INDEX OF SHEETS
SEE SHEET NO. 2, 2A

REGISTERED ACCESSIBILITY SPECIALIST (RAS)
INSPECTION REQUIRED TDLR NO. TABS2024017971

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
GALVESTON COUNTY
CSJ: 1911-01-022, etc.

FM 2004

LIMITS: FROM JACK BROOKS RD TO OAK RD

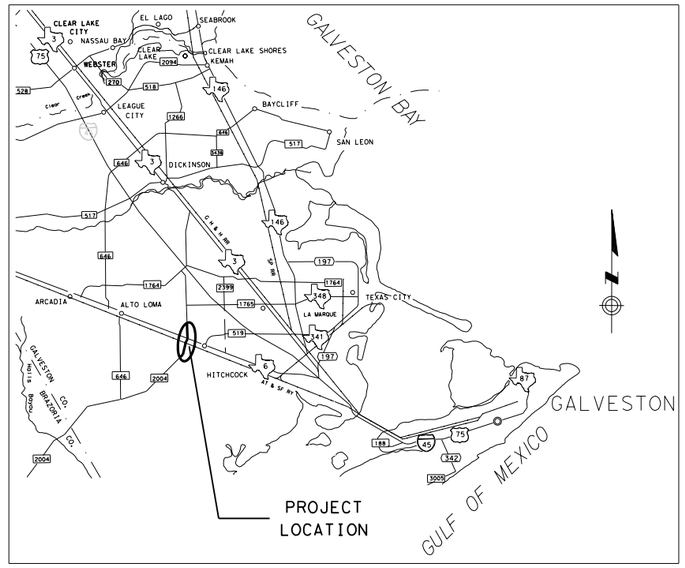
NET LENGTH OF PROJECT: 6097.00 FT = 1.15 MI

FOR THE CONSTRUCTION OF SIDEWALKS CONSISTING OF CONCRETE PATH, CURB RAMPS, DRAINAGE MODIFICATIONS, SIGNAL MODIFICATIONS, DRIVEWAY RECONSTRUCTION, SIGNING, STRIPING, AND SWPPP.

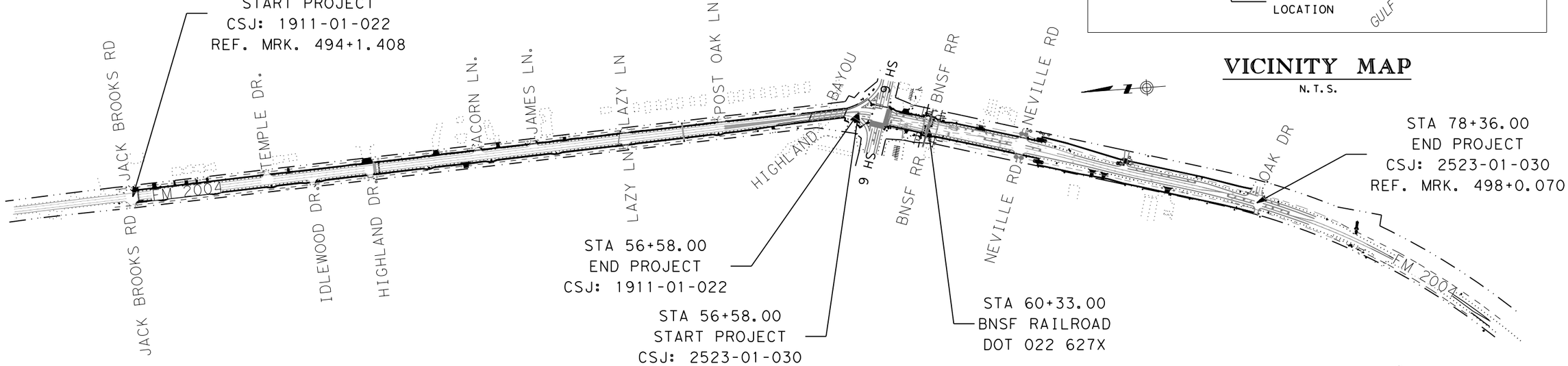
PROJECT NO.
STP 2B24(356)VRU, etc.

FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL
DESIGN SPEED: 55 MPH
ADT (2024) = 13,400
ADT (2044) = 18,600

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	STP 2B24(356)VRU, etc.		1
STATE	STATE DIST.	COUNTY	
TEXAS	12	GALVESTON	
CONT.	SEC.	JOB	HIGHWAY NO.
1911	01	022, ETC	FM 2004



VICINITY MAP
N. T. S.



PROJECT LOCATION MAP
N. T. S.

RR CROSSINGS: BNSF, 60+33, DOT. NO. 022 627X
EQUATIONS: 0+00
EXCEPTIONS: NONE

COUNTY GALVESTON PROJ. NO.
HWY. NO. FM 2004 LETTING DATE AUG 2024
DATE ACCEPTED

NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOV 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS;, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL - AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023).

PREPARED BY:
AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER
05/30/2024

SUBMITTED FOR LETTING: 5-30-2024
AREA ENGINEER

RECOMMENDED FOR LETTING: 5/31/2024
DocuSigned by: Brett McLeod , P.E.
DISTRICT ENGINEER

INDEX OF SHEETS

STATE OF TEXAS
JOEL H. CLARKE
114223
LICENSED
PROFESSIONAL ENGINEER

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

NAME

5-30-2024
DATE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

INDEX OF SHEETS

SHEET 01 OF 02

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		2

DATE: 5/30/2024 1:30:35 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 41\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Index Sheet.dgn

INDEX OF SHEETS

STATE OF TEXAS
JOEL H. CLARKE
114223
LICENSED
PROFESSIONAL ENGINEER

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

NAME

5-28-2024
DATE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

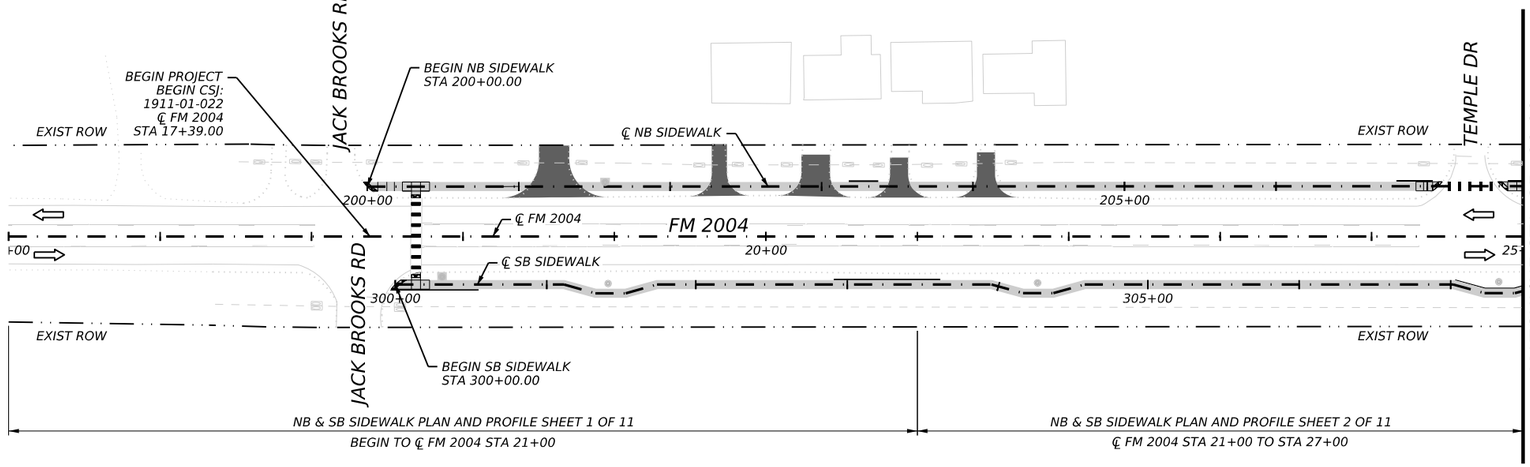
FROM JACK BROOKS RD TO OAK DR

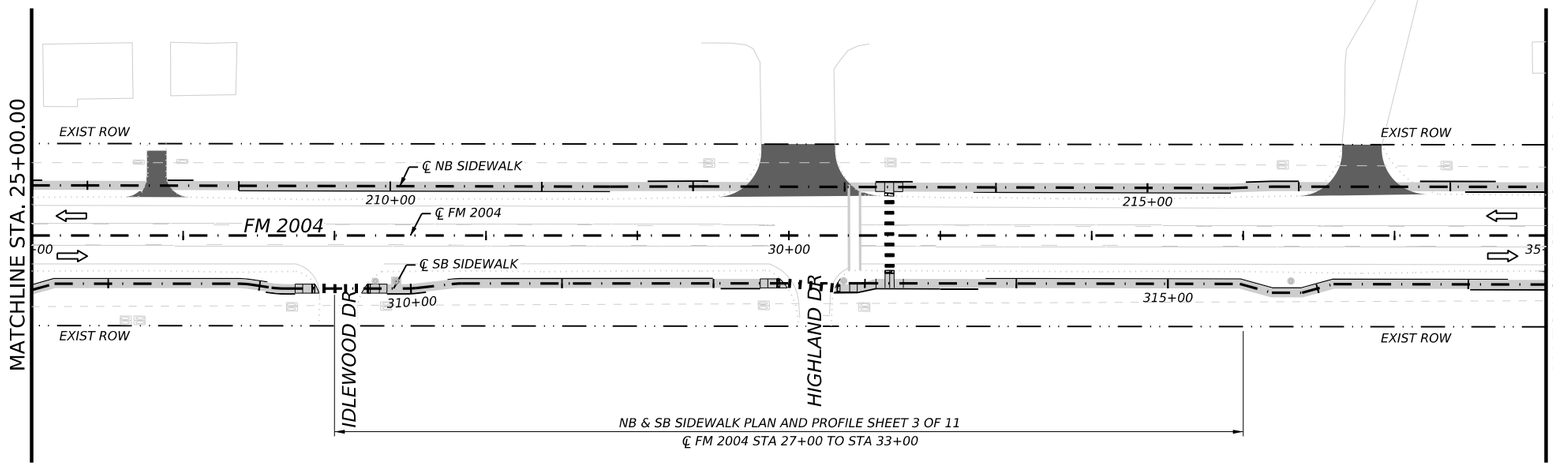
INDEX OF SHEETS

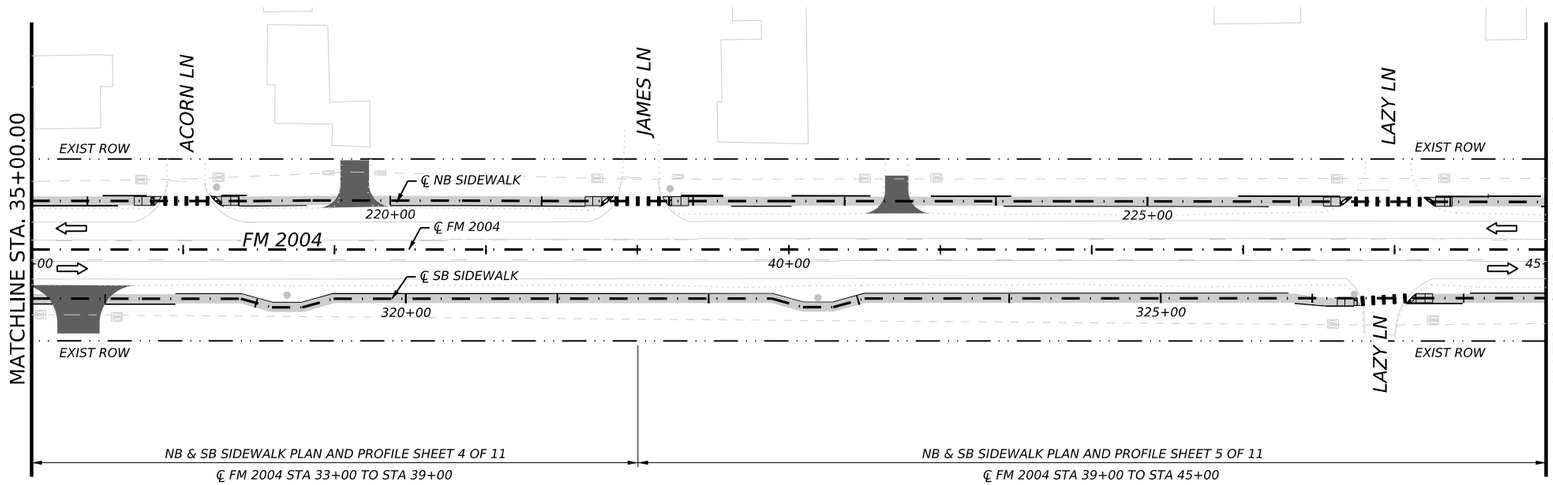
SHEET 02 OF 02

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		2A

DATE: 5/9/2024 4:58:11 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Index Sheet.dgn







HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

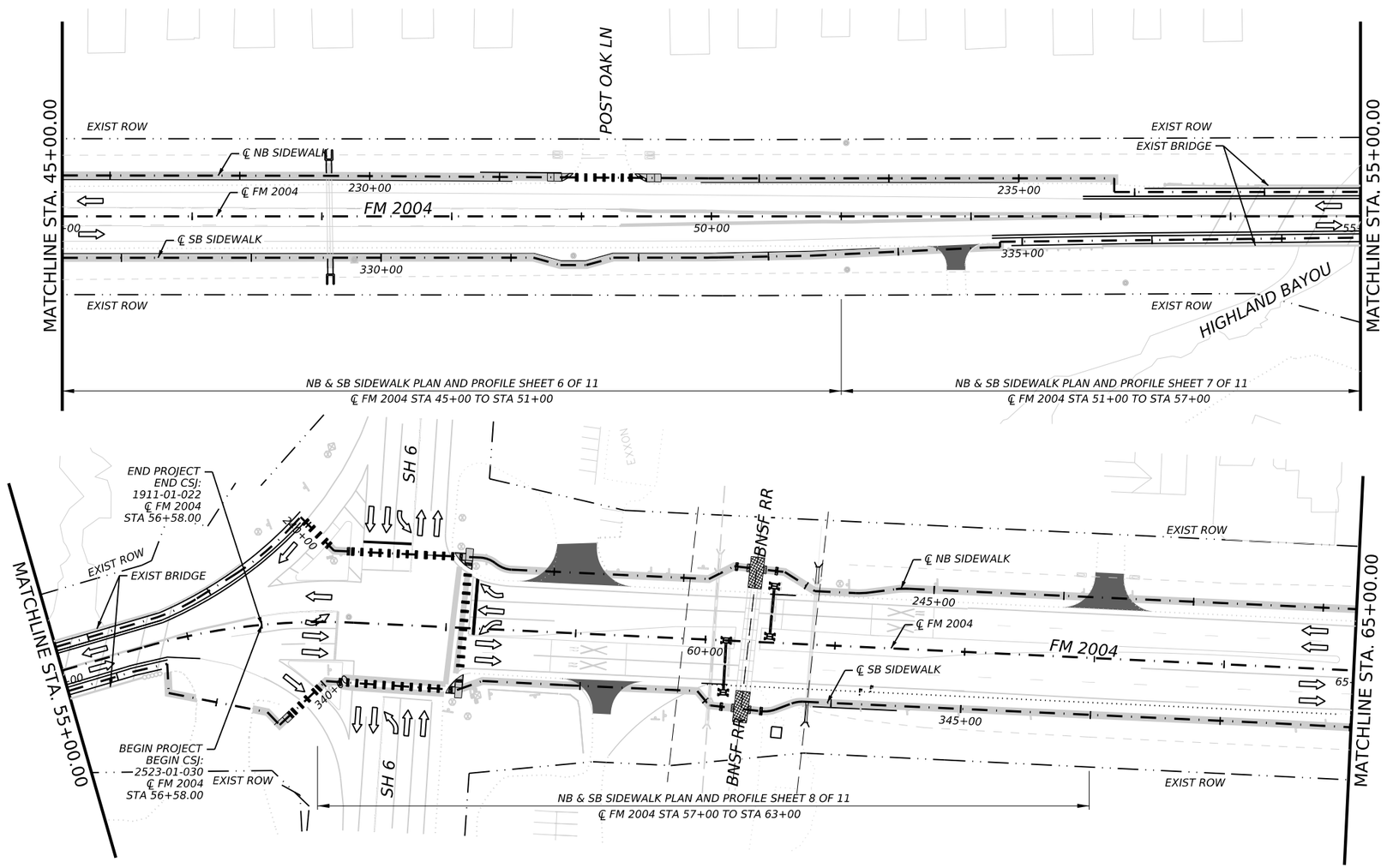
PROJECT LAYOUT

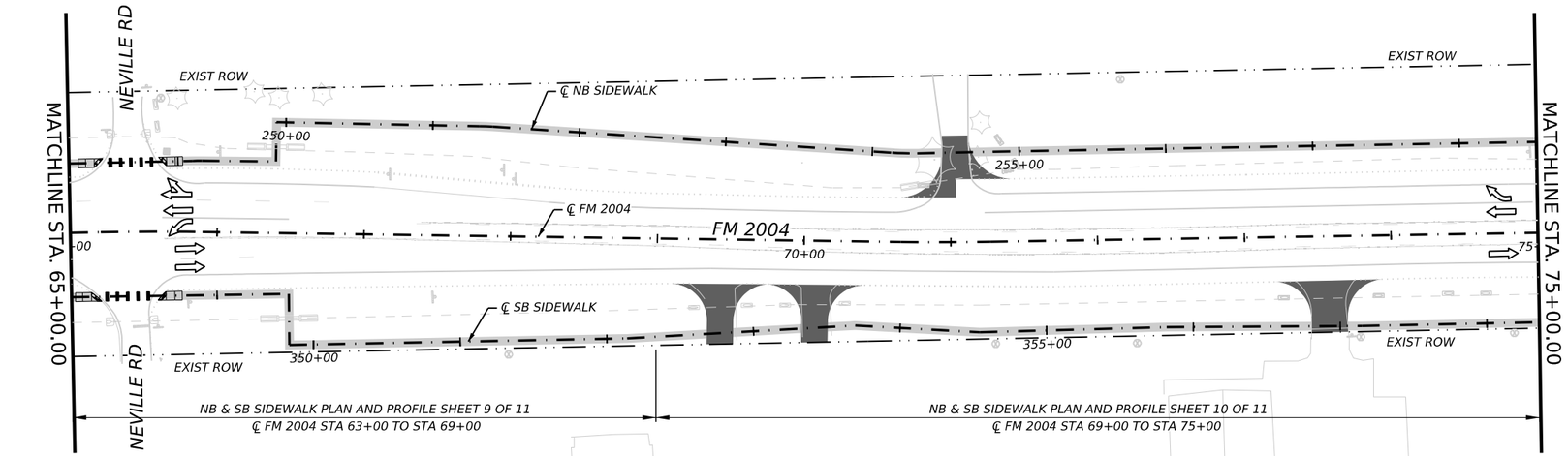
℄ FM 2004
BEGIN TO STA 45+00

SHEET 01 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		3

DATE: 5/30/2024 2:40:17 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Project Layout\Project layout - Plan 1.dgn





HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

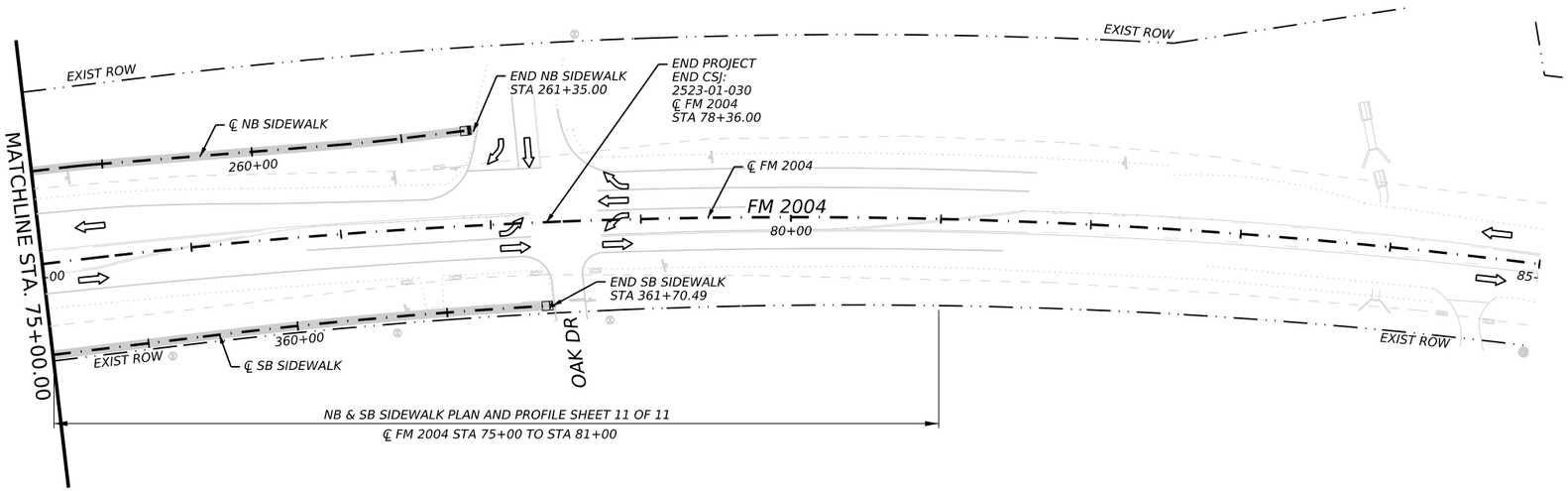
PROJECT LAYOUT

℄ FM 2004
STA 45+00 TO STA 75+00

SHEET 02 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		4

DATE: 5/20/2024 4:25:56 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Project Layout\Project layout - Plan 4.dgn



HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

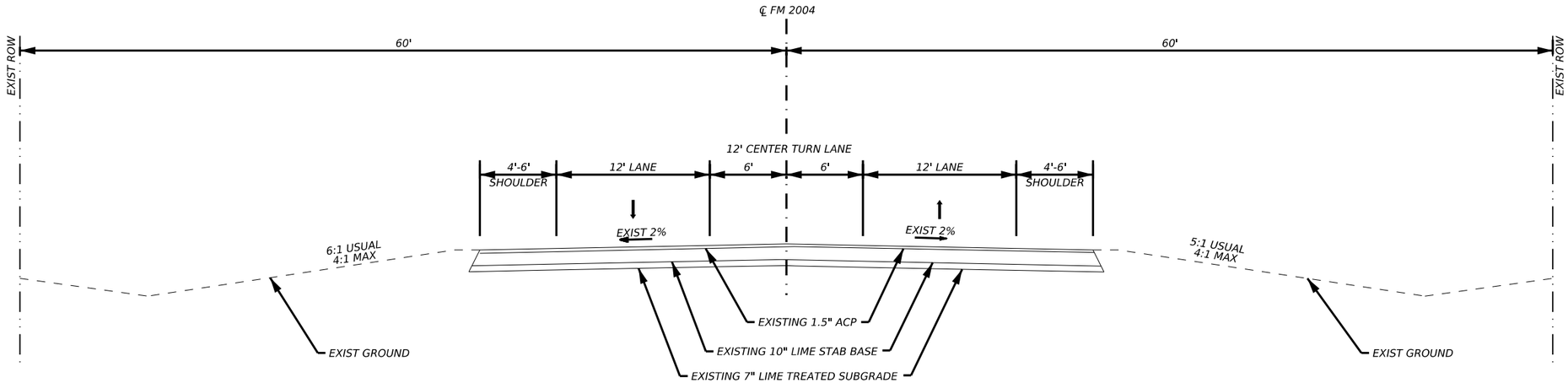
PROJECT LAYOUT

℄ FM 2004
STA 75+00 TO END

SHEET 03 OF 03

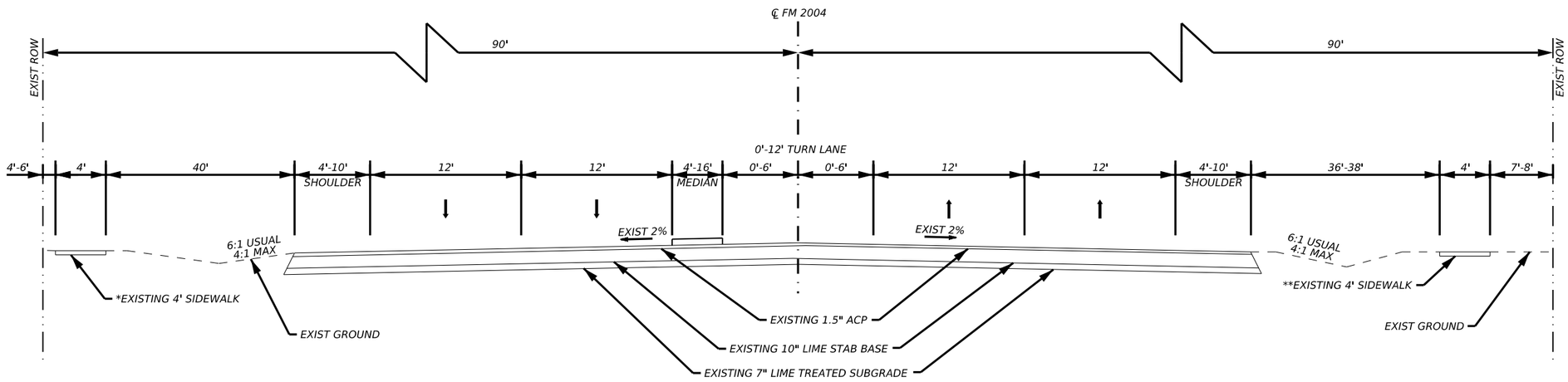
CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		5

DATE: 5/9/2024 5:45:43 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\1911010022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Project Layout\Project layout - Plan 7.dgn



EXISTING TYPICAL SECTION

STA 10+00 TO STA 57+75



EXISTING TYPICAL SECTION

STA 57+75 TO STA 69+30
** STA 65+50 TO STA 69+30*
*** STA 65+55 TO STA 69+30*

NOT TO SCALE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

06/26/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

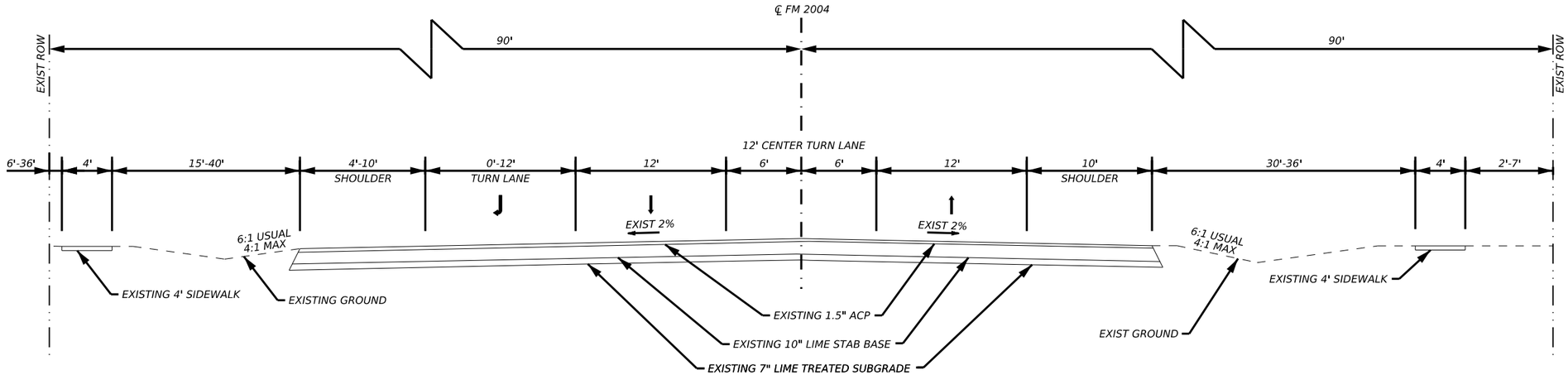
EXISTING TYPICAL SECTIONS

SHEET *01* OF *02*

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		6

DATE: 6/26/2024 10:00:23 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Typical Sections\FM2004 Existing Typicals 01.dgn

CK | DW | CK | DW



EXISTING TYPICAL SECTION

STA 69+30 TO END

NOT TO SCALE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

06/26/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

EXISTING TYPICAL SECTIONS

SHEET 02 OF 02

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		7

DATE: 6/26/2024 10:00:25 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Typical Sections\FM2004_Existing Typicals_02.dgn

DW | CK | DW | CK

NB SIDEWALK

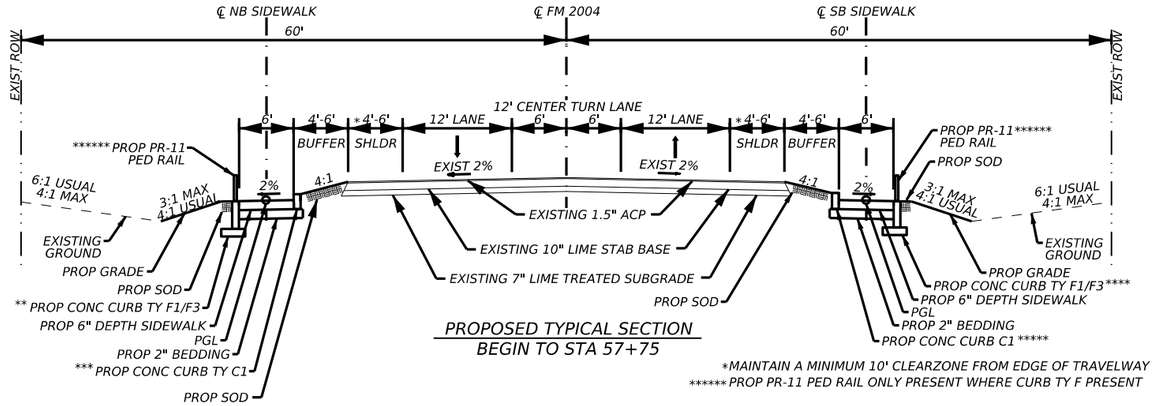
** CURB TY F LIMITS

F1 STA 203+15.00 TO STA 203+40.00
F1 STA 206+80.00 TO STA 207+04.00
F1 STA 207+53.00 TO STA 207+70.00
F1 STA 208+52.00 TO STA 208+70.00
F1 STA 211+70.00 TO STA 212+10.00
F1 STA 213+20.00 TO STA 213+45.00
F1 STA 215+65.00 TO STA 216+00.00
F1 STA 216+80.00 TO STA 217+30.00
F1 STA 218+10.00 TO STA 218+40.00
F1 STA 218+89.00 TO STA 219+05.00
F1 STA 221+92.00 TO STA 222+20.00
F3 STA 222+65.00 TO STA 223+18.00
F3 STA 223+56.00 TO STA 224+10.00
F3 STA 225+60.00 TO STA 226+27.00
F3 STA 226+90.00 TO STA 227+25.00
F1 STA 227+25.00 TO STA 227+60.00
F1 STA 230+85.00 TO STA 231+48.00

NB SIDEWALK

*** CURB TY C1 LIMITS

STA 209+00.00 TO STA 211+45.00
STA 213+85.00 TO STA 215+55.00
STA 217+10.00 TO STA 218+20.00
STA 219+00.00 TO STA 219+45.00
STA 220+00.00 TO STA 221+29.00
STA 222+25.00 TO STA 222+65.00
STA 224+05.00 TO STA 225+80.00
STA 227+60.00 TO STA 231+10.00
STA 232+55.00 TO STA 235+00.00



PROPOSED TYPICAL SECTION
BEGIN TO STA 57+75

*MAINTAIN A MINIMUM 10' CLEARZONE FROM EDGE OF TRAVELWAY
****** PROP PR-11 PED RAIL ONLY PRESENT WHERE CURB TY F PRESENT

SB SIDEWALK

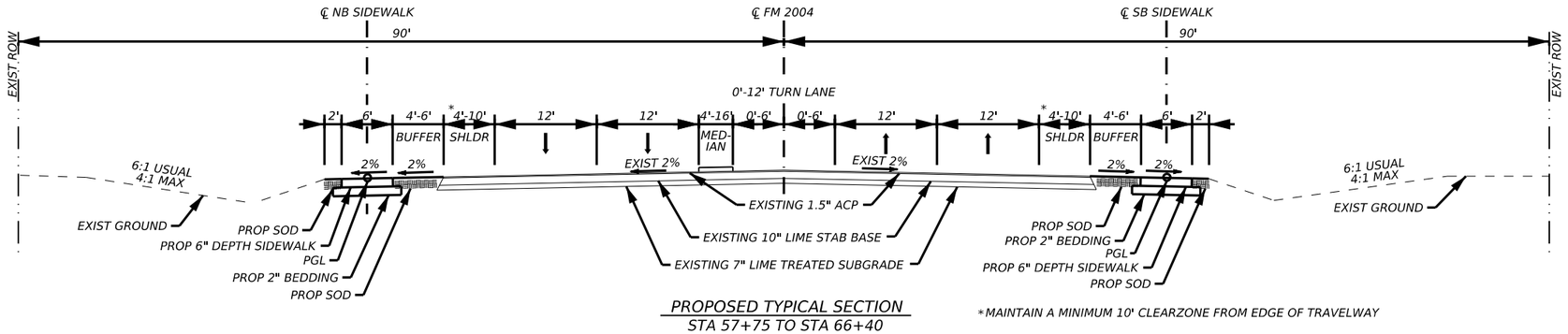
**** CURB TY F LIMITS

F1 STA 300+00.00 TO STA 300+55.02
F1 STA 309+04.67 TO STA 309+23.56
F1 STA 309+84.22 TO STA 310+09.67
F1 STA 312+04.67 TO STA 312+30.84
F3 STA 312+94.87 TO STA 313+74.69
F3 STA 317+01.25 TO STA 317+65.20
F1 STA 318+00.00 TO STA 318+46.24
F1 STA 325+89.35 TO STA 326+31.70
F1 STA 326+61.93 TO STA 326+99.34

SB SIDEWALK

***** CURB TY C1 LIMITS

STA 302+91.55 TO STA 303+61.54
STA 307+02.15 TO STA 309+04.67
STA 310+24.67 TO STA 311+99.66
STA 313+79.65 TO STA 317+26.22
STA 318+46.23 TO STA 325+84.32
STA 327+04.32 TO STA 333+85.89



PROPOSED TYPICAL SECTION
STA 57+75 TO STA 66+40

*MAINTAIN A MINIMUM 10' CLEARZONE FROM EDGE OF TRAVELWAY

NOT TO SCALE

STATE OF TEXAS
MAJED A. AGHA
131711
PROFESSIONAL ENGINEER

06/26/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

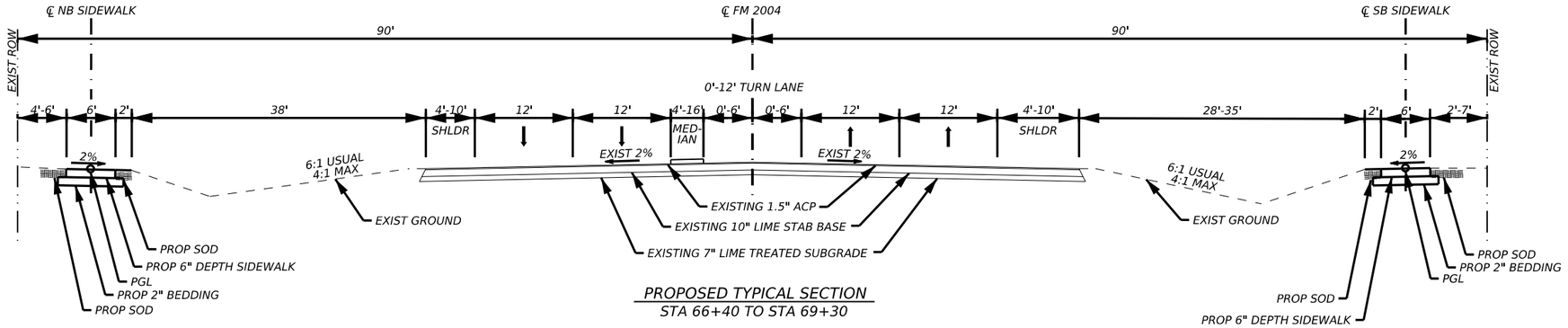
PROPOSED TYPICAL SECTIONS

SHEET 01 OF 02

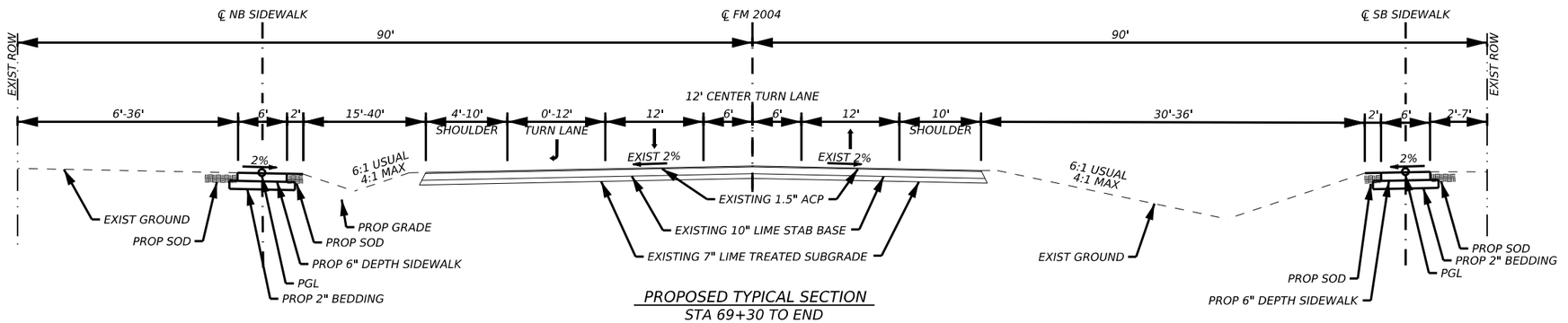
CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		8

DATE: 6/26/2024 10:06:26 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Typical Sections\FM2004 Proposed Typicals_01.dgn

CK | DW | CK | DW



PROPOSED TYPICAL SECTION
STA 66+40 TO STA 69+30



PROPOSED TYPICAL SECTION
STA 69+30 TO END

NOT TO SCALE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

06/26/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

PROPOSED TYPICAL SECTIONS

SHEET 02 OF 02

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		9

DATE: 6/26/2024 10:06:27 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Typical Sections\FM2004 Proposed Typicals 02.dgn

CK | DW | CK | DW

General Notes:

General:
Area Engineer contact information for this project follows:

David Lazaro, P.E. 409-978-2500 David.Lazaro@txdot.gov
Joel H. Clarke, P.E. 409-978-2500 Joel.Clarke@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:

Index of /pub/txdot-info/Pre-Letting Responses/Houston District (state.tx.us) or
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Houston%20District/

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.

The following standard detail sheets are modified:

Modified Standards

CD/PM(APS)PS (MOD)

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 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.

Make requests for additional soil information for this project at the Area Engineer's office.

Unless otherwise shown on the plans or otherwise directed, commence work after sunrise and ensure construction equipment is off the road by sunset.

Procure permits and licenses, which are to be issued by the city, county, or Municipal Utility District (MUD).

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: 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

Mow the grass and weeds within the project limits a maximum of 3 times a year as directed. This work is subsidiary to the various bid items.

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	**Truck Type - 4 Wheel**
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
	Mobile TE-4
	Murphy 4042

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.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

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 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 2

2014 Construction Specification Required Shop/Working Drawing Submittals - Consultant 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	D	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	D	WD
403	Temporary Special Shoring	Y	N	Y	D	WD
420	Formwork/Falsework	Y	N	Y	D	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	D	SD
425	Optional Design Calculations	Y	Y	Y	D	SD

	(Prstrs Bms)					
425	Prestr Concr Sheet Piling	Y	Y	N	D	SD
425	Prestr Concr Beams	Y	Y	N	D	SD
425	Prestr Concr Bent	Y	Y	N	D	SD
426	Post Tension Details	Y	Y	N	D	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	D	SD
441	Bridge Protective Assembly	Y	Y	N	D	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	D	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	D	SD
441	Steel Bearings	Y	Y	N	D	SD
441	Steel Bent	Y	Y	N	D	SD
441	Steel Diaphragms	Y	Y	N	D	SD
441	Steel Finger Joint	Y	Y	N	D	SD
441	Steel Plate Girder	Y	Y	N	D	SD
441	Steel Tub-Girders	Y	Y	N	D	SD
441	Erection Plans, including Falsework	Y	N	Y	D	WD
449	Sign Structure Anchor Bolts	Y	Y	N	D	SD
450	Railing	Y	Y	N	D	SD
462	Concrete Box Culvert	Y	Y	N	D	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	D	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	D	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	D	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	D	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	D	SD
467	Pre-cast Safety End Treatments	Y	Y	N	D	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	D	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	D	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	D	SD
627	Treated Timber Poles	Y	Y	N	D	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	D	SD
647	Large Roadside Sign Supports	Y	Y	Y	D	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	D	SD
650	Sign Structures	Y	Y	N	D	SD
680	Installation of Highway Traffic Signals	Y	Y	N	D	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	D	SD
684	Traffic Signal Cables	Y	Y	N	D	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	D	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	D	SD
687	Pedestal Pole Assemblies	Y	Y	N	D	SD
688	Detectors	Y	Y	N	D	SD
784	Repairing Steel Bridge Members	Y	Y	Y	D	WD

SS	Prestr Concr Crown Span	Y	Y	N	D	SD
SS	Sound Barrier Walls	Y	Y	Y	D	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	D	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	D	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	D	SD
SS	VIVDS System for Signals	Y	Y	N	D	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

D – Consultant: Submit to Engineer of Record at magha@aghaengineering.com	
TMS – Traffic Management System	
Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

Item 6: Control of Materials

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

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7: Legal Relations and Responsibilities

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.

The total area disturbed for this project is 4 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.

If the work is on or in the vicinity of an at-grade railroad crossing, involves incidental work on railroad right of way, or involves construction of a railroad grade separation structure, notify the railroad company's Division Engineer and the Department's Project Engineer at least 30 days before performing any work on the railroad right of way and make arrangements for railroad flaggers unless otherwise shown in the contract. Obtain the required Railroad Right of Entry Permit from the railroad company.

Payment of applicable permit fees is the responsibility of the Contractor. Acquiring the Railroad Right of Entry Permit is a lengthy process, allow sufficient time for this.

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 standard workweek in accordance with Section 8.3.1.4.

Lane Closure Assessment Fee is $500. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour of 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.

The maximum number of days the time charges on this contract may be suspended due to contractor mobilization, and material fabrication/accumulation or processing delays is *90* days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

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 designed 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.

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.

Item 162: Sodding 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 305: Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement

Unless otherwise shown on the plans, Recycled 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.

Item 400: Excavation and Backfill for Structures

Plugging existing pipe culverts is subsidiary to the various bid items.

If Recycled Cement Treatment (Type D) is included in the plans, the following additional requirements apply:

1. Use only approved sand, crushed concrete, or salvaged base free from deleterious matter, as aggregate for cement-stabilized backfill.

2. Provide crushed concrete or salvaged base backfill material in accordance with the Item, "Cement Treatment (Plant-Mixed) (Type D)" (base or crushed concrete), except the recycled Type D material must not contain Reclaimed Asphalt Pavement (RAP).

3. For backfill material below the spring line of pipes, use cement-stabilized sand rather than recycled Type D backfill material.

4. For the cement-stabilized sand backfill, use at least 7 percent of hydraulic cement based on the dry weight of the aggregate. The cement content for the crushed concrete and salvaged base is specified in the Item, "Cement Treatment (Plant-Mixed) (Type D)."

5. Place and compact the stabilized backfill material using a gradation that provides a dense mass without segregating and is impervious to passing of water.

6. Compact the mixture using density control unless otherwise shown on the plans. Place and compact the backfill within 2 hr. of mixing.

Item 416: Drilled Shaft Foundations

Include the cost for furnishing and installing anchor bolts mounted in the drilled shafts in the unit bid price for the various diameter drilled shafts.

The Department may test using ultrasonic methods the anchor bolts for overhead sign supports, light standards, and traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

Item 432: Riprap

If stone riprap is shown on the plans, use common stone riprap (unless otherwise shown in the plans) in accordance with Section 432.2.3.3, placed dry in accordance with Section 432.3.2.3. Do not grout. Crushed concrete may also be used.

Item 442: Metal for Structures

Use temperature zone 1 for Charpy V-Notch (CVN) testing.

Prestressed concrete panels will not be allowed on steel structures.

Item 449: Anchor Bolts

Pipe joint compound, as used in this Item, is an electrically conducting protective thread lubricant compound to be used on the foundation anchor bolts for illuminations poles (Crouse-Hinds TL-2, 0z/Gedney Stl, or Thomas & Betts Kopr-Shield).

Item 462: Concrete Box Culverts and Drains
Item 464: Reinforced Concrete Pipe

Concrete collars are subsidiary to the various bid items except for those specified on the plans for stage construction, which are paid for under the Item, “Concrete Substructures” as “Cl C Conc (Collar).”

Rubber gaskets are required for concrete pipe joints except for connections of safety end treatments, driveway culverts, and joints between the existing pipes and extensions.

If performing the work under the Item, “Jacking, Boring, or Tunneling Pipe or Box,” use reinforced concrete pipe (except circular bell-and-spigot, arch, or horizontal elliptical pipe).

Open, install, and backfill each section, or a portion of a section, in the same day at locations requiring pipe culverts under existing roadways.

Place the pipe drains across existing roadways half at a time to allow passage of traffic. No trenches may remain open overnight.

Known locations of existing stub-outs are shown on the plans, but these stub-outs may be in a different position or condition. Delays, inconveniences, or additional work required will not be a basis for additional compensation.

Provide leave-outs or holes in the proposed storm drain structures and pipes for drainage during interim construction. This work is subsidiary to the various bid items.

The flowline elevations of side road structures are based on the proposed ditches. Field-verify these elevations and adjust them as necessary to meet the field conditions. Before placing these structures, prepare and submit for approval, the data (revised elevation, alignment, length, etc.) for the adjusted structures.

Items 496: Removing Structures

Do not permit debris resulting from the structure removal or construction activities to enter a natural or manmade waterway such as drainage channels, rivers, streams, bays, etc. Remove debris which falls into such waterways. This work is subsidiary to the Item, “Removing Structures.”

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.”

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.

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.

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.

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	9:00AM – 3:00PM	N/A	3:00PM - 9:00AM
Tuesday	9:00AM – 3:00PM	N/A	3:00PM - 9:00AM
Wednesday	9:00AM – 3:00PM	N/A	3:00PM - 9:00AM
Thursday	9:00AM – 3:00PM	N/A	3:00PM - 9:00AM
Friday	9:00AM – 3:00PM	N/A	3:00PM - 9:00AM
Saturday	N/A	N/A	N/A
Sunday	N/A	N/A	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.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

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.

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 529: Concrete Curb, Gutter, and Combined Curb and Gutter
Item 530: Intersections, Driveways, and Turnouts
Item 531: Sidewalks

An air-entraining admixture is not required.

For concrete curbs, use Grade 7 aggregate conforming to Section 421.2.6 of the Item, "Hydraulic Cement Concrete."

For driveways and turnouts, coarse aggregate Grade No. 3 through No. 8 conforming to the gradation requirements specified in the Item, "Hydraulic Cement Concrete" will be permitted.

For reinforcing steel in sidewalks and pedestrian ramps, use No. 4 bars at a maximum 18 in. spacing center-to-center in both directions.

Item 610: Roadway Illumination Assemblies

The cost of providing the electrical conductor in the pole foundation or in the pole base to make connections is subsidiary to the roadway illumination assembly. The quantity for payment is the surface distance between locations.

Fabricate steel roadway illumination poles in accordance with the latest Department RIP (Roadway Illumination Poles) Standards. Poles manufactured according to the latest RIP Standards require no shop drawings. Alternate designs to the Department's RIP Standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25 ft. above the surrounding terrain, provide shop drawings (see ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf) and calculations that are sealed, signed, and dated by a professional engineer registered or licensed in Texas.

Supply anchor bolt assemblies as shown on the RIP standard sheets, unless a larger capacity bolt assembly is required for the 3-second gust wind speed and mounting elevation at the pole installation location.

Item 613: High Mast Illumination Poles

Place the metal beam guard fence before placing the high mast foundation.

Before erecting the high mast poles, notify the Engineer a minimum of 3 working days in advance for scheduling the inspection of each assembled high mast pole and high mast assembly.

Place high mast illumination poles in locations so that the light mounting and support assembly can be lowered and maintained from ground level without interfering with bridges or retaining walls. Notify the Engineer of any such conflicts.

Provide anchor bolts for high mast illumination poles in accordance with the Item, "Anchor Bolts."

Item 614: High Mast Illumination Assemblies

Erect and place in operation high mast illumination poles before removing existing illumination facilities.

The high mast power cable must meet the latest edition of Department Standard sheets, "High Mast Illumination Details" (HMID) and Department Material Specification (DMS) 11021, "High Mast Assembly Kits."

Furnish stainless steel pulley material for the Wire Rope Pulley as shown on the HMID standard.

Item 616: Performance Testing of Lighting Systems

The illumination plans provide for a complete illumination system installed, connected, tested, and ready for operation.

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 618: Conduit
Item 620: Electrical Conductors
Item 628: Electrical Services

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."

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.

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.

Provide Liquid-Tight Flexible Metal (LTFM) conduit if the plans refer to flexible metal conduit. Do not use flexible metal conduit.

Unless otherwise shown on the plans, place conduit runs behind curbs at locations where curbs exist.

Use schedule 80 PVC conduit to house conductor runs under paved riprap, roadway, or driveways, unless otherwise shown on the plans.

Use Rigid Metal Conduit (RMC) for exposed conduit.

Before backfilling conduit trenches, place a detectable underground metalized mylar marking tape above the conduit and concrete encasement. Imprint the marking tape with, "TxDOT CONDUIT AND FIBER OPTIC CABLE SYSTEM. CALL (713) 802-5909 BEFORE PROCEEDING" every 18 in. Supplying and installing the marking tapes is subsidiary to the various bid items.

Conduit elbows and rigid metal extensions required when installing PVC conduit systems are subsidiary to the various bid items.

Install a continuous bare or green insulated copper wire No. 8 AWG or larger in every conduit throughout the electrical system in accordance with the Electrical Detail Standard Sheets, and the latest edition of the NEC.

Provide a single 1/C #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 a temperature range of -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."

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.

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 Roadside Flashing Beacon Assemblies (Item 685) and Pedestal Pole Assemblies (Item 687) within the project, provide single-pole breakaway disconnects as shown on the 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 Item 685. For underground (hot) conductors, install a breakaway connector with a dummy fuse (slug). Provide dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

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 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.

Item 636: Signs

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.

Remove existing street name signs from existing stop signs and re-install them above the new stop signs. Removing and re-installing existing street name signs is subsidiary to the Item, "Small Roadside Sign Assemblies."

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 656: Foundations for Traffic Control Devices

Excavating and disposing of surplus materials for lighting standard foundations are subsidiary to the roadway illumination assembly foundation. Dispose of surplus excavated material. Use rigid metal conduit (RMC) for stub-outs in foundation and concrete structures. These stub-outs are subsidiary to the drilled shaft foundations.

Using ready mix concrete for sign foundations is optional.

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.

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 680: Highway Traffic Signals

Clearly mark or highlight on the shop drawings the items being furnished for this project.

Furnish labor, tools, equipment, and materials as shown on the plans and specifications for a complete and operating signal installation.

Furnish the type of controller cabinet specified on the plans. Refer to the table shown in the Departmental Material Specifications (DMS-11170, Fully Actuated, Solid-State Traffic Signal Controller Assembly), Section 11170.6.A, Type 2 cabinet, page 4 of 39, regarding the size of the cabinet, back panel configuration, and the size of the load bay. Use the following website to view this specification:

https://www.txdot.gov/business/resources/materials/material-specifications.html

Complete traffic signal construction work, including correcting discrepancies shown on the Department inspector's "Traffic Signal Installation Inspection Report" before the beginning of the test period.

Provide a full-time qualified traffic signal technician responsible for installing, maintaining, or replacing traffic signal devices.

Staking in the field is subject to approval.

Adjust project construction, if needed, due to conflicts with underground utilities.

Do not aim the luminaire arms mounted on traffic signal poles into the intersection. Aim each arm perpendicular to the centerline of the roadway it is intended to cover, to develop the proper illumination pattern for the intersection.

Allow the electrical work to is be inspected by the City. Complying with the provisions and requirements of the City electrical ordinance is not required. Such inspection does not make the City a party to this contract.

Provide continuous conductors without splices from signal controller to signal heads. Route the conductors for luminaires to the service enclosure. Splices or attachments to the terminal block in the access compartment of the mast arm pole are not permitted except for the luminaire cable.

Abrasions to the conductor insulation caused while pulling cable for the traffic signal system are cause for immediate rejection. Remove and replace the entire damaged cable at no expense to the Department.

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

Bond the controller housing, signal poles, conduit, and spans to a minimum No. 6 AWG stranded copper conductor. An equipment grounding conductor is required in every conduit to form a continuous grounding system. Effectively connect the grounding system to ground rods or concrete encased grounding electrodes as indicated in the plans.

Wrap signal heads with dark plastic or suitable material to conceal the signal faces from the time of installation until placing into operation. Do not use burlap.

Furnish signal heads from the same manufacturer.

Use Type B (high intensity prismatic) or Type D (diamond grade) retroreflective sheeting for signs mounted under or adjacent to the signal heads.

Furnish and attach compression type connectors. Install the connectors with a compression mechanical release hand-crimping tool to each individual conductor before making connections to the terminal strips.

The Contractor may use ready mix concrete.

Apply membrane curing on concrete work in accordance with Section 420.4.10.3, "Membrane Curing."

The standard 4.5-in. galvanized pipe type poles, except the breakaway type, are subject only to the Engineer's inspection for their acceptance. Mill test reports or documentation will not be required.

Item 682: Vehicle and Pedestrian Signal Heads

Install two set screws on vehicle signal head mounting hardware fittings.

Furnish black housings for vehicle and pedestrian signals. Ensure the door and visor match the mast arm and pedestrian pole color. Furnish black vehicle signal head back plates with 2 in. retroreflective yellow borders.

Item 685: Roadside Flashing Beacon Assemblies

When shown on the plans, provide solar powered flasher controller assemblies in accordance with Departmental Material Specifications DMS-11150, "Solar Power Flasher Controller Assembly."

When solar powered school zone signs are shown on the plans, provide solar powered flasher controller assemblies capable of 24-hour operations.

Item 686: Traffic Signal Pole Assemblies

For a steel mast arm or steel strain pole assembly, hold the anchor bolts and conduits rigidly in place with a welded steel template.

Leave a minimum of one full diameter thread exposed on each anchor bolt securing a signal pole.

Set the anchor bolts for the steel strain poles so that two are in compression and two are in tension.

Use a Texas Cone Penetrometer reading of 10. The drilled shaft length is from the surface elevation to the bottom of the drilled shaft. Provide an additional length of the pole foundation from the surface level to the roadway level, if required for unusual locations. Provide the drilled shaft depth regardless of the length of the pole foundation. The pole foundation depth from the surface level to the roadway level is a maximum of 4 ft., or as approved.

Locate traffic signal pole assembly foundations a minimum of 4 ft. from the roadway curb or pavement edge, or as shown on the plans.

Place steel strain poles at a 10 ft. desirable minimum distance from the roadway curb or pavement edge.

After the traffic signal pole assembly is plumb and the nuts are tight, tack-weld each anchor bolt nut in two places to its washer. Tack-weld each washer to the base plate in two places. Do not weld components to the bolt. Perform tack-welding in accordance with the Item, "Steel Structures." After tack-welding, repair galvanizing damage on bolts, nuts, and washers in accordance with Section 445.3.5, "Repairs."

The Department may test the anchor bolts using ultrasonic methods for traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

Item 688: Pedestrian and Vehicle Detectors

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Provide a black tube loop detector wire as specified in the "International Municipal Signal Association, Inc." (IMSA) Specifications.

At intersections where a minimum of 10 ft. spacing between adjacent accessible pedestrian signal units is not possible, provide each accessible pedestrian pushbutton with the following features: a pushbutton locator tone, a tactile arrow, a speech walk message for the walking person indication and a speech pushbutton information message.

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Item 690: Maintenance of Traffic Signals and Illumination

Furnish the cable to operate the Video Imaging Vehicle Detection System (VIVDS) in accordance with the manufacturer's recommendations or purchase it from the same manufacturer as the VIVDS equipment.

Supply VIVDS equipment that can process up to a maximum of 6 camera inputs per intersection. Additional equipment to accommodate up to 6 camera inputs is subsidiary to the various bid items. No extra compensation will be allowed for additional equipment needed to make the VIVDS equipment fully operational under this Item.

Supply a laptop computer and a video monitor as described in this Special Specification Item.

Detector zone videotaping for this project will not be required.

Video Imaging Vehicle Detection System Requirements

Specification Items	Description	Not Required	Required	State Supplied
1	**Description**		**X**	
	Variable Focal Cameras		**X**	
	VIVDS Card Rack Processor System		**X**	
	Field Setup Computer (1 Required) (Laptop)	**X**		
	Field Setup Video Monitor (1 Ea. Controller)		**X**	
	Connectors and Camera Mounting Hardware		**X**	
3	**Functional Capabilities**			
	System Software		**X**	
4	**Vehicle Detection**			
	Detection Zone Video Taping	**X**		
5	**VIVDS Processor Unit**			
	Provide both TS1 and TS2 Environmental Requirements		**X**	
	12 Volt/5 Amp Power Supply		**X**	
6	**Camera Assembly**			
	Camera Interface Panel		**X**	
7	**Field Communications Link**			
	Lightning and Transient Surge Suppression Devices		**X**	
9	**Temporary Use and Retesting**		**X**	
10	**Operation from Central Control**	**X**		
	Telephone Interconnect	**X**		
	ISDN Interconnect	**X**		
11	**Installation and Training**		**X**	

Other items not specifically listed in this table are required. When shown in the plans, remove and deliver temporary VIVDS equipment to the Department's Signal Shop, 6810 Old Katy Rd., Houston, Texas, or as directed.

Item 6004: Communication Cable

Seal each end of the communications cable that is exposed to elements during storage or after installing with a waterproof sealant, or as per manufacturer recommendations.

Ensure each communication cable run is continuous without splices from controller to controller.

Assume responsibility for the signal carrying capability and performance of the cable. Install each wire with a lightning protection device unless otherwise noted. Ground the cable in accordance with the manufacturer's recommendation.

Item 7017: Sanitary Sewer

Provide a record of the locations of stacks, stubs, etc. to the owner of the sanitary sewer facility.

Maintain a 12-in. minimum vertical clearance at crossings between the sanitary sewers and culverts, unless otherwise noted.

Item 7049: Water Mains

Construct water mains with Class A concrete in accordance with the Item, “Hydraulic Cement Concrete.” This work is subsidiary to this bid Item.

Assume ownership of removed fire hydrants, valves, and boxes.

Cutting and plugging tees, if called for on the plans, are subsidiary to the Item, “Remove Existing Fire Hydrant.”

Install only new fire hydrants, valves, and boxes conforming to the requirements of this specification. Install fire hydrants, valves, and boxes in accordance with the requirements of Section 3.13 of this specification.

County: GALVESTON

Highway: FM 2004

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1911-01-022 **DISTRICT** Houston **COUNTY** Galveston
HIGHWAY FM 2004

			CONTROL SECTION JOB		**1911-01-022**		**2523-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180762**		**A00180761**			
			COUNTY		**Galveston**		**Galveston**			
			HIGHWAY		**FM 2004**		**FM 2004**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)		SY	73.000				73.000	
	104-6011	REMOVING CONC (MEDIANS)		SY			27.000		27.000	
	104-6017	REMOVING CONC (DRIVEWAYS)		SY	63.000		111.000		174.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)		SY			1,092.000		1,092.000	
	105-6045	REMOVING STAB BASE AND ASPH PAV (2"-8")		SY	876.000		619.000		1,495.000	
	110-6001	EXCAVATION (ROADWAY)		CY	1,975.000		667.000		2,642.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)		CY	858.000		836.000		1,694.000	
	162-6002	BLOCK SODDING		SY	2,764.000		1,668.000		4,432.000	
	166-6001	FERTILIZER		AC	0.570		0.340		0.910	
	168-6001	VEGETATIVE WATERING		MG	71.000		42.000		113.000	
	400-6005	CEM STABIL BKFL		CY	2.000		13.000		15.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)		LF	8.000				8.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)		LF	16.000				16.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)		LF	66.000				66.000	
	432-6002	RIPRAP (CONC)(5 IN)		CY	3.000				3.000	
	450-6103	RAIL (TY PR11)		LF	1,010.000		65.000		1,075.000	
	462-6054	CONC BOX CULV (6 FT X 3 FT)(EXTEND)		LF	20.000				20.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF			118.000		118.000	
	466-6005	HEADWALL (CH - FW - 0) (DIA= 24 IN)		EA			4.000		4.000	
	466-6209	WINGWALL (SW - 0) (HW=6 FT)		EA	2.000				2.000	
	467-6007	SET (TY I) (24 IN) (6: 1) (C)		EA			5.000		5.000	
	479-6001	ADJUSTING MANHOLES		EA	2.000				2.000	
	496-6004	REMOV STR (SET)		EA			1.000		1.000	
	496-6005	REMOV STR (WINGWALL)		EA			4.000		4.000	
	496-6006	REMOV STR (HEADWALL)		EA	2.000				2.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	12.000				12.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	718.000		288.000		1,006.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	718.000		288.000		1,006.000	
	529-6011	CONC CURB (DOWEL)		LF			40.000		40.000	
	529-6015	CONC CURB (TY C1)		LF	3,720.000				3,720.000	
	529-6016	CONC CURB (TY F1)		LF	658.000				658.000	
	529-6018	CONC CURB (TY F3)		LF	352.000		65.000		417.000	
	530-6004	DRIVEWAYS (CONC)		SY			779.000		779.000	
	530-6005	DRIVEWAYS (ACP)		SY	1,041.000				1,041.000	
	531-6003	CONC SIDEWALKS (6")		SY	4,273.000		2,624.000		6,897.000	
	531-6005	CURB RAMPS (TY 2)		EA	3.000				3.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1911-01-022 **DISTRICT** Houston **COUNTY** Galveston
HIGHWAY FM 2004

			CONTROL SECTION JOB	**1911-01-022**		**2523-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00180762**		**A00180761**			
			COUNTY	**Galveston**		**Galveston**			
			HIGHWAY	**FM 2004**		**FM 2004**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	531-6009	CURB RAMPS (TY 6)	EA	1.000				1.000	
	531-6010	CURB RAMPS (TY 7)	EA	17.000		11.000		28.000	
	531-6016	CURB RAMPS (TY 21)	EA			2.000		2.000	
	610-6130	IN RD IL (TY SA) 20T-8 (250W EQ) LED	EA	1.000				1.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	190.000				190.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	170.000				170.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	55.000				55.000	
	618-6058	CONDT (PVC) (SCH 80) (4")	LF	155.000				155.000	
	618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	275.000				275.000	
	618-6074	CONDT (RM) (3")	LF	20.000				20.000	
	620-6002	ELEC CONDR (NO.14) INSULATED	LF	20.000				20.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	665.000				665.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	360.000				360.000	
	621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	860.000				860.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	10.000				10.000	
	628-6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1.000				1.000	
	636-6012	INSTALL ALUMINUM SIGNS (TY G)	EA			4.000		4.000	
	644-6070	RELOCATE SM RD SN SUP&AM TY S80	EA	13.000		22.000		35.000	
	672-6012	TRAFFIC BUTTON TY I-C	EA	20.000		2.000		22.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	665.000		114.000		779.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	209.000		408.000		617.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF			98.000		98.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	2,198.000		145.000		2,343.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	342.000		392.000		734.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1.000				1.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	1.000				1.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	9.000				9.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4.000				4.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	9.000				9.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8.000				8.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	9.000				9.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	4.000				4.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8.000				8.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	4.000				4.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	9.000				9.000	
	684-6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF	1,065.000				1,065.000	
	684-6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	990.000				990.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1911-01-022 **DISTRICT** Houston **COUNTY** Galveston
HIGHWAY FM 2004

			CONTROL SECTION JOB		**1911-01-022**		**2523-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180762**		**A00180761**			
			COUNTY		**Galveston**		**Galveston**			
			HIGHWAY		**FM 2004**		**FM 2004**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	684-6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)		LF	2,260.000				2,260.000	
	684-6021	TRF SIG CBL (TY A)(12 AWG)(16 CONDR)		LF	260.000				260.000	
	684-6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)		LF	45.000				45.000	
	686-6045	INS TRF SIG PL AM(S)1 ARM(44')		EA	1.000				1.000	
	686-6055	INS TRF SIG PL AM(S)1 ARM(50')LUM		EA	1.000				1.000	
	686-6059	INS TRF SIG PL AM(S)1 ARM(55')LUM		EA	2.000				2.000	
	687-6001	PED POLE ASSEMBLY		EA	6.000				6.000	
	688-6001	PED DETECT PUSH BUTTON (APS)		EA	6.000				6.000	
	688-6003	PED DETECTOR CONTROLLER UNIT		EA	1.000				1.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN		DAY	356.000				356.000	
	6007-6023	FIBER OPTIC PATCH PANEL (12 POSITION)		EA	1.000				1.000	
	6038-6004	MULTIPOLYMER PAV MRK (W)(6")(SLD)		LF	2,198.000		145.000		2,343.000	
	6038-6013	MULTIPOLYMER PAV MRK (W)(24")(SLD)		LF	342.000		392.000		734.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)		EA	1.000				1.000	
	6089-6002	CAT 5 ETHERNET CABLE		LF	140.000				140.000	
	6185-6002	TMA (STATIONARY)		DAY	178.000				178.000	
	6292-6004	RVDS(PRESENCE DET ONLY)(INSTALL ONLY)		EA	4.000				4.000	
	6292-6005	RVDS(ADVANCE DET ONLY)(INSTALL ONLY)		EA	4.000				4.000	
	7017-6051	MANHOLE (SAN SEWER) (4' DIA)		EA	3.000				3.000	
	7049-6379	REMOVE EXISTING MANHOLE		EA	3.000				3.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS	1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	

SUMMARY OF EARTHWORK QUANTITIES				
LOCATION (STA TO STA)			110	132
			6001	6006
			EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)
CSJ:1911-01-022			CY	CY
BEGIN	TO	21+00.00	96	221
21+00.00	TO	27+00.00	206	146
27+00.00	TO	33+00.00	350	75
33+00.00	TO	39+00.00	442	154
39+00.00	TO	45+00.00	217	102
45+00.00	TO	51+00.00	371	111
51+00.00	TO	56+58.00	293	50
TOTALS			1975	858

SUMMARY OF EARTHWORK QUANTITIES				
LOCATION (STA TO STA)			110	132
			6001	6006
			EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)
CSJ:2523-01-030			CY	CY
56+58.00	TO	57+00.00		
57+00.00	TO	63+00.00	195	809
63+00.00	TO	69+00.00	252	25
69+00.00	TO	75+00.00	151	1
75+00.00	TO	END	69	1
TOTALS			667	836

NOTE: FOR CONTRACTOR'S INFORMATION ONLY

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SUMMARY OF EARTHWORK QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		12

DATE: 5/9/2024 1:34:49 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\1911101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Summary\Summary of Earthwork Quantities.dgn

CK | DW | CK | DW

SUMMARY OF ROADWAY QUANTITIES													
LOCATION (STA TO STA)			500	529	529	529	530	531	531	531	531	479	7017	450
			6001	6015	6016	6018	6005	6003	6005	6009	6010	6004	6051	6103
			MOBILIZATION	CONC CURB (TY C1)	CONC CURB (TY F1)	CONC CURB (TY F3)	DRIVEWAYS (ACP)	CONC SIDEWALKS (6")	CURB RAMPS (TY 2)	CURB RAMPS (TY 6)	CURB RAMPS (TY 7)	ADJUSTING MANHOLES	MANHOLE (SAN SEWER) (4' DIA)	RAIL (TY PR11)
CSJ:1911-01-022			LS	LF	LF	LF	SY	SY	EA	EA	EA	EA	EA	LF
BEGIN	TO	21+00.00		55	80		268	420	1	1	1	1		80
21+00.00	TO	27+00.00		278	78		105	743			3			78
27+00.00	TO	33+00.00		697	116	81	230	720	2		3		2	197
33+00.00	TO	39+00.00		768	178	64	344	672			3			242
39+00.00	TO	45+00.00		701	143	207	54	716			5		1	350
45+00.00	TO	51+00.00		1054	63		0	765			2	1		63
51+00.00	TO	57+00.00		167			40	237						
TOTALS			1	3720	658	352	1041	4273	3	1	17	2	3	1010

SUMMARY OF ROADWAY QUANTITIES										
LOCATION (STA TO STA)			500	529	530	531	531	531	450	529
			6001	6018	6004	6003	6010	6016	6103	6011
			MOBILIZATION	CONC CURB (TY F3)	DRIVEWAYS (CONC)	CONC SIDEWALKS (6")	CURB RAMPS (TY 7)	CURB RAMPS (TY 21)	RAIL (TY PR11)	CONC CURB (DOWEL)
CSJ:2523-01-030			LS	LF	SY	SY	EA	EA	LF	LF
51+00.00	TO	57+00.00			0	26	1			
57+00.00	TO	63+00.00		65	241	668	4	2	65	40
63+00.00	TO	69+00.00			76	763	4			
69+00.00	TO	75+00.00			462	746				
75+00.00	TO	END			0	421	2			
TOTALS			1	65	779	2624	11	2	65	40

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SUMMARY OF ROADWAY QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		13

DW | CK | DW | CK

DATE: 5/9/2024 11:08:31 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Summary\Summary Roadway Quantities.dgn

SUMMARY OF REMOVAL QUANTITIES								
LOCATION (STA TO STA)			104	104	496	496	105	104	7049
			6036	6017	6006	6005	6045	6009	6379
			REMOVING CONC (SIDEWALK)	REMOVING CONC (DRIVEWAY)	REMOVE STR (HEADWALL)	REMOVE STR (WINGWALL)	REMOVING STAB BASE AND ASPH PAV (2"-8")	REMOVING CONC (RIPRAP)	REMOVE EXISTING MANHOLE
CSJ:1911-01-022			SY	SY	EA	EA	SY	SY	SY
BEGIN	TO	27+00		21			345		
27+00	TO	39+00		41			435	73	2
39+00	TO	51+00			2		59		1
51+00	TO	56+58					37		
TOTALS			0	63	2	0	876	73	3

SUMMARY OF REMOVAL QUANTITIES								
LOCATION (STA TO STA)			104	104	496	496	105	104	104
			6036	6017	6004	6005	6045	6009	6011
			REMOVING CONC (SIDEWALK)	REMOVING CONC (DRIVEWAY)	REMOVE STR (SET)	REMOVE STR (WINGWALL)	REMOVING STAB BASE AND ASPH PAV (2"-8")	REMOVING CONC (RIPRAP)	REMOVING CONC (MEDIANS)
CSJ:2523-01-030			SY	SY	EA	EA	SY	SY	SY
56+58	TO	63+00				4	267		27
63+00	TO	75+00	811	111	1		352		
75+00	TO	END	281						
TOTALS			1092	111	1	4	619	0	27

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES		
LOCATION (STA TO STA)	502	6001
	6001	6002
	BARRICADES, SIGN AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN
CSJ:1911-01-022	MO	EA
TOTALS	6	2

SUMMARY OF TRAFFIC CONTROL PLAN QUANTITIES		
LOCATION (STA TO STA)	502	6001
	6001	6002
	BARRICADES, SIGN AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN
CSJ:2523-01-030	MO	EA
TOTALS	6	2

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SUMMARY OF REMOVAL
& TRAFFIC CONTROL QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		14

DATE: 5/9/2024 11:08:31 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Summary\Summary Removal and TCP Quantities.dgn

CK | DW | CK | DW | CK

SUMMARY OF SWPPP QUANTITIES							
LOCATION (STA TO STA)			162	166	168	506	506
			6002	6001	6001	6038	6039
			BLOCK SODDING	FERTILIZER	VEGETATIVE WATERING	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
CSJ:1911-01-022			SY	AC	MG	LF	LF
BEGIN	TO	25+00	594	0.12	15	162	162
25+00	TO	35+00	780	0.16	20	126	126
35+00	TO	45+00	770	0.16	20	108	108
45+00	TO	55+00	610	0.13	16	166	166
55+00	TO	56+58	10			156	156
TOTALS			2764	0.57	71	718	718

SUMMARY OF SWPPP QUANTITIES							
LOCATION (STA TO STA)			162	166	168	506	506
			6002	6001	6001	6038	6039
			BLOCK SODDING	FERTILIZER	VEGETATIVE WATERING	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
CSJ:2523-01-030			SY	AC	MG	LF	LF
56+58	TO	65+00	521	0.11	13	54	54
65+00	TO	75+00	866	0.18	22	180	180
75+00	TO	END	281	0.06	7	54	54
TOTALS			1668	0.34	42	288	288

SUMMARY OF DRAINAGE QUANTITIES						
LOCATION (STA TO STA)			400	432	462	466
			6005	6002	6054	6209
			CEMENT STAB BACKFILL	RIPRAP (CONC)(5 IN)	CONC BOX CULV (6 FT X 3 FT) (EXTEND)	WINGWALL (SW-0) (HW=6 FT)
CSJ:1911-01-022			CY	CY	LF	EA
BEGIN	TO	21+00.00				
21+00.00	TO	27+00.00				
27+00.00	TO	33+00.00				
33+00.00	TO	39+00.00				
39+00.00	TO	45+00.00				
45+00.00	TO	51+00.00	2	3	20	2
51+00.00	TO	57+00.00				
TOTALS			2	3	20	2

SUMMARY OF DRAINAGE QUANTITIES						
LOCATION (STA TO STA)			400	464	466	467
			6005	6005	6005	6007
			CEMENT STAB BACKFILL	RC PIPE (CL III)(24 IN)	HEADWALL (CH-FW-0) (DIA=24 IN)	SET (TY 1) (24 IN)(6:1) 24 "
CSJ:2523-01-030			CY	LF	EA	EA
51+00.00	TO	57+00.00				
57+00.00	TO	63+00.00	8	76	4	
63+00.00	TO	69+00.00	4	28		4
69+00.00	TO	75+00.00	1	14		1
75+00.00	TO	END				
TOTALS			13	118	4	5

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SUMMARY OF SWPPP & DRAINAGE QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		15

DATE: 5/9/2024 11:08:32 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Summary\Summary SWPPP and Drainage Quantities.dgn

CK DW CK DW

SUMMARY OF PAVEMENT MARKING QUANTITIES											
LOCATION (STA TO STA)			636	644	672	677	677	677	678	678	6038	6038
			6012	6070	6012	6002	6005	6007	6002	6008	6004	6013
			INSTALL ALUMINUM SIGNS (TY G)	RELOCATE SM RD SN SUP & AM TY S80	TRAFFIC BUTTON TY I-C	ELIM EXT PAV MRK & MRKS (6")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (24")	MULTIPOLYMER PAV MRK (W)(6")(SLD)	MULTIPOLYMER PAV MRK (W)(24")(SLD)
CSJ:1911-01-022			EA	SY	EA	LF	LF	LF	LF	LF	LF	LF
BEGIN	TO	21+00					100			42		42
21+00	TO	27+00		3						30		30
27+00	TO	33+00					109			96		96
33+00	TO	39+00		5						30		30
39+00	TO	45+00								102		102
45+00	TO	51+00		5						42		42
51+00	TO	56+58			20	665			2198	0	2198	
TOTALS			0	13	20	665	209	0	2198	342	2198	342

SUMMARY OF PAVEMENT MARKING QUANTITIES											
LOCATION (STA TO STA)			636	644	672	677	677	677	678	678	6038	6038
			6012	6070	6012	6002	6005	6007	6002	6008	6004	6013
			INSTALL ALUMINUM SIGNS (TY G)	RELOCATE SM RD SN SUP & AM TY S80	TRAFFIC BUTTON TY I-C	ELIM EXT PAV MRK & MRKS (6")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (24")	MULTIPOLYMER PAV MRK (W)(6")(SLD)	MULTIPOLYMER PAV MRK (W)(24")(SLD)
CSJ:2523-01-030			EA	SY	EA	LF	LF	LF	LF	LF	LF	LF
56+58	TO	63+00	4	16	2	114	408	98	145	332	145	332
63+00	TO	69+00		5						60		60
69+00	TO	75+00										
75+00	TO	END		1								
TOTALS			4	22	2	114	408	98	145	392	145	392

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SUMMARY OF PAVEMENT MARKING QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		16

DATE: 5/9/2024 11:08:33 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\1911101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Summary\Summary Pav Mrk Quantities.dgn

CK DW CK DW

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				
ITEM	DESC CODE	DESCRIPTION	UNIT	TOTAL QUANTITY
PHASE 1				
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	8
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	16
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	66
610	6130	IN RD IL (TY SA) 20T-8 (250W EQ) LED	EA	1
618	6046	CONDT (PVC) (SCH 80) (2")	LF	125
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	95
618	6053	CONDT (PVC) (SCH 80) (3")	LF	55
618	6058	CONDT (PVC) (SCH 80) (4")	LF	155
618	6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	275
618	6074	CONDT (RM) (3")	LF	20
620	6002	ELEC CONDR (NO.14) INSULATED	LF	20
620	6007	ELEC CONDR (NO.8) BARE	LF	655
620	6012	ELEC CONDR (NO.4) INSULATED	LF	360
621	6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	860
624	6010	GROUND BOX TY D (162922)W/APRON	EA	9
628	6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1
680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1
		*** CONTROLLER FULL ACTUATED W/CABINET	EA	1
		*** TRAFFIC SIGNAL CONTROLLER FOUNDATION	EA	1
		*** 18-INCH CABINET BASE EXTENSION	EA	1
		*** GROUND ROD, 5/8" X 10' COPPER (CONTROLLER ONLY)	EA	1
		*** POWER SUPPLY	EA	1
		*** LED RDWY LUMINAIRE (250W HPS EQ)	EA	3
		*** MAST ARM DAMPENER	EA	4
		*** DETECTOR UNIT (DUAL CHANNEL)	EA	12
		*** DETECTOR CARD RACK (8 SLOT & 4 SLOT)	EA	1
		*** 4G LTE CELLULAR MODEM W/ANTENNA AND POWER SUPPLY (INSTALL ONLY)		1
		*** CONTROL, PHOTOELECTRIC	EA	1
		*** SIGN, "LEFT TURN YIELD ON FLASHING YELLOW ARROW" (30"X 36")(R10-17T)	EA	4
		*** SIGN, "SH 6" (36"X18") (4.50 SF)	EA	2
		*** SIGN, "FM 2004" (60"X18") (7.50 SF)	EA	2
		*** SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3e)	EA	1
		*** SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eL)	EA	3
		*** SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eR)	EA	3
		*** INSTALL RR PREEMPTION SYSTEM	EA	1
680	6004	REMOVING TRAFFIC SIGNALS	EA	1
682	6001	VEH SIG SEC (12")LED(GRN)	EA	9
682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4
682	6003	VEH SIG SEC (12")LED(YEL)	EA	9
682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8
682	6005	VEH SIG SEC (12")LED(RED)	EA	9
682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	4
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
682	6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	4
682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	9
684	6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF	1065
684	6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	990
684	6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	2260
684	6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF	45

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				
ITEM	DESC CODE	DESCRIPTION	UNIT	TOTAL QUANTITY
686	6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	1
686	6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1
686	6059	INS TRF SIG PL AM(S)1 ARM(55')LUM	EA	2
687	6001	PED POLE ASSEMBLY	EA	6
		*** SCREW-IN TYPE ANCHOR FOUNDATION	EA	6
688	6001	PED DETECT PUSH BUTTON (APS)	EA	6
688	6003	PED DETECTOR CONTROLLER UNIT	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6089	6002	CAT 5 ETHERNET CABLE	LF	140
6292	6004	RVDS(PRESENCE DET ONLY)(INSTALL ONLY)	EA	4
		*** RADAR PRESENCE DETECTOR CABLE (#22/4C AWG) (COM) / (#18/2C AWG) (POWER)	LF	760
6292	6005	RVDS(ADVANCE DET ONLY)(INSTALL ONLY)	EA	4
		*** RADAR ADVANCE DETECTOR CABLE (#22/4C AWG) (COM) / (#18/2C AWG) (POWER)	LF	1195
PHASE 2				
618	6046	CONDT (PVC) (SCH 80) (2")	LF	65
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	75
624	6010	GROUND BOX TY D (162922)W/APRON	EA	1
684	6021	TRF SIG CBL (TY A)(12 AWG)(16 CONDR)	LF	260

*** MATERIALS SUBSIDIARY TO PERTINENT ITEMS.

ITEM 6292 IS FORCE ACCOUNT. ONCE THE CONTRACTOR HAS BEEN EXECUTED DURING THE KICK-OFF MEETING, THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE OR ARRANGE FOR THE RADAR EQUIPMENT TO BE PROVIDED BY THE DEPARTMENT. THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE WITH ORDERING OF THE RADAR EQUIPMENT BY USING THE FORCE ACCOUNT. THE ENGINEER OR HIS/HER REPRESENTATIVE WILL CONTACT ARNOLD TREVINO AT (13)866-7101 TO ORDER THE RADAR EQUIPMENT.

SH 6
AT FM 2004
TRAFFIC SIGNAL
SUMMARY OF QUANTITIES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		17

DATE: 5/30/2024
FILE: H:\Trfsignals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

TRAFFIC CONTROL PLAN PHASE NARRATIVE/CONSTRUCTION SEQUENCE

1. General: Mobilize, place work zone signs and barricades in accordance with applicable standards. TCP will require multiple move-ins. Place advance warning signs for each activity in accordance with TxDOT standards and the latest edition of the Texas MUTCD. Remove all conflicting signage, pavement markings, and markers with each activity. This shall be subsidiary to the pertinent bid items. Install Sw3P devices as directed and in accordance with applicable standards. Sw3P will require multiple move ins.

a. Phase 1 Step 1,

i. Utilities Note: Contractor to evaluate sanitary sewer manholes that are in conflict and adjust manhole top/rim to avoid conflict. Raise rim elevation to be flush with proposed sidewalk to avoid replacement/relocation. If adjustment of Manhole rims is not possible, consider adjusting sidewalk. If unresolved, contractor Not to perform work in areas where conflicts have not been resolved. Return to conflict area after completion of Phase 1, Step 1. Follow utility general notes, notify utility companies ahead of performing work.

ii. Perform mobile operations per TxDOT standards. If lane closure is required for driveway reconstruction, use applicable TxDOT standards for one lane closure for multi lane conventional roads.

iii. Remove necessary striping near the bridge and replace with new shoulder striping.

i. Perform driveway reconstruction on same side as work being performed for sidewalk.

ii. Perform excavation and embankment slope grading activities, install sidewalk, tall curb and rail tall curb per plans. Grade to reduce the need for tall curb while avoiding excessive fill inside the ditch.

iii. Extend culverts where required, maintain temporary drainage.

iv. Avoid disturbing RR front slope until phase 2 which includes RR work, flagging operations.

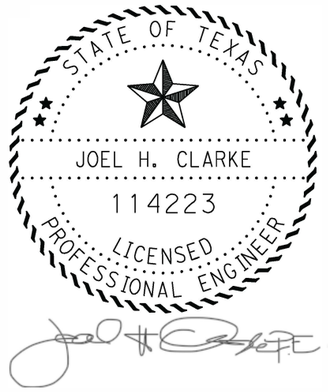
b. Phase 1 Step 2, perform activities from Phase 1 Step 1 on opposite side of roadway. This phase can be performed concurrently depending on utility adjustments/conflict resolution.

c. Phase 2

i. Perform intersection striping and signal work using TxDOT traffic signal work typical details for traffic control.

ii. Schedule RR Planking work and Flagging operations for any work performed near the front slope of the railroad.

Notes: Provide a 3:1 or flatter slope before commencing normal traffic operation and stopping work at the end of the day.



5-31-2024

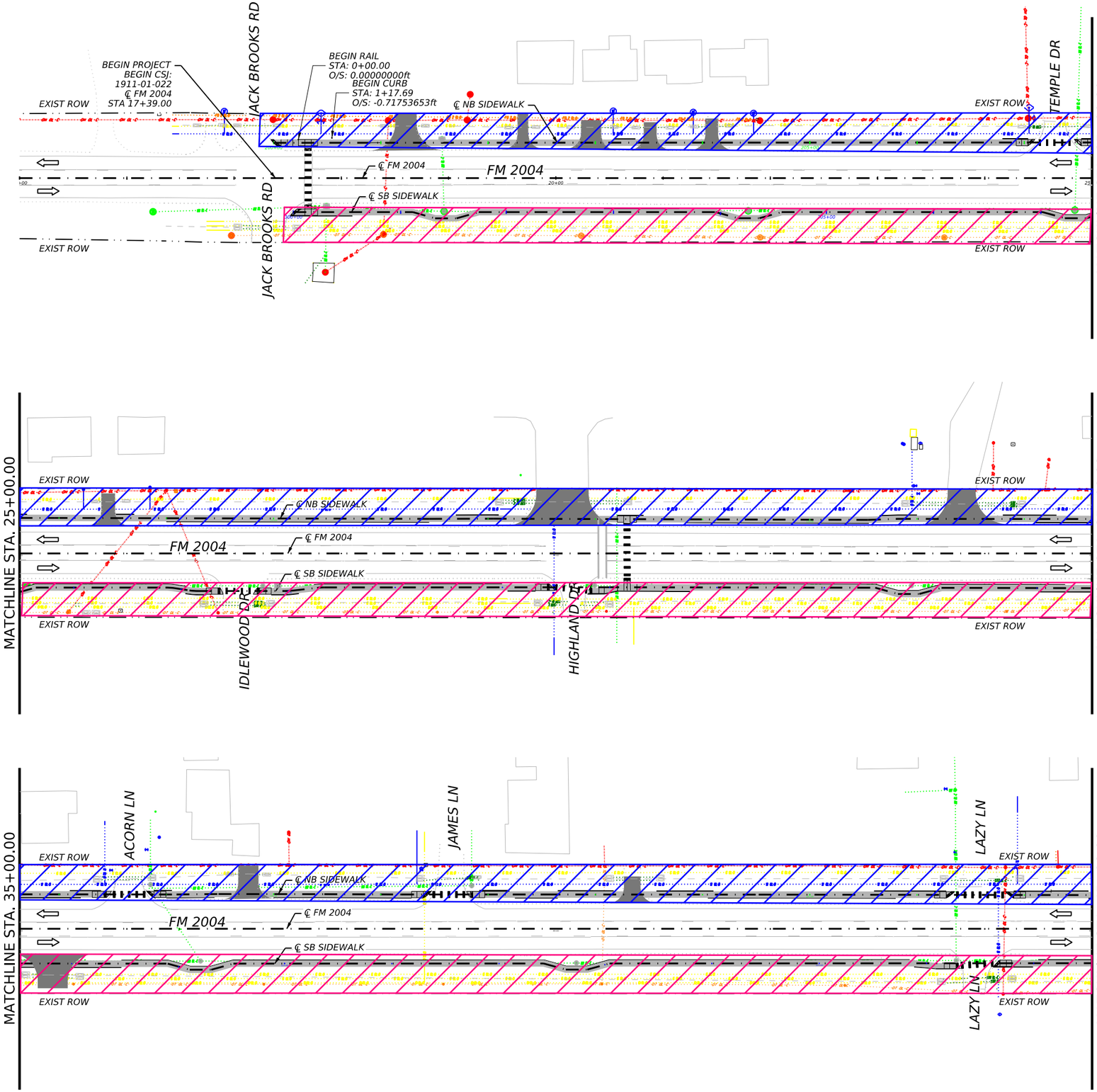
* CONTRACTOR SHALL NOT PERFORM WORK IN AREAS WITH UNRESOLVED CONFLICTS

FILE: $FILES$
DATE: $DATES$ $TIMES$

Texas Department of Transportation
Galveston Area Office

SEQUENCE OF CONSTRUCTION

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	PROJECT NO.		
HOU			
	COUNTY		SHEET NO.
	GALVESTON		17A



LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH

PHASE 1 - Step 1

PHASE 1 - Step 2

PHASE 2

All Phasing and Steps to be performed according to TCP Standards Details.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

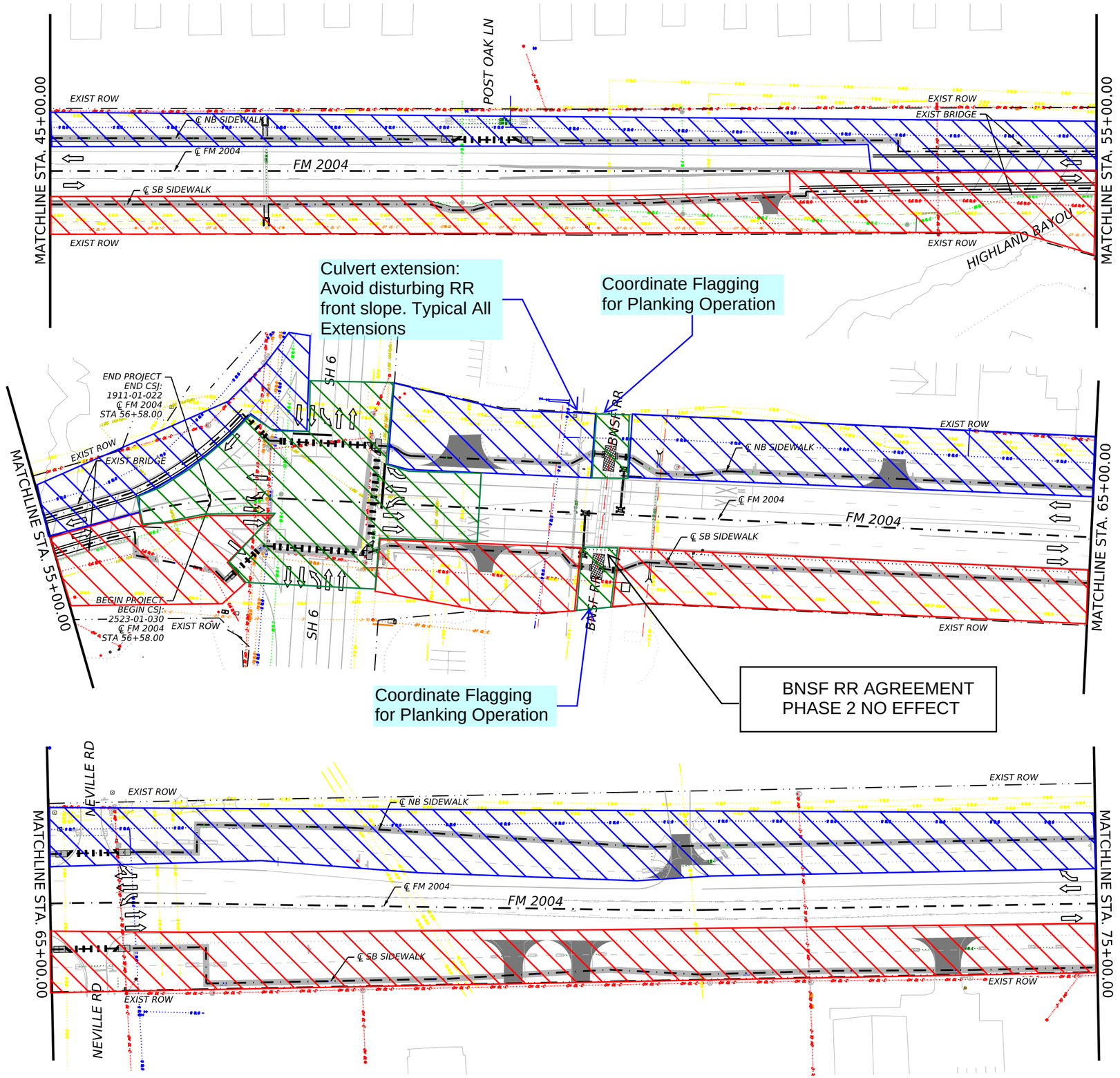
TRAFFIC CONTROL PLAN LAYOUT

℄ FM 2004
BEGIN TO STA 45+00

SHEET 01 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		17B

DATE: 5/30/2024 2:58:56 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Utility Layouts\Utility layout - Plan 1.dgn



LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH

PHASE 1 - Step 1

PHASE 2

PHASE 1 - Step 2

All Phasing and Steps to be performed according to TCP Standards Details.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

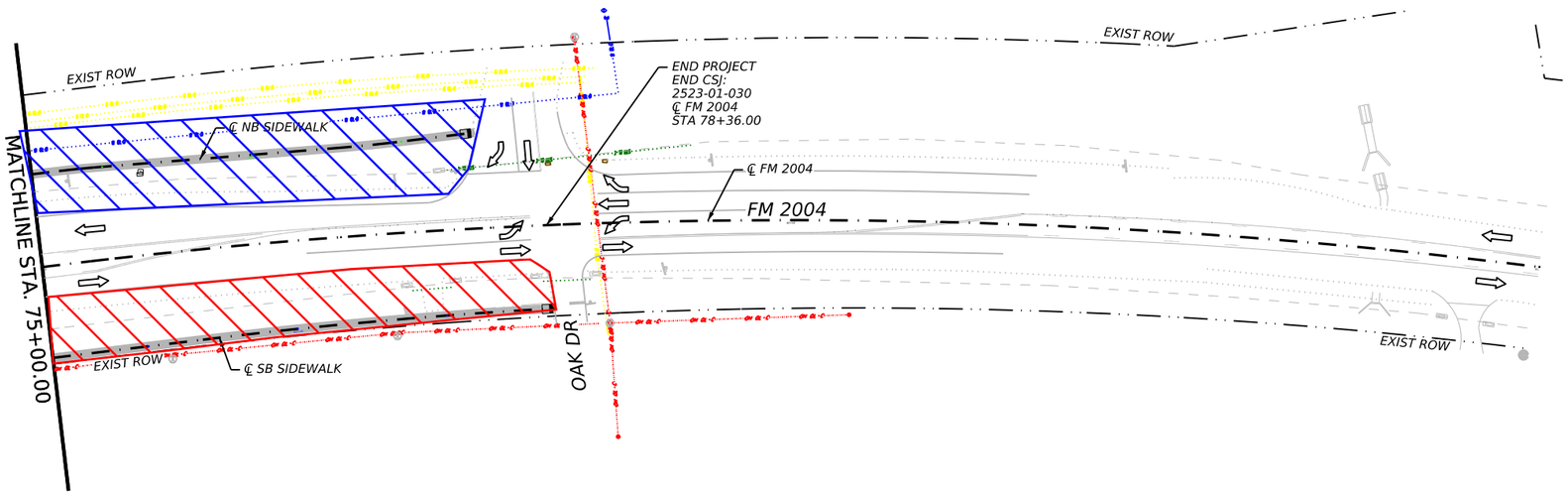
TRAFFIC CONTROL PLAN LAYOUT

℄ FM 2004
STA 45+00 TO STA 75+00

SHEET 02 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		17C

DATE: 5/20/2024 4:24:21 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Utility Layouts\Utility layout - Plan 4.dgn



LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH

PHASE 1 - Step 1

PHASE 2

All Phasing and Steps to be performed according to TCP Standards Details.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

TRAFFIC CONTROL PLAN LAYOUT

℄ FM 2004
STA 75+00 TO END

SHEET 03 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		17D

DATE: 5/9/2024 11:19:56 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Utility Layouts\Utility layout - Plan 7.dgn

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

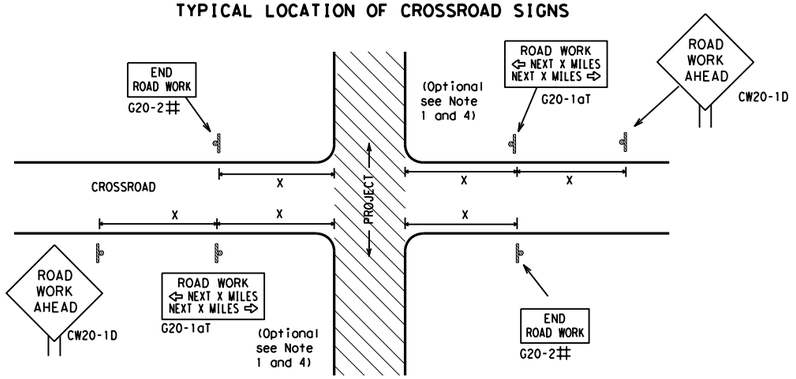
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		18

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

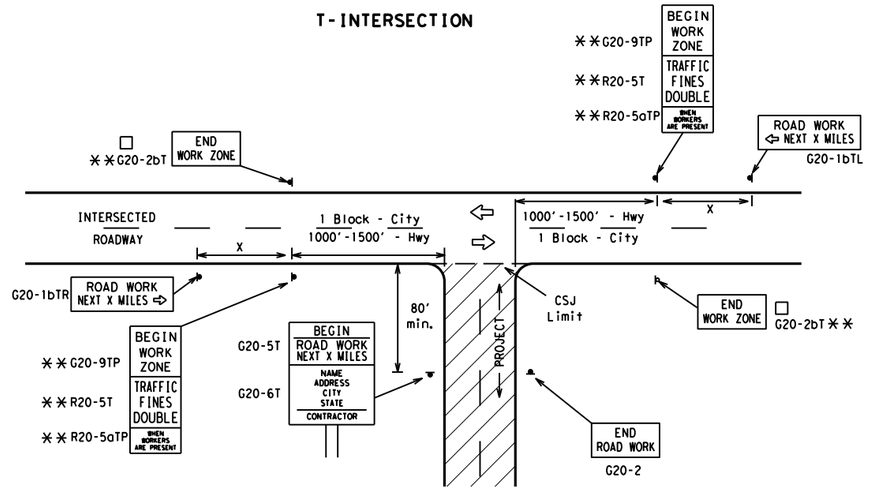
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

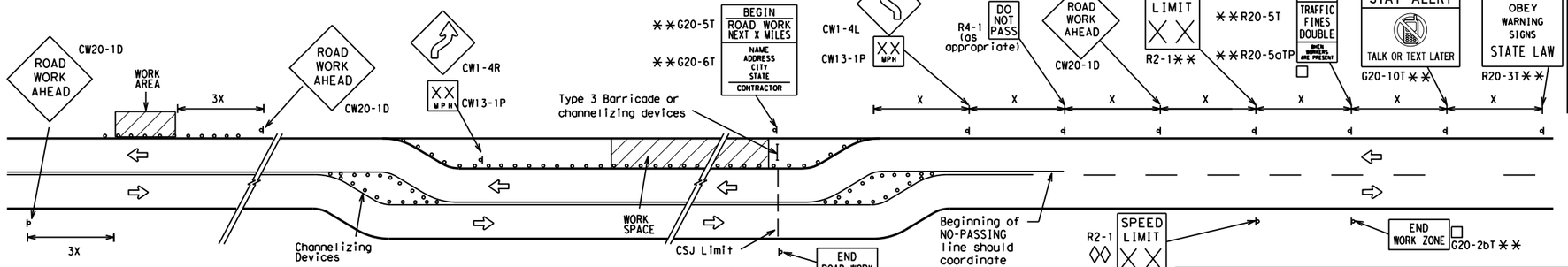
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

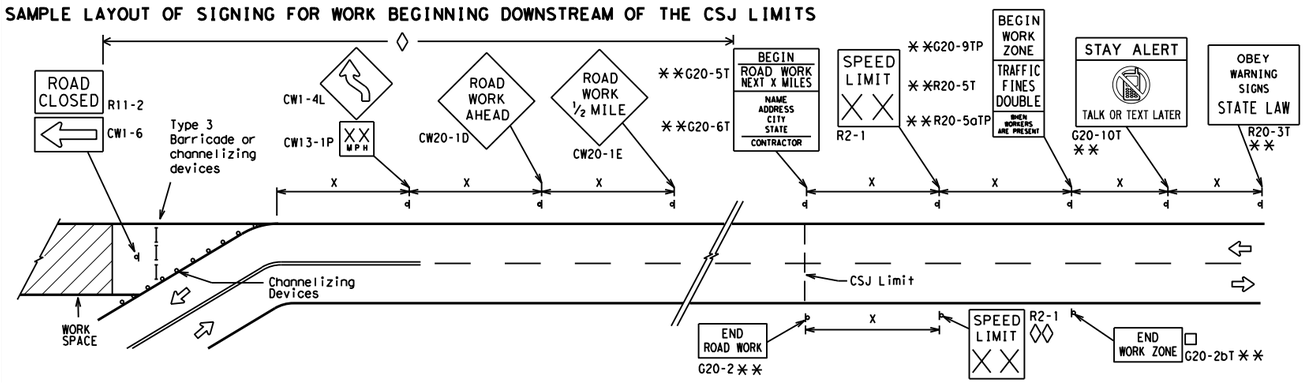
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		19

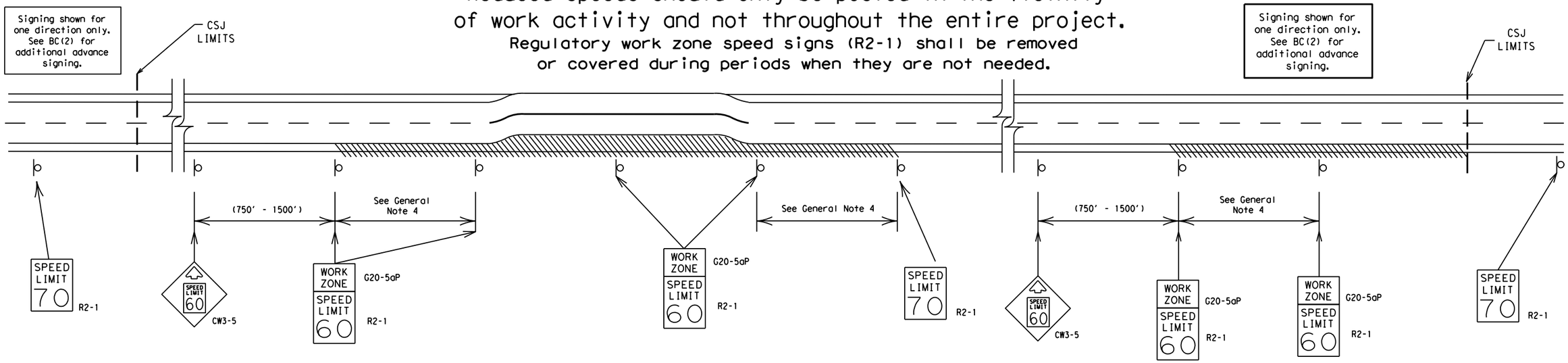
5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA++4\FM2004 Sidewalk\1911022Fm2004Sidewalk\Traffic Control Standards\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

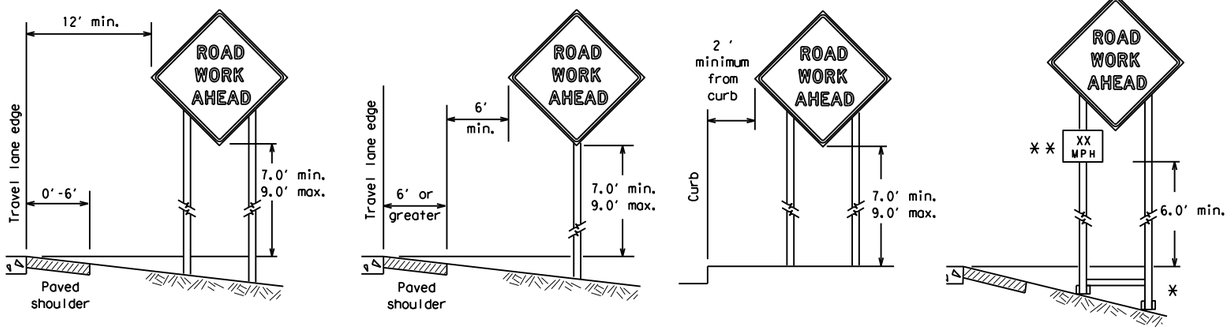
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		20

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004SidewalkTrafficControlPlan Standards\bc-21.dgn

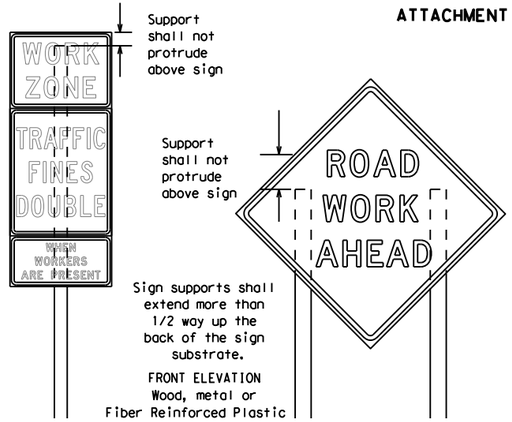
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

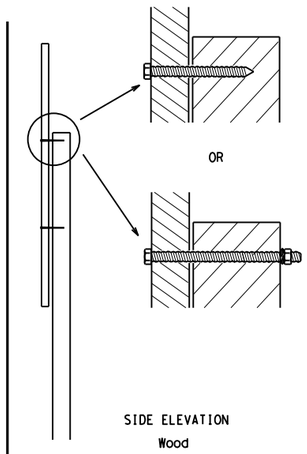


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





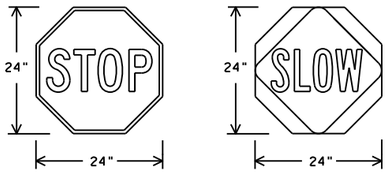
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

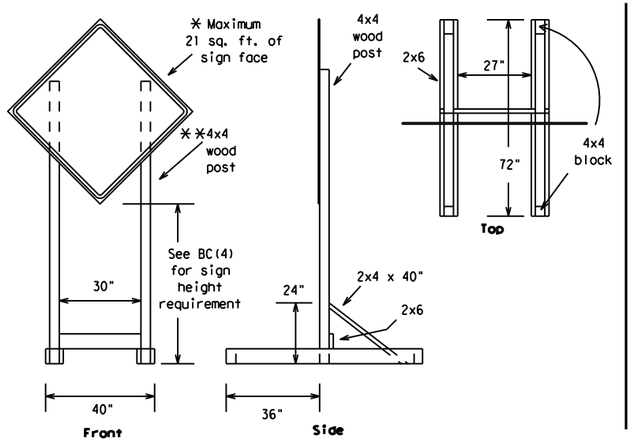
Texas Department of Transportation | Traffic Safety Division Standard

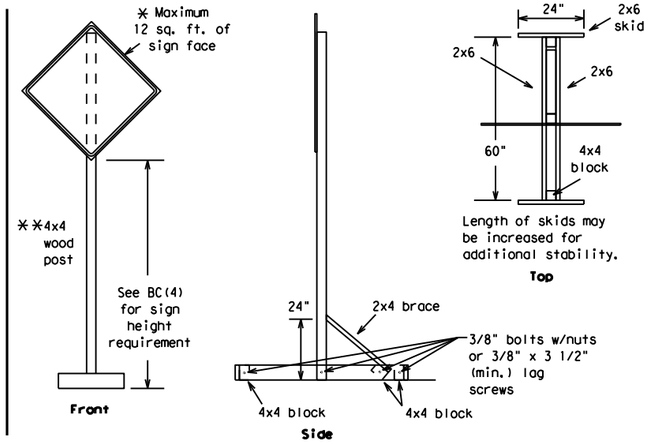
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		21

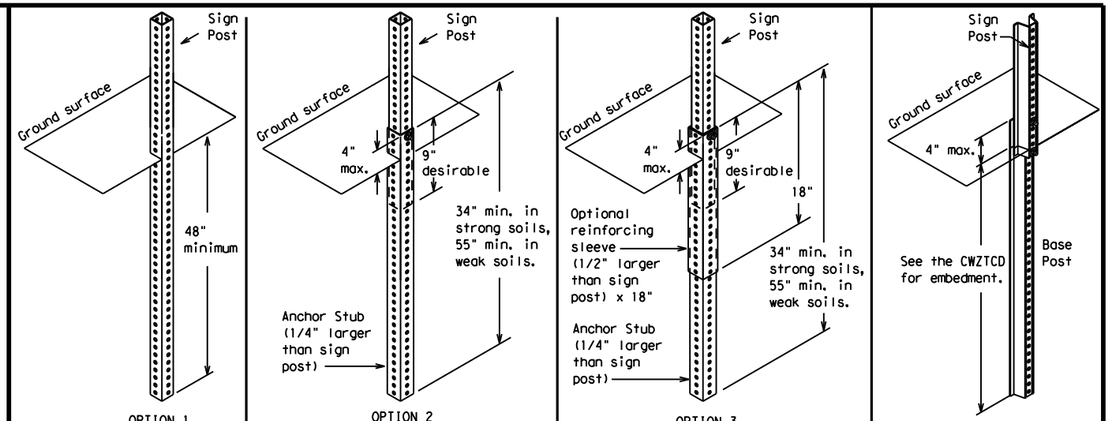
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Traffic Control Plan Standards\bc-21.dgn





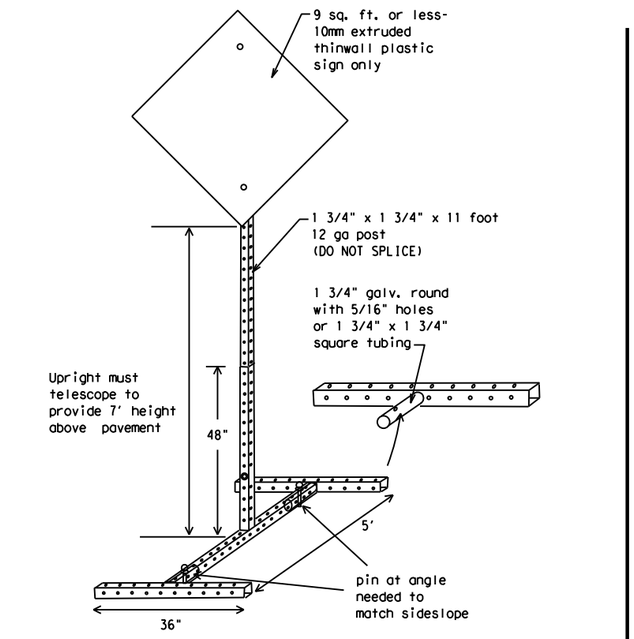
SKID MOUNTED WOOD SIGN SUPPORTS

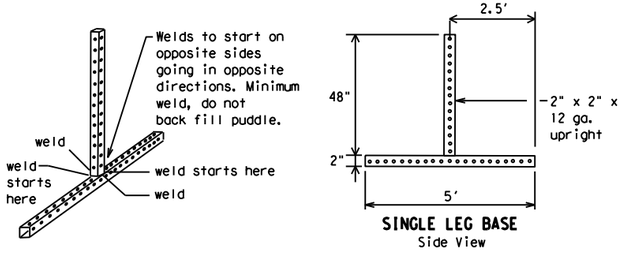
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

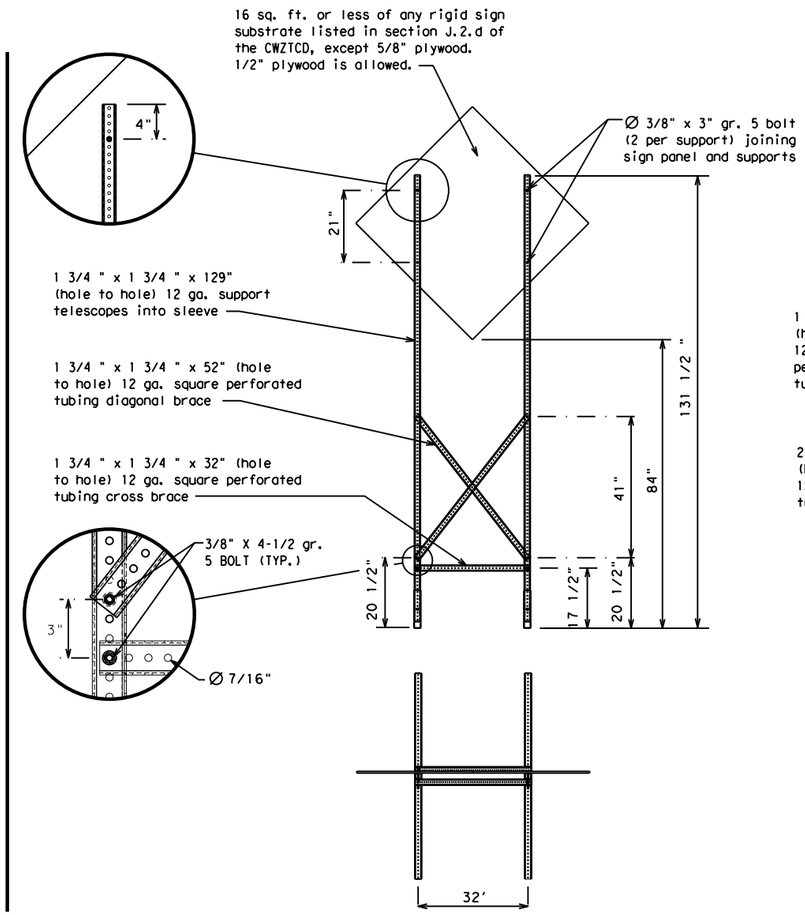


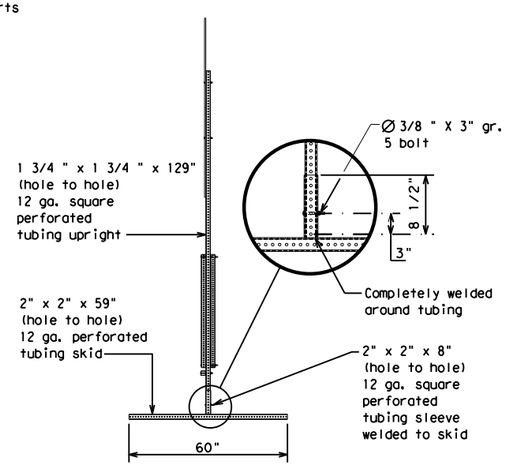
GROUND MOUNTED SIGN SUPPORTS

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

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

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

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

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

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		22

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	**Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

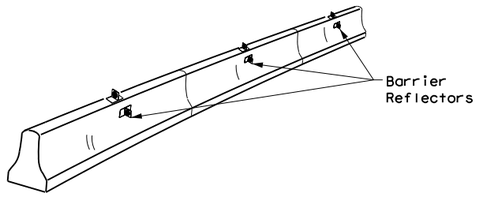
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		23

100

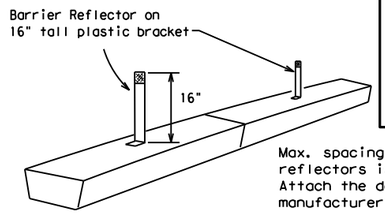
5/9/2024
Z:\Projects\220058+CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

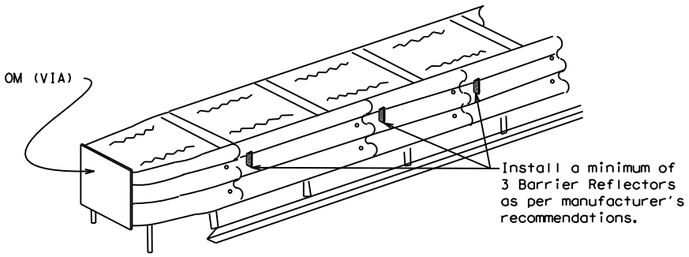


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

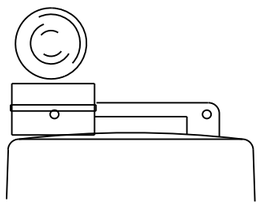


DELINEATION OF END TREATMENTS

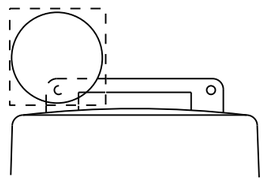
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

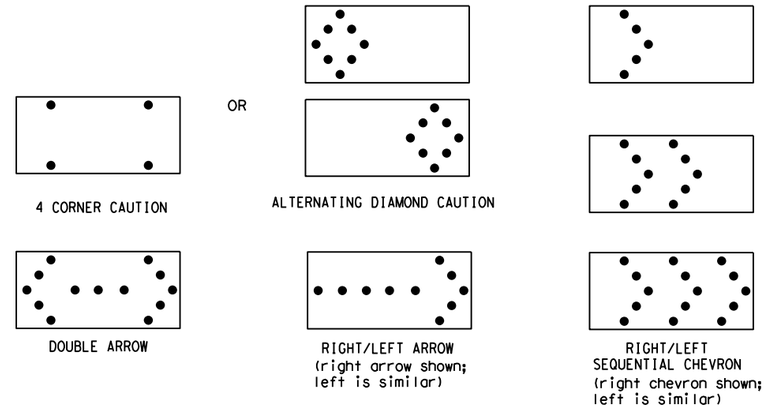
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		24

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkFM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

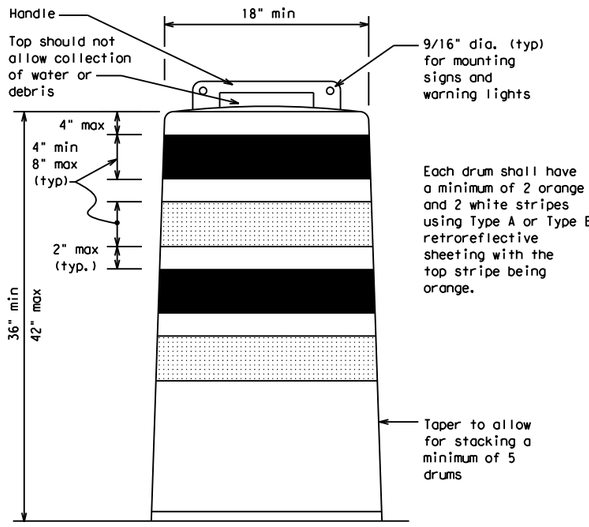
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

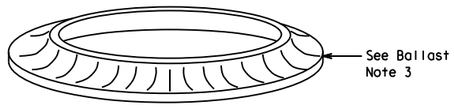
RETROREFLECTIVE SHEETING

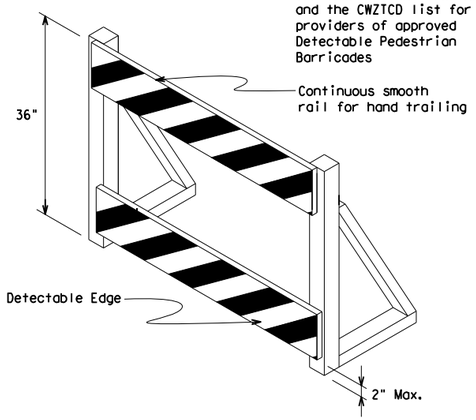
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

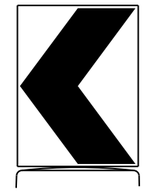




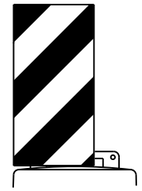


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

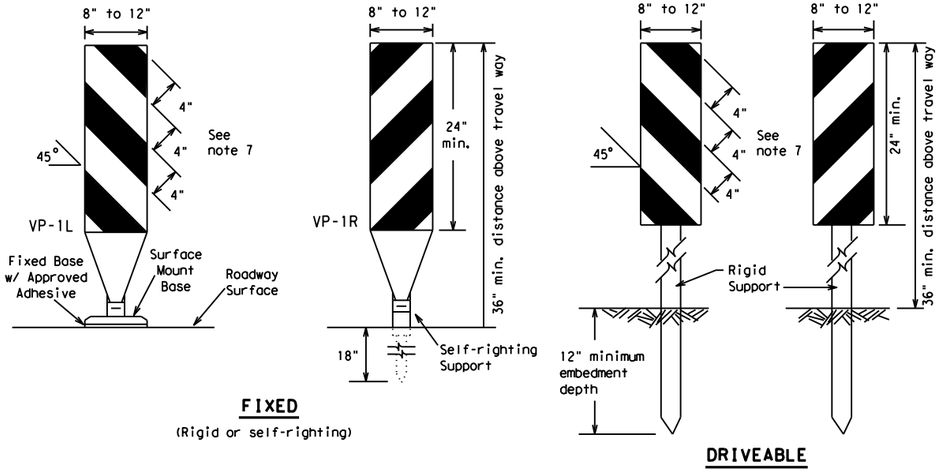
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 8-14 9-07 5-21 7-13	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		25

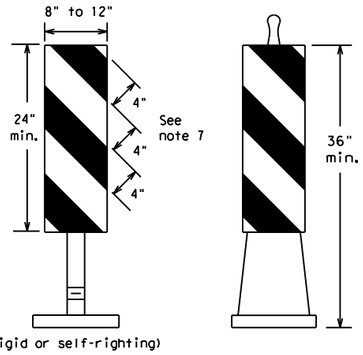
102

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA++4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

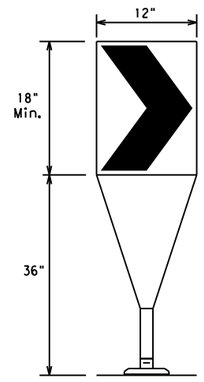


(Rigid or self-righting)

PORTABLE

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

VERTICAL PANELS (VPs)



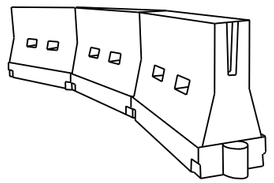
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

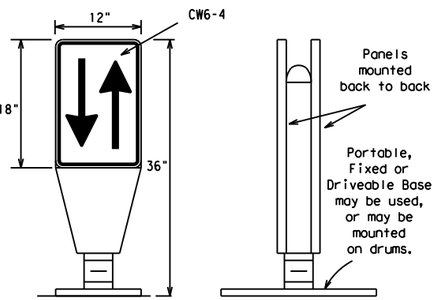
1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

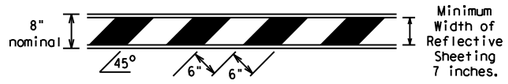
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	GALVESTON		26

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSBLWA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

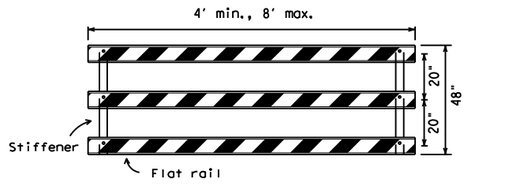
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



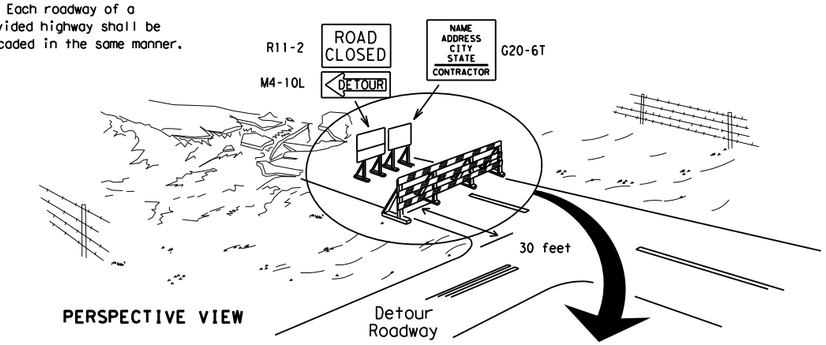
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

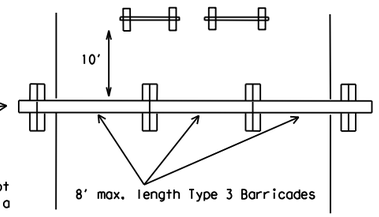
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

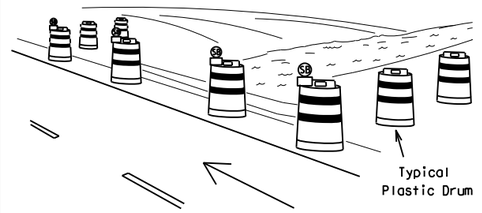
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

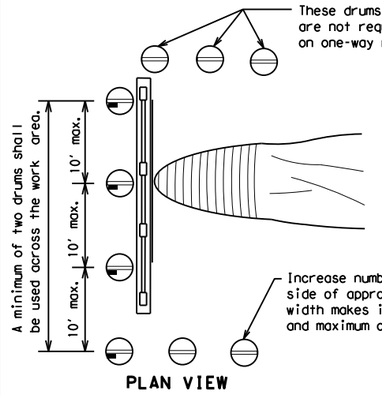
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

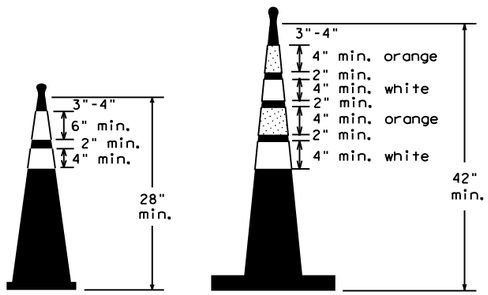
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

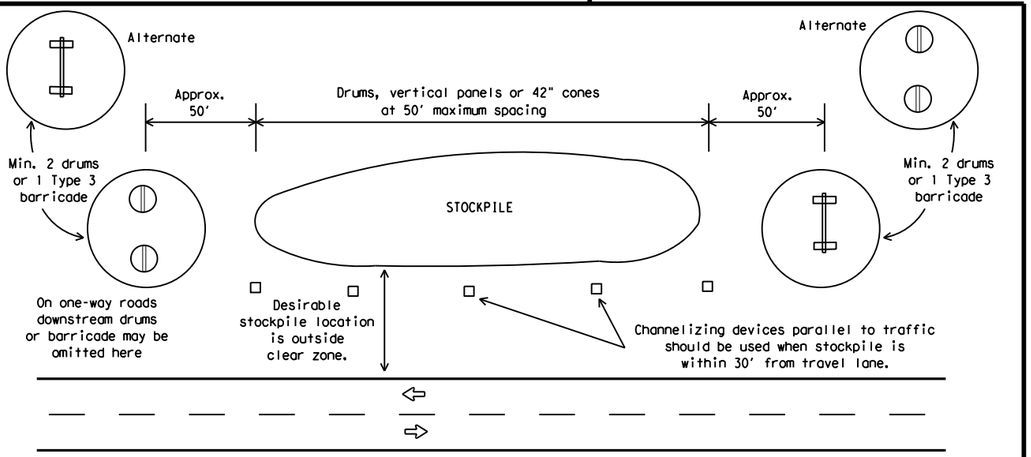


Two-Piece cones | One-Piece cones | Tubular Marker

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

SHEET 10 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		27

104

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 Sidewalk\Traffic Control Plan Standards\bc-21.dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

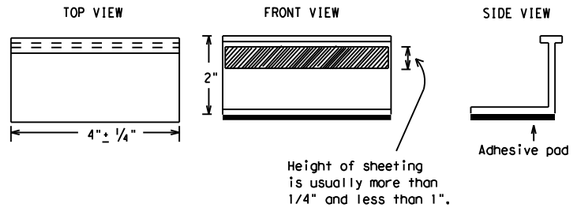
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

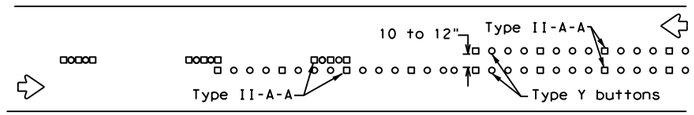
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	HOU	GALVESTON		28
11-02 8-14				

105

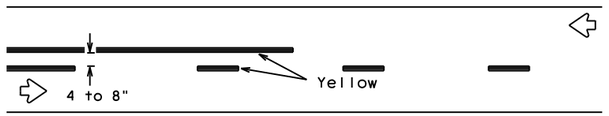
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\1911022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Traffic Control Plan Standards\bc-21.dgn

PAVEMENT MARKING PATTERNS

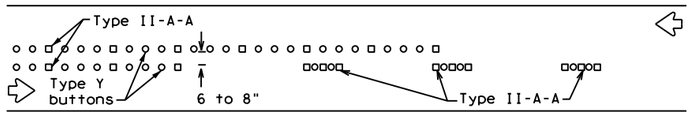
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



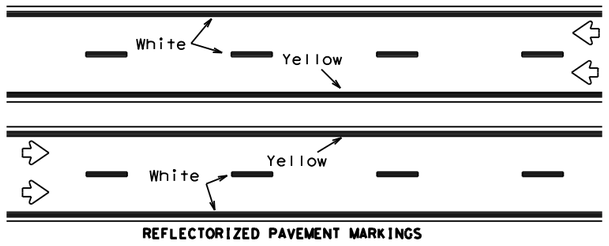
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



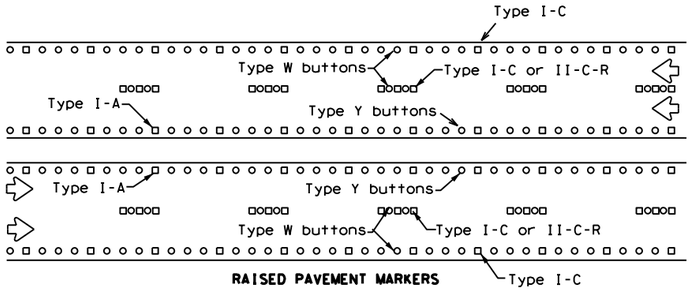
RAISED PAVEMENT MARKERS - PATTERN B

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

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



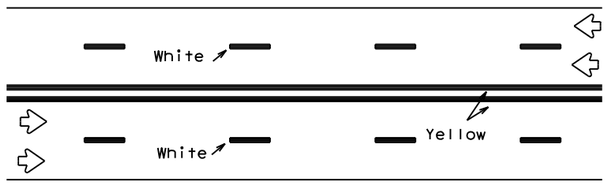
REFLECTORIZED PAVEMENT MARKINGS



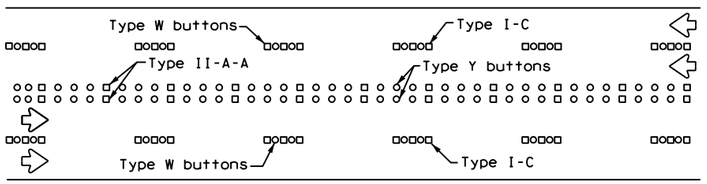
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



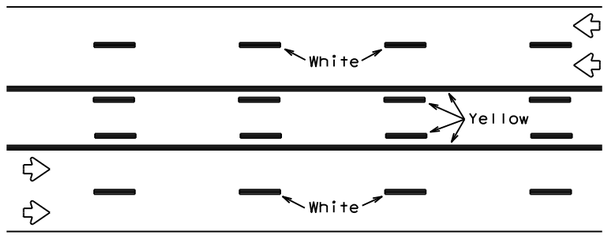
REFLECTORIZED PAVEMENT MARKINGS



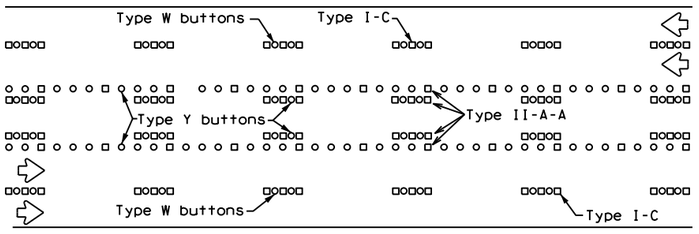
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

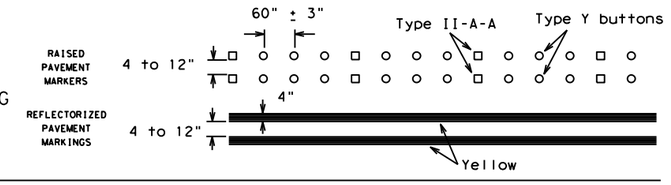
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

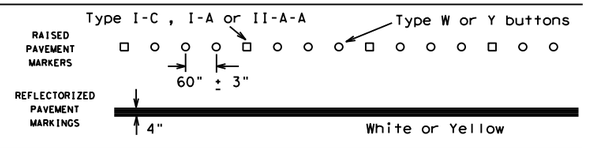
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

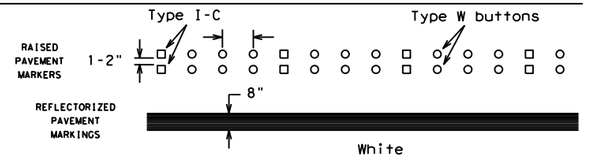


EDGE LINE OR SINGLE NO-PASSING LINE



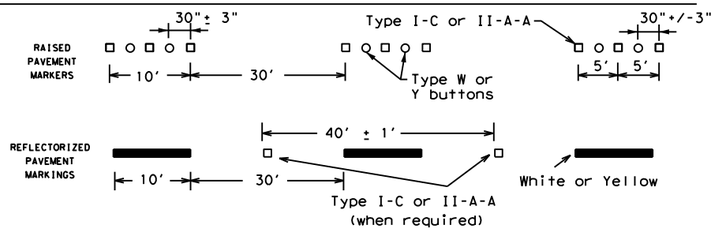
WIDE LINE

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

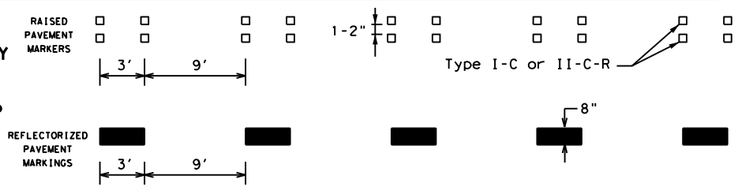


BROKEN LINES

CENTER LINE OR LANE LINE

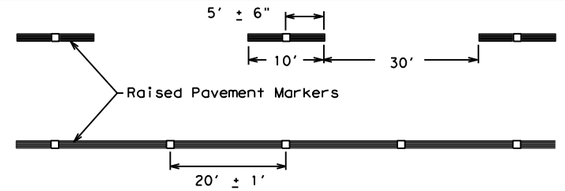


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

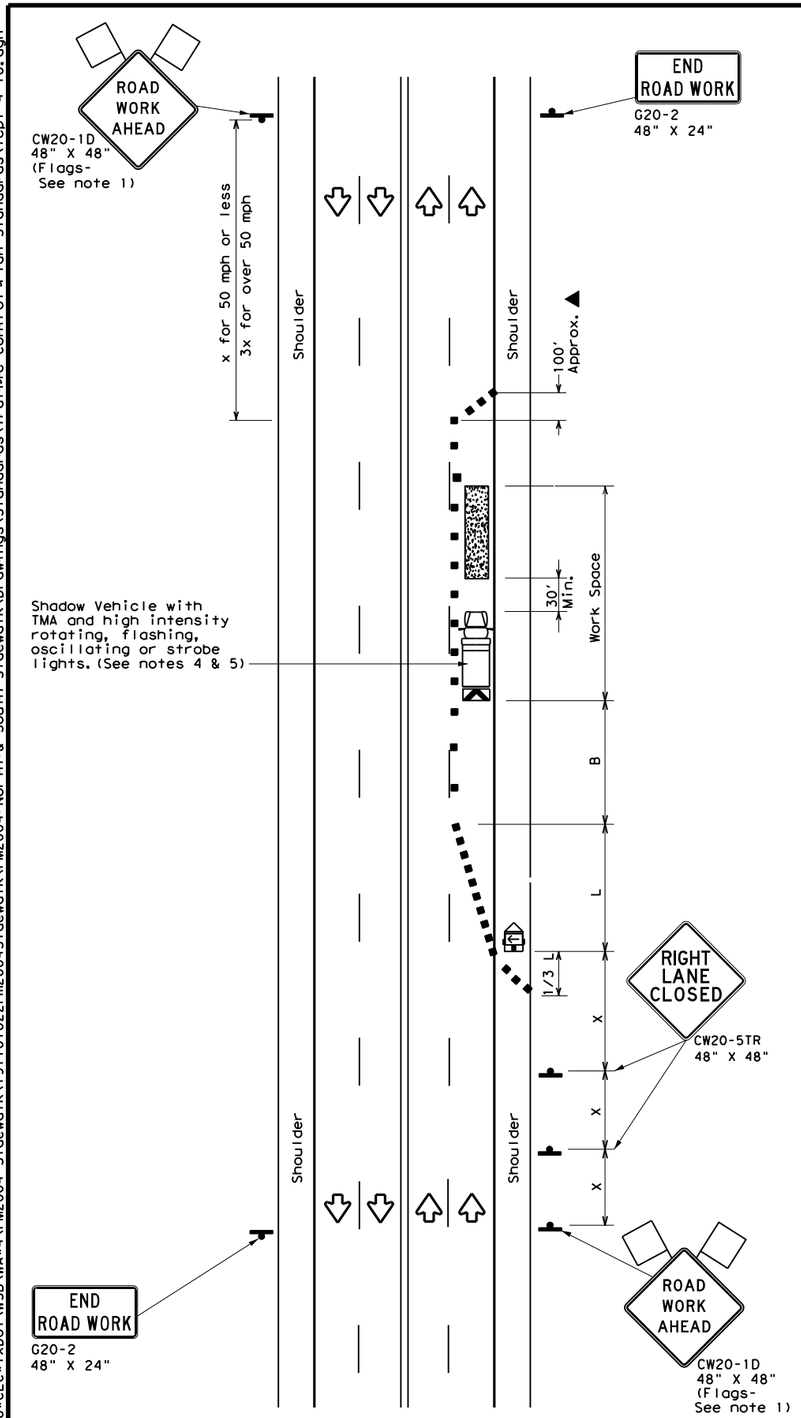
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

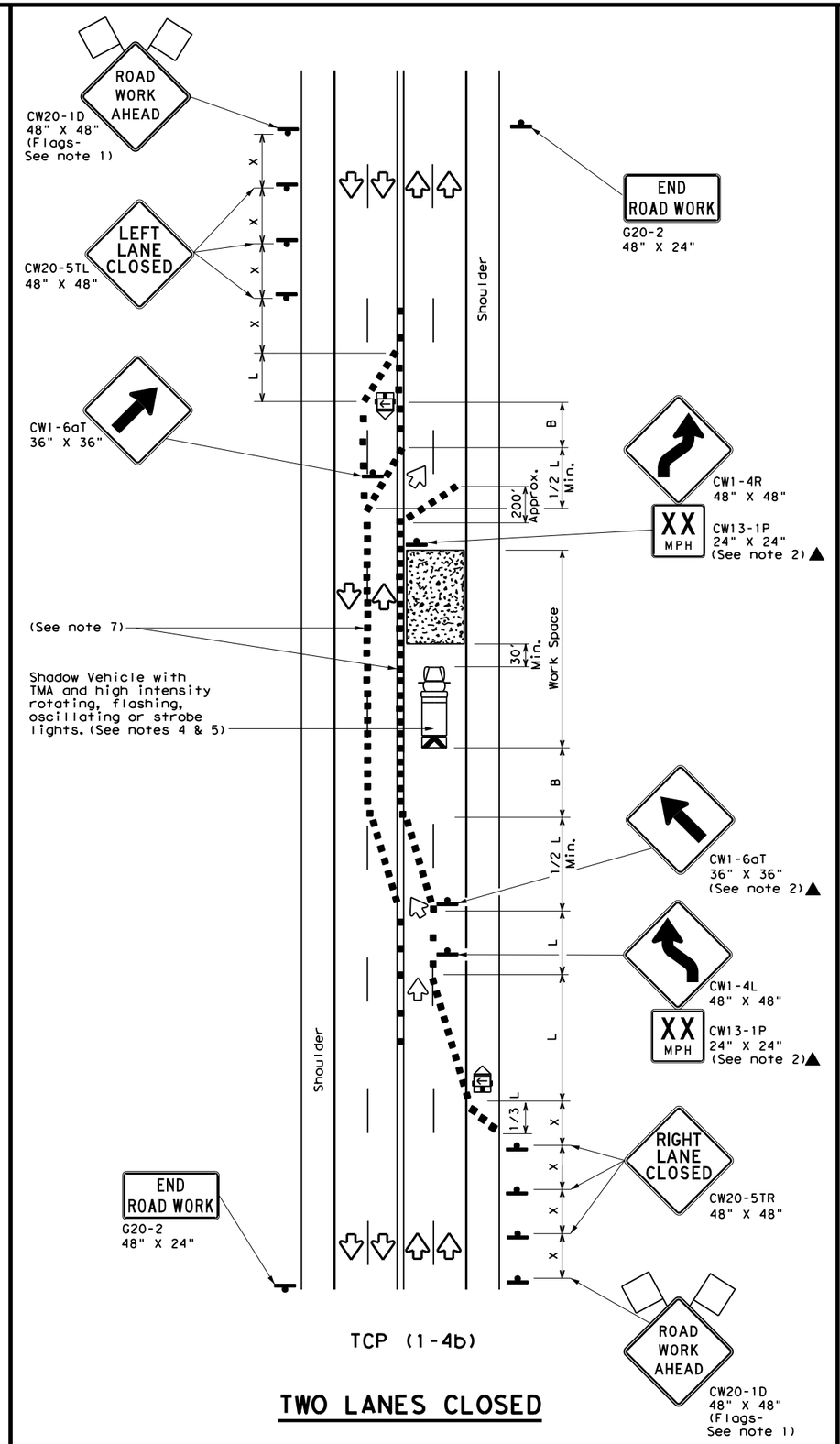
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		29

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004SidewalkTCP1-4-18.dgn



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

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

TCP (1-4a)

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

TCP (1-4b)

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

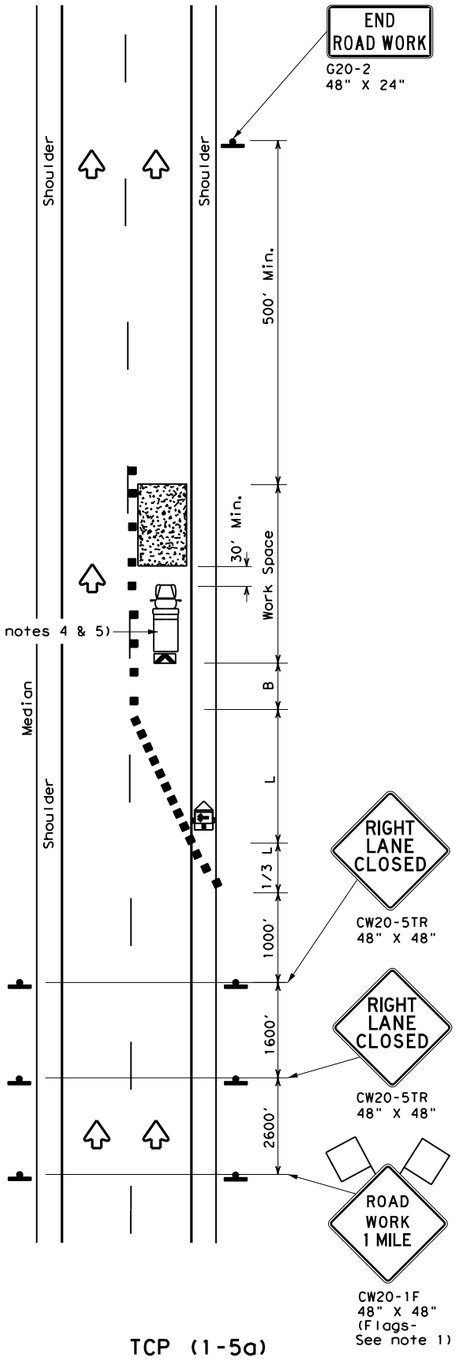
Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

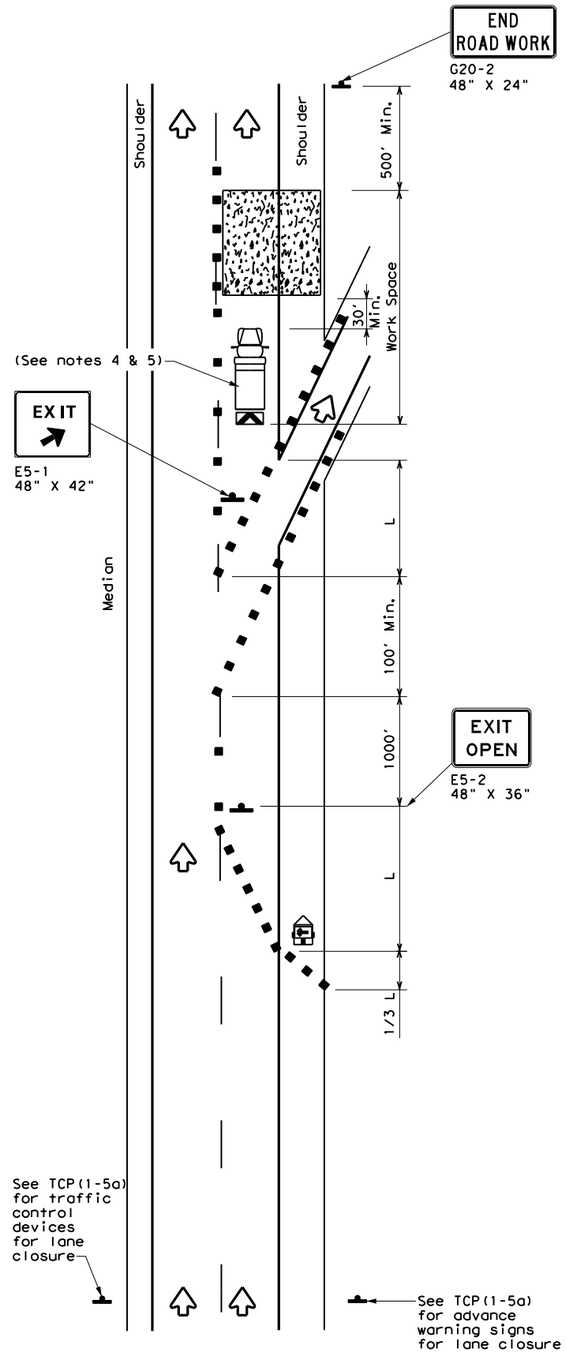
FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	HOU	GALVESTON		30
1-97 2-18				

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkTCP1-5-18.dgn



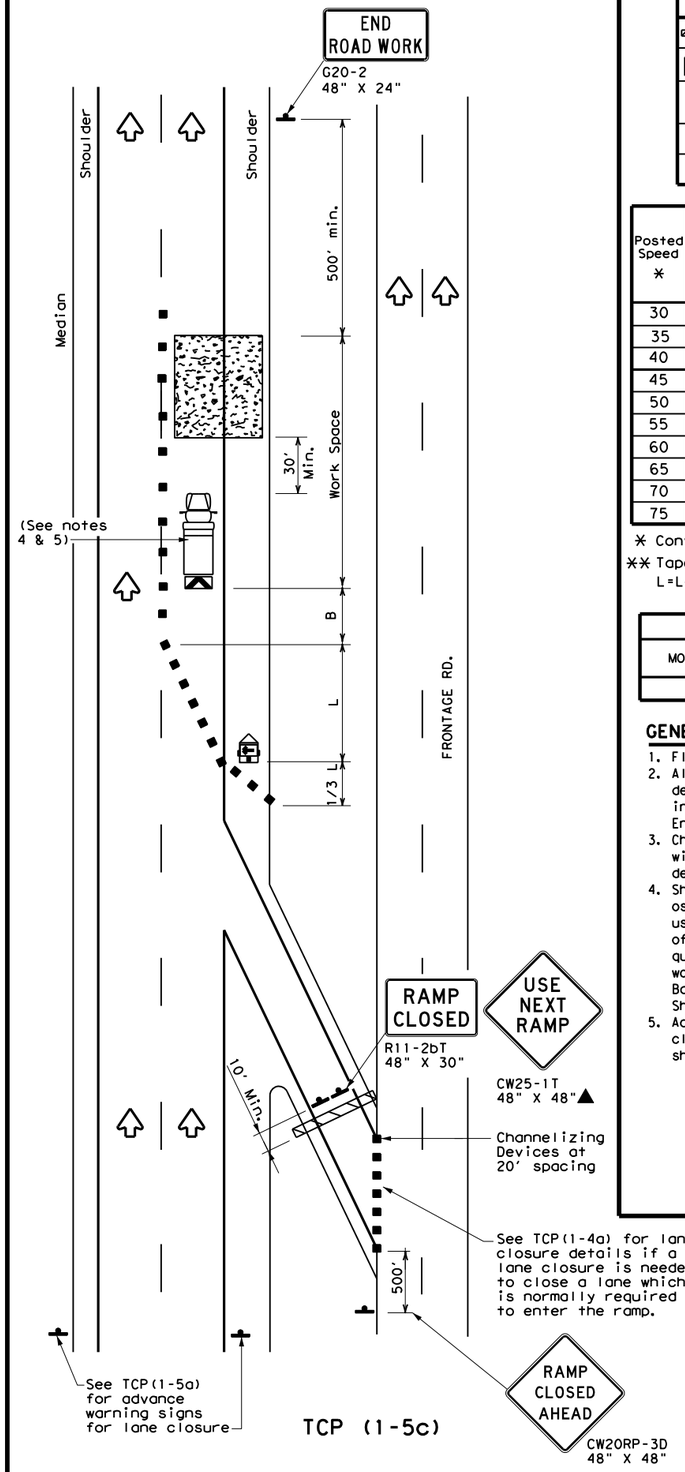
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

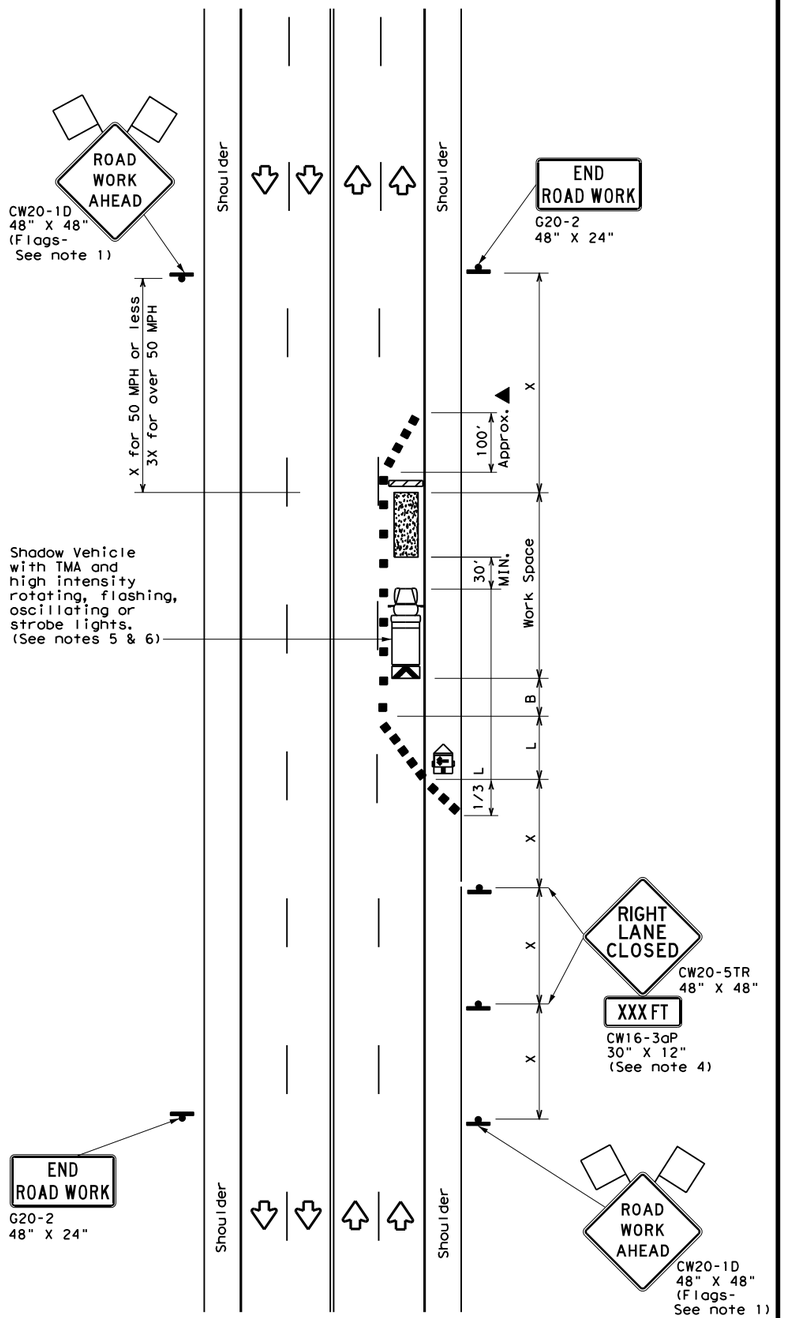
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

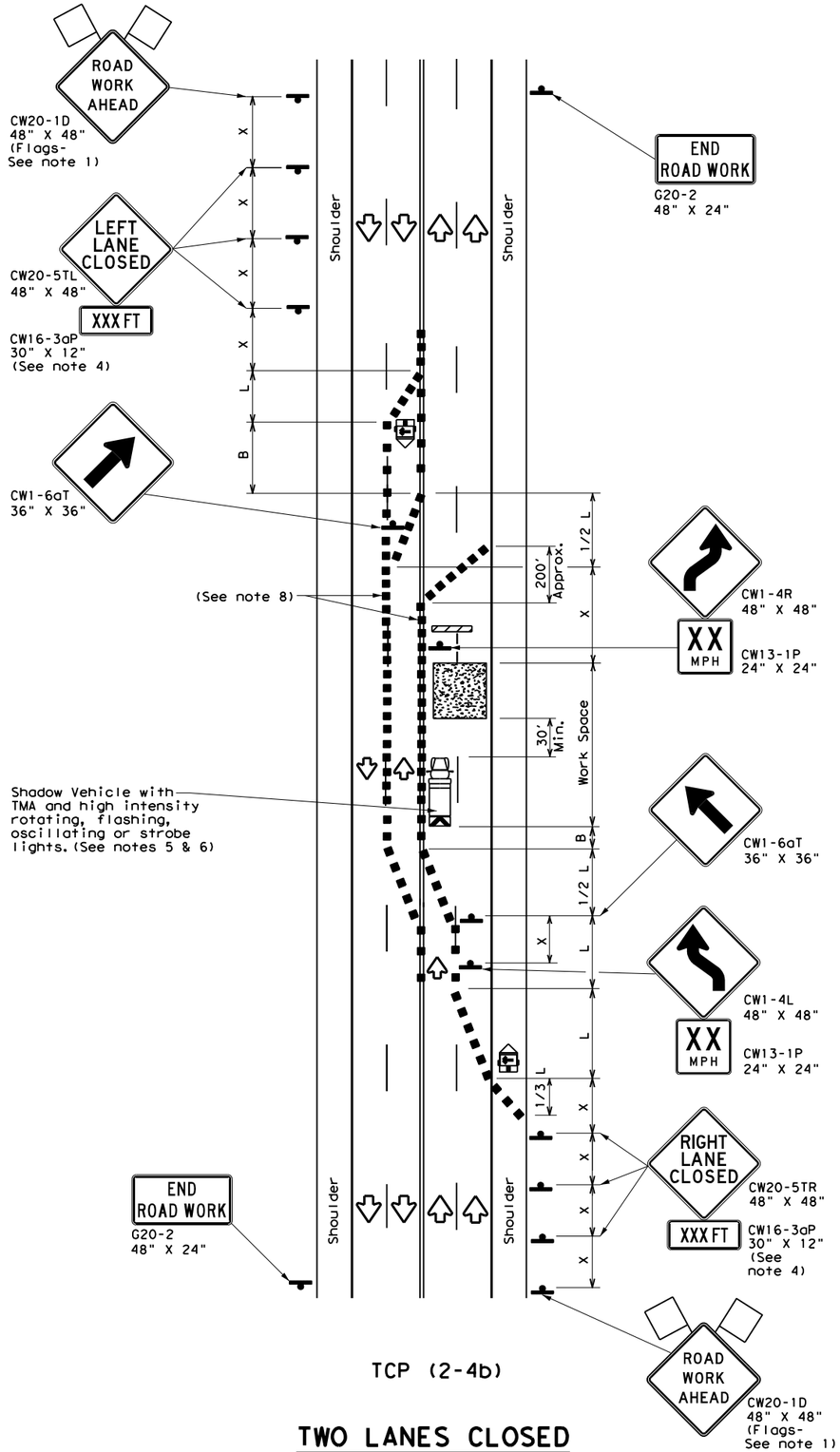
FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		31

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk_TCP2-4-18.dgn



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation

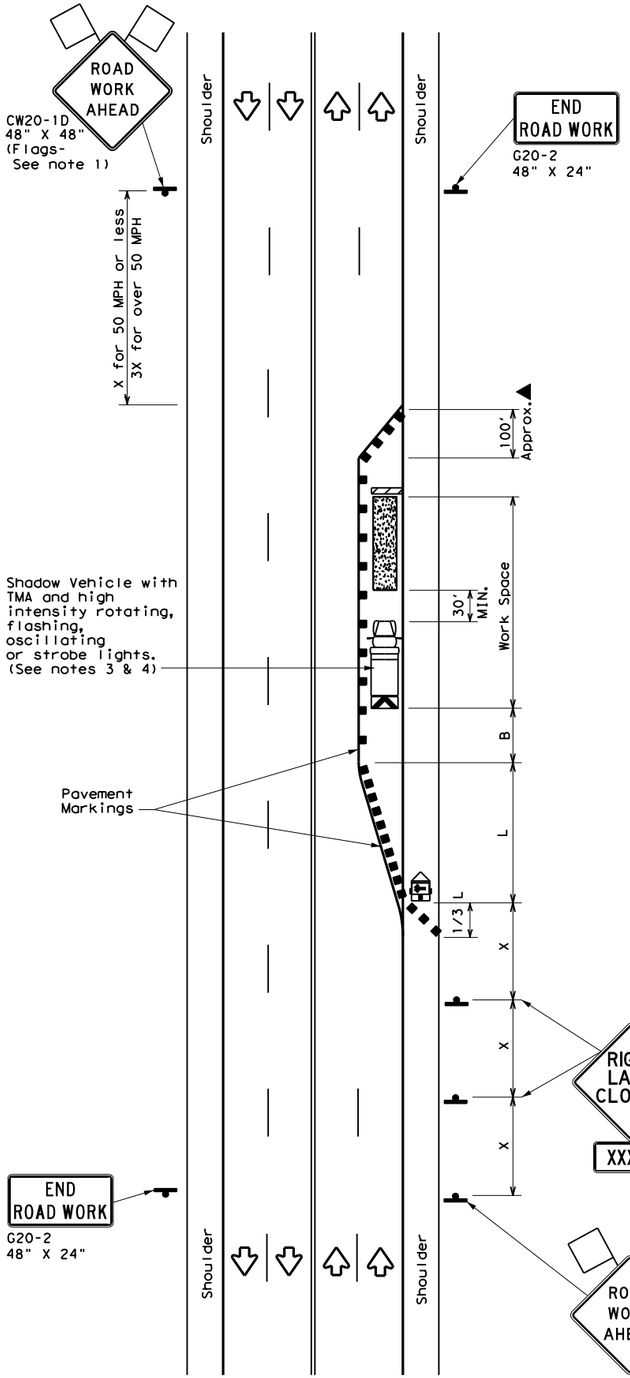
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

