FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	BR 2020(124)			CS
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. BR 2020 (124)
CSJ 0912-72-406
ROAD LOG 2W14001, 2W14002, 2W14201
(UPIN) 19102MF19B01

SOUTH DIAMONDHEAD BLVD @ GUM GULLY
HARRIS COUNTY

NET LENGTH OF ROADWAY:	1,377.14 FT = 0.261 MI.
NET LENGTH OF BRIDGE:	210.00 FT = 0.040 MI.
NET LENGTH OF PROJECT:	1,587.14 FT = 0.301 MI.

BRIDGE AT SOUTH DIAMONDHEAD BLVD

REPLACEMENT OF AN EXISTING BRIDGE

CONSISTING OF GRADING, STRUCTURES, CONCRETE PAVEMENT, CEMENT TREATED BASE, LIME TREATED SUBBASE, ASPHALT STABILIZED BASE, TRAFFIC CONTROL, SIGNING & PAVEMENT MARKINGS, etc.

INDEX OF SHEETS

SEE SHEET 2

CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1. HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2. HCFCD 48-HR PRE-CONSTRUCTION NOTIFICATION

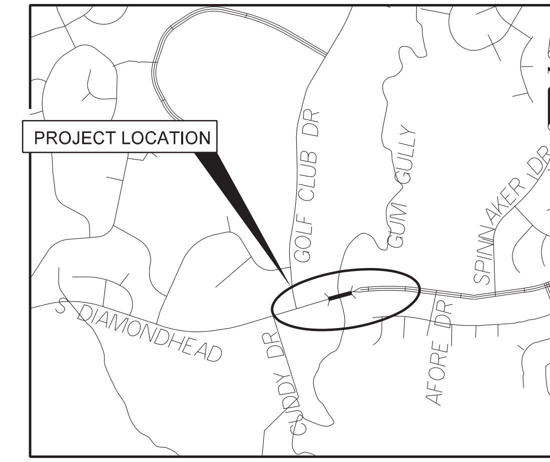
BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG. SITE PLAN MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.

TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO HTTP://APPS.HARRISCOUNTYTX.GOV/EPERMITS AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION.

FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

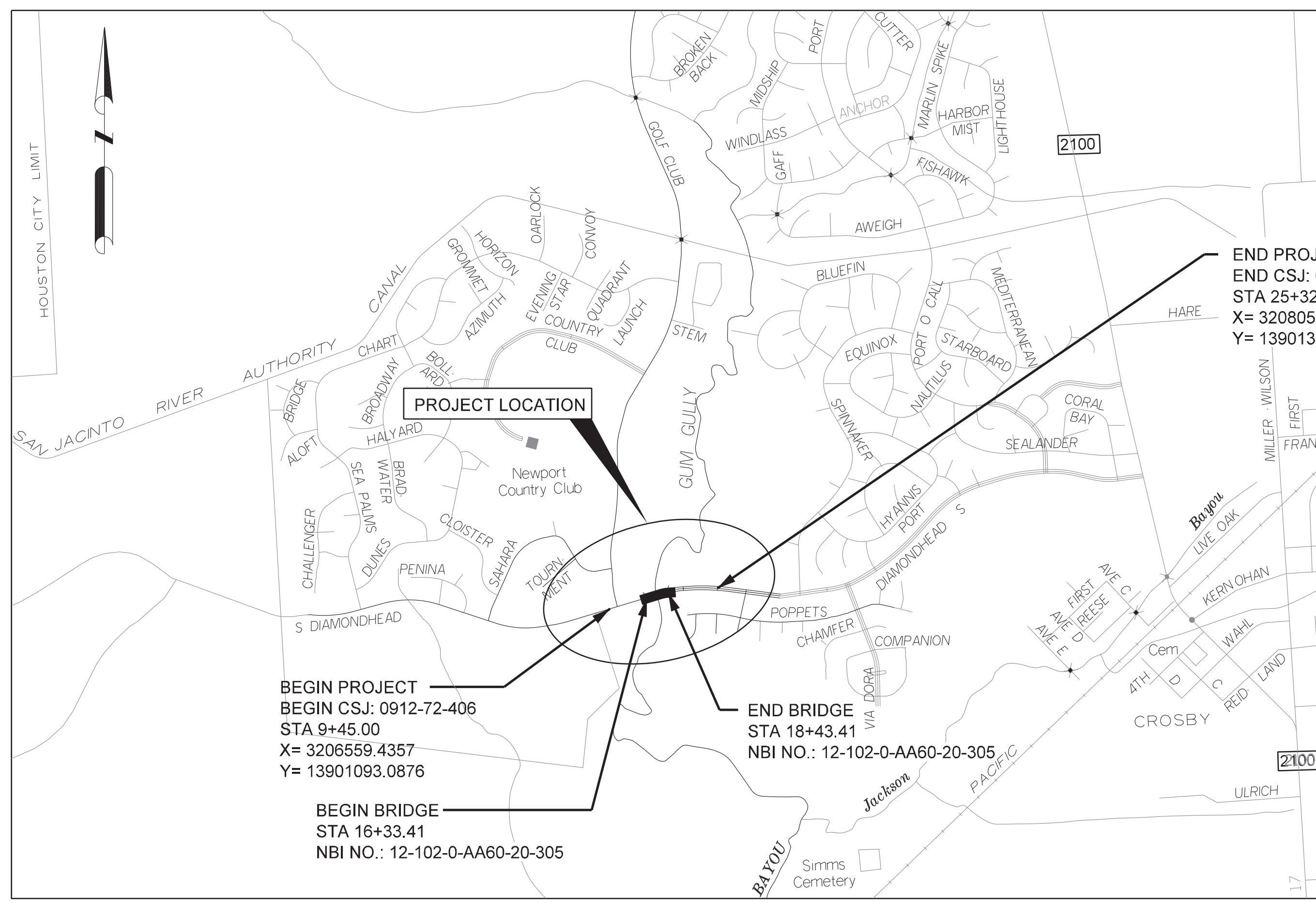
TDLR INSPECTION REQUIRED
EAB# TABS2022010916

FUNCTIONAL CLASS= MAJOR COLLECTOR
DESIGN SPEED MAINLANES= 40 MPH
ADT (2023) = 6,400
ADT (2043) = 8,700
NBI: 12-102-0-AA60-20-305



VICINITY MAP
NTS

consor
F-12040



EXCEPTIONS: N/A
RAILROAD CROSSINGS: NONE
EQUATIONS: N/A

LOCATION MAP
NTS

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION NOVEMBER, 2014 AND SPECIFICATIONS ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS, FEDERAL - AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022).

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

Texas Department of Transportation

APPROVED FOR LETTING:

HARRIS COUNTY ENGINEER

SUBMITTED FOR LETTING: 12/1/2022
DocuSigned by:
Mainul Khan
E69277... PROJECT MANAGER

APPROVED FOR LETTING: 12/1/2022
DocuSigned by:
Larry W. Blackburn, P.E.
FOR DISTRICT ENGINEER

FILE: c:\bms\pwe-useast-006\perla.gonzalez\dms24686\C_406_S_GT01.dgn
DATE: 11/30/2022 11:02:33 AM

COUNTY	HARRIS	PROJ. NO.	BR 2020 (124)
HWY. NO.	CS (DIAMONDHEAD)	LETTING DATE	FEB 2023
DATE ACCEPTED			

STATE OF TEXAS · RICARDO A. PRIETO · 91123 · LICENSED PROFESSIONAL ENGINEER

11/30/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET (**) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

RICARDO A. PRIETO 11/30/2022
NAME DATE

STATE OF TEXAS · JOSEPH M. LOPEZ · 141382 · LICENSED PROFESSIONAL ENGINEER

11/30/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET (***) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

JOSEPH M. LOPEZ 11/30/2022
NAME DATE

STATE OF TEXAS · ALFONSO D. PEREZ · 120364 · LICENSED PROFESSIONAL ENGINEER

11/30/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET (*) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

ALFONSO D. PEREZ 11/30/2022
NAME DATE

STATE OF TEXAS · YVONNE COLMENERO · 130314 · LICENSED PROFESSIONAL ENGINEER

11/30/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET (<) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

YVONNE C. COLMENERO 11/30/2022
NAME DATE

STATE OF TEXAS · ADRIANA C. SUSTAITA · 141394 · LICENSED PROFESSIONAL ENGINEER

11/30/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET (>) HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

ADRIANA C. SUSTAITA 11/30/2022
NAME DATE

NO.	DATE	REVISION	APPROV.

consor F-12040

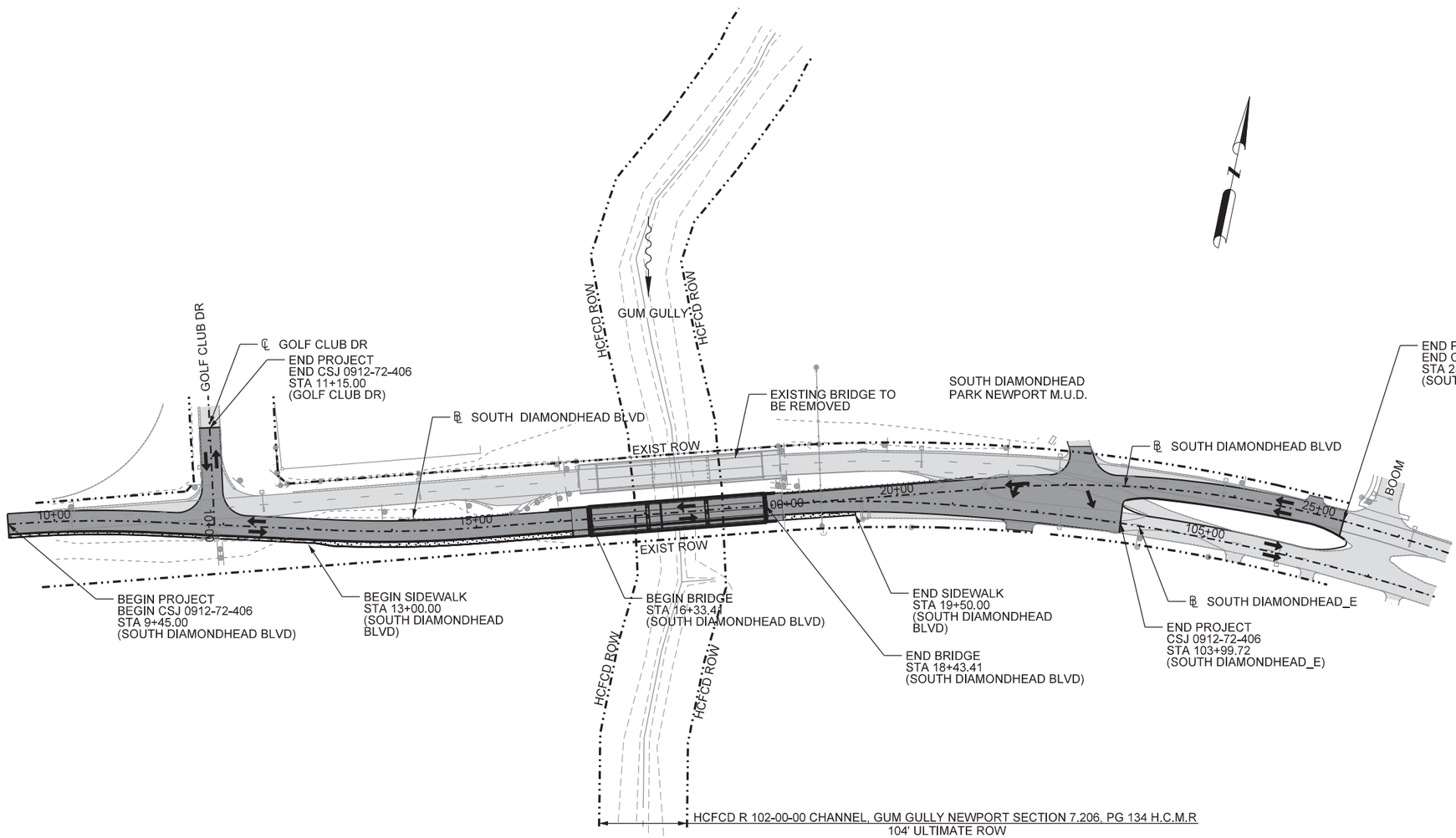
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

INDEX OF SHEETS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		2
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

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FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

0 75′ 150′
SCALE: 1" = 150′

STATE OF TEXAS
RICARDO A. PRIETO
91123
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

PROJECT LAYOUT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		3
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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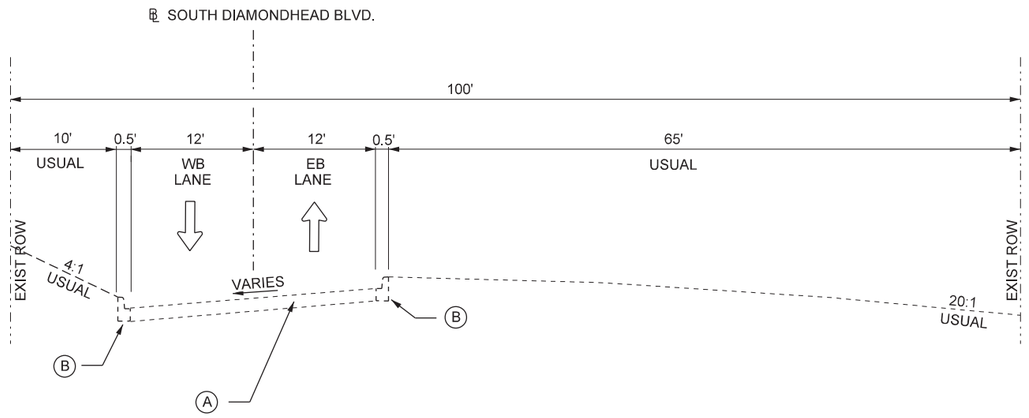
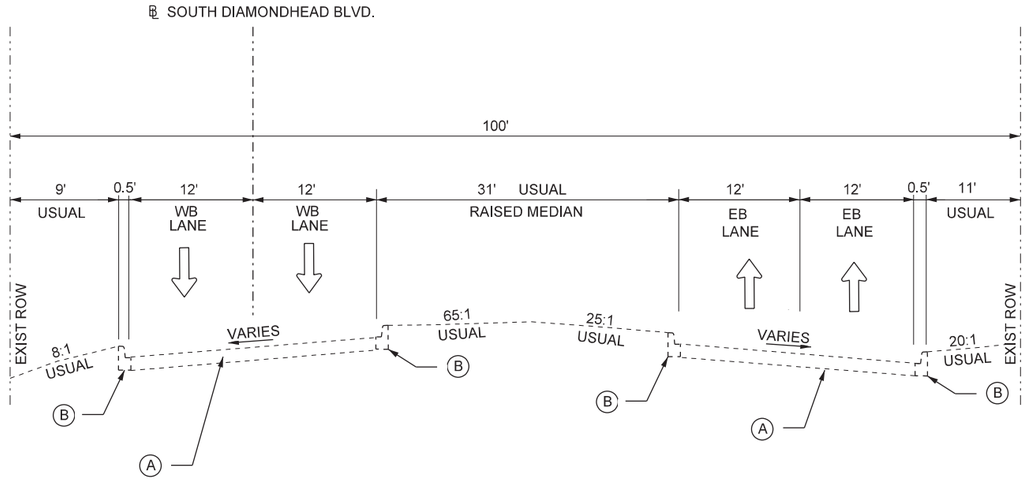


EXISTING TYPICAL SECTION

STA. 10+07.00 TO STA. 16+48.38 (℄ SOUTH DIAMONDHEAD BLVD.)
STA. 18+45.53 TO STA. 19+60.11 (℄ SOUTH DIAMONDHEAD BLVD.)



EXISTING TYPICAL SECTION

STA.19+60.11 TO STA. 25+34.00 (℄ SOUTH DIAMONDHEAD BLVD.)

LEGEND

- (A) EXIST 7" ASPHALT CONCRETE PAV (ACP) (INFO GATHER FROM AS-BUILTS PROVIDED 5401-3-98)
- (B) EXIST CURB AND GUTTER
- EXIST TRAFFIC DIRECTION

NOTE

1. SEE BRIDGE LAYOUTS FOR TYPICAL SECTIONS BETWEEN STA 16+48.38 TO STA 18+45.53 (℄ SOUTH DIAMONDHEAD BLVD)

NOT TO SCALE

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		4
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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11/30/2022
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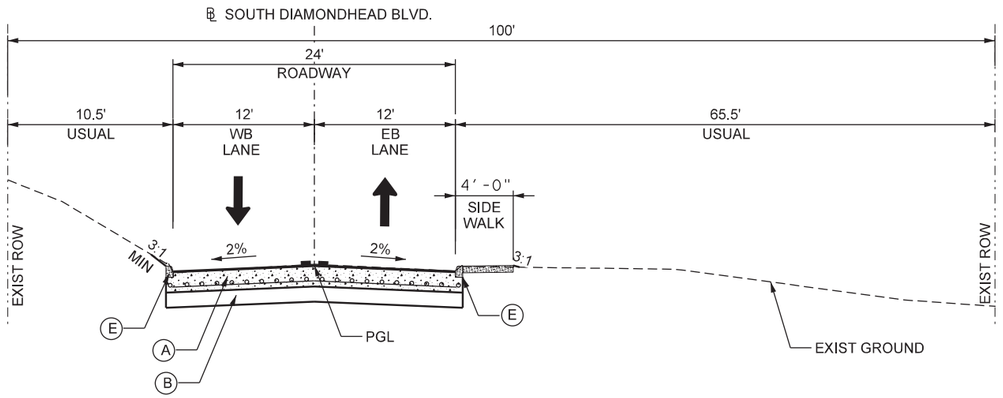
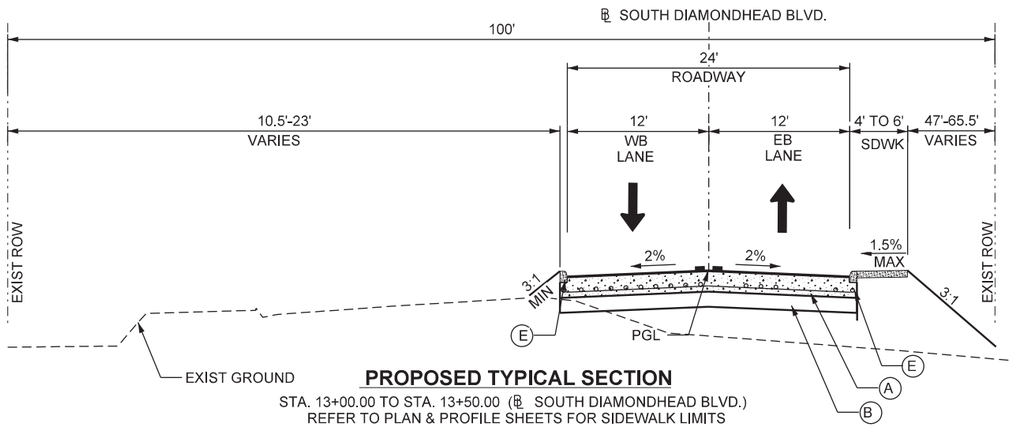
LEGEND

- (A) CONC PVMT (JRCP) (10")
- (B) PROP 8" LIME TREATED SUBGRADE (RATE=10% by WEIGHT)
- (E) TY II CURB
- (F) RETAINING WALL
- (G) METAL BEAM GUARD FENCE
- (H) RAIL (TY C223)
- PROP TRAFFIC DIRECTION



PROPOSED TYPICAL SECTION

SLOPE TRANSITION BEGINS AT STA. 9+45.00 TO STA.13+00.00 TO MATCH EXIST SLOPE (℄ SOUTH DIAMONDHEAD BLVD.)



PROPOSED TYPICAL SECTION

STA. 13+00.00 TO STA. 13+50.00 (℄ SOUTH DIAMONDHEAD BLVD.)
REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK LIMITS

NOT TO SCALE

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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F-12040

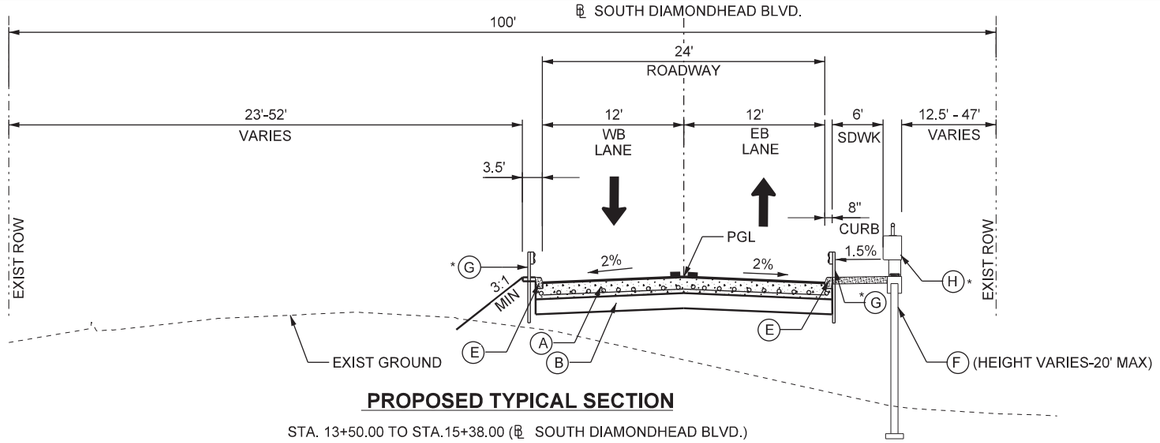
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PROPOSED
TYPICAL SECTIONS

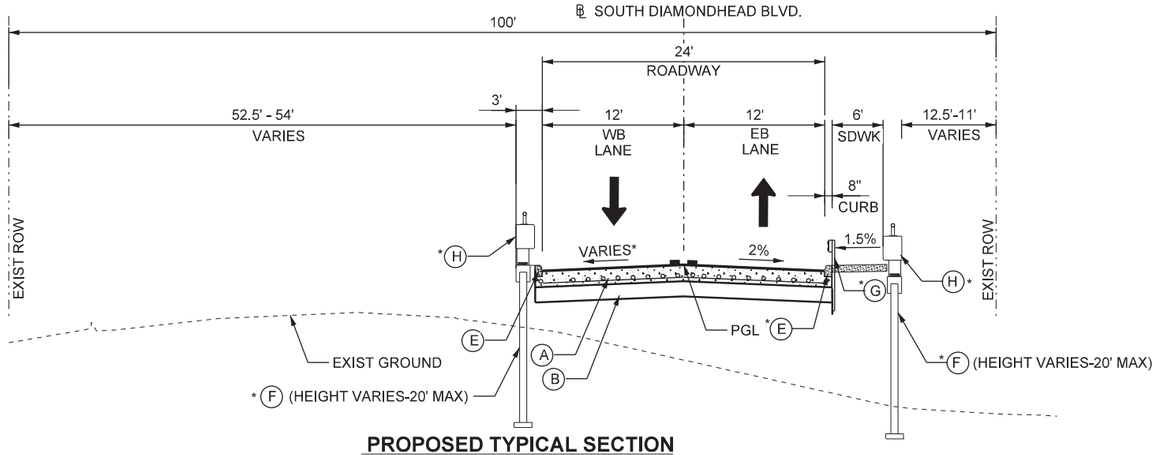
SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		5
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



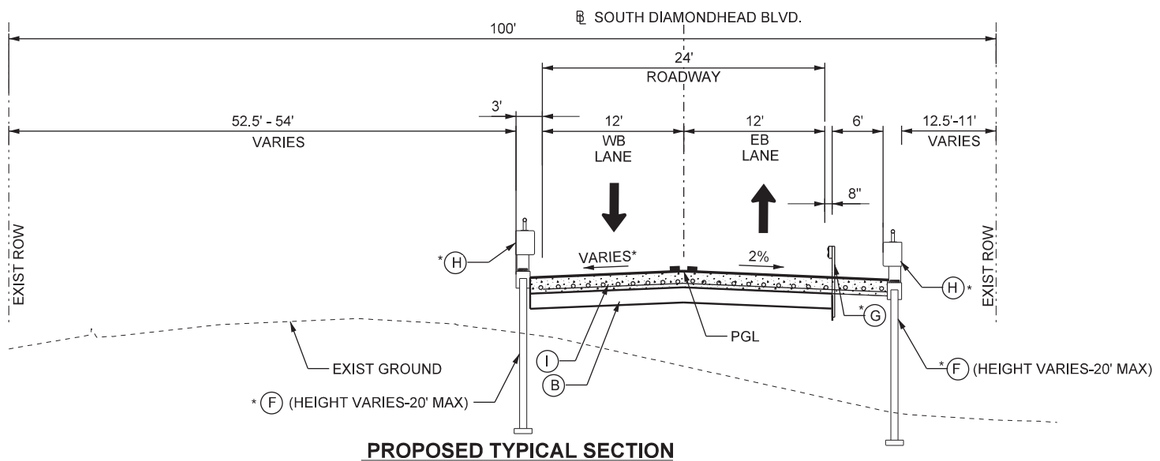
PROPOSED TYPICAL SECTION

STA. 13+50.00 TO STA.15+38.00 (℄ SOUTH DIAMONDHEAD BLVD.)
*REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK, MBGF, AND RETAINING WALL LIMITS



PROPOSED TYPICAL SECTION

STA. 15+38.00 TO STA. 16+13.41 (℄ SOUTH DIAMONDHEAD BLVD.)
*REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK, MBGF, RETAINING WALL LIMITS AND CROSS SLOPE TRANSITION.



PROPOSED TYPICAL SECTION

STA. 16+13.41 TO STA. 16+33.41
STA. 18+43.41 TO STA. 18+63.41
(℄ SOUTH DIAMONDHEAD BLVD.)
*REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK, MBGF, RETAINING WALL LIMITS AND CROSS SLOPE TRANSITION.

LEGEND

- (A) CONC PVMT (JRCP) (10")
- (B) PROP 8" TREATED SUBGRADE !ADE
- (E) TY II CURB
- (F) RETAINING WALL
- (G) METAL BEAM GUARD FENCE
- (H) RAIL (TY C223)
- (I) APPROACH SLAB

PROP TRAFFIC DIRECTION

NOTE

1. SEE BRIDGE LAYOUTS FOR TYPICAL SECTIONS BETWEEN STA 16+33.41 TO STA 18+43.41 (℄ SOUTH DIAMONDHEAD BLVD)

NOT TO SCALE

RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

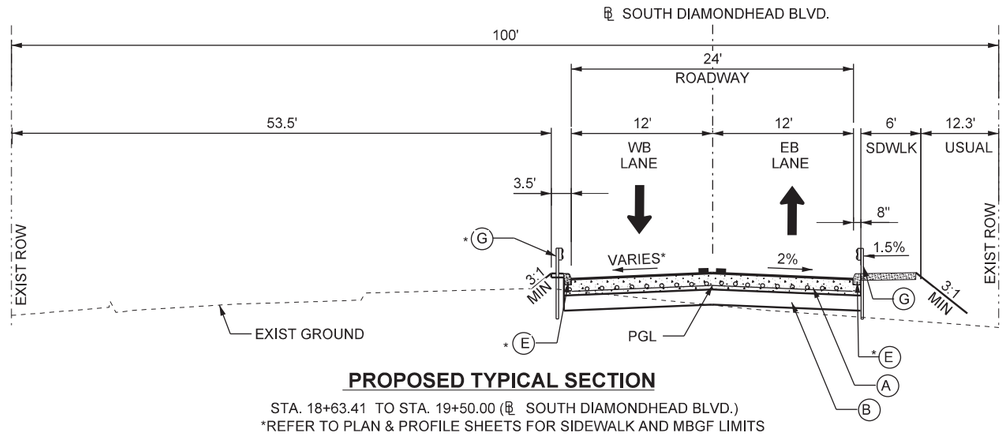
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

PROPOSED TYPICAL SECTIONS

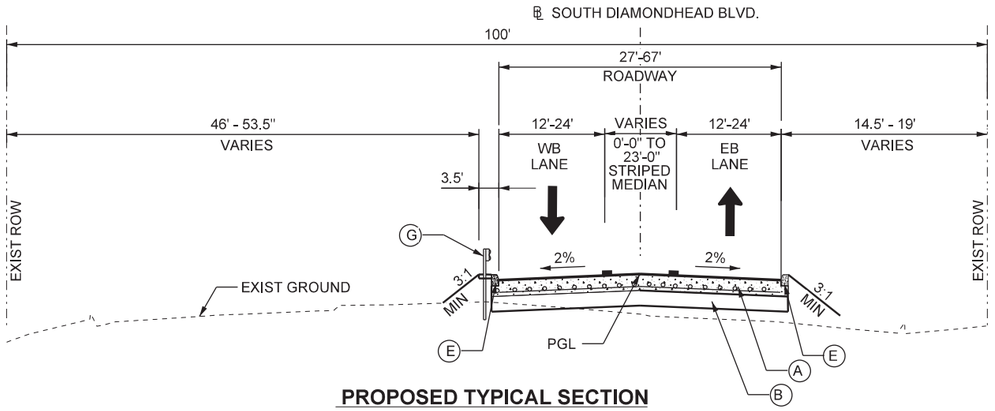
SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		6
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



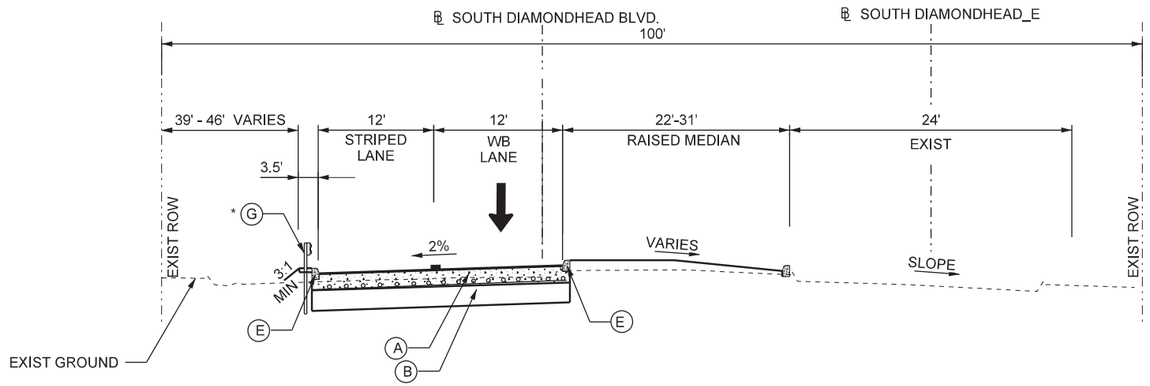
PROPOSED TYPICAL SECTION

STA. 18+63.41 TO STA. 19+50.00 (℄ SOUTH DIAMONDHEAD BLVD.)
*REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK AND MBGF LIMITS



PROPOSED TYPICAL SECTION

STA. 19+50.00 TO STA. 22+68.00 (℄ SOUTH DIAMONDHEAD BLVD.)
REFER TO PLAN & PROFILE SHEETS FOR SIDEWALK AND MBGF LIMITS



PROPOSED TYPICAL SECTION

STA. 22+68.00 TO STA. 25+32.14 (℄ SOUTH DIAMONDHEAD BLVD.)
*REFER TO PLAN & PROFILE SHEETS FOR MBGF LIMITS

LEGEND

- (A) CONC PVMT (JRCP) (10")
- (B) PROP 8" LIME TREATED SUBGRADE (RATE=10% by WEIGHT)
- (E) TY II CURB
- (F) RETAINING WALL
- (G) METAL BEAM GUARD FENCE
- (H) RAIL (TY C223)
- PROP TRAFFIC DIRECTION

NOT TO SCALE

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		7
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

County: Harris **Control:** 0912-72-406

Highway: CS

General Notes:

General:

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

Area Engineer: Phillip Garlin, P.E.
Assistant Area Engineer: Roger Lopez, P.E.

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

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

Questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, and CCSJ/Project Name.

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

Superelevate the curves to match the existing surface.

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

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

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

Grade street intersections and median openings for surface drainage.

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

County: Harris **Control:** 0912-72-406

Highway: CS

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.

Right of way parcels or utility adjustments shown to be unclear on the plans but not listed on the special provisions will have no effect on construction.

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

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

The existing bridge located at South Diamondhead Blvd has been tested for Asbestos Containing Materials (ACM) and found to contain 1% or less ACM. No mitigation was required. (Awaiting on results).

Any groundwater elevation information provided is representative of conditions existing on the day when and for the specific location where this information was collected. The actual groundwater elevation may fluctuate with time, climatic conditions, and construction activity.

The following Standard Detail sheets have been modified:

- FD (MOD)

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.

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County: Harris **Control:** 0912-72-406

Highway: CS

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: 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.

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

County: Harris **Control:** 0912-72-406

Highway: CS

General: Traffic Control and Construction

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

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

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

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

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

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

General: Utilities

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

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

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

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

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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. 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, ftp://ftp.dot.state.tx.us/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.

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Table 2
2014 Construction Specification Required Shop/Working Drawing Submittals

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 (Prstrs Bms)	Y	Y	Y	D	SD
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,	Y	Y	Y	D	SD

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	Etc.)					
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 *rprieto@consoreng.com*
TMS – Traffic Management System

Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdct.gov

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

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Item 6: Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manuafactured 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 2.66 acres. The disturbed area in this project, the project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer (to the appropriate MS4 operator when on an off-state system route) and to the local government that operates a separate storm drain system.

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

Do not store any material in Waters of the United States inside the right of way without written approval.

Before construction operations begin, provide a drawing of the location of proposed temporary access roads, haul roads, or temporary fill used during construction operations to ensure that they are not within Jurisdictional Waters of the United States.

If the Contractor elects to use an area not permitted and determined to be within Jurisdictional Waters of the United States during the prosecution of the work, the Contractor will hold the Department harmless for delays caused by procuring the necessary permits from the United States Army Corps of Engineers.

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

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

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

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

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*

Provide a virus-free computer disk or other acceptable electronic media containing the Primavera construction schedule.

Item 100: Preparing Right of Way

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

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

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

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.

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.

The total excavation quantity shown on the plans includes the quantity for excavating to 2 ft. behind the back of the proposed curb.

Excavate, strip, and stockpile the top 6 in. of existing topsoil only at locations shown in the plans. The salvaged quantity is shown in the plans. Reuse the topsoil under the Item, 161 "Compost" including measurement and payment.

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. Topsoil work is paid under the Item, 161 "Compost".

Item 161: Compost
Item 162: Sodding for Erosion Control
Item 164: Seeding for Erosion Control
Item 166: Fertilizer
Item 168: Vegetative Watering

Refer to SWP3 layouts and "Fertilizer, Seed, Sod, Straw, Compost, and Water" sheet for material specifications, application rates, and for watering requirements.

Item 260: Lime Treatment (Road-Mixed)

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

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

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

Use the type of lime at particular locations as directed.

Place the quicklime dry or as a slurry.

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

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

Provide documentation from certified public scales showing gross, tare, and net weights. Provide producer's delivery tickets also showing gross, tare, and net weights. Completely empty the lime trailers at the project site. The Engineer may direct the Contractor to reweigh any

shipment of lime on certified scales. The cost of this operation is subsidiary to the Item, "Lime Treatment (Road-Mixed)."

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

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

Item 360: Concrete Pavement

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

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

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

Do not use limestone dust of fracture as fine aggregate.

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

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

The pay limits for concrete pavements with traffic rails extends to the outside edge or back of the traffic rail.

Items 360, 420, and 421: All Concrete Items

For the Department's concrete cylinder split samples, transport the test cylinders to the Houston District Laboratory located at 7600 Washington Avenue in Houston, or to the appropriate Area Laboratory, when applicable. Transporting the test cylinders is subsidiary to the various bid items.

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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 a minimum of 7 percent of hydraulic cement based on the dry weight of backfill material. 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.

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 420: Concrete Substructures

Unless otherwise noted, use Class C concrete with an ordinary surface finish for signal, lighting, or sign structure foundations.

Item 421: Hydraulic Cement Concrete

Entrained air is required in all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.), but is not required for other structural concrete. Adjust the dosage of air entraining agent for low air content as directed or allowed by the Engineer. If entrained air is provided where not required, do not exceed the manufacturer's recommended dosage.

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Item 423: Retaining Walls

Provide an exposed aggregate surface finish on retaining walls unless otherwise shown on the plans.

Place concrete riprap mow strips for retaining walls as shown on the plans and in accordance with the Item, "Riprap." Use Class B concrete reinforced with No. 4 bars spaced at 18 in. centers each direction and placed 2 in. below the surface. This work is paid for under the Item, "Riprap."

Provide and maintain positive drainage away from the earth wall system, including the leveling pad, for the contract duration.

Approved Mechanically Stabilized Earth (MSE) Wall Systems are listed at the website below or from the Department's home page>Business>Bridge>Retaining Walls>Approved MSE Panel Systems: http://www.txdot.gov/business/resources/approved-systems/mse-wall.html

Item 432: Riprap

If stone riprap is shown on the plans, use common stone riprap 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 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.

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 structures are shown on the plans, but these structures may be in a different position or condition. Delays, inconveniences, or additional work required will not be a basis for additional compensation.

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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.

If groundwater is encountered while installing the storm drain system, install a suitable dewatering system to facilitate construction of the storm drains. The costs for materials and labor required to install and maintain this system are subsidiary to the Item, "Reinforced Concrete Pipe."

Item 465: Junction Boxes, Manholes, and Inlets

If required on the plans, build manholes and inlets to stage 1 construction, cover with temporary pavement, and complete in a later phase of construction. This temporary covering and pavement are subsidiary to the various bid items.

Construct manholes and inlets in graded areas, first to an elevation at least 4 in. above the top of the highest entering pipe and cover with a wooden cover. Complete the construction of such manholes and inlets to the finished elevation when completing the grading work for such manholes and inlets. Adjust the final elevation, if required, since this elevation is approximate.

Construct manholes and inlets in paved areas to an elevation so their temporary wooden covers are flush with the surface of the base material.

Do not leave excavations or trenches open overnight.

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.

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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."

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

Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

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

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

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

Do not reduce the existing number of lanes open to traffic.

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**.**

Minimize the number of working days for street closures. The following table lists the maximum number of working days allowed for each street closure. The closure period for each intersection occurs only during the phase when constructing that street, unless otherwise directed. Reopen the street within the number of working days allowed; otherwise the Engineer may cease construction activities not affiliated with reopening the closed street, until it fully reopens to the traveling public. Time charges will not be suspended nor increased to compensate for this occurrence.

Street Name	Number of Working Days Allowed for Closure
Golf Club Dr.	*19*

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.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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.

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.

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Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

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

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

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

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

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

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

Item 556: Pipe Underdrains

Do not use crushed blast furnace slag.

Lay the underdrain pipe on a slope to insure proper drainage.

Tie the under drainpipe into the inlets as shown on the plans.

If filter material is processed gravel, use the following material requirements:

Square Sieve	Percent Retained
1/2 in.	0
No. 4	10 - 35
No. 40	55 - 85

If filter material is approved concrete sand, use the following material requirements:

Square Sieve	Percent Retained
5/8 in.	0
No. 4	0 - 40
No. 40	40 - 90

County: Harris **Control:** 0912-72-406

Highway: CS

Square Sieve	Percent Retained
No. 100	90 - 100

Item 585: Ride Quality for Pavement Surfaces

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

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

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

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

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

Item 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 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.

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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 in place of the cast iron junction boxes shown on standard sheets CTBI (3), CTBI (4), and SSCB (4). Mount the junction boxes flush (+ 0 in., - 1/2 in.) with the concrete surface of the concrete barrier.

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

Item 620: Electrical Conductors

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

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

County: Harris **Control:** 0912-72-406

Highway: CS

Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

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

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

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

Item 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 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.

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Remove and assume ownership of the existing ground mounted signs to be relocated within the limits of roadway construction unless otherwise noted or directed. This work 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.

Item 647: Large Roadside Sign Supports and Assemblies

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.

Assume ownership of the removed existing signs.

Item 662: Work Zone Pavement Markings

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

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

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

Item 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.

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 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

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

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

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

Basis of Estimate

Item	Description	Limit and Rate	Unit
260	Lime Treatment (Road-Mixed) For materials used as subgrade * • Lime (HYD, COM, or QK)(SLRY) or QK(DRY)	 8 % by weight based on 128 Lb. / Cu. Ft. subgrade	SY TON

1. PAVING

(FOR H.C. PUBLIC R.O.W. ONLY)

	DESIGN THICKNESS OF PAVING	STABILIZED SUBGRADE DEPTH	DESIGN STRENGTH OF CONCRETE	STEEL SPACING		REINFORCE STEEL SIZE
				LONG.	TRANS.	
CONCRETE	(IN.)	(IN.)	(PSI)	(IN.)	(IN.)	(#4 MIN.)
	10	8	3000	18	36	#5

	DESIGN SURFACE COURSE THICKNESS	DESIGN SURFACE COURSE TYPE	DESIGN BASE COURSE THICKNESS	DESIGN BASE COURSE TYPE	STABILIZED SUBGRADE THICKNESS	STABILIZED SUBGRADE TYPE
ASPHALT	(IN.)	(MATERIAL)	(IN.)	(MATERIAL)	(IN.)	(MATERIAL)

DRIVEWAYS (in H.C. ROW only)

I. NUMBER OF DRIVEWAY APPROACHES PROPOSED INCLUDE WIDENING OR REPAVING EXISTING DRIVEWAYS AS WELL AS NEW DRIVEWAYS

DRWY	WIDTH	MATERIAL	CULVERT?	CULVERT LENGTH	NEAREST X-STREET	DIST. TO X-STREET
1	30.9'	CONC	NO	N/A	BOOM	410'
2	24'	CONC	NO	N/A	BOOM	360'
3	16.5'	CONC	NO	N/A	BOOM	80'
4						
5						

II. HARRIS COUNTY STANDARD DRIVEWAY DETAIL APPEARS ON SHEET ____

FIRE APPARATUS ACCESS ROAD

☐ REQUIRED AND SHOWN ON SHEET(S) _____

☐ NOT REQUIRED DUE TO _____

CURBING

I. ISLANDS, MEDIANS AND ALL AREAS NOT TAKING DIRECT DRIVEWAY ACCESS REQUIRES STANDARD 6" CURBING

II. ☒ STANDARD 6" CURBING PROPOSED

☐ 4" x 12" CURBING PROPOSED EXCEPT AT MEDIANS AND ISLANDS

TRAFFIC CONSIDERATIONS

I. MEDIAN CUTS

☐ NO MEDIAN CUT OR RELOCATION IS PROPOSED

☒ MEDIAN MODIFICATIONS ARE SHOWN ON SHEET 65

II. LEFT / RIGHT TURN LANE

☐ NO LEFT / RIGHT TURN LANE IS PROPOSED

☐ LEFT / RIGHT TURN LANE IS SHOWN ON SHEET _____

III. TRAFFIC CONTROL PLAN

☐ NO WORK IN THE RIGHT OF WAY IS PROPOSED THAT WOULD INTERFERE WITH TRAFFIC FLOW

☒ TRAFFIC CONTROL SHOWN ON SHEET 26-38

IV. TRAFFIC SIGNAL

☐ NO TRAFFIC SIGNAL IS EXISTING / PROPOSED

☐ EXISTING TRAFFIC SIGNAL DEVICES (T.C. BOXES AND LOOPS) SHOWN ON SHEET _____

☐ PROPOSED TRAFFIC SIGNAL (BY OTHERS)

V. TRAFFIC IMPACT ANALYSIS

☐ NO TRAFFIC IMPACT ANALYSIS IS REQUIRED

☐ TRAFFIC IMPACT ANALYSIS HAS BEEN APPROVED ON DATE:_____
PLAN TITLE: _____
HCPID PROJECT NO.: _____

5. DESCRIPTION OF PROPERTY

I. LEGAL DESCRIPTION

A. ACREAGE: 1.4

B. ☐ SUBDIVISION: _____

☐ SURVEY & ABSTRACT: _____

C. ADJACENT ROADS: GOLF CLUB DR

II. PLATTING

A. SUBDIVISION PLAT

☐ PROPOSED PLAT / REPLAT

☐ RECORDED PLAT / REPLAT

PLAT NAME: _____

B. STREETS PROPOSED

☐ PUBLIC

☐ PRIVATE

☐ PUBLIC & PRIVATE

☐ NONE

III. JURISDICTIONS

☐ CITY OF CROSBY

☐ ETJ, CITY OF HOUSTON

☐ ETJ, CITY OF _____

☐ NO ETJ

IV. HCAD ACCOUNT NOS. (ALL) KEY MAP PAGE 419E

_____

_____

V. UNOBSTRUCTED VISIBILITY EASEMENT (U.V.E.)

☐ REQUIRED AND SHOWN ON SHEET(S) _____

☐ NOT REQUIRED

NOTE: ALL APPROVED, FINAL PLATS AND ASSOCIATED CPC101 FORMS MUST BE INCLUDED WITH PLAN SUBMITTAL.

☐ CONFORMING SUBDIVISION

☐ NON-CONFORMING SUBDIVISION

☐ PARTIALLY NON-CONFORMING SUBDIVISION

2. RESIDENTIAL / SUBDIVISION DRAINAGE

I. PROPOSED DRAINAGE SYSTEM TYPE

☐ STORM SEWER

☐ ROADSIDE DITCH

☐ LOW IMPACT DEVELOPMENT (LID)

II. DESIGN METHOD USED

☐ CITY OF HOUSTON ____ YEAR FREQUENCY

☐ OTHER: _____

III. DRAINAGE SYSTEM OUTFALLS DIRECTLY TO EXISTING

☐ DETENTION POND (APPROVED H.C. PRJ NO.): _____
DETENTION POND MAINTAINED BY: _____

☐ HCFCD DRAINAGE DITCH UNIT NO.: _____

☐ H.C. ROADSIDE DITCH (ROAD NAME): _____

☐ H.C. STORM SEWER (APPROVED H.C. PRJ NO.): _____

IV. H.C. OUTFALL CALCULATIONS

☐ ROADSIDE DITCH OUTFALL:
ALLOWABLE OUTFALL RATE: 0.0027 x _____ LF Frontage = _____ (CFS)
PROPOSED OUTFALL RATE: ____ (CFS), CALCULATIONS PROVIDED ON SHEET ___

☐ STORM SEWER OUTFALL
CAPACITY ALLOCATED TO TRACT FROM D. A. MAP: _____ (CFS)
FROM DRAINAGE AREA MAP DATED: _____
PREPARED BY: _____
APPROVED H.C. PROJECT NO.: _____
ACTUAL OUTFALL RATE: ____ (CFS), CALCULATIONS PROVIDED ON SHEET ___

V. DETENTION PROVIDED BY

☐ DETENTION BASIN IS PART THIS PLAN SET. SERVICE AREA MAP IS ON SHEET ___

☐ REGIONAL DETENTION BASIN SYSTEM (APPROVED H.C. PRJ NO.): _____

PROPOSED STORM SEWER IS SUBMERGED (AGREEMENT MUST BE PROVIDED).
STATIC W.S.E. @ OUTFALL IS _____.

OFFSITE SHEET FLOW: (100 YEAR)

OFFSITE SHEET FLOW MAPPING, TOTAL DISCHARGE CALCULATIONS, AND DESIGN ACCOMODATIONS ARE SHOWN ON SHEET ____ OR, AS PRESENTED IN THE APPROVED DRAINAGE STUDY ENTITLED _____.

TOTAL ACREAGE =____
TOTAL DISCHARGE =____

NOTE: ALL OFFSITE SHEET FLOW FROM ADJACENT PROPERTIES MUST BE IDENTIFIED AND PROPERLY ACCOUNTED FOR IN THE PROJECT. THE SIGNING ENGINEER HEREBY CERTIFIES THAT THESE AREAS HAVE BEEN ADDRESSED.

3. COMMERCIAL / OTHER SITE DRAINAGE

I. PROPOSED DRAINAGE AREA

☐ NEW DEVELOPMENT AREA: _____

☐ RE-DEVELOPMENT AREA (NET NEW DEVELOPED AREA): _____

☐ LOW IMPACT DEVELOPMENT (LID)

II. DETENTION VOLUME

NEW AREA_____ * _____ = _____ ACRE FEET
DETENTION REQUIRED

* ☐ .65 (CHANNEL)
* ☐ .75 (STM SWR)
* ☐ 1.00 (RD. DITCH)
* ☐ OTHER: _____

PROPOSED DETENTION VOLUME = _____ ACRE FEET
PROPOSED DETENTION VOLUME CALCULATIONS ARE SHOWN ON SHEET _____

DETENTION VOLUME PROVIDED BY EXISTING DETENTION POND
APPROVED H.C. PROJECT NO.: _____
DETENTION POND SERVICE AREA MAP IS PROVIDED ON SHEET ____

III. OUTFALL
OUTFALL TO ☐ H.C. ROADSIDE DITCH
☐ EXISTING H.C. STORM SEWER
☐ OTHER _____

☐ ROADSIDE DITCH OUTFALL:
ALLOWABLE OUTFALL RATE: 0.0027 x _____ LF Frontage = _____ (CFS)
PROPOSED OUTFALL RATE: ____ (CFS), CALCULATIONS PROVIDED ON SHEET ___

☐ STORM SEWER OUTFALL
CAPACITY ALLOCATED TO TRACT FROM D. A. MAP: _____ (CFS)
FROM DRAINAGE AREA MAP DATED: _____
PREPARED BY: _____
APPROVED H.C. PROJECT NO.: _____
ACTUAL OUTFALL RATE: ____ (CFS), CALCULATIONS PROVIDED ON SHEET ___

IV. PUMPED DETENTION FACILITIES

VOLUME THAT GRAVITY FLOWS:_____ ACRE FEET
VOLUME THAT IS PUMPED:_____ ACRE FEET
ENTRANCE VELOCITY INTO ROADSIDE DITCH OR STORM SEWER: _____
PUMP SPECIFICATIONS AND AUTOMATIC SHUTOFF PLAN FOR ROADSIDE DITCH & STORM SEWER OUTFALLS APPEAR ON SHEET _____

V. FLOW RESTRICTOR SIZE
OUTFALL PIPE SIZE: _____
RESTRICTOR PIPE SIZE: _____

NOTE: ALL ROADSIDE DITCH OUTFALLS REQUIRE EROSION CONTROL MEASURES. RIPRAP IS NOT ALLOWED AS AN EROSION CONTROL MEASURE IN HARRIS COUNTY ROW. ALL PUMPED DETENTION OUTFALLS TO ROADSIDE DITCHES REQUIRE MANHOLE W/ LEADS.

4. WATER AND WASTEWATER

I. COMMERCIAL PROJECTS

DOES PROPERTY HAVE EXISTING AND/OR PROPOSED UTILITIES?
☐ YES ☐ NO

IF YES, CHECK THE BOX THAT APPLIES TO THIS PROJECT

☐ PUBLIC WATER & SANITARY
☐ PRIVATE WATER WELL & SEPTIC SYSTEM
☐ PUBLIC WATER & PRIVATE SEPTIC SYSTEM
☐ PRIVATE WATER WELL & PUBLIC SANITARY

NOTE: PUBLIC UTILITIES REQUIRE A LETTER FROM THE DISTRICT/ MUNICIPALITY AUTHORIZING SERVICE & CONNECTION. THIS IS REQUIRED FOR PLAN APPROVAL.

UTILITY DISTRICT/MUNICIPALITY NAME: _____

NOTE: SEPTIC SYSTEMS REQUIRE H.C. WASTE WATER REVIEW

H.C. SEPTIC PERMIT/REQUEST NO. _____

NOTE: ALL EXISTING AND PROPOSED UTILITIES MUST BE ACCURATELY SHOWN & LABELED ON THE SITE PLANS.

II. SUBDIVISION PROJECTS

☐ UTILITY DISTRICT/MUNICIPALITY NAME: _____

☐ PRIVATE WATER & WASTE WATER SYSTEMS

☐ PRIVATE WATER & INDIVIDUAL OSSF

☐ INDIVIDUAL WATER WELL & OSSF

NOTE: A COPY OF TCEQ APPROVAL FOR PRIVATE WATER & WASTE WATER SYSTEMS IS REQUIRED FOR PLAN APPROVAL.

NOTE: DEDICATED UNDERGROUND FIRE LINES MUST BE SUBMITTED TO THE HARRIS COUNTY FIRE PROTECTION GROUP FOR REVIEW AND PERMITTING BY THE UNDERGROUND FIRE LINE CONTRACTOR. CIVIL REIVEW DOES NOT REVIEW OR APPROVE UNDERGROUND FIRE LINES FOR THE FIRE PROTECTION SYSTEMS.

WASTEWATER TREATMENT PLANTS

H.C. WWTP REVIEW:

IS THE PROPOSED PROJECT A NEW WWTP SITE OR A REHAB/EXPANSION OF AN EXISTING WWTP SITE? YES ☐ NO ☐

IF YES IS A HARRIS COUNTY DOMESTIC WASTEWATER TREATMENT PLANT EXPRES REVIEW SHEET ATTACHED AND COMPLETED ACCORDING TO INSTRUCTIONS? YES ☐ NO ☐

REFER TO: HWW.ENG.HCTX.NET/PERMITS/WASTEWATER/REGULATIONS-STANDARDS-DETAILS FOR DOMESTIC WWTP ERS FORM

6. STORMWATER QUALITY

I. SWPPP: CONSTRUCTION MEASURES. (Complete for ALL projects)

☒ DISTURBS >1AC. SITE PLAN & DETAILS ON SHEET(S) 207-225

☐ DISTURBS <1AC. N/A

II. APPLICABILITY FOR PERMANENT FEATURES. (must be completed on all projects)

EXEMPT NEW DEVELOPMENT:

☐ PROJECT IS ON A PARCEL (A COMMON PLAN OF DEVELOPMENT) LESS THAN 5 ACRES. (must be verified with plat)

EXEMPT REDEVELOPMENT:

☒ PROJECT DOES NOT MEET THE DEFINITION OF SIGNIFICANT REDEVELOPMENT (Part A, Sec. 2.39 of Regulations of Harris County, Texas for Stormwater Quality Management)

EXEMPT GRANDFATHERED:

☐ PROJECT'S DRAINAGE TIES DIRECTLY INTO AN EXISTING DRAINAGE SYSTEM PRIOR TO OCTOBER 1, 2001.
(FOR VERIFICATION: PROVIDE ORIGINAL DRAINAGE AREA MAP INCLUDING CALCULATIONS)

GENERAL:

☒ PROJECT'S SWQ REQUIREMENTS FALL WITHIN THE JURISDICTION OF: CROSBY

☐ STORMWATER QUALITY PERMIT REQUIREMENT IS COVERED BY AN EXISTING SWQMP WITHIN
PROJECT TITLE: _____
HARRIS COUNTY PROJECT NO. _____ & SWQ PERMIT NO. _____

STORMWATER QUALITY MANAGEMENT PLAN:

☐ SITE PLAN ON SHEET(S) _____

III. PERMANENT SWQ FEATURES. (COMPLETE IF NOT EXEMPT)

☐ VEGETATIVE CONTROLS USED: (FILTER STRIP, GRASSY SWALE, URBAN FORESTRY) DETAILS AND CALCULATIONS APPEAR ON SHEET(S)

☐ POND STRUCTURE USED (WET, DRY, WETLANDS) DETAILS AND CALCULATIONS APPEAR ON SHEET(S) _____

☐ HYDRODYNAMIC TYPE SEPARATOR MODEL: _____

☐ OTHER(S): _____

7. FLOOD PLAIN STATUS

I. GENERAL INFORMATION

FIRM PANEL(S) FOR PROPERTY: 48201C0540L
FIRM PANEL(S) DATE: 6/18/2007

STATUS OF PROPERTY ON MAP

☐ ENTIRELY LOCATED IN UNSHADED ZONE "X"

☒ LOCATED PARTIALLY OR ENTIRELY IN ANY "A" ZONE OR SHADED ZONE "X", DELINEATE FLOODPLAIN BOUNDARY ON CONSTRUCTION DRAWINGS
(DRAINAGE LAYOUT PG. NO. 102) (1% BASE FLOOD LEVEL 25.9')
(0.2% BASE FLOOD LEVEL 27.8')

☐ SITE REMOVED FROM FLOODPLAIN BY LOMR, LOMR-F, LOMA
CASE NO._____ REVISED FLOODPLAIN IS SHOWN ON SHEET____

ELEVATION INFORMATION
BENCHMARK USED
☒ HARRIS COUNTY FLOODPLAIN REFERENCE MARK
☐ HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT BENCHMARK (FOR COASTAL AREAS)
DESCRIPTION OF BENCHMARK INCLUDING ELEVATION, DATUM AND YEAR OF ADJUSTMENT (2001 ADJ.) TEXAS COORDINATE SYSTEM, NORTH AMERICAL VERTICAL DATUM OF 1983 (2011 ADJUSTMENT) GEOID99(CONUS)

II. FLOOD PLAIN DETERMINATION BASED ON GROUND ELEVATION

☐ PROPERTY LIES ENTIRELY ABOVE THE BASE FLOOD LEVEL AND IN SHADED ZONE "X"

☒ PROPERTY LIES PARTIALLY OR ENTIRELY BELOW THE BASE FLOOD LEVEL

III. FLOODPLAIN STORAGE SUMMARY (APPLIES ONLY TO PORTION OF LAND LOCATED WITHIN FLOODPLAIN AS DELINEATED BY FIRM PANEL).

A. TOTAL VOLUME OF MATERIAL PROPOSED TO BE MOVED OR PLACED WITHIN THE FIRM DELINEATED FLOODPLAIN (FILL, BASE, CONCRETE, ASPHALT, ETC.):
BELOW 0.2% BASE FLOOD ELEVATION 27.8' (2001 ADJ.) 770 CUBIC YARDS

B. TOTAL VOLUME OF MATERIAL PROPOSED TO BE REMOVED FROM THE FIRM DELINEATED FLOODPLAIN:
BELOW 0.2% BASE FLOOD ELEVATION 27.8' (2001 ADJ.) 1385 CUBIC YARDS

C. FILL AREA & VOLUME CALCULATIONS ARE SHOWN ON SHEET 68

IV. ☐LOMR REQUIRED ☐CLOMR REQUIRED VERIFIED BY: _____

8. CURB RAMPS

A. ARE CURB RAMPS THAT CONNECT TO PUBLIC STREETS PROPOSED IN THIS SET OF PLANS? [ ] YES [ ] NO

9. LANDSCAPING

☐ REQUIRED AND SHOWN ON SHEET(S) _____

☐ NOT REQUIRED

10. PERMITS REQUIRED

DOES THE PROPERTY HAVE ANY VIOLATIONS? IF SO PLEASE PROVIDE ALL VIOLATION NUMBERS. _____

☐ STORM WATER QUALITY

☐ SEPTIC (EXISTING) ☐ SEPTIC (PROPOSED)

☐ CIVIL SITE WORK (PHASE II PERMIT CLASS I (non-floodplain))

☐ CIVIL SITE WORK (PHASE II PERMIT CLASS II (floodplain))

☐ DRIVEWAY WITH CULVERT _____ CURB AND GUTTER _____

☐ BUILDING PERMITS (NO. OF BUILDINGS = _____) ☐ CRITICAL FACILITY

☐ SUBDIVISION INFRASTRUCTURE PHASE II (NO. OF LOTS = _____)

☐ NOTICE OF DETENTION AFFIDAVIT REQUIRED

☐ MUD MAINTENANCE AGREEMENT REQUIRED

NOTES: _____

WORK IN HARRIS COUNTY R.O.W.

☐ UTILITY WORK _____

☐ TURN LANE _____

☒ OTHER CONSTRUCTION _____ BRIDGE REPLACEMENT

NOTES:
A PERMIT IS REQUIRED FOR EACH SCOPE OF WORK ON SITE.
A R.O.W. NOTIFICATION IS REQUIRED FOR EACH SCOPE OF WORK IN HC OR HCFCD ROW.
REFER TO www.eng.hctx.net/permits FOR EACH SCOPE OF WORK IN HC OR IN HCFCD ROW.

BENCHMARK REQUIREMENTS FOR PROPOSED BRIDGES AND OR NEW RESIDENTIAL SUBIDIVSIONS

When the County Engineer has determined that a new benchmark will be required to be established for the proposed project, the developer shall be required to install a benchmark per section 8.0, part 2 of the Harris County Infrastructure Regulations.

Is a new Benchmark required for this project? (*to be determined by Harris County*) [__] yes [__] no

If a new Benchmark is required, the proposed benchmark information is shown on sheets ____

FOR PROJECTS LOCATED IN ANY FLOODPLAIN

Development constructed or placed in accordance with these plans will comply with all provisions of the Regulations of Harris County, Texas for Floodplain Management. No net fill is allowed in the flood plain and no fill is allowed in the floodway.

