SIGNS TO BE PLACED ON BOTH LEFT AND RIGHT SIDES OF IH 610 MAINLANES AND RAMP.



STATE OF TEXAS
ANUSHA POKHREL
151136
LICENSED PROFESSIONAL ENGINEER

Anusha Pokhrel
05

ANUSHA POKHREL, P.E. DATE 9/6/2024

Texas Department of Transportation

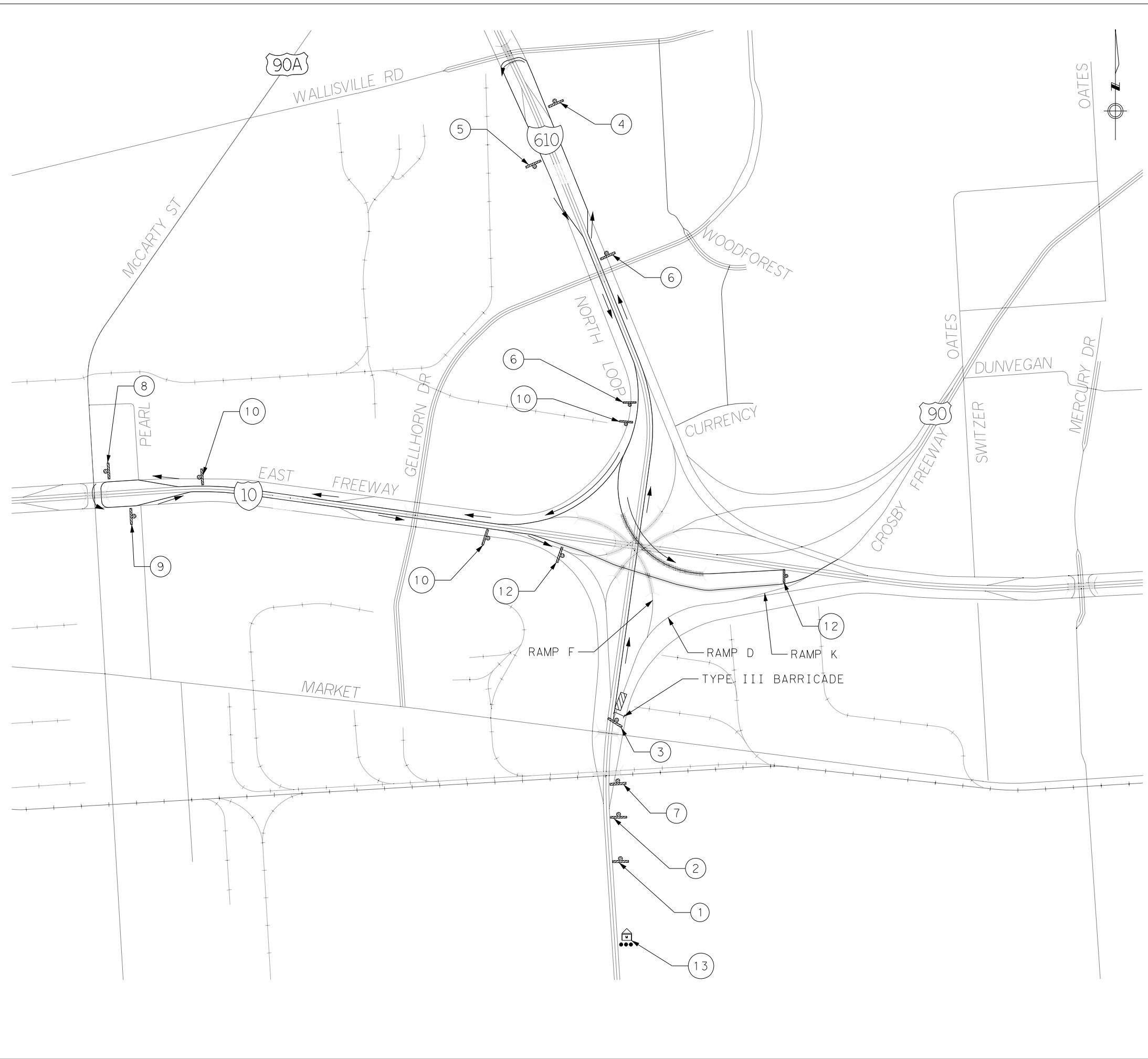
IH 610
TRAFFIC CONTROL
ADVANCE WARNING SIGNS

TxDOT © 2024 SHEET 1 OF 1

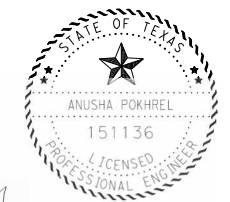
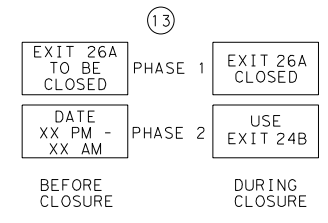
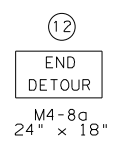
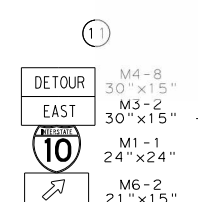
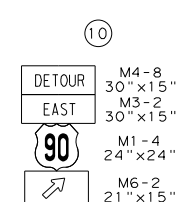
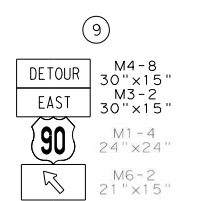
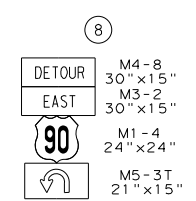
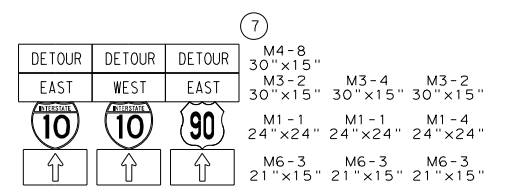
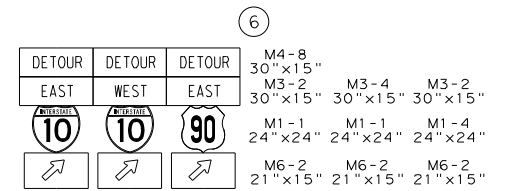
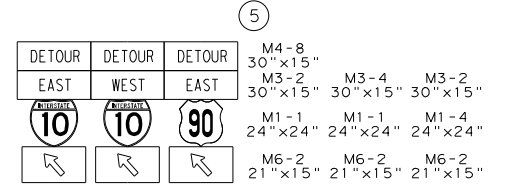
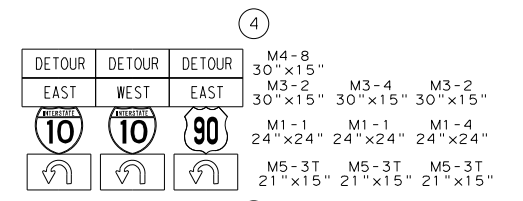
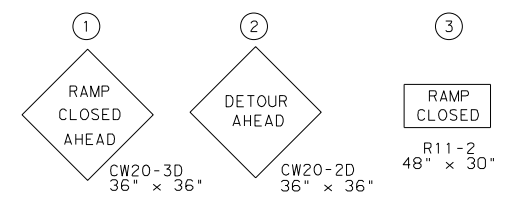
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	19	

DATE: 09/16/2024 03:31:08
FILE: \$PROJECTNAME

CK: DW: CK: DW:



- TYPE III BARRICADE
- GROUND MOUNTED SIGNS
- DETOUR ROUTE
- PCMS
- WORK AREA



Anusha Pokhrel
 ANUSHA POKHREL, P.E. DATE 9/6/2024



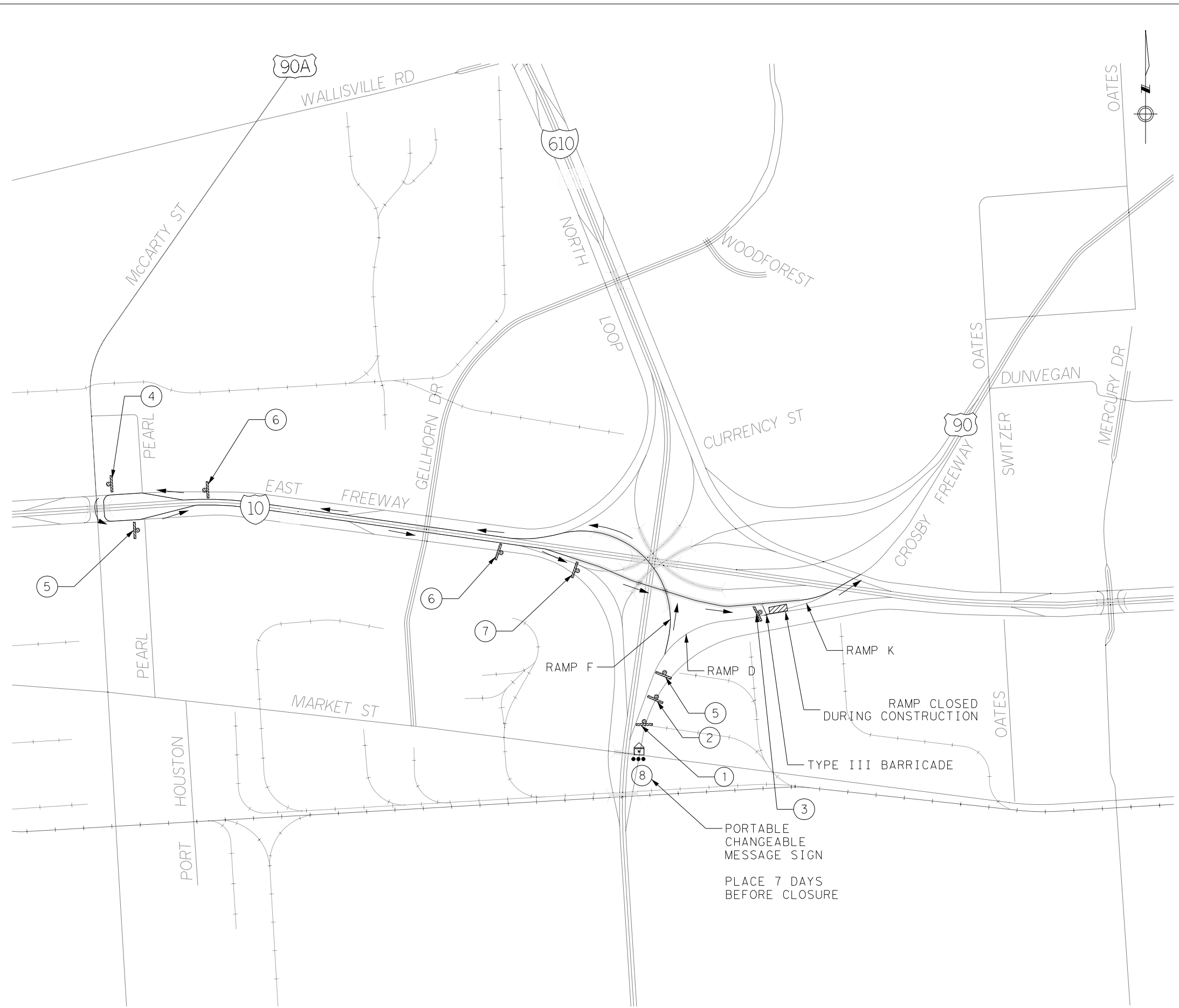
**IH 610
 PHASE 1
 STEP 1
 DETOUR PLAN**

TxDOT ©2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		20

DATE: \$DATES \$FILES \$TIMES \$FILES

CK: DW: CK: DW:



TYPE III BARRICADE
 GROUND MOUNTED SIGNS
 DETOUR ROUTE
 PCMS
 WORK AREA

1 RAMP CLOSED AHEAD
 CW20-3D 48" x 48"

2 DETOUR AHEAD
 CW20-2D 48" x 48"

3 RAMP CLOSED
 R11-2bT 48" x 30"

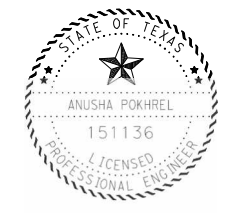
4 DETOUR EAST
 M4-8 30" x 15"
 M3-2 30" x 15"
 90 M1-4 24" x 24"
 M5-3T 21" x 15"

5 DETOUR EAST
 M4-8 30" x 15"
 M3-2 30" x 15"
 90 M1-4 24" x 24"
 M6-2 21" x 15"

6 DETOUR EAST
 M4-8 30" x 15"
 M3-2 30" x 15"
 90 M1-4 24" x 24"
 M6-2 21" x 15"

7 END DETOUR
 M4-8q 24" x 18"

8 US 90 EB CLOSED PHASE 1
 DATE XX PM - XX AM PHASE 2
 BEFORE CLOSURE
 US 90 EB CLOSED
 USE IH 10 WB
 DURING CLOSURE



9/6/2024
ANUSHA POKHREL, P.E. DATE

IH 610
PHASE 3
STEP 2
DETOUR PLAN

TXDOT ©2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		21

DATE: \$DATES
FILE: \$FILES

\$TIMES

TRAFFIC CONTROL PLAN NOTES AND PRINCIPAL OBJECTIVES

1. MINIMIZE IMPACT TO IH 610 TRAFFIC.
2. MAINTAIN ALL MOVEMENTS OR PROVIDE SHORT-TERM DETOURS WHEN APPLICABLE.
3. THE CONTRACTOR MAY COMBINE OR ALTER PHASING TO IMPROVE OPERATIONS BASED ON FIELD CONDITIONS UPON PROVIDING A SIGNED AND SEALED PLAN SHEETS TO BE APPROVED BY THE ENGINEER.
4. CONTRACTOR SHALL COORDINATE WITH THE ADJACENT PROJECT CONSTRUCTION, OR AS DIRECTED BY THE ENGINEER TO ELIMINATE OR MINIMIZE ANY CONFLICTS AND TO ENSURE SMOOTH TRANSITION OF TRAFFIC OPERATIONS DURING CONSTRUCTION.

PHASE 1 - REHABILITATE TRAVEL LANE AND RIGHT SHOULDER FROM STA 126+40.48 TO STA 127+10.48. CONSTRUCT TEMPORARY PAVEMENT STA 133+37.86 TO STA 134+05.22, STA 135+88.94 TO STA 141+01.24, STA 141+13.80 TO STA 141+62.43 AND STA 149+93.25 TO STA 159+80.33. CONSTRUCT AND WIDEN LEFT LANE AND SHOULDER FROM STA 124+96.94 TO STA 132+97.30

PHASE 2 - RECONSTRUCT AND WIDEN RIGHT LANE AND SHOULDER FROM STA 128+54.40 TO STA 159+44.52. CONSTRUCT TEMPORARY PAVEMENT FROM STA 132+71.96 TO STA 136+39.36 AND STA 139+34.89 TO STA 155+04.38

PHASE 3 - RECONSTRUCT AND WIDEN LEFT LANES AND SHOULDER FROM STA 133+15.77 TO STA 152+23.63.

INITIAL TASKS

PRINCIPAL OBJECTIVE - PREPARE R.O.W.

TRAFFIC:

1. INSTALL ADVANCED WARNING SIGNS, CHANNELIZING DEVICES AND BARRICADES IN ACCORDANCE WITH TXDOT BARRICADE AND CONSTRUCTION STANDARD (BC) AS SHOWN IN THE TRAFFIC CONTROL PLAN STANDARD.
2. INSTALL SWP3 DEVICES AS SHOWN IN THE PLANS, ENGINEERING, AND CONSTRUCTION STANDARD DETAIL AND AS DIRECTED BY THE ENGINEER PRIOR TO BEGINNING ANY WORK.

PHASE 1

PRINCIPAL OBJECTIVE - REHABILITATE TRAVEL LANE AND RIGHT SHOULDER FROM STA 126+40.48 TO STA 127+10.48. CONSTRUCT TEMPORARY PAVEMENT STA 133+37.86 TO STA 134+05.22, STA 135+88.94 TO STA 141+01.24, FROM STA 141+13.80 TO STA 141+62.43 AND STA 149+93.25 TO STA 159+80.33.

STEP 1

TRAFFIC:

1. DIRECT CONNECTOR FOR RAMP D WILL BE TEMPORARILY CLOSED FOR WEEKEND OR NIGHT WORK.

CONSTRUCTION:

1. USE FAST TRACK CONCRETE TO REHABILITATE TRAVEL LANE AND RIGHT SHOULDER FROM STA 126+40.48 TO STA 127+10.48.
2. CONSTRUCT TEMPORARY PAVEMENT FROM STA 133+37.86 TO STA 134+05.22, 135+88.94 TO STA 141.01.24, STA 141+13.80 TO STA 141+62.43 AND STA 149+93.25 TO STA 159+80.33

STEP 2

TRAFFIC:

1. TRAFFIC WILL BE TEMPORARILY REDUCED TO 11 FEET LANES.

CONSTRUCTION:

1. RECONSTRUCT AND WIDEN LEFT LANE AND SHOULDER FROM STA 124+96.94 TO STA 132+97.30.

PHASE 2

PRINCIPAL OBJECTIVE -RECONSTRUCT AND WIDEN RIGHT LANE AND SHOULDER FROM STA 128+54.40 TO STA 159+44.52. CONSTRUCT TEMPORARY PAVEMENT FROM STA 132+71.96 TO STA 136+39.36 AND STA 139+34.89 TO STA 155+04.38

STEP 1

TRAFFIC:

1. TRAFFIC WILL BE TEMPORARILY REDUCED TO 11 FEET LANES.

CONSTRUCTION:

1. RECONSTRUCT AND WIDEN RIGHT LANE AND SHOULDER FROM STA 128+54.40 TO STA 159+44.52.
2. CONSTRUCT TEMPORARY PAVEMENT FROM STA 132+71.96 TO STA 136+39.36 AND STA 139+34.89 TO STA 155+04.38

PHASE 3

PRINCIPAL OBJECTIVE - RECONSTRUCT AND WIDEN LEFT LANES AND SHOULDER FROM STA 133+15.77 TO STA 152+23.63.

STEP 1

TRAFFIC:

1. TRAFFIC WILL BE TEMPORARILY REDUCED TO 11 FEET LANES.

CONSTRUCTION:

1. RECONSTRUCT AND WIDEN LEFT LANES AND SHOULDER FROM STA 133+15.77 TO STA 139+04.05 AND FROM STA 140+46.75 TO STA 152+23.63.

STEP 2

TRAFFIC:

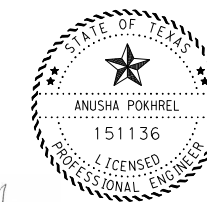
1. TRAFFIC WILL BE TEMPORARILY REDUCED TO 11 FEET LANES. DIRECT CONNECTOR FOR RAMP K WILL BE TEMPORARILY CLOSED FOR WEEKEND OR NIGHT WORK.

CONSTRUCTION:

1. USE FAST TRACK CONCRETE TO RECONSTRUCT AND WIDEN LEFT LANE AND SHOULDER FROM STA 139+02.46 TO STA 140+46.75.

NOTES:

1. CONTRACTOR SHALL STAGE CONSTRUCTION OPERATIONS TO MINIMIZE THE DISTURBED AREAS.
2. AREAS LEFT UNDISTURBED FOR TWO WEEKS OR MORE SHALL HAVE TEMPORARY OR PERMANENT SEEDING / SODDING AS DIRECTED BY THE ENGINEER.
3. FOR DRUM & SIGN SPACING SEE TRAFFIC CONTROL STANDARDS.
4. COVER EXISTING SIGN IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.
5. SEE BC(2) STANDARD FOR PROJECT LIMITS AND ADVANCE WARNING SIGN PLACEMENT.
6. FOR ANY ADDITIONAL SIGNS & BARRICADES NOT SHOWN IN THE PLANS OR REQUESTED BY THE ENGINEER REFER TO STANDARD SHEETS, THESE SIGNS AND BARRICADES SHALL BE SUBSIDIARY TO ITEM 502.



Anusha Pokhrel
00

ANUSHA POKHREL, P.E. 9/6/2024
DATE



IH 610

**TCP
PHASING
NARRATIVE**

TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	22	

DATE: \$DATE\$
FILE: \$FILES\$

CK: \$CK\$
DW: \$DW\$

CK: DW: CK: DW:

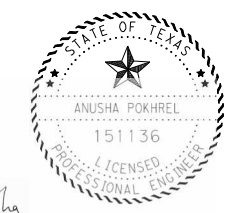
LEGEND

SYMBOL	DESCRIPTION
•••	PRECAST SINGLE SLOPE CONCRETE BARRIER (PSSCB) DRUMS
— — —	TYPE III BARRICADE
⊠	CONSTRUCTION SIGN
⊠	CRASH CUSHION ATTENUATOR (CCA)
⊠	TRAILER MOUNTED FLASHING ARROW PANEL
⊠	PORTABLE CHANGEABLE MESSAGE SIGN
→	DIRECTION OF TRAFFIC FLOW (EXISTING)
→	DIRECTION OF TRAFFIC FLOW (PROPOSED)
▨	PERMANENT CONSTRUCTION THIS PHASE
▨	PAVEMENT COMPLETED IN PREVIOUS PHASE (S)
⋯	SHOULDER REHAB
▨	TEMPORARY PAVEMENT

PAVEMENT MARKERS

ⓐ	WRK ZN PAV MRK REMOVE (W) (4") (SLD)	ⓔ	WRK ZN PAV MRK REMOVE (Y) (4") (SLD)
ⓓ	WRK ZN PAV MRK REMOVE (W) (8") (SLD)	ⓕ	WRK ZN PAV MRK REMOVE (W) (12") (SLD)

- NOTES:**
- ADVANCE WARNING SIGNS SHALL REMAIN IN PLACE FOR THE SPECIFIED CONSTRUCTION. CONTRACTOR MUST COORDINATE TCP SIGNS WITH ADJACENT PROJECT CONSTRUCTION.
 - CONTRACTOR SHALL MAINTAIN CONTINUOUS FLOW BETWEEN EXISTING AND PROPOSED DRAINAGE AT ALL TIMES. PROPER MEASURES MUST BE TAKEN TO ENSURE THAT FLOW DOES NOT CAUSE EROSION AROUND CULVERT INSTALLATION. DEWATERING MEASURES MUST BE DONE IMMEDIATELY IF WATER FILLS ANY TRENCH OR EXCAVATION AREA.
 - TEMPORARY RELOCATION & INSTALLATION OF ROADSIDE SIGNS FOR TRAFFIC CONTROL DURING CONSTRUCTION WILL NOT BE PAID DIRECTLY, BUT WILL BE SUBSIDIARY TO VARIOUS PAY ITEMS.
 - SAW CUTTING IS NOT PAID FOR DIRECTLY, BUT SUBSIDIARY TO VARIOUS PAVEMENT ITEMS.



ANUSHA POKHREL, P.E. 9/6/2024 DATE

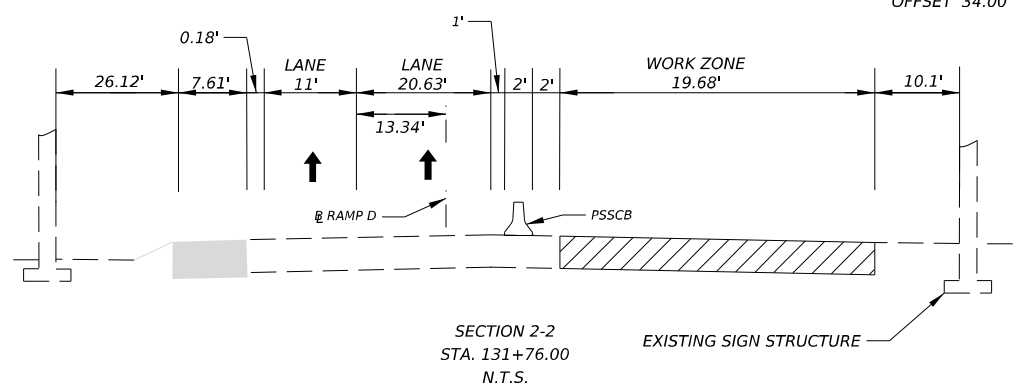
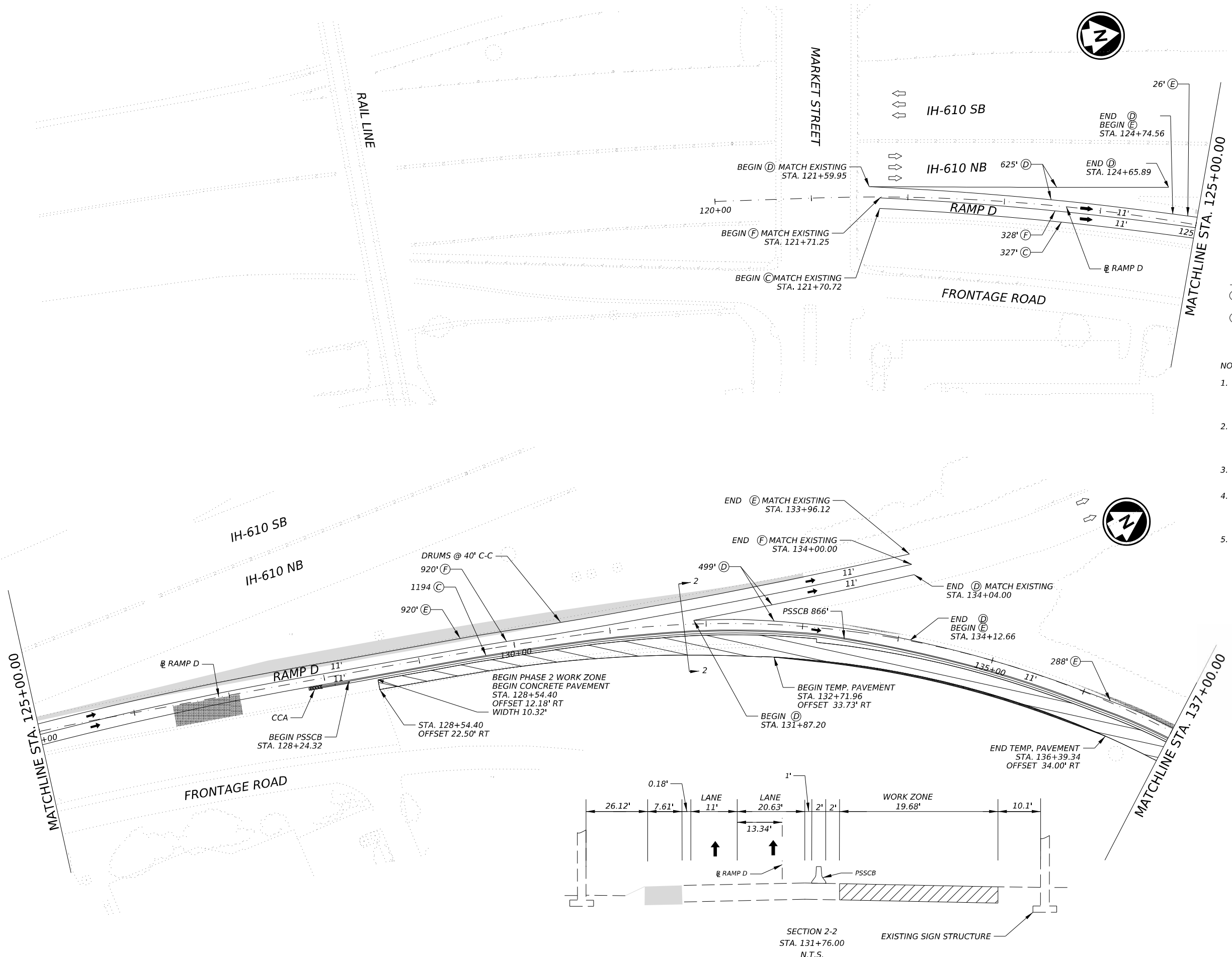


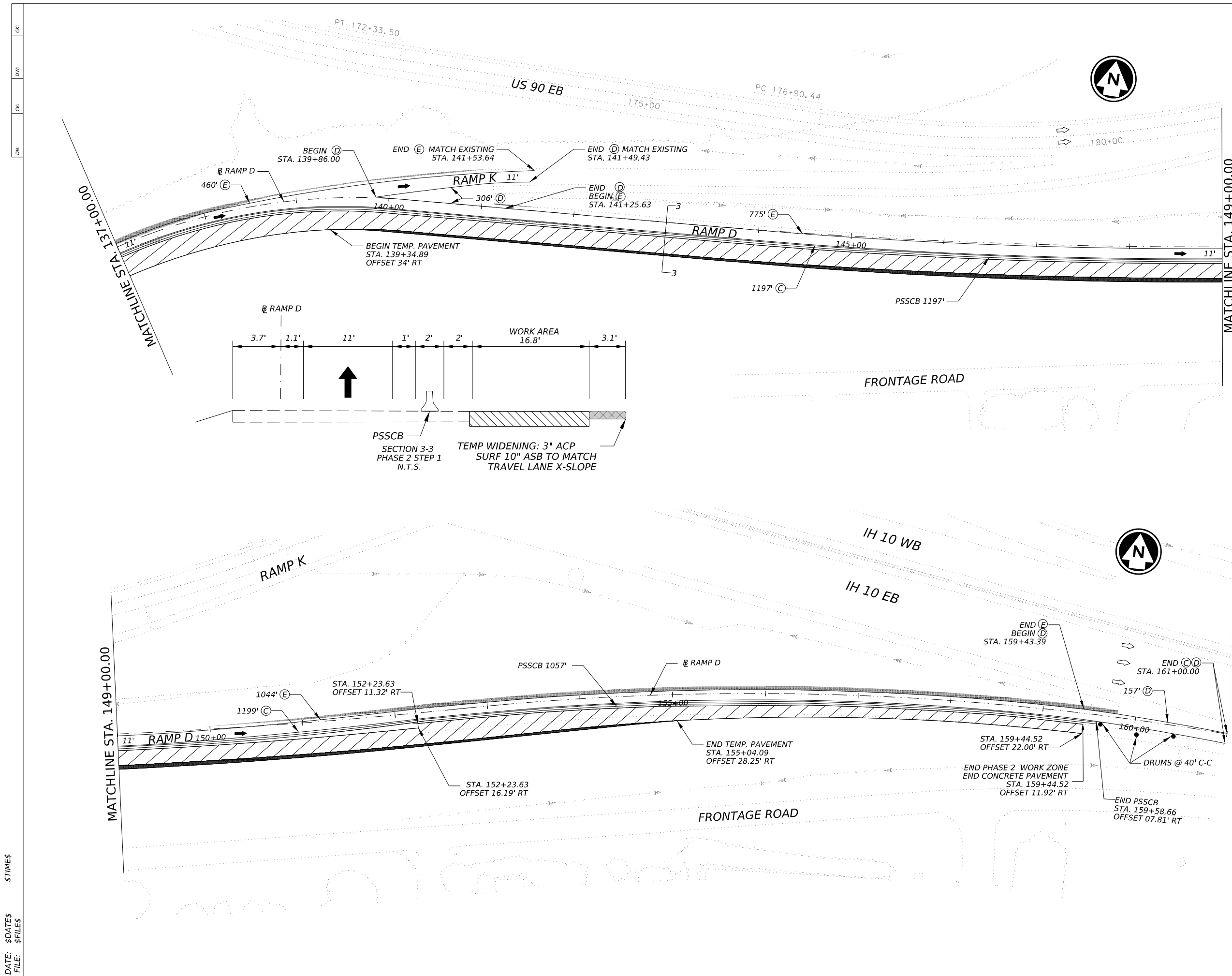
IH 610 TRAFFIC CONTROL PLAN PHASE 2

© TxDOT © 2024 SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	24	

DATE: \$DATE\$ FILE: \$FILE\$





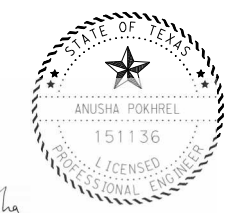
LEGEND

SYMBOL	DESCRIPTION
•••	PRECAST SINGLE SLOPE CONCRETE BARRIER (PSSCB) DRUMS
— —	TYPE III BARRICADE
⬇	CONSTRUCTION SIGN
▬▬▬	CRASH CUSHION ATTENUATOR (CCA)
⬆	TRAILER MOUNTED FLASHING ARROW PANEL
Ⓜ	PORTABLE CHANGEABLE MESSAGE SIGN
←	DIRECTION OF TRAFFIC FLOW (EXISTING)
←	DIRECTION OF TRAFFIC FLOW (PROPOSED)
▨	PERMANENT CONSTRUCTION THIS PHASE
▩	PAVEMENT COMPLETED IN PREVIOUS PHASE (S)
⋯	SHOULDER REHAB
▧	TEMPORARY PAVEMENT

PAVEMENT MARKERS

Ⓒ	WRK ZN PAV MRK REMOV (W) (4") (SLD)	Ⓔ	WRK ZN PAV MRK REMOV (Y) (4") (SLD)
Ⓓ	WRK ZN PAV MRK REMOV (W) (8") (SLD)	Ⓕ	WRK ZN PAV MRK REMOV (W) (12") (SLD)

- NOTES:**
- ADVANCE WARNING SIGNS SHALL REMAIN IN PLACE FOR THE SPECIFIED CONSTRUCTION. CONTRACTOR MUST COORDINATE TCP SIGNS WITH ADJACENT PROJECT CONSTRUCTION.
 - CONTRACTOR SHALL MAINTAIN CONTINUOUS FLOW BETWEEN EXISTING AND PROPOSED DRAINAGE AT ALL TIMES. PROPER MEASURES MUST BE TAKEN TO ENSURE THAT FLOW DOES NOT CAUSE EROSION AROUND CULVERT INSTALLATION. DEWATERING MEASURES MUST BE DONE IMMEDIATELY IF WATER FILLS ANY TRENCH OR EXCAVATION AREA.
 - TEMPORARY RELOCATION & INSTALLATION OF ROADSIDE SIGNS FOR TRAFFIC CONTROL DURING CONSTRUCTION WILL NOT BE PAID DIRECTLY, BUT WILL BE SUBSIDIARY TO VARIOUS PAY ITEMS.
 - SAW CUTTING IS NOT PAID FOR DIRECTLY, BUT SUBSIDIARY TO VARIOUS PAVEMENT ITEMS.



ANUSHA POKHREL, P.E. DATE 9/6/2024

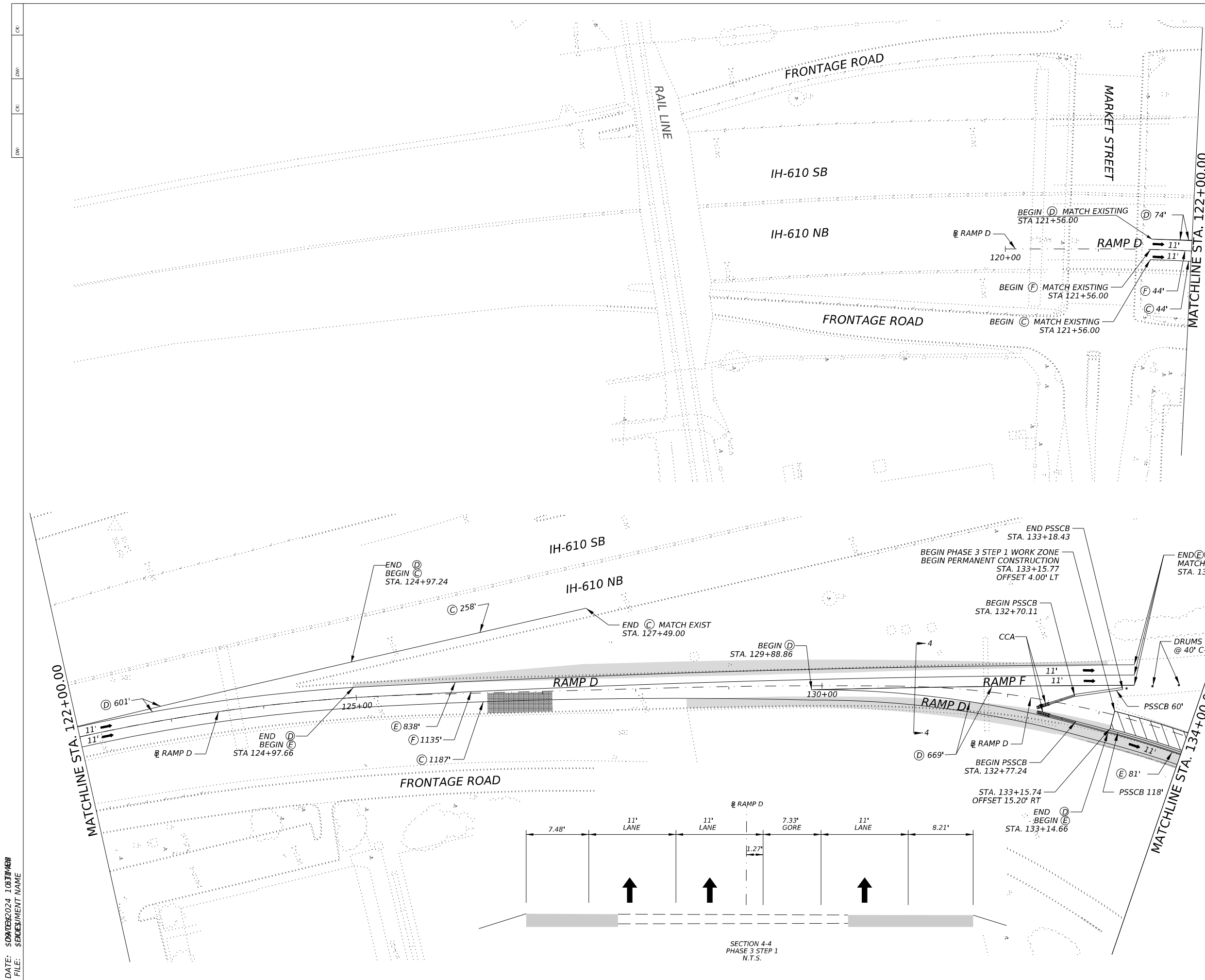


IH 610 TRAFFIC CONTROL PLAN PHASE 2

©TxDOT ©2024 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	25	

DATE: \$DATE\$ FILE: \$FILE\$



LEGEND

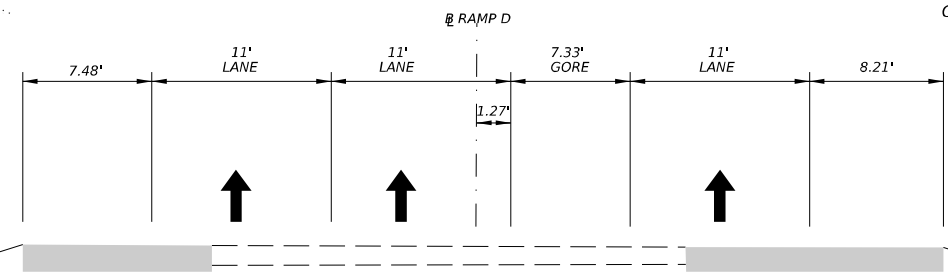
- | SYMBOL | DESCRIPTION |
|--------|---|
| | PRECAST SINGLE SLOPE CONCRETE BARRIER (PSSCB) |
| | DRUMS |
| | TYPE III BARRICADE |
| | CONSTRUCTION SIGN |
| | CRASH CUSHION ATTENUATOR (CCA) |
| | TRAILER MOUNTED FLASHING ARROW PANEL |
| | PORTABLE CHANGEABLE MESSAGE SIGN |
| | DIRECTION OF TRAFFIC FLOW (EXISTING) |
| | DIRECTION OF TRAFFIC FLOW (PROPOSED) |
| | PERMANENT CONSTRUCTION THIS PHASE |
| | PAVEMENT COMPLETED IN PREVIOUS PHASE (S) |
| | SHOULDER REHAB |
| | TEMPORARY PAVEMENT |

- PAVEMENT MARKERS**
- | | | | |
|--|-------------------------------------|--|--------------------------------------|
| | WRK ZN PAV MKR REMOV (W) (4") (SLD) | | WRK ZN PAV MKR REMOV (Y) (4") (SLD) |
| | WRK ZN PAV MKR REMOV (W) (8") (SLD) | | WRK ZN PAV MKR REMOV (W) (12") (SLD) |

- NOTES:**
- ADVANCE WARNING SIGNS SHALL REMAIN IN PLACE FOR THE SPECIFIED CONSTRUCTION. CONTRACTOR MUST COORDINATE TCP SIGNS WITH ADJACENT PROJECT CONSTRUCTION.
 - CONTRACTOR SHALL MAINTAIN CONTINUOUS FLOW BETWEEN EXISTING AND PROPOSED DRAINAGE AT ALL TIMES. PROPER MEASURES MUST BE TAKEN TO ENSURE THAT FLOW DOES NOT CAUSE EROSION AROUND CULVERT INSTALLATION.
 - DEWATERING MEASURES MUST BE DONE IMMEDIATELY IF WATER FILLS ANY TRENCH OR EXCAVATION AREA. TEMPORARY RELOCATION & INSTALLATION OF ROADSIDE SIGNS FOR TRAFFIC CONTROL DURING CONSTRUCTION WILL NOT BE PAID DIRECTLY, BUT WILL BE SUBSIDIARY TO VARIOUS PAY ITEMS.
 - SAW CUTTING IS NOT PAID FOR DIRECTLY, BUT SUBSIDIARY TO VARIOUS PAVEMENT ITEMS.



ANUSHA POKHREL, P.E. DATE 9/6/2024



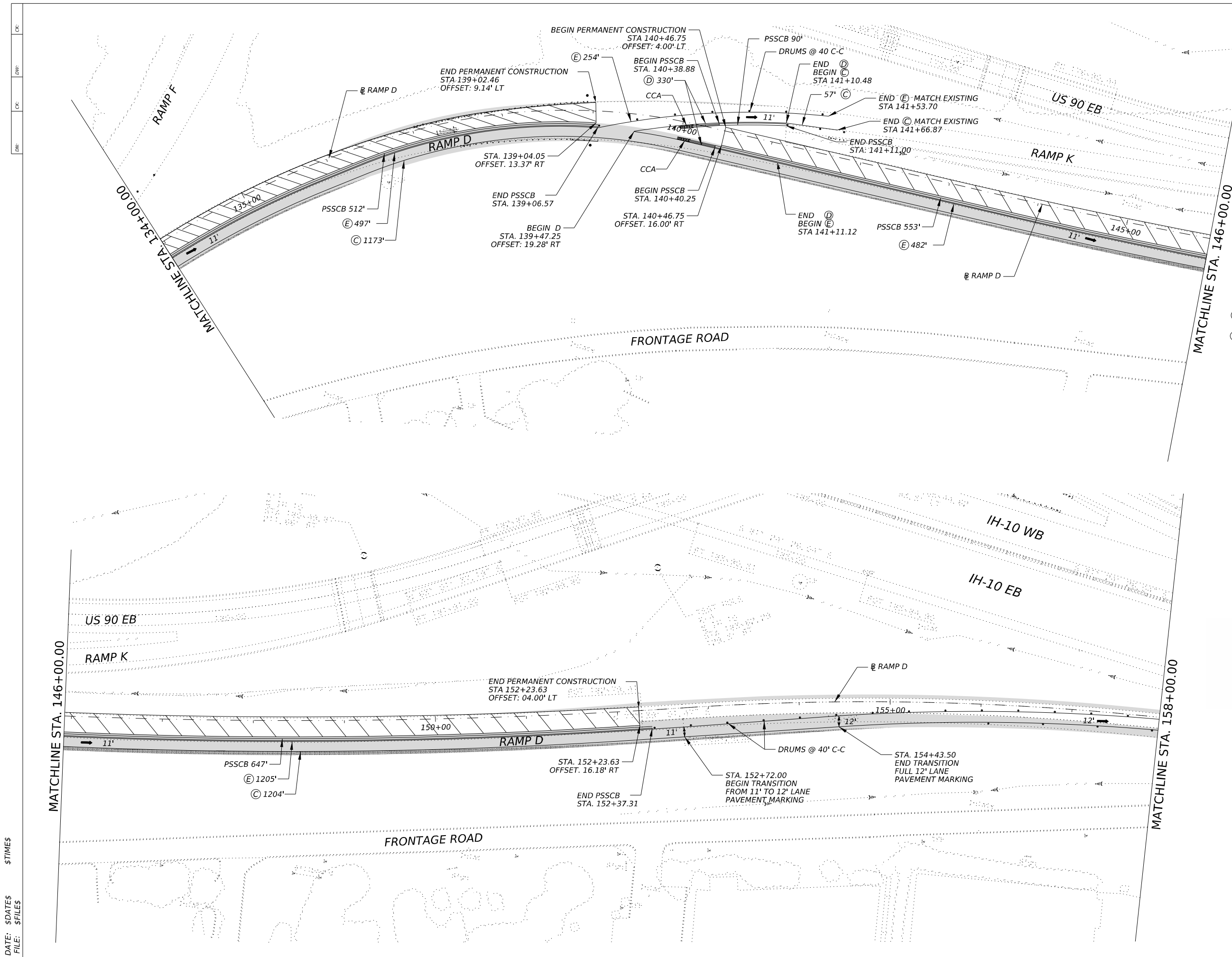
DATE: 09/06/2024 10:31 AM
FILE: \$PROJECTNAME



IH 610 TRAFFIC CONTROL PLAN PHASE 3 STEP 1

CONT		JOB		HIGHWAY	
0271	15	099		IH 610	
DIST		COUNTY		SHEET NO.	
HOU		HARRIS		26	

© TxDOT © 2024 SHEET 1 OF 3



LEGEND

SYMBOL	DESCRIPTION
	PRECAST SINGLE SLOPE CONCRETE BARRIER (PSSCB)
	DRUMS
	TYPE III BARRICADE
	CONSTRUCTION SIGN
	CRASH CUSHION ATTENUATOR (CCA)
	TRAILER MOUNTED FLASHING ARROW PANEL
	PORTABLE CHANGEABLE MESSAGE SIGN
	DIRECTION OF TRAFFIC FLOW (EXISTING)
	DIRECTION OF TRAFFIC FLOW (PROPOSED)
	PERMANENT CONSTRUCTION THIS PHASE
	PAVEMENT COMPLETED IN PREVIOUS PHASE (S)
	SHOULDER REHAB
	TEMPORARY PAVEMENT

PAVEMENT MARKERS

	WRK ZN PAV MRK REMOV (W) (4") (SLD)		WRK ZN PAV MRK REMOV (Y) (4") (SLD)
	WRK ZN PAV MRK REMOV (W) (8") (SLD)		WRK ZN PAV MRK REMOV (W) (12") (SLD)



Anusha Pokhrel
P.E.

ANUSHA POKHREL, P.E. 9/6/2024 DATE



**IH 610
TRAFFIC CONTROL PLAN
PHASE 3 STEP 1**

© TxDOT © 2024		SHEET 2 OF 3	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	27	

DATE: \$DATE\$
FILE: \$FILES\$

\$TIMES

CK:
DW:
CK:
DW:

LEGEND

SYMBOL	DESCRIPTION
	PRECAST SINGLE SLOPE CONCRETE BARRIER (PSSCB)
	DRUMS
	TYPE III BARRICADE
	CONSTRUCTION SIGN
	CRASH CUSHION ATTENUATOR (CCA)
	TRAILER MOUNTED FLASHING ARROW PANEL
	PORTABLE CHANGEABLE MESSAGE SIGN
	DIRECTION OF TRAFFIC FLOW (EXISTING)
	DIRECTION OF TRAFFIC FLOW (PROPOSED)
	PERMANENT CONSTRUCTION THIS PHASE
	PAVEMENT COMPLETED IN PREVIOUS PHASE (S)
	SHOULDER REHAB
	TEMPORARY PAVEMENT

PAVEMENT MARKERS

NOTES:

- ADVANCE WARNING SIGNS SHALL REMAIN IN PLACE FOR THE SPECIFIED CONSTRUCTION. CONTRACTOR MUST COORDINATE TCP SIGNS WITH ADJACENT PROJECT CONSTRUCTION.
- CONTRACTOR SHALL MAINTAIN CONTINUOUS FLOW BETWEEN EXISTING AND PROPOSED DRAINAGE AT ALL TIMES. PROPER MEASURES MUST BE TAKEN TO ENSURE THAT FLOW DOES NOT CAUSE EROSION AROUND CULVERT INSTALLATION.
- DEWATERING MEASURES MUST BE DONE IMMEDIATELY IF WATER FILLS ANY TRENCH OR EXCAVATION AREA.
- TEMPORARY RELOCATION & INSTALLATION OF ROADSIDE SIGNS FOR TRAFFIC CONTROL DURING CONSTRUCTION WILL NOT BE PAID DIRECTLY, BUT WILL BE SUBSIDIARY TO VARIOUS PAY ITEMS.
- SAW CUTTING IS NOT PAID FOR DIRECTLY, BUT SUBSIDIARY TO VARIOUS PAVEMENT ITEMS.



Anusha Pokhrel
P.E.

ANUSHA POKHREL, P.E. 9/6/2024
DATE

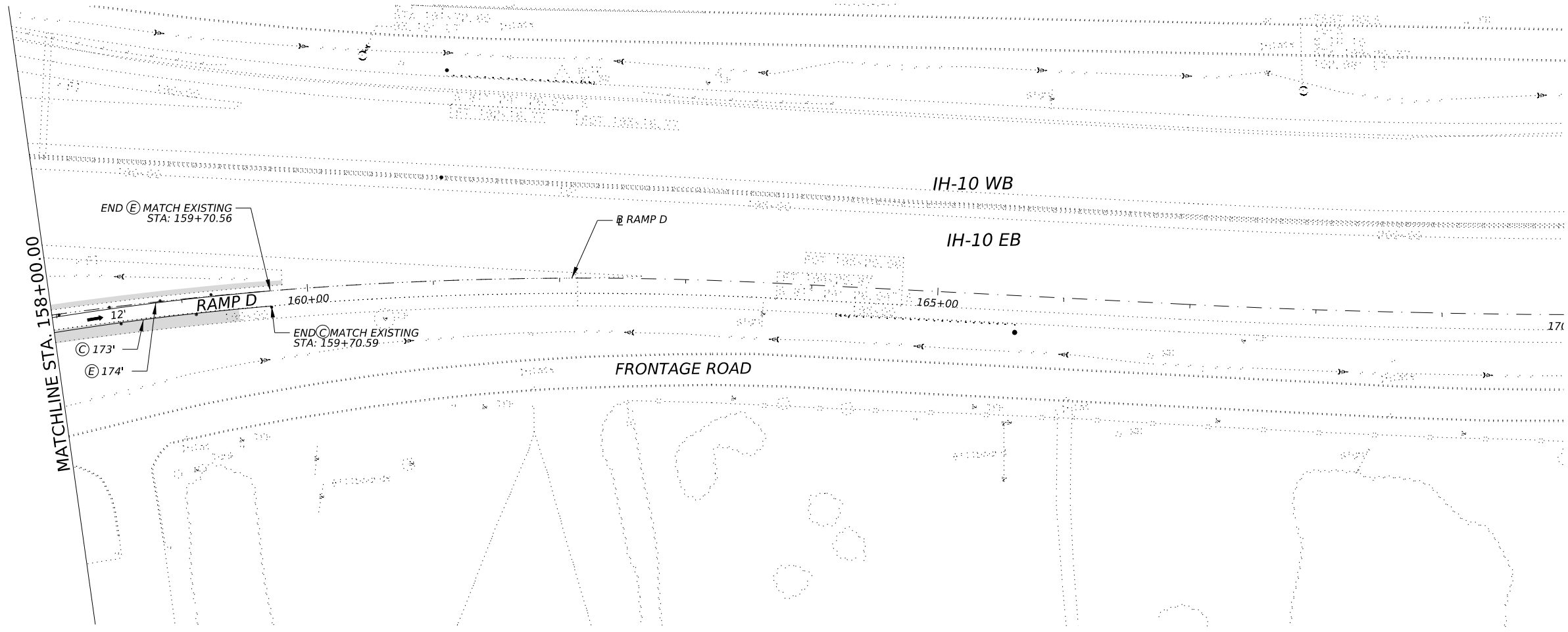


**IH 610
TRAFFIC CONTROL PLAN
PHASE 3 STEP 1**

© TxDOT © 2024 SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	28	

DATE: 09/06/2024 11:57:43 AM
FILE: \$PROJECT\$ \ T.M.T.



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.

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.

DATE:
FILE:

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).

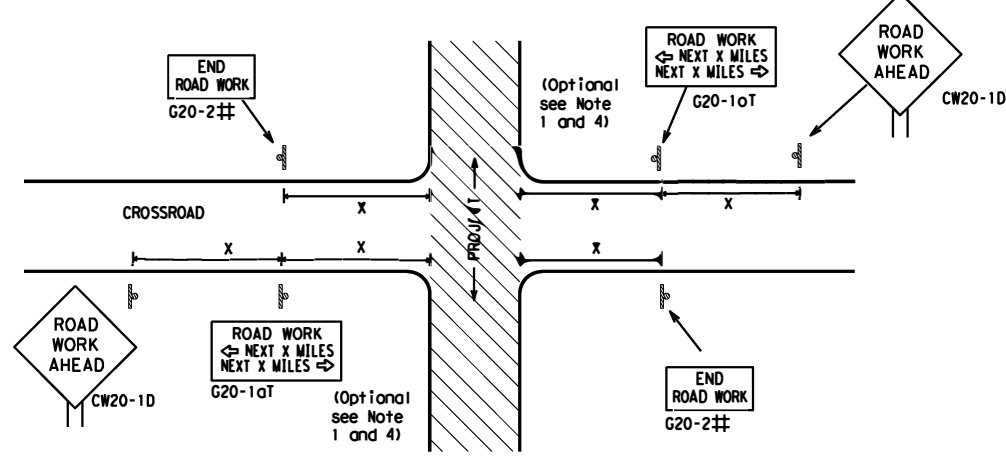
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS) "
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS 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	DW:	TxDOT
© TxDOT	November 2002	CONT:	0271
		SECT:	15
		JOB:	099
		HIGHWAY:	IH 610
REVISIONS		DIST:	
4-03	7-13	COUNTY:	
9-07	8-14	SHEET NO.:	29
5-10	5-21	HOU:	HARRIS

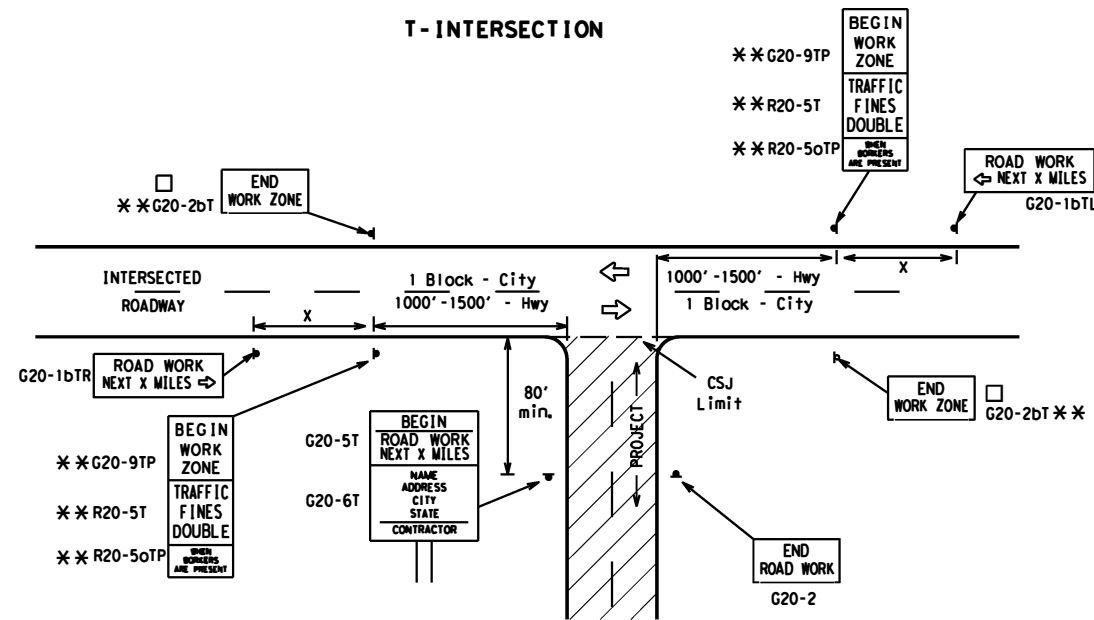
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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)
- 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.
 - 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.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

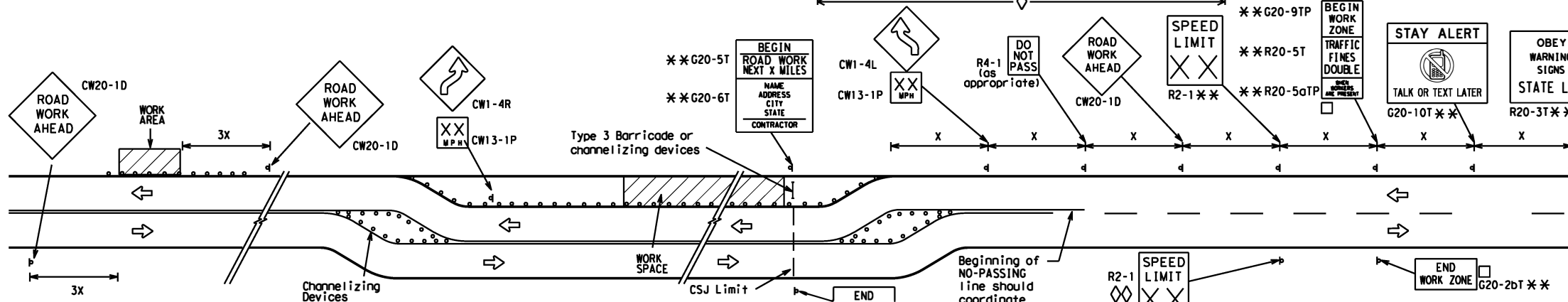
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

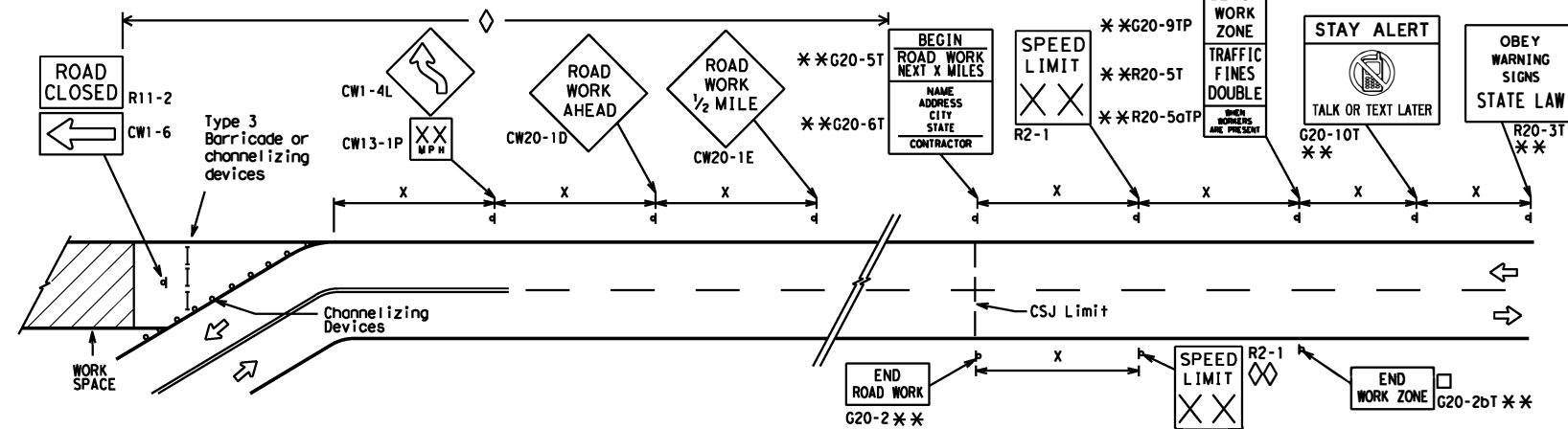
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

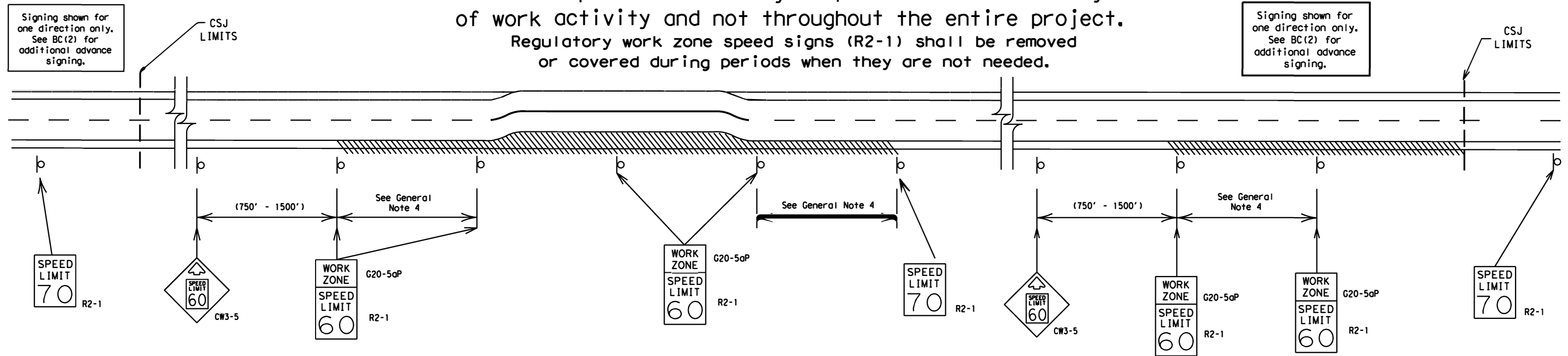
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	30	

DATE: FILE:

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

SHEET 3 OF 12



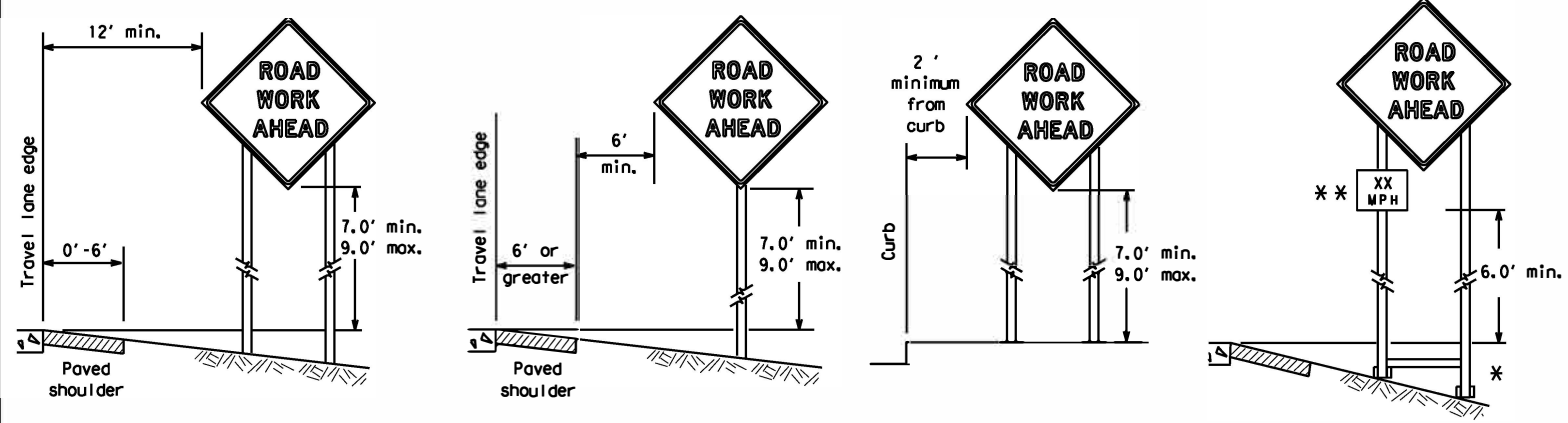
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0271	15	099	IH 610
9-07	8-14	DIST	COUNTY	SHEET NO.	
7-13	5-21	HOU	HARRIS	31	

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.

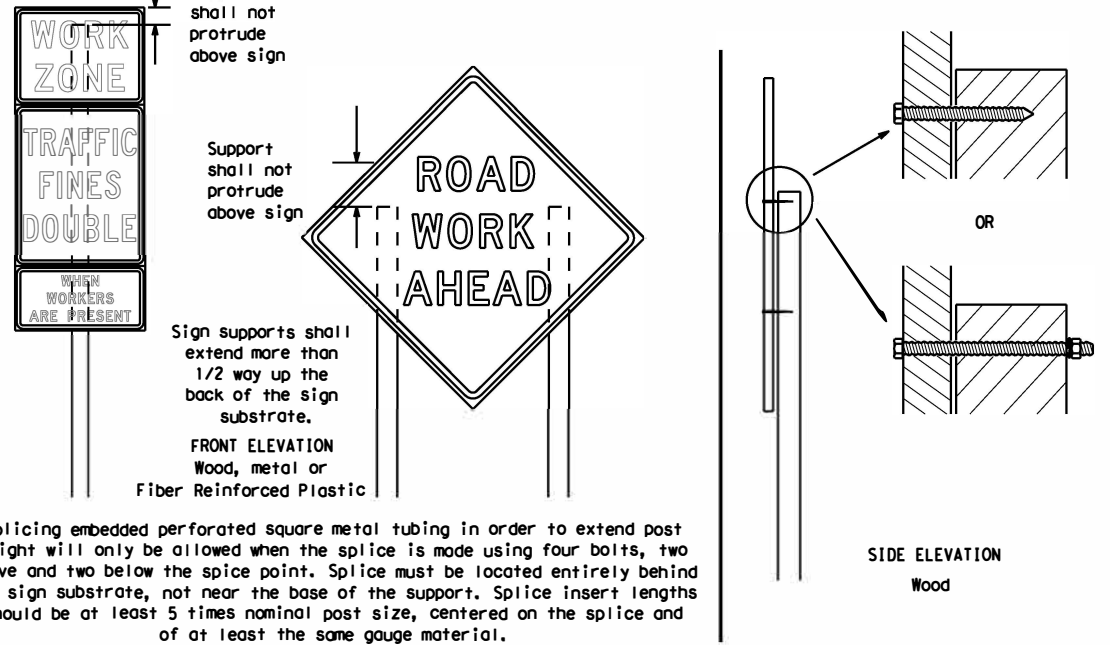
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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



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 splice 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.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

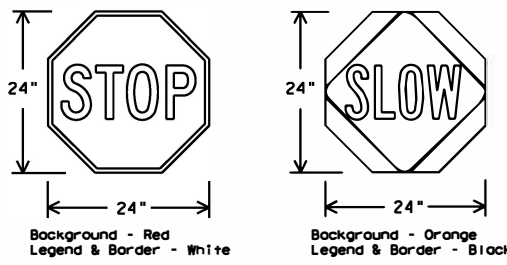
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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.



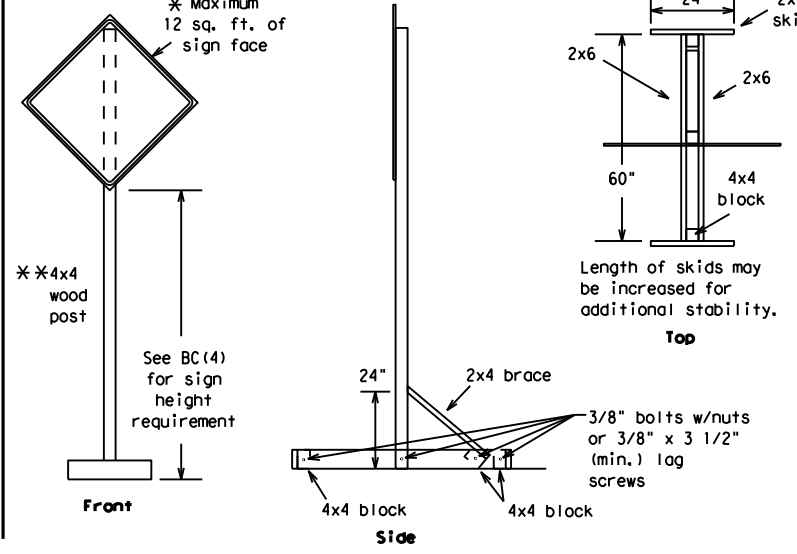
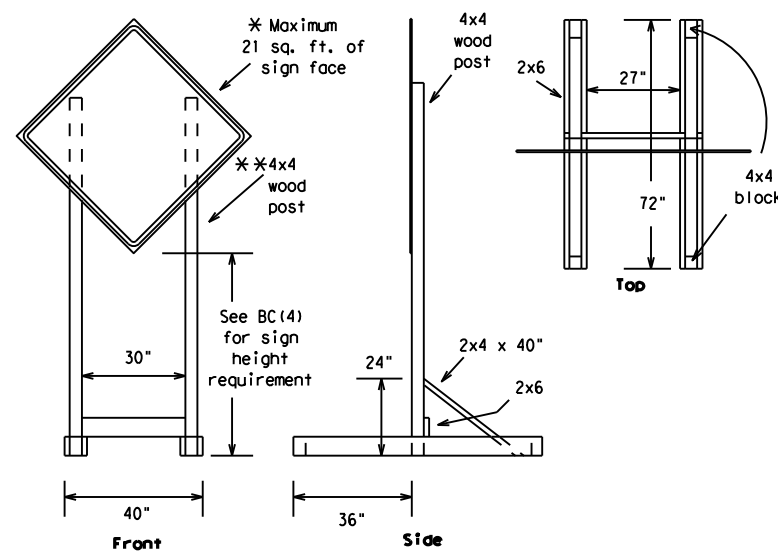
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	32	

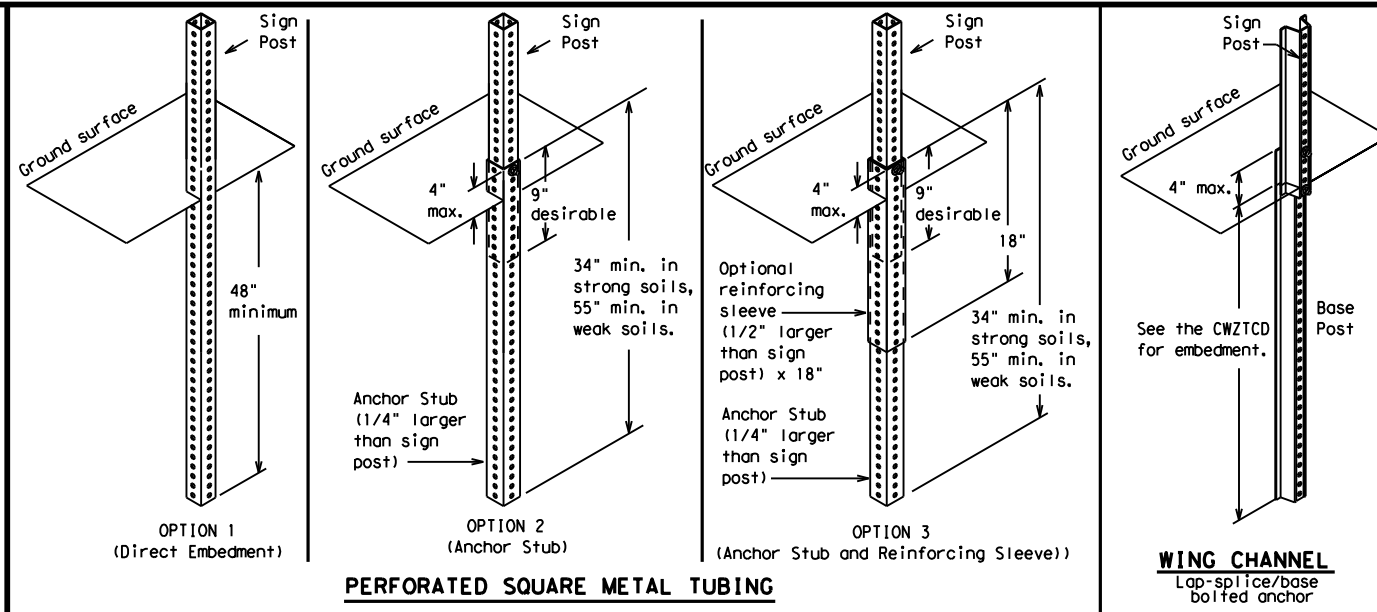
DATE: FILE:

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.



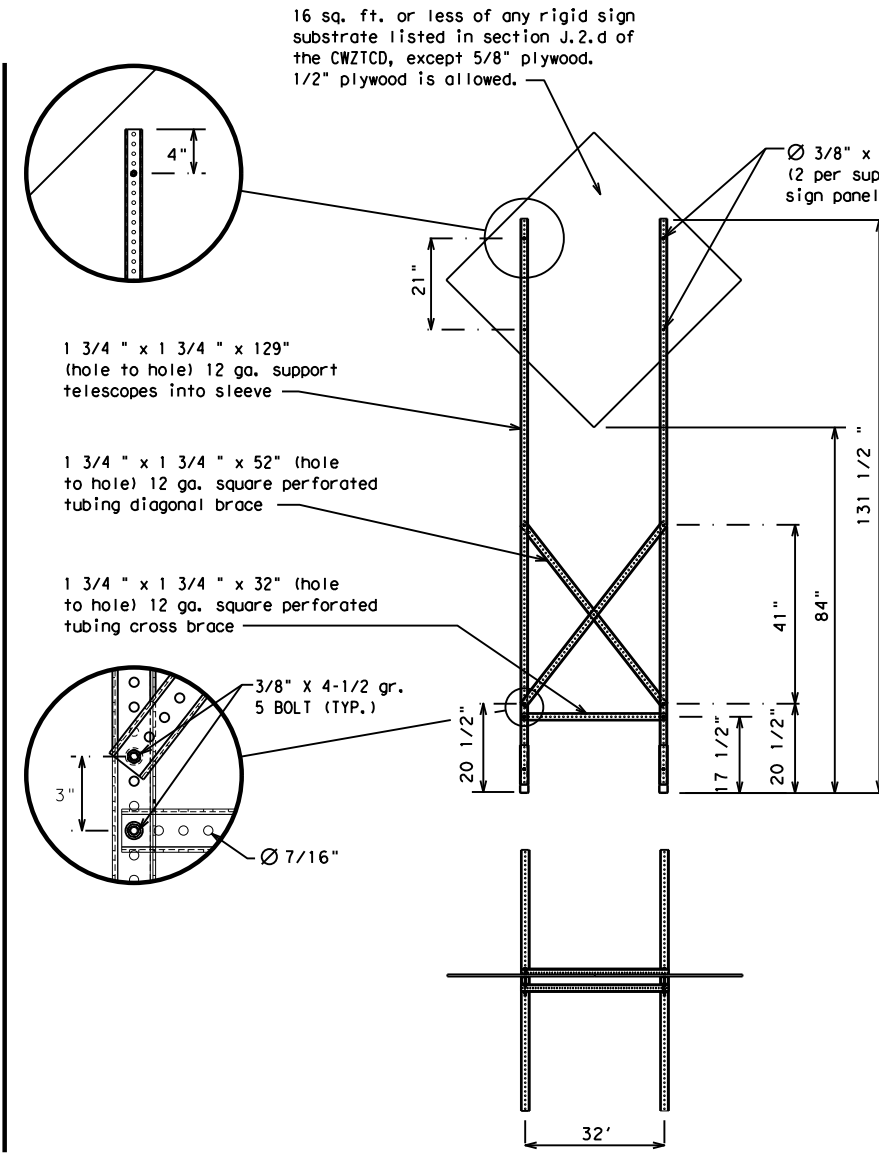
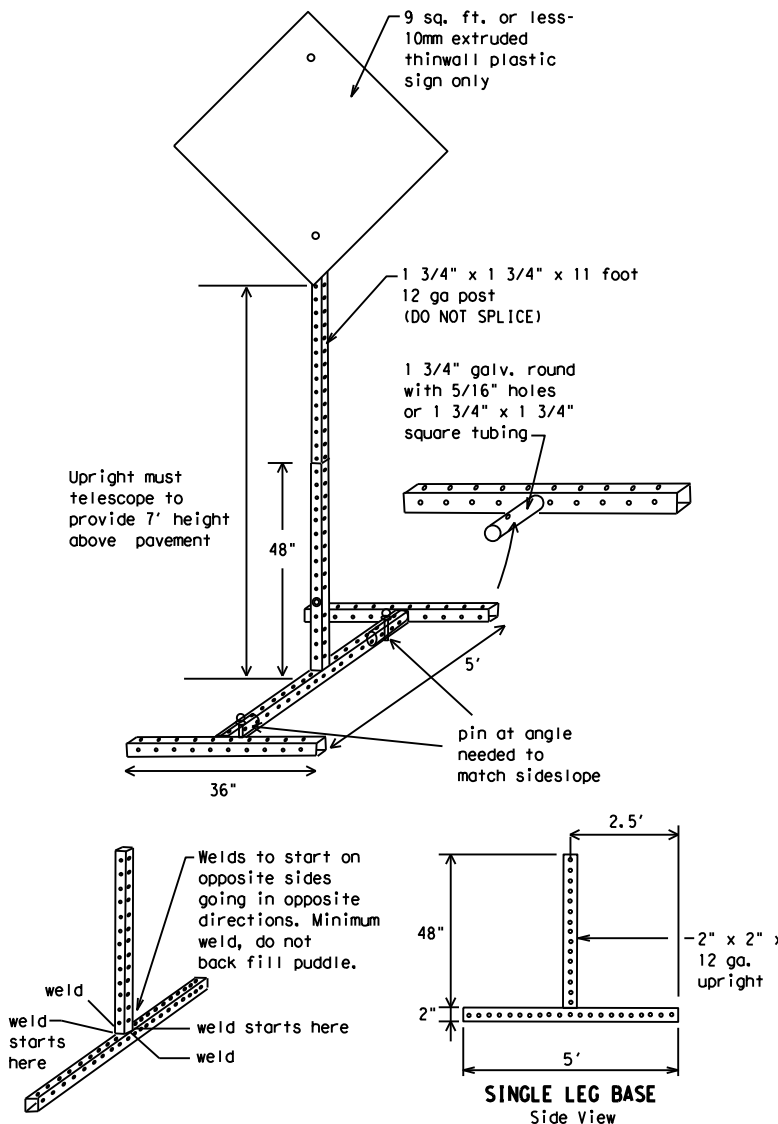
SKID MOUNTED WOOD SIGN SUPPORTS

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



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

- 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.
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- 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



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	33	

DATE: FILE:

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

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.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI
ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT
ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX 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.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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.

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

- 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.
- 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.
- 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.
- 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.

WORDING ALTERNATIVES

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

SHEET 6 OF 12



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

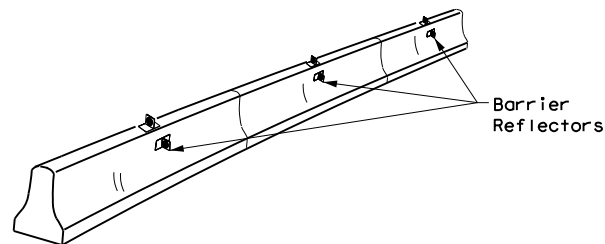
BC (6) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	34	

DATE: FILE:

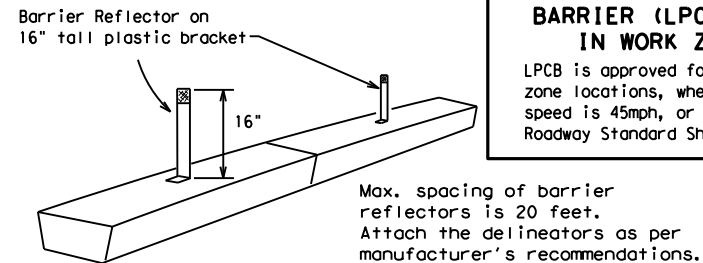
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

- 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).
- 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)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

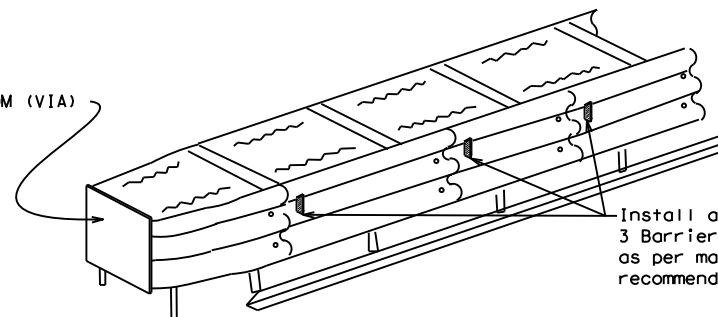


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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)

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



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 appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

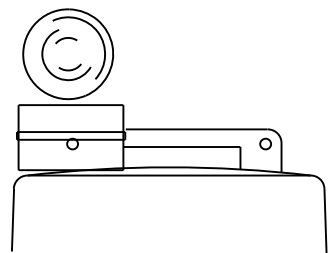
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

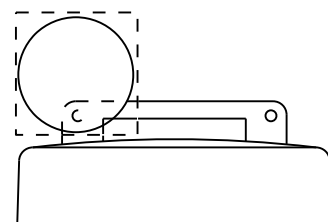
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

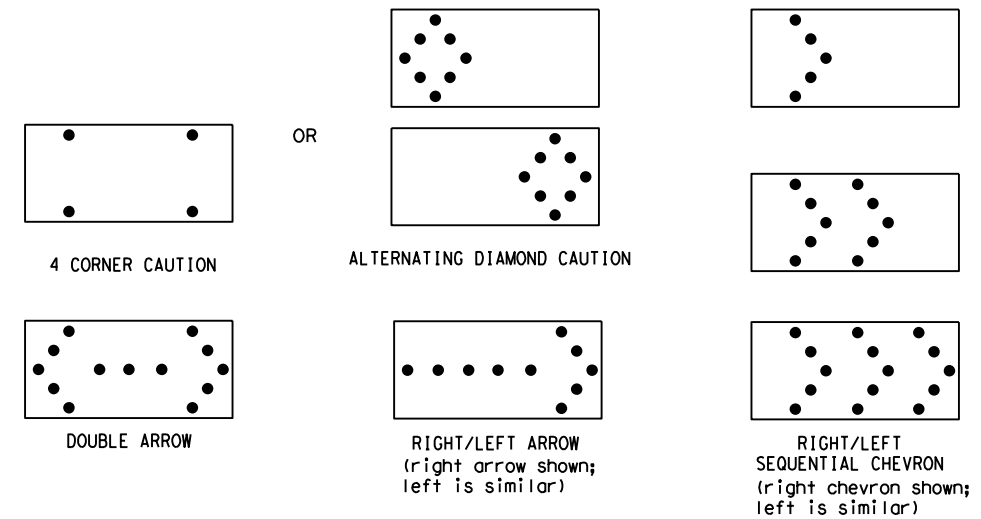


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

DATE:
FILE:

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.



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

BC (7) -21

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0271	15	099	IH 610				
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	HOU	HARRIS		35				

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 incorrect results or damages resulting from its use.

DATE: FILE:

GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

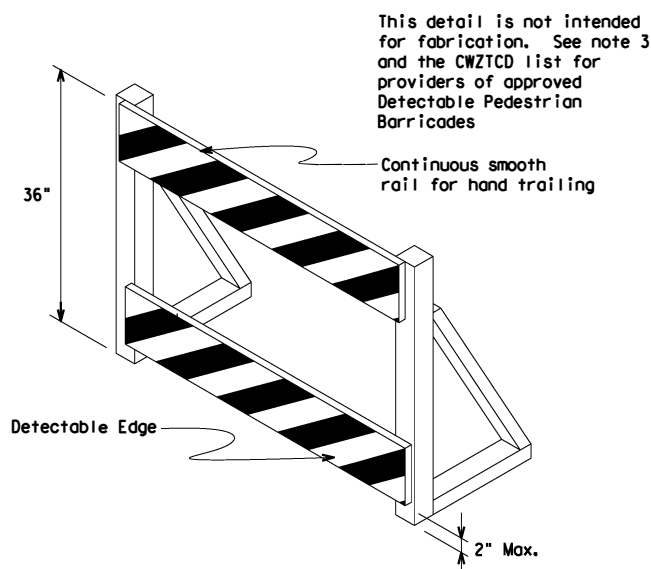
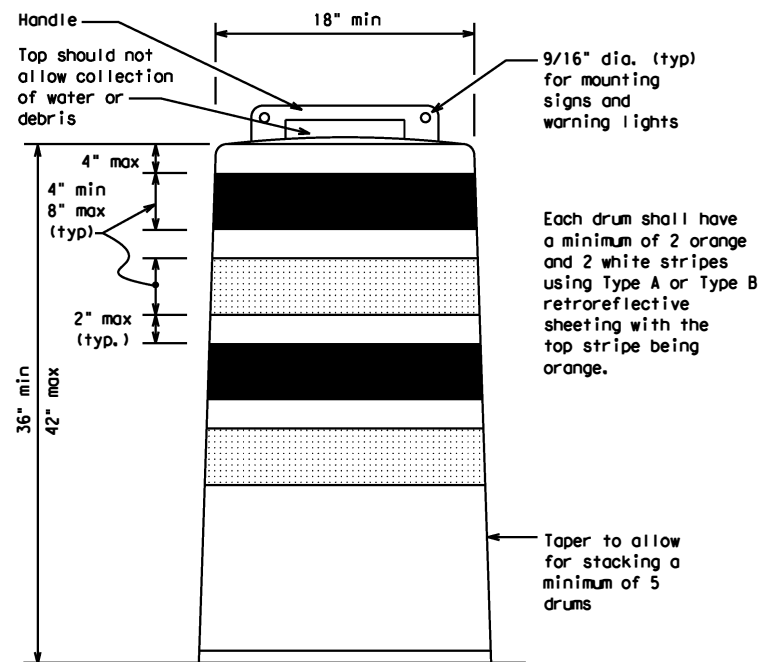
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

- 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.
- 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.

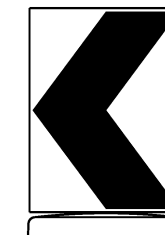
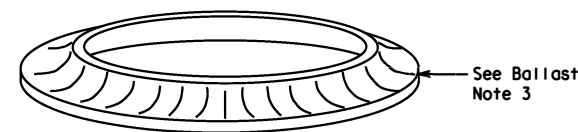
BALLAST

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.

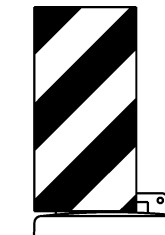


DETECTABLE PEDESTRIAN BARRICADES

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.

SHEET 8 OF 12



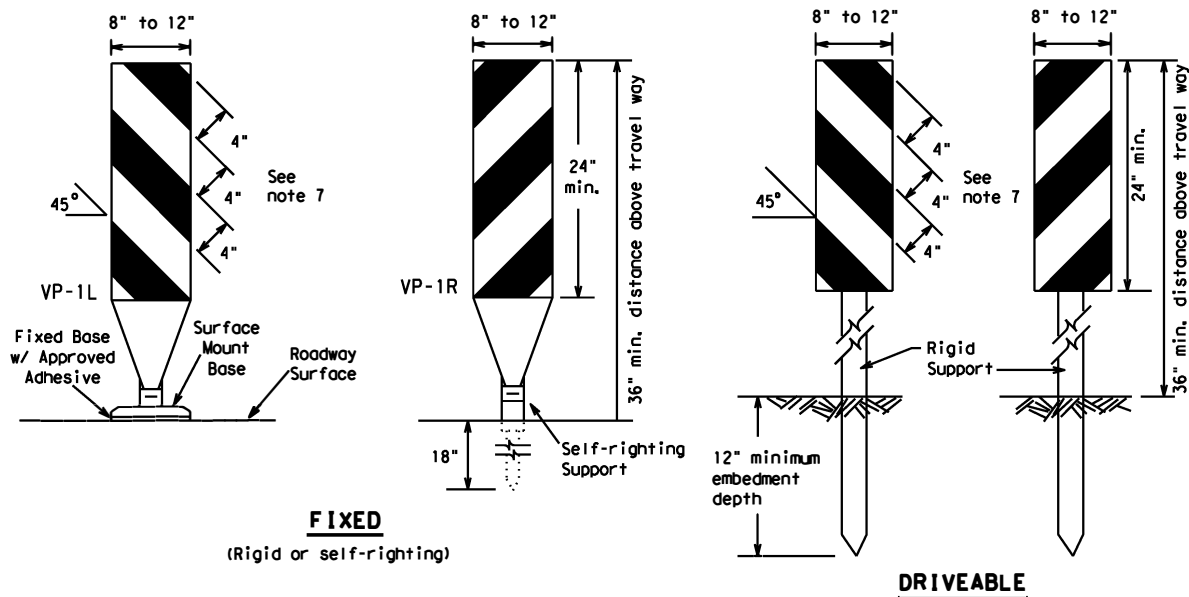
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

FILE:	bc-21.dgn	DW:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0271	15	099	IH 610				
4-03	8-14	DIST	COUNTY		SHEET NO.				
9-07	5-21	HOU	HARRIS		36				
7-13									

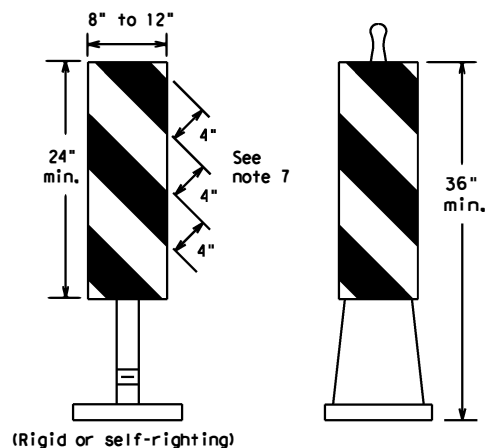
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



FIXED
(Rigid or self-righting)

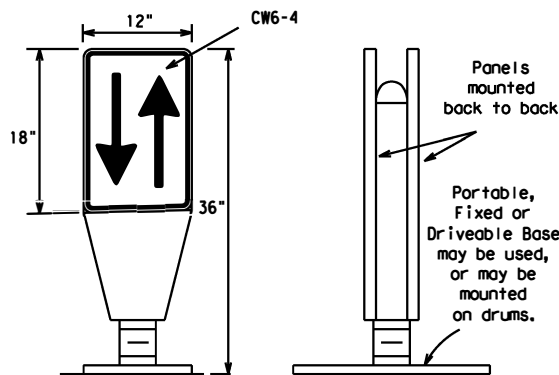
DRIVEABLE



PORTABLE

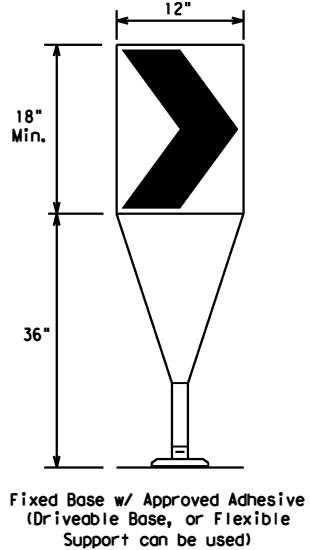
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



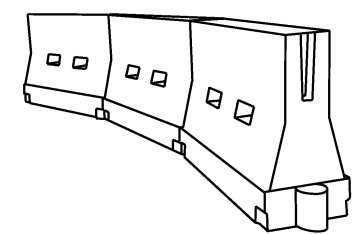
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- 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.



CHEVRONS

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- 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.
- 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.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- 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.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = 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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

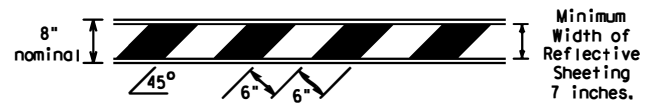
FILE: bc-21.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	37	

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.

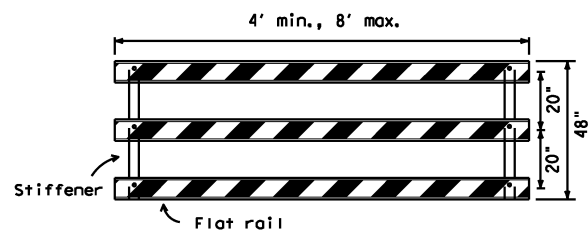
TYPE 3 BARRICADES

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.



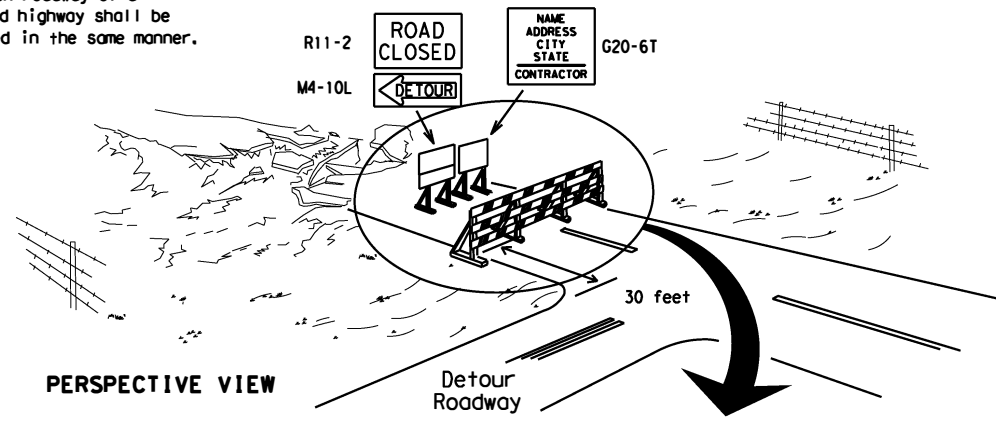
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

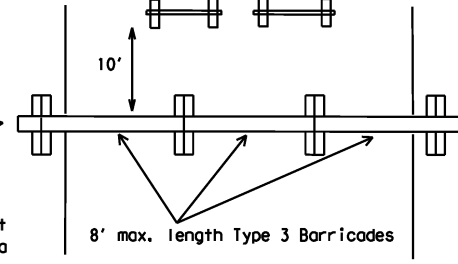
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

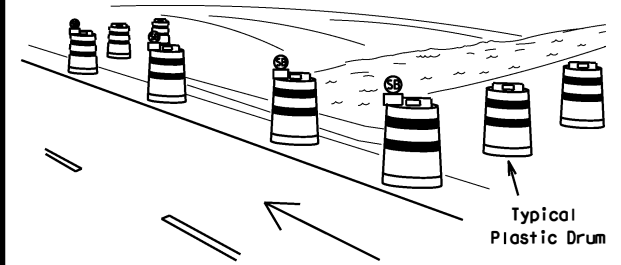
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



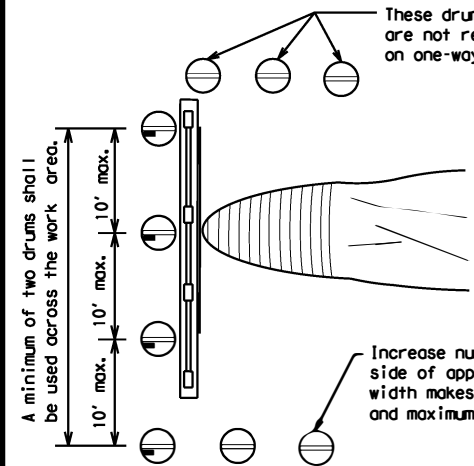
PLAN VIEW

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

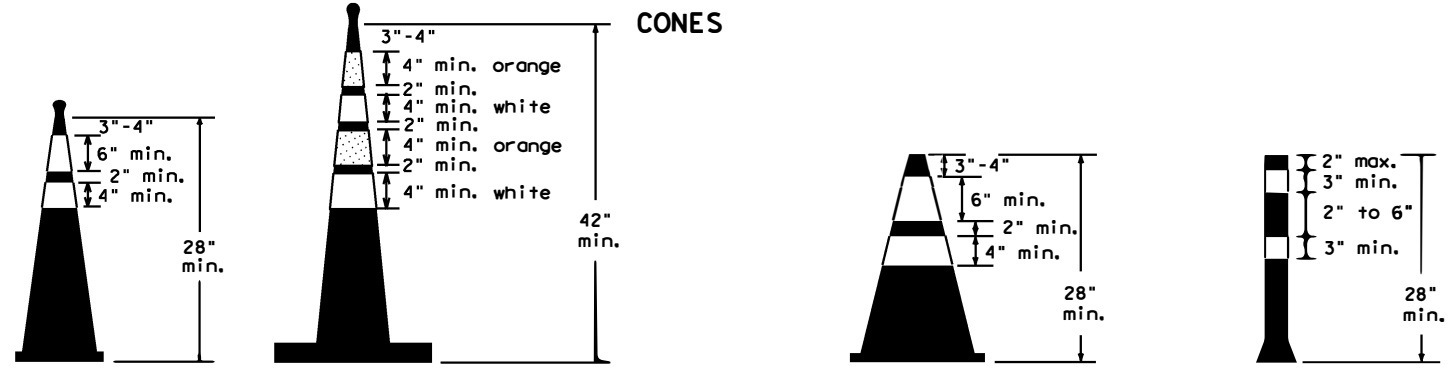


PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector



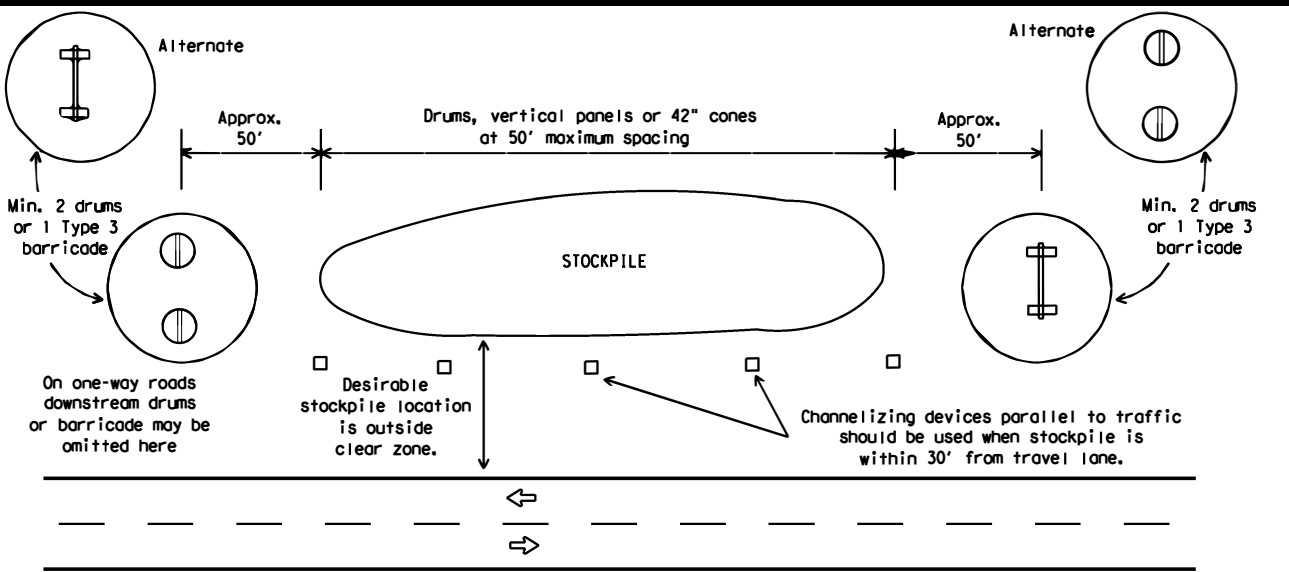
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	HARRIS	38	

DATE: FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

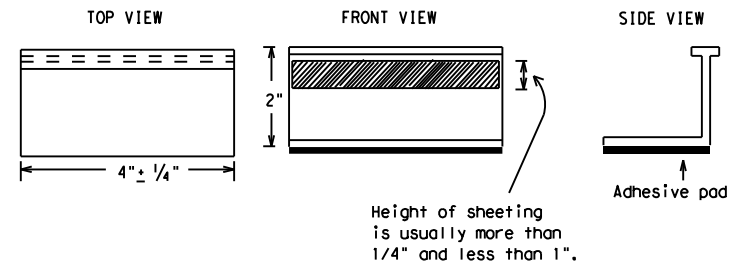
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	HOU	HARRIS		39
11-02 8-14				

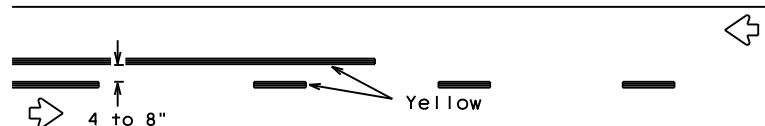
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

PAVEMENT MARKING PATTERNS

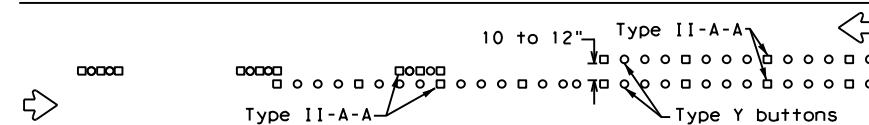


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

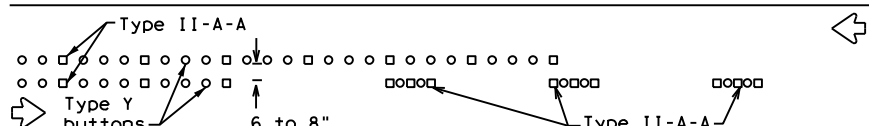


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.



RAISED PAVEMENT MARKERS - PATTERN A



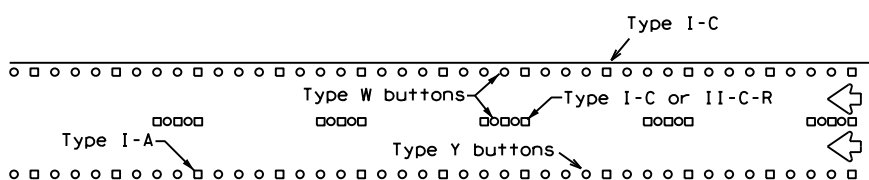
RAISED PAVEMENT MARKERS - PATTERN B

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



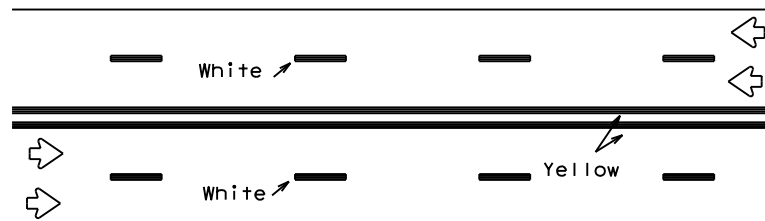
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



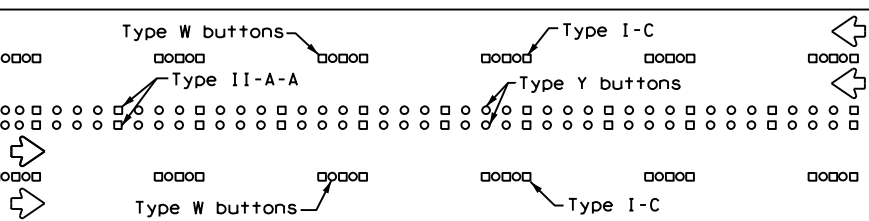
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



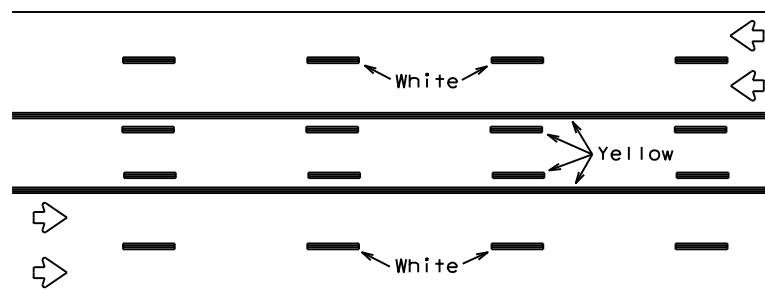
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



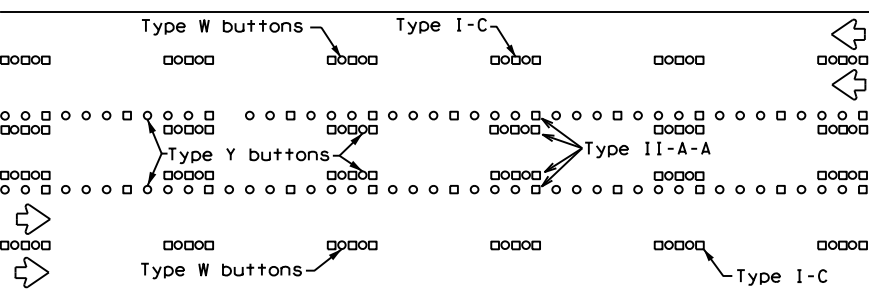
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

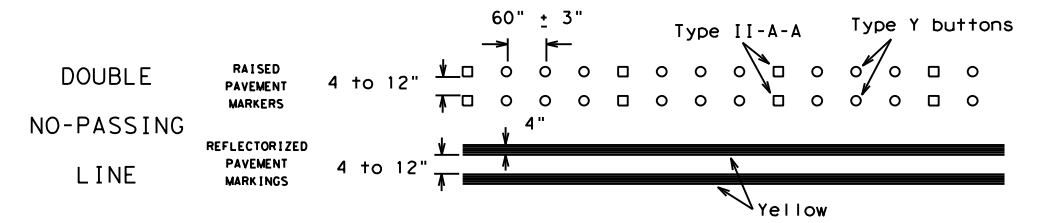
Prefabricated markings may be substituted for reflectORIZED pavement markings.



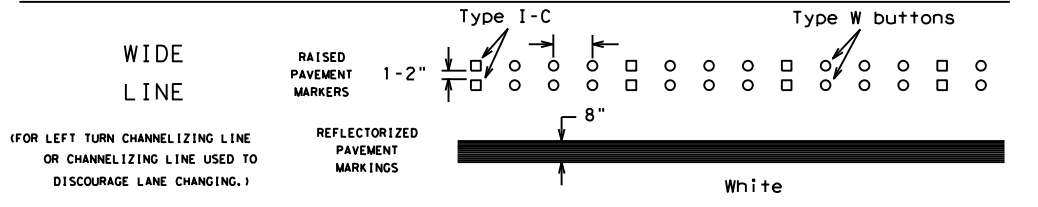
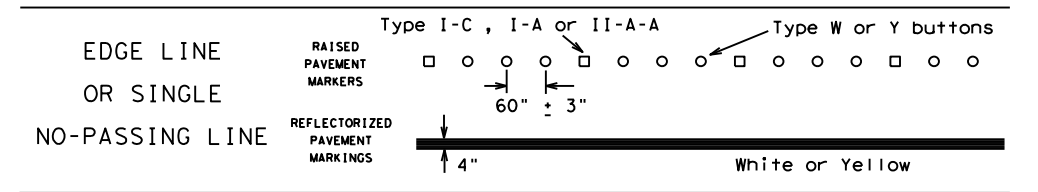
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

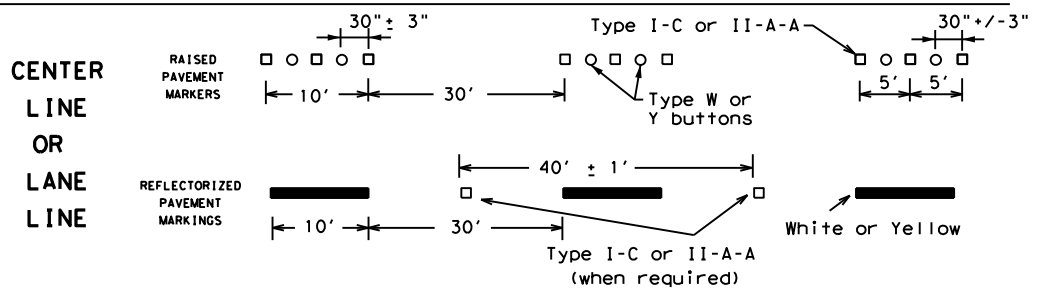
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



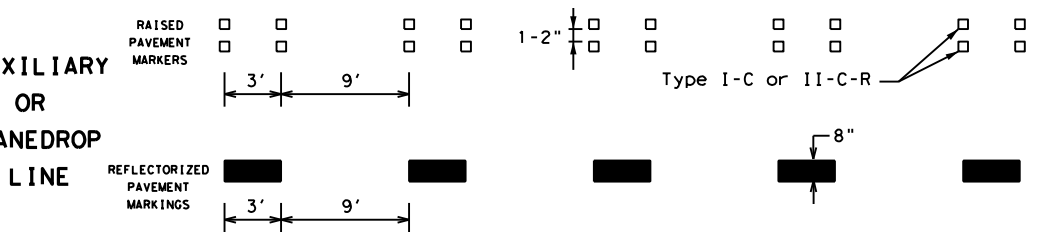
SOLID LINES



BROKEN LINES

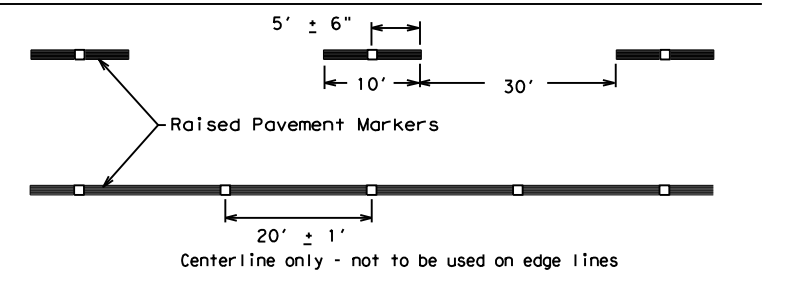


AUXILIARY OR LANEDROP LINE



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

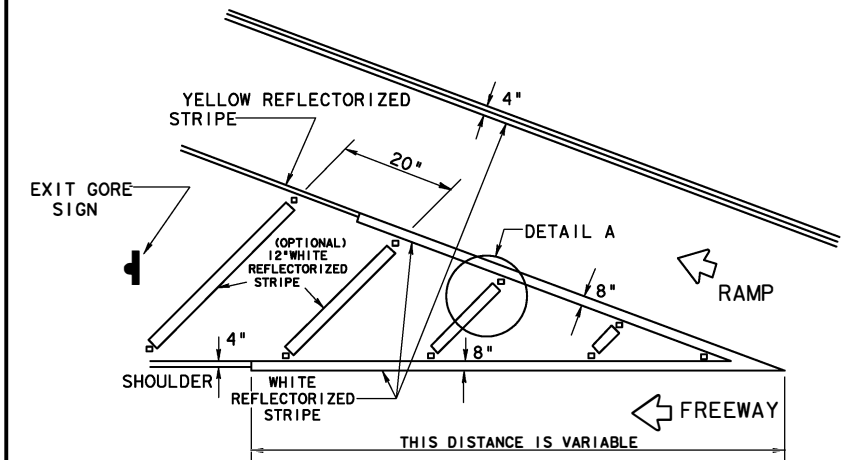
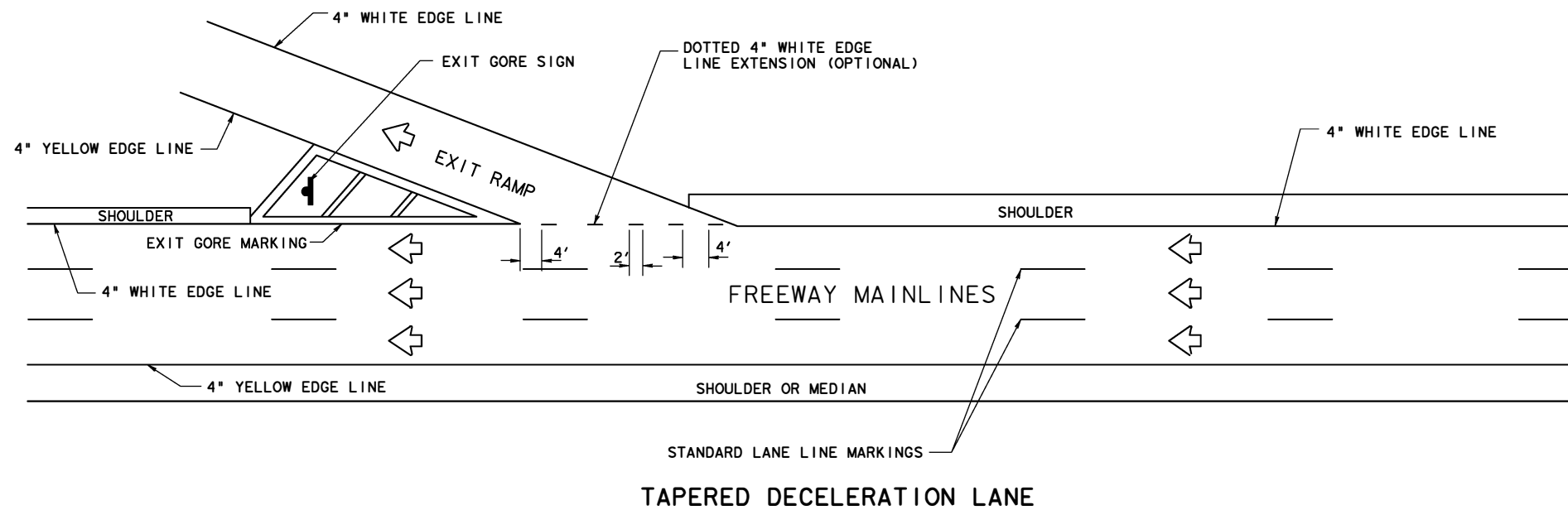
BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	HOU	HARRIS		40
11-02 8-14				

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."

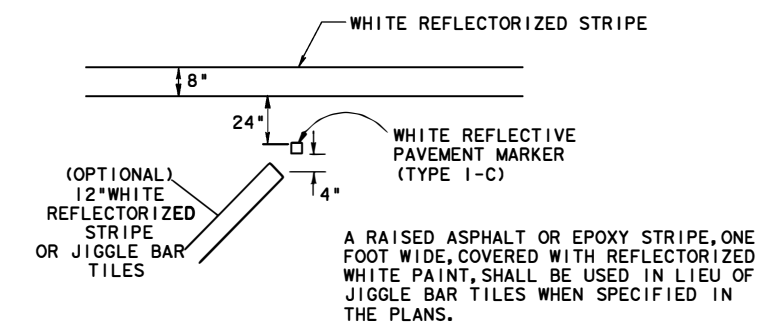
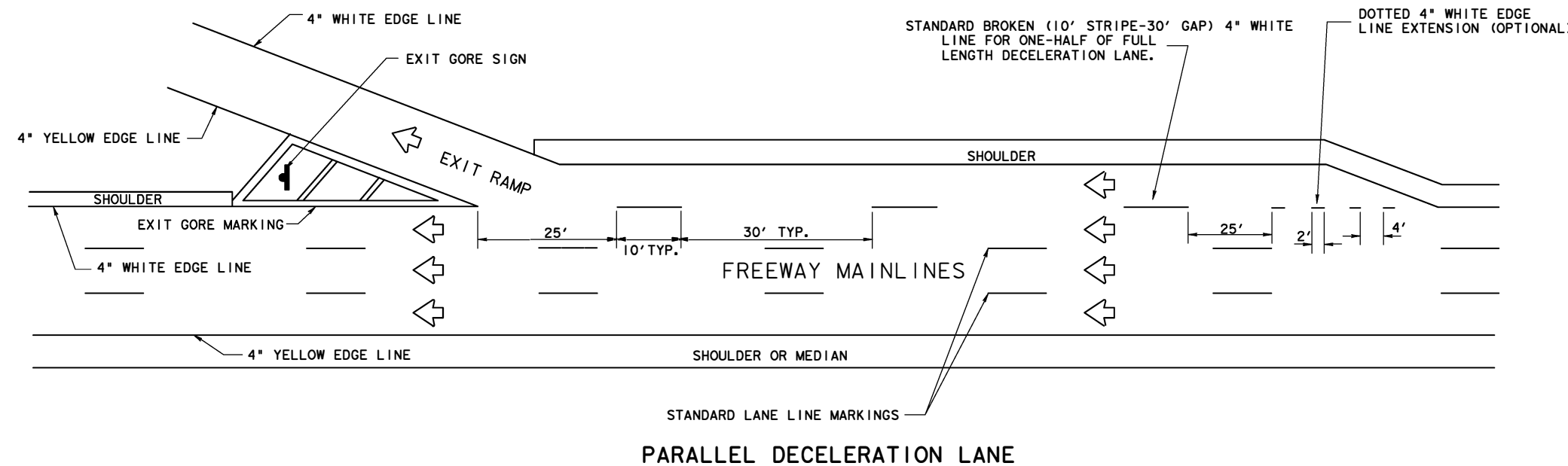
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



THE SHAPE OF THE GORE MARKING WILL VARY DEPENDING ON THE RAMP DESIGN AND WILL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

TYPICAL EXIT RAMP GORE MARKING



DETAIL A

TYPICAL EXIT RAMP MARKINGS

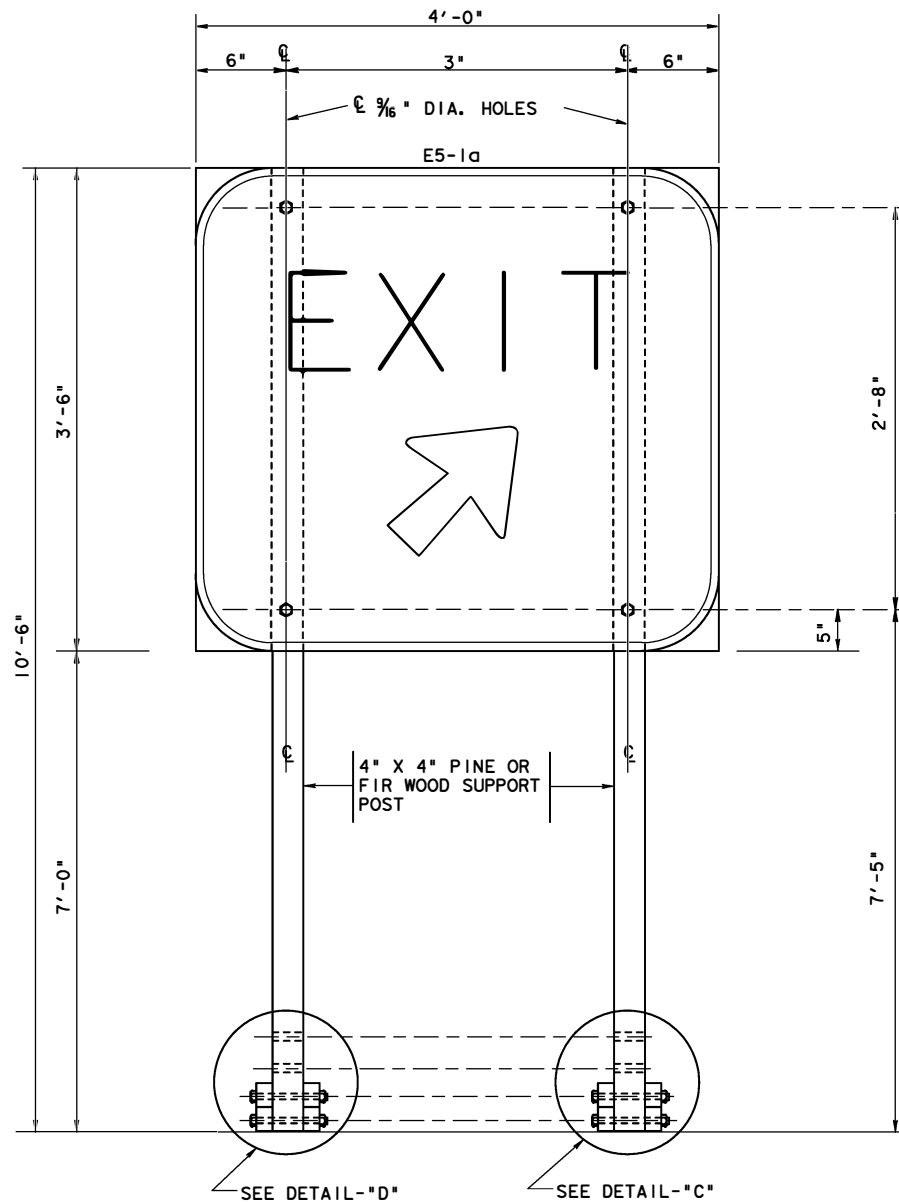
THE ABOVE EXIT RAMP MARKINGS SHALL BE APPLIED ONLY ON ONE LANE EXIT RAMP TO FRONTAGE ROAD OR TO CROSSING ROADS UNLESS OTHERWISE DIRECTED BY THE PLANS OR BY THE ENGINEER.