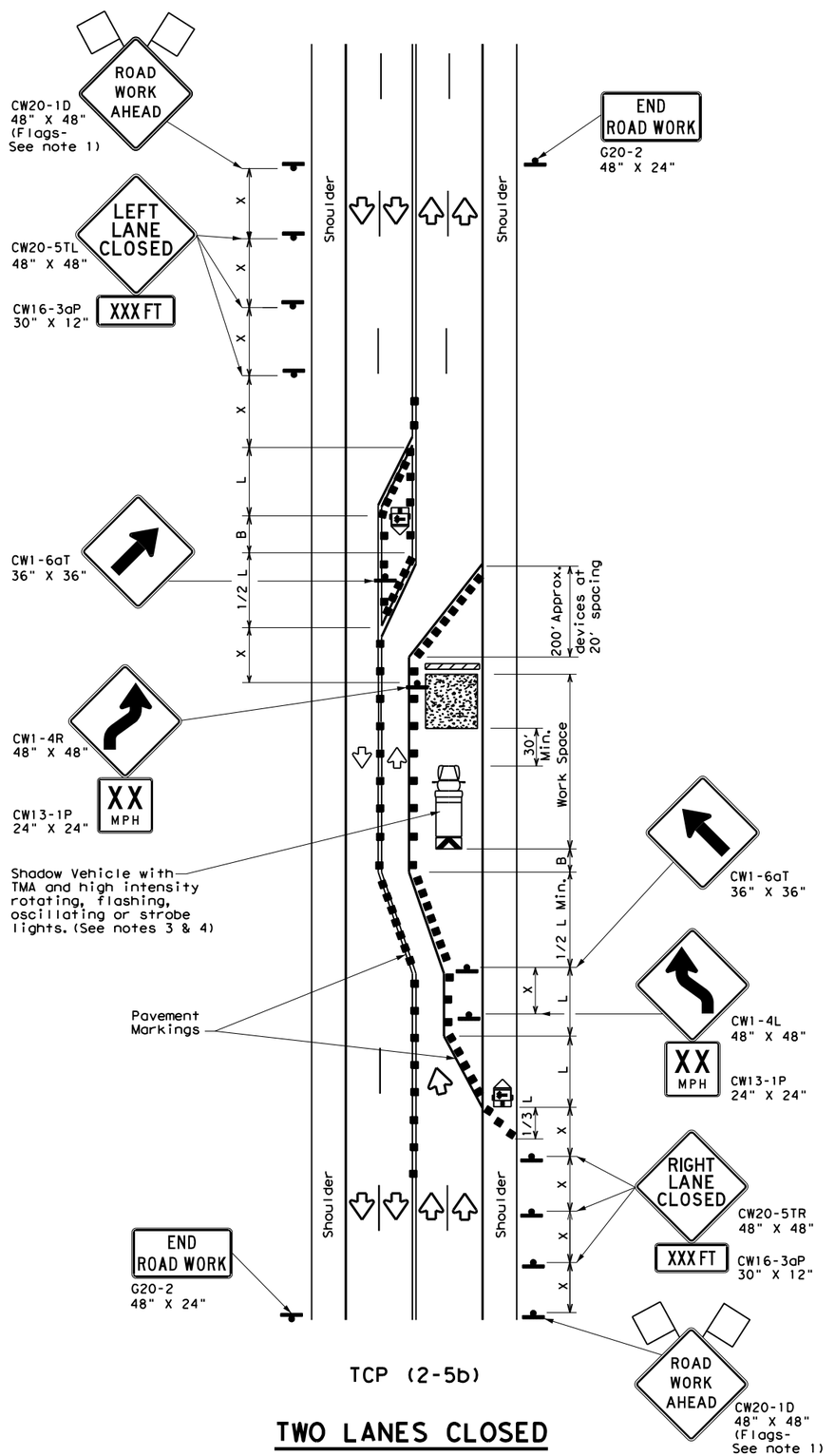
FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	1911	01	022, ETC	FM2004
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	HOU	GALVESTON		32

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkTCP2-5-18.dgn



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

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

TCP (2-5b)

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

Texas Department of Transportation

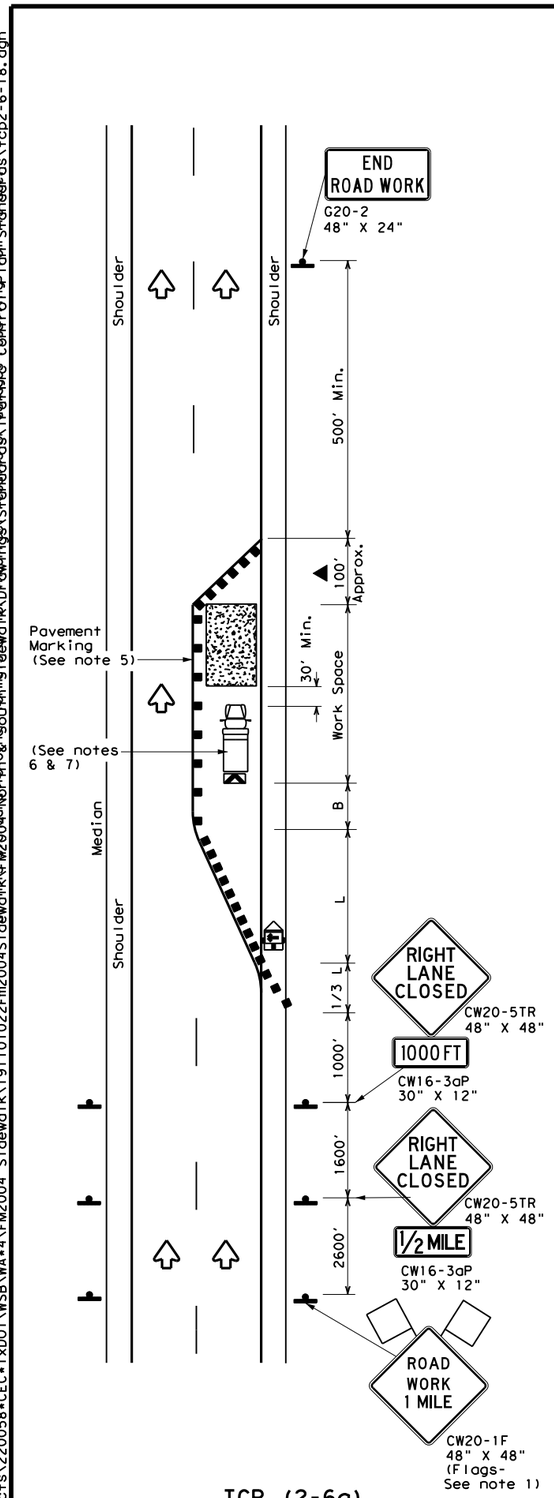
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

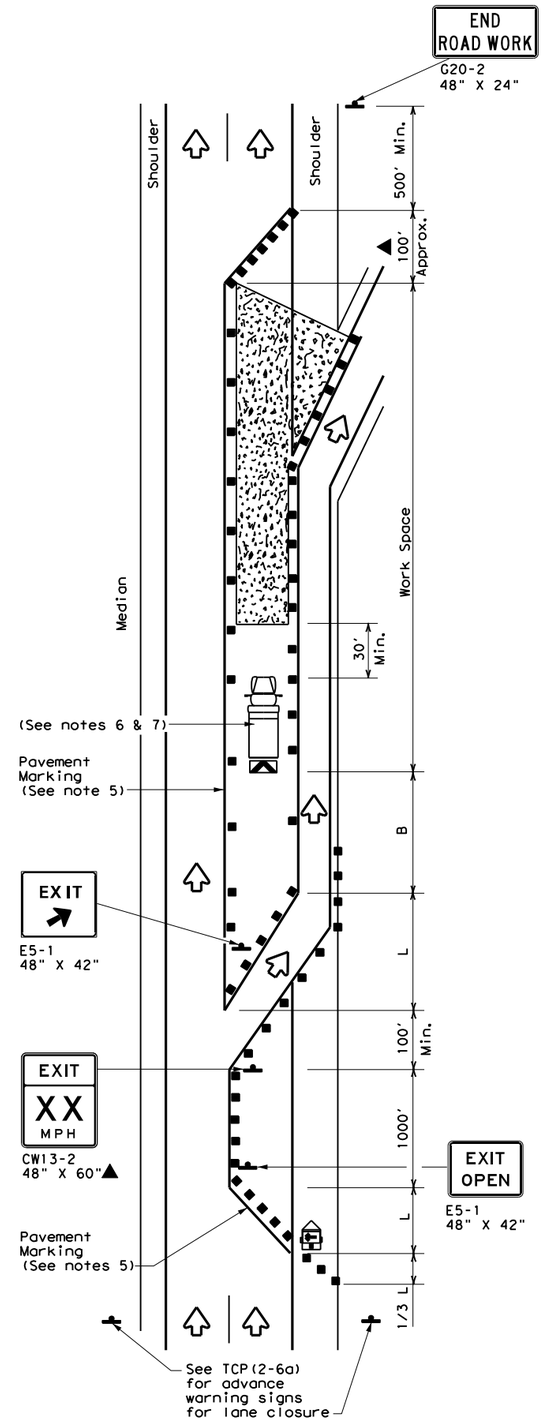
FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	1911	01	022, ETC	FM2004
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	HOU	GALVESTON		33

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004SidewalkTCP2-6-18.dgn



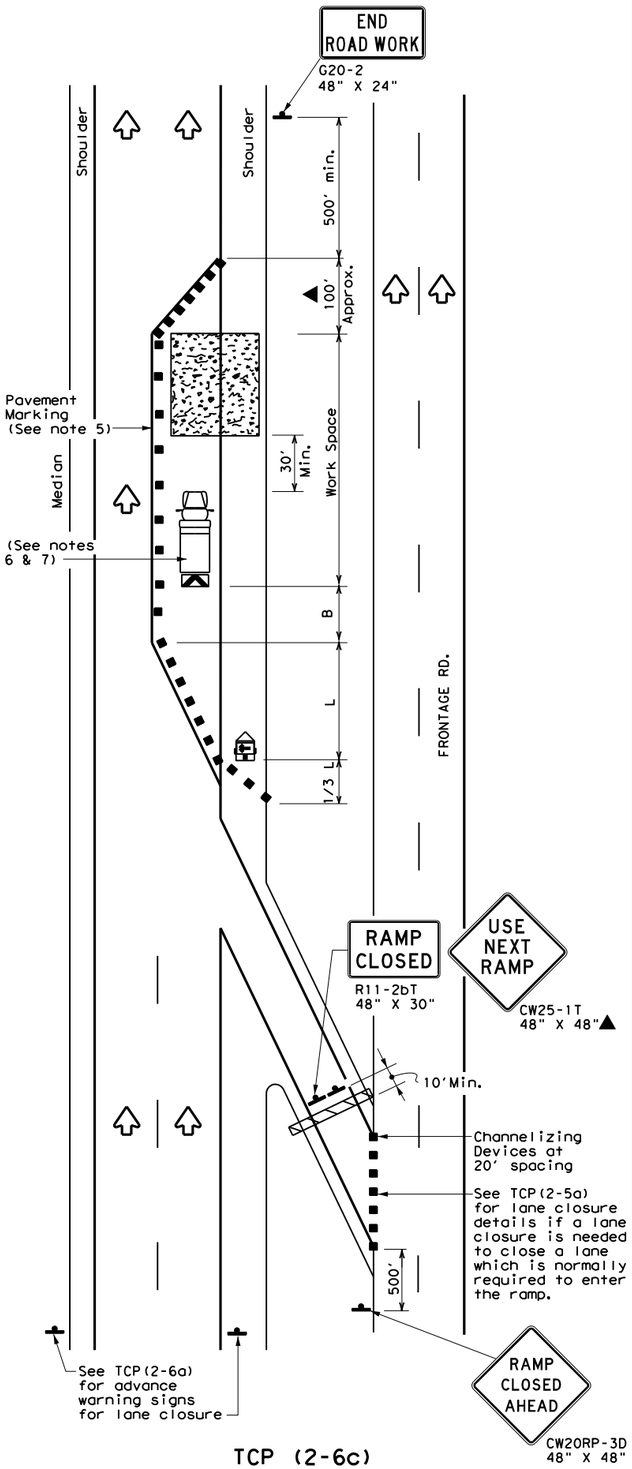
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

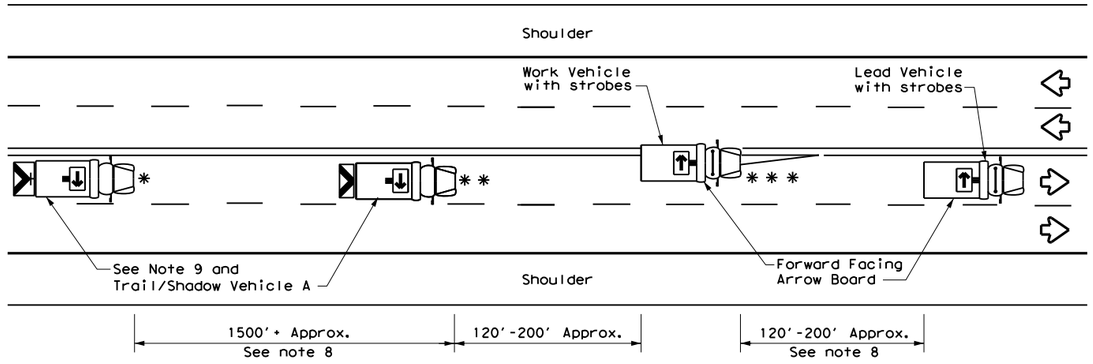
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

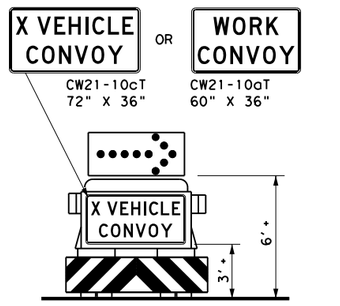
FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		34

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkTCP3-1.dgn



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

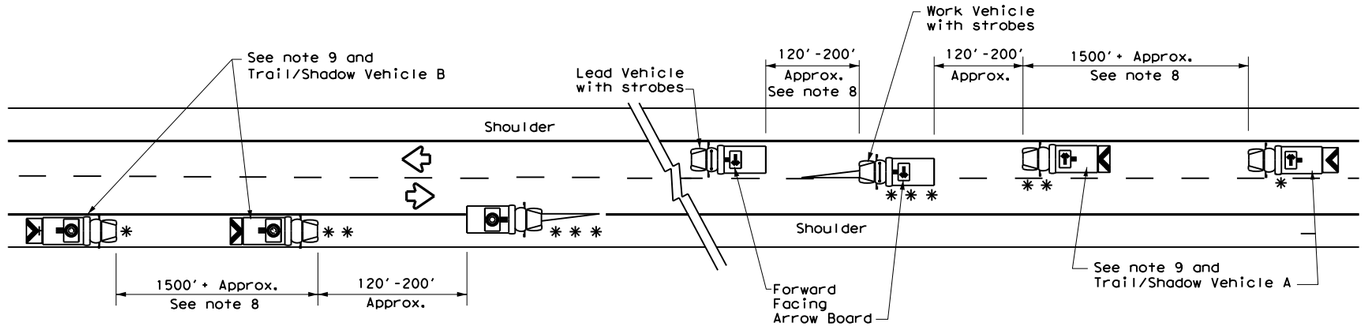
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

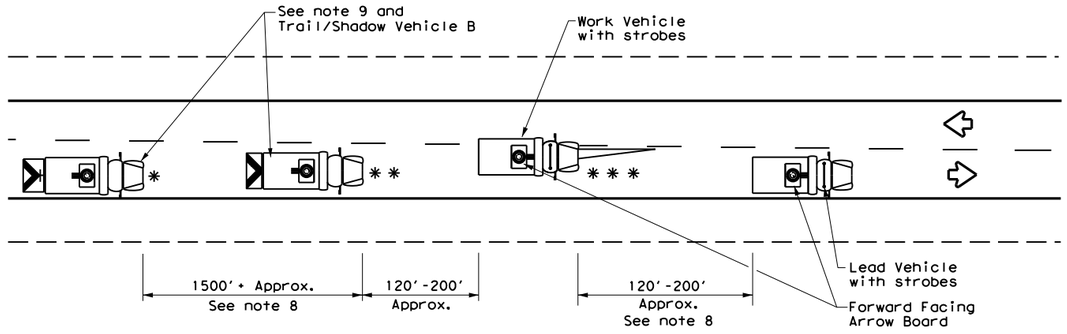


WORK ON SHOULDER

WORK ON TRAVEL LANE

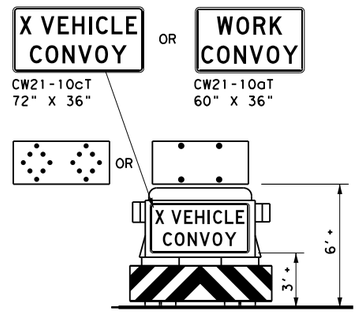
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



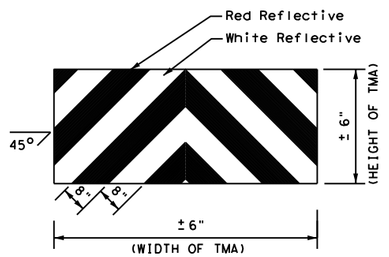
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

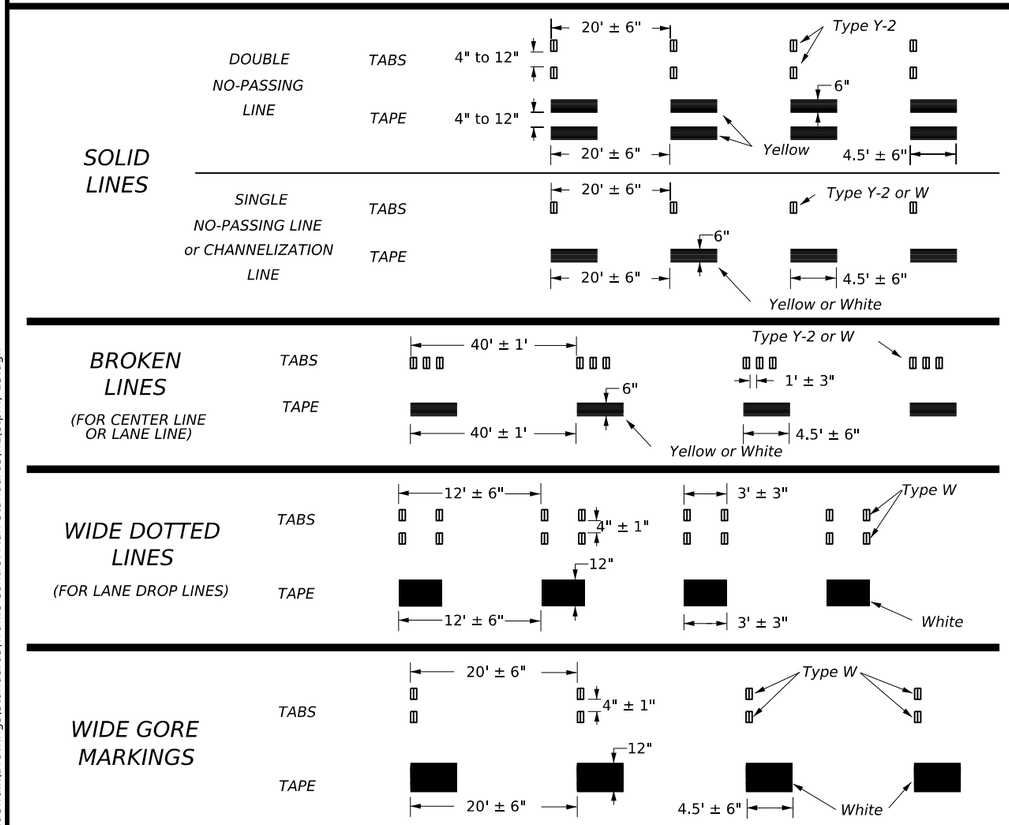
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1911	01	022, ETC	HIGHWAY
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		35

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



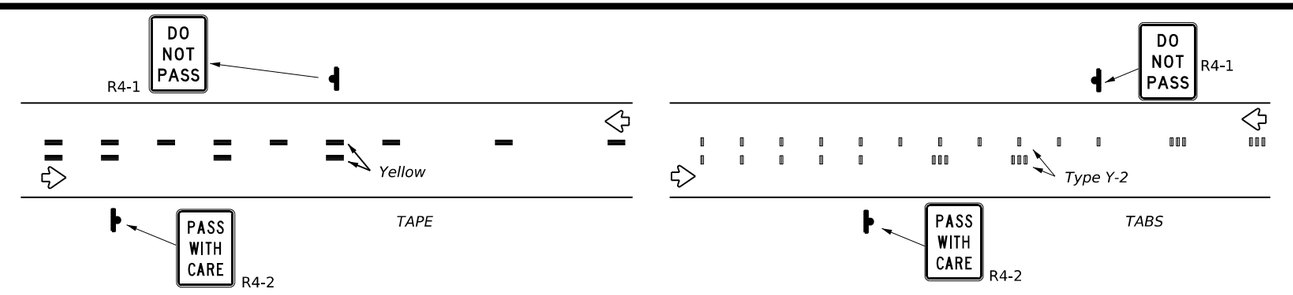
NOTES:

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

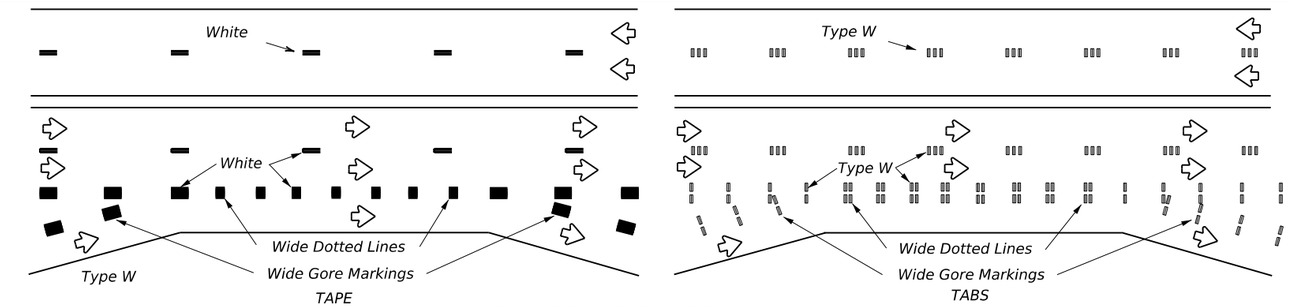
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

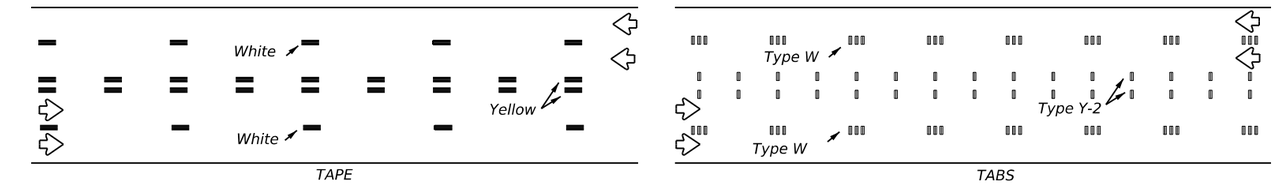
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



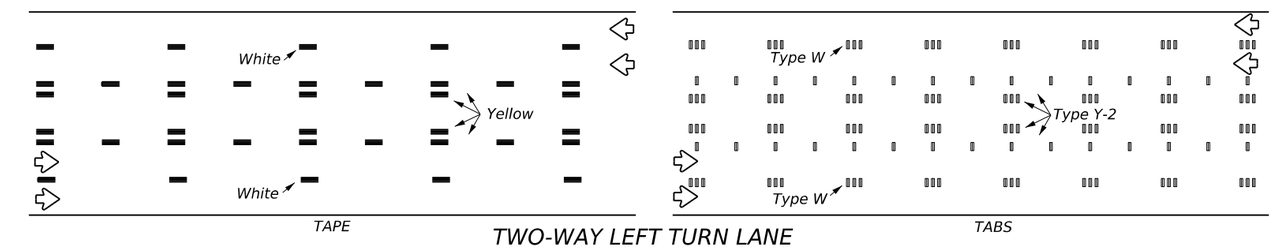
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



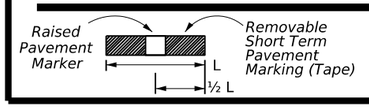
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

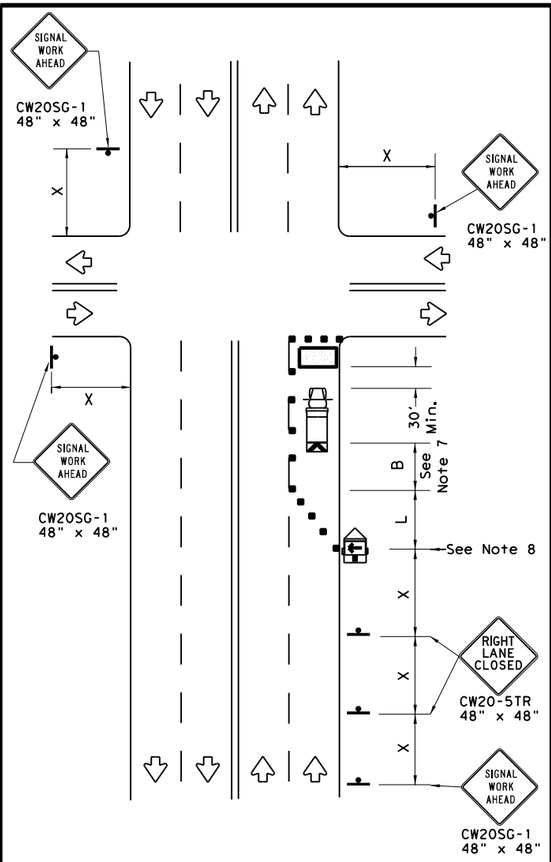
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		36

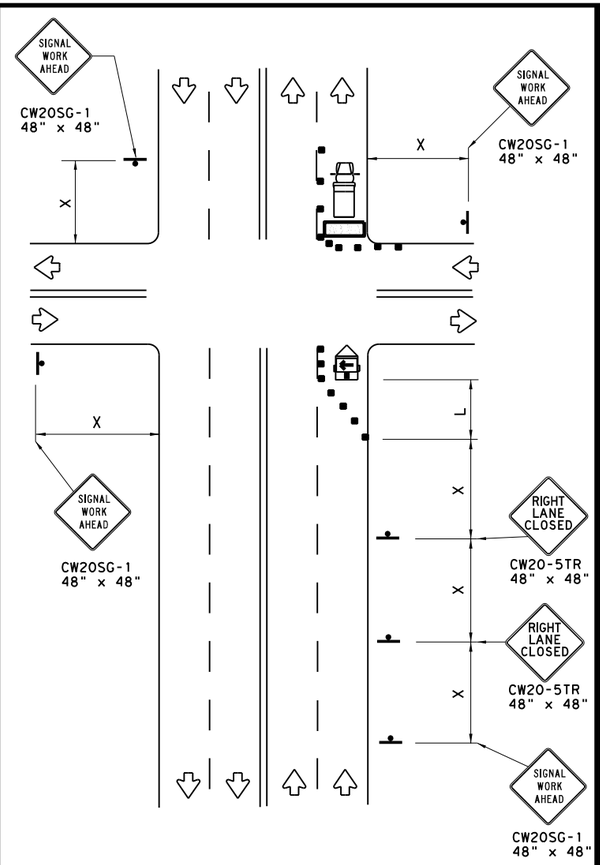
5/9/2024
Z:\Projects\220058_CEC_TxDOT\WSB\WA_4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Draw

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SideWalkWZBTS-13.dgn



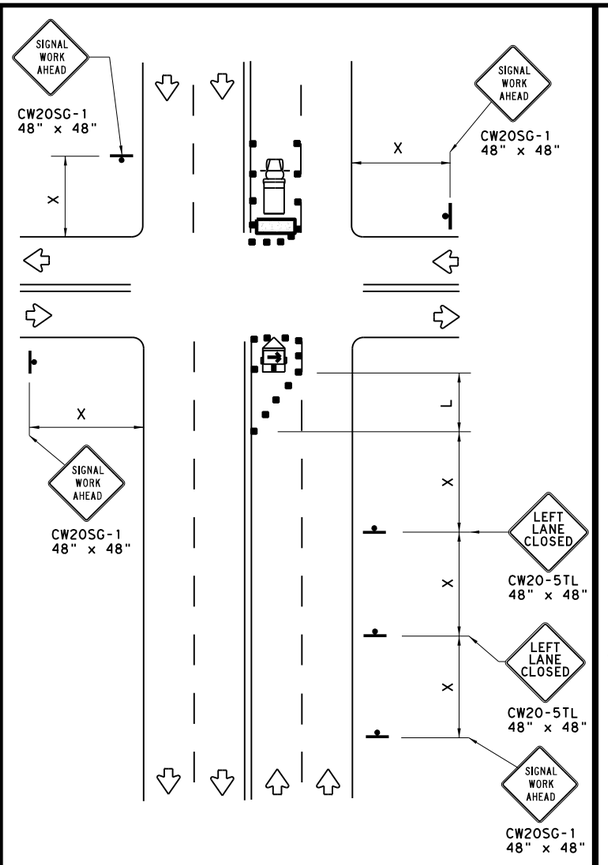
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



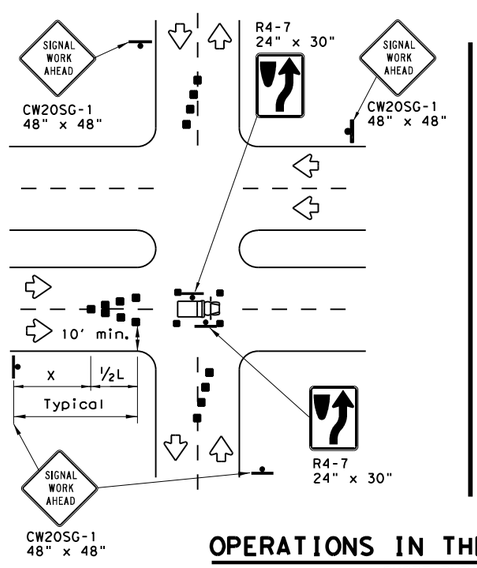
FAR SIDE RIGHT LANE CLOSURE

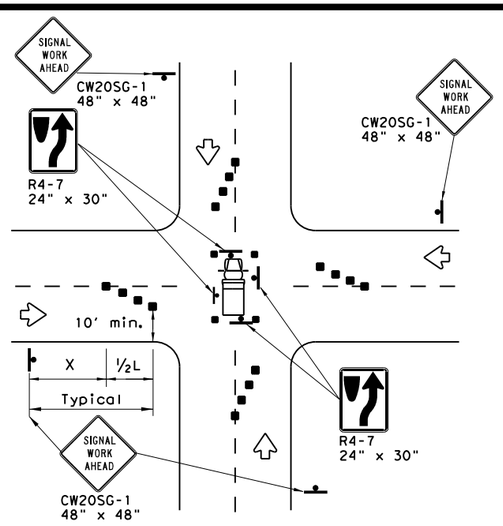
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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

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

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation

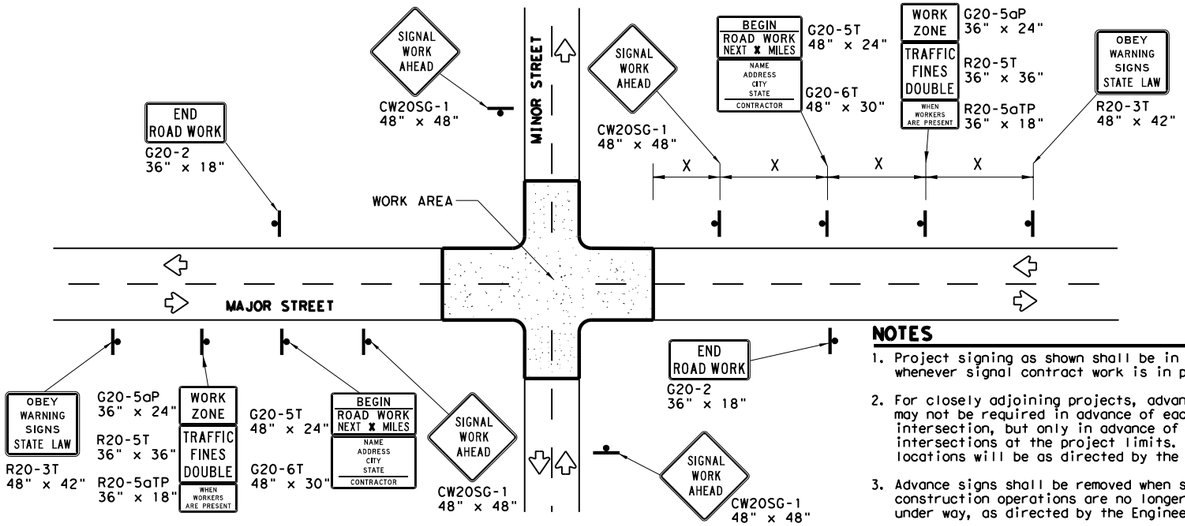
Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	GALVESTON		37

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA#4\FM2004 Sidewalk\19110102Fm2004Sidewalk_TRAFFICCONTROLPLANSHEETS\wzbts-13.dgn



TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

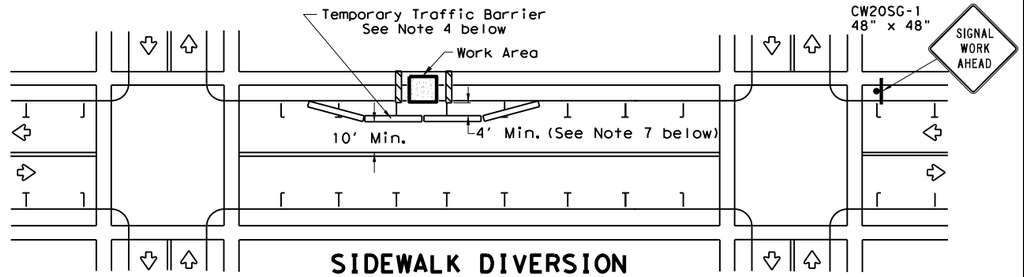
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

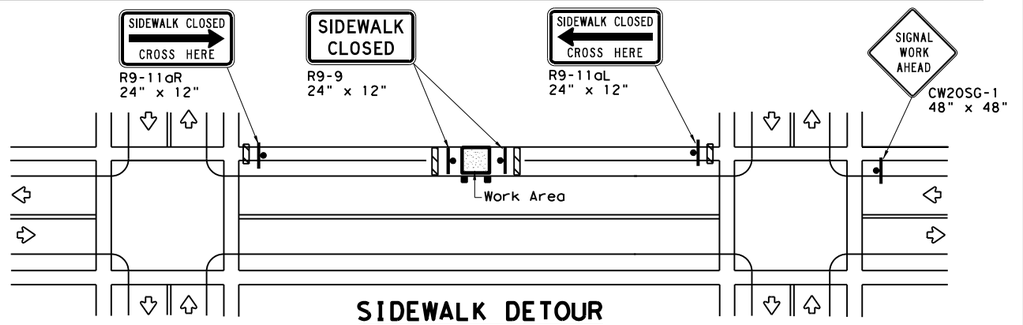
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

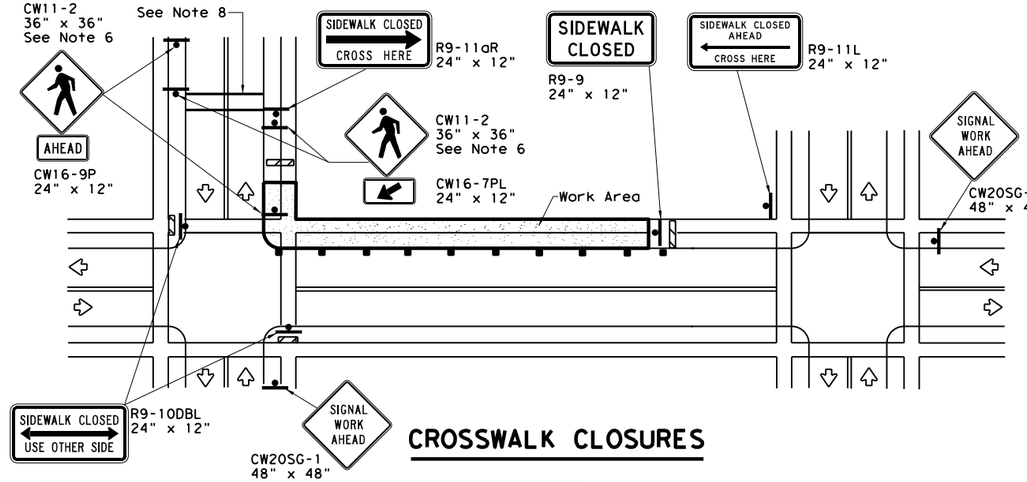
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

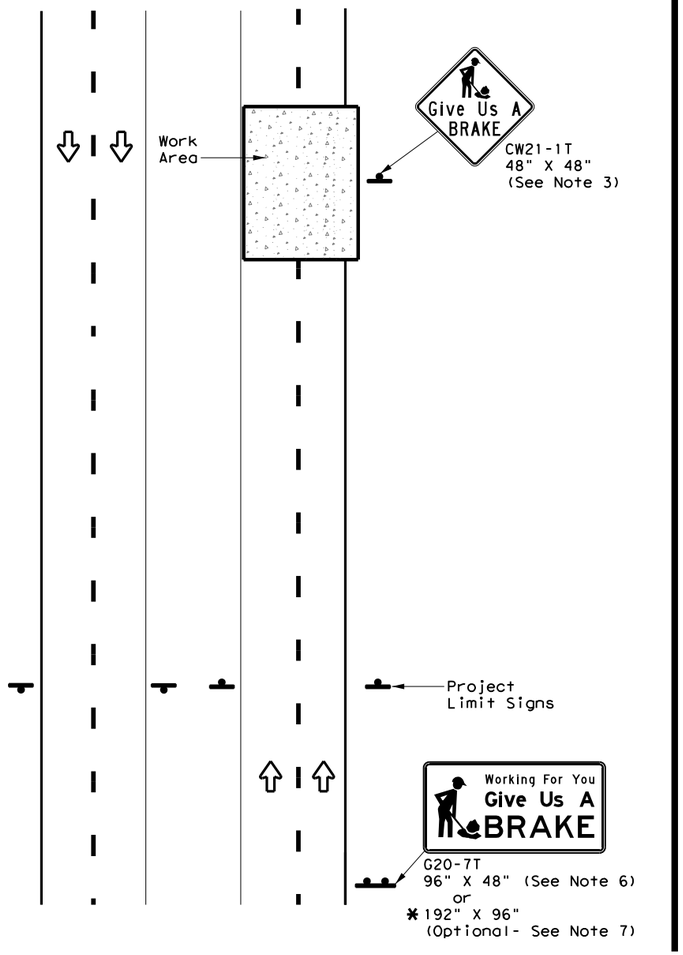
Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

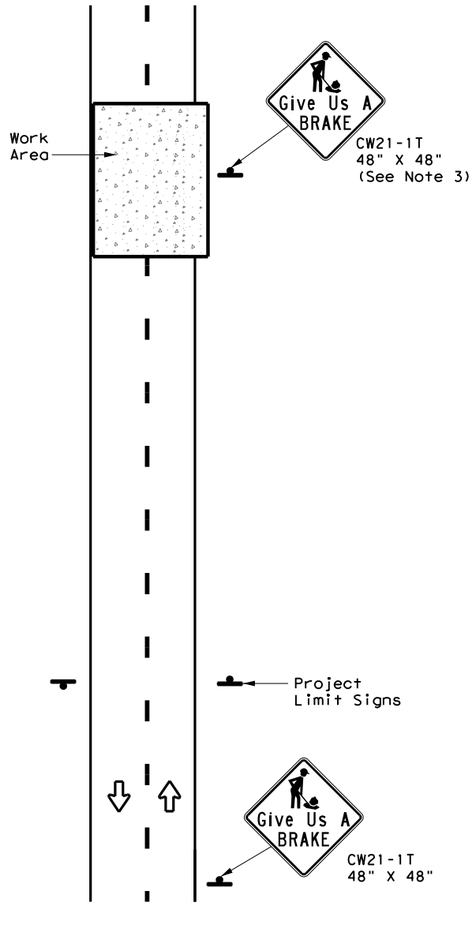
WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	GALVESTON		38

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkPlans\Traffic\Standards\wzbrk-13.dgn



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

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 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	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

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. 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.
4. 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.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. 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.
7. 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
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.

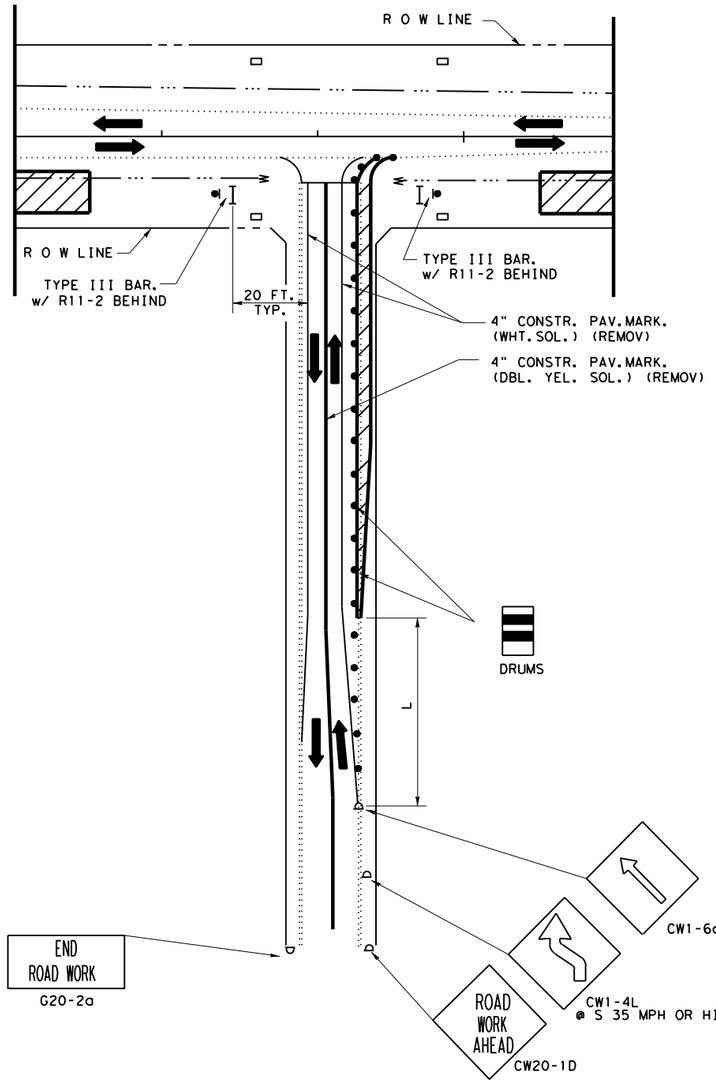
Texas Department of Transportation

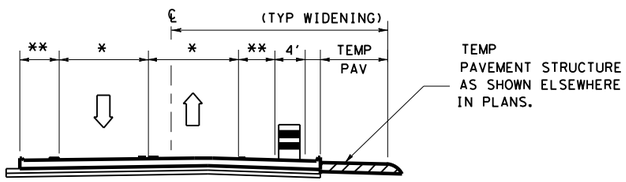
Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

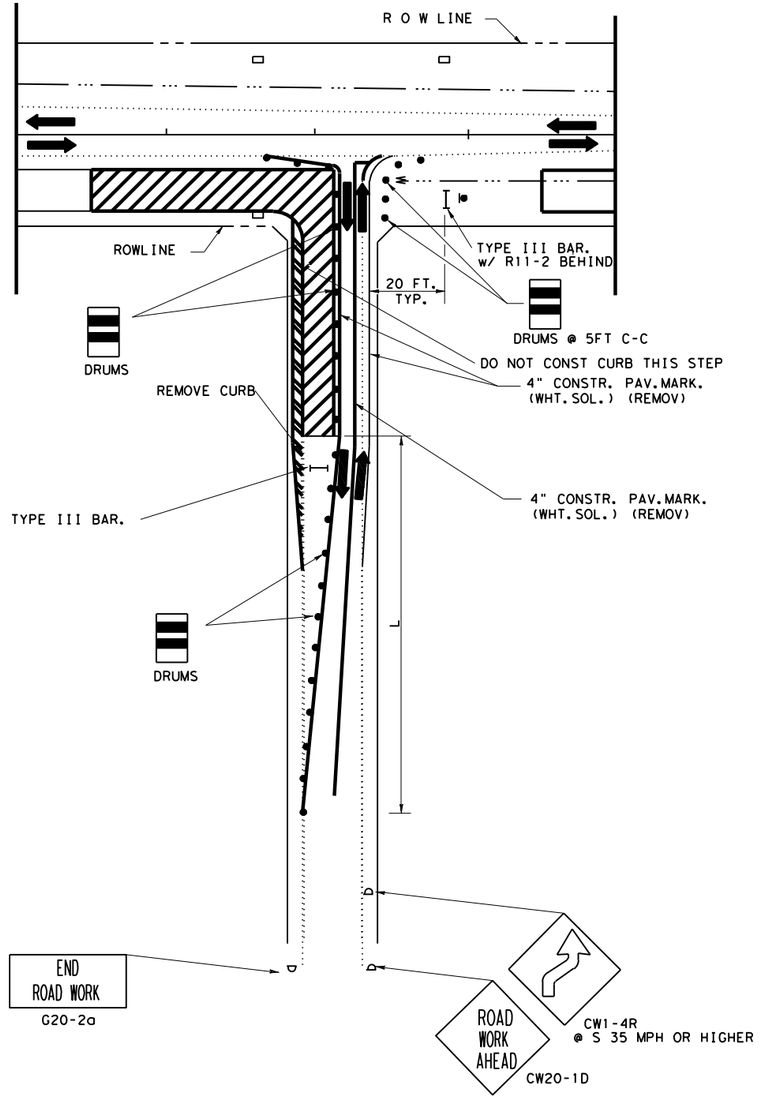
FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	HOU	GALVESTON		39

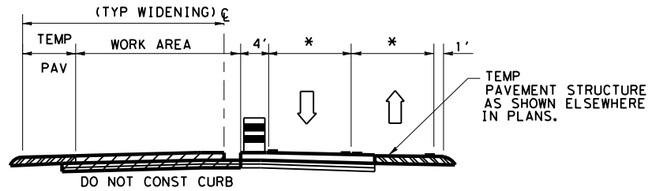




** MIN. 0 FT.
MAX. 10 FT.

STEP 1





STEP 2

* 10 FT. MIN.
12 FT. DESIRABLE IF SPACE AVAILABLE.
* IN CASES WHERE EXISTING SIDE STREETS HAVE LESS THAN 10 FT. LANE WIDTHS, PROVIDE LANE WIDTHS EQUAL OR GREATER THAN EXISTING.

TYPICAL ADVANCE SIGNING
TO REMAIN PLACE DURING ALL PHASES
OR AS DIRECTED BY ENGINEER

END
ROAD WORK
G20-2a

ROAD
WORK
AHEAD
CW20-1D

CONSTRUCTION WARNING
SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	160
40	240
45	320
50	400
55	500
60	600
65	700
70	800

TYPICAL TRANSITION LENGTHS
AND
SUGGESTED MAXIMUM SPACING OF DEVICES

POSTED SPEED	FORMULA	MINIMUM DESIRABLE TAPER LENGTHS ⊛⊛ 10' OFFSET	11' OFFSET	12' OFFSET	SUGGESTED MAX. SPAC. OF DEVICE ON A TAPER	ON A TANGENT	MINIMUM SIGN SPACING x DISTANCE
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	⊛ 600'
65		650'	715'	780'	65'	130'-165'	⊛ 700'
70		700'	770'	840'	70'	140'-175'	⊛ 800'

⊛ CONVENTIONAL ROADS ONLY

⊛⊛ TAPER LENGTHS HAVE BEEN ROUNDED OFF.

LEGEND

- CONSTRUCTION AREA
- TEMPORARY PAVEMENT
- OPEN TO TRAFFIC

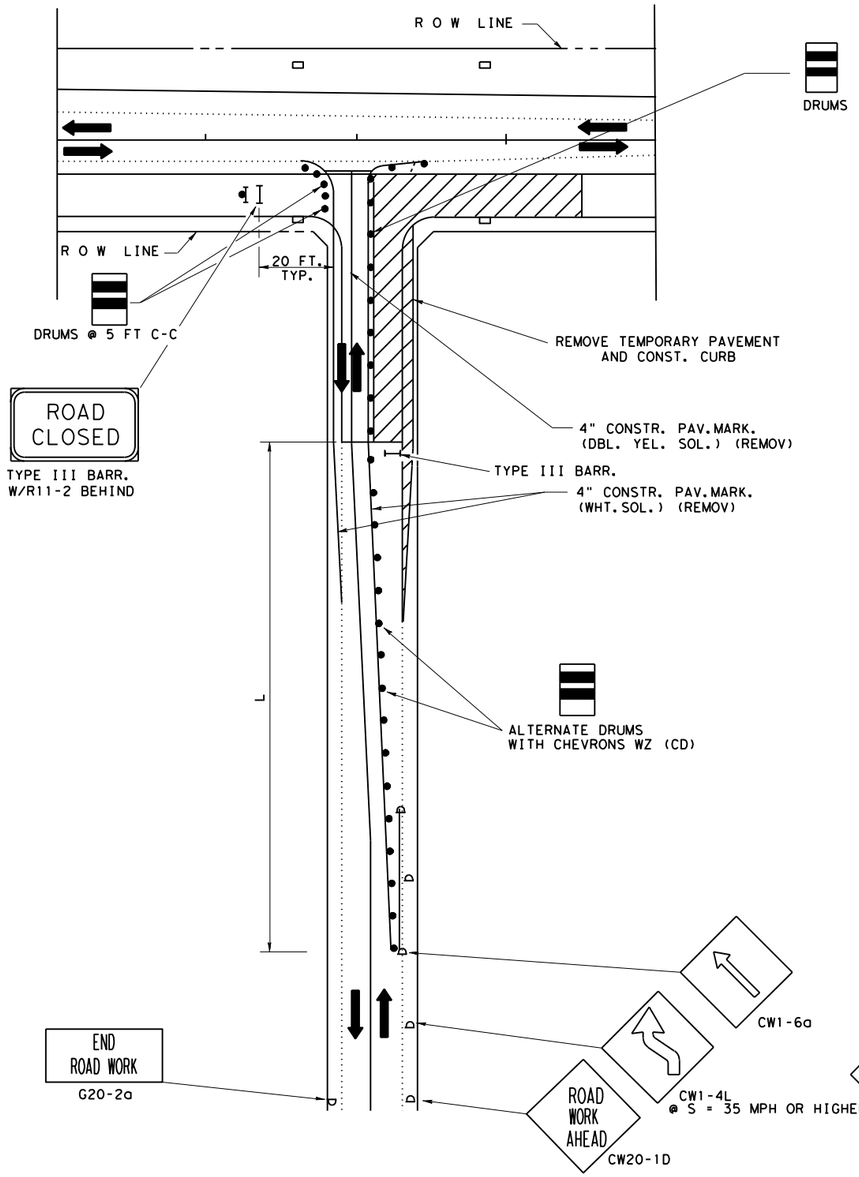
Texas Department of Transportation
Houston District

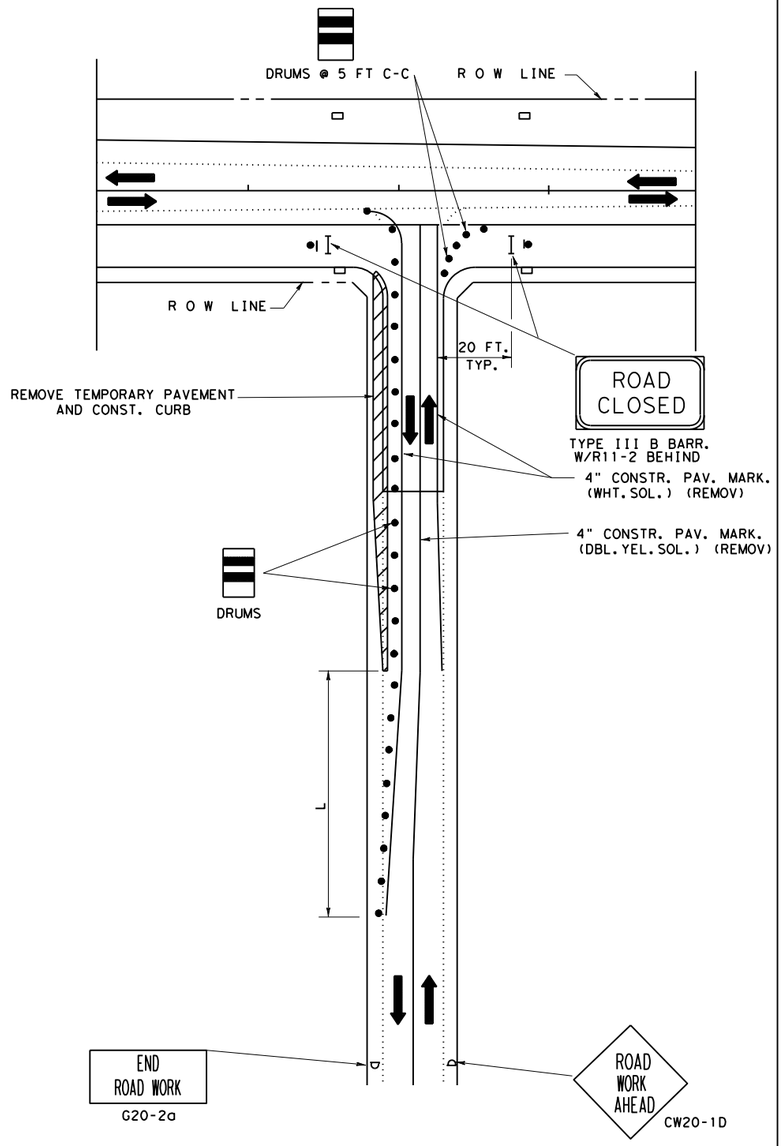
TWO WAY ROADWAY INTERSECTION PHASING

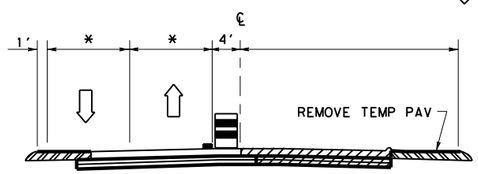
TWRIP(1) TC2010-09

FILE:	DN:	CK:	DW:	CK:
© TxDOT OCT 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		40
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC	FM2004

STD H-5A





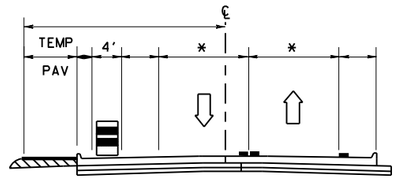


STEP 3

TEMP PAVEMENT STRUCTURE AS SHOWN ELSEWHERE

* 10 FT. MIN.
12 FT. DESIRABLE IF SPACE AVAILABLE.

* IN CASES WHERE EXISTING SIDE STREETS HAVE LESS THAN 10 FT. LANE WIDTHS, PROVIDE LANE WIDTHS EQUAL OR GREATER THAN EXISTING.



STEP 4

TYPICAL ADVANCE SIGNING
TO REMAIN PLACE DURING ALL PHASES
OR AS DIRECTED BY ENGINEER

END ROAD WORK
G20-2a

ROAD WORK AHEAD
CW20-1D

CONSTRUCTION WARNING
SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	160
40	240
45	320
50	400
55	500
60	600
65	700
70	800

TYPICAL TRANSITION LENGTHS
AND
SUGGESTED MAXIMUM SPACING OF DEVICES

POSTED SPEED	FORMULA	MINIMUM DESIRABLE TAPER LENGTHS ⊛⊛ 10' OFFSET	11' OFFSET	12' OFFSET	SUGGESTED MAX. SPAC. OF DEVICE ON A TAPER	ON A TANGENT	MINIMUM SIGN SPACING × DISTANCE
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	⊛ 600'
65		650'	715'	780'	65'	130'-165'	⊛ 700'
70		700'	770'	840'	70'	140'-175'	⊛ 800'

⊛ CONVENTIONAL ROADS ONLY

⊛⊛ TAPER LENGTHS HAVE BEEN ROUNDED OFF.

LEGEND

CONSTRUCTION AREA

TEMPORARY PAVEMENT

OPEN TO TRAFFIC

SHEET 2 OF 2

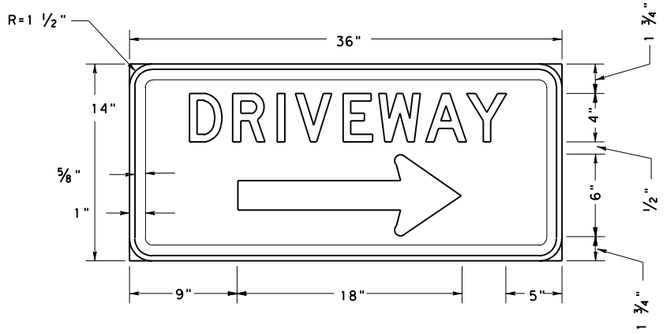
Texas Department of Transportation
Houston District

TWO WAY ROADWAY INTERSECTION PHASING

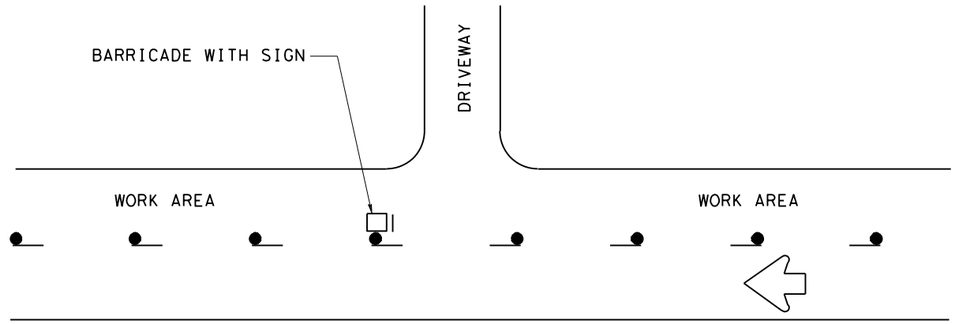
TWRIP(2) TC2010-09

FILE:	DN:	CK:	DW:	CK:
©TxDOT OCT 2009 REVISIONS	DIST: HOU	FED REG: 6	PROJECT NO.: .	SHEET: 41
	COUNTY: GALVESTON	CONTROL: 1911	SECT: 01	JOB: 022. ETC.	HIGHWAY: FM2004

STD H-5B



LETTERS: WHITE
BORDER: WHITE
BACKGROUND: BLUE



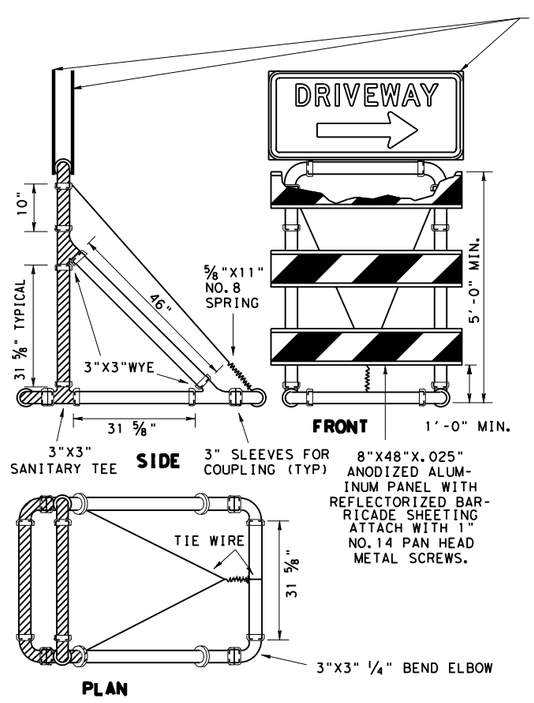
TYPICAL LOCATION OF DRIVEWAY SIGN

TYPE III PVC BARRICADES TYPICAL DESIGN DETAILS

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADIENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
3. ALL PIPE AND FITTINGS SHALL BE WHITE.
4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
5. CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE ⅜" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



CONSTRUCTION SIGN NOTES

MATERIALS

CONSTRUCTION SIGNS SHALL BE MADE FROM APPROVED FIBERGLASS OR HIGH IMPACT PLASTIC AS PRIMARY MATERIALS.

SIGN SHEETING

REFLECTORIZED SIGN SHALL BE CONSTRUCTED OF RETRO REFLECTIVE SHEETING MEETING THE COLOR AND REFLECTIVITY REQUIREMENTS OF MATERIAL SPECIFICATIONS, DMS-8300.

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

ALL SIGNS LETTERING SHALL BE CLEAR, OPEN ROUNDED TYPE CAPITAL LETTERS AS APPROVED BY AND AS PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. SIGNS AND LETTERING SHALL BE OF FIRST CLASS WORKMANSHIP EQUIVALENT TO THAT OF THE DEPARTMENT'S STANDARD SIGNS.

Texas Department of Transportation
Houston District

DRIVEWAY SIGNING

DS TC8020-04

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	HOU	6			42
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC.	FM2004

STD H-30

FM 2004 ℄

POT	10+00.00 R1	3232949.515	13703770.403
PC	55+65.56 R1	3233165.238	13699209.939
Tangential Direction:	S02°42'30"E		
Tangential Length:	4565.564		
PC	55+65.56 R1	3233165.238	13699209.939
PI	56+47.99 R1	3233169.133	13699127.603
CC		3232665.796	13699186.314
PT	57+28.95 R1	3233146.392	13699048.374
Radius:	500.000		
Delta:	18°43'21.76" Right		
Degree of Curvature(Arc):	11°27'32.96"		
Length:	163.386		
Tangent:	82.428		
Chord:	162.661		
Middle Ordinate:	6.659		
External:	6.749		
Tangent Back Direction:	S02°42'30"E		
Radial Direction:	S87°17'30"W		
Chord Direction:	S06°39'11"W		
Radial Direction:	N73°59'08"W		
Tangent Ahead Direction:	S16°00'52"W		
PT	57+28.95 R1	3233146.392	13699048.374
PC	65+20.63 R1	3232927.982	13698287.414
Tangential Direction:	S16°00'52"W		
Tangential Length:	791.684		
PC	65+20.63 R1	3232927.982	13698287.414
PI	65+55.34 R1	3232918.408	13698254.057
CC		3231005.598	13698839.174
PT	65+90.03 R1	3232907.683	13698221.052
Radius:	2000.000		
Delta:	01°59'17.43" Right		
Degree of Curvature(Arc):	02°51'53.24"		
Length:	69.400		
Tangent:	34.704		
Chord:	69.397		
Middle Ordinate:	0.301		
External:	0.301		
Tangent Back Direction:	S16°00'52"W		
Radial Direction:	N73°59'08"W		
Chord Direction:	S17°00'31"W		
Radial Direction:	N71°59'50"W		
Tangent Ahead Direction:	S18°00'10"W		
PT	65+90.03 R1	3232907.683	13698221.052
PC	70+65.93 R1	3232760.602	13697768.454
Tangential Direction:	S18°00'10"W		
Tangential Length:	475.897		
PC	70+65.93 R1	3232760.602	13697768.454
PI	70+96.37 R1	3232751.194	13697739.504
CC		3234662.686	13697150.332
PT	71+26.81 R1	3232742.671	13697710.281
Radius:	2000.000		

FM 2004 ℄ (CONT)

Delta:	01°44'38.28" Left		
Degree of Curvature(Arc):	02°51'53.24"		
Length:	60.876		
Tangent:	30.440		
Chord:	60.874		
Middle Ordinate:	0.232		
External:	0.232		
Tangent Back Direction:	S18°00'10"W		
Radial Direction:	N71°59'50"W		
Chord Direction:	S17°07'50"W		
Radial Direction:	N73°44'29"W		
Tangent Ahead Direction:	S16°15'31"W		
PT	71+26.81 R1	3232742.671	13697710.281
PC	75+32.56 R1	3232629.071	13697320.756
Tangential Direction:	S16°15'31"W		
Tangential Length:	405.752		
PC	75+32.56 R1	3232629.071	13697320.756
PI	81+55.13 R1	3232454.768	13696723.088
CC		3228789.041	13698440.655
PT	87+67.78 R1	3232107.066	13696206.665
Radius:	4000.000		
Delta:	17°41'35.74" Right		
Degree of Curvature(Arc):	01°25'56.62"		
Length:	1235.223		
Tangent:	622.567		
Chord:	1230.320		
Middle Ordinate:	47.586		
External:	48.159		
Tangent Back Direction:	S16°15'31"W		
Radial Direction:	N73°44'29"W		
Chord Direction:	S25°06'19"W		
Radial Direction:	N56°02'53"W		
Tangent Ahead Direction:	S33°57'07"W		

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 01 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		45

FM 2004 NB SIDEWALK ℄

POT	200+00.00 R1	3233017.211	13703035.990
PI	207+95.86 R1	3233054.994	13702241.030
Tangential Direction:	S02°43'16"E		
Tangential Length:	795.857		
PI	207+95.86 R1	3233054.994	13702241.030
PI	211+45.11 R1	3233070.684	13701892.125
Tangential Direction:	S02°34'29"E		
Tangential Length:	349.258		
PI	211+45.11 R1	3233070.684	13701892.125
PI	212+05.28 R1	3233073.622	13701832.036
Tangential Direction:	S02°47'57"E		
Tangential Length:	60.161		
PI	212+05.28 R1	3233073.622	13701832.036
PI	215+54.22 R1	3233089.050	13701483.428
Tangential Direction:	S02°32'02"E		
Tangential Length:	348.948		
PI	215+54.22 R1	3233089.050	13701483.428
PI	215+82.16 R1	3233091.333	13701455.587
Tangential Direction:	S04°41'14"E		
Tangential Length:	27.935		
PI	215+82.16 R1	3233091.333	13701455.587
PI	219+09.53 R1	3233106.562	13701128.569
Tangential Direction:	S02°39'59"E		
Tangential Length:	327.372		
PI	219+09.53 R1	3233106.562	13701128.569
PI	219+48.78 R1	3233108.872	13701089.390
Tangential Direction:	S03°22'27"E		
Tangential Length:	39.247		
PI	219+48.78 R1	3233108.872	13701089.390
PI	220+47.34 R1	3233113.371	13700990.929
Tangential Direction:	S02°36'59"E		
Tangential Length:	98.564		
PI	220+47.34 R1	3233113.371	13700990.929
PI	221+18.98 R1	3233116.418	13700919.352
Tangential Direction:	S02°26'14"E		
Tangential Length:	71.642		
PI	221+18.98 R1	3233116.418	13700919.352
PI	222+55.47 R1	3233122.867	13700783.015
Tangential Direction:	S02°42'30"E		
Tangential Length:	136.490		
PI	222+55.47 R1	3233122.867	13700783.015
PI	224+52.32 R1	3233132.043	13700586.385
Tangential Direction:	S02°40'19"E		
Tangential Length:	196.844		
PI	224+52.32 R1	3233132.043	13700586.385
PI	229+64.39 R1	3233155.604	13700074.851
Tangential Direction:	S02°38'14"E		
Tangential Length:	512.076		
PI	229+64.39 R1	3233155.604	13700074.851
PI	232+60.91 R1	3233167.677	13699778.582
Tangential Direction:	S02°20'01"E		
Tangential Length:	296.515		
PI	232+60.91 R1	3233167.677	13699778.582

FM 2004 NB SIDEWALK ℄ (CONT)

PI	235+73.57 R1	3233182.451	13699466.266
Tangential Direction:	S02°42'30"E		
Tangential Length:	312.665		
PI	235+73.57 R1	3233182.451	13699466.266
PI	235+84.25 R1	3233171.788	13699465.762
Tangential Direction:	S87°17'30"W		
Tangential Length:	10.675		
PI	235+84.25 R1	3233171.788	13699465.762
PI	237+07.77 R1	3233177.624	13699342.379
Tangential Direction:	S02°42'30"E		
Tangential Length:	123.521		
PI	237+07.77 R1	3233177.624	13699342.379
PI	238+25.49 R1	3233183.540	13699224.804
Tangential Direction:	S02°52'51"E		
Tangential Length:	117.724		
PI	238+25.49 R1	3233183.540	13699224.804
PC	238+50.26 R1	3233184.848	13699200.069
Tangential Direction:	S03°01'36"E		
Tangential Length:	24.769		
PC	238+50.26 R1	3233184.848	13699200.069
PI	238+69.92 R1	3233185.886	13699180.440
CC		3233324.653	13699207.461
PT	238+89.32 R1	3233192.289	13699161.855
Radius:	140.000		
Delta:	15°59'04.89" Left		
Degree of Curvature(Arc):	40°55'32.00"		
Length:	39.058		
Tangent:	19.657		
Chord:	38.931		
Middle Ordinate:	1.360		
External:	1.373		
Tangent Back Direction:	S03°01'36"E		
Radial Direction:	S86°58'24"W		
Chord Direction:	S11°01'08"E		
Radial Direction:	S70°59'19"W		
Tangent Ahead Direction:	S19°00'41"E		
PT	238+89.32 R1	3233192.289	13699161.855
PC	239+22.02 R1	3233202.942	13699130.937
Tangential Direction:	S19°00'41"E		
Tangential Length:	32.702		
PC	239+22.02 R1	3233202.942	13699130.937
PI	239+50.35 R1	3233212.170	13699104.153
CC		3233410.942	13699202.603
PT	239+78.37 R1	3233227.883	13699080.581
Radius:	220.000		
Delta:	14°40'30.11" Left		
Degree of Curvature(Arc):	26°02'36.73"		
Length:	56.348		
Tangent:	28.329		
Chord:	56.194		
Middle Ordinate:	1.802		
External:	1.816		
Tangent Back Direction:	S19°00'41"E		
Radial Direction:	S70°59'19"W		
Chord Direction:	S26°20'56"E		
Radial Direction:	S56°18'49"W		
Tangent Ahead Direction:	S33°41'11"E		
PT	239+78.37 R1	3233227.883	13699080.581

FM 2004 NB SIDEWALK ℄ (CONT)

PI	239+91.49 R1	3233235.158	13699069.667
Tangential Direction:	S33°41'11"E		
Tangential Length:	13.117		
PI	239+91.49 R1	3233235.158	13699069.667
PI	240+28.22 R1	3233203.899	13699050.377
Tangential Direction:	S58°19'20"W		
Tangential Length:	36.732		
PI	240+28.22 R1	3233203.899	13699050.377
PC	241+41.19 R1	3233172.731	13698941.787
Tangential Direction:	S16°00'52"W		
Tangential Length:	112.974		
PC	241+41.19 R1	3233172.731	13698941.787
PI	241+47.40 R1	3233171.021	13698935.827
CC		3233153.508	13698947.305
PT	241+53.22 R1	3233166.238	13698931.879
Radius:	20.000		
Delta:	34°27'11.09" Right		
Degree of Curvature(Arc):	286°28'44.03"		
Length:	12.026		
Tangent:	6.201		
Chord:	11.846		
Middle Ordinate:	0.897		
External:	0.939		
Tangent Back Direction:	S16°00'52"W		
Radial Direction:	N73°59'08"W		
Chord Direction:	S33°14'28"W		
Radial Direction:	N39°31'57"W		
Tangent Ahead Direction:	S50°28'03"W		
PT	241+53.22 R1	3233166.238	13698931.879
PC	241+55.14 R1	3233164.754	13698930.655
Tangential Direction:	S50°28'03"W		
Tangential Length:	1.924		
PC	241+55.14 R1	3233164.754	13698930.655
PI	241+61.35 R1	3233159.971	13698926.708
CC		3233177.484	13698915.229
PT	241+67.17 R1	3233158.260	13698920.747
Radius:	20.000		
Delta:	34°27'11.09" Left		
Degree of Curvature(Arc):	286°28'44.03"		
Length:	12.026		
Tangent:	6.201		
Chord:	11.846		
Middle Ordinate:	0.897		
External:	0.939		
Tangent Back Direction:	S50°28'03"W		
Radial Direction:	N39°31'57"W		
Chord Direction:	S33°14'28"W		
Radial Direction:	N73°59'08"W		
Tangent Ahead Direction:	S16°00'52"W		
PT	241+67.17 R1	3233158.260	13698920.747
PI	243+19.33 R1	3233116.282	13698774.492
Tangential Direction:	S16°00'52"W		
Tangential Length:	152.160		
PI	243+19.33 R1	3233116.282	13698774.492
PI	243+41.26 R1	3233121.379	13698753.166
Tangential Direction:	S13°26'27"E		
Tangential Length:	21.927		

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 02 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		46

DATE: 5/9/2024 11:08:47 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Horizontal Alignment Data\Horiz_Align_Data.dgn

FM 2004 NB SIDEWALK ℄ (CONT)

PI	243+41.26 R1	3233121.379	13698753.166
PI	243+80.35 R1	3233108.214	13698716.357
Tangential Direction:	S19°40'50"W		
Tangential Length:	39.092		
PI	243+80.35 R1	3233108.214	13698716.357
PI	244+07.91 R1	3233088.515	13698697.085
Tangential Direction:	S45°37'40"W		
Tangential Length:	27.558		
PI	244+07.91 R1	3233088.515	13698697.085
PC	244+39.38 R1	3233079.833	13698666.835
Tangential Direction:	S16°00'52"W		
Tangential Length:	31.471		
PC	244+39.38 R1	3233079.833	13698666.835
PI	244+44.51 R1	3233078.416	13698661.900
CC		3233137.505	13698650.283
PT	244+49.62 R1	3233077.859	13698656.795
Radius:	60.000		
Delta:	09°47'00.28" Left		
Degree of Curvature(Arc):	95°29'34.68"		
Length:	10.245		
Tangent:	5.135		
Chord:	10.233		
Middle Ordinate:	0.219		
External:	0.219		
Tangent Back Direction:	S16°00'52"W		
Radial Direction:	N73°59'08"W		
Chord Direction:	S11°07'22"W		
Radial Direction:	N83°46'08"W		
Tangent Ahead Direction:	S06°13'52"W		
PT	244+49.62 R1	3233077.859	13698656.795
PC	244+70.48 R1	3233075.595	13698636.059
Tangential Direction:	S06°13'52"W		
Tangential Length:	20.859		
PC	244+70.48 R1	3233075.595	13698636.059
PI	244+75.56 R1	3233075.044	13698631.015
CC		3233015.949	13698642.571
PT	244+80.61 R1	3233073.654	13698626.135
Radius:	60.000		
Delta:	09°40'05.11" Right		
Degree of Curvature(Arc):	95°29'34.68"		
Length:	10.124		
Tangent:	5.074		
Chord:	10.112		
Middle Ordinate:	0.213		
External:	0.214		
Tangent Back Direction:	S06°13'52"W		
Radial Direction:	N83°46'08"W		
Chord Direction:	S11°03'54"W		
Radial Direction:	N74°06'03"W		
Tangent Ahead Direction:	S15°53'57"W		
PT	244+80.61 R1	3233073.654	13698626.135
PC	249+09.89 R1	3232956.055	13698213.275
Tangential Direction:	S15°53'57"W		
Tangential Length:	429.281		
PC	249+09.89 R1	3232956.055	13698213.275
PI	249+13.08 R1	3232955.181	13698210.206
CC		3232763.706	13698268.064
PT	249+16.27 R1	3232954.209	13698207.167
Radius:	200.000		

FM 2004 NB SIDEWALK ℄ (CONT)

Delta:	01°49'41.13" Right		
Degree of Curvature(Arc):	28°38'52.40"		
Length:	6.381		
Tangent:	3.191		
Chord:	6.381		
Middle Ordinate:	0.025		
External:	0.025		
Tangent Back Direction:	S15°53'57"W		
Radial Direction:	N74°06'03"W		
Chord Direction:	S16°48'48"W		
Radial Direction:	N72°16'22"W		
Tangent Ahead Direction:	S17°43'38"W		
PT	249+16.27 R1	3232954.209	13698207.167
PI	249+66.72 R1	3232938.847	13698159.110
Tangential Direction:	S17°43'38"W		
Tangential Length:	50.453		
PI	249+66.72 R1	3232938.847	13698159.110
PI	249+93.53 R1	3232964.294	13698150.683
Tangential Direction:	S71°40'37"E		
Tangential Length:	26.806		
PI	249+93.53 R1	3232964.294	13698150.683
PC	251+31.69 R1	3232920.860	13698019.529
Tangential Direction:	S18°19'23"W		
Tangential Length:	138.159		
PC	251+31.69 R1	3232920.860	13698019.529
PI	251+36.20 R1	3232919.441	13698015.244
CC		3232731.001	13698082.404
PT	251+40.71 R1	3232917.831	13698011.028
Radius:	200.000		
Delta:	02°35'08.04" Right		
Degree of Curvature(Arc):	28°38'52.40"		
Length:	9.025		
Tangent:	4.513		
Chord:	9.025		
Middle Ordinate:	0.051		
External:	0.051		
Tangent Back Direction:	S18°19'23"W		
Radial Direction:	N71°40'37"W		
Chord Direction:	S19°36'57"W		
Radial Direction:	N69°05'29"W		
Tangent Ahead Direction:	S20°54'31"W		
PT	251+40.71 R1	3232917.831	13698011.028
PC	254+13.50 R1	3232820.480	13697756.207
Tangential Direction:	S20°54'31"W		
Tangential Length:	272.784		
PC	254+13.50 R1	3232820.480	13697756.207
PI	254+22.04 R1	3232817.429	13697748.222
CC		3233007.310	13697684.831
PT	254+30.58 R1	3232815.071	13697740.007
Radius:	200.000		
Delta:	04°53'38.98" Left		
Degree of Curvature(Arc):	28°38'52.40"		
Length:	17.084		
Tangent:	8.547		
Chord:	17.079		
Middle Ordinate:	0.182		
External:	0.183		
Tangent Back Direction:	S20°54'31"W		
Radial Direction:	N69°05'29"W		
Chord Direction:	S18°27'42"W		

FM 2004 NB SIDEWALK ℄ (CONT)

Radial Direction:	N73°59'08"W		
Tangent Ahead Direction:	S16°00'52"W		
PT	254+30.58 R1	3232815.071	13697740.007
PI	254+82.04 R1	3232800.876	13697690.550
Tangential Direction:	S16°00'52"W		
Tangential Length:	51.454		
PI	254+82.04 R1	3232800.876	13697690.550
PC	258+71.10 R1	3232692.650	13697316.839
Tangential Direction:	S16°09'04"W		
Tangential Length:	389.067		
PC	258+71.10 R1	3232692.650	13697316.839
PI	258+82.77 R1	3232689.404	13697305.632
CC		3232116.331	13697483.740
PT	258+94.43 R1	3232685.726	13697294.561
Radius:	600.000		
Delta:	02°13'40.39" Right		
Degree of Curvature(Arc):	09°32'57.47"		
Length:	23.330		
Tangent:	11.667		
Chord:	23.329		
Middle Ordinate:	0.113		
External:	0.113		
Tangent Back Direction:	S16°09'04"W		
Radial Direction:	N73°50'56"W		
Chord Direction:	S17°15'54"W		
Radial Direction:	N71°37'16"W		
Tangent Ahead Direction:	S18°22'44"W		
PT	258+94.43 R1	3232685.726	13697294.561
PC	260+54.76 R1	3232635.173	13697142.407
Tangential Direction:	S18°22'44"W		
Tangential Length:	160.332		
PC	260+54.76 R1	3232635.173	13697142.407
PI	260+79.53 R1	3232627.366	13697118.907
CC		3233773.964	13696764.048
PT	261+04.28 R1	3232620.534	13697095.105
Radius:	1200.000		
Delta:	02°21'51.83" Left		
Degree of Curvature(Arc):	04°46'28.73"		
Length:	49.520		
Tangent:	24.763		
Chord:	49.516		
Middle Ordinate:	0.255		
External:	0.255		
Tangent Back Direction:	S18°22'44"W		
Radial Direction:	N71°37'16"W		
Chord Direction:	S17°11'48"W		
Radial Direction:	N73°59'08"W		
Tangent Ahead Direction:	S16°00'52"W		
PT	261+04.28 R1	3232620.534	13697095.105
POT	261+49.05 R1	3232608.184	13697052.078
Tangential Direction:	S16°00'52"W		
Tangential Length:	44.763		

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 03 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		47

DATE: 5/9/2024 11:08:47 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Sidewalk\Drawings\Sheets\Horizontal Alignment Data\Horiz_Align_Data.dgn

CK DW CK DW

FM 2004 SB SIDEWALK ℄

POT	300+00.00 R1	3232953.441	13703014.473
PI	301+11.41 R1	3232958.707	13702903.186
Tangential Direction:	S02°42'33"E		
Tangential Length:	111.411		
PI	301+11.41 R1	3232958.707	13702903.186
PI	301+32.93 R1	3232953.964	13702882.192
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.523		
PI	301+32.93 R1	3232953.964	13702882.192
PI	301+52.93 R1	3232954.909	13702862.215
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	301+52.93 R1	3232954.909	13702862.215
PI	301+74.46 R1	3232961.614	13702841.759
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.527		
PI	301+74.46 R1	3232961.614	13702841.759
PI	303+95.30 R1	3232972.053	13702621.164
Tangential Direction:	S02°42'33"E		
Tangential Length:	220.841		
PI	303+95.30 R1	3232972.053	13702621.164
PI	304+16.82 R1	3232967.310	13702600.171
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.523		
PI	304+16.82 R1	3232967.310	13702600.171
PI	304+36.82 R1	3232968.255	13702580.193
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	304+36.82 R1	3232968.255	13702580.193
PI	304+58.35 R1	3232974.959	13702559.737
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.527		
PI	304+58.35 R1	3232974.959	13702559.737
PI	307+01.66 R1	3232986.460	13702316.701
Tangential Direction:	S02°42'33"E		
Tangential Length:	243.308		
PI	307+01.66 R1	3232986.460	13702316.701
PI	307+23.18 R1	3232981.717	13702295.707
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.523		
PI	307+23.18 R1	3232981.717	13702295.707
PI	307+43.18 R1	3232982.662	13702275.730
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	307+43.18 R1	3232982.662	13702275.730
PI	307+64.49 R1	3232989.356	13702255.499
Tangential Direction:	S18°18'32"E		
Tangential Length:	21.309		
PI	307+64.49 R1	3232989.356	13702255.499
PC	308+85.39 R1	3232995.071	13702134.733
Tangential Direction:	S02°42'33"E		
Tangential Length:	120.902		
PC	308+85.39 R1	3232995.071	13702134.733

FM 2004 SB SIDEWALK ℄ (CONT)

PI	308+89.75 R1	3232995.276	13702130.386
CC		3232935.138	13702131.897
PT	308+94.08 R1	3232994.853	13702126.054
Radius:	60.000		
Delta:	08°17'49.46"	Right	
Degree of Curvature(Arc):	95°29'34.68"		
Length:	8.689		
Tangent:	4.352		
Chord:	8.681		
Middle Ordinate:	0.157		
External:	0.158		
Tangent Back Direction:	S02°42'33"E		
Radial Direction:	S87°17'27"W		
Chord Direction:	S01°26'21"W		
Radial Direction:	N84°24'44"W		
Tangent Ahead Direction:	S05°35'16"W		
PT	308+94.08 R1	3232994.853	13702126.054
PC	309+07.98 R1	3232993.499	13702112.223
Tangential Direction:	S05°35'16"W		
Tangential Length:	13.898		
PC	309+07.98 R1	3232993.499	13702112.223
PI	309+12.33 R1	3232993.076	13702107.892
CC		3233053.214	13702106.380
PT	309+16.67 R1	3232993.281	13702103.545
Radius:	60.000		
Delta:	08°17'45.85"	Left	
Degree of Curvature(Arc):	95°29'34.68"		
Length:	8.688		
Tangent:	4.351		
Chord:	8.680		
Middle Ordinate:	0.157		
External:	0.158		
Tangent Back Direction:	S05°35'16"W		
Radial Direction:	N84°24'44"W		
Chord Direction:	S01°26'23"W		
Radial Direction:	S87°17'30"W		
Tangent Ahead Direction:	S02°42'30"E		
PT	309+16.67 R1	3232993.281	13702103.545
PC	309+96.84 R1	3232997.069	13702023.467
Tangential Direction:	S02°42'30"E		
Tangential Length:	80.168		
PC	309+96.84 R1	3232997.069	13702023.467
PI	310+00.13 R1	3232997.225	13702020.179
CC		3233057.002	13702026.302
PT	310+03.41 R1	3232997.739	13702016.928
Radius:	60.000		
Delta:	06°16'46.37"	Left	
Degree of Curvature(Arc):	95°29'34.68"		
Length:	6.576		
Tangent:	3.291		
Chord:	6.573		
Middle Ordinate:	0.090		
External:	0.090		
Tangent Back Direction:	S02°42'30"E		
Radial Direction:	S87°17'30"W		
Chord Direction:	S05°50'53"E		
Radial Direction:	S81°00'44"W		
Tangent Ahead Direction:	S08°59'16"E		
PT	310+03.41 R1	3232997.739	13702016.928
PC	310+27.18 R1	3233001.452	13701993.452

FM 2004 SB SIDEWALK ℄ (CONT)

Tangential Direction:	S08°59'16"E		
Tangential Length:	23.768		
PC	310+27.18 R1	3233001.452	13701993.452
PI	310+30.45 R1	3233001.964	13701990.217
CC		3232942.189	13701984.079
PT	310+33.72 R1	3233002.120	13701986.945
Radius:	60.000		
Delta:	06°14'57.40"	Right	
Degree of Curvature(Arc):	95°29'34.68"		
Length:	6.544		
Tangent:	3.275		
Chord:	6.541		
Middle Ordinate:	0.089		
External:	0.089		
Tangent Back Direction:	S08°59'16"E		
Radial Direction:	S81°00'44"W		
Chord Direction:	S05°51'47"E		
Radial Direction:	S87°15'41"W		
Tangent Ahead Direction:	S02°44'19"E		
PT	310+33.72 R1	3233002.120	13701986.945
PI	311+07.11 R1	3233005.626	13701913.645
Tangential Direction:	S02°44'19"E		
Tangential Length:	73.384		
PI	311+07.11 R1	3233005.626	13701913.645
PI	312+96.73 R1	3233014.686	13701724.244
Tangential Direction:	S02°44'19"E		
Tangential Length:	189.618		
PI	312+96.73 R1	3233014.686	13701724.244
PI	315+47.55 R1	3233026.105	13701473.682
Tangential Direction:	S02°36'34"E		
Tangential Length:	250.822		
PI	315+47.55 R1	3233026.105	13701473.682
PI	315+69.47 R1	3233021.273	13701452.297
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.924		
PI	315+69.47 R1	3233021.273	13701452.297
PI	315+89.47 R1	3233022.218	13701432.319
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	315+89.47 R1	3233022.218	13701432.319
PI	316+10.99 R1	3233028.922	13701411.867
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.523		
PI	316+10.99 R1	3233028.922	13701411.867
PI	318+24.20 R1	3233038.628	13701198.883
Tangential Direction:	S02°36'34"E		
Tangential Length:	213.204		
PI	318+24.20 R1	3233038.628	13701198.883
PI	318+89.39 R1	3233041.738	13701133.771
Tangential Direction:	S02°44'04"E		
Tangential Length:	65.187		
PI	318+89.39 R1	3233041.738	13701133.771
PI	319+10.80 R1	3233037.018	13701112.880
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.418		

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 04 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		48

DATE: 5/9/2024 11:08:47 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Horizontal Alignment Data\Horiz_Align_Data.dgn

CK DW CK DW

FM 2004 SB SIDEWALK ℄ (CONT)

PI	319+10.80 R1	3233037.018	13701112.880
PI	319+30.80 R1	3233037.963	13701092.902
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	319+30.80 R1	3233037.963	13701092.902
PI	319+52.33 R1	3233044.667	13701072.450
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.523		
PI	319+52.33 R1	3233044.667	13701072.450
PI	322+41.50 R1	3233058.462	13700783.601
Tangential Direction:	S02°44'04"E		
Tangential Length:	289.178		
PI	322+41.50 R1	3233058.462	13700783.601
PI	322+62.91 R1	3233053.744	13700762.718
Tangential Direction:	S12°43'51"W		
Tangential Length:	21.410		
PI	322+62.91 R1	3233053.744	13700762.718
PI	322+82.91 R1	3233054.689	13700742.740
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	322+82.91 R1	3233054.689	13700742.740
PI	323+04.43 R1	3233061.390	13700722.295
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.515		
PI	323+04.43 R1	3233061.390	13700722.295
PI	331+17.34 R1	3233100.171	13699910.311
Tangential Direction:	S02°44'04"E		
Tangential Length:	812.910		
PI	331+17.34 R1	3233100.171	13699910.311
PI	331+38.86 R1	3233095.428	13699889.317
Tangential Direction:	S12°43'50"W		
Tangential Length:	21.523		
PI	331+38.86 R1	3233095.428	13699889.317
PI	331+58.86 R1	3233096.373	13699869.339
Tangential Direction:	S02°42'30"E		
Tangential Length:	20.000		
PI	331+58.86 R1	3233096.373	13699869.339
PI	331+80.49 R1	3233103.109	13699848.786
Tangential Direction:	S18°08'50"E		
Tangential Length:	21.628		
PI	331+80.49 R1	3233103.109	13699848.786
PC	332+50.13 R1	3233106.431	13699779.230
Tangential Direction:	S02°44'04"E		
Tangential Length:	69.635		
PC	332+50.13 R1	3233106.431	13699779.230
PI	332+55.70 R1	3233106.697	13699773.660
CC		3233705.748	13699807.854
PT	332+61.28 R1	3233107.067	13699768.095
Radius:	600.000		
Delta:	01°03'54.42" Left		
Degree of Curvature(Arc):	09°32'57.47"		
Length:	11.154		
Tangent:	5.577		
Chord:	11.154		
Middle Ordinate:	0.026		

FM 2004 SB SIDEWALK ℄ (CONT)

External:	0.026		
Tangent Back Direction:	S02°44'04"E		
Radial Direction:	S87°15'56"W		
Chord Direction:	S03°16'01"E		
Radial Direction:	S86°12'02"W		
Tangent Ahead Direction:	S03°47'58"E		
PT	332+61.28 R1	3233107.067	13699768.095
PI	333+32.65 R1	3233111.797	13699696.877
Tangential Direction:	S03°47'58"E		
Tangential Length:	71.375		
PI	333+32.65 R1	3233111.797	13699696.877
PI	334+70.01 R1	3233124.673	13699560.128
Tangential Direction:	S05°22'46"E		
Tangential Length:	137.353		
PI	334+70.01 R1	3233124.673	13699560.128
PI	334+78.55 R1	3233125.138	13699551.598
Tangential Direction:	S03°07'12"E		
Tangential Length:	8.543		
PI	334+78.55 R1	3233125.138	13699551.598
PI	334+82.85 R1	3233129.424	13699551.885
Tangential Direction:	N86°10'48"E		
Tangential Length:	4.295		
PI	334+82.85 R1	3233129.424	13699551.885
PI	338+12.25 R1	3233148.707	13699223.045
Tangential Direction:	S03°21'21"E		
Tangential Length:	329.404		
PI	338+12.25 R1	3233148.707	13699223.045
PI	338+39.80 R1	3233148.616	13699195.497
Tangential Direction:	S00°11'25"W		
Tangential Length:	27.549		
PI	338+39.80 R1	3233148.616	13699195.497
PI	338+62.41 R1	3233126.394	13699199.665
Tangential Direction:	N79°22'37"W		
Tangential Length:	22.609		
PI	338+62.41 R1	3233126.394	13699199.665
PI	339+39.90 R1	3233094.638	13699128.977
Tangential Direction:	S24°11'32"W		
Tangential Length:	77.493		
PI	339+39.90 R1	3233094.638	13699128.977
PI	339+53.62 R1	3233082.779	13699122.083
Tangential Direction:	S59°49'35"W		
Tangential Length:	13.717		
PI	339+53.62 R1	3233082.779	13699122.083
PI	340+02.82 R1	3233107.509	13699079.547
Tangential Direction:	S30°10'25"E		
Tangential Length:	49.202		
PI	340+02.82 R1	3233107.509	13699079.547
PI	341+03.97 R1	3233077.649	13698982.910
Tangential Direction:	S17°10'13"W		
Tangential Length:	101.145		
PI	341+03.97 R1	3233077.649	13698982.910
PI	341+24.72 R1	3233080.003	13698962.290
Tangential Direction:	S06°30'41"E		
Tangential Length:	20.754		

FM 2004 SB SIDEWALK ℄ (CONT)

PI	341+24.72 R1	3233080.003	13698962.290
PI	341+87.39 R1	3233062.419	13698902.140
Tangential Direction:	S16°17'42"W		
Tangential Length:	62.668		
PI	341+87.39 R1	3233062.419	13698902.140
PI	342+90.39 R1	3233034.388	13698803.029
Tangential Direction:	S15°47'33"W		
Tangential Length:	102.999		
PI	342+90.39 R1	3233034.388	13698803.029
PI	343+04.73 R1	3233021.572	13698796.585
Tangential Direction:	S63°18'27"W		
Tangential Length:	14.344		
PI	343+04.73 R1	3233021.572	13698796.585
PC	343+45.31 R1	3233007.910	13698758.379
Tangential Direction:	S19°40'38"W		
Tangential Length:	40.576		
PC	343+45.31 R1	3233007.910	13698758.379
PI	343+50.74 R1	3233006.081	13698753.265
CC		3233029.567	13698750.634
PT	343+55.97 R1	3233006.733	13698747.874
Radius:	23.000		
Delta:	26°34'15.17" Left		
Degree of Curvature(Arc):	249°06'43.51"		
Length:	10.666		
Tangent:	5.431		
Chord:	10.571		
Middle Ordinate:	0.616		
External:	0.632		
Tangent Back Direction:	S19°40'38"W		
Radial Direction:	N70°19'22"W		
Chord Direction:	S06°23'31"W		
Radial Direction:	S83°06'23"W		
Tangent Ahead Direction:	S06°53'37"E		
PT	343+55.97 R1	3233006.733	13698747.874
PC	343+69.44 R1	3233008.349	13698734.506
Tangential Direction:	S06°53'37"E		
Tangential Length:	13.465		
PC	343+69.44 R1	3233008.349	13698734.506
PI	343+74.07 R1	3233008.906	13698729.902
CC		3232985.515	13698731.745
PT	343+78.59 R1	3233007.635	13698725.442
Radius:	23.000		
Delta:	22°47'59.25" Right		
Degree of Curvature(Arc):	249°06'43.51"		
Length:	9.152		
Tangent:	4.638		
Chord:	9.092		
Middle Ordinate:	0.454		
External:	0.463		
Tangent Back Direction:	S06°53'37"E		
Radial Direction:	S83°06'23"W		
Chord Direction:	S04°30'23"W		
Radial Direction:	N74°05'38"W		
Tangent Ahead Direction:	S15°54'22"W		
PT	343+78.59 R1	3233007.635	13698725.442
PI	347+43.20 R1	3232907.709	13698374.794
Tangential Direction:	S15°54'22"W		
Tangential Length:	364.608		

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 05 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		49

CK: DW: CK: DW:

DATE: 5/9/2024 11:08:48 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Horizontal Alignment Data\Horiz Align Data.dgn

FM 2004 SB SIDEWALK ℄ (CONT)

PI	347+43.20 R1	3232907.709	13698374.794
PI	349+48.84 R1	3232849.942	13698177.429
Tangential Direction:	S16°18'52"W		
Tangential Length:	205.646		
PI	349+48.84 R1	3232849.942	13698177.429
PI	349+83.65 R1	3232816.548	13698187.228
Tangential Direction:	N73°38'44"W		
Tangential Length:	34.802		
PI	349+83.65 R1	3232816.548	13698187.228
PI	352+13.73 R1	3232752.810	13697966.148
Tangential Direction:	S16°04'56"W		
Tangential Length:	230.084		
PI	352+13.73 R1	3232752.810	13697966.148
PI	353+69.33 R1	3232715.327	13697815.128
Tangential Direction:	S13°56'20"W		
Tangential Length:	155.602		
PI	353+69.33 R1	3232715.327	13697815.128
PI	354+54.46 R1	3232685.829	13697735.276
Tangential Direction:	S20°16'29"W		
Tangential Length:	85.126		
PI	354+54.46 R1	3232685.829	13697735.276
PI	355+81.82 R1	3232651.536	13697612.619
Tangential Direction:	S15°37'13"W		
Tangential Length:	127.361		
PI	355+81.82 R1	3232651.536	13697612.619
PI	357+14.87 R1	3232612.985	13697485.278
Tangential Direction:	S16°50'35"W		
Tangential Length:	133.048		
PI	357+14.87 R1	3232612.985	13697485.278
PC	359+36.33 R1	3232551.889	13697272.414
Tangential Direction:	S16°00'52"W		
Tangential Length:	221.459		
PC	359+36.33 R1	3232551.889	13697272.414
PI	360+54.25 R1	3232519.357	13697159.068
CC		3229091.598	13698265.583
PT	361+72.09 R1	3232479.477	13697048.094
Radius:	3600.000		
Delta:	03°45'08.04" Right		
Degree of Curvature(Arc):	01°35'29.58"		
Length:	235.760		
Tangent:	117.922		
Chord:	235.718		
Middle Ordinate:	1.930		
External:	1.931		
Tangent Back Direction:	S16°00'52"W		
Radial Direction:	N73°59'08"W		
Chord Direction:	S17°53'26"W		
Radial Direction:	N70°14'00"W		
Tangent Ahead Direction:	S19°46'00"W		
PT	361+72.09 R1	3232479.477	13697048.094
POT	361+72.51 R1	3232479.620	13697048.493
Tangential Direction:	N19°46'00"E		
Tangential Length:	0.424		

DATE: 5/9/2024 11:08:48 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Horizontal Alignment Data\Horiz Align Data.dgn

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

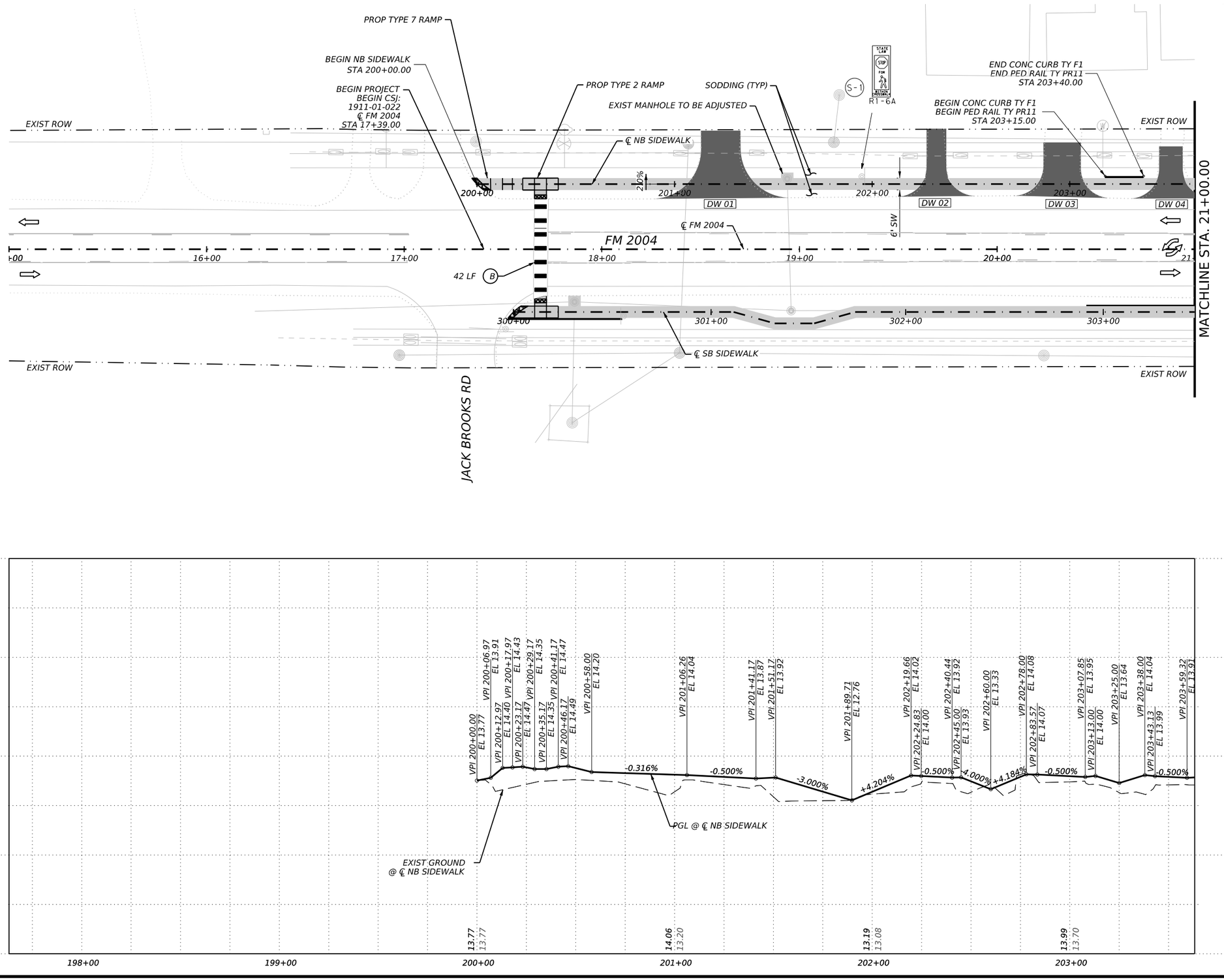
FM 2004

FROM JACK BROOKS RD TO OAK DR

HORIZONTAL ALIGNMENT DATA

SHEET 06 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		50



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- A — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- B — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- C — TRAFFIC BUTTON TY I-C
- S- — RELOCATE SM RD SN SUP&AM TY S80
- T- — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

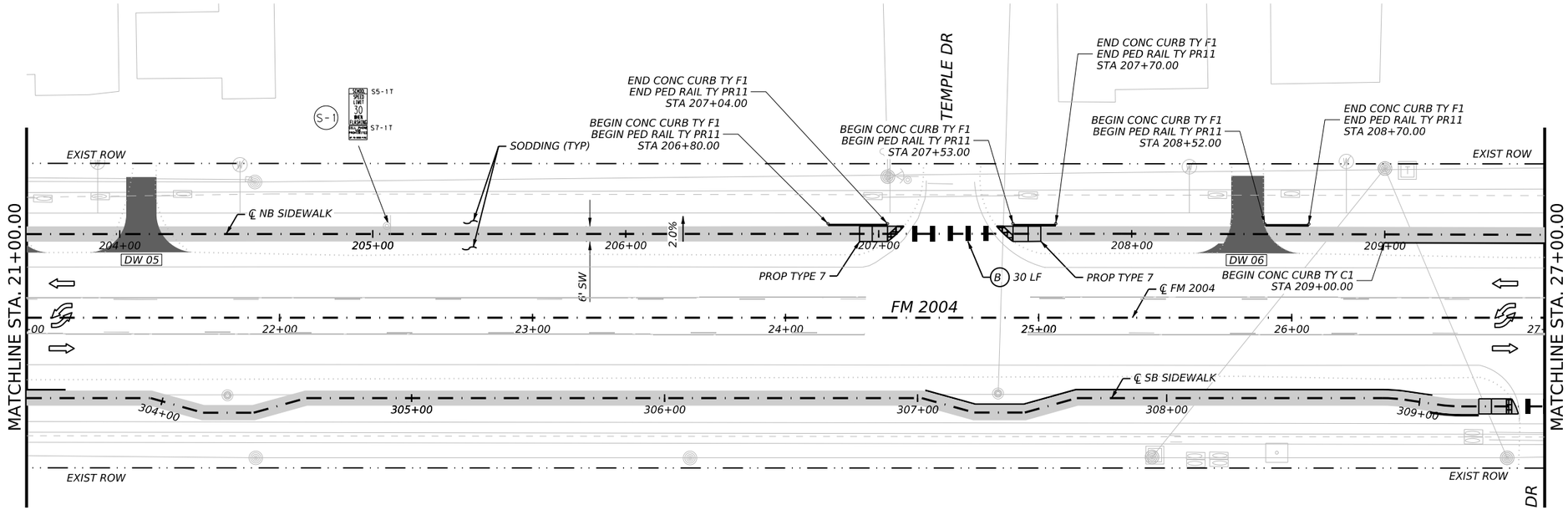
NB SIDEWALK PLAN & PROFILE

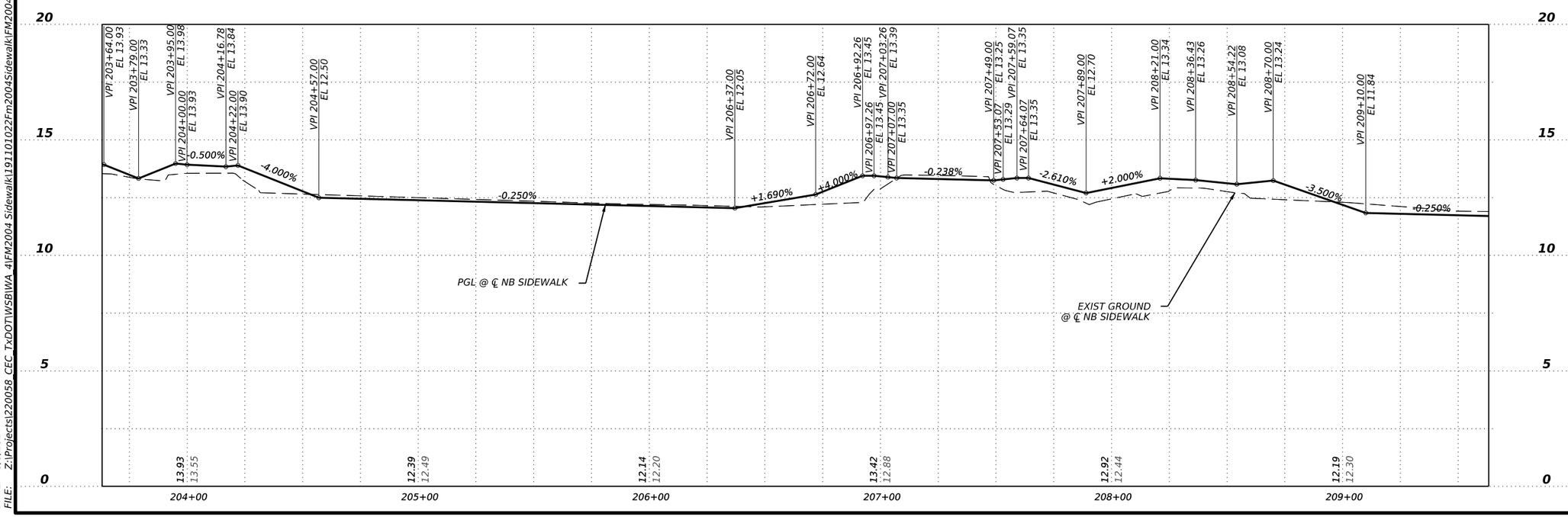
BEGIN TO STA 21+00.00

SHEET 01 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		51

DATE: 5/9/2024 11:08:54 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 1.dgn





LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

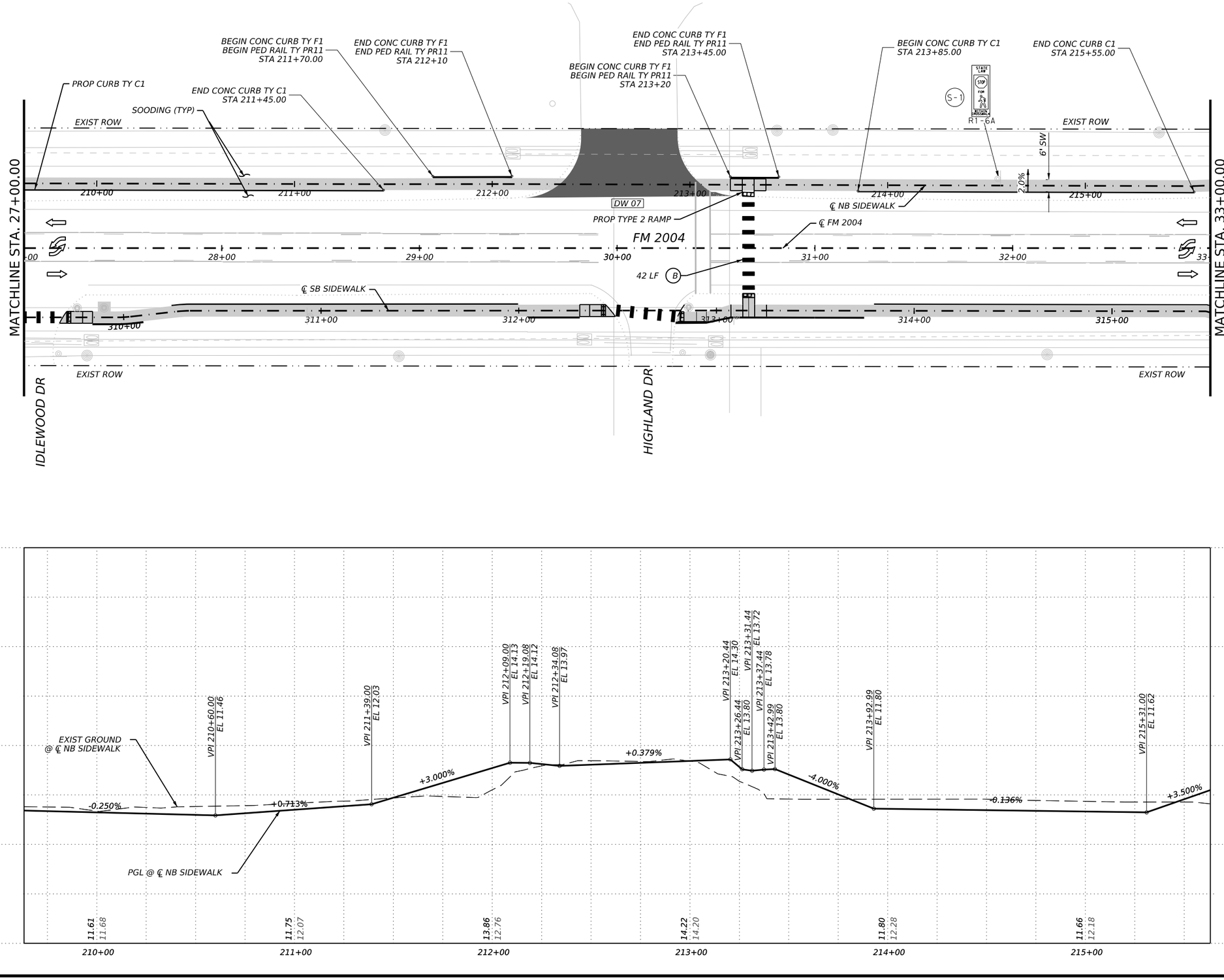
NB SIDEWALK PLAN & PROFILE

STA 21+00.00 TO STA 27+00.00

SHEET 02 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		52

DATE: 5/9/2024 11:08:56 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\DrawingsSheets\Sidewalk NB\Sidewalk NB - PP 2.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

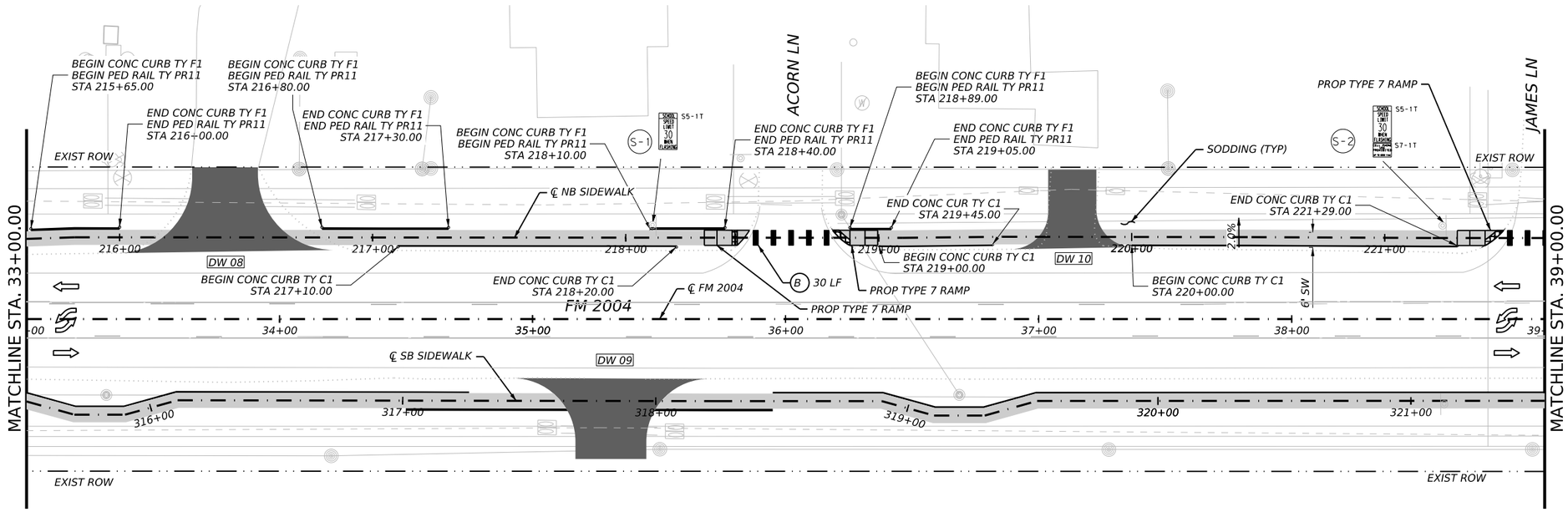
NB SIDEWALK PLAN & PROFILE

STA 27+00.00 TO STA 33+00.00

SHEET 03 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		53

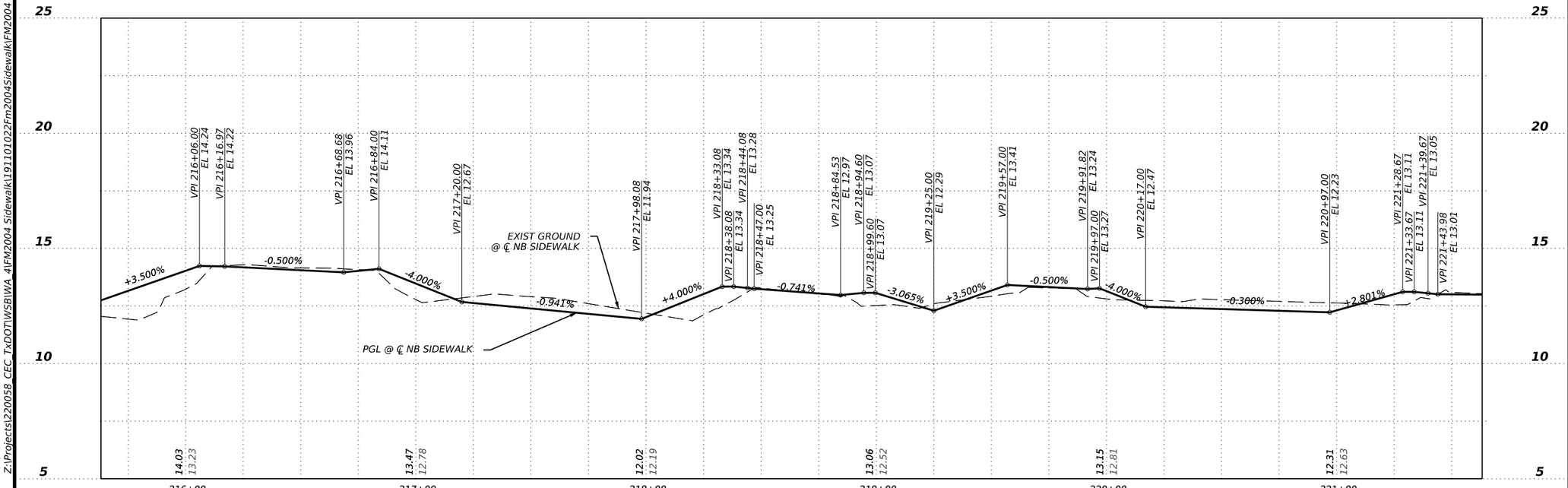
DATE: 5/30/2024 2:42:44 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 3.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

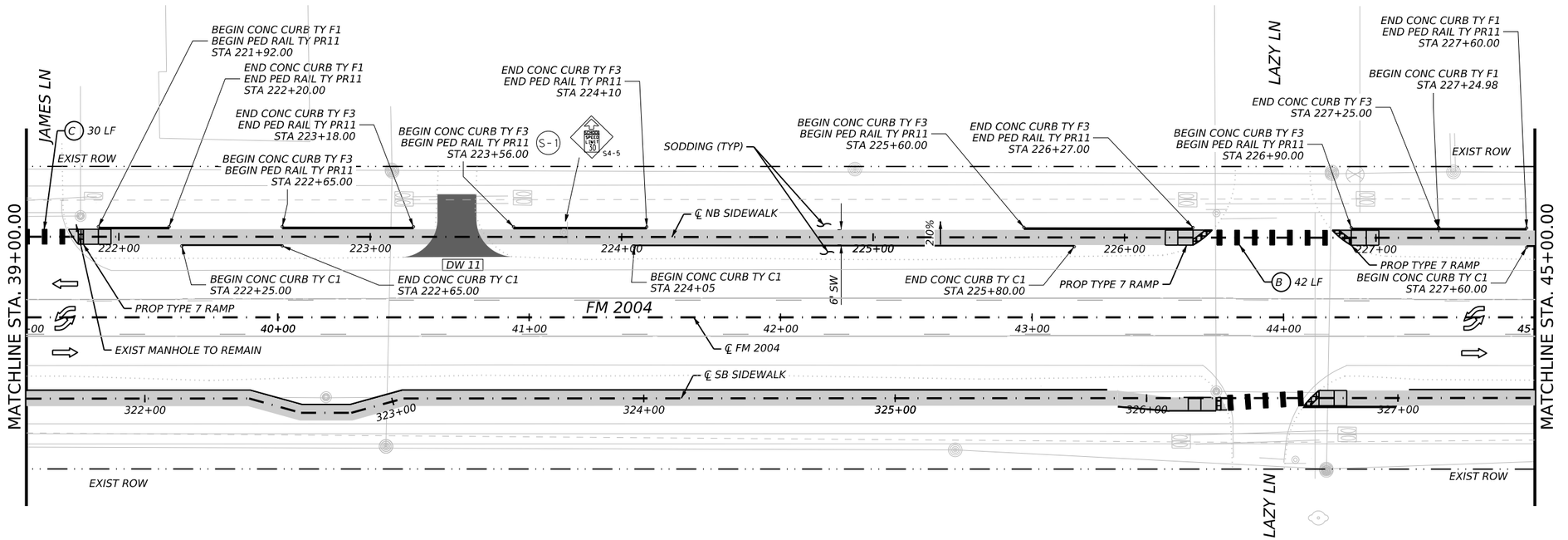
NB SIDEWALK PLAN & PROFILE

STA 33+00.00 TO STA 39+00.00

SHEET 04 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		54

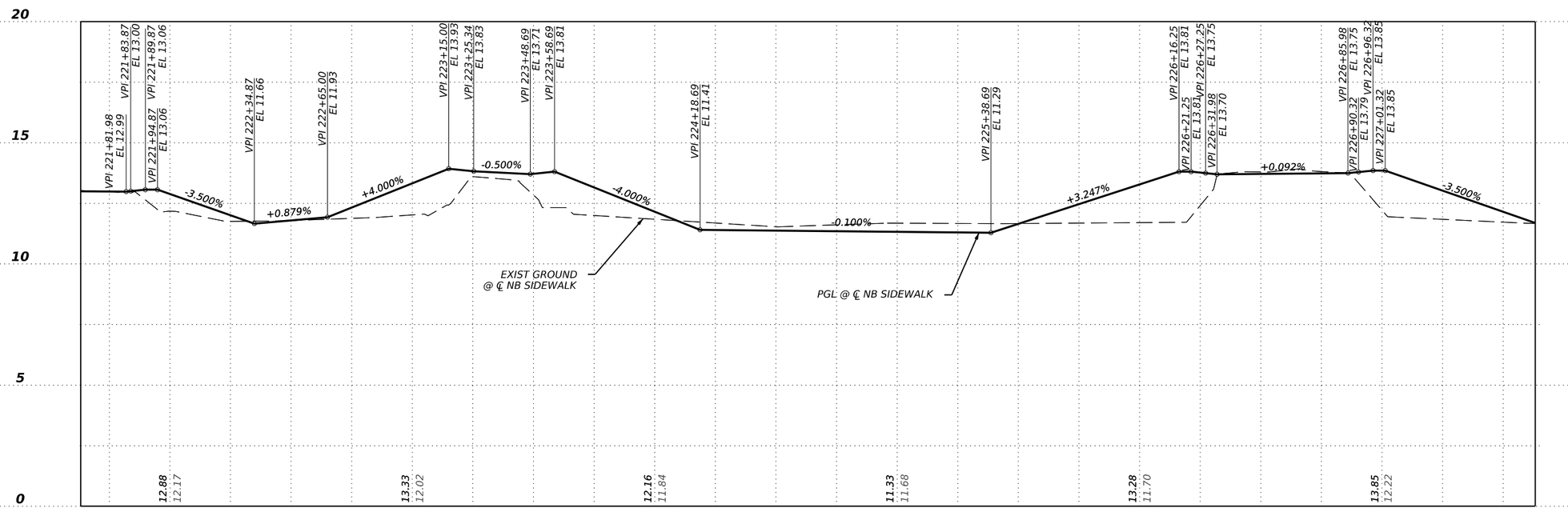
DATE: 5/9/2024 11:08:58 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 4.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

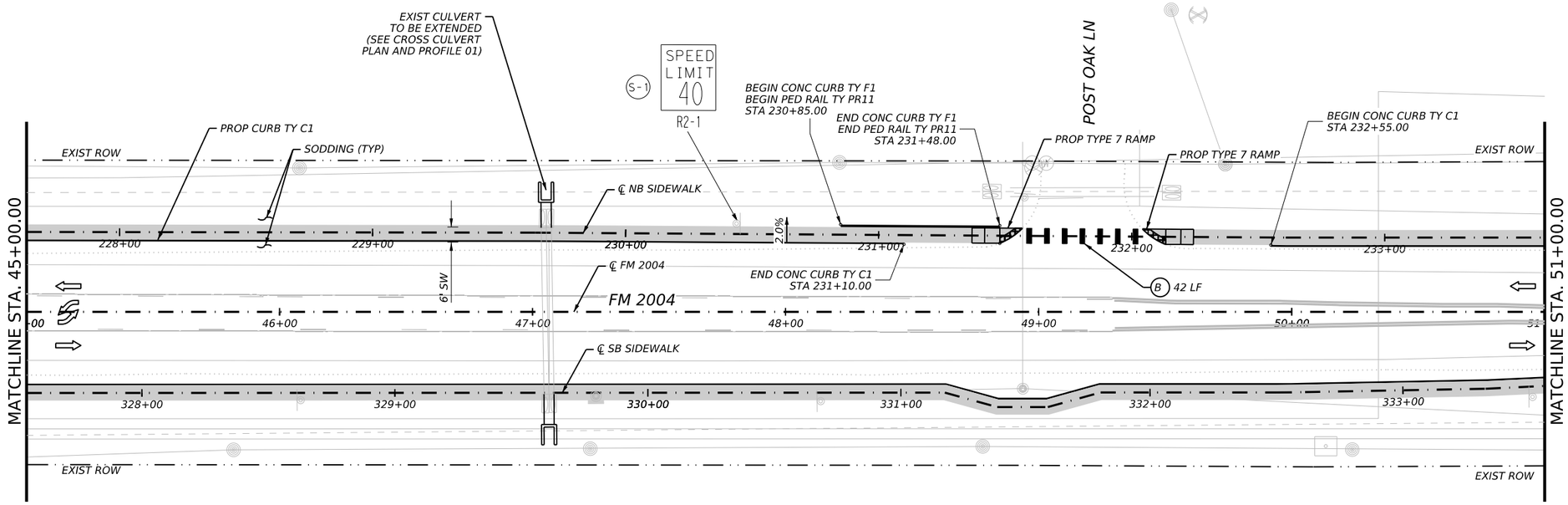
NB SIDEWALK PLAN & PROFILE

STA 39+00.00 TO STA 45+00.00

SHEET 05 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		55

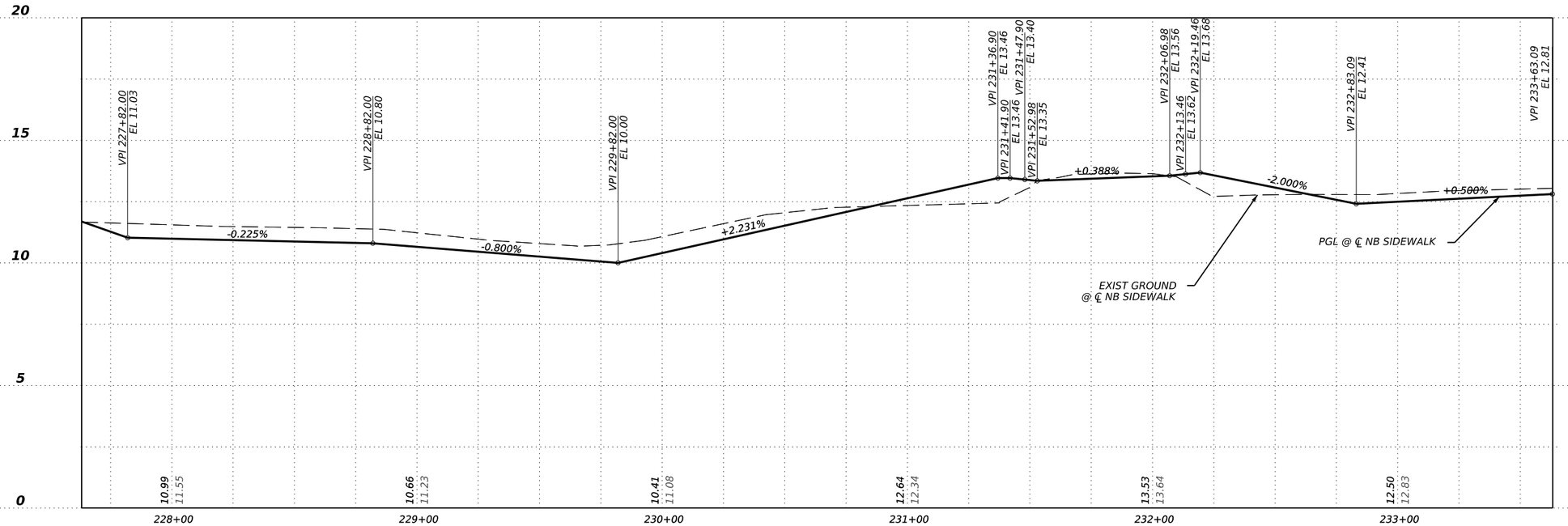
DATE: 5/30/2024 2:42:45 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\DrawingsSheets\Sidewalk NB\Sidewalk_NB - PP 5.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

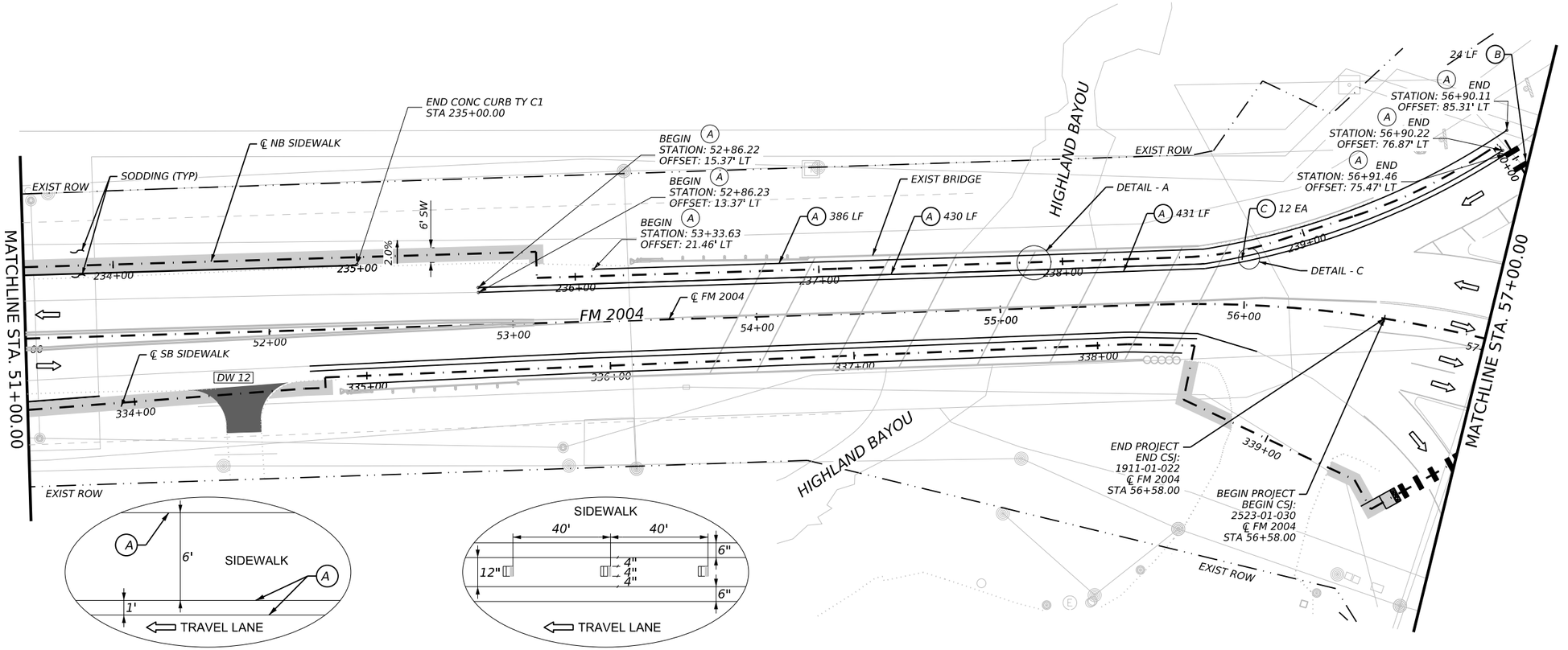
NB SIDEWALK PLAN & PROFILE

STA 45+00.00 TO STA 51+00.00

SHEET 06 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		56

DATE: 5/9/2024 4:39:32 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\DrawingsISheetsISidewalk NBISidewalk NB - PP 6.dgn



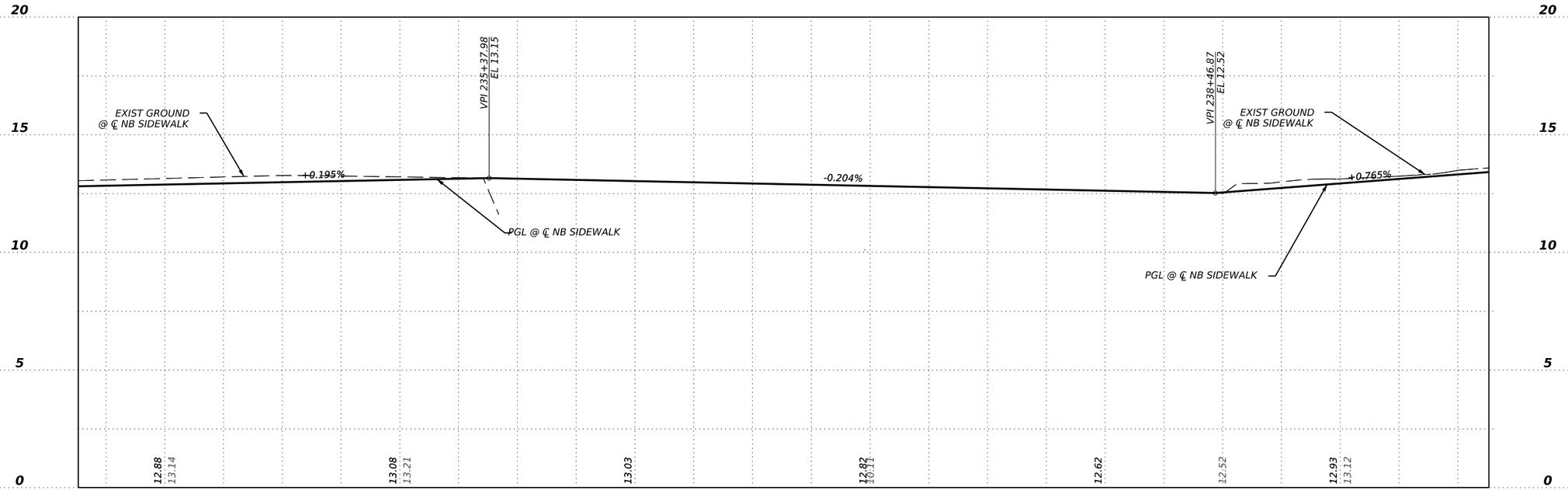
DETAIL - A

DETAIL - C

LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) — TRAFFIC BUTTON TY I-C
- (S-) — RELOCATE SM RD SN SUP&AM TY S80
- (T-) — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

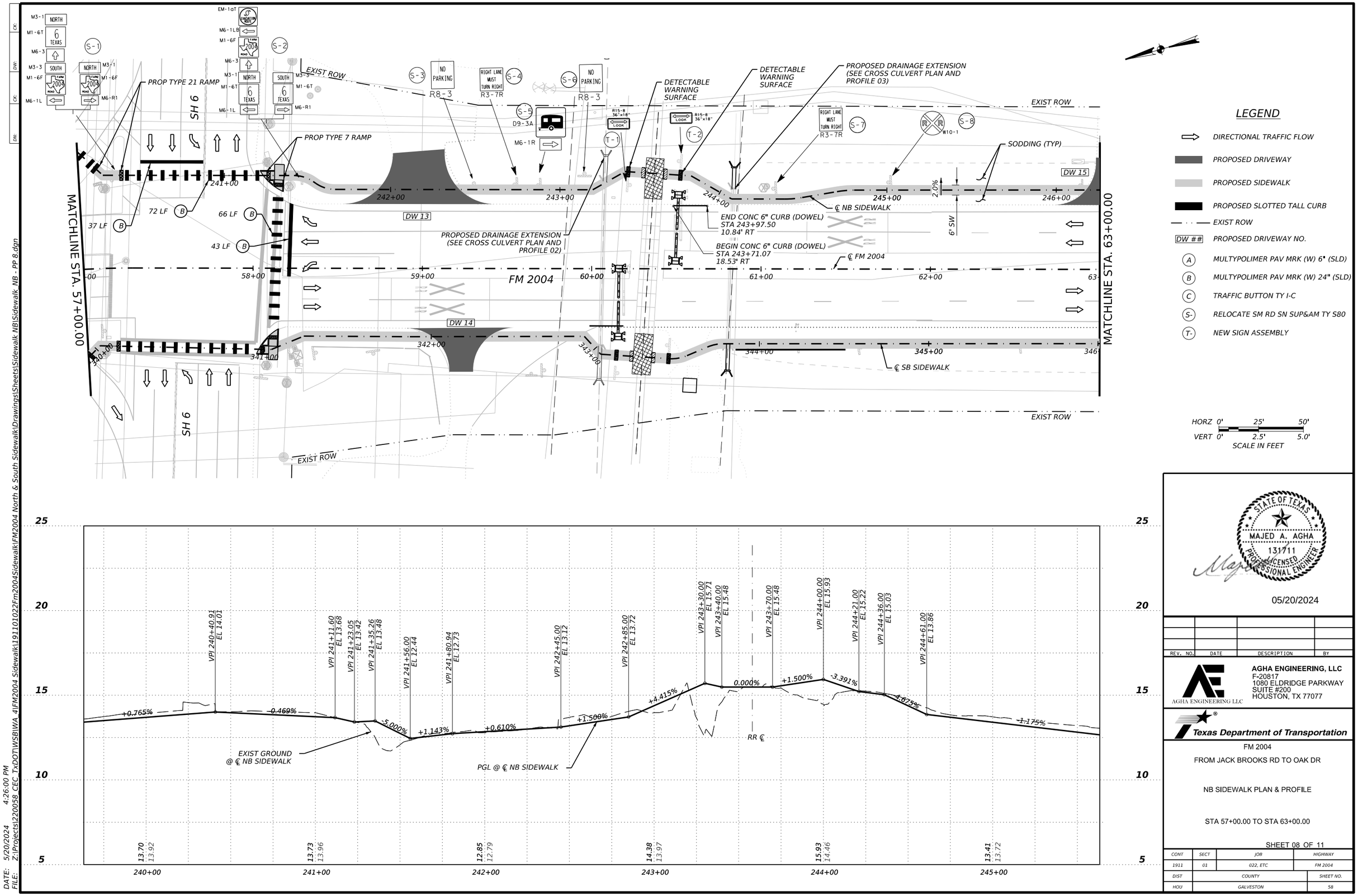
NB SIDEWALK PLAN & PROFILE

STA 51+00.00 TO STA 57+00.00

SHEET 07 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		57

DATE: 5/9/2024 4:39:33 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSBI\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 7.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

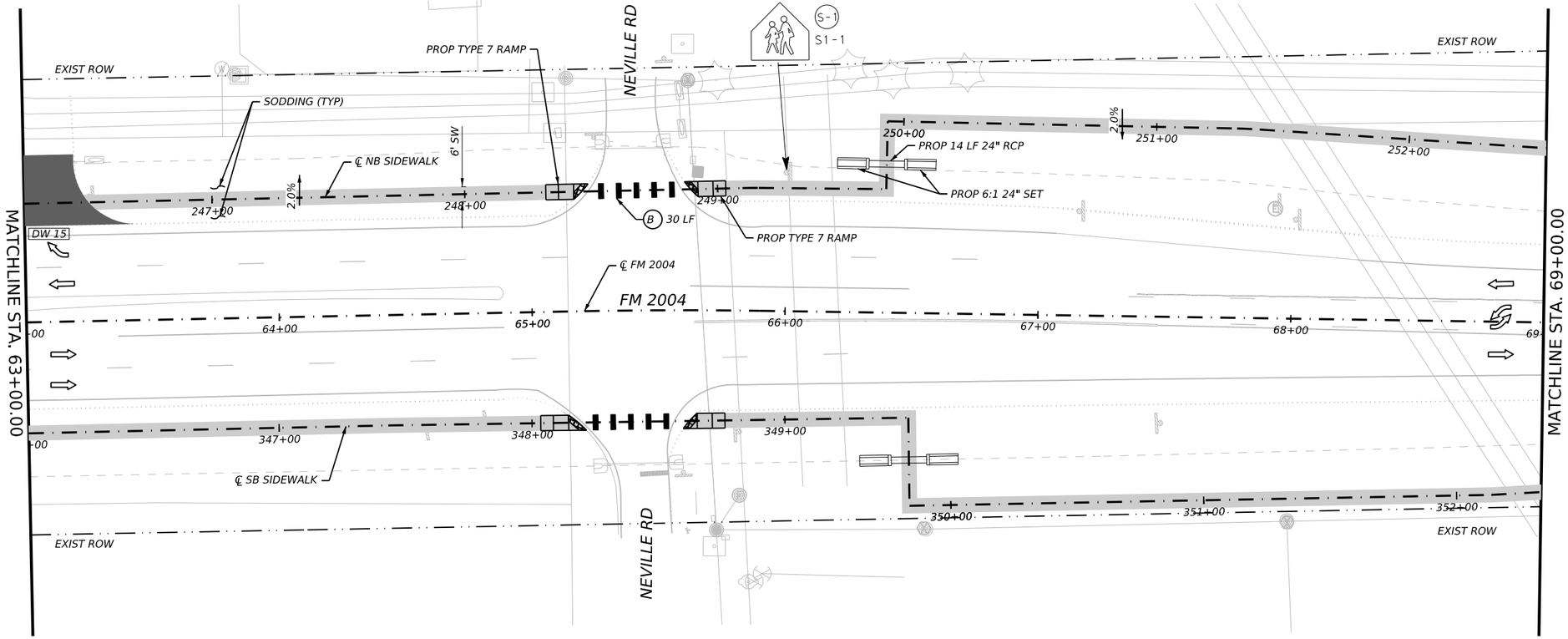
NB SIDEWALK PLAN & PROFILE

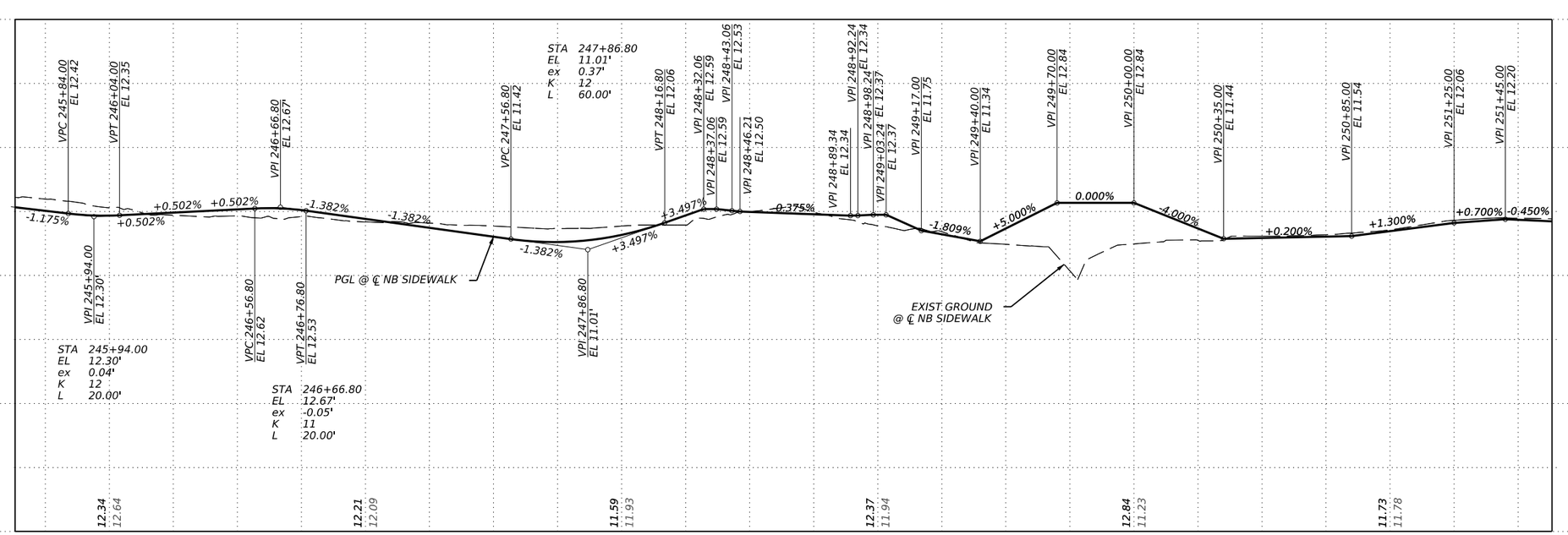
STA 57+00.00 TO STA 63+00.00

SHEET 08 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		58

DATE: 5/20/2024 4:26:00 PM
FILE: Z:\Projects\220058 CEC_TxDOT\WSB\WA 4\FM2004 Sidewalk\1911101022\Fm2004Sidewalk\FM2004 North & South Sidewalk\Sheets\Sidewalk NB\Sidewalk_NB - PP 8.dgn





LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
PROFESSIONAL ENGINEER
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

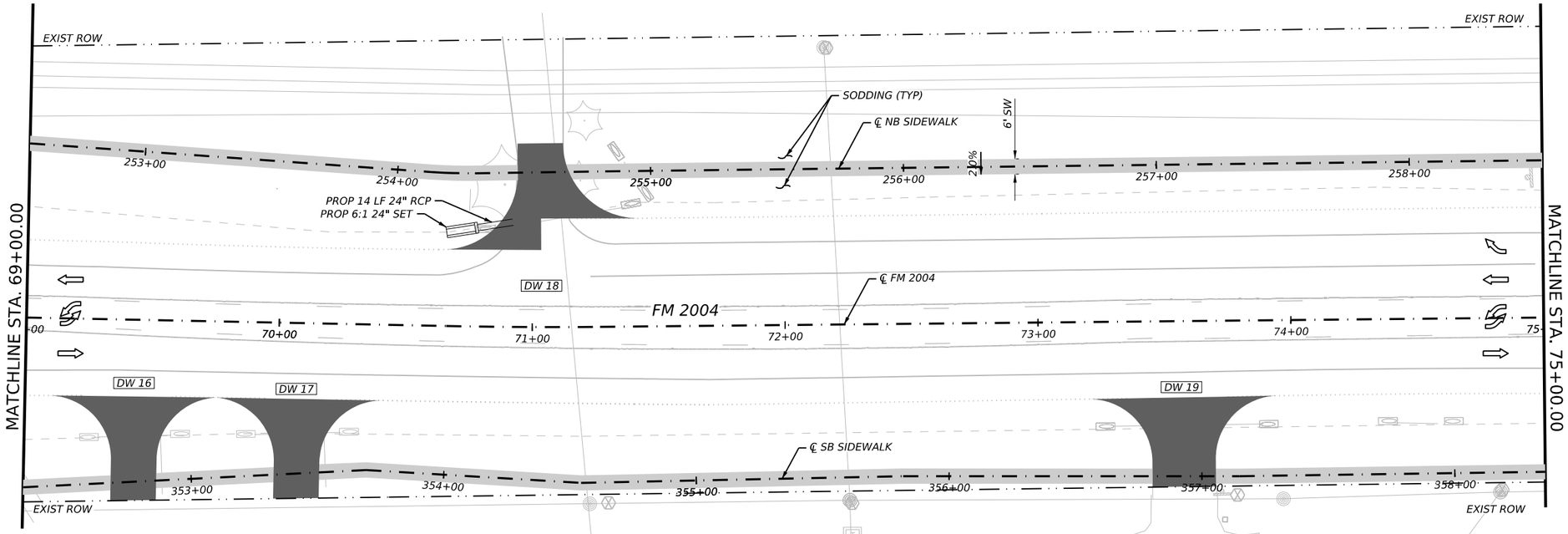
NB SIDEWALK PLAN & PROFILE

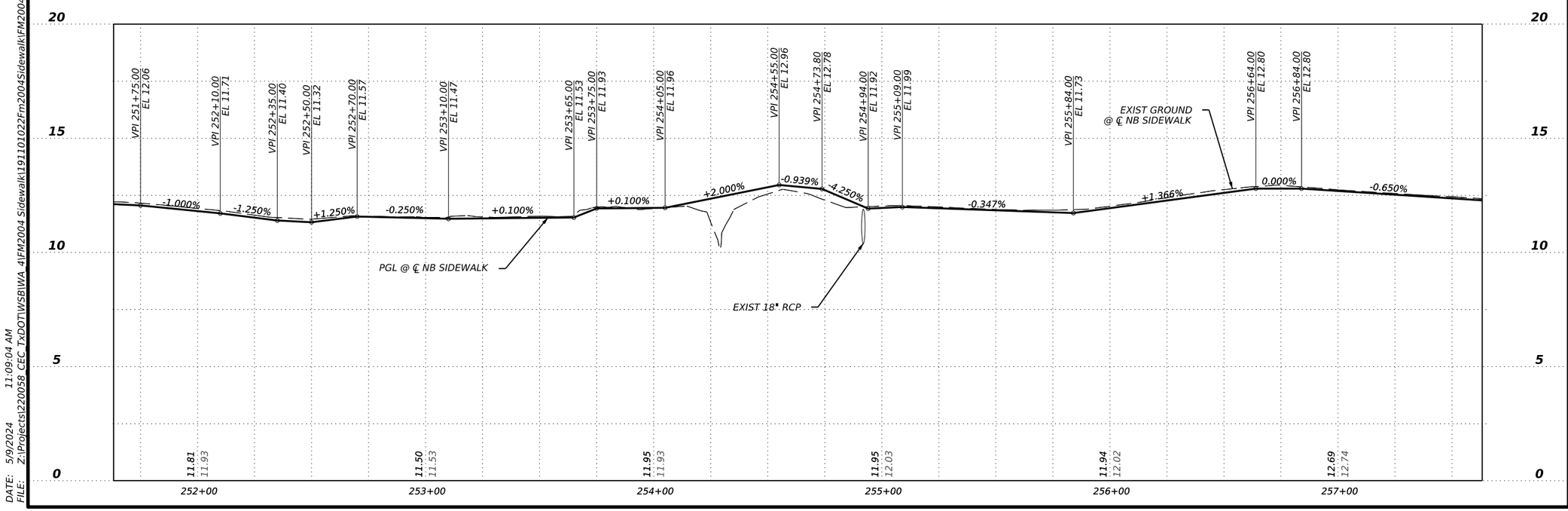
STA 63+00.00 TO STA 69+00.00

SHEET 09 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		59

DATE: 5/9/2024 11:09:03 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSBI\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 9.dgn





LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

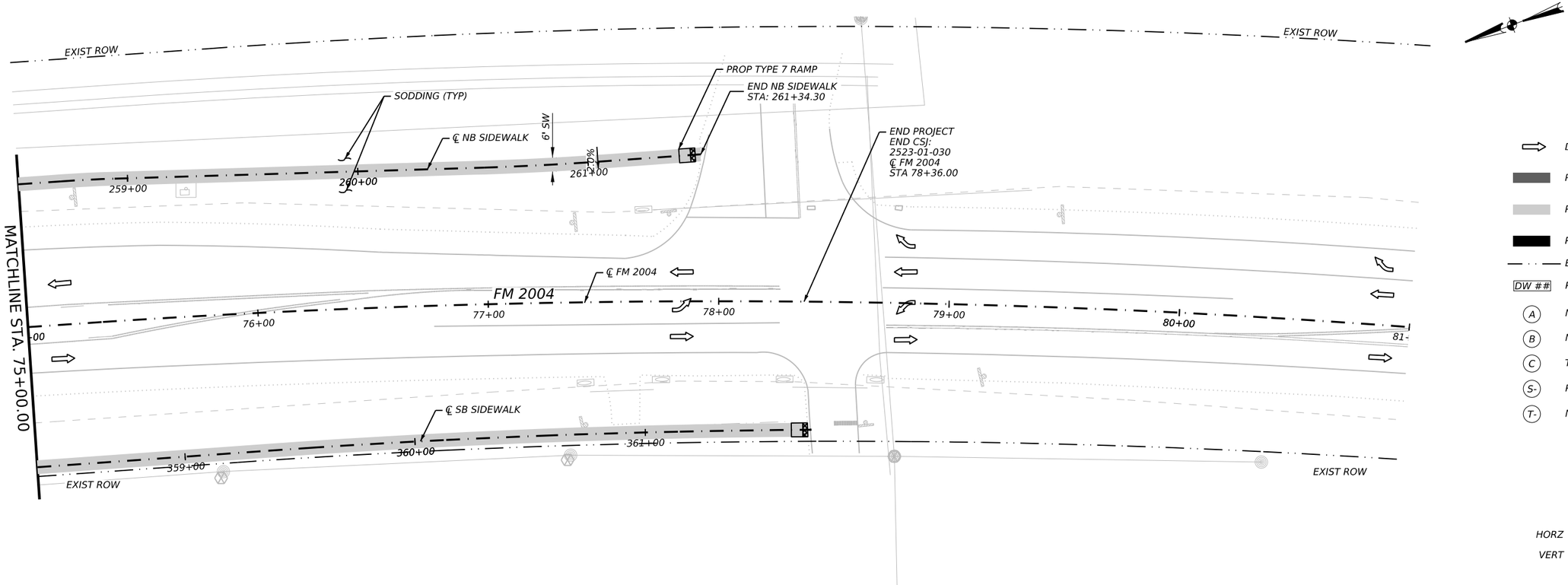
NB SIDEWALK PLAN & PROFILE

STA 69+00.00 TO STA 75+00.00

SHEET 10 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		60

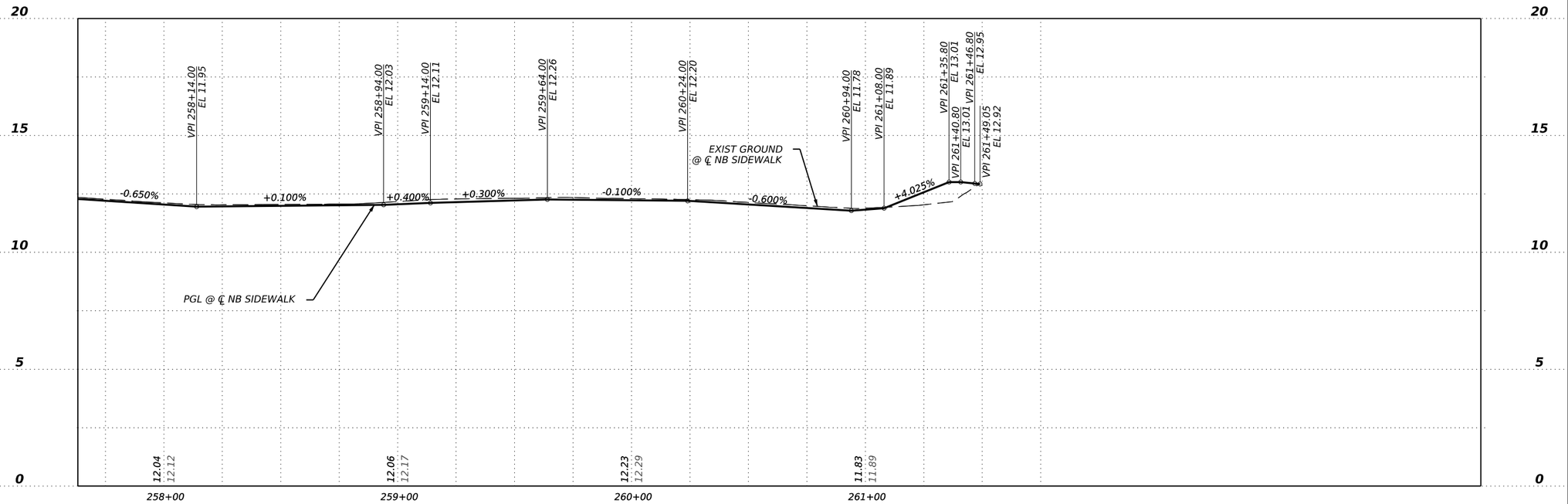
DATE: 5/9/2024 11:09:04 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\DrawingsISheetsISidewalk NB\Sidewalk_NB - PP 10.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

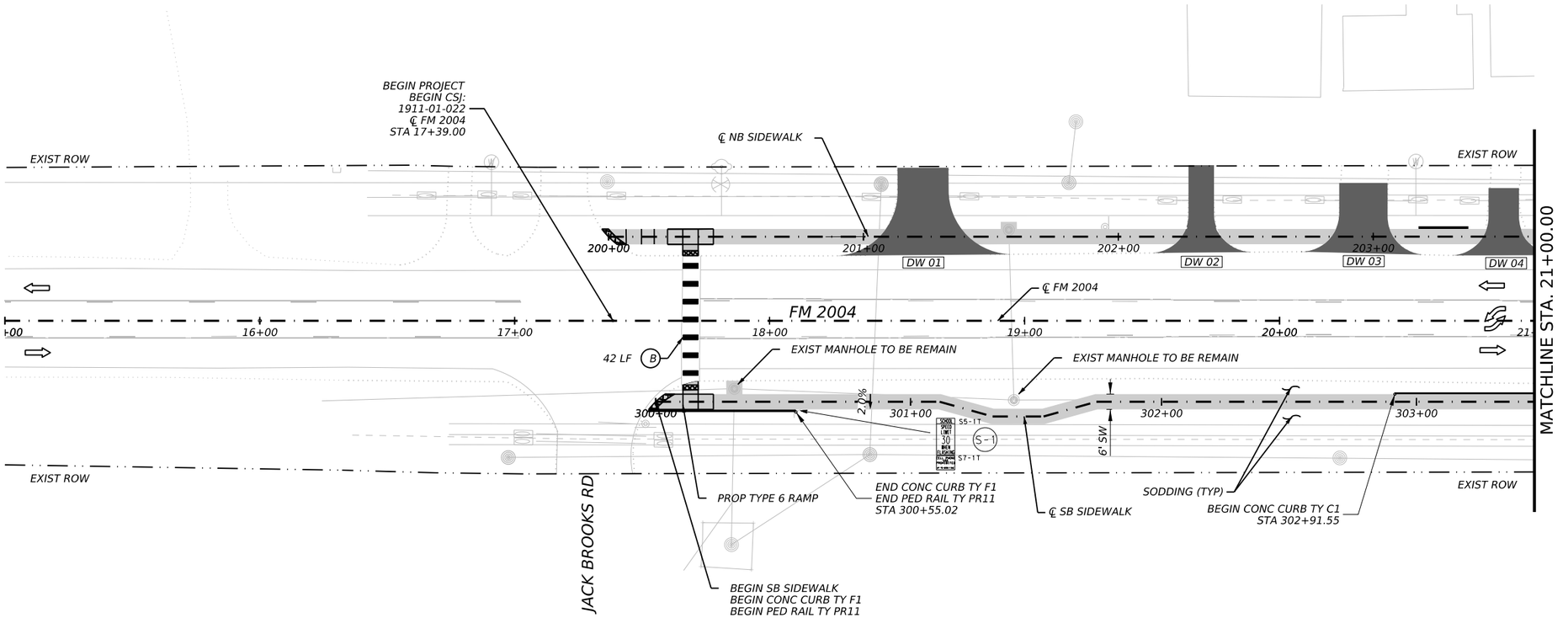
NB SIDEWALK PLAN & PROFILE

STA 75+00.00 TO END

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		61

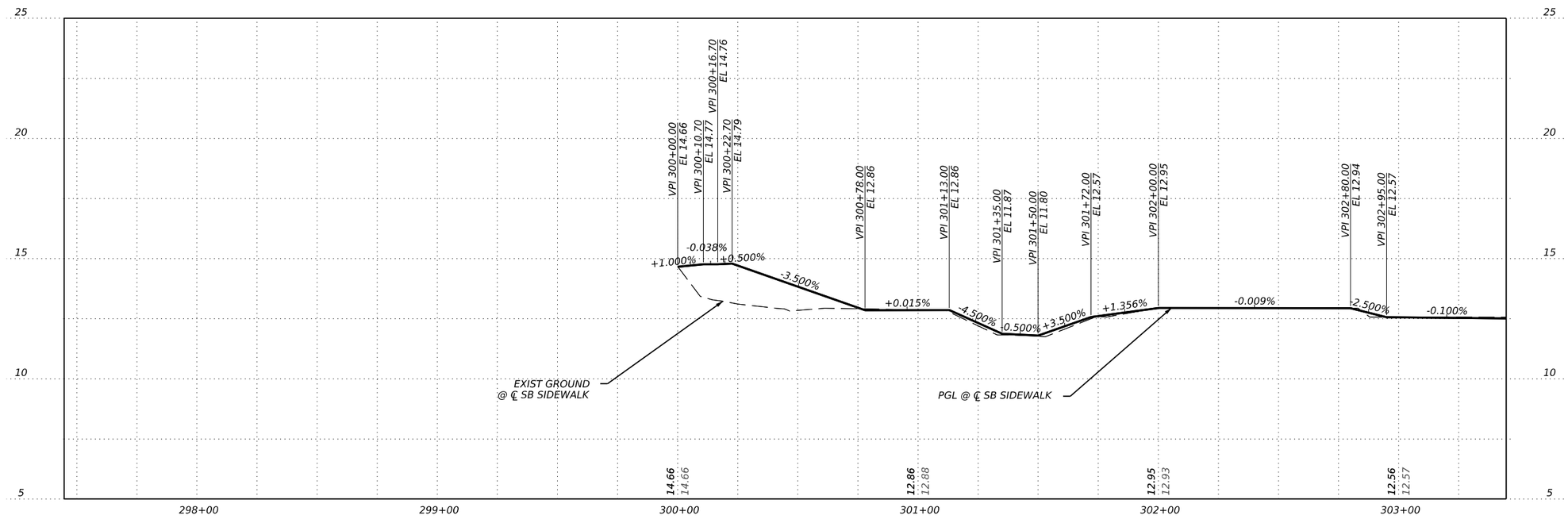
DATE: 5/9/2024 11:09:05 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk NB\Sidewalk_NB - PP 11.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) — TRAFFIC BUTTON TY I-C
- (S-) — RELOCATE SM RD SN SUP&AM TY S80
- (T-) — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
PROFESSIONAL ENGINEER
LICENSED
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