FOUNDATION NOTES: (*Applies to only buildings or building additions requiring a class II permit*)

All water heaters, furnaces, air conditioning units, electrical distribution panels, and any other mechanical or electrical equipment must be elevated in accordance with Section 4.05 of Harris County Floodplain regulations.
Any electrical circuit serving a light switch or outlet located below the base (100-year) flood elevation shall be dropped from above and be on a separate breaker.
All materials used below the (100-year) base flood elevation are on approved FEMA Technical Bulletin 2-08 as Class 5 water-resistant, and approved in accordance with FEMA Technical Bulletin 1-08 for foundation openings.
Critical facilities located in the 0.2% or 500yr floodplain or 1% or 100yr floodplain shall have the lowest floor elevated to 3 feet or more above the 0.2% flood elevation, or 24 inches above the crown of the adjacent road, which ever results in a higher elevation.
Floodproofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters.
Access routes elevated to or above the level of the base flood shall be provided to all critical facilities to the extent possible.
A completed as-built certificate must be submitted after the structure is complete and before it is occupied.
The County Engineer's Office will post a final inspection notice on the structure once all requirements have been met.
No fill may be used to elevate structures in the 1% or 100yr flood plain. Structures may be constructed on an open foundation, such as piers, or on continuous foundation walls with properly sized and located openings. All foundations are required to be designed by a registered professional engineer.
All structures shall be designed to withstand a three second gust basic wind speed of 120mph.
*Completed **Elevation Certificates** to be submitted: one at permitting, a second after the slab is poured or sub-floor is installed and before the framing starts, and a third is required once construction is finished. *(PER CURRENT FIRM PANEL) to the Harris County Engineering Department, 10555 Northwest Freeway, Suite 120, Houston, TX 77092*

HARRIS COUNTY ENGINEERING DEPARTMENT - PERMIT OFFICE NOTE:

THE PERMIT MANAGER SIGNATURE REPRESENTS THE FOLLOWING:
- THE COMPLETION OF REVIEW OF THESE PLANS
- INTERPOSE NO OBJECTION TO THE PROPOSED DESIGN ON PRIVATE PROPERTY
- APPROVAL OF WORK IN HARRIS COUNTY MAINTAINED RIGHT OF WAY
- APPROVAL OF WORK IN PROPOSED HARRIS COUNTY RIGHT OF WAY THAT IS TO BE ACCEPTED BY THE COUNTY

HCED SIGNATURE BLOCK:

THE PROJECT WAS REVIEWED, HOWEVER, THIS DOES NOT MEAN THE ENTIRE PROJECT, INCLUDING ALL SUPPORTING DATA AND CALCULATIONS HAVE BEEN COMPLETELY CHECKED AND VERIFIED. THESE DRAWINGS ARE SIGNED, DATED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS, WHICH THEREFORE CONVEYS THE ENGINEER'S RESPONSIBILITY AND ACCOUNTABILITY. THIS DOES NOT RELIEVE ANY PARTY FROM COMPLYING WITH APPROPRIATE FEDERAL, STATE AND LOCAL ENVIRONMENTAL RULES, LAWS, AND REGULATIONS AND ANY OTHER LEGALLY ADOPTED REGULATION OR ORDINANCE RELATED TO LAND DEVELOPMENT. IF THE CITY SIGNATURES ARE REQUIRED BY ORDINANCE, COUNTY PERMITS WILL NOT BE ISSUED UNTIL SUCH SIGNATURES ARE OBTAINED. PLAN APPROVAL EXPIRATION TO BE IN ACCORDANCE WITH LOCAL GOVERNEMENT CODE CH. 245.

ENGINEER'S CERTIFICATION

I, RICARDO A. PRIETO, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THE INFORMATION PRESENTED ON THIS SHEET IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND THAT I AM NOT VIOLATING ANY PROVISION OF THE CURRENT TEXAS ENGINEERING PRACTICE ACT AND RULES CONCERNING THE PRACTICE OF ENGINEERING AND PROFESSIONAL ENGINEERING LICENSURE. I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE PLANS IN THEIR ENTIRETY ARE DESIGNED PER THE HARRIS COUNTY ENGINEERING STANDARDS, REGULATIONS, AND GUIDELINES UNLESS PROVIDED A VARIANCE BY THE COUNTY ENGINEER OR HIS DESIGNEE. SHOULD IT BE DEEMED BY HCED STAFF, THAT THE PLANS DO NOT MEET THE COUNTY'S STANDARDS, REGULATIONS AND GUIDELINES AND DID NOT RECEIVE AN APPROVED VARIANCE, THE APPROVAL OF SAID PLANS BECOMES NULL AND VOID AND THE DESIGN PLANS MUST BE CORRECTED AT NO CHARGE TO THE COUNTY.

THE COMPLETED PROJECT CONSISTS OF DRAWING SHEETS 1 THRU 180

SIGNATURE _____ DATE 11/30/2022

SEAL: STATE OF TEXAS — RICARDO A. PRIETO — 91123 — LICENSED PROFESSIONAL ENGINEER

REVISIONS

NOTE: REVISION BLOCK IS TO BE USED ONLY FOR CHANGES MADE AFTER PLANS HAVE BEEN APPROVED BY HARRIS COUNTY.

DATE	SHEET NO.	DESCRIPTION	P.E. INITIAL	H.C. APPROVED DATE

HARRIS COUNTY
ENGINEERING DEPARTMENT
REVIEW SHEET

VERSION 20.0 MAY 27, 2020

HC PROJECT NO. 2009210078 HCFCD PROJECT NO. 2009210097

1. PROPERTY DESCRIPTION

I. LOCATION INFORMATION

A. HARRIS COUNTY COMMISSIONER'S PRECINCT:
☐ 1 ■ 2 ☐ 3 ☐ 4

B. KEY MAP: _____

C. ADDRESS: SOUTH DIAMONDHEAD BLVD. @ GUM GULLY

II. LEGAL DESCRIPTION

A. ACREAGE: 1.40

B. ☐ SUBDIVISION: NEWPORT

☐ SURVEY & ABSTRACT: _____

C. ADJACENT ROADS: GOLF CLUB DR.

III. PLATTING

A. SUBDIVISION PLAT
☐ PROPOSED PLAT / REPLAT
☐ RECORDED PLAT / REPLAT

PLAT NAME: _____

B. STREETS PROPOSED
☐ PUBLIC
☐ PRIVATE
☐ PUBLIC & PRIVATE
☐ NONE

IV. JURISDICTIONS

■ CITY OF CROSBY
☐ ETJ, CITY OF HOUSTON
☐ ETJ, CITY OF _____
☐ NO ETJ
☐ UTILITY DISTRICT (NAME)_____

V. HCAD ACCOUNT NOS. (ALL)

_____

2. SITE DETENTION DRAINAGE

I. PROPOSED DRAINAGE AREA

☐ NEW DEVELOPMENT AREA: _____
☐ RE-DEVELOPMENT AREA (AMOUNT INCREASED IMPERVIOUS AREA): _____
☐ LOW IMPACT DEVELOPMENT (LID)
METHOD/DESCRIPTION _____

II. METHODOLOGY

HCFCD PCPM DETENTION METHOD USED:
☐ METHOD 1 (LESS THAN 20 ACRES)
☐ METHOD 2 (20 ACRES TO 640 ACRES)
☐ METHOD 3 (GREATER THAN 640 ACRES)
☐ OTHER _____

III. DETENTION VOLUME & OUTFALL

OUTFALL TO:
☐ .65, H.C.F.C.D. CHANNEL, (H.C.F.C.D. UNIT NO.) _____
☐ .75, EXISTING STORM SEWER (OWNER & OPERATOR) _____
☐ 1.00, ROADSIDE DITCH (OWNER & ROAD NAME) _____
☐ OTHER (OWNER & OPERATOR) _____

IV. STORMWATER DETENTION BASIN INFORMATION

A. HCFCD PCPM SUMMARY TABLE SEE SHEET _____ OF THESE PLANS.

DETENTION BASIN SERVICE AREA		acres	
STORM EVENT	50% EXCEEDANCE (2-YEAR)	10% EXCEEDANCE (10-YEAR)	1% EXCEEDANCE (100-YEAR)
MAXIMUM ALLOWABLE OUTFLOW (PRE-DEVELOPMENT PEAK FLOW)			
MAXIMUM OUTFLOW PROVIDED (PEAK FLOW FROM BASIN)			
LOWEST NATURAL/FINISHED GROUND OR FINISHED FLOOR ELEVATION ESTIMATE			
DESIGN WATER SURFACE ELEVATION			
MINIMUM STORAGE REQUIRED (ac-ft)			
DETENTION STORAGE PROVIDED (ac-ft)			
STORAGE RATE PROVIDED (ac-ft/ac)			
OUTFLOW VELOCITY INTO CHANNEL (ft/sec)			
DRAIN TIME - 1% ONLY (hours)			
EMERGENCY OVERFLOW (TYPE, SIZE, ELEVATION, ETC.)			

B. DETENTION BASIN TO BE MAINTAINED BY _____

C. DETENTION SERVICE AREA MAP ON SHEET _____

D. ADDITIONAL CRITERIA FOR PUMPED DETENTION BASINS
VOLUME OF PUMPED 1% EXCEEDANCE STORAGE VOLUME = _____ ACFT _____ % OF TOTAL VOLUME
MAXIMUM DESIGN OUTFLOW VELOCITY INTO HCFCD CHANNEL = _____ FT/SEC
DRAIN TIME FOR BASIN = _____ HOURS BASED ON _____HEAD CONDITIONS

V. DETENTION PROVIDED IN OTHER PLANS:

HCFCD PROJECT No. _____ DATE SIGNED BY HCFCD: _____
PLAN TITLE _____
DETENTION POND SERVICE AREA MAP IS PROVIDED ON SHEET _____
ENGINEERING FIRM _____
DETENTION BASIN MAINTAINED BY: _____

VI. FLOW RESTRICTOR SIZE

OUTFALL PIPE SIZE: _____
RESTRICTOR PIPE SIZE _____
RESTRICTOR PLATE DIMENSION: _____

VII. DETENTION PROVIDED BY

☐ REGIONAL DETENTION BASIN SYSTEM (APPROVED H.C. PRJ NO.): _____

FOR PROJECTS LOCATED IN ANY FLOODPLAIN
Development constructed or placed in accordance with these plans will comply with all provisions of the designated Floodplain Administrator.
No net fill is allowed in the flood plain and no fill is allowed in the floodway.

OFFSITE SHEET FLOW: (100 YEAR)

OFFSITE SHEET FLOW MAPPING, TOTAL DISCHARGE CALCULATIONS, AND DESIGN ACCOMODATIONS ARE SHOWN ON SHEET ____ OR, AS PRESENTED IN THE APPROVED DRAINAGE STUDY ENTITLED _____.

TOTAL ACREAGE =____
TOTAL DISCHARGE =____

NOTE: ALL OFFSITE SHEET FLOW FROM ADJACENT PROPERTIES MUST BE IDENTIFIED AND PROPERLY ACCOUNTED FOR IN THE PROJECT. THE SIGNING ENGINEER HEREBY CERTIFIES THAT THESE AREAS HAVE BEEN ADDRESSED.

3. SWQ DISCHARGE INTO FCD FACILITY

I. SWPPP: CONSTRUCTION MEASURES. (Must complete)

■ DISTURBS >1AC. SITE PLAN & DETAILS ON SHEET(S) **168-215**

☐ DISTURBS <1AC. N/A

*II. APPLICABILITY FOR PERMANENT FEATURES. (Must complete)

EXEMPT NEW DEVELOPMENT:
☐ PROJECT IS ON A PARCEL (A COMMON PLAN OF DEVELOPMENT) LESS THAN 5 ACRES. (Must be verified with plat)

EXEMPT REDEVELOPMENT:
☒ PROJECT DOES NOT MEET THE DEFINITION OF SIGNIFICANT REDEVELOPMENT (Part A,Sec. 2.39 of Regulations of Harris County, Texas for Stormwater Quality Management)

EXEMPT GRANDFATHERED:
☐ PROJECT'S DRAINAGE TIES DIRECTLY INTO AN EXISTING DRAINAGE SYSTEM PRIOR TO OCTOBER 1, 2001.
(FOR VERIFICATION: PROVIDE ORIGINAL DRAINAGE AREA MAP INCLUDING CALCULATIONS)

GENERAL:
☐ PROJECT'S SWQ REQUIREMENTS FALL WITHIN THE JURISDICTION OF: _____
☐ STORMWATER QUALITY PERMIT REQUIREMENT IS COVERED BY AN EXISTING SWQMP WITHIN PROJECT TITLE: _____
HARRIS COUNTY PROJECT No _____ & SWQ PERMIT No.

STORMWATER QUALITY MANAGEMENT PLAN:
☐ SITE PLAN ON SHEET(S)

III. PERMANENT SWQ FEATURES, (COMPLETE IF NOT EXEMPT)

☐ VEGETATIVE CONTROLS USED: (FILTER STRIP, GRASSY SWALE, URBAN FORESTRY DETAILS AND CALCULATIONS APPEAR ON SHEET(S) _____
☐ POND STRUCTURE USED (WET, DRY, WETLANDS) DETAILS AND CALCULATIONSAPPEAR ON SHEET(S)_____
☐ HYDRODYNAMIC TYPE SEPARATOR MODEL: _____
☐ OTHER(S): _____

4. FLOOD PLAIN STATUS

I. GENERAL INFORMATION

FIRM PANEL(S) FOR PROPERTY: 48201C0540L
FIRM PANEL(S) DATE: 6/18/2007
STATUS OF PROPERTY ON MAP
☐ ENTIRELY LOCATED IN UNSHADED ZONE "X"
■ LOCATED PARTIALLY OR ENTIRELY IN ANY "A" ZONE OR SHADED ZONE "X", DELINEATE FLOODPLAIN BOUNDARY ON CONSTRUCTION DRAWINGS
(DRAINAGE LAYOUT PG. NO. 102) (1% BASE FLOOD LEVEL 25.93)
(0.2% BASE FLOOD LEVEL 27.76)
☐ SITE REMOVED FROM FLOODPLAIN BY LOMR, LOMR-F, LOMA CASE NO._____ REVISED FLOODPLAIN IS SHOWN ON SHEET____

ELEVATION INFORMATION
BENCHMARK USED
■ HARRIS COUNTY FLOODPLAIN REFERENCE MARK
☐ HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT BENCHMARK (FOR COASTAL AREAS)
DESCRIPTION OF BENCHMARK INCLUDING ELEVATION, DATUM AND YEAR OF ADJUSTMENT **(2001 ADJ.)** TEXAS COORDINATE SYSTEM, NORTH AMERICAL VERTICAL DATUM OF 1983 (2011 ADJUSTMENT) GEOID99(CONUS)

II. FLOOD PLAIN DETERMINATION BASED ON GROUND ELEVATION

■ PROPERTY LIES ENTIRELY ABOVE THE BASE FLOOD LEVEL AND IN SHADED ZONE "X"
☐ PROPERTY LIES PARTIALLY OR ENTIRELY BELOW THE BASE FLOOD LEVEL

III. FLOODPLAIN STORAGE SUMMARY

(APPLIES ONLY TO PORTION OF LAND LOCATED WITHIN FEMA REGULATORY FLOODPLAIN).

A. TOTAL VOLUME OF MATERIAL PROPOSED TO BE MOVED OR PLACED WITHIN THE FIRM DELINEATED FLOODPLAIN (FILL, BASE, CONCRETE, ASPHALT, ETC.):
BELOW 0.2% BASE FLOOD ELEVATION (2001 ADJ.) 27.76 CUBIC YARDS 770

B. TOTAL VOLUME OF MATERIAL PROPOSED TO BE REMOVED FROM THE FIRM DELINEATED FLOODPLAIN:
BELOW 0.2% BASE FLOOD ELEVATION (2001 ADJ.) 27.76 CUBIC YARDS 1385
INCLUDING CALCULATIONS)

C. FILL AREA & VOLUME CALCULATIONS ARE SHOWN ON SHEET 68

5. WORK IN HCFCD RIGHT-OF-WAY

I. TYPE OF WORK TO BE PERFORMED IN HCFCD HCFCD ROW

A. BOND/NOTIFICATION INFORMATION
■ HCFCD WATERSHED JACKSON BAYOU
■ HCFCD UNIT No. R102-00-00
☐ NUMBER OF OUTFALLS _____
☐ UTILITY CROSSING
■ ROADWAY BRIDGE/CULVERT CROSSING
☐ FILL ACTIVITY
☐ REHABILITATION OF CHANNEL
☐ MAINTENANCE
☐ TEMPORARY CROSSING
☐ TRAIL (LENGTH) _____
☐ OTHER _____
COST OF WORK IN HCFCD ROW _____

II. USACE ENVIRONMENTAL PERMIT

☐ US ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBER(S) _____
☐ US ARMY CORPS OF ENGINEERS INDIVIDUAL PERMITS
☐ OTHER
■ NO PERMITS REQUIRED
EXPLAIN:
PLANNED ACTIVITY IS OUTSIDE OF THE GUM GULLY ORDINARY HIGH WATER MARK (OHWM)

III. REFERENCE / BASIS OF DETERMINATION

☐ ENVIRONMENTAL CONSULTANT REPORT
BY COX McLAIN ENVIROMENTAL CONSULTING, INC
REPORT TITLE _____
REPORT DATE _____
☐ OTHER _____

NOTES:
I. - III. REQUIRED ON PROJECTS WITH WORK IN A HCFCD CHANNEL. PLEASE REFERENCE SECTION 17 OF THE FLOOD CONTROL DISTRICT POLICY, CRITERIA, AND PROCEDURE MANUAL FOR MORE INFORMATION.

IV. HCFCD STANDARD NOTES: SEE SHEET _____ OF THESE PLANS.

V. HCFCD STANDARD DETAILS: SEE SHEET _____ OF THESE PLANS.

VI. HCFCD ACCESS PLAN: SEE SHEET _____ OF THESE PLANS.

VII. REFER TO THE FOLLOWING PLAN SHEETS: _____
FOR EXISTING AND PROPOSED RIGHT(S) OF WAY INCLUDING DELINEATION AND RECORDING INFORMATION PER HCFCD POLICY, CRITERIA, & PROCEDURE MANUAL (i.e. DRAINAGE EASEMENT, FEE STRIP, ETC.) AND GRANTEE (e.g. COH, HCFCD, PUBLIC, TXDOT, ETC.)

6. REPORTS/AGREEMENTS

I. HCFCD ACCEPTED REPORTS (ALL)

STORMWATER DRAINAGE DESIGN REPORT
REPORT TITLE S DIAMONDHEAD BLVD AT GUM GULLY BRIDGE REPLACEMENT FINAL HYDRAULIC REPORT
HCFCD PROJECT # 2009210097
ENGINEERING FIRM CP&Y
REPORT ACCEPTANCE DATE _____

GEOTECHNICAL INVESTIGATION REPORT
REPORT TITLE GEOTECHNICAL STUDY - DIAMONDHEAD BOULEVARD OVER GUM GULLY
HCFCD PROJECT # 2102150004
ENGINEERING FIRM HVJ ASSOCIATES
REPORT ACCEPTANCE DATE 3/23/2022

HCFCD APPROVED VARIANCE
DESCRIPTION OF VARIANCE _____
DOCUMENT ID #_____
VARIANCE ACCEPTANCE DATE _____

II. AGREEMENT TYPE & No.:

☐ INTERLOCAL (ILA): _____
☐ HCFCD MAINTENANCE _____
☐ TURF ESTABLISHMENT _____
☐ OTHER _____

HCFCD SIGNATURE BLOCK

PROJECT NAME: BRIDGE REPLACEMENT
ADDRESS: SOUTH DIAMONDHEAD AT GUM GULLY
WAS ACCEPTED BY HARRIS COUNTY FLOOD CONTROL DISTRICT FOR THE PURPOSES LISTED BELOW:

HARRIS COUNTY FLOOD CONTROL DISTRICT

INTERPOSE NO OBJECTION
BY _____
FOR ITEMS LOCATED OUTSIDE OF HCFCD RIGHT-OF-WAY

APPROVED:
BY _____
FOR ITEMS LOCATED WITHIN EXISTING HCFCD RIGHT-OF-WAY

APPROVED:
BY _____
FOR ITEMS LOCATED WITHIN PROPOSED HCFCD RIGHT-OF-WAY

NO REVIEW REQUIRED:
BY _____
FINAL PERMITTING BY OTHERS

ADDITIONAL COMMENTS:
_____

THE PROJECT WAS REVIEWED, HOWEVER, THIS DOES NOT MEAN THE ENTIRE PROJECT, INCLUDING ALL SUPPORTING DATA AND CALCULATIONS HAVE BEEN COMPLETELY CHECKED AND VERIFIED. THESE DRAWINGS ARE SIGNED, DATED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS, WHICH THEREFORE CONVEYS THE ENGINEER'S RESPONSIBILITY AND ACCOUNTABILITY. THIS DOES NOT RELIEVE ANY PARTY FROM COMPLYING WITH APPROPRIATE FEDERAL, STATE AND LOCAL ENVIRONMENTAL RULES, LAWS, AND REGULATIONS AND ANY OTHER LEGALLY ADOPTED REGULATION OR ORDINANCE RELATED TO LAND DEVELOPMENT. IF THE CITY SIGNATURES ARE REQUIRED BY ORDINANCE, COUNTY PERMITS WILL NOT BE ISSUED UNTIL SUCH SIGNATURES ARE OBTAINED. PLAN APPROVAL EXPIRATION TO BE IN ACCORDANCE WITH LOCAL GOVERNEMENT CODE CH. 245.

ENGINEER'S CERTIFICATION

I, RICARDO A. PRIETO , A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THE INFORMATION PRESENTED ON THIS SHEET IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND THAT I AM NOT VIOLATING ANY PROVISION OF THE CURRENT TEXAS ENGINEERING PRACTICE ACT AND RULES CONCERNING THE PRACTICE OF ENGINEERING AND PROFESSIONAL ENGINEERING LICENSURE.

ANY VIOLATIONS WILL BE FORWARDED TO THE HARRIS COUNTY DISTRICT ATTORNEY'S OFFICE FOR PROSECUTION.

THE COMPLETED PROJECT CONSISTS OF DRAWING SHEETS 1 THRU 180 .

SIGNATURE _____ 11/30/2022 DATE

SEAL
STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

REVISIONS

NOTE: REVISION BLOCK IS TO BE USED ONLY FOR CHANGES MADE AFTER PLANS HAVE BEEN APPROVED BY HARRIS COUNTY FLOOD CONTROL.

DATE	SHEET NO.	DESCRIPTION	P.E. INITIAL	H.C.F.C.D APPROVED DATE

HARRIS COUNTY
FLOOD CONTROL DISTRICT
REVIEW SHEET

VERSION 1.0 OCTOBER 2019

HARRIS COUNTY FLOOD CONTROL PROJECT NO. 2009210097

STANDARD HCFCD NOTES FOR CONSTRUCTION DRAWINGS

1. OBTAIN AND COMPLY WITH ALL APPLICABLE CITY, COUNTY, STATE, AND FEDERAL PERMITS AND APPROVALS, WITH ASSISTANCE FROM ENGINEER, IF NECESSARY. OBTAIN PERMIT (CERTIFICATION) FROM HARRIS COUNTY ENGINEER TO ENTER HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY.

2. NOTIFY THE HARRIS COUNTY FLOOD CONTROL DISTRICT'S DEVELOPMENT COORDINATION AND INSPECTION DEPARTMENT IN WRITING AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. SUBMIT THE HCFCD 48 HOUR PRE- CONSTRUCTION NOTIFICATION FORM, A COPY OF THE APPROVED CONSTRUCTION DRAWINGS, AND A COPY OF THE CORPS OF ENGINEERS INDIVIDUAL SECTION 404 PERMIT OR COMPLIANCE WITH NATIONWIDE PERMIT, IF APPLICABLE, TO HCFCD, 9900 NORTHWEST FREEWAY, HOUSTON, TEXAS 77092, ATTN: DEVELOPMENT COORDINATION AND INSPECTION DEPT. BY HAND DELIVERY, BY EMAIL DCID@HCFCD.HCTX.NET, OR FAX TO 713-684-4129 (FAX NUMBER).

3. ENGINEER SHALL SUBMIT CERTIFICATION LETTER AND RECORD DRAWINGS TO THE HARRIS COUNTY FLOOD CONTROL DISTRICT'S DEVELOPMENT COORDINATION AND INSPECTION SECTION REQUESTING INSPECTION OF ITEMS CONSTRUCTED IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. PRIOR TO REQUESTING INSPECTION, THE DRAINAGE RIGHT-OF-WAY AND/OR EASEMENTS SHALL BE STAKED AND FLAGGED.

4. PROTECT, MAINTAIN, AND RESTORE EXISTING BACKSLOPE DRAINAGE SYSTEMS.

5. BACKSLOPE SWALE AND INTERCEPTOR STRUCTURE ELEVATIONS AND LOCATIONS SHOWN ON PLANS ARE APPROXIMATE. FINAL ELEVATIONS AND LOCATIONS SHALL BE FIELD VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

7. PERFORM ALL ACTIVITIES WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY IN ACCORDANCE WITH THE MOST RECENT HARRIS COUNTY FLOOD CONTROL DISTRICT STANDARD SPECIFICATIONS BOOK.

8. EXCAVATE CHANNEL FLOWLINE TO DESIGN ELEVATION AS SHOWN ON PLANS AND DOWNSTREAM, AS NECESSARY, TO ENSURE NO WATER REMAINS IN THE FACILITY (STORM SEWER, LATERAL CHANNEL, OR DRY BOTTOM DETENTION BASIN) DURING NORMAL WATER SURFACE CONDITIONS IN THE CHANNEL, SO THE FACILITY WILL FUNCTION AS INTENDED. FOR WET BOTTOM DETENTION BASINS, ENSURE NO WATER IS ABOVE THE DESIGN LEVEL IN THE WET BOTTOM DURING NORMAL WATER SURFACE CONDITIONS IN THE CHANNEL.

9. MAINTAIN FLOW IN CHANNEL DURING CONSTRUCTION AND RESTORE CHANNEL TO ORIGINAL CONDITION.

10. REMOVE ALL EXCAVATED MATERIAL FROM THE HARRIS COUNTY FLOOD CONTROL DISTRICT OR DRAINAGE RIGHT-OF-WAY. NO FILL IS TO BE PLACED WITHIN A DESIGNATED FLOOD PLAIN AREA WITHOUT FIRST OBTAINING A FILL PERMIT FROM THE APPROPRIATE JURISDICTIONAL AUTHORITY.

CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1.) HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2.) HCFCD 48-HR PRE-CONSTRUCTION NOTIFICATION
BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY.
BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG.
SITE PLANS MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION.
BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.
TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO
HTTP://APPS.HARRISCOUNTYTX.GOV/EPERMITS AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION.
FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

HCFCD GENERAL NOTES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		11
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-72-406 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY CS

			CONTROL SECTION JOB		**0912-72-406**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00122502**		
			COUNTY		**Harris**		
			HIGHWAY		**CS**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	17.000		17.000	
	104-6001	REMOVING CONC (PAV)	SY	1,291.000		1,291.000	
	104-6015	REMOVING CONC (SIDEWALKS)	SY	46.000		46.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	134.000		134.000	
	104-6027	REMOVING CONC (APPR SLAB)	SY	157.000		157.000	
	104-6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	3,240.000		3,240.000	
	105-6084	REM STAB BASE & ASPH (6"-12")	SY	3,864.000		3,864.000	
	110-6001	EXCAVATION (ROADWAY)	CY	1,401.000		1,401.000	
	110-6002	EXCAVATION (CHANNEL)	CY	1,385.000		1,385.000	
	110-6003	EXCAVATION (SPECIAL)	CY	139.000		139.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	634.000		634.000	
	132-6033	EMB(FNL)(DC)(TYC)(CSBE)(RWALL FND IMPR)	CY	181.000		181.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	8,589.000		8,589.000	
	162-6002	BLOCK SODDING	SY	391.000		391.000	
	162-6003	STRAW OR HAY MULCH	SY	8,589.000		8,589.000	
	164-6052	BROADCAST SEED (PERM)(SPECIAL MIX)	SY	1,150.000		1,150.000	
	164-6066	DRILL SEEDING (PERM)(WARM OR COOL)	SY	7,439.000		7,439.000	
	166-6001	FERTILIZER	AC	1.860		1.860	
	168-6001	VEGETATIVE WATERING	MG	223.200		223.200	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	174.000		174.000	
	260-6073	LIME TRT (SUBGRADE)(8")	SY	5,674.000		5,674.000	
	360-6032	CONC PAV (JOINT REINF) (10")	SY	5,674.000		5,674.000	
	400-6003	STRUCT EXCAV (PIPE)	CY	1,683.000		1,683.000	
	400-6005	CEM STABIL BKFL	CY	784.000		784.000	
	400-6009	CEMENT STAB BACKFILL (INLET OR MH)	CY	210.000		210.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	986.000		986.000	
	416-6003	DRILL SHAFT (30 IN)	LF	32.000		32.000	
	416-6004	DRILL SHAFT (36 IN)	LF	907.000		907.000	
	420-6013	CL C CONC (ABUT)	CY	38.400		38.400	
	420-6025	CL C CONC (BENT)	CY	31.400		31.400	
	420-6037	CL C CONC (COLUMN)	CY	25.100		25.100	
	420-6071	CL C CONC (COLLAR)	EA	1.000		1.000	
	422-6001	REINF CONC SLAB	SF	7,350.000		7,350.000	
	422-6015	APPROACH SLAB	CY	54.000		54.000	
	423-6001	RETAINING WALL (MSE)	SF	4,539.000		4,539.000	
	423-6007	RETAINING WALL (DRILL SHAFT) (FACIA)	SF	681.000		681.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	1,042.500		1,042.500	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-72-406 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY CS

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0912-72-406**			
		PROJECT ID		**A00122502**			
		COUNTY		**Harris**			
		HIGHWAY		**CS**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	432-6005	RIPRAP (CONC) (CL A)	CY	11.000		11.000	
	432-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	42.000		42.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	259.000		259.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	16.000		16.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	196.000		196.000	
	450-6032	RAIL (TY C223)	LF	1,072.000		1,072.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	70.000		70.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	19.000		19.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	789.000		789.000	
	464-6012	RC PIPE (CL III)(60 IN)	LF	189.000		189.000	
	465-6032	INLET (COMPL)(PCU)(3FT)(BOTH)	EA	1.000		1.000	
	465-6158	INLET(COMPL)(PAZD)(FG)(3FTX3FT-3FTX3FT)	EA	2.000		2.000	
	465-6172	INLET (COMPL)(TY AZR2G)	EA	3.000		3.000	
	465-6173	MANH (COMPL)(TY A)	EA	6.000		6.000	
	465-6176	INLET (COMPL)(CURB)(TY C1)	EA	8.000		8.000	
	465-6341	INLET (COMPL) (EXT) (TY CI)	EA	14.000		14.000	
	465-6348	JCTBOX(COMPL)(PJB)(7FTX7FT)(MOD)	EA	2.000		2.000	
	467-6397	SET (TY II) (24 IN) (RCP) (8: 1) (P)	EA	1.000		1.000	
	467-6497	SET (TY II) (60 IN) (RCP) (4: 1) (P)	EA	1.000		1.000	
	496-6002	REMOV STR (INLET)	EA	5.000		5.000	
	496-6003	REMOV STR (MANHOLE)	EA	1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF	410.000		410.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	496-6040	REMOV STR (RET WALL)	LF	152.000		152.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18.000		18.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	60.000		60.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	60.000		60.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	312.000		312.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	312.000		312.000	
	506-6034	CONSTRUCTION PERIMETER FENCE	LF	150.000		150.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,534.000		3,534.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,534.000		3,534.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	47.000		47.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	47.000		47.000	
	508-6001	CONSTRUCTING DETOURS	SY	2,247.000		2,247.000	
	529-6001	CONC CURB (TY I)	LF	20.000		20.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-72-406 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY CS

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0912-72-406**			
		PROJECT ID		**A00122502**			
		COUNTY		**Harris**			
		HIGHWAY		**CS**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	529-6002	CONC CURB (TY II)	LF	3,457.000		3,457.000	
	530-6004	DRIVEWAYS (CONC)	SY	195.000		195.000	
	531-6002	CONC SIDEWALKS (5")	SY	489.000		489.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	475.000		475.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	610-6198	IN RD IL (TY SA) 40B-8 (250W EQ) LED	EA	1.000		1.000	
	610-6254	IN RD IL (TY ST) 40T-8 (250W EQ) LED	EA	4.000		4.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	875.000		875.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	60.000		60.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	1,000.000		1,000.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	2,000.000		2,000.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	6.000		6.000	
	628-6006	ELC SRV TY A 120/240 060(NS)SS(E)GC(O)	EA	1.000		1.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	14.000		14.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	19.000		19.000	
	647-6002	RELOCATE LRSA	EA	2.000		2.000	
	647-6003	REMOVE LRSA	EA	2.000		2.000	
	658-6053	INSTL OM ASSM (OM-3L)(TWT)GND	EA	2.000		2.000	
	658-6057	INSTL OM ASSM (OM-3R)(TWT)GND	EA	2.000		2.000	
	662-6051	WK ZN PAV MRK REMOV (REFL) TY II-A-A	LF	186.000		186.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	20.000		20.000	
	662-6061	WK ZN PAV MRK REMOV (W)4"(DOT)	LF	160.000		160.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	6,543.000		6,543.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	75.000		75.000	
	662-6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	2.000		2.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	8,588.000		8,588.000	
	662-6102	WK ZN PAV MRK REMOV (Y)24"(SLD)	LF	245.000		245.000	
	662-6103	WK ZN PAV MRK REMOV (Y)4"(BKN W/MRKR)	LF	90.000		90.000	
	666-6167	REFL PAV MRK TY II (W) 4" (BRK)	LF	190.000		190.000	
	666-6168	REFL PAV MRK TY II (W) 4" (DOT)	LF	66.000		66.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	437.000		437.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	60.000		60.000	
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	2.000		2.000	
	666-6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	250.000		250.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	2,636.000		2,636.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-72-406 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY CS

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0912-72-406**			
		PROJECT ID		**A00122502**			
		COUNTY		**Harris**			
		HIGHWAY		**CS**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6214	REFL PAV MRK TY II (Y) 24" (SLD)	LF	398.000		398.000	
	666-6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	3.000		3.000	
	666-6224	PAVEMENT SEALER 4"	LF	3,579.000		3,579.000	
	666-6230	PAVEMENT SEALER 24"	LF	368.000		368.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	2.000		2.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	188.000		188.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	10.000		10.000	
	672-6017	TRAFFIC BUTTON TY Y	EA	141.000		141.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	1,806.000		1,806.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	190.000		190.000	
	677-6013	ELIM EXT PAV MRK & MRKS (ENTR GORE)	EA	1.000		1.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	3,579.000		3,579.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	398.000		398.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	2.000		2.000	
	4161-6001	Stenciling Permanent Structure Numbers	EA	2.000		2.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6120-6001	DEAD END ROADWAY BARRICADE	LF	27.000		27.000	
	6185-6002	TMA (STATIONARY)	DAY	55.000		55.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	2.000		2.000	
	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 TCP QUANTITIES

ITEM				0502 6001	0508 6001	0529 6002	0662 6051	0662 6060	0662 6061	0662 6063	0662 6075	0662 6080	0662 6095	0662 6102
DESCRIPTION				BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	CONC CURB (TY II)	WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK REMOV (W)4"(BRK)	WK ZN PAV MRK REMOV (W)4"(DOT)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (W)(ARROW)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK REMOV (Y)24"(SLD)
				MO	SY	LF	LF	LF	LF	LF	LF	EA	LF	LF
PHASE I														
SHEET	1	OF	2		991									
SHEET	2	OF	2											
SHEET													347	
PHASE IA														
SHEET	1	OF	1		882								347	
SHEET	2	OF	2		374									
PHASE IB														
SHEET	1	OF	1											
PHASE II														
SHEET	1	OF	4				46			1,362			1,362	
SHEET	2	OF	4				34	20		1,054	0	2	1,623	75
SHEET	3	OF	4						160	700	75	0	1,238	
SHEET	4	OF	4											
PHASE III A														
SHEET	1	OF	4				32			1,093			910	
SHEET	2	OF	4				54			1,057			1,600	
SHEET	3	OF	4				20			1,127			1,161	170
SHEET	4	OF	4							150				
PHASEIV														
SHEET	1	OF	1			150								
TOTAL				**20**	**2,247**	**150**	**186**	**20**	**160**	**6,543**	**75**	**2**	**8,588**	**245**

SUMMARY OF TCP QUANTITIES

ITEM				0662 6103	0677 6001	0677 6007	0677 6013	60016002	6185 6002	6185 6005
DESCRIPTION				WK ZN PAV MRK REMOV (Y)4"(BKN W/MRKR)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ENTR GORE)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
				LF	LF	LF	EA	EA	DAY	DAY
PHASE I										
SHEET	1	OF	2							
SHEET	2	OF	2							
SHEET					254					
PHASE IA										
SHEET	1	OF	1		254					
SHEET	2	OF	2							
PHASE IB										
SHEET	1	OF	1							
PHASE II										
SHEET	1	OF	4		40			0		
SHEET	2	OF	4	50	207	119	1			
SHEET	3	OF	4	40	261	56				
SHEET	4	OF	4							
PHASE III A										
SHEET	1	OF	4						55	2
SHEET	2	OF	4							
SHEET	3	OF	4		130					
SHEET	4	OF	4		50					
PHASEIV										
SHEET	1	OF	1							
TOTAL				**90**	**1,196**	**175**	**1**	**0**	**55**	**2**

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

SUMMARY OF TCP QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		13
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

SUMMARY OF REMOVAL QUANTITIES

ITEM	0104 6001	0104 6015	0104 6017	0104 6027	0104 6029	0105 6084	0110 6003	0496 6002	0496 6003	0496 6007	0496 6010	0496 6040
DESCRIPTION	REMOVING CONC (PAV)	REMOVING CONC (SIDEWALKS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (APPR SLAB)	REMOVING CONC (CURB OR CURB & GUTTER)	REM STAB BASE & ASPH (6"-12")	EXCAVATION (SPECIAL)	REMOV STR (INLET)	REMOV STR (MANHOLE)	REMOV STR (PIPE)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOV STR (RET WALL)
	SY	SY	SY	SY	LF	SY	CY	EA	EA	LF	EA	LF
SHEET 1 OF 2	0	23	0	79	1,156	2,153	0	1	1	322	1	76
SHEET 2 OF 2	1,291	23	134	78	2,084	1,711	139	4	0	88	0	76
PROJECT TOTALS	**1,291**	**46**	**134**	**157**	**3,240**	**3,864**	**139**	**5**	**1**	**410**	**1**	**152**

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF REMOVAL QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		14
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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SUMMARY OF ROADWAY QUANTITIES

ITEM	0100 6002	0110 6001	0110 6002	0132 6006	0260 6012	0260 6073	0360 6032	0422 6015
DESCRIPTION	PREPARING ROW	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL)(DENS CONT)(TY C)	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	LIME TRT (SUBGRADE)(8")	CONC PAV (JOINT REINF) (10")	APPROACH SLAB
	STA	CY	CY	CY	TON	SY	SY	CY
SHEET 1 OF 4	5	542	0	69	49	1,604	1,604	0
SHEET 2 OF 4	4	419	1,385	387	18	599	599	27
SHEET 3 OF 4	4	127	0	178	46	1,509	1,509	27
SHEET 4 OF 4	4	313		0	43	1,389	1,389	0
SHEET 1 OF 1	0	0		0	18	573	573	0
TOTAL	**17**	**1,401**	**1,385**	**634**	**174**	**5,674**	**5,674**	**54**

SUMMARY OF ROADWAY QUANTITIES

ITEM	0432 6045	0450 6032	0529 6001	0529 6002	0530 6004	0531 6002	0540 6001	0540 6006	0544 6001
DESCRIPTION	RIPRAP (MOW STRIP)(4 IN)	RAIL (TY C223)	CONC CURB (TY I)	CONC CURB (TY II)	DRIVEWAYS (CONC)	CONC SIDEWALKS (5")	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)
	CY	LF	LF	LF	SY	SY	LF	EA	EA
SHEET 1 OF 4	0	0	20	1,063	0	302	0	0	1
SHEET 2 OF 4	5	418	0	431	0	143	275	2	1
SHEET 3 OF 4	11	0		747	5	44	200	2	2
SHEET 4 OF 4	0	0		909	148	0	0	0	0
SHEET 1 OF 1	0	0		157	42	0	0	0	0
TOTAL	**16**	**418**	**20**	**3,307**	**195**	**489**	**475**	**4**	**4**

SUMMARY OF RETAINING WALL QUANTITIES

ITEM	0132 6033	0423 6001	0423 6007	0432 6005
DESCRIPTION	EMB(FNL)(DC)(TYC)(CSBE)(RWALL FND IMPR)	RETAINING WALL (MSE)	RETAINING WALL (DRILL SHAFT) (FACIA)	RIPRAP (CONC) (CL A)
	CY	SF	SF	CY
SHEET 1 OF 3	77	3,086		8
SHEET 2 OF 3			681	
SHEET 3 OF 3	104	1,453		3
PROJECT TOTALS	181	4,539	681	11

NO.	DATE	REVISION	APPROV.

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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

SUMMARY OF ROADWAY / RTW QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		15
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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1/6/2023
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SUMMARY OF DRAINAGE QUANTITIES

ITEM	0400 6003	0400 6005	0400 6009	0402 6001	0420 6071	0464 6003	0464 6005	0464 6012	0465 6032	0465 6158	0465 6172	0465 6173	0465 6176
DESCRIPTION	STRUCT EXCAV (PIPE)	CEM STABIL BKFL	CEMENT STAB BACKFILL (INLET OR MH)	TRENCH EXCAVATION PROTECTION	CL C CONC (COLLAR)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(60 IN)	INLET (COMPL)(PCU)(3FT)(BOTH)	INLET(COMPL)(PAZD)(FG) (3FTX3FT-3FTX3FT)	INLET (COMPL)(TY AZR2G)	MANH (COMPL)(TY A)	INLET (COMPL)(CURB)(TY C1)
	CY	CY	CY	LF	EA	LF	LF	LF	EA	EA	EA	EA	EA
SHEET 1 OF 4	599	188	77	394			394					3	5
SHEET 2 OF 4	517	193	75	387		19	387		1	1	3	3	
SHEET 3 OF 4	564	329	23	189	1		5	189		1			1
SHEET 4 OF 4	3	1	35	16			3						2
TOTAL	**1,683**	**711**	**210**	**986**	**1**	**19**	**789**	**189**	**1**	**2**	**3**	**6**	**8**

SUMMARY OF DRAINAGE QUANTITIES

ITEM	0465 6341	0465 6348	0467 6397	0467 6497
DESCRIPTION	INLET (COMP)(EXT)(TY C1)	JCTBOX(COMPL)(PJB)(7 FTX7FT)(MOD)	SET (TY II) (24 IN) (RCP) (8:1) (P)	SET (TY II) (60 IN) (RCP) (4:1) (P)
	EA	EA	EA	EA
SHEET 1 OF 4	9			
SHEET 2 OF 4			1	
SHEET 3 OF 4	1	2		1
SHEET 4 OF 4	4			
TOTAL	**14**	**2**	**1**	**1**

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF DRAINAGE QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		16
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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11/30/2022
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SUMMARY OF PAVEMENT MARKING QUANTITIES										
ITEM		0658 6053	0658 6057	0666 6167	0666 6168	0666 6170	0666 6182	0666 6184	0666 6205	0666 6207	0666 6214
DESCRIPTION		INSTL OM ASSM (OM-3L)(TWT)GND	INSTL OM ASSM (OM-3R)(TWT)GND	REFL PAV MRK TY II (W) 4" (BRK)	REFL PAV MRK TY II (W) 4" (DOT)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (Y) 4" (BRK)	REFL PAV MRK TY II (Y) 4" (SLD)	REFL PAV MRK TY II (Y) 24" (SLD)
		EA	EA	LF	LF	LF	LF	EA	LF	LF	LF
SHEET 1 OF 6							15		150		
SHEET 2 OF 6		2	2			151			10	896	
SHEET 3 OF 6		0	0	30		286		2	90	1,265	170
SHEET 4 OF 6				60			45			475	168
SHEET 5 OF 6				40	66						
SHEET 6 OF 6				60	0						
TOTAL		**2**	**2**	**190**	**66**	**437**	**60**	**2**	**250**	**2,636**	**338**

SUMMARY OF PAVEMENT MARKING QUANTITIES										
ITEM		0666 6217	0666 6224	0666 6230	0666 6231	0672 6009	0672 6010	0672 6017	0677 6001	0677 6007
DESCRIPTION		REFL PAV MRK TY II (Y) (MED NOSE)	PAVEMENT SEALER 4"	PAVEMENT SEALER 24"	PAVEMENT SEALER (ARROW)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	TRAFFIC BUTTON TY Y	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (24")
		EA	LF	LF	EA	EA	EA	EA	LF	LF
SHEET 1 OF 6			150	15		8				
SHEET 2 OF 6			1,057			12				
SHEET 3 OF 6		1	1,671	170	2	88	2	68	440	
SHEET 4 OF 6		2	535	213		80	3	73	30	15
SHEET 5 OF 6			106				2		70	
SHEET 6 OF 6			60				3		70	
TOTAL		**3**	**3,579**	**398**	**2**	**188**	**10**	**141**	**610**	**15**

SUMMARY OF PAVEMENT MARKING QUANTITIES						
ITEM			0678 6001	0678 6008	0678 6009	
DESCRIPTION			PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	
			LF	LF	EA	
SHEET 1 OF 6			150	15		
SHEET 2 OF 6			1,057			
SHEET 3 OF 6			1,671	170	2	
SHEET 4 OF 6			535	213		
SHEET 5 OF 6			106			
SHEET 6 OF 6			60			
TOTAL			**3,579**	**398**	**2**	

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF PAVEMENT MARKING QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		17
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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USER: pgonzalez
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SUMMARY OF SIGNING QUANTITIES						
ITEM	0644 6001	0644 6004	0644 6076	0647 6002	0647 6003	6120 6001
DESCRIPTION	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	REMOVE SM RD SN SUP&AM	RELOCATE LRSA	REMOVE LRSA	DEAD END ROADWAY BARRICADE
	EA	EA	EA	EA	EA	LF
SHEET 1 OF 7	3	1	3	2	2	12
SHEET 2 OF 7	3		10			
SHEET 3 OF 7	6		5			15
SHEET 4 OF 7			1			
SHEET 5 OF 7	1					
SHEET 6 OF 7	1					
SHEET 7 OF 7	0					
TOTAL	**14**	**1**	**19**	**2**	**2**	**27**

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF SIGNING QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		18
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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SUMMARY OF ILLUMINATION QUANTITIES										
ITEM				0416 6003	0610 6198	0610 6254	0618 6023	0618 6047	0620 6007	0620 6008	0624 6002	0628 6006
DESCRIPTION				DRILL SHAFT (30 IN)	IN RD IL (TY SA) 40B-8 (250W EQ) LED	IN RD IL (TY ST) 40T-8 (250W EQ) LED	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	GROUND BOX TY A (122311)W/A PRON	ELC SRV TY A 120/240 060(NS)SS(E) GC(O)
				LF	EA	EA	LF	LF	LF	LF	EA	EA
SHEET	1	OF	4									
SHEET	2	OF	4	8	1	1	390		410	820	2	
SHEET	3	OF	4	16		2	370	60	470	940	4	1
SHEET	4	OF	4	8		1	115		120	240		
TOTAL				**32**	**1**	**4**	**875**	**60**	**1,000**	**2,000**	**6**	**1**

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF ILLUMINATION QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		19
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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SUMMARY OF SW3P QUANTITIES												
ITEM				0161 6017	0162 6002	0162 6003	0164 6052	0164 6066	0166 6001	0168 6001	0506 6002	0506 6011	0506 6020	0506 6024
DESCRIPTION				COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	STRAW OR HAY MULCH	BROADCAST SEED (PERM)(SPECIAL MIX)	DRILL SEEDING (PERM)(WARM OR COOL)	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)
				SY	SY	SY	SY	SY	AC	MG	LF	LF	SY	SY
PHASE 1														
SHEET	1	OF	4										78	78
SHEET	2	OF	4											
SHEET	3	OF	4								30			
SHEET	4	OF	4										78	78
PHASE 2														
SHEET	1	OF	4										78	
SHEET	2	OF	4											
SHEET	3	OF	5											
SHEET	4	OF	4											
PHASE 3														
SHEET	1	OF	5	2,045		2,045		2,045	0.42	50.4				78
SHEET	2	OF	5	2,705		2,705		2,705	0.56	67.2				
SHEET	3	OF	5	2,464	391	2,464		2,464	0.59	70.8	30	60		
SHEET	4	OF	5	1,263		1,263	1,037	226	0.26	32.4				
SHEET	5	OF	5	112		112	112		0.02	2.4			78	78
TOTAL				**8,589**	**391**	**8,589**	**1,150**	**7,439**	**1.86**	**223.2**	**60**	**60**	**312**	**312**

SUMMARY OF SW3P QUANTITIES									
ITEM				0506 6034	0506 6038	0506 6039	0506 6040	0506 6043
DESCRIPTION				CONSTRUCTION PERIMETER FENCE	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (8")	BIODEG EROSN CONT LOGS (REMOVE)
				LF	LF	LF	LF	LF
PHASE 1								
SHEET	1	OF	4		400	0		
SHEET	2	OF	4		850	412		
SHEET	3	OF	4	90	614	445		
SHEET	4	OF	4		155		26	
PHASE 2								
SHEET	1	OF	4		458			
SHEET	2	OF	4		150			
SHEET	3	OF	5					
SHEET	4	OF	4					0
PHASE 3								
SHEET	1	OF	5			803		
SHEET	2	OF	5		245	695	10	10
SHEET	3	OF	5	60	260	622	11	11
SHEET	4	OF	5		357	512		26
SHEET	5	OF	5		45	45		
TOTAL				**150**	**3,534**	**3,534**	**47**	**47**

NO.	DATE	REVISION	APPROV.

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SUMMARY OF SW3P QUANTITIES

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		20
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1 OF 6		D3-1G	Golf Club RD	57 X 12								
		D3-1G	South Diamondhead BLVD	89 X 12								
	1				✓		10BWG	1	SA	P	BM	
		R1-1	STOP	36 X 36								
2 OF 6												
	2	W1-7		48 x 24			10BWG	1	SA	T	BM	
2 OF 6												
	3	R2-1	SPEED LIMIT 30	24 X 30			10BWG	1	SA	P	BM	
2 OF 6												
	1 & 2	I-3	GUM GULLY	48 X 30			10BWG	1	SA	P	BM	
2 OF 6												
	3	W6-2		36 X 36			10BWG	1	SA	P	BM	
3 OF 6												
	1 & 4	R4-7		24 X 30			10BWG	1	SA	P	BM	
	2 & 6	R3-9dP	END CENTER LANE ONLY	30 X 12			10BWG	1	SA	P	BM	
		R3-9		24 X 36			10BWG	1	SA	P	BM	
	3 & 5	R3-9cP	BEGIN CENTER LANE ONLY	30 X 12			10BWG	1	SA	P	BM	
		R3-9b		24 X36			10BWG	1	SA	P	BM	
	1	R1-1	STOP	36 X 36			10BWG	1	SA	P	BM	
5 OF 6												
	1	W9-2TL	LANE ENDS MERGE LEFT	36 X 36			10BWG	1	SA	P	BM	
6 OF 6												
	1	W9-1R	RIGHT LANE ENDS	36 X 36			10BWG	1	SA	P	BM	

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STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER
1/6/2023

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

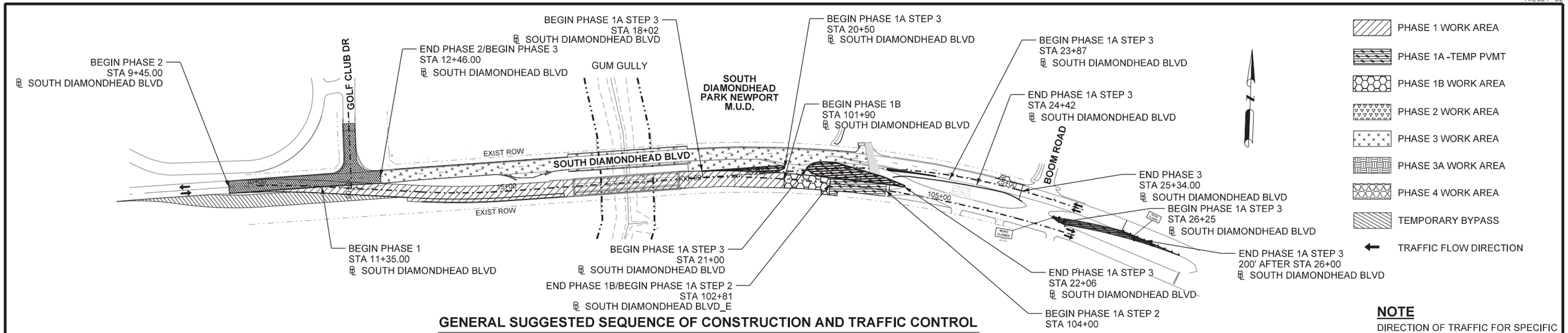
Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
4-16 8-16	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		21

18



GENERAL SUGGESTED SEQUENCE OF CONSTRUCTION AND TRAFFIC CONTROL

NOTE
DIRECTION OF TRAFFIC FOR SPECIFIC PHASES IS SHOWN ON TCP PHASE LAYOUTS.

PHASE 1:

CONSTRUCTION:

1. CONSTRUCT PROPOSED BRIDGE AND APPOACHES (STA. 11+35.00 - STA. 20+68.00 SOUTH DIAMONDHEAD BLVD)
2. CONSTRUCT TEMPORARY BY-PASS
3. CONSTRUCT STORMSEWER
4. INSTALL ILLUMINATION

TRAFFIC OPERATIONS:

1. SET UP CONSTRUCTION SIGNS PER THE ADVANCED WARNING SIGNS TCP LINE DIAGRAM AND BC (1-12)-21 SHEETS
2. MAINTAIN EXISTING TRAFFIC PATTERNS ON EXISTING ROADWAY DURING THIS PHASE

PHASE 1A:

CONSTRUCTION:

1. CONSTRUCT PROPOSED EASTBOUND LANES (STA. 102+81 THRU STA. 104+00 SOUTH DIAMONDHEAD BLVD_E)
2. CONSTRUCT PORTION OF DRIVEWAY 1
3. INSTALL TEMPORARY PAVEMENT
   (STA. 18+02 THRU STA. 20+50 SOUTH DIAMONDHEAD BLVD)
   (STA. 21+00 THRU STA. 22+06 SOUTH DIAMONDHEAD BLVD)
   (STA. 23+87 THRU STA. 24+42 SOUTH DIAMONDHEAD BLVD)
   (STA. 26+25 THRU 200' AFTER STA 26+00 SOUTH DIAMONDHEAD BLVD)

TRAFFIC OPERATIONS:

1. MAINTAIN EXISTING TRAFFIC PATTERNS ON EXISTING ROADWAY DURING THIS PHASE

PHASE 1B:

CONSTRUCTION:

1. CONSTRUCT PROPOSED EASTBOUND LANES (STA. 101+90 THRU STA. 102+81 SOUTH DIAMONDHEAD BLVD_E)
2. CONSTRUCT REMAINING PORTION OF DRIVEWAY 1

TRAFFIC OPERATIONS:

1. MAINTAIN EXISTING TRAFFIC PATTERNS ON EXISTING ROADWAY
2. CLOSE EXISTING MEDIAN OPENING AT STA. 101+90.00 SOUTH DIAMONDHEAD BLVD_E
3. ALLOW DRIVEWAY ACCESS USING TEMPORARY PAVEMENT INSTALLED ON PREVIOUS PHASE. SEE TCP PHASE 1B LAYOUTS.

PHASE 2:

CONSTRUCTION:

1. CONSTRUCT PROPOSED ROADWAY TIE-IN ON WESTSIDE OF PROPOSED BRIDGE (STA 9+45.00 - 12+45.00 SOUTH DIAMONDHEAD BLVD.)

TRAFFIC OPERATIONS:

1. SEE PHASE 2 LAYOUTS
2. INSTALL WORK ZONE STRIPING FOR TWO -WAY CONDITION ON NEWLY CONSTRUCTED BY-PASS ROADWAY AND BRIDGE.
3. CONTINUE WORK ZONE STRIPING FOR TWO -WAY CONDITION ON EXISTING EASTBOUND LANES
4. CLOSE EXISTING ROAD AND BRIDGE (STA. 9-45.00 THRU STA. 12+46.00 SOUTH DIAMONDHEAD BLVD)
5. IMPLEMENT DETOUR AT GOLF CLUB DRIVE
6. SHIFT EASTBOUND TRAFFIC FROM EXISTING ROADWAY ONTO BY-PASS, BRIDGE, AND EXISTING EASTBOUND RIGHT LANE
7. SHIFT WESTBOUND TRAFFIC ONTO EXISTING EASTBOUND LEFT LANE, BRIDGE, BY-PASS, THEN BACK ON TO EXISTING ROADWAY

PHASE 3A:

CONSTRUCTION:

1. CONSTRUCT PROPOSED TIE-IN ROADWAY ON EAST SIDE OF PROPOSED BRIDGE (STA. 12+46 THRU STA. 22+24 SOUTH DIAMONDHEAD BLVD)
2. RECONSTRUCT ONE LANE OF SOUTH DIAMONDHEAD PARK NEWPORT M.U.D. INTERSECTION
3. CONSTRUCT SIDEWALKS
4. REMOVE TEMPORARY BY-PASS
   (STA. 18+02 THRU STA. 20+50 SOUTH DIAMONDHEAD BLVD)
   (STA. 21+00 THRU STA. 22+06 SOUTH DIAMONDHEAD BLVD)
   (STA. 23+87 THRU STA. 24+42 SOUTH DIAMONDHEAD BLVD)
5. REMOVE EXISTING ROADWAY AND BRIDGE (STA 13+63.00 THRU STA. 21+53.00 SOUTH DIAMONDHEAD BLVD)
6. INSTALL PERMANENT SWP3 ITEMS

TRAFFIC OPERATIONS:

1. SEE TCP PHASE 3 LAYOUTS
2. INSTALL WORK ZONE STRIPING ON NEWLY CONSTRUCTED WESTSIDE TIE-IN AND MAINTAIN WORK ZONE STRIPING FROM PREVIOUS PHASE ON REMAINING ROAD
3. SHIFT EASTBOUND TRAFFIC ONTO NEWLY CONSTRUCTED WESTSIDE TIE-IN RAMP, THROUGH BRIDGE, AND ON TO EXISTING EASTBOUND RIGHT LANE
4. MAINTAIN PHASE 2 WORK ZONE STRIPING FOR WESTBOUND TRAFFIC THROUGH BRIDGE. SHIFT TRAFFIC ONTO NEWLY CONSTRUCTED WESTSIDE TIE-IN RAMP.

PHASE 3B:

CONSTRUCTION:

1. CONSTRUCT PROPOSED ROADWAY TIE-IN ON WESTSIDE OF PROPOSED BRIDGE (STA 22+24- 25+32 SOUTH DIAMONDHEAD BLVD.)
2. RECONSTRUCT ONE LANE OF SOUTH DIAMONDHEAD PARK NEWPORT M.U.D. INTERSECTION
3. CONSTRUCT SIDEWALKS.
4. CONSTRUCT MEDIANS.
5. INSTALL PERMANENT PAVEMENT MARKINGS.

TRAFFIC OPERATIONS:

1. MAINTAIN EXISTING TRAFFIC PATTERNS AS PER PHASE 3A.

PHASE 4:

CONSTRUCTION:

1. REMOVE TEMPORARY PAVEMENT.
   (STA. 26+25 THRU 200' AFTER STA 26+00 SOUTH DIAMONDHEAD BLVD)
2. INSTALL CONC CURB (TY II) ON MEDIAN.