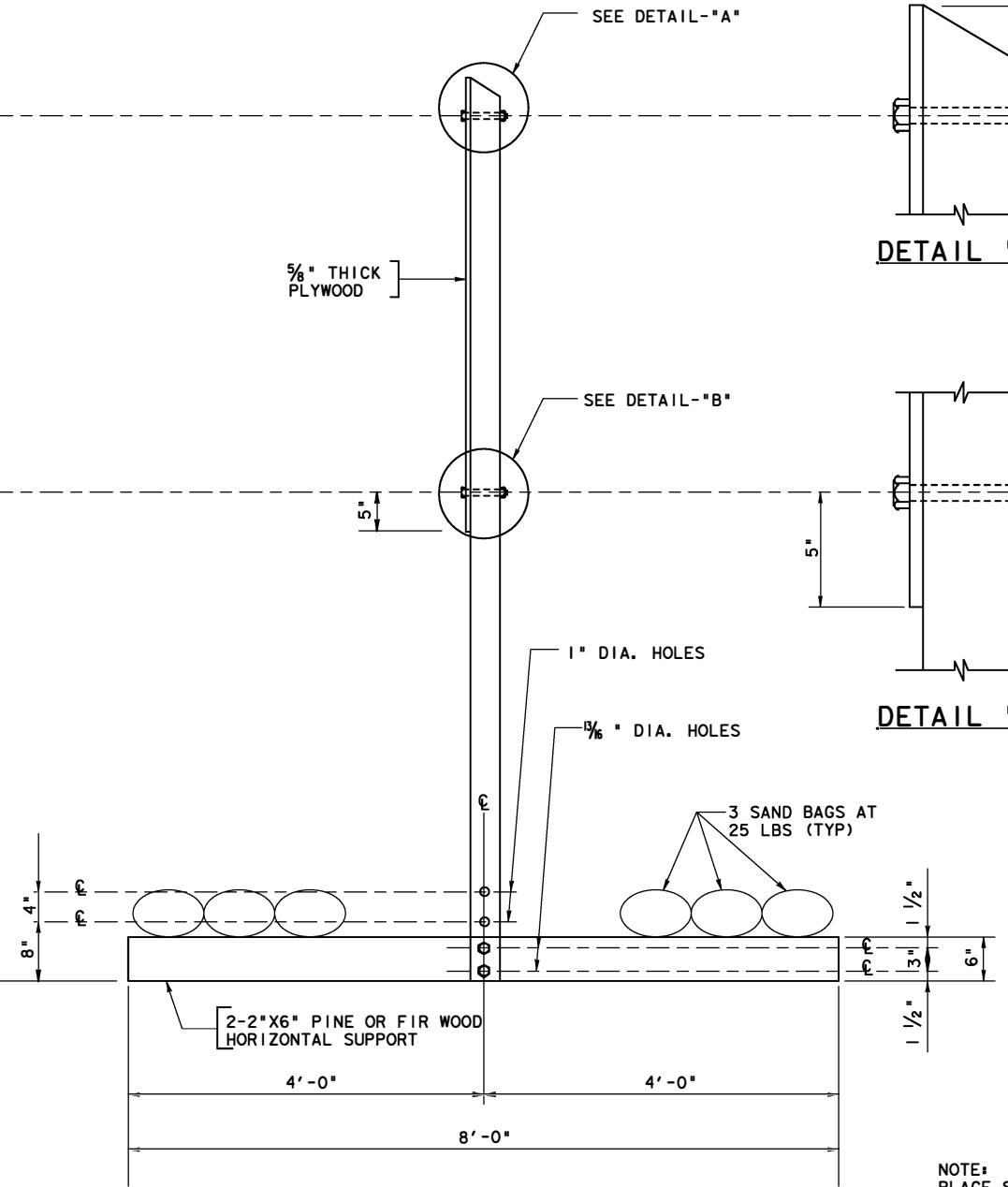
EXIT GORE PAVEMENT MARKINGS

EGPM TC6001-04

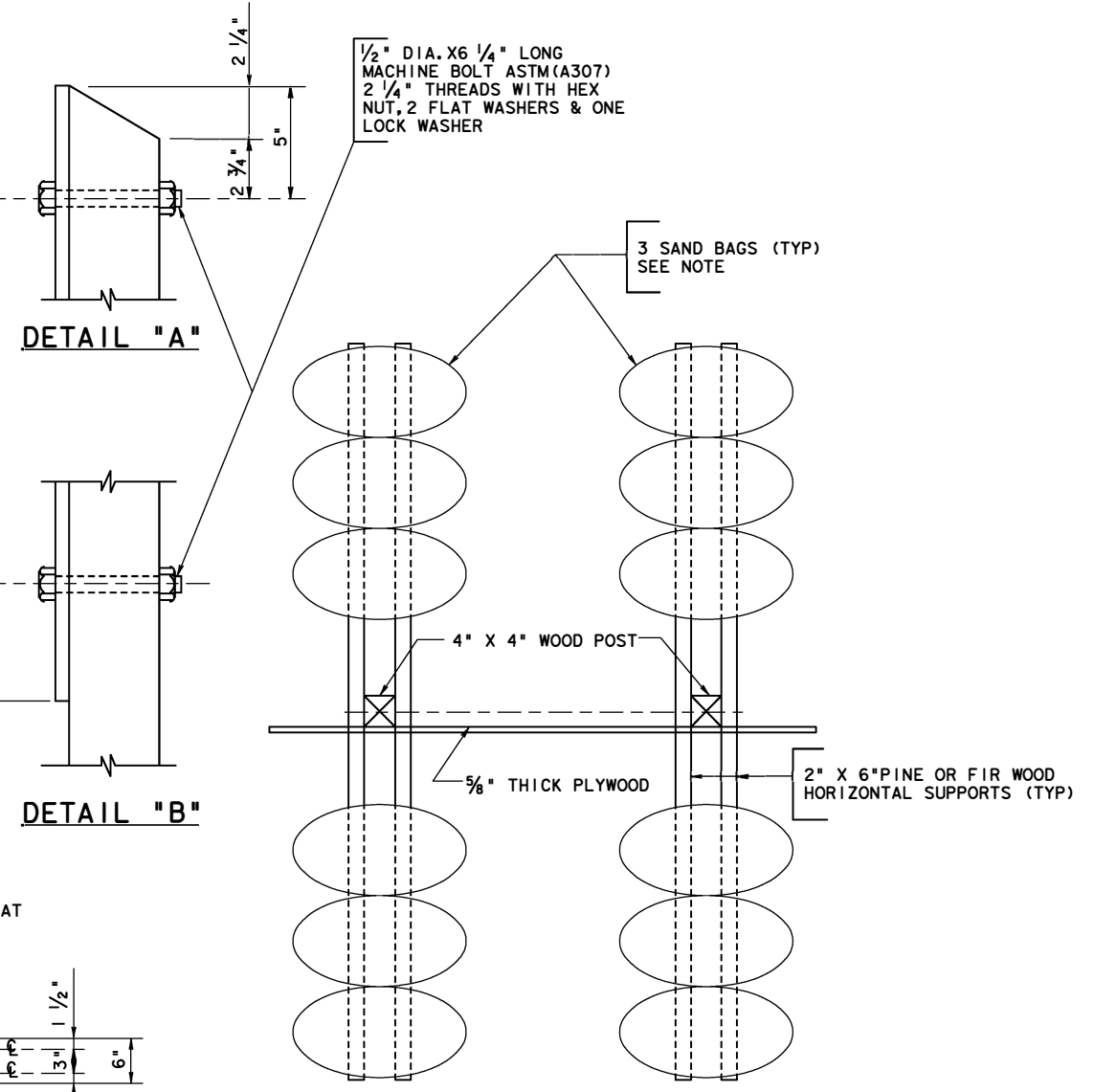
FILE#	DN#	CK#	DW#	CK#
© TxDOT	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		41
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	15	099
				HIGHWAY
				IH 610



FRONT VIEW



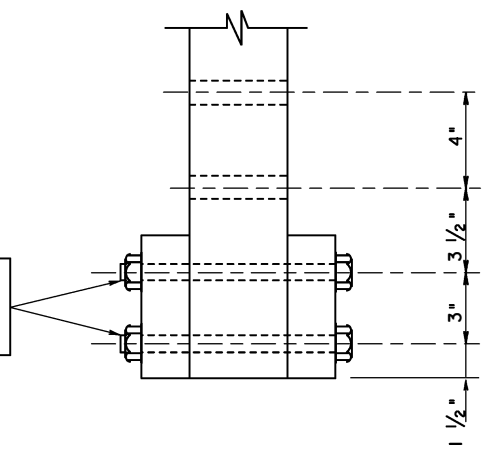
SIDE VIEW



TOP VIEW

NOTE:
 PLACE SAND BAGS EQUALING 75 LBS'
 3 BAGS AT 25 LBS. ON EACH END OF
 WOOD HORIZONTAL SUPPORTS.

3/4" DIA. X 10 1/2" LONG MACHINE BOLT ASTM (A307)
 2 1/2" THREADS WITH HEX NUT, 2 FLAT WASHERS & ONE LOCK WASHER



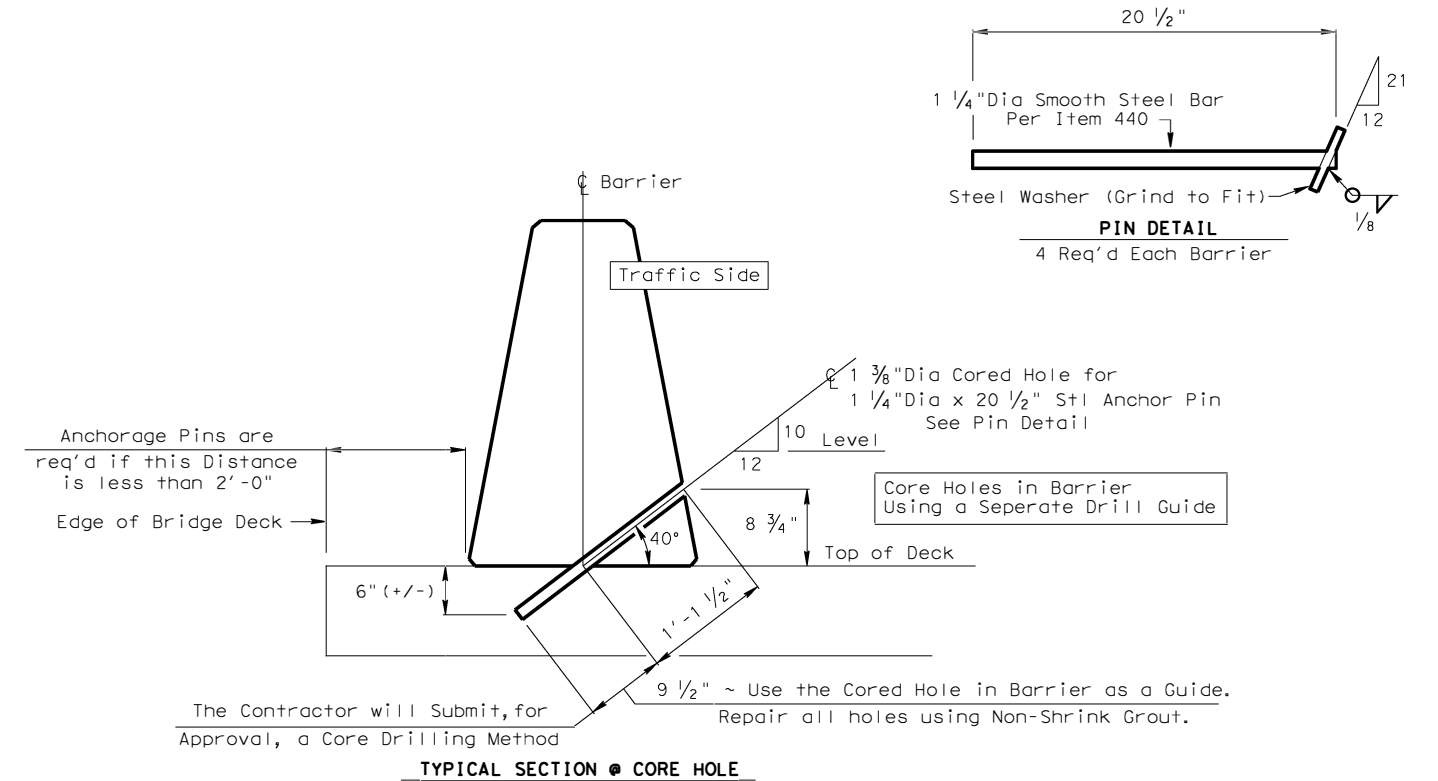
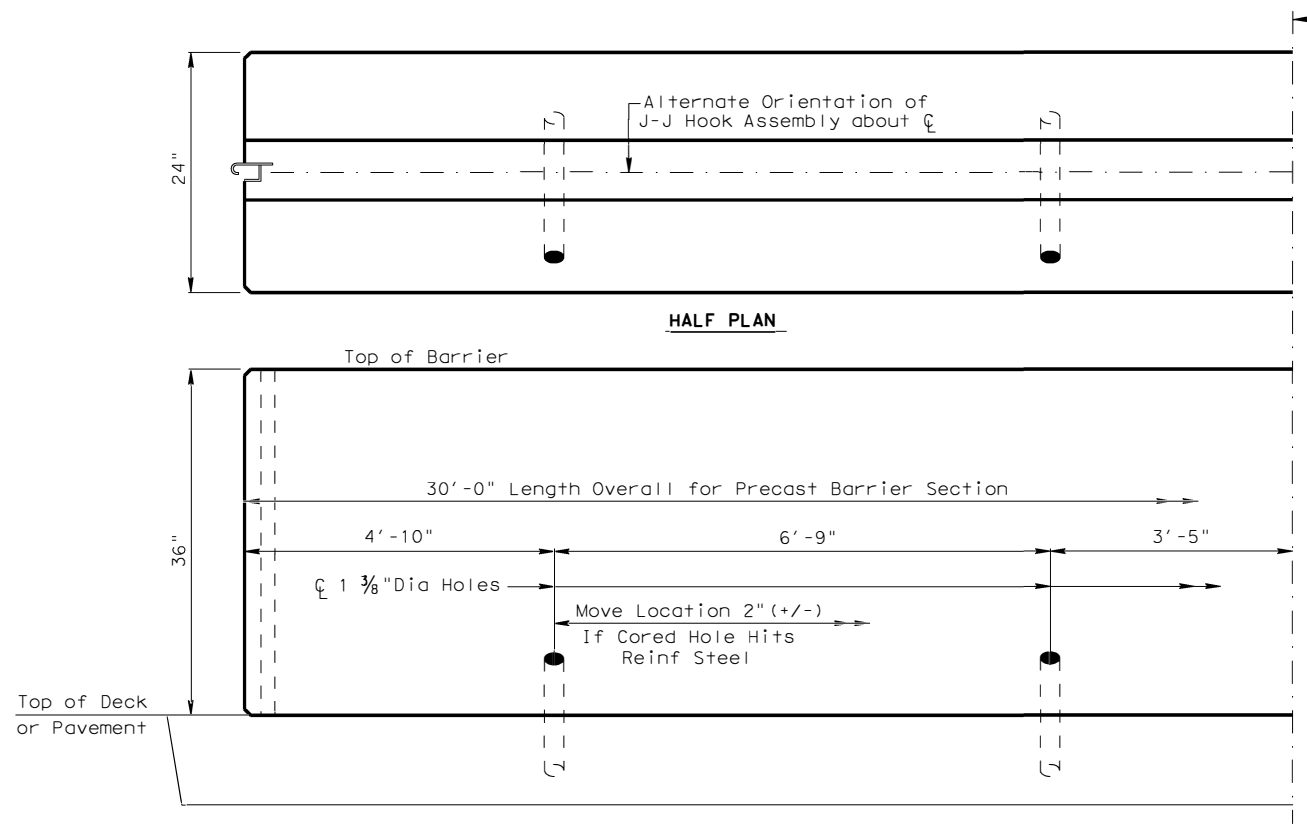
DETAIL "C" AS SHOWN
 DETAIL "D" OPP. HAND



TEMPORARY EXIT GORE SIGN

TEGS TC6000-96

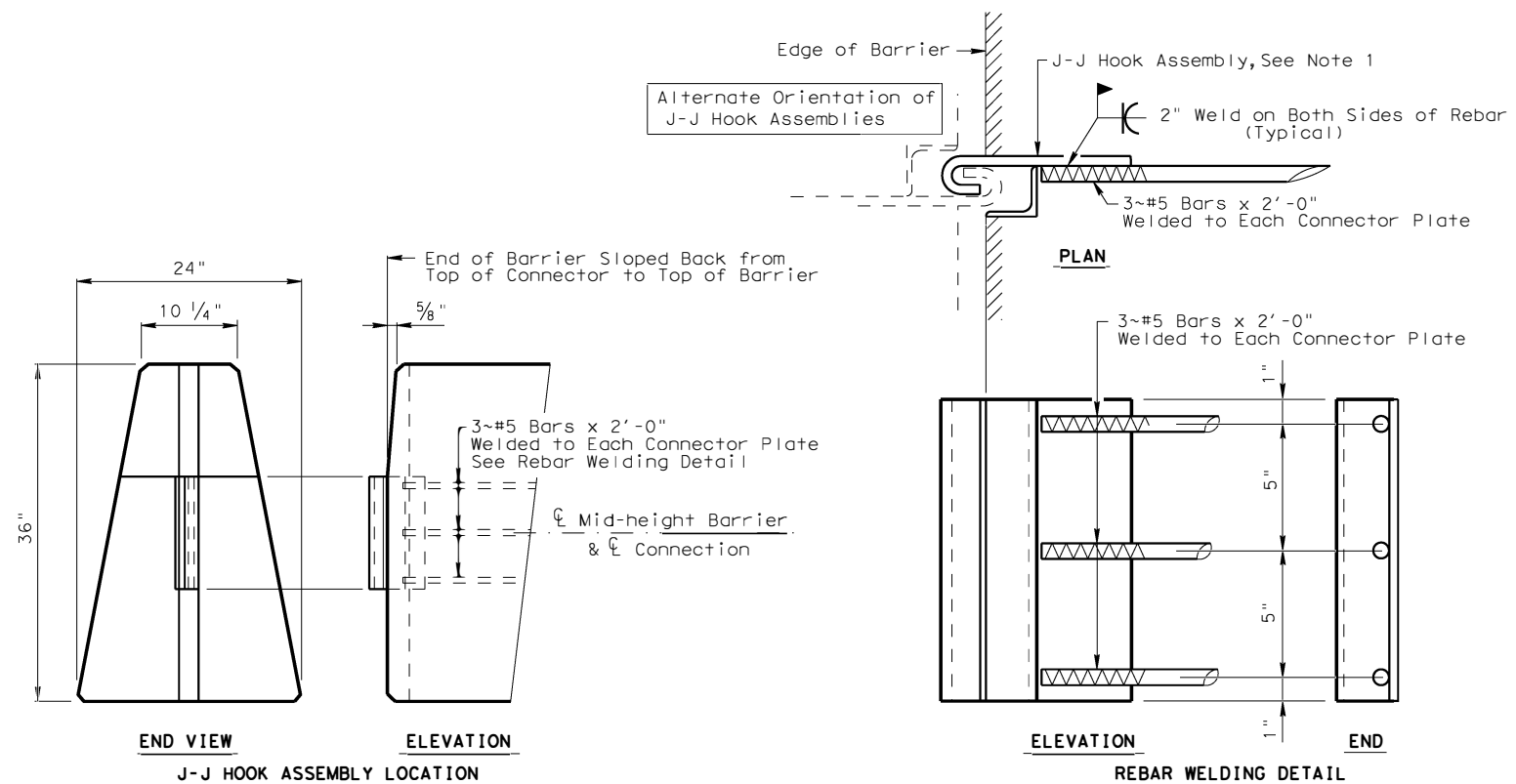
FILE#	DN#	CK#	DW#	CK#
© TxDOT	DIST	FED REG	PROJECT NO.	SHEET
REV. 3/2010 Title	HOU	6		42
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	15	099
				HIGHWAY
				IH 610



HALF ELEVATION (TRAFFIC SIDE)

BARRIER ANCHORAGE DETAIL

For Barrier located on Bridge Deck with less than 2' clearance or transition to dissimilar Barrier



J-J HOOK DETAILS

CONNECTOR NOTES AND SPECIFICATIONS

- 1) J-J Hooks are a patented design as manufactured by EASI-SET Industries, phone 1-800-547-4045. All steel assemblies for joint shall be galvanized after fabrication in accordance with item 445, "Galvanizing."
- 2) Reinforcing Steel: ASTM A-36 (plain).
- 3) Welding: All Welding to be in accordance with American Welding Society (AWS) Structural Welding Codes. Use weldable rebar per item 440.
- 4) Tolerances: J-J Hook assembly tolerances as per manufacturer. Installation and fabrication tolerances as follows: Barrier length $+1/4"$ Connector location $\pm 1/16"$



PRECAST SINGLE SLOPE CONCRETE BARRIER (J-J HOOK CONNECTION) PSSCB-JJ

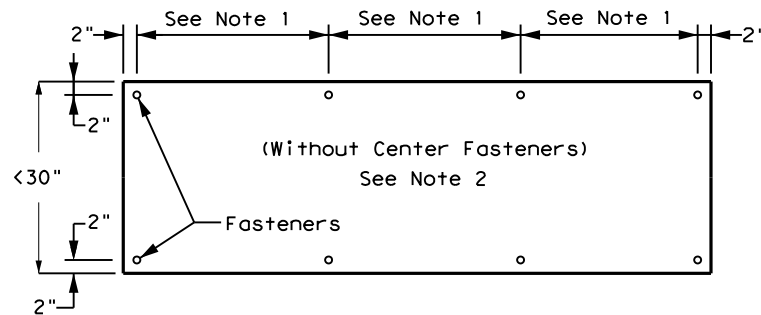
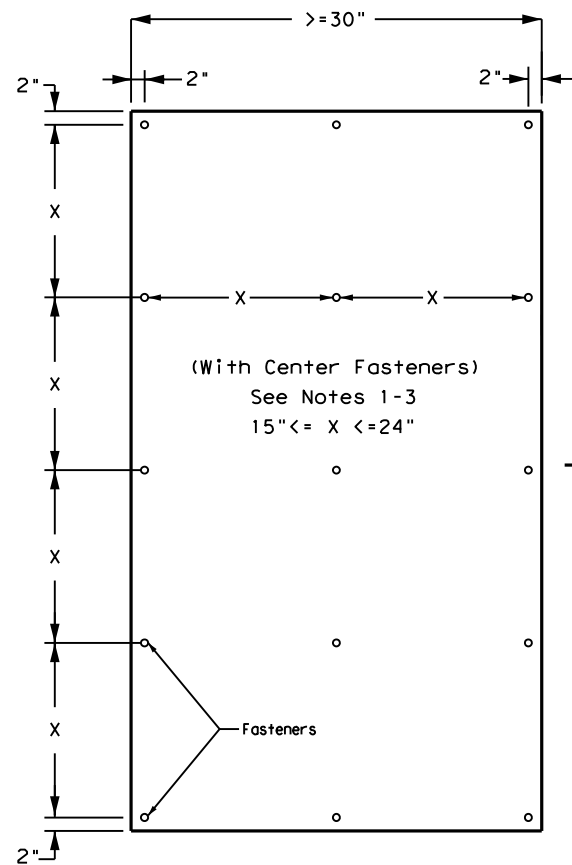
FILE:	STDC3.DGN	DW:	TxDot	CK:	TxDot	DW:	TxDot	CK:	TxDot
©xDOT	JANUARY 2005	DIST	FED REG	PROJECT NO.		SHEET			
REVISIONS	HOUSTON	6			43A				
12/2004	COUNTY	CONTROL	SECT	JOB	HIGHWAY				
	HARRIS	0271	15	099	IH 610				

R = Radius
Dia = Diameter

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

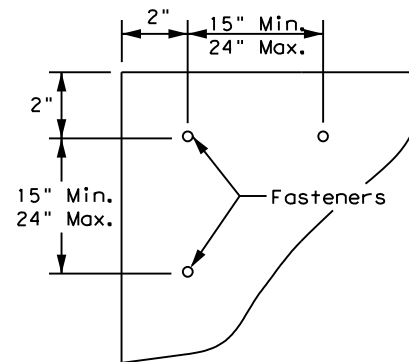
DATE: FILE:

OVERLAY PANEL SPACING DETAIL

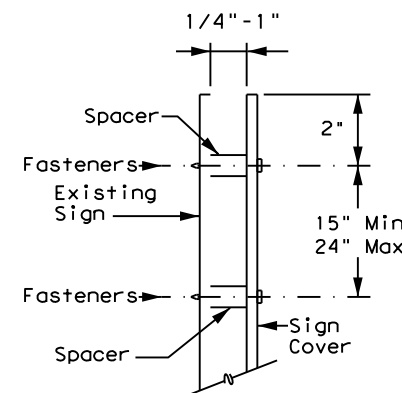


SPACING NOTES:

1. Edge fasteners should be placed 2" from edges of overlay panel, and be evenly spaced no less than 15" apart and no greater than 24" apart for the length of the panel.
2. For overlay panels measuring less than 30" on any side, only edge fasteners should be used.
3. Center fasteners should only be used for panels measuring 30" or greater on both sides. Center fasteners should be used evenly spaced and aligned with the edge fasteners along the longest side.
4. The CW26-1aT EXIT CLOSED sign panel and the CW26-1bT EXIT CLOSED sign panel may come with pre-drilled holes for installation. If no pre-drilled holes, refer to notes 1 and 2 above.



EDGE FASTENER SPACING DETAIL



SIDE VIEW DETAIL

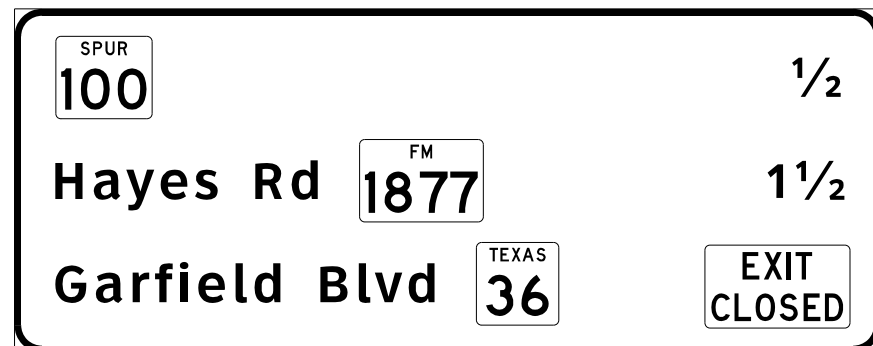
GENERAL NOTES:

1. Permanent large guide signs that are in conflict with work zone conditions should be removed or covered until the message matches the roadway condition.
2. Sign panel overlays should be made of a rigid material (sheet aluminum, corrugated plastic, or other material as approved by the Engineer). The installation should allow adequate air flow between the overlay panel and the existing sign panel by providing a minimum spacer of 1/4" (1" maximum).
3. Spacers should be a material (such as plastic or nylon fiber) that will not harm the sign sheeting face.
4. #12 x 1/2" self-drilling screw (fasteners) should be aluminum, galvanized, blue coated, or stainless steel.
5. Sign panel overlays used to cover all or part of a sign should be the same color as the background color of the sign to be covered with the exception of Exit Closed Sign Panels. The sign panel overlays should cover the conflicting or non-applicable sign information. See the Exit Closed Sign Panel detail and notes for sign panel overlay installations for closed exits.
6. Large extruded sign covers in work zones should only be used for long-term stationary work.
7. All covering material, mounting hardware, and spacers should be removed when panel overlay is removed.

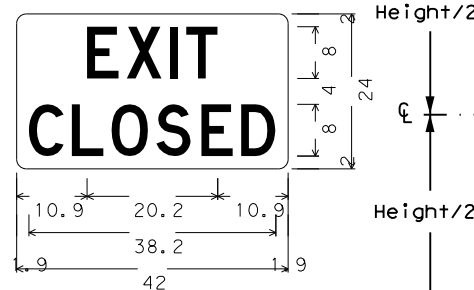
ASSEMBLY NOTES:

1. Apply fasteners to the sheet aluminum overlays in accordance with the hole spacing in the Overlay Panel Spacing Detail.
2. Tape should not be applied to the sign sheeting surface. Pre-mask or application tape should be removed prior to exposure to sunlight.
3. For full sign covering applications, position the overlay panel's bottom edge flush with the bottom of the existing extruded sign panel and then position the overlay panel's lower left edge flush with the lower left edge of the bottom existing extruded panel section. For only covering a specific sign message, position the overlay panel's bottom edge first and then position the overlay panel's lower left edge to completely cover the conflicting or non-applicable message.
4. If additional overlay panels are needed, abut the next overlay panel to the first attached overlay panel and perform the same work as specified in steps above.

EXIT CLOSED SIGN DETAILS

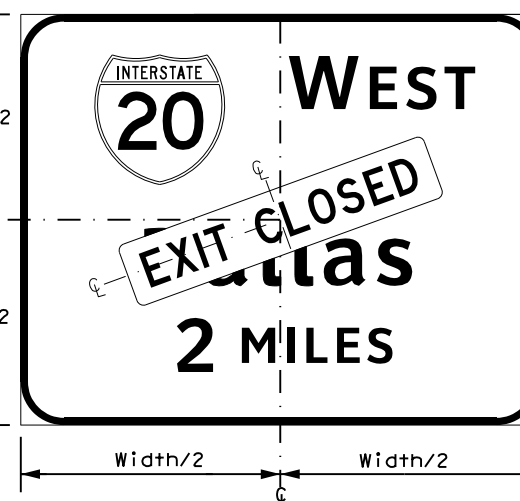


EXIT CLOSED SIGN PANEL
(See detail 1)

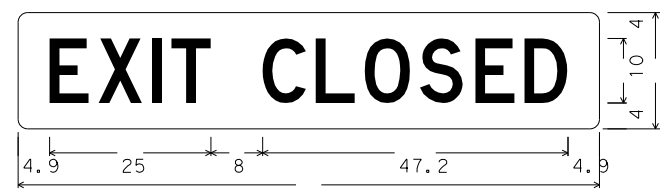


Identifier : CW26-1bT*42x24;
1.50" Radius, No border, Orange;
[EXIT] Black D 85) spacing;
[CLOSED] Black D 85) spacing

DETAIL 1



EXIT CLOSED SIGN PANEL
(See detail 2)



Identifier : CW26-1aT*90x18;
1.5" Radius, No border, Orange;
[EXIT] Black D, [CLOSED] Black D 80) spacing;

DETAIL 2

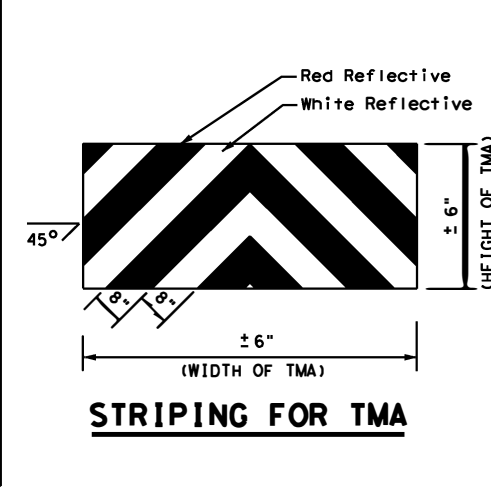
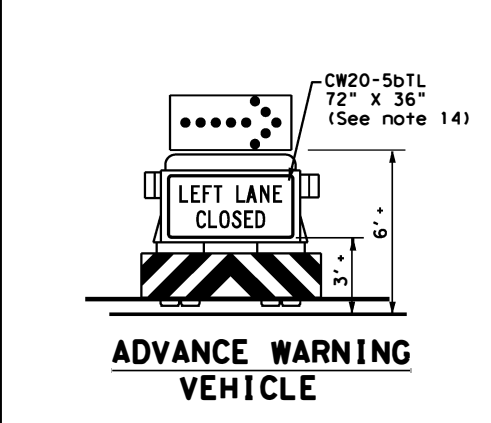
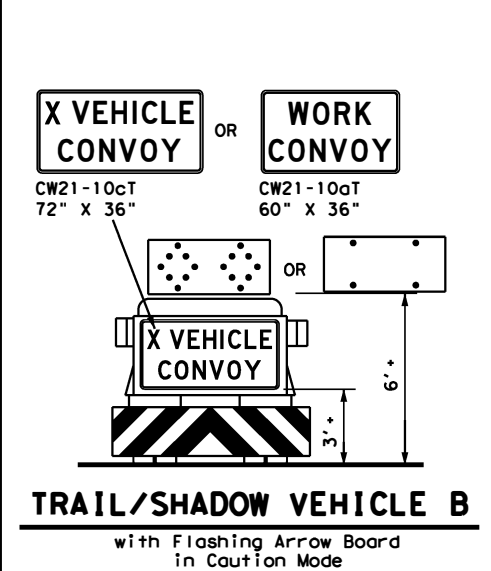
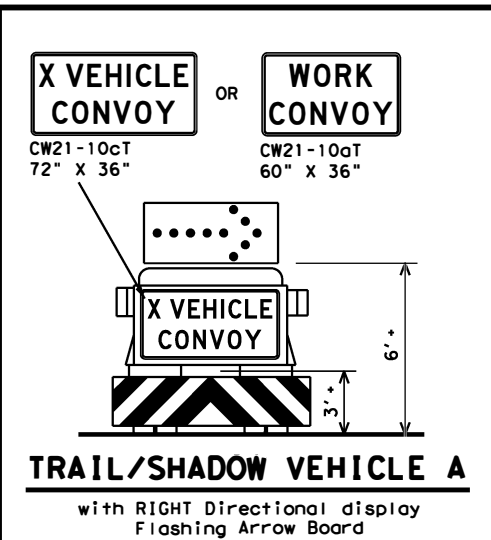
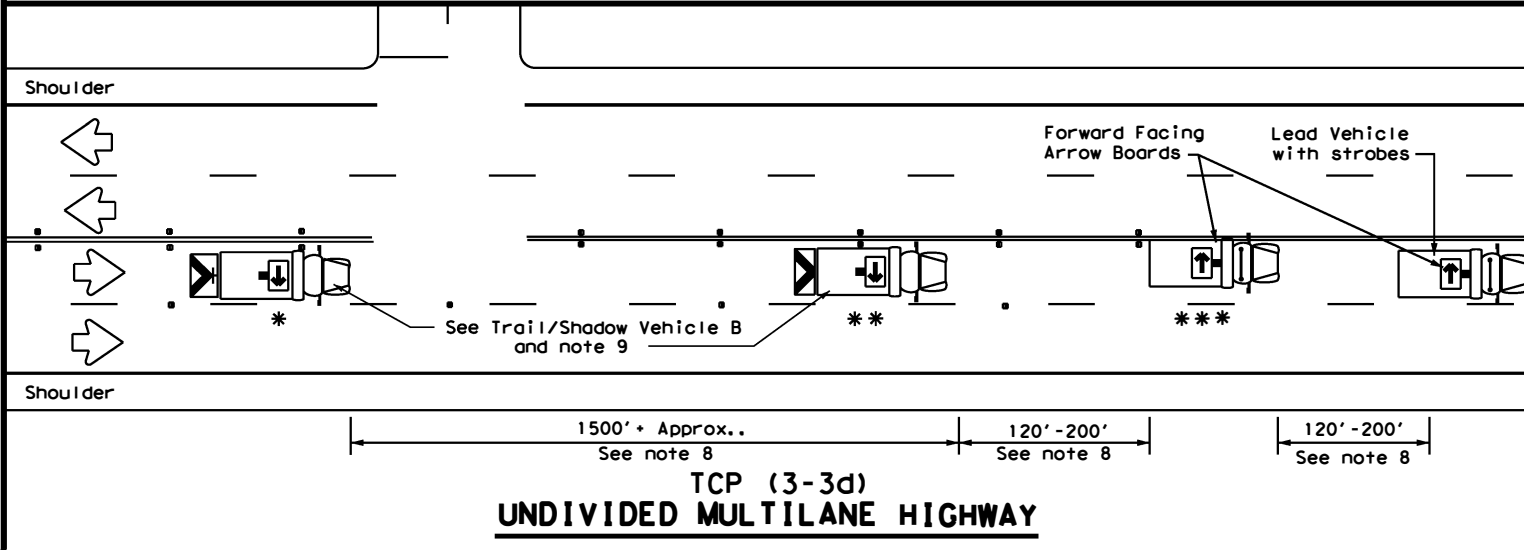
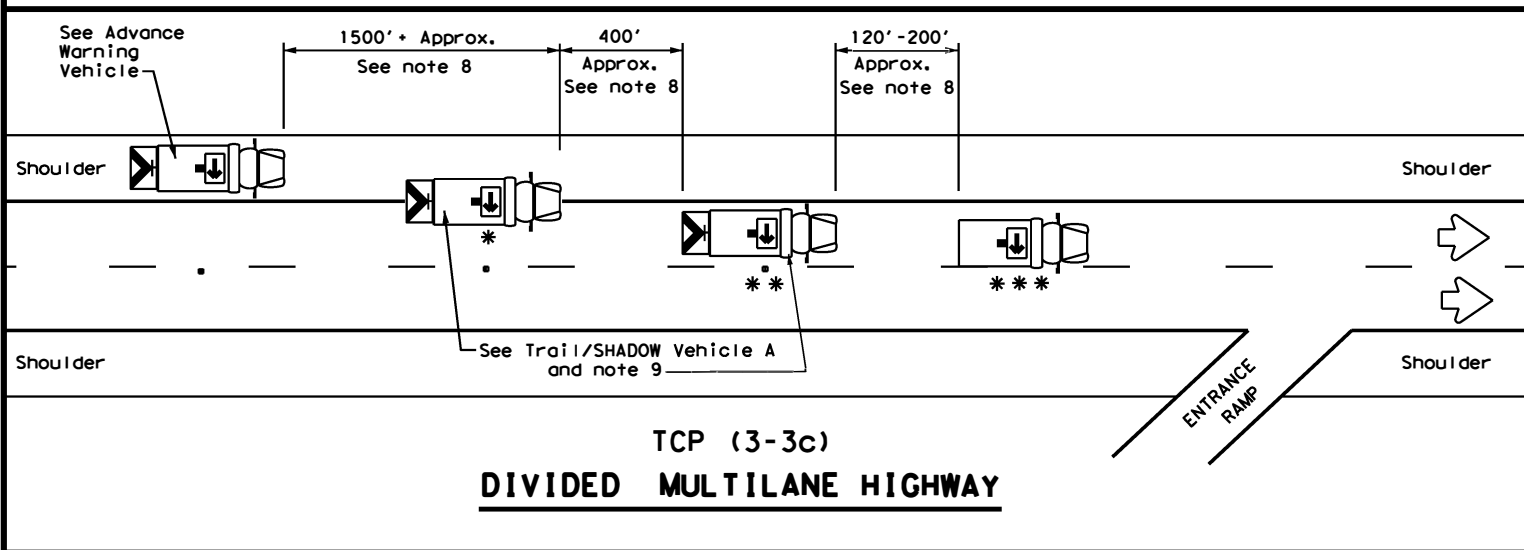
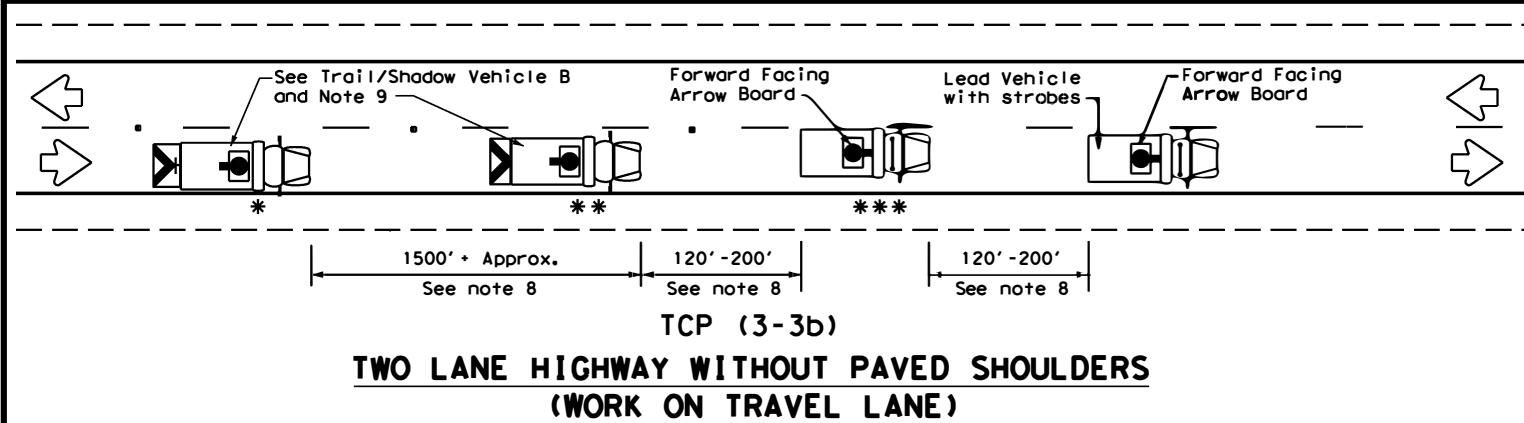
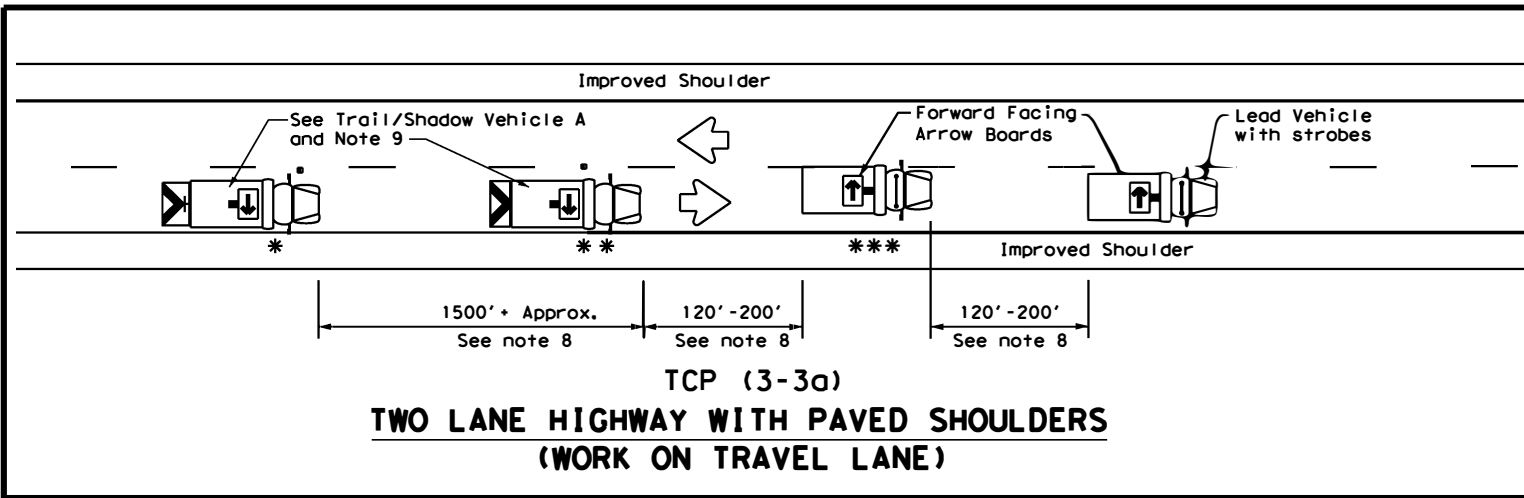
EXIT CLOSED SIGN PANEL NOTES:

1. When using an EXIT CLOSED (CW26-1bT) sign on an interchange sequence guide sign, place the EXIT CLOSED (CW26-1bT) sign panel horizontal in-line with the information for the closed exit and right-aligned with the distances shown for the other destinations.
2. When using an EXIT CLOSED (CW26-1aT) sign on interchange guide sign(s), place the EXIT CLOSED (CW26-1aT) sign panel diagonally across the interchange guide sign(s) as per TMUTCD 6F.28.
3. The EXIT CLOSED (CW26-1aT & CW26-1bT) signs should have a black legend on an orange background.

				Traffic Safety Division Standard	
TEMPORARY LARGE SIGN COVERING DETAILS TS-CD-22					
FILE: ts-cd-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY	
12-19	0271	15	099	IH 610	
10-22	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		44	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



LEGEND		
* Trail Vehicle	ARROW BOARD DISPLAY	
** Shadow Vehicle		
*** Work Vehicle		RIGHT Directional
		LEFT Directional
		Double Arrow
		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

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

Texas Department of Transportation

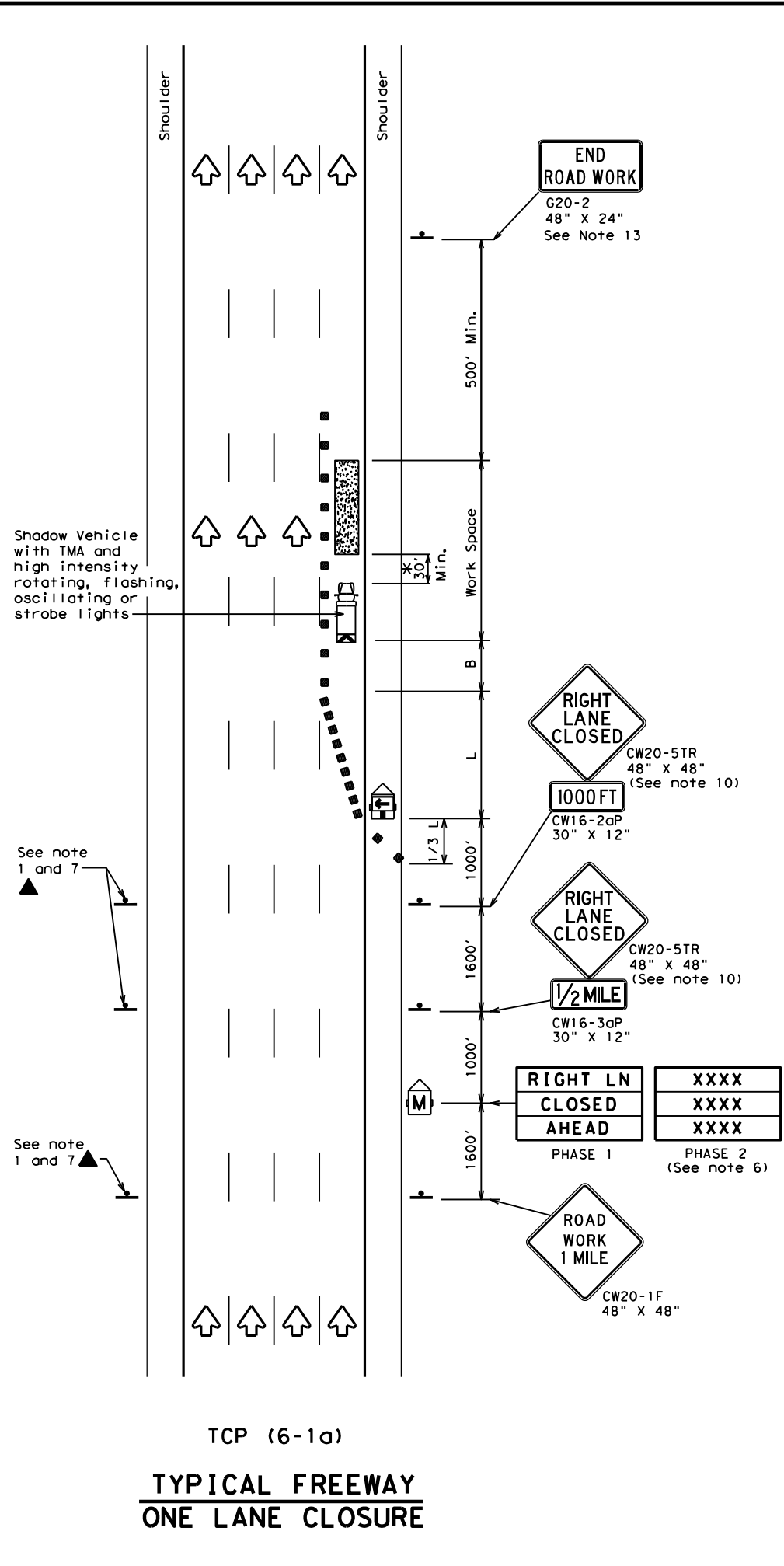
Traffic Operations Division Standard

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

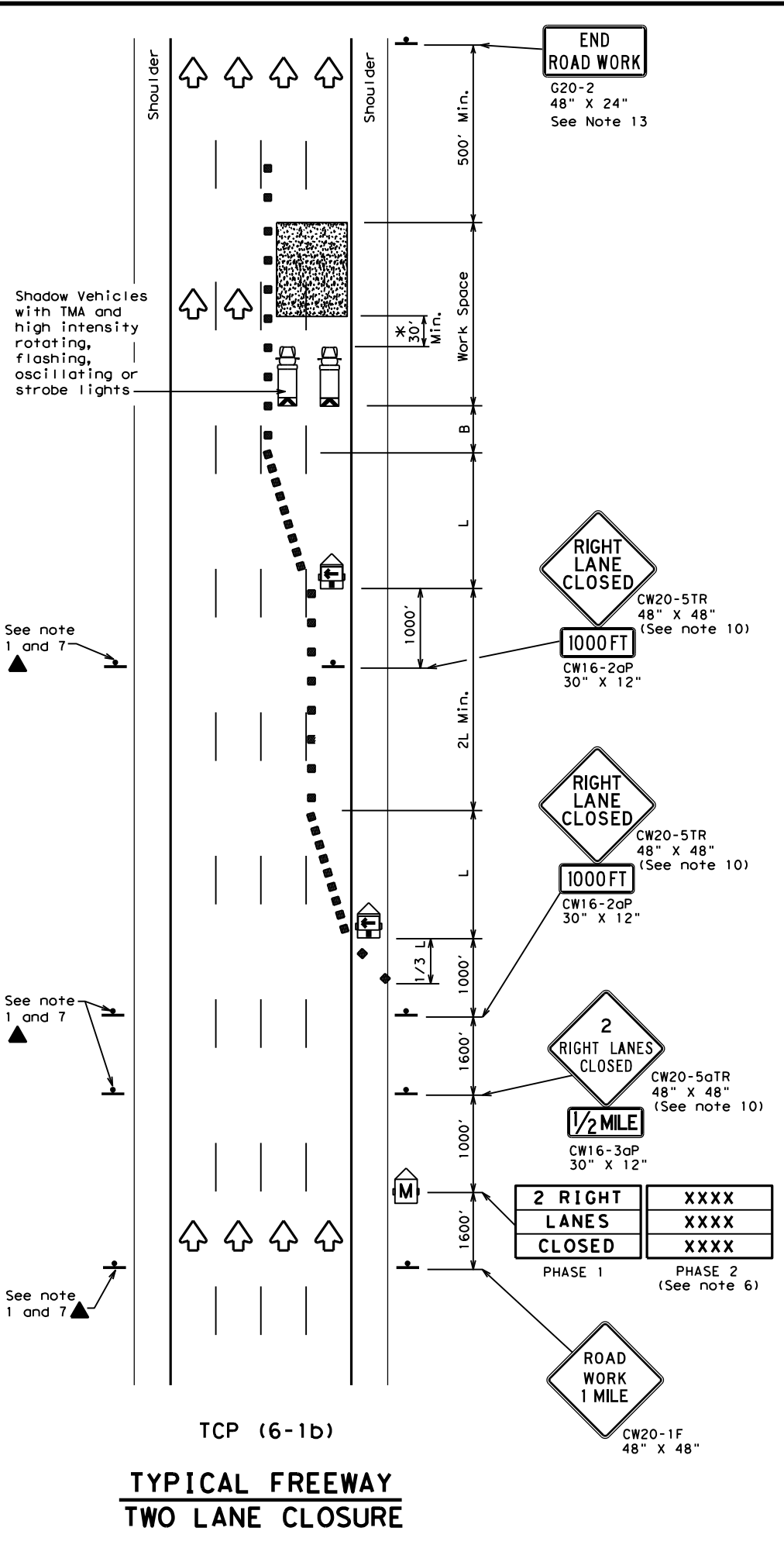
FILE: tcp3-3.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0271	15	099
2-94 4-98				IH 610
8-95 7-13				
1-97 7-14				
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	45	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



TCP (6-1a)
**TYPICAL FREEWAY
ONE LANE CLOSURE**



TCP (6-1b)
**TYPICAL FREEWAY
TWO LANE CLOSURE**

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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80	800'	880'	960'	80'	160'	615'	

** 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- Drums or 42" cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
- All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
- The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
- Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
- Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
- Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
- The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
- Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
- Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
- When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
- For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
- The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

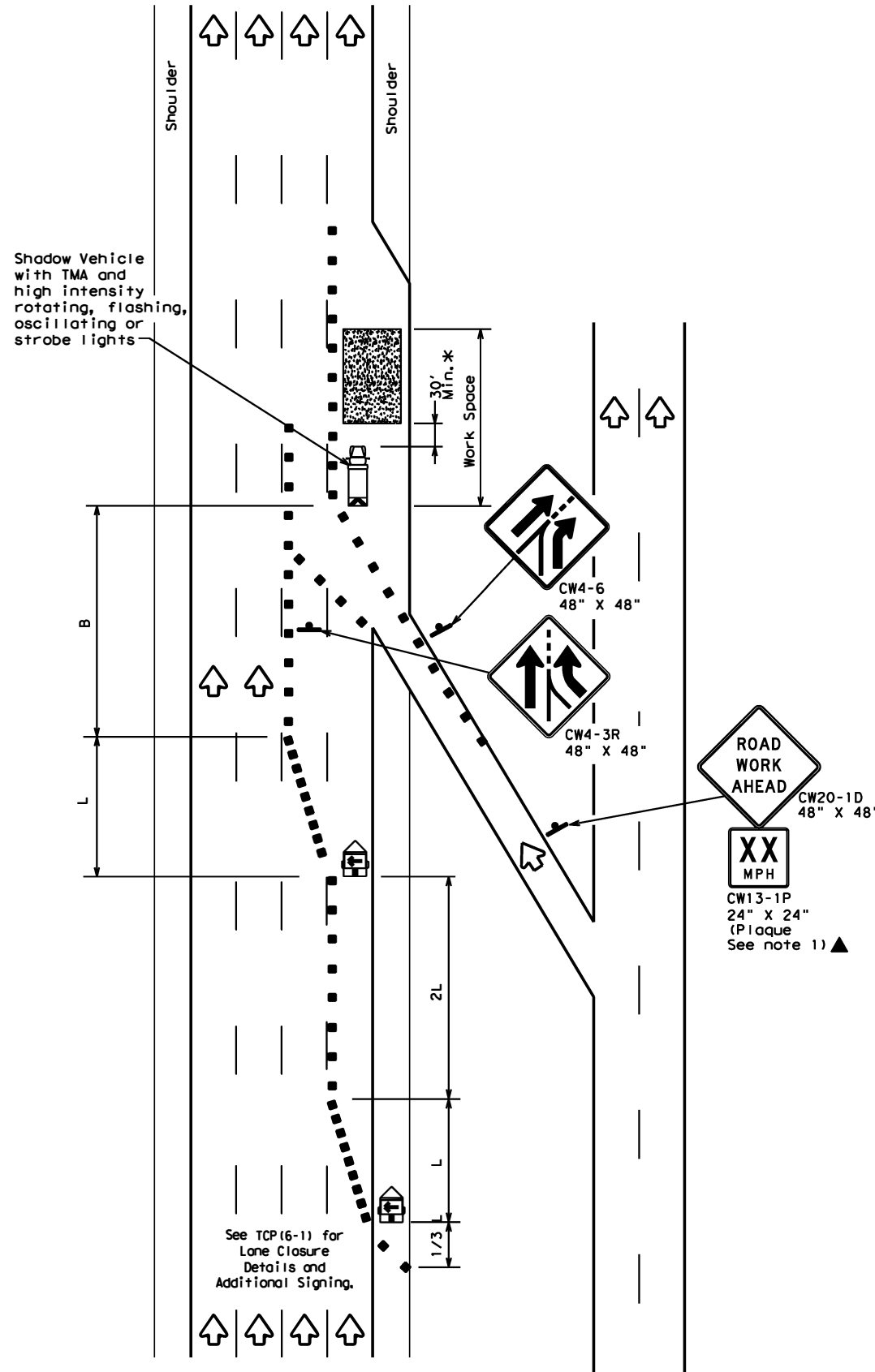
**TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES**

TCP (6-1) - 12

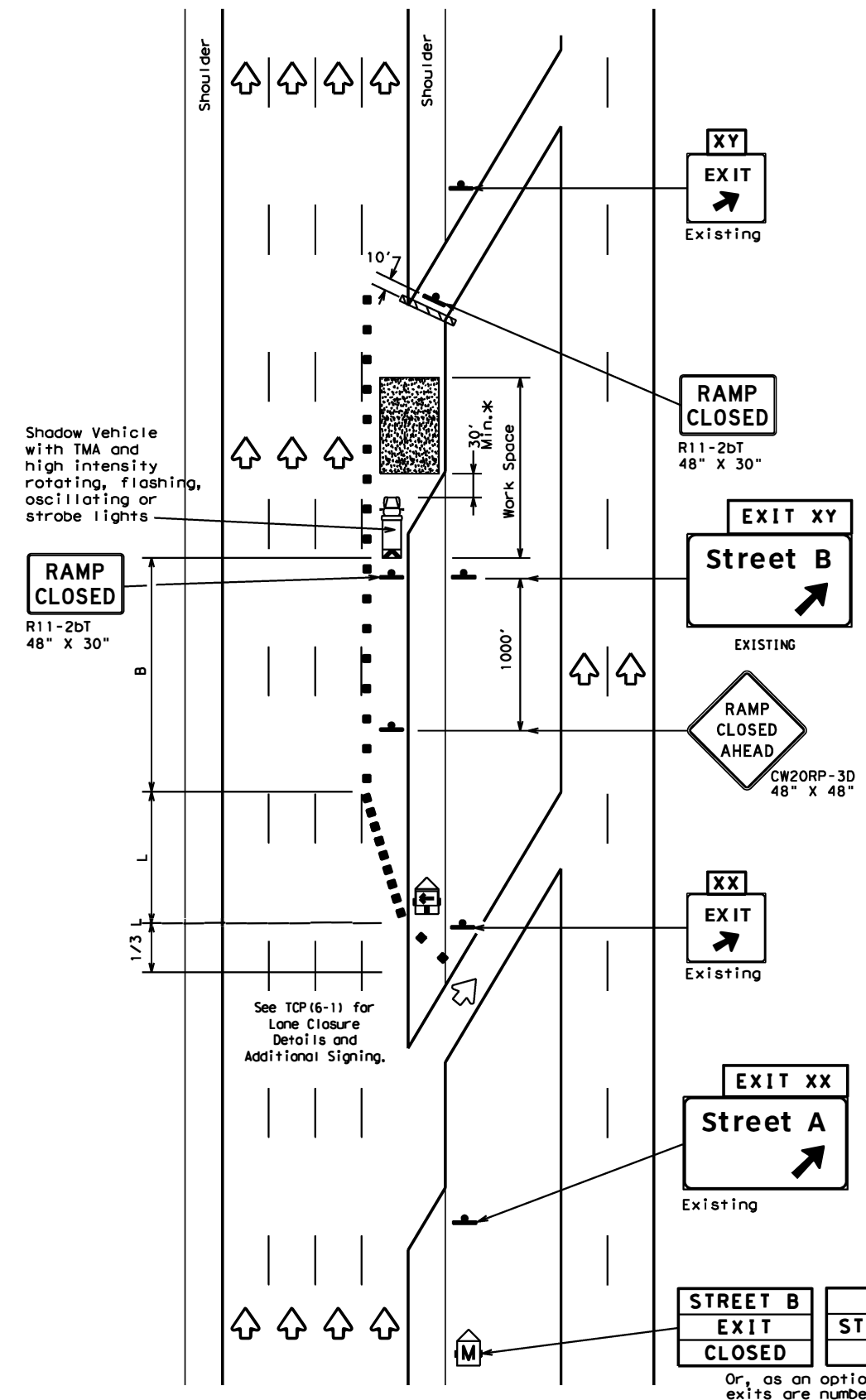
FILE:	tcp6-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	0271	15	099	IH 610				
	DIST	COUNTY			SHEET NO.				
	HOU	HARRIS			46				

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

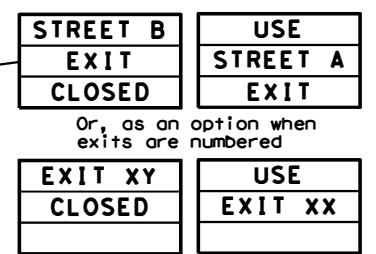
DATE: FILE:



TCP (6-3a)
ENTRANCE RAMP OPEN



TCP (6-3b)
EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP



Place 1 mile (approx.) in advance of Street A exit.

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 "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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:

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

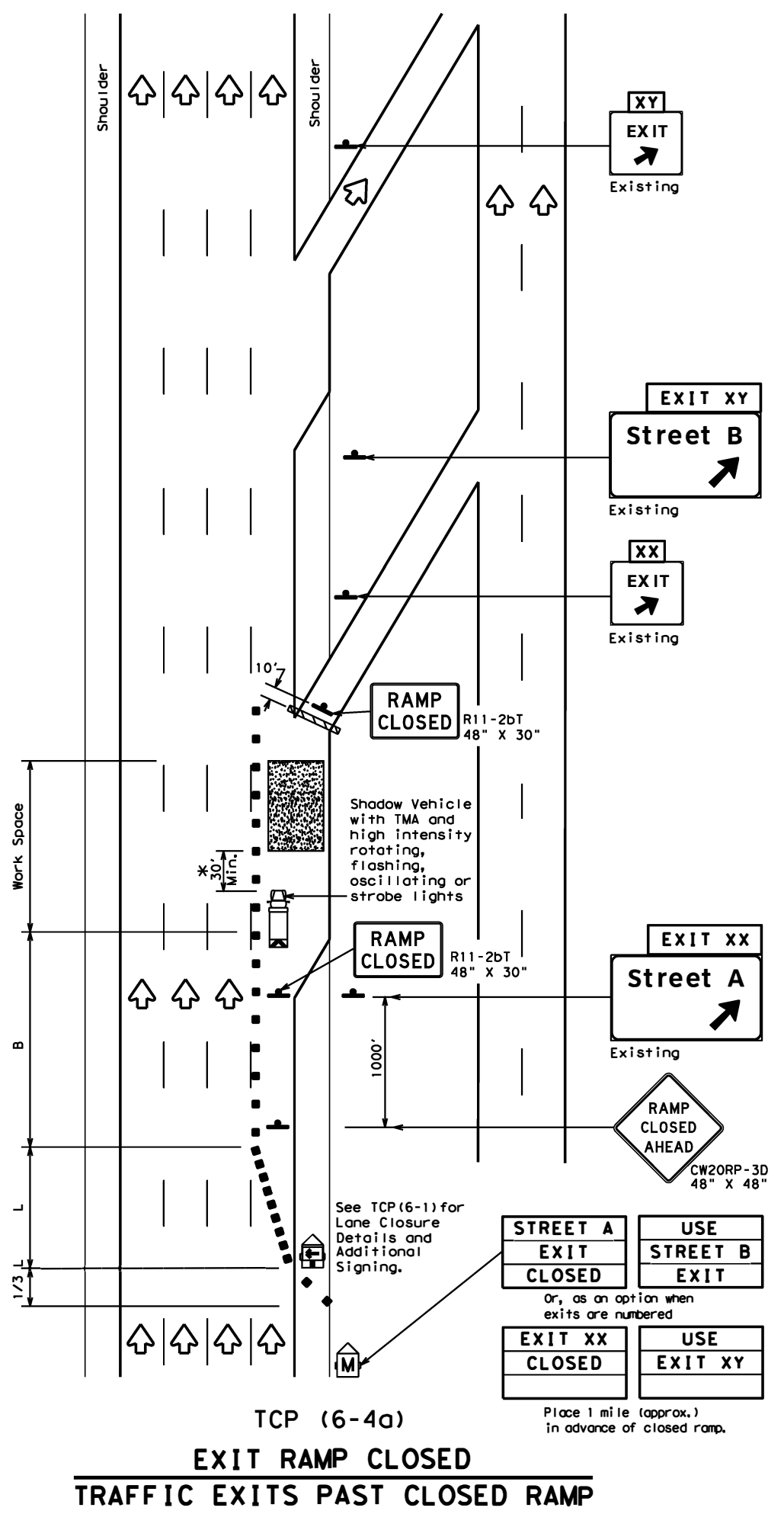
TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP (6-3) - 12

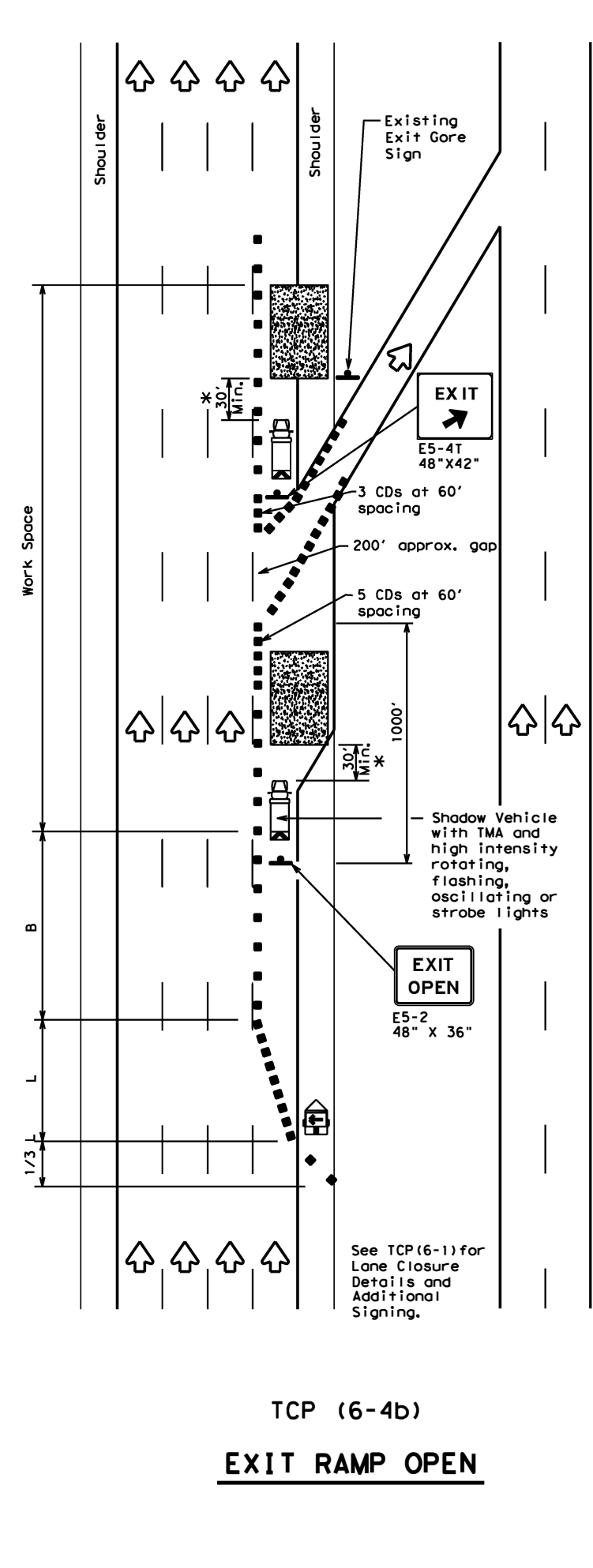
FILE: tcp6-3.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1994	CONT: 0271	SECT: 15	JOB: 099	HIGHWAY: IH 610
1-97 8-98	REVISIONS		DIST: COUNTY	SHEET NO.
4-98 8-12			HOU: HARRIS	46A

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



TCP (6-4a)
EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)
EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- See BC Standards for sign details.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP (6-4) - 12

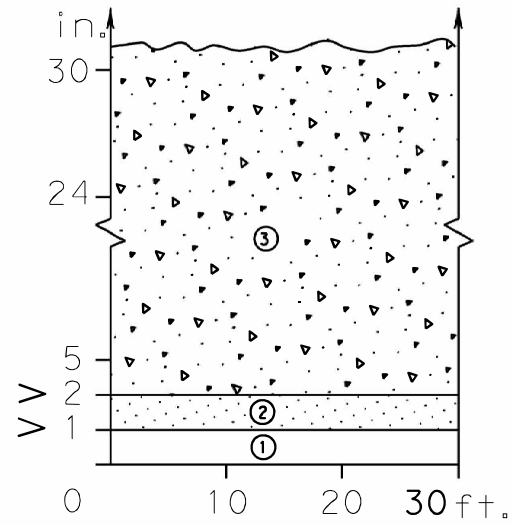
FILE: tcp6-4.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	HOU	HARRIS	47	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

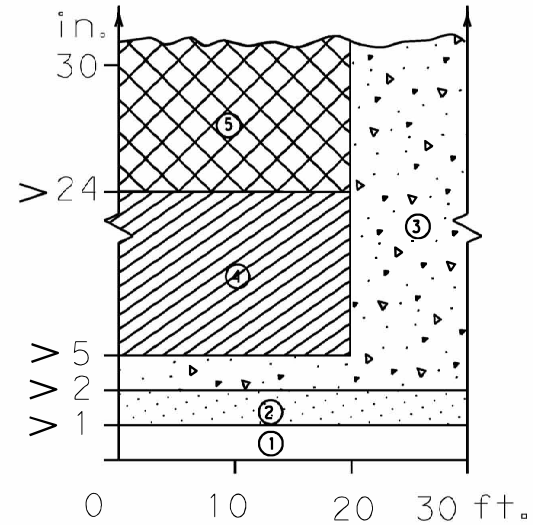
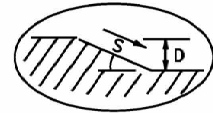
DATE: FILE:

DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

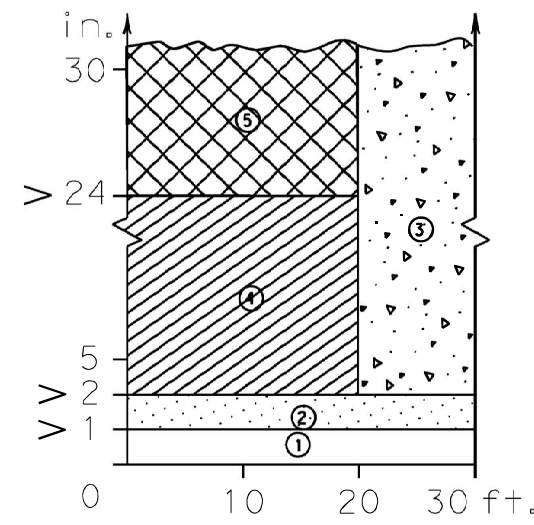
Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet



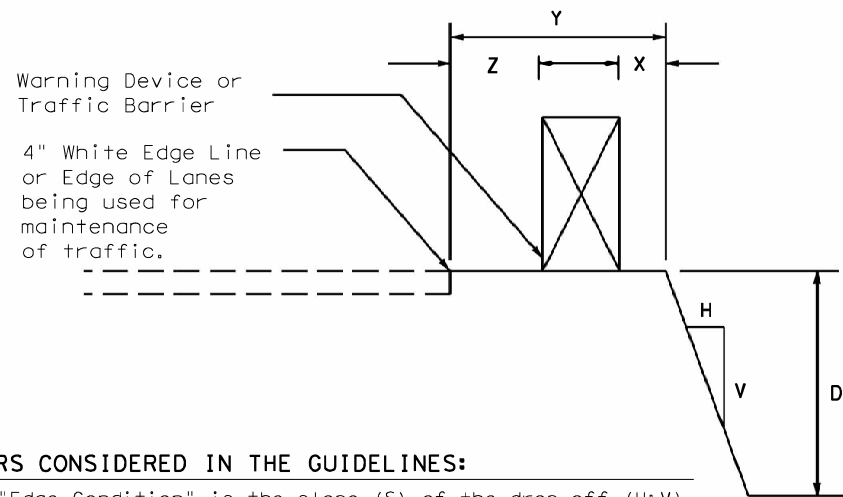
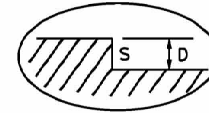
Edge Condition I
S = (3:1) (or flatter)



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



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



FACTORS CONSIDERED IN THE GUIDELINES:

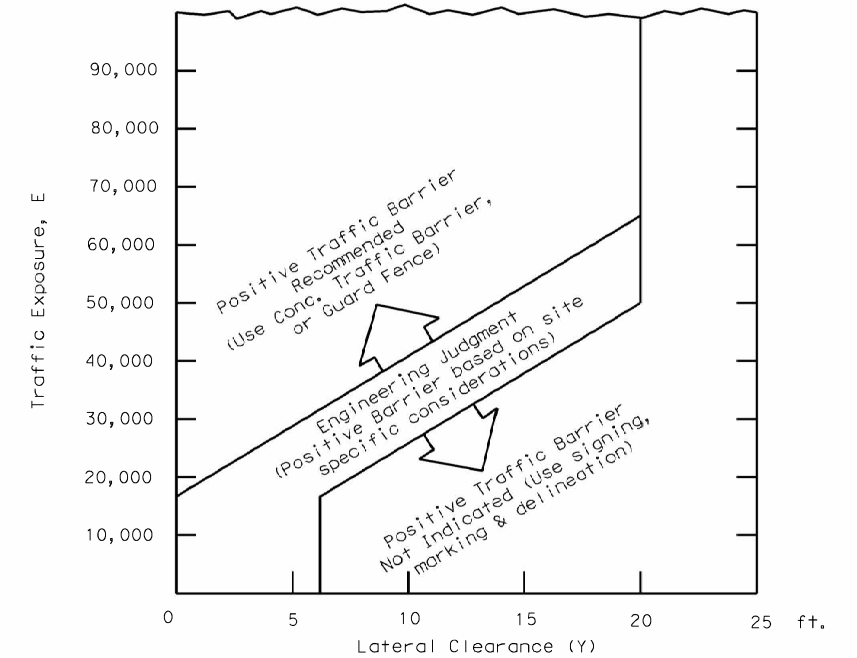
- The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height" is the depth of the drop-off "D".
- Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
- 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.
- 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.
- If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

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

Edge Condition Notes:

- 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.
- 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" exceeds 24 inches, the possibility for rollover is greater in most vehicles.
- 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.
- Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ([Cross-hatch])



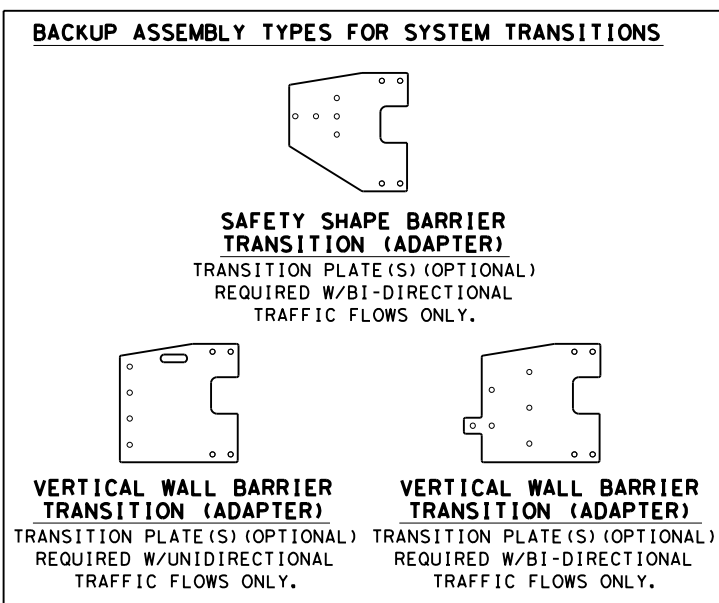
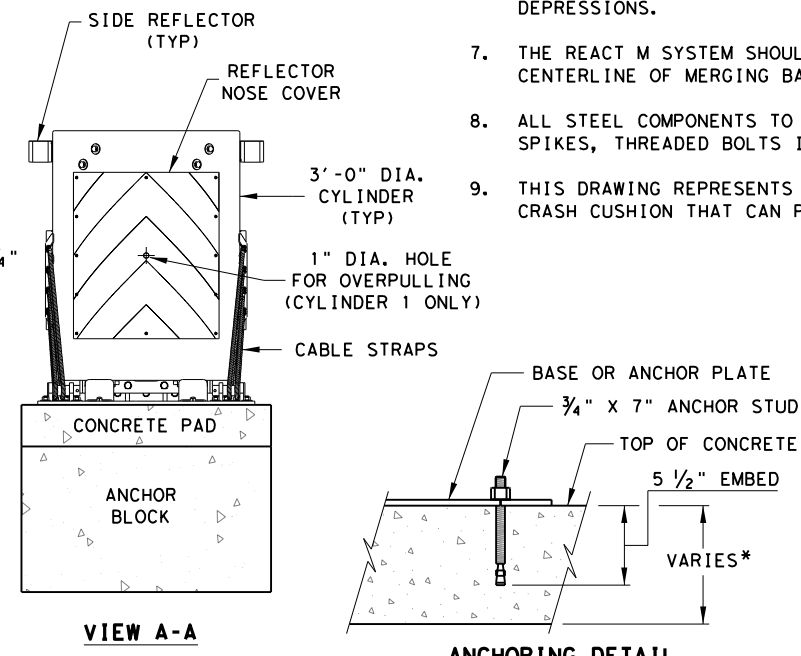
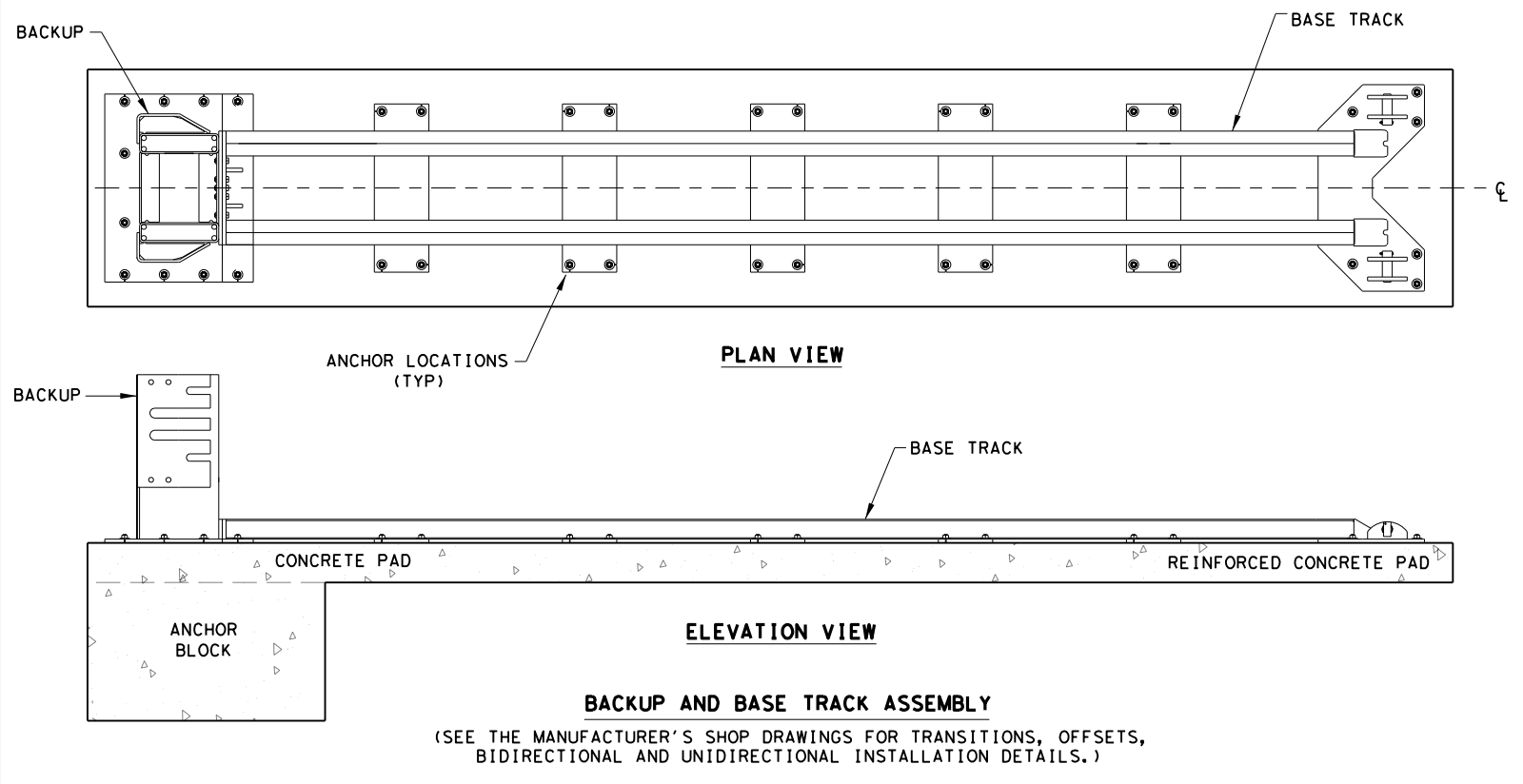
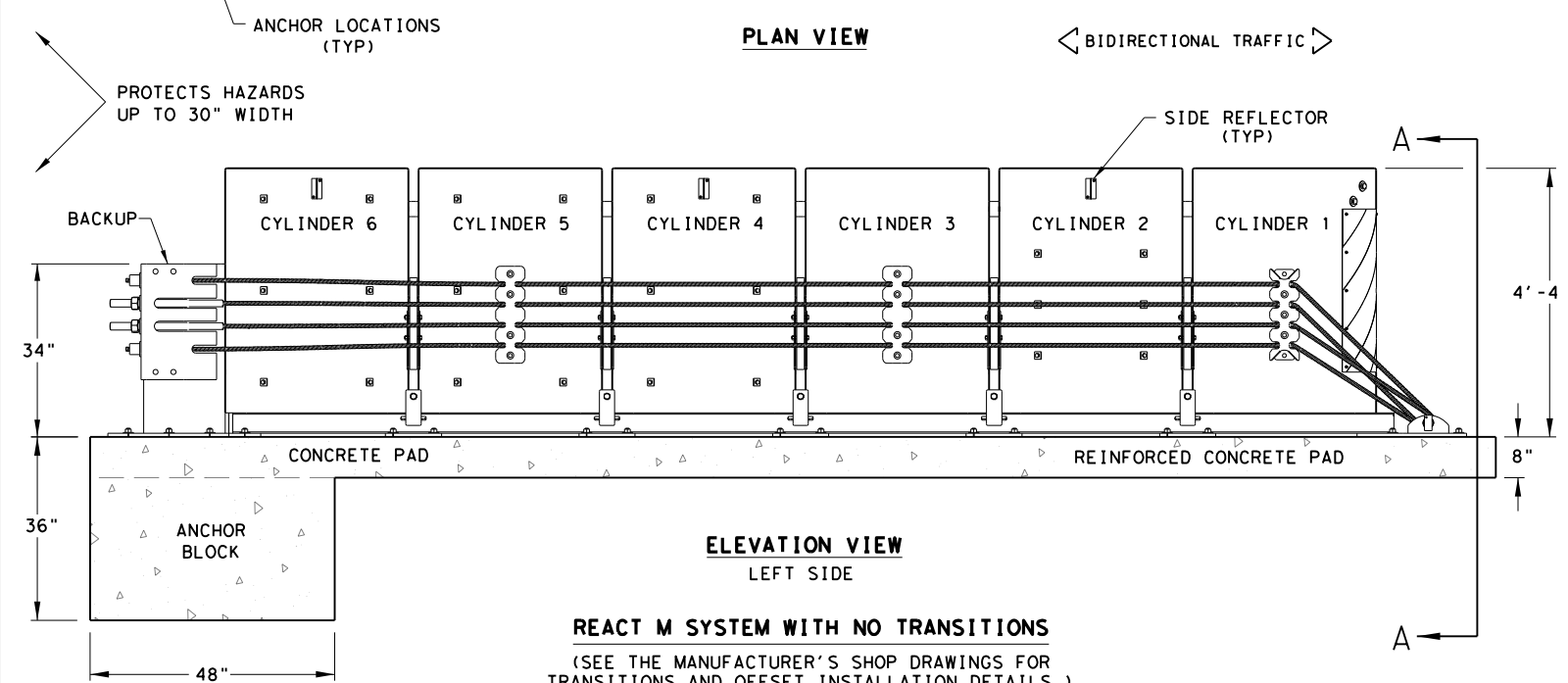
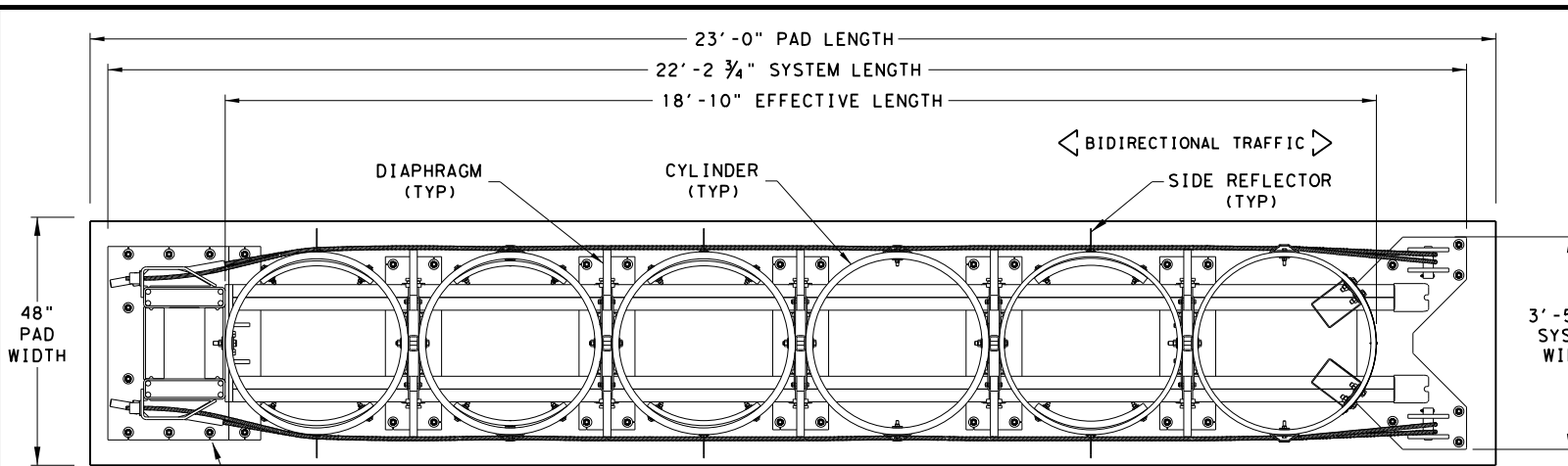
- $E = ADT \times T$
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
- Figure-1 provides a practical approach to the use of positive barriers 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.
- An approved end treatment should be provided for any positive barrier end located within the clear zone.

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

				Traffic Safety Division Standard	
<h3>TREATMENT FOR VARIOUS EDGE CONDITIONS</h3>					
FILE:	edgecon.dgn	DN:		CK:	
© TxDOT	August 2000	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
03-01		DIST		COUNTY	SHEET NO.
08-01		HOU		HARRIS	48
9-21					

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



NOTES:
 CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION AT 1(888)323-6374 OR WEBSITE: www.trinityhighway.com.
 - THE NOSE OF THE REACT M SHALL BE CLAD WITH A PLASTIC WRAP WITH STANDARD DELINEATION ADHERED TO THE WRAP AND SHALL HAVE A SERIES OF SIDE MARKER REFLECTORS ON BOTH SIDES OF THE UNIT. SEE SITE PLAN VIEWS FOR MARKER AND PLASTIC WRAP COLOR ORIENTATION.
 - FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION DETAILS WILL BE AS SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.
 - DETAILS OF COMPONENTS FOR THE REACT M, BACKUPS AND REINFORCING DETAILS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
 - IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
 - THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
 - THE REACT M SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.
 - ALL STEEL COMPONENTS TO BE HOT DIPPED GALVANIZED EXCEPT STAKES, DRIVE SPIKES, THREADED BOLTS IN BACKUP UNIT, AND WEDGE FITTINGS ON CABLES.
 - THIS DRAWING REPRESENTS THE REACT M TL-3 SYSTEM, RE-DIRECTIVE, NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH.

DESIGN DATA TABLE FOR REACT M

TEST NUMBER	TEST LEVEL	OVERALL LENGTH	TRANSITION LENGTH	SYSTEM WIDTH
3-30 to 3-36	TL-3	22'-2 3/4"	-	3'-5 3/4"
3-37A	TL-3	22'-2 3/4"	9'-10 3/4"	3'-5 3/4"
3-38	TL-3	22'-2 3/4"	-	3'-5 3/4"

ANCHOR SYSTEM TYPE

APPROVED ADHESIVE, 7" STUDS, 5.5" EMBEDMENT

FOUNDATION TYPES

MINIMUM 8" REINFORCED PORTLAND CEMENT CONCRETE PAD (REQUIRED REINFORCING STEEL FOR CONCRETE PAD SHALL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.)

MINIMUM 8" NON-REINFORCED PORTLAND CEMENT CONCRETE ROADWAY MEASURING AT LEAST 12' WIDE BY 50' LONG)

MINIMUM 7" CONCRETE DECK STRUCTURE, OR MINIMUM 6" REINFORCED CONCRETE ROADWAY

NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE REACT M SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Design Division Standard

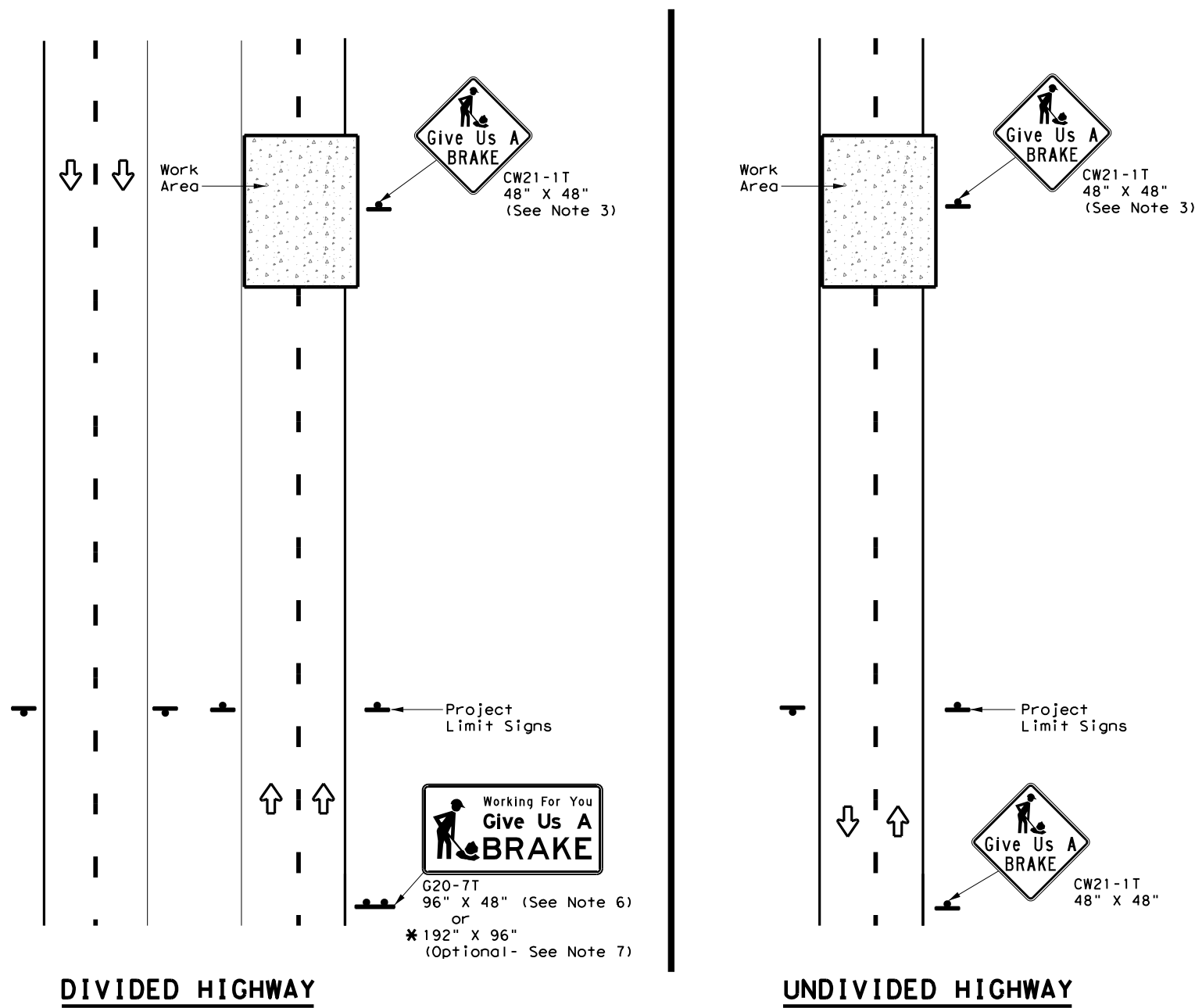
TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION REACT M (NARROW) (MASH TL-3) REACT (M) -21

FILE: reactm21.dgn	DN: TxDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		50

LOW MAINTENANCE

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL		DRILLED SHAFT
						Size	(LF)	
							① ②	24" DIA. (LF)
Orange	G20-7T		96" X 48"	Type B _{FL} or C _{FL}	32	▲	▲ ▲	▲
Orange	G20-7T		192" X 96"	Type B _{FL} or C _{FL}	128	W8x18	16 17	12

▲ See Note 6 Below

LEGEND

	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

- See BC and SMD sheets for additional sign support details.
- Sign locations shall be approved by the Engineer.
- For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
- Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
- Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
- The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
- The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
 Item 636 - Aluminum Signs
 Item 647 - Large Roadside Sign Supports and Assemblies.
 Item 416 - Drilled Shaft Foundations
- 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.

Texas Department of Transportation Traffic Operations Division Standard

**WORK ZONE
"GIVE US A BRAKE"
SIGNS**

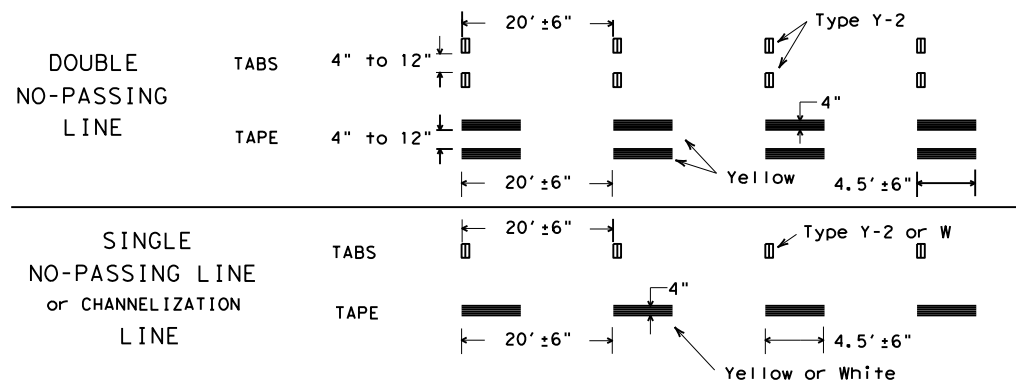
WZ (BRK) - 13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	HOU	HARRIS		51

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.

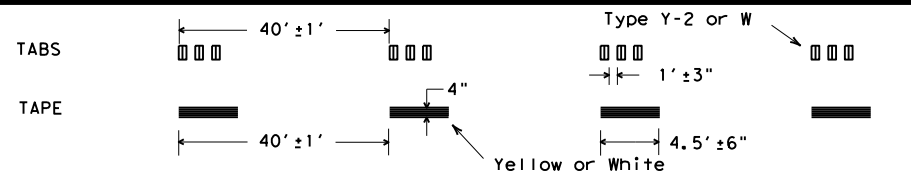
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES



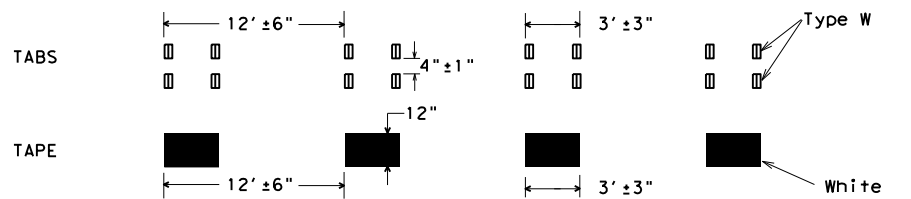
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

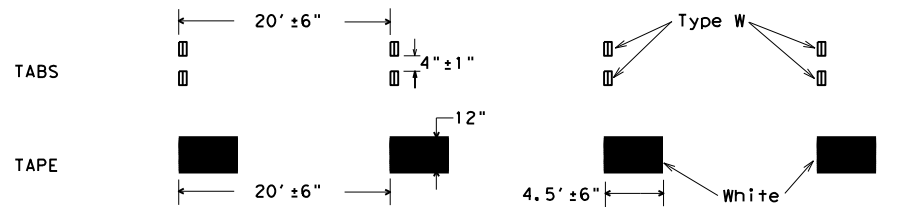


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



NOTES:

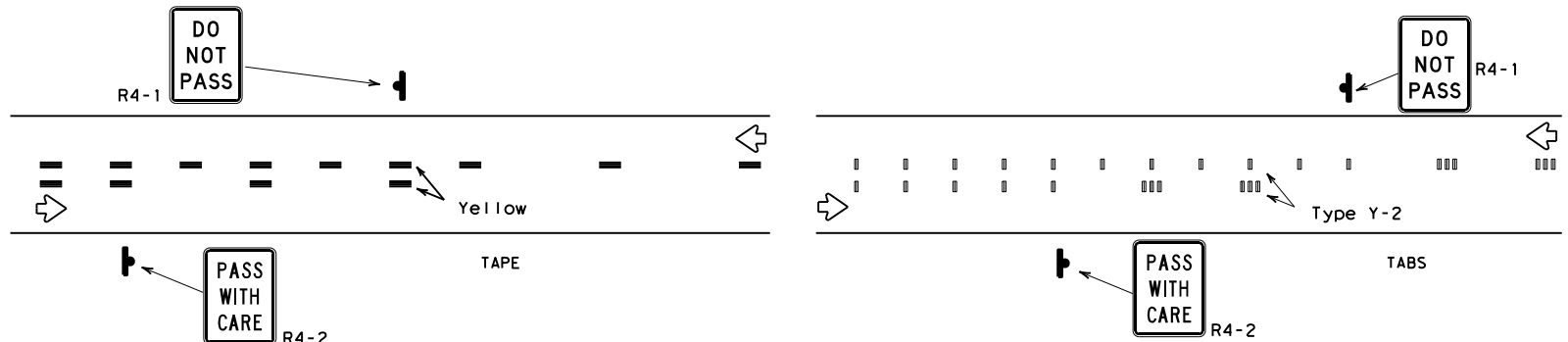
- Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
- Short term pavement markings shall NOT be used to simulate edge lines.
- Dimensions indicated on this sheet are typical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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

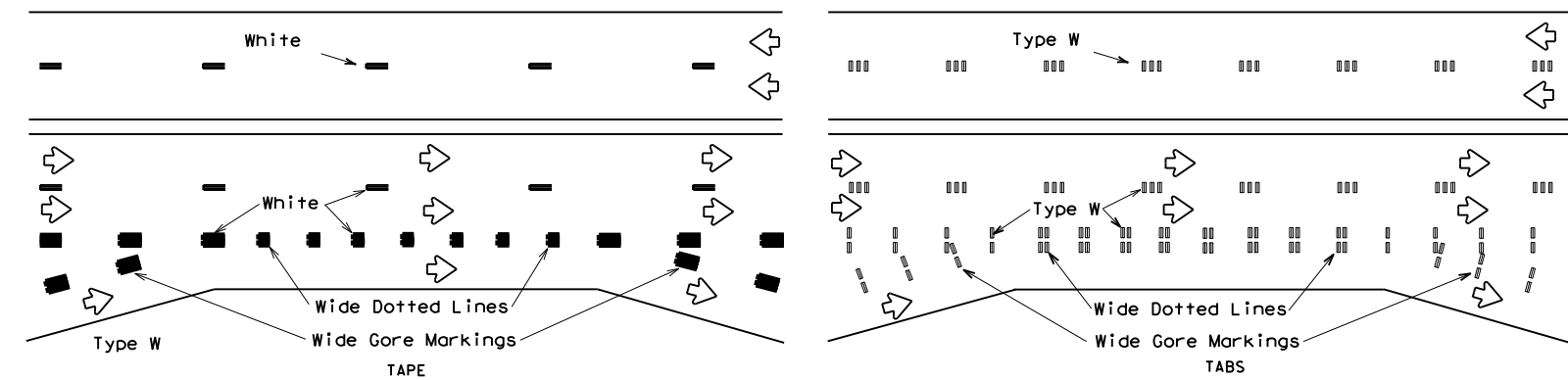
- Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may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

DATE: FILE:

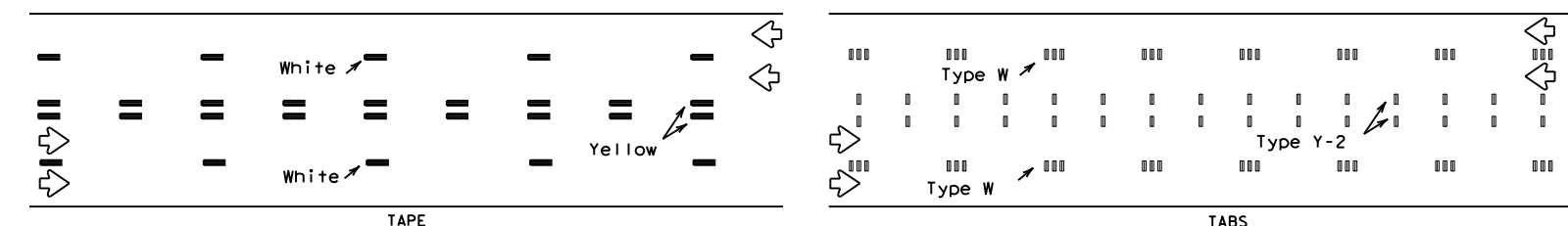
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



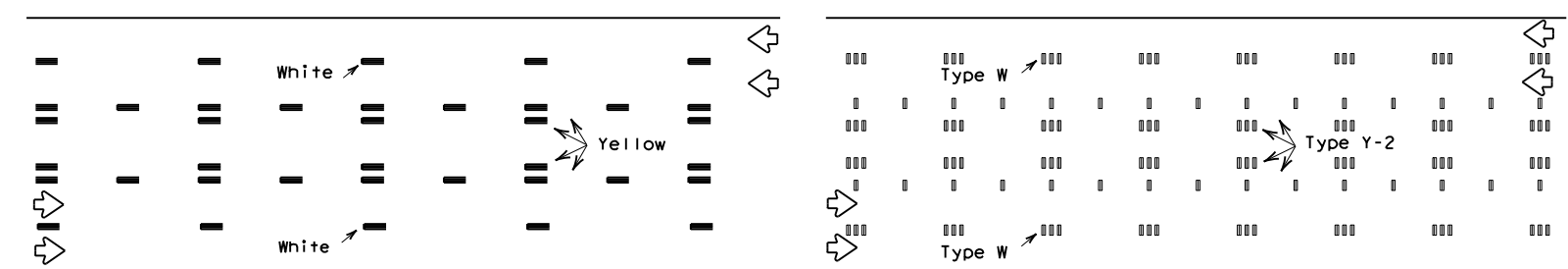
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



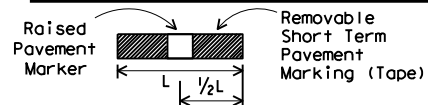
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

WORK ZONE SHORT TERM PAVEMENT MARKINGS

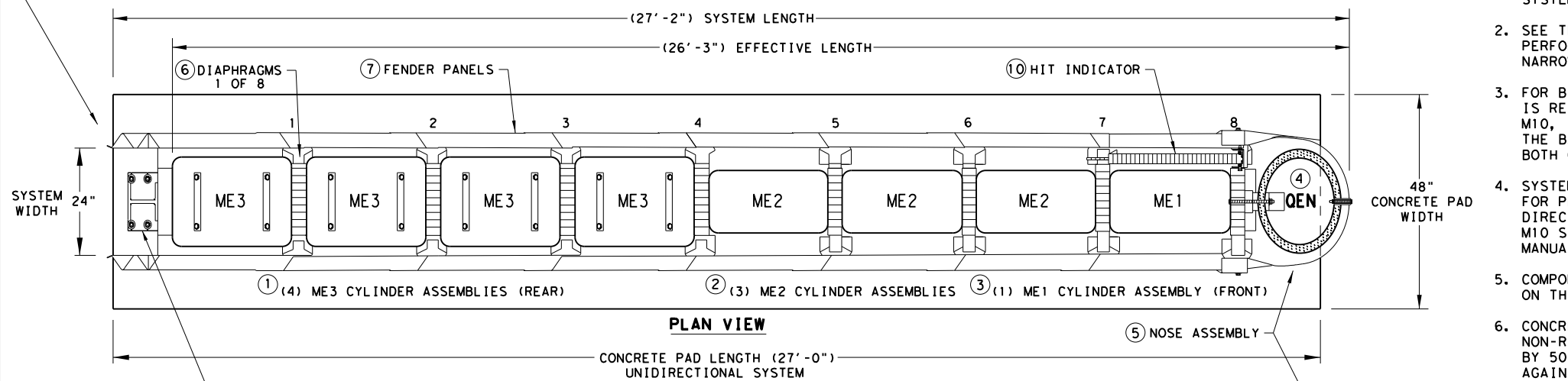
WZ (STPM) - 13

FILE:	wzstpm-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	April 1992	CONT:	0271	SECT:	15	JOB:	099	HIGHWAY:	IH 610
REVISIONS:		DIST:		COUNTY:		SHEET NO.:			
1-97		HOU:		HARRIS					52
3-03									
7-13									

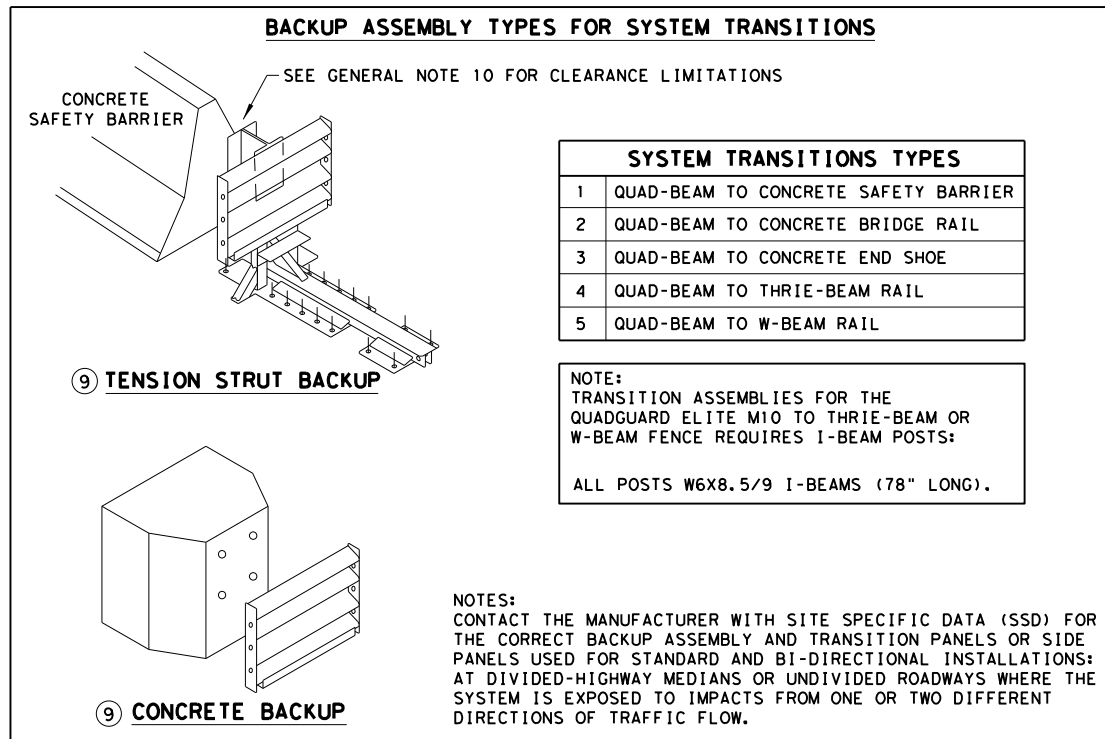
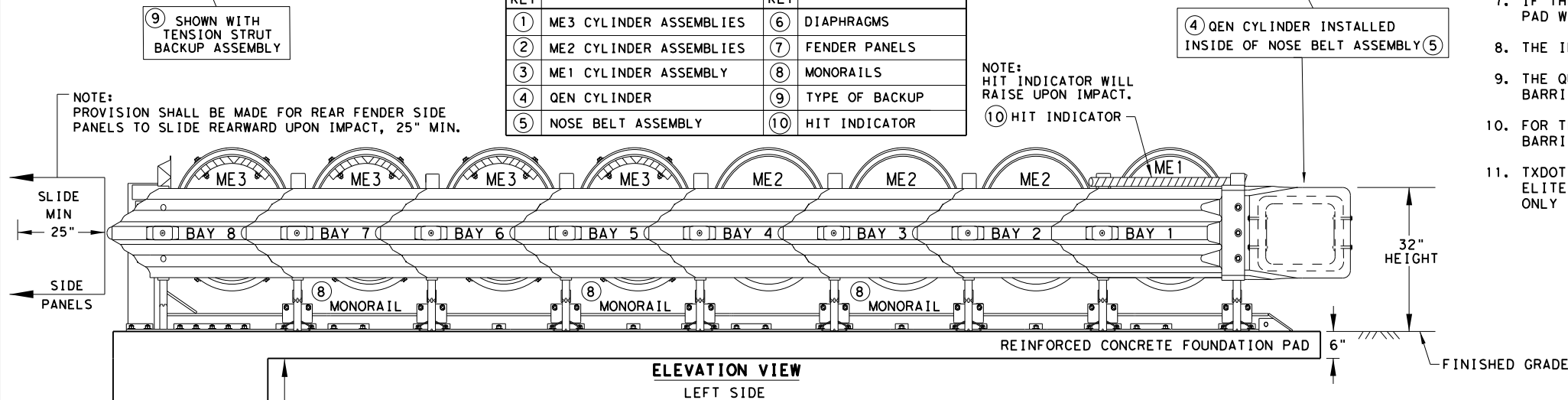
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

NOTE:
 A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD ELITE M10 24" WIDE (8 BAY) SYSTEM



KEY	KEY	KEY
① ME3 CYLINDER ASSEMBLIES	⑥ DIAPHRAGMS	
② ME2 CYLINDER ASSEMBLIES	⑦ FENDER PANELS	
③ ME1 CYLINDER ASSEMBLY	⑧ MONORAILS	
④ QEN CYLINDER	⑨ TYPE OF BACKUP	
⑤ NOSE BELT ASSEMBLY	⑩ HIT INDICATOR	



SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
 TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:
 ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
 CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
- SEE THE RECENT QUADGUARD ELITE M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
- FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10, THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
- SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
- COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
- CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
- IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
- THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
- FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
- TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD ELITE M10 SYSTEM. THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS	
FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
 ASPHALT CONCRETE (A.C.)
 COMPACTED SUBBASE (C.S.)
 PORTLAND CEMENT CONCRETE (P.C.C.)
 NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.
 IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.
 TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

NOTES:
 CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.
 A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE M10 FIELD INSTALLATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.
 6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.
 8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.
 CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
 THE QUADGUARD ELITE M10 8-BAY, 24" WIDE - NARROW SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	24"	REAR	FRONT		NOSE

DATE: FILE:

NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

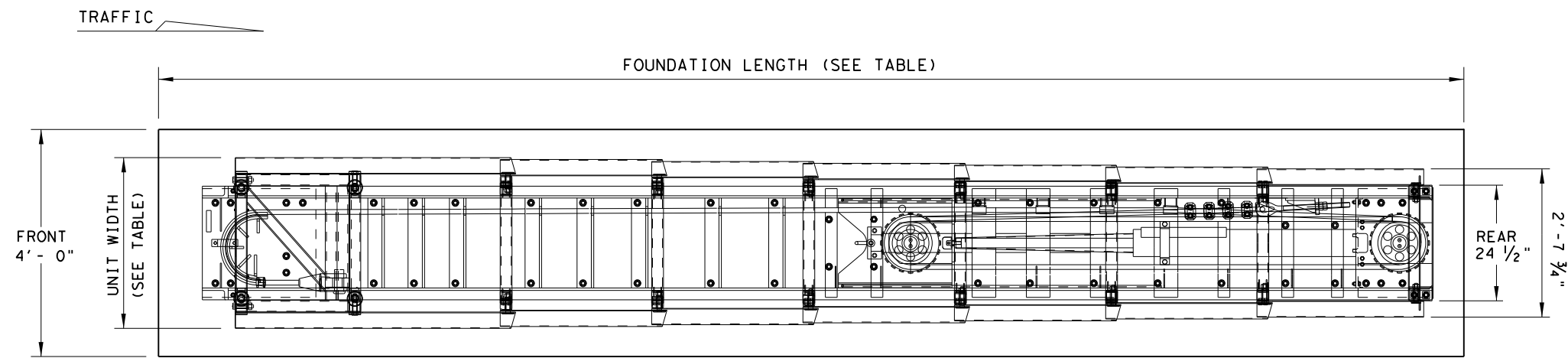
LOW MAINTENANCE

Design Division Standard
TRINITY HIGHWAY
ENERGY ABSORPTION
QUADGUARD ELITE M10
(MASH TL-3)
QGUARD ELITE (M10) (N) -20

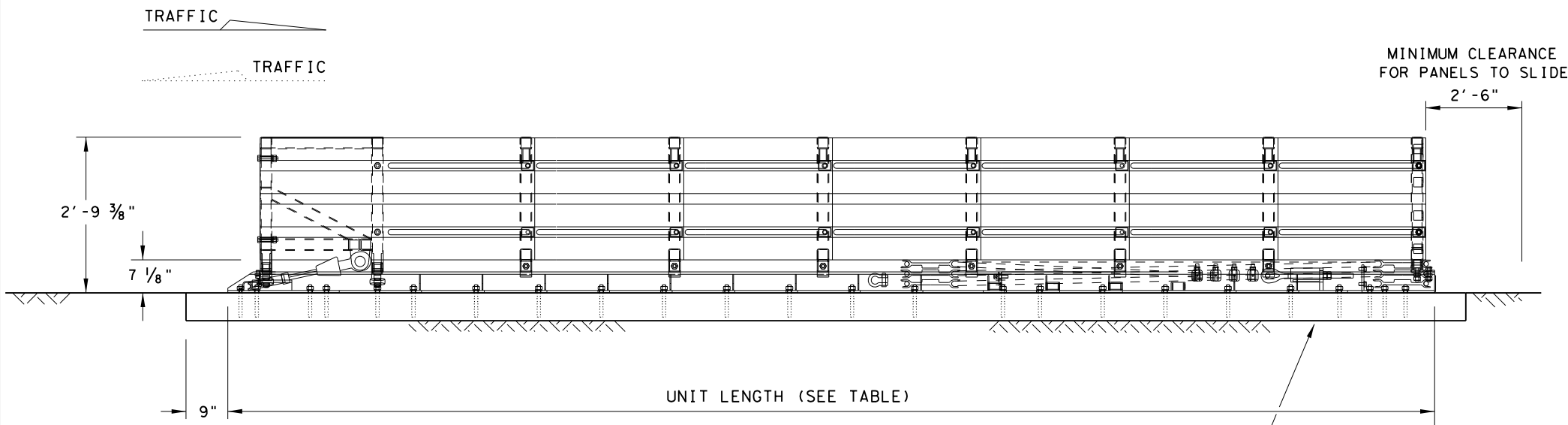
FILE: qgel1+em10n20.dgn	DN: TXDOT	CK: KM	DW: VP	CK: AG
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS		53

DISCLAIMER: This standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



PLAN VIEW



ELEVATION VIEW

6" REINFORCED PAD SHOWN
(SEE FOUNDATION OPTIONS)

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 5/8"	15'- 6 1/4"	24" to 36"
SCI100GM	TL-3	21'-6"	3'-1 1/2"	23'- 0"	24" to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS

6" REINFORCED CONCRETE (5 1/2" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 1/2" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 1/2" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 1/2" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 1/2" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS

CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.



**WORK AREA PROTECTION
CORP
(SMART-NARROW)**

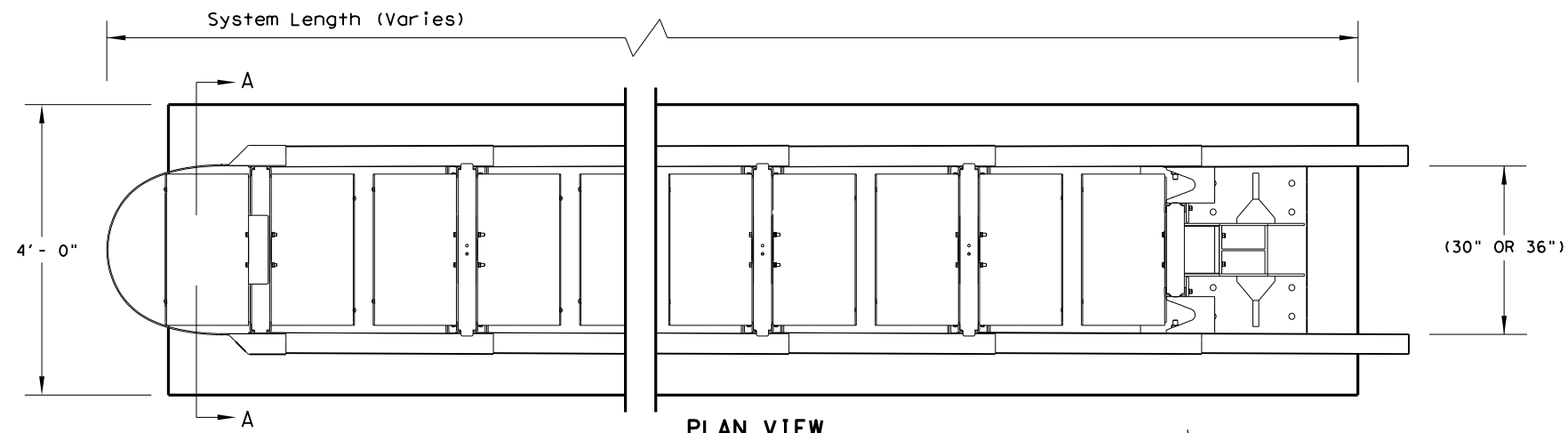
SMTc (N) - 16

LOW MAINTENANCE

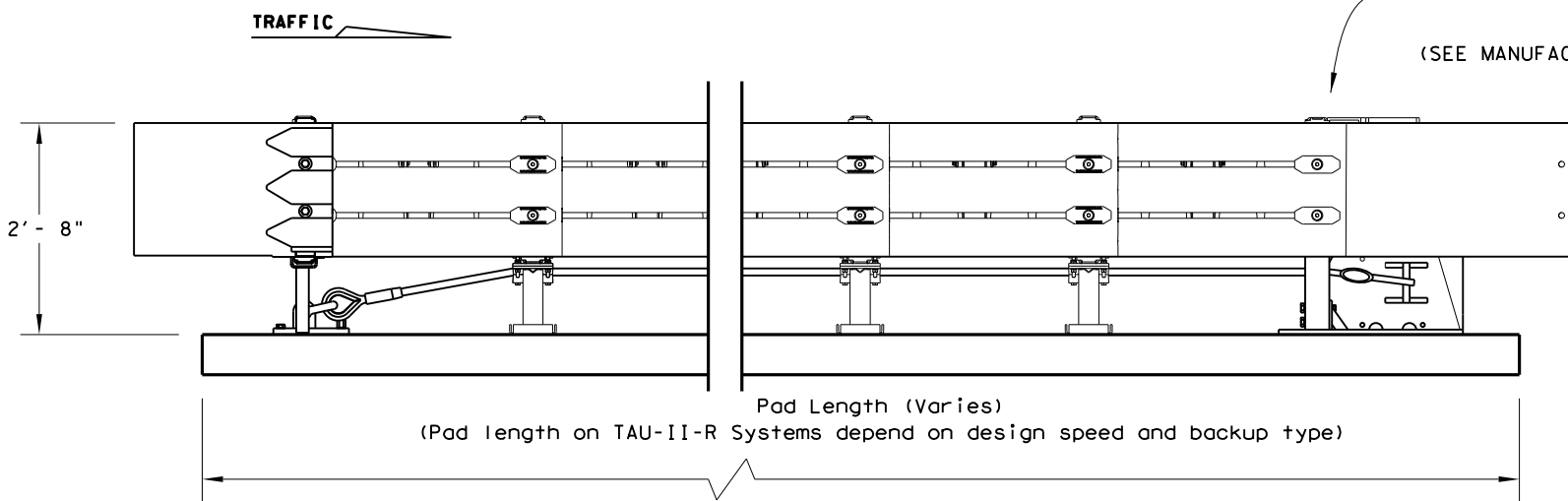
FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	027	15	099	IH 610
REVISED 06, 2013 (VP)	DIST	COUNTY	SHEET NO.	
REVISED 03, 2016 (VP)	HOU	HARRIS	54	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

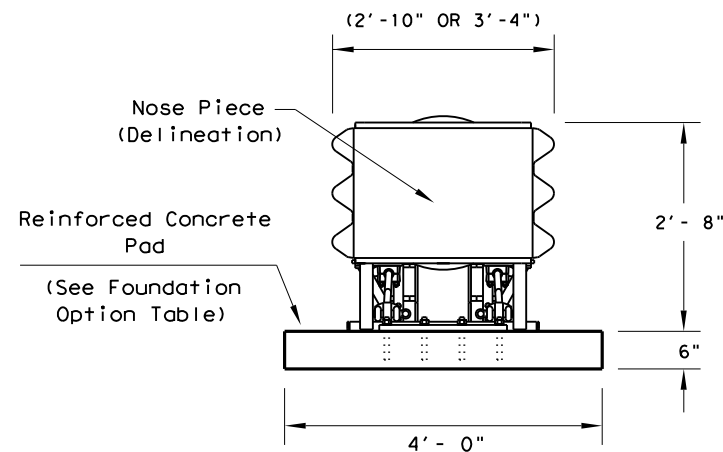
DATE: \$DATES
FILE: \$FILES



PLAN VIEW



ELEVATION VIEW



SECTION A-A

Nose Piece delineation orientation, is shown elsewhere on the plans.

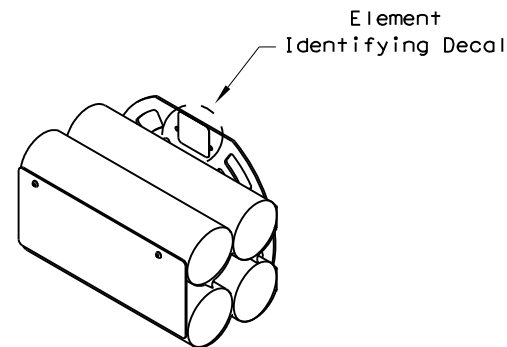
TRANSITION OPTIONS
Vertical Wall
Concrete Traffic Barriers
W-Beam Guardrail
Thrie Beam Guardrail

For bi-directional transition panel and end shoe details. (See manufacturer's product manual.)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations. (See manufacturer's product manual)

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available. (SEE MANUFACTURER'S PRODUCT MANUAL)



ENERGY ABSORBING ELEMENTS (EAE)

BACKUP SUPPORT OPTIONS
Compact (Stand Alone)
Flush Mount
PCB (Concrete Barrier)

TAU-II-R (NARROW) SYSTEM LENGTHS			
BACKSTOP	TL-2	TL-3	70 mph
PCB	13'-7"	27'-10"	30'-7"
Flush Mount	14'-0"	28'-3"	31'-0"
Compact	15'-3"	29'-6"	32'-3"

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

Note: System lengths are ± 2"

GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
- For bi-directional traffic, appropriate transition panels will be required.
- Additional details for the backup support option, transition options and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
- Concrete shall be class "S" with a minimum compressive strength of 4,000 psi.
- Maximum permissible cross-slope is 8%.
- The installation area should be free from curbs, elevated objects, or depressions.
- The TAU-II-R system should be approximately parallel with the barrier or center of merging barriers.
- Refer to Universal TAU-II-R configuration chart for specific systems configuration number and location of each type of energy absorbing element.
- 30-inch (30") model shown, also available in 36-inch (36") configuration.

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	1	Backstop Assembly (See Table)
TBD	1	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
B010651	4	Pipe Panel Mount
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.