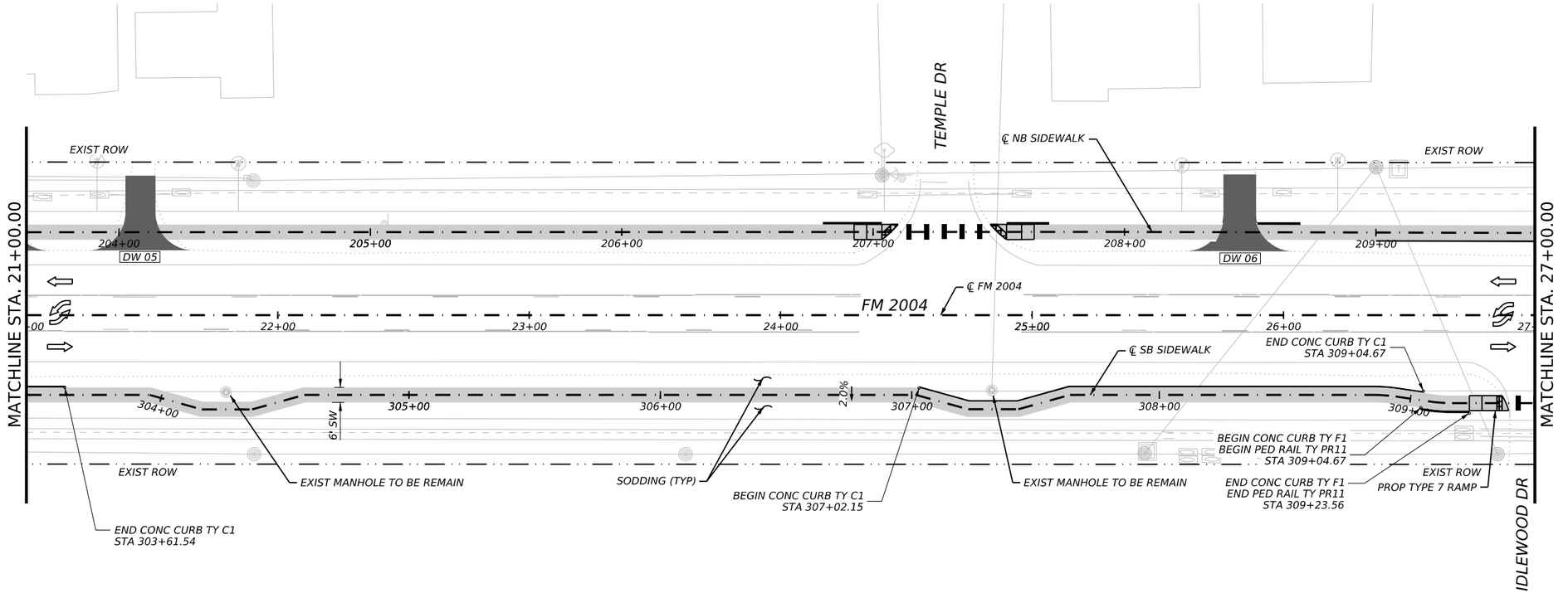
SB SIDEWALK PLAN & PROFILE

BEGIN TO STA 21+00.00

SHEET 01 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		62

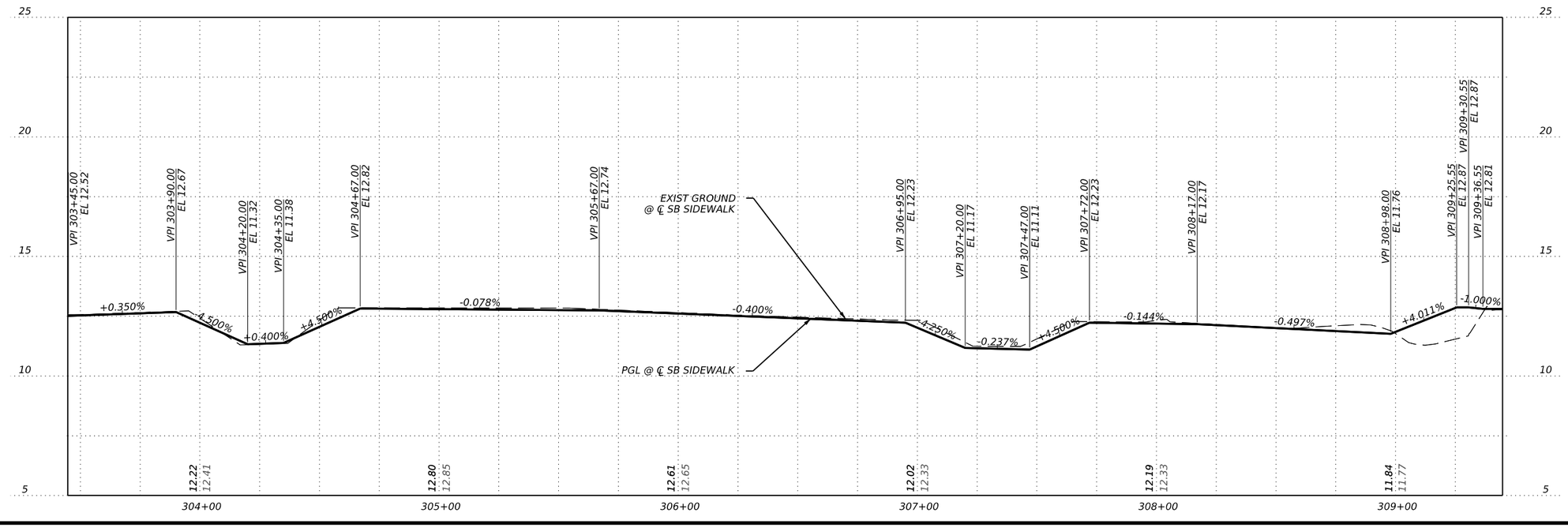
DATE: 5/9/2024 11:09:12 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 1.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) — TRAFFIC BUTTON TY I-C
- (S-) — RELOCATE SM RD SN SUP&AM TY S80
- (T-) — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

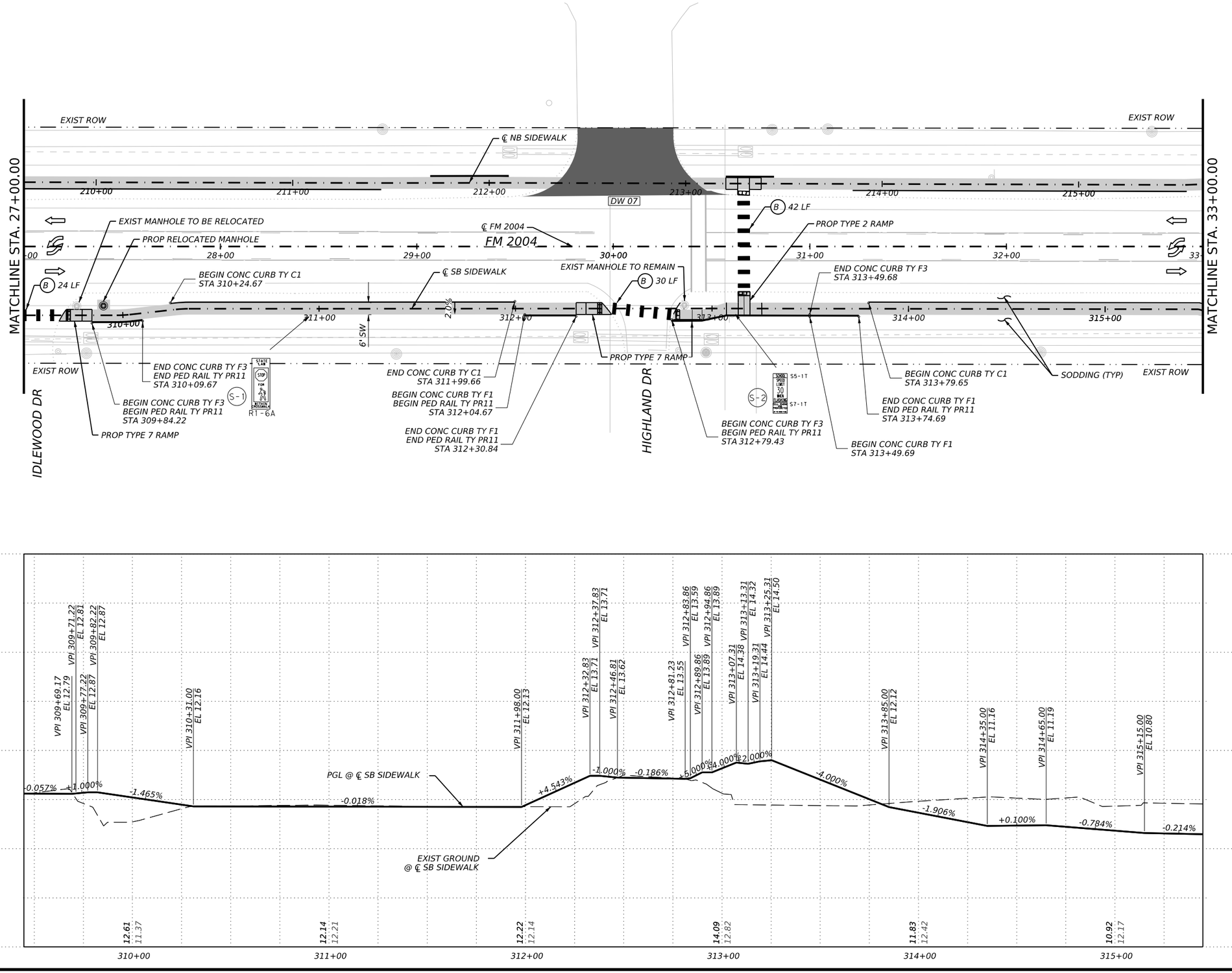
SB SIDEWALK PLAN & PROFILE

STA 21+00 TO STA 27+00

SHEET 02 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		63

DATE: 5/9/2024 11:09:14 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\DrawingsSheets\Sidewalk SB\Sidewalk SB - PP 2.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) — TRAFFIC BUTTON TY I-C
- (S-) — RELOCATE SM RD SN SUP&AM TY S80
- (T-) — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

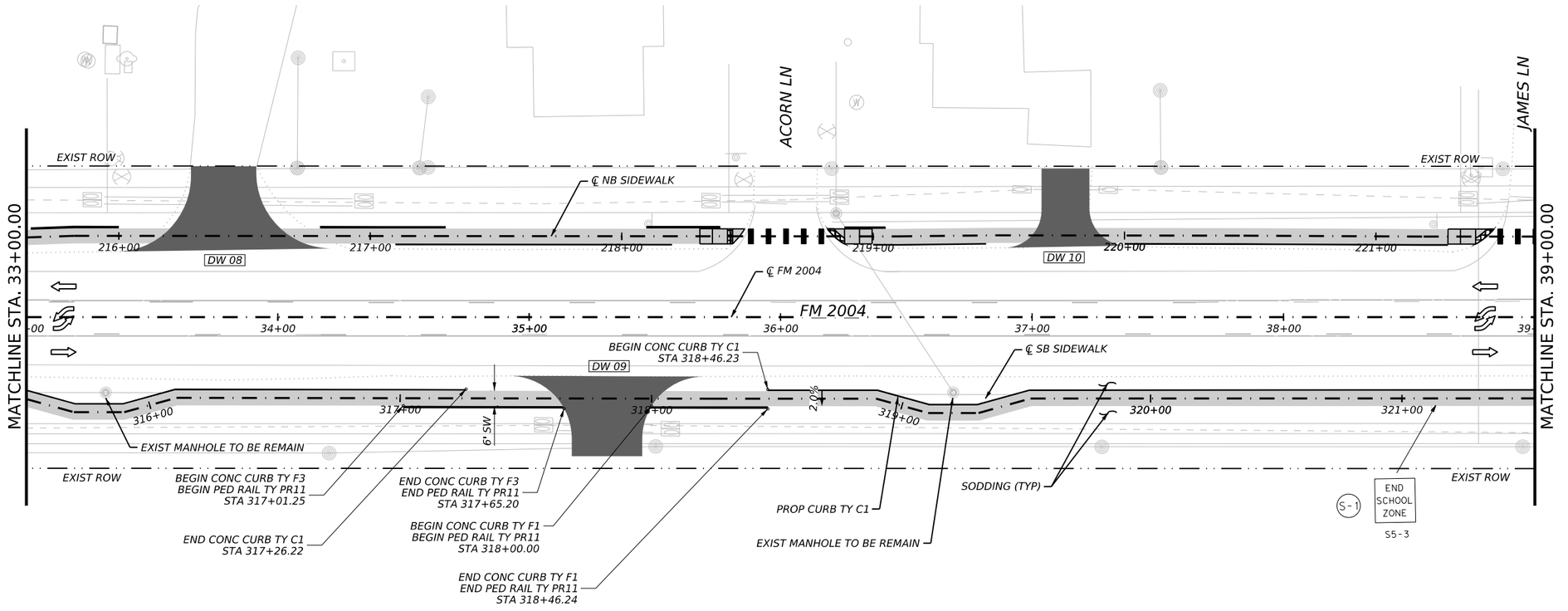
FROM JACK BROOKS RD TO OAK DR

SB SIDEWALK PLAN & PROFILE

STA 27+00 TO STA 33+00

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		64

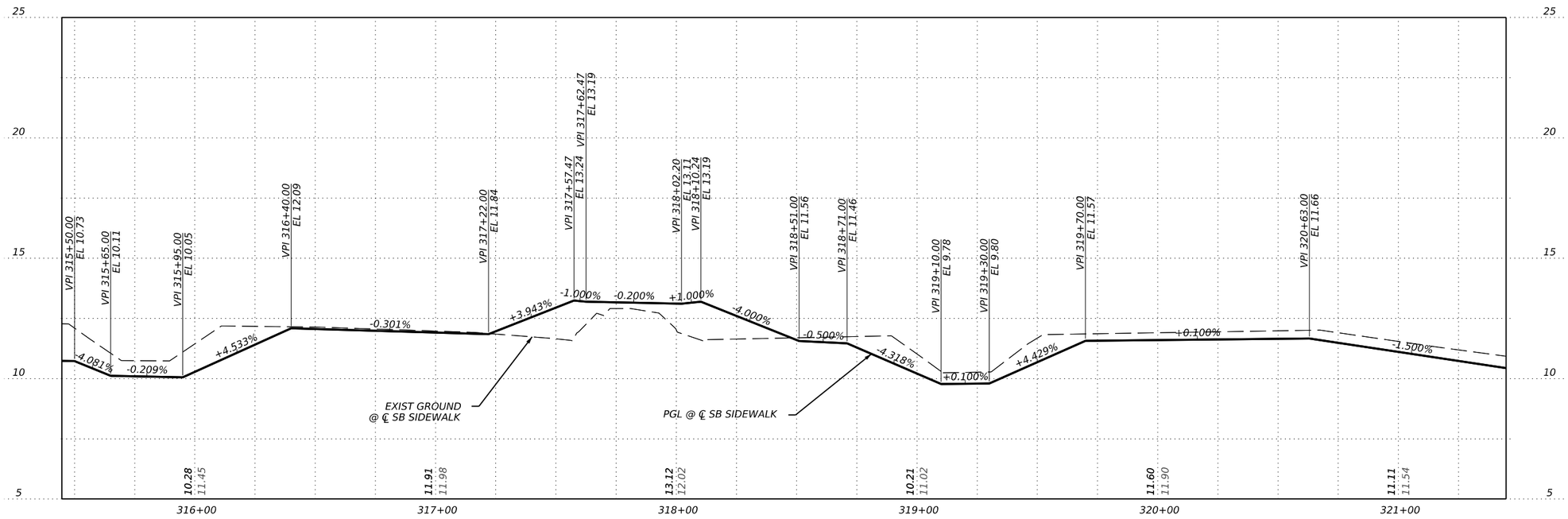
DATE: 5/30/2024 2:42:52 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 3.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

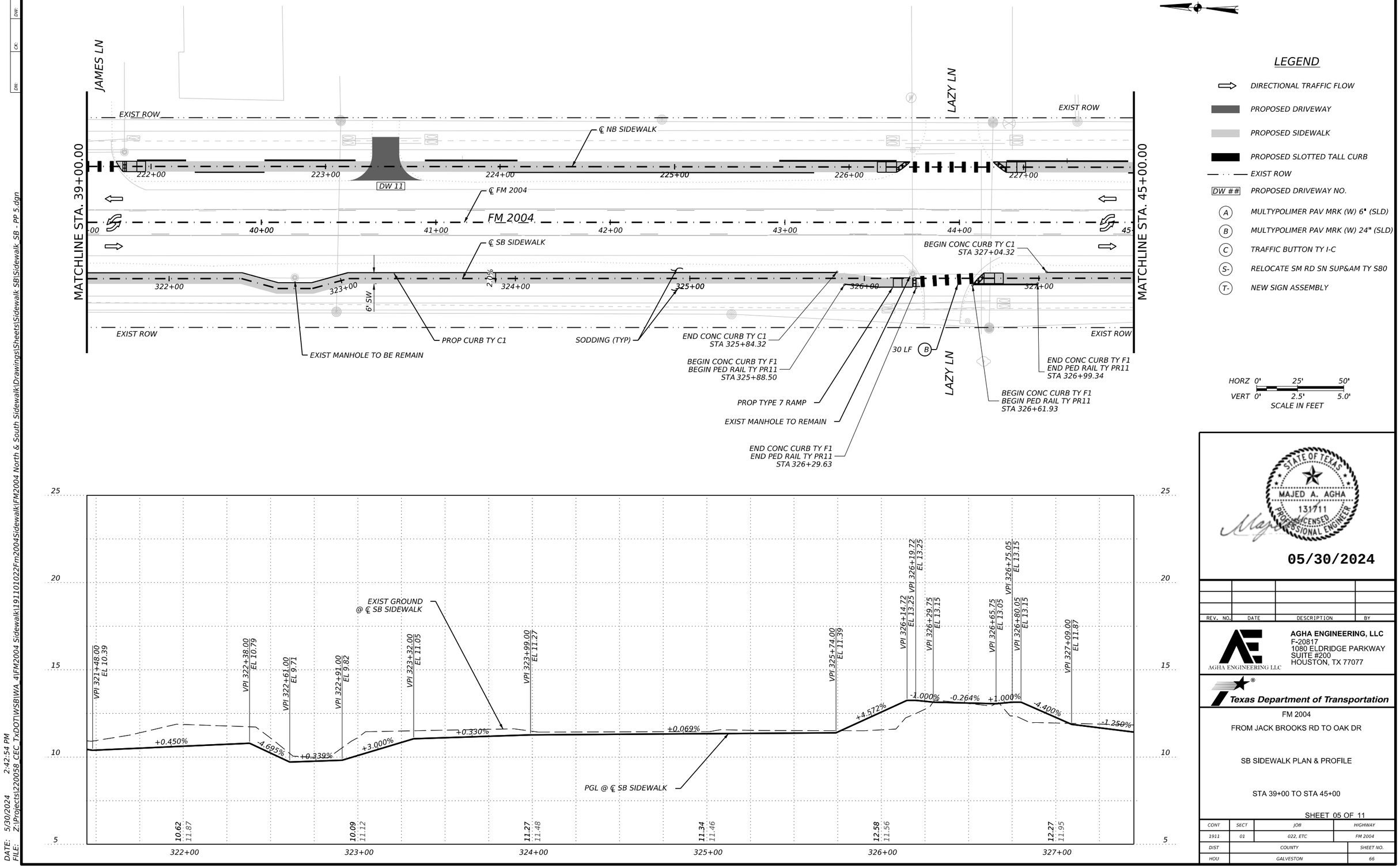
SB SIDEWALK PLAN & PROFILE

STA 33+00 TO STA 39+00

SHEET 04 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		65

DATE: 5/9/2024 11:09:17 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk_SB - PP 4.dgn



DATE: 5/30/2024 2:42:54 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk_SB - PP 5.dgn

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

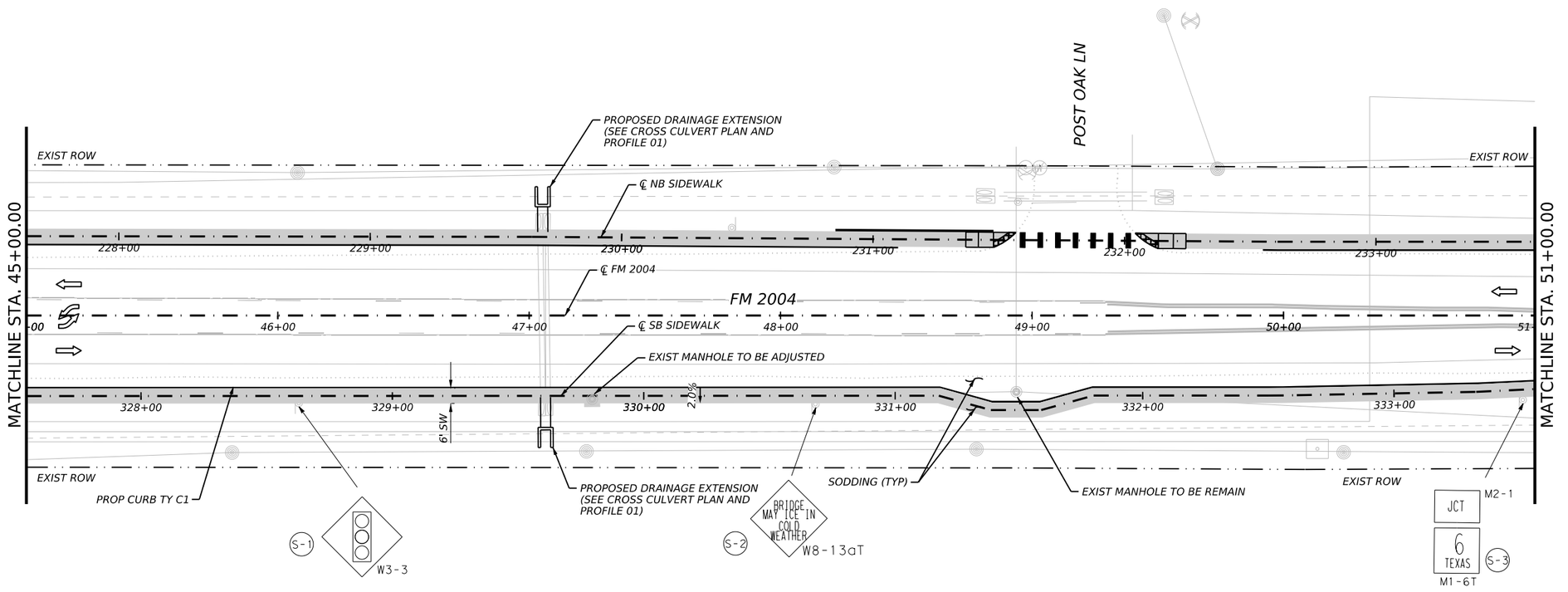
FROM JACK BROOKS RD TO OAK DR

SB SIDEWALK PLAN & PROFILE

STA 39+00 TO STA 45+00

SHEET 05 OF 11

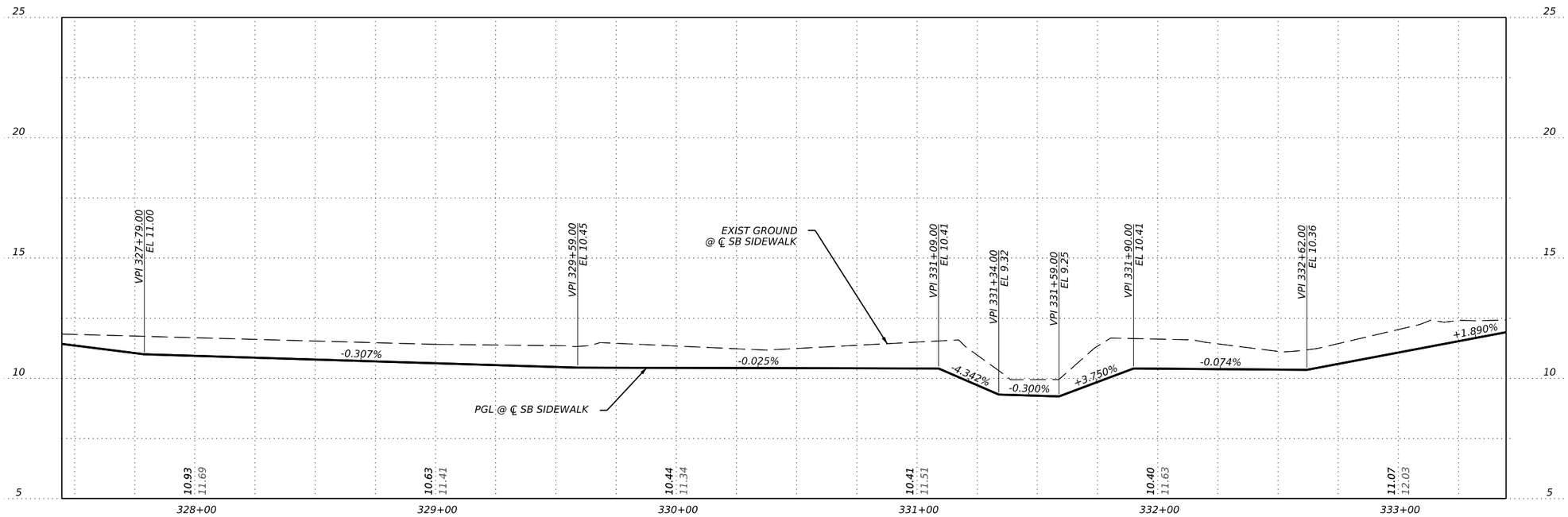
CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		66



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

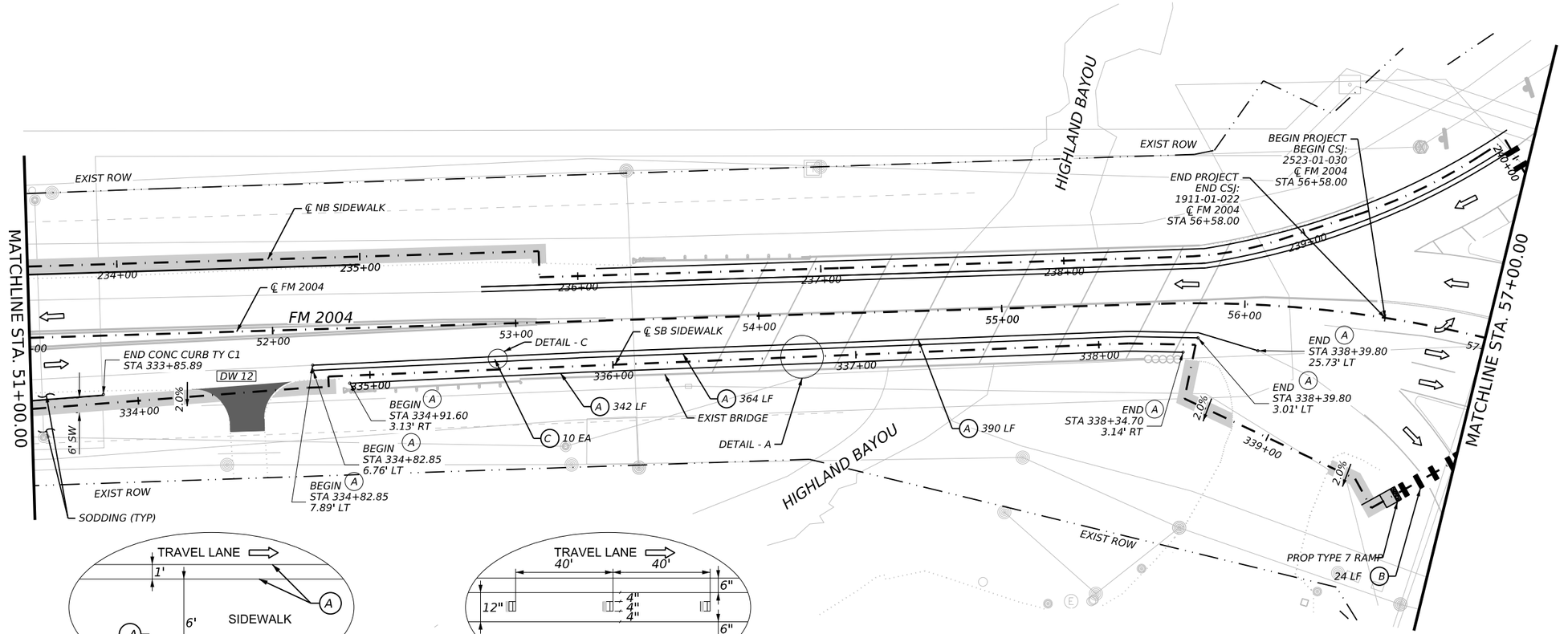
SB SIDEWALK PLAN & PROFILE

STA 45+00 TO STA 51+00

SHEET 06 OF 11

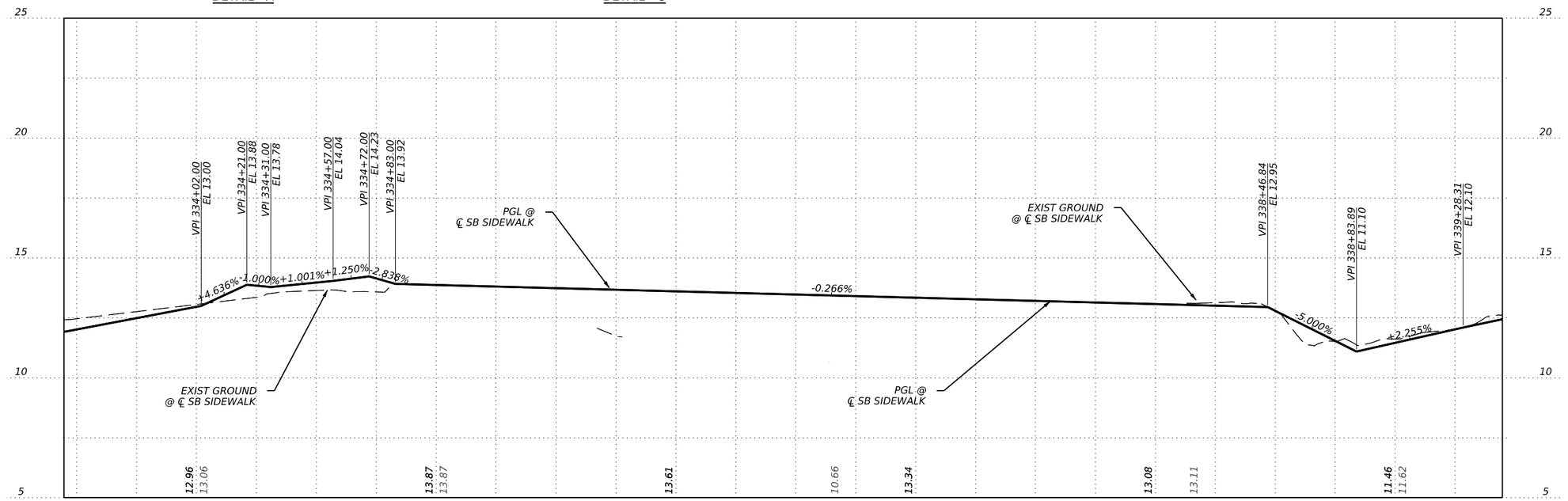
CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		67

DATE: 5/9/2024 11:09:22 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 6.dgn



DETAIL - A

DETAIL - C



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## — PROPOSED DRIVEWAY NO.
- (A) — MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) — MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) — TRAFFIC BUTTON TY I-C
- (S-) — RELOCATE SM RD SN SUP&AM TY S80
- (T-) — NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

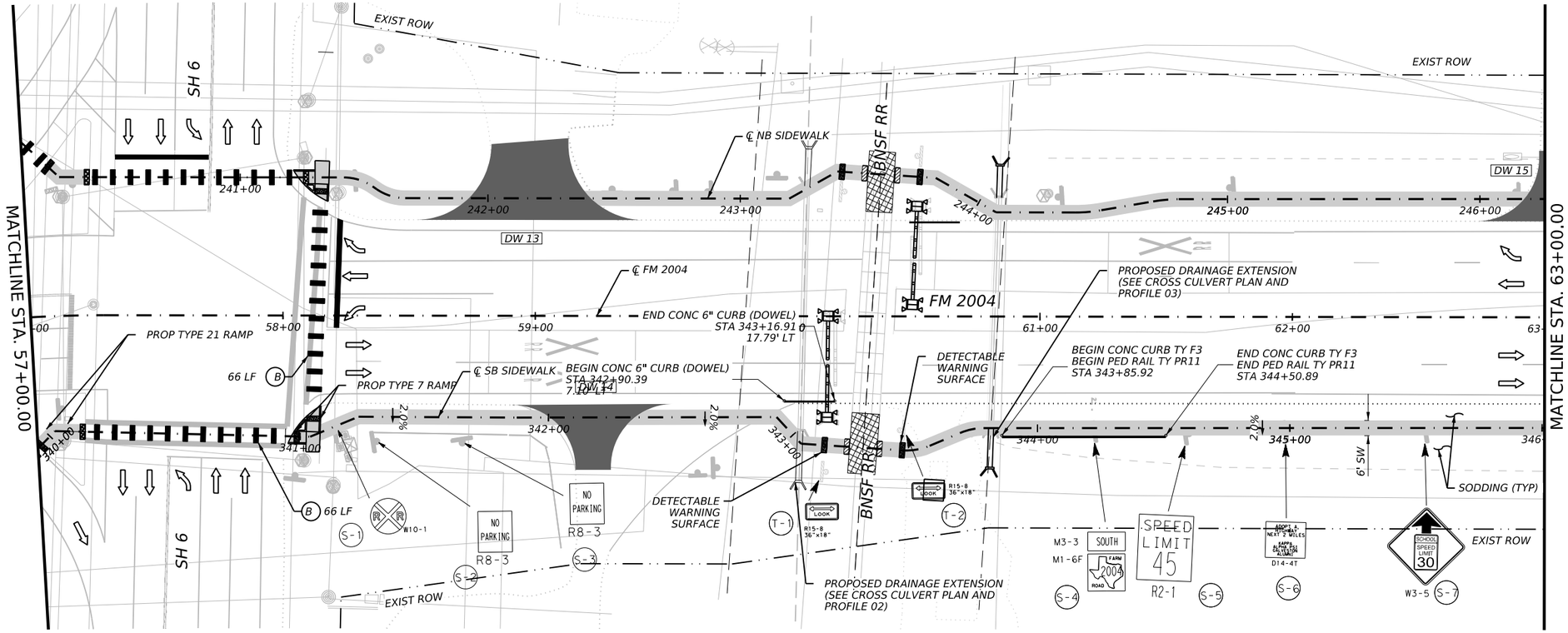
SB SIDEWALK PLAN & PROFILE

STA 51+00 TO STA 57+00

SHEET 07 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		68

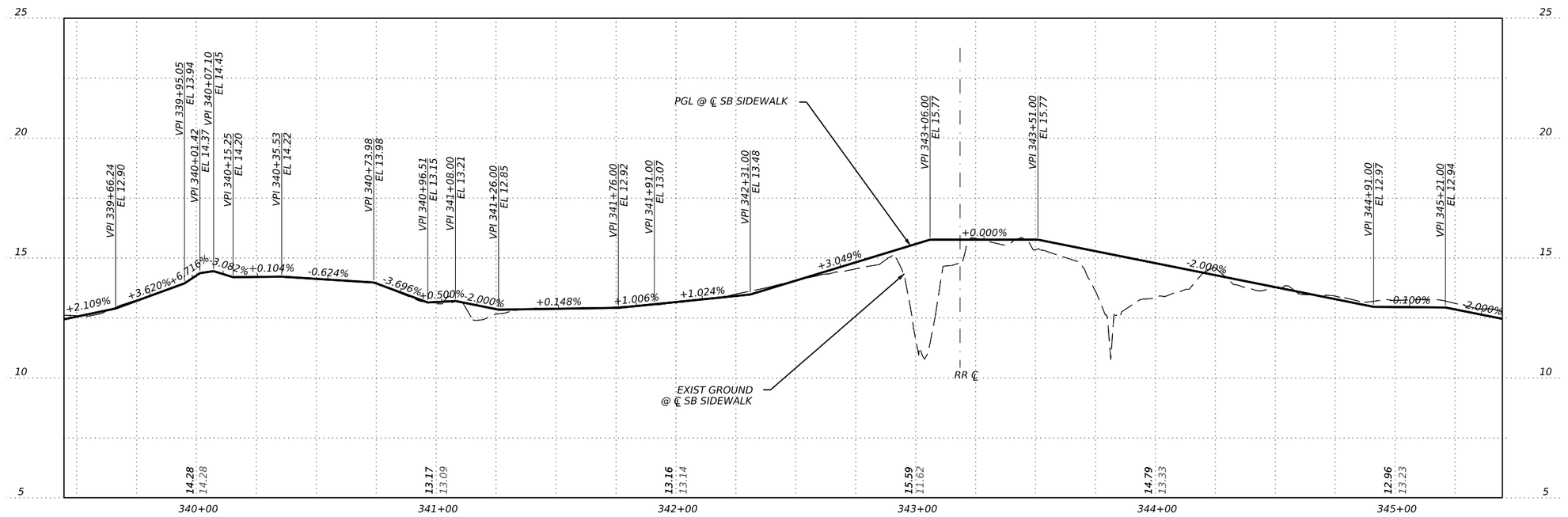
DATE: 5/9/2024 11:09:23 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 7.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER
05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SB SIDEWALK PLAN & PROFILE

STA 57+00 TO STA 63+00

SHEET 08 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		69

DATE: 5/20/2024 4:26:06 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 8.dgn

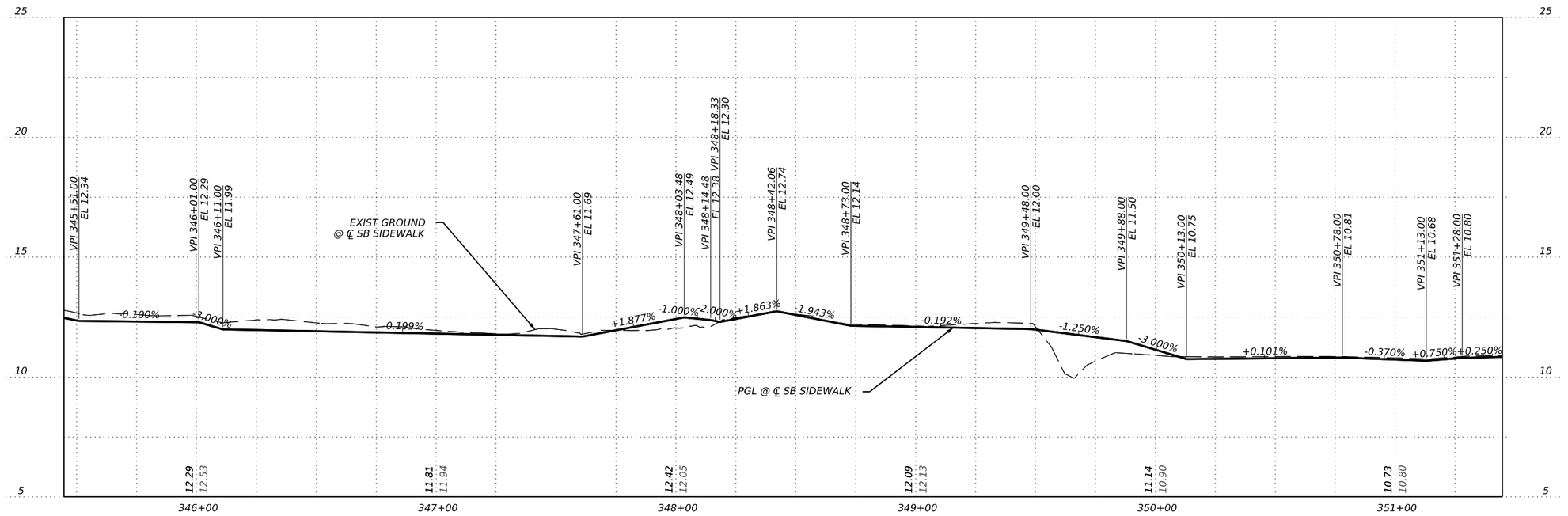
DW
CK
DW
CK

EXIST ROW
℄ NB SIDEWALK
NEVILLE RD
EXIST ROW
MATCHLINE STA. 63+00.00
MATCHLINE STA. 69+00.00
247+00
248+00
249+00
250+00
251+00
252+00
DW 15
℄ FM 2004
FM 2004
64+00
65+00
66+00
67+00
68+00
℄ SB SIDEWALK
PROP TYPE 7 RAMP
B 30 LF
PROP TYPE 7 RAMP
2.0%
347+00
348+00
349+00
PROP 6:1 24" SET
PROP 14 LF 24" RCP
6' SW
SODDING (TYP)
2.0%
350+00
351+00
352+00
EXIST ROW
EXIST ROW
NEVILLE RD
S-1
W6-1
S1-1
S-2
SCHOOL SPEED LIMIT 30 WHEN FLASHING CELL PHONE PROHIBITED IF TX 6AM-7PM
S5-1T
S-3

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY



MAJED A. AGHA
131711
PROFESSIONAL ENGINEER
STATE OF TEXAS
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

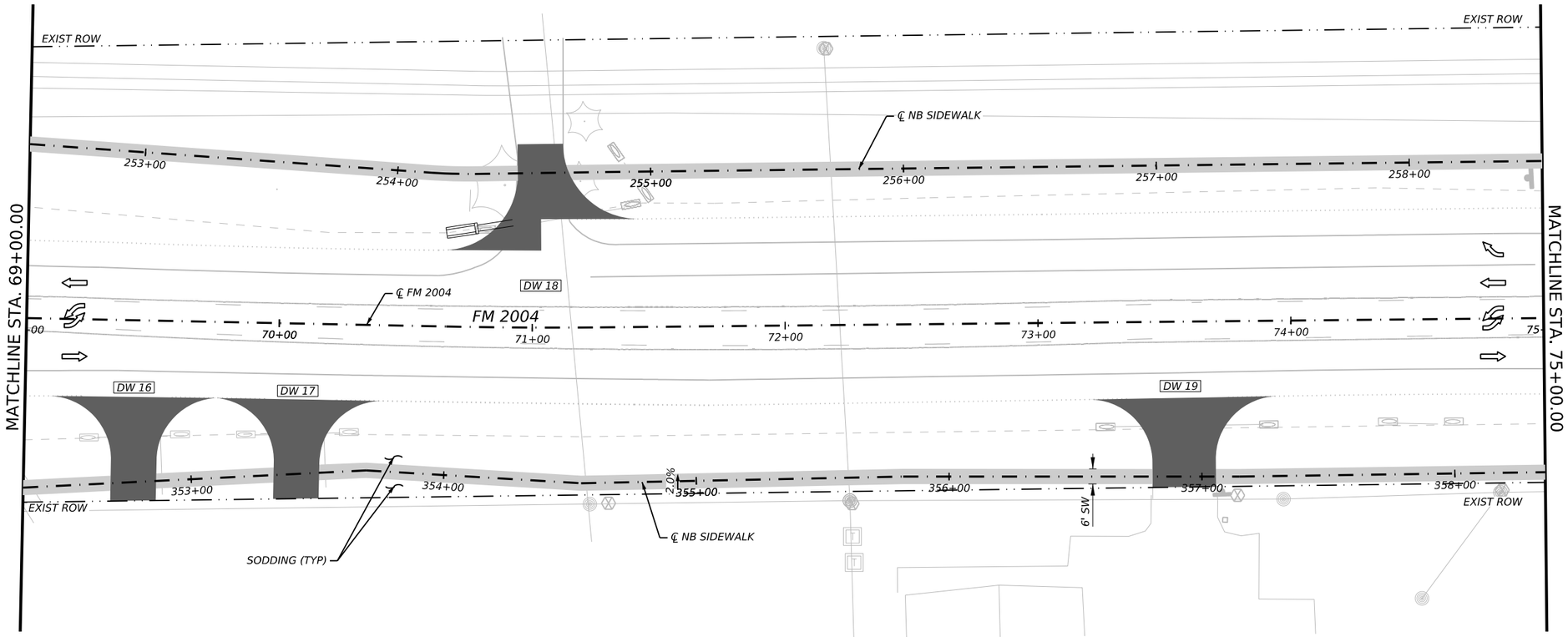
SB SIDEWALK PLAN & PROFILE

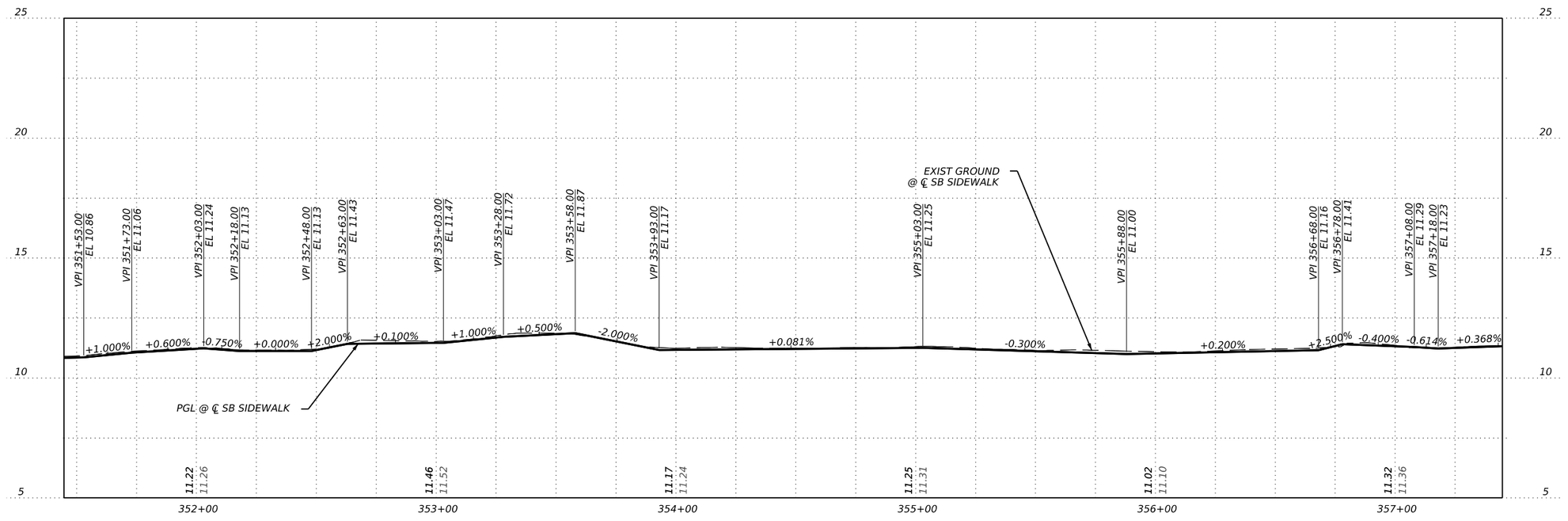
STA 63+00 TO STA 69+00

SHEET 09 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		70

DATE: 5/9/2024 11:09:26 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk - SB - PP 9.dgn





LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
PROFESSIONAL ENGINEER
LICENSED

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

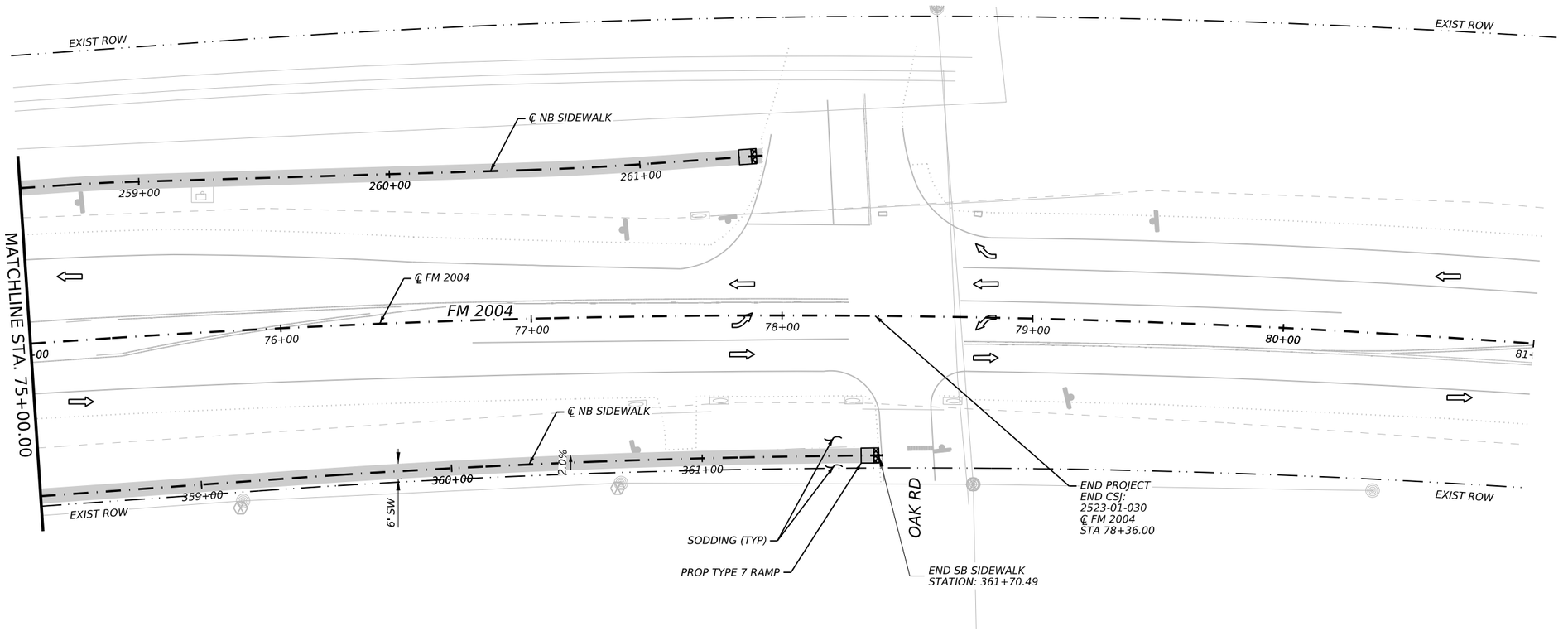
SB SIDEWALK PLAN & PROFILE

STA 69+00 TO STA 75+00

SHEET 10 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		71

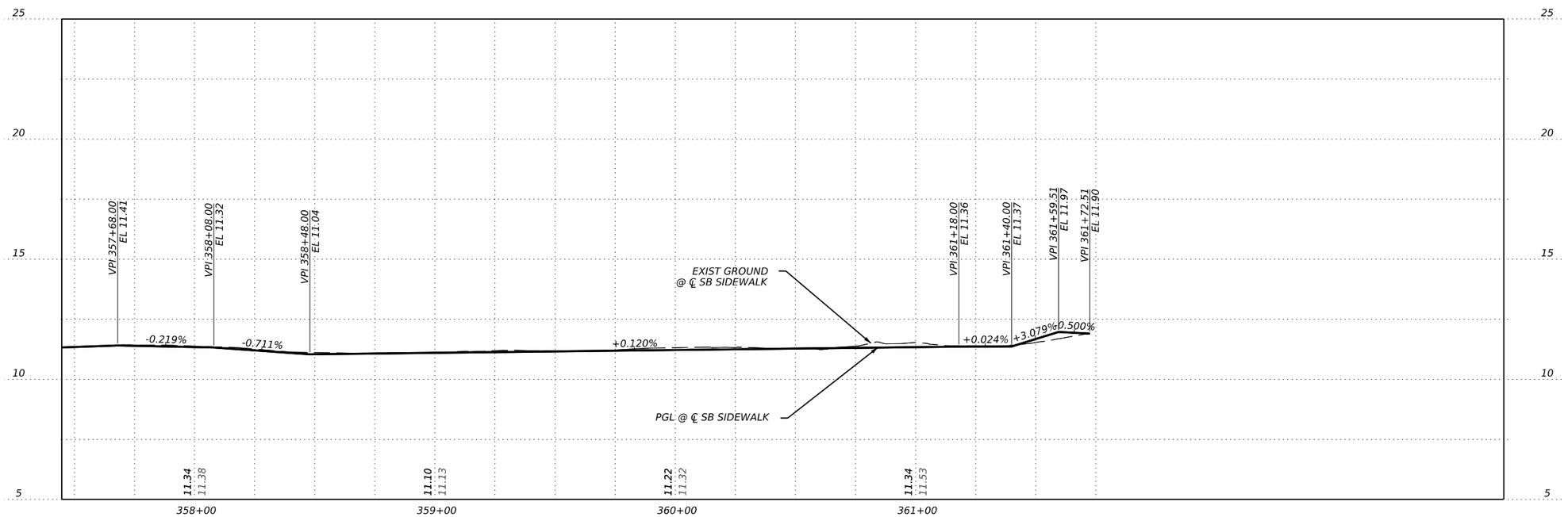
DATE: 5/9/2024 11:09:27 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk SB - PP 10.dgn



LEGEND

- DIRECTIONAL TRAFFIC FLOW
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED SLOTTED TALL CURB
- EXIST ROW
- DW ## PROPOSED DRIVEWAY NO.
- (A) MULTYPOLIMER PAV MRK (W) 6" (SLD)
- (B) MULTYPOLIMER PAV MRK (W) 24" (SLD)
- (C) TRAFFIC BUTTON TY I-C
- (S-) RELOCATE SM RD SN SUP&AM TY S80
- (T-) NEW SIGN ASSEMBLY

HORZ 0' 25' 50'
VERT 0' 2.5' 5.0'
SCALE IN FEET



STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

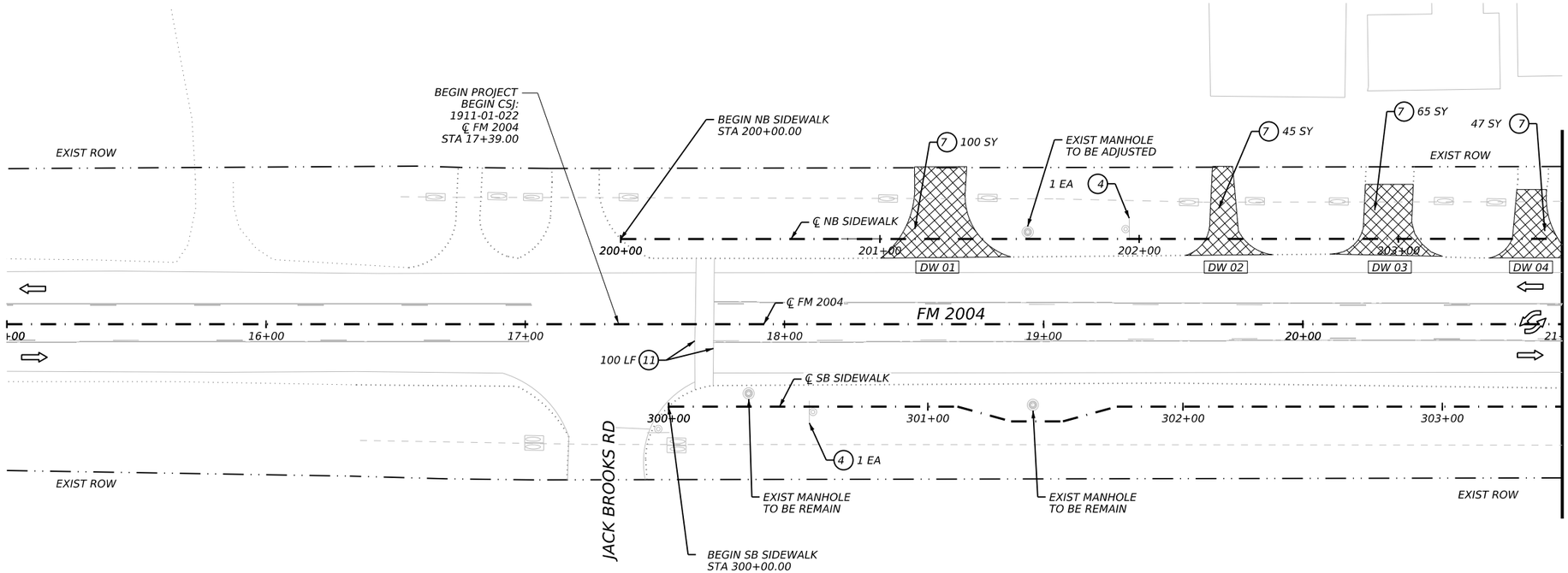
SB SIDEWALK PLAN & PROFILE

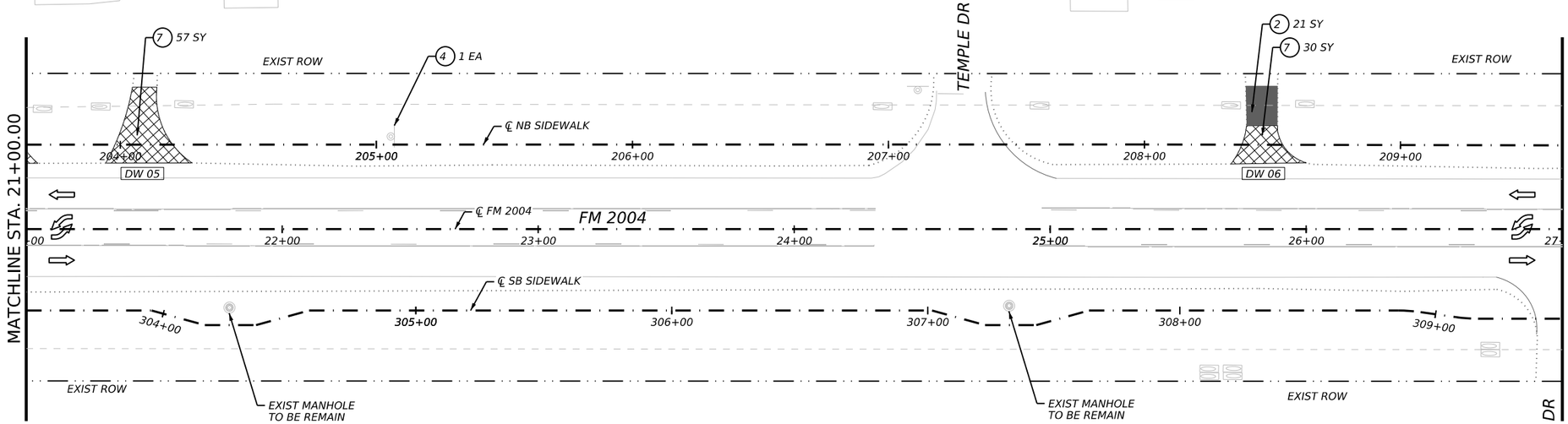
STA 75+00 TO END

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		72

DATE: 5/9/2024 11:09:28 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\South Sidewalk\Drawings\Sheets\Sidewalk SB\Sidewalk_SB - PP 11.dgn





LEGEND

1	REMOVE CONC (SIDEWALK / RAMP)
2	REMOVE CONC (DRIVEWAY)
3	REMOVE STR (HEADWALL)
4	RELOCATE SM RD SIGN SUP & AM
5	REMOVE STR (SET)
6	REMOVE STR (WINGWALL)
7	REM STAB BASE & ASPH PAV (2"-8")
8	REMOVE CONC (RIPRAP)
9	REMOVE CONC (MEDIANS)
10	ELIM EXT PAV MRK & MRKS (6")
11	ELIM EXT PAV MRK & MRKS (12")
12	ELIM EXT PAV MRK & MRKS (24")
DW ##	PROPOSED DRIVEWAY NO.

HORZ 0' 25' 50'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

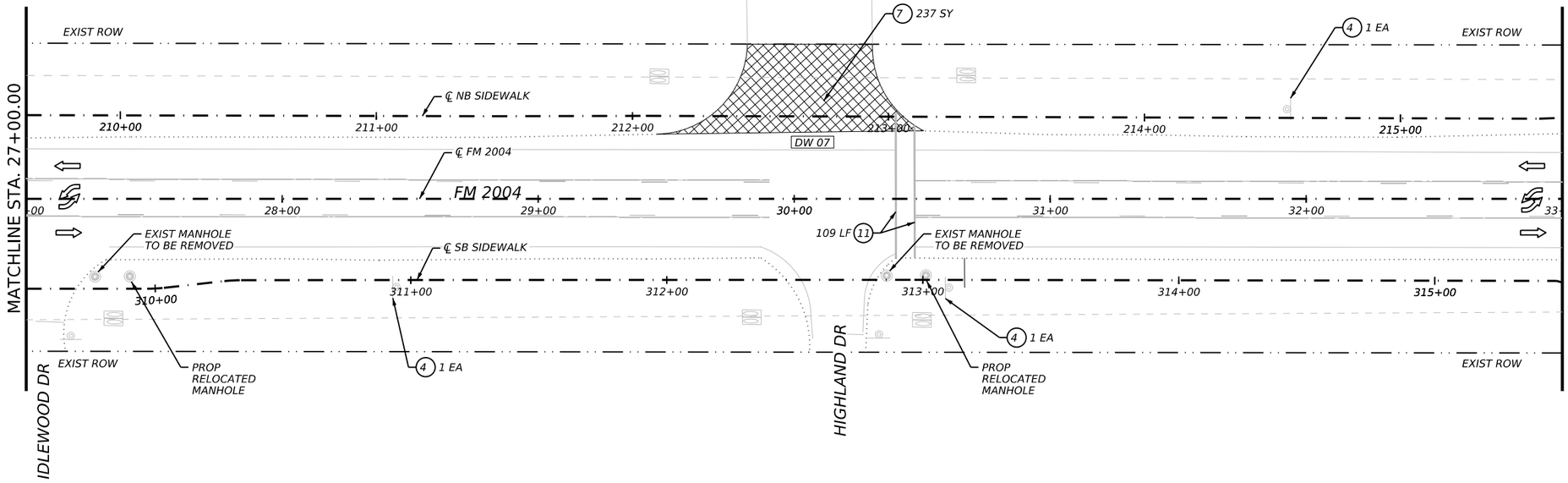
REMOVAL PLAN

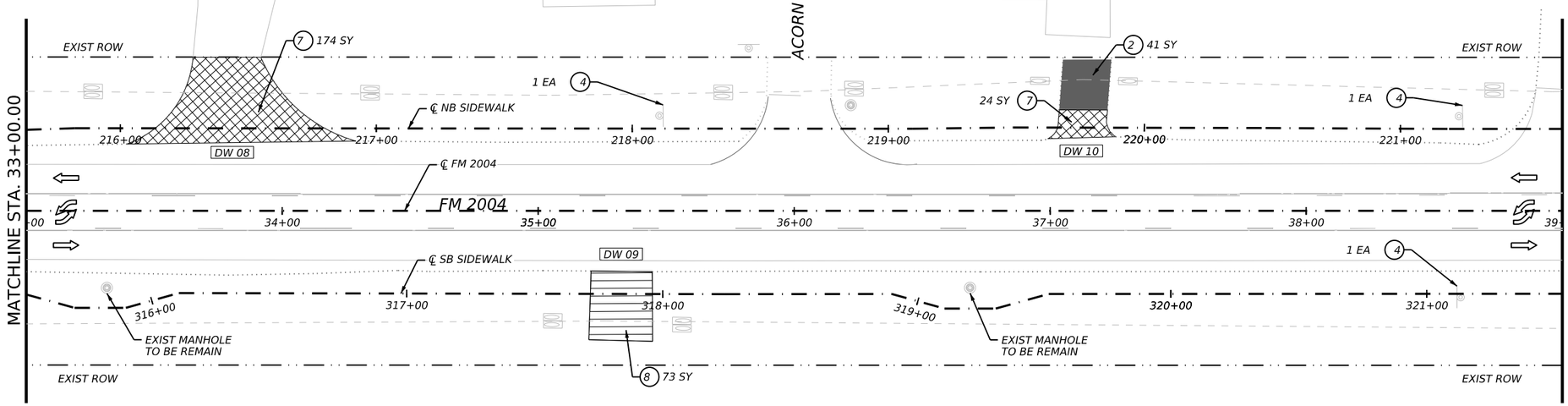
BEGIN TO STA 27+00

SHEET 01 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		73

DATE: 5/9/2024 11:09:30 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 1.dgn





LEGEND

- 1 REMOVE CONC (SIDEWALK / RAMP)
- 2 REMOVE CONC (DRIVEWAY)
- 3 REMOVE STR (HEADWALL)
- 4 RELOCATE SM RD SIGN SUP & AM
- 5 REMOVE STR (SET)
- 6 REMOVE STR (WINGWALL)
- 7 REM STAB BASE & ASPH PAV (2"-8")
- 8 REMOVE CONC (RIPRAP)
- 9 REMOVE CONC (MEDIANS)
- 10 ELIM EXT PAV MRK & MRKS (6")
- 11 ELIM EXT PAV MRK & MRKS (12")
- 12 ELIM EXT PAV MRK & MRKS (24")
- DW ## PROPOSED DRIVEWAY NO.

HORZ 0' 25' 50'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

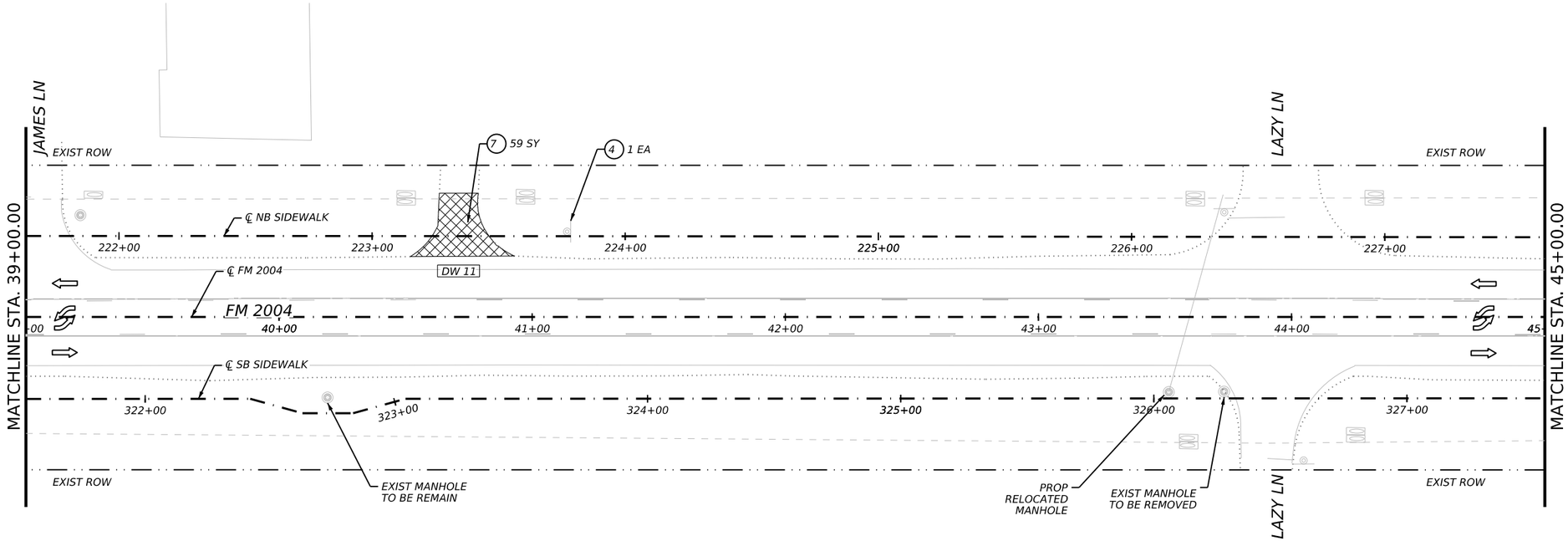
REMOVAL PLAN

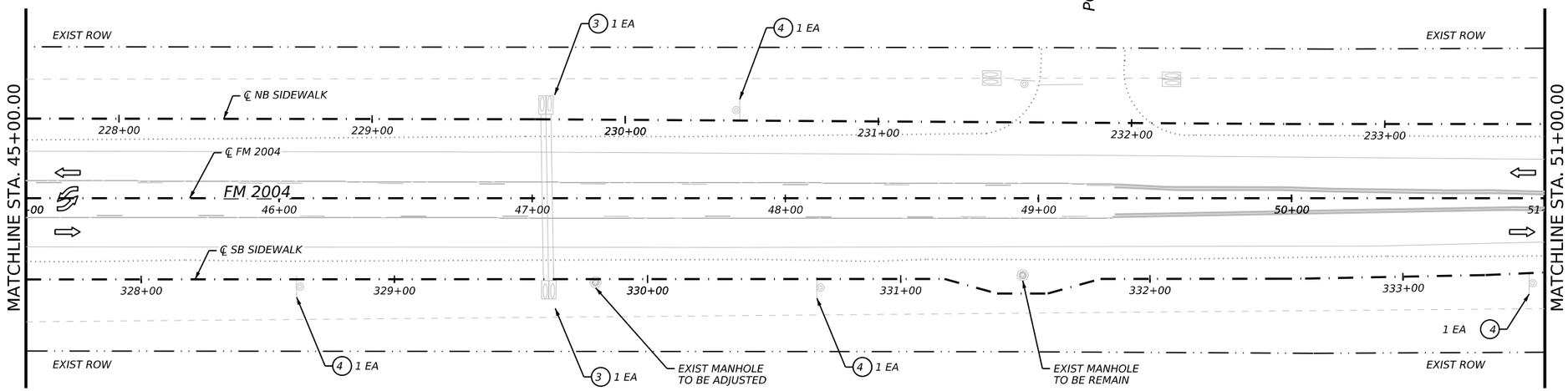
STA 27+00 TO STA 39+00

SHEET 02 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		74

DATE: 5/9/2024 11:09:30 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191010022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 3.dgn





LEGEND

1. REMOVE CONC (SIDEWALK / RAMP)
2. REMOVE CONC (DRIVEWAY)
3. REMOVE STR (HEADWALL)
4. RELOCATE SM RD SIGN SUP & AM
5. REMOVE STR (SET)
6. REMOVE STR (WINGWALL)
7. REM STAB BASE & ASPH PAV (2"-8")
8. REMOVE CONC (RIPRAP)
9. REMOVE CONC (MEDIANS)
10. ELIM EXT PAV MRK & MRKS (6")
11. ELIM EXT PAV MRK & MRKS (12")
12. ELIM EXT PAV MRK & MRKS (24")

DW ## PROPOSED DRIVEWAY NO.

HORZ 0' 25' 50'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

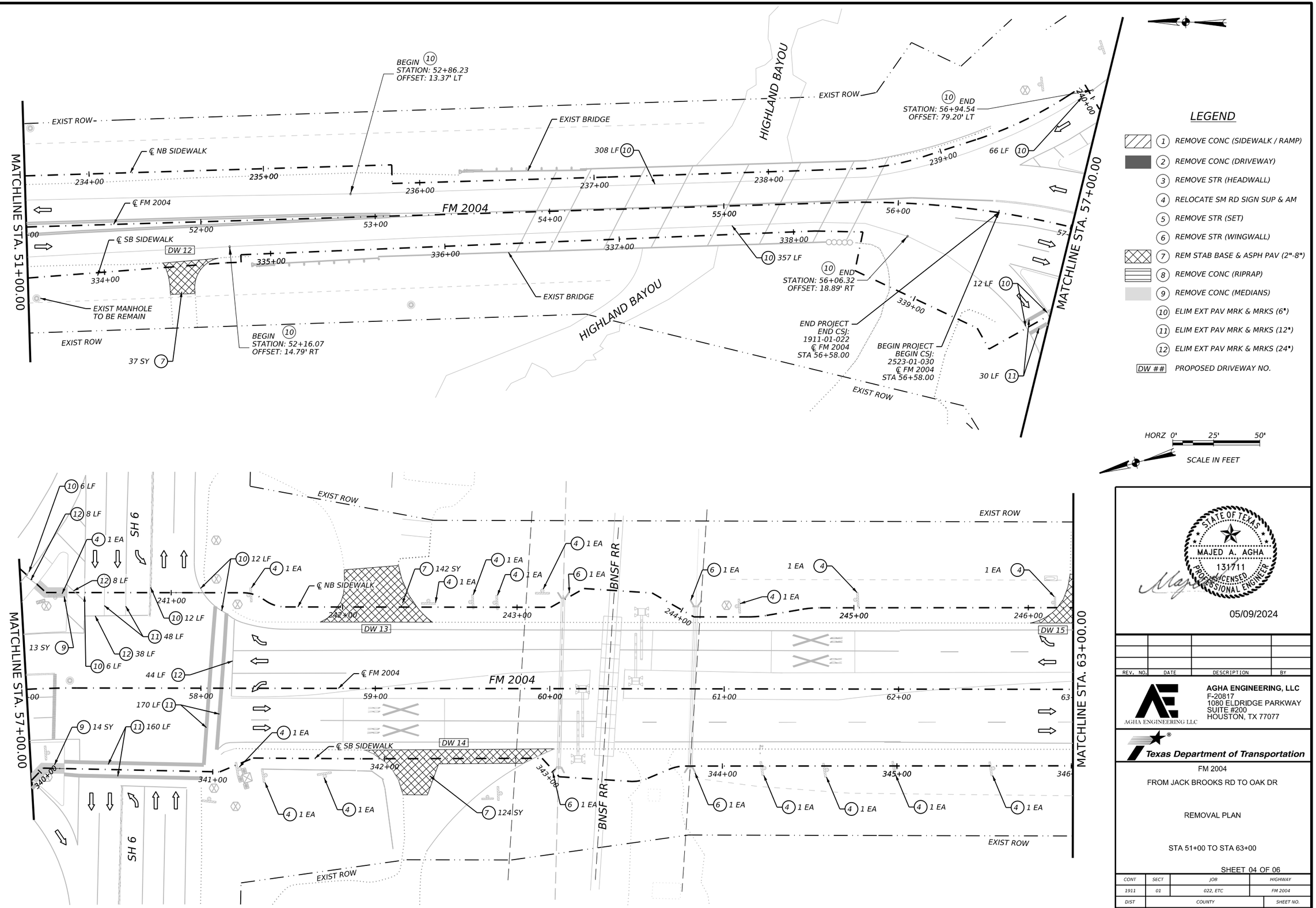
REMOVAL PLAN

STA 39+00 TO STA 51+00

SHEET 03 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		75

DATE: 5/9/2024 11:09:31 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 5.dgn



STATE OF TEXAS
MAJED A. AGHA
131711
PROFESSIONAL ENGINEER
LICENSED
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

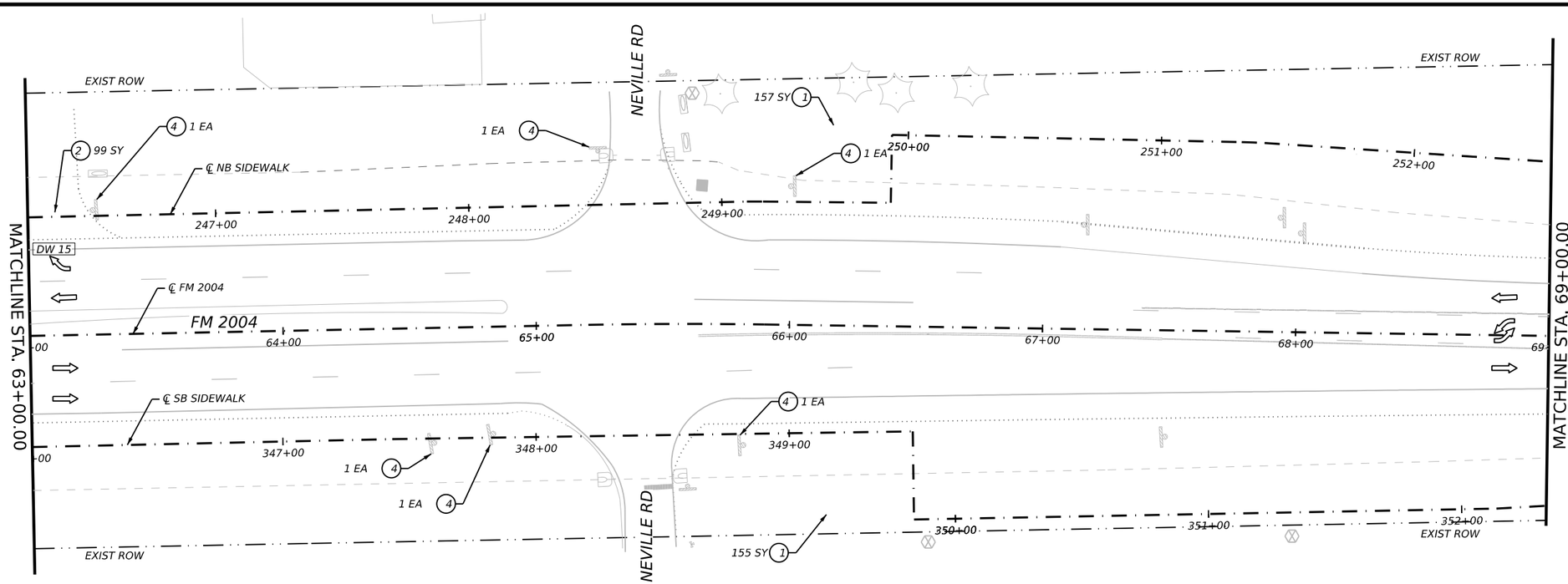
REMOVAL PLAN

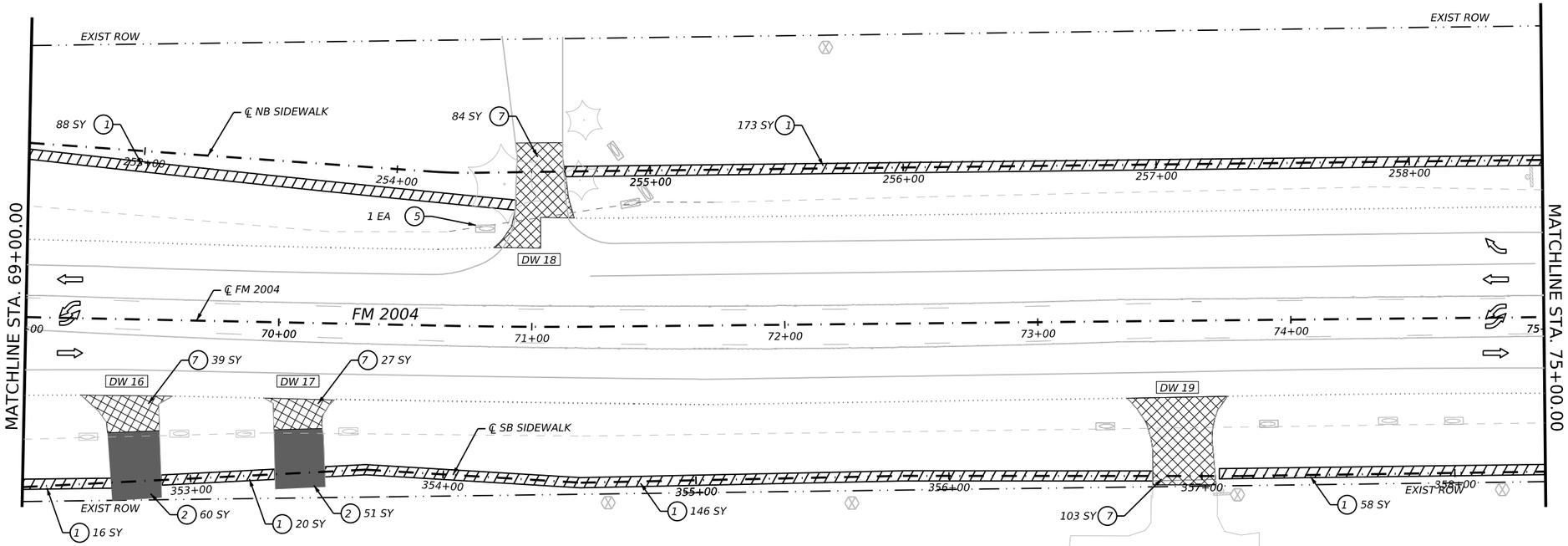
STA 51+00 TO STA 63+00

SHEET 04 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		76

DATE: 5/9/2024 11:09:32 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 7.dgn





HORZ 0' 25' 50'

SCALE IN FEET

LEGEND

1	REMOVE CONC (SIDEWALK / RAMP)
2	REMOVE CONC (DRIVEWAY)
3	REMOVE STR (HEADWALL)
4	RELOCATE SM RD SIGN SUP & AM
5	REMOVE STR (SET)
6	REMOVE STR (WINGWALL)
7	REM STAB BASE & ASPH PAV (2"-8")
8	REMOVE CONC (RIPRAP)
9	REMOVE CONC (MEDIANS)
10	ELIM EXT PAV MRK & MRKS (6")
11	ELIM EXT PAV MRK & MRKS (12")
12	ELIM EXT PAV MRK & MRKS (24")
DW ##	PROPOSED DRIVEWAY NO.

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

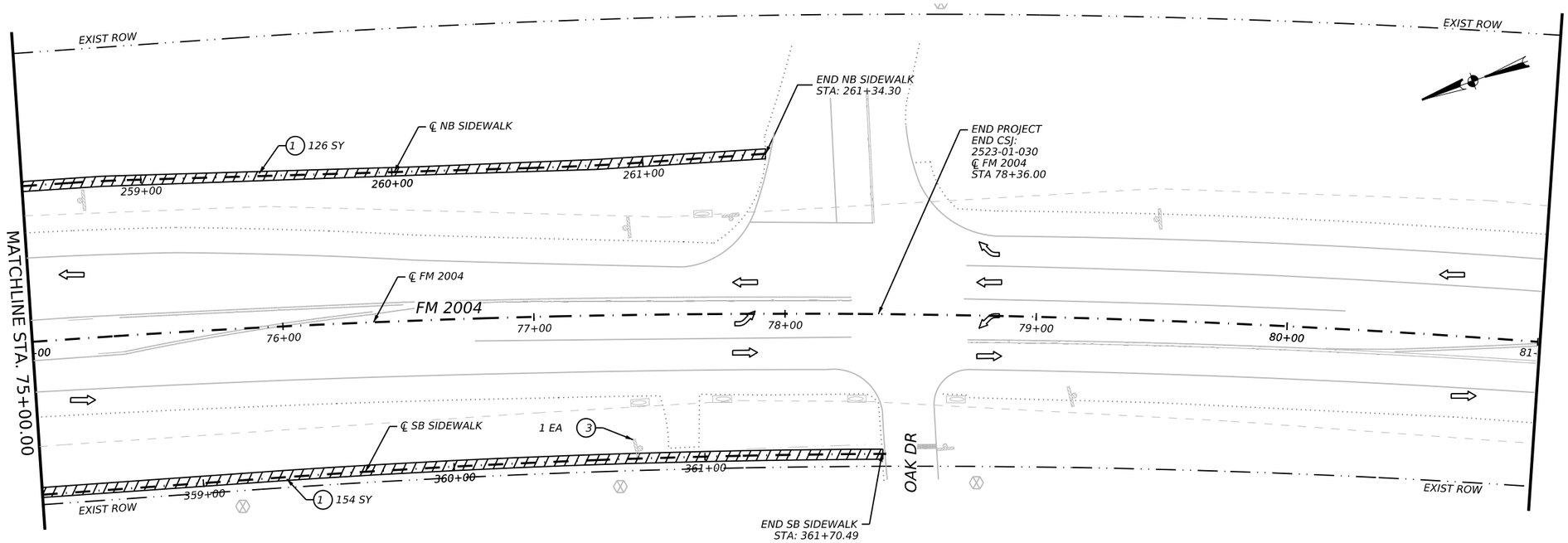
REMOVAL PLAN

STA 63+00 TO STA 75+00

SHEET 05 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		77

DATE: 5/9/2024 11:09:33 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 9.dgn



LEGEND

- 1 REMOVE CONC (SIDEWALK / RAMP)
- 2 REMOVE CONC (DRIVEWAY)
- 3 REMOVE STR (HEADWALL)
- 4 RELOCATE SM RD SIGN SUP & AM
- 5 REMOVE STR (SET)
- 6 REMOVE STR (WINGWALL)
- 7 REM STAB BASE & ASPH PAV (2"-8")
- 8 REMOVE CONC (RIPRAP)
- 9 REMOVE CONC (MEDIANS)
- 10 ELIM EXT PAV MRK & MRKS (6")
- 11 ELIM EXT PAV MRK & MRKS (12")
- 12 ELIM EXT PAV MRK & MRKS (24")
- DW ## PROPOSED DRIVEWAY NO.

HORZ 0' 25' 50'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

REMOVAL PLAN

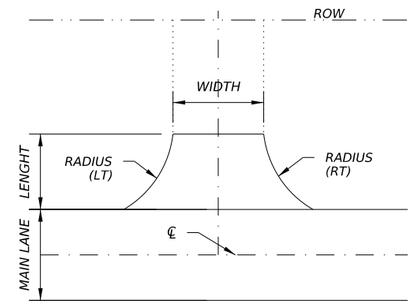
STA 75+00 TO END

SHEET 06 OF 06

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		78

DATE: 5/9/2024 5:47:09 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Removal\Removal - Plan 11.dgn

DRIVEWAY NUMBER	FM 2004 NORTH/SOUTH	EXISTING DRIVEWAYS & INTERSECTION		PROPOSED DRIVEWAY															
		STATION	SURFACE TYPE	LT RADIUS	RT RADIUS	WIDTH	LENGTH	ITEM 530 6005 DRIVEWAYS (CONC)	ELEVATION AT EOP	FACE OF SIDEWALK ELEVATION	BACK OF SIDEWALK ELEVATION	ELEVATION AT TIE TO EXISTING PAVEMENT	EL AT CL	D1 EOP TO FACE OF SIDEWALK	D2 SIDEWALK	D3 BACK OF SIDEWALK TO END	S1 EOP TO FACE OF SIDEWALK	S2 SIDEWALK	S3 BACK OF SIDEWALK TO END
				FT	FT	FT	FT	SY	FT	FT	FT	FT	FT	FT	FT	FT	%	%	%
1	NORTH	18+60.15	CONC	25.00	25.00	20.00	34.23	106	14.16	14.01	13.89	12.02	15.26	4.2	6	23.88	3.57%	2.00	7.83
2	NORTH	19+69.3	CONC	15.00	15.00	10.00	34.23	49	14.17	14.02	13.9	12.07	15.18	3.26	6	24.98	4.60%	2.00	7.33
3	NORTH	20+32.92	CONC	15.00	15.00	19.00	27.50	69	14.24	14.07	13.95	12.3	15.17	3.49	6	18.01	4.87%	2.00	9.16
4	NORTH	20+87.98	CONC	15.00	15.00	12.00	26.37	46	14.23	14.02	13.9	12.49	15.08	3.49	6	16.03	6.02%	2.00	8.80
5	NORTH	21+45.38	CONC	15.00	15.00	12.00	29.69	50	14.16	14.17	14.05	12.35	14.99	4.24	6	19.4	-0.24%	2.00	8.76
6	NORTH	25+82.58	CONC / ASPH	15.00	15.00	13.00	30.59	55	13.77	13.72	13.6	11.26	14.8	4.54	6	20.02	1.10%	2.00	11.69
7	NORTH	30+06.14	CONC	30.00	30.00	48.00	34.33	230	14.29	14.16	14.04	13.99	14.44	3.76	6	25.18	3.46%	2.00	0.20
8	NORTH	33+78.42	CONC	30.00	30.00	26.00	33.39	139	14.23	14.15	14.03	13.97	14.72	2.67	6	21.4	3.00%	2.00	0.28
9	NORTH	35+30.92	GRAVEL	25.00	25.00	28.00	31.78	129	13.68	13.21	13.09	11.42	14.6	5.84	6	19.93	8.05%	2.00	8.38
10	NORTH	37+13.29	CONC / ASPH	15.00	15.00	19.00	30.66	76	13.65	13.55	13.43	10.86	14.48	1.1	6	23.55	9.09%	2.00	10.91
11	NORTH	40+70.96	CONC	15.00	15.00	15.00	24.94	54	14.02	13.83	13.71	11.95	14.52	5	6	13.94	3.80%	2.00	12.63
12	NORTH	51+88.45	CONC	15.00	15.00	14.00	18.68	40	13.95	13.86	13.74	12.51	14.54	0	6	12.94	N/A	2.00	9.51
13	SOUTH	58+98.52	CONC	30.00	30.00	30.60	32.20	149	13.12	13	12.88	12.68	13.95	8	6	20.59	1.50%	2.00	0.97
14	SOUTH	59+23.04	CONC	25.00	25.00	14.00	25.84	70	13.45	13.4	13.28	13.02	14.71	2.13	6	17.7	2.35%	2.00	1.47
15	SOUTH	63+08.7	CONC	25.00	25.00	22.00	28.00	98	13.02	12.60	12.48	12.1	13.89	5.88	6	16.11	7.14%	2.00	2.36
16	SOUTH	69+43.52	CONC / ASPH	25.00	25.00	18.00	41.25	112	12.35	11.38	11.26	11.52	13.22	30.88	6	4.4	3.14%	2.00	-5.91
17	SOUTH	70+07.92	CONC / ASPH	25.00	25.00	18.00	39.25	108	12.31	11.72	11.6	11.79	13.15	26.45	6	6.8	2.23%	2.00	-2.79
18	SOUTH	71+03.88	CONC	30.00	30.00	18.00	42.13	115	12.97	12.55	12.43	12.61	13.19	27.66	6	8.5	1.52%	2.00	-2.12
19	SOUTH	73+57.25	CONC	25.00	25.00	25.00	35.25	128	12.08	11.29	11.17	11.45	13.22	28	6	1.15	2.82%	2.00	N/A



TYPICAL DRIVEWAY MODIFICATION DETAIL B

NTS
SEE PLAN & PROFILE SHEETS FOR PROPOSED DRIVEWAY GEOMETRY TO MATCH EXISTING

NOTE:
1. DIMENSIONS SHOWN ARE FOR CONTRACTORS INFORMATION ONLY. PRIOR TO THE REMOVAL OF EXISTING DRIVEWAYS, VERIFY DIMENSIONS OF EXISTING DRIVEWAYS AND ALERT THE ENGINEER IMMEDIATELY IF THERE IS DISCREPANCY BETWEEN THE EXISTING AND PROPOSED DRIVEWAY WIDTHS. MATCH EXISTING DRIVEWAY WIDTH UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77074

Texas Department of Transportation

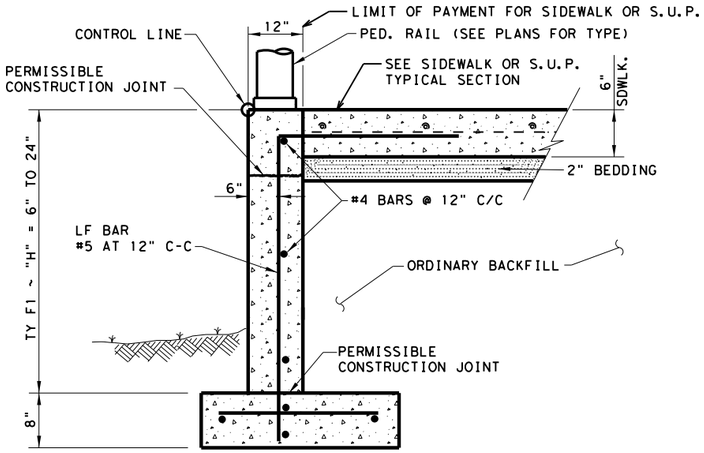
FM 2004

FROM JACK BROOKS RD TO OAK DR

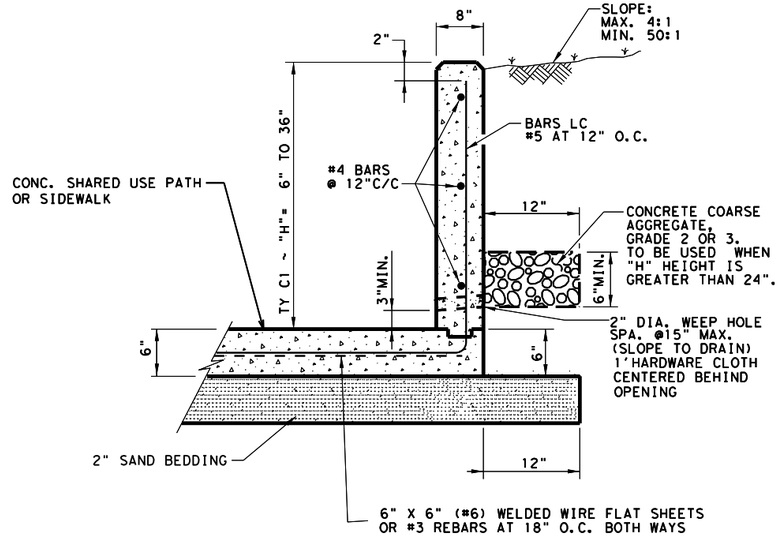
DRIVEWAY TABLE

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		79

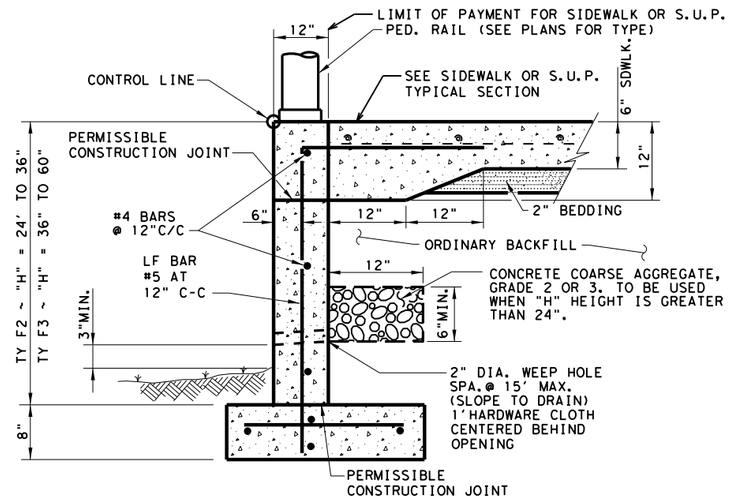
DATE: 5/9/2024 11:09:34 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Driveway Table\Driveway Table.dgn



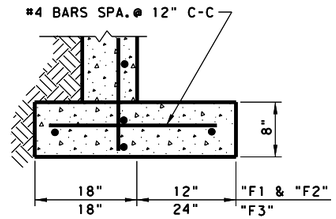
CONC CURB (TY F1)‡



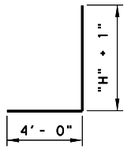
TYPE "C1" CURB



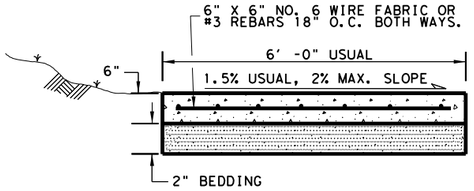
CONC CURB (TY F2) & (TY F3)‡



FOOTING DETAIL



BAR LC



TYPICAL SIDEWALK SECTION

GROOVED JOINTS IN THE SIDE WALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE 3/4" EXPANSION JOINTS AT A MAX. SPACING OF 60' AND TO COINCIDE WITH THE CURB EXP. JOINTS.

CONCRETE CURB NOTES:
All Concrete, including adjacent sidewalk or S.U.P., shall be Class "C".
All Reinforcing Steel shall be Grade 60.
Minimum 4' sidewalk width for CONC CURB (TYPES C1 & C2).

Until the sidewalk is complete, lateral support for the "F" curbs will be required.

ALL WORK SHOWN BEYOND TYPICAL SIDEWALK, S.U.P., AND PED RAIL IS SUBSIDIARY.

DESIGN SOIL PARAMETERS:
Soil Unit Wt.= 120 pcf
Phi = 30 Degrees
Cohesion = 50 psf
Min. PI = 15
Max. PI = 30
SURCHARGE:
TYPE F CURB q = 2' Adjacent to sidewalk
Max. slope behind TYPE C Curb = 4:1
Min. Factor of Safety against sliding is 1.5.
Designed in accordance with current AASHTO Standards and Interim Specifications.

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED PROFESSIONAL ENGINEER
05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

MISCELLANEOUS SIDEWALK DETAILS

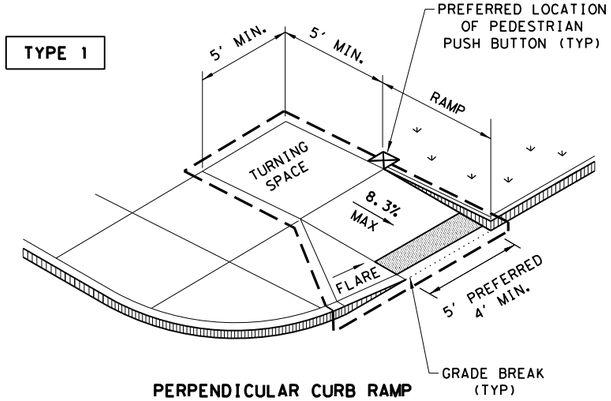
SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		79A

DATE: 5/9/2024 12:10:52 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Standards\Roadway Standards\Miscellaneous Sidewalk Details.dgn

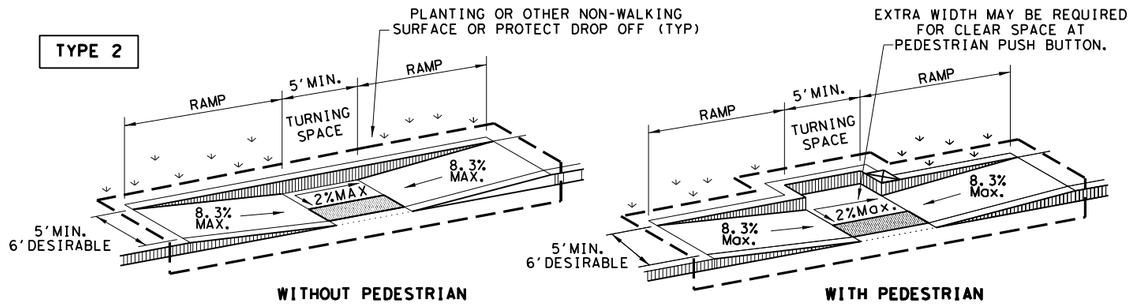
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\ped18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

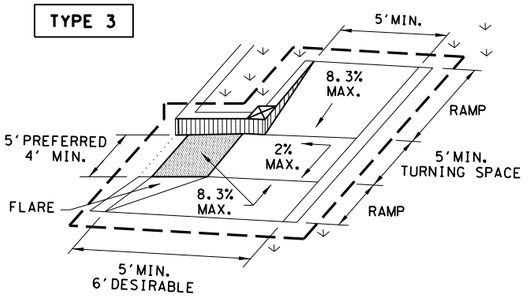


WITHOUT PEDESTRIAN PUSH BUTTON

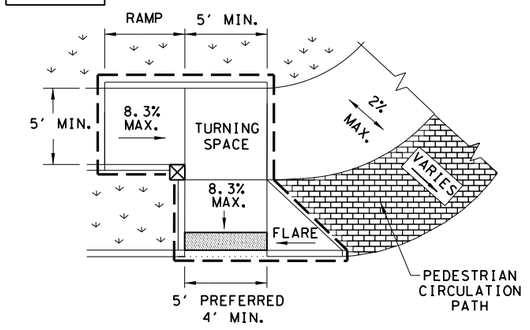
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

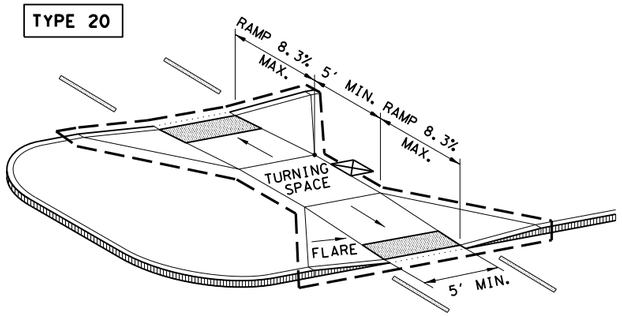


TYPE 6



COMBINATION CURB RAMPS

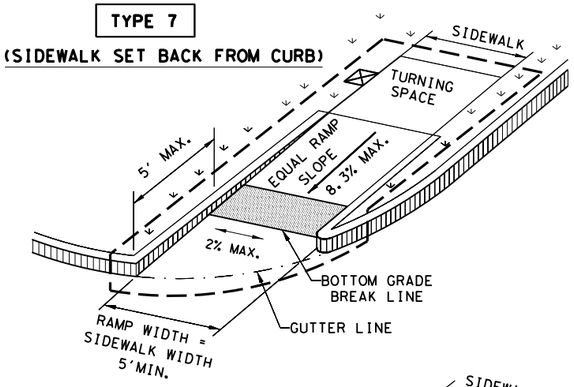
TYPE 20



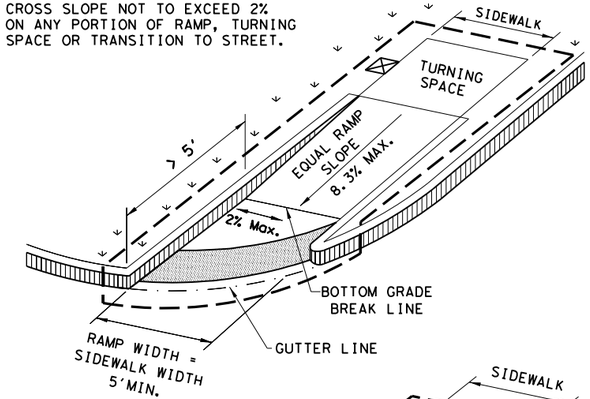
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

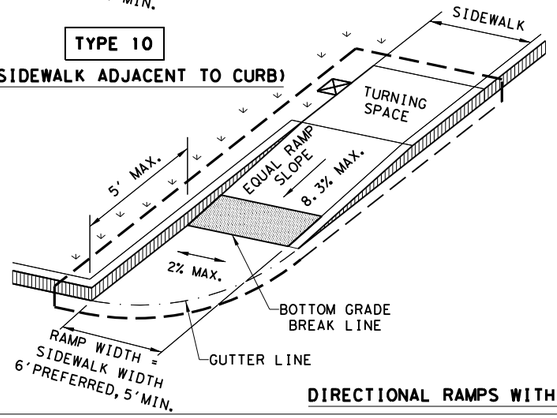


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

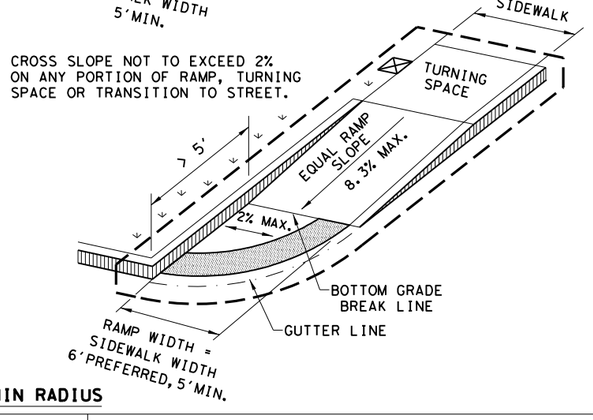


TYPE 10

(SIDEWALK ADJACENT TO CURB)

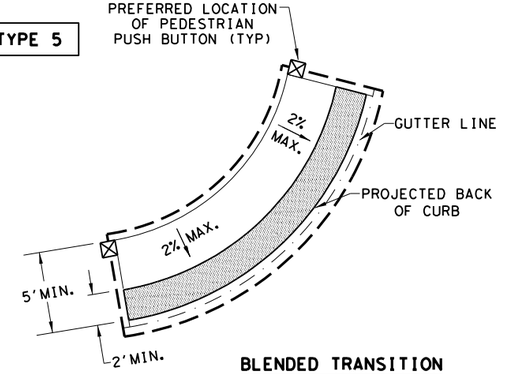


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

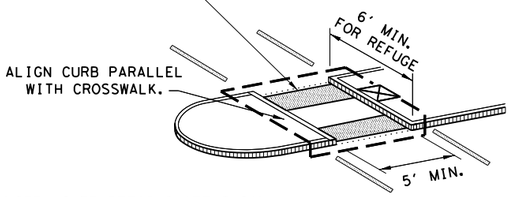
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

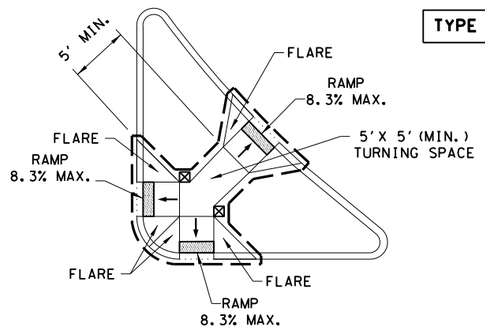
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



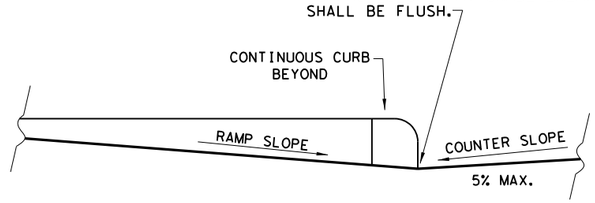
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		80

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\ped18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

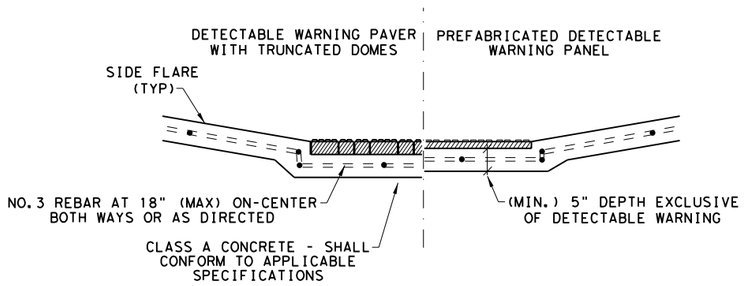
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

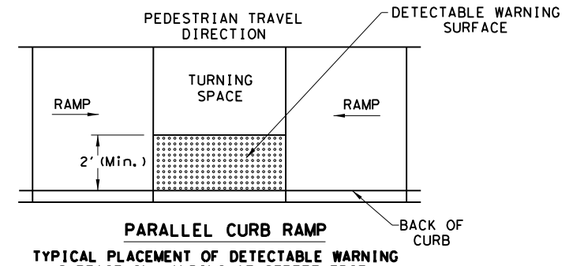
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

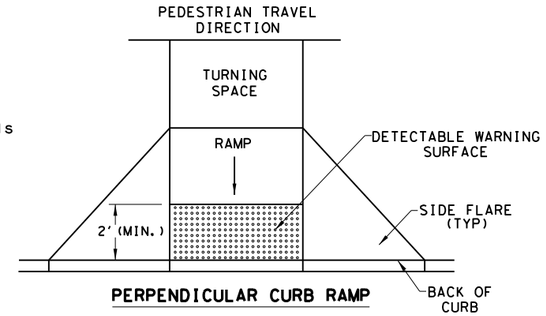


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

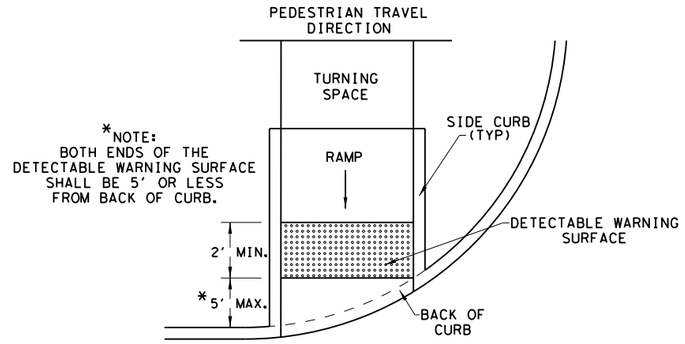
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

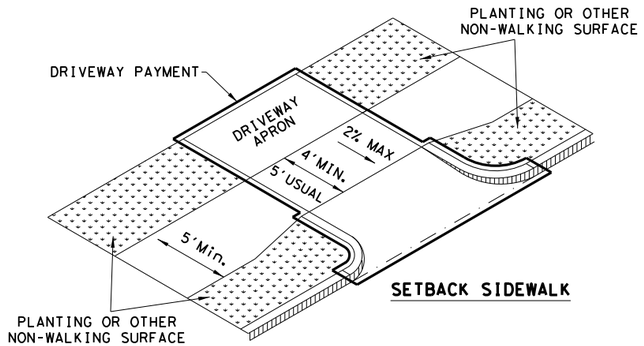
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

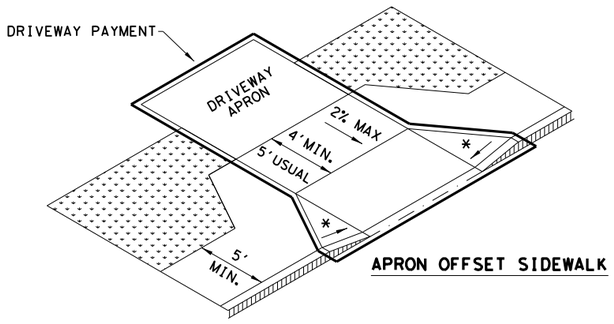
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	1911	01	022, ETC		FM 2004
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	GALVESTON			81

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\ped18.dgn

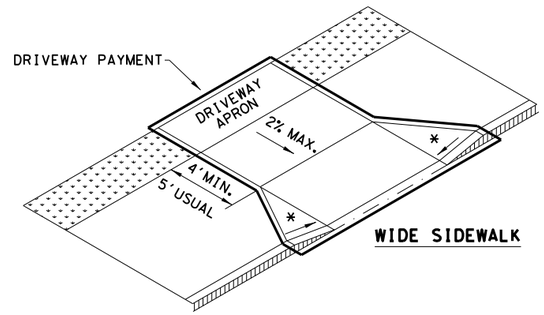
SIDEWALK TREATMENT AT DRIVEWAYS



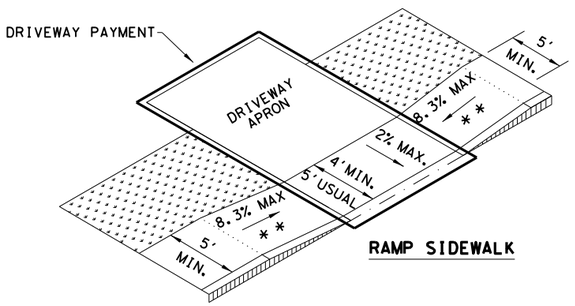
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

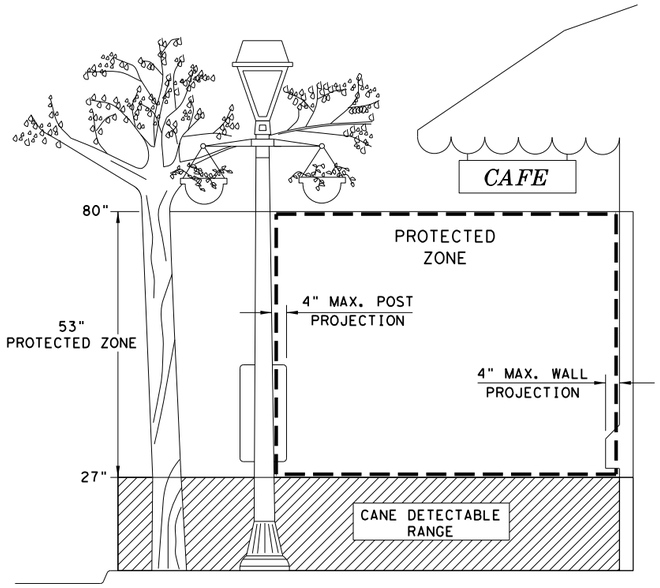


RAMP SIDEWALK

NOTES:

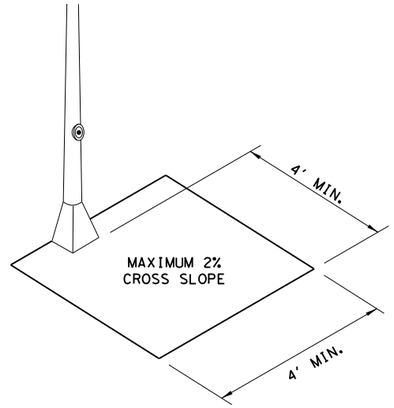
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

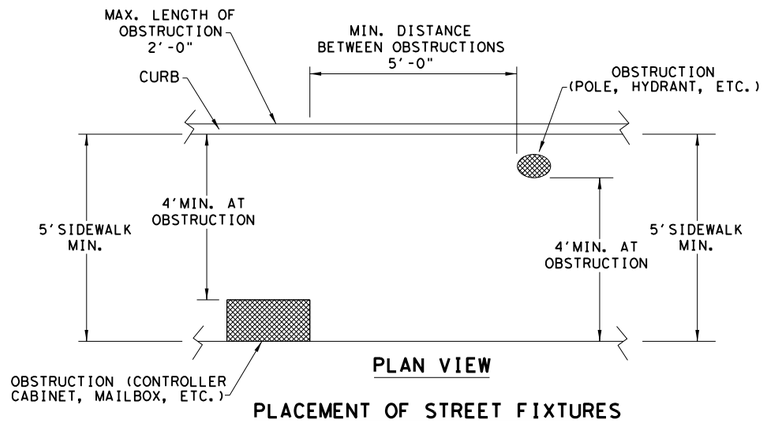


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



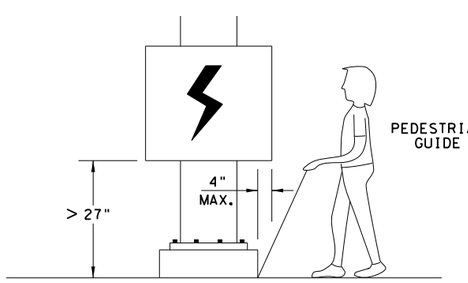
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



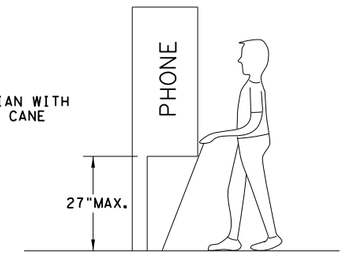
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

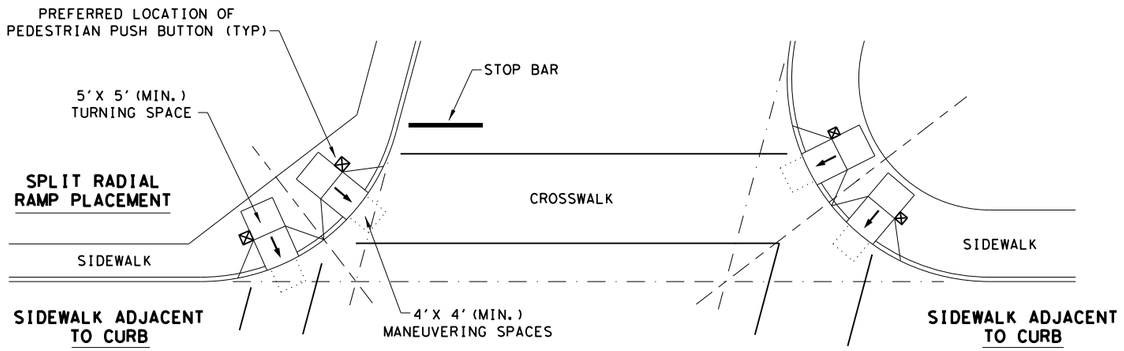
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1911	01	022, ETC	FM 2004	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	HOU	GALVESTON		82	

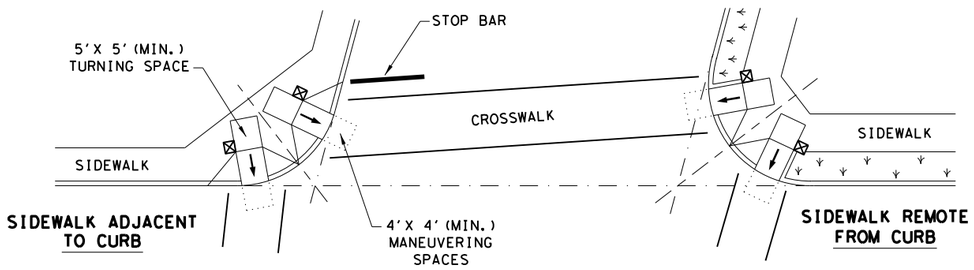
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\ped18.dgn

TYPICAL CROSSING LAYOUTS

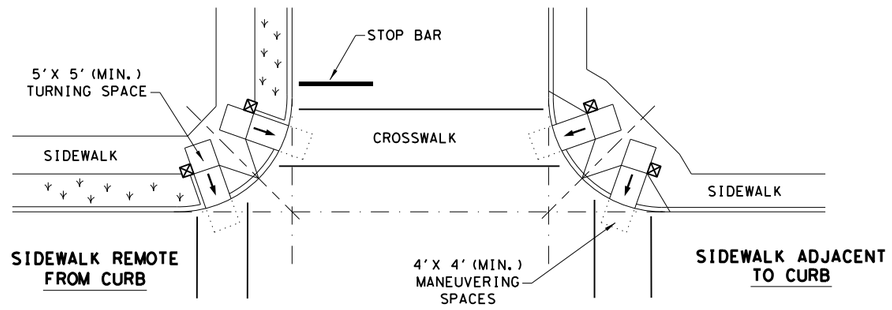
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



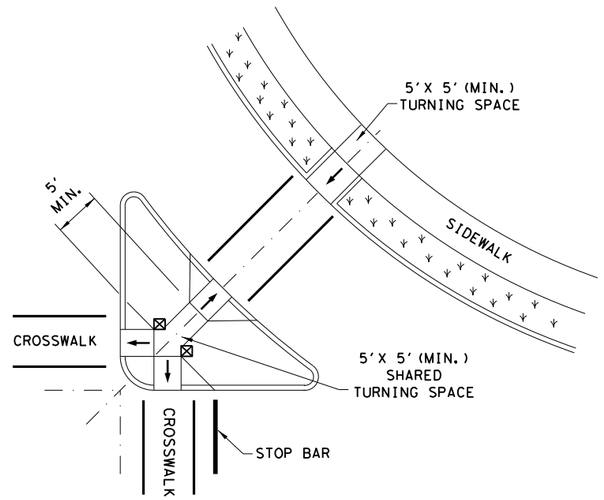
SKEWED INTERSECTION WITH "LARGE" RADIUS



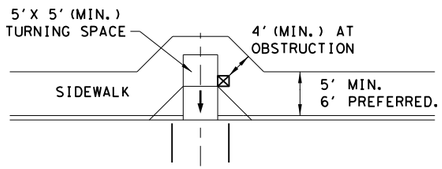
SKEWED INTERSECTION WITH "SMALL" RADIUS

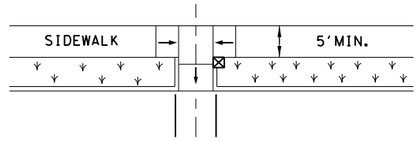


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

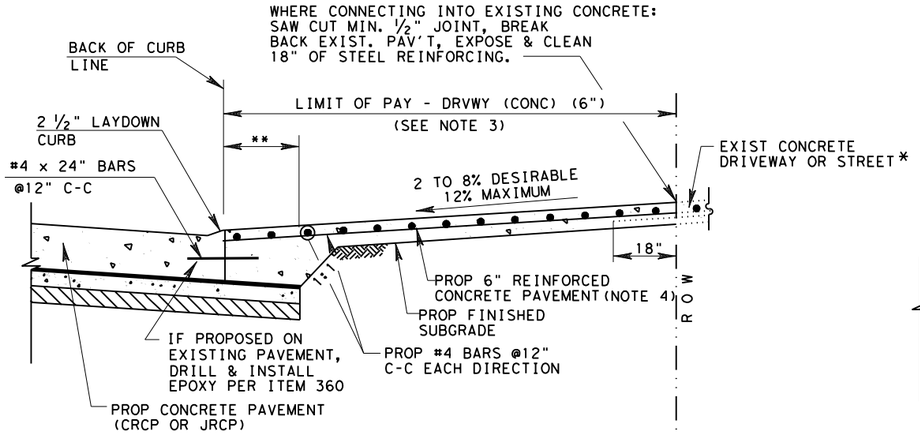
Texas Department of Transportation

Design Division Standard

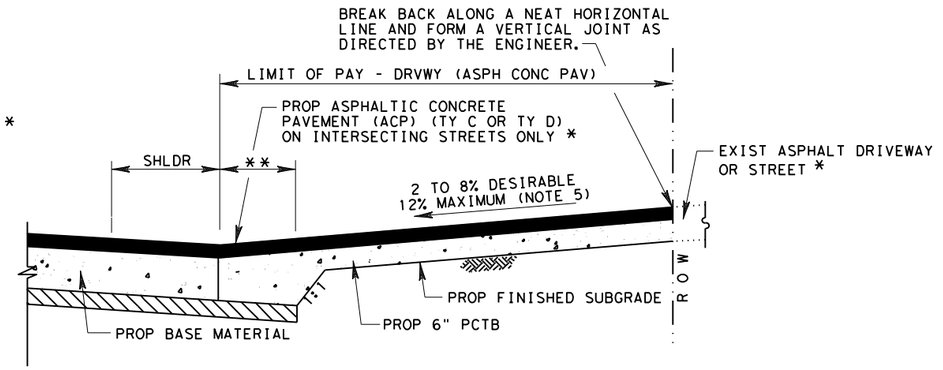
PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	1911	01	022, ETC		FM 2004
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	GALVESTON			83



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE
CURB AND GUTTER ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ PCTB AT ASPHALT ROADWAY

NOTES:

1. ALSO SEE SHEET 2 OF 2 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
3. FAST TRACK CONCRETE IS PAID AS DRVWY (CONC) (FAST TRACK).
4. THICKNESS OF DRIVEWAY IS 6 INCHES FOR REGULAR AND FAST TRACK CONCRETE.
5. MAXIMUM SLOPE IS: 12% RESIDENTIAL
   8% OTHERS

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

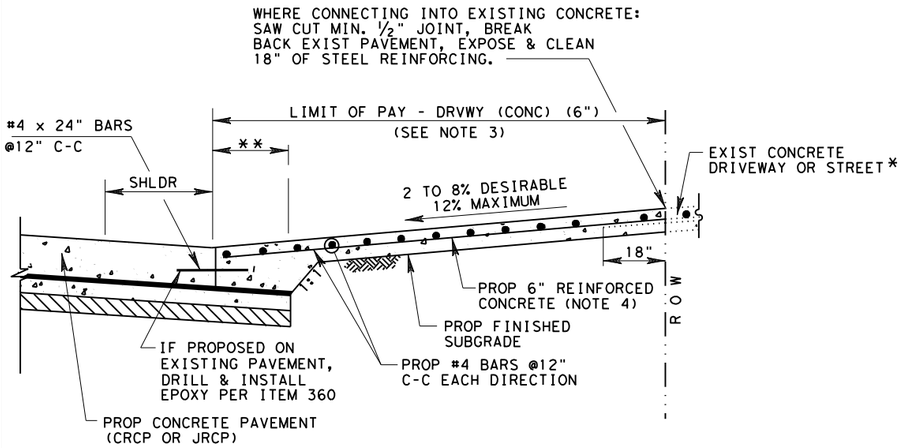
JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

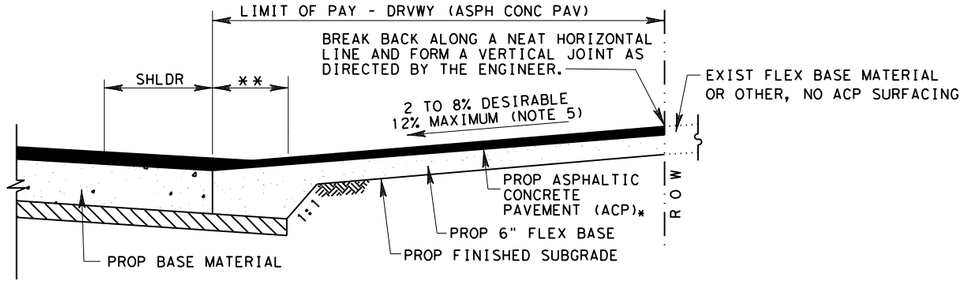
ACP- ASPHALTIC CONCRETE PAVEMENT

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS FOR REINFORCING STEEL AND SECTION REQUIREMENTS.

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ FLEX BASE AT ASPHALT ROADWAY

SHEET 1 OF 3

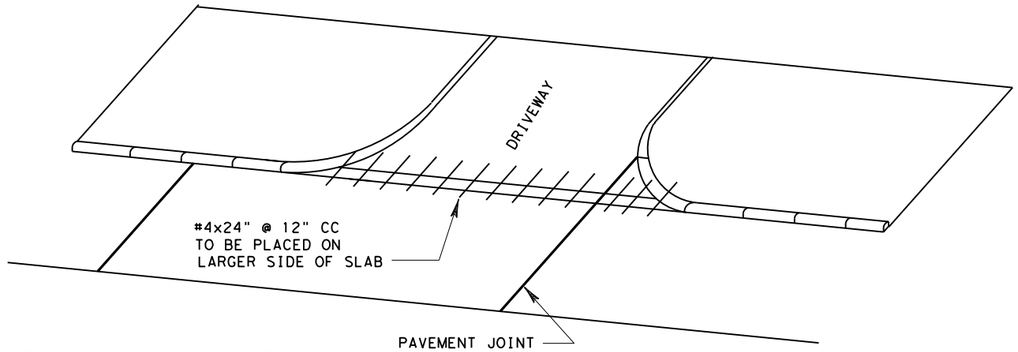
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

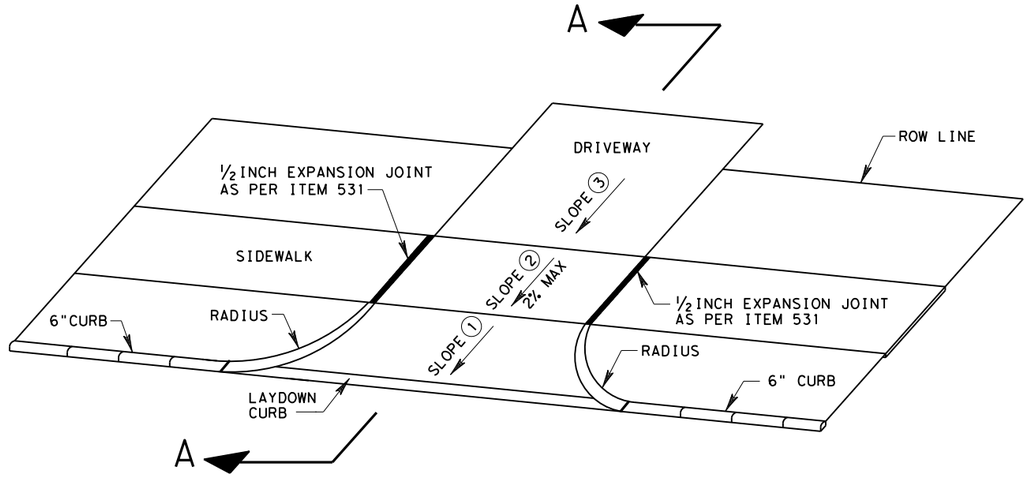
DD

FILE: STDB-8a.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				84
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC.	FM 2004

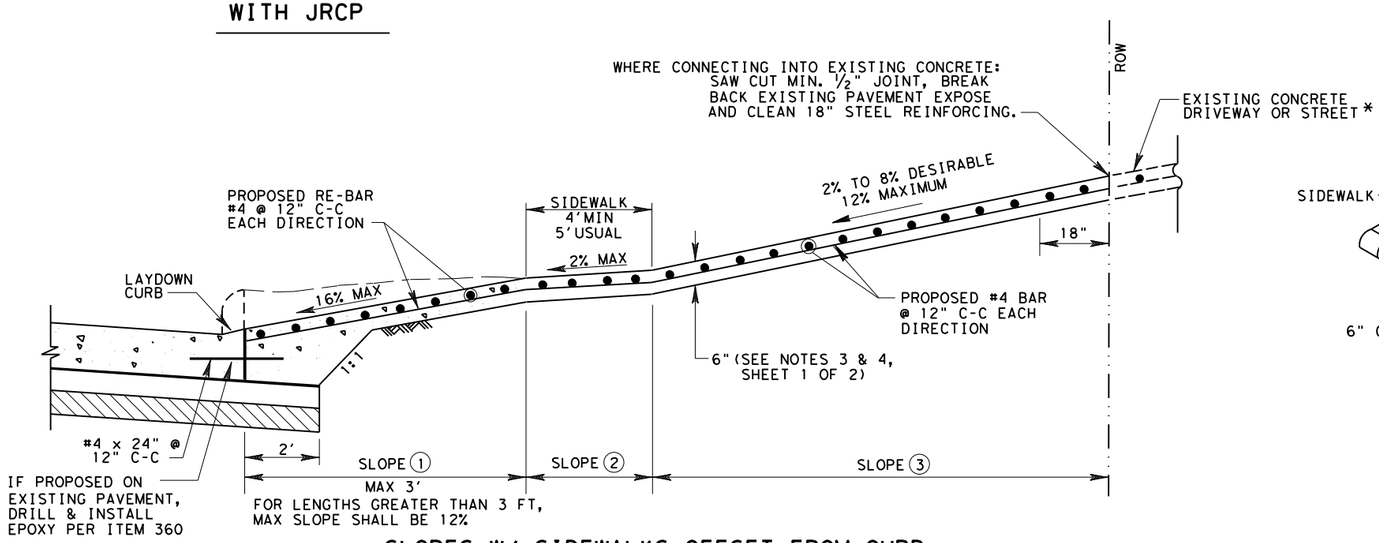
STDB8A



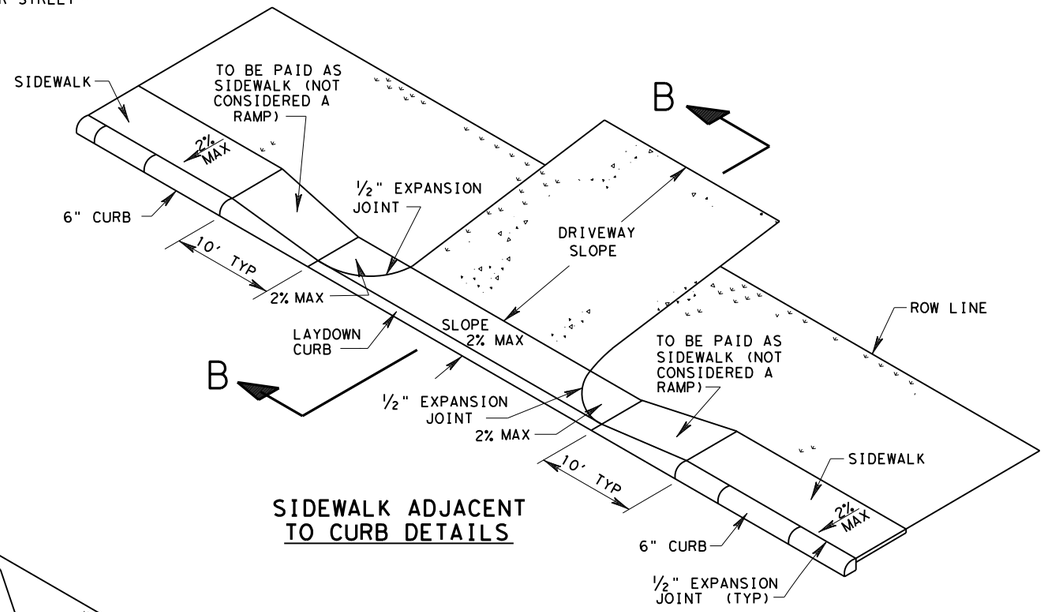
TIE BAR PLACEMENT WITH JRCP



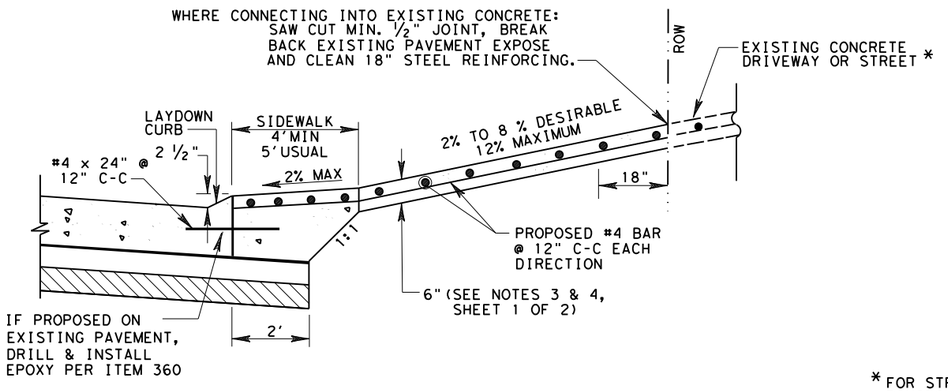
SIDEWALK OFFSET FROM CURB DETAILS



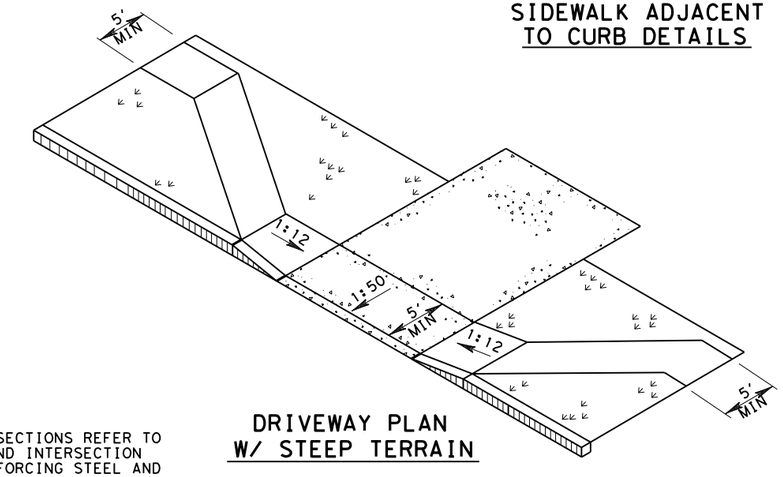
SLOPES W/ SIDEWALKS OFFSET FROM CURB (SECTION A-A)



SIDEWALK ADJACENT TO CURB DETAILS



DRIVEWAY SLOPES W/ SIDEWALKS ADJACENT TO CURB (SECTION B-B)



DRIVEWAY PLAN W/ STEEP TERRAIN

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS FOR REINFORCING STEEL AND SECTION REQUIREMENTS.

SHEET 2 OF 3

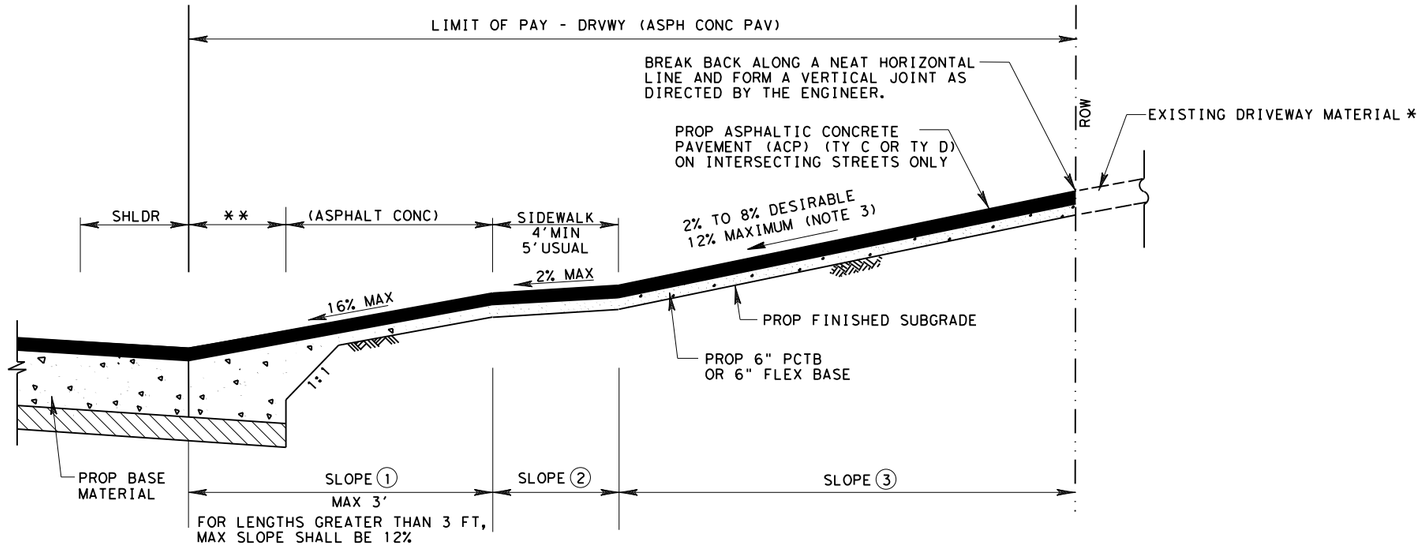
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

FILE: STDB-8b.dgn	DN:	CK:	DW:	CK:
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 9/09 ADDED NOTE FOR ITEM 360. 1/15 ADDED NOTE FOR PCTB	HOU	6		85
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC	FM 2004

STDB8B



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS OFFSET

NOTES:

1. ALSO SEE SHEET 2 OF 3 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
3. MAXIMUM SLOPE IS: 12% RESIDENTIAL 8% OTHERS

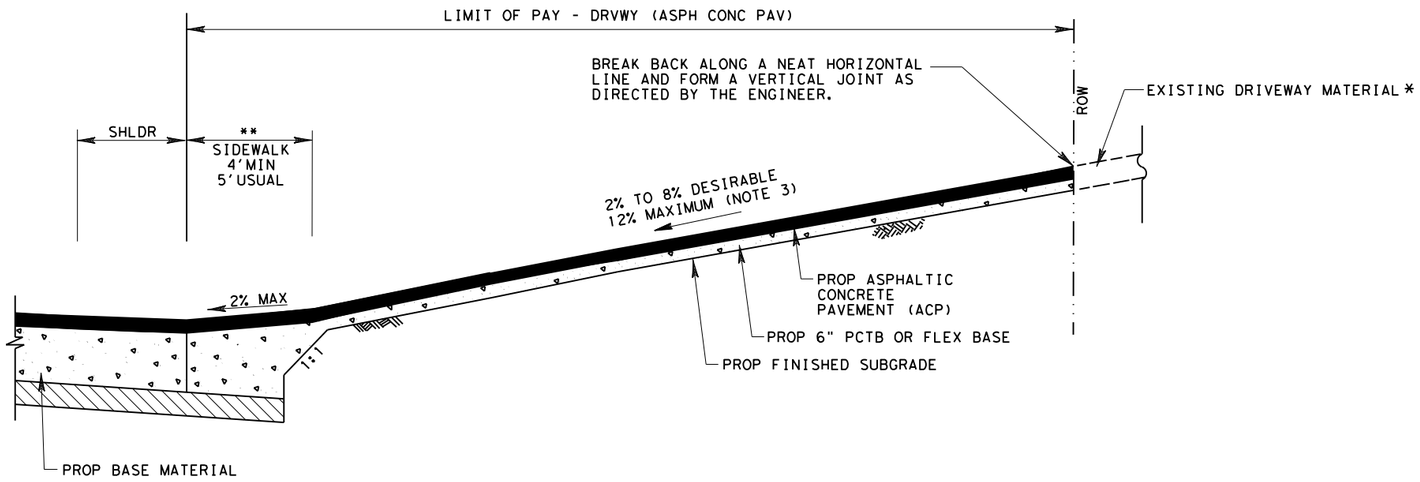
LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

ACP- ASPHALTIC CONCRETE PAVEMENT

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS.

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS ADJACENT

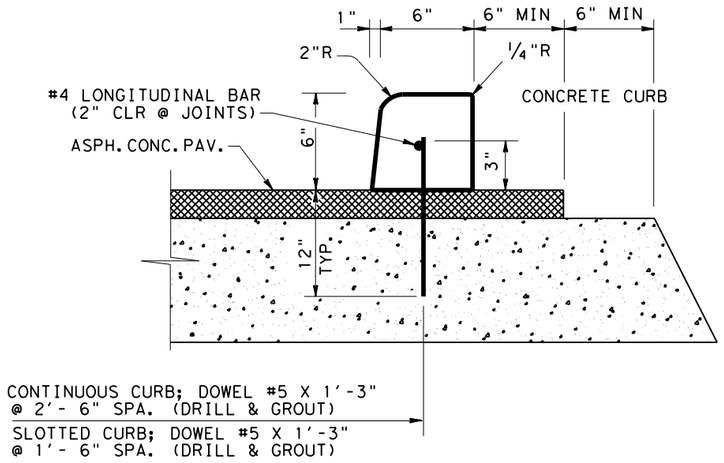
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

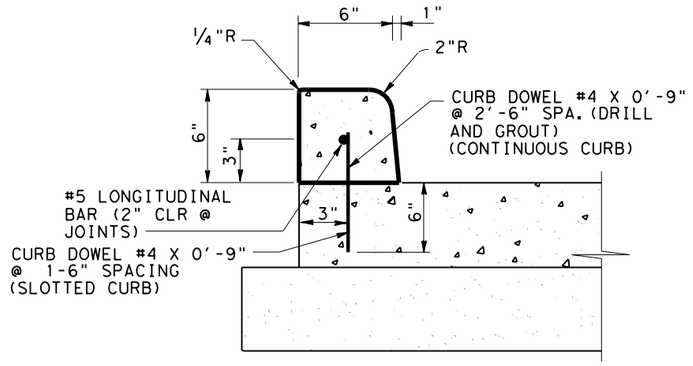
FILE: STDB-8c.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				86
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC.	FM 2004

STDB8C



SHOWN ON EXISTING OR PROPOSED ACP PAVEMENT

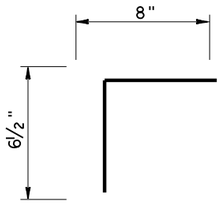
(PAY ITEM 529-6011) - FOR CONTINUOUS



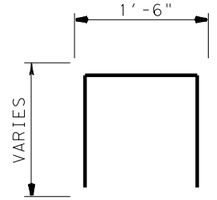
SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

(PAY ITEM 529-6011) - FOR CONTINUOUS

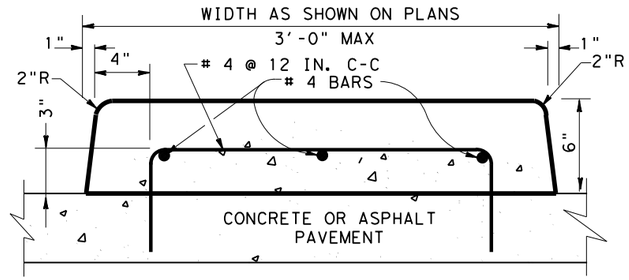
CONCRETE CURB (DOWEL) (6 IN.)



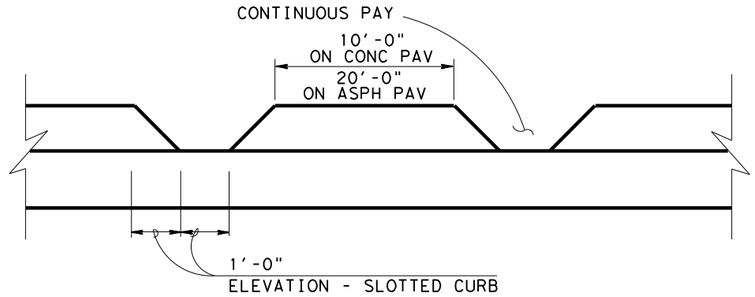
BAR K
#4



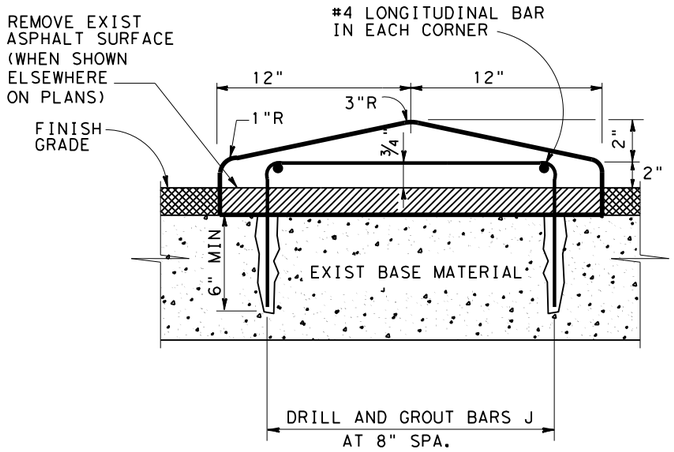
BAR J
#4



ITEM 536-6001 CONCRETE MEDIAN
SEE NOTE 2

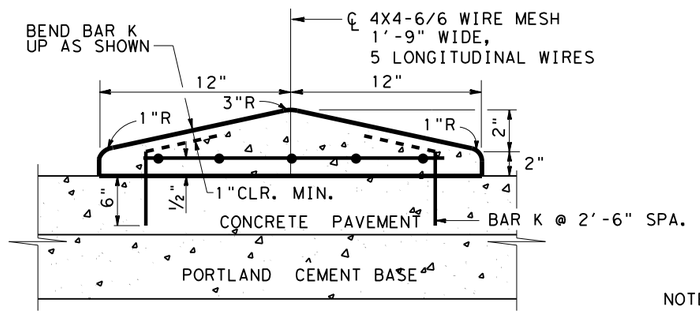


ITEM 529-6012 CONCRETE CURB (SLOTTED) - ON CONC.
ITEM 529-6009 CONC CURB (DOWEL)(SLOTTED) - ON ASPH.



SHOWN ON EXISTING ACP PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND



SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND

NOTES:

1. DRILL AND GROUT BARS SHOWN AS PER ITEM 420.4.7.10, 6" EMBEDMENT, MINIMUM ON CONC.
2. INSTALL A 2 INCH DRAINAGE OPENING AT 10 FT C-C WHEN CURB/ISLAND IS NOT ON TOP OF CROSS SECTION. (LOCATED ON A 2 OR 3 PERCENT TRANSVERSE GRADE, OR SUPERELEVATION.)