TRAFFIC OPERATIONS:

1. PERMANENT TRAFFIC PATTERNS SHOULD BE IN PLACE.

NOT TO SCALE

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED PROFESSIONAL ENGINEER

11/30/2022

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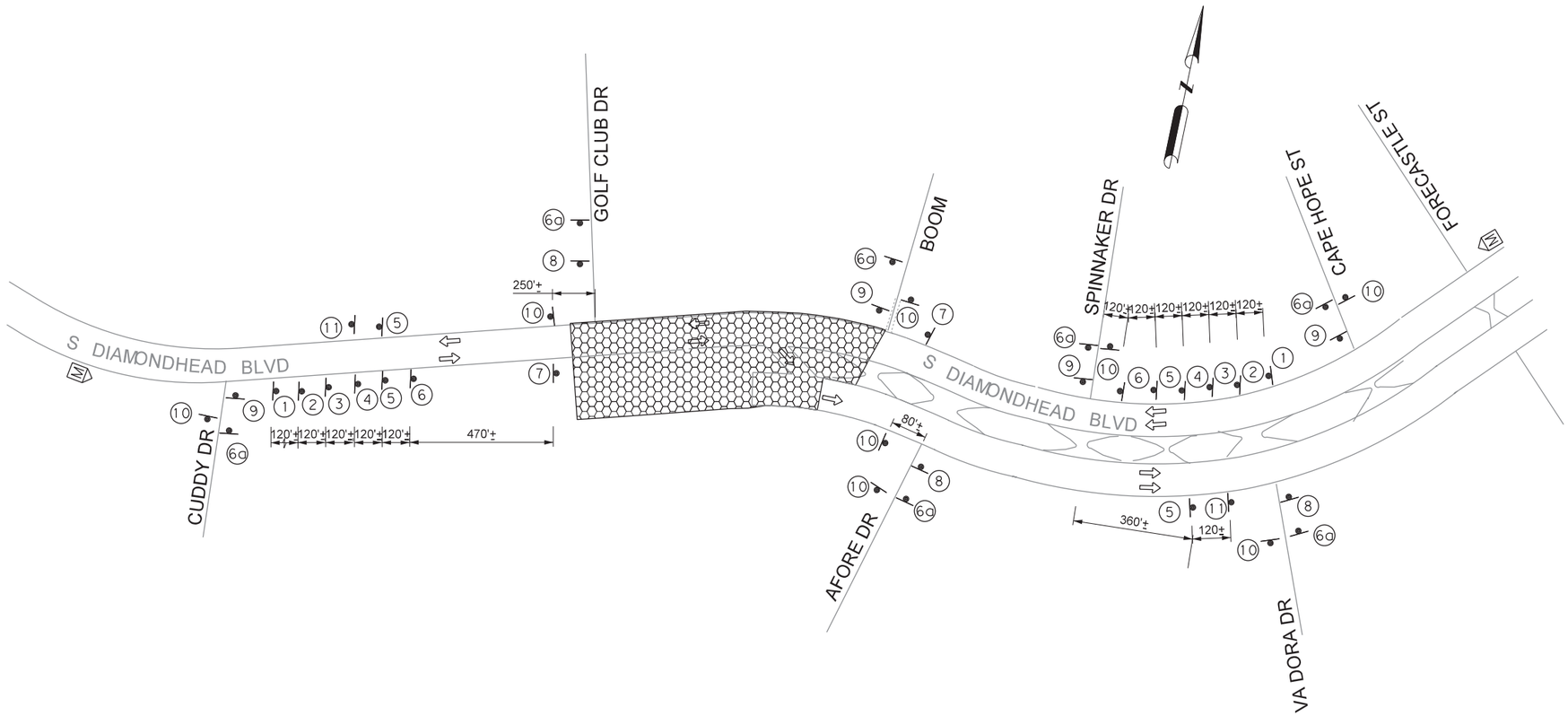
SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL NARRATIVE

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		22
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- WORK ZONE
- CONSTRUCTION WARNING SIGNS
- TRAFFIC FLOW ARROW
- PCMS

POSTED SPEED LIMIT = 30 MPH

NOTES:

1. PLACE PROJECT LIMIT SIGNS AT LOCATION SHOWN AS FIELD CONDITIONS PERMIT. SIGNS TO REMAIN FOR THE DURATION OF THE PROJECT OR AS DIRECTED,BY ENGINEER.
2. REFER TO BC AND WZ(BRK) STANDARDS FOR MINIMUM SPACING.
3. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
4. PLACE PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) IN ADVANCE OF ALL SIGNS ON THIS LAYOUT FOR DURATION OF PROJECT. MESSAGES WILL BE DIRECTED BY ENGINEER.

NOT TO SCALE

CW21-1T
48" X 48"
(1)

G20-10T
48" X 60"
(2)

R20-3T
48" X 42"
(3)

G20-9TP
24" X 24"

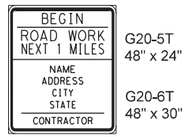
R20-5T
24" X 30"

R20-5aTP
24" X 12"

(4)

R2-1
30" X 36"
(5)

CW20-1D
48" X 48"
(6)



G20-5T
48" x 24"

G20-6T
48" x 30"

(7)

G20-1bTL
72" X 24"
(8)

G20-1bTR
72"x24"
(9)

G20-2
36" X 18"
(10)

G20-2bT
36" X 18"
(11)

CW20-1D
36" X 36"
(6a)

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL
ADVANCED WARNING SIGNS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		23
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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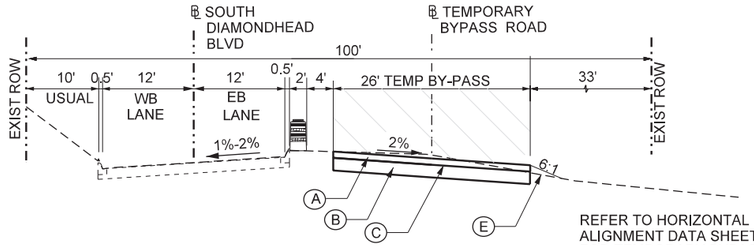


TCP PHASE 1 TYPICAL SECTION A-A

PROPOSED TEMPORARY BYPASS ROAD
N.T.S.

FOR CONTRACTOR INFORMATION ONLY		
TEMPORARY BY PASS ROAD QUANTITIES		
4" HMA(SQ)TY-D SAC-A PG 77-22	TON	218.0
HYDRATED LIME (DRY)	TON	38.8
8" LIME TREAT SUBGRADE	CY	220.2
PRIME COAT (AEP)	GAL	198.2
EMBANKMENT (FINAL)(TY C)	CY	49.6
BACKFILL TY B	STA	5.6

REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR TEMPORARY BYPASS ROAD INFORMATION

MATCH TO EXIST EDGE OF PAVEMENT STA 13+29 ℄ TEMPORARY BYPASS ROAD 12 ' LT

EXIST PAV MRKS TO REMAIN

EXIST ROW

℄ TEMPORARY BYPASS ROAD

SOUTH DIAMONDHEAD BLVD

10+00

R=580'

TRAFFIC BARRELS AT 30' SPACING

BEGIN PROJECT
BEGIN CSJ 0912-72-406
STA 9+45
℄ SOUTH DIAMONDHEAD BLVD

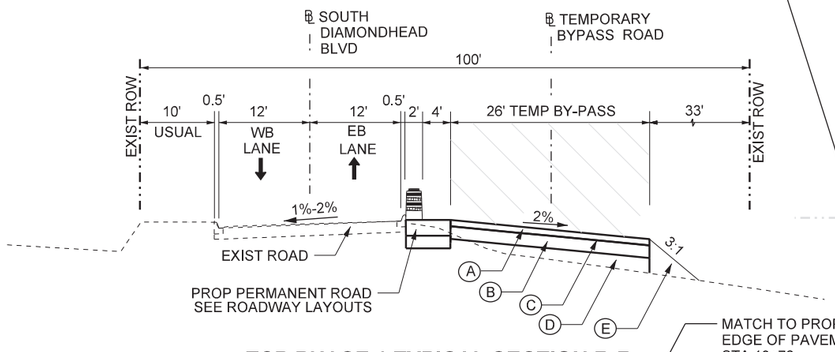
MATCH TO EXIST EDGE OF PAVEMEMT STA 11+35 ℄ TEMPORARY BYPASS ROAD 12 ' RT

EXIST ROW

R=775'

PHASE I WORK AREA
BEGIN STA 9+45
℄ SOUTH DIAMONDHEAD BLVD
12' RT

MATCHLINE STA 14+12 (℄ TEMPORARY BYPASS ROAD)



TCP PHASE 1 TYPICAL SECTION B-B

PROPOSED TEMPORARY BYPASS ROAD
N.T.S.

MATCH TO PROPOSED EDGE OF PAVEMENT STA 10+72 ℄ SOUTH DIAMONDHEAD BLVD 13' RT , ELEV= 36.1242'

MATCHLINE STA 14+12 (℄ TEMPORARY BYPASS ROAD)

EXIST ROW

A

GOLF CLUB DR

℄ GOLF CLUB DR

EXIST PAV MRKS TO REMAIN

B

EXIST ROW

TRAFFIC BARRELS AT 30' SPACING

10+00

℄ SOUTH DIAMONDHEAD BLVD

10+00

15+00

PROPOSED TEMPORARY BYPASS ROAD

PROPOSED ROAD

℄ TEMPORARY BYPASS ROAD

A

B

EXIST ROW

MATCH TO PROPOSED EDGE OF PAVEMENT STA 12+91 ℄ SOUTH DIAMONDHEAD BLVD 12' RT , ELEV= 36.63'

MATCHLINE STA. 14+00 (℄ SOUTH DIAMONDHEAD BLVD)

LEGEND

- PHASE 1 WORK AREA
- TEMPORARY BY-PASS
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

(A) 4" ACP
(B) 8" TREATED SUBGRADE
(C) PRIME COAT
(D) EMBANKMENT
(E) BACKFILL TY B

FOR CONTRACTORS INFORMATION ONLY

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR TEMPORARY BY PASS ROAD INFORMATION.
2. ENSURE SMOOTH LATERAL TRANSITION AT THE CONNECTION POINTS OF THE BY PASS ROAD TO EXISTING PAVEMENT. ANY ADDITIONAL WORK AND MATERIALS REQUIRED AS DIRECTED IS SUSIDIARY TO ITEM 508.
3. SEE VERTICAL PROFILE SHEET "TEMPORARY BYPASS ROAD" .
4. MAINTAIN POSITIVE CONSTRUCTION SITE DRAINAGE AT ALL TIMES.

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN PHASE I BEGIN PROJECT TO STA 14+00

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		24
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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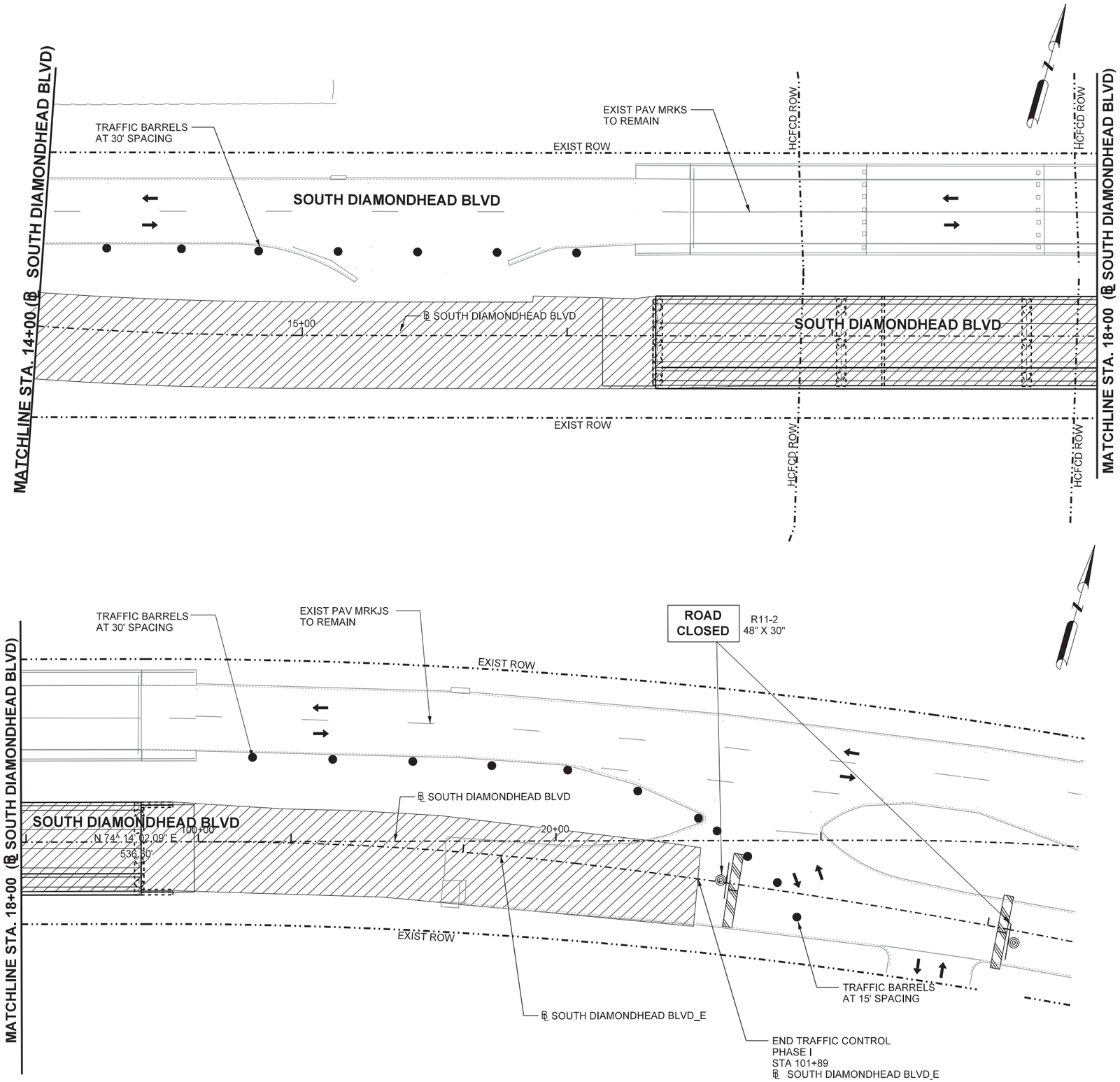

LEGEND

- PHASE 1 WORK AREA
- TEMPORARY BY-PASS
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR TEMPORARY BY PASS ROAD INFORMATION.
2. ENSURE SMOOTH LATERAL TRANSITION AT THE CONNECTION POINTS OF THE BY PASS ROAD TO EXISTING PAVEMENT. ANY ADDITIONAL WORK AND MATERIALS REQUIRED AS DIRECTED IS SUSIDIARY TO ITEM 508.
3. SEE VERTICAL PROFILE SHEET "TEMPORARY BYPASS ROAD".
4. MAINTAIN POSITIVE CONSTRUCTION SITE DRAINAGE AT ALL TIMES.

0 20' 40'

SCALE: 1" = 40'

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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN PHASE I STA 14+00 TO 22+00

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		25
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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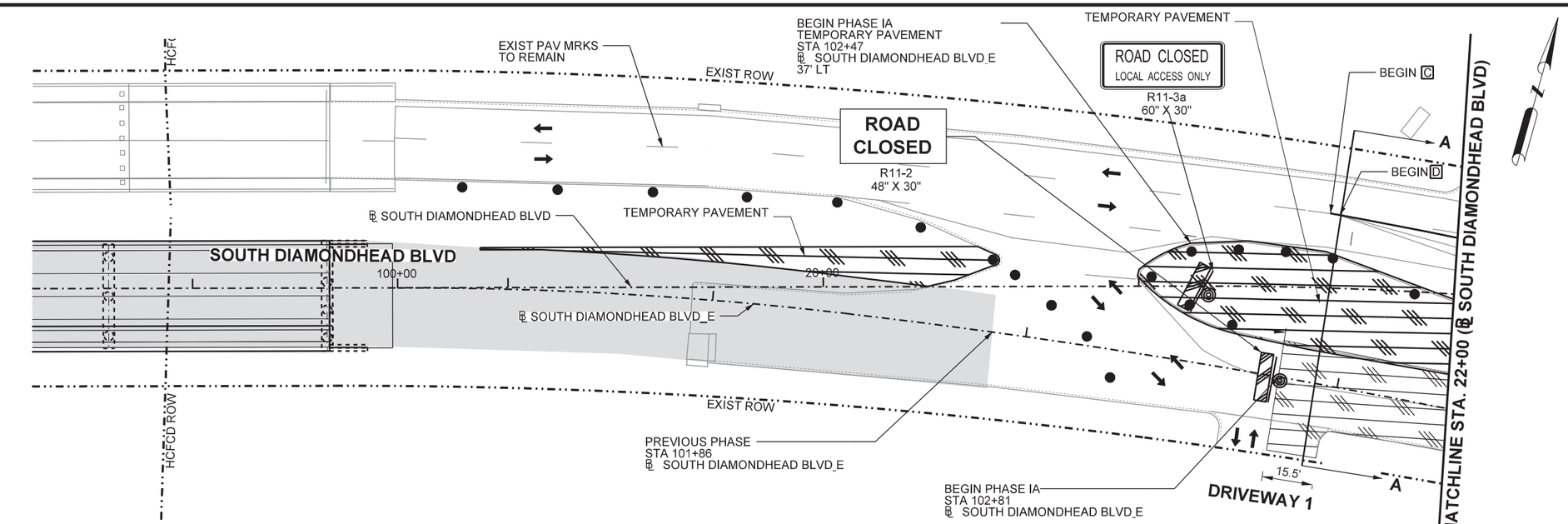
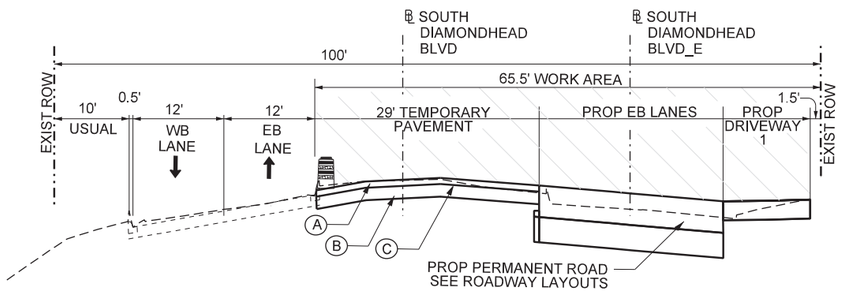


LEGEND

- PREVIOUS PHASE
- PHASE 1A
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

C WK ZN PAV MRK REMOV(Y)4"(SLD)

D ELIM EXT PAV MARK & MRKS(4")



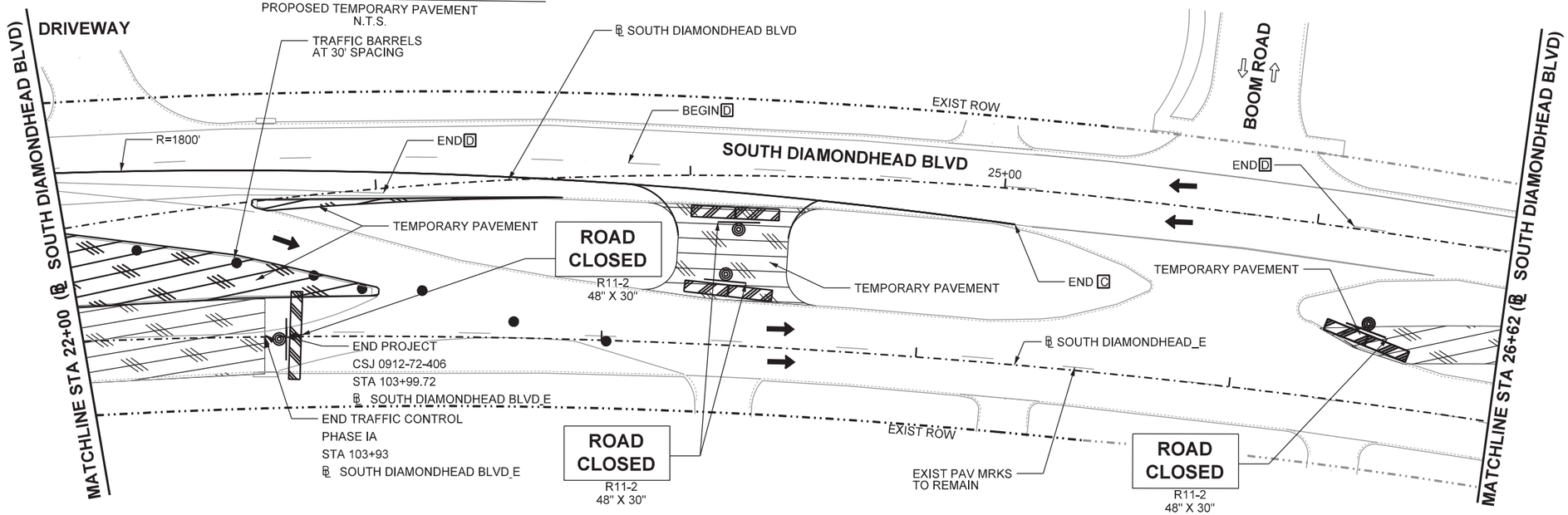
FOR CONTRACTOR INFORMATION ONLY		
TEMPORARY PAVEMENT QUANTITIES		
4" HMA(SQ)TY-D SAC-A PG 77-22	TON	19.1
HYDRATED LIME (DRY)	TON	2.7
8" LIME TREAT SUBGRADE	CY	20.0
PRIME COAT (AEP)	GAL	13.1

NOTES:

1. ENSURE SMOOTH LATERAL TRANSITION AT THE CONNECTION POINTS OF THE BY PASS ROAD TO EXISTING AND PROPOSED PAVEMENT. ANY ADDITIONAL WORK AND MATERIALS REQUIRED AS DIRECTED IS SUBSIDIARY TO ITEM 508.
2. MAINTAIN POSITIVE CONSTRUCTION SITE DRAINAGE AT ALL TIMES.
3. PROVIDE ACCESS TO DRIVEWAY AT ALL TIMES.
4. REMOVAL OF EXISTING TREES WILL BE SUBSIDIARY TO ITEM 508, "CONSTRUCTING DETOURS"

TCP PHASE IA TYPICAL SECTION A-A

PROPOSED TEMPORARY PAVEMENT
N.T.S.



A 4" ACP
B 8" TREATED SUBGRADE
C PRIME COAT

FOR CONTRACTORS INFORMATION ONLY

0 20′ 40′
SCALE: 1" = 40′

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE IA
STA 14+00 TO 22+00

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		26
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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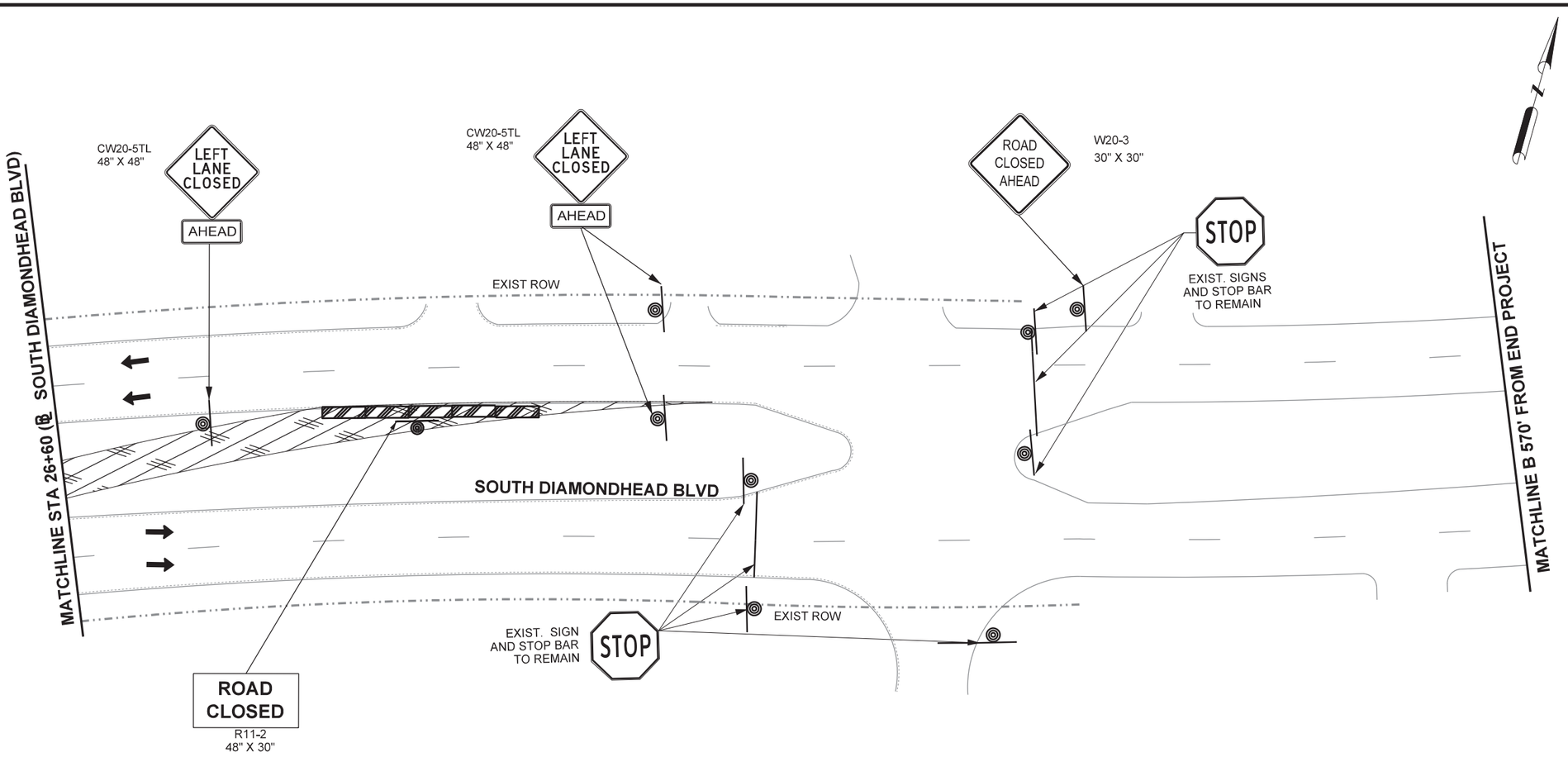

LEGEND

- PREVIOUS PHASE
- PHASE 1A- TEMP PVMT
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

(A) 4" ACP
(B) 8" TREATED SUBGRADE
(C) PRIME COAT

FOR CONTRACTORS INFORMATION ONLY

NOTES:

(1) REMOVAL OF EXISTING TREES WILL BE SUBSIDIARY TO ITEM 508, "CONSTRUCTING DETOURS"

0 20′ 40′
SCALE: 1" = 40′

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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN PHASE IA STA 26+60 TO 570' FROM END PROJECT

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		27
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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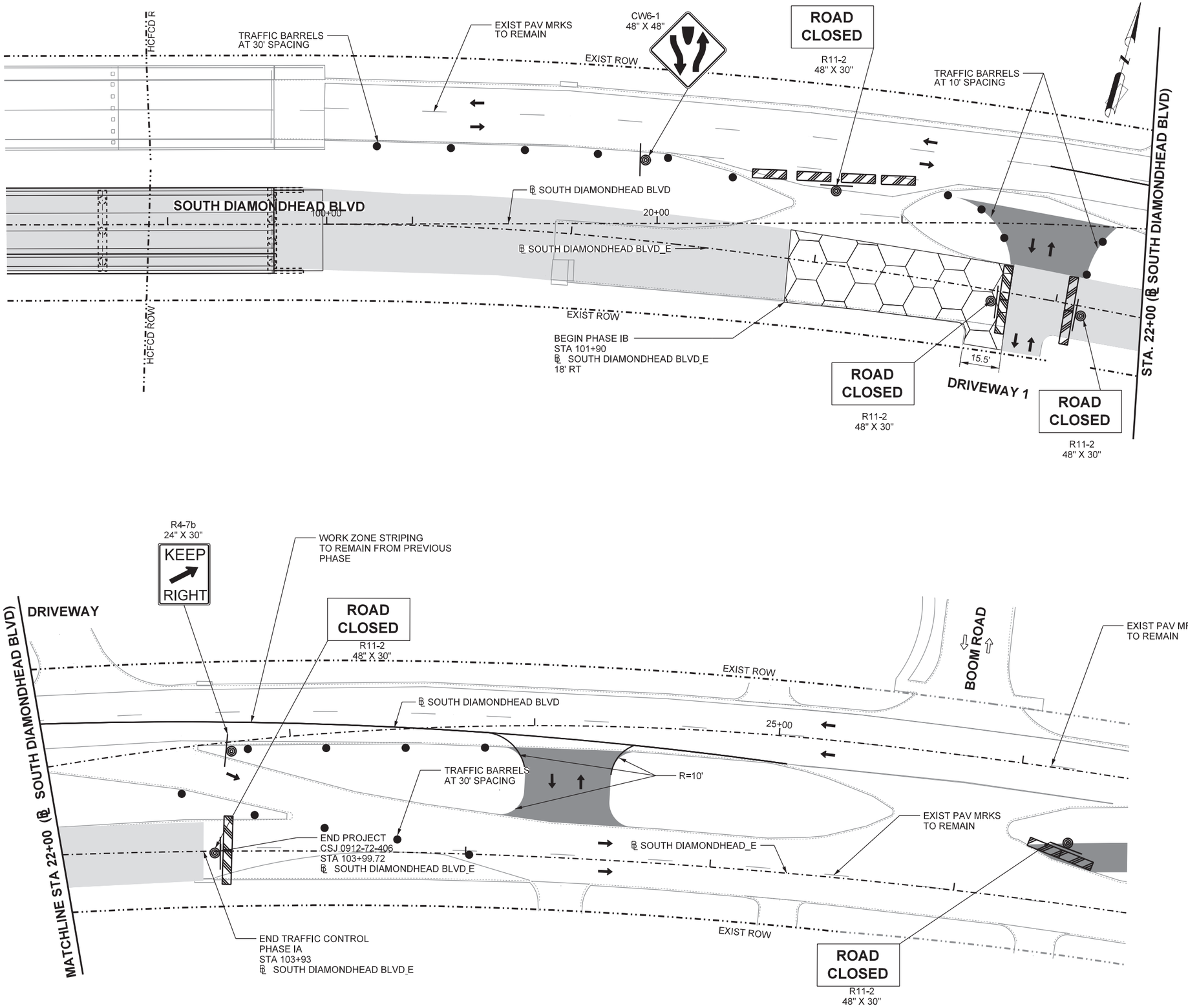

LEGEND

- PHASE 1B WORK AREA
- PREVIOUS PHASE
- TEMP PVMT (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

NOTES:

1. MAINTAIN POSITIVE CONSTRUCTION SITE DRAINAGE AT ALL TIMES.
2. PROVIDE ACCESS TO DRIVEWAY AT ALL TIMES.

0 20′ 40′

SCALE: 1" = 40′

YVONNE COLMENERO
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STATE OF TEXAS

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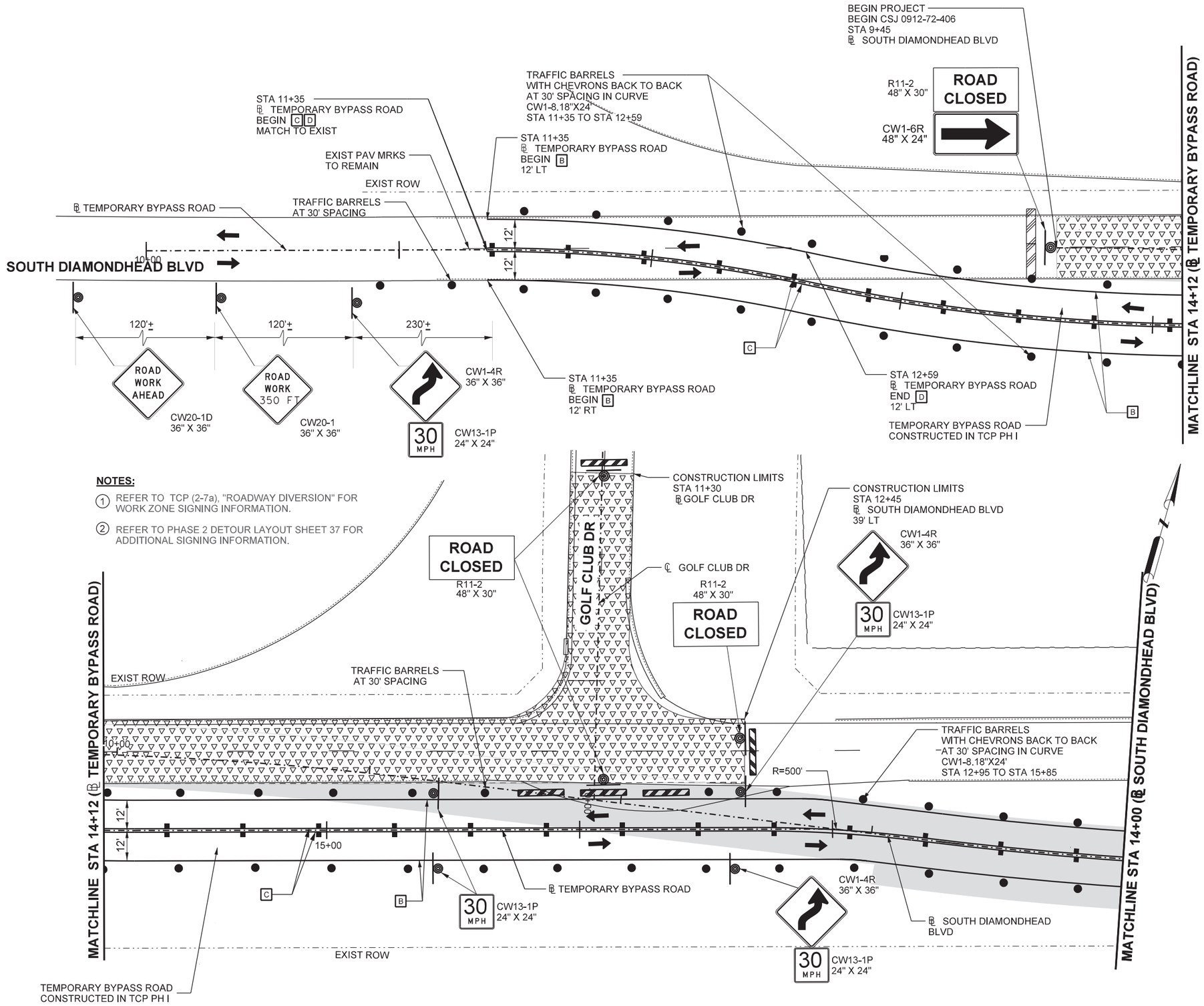
SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN PHASE IB STA 14+00 TO 22+00

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		28
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- PHASE 2 WORK AREA
- PREVIOUS PHASE
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

- A WK ZN PAV MRK REMOV(Y)4"(BRK)
- B WK ZN PAV MRK REMOV(W)4"(SLD)
- C WK ZN PAV MRK REMOV(Y)4"(SLD)
- D ELIM EXT PAV MARK & MRKS(4")
- E ELIM EXT PAV MRK & MRKS(ENTR GORE)
- F WK ZN PAV MRK REMOV(W)(ARROW)
- G WK ZN PAV MRK REMOV(W)(WORD)
- H WK ZN PAV MRK REMOV(W)24"(SLD)
- I WK ZN PAV MRK REMOV(W)4"(DOT)
- J ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′
SCALE: 1" = 40′

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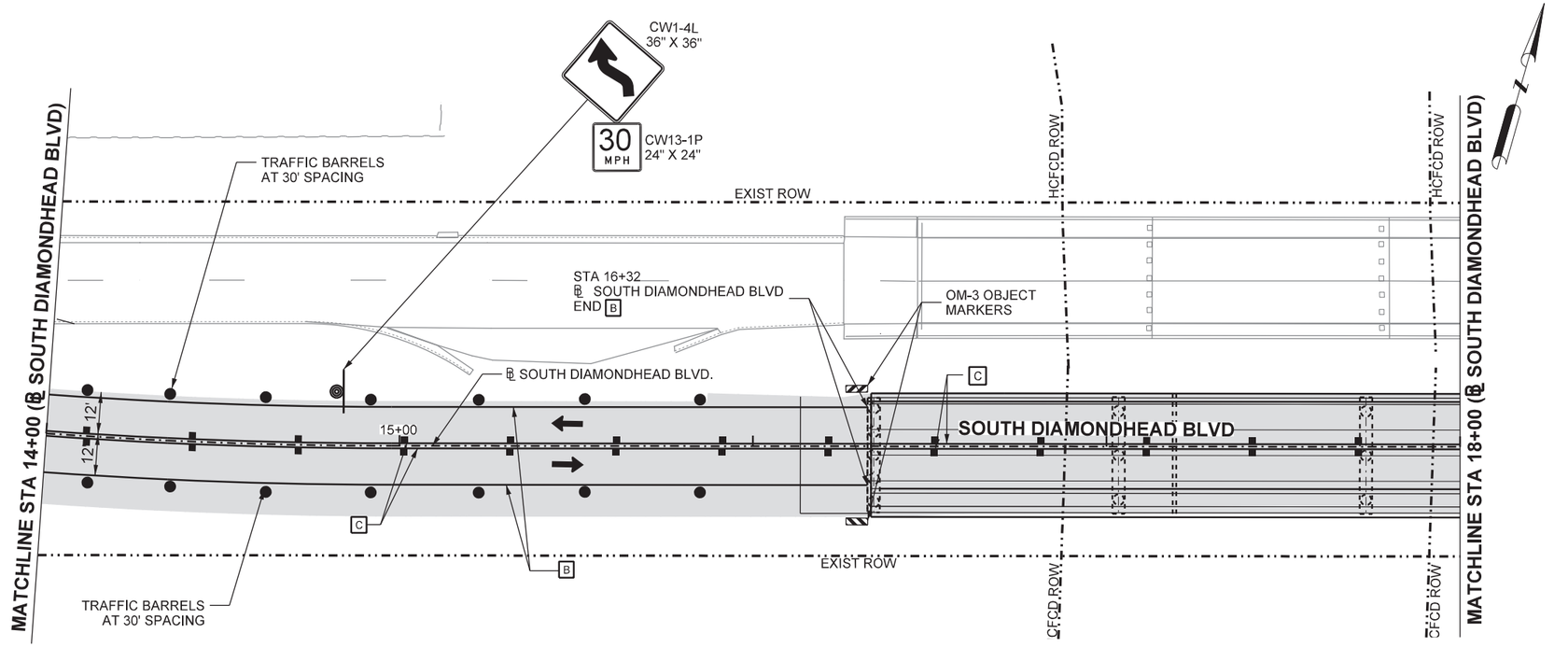
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 2
BEGIN TO PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		29
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

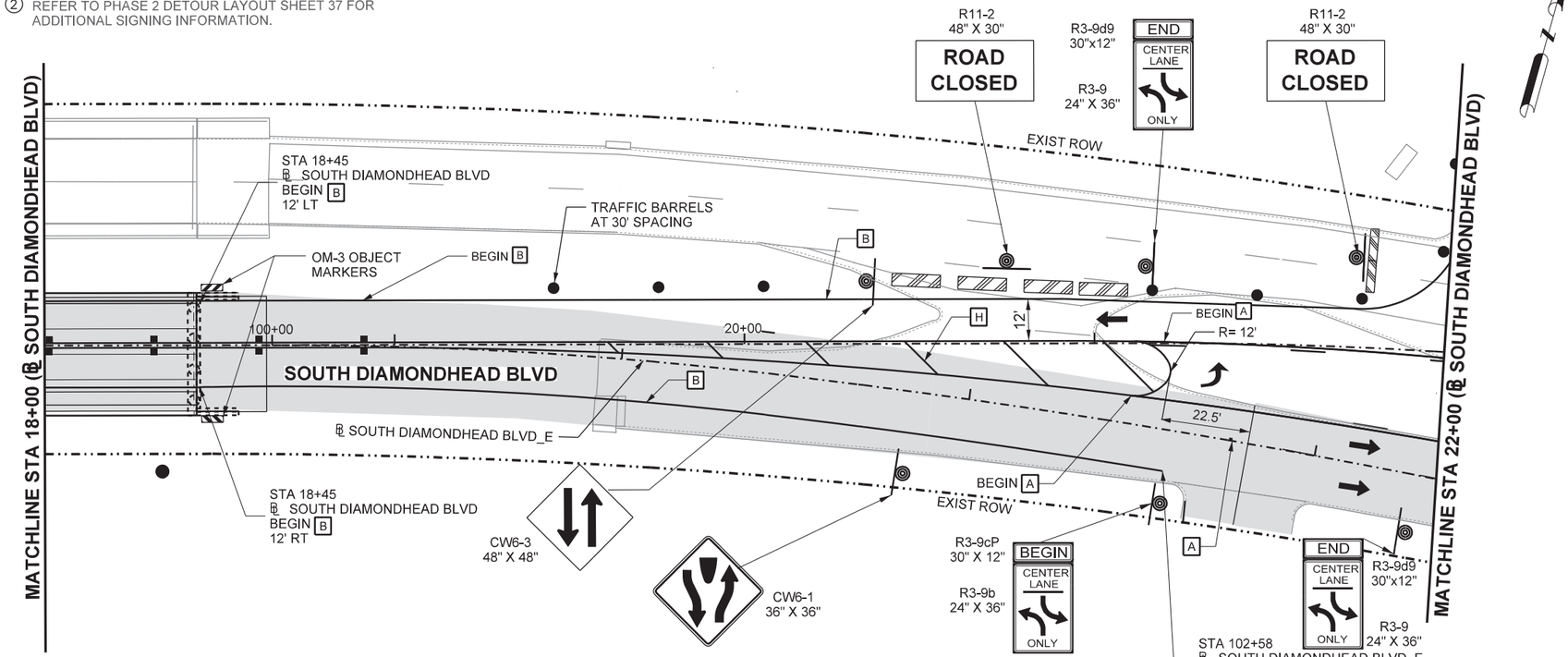
- PREVIOUS PHASE
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

- A WK ZN PAV MRK REMOV(Y)4"(BRK)
- B WK ZN PAV MRK REMOV(W)4"(SLD)
- C WK ZN PAV MRK REMOV(Y)4"(SLD)
- D ELIM EXT PAV MARK & MRKS(4")
- E ELIM EXT PAV MRK & MRKS(ENTR GORE)
- F WK ZN PAV MRK REMOV(W)(ARROW)
- G WK ZN PAV MRK REMOV(W)(WORD)
- H WK ZN PAV MRK REMOV(W)24"(SLD)
- I WK ZN PAV MRK REMOV(W)4"(DOT)
- J ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′
SCALE: 1" = 40′

NOTES:

1. REFER TO TCP (2-7a), "ROADWAY DIVERSION" FOR WORK ZONE SIGNING INFORMATION.
2. REFER TO PHASE 2 DETOUR LAYOUT SHEET 37 FOR ADDITIONAL SIGNING INFORMATION.



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YVONNE COLMENERO
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PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 2
STA 14+00 TO STA 22+00

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		30
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

STA 22+31
℄ SOUTH DIAMONDHEAD BLVD
BEGIN B
39' LT

END B

DRIVEWAY

BEGIN
CENTER LANE
ONLY
R3-9cP
30" X 12"

R3-9b
24" x 36"

TRAFFIC BARRELS
WITH CHEVRONS
AT 30' SPACING
CW1-8 18" X 24"

CW1-4L
48" X 48"

30
MPH
CW13-1P
24" X 24"

NOTES:

1. REFER TO TCP (2-7a), "ROADWAY DIVERSION" FOR WORK ZONE SIGNING INFORMATION.
2. REFER TO PHASE 2 DETOUR LAYOUT SHEET 37 FOR ADDITIONAL SIGNING INFORMATION.

END B

BOOM ROAD

BEGIN B

TRAFFIC BARRELS AT
30' SPACING

EXIST ROW

25+00

℄ SOUTH DIAMONDHEAD BLVD

END C

TRAFFIC BARRELS
AT 30' SPACING

STA 106+30
℄ SOUTH DIAMONDHEAD_E
END C

BEGIN D

12'

℄ SOUTH DIAMONDHEAD_E

MATCHLINE STA 22+00 (℄ SOUTH DIAMONDHEAD BLVD)

12'

12'

BEGIN D

J

EXIST. SIGN TO
BE REMOVED. SEE
SIGNING AND
PAVEMENT MARKING
LAYOUT FOR PAYMENT.

END D

ROAD
CLOSED
R11-2
48" X 30"

EXIST ROW

MATCHLINE STA 26+62 (℄ SOUTH DIAMONDHEAD BLVD)

180'

ROAD
CLOSED
R11-2
48" X 30"

EXIST ROW

END TAPER / B

BEGIN TAPER

TRAFFIC BARRELS WITH
CHEVRONS AT
30' SPACING IN TAPER
CW1-8 18"X 24"

TRAFFIC BARRELS
WITH CHEVRONS
AT 30' SPACING
CW1-8 18" X 24"

END D

STOP
CW20-5TR
48" X 48"

EXIST. SIGNS
AND STOP BAR
TO REMAIN

MATCHLINE STA 26+60 (℄ SOUTH DIAMONDHEAD BLVD)

12'

12'

EXIST ROW

AFORE DRIVE

MATCHLINE B 570' FROM END PROJECT

STOP

EXIST SIGN
AND STOP BAR
TO REMAIN

LEGEND

- PREVIOUS PHASE
- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)
I	WK ZN PAV MRK REMOV(W)4"(DOT)
J	ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
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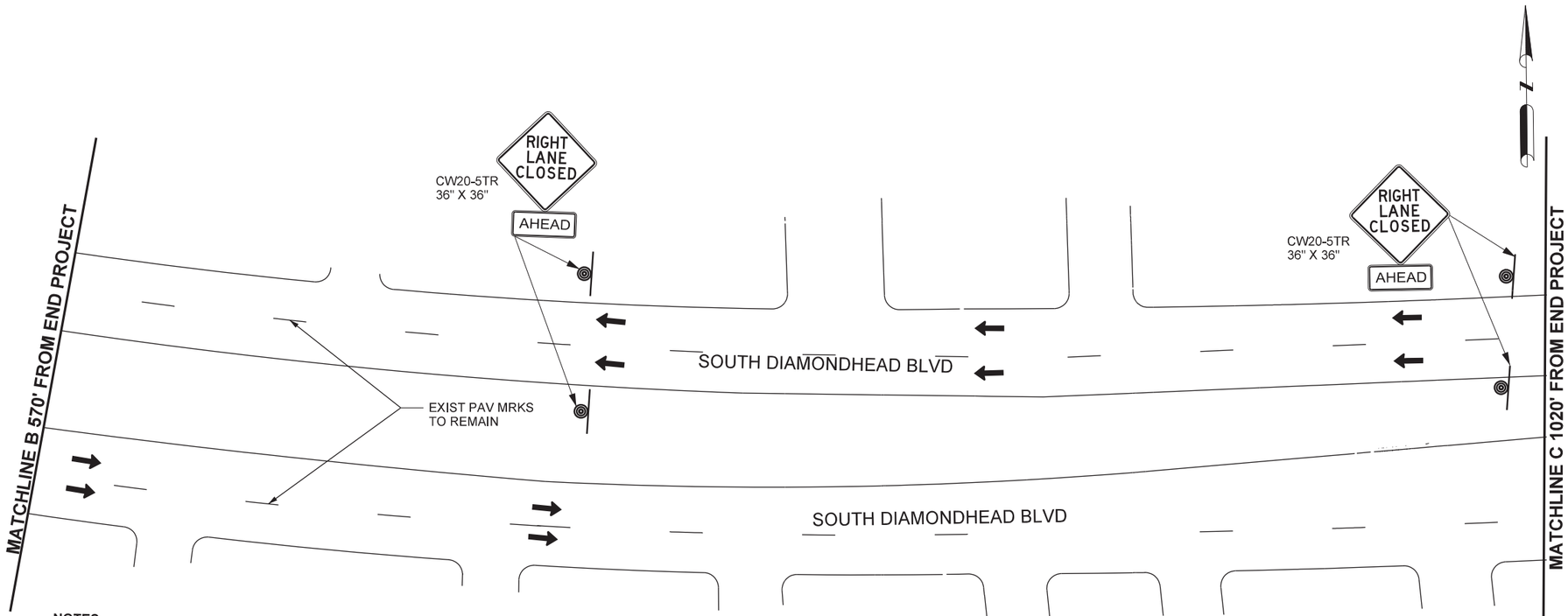
**SOUTH DIAMONDHEAD BLVD
AT GUM GULLY**

**TRAFFIC CONTROL PLAN
PHASE 2
STA 22+00 TO 570' FROM
END PROJECT**

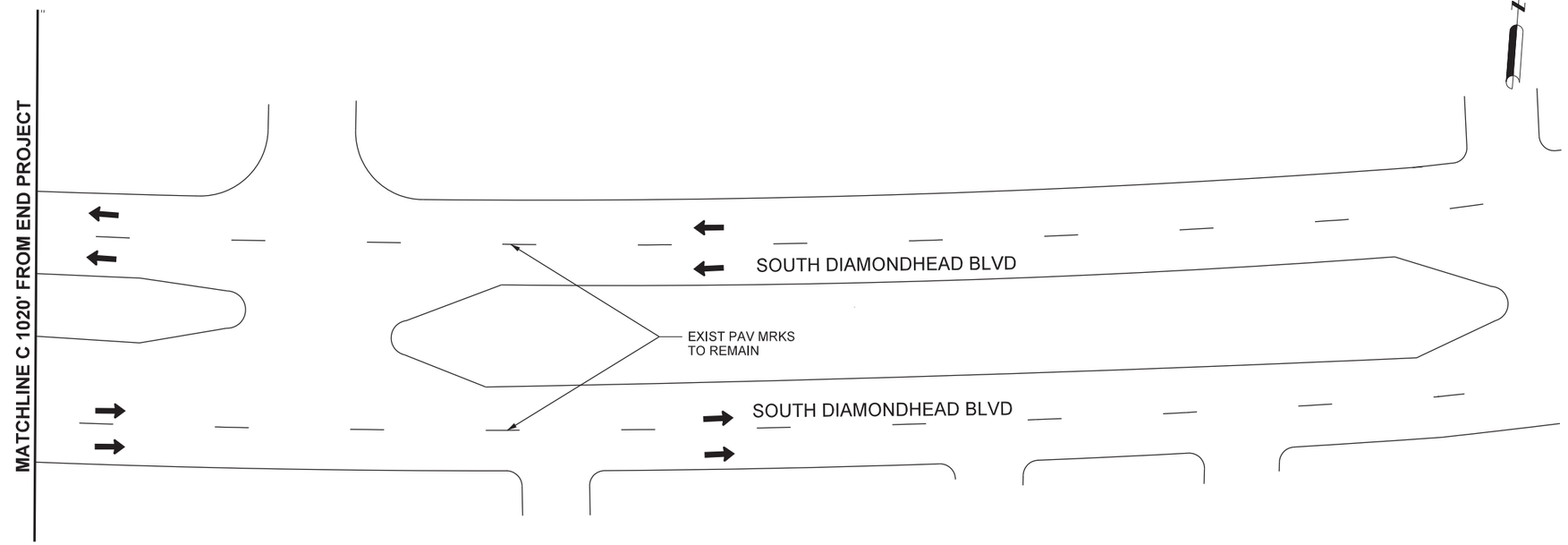
SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		31
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



NOTES:

1. REFER TO TCP (2-7a), "ROADWAY DIVERSION" FOR WORK ZONE SIGNING INFORMATION.
2. REFER TO PHASE 2 DETOUR LAYOUT SHEET 37 FOR ADDITIONAL SIGNING INFORMATION.



LEGEND

- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)
I	WK ZN PAV MRK REMOV(W)4"(DOT)
J	ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′
SCALE: 1" = 40′

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 2
570' FROM END PROJECT TO 1470' FROM END PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		32
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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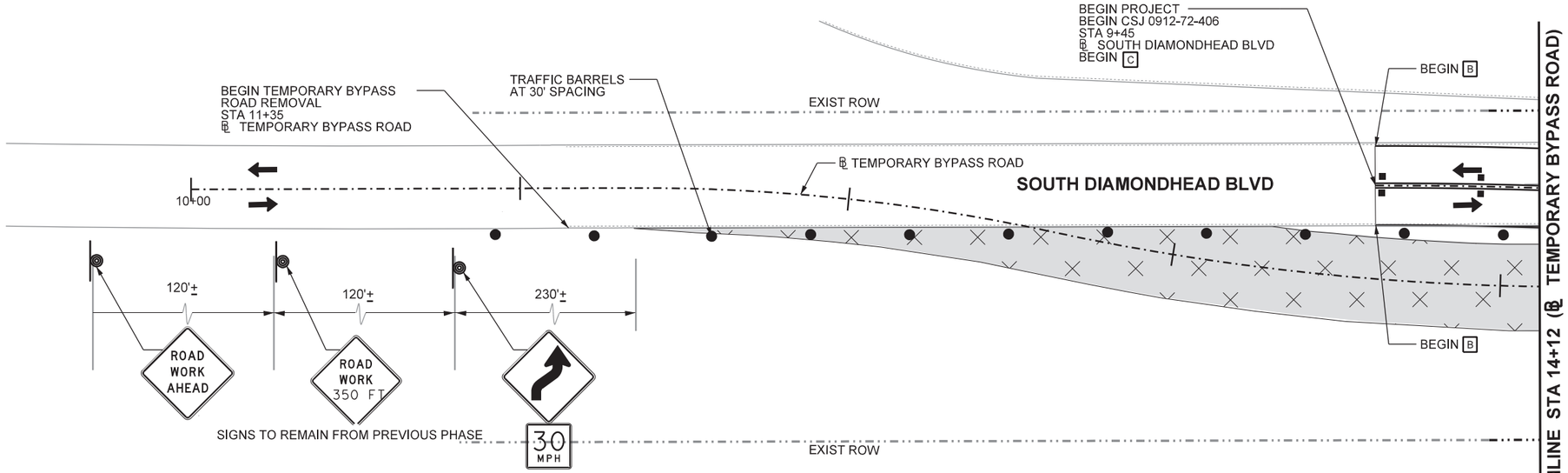

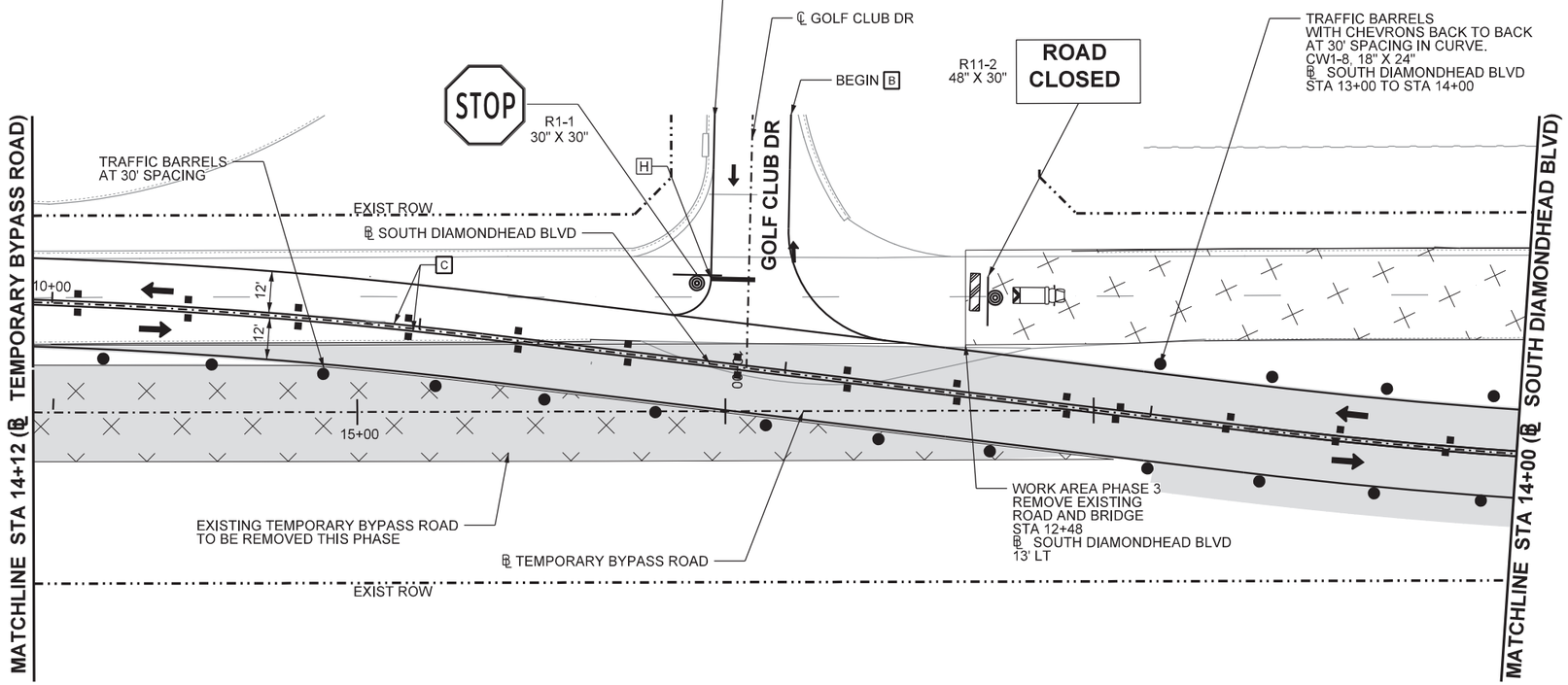

LEGEND

- PHASE 3 WORK AREA
- PREVIOUS PHASE
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)
I	WK ZN PAV MRK REMOV(W)4"(DOT)
J	ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′

SCALE: 1" = 40′

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ENGINEER

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 3A
BEGIN PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		33
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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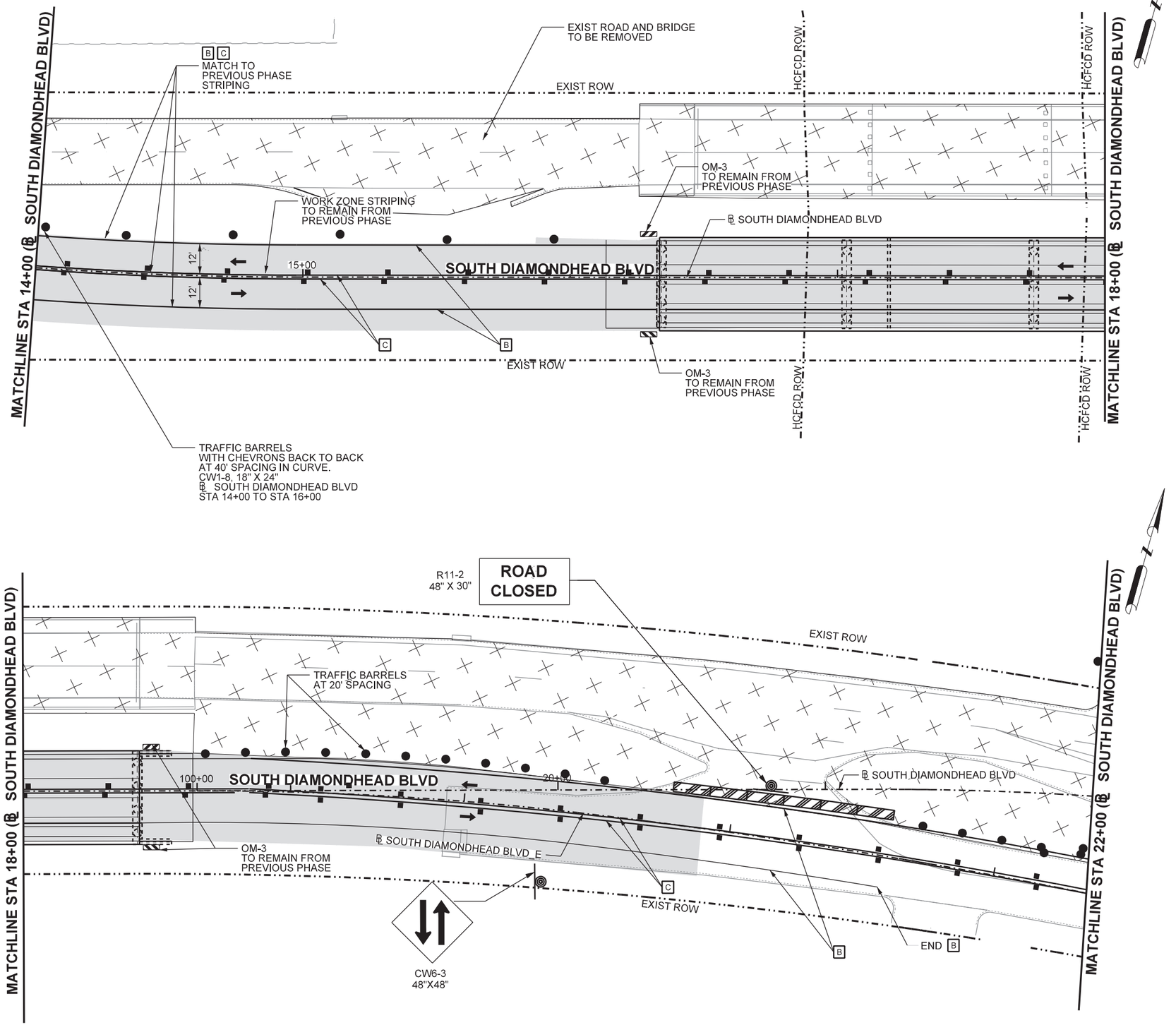


LEGEND

- PHASE 3 WORK AREA
- PREVIOUS PHASE
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)
I	WK ZN PAV MRK REMOV(W)4"(DOT)
J	ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′

SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor F-12040

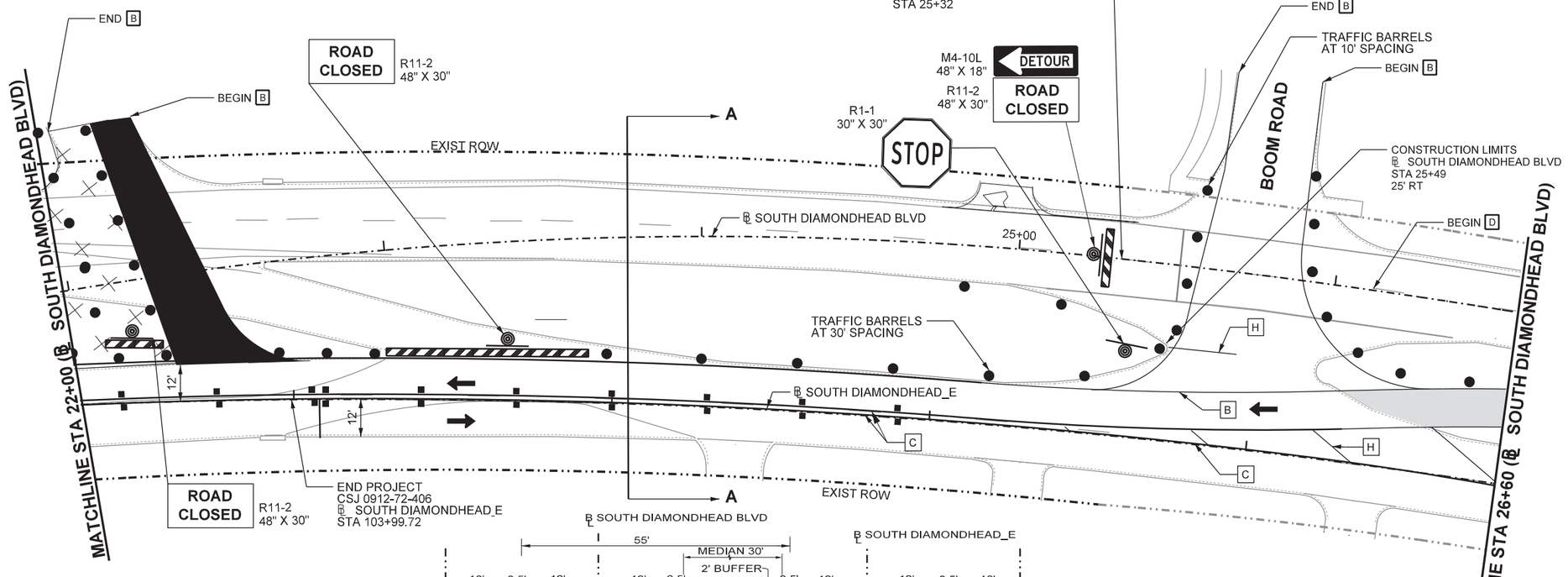
Texas Department of Transportation

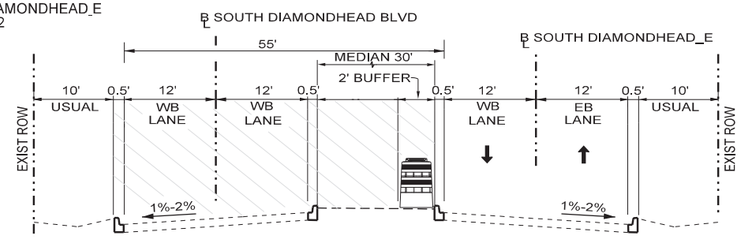
SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 3A
STA 14+00 TO STA 22+00

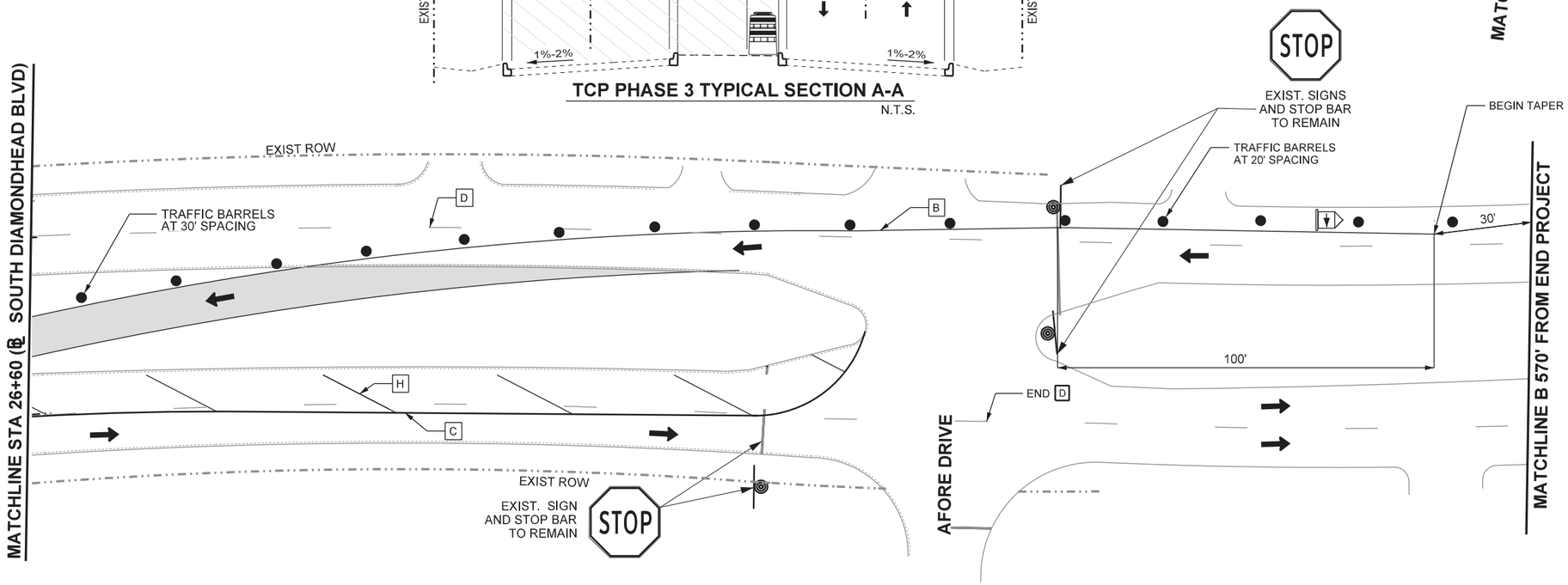
SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		34
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS





TCP PHASE 3 TYPICAL SECTION A-A
N.T.S.