(See manufacturer's product manual for details)



LTS-BARRIER SYSTEMS
CRASH CUSHION
(R-NARROW)

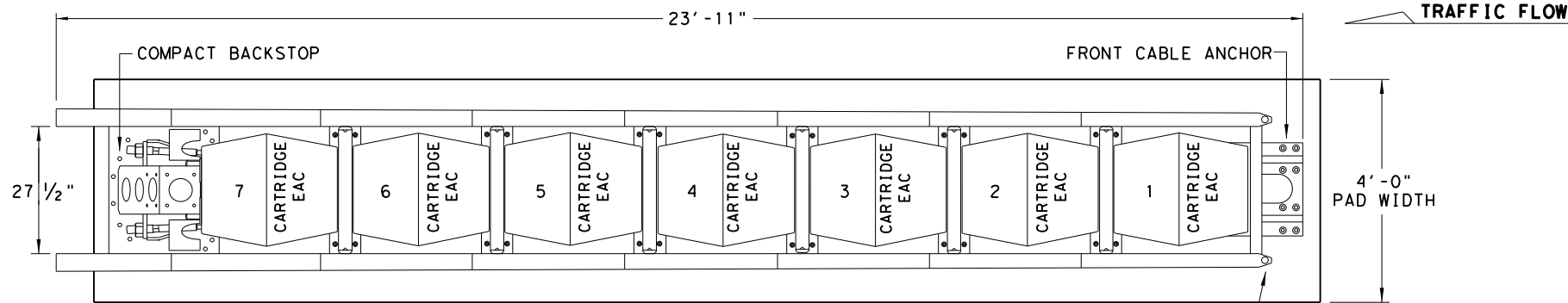
TAU-II-R(N)-16

LOW MAINTENANCE

FILE: tauirr16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
REVISED 06, 2013 (VP)	DIST	COUNTY	SHEET NO.	
REVISED 03, 2016 (VP)	HOU	HARRIS		55

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.

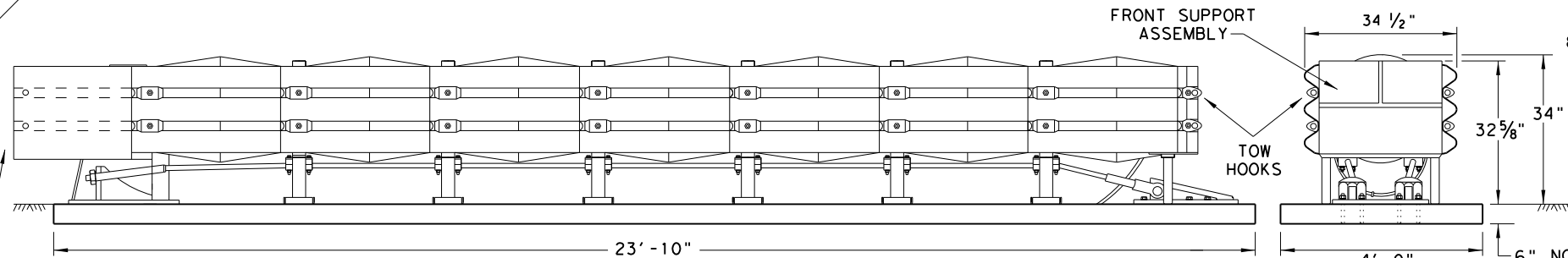
TAU(M) (N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE



PLAN VIEW

NOTE:
 TAU(M) (N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES,
 INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.

PROTECTS HAZARDS
 UP TO 30" WIDTH



ELEVATION VIEW

NOTE:
 PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

NOTES:
 TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES,
 RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE.
 SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR
 ADDITIONAL TRANSITION DETAILS.

NOTE:
 CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND
 TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE
* 6" ASPHALT OVER 6" COMPACT SUBBASE
* 8" MINIMUM ASPHALT

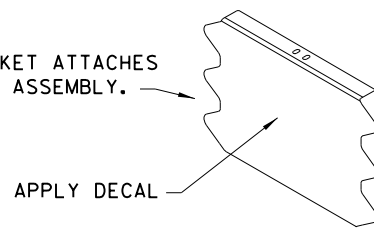
SYSTEM & FOUNDATION LENGTH TABLE	
SYSTEM LENGTH	FOUNDATION LENGTH
TL-2 = 15'-5"	TL-2 = 15'-4"
TL-3 = 23'-11"	TL-3 = 23'-10"

* NOTE:
 REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES
 FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT
 HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED
 SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S
 INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

NOTE:
 SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION
 SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION
 STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

* * NOTE:
 ENGINEER OR CONTRACTOR SHALL COORDINATE WITH
 THE MANUFACTURER FOR THE CORRECT DECAL PER
 TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
 DELINEATION BRACKET ATTACHES
 TO FRONT SUPPORT ASSEMBLY.



DELINEATION BRACKET

NOTE:
 APPLY A HIGH REFLECTIVE DECAL TO THE DELINEATION BRACKET.
 DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION
 PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD
 FOR (TRAFFIC CONTROL DEVICES). DECALS ARE AVAILABLE FOR
 TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTES:
 UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING
 NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS.
 SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M) (N) UNIDIRECTIONAL SYSTEM IS FREE STANDING
 AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE
 BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE
 UNIVERSAL TAU(M) (N) SYSTEM, IT IS NOT INTENDED TO
 REPLACE THE INSTALLATION INSTRUCTION MANUAL.

REUSABLE

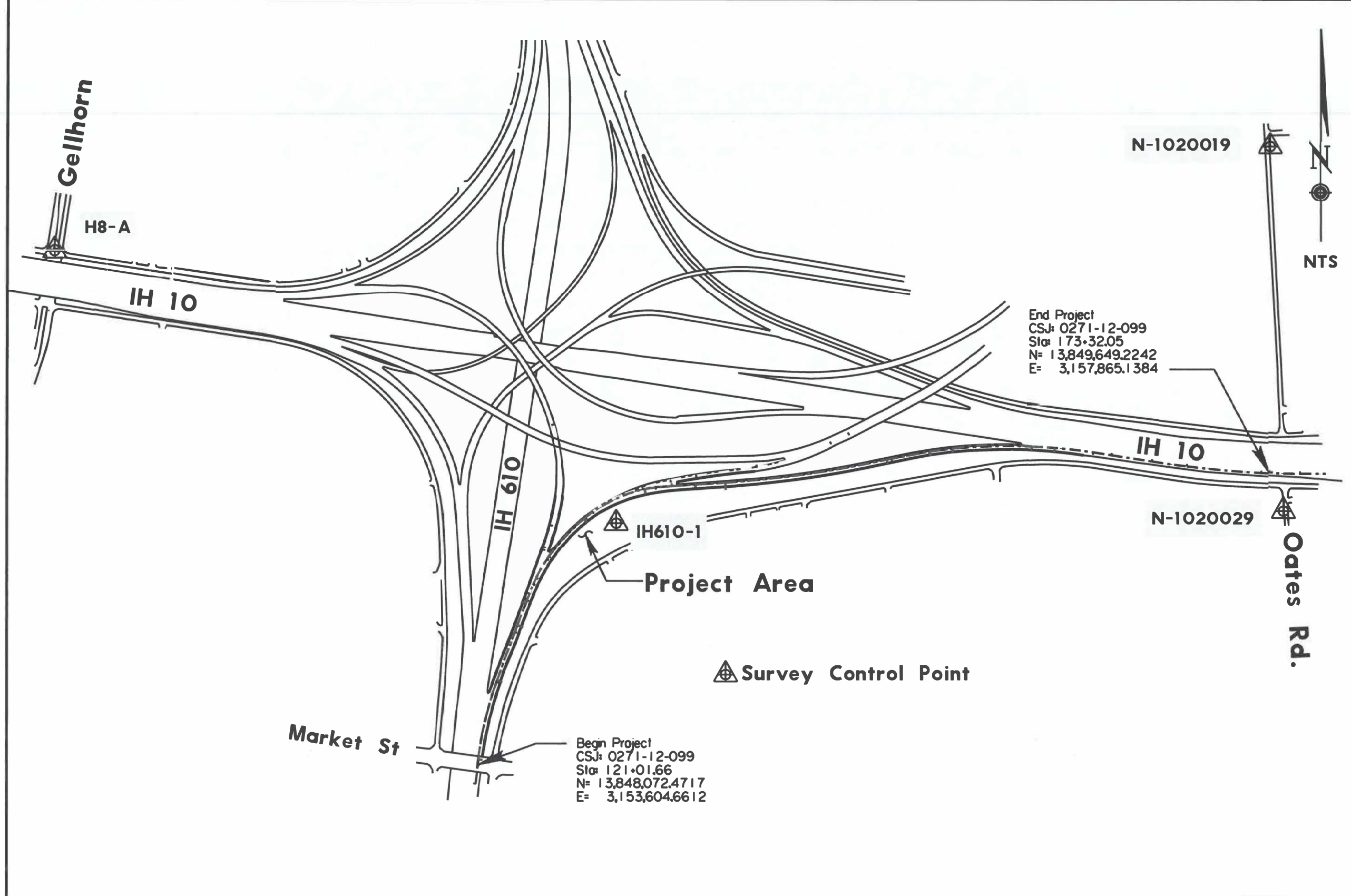
GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
- REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
- INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
- CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
- IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
- THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE TAU(M) (N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
- THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M) (N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.

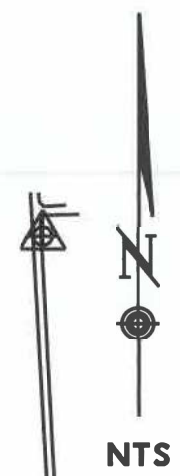
BILL OF MATERIALS FOR TAU(M) (N) TL-3 & TL-2 SYSTEMS		QUANTITIES	
PART NUMBER	PART DESCRIPTION	TL-3 SYSTEM	TL-2 SYSTEM
BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M) (N)	14	8
BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M) (N)	2	2
BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M) (N)	2	-
BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M) (N)	-	2
BSI-1708018-00	FRONT CABLE ANCHOR	1	1
BSI-1707034-00	COMPACT BACKSTOP	1	1
B030703	MIDDLE SUPPORT ASSEMBLY	6	3
B030704	FRONT SUPPORT	1	1
B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808034-KT	DELINEATION BRACKET KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
* * SEE NOTE	HIGH REFLECTIVE DECAL	1	1
ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

		Design Division Standard	
LINDSAY TRANSPORTATION SOLUTIONS UNIVERSAL CRASH CUSHION (MASH TL-3 & TL-2) TAU(M) (N) - 19			
FILE: tau19.dgn	DW: TxDOT	CK: KM	VP: VP
© TxDOT: APRIL 2019	CONT: 0271	SECT: 15	JOB: 099
REVISIONS	HOU: HARRIS	COUNTY: HARRIS	HIGHWAY: IH 610
			SHEET NO.: 56

DATE: FILE:



- NOTES
1. ALL HORIZONTAL CONTROL POINT VALUES AS SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM OF NAD 83 - SOUTH CENTRAL ZONE (4204) UTILIZING PROVIDED TXDOT PROJECT CONTROL DATA AS ESTABLISHED BY UNITED ENGINEERS, INC IN 2006.
 2. TXDOT CONTROL POINTS N1020019, N1020029, AND H8-A AS ESTABLISHED BY UNITED ENGINEERS, INC. WERE UTILIZED FOR THIS PROJECT
 3. ALL ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND HOLDING PROVIDED TXDOT PROJECT CONTROL N1020029 WITH A PUBLISHED ELEVATION OF 31.22 FEET AS ESTABLISHED BY UNITED ENGINEERS, INC.
 4. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A TXDOT COMBINED SCALE FACTOR OF 1.00013.
 5. ALL MEASUREMENTS SHOWN ARE IN U.S. SURVEY FEET.
- AN ON THE GROUND SURVEY WAS PERFORMED UNDER MY SUPERVISION UTILIZING SURVEY CONTROL POINTS AS ESTABLISHED BY UNITED ENGINEER, INC, WHILE UNDER THE DIRECT SUPERVISION OF TXDOT.



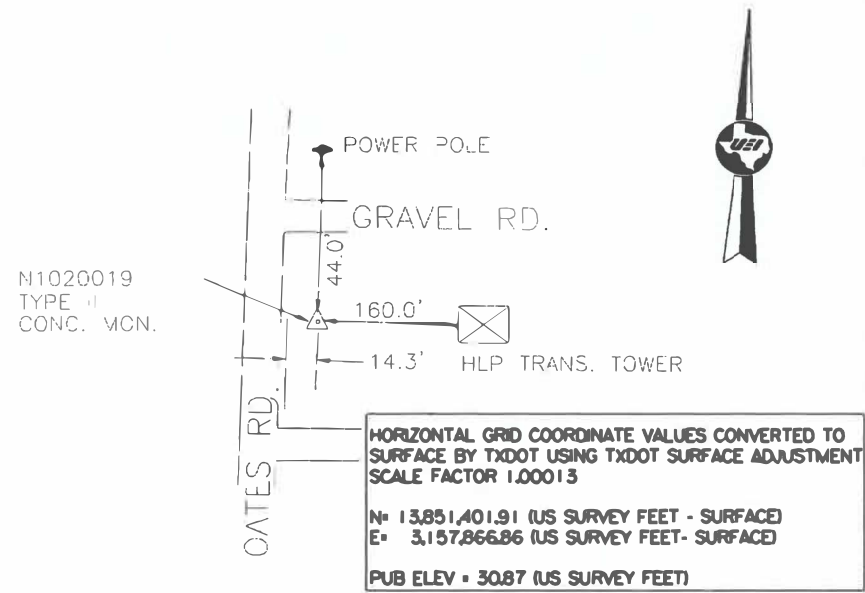
THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

Anusha Pokhrel
 00
 9/30/2024

TEXAS DEPARTMENT OF TRANSPORTATION
 © 2024 TXDOT

Survey Control Index

APRIL 2024	FED. RD. DIV.	RD.	STATE	PROJECT NO.		HIGHWAY
	6		TX			IH610
DISTRICT	COUNTY		CONTROL	SECT	JOB	SHEET
HOUSTON	HARRIS		0271	15	099	57



NOT TO SCALE
(all measurements & data in US Survey Feet)

General Location: LOCATED ALONG CATES ROAD OFF THE EAST EDGE OF PMVT. APPROXIMATELY 2/10 MILE NORTH OF I-10

Combined Scale Factor: 0.999895615

Texas Coordinate System,
South Central Zone, NAD 83
Grid X= 3157456.39
Grid Y= 13849601.46

Surface X= 3157786.02
Surface Y= 13851047.30
Elevation: 30.87

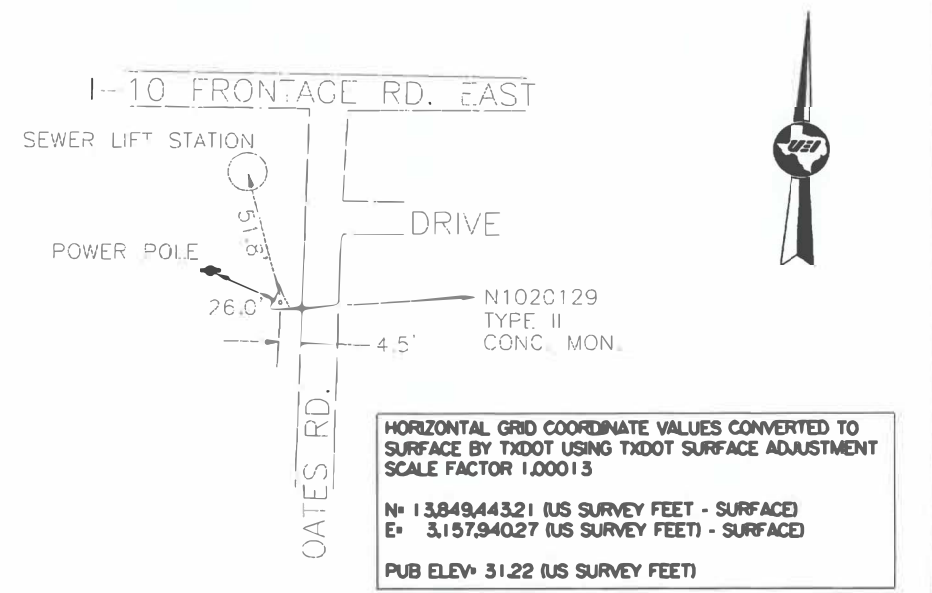
Date Set: 2/10/05
Type of Mark: 5/8" I.R. TXDOT CAP



Aurelio D. Cortes
C. S. J. No. 0508-01-166 FNC 150

United Engineers, Inc.
 CIVIL ENGINEERING • LAND DEVELOPMENT
 CONSTRUCTION MANAGEMENT • SURVEYING

8303 SOUTHWEST FREEWAY, SUITE 600 TEL (713) 271-2900
 HOUSTON, TEXAS 77074 FAX (713) 271-2999



NOT TO SCALE
(all measurements & data in US Survey Feet)

General Location: LOCATED ALONG CATES ROAD OFF THE WEST EDGE OF PMVT APPROXIMATELY 140' SOUTH OF I-10 FRONTAGE RD. EAST

Combined Scale Factor: 0.999895615

Texas Coordinate System,
South Central Zone, NAD 83
Grid X= 3157529.79
Grid Y= 13847643.02

Surface X= 3157859.42
Surface Y= 13849088.65
Elevation: 31.22

Date Set: 2/10/2005
Type of Mark: 5/8" I.R. TXDOT CAP

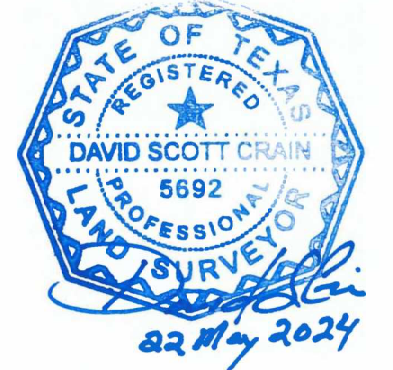


Aurelio D. Cortes
C. S. J. No. 0508-01-166 FNC 150

United Engineers, Inc.
 CIVIL ENGINEERING • LAND DEVELOPMENT
 CONSTRUCTION MANAGEMENT • SURVEYING

8303 SOUTHWEST FREEWAY, SUITE 600 TEL (713) 271-2900
 HOUSTON, TEXAS 77074 FAX (713) 271-2999

- NOTES
- ALL HORIZONTAL CONTROL POINT VALUES AS SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM OF NAD 83 - SOUTH CENTRAL ZONE (4204) UTILIZING PROVIDED TXDOT PROJECT CONTROL DATA AS ESTABLISHED BY UNITED ENGINEERS, INC IN 2006.
 - TXDOT CONTROL POINTS N1020019, N1020029, AND H8-A AS ESTABLISHED BY UNITED ENGINEERS, INC. WERE UTILIZED FOR THIS PROJECT.
 - ALL ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND HOLDING PROVIDED TXDOT PROJECT CONTROL N1020029 WITH A PUBLISHED ELEVATION OF 31.22 FEET AS ESTABLISHED BY UNITED ENGINEERS, INC.
 - ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A TXDOT COMBINED SCALE FACTOR OF 1.00013.
 - ALL MEASUREMENTS SHOWN ARE IN U.S. SURVEY FEET.
- AN ON THE GROUND SURVEY WAS PERFORMED UNDER MY SUPERVISION UTILIZING SURVEY CONTROL POINTS AS ESTABLISHED BY UNITED ENGINEER, INC, WHILE UNDER THE DIRECT SUPERVISION OF TXDOT.



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



Anusha Pokhrel
00
9/30/2024

TEXAS DEPARTMENT OF TRANSPORTATION
 © 2024 TXDOT

Horizontal and Vertical Control Sheet

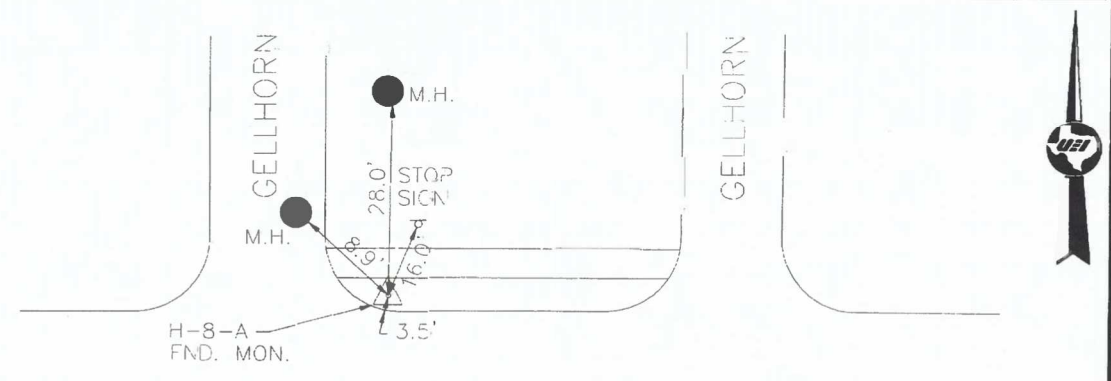
APRIL 2024	FED. RD. DIV. RD.	STATE	PROJECT NO.			HIGHWAY
	6	TX				IH610
DISTRICT	COUNTY	CONTROL	SECT	JOB	SHEET	
HOUSTON	HARRIS	0271	15	099	58	



Texas Department of Transportation

HOUSTON DISTRICT HARRIS COUNTY, TEXAS

SURVEY CONTROL PT: H-8-A



I-10 EAST FRONTAGE RD.

HORIZONTAL GRID COORDINATE VALUES CONVERTED TO SURFACE BY TXDOT USING TXDOT SURFACE ADJUSTMENT SCALE FACTOR 1.00013
N= 13850833.28 (US SURVEY FEET - SURFACE)
E= 3151325.44 (US SURVEY FEET) - SURFACE
PUB ELEV= 30.70 (US SURVEY FEET)

NOT TO SCALE
(all measurements & data in US Survey Feet)

General Location: SET 5/8" I.R. W/TXDOT CAP LOCATED BETWEEN SIDEWALK AND PVMT. OF MEDIAN DIRECTLY NORTH OF I-10 UNDERPASS @ GELLHORN

Combined Scale Factor: ~~0.999895615~~
Texas Coordinate System, South Central Zone, NAD 83
Grid X= 3150915 82
Grid Y= 13849032 91
Surface X= ~~3151244.76~~
Surface Y= ~~13850478.69~~
Elevation: 30.70
Date Set: 11/19/99
Type of Mark: 5/8" I.R. TXDOT CAP

STATE OF TEXAS REGISTERED PROFESSIONAL LAND SURVEYOR
AURELIO D. CORTES
5413
[Signature] 5/31/04
C. S. J. No. 0508-01-166 FNC 150

United Engineers, Inc.
CIVIL ENGINEERING • LAND DEVELOPMENT
CONSTRUCTION MANAGEMENT • SURVEYING
5303 SOUTHWEST FREEWAY, SUITE 600 TEL. (713) 271-2900
HOUSTON, TEXAS 77074 FAX (713) 271-2999

- NOTES
1. ALL HORIZONTAL CONTROL POINT VALUES AS SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM OF NAD 83 - SOUTH CENTRAL ZONE (4204) UTILIZING PROVIDED TXDOT PROJECT CONTROL DATA AS ESTABLISHED BY UNITED ENGINEERS, INC IN 2006.
 2. TXDOT CONTROL POINTS N1020019, N1020029, AND H8-A AS ESTABLISHED BY UNITED ENGINEERS, INC. WERE UTILIZED FOR THIS PROJECT
 3. ALL ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND HOLDING PROVIDED TXDOT PROJECT CONTROL N1020029 WITH A PUBLISHED ELEVATION OF 31.22 FEET AS ESTABLISHED BY UNITED ENGINEERS, INC.
 4. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A TXDOT COMBINED SCALE FACTOR OF 1.00013.
 5. ALL MEASUREMENTS SHOWN ARE IN U.S. SURVEY FEET.
- AN ON THE GROUND SURVEY WAS PERFORMED UNDER MY SUPERVISION UTILIZING SURVEY CONTROL POINTS AS ESTABLISHED BY UNITED ENGINEER, INC., WHILE UNDER THE DIRECT SUPERVISION OF TXDOT.

STATE OF TEXAS REGISTERED LAND SURVEYOR
DAVID SCOTT CRAIN
5692
[Signature]
22 May 2024

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

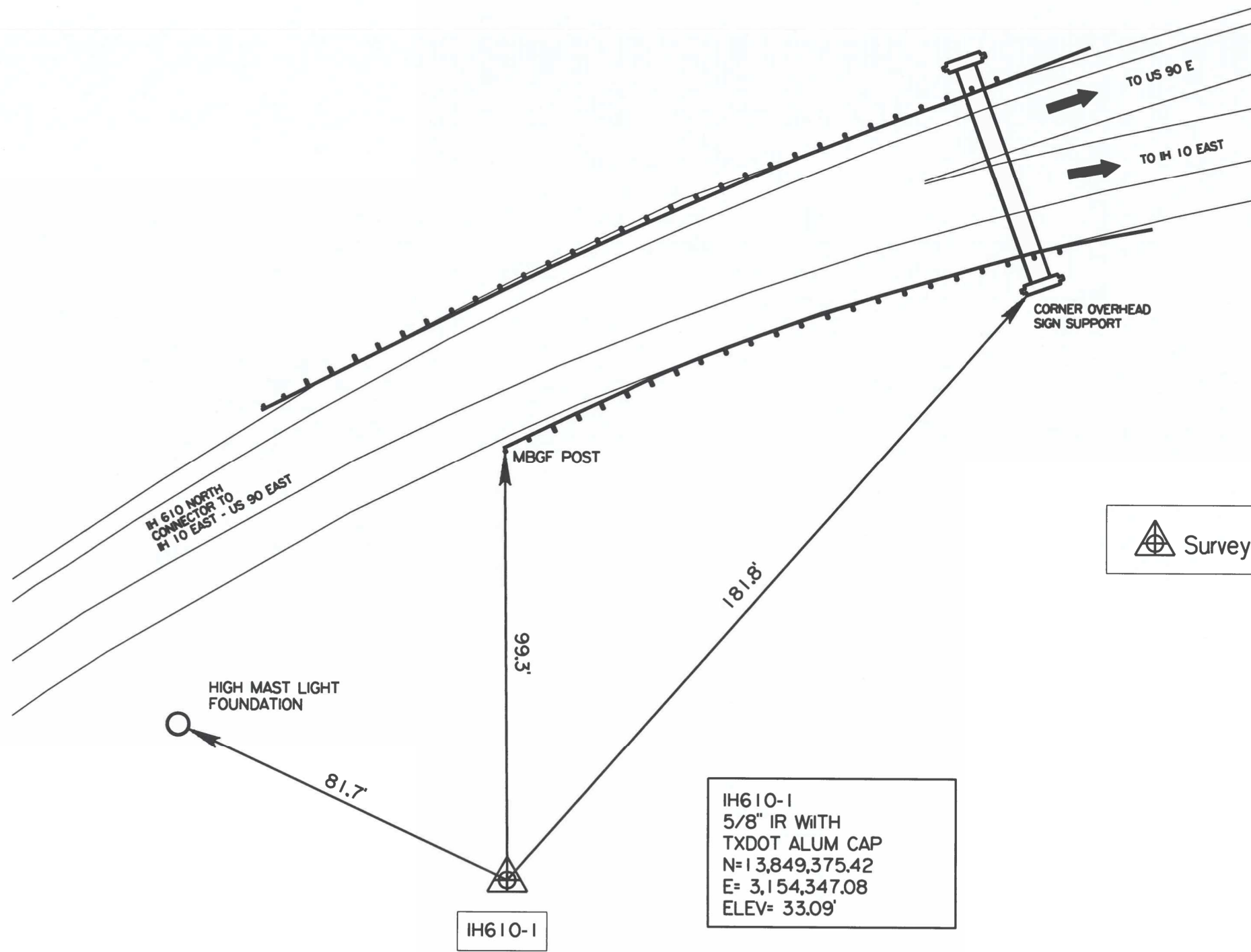
STATE OF TEXAS
ANUSHA POKHREL
151136
LICENSED PROFESSIONAL ENGINEER

[Signature] 9/30/2024

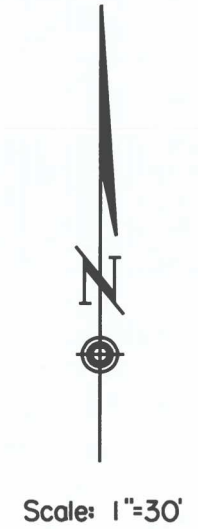
Sheet 2 of 3

TEXAS DEPARTMENT OF TRANSPORTATION
© 2024 TXDOT
Horizontal and Vertical Control Sheet

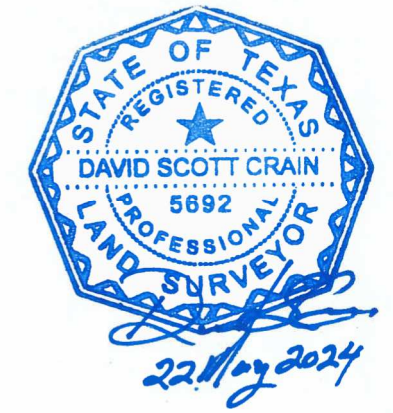
APRIL 2024	FED. RD. DIV.	RD.	STATE	PROJECT NO.		HIGHWAY
	6		TX			IH610
DISTRICT	COUNTY		CONTROL	SECT	JOB	SHEET
HOUSTON	HARRIS		0271	15	099	59



IH610-1
 5/8" IR WITH
 TXDOT ALUM CAP
 N= 1,384,937.42
 E= 3,154,347.08
 ELEV= 33.09'



- NOTES
1. ALL HORIZONTAL CONTROL POINT VALUES AS SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM OF NAD 83 - SOUTH CENTRAL ZONE (4204) UTILIZING PROVIDED TXDOT PROJECT CONTROL DATA AS ESTABLISHED BY UNITED ENGINEERS, INC IN 2006.
 2. TXDOT CONTROL POINTS N1020019, N1020029, AND H8-A AS ESTABLISHED BY UNITED ENGINEERS, INC. WERE UTILIZED FOR THIS PROJECT
 3. ALL ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND HOLDING PROVIDED TXDOT PROJECT CONTROL N1020029 WITH A PUBLISHED ELEVATION OF 31.22 FEET AS ESTABLISHED BY UNITED ENGINEERS, INC.
 4. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A TXDOT COMBINED SCALE FACTOR OF 1.00013.
 5. ALL MEASUREMENTS SHOWN ARE IN U.S. SURVEY FEET.
- AN ON THE GROUND SURVEY WAS PERFORMED UNDER MY SUPERVISION UTILIZING SURVEY CONTROL POINTS AS ESTABLISHED BY UNITED ENGINEER, INC. WHILE UNDER THE DIRECT SUPERVISION OF TXDOT.



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



Anusha Pokhrel
 9/30/2024

Sheet 3 of 3

TEXAS DEPARTMENT OF TRANSPORTATION
 © 2024 TXDOT

Horizontal and Vertical Control Sheet

APRIL 2024	FED. RD. DIV. RD.	STATE	PROJECT NO.			HIGHWAY
	6	TX	6			IH610
DISTRICT	COUNTY	CONTROL	SECT	JOB	SHEET	
HOUSTON	HARRIS	0271	15	099	60	

DATE: \$DATE\$ FILE: \$FILES\$ \$TIMES\$

HORIZONTAL ALIGNMENT REPORT

Alignment name: BL DCRAMP_EB
 Alignment description:
 Report Created: Wednesday, June 5, 2024
 Time: 3:06:06 PM

	STATION	X	Y
POT	12000.000 R1	3153594.179	13847971.354
PC	12101.660 R1	3153604.661	13848072.472
Tangential Direction:	N5.918°E		
Tangential Length:	101.660		
PC	12101.660 R1	3153604.661	13848072.472
PI	12336.805 R1	3153628.908	13848306.364
CC		3155503.486	13847875.629
PT	12569.594 R1	3153709.189	13848527.380
Radius:	1909.000		
Delta:	14.044° Right		
Degree of Curvature (Arc):	3.001°		
Length:	467.934		
Tangent:	235.145		
Chord:	466.763		
Middle Ordinate:	14.320		
External:	14.428		
Tangent Back Direction:	N5.918°E		
Radial Direction:	S84.082°E		
Chord Direction:	N12.941°E		
Radial Direction:	S70.037°E		
Tangent Ahead Direction:	N19.963°E		
PT	12569.594 R1	3153709.189	13848527.380
PC	12834.802 R1	3153799.733	13848776.653
Tangential Direction:	N19.963°E		
Tangential Length:	265.208		
PC	12834.802 R1	3153799.733	13848776.653
PI	12956.061 R1	3153841.132	13848890.627
CC		3159890.380	13846564.319
PCC	13077.292 R1	3153886.767	13849002.972
Radius:	6480.000		
Delta:	2.144° Right		
Degree of Curvature (Arc):	0.884°		
Length:	242.491		
Tangent:	121.260		
Chord:	242.477		
Middle Ordinate:	1.134		
External:	1.134		
Tangent Back Direction:	N19.963°E		
Radial Direction:	S70.037°E		
Chord Direction:	N21.035°E		
Radial Direction:	S67.893°E		
Tangent Ahead Direction:	N22.107°E		
PCC	13077.292 R1	3153886.767	13849002.972
PI	13400.112 R1	3154008.255	13849302.059
CC		3154813.250	13848626.636
PCC	13701.810 R1	3154281.690	13849473.657
Radius:	1000.000		
Delta:	35.782° Right		
Degree of Curvature (Arc):	5.730°		
Length:	624.518		
Tangent:	322.820		
Chord:	614.418		
Middle Ordinate:	48.358		
External:	50.815		
Tangent Back Direction:	N22.107°E		
Radial Direction:	S67.893°E		
Chord Direction:	N39.998°E		
Radial Direction:	S32.111°E		
Tangent Ahead Direction:	N57.889°E		

PCC	13701.810 R1	3154281.690	13849473.657
PI	13864.075 R1	3154419.132	13849559.911
CC		3154624.546	13848927.329
PT	14019.743 R1	3154581.028	13849570.859
Radius:	645.000		
Delta:	28.242° Right		
Degree of Curvature (Arc):	8.883°		
Length:	317.933		
Tangent:	162.265		
Chord:	314.724		
Middle Ordinate:	19.490		
External:	20.098		
Tangent Back Direction:	N57.889°E		
Radial Direction:	S32.111°E		
Chord Direction:	N72.010°E		
Radial Direction:	S3.869°E		
Tangent Ahead Direction:	N86.131°E		
PT	14019.743 R1	3154581.028	13849570.859
PC	14324.397 R1	3154884.988	13849591.414
Tangential Direction:	N86.131°E		
Tangential Length:	304.655		
PC	14324.397 R1	3154884.988	13849591.414
PI	14799.389 R1	3155358.897	13849623.462
CC		3154447.776	13856056.648
PT	15272.684 R1	3155823.067	13849724.273
Radius:	6480.000		
Delta:	8.385° Left		
Degree of Curvature (Arc):	0.884°		
Length:	948.286		
Tangent:	474.991		
Chord:	947.441		
Middle Ordinate:	17.339		
External:	17.385		
Tangent Back Direction:	N86.131°E		
Radial Direction:	S3.869°E		
Chord Direction:	N81.939°E		
Radial Direction:	S12.253°E		
Tangent Ahead Direction:	N77.747°E		
PT	15272.684 R1	3155823.067	13849724.273
PC	15276.554 R1	3155826.849	13849725.094
Tangential Direction:	N77.747°E		
Tangential Length:	3.870		
PC	15276.554 R1	3155826.849	13849725.094
PI	15830.614 R1	3156368.286	13849842.686
CC		3156466.104	13846781.712
PT	16372.423 R1	3156916.127	13849759.903
Radius:	3012.000		
Delta:	20.846° Right		
Degree of Curvature (Arc):	1.902°		
Length:	1095.869		
Tangent:	554.060		
Chord:	1089.835		
Middle Ordinate:	49.702		
External:	50.536		
Tangent Back Direction:	N77.747°E		
Radial Direction:	S12.253°E		
Chord Direction:	N88.170°E		
Radial Direction:	S8.593°W		
Tangent Ahead Direction:	S81.407°E		
PT	16372.423 R1	3156916.127	13849759.903
PI	16471.614 R1	3157014.205	13849745.083
Tangential Direction:	S81.407°E		
Tangential Length:	99.191		



Anusha Pokhrel

ANUSHA POKHREL, P.E. 9/6/2024 DATE

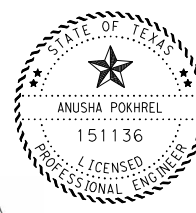
IH 610
HORIZONTAL ALIGNMENT DATA
 TxDOT ©2024 SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	61	


DATE: \$DATE\$ FILE: \$FILE\$ \$TIMES

CK: DW: CK: DW:

PI	16471.614 R1	3157014.205	13849745.083
PC	16692.966 R1	3157233.072	13849712.011
Tangential Direction:	S81.407°E		
Tangential Length:	221.352		
PC	16692.966 R1	3157233.072	13849712.011
PI	16786.783 R1	3157325.837	13849697.995
CC		3158099.373	13855445.810
PCC	16880.584 R1	3157419.006	13849686.988
Radius:	5798.874		
Delta:	1.854° Left		
Degree of Curvature (Arc):	0.988°		
Length:	187.618		
Tangent:	93.817		
Chord:	187.610		
Middle Ordinate:	0.759		
External:	0.759		
Tangent Back Direction:	S81.408°E		
Radial Direction:	S8.592°W		
Chord Direction:	S82.335°E		
Radial Direction:	S6.738°W		
Tangent Ahead Direction:	S83.262°E		
PCC	16880.584 R1	3157419.006	13849686.988
PI	17081.749 R1	3157618.648	13849662.285
CC		3158131.344	13855443.810
PCC	17282.752 R1	3157819.522	13849651.471
Radius:	5800.726		
Delta:	3.972° Left		
Degree of Curvature (Arc):	0.988°		
Length:	402.168		
Tangent:	201.165		
Chord:	402.088		
Middle Ordinate:	3.485		
External:	3.487		
Tangent Back Direction:	S82.946°E		
Radial Direction:	S7.054°W		
Chord Direction:	S84.932°E		
Radial Direction:	S3.081°W		
Tangent Ahead Direction:	S86.919°E		
PCC	17282.752 R1	3157819.522	13849651.471
PI	17387.660 R1	3157924.278	13849645.832
CC		3158088.301	13854644.242
PCC	17492.536 R1	3158029.178	13849644.591
Radius:	5000.000		
Delta:	2.404° Left		
Degree of Curvature (Arc):	1.146°		
Length:	209.784		
Tangent:	104.907		
Chord:	209.768		
Middle Ordinate:	1.100		
External:	1.100		
Tangent Back Direction:	S86.919°E		
Radial Direction:	S3.081°W		
Chord Direction:	S88.121°E		
Radial Direction:	S0.678°W		
Tangent Ahead Direction:	S89.322°E		
PCC	17492.536 R1	3158029.178	13849644.591
PI	17770.352 R1	3158306.975	13849641.306
CC		3158097.791	13855446.763
PT	18047.745 R1	3158583.815	13849664.576
Radius:	5802.578		
Delta:	5.482° Left		
Degree of Curvature (Arc):	0.987°		
Length:	555.209		
Tangent:	277.816		
Chord:	554.997		
Middle Ordinate:	6.639		
External:	6.647		
Tangent Back Direction:	S89.322°E		
Radial Direction:	S0.678°W		
Chord Direction:	N87.936°E		
Radial Direction:	S4.805°E		
Tangent Ahead Direction:	N85.195°E		



Anusha Pokhrel
 ANUSHA POKHREL, P.E. DATE 9/6/2024



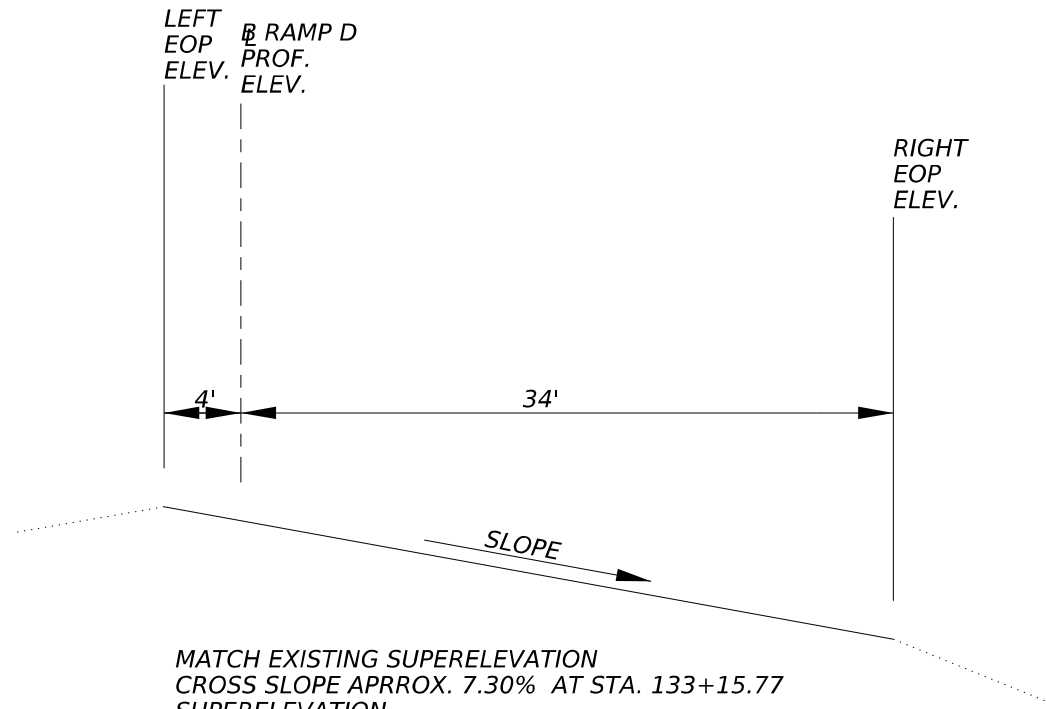
IH 610
HORIZONTAL
ALIGNMENT
DATA

TxDOT © 2024 SHEET 2 OF 2

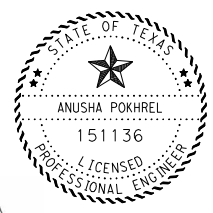
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	62	

CK: DW: CK: DW:

Connector D						
Station	Left EOP Elev.	D BL Elev.	Right EOP Elev.	Left Offset	Right Offset	Slope
133+15.77	37.22	36.93	34.45	4.00	34.00	7.30%
133+25.77	37.45	37.16	34.72	4.00	34.00	7.17%
133+35.77	37.66	37.38	34.99	4.00	34.00	7.04%
133+45.77	37.86	37.59	35.24	4.00	34.00	6.91%
133+55.77	38.06	37.79	35.48	4.00	34.00	6.78%
133+65.77	38.24	37.97	35.71	4.00	34.00	6.65%
133+75.77	38.41	38.15	35.93	4.00	34.00	6.52%
133+85.77	38.56	38.31	36.14	4.00	34.00	6.39%
133+95.77	38.71	38.46	36.33	4.00	34.00	6.26%
134+05.77	38.85	38.60	36.52	4.00	34.00	6.13%
134+15.77	38.97	38.73	36.69	4.00	34.00	6.00%



MATCH EXISTING SUPERELEVATION
 CROSS SLOPE APPROX. 7.30% AT STA. 133+15.77
 SUPERELEVATION
 TRANSITION ENDS AT STA 134+15.77 AT 6.00%



Anusha Pokhrel
 AN

ANUSHA POKHREL, P.E. 9/6/2024
 DATE



IH 610
 SUPERELEVATION
 TRANSITION
 TABLES

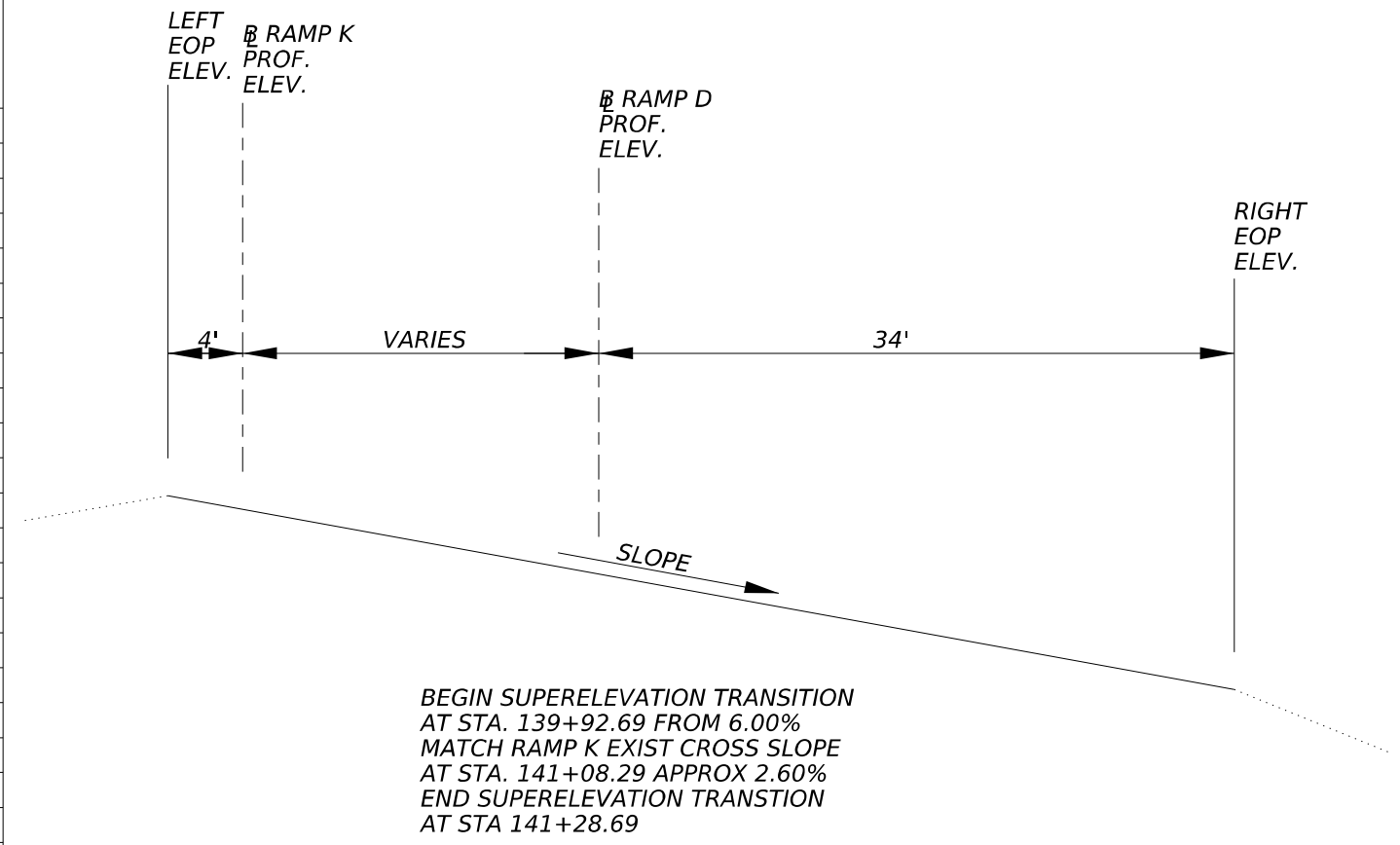
TxDOT © 2024 SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	63	

DATE: \$DATE\$
 FILE: \$FILE\$

CK: _____ DW: _____ CK: _____ DW: _____
 DATE: \$DATES\$ FILE: \$FILES\$ \$TIMES\$

Connector D/K									
K Station	D Station	Left EOP Elev.	Left EOP Offset (From D)	Needed BL K Elev.	BL K-D Offset	D BL Elev.	Right EOP Elev.	Right EOP Offset (From D)	Slope
270+03.18	137+87.7	36.268	4.00	36.028	0.00	36.028	33.988	34.00	6.00%
270+13.18	137+97.7	36.090	4.04	35.850	0.04	35.848	33.808	34.00	6.00%
270+23.18	138+07.7	35.917	4.16	35.677	0.16	35.668	33.628	34.00	6.00%
270+33.19	138+17.7	35.750	4.35	35.510	0.35	35.489	33.449	34.00	6.00%
270+43.2	138+27.7	35.595	4.62	35.355	0.62	35.318	33.278	34.00	6.00%
270+53.22	138+37.7	35.455	4.97	35.215	0.97	35.156	33.116	34.00	6.00%
270+63.24	138+47.7	35.328	5.40	35.088	1.40	35.004	32.964	34.00	6.00%
270+73.28	138+57.7	35.216	5.91	34.976	1.90	34.862	32.822	34.00	6.00%
270+83.33	138+67.7	35.118	6.49	34.877	2.48	34.728	32.688	34.00	6.00%
270+93.4	138+77.7	35.033	7.16	34.793	3.15	34.604	32.564	34.00	6.00%
271+03.48	138+87.7	34.963	7.90	34.723	3.89	34.489	32.449	34.00	6.00%
271+13.58	138+97.7	34.907	8.72	34.666	4.70	34.384	32.344	34.00	6.00%
271+23.7	139+07.7	34.865	9.62	34.624	5.60	34.288	32.248	34.00	6.00%
271+33.84	139+17.7	34.838	10.60	34.596	6.58	34.202	32.162	34.00	6.00%
271+44.01	139+27.7	34.824	11.66	34.583	7.63	34.125	32.085	34.00	6.00%
271+54.2	139+37.7	34.825	12.80	34.583	8.77	34.057	32.017	34.00	6.00%
271+64.42	139+47.7	34.839	14.02	34.598	9.99	33.998	31.958	34.00	6.00%
271+74.67	139+57.7	34.868	15.32	34.626	11.28	33.949	31.909	34.00	6.00%
271+84.94	139+67.7	34.912	16.70	34.669	12.66	33.910	31.870	34.00	6.00%
271+95.26	139+77.7	34.968	18.17	34.726	14.13	33.878	31.838	34.00	6.00%
272+05.61	139+87.7	35.033	19.74	34.790	15.69	33.848	31.808	34.00	6.00%
272+10.79	139+92.69	35.067	20.57	34.824	16.51	33.833	31.793	34.00	6.00%
272+16.	139+97.7	35.072	21.42	34.835	17.37	33.818	31.828	34.00	5.85%
272+26.44	140+07.71	35.078	23.21	34.852	19.14	33.788	31.899	34.00	5.56%
272+36.92	140+17.71	35.080	25.10	34.864	21.00	33.758	31.969	34.00	5.26%
272+47.16	140+27.71	35.069	26.99	34.867	22.92	33.728	32.039	34.00	4.97%
272+57.33	140+37.71	35.045	28.80	34.855	24.74	33.698	32.109	34.00	4.68%
272+67.48	140+47.71	35.007	30.56	34.829	26.50	33.668	32.179	34.00	4.38%
272+77.62	140+57.71	34.957	32.26	34.791	28.20	33.638	32.249	34.00	4.09%
272+87.76	140+67.71	34.894	33.89	34.740	29.84	33.608	32.319	34.00	3.79%
272+97.88	140+77.71	34.820	35.47	34.678	31.43	33.578	32.389	34.00	3.50%
273+08.	140+87.71	34.734	37.00	34.604	32.95	33.548	32.459	34.00	3.21%
273+18.1	140+97.71	34.638	38.46	34.520	34.42	33.518	32.529	34.00	2.91%
273+28.2	141+07.71	34.532	39.86	34.426	35.82	33.488	32.599	34.00	2.62%
273+28.79	141+08.29	34.525	39.94	34.420	35.90	33.487	32.603	34.00	2.60%
	141+17.71	33.551	4.00			33.458	32.669	34.00	2.32%
	141+27.71	33.509	4.00			33.428	32.739	34.00	2.03%
	141+28.69	33.505	4.00			33.425	32.745	34.00	2.00%



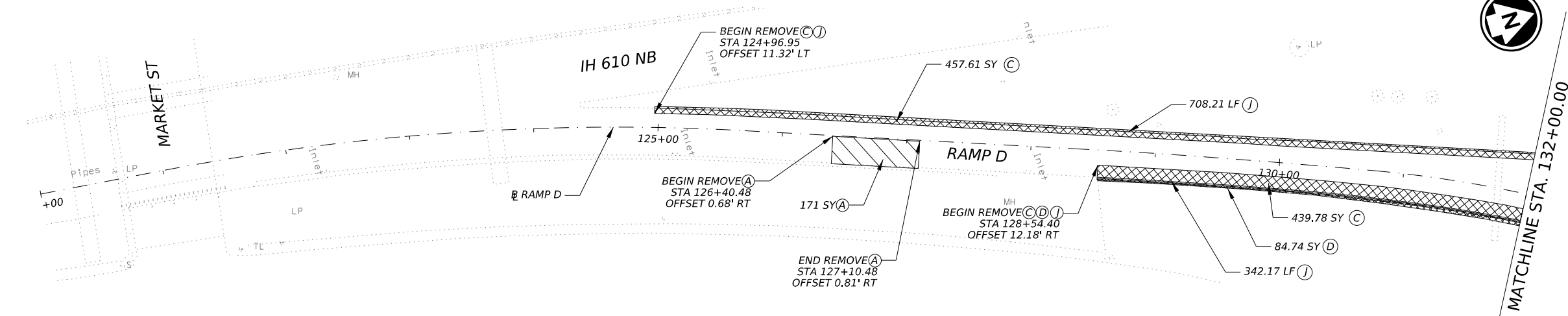
ANUSHA POKHREL, P.E. DATE 9/6/2024

IH 610
SUPERELEVATION
TRANSITION
TABLES

TxDOT © 2024 SHEET 2 OF 2

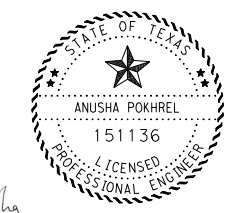
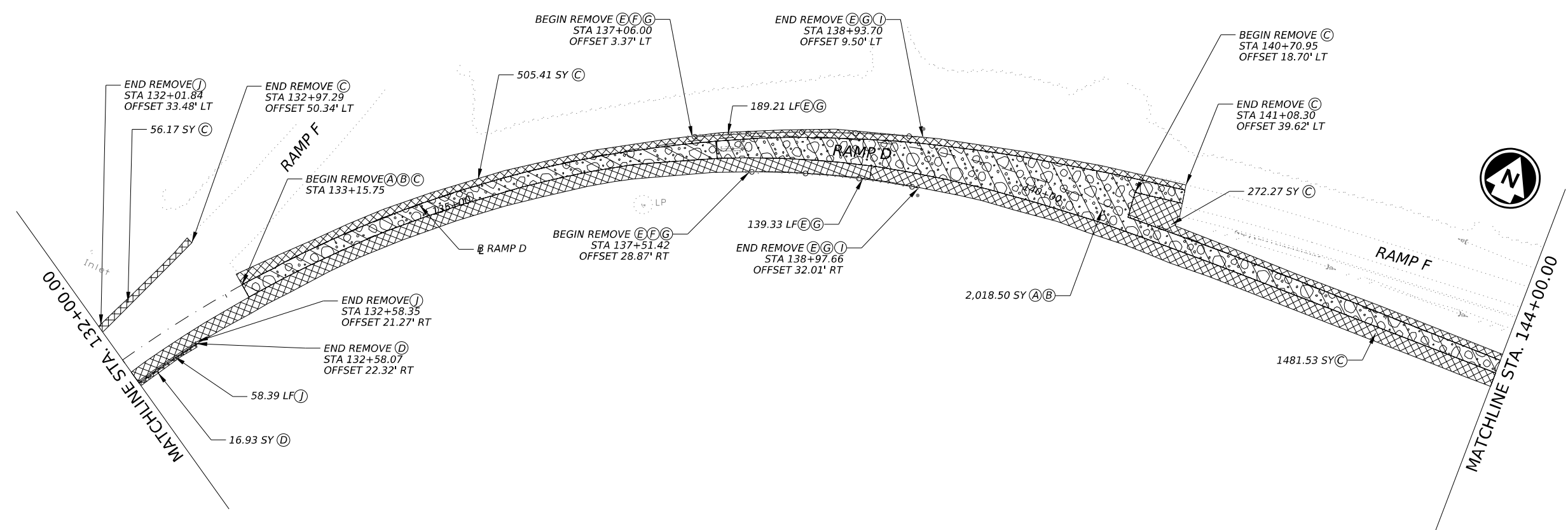
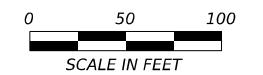
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		64

CK: DW: CK: DW:



- (A) REMOVE CONC(PAV)
- (B) REMOVE 7"-11" TRT/UNTRT BASE & ASPH PAVMT
- (C) REMOVE 16"-20" TRT/UNTRT BASE & ASPH PAVMT
- (D) REMOVE CONC (RIPRAP)
- (E) REMOVE CONC(MOW STRIP)
- (F) REMOVE GUARDRAIL END TREATMENT
- (G) REMOVE METAL BEAM GUARD FENCE
- (I) REMOVE TERMINAL ANCHOR SECTION
- (J) REMOVE CONC CURB

NOTE:
CONTRACTOR SHALL CONTACT 811 PRIOR TO ANY EXCAVATION WORK.



Anusha Pokhrel
ANUSHA POKHREL, P.E. DATE 9/6/2024



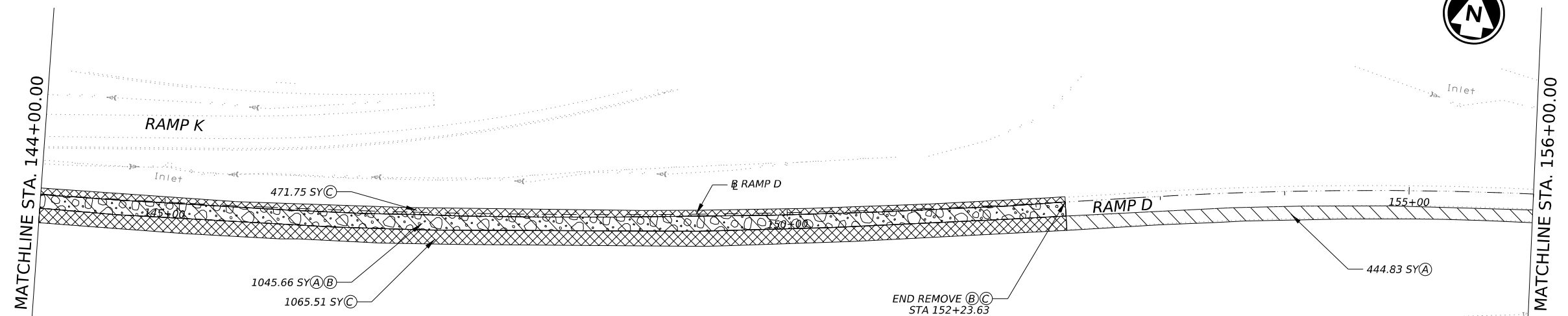
IH 610
DEMOLITION LAYOUT

TxDOT © 2024 SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	65	

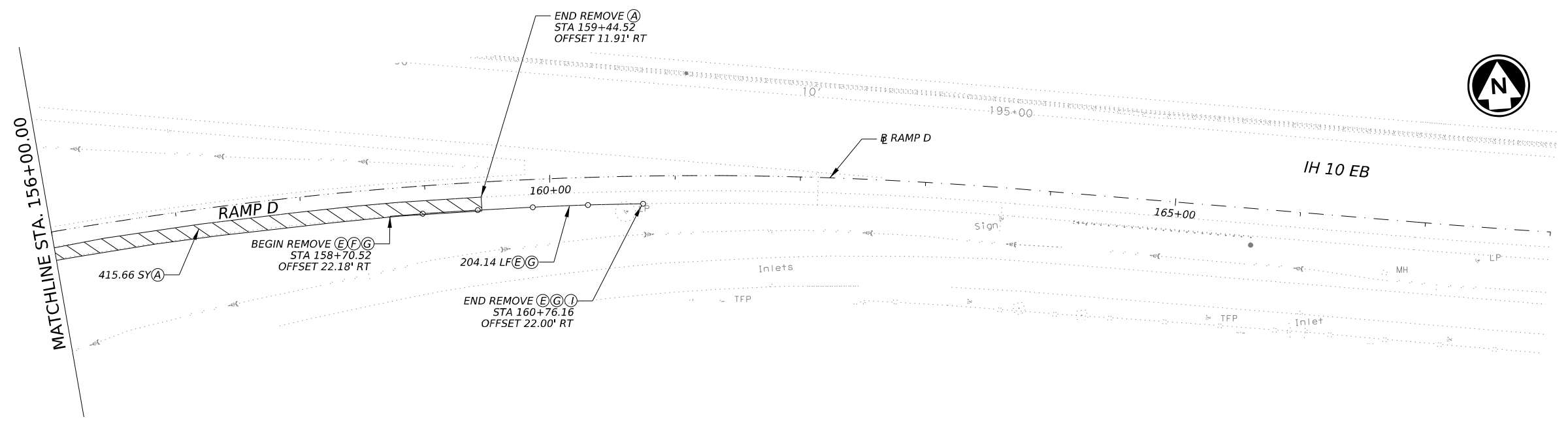
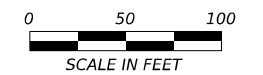
DATE: 5/28/2024 03:11:18
FILE: \$PROJECTNAME

CK:
DW:
CK:
DW:



- (A) REMOVE CONC(PAV)
- (B) REMOVE 7"-11" TRT/UNTRT BASE & ASPH PAVMT
- (C) REMOVE 16"-20" TRT/UNTRT BASE & ASPH PAVMT
- (D) REMOVE CONC (RIPRAP)
- (E) REMOVE CONC(MOW STRIP)
- (F) REMOVE GUARDRAIL END TREATMENT
- (G) REMOVE METAL BEAM GUARD FENCE
- (I) REMOVE TERMINAL ANCHOR SECTION
- (J) REMOVE CONC CURB

NOTE:
CONTRACTOR SHALL CONTACT 811 PRIOR TO ANY EXCAVATION WORK.



Anusha Pokhrel
ANUSHA POKHREL

ANUSHA POKHREL, P.E. DATE 9/6/2024



**IH 610
DEMOLITION LAYOUT**

TxDOT © 2024 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	66	

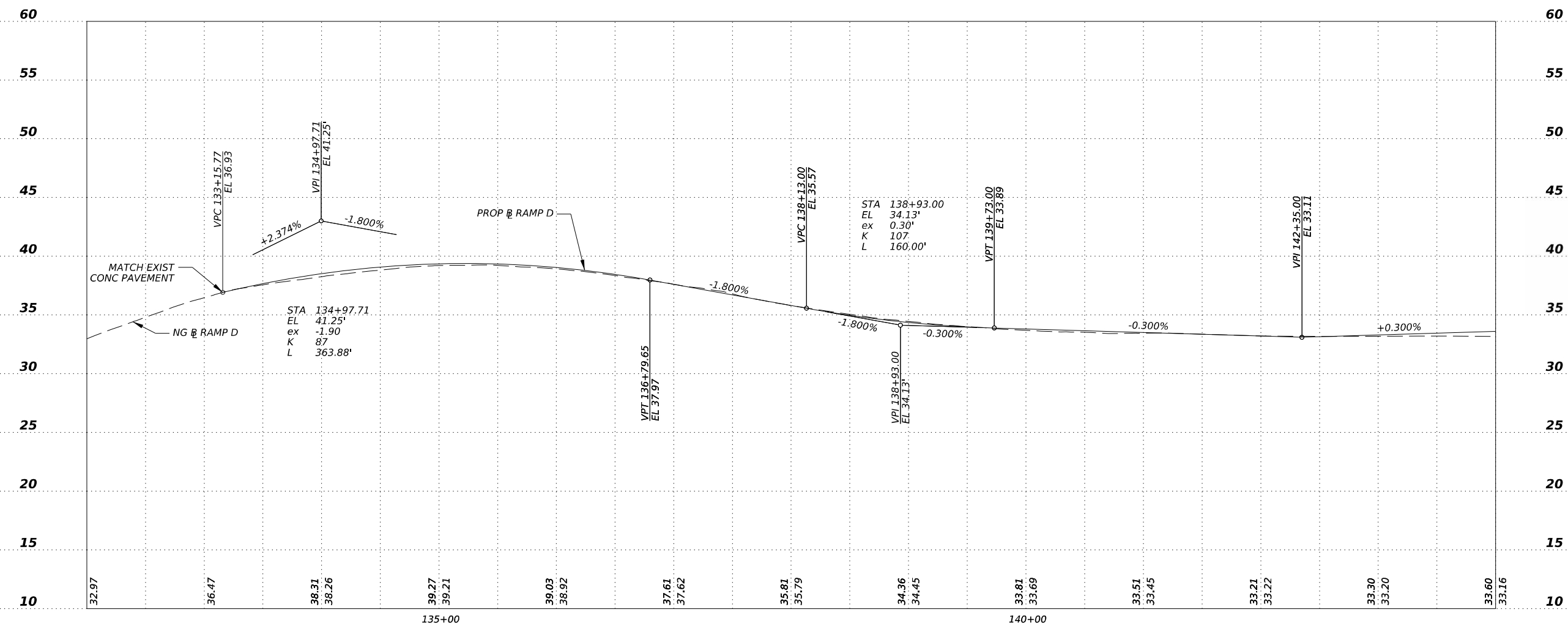
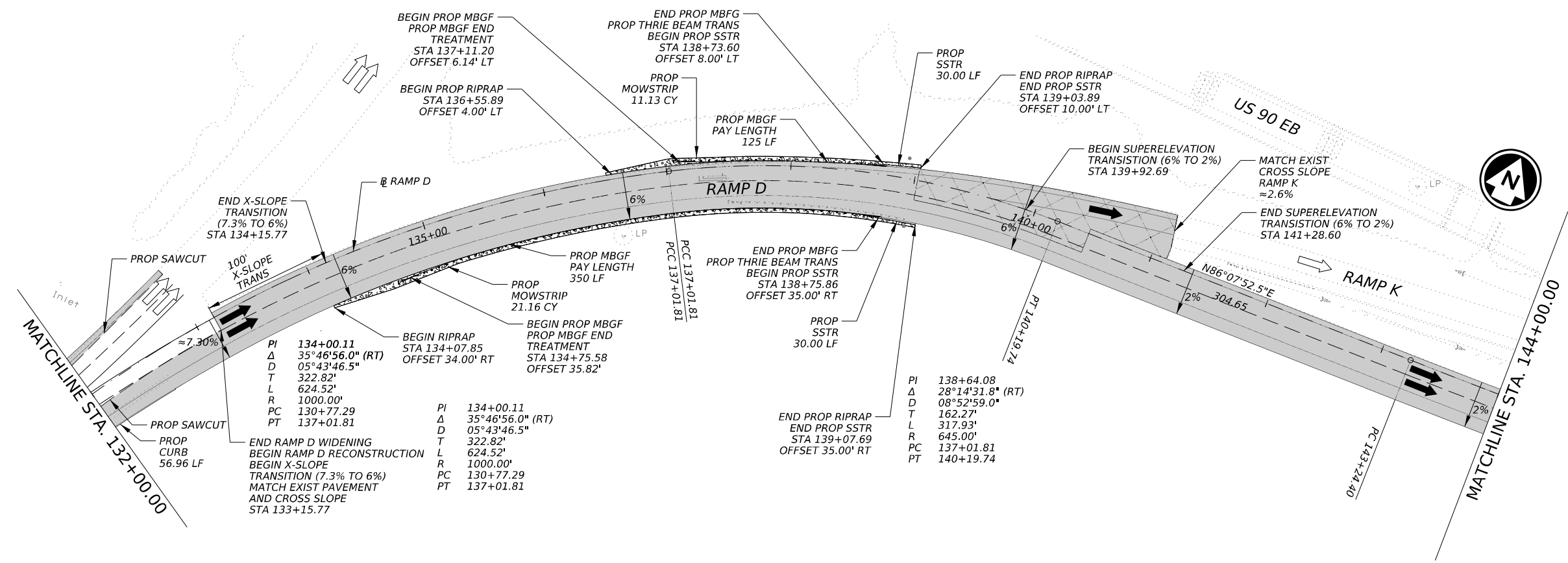
DATE: 5/28/2024 03:37:18
FILE: \$PROJECTNAME

CK:
DW:
CK:
DW:

LEGEND

SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT
	PROP SAWCUT

- NOTES:**
1. ALL CALLOUTS REFERENCE @ RAMP D UNLESS OTHERWISE NOTED.
 2. ALL CALLOUTS ARE FROM THE FACE OF RAIL OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
 3. CONTRACTOR SHALL FIELD VERIFY ALL INFORMATION. CROSS SLOPE AND SUPERELEVATION DATA IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR IS TO MATCH EXISTING CROSS SLOPE FOR ROADWAY WIDENING.
 4. FOR HORIZONTAL ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEETS.
 5. SAW CUTTING AS SHOWN ON THE PLANS IS SUBSIDIARY TO VARIOUS BID ITEMS.
 6. REFER TO SIGNING & PAVEMENT MARKING LAYOUT FOR SIGNING & PAVEMENT MARKING DETAILS.
 7. FOR TYPICAL SECTIONS, REFER TO TYPICAL SECTIONS SHEETS.
 8. LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR IS TO EXERCISE CAUTION AND VERIFY THE LOCATION OF UTILITIES PRIOR TO EXCAVATION.



0 50 100
HORIZONTAL SCALE IN FEET

0 2 4 6 8 10
VERTICAL SCALE IN FEET

ANUSHA POKHREL, P.E. DATE 9/6/2024

Texas Department of Transportation

IH 610
RAMP D
PLAN AND PROFILE

TxDOT © 2024 SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	68	

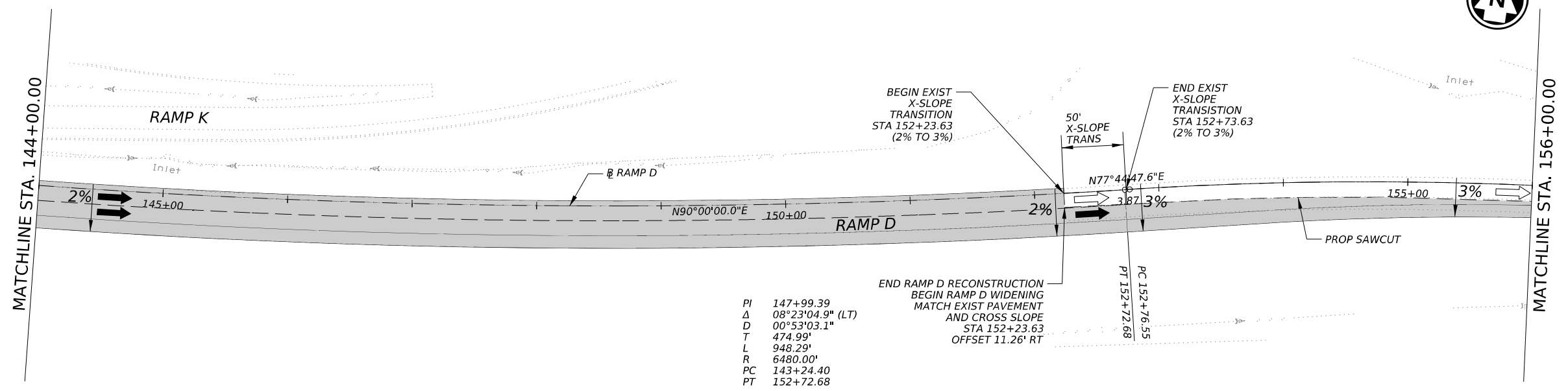
DATE: 5/04/2024 1:18:00 PM
FILE: \$PROJECTNAME

CK: DW: CK: DW:

LEGEND

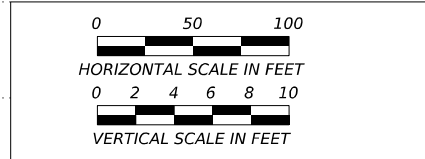
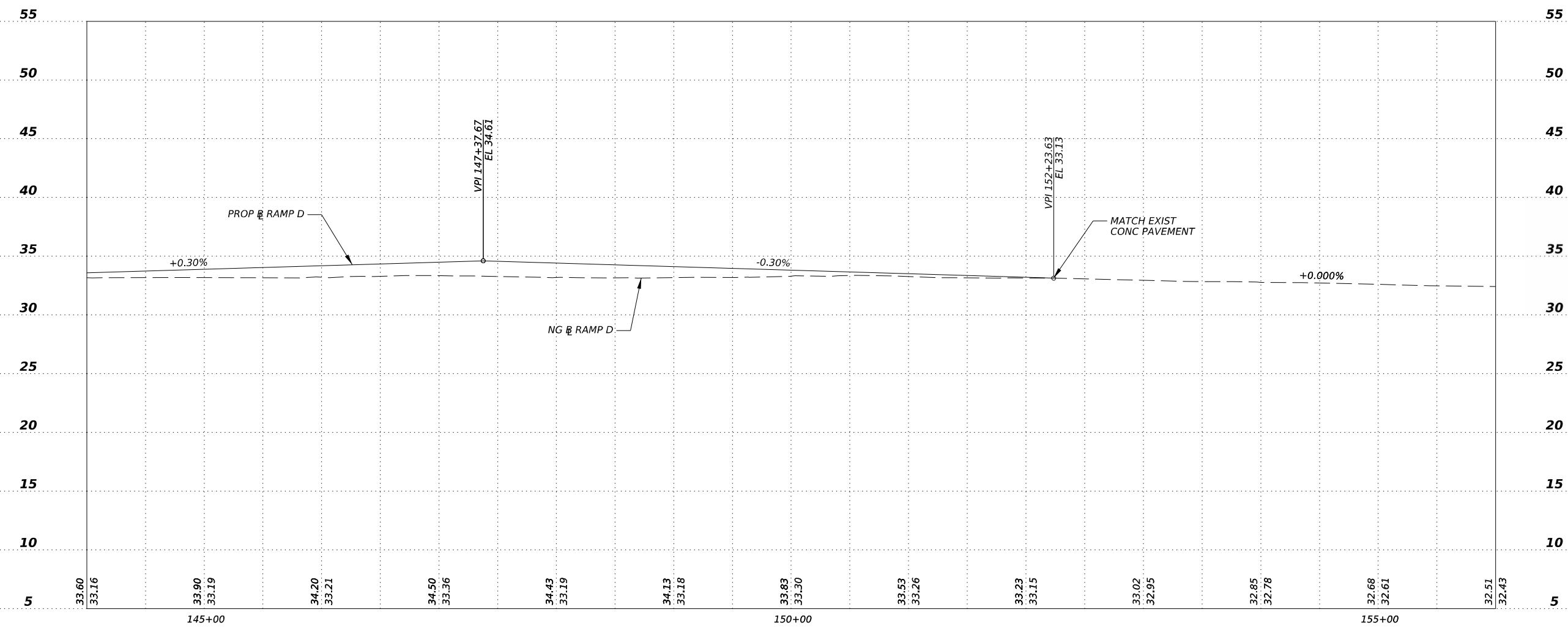
SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT
	PROP SAWCUT

- NOTES:**
1. ALL CALLOUTS REFERENCE @ RAMP D UNLESS OTHERWISE NOTED.
 2. ALL CALLOUTS ARE FROM THE FACE OF RAIL OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
 3. CONTRACTOR SHALL FIELD VERIFY ALL INFORMATION. CROSS SLOPE AND SUPERELEVATION DATA IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR IS TO MATCH EXISTING CROSS SLOPE FOR ROADWAY WIDENING.
 4. FOR HORIZONTAL ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEETS.
 5. SAW CUTTING AS SHOWN ON THE PLANS IS SUBSIDIARY TO VARIOUS BID ITEMS.
 6. REFER TO SIGNING & PAVEMENT MARKING LAYOUT FOR SIGNING & PAVEMENT MARKING DETAILS.
 7. FOR TYPICAL SECTIONS, REFER TO TYPICAL SECTIONS SHEETS.
 8. LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR IS TO EXERCISE CAUTION AND VERIFY THE LOCATION OF UTILITIES PRIOR TO EXCAVATION.



PI 147+99.39
 Δ 08°23'04.9" (LT)
 D 00°53'03.1"
 T 474.99'
 L 948.29'
 R 6480.00'
 PC 143+24.40
 PT 152+72.68

END RAMP D RECONSTRUCTION
 BEGIN RAMP D WIDENING
 MATCH EXIST PAVEMENT
 AND CROSS SLOPE
 STA 152+23.63
 OFFSET 11.26' RT



ANUSHA POKHREL, P.E. DATE 9/6/2024



**IH 610
 RAMP D
 PLAN AND PROFILE**

TxDOT © 2024 SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	69	

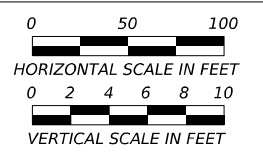
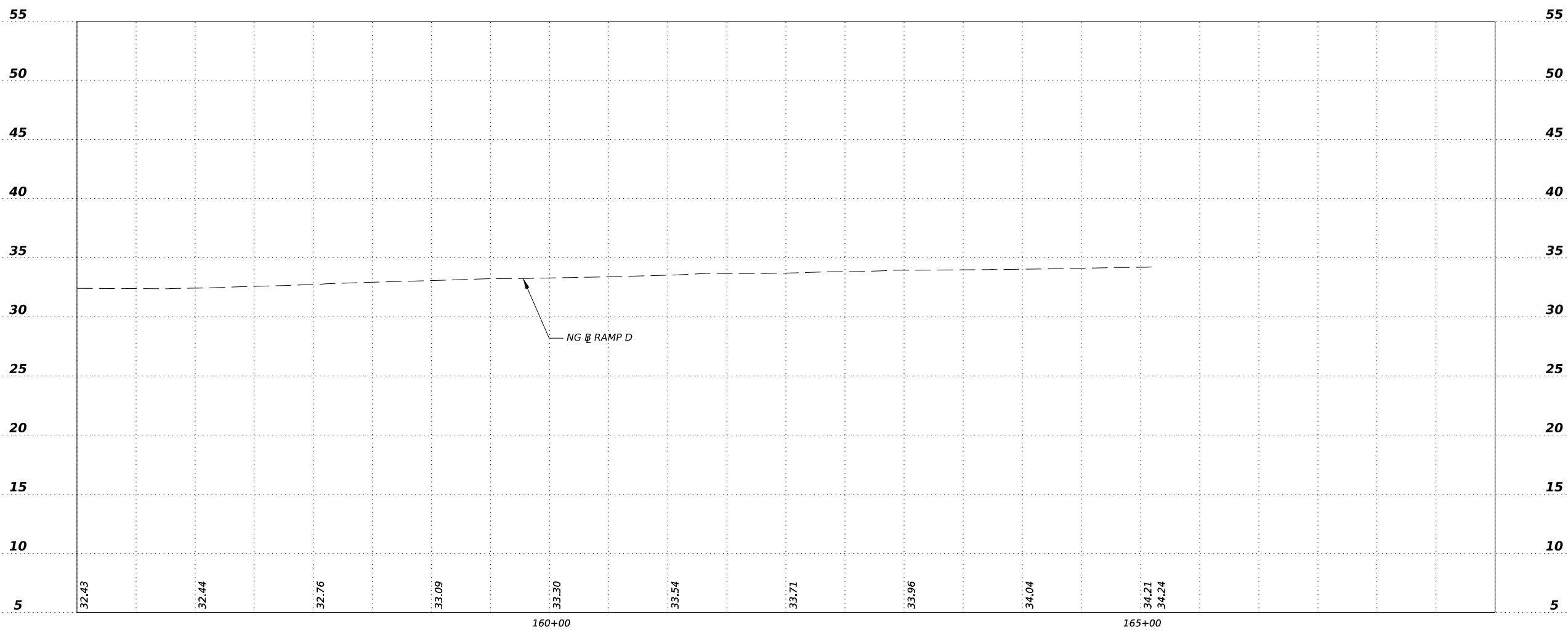
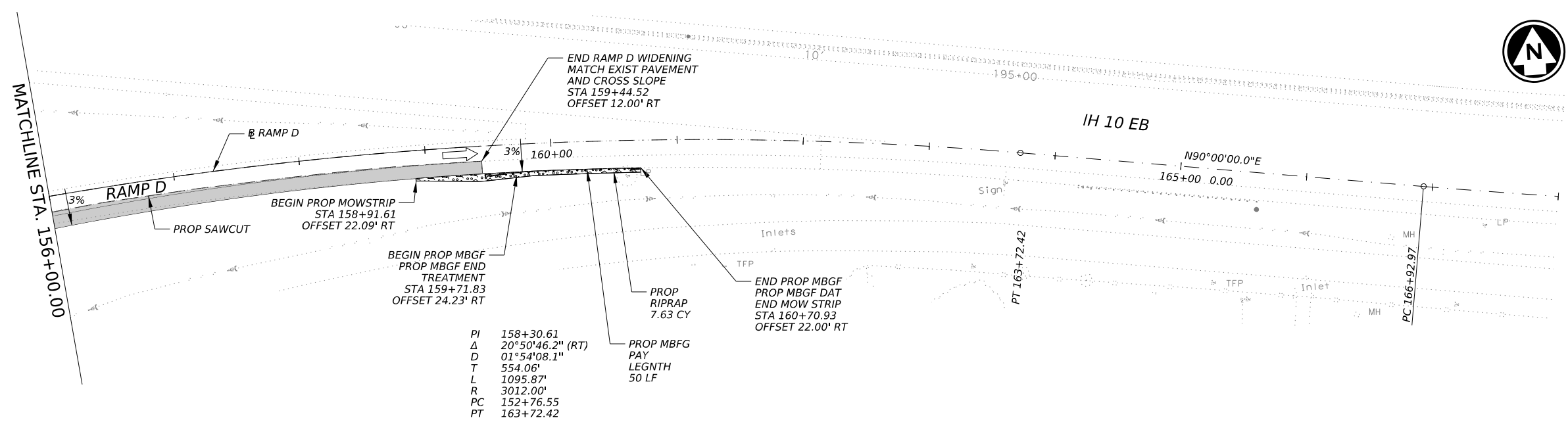
DATE: 5/04/2024 11:31 AM
 FILE: \$PROJECTNAME

CK:
DW:
CK:
DW:

LEGEND

SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT
	PROP SAWCUT

- NOTES:**
1. ALL CALLOUTS REFERENCE @ RAMP D UNLESS OTHERWISE NOTED.
 2. ALL CALLOUTS ARE FROM THE FACE OF RAIL OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
 3. CONTRACTOR SHALL FIELD VERIFY ALL INFORMATION. CROSS SLOPE AND SUPERELEVATION DATA IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR IS TO MATCH EXISTING CROSS SLOPE FOR ROADWAY WIDENING.
 4. FOR HORIZONTAL ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEETS.
 5. SAW CUTTING AS SHOWN ON THE PLANS IS SUBSIDIARY TO VARIOUS BID ITEMS.
 6. REFER TO SIGNING & PAVEMENT MARKING LAYOUT FOR SIGNING & PAVEMENT MARKING DETAILS.
 7. FOR TYPICAL SECTIONS, REFER TO TYPICAL SECTIONS SHEETS.
 8. LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR IS TO EXERCISE CAUTION AND VERIFY THE LOCATION OF UTILITIES PRIOR TO EXCAVATION.



Anusha Pokhrel
00

ANUSHA POKHREL, P.E. DATE 9/6/2024



**IH 610
RAMP D
PLAN AND PROFILE**

TxDOT © 2024 SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	70	

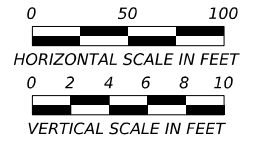
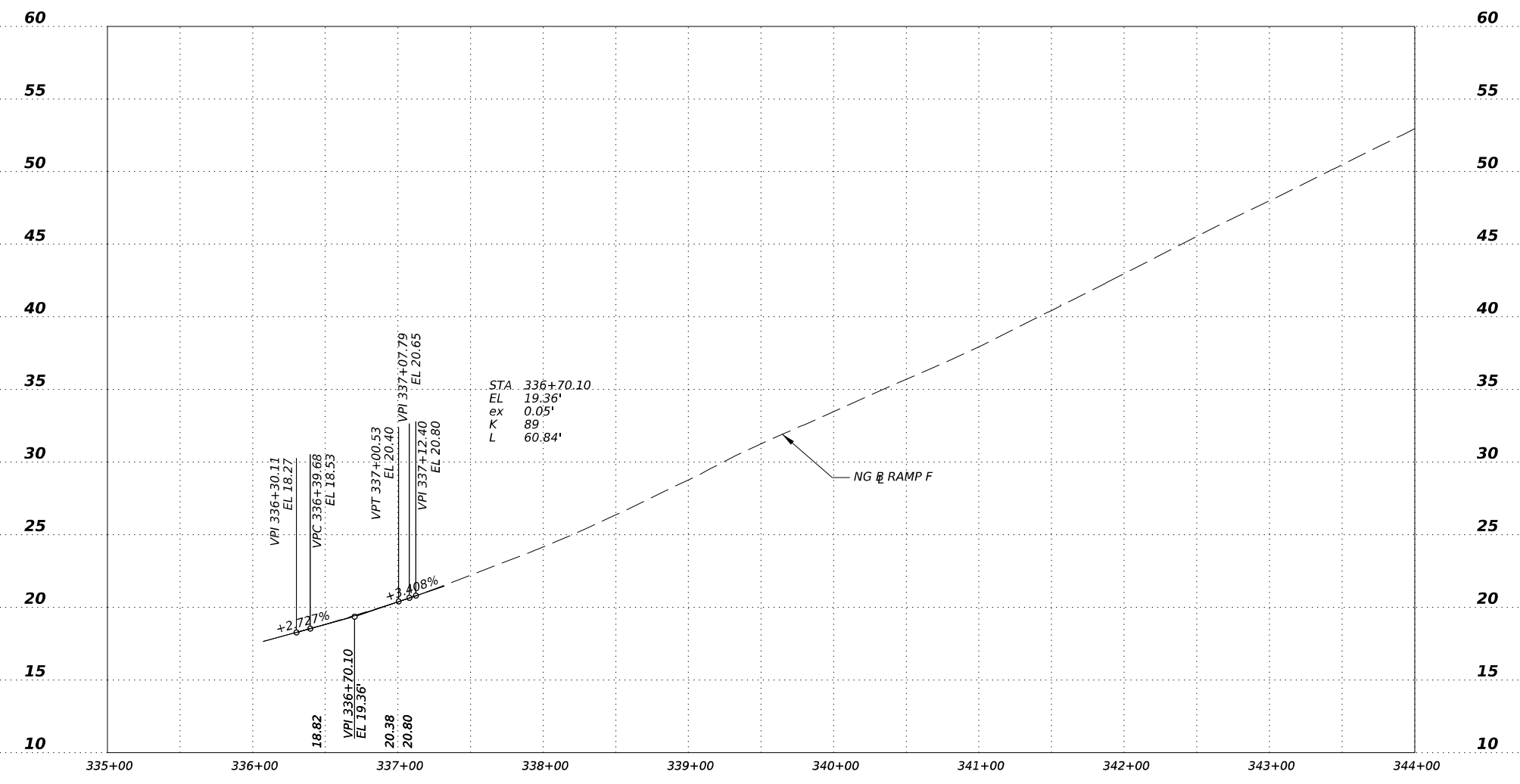
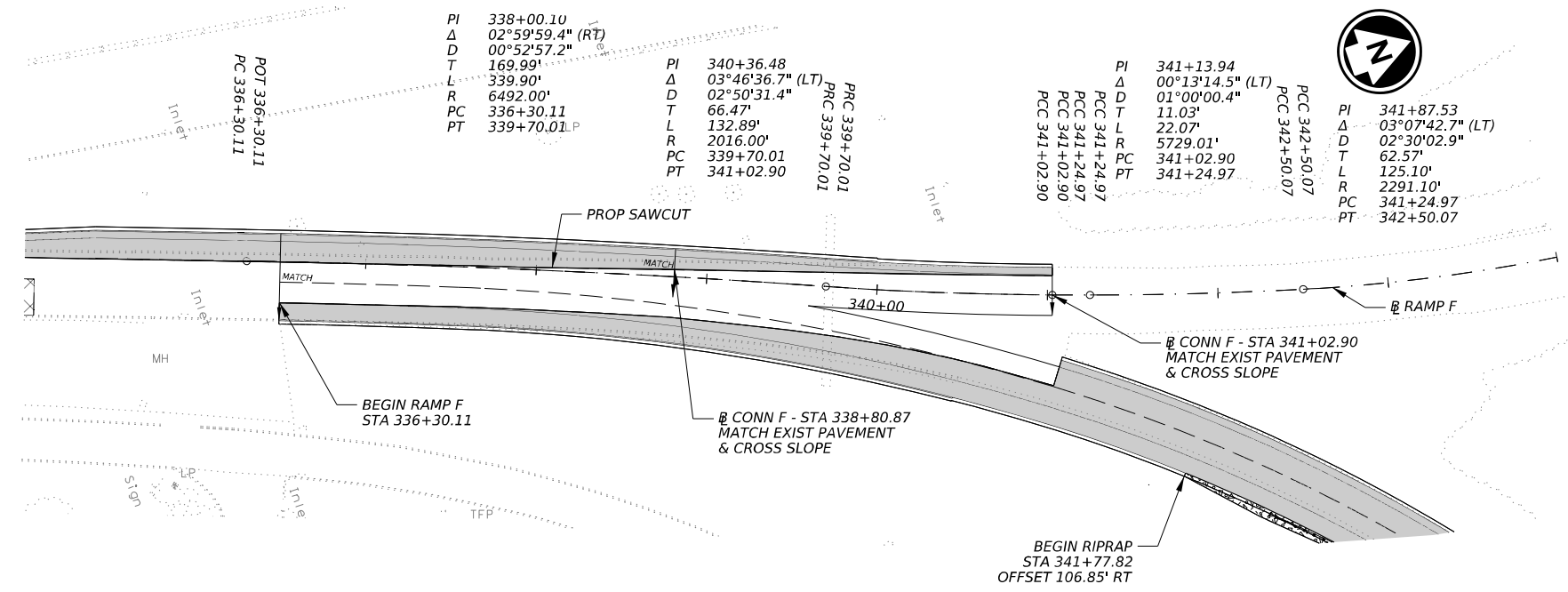
DATE: 5/04/2024 11:51 AM
FILE: \$PROJECTNAME

CK: DW: CK: DW:

LEGEND

SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT
	PROP SAWCUT

- NOTES:**
- ALL CALLOUTS REFERENCE @ RAMP D UNLESS OTHERWISE NOTED.
 - ALL CALLOUTS ARE FROM THE FACE OF RAIL OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
 - CONTRACTOR SHALL FIELD VERIFY ALL INFORMATION. GROSS SLOPE AND SUPERELEVATION DATA IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR IS TO MATCH EXISTING CROSS SLOPE FOR ROADWAY WIDENING.
 - FOR HORIZONTAL ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEETS.
 - SAW CUTTING AS SHOWN ON THE PLANS IS SUBSIDIARY TO VARIOUS BID ITEMS.
 - REFER TO SIGNING & PAVEMENT MARKING LAYOUT FOR SIGNING & PAVEMENT MARKING DETAILS.
 - FOR TYPICAL SECTIONS, REFER TO TYPICAL SECTIONS SHEETS.
 - LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR IS TO EXERCISE CAUTION AND VERIFY THE LOCATION OF UTILITIES PRIOR TO EXCAVATION.

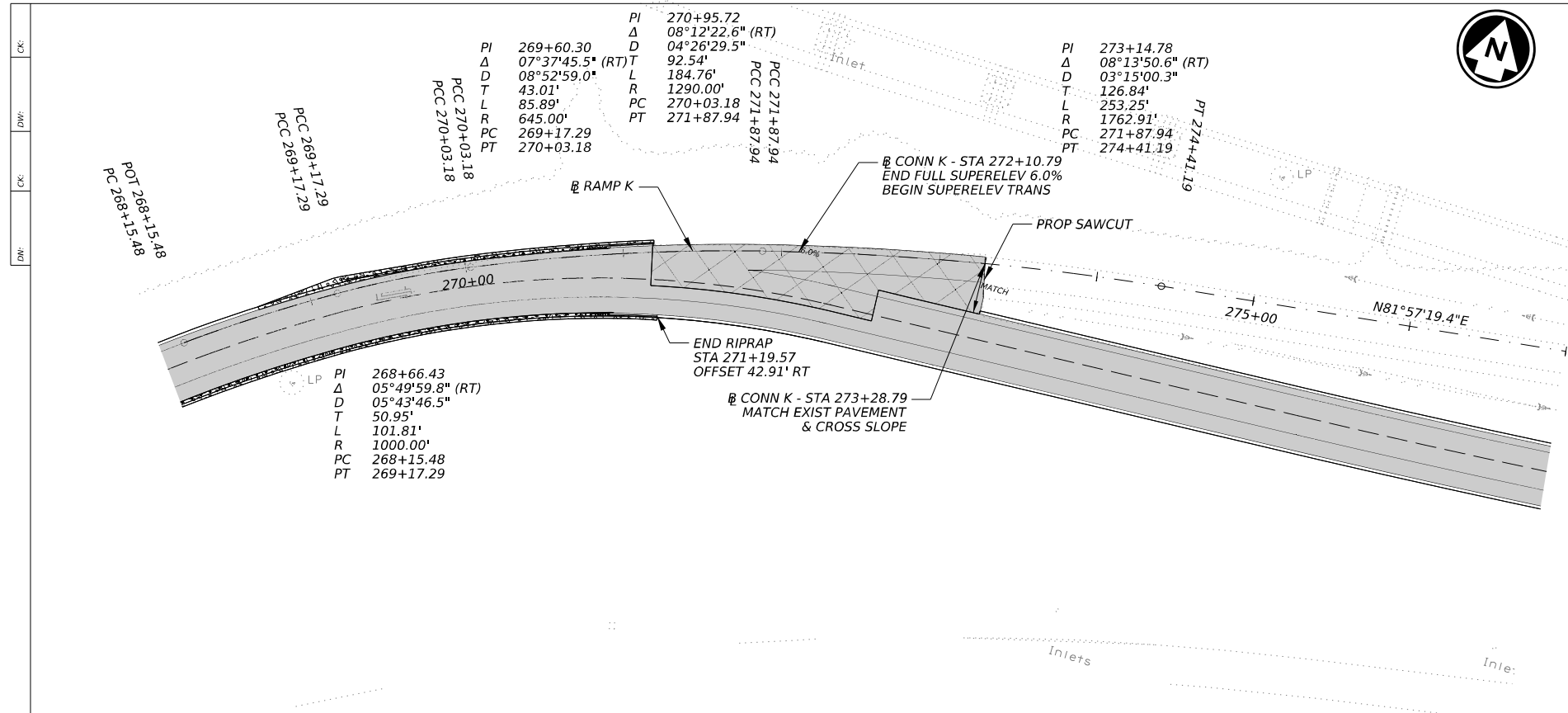


**IH 610
RAMP F
PLAN AND PROFILE**

TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	71	

DATE: 5/04/2024 11:51:48 AM
FILE: \$PROJECTNAME



PI 268+66.43
 Δ 05°49'59.8" (RT)
 D 05°43'46.5"
 T 50.95'
 L 101.81'
 R 1000.00'
 PC 268+15.48
 PT 269+17.29

PI 269+60.30
 Δ 07°37'45.5" (RT)
 D 08°52'59.0"
 T 43.01'
 L 85.89'
 R 645.00'
 PC 270+03.18
 PT 270+03.18

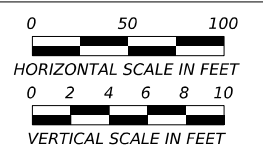
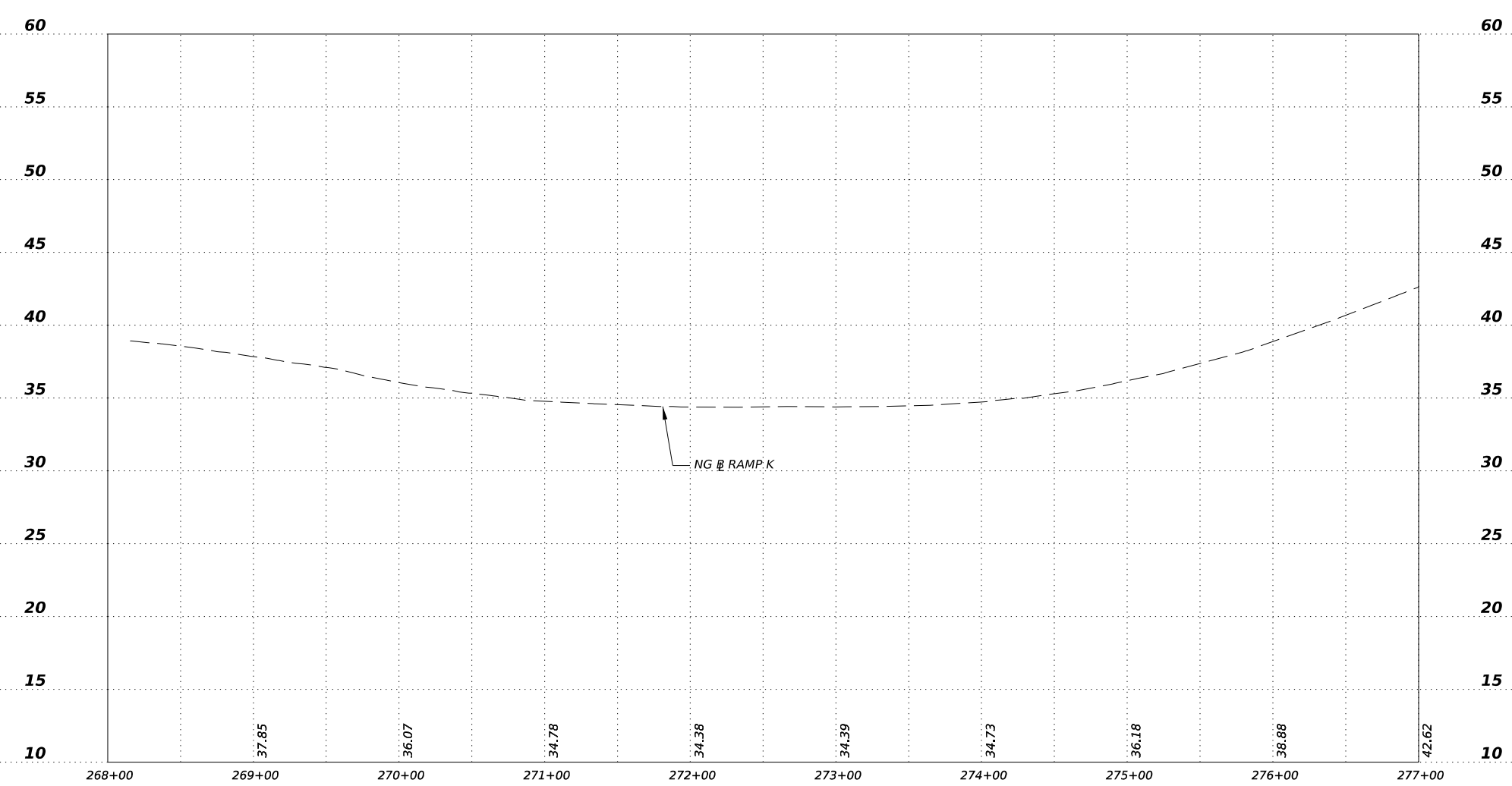
PI 270+95.72
 Δ 08°12'22.6" (RT)
 D 04°26'29.5"
 T 92.54'
 L 184.76'
 R 1290.00'
 PC 271+87.94
 PT 271+87.94

PI 273+14.78
 Δ 08°13'50.6" (RT)
 D 03°15'00.3"
 T 126.84'
 L 253.25'
 R 1762.91'
 PC 271+87.94
 PT 274+41.19

LEGEND

SYMBOL	DESCRIPTION
	EXIST TRAFFIC FLOW
	PROP TRAFFIC FLOW
	PROP CONC PAV
	FAST TRACK CONC PVMT
	PROP SAWCUT

- NOTES:**
- ALL CALLOUTS REFERENCE @ RAMP D UNLESS OTHERWISE NOTED.
 - ALL CALLOUTS ARE FROM THE FACE OF RAIL OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
 - CONTRACTOR SHALL FIELD VERIFY ALL INFORMATION. CROSS SLOPE AND SUPERELEVATION DATA IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR IS TO MATCH EXISTING CROSS SLOPE FOR ROADWAY WIDENING.
 - FOR HORIZONTAL ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEETS.
 - SAW CUTTING AS SHOWN ON THE PLANS IS SUBSIDIARY TO VARIOUS BID ITEMS.
 - REFER TO SIGNING & PAVEMENT MARKING LAYOUT FOR SIGNING & PAVEMENT MARKING DETAILS.
 - FOR TYPICAL SECTIONS, REFER TO TYPICAL SECTIONS SHEETS.
 - LOCATION OF UTILITIES IS APPROXIMATE. CONTRACTOR IS TO EXERCISE CAUTION AND VERIFY THE LOCATION OF UTILITIES PRIOR TO EXCAVATION.



ANUSHA POKHREL, P.E. DATE 9/6/2024



IH 610
RAMP K
PLAN AND PROFILE

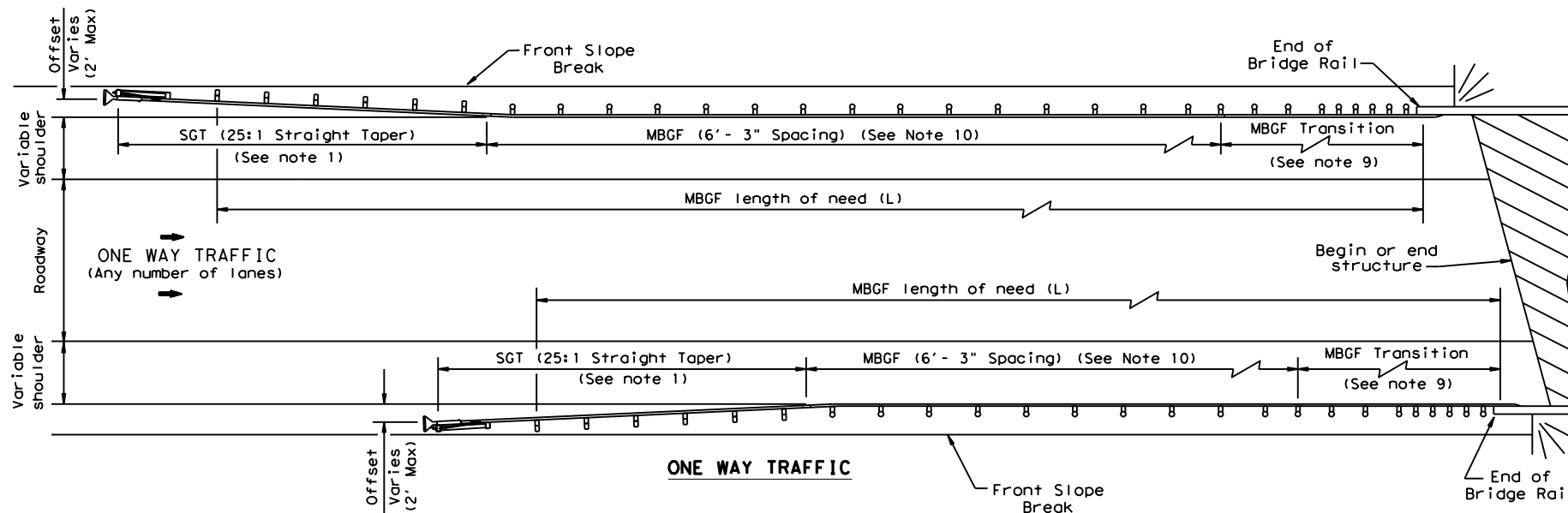
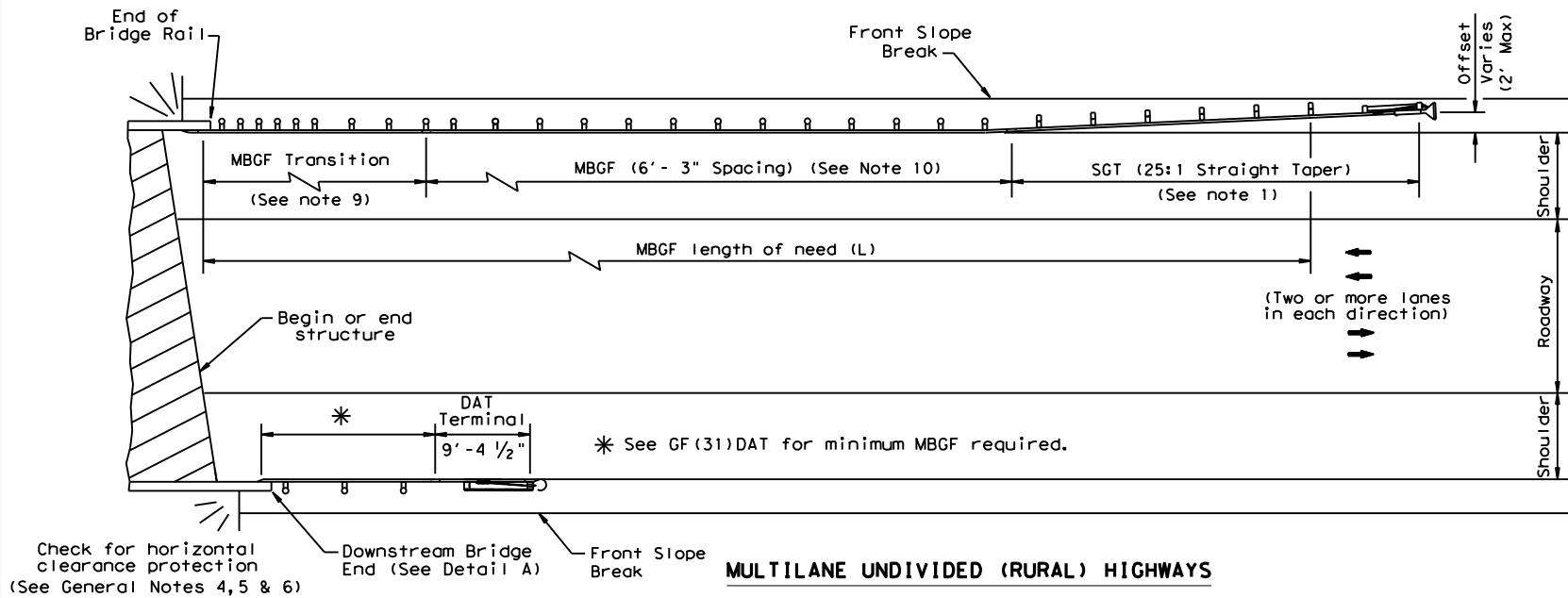
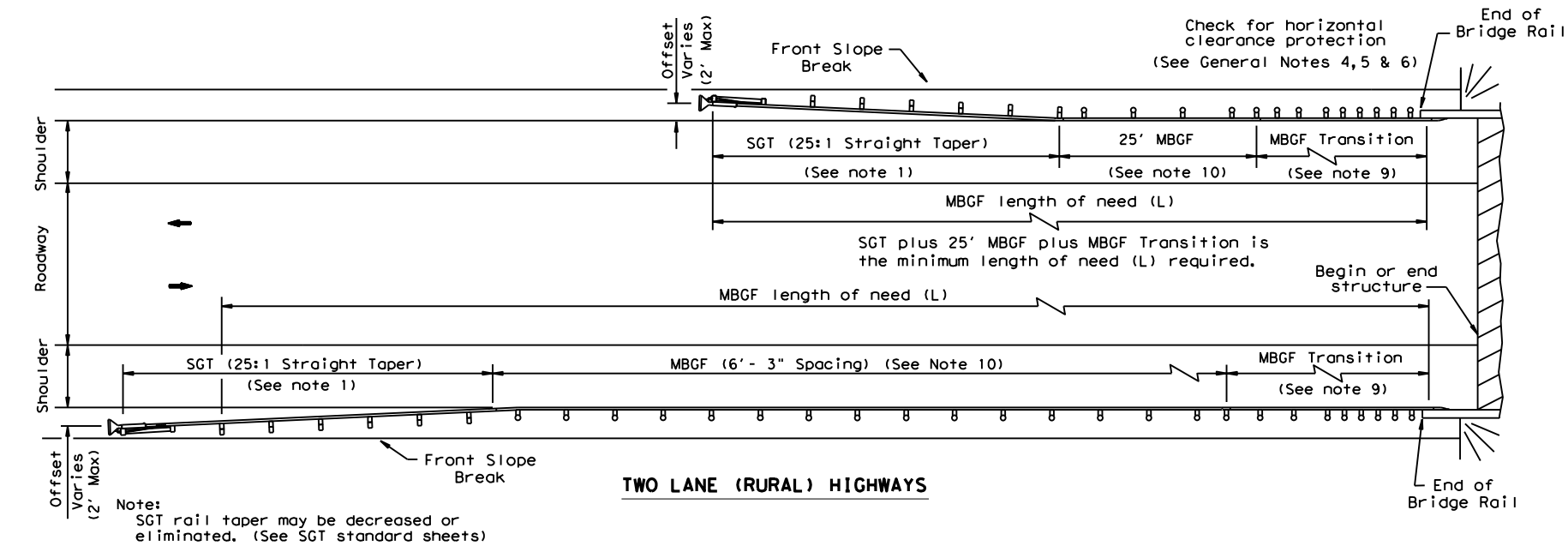
TxDOT © 2024 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	72	

DATE: 09/06/2024 01:51:18
 FILE: \$PROJECTNAME

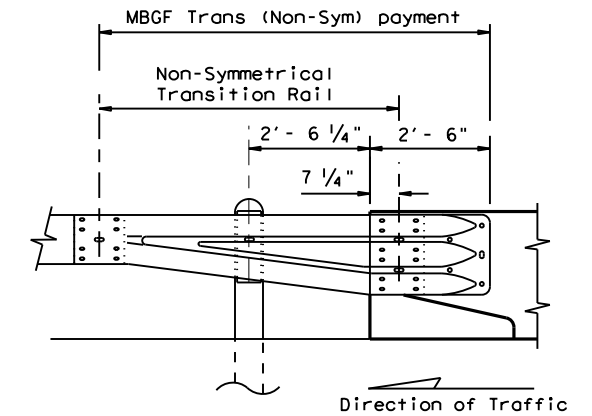
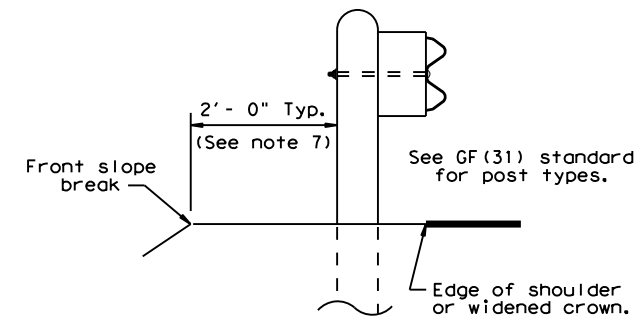
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



GENERAL NOTES

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

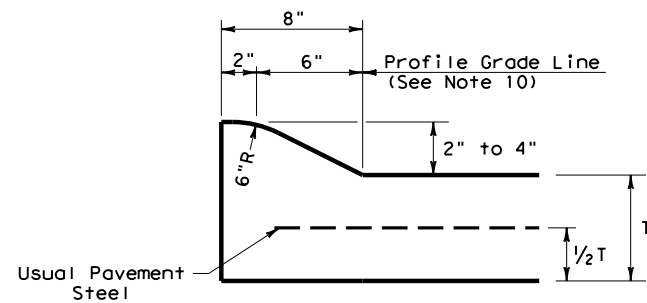


Note: All rail elements shall be lapped in the direction of adjacent traffic.

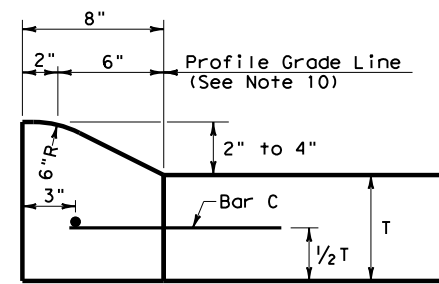
		Design Division Standard	
BRIDGE END DETAILS (METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)			
BED-14			
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP
© TxDOT: December 2011	CONT	SECT	JOB
REVISIONS	027	15	099
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY	HIGHWAY
	HOU	HARRIS	IH 610
			SHEET NO.
			73

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

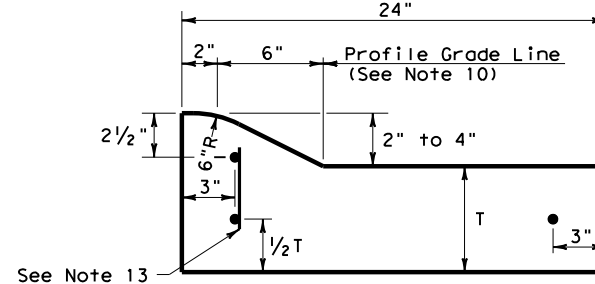
DATE:
FILE:



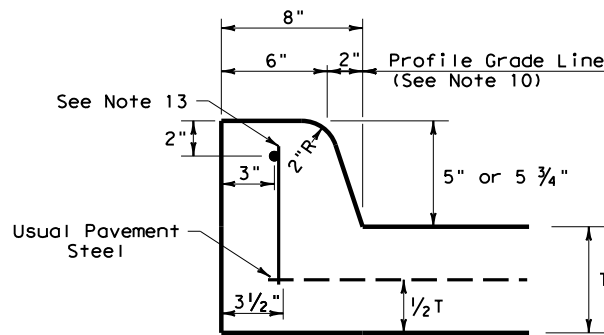
**TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT**



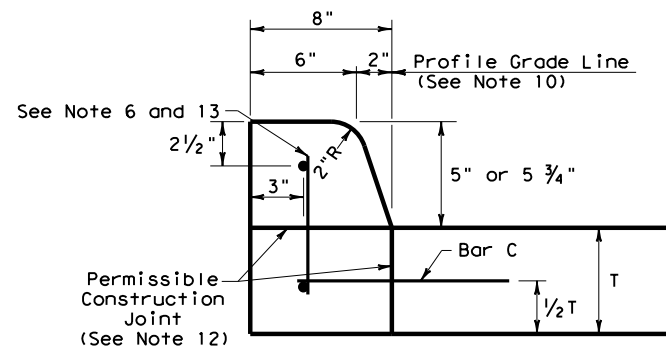
**TYPE I CURB
2" - 4" HEIGHT**



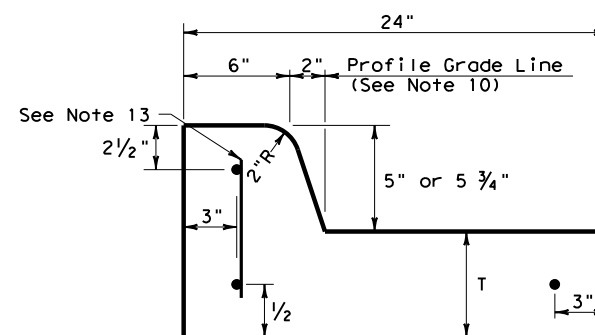
**TYPE I CURB AND GUTTER
2" - 4" HEIGHT**



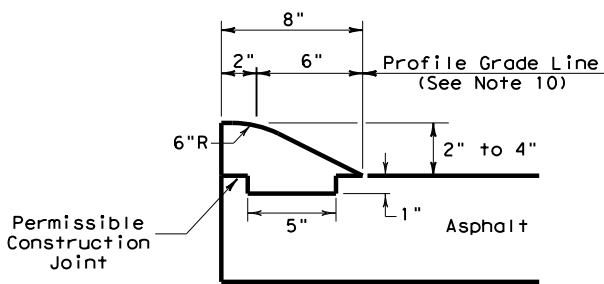
**TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT**



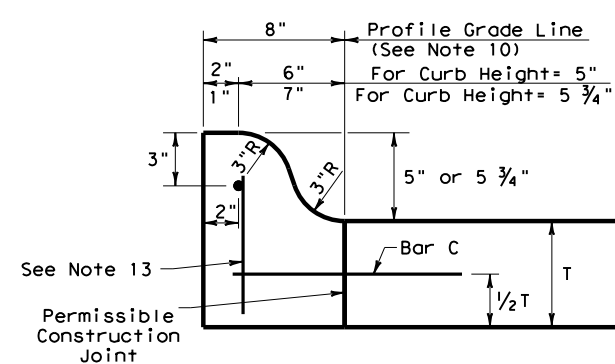
**TYPE II CURB
5" - 5 3/4" HEIGHT**



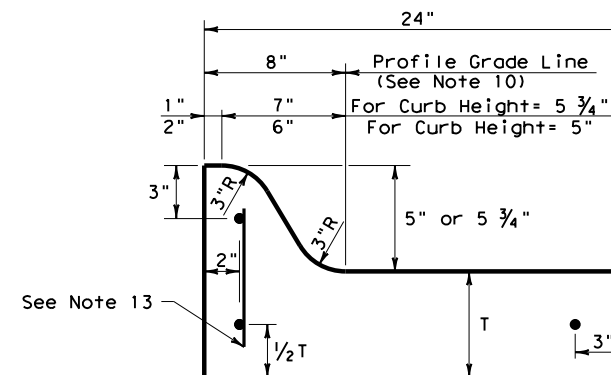
**TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT**



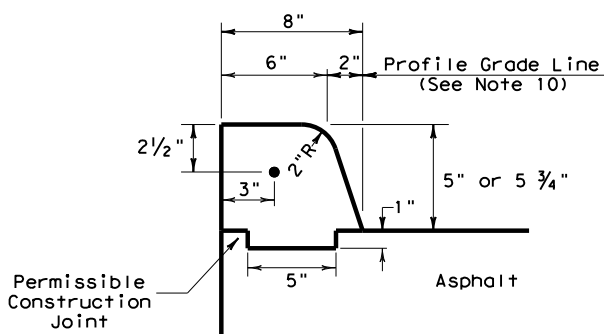
**TYPE III CURB (KEYED)
2" - 4" HEIGHT**



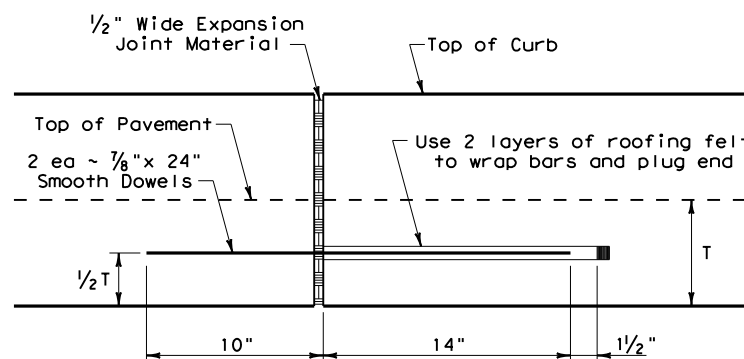
**TYPE IIa CURB
5" - 5 3/4" HEIGHT**



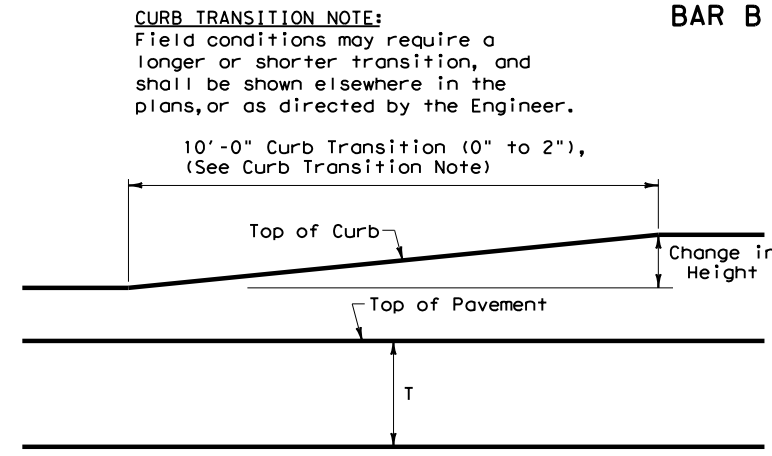
**TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT**



**TYPE IV CURB (KEYED)
5" - 5 3/4" HEIGHT**



EXPANSION JOINT DETAIL

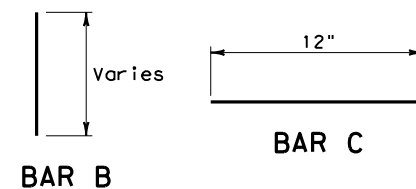


CURB TRANSITION

Note: To be paid for as Highest Curb

GENERAL NOTES

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

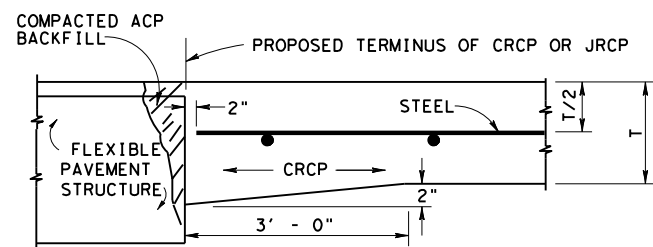
BAR C

CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

				Design Division Standard	
CONCRETE CURB AND GUTTER					
CCCG-22					
FILE: cccg21.dgn	DN: TxDOT	CK: AN	DW: CS	CK: KM	
© TxDOT: JUNE 2022	CONT: 027	SECT: 15	JOB: 099	HIGHWAY: IH 610	
REVISIONS		DIST: HOU	COUNTY: HARRIS	SHEET NO.: 74	

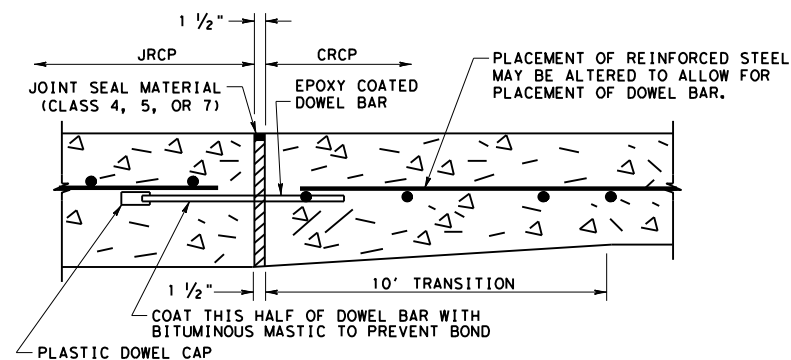
GENERAL NOTES

- FOR FURTHER INFORMATION REGARDING PLACING CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATION FOR CONCRETE PAVEMENT.
- THE DESIGN REQUIREMENTS FOR THE PAVEMENT STRUCTURE, I.E. BAR SPACING, BAR SIZE LAP REQUIREMENTS, ETC., ARE SHOWN ON THE APPROPRIATE PAVEMENT DESIGN DETAIL.
- SLEEPER SLAB AND ADDITIONAL REINFORCING REQUIRED ON THIS DRAWING ARE INCIDENTAL TO THE VARIOUS BID ITEMS.
- USE THE SIZE, SPACING, AND LENGTH OF DOWEL BARS SHOWN IN TABLE "A".
- WHERE THERE WILL BE A JUNCTURE AND ADDITIONAL JRCP PAVING WILL BE PLACED AT A FUTURE DATE, MULTIPLE PIECE DOWEL BARS WILL BE PERMITTED AT THE JUNCTURE. PROVIDE MULTIPLE PIECE DOWEL BAR ASSEMBLIES WITH A MINIMUM ULTIMATE TENSILE STRENGTH OF 60.0 KIPS AND THAT HAVE SMOOTH EPOXY COATED BARS. ENSURE THE MULTIPLE PIECE DOWEL BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND HAVE ROLLED THREADS ON THE BARS. DISMANTLE THE BAR AND FIT THE COUPLING PORTION USED IN CONSTRUCTION, WITH A PLASTIC CAP. FURNISH THE REMAINING PORTION OF THE BAR TO THE ENGINEER.
- WHERE THE PAVING IS CRCP AND A RAMP COMPOSED OF A FLEXIBLE PAVEMENT WILL BE USED AT THE JUNCTURE UNTIL FUTURE PAVING IS CONSTRUCTED, MULTIPLE PIECE TIE BARS MAY BE USED IF PERMITTED BY THE ENGINEER. IF USED, ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND ROLLED THREADS ON THE BARS. FURNISH MULTIPLE PIECE TIE BAR ASSEMBLIES THAT DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. FOR TIE BARS, USE DEFORMED REINFORCING BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STD. MAY BE USED PROVIDED THEY PROVE SATISFACTORY TO THE ENGINEER AND ARE IN EVERY RESPECT THE EQUAL TO THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED. LAP AND WELD ONE PORTION OF THE TIE BAR ASSEMBLY TO EACH LONGITUDINAL BAR IN ACCORDANCE WITH THE ITEM "STRUCTURAL FIELD WELDING" AND THE OTHER PORTION INTO THE COUPLING PRIOR TO PAVING. ENSURE MULTIPLE PIECE TIE BAR LENGTHS CONFORM TO THE TIE BAR LENGTHS SHOWN ELSEWHERE IN THE PLANS. ADDITIONAL "SHEAR STEEL" WILL ALSO BE REQUIRED AND MAY BE USED WITH MULTIPLE PIECE ASSEMBLIES AS PREVIOUSLY DESCRIBED. USE ADDITIONAL STEEL BARS OF EQUAL DIAMETER AT A SPACING DOUBLE THAT OF THE LONGITUDINAL STEEL AND ENSURE THE LENGTH IS 66 TIMES THE TIE BAR DIAMETER.
- DO NOT SHEAR CUT DOWEL BARS.
- ENSURE DOWEL BAR EPOXY COATING CONFORMS TO ARTICLE 440.2.7., "EPOXY COATING".
- REPLACE ANY BENT LONGITUDINAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE 12 BELOW. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.
- TIE BARS AND DOWEL BARS OMITTED, LOST, OR DAMAGED SHALL BE REPAIRED BY DRILLING AND EPOXY GROUTING AT NO EXPENSE TO THE DEPARTMENT.
- JUNCTURES A & B ARE ONLY SUITABLE FOR MINOR STREETS WITH LOW TRAFFIC VOLUMES.
- FURNISH ADDITIONAL SHEAR BARS (DIAMETER "D") OF THE SAME SIZE AS LONGITUDINAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.