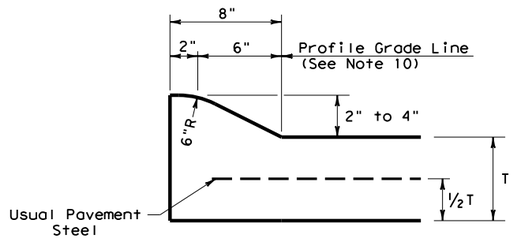
CONCRETE DIRECTIONAL ISLAND

Texas Department of Transportation
Houston District

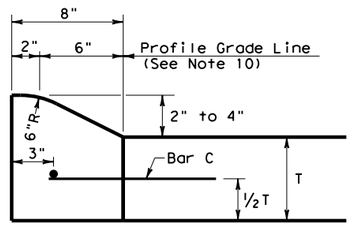
CONCRETE CURB AND DIRECTIONAL ISLAND DETAILS CC & DID

FILE: STDB-9.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		87
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC	FM 2004

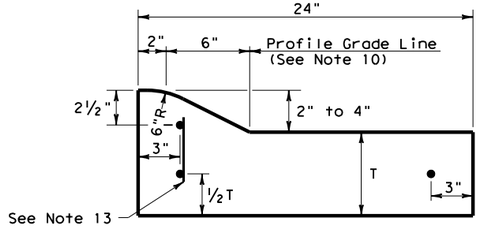
5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\cccg22.dgn



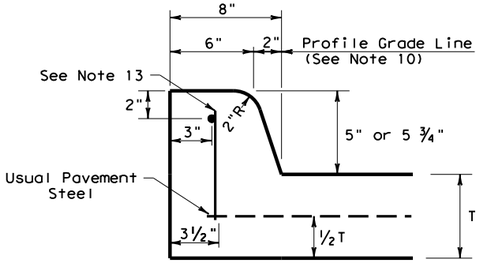
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



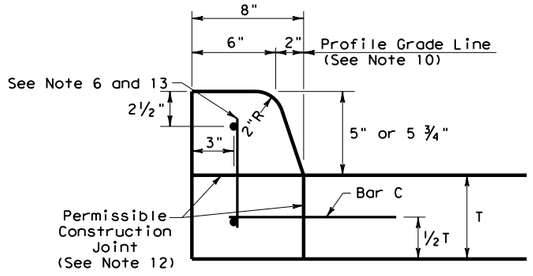
TYPE I CURB
2" - 4" HEIGHT



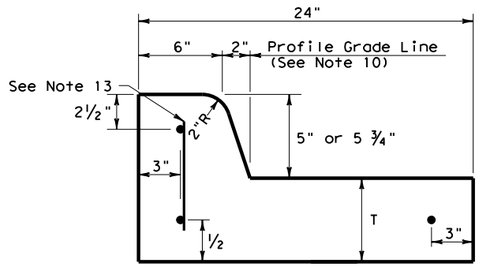
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



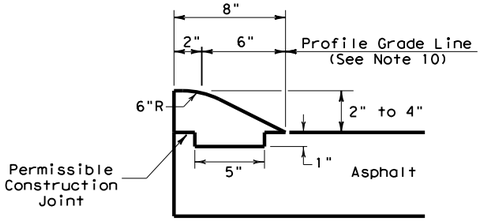
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



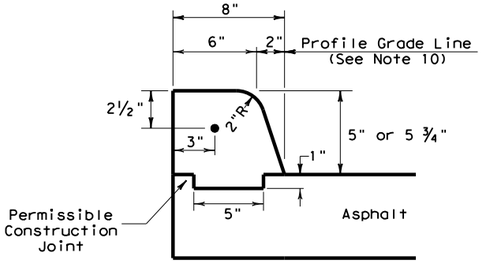
TYPE II CURB
5" - 5 ¾" HEIGHT



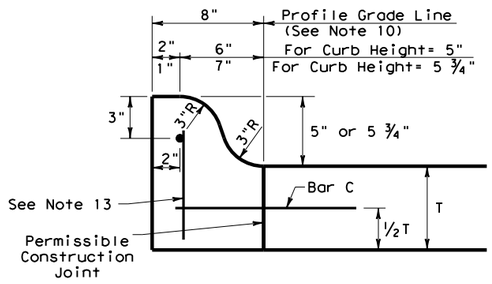
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



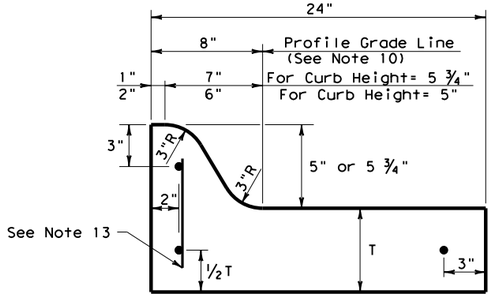
TYPE III CURB (KEYED)
2" - 4" HEIGHT



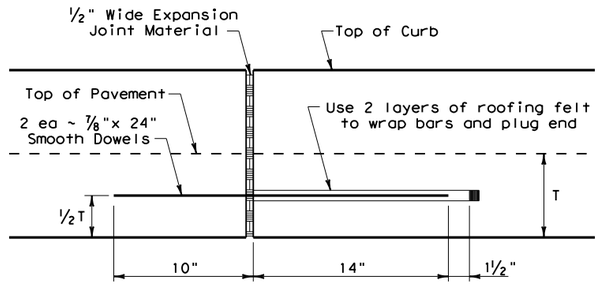
TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

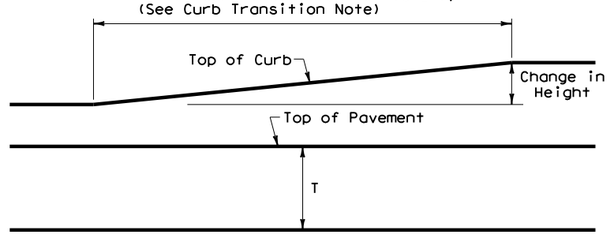


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

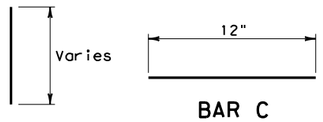
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. 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."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. 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.
7. 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.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. 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.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

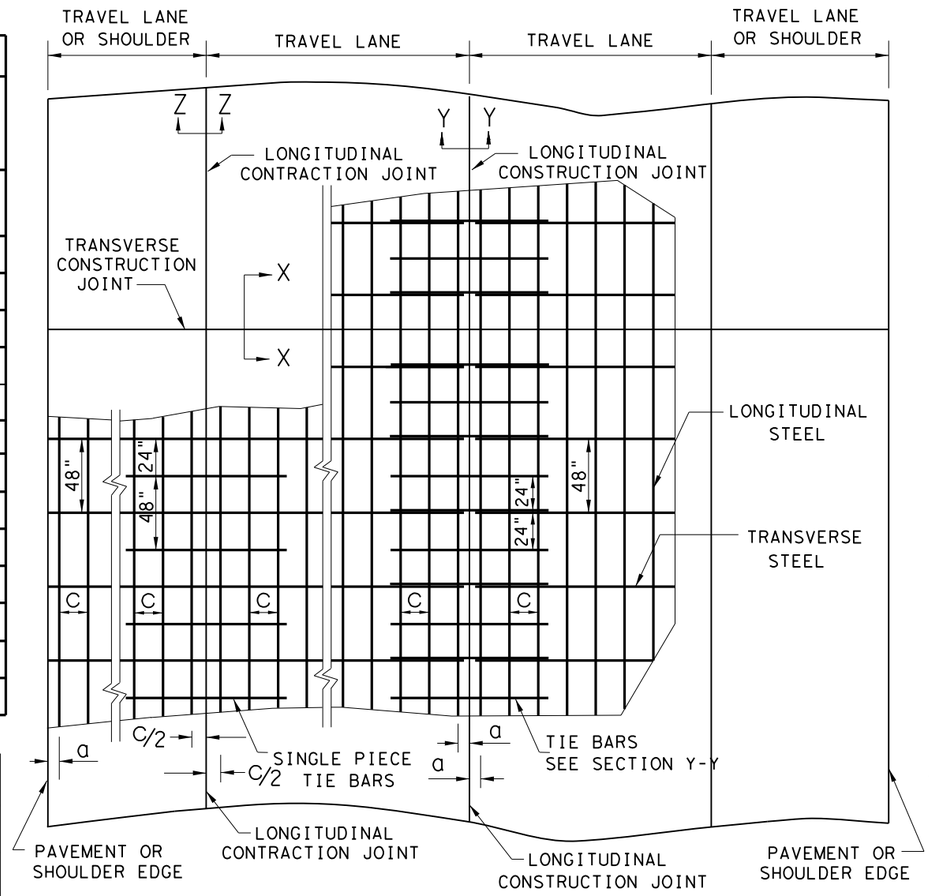
CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		88

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 CONSTRUCTION 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

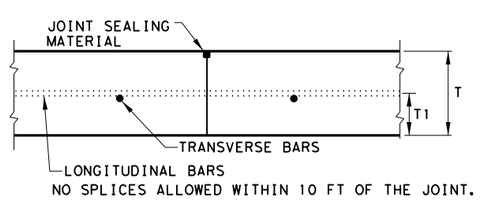


TYPICAL PAVEMENT LAYOUT

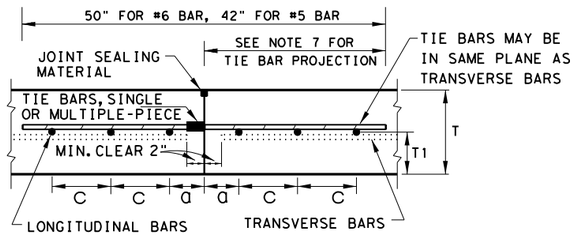
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

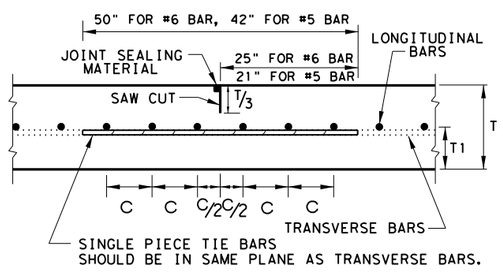
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO. 1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

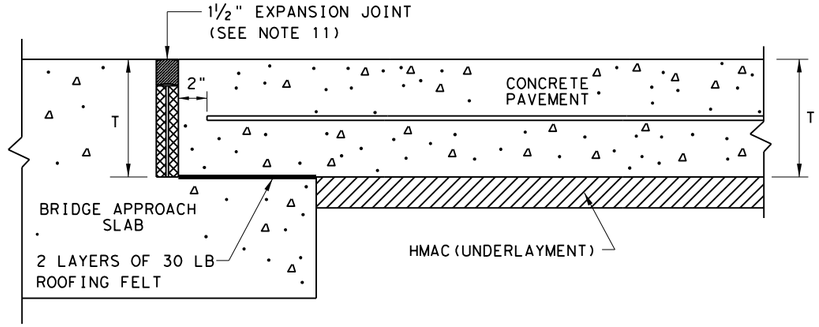
ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-23

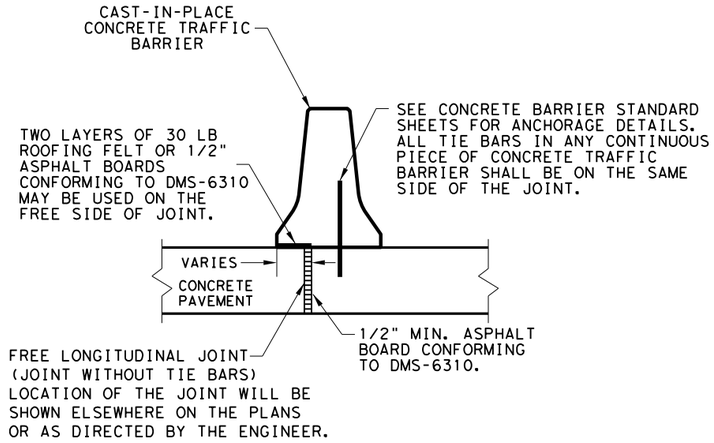
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
APRIL 2023: REVISED LONG. STEEL VERTICAL LOCATION. REMOVED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		89

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\crcp123 (CRCP1-23).dgn

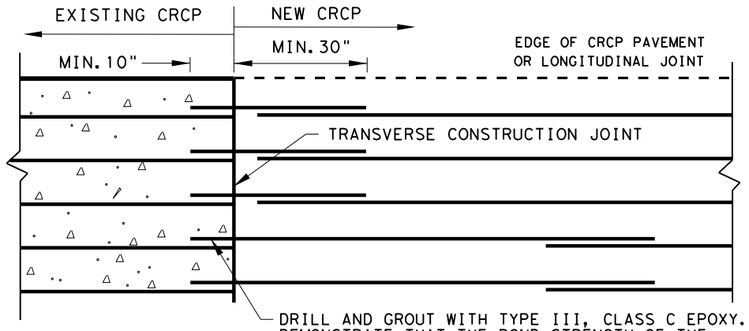
5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\crcp123 (CRCP1-23).dgn



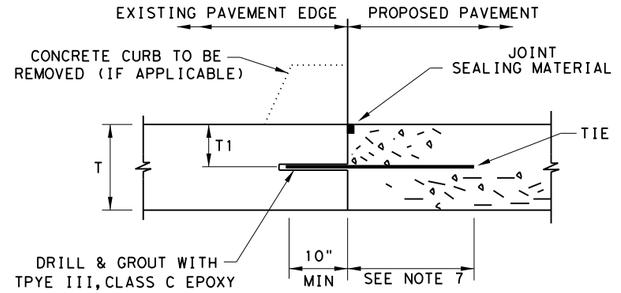
TRANSVERSE EXPANSION JOINT DETAIL AT BRIDGE APPROACH



CENTERLINE FREE LONGITUDINAL JOINT DETAIL

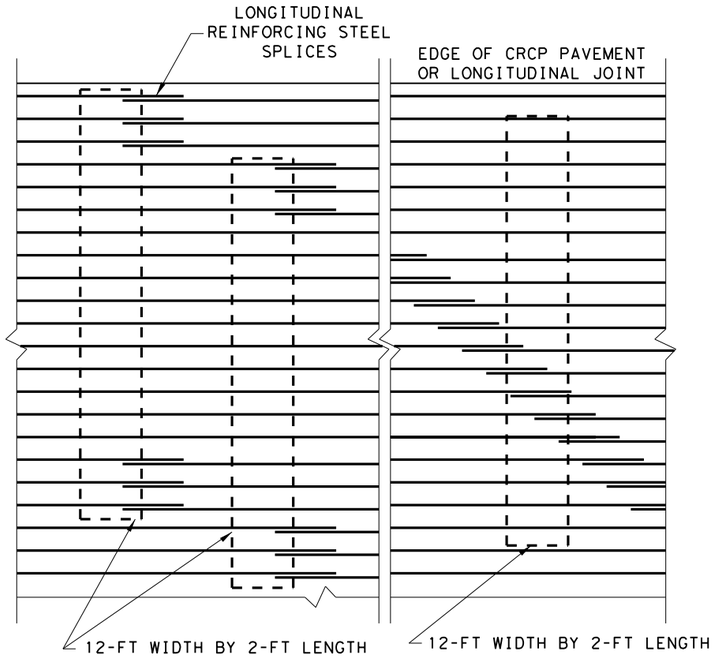


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



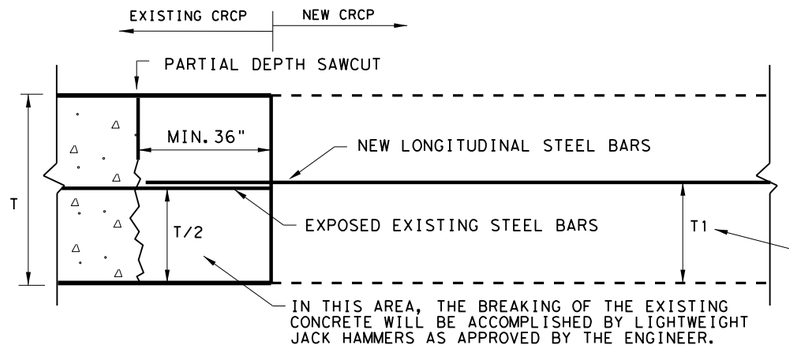
1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING JOINT DETAIL



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)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP

SHEET 2 OF 2

Texas Department of Transportation | 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	CK:
© TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		90

DATE:
FILE:

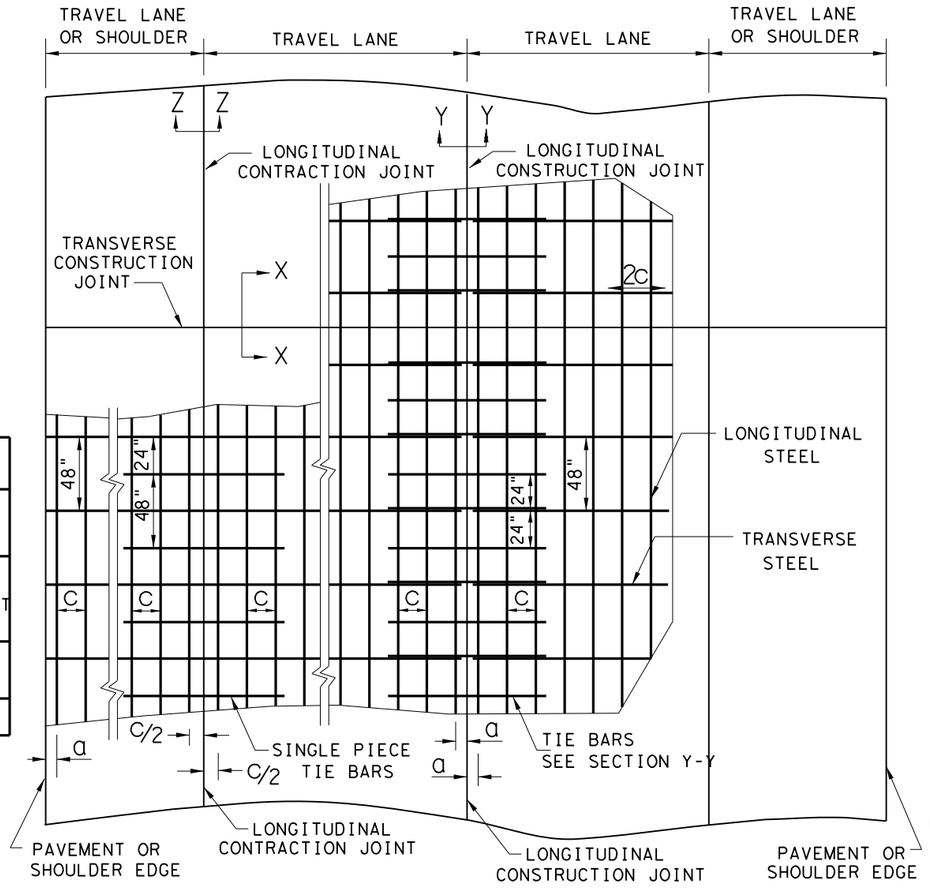
TABLE NO. 1 LONGITUDINAL STEEL

SLAB THICKNESS AND BAR SIZE		FOR BOTH STEEL MATS		LOWER STEEL MAT HEIGHT	TOP STEEL MAT HEIGHT
		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT		
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	T1 (IN.)	T2 (IN.)
14	#6	9.5	3 TO 4	4.5	8.0
15	#6	8.5	3 TO 4	5.0	8.5

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS

SLAB THICKNESS T (IN.)	FOR BOTH STEEL MATS		FOR LOWER STEEL MAT ONLY		FOR BOTH STEEL MATS	
	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE*	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14 - 15	#5	48	#6	48	#6	24

*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE

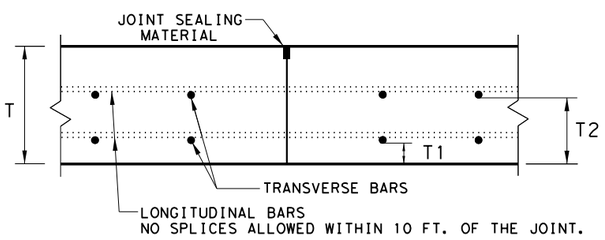


TYPICAL PAVEMENT LAYOUT

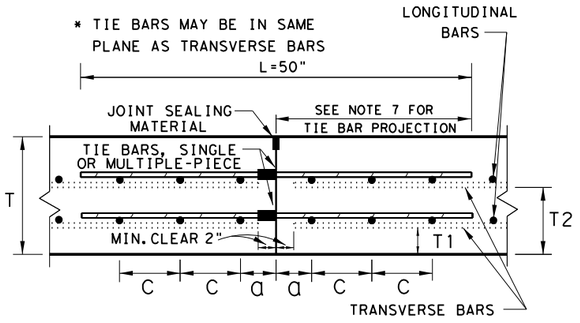
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

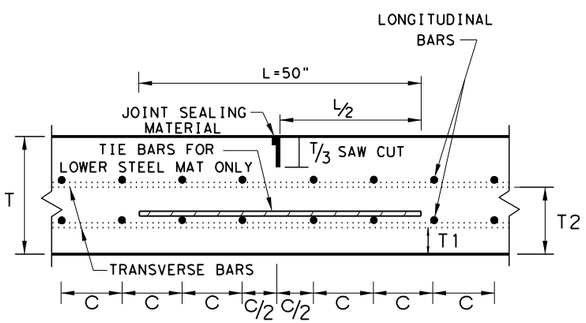
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS IN A SINGLE LAYER) SHALL CONFORM TO TABLE NO. 1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

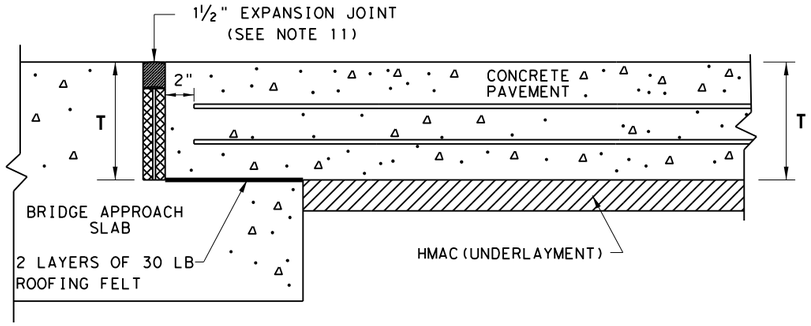
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

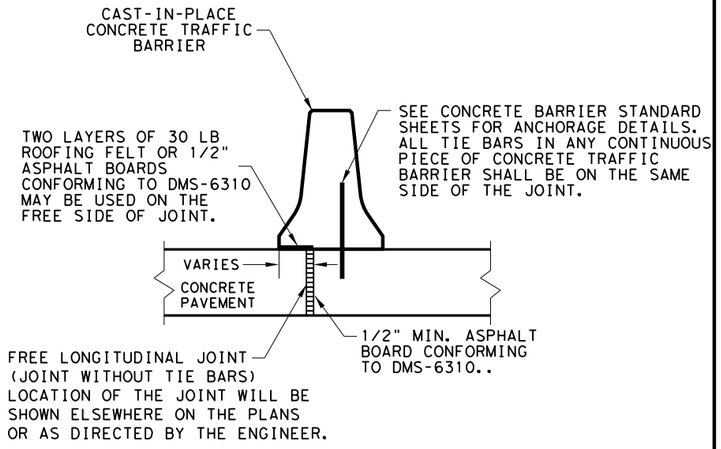
CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
APRIL 2023: REVISED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		90A

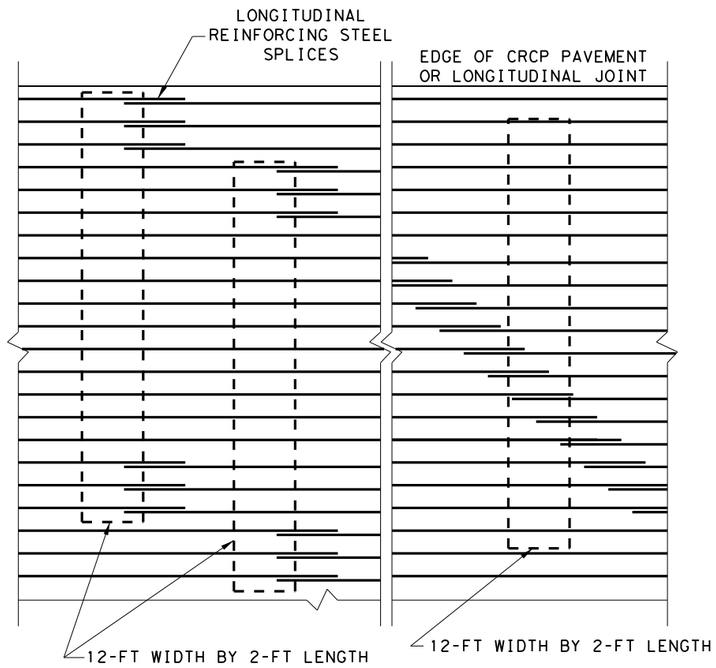
DATE:
FILE:



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

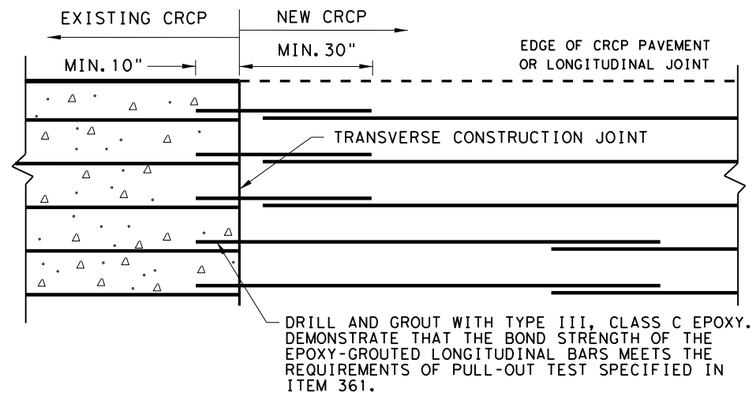


CENTERLINE FREE LONGITUDINAL JOINT DETAIL

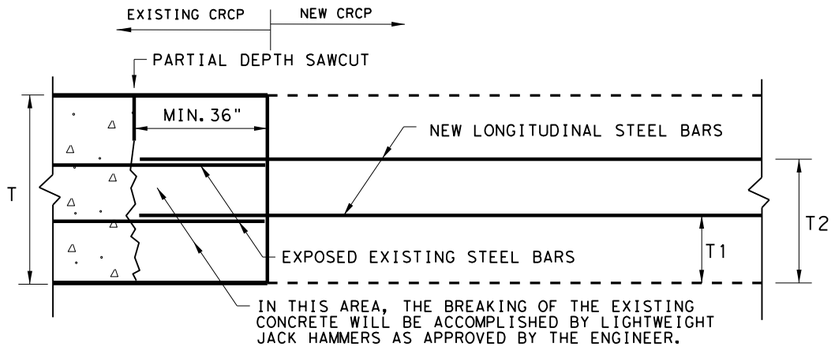


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

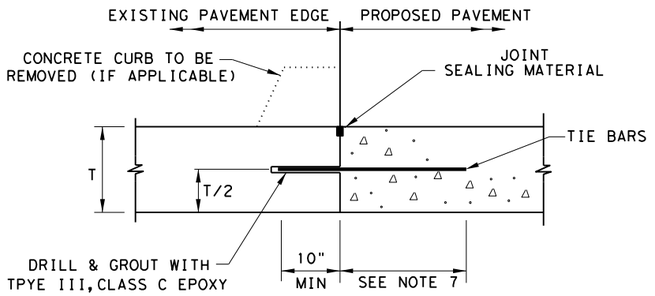


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP



1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT
T - 14 & 15 INCHES

CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		90B

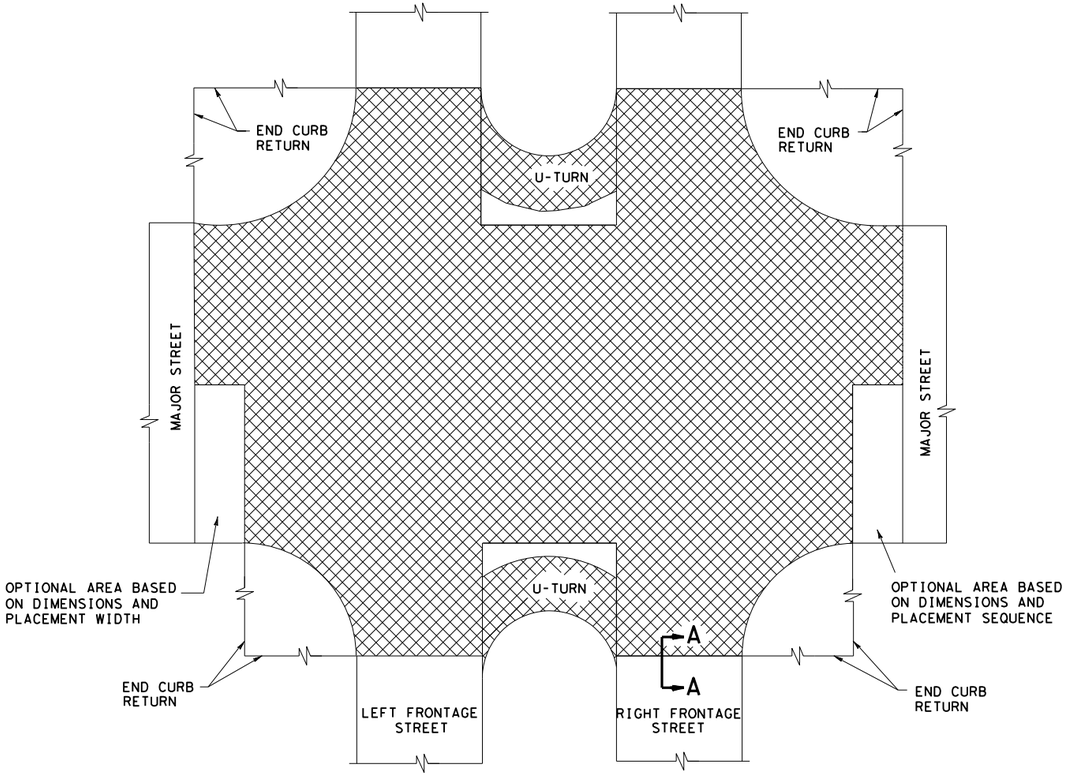


FIGURE 2

INTERSECTION OF MAJOR STREET
WITH FRONTAGE STREET

FAST TRACK PAVING AREA

TYPICAL PAVING PLANS

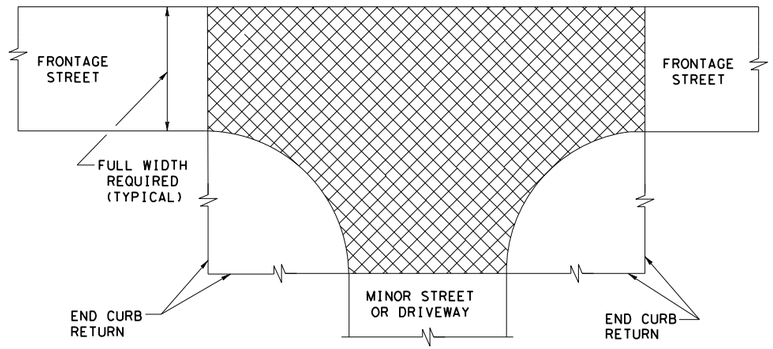


FIGURE 3

INTERSECTION OF MINOR STREET OR
DRIVEWAY WITH FRONTAGE STREET

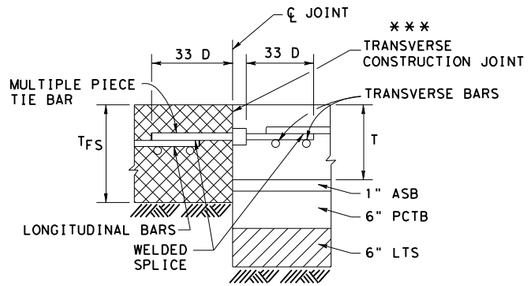
TABLE 1

EQUIVALENT PAVEMENT THICKNESS	
T * (IN.)	T_{FS} ** (IN.)
<=12"	T+3"
>12"	15"

*WITH BASE STRUCTURE OF:
1" ASPHALT STABILIZED BASE
6" PORTLAND CEMENT TREATED BASE
6" LIME TREATED SUBGRADE

**ON AS CUT SUBGRADE

***SEE JOINT SEALING DETAILS ON CRCP STANDARDS



SINGLE MAT

TRANSVERSE CONSTRUCTION JOINTS

SECTION A - A
FIGURE 1

GENERAL NOTES

1. DEFINITION OF TERMS

   T_{FS} - FAST TRACK CONCRETE PAVING DEPTH AT INTERSECTIONS AND LEAVE OUTS.
   T - NOMINAL CONCRETE PAVING DEPTH AS SHOWN IN THE PLANS.
   DETERMINE FAST TRACK CONCRETE PAVING DEPTH USING TABLE 1 AND THE NOMINAL CONCRETE PAVING DEPTH "T" SHOWN IN THE PLANS.

2. AT INTERSECTIONS AND LEAVE-OUT LOCATIONS USE THE SAME LONGITUDINAL AND TRANSVERSE BAR SPACING FOR THE FAST TRACK PAVING AREA AS THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T"(EXCEPT BAR SIZE SHALL BE #7 ON SINGLE MAT). FOR SINGLE MAT FAST TRACK PAVING, PLACE THE LONGITUDINAL AND TRANSVERSE BARS FOR THE FAST TRACK PAVING AREA AT THE HORIZONTAL PLANE ELEVATION THAT IS TWO TIE-BAR DIAMETERS LOWER THAN THAT USED FOR THE ADJACENT CONCRETE PAVEMENT DEPTH "T", AS SHOWN IN FIGURE 1. USE SINGLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH SINGLE MAT REINFORCING. USE DOUBLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH DOUBLE MAT REINFORCING.

3. THE REQUIRED FAST TRACK PAVING AREAS WILL BE SHOWN ON THE PLANS. THE CONTRACTOR HAS THE OPTION TO UTILIZE FAST TRACK CONCRETE PAVING AT U-TURNS, AT INTERSECTIONS, AT MINOR STREETS, AND AT DRIVEWAYS WITH FRONTAGE ROAD LEAVE-OUT AREAS THAT ARE NOT SHOWN ON THE PLANS, WITH PRIOR WRITTEN APPROVAL FROM THE ENGINEER. TYPICAL PAVING PLANS FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS FIGURE 2, AND FOR THE INTERSECTION OF A MINOR STREET OR DRIVEWAY WITH THE FRONTAGE ROAD AS FIGURE 3. FAST TRACK PAVE THE FRONTAGE ROAD FOR THE FULL FRONTAGE ROAD WIDTH AND PLACE IN STAGES AS REQUIRED.

4. USE ADDITIONAL #6 REINFORCING STEEL BARS (MINIMUM 42 INCHES LONG) AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE FAST TRACK PAVING INTERFACE (T_{FS}) WITH THE ADJACENT PAVEMENT SLAB (T).

5. SPLICE LENGTH IS A MINIMUM OF 33 TIMES THE NOMINAL STEEL DIAMETER.

6. PLACE THE CONCRETE PLACEMENT AT A UNIFORM DEPTH THROUGHOUT THE FAST TRACK CONCRETE PAVING AREA.

7. FOR CONTINUOUS SECTIONS OF ROADWAY WHERE FAST TRACK PAVING IS THE PRIMARY PAVEMENT TYPE, USE THE BAR SIZE AND SPACING FROM THE CRCP STANDARDS THAT CORRESPONDS TO THE FAST TRACK SLAB THICKNESS.

8. USE LONGITUDINAL TIE-BARS OF THE SAME SIZE DIAMETER AND SPACING AS THE LONGITUDINAL BAR. A SINGLE PIECE TIE-BAR MAY BE USED IF THE 33 TIMES DIAMETER TIE-BAR PROJECTION DOES NOT INTERFERE WITH THE SAFE HANDLING OF TRAFFIC.

9. BASE THE DEPTH OF SAW CUTS FOR SAWED JOINTS ON THE FAST TRACK CONCRETE PAVEMENT THICKNESS.

10. THIS STANDARD IS NOT INTENDED TO REPLACE OTHER STANDARDS EXCEPT WHERE SPECIFICALLY STATED HEREIN. FOR PAVING DETAILS NOT SHOWN ON THIS DRAWING, REFER TO THE STANDARD SHEETS FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SHOWN ELSEWHERE IN THE PLANS.

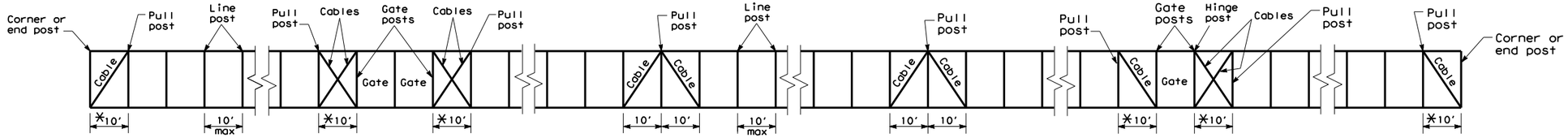
LEGEND

ASB - ASPHALT STABILIZED BASE
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
D - DIAMETER
LTS - LIME TREATED SUBGRADE
PCTB - PORTLAND CEMENT TREATED BASE

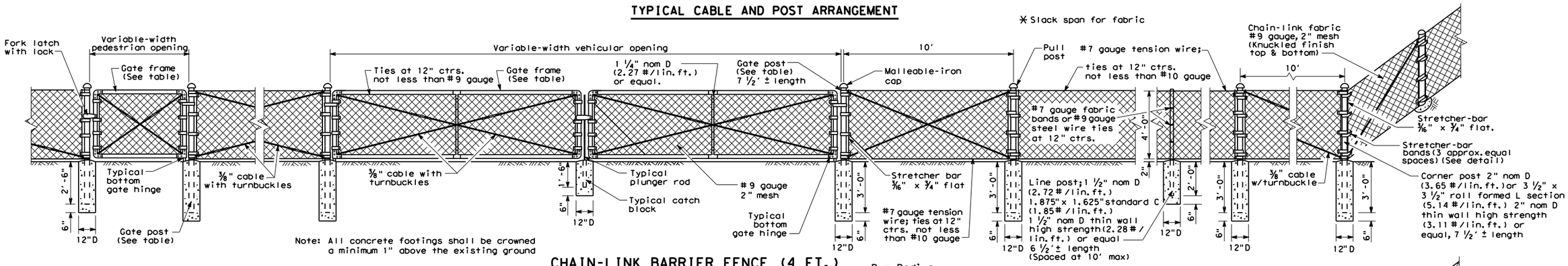
Texas Department of Transportation
Houston District

FAST TRACK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
DETAILS
CRCP-FT

FILE: STDB-4.dgn	DN:	CK:	DW:	CK:
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 2/15 2014 SPECS	HOU	6		91
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	GALVESTON	1911	01 022, ETC	FM2004



TYPICAL CABLE AND POST ARRANGEMENT

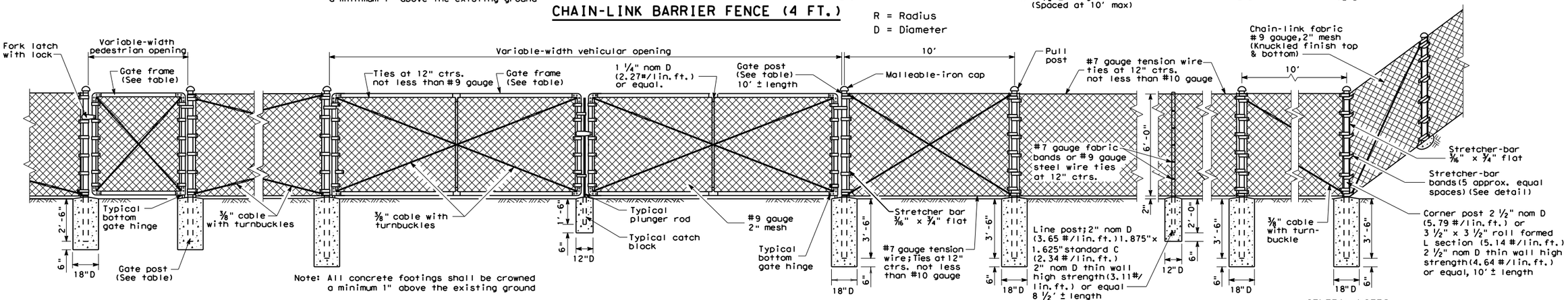


✳ Slack span for fabric

Note: All concrete footings shall be crowned a minimum 1" above the existing ground

CHAIN-LINK BARRIER FENCE (4 FT.)

R = Radius
D = Diameter



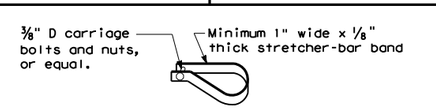
Note: All concrete footings shall be crowned a minimum 1" above the existing ground

CHAIN-LINK BARRIER FENCE (6 FT.)

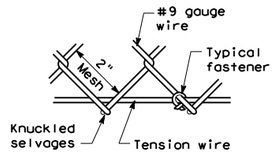
TABLE OF MINIMUM SIZES & WEIGHTS

GATE OPENING TYPE	
Single Inclusive	Double Inclusive
Up to 6'	Up to 12'
Over 6' to 12'	Over 12' to 26'
Over 12' to 18'	Over 26' to 36'
Over 18'	Over 36'

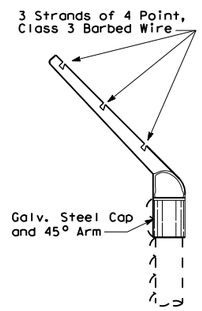
GATE FRAME		GATE POST	
SIZE	WT./LIN.FT.	SIZE	WT./LIN.FT.
1½" nom D or equal	2.72 LBS.	2½" nom D or equal	5.79 LBS.
	2.72 LBS.	3½" nom D or equal	9.11 LBS.
	2.72 LBS.	6" nom D	18.97 LBS.
	2.72 LBS.	8" nom D	24.70 LBS.



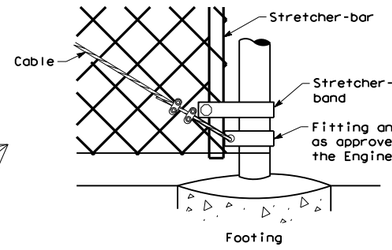
TYPICAL STRETCHER-BAR BAND



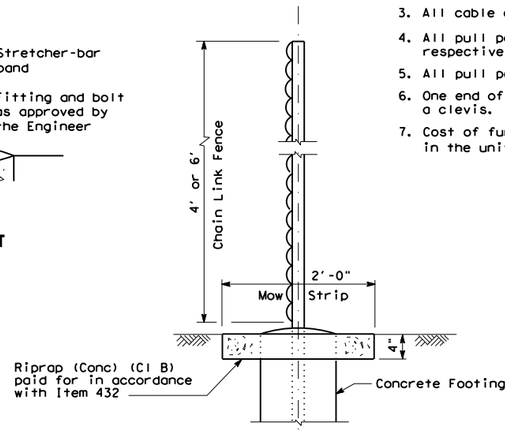
FABRIC & TENSION WIRE DETAIL TOP & BOTTOM



3 WIRE 45° BARBED WIRE ARM FOR CHAIN LINK SECURITY FENCE ⚠



TERMINAL POST DETAIL



MOWING STRIP DETAIL ⚠

GENERAL NOTES

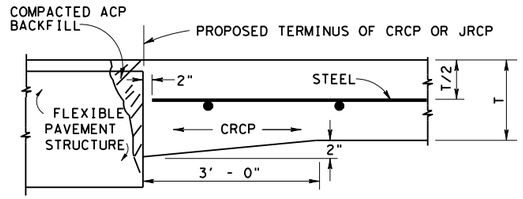
1. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
2. Gate-frame members shall be bolted, at frame corners, to joint fittings with four ½" bolts per joint.
3. All cable connections are to be made with two ⅜" cable clamps.
4. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
5. All pull post shall be furnished with two stretcher bars.
6. One end of each turnbuckle may be attached directly to fittings with a clevis.
7. Cost of furnishing and installing 45°Arm and Barbed Wire to be included in the unit price bid for "Chain Link Security Fence."

Texas Department of Transportation
Houston District

CHAIN-LINK BARRIER FENCE (4 AND 6 FOOT HEIGHT) CLF

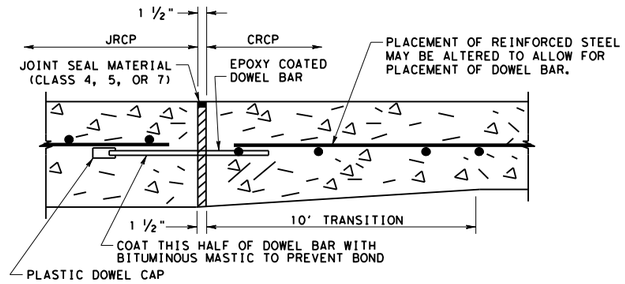
FILE: STDG-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT NOV. 2006	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 3/15 2014 SPECS	HOU	6		92
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC	FM2004

STD G3



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

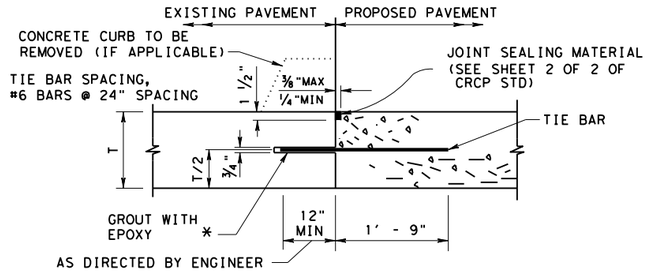


FOR DETAILS NOT SHOWN, SEE TRANSVERSE EXPANSION JOINT DETAILS ELSEWHERE IN PLANS.

DETAIL "B" - DOWEL ASSEMBLY AT EXPANSION JOINT

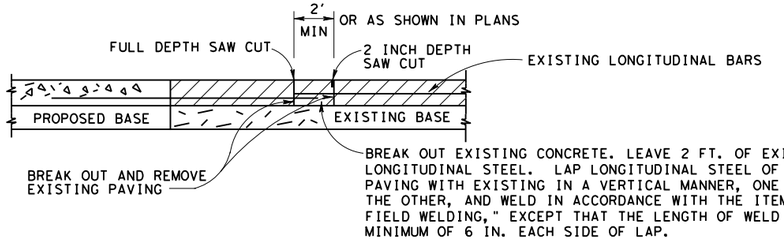
DOWEL BAR DATA			
SLAB THICKNESS(T)	6"-7.5"	8"-10"	10.5"-15"
DOWEL SIZE	1"	1 ¼"	1 ½"
DOWEL LENGTH	18"	20"	22"
DOWEL BAR SPACING	12"	12"	12"

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

GENERAL NOTES

1. FOR FURTHER INFORMATION REGARDING PLACING CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATION FOR CONCRETE PAVEMENT.
2. THE DESIGN REQUIREMENTS FOR THE PAVEMENT STRUCTURE, I.E. BAR SPACING, BAR SIZE LAP REQUIREMENTS, ETC., ARE SHOWN ON THE APPROPRIATE PAVEMENT DESIGN DETAIL.
3. SLEEPER SLAB AND ADDITIONAL REINFORCING REQUIRED ON THIS DRAWING ARE INCIDENTAL TO THE VARIOUS BID ITEMS.
4. USE THE SIZE, SPACING, AND LENGTH OF DOWEL BARS SHOWN IN TABLE "A".
5. 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 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.
6. 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.
7. DO NOT SHEAR CUT DOWEL BARS.
8. ENSURE DOWEL BAR EPOXY COATING CONFORMS TO ARTICLE 440.2.7., "EPOXY COATING".
9. 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.
10. TIE BARS AND DOWEL BARS OMITTED, LOST, OR DAMAGED SHALL BE REPAIRED BY DRILLING AND EPOXY GROUTING AT NO EXPENSE TO THE DEPARTMENT.
11. JUNCTURES A & B ARE ONLY SUITABLE FOR MINOR STREETS WITH LOW TRAFFIC VOLUMES.
12. 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.

LEGEND

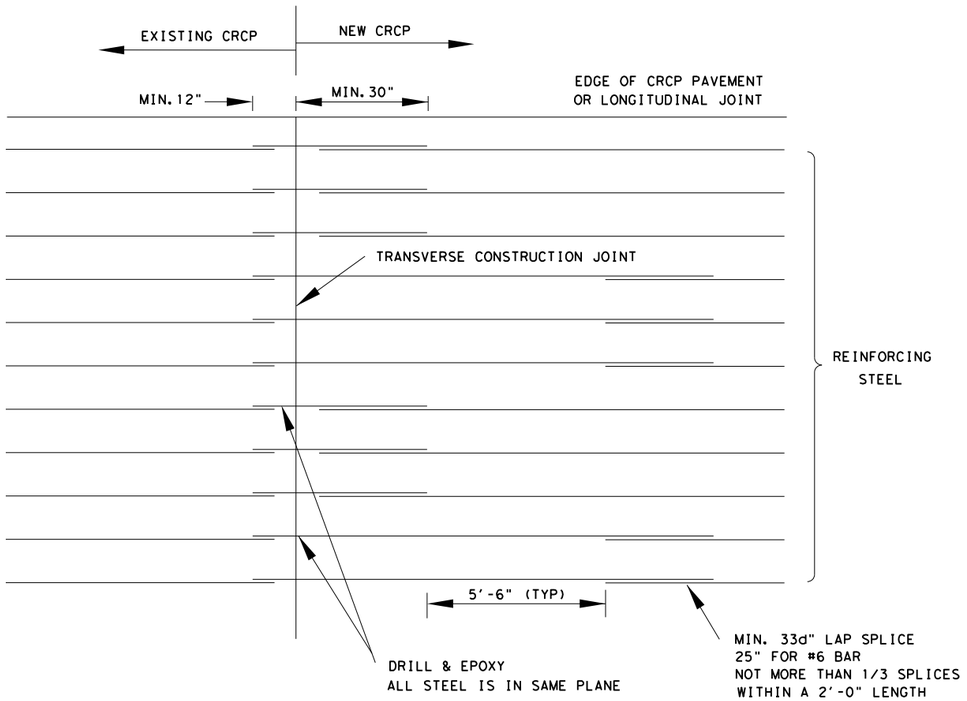
ACP - ASPHALT CONCRETE PAVEMENT
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
T - THICKNESS

Texas Department of Transportation
Houston District

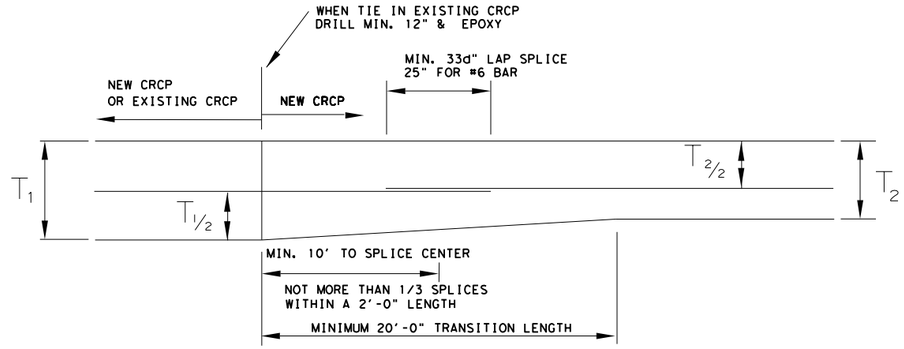
CONCRETE PAVEMENT JUNCTURES

CPJ

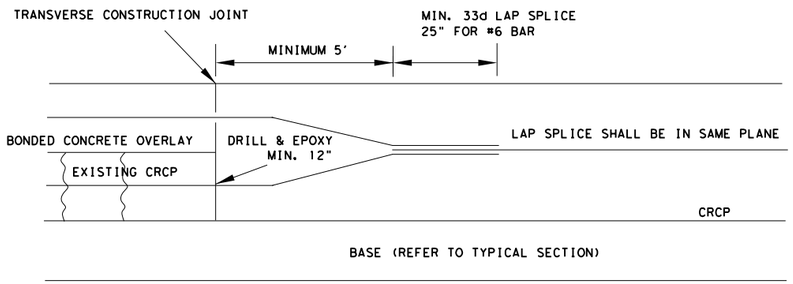
FILE: STDB-5.dgn	DN:	CK:	DW:	CK:	
©TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU	6			93
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC.	FM2004



EXISTING CRCP TO NEW CRCP

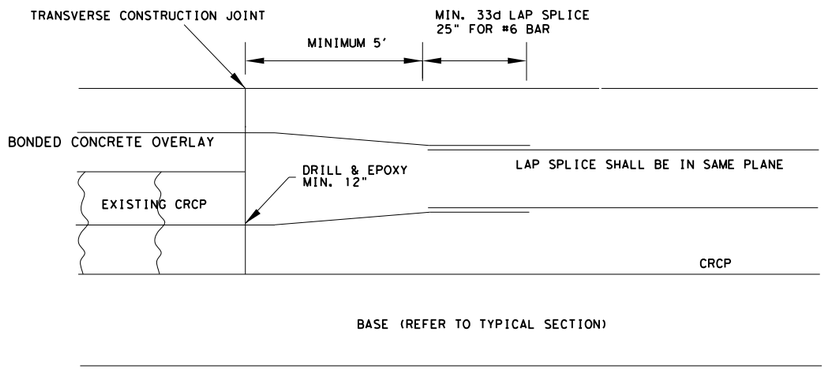


CRCP THICKNESS TRANSITION



CRCP BONDED OVERLAY TO CRCP TRANSITION

(ONE LAYER STEEL)



CRCP BONDED OVERLAY TO CRCP TRANSITION

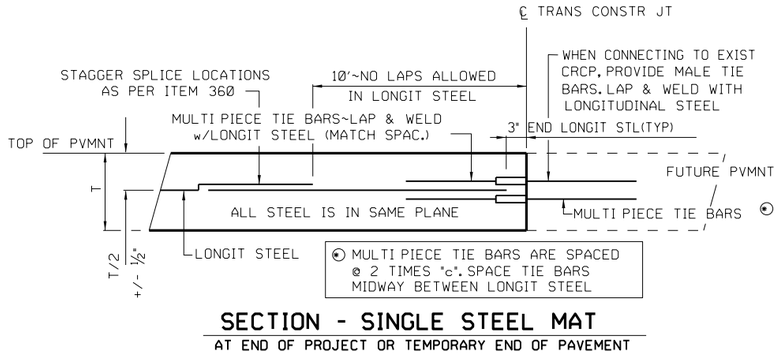
(TWO LAYER STEEL)

Texas Department of Transportation
Houston District

CONCRETE PAVEMENT JUNCTURES

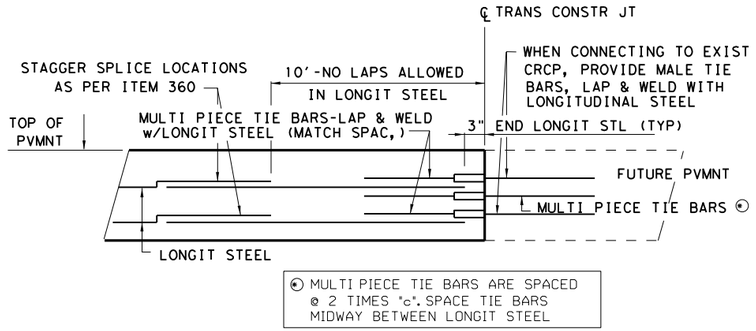
CPJ

FILE: STDB-5.dgn	DN:	CK:	DW:	CK:		
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU	6				94
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC.	FM2004



SECTION - SINGLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT



SECTION - DOUBLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT

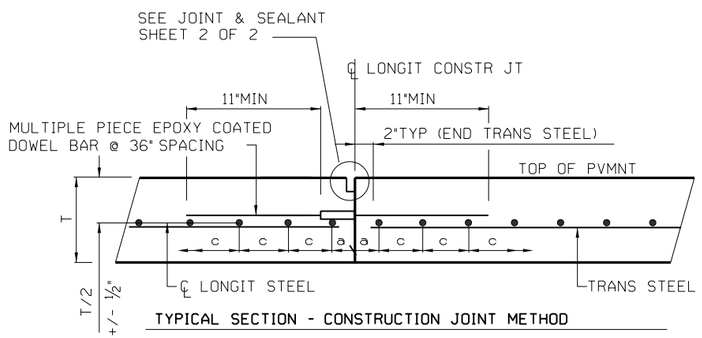
GENERAL NOTES

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.

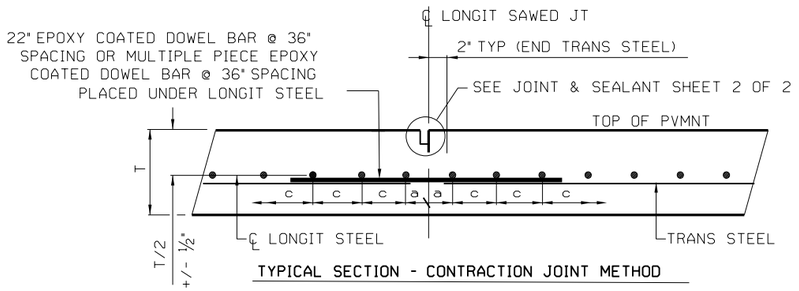
LONGITUDINAL DOWEL JOINT DETAILS

LOCATE WHERE SHOWN IN THE PLANS OR AS APPROVED. CONTRACTOR MAY USE EITHER METHOD

SINGLE STEEL MAT

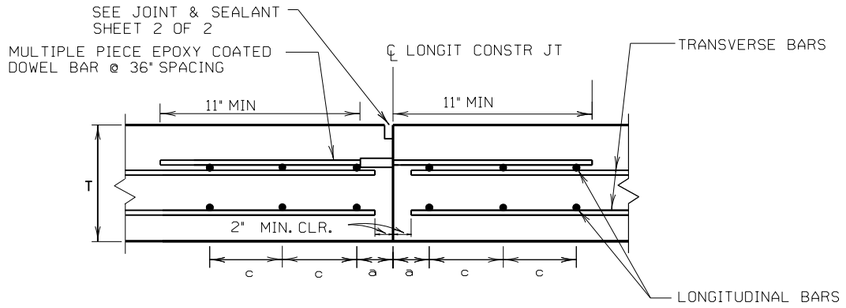


TYPICAL SECTION - CONSTRUCTION JOINT METHOD

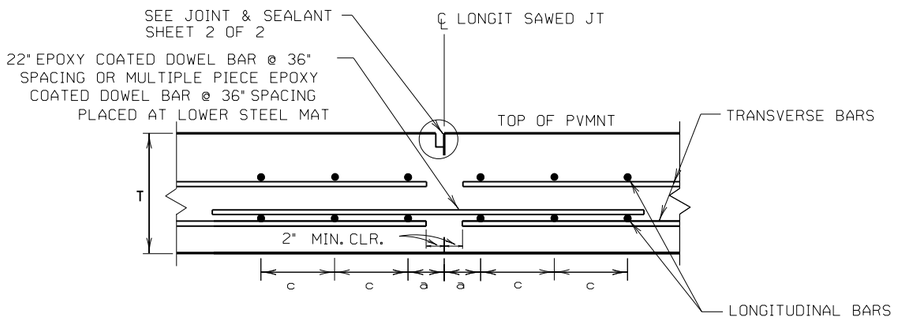


TYPICAL SECTION - CONTRACTION JOINT METHOD

DOUBLE STEEL MAT



TYPICAL SECTION - CONSTRUCTION JOINT METHOD



TYPICAL SECTION - CONTRACTION JOINT METHOD

Texas Department of Transportation
Houston District

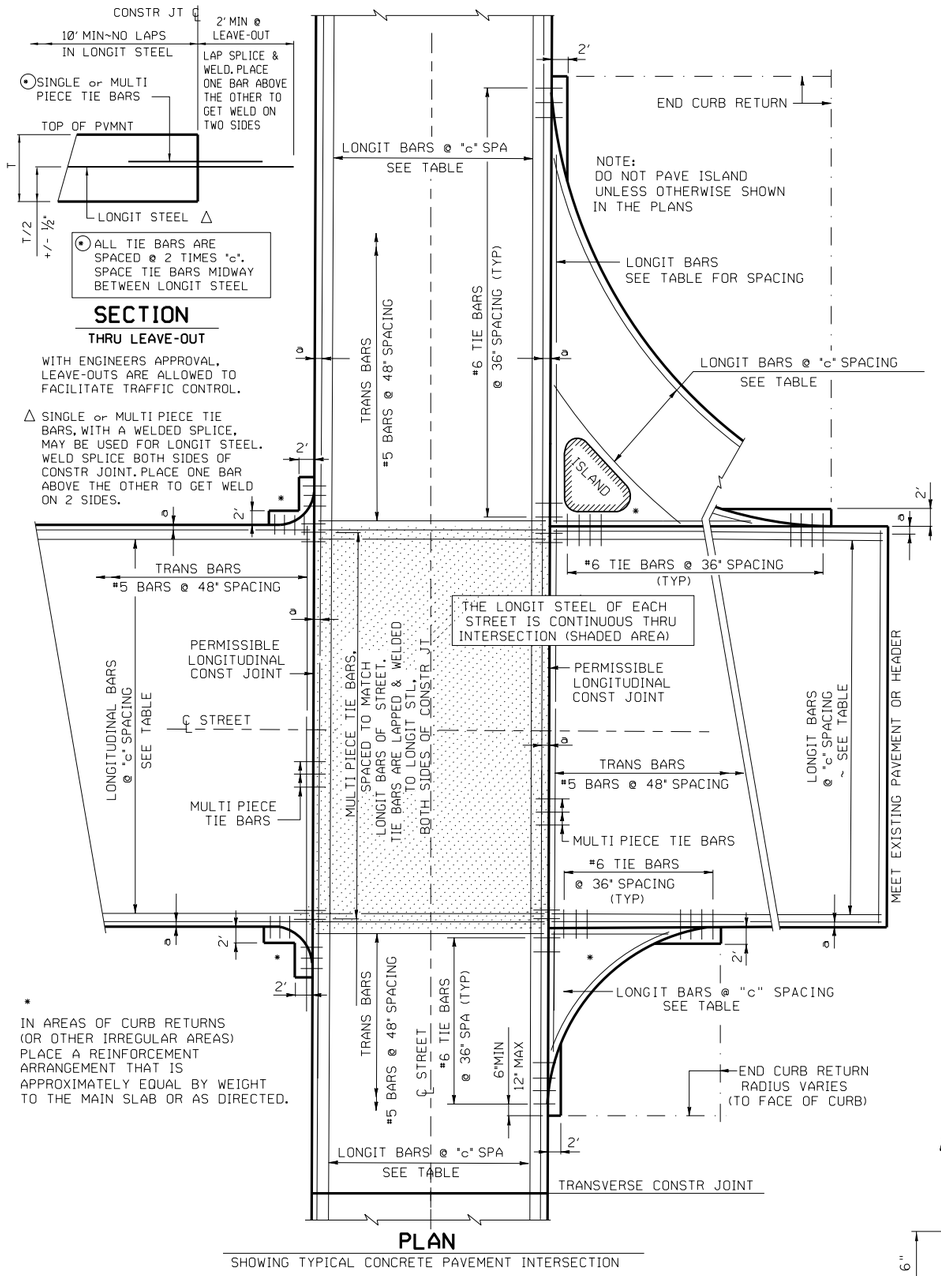
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

DN: - CK: - DW: - CK: -

REVISIONS
4/12 CHANGED CTE FROM 6.0 TO 5.0
8/14 UPDATE TO REFERENCE CRCP-13 STND.
2/15 REVISED GENERAL NOTES, MINOR CORRECTIONS.
4/17 REVISED NOTE #3 OF GENERAL NOTES, MINOR CORRECTIONS.

DISTRICT	PROJECT NO.			SHEET
HOU				95
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
GALVESTON	1911	01	022, ETC.	FM2004

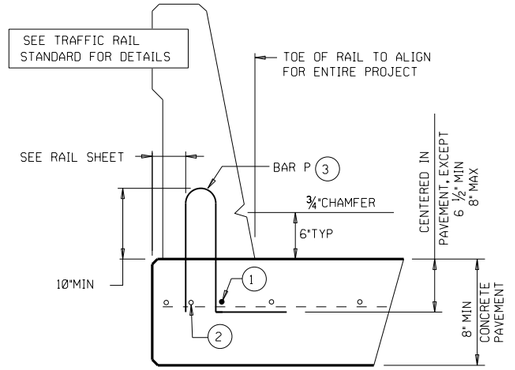
STD-B1A



PLAN

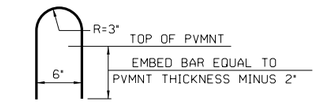
SHOWING TYPICAL CONCRETE PAVEMENT INTERSECTION

1. 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.
2. LONGITUDINAL SLAB BAR MAY BE ADJUSTED LATERALLY 3" +/- TO TIE REINFORCING.
3. 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.

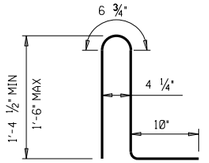


RAIL DETAIL

FOR ADDITIONAL DETAILS, SEE RAIL STANDARD SHEET.
THE MINIMUM LENGTH OF A CONCRETE RAILING PANEL IS FIVE FEET.

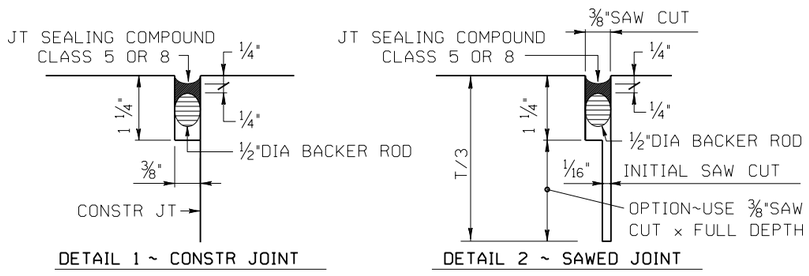


BAR A (#3)

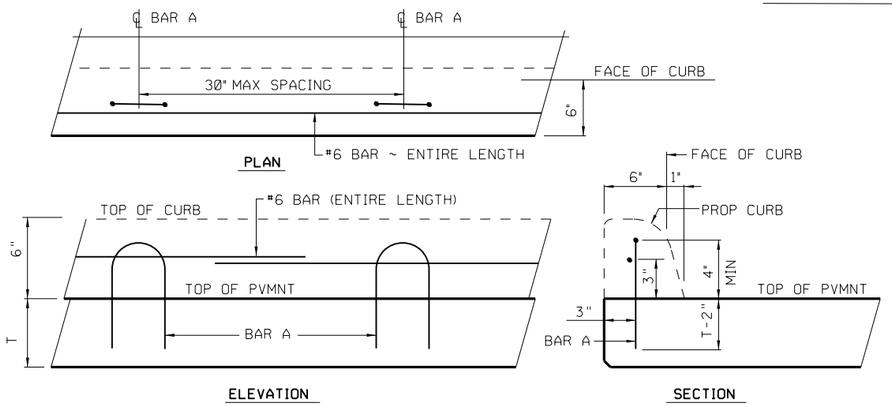


BAR P (#5)

RAIL ANCHOR INSTALLED IN PAVEMENT (3)



JOINT AND SEALANT DETAILS



CURB DETAIL

SEE CC & DID STANDARD

SHEET 2 OF 2

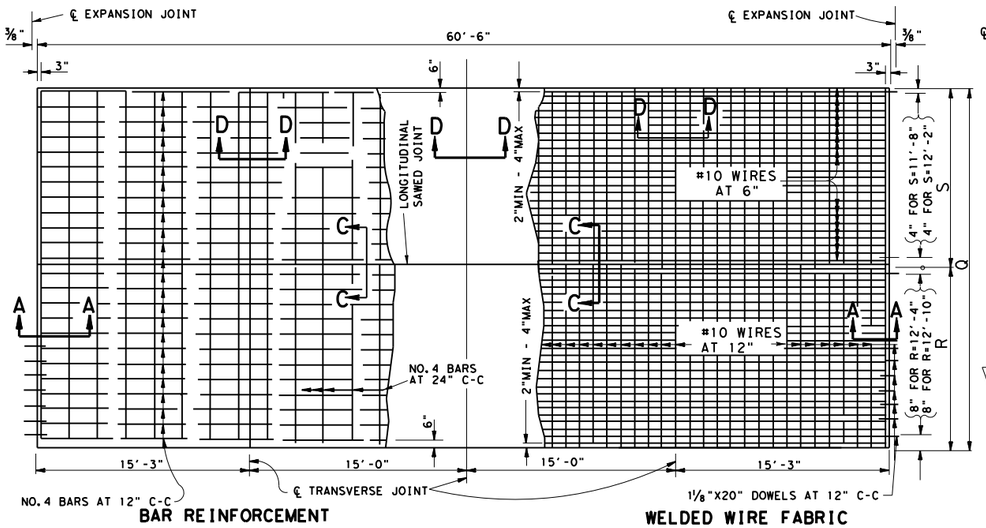
Texas Department of Transportation
Houston District

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

DN: -	CK: -	DW: -	CK: -	
DISTRICT	PROJECT NO.			SHEET
HOU				96
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
GALVESTON	1911	01	022 ETC.	FM2004

REVISIONS
4/12 CHANGED CTE FROM 6.0 TO 5.0 (ON SHEET 1)
2/15 MINOR CORRECTIONS.

STD-B1B

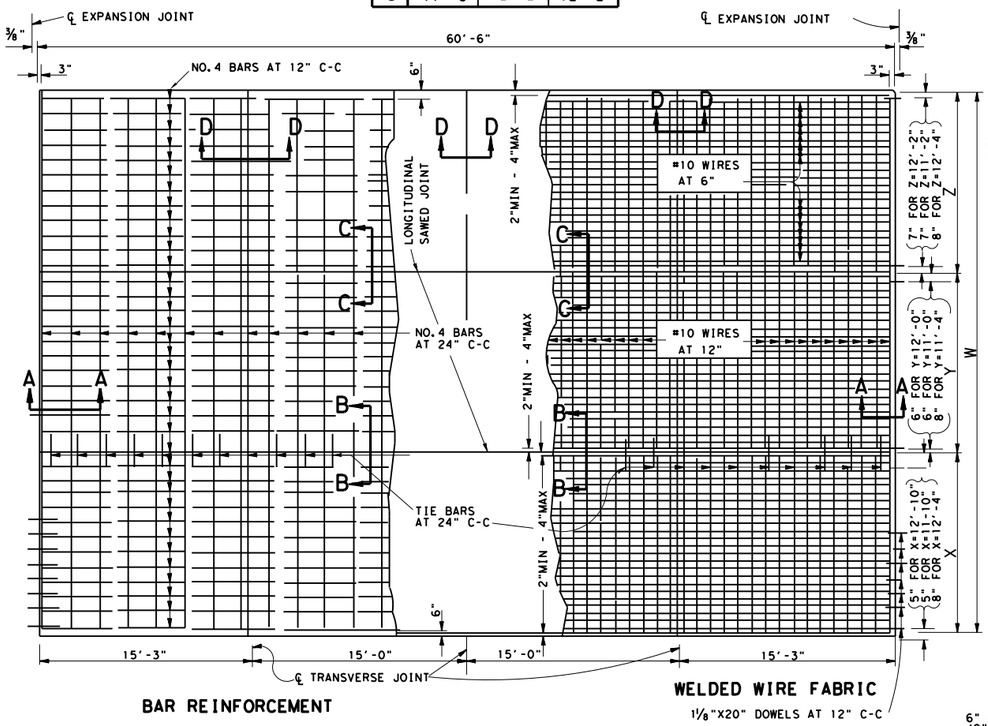


BAR REINFORCEMENT

WELDED WIRE FABRIC

TWO LANE PAVEMENT PLAN

	WIDTH - Q		
	24'-0"	24'-6"	25'-0"
R	12'-4"	12'-4"	12'-10"
S	11'-8"	12'-2"	12'-2"



BAR REINFORCEMENT

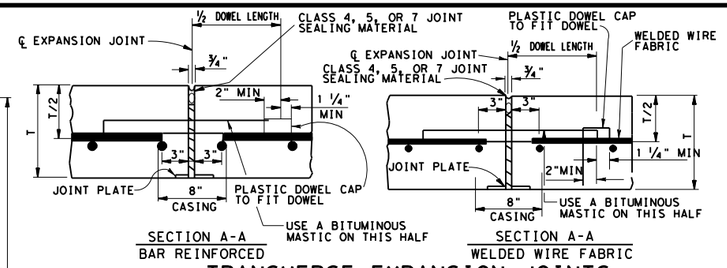
WELDED WIRE FABRIC

1⅛"X20" DOWELS AT 12" C-C

THREE LANE PAVEMENT PLAN

	WIDTH - W		
	37'-0"	36'-0"	34-0"
X	12'-10"	12'-4"	11'-10"
Y	12'-0"	11'-4"	11'-0"
Z	12'-2"	12'-4"	11'-2"

D = DIAMETER
R = RADIUS
T = THICKNESS

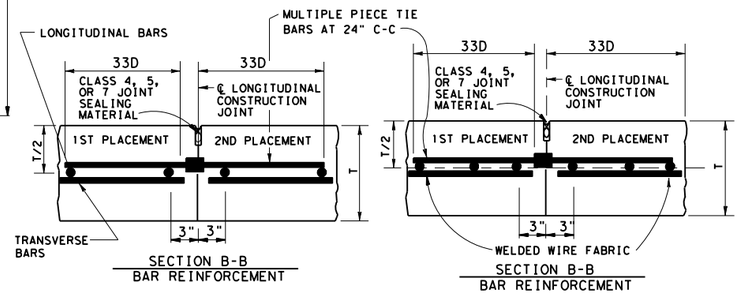


SECTION A-A
BAR REINFORCED

SECTION A-A
WELDED WIRE FABRIC

TRANSVERSE EXPANSION JOINTS

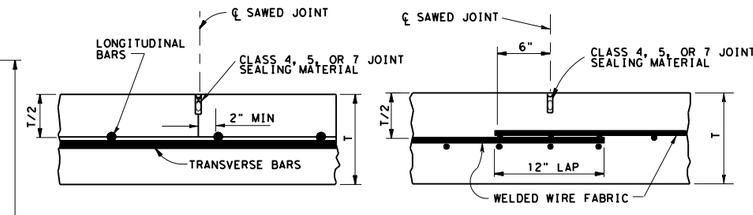
NOTE: DOWEL BARS CONFORMING TO ASTM A615 OR A616 GRADE 60 ARE ACCEPTABLE



SECTION B-B
BAR REINFORCEMENT

SECTION B-B
BAR REINFORCEMENT

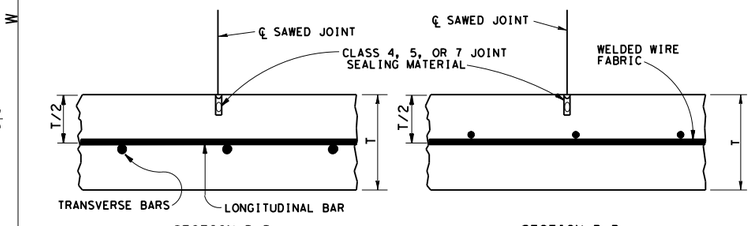
LONGITUDINAL CONSTRUCTION JOINTS



SECTION C-C
BAR REINFORCEMENT

SECTION C-C
WELDED WIRE FABRIC

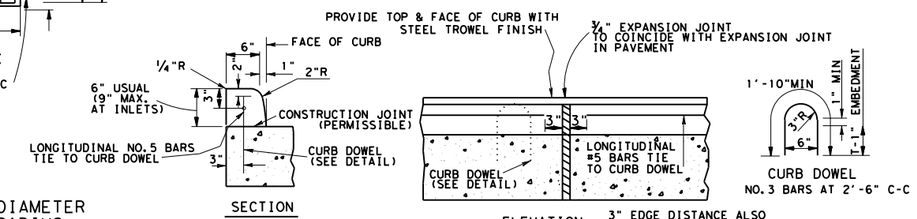
LONGITUDINAL SAWED JOINTS



SECTION D-D
BAR REINFORCEMENT

SECTION D-D
BAR REINFORCEMENT

TRANSVERSE SAWED JOINTS



SECTION

ELEVATION

3" EDGE DISTANCE ALSO APPLIES TO TRANSVERSE GROOVED PLANE JOINT IN CURB

TYPICAL 6" CURB (DETAIL)

GENERAL NOTES

1. MULTIPLE PIECE TIE BARS ARE REQUIRED AT LONGITUDINAL CONSTRUCTION JOINTS. USE MULTIPLE PIECE TIE BAR ASSEMBLIES WITH STOP TYPE COUPLINGS AND WITH THREADS ON THE BARS. ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. USE DEFORMED REINFORCING BARS FOR TIE BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STANDARD MAY BE USED IF IT CAN BE PROVEN TO THE ENGINEER THAT THEY ARE IN EVERY RESPECT THE EQUAL OF THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED.
2. FORM CONSTRUCTION JOINTS WITH METAL OR WOOD FORMS EQUAL IN DEPTH TO THE NOMINAL DEPTH OF THE PAVEMENT OR BY OTHER MEANS APPROVED PRIOR TO THEIR USE.
3. SAW LONGITUDINAL AND TRANSVERSE JOINTS AS SOON AS SAWING CAN BE ACCOMPLISHED WITHOUT DAMAGE TO THE PAVEMENT AND BEFORE 24 HOURS AFTER PLACING THE CONCRETE, THE EXACT TIME WILL BE APPROVED BY THE ENGINEER. PREFORMED JOINT WITH ASPHALT STRIP IS NOT ACCEPTABLE.
4. LONGITUDINAL JOINTS ARE SHOWN OFFSET FOUR INCHES FROM THE THEORETICAL LANE LINE AND MAY BE OFFSET TO EITHER SIDE IF THE WIDTH OF THE WIRE FABRIC IS PROPERLY ADJUSTED.
5. ONE OF THE LONGITUDINAL JOINTS OF PAVEMENT SLABS WIDER THAN TWO LANES MAY BE A CONSTRUCTION JOINT. FOR PAVEMENT SLABS WIDER THAN 15 FT. PROVIDE A LOGITUDINAL SAWED JOINT UNLESS OTHERWISE DIRECTED.
6. FORM THE JOINT SEAL SPACE AT TRANSVERSE EXPANSION JOINTS BY USING A STRAIGHT FORM PLACED BEHIND THE LONGITUDINAL FLOAT. LOOSEN THE FORM AS SOON AS THE CONCRETE WILL RETAIN ITS SHAPE AND EDGE WITH AN APPROVED EDGING TOOL. TOOL BOTH EDGES OF LONGITUDINAL CONSTRUCTION JOINTS TO A ⅛ IN. RADIUS AT THE PAVEMENT SURFACE.
7. DO NOT DISCHARGE CONCRETE FROM THE MIXER DIRECTLY ON TOP OF OR ON THE SIDES OF THE EXPANSION JOINT ASSEMBLIES.
8. LAP TRANSVERSE EDGES OF SHEETS OF WELDED WIRE FABRIC 12 INCHES EXCEPT AT TRANSVERSE EXPANSION JOINTS. LAP LONGITUDINAL EDGES 6 INCHES EXCEPT AT LONGITUDINAL CONSTRUCTION JOINTS.
9. DOWEL BARS MAY BE COATED WITH STAINLESS STEEL, MONEL METAL, OR IN ACCORDANCE WITH THE ITEM "REINFORCING STEEL" SECTION ON EPOXY COATING; WITH A WELDED DOWEL ASSEMBLY SUPPORT, AS APPROVED. ENSURE THE CASING CONFORMS TO THE REQUIREMENTS OF ONE OF THE GRADES OF ASTM A167-70 OR A176-71 AND IS NOT LESS THAN 0.010 INCH THICK. PROVIDE A CASING AT LEAST 8 INCHES LONG AND THAT COVERS THE MIDDLE 8 INCHES OF THE DOWEL.
10. SECURE DOWELS PARALLEL TO THE PAVEMENT SURFACE AND PERPENDICULAR TO THE JOINT WITH THE AID OF APPROVED WELDED WIRE BASKET ARRANGEMENTS. ENSURE WELDED WIRE BASKET ARRANGEMENTS DO NOT CROSS THE EXPANSION JOINT. UNIFORMLY COAT DOWELS WITH A BITUMINOUS MASTIC ON THE END WITH THE DOWEL CAP.
11. DO NOT BEND TIE BARS AND DOWEL BARS. TO PREVENT DISPLACEMENT OF WIRE FABRIC BY CONCRETE PLACEMENT, TIE THE FABRIC PANEL TOGETHER AND TIE THE INITIAL FABRIC PANELS OF EACH SLAB TO THE DOWEL BASKET OR AS DIRECTED.
12. TOOL PAVEMENT EDGES TO A RADIUS OF ⅛ IN. WITH AN APPROVED EDGING TOOL.
13. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN-SLOPE ARE ELSEWHERE SHOWN ON THE PLANS.
14. THE CONTRACTOR HAS THE OPTION OF USING WELDED WIRE FABRIC OR BAR REINFORCEMENT. LOCATE THE LONGITUDINAL STEEL AT THE CENTER OF THE SLAB. TAKE NECESSARY PRECAUTIONS TO INSURE THAT THE FINAL POSITION OF STEEL IS WITHIN ½ IN. OF THE SLAB CENTER. ENSURE THE LONGITUDINAL AND TRANSVERSE STEEL SPACING DOES NOT VARY MORE THAN ONE-TWELFTH OF SPACING SHOWN.
15. LONGITUDINAL STEEL MAY BE SPLICED WITH 33 TIMES BAR DIAMETER LAPS.
16. FOR LANE WIDTHS NOT SHOWN OR FOR VARIABLE PANEL LENGTHS AND WIDTHS, SPACE REINFORCING STEEL AND DOWELS AS DIRECTED.
17. USE APPROVED BAR MAT CHAIRS. DO NOT EXCEED CHAIR SPACING OF 30 IN. C-C (TRANSVERSE) AND 48 IN. C-C (LONGITUDINAL). GALVANIZING THE CHAIRS IS NOT REQUIRED.
18. OBTAIN BOARDS FOR EXPANSION JOINT FILLER FROM REDWOOD TIMBER.
19. PROVIDE AND CONSTRUCT THE JOINT PLATE AS APPROVED.
20. WHEN CURB IS PLACED SEPARATELY FROM THE CONCRETE PAVEMENT, PROVIDE THE REINFORCING STEEL AS SHOWN IN THE CURB DETAIL. THE CURB REINFORCING STEEL MAY BE OMITTED WHEN THE CURB IS PLACED MONOLITHICALLY.

(GENERAL NOTES CONTINUED ON SHEET 2 OF 2)

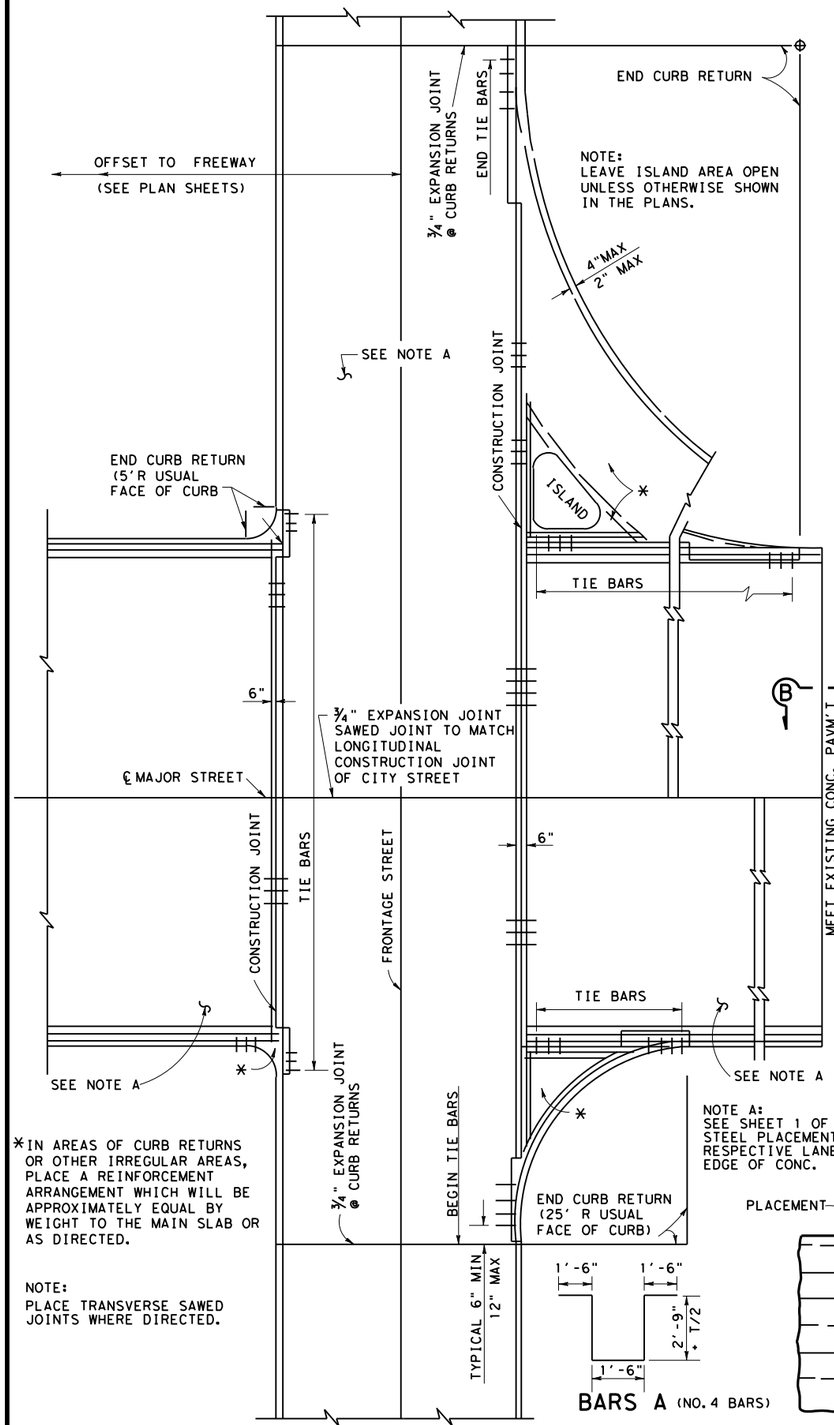
Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS

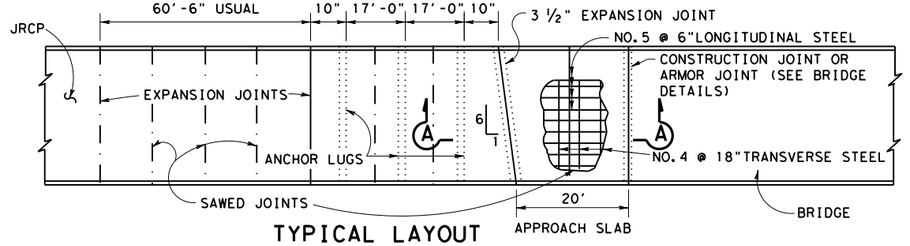
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP

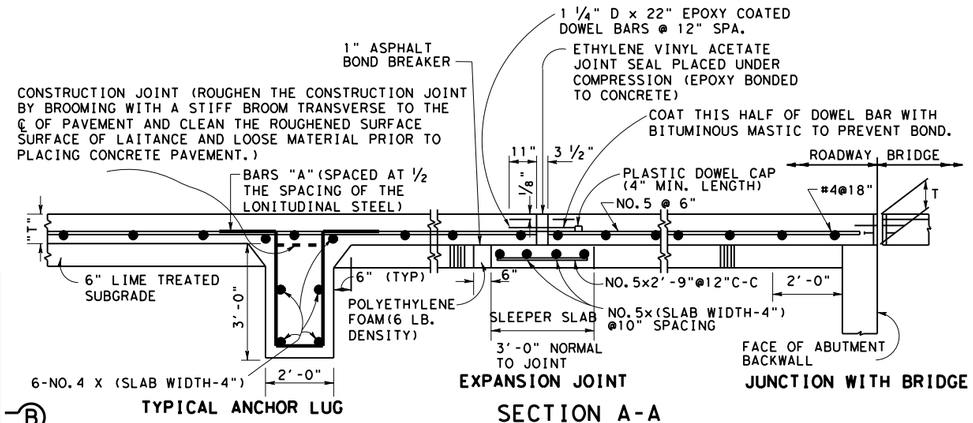
FILE: STDB-2.dgn	DN:	CK:	DW:	CK:	
©TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 8/2015 MODIFIED NOTES	HOU	6			97
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC.	FM2004



INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET TYPICAL REINFORCING PLAN

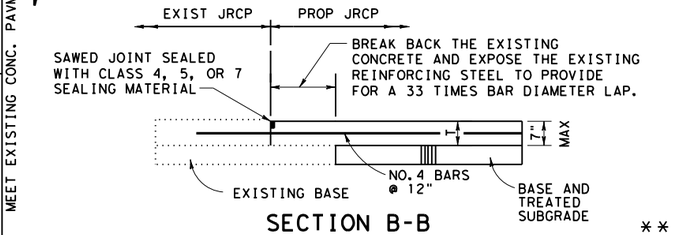


TYPICAL LAYOUT
(TERMINAL ANCHORAGE AT BRIDGES)



TYPICAL ANCHOR LUG | **EXPANSION JOINT** | **JUNCTION WITH BRIDGE**

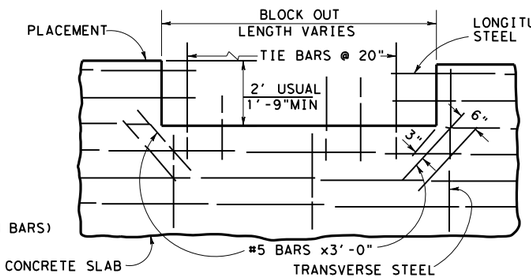
SECTION A-A



SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 7" MAX)

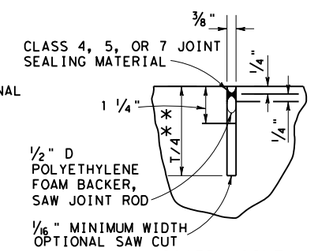
**

REPLACE ANY BENT LONGITUDNIAL 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 #29. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.

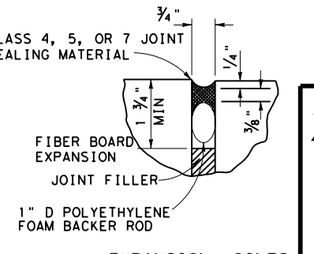


DETAIL OF BLOCKOUT

*OMIT TIE BARS @ INLET BLOCK-OUT



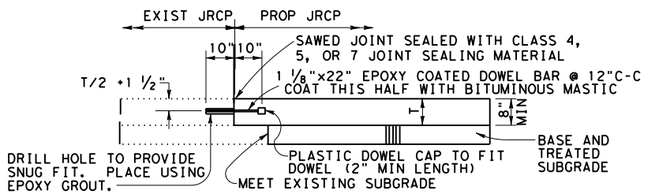
SAWED JOINT



EXPANSION JOINTS

** IF SILICEOUS RIVER GRAVEL IS USED AS THE COARSE AGGREGATE, THIS DEPTH IS T/3.

JOINT SEALING DETAILS



SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 8" MIN)

GENERAL NOTES (CONTINUED FROM SHEET 1 OF 2)

21. CONSTRUCT ANCHOR LUGS, EXPANSION JOINTS, AND SLEEPER SLABS AS DETAILED IN SECTION A-A. THESE WILL BE PAID FOR IN ACCORDANCE WITH ITEM, "CONCRETE PAVEMENT TERMINALS."
22. REINFORCING STEEL FOR TERMINAL ANCHOR SYSTEMS MAY BE GRADE 40 OR GRADE 60.
23. PLACE CONCRETE FOR ANCHOR LUGS AS SOON AS POSSIBLE AFTER COMPLETING EXCAVATION, TO PRESERVE THE INHERENT SOIL CHARACTERISTICS. EXCAVATING FOR AND PLACING CONCRETE FOR ANCHOR SYSTEM MAY BE IN PREFORMED SECTIONS CORRESPONDING TO THE WIDTH OF PAVING PLACEMENT.
24. APPLY A STEEL TROWEL FINISH TO SLEEPER SLABS AND AND COAT WITH AN ASPHALT BOND BREAKER.
25. THE DETAILS FOR ANCHORS, LUGS, EXPANSION JOINTS, AND SLEEPER SLABS ARE NOT APPLICABLE UNLESS SHOWN ELSEWHERE IN THE PLANS.
26. APPROACH SLAB WILL BE PAID FOR IN ACCORDANCE WITH THE ITEM "CONCRETE STRUCTURES."
27. WITHIN 5 MINUTES OF SAWING, COMPLETELY REMOVE THE RESULTING SLURRY FROM THE JOINT BY FLUSHING WITH HIGH PRESSURE WATER. THEN ALLOW THE JOINT TO DRY FOR A MINIMUM OF 48 HOURS BEFORE SANDBLASTING THE JOINT.
28. DO NOT SHEAR CUT DOWEL BARS.
29. SIZE ADDITIONAL SHEAR BARS AS LONGITUDIAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.
30. IF THE CONCRETE DESIGN REQUIRES GREATER THAN 5.5 SACKS OF CEMENTITIOUS MATERIAL PER CUBIC YARD, WRITTEN APPROVAL BY THE AREA ENGINEER WILL BE REQUIRED. ENSURE CONCRETE PAVEMENT MIXES PLACED FROM APRIL 1 TO OCTOBER 31 CONTAIN A MINIMUM OF 25 PERCENT BY WEIGHT OF CLASS "F" FLY ASH.
31. IN LOCATIONS WHERE THE PLANS CALL FOR FAST TRACK CONCRETE PAVEMENT IN LIEU OF JRCP (LAID ON COMPACTED OR STABILIZED SUBGRADE), USE DETAILS IN THIS STANDARD IN CONJUNCTION WITH THE APPROPRIATE FAST TRACK CONCRETE SPECIFICATION. IF THE JRCP IS LAID UPON A BASE STRUCTURE, ADD 3" TO THE FAST TRACK PAVEMENT THICKNESS TO COMPENSATE FOR THE BASE.

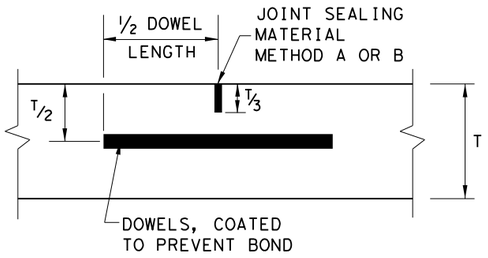
Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS
EXPANSION JOINT DESIGN
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

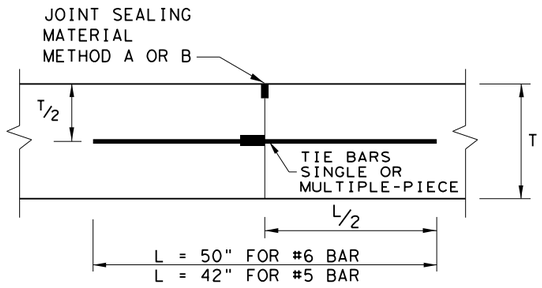
JRCP SHEET 2 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 9/2013 ADDED NOTE 8/2015 MODIFIED NOTES	HOU	6	.	98
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, ETC	FM2004

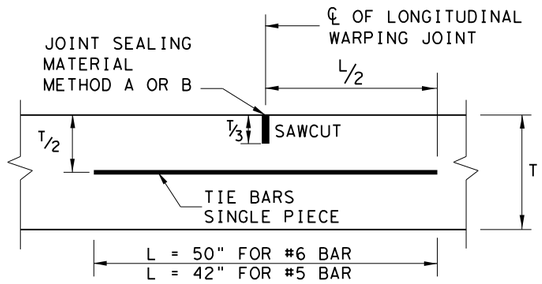
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\cpcd14.dgn



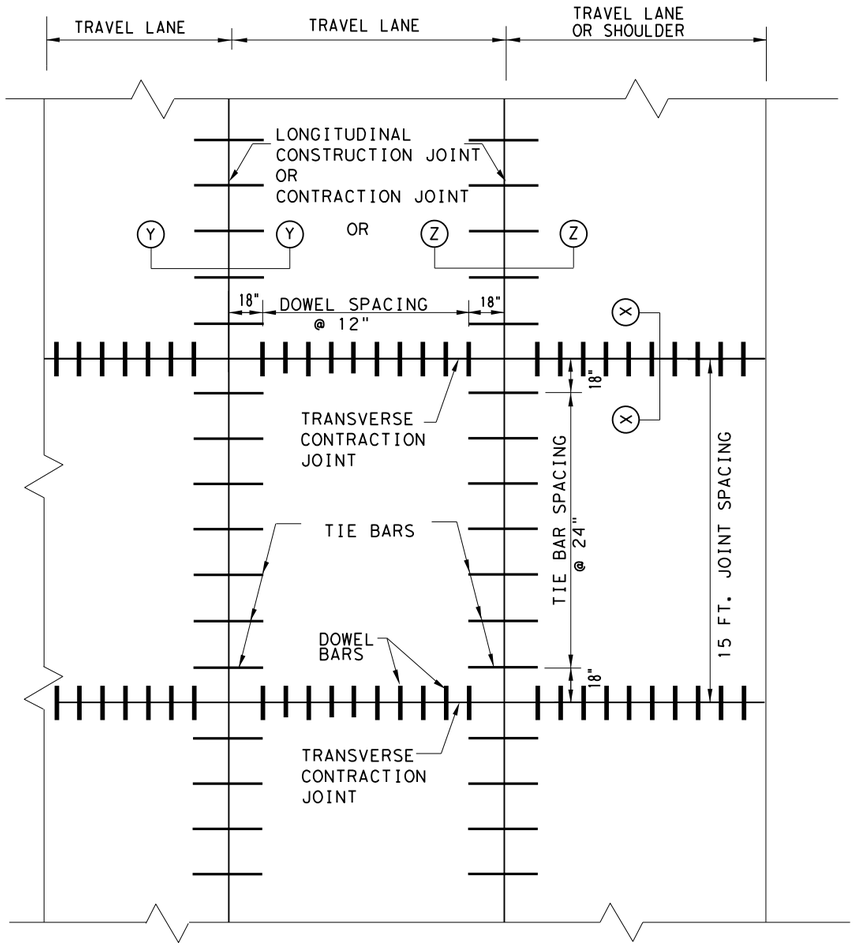
TRANSVERSE CONTRACTION JOINT
SECTION X-X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y-Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z-Z



TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATION FOR "CONCRETE PAVEMENT".
3. THE SPACING BETWEEN TRANSVERSE CONTRACTION JOINTS SHALL BE 15 FT. UNLESS OTHERWISE SHOWN IN THE PLANS.
4. TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE DEPTH OF PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
5. USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL THE FORMED JOINTS.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS. THE SAW CUT DEPTH FOR THE LONGITUDIANL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLABTHICKNESS (T/3).
8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. WHEN AN MONOLITHIIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
11. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.
12. THE DETAIL FOR JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

TABLE NO. 1 DOWELS (SMOOTH BARS)		
SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	AVERAGE SPACING (IN.)
6 to 7.5	1" X 18"	12
8 to 10	1 1/4" X 18"	12
>= 10.5	1 1/2" X 18"	12

TABLE NO. 2 TIE BARS (DEFORMED BARS)		
SLAB THICKNESS T (IN.)	BAR SIZE	AVERAGE SPACING (IN.)
6 to 7.5	#5	24
>= 8	#6	24

SHEET 1 OF 2

Texas Department of Transportation

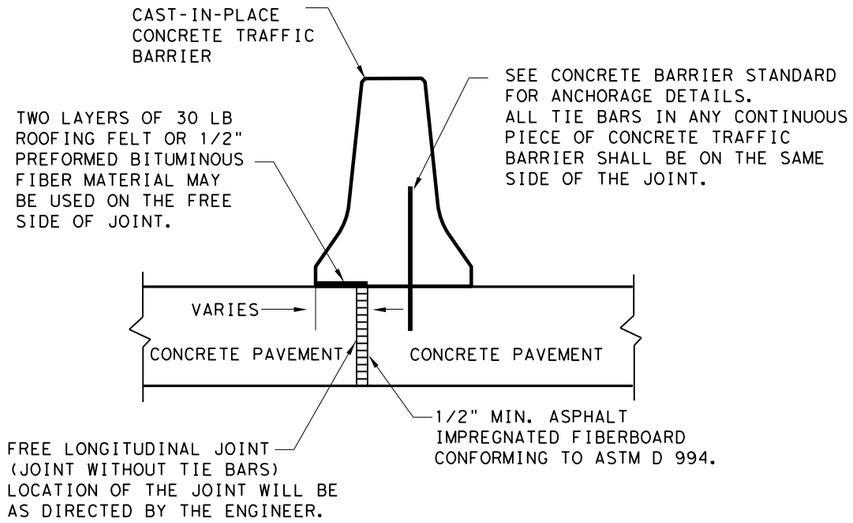
Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

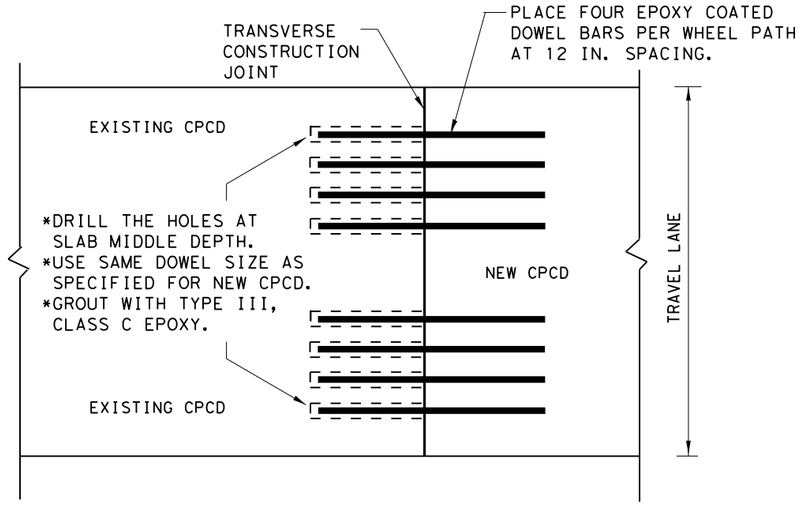
CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		99

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\cpcd14.dgn



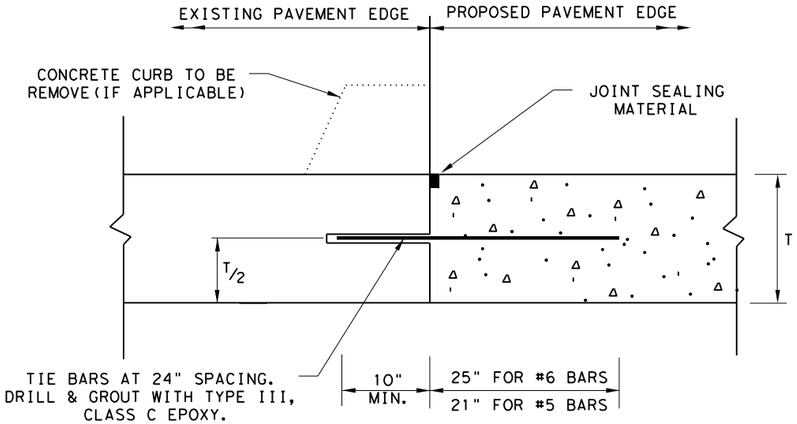
FREE LONGITUDINAL JOINT DETAIL



TRANSVERSE JOINT DETAIL

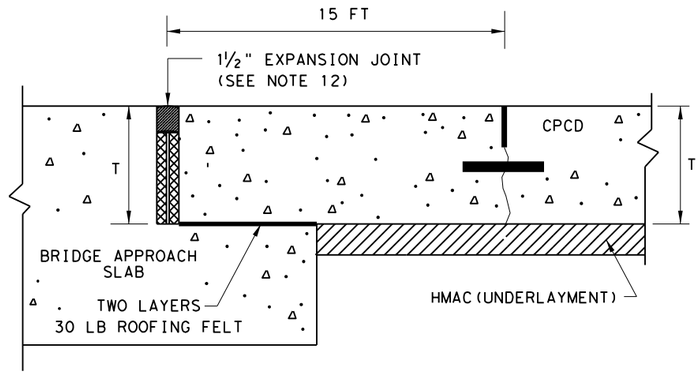
EXISTING CPCD TO NEW CPCD

PLAN VIEW (NOT TO SCALE)



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 BARS FOR 8" AND THICKER SLABS, USE #5 BARS FOR LESS THAN 8" THICK SLABS.
3. THE TRANSVERSE JOINTS OF PROPOSED PAVEMENT SHALL COINCIDE WITH EXISTING PAVEMENT JOINTS UNLESS OTHERWISE SHOWN ON THE PLANS.

LONGITUDINAL WIDENING JOINT DETAIL



TRANSVERSE EXPANSION JOINT DETAIL

AT BRIDGE APPROACH

SHEET 2 OF 2

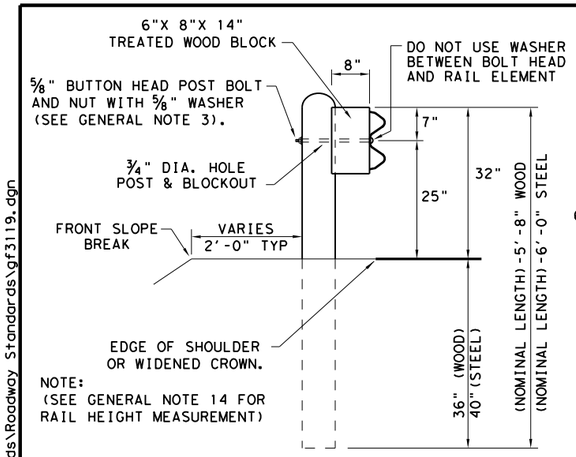
Texas Department of Transportation | Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

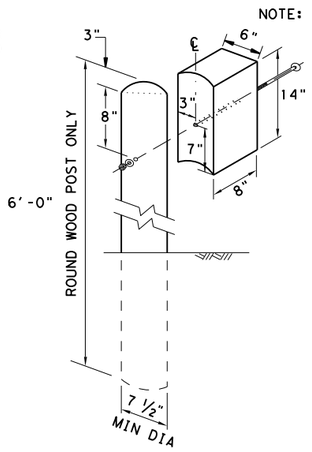
CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		100

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\gf3119.dgn

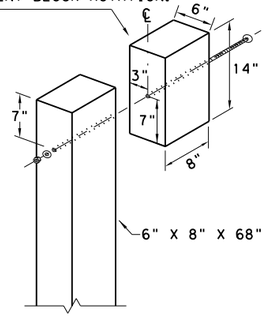


TYPICAL POST PLACEMENT

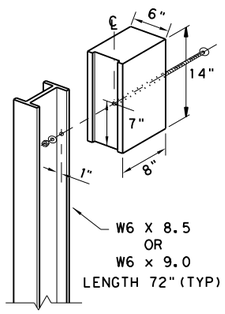


WOOD BLOCK TO ROUND WOOD POST

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

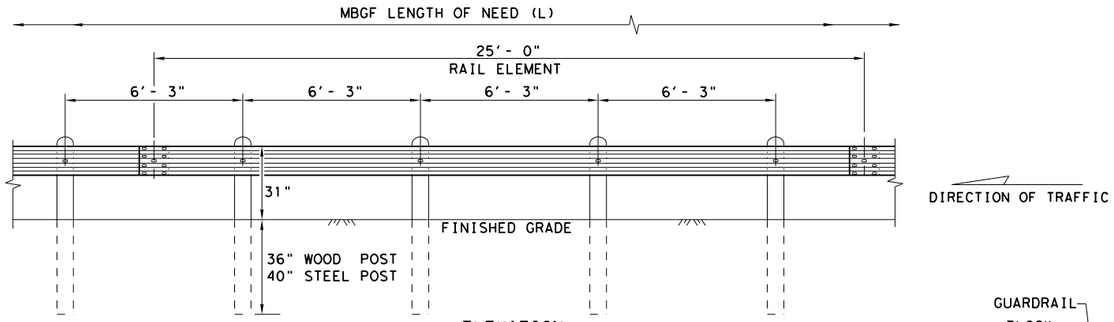


WOOD BLOCK TO RECTANGULAR WOOD POST



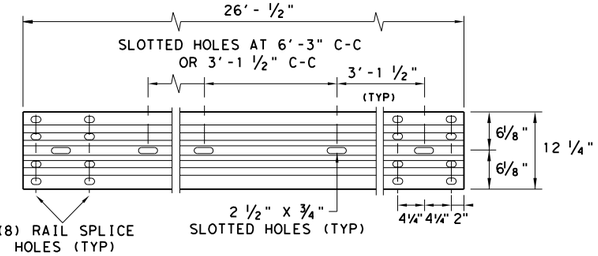
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

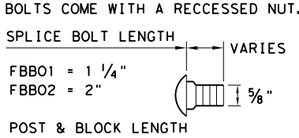
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

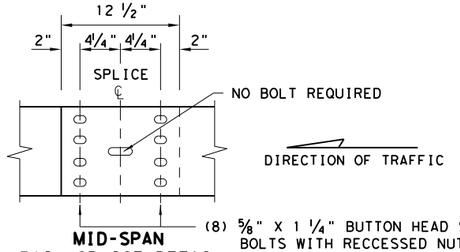
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



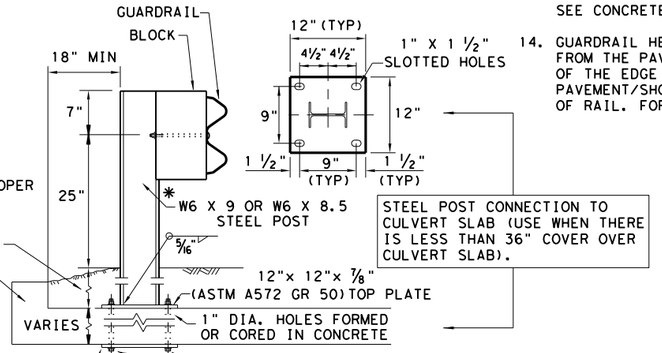
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

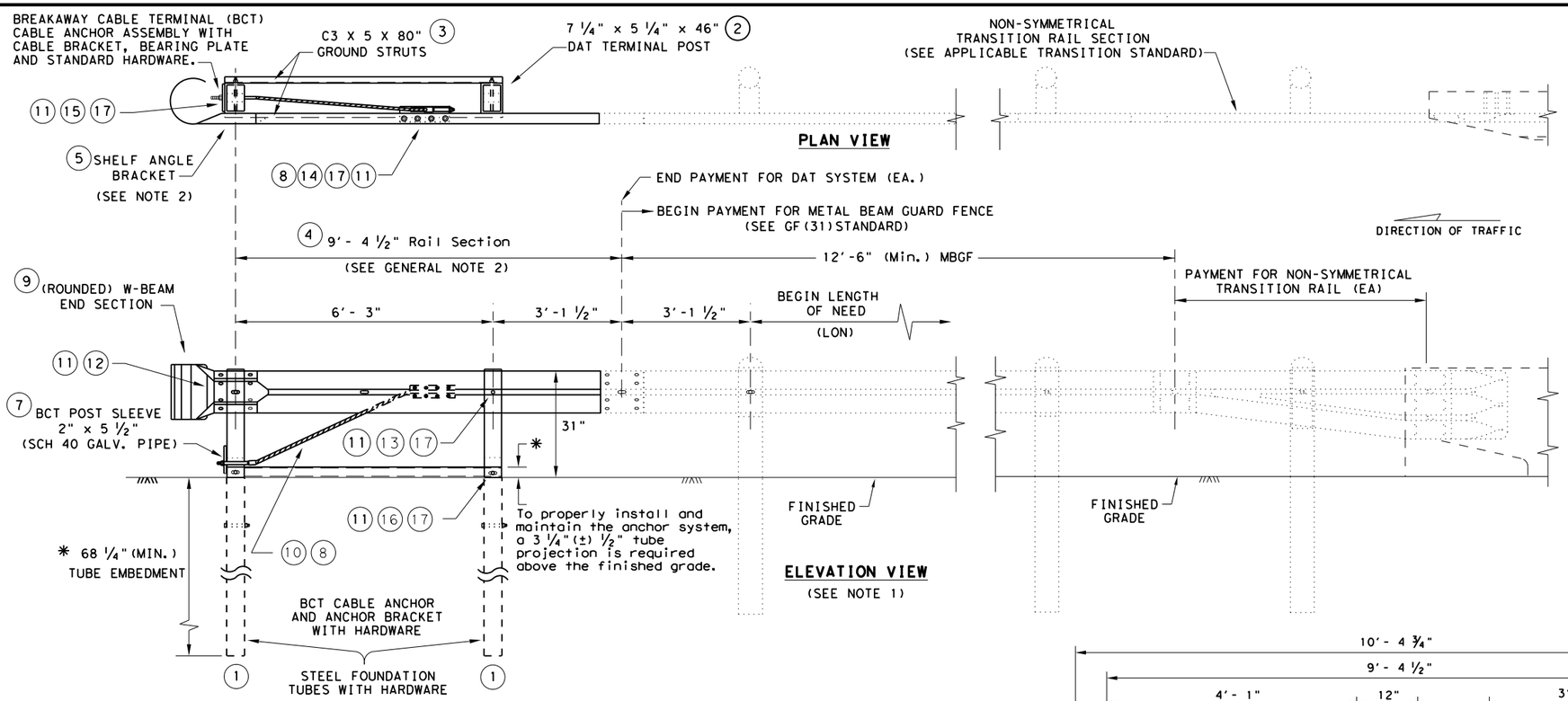
Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		101

5/9/2024
Z:\Projects\220058+CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

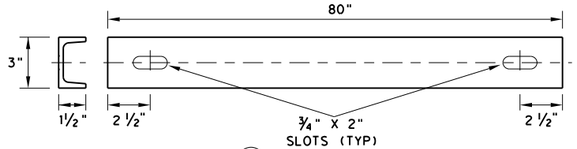
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

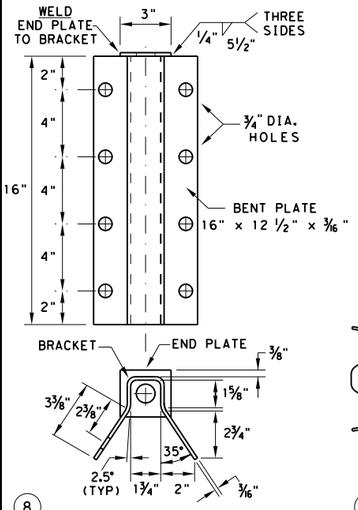
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

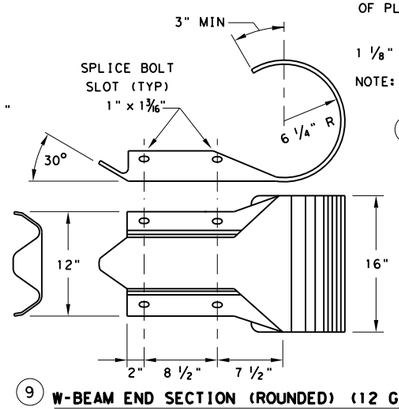
(4) TERMINAL RAIL ELEMENT FOR DAT



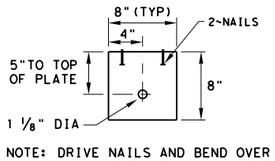
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

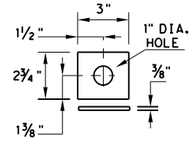


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

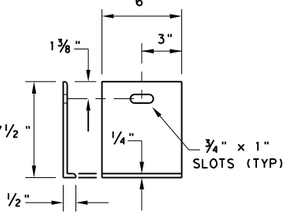


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

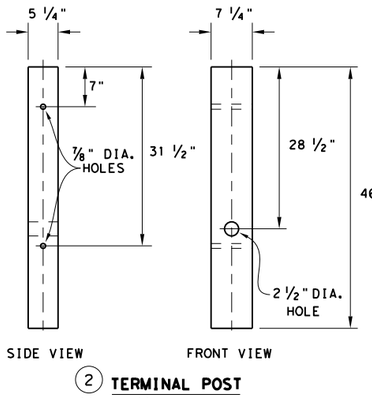
(6) BEARING PLATE
8"x 8"x 5/8" R



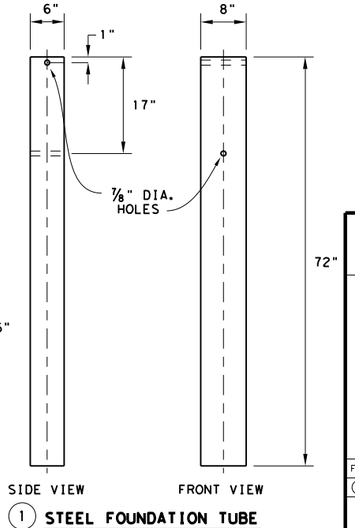
END PLATE



(5) SHELF ANGLE BRACKET



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



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

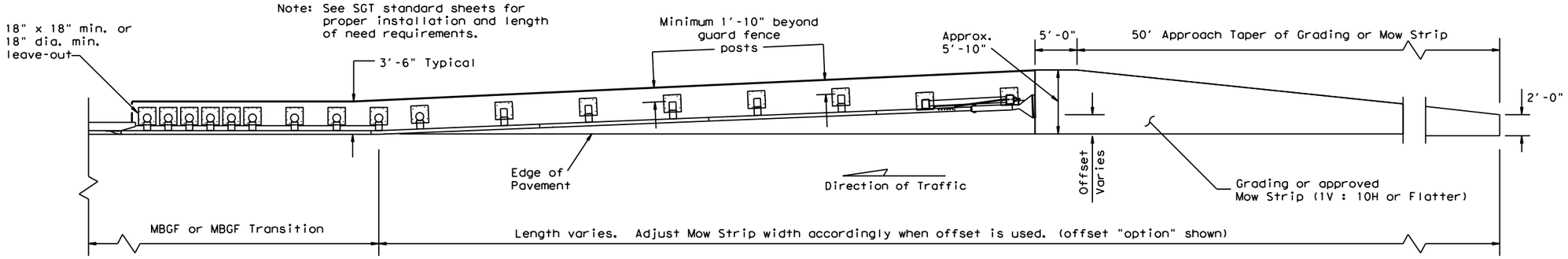
Texas Department of Transportation — Design Division Standard

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

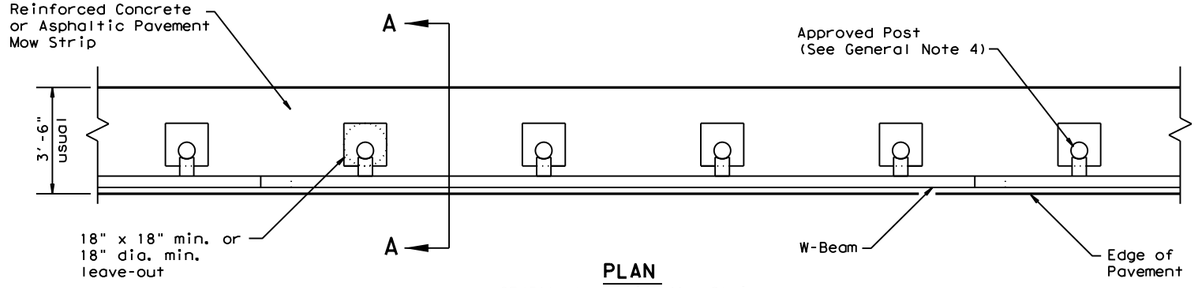
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1911	01	022, ETC	HIGHWAY		
	DIST	COUNTY		SHEET NO.		
	HOU	GALVESTON		102		

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\gf31ms19.dgn
FM2004 North & South Sidewalk\19110102Fm2004Sidewalk\FM2004 Sidewalk

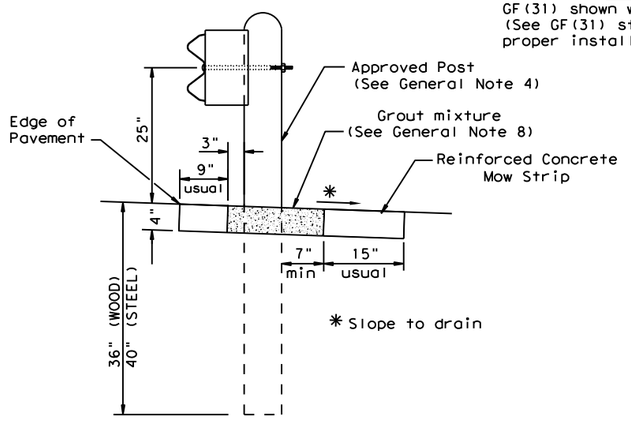


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



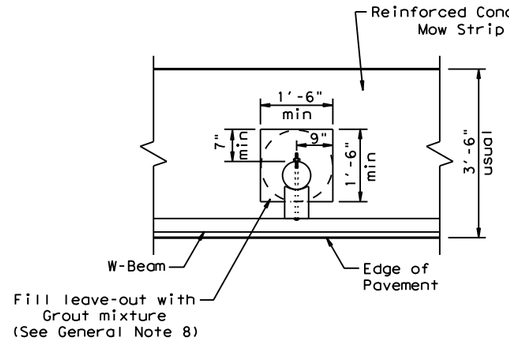
PLAN

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



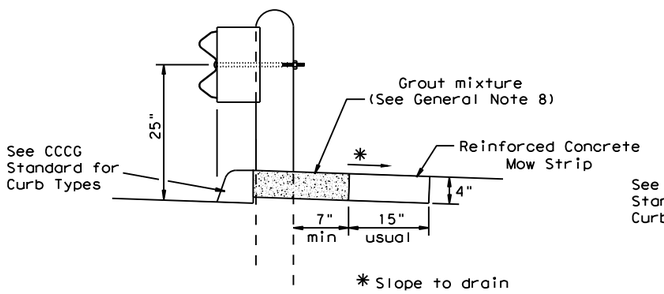
SECTION A-A

Typical



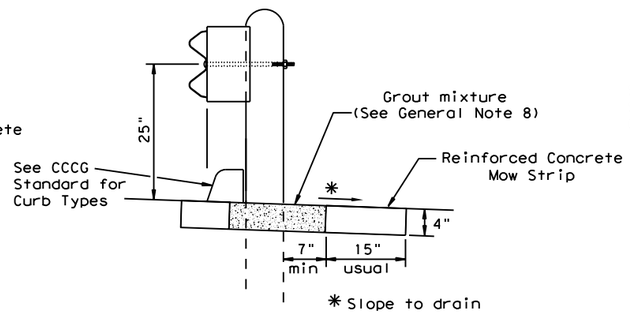
MOW STRIP DETAIL

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



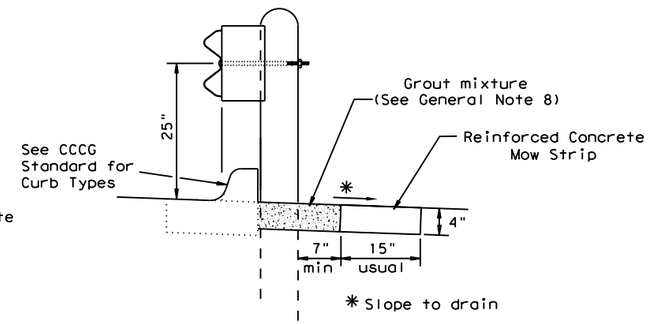
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

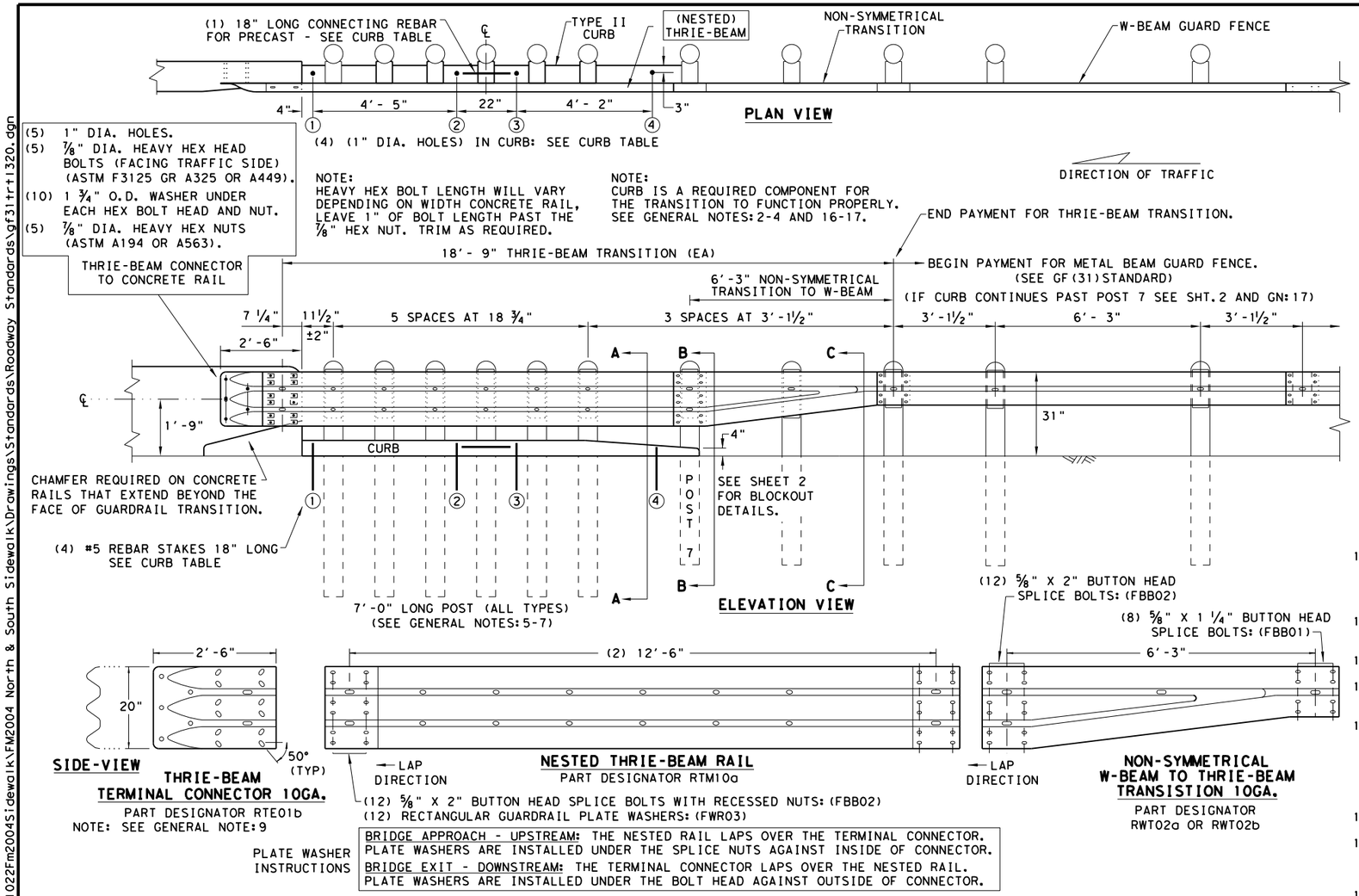
Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		103

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*1\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\gf31tr1320.dgn



GENERAL NOTES

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

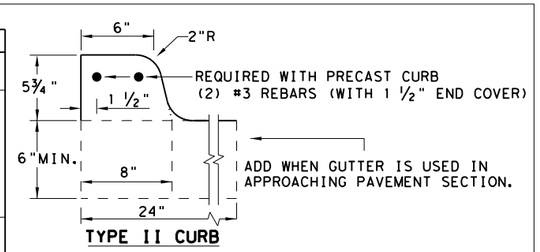
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

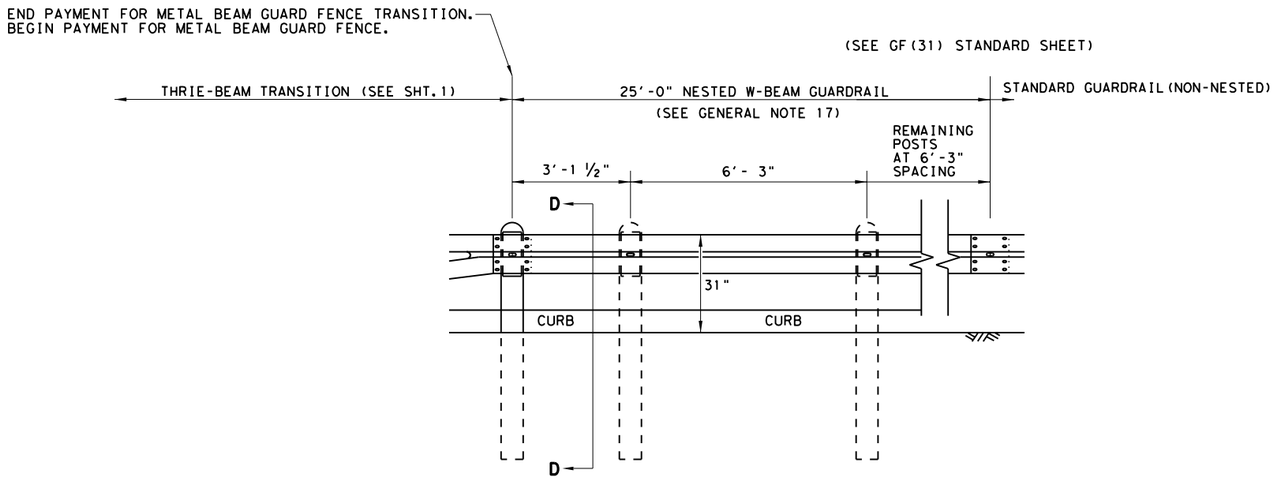
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

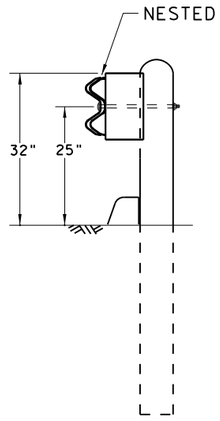
FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		104

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\gf31trt1320.dgn
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\gf31trt1320.dgn

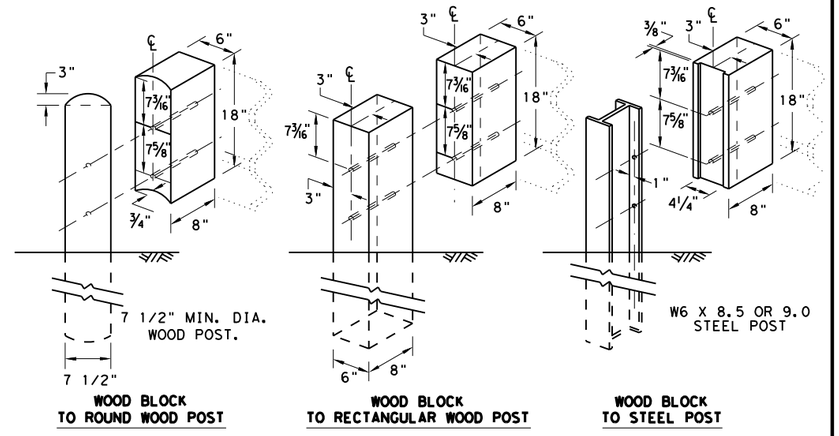
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1911	01	022, ETC	FM2004	
	DIST	COUNTY		SHEET NO.	
	HOU	GALVESTON		105	

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Roadway Standards\sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

PLAN VIEW

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

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

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

POST 40" DEPTH (TYP 1-8)

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

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

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

6'-1⅜"

POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

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

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

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT		CK: KM	DW: VP		CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1911	01	022, ETC		FM2004	
	DIST	COUNTY			SHEET NO.	
	HOU	GALVESTON			106	

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkSGT11S3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

CABLES

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

INSTALLATION LENGTH 55'- ½"

BEGIN LENGTH OF NEED

49'-8 5/16"

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

DETAIL (D)

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

68-⅛"

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1

(8) X-LITE LINE POST - ITEM (11)

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

SOIL
ANCHOR POST
ITEM (1)

ELEVATION VIEW

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

SECTION VIEW A-A

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR
OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

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

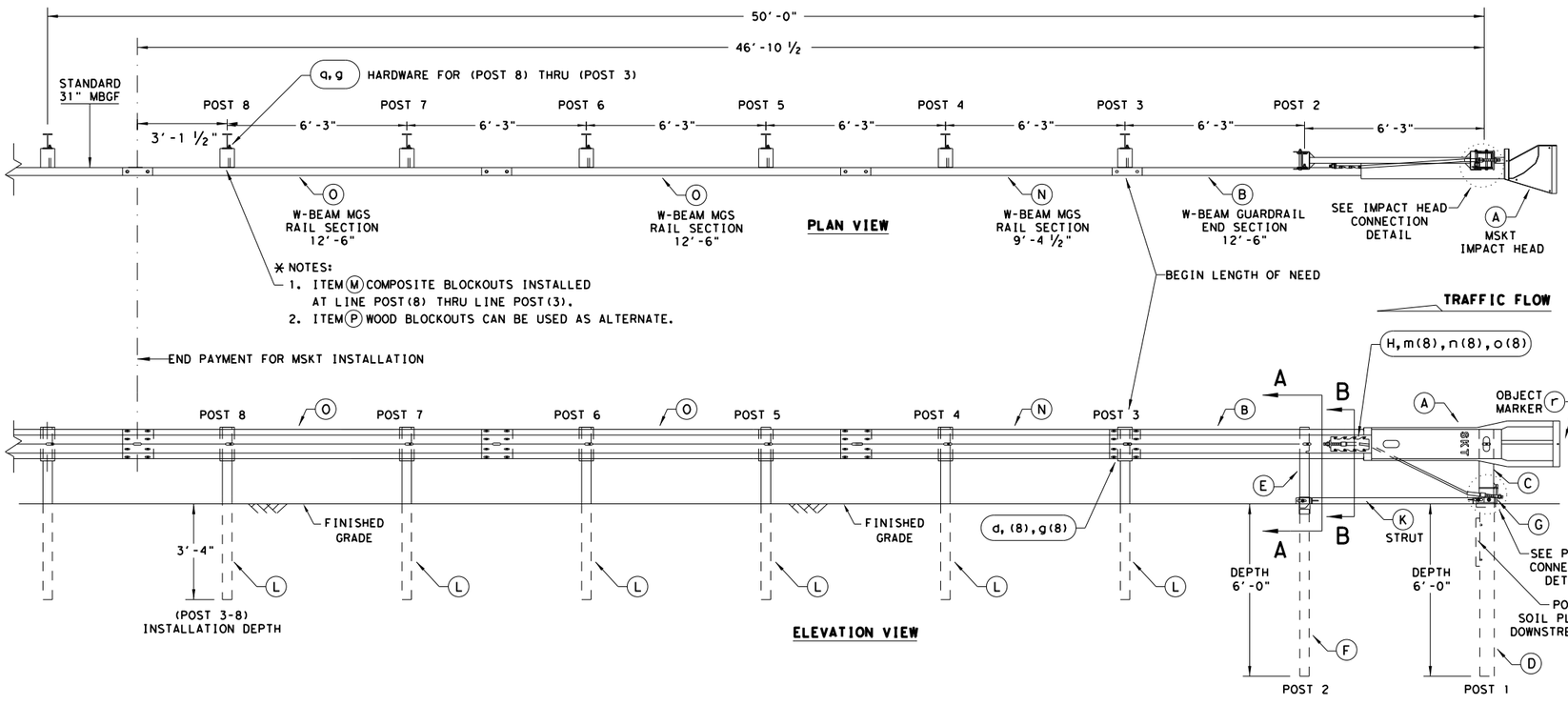
Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		107

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\sgt12s3118.dgn



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

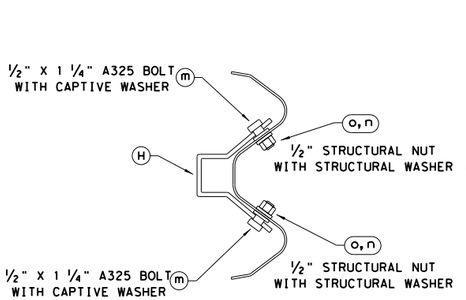
GENERAL NOTES

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

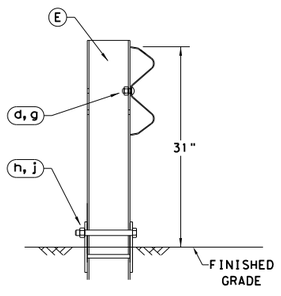
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

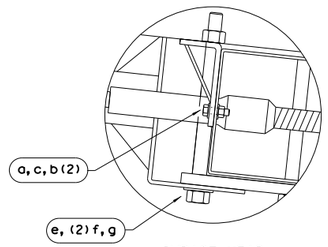
ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL



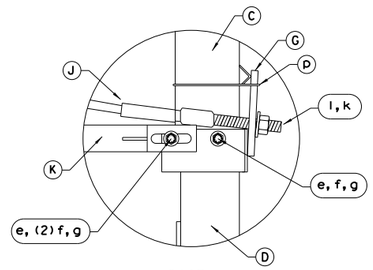
SECTION B-B
ANCHOR BRACKET



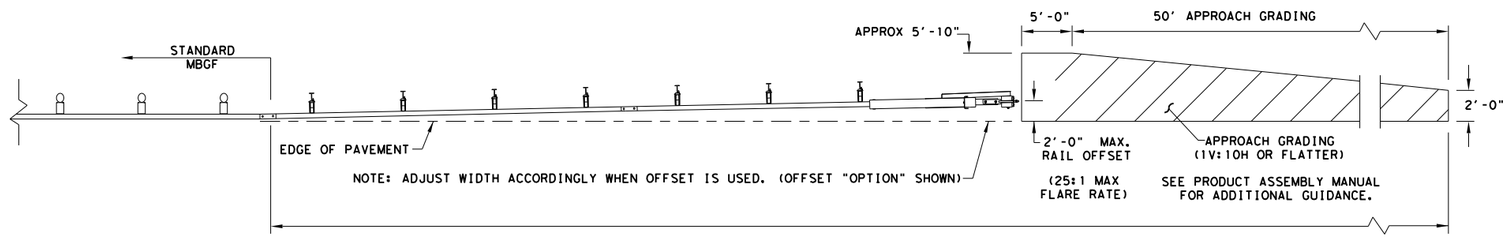
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

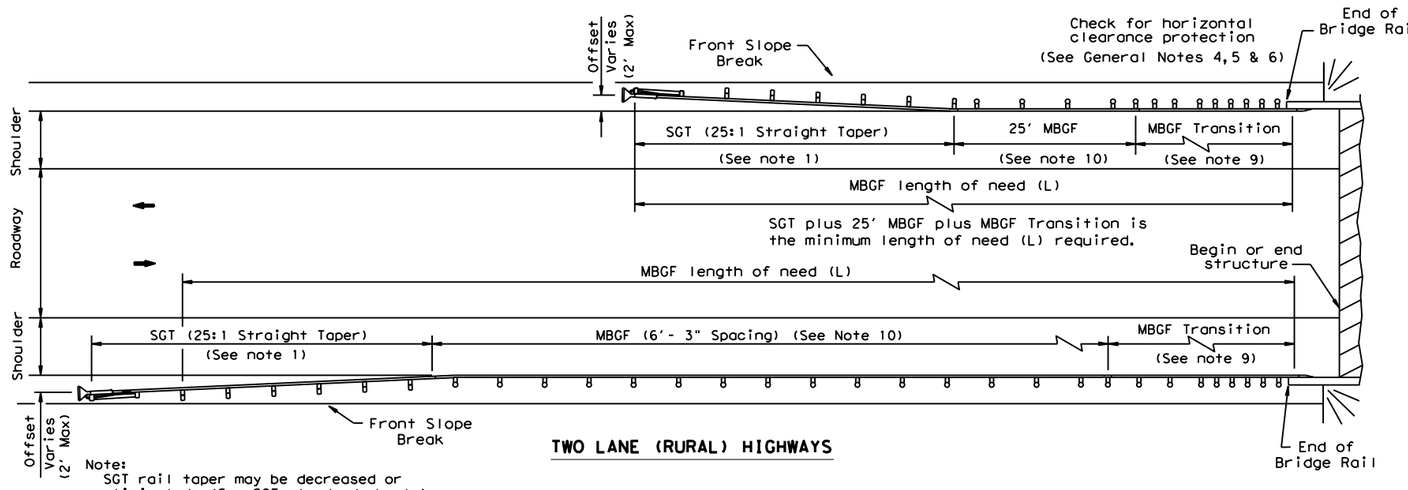
Texas Department of Transportation

Design Division Standard

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

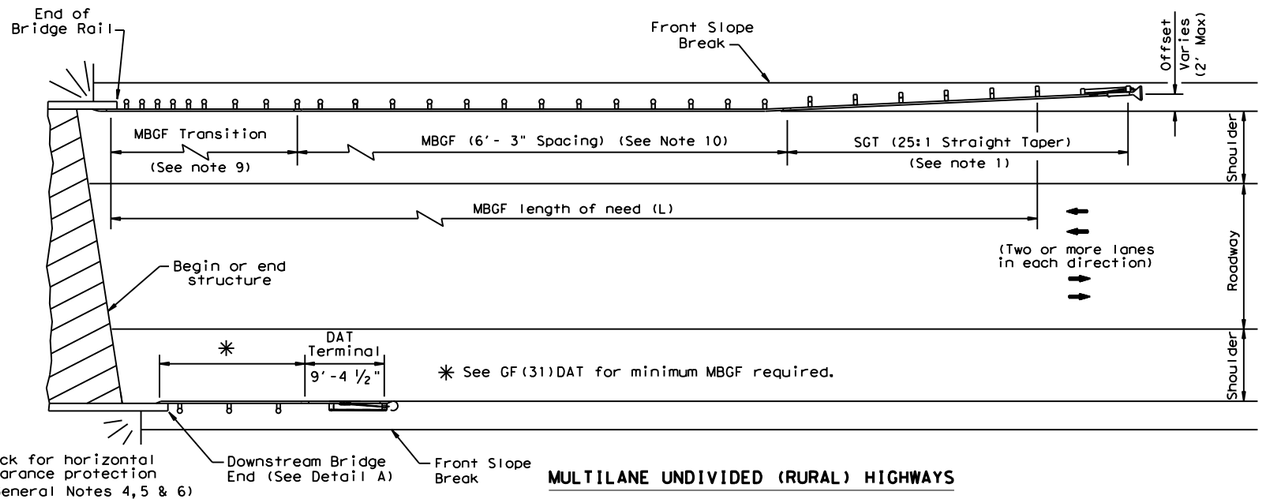
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1911	01	022, ETC		FM2004	
	DIST	COUNTY			SHEET NO.	
	HOU	GALVESTON			108	

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA+4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\bed14.dgn

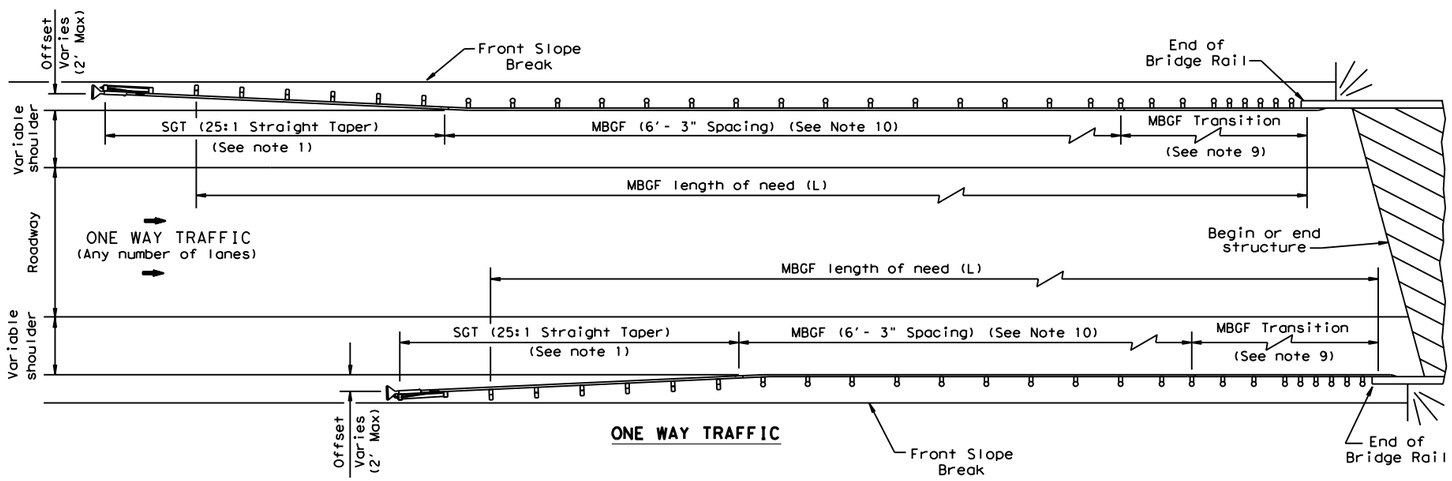


TWO LANE (RURAL) HIGHWAYS

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



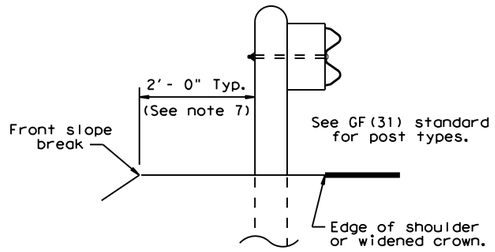
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



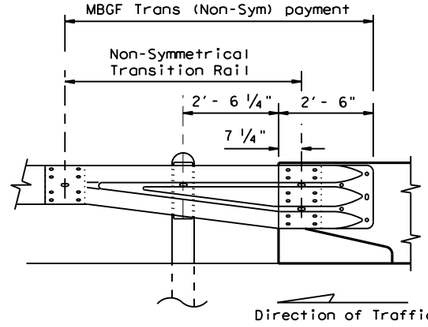
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

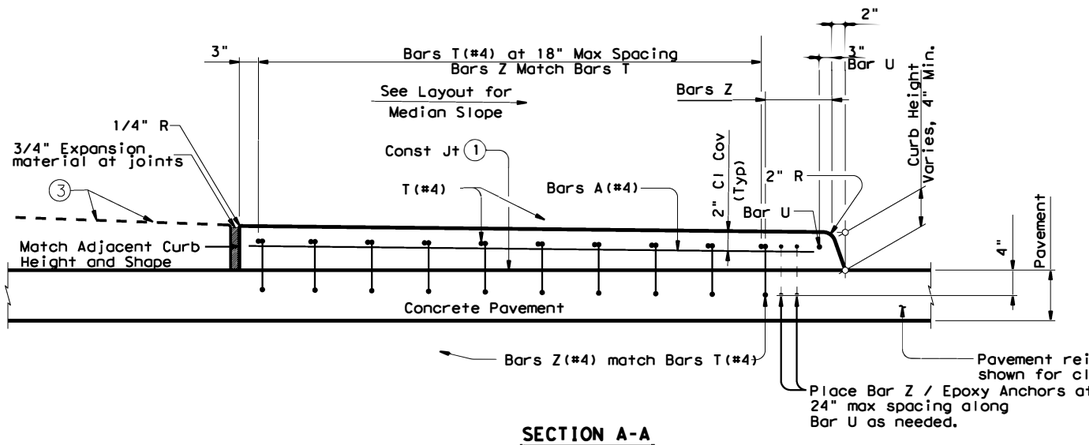
Texas Department of Transportation — Design Division Standard

BRIDGE END DETAILS

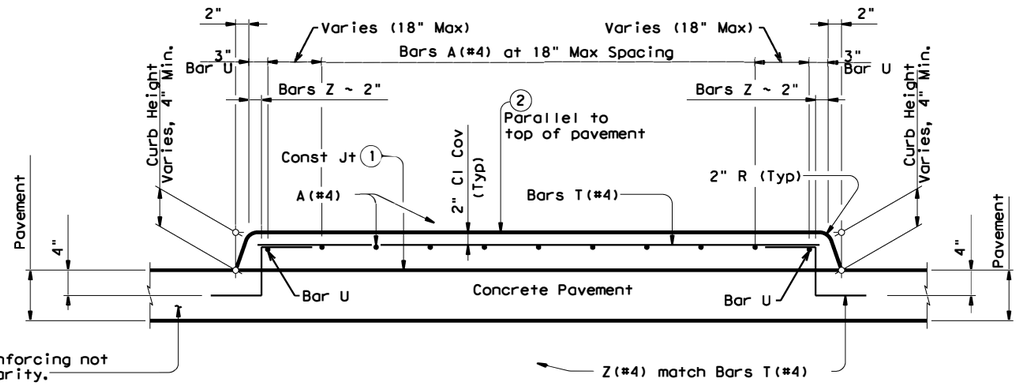
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		112



SECTION A-A

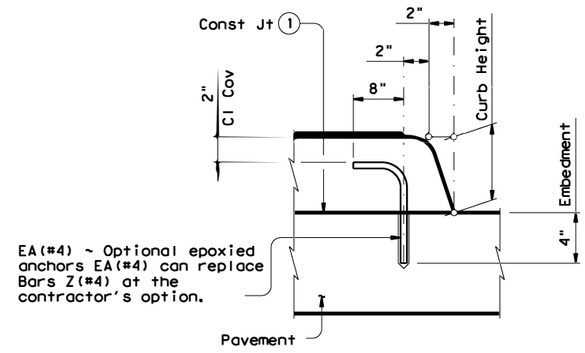


SECTION B-B

(1) Provide broom finish to top of pavement where raised median area is defined.

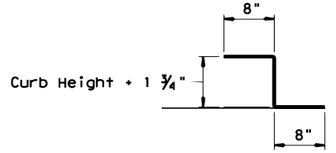
(2) Unless noted otherwise on the pavement details.

(3) Unless otherwise directed, place concrete riprap over pavement or base. If not over pavement or base, place sod or seed.

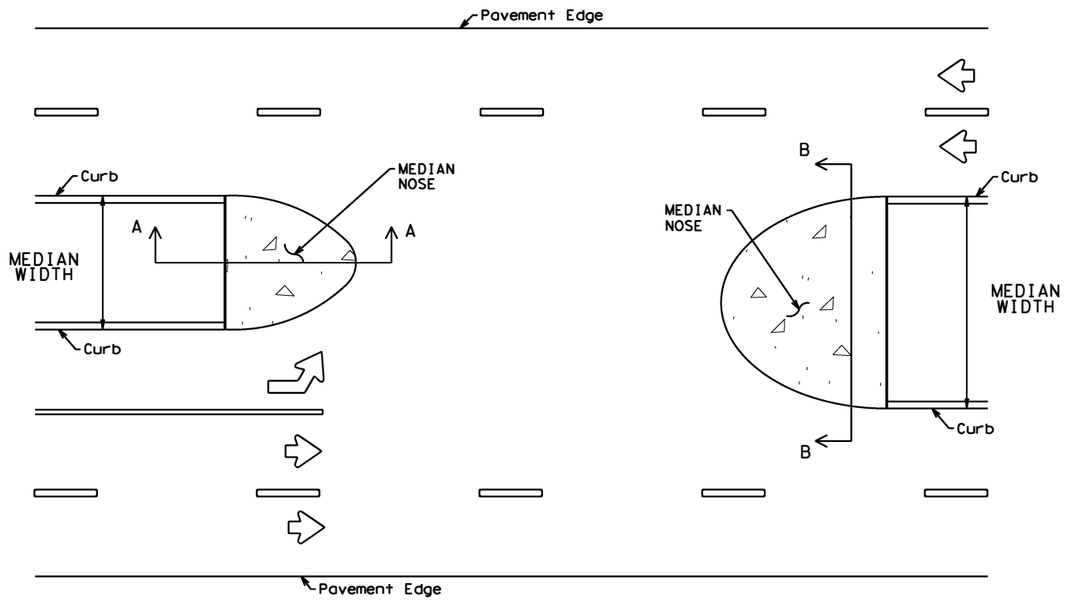


OPTIONAL EPOXY ANCHORS

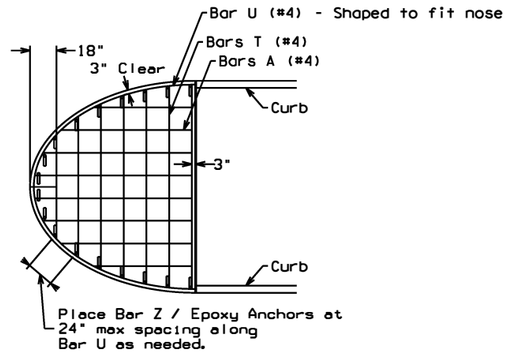
Embed EA(#4) bar into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Follow manufacturer's directions for installing the epoxied anchor bars.



BARS Z(#4)



PLAN



REINFORCING

MATERIAL NOTES:
Provide Grade 60 reinforcement. Welded wire reinforcement (WWR) meeting ASTM A497 of equivalent size and spacing may be substituted for Bars A and Bars T.

Epoxy coat reinforcement if pavement reinforcement is required to be epoxy coated.

DESIGNER NOTES:
Provide Median Slope in Design Layouts.

SHEET 1 OF 1

Texas Department of Transportation
Houston District

MEDIAN NOSE DETAILS

HOU-MEDNS-22

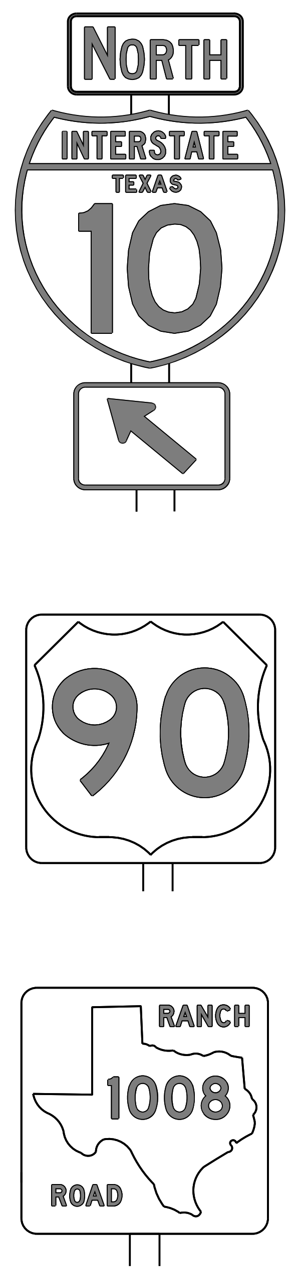
FILE: stdB13.dgn	DN: NHEB	CK: TxDOT	DW: NHEB	CK: TxDOT
©TxDOT FEBRUARY 2022	DISTRICT	PROJECT		SHEET
REVISIONS	HOU			113
03/15 FOR 2014 SPECS 02/22 ADDED NOTE FOR FINISH BEHIND MEDIAN NOSE	COUNTY	CONTROL	SECT	JOB / HIGHWAY
	GALVESTON	1911	01	022, ETC. / FM2004

LEVELS DISPLAYED 60 1
PATH:

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\1911010022Fm2004Sidewalk\

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

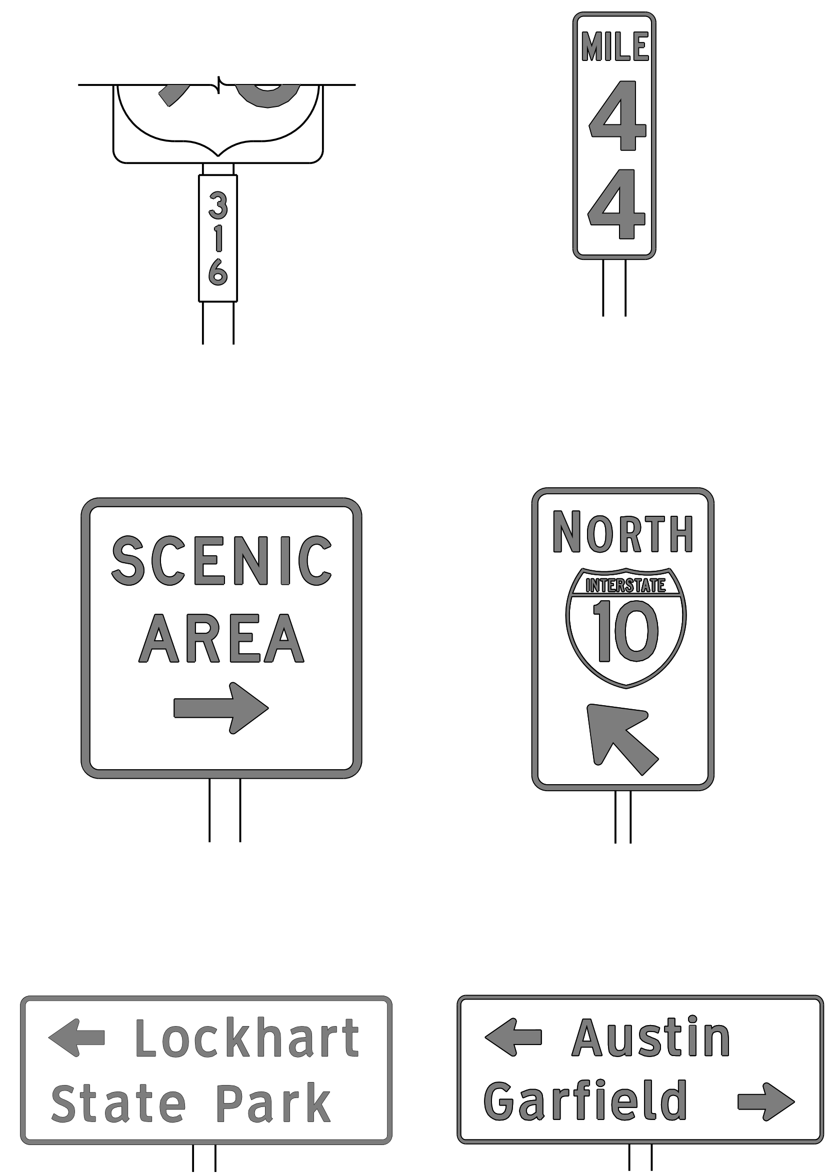
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

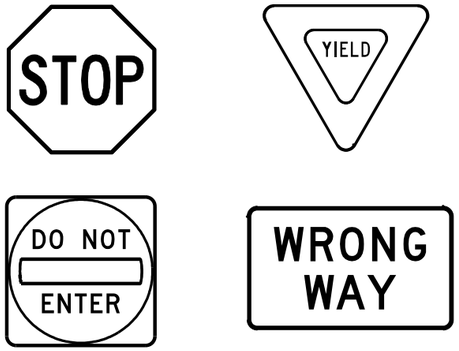
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT 1911	SECT 01	JOB 022, ETC	HIGHWAY FM 2004
REVISIONS 12-03 7-13 9-08	DIST HOU	COUNTY GALVESTON		SHEET NO. 113A

3

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004SidewalkTSR4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

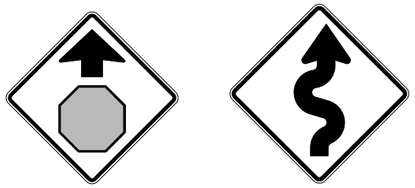
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

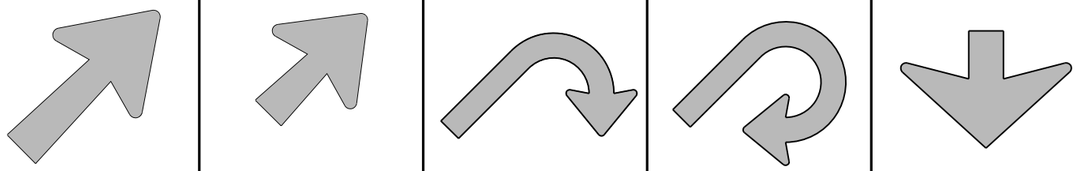
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113B

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkTSR5Standards.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

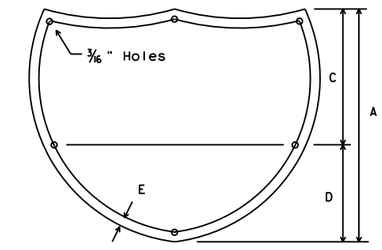
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

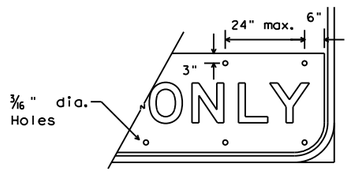
http://www.txdot.gov/

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

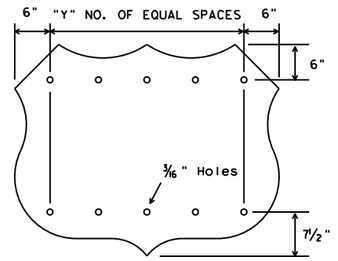


INTERSTATE ROUTE MARKERS

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

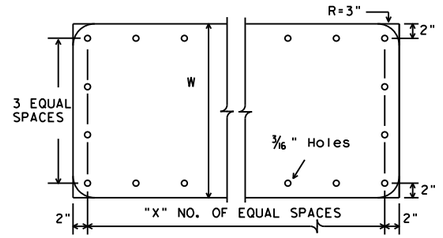


EXIT ONLY PANEL



U.S. ROUTE MARKERS

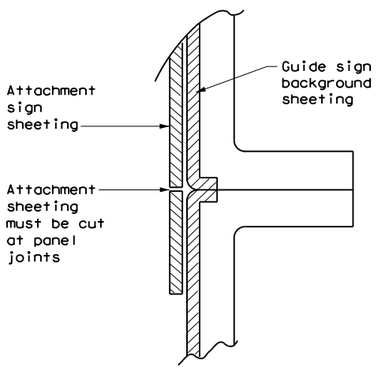
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



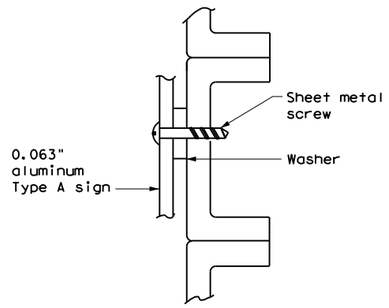
STATE ROUTE MARKERS

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

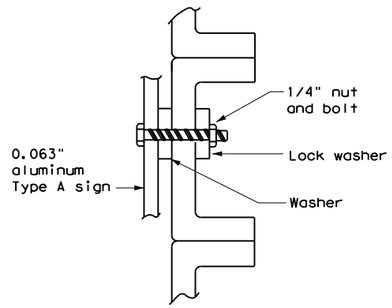
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

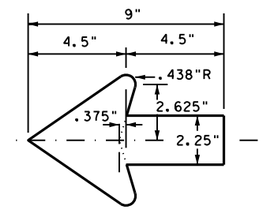
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

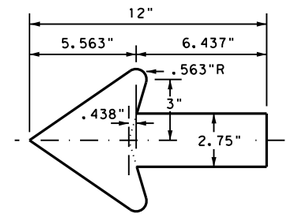
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113C

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

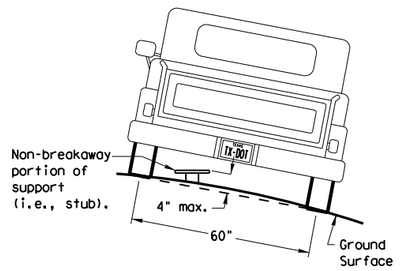
Anchor Type

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

Sign Mounting Designation

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

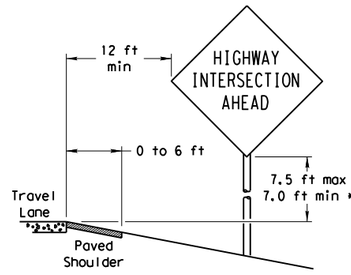
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

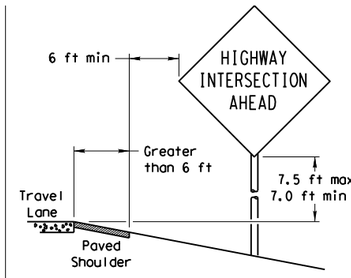
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

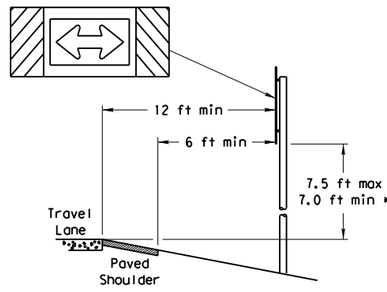
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



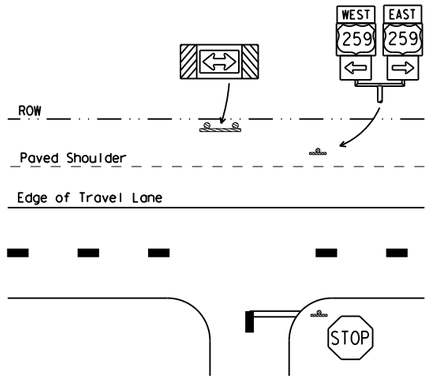
GREATER THAN 6 FT. WIDE

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

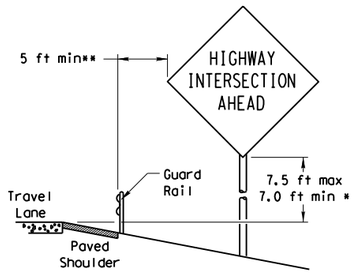
T-INTERSECTION



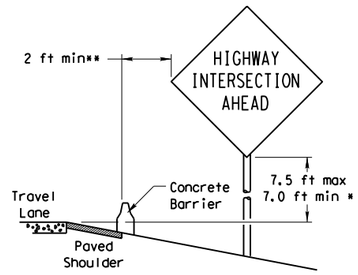
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER

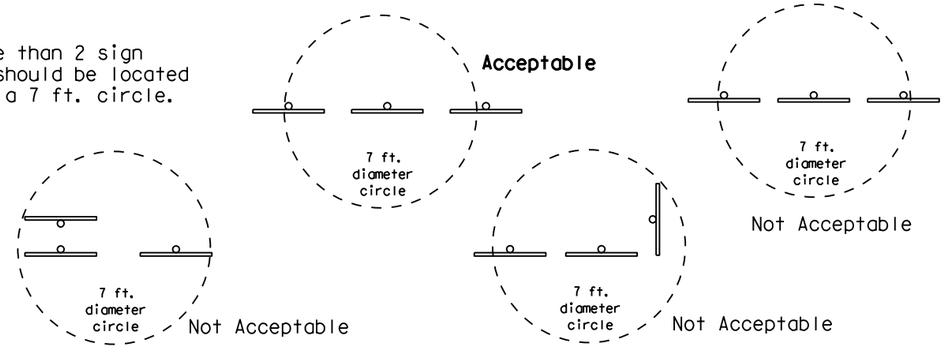


BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

When a 7 ft. sign height is used, no more than 2 sign posts should be located within a 7 ft. circle.

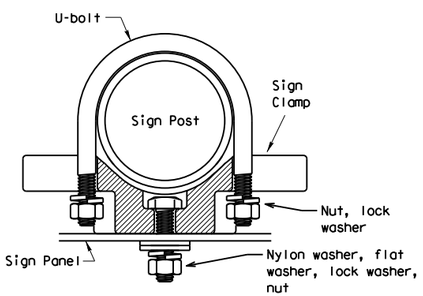


When a 10 ft. sign height is used, no more than 2 sign posts should be located within a 10 ft. circle.

When a 14 ft. sign height is used, no more than 2 sign posts should be located within a 14 ft. circle.

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

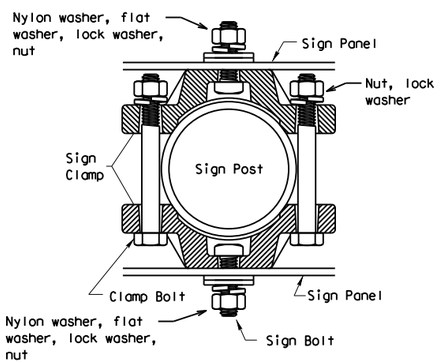


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

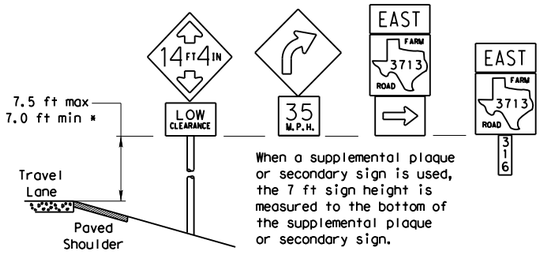
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



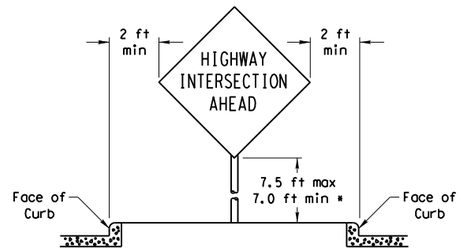
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



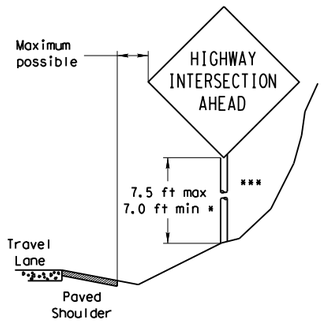
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

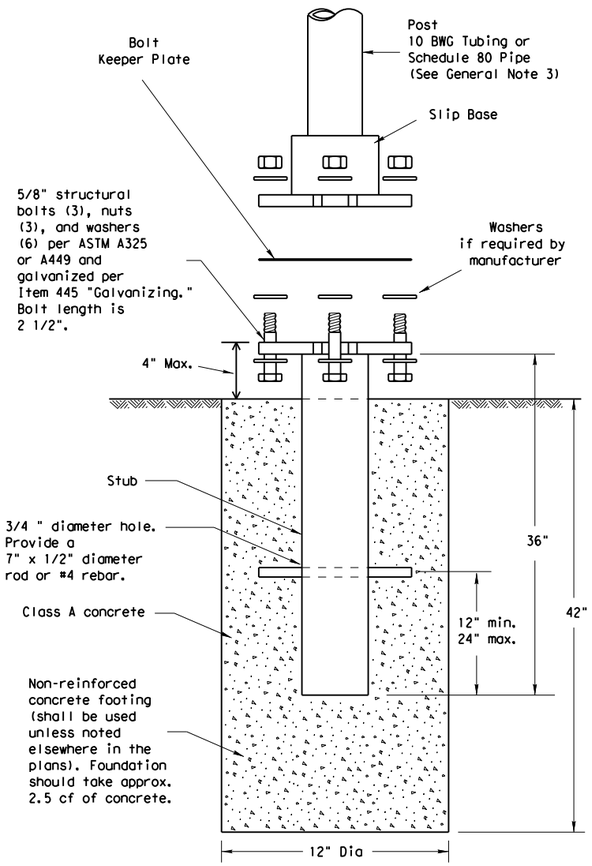
© TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113D

26A

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Sign\smdgen.dgn

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Sign\smds1.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

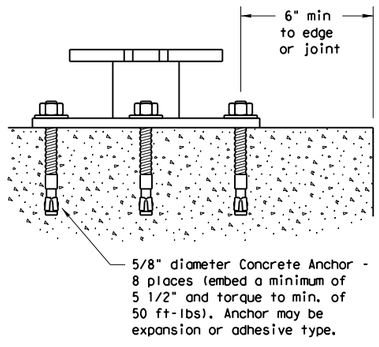
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

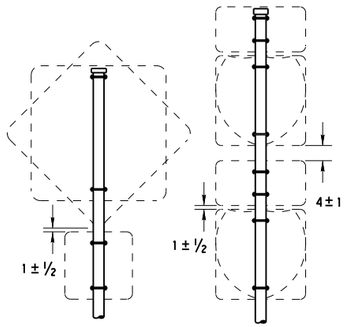
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

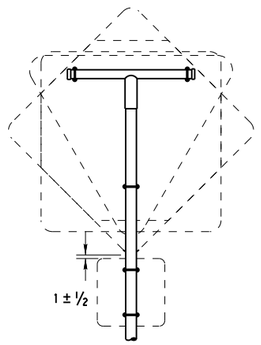
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1911	01	022,ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113E

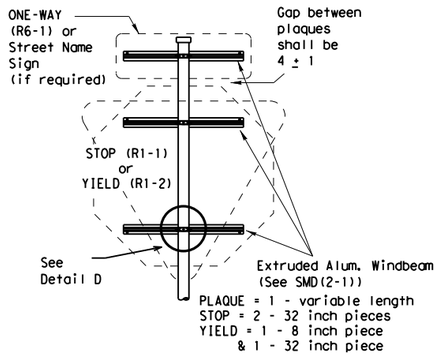
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalK\FM2004 North & South SidewalK\Drawings\Standards\Signs\smds2.dgn



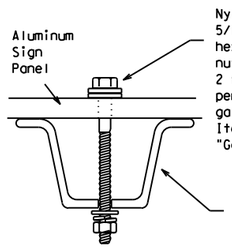
SM RD SGN ASSM TY XXXXX(1)XX(P)



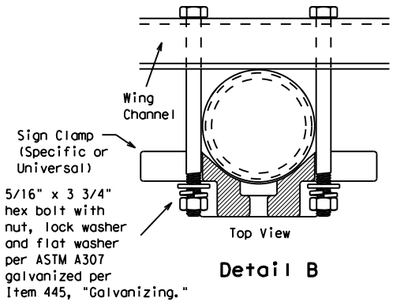
SM RD SGN ASSM TY XXXXX(1)XX(T)



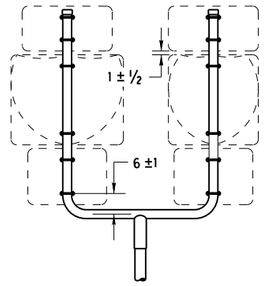
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



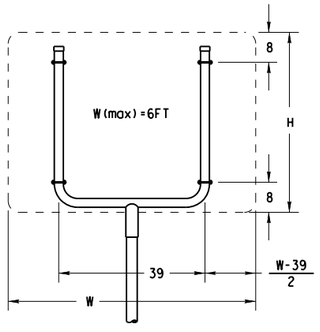
Detail A



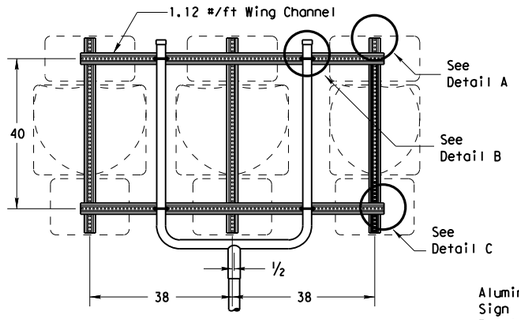
Detail B



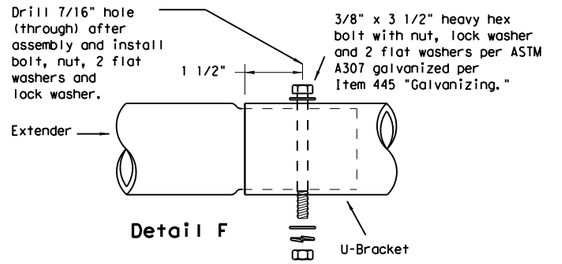
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

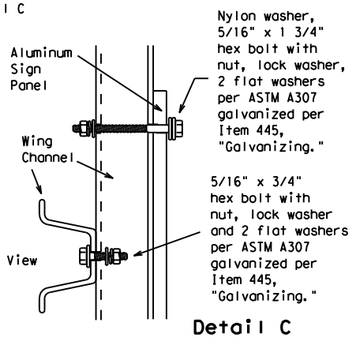


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

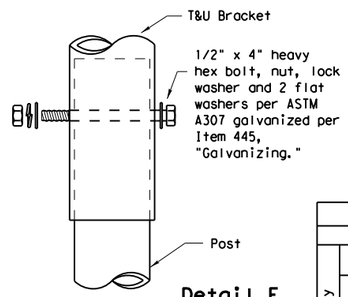


Detail F

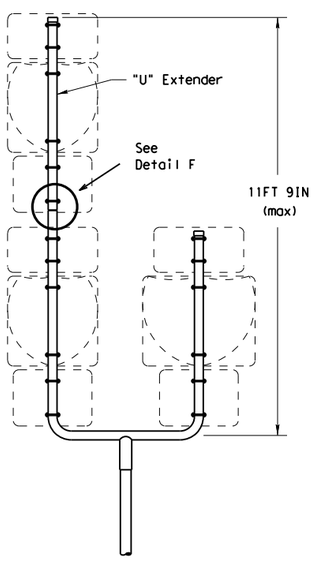
Splices shall only be allowed behind the sign substrate.