LEGEND

- PHASE 3 CONSTRUCTION
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

- A WK ZN PAV MRK REMOV(Y)4"(BRK)
- B WK ZN PAV MRK REMOV(W)4"(SLD)
- C WK ZN PAV MRK REMOV(Y)4"(SLD)
- D ELIM EXT PAV MARK & MRKS(4")
- E ELIM EXT PAV MRK & MRKS(ENTR GORE)
- F WK ZN PAV MRK REMOV(W)(ARROW)
- G WK ZN PAV MRK REMOV(W)(WORD)
- H WK ZN PAV MRK REMOV(W)24"(SLD)

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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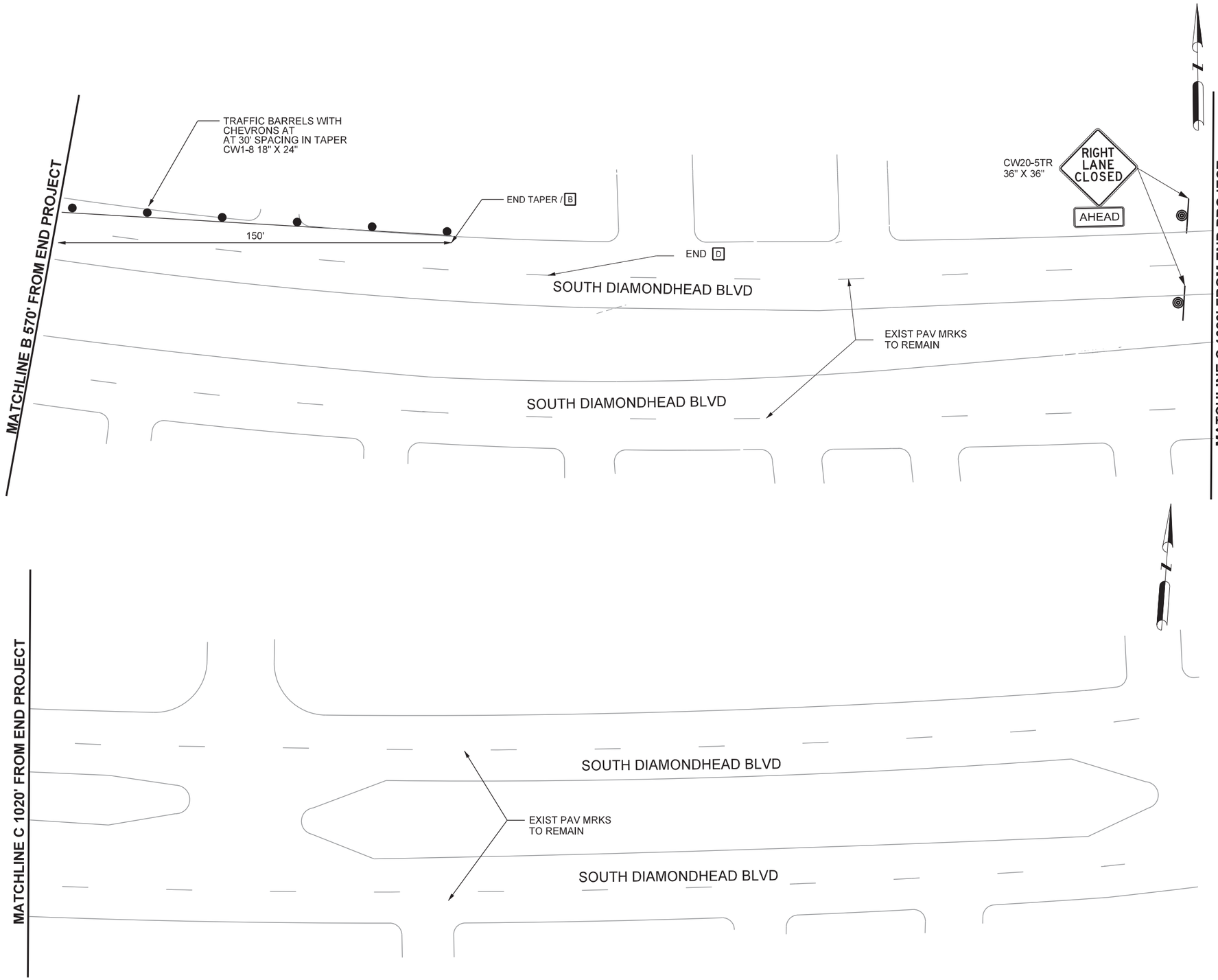
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 3A
STA 22+00 TO END PROJECT

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		35
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- BARRELS (TYPICAL)
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)
I	WK ZN PAV MRK REMOV(W)4"(DOT)
J	ELIM EXT PAV MRK & MRKS (24")

0 20′ 40′

SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

TRAFFIC CONTROL PLAN PHASE 3A 570' FROM END PROJECT TO 1470' FROM END PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		36
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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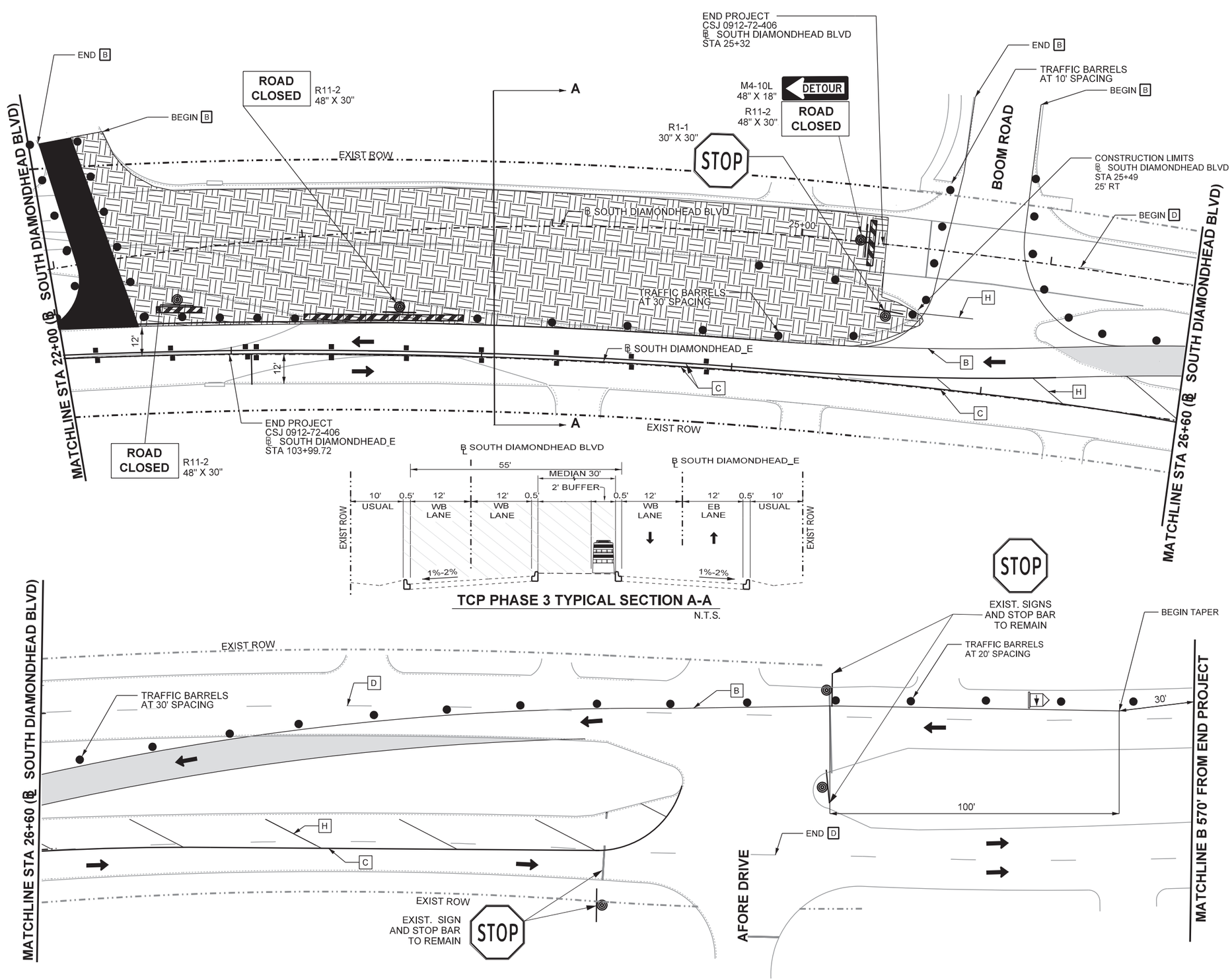

LEGEND

- PHASE 3B CONSTRUCTION
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

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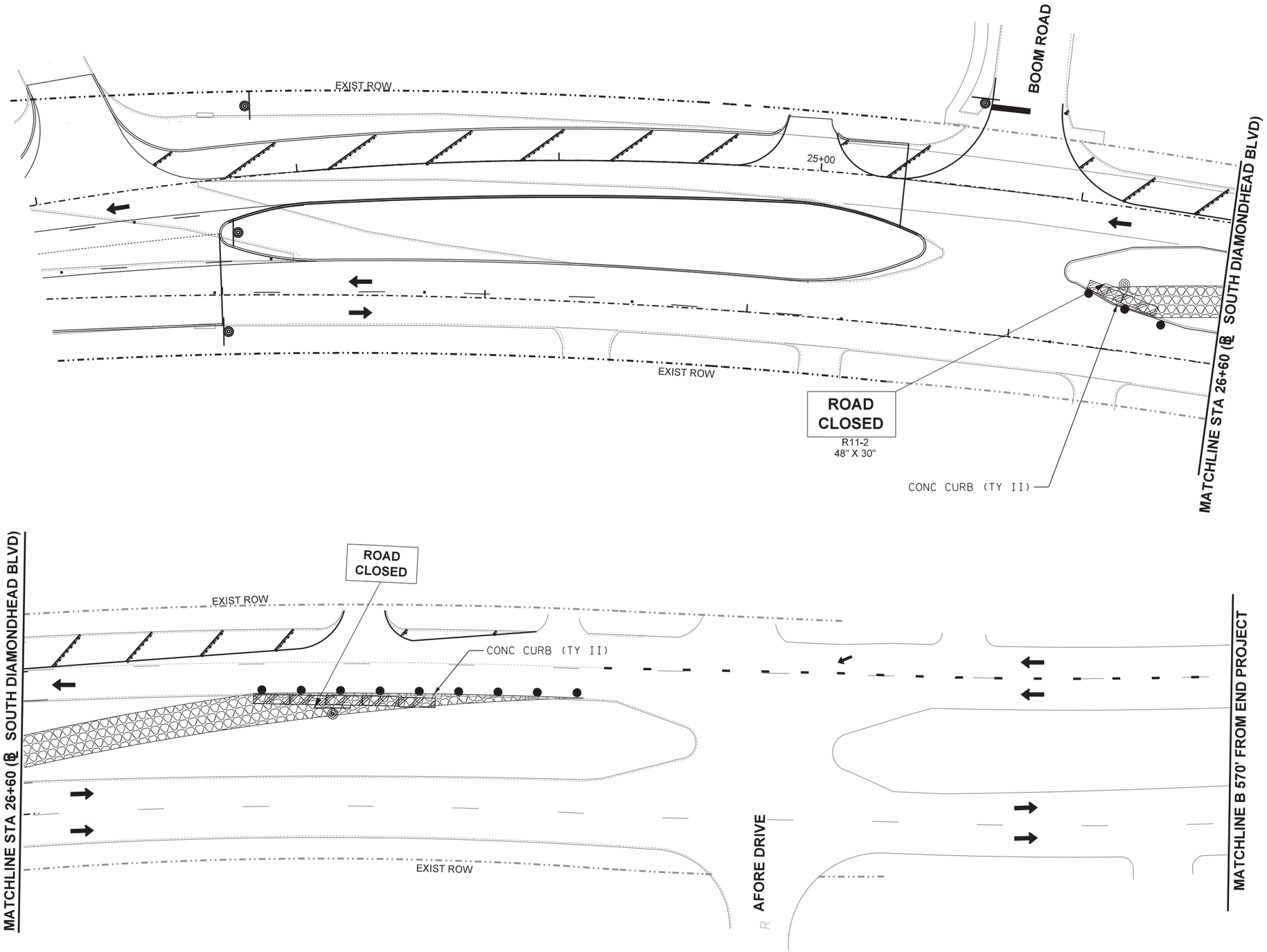
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 3B
STA 22+00 TO END PROJECT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		37
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- PHASE 4 CONSTRUCTION
- BARREL (LAYOUT)
- OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
- TRAFFIC FLOW DIRECTION
- TYPE III BARRICADE
- TEMP. SIGN
- FLASHING ARROW BOARD
- TRUCK MOUNTED ATTENUATOR (TMA)
- PORTABLE MESSAGE SIGN (PMS)

A	WK ZN PAV MRK REMOV(Y)4"(BRK)
B	WK ZN PAV MRK REMOV(W)4"(SLD)
C	WK ZN PAV MRK REMOV(Y)4"(SLD)
D	ELIM EXT PAV MARK & MRKS(4")
E	ELIM EXT PAV MRK & MRKS(ENTR GORE)
F	WK ZN PAV MRK REMOV(W)(ARROW)
G	WK ZN PAV MRK REMOV(W)(WORD)
H	WK ZN PAV MRK REMOV(W)24"(SLD)

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
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PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

TRAFFIC CONTROL PLAN
PHASE 4
STA 22+00 TO END PROJECT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		38
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

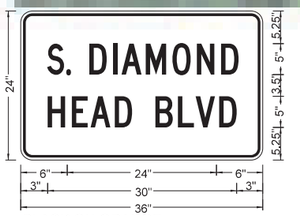
LEGEND

- PHASE 2 WORK AREA
- PROPOSED TRAFFIC FLOW
- TEMP SIGN
- TY III BARRICADE
- PCMS

NOTES:

1. MAINTAIN ACCESS TO DRIVEWAYS AT ALL TIMES.
2. DETOUR SIGNING CAN BE ADJUSTED TO ACCOMMODATE SITE CONDISITON AS APPROVED.
3. REFER TO TCP PHASE 2 LAYOUTS FOR ADDITIONAL SIGNING REQUIREMENTS.

0 100′ 200′
SCALE: 1" = 200′



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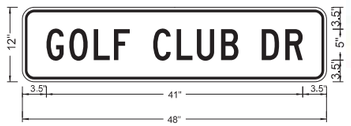

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PANEL STYLE: M4-12T
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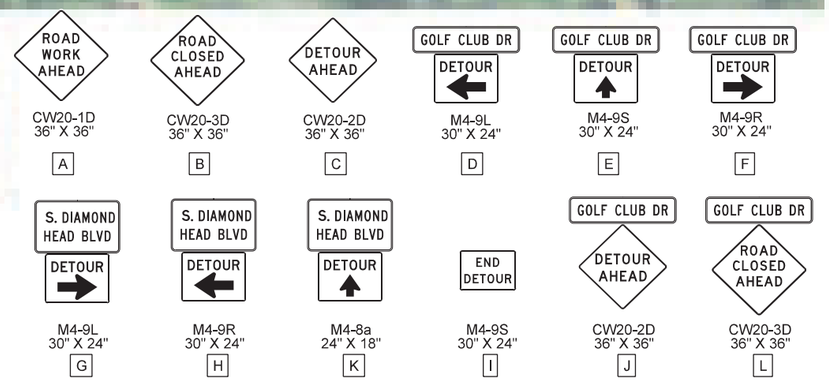
BORDER R=1.5" TH=0.438 IN=0.375"

SIGN DETAILS



STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

DETOUR LAYOUT PHASE 2

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		39
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		40

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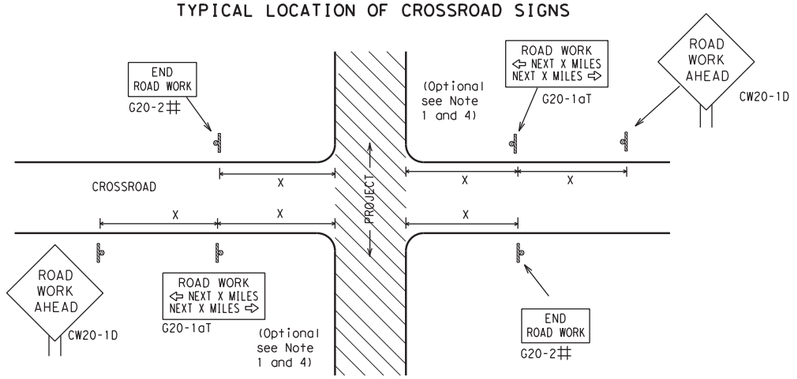
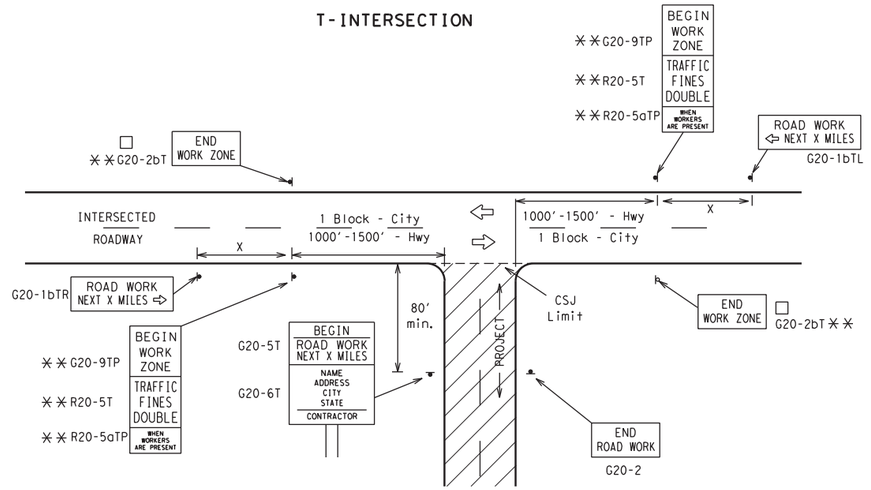
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

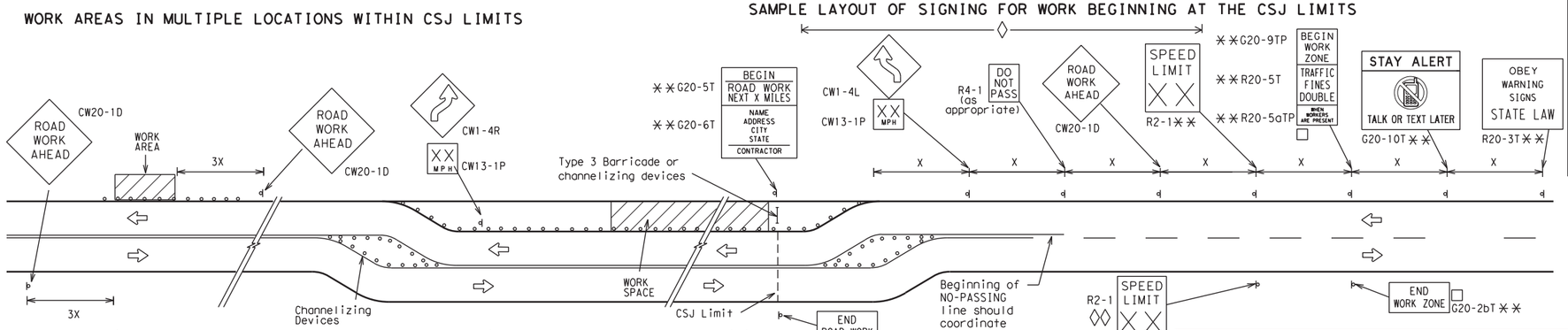
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

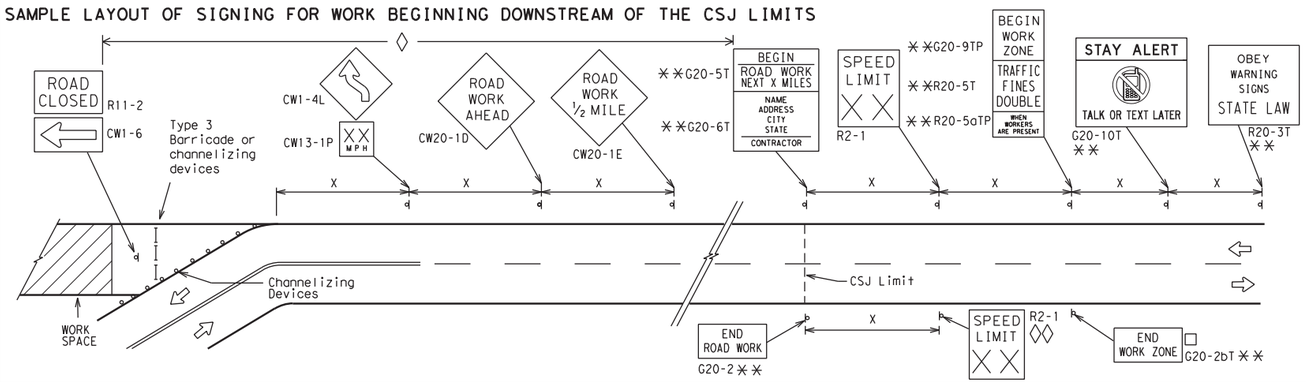
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

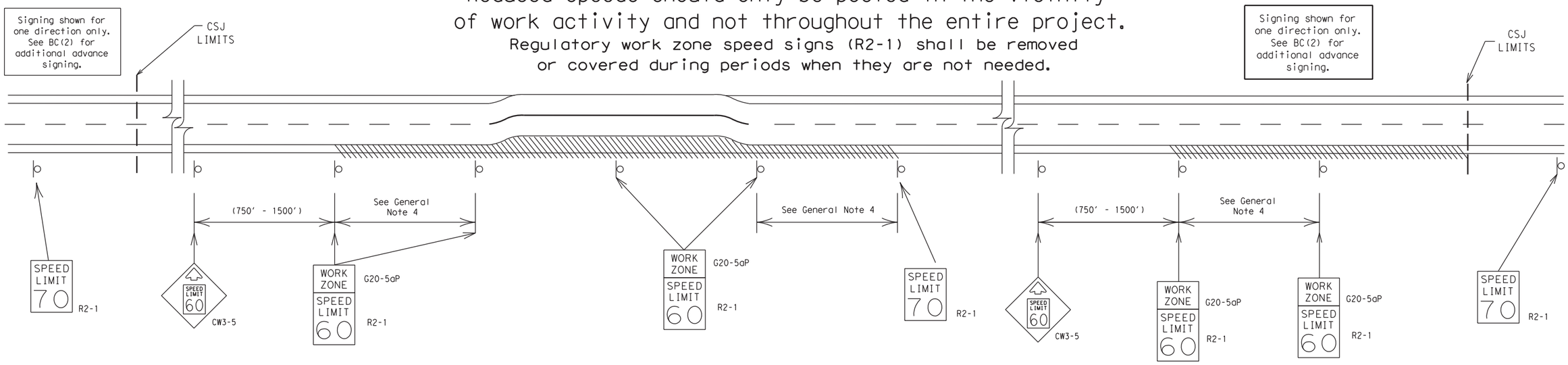
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		41

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.

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SHEET 3 OF 12

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	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		42

97

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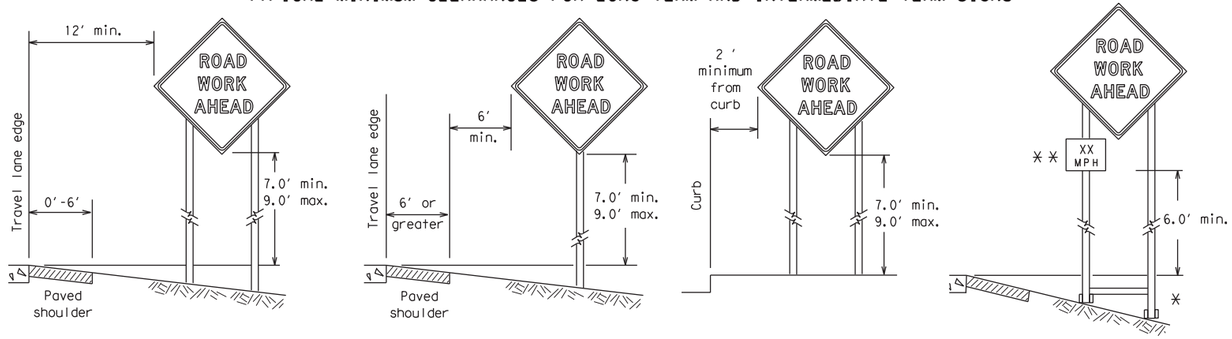
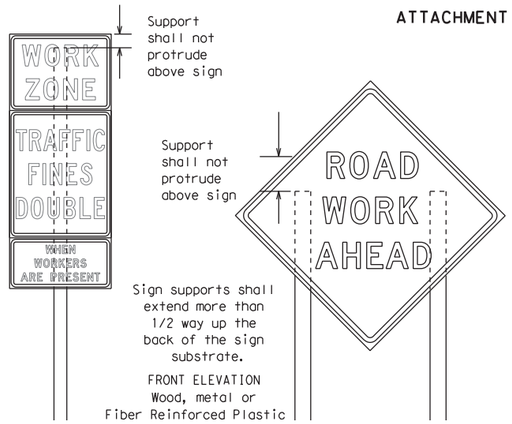
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



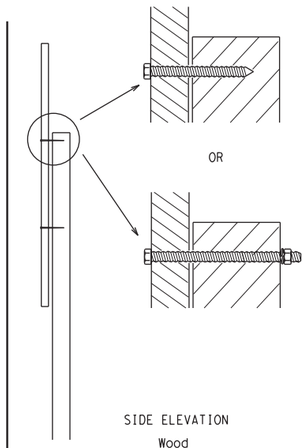
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

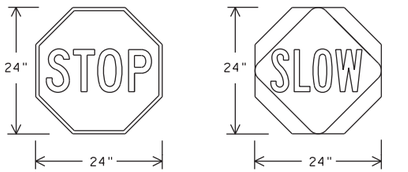
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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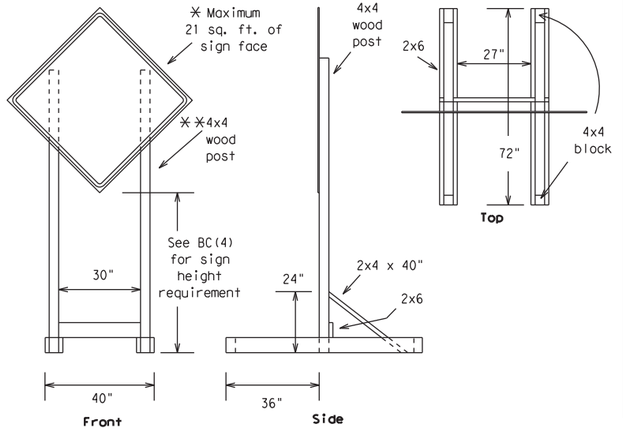
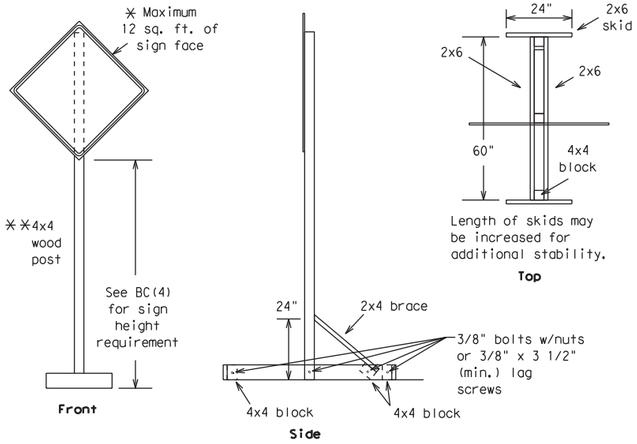
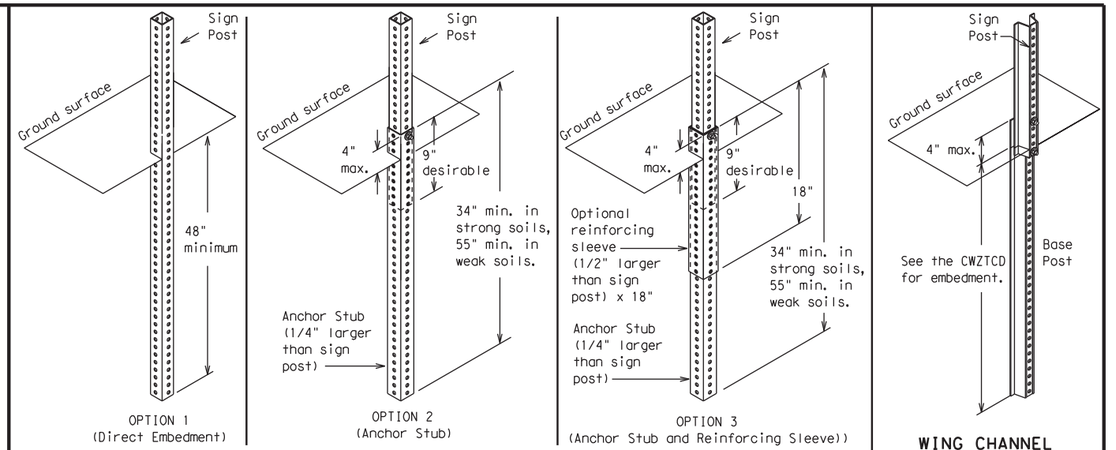
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		43





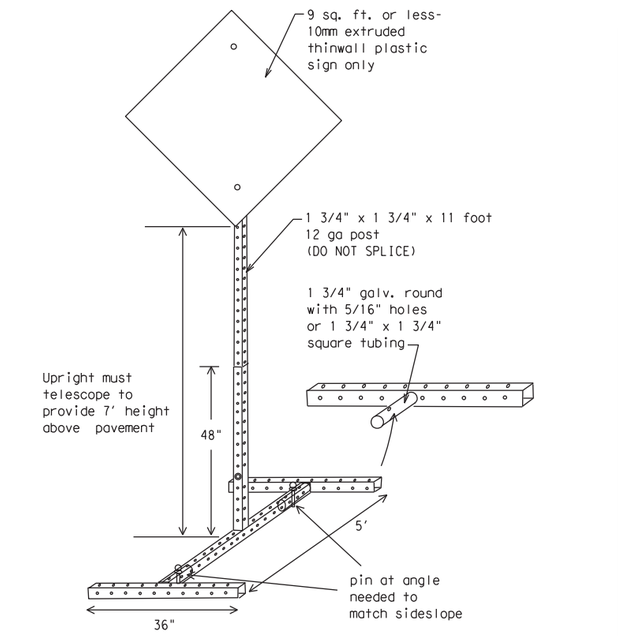
SKID MOUNTED WOOD SIGN SUPPORTS

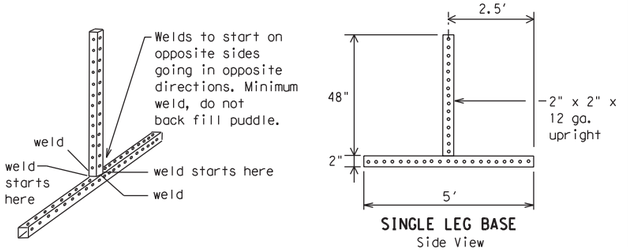
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

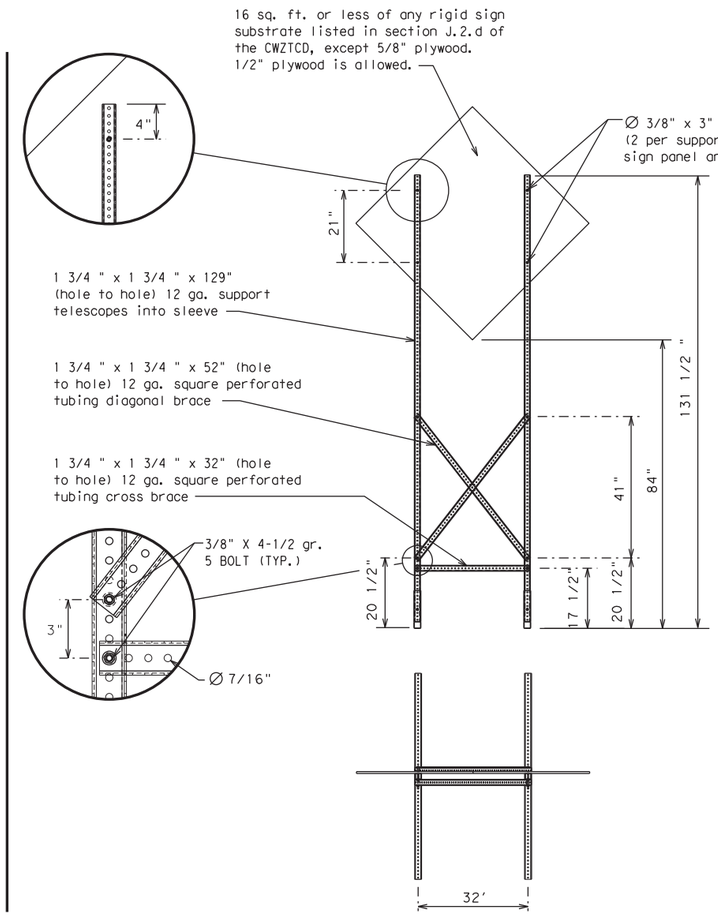


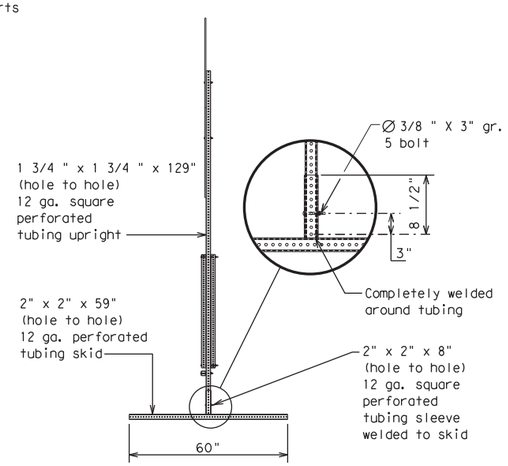
GROUND MOUNTED SIGN SUPPORTS

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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		44

DATE: 11/30/2022 11:24:49 AM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		45

DATE: 11/30/2022 11:24:59 AM
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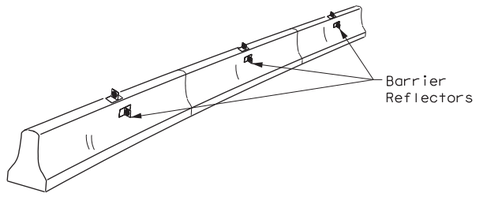
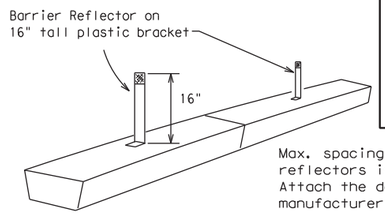
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

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

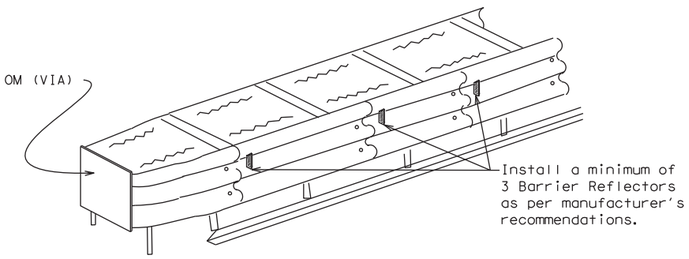


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

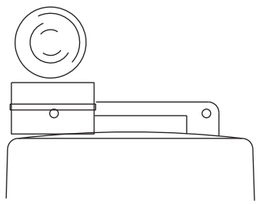


DELINEATION OF END TREATMENTS

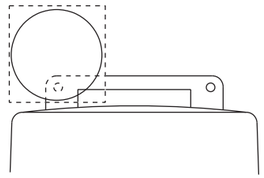
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

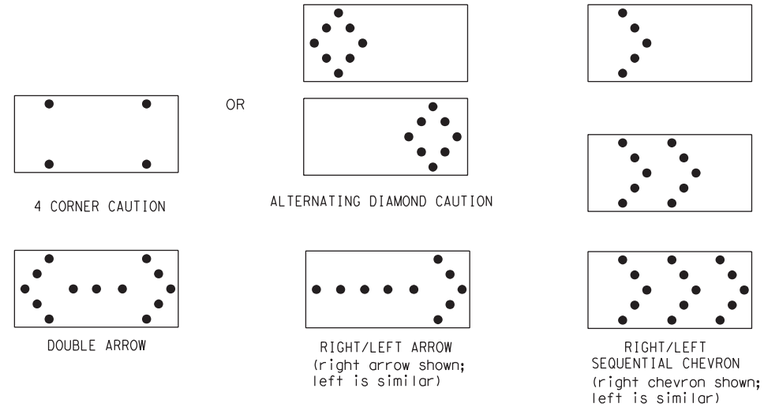
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	0912	72	406	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		46

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

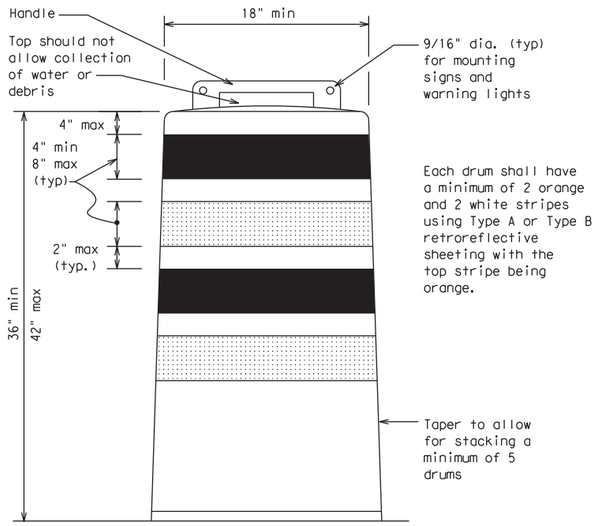
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

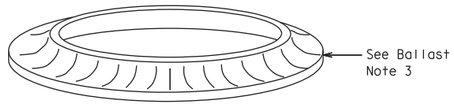
RETROREFLECTIVE SHEETING

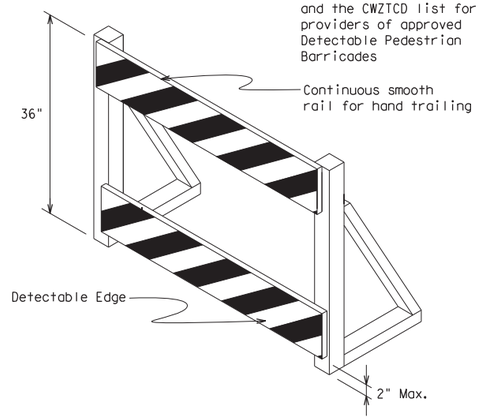
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

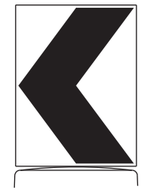




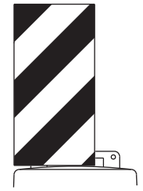


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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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
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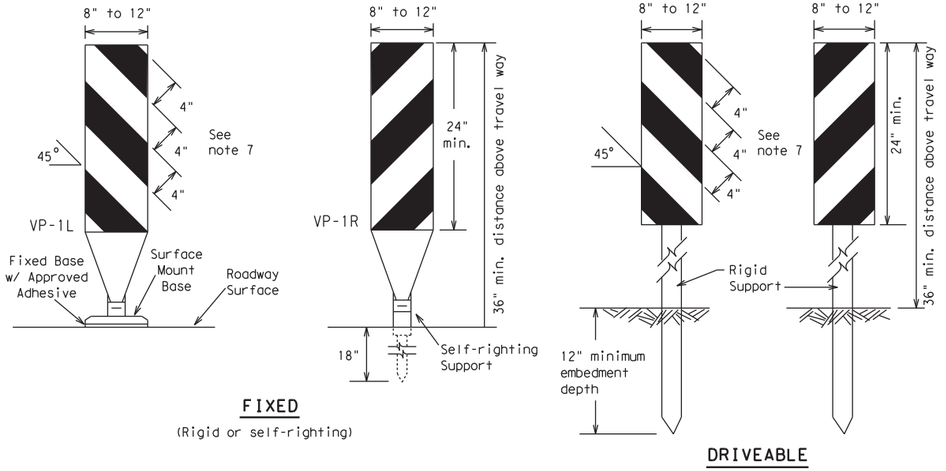
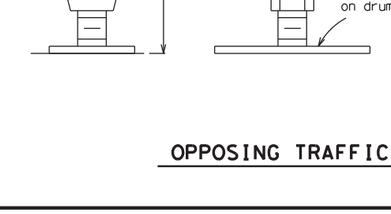
9-07 5-21	HOU	HARRIS		47
7-13				



FIXED

(Rigid or self-righting)

DRIVEABLE

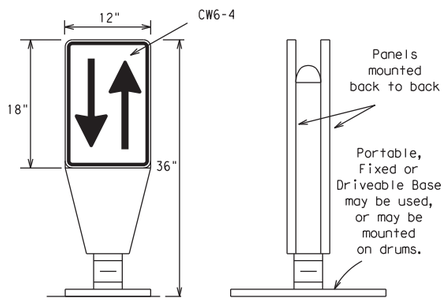


(Rigid or self-righting)

PORTABLE

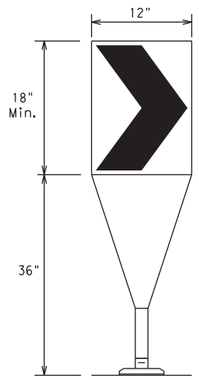
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



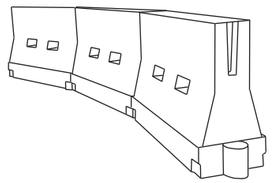
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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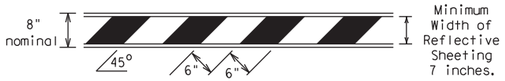
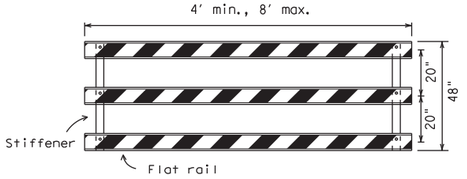
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



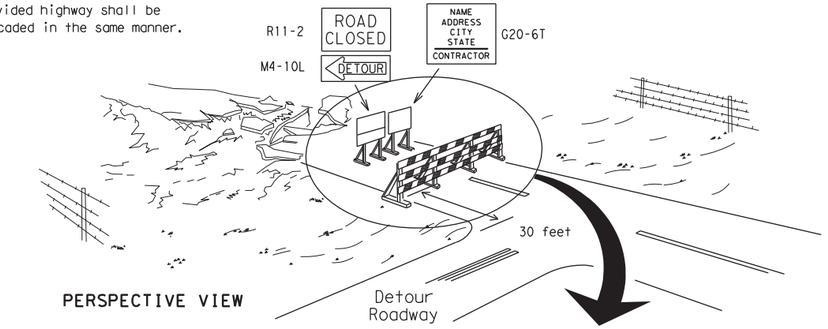
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

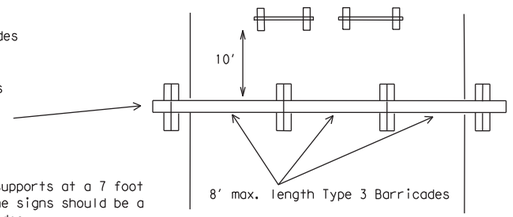
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

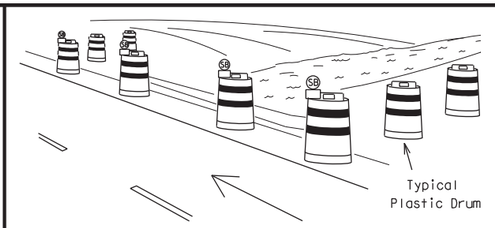
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

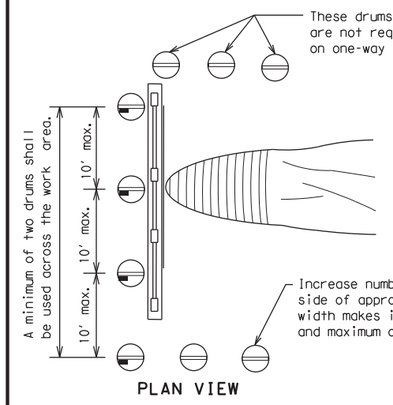
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

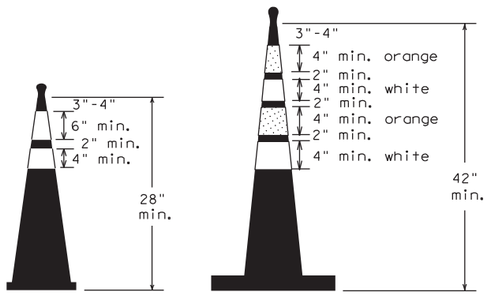
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



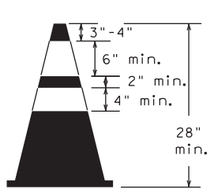
PLAN VIEW

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

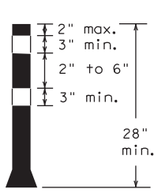
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

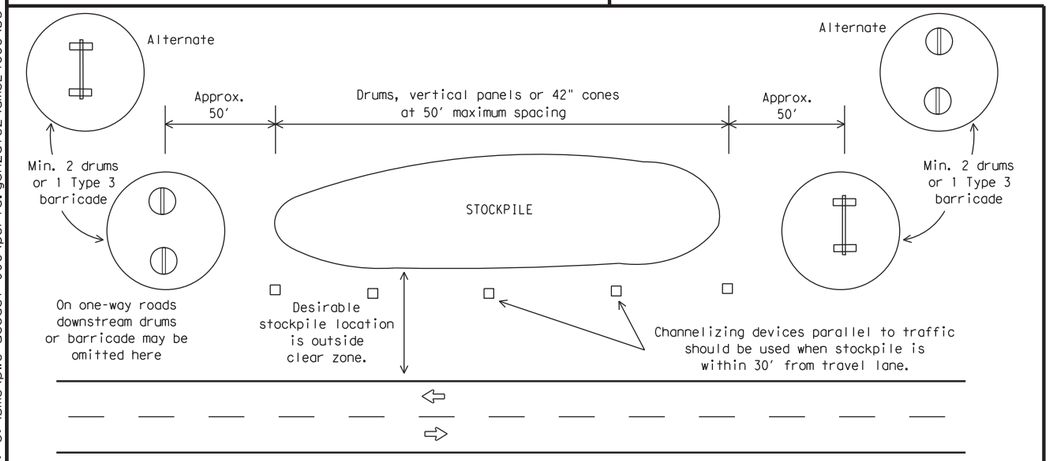


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

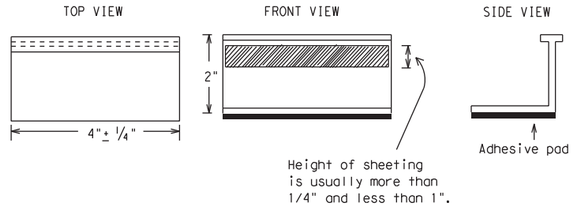
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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11-02 8-14				

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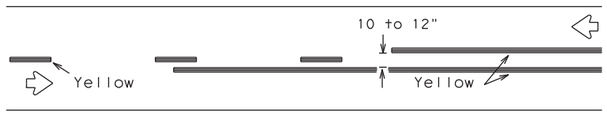
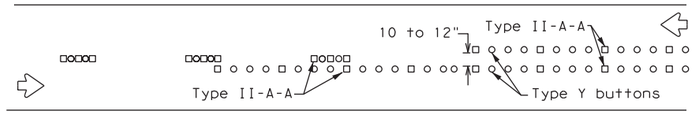
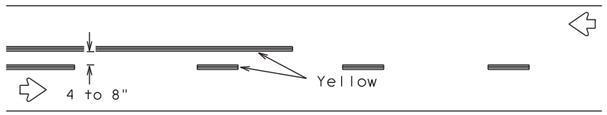
PAVEMENT MARKING PATTERNS



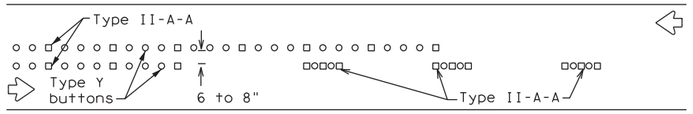
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



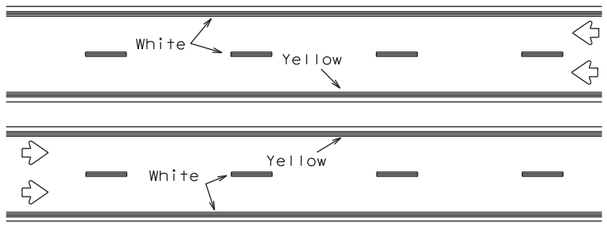
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



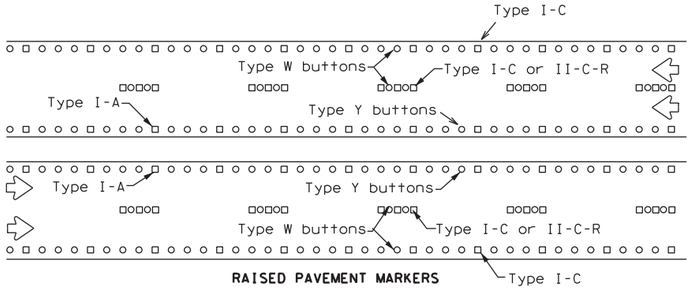
RAISED PAVEMENT MARKERS - PATTERN B

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

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



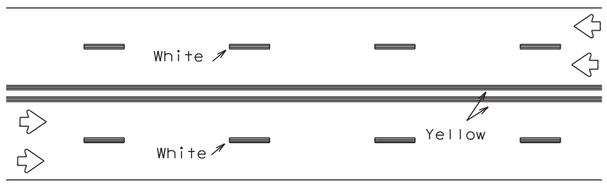
REFLECTORIZED PAVEMENT MARKINGS



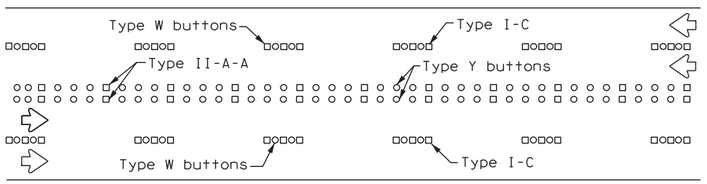
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



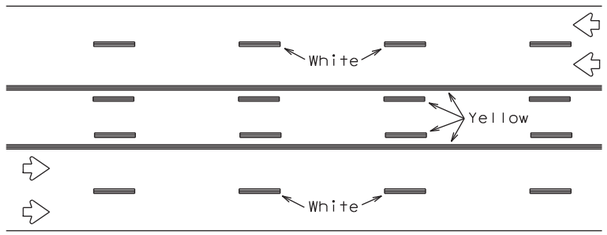
REFLECTORIZED PAVEMENT MARKINGS



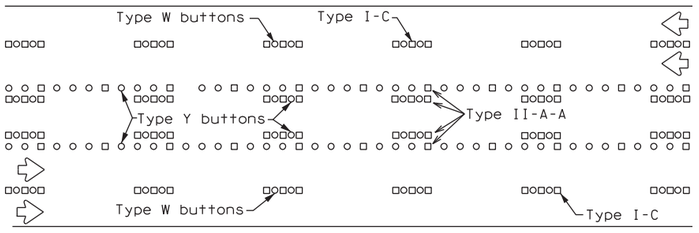
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

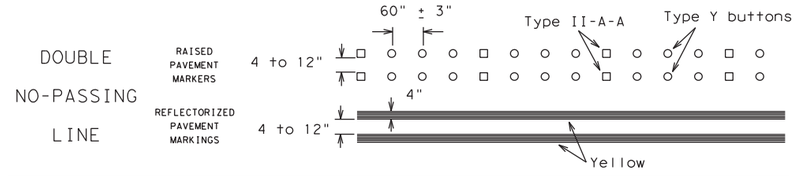
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

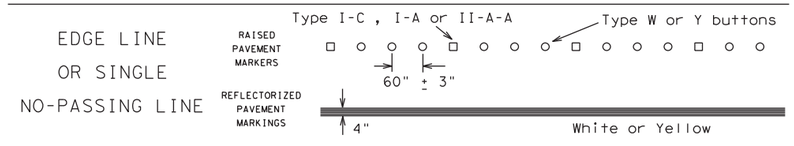
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

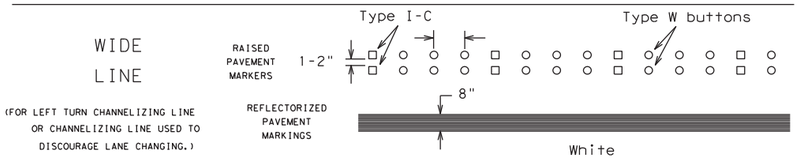


EDGE LINE OR SINGLE NO-PASSING LINE



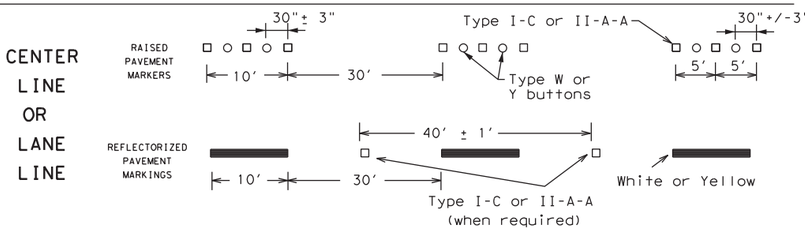
WIDE LINE

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

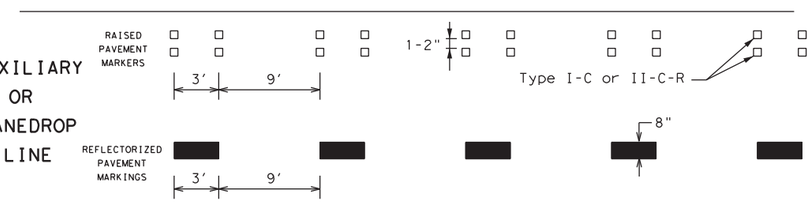


BROKEN LINES

CENTER LINE OR LANE LINE

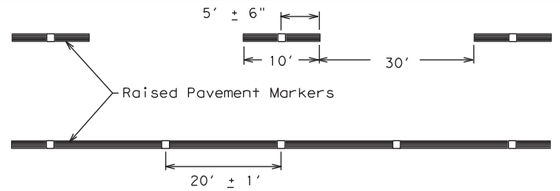


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		51

106

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DATE: 11/30/2022 11:26:08 AM
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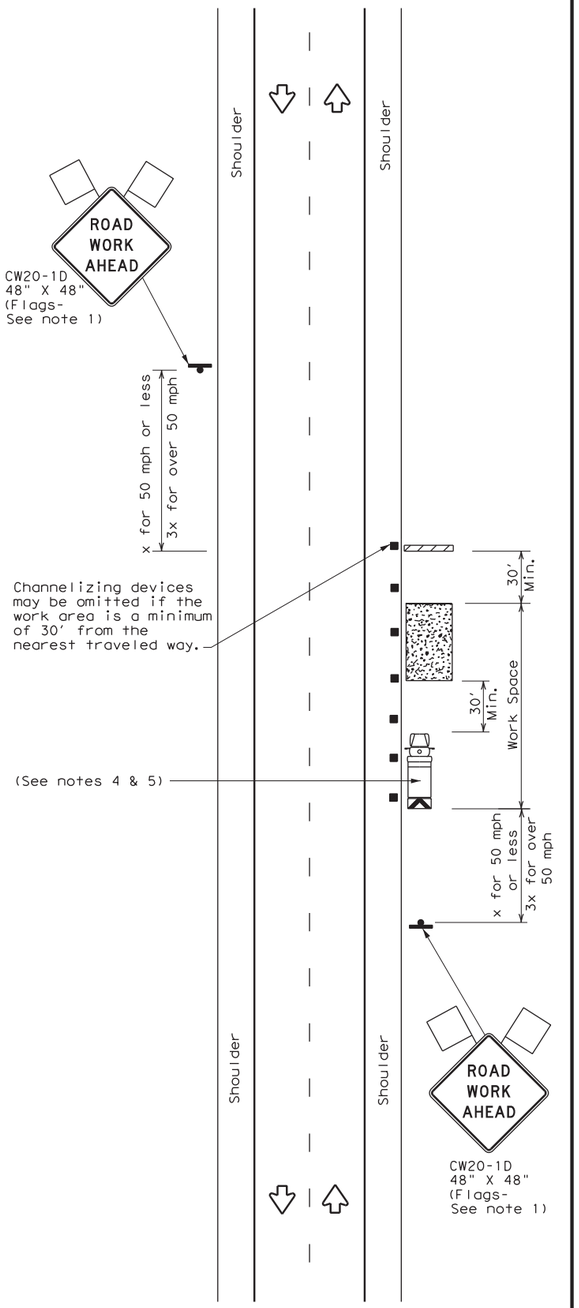
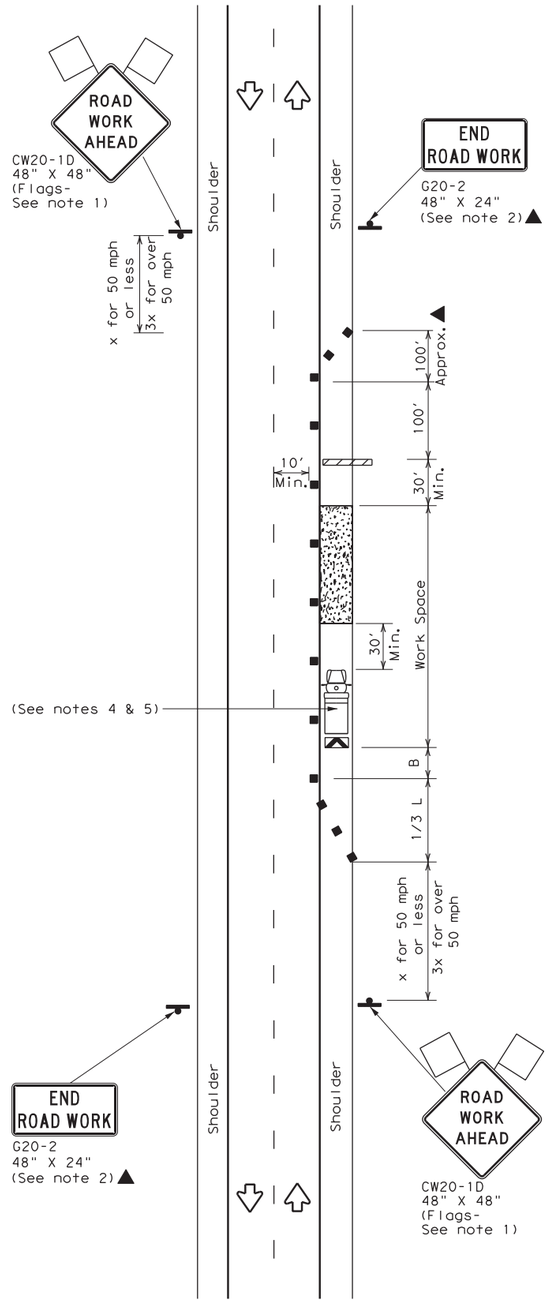