NOTE:
ADDITIONAL CONCRETE FOR THICKENED EDGE IS SUBSIDIARY TO VARIOUS BID ITEMS. BACKFILL DISTURBED MATERIAL IN THE FLEXIBLE PAVEMENT WITH ACP. THIS ACP IS SUBSIDIARY TO VARIOUS BID ITEMS.

JUNCTURE A & B - CRCP OR JRCP WITH FLEXIBLE TYPE PAVEMENT STRUCTURE

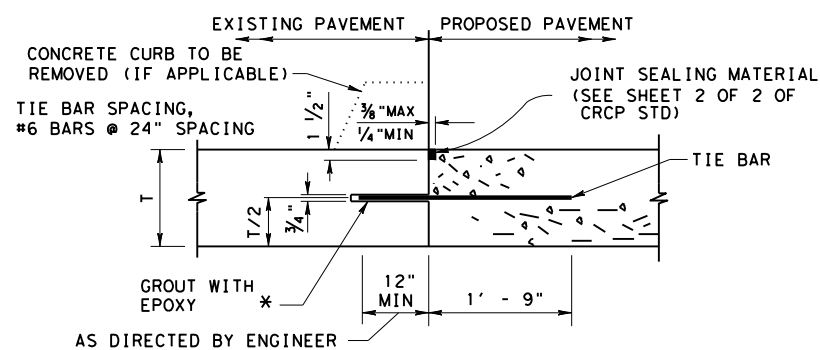


FOR DETAILS NOT SHOWN, SEE TRANSVERSE EXPANSION JOINT DETAILS ELSEWHERE IN PLANS.

DETAIL "B" - DOWEL ASSEMBLY AT EXPANSION JOINT

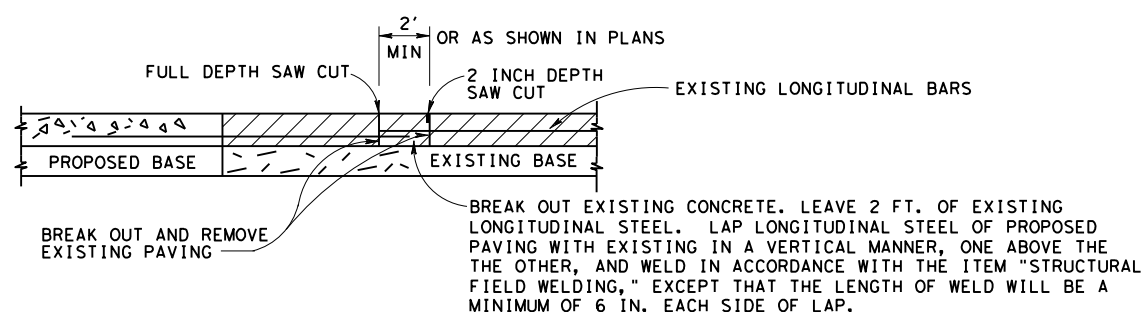
DOWEL BAR DATA			
SLAB THICKNESS (T)	6"-7.5"	8"-10"	10.5"-15"
DOWEL SIZE	1"	1 1/4"	1 1/2"
DOWEL LENGTH	18"	20"	22"
DOWEL BAR SPACING	12"	12"	12"

TABLE A - DOWEL BAR DATA



JUNCTURE D - TYPICAL CONNECTION TO EXISTING CONCRETE

*FOR EPOXY TYPE SEE ITEM 361.



JUNCTURE F - "BREAK BACK" CONCRETE CRCP WITH CRCP OR JRCP WITH JRCP

LEGEND

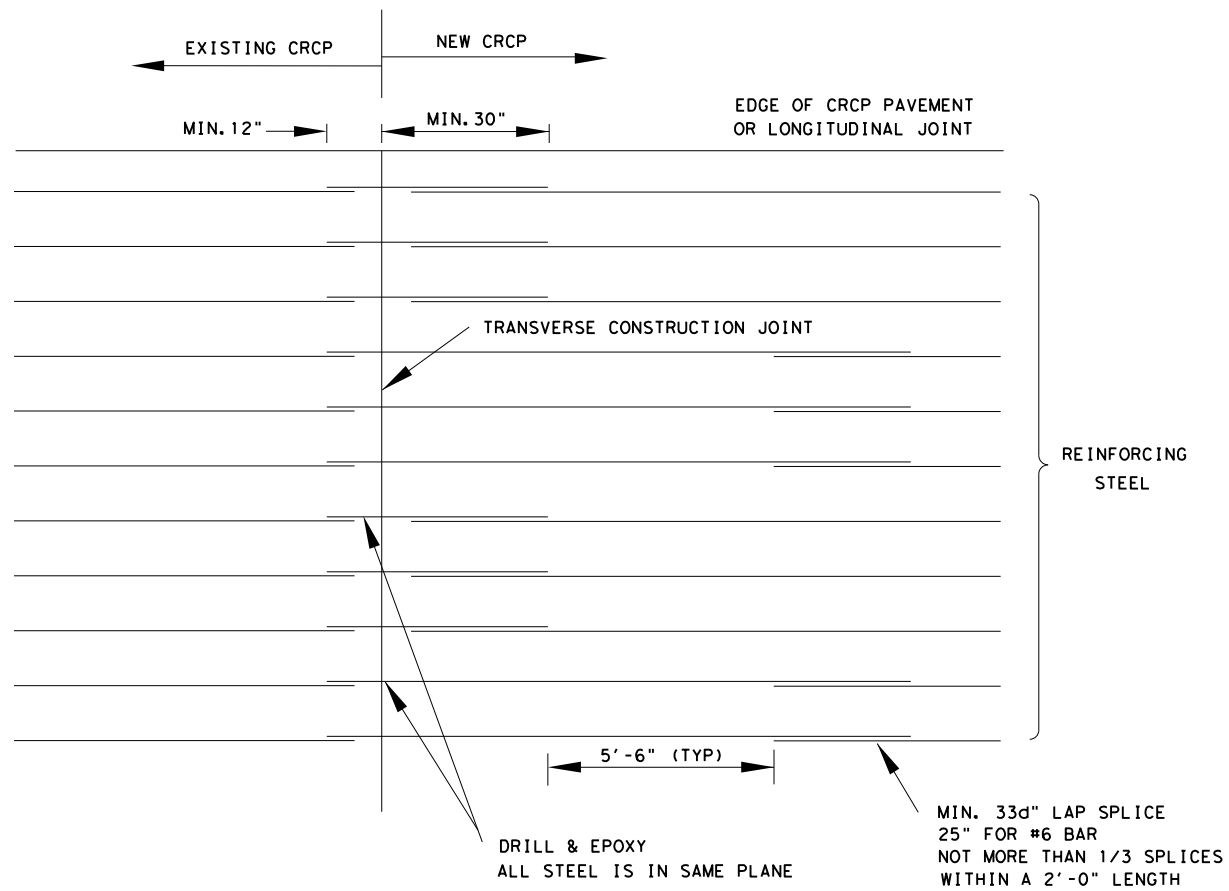
- ACP - ASPHALT CONCRETE PAVEMENT
- CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
- JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
- T - THICKNESS

Texas Department of Transportation
Houston District

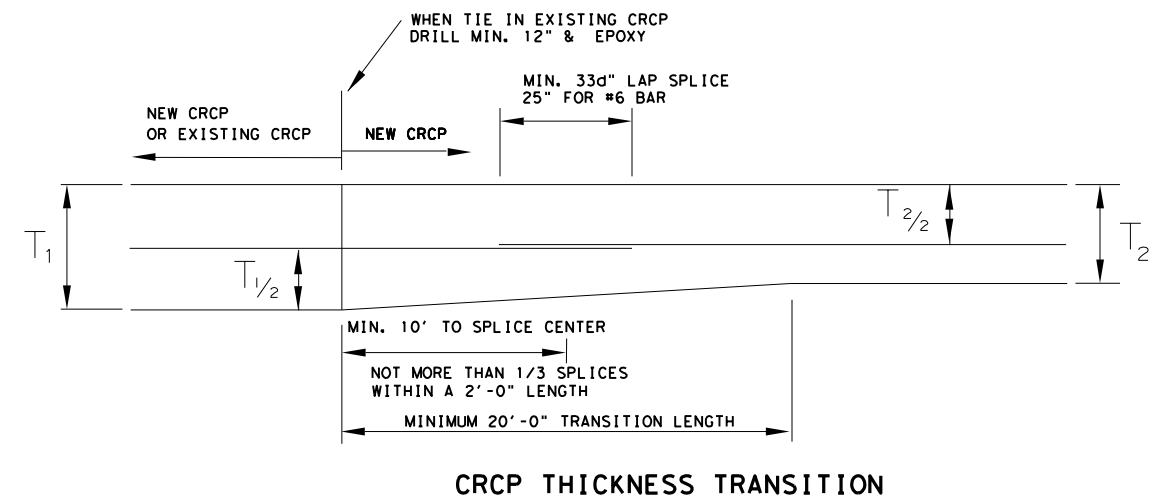
CONCRETE PAVEMENT JUNCTURES

CPJ

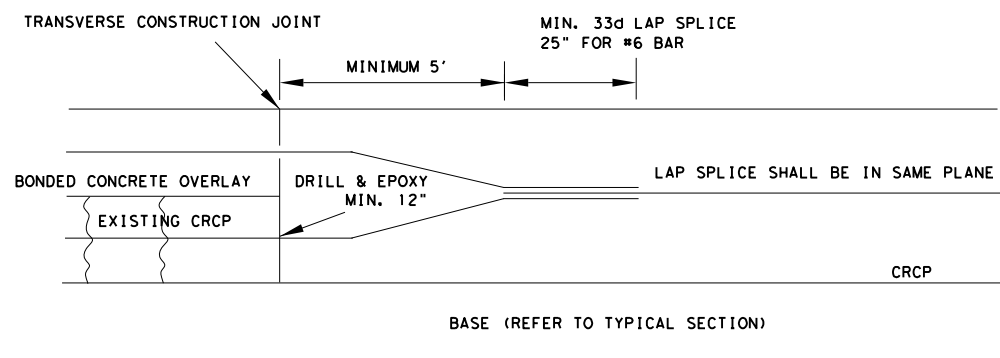
FILE: STDB-5.dgn	DN:	CK:	DW:	CK:
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	127115099	75
5/05 2004 SPECS	COUNTY	CONTROL	SECT	JOB
REVISED 4/2008	HARRIS	0271	15	099
2/15 2014 SPECS				HIGHWAY
				IH 610



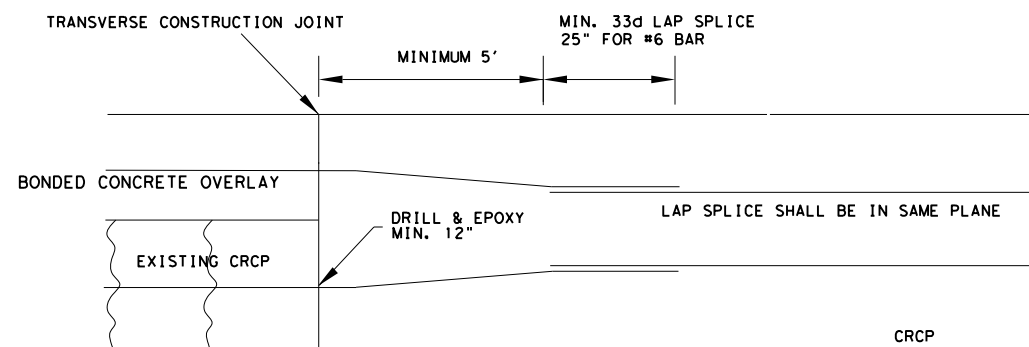
EXISTING CRCP TO NEW CRCP



CRCP THICKNESS TRANSITION



**CRCP BONDED OVERLAY TO CRCP TRANSITION
(ONE LAYER STEEL)**



**CRCP BONDED OVERLAY TO CRCP TRANSITION
(TWO LAYER STEEL)**



**CONCRETE PAVEMENT
JUNCTURES**

CPJ

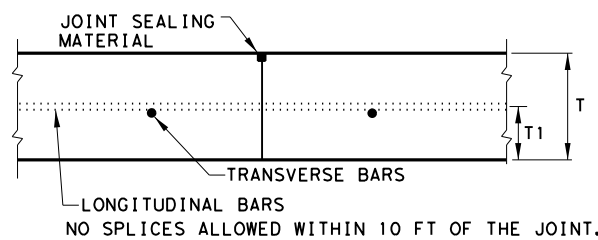
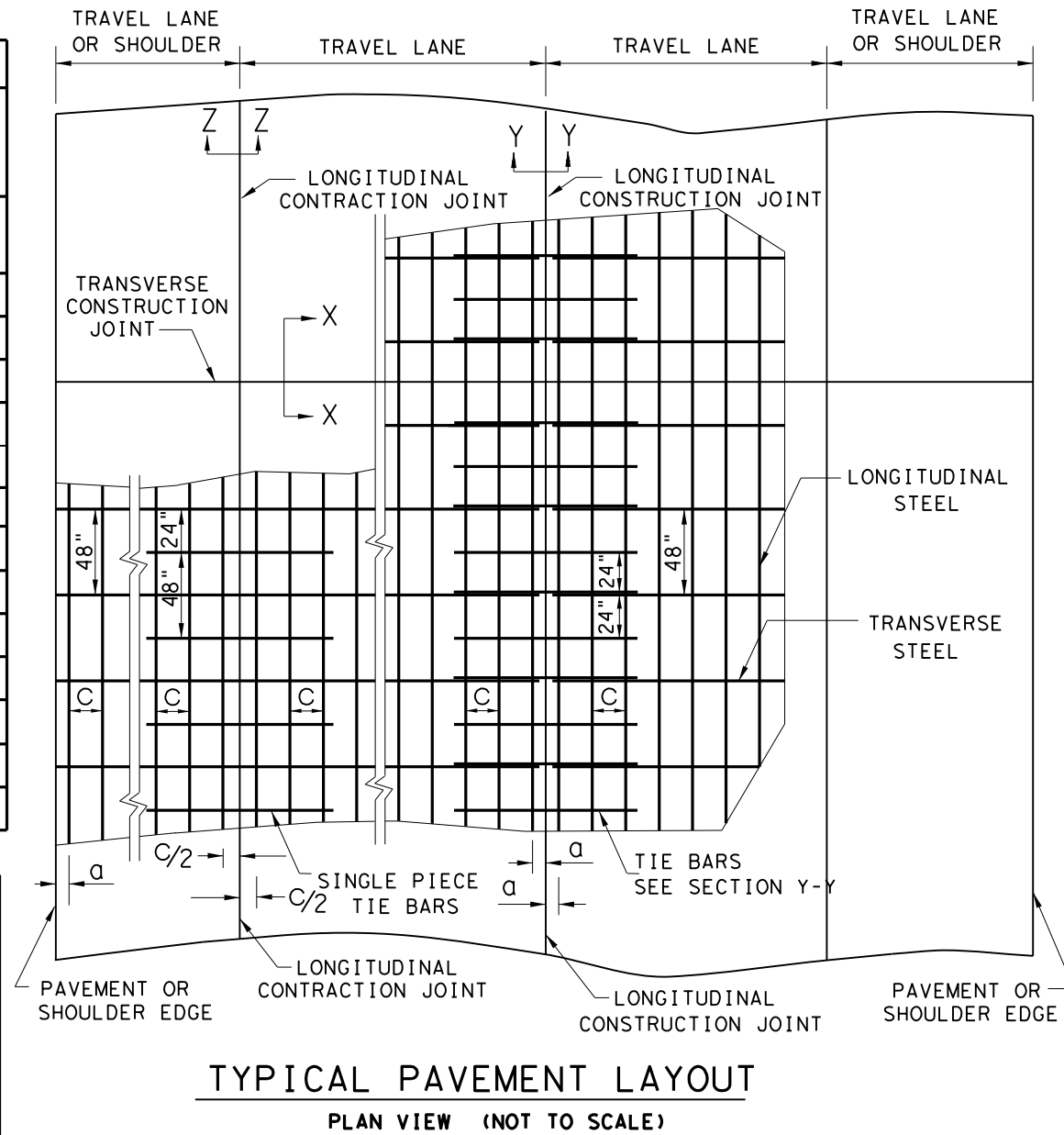
FILE: STDB-5.dgn	DN:	CK:	DW:	CK:
© TXDOT DEC. 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU	6	127115099	76
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	15	099
				HIGHWAY
				IH 610

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.

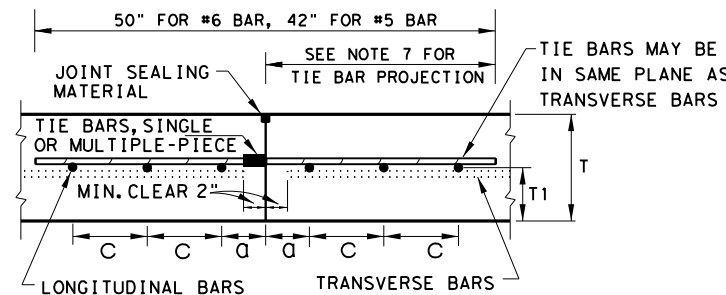
TABLE NO. 1 LONGITUDINAL STEEL				
SLAB THICKNESS AND BAR SIZE		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT	LONG. STEEL VERTICAL POSITION FROM BOTTOM OF PAVEMENT
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	T1 (IN.)
7.0	#5	6.5	3 TO 4	3.5
7.5	#5	6.0	3 TO 4	3.75
8.0	#6	9.0	3 TO 4	4.0
8.5	#6	8.5	3 TO 4	4.25
9.0	#6	8.0	3 TO 4	4.5
9.5	#6	7.5	3 TO 4	4.75
10.0	#6	7.0	3 TO 4	5.0
10.5	#6	6.75	3 TO 4	5.5
11.0	#6	6.5	3 TO 4	6.0
11.5	#6	6.25	3 TO 4	6.5
12.0	#6	6.0	3 TO 4	7.0
12.5	#6	5.75	3 TO 4	7.5
13.0	#6	5.5	3 TO 4	8.0

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

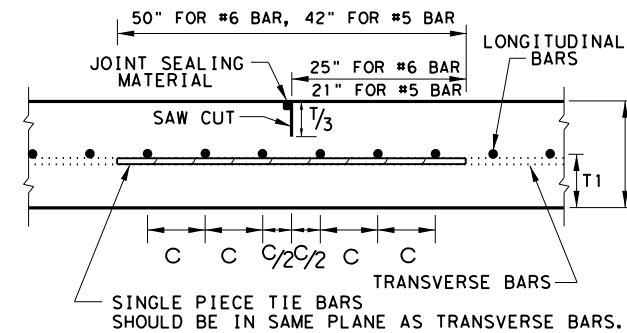
*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE



TRANSVERSE CONSTRUCTION JOINT SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT SECTION Y - Y



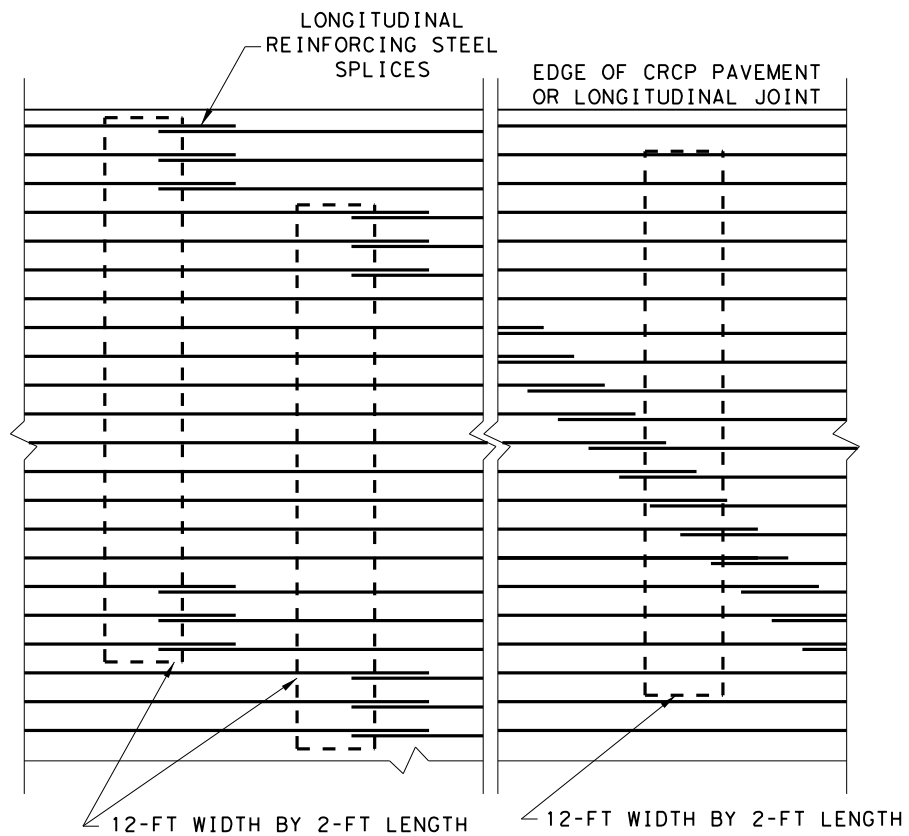
LONGITUDINAL CONTRACTION JOINT SECTION Z - Z

		Design Division Standard	
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ONE LAYER STEEL BAR PLACEMENT T - 7 TO 13 INCHES CRCP (1) - 23			
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES
© TxDOT: APRIL 2023	CONT SECT	JOB	HIGHWAY
APRIL 2023	0271	15	099
REVISOR: LONG. STEEL VERTICAL LOCATION	DIST	COUNTY	SHEET NO.
REVISOR: TIE BAR AT TRANSVERSE	HOU	HARRIS	77

DATE: \$DATES\$
FILE: \$FILES\$

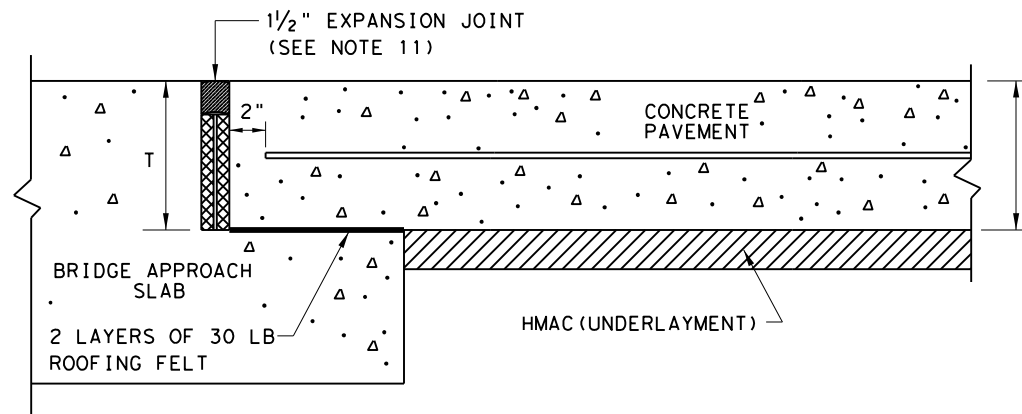
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: \$DATES\$
FILE: \$FILES\$
\$TIME\$

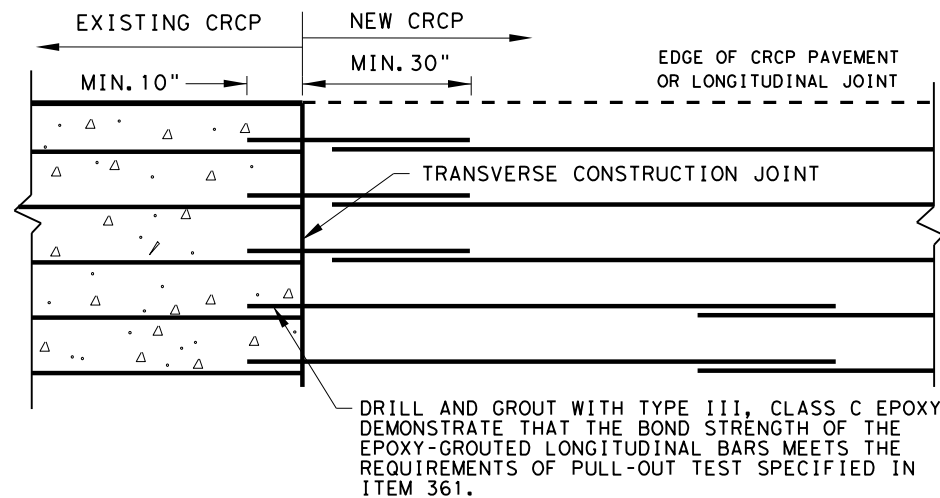


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

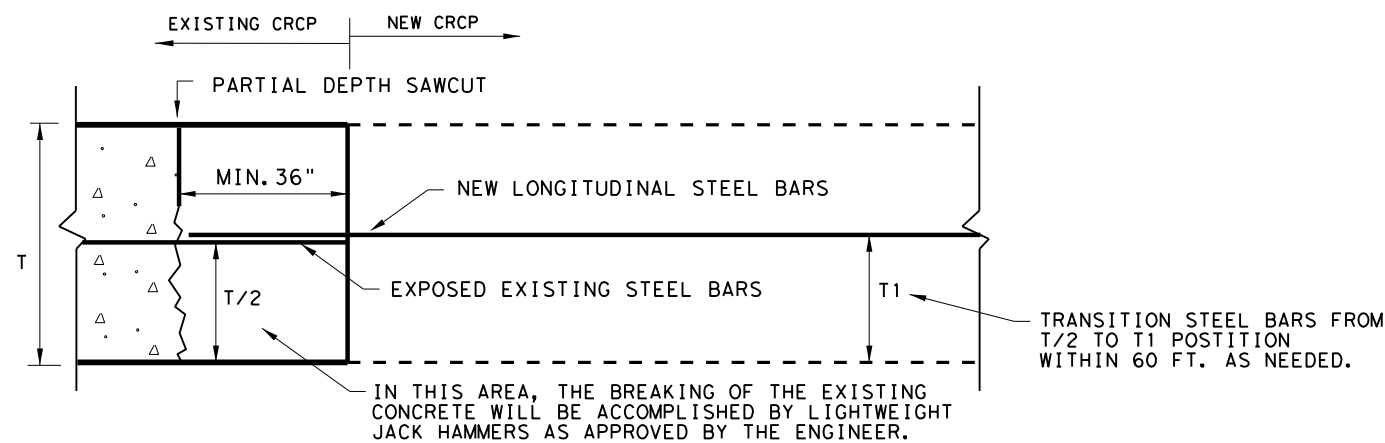
EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

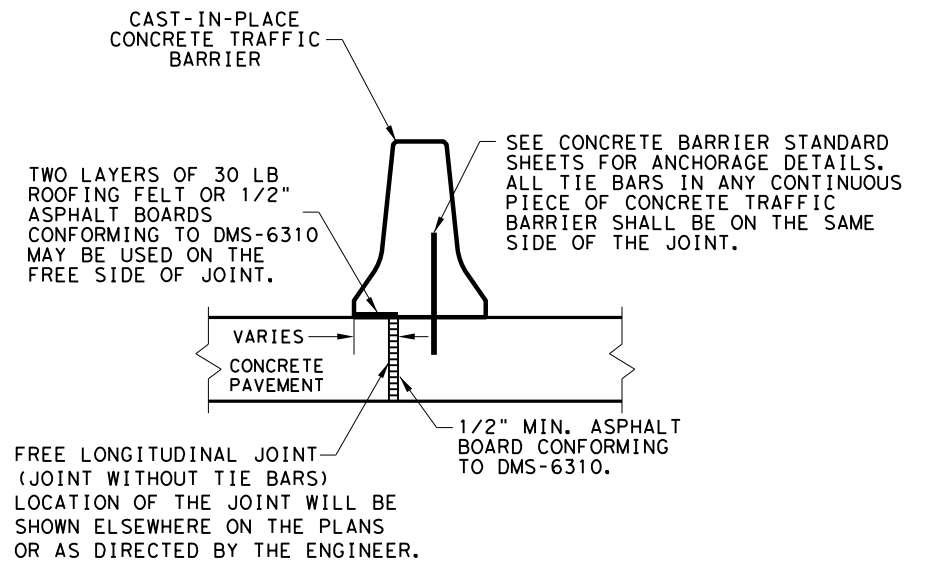


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)

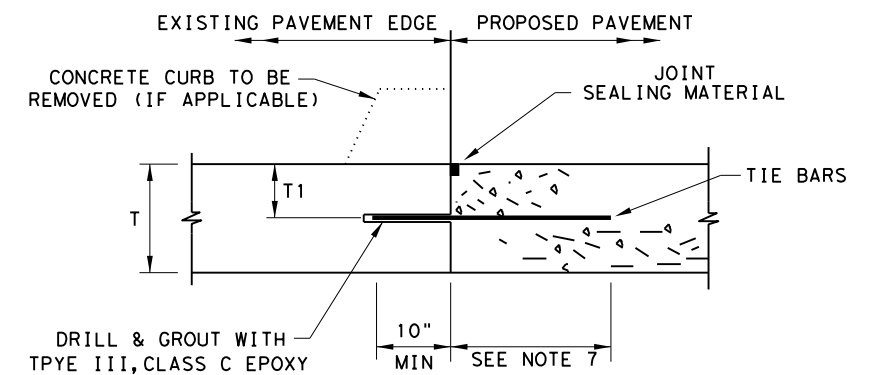


OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP



CENTERLINE FREE LONGITUDINAL JOINT DETAIL

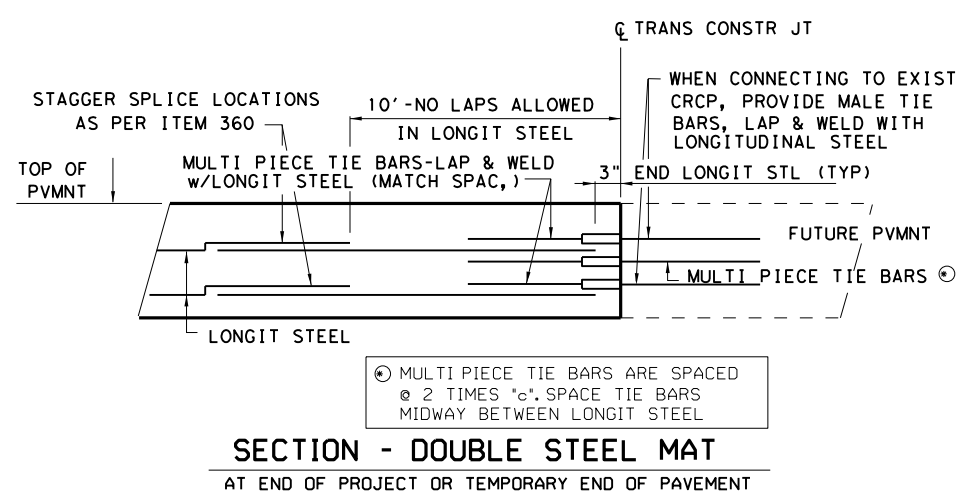
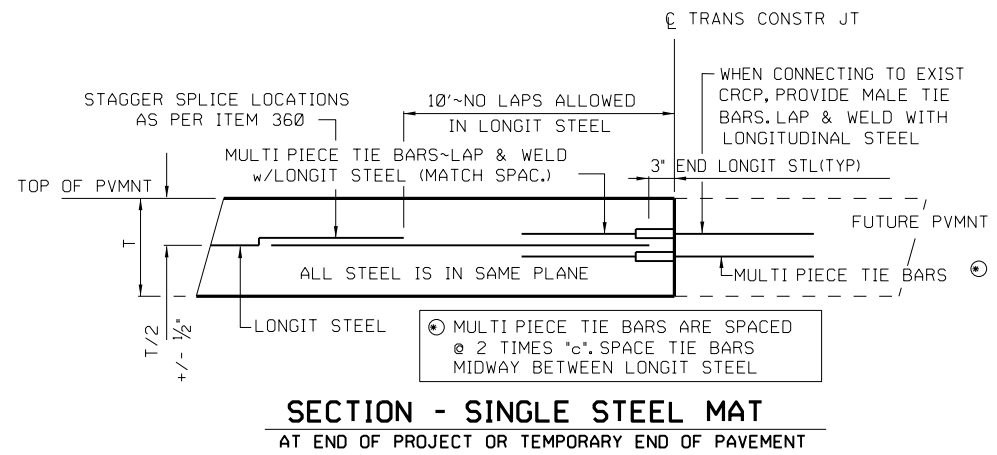


- BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
- SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

		Design Division Standard	
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES CRCP (1) - 23			
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES
© TxDOT: APRIL 2023	CONT SECT	JOB	HIGHWAY
APRIL 2023: REVISIONS	0271 15	099	IH 610
MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH	DIST	COUNTY	SHEET NO.
	HOU	HARRIS	78

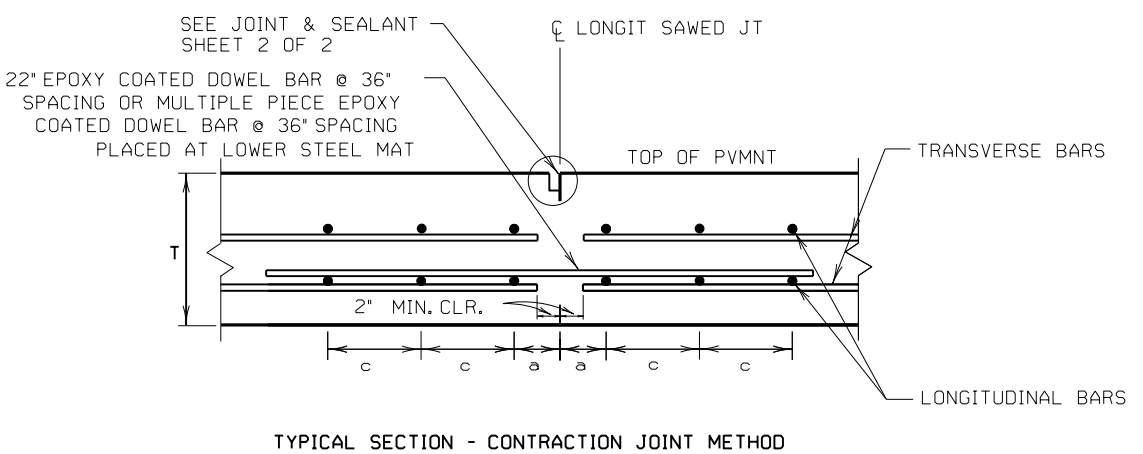
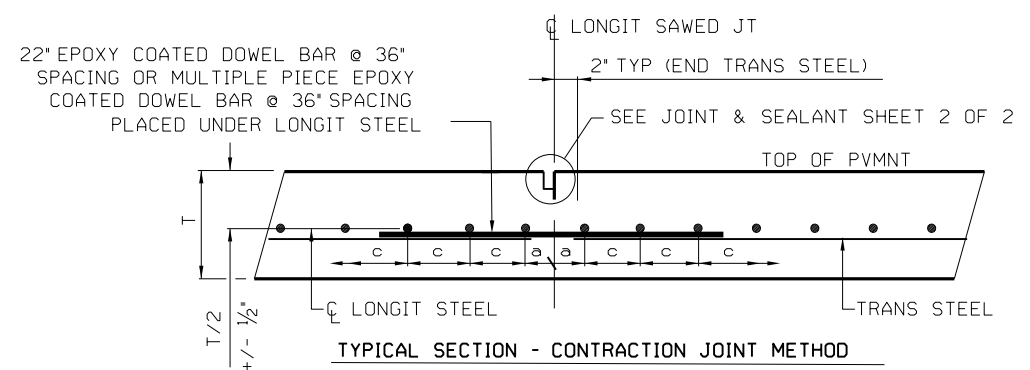
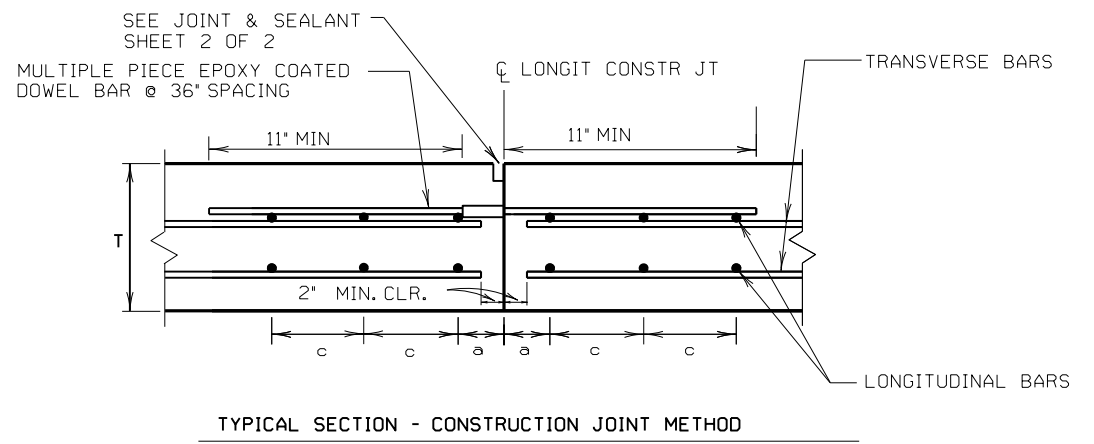
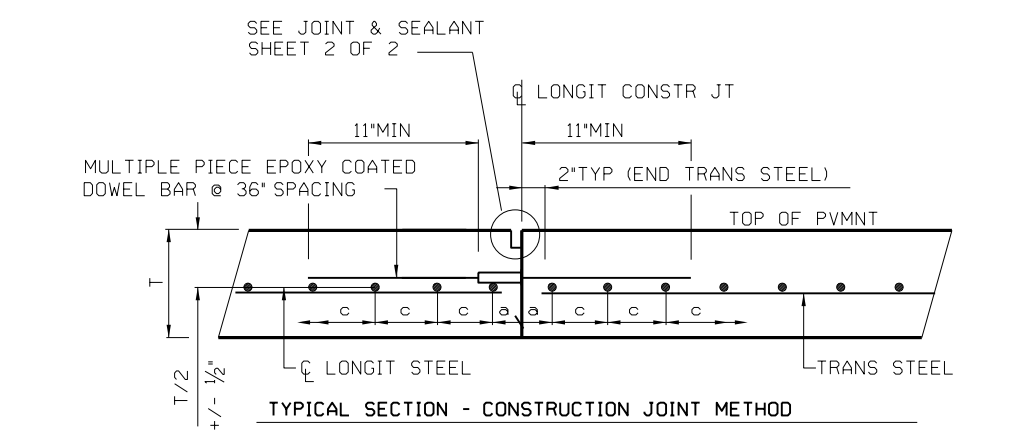


LONGITUDINAL DOWEL JOINT DETAILS

LOCATE WHERE SHOWN IN THE PLANS OR AS APPROVED. CONTRACTOR MAY USE EITHER METHOD

SINGLE STEEL MAT

DOUBLE STEEL MAT



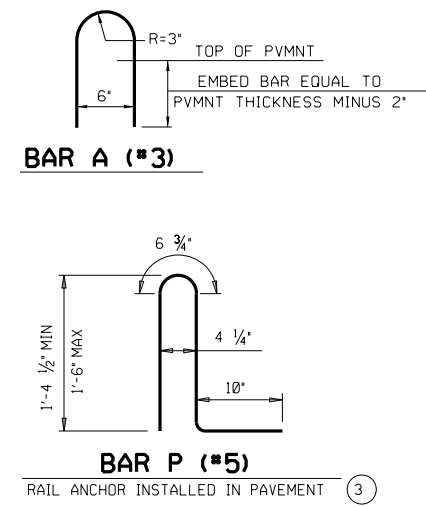
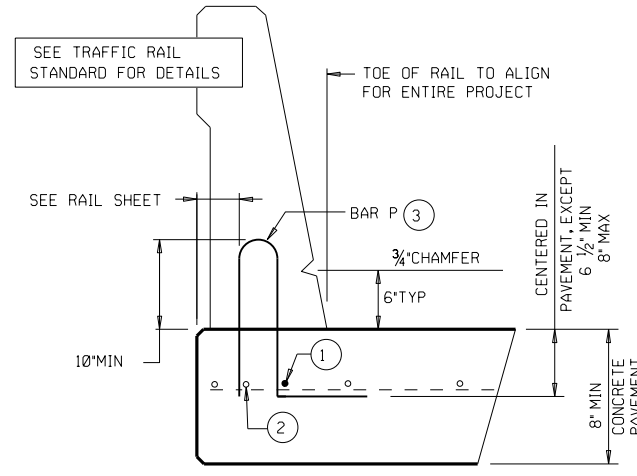
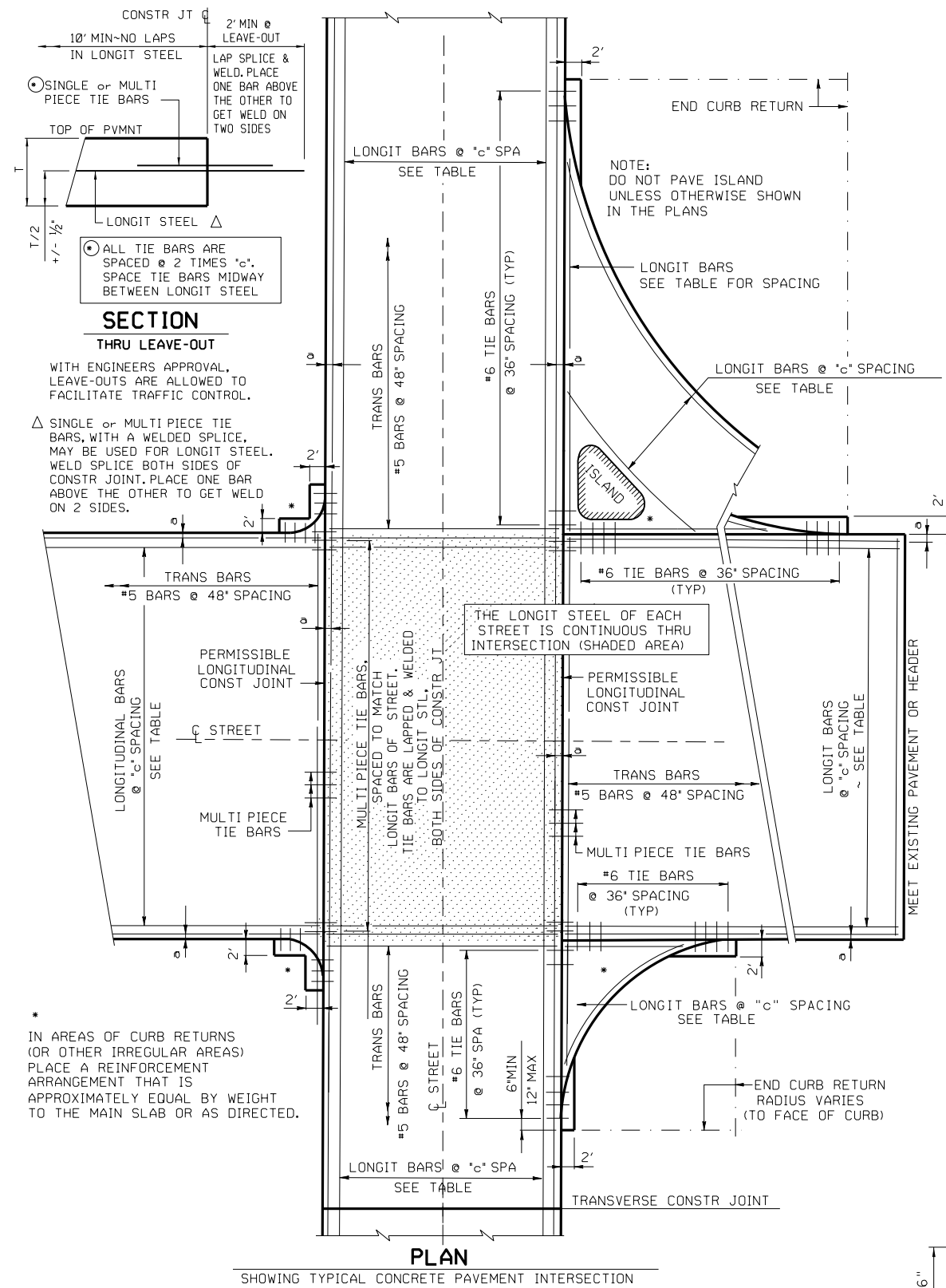
GENERAL NOTES

1. DETAILS FOR 7.0 IN. TO 13.0 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(1)-17. DETAILS FOR 14 IN. TO 15 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(2)-17.
2. DOWELS AND TIE BARS - DOWELS ARE ONE INCH MINIMUM DIAMETER. ENSURE DOWELS ARE FREE OF GREASE AND ARE EPOXY COATED. DO NOT SHEAR CUT DOWELS DURING FABRICATION. PROVIDE TIE BARS PER ITEM 360. FURNISH MULTI PIECE TIE BARS AND DOWELS WITH STOP COUPLINGS AND WITH THREADS ON THE BARS.
3. USE CHAIRS OF SUFFICIENT STRUCTURAL QUALITY AND NUMBER TO SUPPORT THE MAT TO THE VERTICAL TOLERANCES. CHAIRS WILL BE APPROVED BY THE ENGINEER AND DO NOT REQUIRE GALVANIZING.
4. MECHANICALLY PLACING REINFORCING STEEL IS NOT ALLOWED. NO BARS, DOWELS OR TIE BARS MAY BE VIBRATED INTO POSITION.
5. WHERE DIFFERENT THICKNESS PAVEMENTS MEET, TRANSITION THE THINNER SECTION TO THE THICKER SECTION OVER A DISTANCE OF 20 FT. PLACE REINFORCING STEEL WITHIN THE TRANSITION THE SAME AS IN THE THICKER PAVEMENT.
6. PERFORM WELDING PER ITEM 448. FURNISH WELDABLE REBAR PER ITEM 440.

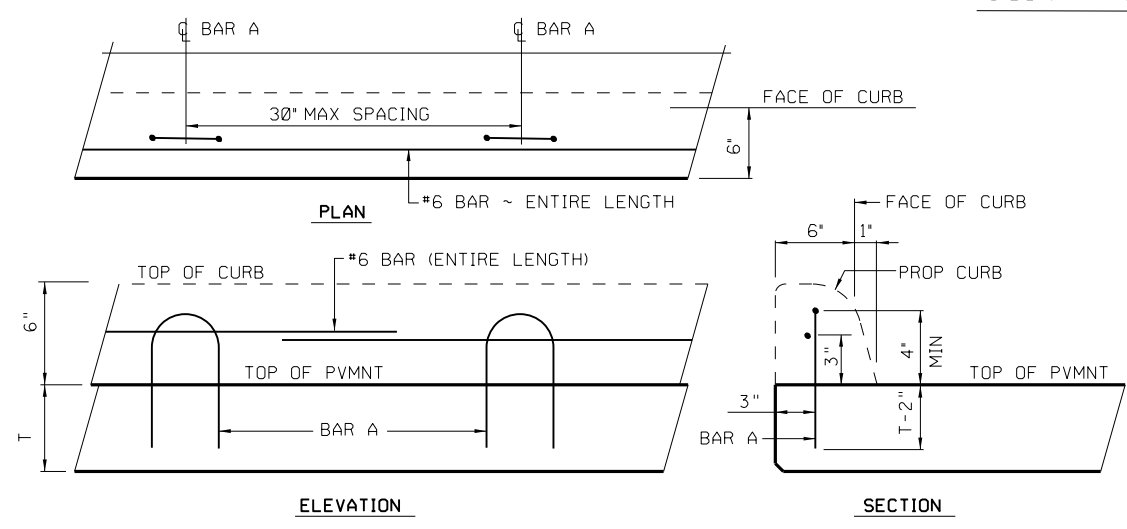
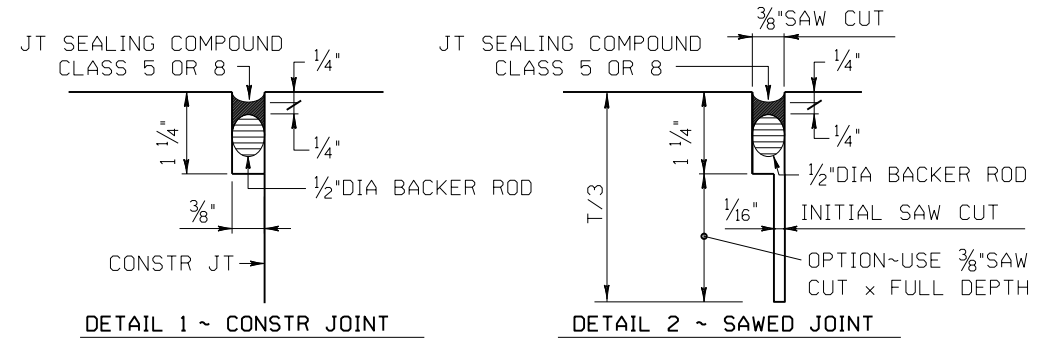
Texas Department of Transportation
Houston District

**CONTINUOUSLY REINFORCED
CONCRETE PAVEMENT
HOUSTON SUPPLEMENT
CRCP-HS**

© TxDOT APR. 2012	Dist -	City -	Div -	Proj -	Sheet
REVISIONS 4/12 CHANGED CTE FROM 6.0 TO 5.0 8/14 UPDATE TO REFERENCE CRCP-13 STD. 2/15 REVISED GENERAL NOTES, MINOR CORRECTIONS. 4/17 REVISED NOTE #3 OF GENERAL NOTES, MINOR CORRECTIONS.	DISTRICT HOU	PROJECT NO. F 2025 (280)	JOB 027115 099 IN 610		SHEET 79
COUNTY HARRIS		CONTROL SECTION	JOB	HIGHWAY	



- AS AN AID IN SUPPORTING REINFORCEMENT, ADDITIONAL LONGITUDINAL BARS MAY BE USED IN THE SLAB WITH THE APPROVAL OF THE ENGINEER. FURNISH SUCH BARS AT NO EXPENSE TO THE DEPARTMENT.
- LONGITUDINAL SLAB BAR MAY BE ADJUSTED LATERALLY 3" +/- TO TIE REINFORCING.
- ANCHORAGE BAR SHOWN IS FOR AN SSTR OR T551 RAIL. SEE RAILING DETAIL SHEET FOR SPACING OF BAR P. FOR OTHER RAIL TYPES SEE RAILING DETAIL SHEET.



SHEET 2 OF 2

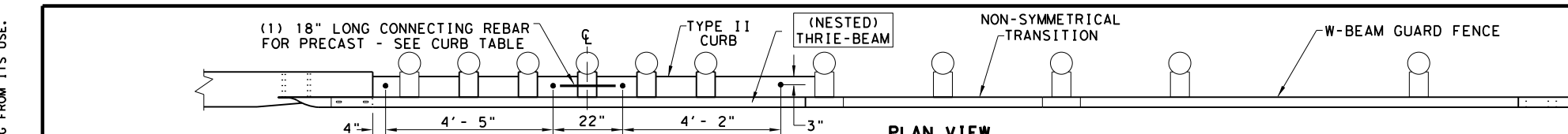
Texas Department of Transportation
Houston District

**CONTINUOUSLY REINFORCED
CONCRETE PAVEMENT
HOUSTON SUPPLEMENT
CRCP-HS**

© TxDOT APR. 2012		DN-	CR-	DR-	CK-
REVISIONS		PROJECT NO.		SHEET	
4/12 CHANGED CTE FROM 6.0 TO 5.0 (ON SHEET 1)		HOU		F 2025 (280)	
2/15 MINOR CORRECTIONS.		COUNTY		JOB	
		HARRIS		027115 099 IN 610	

STD-B1B

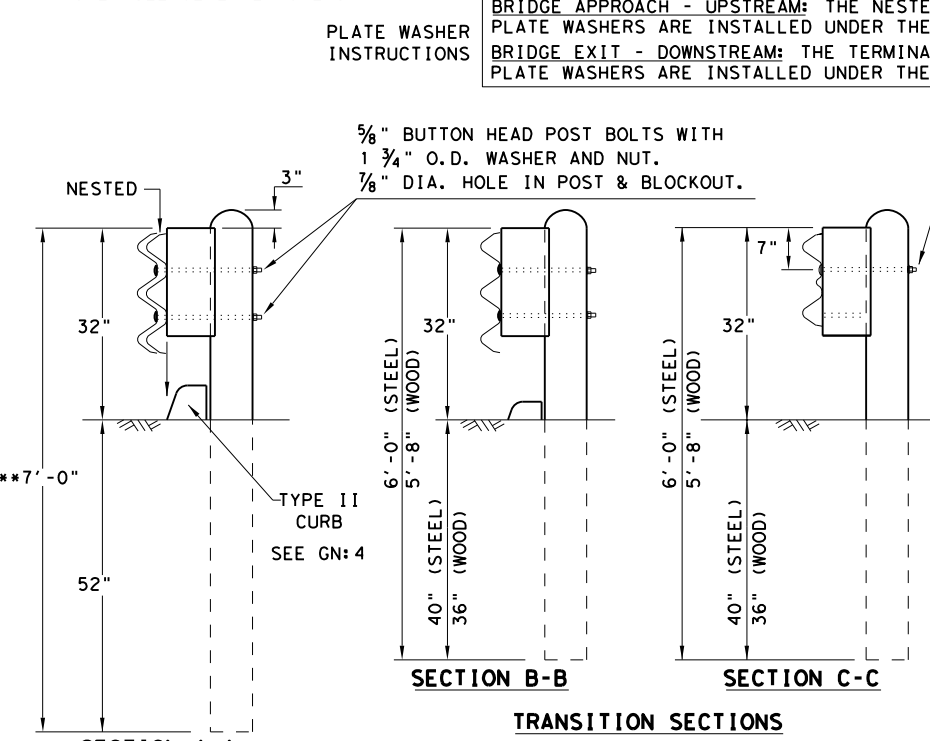
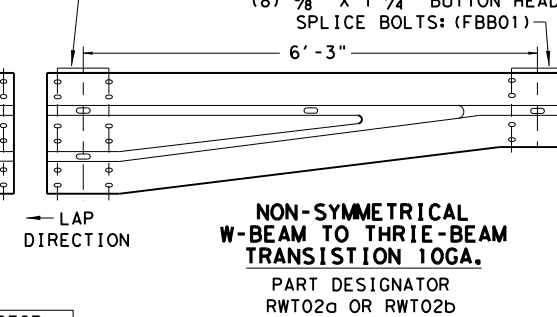
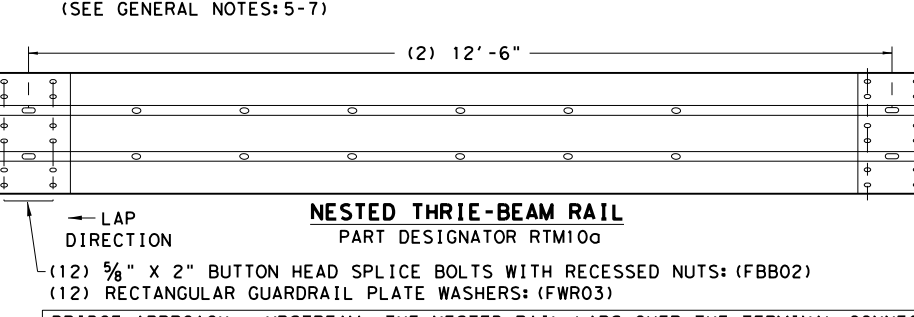
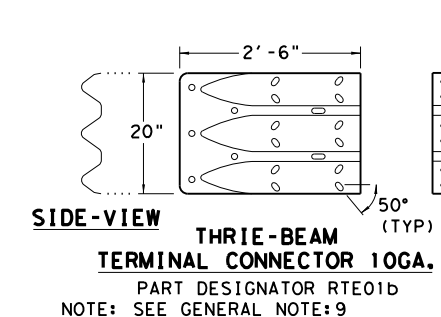
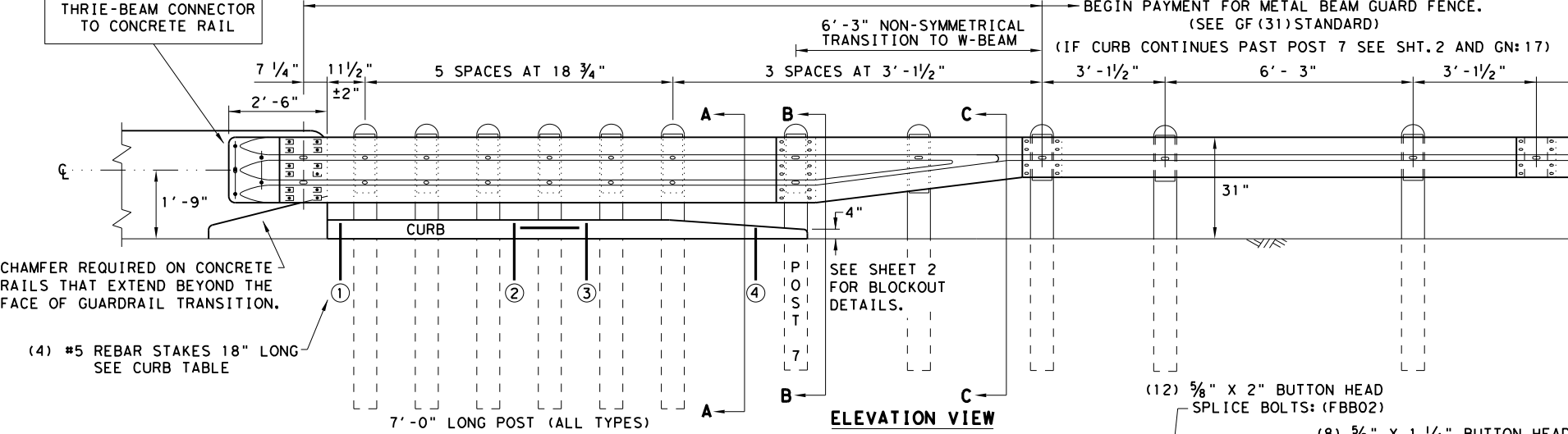
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- (5) 1" DIA. HOLES.
- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

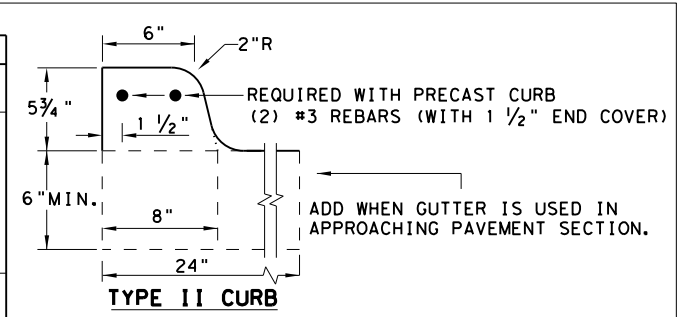
NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.



BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

THRIE-BEAM TERMINAL - CURB TABLE	
PRECAST CURB FULL LENGTH EQUALS 12'- 2"	
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.	
CURB (1) LENGTH	5'- 8"
CURB (2) LENGTH	6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7	
CONNECTING PRECAST CURB SECTIONS (1) & (2):	
FORM OR CORE	1" DIA. HOLE 9" LONG INTO EACH CURB END.
USE	(1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:	
FORM OR CORE	(4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.	

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



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

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCGG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF (31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TxDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION
SHEET 1 OF 2

				Design Division Standard
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT				
GF (31) TR TL3-20				
FILE: gf31tr+1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	81	

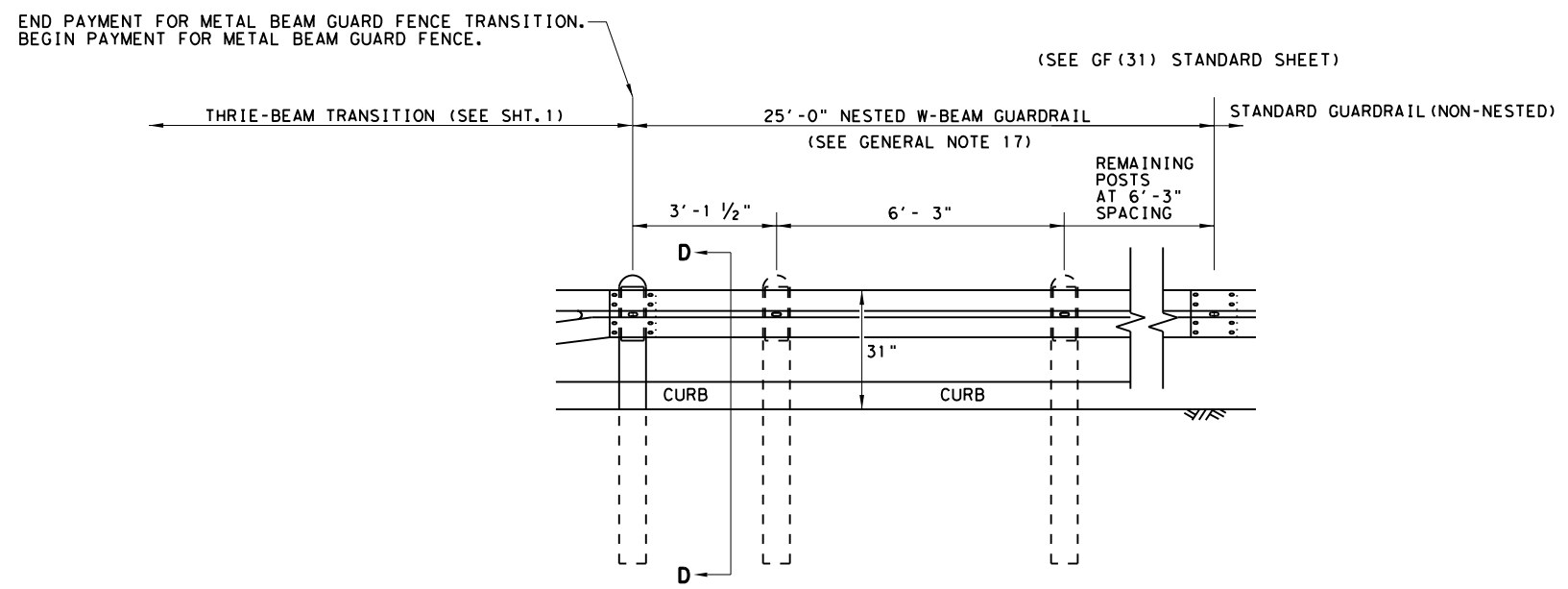
DATE: FILE:

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

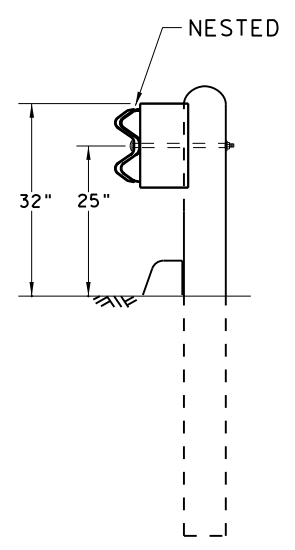
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE:
FILE:

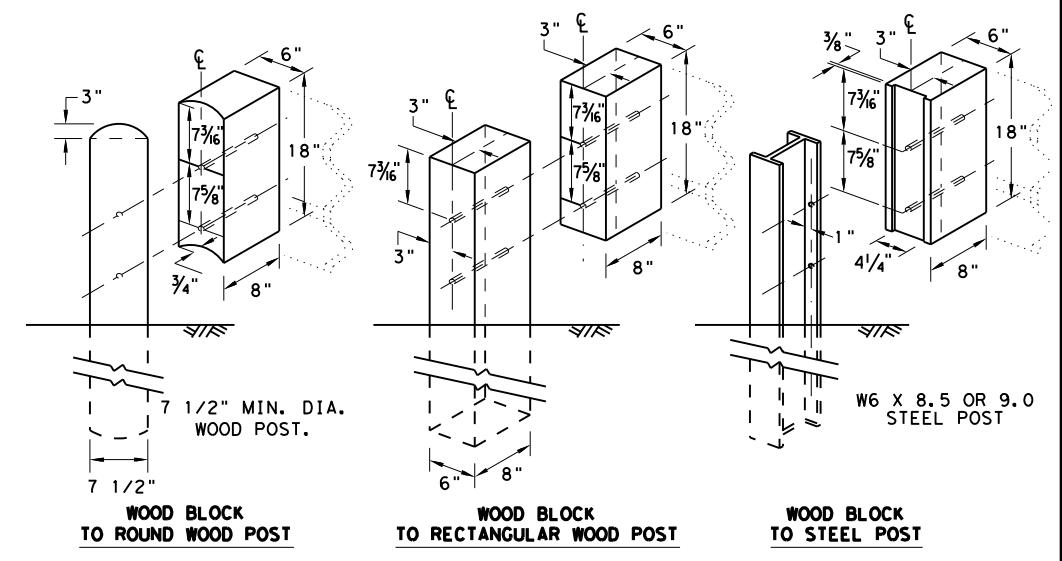
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THREE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

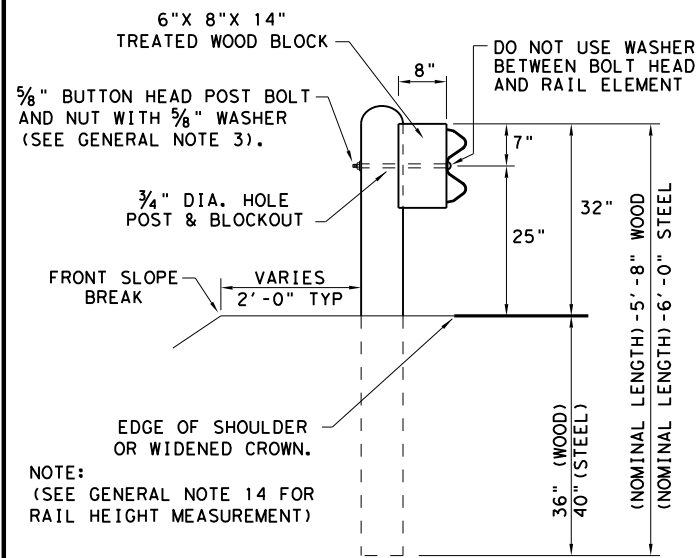


METAL BEAM GUARD FENCE
THREE-BEAM TRANSITION
TL-3 MASH COMPLIANT
GF (31) TR TL3-20

FILE: gf31tr+1320.dgn	DN: TXDOT	CK: KM	DW: KM	CK: CGL/AG
©TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	82	

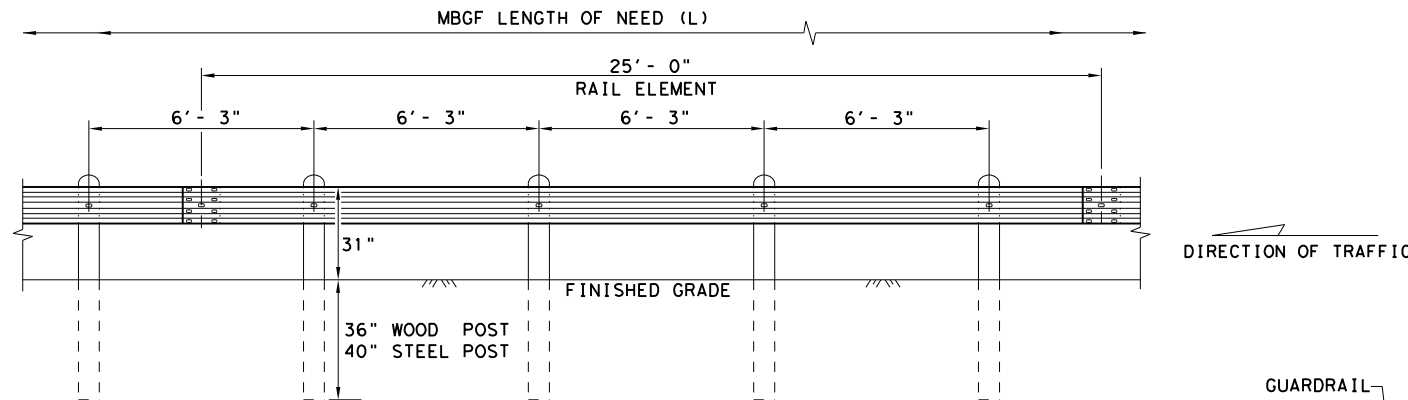
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: FILE:



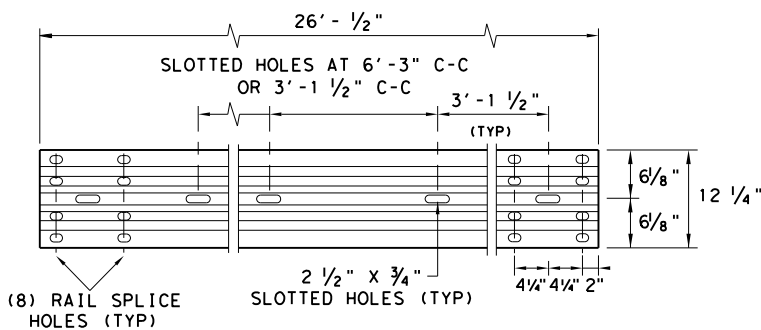
TYPICAL POST PLACEMENT

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 RECESSED NUT.

SPLICE BOLT LENGTH VARIES

FBB01 = 1 1/4"

FBB02 = 2"

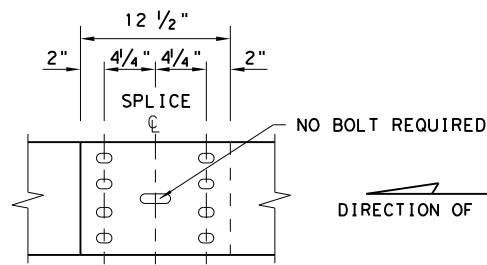
POST & BLOCK LENGTH

FBB03 = 10"

FBB04 = 18"

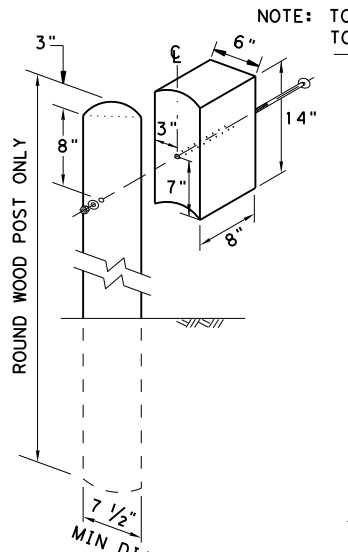
BUTTON HEAD BOLT

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



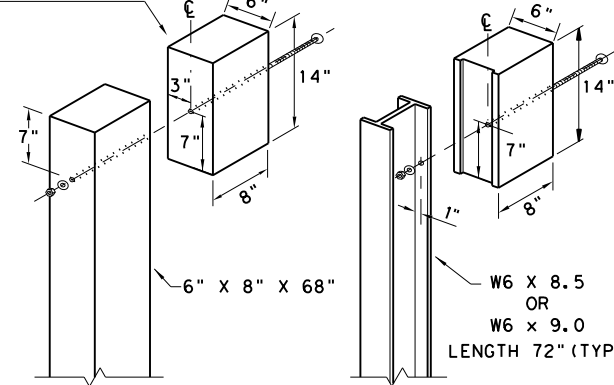
MID-SPAN RAIL SPLICE DETAIL

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



WOOD BLOCK TO ROUND WOOD POST

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

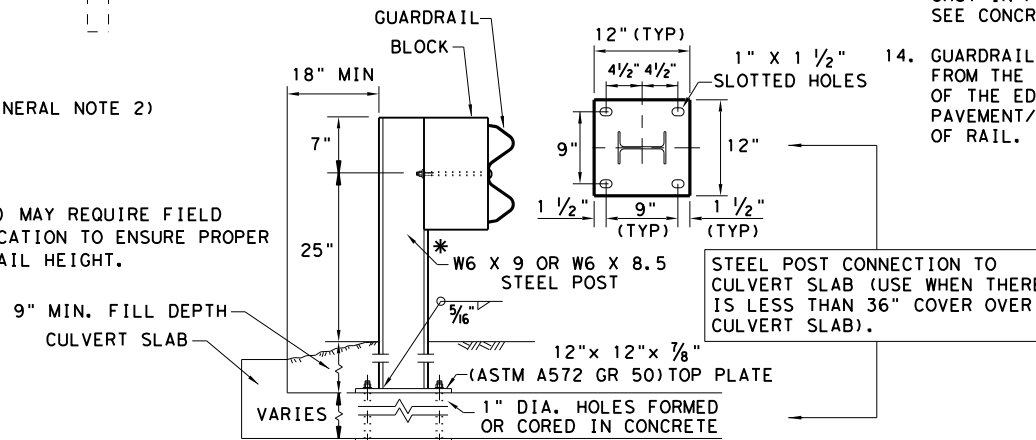


WOOD BLOCK TO RECTANGULAR WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

- 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 1/2" 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 3/8" WASHER (FWC16G) 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/SOULDER 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.

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" 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 1/4" MIN. BEYOND NUT.

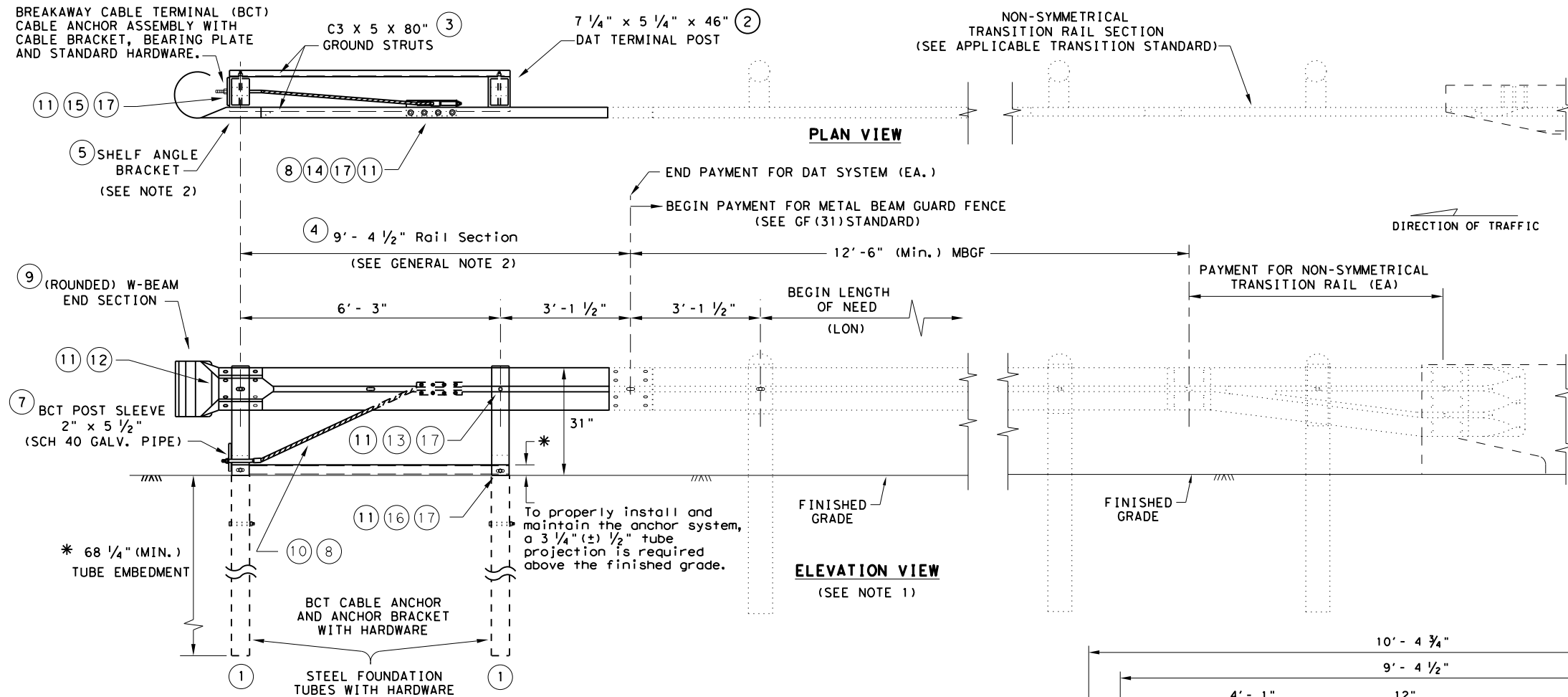
NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSITIONS 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.

				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
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	83	

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: FILE:

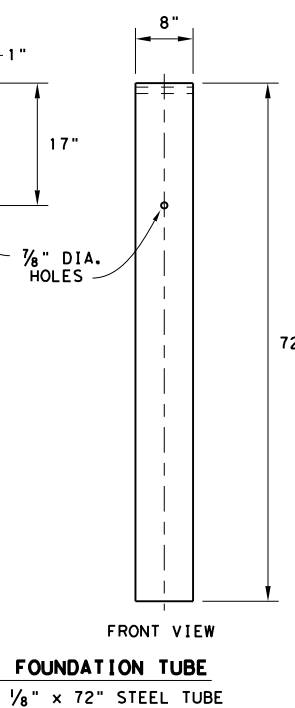
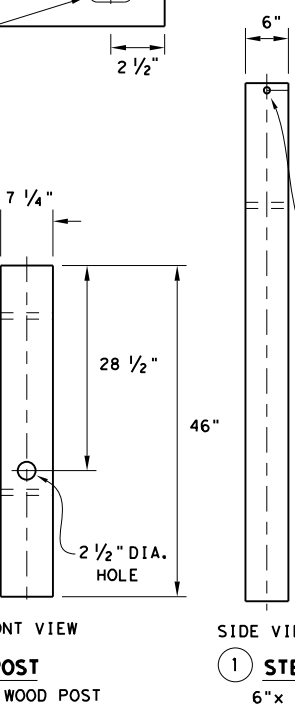
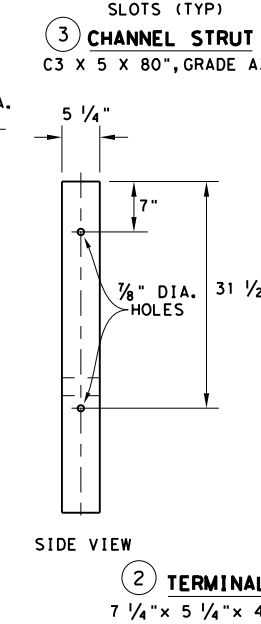
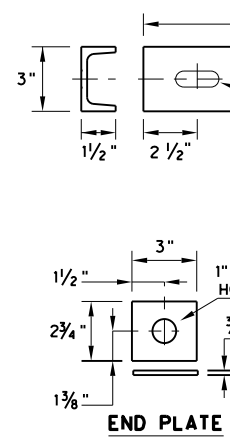
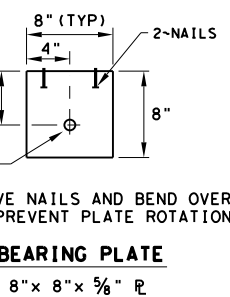
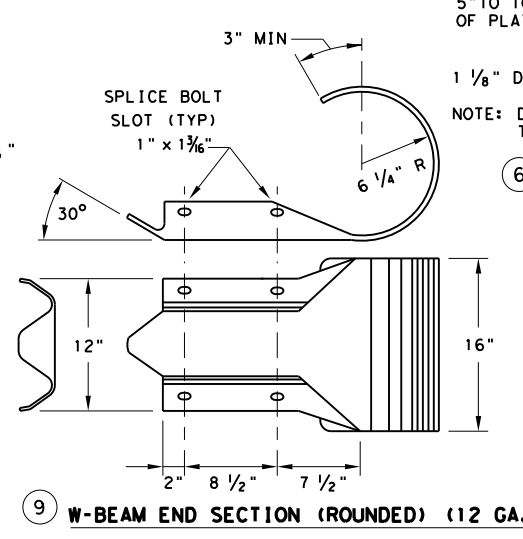
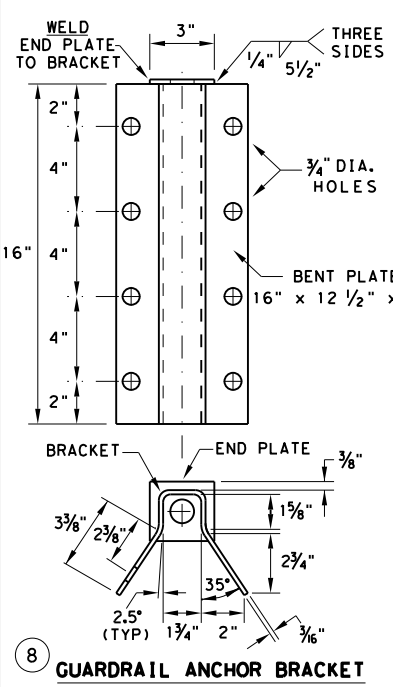
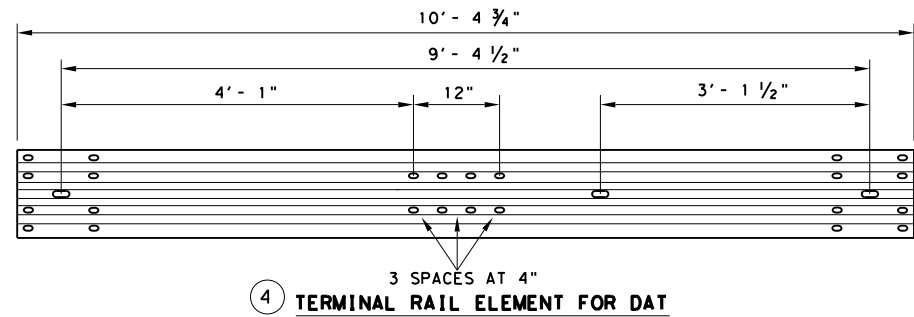


DOWNSTREAM ANCHOR TERMINAL (DAT)
 NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

- 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.

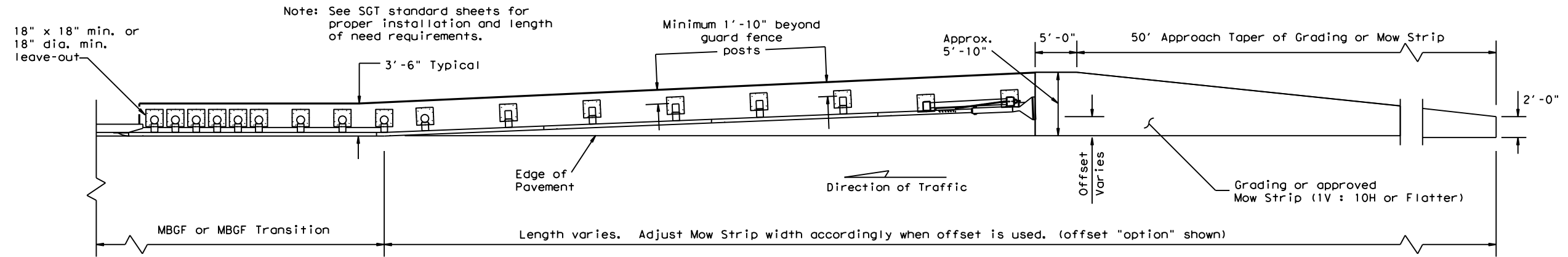
MOW STRIP INSTALLATION
 IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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



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 REVISIONS CONT SECT JOB HIGHWAY
 0271 15 099 IH 610
 DIST COUNTY SHEET NO.
 HOU HARRIS 84

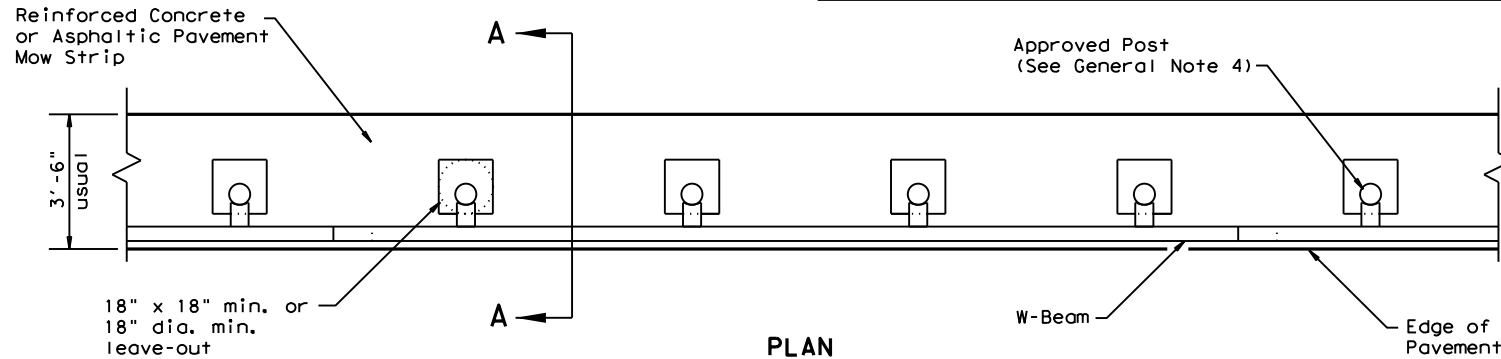
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

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.

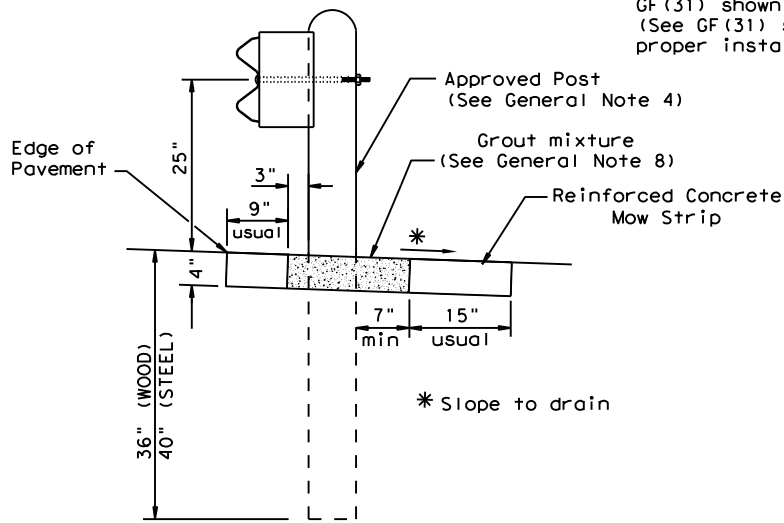


PLAN

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

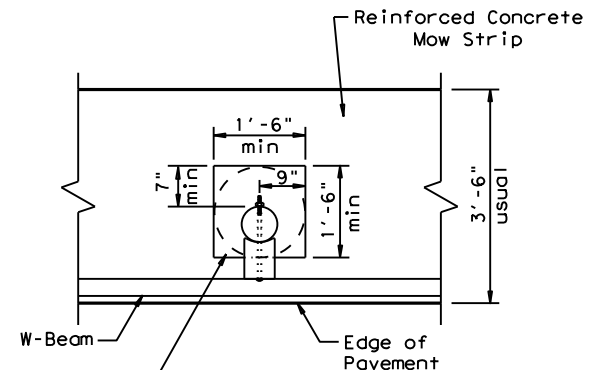
GENERAL NOTES

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 1/2" 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 I 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.



SECTION A-A

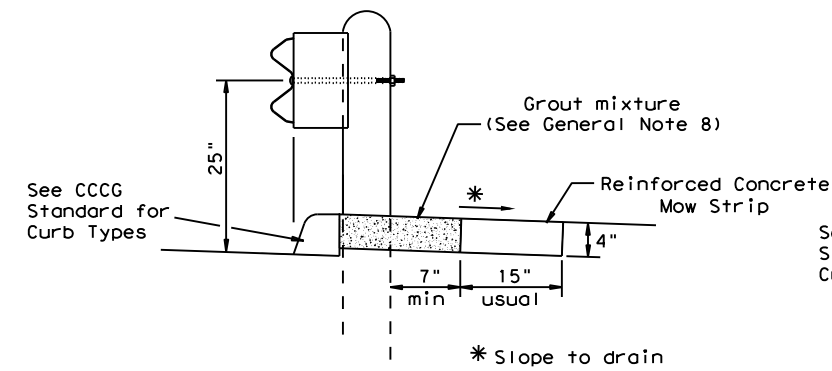
Typical



MOW STRIP DETAIL

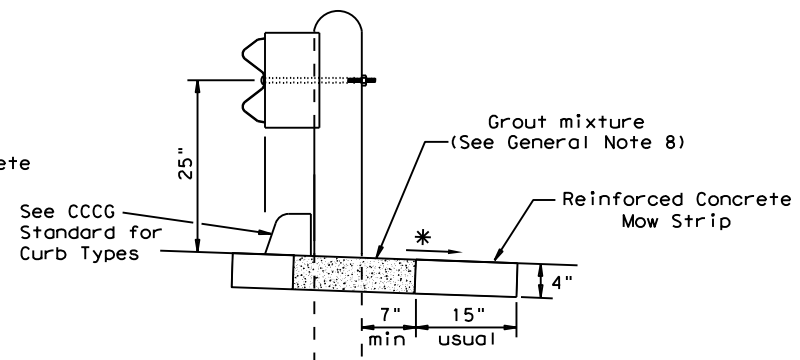
Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

Fill leave-out with Grout mixture (See General Note 8)



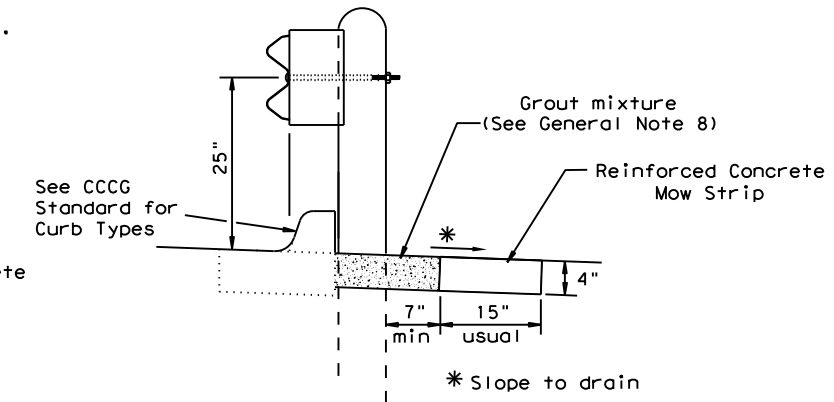
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



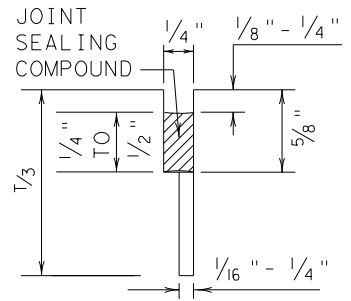
CURB OPTION (3)

		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
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB
REVISIONS	0271	15	099
	DIST	COUNTY	SHEET NO.
	HOU	HARRIS	85

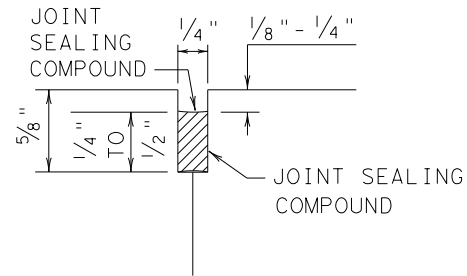
DATE: FILE:

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.

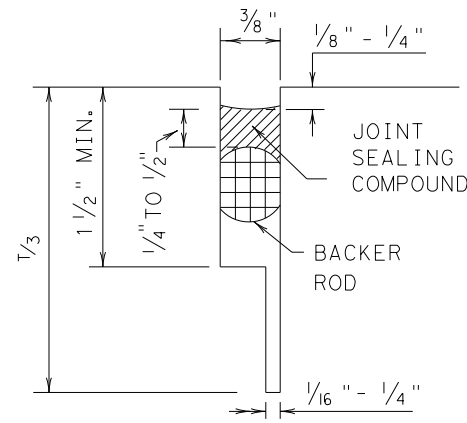
METHOD B: JOINT SEALING COMPOUND



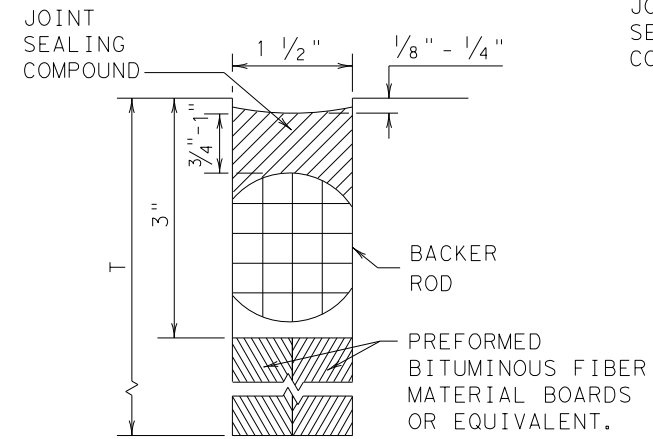
LONGITUDINAL SAWED CONTRACTION JOINT



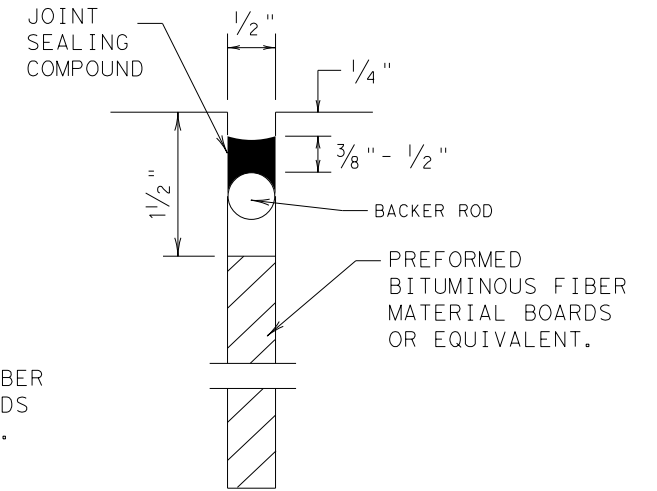
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

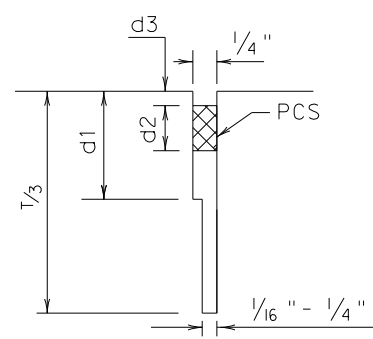


TRANSVERSE FORMED EXPANSION JOINT

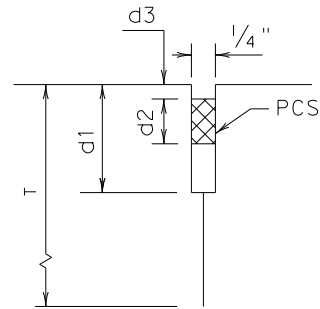


FORMED ISOLATION JOINT

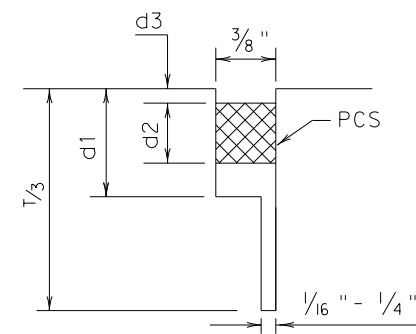
METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)



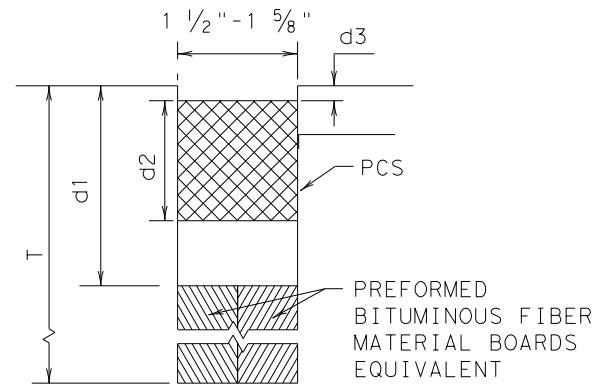
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

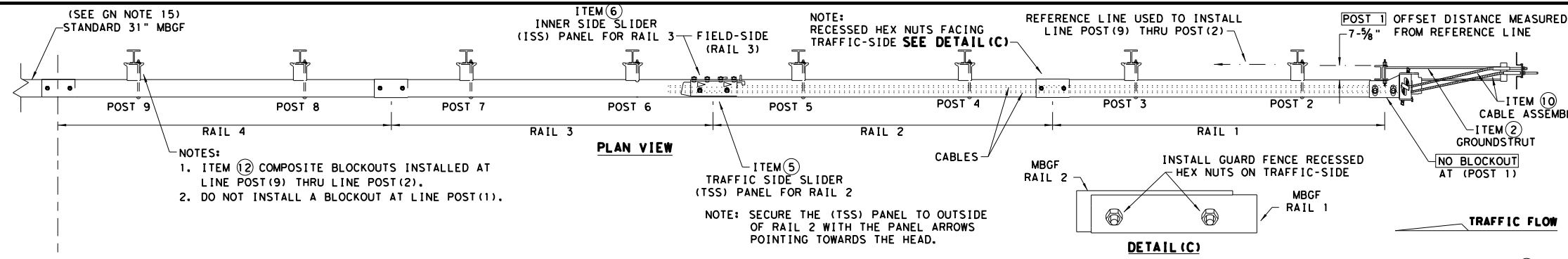
GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4, 5, 7, OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

DATE:
FILE:

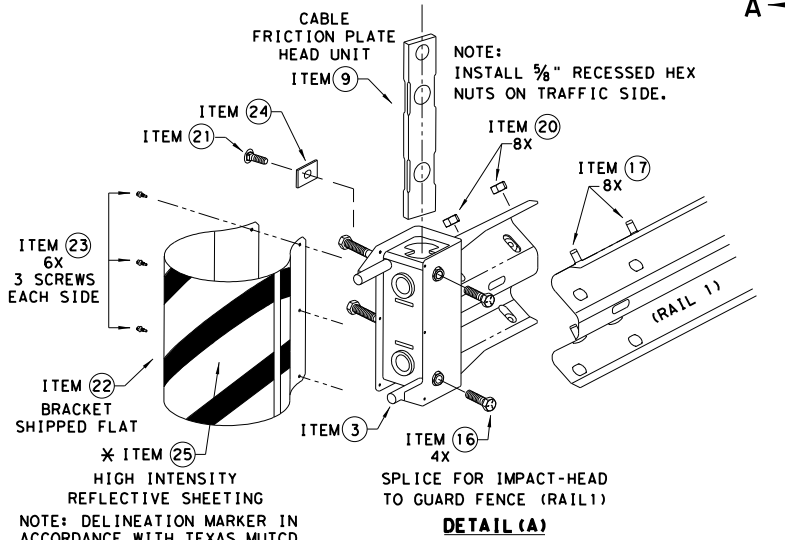
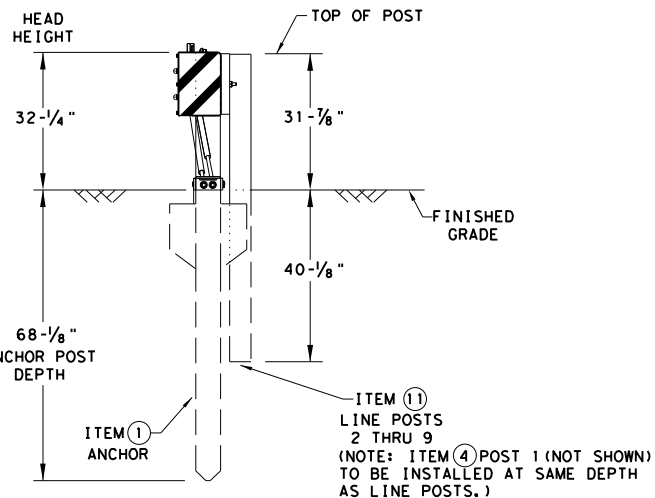
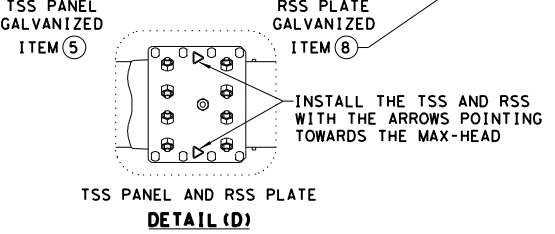
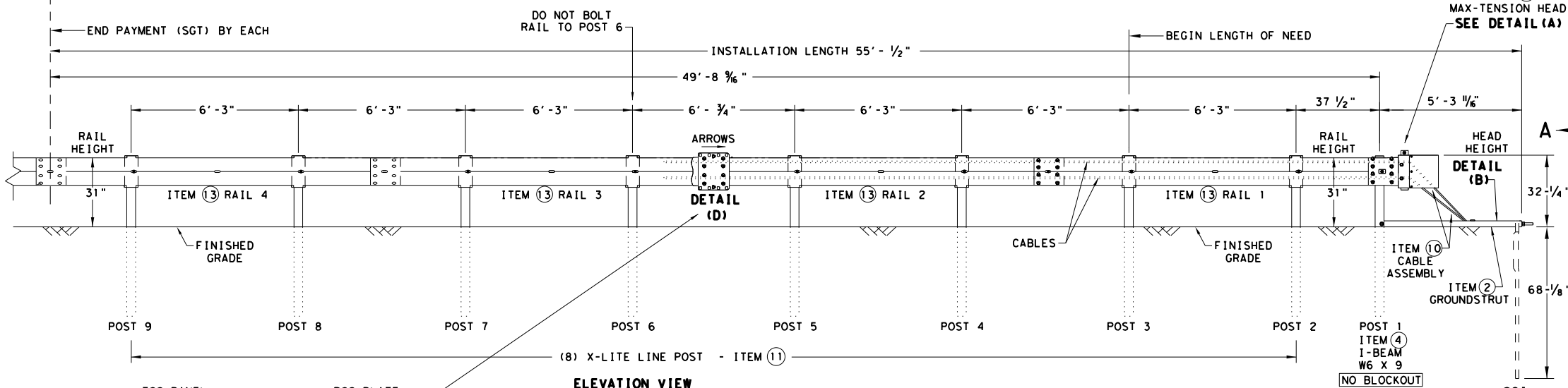
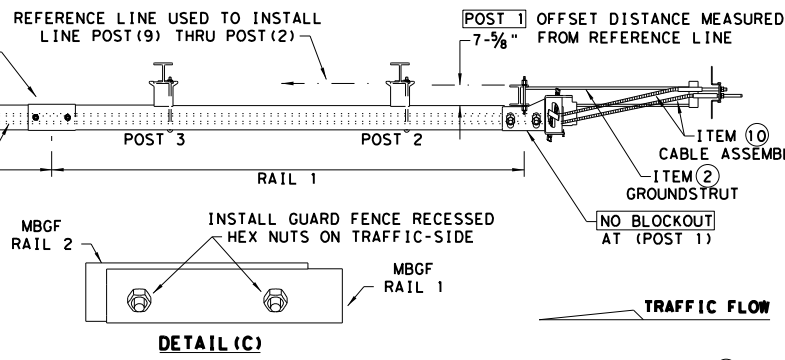
				Design Division Standard	
CONCRETE PAVING DETAILS JOINT SEALS JS-14					
FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN	
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	027	15	099	IH 610	
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		86	

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.



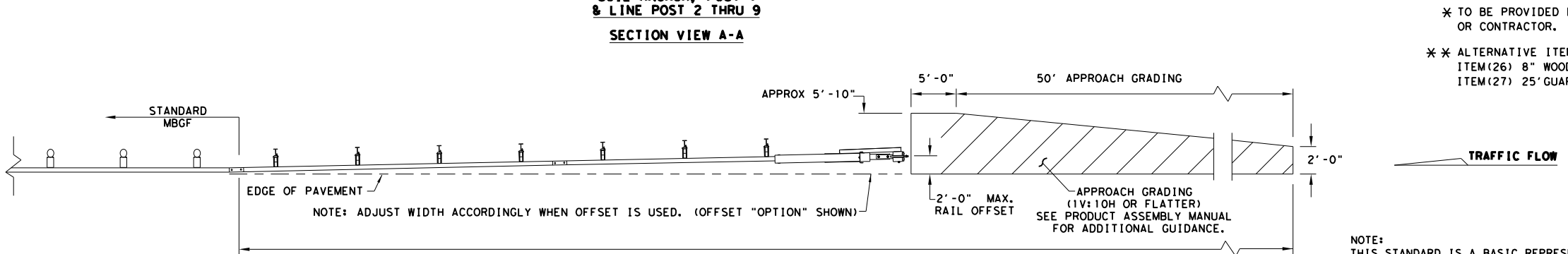
NOTES:
 1. ITEM ② COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (9) THRU LINE POST (2).
 2. DO NOT INSTALL A BLOCKOUT AT LINE POST (1).

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
 - FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL, P/N MANMAX REV D (ECN 3516).
 - 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.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
 - 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.
 - REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - 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.
 - MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
 - IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
 - THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
 - 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	3/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	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



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

APPROACH GRADING AT GUARDRAIL 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.

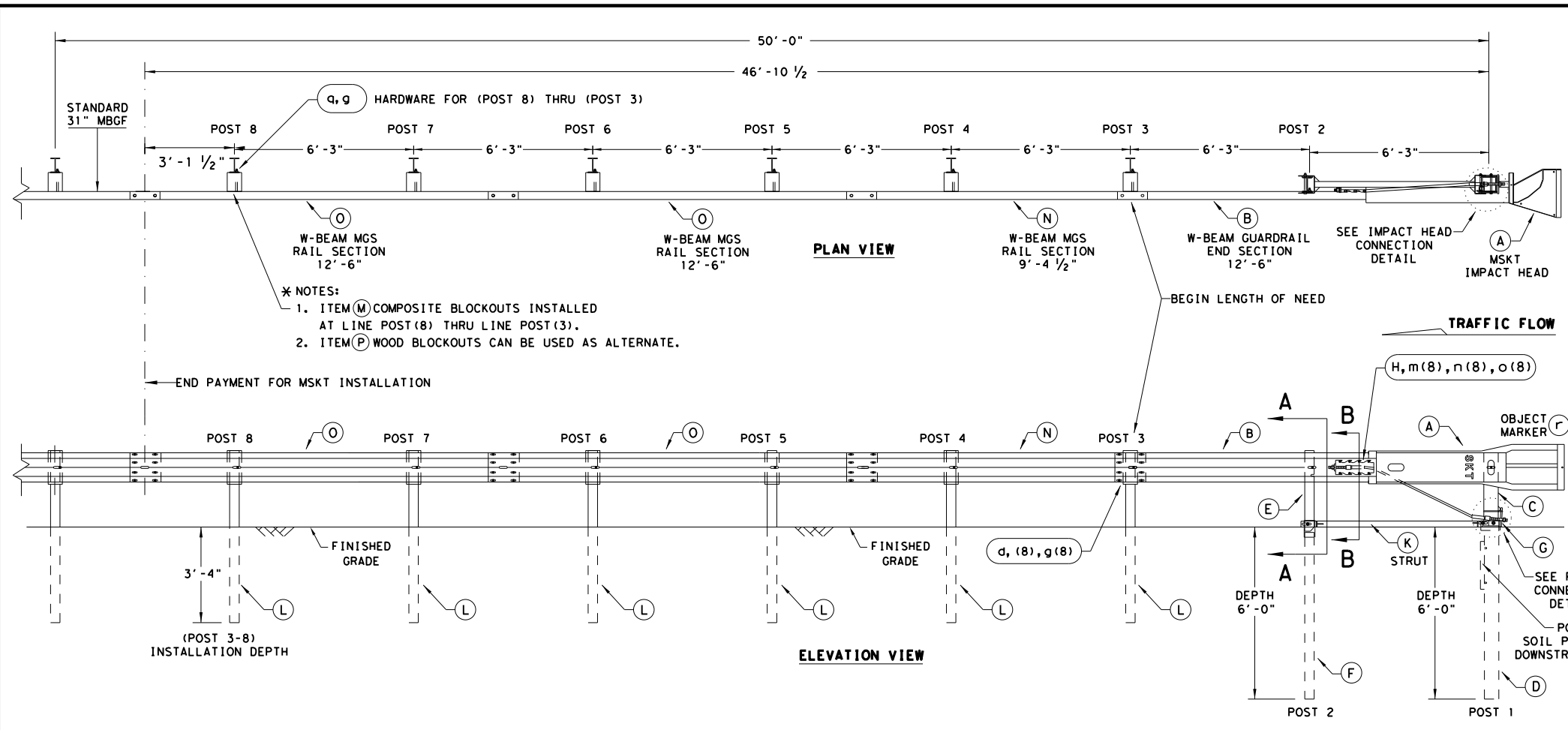
* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.
 ** ALTERNATIVE ITEMS NOT SHOWN. ITEM (26) 8" WOOD-BLOCKOUTS ITEM (27) 25' GUARD FENCE PANELS

Texas Department of Transportation
Design Division Standard

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

FILE: sg+11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		88

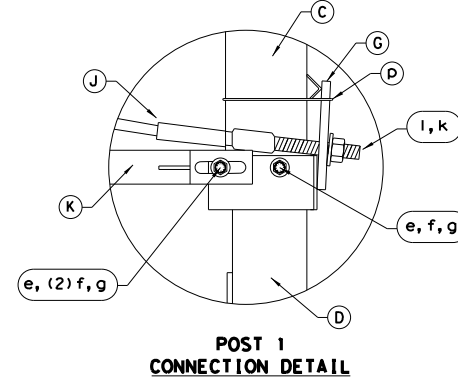
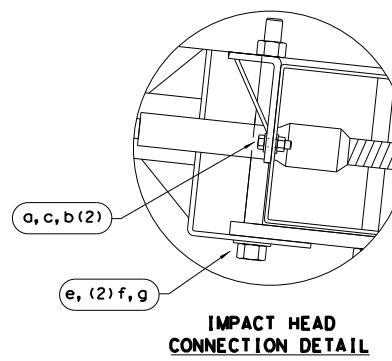
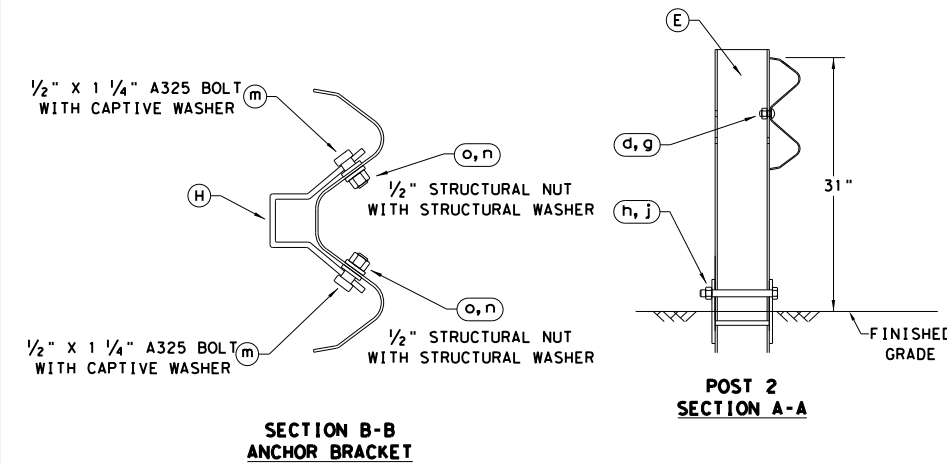
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. THE USE OF THIS STANDARD ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



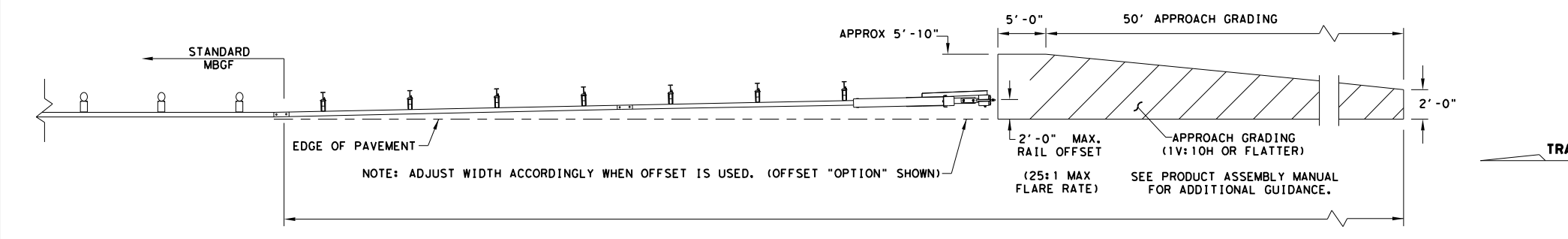
- * NOTES:**
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
 - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

- GENERAL NOTES**
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
 - 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.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
 - 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.
 - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MOW STRIP STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
 - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN ITS PLACE.
 - 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 Go.	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			
o	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" 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 1/8" O.D. x 3/8" 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



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



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.

Design Division Standard

SINGLE GUARDRAIL TERMINAL

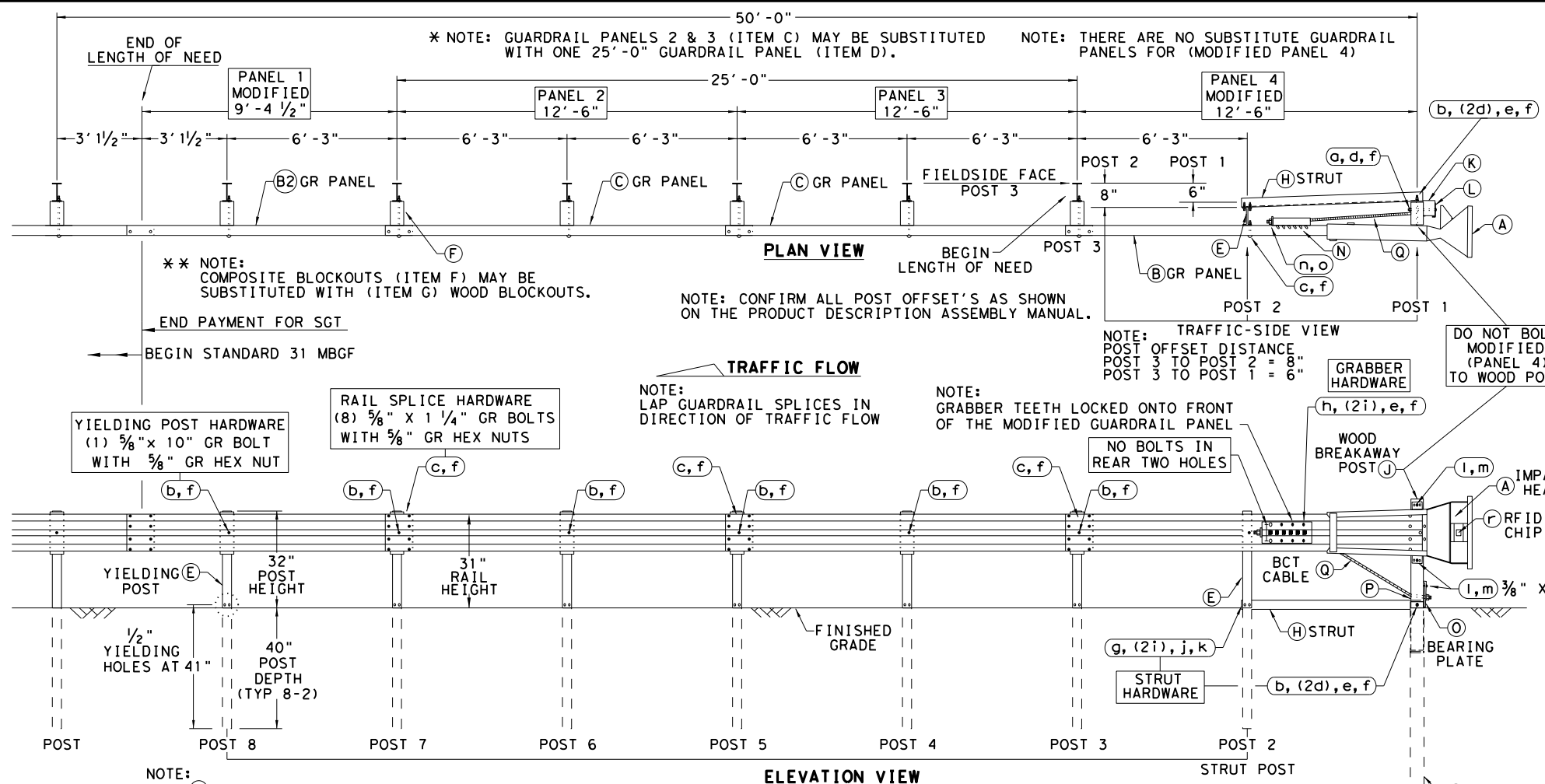
MSKT-MASH-TL-3

SGT (12S) 31-18

FILE: sgt12s3118.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CL
© TXDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	89	

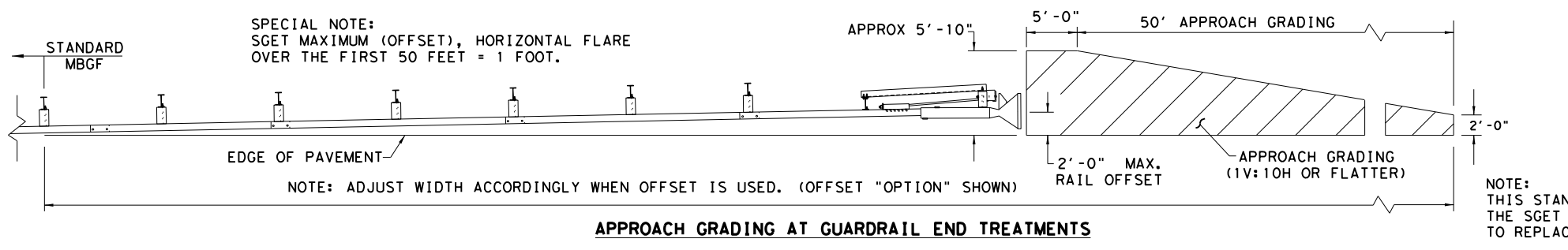
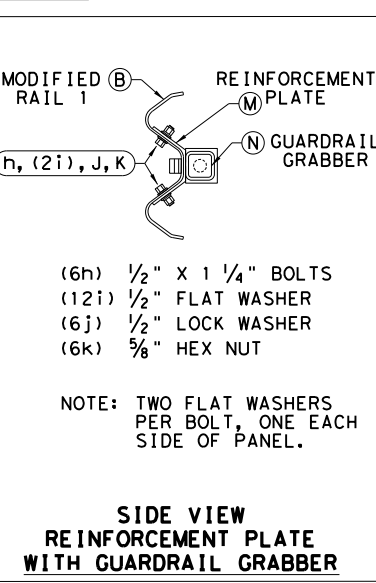
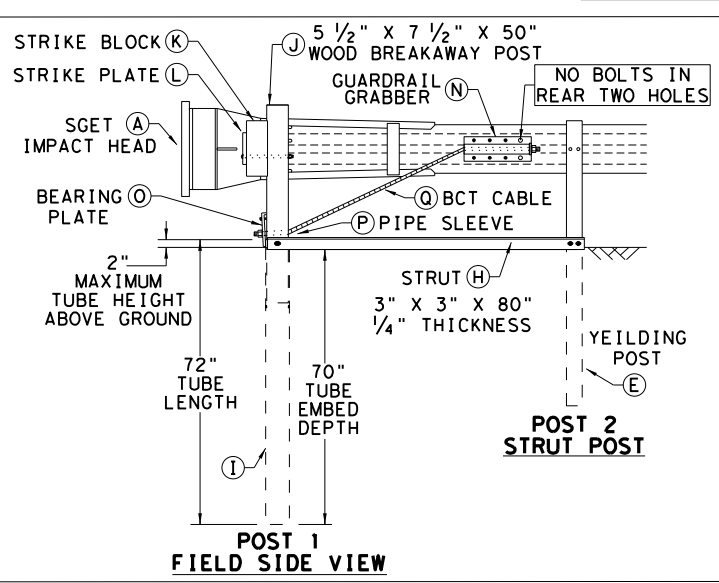
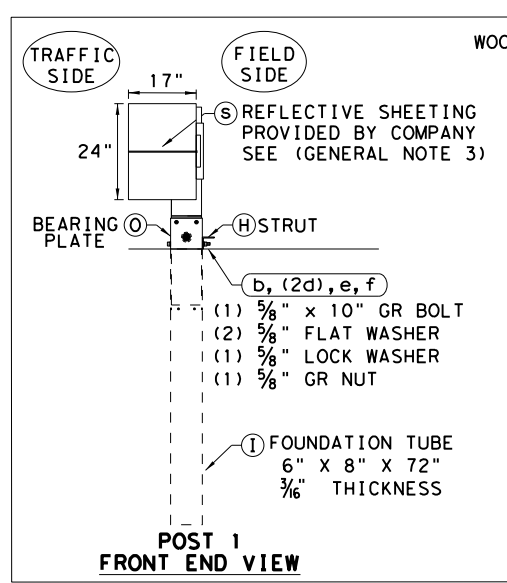
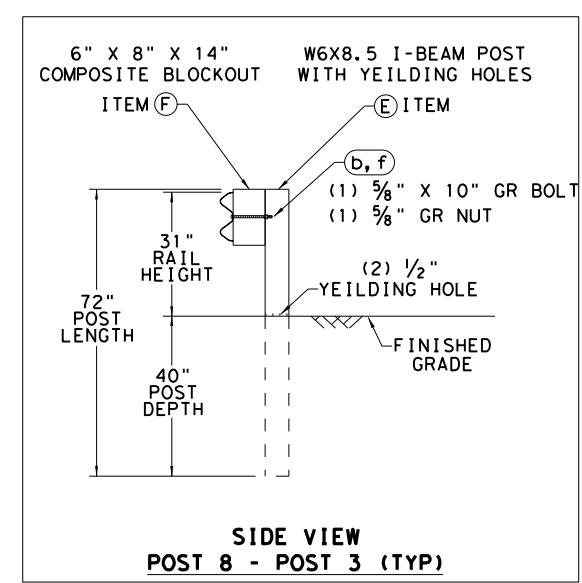
DATE: \$DATES
 FILE: \$FILES

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.