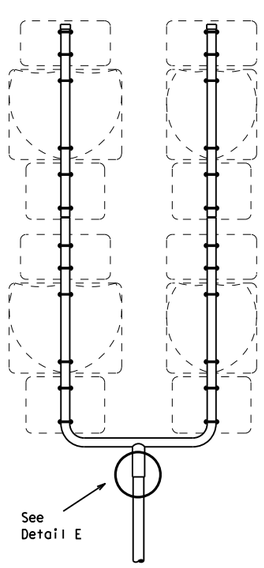
Detail C



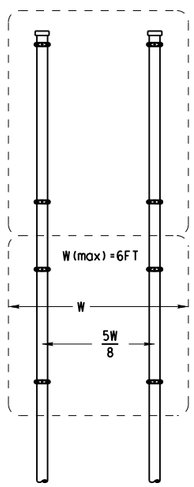
Detail E



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

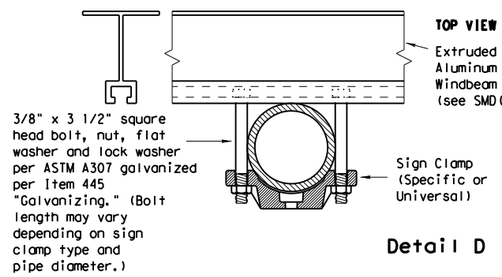


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

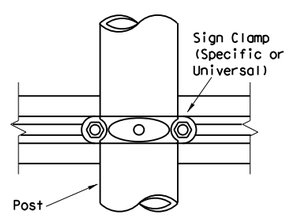


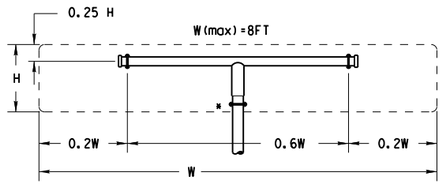
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

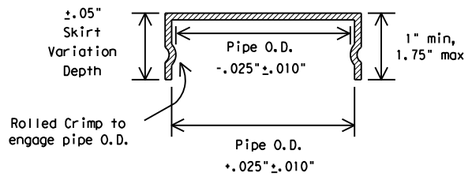




All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

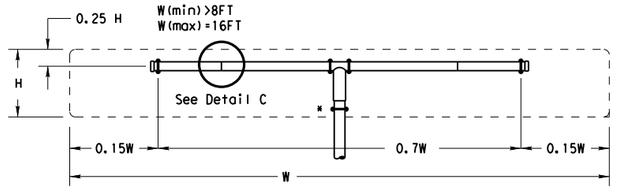
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004

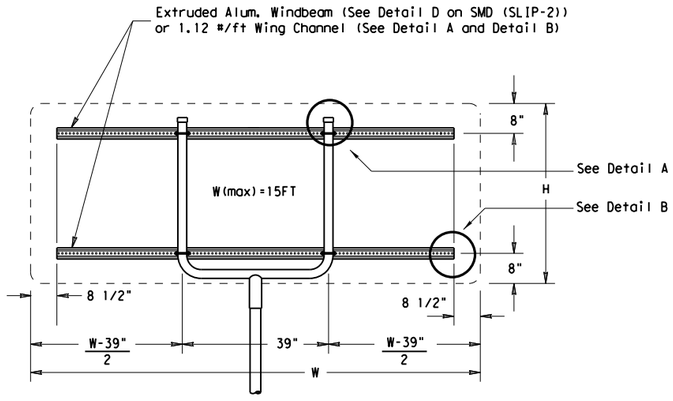
DIST	COUNTY	SHEET NO.
HOU	GALVESTON	113F

9-08 REVISIONS

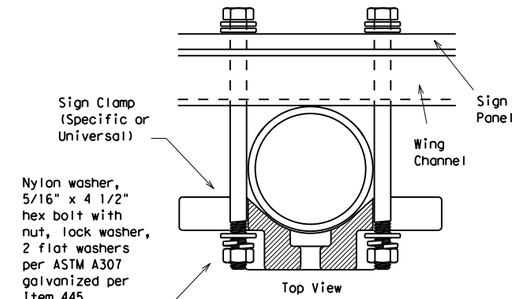
5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA++FM2004 Sidewalk\19110022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Sign\smds3.dgn



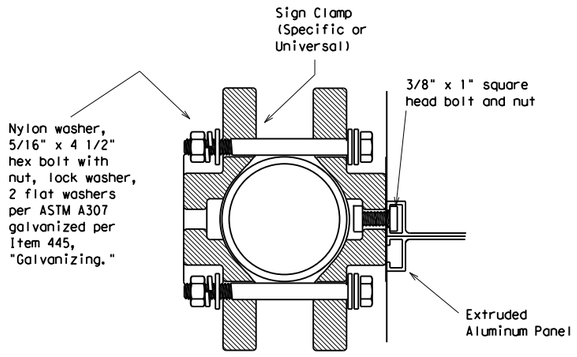
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



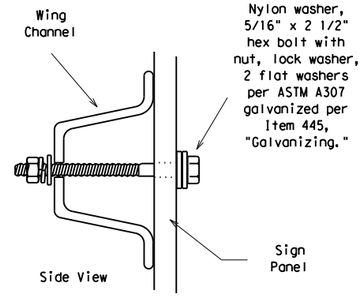
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



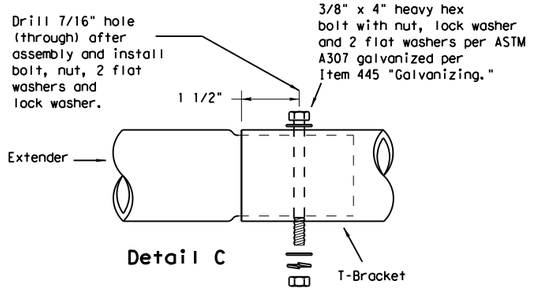
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

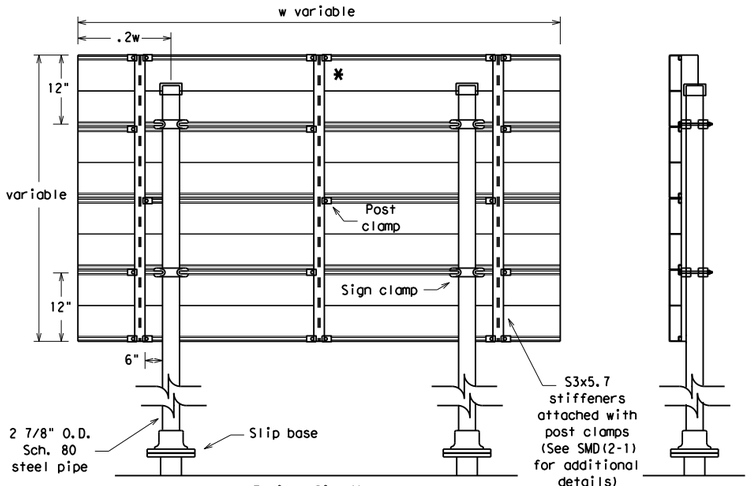


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

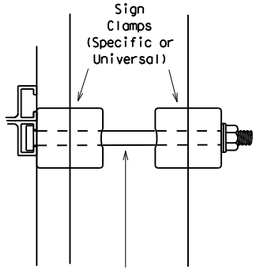


Typical Sign Mount

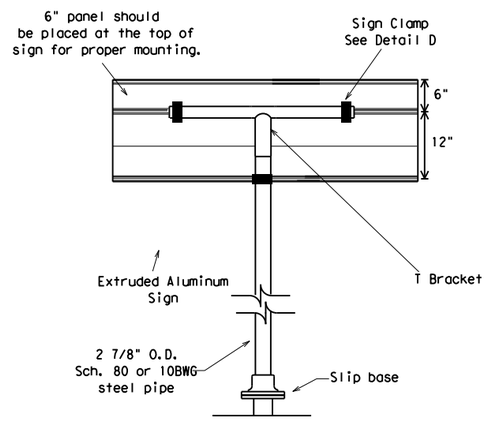
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

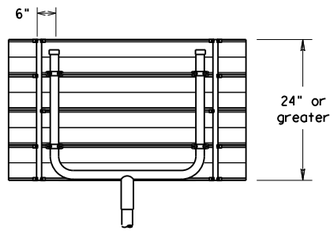
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

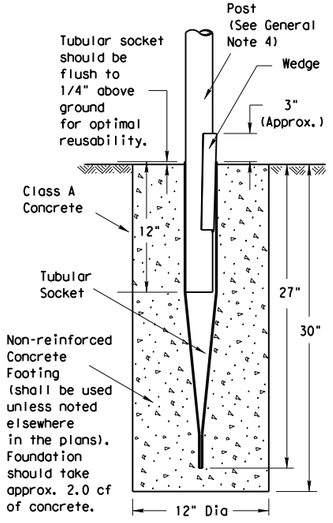
REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004

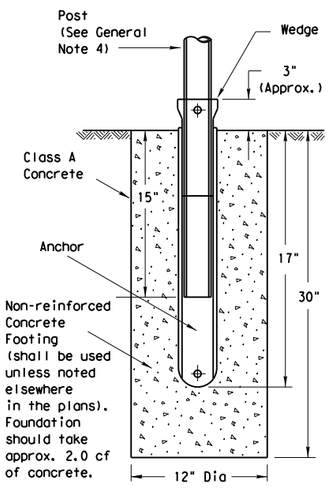
DIST	COUNTY	SHEET NO.
HOU	GALVESTON	113G

Wedge Anchor Steel System



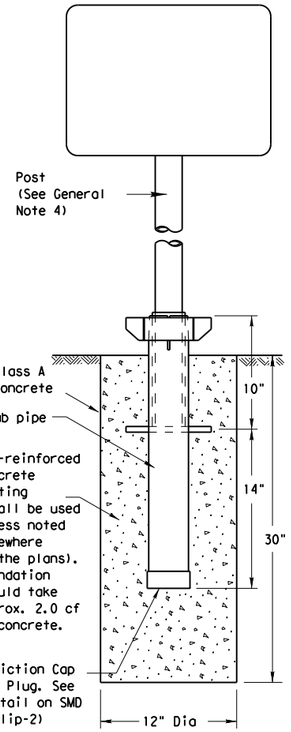
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

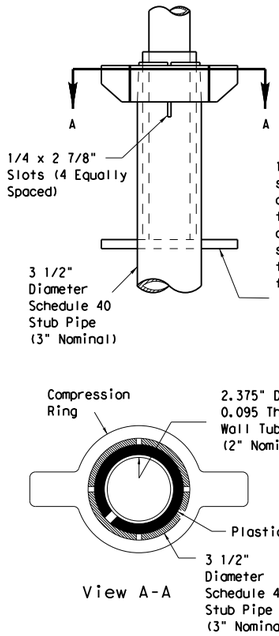


SMD RD SGN ASSM TY TWT(X)WP(X)

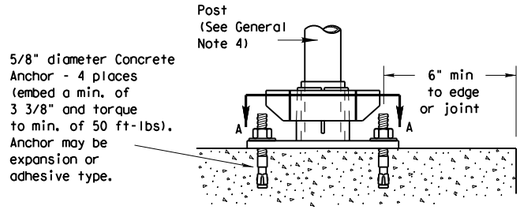
Universal Anchor System with Thin-Walled Tubing Post



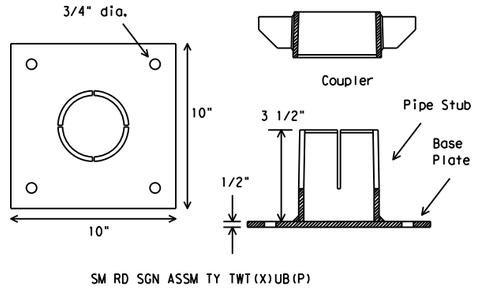
SM RD SGN ASSM TY TWT(X)UA(P)



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

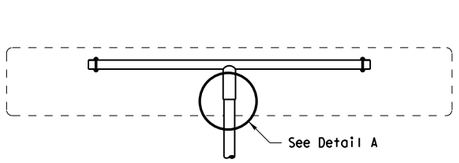


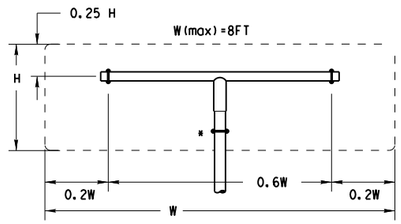
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized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



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

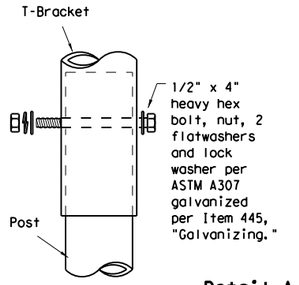
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





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

(* - See General Note 6)



Detail A

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

NOTE

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

GENERAL NOTES:

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

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

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

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

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

Texas Department of Transportation
Traffic Operations Division

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

SMD(TWT)-08

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

9-08 REVISIONS

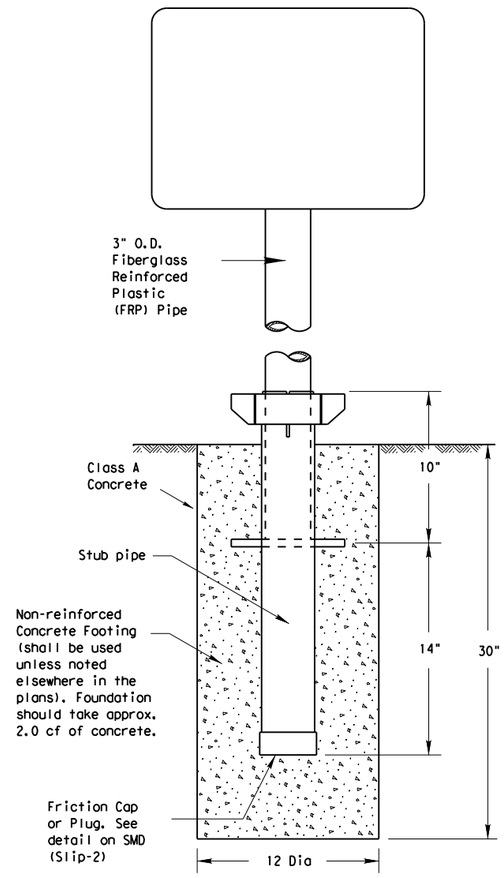
CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		113H

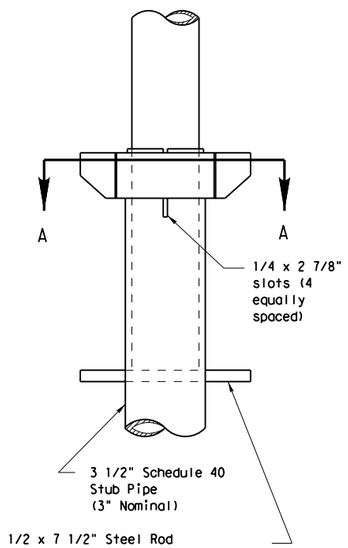
26E

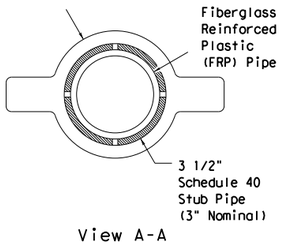
5/9/2024
Z:\Projects\220058*CEC*TxDOT\SB\WA*4\FM2004 Sidewalk\19110022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Sign\smdtwt.dgn

5/9/2024
Z:\Projects\220058#CEC#TxDOT\WSB\WA#4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Sign\smdfrp.dgn

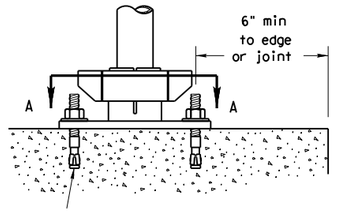
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post





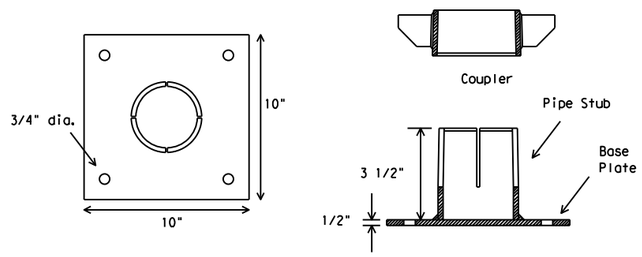


SM RD SGN ASSM TY FRP(X)UA(P)



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

BOLT-DOWN DETAILS



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

GENERAL NOTES:

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

FRP POST REQUIREMENTS

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

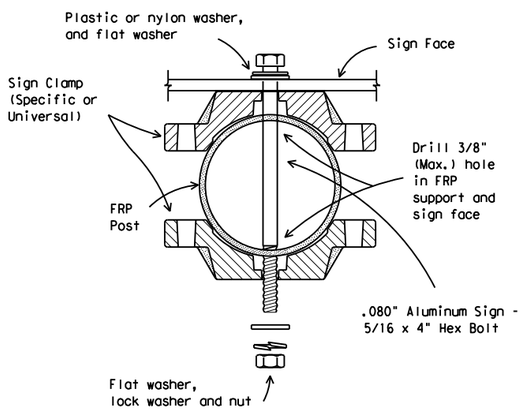
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

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

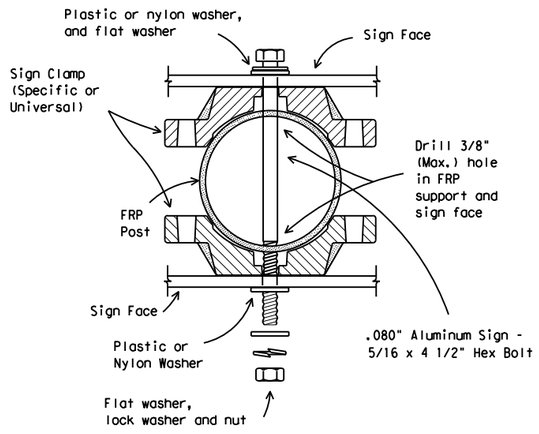
BOLT DOWN SIGN SUPPORT

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

Typical Sign Mounting Detail for FRP Support with Single Sign



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



Texas Department of Transportation
Traffic Operations Division

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

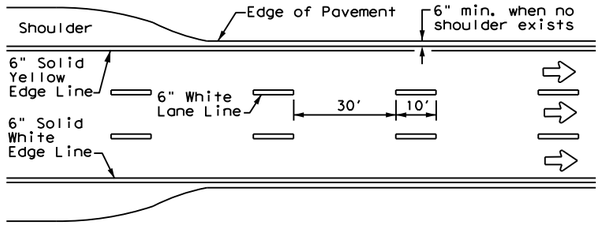
SMD(FRP)-08

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

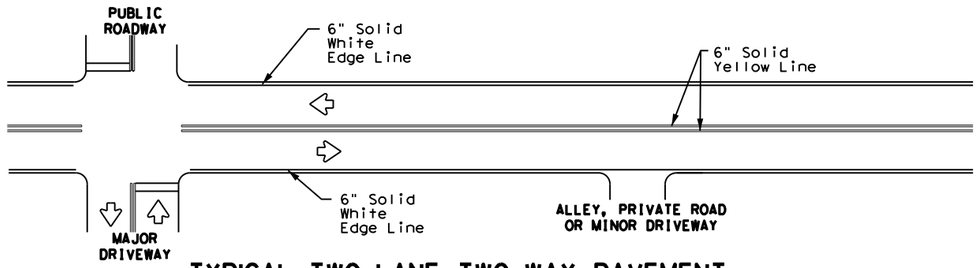
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		113I

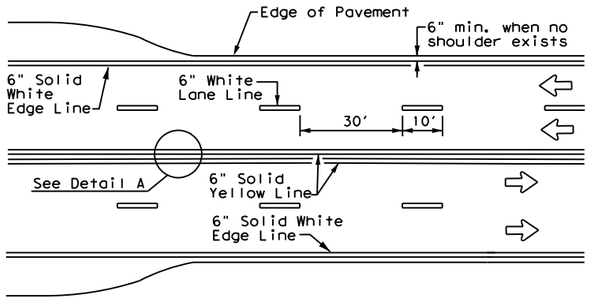
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004SidewalkPMKD.dgn

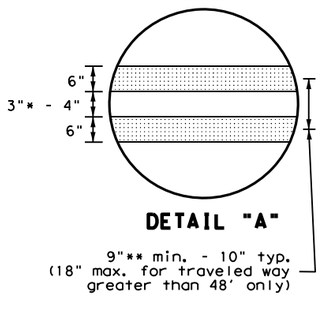


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





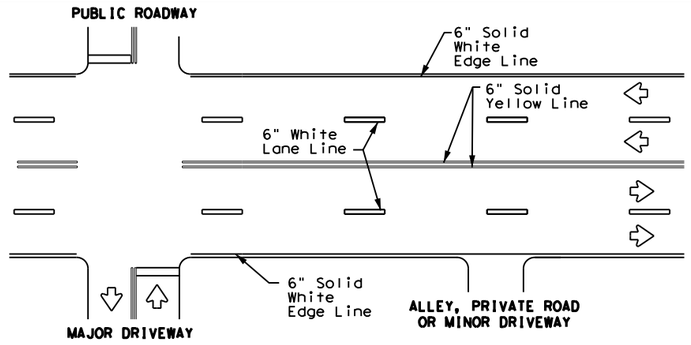
DETAIL "A"

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

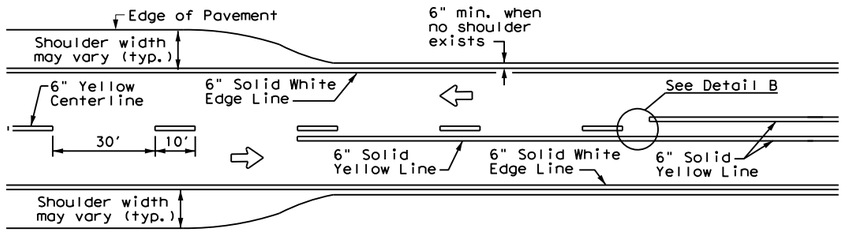
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

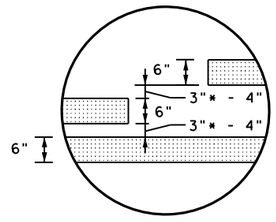
** 8" minimum for restripe projects when approved by the Engineer.



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



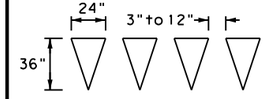
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

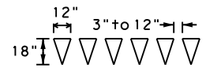
DETAIL "B"

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

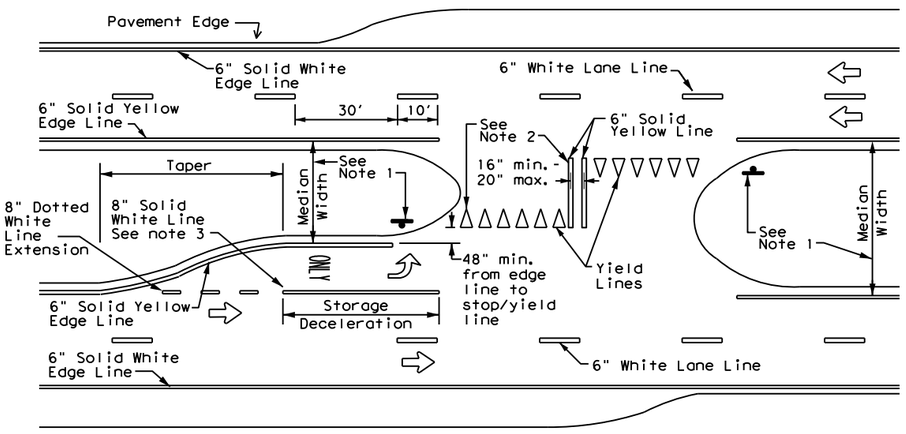


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

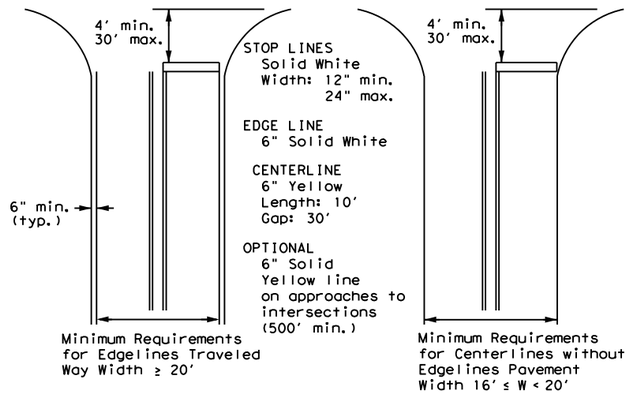
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

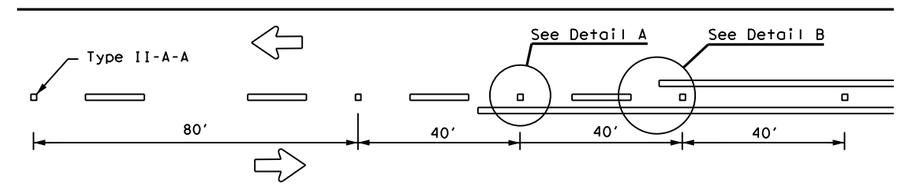
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

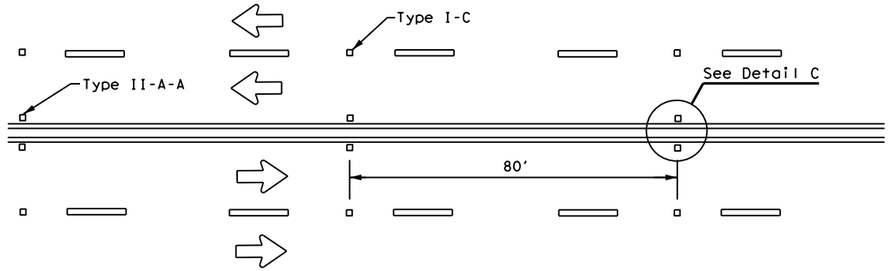
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113J

22A

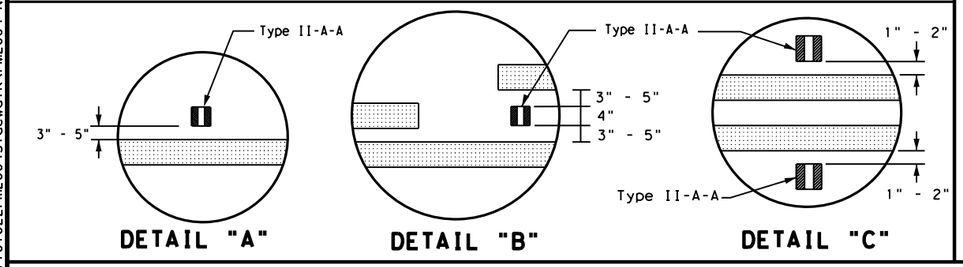
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



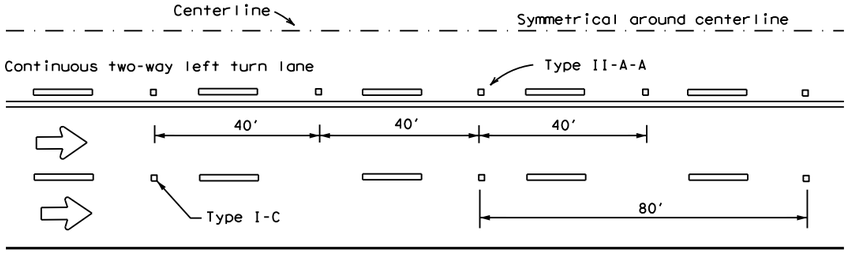
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



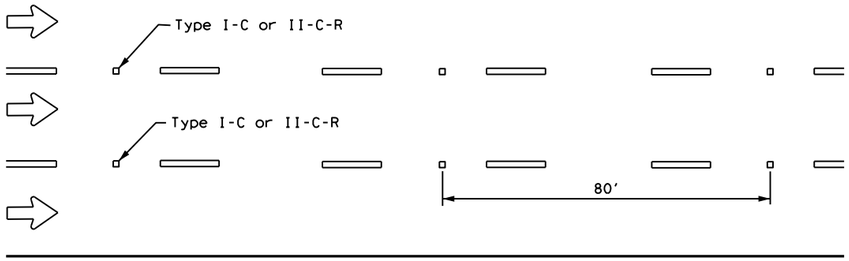
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



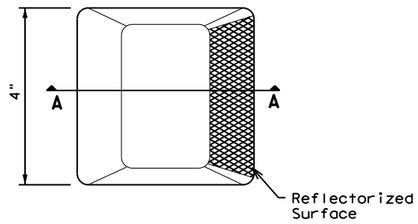
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

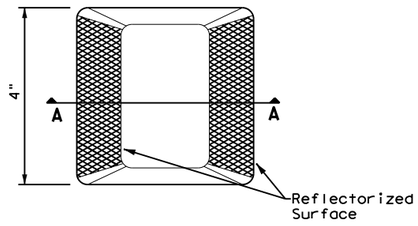
See Note 3.

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

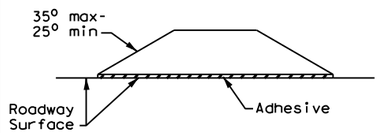
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

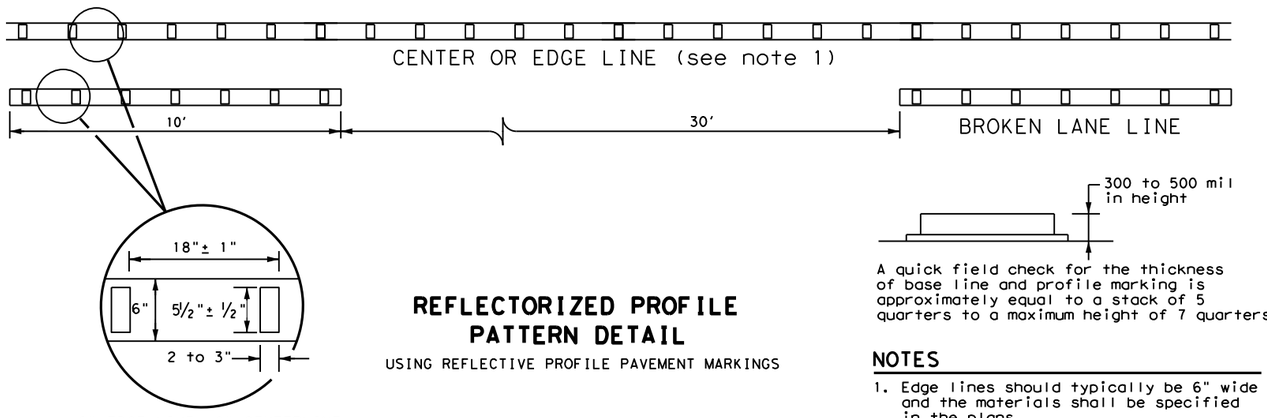


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

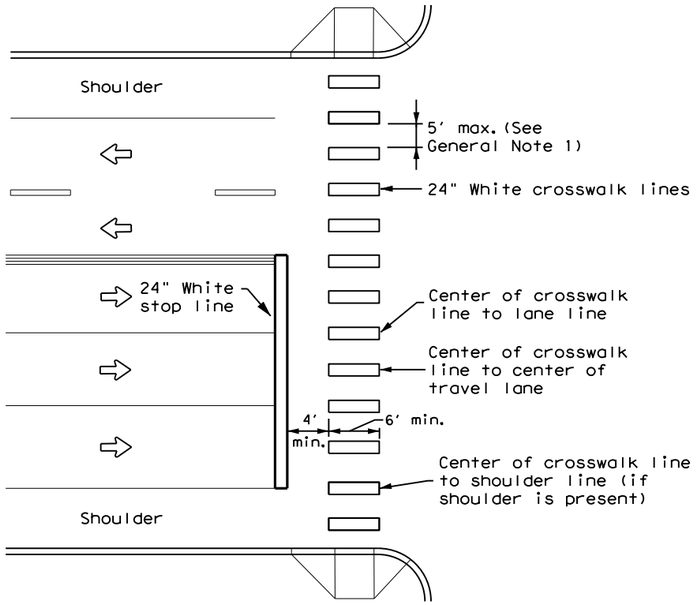
POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113K

22B

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\1911010022Fm2004SidewalkPavMrkgsSht1.dgn

5/9/2024
Z:\Projects\220058+CEC+TxDOT\WSB\WA#4\FM2004 Sidewalk\19110102Fm2004SidewalkPWM04.dgn



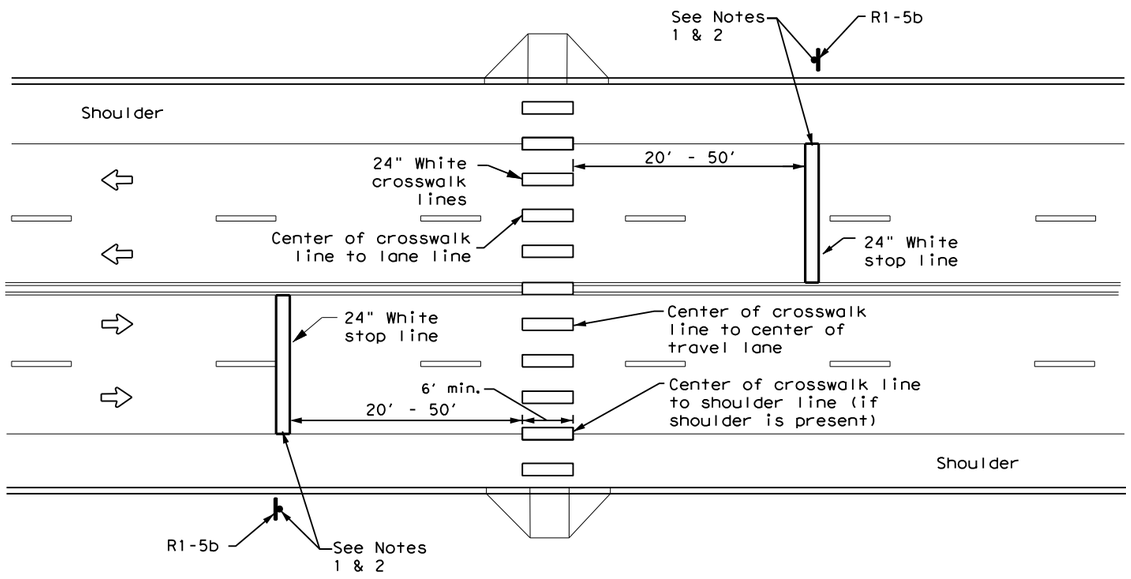
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

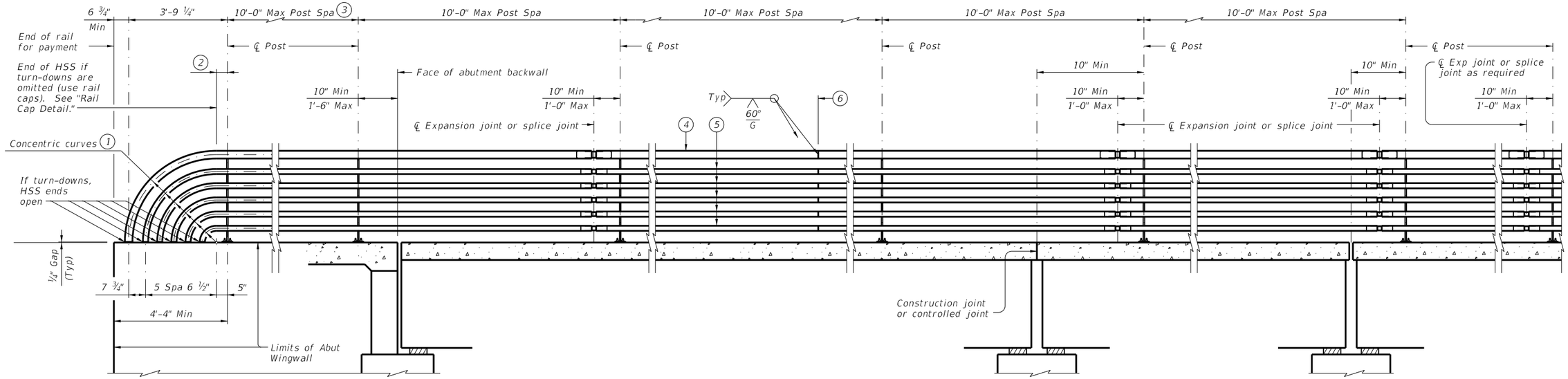
CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
6-20	DIST	COUNTY		SHEET NO.
6-22	HOU	GALVESTON		113L
12-22				

22D

5/9/2024
Z:\Projects\220058_CEC_TxDOTWSBIWA_4\FM2004 Sidewalk\191101022Fm2004SidewalkFM2004 North & South Sidewalk\Roadway Standards\RL-PR11-19.dgn

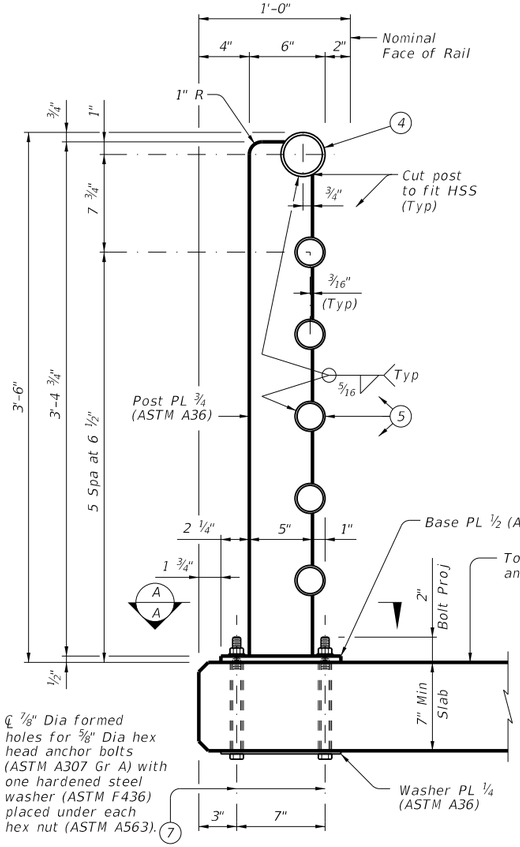


AT ABUTMENTS

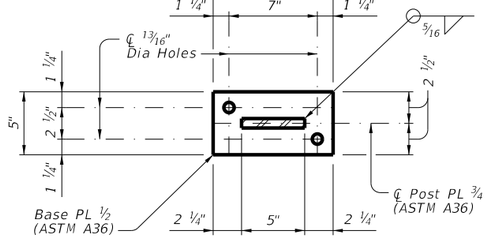
AT BENTS WITHOUT SLAB EXP JOINTS

AT BENTS WITH SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

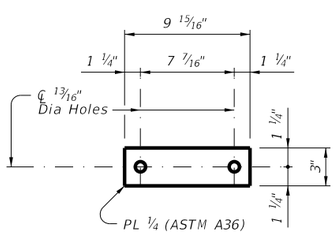


ON BRIDGE SLAB

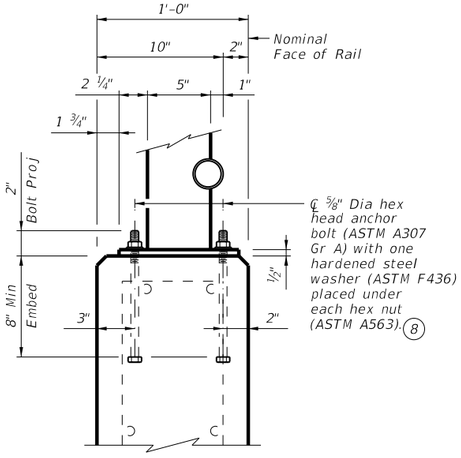


SECTION A-A

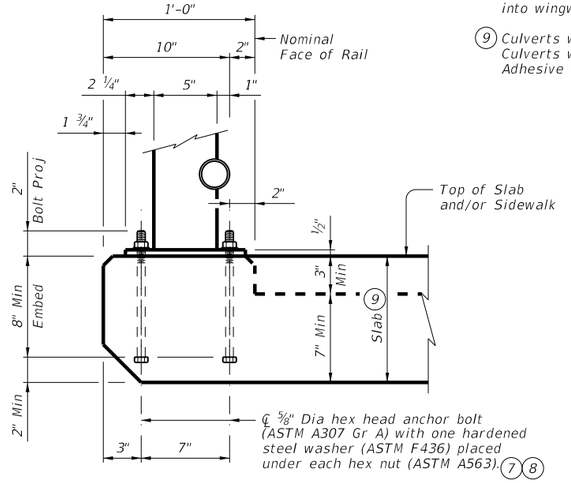
Showing base plate detail.



WASHER PLATE DETAIL



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON CULVERTS WITH OR WITHOUT CURBS

Used with 1'-0" Min thick parallel wings on culverts.

SECTIONS THRU RAIL

(1) Portion of railing with turn-downs to be used or omitted as indicated on Bridge Layout.

(2) 10" Min ~ 1'-6" Max if turn-downs are omitted.

(3) Min of 2 posts required on wingwall.

(4) HSS 3.500 x 0.216 (Rail Member)

(5) HSS 2.375 x 0.154 (Rail Member)

(6) One shop splice per panel is permitted (with minimum 85 percent penetration). The weld may be square groove or single V groove. Grind smooth.

(7) At Contractor's option, adhesive anchors may be used. Adhesive anchors must be ⅝" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 5" into slabs or culverts without curbs. See "Material Notes" for adhesive anchor requirements.

(8) At Contractor's option, adhesive anchors may be used. Adhesive anchors must be ⅝" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 7" into wingwalls or culverts with curbs. See "Material Notes" for adhesive anchor requirements.

(9) Culverts without curbs for cast-in-place anchor bolts require a 10" Min slab thickness. Culverts with curbs for cast-in-place anchor bolts require a curb plus slab thickness of 10" Min. Adhesive anchors may be used with a 7" Min slab thickness or culverts with curbs.

Texas Department of Transportation

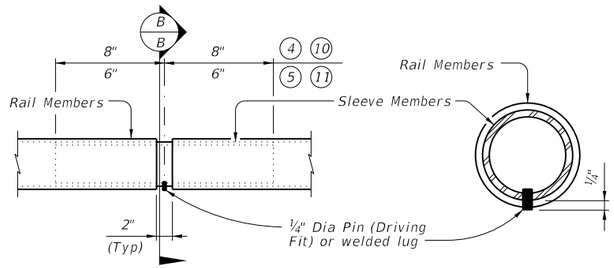
Bridge Division Standard

PEDESTRIAN RAIL

TYPE PR11

FILE:	DN: TAR	CK: TBE	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113M

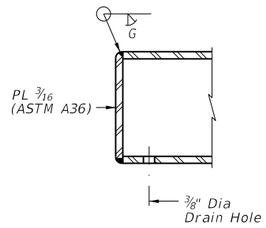
5/9/2024
Z:\Projects\220058_CEC_TxDOTWSBIWA_4\FM2004 Sidewalk\19110102\Fm2004SidewalkFM2004 North & South Sidewalk\Drawings\Standards\Roadway Standards\RL-PR11-19.dgn



AT SPLICES OR EXP JTS

SECTION B-B

PIPE SPLICE DETAIL



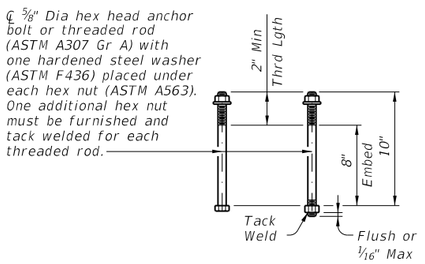
RAIL CAP DETAIL

(4) HSS 3.500 x 0.216 (Rail Member)

(5) HSS 2.375 x 0.154 (Sleeve Member)

(10) HSS 2.875 x 0.203 (Sleeve Member)

(11) HSS 1.900 x 0.145 (Sleeve Member)



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

CONSTRUCTION NOTES:

Panel lengths of railing must be attached to a minimum of three posts except at abutment wingwalls.

At the Contractor's option anchor bolts may be an adhesive anchorage system. See "Material Notes."

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

Face of rail and posts must be vertical transversely unless otherwise approved. Posts must be perpendicular to adjacent roadway grade. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

For curved railing applications, fabricate the HSS rail to the radius when the radius is 600' or less. Submit shop drawings for approval when tubes are required to be fabricated to a radius. Shop drawings must be submitted to the Engineer for approval.

Round or chamfer all exposed edges of steel components 1/16" by grinding prior to galvanizing.

MATERIAL NOTES:

Provide ASTM A500 Gr B, A1085 or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel." Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A with one hardened steel washer (ASTM F436) placed under each hex nut or ASTM A307 Gr A threaded rods with one tack welded hex nut each and with one hex nut with one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436). Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into slab, wingwalls, or culvert curbs using a Type III, Class C, D, E, or F anchor adhesive. Anchor adhesive chosen must be able to achieve a nominal bond strength in tension, Na, of a single anchor of 10 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

For all rails, submit erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting for approval.

Average weight of railing is 30 plf.

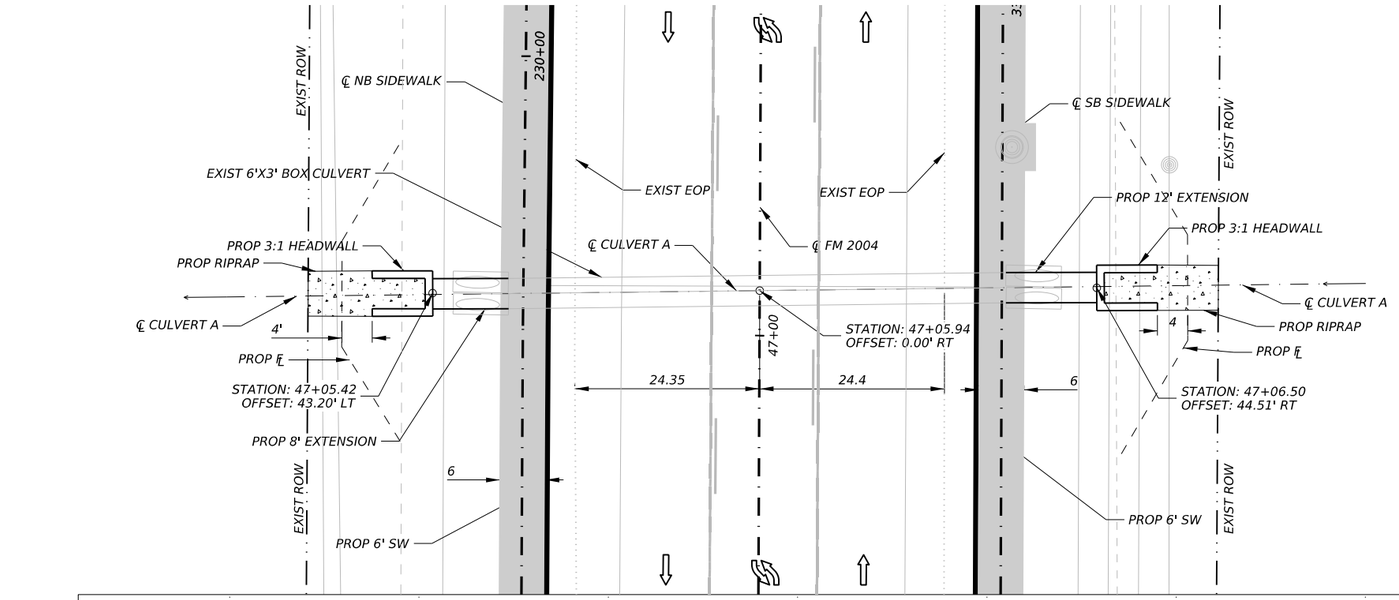
Texas Department of Transportation

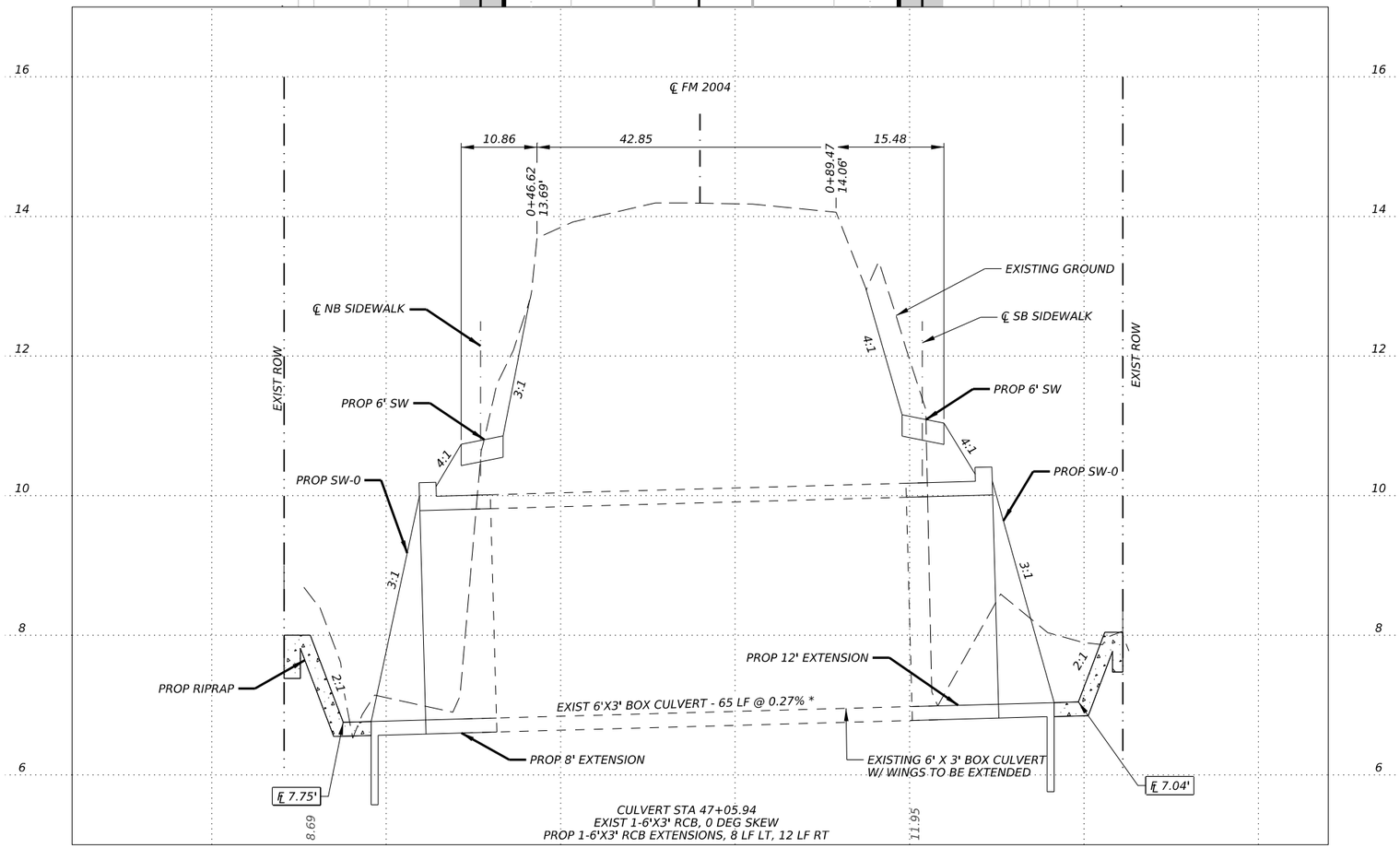
Bridge Division Standard

PEDESTRIAN RAIL

TYPE PR11

FILE:	DN: TAR	CK: TBE	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		113N





CULVERT STA 47+05.94
EXIST 1-6'X3' RCB, 0 DEG SKEW
PROP 1-6'X3' RCB EXTENSIONS, 8 LF LT, 12 LF RT

* NOTE: MATCH EXISTING CULVERT SLOPE

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

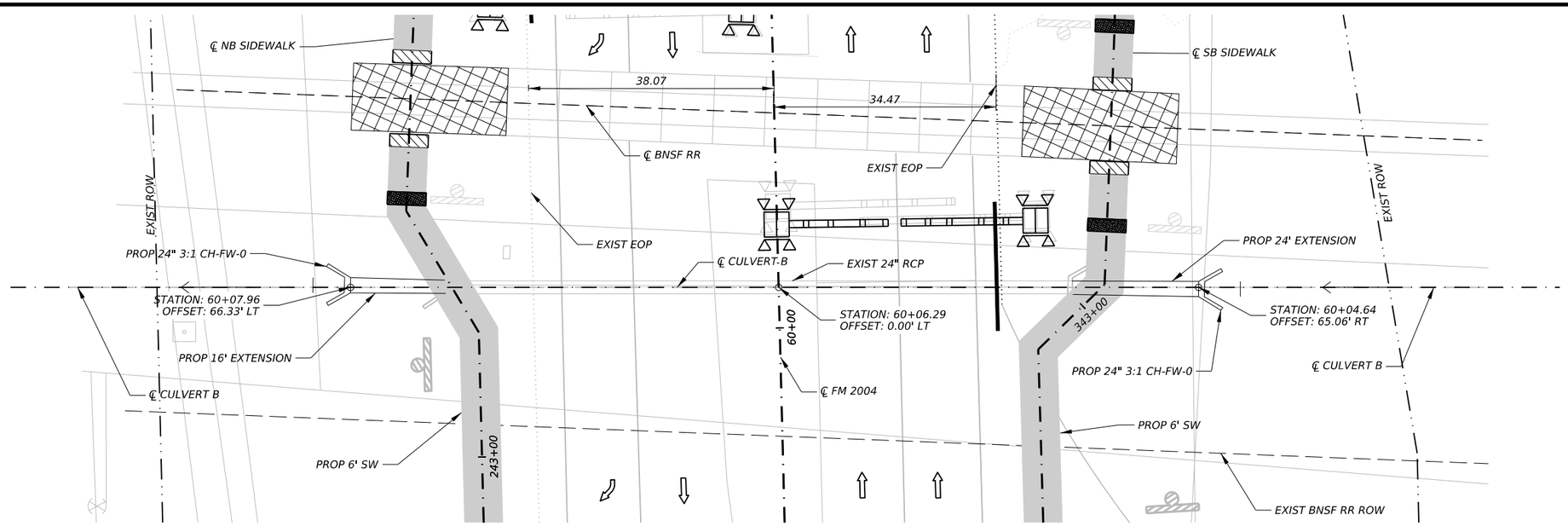
CROSS CULVERT PLAN AND PROFILE A

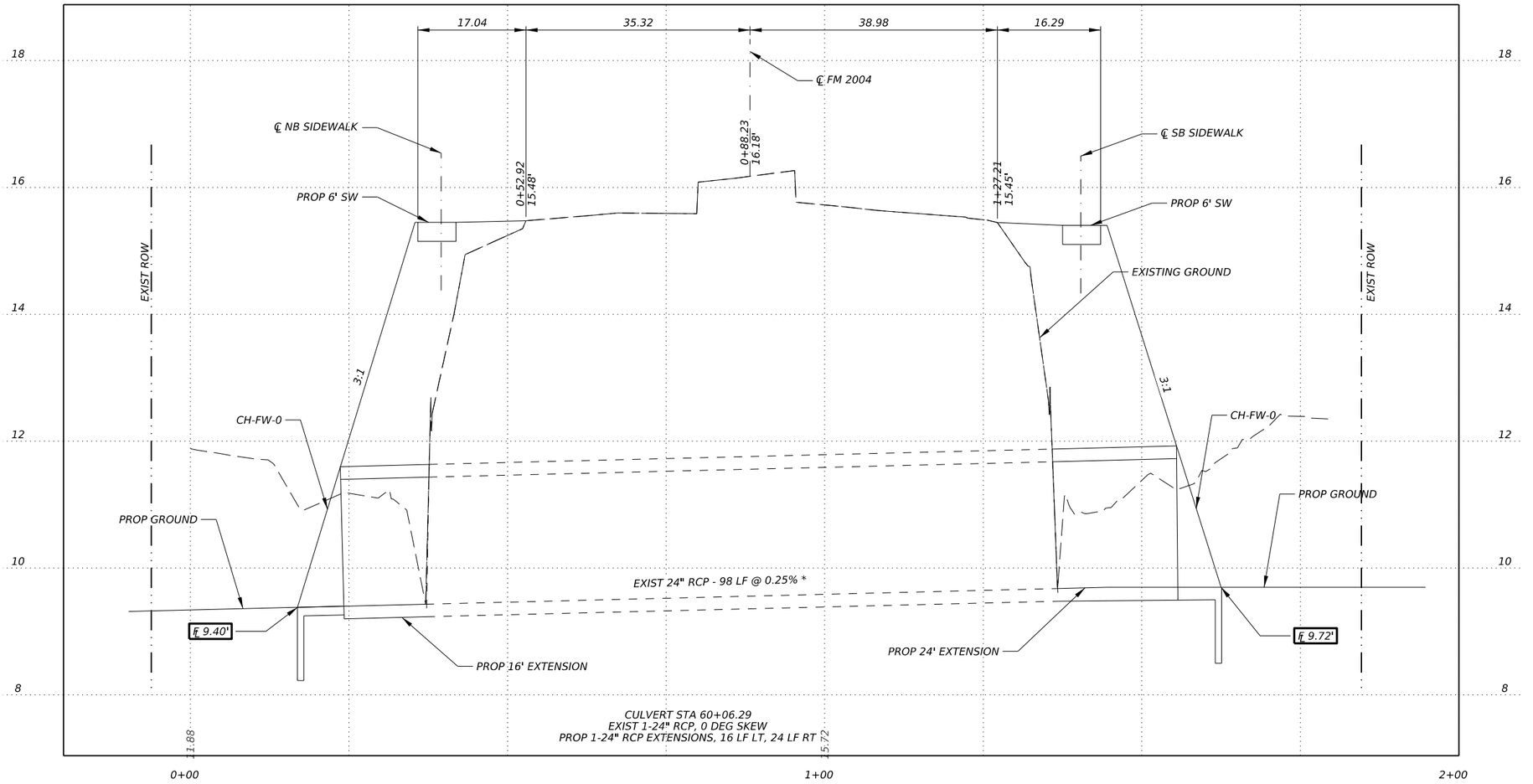
SHEET 01 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		114

DATE: 5/9/2024 11:09:53 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\1911010022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Drainage P&P\Unnamed Plan-1 - FM2004 CROSS CULVERT 01.dgn

ck | dw | ck | ck





* NOTE: MATCH EXISTING CULVERT SLOPE

DATE: 5/20/2024 5:04:05 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Drainage P&P\Unnamed Plan-2 - Plan 1.dgn

CK | DW | CK | DW

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

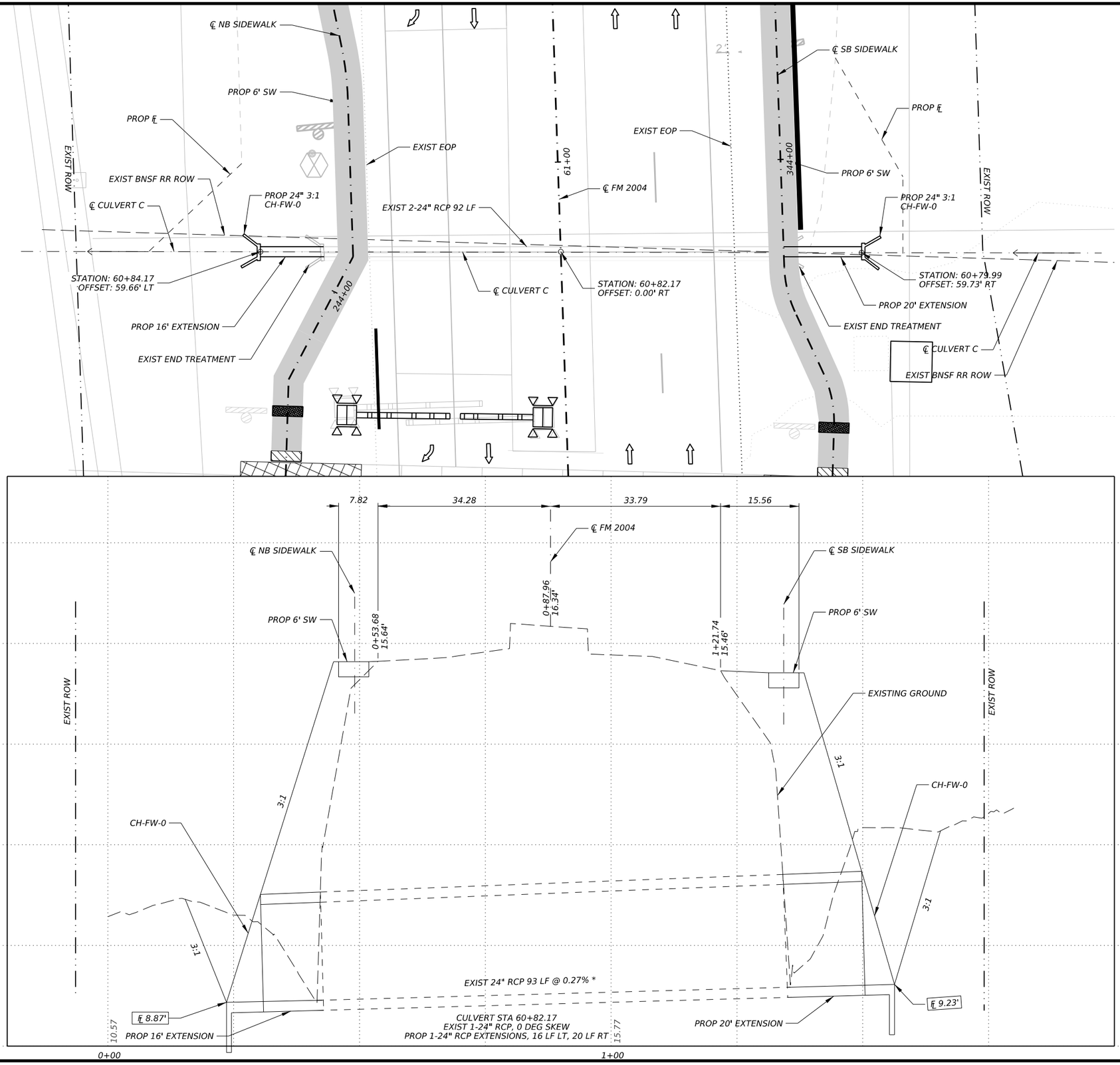
FM 2004

FROM JACK BROOKS RD TO OAK DR

CROSS CULVERT PLAN AND PROFILE B

SHEET 02 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		115



* NOTE: MATCH EXISTING CULVERT SLOPE

DATE: 5/20/2024 5:04:10 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Drainage P&P\Unnamed Plan-3 - Plan 2.dgn

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

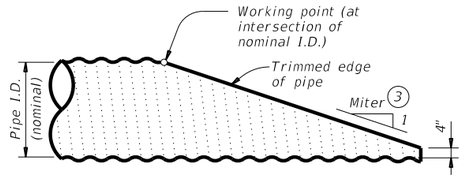
FROM JACK BROOKS RD TO OAK DR

CROSS CULVERT PLAN AND PROFILE C

SHEET 03 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		116

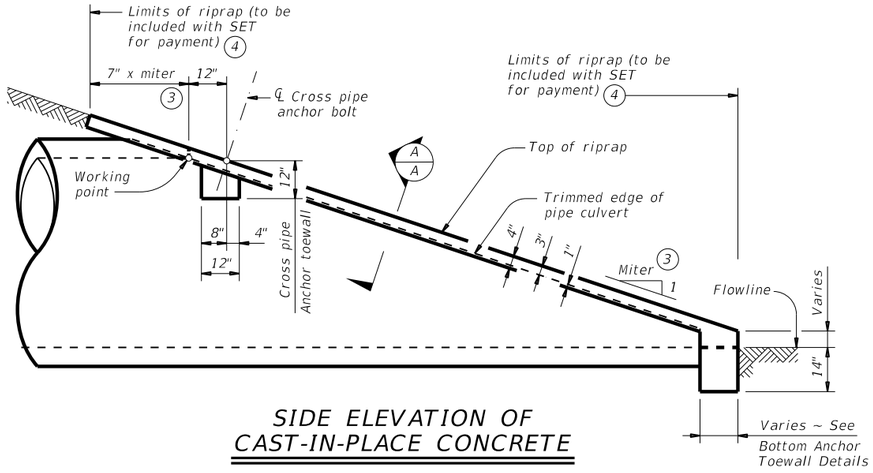
DATE: 5/9/2024
FILE: Z:\Projects\220058_CEC_TxDOT\WSB\WA_4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Drainage Standards\CD-SETP-CD-20.dgn



NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

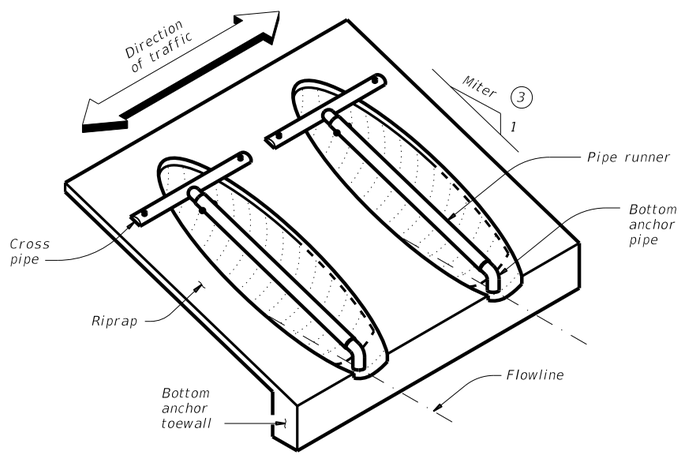
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert.
Details of reinforced concrete pipe (RCP) culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert.
Details of corrugated metal pipe (CMP) culvert
are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	N/A	8' - 1"	N/A	N/A	N/A	12' - 9"
27"	1' - 8"	3' - 8"	N/A	N/A	5' - 5"	6' - 11"	N/A	N/A	7' - 7"	9' - 7"	N/A	N/A	11' - 11"	14' - 11"
30"	1' - 10"	3' - 11"	N/A	N/A	6' - 4"	8' - 0"	N/A	N/A	8' - 9"	11' - 0"	N/A	N/A	13' - 8"	17' - 0"
33"	1' - 11"	4' - 2"	6' - 2"	6' - 5"	7' - 3"	9' - 1"	8' - 6"	8' - 10"	10' - 0"	12' - 5"	13' - 3"	13' - 9"	15' - 5"	19' - 2"
36"	2' - 1"	4' - 5"	6' - 11"	7' - 3"	8' - 2"	10' - 2"	9' - 6"	9' - 11"	11' - 2"	13' - 10"	14' - 9"	15' - 3"	17' - 2"	21' - 3"
42"	2' - 4"	4' - 11"	8' - 6"	8' - 10"	9' - 11"	12' - 4"	11' - 7"	12' - 0"	13' - 6"	16' - 8"	17' - 9"	18' - 5"	20' - 8"	25' - 7"
48"	2' - 7"	5' - 5"	10' - 1"	10' - 5"	11' - 9"	N/A	13' - 7"	14' - 2"	15' - 10"	N/A	20' - 9"	21' - 6"	24' - 2"	N/A
54"	3' - 0"	5' - 11"	11' - 8"	12' - 1"	N/A	N/A	15' - 8"	16' - 3"	N/A	N/A	23' - 10"	24' - 8"	N/A	N/A
60"	3' - 3"	6' - 5"	13' - 3"	N/A	N/A	N/A	17' - 9"	N/A	N/A	N/A	26' - 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' - 0"
4" STD	4.500"	4.026"	19' - 8"
5" STD	5.563"	5.047"	34' - 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

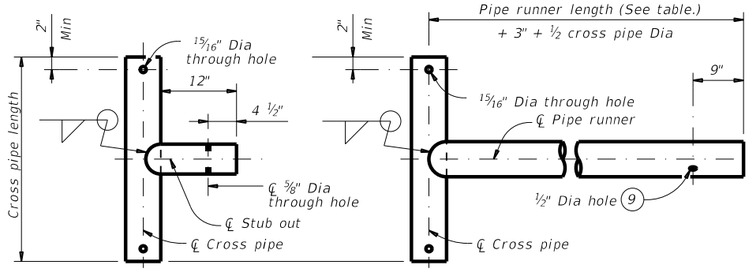
Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT
FOR 12" DIA TO 60" DIA PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE
SETP-CD

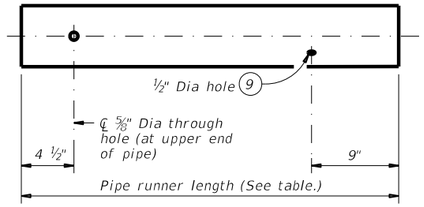
FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		117

DATE: 5/9/2024
FILE: Z:\Projects\220058_CEC_TxDOTWSBIWA_4\FM2004 Sidewalk\191101022Fm2004SidewalkFM2004 North & South Sidewalk\Drawings\Standards\FM2004 Sidewalk\Drawings\Standards\CD-SETP-CD-20.dgn



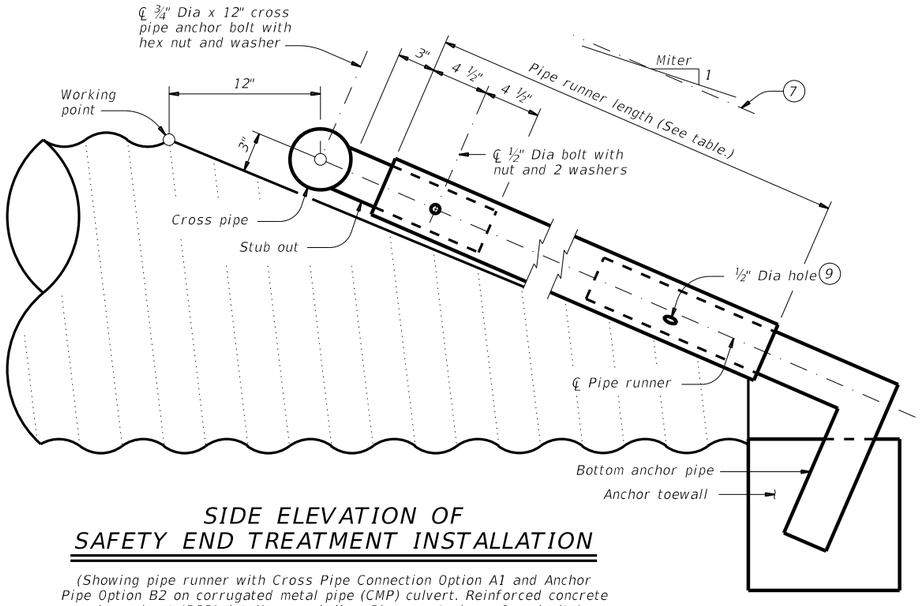
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



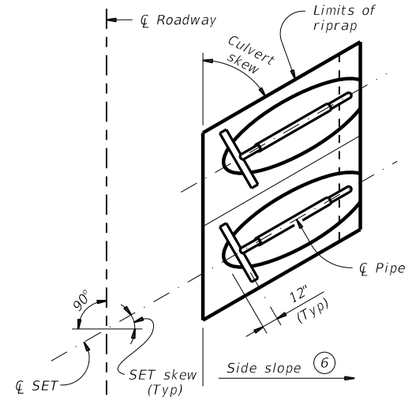
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

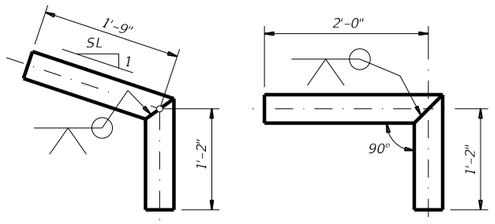


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

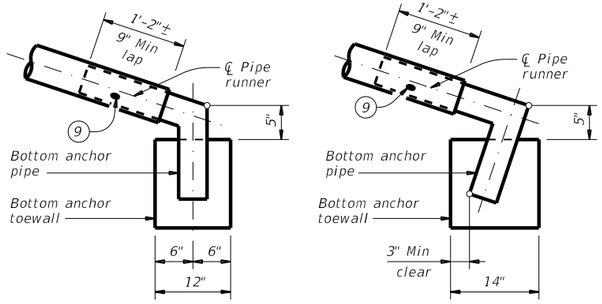


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

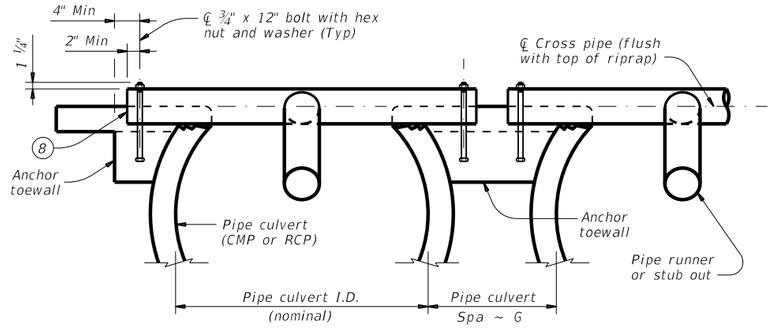
BOTTOM ANCHOR PIPE DETAILS (10)



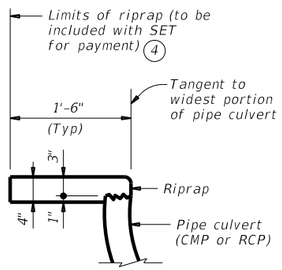
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

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

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

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

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

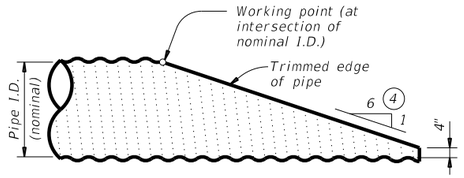
Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT
FOR 12" DIA TO 60" DIA PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE
SETP-CD

FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	2523	01	030	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		118

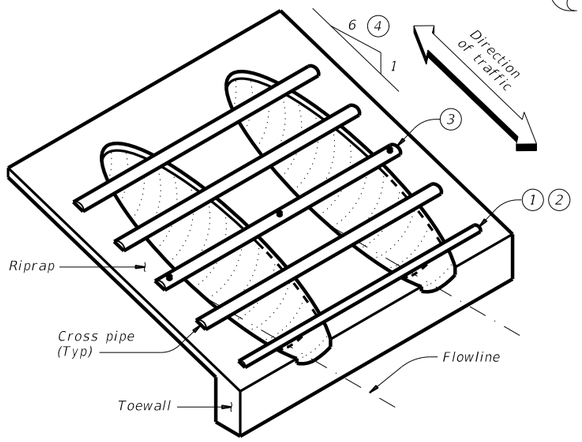
DATE: 5/9/2024
FILE: Z:\Projects\220058_CEC_TxDOT\WSB\WA_4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\CD-SETP-PD-20.dgn



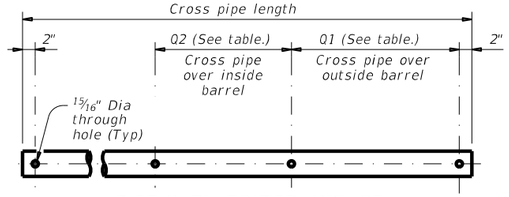
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

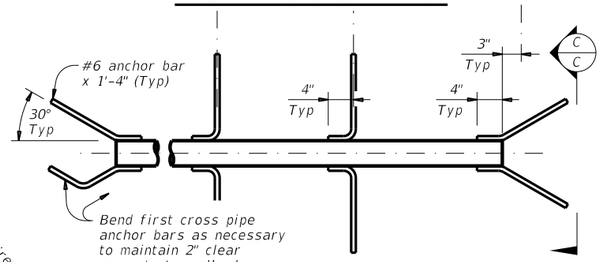
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



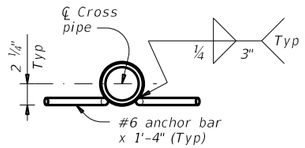
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

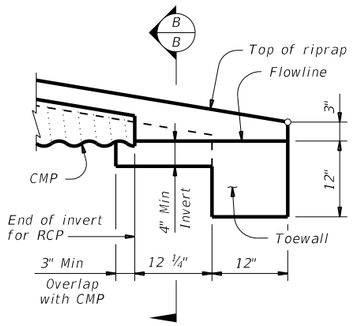


PIPE WITH ANCHOR BARS



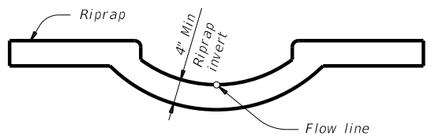
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

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

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

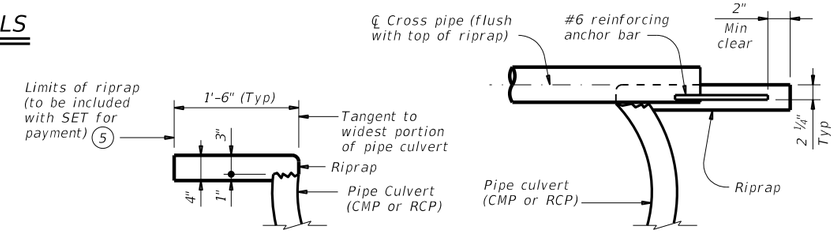
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

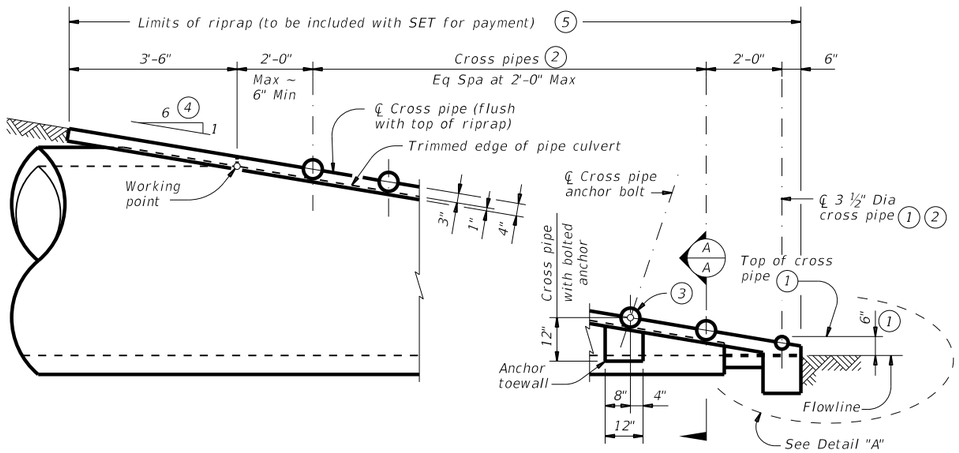
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



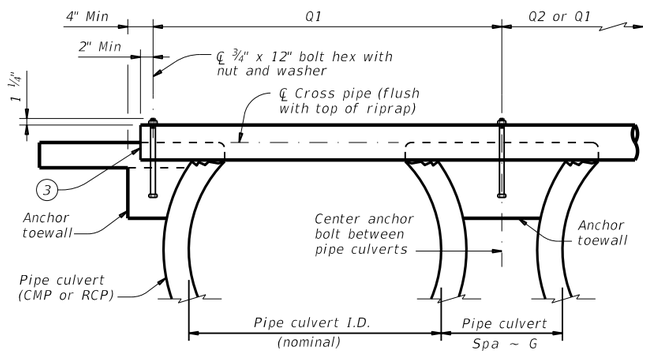
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT
FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

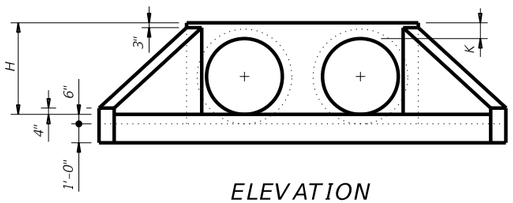
SETP-PD

FILE:	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		119

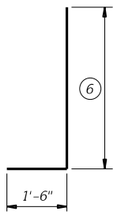
5/9/2024
Z:\Projects\220058_CEC_TxDOTWSBIWA_4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Drainage Standards\CD-CH-FW0-20.dgn

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

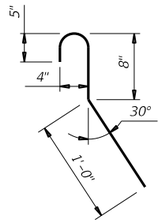
Slope	Dia of Pipe (D)	Values for One Pipe: W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	Values to be Added for Each Addt'l Pipe: X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' - 7 ½"	2' - 6"	2' - 10"	3' - 3 ¼"	88	0.6	1' - 9"	20	0.2
	15"	5' - 5 ¾"	2' - 9 ½"	3' - 4"	3' - 10 ¼"	103	0.7	2' - 2"	24	0.3
	18"	6' - 4 ¼"	3' - 1"	3' - 10"	4' - 5"	124	0.9	2' - 8"	32	0.3
	21"	7' - 2 ¾"	3' - 4 ½"	4' - 4"	5' - 0"	143	1.1	3' - 1"	43	0.4
	24"	8' - 2 ½"	3' - 9 ½"	4' - 10"	5' - 7"	164	1.3	3' - 7"	50	0.5
	27"	9' - 1"	4' - 1"	5' - 4"	6' - 2"	179	1.5	3' - 11"	56	0.6
	30"	9' - 11 ½"	4' - 4 ½"	5' - 10"	6' - 8 ¾"	203	1.7	4' - 4"	65	0.8
	33"	10' - 10"	4' - 8"	6' - 4"	7' - 3 ¾"	224	2.0	4' - 8"	71	0.9
	36"	11' - 8 ¼"	4' - 11 ½"	6' - 10"	7' - 10 ¾"	249	2.2	5' - 1"	81	1.0
	42"	13' - 5 ¼"	5' - 6 ½"	7' - 10"	9' - 0 ½"	298	2.8	5' - 10"	97	1.3
	48"	15' - 9"	6' - 1 ½"	9' - 4"	10' - 9 ¼"	360	3.8	6' - 7"	117	1.7
	54"	17' - 5 ¾"	6' - 8 ½"	10' - 4"	11' - 11 ¼"	427	4.5	7' - 6"	151	2.1
	60"	19' - 2 ¾"	7' - 3 ½"	11' - 4"	13' - 1"	481	5.3	8' - 3"	174	2.5
	66"	20' - 11 ½"	7' - 10 ½"	12' - 4"	14' - 3"	544	6.2	8' - 9"	194	2.9
	72"	22' - 8 ½"	8' - 5 ½"	13' - 4"	15' - 4 ¾"	601	7.1	9' - 4"	213	3.3
3:1	12"	6' - 3"	2' - 6"	4' - 3"	4' - 11"	118	0.8	1' - 9"	22	0.2
	15"	7' - 5"	2' - 9 ½"	5' - 0"	5' - 9 ¼"	137	1.1	2' - 2"	28	0.3
	18"	8' - 6 ¾"	3' - 1"	5' - 9"	6' - 7 ¾"	170	1.3	2' - 8"	37	0.5
	21"	9' - 8 ¾"	3' - 4 ½"	6' - 6"	7' - 6"	195	1.6	3' - 1"	48	0.6
	24"	11' - 0"	3' - 9 ½"	7' - 3"	8' - 4 ½"	227	2.0	3' - 7"	58	0.7
	27"	12' - 2"	4' - 1"	8' - 0"	9' - 2 ¾"	251	2.3	3' - 11"	67	0.8
	30"	13' - 4"	4' - 4 ½"	8' - 9"	10' - 1 ¼"	293	2.7	4' - 4"	77	1.0
	33"	14' - 5 ¾"	4' - 8"	9' - 6"	10' - 11 ¾"	318	3.1	4' - 8"	84	1.2
	36"	15' - 7 ¾"	4' - 11 ½"	10' - 3"	11' - 10"	351	3.5	5' - 1"	96	1.4
	42"	17' - 11 ½"	5' - 6 ½"	11' - 9"	13' - 6 ¾"	432	4.5	5' - 10"	119	1.7
	48"	21' - 1 ¾"	6' - 1 ½"	14' - 0"	16' - 2"	537	6.1	6' - 7"	146	2.3
	54"	23' - 5 ½"	6' - 8 ½"	15' - 6"	17' - 10 ¾"	630	7.3	7' - 6"	186	2.9
	60"	25' - 9 ¼"	7' - 3 ½"	17' - 0"	19' - 7 ½"	719	8.7	8' - 3"	219	3.4
	66"	28' - 1"	7' - 10 ½"	18' - 6"	21' - 4 ¼"	811	10.1	8' - 9"	242	3.9
	72"	30' - 4 ¾"	8' - 5 ½"	20' - 0"	23' - 1 ¼"	924	11.7	9' - 4"	272	4.4
4:1	12"	7' - 10 ¾"	2' - 6"	5' - 8"	6' - 6 ½"	148	1.1	1' - 9"	24	0.3
	15"	9' - 4"	2' - 9 ½"	6' - 8"	7' - 8 ½"	181	1.5	2' - 2"	32	0.4
	18"	10' - 9 ½"	3' - 1"	7' - 8"	8' - 10 ¼"	221	1.9	2' - 8"	42	0.5
	21"	12' - 2 ¾"	3' - 4 ½"	8' - 8"	10' - 0"	260	2.3	3' - 1"	57	0.7
	24"	13' - 9 ½"	3' - 9 ½"	9' - 8"	11' - 2"	301	2.8	3' - 7"	67	0.9
	27"	15' - 3"	4' - 1"	10' - 8"	12' - 3 ¾"	334	3.3	3' - 11"	77	1.0
	30"	16' - 8 ¼"	4' - 4 ½"	11' - 8"	13' - 5 ¾"	385	3.8	4' - 4"	89	1.3
	33"	18' - 1 ¾"	4' - 8"	12' - 8"	14' - 7 ½"	425	4.5	4' - 8"	101	1.4
	36"	19' - 7"	4' - 11 ½"	13' - 8"	15' - 9 ¼"	472	5.1	5' - 1"	115	1.7
	42"	22' - 5 ¾"	5' - 6 ½"	15' - 8"	18' - 1"	583	6.5	5' - 10"	141	2.1
	48"	26' - 6 ¼"	6' - 1 ½"	18' - 8"	21' - 6 ¾"	730	8.9	6' - 7"	175	2.8
	54"	29' - 5"	6' - 8 ½"	20' - 8"	23' - 10 ¼"	875	10.7	7' - 6"	226	3.6
	60"	32' - 3 ¾"	7' - 3 ½"	22' - 8"	26' - 2"	996	12.7	8' - 3"	264	4.3
	66"	35' - 2 ½"	7' - 10 ½"	24' - 8"	28' - 5 ¾"	1,140	14.9	8' - 9"	300	4.9
	72"	38' - 1 ¼"	8' - 5 ½"	26' - 8"	30' - 9 ½"	1,297	17.3	9' - 4"	334	5.6
6:1	12"	11' - 2"	2' - 6"	8' - 6"	9' - 9 ¾"	224	1.9	1' - 9"	28	0.4
	15"	13' - 2 ¼"	2' - 9 ½"	10' - 0"	11' - 6 ½"	268	2.5	2' - 2"	37	0.5
	18"	15' - 2 ½"	3' - 1"	11' - 6"	13' - 3 ¼"	330	3.2	2' - 8"	50	0.7
	21"	17' - 2 ¾"	3' - 4 ½"	13' - 0"	15' - 0 ¼"	387	3.9	3' - 1"	69	0.9
	24"	19' - 4 ½"	3' - 9 ½"	14' - 6"	16' - 9"	453	4.8	3' - 7"	80	1.2
	27"	21' - 4 ¾"	4' - 1"	16' - 0"	18' - 5 ¾"	512	5.7	3' - 11"	96	1.4
	30"	23' - 5 ¼"	4' - 4 ½"	17' - 6"	20' - 2 ½"	593	6.7	4' - 4"	110	1.7
	33"	25' - 5 ½"	4' - 8"	19' - 0"	21' - 11 ¼"	675	7.8	4' - 8"	127	2.0
	36"	27' - 5 ¾"	4' - 11 ½"	20' - 6"	23' - 8"	735	9.0	5' - 1"	144	2.3
	42"	31' - 6 ¼"	5' - 6 ½"	23' - 6"	27' - 1 ½"	922	11.5	5' - 10"	179	3.0
	48"	37' - 3 ½"	6' - 1 ½"	28' - 0"	32' - 4"	1,191	15.9	6' - 7"	231	4.0
	54"	41' - 4 ¼"	6' - 8 ½"	31' - 0"	35' - 9 ½"	1,424	19.2	7' - 6"	300	5.0
	60"	45' - 4 ¾"	7' - 3 ½"	34' - 0"	39' - 3"	1,631	22.9	8' - 3"	353	6.0



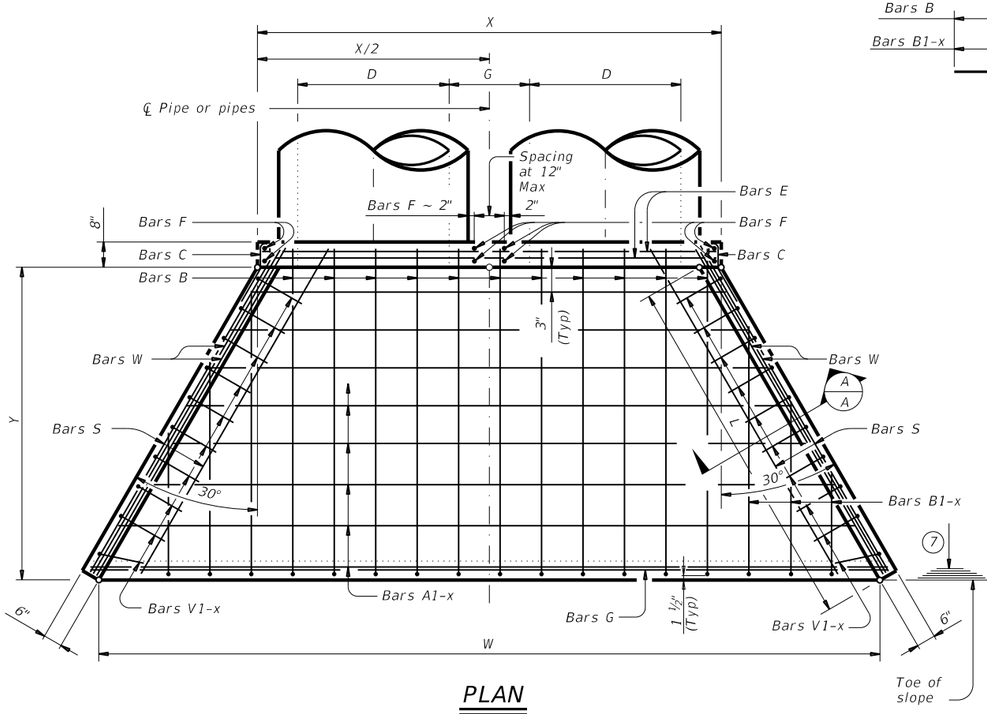
ELEVATION
(Showing dimensions.)



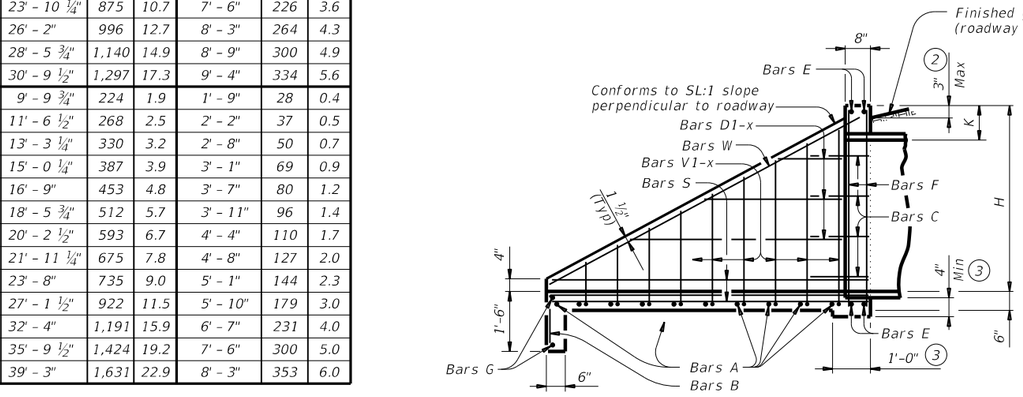
BARS V



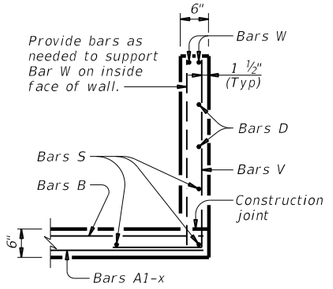
BARS CL
(Length = 2'-5")



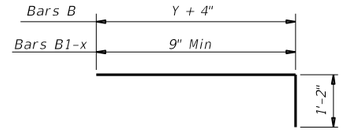
PLAN



TYPICAL WING ELEVATION



SECTION A-A



BARS B and B1-x

TABLE OF (5) REINFORCING STEEL

Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 6"	~
C	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' - 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (4)	H
12"	0' - 9"	1' - 0"	2' - 0"
15"	0' - 11"	1' - 0"	2' - 3"
18"	1' - 2"	1' - 0"	2' - 6"
21"	1' - 4"	1' - 0"	2' - 9"
24"	1' - 7"	1' - 0"	3' - 0"
27"	1' - 8"	1' - 0"	3' - 3"
30"	1' - 10"	1' - 0"	3' - 6"
33"	1' - 11"	1' - 0"	3' - 9"
36"	2' - 1"	1' - 0"	4' - 0"
42"	2' - 4"	1' - 0"	4' - 6"
48"	2' - 7"	1' - 3"	5' - 3"
54"	3' - 0"	1' - 3"	5' - 9"
60"	3' - 3"	1' - 3"	6' - 3"
66"	3' - 3"	1' - 3"	6' - 9"
72"	3' - 4"	1' - 3"	7' - 3"

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

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

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

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

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS
WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		119A

5/9/2024
Z:\Projects\220058_CEC_TxDOTWSBIWA_4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Drainage Standards\CD-SW0-20.dgn

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

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:

(All values are in feet.)

Hw = H + T + C – 0.250'
Lw = (Hw – 0.333') (SL)

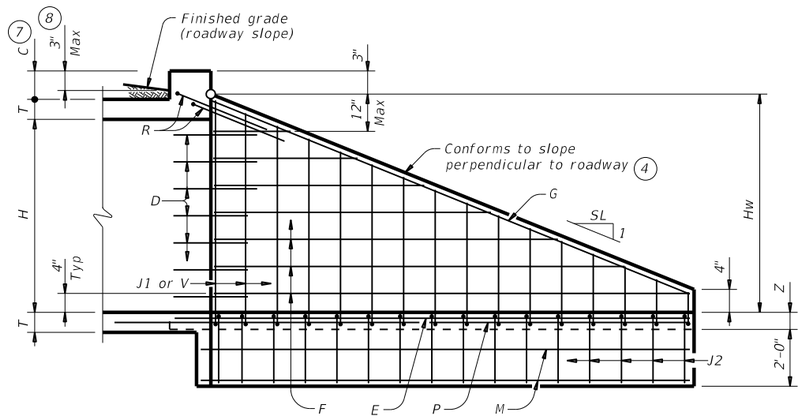
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total Wingwall Area (two wings ~ SF) = (Hw + 0.333') (Lw)

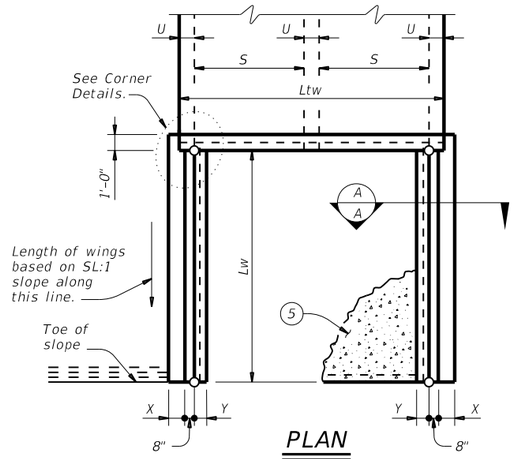
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

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



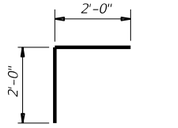
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

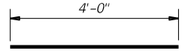


PLAN

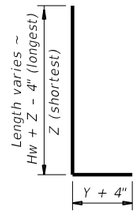
(Showing dimensions.)



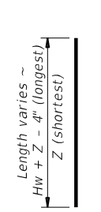
BARS R



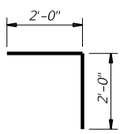
BARS D



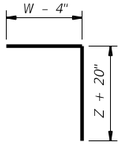
BARS J1



BARS V



BARS L



BARS J2

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap." Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

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

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

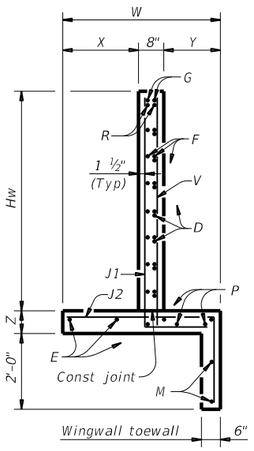
MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

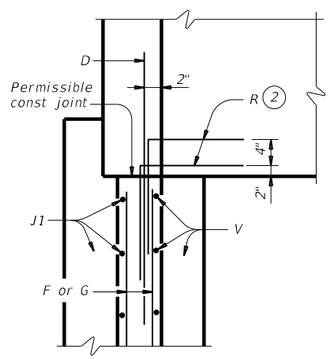
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

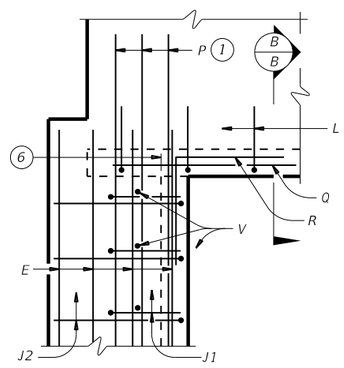
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



SECTION A-A

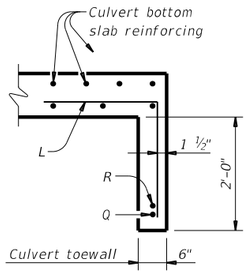


WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS



SECTION B-B (5)

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS
WITH STRAIGHT WINGS FOR 0° SKEW BOX CULVERTS

SW-0

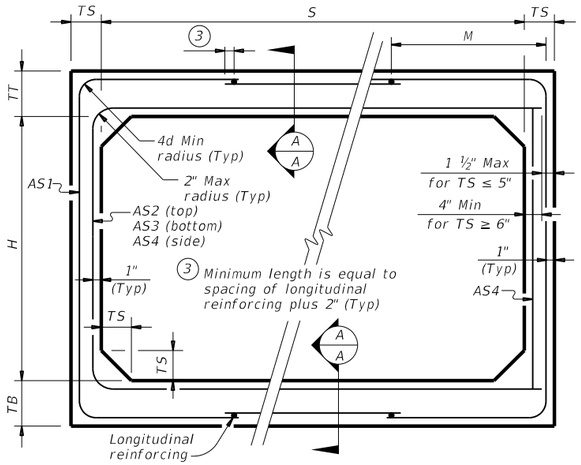
FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		119B

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	–	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	–	–	–	6.8
6	2	7	7	7	3 – 5	43	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	–	–	–	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	–	–	–	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	–	–	–	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	–	–	–	6.8
6	3	8	7	7	< 2	–	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	–	–	–	7.5
6	3	7	7	7	3 – 5	39	0.17	0.18	0.17	0.17	–	–	–	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	–	–	–	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	–	–	–	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	–	–	–	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	–	–	–	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	–	–	–	7.5
6	4	8	7	7	< 2	–	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	–	–	–	8.2
6	4	7	7	7	3 – 5	39	0.17	0.21	0.19	0.17	–	–	–	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	–	–	–	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	–	–	–	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	–	–	–	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	–	–	–	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	–	–	–	8.2
6	5	8	7	7	< 2	–	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	–	–	–	8.9
6	5	7	7	7	3 – 5	43	0.17	0.23	0.21	0.17	–	–	–	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	–	–	–	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	–	–	–	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	–	–	–	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	–	–	–	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	–	–	–	8.9
6	6	8	7	7	< 2	–	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	–	–	–	9.6
6	6	7	7	7	3 – 5	52	0.17	0.24	0.22	0.17	–	–	–	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	–	–	–	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	–	–	–	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	–	–	–	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	–	–	–	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	–	–	–	9.6

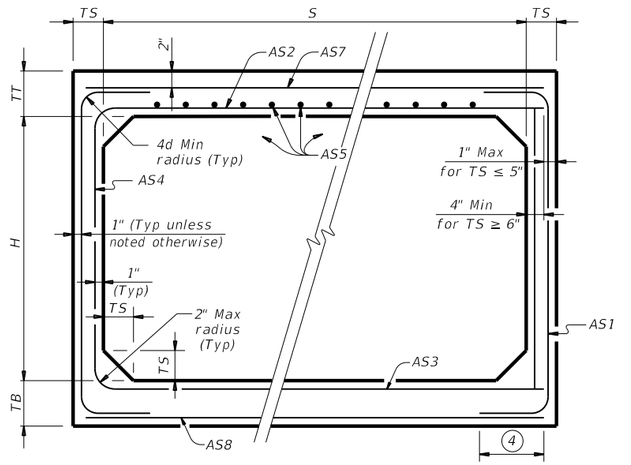
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

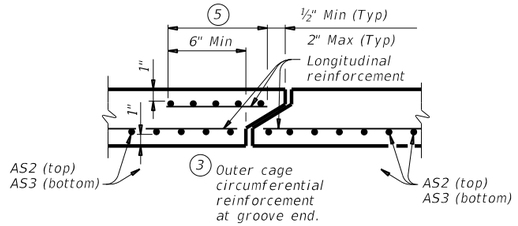
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

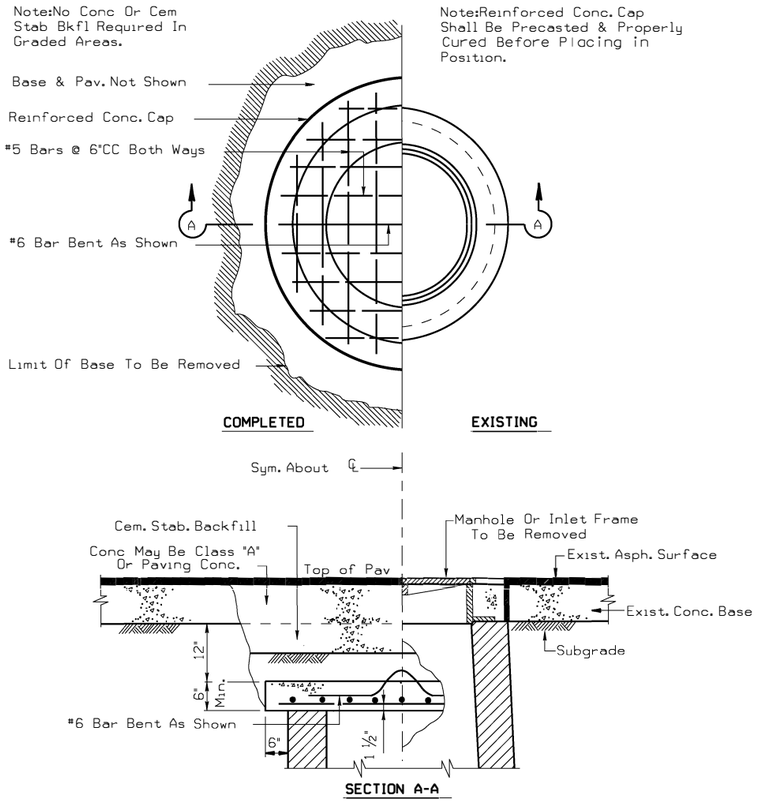
SINGLE BOX CULVERTS PRECAST

6'-0" SPAN

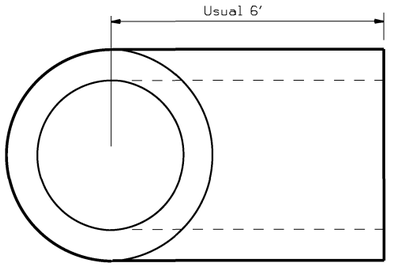
SCP-6

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		119C

DATE:
FILE:

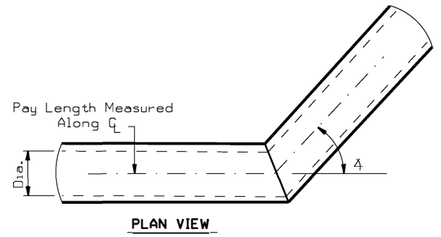


DETAIL SHOWING METHOD OF CAPPING ABANDONED MANHOLES OR INLETS (GRADED OR PAVED AREAS)



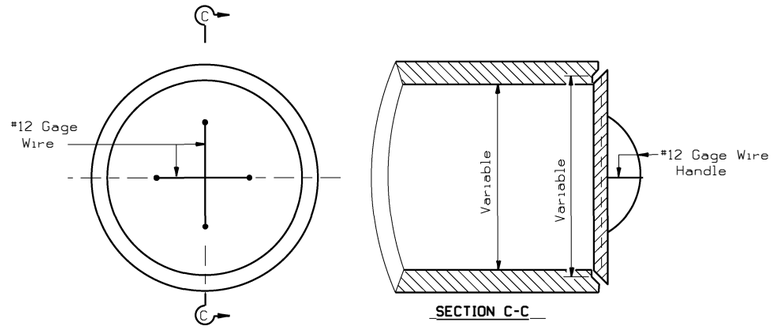
Note: Jointing Material Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Material For Tees Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Payment For Tee To Be In Accordance With Item "Reinforced Concrete Pipe."

PRECAST STORM SEWER TEE



BENDING DETAIL

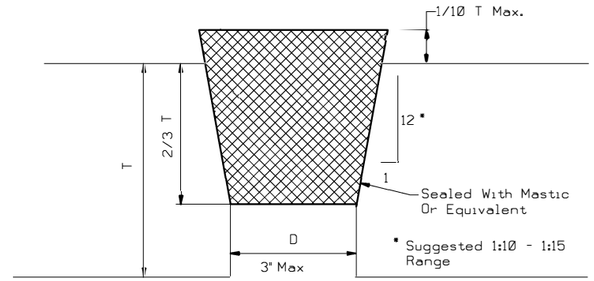
Note: Bending Of Proposed Pipe Sewer Or RCP In A Vertical & /Or Horizontal Plane Shall Be Accomplished By The Use Of A "Pipe Collar" Or A "Precast Elbow", As Approved By The Engineer. Price Of "Pipe Collar" Or, "Precast Elbow" Shall Be Subsidiary To The Unit Prices Bid For Item Reinforced Concrete Pipe. Pay Length Measurement To Be Along Horizontal C & Horizontal Plane Of Pipes.



Note: The Price Of Plug Shall Be Subsidiary To The Unit Bid Price For Pipe Sewer Or RCP. Mortar Joints To Be Used As Directed By The Engineer. Removal Of The Existing Plugs For Storm Sewer Or RCP Conns. Shall Be Considered Incidental To Item "Excavation And Backfill For Structures."

Concrete Plug For End Of Pipe Culvert Or Sewer

CONCRETE PLUG FOR PIPE

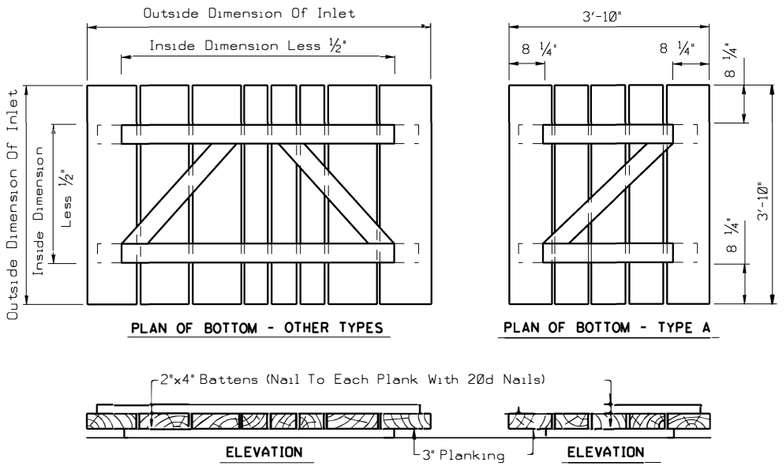


T = Wall Thickness On Top Of Box Or Pipe
D = Diameter Of Lifting Hole

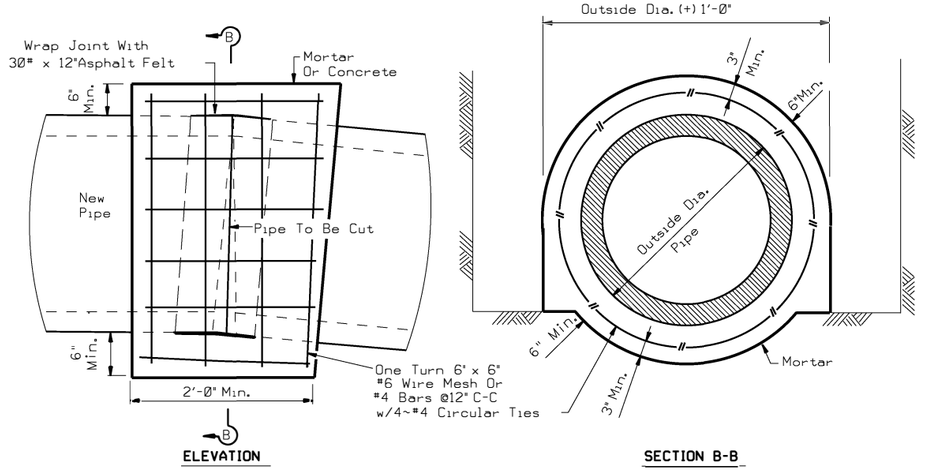
Minimum Length Of Plug Is 2/3 T +/-
Minimum Diameter At Bottom Of Plug = D - ⅛"
Maximum 1/10 T Of Plug Not Seated In Lifting Hole

Note: The Plug Shall Be Cast With The Same Taper As The Lifting Hole.

DETAIL OF PLUG FOR LIFTING HOLES IN RCB AND RCP



TEMPORARY COVERS FOR ALL TYPES OF INLETS



PIPE COLLAR DETAIL

For Horizontal Or Vertical Placement

d = Diameter
R = Radius

Texas Department of Transportation
Houston District (Bridge)

MISCELLANEOUS SEWER DETAILS

MSD

FILE: STDD11.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK:	
© TxDOT Mar 2004	DISTRICT	FED REG	PROJECT NO.		SHEET
REVISIONS 3/2015 2014 Specs	HOU	6			119D
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	GALVESTON		1911	01	022, ETC	FM2004

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

1. INSTALL SIGNALS HORIZONTALLY ON MAST ARM, 17 FT. - 6 IN. ABOVE THE ROADWAY
2. FURNISH BLACK HOUSING FOR VEHICLE AND PEDESTRIAN SIGNALS. FURNISH BLACK VEHICLE SIGNAL HEAD BACK PLATES WITH 2 IN. RETROFLECTIVE YELLOW BORDER.
3. FURNISH VEHICLE AND PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.
4. USE TYPE B (HIGH INTENSITY PRISMATIC) OR TYPE D (DIAMOND GRADE) RETROREFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.
5. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
6. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN THE PLANS. INSTALL AT 3 FT. - 6 IN. TO 4 FT. - 0 IN. ABOVE THE SIDEWALK OR CONCRETE WALKWAY.
7. ROUTE CABLE FOR LUMINAIRES (#12/4C - TRAY CABLE) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAIL SHEETS. DO NOT PASS LUMINAIRE CONDUCTORS THROUGH THE SIGNAL CONTROLLER CABINET.
8. FURNISH AND INSTALL FULL-ACTUATED CONTROLLER WITH INTERNAL TIME BASE COORDINATION UNIT IN A CABINET, MOUNTED ON AN 18-INCH BASE EXTENSION.
9. FURNISH ALL MATERIALS. SUPPLY THE CONTROLLER WITH DETECTION PHASE SEQUENCE, DETECTOR UNITS, DETECTOR CARDS, DETECTOR CARD RACK, AND POWER SUPPLY, TO THE DEPARTMENT'S SIGNAL SHOP, 6810 KATY ROAD, HOUSTON, TEXAS FORTY FIVE (45) DAYS IN ADVANCE FOR INSPECTION, SET UP, AND TESTING. CONTACT MR. MICHAEL AWA, P. E., IN WRITING, AT LEAST FIFTEEN (15) WORKING DAYS PRIOR TO PICKING UP THE MATERIALS.

   ADDRESS: TEXAS DEPARTMENT OF TRANSPORTATION
   P. O. BOX 1386
   HOUSTON, TEXAS 77251-1386
   TEL. NO. (713) 802-5661
10. THE DEPARTMENT'S TRAFFIC SIGNAL MAINTENANCE OFFICE WILL PROVIDE PHASING FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS. THE CONTRACTOR WILL PROVIDE TIMING.
11. LOCATE CABINET(S), STEEL SIGNAL POLES, SIGNAL DETECTORS, ETC., AS APPROVED.
12. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.
13. ALL TRAFFIC SIGNAL DETECTION DEVICES AND RELATED COMPONENTS SHALL BE SALVAGED AND RETURNED TO THE DEPARTMENT'S SIGNAL SHOP AT 6810 OLD KATY ROAD, HOUSTON, TEXAS, BETWEEN 9:00 AM AND 3:00 PM, MONDAY THROUGH FRIDAY. CAREFULLY REMOVE THE MATERIALS SO THAT THEY WILL NOT BE MARRED OR DAMAGED. REPLACE MATERIALS THAT ARE SCARRED, BATTERED OR BROKEN BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT.
14. FOR ALL OTHER TRAFFIC SIGNAL-RELATED COMPONENTS, CONTACT MR. MICHAEL AWA, P. E., AT TEXAS DEPARTMENT OF T RANSPORTATION, P. O. BOX 1386, HOUSTON, TEXAS 77251-1386, TEL. NO. (713) 802-5661; HIS EMPLOYEES WILL DETERMINE WHICH ITEMS WILL BE SALVAGED. ITEMS DEEMED SALVAGEABLE WILL BE DELIVERED TO THE DEPARTMENT'S SIGNAL SHOP AT 6810 OLD KATY ROAD, HOUSTON, TEXAS, BETWEEN 9:00 AM AND 3:00 PM, MONDAY THROUGH FRIDAY. CAREFULLY REMOVE THE MATERIALS SO THAT THEY WILL NOT BE MARRED OR DAMAGED. REPLACE MATERIALS THAT ARE SCARRED, BATTERED OR BROKEN BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT. DISPOSE OF OTHER ITEMS REMOVED BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT.
15. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.
16. 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 PERMANENT CONDUIT SEALANT. DO NOT USE SILICON CAULK AS A CONDUIT SEALANT.
17. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPPING DEVICES.
18. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.
19. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.
20. PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED OPERATION IS COMPLETED.
21. ONCE THE INTEGRITY AND/OR FUNCTION OF THE EXISTING TRAFFIC SIGNAL(S) IS ALTERED BY THE CONTRACTOR, MAINTAIN AND OPERATE THE EXISTING TRAFFIC SIGNAL(S) UNTIL THE TRAFFIC SIGNAL WORK IS ACCEPTED BY THE DEPARTMENT. DURING THE CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL WORK, MAINTAIN THE EXISTING TRAFFIC SIGNAL(S) AND/OR TEMPORARY CONSTRUCTION TRAFFIC SIGNAL(S) IN CONFORMANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
22. DURING CONSTRUCTION OF THE PROPOSED SIGNAL WORK, IF THE EXISTING TRAFFIC SIGNAL EQUIPMENT REQUIRES REPLACEMENT DUE TO WEAR, DETERIORATION, OR ANY CIRCUMSTANCE OVER WHICH THE CONTRACTOR HAS NO CONTROL, THE EQUIPMENT WILL BE FURNISHED BY THE DEPARTMENT AT NO COST TO THE CONTRACTOR. INSTALL THIS EQUIPMENT AT NO COST TO THE DEPARTMENT. SUCH MATERIALS WILL BE PROVIDED AT THE DEPARTMENT'S SIGNAL SHOP LOCATED AT 6810 KATY ROAD, HOUSTON, TEXAS. CONTACT MR. MICHAEL AWA, P.E., AT TELEPHONE NUMBER (713) 802-5661.
23. MAINTAIN THE INTEGRITY AND FUNCTION OF EACH EXISTING SIGNALIZED INTERSECTION. ONCE THE INTEGRITY OR FUNCTION OF THE SIGNAL HAS BEEN ALTERED, PURSUE THE WORK AT THAT LOCATION WITHOUT DELAY OR INTERRUPTION TO RESTORE OPERATION TO ITS ORIGINAL OR FINAL OPERATIONAL DESIGN.
24. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP TO STEEL OR WOOD POLE.
25. AIM LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.
26. PROVIDE 250 WATT HPS (HIGH PRESSURE SODIUM) EQUIVALENT LIGHT EMITTING DIODE (LED) LUMINAIRES OPERATING AT 240 VOLTS.
27. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.
28. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH REQUIREMENTS SHOWN ON THE LATEST TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.
29. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.
30. INSTALL A CLOSE NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.
31. RETAIN ALL REMOVED TEMPORARY SIGNAL COMPONENTS, EXCEPT FOR THOSE FURNISHED BY THE DEPARTMENT AND THE TEMPORARY VIVDS EQUIPMENT, UNLESS OTHERWISE SHOWN ON THE PLANS. REMOVE AND DELIVER ALL TEMPORARY VIVDS EQUIPMENT AND SET-UP EQUIPMENT TO THE DEPARTMENT'S SIGNAL SHOP, 6810 KATY ROAD, HOUSTON, TEXAS, OR AS DIRECTED BY THE DEPARTMENTS' ENGINEER.
32. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING RADAR DETECTORS, VIVDS CAMERAS, WIRELESS MAGNETOMETERS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, ACCESSIBLE PEDESTRIAN SIGNALS, SIGNAL CONTROLLERS, SIGNAL CABINETS, BUS INTERFACE UNITS, BATTERY BACKUP UNITS. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.
33. THE CONTRACTOR IS RESPONSIBLE FOR THE SIGNAL CARRYING CAPABILITY AND PERFORMANCE OF THE CABLE. INSTALL EACH WIRE WITH A LIGHTNING PROTECTION DEVICE UNLESS OTHERWISE NOTED.
34. CONTRACTOR TO ADJUST SIGNAL HEAD ALIGNMENT, AS NEEDED, USING ARTICULATING SIGNAL BRACKET ASSEMBLIES WITH A MINIMUM OF THREE ADJUSTABLE AXES.
35. SEAL WITH WATERPROOF SEALANT EACH END OF THE COMMUNICATIONS CABLE THAT IS EXPOSED TO THE ELEMENTS DURING STORAGE OR AFTER INSTALLATION.
36. THE CONTRACTOR TO FURNISH AND INSTALL ALL EQUIPMENT CALLED FOR AND REQUIRED AS NEEDED FOR A FULLY OPERATIONAL TRAFFIC SIGNAL.
37. WIMAX OR OTHER COMMUNICATION SYSTEM AND OTHER I.T.S EQUIPMENTS MAY EXIST AT THE INTERSECTIONS. CONTACT THE OWNER PRIOR TO CONSTRUCTION. EQUIPMENT WILL NEED TO BE REMOVED AND REINSTALLED AS NOTED ON THE TRAFFIC SIGNAL PLANS.

NOTES FOR RADAR DETECTION SYSTEM

38. THE VENDORS' REPRESENTATIVES OF THE RADAR EQUIPMENT SUPPLIED FOR THIS PROJECT MUST SUPERVISE THE INSTALLATION, SETUP AND TESTING OF THIS EQUIPMENT AND BE FACTORY CERTIFIED. THE REPRESENTATIVE MUST BE ON SITE DURING THIS TIME. ANY EQUIPMENT REQUIRED FOR SETUP AND OPERATION OF THE RADAR DEVICES MUST BE PROVIDIED TO TXDOT UPON COMPLETION. THE VENDORS' REPRESENTATIVE MUST PROVIDE TRAINING TO THE MUNICIPALITIES WHO WILL BE RESPONSIBLES FOR THE MAINTENANCE OF THE RADAR EQUIPMENT AFTER ACCEPTANCE OF THE PROJECT.
39. THE RADAR PRESENCE DETECTOR AND RADAR ADVANCE DETECTION DEVICES MUST BE COMPATIBLE WITH EACH OTHER AND FROM THE SAME MANUFACTURER.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/30/2024

SH 6
AT FM 2004
NOTES FOR PERMANENT TRAFFIC SIGNALS

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		120

DATE: 5/30/2024
FILE: H:\Tr\Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

40. RADAR PRESENCE DETECTION DEVICE MUST UTILIZE TRUE-PRESENCE DETECTION. SYSTEM USING LOCKING ALGORITHMS TO ATTEMPT PRESENCE DETECTION WILL NOT BE ACCEPTED.

41. RADAR ADVANCE DETECTION DEVICE MUST CONTINUOUSLY TRACK VEHICLE SPEED, DISTANCE, AND ESTIMATED TIME OF ARRIVAL.

42. COMMUNICATION AND POWER TO THE RADAR DEVICES SHALL BE VIA CONTINUOUS CABLE RUN OF UP TO 1000 FEET WITH THE USE OF REPEATERS.

43. THE FINAL PLACEMENT OF RADAR DEVICES TO BE APPROVED BY ENGINEER.

44. THE LOCATION OF THE RADAR DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR DEPARTMENT'S TRAFFIC OPERATIONS SECTION.

NOTES FOR INSTALL 6292-6004 AND 6292-6005 ONLY:

1. ONCE THE CONTRACT HAS BEEN EXECUTED OR DURING THE KICK-OFF MEETING, THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE OR ARRANGE FOR THE RADAR EQUIPMENT TO BE PROVIDED BY THE DEPARTMENT.
2. THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE THE ORDERING OF THE RADAR EQUIPMENT BY USING THE FORCE ACCOUNT. ENGINEER OR HIS/HER REPRESENTATIVE WILL CONTACT ARNOLD TREVINO AT (713) 866-7101 TO ORDER THE RADAR EQUIPMENT.

SPREAD SPECTRUM RADIO NOTES:

45. FURNISH SPREAD SPECTRUM RADIO EQUIPMENT CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE THE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE SPREAD SPECTRUM RADIO EQUIPMENT.

FIBER OPTIC CABLE NOTES:

46. EACH FIBER OPTIC CABLE RUN IN UNDERGROUND CONDUITS SHALL HAVE AN EXTRA LENGTH OF FIVE FEET COILED AND LEFT IN EACH GROUND BOX WITH WATERPROOF SPLICE ENCLOSURES. EXTRA FIBER OPTIC CABLE SHALL NOT EXCEED FIFTEEN FEET PER CABLE UNLESS OTHERWISE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER IN THE FIELD.

47. LIMITS OF PAY FOR BORED CONDUITS SHALL NOT EXTEND MORE THAN FIVE FEET IN FRONT OF AND BEYOND THE ROADWAY OR DRIVEWAY THAT IS BEING BORED UNDER. WHEN MULTIPLE DRIVEWAYS EXIST, THE CONTRACTOR MAY BE ALLOWED TO BORE UNDER THE ENTIRE GROUP OF DRIVEWAYS PROVIDED THE DRIVEWAYS DO NOT EXCEED FORTY FOOT SPACING AS APPROVED BY THE ENGINEER IN THE FIELD. NO INCREASE FOR BORED CONDUITS WILL BE INCURRED FOR THIS WORK. CONDUIT BORED BETWEEN MULTIPLE DRIVEWAYS TO BE PAID FOR AS TRENCHED CONDUIT.

48. INSTALL A FIBER OPTIC FAN OUT KIT ON THE FIBER DROP CABLE IN EACH CONTROLLER CABINET. THE FAN OUT KIT SHALL BE CONSIDERED INCIDENTAL TO THE PERTINENT BID ITEMS IN THIS PROJECT.

49. FURNISH AND INSTALL ALL FIBER OPTIC CABLES AND ACCESSORIES FOR A COMPLETE AND OPERATIONAL SYSTEM.

50. USE TYPE 1 GROUND BOXES, INSTALLED NEAR CONTROLLER, EXCLUSIVELY FOR PROPOSED INTERCONNECT CABLE WITH CONDUIT ONLY. DO NOT INSTALL ANY OTHER ELECTRICAL CABLE OR CONDUIT IN THE TYPE 1 GROUND BOX. PROPERLY GROUND THE METAL GROUND BOX COVER(S) WITH THE SYSTEM GROUND TO A GROUND ROD INSTALLED IN THE GROUND BOX. PERFORM THIS WORK IN ACCORDANCE WITH THE LATEST STANDARD SHEET ED (4)-14.

51. CONSTRUCT CONCRETE APRONS FOR TYPE 1 GROUND BOXES, IF NECESSARY, IN ACCORDANCE WITH THE GENERAL CONSTRUCTION NOTES SHOWN UNDER ITEM 624.

52. GROUND ALL EXISTING METAL GROUND BOX COVERS AS OUTLINED ON LATEST STANDARD SHEET ED (4)-14. REPLACEMENTS FOR THESE GROUND BOXES MUST BE MADE OF POLYMER CONCRETE AS DETAILED ON THE LATEST STANDARD SHEET ED (4)-14. THE MATERIALS AND LABOR ASSOCIATED WITH THIS WORK IS SUBSIDIARY TO VARIOUS BID ITEMS IN THE PROJECT.

53. IF EXISTING GROUND BOXES ARE FOUND TO BE INSUFFICIENT IN SIZE TO ACCOMMODATE THE PROPOSED CONDUITS AND CABLES AS SHOWN ON THE PLANS OR IF THEY HAVE BEEN DAMAGED TO THE EXTENT THEY WILL NOT ACCOMMODATE THE ADDITIONAL CONDUITS AND CABLES, REPLACE THE GROUND BOX WITH A NEW GROUND BOX (SIZE AS REQUIRED) OR INSTALL A NEW GROUND BOX ADJACENT TO THE EXISTING GROUND BOX AS APPROVED BY THE ENGINEER. SUCH REPAIR OR REPLACEMENT IS INCIDENTAL TO ITEM 624, "GROUND BOX".

54. CLAMP ALL CONDUITS ATTACHED TO SIGNAL POLE FOUNDATIONS OR WOOD POLES WITH CONDUIT STRAPS AND CLAMPS BACKS (MALLEABLE IRON) AT A MAXIMUM SPACING OF 5 FT. CENTER TO CENTER.

55. FURNISH AND INSTALL FIBER OPTIC CABLE. SUCH WORK IS INCIDENTAL TO THE ITEM 6007, "FIBER OPTIC CABLE".

56. INSTALL CONTINUOUS COMMUNICATIONS CABLE RUNS WITHOUT SPLICES FROM CONTROLLER CABINET TO CONTROLLER CABINET EXCEPT AS APPROVED.

57. GROUND COMMUNICATIONS CABLE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.

DATE: 5/30/2024
FILE: H:\Traffic Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

05/30/2024

SH 6
AT FM 2004
NOTES FOR PERMANENT TRAFFIC SIGNALS

SHEET 2 OF 2

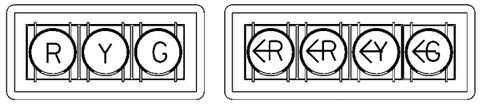
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		121

POLE CALLOUTS:

POLE ID	DESCRIPTION
(A)	EXISTING STRAIN POLE W/LUMINAIRE AND VIDEO CAMERA (E EA).
(B)	EXISTING STRAIN POLE W/PEDESTRIAN SIGNAL HEAD (1 EA),PUSH BUTTON (1 EA), VIDEO CAMERA (2 EA).
(C)	EXISTING STRAIN POLE W/LUMINAIRE; PEDESTRIAN SIGNAL HEAD (2 EA); PUSH BUTTON (2 EA); VIDEO CAMERA (2 EA); ITS BROADBAND RADIO ANTENA (4 EA); PTZ CAMERA (1 EA); RADIO ROADSIDE UNIT AND OMNI DIRECTIONAL ANTENNAS; AND CTMS CABINET WITH BLUETOOTH/CELL MODEM ANTENNA, CELL MODEM, SWITCH, ETC. (1 EA).
(D)	EXISTING STRAIN POLE W/PEDESTRIAN SIGNAL HEAD, PUSH BUTTON, AND ONE VIDEO CAMERA.
(E)	EXISTING SERVICE POLE W/METER AND SERVICE ENCLOSURE.

EXISTING SIGNAL HEADS



B, C, D, F, G, J, K, M, N

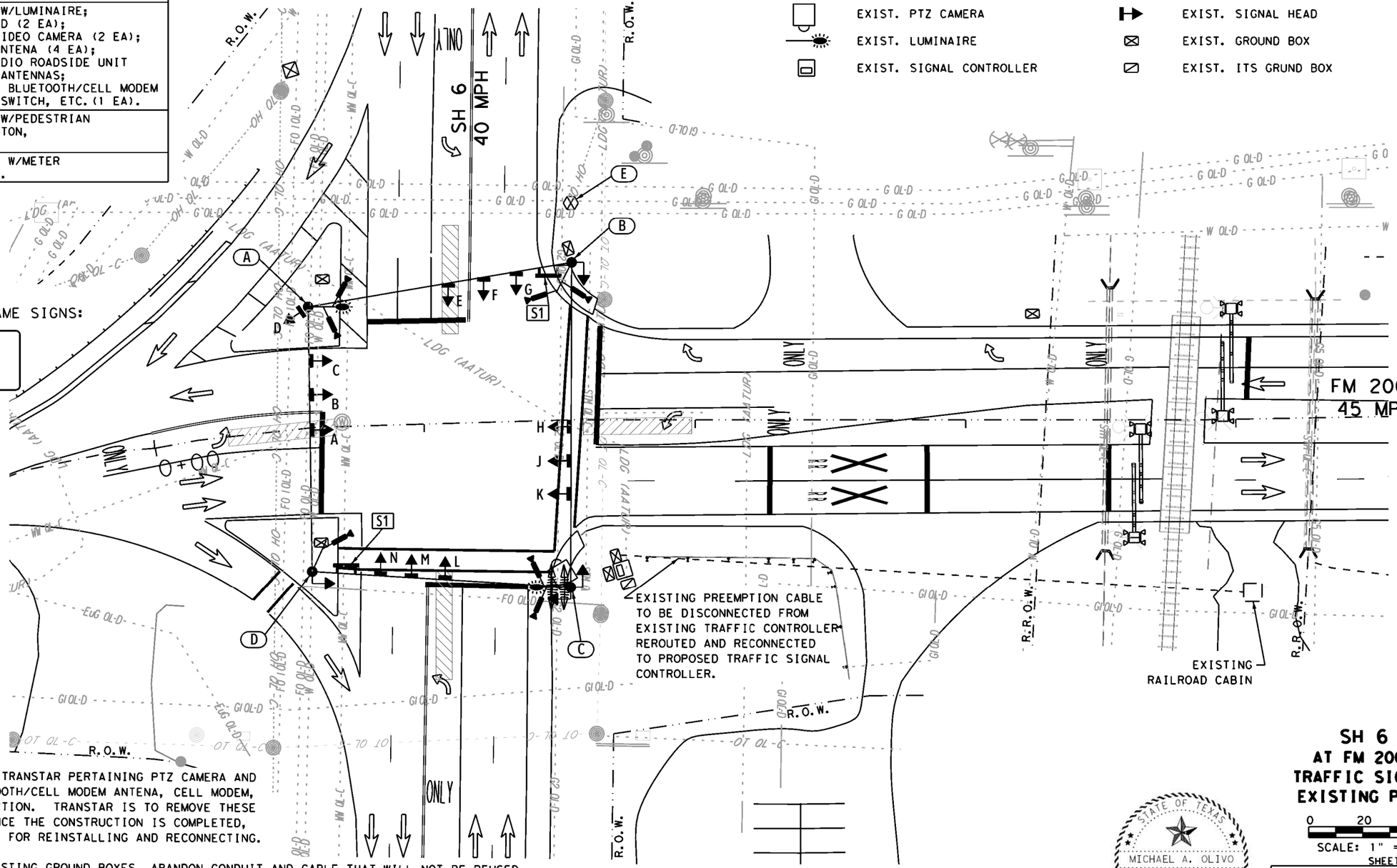
A, E, H, L

LEGEND:

EXIST. PEDSTRIAN SIGNAL HEAD
EXIST. VIDEO CAMERA
EXIST. BROADBAND RADIO ANTENA
EXIST. PTZ CAMERA
EXIST. LUMINAIRE
EXIST. SIGNAL CONTROLLER
TRAFFIC DIRECTION
PP/T POWER POLE W/TRANSFORMER
OP OVERHEAD POWER LINE
EXIST. SIGNAL HEAD
EXIST. GROUND BOX
EXIST. ITS GRUND BOX

EXISTING ROADWAY/STREET NAME SIGNS:

S1 FM 2004



NOTES:

1. CONTACT AND COORDINATE WITH TRANSTAR PERTAINING PTZ CAMERA AND THE CTMS CABINET WITH BLUETOOTH/CELL MODEM ANTENA, CELL MODEM, AND SWITCH PRIOR TO CONSTRUCTION. TRANSTAR IS TO REMOVE THESE PIECES OF EQUIPMENT AND, ONCE THE CONSTRUCTION IS COMPLETED, TRANSTAR WILL BE RESPONSIBLE FOR REINSTALLING AND RECONNECTING.
2. CONTRACTOR TO REMOVE ALL EXISTING GROUND BOXES, ABANDON CONDUIT AND CABLE THAT WILL NOT BE REUSED AS PART OF PROPOSED SIGNAL INSTALLATION.
3. CONTRACTOR TO REMOVE, REINSTALL AND RECONNECT THE FOLLOWING: AI-500-085 (CONTROLLER WITH CELLULAR MODEM); THE RADIO ROADSIDE UNIT CABINET (AI-900-040) WITH AI-500-095 (DUAL MODE DSRC/C-V2X RADIOS), AND ITS OMNI DIRECTIONAL ANTENNAS (DSRC/C-2X). THIS WORK WILL BE PAID UNDER 6062-6042 "RELOCATE ITS RADIO". COORDINATE THIS WORK WITH STEVE CHIU FROM TXDOT AT 713-802-5869 (steve.chiu@txdot.gov).
4. CONTRACTOR TO REMOVE AND REINSTALL THE EXISTING RAILROAD PREEMPTION EQUIPMENT AND RECONNECT THE EXISTING RAILROAD PREEMPTION CABLE.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

05/30/2024

SH 6 AT FM 2004 TRAFFIC SIGNAL EXISTING PLAN

0 20 40 FT
SCALE: 1" = 40'
SHEET 1 OF 1

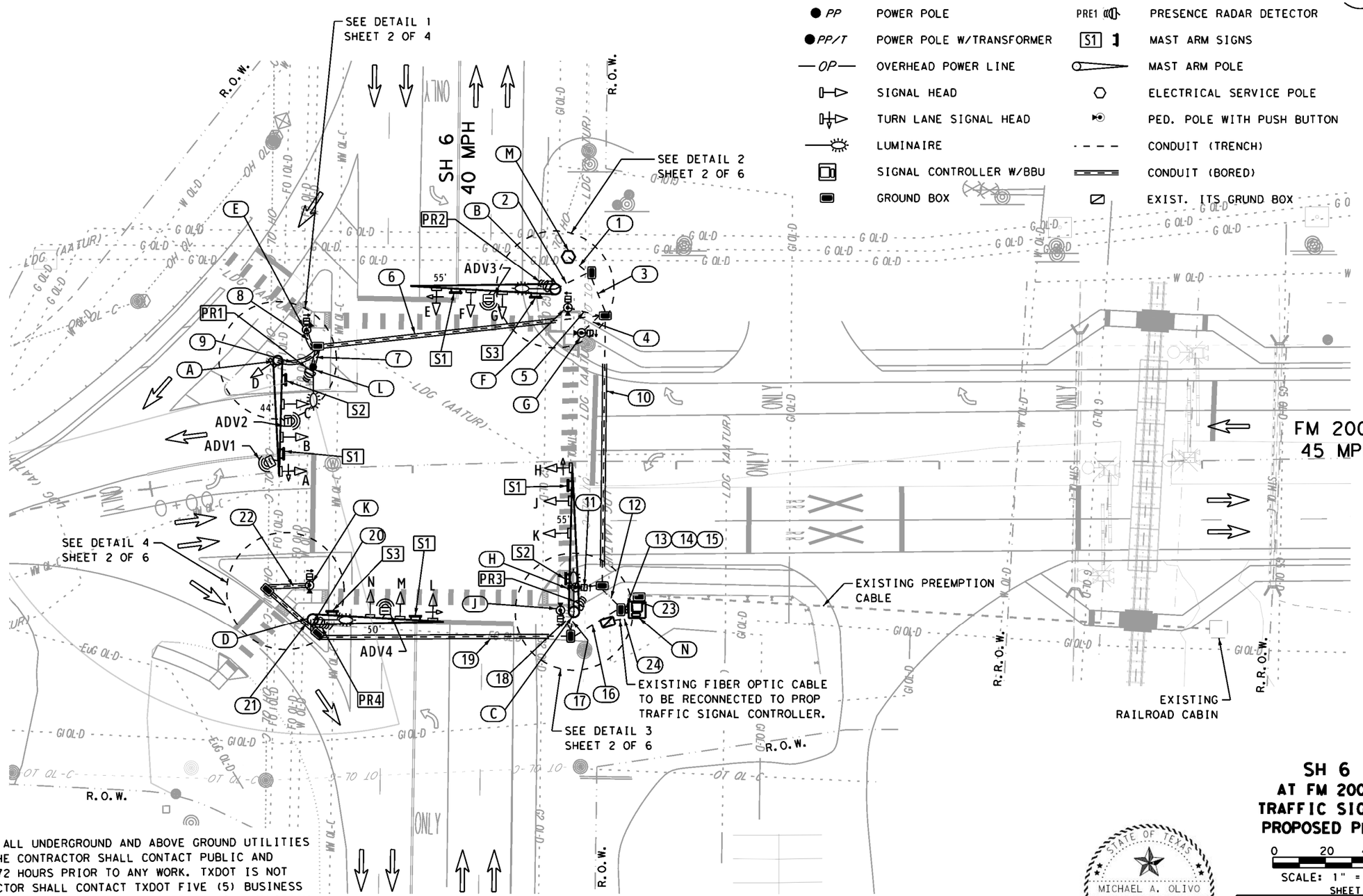
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		122

DATE: 5/30/2024
FILE: H:\Traffic Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

LEGEND:

TRAFFIC DIRECTION		ADV1	ADVANCE RADAR DETECTOR
PP	POWER POLE	PRE1	PRESENCE RADAR DETECTOR
PP/T	POWER POLE W/TRANSFORMER	S1 1	MAST ARM SIGNS
OP	OVERHEAD POWER LINE		MAST ARM POLE
	SIGNAL HEAD		ELECTRICAL SERVICE POLE
	TURN LANE SIGNAL HEAD		PED. POLE WITH PUSH BUTTON
	LUMINAIRE		CONDUIT (TRENCH)
	SIGNAL CONTROLLER W/BBU		CONDUIT (BORED)
	GROUND BOX		EXIST. ITS GRUND BOX



NOTES:

1. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND AND ABOVE GROUND UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES AT LEAST 72 HOURS PRIOR TO ANY WORK. TXDOT IS NOT A MEMBER OF 811. THE CONTRACTOR SHALL CONTACT TXDOT FIVE (5) BUSINESS DAYS TO LOCATE TXDOT OWNED EXISTING TXDOT COMMUNICATIONS, ILLUMINATION, AND TRAFFIC SIGNAL CABLING (OR WE CAN JUST SAY EXISTING TXDOT UNDER AND ABOVE GROUND UTILITIES). TXDOT HOUSTON DISTRICT TRAFFIC OPERATIONS OFFICE CAN BE REACHED AT: HOU-LOCATEREQUEST@TXDOT.GOV

2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY CONTRACTOR S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND OR ABOVE GROUND. UTILITIES ON THE PLANS ARE SHOWN IN APPROXIMATE LOCATIONS.

PHASE 1

SH 6 AT FM 2004 TRAFFIC SIGNAL PROPOSED PLAN

0 20 40 FT

SCALE: 1" = 40'

SHEET 1 OF 6

Texas Department of Transportation

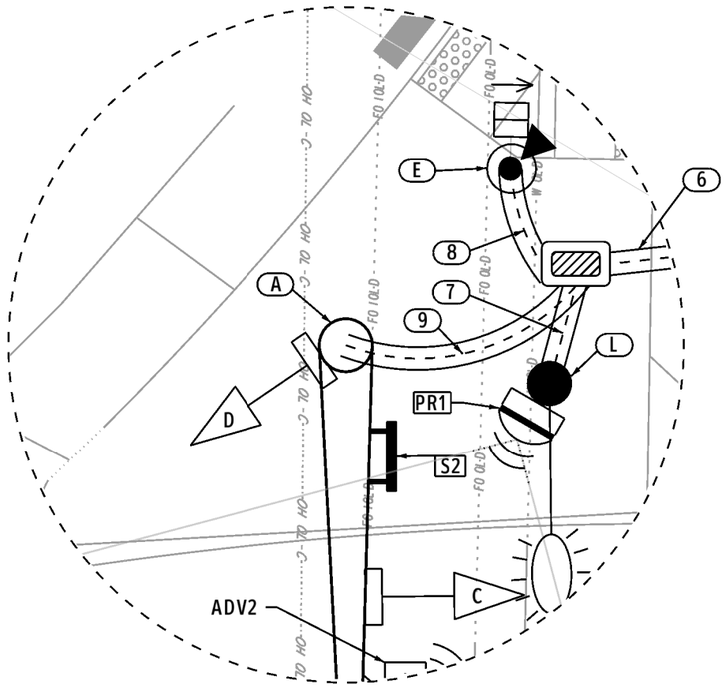
CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		123

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER

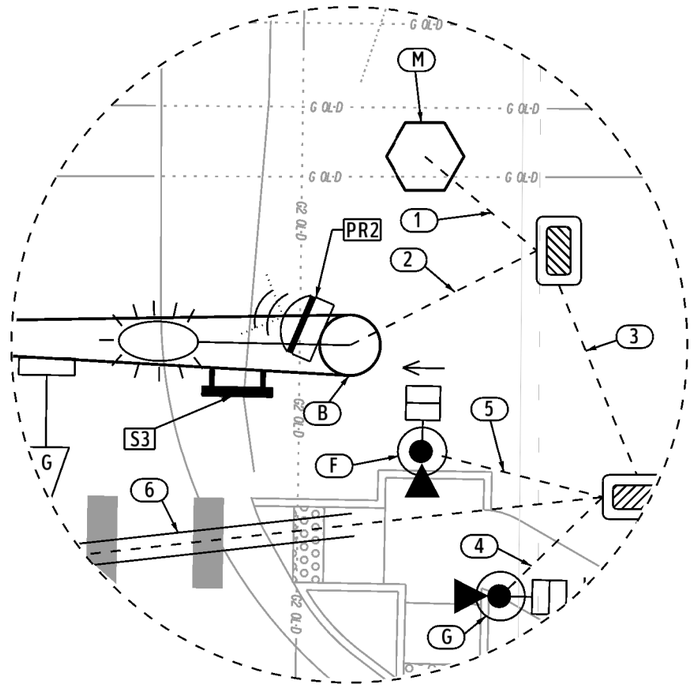
P.E.

05/30/2024

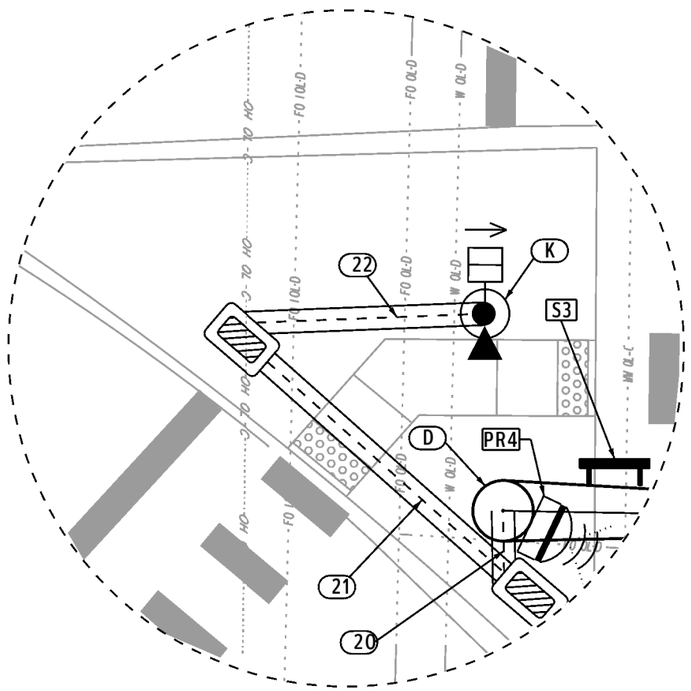
DATE: 5/30/2024
FILE: H:\Trf\Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn



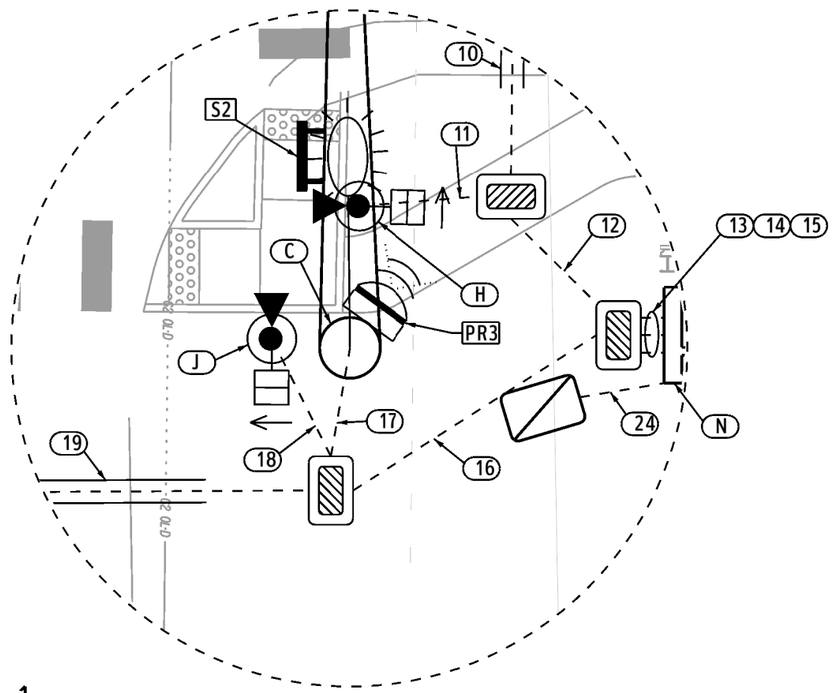
DETAIL 1



DETAIL 2



DETAIL 4



DETAIL 3

PHASE 1

LEGEND:

ADV1	ADVANCE RADAR DETECTOR
PRE1	PRESENCE RADAR DETECTOR
S1 1	MAST ARM SIGNS
	MAST ARM POLE
	ELECTRICAL SERVICE POLE
	PED. POLE WITH PUSH BUTTON
	CONDUIT (TRENCH)
	CONDUIT (BORED)
	TRAFFIC DIRECTION
PP	POWER POLE
PP/T	POWER POLE W/TRANSFORMER
OP	OVERHEAD POWER LINE
	SIGNAL HEAD
	TURN LANE SIGNAL HEAD
	LUMINAIRE
	SIGNAL CONTROLLER W/BBU
	GROUND BOX
	EXIST. ITS GRUND BOX

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

05/30/2024

SH 6 AT FM 2004 TRAFFIC SIGNAL PROPOSED PLAN

0 2 4 6 8 10
SCALE IN FEET

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		124

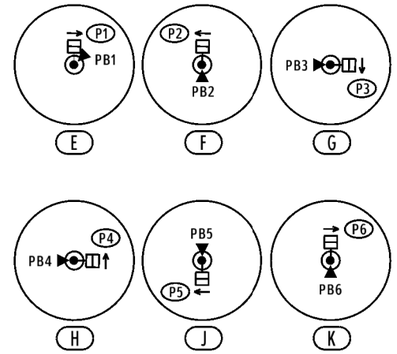
DATE: 5/30/2024
FILE: H:\Tr\Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

CALLOUTS	DESCRIPTION
(A)	PROPOSED 44' MAST ARM POLE WITH ADVANCE RADAR (2 EA)
(B)	PROPOSED 50' MAST ARM POLE WITH LUMINAIRE, ADVANCE RADAR (1), AND PRESENCE RADAR (1 EA
(C)	PROPOSED 55' MAST ARM POLE WITH LUMINAIRE, PRESENCE RADAR (1 EA), RELOCATED PTZ CAMERA, RELOCATED ROADSIDE UNIT AND OMNI DIRECTIONAL ANTENNAS.
(D)	PROPOSED 50' MAST ARM POLE WITH LUMINAIRE, ADVANCE RADAR (1 EA), AND PRESENCE RADAR (1 EA)
(E)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eL) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(F)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eL) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(G)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eR) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(H)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eL) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(J)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eR) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(K)	PROPOSED 4 1/2" PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN SIGN (R10-3eR) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
(L)	PROPOSED RDWY ILL POLE W/8' LUMINAIRE ARM
(M)	PROPOSED SERVICE POLE TY D WITH SERVICE (120/240 VOLTS) METER, SERVICE ENCLOSURE AND SERVICE DISCONNECT
(N)	PROPOSED FULL- ACTUATED CONTROLLER WITH CABINET, 4G LTE CELLULAR MODEM W/ANTENNA AND POWER SUPPLY, BATTERY BACKUP, AND RELOCATED AI-500-085 (CONTROLLER WITH CELLULAR MODEM).

PROPOSED RADAR DETECTIONS SCHEDULE:

ADV1	DESIGNATED FOR SOUTHBOUND APPROACHING VEHICLES (FM 2004)
ADV2	DESIGNATED FOR NORTHBOUND APPROACHING VEHICLES (FM 2004)
ADV3	DESIGNATED FOR EASTBOUND APPROACHING VEHICLES (SH 6)
ADV4	DESIGNATED FOR WESTBOUND APPROACHING VEHICLES (SH 6)
PR1	DESIGNATED FOR SOUTHBOUND VEHICLES (FM 2004)
PR2	DESIGNATED FOR WESTBOUND VEHICLES (SH 6)
PR3	DESIGNATED FOR NORTHBOUND VEHICLES (FM 2004)
PR4	DESIGNATED FOR EASTBOUND VEHICLES (SH 6)

PROPOSED PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON ORIENTATION:

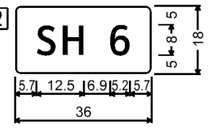


PROPOSED ROADWAY/STREET NAME SIGNS:

S1

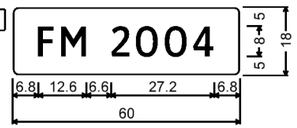
R10-17T 30x30

S2



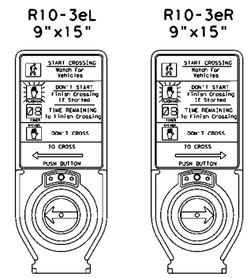
1.5" Radius, 0.5" Border, White on Green;
"SH 6", ClearviewHwy-3-W;

S3



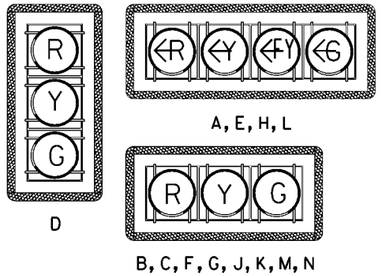
1.5" Radius, 0.5" Border, White on Green;
"FM 2004", ClearviewHwy-3-W;

PROPOSED PEDESTRIAN SIGNS WITH PUSH BUTTON:



PB1, PB2, PB4 PB3, PB5, PB6

PROPOSED SIGNAL HEAD SCHEDULE WITH RETROREFLECTIVE BORDER



PROPOSED PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE):

P1-P6

PHASE 1

ELECTRICAL SERVICE DATA:

ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION SEE ED(5,6,7,8)-14	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
SH 6 AT FM 2004	(M)	ELEC SERV TY D (120/240)060(NS)SS(E)SP(O)	1-1/4"	3/#6	N/A	2P/60		100	TRF. SIG	1P/50	40	5.52
							30		LIGHTING	2P/20	3	

05/30/2024

SH 6
AT FM 2004
TRAFFIC SIGNAL
PROPOSED PLAN

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		125

DATE: 5/30/2024
FILE: H:\Traffic\Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)												CONDUCTORS (620)				TRAY CABLE (621)		CABLES (684)								RADAR (6292)		RADAR (6292)		TRACER (620)		AI-500-095 (6089)	
	PVC										RM		POWER		GROUND		LUMINAIRE		PEDESTRIAN				SIGNAL		OMNI ANTENNA		PRES. RADAR		ADV. RADAR		WIRE		ETHERNET	
	2" (SCHD 80)				3" (SCHD 80)		4" (SCHD 80)				3"		#4 INSULATED		#8 BARE		#12/4C Tray Cable		#12/2C		#12/4C		#12/7C		#16/3C		# 18/2C & #22/4C		# 18/2C & #22/4C		#14 INSULATED		CAT 5	
	(6046)		(6047)		(6053)		(6058)		(6059)		(6074)		(6012)		(6007)		(6005)		(6007)		(6009)		(6012)		(6049)		(Subsidiary		(Subsidiary		(6002)		(6002)	
	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1					1	15							2	15	1	15	4	15																
2	1	20													1	20	1	20					2	20			1	20	1	20				
3					1	20							2	20	1	20	3	20					2	20			1	20	1	20				
4	1	15													1	15			1	15	1	15												
5	1	15													1	15			1	15	1	15												
6							1	20	1	95					1	115	1	115	1	115	1	115	3	115			1	115	2	115				
7			1	10											1	10	1	10									1	10						
8			1	10											1	10			1	10	1	10												
9			1	20											1	20							3	20					2	20				
10							1	25	1	80			2	105	1	105	2	105	3	105	3	105	5	105			2	105	3	105				
11	1	15													1	15			1	15	1	15												
12							1	15					2	15	1	15	2	15	4	15	4	15	5	15			2	15	3	15				
13							1	15					2	15	1	15			6	15	6	15											2	15
14							1	15							1	15							9	15			4	15	4	15				
15 (SPARE)							1	15																										
16							1	25							1	25	2	25	2	25	2	25	4	25			2	25	1	25			2	25
17	1	15													1	15	1	15					2	15			1	15					2	15
18	1	15													1	15			1	15	1	15												
19							1	15	1	85					1	100	1	100	2	100	1	100	2	100			1	100	1	100				
20	1	10													1	10	1	10					2	10			1	10	1	10				
21			1	30											1	30			2	30	2	30												
22			1	20											1	20			1	20	1	20												
*23	1	10																																
**24					1	15																									1	15		
A																							3	20					2	20				
MA																							2	45					2	45				
MA2																																		
B																	1	35					2	20			1	20	1	20				
MB																	1	10					2	50					1	50				
MB2																																		
C																	1	35					2	20	2	20	1	20					2	10
MC																	1	10					2	55										
MC2																																		
D																	1	35					2	20			1	20	1	20				
MD																	1	10					2	50					1	50				
E																			1	5	1	10												
F																			1	5	1	10												
G																			1	5	1	10												
H																			1	5	1	10												
J																			1	5	1	10												
K																			1	5	1	10												
L																											1	20						
M											1	15																						
TOTAL (LF)	115		90		50		145		260		15		340		620		815		1010		940		2150		40		720		1135		15		130	
EST. TOTAL	125		95		55		155		275		20		360		655		860		1065		990		2260		45		760		1195		20		140	

NOTES:

1. ITEMS 684-6049 "TRF SIG CBL (TY A)(16 AWG)(3 CONDR)" AND 6089-6002 "CAT 5 ETHERNET CABLE" ARE FOR THE INSTALLATION AND RECONNECTING OF RADIO ROADSIDE UNIT AND OMNI DIRECTIONAL ANTENNAS (REMOVED AND RELOCATED FROM EXISTING STRAIN POLE "C" TO PROPOSED MAST ARM POLE "C". CONTRACTOR TO CONTACT AND COORDINATE THIS WORK WITH STEVE CHIU FROM TXDOT AT 713-802-5869 (steve.chiu@txdot.gov).

* CONDUIT FOR THE REROUTING OF THE EXISTING PREEMPTION CABLE.