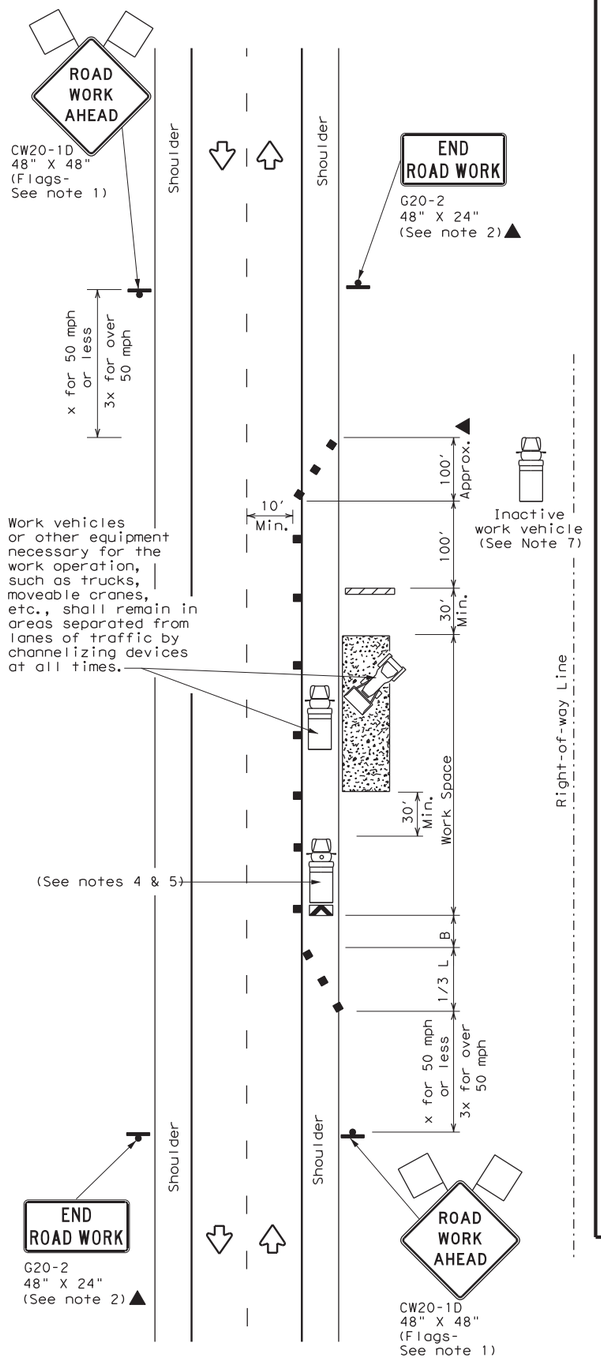
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	HOU	HARRIS		52
1-97 2-18				

161

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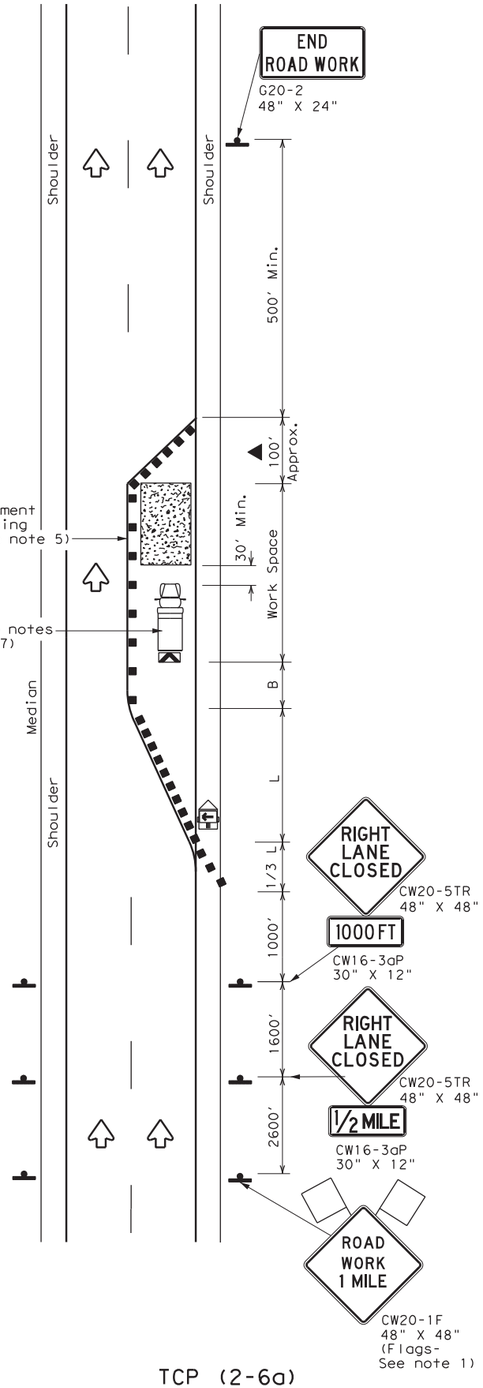
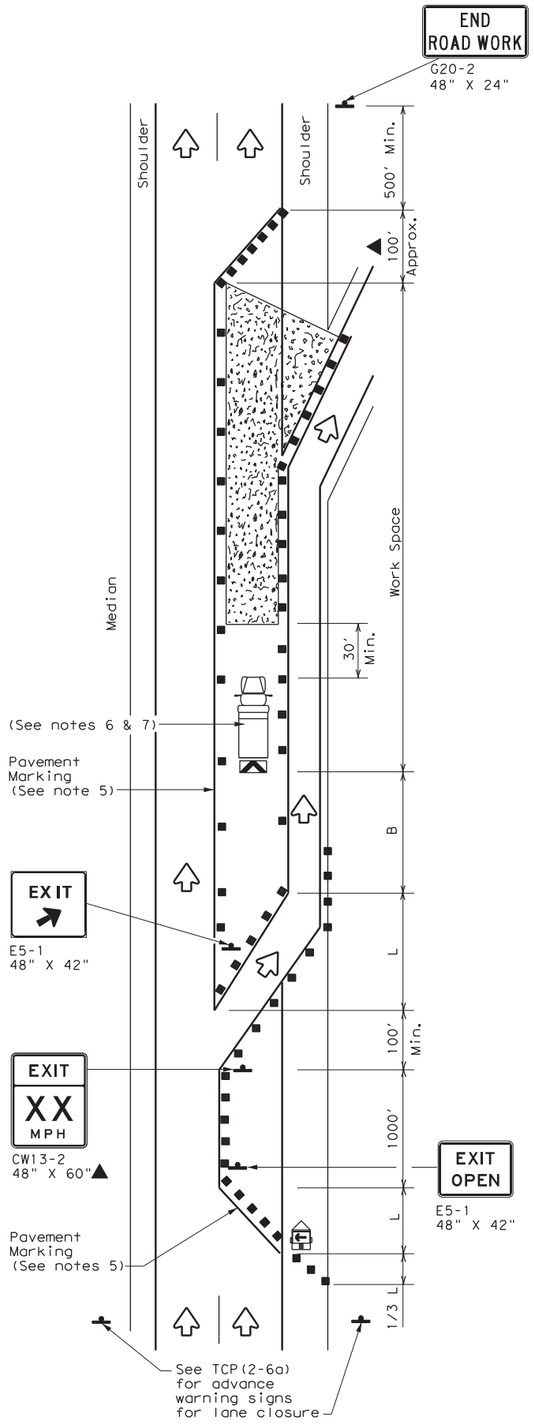


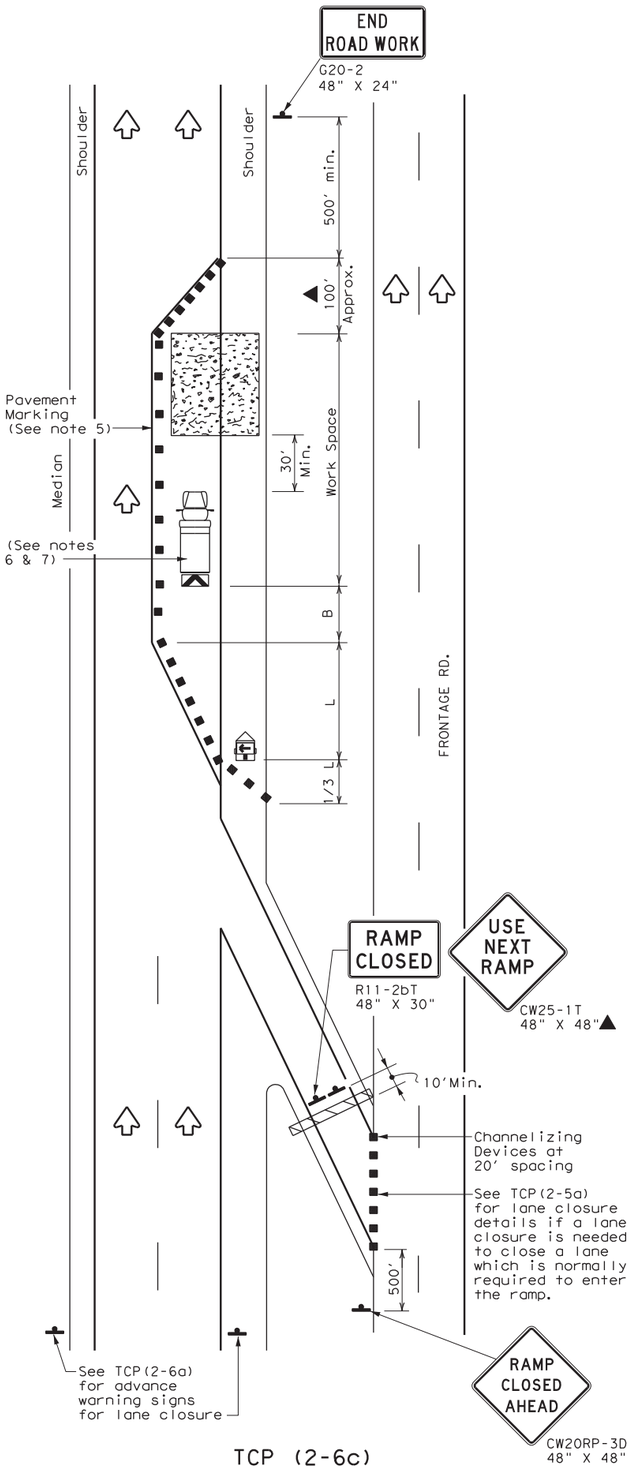
TCP (2-6a)

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	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		53

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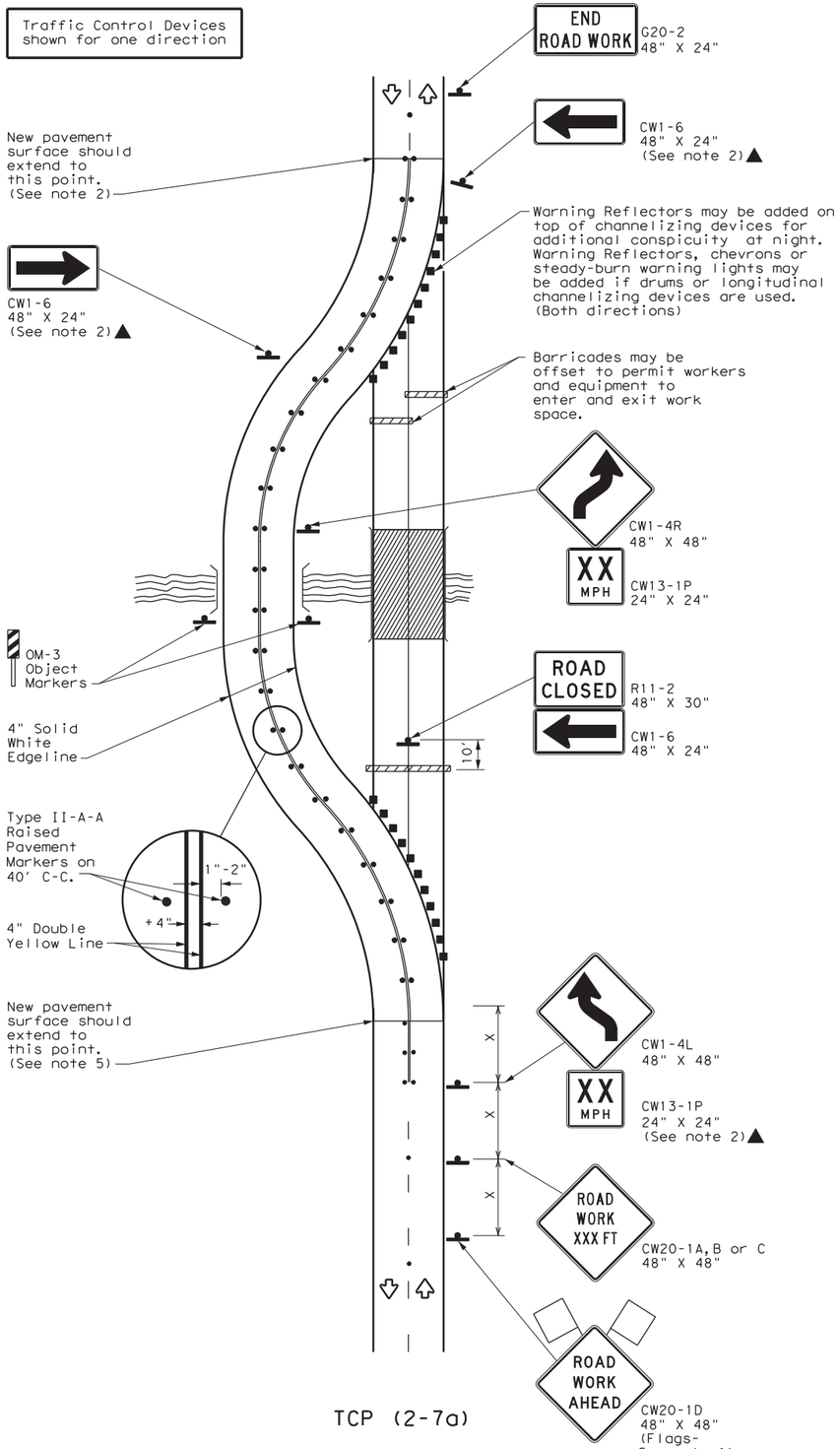
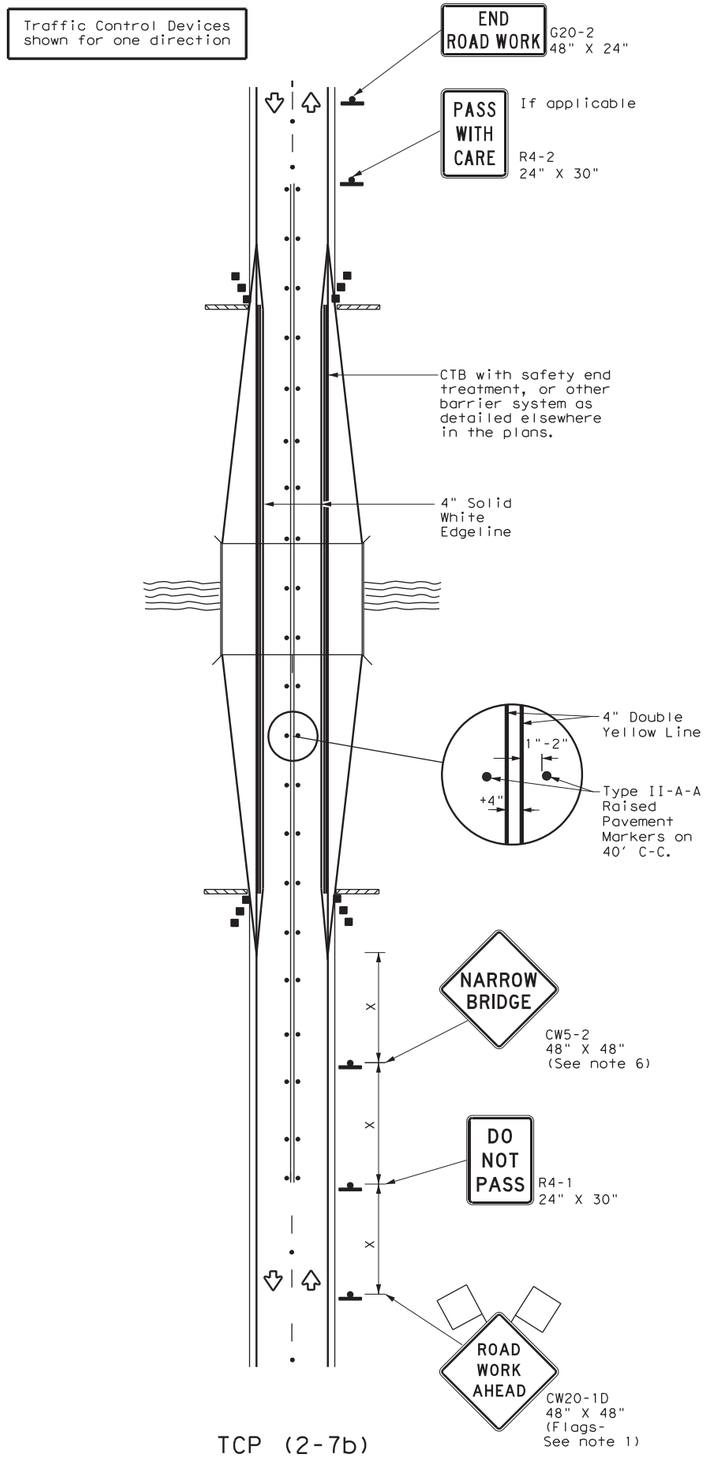


TCP (2-7a)

ROADWAY DIVERSION



TCP (2-7b)

BRIDGE WIDENING

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	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.

TCP (2-7a)

3. Raised pavement markers shall be placed 40 feet c-c on centerline throughout project.
4. Roadway diversion design requirements should be based on posted speed limit or prevailing speed.
5. New pavement surface should be extended across existing roadway edge to a point where existing pavement markings left in place during project do not conflict with construction area pavement marking.

TCP (2-7b)

6. The CW5-2 "Narrow Bridge" sign may be omitted if lane and shoulder widths are maintained.

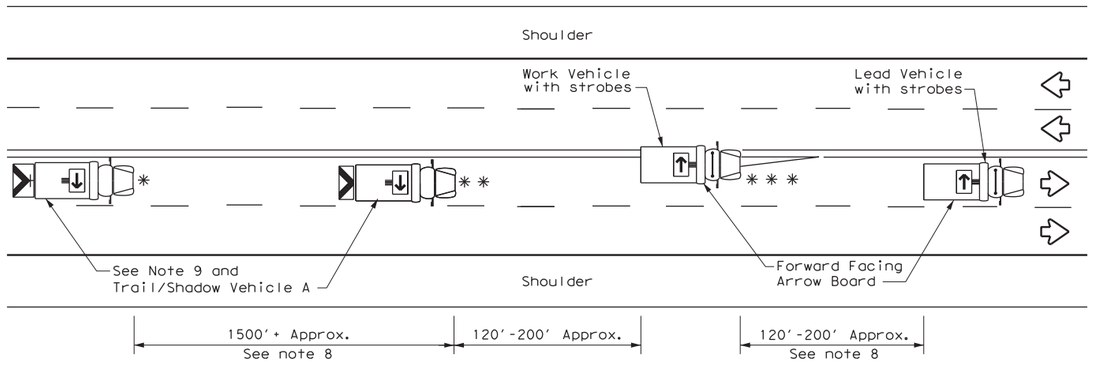
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN DIVERSIONS AND NARROW BRIDGES

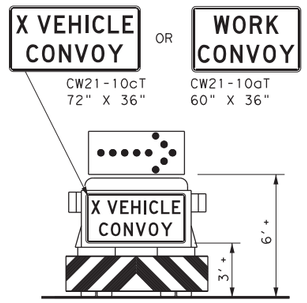
TCP(2-7)-18

FILE: tcp2-7-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		54



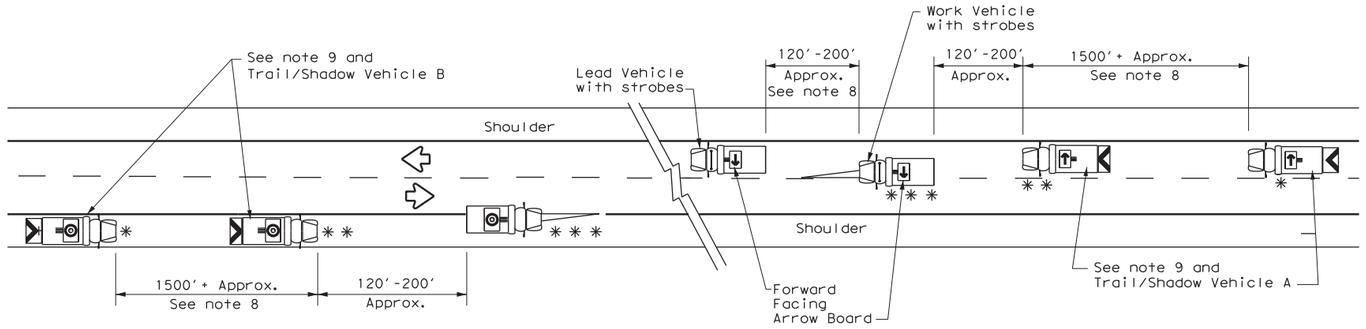
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

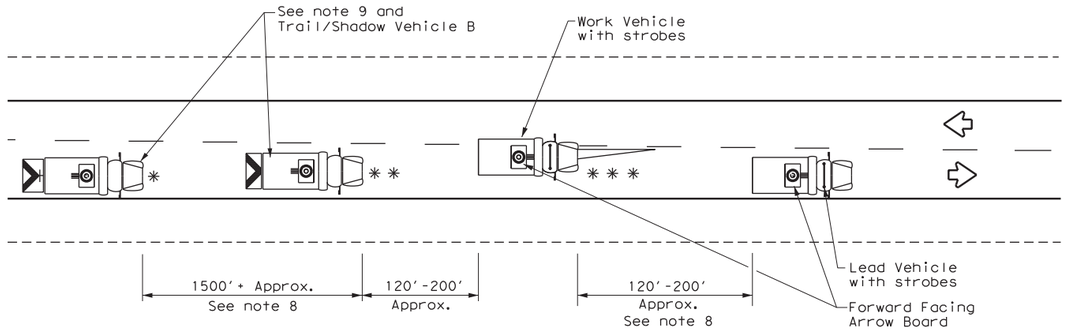


WORK ON SHOULDER

WORK ON TRAVEL LANE

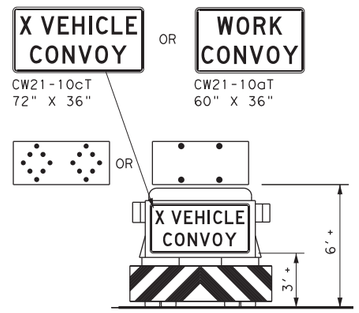
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

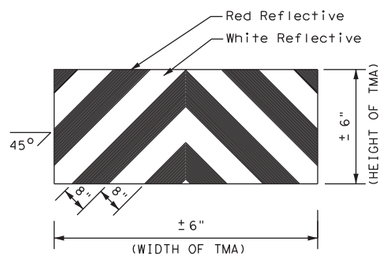
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0912	72	406	CS
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	HOU	HARRIS		55

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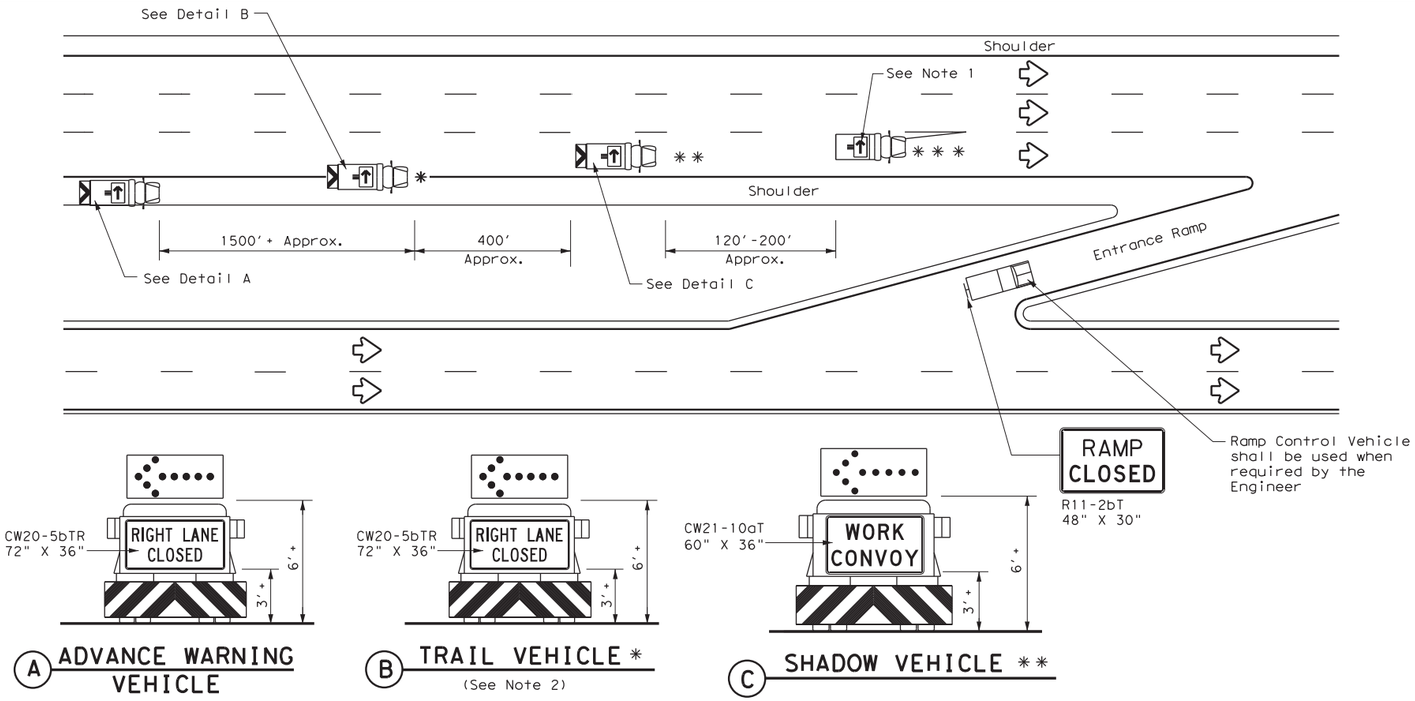
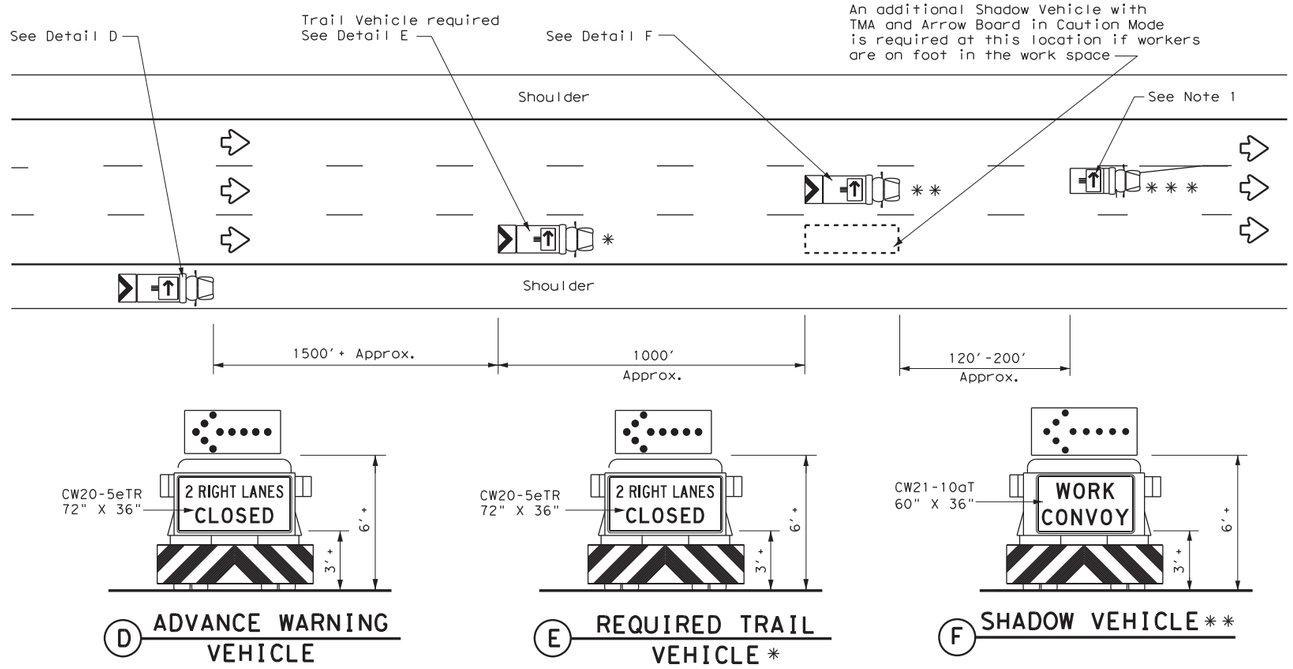


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



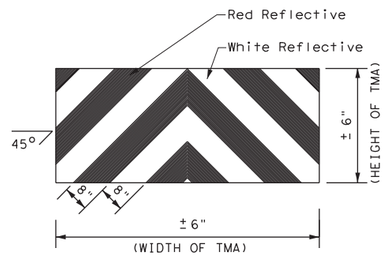
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. 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.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
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 may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		56

176

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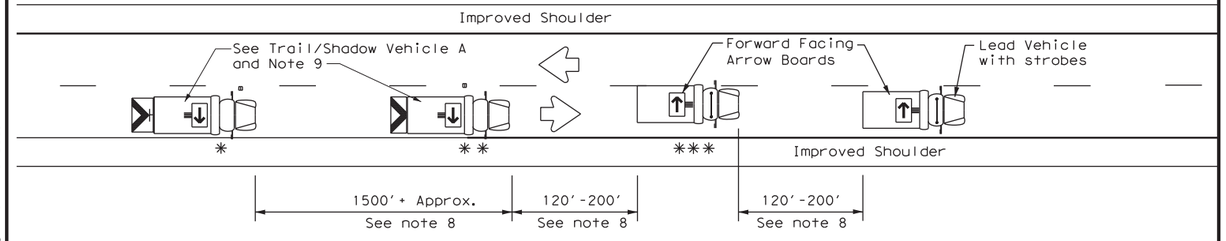
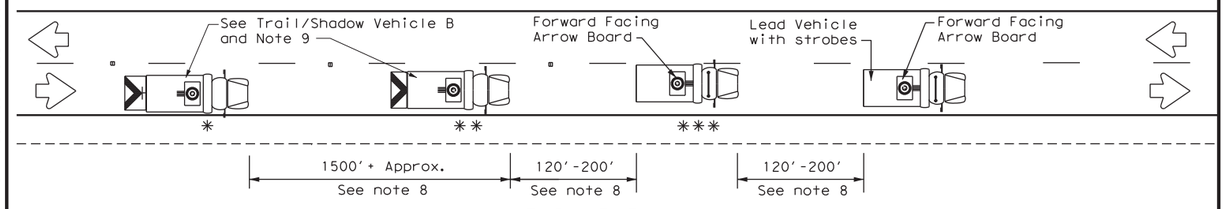


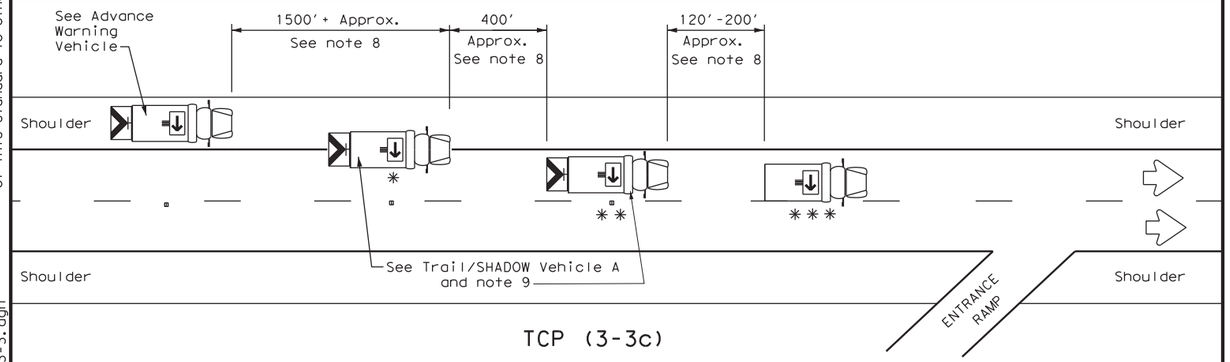
TCP (3-3a)

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



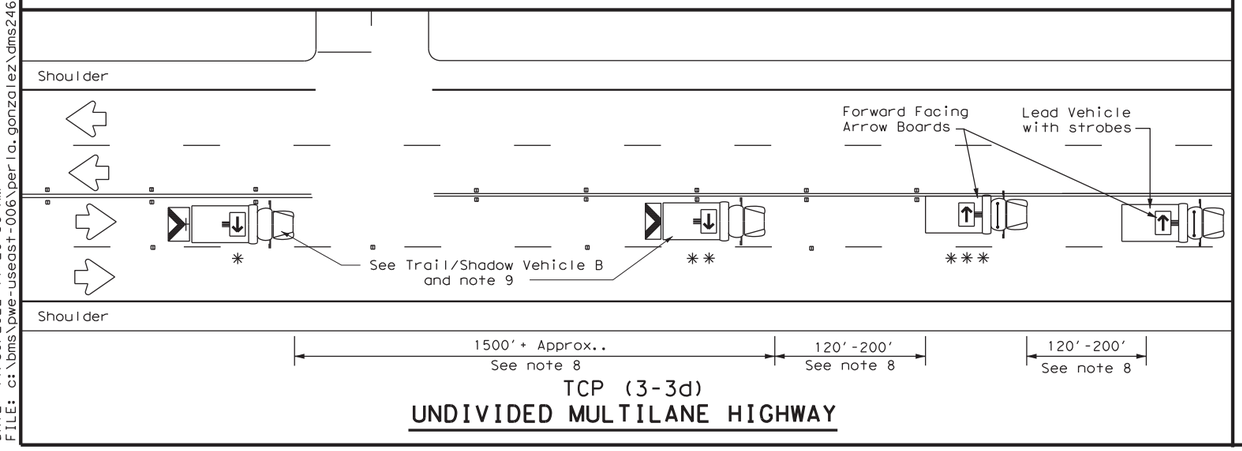
TCP (3-3b)

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



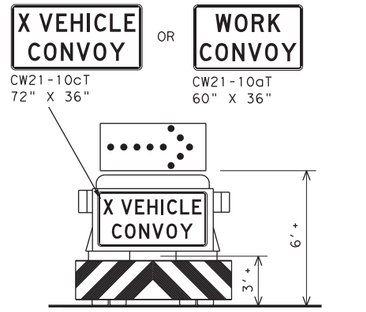
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



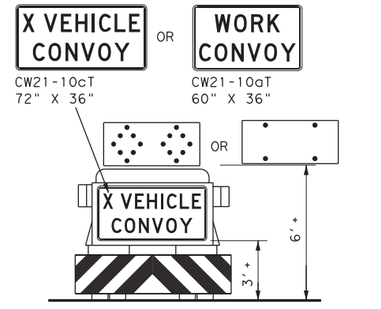
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



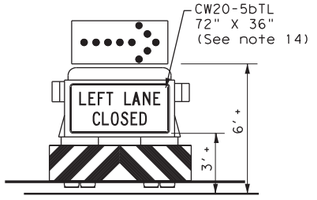
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

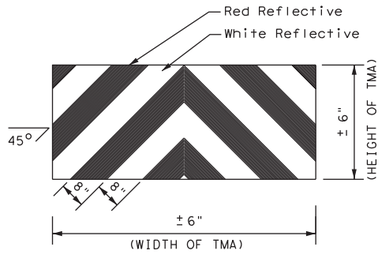


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	HOU	HARRIS		57
1-97 7-14				

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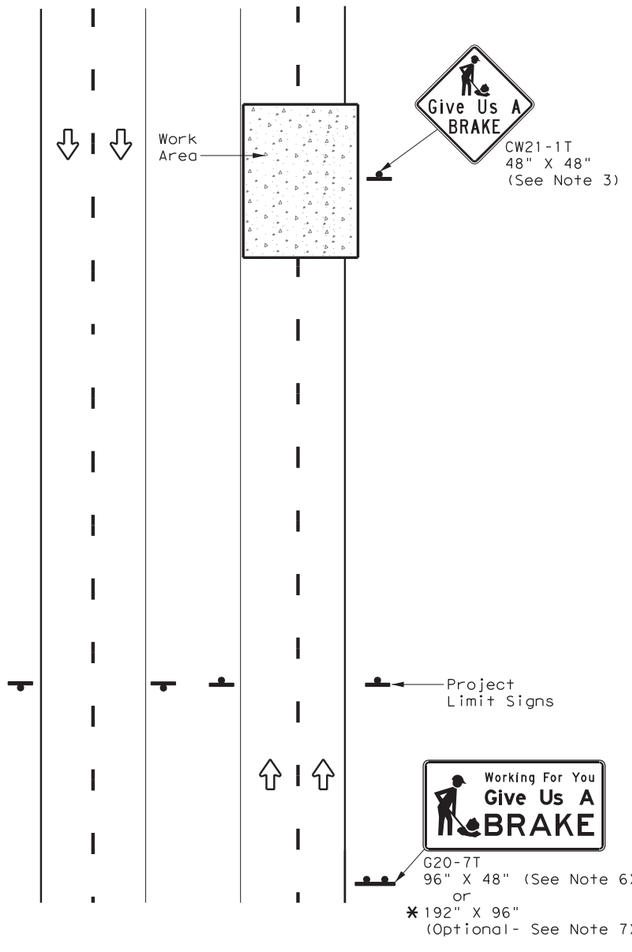
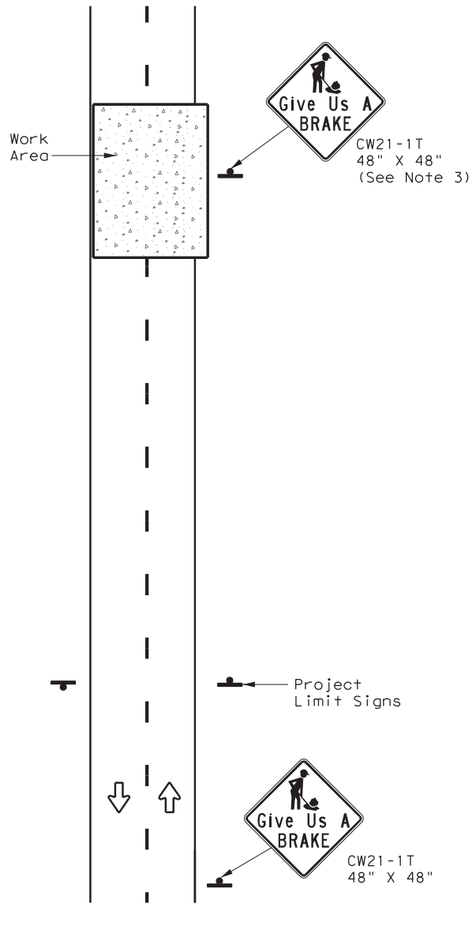


DIVIDED HIGHWAY



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	0912	72	406	CS
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	HOU	HARRIS		58

116

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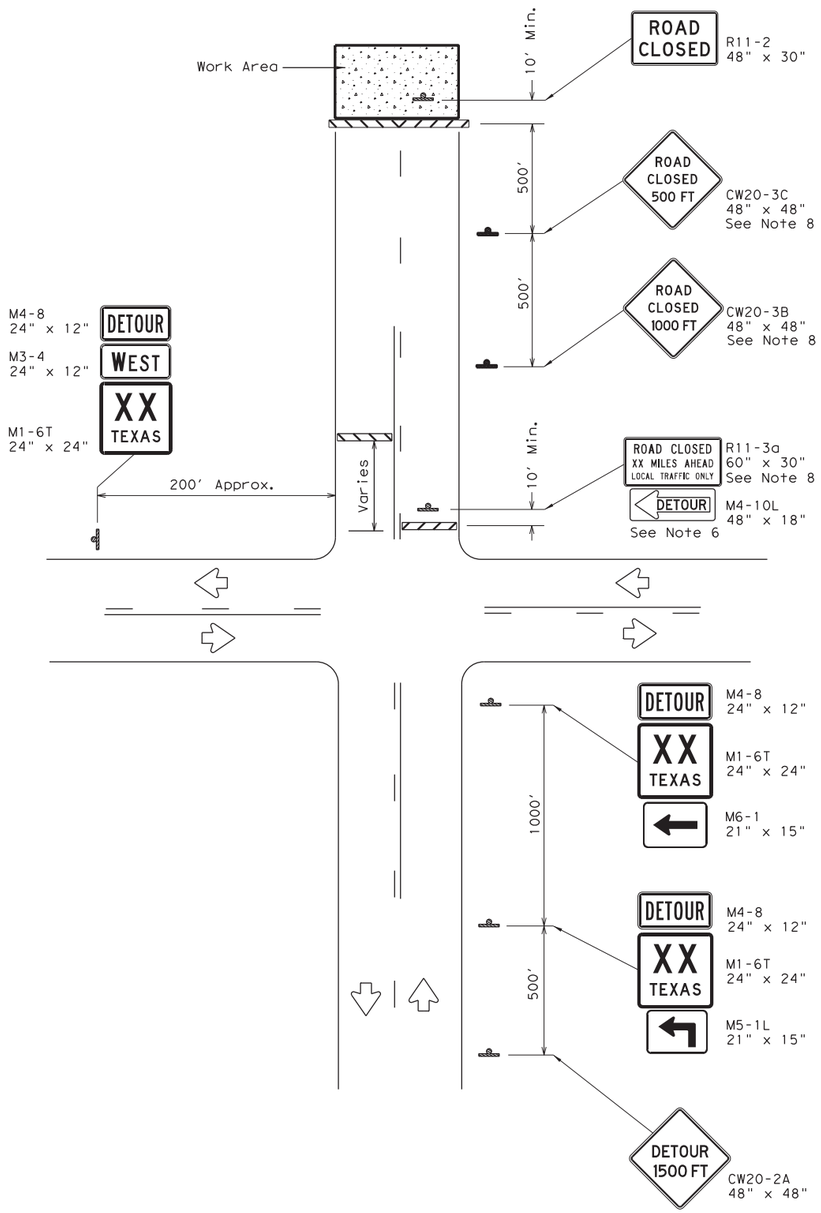
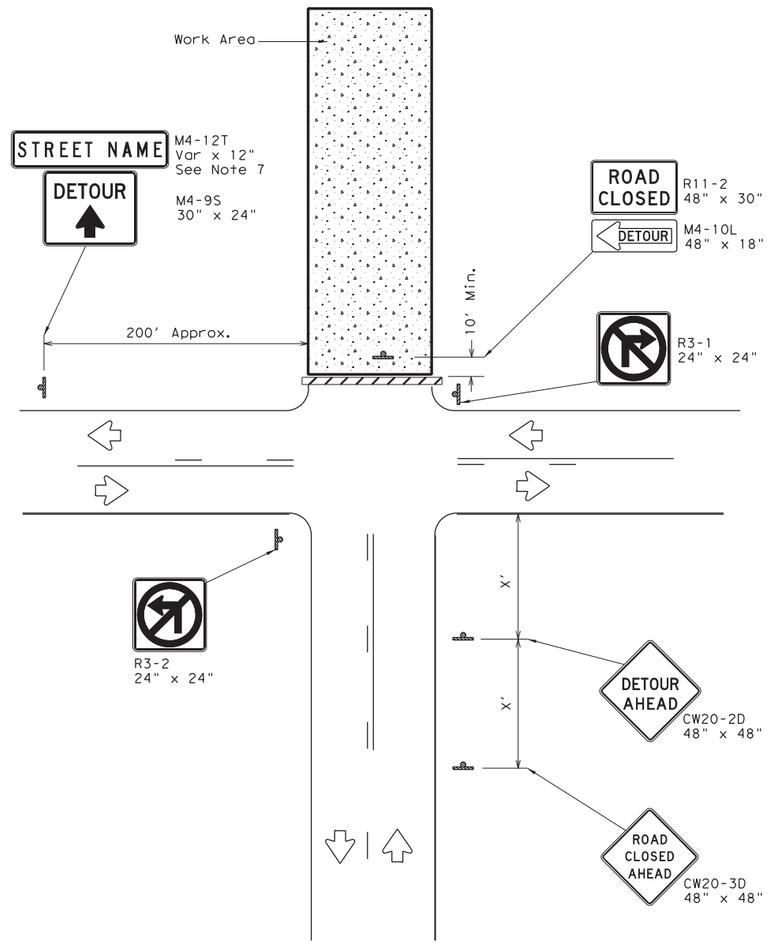


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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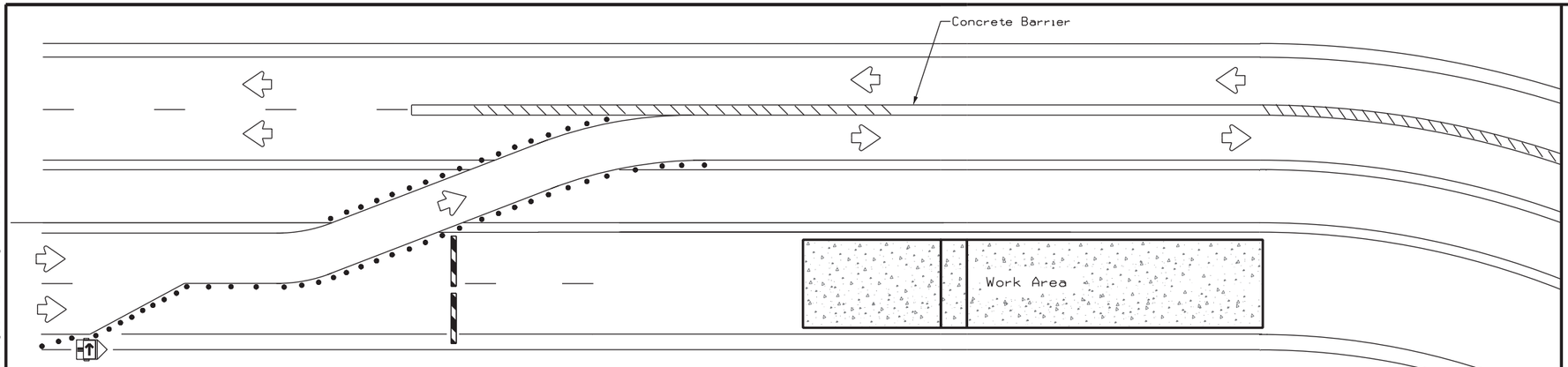
1-97 4-98 7-13 2-98 3-03	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		59



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

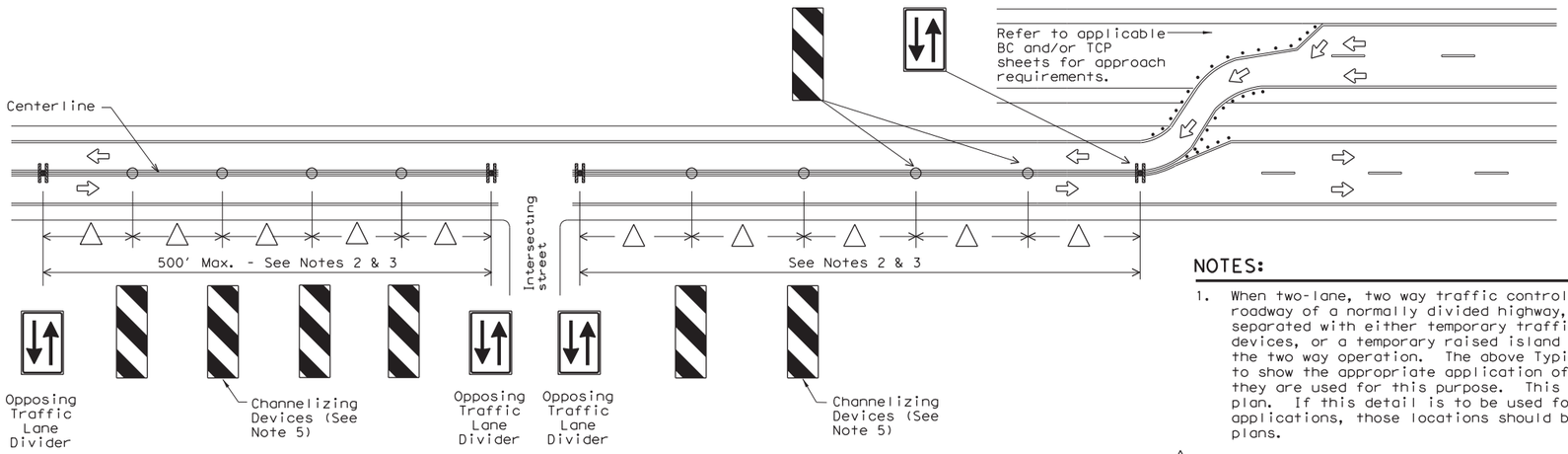
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

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/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.
2. △ Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		60

110

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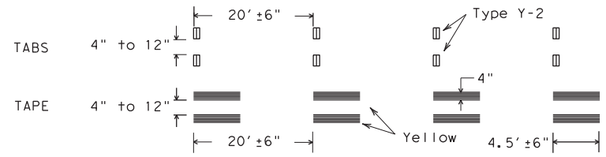
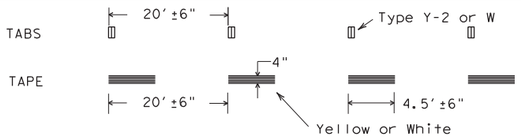
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

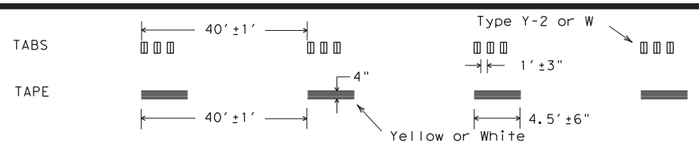


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



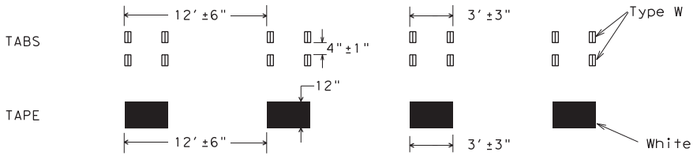
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

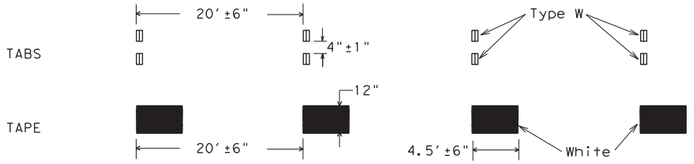


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



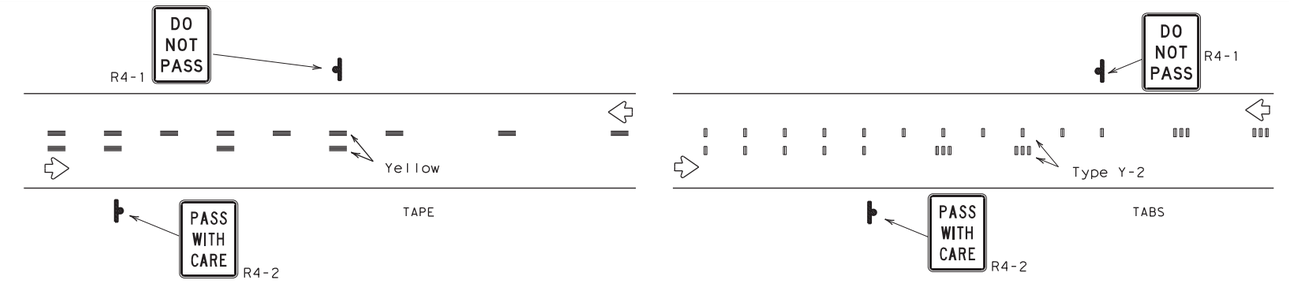
NOTES:

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

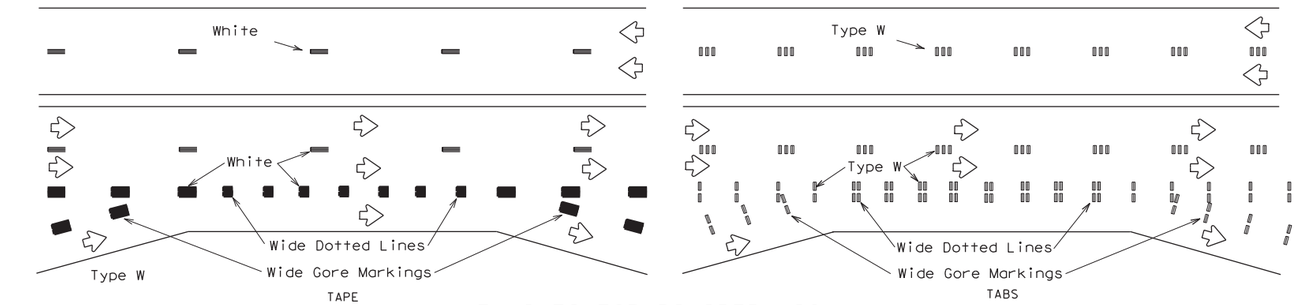
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

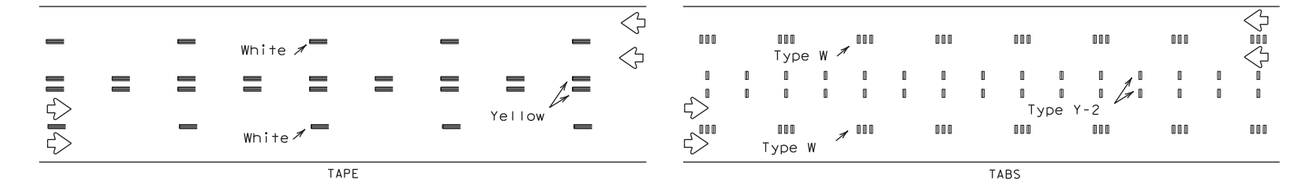
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



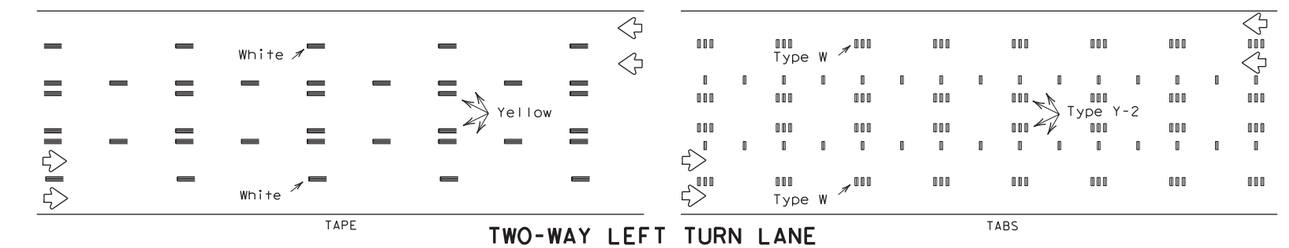
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



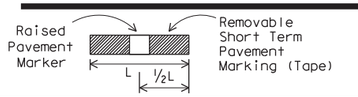
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

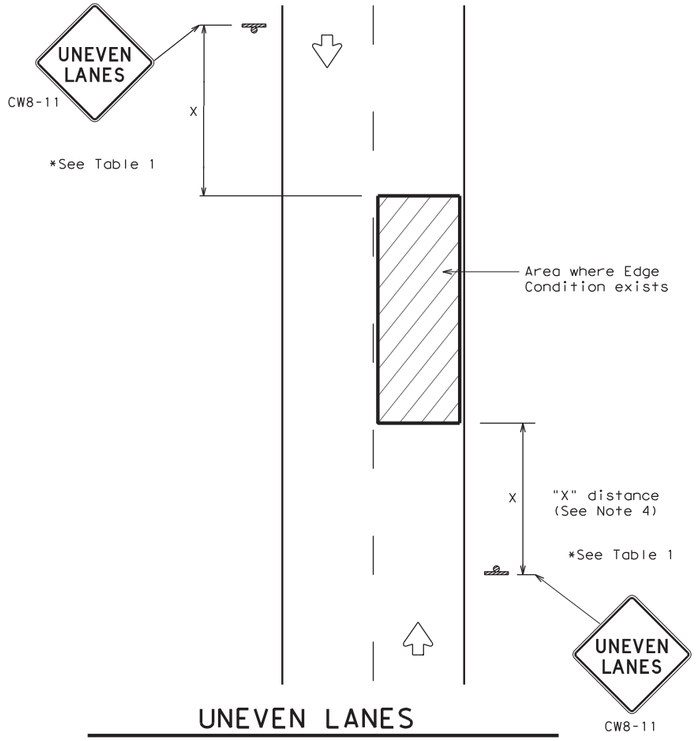
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

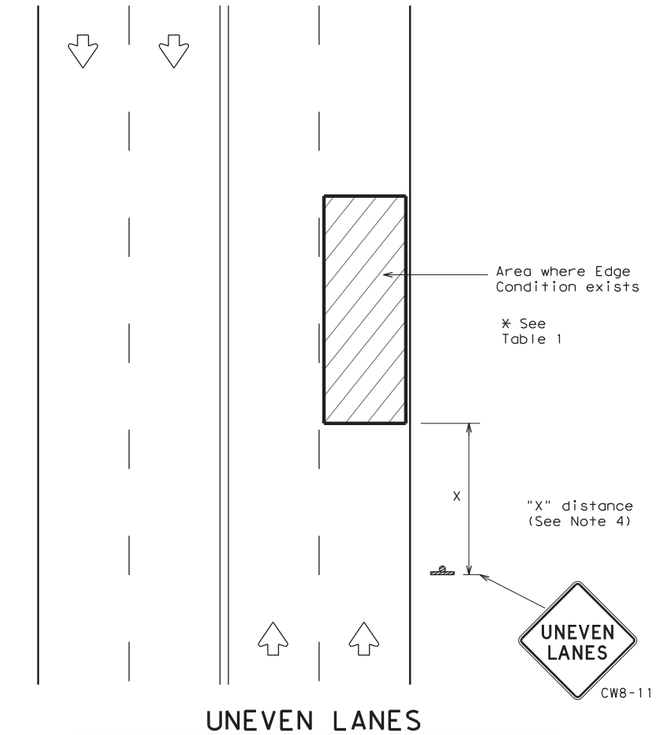
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0912	72	406	CS
1-97		DIST	COUNTY		SHEET NO.
3-03		HOU	HARRIS		61
7-13					