- ### GENERAL NOTES
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
 - 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.
 - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - 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.
 - 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 3/8"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBK14
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"	GR17
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			
o	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 SPICE 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 A563HDG 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



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

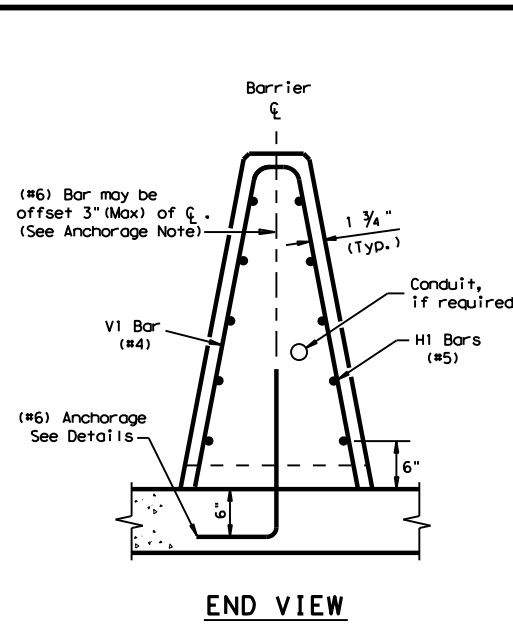
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT (15) 31-20

FILE: sg153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	90	

Design Division Standard

DATE: FILE:

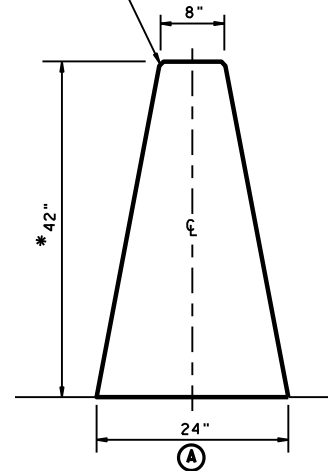
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



END VIEW

CAST-IN-PLACE (CIP) BARRIER
Barrier is Symmetrical About the Center Line

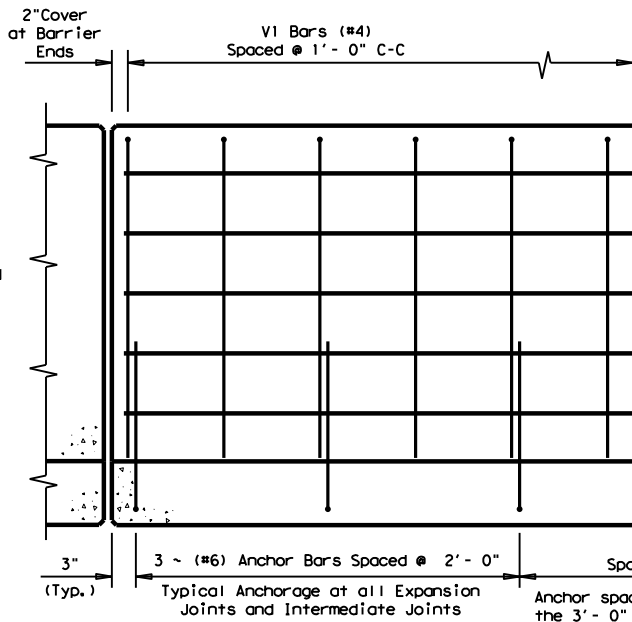
Top edges of CIP barrier shall have a 3/4" chamfer or tooling radius.



SINGLE SLOPE CONCRETE BARRIER (SSCB) (42")

* Barrier height (IN.)	Dimensions (IN.)		
	(A)	(B)	(C)
42	24	40 1/4	20 1/2
48	26 1/4	46 1/4	22 3/4
54	28 1/2	52 1/4	25 1/6

* (SSCB) (42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.



ELEVATION VIEW

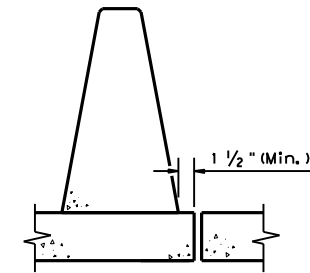
Cast-in-Place (SSCB) on Bridge Decks or Continuously Reinforced Concrete Pavement (CRCP) (Showing Reinforcement and Anchor Placement)

BARRIER PLACEMENT OVER (CRCP) JOINTS

Barrier may be cast over a "Longitudinal" CRCP joint.

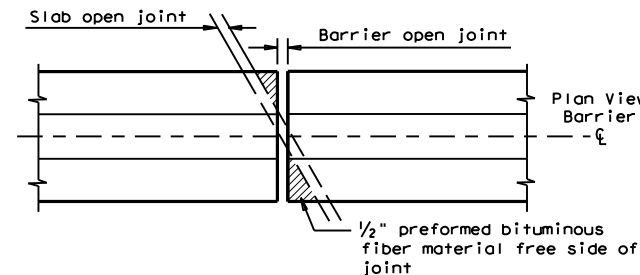
CRCP Joints (with or without tiebars): Two layers of 30 lb roofing felt or 1/2" preformed bituminous fiber material.

Barrier Anchorage Note: Anchorage must be located at least 3" from a longitudinal joint.

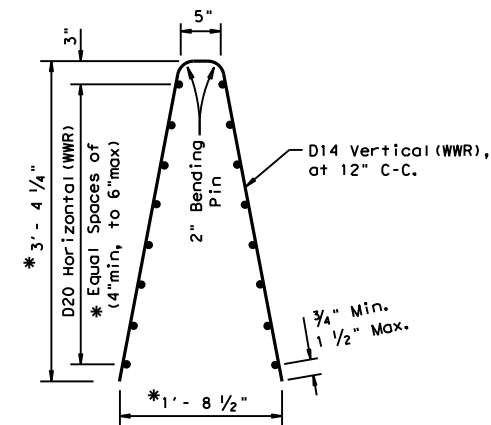


MINIMUM EDGE DISTANCE FROM LONGITUDINAL JOINT

Barrier placement over a longitudinal bridge joint is not recommended.



BARRIER OVER TRANSVERSE OPEN JOINT



Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

- Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
- Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
- Welded wire splice locations shall have a "minimum" splice lap length of 12".
- Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

General Notes

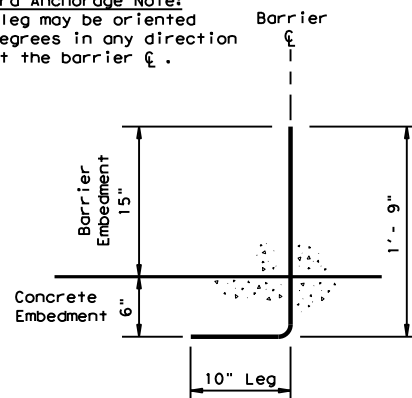
- Concrete shall be Class C. Unless otherwise specified in the plans.
- Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615. If the bridge slab requires epoxy "coated" reinforcement, the barrier and/or anchorage may require the same, if shown elsewhere in the plans.
- These details cover barrier per Item 514, "Permanent Concrete Traffic Barrier".
- Anchorage: The "Optional" Anchor system shall be embedded 6" into fresh concrete or using a Type III, Class C Epoxy anchorage system. Follow the manufacturer's directions for installing the expoxied anchor bars. All anchorage shown is the minimum required, and considered subsidiary to the bid item.
- Top edges of CIP barrier shall have a 3/4" chamfer or tooling radius.
- Drainage slot locations (12'-0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
- Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchor bars. The reinforcement cage may rest on the top of the finished grade.
- For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.

Cast-in-Place (CIP) or Slip-Formed (SSCB)

Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier centerline.

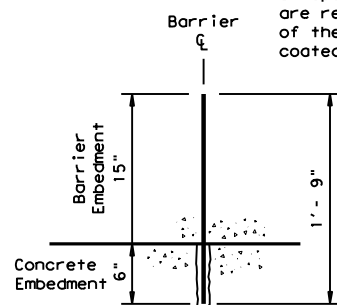


STANDARD ANCHORAGE

(#6) Bar

Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier
(See General Notes 2)

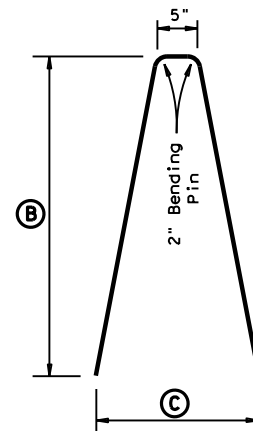
Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated.



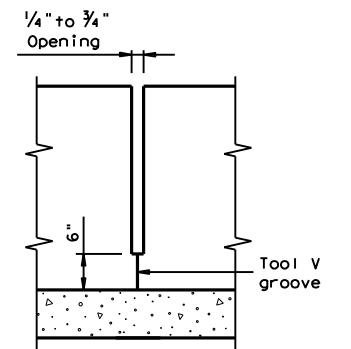
"OPTIONAL" ANCHORAGE

(#6) Bar

Fresh insertion method or Type III, Class C Epoxy Method
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier
(See General Notes 2 & 4)



V1 Bar
(#4) Bar



INTERMEDIATE JOINT DETAIL

Place at all Bent C's, without expansion joints and spaced at 33 ft. (max.), 10 ft. (min).

EXPANSION JOINT PLACEMENT

Place at all transverse joints or 100 ft. (max.), 10 ft. (min).

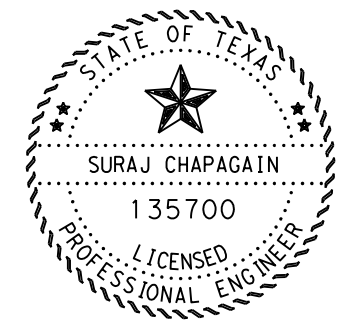
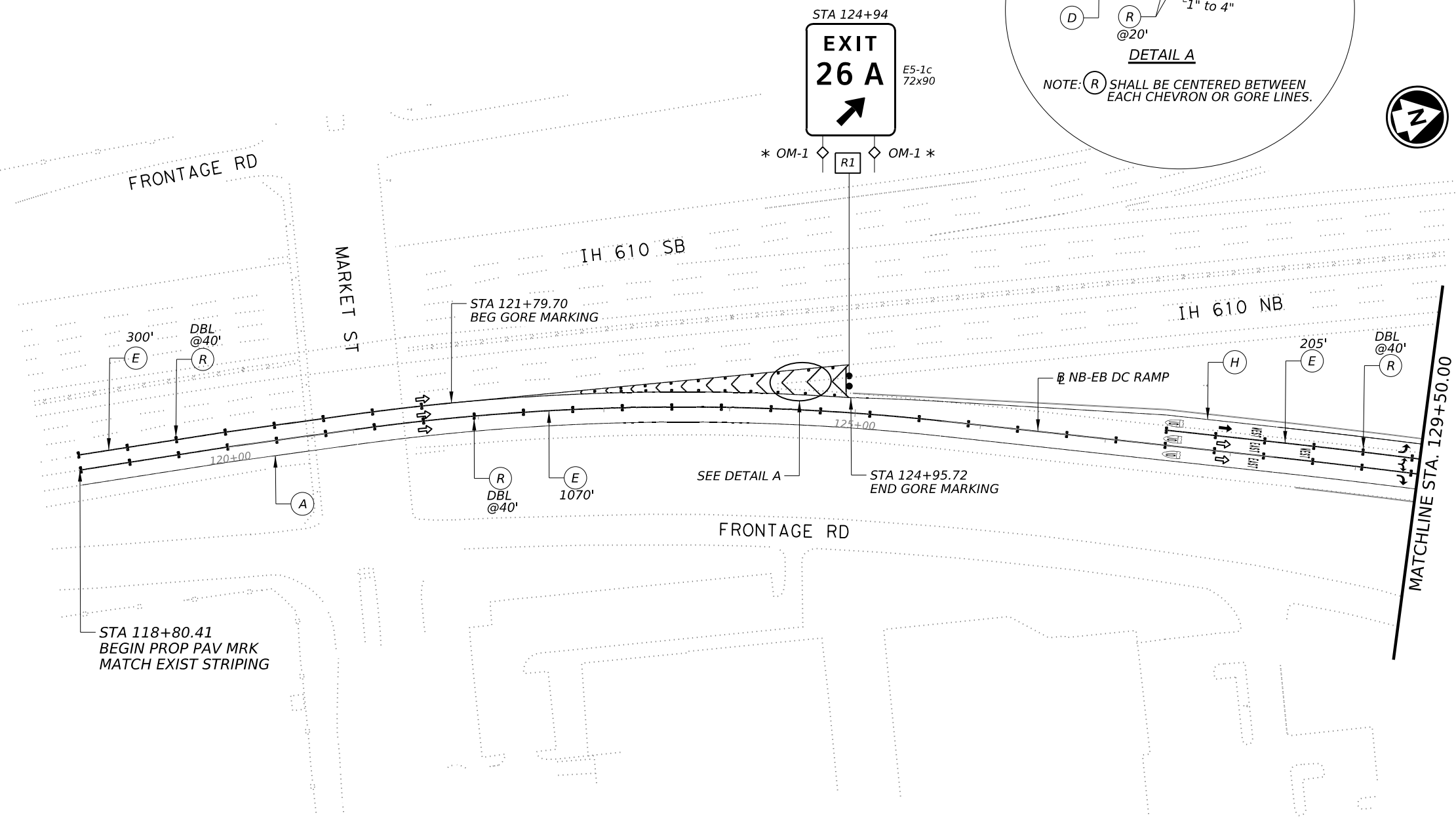
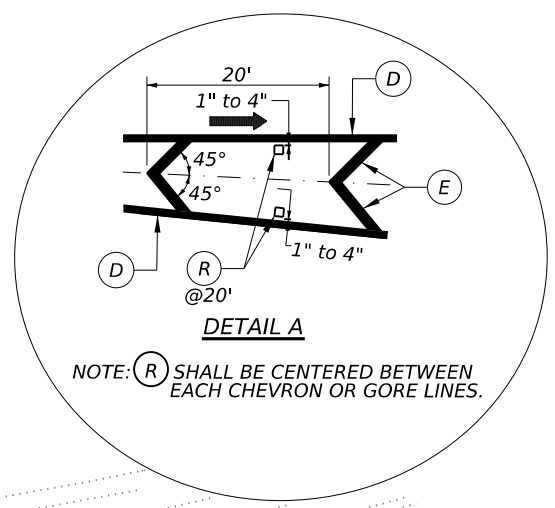
DATE:
FILE:

Texas Department of Transportation
SINGLE SLOPE CONCRETE BARRIER
CAST-IN-PLACE (TYPE 1)
(BRIDGE DECK OR CRCP)
SSCB(1)-16

FILE: sscb116.dgn	DN: TxDOT	CK: HC/AN	DN: BD/VP	CK: KM
© TxDOT January 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
CST 01-2016	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS		91

CK: DW: CK: DW:

- NOTES:**
- EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
 - REMOVAL OF RAISED PAVEMENT MARKERS & TRAFFIC BUTTONS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
 - REMOVAL AND DISPOSAL OF SMALL SIGNS WITHIN THE RIGHT OF WAY THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 100.
- * FURNISHING AND INSTALLING OBJECT MARKER OM-1 IS SUBSIDIARY TO THE ITEM "REPLACE EXISTING ALUMINUM SIGNS (TY G)".



Suraj Chapagain, P.E.
8/27/2024

LEGEND:

(A) RE PM TY III (W)(6")(SLD)	(K) RE PM TY III (Y)(24")(SLD)	(U) INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB	↑ → PREFAB PM TY C (W)(ARROW)	○ PROPOSED SMALL SIGN
(B) RE PM TY III (W)(6")(BRK)	(L) RE PM TY III (BLK)(6")(SHADOW)	(V) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB	↑ → PREFAB PM TY C (W)(DBL ARROW)	⊗ REMOVE SM RD SN SUP&AM
(C) RE PM TY III (W)(6")(DOT)	(M) REFL PAV MRK TY II (W) 12" SLD	(W) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB(BI)	↶ ↷ PREFAB PM TY C (W)(UTURN ARROW)	□ PROPOSED LARGE SIGN
(D) RE PM TY III (W)(8")(SLD)	(N) REFL PAV MRK TY II (Y) 12" SLD	(X) INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	4 PREFAB PM TY C (W)(NUMBER)	(R-) REPLACE EXIST ALUMINUM SIGNS (TY G OR TY O)
(E) RE PM TY III (W)(12")(SLD)	(O) REFL PAV MRKR TY I-A	(Y) INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	MERGE ONLY PREFAB PM TY C (W)(WORD)	▨ EXIST SIGN TO REMAIN
(F) RE PM TY III (W)(12")(DOT)	(P) REFL PAV MRKR TY I-C	(Z) INSTL OM ASSM (OM-2Y)(WC)GND	⊡ PREFAB PM TY C (MULTI)(SHIELD)	
(G) RE PM TY III (W)(24")(SLD)	(Q) REFL PAV MRKR TY II-A-A		⇄ DIRECTION OF TRAVEL	
(H) RE PM TY III (Y)(6")(SLD)	(R) REFL PAV MRKR TY II-C-R			
(I) RE PM TY III (Y)(8")(SLD)	(S) PREFAB PM TY C (W)(RR XING)			
(J) RE PM TY III (Y)(12")(SLD)	(T) PREFAB PM TY C (W)(36")(YLD TRI)			



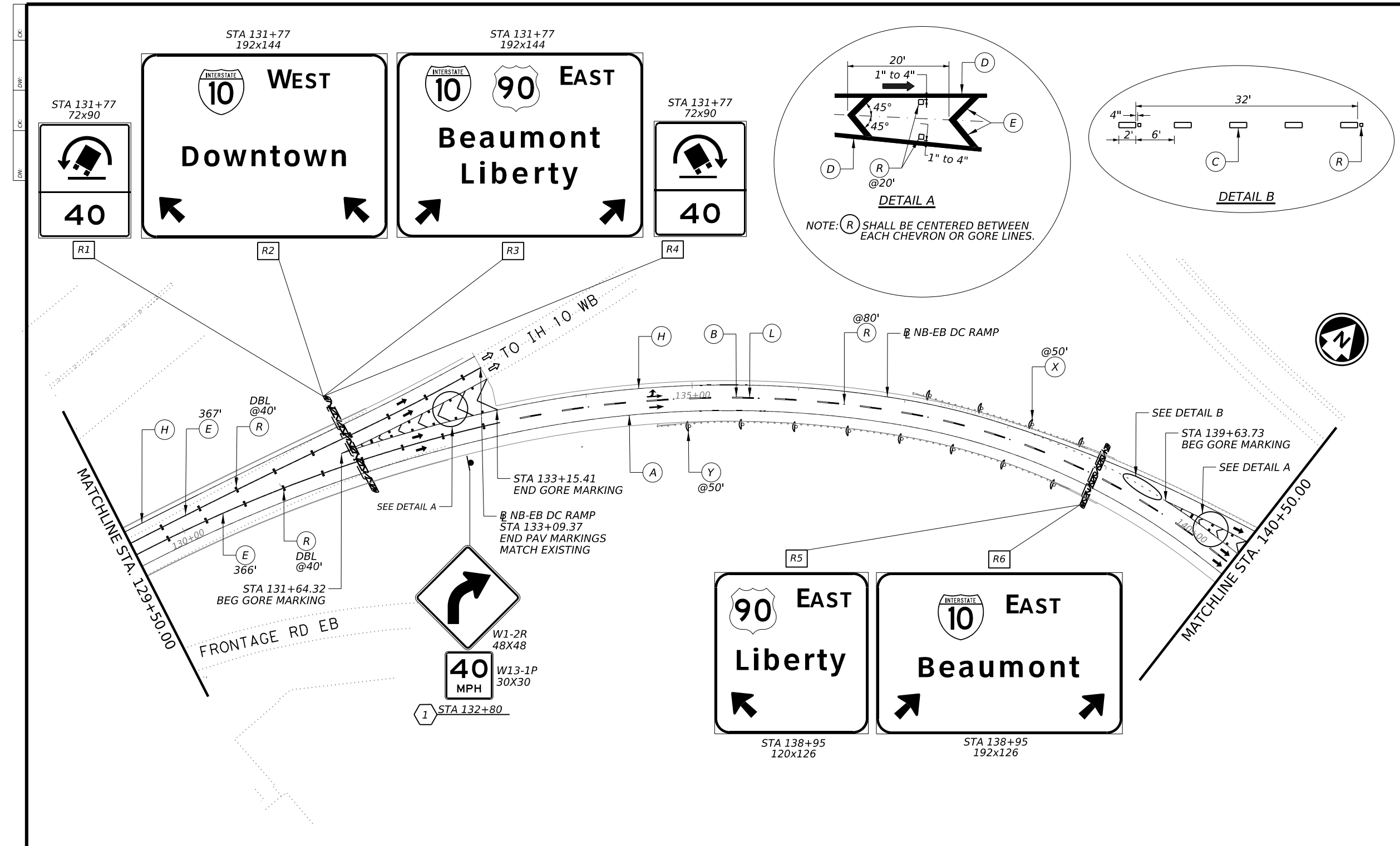
**IH 610
SIGNING & PAVEMENT
MARKINGS LAYOUT**

© TxDOT 2024 SHEET 1 OF 4

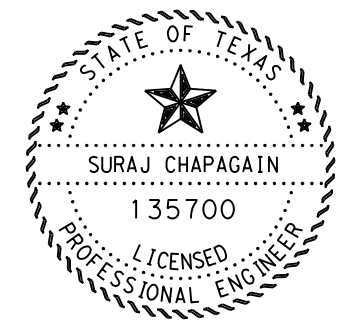
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	92	



DATE: FILE:



- NOTES:**
- EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
 - REMOVAL OF RAISED PAVEMENT MARKERS & TRAFFIC BUTTONS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
 - REMOVAL AND DISPOSAL OF SMALL SIGNS WITHIN THE RIGHT OF WAY THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 100.
- * FURNISHING AND INSTALLING OBJECT MARKER OM-1 IS SUBSIDIARY TO THE ITEM "REPLACE EXISTING ALUMINUM SIGNS (TY G)".



Suraj Chapagain, P.E.
8/27/2024

LEGEND:

(A) RE PM TY III (W)(6")(SLD)	(K) RE PM TY III (Y)(24")(SLD)	(U) INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB	↖ PREFAB PM TY C (W)(ARROW)	◊ PROPOSED SMALL SIGN
(B) RE PM TY III (W)(6")(BRK)	(L) RE PM TY III (BLK)(6")(SHADOW)	(V) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB	↗ PREFAB PM TY C (W)(DBL ARROW)	◊- REMOVE SM RD SN SUP&AM
(C) RE PM TY III (W)(6")(DOT)	(M) REFL PAV MRK TY II (W) 12" SLD	(W) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB(BI)	↻ PREFAB PM TY C (W)(UTURN ARROW)	◻ PROPOSED LARGE SIGN
(D) RE PM TY III (W)(8")(SLD)	(N) REFL PAV MRK TY II (Y) 12" SLD	(X) INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	4 PREFAB PM TY C (W)(NUMBER)	R- REPLACE EXIST ALUMINUM SIGNS (TY G OR TY O)
(E) RE PM TY III (W)(12")(SLD)	(O) REFL PAV MRKR TY I-A	(Y) INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	MERGE ONLY PREFAB PM TY C (W)(WORD)	▨ EXIST SIGN TO REMAIN
(F) RE PM TY III (W)(12")(DOT)	(P) REFL PAV MRKR TY I-C	(Z) INSTL OM ASSM (OM-2Y)(WC)GND	🛡️ PREFAB PM TY C (MULTI)(SHIELD)	
(G) RE PM TY III (W)(24")(SLD)	(Q) REFL PAV MRKR TY II-A-A		⇄ DIRECTION OF TRAVEL	
(H) RE PM TY III (Y)(6")(SLD)	(R) REFL PAV MRKR TY II-C-R			
(I) RE PM TY III (Y)(8")(SLD)	(S) PREFAB PM TY C (W)(RR XING)			
(J) RE PM TY III (Y)(12")(SLD)	(T) PREFAB PM TY C (W)(36")(YLD TRI)			

Texas Department of Transportation

IH 610 SIGNING & PAVEMENT MARKINGS LAYOUT

© TxDOT 2024 SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	93	

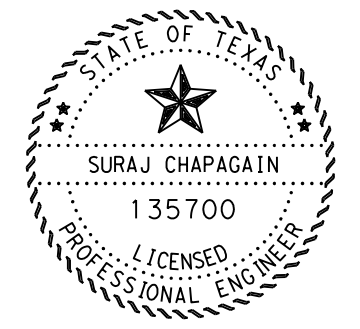
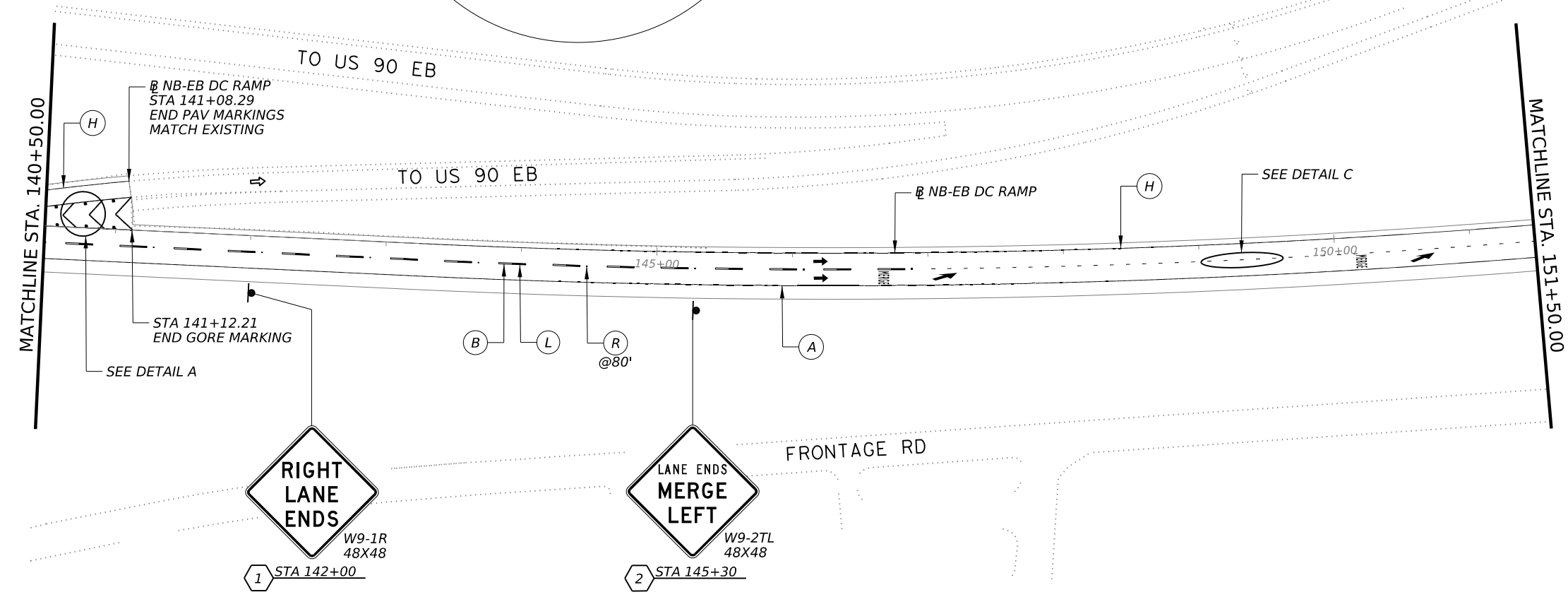
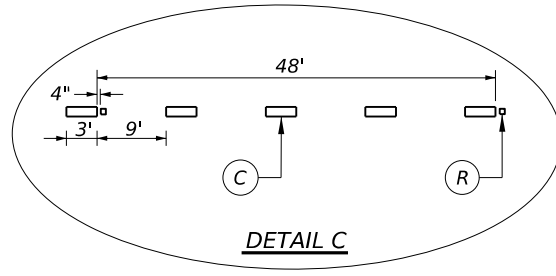
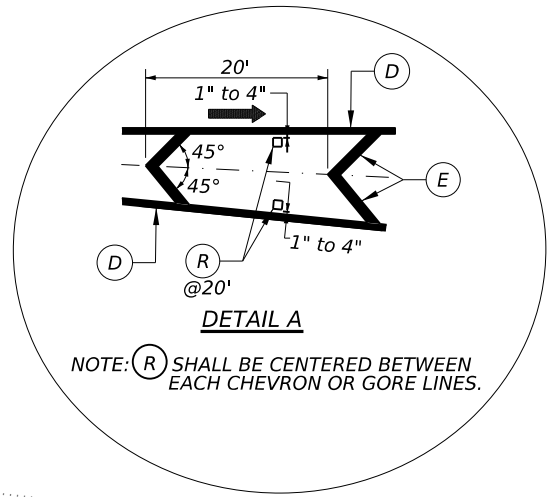


DATE: FILE:

CK: DW: CK: DW:

NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
 2. REMOVAL OF RAISED PAVEMENT MARKERS & TRAFFIC BUTTONS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
 3. REMOVAL AND DISPOSAL OF SMALL SIGNS WITHIN THE RIGHT OF WAY THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 100.
- * FURNISHING AND INSTALLING OBJECT MARKER OM-1 IS SUBSIDIARY TO THE ITEM "REPLACE EXISTING ALUMINUM SIGNS (TY G)".



Suraj Chapagain, P.E.
8/27/2024

LEGEND:

(A) RE PM TY III (W)(6")(SLD)	(K) RE PM TY III (Y)(24")(SLD)	(U) INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB	↖ PREFAB PM TY C (W)(ARROW)	○ PROPOSED SMALL SIGN
(B) RE PM TY III (W)(6")(BRK)	(L) RE PM TY III (BLK)(6")(SHADOW)	(V) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB	↗ PREFAB PM TY C (W)(DBL ARROW)	⊗ REMOVE SM RD SN SUP&AM
(C) RE PM TY III (W)(6")(DOT)	(M) REFL PAV MRK TY II (W) 12" SLD	(W) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB(BI)	↻ PREFAB PM TY C (W)(UTURN ARROW)	□ PROPOSED LARGE SIGN
(D) RE PM TY III (W)(8")(SLD)	(N) REFL PAV MRK TY II (Y) 12" SLD	(X) INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	4 PREFAB PM TY C (W)(NUMBER)	R- REPLACE EXIST ALUMINUM SIGNS (TY G OR TY O)
(E) RE PM TY III (W)(12")(SLD)	(O) REFL PAV MRKR TY I-A	(Y) INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	MERGE ONLY PREFAB PM TY C (W)(WORD)	▨ EXIST SIGN TO REMAIN
(F) RE PM TY III (W)(12")(DOT)	(P) REFL PAV MRKR TY I-C	(Z) INSTL OM ASSM (OM-2Y)(WC)GND	⚡ PREFAB PM TY C (MULTI)(SHIELD)	
(G) RE PM TY III (W)(24")(SLD)	(Q) REFL PAV MRKR TY II-A-A		⇄ DIRECTION OF TRAVEL	
(H) RE PM TY III (Y)(6")(SLD)	(R) REFL PAV MRKR TY II-C-R			
(I) RE PM TY III (Y)(8")(SLD)	(S) PREFAB PM TY C (W)(RR XING)			
(J) RE PM TY III (Y)(12")(SLD)	(T) PREFAB PM TY C (W)(36")(YLD TRI)			



**IH 610
SIGNING & PAVEMENT
MARKINGS LAYOUT**

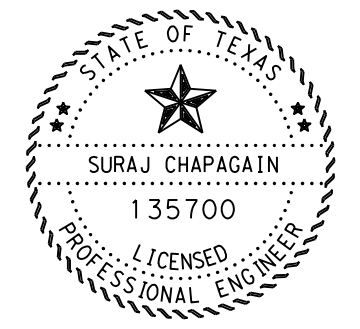
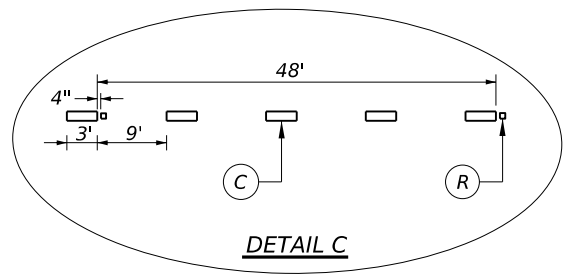
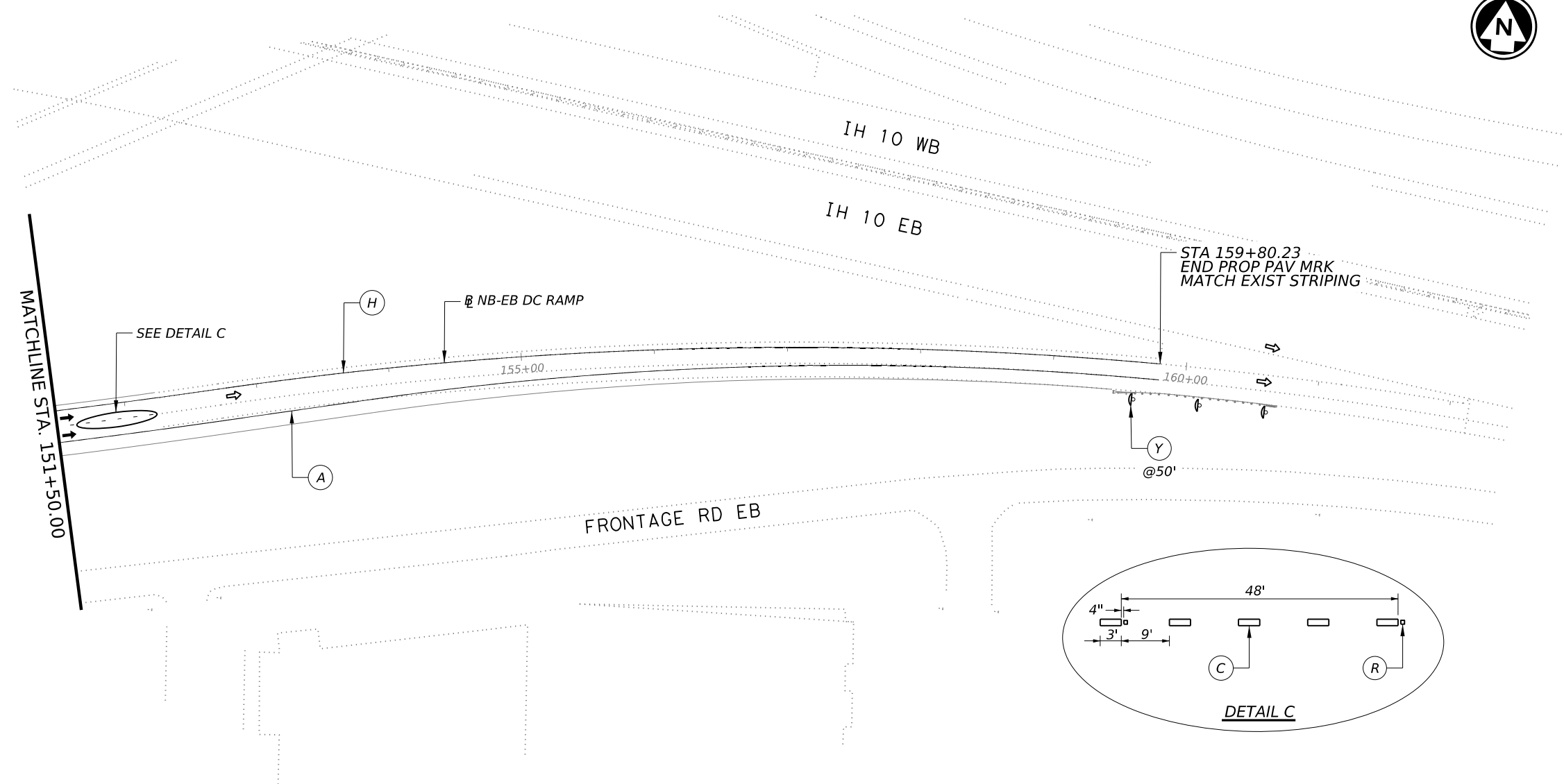
© TxDOT 2024		SHEET 3 OF 4	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	94	



DATE: FILE:

CK: _____
 DW: _____
 CK: _____
 DW: _____

- NOTES:**
- EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
 - REMOVAL OF RAISED PAVEMENT MARKERS & TRAFFIC BUTTONS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
 - REMOVAL AND DISPOSAL OF SMALL SIGNS WITHIN THE RIGHT OF WAY THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 100.
- * FURNISHING AND INSTALLING OBJECT MARKER OM-1 IS SUBSIDIARY TO THE ITEM "REPLACE EXISTING ALUMINUM SIGNS (TY G)".



Suraj Chapagain, P.E.
8/27/2024

LEGEND:

(A) RE PM TY III (W)(6")(SLD)	(K) RE PM TY III (Y)(24")(SLD)	(U) INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB	↖ PREFAB PM TY C (W)(ARROW)	⬡ PROPOSED SMALL SIGN
(B) RE PM TY III (W)(6")(BRK)	(L) RE PM TY III (BLK)(6")(SHADOW)	(V) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB	↗ PREFAB PM TY C (W)(DBL ARROW)	⊗ REMOVE SM RD SN SUP&AM
(C) RE PM TY III (W)(6")(DOT)	(M) REFL PAV MRK TY II (W) 12" SLD	(W) INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB(BI)	↻ PREFAB PM TY C (W)(UTURN ARROW)	⬢ PROPOSED LARGE SIGN
(D) RE PM TY III (W)(8")(SLD)	(N) REFL PAV MRK TY II (Y) 12" SLD	(X) INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	4 PREFAB PM TY C (W)(NUMBER)	R- REPLACE EXIST ALUMINUM SIGNS (TY G OR TY O)
(E) RE PM TY III (W)(12")(SLD)	(O) REFL PAV MRKR TY I-A	(Y) INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	MERGE ONLY PREFAB PM TY C (W)(WORD)	▨ EXIST SIGN TO REMAIN
(F) RE PM TY III (W)(12")(DOT)	(P) REFL PAV MRKR TY I-C	(Z) INSTL OM ASSM (OM-2Y)(WC)GND	🛡️ PREFAB PM TY C (MULTI)(SHIELD)	
(G) RE PM TY III (W)(24")(SLD)	(Q) REFL PAV MRKR TY II-A-A		⇄ DIRECTION OF TRAVEL	
(H) RE PM TY III (Y)(6")(SLD)	(R) REFL PAV MRKR TY II-C-R			
(I) RE PM TY III (Y)(8")(SLD)	(S) PREFAB PM TY C (W)(RR XING)			
(J) RE PM TY III (Y)(12")(SLD)	(T) PREFAB PM TY C (W)(36")(YLD TRI)			



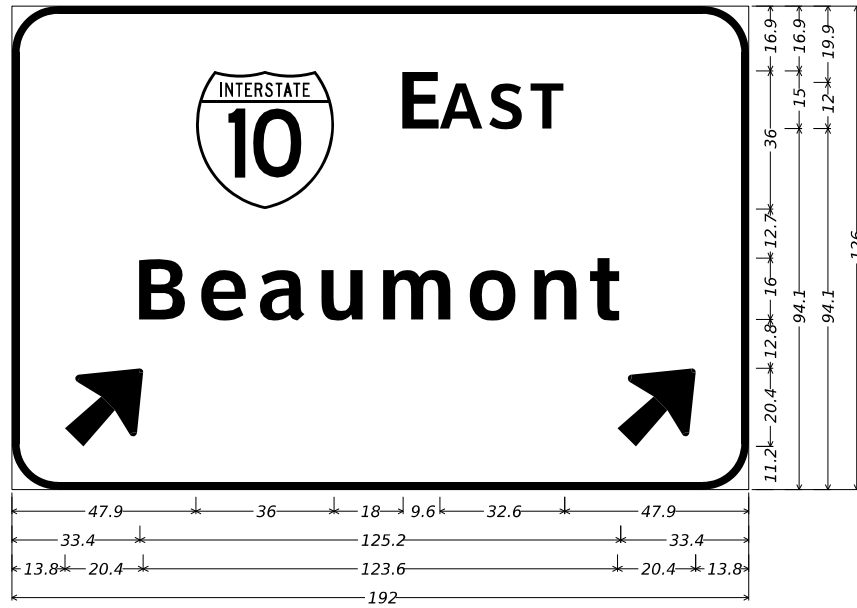
**IH 610
SIGNING & PAVEMENT
MARKINGS LAYOUT**

© TxDOT 2024		SHEET 4 OF 4	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	95	

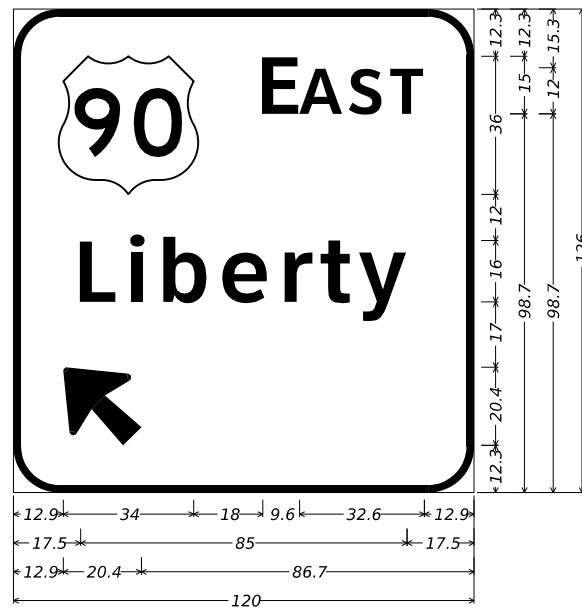


DATE: _____
FILE: _____

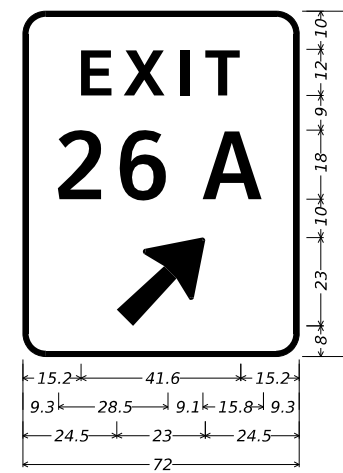
CK: DW: CK: DW: CK: DW: CK: DW:



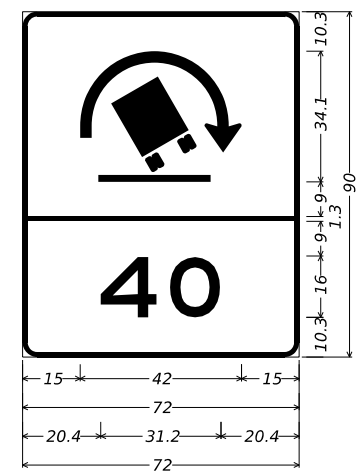
12.0" Radius, 2.0" Border, White on Green;
 Interstate 10 M1-1; "EAST", ClearviewHwy-5-W-R; "Beaumont", ClearviewHwy-5-W-R;
 Arrow B-3 - 25.0" 45°; Arrow B-3 - 25.0" 45°;
 LAYOUT 2 OF 4: SIGN NO. R6 - STA 138+95



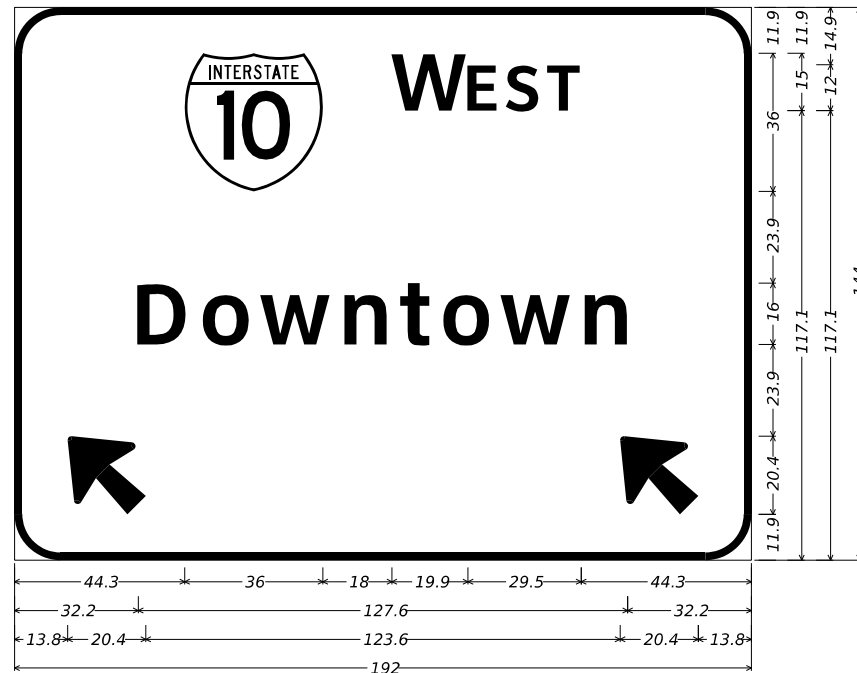
12.0" Radius, 2.0" Border, White on Green;
 US 90 M1-4; "EAST", ClearviewHwy-5-W-R;
 "Liberty", ClearviewHwy-5-W-R; Arrow B-3 - 25.0" 135°;
 LAYOUT 2 OF 4: SIGN NO. R5 - STA 138+95



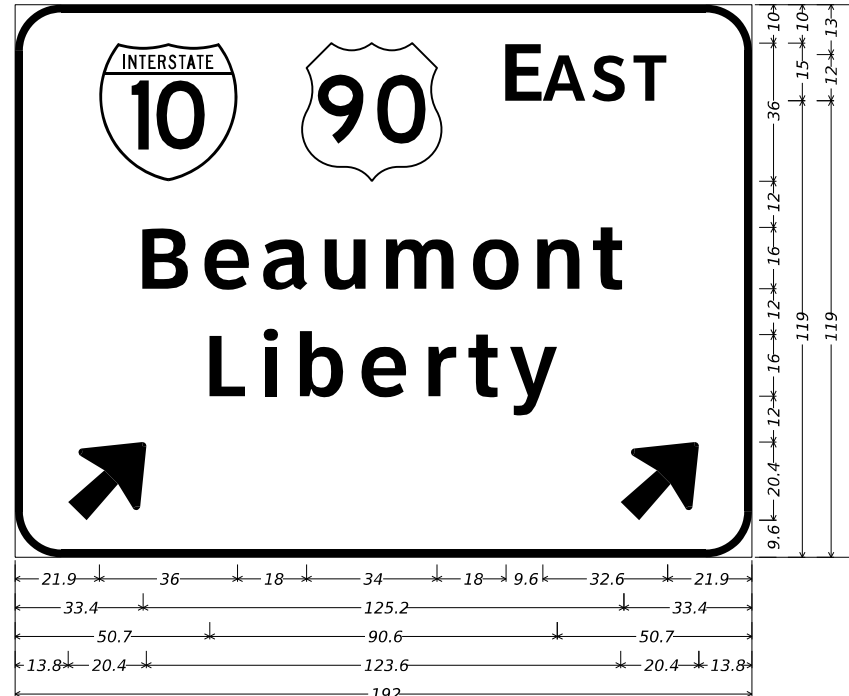
E5-1c_72x90;
 6.0" Radius, 1.5" Border, White on Green;
 "EXIT", ClearviewHwy-6-W;
 "26 A", ClearviewHwy-4-W specified length;
 Arrow A-2 - 29.3" 45°;
 LAYOUT 1 OF 4: SIGN NO. R1 - STA 124+94



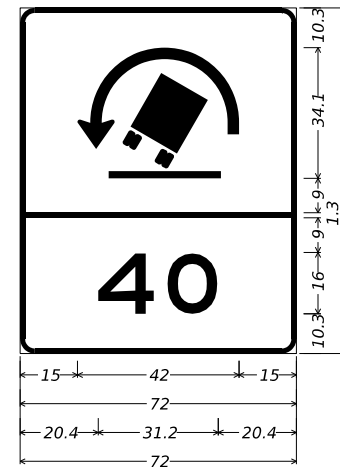
3.8" Radius, 1.3" Border, Black on Yellow;
 W1-13; "40", E;
 LAYOUT 2 OF 4: SIGN NO. R4 - STA 131+77



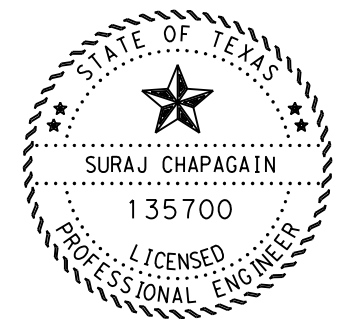
12.0" Radius, 2.0" Border, White on Green;
 Interstate 10 M1-1; "WEST", ClearviewHwy-5-W-R; "Downtown", ClearviewHwy-5-W-R;
 Arrow B-3 - 25.0" 135°; Arrow B-3 - 25.0" 135°;
 LAYOUT 2 OF 4: SIGN NO. R2 - STA 131+77



12.0" Radius, 2.0" Border, White on Green;
 Interstate 10 M1-1; US 90 M1-4; "EAST", ClearviewHwy-5-W-R;
 "Beaumont", ClearviewHwy-5-W-R; "Liberty", ClearviewHwy-5-W-R; Arrow B-3 - 25.0" 45°;
 Arrow B-3 - 25.0" 45°;
 LAYOUT 2 OF 4: SIGN NO. R3 - STA 131+77



3.8" Radius, 1.3" Border, Black on Yellow;
 W1-13; "40", E;
 LAYOUT 2 OF 4: SIGN NO. R1 - STA 131+77



Suraj Chapagain, P.E.

8/27/2024



IH 610
 LARGE GUIDE SIGN DETAILS

©TxDOT 2024		SHEET 1 OF 1	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	96	

DATE: \$DATE\$
 FILE: \$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.

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE	DOUBLE	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	
SHEETING	Yellow, White or Red Type B or C reflective sheeting				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 (fix). 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.				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS								D & OM DESCRIPTIVE CODES		
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)	
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4	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 (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
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting	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	
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT		
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP		

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		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.		
DEVICE	GF1	GF2	CTB	 W1-8				 W1-6			
SHEETING	Yellow, White, Red			SIZE (W x L)	18" x 24" (Conventional)	24" x 30" (Conventional Oversize)	30" x 36" (Expressway)	36" x 48" (Freeway)	SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
NOTE	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	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).						

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	OW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	HOU	HARRIS	97	

DATE: \$DATES
 FILE: \$FILES
 \$TIMES

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.

POST TYPE AND SUPPORT FOUNDATION DETAILS

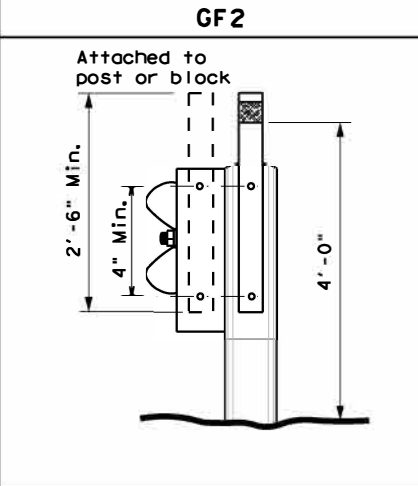
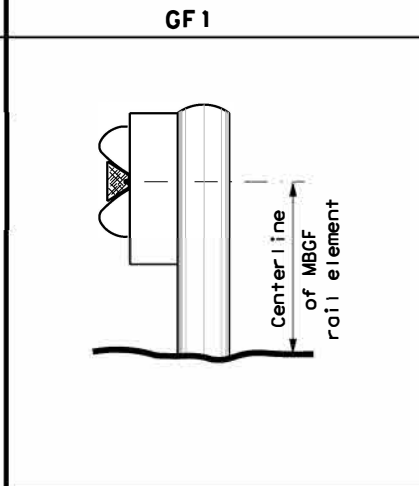
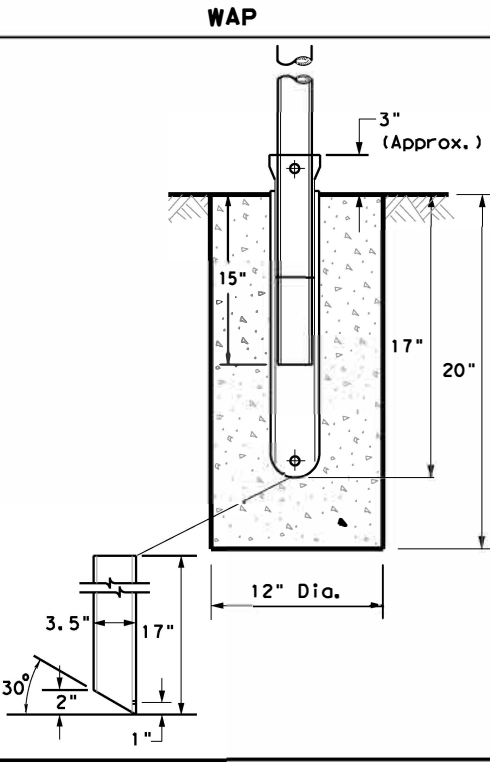
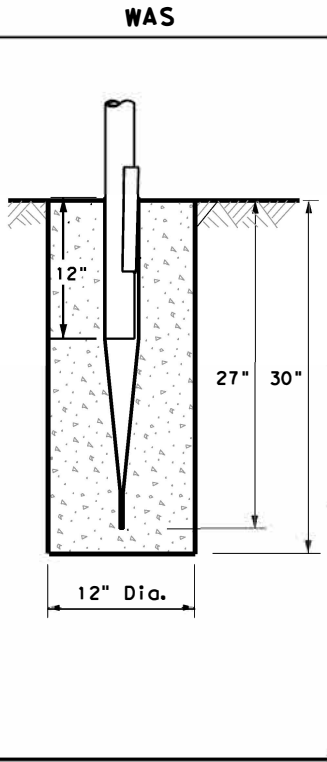
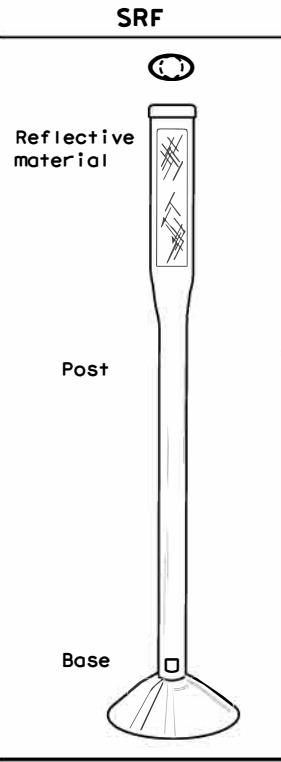
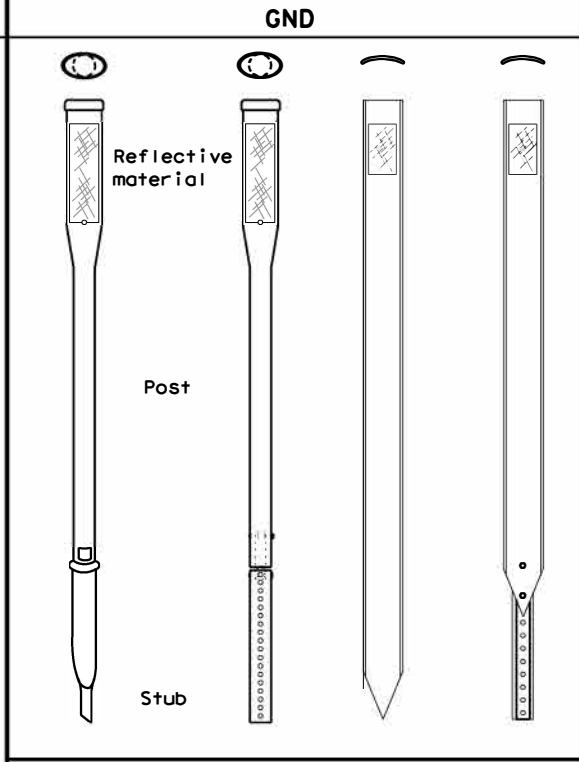
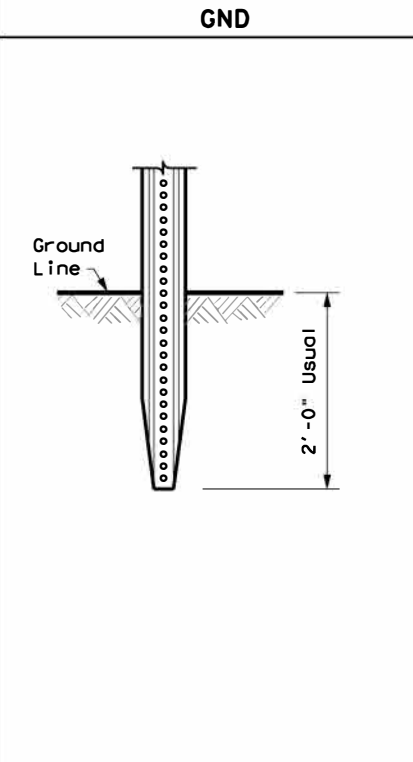
TYPE OF BARRIER MOUNTS

WING CHANNEL (WC)

FLEXIBLE POSTS (YFLX, WFLX)

WEDGE ANCHOR SYSTEMS

GUARD FENCE ATTACHMENT



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.

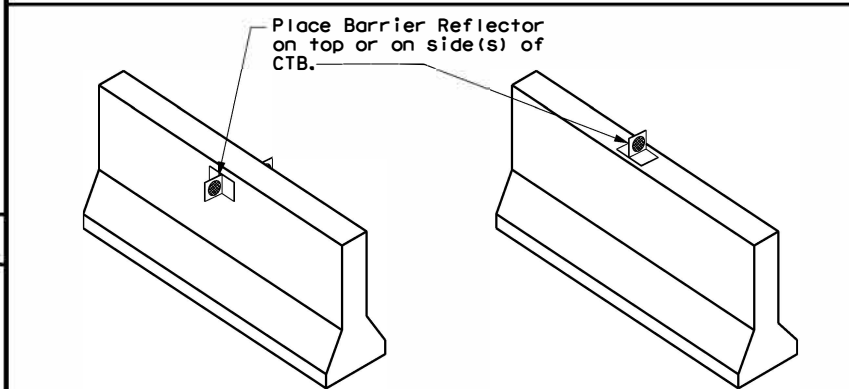
NOTES

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.

NOTE

1. Install per manufacturer's recommendations.

CONCRETE TRAFFIC BARRIER (CTB)



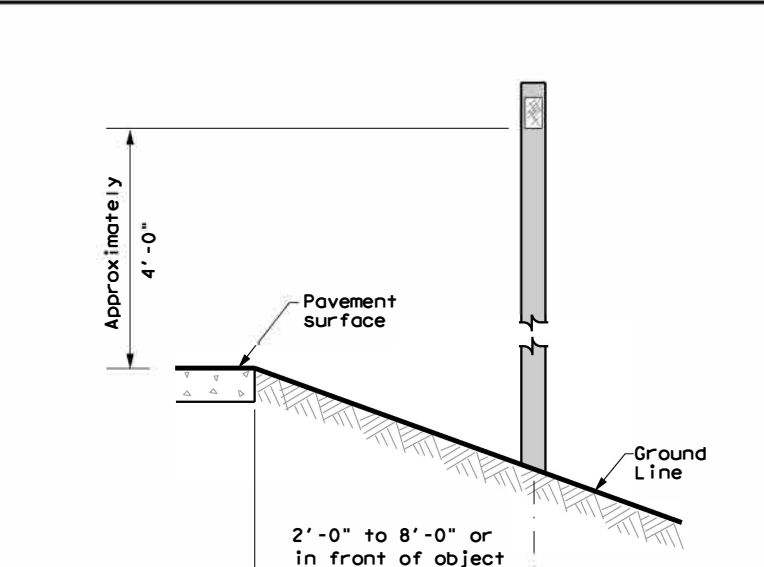
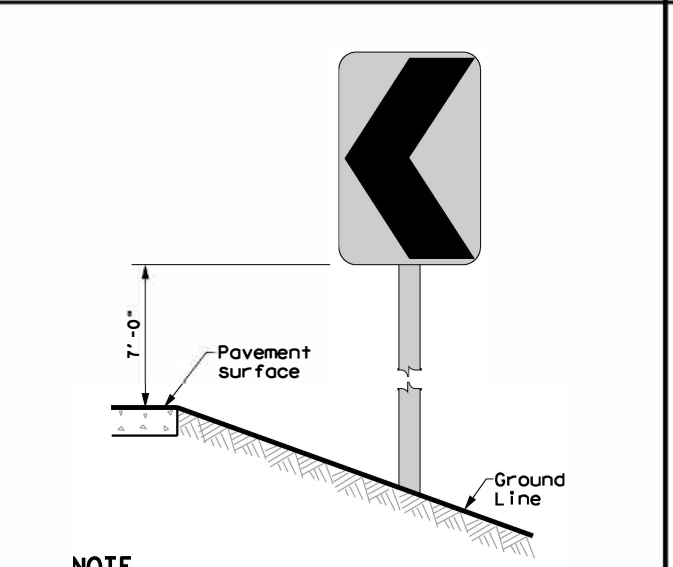
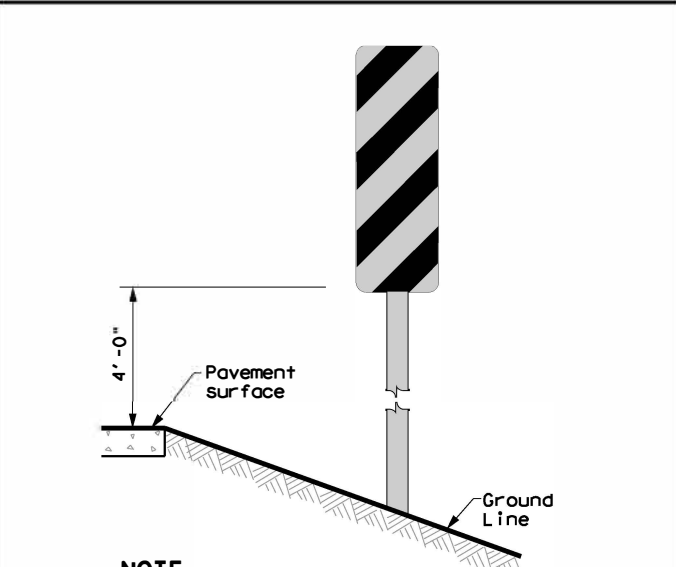
GENERAL NOTES

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

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN

DELINEATORS AND TYPE 2 OBJECT MARKERS



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)

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.

See general notes 1, 2 and 3.

DATE: \$DATES
 FILE: \$FILES
 \$TIMES

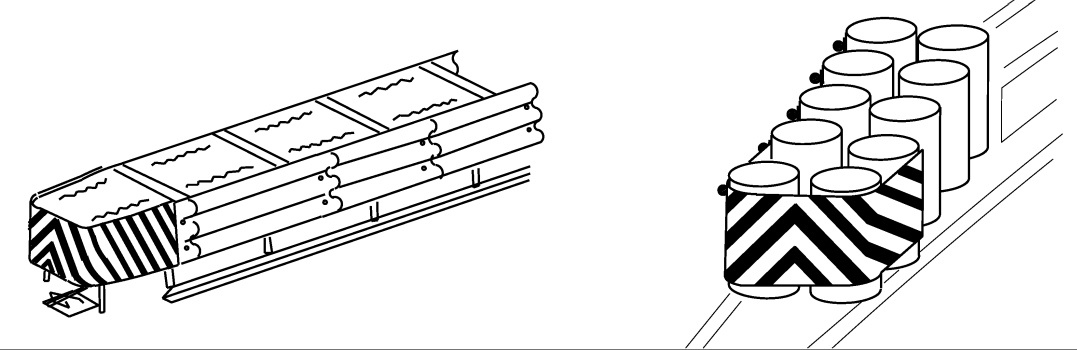
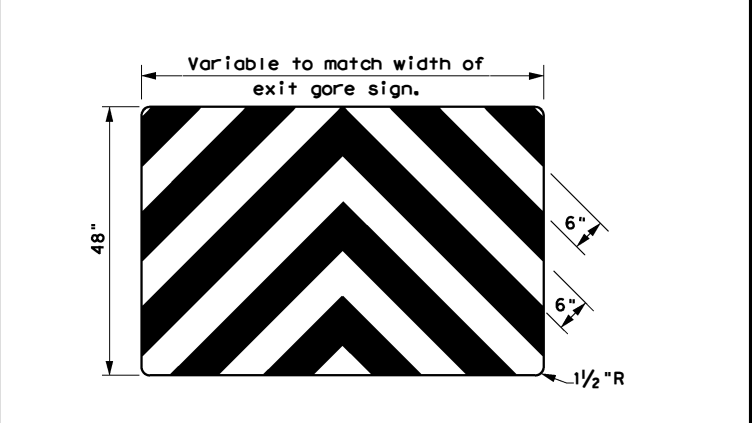
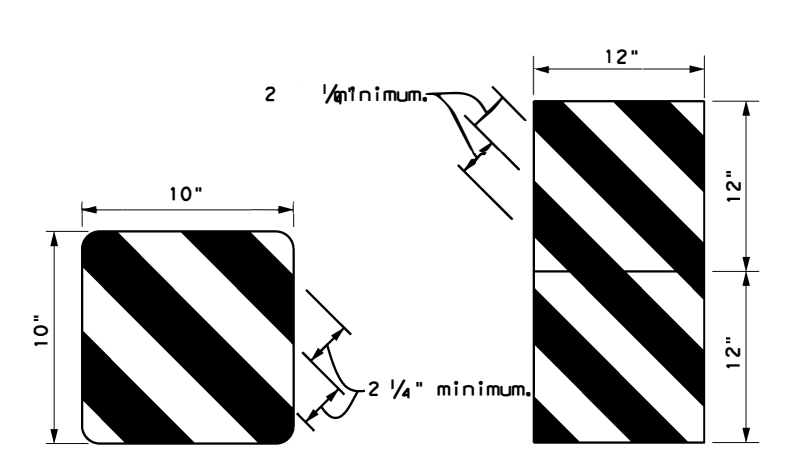
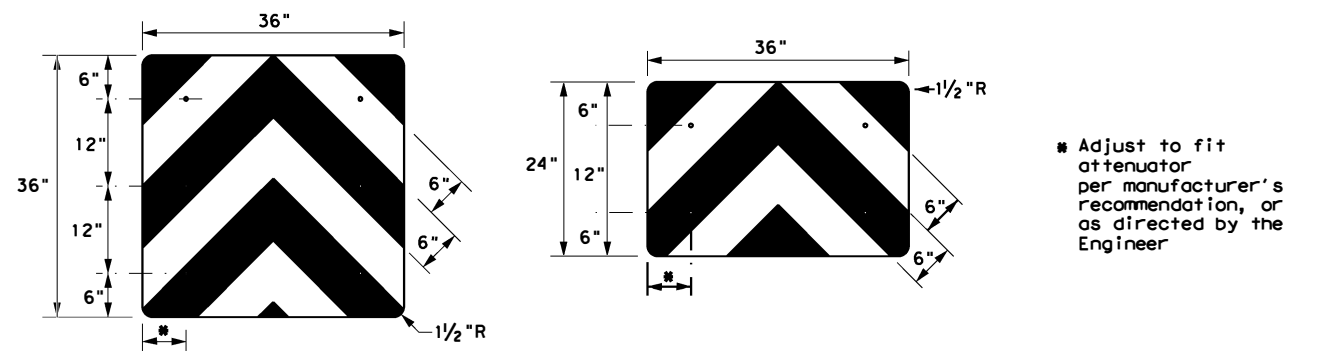
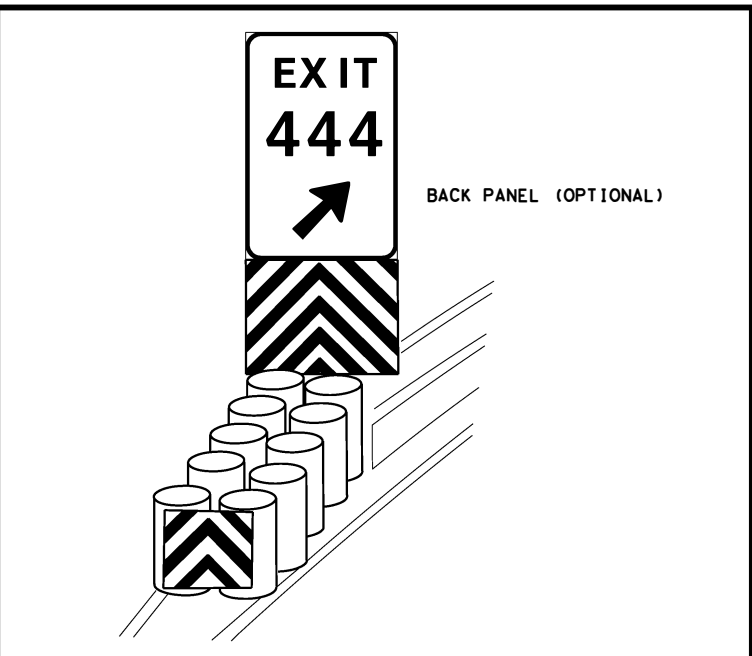
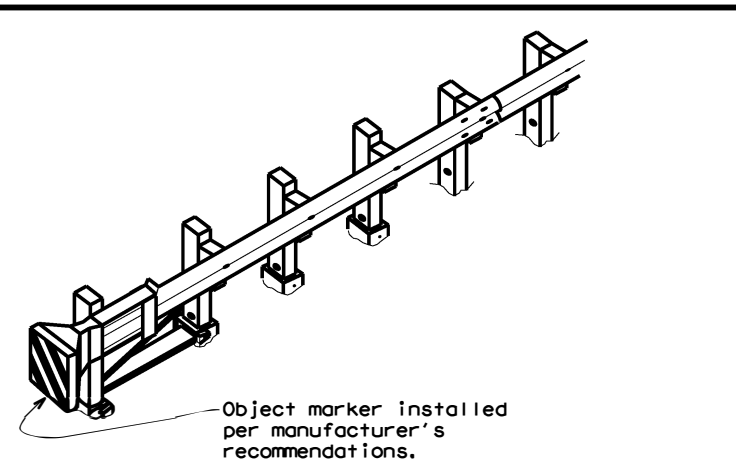
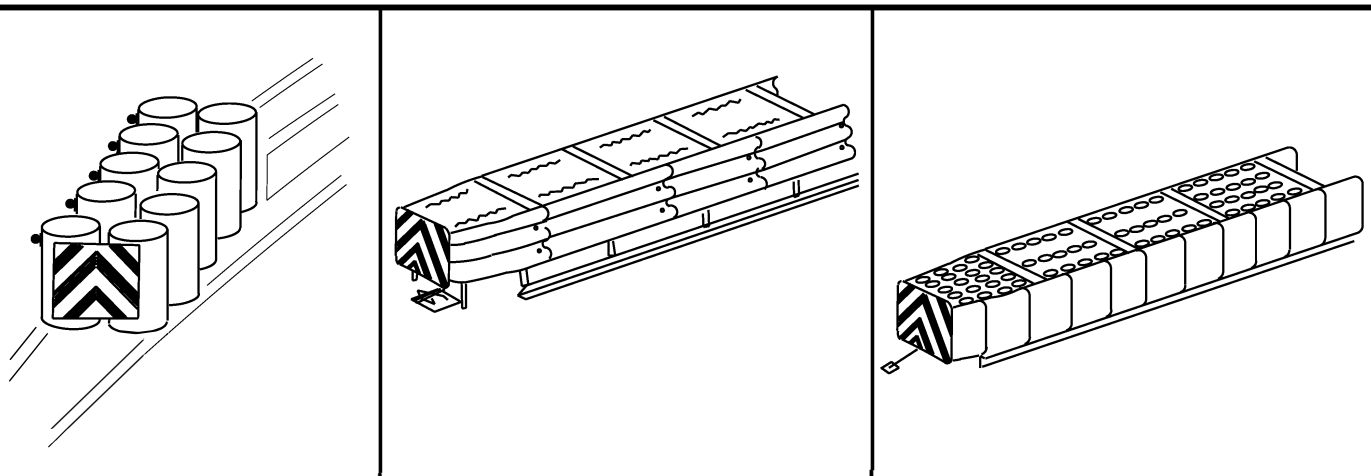


DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	HOU	HARRIS	98	

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.



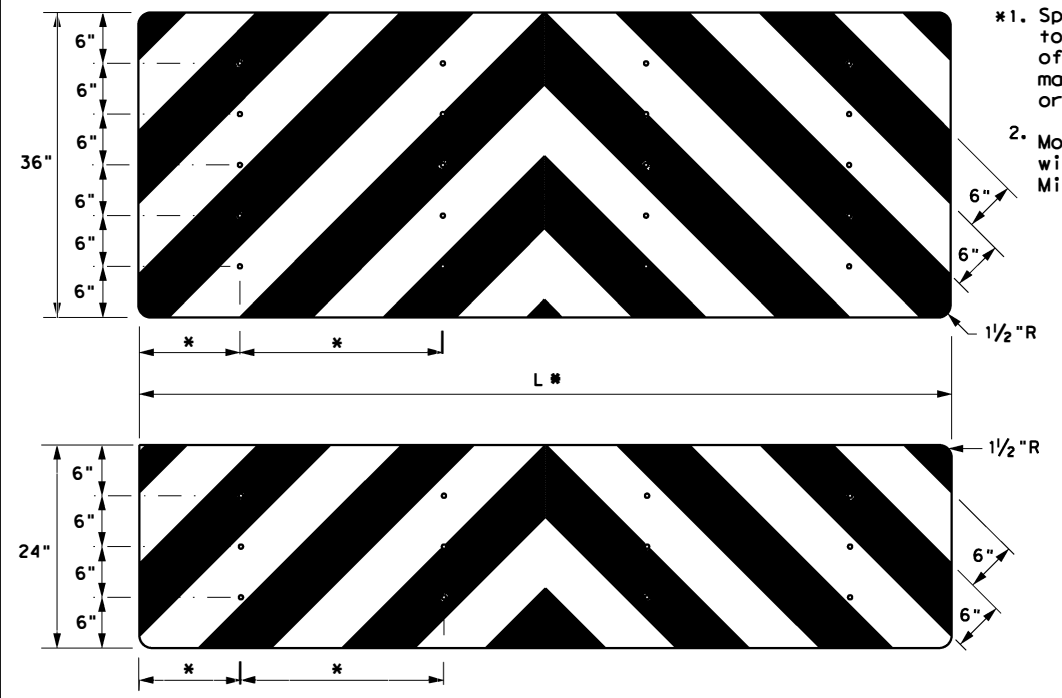
OBJECT MARKERS SMALLER THAN 3 FT²

NOTES

- 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.
- 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.
- 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 1/4".
- 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.
- Object Marker at nose of attenuator is subsidiary to the attenuator.
- See D & OM (1-4) for required barrier reflectors.

NOTES

- Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.
- Mounting should be flush with top of attenuator. Minimum size 96" x 24".

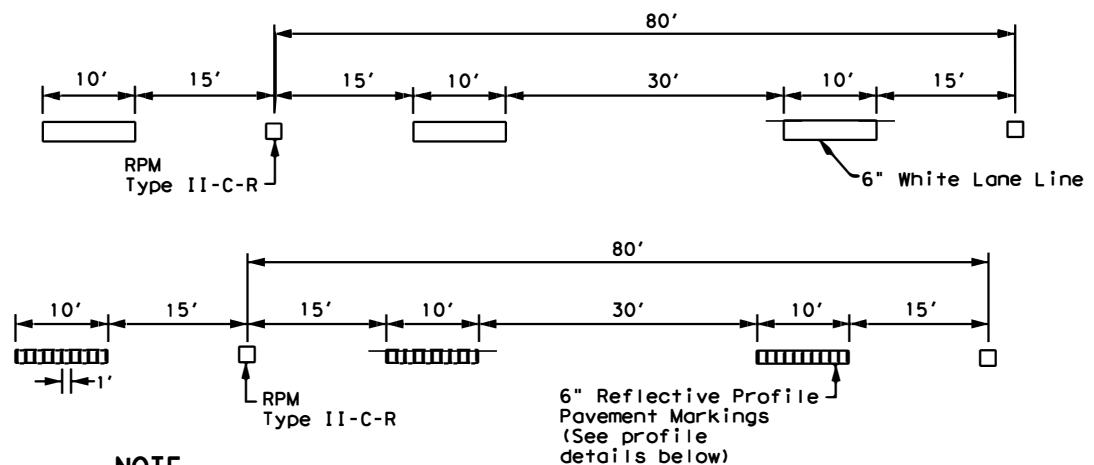


DATE: \$DATES \$TIMES
FILE: \$FILES

<p>DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</p> <p>D & OM(VIA) -20</p>			
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT
© TXDOT December 1989	CONT SECT	JOB	HIGHWAY
REVISIONS		0271 15	099 IH 610
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	HOU	HARRIS	100
4-98 7-20			
20G			

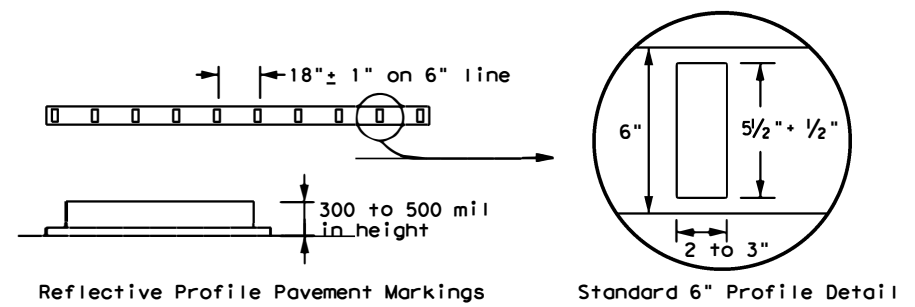
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 03/25/2024 08:23 AM
FILE: DOCUMENT NAME



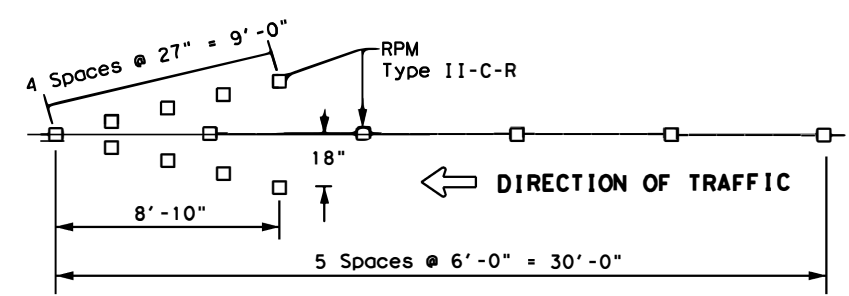
NOTE
ReflectORIZED raised pavement markers Type II-C-R shall be spaced on 80' centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



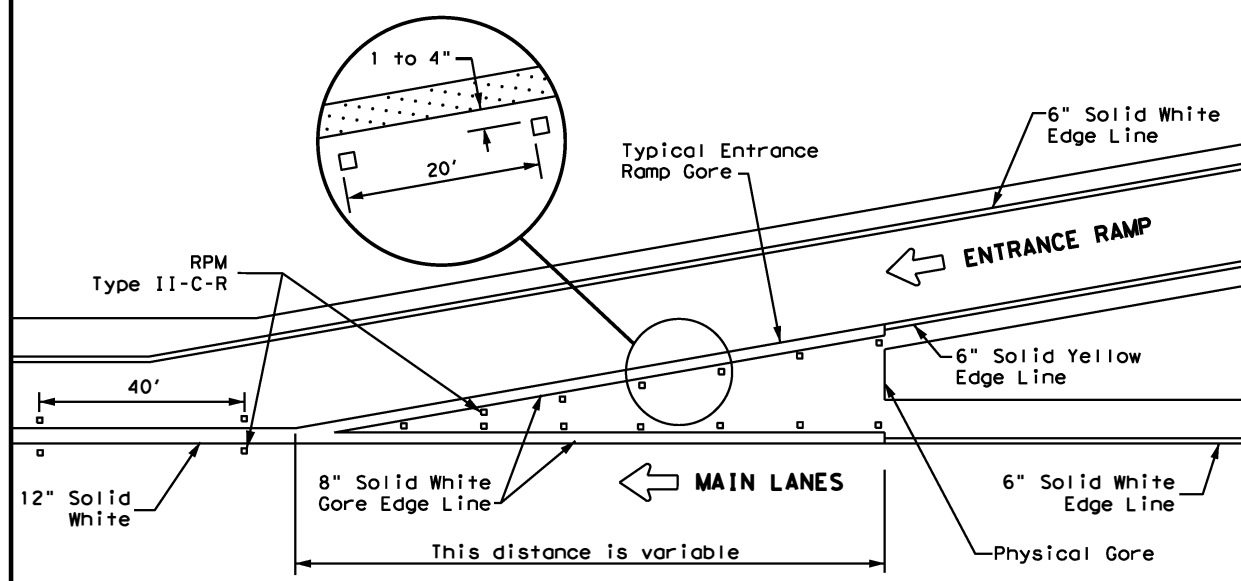
NOTE
Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

EDGE LINE PAVEMENT MARKINGS

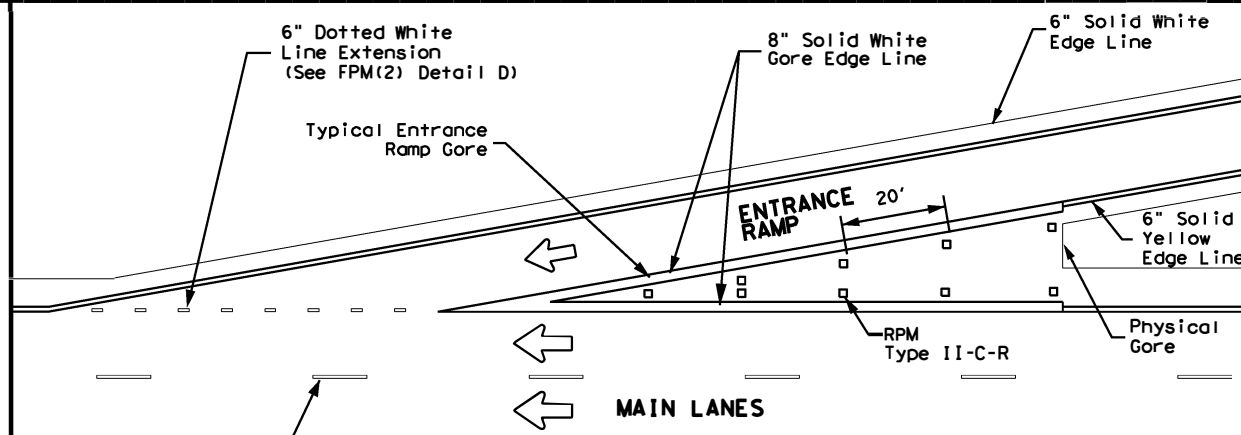


NOTES
1. ReflectORIZED raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectORIZED wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW

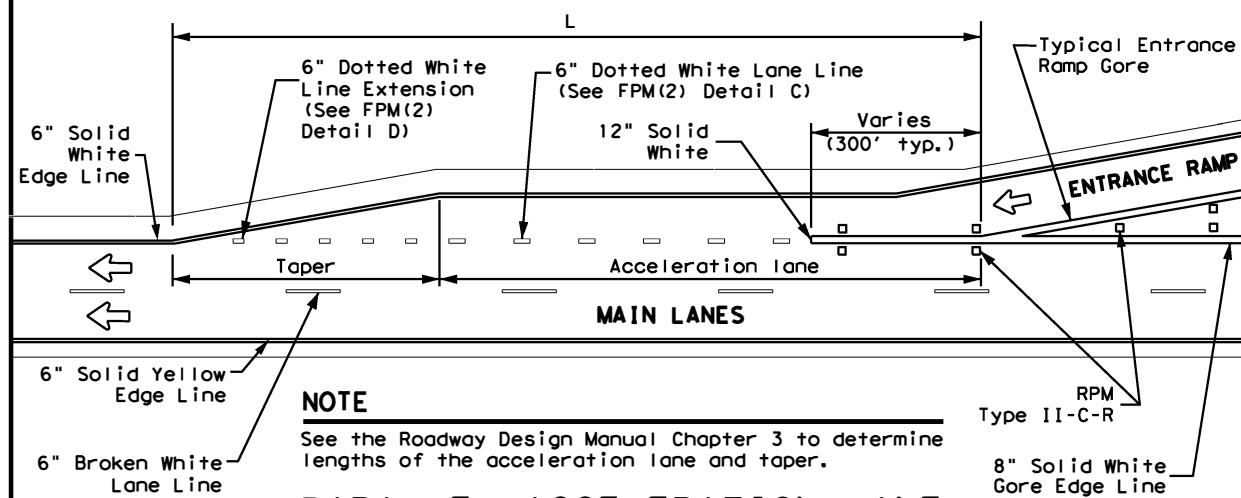


TYPICAL ENTRANCE RAMP GORE MARKING



NOTE
See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



NOTE
See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

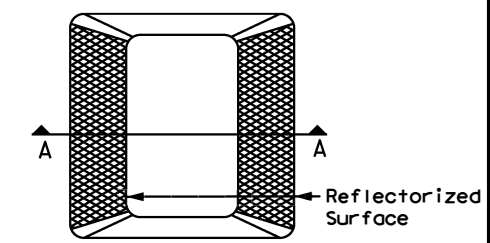
PARALLEL ACCELERATION LANE

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

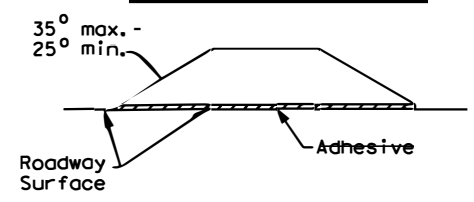
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
←	Traffic flow
↩	Pavement marking arrows (white)
□	ReflectORIZED Raised Markers (RPM) Type II-C-R

GENERAL NOTE
On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



Type II (Top View)



SECTION A

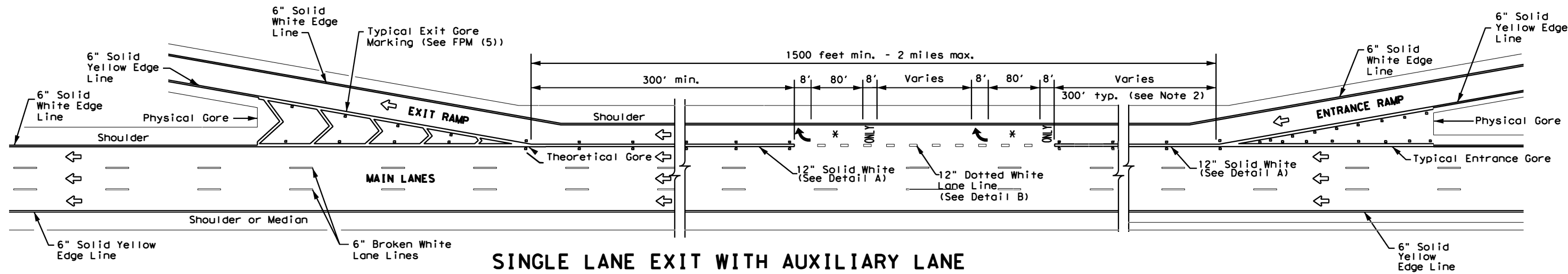
REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

Texas Department of Transportation
Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS FPM(1)-22

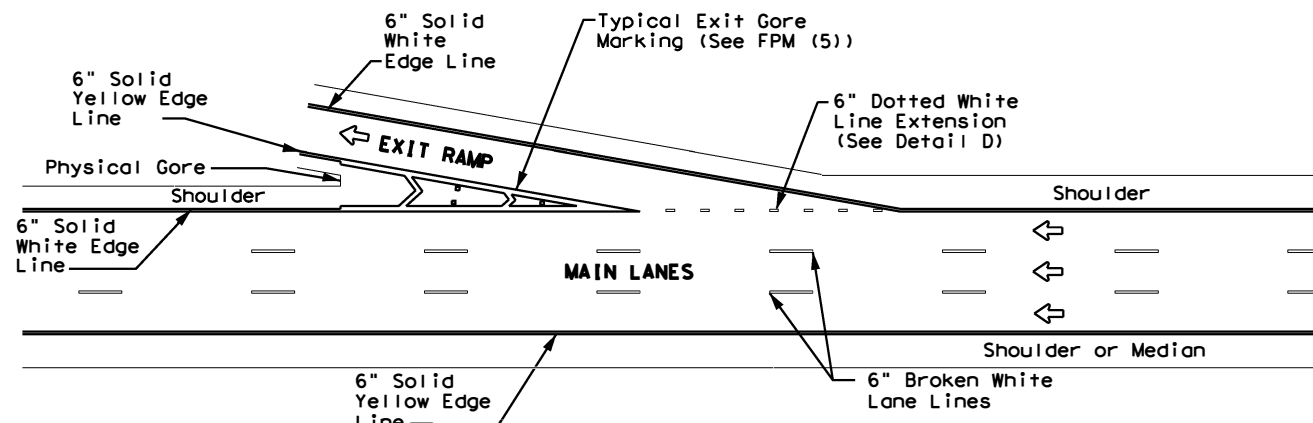
FILE: fpm(1)-22.dgn	DN: October 2022	CK: 0271	DW: 15	CK: 099	CK: IH 610
© TxDOT	REVISIONS	CONT	SECT	JOB	HIGHWAY
5-74	8-00	2-12			
4-92	2-08	10-22			
5-00	2-10				
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		101	

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.



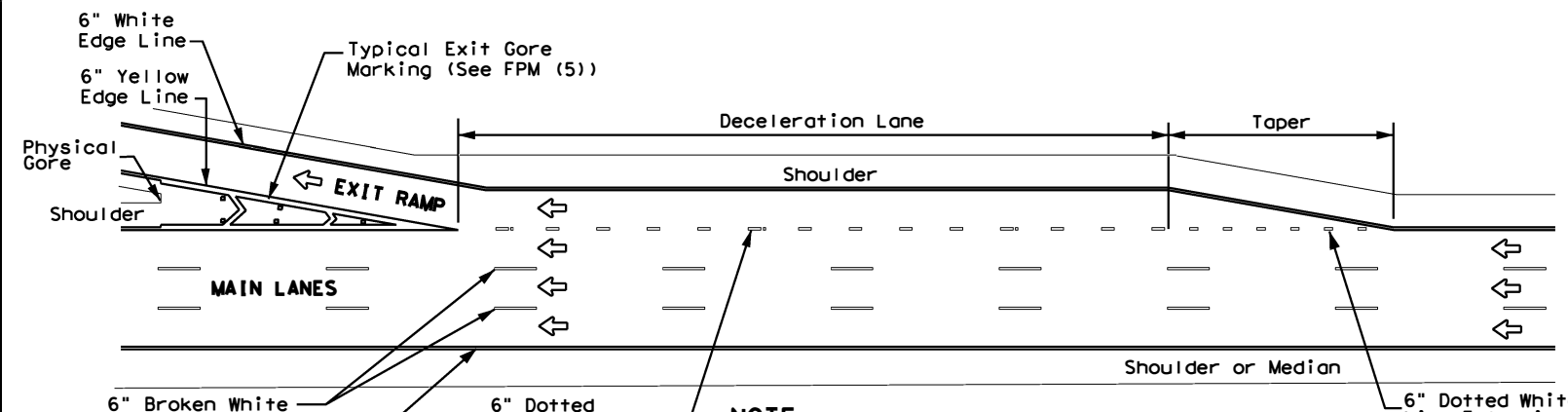
SINGLE LANE EXIT WITH AUXILIARY LANE

(See Note 2)



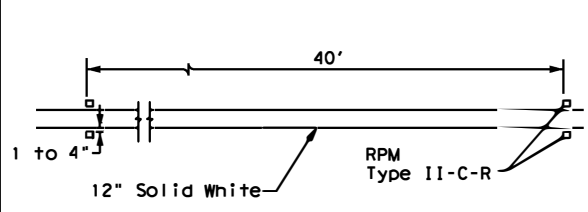
NOTE
Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

TAPERED DECELERATION LANE

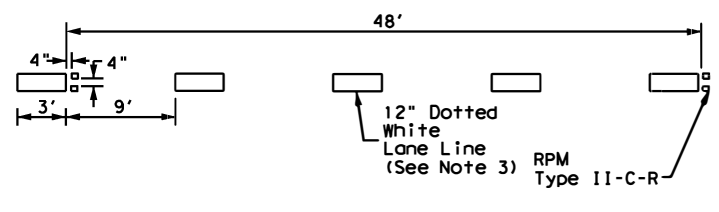


NOTE
Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.

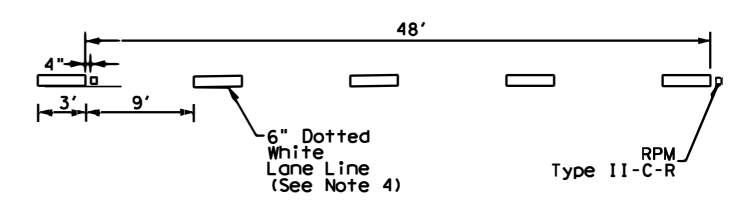
PARALLEL DECELERATION LANE



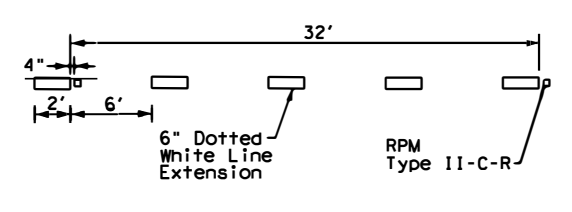
DETAIL A



DETAIL B



DETAIL C



DETAIL D

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND

←	Traffic flow
↩	Pavement marking arrows (white)
□	Reflectorized Raised Markers (RPM) Type II-C-R
✱	Arrow markings are optional, however "ONLY" is required if arrow is used

MATERIAL SPECIFICATIONS

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

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

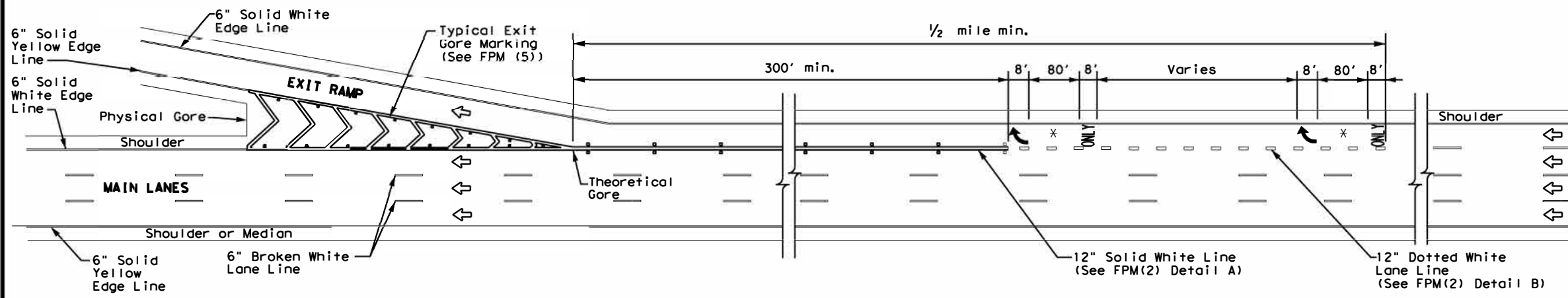


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMP

FPM(2) - 22

FILE: fpm(2)-22.dgn	DWG: October 2022	CK: 0271	DW: 15	CK: 099	CK: 610
© TxDOT October 2022		CONT	SECT	JOB	HIGHWAY
REVISIONS		0271	15	099	IH 610
2-77	5-00	2-12			
4-92	8-00	10-22			
8-95	2-10				
DIST		COUNTY		SHEET NO.	
HOU		HARRIS		102	

DATE: 03/25/2024 08:23 AM
FILE: DOCUMENT NAME

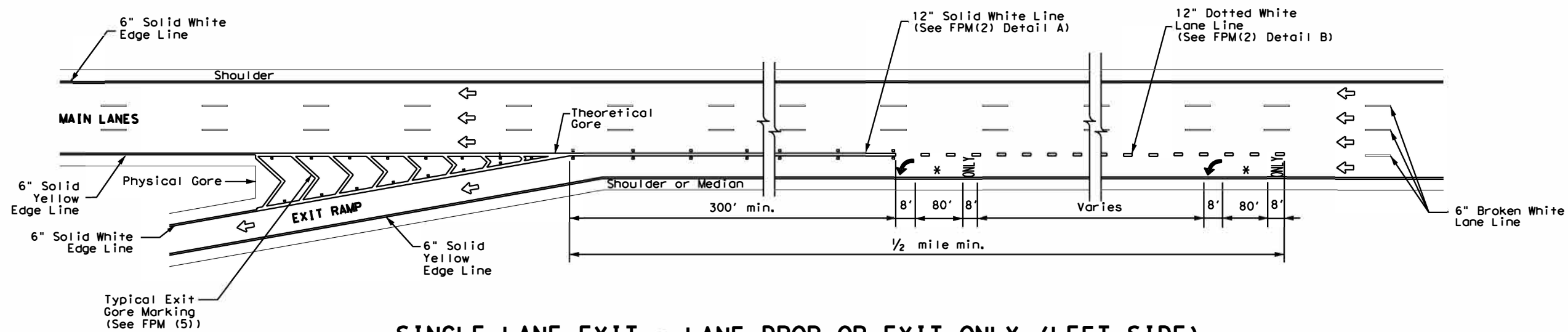


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

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.

LEGEND	
←	Traffic flow
↶	Pavement marking arrows (white)
□	ReflectORIZED Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used



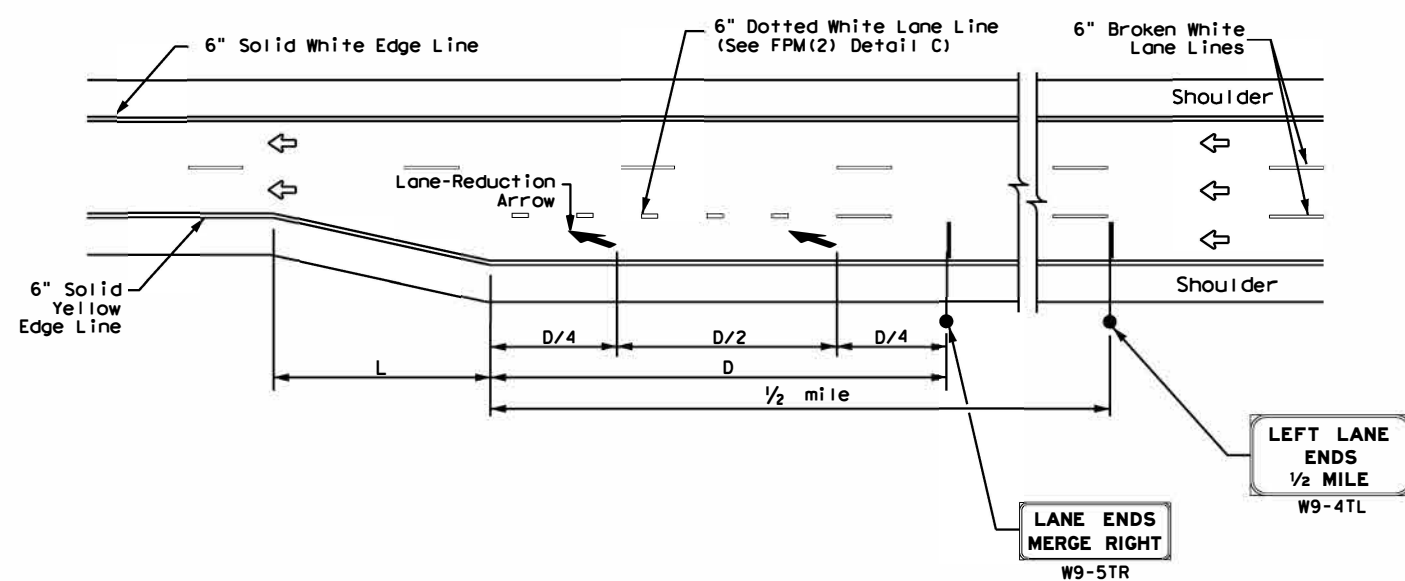
SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

NOTES

1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
2. 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.
3. Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at <http://www.txdot.gov>.
4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.



FREEWAY LANE REDUCTION

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
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	
80 MPH	1,500	
85 MPH	1,625	

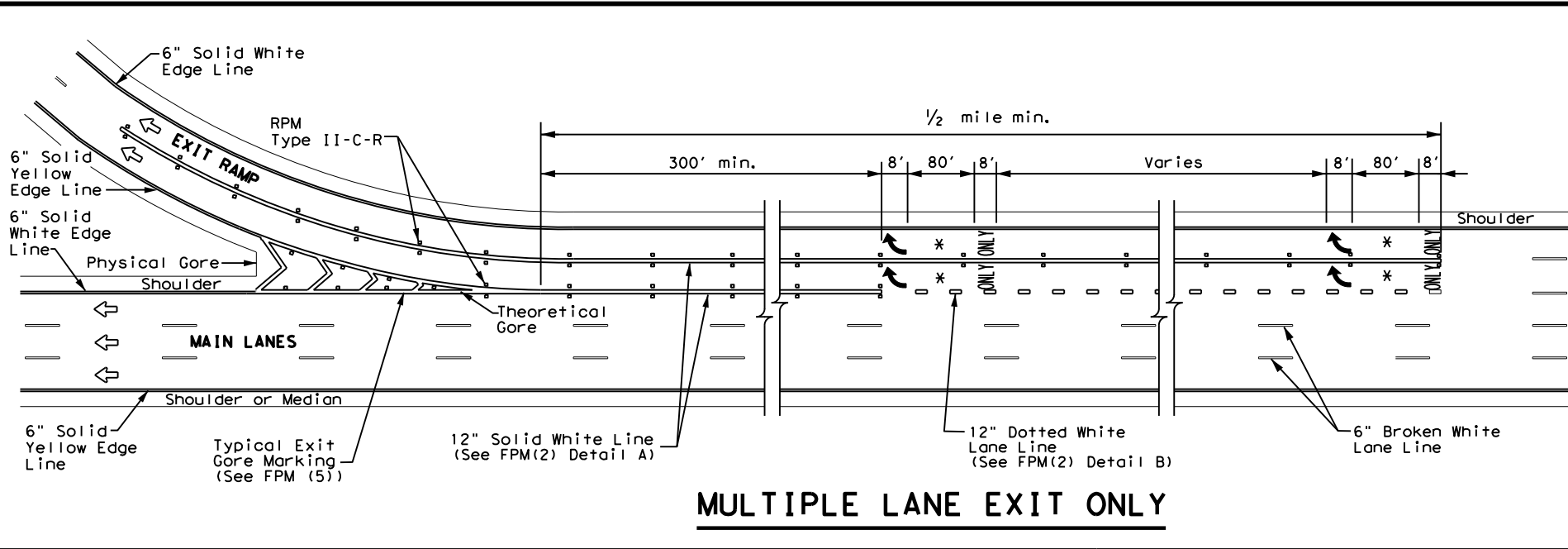


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS SINGLE LANE DROP (EXIT ONLY) AND LANE REDUCTION DETAILS

FPM(3)-22

FILE: fpm(3)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
4-92 2-10	DIST	COUNTY	SHEET NO.	
5-00 2-12	HOU	HARRIS	103	
8-00 10-22				

DATE: 03/25/2024 08:26 AM
FILE: DOCUMENT NAME



MULTIPLE LANE EXIT ONLY

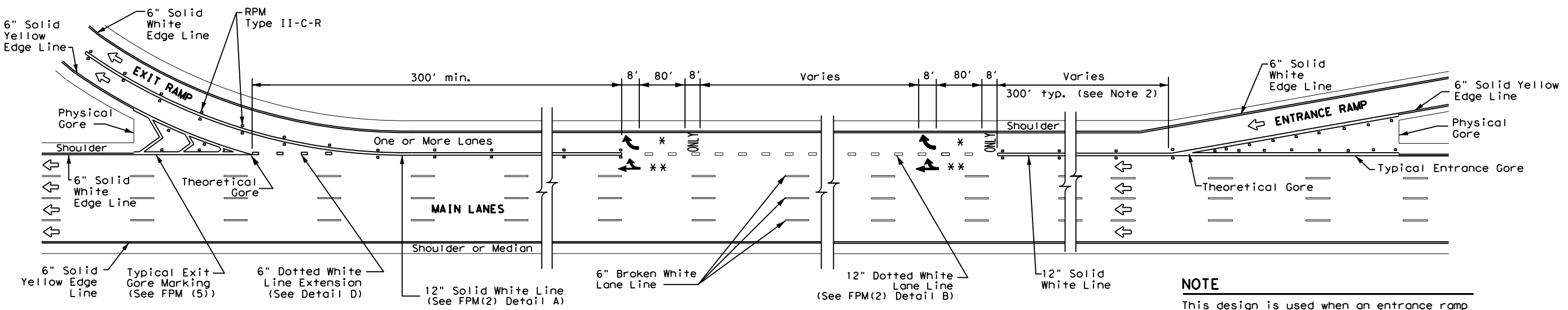
LEGEND	
↔	Traffic Flow
◻	Reflectorized Raised Markers (RPM) Type II-C-R
↶	Pavement marking arrow (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used
**	Arrow markings are optional

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.

GENERAL NOTES

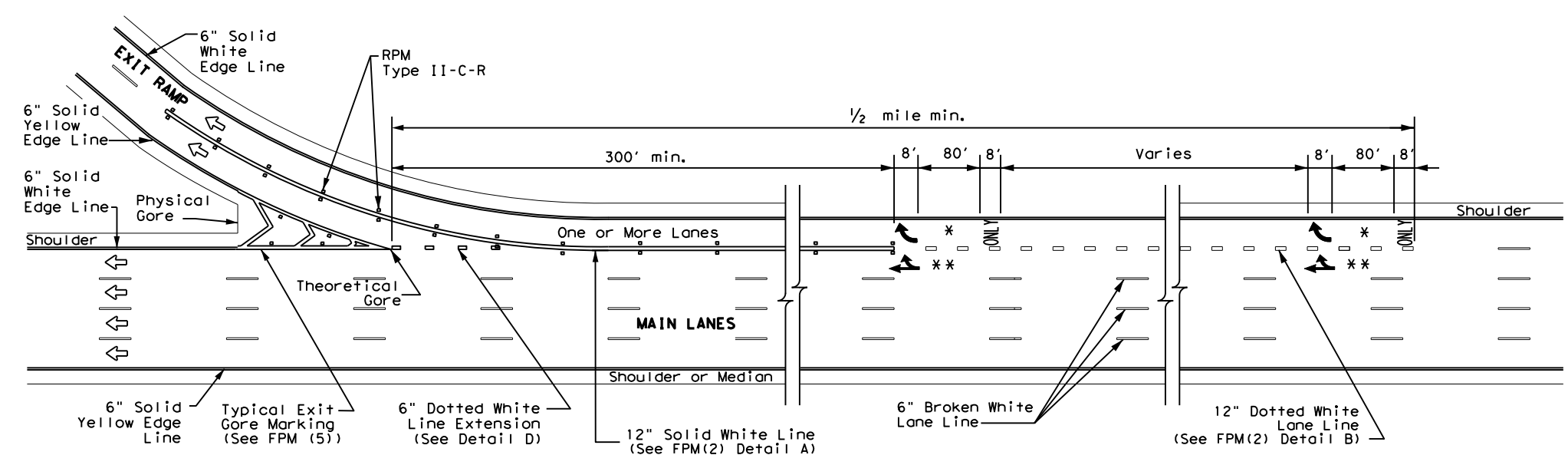
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.



SINGLE LANE ENTRANCE WITH MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

NOTE

This design is used when an entrance ramp is followed by a dual lane exit ramp within 2400' downstream (theoretical gore to theoretical gore).



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

DATE: 03/25/2024 08:23 AM
FILE: DOCUMENT NAME



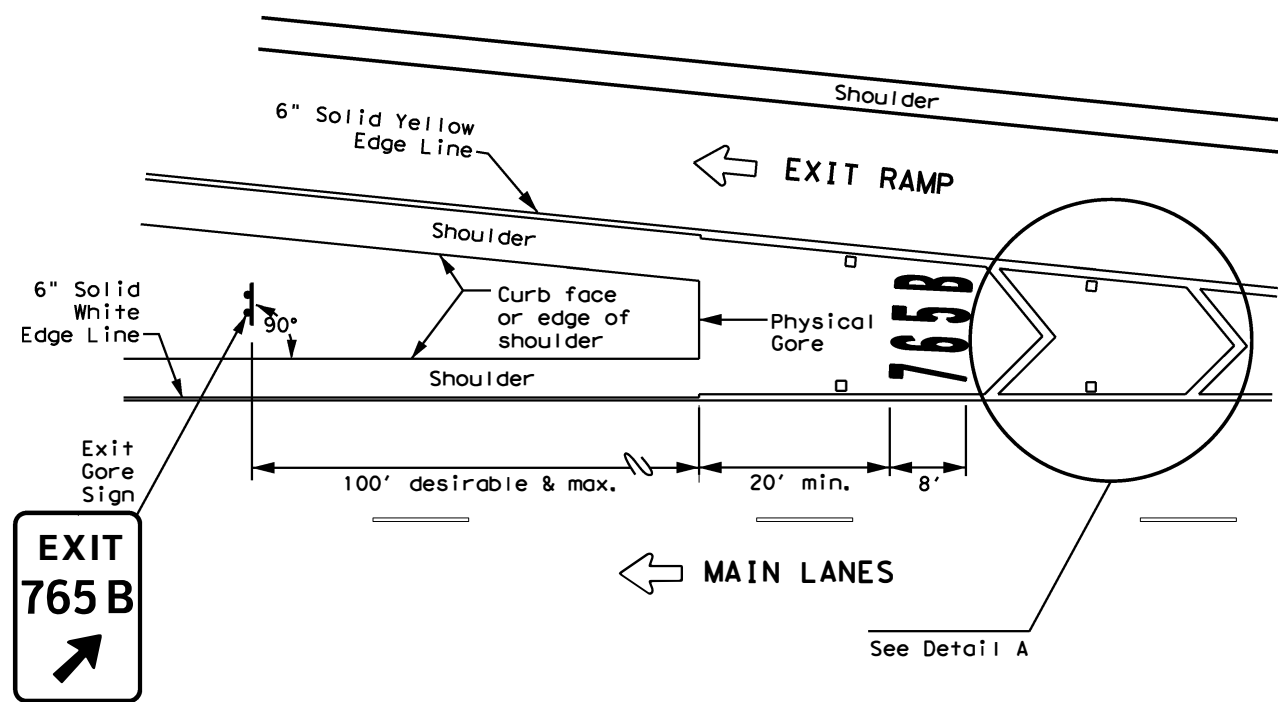
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS MULTIPLE LANE DROP (EXIT) DETAILS FPM(4)-22

FILE: fpm(4)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
2-77 2-10	DIST	COUNTY	SHEET NO.	
5-00 2-12	HOU	HARRIS	104	
8-00 10-22				

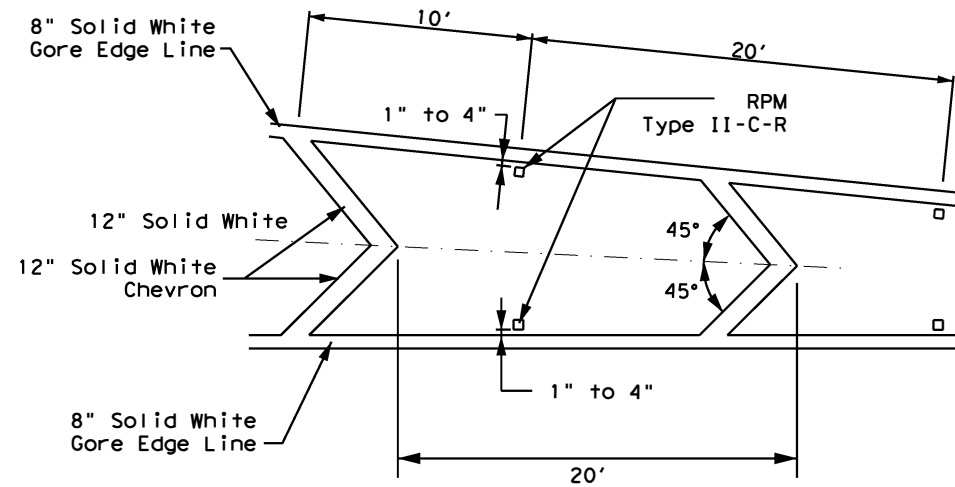
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at <http://www.txdot.gov>



MARKINGS WITH EXIT NUMBER



NOTES

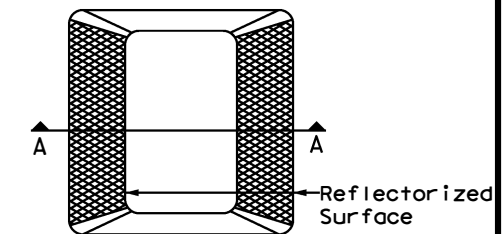
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see ReflectORIZED Raised Pavement Marker Detail.

DETAIL A

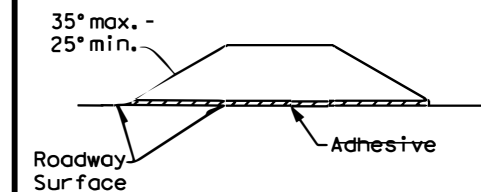
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
←	Traffic flow
□	ReflectORIZED Raised Markers (RPM) Type II-C-R



Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

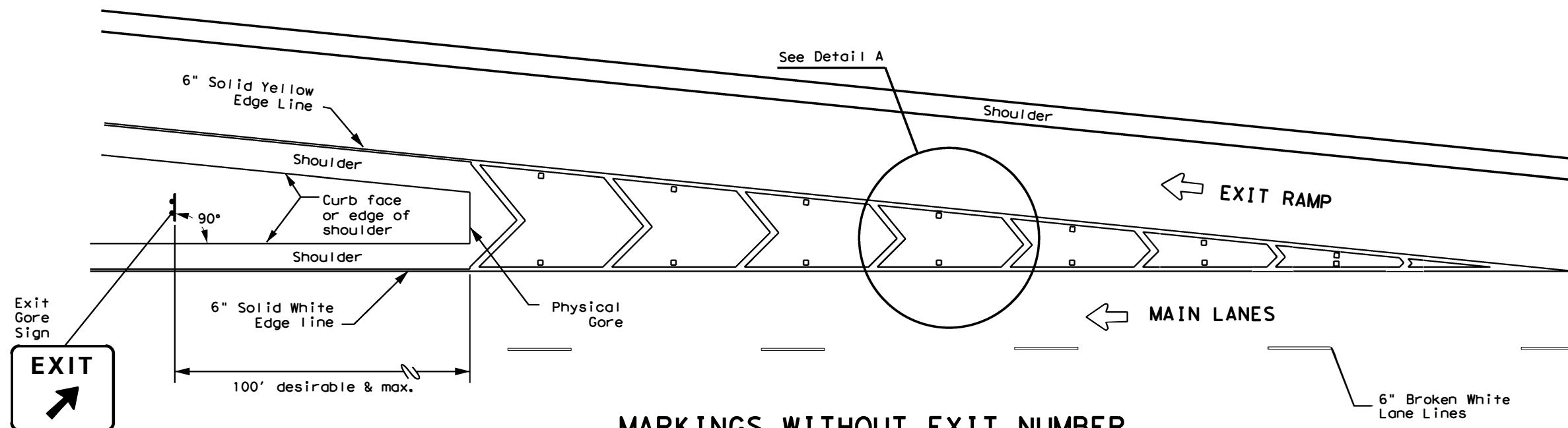


EXIT GORE PAVEMENT MARKINGS

FPM(5) - 22

FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
9-19	DIST	COUNTY	SHEET NO.	
10-22	HOU	HARRIS	105	

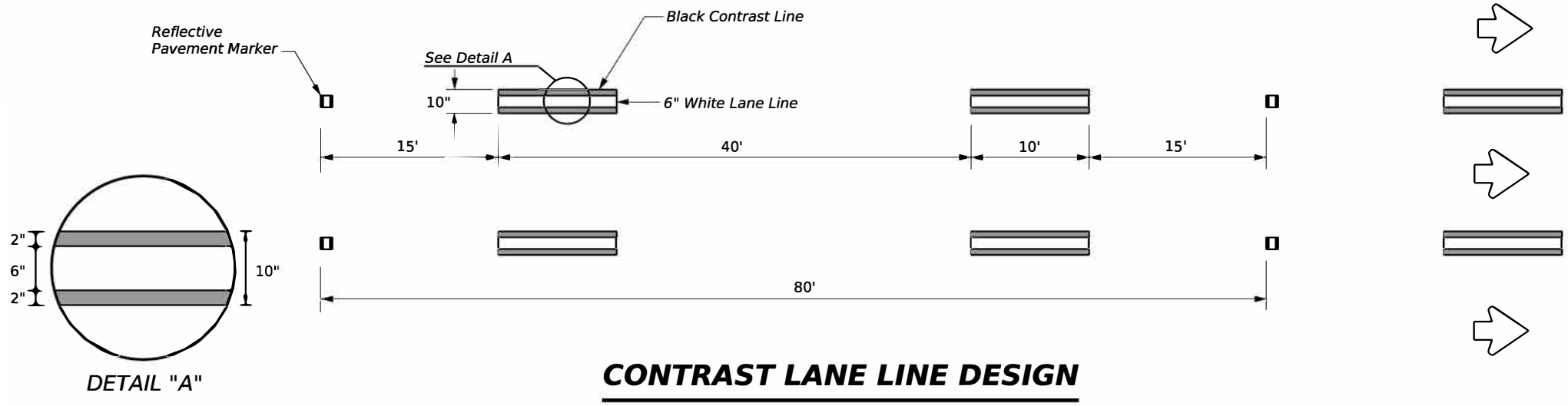
DATE: 03/25/2024 08:23 AM
FILE: DOCUMENT NAME



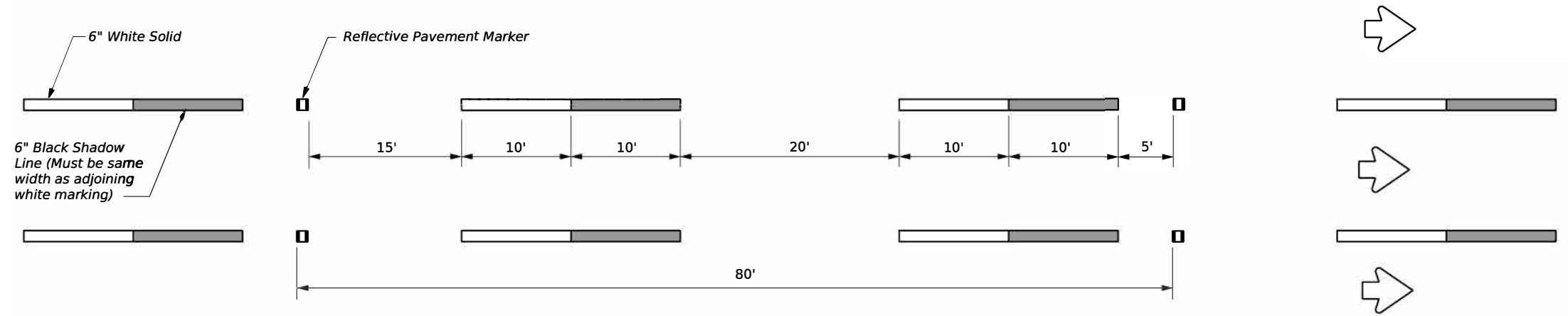
MARKINGS WITHOUT EXIT NUMBER

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

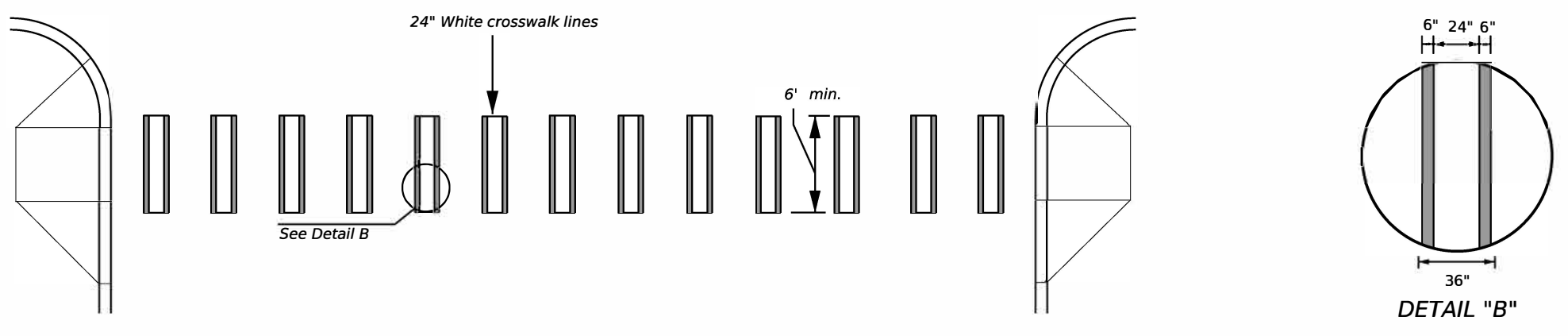
DATE: 03/25/2024 08:23 AM
FILE: DOCUMENT NAME



CONTRAST LANE LINE DESIGN



SHADOW LANE LINE DESIGN



CONTRAST CROSSWALK DESIGN

(See PM(4) for crosswalk line placement details)

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.