** CONDUIT FOR THE REROUTING OF THE EXISTING FIBER OPTIC CABLE.

PHASE 1

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

05/30/2024

SH 6
AT FM 2004
TRAFFIC SIGNAL
PROPOSED PLAN

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		126

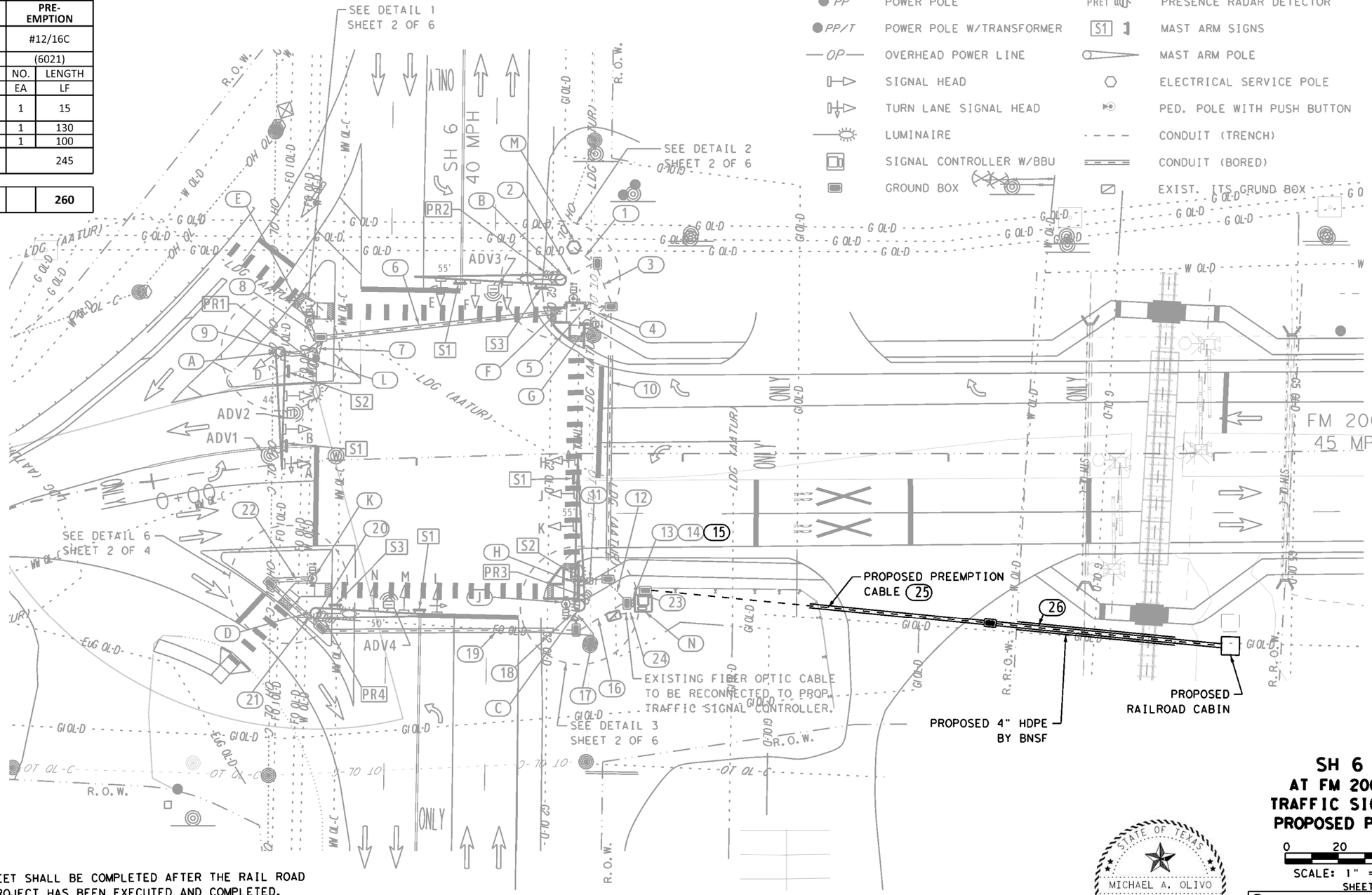
DATE: 5/30/2024
FILE: H:\Trfsignals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

CONDUIT AND CONDUCTOR RUNS						
RUN NO.	CONDUIT (618)				CABLES (684)	
	PVC				PRE-EMPTION	
	2" (SCHD 80)				#12/16C	
	(6046)		(6047)		(6021)	
	NO.	TRENCH	NO.	BORE	NO.	LENGTH
	EA	LF	EA	LF	EA	LF
15 (SPARE)					1	15
25	1	60	1	70	1	130
26					1	100
TOTAL (LF)	60		70		245	

EST. TOTAL	65	75		260

LEGEND:

TRAFFIC DIRECTION		ADV1	ADVANCE RADAR DETECTOR
PP	POWER POLE	PRE1	PRESENCE RADAR DETECTOR
PP/T	POWER POLE W/TRANSFORMER	S1	MAST ARM SIGNS
OP	OVERHEAD POWER LINE		MAST ARM POLE
	SIGNAL HEAD		ELECTRICAL SERVICE POLE
	TURN LANE SIGNAL HEAD		PED. POLE WITH PUSH BUTTON
	LUMINAIRE		CONDUIT (TRENCH)
	SIGNAL CONTROLLER W/BBU		CONDUIT (BORED)
	GROUND BOX		EXIST. ITS GRUND BOX



NOTES:

1. SCOPE OF WORK UNDER THIS SHEET SHALL BE COMPLETED AFTER THE RAIL ROAD AGREEMENT AND SECTION 130 PROJECT HAS BEEN EXECUTED AND COMPLETED.
2. THE CONTRACTOR TO ROUTE THE PROPOSED RR PREEMPTION CABLE TO CONTROLLER CABINET.
3. THE CONTRACTOR TO DISCONNECT AND REMOVE EXISTING PREEMPTION CABLE AND EXISTING RR EQUIPMENT FROM THE CONTROLLER CABINET.
4. SECTION 130 TO FURNISH ALL NEW PREEMPTION EQUIPMENT. THE VENDOR'S REPRESENTATIVE WILL INSTALL, SETUP AND TEST THE EQUIPMENT. IF THE ENGINEER ELECTS TO ALLOW THE CONTRACTOR PERFORM THE SETUP, THEN A CERTIFIED VENDOR'S REPRESENTATIVE OF THE RR PREEMPTION EQUIPMENT MUST SUPERVISE THE INSTALLATION, SETUP AND TESTING OF THIS EQUIPMENT. SIGNAL MAINTENANCE SHOULD BE ON SITE DURING THIS TIME.
5. REFER TO SHEET 6 OF 6 FOR DETAILS.

PHASE 2

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

05/30/2024

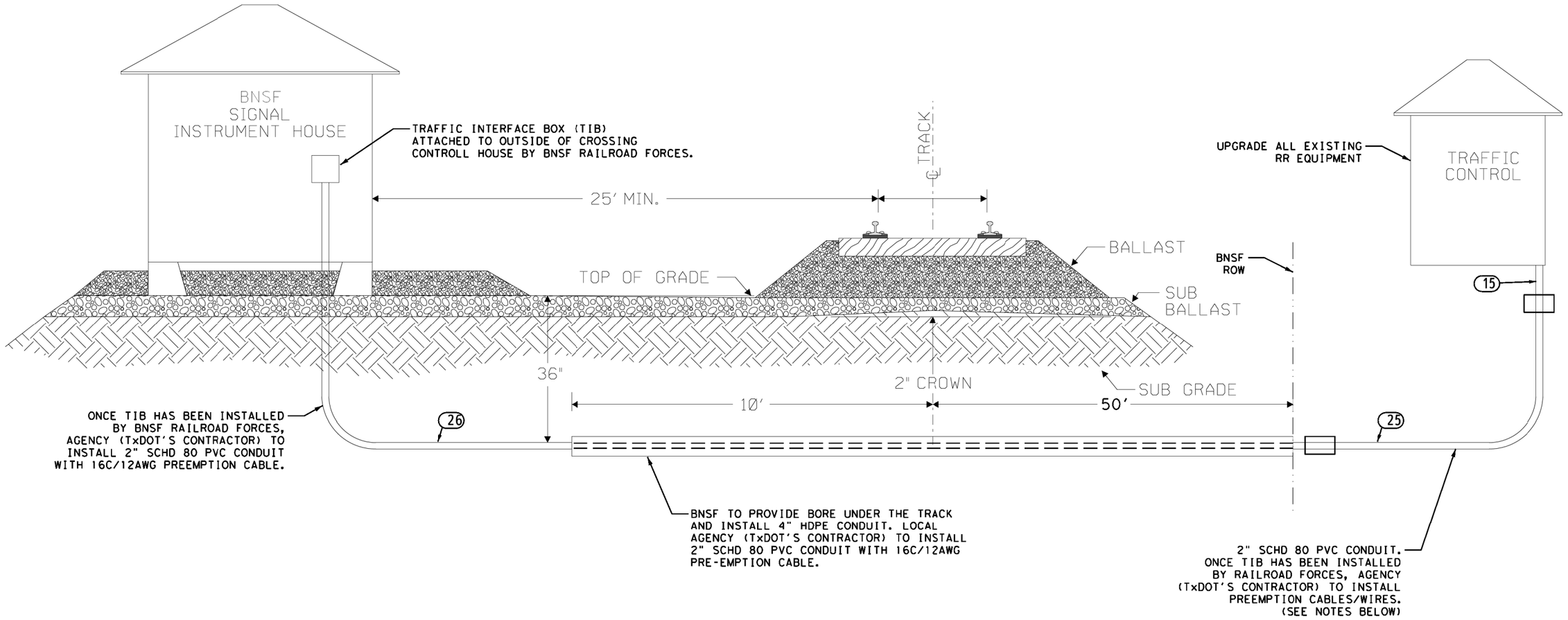
SH 6 AT FM 2004 TRAFFIC SIGNAL PROPOSED PLAN

0 20 40 FT
SCALE: 1" = 40'
SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		126A

DATE: 5/30/2024
FILE: H:\Trf\Signals\Luis Gonzolez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn



PHASE 2

NOTES:

1. LOCAL AGENCY IS TO PROVIDE ALL LABOR, MATERIAL, EQUIPMENT AND SUPERVISION FOR THE INSTALLATION OF TRAFFIC INTERCONNECT OR TRAFFIC PREEMPTION WIRE. BNSF FORCES MUST BE PRESENT PRIOR TO AND DURING ANY WORK ON BNSF RIGHT OF WAY.
2. CONDUIT REQUIRED TO EXTEND A MINIMUM OF 10′ FROM CENTER OF TRACK.
3. TRENCH INTERCONNECT WIRING A MINIMUM OF 36" BELOW TOP OF GRADE.
4. CABLE IS TO DEMARK AT BNSF PROVIDED TIB ON BNSF SIGNAL ENCLOSURE.
5. GROUND TESTS MUST BE TAKEN PRIOR TO WORK AND AFTER WORK IS COMPLETED.
6. PRIOR TO CUTOVER, BNSF SIGNAL AND LOCAL TRAFFIC DEPARTMENTS MUST REVIEW THE INSTALLATION.
7. DURING CUTOVER, BNSF AND LOCAL TRAFFIC DEPARTMENTS MUST BE PRESENT.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

05/30/2024

SH 6
AT FM 2004
TRAFFIC SIGNAL
PROPOSED PLAN

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		126B

DATE: 5/30/2024
FILE: H:\Tr\Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\SIGNALS.dgn

PROPOSED SIGNAL CONTROLLER ON
SH 6 AT FM 2004

PATCH PANEL (12 POSITION)

T	ALTERNATE	7	1	ALTERNATE	T
T	ALTERNATE			ALTERNATE	T
T	ALTERNATE			ALTERNATE	T
T	ALTERNATE			ALTERNATE	T
T	ALTERNATE			ALTERNATE	T
T	ALTERNATE	12	6	ALTERNATE	T

EXISTING
12 STRAND SM FOC

EXISTING SIGNAL CONTROLLER ON
SH 6 AT DELANY RD

EXISTING
12 STRAND SM FOC

C		7	1	S	ALTERNATE 1
C				S	ALTERNATE
C				S	ALTERNATE
C				S	ALTERNATE
C				S	ALTERNATE
C		12	6	S	ALTERNATE 6

C	ALTERNATE	7
C	ALTERNATE	
C	ALTERNATE	
C	ALTERNATE	
C	ALTERNATE	
C	ALTERNATE	12

EXISTING ITS GROUND BOX
WITH EXISTING
FO SPLICE ENCLOSURE

LEGEND

- [T] FC CONNECTOR
- [S] FUSION SPLICE
- [C] COILED

DATE: 5/30/2024
FILE: H:\Traffic Signals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\FOC_TERMINATION_ASSIGNMENTS.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

05/30/2024

SH 6
AT FM 2004
TERMINATION
ASSIGNMENT

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		127

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.

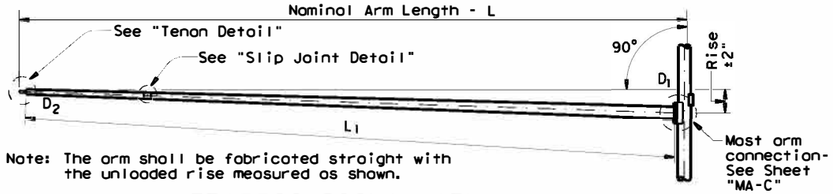
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminoire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminoire
D_{30} = Pole Top O.D. with Luminoire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

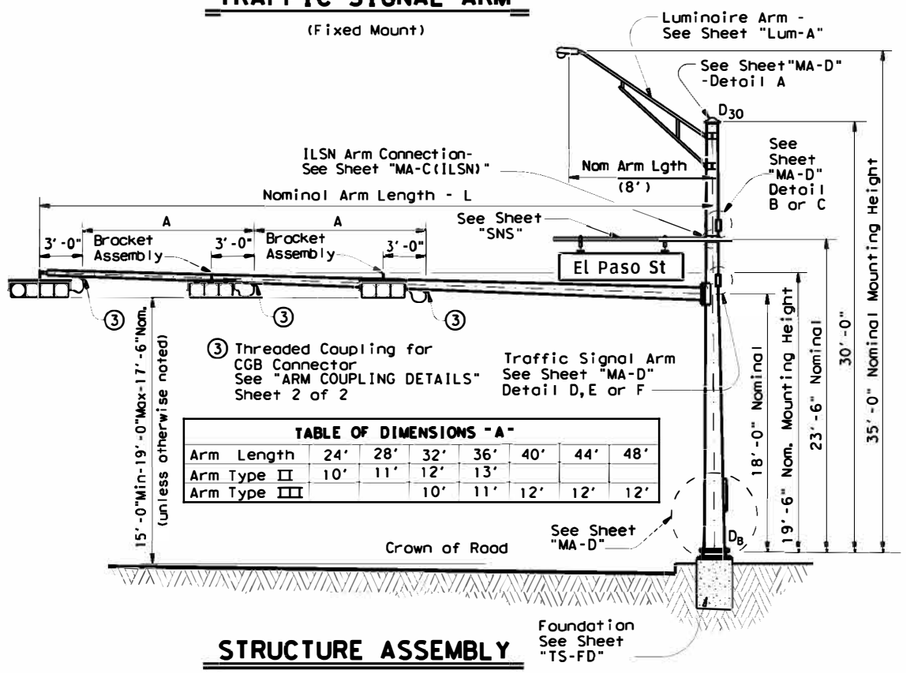


TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminoire		24' Poles With ILSN		19' Poles With No Luminoire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-100		20S-100		20-100	
24	24L-100		24S-100		24-100	
28	28L-100		28S-100		28-100	
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100		40S-100		40-100	
44	44L-100		44S-100		44-100	1

Traffic Signal Arms (1 per pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	1

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	
2"	4'-3"	1

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SH 6 AT FM 2004

SHEET 1 OF 2

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

05/30/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

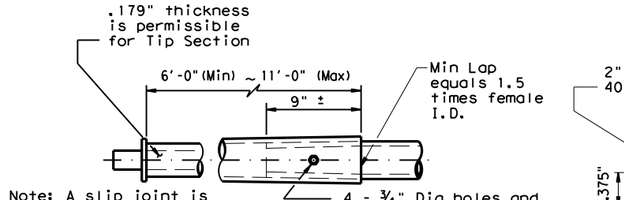
REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		128

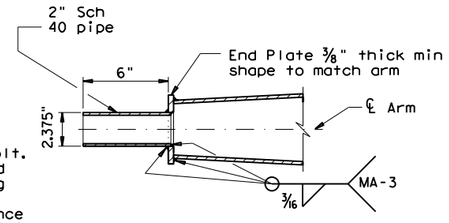
123A

DATE:
FILE:

DATE:
FILE:



SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

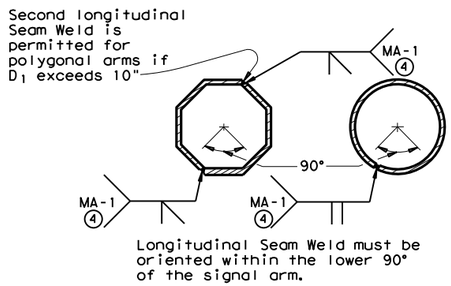
If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

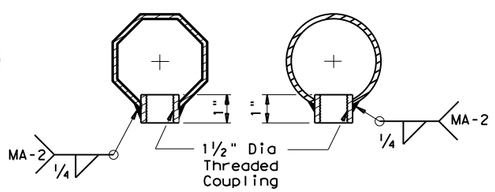
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		129

123B

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:

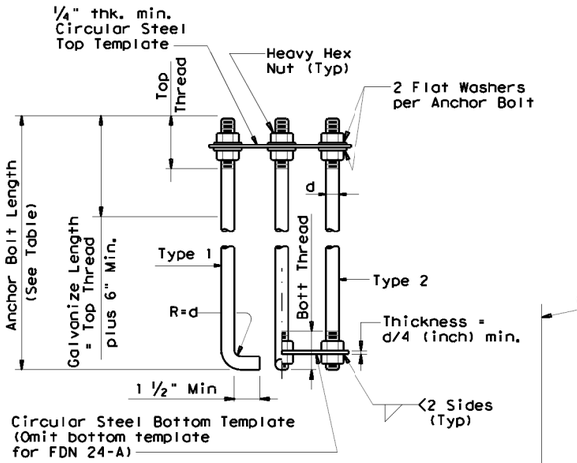
FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft 10	15	40	ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'

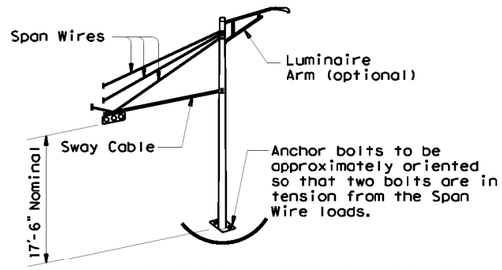
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



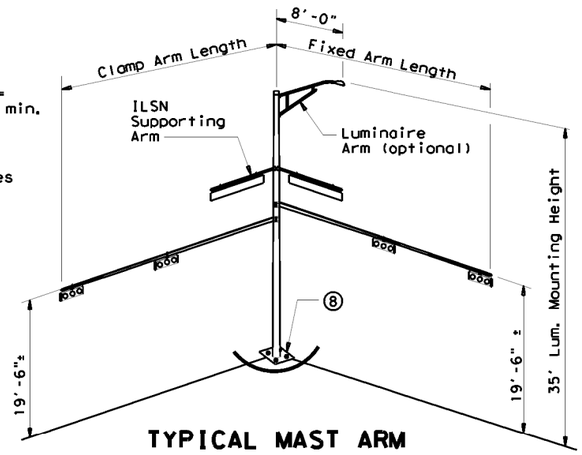
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

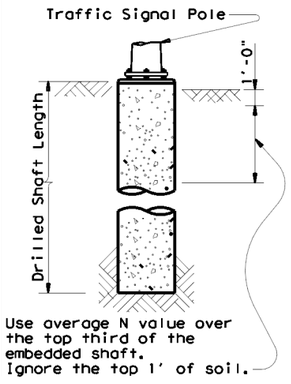
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



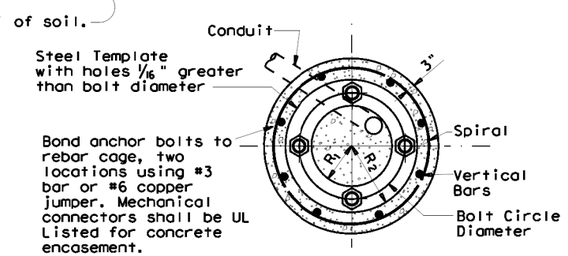
TYPICAL STRAIN POLE ASSEMBLY



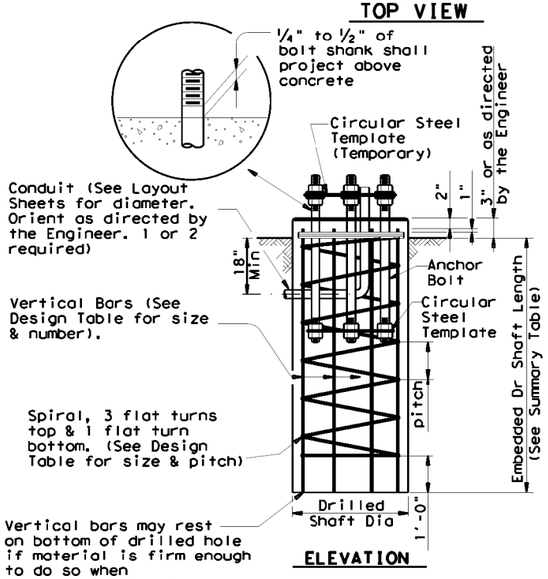
TYPICAL MAST ARM ASSEMBLY



Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.



TOP VIEW



ELEVATION

FOUNDATION DETAILS

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET) 24-A	30-A	36-A	36-B	42-A
POLE A	10	36-B					15.2	
TOTAL DRILLED SHAFT LENGTHS							15.2	

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

SH 6 AT FM 2004

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

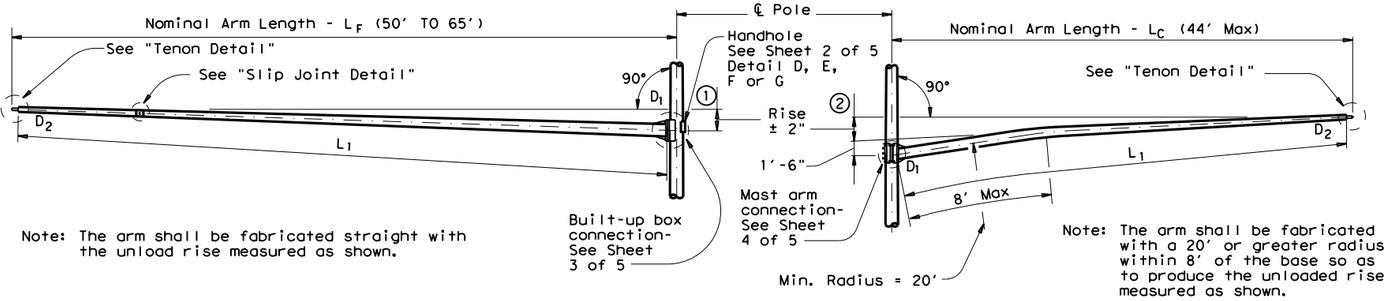
05/30/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEE
5-96 11-98 1-12	CONT	SECT	JOB	HIGHWAY
	1911	01	022, etc.	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		130

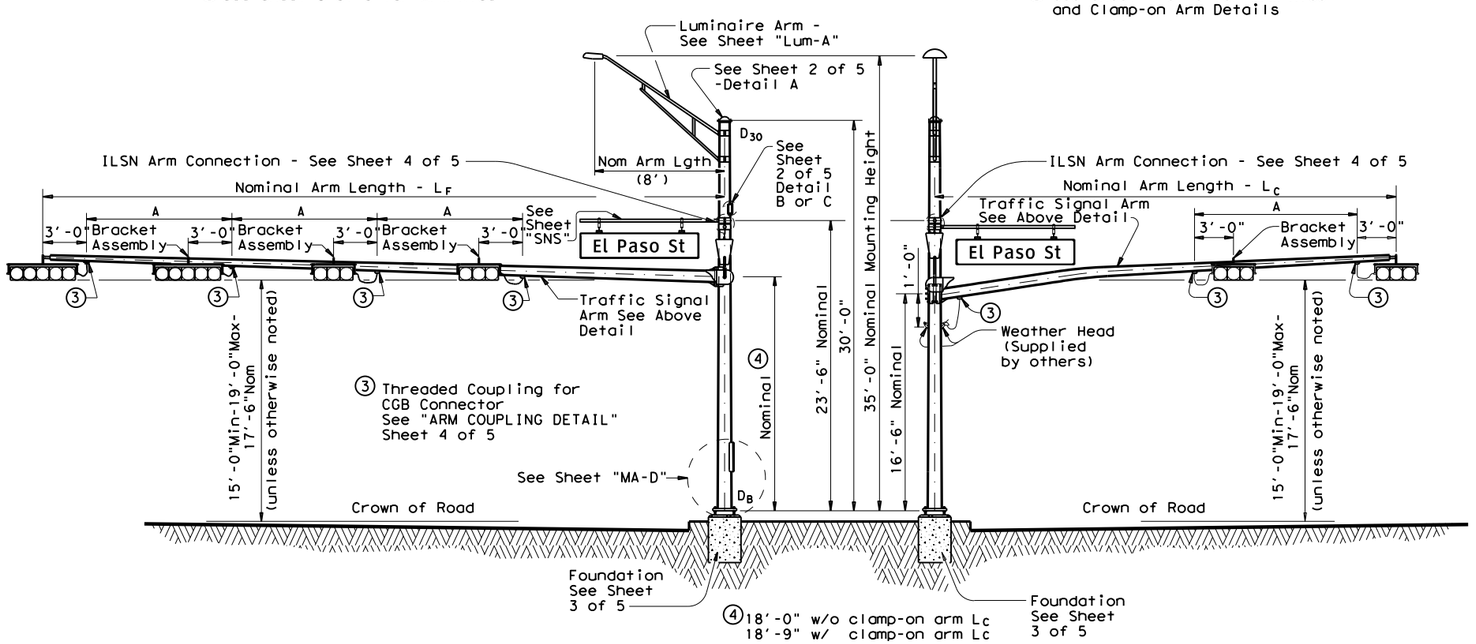


FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

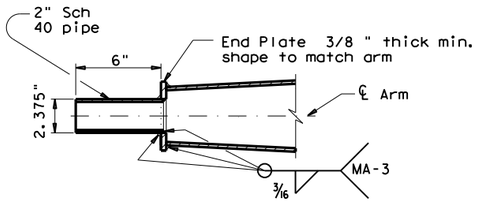


ELEVATION
(Showing fixed mount arm)

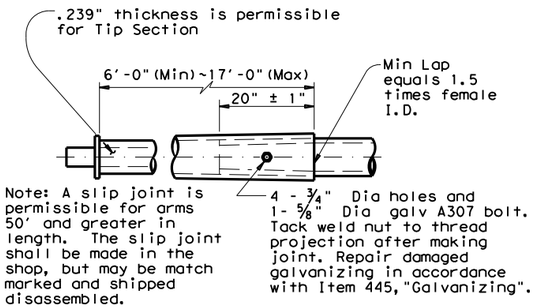
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

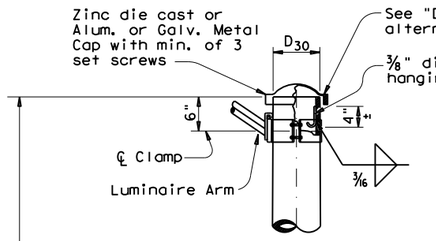
REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		131

131A

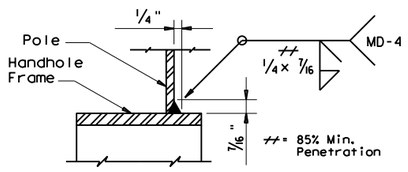
DATE:
FILE:

DATE:
FILE:

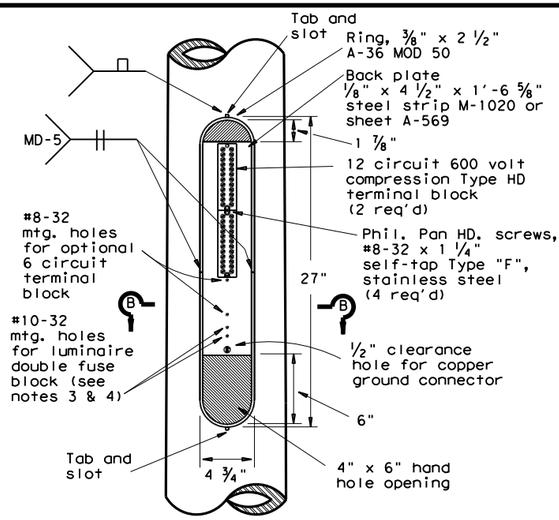


DETAIL A

(for pole with luminaire)



DETAIL H

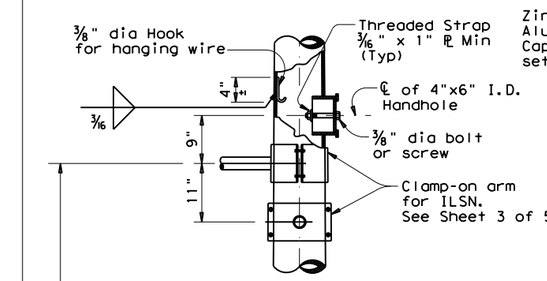


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

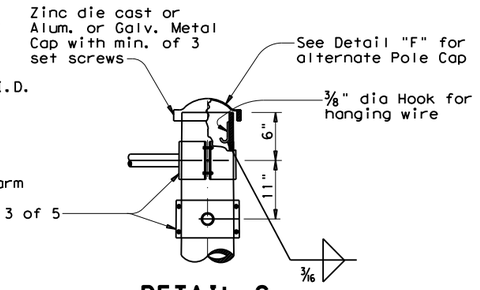
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

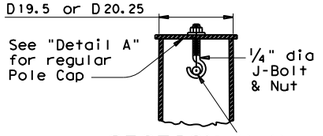


DETAIL B

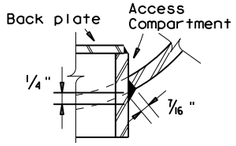
(If ILSN applied)



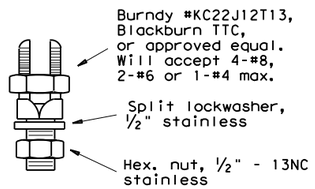
DETAIL C



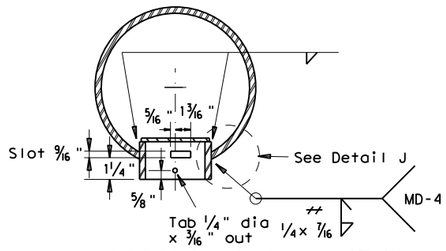
SECTION Y-Y



DETAIL J



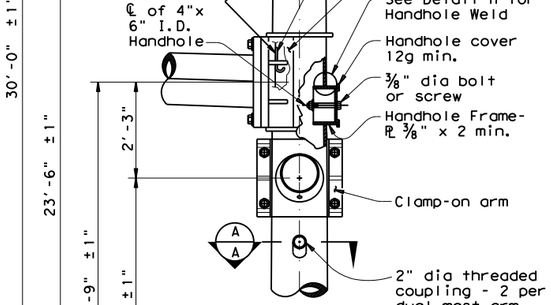
COPPER GROUND CONNECTOR



SECTION B-B

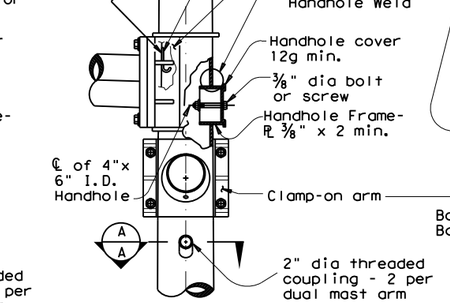
= 85% Min. Penetration

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



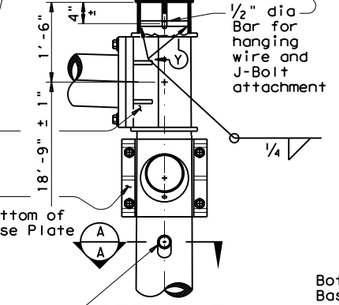
DETAIL D

(for 30' pole with luminaire and ILSN sign)



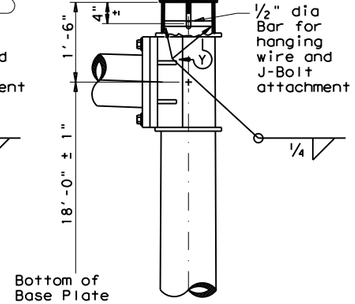
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)

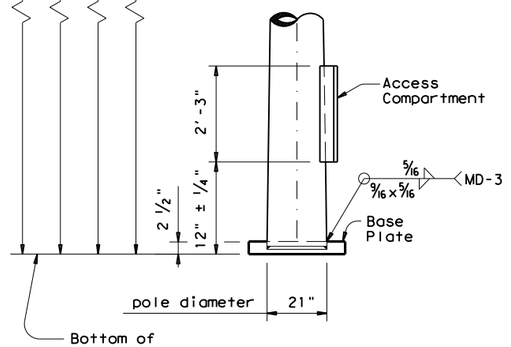


DETAIL G

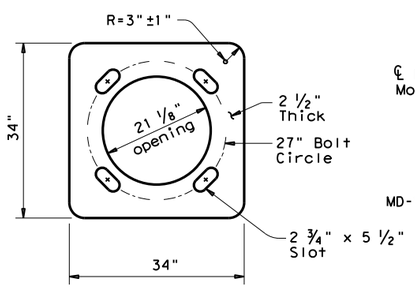
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

ACCESS COMPARTMENT NOTES:

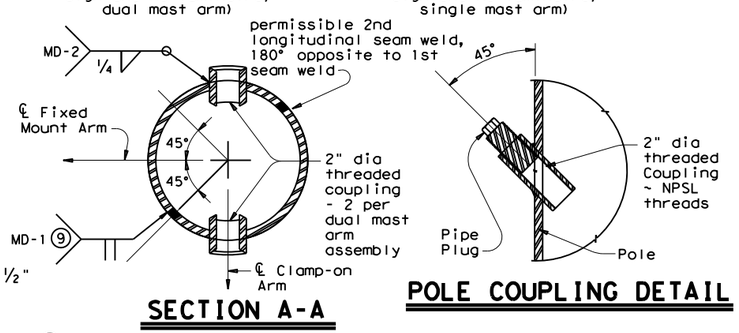
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



POLE ELEVATION



BASE PLATE



SECTION A-A

POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

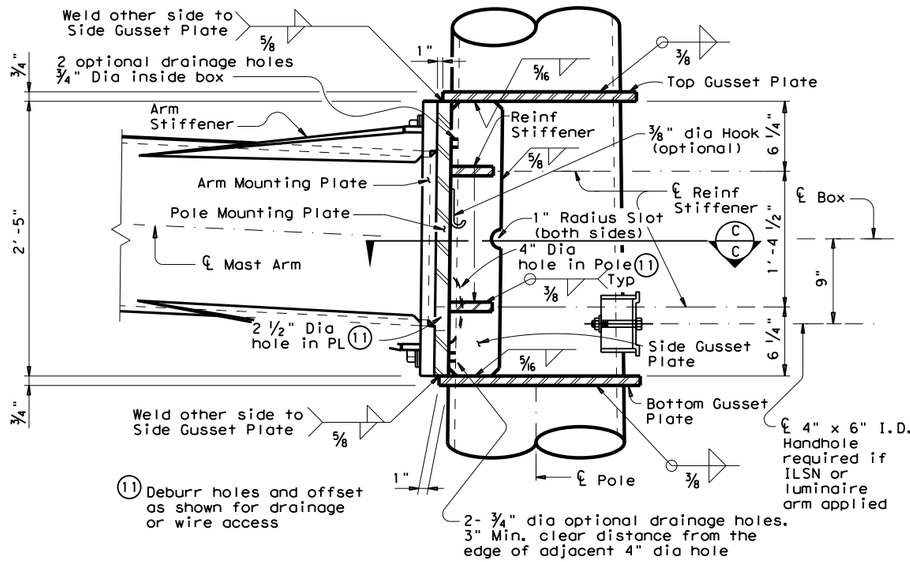
LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

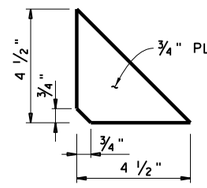
REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		132

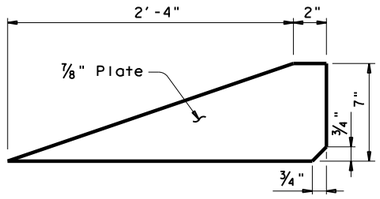
131B



BUILT-UP BOX CONNECTION

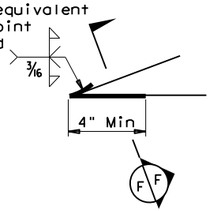


REINFORCING STIFFENER



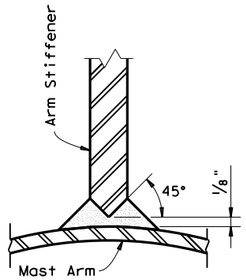
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

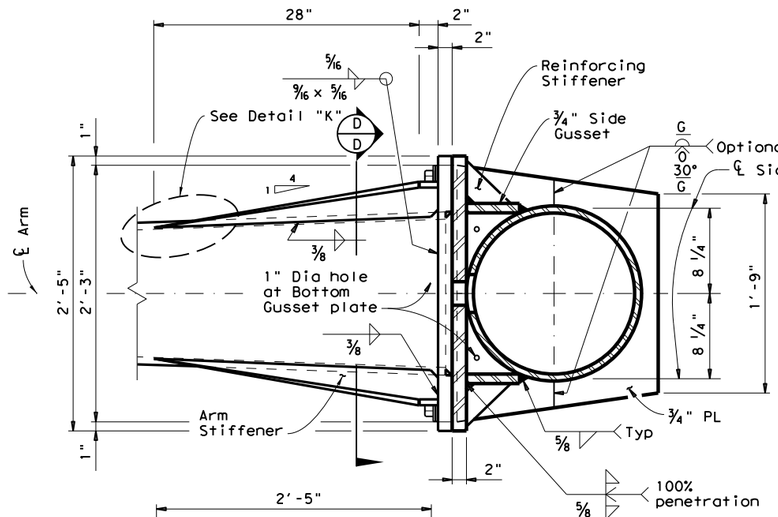
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

GENERAL NOTES:

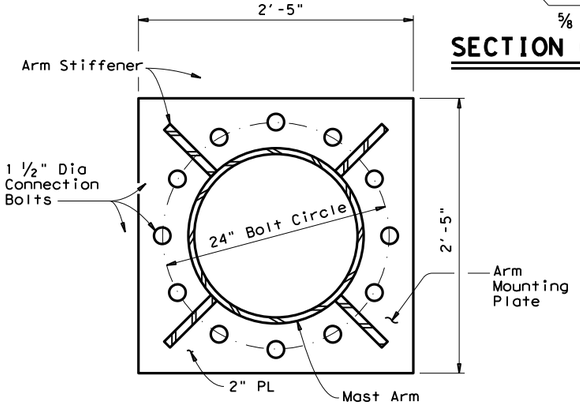
Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

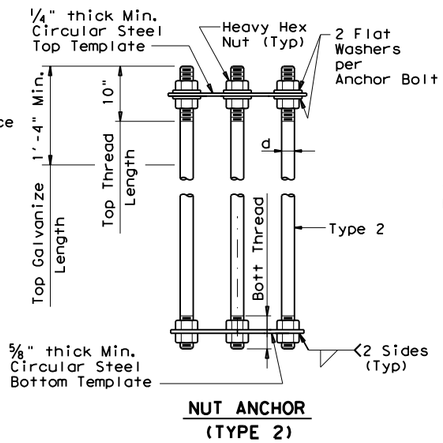
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.



SECTION C-C

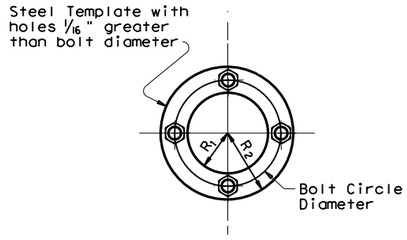


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

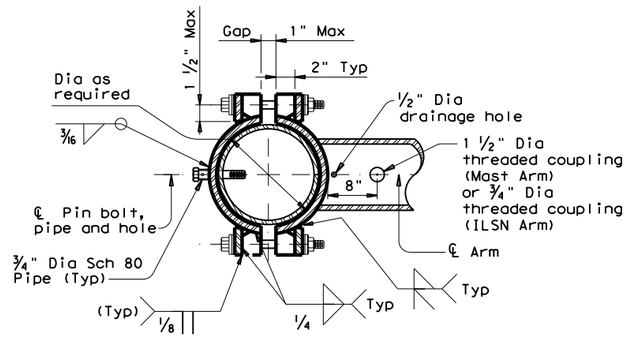
DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

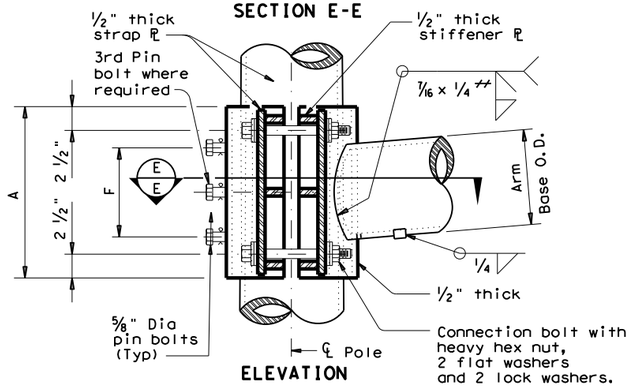
CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		133

DATE:
FILE:

131C



SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

⁄⁄ = 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

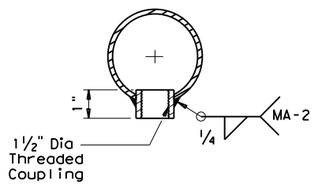
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

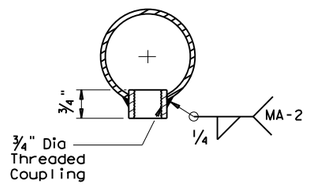
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



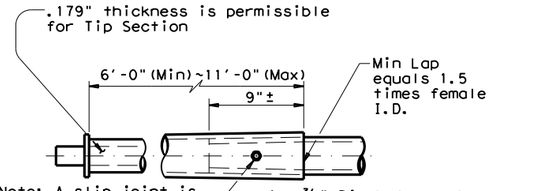
ILSN ARM COUPLING DETAIL

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

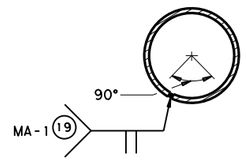


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		134

131D

DATE:
FILE:

Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L	2	50S		50	
55	55L	1	55S		55	
60	60L		60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
24	5024L		5024S		5024	
28	5028L		5028S		5028	
32	5032L		5032S		5032	
36	5036L		5036S		5036	
40	5040L		5040S		5040	
44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
24	5524L		5524S		5524	
28	5528L		5528S		5528	
32	5532L		5532S		5532	
36	5536L		5536S		5536	
40	5540L		5540S		5540	
44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
24	6024L		6024S		6024	
28	6028L		6028S		6028	
32	6032L		6032S		6032	
36	6036L		6036S		6036	
40	6040L		6040S		6040	
44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
24	6524L		6524S		6524	
28	6528L		6528S		6528	
32	6532L		6532S		6532	
36	6536L		6536S		6536	
40	6540L		6540S		6540	
44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
POLE B	10	1	22
POLE C	10	1	22
POLE D	10	1	22
Total Drill Shaft Length			66

Notes

** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	1
55	55IV	2
60	60IV	
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	3

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	3

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

SH 6 AT FM 2004

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022, etc.	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		135

131E

DATE: 5/30/2024 10:14:36 AM
FILE: H:\Traffsignals\Luis Gonzalez\1911-01-022 SH 6 @ FM 2004\STANDARDS\lma.dgn

DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		1911	01	022,etc	FM 2004
		DIST	COUNTY		SHEET NO.
		HOU	Galveston		136

71A

DATE:
FILE:

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

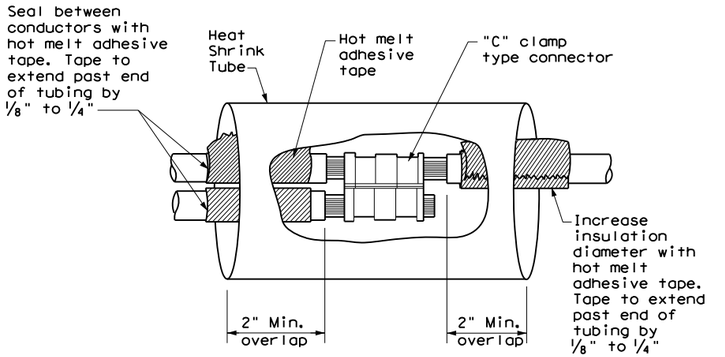
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

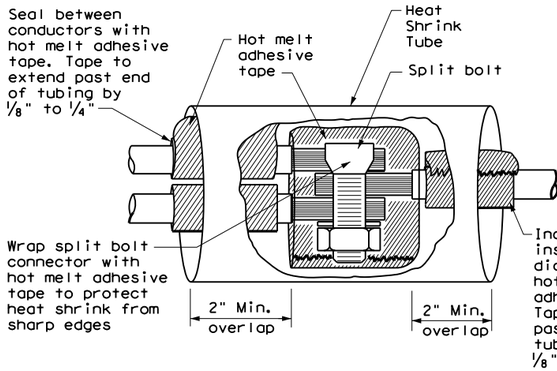
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

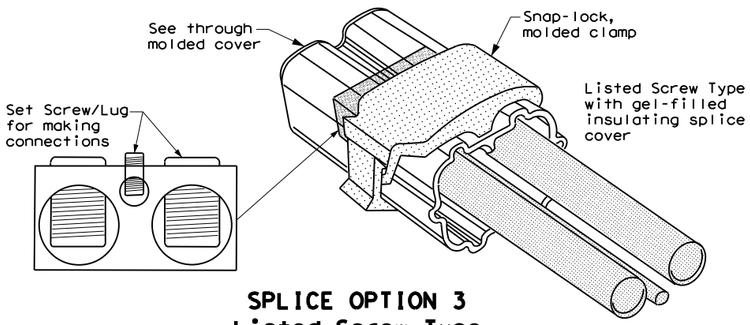
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

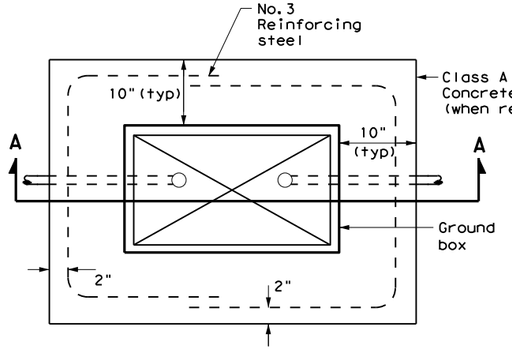
ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

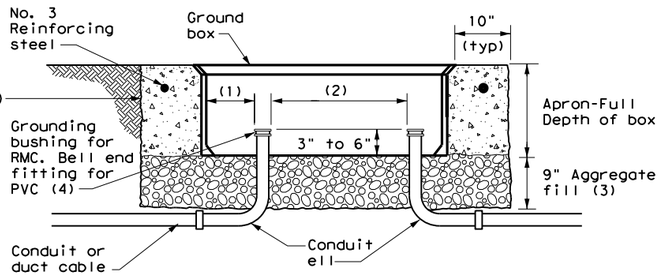
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		137

71C

DATE:
FILE:



PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

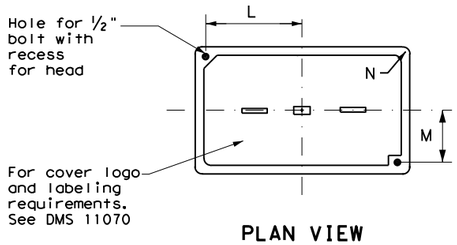
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

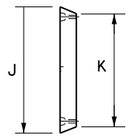
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

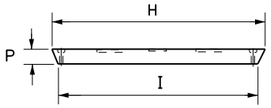
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

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.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		138

DATE:
FILE:

ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

*ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

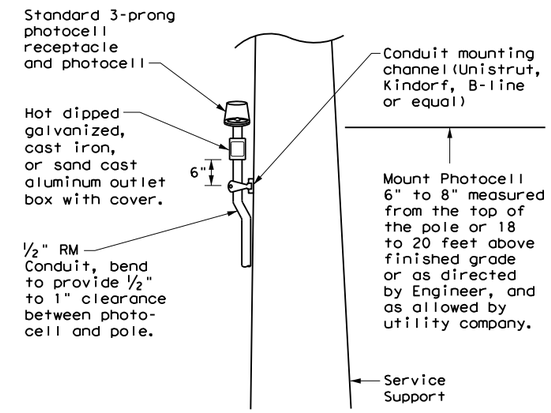
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
- (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  - GS= Galvanized steel("off the shelf")
  - SS= Stainless steel(Custom Enclosure)See MPL
  - AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  - (E)= Inside Service/Enclosure Mounted
  - (T)= Top of pole
  - (L)= Luminaire mounted
  - (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  - GC= Granite concrete
  - OC= Other concrete
  - TP= Timber pole
  - SP= Steel pole
  - SF= Steel frame
  - OT= Pole by others or paid for separately
  - EX= Existing pole
  - TS= Service on traffic signal pole
  - PS= Pedestal Service
- O= Overhead Service Feed from Utility
- U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

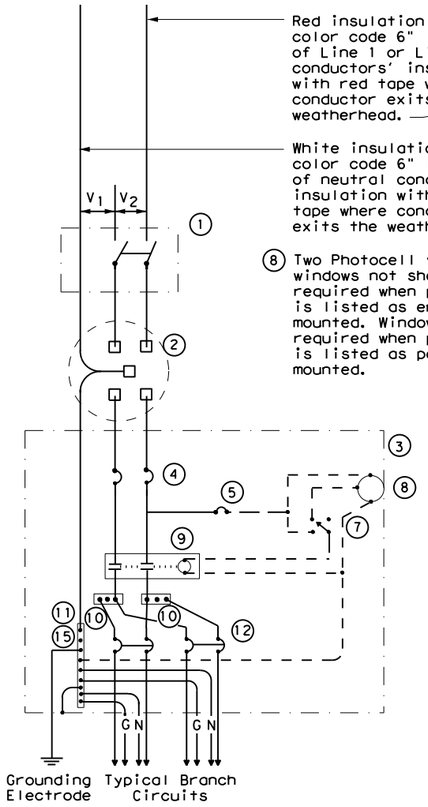
Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

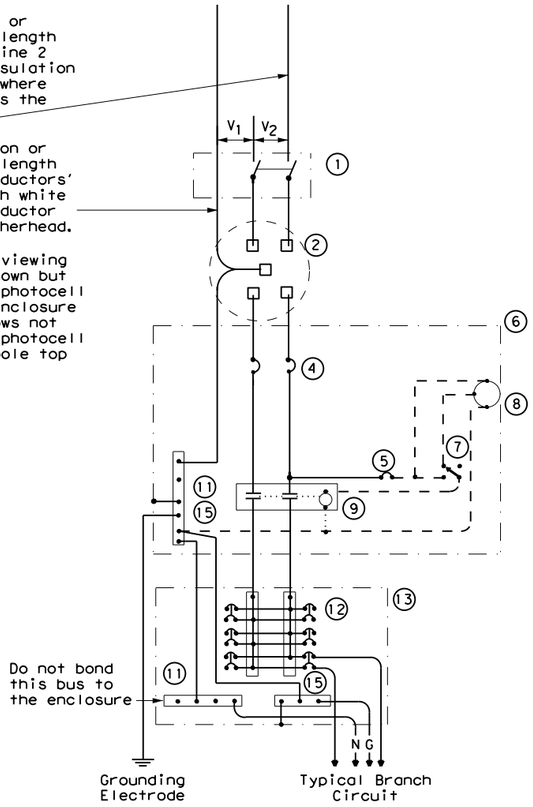
ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		139

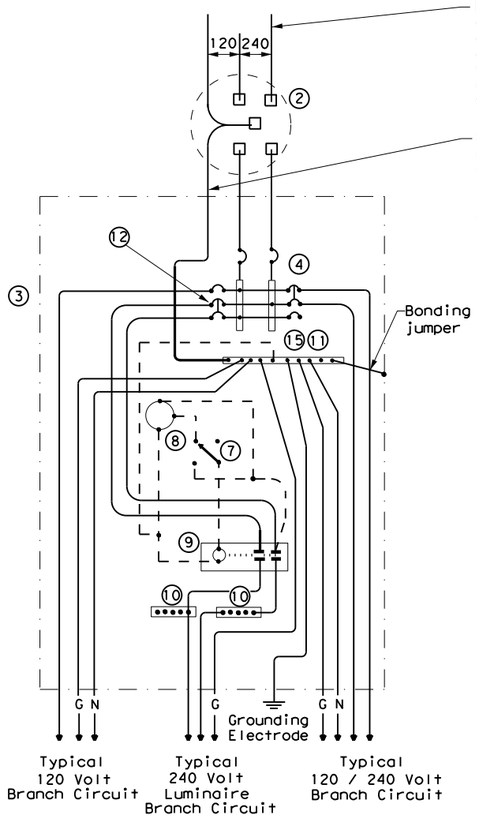
DATE:
FILE:



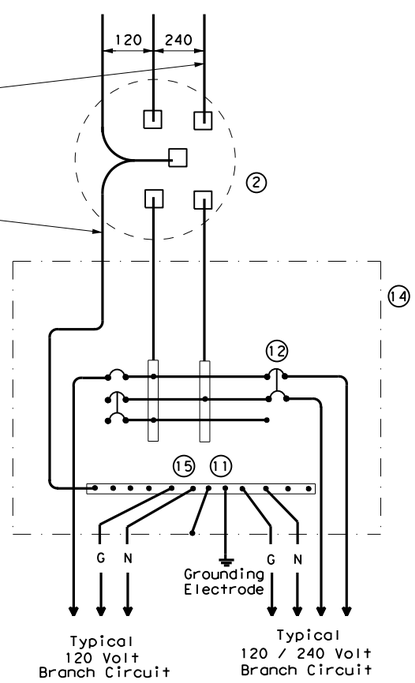
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		140

71F

DATE:
FILE:

SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 5/8 in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

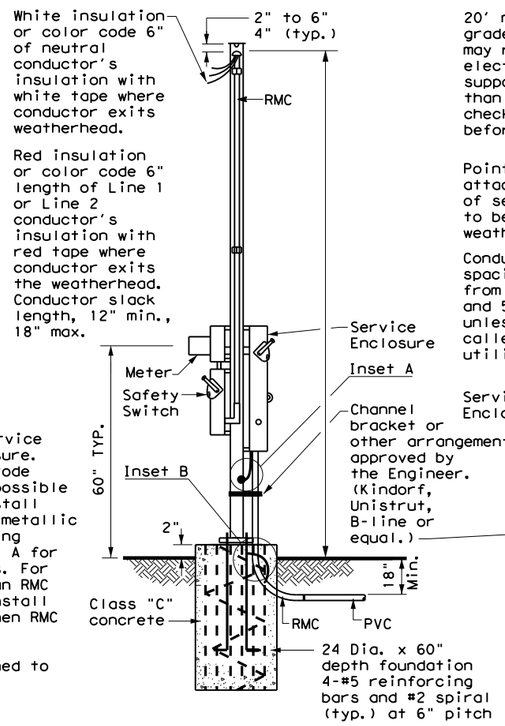
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

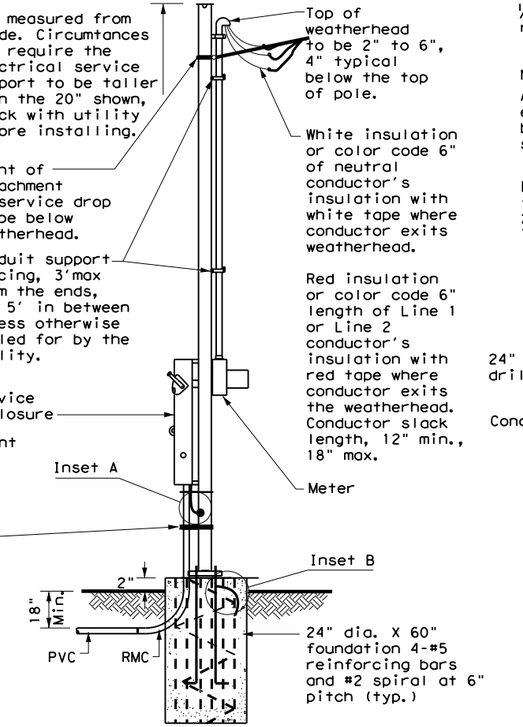
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

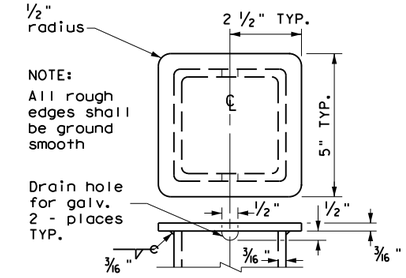


WITH SAFETY SWITCH

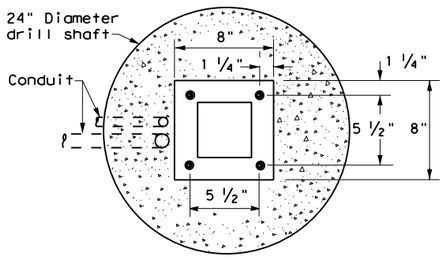


WITHOUT SAFETY SWITCH

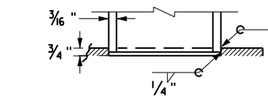
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

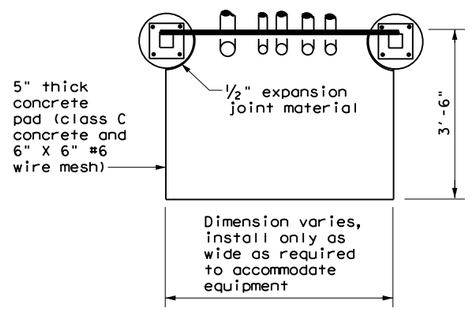


BASE PLATE DETAIL



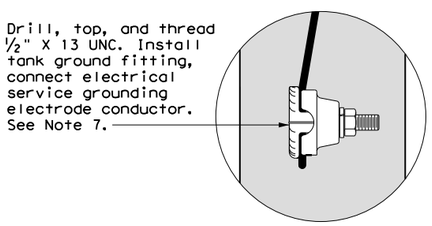
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



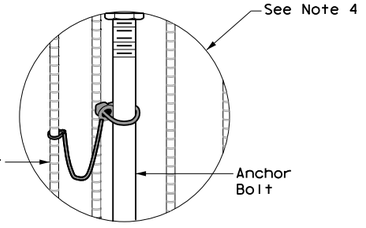
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

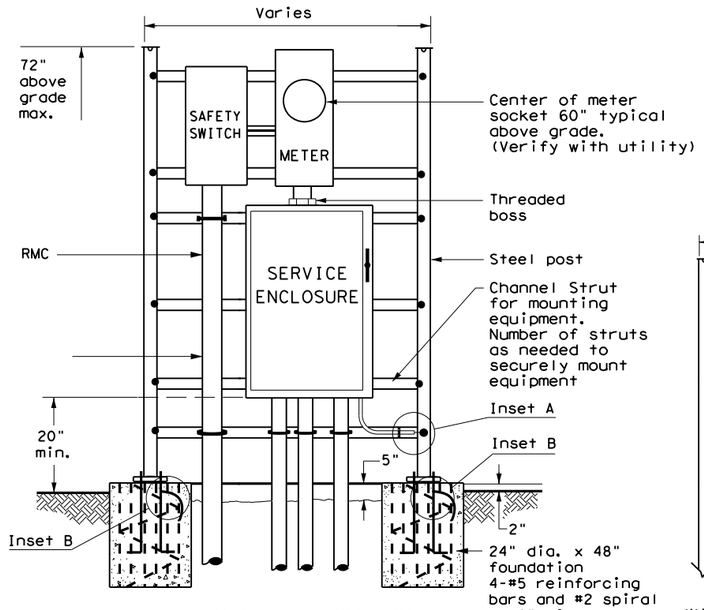


FRONT VIEW

INSET A

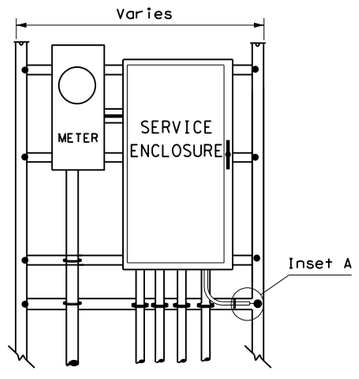


INSET B

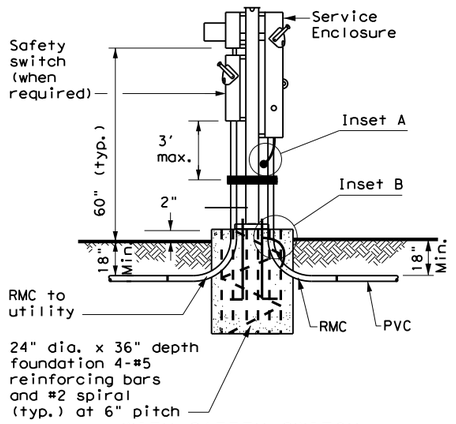


WITH SAFETY SWITCH

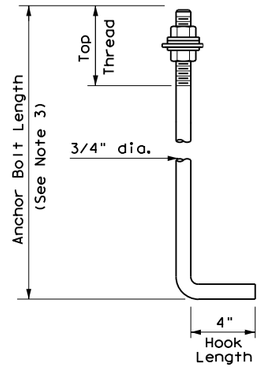
FRONT VIEW



WITHOUT SAFETY SWITCH



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

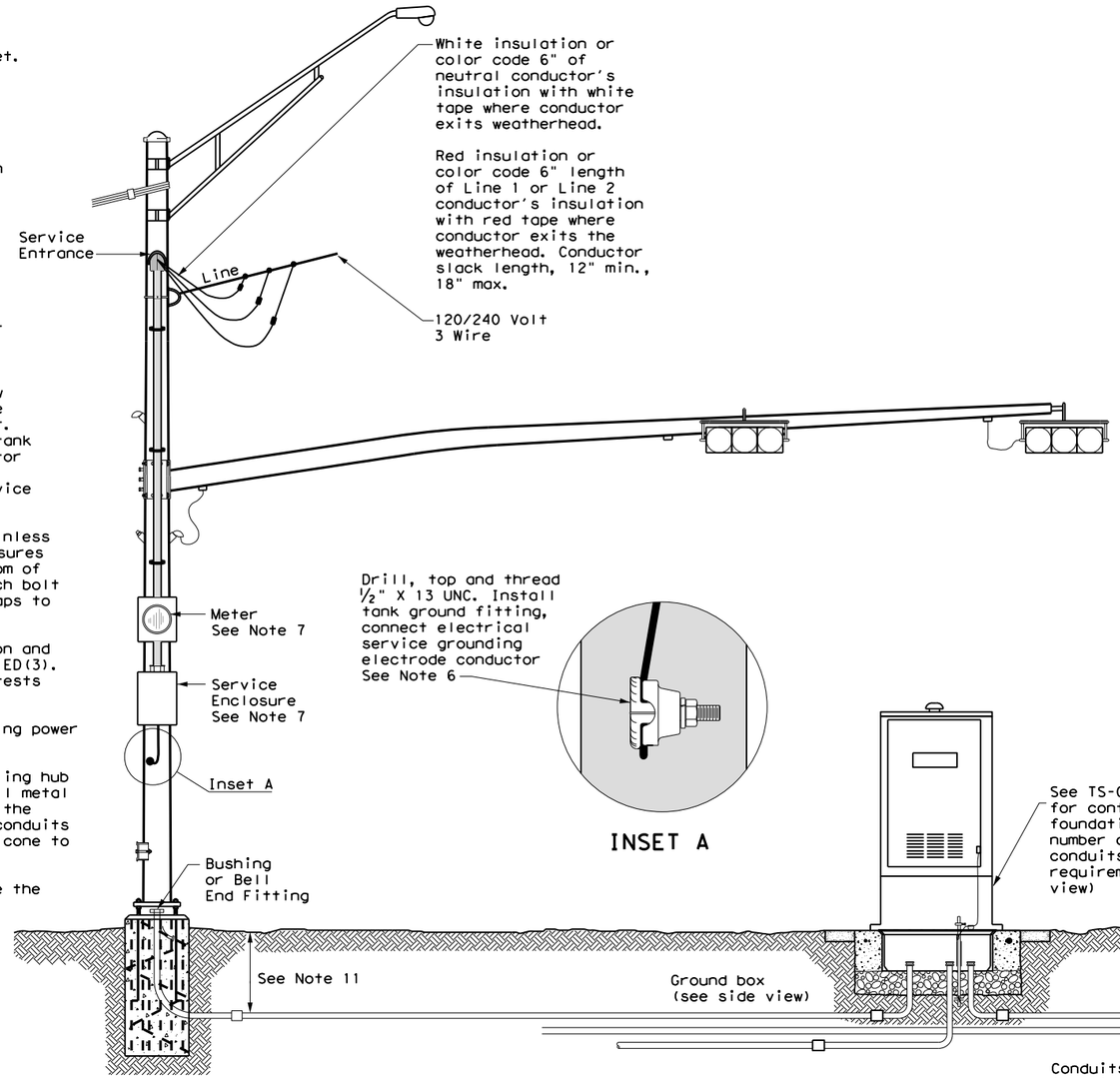
FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		141

71G

DATE:
FILE:

TRAFFIC SIGNAL NOTES

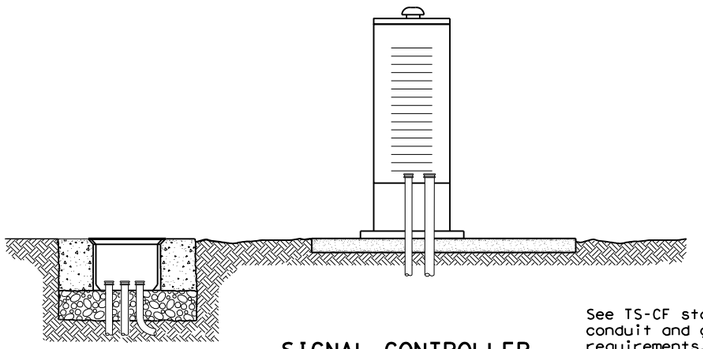
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

Texas Department of Transportation

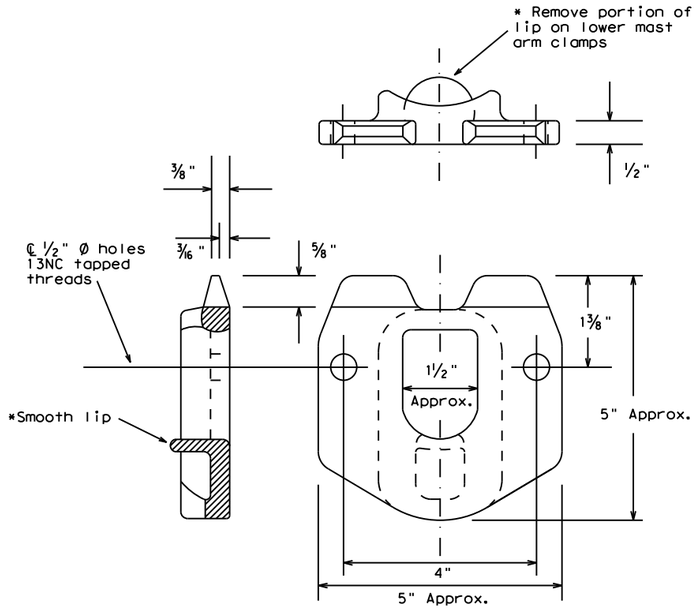
Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		142

71H



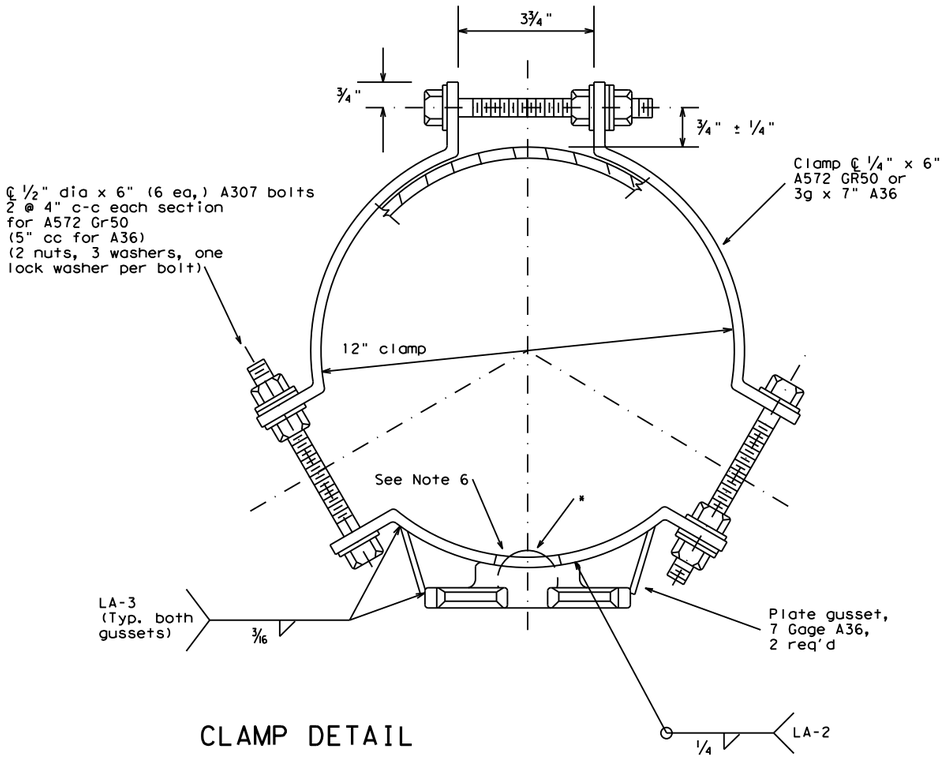
POLE SIMPLEX DETAILS

OTHER MATERIALS:

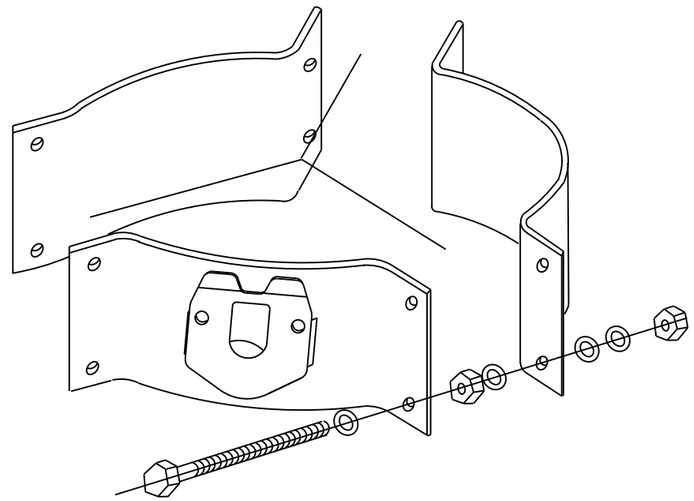
1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, ½in. X 1½in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.



CLAMP DETAIL



PROJECTION

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

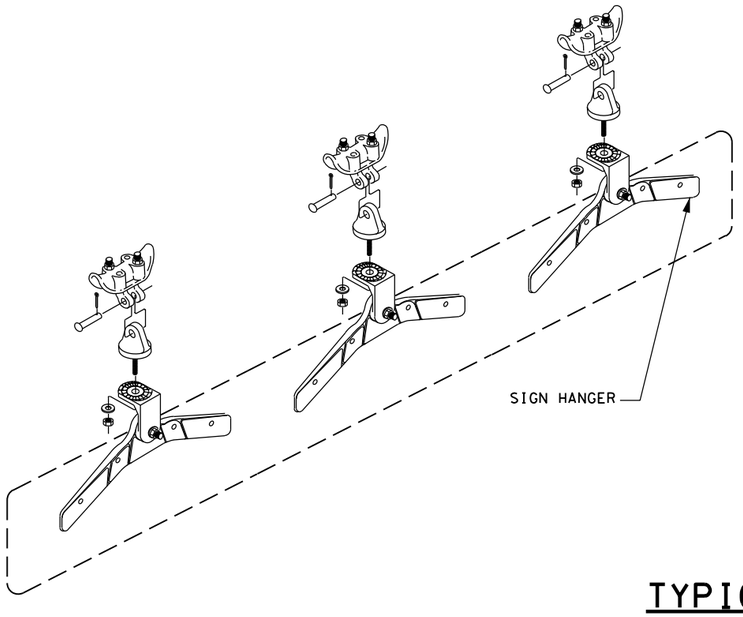
Texas Department of Transportation
Traffic Operations Division

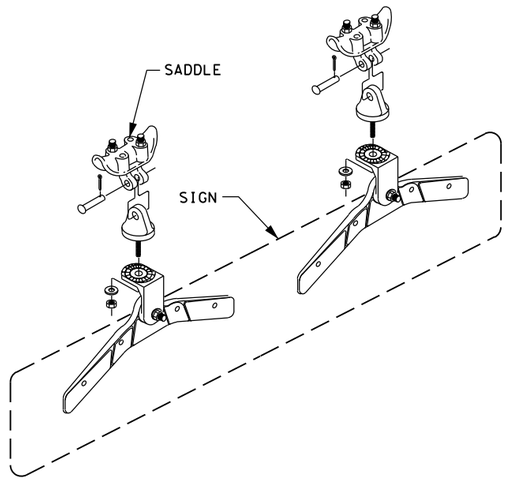
CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

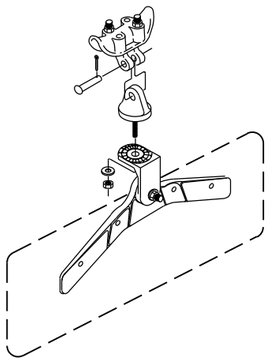
CFA-12

©TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99	1911	01	022,etc	FM 2004
1-12	DIST	COUNTY		SHEET NO.
	HOU	Galveston		143

DATE:
FILE:

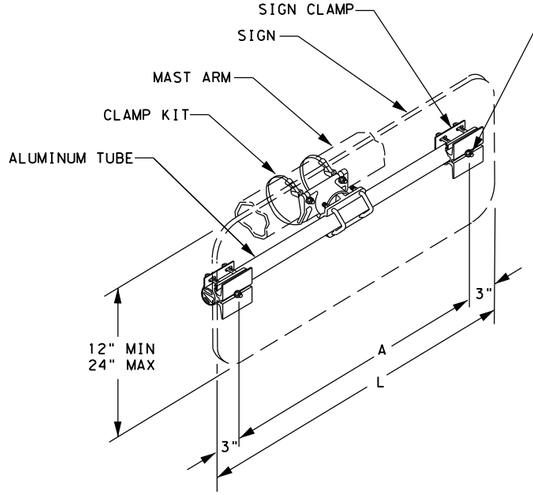


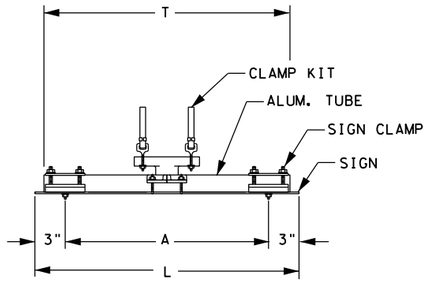


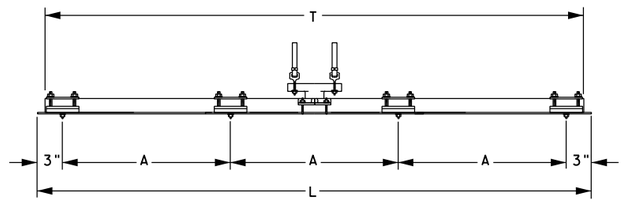


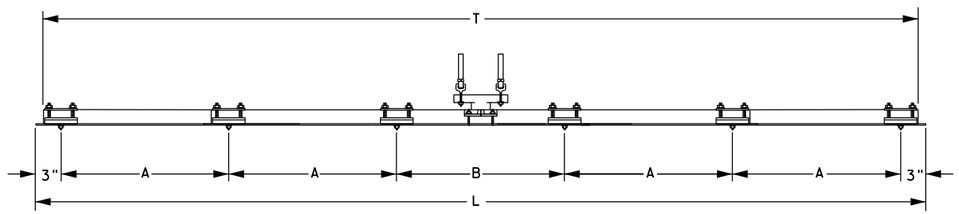
1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT.- 0 IN. REQUIRE 2 HANGERS. SIGNS LARGER THAN 6 FT. - 0 IN. REQUIRE 3 HANGERS.

TYPICAL SPAN WIRE SIGN HANGER DETAILS









SIGNS (1'-6" to 3'-0" Long)

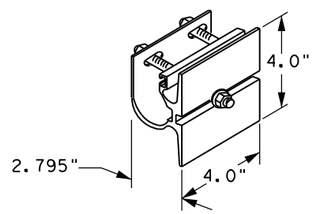
SIGN LENGTH (L)	TUBE LENGTH (T)	A
1'-6"	16"	12"
2'-0"	22"	18"
2'-6"	28"	24"
3'-0"	34"	30"

SIGNS (3'-6" to 8'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A
3'-6"	40"	12"
4'-0"	46"	14"
4'-6"	52"	16"
5'-0"	58"	18"
5'-6"	64"	20"
6'-0"	70"	22"
6'-6"	76"	24"
7'-0"	82"	26"
7'-6"	88"	28"
8'-0"	94"	30"

SIGNS (8'-6" to 10'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A	B
8'-6"	100"	19"	20"
9'-0"	106"	20"	22"
9'-6"	112"	21"	24"
10'-0"	118"	22"	26"



SIGN CLAMP DETAIL

GUSSETED TUBE CROSS SECTION

TYPICAL MAST ARM SIGN MOUNT DETAILS

FILE: Overhead-Sign-mount-det-sp04.dgn

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
OVERHEAD STREET NAME SIGN MOUNTING DETAILS

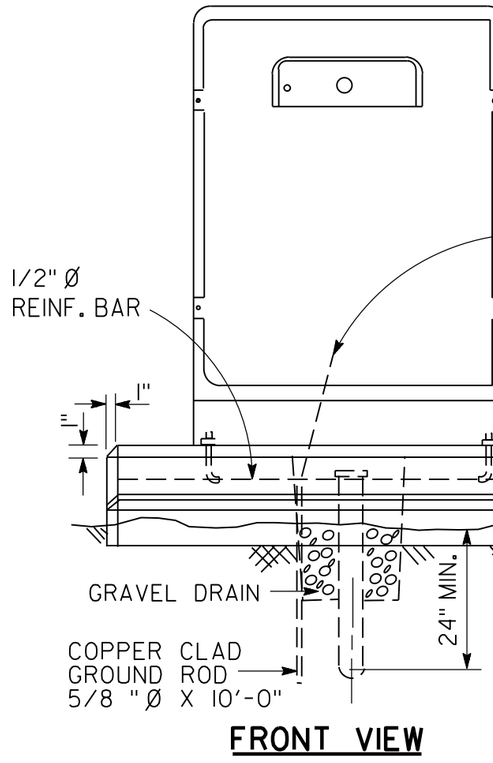
OSNS/MD

DN:	CK:	DW:	CK:

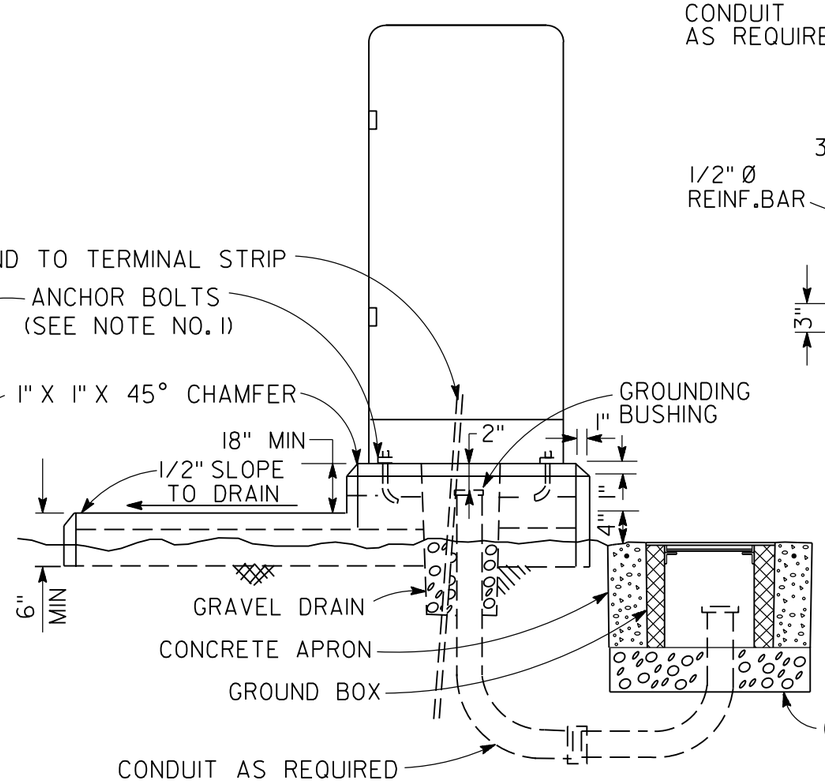
DIST	FED REG	PROJECT NO.	SHEET
HOU	6		144

COUNTY	CONTROL	SECT	JOB	HIGHWAY
HOU	1911	01	022, etc	FM 2004

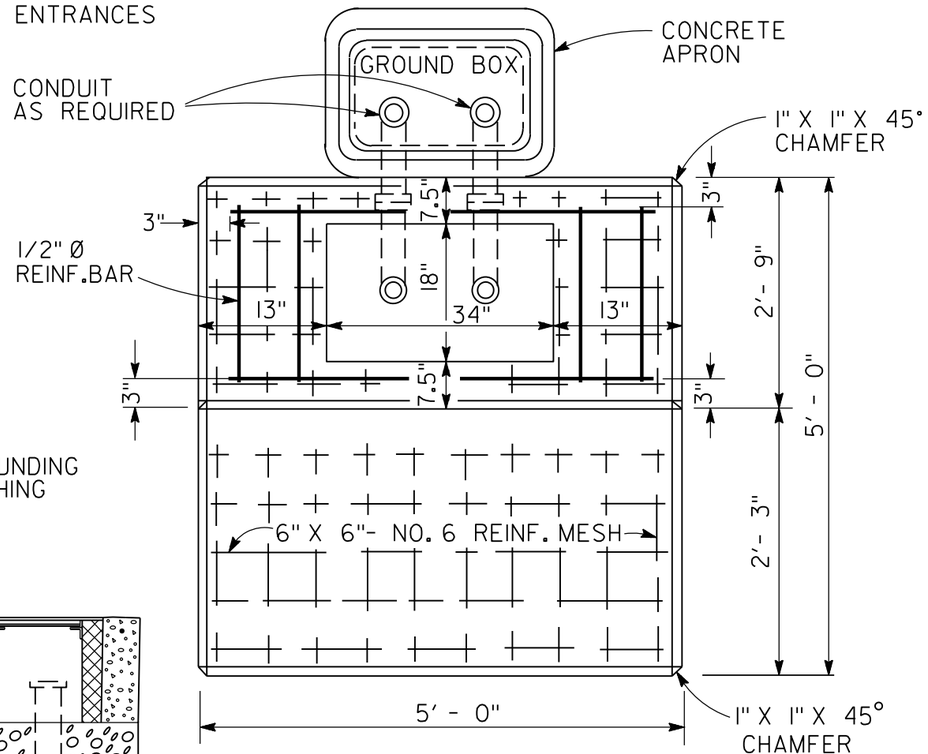
STD-M12



FRONT VIEW



SIDE VIEW



TOP VIEW
(LESS CABINET)

NOTES:

1. CABINET MANUFACTURER TO PROVIDE DETAILS OF ANCHOR BOLT LOCATION.
2. MODIFY DIMENSIONS FOR CONCRETE BASE TO FIT EQUIPMENT FURNISHED, IF NECESSARY.
3. PROVIDE GRAVEL DRAIN FOR CONTROLLER AND ALL GROUND BOXES.
4. FURNISH CLASS "B" OR CLASS "C" CONCRETE.
5. SET CONTROLLER FOUNDATION LEVEL WITH THE PAVEMENT SURFACE OR AS APPROVED BY THE ENGINEER.
6. FURNISH AT NO COST TO THE DEPARTMENT ANY ADDITIONAL CONCRETE WHICH MAY BE NECESSARY TO STABILIZE THE FOUNDATION AT UNUSUAL LOCATIONS.
7. PLACE REINFORCING BARS AS DIRECTED.
8. UPON INSTALLING THE CONTROLLER CABINET, APPLY A SILICON-BASED CAULKING COMPOUND AROUND THE BASE OF THE CONTROLLER CABINET.

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONTROLLER FOUNDATION DETAIL

SD/SCFD

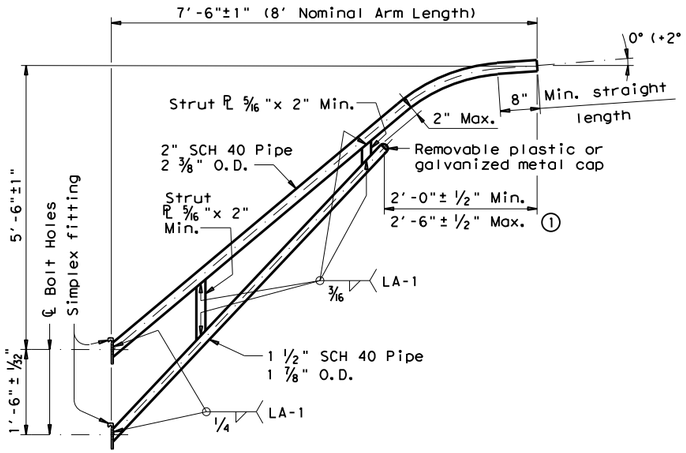
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 08-04 03-07	HOU	6		145
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	Galveston	1911	01 022,	FM 2004

etc

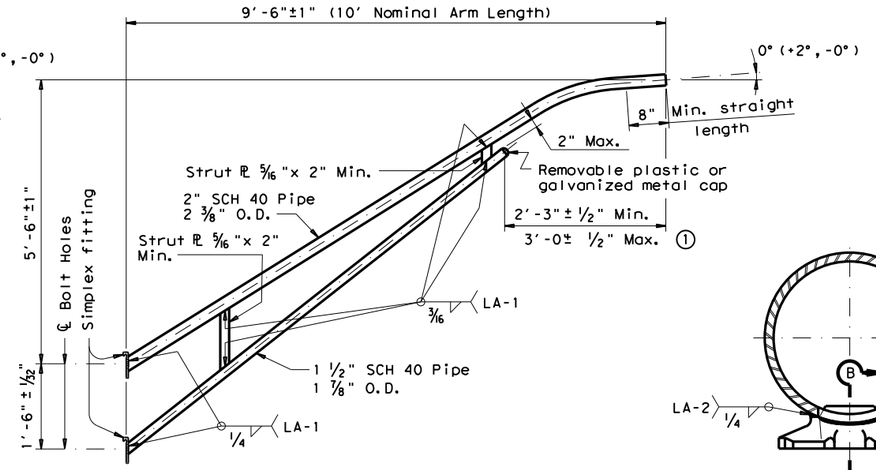
STD-M1

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:



8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

DIRECT ATTACHMENT DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

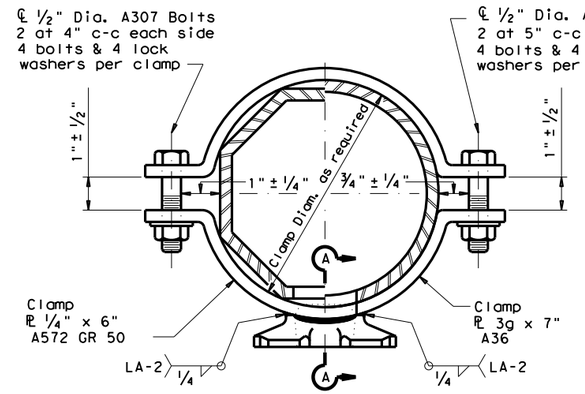
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

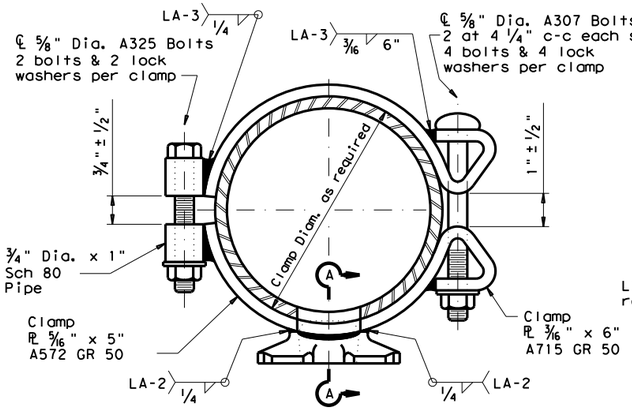
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



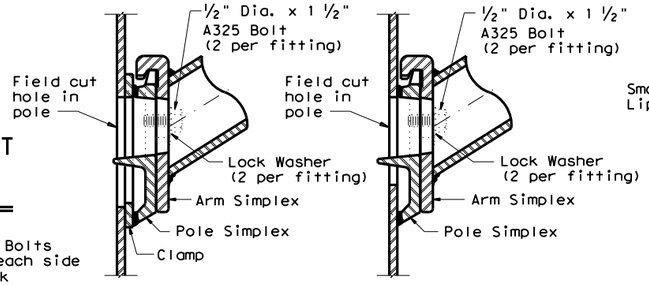
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



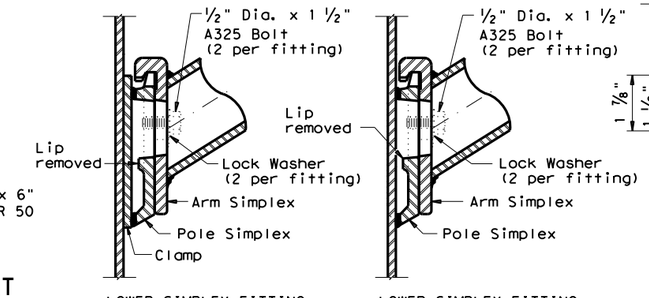
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



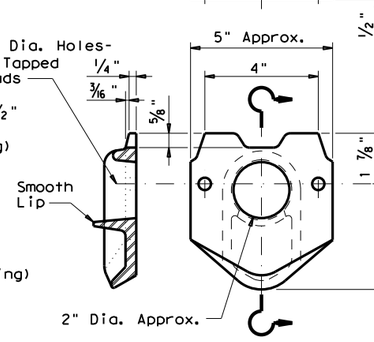
UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

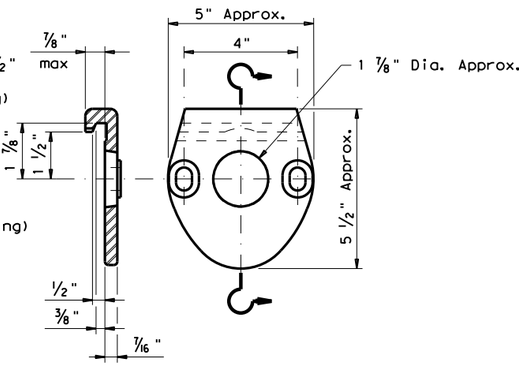


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING



POLE SIMPLEX DETAIL



SECTON A-A

SECTON B-B

ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

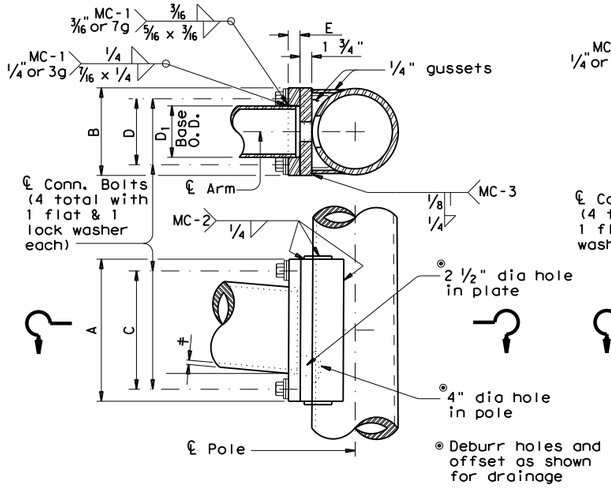
DN: LEH.	CK: JSY.	DW: LII.	CK: TEB.

REVISIONS
5-96
1-99
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		146

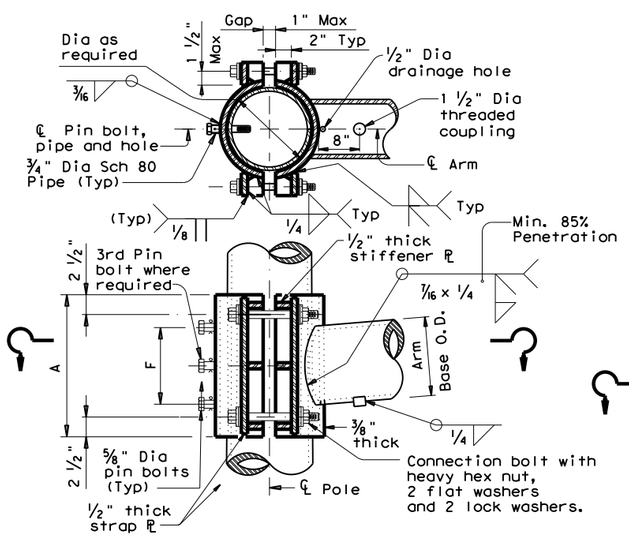
DATE:
FILE:

ARM SIZE D_1	ARM SIZE ϕ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



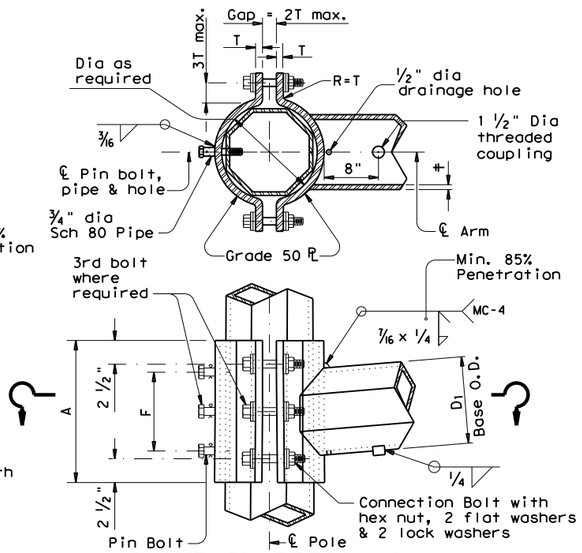
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	4	1 ¼	3	⅝
9.5	.239	18	12	4	1 ¼	3	⅝
10.0	.239	18	12	4	1 ¼	3	⅝

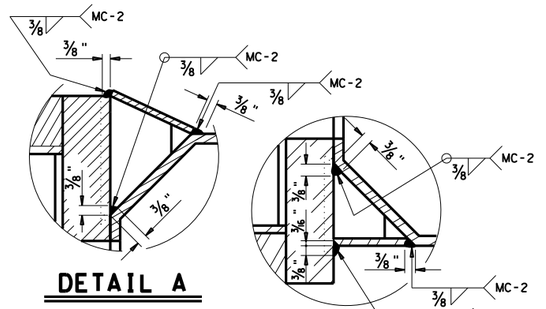


CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ϕ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	¾	4	¾	2	⅝
7.5	.179	14	8	¾	4	¾	2	⅝
8.0	.179	14	8	¾	4	¾	2	⅝
9.0	.179	16	10	⅞	4	1	2	⅝
10.0	.179	18	10	⅞	4	1	2	⅝
9.5	.239	18	10	1	6	1	3	⅝
10.0	.239	18	10	1	6	1	3	⅝

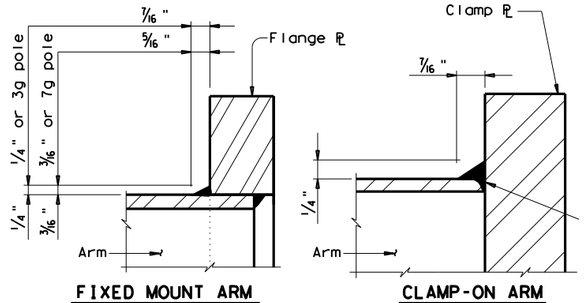


CLAMP-ON DETAIL 2



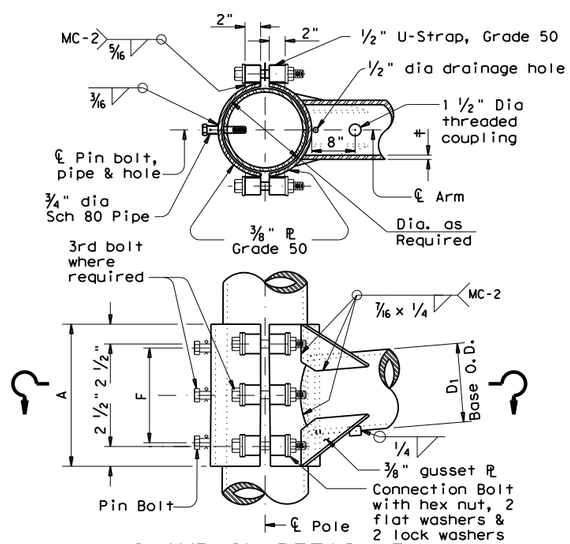
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝



MATERIALS

Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 9/16" dia holes for a ⅛" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

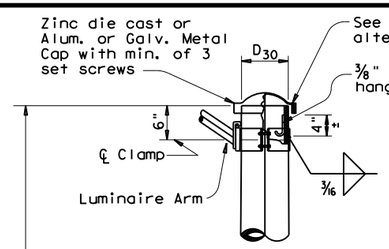
MAST ARM CONNECTIONS

MA-C-12

REVISIONS	DN: MS	CK: JSY	DW: MWF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
5-09	1911	01	022,etc	FM 2004
1-12	DIST	COUNTY		SHEET NO.
	HOU	Galveston		147

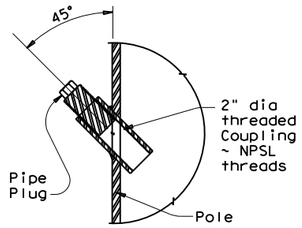
126A

DATE:
FILE:

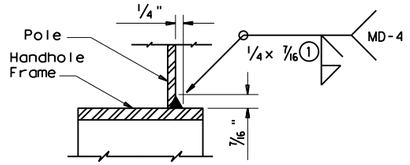


DETAIL A

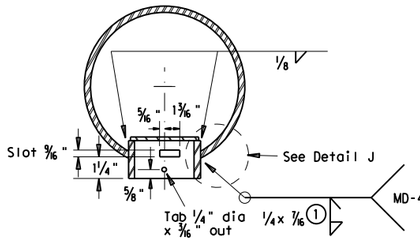
(for pole with luminaire)



POLE COUPLING DETAIL

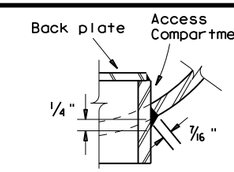


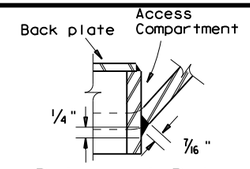
DETAIL G



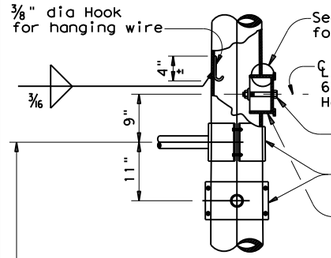
SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



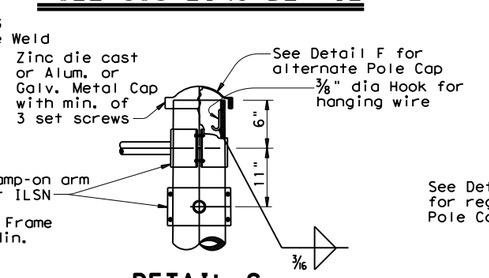


DETAIL J

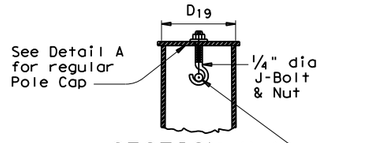


DETAIL B

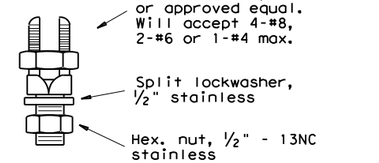
(If ILSN applied)



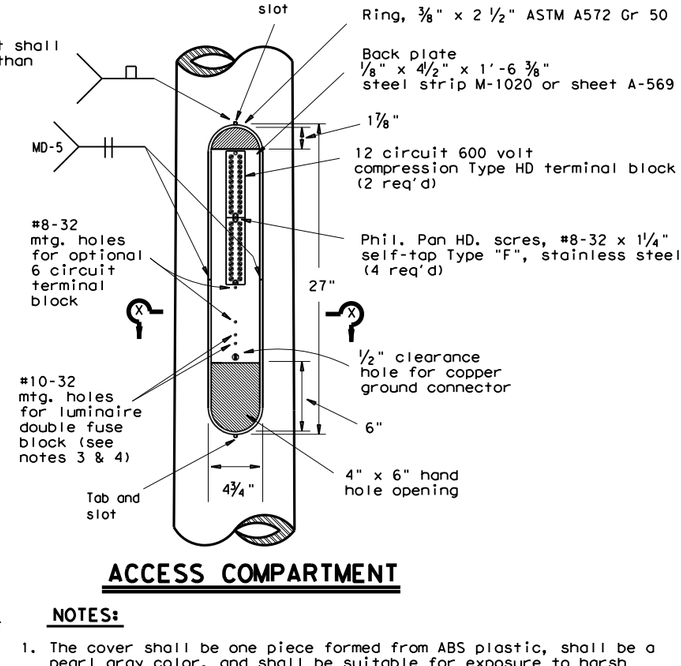
DETAIL C



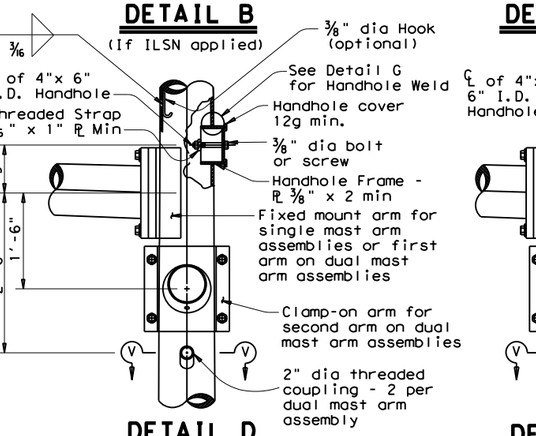
SECTION Y-Y



COPPER GROUND CONNECTOR

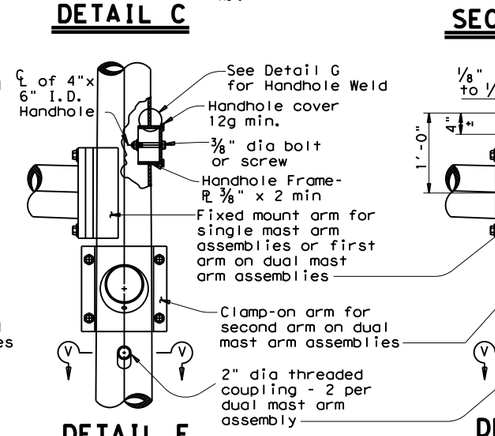


ACCESS COMPARTMENT



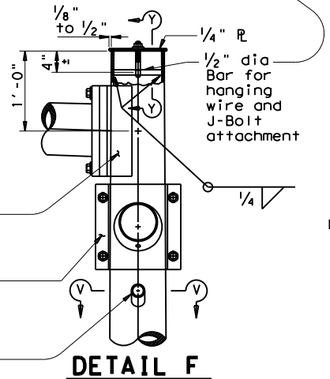
DETAIL D

(for 30' pole with luminaire and ILSN sign)



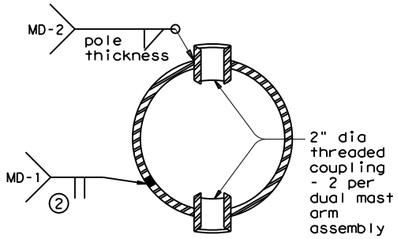
DETAIL E

(for 24' pole with ILSN sign and no luminaire)

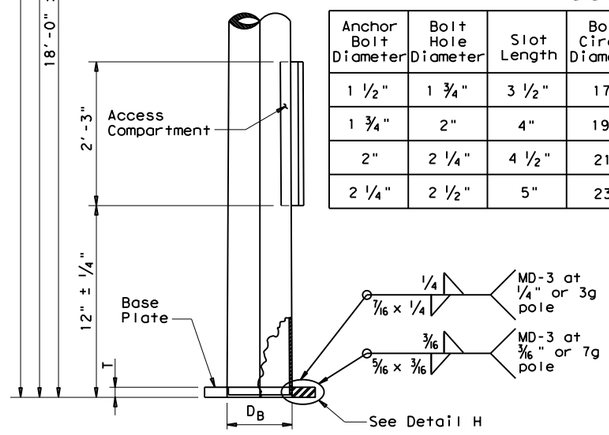


DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

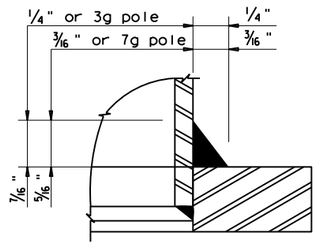


SECTION V-V

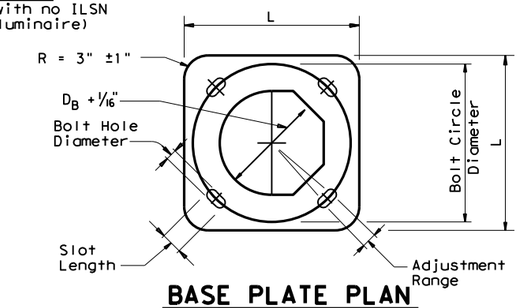


POLE ELEVATION

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base PL Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

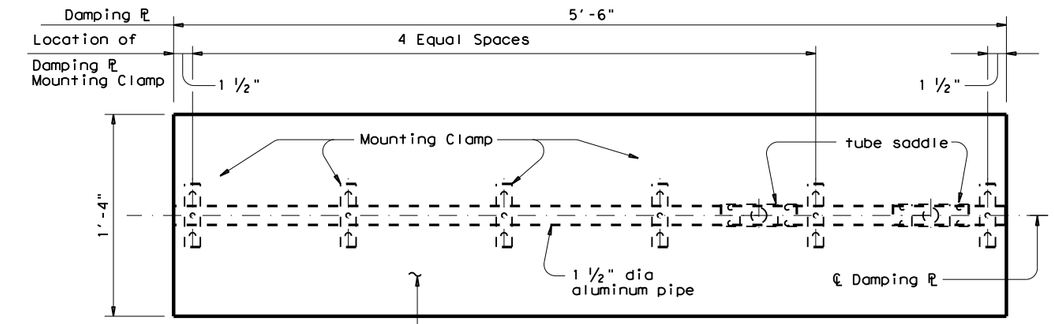
MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

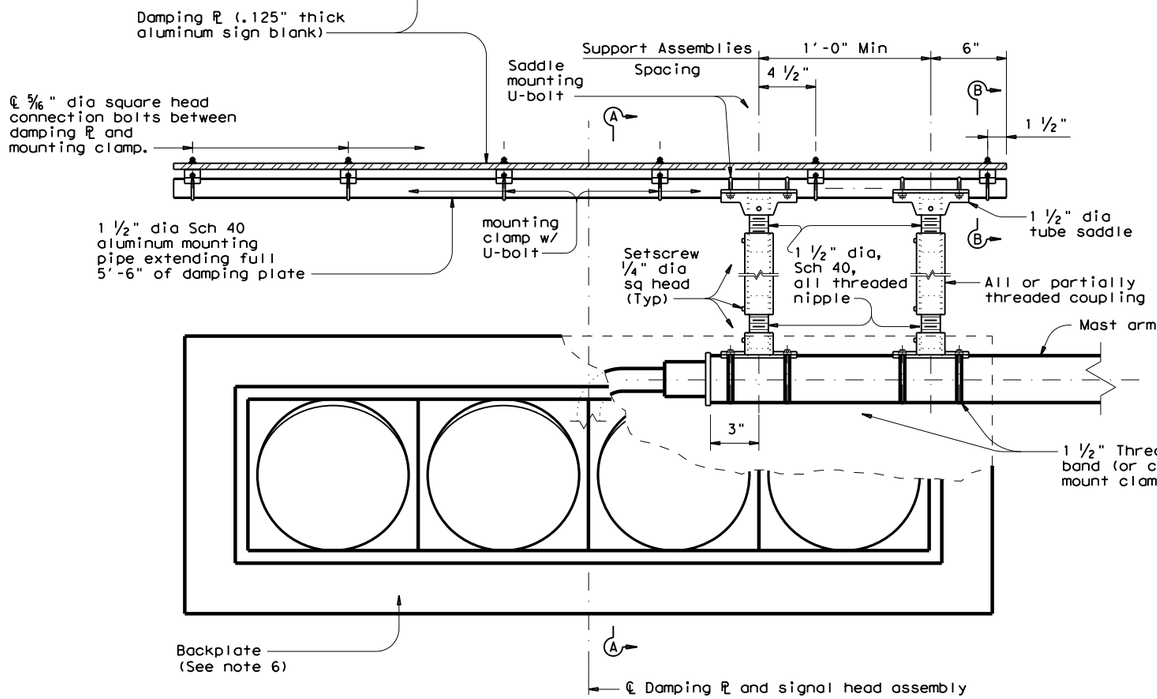
REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
1911	01	022,etc	FM 2004
DIST	COUNTY		SHEET NO.
HOU	Galveston		148

DATE:
FILE:



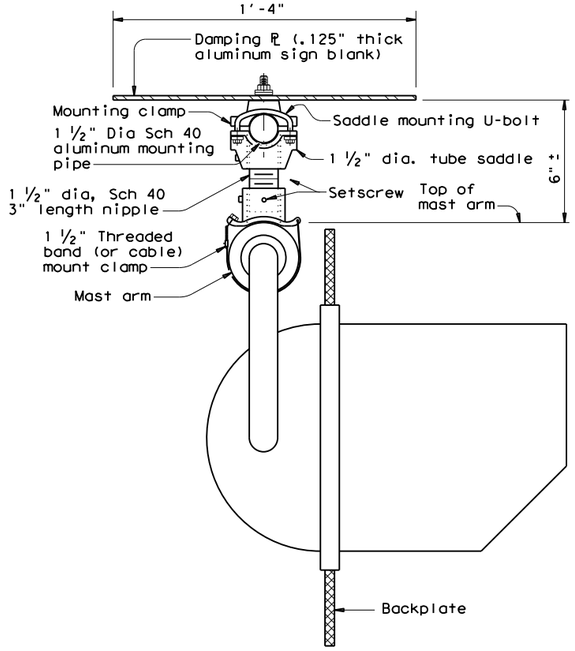
PLAN



ELEVATION

DAMPING PLATE MOUNTING DETAILS

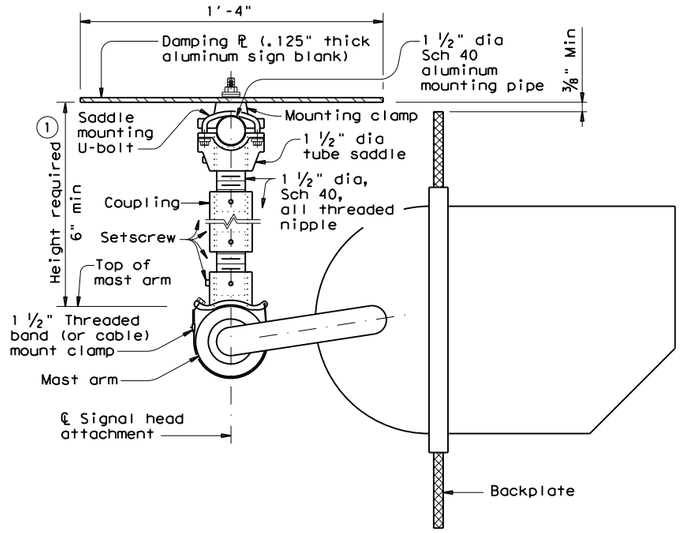
(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

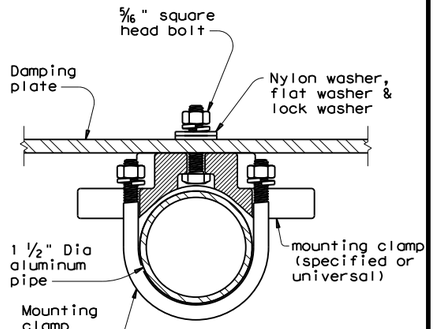


SECTION A-A

(Showing alternate placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate)and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

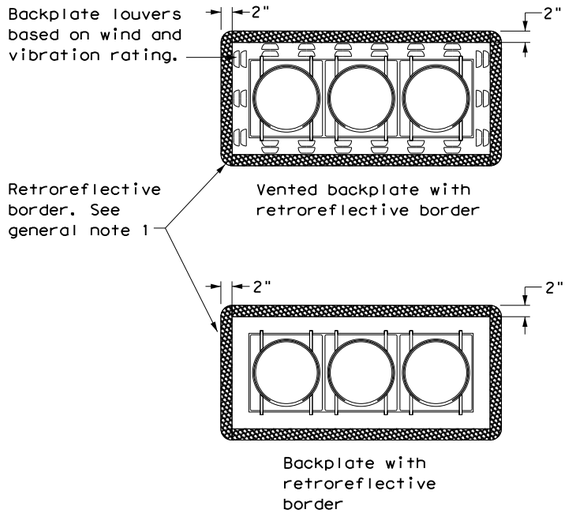
Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

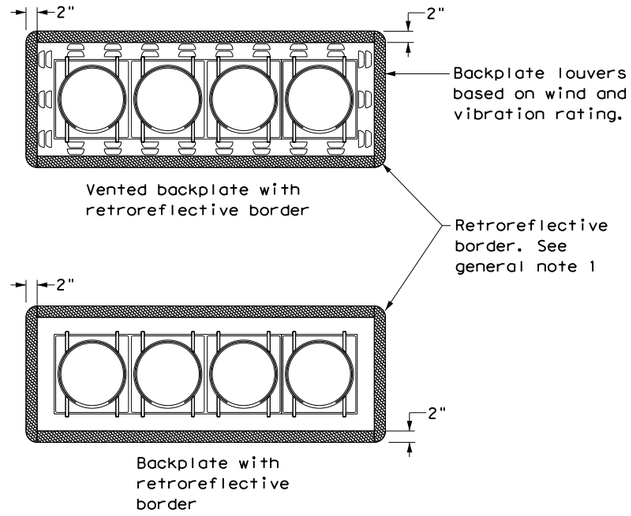
MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
6-20	DIST	COUNTY		SHEET NO.
	HOU	Galveston		149

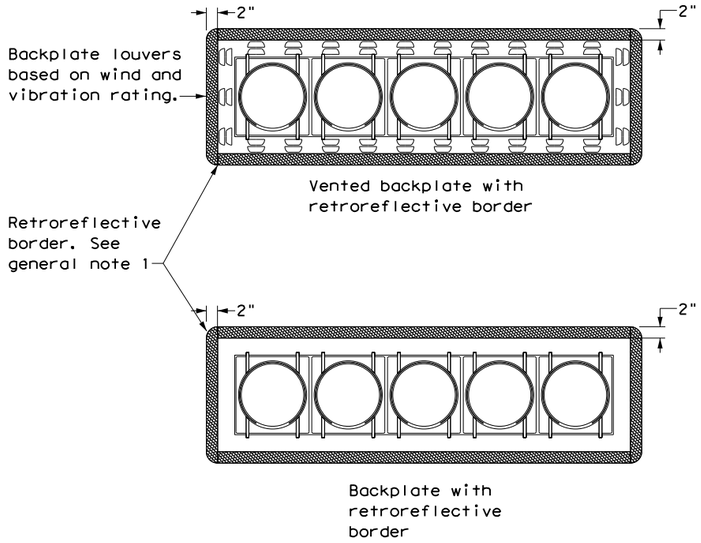
DATE:
FILE:



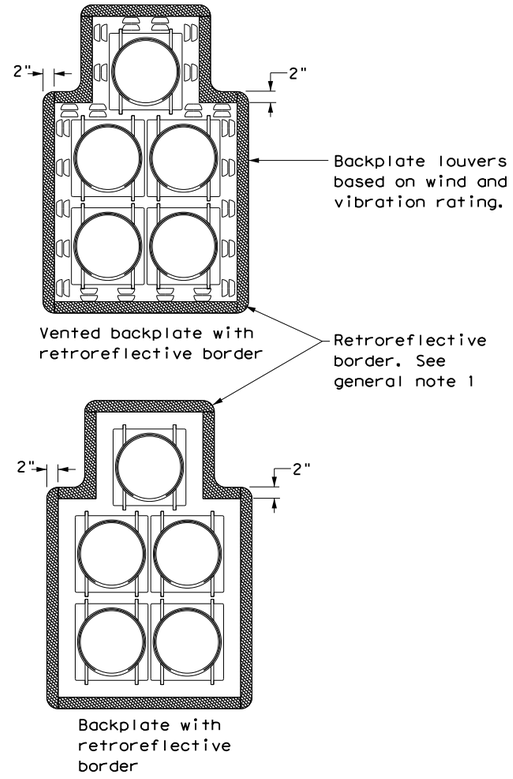
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



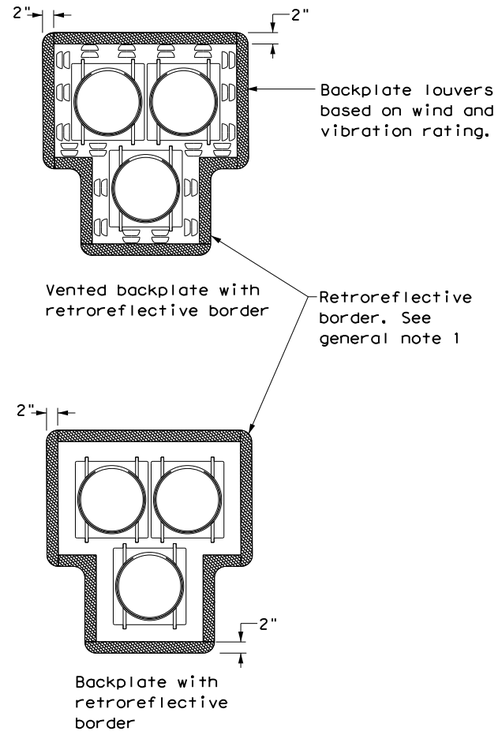
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

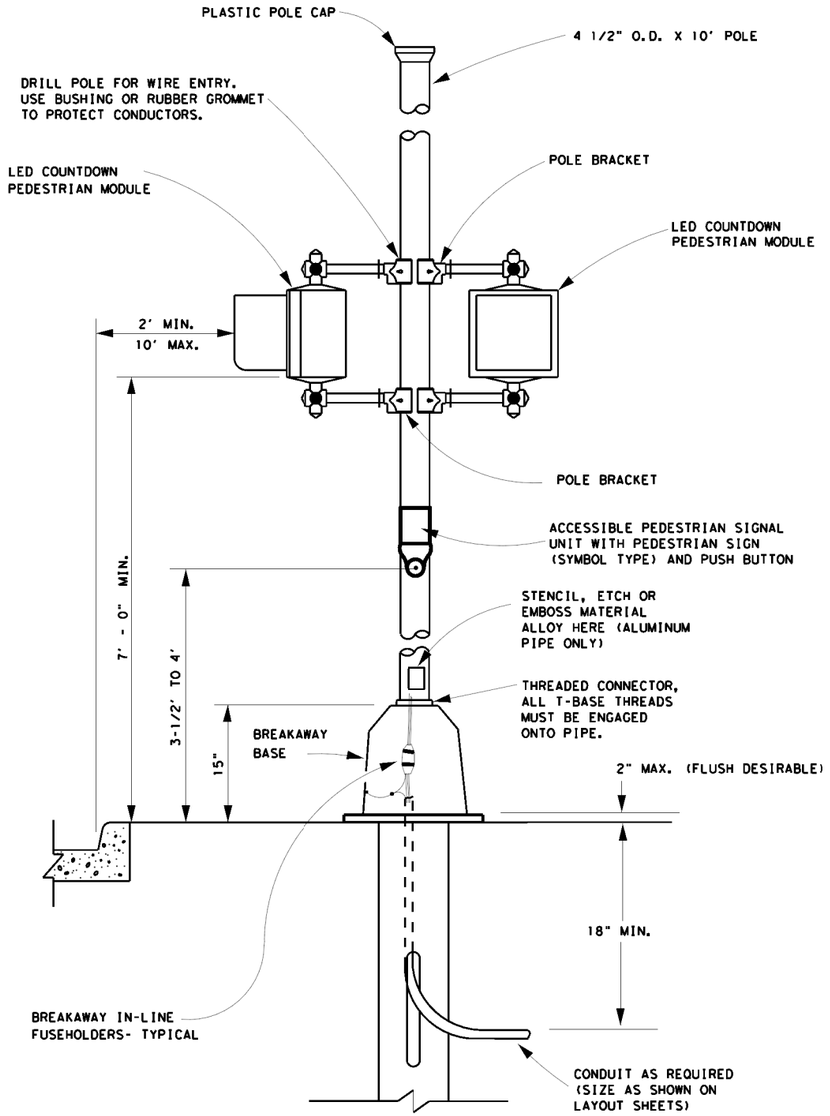
Texas Department of Transportation

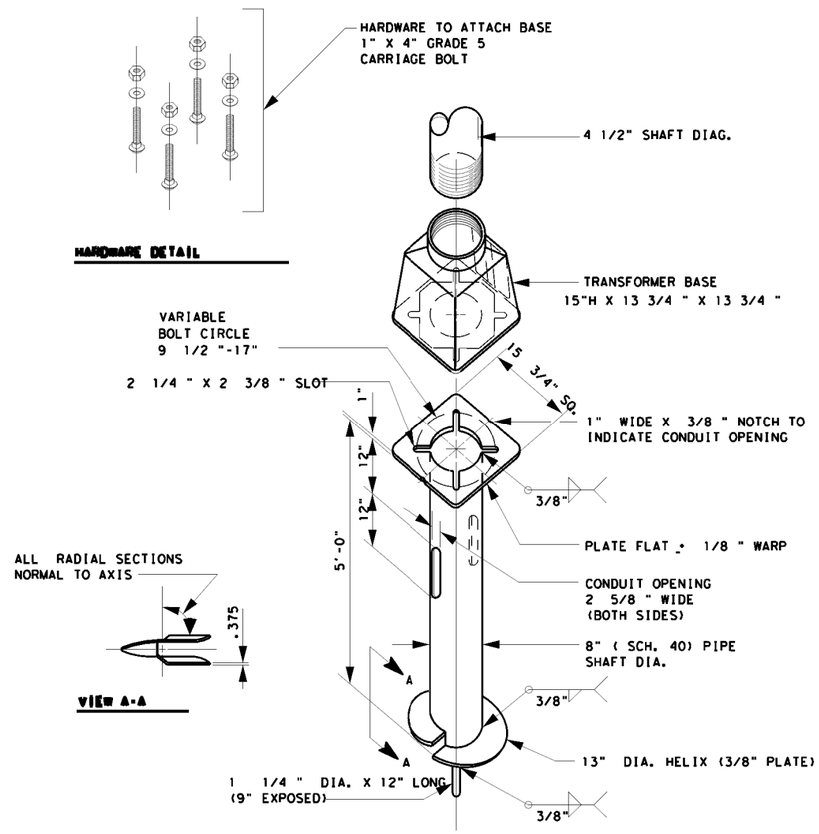
Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

FILE: ts-bp-20.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT		CK: TxDOT	
		CONT	SECT	JOB		HIGHWAY	
REVISIONS		1911	01	022,etc		FM 2004	
		DIST	COUNTY			SHEET NO.	
		HOU	Galveston			150	

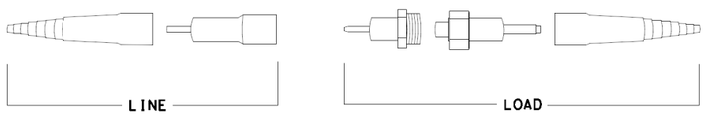




SCREW ANCHOR FOUNDATION DETAIL

NOTE:

Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW- TYPICAL

05/30/2024

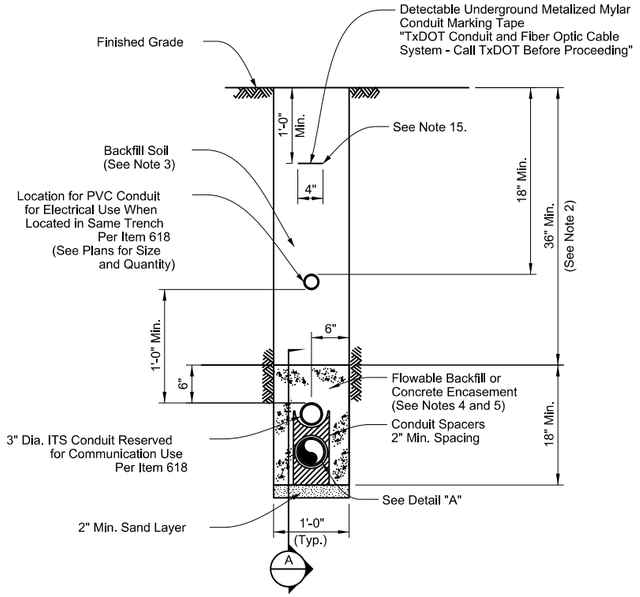
Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED (APS) PEDESTRIAN SIGNALS

CD/PM(APS)PS(MOD)

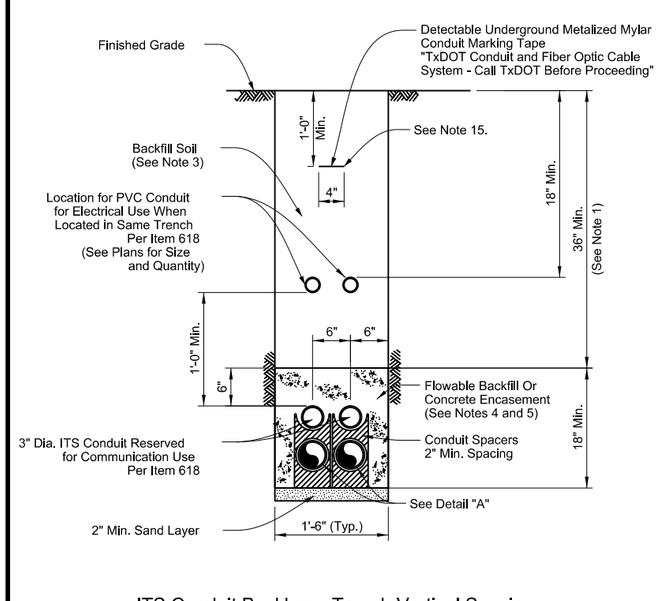
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2012	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 07-14 02-15 02-23	HOU	6		151
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON	1911	01	022, etc.	FM 2004

STD-M19



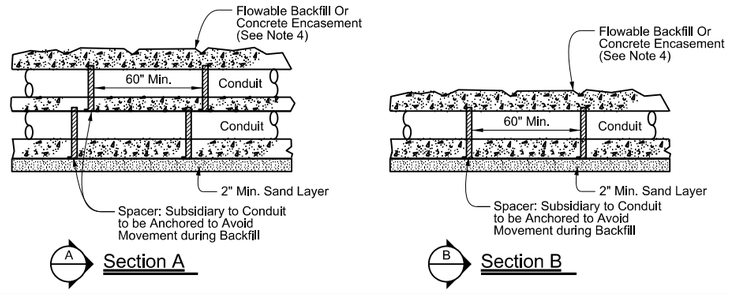
ITS Conduit Backbone Trench Vertical Spacing

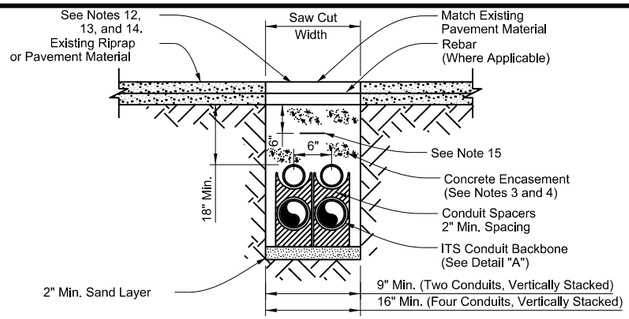
Two Conduit System



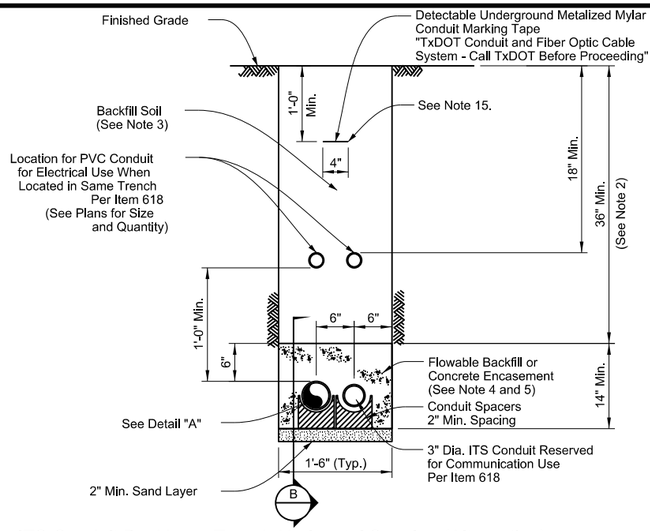
ITS Conduit Backbone Trench Vertical Spacing

Four Conduit System



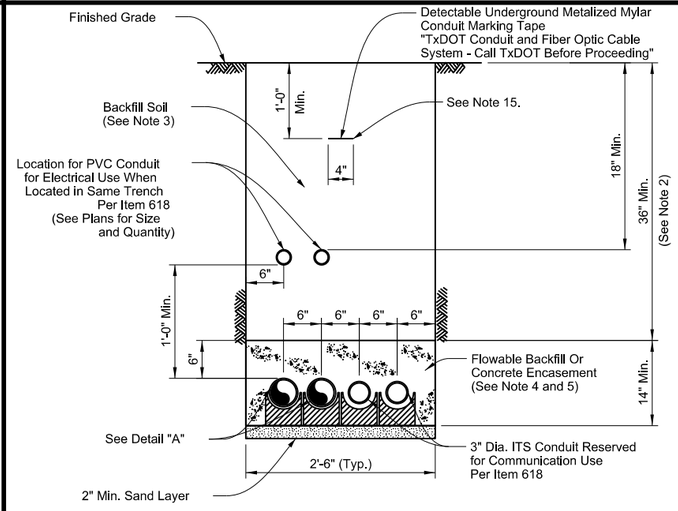


Open Cut Trenching Details



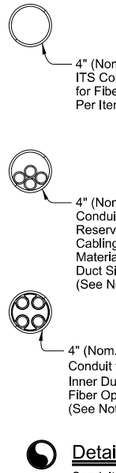
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Two Conduit System



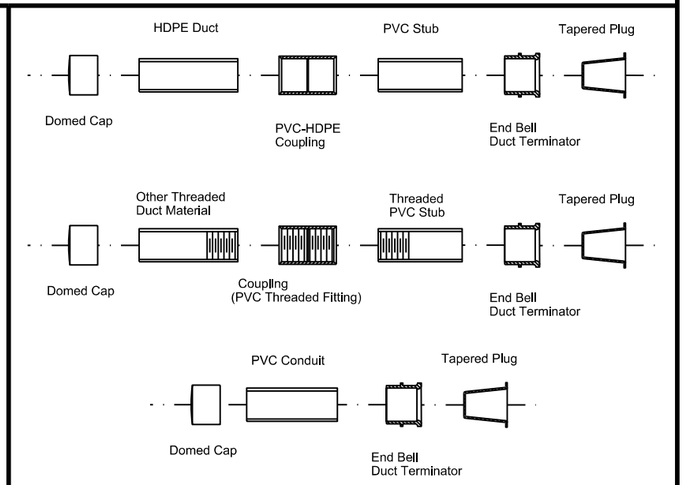
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Four Conduit System



Detail "A"

Conduit Types
(See Plans for Type and Quantity)



Typical Conduit Fitting Combinations

2 Conduit and Single Conduit Configuration

SHEET 1 OF 2

General Notes:

1. 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.
2. 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.
3. Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
4. 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.
5. 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."
6. Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
7. Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
8. Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."
9. Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
10. Provide a single 1/C #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."
11. 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.
12. Remove saw cut width to accommodate conduit installation.
13. Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
14. Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
15. 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.
16. Provide a 1/C #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

Texas Department of Transportation

Traffic Operations Division Standard

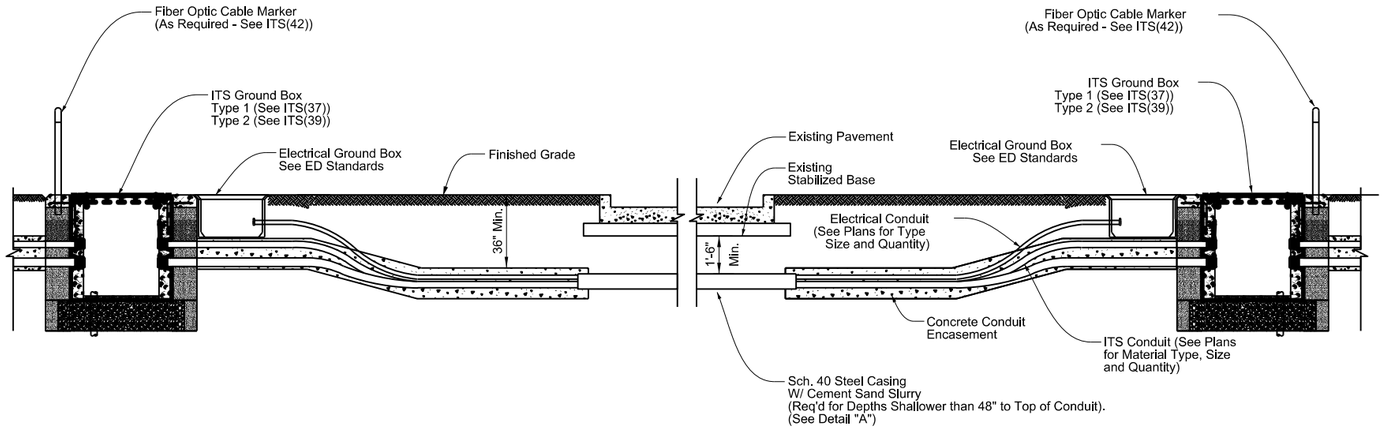
ITS CONDUIT TRENCH DETAILS

ITS(27)-16

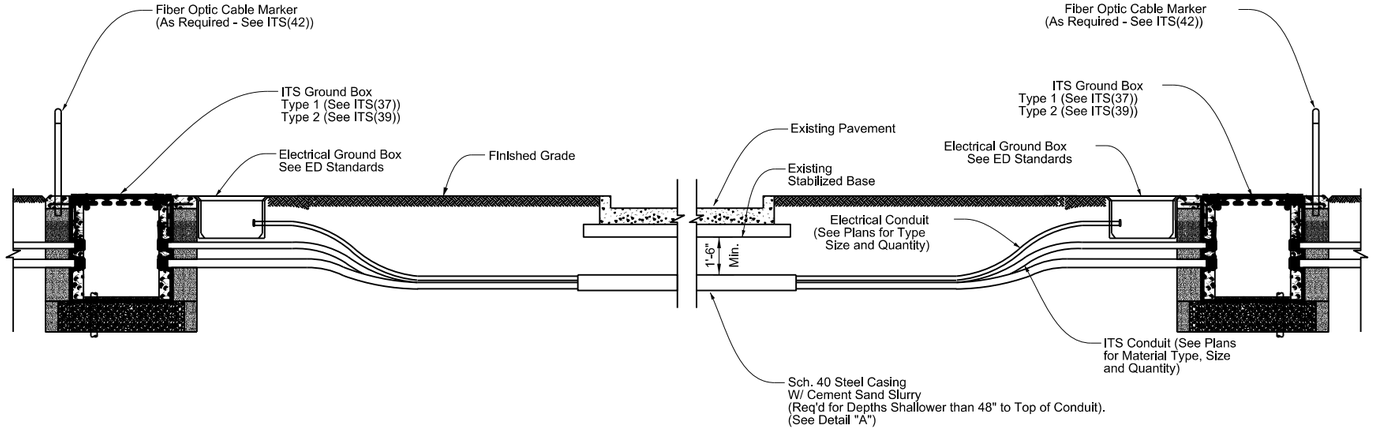
FILE: its(27)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		152

DATE:
FILE:

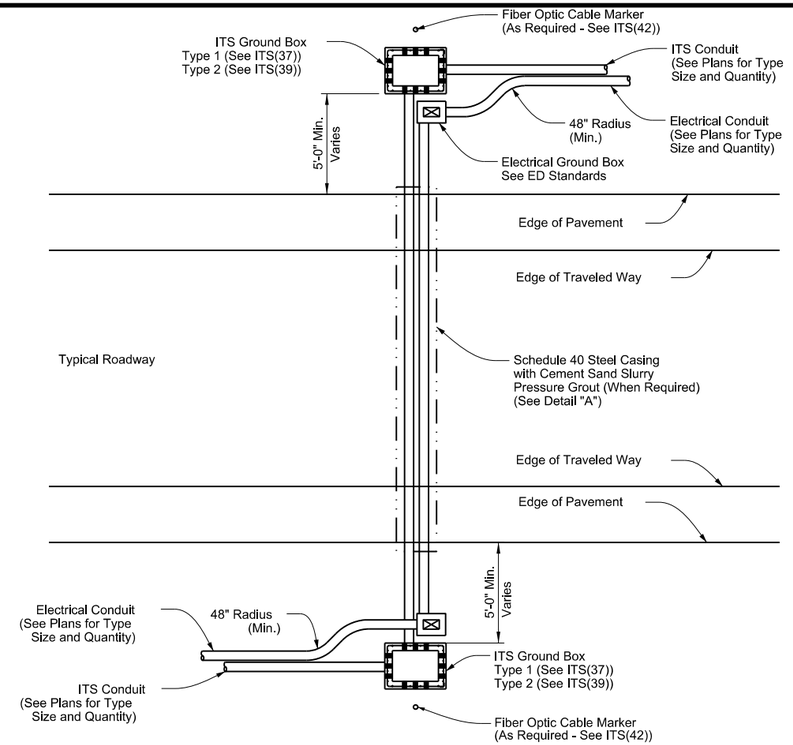
DATE:
FILE:



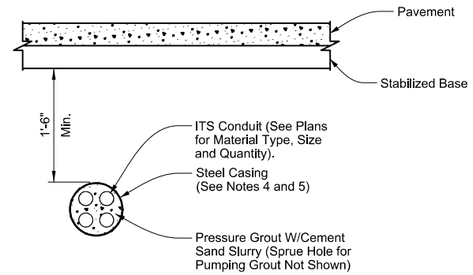
Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway



Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway
(Where Concrete Encasement Not Required)



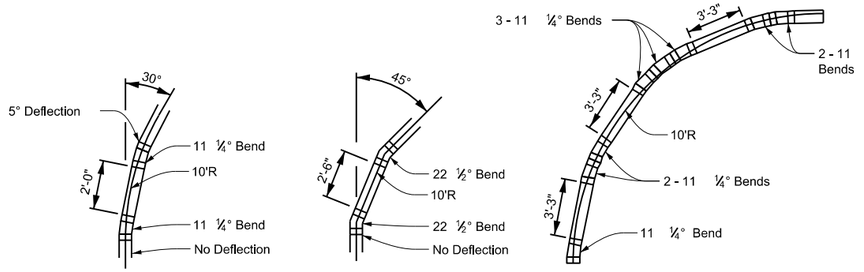
Bore Under Pavement



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

Texas Department of Transportation

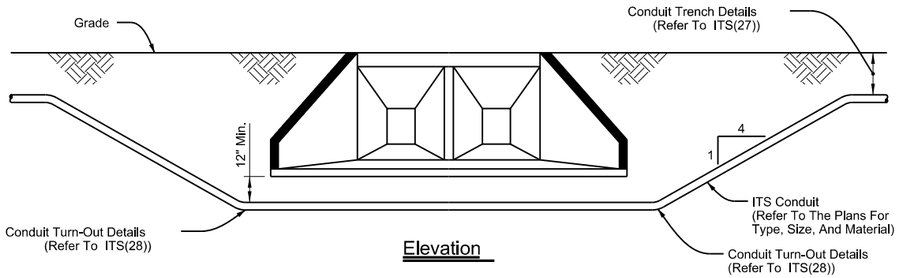
Traffic Operations Division Standard

ITS CONDUIT BORE AND STEEL CASING DETAILS

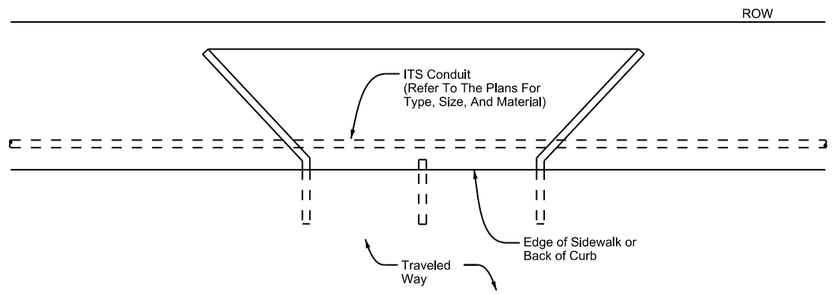
ITS(28)-16

FILE: its(28)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		153

DATE:
FILE:

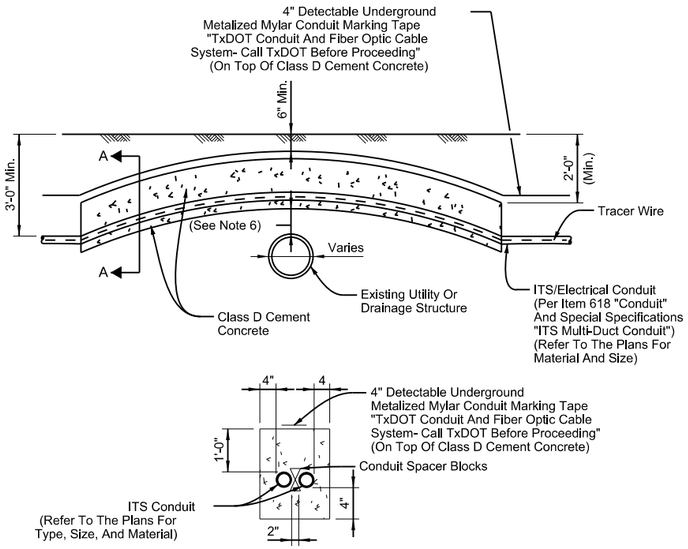


Elevation



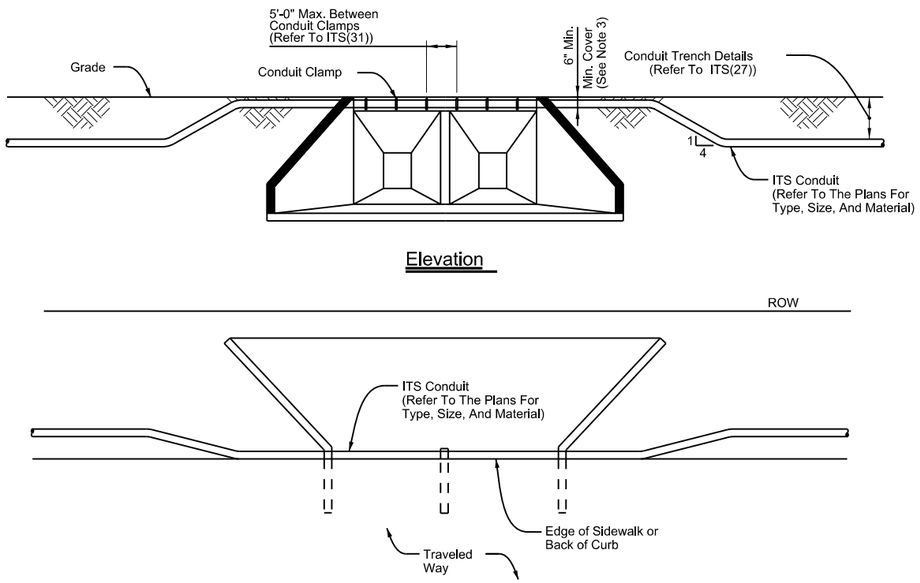
Plan View

Conduit Bored Under Culvert



Section A-A

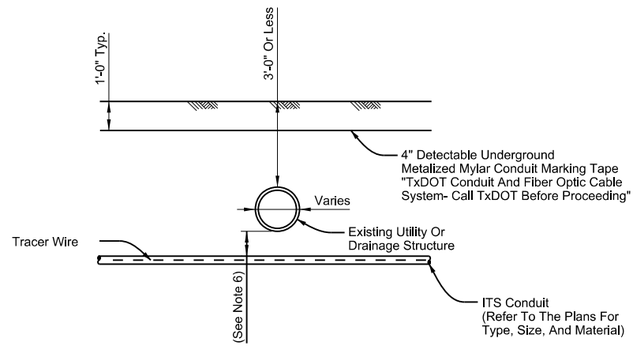
Conduit Installation Detail Above Existing Drain Pipes Or Utilities



Elevation

Plan View

Conduit Attached To Culvert Headwall



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.

Texas Department of Transportation

Traffic Operations Division Standard

ITS CONDUIT OBSTRUCTION CROSSING

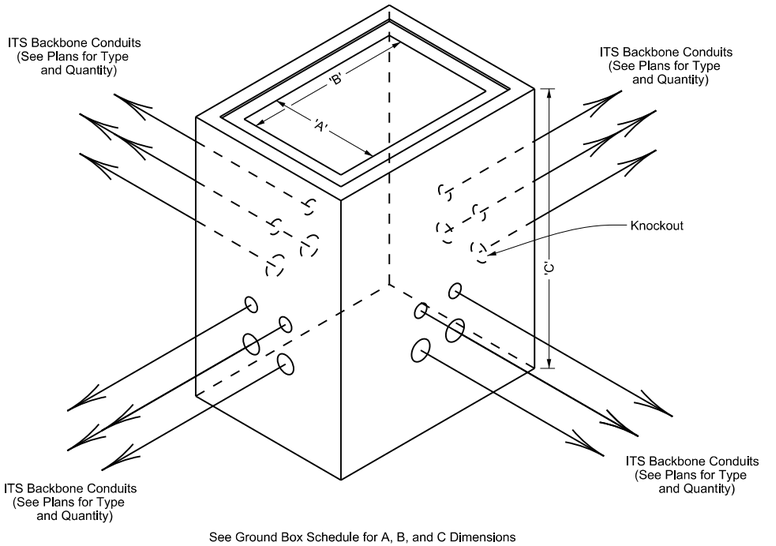
ITS(35)-16

FILE: its(35)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		154

Sheet Details
Not to Scale

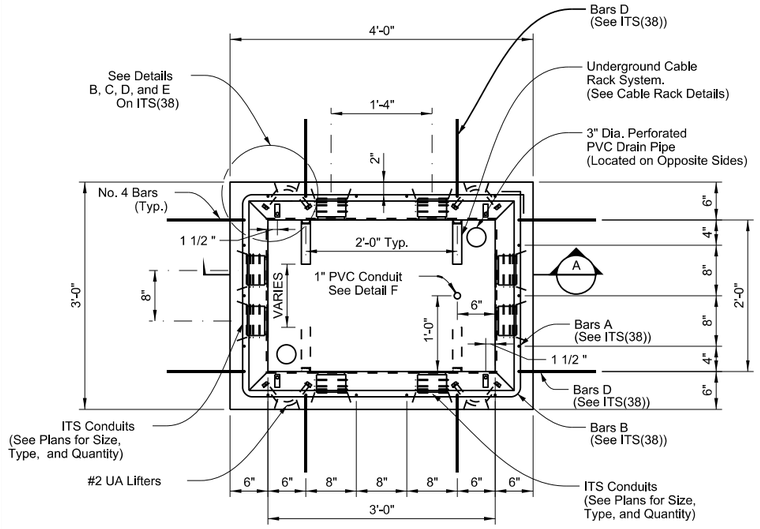
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



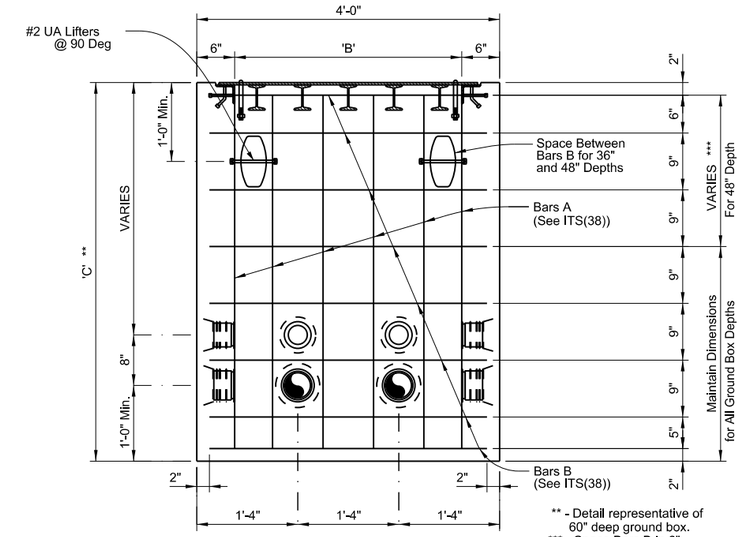
See Ground Box Schedule for A, B, and C Dimensions

Type 1 Ground Box Isometric View



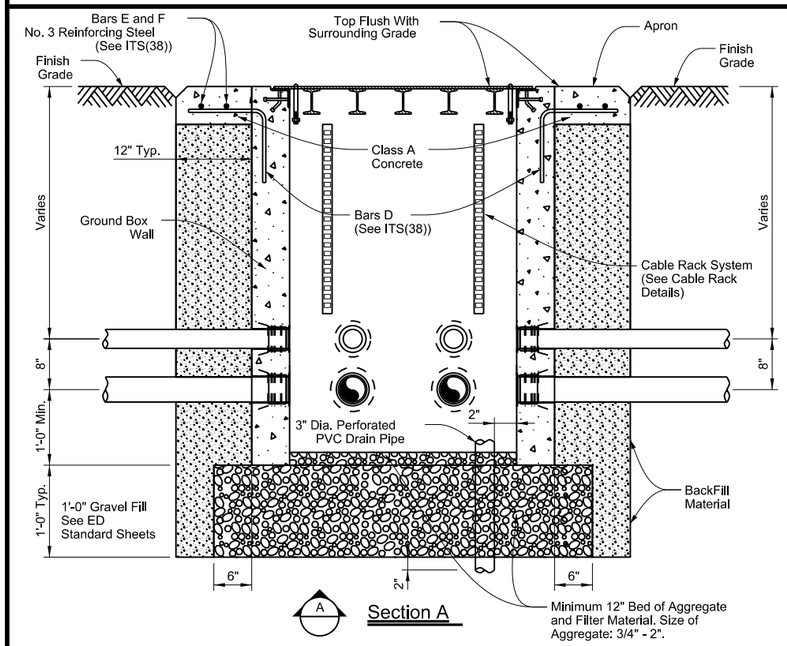
Note: Bar Spacing is The Same on Opposing Sides.

Type 1 Ground Box Plan View

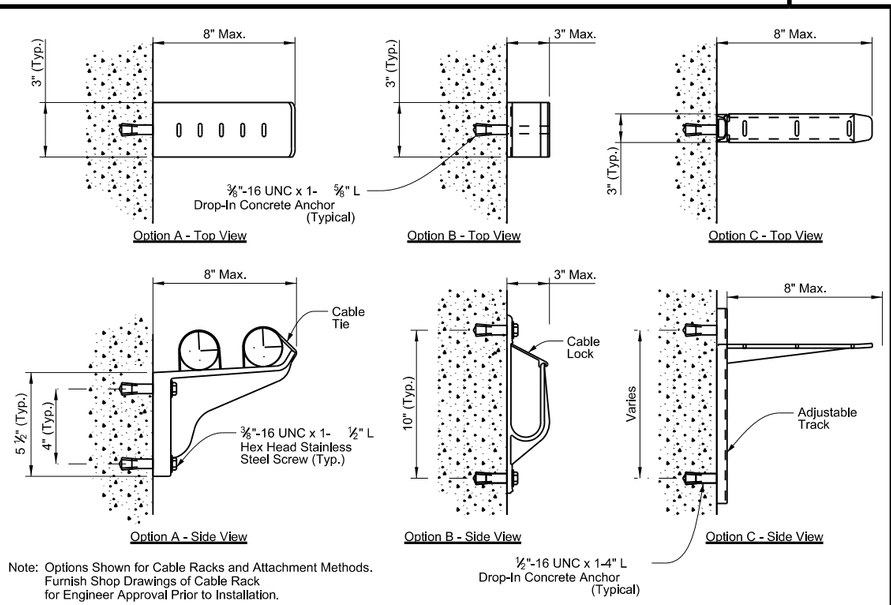


** - Detail representative of 60" deep ground box.
*** - Space Bars B in 6" Intervals for 48" Depth

Type 1 Ground Box Elevation View

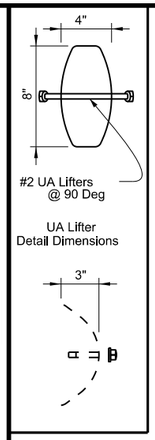


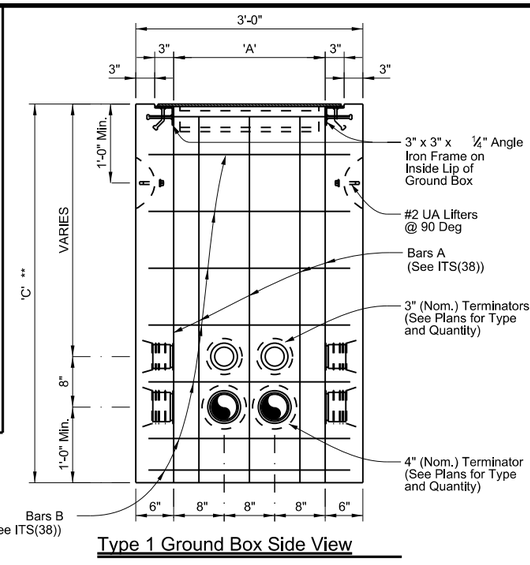
Section A



Note: Options Shown for Cable Racks and Attachment Methods. Furnish Shop Drawings of Cable Rack for Engineer Approval Prior to Installation.

Type 1 Cable Rack Details





Type 1 Ground Box Side View

** - Detail representative of 60" deep ground box.

SHEET 1 OF 2

General Notes:

1. Conduit entry points shown represent the standard configuration for backbone conduit as detailed on ITS(27). Additional conduits may be required as shown on the plans.
2. Provide Class A concrete for Type "1" ground boxes.
3. Provide terminators for the PVC conduit 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.
4. Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.
5. Closed bottom Type "1" ground boxes are acceptable in lieu of open bottom boxes. Provide two 3" Dia. perforated PVC drain pipes on opposite corners to optimize water drainage. Provide 12-inch bed of aggregate that extends 6 inches in all directions from the perimeter of the box for closed bottom boxes. Aggregate bed will be subsidiary to Special Specification, "ITS Ground Box."
6. Install all open bottom Type "1" ground boxes on a 12-inch bed of aggregate that extends 6 inches in all directions from the perimeter of the box. Aggregate bed will be subsidiary to Special Specification, "ITS Ground Box."
7. Cap and seal terminators that do not have conduits attached.
8. 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.
9. Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.
10. 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.
11. Install a nylon string and plug all unused conduits with tug-plugs sized for the particular conduits. Provide split innerduct plugs in conduits or innerducts with cables to seal the innerduct around the cables to prevent water and dirt from entering.
12. Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack identified in the plans. Locate cable rack system on one side only (longer length side) to allow 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 concrete side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.

Ground Box Schedule			
Ground Box Type	'A' Width Inside (Inches)	'B' Length Inside (Inches)	'C' Depth Inside (Inches)
Type 1	24	36	36, 48, 60

Sheet Details
Not to Scale

Texas Department of Transportation

Traffic Safety Division Standard

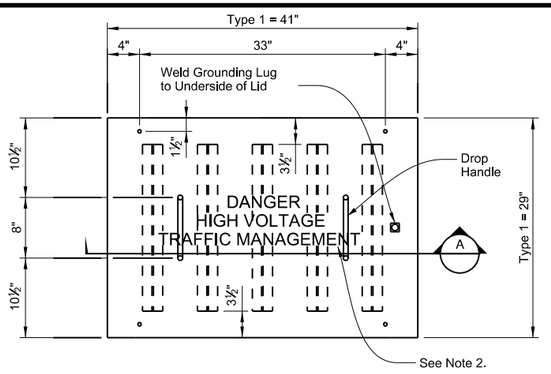
ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

ITS(37)-22

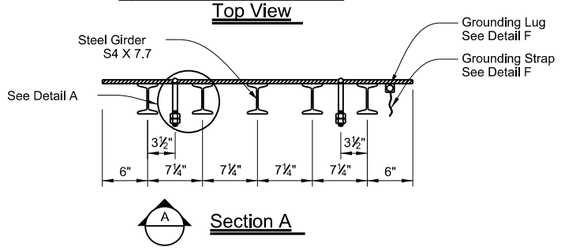
FILE: its(37)-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
02-16	DIST	COUNTY		SHEET NO.
10-22	HOU	Galveston		155

262

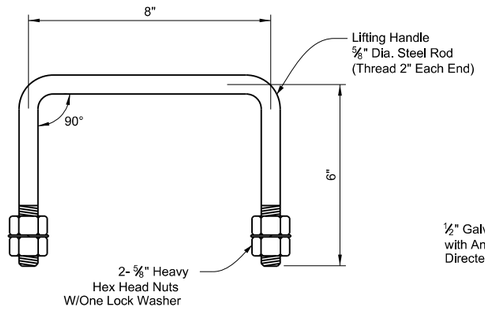
DATE:
FILE:



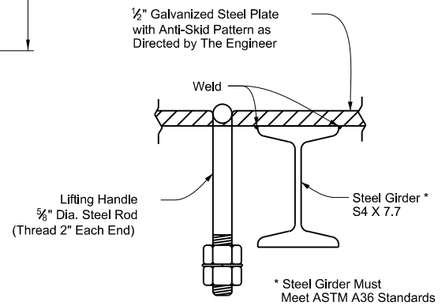
Type 1 Steel Cover Details
Top View



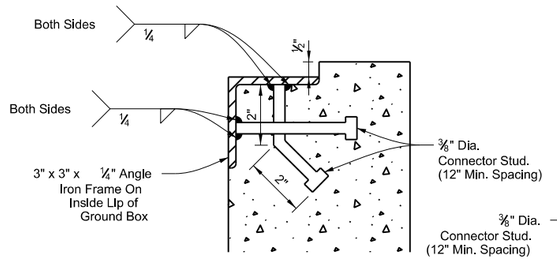
Section A



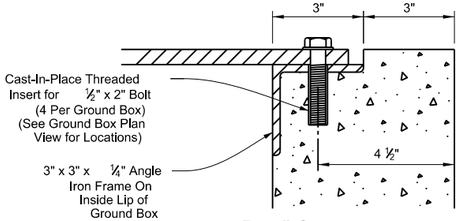
Drop Handle Detail



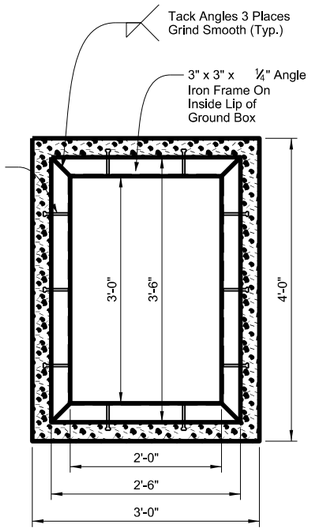
Detail A



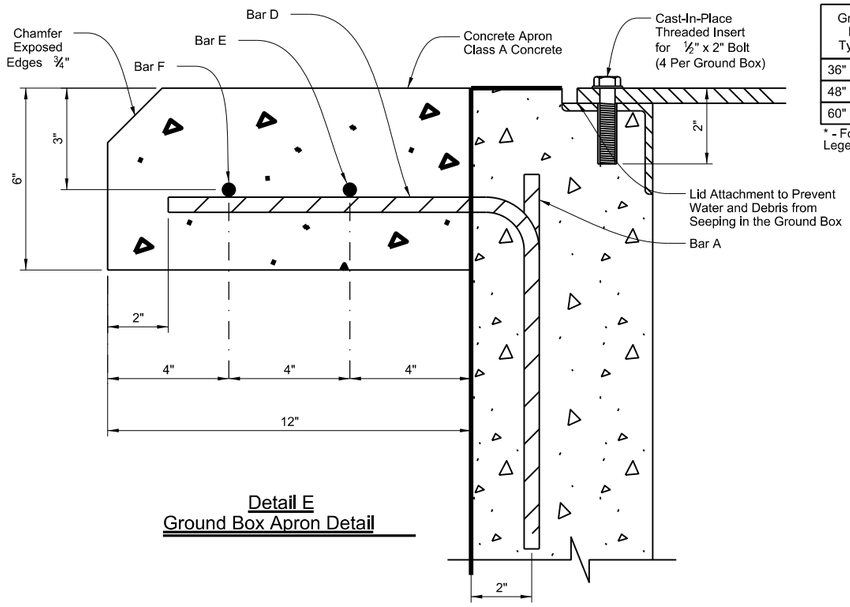
Detail B



Detail C
Lid Attachment Detail



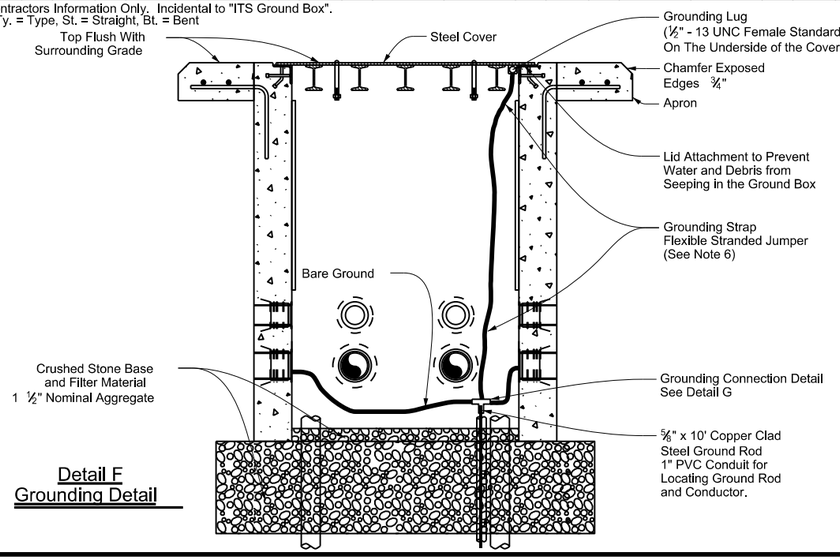
Detail D



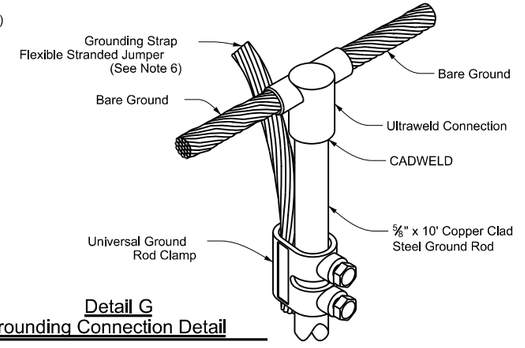
Detail E
Ground Box Apron Detail

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

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.