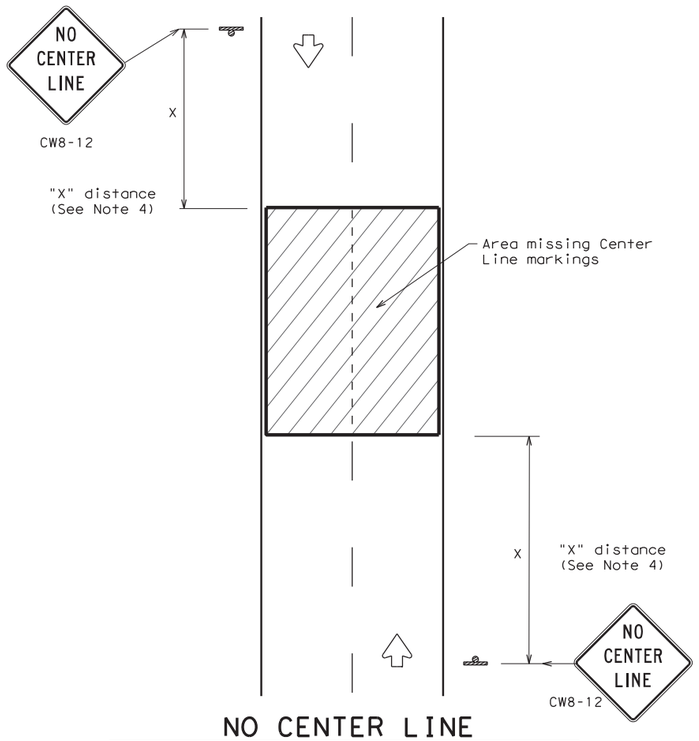
111



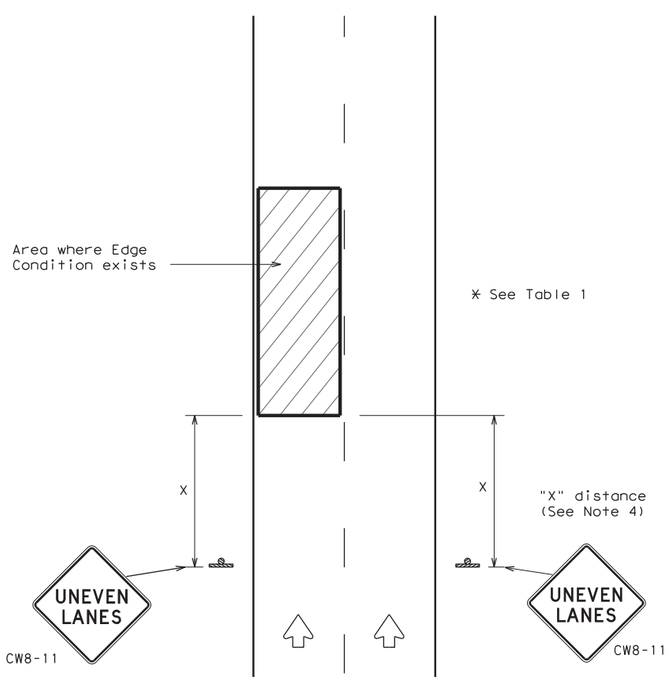
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

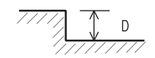
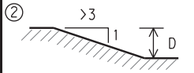
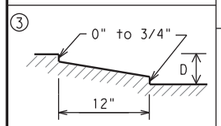
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	HOU	HARRIS		62

112

DATE: 11/30/2022 11:27:47 AM
FILE: c:\bms\pwe-useast-006\perla.gonzalez\dms24688\wzul-13.dgn

C-1
PI STATION = 10+31.22
DELTA = 7° 02' 55.22" (RT)
DEGREE OF CURVE = 4° 05' 33.20"
TANGENT = 86.22
LENGTH = 172.23
RADIUS = 1,400.00
PC STATION = 9+45.00
PT STATION = 11+17.23

C-2
PI STATION = 14+12.41
DELTA = 6° 59' 24.54" (LT)
DEGREE OF CURVE = 4° 05' 33.20"
TANGENT = 85.51
LENGTH = 170.80
RADIUS = 1,400.00
PC STATION = 13+26.91
PT STATION = 14+97.71

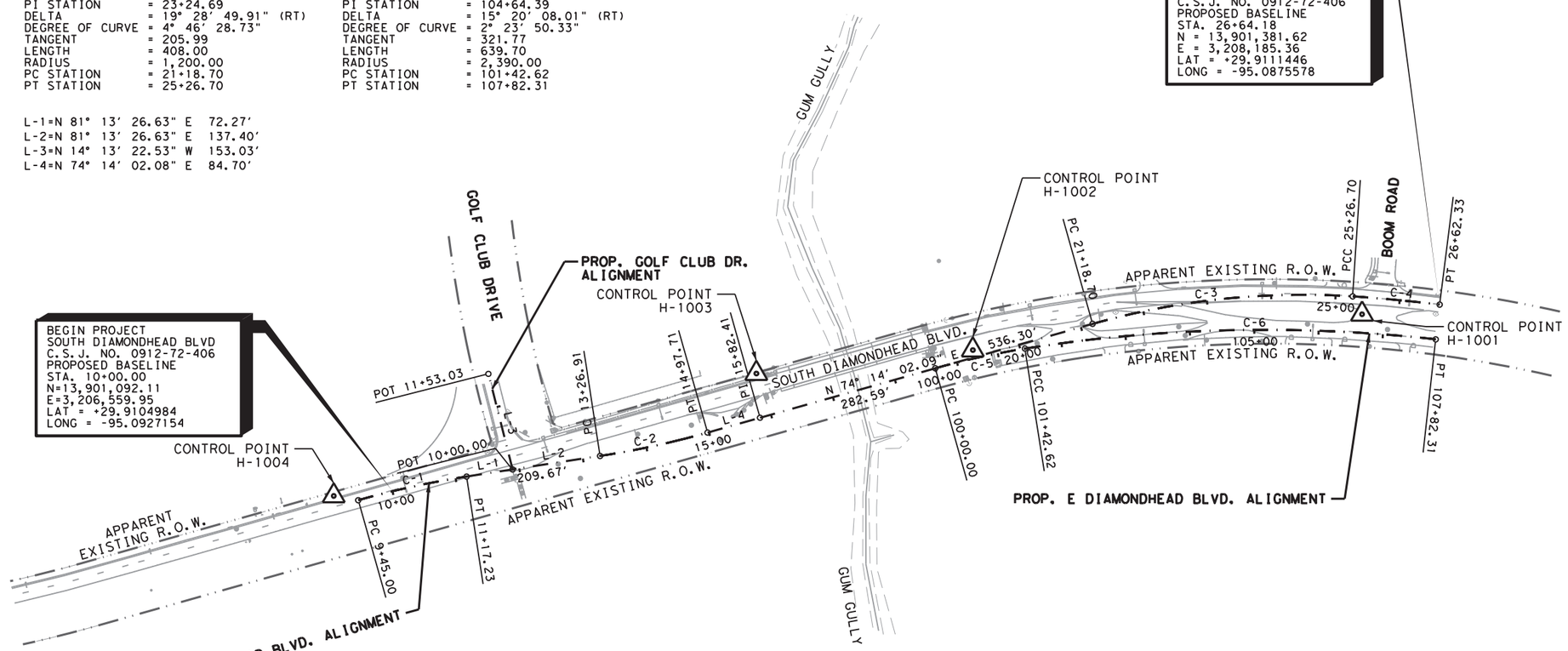
C-3
PI STATION = 23+24.69
DELTA = 19° 28' 49.91" (RT)
DEGREE OF CURVE = 4° 46' 28.73"
TANGENT = 205.99
LENGTH = 408.00
RADIUS = 1,200.00
PC STATION = 21+18.70
PT STATION = 25+26.70

C-4
PI STATION = 25+94.53
DELTA = 3° 25' 45.04" (RT)
DEGREE OF CURVE = 2° 31' 42.60"
TANGENT = 67.83
LENGTH = 135.62
RADIUS = 2,266.00
PC STATION = 25+26.70
PT STATION = 26+62.33

C-5
PI STATION = 100+71.39
DELTA = 6° 48' 33.91" (RT)
DEGREE OF CURVE = 4° 46' 28.73"
TANGENT = 71.39
LENGTH = 142.62
RADIUS = 1,200.00
PC STATION = 100+00.00
PT STATION = 101+42.62

C-6
PI STATION = 104+64.39
DELTA = 15° 20' 08.01" (RT)
DEGREE OF CURVE = 2° 23' 50.33"
TANGENT = 321.77
LENGTH = 639.70
RADIUS = 2,390.00
PC STATION = 101+42.62
PT STATION = 107+82.31

L-1=N 81° 13' 26.63" E 72.27'
L-2=N 81° 13' 26.63" E 137.40'
L-3=N 14° 13' 22.53" W 153.03'
L-4=N 74° 14' 02.08" E 84.70'



From	To	Direction	Distance
1004	1003	N 73° 51' 06" E	683.00'
1003	1002	N 83° 49' 36" E	337.99'
1002	1001	N 84° 44' 11" E	606.71'

DIAMONDHEAD ALIGNMENT

POINT	NORTH	EAST	ELEVATION	STATION	OFFSET	DESCRIPTION
H-1001	13,901,366.78	3,208,064.94	38.97'	25+43.23	26.60'	5/8" IRON ROD W/RED CAP STAMPED "CONTROL"
H-1002	13,901,311.12	3,207,460.78	35.06'	19+28.85	-11.31'	5/8" IRON ROD W/RED CAP STAMPED "CONTROL"
H-1003	13,901,274.78	3,207,124.76	32.98'	15+95.59	-67.64'	5/8" IRON ROD W/RED CAP STAMPED "CONTROL"
H-1004	13,901,084.82	3,206,468.70	36.32'	Off Chain	Off Chain'	5/8" IRON ROD W/RED CAP STAMPED "CONTROL"

200' 100' 0' 200'
SCALE: 1" = 200' (11 X 17)

NOTES:
1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS SOUTH CENTRAL ZONE (4204), NAD 83 (2011 ADJ.; EPOCH 2010.00) GEOID 12B, AND NAVD 88. ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.000130 (HARRIS COUNTY).
2. ALL HORIZONTAL VALUES WERE DERIVED FROM GPS (RTK) OBSERVATION.
3. ALL PRIMARY VERTICAL VALUES ARE NAVD88 UTILIZING GEOID 12B AND WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION 38.968' FROM CONTROL POINT H-1001.
4. ALL HORIZONTAL AND VERTICAL CONTROL FOR THIS PROJECT WAS VERIFIED BY GPS (RTK) OBSERVATION MEANS.
5. THE CONTROL POINTS SHOWN HEREIN WAS DETERMINED BY SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
6. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS REGISTERED JAMES A. WOODS 5333 PROFESSIONAL LAND SURVEYOR

SIGNED: James A. Woods
JAMES A. WOODS
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 5333

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

CivilCorp ENGINEERS • SURVEYORS
801 LIPAN STREET, CORPUS CHRISTI, TEXAS 78401
TEL: (361)371-5380 TBPLS #10194156 TBPE #10283

Texas Department of Transportation

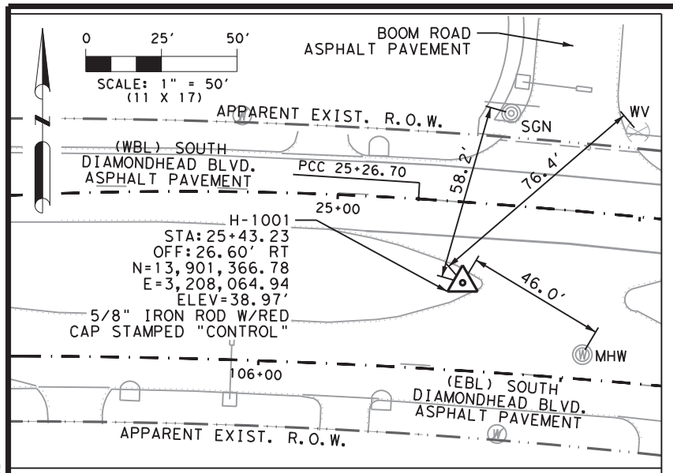
SOUTH DIAMONDHEAD BLVD.
AT GUM GULLY

SURVEY CONTROL LAYOUT

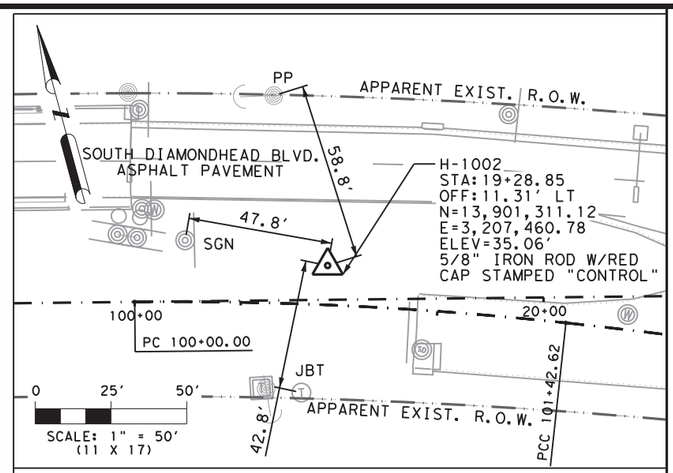
SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6			63
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	S.DIAMONDHEAD BLVD

USER: $USER$
$PLTDRVS$
$USER$
$PWFILE$
$TIME$
$DATE$
$FILE$



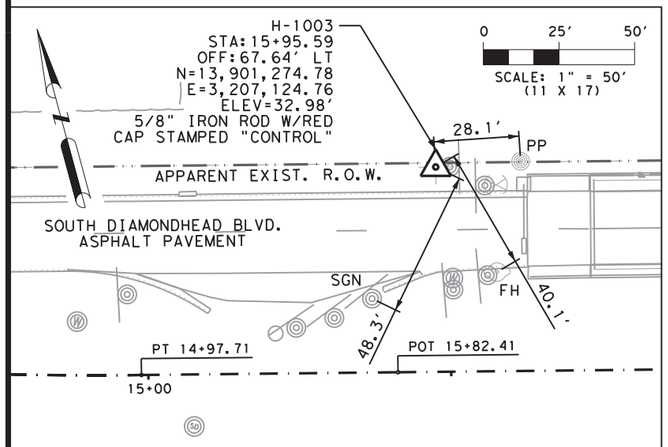
SITUATED IN THE CENTER OF THE DIAMONDHEAD BLVD. MEDIAN APPROXIMATELY 50 FEET SOUTH OF BOOM RD.



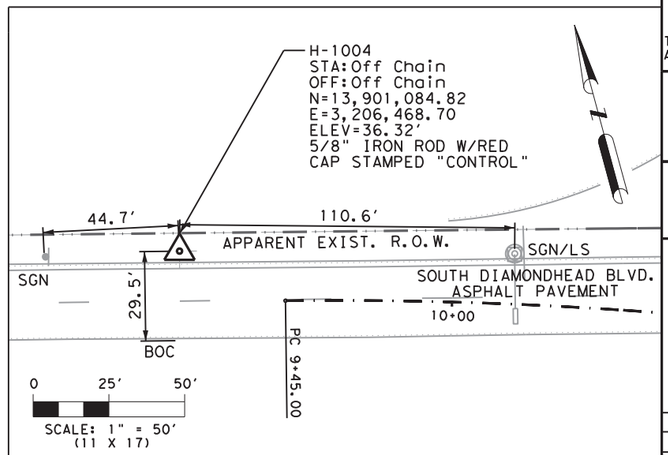
SITUATED IN THE CENTER OF THE DIAMONDHEAD BLVD. MEDIAN APPROXIMATELY 650 FEET WEST OF BOOM RD.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS SOUTH CENTRAL ZONE (4204), NAD 83 (2011 ADJ.; EPOCH 2010.00) GEOID 12B, AND NAVD 88. ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.000130 (HARRIS COUNTY).
2. ALL HORIZONTAL VALUES WERE DERIVED FROM GPS (RTK) OBSERVATION.
3. ALL PRIMARY VERTICAL VALUES ARE NAVD88 UTILIZING GEOID 12B AND WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION 38.968' FROM CONTROL POINT H-1001.
4. ALL HORIZONTAL AND VERTICAL CONTROL FOR THIS PROJECT WAS VERIFIED BY GPS (RTK) OBSERVATION MEANS.
5. THE CONTROL POINTS SHOWN HEREIN WAS DETERMINED BY SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
6. ALL MEASUREMENTS ARE U.S. SURVEY FEET.



SITUATED IN THE NORTH RIGHT-OF-WAY OF DIAMONDHEAD BLVD. APPROXIMATELY 400 FEET EAST OF GOLF CLUB DR.



SITUATED IN THE NORTH RIGHT-OF-WAY OF DIAMONDHEAD BLVD. APPROXIMATELY 285 FEET WEST OF GOLF CLUB DR.

STATE OF TEXAS
REGISTERED
JAMES A. WOODS
5333
PROFESSIONAL
LAND SURVEYOR

SIGNED: James A. Woods
JAMES A. WOODS
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 5333

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

CivilCorp
ENGINEERS • SURVEYORS
801 LIPAN STREET, CORPUS CHRISTI, TEXAS 78401
TEL: (361)371-5380 TBPLS #10194156 TBPE #10283

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD. AT GUM GULLY

SURVEY HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6			64
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	S. DIAMONDHEAD BLVD

USER: $USER$

$PLTDRVS$
$USER$
$PWFILE$
$TIME$
$DATE$
$FILE$

℄ SOUTH DIAMONDHEAD BLVD

Chain DIAMONDHEAD contains:
CUR DIAMONDHEAD1 CUR DIAMONDHEAD2 DH2 CUR DIAMONDHEAD3 CUR DIAMONDHEAD4

Beginning chain DIAMONDHEAD description
==========

Curve Data
————
Curve DIAMONDHEAD1
P.I. Station 10+31.22 N 13,901,101.6671 E 3,206,589.7054
Delta = 7^ 02' 55.22" (RT)
Degree = 4^ 05' 33.20"
Tangent = 86.2245
Length = 172.2315
Radius = 1,400.0000
External = 2.6527
Long Chord = 172.1229
Mid. Ord. = 2.6477
P.C. Station 9+45.00 N 13,901,078.1542 E 3,206,506.7487
P.T. Station 11+17.23 N 13,901,114.8224 E 3,206,674.9205
C.C. N 13,899,731.2129 E 3,206,888.5196
Back = N 74^ 10' 31.41" E
Ahead = N 81^ 13' 26.63" E
Chord Bear = N 77^ 41' 59.02" E

Course from PT DIAMONDHEAD1 to PC DIAMONDHEAD2 N 81^ 13' 26.63" E Dist 209.6735

Curve Data
————
Curve DIAMONDHEAD2
P.I. Station 14+12.41 N 13,901,159.8584 E 3,206,966.6451
Delta = 6^ 59' 24.54" (LT)
Degree = 4^ 05' 33.20"
Tangent = 85.5069
Length = 170.8016
Radius = 1,400.0000
External = 2.6088
Long Chord = 170.6957
Mid. Ord. = 2.6039
P.C. Station 13+26.91 N 13,901,146.8125 E 3,206,882.1393
P.T. Station 14+97.71 N 13,901,183.0915 E 3,207,048.9351
C.C. N 13,902,530.4221 E 3,206,668.5401
Back = N 81^ 13' 26.63" E
Ahead = N 74^ 14' 02.09" E
Chord Bear = N 77^ 43' 44.36" E

Course from PT DIAMONDHEAD2 to DH2 N 74^ 14' 02.08" E Dist 84.7031

Point DH2 N 13,901,206.1062 E 3,207,130.4515 Sta 15+82.41

Course from DH2 to PC DIAMONDHEAD3 N 74^ 14' 02.09" E Dist 536.2952

Curve Data
————
Curve DIAMONDHEAD3
P.I. Station 23+24.69 N 13,901,407.7924 E 3,207,844.8090
Delta = 19^ 28' 49.91" (RT)
Degree = 4^ 46' 28.73"
Tangent = 205.9878
Length = 407.9993
Radius = 1,200.0000
External = 17.5512
Long Chord = 406.0369
Mid. Ord. = 17.2982
P.C. Station 21+18.70 N 13,901,351.8233 E 3,207,646.5707
P.T. Station 25+26.70 N 13,901,394.4477 E 3,208,050.3641
C.C. N 13,900,196.9685 E 3,207,972.6235
Back = N 74^ 14' 02.09" E
Ahead = S 86^ 17' 08.01" E
Chord Bear = N 83^ 58' 27.04" E

Curve Data
————
Curve DIAMONDHEAD4
P.I. Station 25+94.53 N 13,901,390.0534 E 3,208,118.0524
Delta = 3^ 25' 45.04" (RT)
Degree = 2^ 31' 42.60"
Tangent = 67.8308
Length = 135.6211
Radius = 2,266.0000
External = 1.0150
Long Chord = 135.6008
Mid. Ord. = 1.0145
P.C. Station 25+26.70 N 13,901,394.4477 E 3,208,050.3641
P.T. Station 26+62.33 N 13,901,381.6182 E 3,208,185.3567
C.C. N 13,899,133.2079 E 3,207,903.5639
Back = S 86^ 17' 08.01" E
Ahead = S 82^ 51' 22.97" E
Chord Bear = S 84^ 34' 15.49" E

==========
Ending chain DIAMONDHEAD description

℄ SOUTH DIAMONDHEAD BLVD_E

Chain DIAMONDHEAD_E contains:
CUR DIAMONDHEAD_E1 CUR DIAMONDHEAD_E2

Beginning chain DIAMONDHEAD_E description
==========

Curve Data
————
Curve DIAMONDHEAD_E1
P.I. Station 100+71.39 N 13,901,302.2871 E 3,207,471.1171
Delta = 6^ 48' 33.91" (RT)
Degree = 4^ 46' 28.73"
Tangent = 71.3921
Length = 142.6162
Radius = 1,200.0000
External = 2.1218
Long Chord = 142.5323
Mid. Ord. = 2.1181
P.C. Station 100+00.00 N 13,901,282.8891 E 3,207,402.4108
P.T. Station 101+42.62 N 13,901,313.4020 E 3,207,541.6387
C.C. N 13,900,128.0343 E 3,207,728.4637
Back = N 74^ 14' 02.09" E
Ahead = N 81^ 02' 36.00" E
Chord Bear = N 77^ 38' 19.04" E

Curve Data
————
Curve DIAMONDHEAD_E2
P.I. Station 104+64.39 N 13,901,363.4979 E 3,207,859.4873
Delta = 15^ 20' 08.01" (RT)
Degree = 2^ 23' 50.33"
Tangent = 321.7722
Length = 639.6978
Radius = 2,390.0000
External = 21.5633
Long Chord = 637.7900
Mid. Ord. = 21.3704
P.C. Station 101+42.62 N 13,901,313.4020 E 3,207,541.6387
P.T. Station 107+82.31 N 13,901,327.7481 E 3,208,179.2674
C.C. N 13,898,952.5447 E 3,207,913.7317
Back = N 81^ 02' 36.00" E
Ahead = S 83^ 37' 15.99" E
Chord Bear = N 88^ 42' 40.00" E

==========
Ending chain DIAMONDHEAD_E description

℄ GOLF CLUB DR

Chain GOLF_CLUB_DR contains:
GCR1 GCR2

Beginning chain GOLF_CLUB_DR description
==========

Point GCR1 N 13,901,125.8486 E 3,206,746.3436 Sta 10+00.00

Course from GCR1 to GCR2 N 14^ 13' 22.53" W Dist 153.0271

Point GCR2 N 13,901,274.1850 E 3,206,708.7456 Sta 11+53.03

==========
Ending chain GOLF_CLUB_DR description

℄ TEMP ROAD

Chain TEMP_ROAD contains:
YC99 CUR TEMP_ROAD1 CUR TEMP_ROAD2 YC100

Beginning chain TEMP_ROAD description
==========

Point YC99 N 13,900,979.9798 E 3,206,160.3755 Sta 10+00.00

Course from YC99 to PC TEMP_ROAD1 N 74^ 10' 31.41" E Dist 134.8088

Curve Data
————
Curve TEMP_ROAD1
P.I. Station 11+97.20 N 13,901,033.7558 E 3,206,350.1049
Delta = 12^ 00' 46.47" (RT)
Degree = 9^ 39' 43.27"
Tangent = 62.3944
Length = 124.3312
Radius = 593.0000
External = 3.2735
Long Chord = 124.1036
Mid. Ord. = 3.2555
P.C. Station 11+34.81 N 13,901,016.7413 E 3,206,290.0752
P.T. Station 12+59.14 N 13,901,037.9036 E 3,206,412.3612
C.C. N 13,900,446.2154 E 3,206,451.7824
Back = N 74^ 10' 31.41" E
Ahead = N 86^ 11' 17.88" E
Chord Bear = N 80^ 10' 54.65" E

℄ TEMP ROAD CONT.

Curve Data
————
Curve TEMP_ROAD2
P.I. Station 13+41.88 N 13,901,042.7645 E 3,206,494.9552
Delta = 12^ 23' 37.29" (LT)
Degree = 7^ 31' 08.97"
Tangent = 82.7369
Length = 164.8282
Radius = 761.9972
External = 4.4786
Long Chord = 164.5070
Mid. Ord. = 4.4524
P.C. Station 12+59.14 N 13,901,037.9036 E 3,206,412.3612
P.T. Station 14+23.97 N 13,901,065.2390 E 3,206,574.5812
C.C. N 13,901,798.5846 E 3,206,367.5934
Back = N 86^ 37' 54.82" E
Ahead = N 74^ 14' 17.53" E
Chord Bear = N 80^ 26' 06.18" E

Course from PT TEMP_ROAD2 to YC100 N 74^ 14' 17.53" E Dist 277.0338

Point YC100 N 13,901,140.4921 E 3,206,841.1984 Sta 17+01.00

==========
Ending chain TEMP_ROAD description

NOT TO SCALE

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED PROFESSIONAL ENGINEER

11/30/2022

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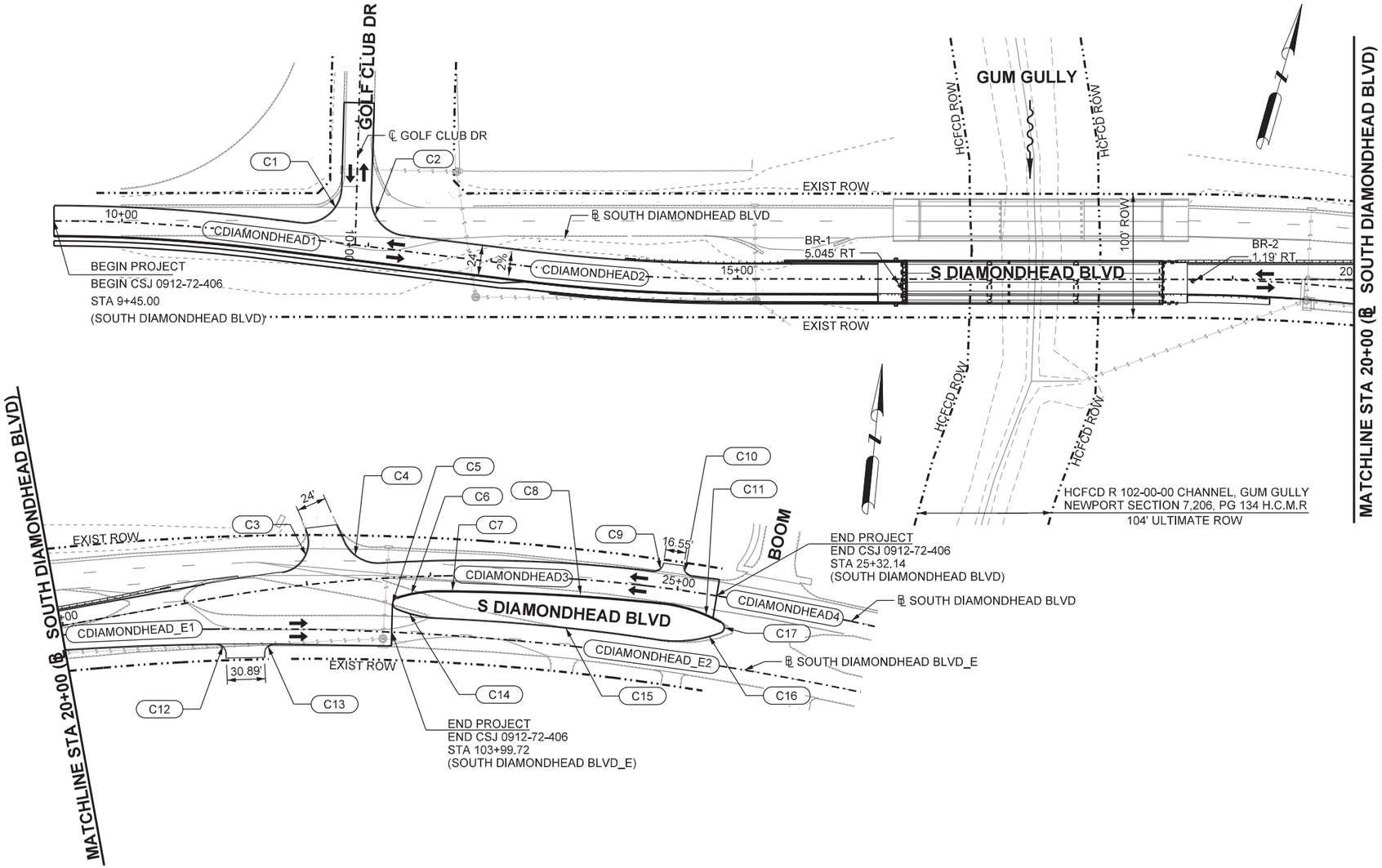
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		65
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- EXIST ROW
- PROP ℄ ALIGNMENT
- XX — PROP CURVE GEOMETRY DESIGNATION
- C### — CURVE DATA (SEE HORIZONTAL DATA SHEETS)
- PROPOSED TRAFFIC FLOW DIRECTION

HORIZONTAL CONTROL

ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS SOUTH CENTRAL ZONE (4204), NAD 83 (2011 ADJ.; EPOCH 2010.0) GEOID 12B, AND NAVD 88. ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00013 (HARRIS COUNTY).

VERTICAL CONTROL

PRIMARY VERTICAL VALUES WERE DERIVED FROM GPS OBSERVATIONS FROM THE TXDOT RTN NETWORK (GEOID12B) AND CONVERTED TO ORTHOMETRIC HEIGHTS AND A DIGITAL LEVEL LOOP HOLDING ELEVATION 38.968' FROM POINT CP 1001.

0 50' 100'
SCALE: 1" = 100'

CURVE DATA TABLE						
ID	LENGTH	RADIUS	PC STA		PT STA	
			STATION*	OFFSET*	STATION*	OFFSET*
C1	48.86'	30'	11+43.44	12.00' LT	11+73.31	44.84' LT
C2	43.38	30'	11+97.37	39.24' LT	12+27.24	12.00' LT
C3	46.08'	25'	21+80.98	12.00' LT	22+04.20	43.96' LT
C4	36.33'	30'	22+32.68	31.75' LT	22+60.04	12.00' LT
C5	11.94'	5'	22+70.78	25.51' RT	22+71.68	16.25' RT
C6	32.94'	100'	22+71.68	16.25' RT	23+04.59	12.00' RT
C7	75.71'	1188'	23+04.59	12.00' RT	23+81.07	12.00' RT
C8	104.24'	1188'	23+81.07	12.00' RT	24+86.37	12.00' LT
C9	12.42'	8'	24+78.33	11.96' LT	24+86.24	19.81'LT
C10	12.44'	8'	25+02.51	19.97' LT	25+10.55	12.23' LT
C11	53.32'	150'	24+86.37	12.00' RT	25+39.39	20.25' RT
C12	12.40'	8'	21+19.32	36.70' RT	21+26.00	45.86' RT
C13	12.64'	8'	21+57.88	50.75' RT	21+67.43	44.04' RT
C14	34.23'	100'	22+70.78	25.51' RT	23+04.67	34.55' RT
C15	178.98'	1639'	23+04.67	34.55' RT	24+89.40	42.44' RT
C16	51.91'	100'	24+89.40	42.44' RT	25+40.39	23.91' RT
C17	11.45'	5'	25+40.39	23.91' RT	25+39.39	20.25' RT

* ALL STATIONS AND OFFSETS ARE FROM BL SOUTH DIAMONDHEAD BLVD.

STATE OF TEXAS
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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

ROADWAY GEOMETRY LAYOUT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		66
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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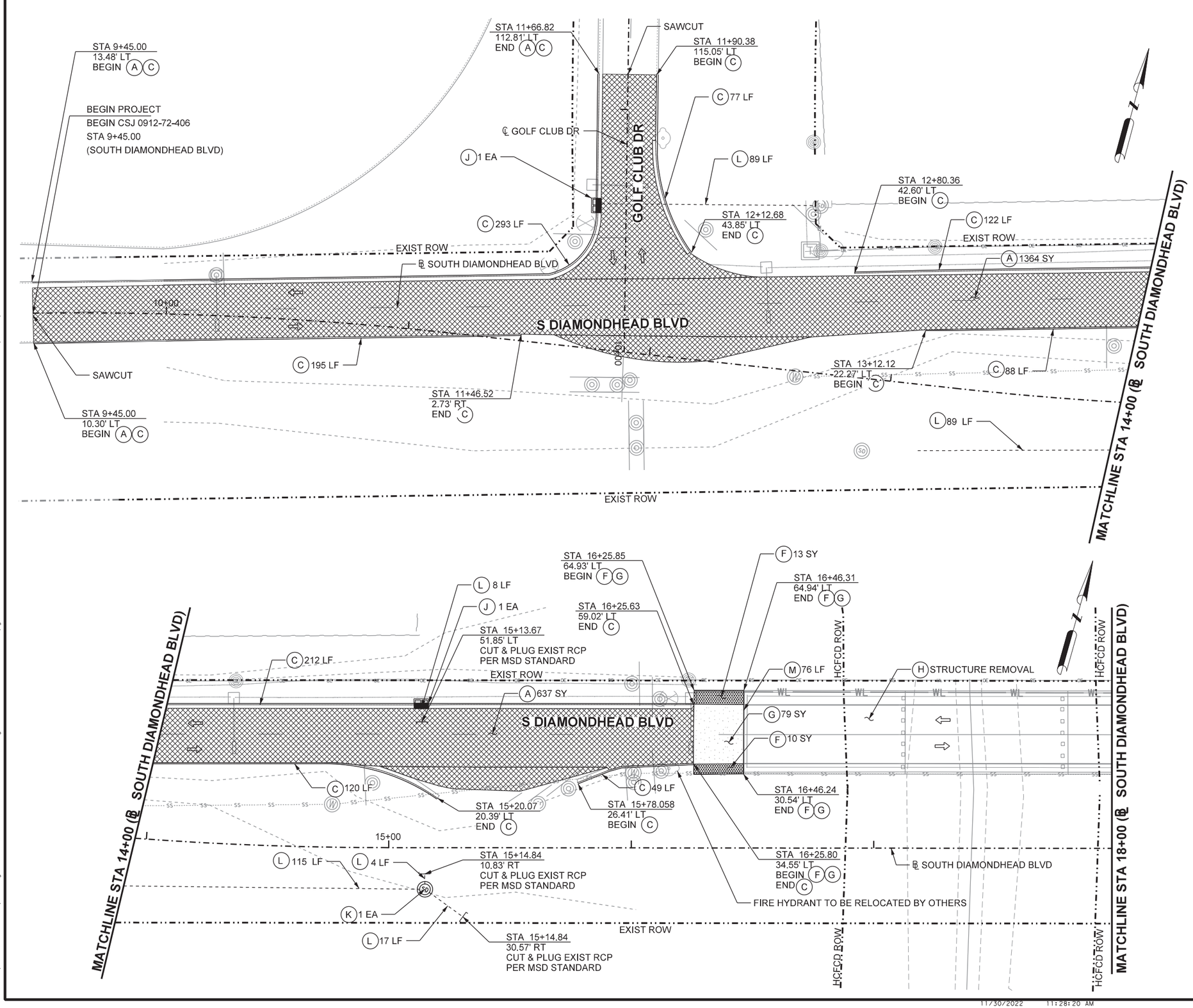
LEGEND

- (A) ASPH PAV REMOVAL
- (B) CONC DRIVEWAY REMOVAL
- (C) CURB & GUTTER REMOVAL
- (D) CONC REMOVAL
- (E) EXCAVATION (SPECIAL)
- (F) CONC SIDEWALK REMOVAL
- (G) CONC APPR SLAB REMOVAL
- (H) STRUCTURE REMOVAL
- (J) REMOVE STR (INLET)
- (K) REMOVE STR (MANHOLE)
- (L) REMOVE STR (PIPE)
- (M) REMOVE STR (RET WALL)
- EXISTING TRAFFIC FLOW DIRECTION

NOTES:

1. ALL STATION AND OFFSET CALL OUTS ARE REFERENCED FROM DIAMONDHEAD BLVD CENTERLINE, UNLESS OTHERWISE NOTED.
2. REFER TO EXISTING UTILITY LAYOUT SHEET FOR EXISTING UTILITIES TO REMAIN UNDISTURBED.
3. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT FOR SIGN REMOVAL ITEMS.
4. BRIDGE RAIL REMOVAL UP TO THE APPROACH SLAB IS SUBSIDIARY TO ITEM 496-6010, "REMOV STR".



0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

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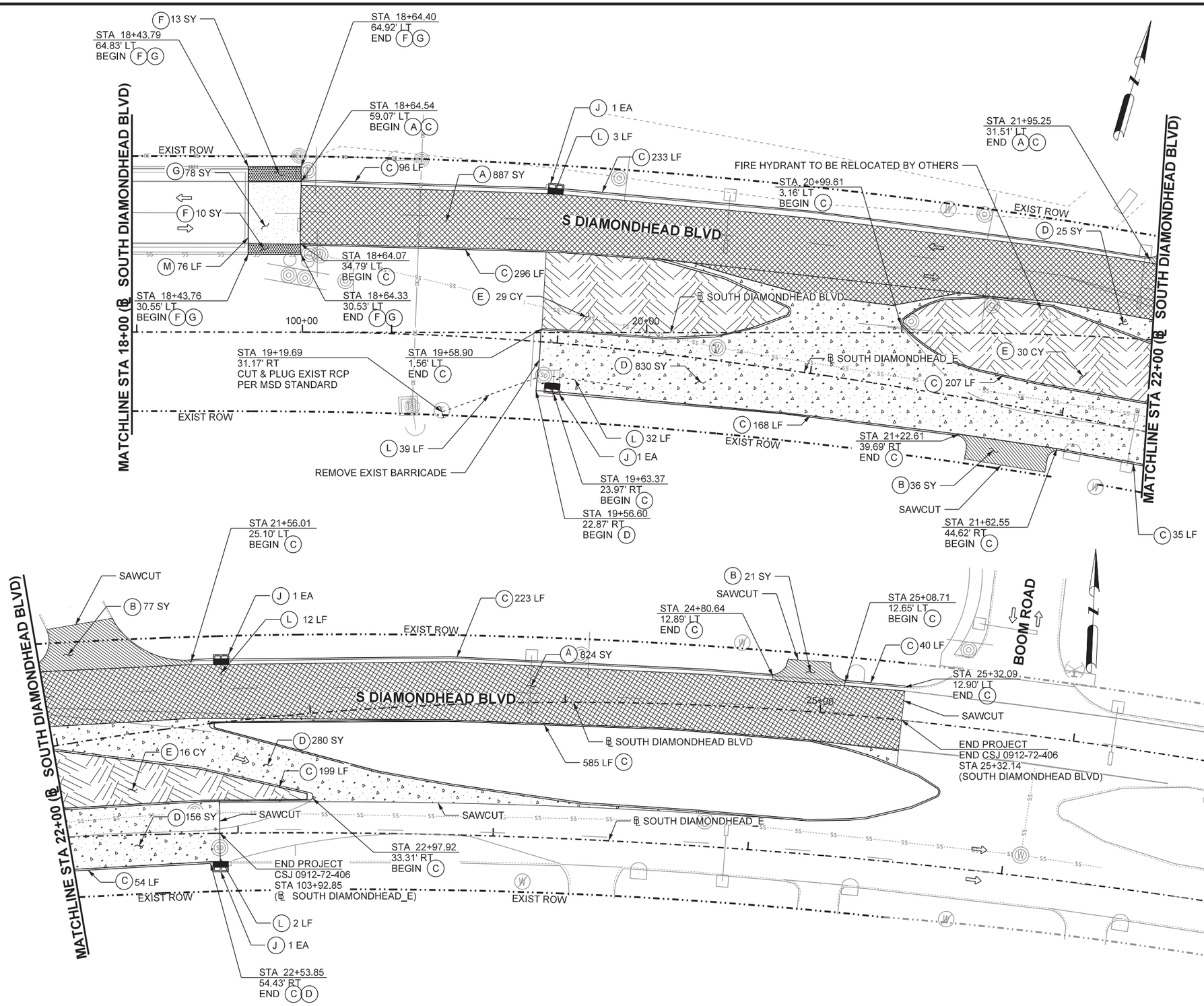
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

REMOVAL LAYOUT
BEGIN PROJECT TO STA 18+00

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		67
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- A ASPH PAV REMOVAL
- B CONC DRIVEWAY REMOVAL
- C CURB & GUTTER REMOVAL
- D CONC REMOVAL
- E EXCAVATION (SPECIAL)
- F CONC SIDEWALK REMOVAL
- G CONC APPR SLAB REMOVAL
- H STRUCTURE REMOVAL
- J REMOVE STR (INLET)
- K REMOVE STR (MANHOLE)
- L REMOVE STR (PIPE)
- M REMOVE STR (RET WALL)
- ⇦ EXISTING TRAFFIC FLOW DIRECTION

NOTES:

1. ALL STATION AND OFFSET CALL OUTS ARE REFERENCED FROM DIAMONDHEAD BLVD CENTERLINE, UNLESS OTHERWISE NOTED.
2. REFER TO EXISTING UTILITY LAYOUT SHEET FOR EXISTING UTILITIES TO REMAIN UNDISTURBED.
3. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT FOR SIGN REMOVAL ITEMS.
4. BRIDGE RAIL REMOVAL UP TO THE APPROACH SLAB IS SUBSIDIARY TO ITEM 496-6010, "REMOV STR".

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

REMOVAL LAYOUT
STA 18+00 TO END PROJECT

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		68
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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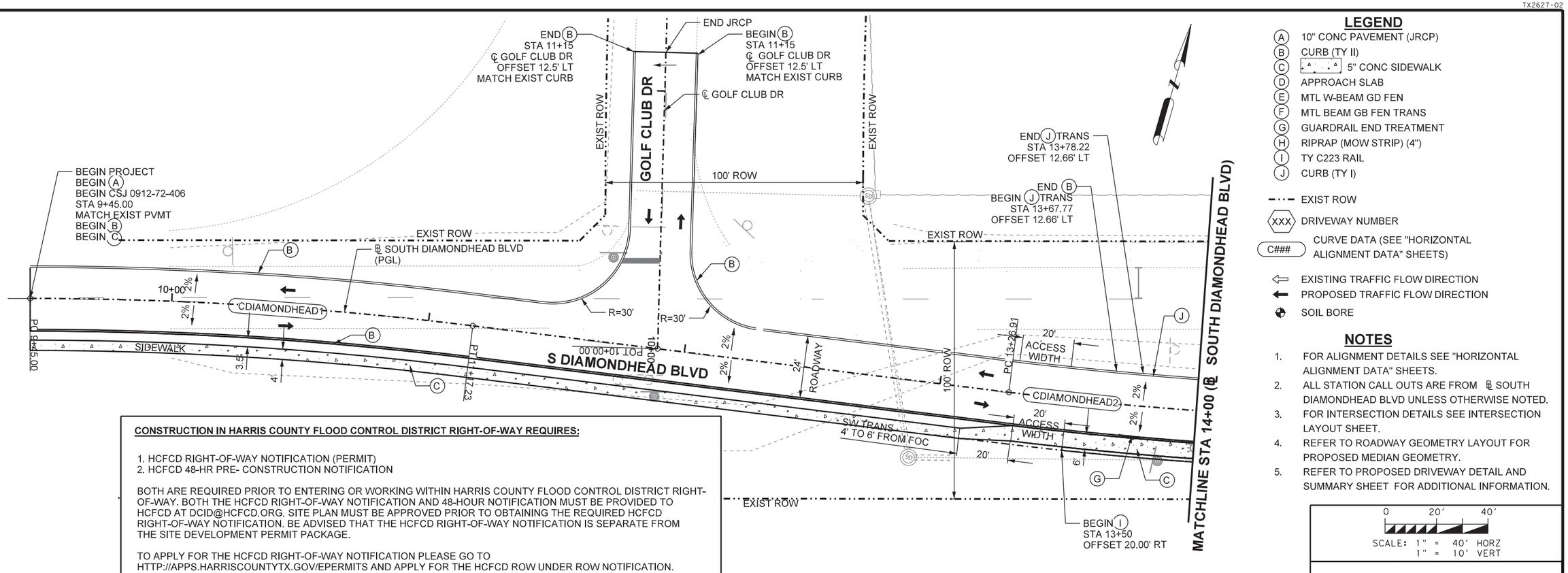


CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1. HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2. HCFCD 48-HR PRE- CONSTRUCTION NOTIFICATION

BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG. SITE PLAN MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.

TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO HTTP://APPS.HARRISCOUNTYTX.GOV/EPERMITS AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION.

FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

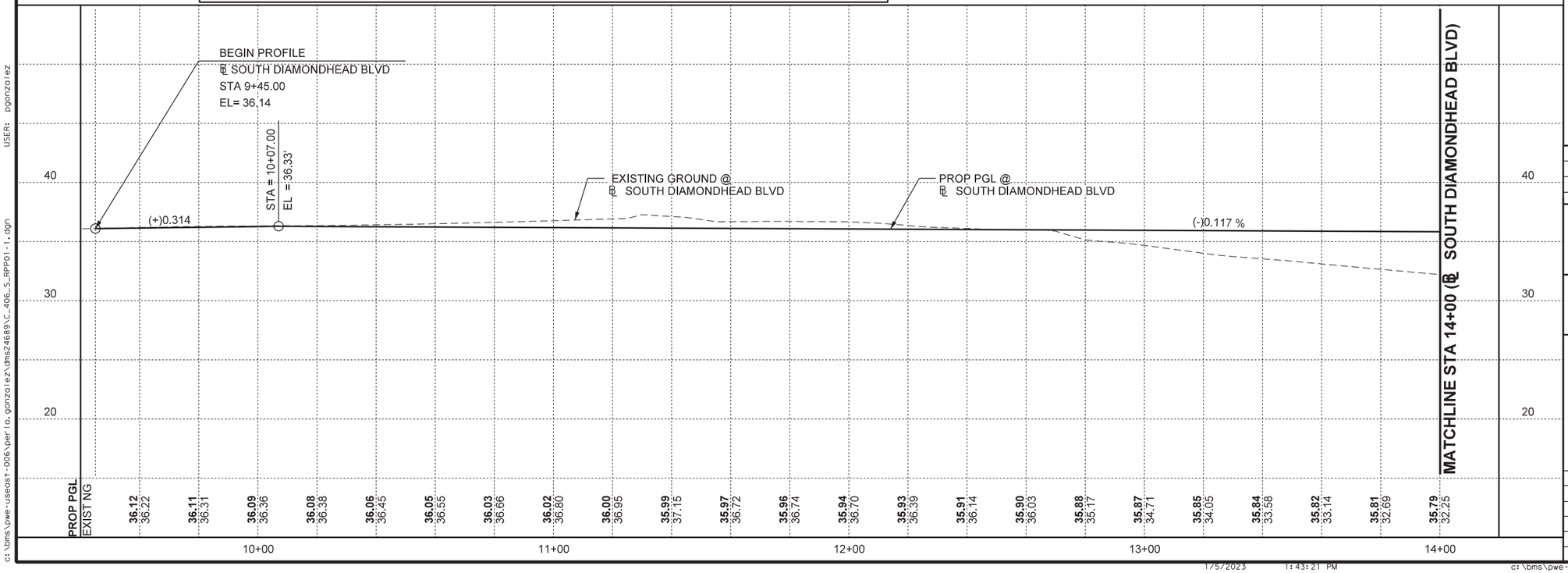
LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
- (D) APPROACH SLAB
- (E) MTL W-BEAM GD FEN
- (F) MTL BEAM GB FEN TRANS
- (G) GUARDRAIL END TREATMENT
- (H) RIPRAP (MOW STRIP) (4")
- (I) TY C223 RAIL
- (J) CURB (TY I)

- EXIST ROW
- XXX DRIVEWAY NUMBER
- C### CURVE DATA (SEE "HORIZONTAL ALIGNMENT DATA" SHEETS)
- EXISTING TRAFFIC FLOW DIRECTION
- PROPOSED TRAFFIC FLOW DIRECTION
- SOIL BORE

NOTES

1. FOR ALIGNMENT DETAILS SEE "HORIZONTAL ALIGNMENT DATA" SHEETS.
2. ALL STATION CALL OUTS ARE FROM ℄ SOUTH DIAMONDHEAD BLVD UNLESS OTHERWISE NOTED.
3. FOR INTERSECTION DETAILS SEE INTERSECTION LAYOUT SHEET.
4. REFER TO ROADWAY GEOMETRY LAYOUT FOR PROPOSED MEDIAN GEOMETRY.
5. REFER TO PROPOSED DRIVEWAY DETAIL AND SUMMARY SHEET FOR ADDITIONAL INFORMATION.



0 20' 40'
SCALE: 1" = 40' HORZ
1" = 10' VERT

ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
1/5/2023

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

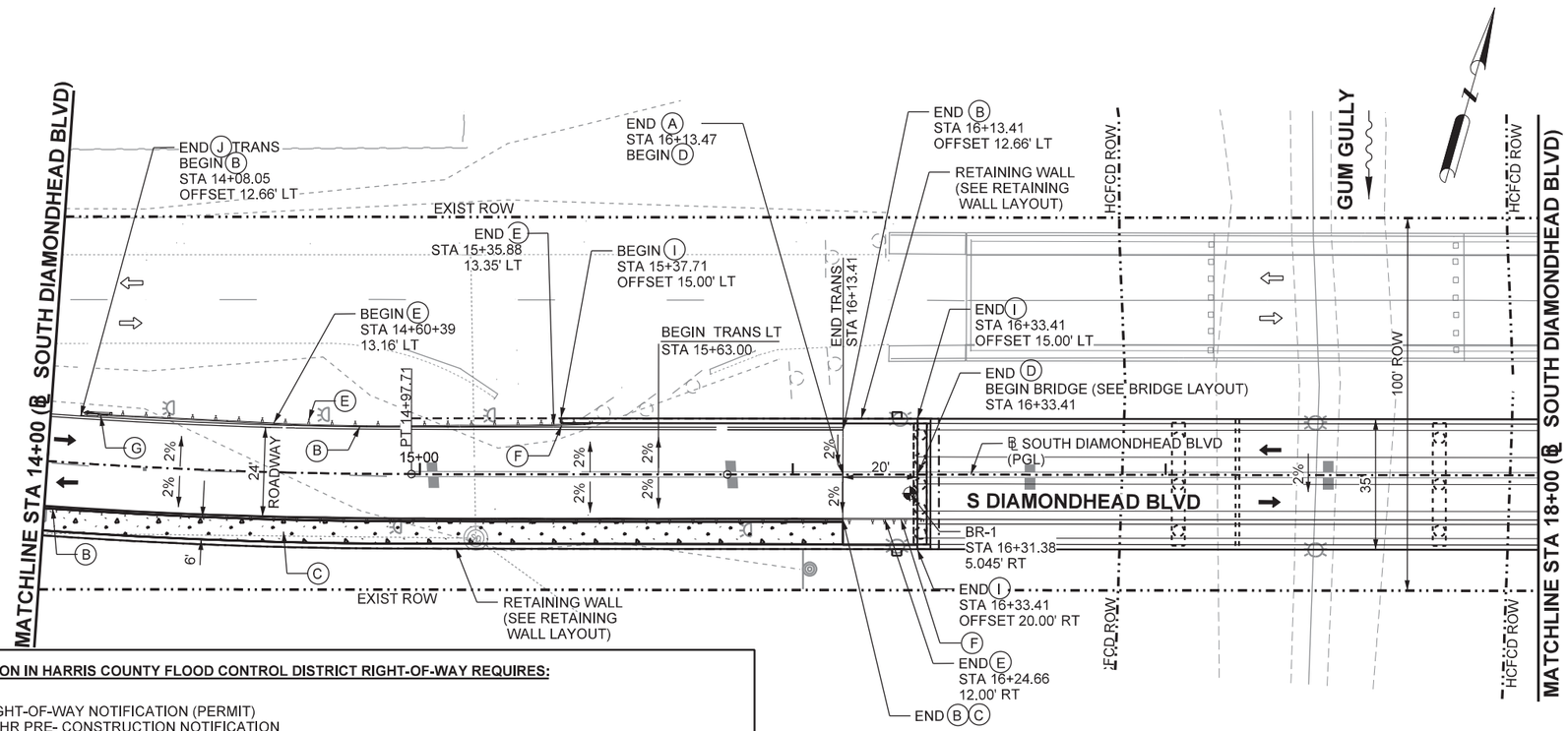
SOUTH DIAMONDHEAD BLVD AT GUM GULLY

PLAN & PROFILE

BEGIN PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		69
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1. HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2. HCFCD 48-HR PRE- CONSTRUCTION NOTIFICATION

BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG. SITE PLAN MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.

TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO HTTP://APPS.HARRISCOUNTYTX.GOV/EPERMITS AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION.

FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
- (D) APPROACH SLAB
- (E) MTL W-BEAM GD FEN
- (F) MTL BEAM GB FEN TRANS
- (G) GUARDRAIL END TREATMENT
- (H) RIPRAP (MOW STRIP) (4")
- (I) TY C223 RAIL
- (J) CURB (TY I)

EXIST ROW

XXX DRIVEWAY NUMBER

C### CURVE DATA (SEE "HORIZONTAL ALIGNMENT DATA" SHEETS)

EXISTING TRAFFIC FLOW DIRECTION

PROPOSED TRAFFIC FLOW DIRECTION

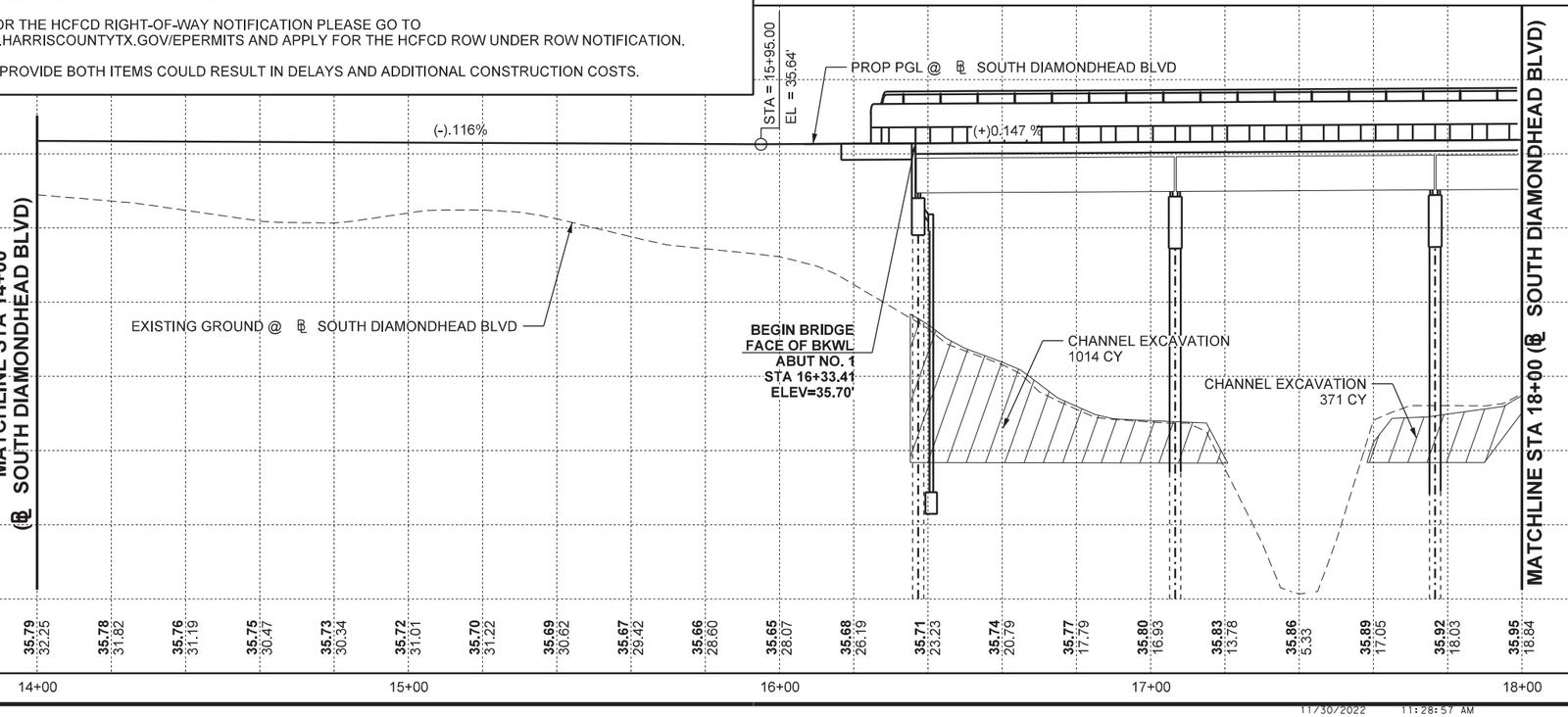
SOIL BORE

NOTES

1. FOR ALIGNMENT DETAILS SEE "HORIZONTAL ALIGNMENT DATA" SHEETS.
2. ALL STATION CALL OUTS ARE FROM ℄ SOUTH DIAMONDHEAD BLVD UNLESS OTHERWISE NOTED.
3. FOR INTERSECTION DETAILS SEE INTERSECTION LAYOUT SHEET.
4. REFER TO ROADWAY GEOMETRY LAYOUT FOR PROPOSED MEDIAN GEOMETRY.
5. REFER TO PROPOSED DRIVEWAY DETAIL AND SUMMARY SHEET FOR ADDITIONAL INFORMATION.

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT



STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

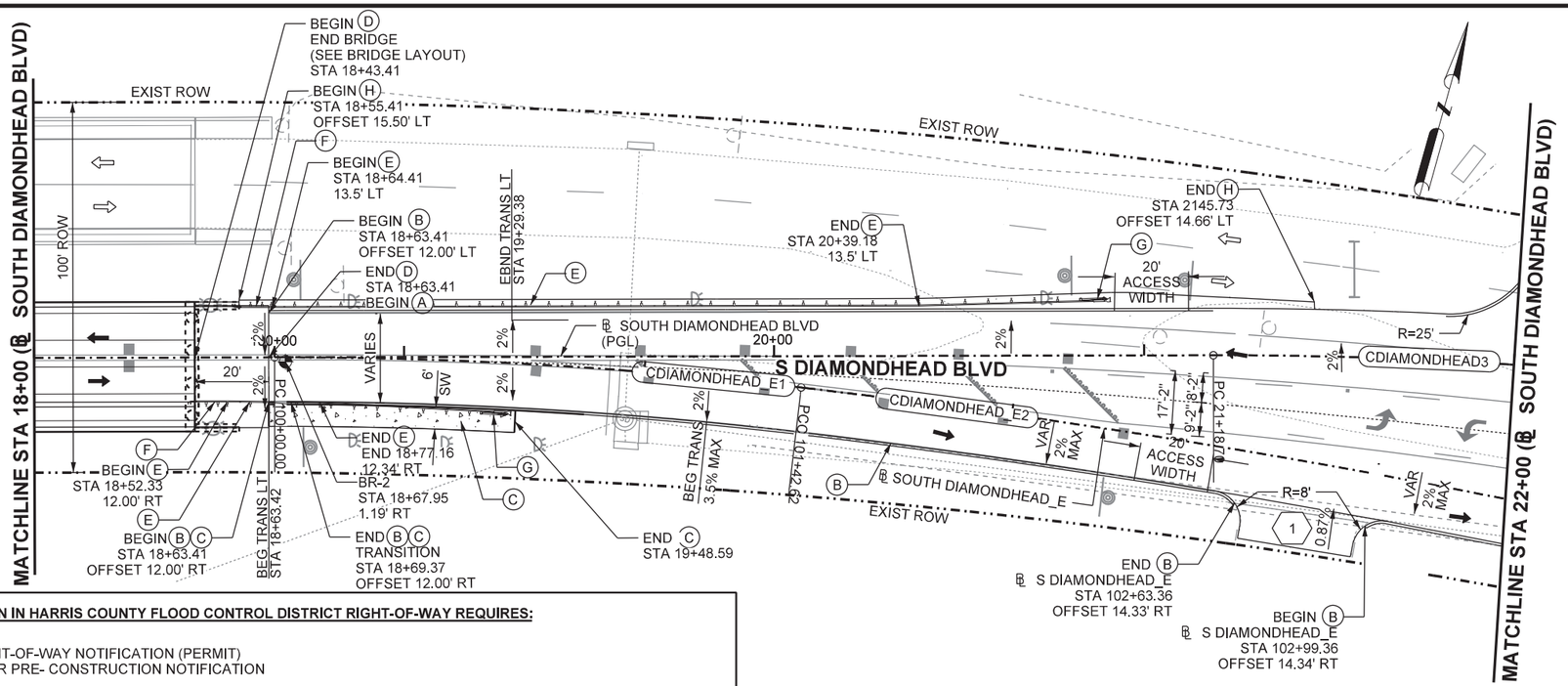
SOUTH DIAMONDHEAD BLVD AT GUM GULLY

PLAN & PROFILE

STA 14+00 TO STA 18+00

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		70
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1. HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2. HCFCD 48-HR PRE- CONSTRUCTION NOTIFICATION

BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG. SITE PLAN MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.