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

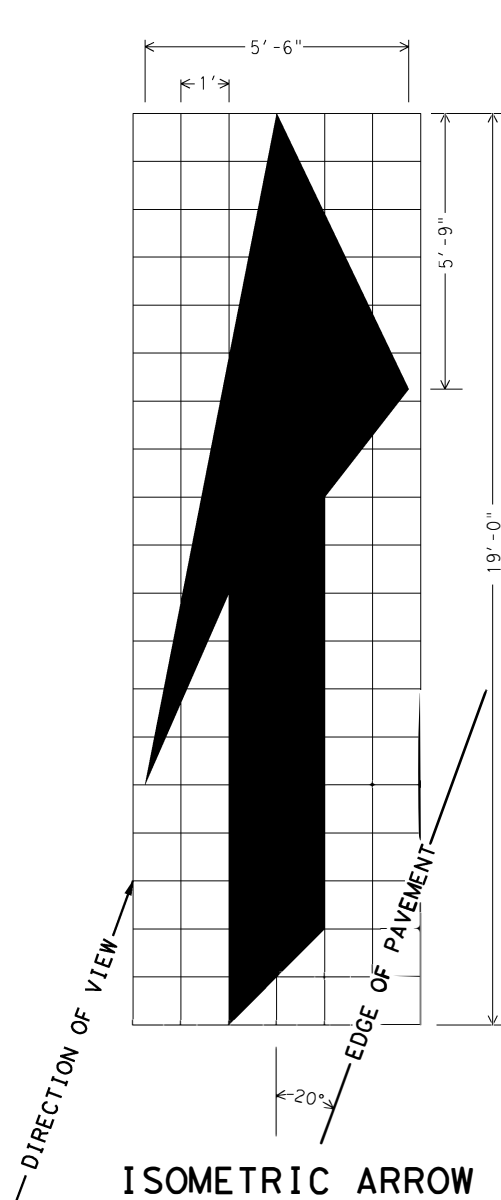
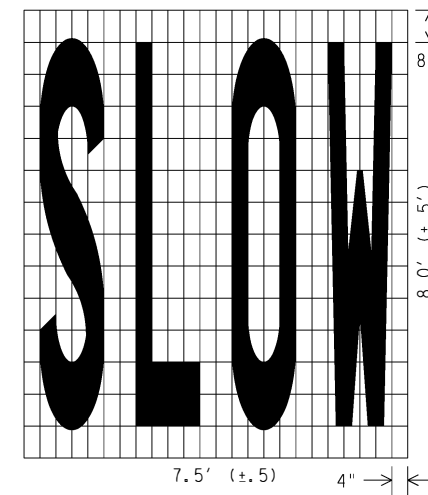
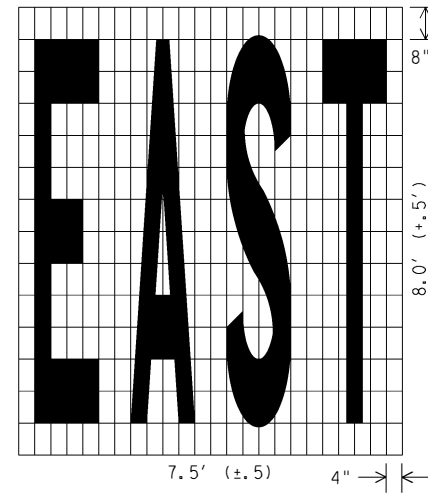
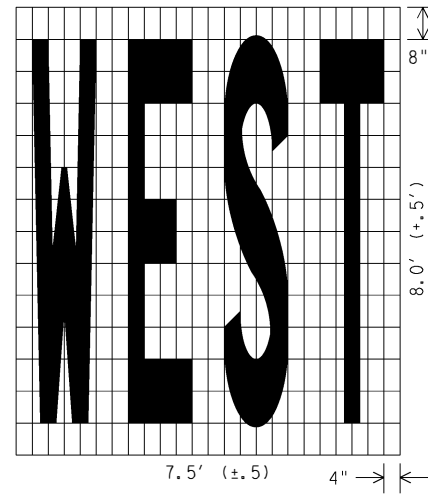
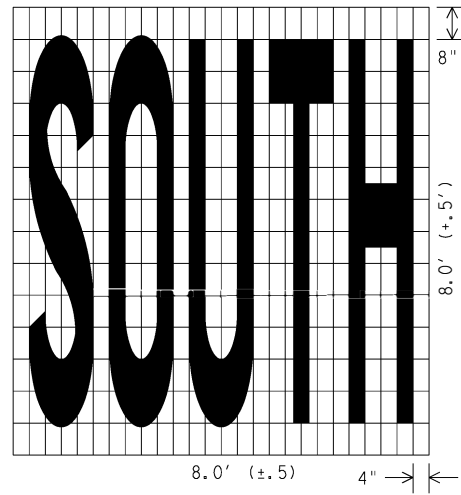
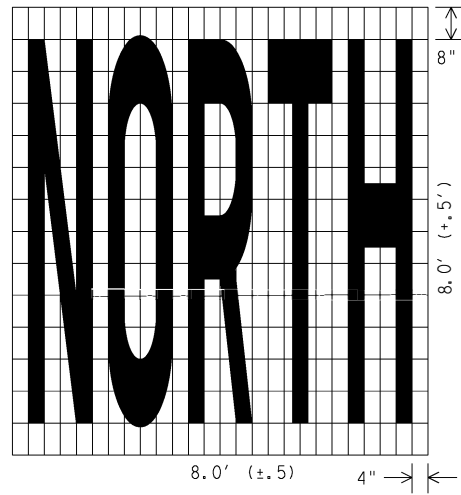
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



CONTRAST AND SHADOW PAVEMENT MARKINGS

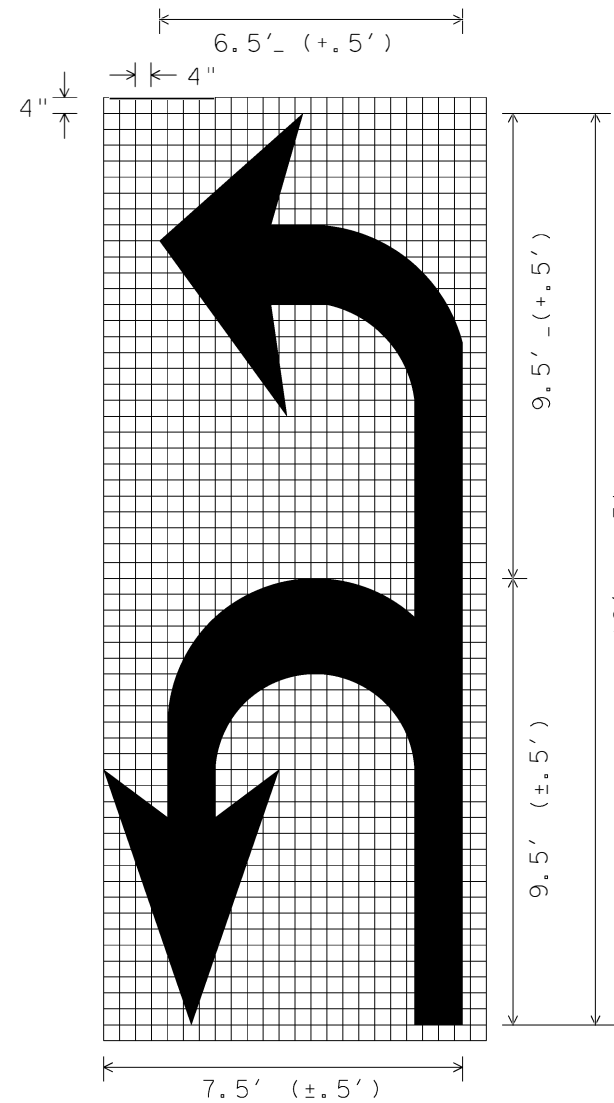
CPM(1)-23

FILE: CPM(1)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
5-14	DIST	COUNTY	SHEET NO.	
2-23	HOU	HARRIS	106	

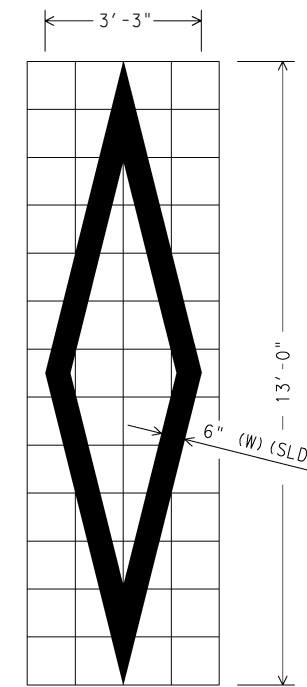


ISOMETRIC ARROW

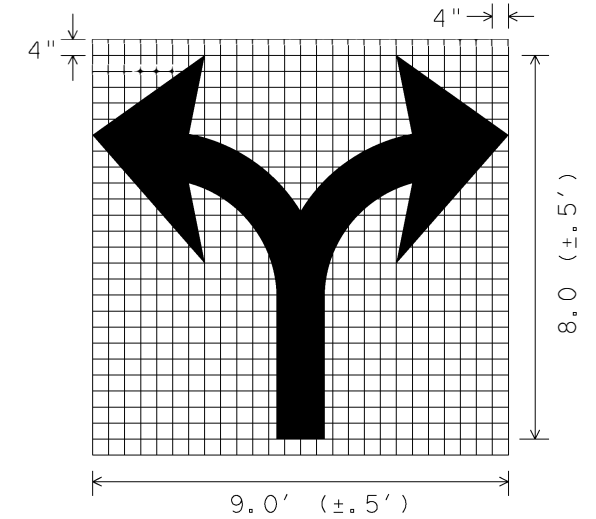
12 INCH GRID
 AREA = 42 SQ. FT.
 RIGHT LANE DROP ARROW
 (FOR LEFT LANE, USE MIRROR IMAGE)



U-L ARROW



DIAMOND SYMBOL



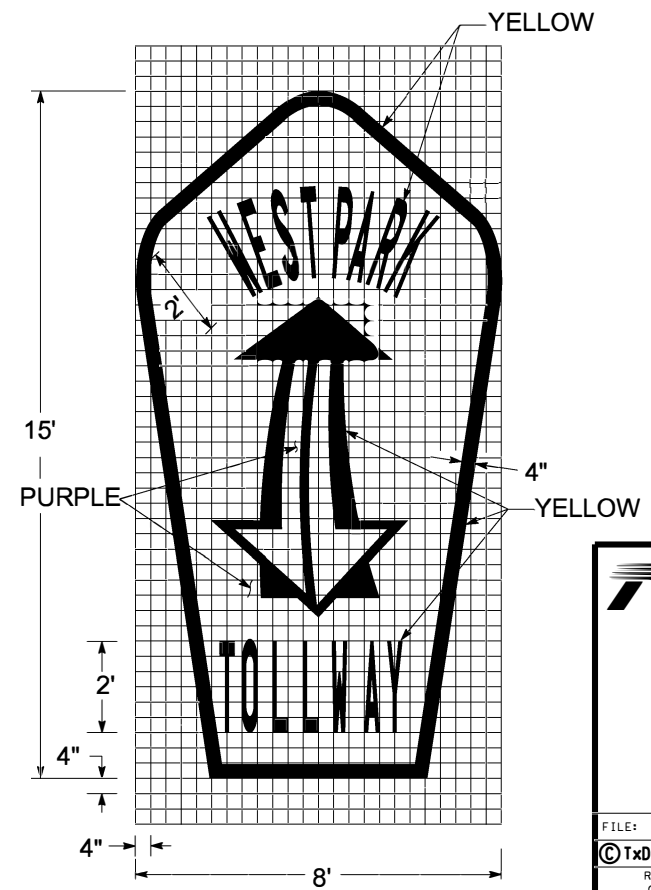
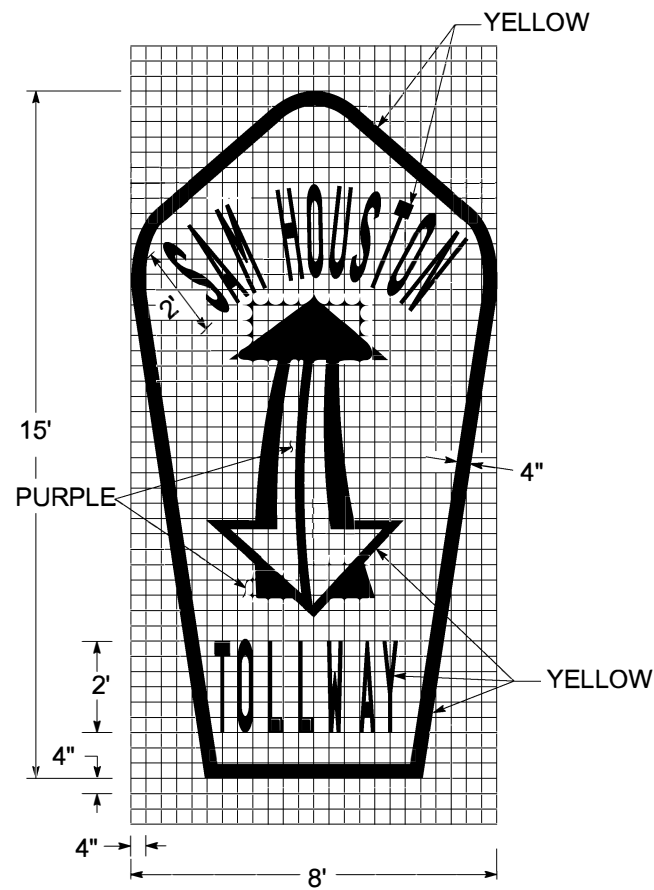
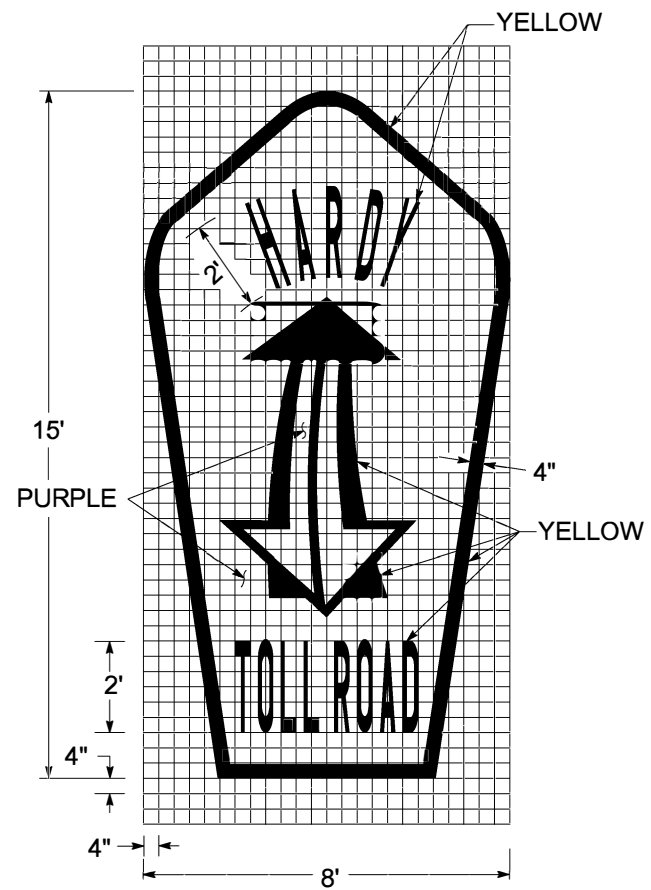
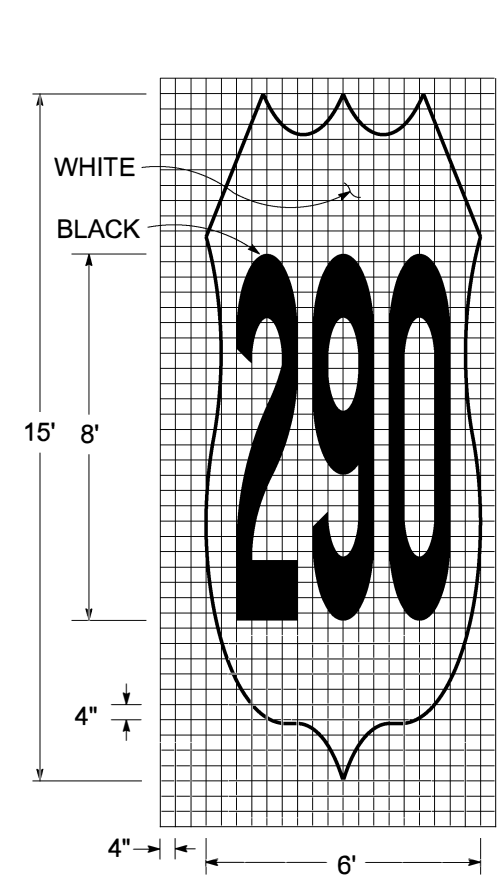
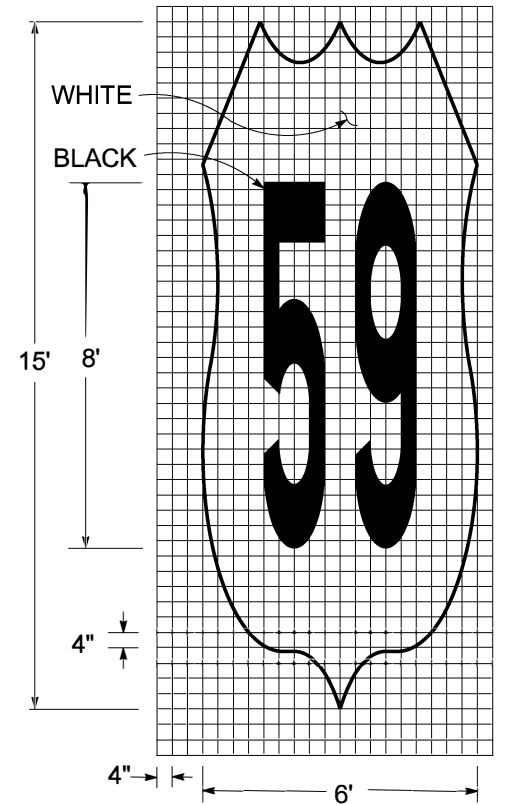
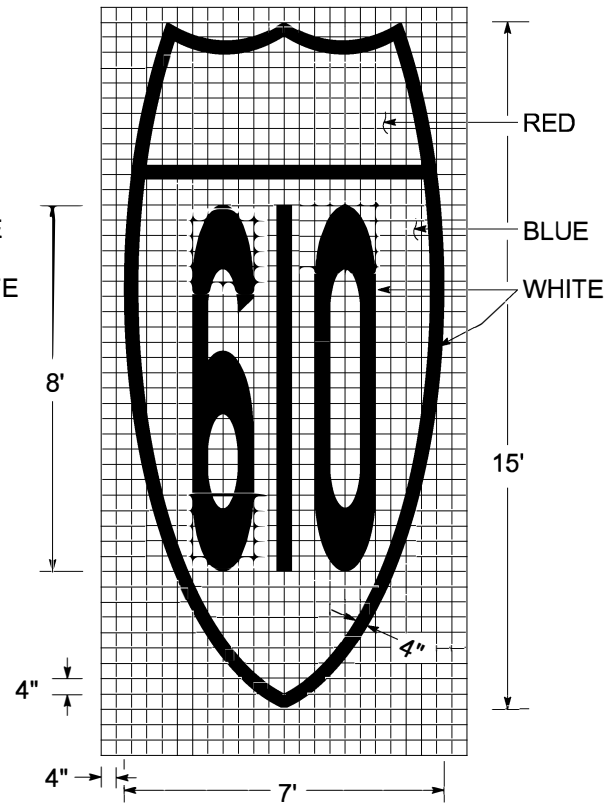
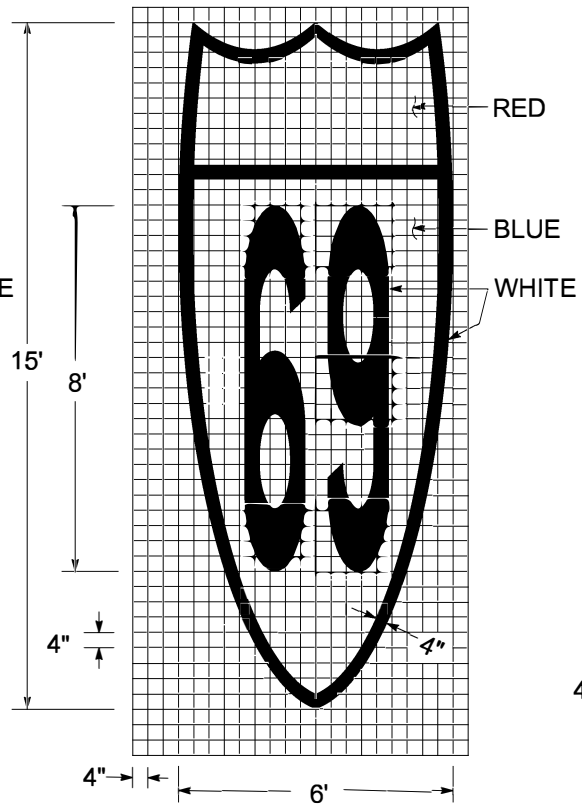
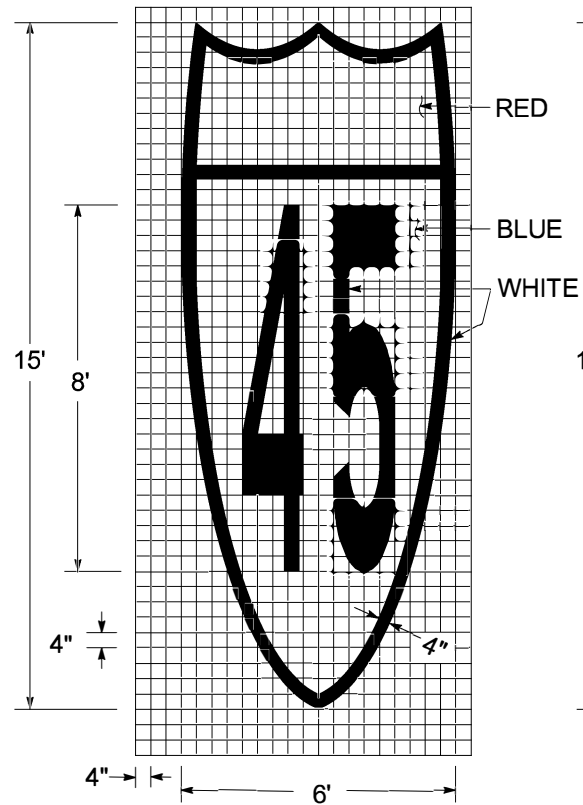
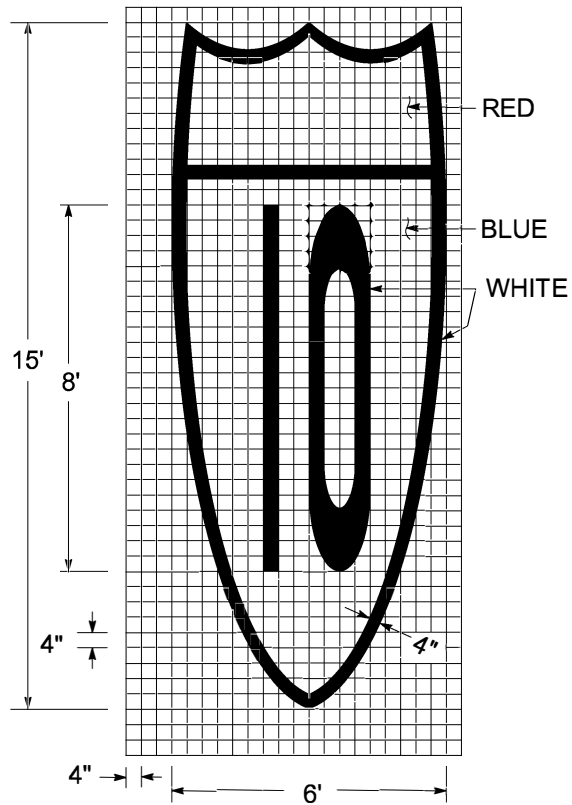
SCALE 1/4" = 1'



**PAVEMENT MARKINGS
 (WORDS, ARROWS & SYMBOLS)**

PM(WAS) -07

FILE#	DN#	CK#	DW#	CK#
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 03-19-07	HOU	6		107
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	15	099
				HIGHWAY
				IH 610



Texas Department of Transportation
Houston District

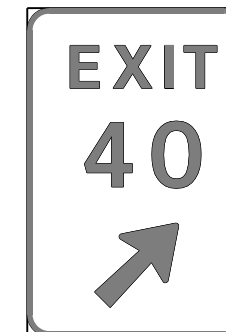
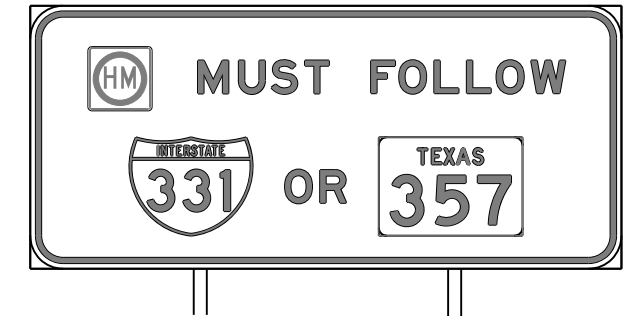
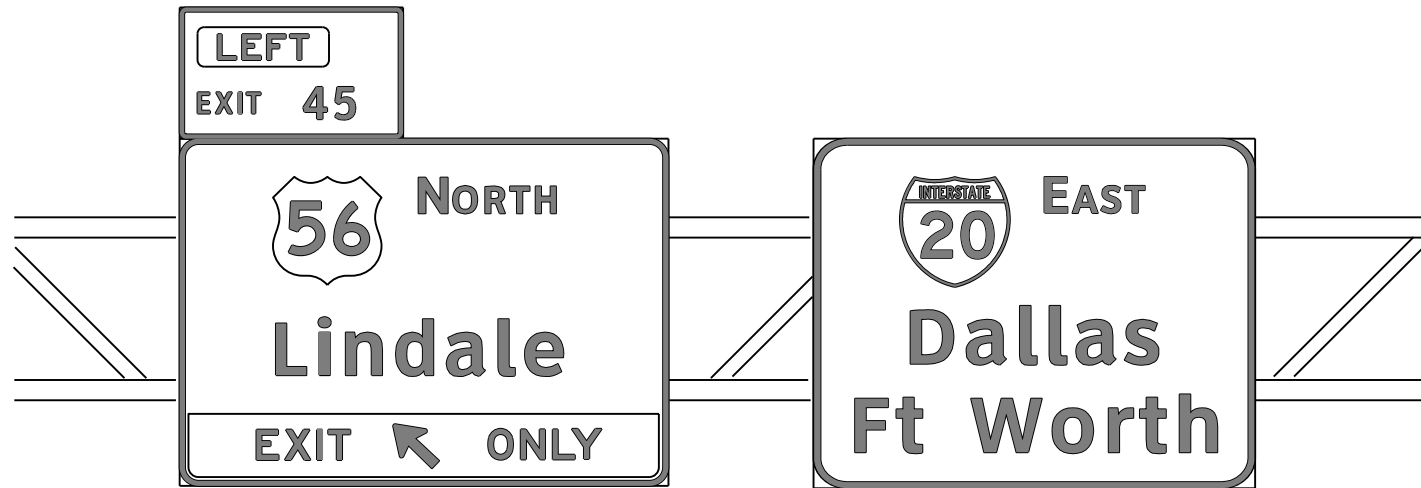
PAVEMENT MARKING (SHIELD)

PM(SHIELD-1) - 17

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 07-12-17 07-30-17	HOU	6		108
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	15	099 IH 610

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES



GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F). White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

<http://www.txdot.gov/>

SHEETING REQUIREMENTS

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

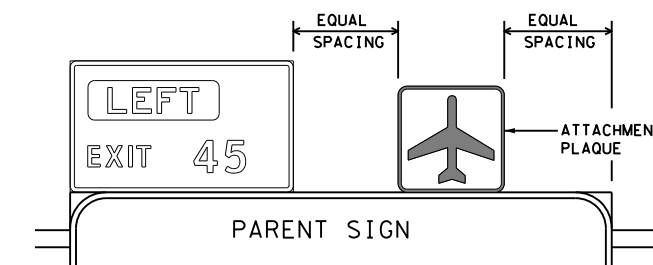
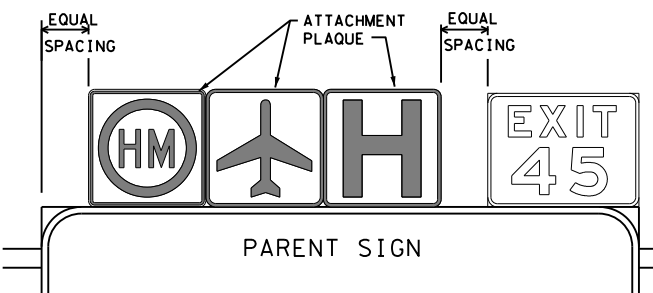
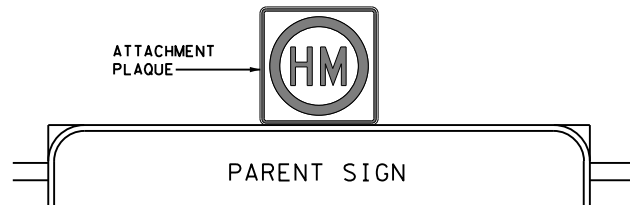
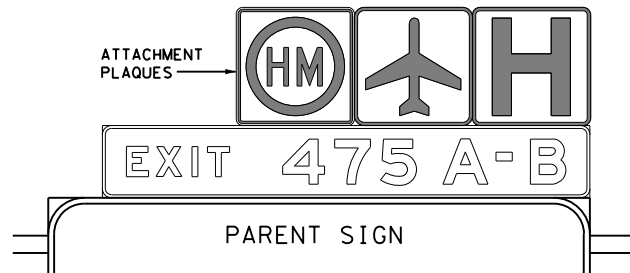
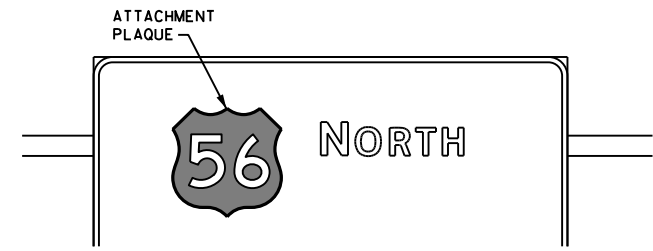
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 03/25/2024 09:17 AM
FILE: DOCUMENT NAME

		Traffic Operations Division Standard	
<h2>TYPICAL SIGN REQUIREMENTS</h2> <h3>TSR(1) - 13</h3>			
FILE:	fsr1-13.dgn	DN:	TxDOT
© TxDOT	October 2003	CONT:	0271 15
REVISIONS		SECT:	099
12-03	7-13	JOB:	H 610
9-08		DIST:	HOU
		COUNTY:	HARRIS
		SHEET NO.:	109

REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS

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.



TYPICAL EXAMPLES

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

- 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).
- Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
- 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.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- 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.
- Colored legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
- Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
- General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
- The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
- Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
- Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.



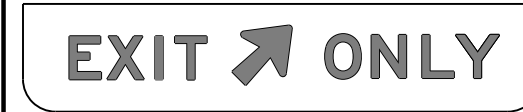
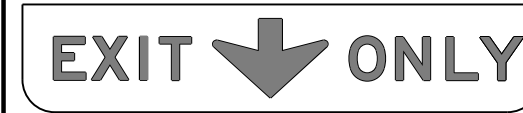
REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM

GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
- Exit Panel legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets E Series.
- 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.
- Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
- Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
- Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).



TYPICAL EXAMPLES

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
<http://www.txdot.gov/>

DATE: 03/25/2024 09:17 AM
FILE: DOCUMENT NAME

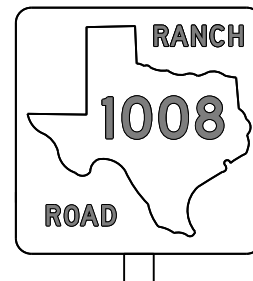
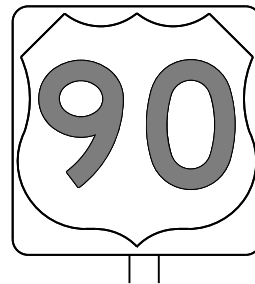
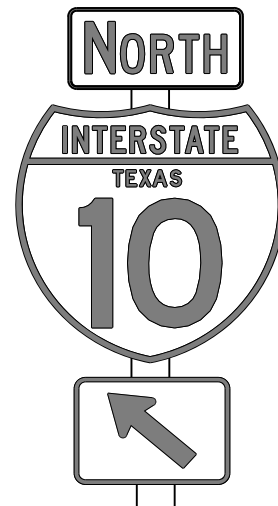
<h2>TYPICAL SIGN REQUIREMENTS</h2>			
<h3>TSR(2) - 13</h3>			
FILE:	tsr2-13.dgn	DN:	TxDOT
©TxDOT	October 2003	CK:	TxDOT
REVISIONS		OW:	TxDOT
		CK:	TxDOT
12-03	7-13	CONT	SECT
9-08		0271	15
		JOB	099
		HIGHWAY	IH 610
		DIST	COUNTY
		HOU	HARRIS
		SHEET NO.	110

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: \$DATES \$TIME\$
FILE: \$FILES

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

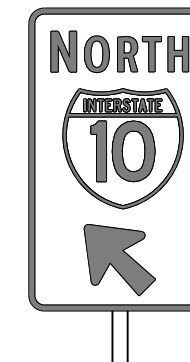
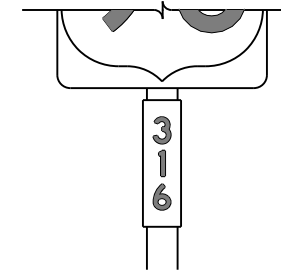
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

- 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).
- 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

- 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).
- 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.
- 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.
- 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.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- 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/>

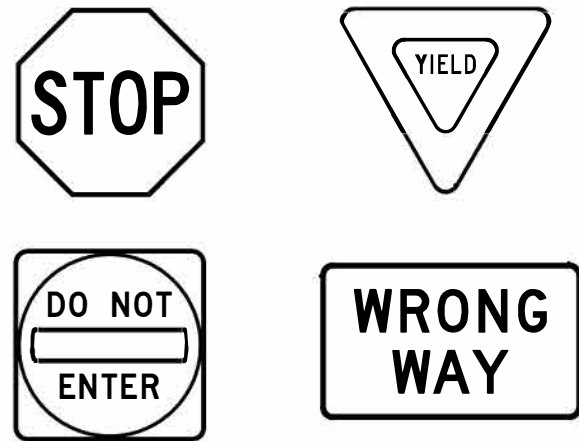
		<i>Traffic Operations Division Standard</i>	
<h3>TYPICAL SIGN REQUIREMENTS</h3>			
<h3>TSR(3) - 13</h3>			
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT October 2003	CONT SECT	JOB	HIGHWAY
REVISIONS	0271 15	099	IH 610
12-03 7-13	DIST	COUNTY	SHEET NO.
9-08	HOU	HARRIS	111

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: \$DATE\$
 FILE: \$FILE\$
 STIME: \$STIME\$

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

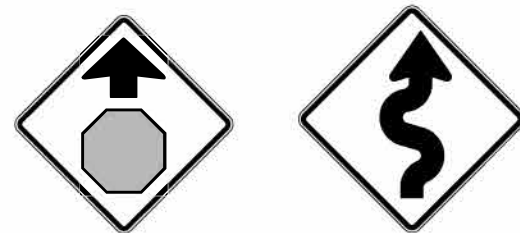
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



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

- 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).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- 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.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- 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.
- 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.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- 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/>



TYPICAL SIGN REQUIREMENTS

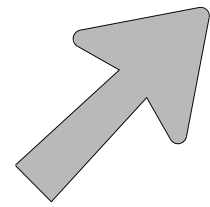
TSR(4) - 13

FILE:	tsr4-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0271	15	099	IH 610				
12-03	7-13	DIST	COUNTY	SHEET NO.					
9-08		HOU	HARRIS	112					

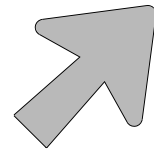
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

ARROW DETAILS

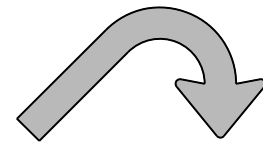
for Large Ground-Mounted and Overhead Guide Signs



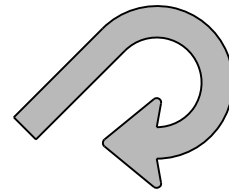
Type A



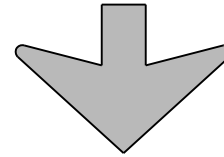
Type B



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

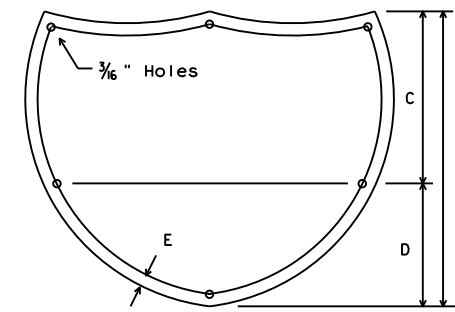
NOTE

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.

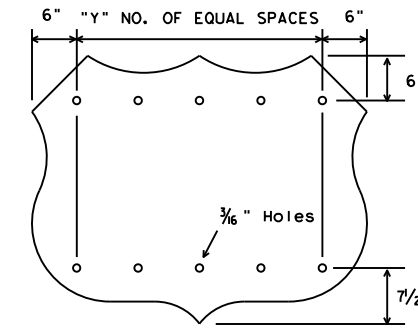
<http://www.txdot.gov/>

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



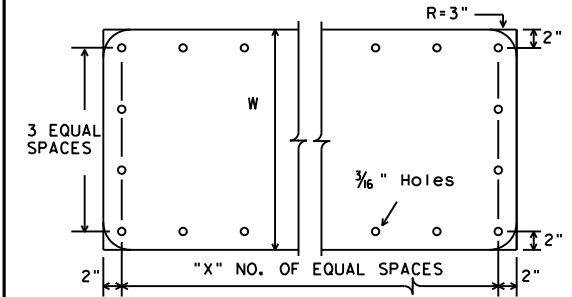
INTERSTATE ROUTE MARKERS

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



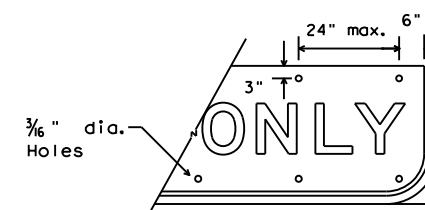
U.S. ROUTE MARKERS

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



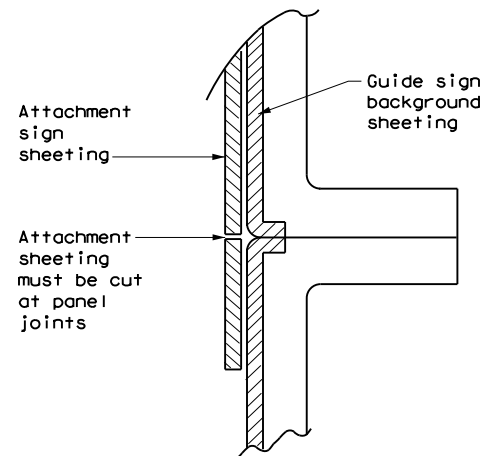
STATE ROUTE MARKERS

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

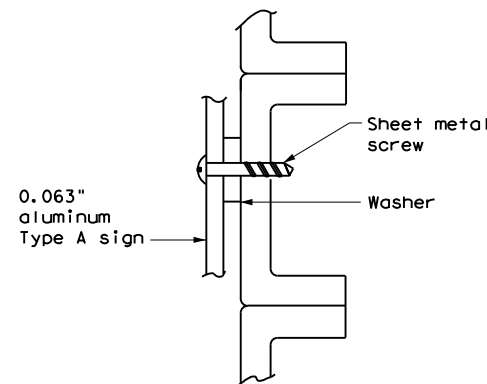


EXIT ONLY PANEL

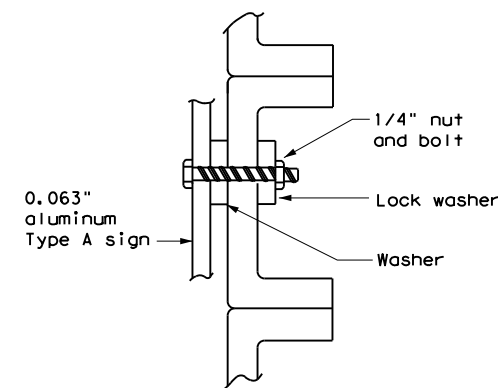
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



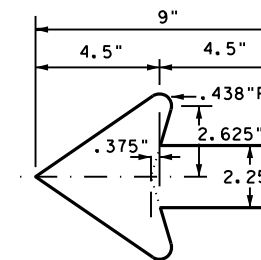
SCREW ATTACHMENT



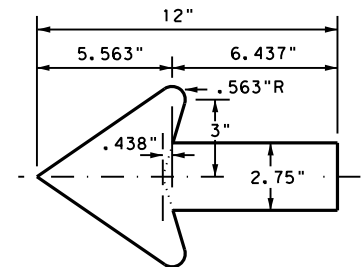
NUT/BOLT ATTACHMENT

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



TYPICAL SIGN REQUIREMENTS

TSR (5) - 13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	HOU	HARRIS	113	

DATE: \$DATE\$ \$TIME\$
 FILE: \$FILES\$

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.

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)

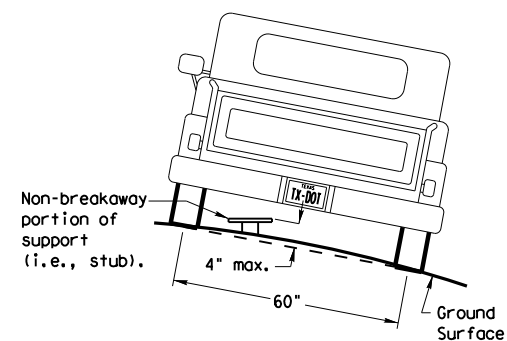
Anchor Type

- 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-3))

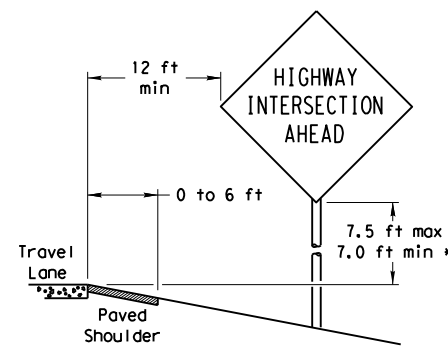
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

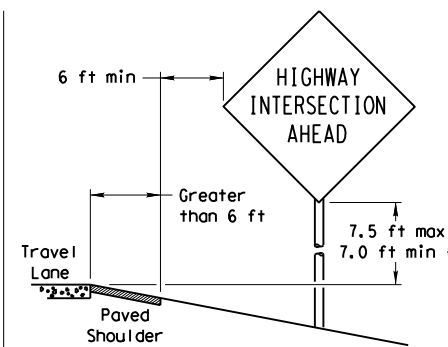
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

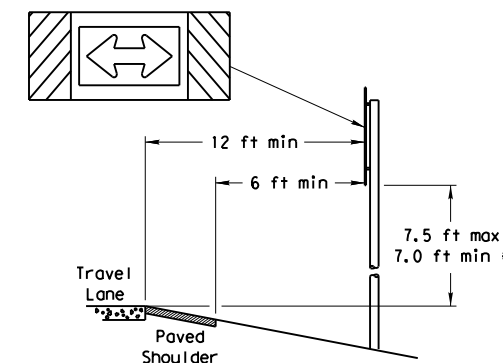
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

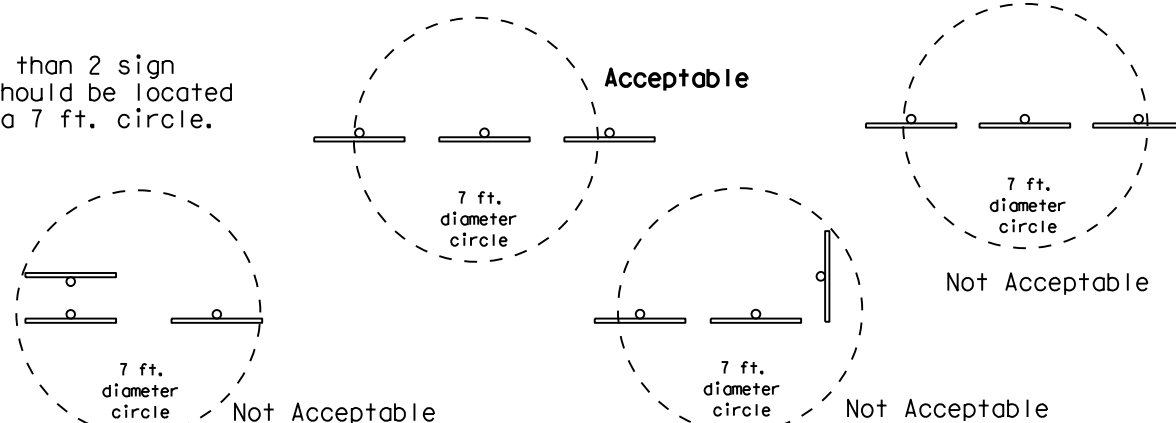
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

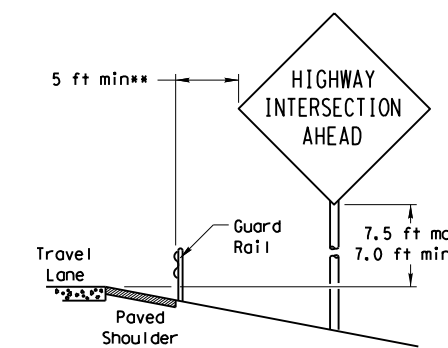


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

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

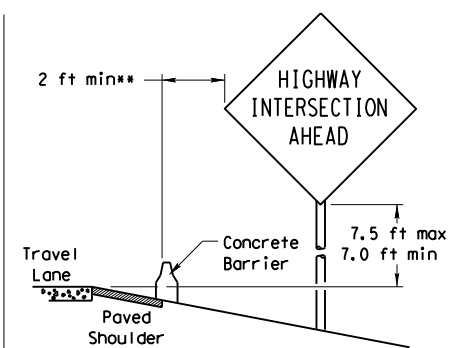


BEHIND BARRIER

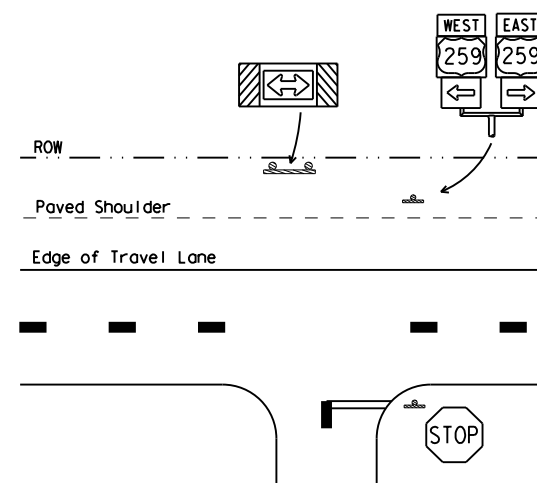


BEHIND GUARDRAIL

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



BEHIND CONCRETE BARRIER



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

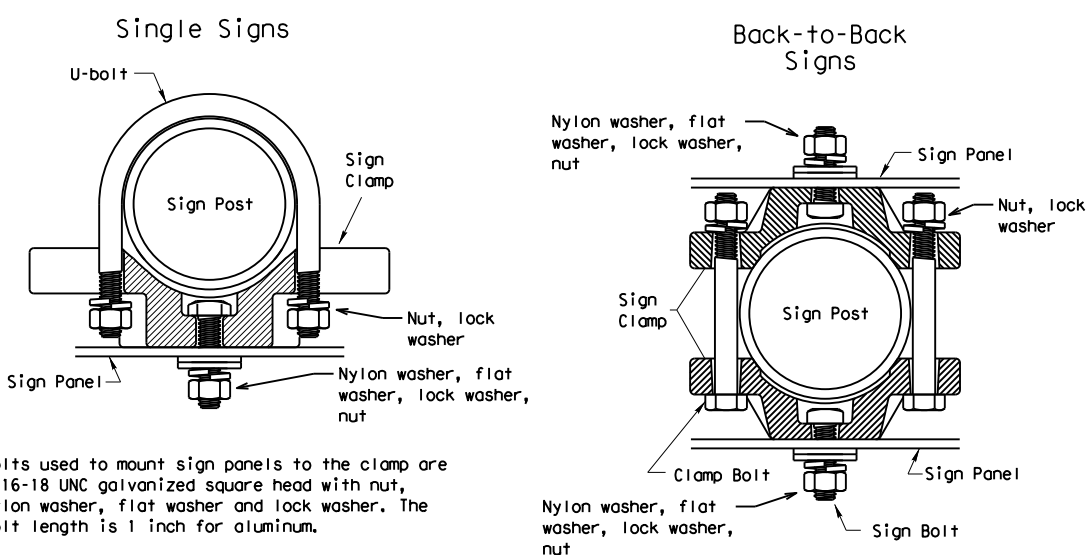
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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>

TYPICAL SIGN ATTACHMENT DETAIL



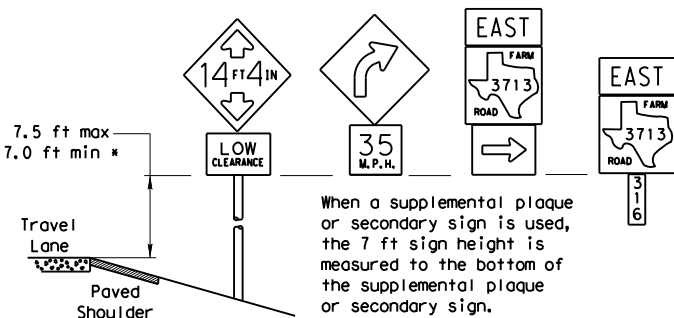
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

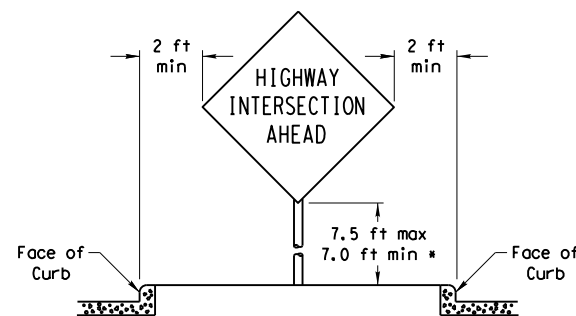
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

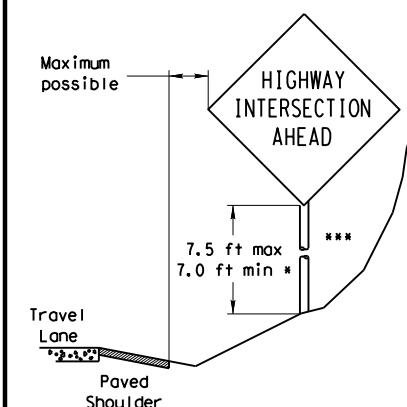


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

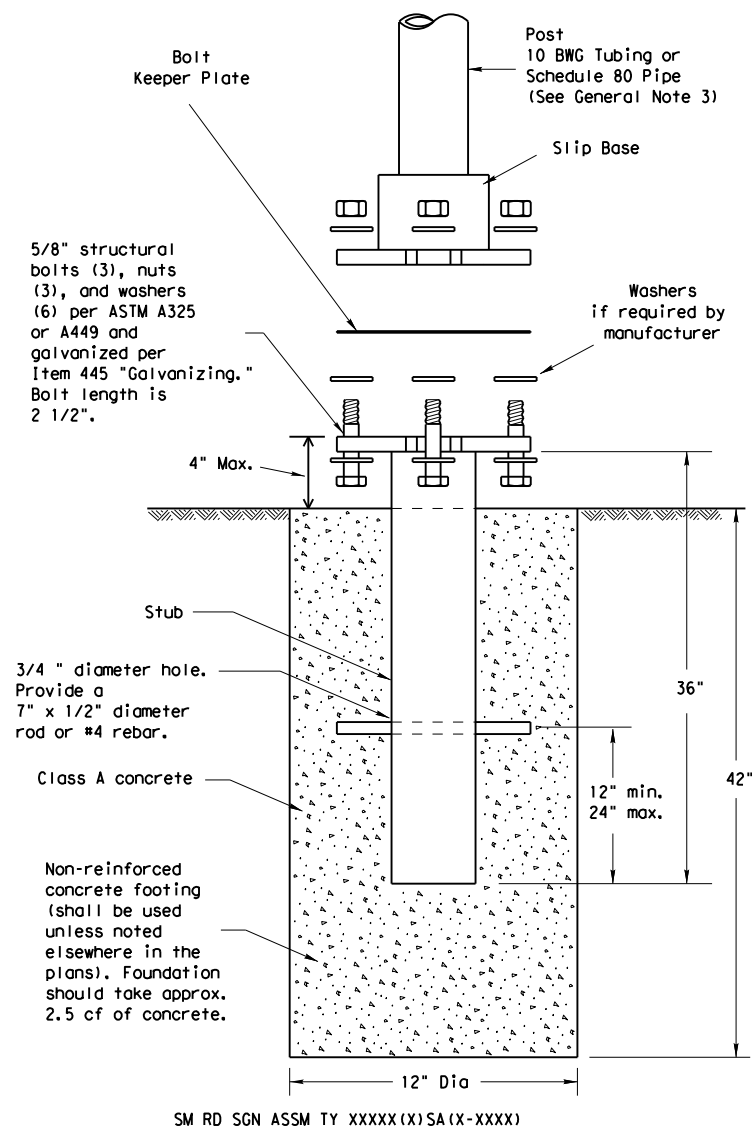
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		114

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.

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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:

- 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.
- 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
- 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>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

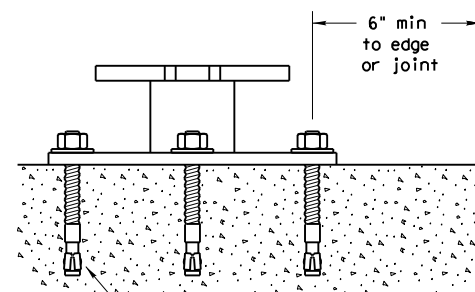
Foundation

- 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.
- 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.
- 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.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- 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.
- 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, "Epoxyes 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.

DATE: \$DATE\$
FILE: \$FILE\$

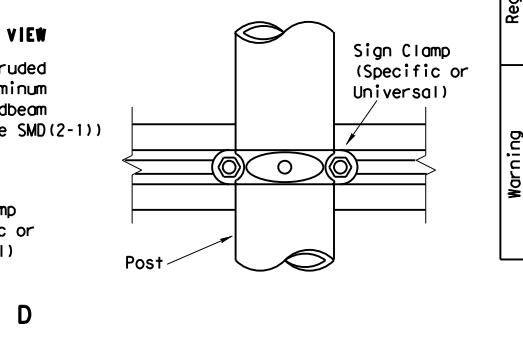
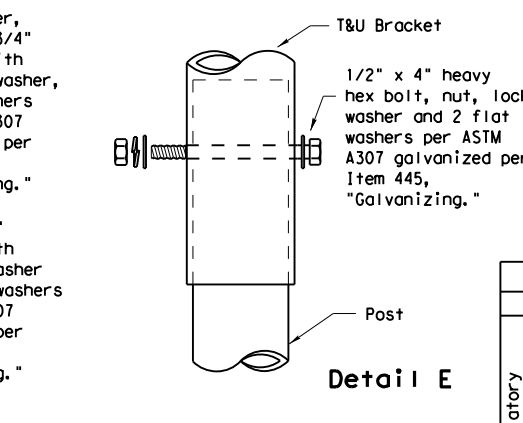
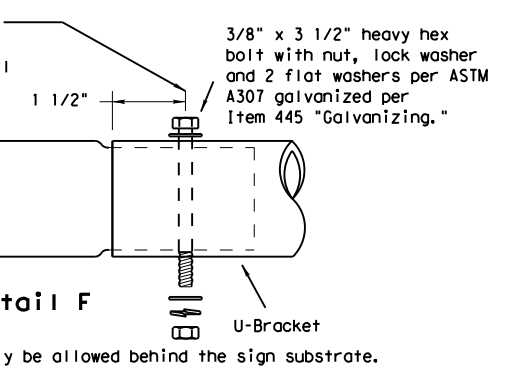
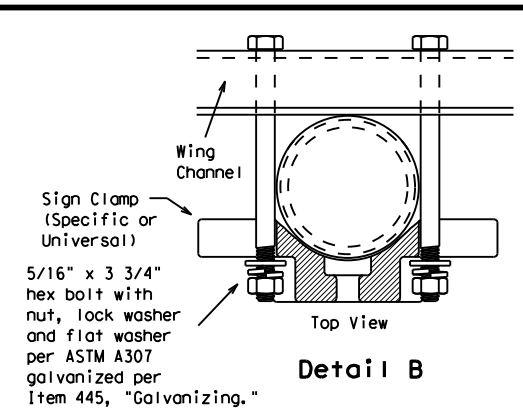
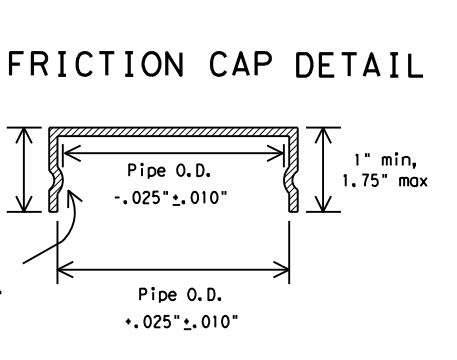
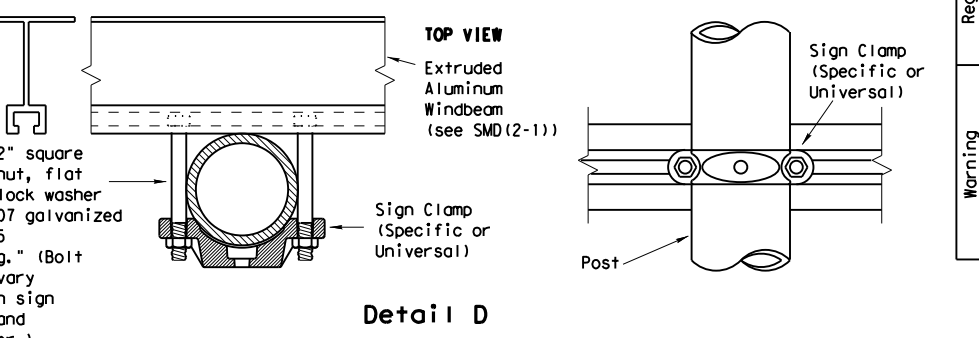
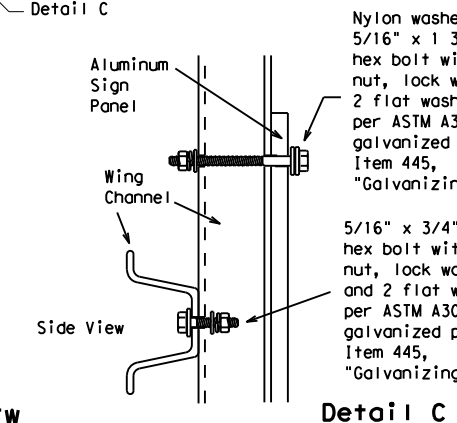
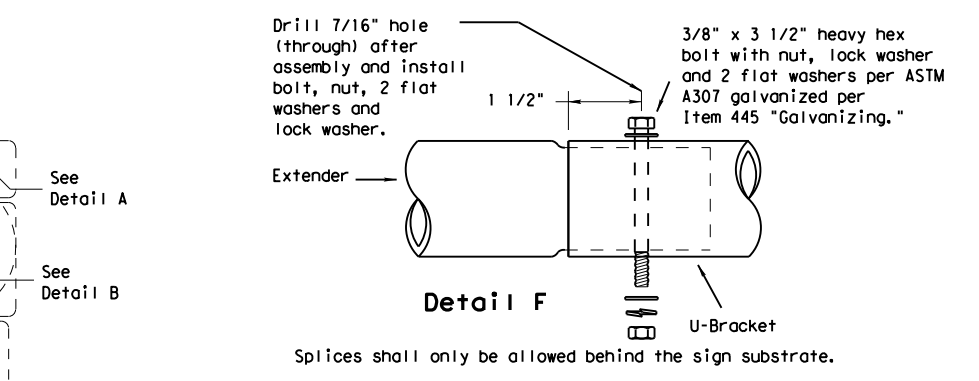
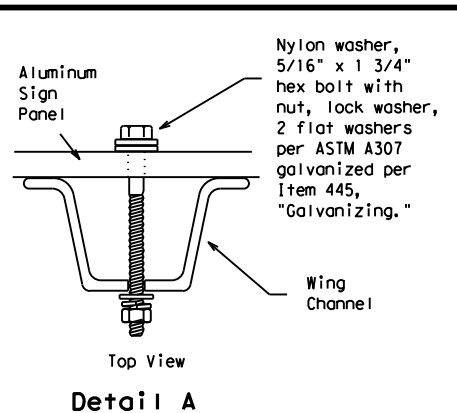
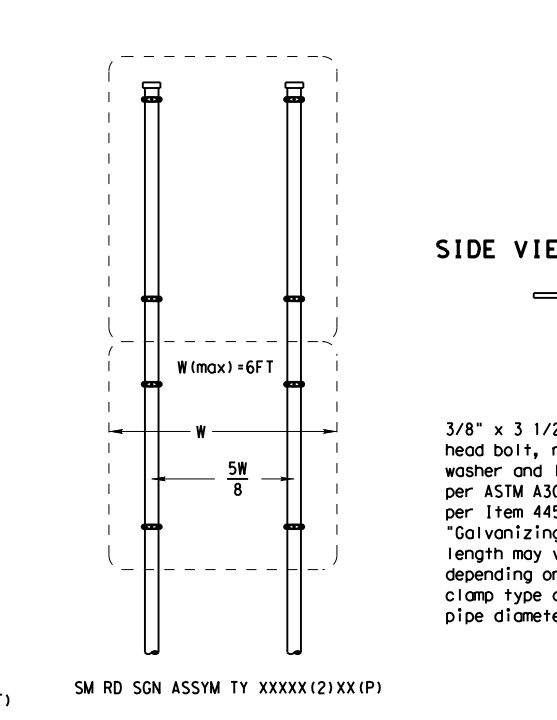
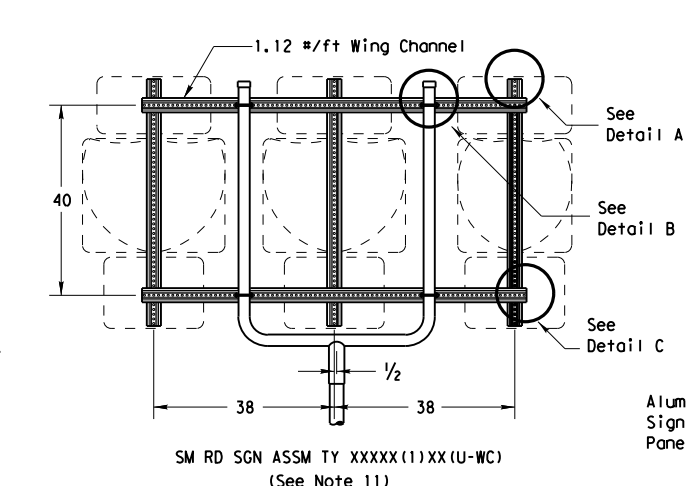
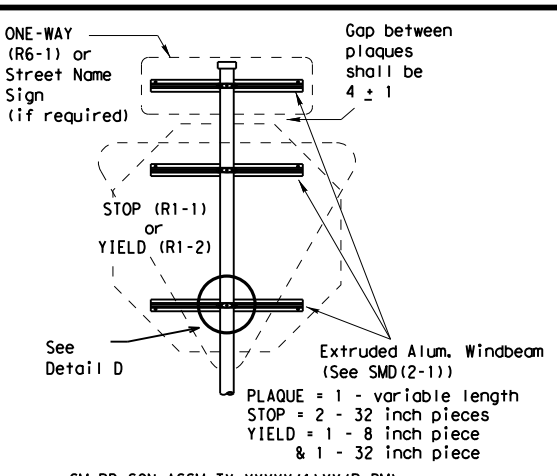
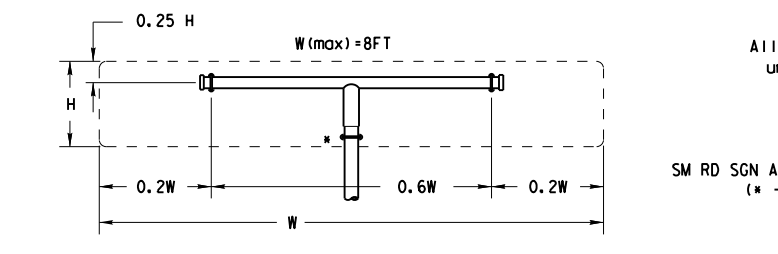
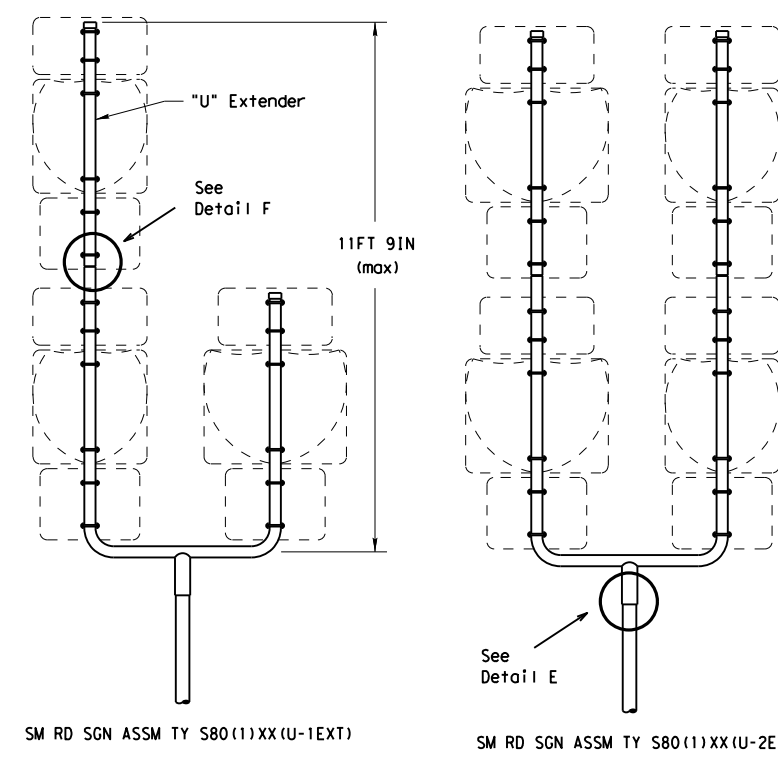
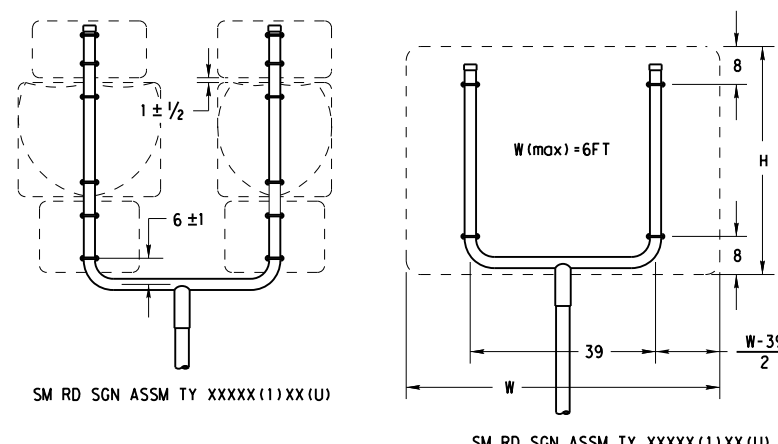
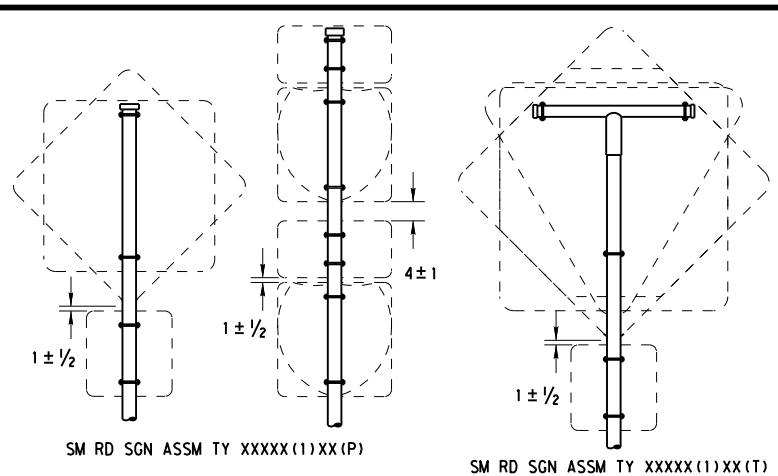
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY	SHEET NO.	
		HOU	HARRIS	115	

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.



- GENERAL NOTES:**
1. SIGN SUPPORT # OF POSTS MAX. SIGN AREA

10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF
 2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
 3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
 4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
 5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
 6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
 7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
 8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
 9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
 10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
 11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
 12. Post open ends shall be fitted with Friction Caps.
 13. Sign blanks shall be the sizes and shapes shown on the plans.

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-2)-08

© TxDOT July 2002		DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY	SHEET NO.	
		HOU	HARRIS	116	

DATE: \$DATES\$
FILE: \$FILES\$

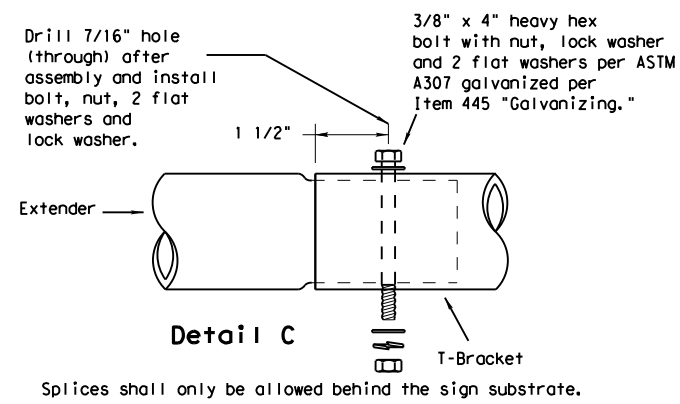
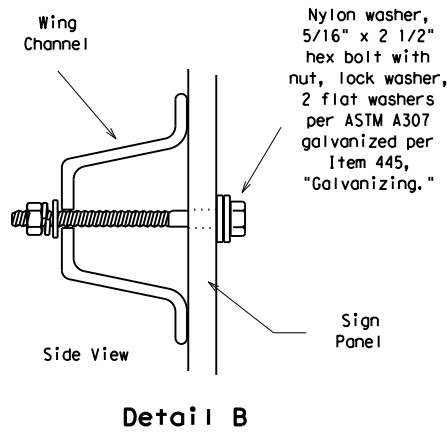
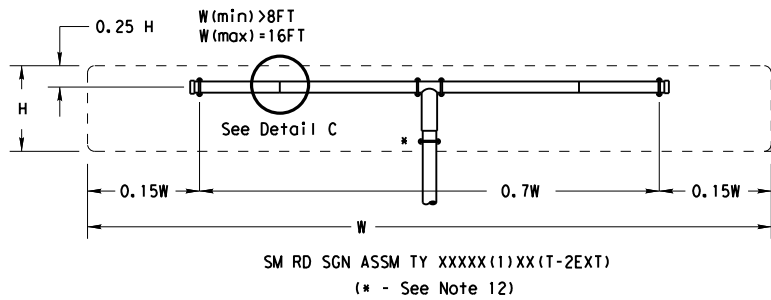
All dimensions are in english unless detailed otherwise.

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

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.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

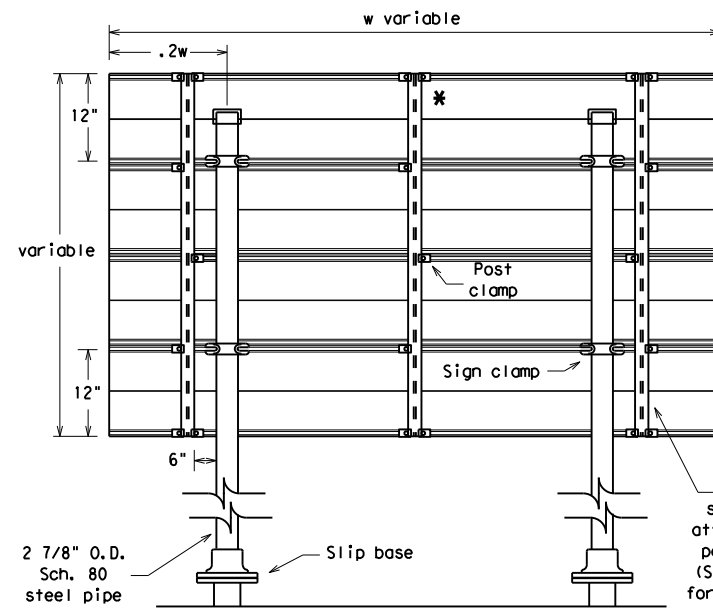
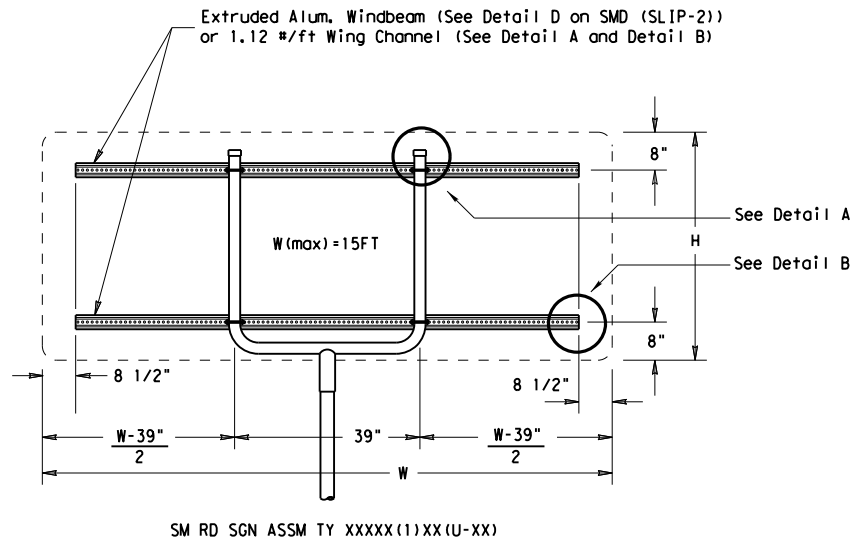
DATE: \$DATE\$
 TIME: \$TIME\$
 FILE: \$FILES\$



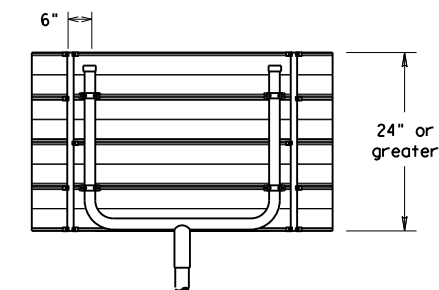
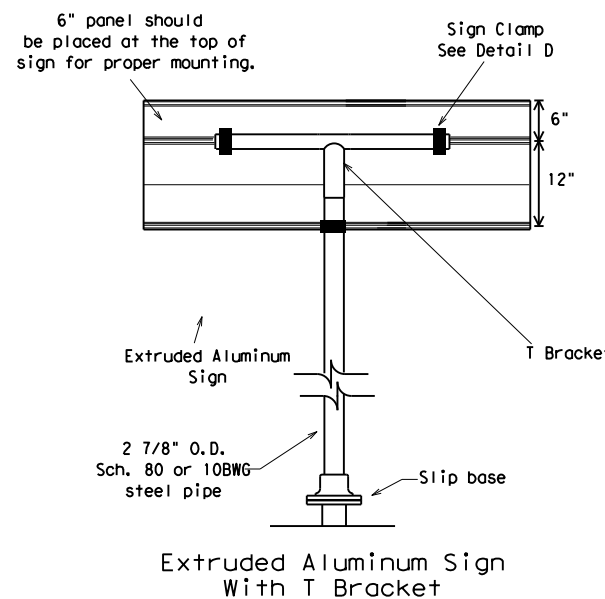
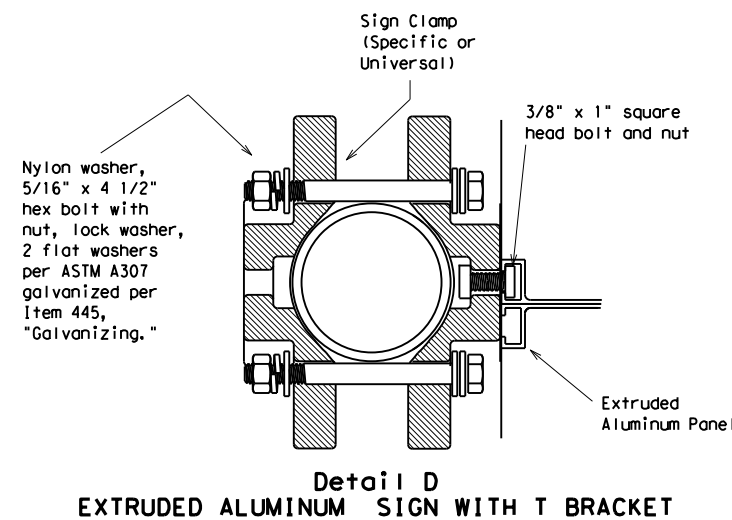
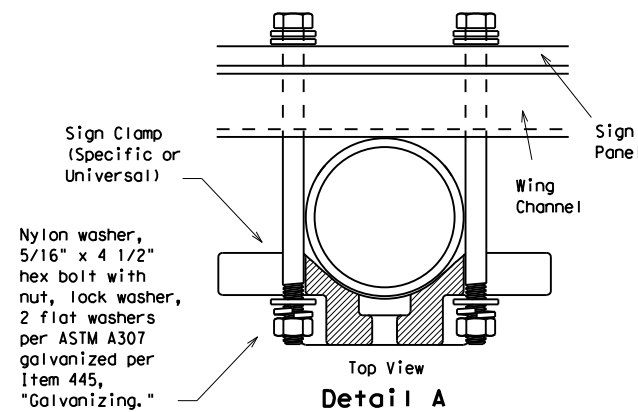
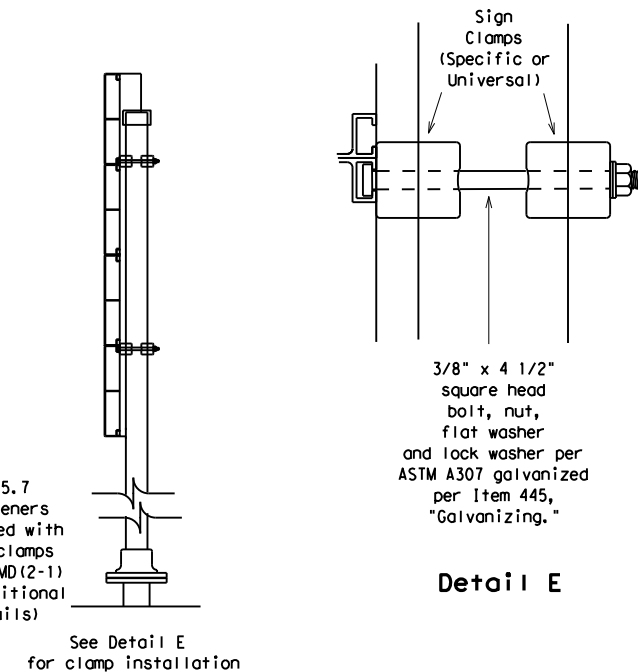
Splices shall only be allowed behind the sign substrate.

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 |
- 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.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- 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.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- 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.
- 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.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- 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."
- Sign blanks shall be the sizes and shapes shown on the plans.
- 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.
- Post open ends shall be fitted with Friction Caps.



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



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

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	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)

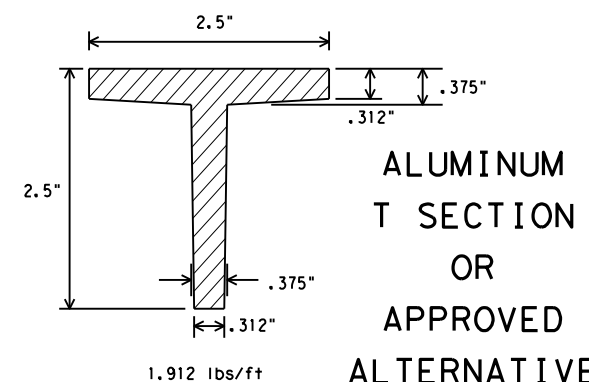
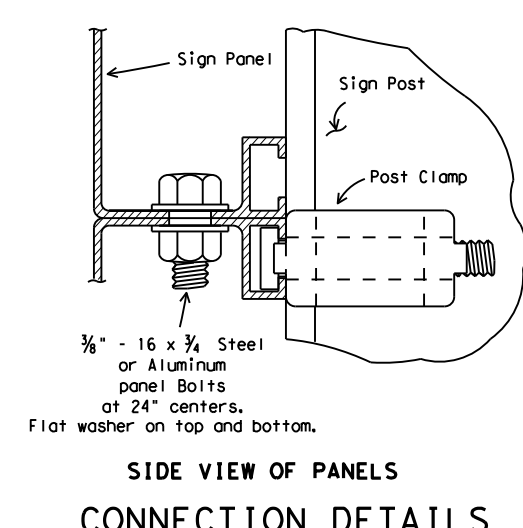
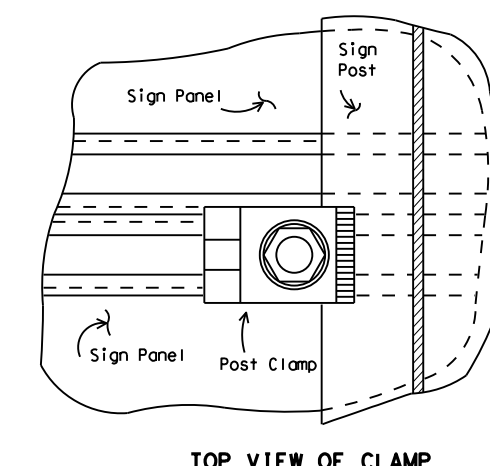
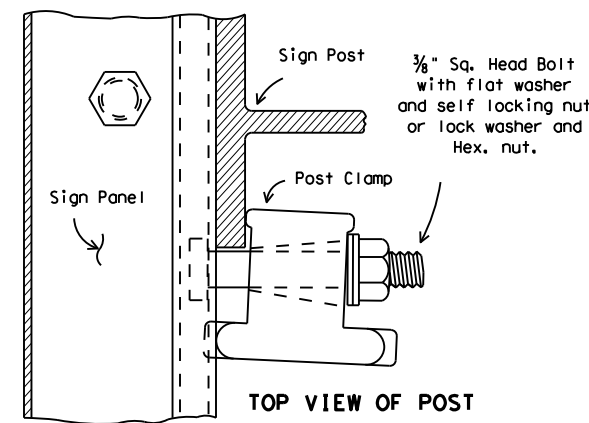
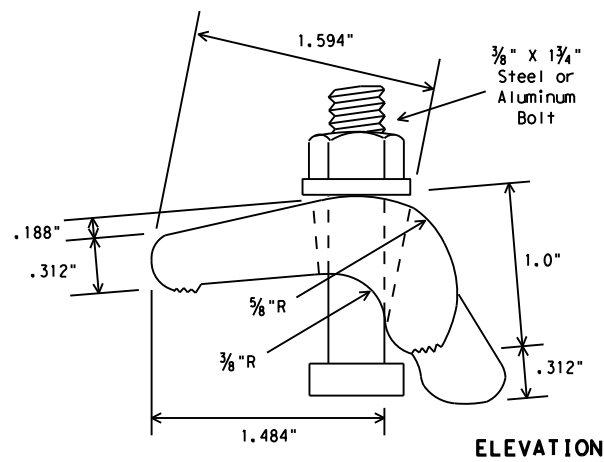
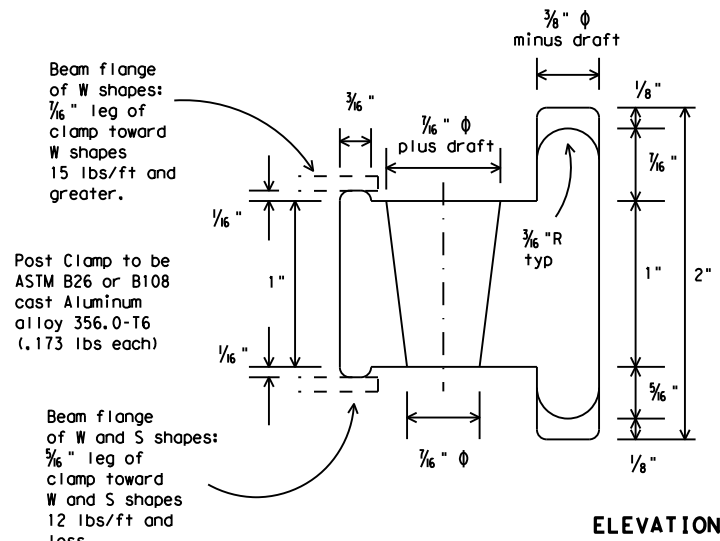
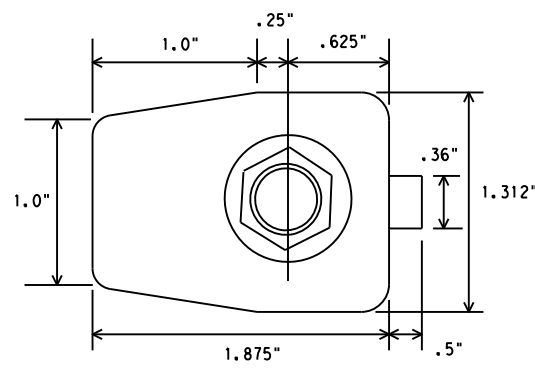
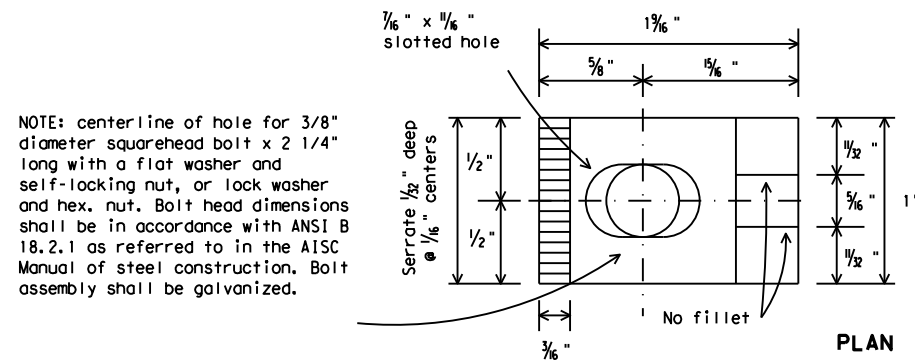
Texas Department of Transportation
 Traffic Operations Division

**SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-3)-08**

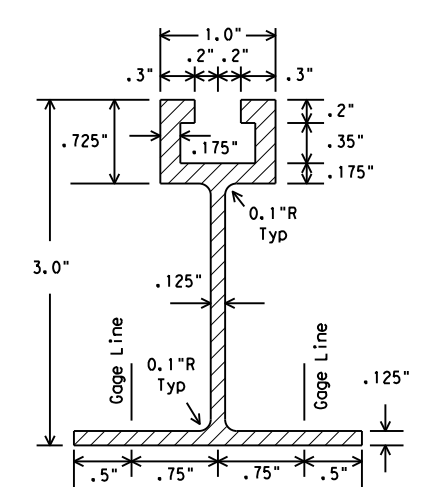
© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		117

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 construction of this standard to other formats or for incorrect results or damages resulting from its use.

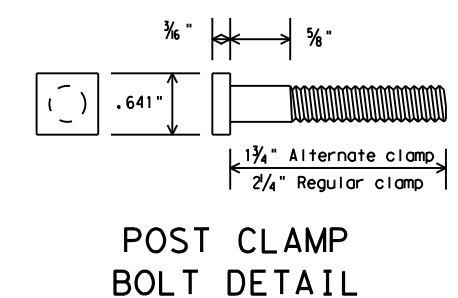
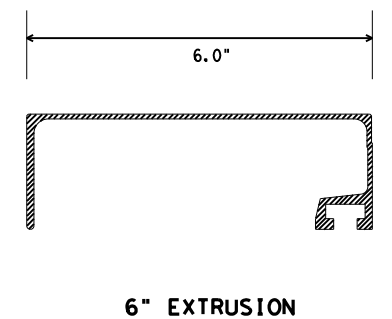
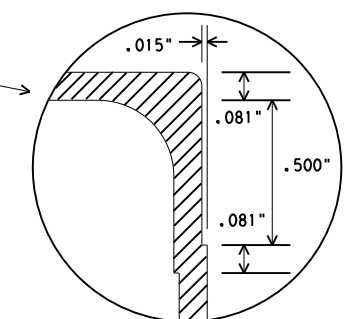
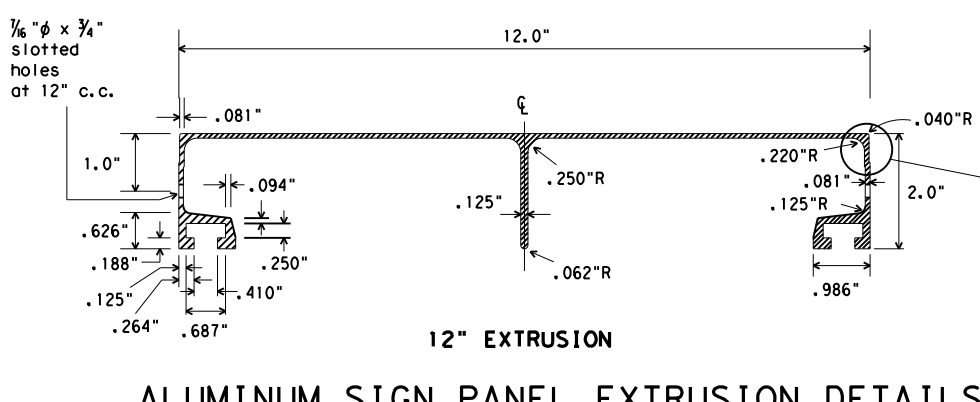
DATE: FILE:



WINDBEAM CROSS SECTION
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



SIDE VIEW OF PANELS CONNECTION DETAILS



DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE DMS-7120

- GENERAL NOTES:
- Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
 - Materials and fabrication shall conform to the requirements of the Department material specifications.
 - Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
 - For fiberglass substrate connection details, see manufacturer's recommendations.

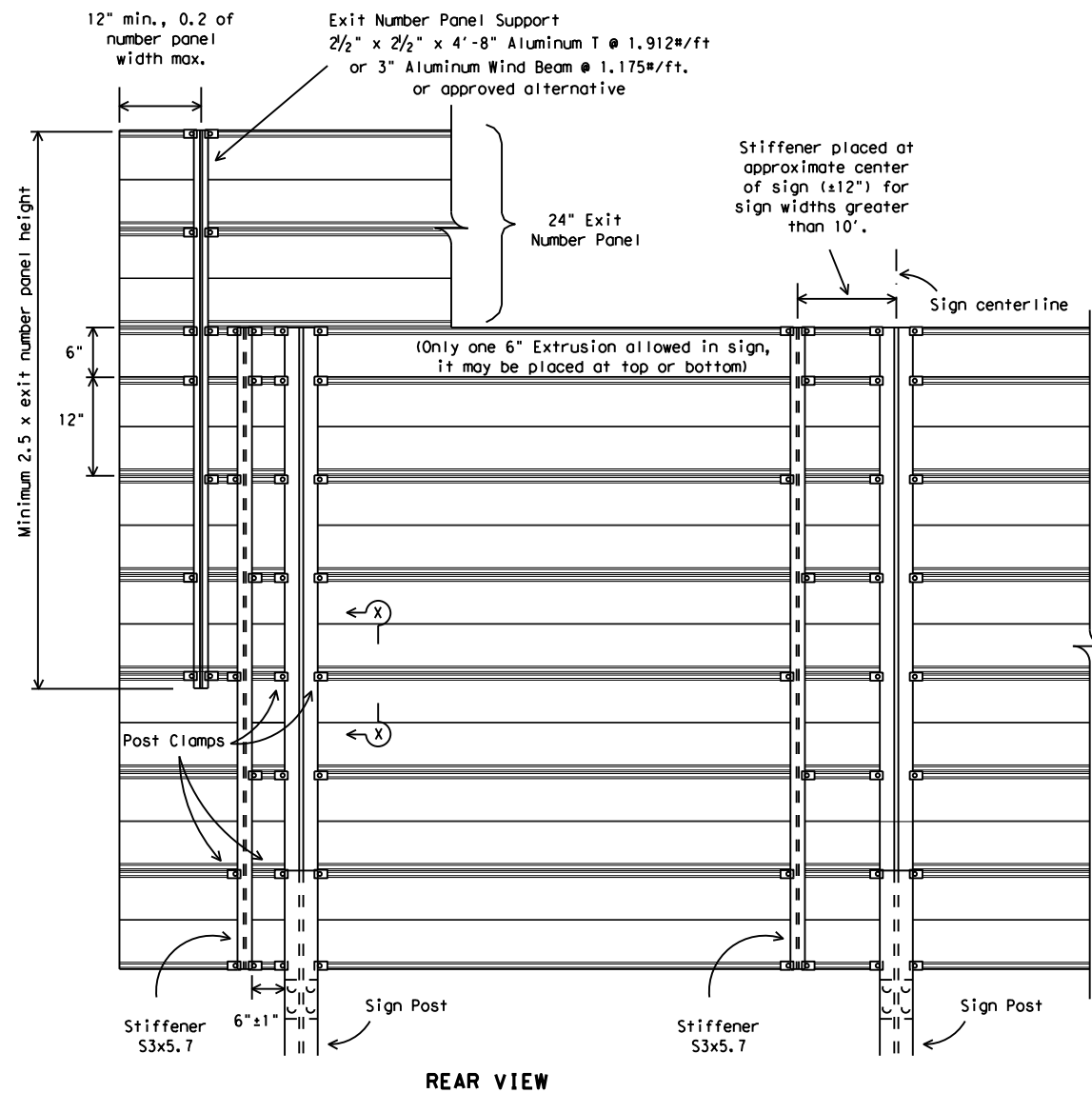
Texas Department of Transportation
Traffic Operations Division

**SIGN MOUNTING DETAILS-
EXTRUDED ALUMINUM
SIGN PANELS & HARDWARE**

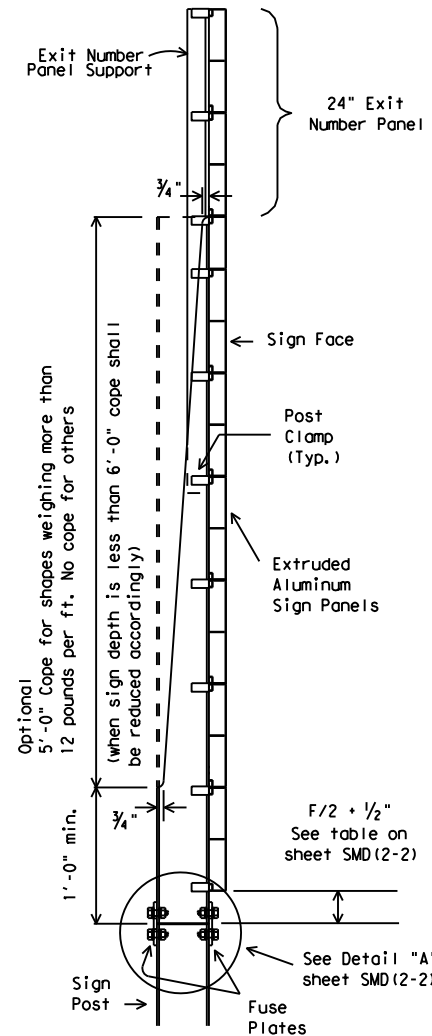
SMD(2-1)-08

© TxDOT 2001	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY	SHEET NO.	
		HOU	HARRIS	118	

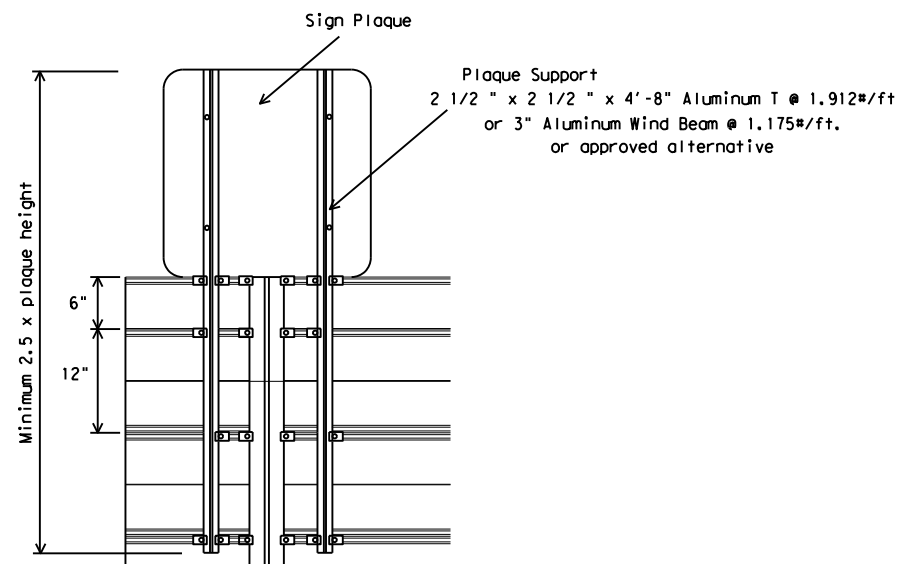
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



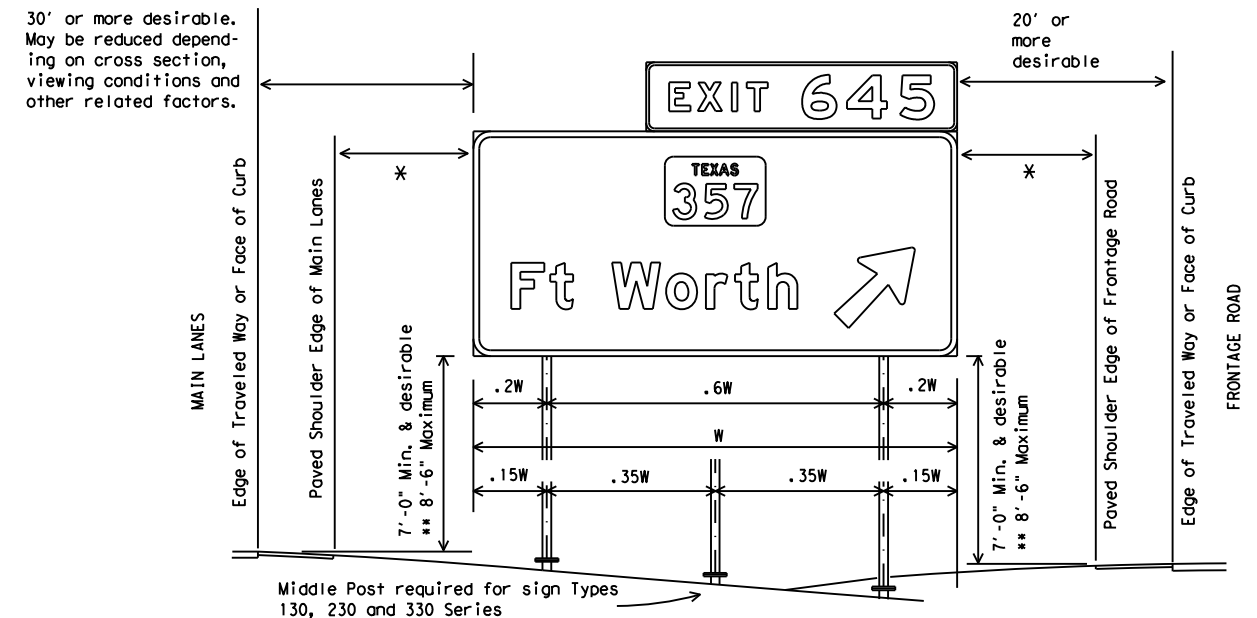
REAR VIEW
ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIDE VIEW



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

* - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

- Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
- Exit number panel support shall be symmetrical about number panel centerline.
- Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
- All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
- Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
- Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
- Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
- For fiberglass sign installation details, see manufacturer's recommendations.



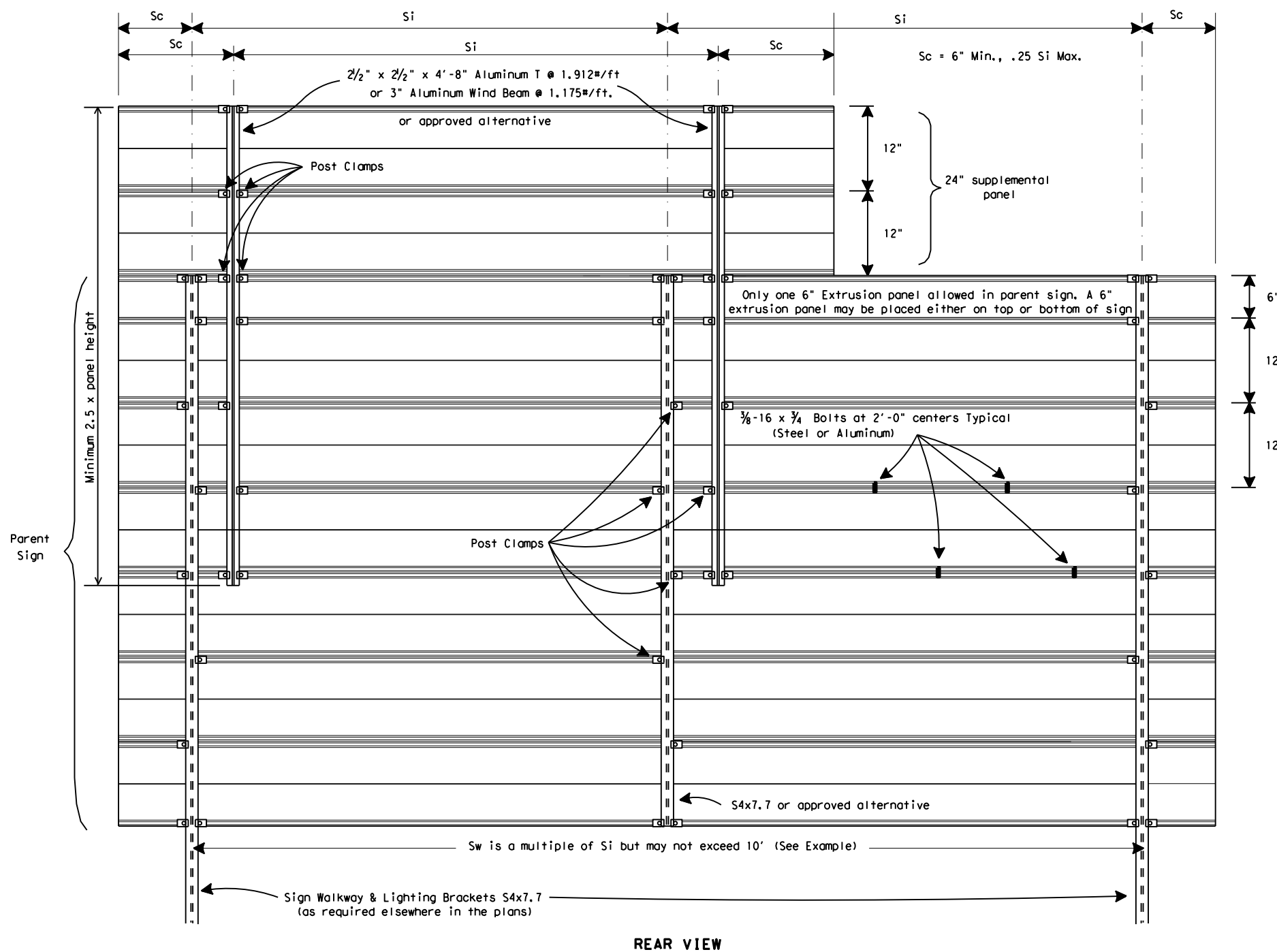
SIGN MOUNTING DETAILS-
LARGE ROADSIDE SIGNS

SMD(2-3)-08

© TxDOT August 1995	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY	SHEET NO.	
		HOU	HARRIS	119	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

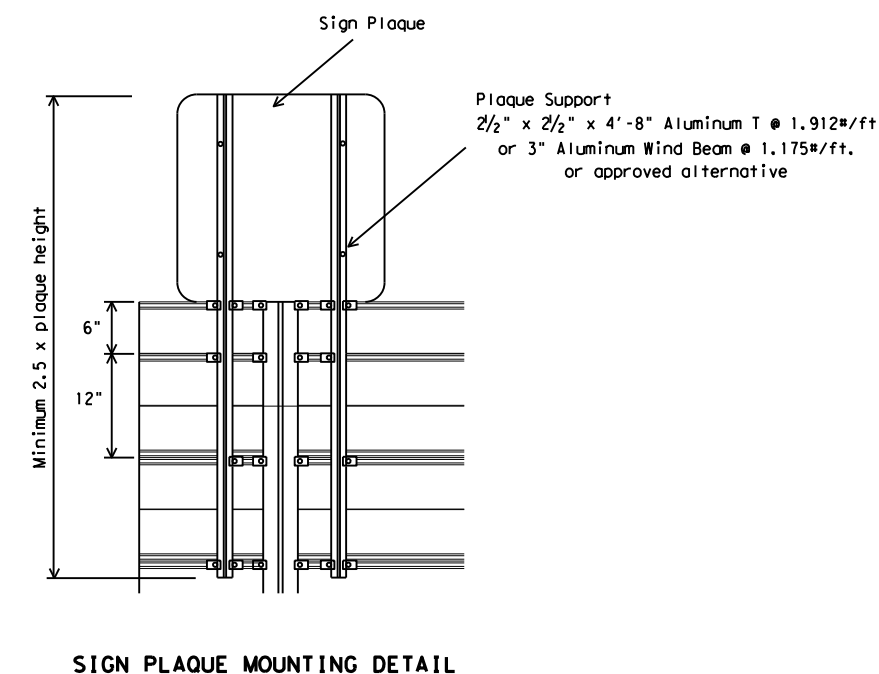
DATE:
FILE:



EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si (Max.) or 10 feet.



"d"	MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)															
	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
Deepest Sign in Group (Ft.)	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.



**SIGN MOUNTING DETAILS-
OVERHEAD SIGNS
EXTRUDED ALUMINUM
SMD(2-4)-08**

© TxDOT December 1995		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0271	15	099	IH 610
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		120

DATE: \$DATES\$
FILE: \$FILES\$

- 1. EXISTING
4-3" CONDUITS ②
IN COND. *1 - FIBER DROP CABLE (VIVDS) ①
IN COND. *2 - SENSOR UNIT POWER CONDRS.(VIVDS) ①
IN COND. *3 - 1 SINGLE MODE FIBER OPTIC CABLE ①
1 MULTIMODE FIBER OPTIC CABLE ①
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
- 2. EXISTING
3-3" CONDUITS ②
IN COND. *1 - 1 SINGLE MODE FIBER OPTIC CABLE ①
1 MULTIMODE FIBER OPTIC CABLE ①
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
- 3. EXISTING
4-3" CONDUITS ②
IN COND. *1 - FIBER DROP CABLE (VIVDS) ①
IN COND. *2 - SENSOR UNIT POWER CONDRS.(VIVDS) ①
- 4. EXISTING
4-3" CONDUITS
1-2" CONDUIT
IN COND. *1(3) -1 SINGLE MODE FIBER OPTIC CABLE
1 MULTIMODE FIBER OPTIC CABLE ①
1-6 PAIR *22 COMM. CABLE (VOICE COMM.) ①
FIBER DROP CABLE (VIVDS(4)) ①
FIBER DROP CABLE (CCTV(2))
IN COND. *2(3") -SENSOR UNIT POWER CONDRS. (VIVDS(4)) ①
IN COND. *3(3") -4-6 PAIR *22 COMM. CABLE (CCTV(2), FTM, CMS)
4 LOOP LEAD-IN CABLES ①
IN COND. *4(2") -3*4XHHW, 1*4 BARE (HUB BUILDING POWER)
IN COND. *5(3") -CTMS CABLES ①

INSTALL
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR
- 5. EXISTING
COMMUNICATIONS HUB BUILDING
DROP/INSERT MULDEM
2 DATA FIBER OPTIC TX'S (M/M)
LDM BACKPLANE ASSEMBLY W/8 MODEM CARDS
2 LOCAL CONTROL UNITS (FTM LCU *ES1 NORTHBOUND)
(FTM LCU *ES2 SOUTHBOUND)

VIVDS FIELD EQUIPMENT
4 VIDEO FIBER OPTIC RX'S (M/M)
DETECTOR CARD RACK W/2 CARDS
DETECTOR CARD RACK POWER SUPPLY
8-3" CONDUITS TO GRD. BOX
1-2" CONDUITS TO GRD. BOX
IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE ①
FIBER DROP CABLE (VIVDS(4)) ①
FIBER DROP CABLE (CCTV(2))
IN COND. *2(3") -SENSOR UNIT POWER CONDRS. (VIVDS(4)) ①
IN COND. *3(3") -4-6 PAIR *22 COMM. CABLE (CCTV(2), FTM, CMS)
4 LOOP LEAD-IN CABLES ①
IN COND. *4(2") -3*4XHHW, 1*4 BARE (HUB BUILDING POWER)
IN COND. *5(3") - 1 SINGLE MODE FIBER OPTIC CABLE
1 MULTIMODE FIBER OPTIC CABLE ①

INSTALL
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR
- 6. EXISTING
4-3" CONDUITS
1-2" CONDUITS
IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE ①
1 MULTIMODE FIBER OPTIC CABLE ①
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
FIBER DROP CABLE (VIVDS(4)) ①
FIBER DROP CABLE (CCTV(2))
IN COND. *2(3") -SENSOR UNIT POWER CONDRS. (VIVDS(4)) ①
IN COND. *3(3") -4-6 PAIR *22 COMM. CABLE (CCTV(2), FTM, CMS)
4 LOOP LEAD-IN CABLES ①
IN COND. *4(2") -2*8XHHW, 1*8 BARE (CCTV CABINET POWER)
2*2XHHW, 1*2 BARE (CCTV CABINET POWER)
IN COND. *5(3") -CTMS CABLES ①

INSTALL
IN COND. *2 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR
- 7. EXISTING
3-3" RMC (SUSPENDED BENEATH BRIDGE)
IN COND. *1 - SENSOR UNIT POWER CONDRS.(VIVDS) ①
IN COND. *2 - FIBER DROP CABLE (VIVDS) ①
2-6 PAIR 22 COMM. CABLE (FTM, CMS) ①
2 LOOP LEAD-IN CABLES ①

INSTALL
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
- 8. EXISTING
2-2" CONDUITS ②
IN COND. *1 - SENSOR UNIT POWER CONDRS. (VIVDS) ①
IN COND. *2 - FIBER DROP CABLE (VIVDS) ①
- 9. EXISTING
VIVDS-SENSOR *25 (NORTHBOUND)
VIDEO FIBER OPTIC TX (M/M) ①
VIVDS SUPPORT POLE & FOUNDATION (40') ①
IN COND. *1 - SENSOR UNIT POWER CONDRS. (VIVDS) ①
IN COND. *2 - FIBER DROP CABLE (VIVDS) ①
- 10. EXISTING
125' M.B.G.F. W/GET-94 ①

- 11. EXISTING
JUNCTION BOX
4-3" RMC TO GRD. BOX
1-2" RMC TO GRD. BOX
IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE
1 MULTIMODE FIBER OPTIC CABLE
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
FIBER DROP CABLE (VIVDS(3)) ①
FIBER DROP CABLE (CCTV)
IN COND. *2(3") - SENSOR UNIT POWER CONDRS.(VIVDS(3)) ①
IN COND. *3(3") -3-6 PAIR *22 COMM. CABLE (CCTV, FTM, CMS)
4 LOOP LEAD-IN CABLES
IN COND. *4(2") -2*2XHHW, 1*2 BARE (CCTV CABINET POWER)

INSTALL
COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR

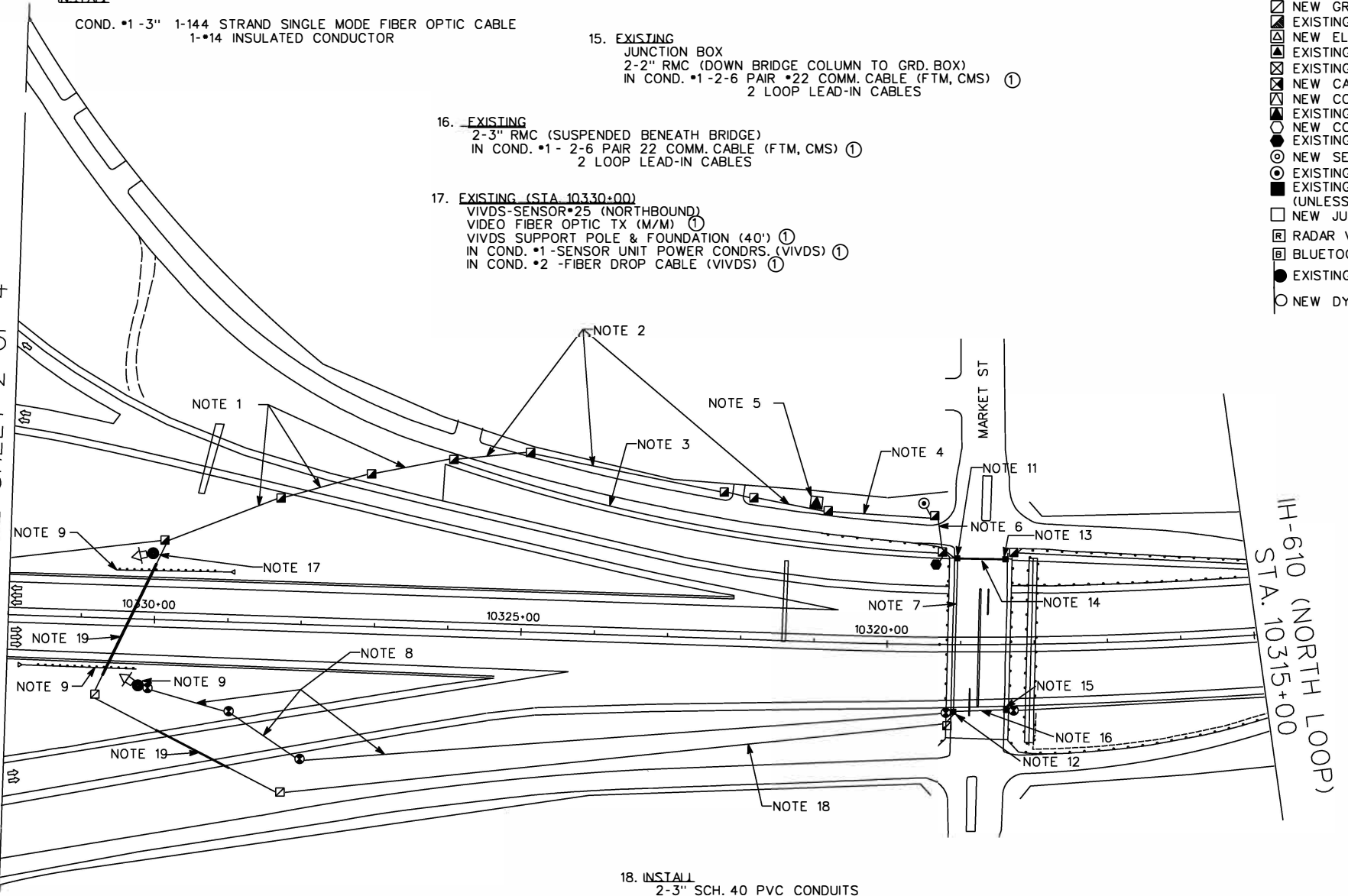
- 14. EXISTING
4-3" RMC (STRAPPED TO ABUTMENT)
1-2" RMC (STRAPPED TO ABUTMENT)
IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE
1 MULTIMODE FIBER OPTIC CABLE
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
FIBER DROP CABLE (VIVDS(2)) ①
FIBER DROP CABLE (CCTV)
IN COND. *2(3") -SENSOR UNIT POWER CONDRS. (VIVDS(2)) ①
IN COND. *3(3") -1-6 PAIR *22 COMM. CABLE (CCTV)
2 LOOP LEAD-IN CABLES
IN COND. *4(2") -2*2XHHW, 1*2 BARE (CCTV CABINET POWER)

- 15. EXISTING
JUNCTION BOX
2-2" RMC (DOWN BRIDGE COLUMN TO GRD. BOX)
IN COND. *1 -2-6 PAIR *22 COMM. CABLE (FTM, CMS) ①
2 LOOP LEAD-IN CABLES

- 16. EXISTING
2-3" RMC (SUSPENDED BENEATH BRIDGE)
IN COND. *1 - 2-6 PAIR 22 COMM. CABLE (FTM, CMS) ①
2 LOOP LEAD-IN CABLES

- 17. EXISTING (STA 10330+00)
VIVDS-SENSOR*25 (NORTHBOUND)
VIDEO FIBER OPTIC TX (M/M) ①
VIVDS SUPPORT POLE & FOUNDATION (40') ①
IN COND. *1 -SENSOR UNIT POWER CONDRS. (VIVDS) ①
IN COND. *2 -FIBER DROP CABLE (VIVDS) ①

MATCH LINE CL IH-610
STA. 10332+00 SEE SHEET 2 OF 4



- 12. EXISTING
JUNCTION BOX
2-2" RMC (DOWN BRIDGE COLUMN TO GRD. BOX)
IN COND. *1 - SENSOR UNIT POWER CONDRS.(VIVDS) ①
IN COND. *2 - FIBER DROP CABLE (VIVDS) ①

INSTALL
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR

- 13. EXISTING
JUNCTION BOX
4-3" RMC TO GRD. BOX
1-2" RMC TO GRD. BOX
IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE
1 MULTIMODE FIBER OPTIC CABLE
1-6 PAIR 22 COMM. CABLE (VOICE COMM.) ①
FIBER DROP CABLE (VIVDS(3)) ①
FIBER DROP CABLE (CCTV)
IN COND. *2(3") - SENSOR UNIT POWER CONDRS.(VIVDS(2)) ①
IN COND. *3(3") -1-6 PAIR *22 COMM. CABLE (CCTV)
2 LOOP LEAD-IN CABLES
IN COND. *4(2") -2*2XHHW, 1*2 BARE (CCTV CABINET POWER)

- 18. INSTALL
2-3" SCH. 40 PVC CONDUITS
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR

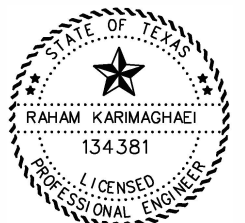
- 19. INSTALL
2-3" SCH. 80 PVC CONDUITS (BORED)
IN NEW SCH. 40 STEEL CASING
IN COND. *1 -3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
1-14 INSULATED CONDUCTOR

- ① TO BE REMOVED AND SALVAGED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL. REMOVAL AND SALVAGE OF CABLE WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS BID ITEMS.
- ② TO BE ABANDONED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL.