General Notes:

1. See ITS(37) for additional Type "1" ground box details.
2. Hot-dip galvanized steel covers after all welds are made.
3. 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.
4. Provide all Type "1" ground boxes with a securable, tamper-proof cover equipped with a bolting system that positively secures the cover in place.
5. Ground steel covers in accordance with the National Electrical Code.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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

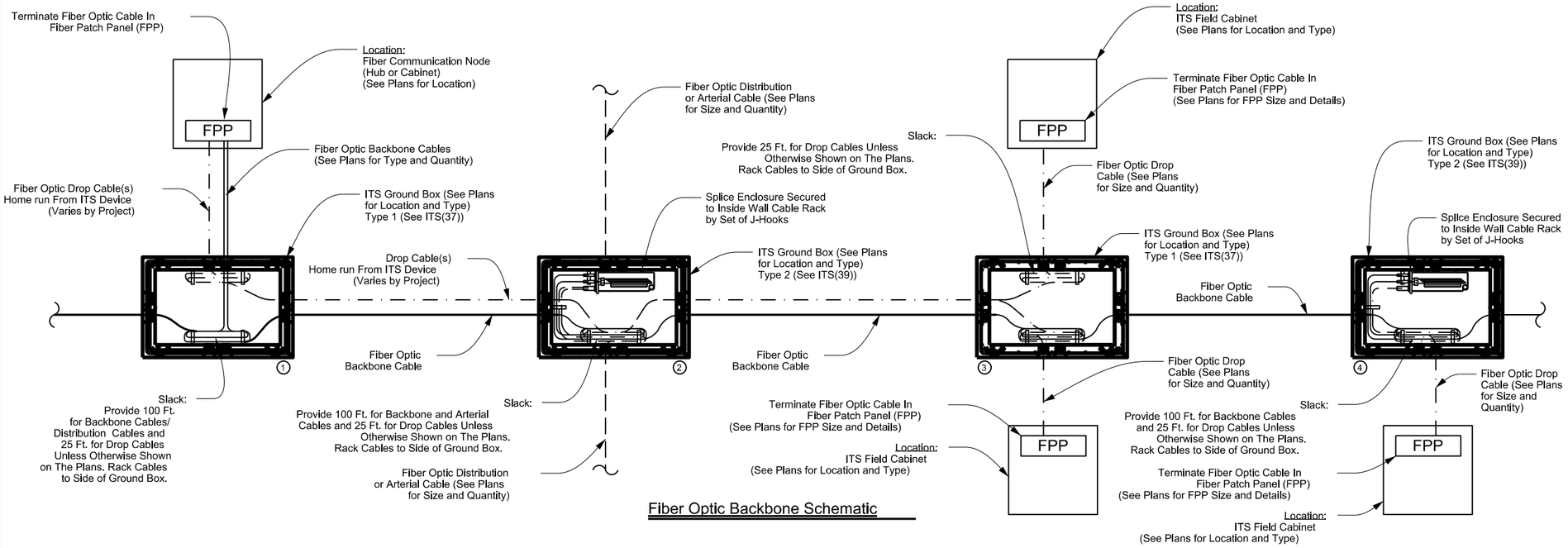
Traffic Operations Division Standard

ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

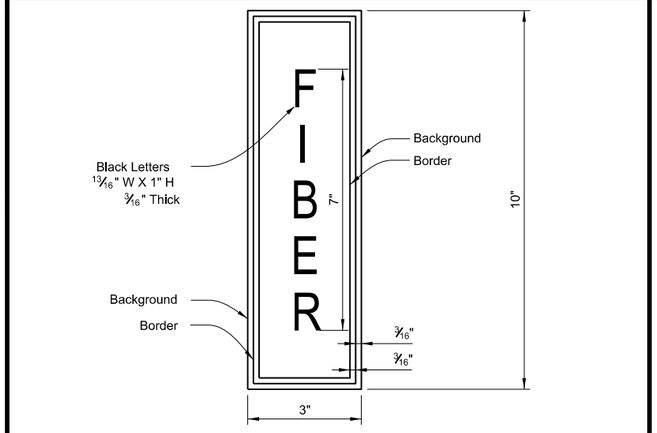
ITS(38)-17

FILE: its(38)-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
5-17	DIST	COUNTY		SHEET NO.
	HOU	Galveston		156

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.

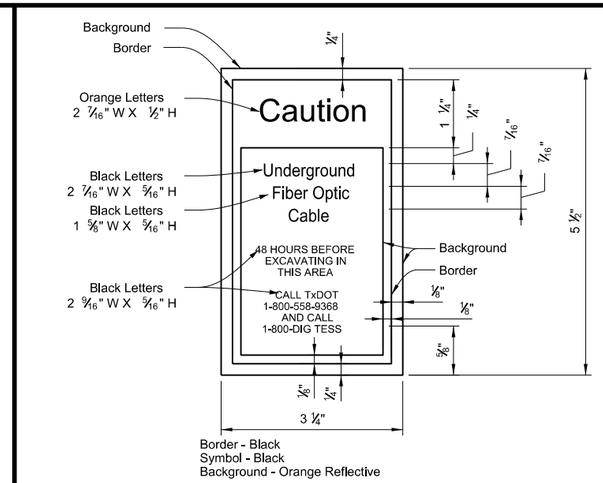


Fiber Optic Backbone Schematic



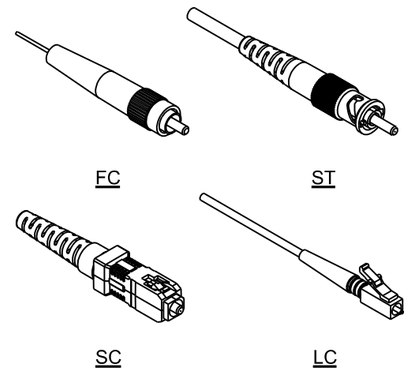
Border - Black
Background - Orange Reflective

Fiber Decal Details



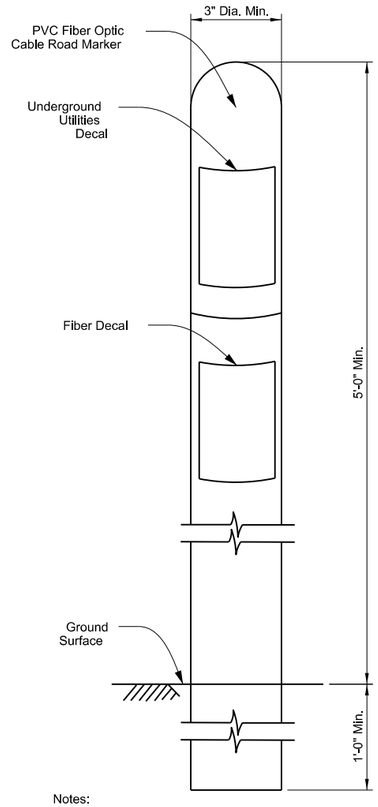
Border - Black
Symbol - Black
Background - Orange Reflective

Underground Utilities Decal Details



Fiber Optic Connectors

Note - Details are diagrammatic and may vary by manufacturer.



Notes:
1. Space fiber optic cable road markers at maximum 1000' intervals or at significant changes in direction such as a 90 degree turn.
2. Provide all orange fiber optic cable road markers for non-splice locations.
3. Provide orange fiber optic cable road markers with white dome for splice locations.
4. Locate marker within concrete apron of fiber ground box.

Fiber Optic Cable Road Markers

Reference Notes:

1. Fiber architecture at communication node.
2. Fiber architecture for splicing arterial distribution cables.
3. Fiber architecture for home run of drop cables from ITS field equipment cabinets to communication node.
4. Fiber architecture for splicing drop cable from ITS field equipment cabinet.

SHEET 1 OF 2

General Notes:

1. The fiber optic backbone schematic shown is diagrammatic only and intended to represent the various fiber optic communication architectures seen across the state and may not show all configurations seen. Connection of ITS field equipment to ITS communication nodes or hubs is achieved through home run drop cables or spliced to the backbone in a splice enclosure. Refer to fiber communication schematic details and fiber termination information shown on the plans for further information.
2. Install a flat pull cord in all empty conduits and inner-ducts identified for communication use. The pull cord must have a tensile strength of 1,250 lbs minimum and have foot markings to determine length installed. Furnish and installation of pull cord will be subsidiary to special specification "ITS Fiber Optic Cable".
3. Color code each type of fiber optic cable to identify the cable as a "backbone" (green or blue), "distribution" (red), or "drop" (orange or yellow).
4. Terminate fibers at fiber patch panel (FPP), also referred to as patch panel, with SC connectors for new installations. When connecting to existing FPP, terminate with FC or ST connectors as shown on the plans. Provide connector adaptors as required to accommodate existing equipment if information is not provided in the plans.
5. Provide a list showing cable number assignments and highway or facility that the cable services.
6. Provide a single 1/C #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."
7. Ensure each cable is marked on the outer jacket with a label detailing the manufacturer's name, the date of manufacturer (month/year), the fiber count (Example: 48F SM or 48 SMF), and sequential length markings at maximum 3 FT increments.

DATE:
FILE:

Sheet Details
Not to Scale

Texas Department of Transportation

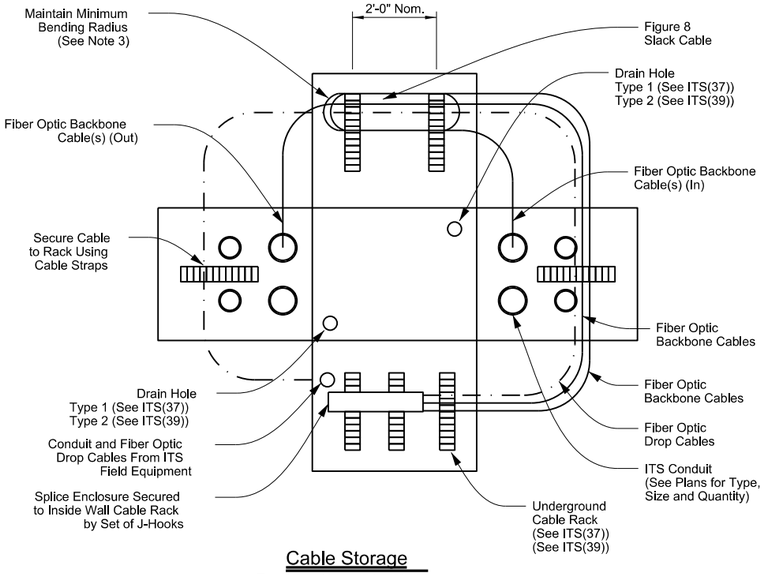
Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

ITS(42)-16

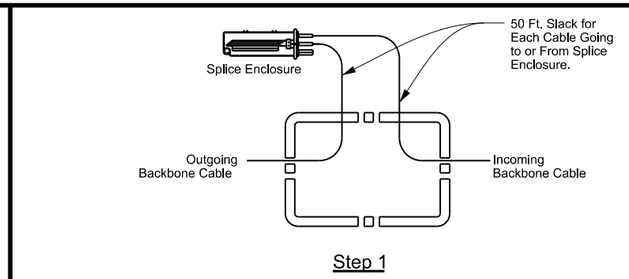
FILE: its(42)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		157

DATE:
FILE:

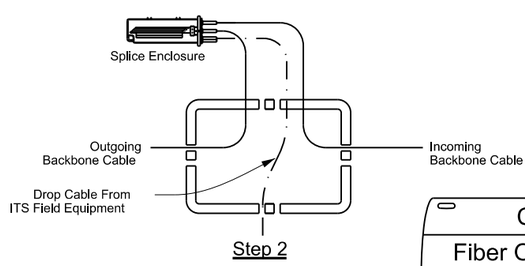


Cable Storage

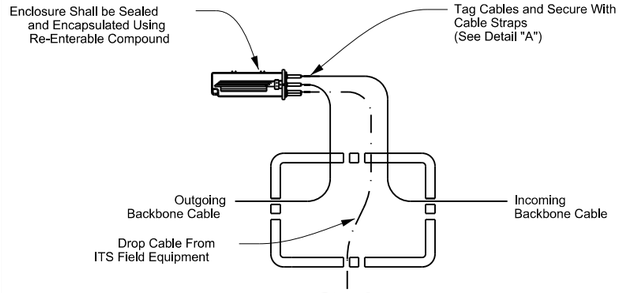
Top View - Ground Box Walls Folded Down for Clarity



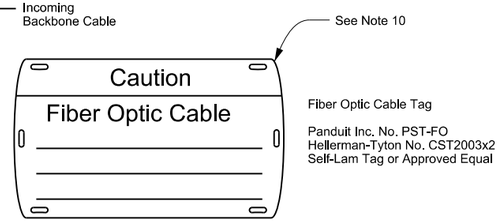
Step 1



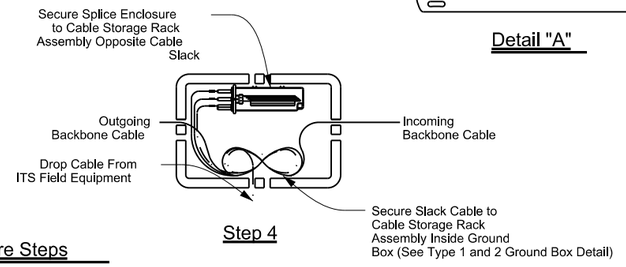
Step 2



Step 3

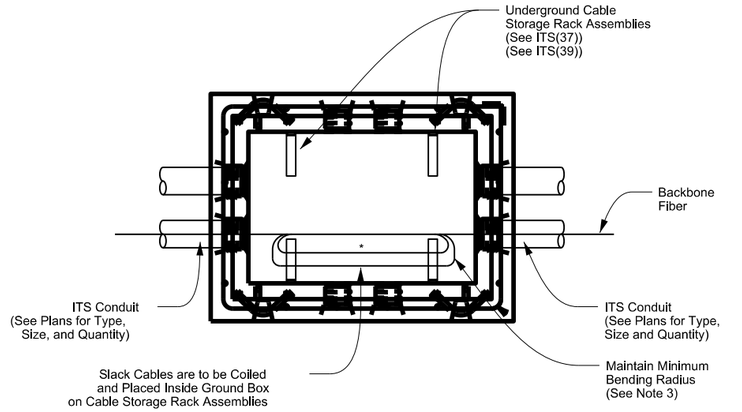


Detail "A"



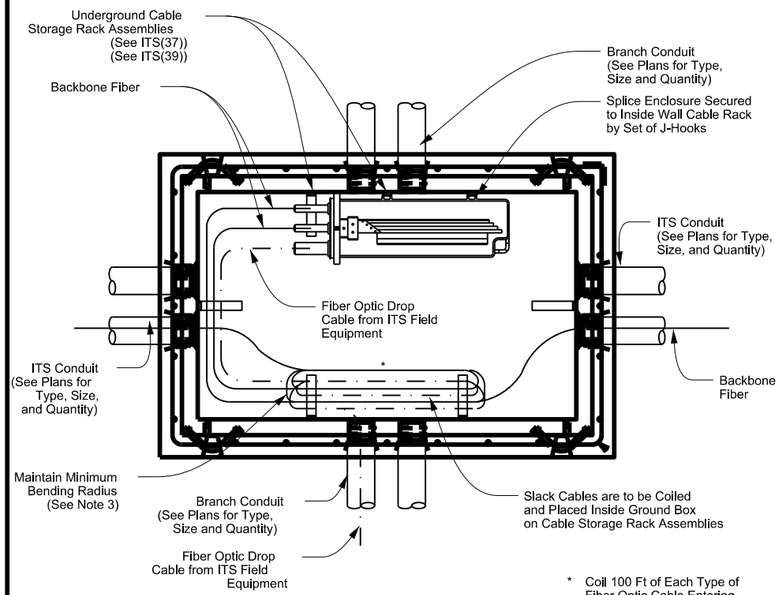
Step 4

Splice Procedure Steps



Type "1" Ground Box

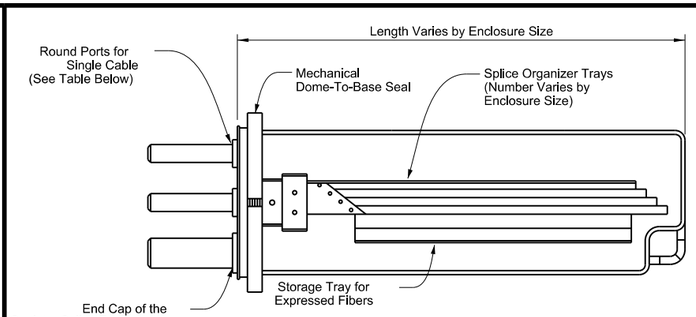
* Coil 25 Ft of Fiber Optic Cable for Slack



Type "2" Ground Box

with Splice

* Coil 100 Ft of Each Type of Fiber Optic Cable Entering the Ground Box



Splice Enclosure Sizes			
Type	No. of Ports	Port Capacity	Fiber Use
1	4	2 - Up to 144 Sm	Backbone
		2 - Up to 48 Sm	Drop
2	6	4 - Up to 144 Sm	Backbone/Arterial
		2 - Up to 48 Sm	Drop
3	8	4 - Up to 144 Sm	Backbone/Arterial
		4 - Up to 48 Sm	Drop

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	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022,etc	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	Galveston		158

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.: 022627X

Crossing Type: Pedestrian

RR Company Operating Track at Crossing: BNSF RAILWAY

RR Company Owning Track at Crossing: BNSF

RR MP: 14.850

RR Subdivision: GALVESTON

City: HITCHCOCK

County: GALVESTON

CSJ at this Crossing: 2523-01-030 / 1911-01-022

Scope of Work, including any TCP, to be performed by State Contractor:

Provide traffic control during construction of the crossing and device the public of the proposed construction and traffic detouring.
Construct sidewalks, including 24" asphalt strip at planks, both North Bound and South Bound.

Scope of Work to be performed by Railroad Company:

Construct proposed 6- 8' concrete planking crossings for sidewalks
Excavate for the support foundation as needed.

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 14

On this project, night or weekend flagging is:

☐ Expected

☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices. Flagging Agreement with Railroad will be needed

☑ 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 877-984-677

☑ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☑ Not Required

☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____

☑ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required

☐ Required: UPRR Maintenance Consent Letter. TxDOT to assist

☐ Required: TxDOT to assist in obtaining the UPRR CROE

☑ Required: Contractor to obtain

- ☐ BNSF: CROE (C and C-1 included), Tim Huya (BNSF) Tim.Huya@bnsf.com
  https://bnsf.railpermitting.com
- ☐ KCS
  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, KCS/TEXMEX 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: BNSF RAILWAY

Railroad Emergency Line at: 1-800-832-5452

Location: DOT 022627X

RR Milepost: 14.850

Subdivision: GALVESTON

RRD Review Only

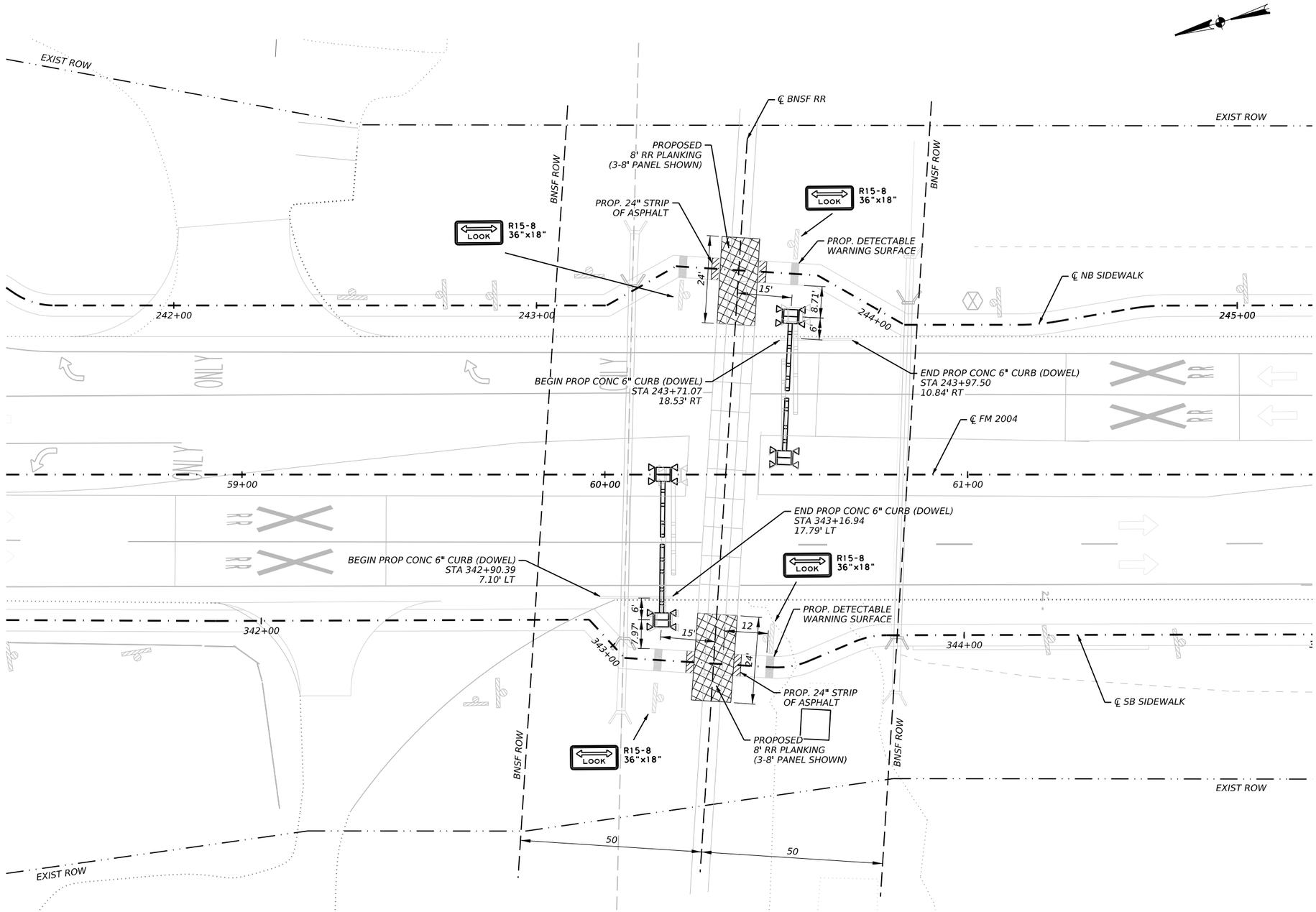
Initials: MA

Date: 05/20/2024

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		1911	01	022		FM 2004	
3/2023		DIST	COUNTY			SHEET NO.	
		HOU	GALVESTON			159	



LEGEND

PROPOSED PLANKING

HORZ 0' 15' 30'

SCALE IN FEET

WORK TO BE DONE BY BNSF -
A. Proposed 6-8' concrete planking crossings for sidewalk
B. Excavate for the support foundation as needed.

EXHIBIT "A"
BNSF DOT# 022627X RRMP 14.850
GALVESTON SUBDIVISION

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

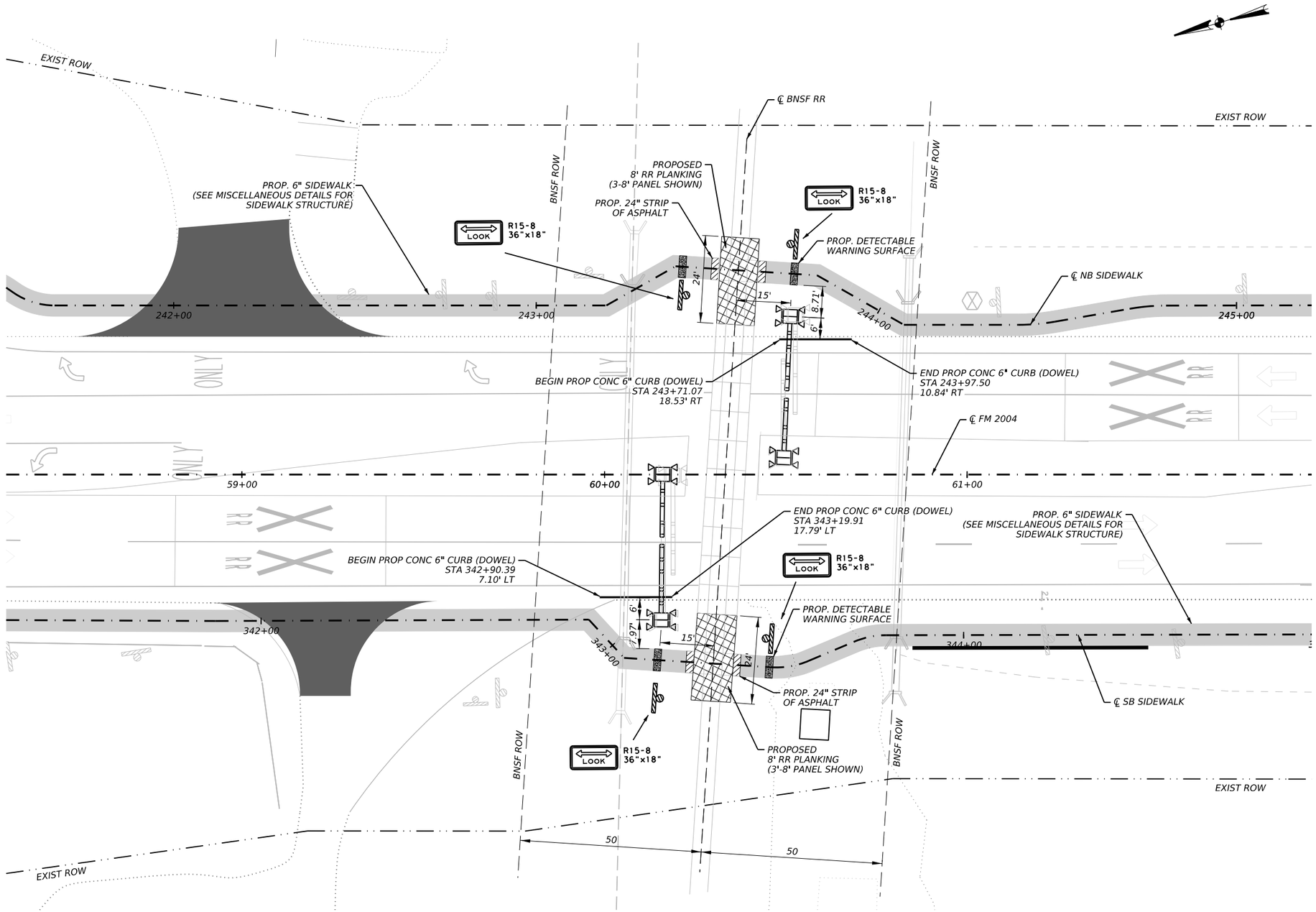
FM 2004 PLANKING RAILROAD PLANS

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		160

DATE: 5/20/2024 5:09:14 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Railroad\Planking Railroad Plans - Plan 1.dgn

CK DW CK DW



LEGEND

- PROPOSED PLANKING
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK

HORZ 0' 15' 30'

SCALE IN FEET

WORK TO BE DONE BY BNSF -

A. Proposed 6-8' concrete planking crossings for sidewalk
B. Excavate for the support foundation as needed.

WORK TO BE DONE BY STATE'S CONTRACTOR:

A. Provide traffic control during construction of the crossing and device the publuc of the proposed construction and traffic detouring.
B. Construct sidewalk.

EXHIBIT "A"
BNSF DOT# 022627X RRMP 14.850
GALVESTON SUBDIVISION

LATITUDE: 29.3519895
LONGITUDE: -95.0307946

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

FM 2004 SIDEWALK PROPOSAL

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		161

DATE: 5/20/2024 5:09:18 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Railroad\Railroad Sidewalk Proposal - Plan 1.dgn

Crossing Details | Project Details

022627X ×

Classification

Crossing Number	022627X	Crossing Type	Public	Roadway Type	2-Way	Spur Permit?	
Crossing Status	Open	Crossing Purpose	Highway	Approach 1 Direction	SOUTHBOUND	Inventory Date	3/11/2015
Crossing Position	At Grade	Public Access?		Approach 3 Direction		FRA Updated	Enter date

Crossing Location

Region	East	Street/Road Name	FM 2004	Bridge Number	--
District	Houston	Hwy Type and No.	FM2004 State Hwy? No	Latitude	29.3519895
County	Galveston	Functional Class	Minor Arterial	Longitude	-95.0307946
City	Hitchcock	In City Limits?	Urban? Yes	Elevation	70.3289040

Railroad Information Summary

Railroad:	BNSF	Total Tracks:	1
Subdivision:	GALVESTON	Total Trains:	14
Milepost:	14.850	Total Trains Thru:	14
RR Phone:		Max Train Speed:	55

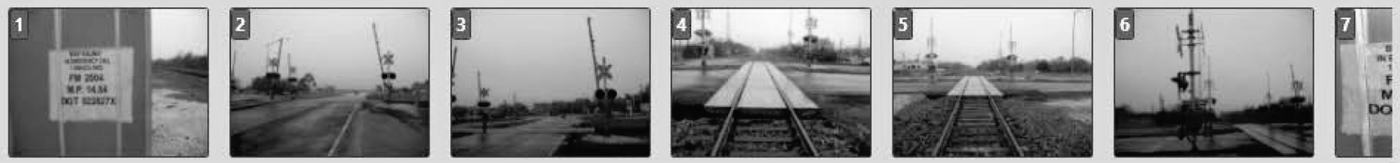
Roadway Features Summary

Warning Device:	Gates, 8	No. Lanes:	4
Speed Limit:	55	% Trucks:	2
Land Use:	Commercial	School Buses:	0
Road Surface:	Asphalt	Nearby Int?:	Yes

Safety Information Summary

ENS Phone:	(800)-832-5452		
AADT:	14000	Year:	2019
5yr Crashes:	0		
Priority Index:	4.664		

Current Crossing Photos



Crossing inventory data last modified on 3/30/2022 4:00:29 PM.
Click here to download reports from the FRA website.

Summary | Railroad Operations | Features | Controls | Photos | Review | Safety | Projects

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

CROSSING REPORT

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		162

DATE: 5/9/2024 11:10:13 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022\Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\RAILROAD DETAILS\CROSSING REPORT.dgn

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		163

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

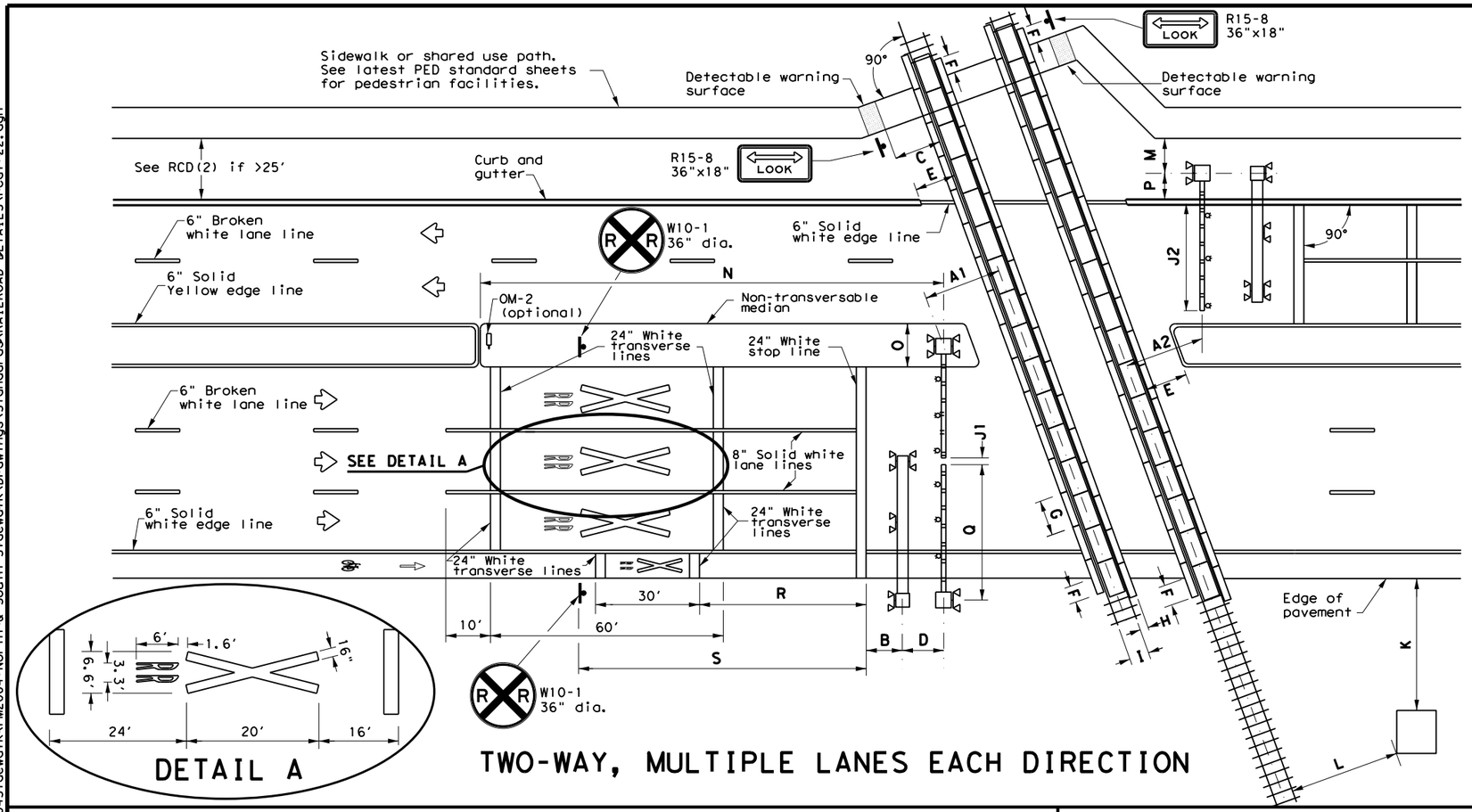
When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

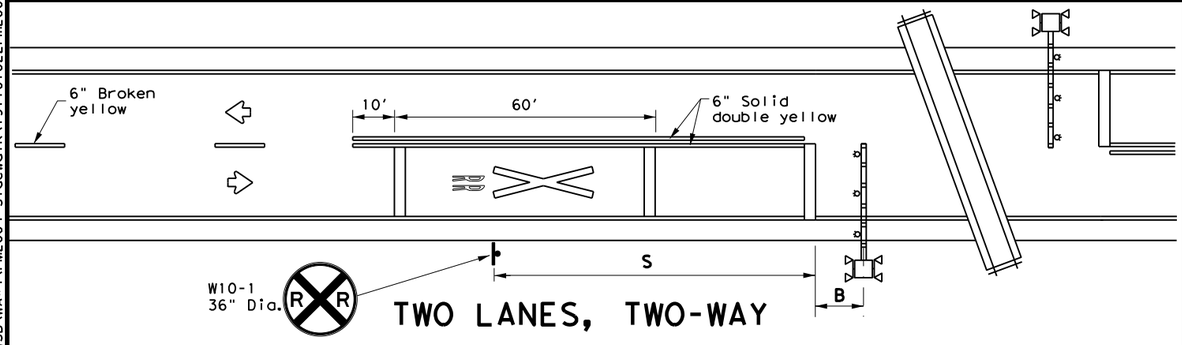
Texas Department of Transportation — Rail Division

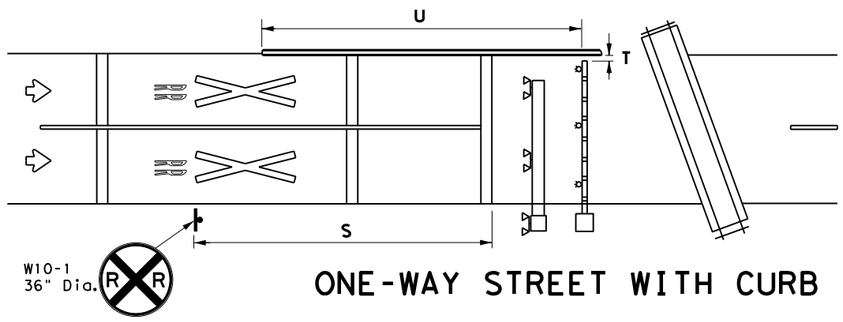
RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		164

DATE: 5/9/2024
FILE: Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004SidewalkRCD1-22.dgn







NOTES

T: Tip of gate to edge of curb: 1' maximum for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations.

U: Non-traversable curb length from gate: 100' minimum for a Quiet Zone SSM, 10' minimum for all other locations.

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

NOTES

A1: Center of RR mast to center of rail: 12' minimum, 15' typical.

A2: Tip of gate to center of rail: 12' minimum, 15' typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).

C: Near edge of detectable warning surface to nearest rail: 12' minimum.

D: Center of gate mast to center of cantilever mast: 6' typical. NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10' typical. NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum. NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8' typical.

H: Width of field panel: 2' typical (check with railroad company).

I: Distance between rails: 4'- 8'1/2".

J1: Tip of gate to tip of gate: 2' maximum.

J2: 90% of traveled roadway to be covered by gate.

K: Nearest edge of RR cabinet from edge of pavement: 30' typical. NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabinet from nearest rail: 25' typical.

M: Center of RR mast to edge of sidewalk: 6' minimum.

N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60'will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.

O: Width of median for RR gate assembly: 8'-6" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3" from face of curb.

P: Center of RR mast to face of curb: 5'-3" minimum. Center of RR mast to edge of pavement (with shoulder): 7' minimum. Center of RR mast to edge of pavement (no shoulder): 9'-3" minimum. NOTE: Final location determined by the railroad company.

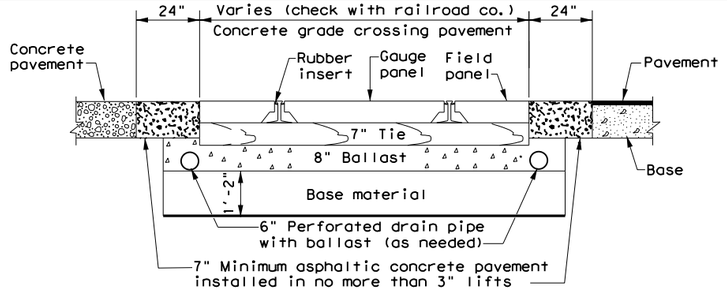
Q: Gate length: 28' or less typical, but railroad company may allow up to 32' under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

GENERAL NOTES

1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.



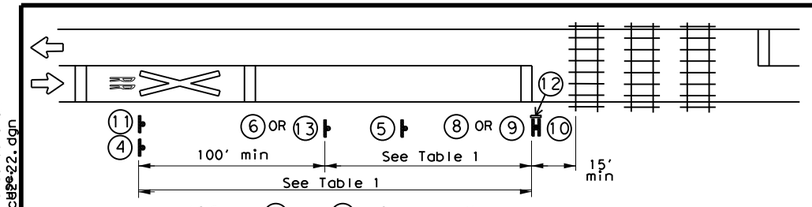
Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-22

FILE: rcd1-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
2-16	DIST	COUNTY		SHEET NO.
11-22	HOU	GALVESTON		165

DATE: 5/9/2024
FILE: Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022fm2004standards.dgn

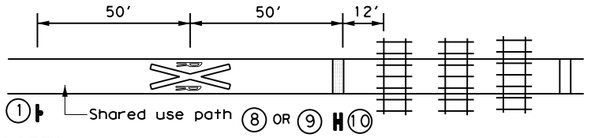


(if no (6) or (13) sign used)

PASSIVE CROSSING

NOTES

1. STOP or YIELD sign may also be installed to the left of the crossbuck sign, rather than below it.
2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.
3. See the Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings section of the TMUTCD for further details about sign mounting arrangements.



NOTES

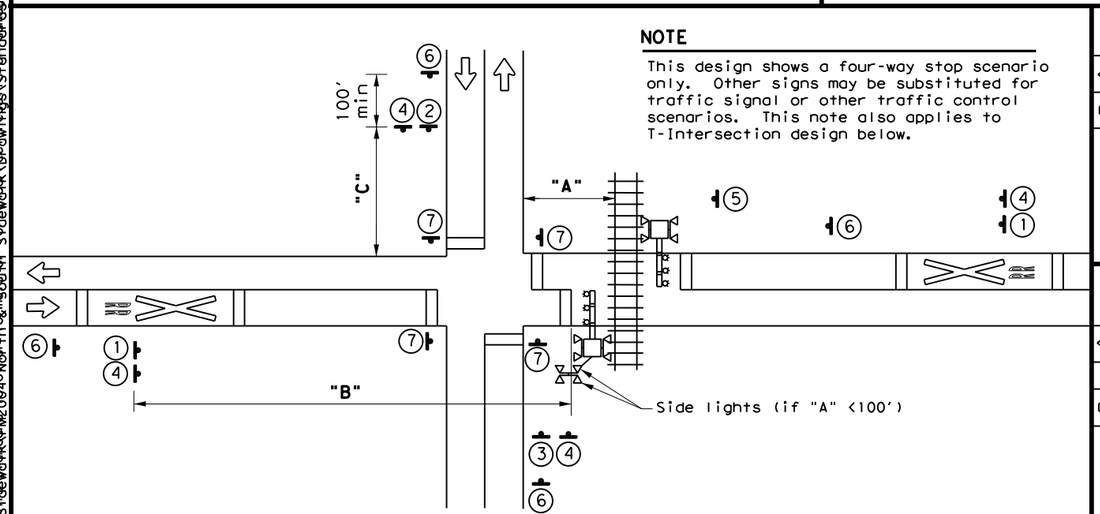
1. A shared use path is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller signs preferred. See the Design of Bicycle Signs section within the TMUTCD for sizing details.

PATHWAY CROSSING

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS (R15-2P) plaque (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per the Placement of Warning Signs section of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

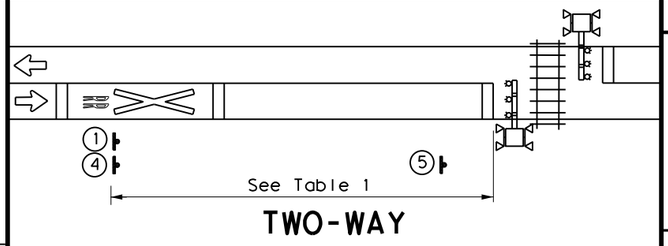


NOTE

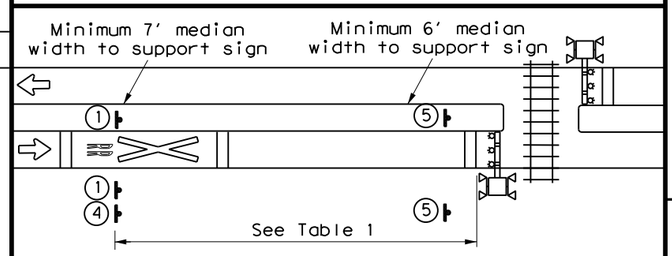
This design shows a four-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

	"A" <100'	"A" ≥100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

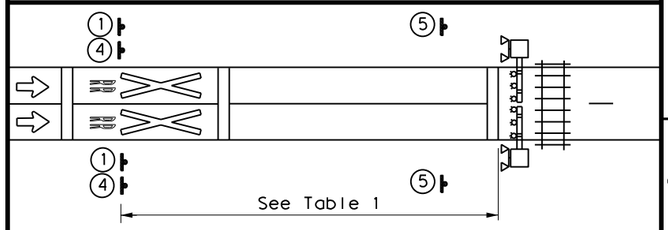
GRADE CROSSING NEAR A PARALLEL STREET



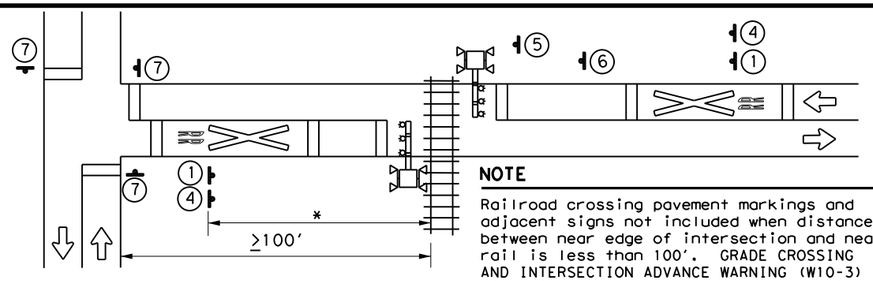
TWO-WAY



TWO-WAY WITH MEDIAN



ONE-WAY

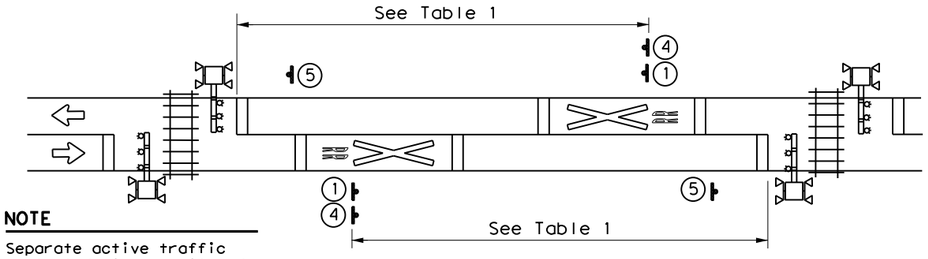


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100'. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION

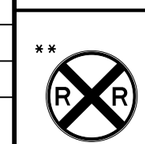


NOTE

Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100' apart.

TWO ADJACENT CROSSINGS

SIGNS



(1) W10-1 36" Dia. — **

(2) W10-2L 36" X 36" — **

(3) W10-2R 36" X 36" — **

IF NEEDED

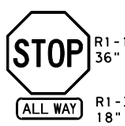
(4) W10-5P 30" X 24" / W10-5 36" X 36"

IF NEEDED

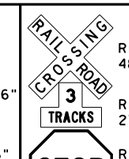
(5) R8-8 24" X 30"

IF NEEDED

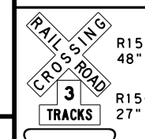
(6) W3-1 30" X 30"



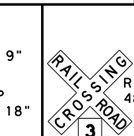
(7) R1-1 36" X 36" / R1-3P 18" X 6"



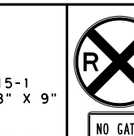
(8) R15-1 48" X 9" / R15-2P 27" X 18" / R1-1 36" X 36"



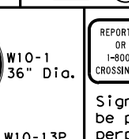
(9) R15-1 48" X 9" / R15-2P 27" X 18" / R1-2 48" X 48" X 48"



(10) R15-1 48" X 9" / R15-2P 27" X 18"

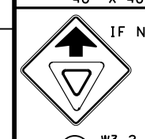


(11) ** W10-13P 30" X 24" / W10-1 36" Dia.



Sign may be placed perpend. to travel lanes.

(12) I-13 15" X 9"



IF NEEDED

(13) W3-2 30" X 30"

** Includes a NO TRAIN HORN (W10-9P) plaque if crossing is in a Quiet Zone. If needed, is mounted below W10-2/W10-3/W10-4 signs.

W10-9P 30" X 24"

Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-22

FILE: rcd2-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
2-16 11-22	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		166

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
CSJ:1911-01-022, CSJ:2523-01-030

1.2 PROJECT LIMITS:
From: JACK BROOKS RD

To: OAK DR

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 29.3637° (N) ,(Long) -95.0305° (W)

END: (Lat) 29.3472° (N) ,(Long) -95.0326° (W)

1.4 TOTAL PROJECT AREA (Acres): 20.16

1.5 TOTAL AREA TO BE DISTURBED (Acres): 4.2

1.6 NATURE OF CONSTRUCTION ACTIVITY:
FOR THE CONSTRUCTION OF SIDEWALK BOTH SIDE, STRIPING, GRADING, CULVERTS, DRIVEWAYS.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
BACLIFF CLAY	STA 17+39 TO STA 64+00; CONSISTS OF VERY DEEP, POORLY DRAINED SOILS.
VERLAND SILTY CLAY	STA 64+00 TO STA 78+36; CONSISTS OF VERY DEEP, SOMEWHAT POORLY DRAINED, VERY SLOWLY PERMEABLE SOILS

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
HIGHLAND BAYOU (2424A) IMPAIRED FOR BACTERIA IN WATER, DEPRESSED DISSOLVED OXYGEN IN WATER, DIOXIN IN EDIBLE TISSUE	WEST BAY (OYSTER WATERS) (2424) DIOXIN IN EDIBLE TISSUE, PCBs IN EDIBLE TISSUE.

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☐ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
MAJED A. ACHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			167
STATE	STATE DIST.	COUNTY	
TEXAS	12	GALVESTON	
CONT.	SECT.	JOB	HIGHWAY NO.
1911	Ø1	Ø22, ETC	FM2Ø04

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

- X ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ 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

- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
PERMANENT SODDING	STA 17+39	STA 78+36

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- X Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			167A
STATE	STATE DIST.	COUNTY	
TEXAS	12	GALVESTON	
CONT.	SECT.	JOB	HIGHWAY NO.
1911	01	022, ETC	FM2004

I. STORMWATER POLLUTION PREVENTION

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.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

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.

☒ No United States Army Corps (USACE) Permit Required

☐ 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."

☐ 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."

☐ 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.

☐ 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.

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.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

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.

No Additional Comments

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

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.

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)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

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.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Oct 27, 2023
FILE:

Version 2.2

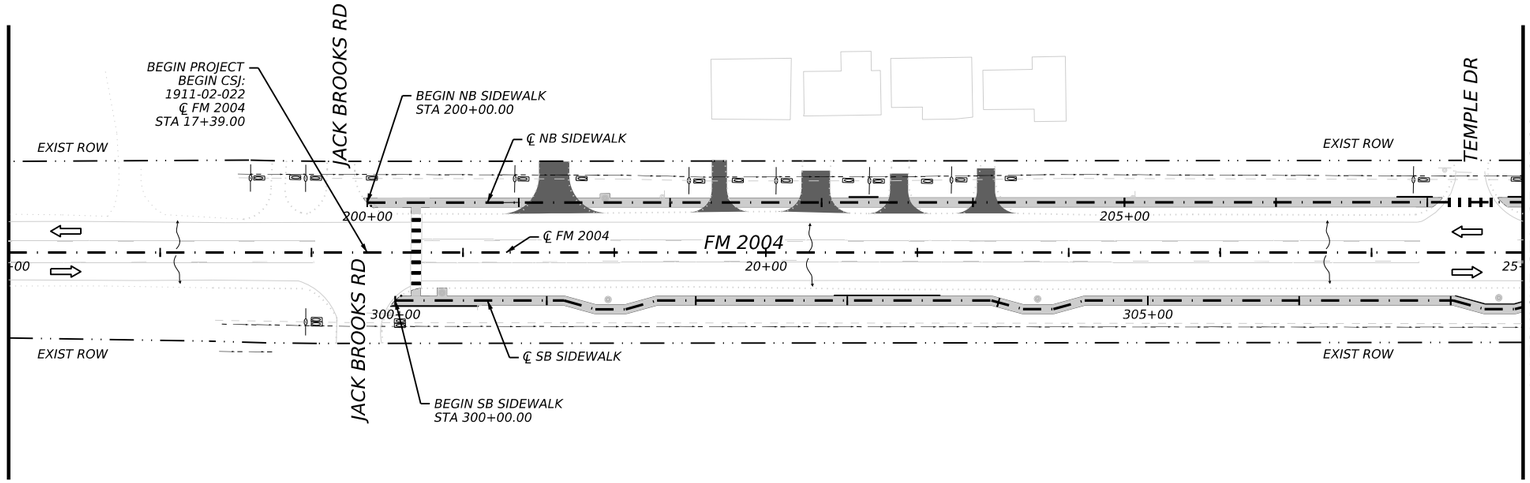
Texas Department of Transportation

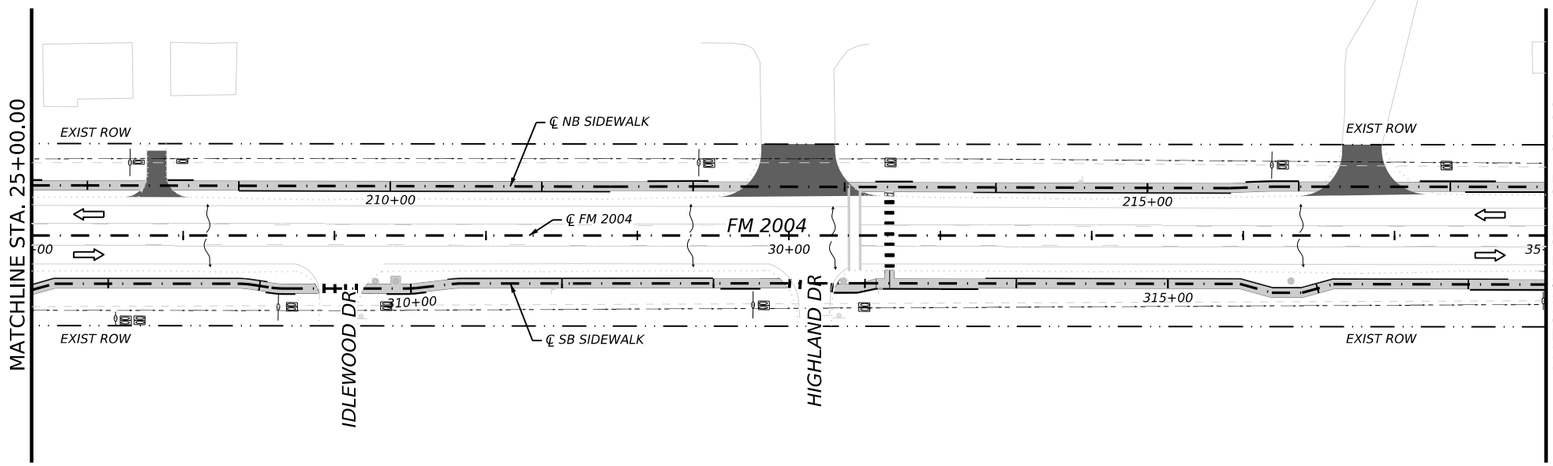
TxDOT Houston District

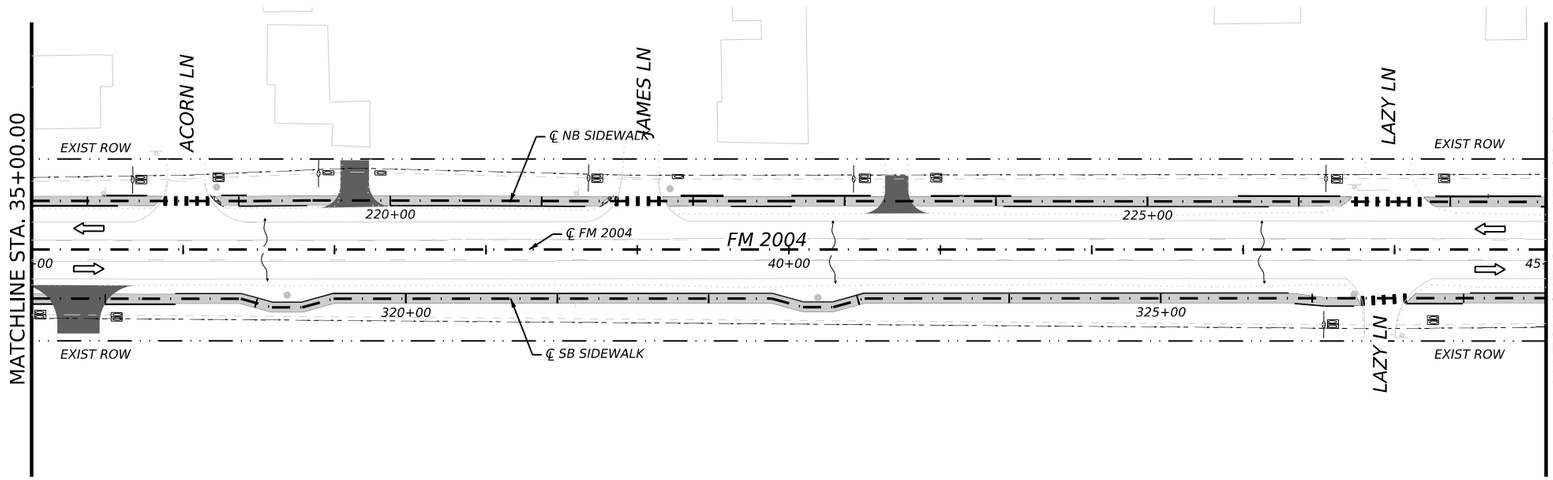
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, etc.	FM 2004
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	HOU	Galveston		168







LEGEND

- FLOW DIRECTION
- DITCH FLOW DIRECTION
- EXISTING DIRECTION OF TRAFFIC
- SEDIMENT CONTROL FENCE

NOTES

1. THE PLACEMENT OF HYDRO-MULCH AND BLOCK FOR FINAL STABILIZATION CAN BE FOUND ON THE ROADWAY TYPICAL SECTION.
2. THE LOCATION OF CONSTRUCTION SUPPORT ACTIVITIES INCLUDING MATERIALS, WASTE, BORROW, FILL, AND EQUIPMENT STORAGE AREA WILL BE SHOWN ON THE PLAN SHEETS ONCE ESTABLISHED BY CONTRACTOR. THESE SITES WILL BE INCLUDED IN THE INSPECTIONS REPORT.
3. THE LOCATION OF VEHICLE WASH AREA INCLUDING CONCRETE WASHOUT WILL BE SHOWN ON THE PLANS ONCE ESTABLISHED BY THE CONTRACTOR. THIS SITE WILL BE INCLUDED IN THE INSPECTION REPORT.
4. THE FOLLOWING RECORDS WILL BE MAINTAINED BY THE CONTRACTOR AND WILL BE MADE READILY AVAILABLE UPON REQUEST TO PARTIES LISTED IN PART III. D.1 OF THE TPDES GENERAL PERMIT TXR150000:
   - I. DATES WHEN MAJOR GRADING ACTIVITIES OCCUR;
   - II. ALL DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   - III. THE DATES WHEN STABILIZATION (BOTH TEMPORARY AND/OR PERMANENT) MEASURE ARE INITIATED.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

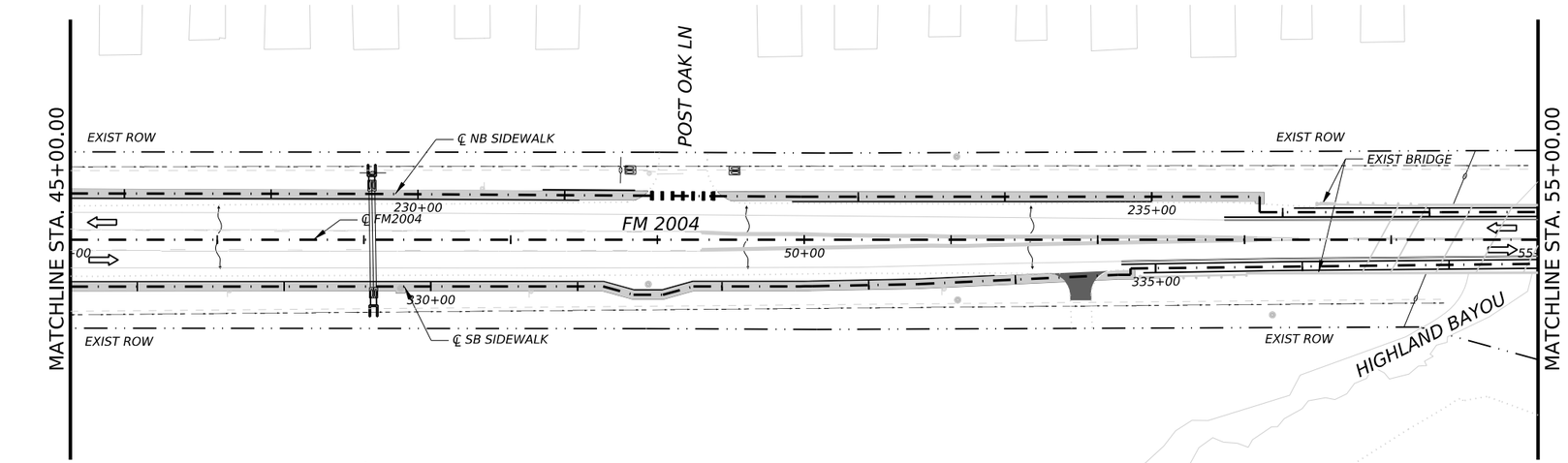
SWPPP LAYOUT

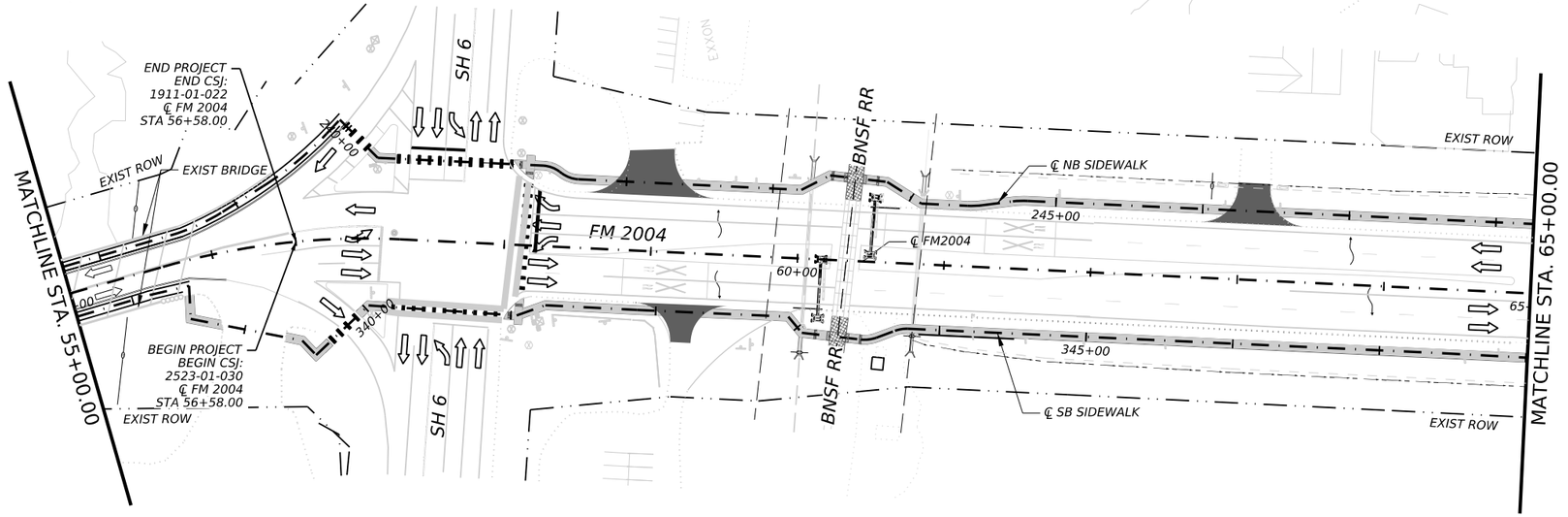
BEGIN TO STA 45+00

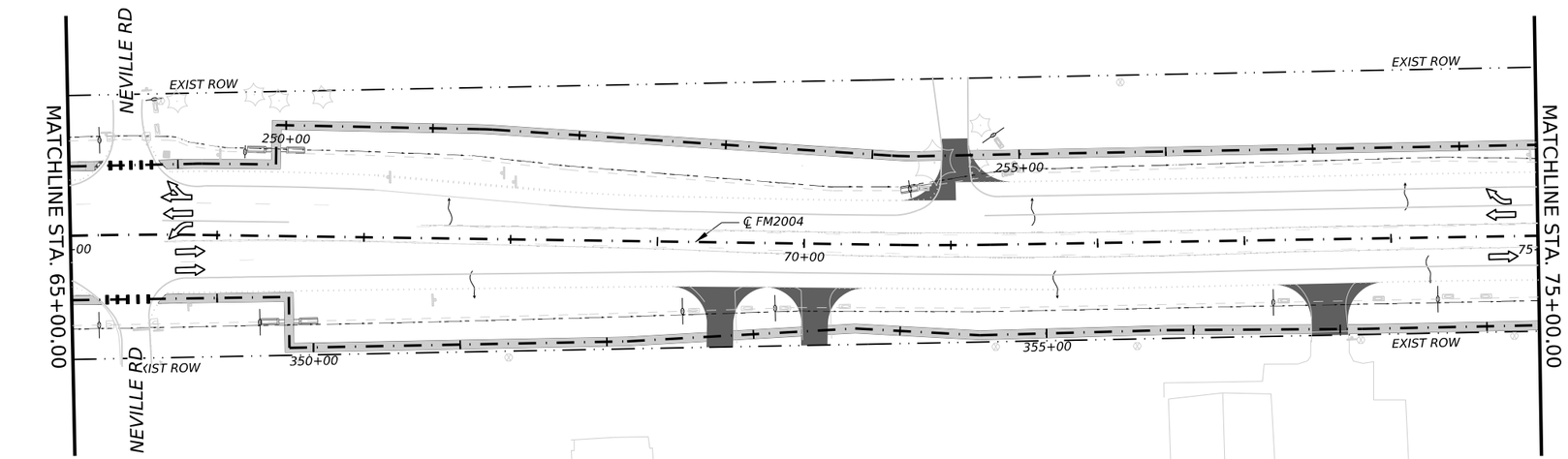
SHEET 01 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		169

DATE: 5/30/2024 2:56:25 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 41\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\SW3P\SWPPP - Plan 1.dgn







LEGEND

- FLOW DIRECTION
- DITCH FLOW DIRECTION
- EXISTING DIRECTION OF TRAFFIC
- SEDIMENT CONTROL FENCE

NOTES

1. THE PLACEMENT OF HYDRO-MULCH AND BLOCK FOR FINAL STABILIZATION CAN BE FOUND ON THE ROADWAY TYPICAL SECTION.
2. THE LOCATION OF CONSTRUCTION SUPPORT ACTIVITIES INCLUDING MATERIALS, WASTE, BORROW, FILL, AND EQUIPMENT STORAGE AREA WILL BE SHOWN ON THE PLAN SHEETS ONCE ESTABLISHED BY CONTRACTOR. THESE SITES WILL BE INCLUDED IN THE INSPECTIONS REPORT.
3. THE LOCATION OF VEHICLE WASH AREA INCLUDING CONCRETE WASHOUT WILL BE SHOWN ON THE PLANS ONCE ESTABLISHED BY THE CONTRACTOR. THIS SITE WILL BE INCLUDED IN THE INSPECTION REPORT.
4. THE FOLLOWING RECORDS WILL BE MAINTAINED BY THE CONTRACTOR AND WILL BE MADE READILY AVAILABLE UPON REQUEST TO PARTIES LISTED IN PART III. D.1 OF THE TPDES GENERAL PERMIT TXR150000:
   - I. DATES WHEN MAJOR GRADING ACTIVITIES OCCUR;
   - II. ALL DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   - III. THE DATES WHEN STABILIZATION (BOTH TEMPORARY AND/OR PERMANENT) MEASURE ARE INITIATED.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

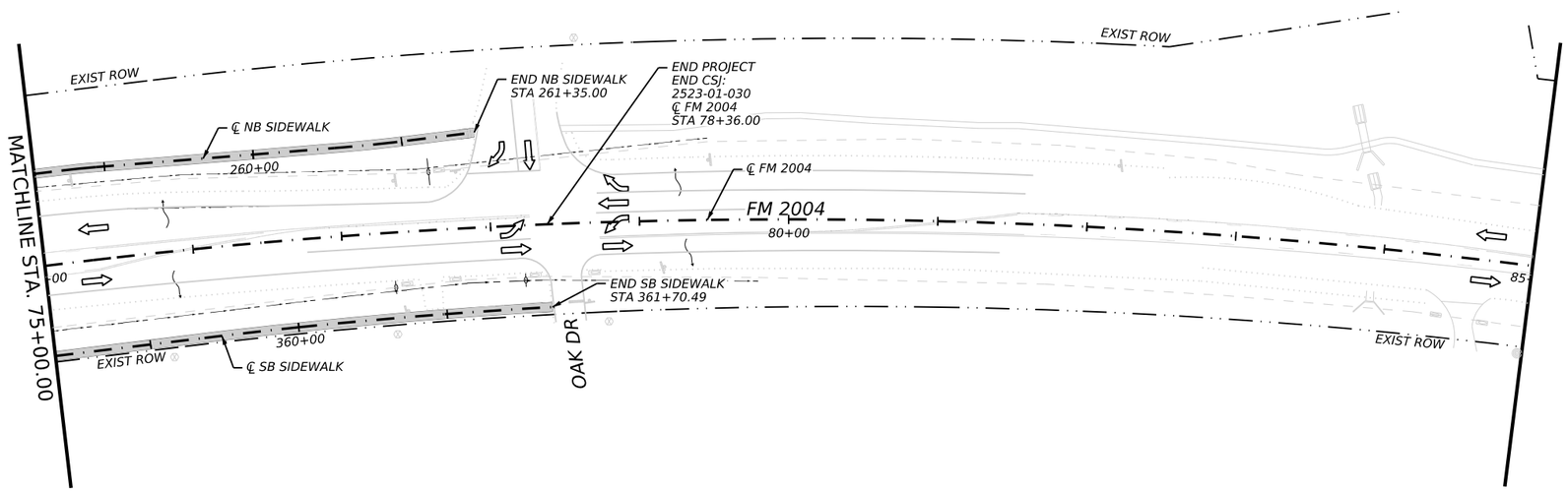
SWPPP LAYOUT

STA 45+00 TO STA 75+00

SHEET 02 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		170

DATE: 5/20/2024 4:26:15 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\1911010022Fm2004SidewalkIFM2004 North & South SidewalkIDrawings\Sheets\SW3PISWPPP - Plan 4.dgn



LEGEND

- FLOW DIRECTION
- DITCH FLOW DIRECTION
- EXISTING DIRECTION OF TRAFFIC
- SEDIMENT CONTROL FENCE (SF)

NOTES

1. THE PLACEMENT OF HYDRO-MULCH AND BLOCK FOR FINAL STABILIZATION CAN BE FOUND ON THE ROADWAY TYPICAL SECTION.
2. THE LOCATION OF CONSTRUCTION SUPPORT ACTIVITIES INCLUDING MATERIALS, WASTE, BORROW, FILL, AND EQUIPMENT STORAGE AREA WILL BE SHOWN ON THE PLAN SHEETS ONCE ESTABLISHED BY CONTRACTOR. THESE SITES WILL BE INCLUDED IN THE INSPECTIONS REPORT.
3. THE LOCATION OF VEHICLE WASH AREA INCLUDING CONCRETE WASHOUT WILL BE SHOWN ON THE PLANS ONCE ESTABLISHED BY THE CONTRACTOR. THIS SITE WILL BE INCLUDED IN THE INSPECTION REPORT.
4. THE FOLLOWING RECORDS WILL BE MAINTAINED BY THE CONTRACTOR AND WILL BE MADE READILY AVAILABLE UPON REQUEST TO PARTIES LISTED IN PART III. D.1 OF THE TPDES GENERAL PERMIT TXR150000:
   - I. DATES WHEN MAJOR GRADING ACTIVITIES OCCUR;
   - II. ALL DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND
   - III. THE DATES WHEN STABILIZATION (BOTH TEMPORARY AND/OR PERMANENT) MEASURE ARE INITIATED.

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

SWPPP LAYOUT

STA 75+00 TO END

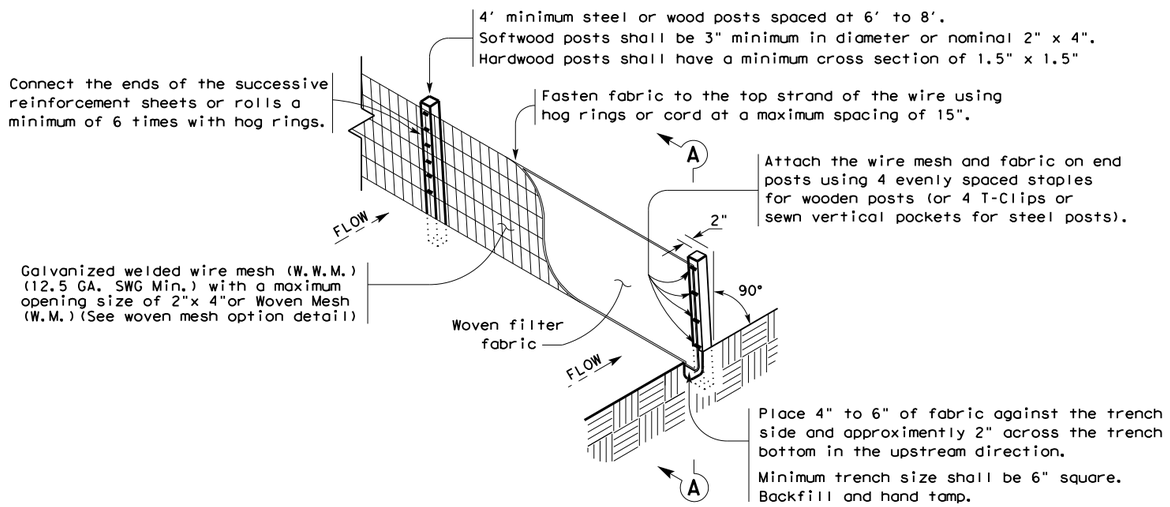
SHEET 03 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		171

DATE: 5/9/2024 5:48:23 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\SW3P\SWPPP - Plan 7.dgn

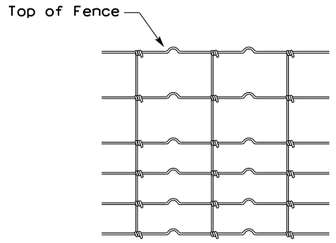
CK DW CK DW

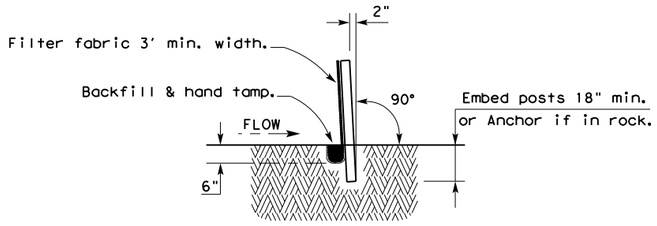
5/9/2024
Z:\Projects\220058_CEC_TxDOT\WSB\WA_4\FM2004 Sidewalk\191101022Fm2004SidewalK\FM2004 North & South SidewalK\Drawings\Standards\Environmental Standards\ec116.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

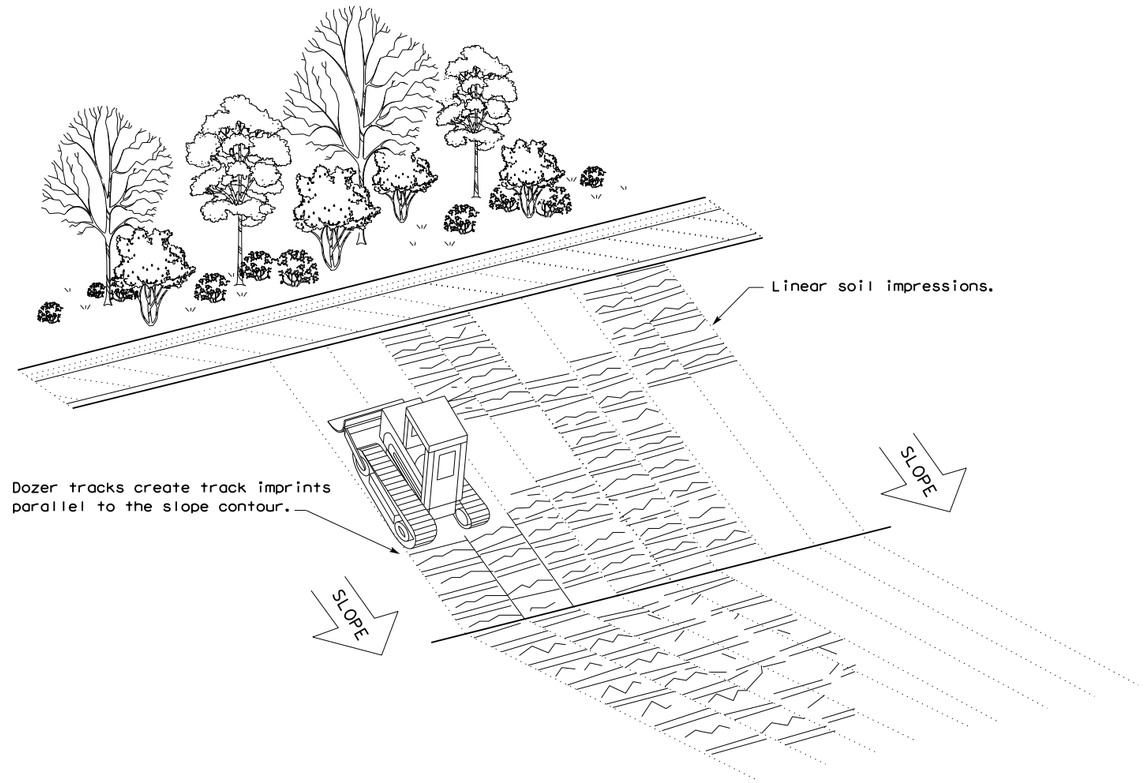
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

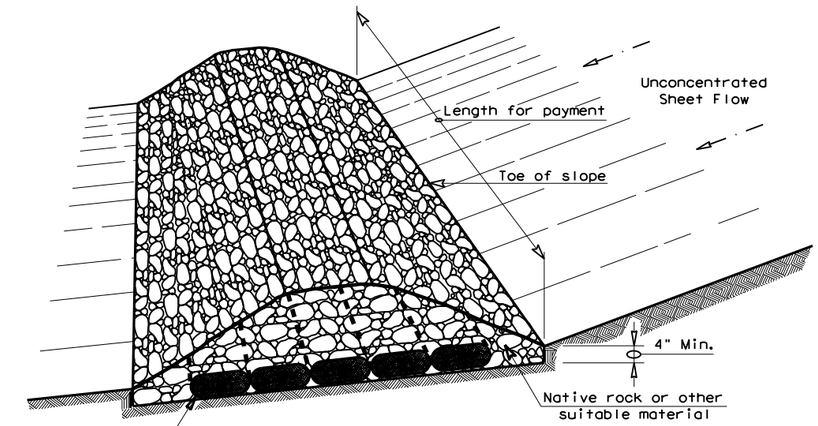
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

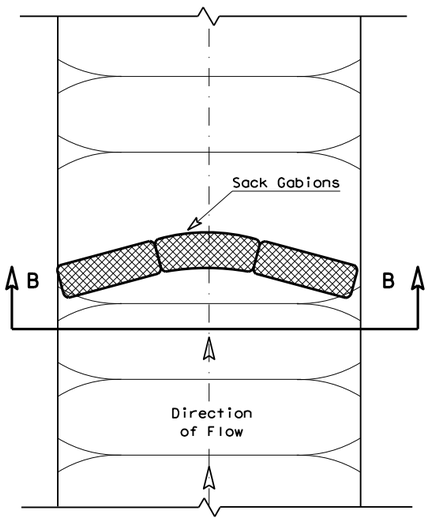
FILE: ec116	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB			HIGHWAY	
REVISIONS	1911	01	022,	ETC		FM 2004	
	DIST	COUNTY				SHEET NO.	
	HOU	GALVESTON				172	

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Environmental Standards\ec216.dgn

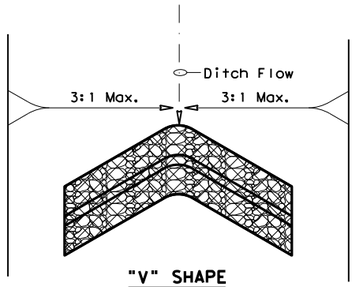


FILTER DAM AT TOE OF SLOPE

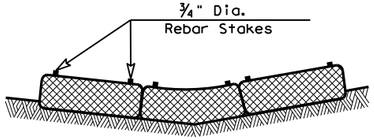
RFD1



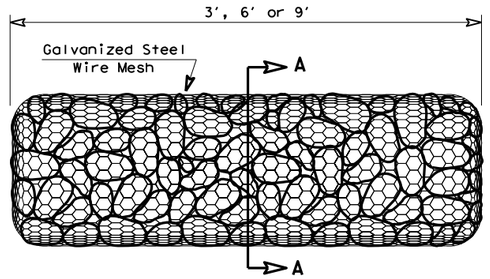
PLAN VIEW



"V" SHAPE PLAN VIEW

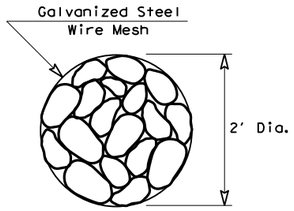


SECTION B-B

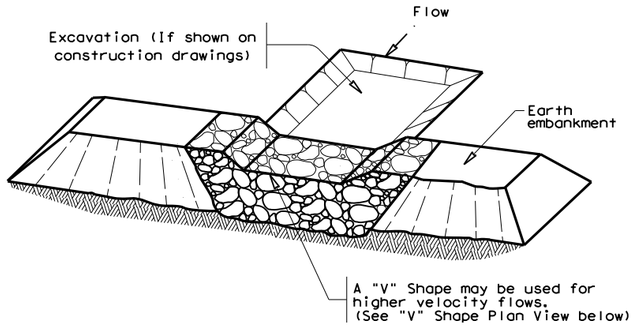


TYPE 4 (SACK GABIONS)

RFD4

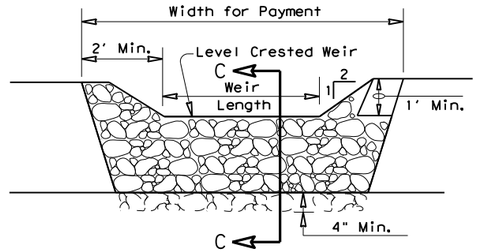


SECTION A-A

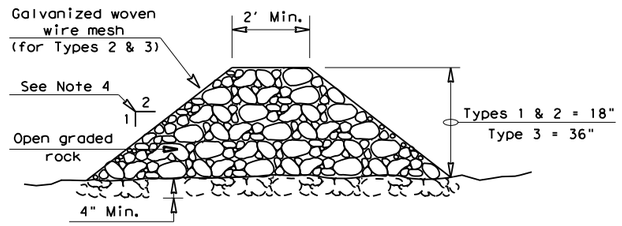


FILTER DAM AT SEDIMENT TRAP

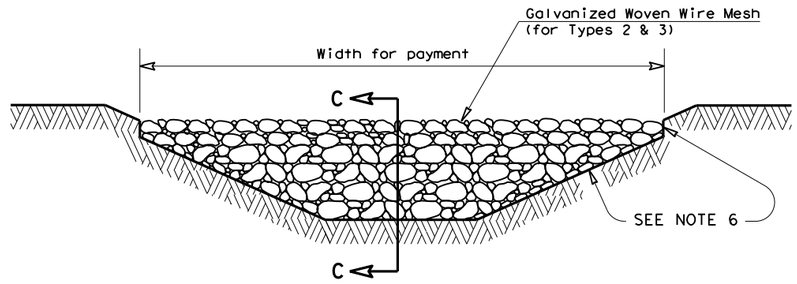
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

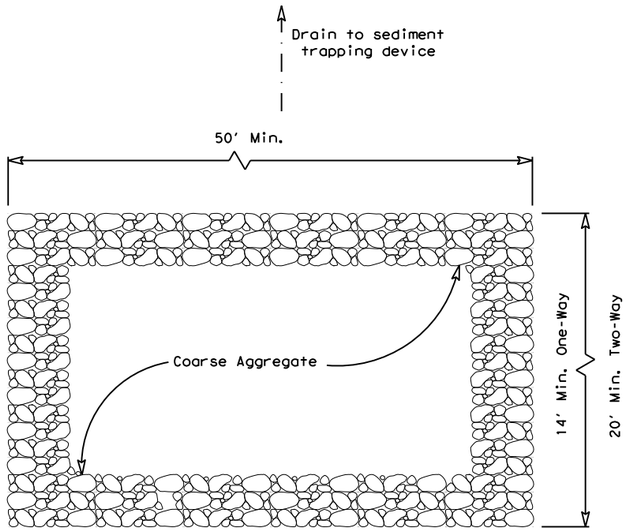
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

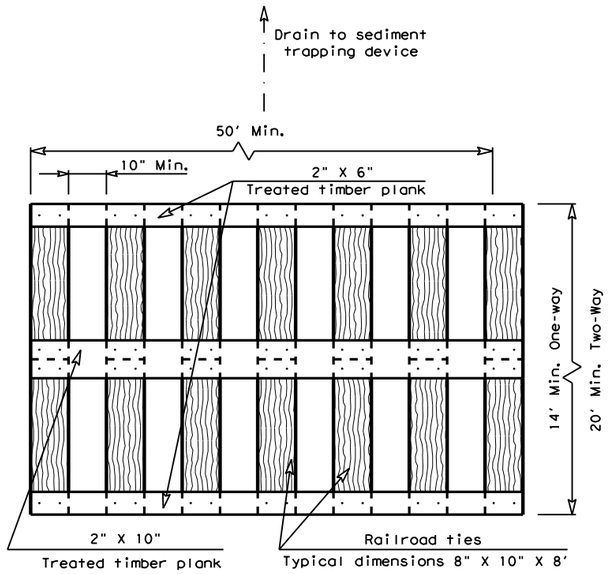
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		173

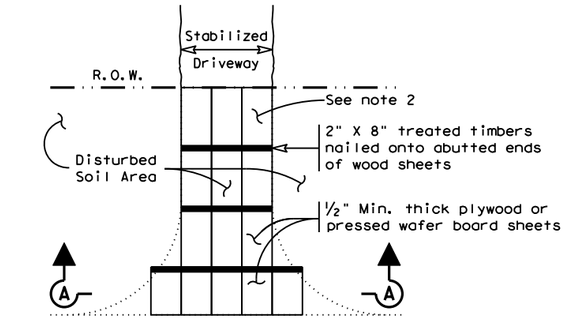
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Standards\Environmental Standards\ec316.dgn
North & South Sidewalk\19110102Fm2004Sidewalk\FM2004 North &



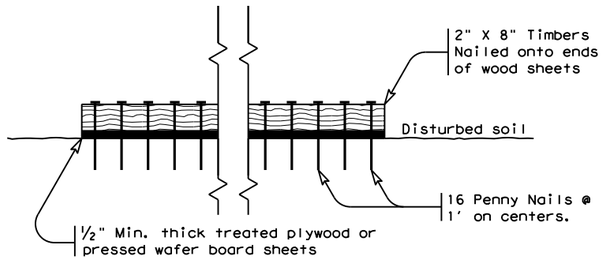
PLAN VIEW



PLAN VIEW



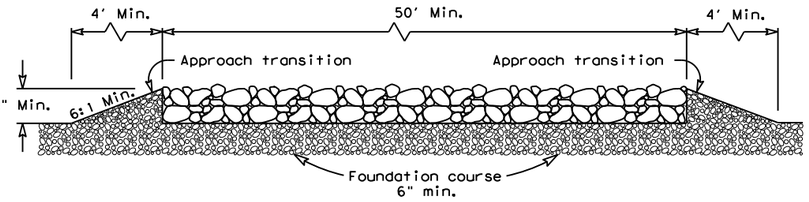
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

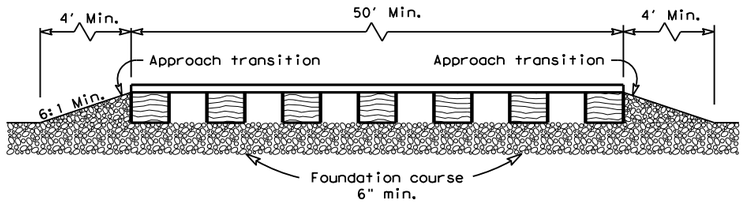
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

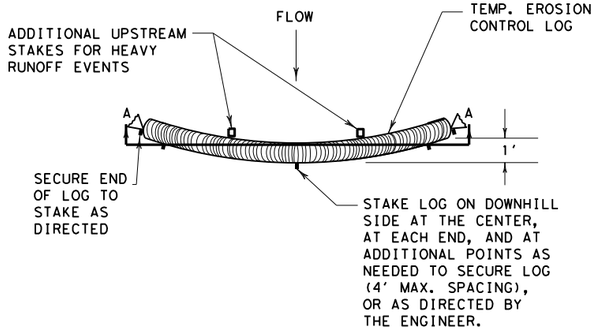
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

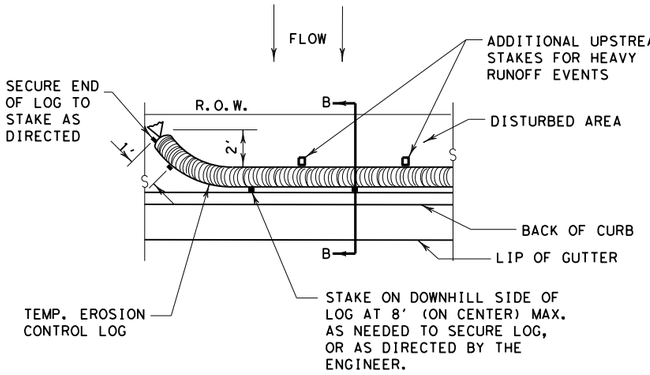
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		174

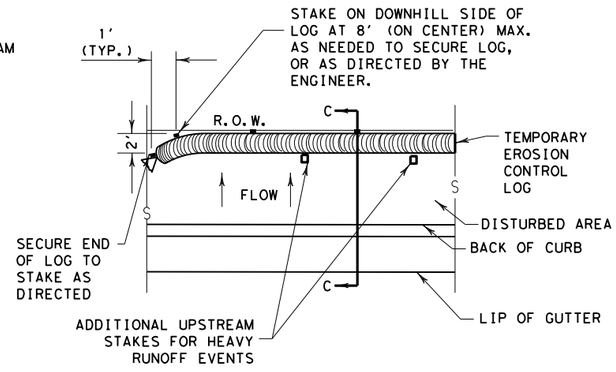
5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Environmental Standards\ec916.dgn
K:\FM2004 North & South Sidewalk\19110102Fm2004Sidewalk\FM2004 Sidewalk\19110102Fm2004Sidewalk\Standards\ec916.dgn



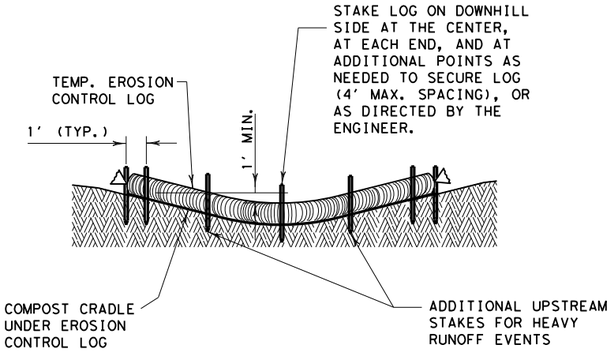
PLAN VIEW



PLAN VIEW



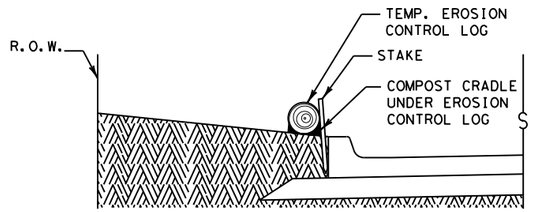
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

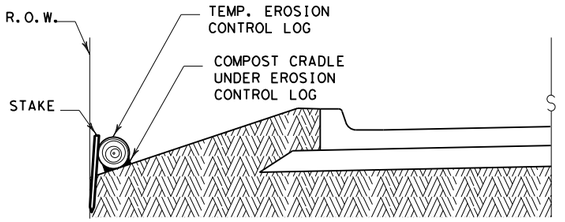
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

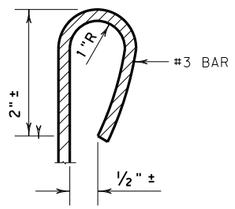
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



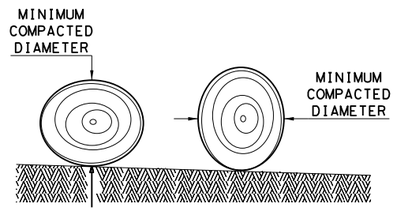
REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

SHEET 1 OF 3

Texas Department of Transportation | Design Division Standard

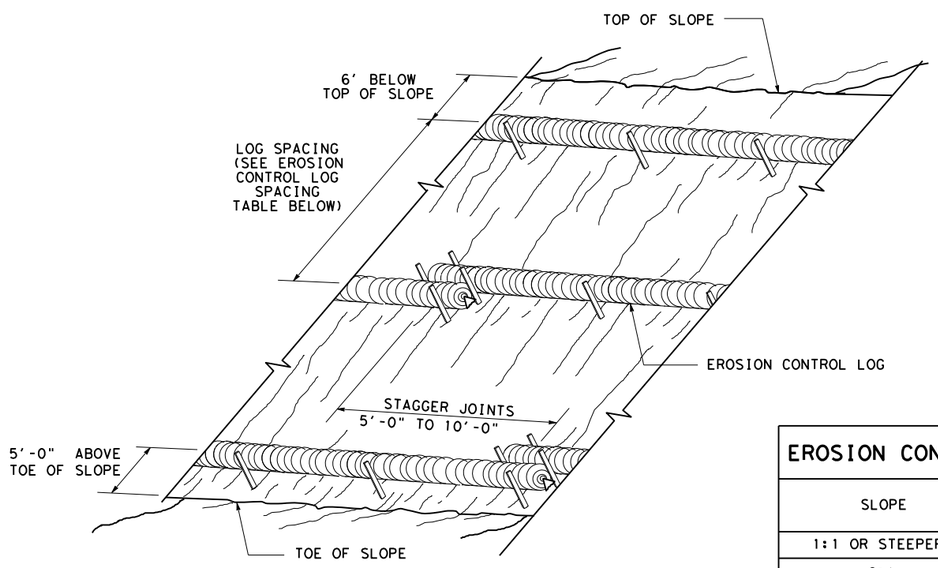
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

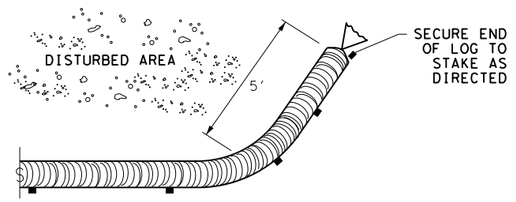
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	1911	01	022, ETC		FM 2004		
	DIST	COUNTY			SHEET NO.		
	HOU	GALVESTON			175		

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Standards\Environmental Standards\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

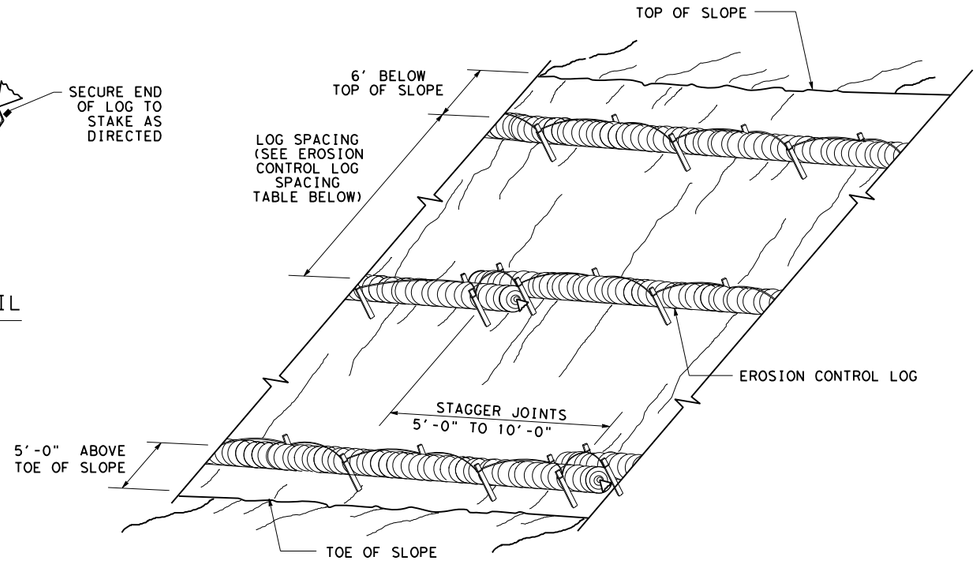
CL-SST



END SECTION RAP DETAIL

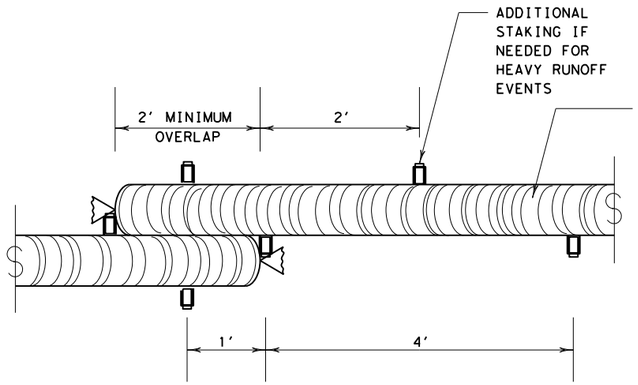
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

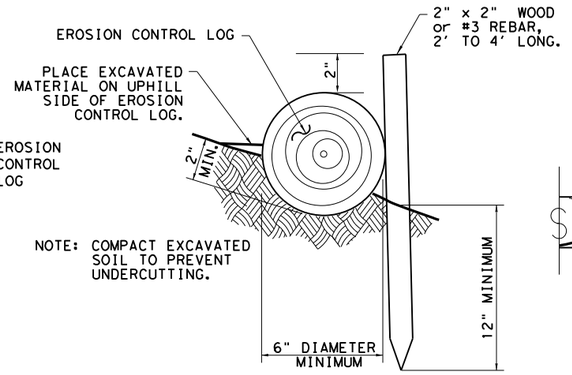
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

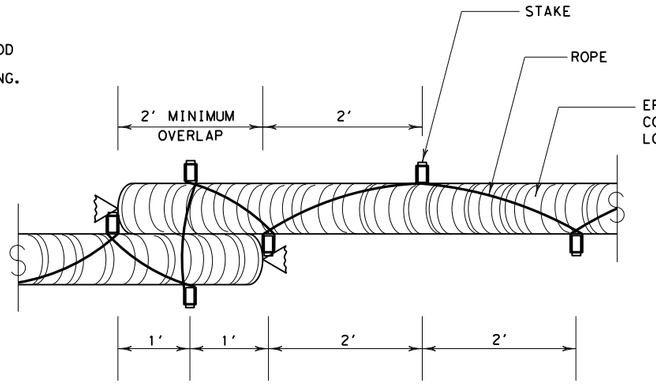


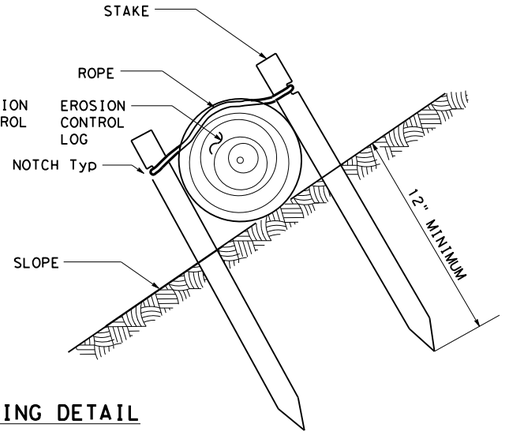


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

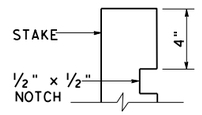
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

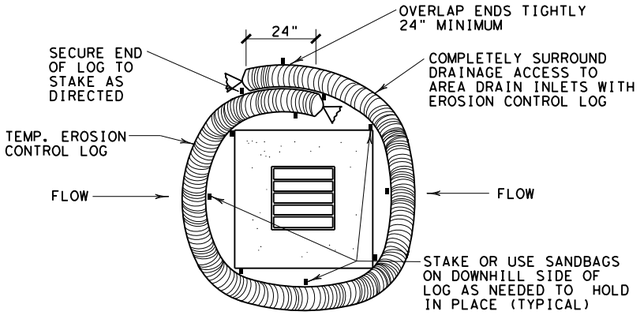
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

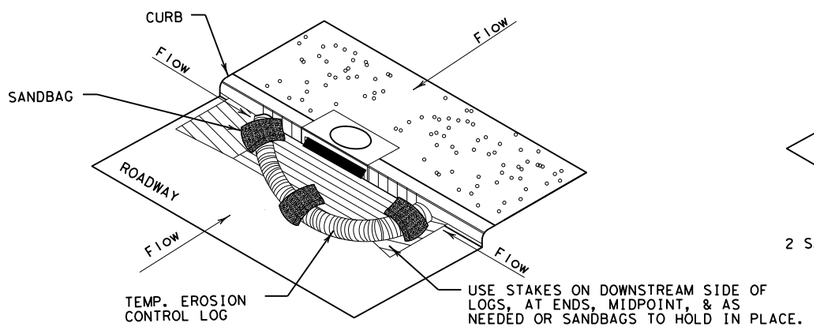
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1911	01	022, ETC	FM 2004	
	DIST	COUNTY		SHEET NO.	
	HOU	GALVESTON		176	

5/9/2024
Z:\Projects\220058*CEC*TxDOT\WSB\WA*4\FM2004 Sidewalk\Drawings\Standards\Environmental Standards\ec916.dgn
North & South Sidewalk\19110102Fm2004Sidewalk\FM2004



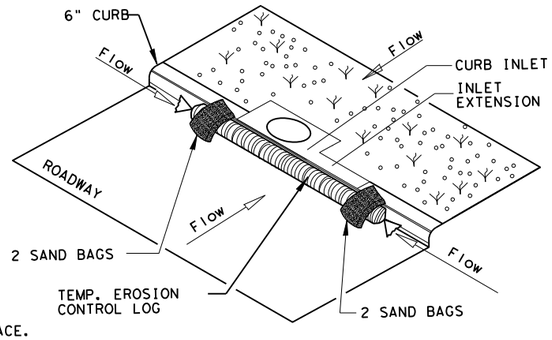
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

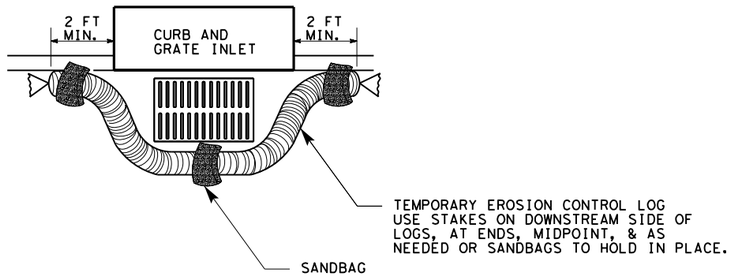
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

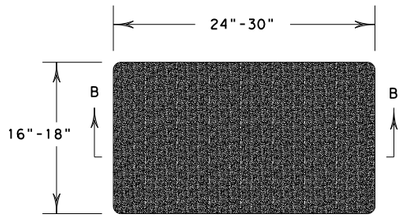
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

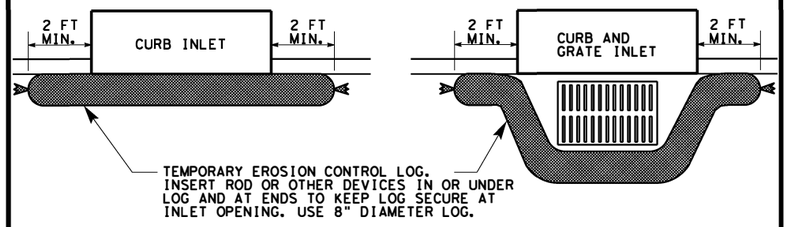
EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1911	01	022, ETC	FM 2004
	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		177

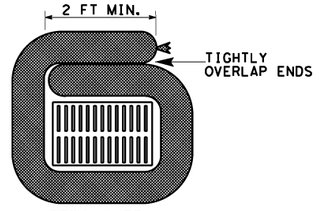
CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")

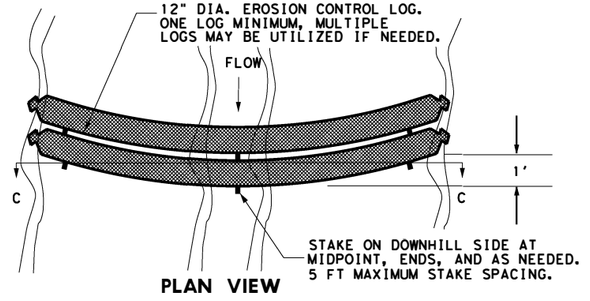


DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

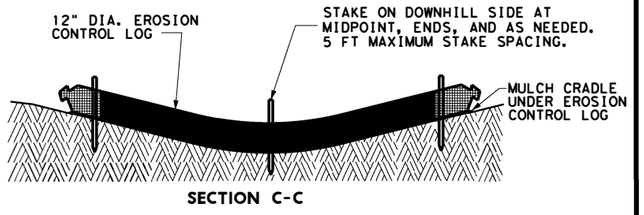
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

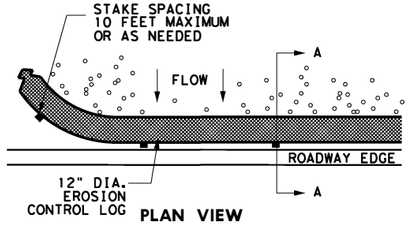


PLAN VIEW

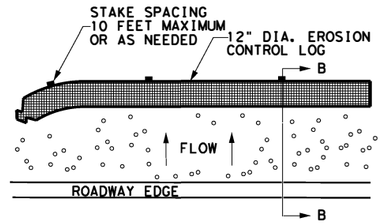


SECTION C-C

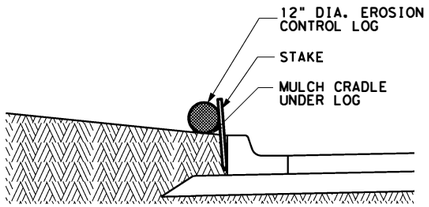
DRAINAGE SWALE OR DITCH



PLAN VIEW

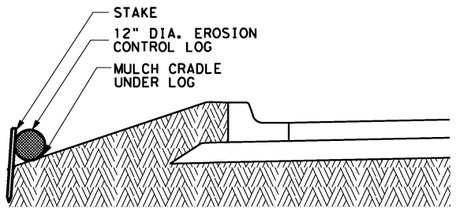


PLAN VIEW



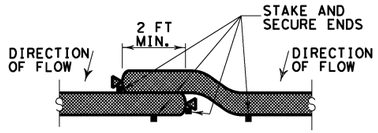
SECTION A-A

SLOPE TO ROADWAY EDGE



SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP

MATERIAL REQUIREMENTS

FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs. No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:

Use mesh with ¼" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

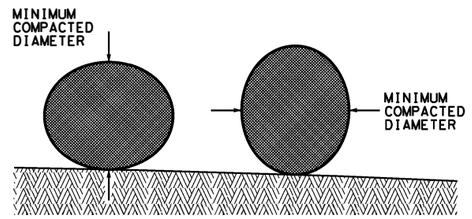
Sediment traps should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

The trap should be cleaned when the capacity has been reduced by ½ or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District

EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot			
© TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER				SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6					178
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	GALVESTON			1911	01	022, ETC.	FM2004

STD G-4A

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 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-6017 COMPOST MANUF TOPSOIL (BIP)(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.
✓			**162-6002 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.
	✓		**164-6066 DRILL SEEDING(PERM)(WARM OR 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: 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 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	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate 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. 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. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. 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.
	✓		**164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-6051 DRILL SEED(TEMP)(WARM OR 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 November, December, January, February: Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	**164-6009 BROADCAST SEED(TEMP)(WARM) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**162-6003 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) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-6001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown on 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, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	**168-6001 VEGETATIVE WATERING MG**	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 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

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. CULTIVATE SOIL (ITEM 162.3) 3. SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL 3. CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4. PERMANENT SEEDING 5. STRAW OR HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. CULTIVATE SOIL (PER ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW OR HAY MULCH 5. VEGETATIVE WATERING

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

FSSSCW-15

REVISIONS	FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS 3/2023 ADDED SHEET ABBREVIATION	OCT 2014	6	TEXAS				179
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12	GALVESTON	1911	01	022, ETC	FM 2004

STD K-1

GENERAL TREE PROTECTION NOTES:

1. Protect and ensure the continued good health of existing trees identified on the plans or directed by the Engineer. Protective measures include providing, installing, maintaining and removing protective fences, bound wood planking, compost, berm pruning, boring, and watering.
2. Install tree protection before any heavy equipment arrives on the site and remains in place for the duration of the project.

PROTECTIVE FENCE

1. Critical Root Zone (CRZ)= 1 foot radius per 1 caliper inch of trunk diameter.
2. Place protective fence at the edge of the critical root zone of trees to be protected. Use 4 feet high orange plastic mesh or approved equivalent supported on steel T-posts. Use steel T-posts minimum of 6 feet long, spaced at intervals sufficient to keep fence pulled tight. Stretch smooth galvanized wire from post to post across the top of fence and draw tight. Attach plastic mesh to posts and top wire with aluminum tie wire or nylon ties.
3. No excavation, grading, filling, soil compaction, parking, or equipment storage is allowed within the fenced area.
4. When a construction zone overlaps the root zone due to lack of space, place fence within 2 feet of construction zone.
5. Install protective compost filter berm at base of protective fence as shown in detail and described in these notes under "Root Zone Protection". Compost filter berm functions as a protective filter from runoff associated with construction activities such as: concrete wash, erosion, fill, chemicals, cement and lime work and other activities.

VEGETATIVE WATERING FOR TREE PROTECTION

1. Water trees at a rate of 30 gallons per week for every week during construction activities. Watering is paid for separately under Item 168-6001 Vegetative Watering.

TRUNK PROTECTION

1. Where protective fence is located closer than 6 feet from a tree trunk from any direction, protect the tree trunk with bound wood planking. Wood planks may be construction grade lumber a minimum of 1 inch by 6 inch nominal. Band planks together with rope, band, or strap of sufficient gauge and quality to keep protective planking in place around tree trunk for the duration of the project. Install wood planks of sufficient length to protect the trunk to a height of 10 feet, or the height of the lowest major branching, whichever is less. Do not use nails, screws or other damaging attachment methods.

ROOT ZONE PROTECTION

1. Cover entire area of critical root zone with 4" depth of erosion control compost. Erosion control compost is paid for separately under Item 161-6009 Erosion Control Compost. See standard specification for compost requirements.
2. Install protective compost filter berm at base of protective fence along entire edge of critical root zone as shown on detail this sheet. Dimensions of compost filter berm are 1 foot tall, and 2 feet wide at base. Use erosion control compost for berm paid for under Item 161-6009 Erosion Control Compost. Maintain berm throughout project.
3. Vehicular traffic, stockpiling or storage of materials, parking of equipment and refueling equipment is prohibited in protected areas.

BORING, TRENCHING, GRADING, AND PRUNING

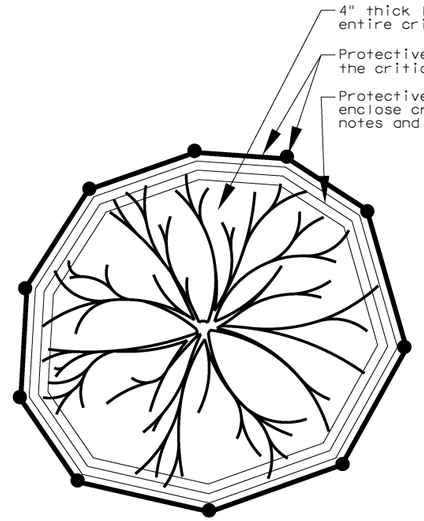
1. Where shown in plans, underground utilities crossing under protected areas will be bored beneath critical root zones. Avoid boring directly beneath root flare. Bore depth is 4 feet below existing grade.
2. No trenching, excavating, filling, or compaction is allowed within the critical root zone except as specifically identified in the plans and approved by the Engineer.
3. When existing grade must be cut within the critical root zone, contact the Engineer prior to beginning work. Before grading or excavation work, saw cut roots to the depth of the proposed disturbance along the edge of the proposed disturbance before excavation is begun.
4. Prune flush with soil any roots exposed by construction. Backfill root areas with good quality topsoil as soon as possible. If exposed root areas are not to be backfilled within two days, then cover with a minimum of six inches of erosion control compost. Erosion compost is paid for separately under Item 161-6009 Erosion Control Compost.
5. When grading within the critical root zone, use hand or small equipment and alter grade no more than two inches. No soil disturbance is allowed on the root flare under any circumstances.
6. Perform any pruning to provide clearance for structures, vehicular traffic, and construction equipment before construction damage might occur. Prune any limb damage within two hours of occurrence and according with ANSI A300-1995 standard.

MAINTENANCE OF TREE PROTECTION MATERIALS

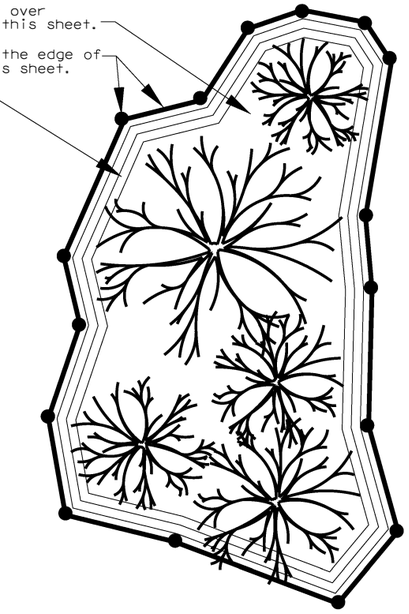
1. Maintain all tree protection materials throughout entire length of project. Repair damaged or affected tree protection materials. Additional erosion control compost may be required during the project and will be paid for separately.

REMOVAL OF TREE PROTECTION MATERIALS

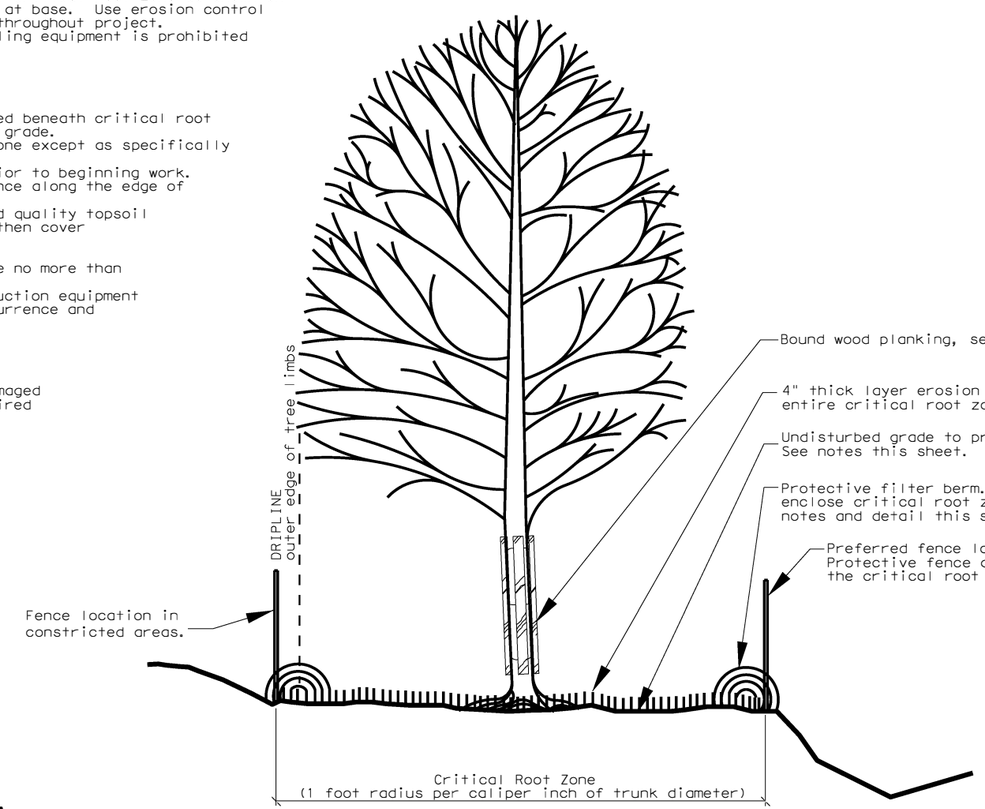
1. Remove and dispose of all protective fencing and trunk protection at end of project.



PLAN VIEW OF INDIVIDUAL TREE AND PROTECTIVE FENCE



PLAN VIEW OF TREE GROUP AND PROTECTIVE FENCE



TYPICAL TREE PROTECTION

REQUIRED ITEMS:

- Item 1004-6001 Tree Protection EA
- Item 1004-6002 Tree Protection AC
- Item 161-6009 Erosion Control Compost CY
- Item 168-6001 Vegetative Watering MG

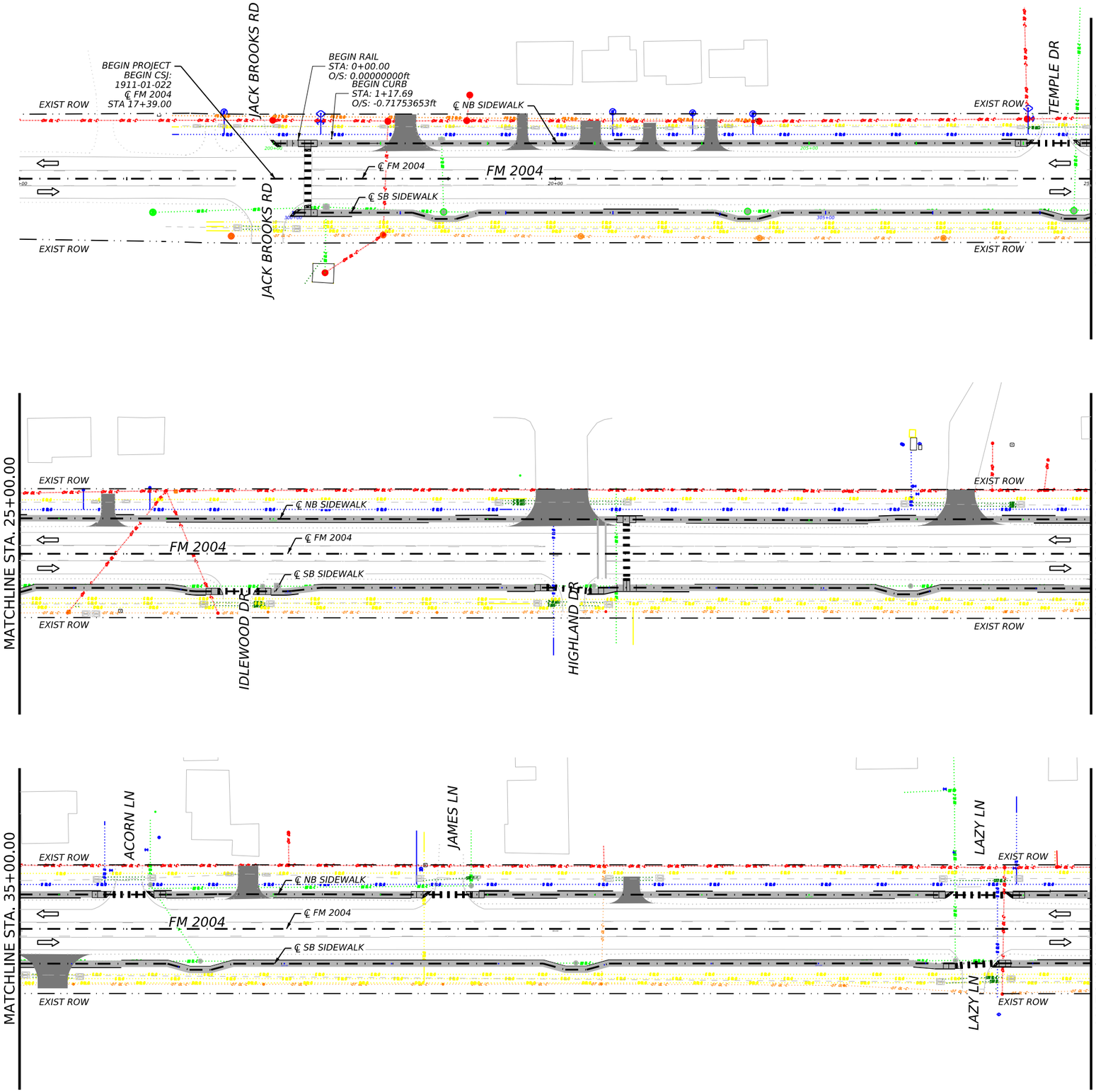
Texas Department of Transportation
HOUSTON DISTRICT

TREE PROTECTION
SHEET 1 OF 1

Details not to scale

FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
	6	TEXAS				180
REVISED: FEB 2015 FOR 2014 SPECS	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	12	GALVESTON	1911	01	022, ETC	FM 2004

STD K-3



LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/30/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

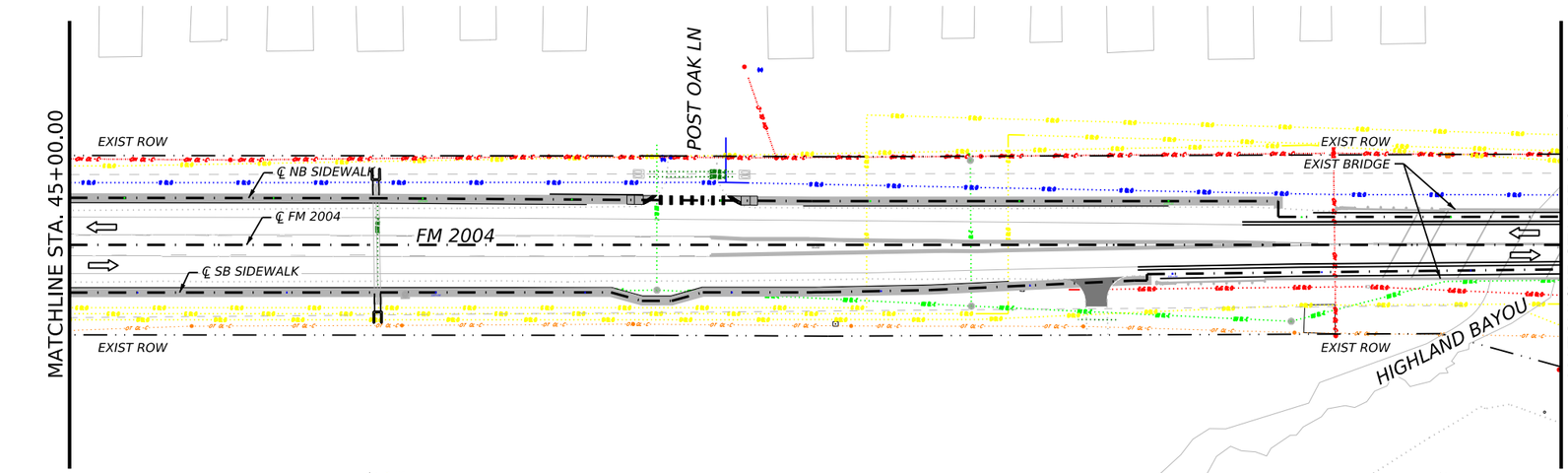
UTILITY LAYOUT

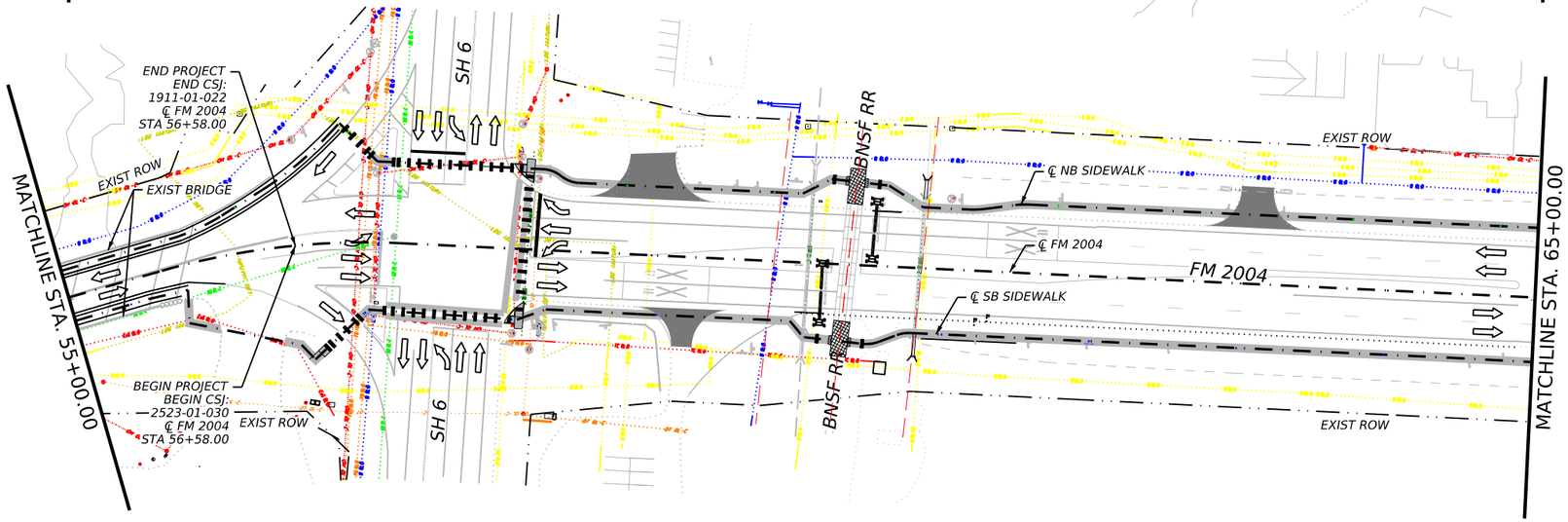
℄ FM 2004
BEGIN TO STA 45+00

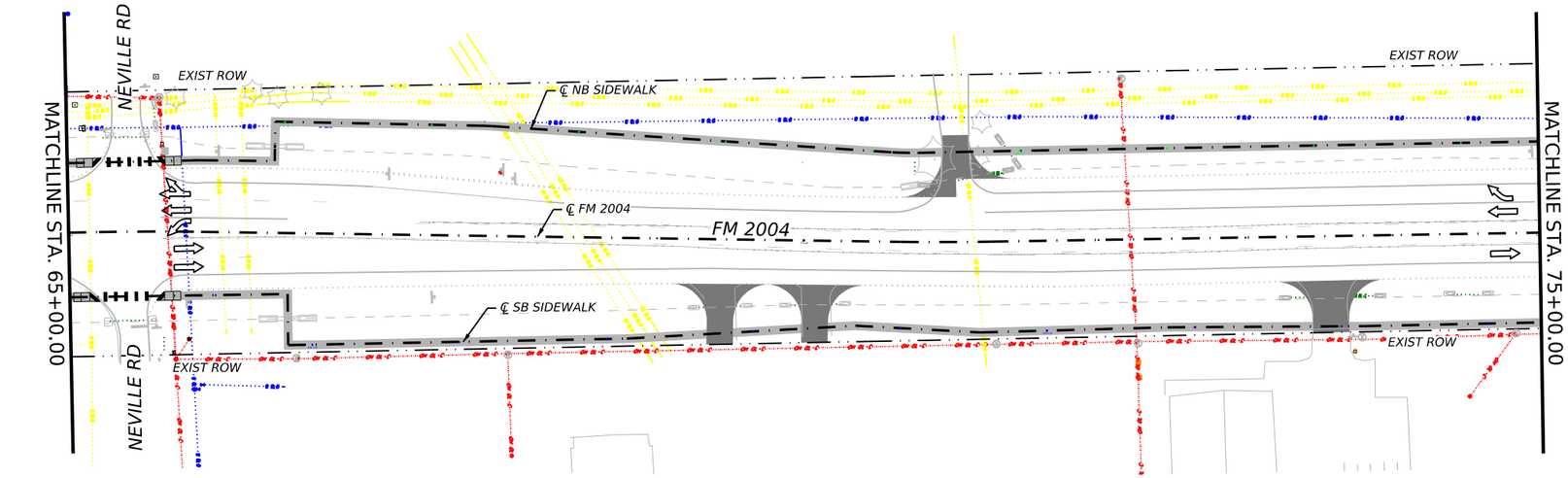
SHEET 01 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		180A

DATE: 5/30/2024 2:58:56 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Drawings\Sheets\Utility Layouts\Utility layout - Plan 1.dgn







LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH

HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/20/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

UTILITY LAYOUT

℄ FM 2004
STA 45+00 TO STA 75+00

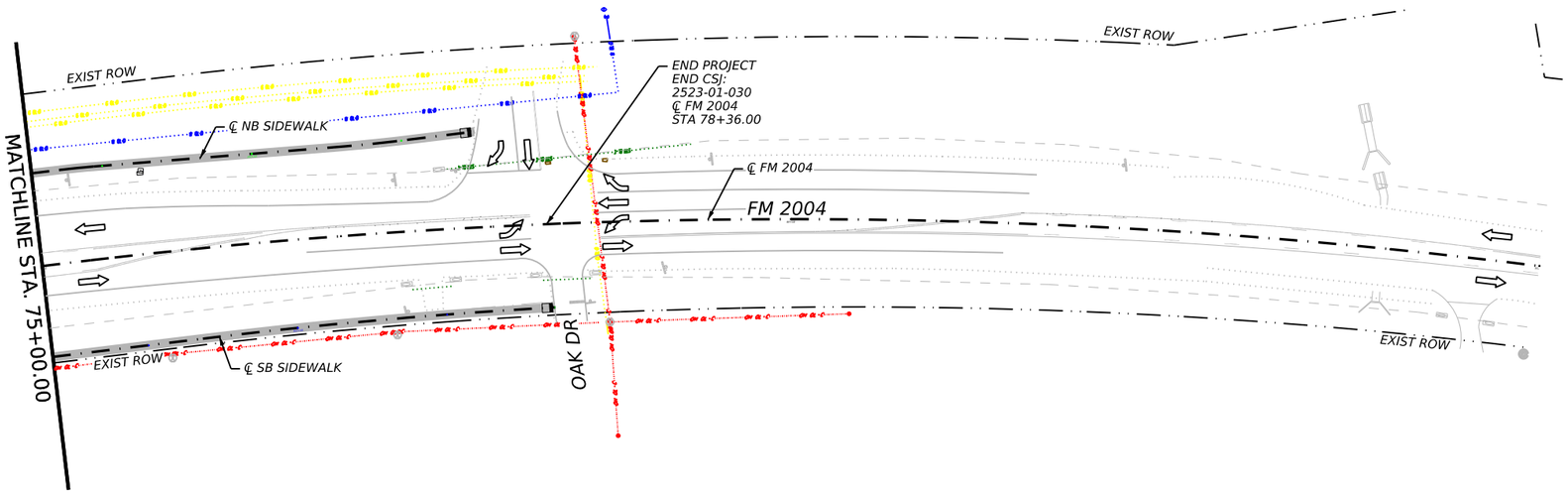
SHEET 02 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		180B

DATE: 5/20/2024 4:24:21 PM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Sheets\Utility Layouts\Utility layout - Plan 4.dgn

LINESTYLE LEGEND

UTILITY	OWNER
OH UTILITIES (QLC)	AS NOTED
OH TELEPHONE (QLC)	VERIZON
ELECTRIC-UG (QLD)	CENTERPOINT
FIBER OPTIC(QLD)	AT&T
FIBER OPTIC(QLD)	COMCAST
FIBER OPTIC(QLD)	FRONTIER
FIBER OPTIC(QLD)	PHONOSCOPE
GAS (QLD)	AIR LIQUIDE
GAS (QLD)	CENTERPOINT
GAS (QLD)	ENTERPRISE
GAS (QLD)	GENESIS
GAS (QLD)	KINDER MORGAN
GAS (QLD)	SHELL
GAS (QLD)	ABANDONED ACCORDING TO UTIL RECORDS
STORM (QLC)	TXDOT
SANITARY (QLD)	CITY OF HITCHCOCK
TELEPHONE (QLD)	VERIZON
TRAFFIC CONTROL(QLD)	TXDOT
WATER (QLD)	GULF COAST WATER AUTH



HORZ 0' 50' 100'

SCALE IN FEET

STATE OF TEXAS
MAJED A. AGHA
131711
LICENSED
PROFESSIONAL ENGINEER

05/09/2024

REV. NO.	DATE	DESCRIPTION	BY

AGHA ENGINEERING LLC

AGHA ENGINEERING, LLC
F-20817
1080 ELDRIDGE PARKWAY
SUITE #200
HOUSTON, TX 77077

Texas Department of Transportation

FM 2004

FROM JACK BROOKS RD TO OAK DR

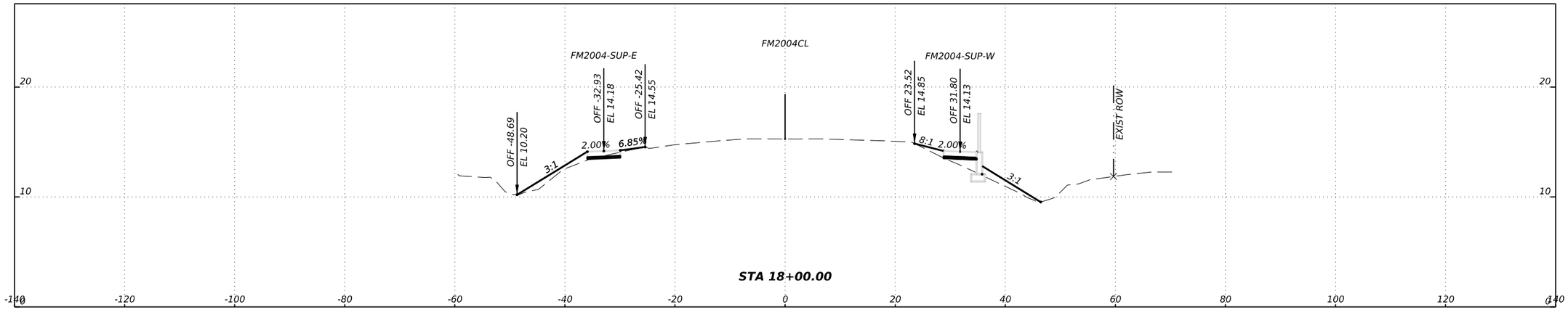
UTILITY LAYOUT

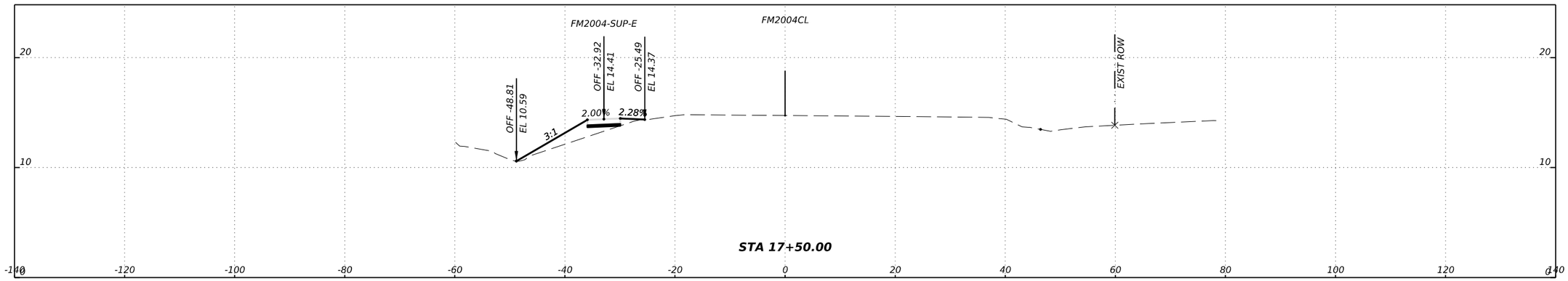
℄ FM 2004
STA 75+00 TO END

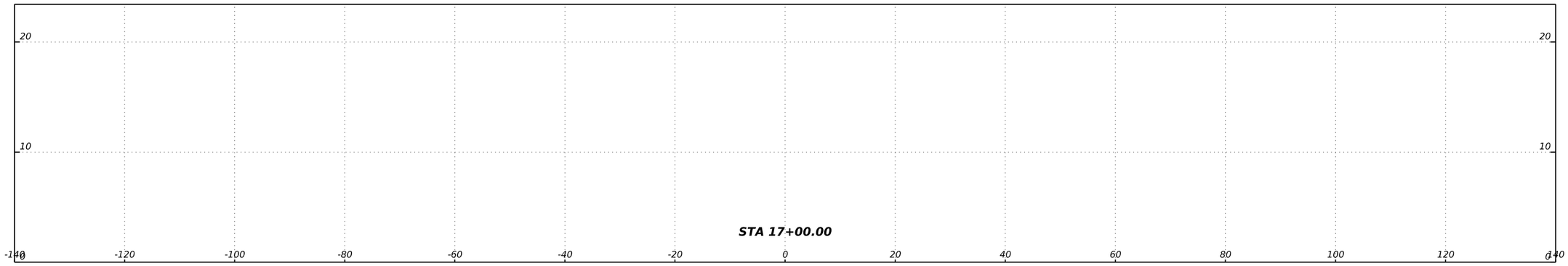
SHEET 03 OF 03

CONT	SECT	JOB	HIGHWAY
1911	01	022, ETC	FM 2004
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		180C

DATE: 5/9/2024 11:19:56 AM
FILE: Z:\Projects\220058 CEC TxDOTWSB\WA 4\FM2004 Sidewalk\19110\022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Sheets\Utility Layouts\Utility Layout - Plan 7.dgn



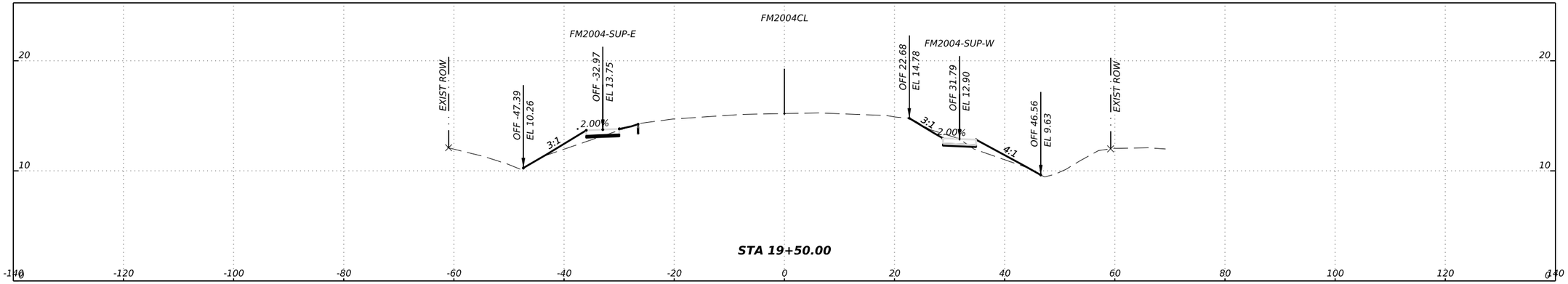


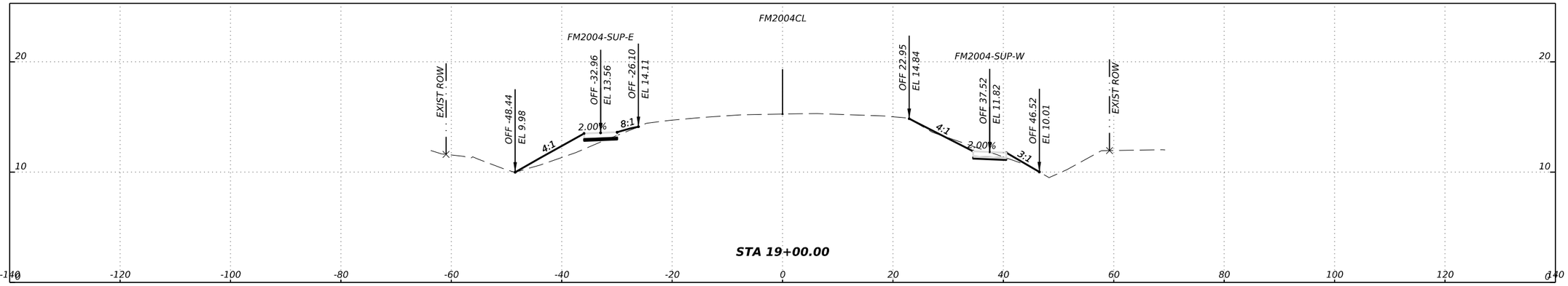


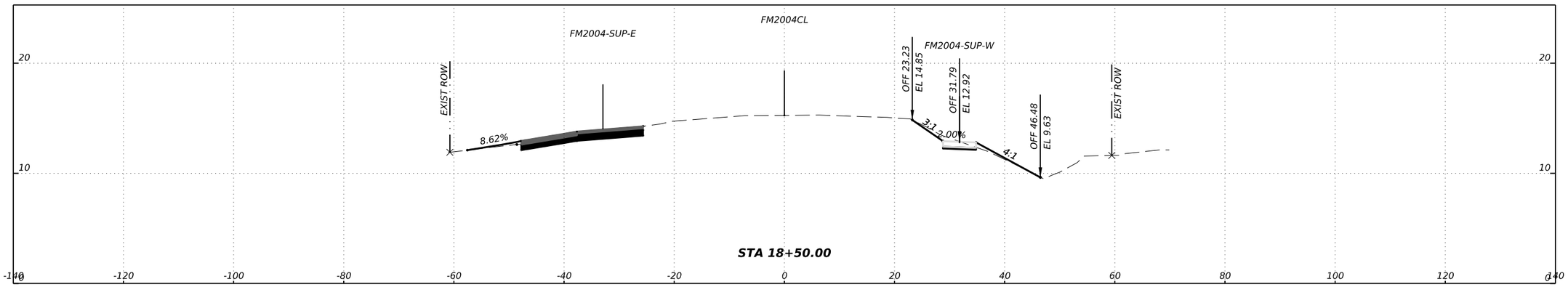
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	181

DATE: 3/14/2024 9:50:07 AM
FILE: ZDGN\191101022fm2004Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn
DESIGNED: CEC TxDOTWSBIWA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn
DRAWN: CEC
CHECKED:
DW:
CK:





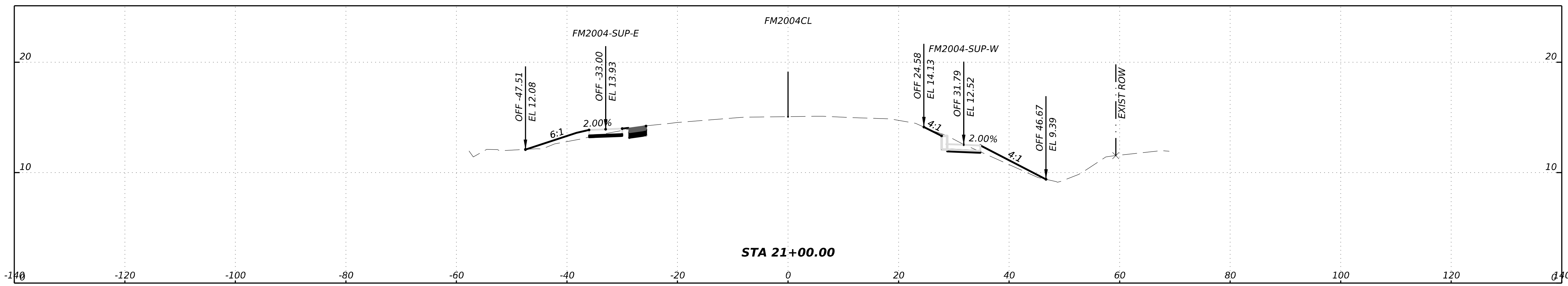


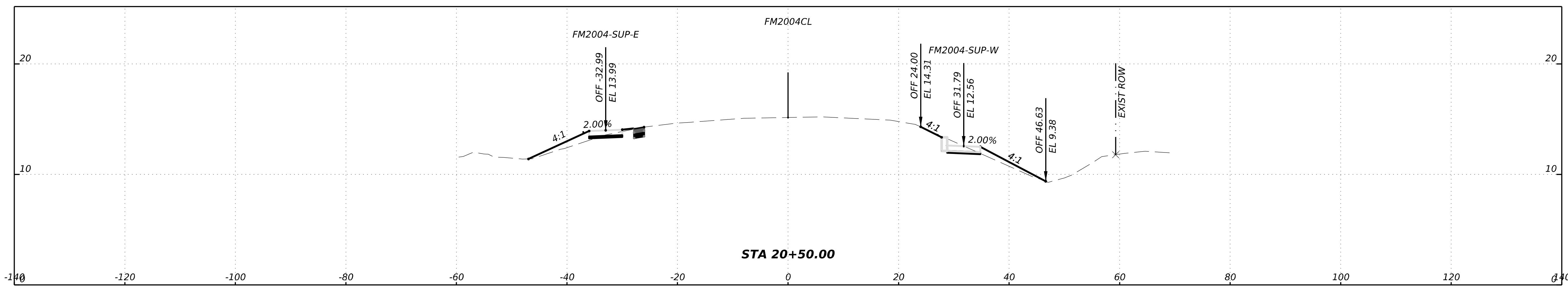
NOTE - CONTRACTOR INFORMATION ONLY

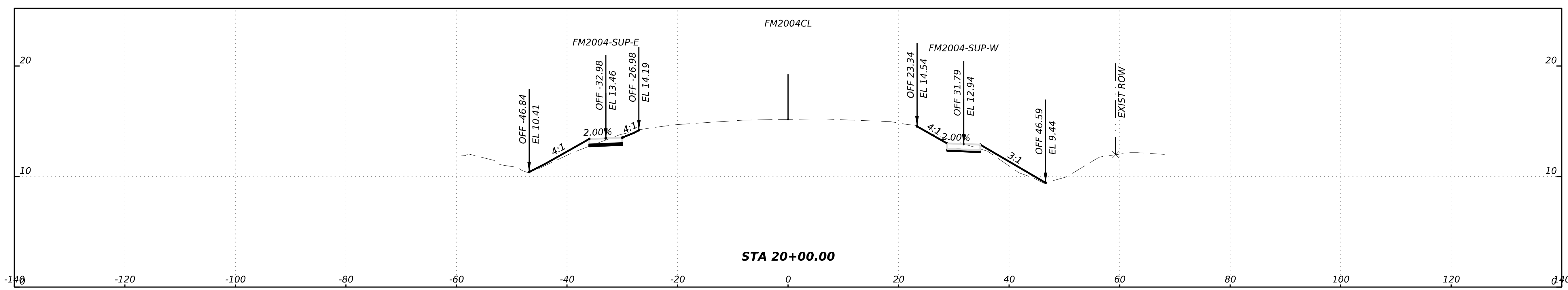
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	182

DATE: 5/9/2024 11:03:37 AM
FILE: Z:\Projects\220058 CEC_TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn







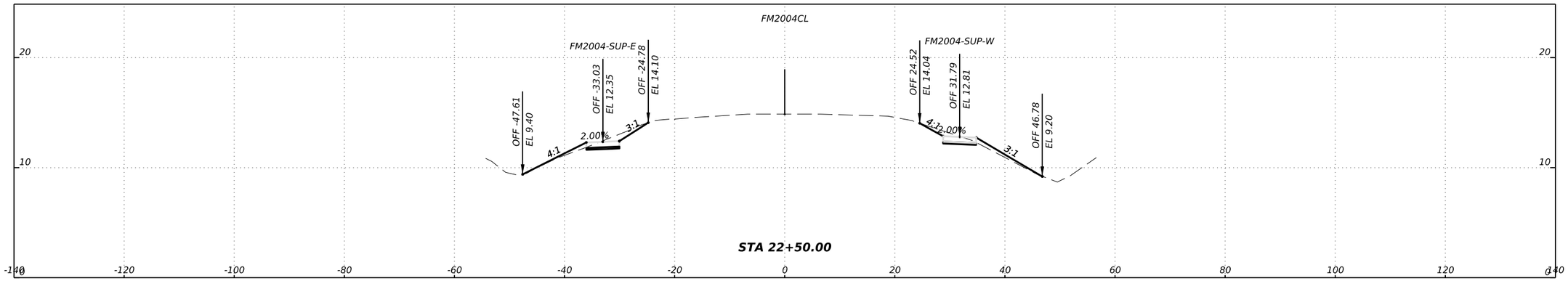
NOTE - CONTRACTOR INFORMATION ONLY

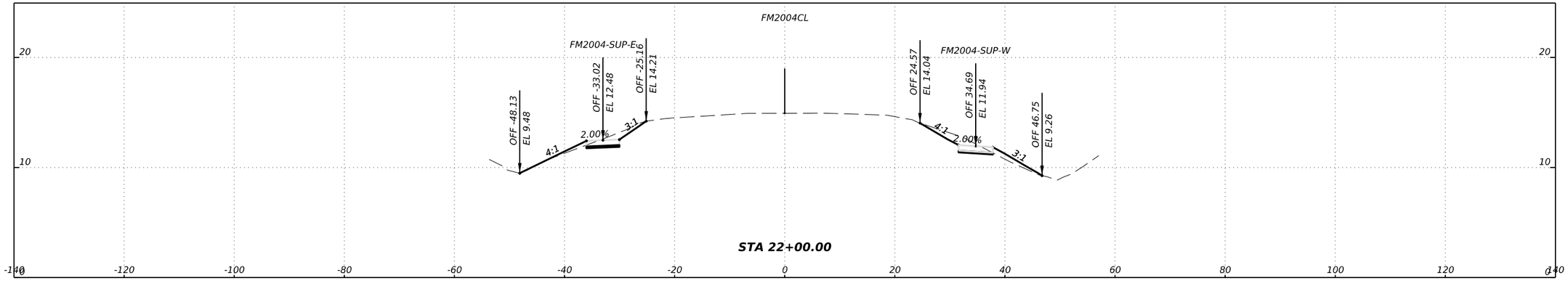
Texas Department of Transportation

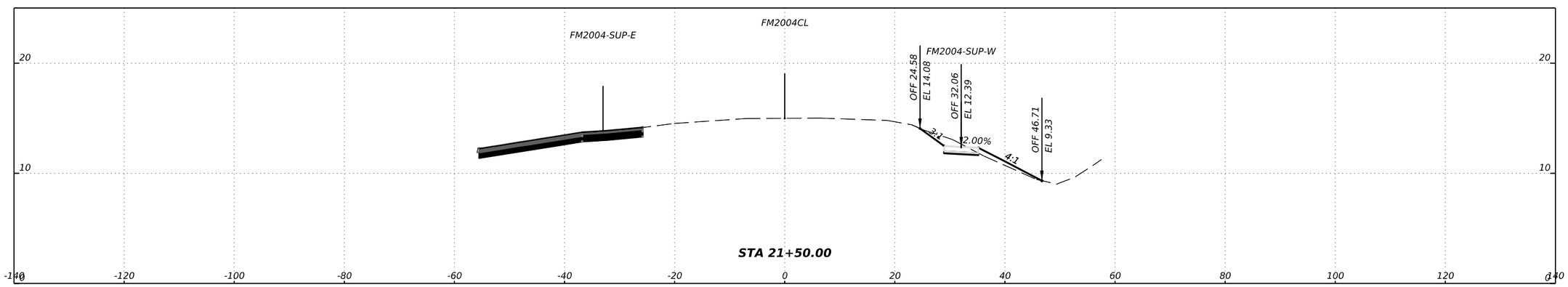
SHEET 3 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	183

DATE: 3/14/2024 TIME: 9:50:18 AM
FILE: ...\FM2004 Sidewalk\1911022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn





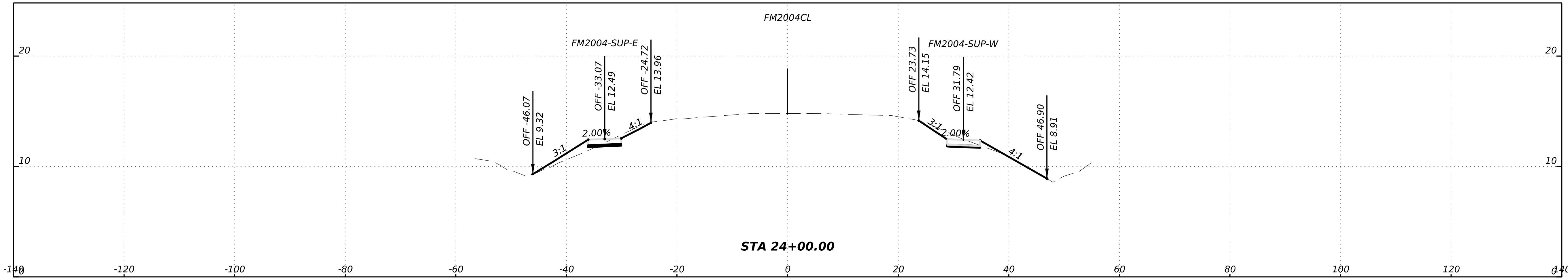


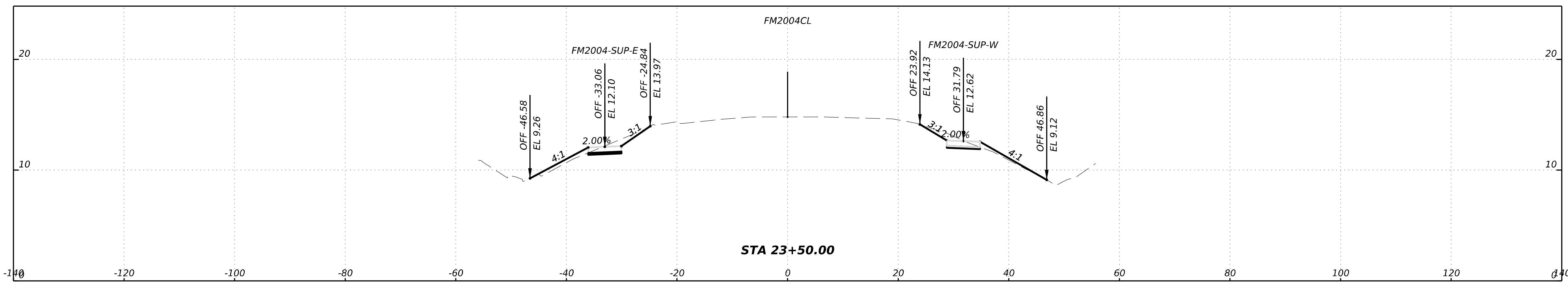
NOTE - CONTRACTOR INFORMATION ONLY

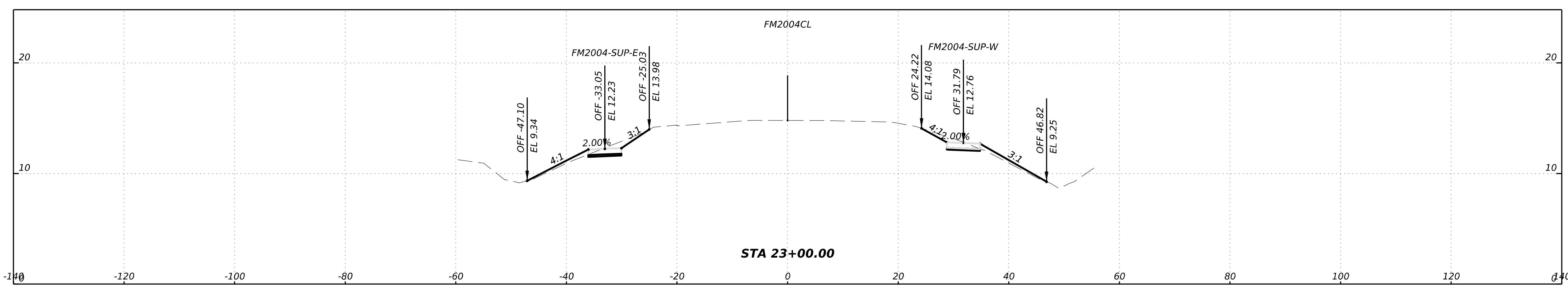
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	184

DATE: 5/9/2024 11:03:42 AM
FILE: Z:\Projects\220058 CEC_TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

DW: CK: DW: CK:







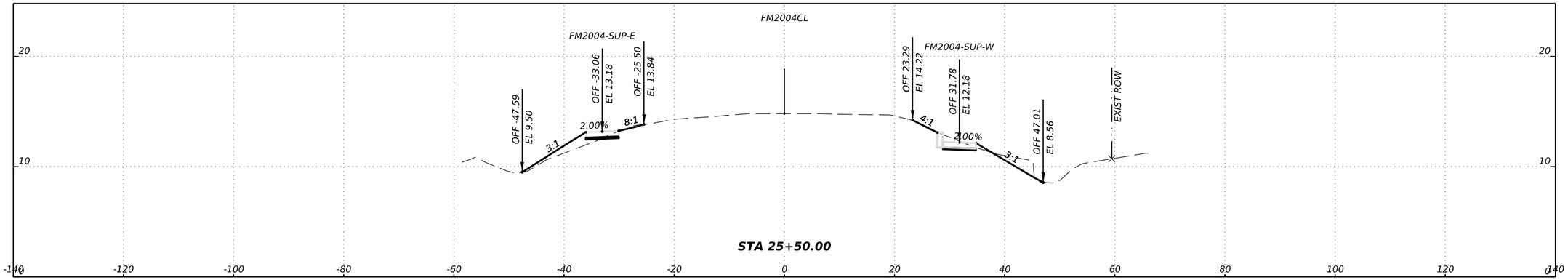
NOTE - CONTRACTOR INFORMATION ONLY

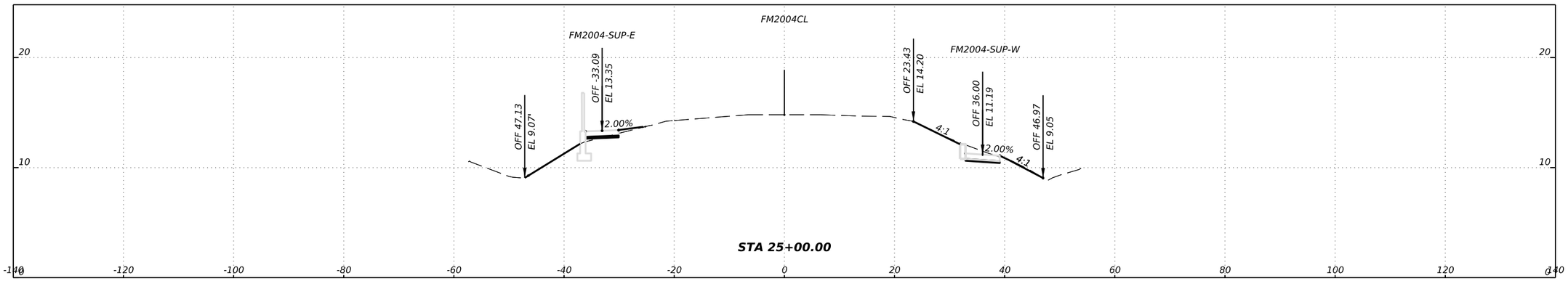
SHEET 5 OF 44

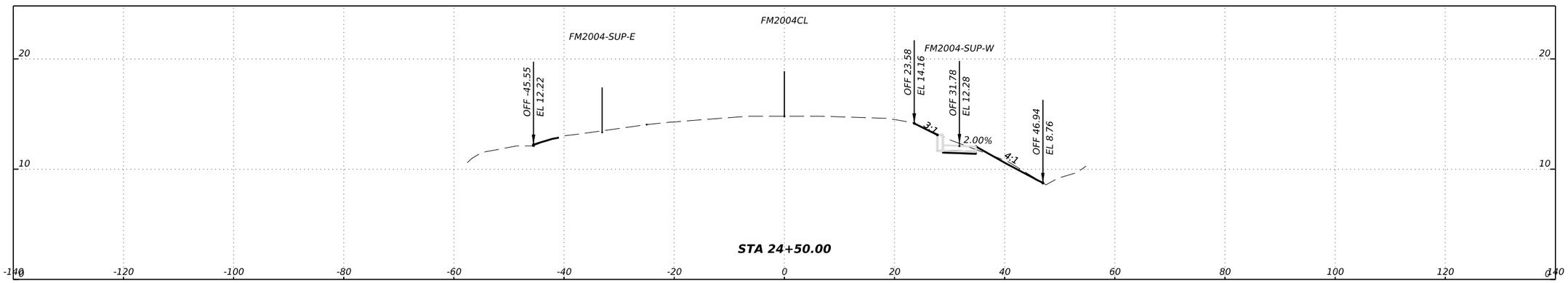
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	185

DATE: 9:50:29 AM
FILE: ...CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







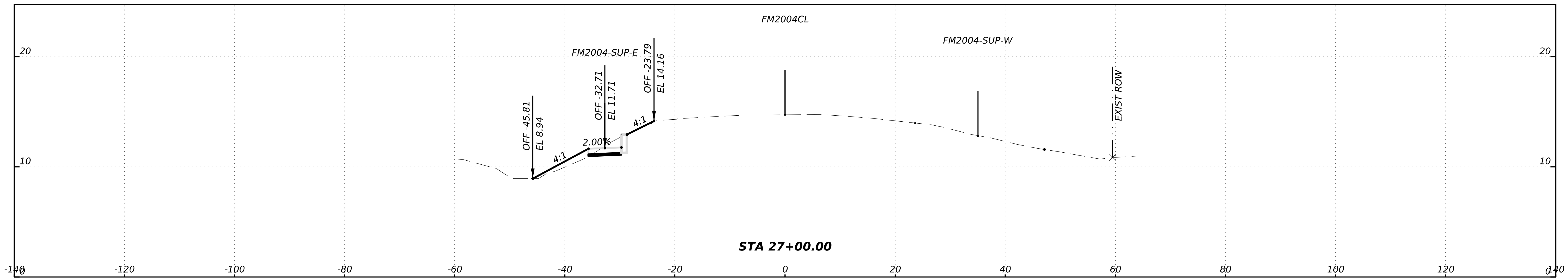
NOTE - CONTRACTOR INFORMATION ONLY

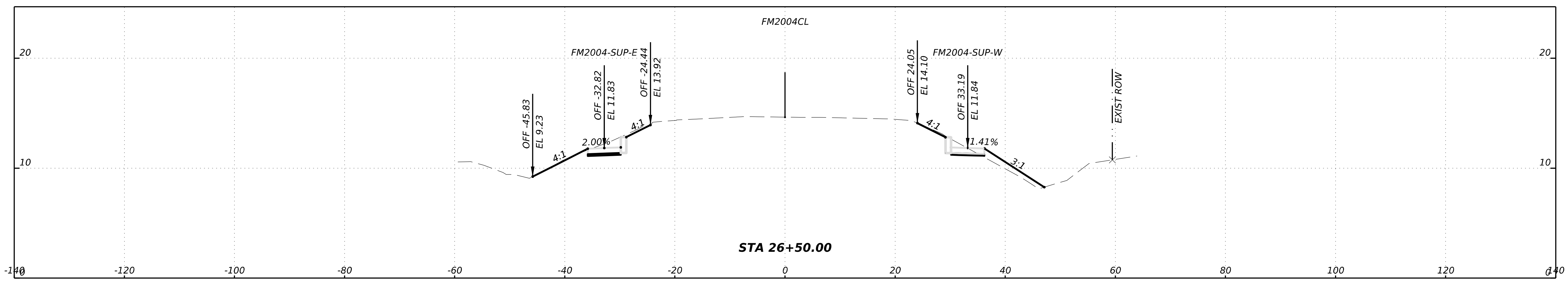
Texas Department of Transportation

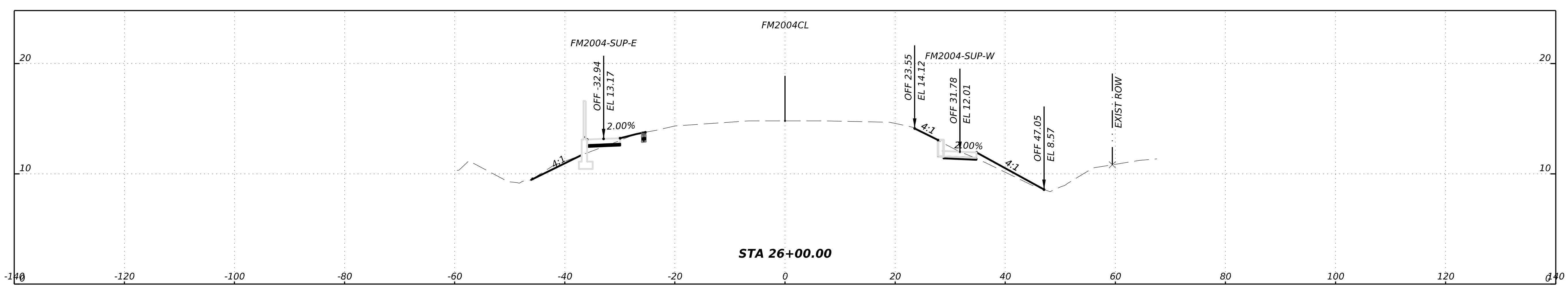
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	186

DATE: 5/9/2024 11:03:48 AM
FILE: Z:\Projects\220058 CEC_TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW: CK: DW: CK:







NOTE - CONTRACTOR INFORMATION ONLY

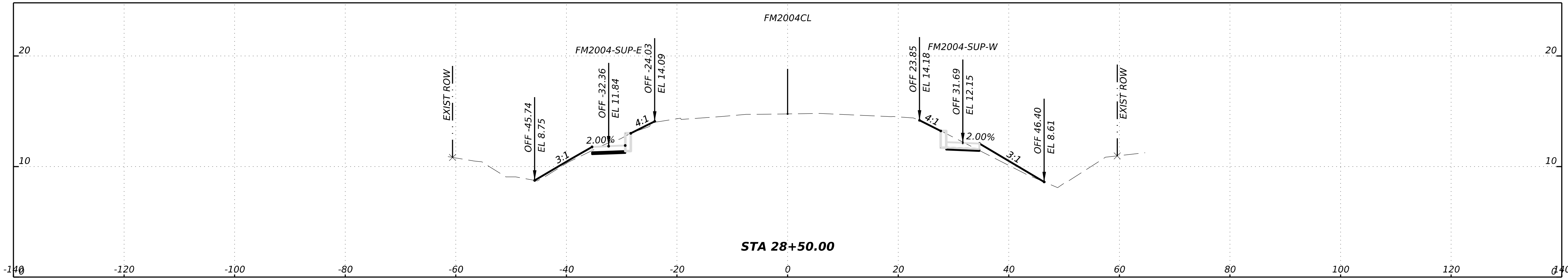
SHEET 7 OF 44

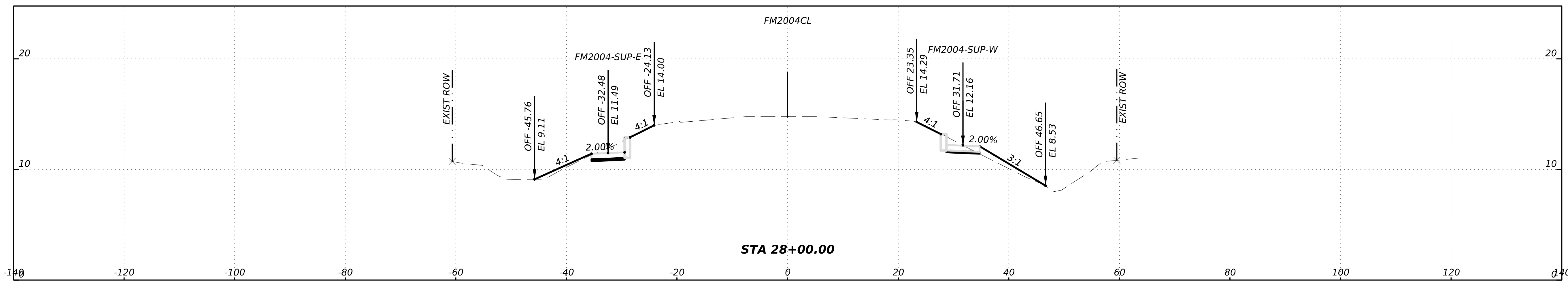
Texas Department of Transportation

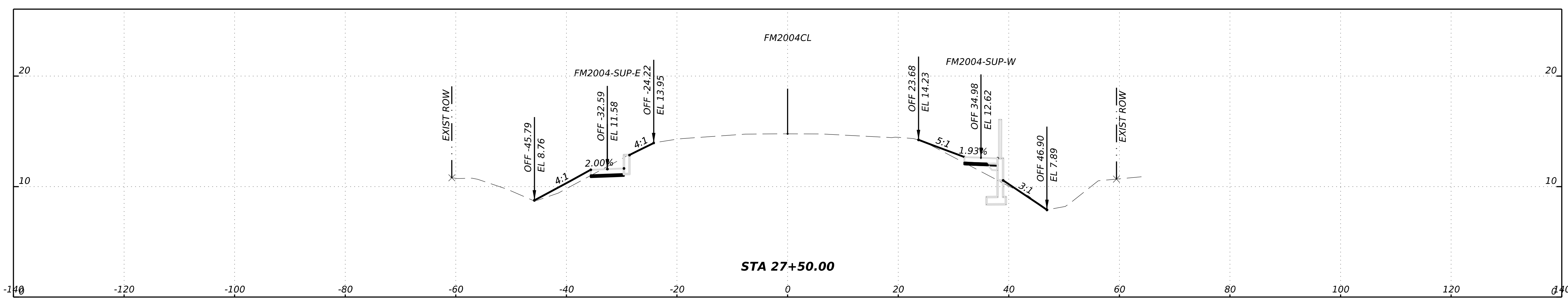
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	187

DATE: 3/14/2024 TIME: 12:21:57 PM
FILE: ...\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

DN: CK: DW: CK:







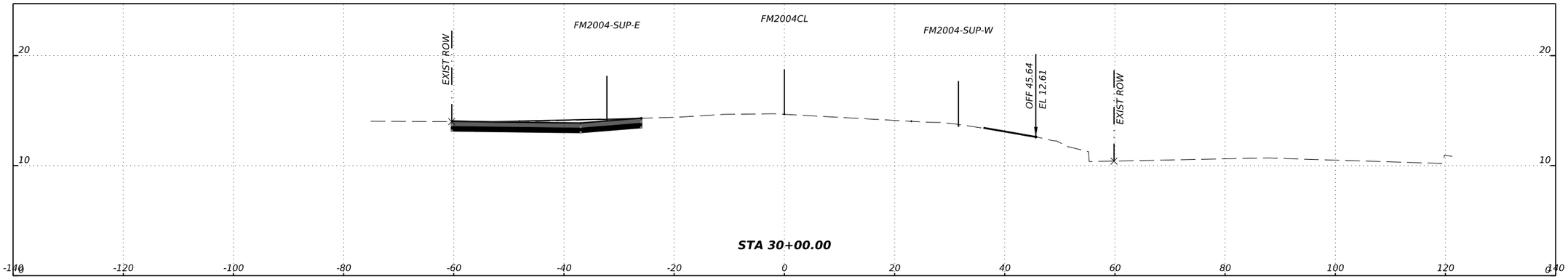
DATE: 3/14/2024 9:50:47 AM
FILE: ZDOCUMENTS\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

NOTE - CONTRACTOR INFORMATION ONLY

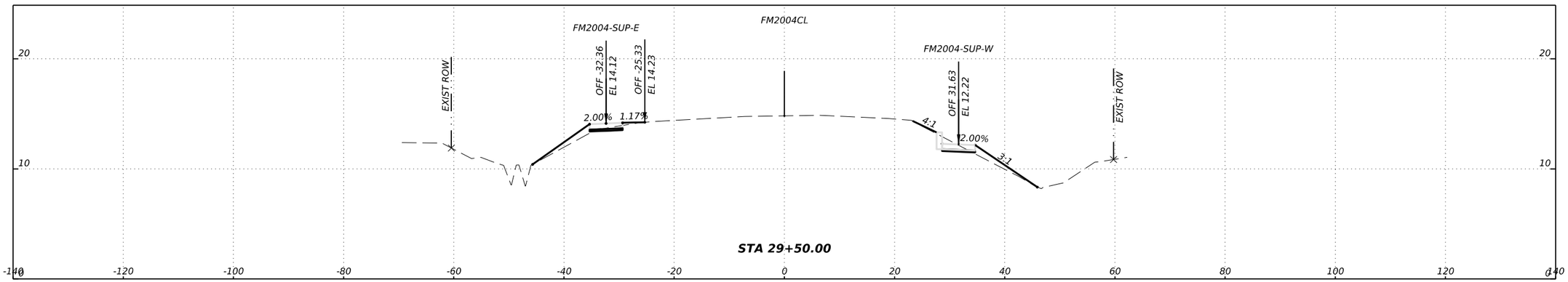
Texas Department of Transportation

SHEET 8 OF 44

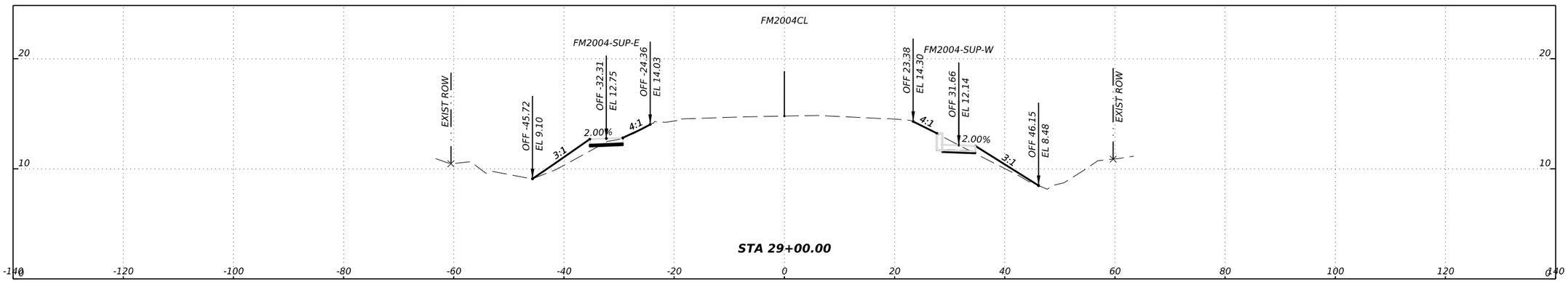
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	188



STA 30+00.00



STA 29+50.00

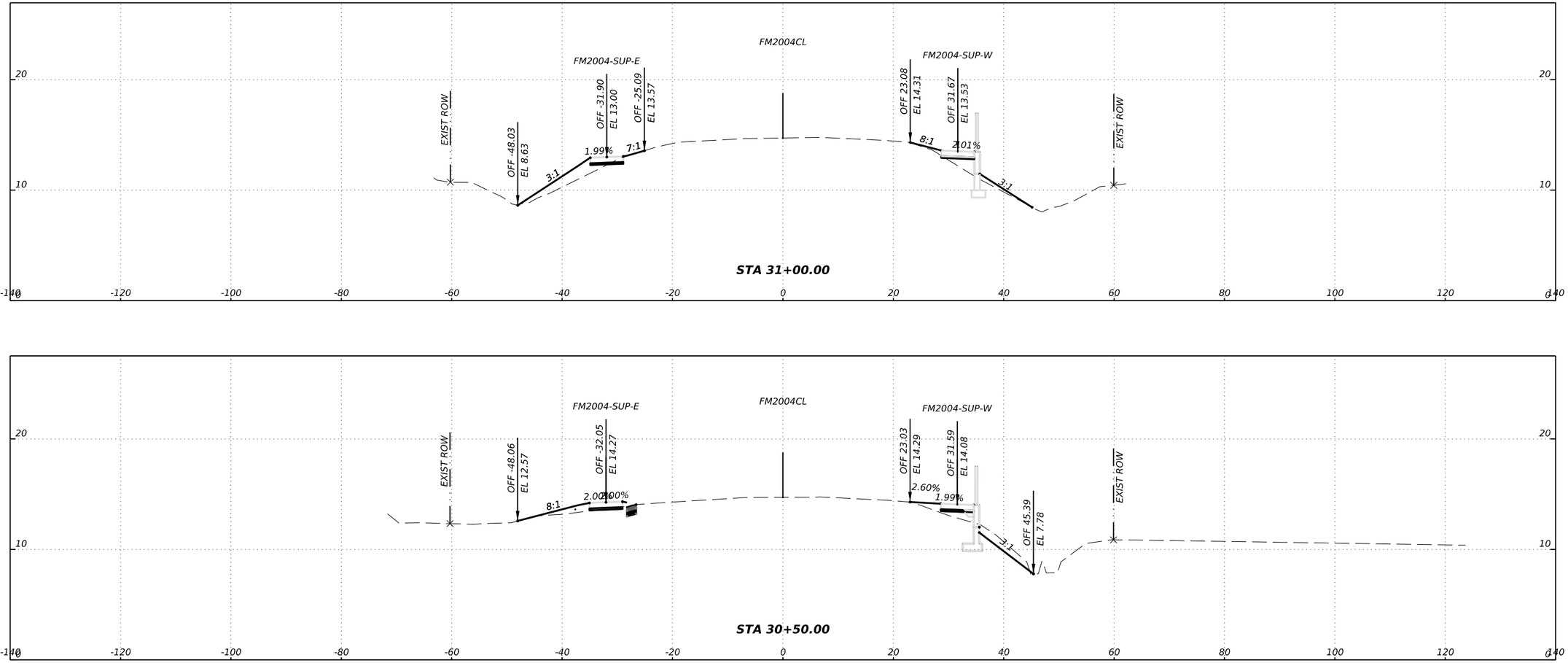


STA 29+00.00

NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	189

DATE: 3/14/2024 9:50:53 AM
FILE: C:\Projects\2024\Sidewalk\TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD Cross Sections.dgn
DW: CEC
CK:
DW:
CK:



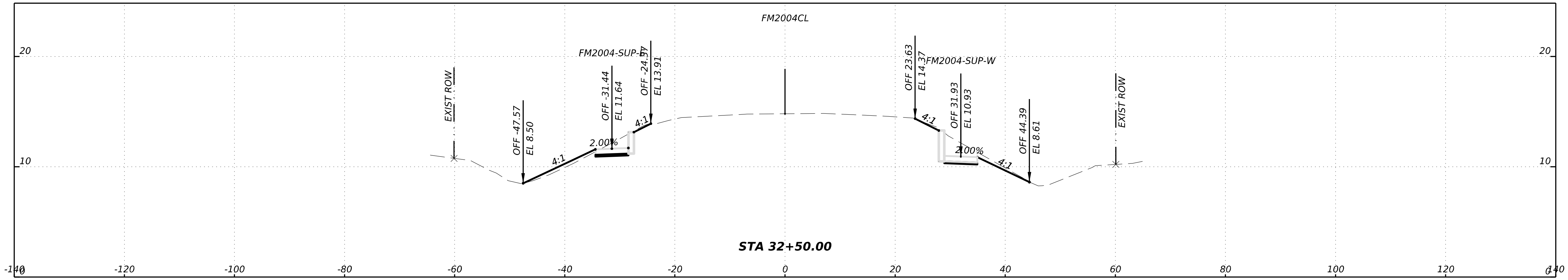
NOTE - CONTRACTOR INFORMATION ONLY

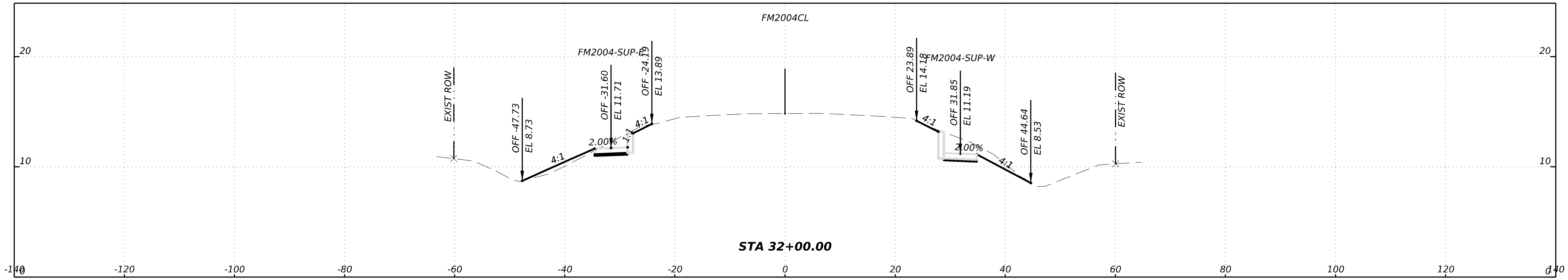
SHEET 10 OF 44

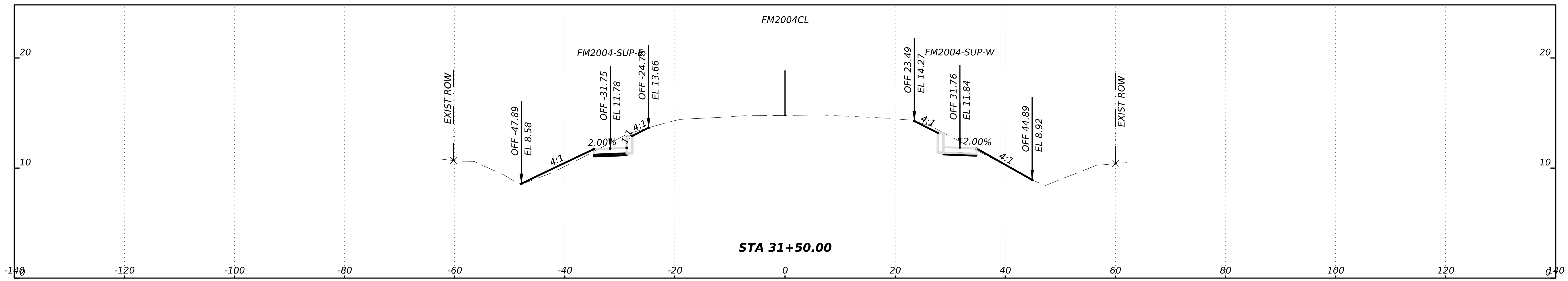
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	190

DATE: 3/14/2024 12:22:16 PM
FILE: C:\Projects\191101022 - FM 2004 Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW | CK | DW | CK







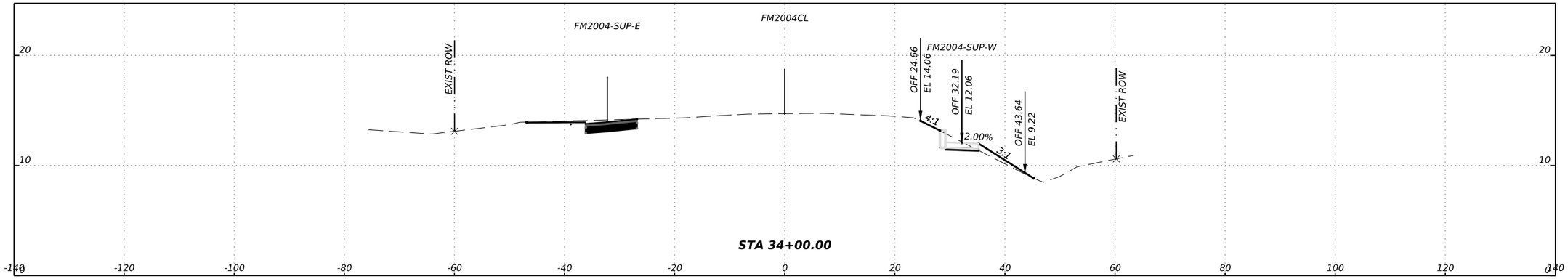
NOTE - CONTRACTOR INFORMATION ONLY

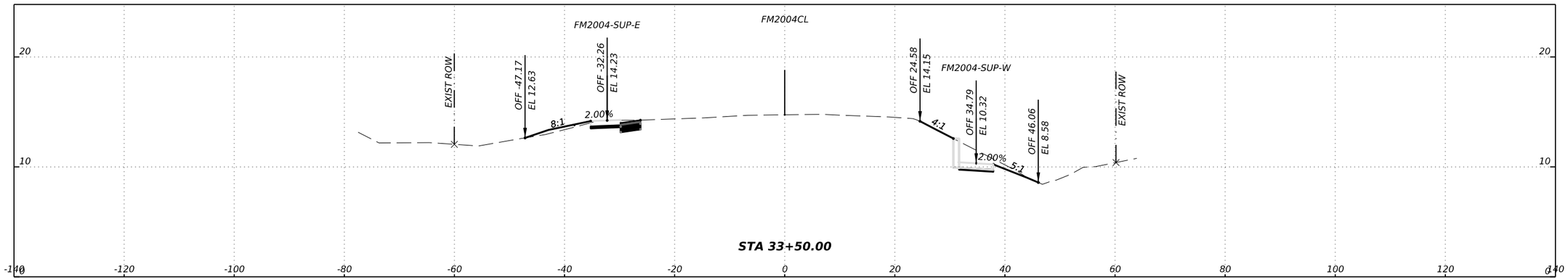
DATE: 3/14/2024 TIME: 12:22:23 PM
FILE: ...\FM2004 Sidewalk\19110102 2Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

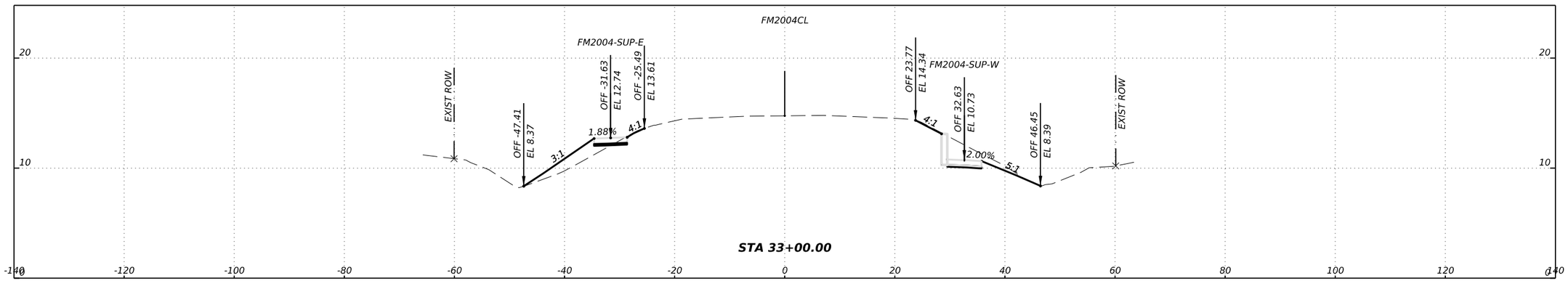
Texas Department of Transportation

SHEET 11 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	191



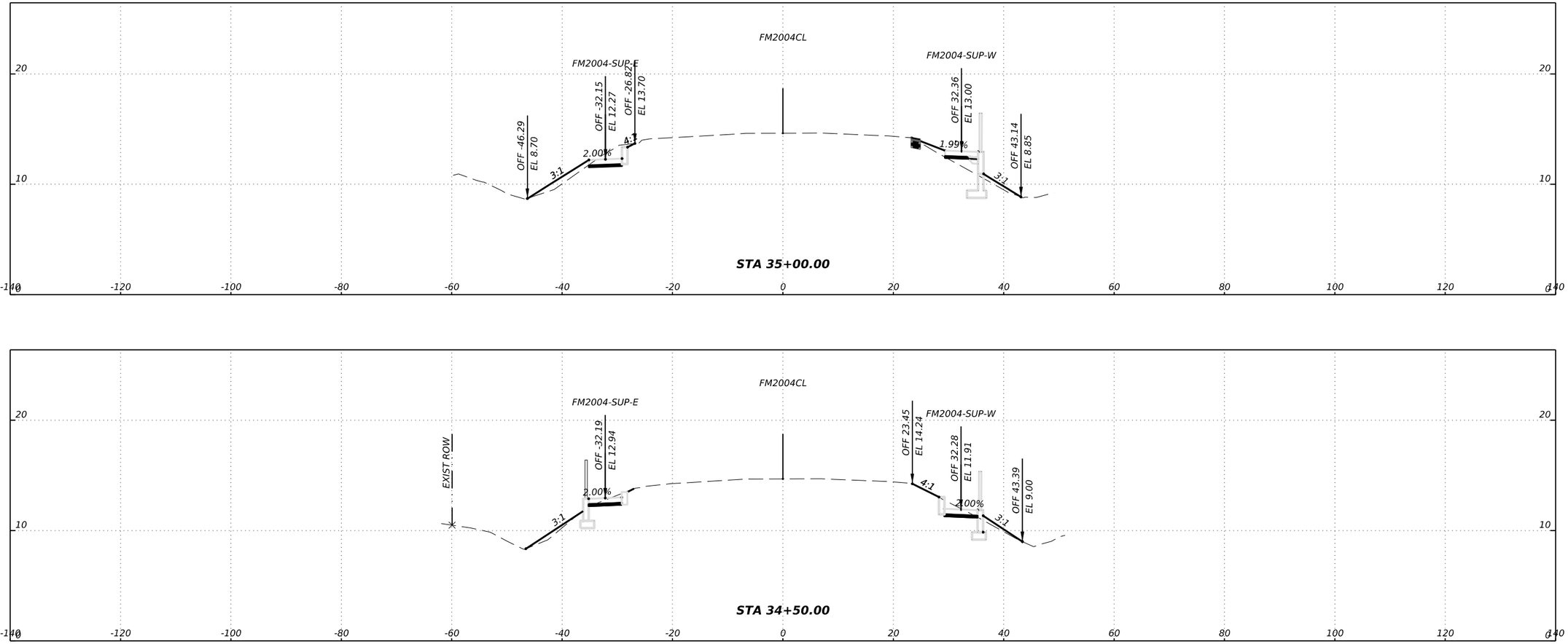




NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	192

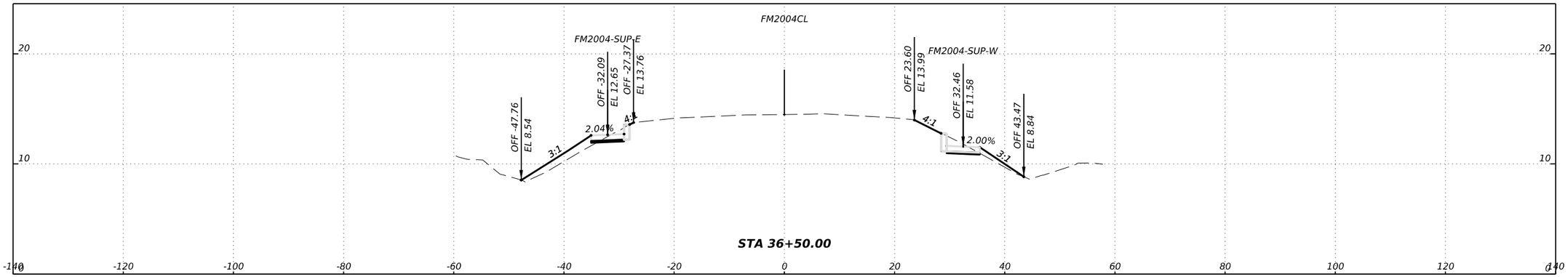
DATE: 5/9/2024 11:03:53 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSBIWA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

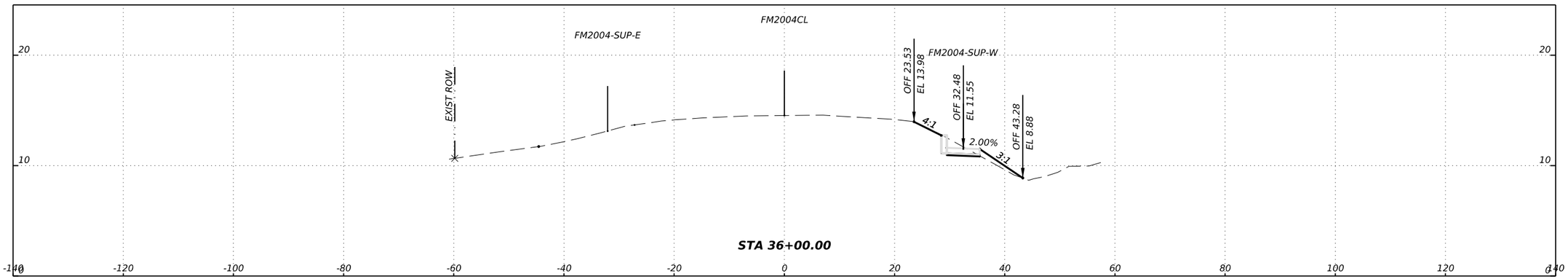


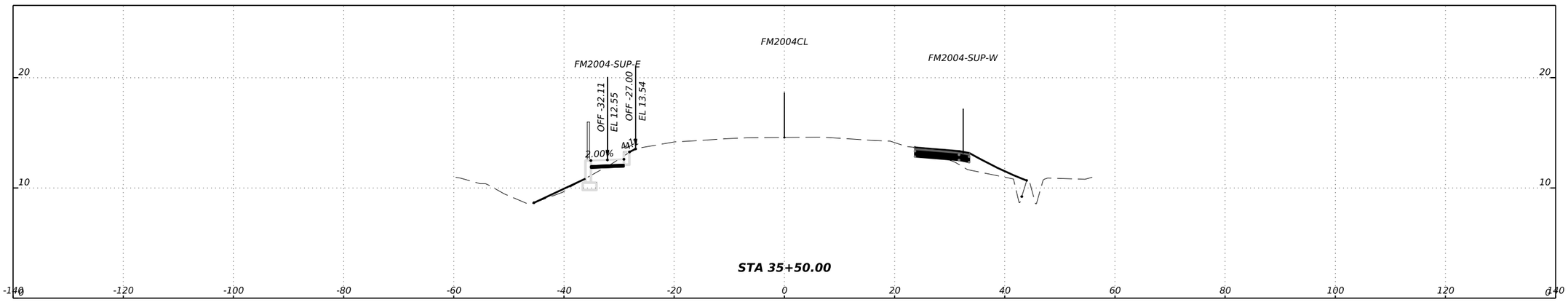
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	193

DATE: 3/14/2024 12:22:37 PM
FILE: ZDGN\191101022fm2004SidewalkFM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn
DGN: TxDOTWSBIWA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn



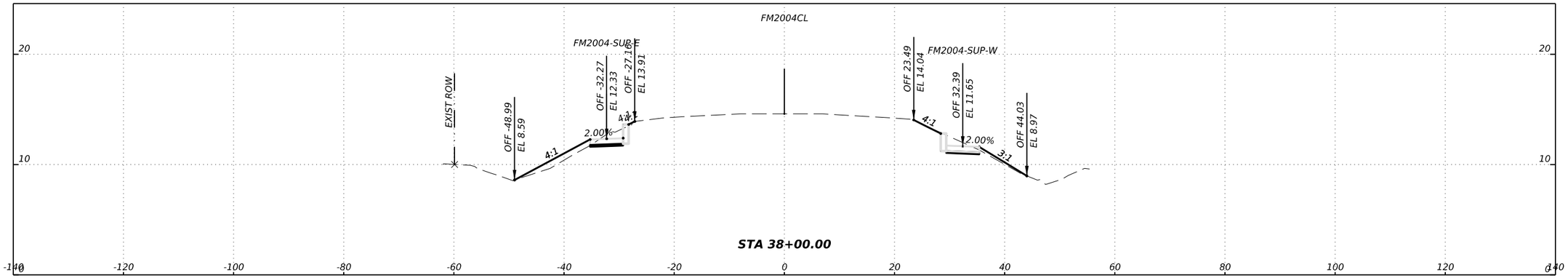


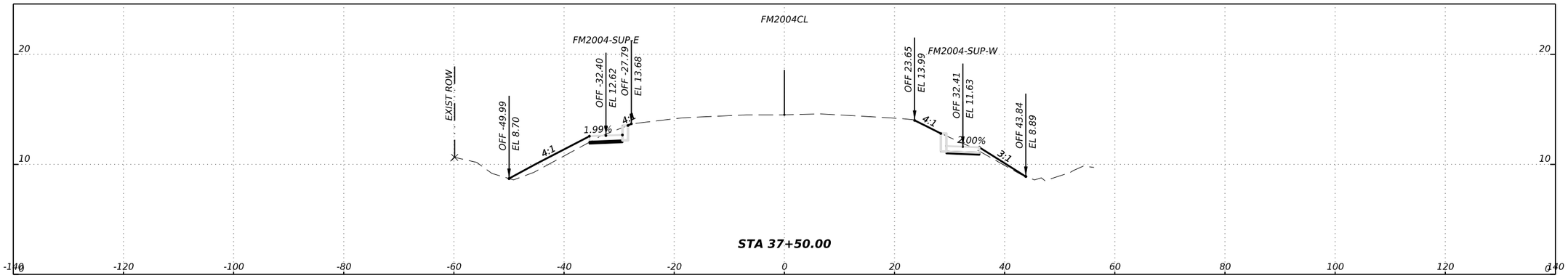


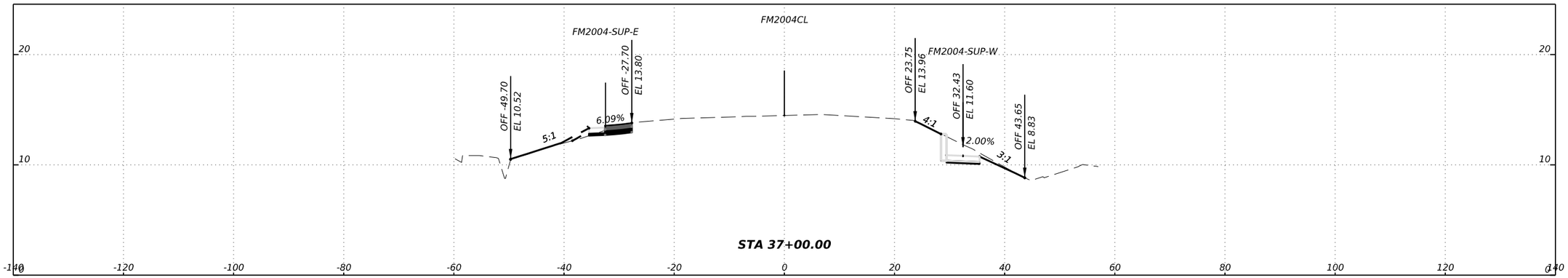
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	194

DATE: 3/14/2024 9:51:18 AM
FILE: C:\Projects\191101022 Fm2004Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn





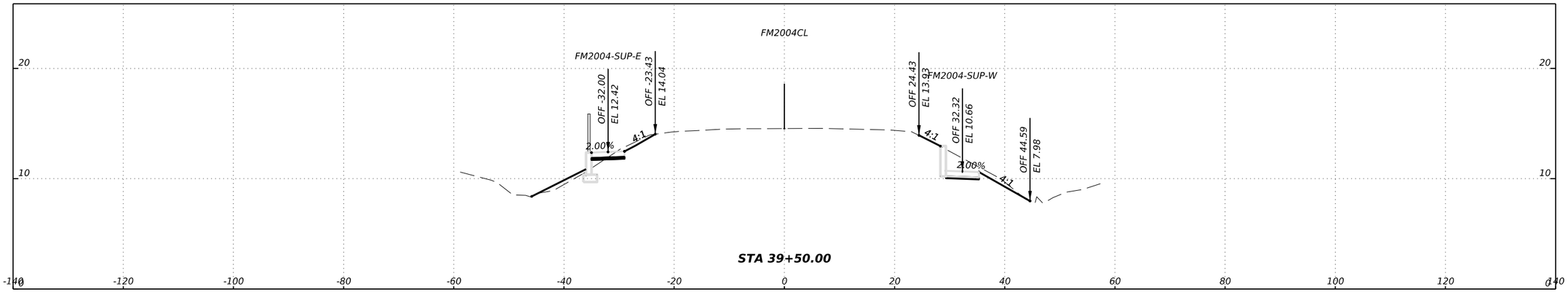


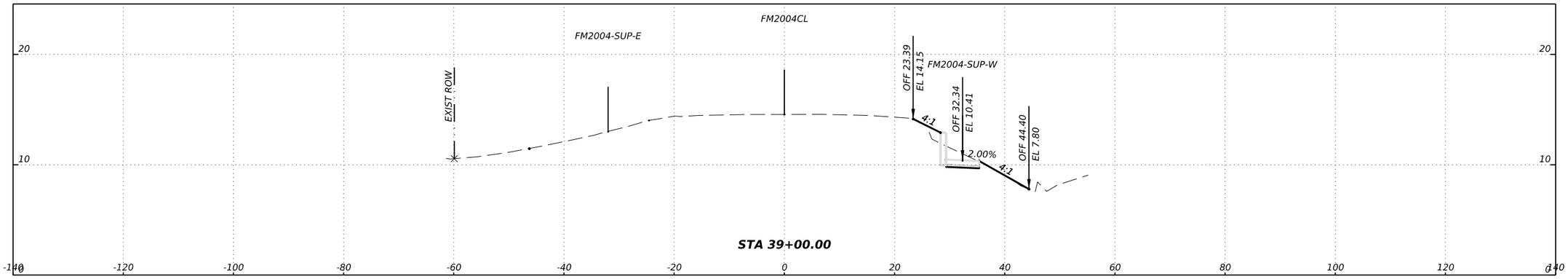
NOTE - CONTRACTOR INFORMATION ONLY

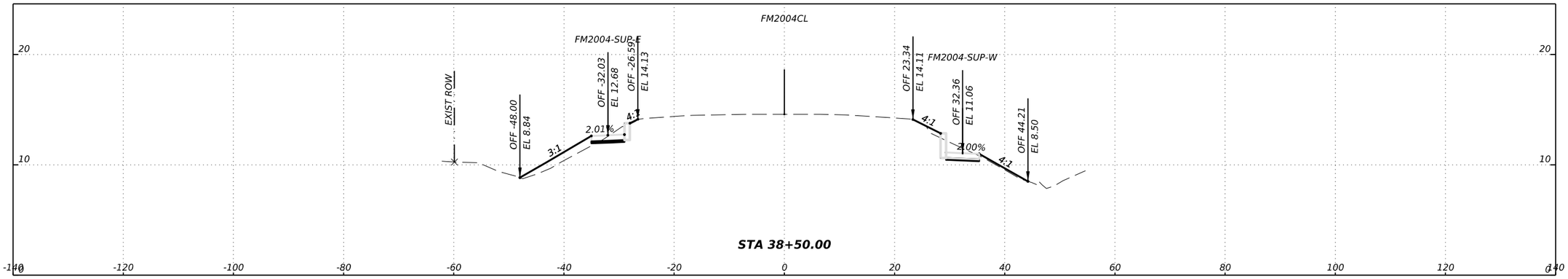
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	195

DATE: 5/9/2024 11:03:58 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSBIWA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

DW: CK: DW: CK:



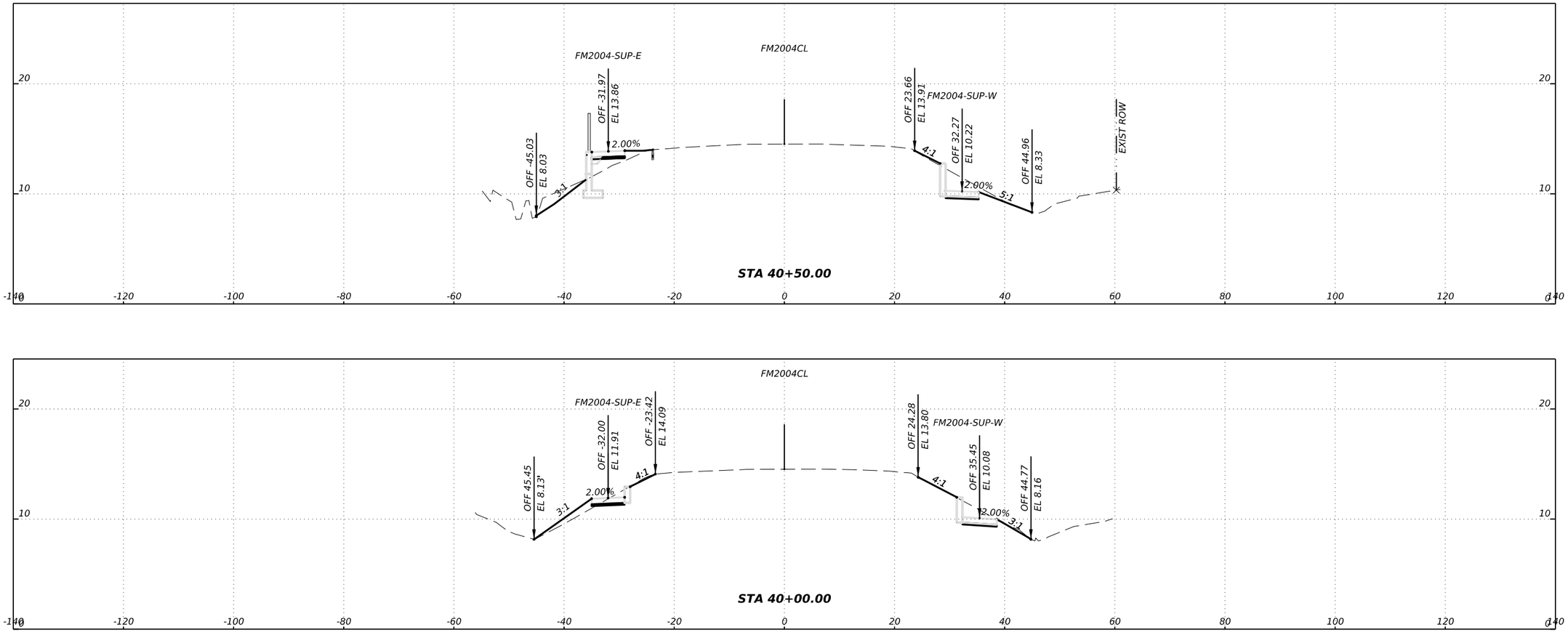




NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	196

DATE: 3/4/2024 9:51:30 AM
FILE: C:\Users\CEC\OneDrive - TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

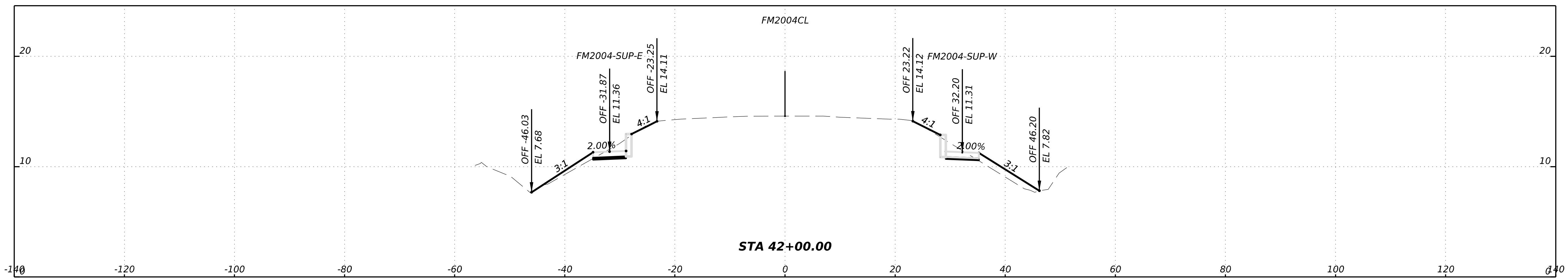


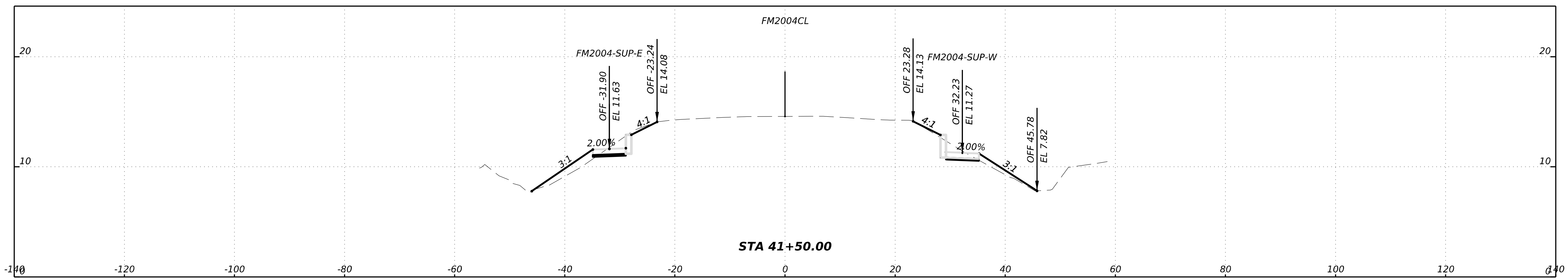
NOTE - CONTRACTOR INFORMATION ONLY

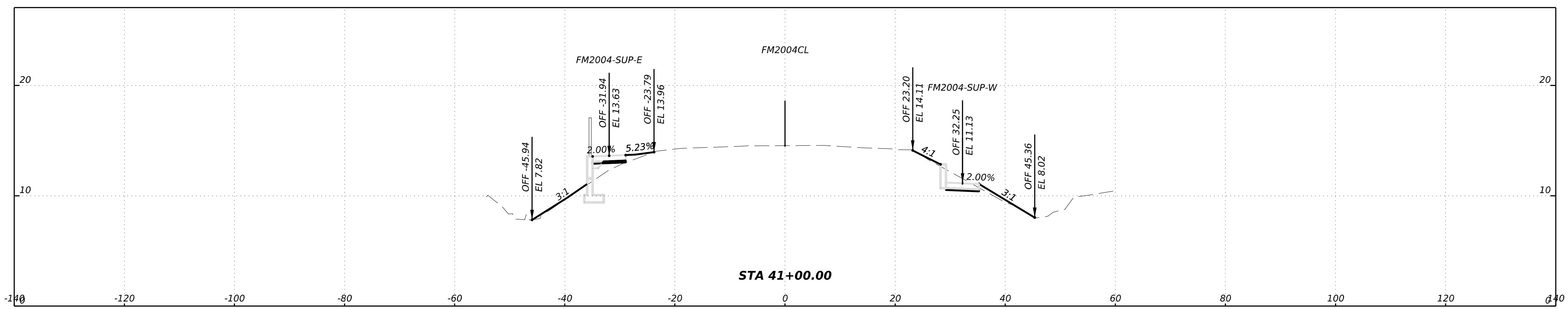
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	197

DATE: 5/9/2024 11:04:02 AM
FILE: Z:\Projects\220058 CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW: CK: DW: CK:







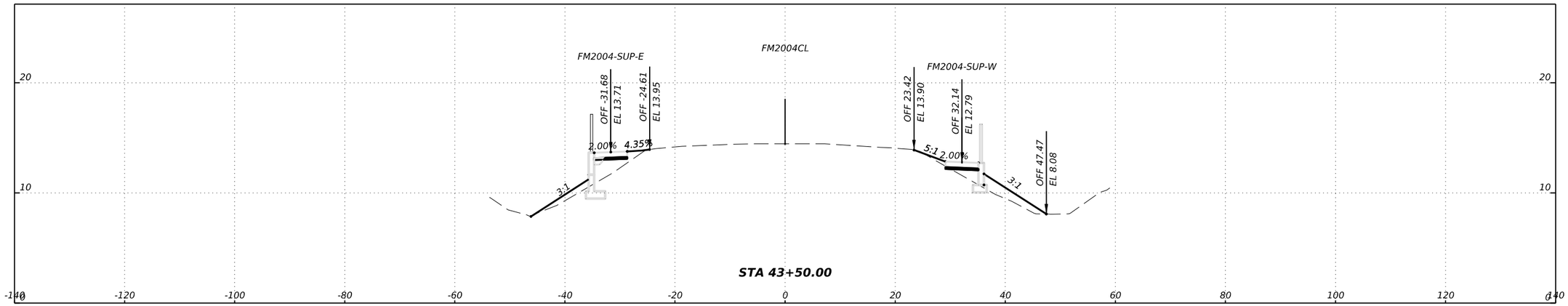
NOTE - CONTRACTOR INFORMATION ONLY

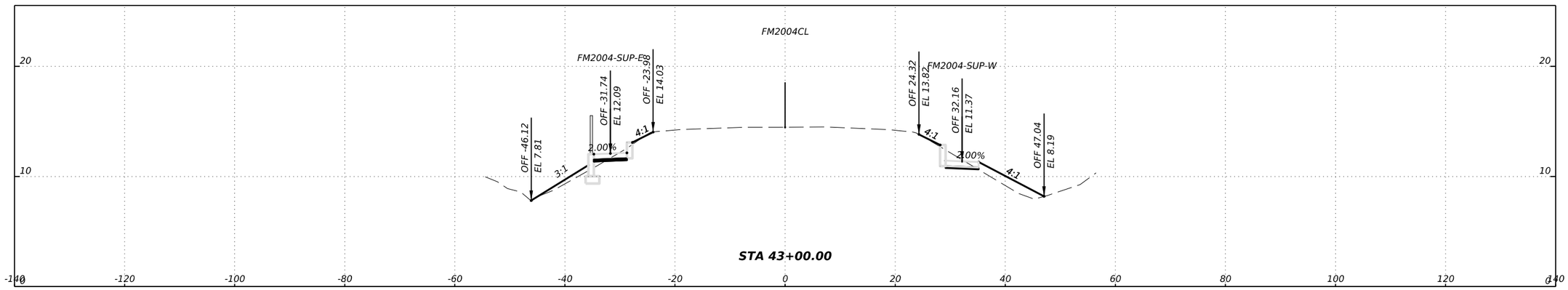
Texas Department of Transportation

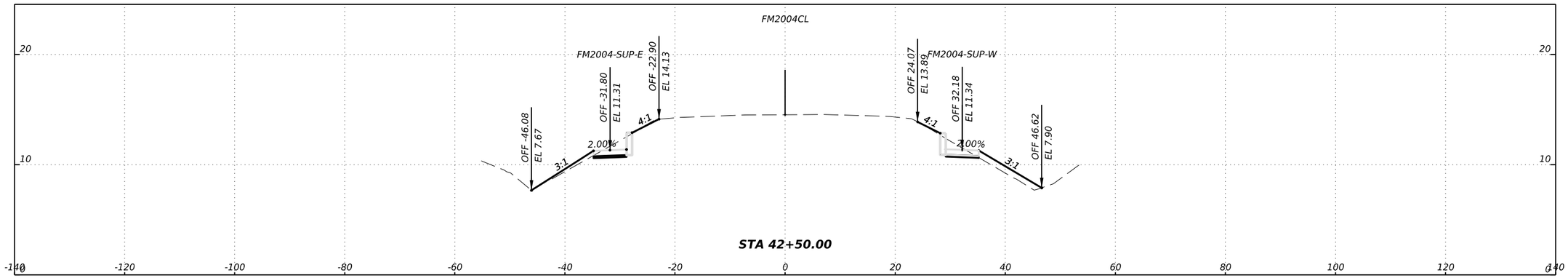
SHEET 18 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	198

DATE: 3/1/2024 9:51:40 AM
FILE: ZYOQIHMW27AAE CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102 2Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn



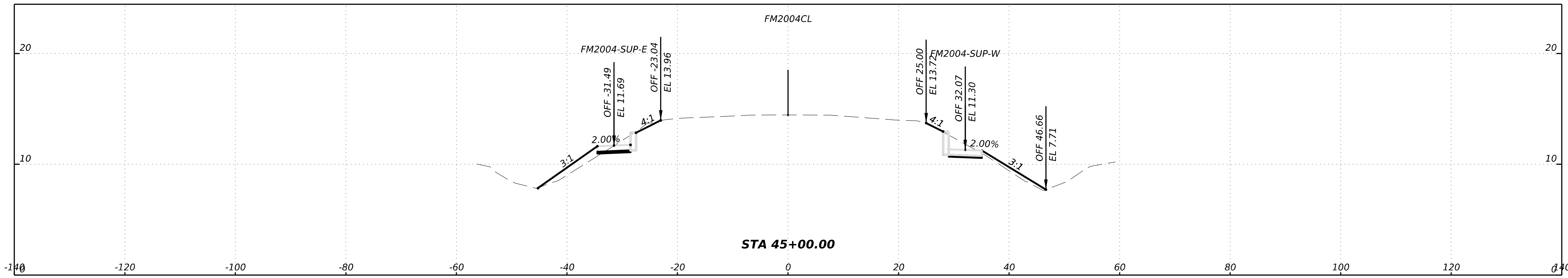


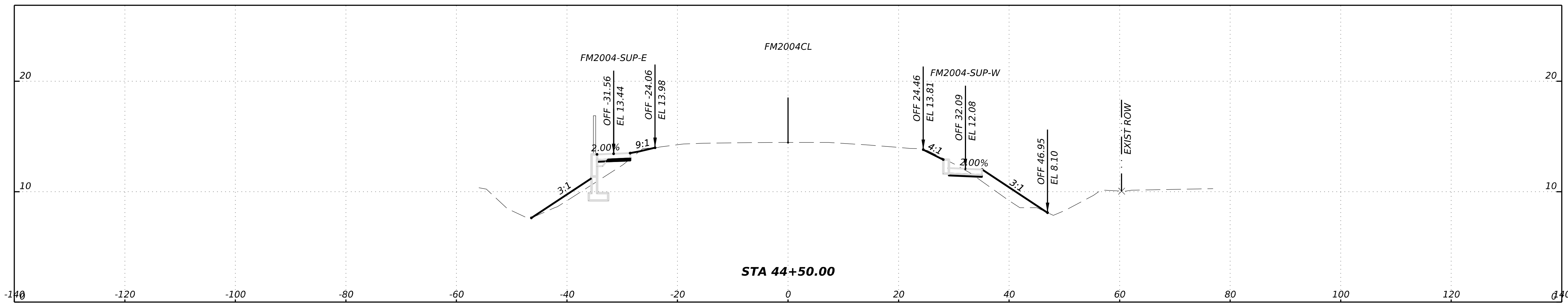


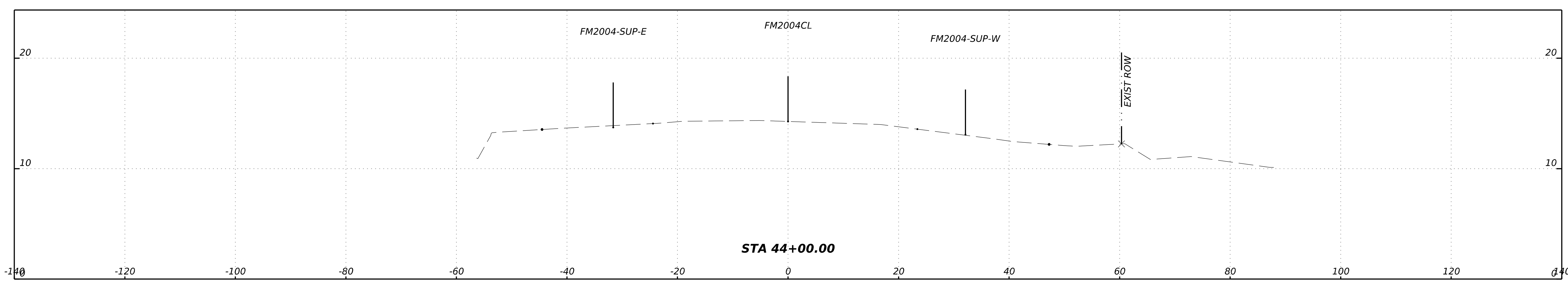
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	199

DATE: 3/4/2024 9:51:46 AM
FILE: 20191101022Fm2004SidewalkIFM2004_ORD_Cross_Sections.dgn
DGN: CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004SidewalkIFM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn







FILE: Z:\P\DOHMSTX\PCBE CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

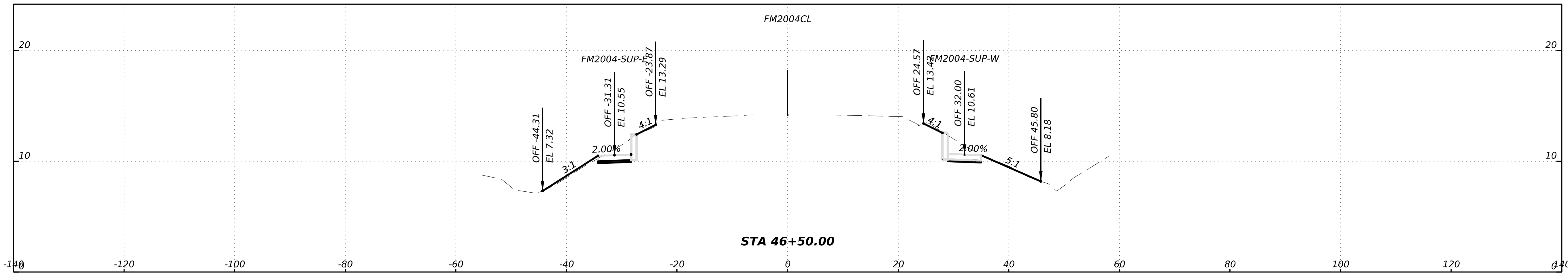
DATE: 3/14/2024 TIME 9:51:51 AM

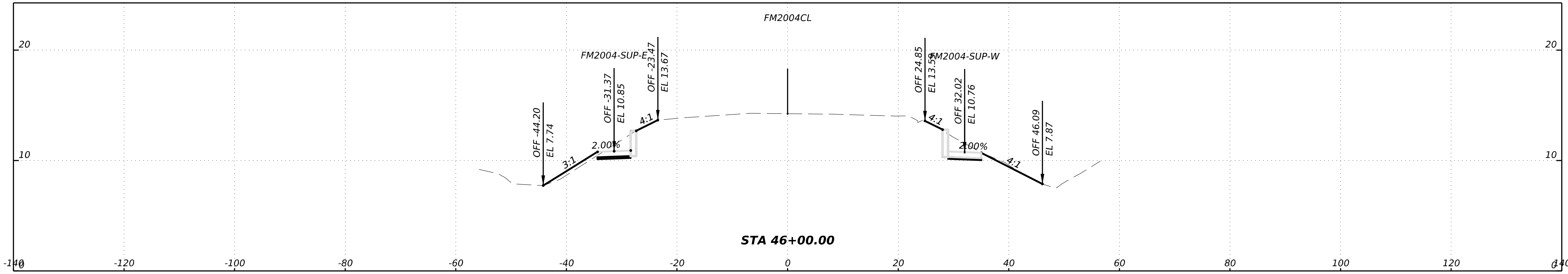
NOTE - CONTRACTOR INFORMATION ONLY

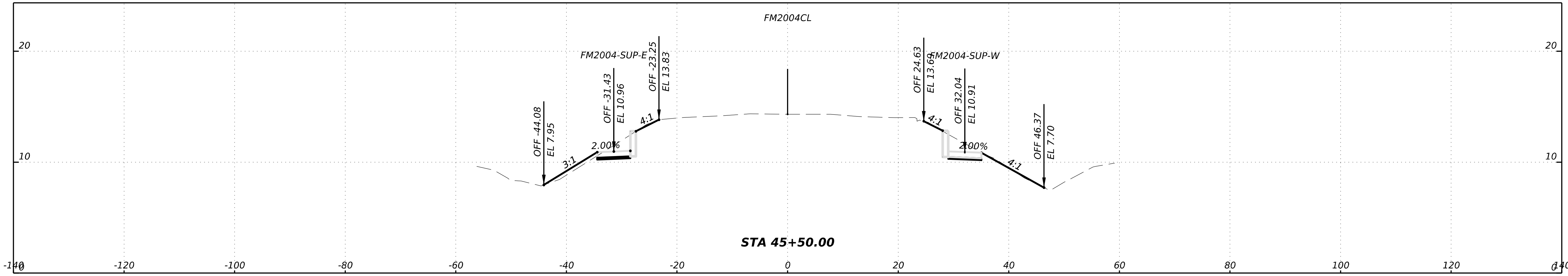
Texas Department of Transportation

SHEET 20 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	200







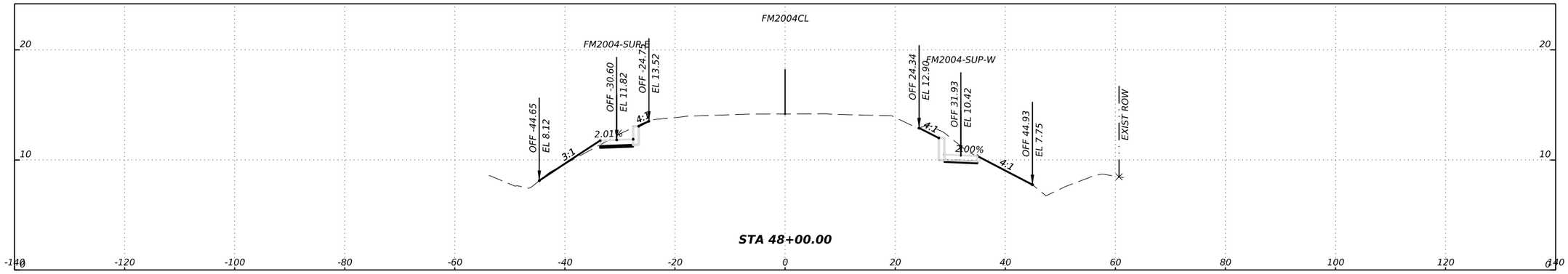
NOTE - CONTRACTOR INFORMATION ONLY

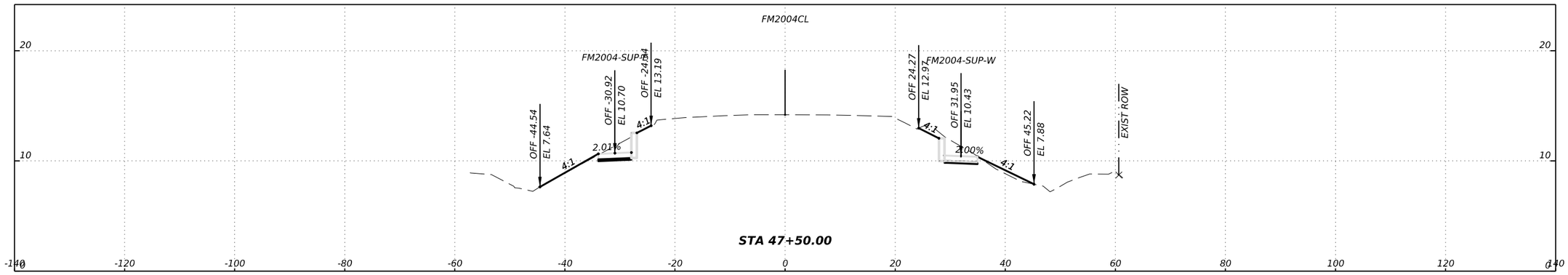
Texas Department of Transportation

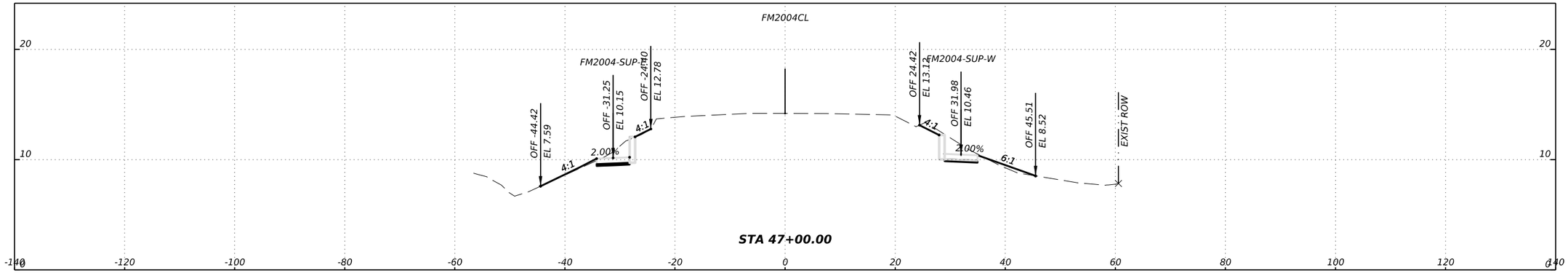
SHEET 21 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	201

DATE: 3/14/2024 TIME: 9:51:57 AM
FILE: Z:\PROJECTS\2024\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn



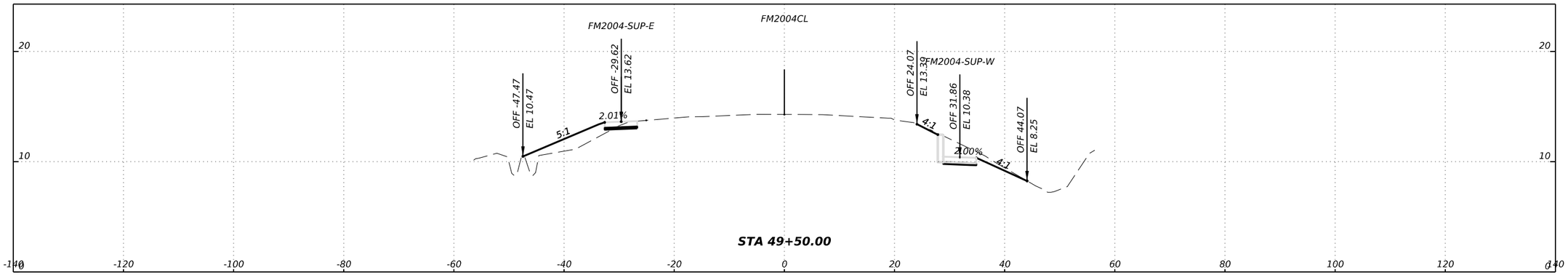


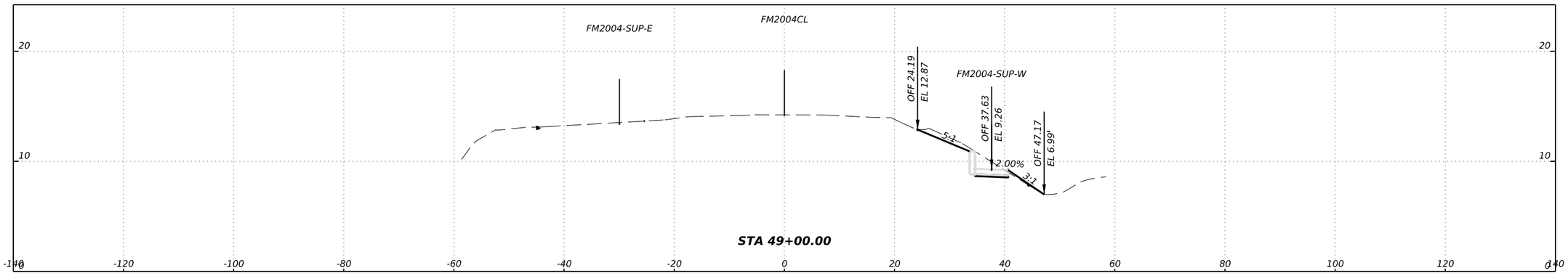


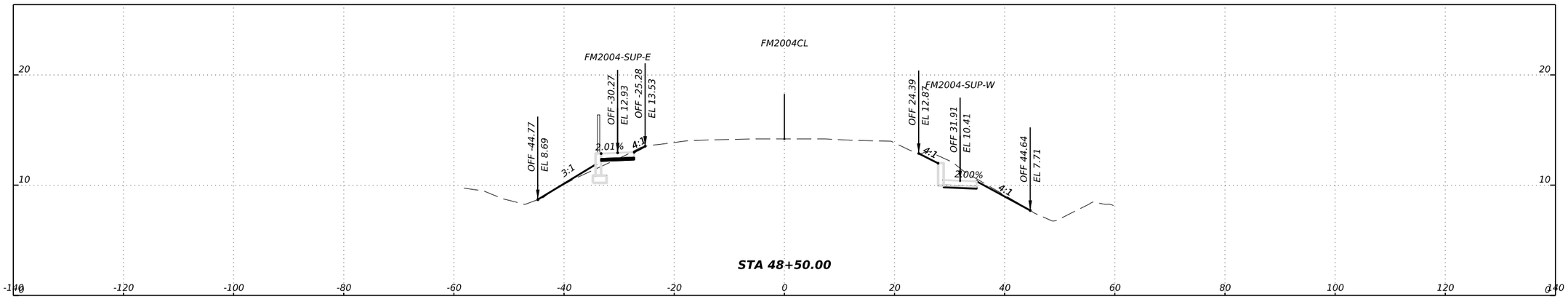
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	202

DATE: 3/4/2024 9:52:03 AM
FILE: C:\Users\CEC\TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD Cross Sections.dgn
DW CK DW CK





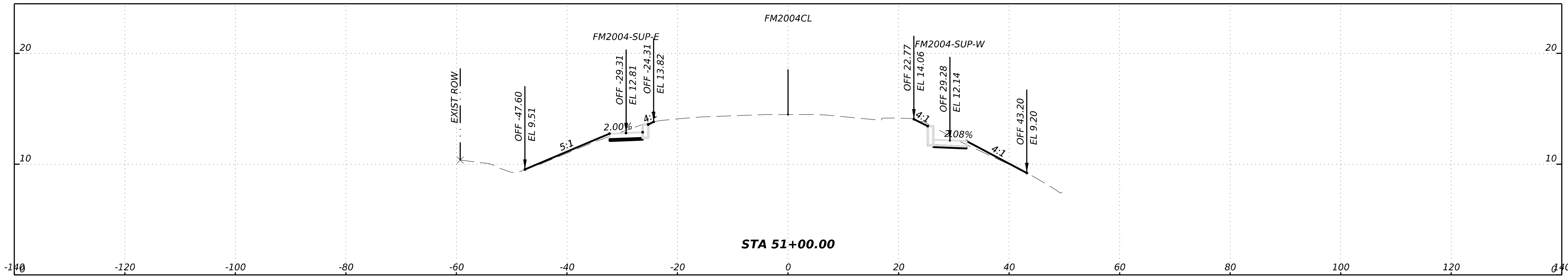


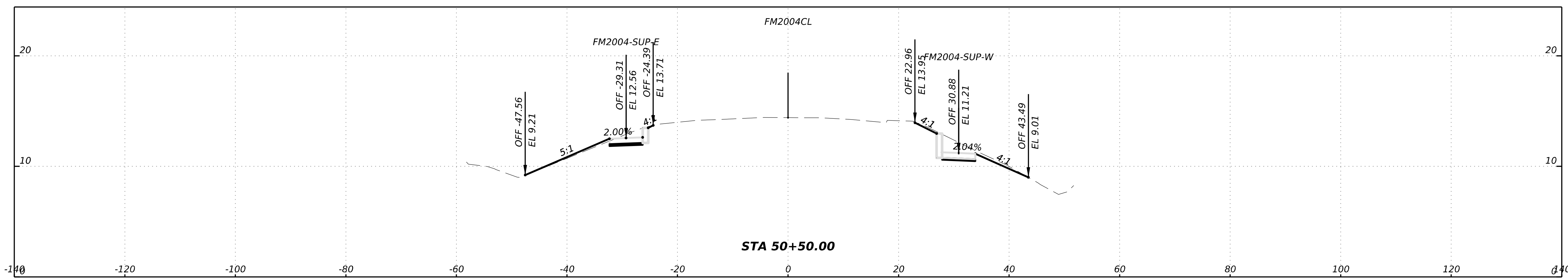
NOTE - CONTRACTOR INFORMATION ONLY

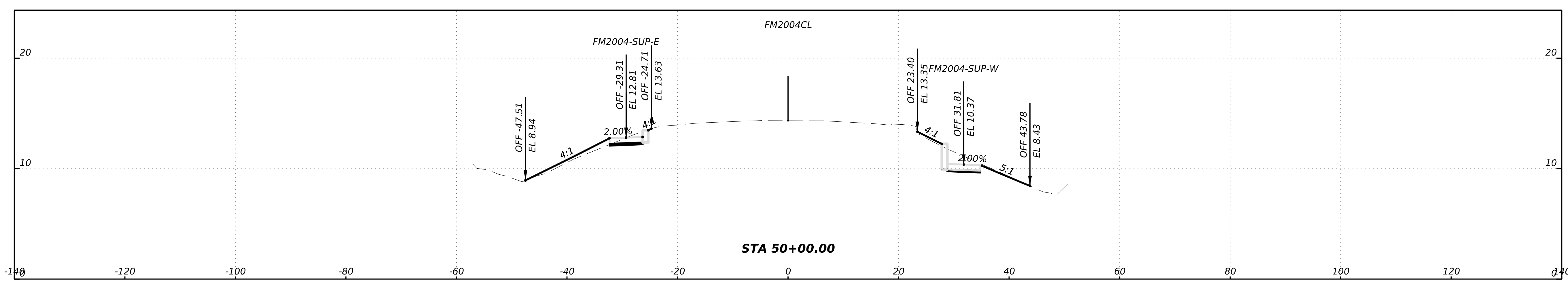
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	203

DATE: 5/9/2024 11:04:07 AM
FILE: Z:\Projects\220058 CEC_TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW: CK: DW: CK:







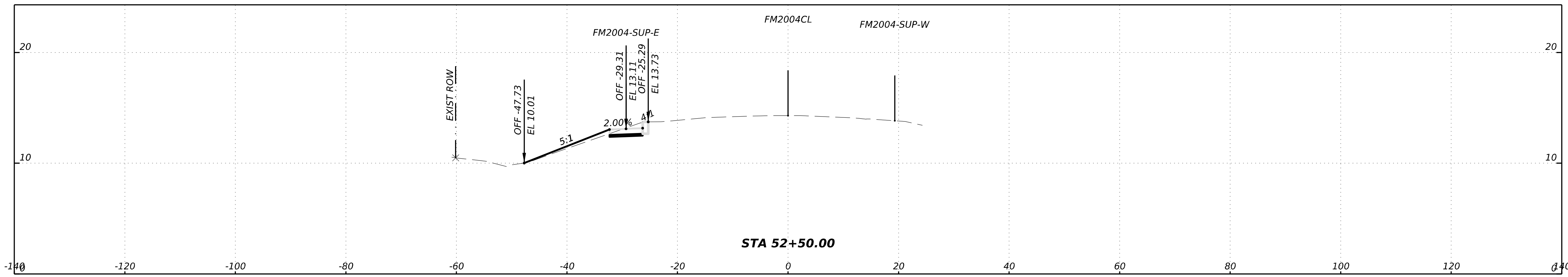
NOTE - CONTRACTOR INFORMATION ONLY

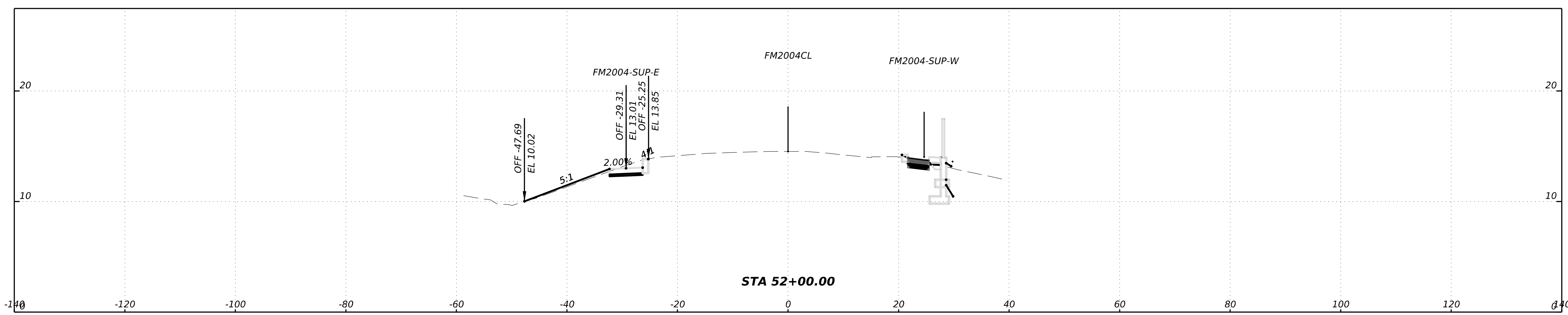
SHEET 24 OF 44

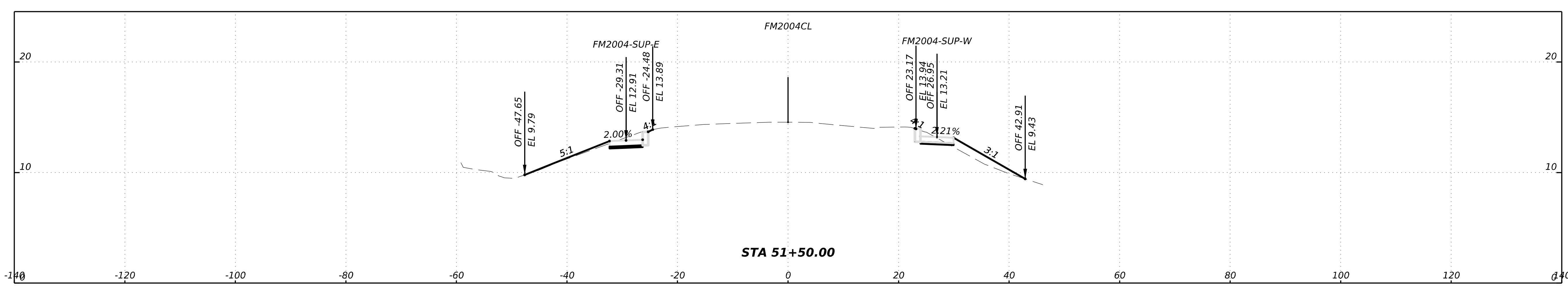
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	204

DATE: 3/14/2024 TIME: 9:52:15 AM
FILE: Z:\DOCUMENTS\...\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102 2Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







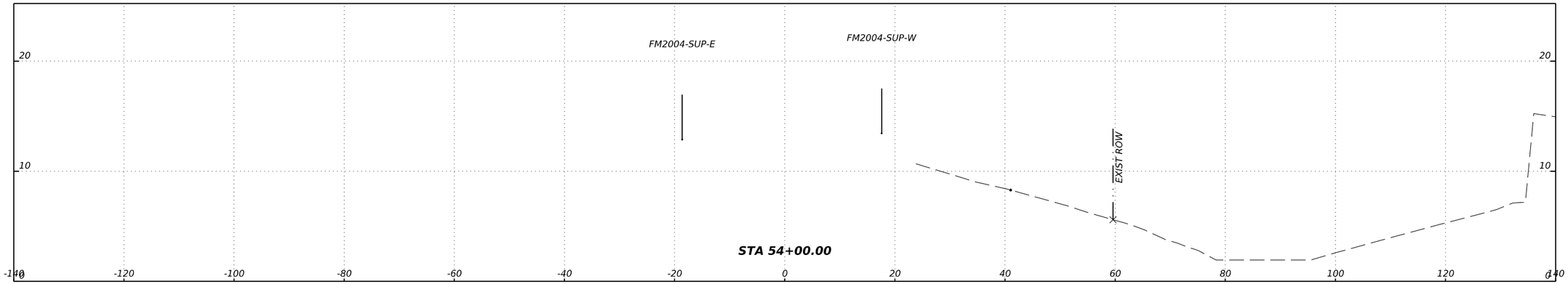
NOTE - CONTRACTOR INFORMATION ONLY

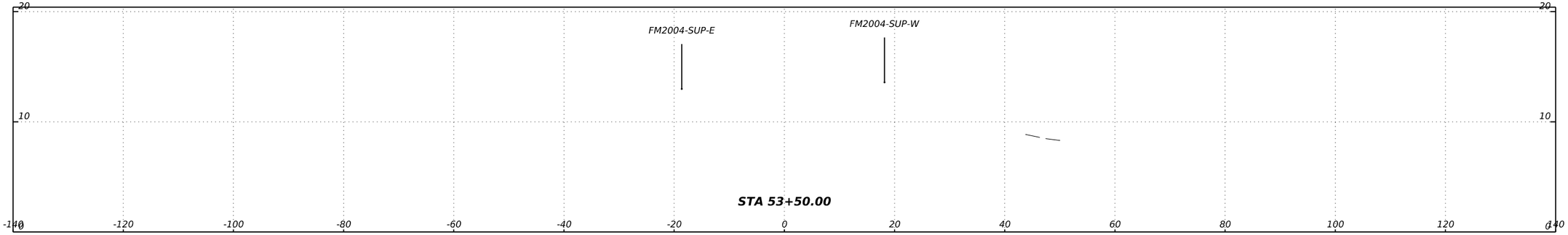
Texas Department of Transportation

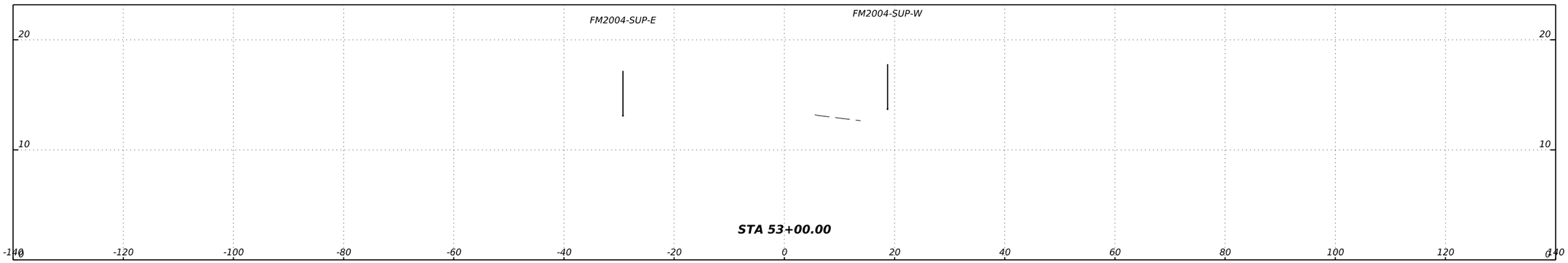
SHEET 25 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	205

DATE: 3/14/2024 TIME: 9:52:21 AM
FILE: ...CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102 2Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn





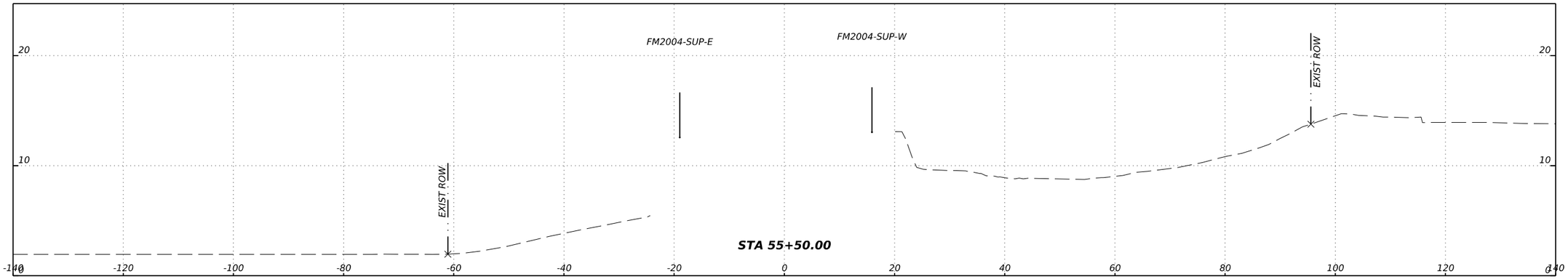


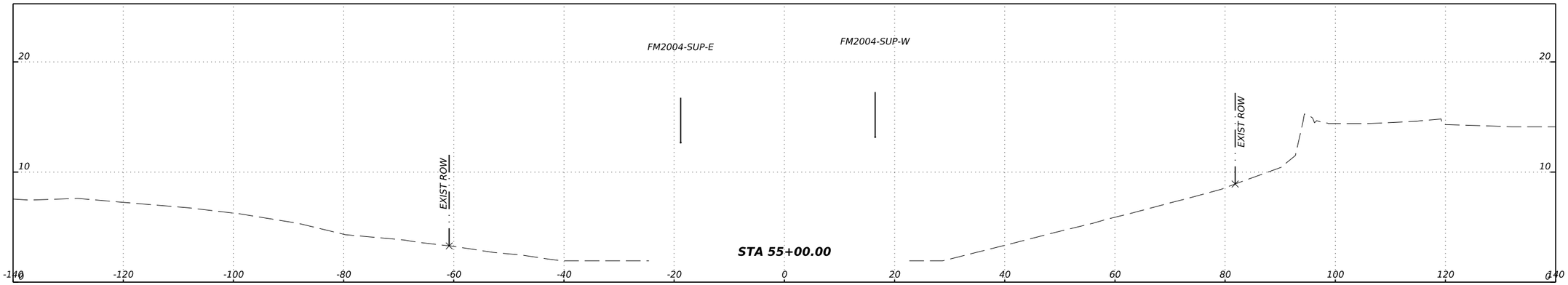
NOTE - CONTRACTOR INFORMATION ONLY

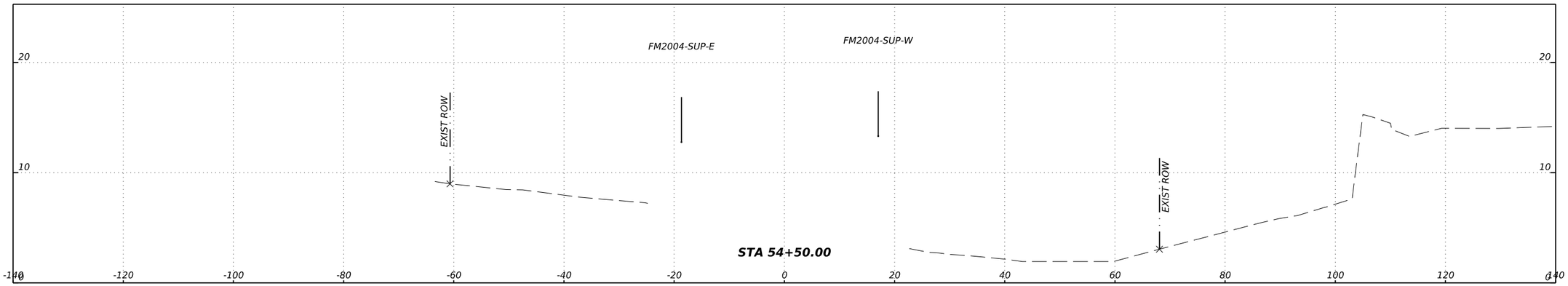
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	206

DATE: 3/4/2024 9:52:28 AM
FILE: C:\Users\CEC\TxDOT\WSBIWA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn





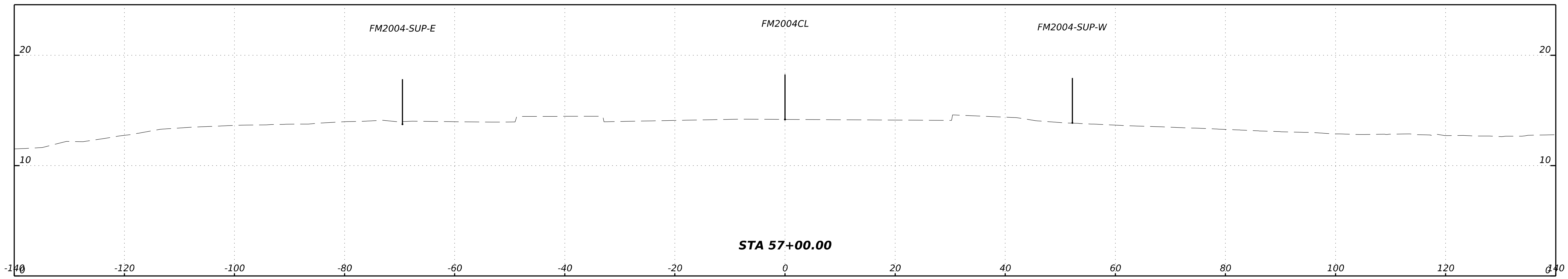


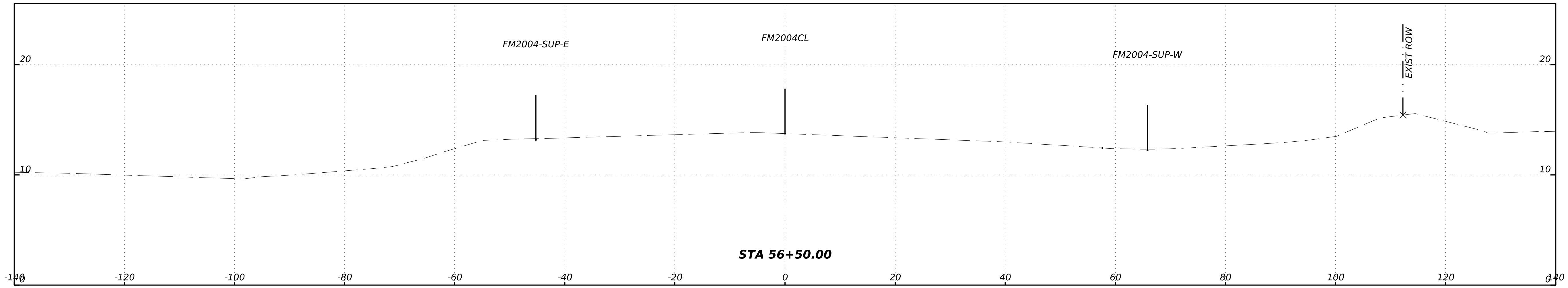
NOTE - CONTRACTOR INFORMATION ONLY

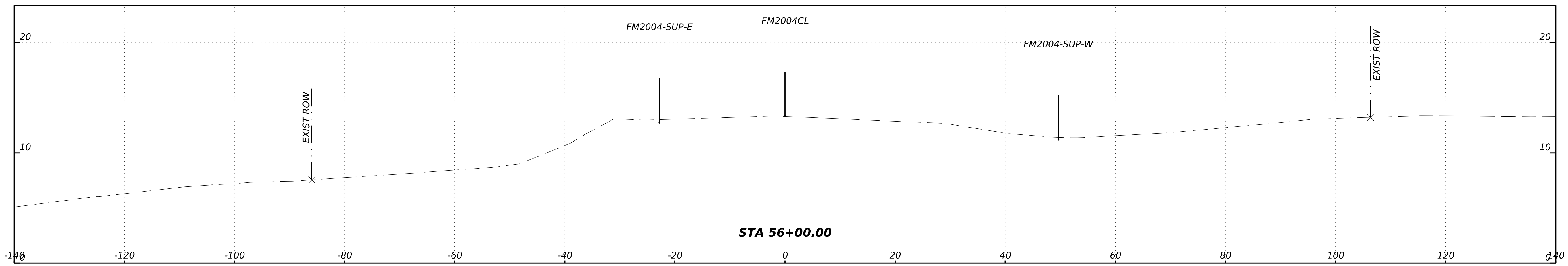
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	207

DATE: 3/4/2024 9:52:35 AM
FILE: 20191101022Fm2004Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn
USER NAME = CEC TxDOT\WSB\WA 41\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn







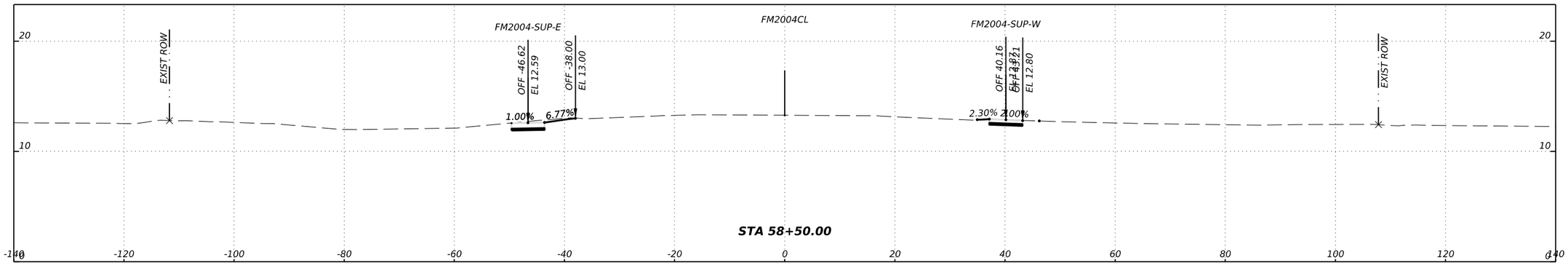
NOTE - CONTRACTOR INFORMATION ONLY

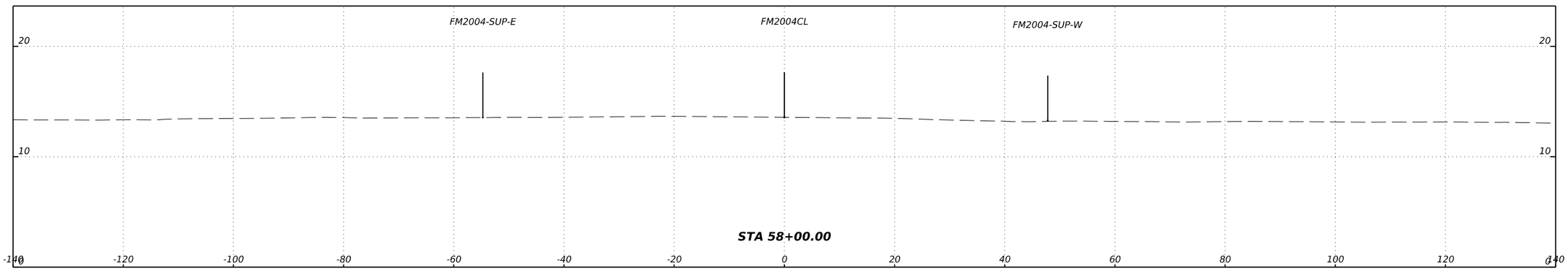
Texas Department of Transportation

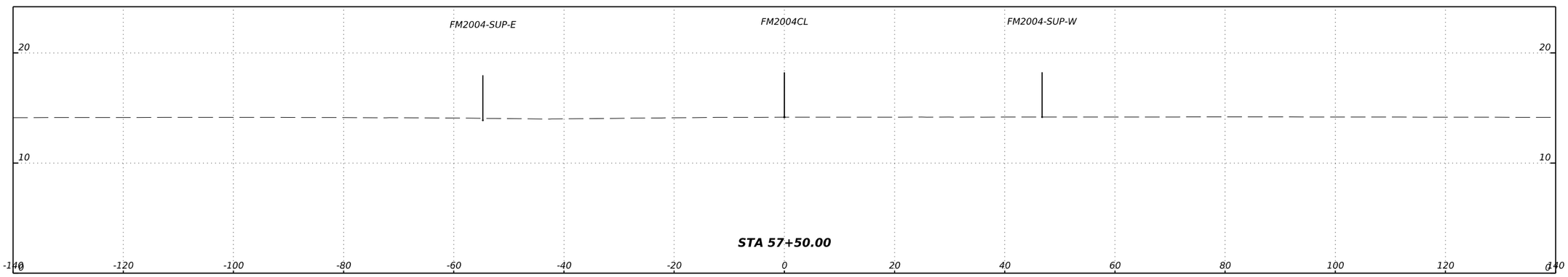
SHEET 28 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	208

DATE: 3/14/2024 9:52:42 AM
FILE: ...CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn



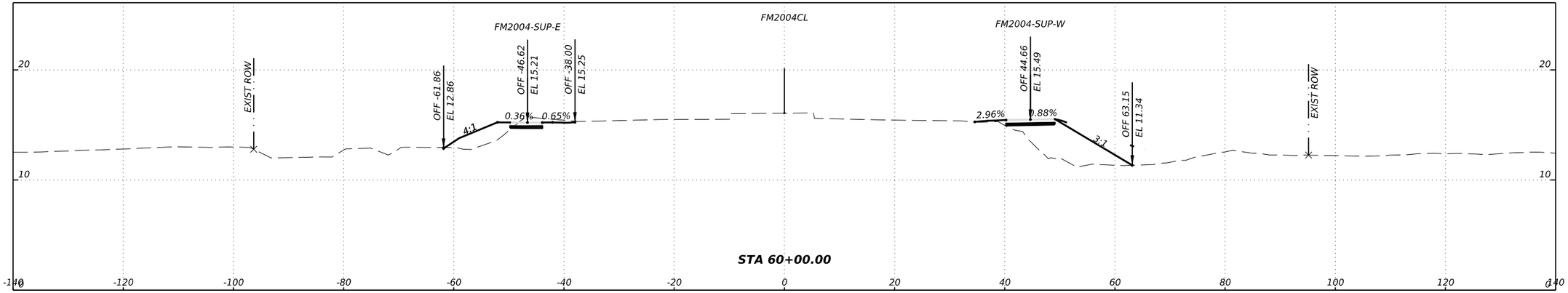


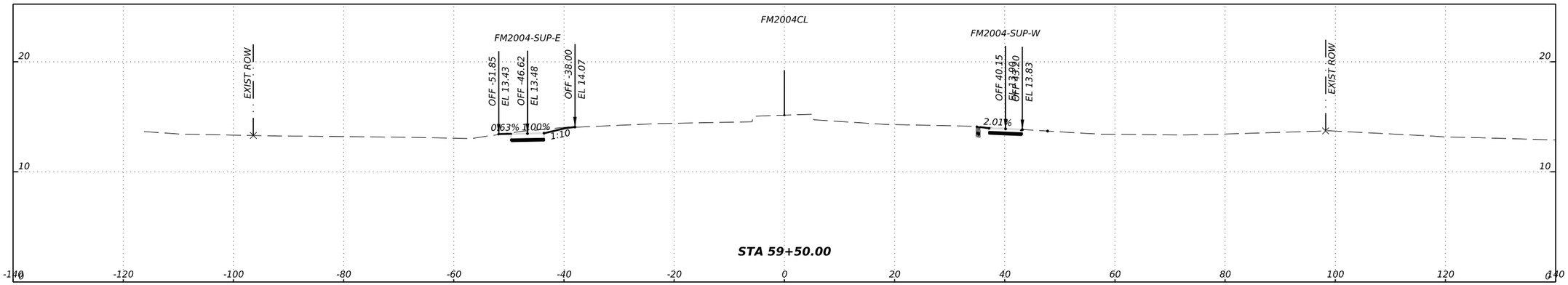


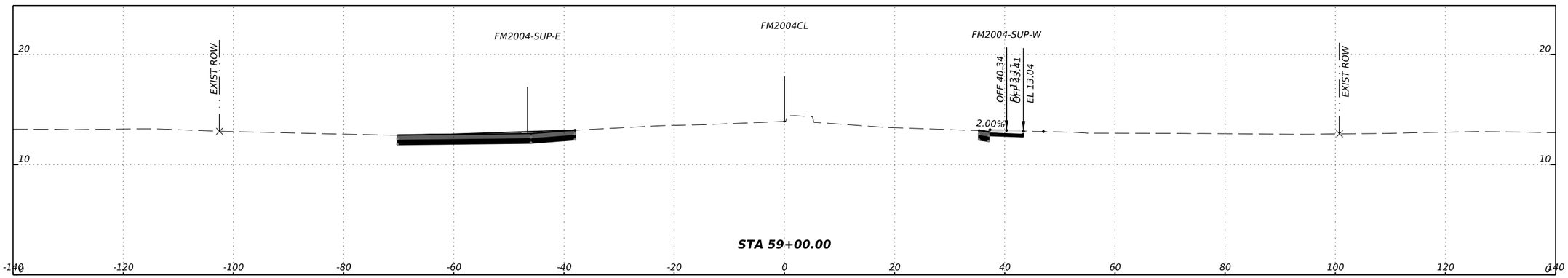
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	209

DATE: 3/14/2024 9:52:49 AM
FILE: ZDGN\FM2004 Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn
DGN: CEC TxDOTWSBIWA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn





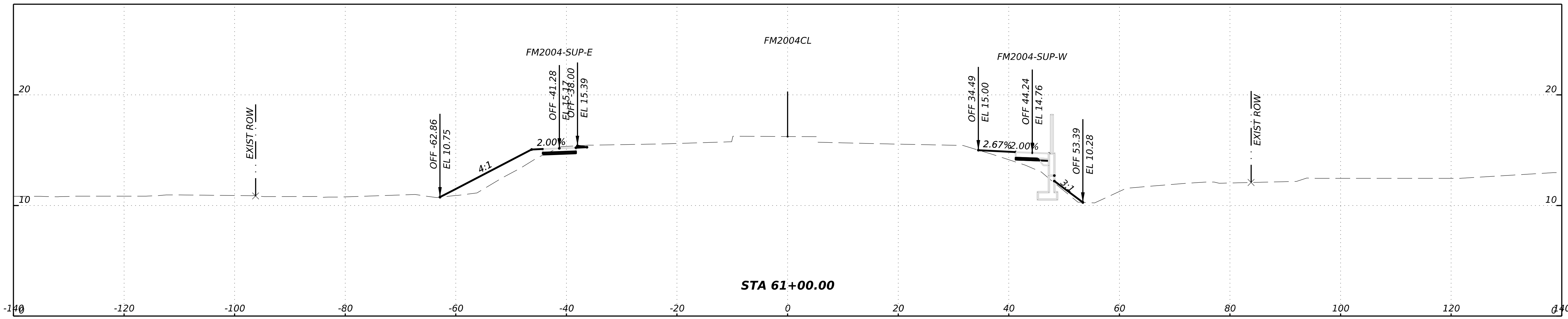


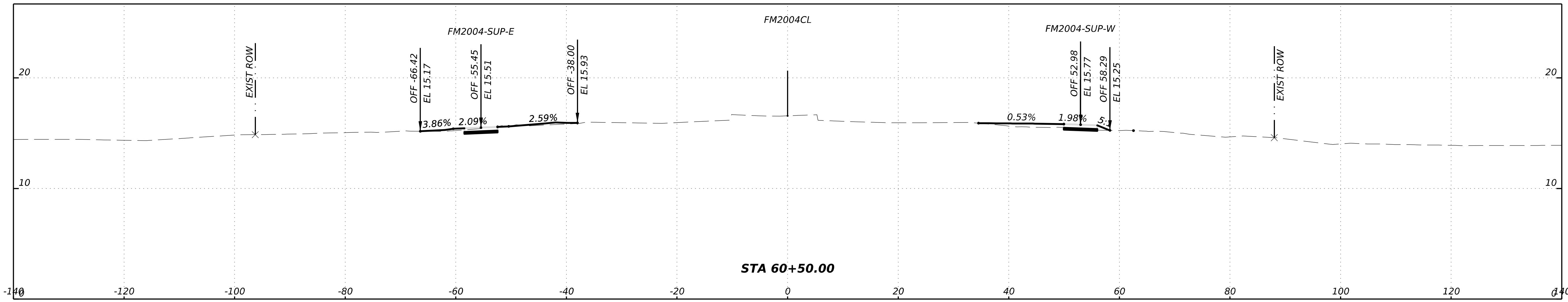
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	210

DATE: 3/4/2024 12:24:44 PM
FILE: ZDGN\FM2004_ORD_Cross_Sections.dgn

C:\Users\CEC\TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022fm2004Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn





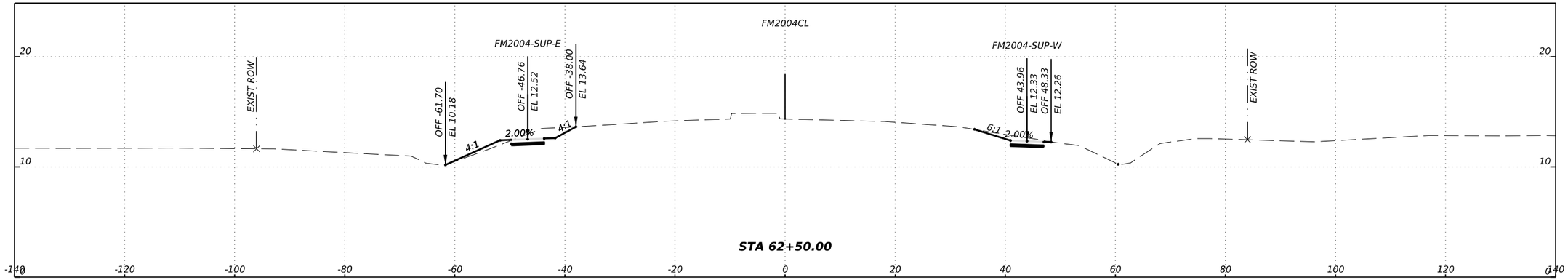
NOTE - CONTRACTOR INFORMATION ONLY

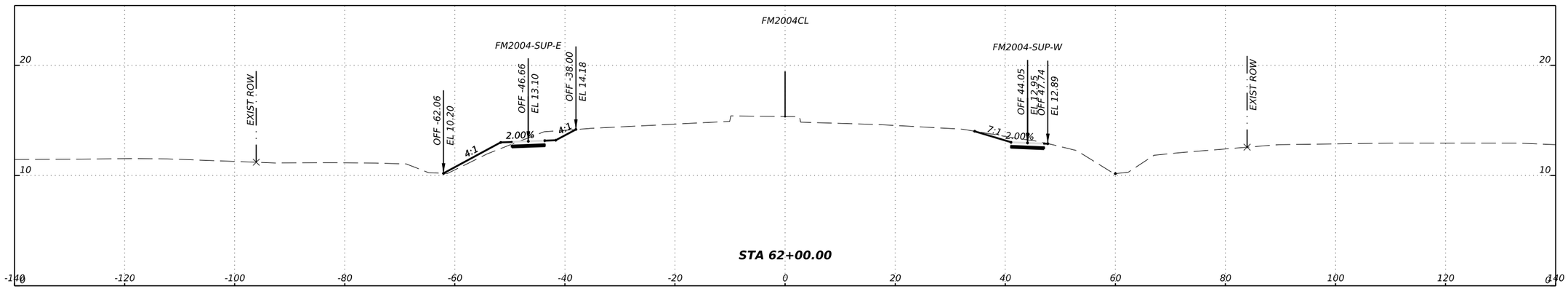
Texas Department of Transportation

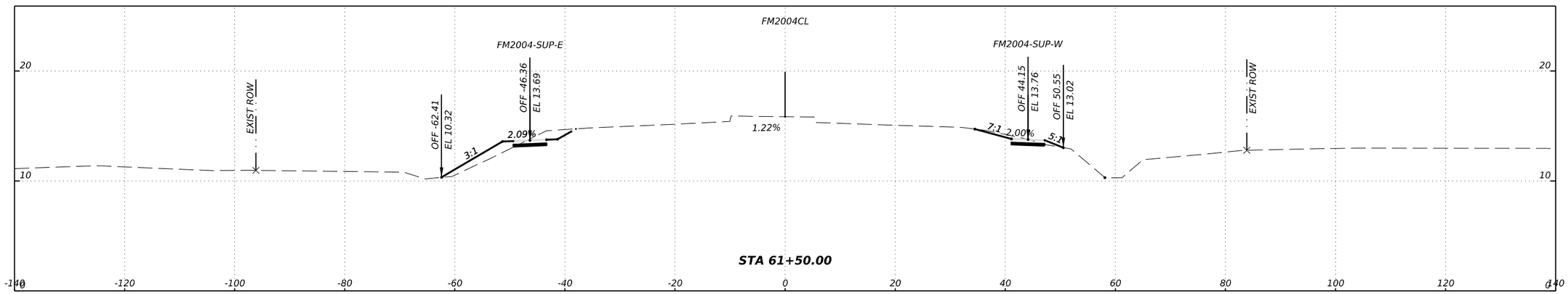
SHEET 31 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	211

DATE: 3/1/2024 9:53:02 AM
FILE: Z:\PROJECTS\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







NOTE - CONTRACTOR INFORMATION ONLY

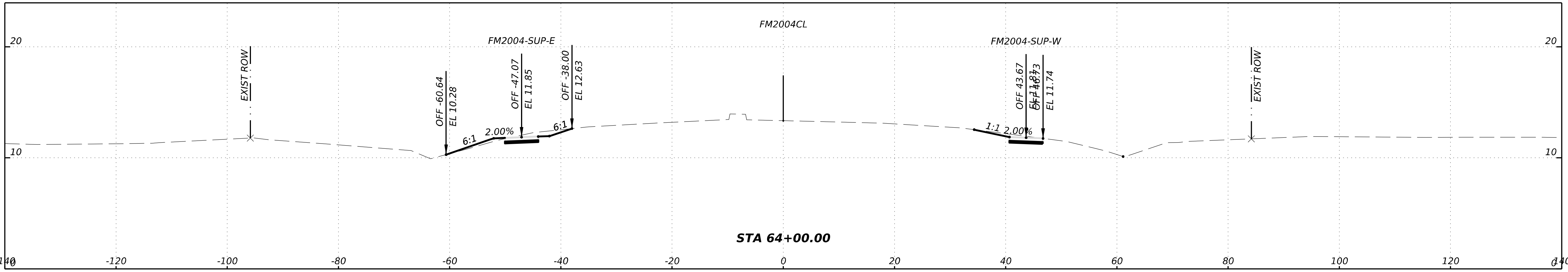
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	212

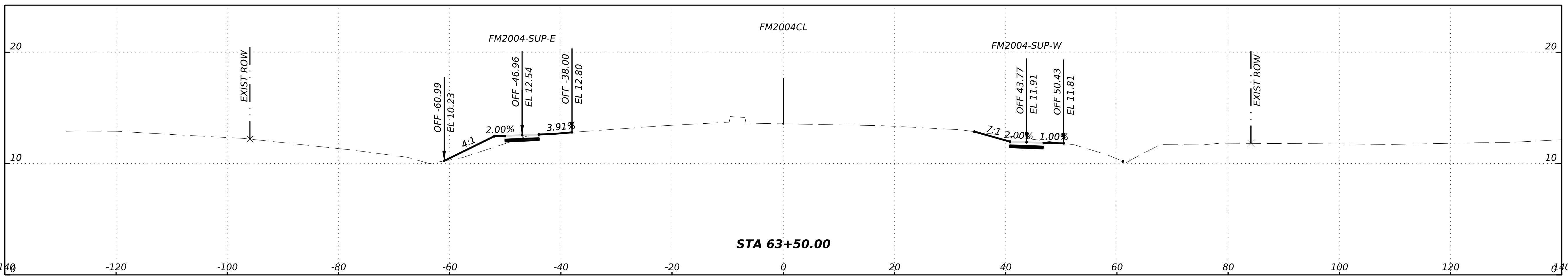
DATE: 3/4/2024 12:24:56 PM
FILE: C:\Users\CEC\TxDOT\WSBIWA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

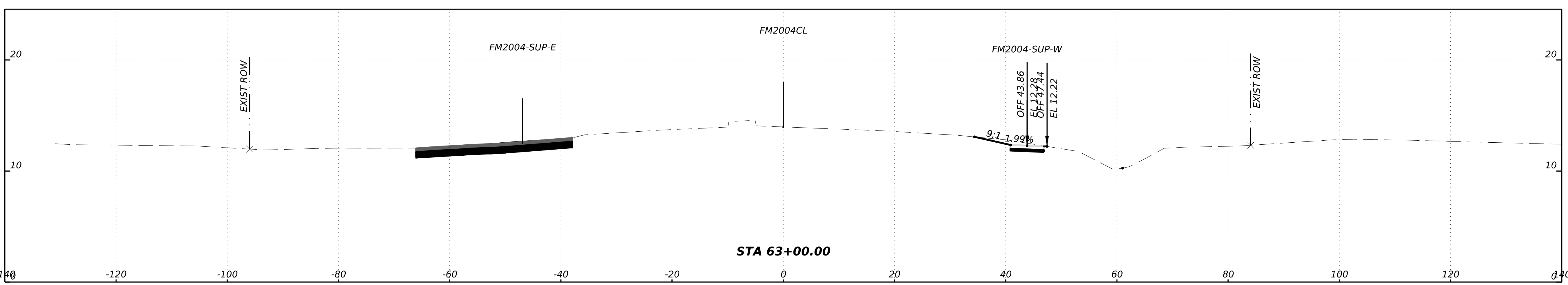
DW | CK | DW | CK

Z:\...\TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102 2Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

DATE: 3/11/2024 TIME: 9:53:16 AM





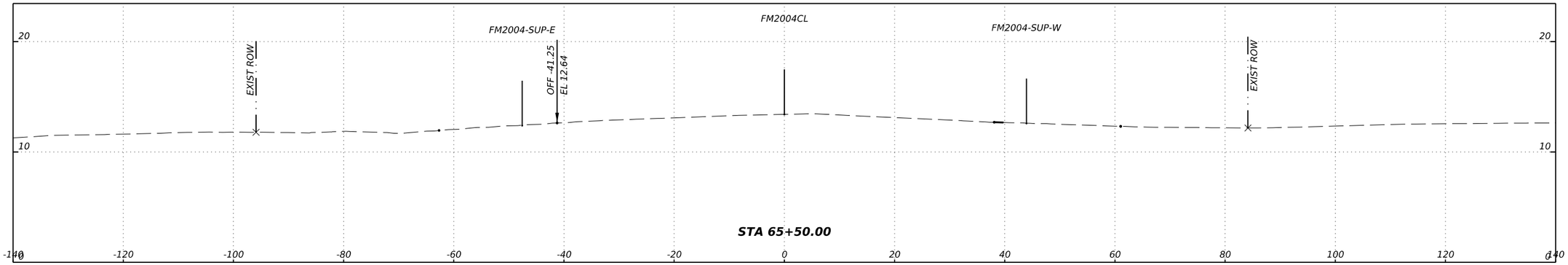


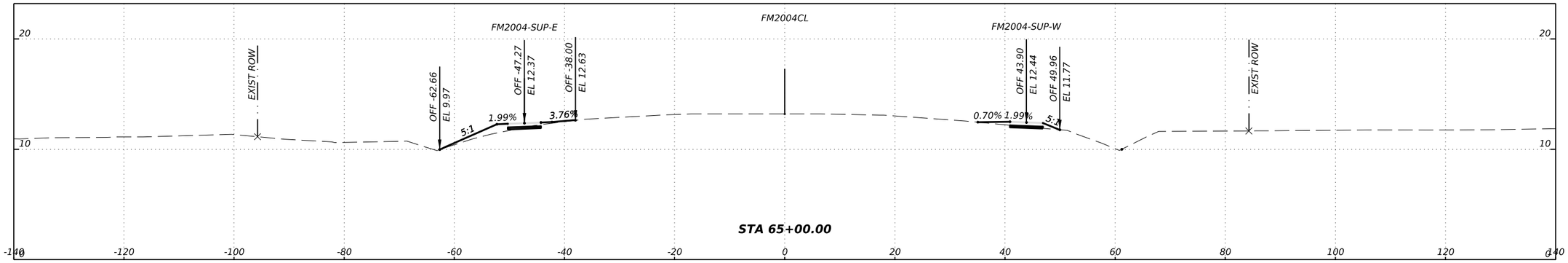
NOTE - CONTRACTOR INFORMATION ONLY

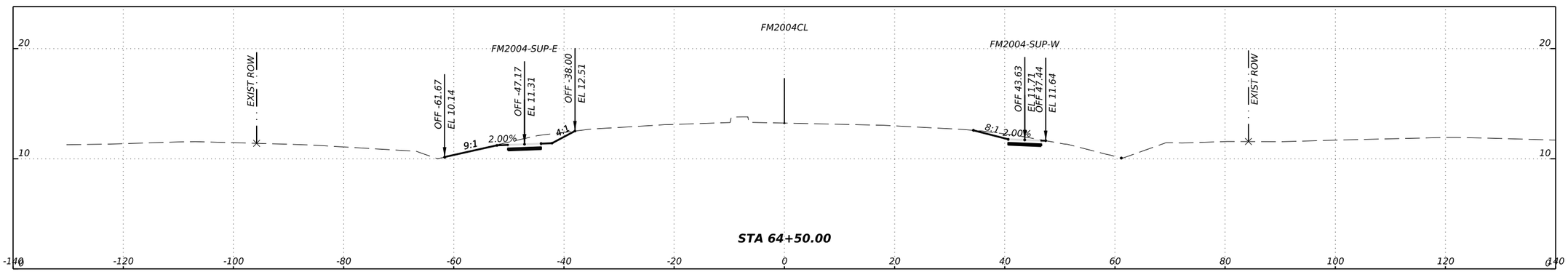
Texas Department of Transportation

SHEET 33 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	213



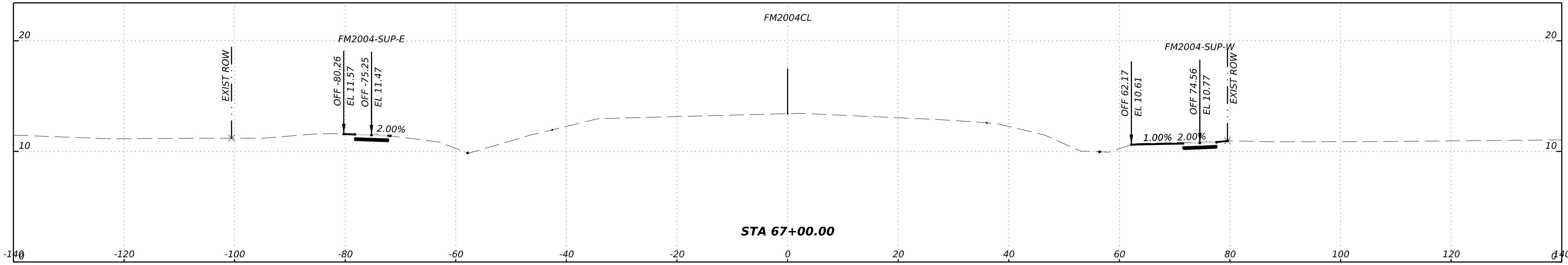


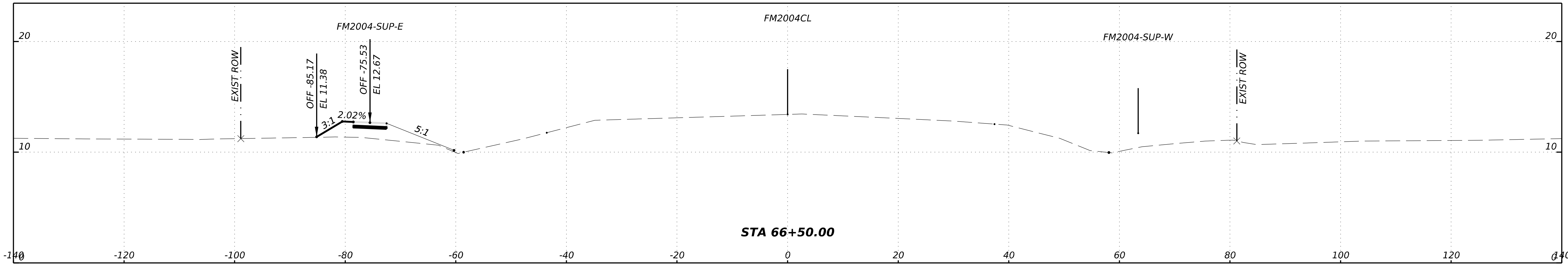


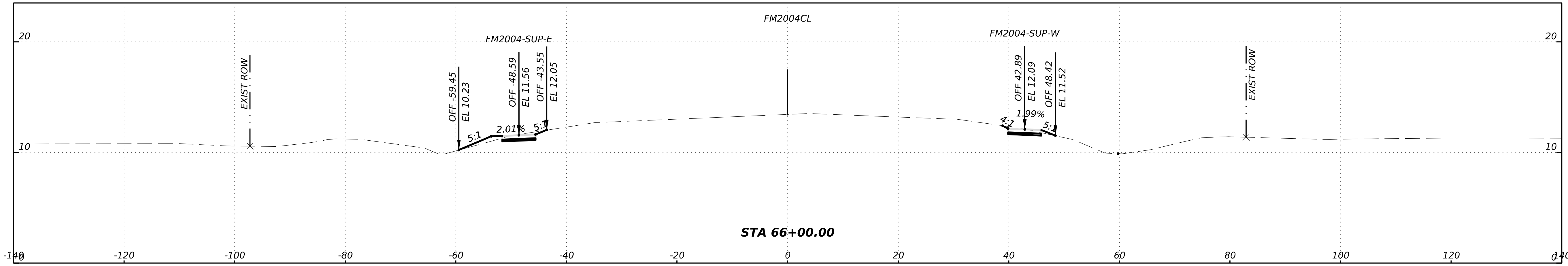
NOTE - CONTRACTOR INFORMATION ONLY

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	214

DATE: 3/4/2024 9:53:23 AM
FILE: 2D Design\Sidewalk\Drawings\Model\FM2004 Sidewalk\191101022fm2004Sidewalk\FM2004 North & South Sidewalk\FM2004_ORD Cross Sections.dgn
DGN: TxDOTWSBIWA 4







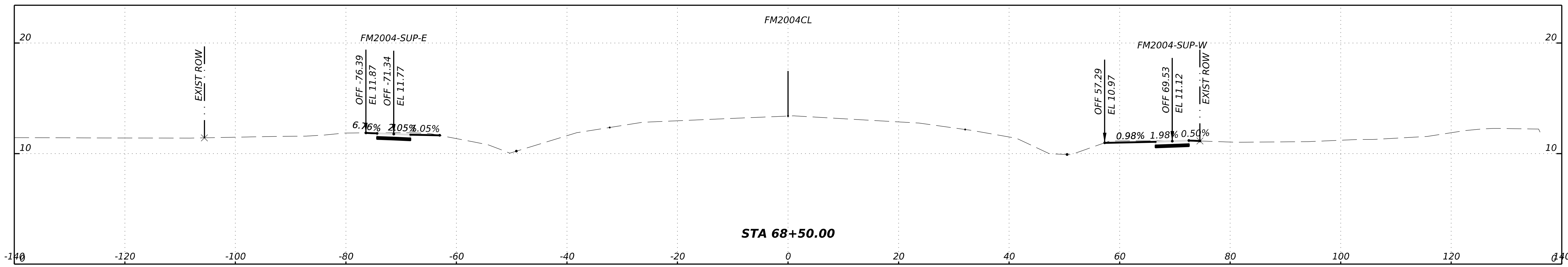
NOTE - CONTRACTOR INFORMATION ONLY

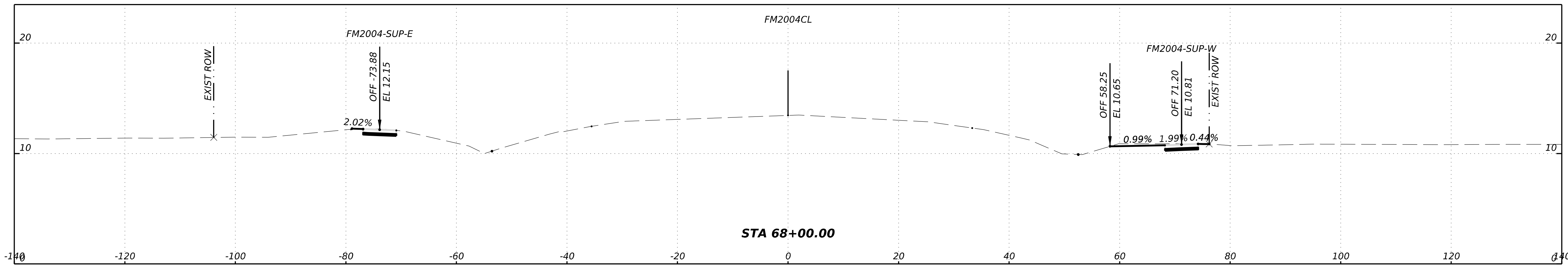
SHEET 35 OF 44

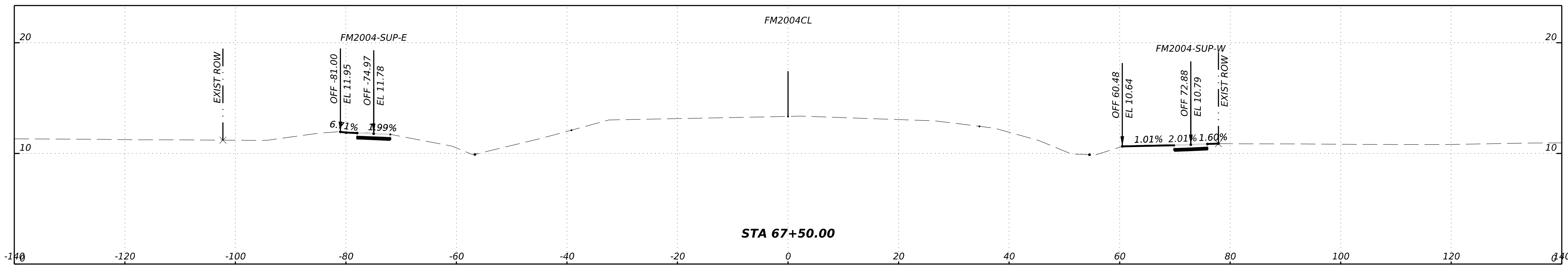
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	215

DATE: 3/14/2024 12:25:18 PM
FILE: Z:\PROJECTS\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







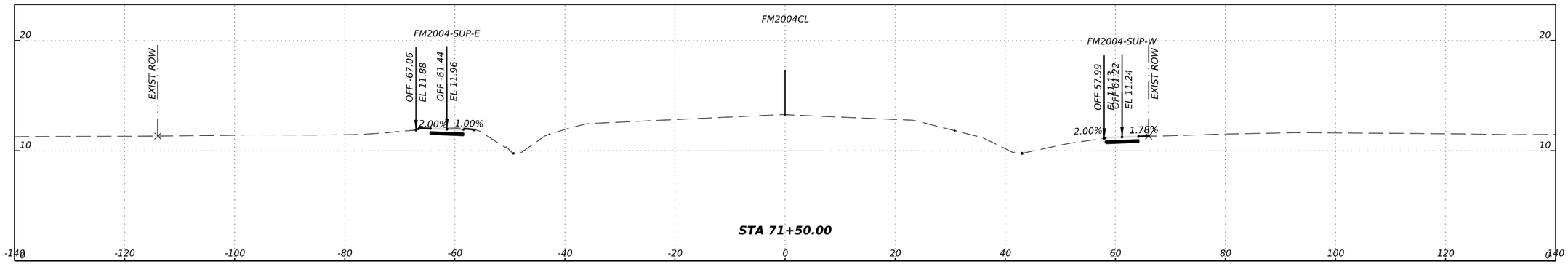
NOTE - CONTRACTOR INFORMATION ONLY

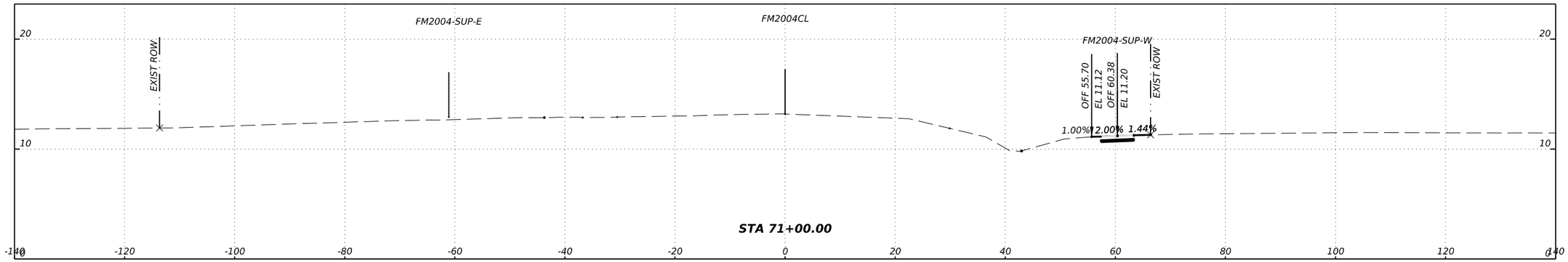
Texas Department of Transportation

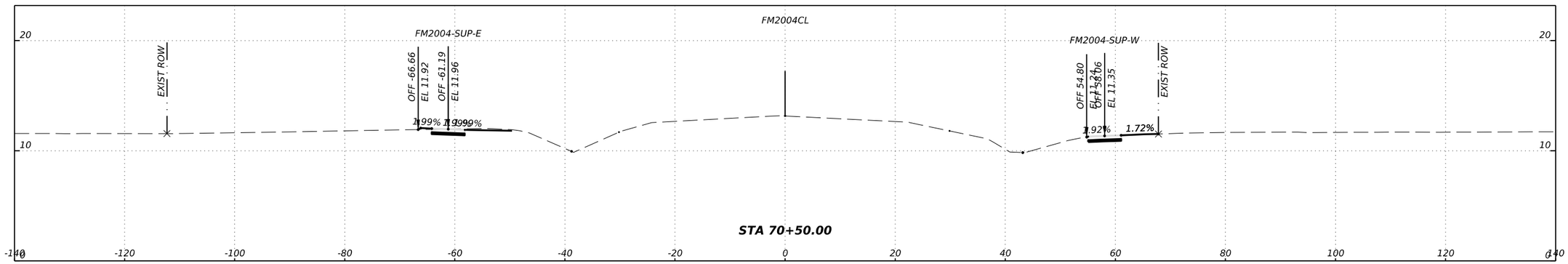
SHEET 36 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	216

DATE: 3/14/2024 9:53:38 AM
FILE: ZDPCURRENT\WA CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn





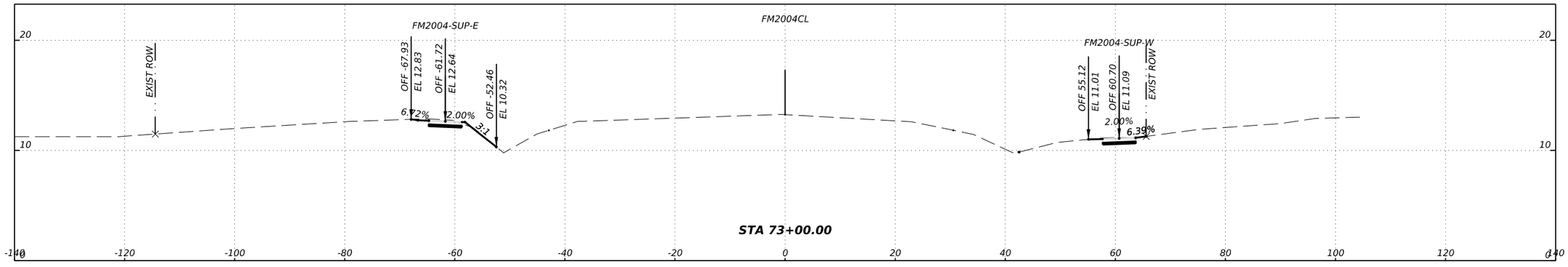


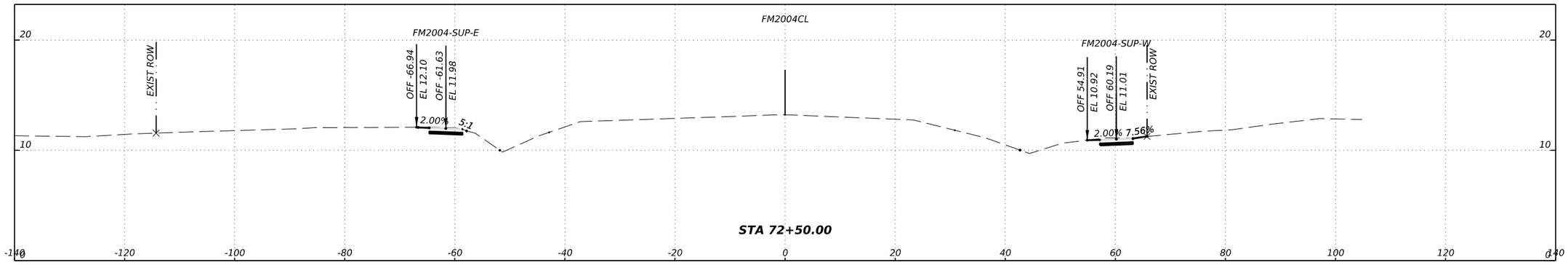
NOTE - CONTRACTOR INFORMATION ONLY

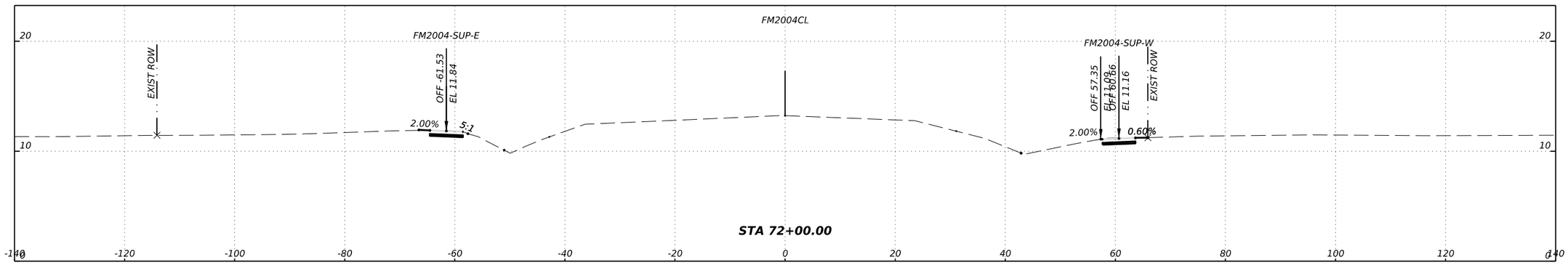
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	218

DATE: 3/14/2024 9:53:52 AM
FILE: ZDesignFiles\2018 CEC\TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW | CK | DW | CK







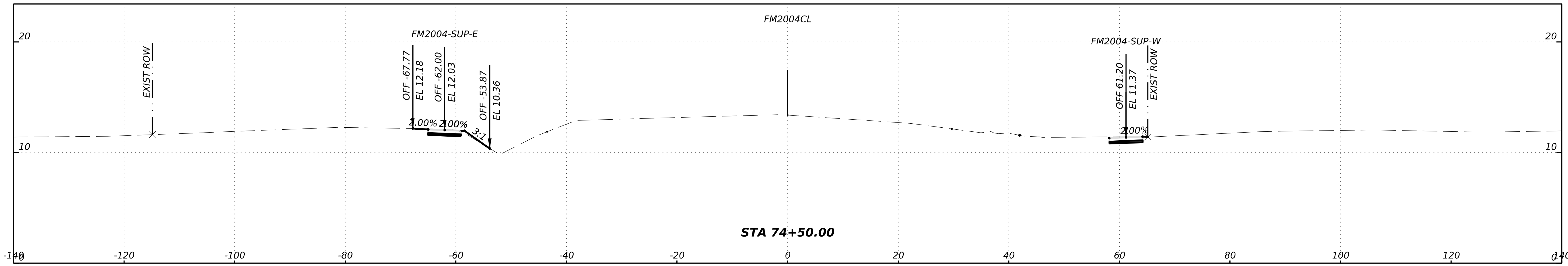
NOTE - CONTRACTOR INFORMATION ONLY

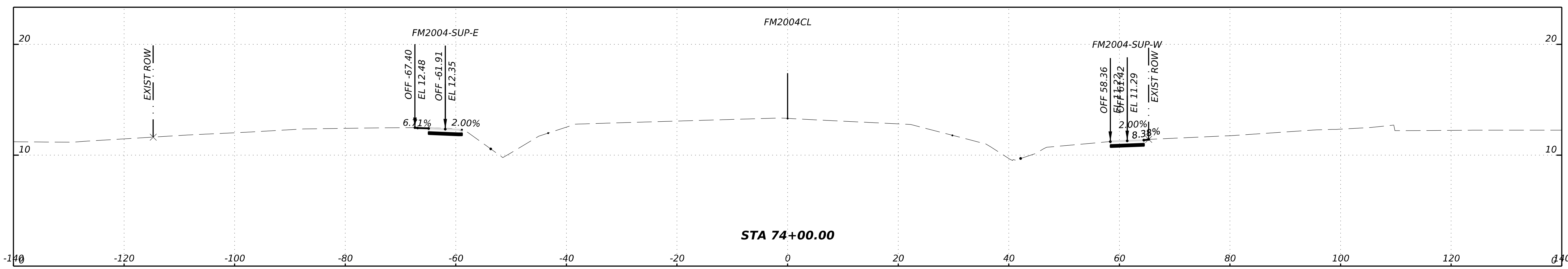
Texas Department of Transportation

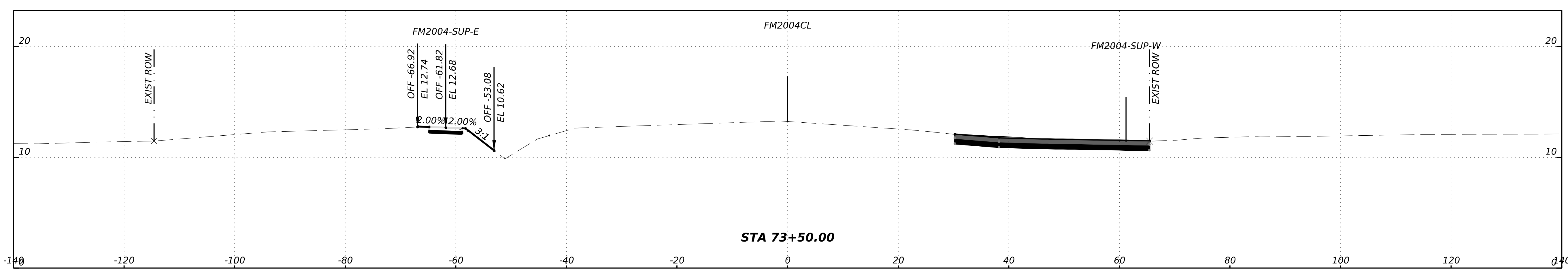
CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	219

DATE: 3/14/2024 9:53:59 AM
FILE: ZDocuments\2024\HE CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004_ORD_Cross_Sections.dgn

DW | CK | DW | CK







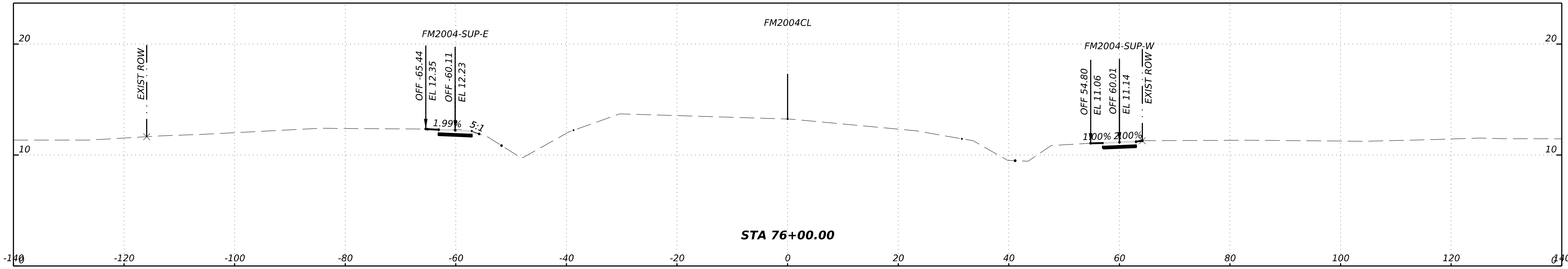
NOTE - CONTRACTOR INFORMATION ONLY

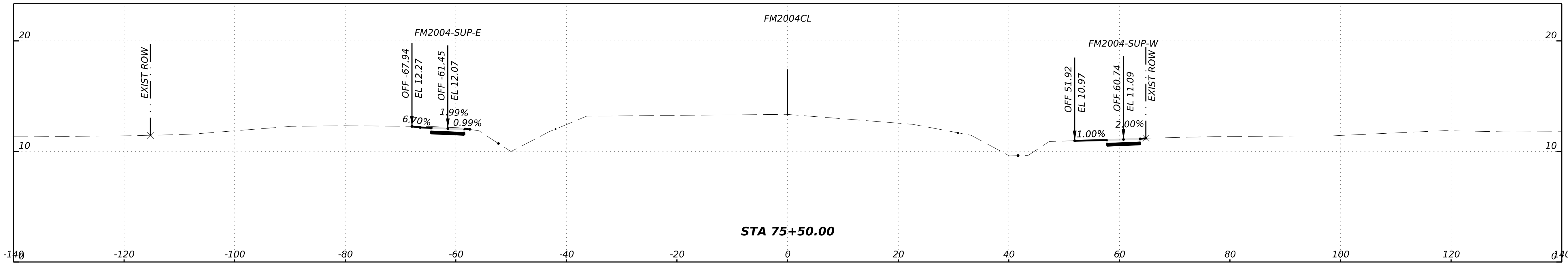
Texas Department of Transportation

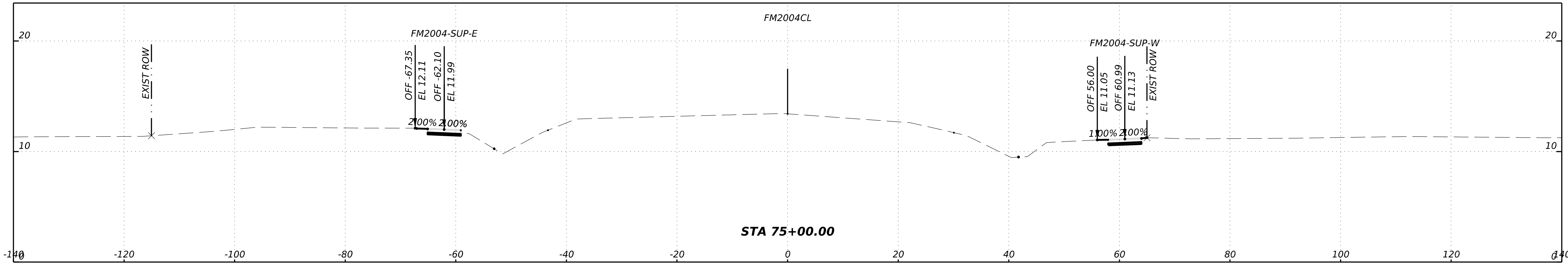
SHEET 40 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	220

DATE: 3/14/2024 9:54:06 AM
FILE: ZDPOWMSNMTXDOT CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\191101022Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







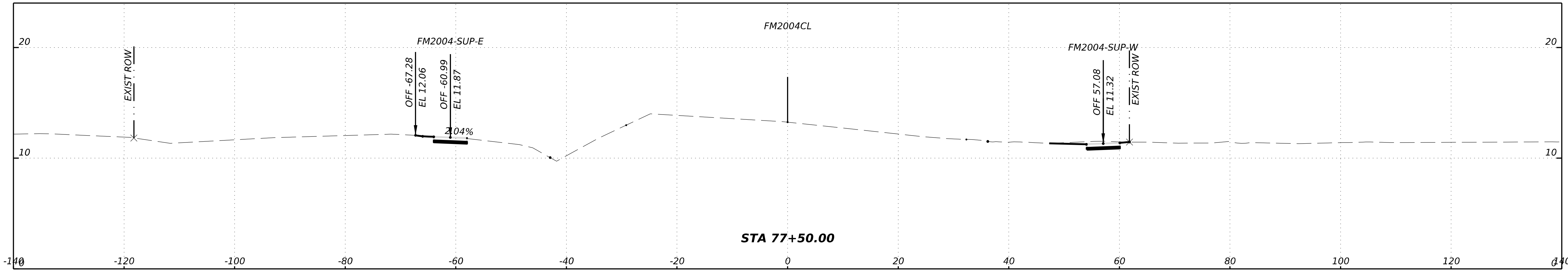
NOTE - CONTRACTOR INFORMATION ONLY

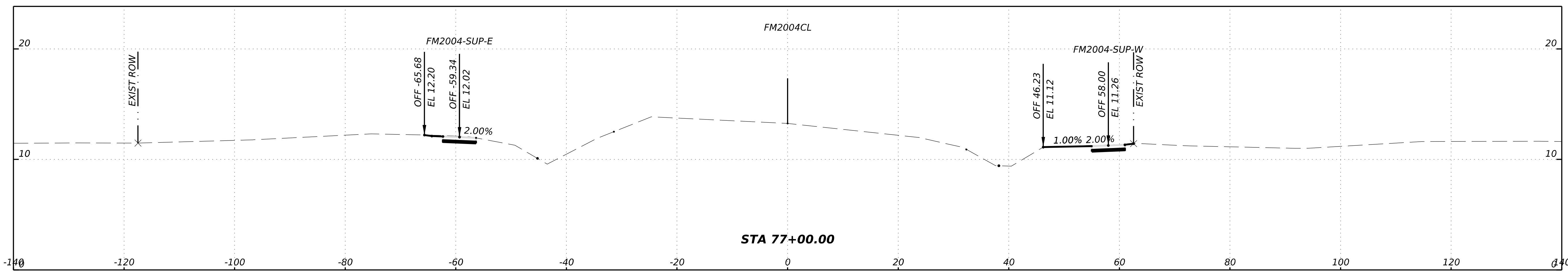
Texas Department of Transportation

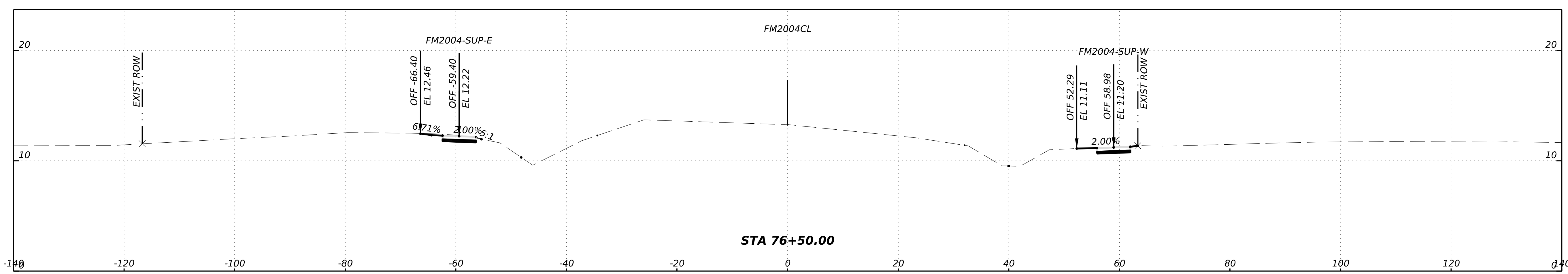
SHEET 41 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	221

DATE: 3/14/2024 9:54:13 AM
FILE: ...CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110122Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







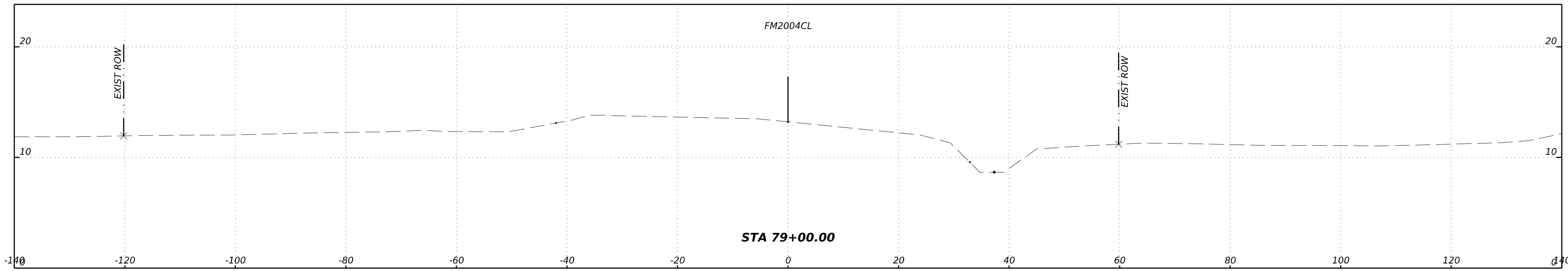
NOTE - CONTRACTOR INFORMATION ONLY

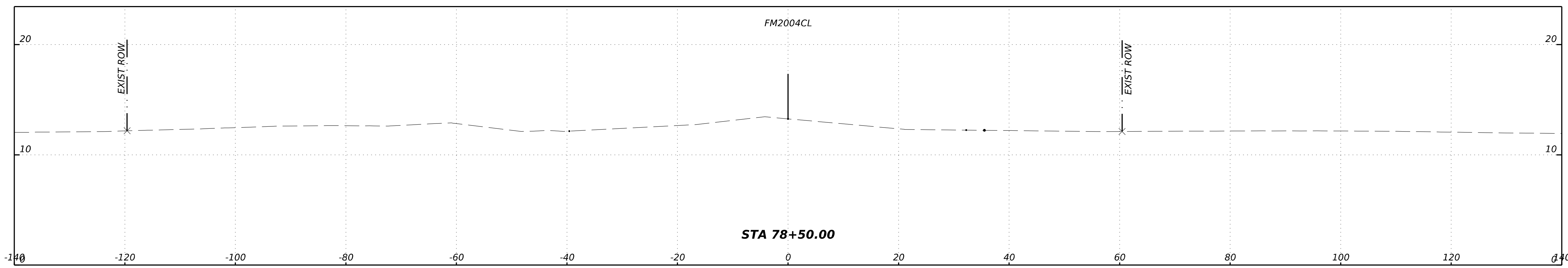
Texas Department of Transportation

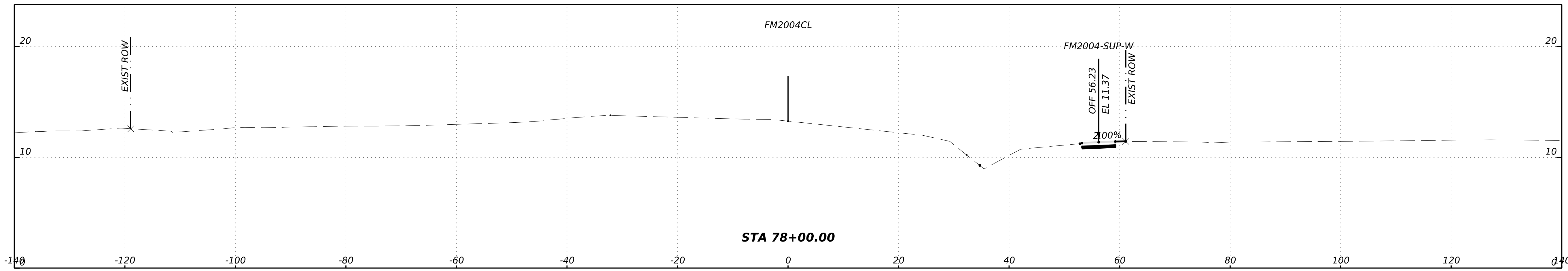
SHEET 42 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	222

DATE: 3/1/2024 9:54:20 AM
FILE: ...\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn







NOTE - CONTRACTOR INFORMATION ONLY

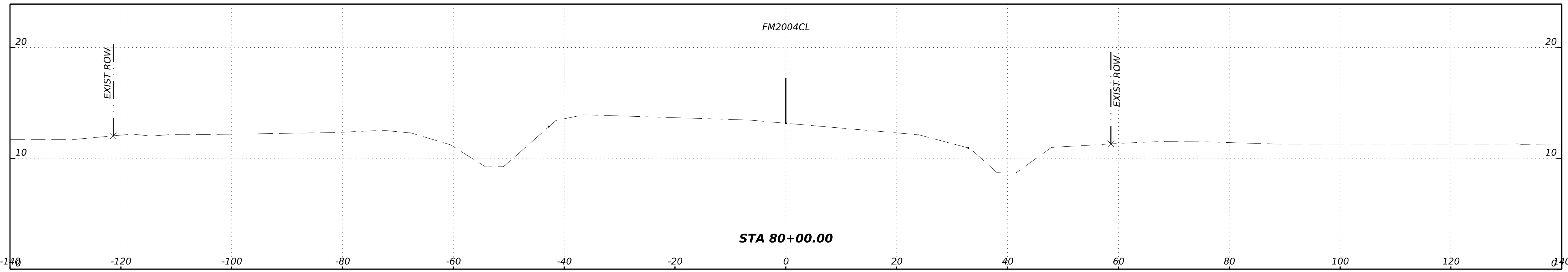
SHEET 43 OF 44

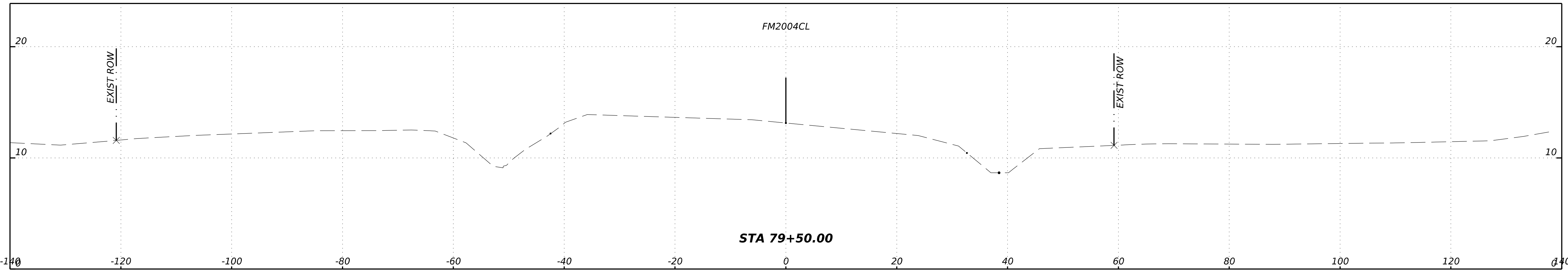
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	223

FILE: Z:\PROJECTS\2022\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn

DATE: 3/14/2024 9:54:27 AM





NOTE - CONTRACTOR INFORMATION ONLY

SHEET 44 OF 44

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
1911	01	022, ETC	FM 2004	HOU	GALVESTON	224

DATE: 3/17/2024 9:54:32 AM
FILE: Z:\PROJECTS\2023\CEC TxDOT\WSB\WA 4\FM2004 Sidewalk\19110102Fm2004Sidewalk\FM2004 North & South Sidewalk\Drawings\Model\FM2004 ORD Cross Sections.dgn