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FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.

LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
- (D) APPROACH SLAB
- (E) MTL W-BEAM GD FEN
- (F) MTL BEAM GB FEN TRANS
- (G) GUARDRAIL END TREATMENT
- (H) RIPRAP (MOW STRIP) (4")
- (I) TY C223 RAIL
- (J) CURB (TY I)

EXIST ROW

XXX DRIVEWAY NUMBER

C### CURVE DATA (SEE "HORIZONTAL ALIGNMENT DATA" SHEETS)

EXISTING TRAFFIC FLOW DIRECTION

PROPOSED TRAFFIC FLOW DIRECTION

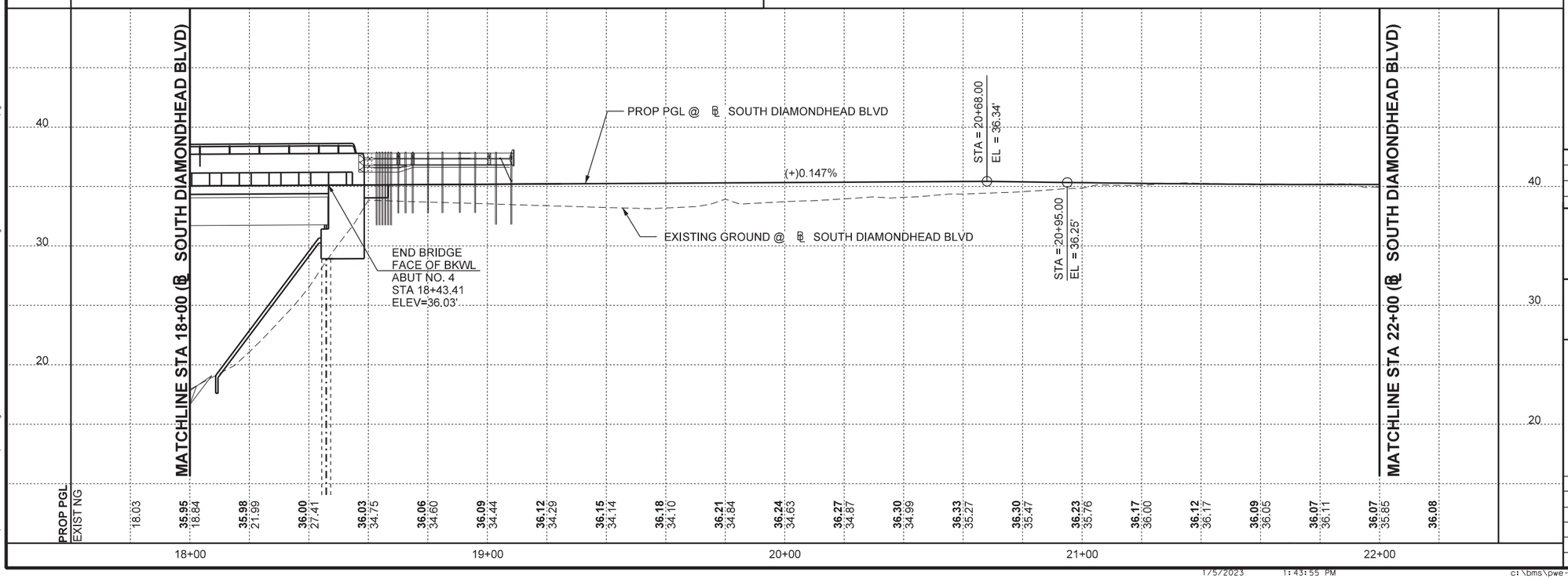
SOIL BORE

NOTES

1. FOR ALIGNMENT DETAILS SEE "HORIZONTAL ALIGNMENT DATA" SHEETS.
2. ALL STATION CALL OUTS ARE FROM ℄ SOUTH DIAMONDHEAD BLVD UNLESS OTHERWISE NOTED.
3. FOR INTERSECTION DETAILS SEE INTERSECTION LAYOUT SHEET.
4. REFER TO ROADWAY GEOMETRY LAYOUT FOR PROPOSED MEDIAN GEOMETRY.
5. REFER TO PROPOSED DRIVEWAY DETAIL AND SUMMARY SHEET FOR ADDITIONAL INFORMATION.

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT



STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

PLAN & PROFILE

STA 18+00 TO 22+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	71

STATE	DISTRICT	COUNTY
TEXAS	HOU	HARRIS

CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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1/5/2023
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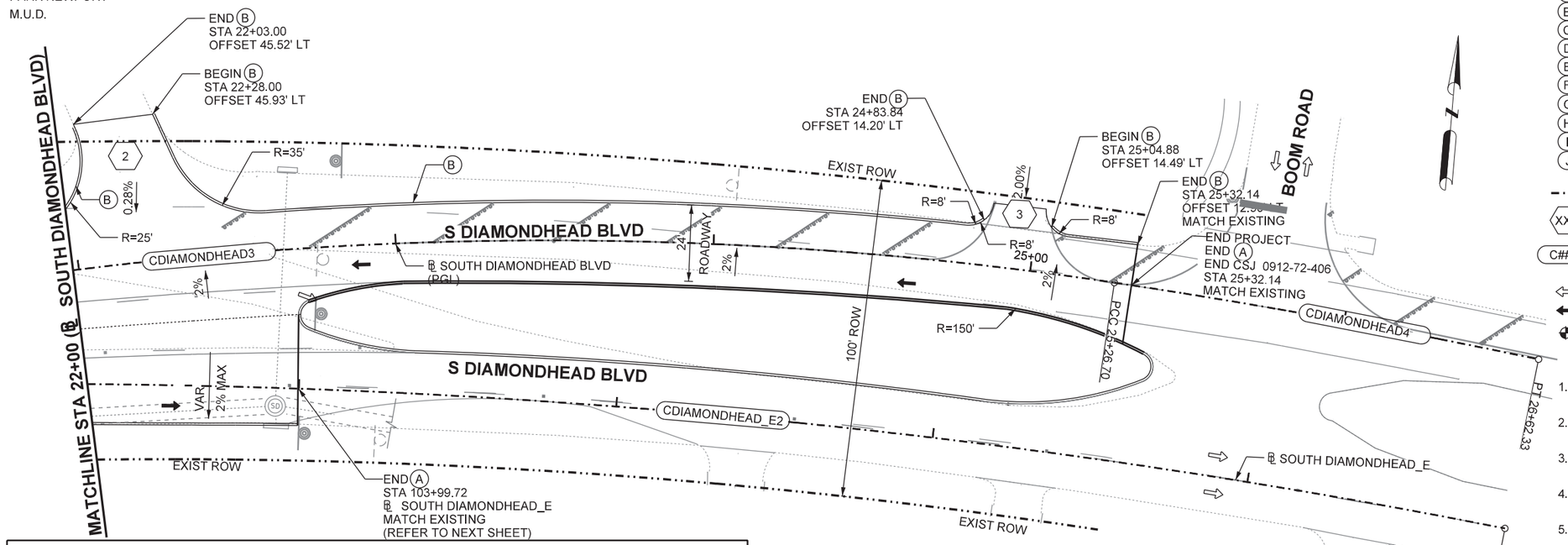
SOUTH DIAMONDHEAD
PARK NEWPORT
M.U.D.



LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
- (D) APPROACH SLAB
- (E) MTL W-BEAM GD FEN
- (F) MTL BEAM GB FEN TRANS
- (G) GUARDRAIL END TREATMENT
- (H) RIPRAP (MOW STRIP) (4")
- (I) TY C223 RAIL
- (J) CURB (TY I)

EXIST ROW
XXX DRIVEWAY NUMBER
C### CURVE DATA (SEE "HORIZONTAL ALIGNMENT DATA" SHEETS)
EXISTING TRAFFIC FLOW DIRECTION
PROPOSED TRAFFIC FLOW DIRECTION
SOIL BORE

NOTES

1. FOR ALIGNMENT DETAILS SEE "HORIZONTAL ALIGNMENT DATA" SHEETS.
2. ALL STATION CALL OUTS ARE FROM ℄ SOUTH DIAMONDHEAD BLVD UNLESS OTHERWISE NOTED.
3. FOR INTERSECTION DETAILS SEE INTERSECTION LAYOUT SHEET.
4. REFER TO ROADWAY GEOMETRY LAYOUT FOR PROPOSED MEDIAN GEOMETRY.
5. REFER TO PROPOSED DRIVEWAY DETAIL AND SUMMARY SHEET FOR ADDITIONAL INFORMATION.

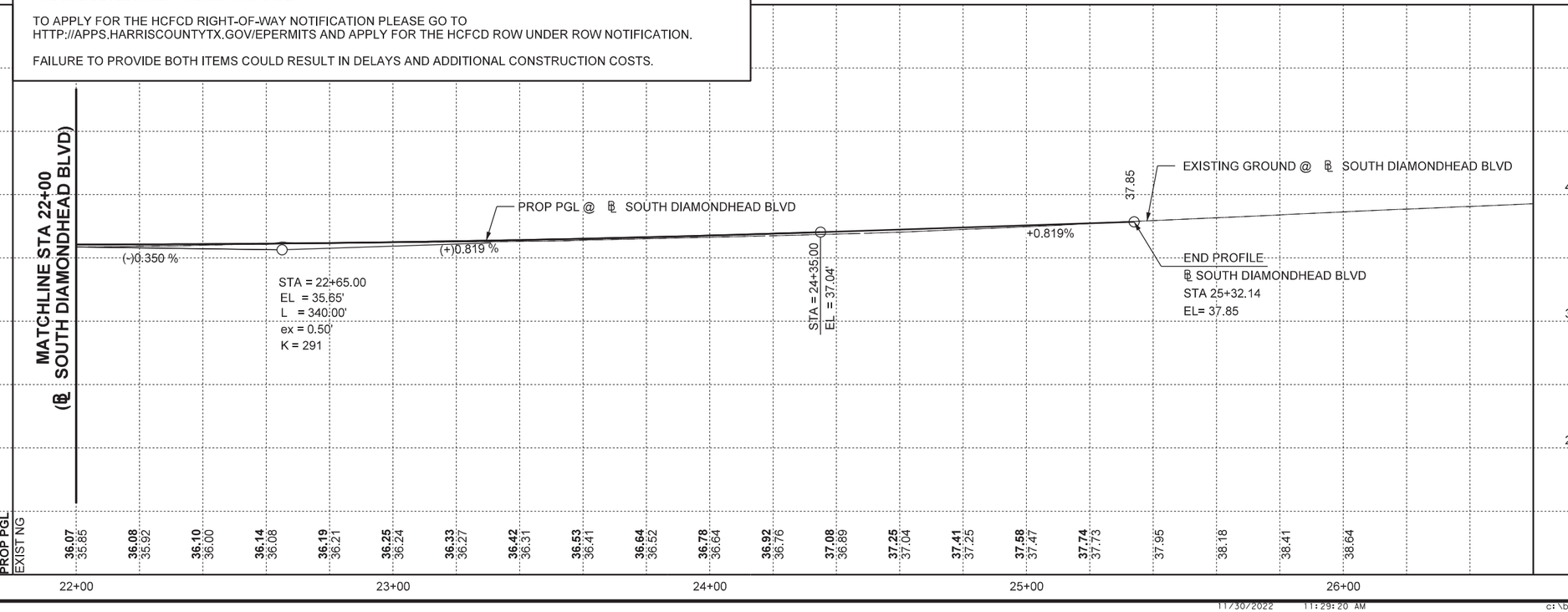
CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:

1. HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
2. HCFCD 48-HR PRE- CONSTRUCTION NOTIFICATION

BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. BOTH THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTIFICATION MUST BE PROVIDED TO HCFCD AT DCID@HCFCD.ORG. SITE PLAN MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE.

TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO HTTP://APPS.HARRISCOUNTYTX.GOV/EPERMITS AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION.

FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.



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SCALE: 1" = 40′ HORZ
1" = 10′ VERT

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ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PLAN & PROFILE
STA 22+00 TO END PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		72
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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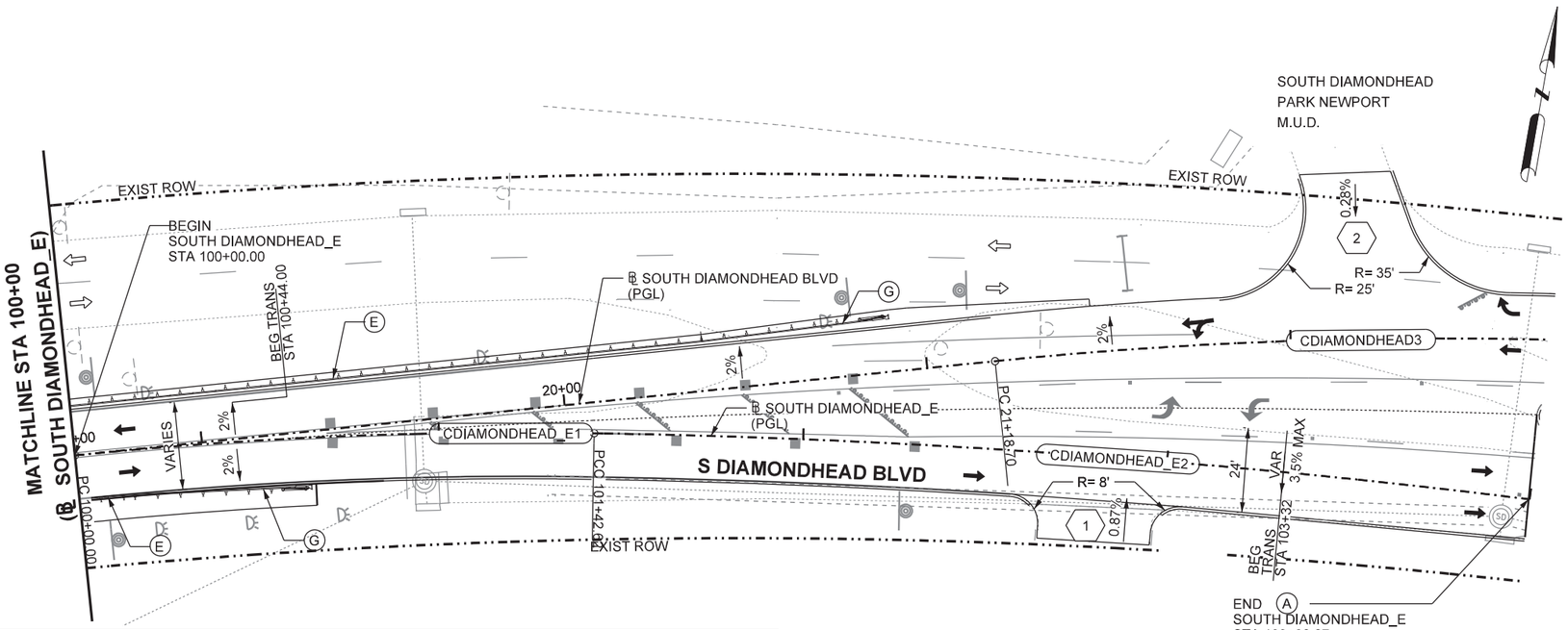

LEGEND

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- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
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- (E) MTL W-BEAM GD FEN
- (F) MTL BEAM GB FEN TRANS
- (G) GUARDRAIL END TREATMENT
- (H) RIPRAP (MOW STRIP) (4")
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- (J) CURB (TY I)

- EXIST ROW
- (XXX) DRIVEWAY NUMBER
- (C###) CURVE DATA (SEE "HORIZONTAL ALIGNMENT DATA" SHEETS)
- EXISTING TRAFFIC FLOW DIRECTION
- PROPOSED TRAFFIC FLOW DIRECTION
- SOIL BORE

NOTES

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3. FOR INTERSECTION DETAILS SEE INTERSECTION LAYOUT SHEET.
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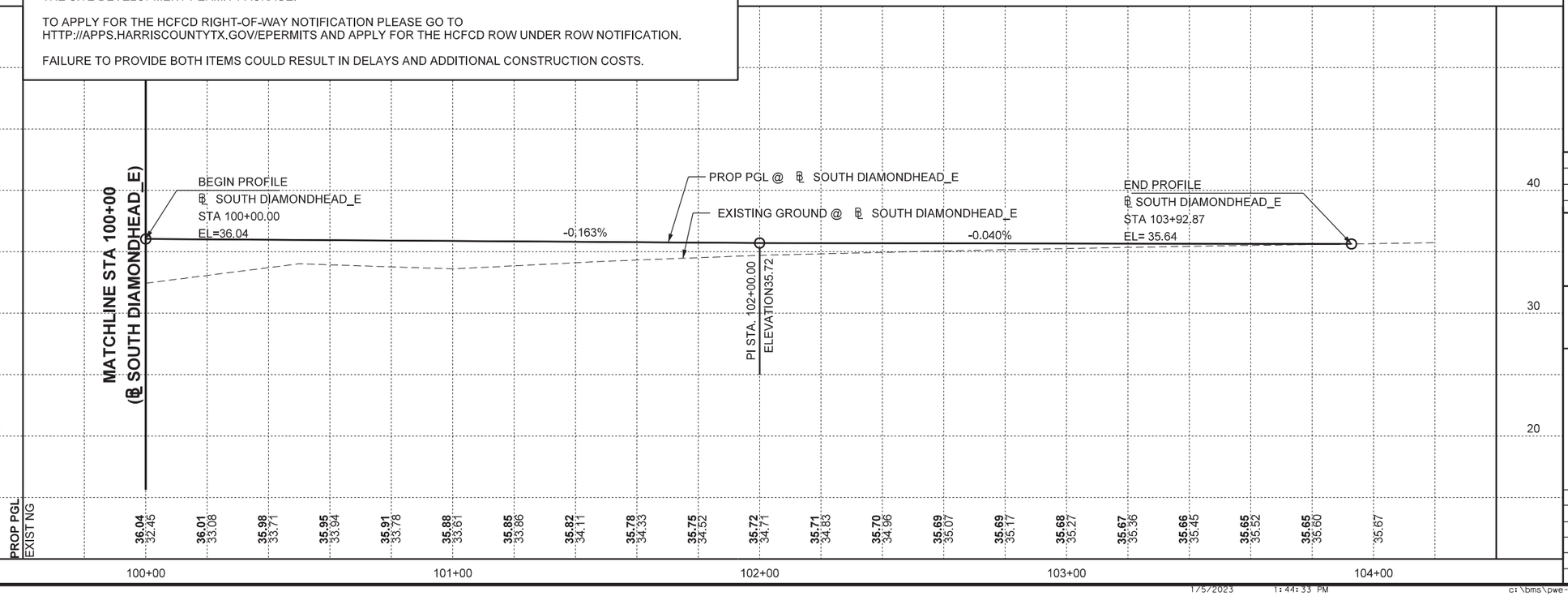
FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN DELAYS AND ADDITIONAL CONSTRUCTION COSTS.



SCALE: 1" = 40' HORZ
1" = 10' VERT

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PLAN & PROFILE
STA 100+00 TO END PROJECT

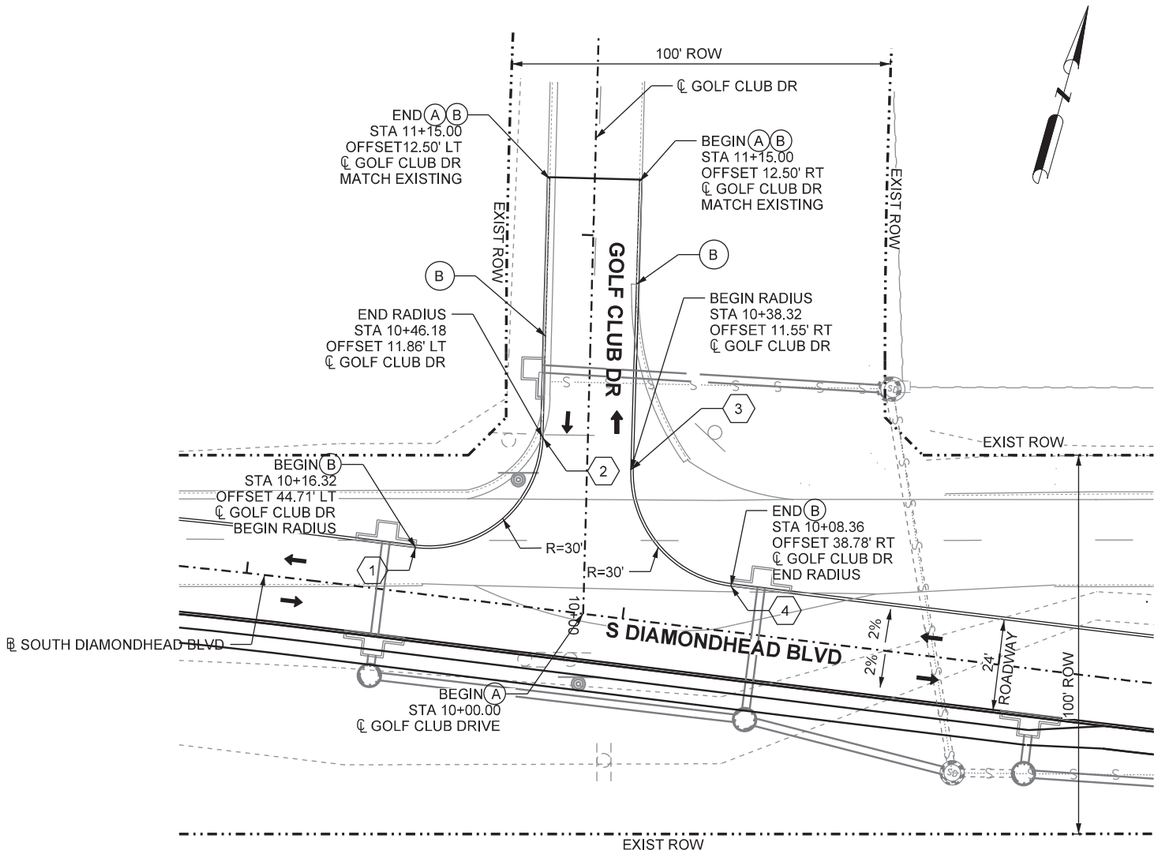
SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		73
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) CURB (TY II)
- (C) SIDEWALK

- PROPOSED TRAFFIC FLOW DIRECTION
- EXIST ROW
- (#) POINT #



POINT #	ALIGNMENT	*STATION	*OFFSET (FT)	*ELEV (FT)
1	GOLF CLUB DR	10+16.32	44.71LT	35.93'
2	GOLF CLUB DR	10+46.18	11.86' LT	36.17'
3	GOLF CLUB DR	10+38.32	11.55 RT	36.20'
4	GOLF CLUB DR	10+08.36	38.78 RT	35.84'

* EDGE OF PAVEMENT

NOTES

1. FOR ALIGNMENT DETAILS SEE "HORIZONTAL ALIGNMENT DATA" SHEETS.
2. REFER TO CROSS STREET PROFILE SHEET FOR VERTICAL ALIGNMENT.

0 20′ 40′
SCALE: 1" = 40′

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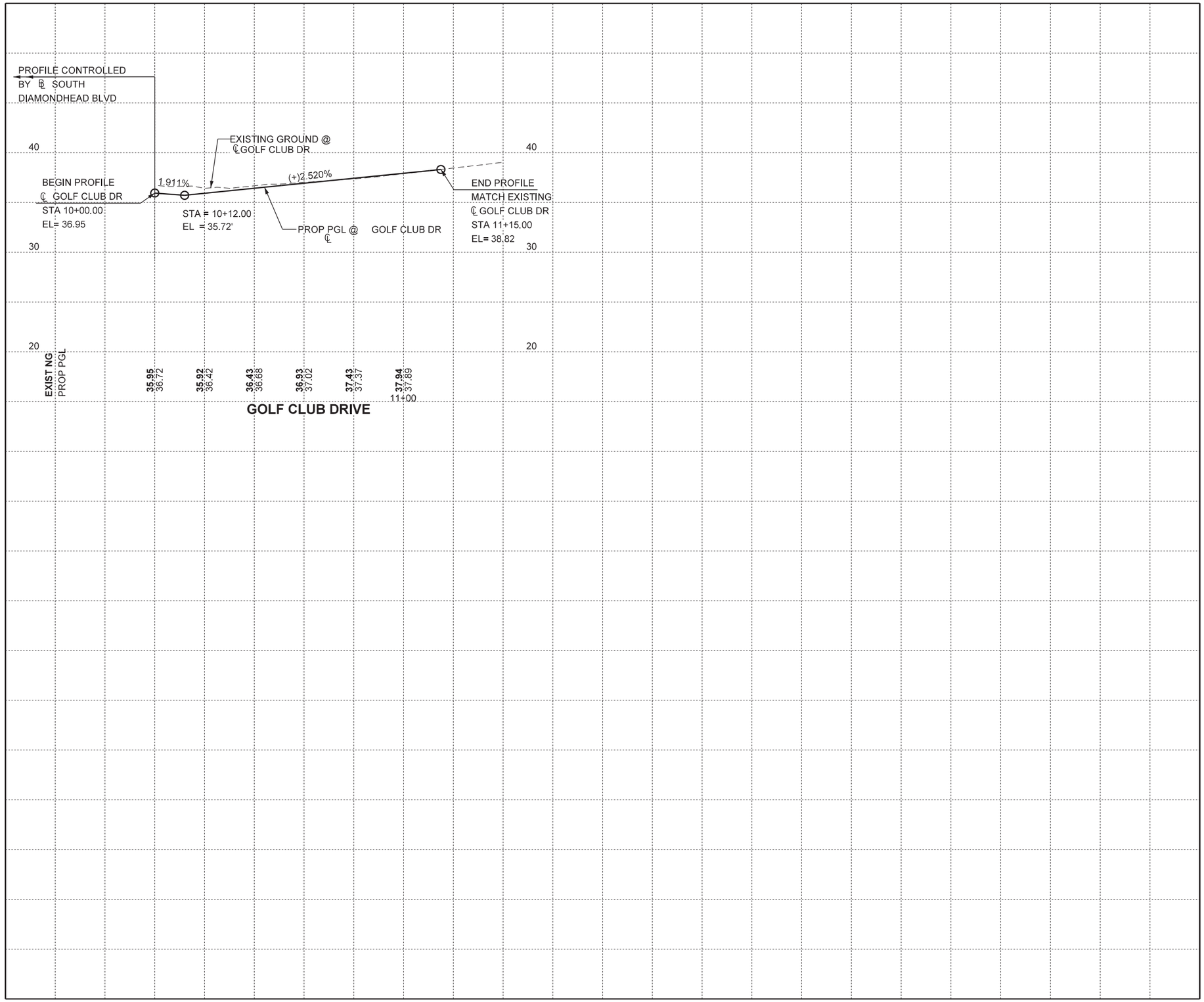
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

INTERSECTION LAYOUT
(GOLF CLUB DR)

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		74
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

CROSS STREET PROFILE
(GOLF CLUB DR)

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		75
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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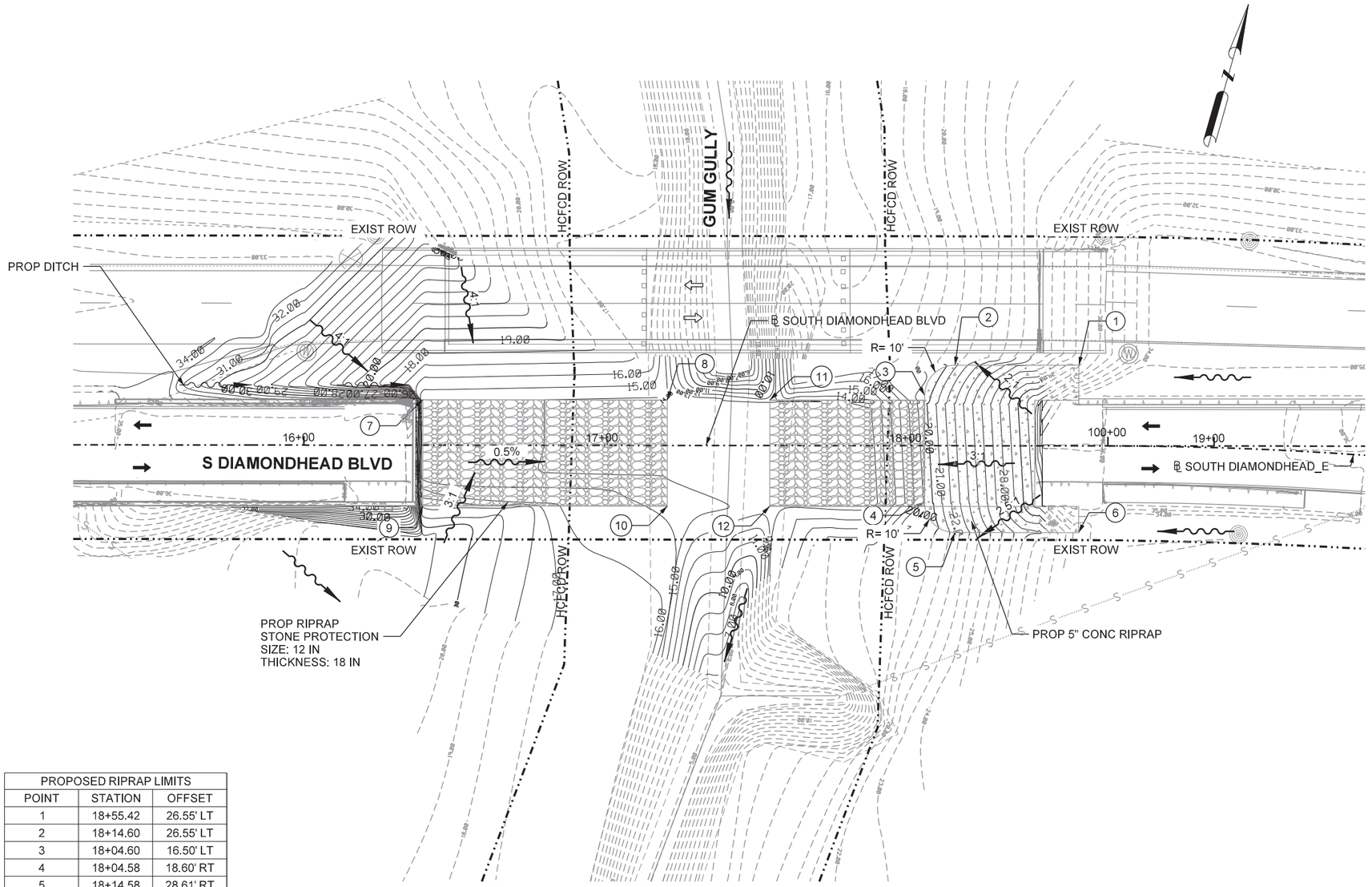

PROPOSED RIPRAP LIMITS		
POINT	STATION	OFFSET
1	18+55.42	26.55' LT
2	18+14.60	26.55' LT
3	18+04.60	16.50' LT
4	18+04.58	18.60' RT
5	18+14.58	28.61' RT
6	18+55.41	28.62' RT
7	16+39.17	15.00' LT
8	17+19.77	15.00' LT
9	16+39.17	20.00' RT
10	17+19.77	20.00' RT
11	17+53.59	15.00' LT
12	17+53.59	20.00' RT

LEGEND

- EXIST ROW
- EXISTING TRAFFIC FLOW DIRECTION
- PROPOSED TRAFFIC FLOW DIRECTION
- FLOW DIRECTION
- PROP CONCRETE RIPRAP
- EXIST CONTOUR
- PROP CONTOUR
- ROCK RIPRAP

NOTES

1. EXISTING POWER POLES SHALL NOT BE DISTURBED. CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGED TO THE EXISTING POWER POLE AND POWER LINES DURING CONSTRUCTION AT CONTRACTOR'S OWN EXPENSE.

2.REFER TO "PLAN & PROFILE" SHEETS FOR ROADWAY INFORMATION.

0 20′ 40′
SCALE: 1" = 40′

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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

GRADING LAYOUT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		76
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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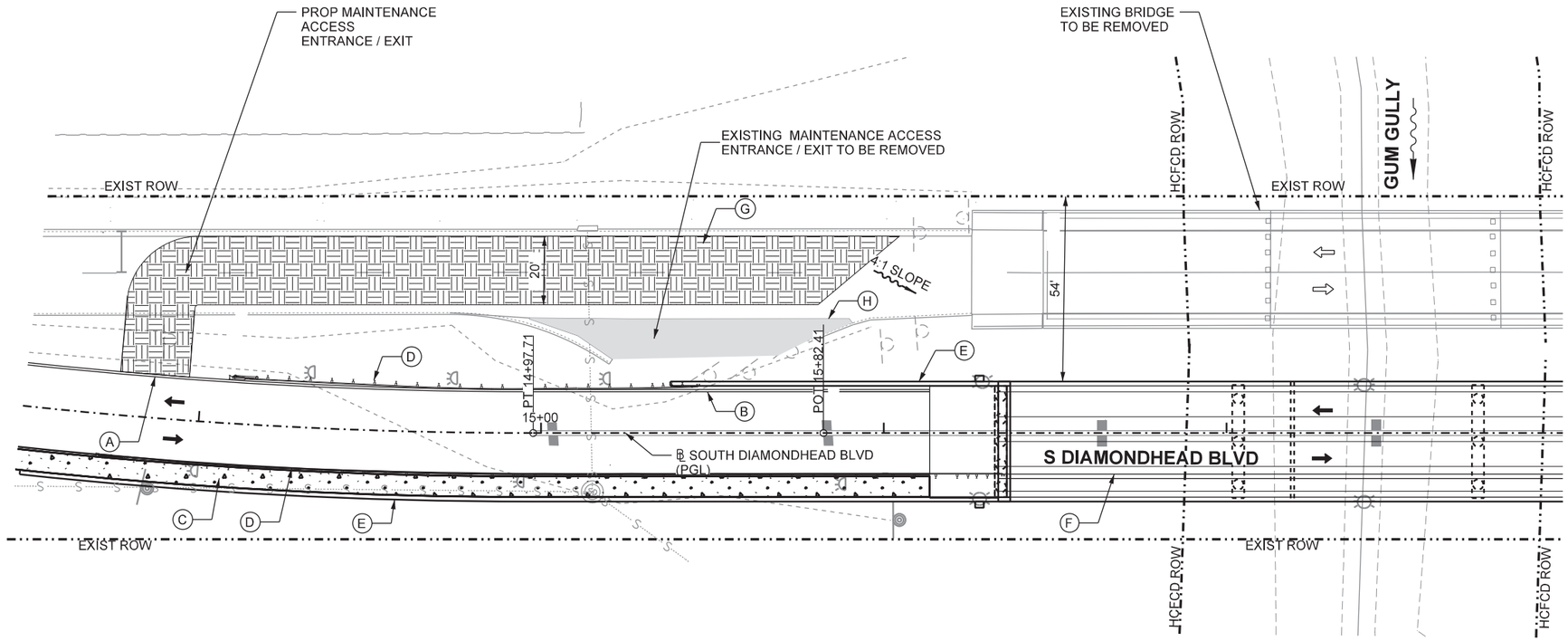
LEGEND

- (A) CURB (TY I)
- (B) CURB (TY II)
- (C) 5" CONC SIDEWALK
- (D) MBGF
- (E) RETAINING WALL
- (F) BRIDGE
- (G) PROP DIRT MAINTENANCE ACCESS ROAD
- (H) EXIST MAINTENANCE ACCESS ENTRANCE / EXIT
- EXISTING TRAFFIC FLOW DIRECTION
- PROPOSED TRAFFIC FLOW DIRECTION
- FLOW DIRECTION



0 20' 40'

SCALE: 1" = 40'

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SOUTH DIAMONDHEAD BLVD AT GUM GULLY

MAINTENANCE ACCESS PLAN

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		77
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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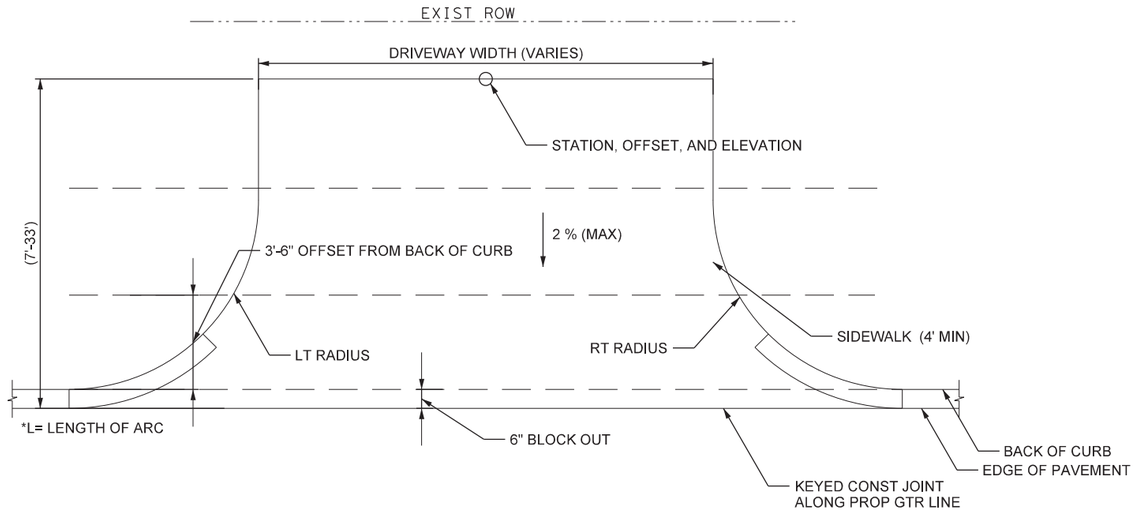

DRIVEWAY PLAN

S DIAMONDHEAD BLVD DRIVEWAY SUMMARY TABLE

DRIVEWAY #	ALIGNMENT	STATION	OFFSET	ELEVATION	SLOPE (%)	WIDTH (FT)	LENGTH (FT)	LT RADIUS (FT)
1	SOUTH DIAMONDHEAD_E	102+80.48	23.45' RT	35.48'	0.87%	30.9'	11.34'	8'
2	SOUTH DIAMONDHEAD BLVD	22+15.83	45.66' LT	35.68'	0.28%	25'	33.0'	25'
3	SOUTH DIAMONDHEAD BLVD	24+94.85	19.86' LT	37.41'	2.70%	16.5'	7.87'	8'

SCALE = N.T.S

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PROPOSED DRIVEWAY DETAIL AND SUMMARY

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		78
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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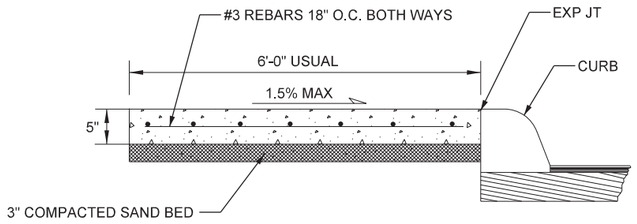

TYPICAL SIDEWALK SECTION
NTS

SIDEWALK NOTES:

1. REINFORCING STEEL SHALL BE GRADE 60.
2. CONCRETE SHALL HAVE MIN STRENGHT OF 3,000 PSI.
3. EXPANSION JOINTS SHALL BE SPACED AT 40 FT (MAX).
4. PAYMENT OF SAND BED SUBSIDIARY TO ITEM 531, SIDEWALKS.

SCALE = N.T.S

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STATE OF TEXAS

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

MISCELLANEOUS
ROADWAY DETAILS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		79
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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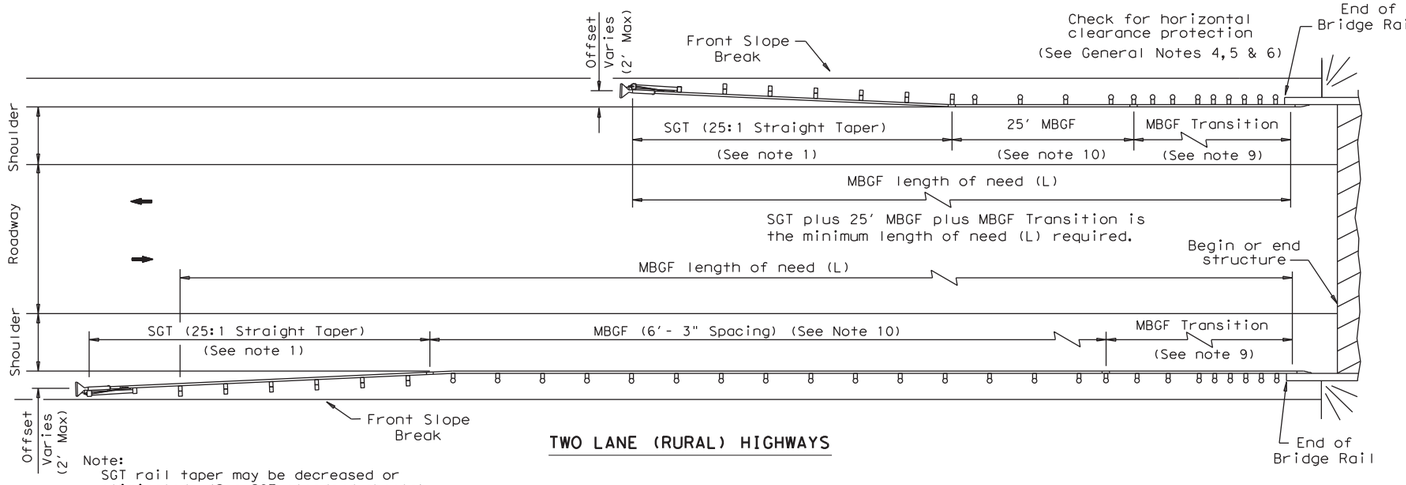
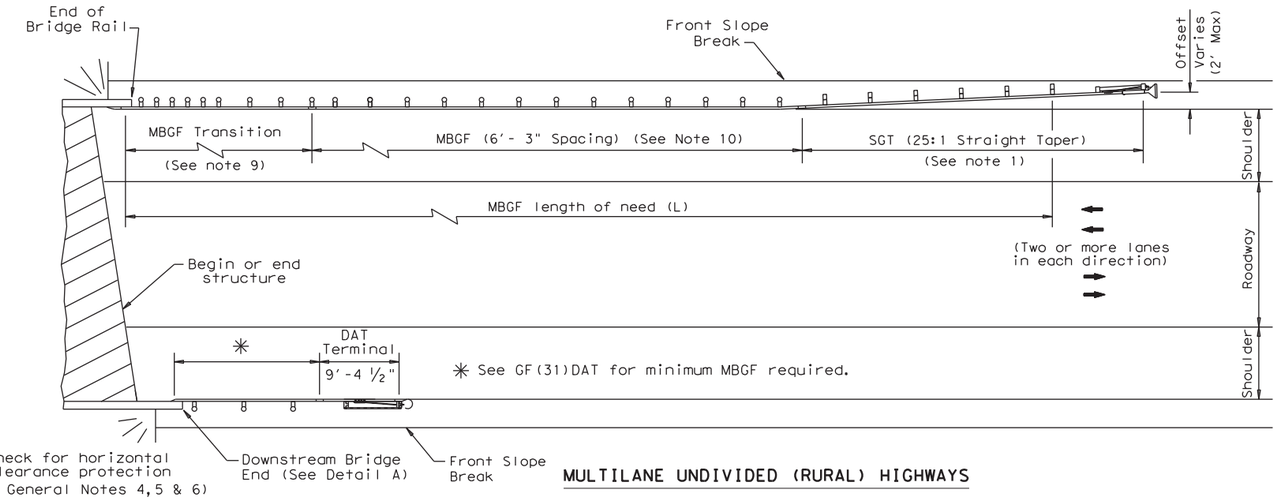
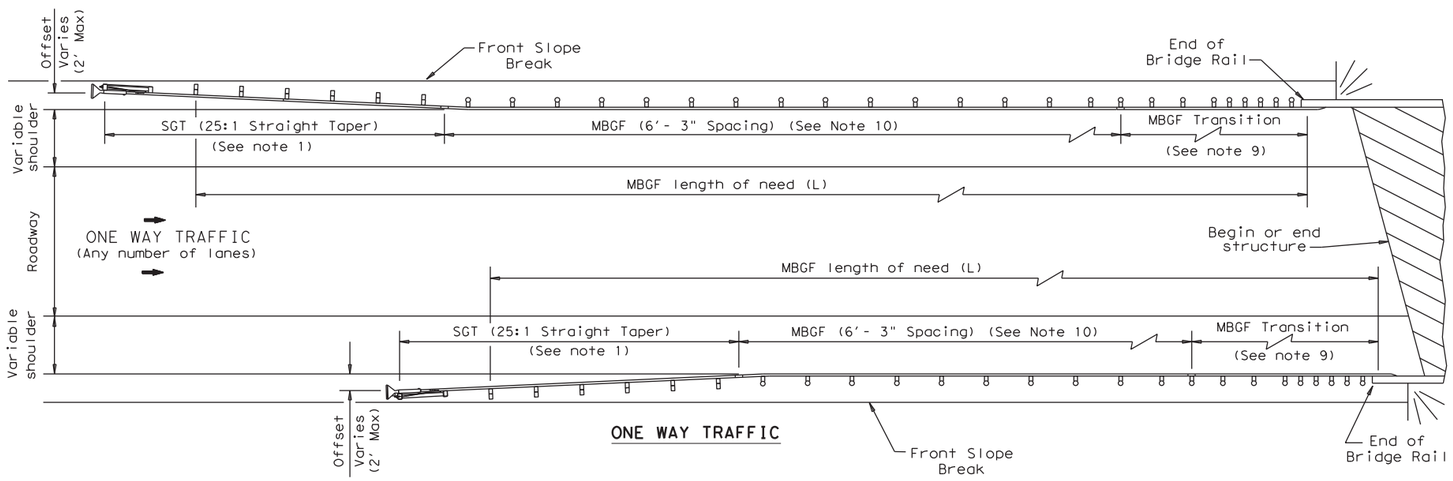


TWO LANE (RURAL) HIGHWAYS

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



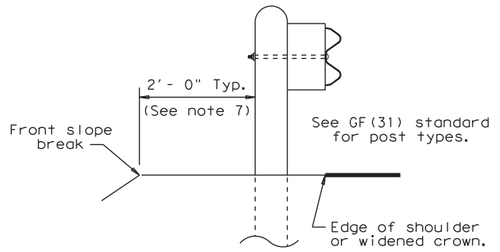
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		80

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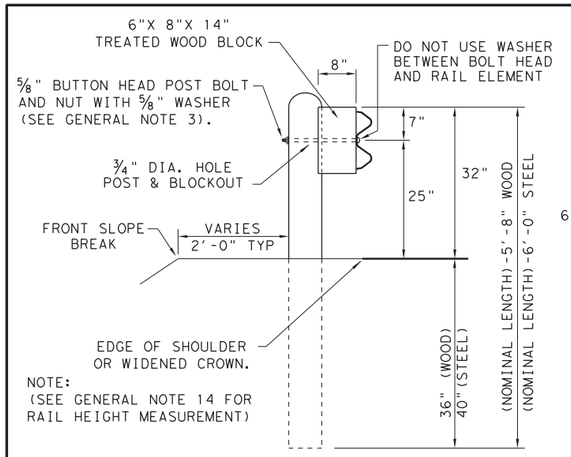
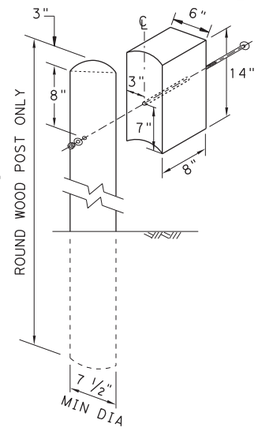
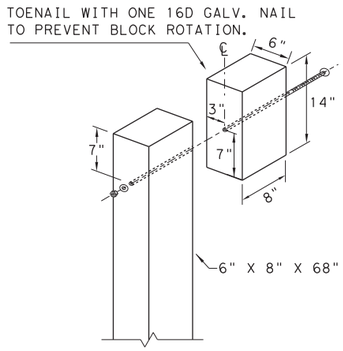


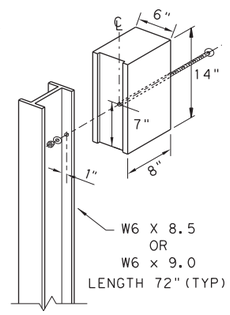
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

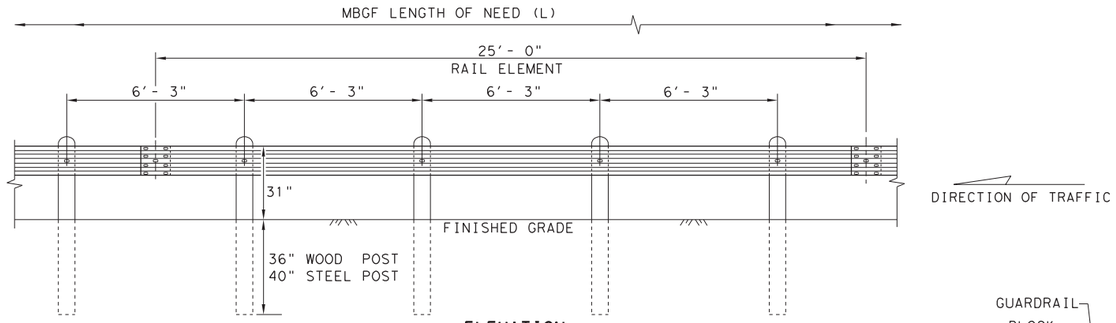


WOOD BLOCK TO
RECTANGULAR WOOD POST



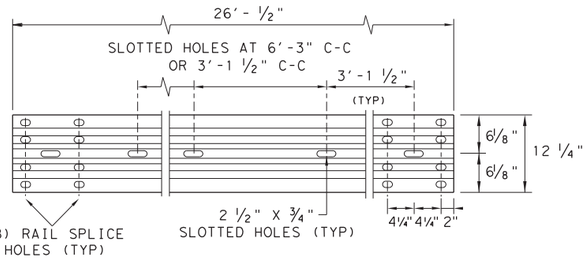
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



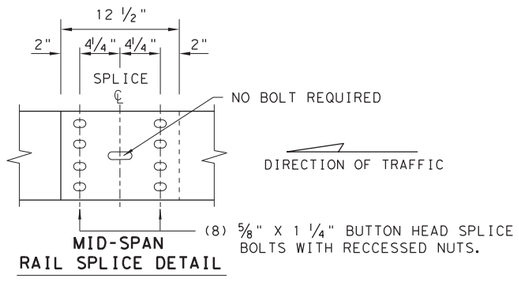
ELEVATION
MID-SPAN RAIL SPLICE

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



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

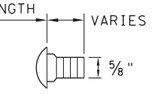
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



MID-SPAN
RAIL SPLICE DETAIL

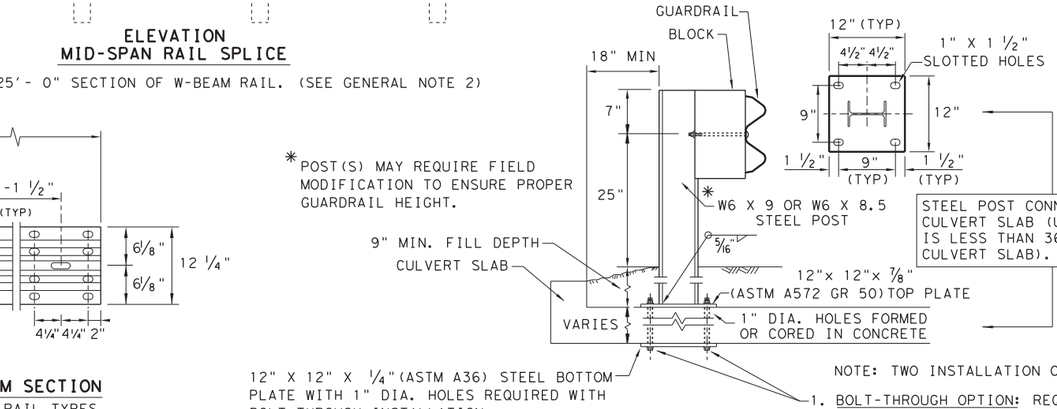
NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

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.



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

12" X 12" X 1/4"(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. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" 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.

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.