LEGEND

- RIGHT OF WAY
- NEW CONDUIT
- EXISTING CONDUIT
- ▣ NEW GROUND BOX-TYPE 2
- ▣ EXISTING GROUND BOX-TYPE 2
- ▣ NEW ELECTRICAL GROUND BOX-TYPE A
- ▣ EXISTING ELECTRICAL GROUND BOX-TYPE A
- ▣ EXISTING CABINET
- ▣ NEW CABINET (DOOR ON DARKENED SIDE)
- ▣ NEW COMMUNICATIONS HUB BUILDING
- ▣ EXISTING COMMUNICATIONS HUB BUILDING
- NEW CCTV CAMERA
- EXISTING CCTV CAMERA
- NEW SERVICE POLE
- EXISTING SERVICE POLE
- ▣ EXISTING JUNCTION BOX (UNLESS OTHERWISE NOTED)
- ▣ NEW JUNCTION BOX
- ▣ RADAR VEHICLE SENSING DEVICE
- ▣ BLUETOOTH DEVICE
- EXISTING DYNAMIC MESSAGE SIGN
- NEW DYNAMIC MESSAGE SIGN



The seal appearing on this document was authorized by RAHAM KARIMAGHAEI P.E. 134381, on

MAY 10, 2024

Raham Karimaghahi



**IH 610
PLAN LAYOUT PROPOSED
NB-EB RAMP**

© TxDOT © 2024		SHEET 1 OF 4	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		121

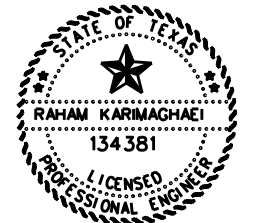
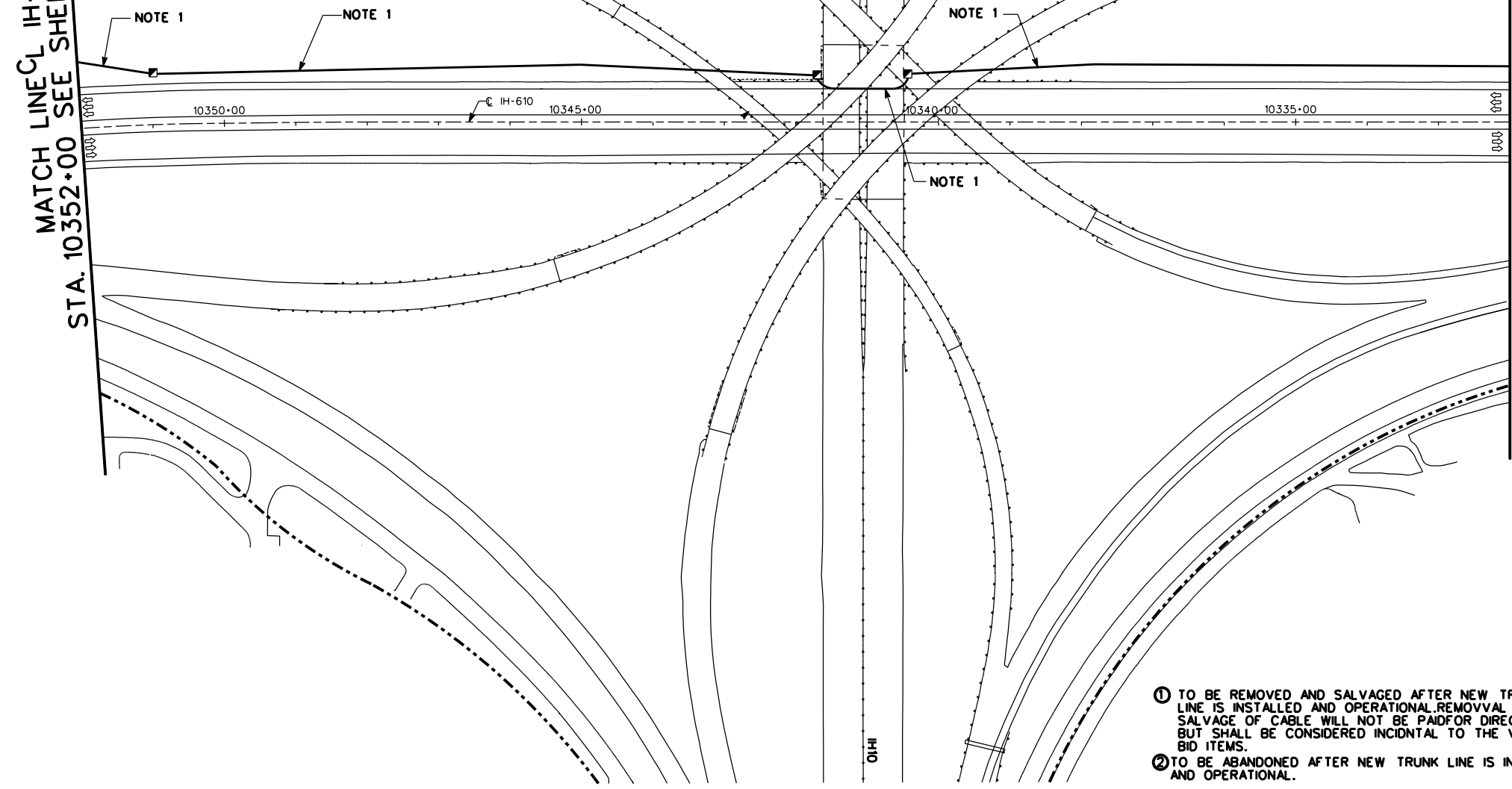
1. EXISTING
 4-3" CONDUITS
 IN COND. #1 - 1 SINGLE MODE FIBER OPTIC CABLE ①
 1 MULTIMODE FIBER OPTIC CABLE ①
 1-6 PAIR #22 COMM. CABLE (VOICE COMM.) ①

INSTALL
 IN COND. #1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
 1-#14 INSULATED CONDUCTOR

- LEGEND**
- RIGHT OF WAY
 - - - NEW CONDUIT
 - EXISTING CONDUIT
 - ☐ NEW GROUND BOX-TYPE 1
 - ☐ EXISTING GROUND BOX-TYPE 1
 - ☐ NEW ELECTRICAL GROUND BOX-TYPE A
 - ☐ EXISTING ELECTRICAL GROUND BOX-TYPE A
 - ☐ EXISTING CABINET
 - ☐ NEW CABINET (DOOR ON DARKENED SIDE)
 - ☐ NEW COMMUNICATIONS HUB BUILDING
 - ☐ EXISTING COMMUNICATIONS HUB BUILDING
 - NEW CCTV CAMERA
 - EXISTING CCTV CAMERA
 - ⊙ NEW SERVICE POLE
 - ⊙ EXISTING SERVICE POLE
 - EXISTING JUNCTION BOX (UNLESS OTHERWISE NOTED)
 - NEW JUNCTION BOX
 - ▣ RADAR VEHICLE SENSING DEVICE
 - ▣ BLUETOOTH SENSING
 - EXISTING DYNAMIC MESSAGE SIGN
 - NEW DYNAMIC MESSAGE SIGN

MATCH LINE CL IH-610
 STA. 10352+00 SEE SHEET 3 OF 4

MATCH LINE CL IH-610
 STA. 10332+00 SEE SHEET 1 OF 4



The seal appearing on this document was authorized by RAHAM KARIMAGHAEI P.E. 134381, on

MAY 10, 2024

Raham Karimaghahi

- ① TO BE REMOVED AND SALVAGED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL. REMOVAL AND SALVAGE OF CABLE WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS BID ITEMS.
- ② TO BE ABANDONED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL.



IH 610
 PLAN LAYOUT PROPOSED
 NB-EB RAMP

© TxDOT ©2024 SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	122	

DATE: SDATES \$TIMES
 FILE: \$FILES

GR
 DW
 GR
 DW



1. EXISTING

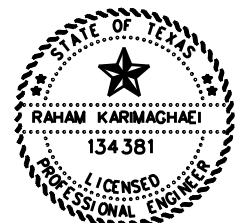
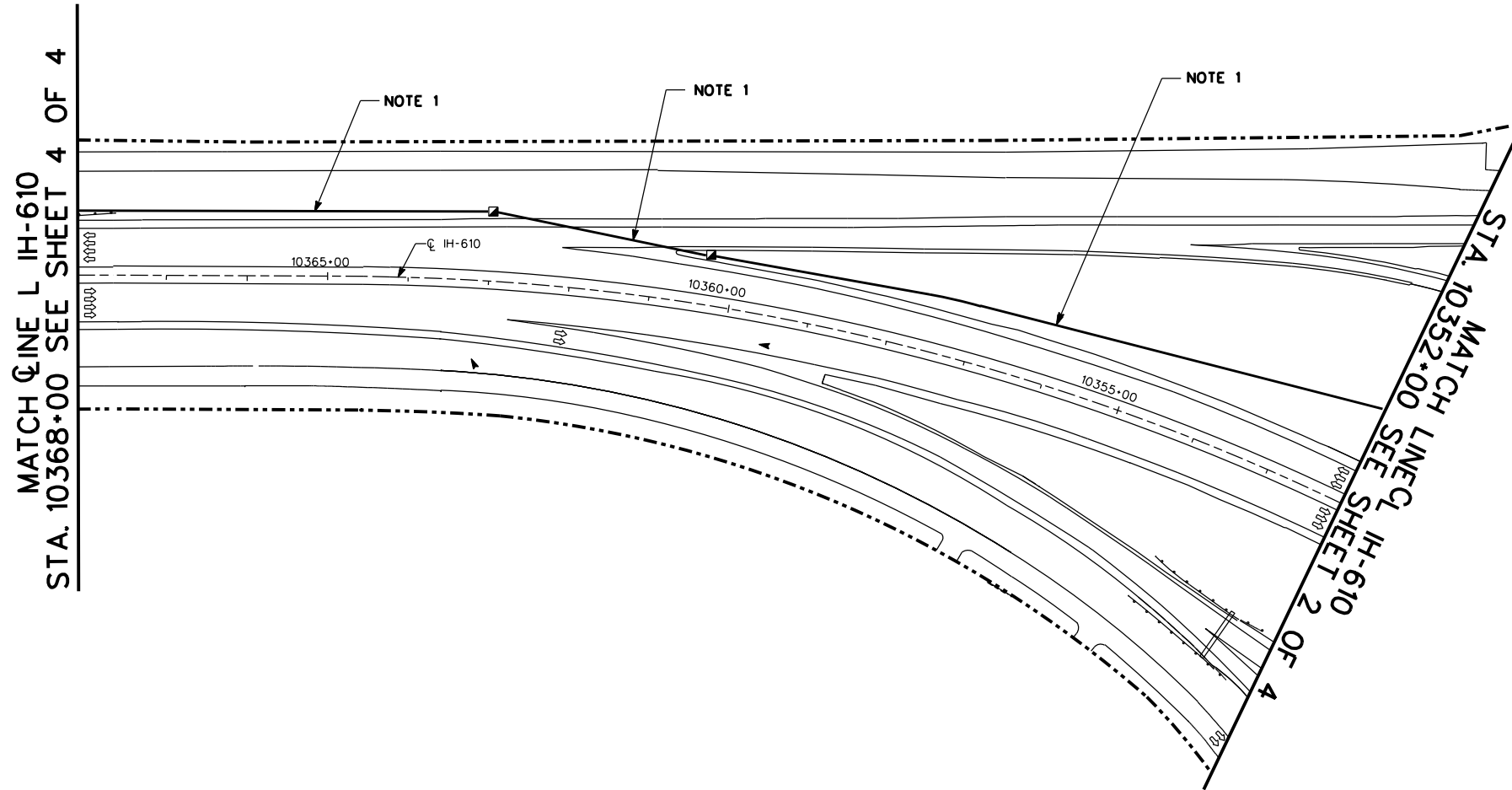
- 4-3" CONDUITS
- IN COND. *1- 1 SINGLE MODE FIBER OPTIC CABLE ①
- 1 MULTIMODE FIBER OPTIC CABLE ①
- 1-6 PAIR *22 COMM. CABLE (VOICE COMM.) ①

INSTALL

- IN COND. *1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
- 1-*14 INSULATED CONDUCTOR

LEGEND

- RIGHT OF WAY
- NEW CONDUIT
- EXISTING CONDUIT
- ☐ NEW GROUND BOX-TYPE 1
- ☐ EXISTING GROUND BOX-TYPE 1
- ☐ NEW ELECTRICAL GROUND BOX-TYPE A
- ☐ EXISTING ELECTRICAL GROUND BOX-TYPE A
- ☐ EXISTING CABINET
- ☐ NEW CABINET (DOOR ON DARKENED SIDE)
- ☐ NEW COMMUNICATIONS HUB BUILDING
- ☐ EXISTING COMMUNICATIONS HUB BUILDING
- NEW CCTV CAMERA
- EXISTING CCTV CAMERA
- ⊙ NEW SERVICE POLE
- ⊙ EXISTING SERVICE POLE
- ⊙ EXISTING JUNCTION BOX (UNLESS OTHERWISE NOTED)
- ☐ NEW JUNCTION BOX
- ☐ RADAR VEHICLE SENSING DEVICE
- ☐ BLUETOOTH DEVICE
- EXISTING DYNAMIC MESSAGE SIGN
- NEW DYNAMIC MESSAGE SIGN



The seal appearing on this document was authorized by RAHAM KARIMAGHAEI, P.E. 134381, on

MAY 10, 2024

Raham Karimaghahi

① TO BE REMOVED AND SALVAGED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL. REMOVAL AND SALVAGE OF CABLE WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS BID ITEMS.



IH 610
 PLAN LAYOUT PROPOSED
 NB-EB RAMP

© TxDOT ©2024 SHEET 3 OF 4

CONT.	SECT.	JOB	HIGHWAY
0271	15	099	IH 610
DIST.	COUNTY	SHEET NO.	
HOU	HARRIS	123	

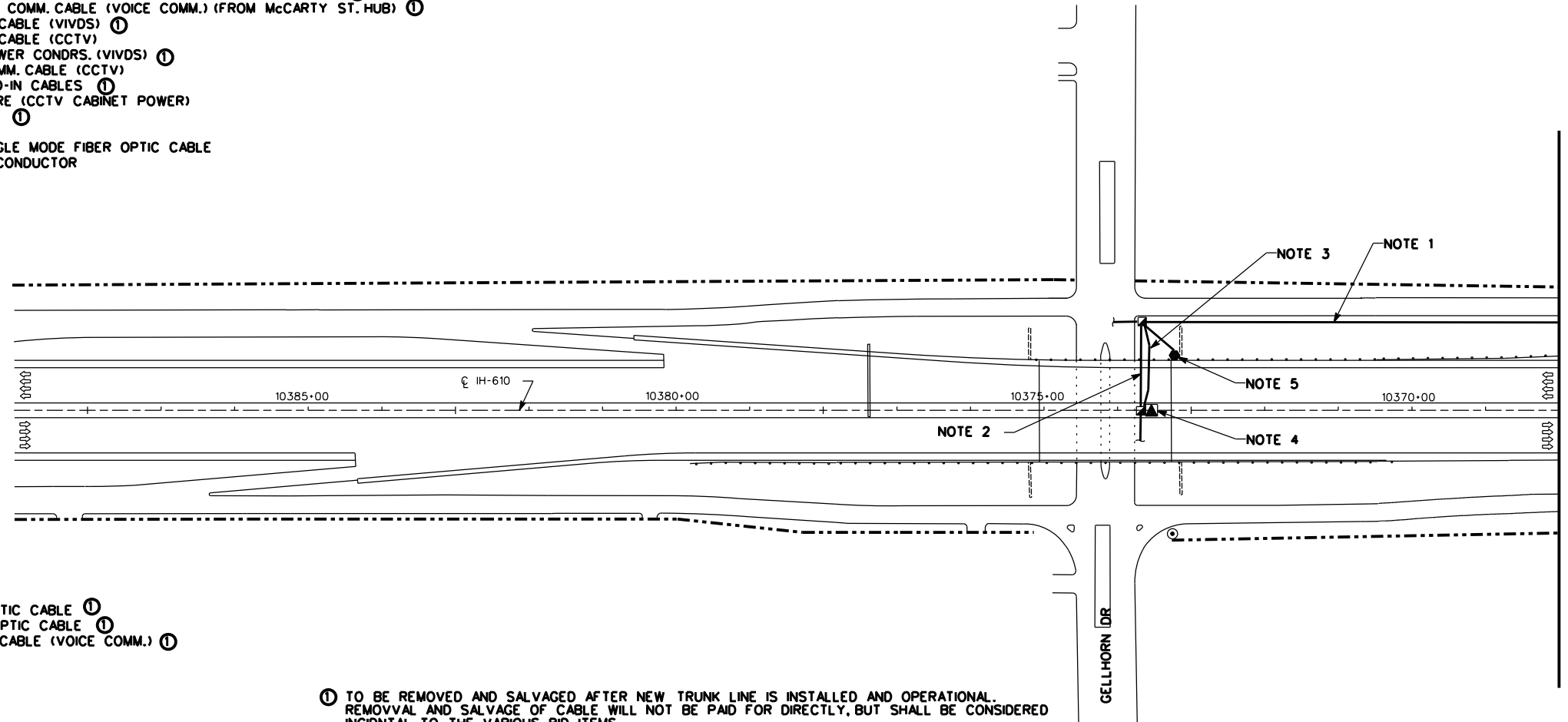
DATE: \$DATE\$
 FILE: \$FILE\$
 \$TIMES\$



- 1. EXISTING**
 4-3" CONDUITS
 IN COND. *1 - 1 SINGLE MODE FIBER OPTIC CABLE ①
 1 MULTIMODE FIBER OPTIC CABLE ①
 1-6 PAIR *22 COMM. CABLE (VOICE COMM.) ①
- INSTALL**
 IN COND. *1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
 1-14 INSULATED CONDUCTOR

- 2. EXISTING**
 4-3" CONDUITS
 1-2" CONDUIT
 IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLE (FROM McCARTY ST. HUB) ①
 1 MULTIMODE FIBER OPTIC CABLE (FROM McCARTY ST. HUB) ①
 1-6 PAIR *22 COMM. CABLE (VOICE COMM.) (FROM McCARTY ST. HUB) ①
 FIBER DROP CABLE (VIVDS) ①
 FIBER DROP CABLE (CCTV) ①
 IN COND. *2(3") - SENSOR UNIT POWER CONDRS. (VIVDS) ①
 IN COND. *3(3") - 1-6 PAIR *22 COMM. CABLE (CCTV)
 2 LOOP LEAD-IN CABLES ①
 IN COND. *4(2") - 2*6XHHW, 1*6 BARE (CCTV CABINET POWER)
 IN COND. *3(3") - CTMS CABLES ①
- INSTALL**
 IN COND. *1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
 1-14 INSULATED CONDUCTOR

- 5. EXISTING (STA. 10810-00)**
 CCTV CAMERA *43
 CAMERA SUPPORT POLE & FOUNDATION (55')
 CCTV CABINET
 CCTV FIELD EQUIPMENT
 1 STAND ALONE LDM
 VIDEO FIBER OPTIC TX (M/M)
 3-2" CONDUITS TO GRD. BOX
 IN COND. *1 - 1-6 PAIR *22 COMM. CABLE (CCTV)
 IN COND. *2 - 2*6XHHW, 1*6 BARE (CCTV CABINET POWER)
 IN COND. *3 - FIBER DROP CABLE (CCTV)
- INSTALL**
 IN COND. *1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
 1-14 INSULATED CONDUCTOR



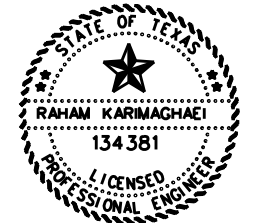
- 3. EXISTING**
 3-3" SCH. 80 PVC
 IN COND. *1 - 1 SINGLE MODE FIBER OPTIC CABLE ①
 1 MULTIMODE FIBER OPTIC CABLE ①
 1-6 PAIR *22 COMM. CABLE (VOICE COMM.) ①

- 4. EXISTING (STA. 10809+50)**
 COMMUNICATIONS HUB BUILDING
 DROP/INSERT MULDEM
 2 DATA FIBER OPTIC TX'S (M/M)
 LDM BACKPLANE ASSEMBLY W/8 MODEM CARDS
 2 LOCAL CONTROL UNITS (FTM LCU *EN1 NORTHBOUND)
 (FTM LCU *EN2 SOUTHBOUND)
- VIVDS FIELD EQUIPMENT
 4 VIDEO FIBER OPTIC RX'S (M/M)
 DETECTOR CARD RACK W/2 CARDS
 DETECTOR CARD RACK POWER SUPPLY
 8-3" CONDUITS TO GRD. BOX
 1-2" CONDUIT TO GRD. BOX
 IN COND. *1(3") - 1 SINGLE MODE FIBER OPTIC CABLES (FROM McCARTY ST. HUB)
 1 MULTIMODE FIBER OPTIC CABLE (FROM McCARTY ST. HUB)
 1-6 PAIR *22 COMM. CABLE (VOICE COMM.) (FROM McCARTY ST. HUB)
 FIBER DROP CABLE (VIVDS(4))
 FIBER DROP CABLE (CCTV(2))
- IN COND. *2(3") - SENSOR UNIT POWER CONDRS. (VIVDS(4))
 IN COND. *3(3") - 2-6 PAIR *22 COMM. CABLE (CCTV(2))
 4 LOOP LEAD-IN CABLES
- IN COND. *4(2") - 3*4XHHW, 1*4 BARE (HUB BUILDING POWER)
 IN COND. *5(3") - 1 SINGLE MODE FIBER OPTIC CABLE
 1 MULTIMODE FIBER OPTIC CABLE
 1-6 PAIR *22 COMM. CABLE (VOICE COMM.)
- INSTALL**
 1 FIBER OPTIC PATCH PANEL (144 POSITION)
 IN COND. *1-3" 1-144 STRAND SINGLE MODE FIBER OPTIC CABLE
 1-14 INSULATED CONDUCTOR

- ① TO BE REMOVED AND SALVAGED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL. REMOVAL AND SALVAGE OF CABLE WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS BID ITEMS.
- ② TO BE ABANDONED AFTER NEW TRUNK LINE IS INSTALLED AND OPERATIONAL.

- LEGEND**
- RIGHT OF WAY
 - NEW CONDUIT
 - EXISTING CONDUIT
 - ☐ NEW GROUND BOX-TYPE 1
 - ☐ EXISTING GROUND BOX-TYPE 1
 - ☐ NEW ELECTRICAL GROUND BOX-TYPE A
 - ☐ EXISTING ELECTRICAL GROUND BOX-TYPE A
 - ☐ EXISTING CABINET
 - ☐ NEW CABINET (DOOR ON DARKENED SIDE)
 - ☐ NEW COMMUNICATIONS HUB BUILDING
 - ☐ EXISTING COMMUNICATIONS HUB BUILDING
 - NEW CCTV CAMERA
 - EXISTING CCTV CAMERA
 - ⊙ NEW SERVICE POLE
 - ⊙ EXISTING SERVICE POLE
 - ☐ EXISTING JUNCTION BOX (UNLESS OTHERWISE NOTED)
 - ☐ NEW JUNCTION BOX
 - ☐ RADAR VEHICLE SENSING DEVICE
 - ☐ BLUETOOTH DEVICE
 - EXISTING DYNAMIC MESSAGE SIGN
 - NEW DYNAMIC MESSAGE SIGN

MATCH LINE Q IH-610
 STA. 10368+00 SEE SHEET 3 OF 4



The seal appearing on this document was authorized by RAHAM KARIMAGHAEI, P.E. 134381, on

MAY 10, 2024

Raham Karimaghahi



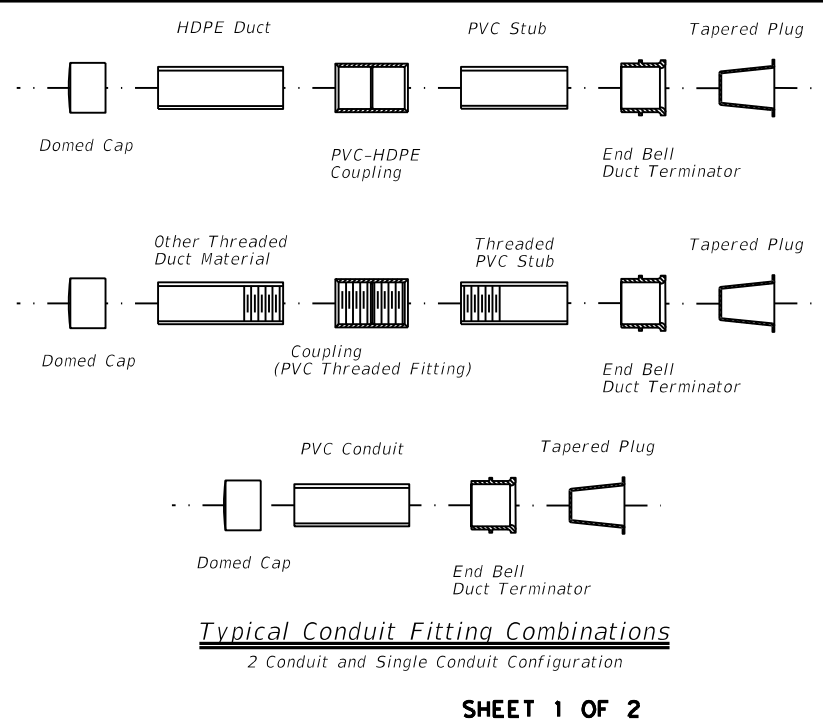
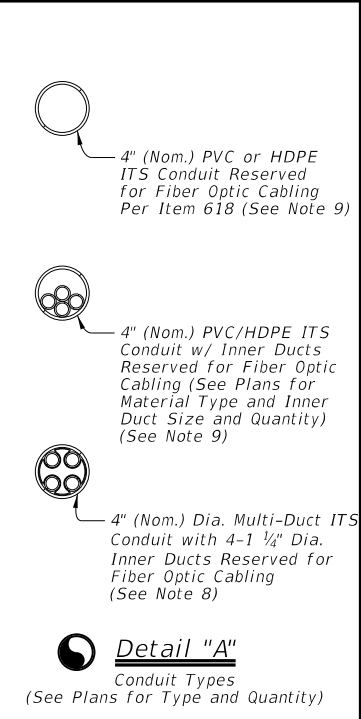
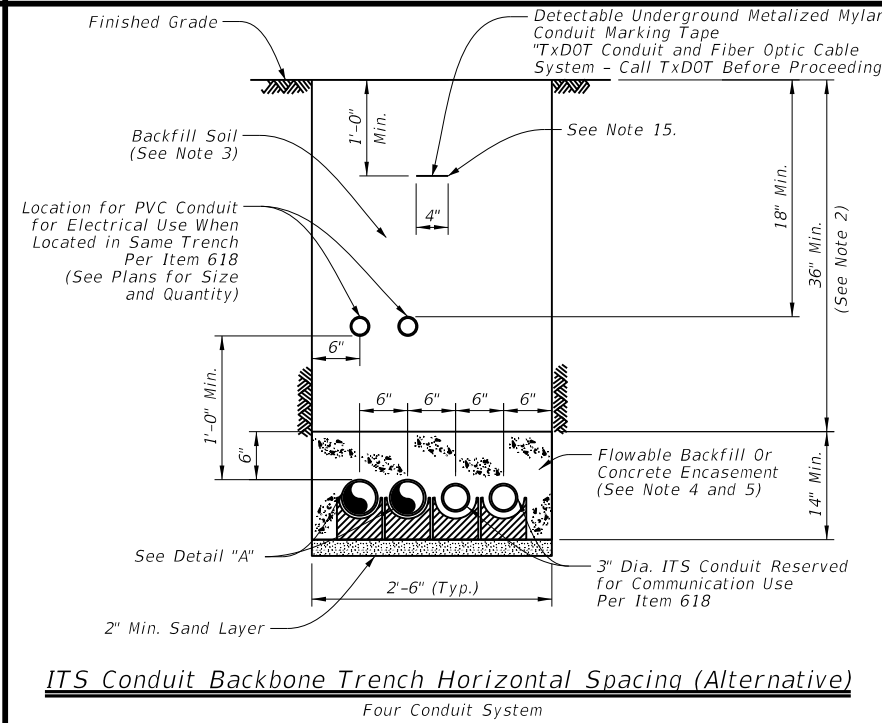
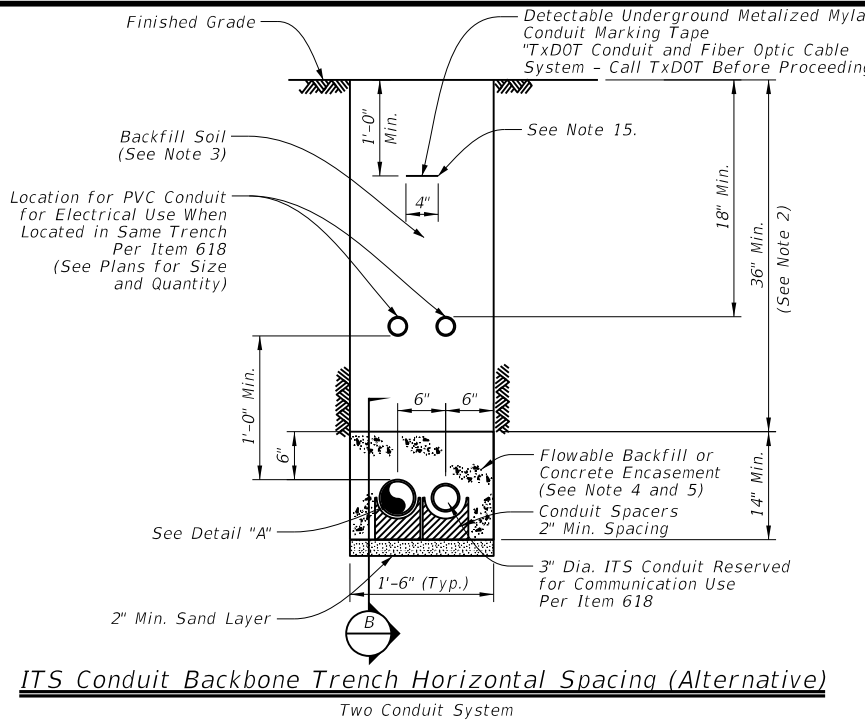
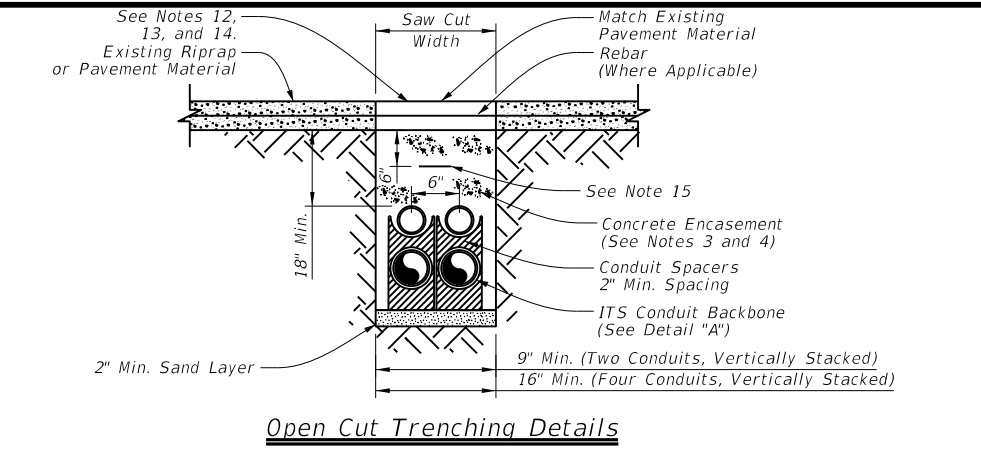
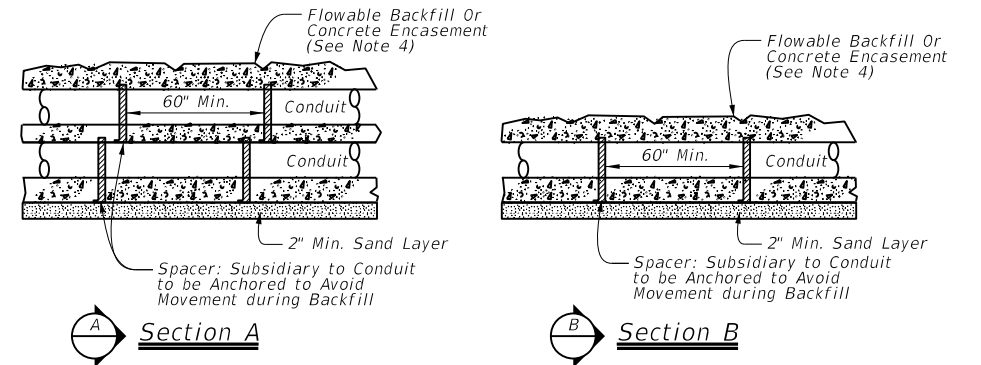
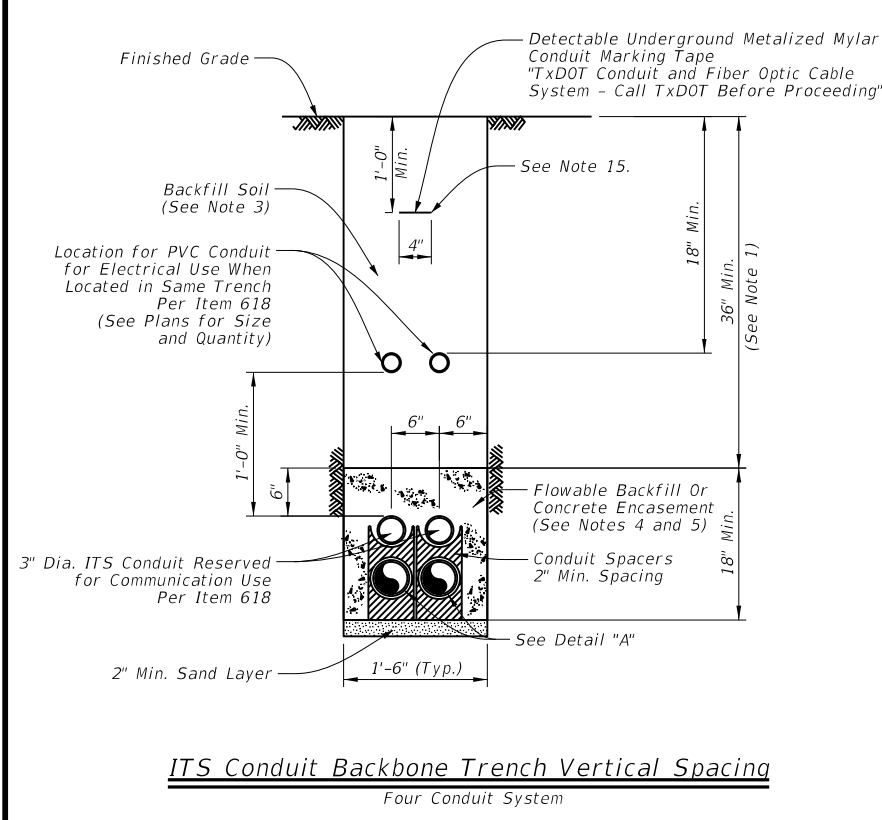
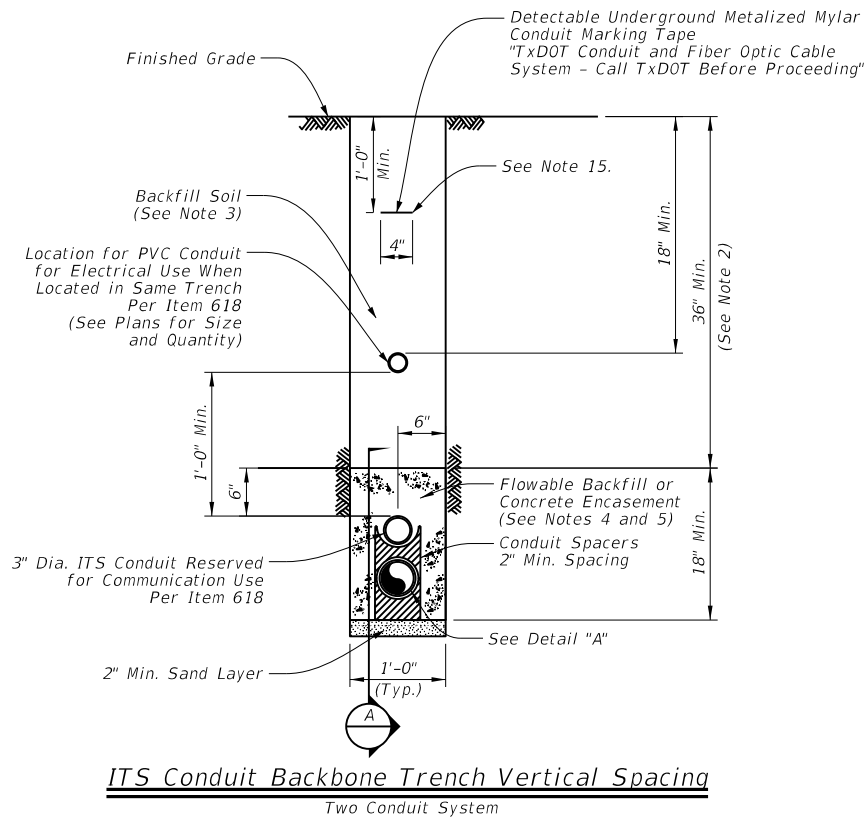
IH 610
 PLAN LAYOUT PROPOSED
 NB-EB RAMP

© TxDOT ©2024		SHEET 4 OF 4	
CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	124

DATE: SDATES \$TIMES
 FILE: \$FILES

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME



- General Notes:**
- Construct the ITS conduit backbone system by vertically spacing conduit, unless field constraints, obstructions, or utility conflicts require horizontal spacing of conduits. Both vertical and horizontal spacing configurations have been detailed for contractor information for construction.
 - Install ITS conduit backbone system a minimum of 42 inches from finished grade to the top of the conduit unless otherwise directed or to avoid conflicts or field conditions such as utilities or obstructions. Vary depth of the trench in order to pass over/under any existing utilities. Refer to ITS Conduit Obstruction Crossing Standard ITS(35) for further detail.
 - Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
 - When a trench depth greater than 24 inches can be achieved from the finished grade to the top of ITS conduit, encase the conduits with flowable backfill in accordance with Item 401, "Flowable Backfill." Use Class B concrete as a substitute in accordance with Item 421, "Hydraulic Cement Concrete" at the discretion of the Engineer.
 - When a trench depth of less than 24 inches is required due to field conditions, encase the conduits in Class B concrete in accordance with Item 421, "Hydraulic Cement Concrete."
 - Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
 - Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
 - Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."

- Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
- Provide a single 1/8" #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
- Provide a flat pull cord in all empty conduits and innerducts. Provide a pull cord with a tensile strength of 1,250 Lbs. minimum and have foot markings to determine length installed. Pull cord and installation to be subsidiary to various bid items.
- Remove saw cut width to accommodate conduit installation.
- Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
- Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
- Place marking tape a minimum of 1 foot - 0 inches below grade when no other electrical marking tape required, or 8 inches below electrical marking tape when provisioned under Item 618.
- Provide a 1/8" #8 insulated grounding conductor within one inner duct of a pre-assembled multi-duct when no other grounding conductor is provisioned for in the plans.

Sheet Details
Not to Scale

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division Standard

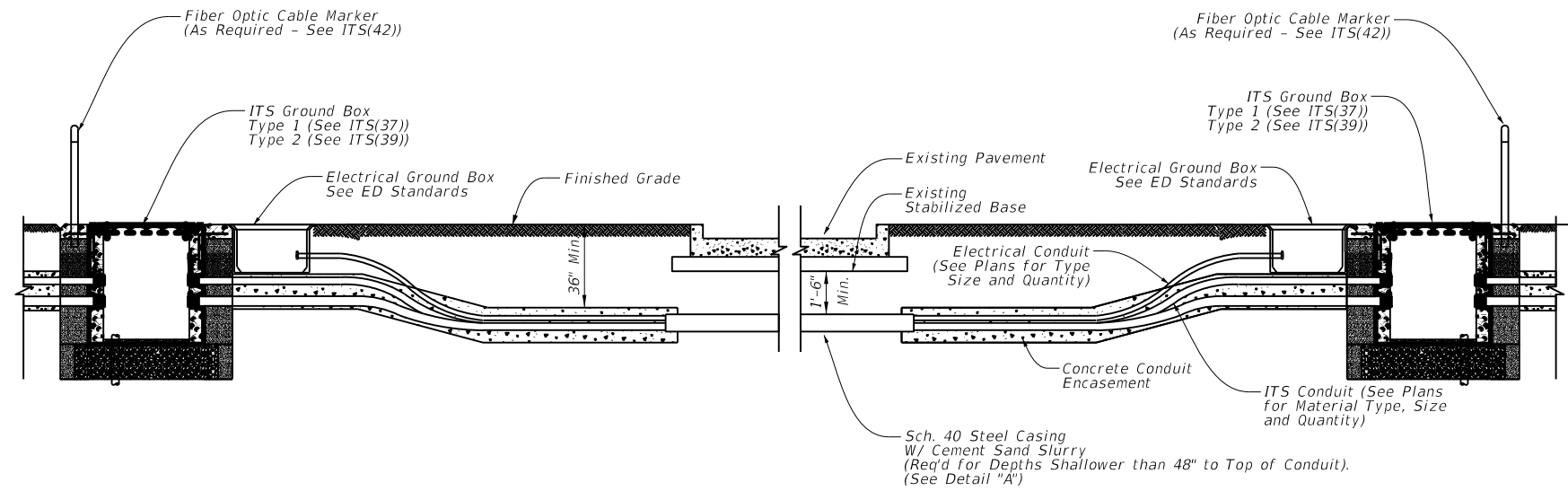
ITS CONDUIT TRENCH DETAILS

ITS(27)-16

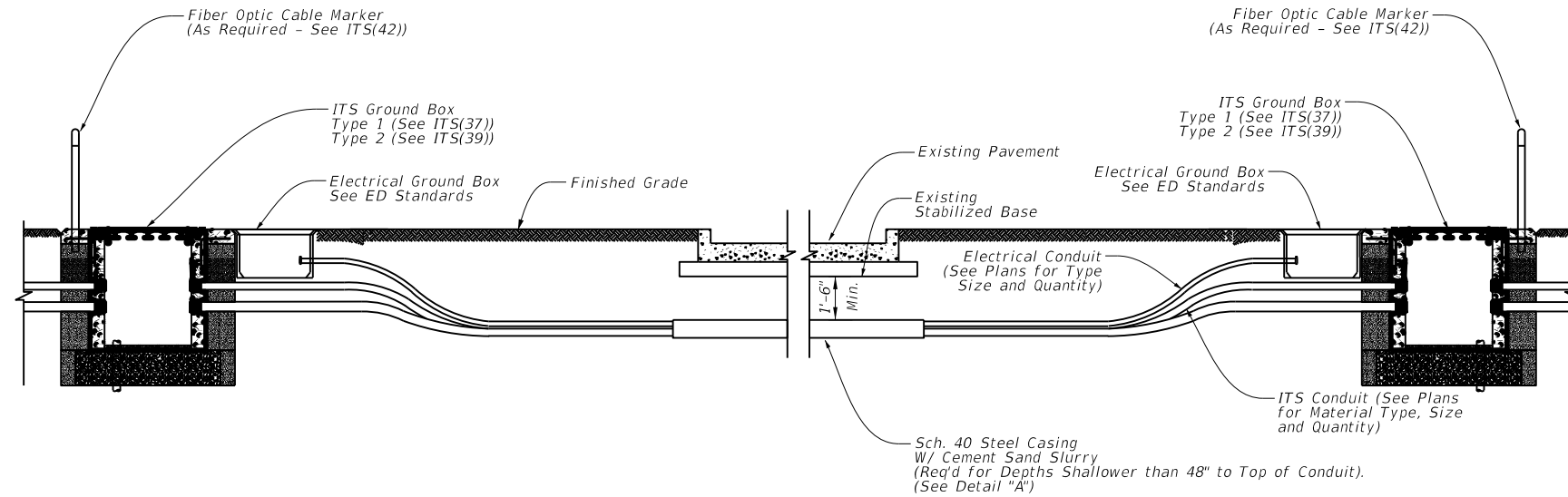
FILE: its(27)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT FEBRUARY 2016	CON: 0271	SECT: 15	JOB: 099	HIGHWAY: IH 610
REVISIONS	DIST: HOU	COUNTY: HARRIS	SHEET NO. 125	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

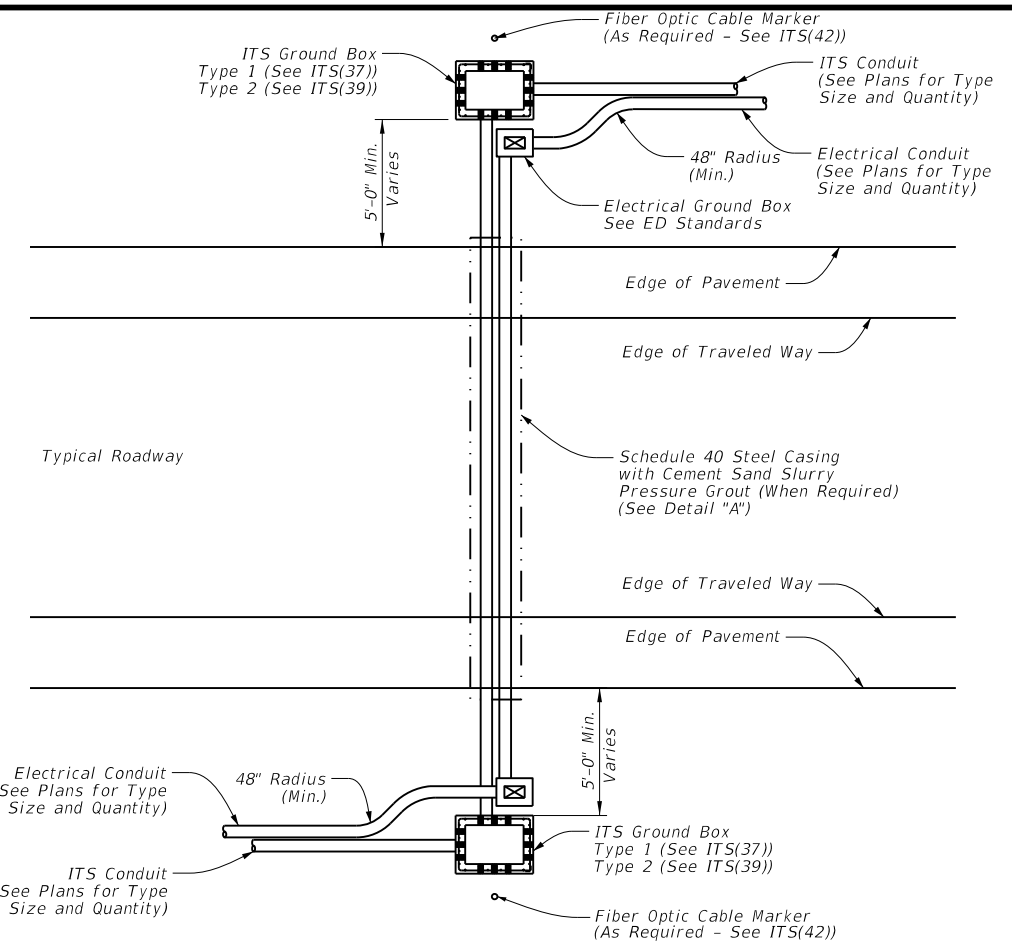
DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME



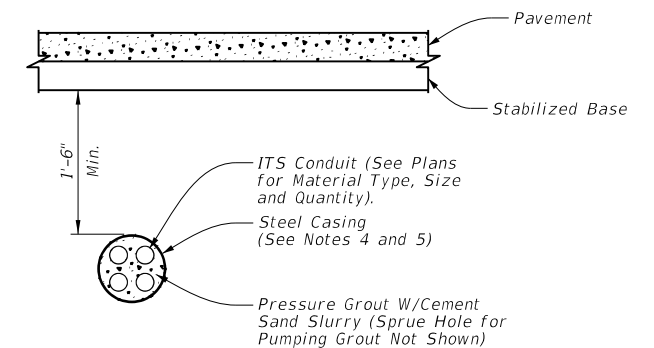
Typical Conduit Installation Jacking or Boring Beneath Existing Roadway



Typical Conduit Installation Jacking or Boring Beneath Existing Roadway (Where Concrete Encasement Not Required)



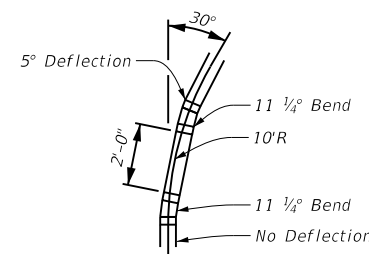
Bore Under Pavement



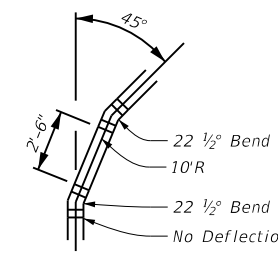
Steel Casing Detail "A"

General Notes:

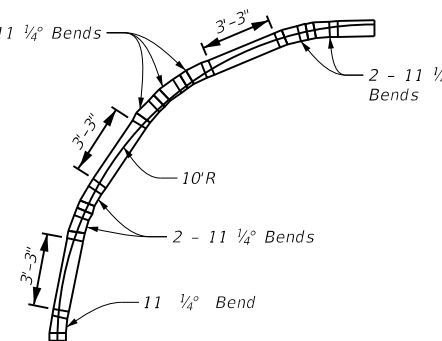
1. Typical conduit installation details for jacking or boring beneath existing roadway is diagrammatic in nature. Roadway cross-slopes may vary for each crossing.
2. Jack or bore in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box" except for measurement and payment.
3. Furnishing and installation of pressure grouting will not be paid for directly but considered incidental to Special Specification "ITS Multi-Duct Conduit" or Item 618, "Conduit."
4. When boring under pavement shallower than 48 inches from finished grade to top of conduit, provide Schedule 40 steel casing under pavement to encase the conduit system. Provide steel casing of a size to accommodate ITS conduit and electrical conduit as shown in the plans. Provide a minimum 20 percent void space around all conduits. Steel casing will not be paid for directly but considered incidental to Special Specification, "ITS Multi-Duct Conduit" or Item 618, "Conduit."
5. When a depth greater than 48 inches can be achieved from finished grade to top of conduit, provide Schedule 80 PVC. No steel casing required unless otherwise directed.
6. Ensure all conduit bends are in conformance with the latest edition of the National Electrical Code.
7. Provide GPS coordinate points to the District for all ground boxes installed, and shifts or deviations of the conduit alignment from the plans required to avoid obstructions or utilities. Take GPS coordinate points at the start of the transition, at the point of curvature, and at the end of the transition at the point of tangency. Document the turnout radius and installed depth. Provide GPS coordinate points in NAD83 coordinate system and be accurate to 5 feet.



30° Turnout Detail



45° Turnout Detail



90° Turnout Detail

Provide this arrangement of conduit and fittings or approved equal at all 30°, 45°, and 90° bends, horizontal and vertical, to achieve a nominal 10' conduit radius for pre-assembled multi-duct conduit. See Note 7.

Sheet Details
Not to Scale

SHEET 2 OF 2



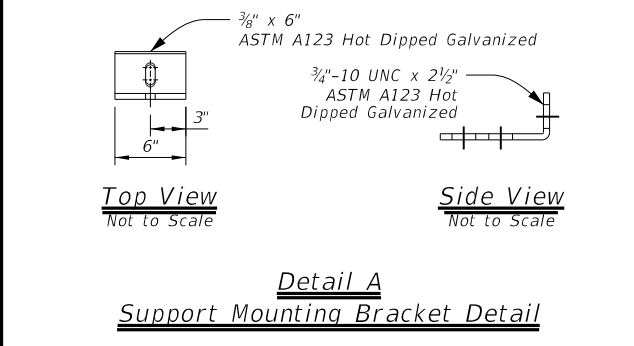
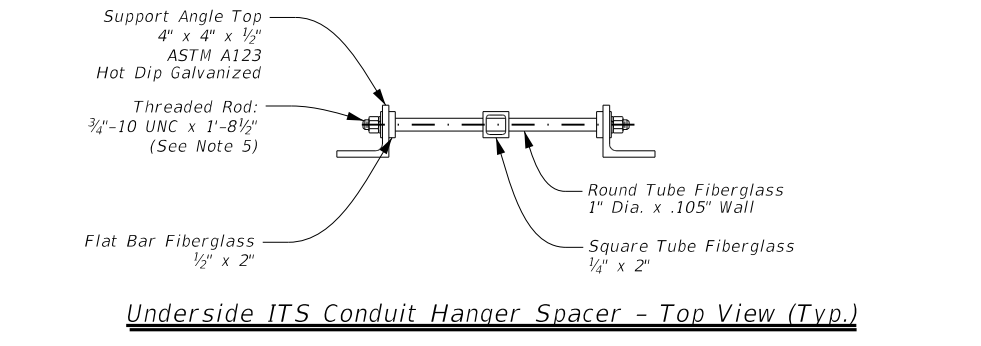
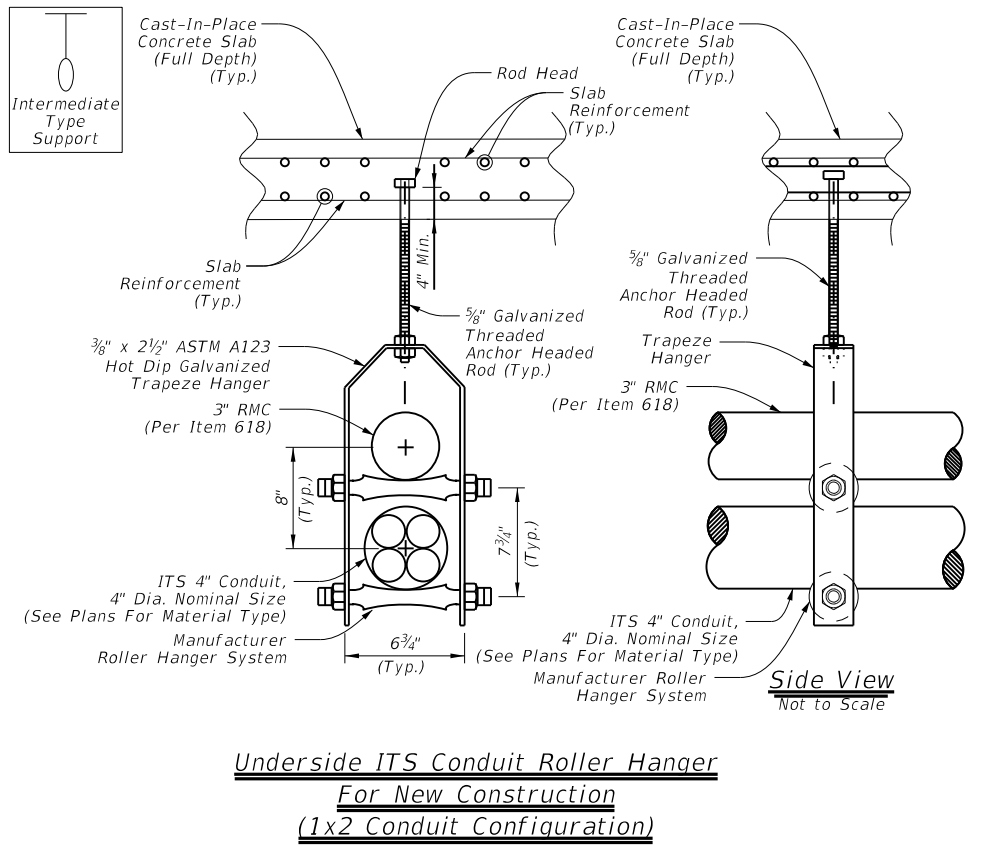
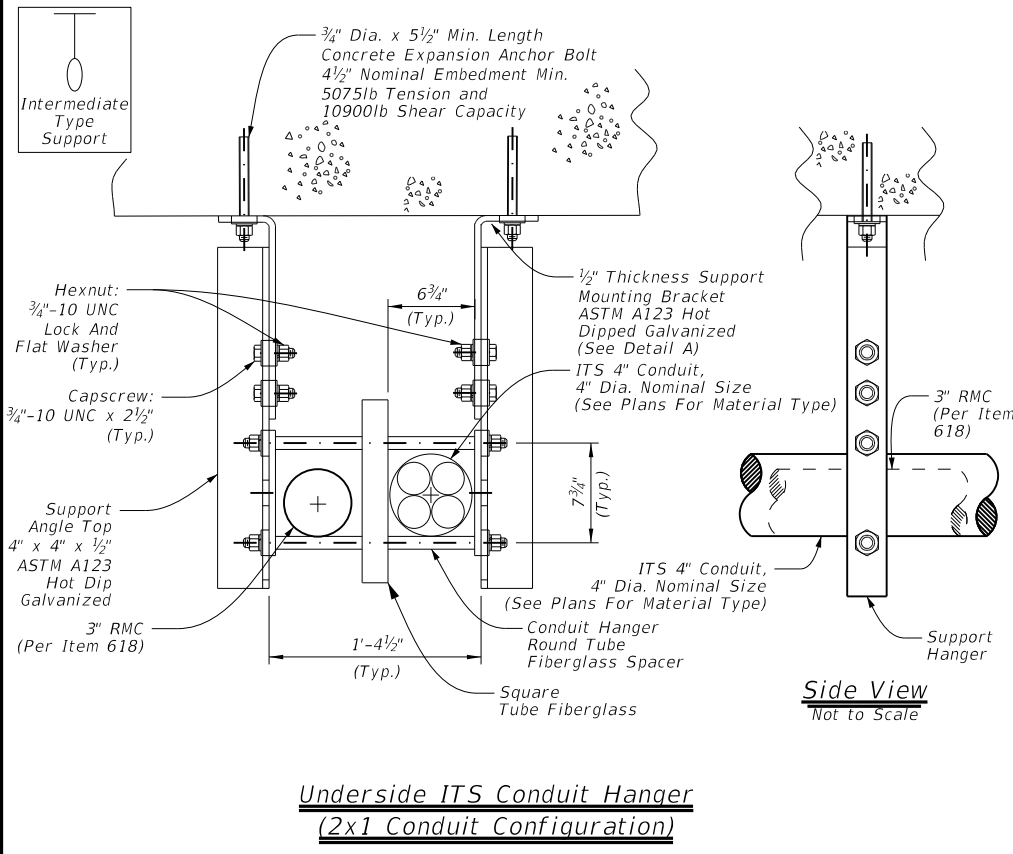
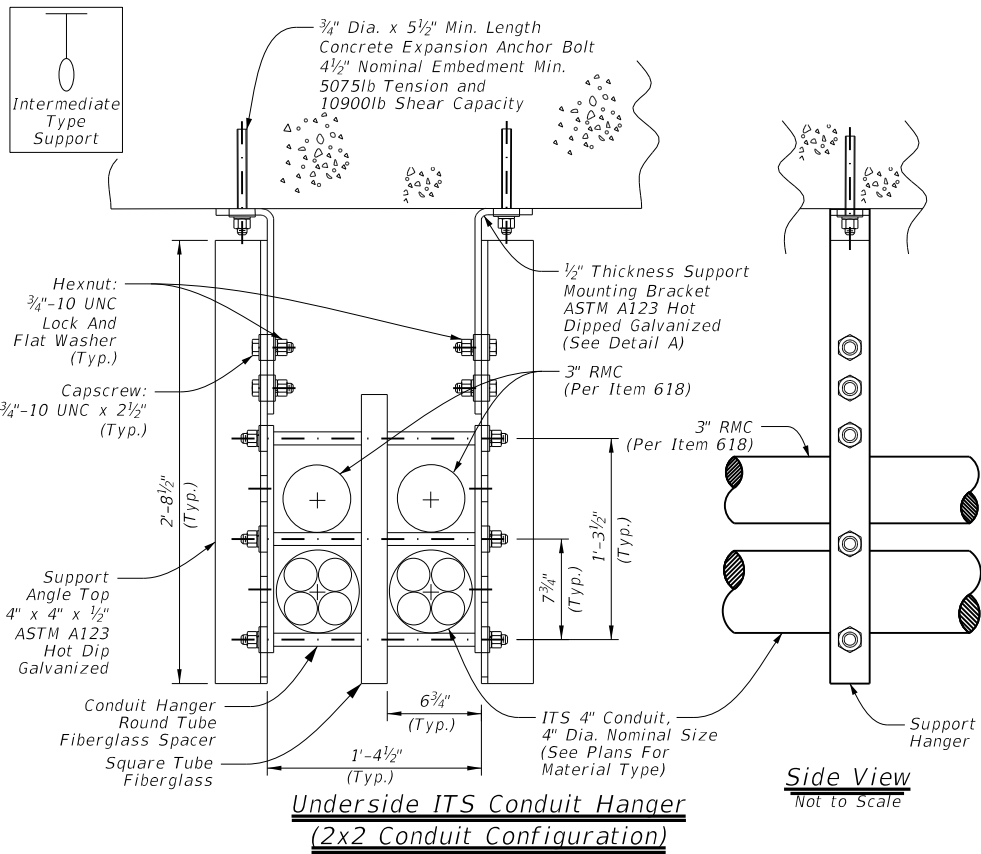
ITS CONDUIT BORE AND STEEL CASING DETAILS

ITS(28)-16

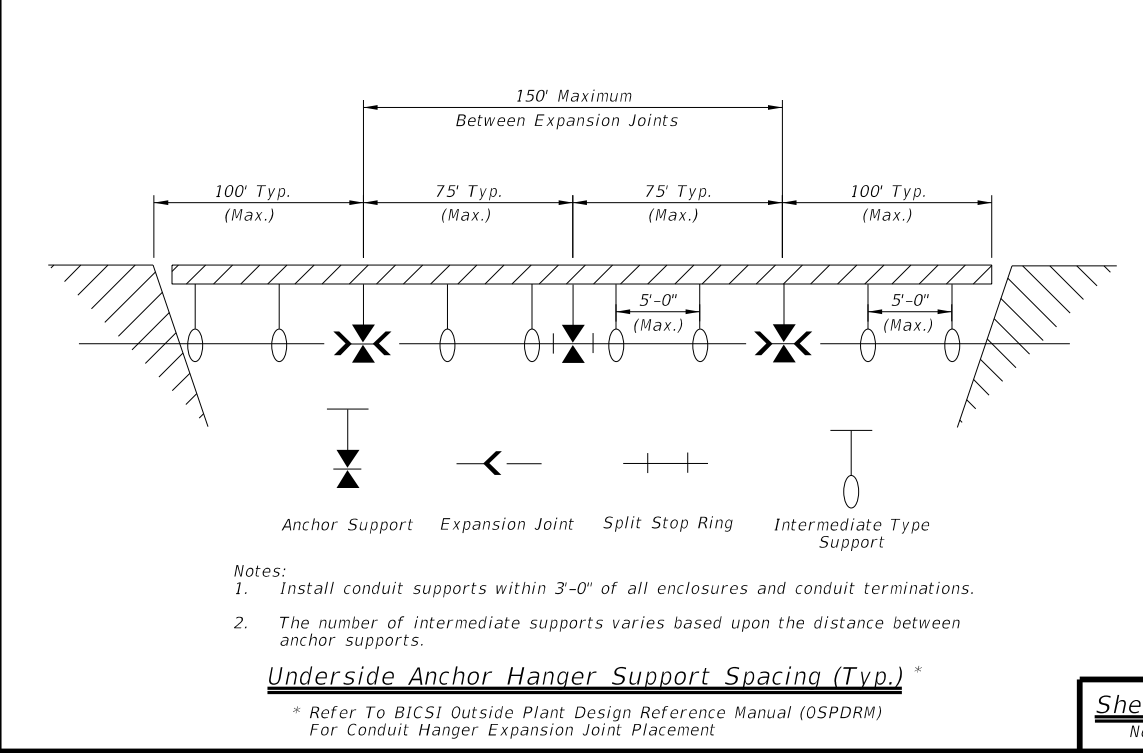
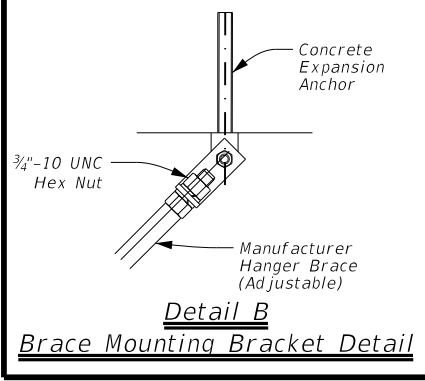
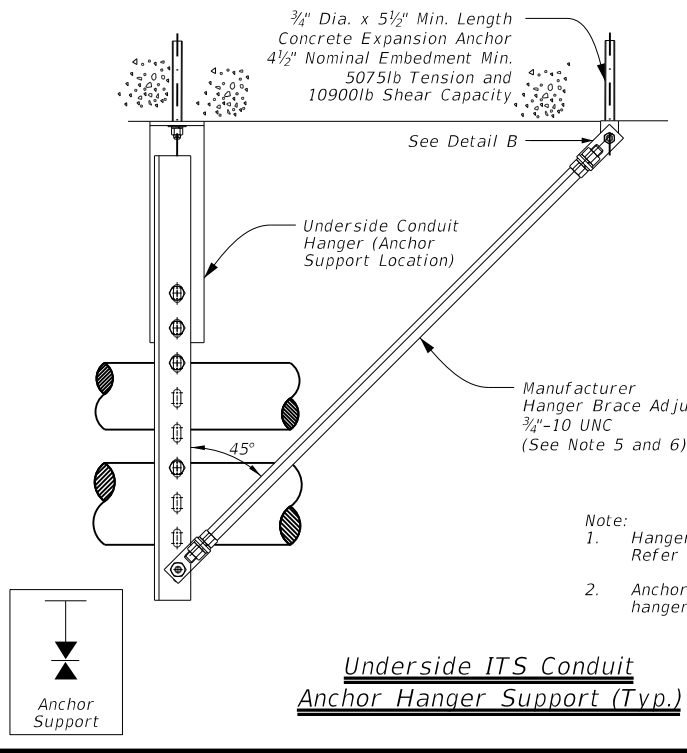
FILE: its(28)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	126	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME



- General Notes:**
- Use commercially designed multiple conduit support hangers as an alternative to the hanger details on this sheet, or standard sheet ED(2)-14 may be used. Verify sufficient tension and shear capacity before proposed substitution. Submit hanger details and specifications to the Engineer for approval prior to using on project.
 - Refer to the contract plans for conduit design and hanger configuration requirements. For two (2) conduit configurations, use the typical underside hanger or roller hanger system.
 - Maximum spacing of intermediate conduit hangers is 5'-0" C-C.
 - Hangers vary in length, but do not allow conduit to hang below bridge beams. Refer to ITS(30) for minimum clearance requirement below bridge deck.
 - Ensure all conduit hanger steel shapes conform to ASTM A36 and expansion anchors conform to ASTM A307 and are supplied with minimum of one nut and washer per bolt. Galvanize all steel plate, shapes, and hardware per Item 445, "Galvanizing".
 - Use angle bracing on both sides of conduit support for conduit anchor point hangers.
 - Refer to ITS(32) for expansion-deflection joint details.
 - Provide a minimum of two (2) expansion joints at all bridges. Ensure expansion joint spacing does not exceed manufacturer recommendations.
 - Select conduit lengths so that couplings do not coincide with conduit hanger locations.
 - Allowable types of outer duct material for above ground ITS conduit include rigid metallic conduit (RMC) and fiberglass.
 - Refer to ITS(30) for anchor details through pre-stressed concrete panels.
 - Bond all external structure conduit throughout entire length of run and ground at ground box locations according to ITS(38).



Texas Department of Transportation Traffic Safety Division Standard

ITS CONDUIT HANGER DETAILS

ITS (29) - 22

FILE: its(29)-22.dgn DWN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT
© TxDOT FEBRUARY 2016 CONT SECT JOB HIGHWAY
REVISIONS 0271 15 099 IH 610
05-22 DIST COUNTY SHEET NO.
HOU HARRIS 127

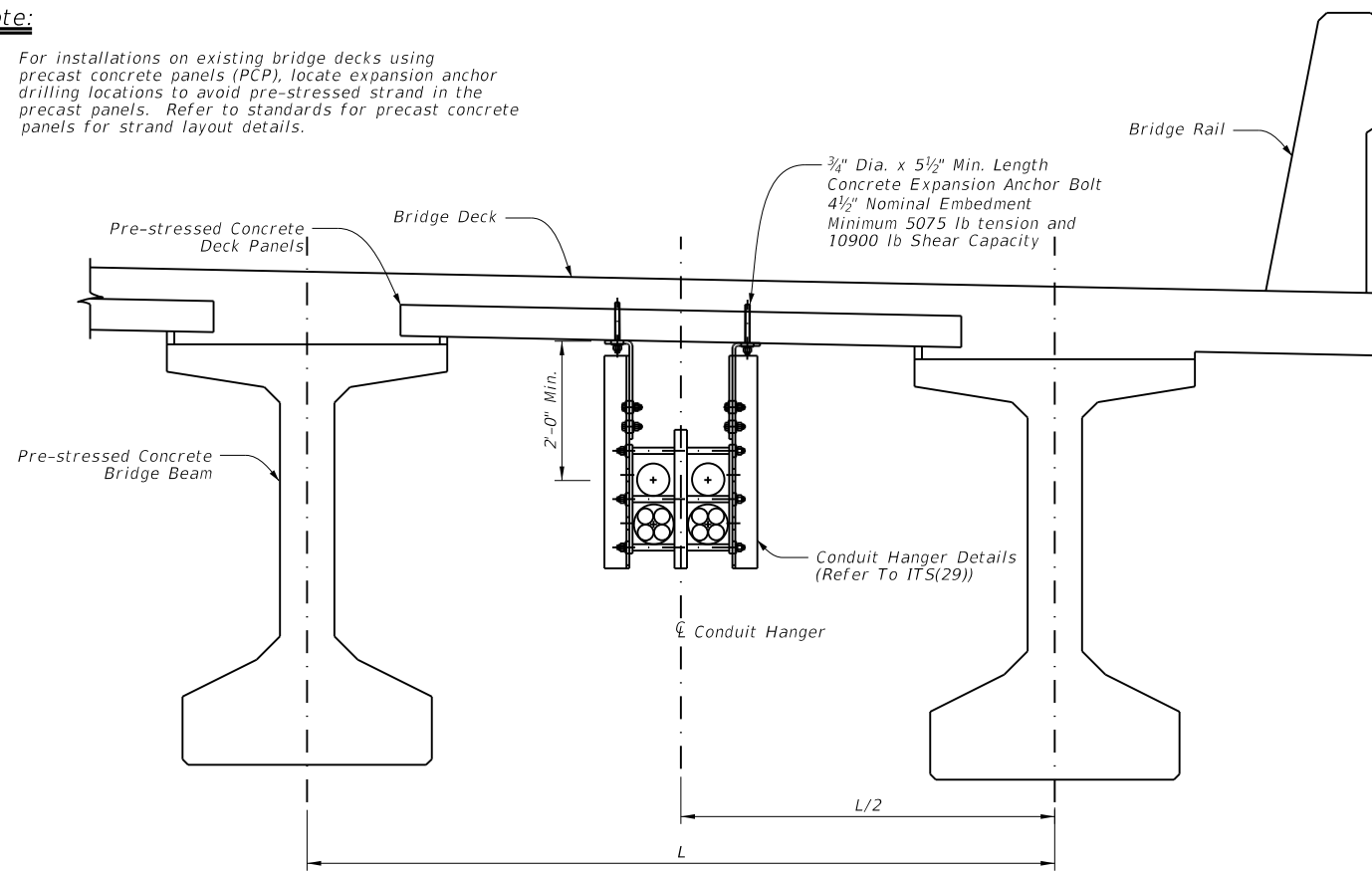
Sheet Details Not to Scale

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME

Note:

- For installations on existing bridge decks using precast concrete panels (PCP), locate expansion anchor drilling locations to avoid pre-stressed strand in the precast panels. Refer to standards for precast concrete panels for strand layout details.

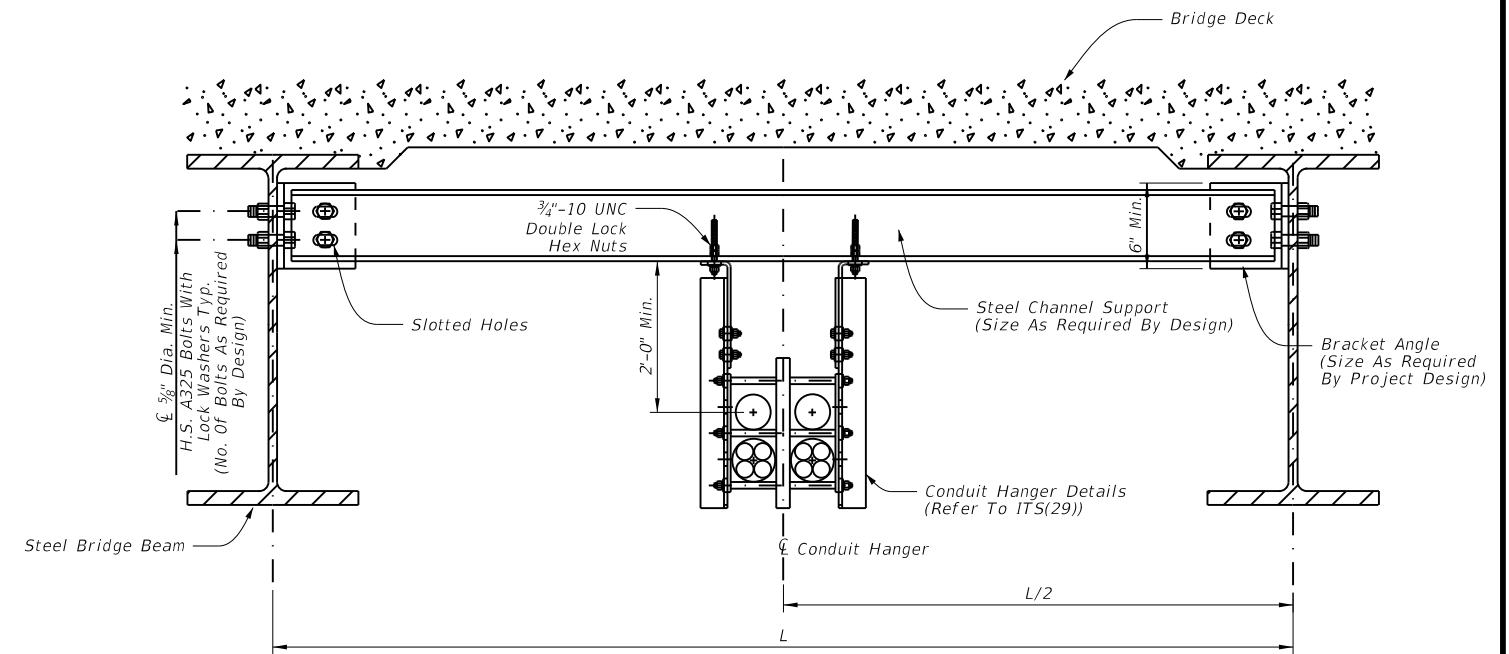


Structure Mounted ITS Conduit - Concrete Bridge Deck With Precast Panels

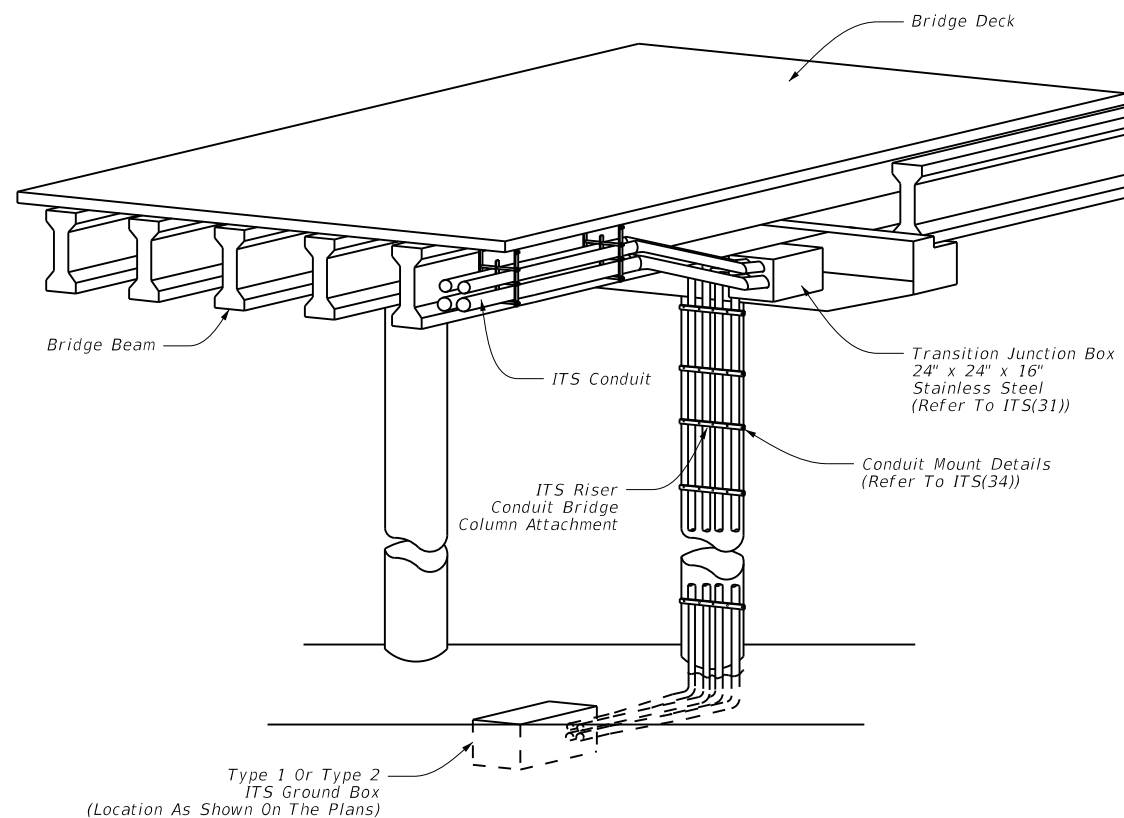
Refer To ITS(29) For General Notes

Note:

- Position conduit hanger height to avoid conflicts with diaphragms in the conduit runs.



Typical Alternate Conduit Hanger Support (Steel I-Beam Mount)



Type 1 Or Type 2
ITS Ground Box
(Location As Shown On The Plans)

Underside Conduit Hanger Transition Detail

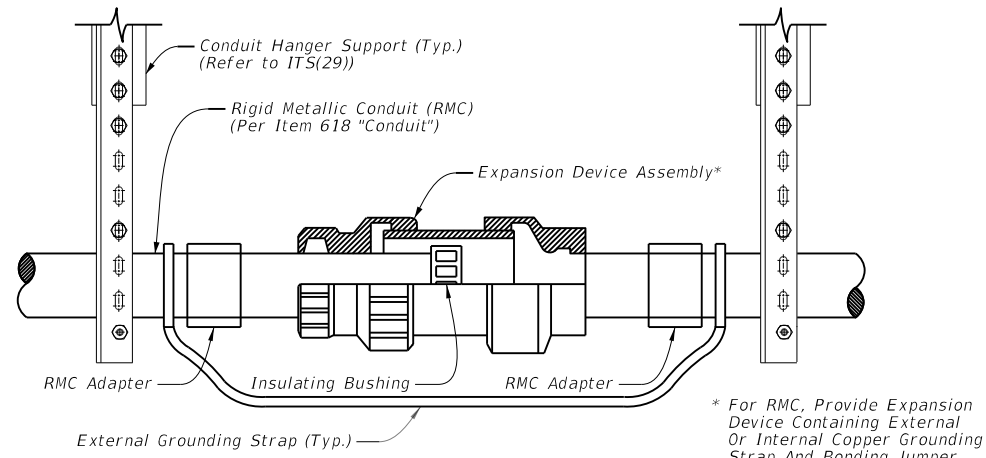
General Notes:

- The alternative mounting conduit hanger support mounting detail for steel I-Beam structures as shown is a suggested detail for steel structures. Submit details for the configuration shown on this sheet via shop drawings and include structural load analysis, support member and connection design. Seal all calculations and shop drawings by a Texas P.E.
- Conduit hanger support mounting details for concrete bridge deck with precast panels as shown are a suggested method for pre-stressed concrete beam structures. Submit any deviation from these details via shop drawing and include structural load analysis, support member, and connection design. Seal all calculations and shop drawings by a Texas P.E.
- Locate auxiliary conduit hanger supports for steel structures at a maximum 5'-0" spacing.
- For conduit loads located between beams exceeding 5 lbs per ft, furnish structural load analysis calculations for adjacent beams in the shop drawing submission.
- Submit design details for structure with cathodic protection in the shop drawing submission.
- Do not extend conduit hangers below the bottom of the bridge beams (any exceptions at end spans are subject to approval).
- Drilling in pre-stressed beams or field welding of steel beams is not permitted. Submit any exceptions on a case by case basis for evaluation and approval by the Engineer.
- Ensure all conduit hanger assemblies are furnished and supplied by the conduit hanger manufacturer.
- Galvanize all hardware and structural steel that is not stainless steel. Ensure all bolt hardware used to secure hangers to steel structures conforms to ASTM A325 for high strength. Ensure all expansion anchors conform to ASTM A307. Separate dissimilar materials for use of galvanized hardware with weathering steel girders.
- Select conduit lengths so that couplings do not coincide with conduit hanger locations.
- Refer to Special Specification, "ITS Multi-Duct Conduit" or Item 618 "Conduit", for details on conduit mandreling and other testing required upon conduit installation.
- Provide a flat pull cord in each conduit and inner duct to allow for installation of future cables to match 1250 lbs-ft tension. Refer to ITS(27) for additional conduit details.
- Provide a transition junction box for conduit access located outside the abutments for bridge spans < 800 ft. For bridge spans > 800 ft., locate an additional junction box for conduit access near the mid-span/pier.
- Provide ITS conduit of the type and configuration shown on the plans in accordance with Special Specification, "ITS Multi-Duct Conduit" or Item 618 "Conduit". Ensure all other conduit is in accordance with Item 618 "Conduit" and as shown on the plans.
- Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

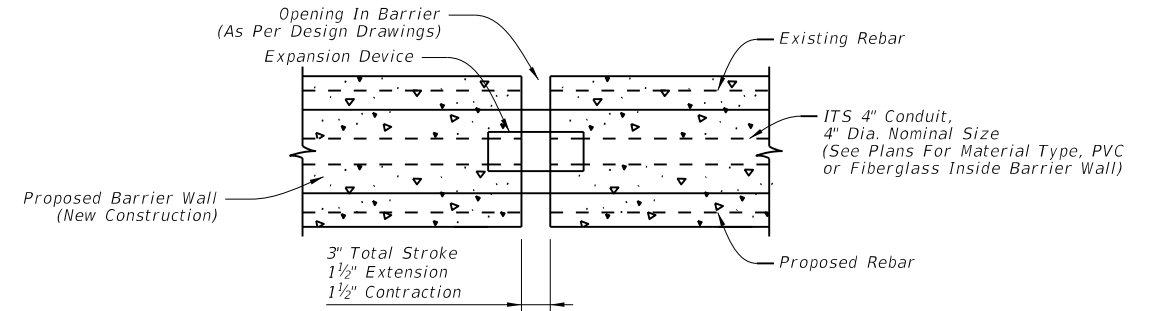
		Traffic Operations Division Standard	
<h2>STRUCTURE MOUNTED ITS CONDUIT</h2>			
<h3>ITS (30) - 16</h3>			
FILE: its (30) - 16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	HIGHWAY
REVISIONS	0271	15	099
DIST	COUNTY		SHEET NO.
HOU	HARRIS		128

Sheet Details
Not to Scale

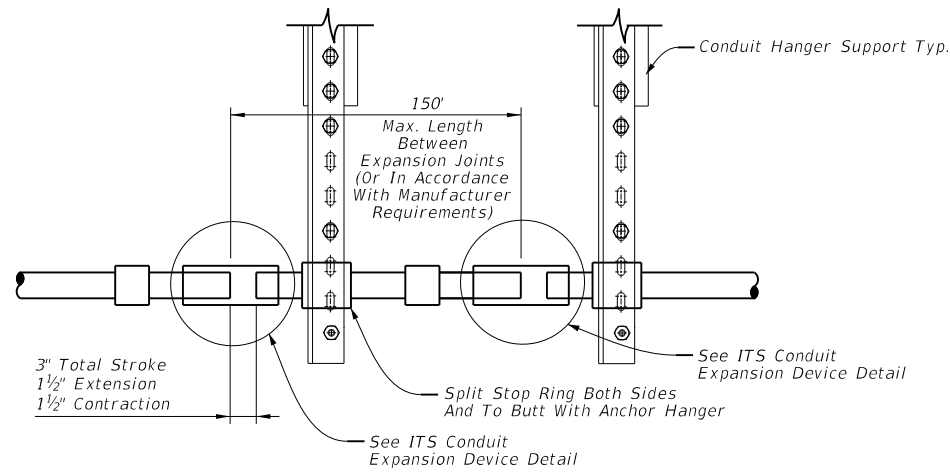
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



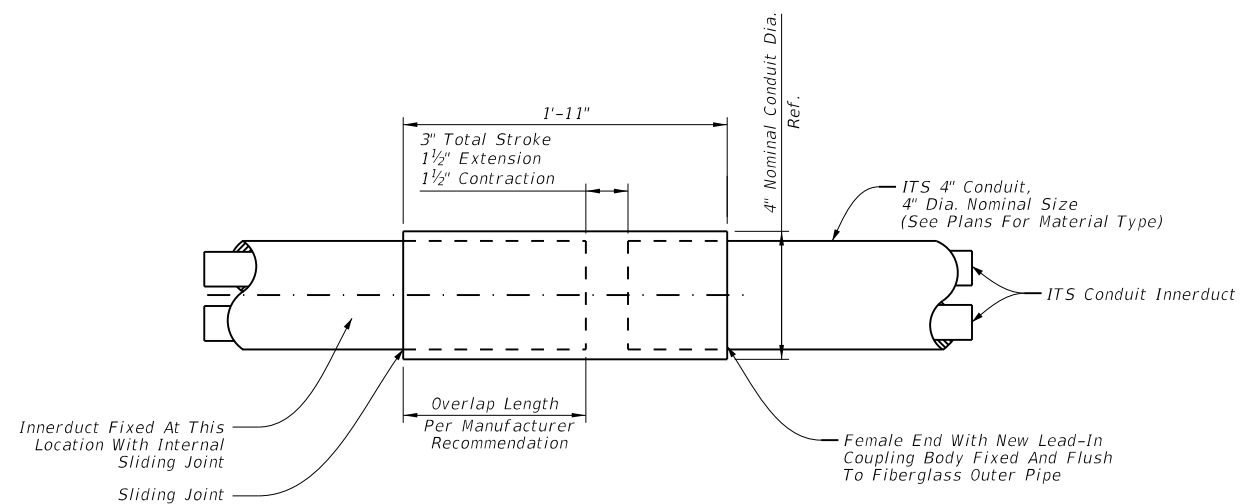
RMC Conduit Expansion Device Detail (Typ.)



ITS Conduit In New Construction Barrier Wall Expansion And Deflection Joint Fitting (Typ.)



ITS Conduit Expansion Device Placement (Typ.)



ITS Conduit Expansion Device Detail

General Notes:

1. Install expansion device at all open joints, at each end of bridge abutments and between bridge bents, allowing for 3" movement.
2. Provide a minimum of two (2) expansion joints at all bridges. Ensure expansion joint spacing does not exceed manufacturer recommendations.
3. Ensure conduit lengths are selected so that couplings do not coincide with hanger locations.
4. Ensure all rigid metallic conduit (RMC) expansion devices are constructed per manufacturer specifications.
5. Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

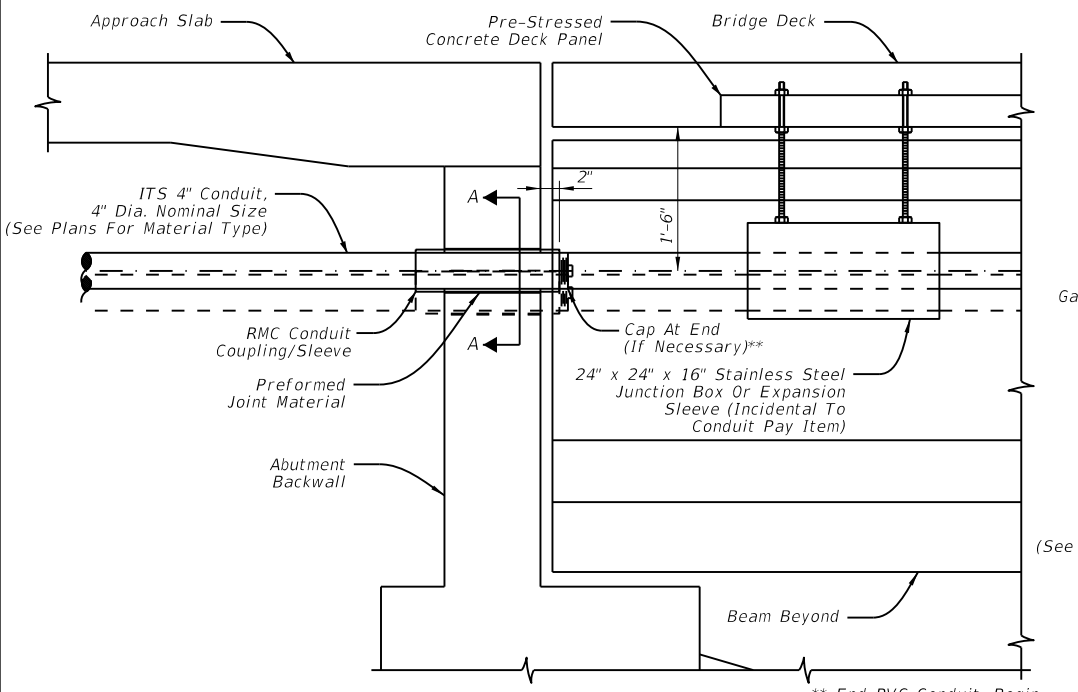
DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME

Sheet Details
 Not to Scale

				Traffic Operations Division Standard	
<h2>EXPANSION / DEFLECTION JOINT</h2> <h3>ITS(32)-16</h3>					
FILE: its(32)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0271	15	099	IH 610	
	DIST	COUNTY	SHEET NO.		
	HOU	HARRIS	129		

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

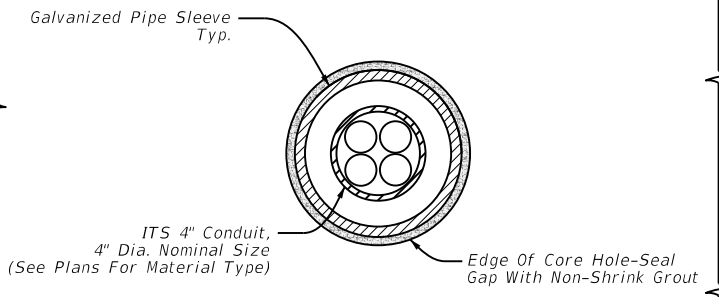
DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME



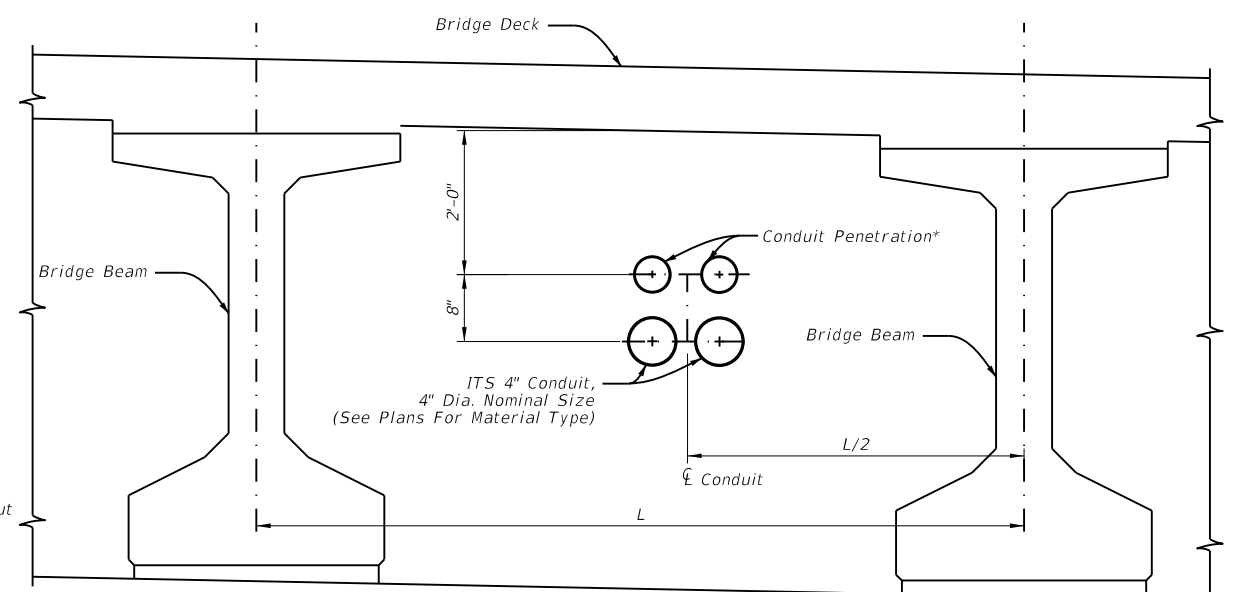
Section Through New Construction Abutment Backwall

Standard Notes:

1. If constant conduit elevation is maintained from the abutment backwall to the underside conduit hangers, provide an expansion joint sleeve (same size as conduit) with one travel overlap. If conduit elevation varies from the abutment backwall to the underside conduit hangers, provide an abutment wall mounted transition junction box (NEMA 3R rated).
2. Provide separate pipe sleeve for each conduit through abutment backwall. Size sleeve per manufacturer recommendations.



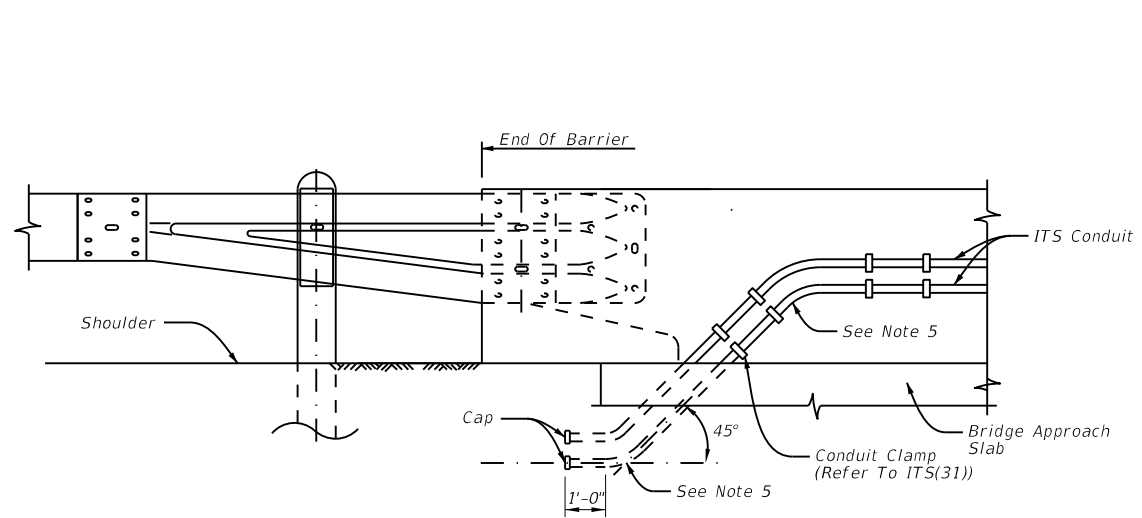
Section A-A (Typical Pipe Sleeve)



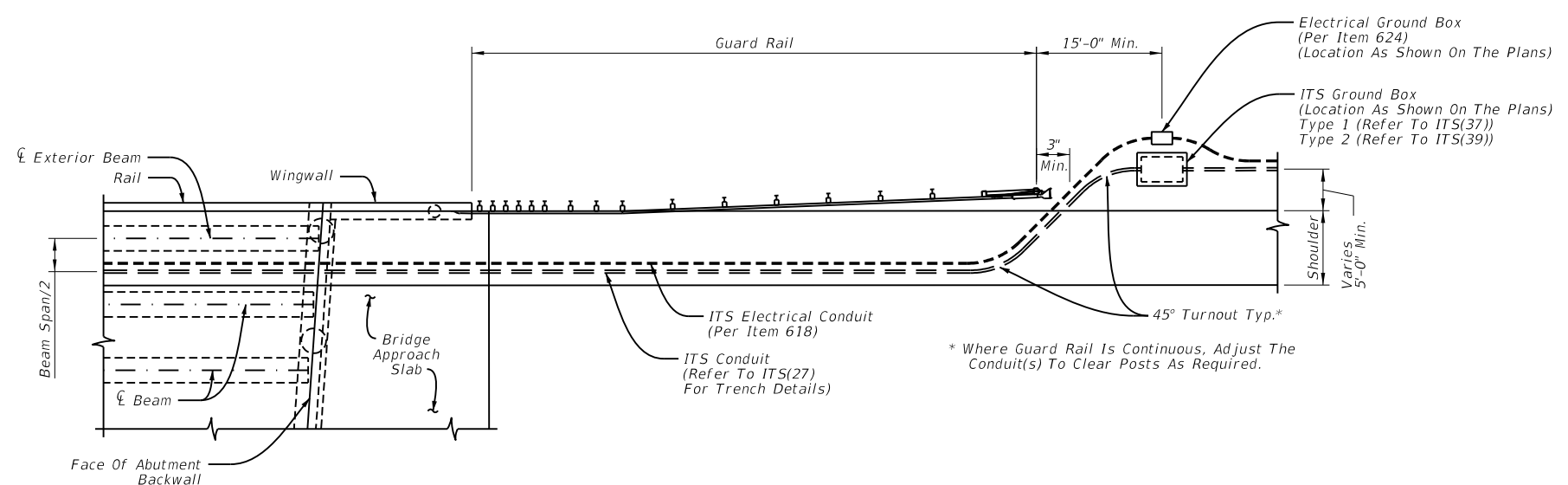
Abutment Elevation

* Showing Control Dimensions For Conduits Thru Abutment Backwall. 2 x 2 Conduit Configuration Shown.

ITS Conduit Transition At Bridge Abutment Detail



Parapet Mounted Conduit Transition To Ground Detail



Conduit Through Abutment Backwall Transition To Ground Box Detail

General Notes:

1. An alternative option to conduit mountings shown is conduit encased within parapet or bridge structure at crossings. Submit shop drawings and specifications to the engineer for approval.
2. Install expansion sleeves at bridge expansion joints and per manufacturer recommendations.
3. For conduit crossings over bridges, provide ITS communications junction boxes at 1000' maximum spacing and electrical junction boxes at 450' maximum spacing.
4. Keep all junction boxes sufficiently clear of guard rail or other obstructions to maintain clear access.
5. Install conduit sweep at an angle that accommodates cable bend radius. Do not exceed 45 degrees to the shoulder line. Refer to ITS(28) for conduit turn-out details.
6. Do not install junction boxes within paved shoulder area.
7. Ensure all work is in compliance with the latest edition of NFPA 70, National Electrical Code.
8. Junction boxes and associated appurtenances are incidental to ITS conduit.
9. For installation requiring ITS conduit transition within mechanically stabilized earth (MSE) walls with select fill, locate conduit to avoid reinforced straps. Refer to retaining wall standards for further details.
10. Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

Texas Department of Transportation
Traffic Operations Division Standard

ITS CONDUIT TRANSITION AT ABUTMENT

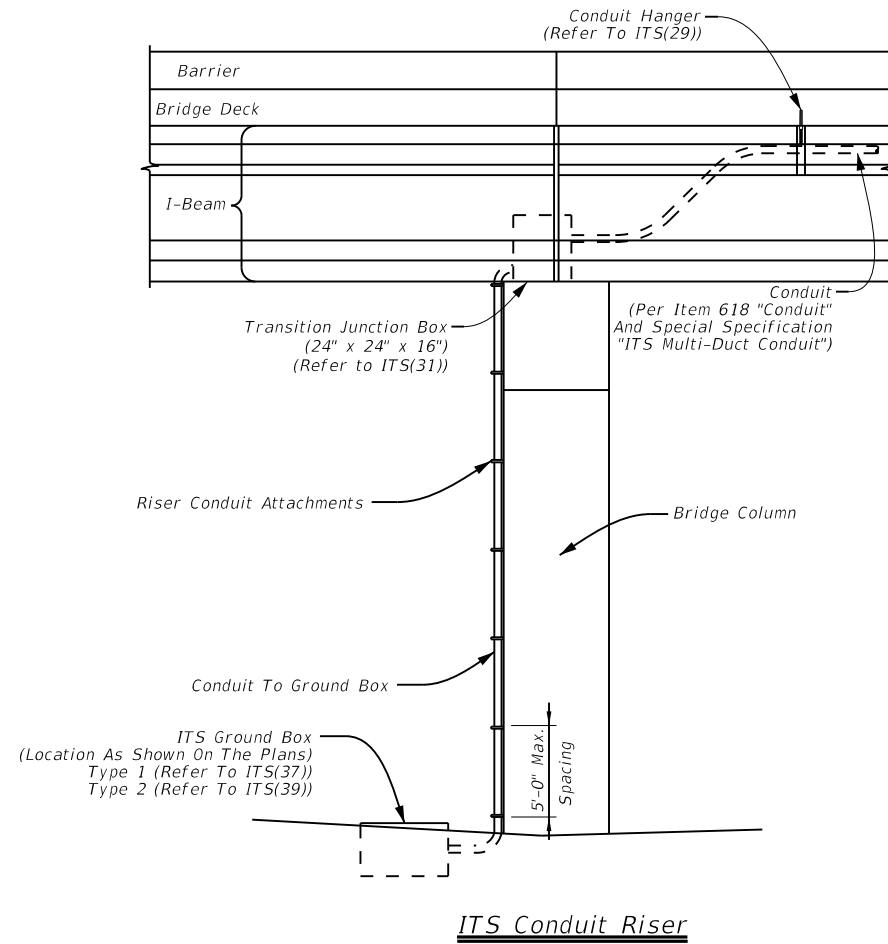
ITS(33)-16

FILE: its(33)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	130	

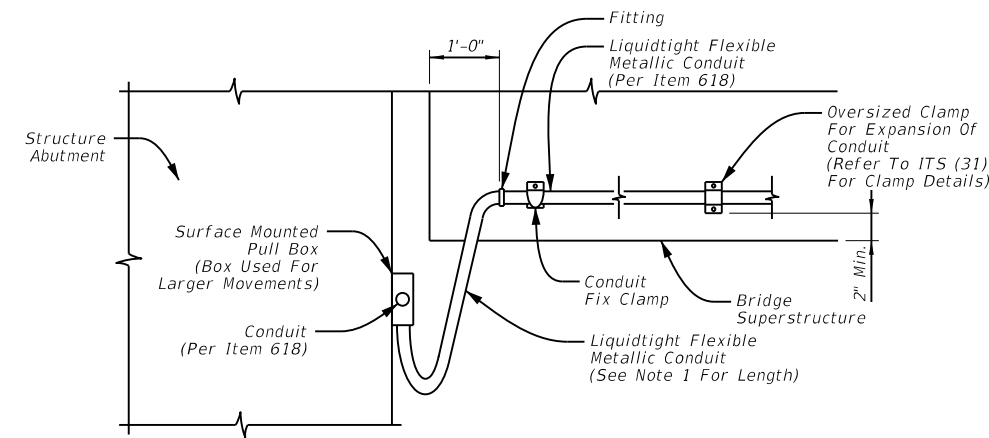
Sheet Details
Not to Scale

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME



ITS Conduit Riser



Exposed Conduit Connections At Expansion Joints

Notes:

- Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).
- The detail shown applies to conduit connections for conduit per Item 618 and is not intended for conduit for fiber optic cable applications.

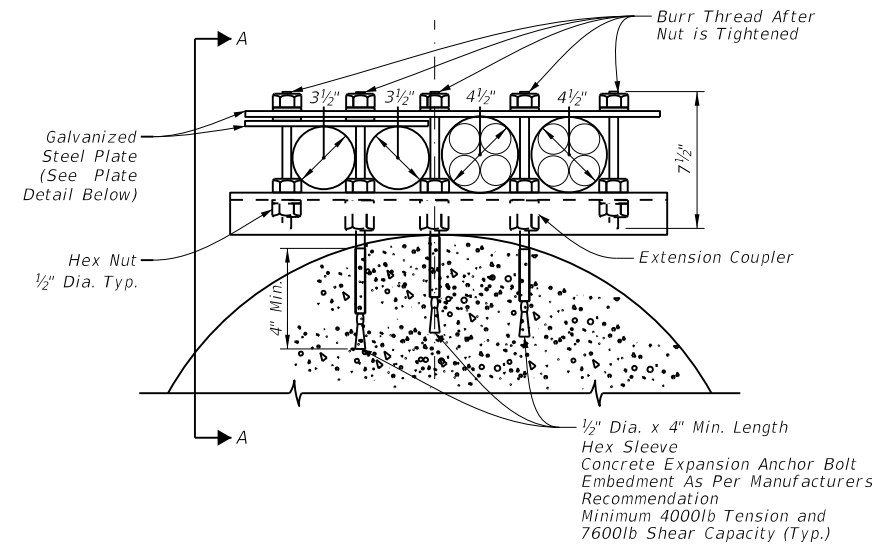
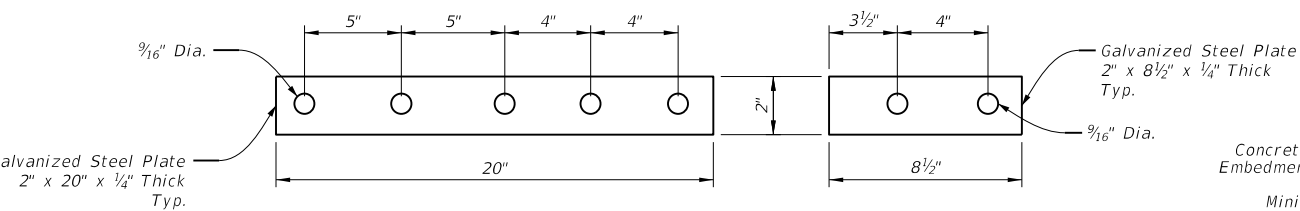
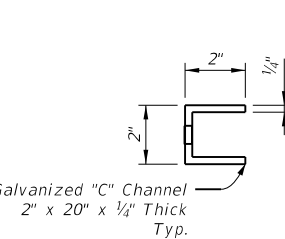


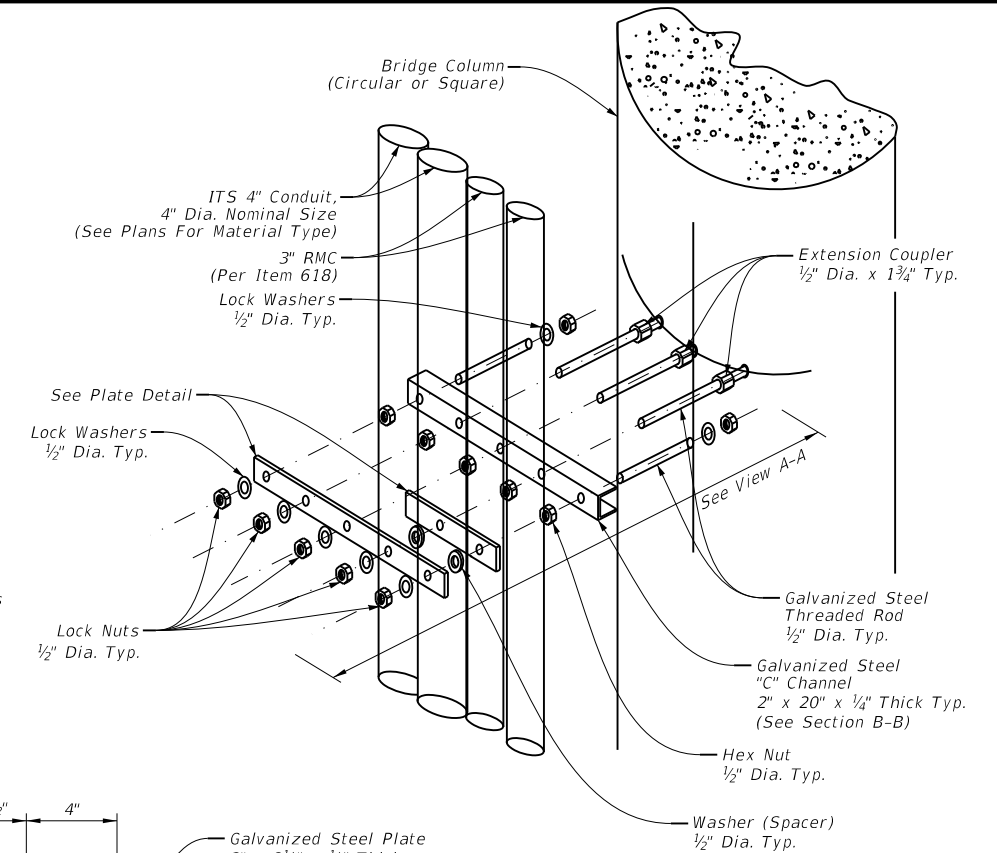
Plate Detail



C Channel Detail



Section B-B



ITS Riser Conduit Bridge Column Attachment

General Notes:

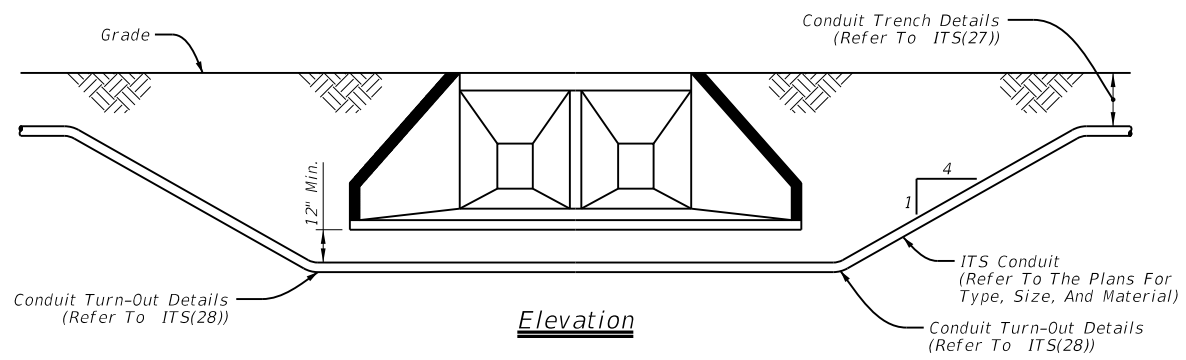
- Utilize an approximate length of flexible conduit at exposed connections of 2 times anticipated movement or 4'-0" minimum.
- Size all transition boxes and surface mounted pull boxes per National Electrical Code Article 314 boxes and fittings.
- For under bridge locations, ensure all junction boxes are kept inaccessible from general public and placed a minimum 10'-0" above surrounding ground.
- Refer to ED standard sheets for additional notes and attachment details for riser conduit.
- See plan sheets for number and size of conduit(s) to be installed.
- Refer to ITS(33) for details involving conduit passing through the abutment.
- Ensure maximum spacing between ITS riser conduit attachments is 5'-0" C-C.
- Install conduit supports within 3'-0" of all enclosures and conduit terminations.
- Ground all rigid metallic conduit (RMC) hangers per manufacturer recommendations when electrical conductors present.
- Ensure all expansion anchors conform to ASTM A307.
- Allowable types of outer duct material for above ground ITS conduit include rigid metallic conduit (RMC) and fiberglass.

Sheet Details
Not to Scale

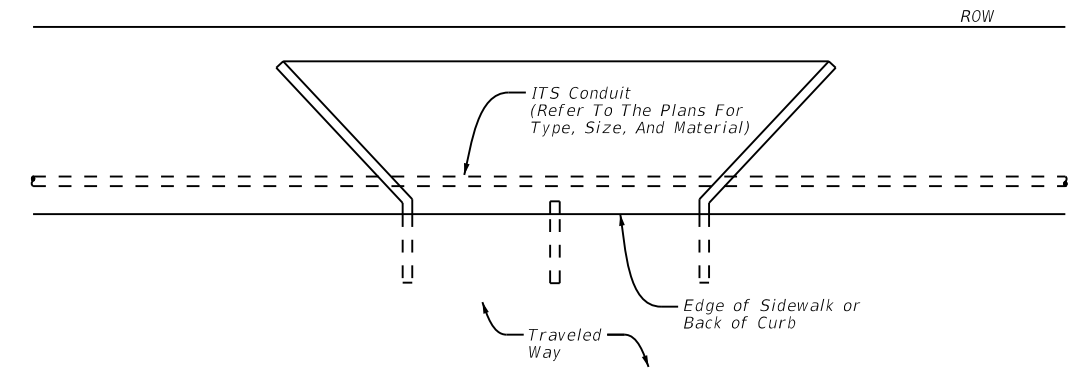
		Traffic Operations Division Standard	
<h1>ITS CONDUIT RISER</h1>			
<h2>ITS(34)-16</h2>			
FILE: its(34)-16.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	HIGHWAY
REVISIONS	0271	15	099
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	131	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME

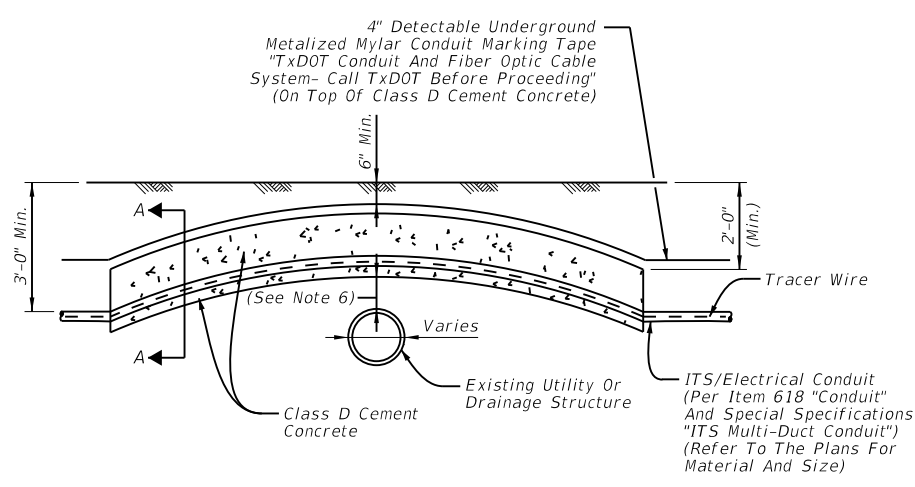


Elevation



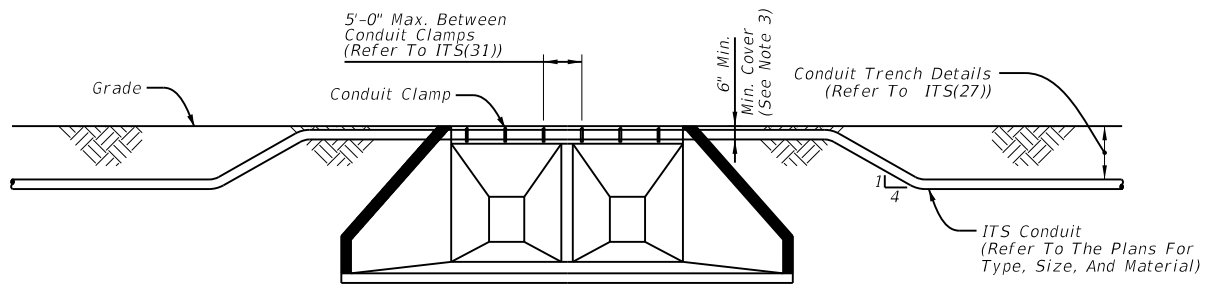
Plan View

Conduit Bored Under Culvert

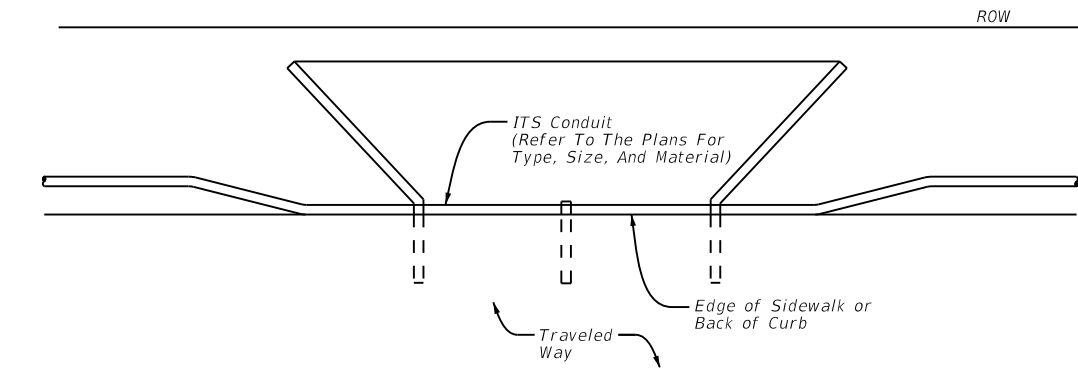


Section A-A

Conduit Installation Detail Above Existing Drain Pipes Or Utilities

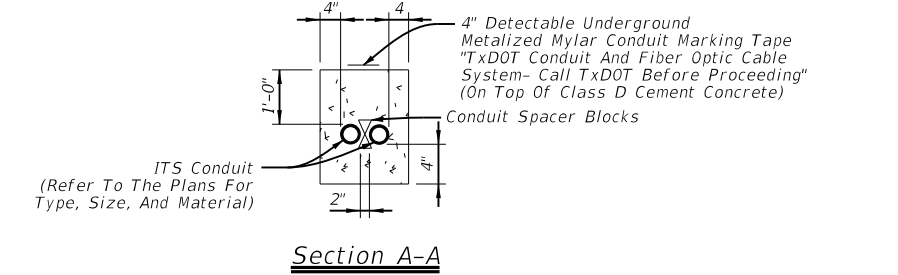


Elevation



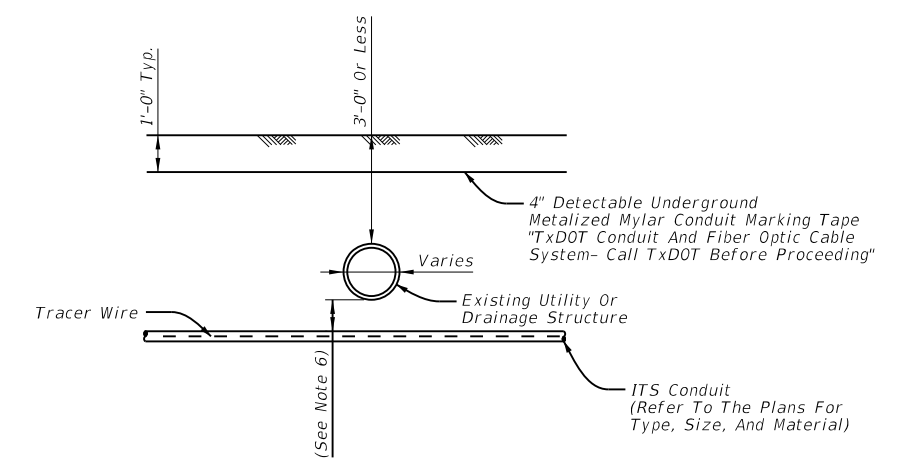
Plan View

Conduit Attached To Culvert Headwall



Section A-A

Conduit Installation Detail Below Existing Drain Pipes Or Utilities



Conduit Installation Detail Below Existing Drain Pipes Or Utilities

General Notes:

1. With approval from the field engineer adjust the final burial depth of conduit(s) in circumstances requiring traversal of non-movable object conflicts.
2. Where conduits are to be installed over existing underground infrastructure (i.e., existing utility or drainage structure) which are less than 3'-0" deep, encase conduit in Class D cement concrete in accordance with Item 421, "Hydraulic Cement Concrete", for the entire length of the conduit that is installed at a depth of less than 3'-0".
3. If depth of cover over encasement is less than 6", install the conduit to pass beneath the underground infrastructure.
4. Refer to the plans for type, size and configuration of all conduits. Refer to ITS(27) and ITS(28) for further installation details.
5. It is the responsibility of the contractor to verify all existing underground infrastructure. The contractor is responsible for any damage to any underground infrastructure during construction. Verify all utility locations at least 100' in advance of trenches, plowing or boring, and make changes in conduit placement in the event of conflict.
6. If proposed conduit is crossing or in close proximity to an existing underground utility, maintain a minimum clearance of 1'-6" vertical, 1'-6" horizontal or a clearance dictated by municipal code and or utility owner.
7. Install underground warning tape directly above all conduits per ITS(27) standard.
8. Do not install communications and electric cables in the same conduit. Separate conduits installed within the same trench based on NFPA 70, National Electrical Code. Refer to ITS(27) for additional conduit installation details.
9. Ensure all work is in compliance with the latest edition of NFPA 70, National Electrical Code.
10. Utilize PVC conduit for all underground applications as required by design. Transition with a conduit coupling to RMC conduit or other as required by design that is approved for above ground applications.
11. Do not exceed a rise:run ratio of 1:4 for conduit sloped through increases or decreases in elevation.

Sheet Details
Not to Scale



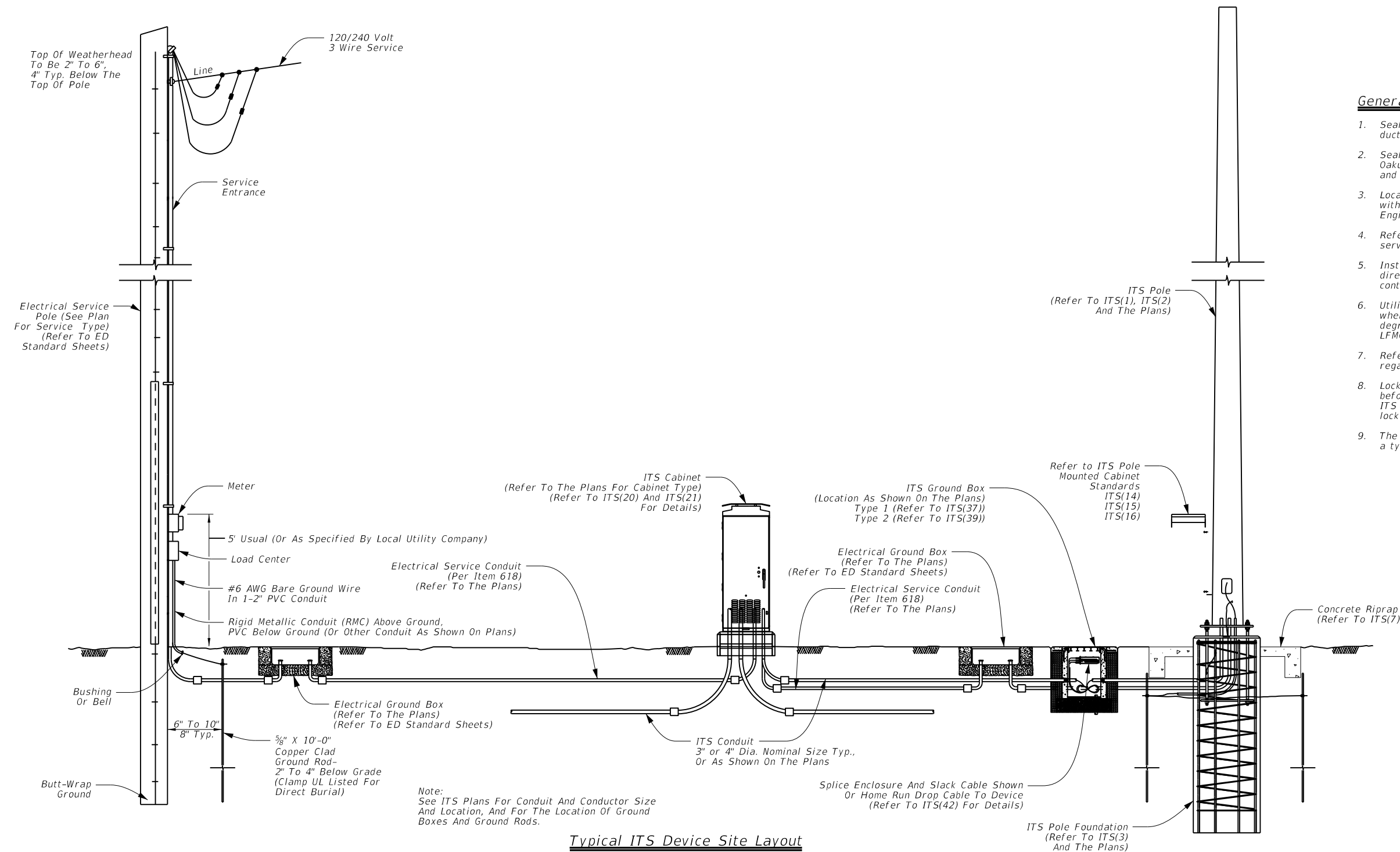
ITS CONDUIT OBSTRUCTION CROSSING

ITS(35)-16

FILE: its(35)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	132	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME



General Notes:

1. Seal all ITS communications conduits with waterproof duct plugs and seals.
2. Seal ends of all conduit entries into ITS cabinets with Oakum or other as approved by the District representative and pack with duct sealant.
3. Locate ground boxes for electrical and ITS communications within 5'-0" of cabinet enclosure, or as directed by the Engineer.
4. Refer to ED standard sheets for additional notes regarding electrical service.
5. Install service pole ground rod at alternate location when directed by the engineer. Maintain a minimum of 8'-0" in contact with the earth.
6. Utilize liquidtight flexible metal conduit (LFMC), as required when meter and service enclosure are mounted 90 to 180 degrees to each other. Refer to ED standard sheets for details on LFMC use.
7. Refer to ITS(21), ITS(37) and ITS(39) for details regarding conduit depth and entry into ITS ground boxes.
8. Lock all enclosures and bolt all ground box covers before power is applied to the circuit. Refer to the ITS cabinet references indicated on this sheet for cabinet lock requirements.
9. The detail shown is diagrammatic and is intended to represent a typical layout from electrical service to ITS devices.

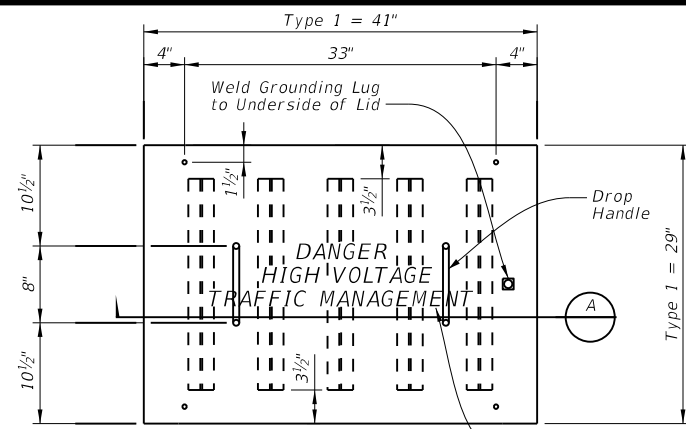
Typical ITS Device Site Layout

Sheet Details
 Not to Scale

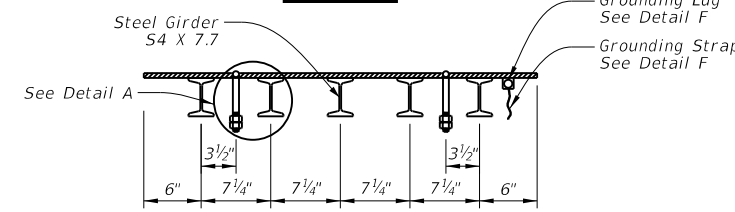
		Traffic Operations Division Standard	
<h2>TYPICAL ITS DEVICE SITE LAYOUT</h2>			
<h3>ITS(36)-16</h3>			
FILE: its(36)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	HIGHWAY
REVISIONS	0271	15	099
DIST	COUNTY		SHEET NO.
HOU	HARRIS		133

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

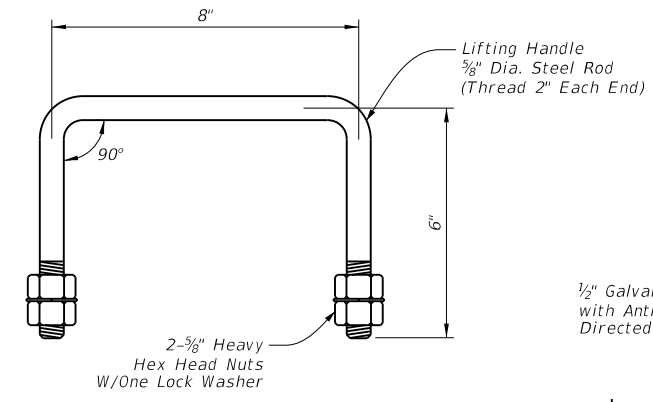
DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME



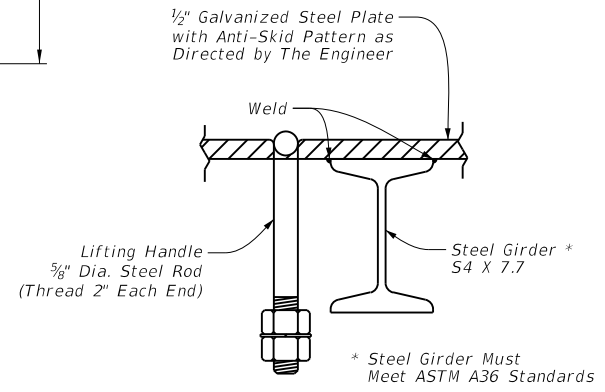
Type 1 Steel Cover Details
 Top View



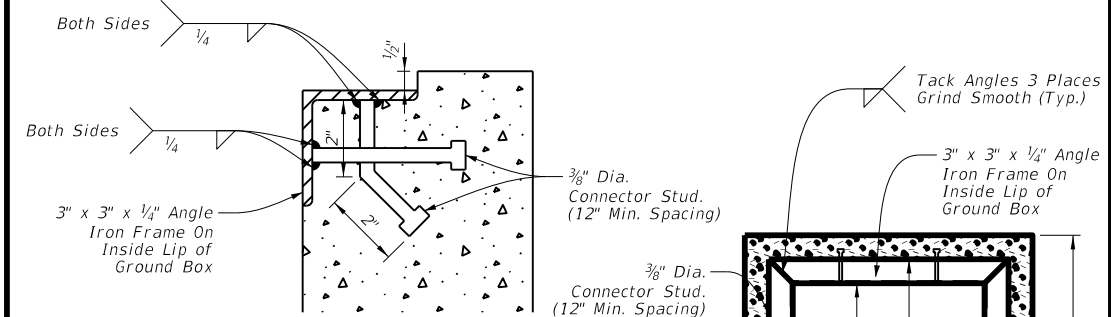
Section A



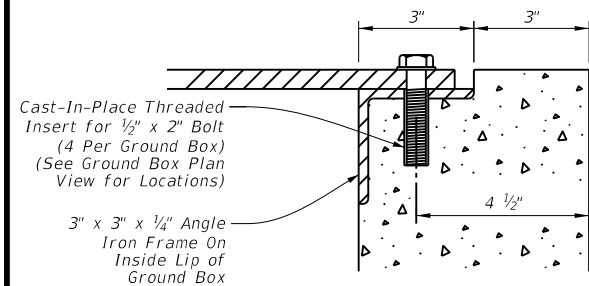
Drop Handle Detail



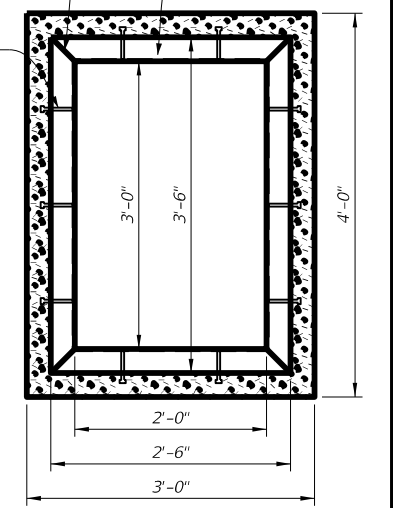
Detail A



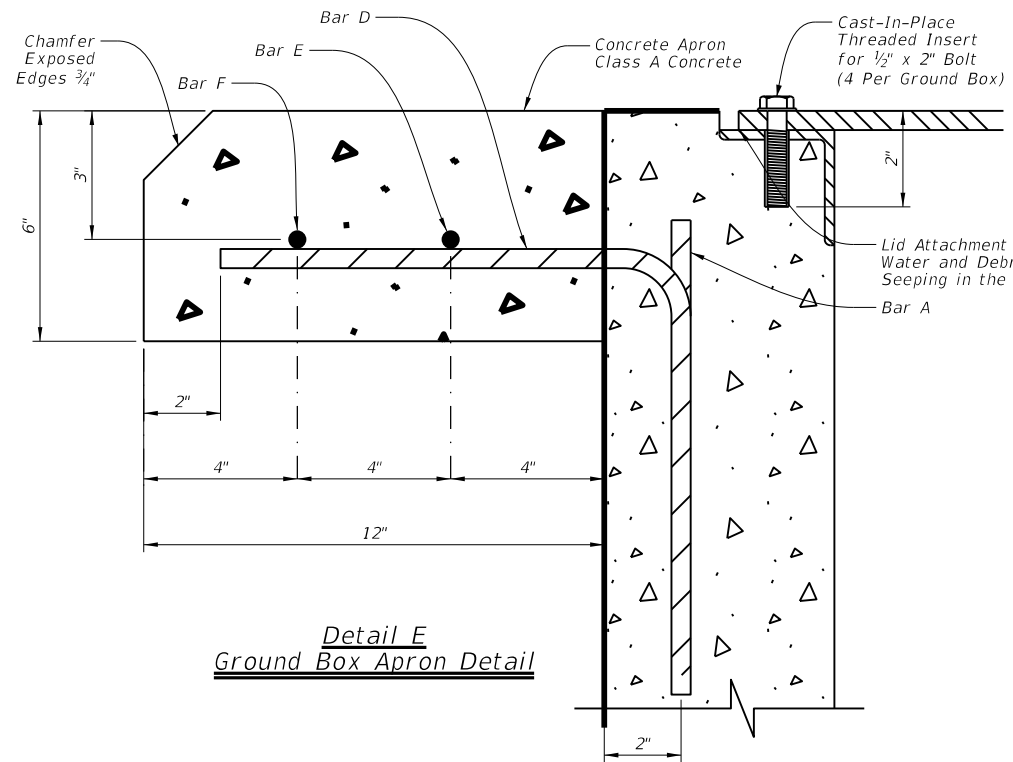
Detail B



Detail C
 Lid Attachment Detail



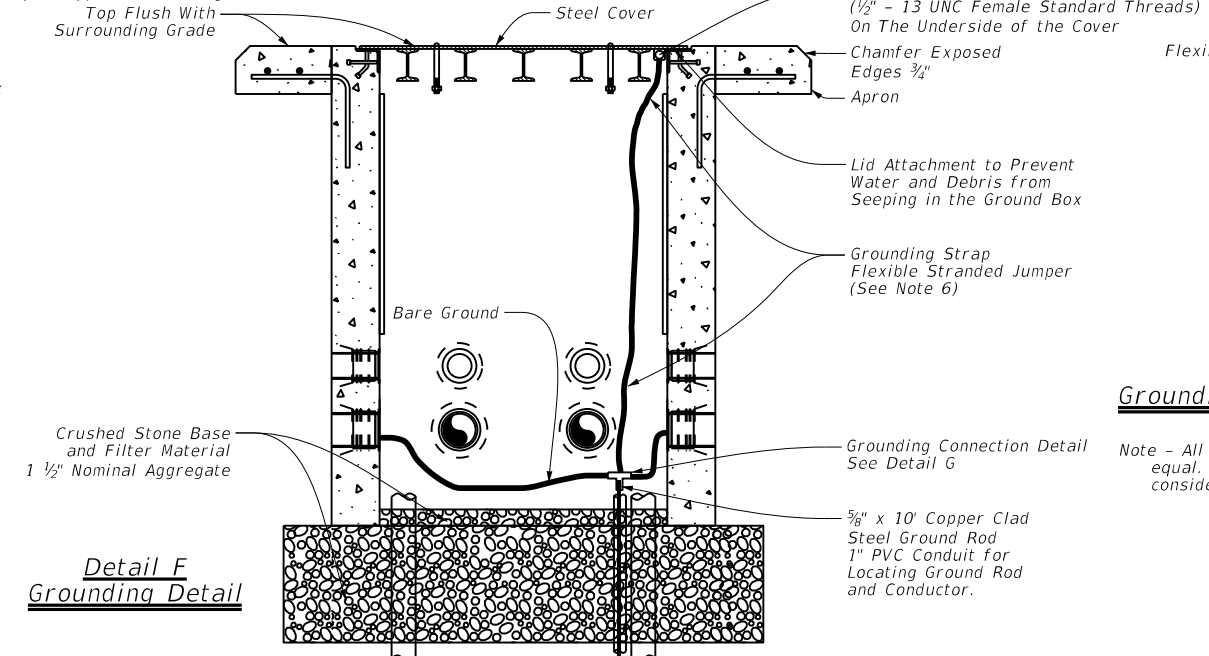
Detail D



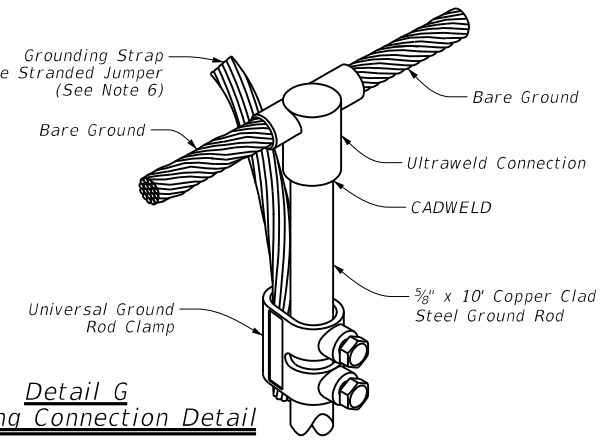
Detail E
 Ground Box Apron Detail

Ground Box Type 1	BAR A					BAR B					BAR D					BAR E					BAR F					TOTALS	
	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	Steel * LBS.	Conc. * CY
36" Depth	22	#4	St.	2'-8"	39.3	5	#4	Bt.	13'-2"	44.1	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	17'-2"	6.5	1	#3	Bt.	19'-10"	7.5	108.1	.67
48" Depth	22	#4	St.	3'-8"	54.0	7	#4	Bt.	13'-2"	61.8	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	17'-2"	6.5	1	#3	Bt.	19'-10"	7.5	140.5	.89
60" Depth	22	#4	St.	4'-8"	68.8	8	#4	Bt.	13'-2"	70.6	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	17'-2"	6.5	1	#3	Bt.	19'-10"	7.5	164.1	1.11

* - For Contractors Information Only. Incidental to "ITS Ground Box".
 Legend: Ty. = Type, St. = Straight, Bt. = Bent



Detail F
 Grounding Detail



Detail G
 Grounding Connection Detail

General Notes:

- See ITS(37) for additional Type "1" ground box details.
- Hot-dip galvanized steel covers after all welds are made.
- Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT" using template-guided, hand-welded lettering at a height of 2 inches to ensure neatness.
- Provide all Type "1" ground boxes with a securable, tamper-proof cover equipped with a bolting system that positively secures the cover in place.
- Ground steel covers in accordance with the National Electrical Code.
- Ground covers to the grounding cable using a split-bolt kearney clamp, and a minimum 8-foot long flexible stranded jumper the same size as the grounding conductor. Terminate to metal ground box cover with a tank ground type lug as approved and directed by the Engineer.
- Provide Type "1" ground box and cover designed for heavy duty loading in accordance with AASHTO H20 loading when located where the box may experience deliberate, continuous vehicular traffic, such as near the shoulder or an auxiliary lane, or immediately adjacent to the unprotected edge of pavement.
- Provide a Type "1" ground box and cover tested by a laboratory independent of the manufacturer certifying loading requirements are met. Provide certification of such tests to the Engineer for approval.
- Provide a steel or cast iron cover in accordance with Item 471, Article 471.2, "Frames, Grates, Rings, and Covers." Provide covers with the number of drop handles shown. Provide Class "A" concrete for ground box construction and aprons.
- Fabricate cover so to fits properly on the ground box, and no undue noise results when traffic contacts the cover.

Sheet Details
 Not to Scale

SHEET 2 OF 2

Texas Department of Transportation
 Traffic Operations Division Standard

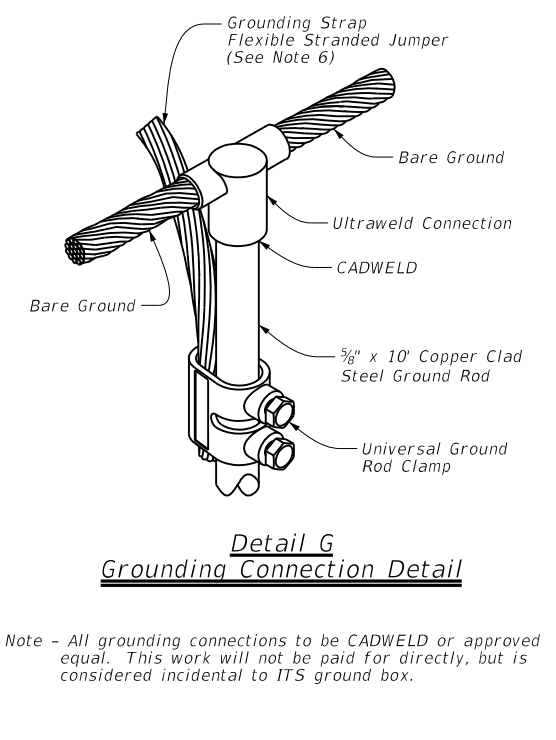
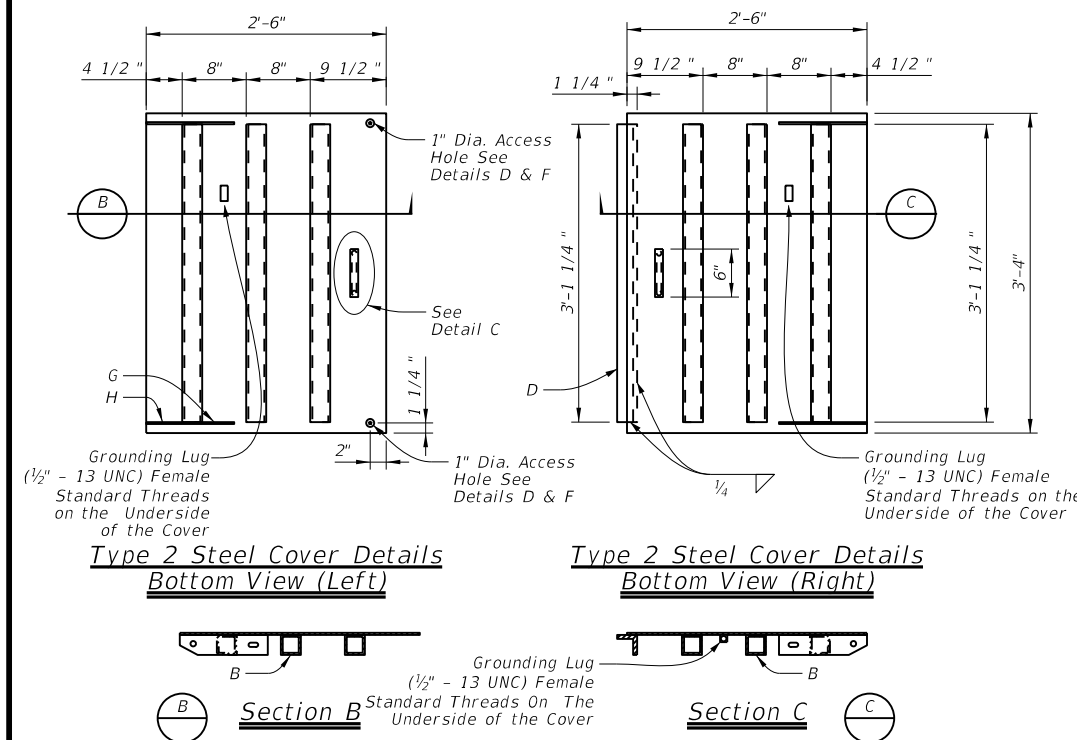
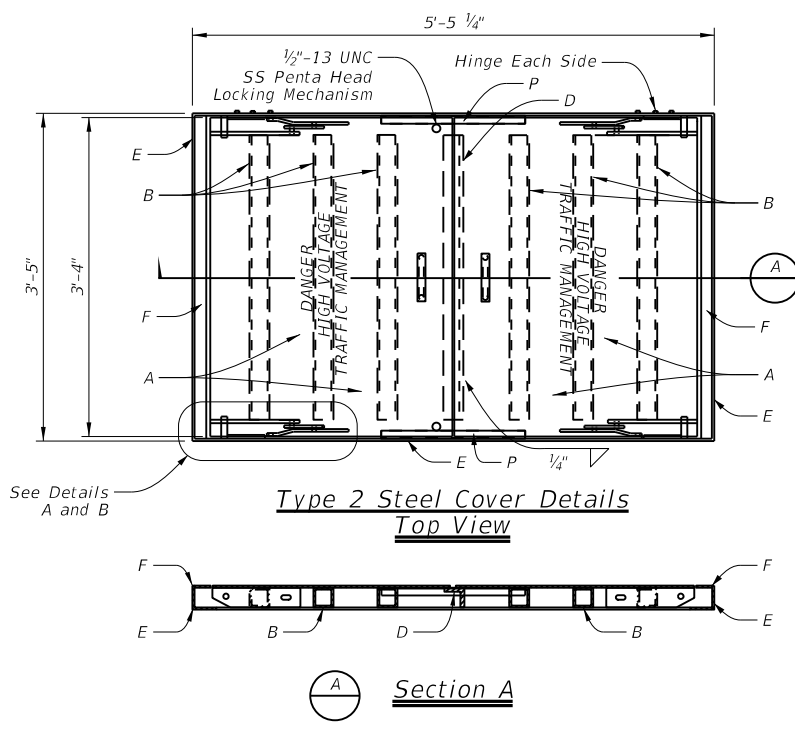
ITS GROUND BOX DETAILS
 TYPE "1" WITH STEEL COVER

ITS(38)-17

FILE: its(38)-17.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
5-17	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	135	

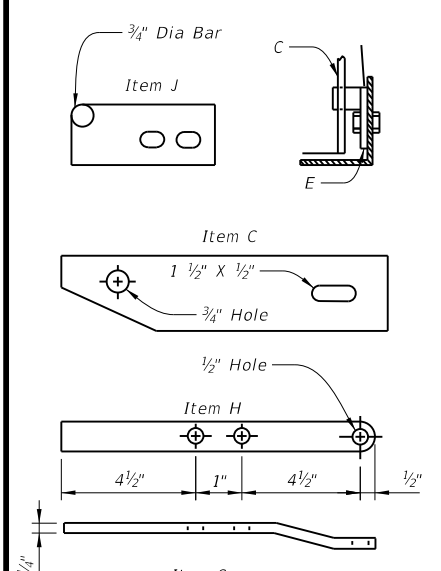
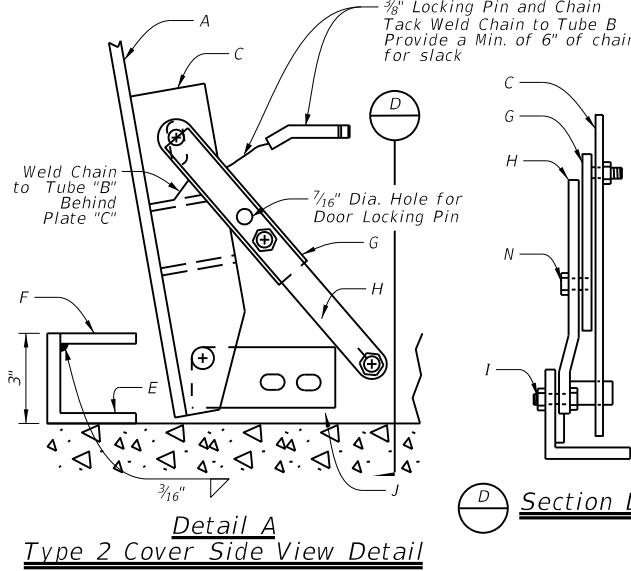
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME



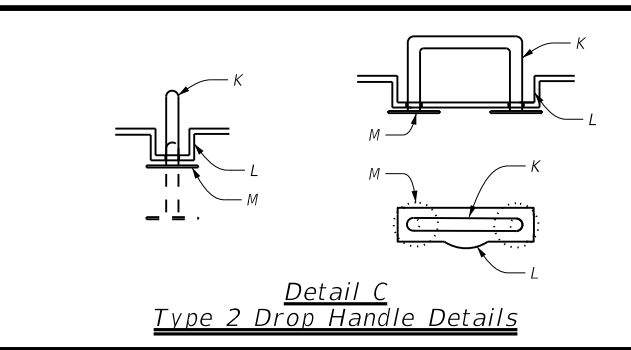
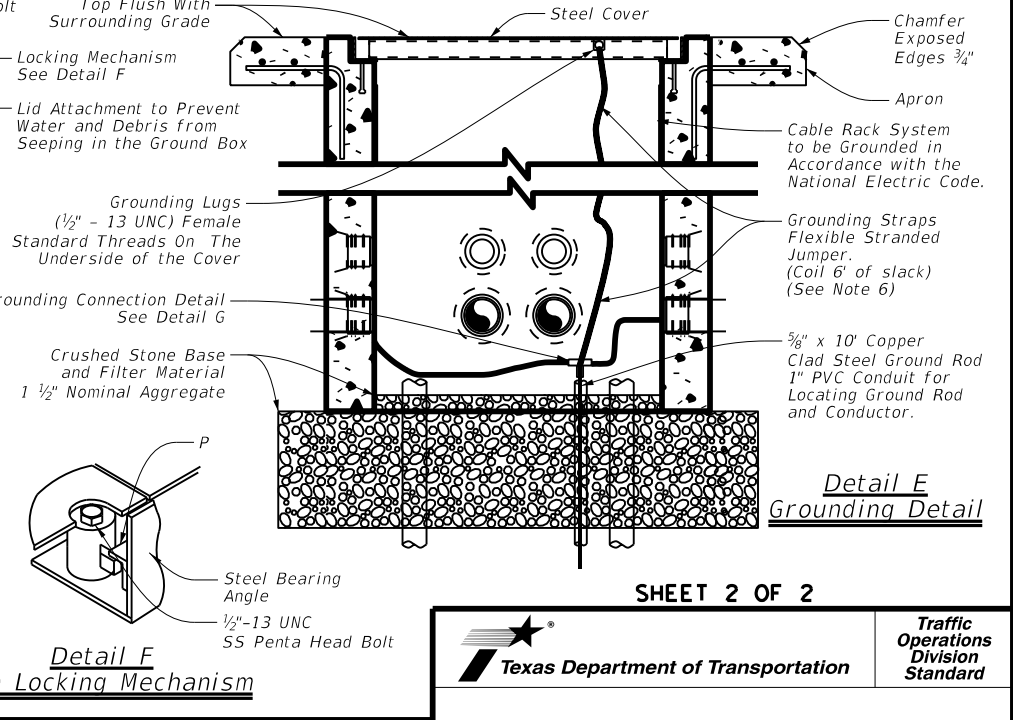
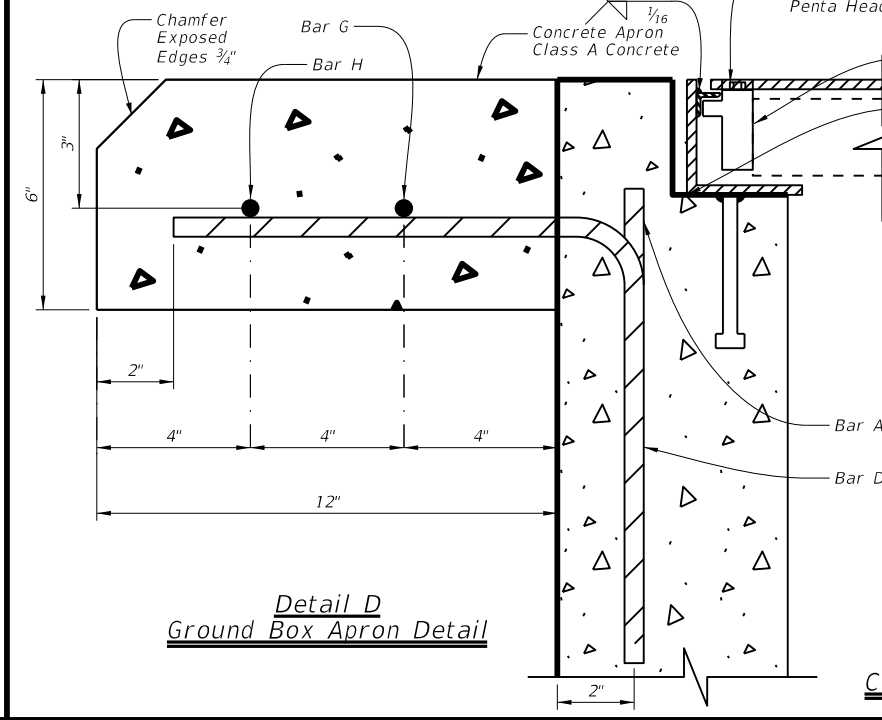
Item	Qty	Incidental "ITS Ground Box" Material
A	2	1/4" Floor Plate 40" x 30"
B	6	2 1/2" x 2 1/2" x 37 1/4" Tube
C	4	11" x 2 1/2" x 1/4" Plate
D	1	2 1/2" x 2 1/2" x 1/2" x 37 1/4" Angle
E	4	3" x 3" x 1/4" Angle
F	2	40 1/2" x 2" x 1/4" Plate
G	4	6 1/2" x 1 1/4" x 1/4" Plate
H	4	10 1/2" x 1 1/4" x 1/4" Plate
I	12	1/2" Bolt/Nut
J	4	4 3/4" x 2" x 3/4" Plate
K	2	5/8" Drop Handle
L	2	1 1/2" x 5/8" x 3/16" Channel x 7"
M	4	1 1/2" x 1/8" P Disk
N	8	1/2" x 5/8" Bolt
P	2	1" x 1" x 1/8" Angle x 18"

Note - All grounding connections to be CADWELD or approved equal. This work will not be paid for directly, but is considered incidental to ITS ground box.



Ground Box Type 2	BAR A					BAR C					BAR D					BAR G					BAR H					TOTALS	
	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	No.	Size	Ty.	Length	Weight	Steel * LBS.	Conc. * CY
36" Depth	28	#4	St.	2'-8"	50.0	5	#4	Bt.	19'-1"	63.9	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	23'-3"	8.8	1	#3	Bt.	25'-11"	9.8	143.2	1.00
48" Depth	28	#4	St.	3'-8"	68.8	7	#4	Bt.	19'-1"	89.5	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	23'-3"	8.8	1	#3	Bt.	25'-11"	9.8	187.6	1.33
60" Depth	28	#4	St.	4'-8"	87.5	8	#4	Bt.	19'-1"	102.3	8	#4	Bt.	2'-0"	10.7	1	#3	Bt.	23'-3"	8.8	1	#3	Bt.	25'-11"	9.8	219.1	1.67

* - For Contractors Information Only. Incidental to "ITS Ground Box".
 Legend: Ty. = Type, St. = Straight, Bt. = Bent



- General Notes:**
- See ITS(39) for additional Type "2" ground box details.
 - Hot-dip galvanized steel covers after all welds are made.
 - Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT" using template-guided, hand-welded lettering at a height of 2 inches to ensure neatness.
 - Provide all Type "2" ground boxes with a securable, tamper-proof cover equipped with a bolting system that positively secures the cover in place.
 - Ground steel covers in accordance with the National Electrical Code.
 - Ground covers to the grounding cable using a split-bolt kearney clamp, and a minimum 8-foot long flexible stranded jumper the same size as the grounding conductor. Terminate to metal ground box cover with a tank ground type lug as approved and directed by the Engineer.

- Provide Type "2" ground box and cover designed for heavy duty loading in accordance with AASHTO H20 loading when located where the box may experience deliberate, continuous vehicular traffic, such as near the shoulder or an auxiliary lane, or immediately adjacent to the unprotected edge of pavement.
- Provide a Type "2" ground box and cover tested by a laboratory independent of the manufacturer certifying loading requirements are met. Provide certification of such tests to the Engineer for approval.
- Provide a steel or cast iron cover in accordance with Item 471, Article 471.2, "Frames, Grates, Rings, and Covers." Provide covers with the number of drop handles shown. Provide Class "A" concrete for ground box construction and aprons.
- Fabricate cover so to fits properly on the ground box, and no undue noise results when traffic contacts the cover.

Sheet Details
 Not to Scale

SHEET 2 OF 2

Texas Department of Transportation
 Traffic Operations Division Standard

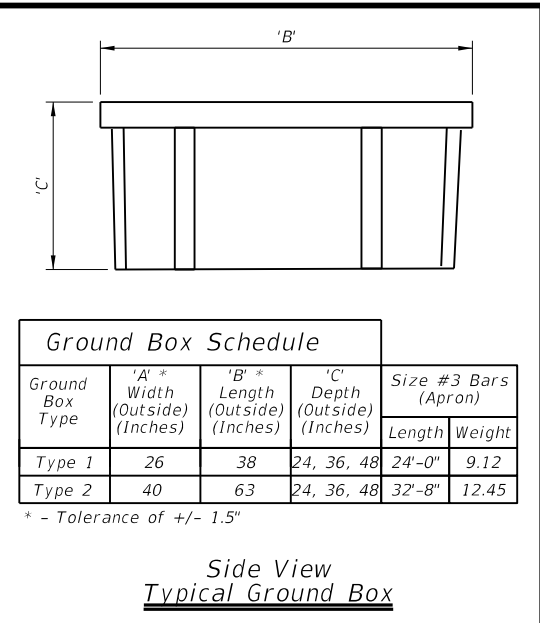
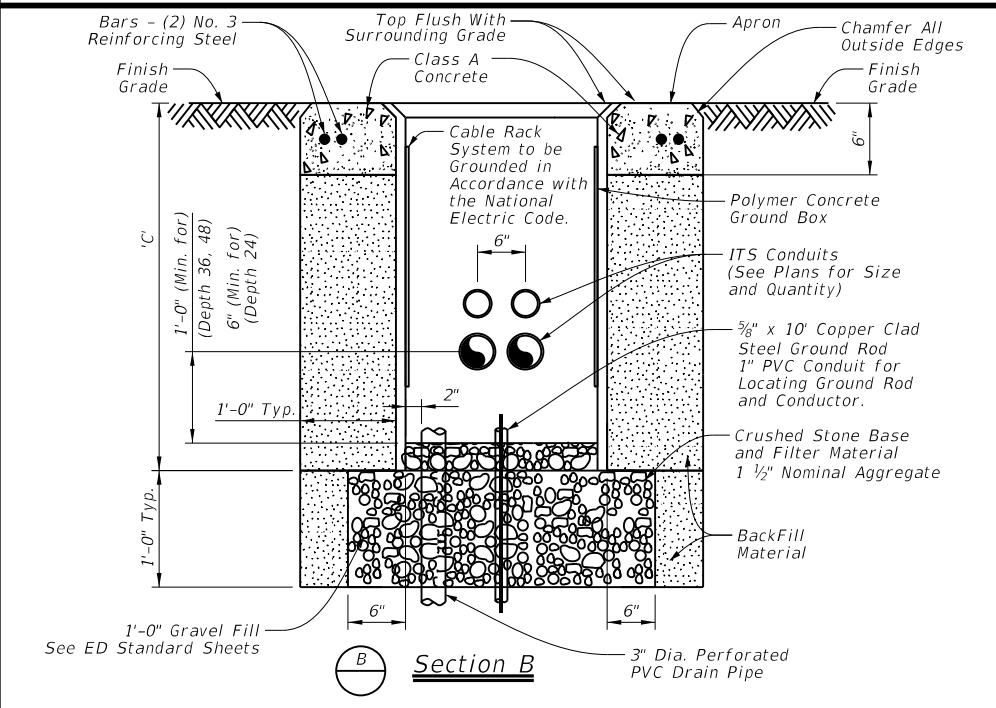
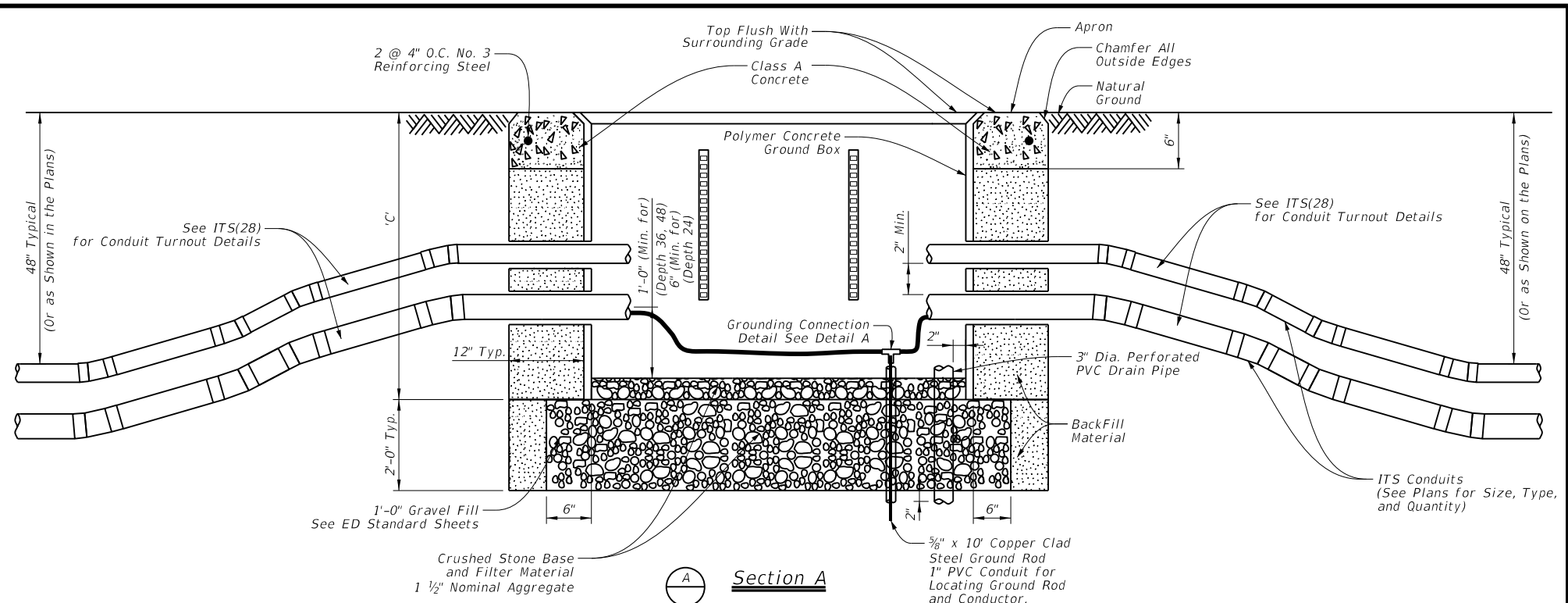
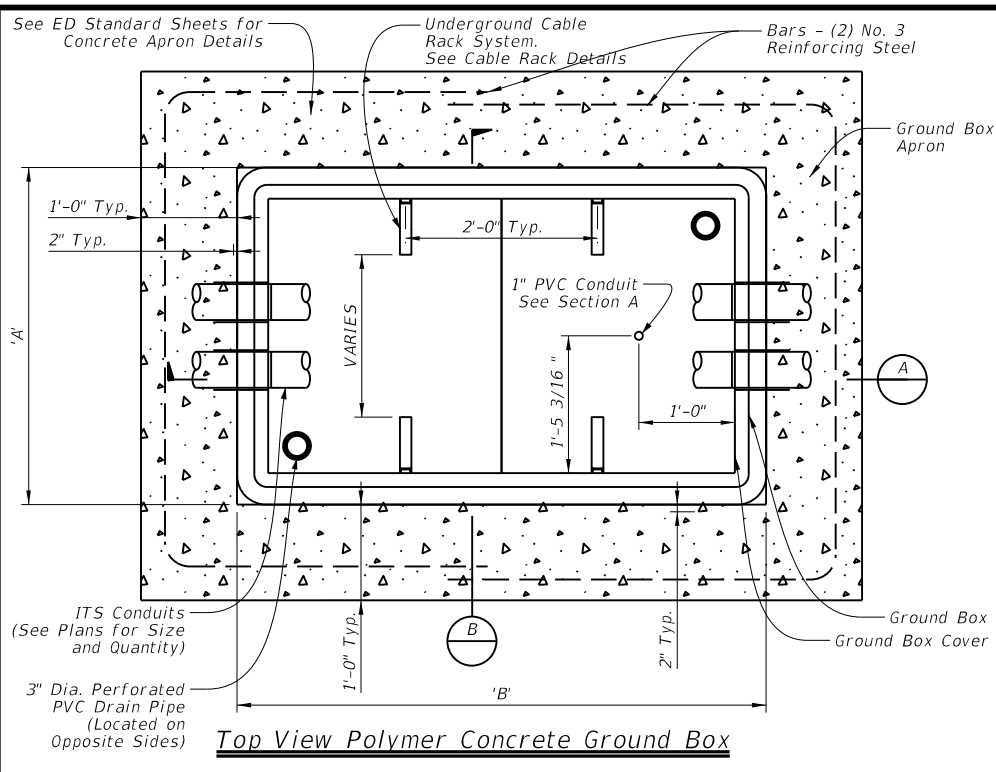
ITS GROUND BOX DETAILS TYPE "2" WITH STEEL COVER

ITS(40)-17

FILE: its(40)-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
5-17	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	137	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

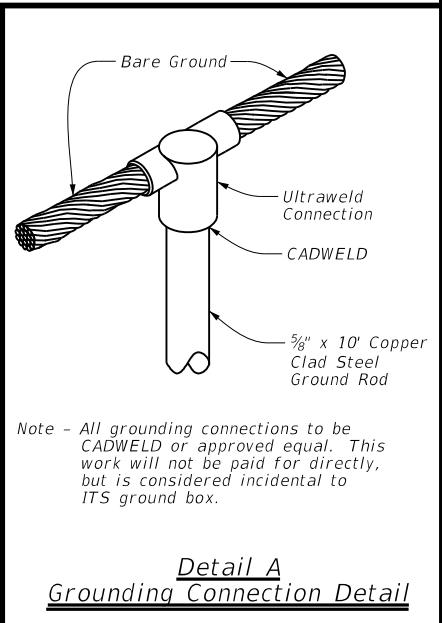
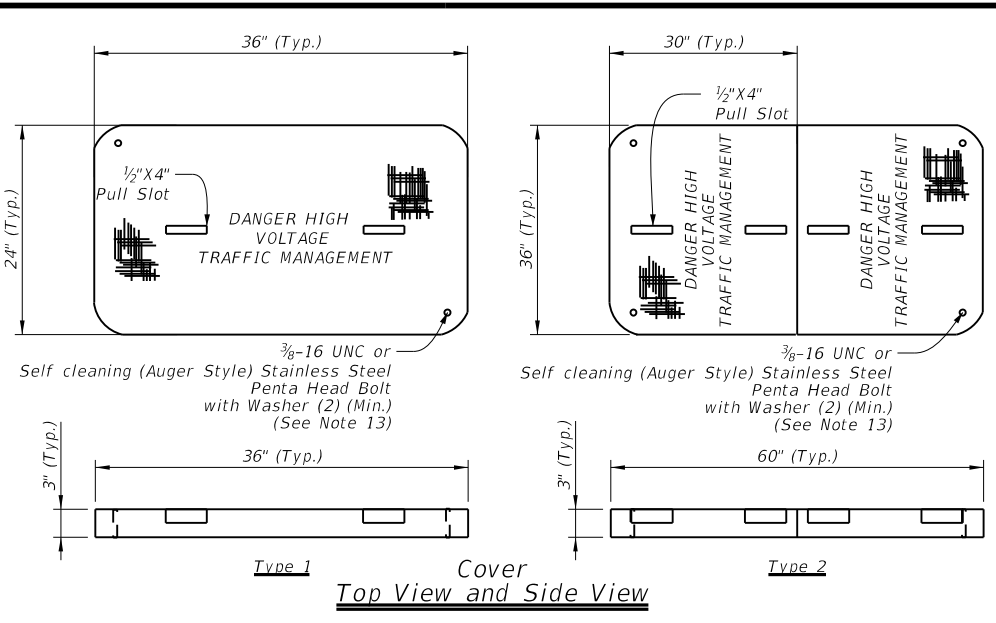
DATE: 06/28/2024 09:01 AM
 FILE: DOCUMENT NAME



Ground Box Schedule

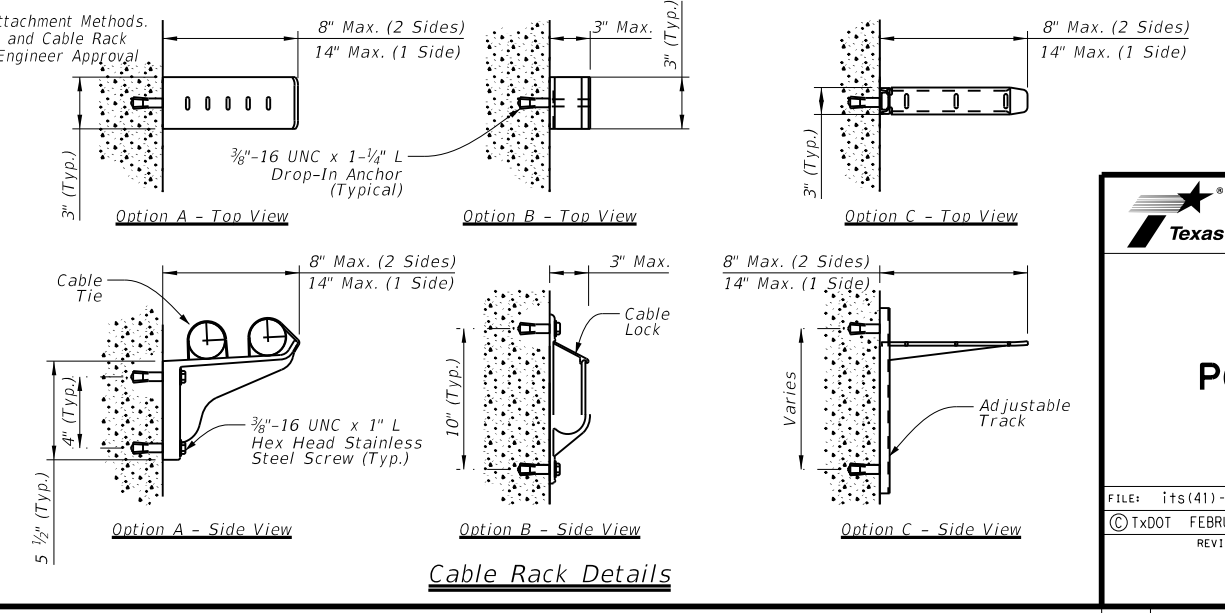
Ground Box Type	'A' * Width (Outside) (Inches)	'B' * Length (Outside) (Inches)	'C' Depth (Outside) (Inches)	Size #3 Bars (Apron)	
				Length	Weight
Type 1	26	38	24, 36, 48	24'-0"	9.12
Type 2	40	63	24, 36, 48	32'-8"	12.45

* - Tolerance of +/- 1.5"



General Notes:

- Conduit shown is for example only. Additional conduits may be required as shown on the plans.
- Provide polymer concrete ground box and cover.
- Provide Type "2" ground boxes when splice enclosure is required, as shown on the plans.
- Terminate conduits through the side of the ground box.
- Provide terminators for conduits cast in the walls and placed symmetrically about the centerline of the box at the depths shown, unless otherwise noted, for the number of conduits identified on the plans to enter the box.
- Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.
- Provide ground box with open bottom. Provide two 3" Dia. perforated PVC drain pipes on opposite corners and extend 2" below bottom of gravel bed to optimize water drainage.
- Install ground box on a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to special specification, "ITS Ground Box."
- When additional conduit entry points are needed to accommodate existing conduit, core drill conduit knockouts in the field of the appropriate number and size of conduit at each location, as directed by the Engineer.
- Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.
- Concrete grout around the knockout (inside and out) and around the conduit and bell fitting to ensure a neat watertight fit after the conduit and bell fitting have been placed in a knockout. Ensure all openings in the ground box are sealed prior to grouting operations.
- Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT."
- Equip all covers with a bolting system that will positively secure the cover in place.
- Backfill in accordance with Item 400, "Excavation and Backfill for Structures."
- Provide p
- Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack and splice enclosures identified in the plans. Locate cable rack system on any side but allow for sufficient access to the inside of the ground box. Cable racks may be installed at the factory or in the field. When mounting cable racks in the field, seal all penetrations to the side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.



Sheet Details
 Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

ITS GROUND BOX POLYMER CONCRETE

ITS(41)-16

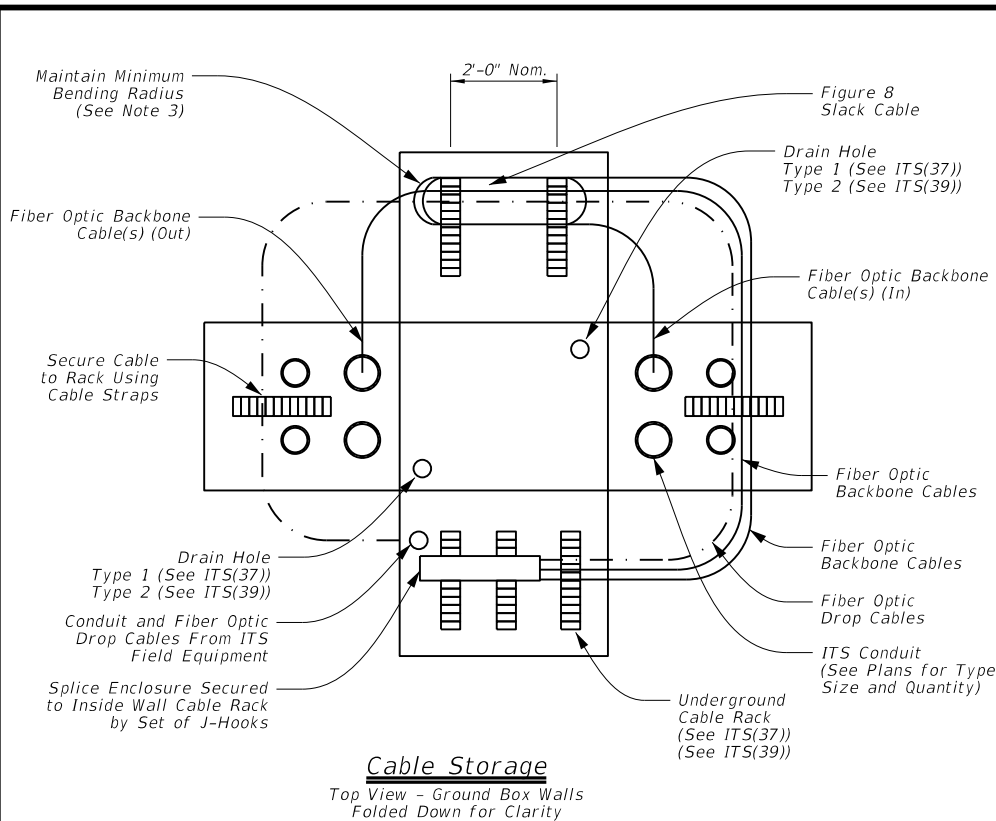
FILE: its(41)-16.dgn ON: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT

© TxDOT FEBRUARY 2016 REVISIONS

CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	138	

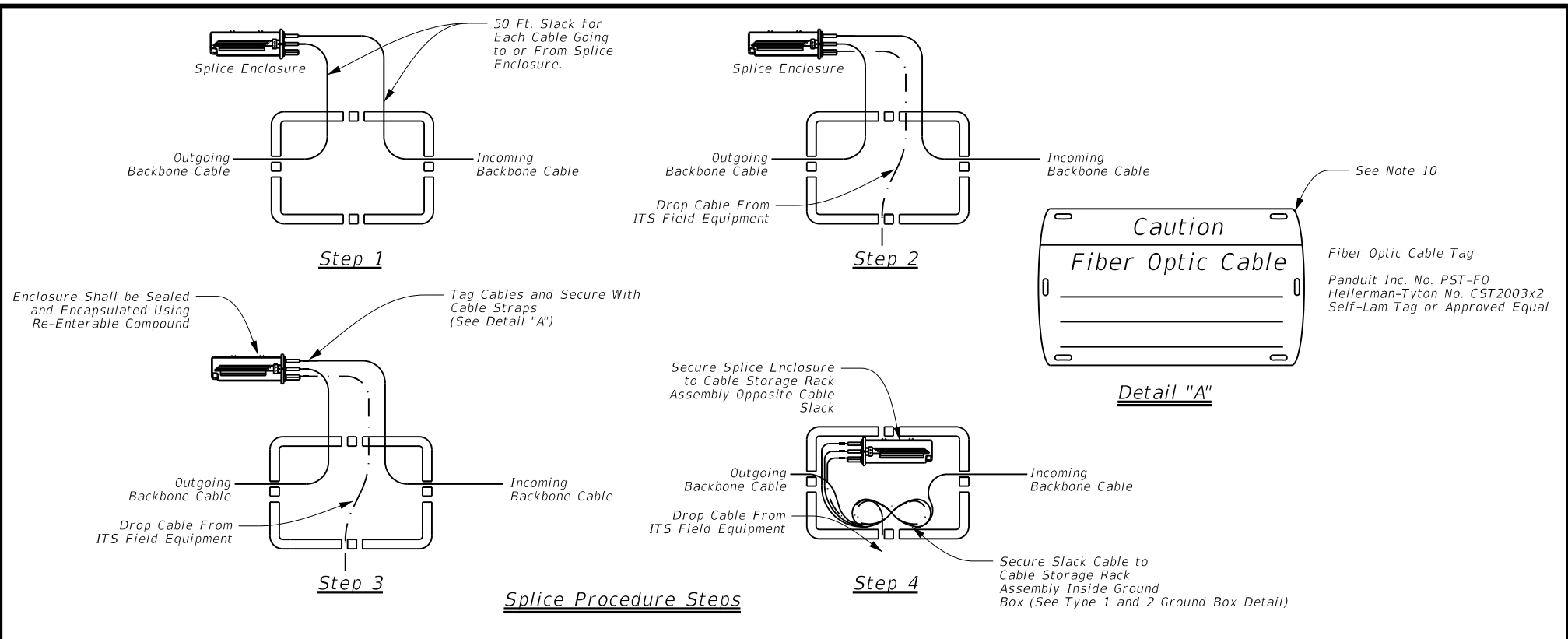
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 06/28/2024 09:01 AM
FILE: DOCUMENT NAME

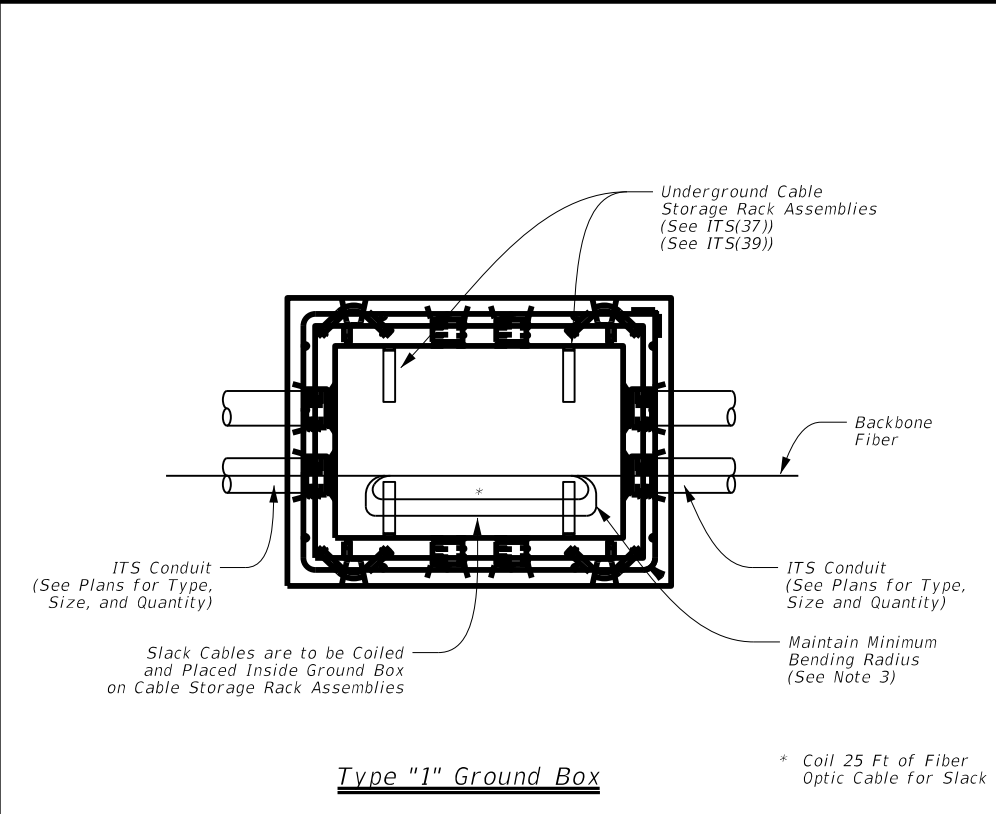


Cable Storage

Top View - Ground Box Walls Folded Down for Clarity

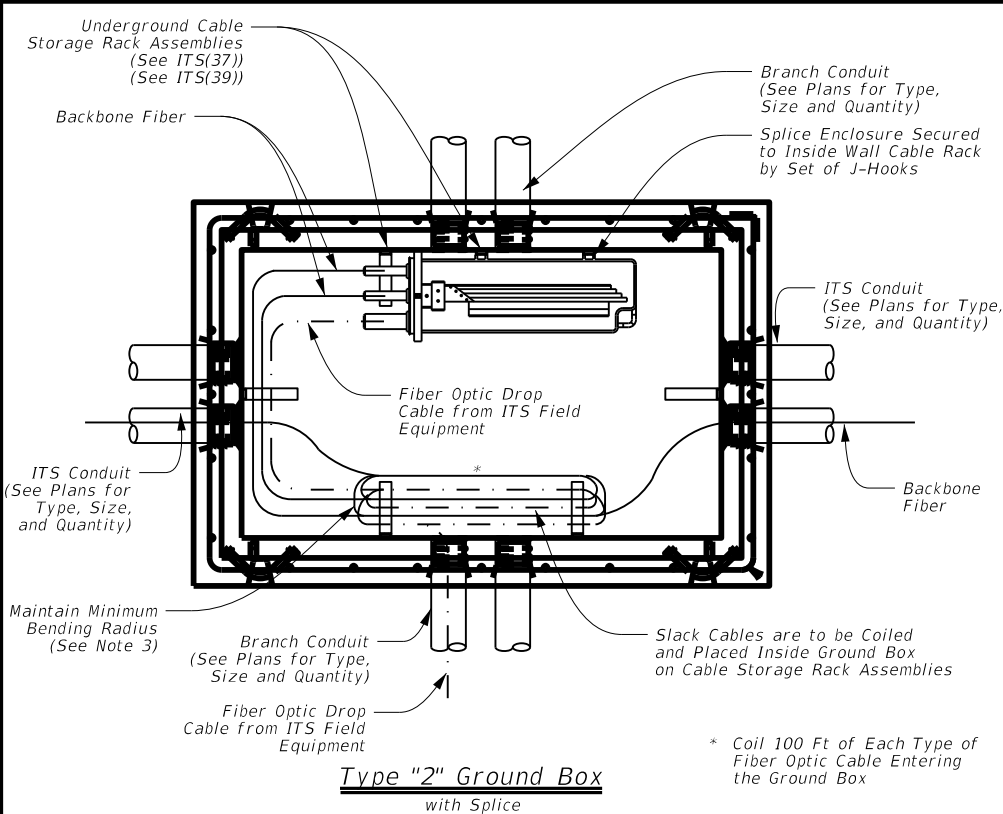


Splice Procedure Steps



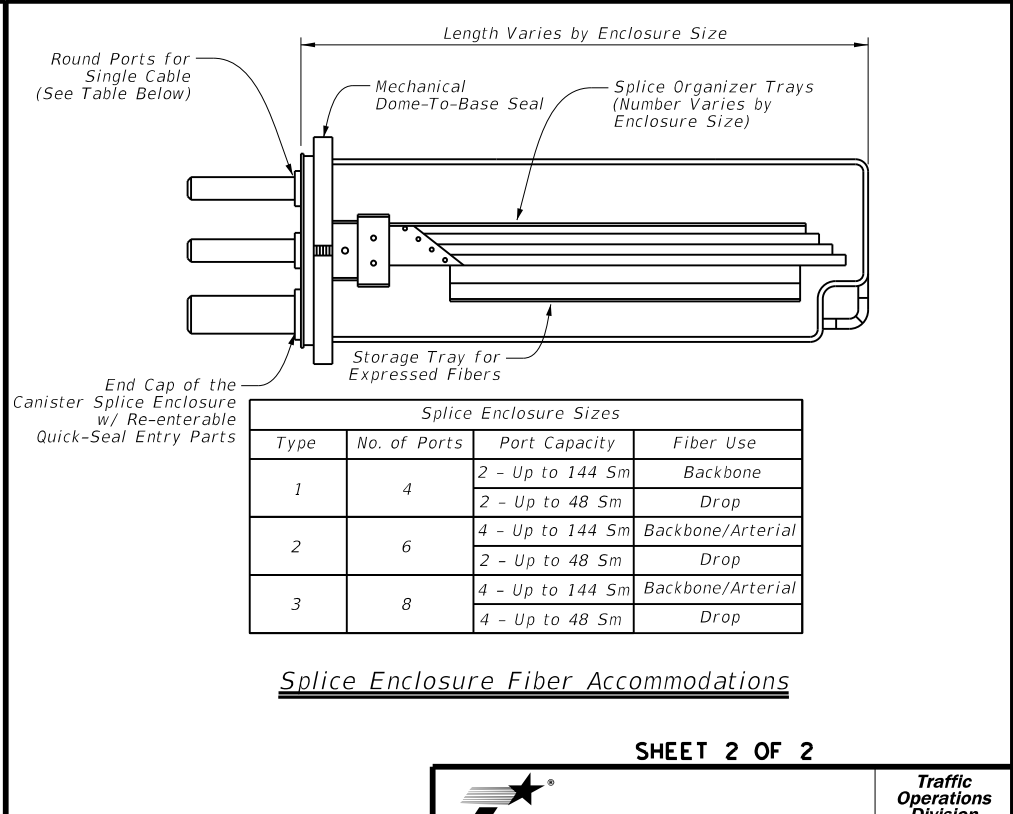
Type "1" Ground Box

* Coil 25 Ft of Fiber Optic Cable for Slack



Type "2" Ground Box with Splice

* Coil 100 Ft of Each Type of Fiber Optic Cable Entering the Ground Box



Splice Enclosure Fiber Accommodations

General Notes:

1. Conduit entry points to the Type 1 and Type 2 ground boxes are diagrammatic. Refer to ITS ground box standards, ITS(37) and ITS(39), for more information. Additional conduits may be required as shown on the plans.
2. Type 2 ground boxes are to be used, as shown on the plans, when splice enclosures are required.
3. Maintain a minimum bend radius of 20 times the fiber optic cable diameter during installation, relocation, and removal and a minimum of 10 times the fiber optic cable diameter when in operation.
4. Caulk all conduit around the top of the cable ducts with an engineer approved caulking compound to seal clearance between the cables and ducts. Place conduit plugs in all vacant conduits or inner-ducts.
5. Provide cable straps that will withstand ultra-violet exposure and do not damage cables when tightening.
6. All incidental equipment necessary for the cable installation and mounting of splice enclosure within the ground box will be incidental to Special Specification, "ITS Fiber Optic Cable."
7. Submit all splice locations to the field engineer for approval before beginning work.

8. Provide splice enclosures designed to seal, bond, anchor, and protect fiber optic cable splices. Provide splice enclosures designed to handle mechanical and fusion type splices. Provide splice enclosures with port configurations for the sizes detailed above.
9. Provide splice enclosures designed for underground placement with a sealing system preventing water penetration when submerged under 10 ft. of water.
10. Furnish, install, and secure fiber optic cable tags for each fiber optic cable entering a ground box, ITS field equipment cabinet (ground and pole), and hub building or communication node as detailed above. Provide information including fiber optic type, count, origin, and destination on the cable tag. Use UV resistant tie-wraps for securing the tag to the cable. Provide tie-wraps that do not damage fiber when securing to cable.

Sheet Details
Not to Scale

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

ITS(43)-16

FILE: its(43)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
DIST	COUNTY		SHEET NO.	
HOU	HARRIS		140	

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 any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

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):
0271-15-099

1.2 PROJECT LIMITS:

From: MARKET ST.

To: 0.25 MI W. OF MERCURY DR.

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29.7756° (N) , (Long) 95.2640° (W)

END: (Lat) 29.7696° (N) , (Long) 95.2653° (W)

1.4 TOTAL PROJECT AREA (Acres): 2.16

1.5 TOTAL AREA TO BE DISTURBED (Acres): 3.43

1.6 NATURE OF CONSTRUCTION ACTIVITY:

Construction of freeway operational improvements

consisting of grading, cement treated base, concrete pavement, signing, pavement markings, CTMS, etc.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Bernard-Edna complex, 0 to 1% slopes	34 to 49% clay, somewhat poorly drained, high rate of runoff
Bernard-Urban land complex	34 to 49% clay, somewhat poorly drained, high rate of runoff
Lake Charles-Urban land complex, 0 to 3% slopes	45 to 60% clay, moderately drained, high rate of runoff on 0 to 1% slopes, very high rate of runoff on >1% 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
BUFFALO BAYOU TIDAL	1007

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

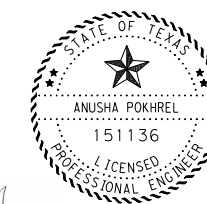
- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain 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
No MS4s receive stormwater discharge from the site



Anusha Pokhrel
08

ANUSHA POKHREL, P.E. 9/6/2024 DATE

STORMWATER POLLUTION PREVENTION PLAN (SWP3)



Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6	F 2025(280)			141
STATE	STATE DIST.	COUNTY		
TEXAS	HOU	HARRIS		
CONT.	SECT.	JOB	HIGHWAY NO.	
0271	15	099	IH 610	

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
Block Sodding (Left)	124+96.94	152+23.63
Block Sodding (Right)	128+54.38	160+83.85

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
- 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: _____

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:

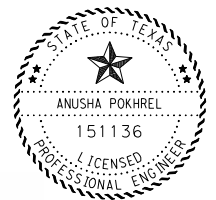
- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 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 .

2.9 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.



Anusha Pokhrel
00

ANUSHA POKHREL, P.E. 9/6/2024 DATE








STORMWATER POLLUTION PREVENTION PLAN (SWP3)

© 2024 Sheet 2 of 2

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	F 2025(280)		142
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	15	099	IH 610

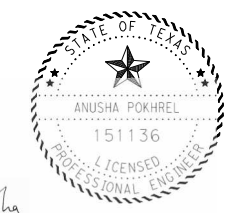
CK: DW: CK: DW:

LEGEND

-  LIMITS OF PERMANENT SEEDING
-  LIMITS OF BLOCK SODDING
-  CONSTRUCTION ENTRANCE/EXIT TY 1 (14'X70') (109 SY TYP.)
-  12" EROSION CONTROL LOG
-  12" EROSION CONTROL LOG AT INLET
-  SEDIMENT CONTROL FENCE
-  ROCK FILTER DAM TYPE 2



- NOTES:**
1. ALL SWP3 MEASURES SHALL BE PLACED DURING EACH PHASE OF CONSTRUCTION.
 2. ESTIMATED QUANTITY OF CONSTRUCTION EXITS IS PROVIDED IN THIS PROJECT TO BE USED AS REQUIRED. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO INSTALLATION OF THE CONSTRUCTION EXITS.
 3. SWP3 MEASURES ARE REQUIRED AROUND PROPOSED INLETS WHEN INSTALLED. INLETS TO BE CAPPED OR REMOVED WILL HAVE SWP3 MEASURES UNTIL CAPPED OR REMOVED.
 4. LOCATIONS SHOWN FOR SWP3 MEASURES ARE APPROXIMATE AND ARE TO BE APPROVED BY THE ENGINEER.
 5. PLACE PERMANENT SODDING IMMEDIATELY AFTER ACHIEVING FINAL GRADING AT ANY WORK AREA, SEE HOUSTON DISTRICT STANDARD FOR ESTABLISHMENT REQUIREMENTS.
 6. PLACE TEMPORARY SEEDING AS DIRECTED BY THE ENGINEER.
 7. ALL SWP3 CONTROL MEASURES INSTALLED DURING CONSTRUCTION ARE TO REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE COVER IS ESTABLISHED OR AS APPROVED BY THE ENGINEER.
 8. MAXIMUM LIMIT OF PREP ROW CLEARANCE IS 50 FEET.



Anusha Pokhrel
00

ANUSHA POKHREL, P. E. DATE 9/6/2024

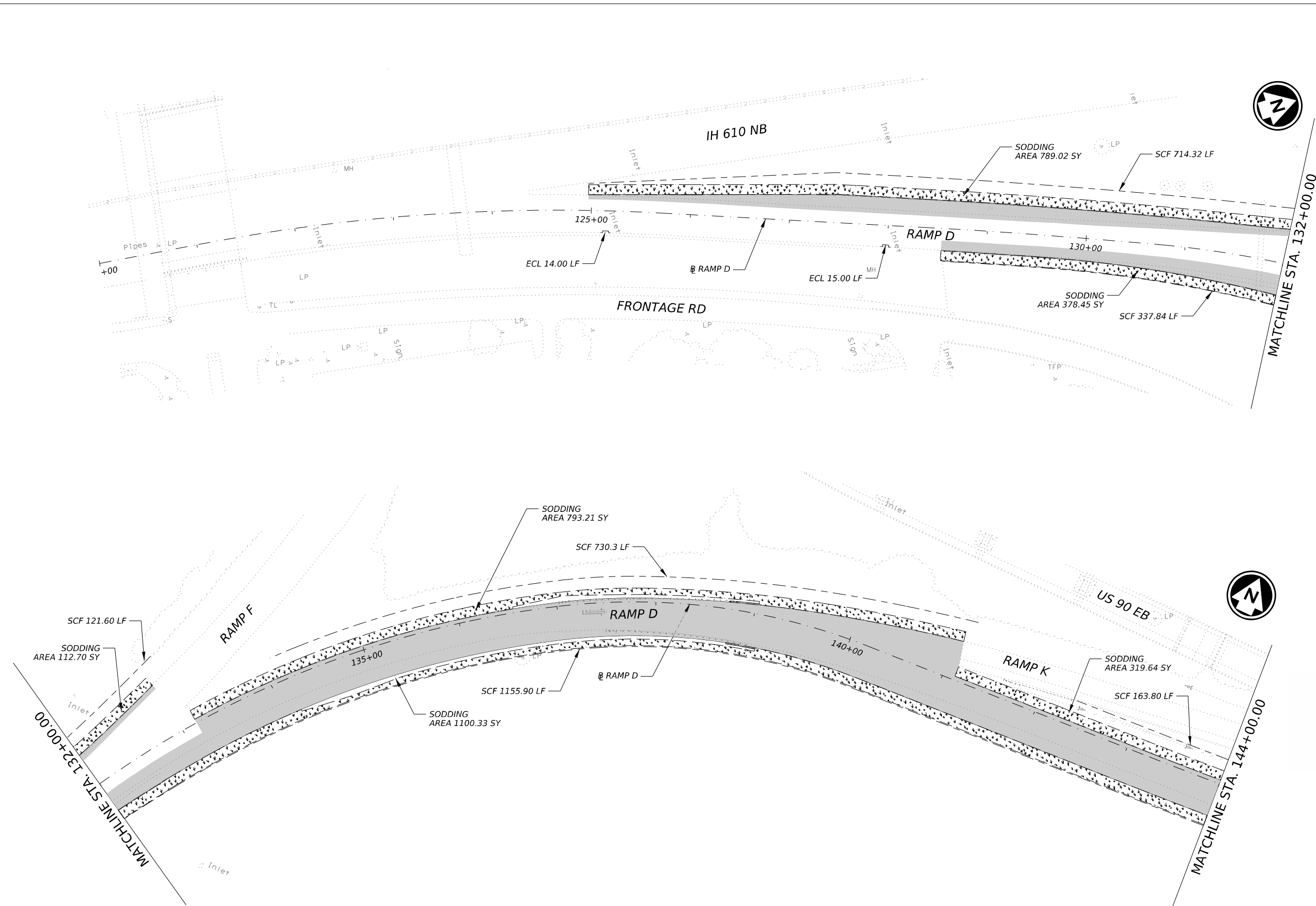


**IH 610
STORM WATER
POLLUTION
PREVENTION PLAN**

TxDOT © 2024 SHEET 1 OF 2








CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	143

DATE: 09/06/2024 01:53:48
FILE: \$PROJECTNAME



CK: DW: CK: DW:

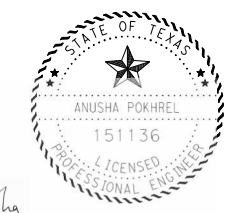
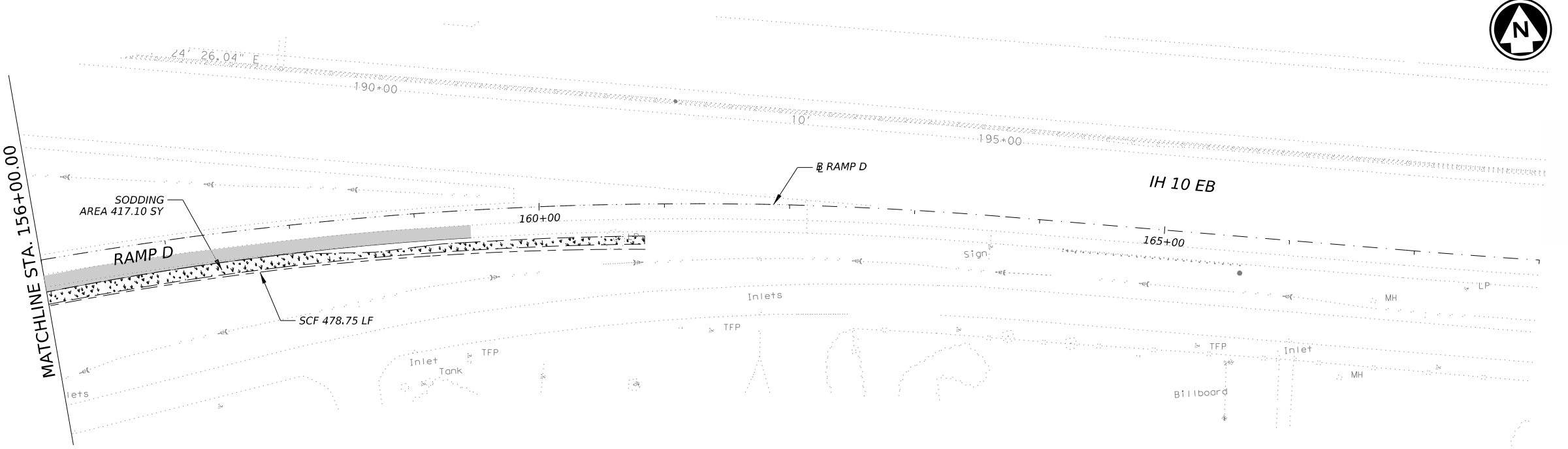
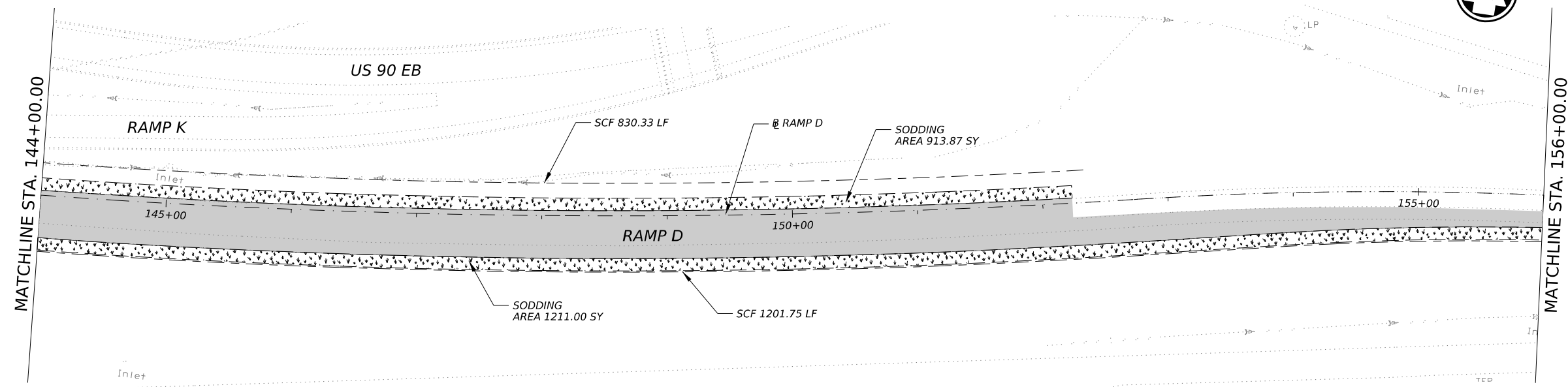
LEGEND

-  LIMITS OF PERMANENT SEEDING
-  LIMITS OF BLOCK SODDING
-  CONSTRUCTION ENTRANCE/EXIT TY 1 (14'X70') (109 SY TYP.)
-  12" EROSION CONTROL LOG
-  12" EROSION CONTROL LOG AT INLET
-  SEDIMENT CONTROL FENCE
-  ROCK FILTER DAM TYPE 2



NOTES:

1. ALL SWP3 MEASURES SHALL BE PLACED DURING EACH PHASE OF CONSTRUCTION.
2. ESTIMATED QUANTITY OF CONSTRUCTION EXITS IS PROVIDED IN THIS PROJECT TO BE USED AS REQUIRED. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO INSTALLATION OF THE CONSTRUCTION EXITS.
3. SWP3 MEASURES ARE REQUIRED AROUND PROPOSED INLETS WHEN INSTALLED. INLETS TO BE CAPPED OR REMOVED WILL HAVE SWP3 MEASURES UNTIL CAPPED OR REMOVED.
4. LOCATIONS SHOWN FOR SWP3 MEASURES ARE APPROXIMATE AND ARE TO BE APPROVED BY THE ENGINEER.
5. PLACE PERMANENT SODDING IMMEDIATELY AFTER ACHIEVING FINAL GRADING AT ANY WORK AREA, SEE HOUSTON DISTRICT STANDARD FOR ESTABLISHMENT REQUIREMENTS.
6. PLACE TEMPORARY SEEDING AS DIRECTED BY THE ENGINEER.
7. ALL SWP3 CONTROL MEASURES INSTALLED DURING CONSTRUCTION ARE TO REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE COVER IS ESTABLISHED OR AS APPROVED BY THE ENGINEER.
8. MAXIMUM LIMIT OF PREP ROW CLEARANCE IS 50 FEET.



Anusha Pokhrel
ANUSHA POKHREL, P.E.

9/6/2024
DATE




**IH 610
STORM WATER
POLLUTION
PREVENTION PLAN**

TxDOT © 2024 SHEET 2 OF 2


CONT	SECT	JOB	HIGHWAY
0271	15	099	IH 610
DIST	COUNTY	SHEET NO.	
HOU	HARRIS	144	

DATE: 09/06/2024 03:31:18
FILE: \$PROJECTNAME

<p>I. STORMWATER POLLUTION PREVENTION</p> <p>Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. Refer to the TxDOT SWP3 Summary Sheets, SWP3 Binder Template, and Form 2118.</p> <p style="text-align: center;">No Additional Comments</p>	<p>III. CULTURAL RESOURCES</p> <p>Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.</p> <p style="text-align: center;">Additional Comments</p> <p>HIST Finding: In compliance with the Section 106 PA, the Antiquities Code of Texas, and the MOU, TxDOT historians determined project activities do not affect historic properties. Individual project coordination with SHPO is not required. The APE is the existing ROW; there are no sensitive property types.</p>	<p>VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES</p> <p>Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.</p> <p style="text-align: center;">No Additional Comments</p>
<p>II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS</p> <p>United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.</p> <p><input checked="" type="checkbox"/> No United States Army Corps (USACE) Permit Required</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the "General Notes."</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the "General Notes."</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.</p> <p><input type="checkbox"/> Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.</p> <p>United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.</p> <p><input checked="" type="checkbox"/> No United States Coast Guard (USCG) Coordination Required</p> <p><input type="checkbox"/> United States Coast Guard (USCG) Permit</p> <p><input type="checkbox"/> United States Coast Guard (USCG) Exemption</p> <p style="text-align: center;">Additional Comments</p> <p>The Texas Department of Transportation reviewed this proposed action for consistency with the Texas Coastal Management Program (Texas CMP) goals and policies in accordance with the regulations of the Coastal Coordination Advisory Council and determined that the proposed action will not have a direct and significant adverse effect on the coastal natural resource areas (CNRAs) identified in the applicable policies (31 TAC 29.30(b)(2)).</p>	<p>IV. VEGETATION RESOURCES</p> <p>Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.</p> <p style="text-align: center;">No Additional Comments</p>	<p>V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS</p> <p>If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.</p> <p>The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)</p> <p style="text-align: center;">No Additional Comments</p>
		<p>VII. OTHER ENVIRONMENTAL ISSUES</p> <p>Comments:</p>


	TxDOT Houston District			
<p>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</p> <p>EPIC</p>				
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
UPDATED section V, text and added definition (10/17/04/18) ADDED USCG and USACE notes in Section VII	DIST	COUNTY		SHEET NO.
	12	HARRIS		145

VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES
<p>1.1 General Design and Construction BMP</p> <ul style="list-style-type: none"> • Employees and contractors will be provided information prior to start of construction to educate personnel of the potential for all state-listed threatened species or other SGCN to occur within the project area and should be advised of relevant rules and regulations to protect plants, fish, and wildlife. • Contractors will be informed to avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects. • Direct animals away from the construction area with the judicious use and placement of sediment control fencing to exclude wildlife. Exclusion fence should be buried at least 6 inches and be at least 24 inches high, maintained for the life of the project, and removed after construction is completed. Contractors should examine the inside of the exclusion area daily to determine if any wildlife species have been trapped inside the area of impact and provide safe egress opportunities prior to initiation of construction activities. • Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas around wetlands and in riparian areas. • If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided. • Project staging areas, stockpiles, temporary construction easements, and other project related sites should be situated in previously disturbed areas to avoid or minimize impacts to sensitive or unique habitats including intact native vegetation, floodplains, riparian corridors, wetlands, playa lakes, and habitat for wildlife species. • When lighting is added, consider wildlife impacts from light pollution and incorporating dark-sky practices into design strategies. Minimize sky glow by focusing light downward, with full cutoff luminaries to avoid light emitting above the horizontal. The minimum amount of night-time lighting needed for safety and security should be used. <p>1.2 Vegetation BMP</p> <ul style="list-style-type: none"> • Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided. Impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation. • To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover. • It is strongly recommended that trees greater than 12 inches in diameter at breast height (DBH) that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to either on-site or off-site. Trees less than 12 inches DBH should be replaced at a 1:1 ratio. • Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species. • When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three years should be developed for the replacement trees. • The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used. • The use of seed mix that contains seeds from only regional ecotype native species is recommended. 	<p>2.5.3 Bat BMP</p> <p>The following Bat BMP apply to projects within the range and in suitable habitat for all bat SGCN and that are also listed on TPWD's RTEST online application. Review the habitat descriptions for species of interest on RTEST and other trusted resources to determine the appropriate beneficial management practice to avoid or minimize impacts to bats. All bat surveys and other activities that include direct contact with bats shall comply with TPWD-recommended white-nose syndrome protocols located on the TPWD Wildlife Habitat Assessment Program website under "Project Design and Construction".</p> <p>The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this document, structures are defined as bridges, culverts (concrete or metal), wells, and buildings.</p> <ul style="list-style-type: none"> • Inform TPWD WHAB during initial collaborative review phase for projects that may impact the following bat species: <ul style="list-style-type: none"> o Any Myotis spp. o Tricolored bat (<i>Perimyotis subflavus</i>) • If identification of a bat species is in question, consult with TPWD or a qualified TxDOT biologist during initial collaborative review phase. <ul style="list-style-type: none"> • For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting. • For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats. • If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction. • Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. • If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features. • Conversion of property containing cave or cliff features to transportation purposes should be avoided. • Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1 through October 31. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures > 55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts. • Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape. • Retain mature, large diameter hardwood forest species and native/ornamental palm trees. • If gating a cave or abandoned mine is desired, consult with TPWD before installing gates. Gating should only be conducted by qualified groups with a history of successful gating operations. Gate designs must be approved by TPWD. • In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD. 	<p>2.5.3 Bat BMP Continued</p> <ul style="list-style-type: none"> • Coordinate with TPWD about the latest bat handling restrictions and protocols involving COVID-19 and bat handling. In general, all staff must follow the guidelines listed below: <ul style="list-style-type: none"> o Do not handle bats if not part of a critical or time-sensitive research project. Contact TPWD to discuss your project needs before beginning work. o All participants must follow CDC social-distancing guidelines. o Wear a face mask to minimize the exchange of respiratory droplets such as a surgical mask, dust mask, or cloth mask when within 6 feet of a living bat. o Use disposable exam gloves or other reusable gloves (e.g., rubber dish-washing gloves) that can be decontaminated to prevent spread of pathogens. Do not touch your face or other potentially contaminated surfaces with your gloves prior to handling bats. o Limit handling to as few handlers as possible. o Do not blow on bats for any reason. o Use separate temporary holding containers for each bat such as disposable paper bags. o Caves housing bats should be avoided unless absolutely necessary. o Implement additional disinfection, quarantine, and cleaning procedures. • Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats. • Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e., continuously active – not intermittently active due to arousals from hibernation). <ul style="list-style-type: none"> o Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes. o Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate. o Avoid using chemical and ultrasonic repellents. o Avoid use of silicone, polyurethane or similar non-water-based caulk products. o Avoid use of expandable foam products at occupied sites. o Avoid the use of flexible netting attached with duct tape. • In order to avoid entombing bats, exclusion activities should be only implemented by a qualified individual. A qualified individual or company should possess at least the following minimum qualifications: <ul style="list-style-type: none"> o Experience in bat exclusion (the individual, not just the company). o Proof of rabies pre-exposure vaccinations. o Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements. o Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts. • Contact TPWD for additional resources and information to assist in executing successful bat exclusions that will avoid unnecessary harm or death in bats.

		TxDOT Houston District		
<p>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</p> <p>EPIC</p>				
FILE: EPIC Additional Comment Sheet.dgn	DN:	CR:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		146

VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES
<p>2.4.4 Insect Pollinator BMP</p> <p>The following Insect Pollinator BMP apply to projects within the range and in suitable habitat for insect SGCN found below and that are also listed on TPWD’s RTEST online application.</p> <ul style="list-style-type: none"> • Mowing should only be applied to 30% or less of a site in a given year when practical. In general, mowing is inadequate for management of native insect pollinator habitat in the long term, except to remove annual non-native plants during establishment (i.e., high-mowing before they flower) or to facilitate a light disking. When conducted it should be done post bloom or when host plants have gone dormant for the growing season. This can also be done by leaving strips of habitat farthest from road or highway corridors un-mowed when practical. • If mowing is required during period of active bloom or high pollinator activity it should be implemented during the heat of the day and with a high mower deck to allow for pollinators to escape and to give late season blooming species a chance to recover and bloom. • Deep soil disturbances, such as, tilling or deep disking in areas that host aggregations of ground- nesting bees should be avoided. Tilling and disking also may promote the invasion or germination of non-native plants. Different species of native ground-nesting bees prefer different soil conditions, although research suggests that many ground nesting bees prefer sandy, loamy sand or sandy loam soils. In areas with these soil types consider leaving open patches of soil. • Allow dead trees to stand (so long as they do not pose a risk to property or people) and protect shrubs and herbaceous plants with pithy or hollow stems (e.g., cane fruits, sumac, elderberry), as these provide nesting habitat for tunnel-nesting native bees. • Retain dead or dying branches whenever it is safe and practical at the edges of the ROW. Wood- boring beetle larvae often fill dead trees and branches with narrow tunnels into which tunnel- nesting bees will establish nests. Additionally, bumble bees may choose to nest in wood piles. • Retain rotting logs at edges of the ROW where some bee species may burrow tunnels in which to nest. • Protect sloped or well-drained ground sites where plants are sparse and direct access to soil is available. These are the areas where ground-nesting bees may dig nests. Turning the soil destroys all ground nests that are present at that depth and hinders the emergence of bees that are nesting deeper in the ground. • Protect grassy thickets, or other areas of dense, low cover from mowing or other disturbance. These are the sites where bumble bees might find the nest cavities they need, as well as annual and perennial wildflowers that can provide important food resources. • Where available and economical, native plants and seed should be procured from local eco-type providers. Seed mixes should be diverse and include as many ecoregion natives as possible ensuring full season floral resources. Species by Texas ecoregion can be found in the Texas Management Recommendations for Native Insect Pollinators in Texas document: https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_w7000_1813.pdf. • Planting at least three different native flowering plants within each of three blooming periods are recommended (spring, summer, early fall) in high rainfall regions of Texas. In drier regions of the state, a target of three native flowering plants within each of two blooming periods can be used. • In areas along the I-35 corridor of central Texas consider increasing fall blooming nectar resources as this is a critical time period of monarch butterflies (<i>Danaus plexippus</i>) and nesting bees and has been identified as a critical need for these species in Texas. • Habitat enhancements for native pollinators should include at least one native bunchgrass adapted to the site. • Utilize an Integrated Pest Management Strategy (IPM) strategy for controlling weedy or invasive plants by minimizing broad use of certain herbicides and surfactants in close proximity to intact habitats utilized by native pollinators. Reduce application timing to periods of low pollinator activity and not during peak bloom season. 	<p>2.6.2 Terrestrial Amphibian and Reptile BMP</p> <p>The following Terrestrial Amphibian and Reptile BMP apply to projects within the range and in suitable habitat for herpetofauna SGCN listed below and that are also listed on TPWD’s RTEST online application. Please note that some species may require both aquatic and terrestrial BMP. It is difficult to confirm absence for most species of amphibians and reptiles; therefore, assume presence in suitable habitat and implement the following BMP.</p> <ul style="list-style-type: none"> • Inform TPWD WHAB during initial collaborative review phase for projects that may affect habitat for the following species: <ul style="list-style-type: none"> o Black-spotted newt (<i>Notophthalmus meridionalis</i>) o Brazos water snake (<i>Nerodia harteri</i>) o Concho water snake (<i>Nerodia paucimaculata</i>) o Dunes sagebrush lizard (<i>Sceloporus arenicolus</i>) o Tamaulipan spot-tailed earless lizard (<i>Holbrookia subcaudalis</i>) • For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling • Avoid or minimize disturbing or removing cover objects, such as downed trees, rotting stumps, brush piles, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion. • Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge. • Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged. • When designing roads with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways. • If Texas tortoises (<i>Gopherus berlandieri</i>) or box turtles (<i>Terrepena</i> spp.) are present in a project area, they should be removed from the area and relocated between 100 and 200 meters from the project area. After removal of the individuals, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude reentry by turtles, tortoises, and other reptiles. The exclusion fence should be constructed and maintained as follows: <ul style="list-style-type: none"> o The exclusion fence should be constructed with metal flashing or drift fence material. o Rolled erosion control mesh material should not be used. o The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high. o The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated. • After project is complete, revegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided. 	<p>2.5.1 Small Mammal BMP</p> <p>The following Mammal BMP apply to projects within the range and in suitable habitat for mammal SGCN below and that are also listed on TPWD’s RTEST online application:</p> <ul style="list-style-type: none"> • For state-threatened Coues' rice rat (<i>Oryzomys couesi aquaticus</i>): <ul style="list-style-type: none"> o Minimize impacts to wetland, resaca, oxbow lake, and marsh habitats o Water Quality BMP <p>2.5.2 Fossorial Mammal BMP</p> <p>The Fossorial Mammal BMP apply to projects within the range and in suitable habitat for mammal SGCN found below and that are also listed on TPWD’s RTEST online application:</p> <ul style="list-style-type: none"> • If black-tailed prairie dog (BTPD) (<i>Cynomys ludovicianus</i>) burrows or pocket gopher mounds are to be excavated/directly impacted inform TPWD WHAB during initial collaborative review phase. • When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area. • When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW. <p>1.4 Water Quality BMP</p> <p>In addition to BMP required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 Water Quality Certification:</p> <ul style="list-style-type: none"> • Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges. • When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing. • Wet-Bottomed detention ponds are recommended to benefit wildlife and downstream water quality. Consider potential wildlife-vehicle interactions when siting detention ponds. • Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

DATE:
FILE:

				TxDOT Houston District
<p>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</p> <p>EPIC</p>				
FILE: EPIC Additional Comment Sheet.dgn	DN:	CR:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		147

TYPE OF WORK

ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2024 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		161-7002 COMPOST MANUF TOPSOIL (4") SY	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			162-7002 BLOCK SODDING SY	GRASS SPECIES Item 162.2. Materials Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod Use block palletized or roll type sod. REMOVE PLASTIC BACKING FROM ROLL TYPE SOD. Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		164-7016 DRILL SEEDING (OPT1) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH SEED MIX March, April, May, June, July, August, September, October Hulled - Bermudagrass (Cynodon dactylon).....40.0 lbs PLS/acre Foxtail Millet (Setaria italica).....34.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia).....4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula).....3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium).....1.4 lbs PLS/acre	Item 164.2.1. Seed Provide documentation of PLS (Pure Live Seed) requirements. Item 164.3. Construction Scarify the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, scarify the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans.
	✓		164-7008 BROADCAST SEED (OPT1) SY Item 164.1. Description Provide and install seeding as shown on District Standard	November, December, January, February Unhulled - Bermudagrass (Cynodon dactylon)...40.0 lbs PLS/acre Oats (Avena sativa).....72.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia).....4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula).....3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium).....1.4 lbs PLS/acre	Item 164.3.2. Broadcast Seeding Use broadcast seeding method where site conditions prevent drill seeding method. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil. HYDRO SEEDING NOT ALLOWED.
		✓	164-7015 DRILL SEED (TEMP*WARM*COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH SEED MIX March, April, May, June, July, August, September, October Foxtail Millet (Setaria italica).....34.0 lbs PLS/acre	Item 164.3.5. Drill Seeding Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker (turfgrass type seeder). Plant seed along the contour of the slopes.
		✓	164-7007 BROADCAST SEED (TEMP*WARM*COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	November, December, January, February Oats (Avena sativa).....72.0 lbs PLS/acre	
	✓	✓	164-7065 STRAW OR HAY MULCH SY	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5. Mulch. Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal (see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9561 Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	166-7001 FERTILIZER AC Item 166.2. Materials Use fertilizer as shown in District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a NON-CHEMICAL fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal (see note this sheet): Sigma, SIGMA AgriScience, 281-706-8171 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645
✓	✓	✓	168-7001 VEGETATIVE WATERING TGL	APPLICATION RATE Item 168.3. Construction 6 TGL (6000 gallons/acre 20 consecutive working days) = 120 TGL (120,000 gallons total/acre)	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. SCARIFY SOIL (ITEM 162.3) 3. BLOCK SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL (ITEM 161.2.1) 3. BLEND/SCARIFY SOIL (ITEMS 161.3.1 AND 164.3) 4. PERMANENT SEEDING 5. STRAW/HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. SCARIFY SOIL (ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW/HAY MULCH 5. VEGETATIVE WATERING



HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

FSSCW-15

REVISIONS		FILE:	FED	STATE	PROJECT NUMBER		SHEET
10/2014 UPDATED TO 2014 SPECS			6	TEXAS			148
3/2015 MINOR CORRECTIONS							
3/2023 ADDED SHEET ABBREVIATION		ORIGINAL:	DIS	COUNTY	CONTROL	SECT	JOB
6/2024 UPDATED TO 2024 SPECS			12	HARRIS	0271	15	099 IH 610

SUMMARY OF ILLUMINATION QUANTITIES

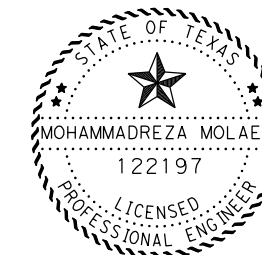
CSJ: 0271-15-099

ROADWAY: IH 610

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
0618	7055	CONDT (PVC) (SCH 80) (2") (BORE)	LF	616
0618	7054	CONDT (PVC) (SCH 80) (2")	LF	-
0620	7007	ELEC CONDR (NO. 8) BARE	LF	620
0620	7008	ELEC CONDR (NO. 8) INSULATED	LF	1240
0624	7008	GROUND BOX TY D (162922)W/APRON	EA	2


NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS.
- BORE PIT SHALL BE NO CLOSER THAN 5.0 FEET FROM THE EDGE OF PAVING OR ROAD BASE. BORE PIT HOLES SHALL NOT BE LEFT OPEN OVERNIGHT.
- LINEAR MEASUREMENT OF CONDUCTORS FOR PAYMENT SHALL BE SURFACE DISTANCE BETWEEN LOCATIONS.
- VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES OR OTHER INSTALLATIONS AND PROVIDE ADEQUATE PROTECTION FOR THEM. ANY DAMAGE BY CONTRACTOR SHALL BE PAID FOR BY CONTRACTOR.
- ALL STUB-OUTS IN FOUNDATION AND CONCRETE STRUCTURES ARE TO BE RIGID METAL CONDUIT (RMC).
- USE ESTABLISHED INDUSTRY AND UTILITY SAFETY PRACTICES WHEN INSTALLING OR REMOVING POLES OR LUMINAIRES LOCATED NEAR OVERHEAD OR UNDERGROUND UTILITIES. CONSULT WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO BEGINNING OF WORK. PROTECT THE LIGHT POLES WHEN INSIDE THE CLEAR ZONE.
- COORDINATE AND VERIFY ELECTRICAL SERVICES WITH THE APPROPRIATE UTILITY COMPANY FOR PROVIDING ELECTRICAL SERVICES. CONTACT MR. TERRANCE GEORGE OF THE TXDOT TRAFFIC SYSTEMS CONSTRUCTION AT (713) 802-5405 BEFORE REMOVAL OF ELECTRICAL SERVICE. REMOVE EXISTING ELECTRICAL EQUIPMENTS IN ACCORDANCE WITH ESTABLISHED INDUSTRY, UTILITY PRACTICES AND TXDOT STANDARDS.
- VERIFY ALL POWERLINE LOCATIONS PRIOR TO DOING WORK. FOLLOW NEC AND LOCAL UTILITY COMPANY REQUIREMENTS WHEN INSTALLING THE ELECTRICAL EQUIPMENT.
- THE CONTRACTOR WILL NOT BE PERMITTED TO USE ANY EQUIPMENT THAT CAN SWING OR BOOM INTO THE RAILROAD RIGHT OF WAY.
- CONDUIT PLACED UNDER PAVED AREAS SHALL BE BY BORING. IF PLACED PRIOR TO PAVING, MAY BE TRENCHED.



The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

[Signature]
8/30/2024


 © 2024 TxDOT
TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF ILLUMINATION QUANTITIES & NOTES

 NTS SHEET 1 OF 1

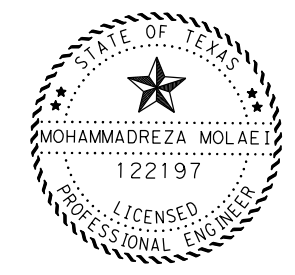
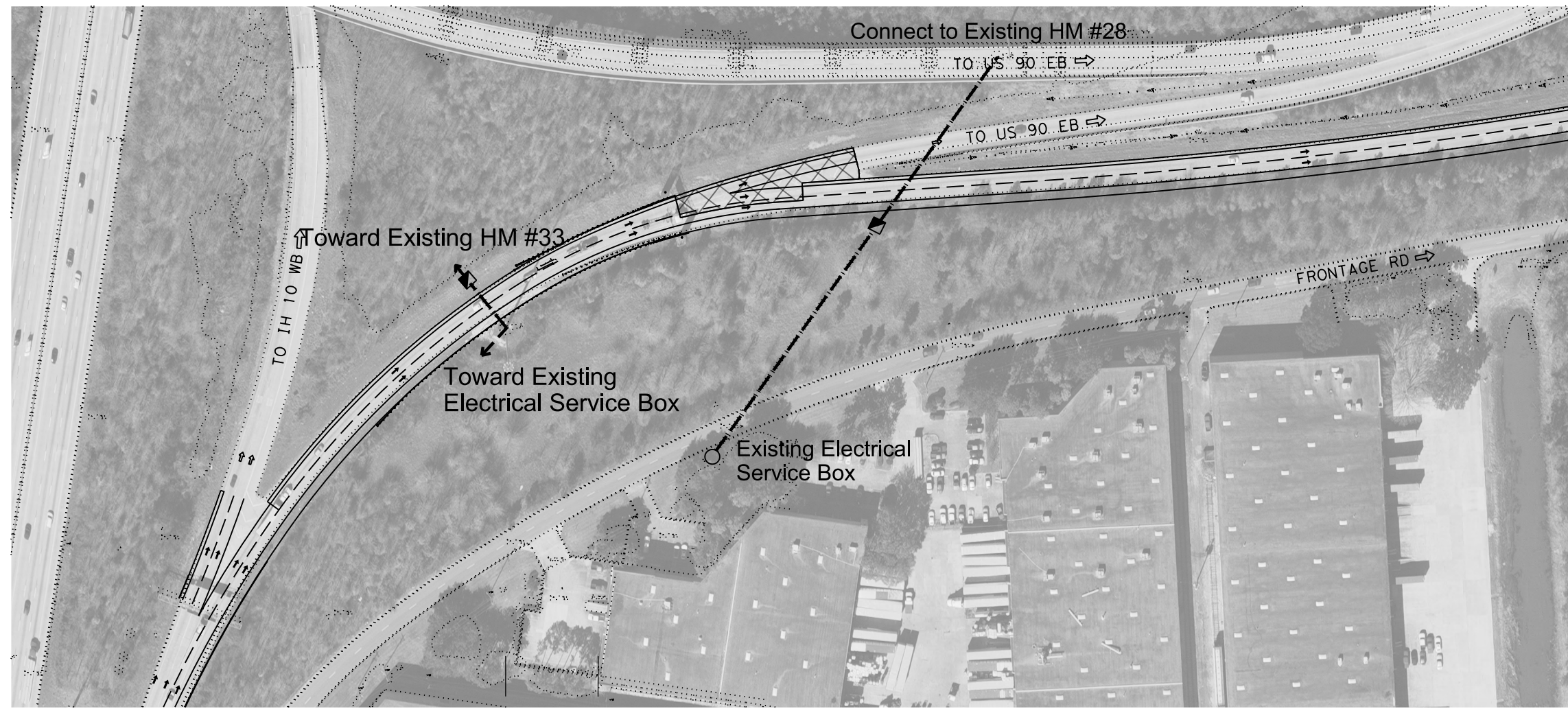
ORIGINAL DRAWING DATE:	STATE DISTRICT:	FEDERAL REGION:	FEDERAL AID PROJECT:	SHEET:
	HOU	6		149
DESIGNER:	COUNTY:	CONTROL SECTION:	JOB:	HIGHWAY:
	HARRIS	0271 15	099	IH 610

STIME\$
SDATE\$
SF ILEL\$

STIME\$

SDATE\$

SDATE\$



The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

[Signature] 8/30/2024

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW GROUND BOX TY D WITH APRON
- — — — NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- ⋯⋯⋯⋯⋯ NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

	GROUND BOX TY D W/APRON 0624-7008 (EA)	CONDUIT		CONDUCTOR	
		2" PVC SCH 80 0618-7054 (FT)	2" PVC SCH 80 BORE 0618-7055 (FT)	#8 BARE 0620-7007 (FT)	INSULATED #8 XHHW 0620-7008 (FT)
TOTAL	2	-	616	620	1240



ILLUMINATION LAYOUT

IH 610

SCALE: 1"=100' SHEET 1 OF 1

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DL-1 - JR		12	6		150
CL-1 - MJ		COUNTY		CONTROL SECTION	JOB HIGHWAY
DL-1 - JR		HARRIS		0271 15	099 IH 610
CL-1 - MJ					

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- 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.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- 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.
- 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.
- 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

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

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

- 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.
- 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.
- 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.

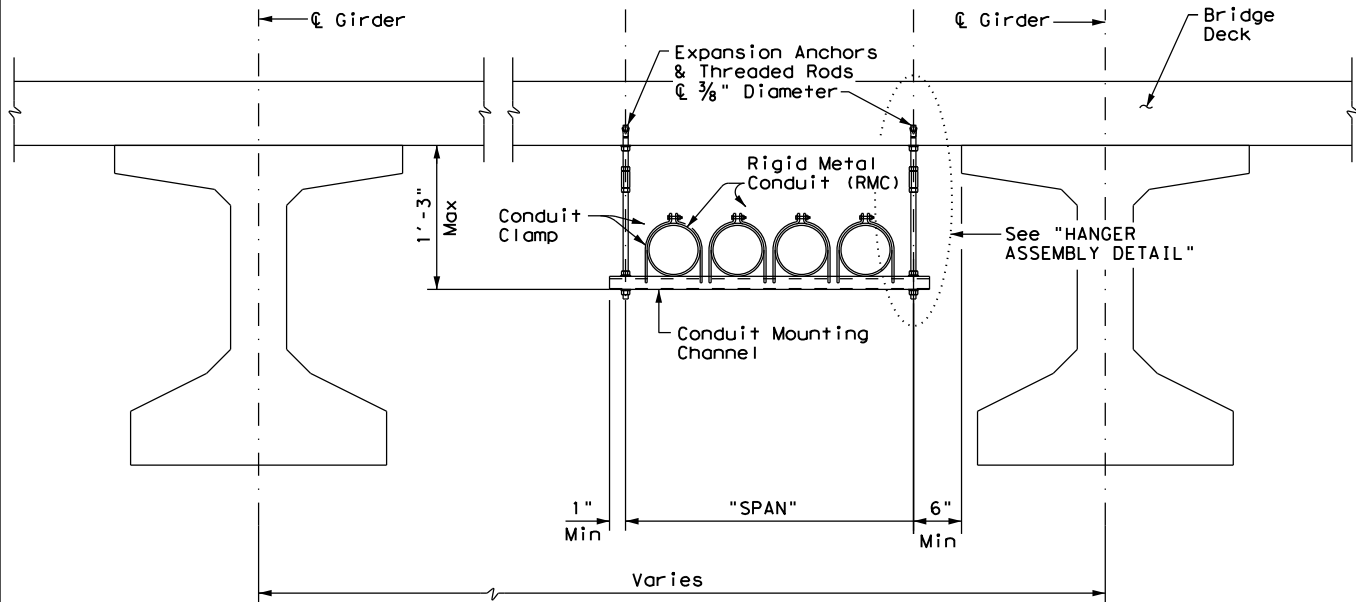
B. CONSTRUCTION METHODS

- 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.
- 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.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- 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.
- 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."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 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.
- 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.
- 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.
- 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.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 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).
- 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.
- 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	
<h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1>			
<h2>ED(1)-14</h2>			
FILE: ed1-14.dgn	DN:	CK:	DW:
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS	0271	15	099
	DIST	COUNTY	IH 610
	12	HARRIS	151

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

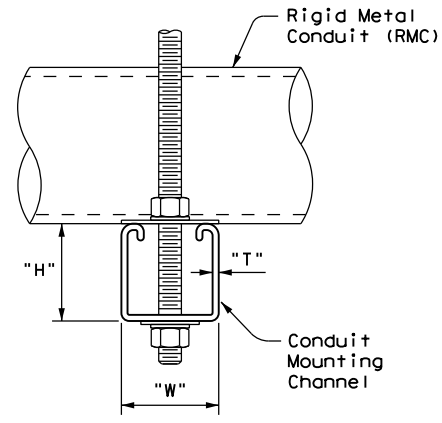
DATE: FILE:



CONDUIT HANGING DETAIL

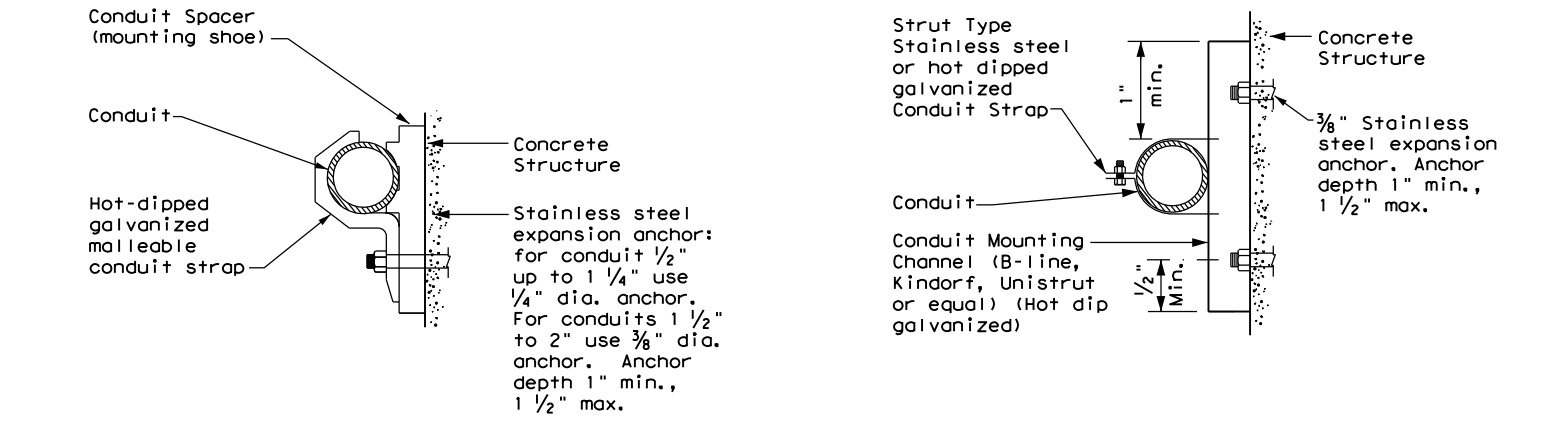
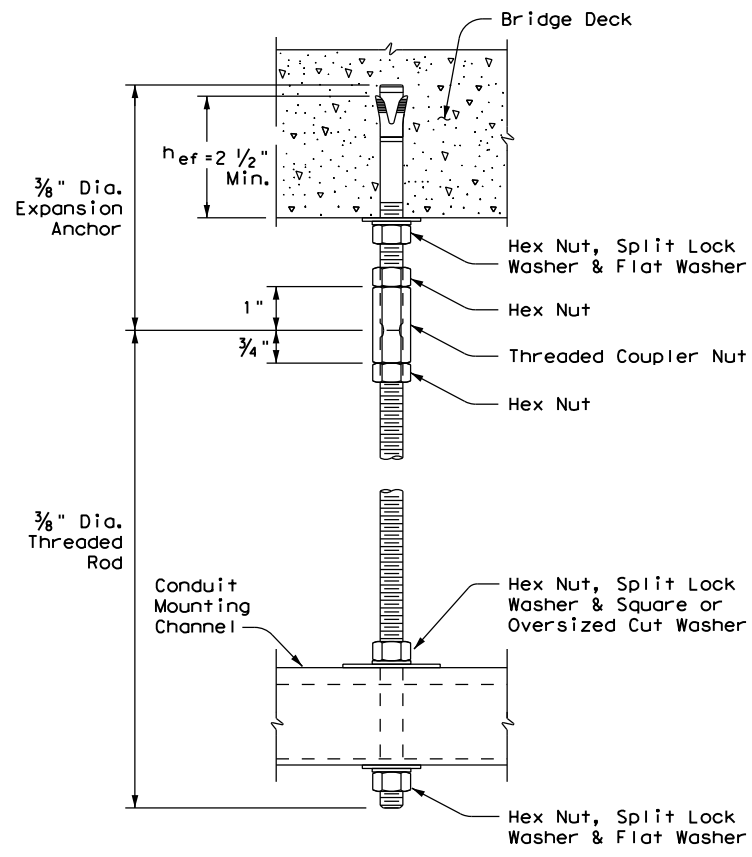
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.



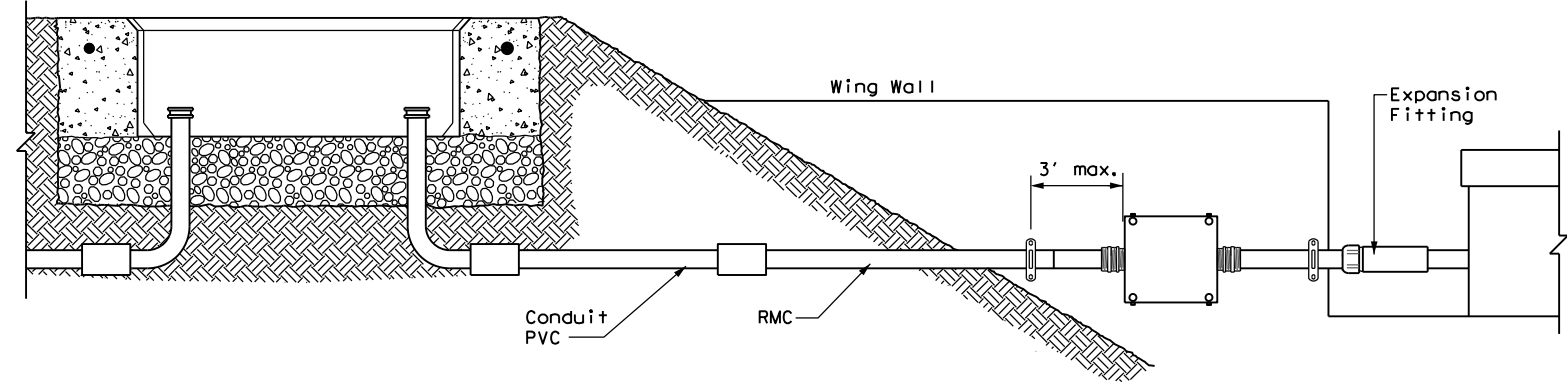
HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT



CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUIT SUPPORTS</h2>			
<h3>ED(2) - 14</h3>			
FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT October 2014	CONT: 0271	SECT: 15	JOB: 099
REVISIONS			HIGHWAY: IH 610
	DIST: 12	COUNTY: HARRIS	SHEET NO.: 152

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

- 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.
- 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.
- 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.
- 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

- 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.
- 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.
- 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.
- Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
- 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.
- Support conductors in illumination poles with a J-hook at the top of the pole.
- 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.
- Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
- Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
- 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.
- 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.

- 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

- Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
- 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.
- Use listed wire nuts with factory applied sealant for temporary wiring where approved.
- 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.
- Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

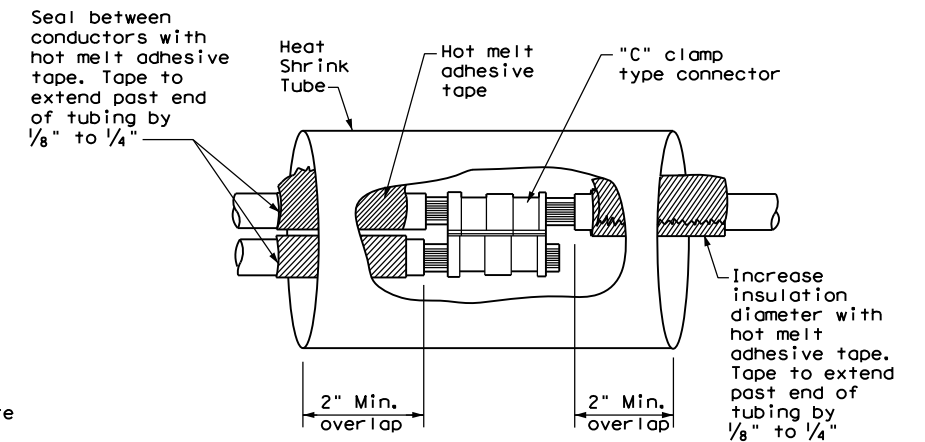
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

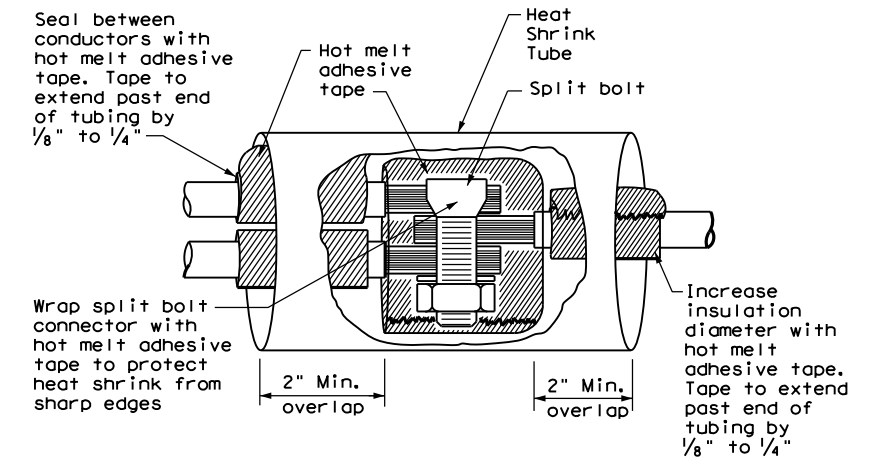
- Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

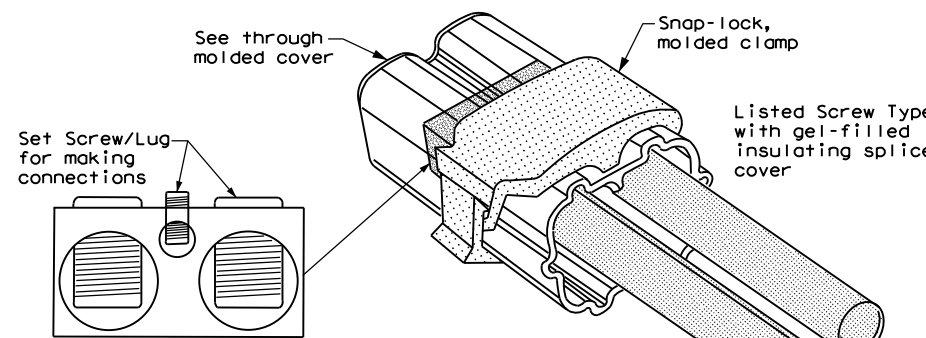
- Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
- Do not place ground rods in the same drilled hole as a timber pole.
- Install ground rods so the imprinted part number is at the upper end of the rod.
- Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
- 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.
- 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.
- 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**

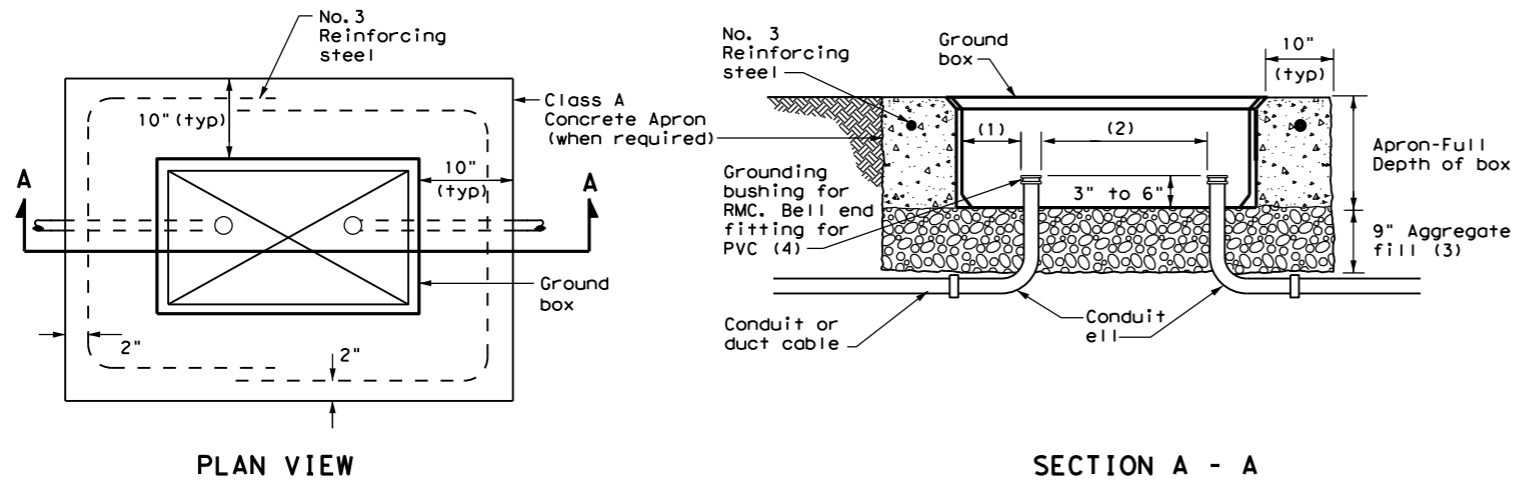
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

		Texas Department of Transportation		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUCTORS</h1>					
<h2>ED(3) - 14</h2>					
FILE#	ed3-14.dgn	DN#	TxDOT	CK#	TxDOT
©	TxDOT	October	2014	CONT	SECT
REVISIONS		0271	15	099	IH 610
		DIST	COUNTY	SHEET NO.	
		12	HARRIS	153	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

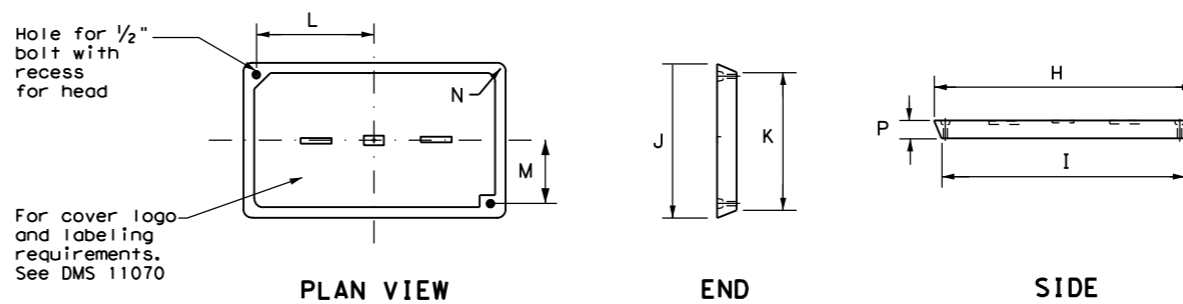


APRON FOR GROUND BOX

- (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 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



GROUND BOX COVER

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.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS GROUND BOXES</h2>			
<h3>ED(4) - 14</h3>			
FILE: ed4-14.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
© TxDOT October 2014	CONT	SECT	HIGHWAY
REVISIONS	0271	15	099 IH 610
	DIST	COUNTY	SHEET NO.
	12	HARRIS	154

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.

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.: 435469S
 Crossing Type: RR OVERPASS
 RR Company Operating Track at Crossing: UPRR
 RR Company Owning Track at Crossing: UPRR
 RR MP: 2.034
 RR Subdivision: Baytown
 City: Houston
 County: Harris
 CSJ at this Crossing: 0271-15-099
 Latitude: 29.7682888
 Longitude: -95.2653915

Scope of Work, including any TCP, to be performed by State Contractor:

Only signs for the TCP work to be performed on interstate highway passing under the railroad.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 0
 On this project, night or weekend flagging is:
 Expected
 Not Expected

Flagging services will be provided by:

Railroad Company: 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	
<input type="checkbox"/> Not Required	
<input checked="" type="checkbox"/> Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	\$2,000,000 / \$6,000,000
<input type="checkbox"/> Bridge Structure Projects. Includes new construction or replacement of overpass/underpass structures	\$5,000,000 / \$10,000,000
<input type="checkbox"/> 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: UPRR _____
 Railroad Emergency Line at: (800) 848-8715 _____
 Location: DOT 435469S _____
 RR Milepost: 2.034 _____
 Subdivision: Baytown _____

RRD Review Only
 Initials: [Signature]
 Date: 7/23/24

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
6/2023	0271	15	099	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		155

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	CR: TxDOT	
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS March 2020	0271	15	099	IH 610	
	DIST	COUNTY	SHEET NO.		
	HOU	HARRIS	156		

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 Contractor'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.



RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	15	099	IH 610
March 2020	DIST	COUNTY	SHEET NO.	
	HOU	HARRIS	157	