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	
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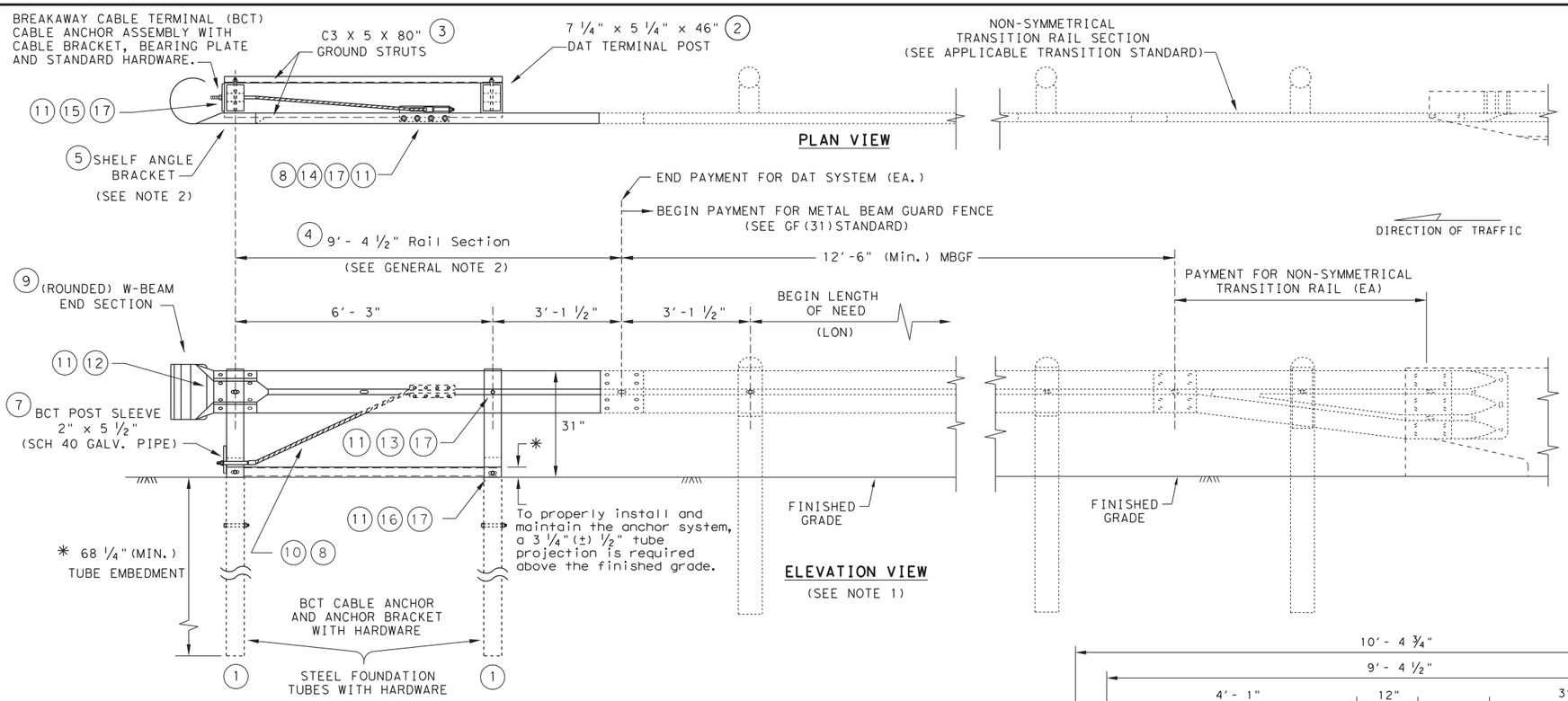


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

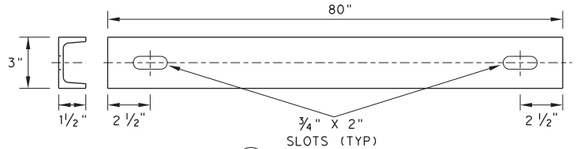
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

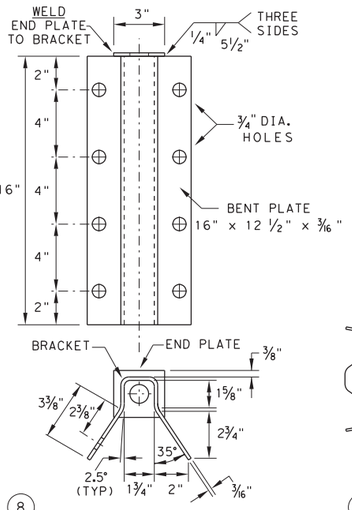
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

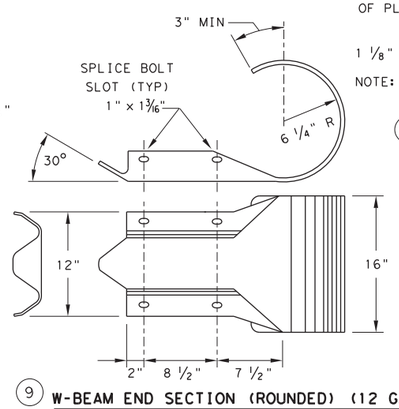
(4) TERMINAL RAIL ELEMENT FOR DAT



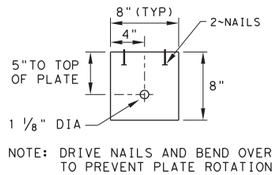
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

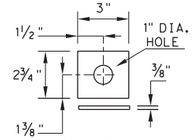


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

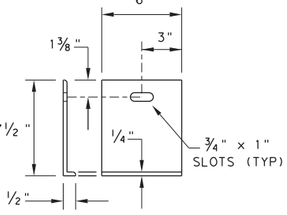


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

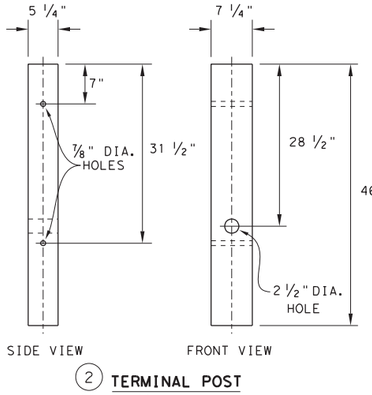
(6) BEARING PLATE
8"x 8"x 5/8" R



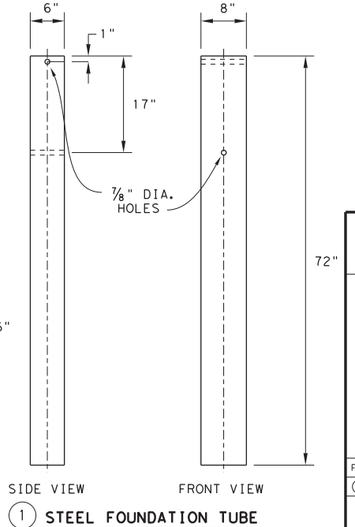
END PLATE



(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 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		82

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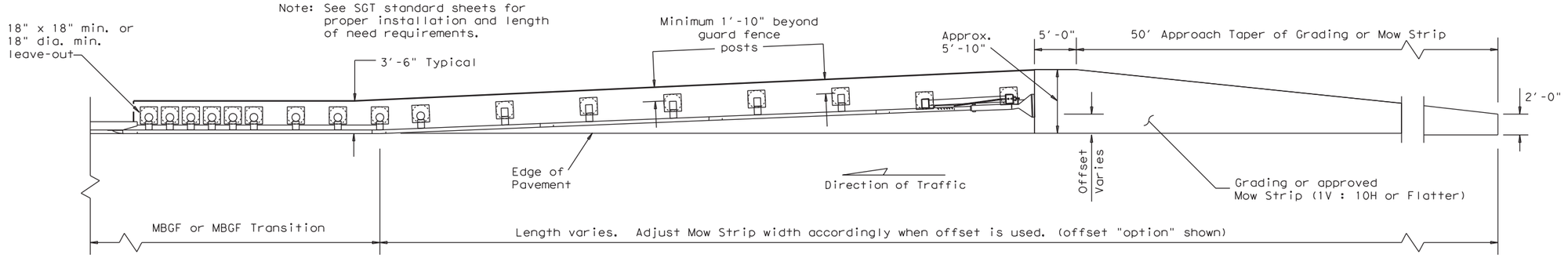
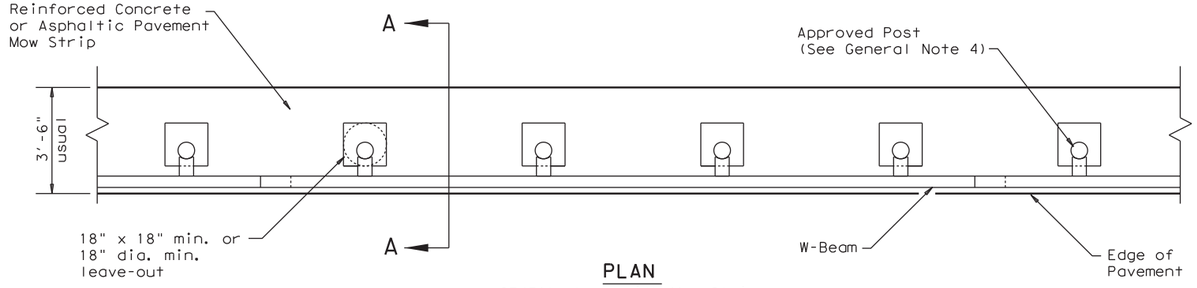
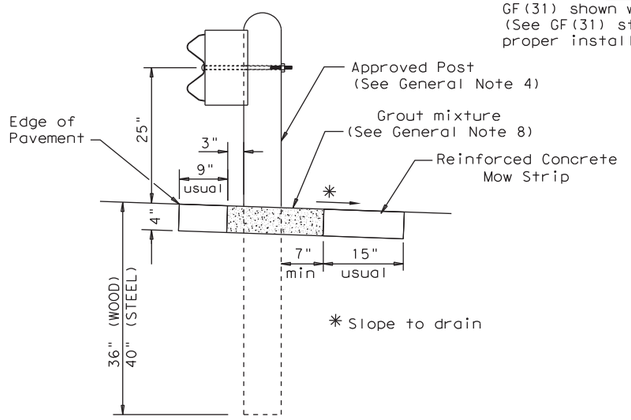


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



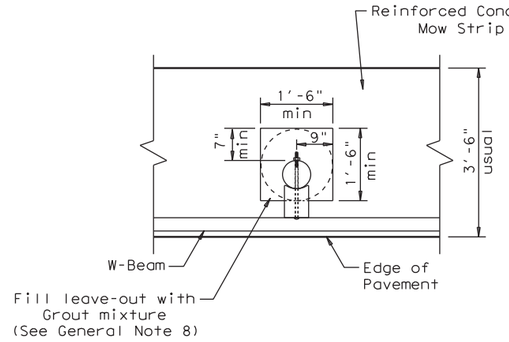
PLAN

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



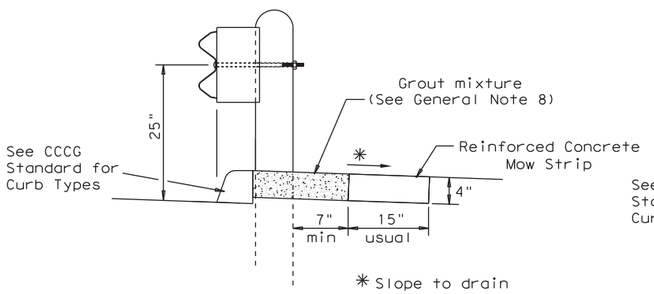
SECTION A-A

Typical



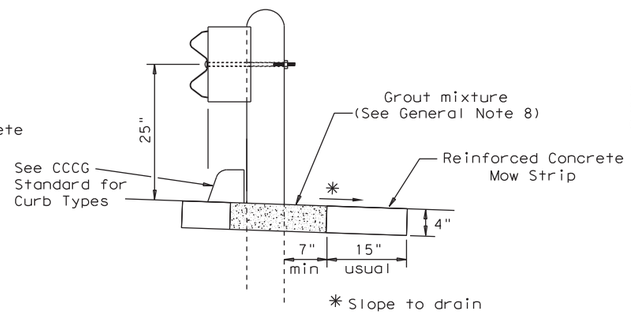
MOW STRIP DETAIL

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



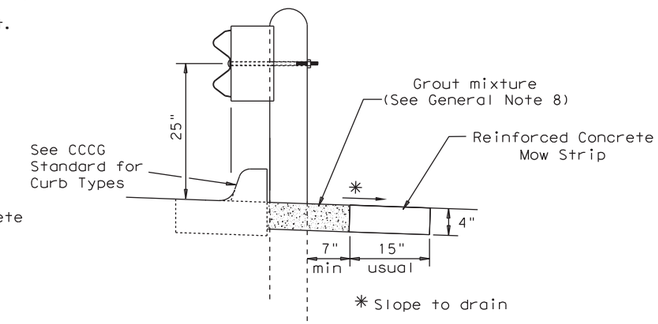
CURB OPTION (1)

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		
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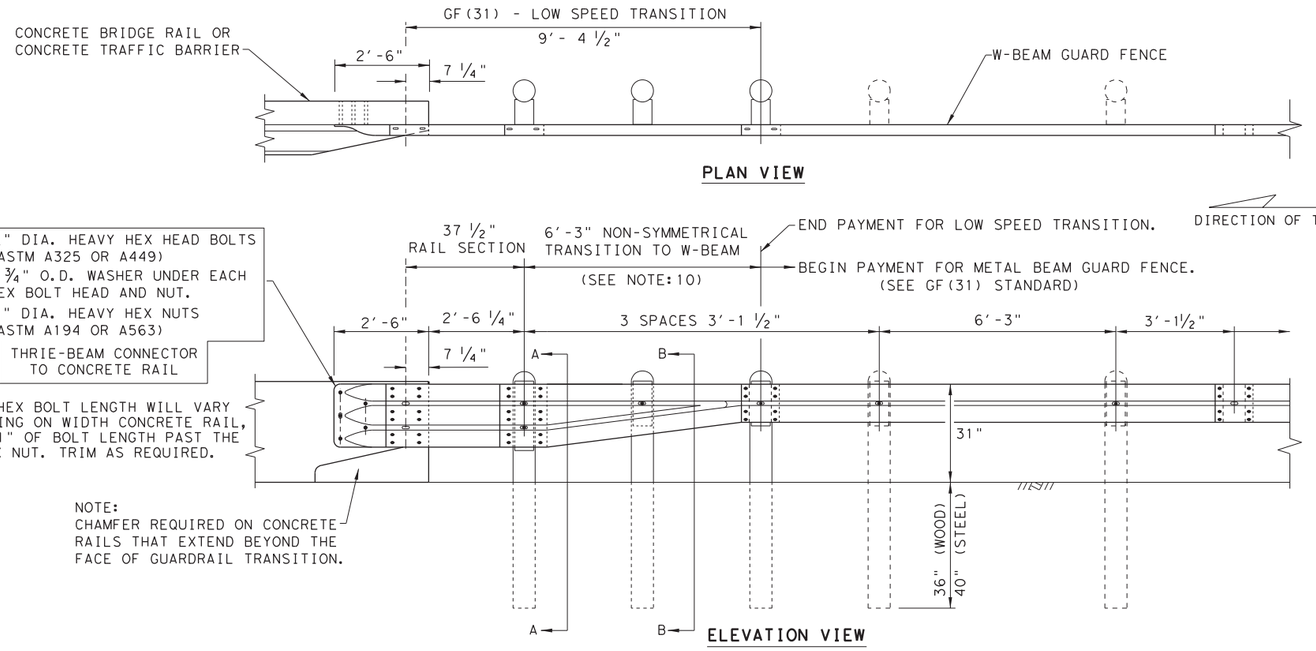


GENERAL NOTES

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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. 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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

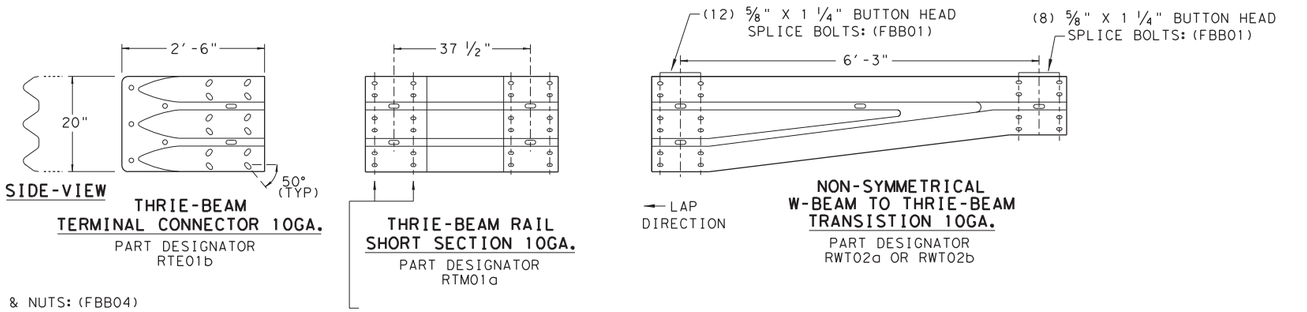
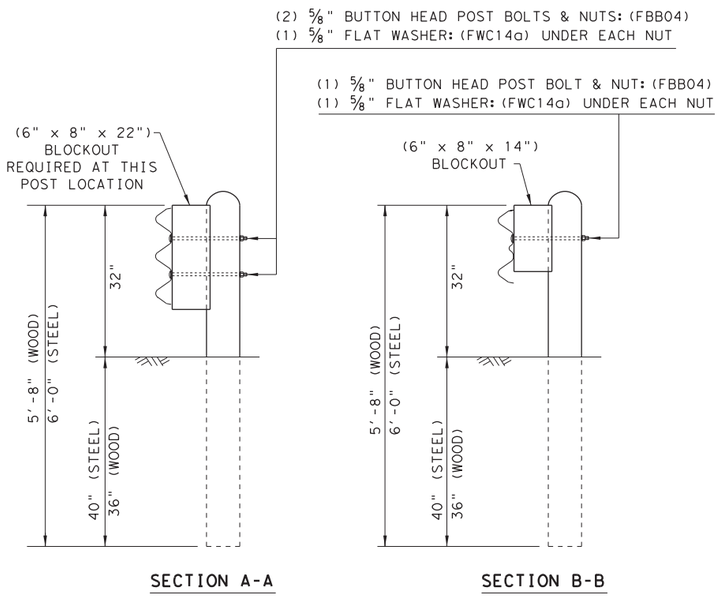
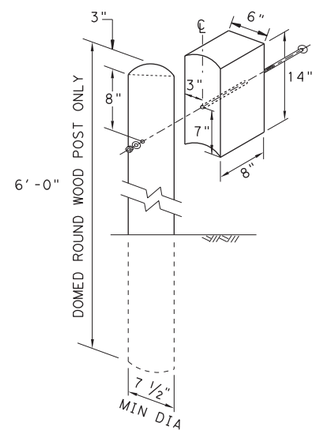


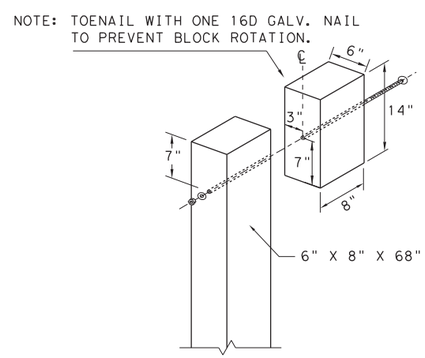
PLATE WASHER INSTRUCTIONS

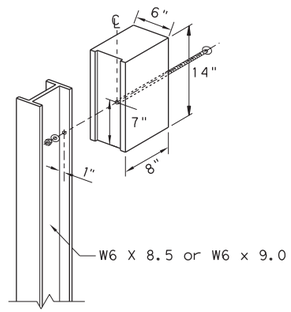
BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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







LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

FILE: gf31trt1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		84

DATE: 11/30/2022
FILE: c:\pw\pwe-useast-006\per1a.gonzalez\dms24690\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(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

PLAN VIEW

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)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½" (+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

B B A A

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

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) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

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)

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)

(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

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"

FINISHED GRADE

LINE POST (3, 4, 5, 6, 7 & 8)

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

POST(2)

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	⅞" 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	0912	72	406	CS	
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		85	

DATE: 11/30/2022
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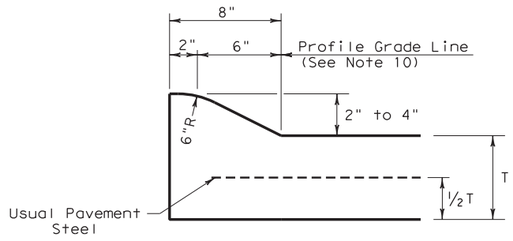
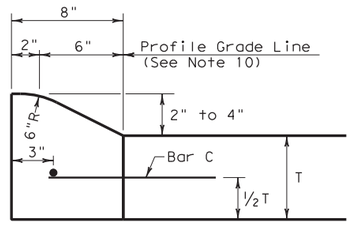
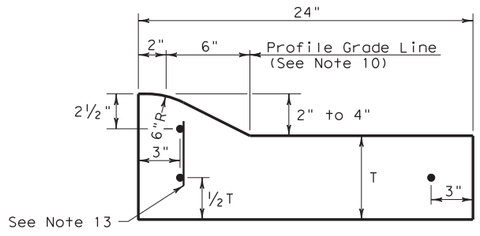


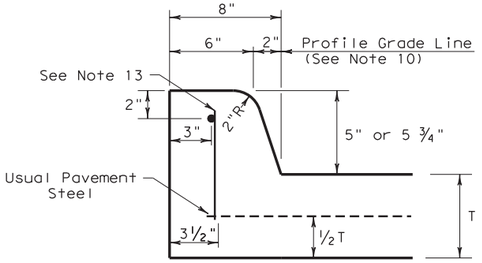
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



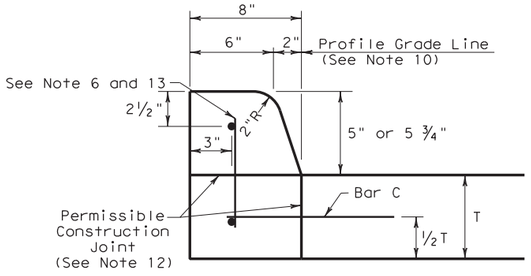
TYPE I CURB
2" - 4" HEIGHT



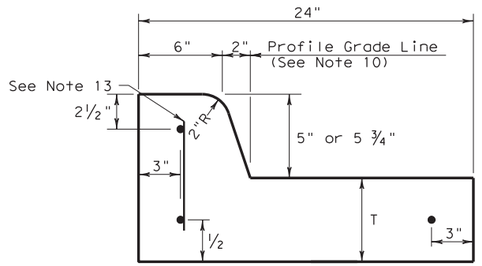
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



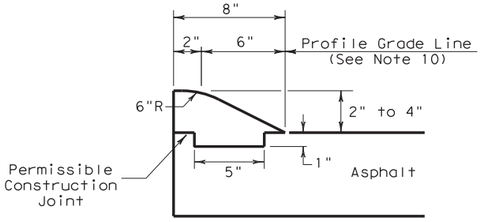
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



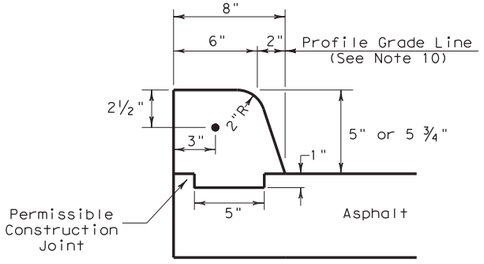
TYPE II CURB
5" - 5 ¾" HEIGHT



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



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



TYPE IV CURB (KEYED)
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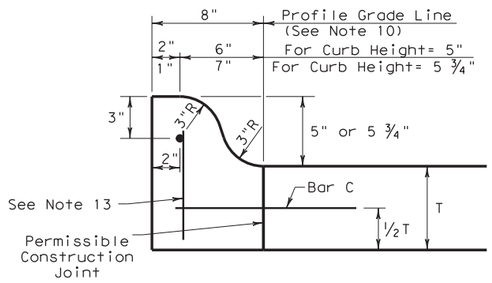
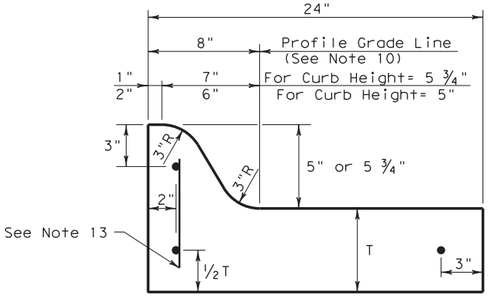
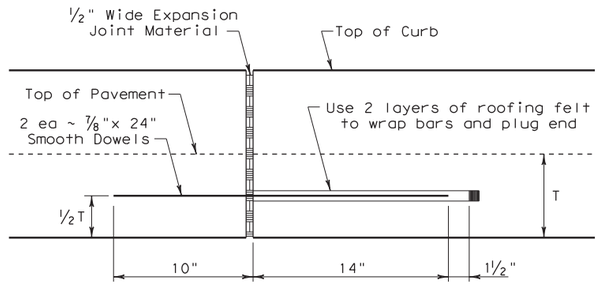


TYPE IIa CURB
5" - 5 ¾" HEIGHT

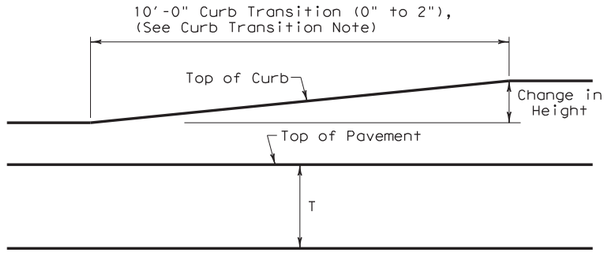


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

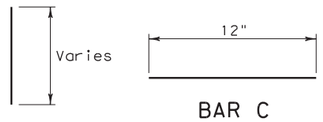
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



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

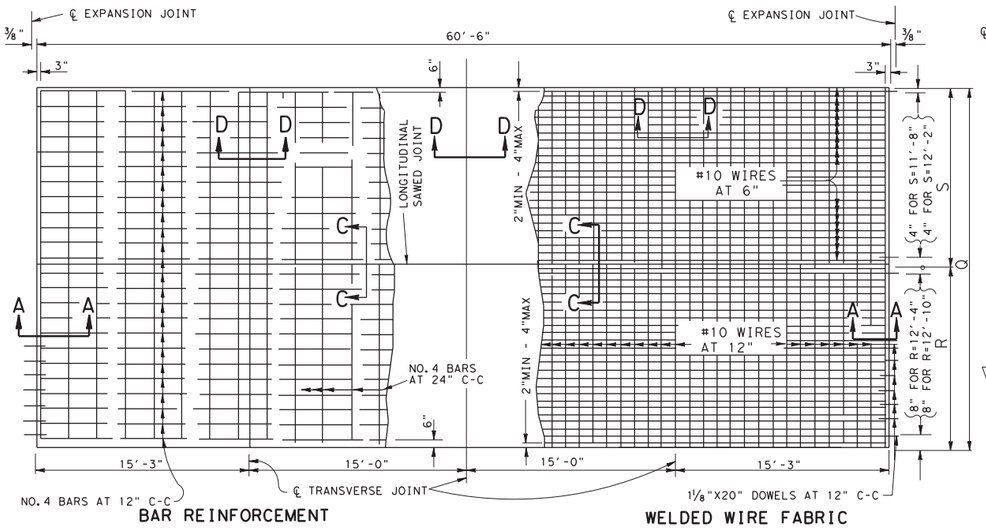
Texas Department of Transportation

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	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		86

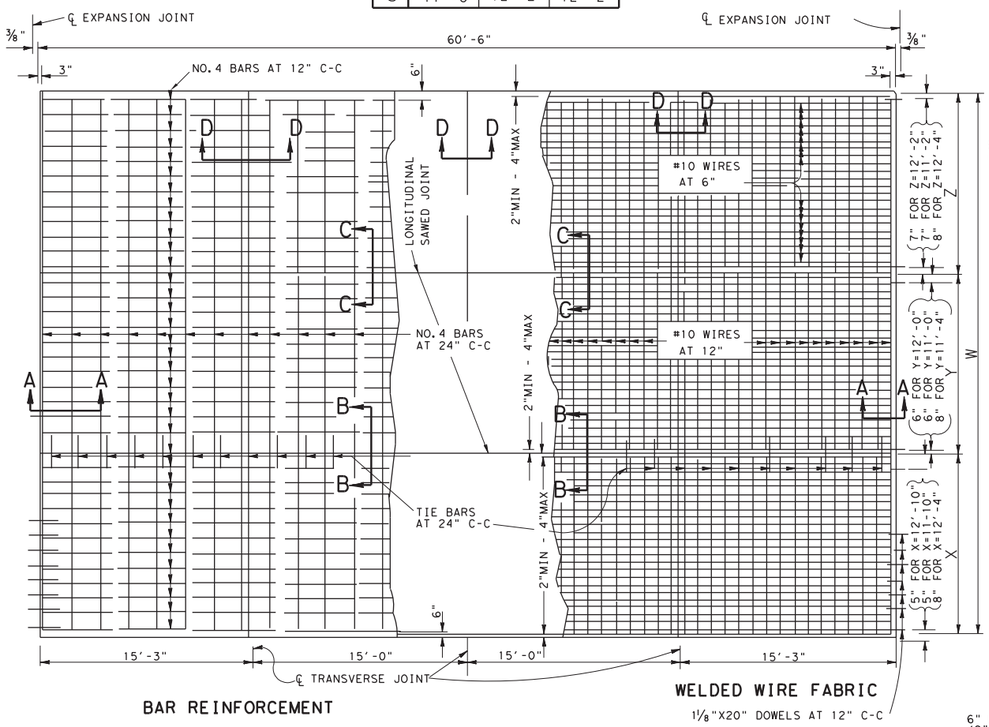


BAR REINFORCEMENT

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"



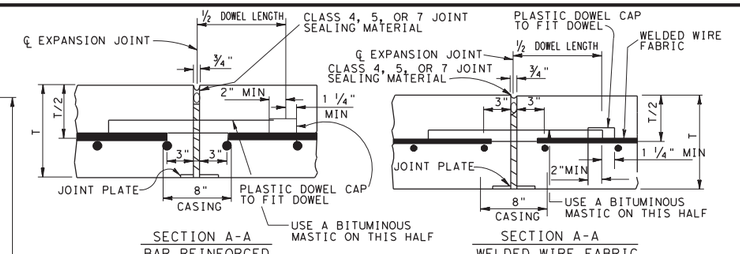
BAR REINFORCEMENT

WELDED WIRE FABRIC

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

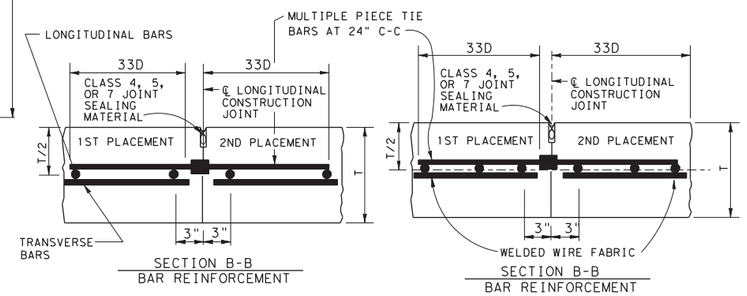


SECTION A-A
BAR REINFORCED

SECTION A-A
WELDED WIRE FABRIC

TRANSVERSE EXPANSION JOINTS

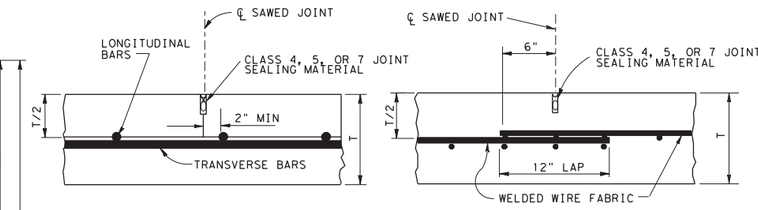
NOTE: DOWEL BARS CONFORMING TO ASTM A615 OR A616 GRADE 60 ARE ACCEPTABLE



SECTION B-B
BAR REINFORCEMENT

SECTION B-B
BAR REINFORCEMENT

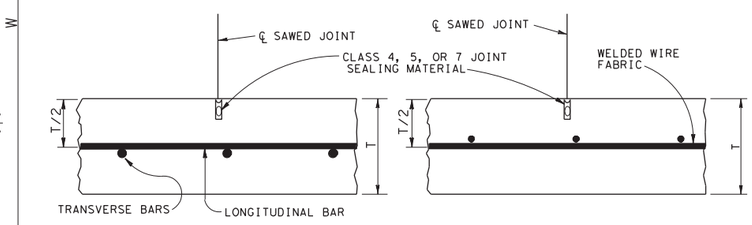
LONGITUDINAL CONSTRUCTION JOINTS



SECTION C-C
BAR REINFORCEMENT

SECTION C-C
WELDED WIRE FABRIC

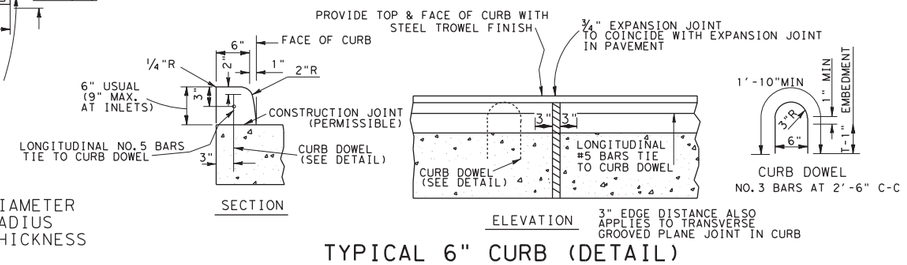
LONGITUDINAL SAWED JOINTS



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 1/8 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 1/8 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 1/2 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)

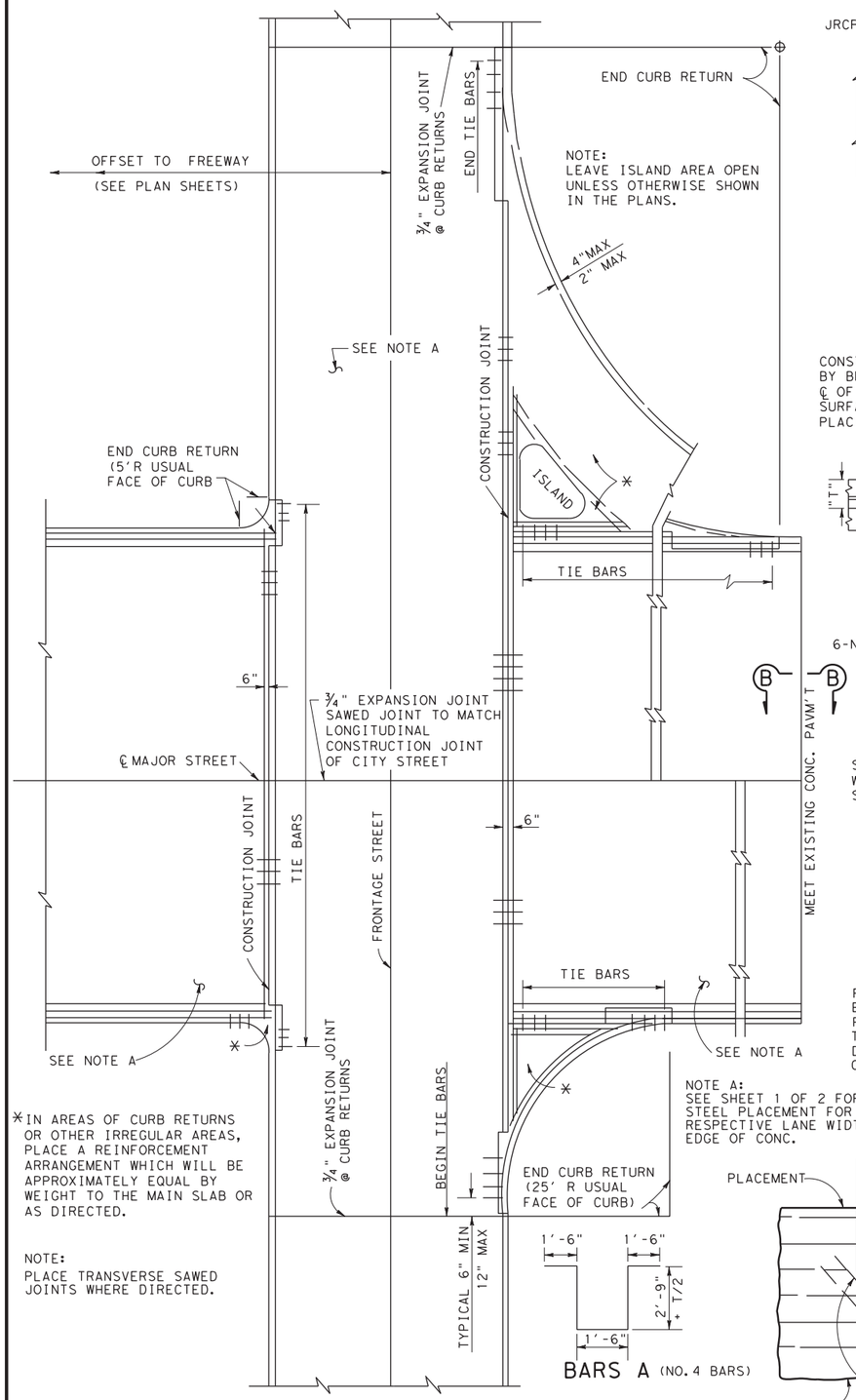
Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS

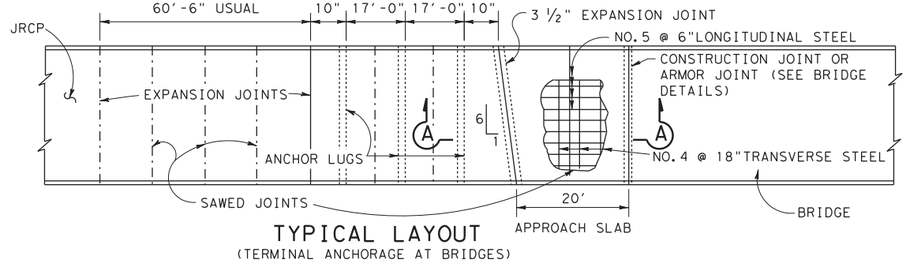
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP

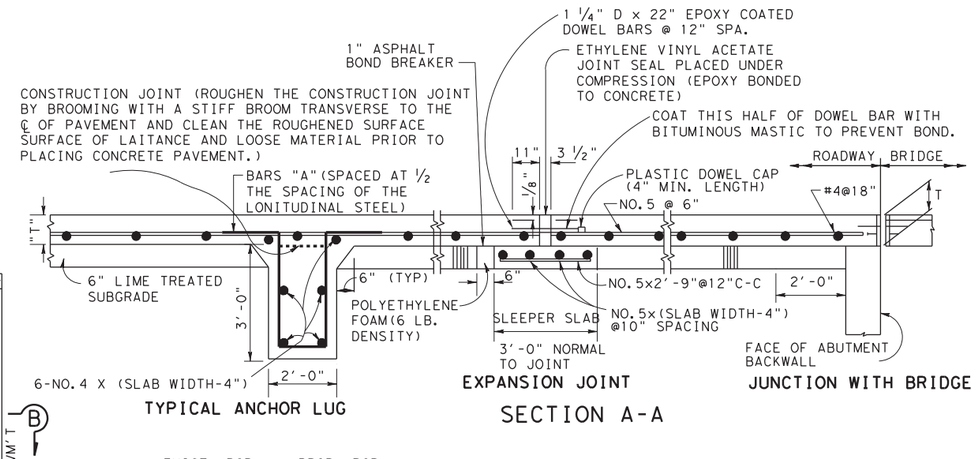
FILE: STDB-2.dgn	DN:	CK:	DW:	CK:	
©TxDOT MAR.2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 8/2015 MODIFIED NOTES	HOU				87
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0912	72	406	CS



INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET
TYPICAL REINFORCING PLAN



TYPICAL LAYOUT
(TERMINAL ANCHORAGE AT BRIDGES)

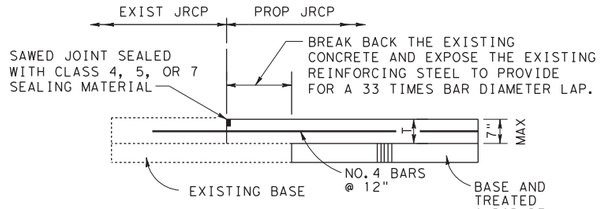


TYPICAL ANCHOR LUG

EXPANSION JOINT

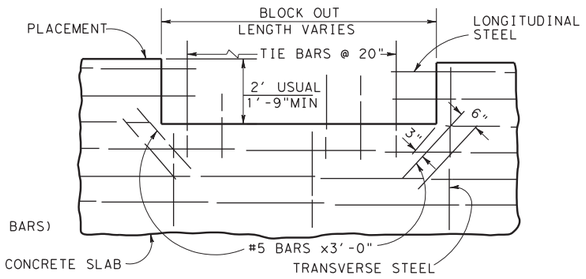
SECTION A-A

JUNCTION WITH BRIDGE



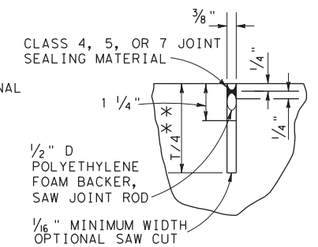
SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 7" MAX)

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.

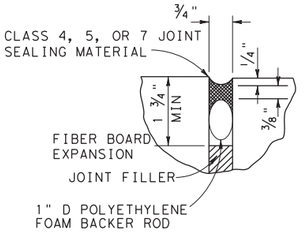


DETAIL OF BLOCKOUT

*OMIT TIE BARS @ INLET BLOCK-OUT



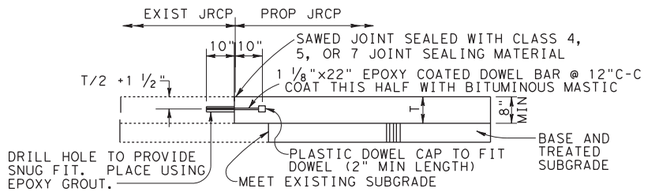
SAWED JOINT



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

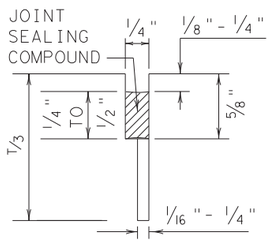
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP SHEET 2 OF 2

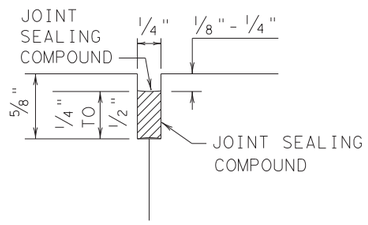
FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 9/2013 ADDED NOTE 8/2015 MODIFIED NOTES	HOU			88
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0912	72	406	CS

DATE: 11/30/2022
FILE: c:\bms\pwe-useast-006\perla.gonzalez\dms24690\js14.dgn

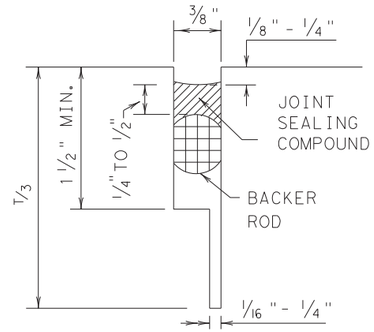
METHOD B: JOINT SEALING COMPOUND



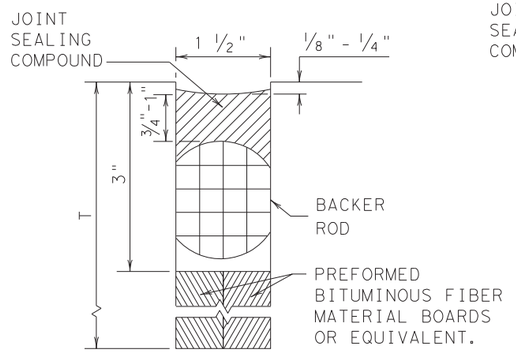
LONGITUDINAL SAWED CONTRACTION JOINT



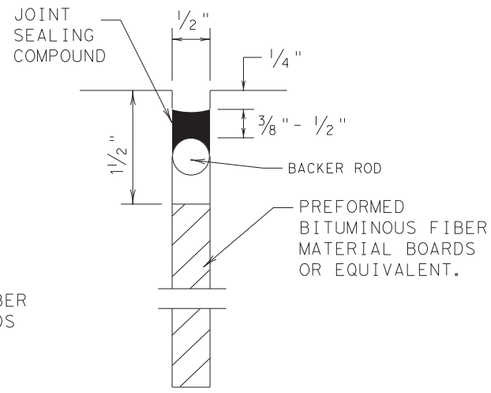
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

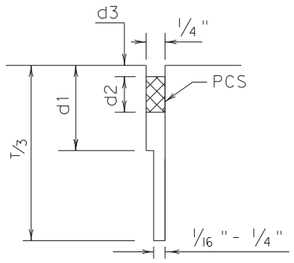


TRANSVERSE FORMED EXPANSION JOINT

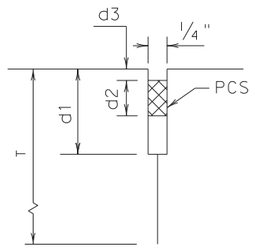


FORMED ISOLATION JOINT

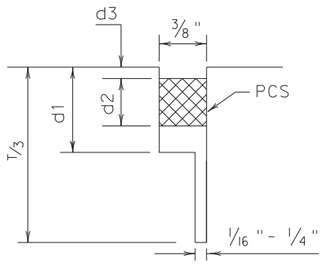
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



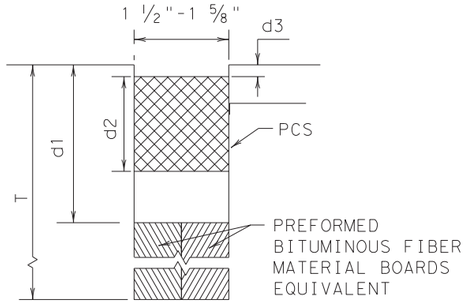
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

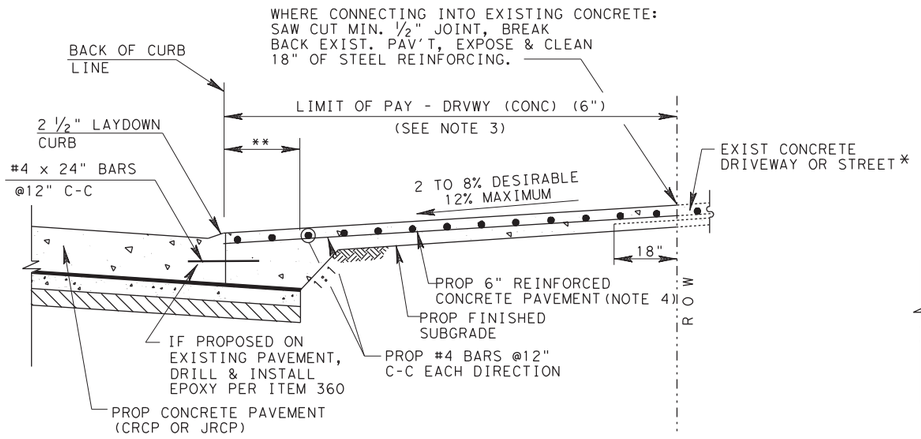
Texas Department of Transportation | Design Division Standard

CONCRETE PAVING DETAILS

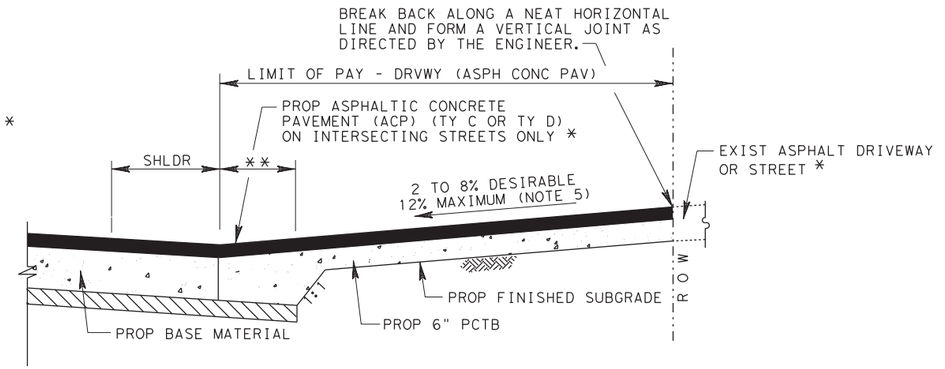
JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		89



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

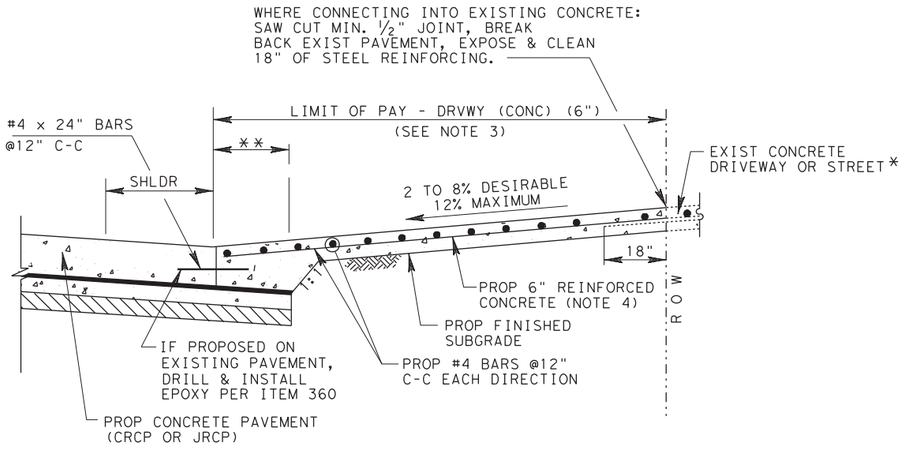
JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

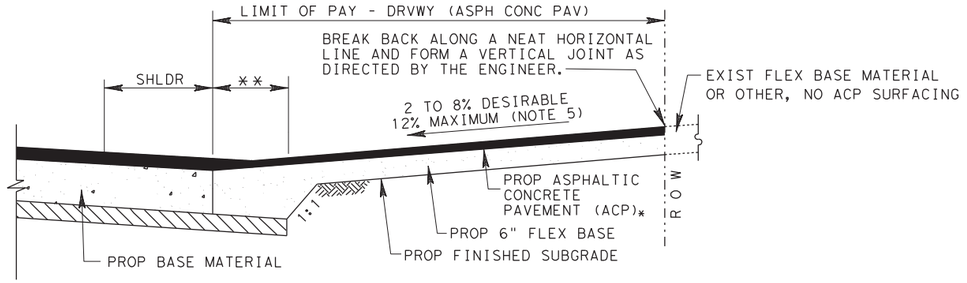
ACP- ASPHALTIC CONCRETE PAVEMENT

* 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

Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

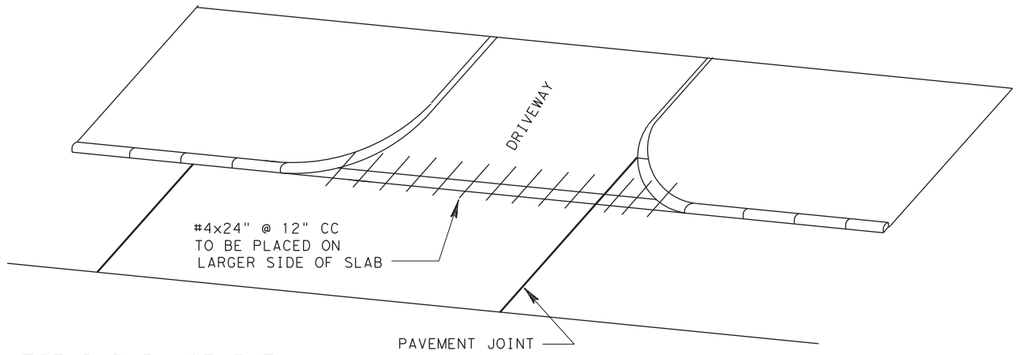
DD

FILE: STDB-8a.dgn

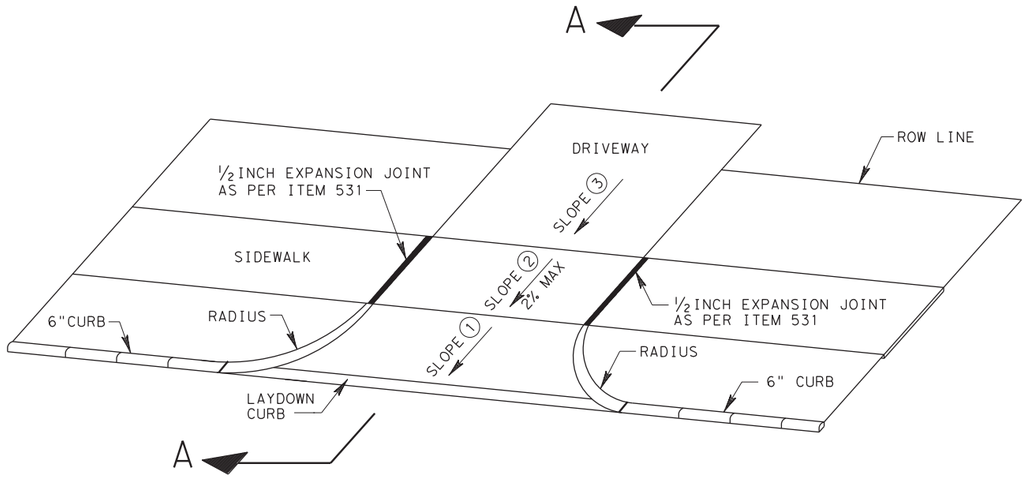
REVISIONS
11/15 ADDED NOTE FOR PCTB
3/17 MODIFIED PAVEMENT SLOPES

DIST	FED REG	PROJECT NO.	SHEET
HOU	6	SEE TITLE SHEET	90

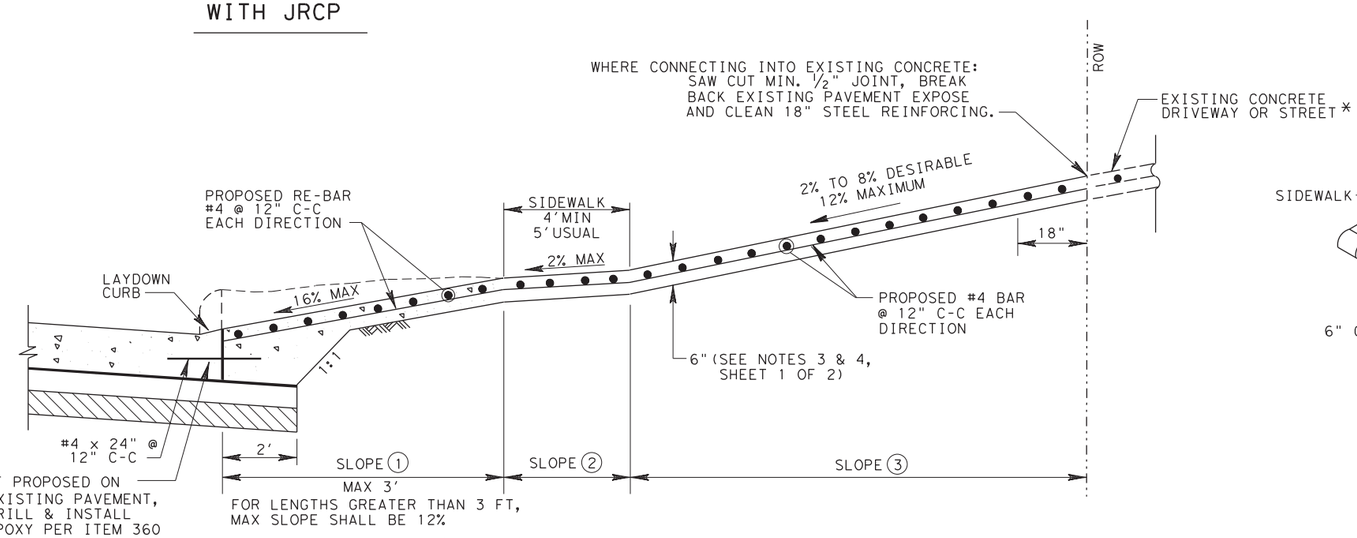
COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	0912	72	406	CS



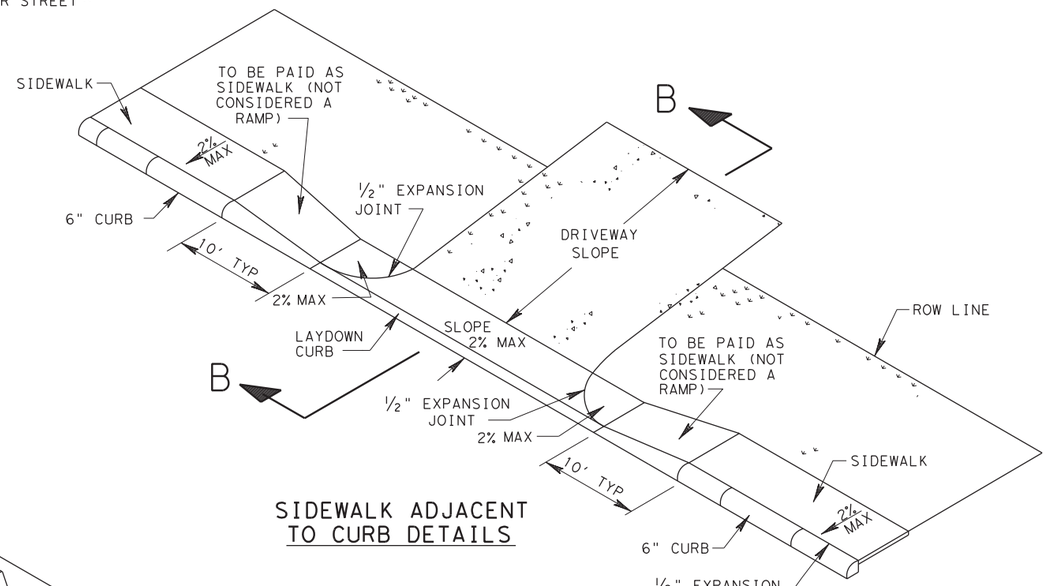
TIE BAR PLACEMENT WITH JRCP



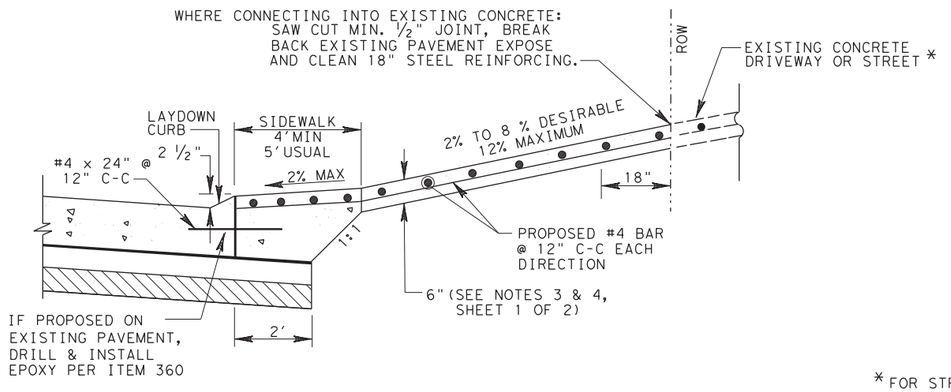
SIDEWALK OFFSET FROM CURB DETAILS



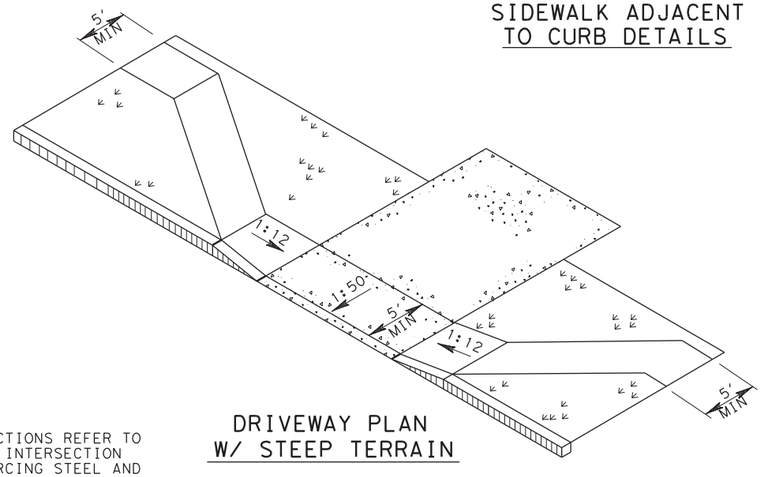
SLOPES W/ SIDEWALKS OFFSET FROM CURB (SECTION A-A)



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

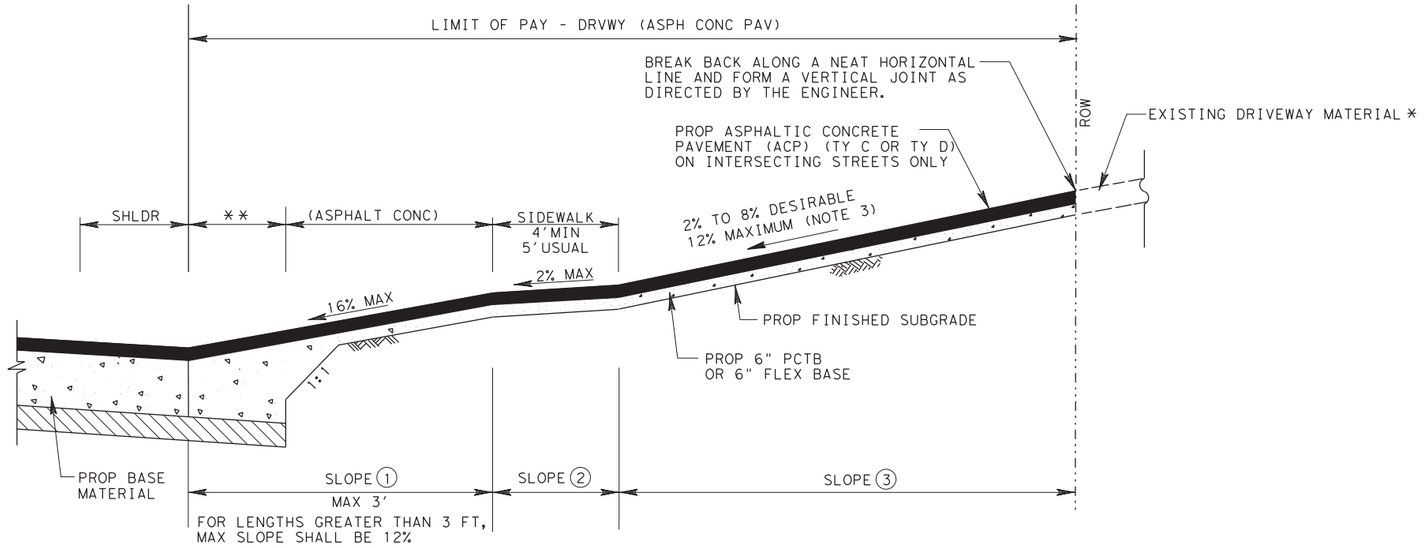
DRIVEWAY DETAILS

DD

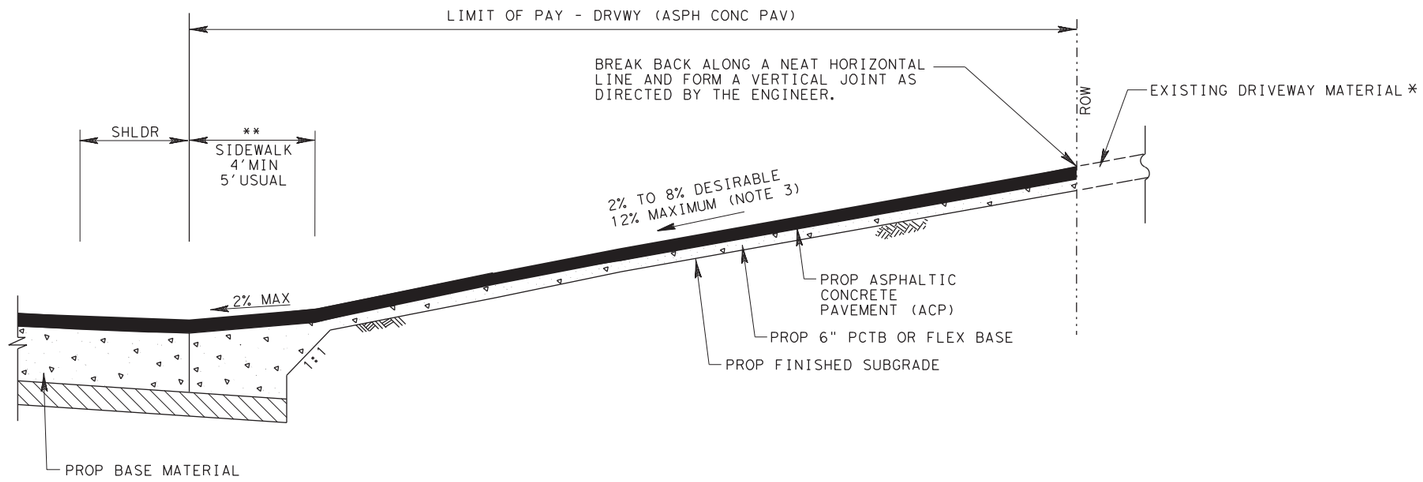
FILE: STDB-8b.dgn	DN:	CK:	DW:	CK:
©TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 9/09 ADDED NOTE FOR ITEM 360. 11/15 ADDED NOTE FOR PCTB	HOU	6	SEE TITLE SHEET	91

COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	0912	72	406	CS

STDB8B



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS OFFSET



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS ADJACENT

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

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	SEE TITLE SHEET			92
	COUNTY	CONTROL	SECT	JOB	HIGHWAY	
	HARRIS	0912	72	406	CS	

STDB8C

RW_EB01

Beginning chain RW_EB01 description
==========

Point W40 N 13,901,122.9417 E 3,206,858.6006 Sta 10+00.00

Course from W40 to PC RW_EB011 N 81^ 13' 26.63" E Dist 26.9050

Curve Data

Curve RW_EB011
P.I. Station 11+13.63 N 13,901,140.2789 E 3,206,970.9037
Delta = 6^ 59' 24.54" (LT)
Degree = 4^ 02' 05.69"
Tangent = 86.7284
Length = 173.2416
Radius = 1,420.0000
External = 2.6461
Long Chord = 173.1342
Mid. Ord. = 2.6411
P.C. Station 10+26.91 N 13,901,127.0466 E 3,206,885.1907
P.T. Station 12+00.15 N 13,901,163.8439 E 3,207,054.3693
C.C. N 13,902,530.4221 E 3,206,668.5401
Back = N 81^ 13' 26.63" E
Ahead = N 74^ 14' 02.08" E
Chord Bear = N 77^ 43' 44.35" E

Course from PT RW_EB011 to W41 N 74^ 14' 02.08" E Dist 84.7030

Point W41 N 13,901,186.8586 E 3,207,135.8857 Sta 12+84.85

Course from W41 to W42 N 74^ 14' 02.09" E Dist 56.7653

Point W42 N 13,901,202.2824 E 3,207,190.5154 Sta 13+41.61

==========
Ending chain RW_EB01 description

RW01

Beginning chain RW01 description
==========

Point R1 N 13,901,202.2855 E 3,207,190.5265 Sta 10+00.00

Course from R1 to R2 N 15^ 46' 39.97" W Dist 89.0030

Point R2 N 13,901,287.9352 E 3,207,166.3260 Sta 10+89.00

==========
Ending chain RW01 description

RW_WB01

Beginning chain RW_WB01 description
==========

Point W30 N 13,901,197.5272 E 3,207,044.8594 Sta 10+00.00

Course from W30 to W31 N 74^ 14' 02.08" E Dist 84.7031

Point W31 N 13,901,220.5419 E 3,207,126.3759 Sta 10+84.70

Course from W31 to W32 N 74^ 14' 02.09" E Dist 56.7653

Point W32 N 13,901,235.9656 E 3,207,181.0056 Sta 11+41.47

==========
Ending chain RW_WB01 description

NOT TO SCALE

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141382
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

RETAINING WALL
HORIZONTAL ALIGNMENT
DATA

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		93
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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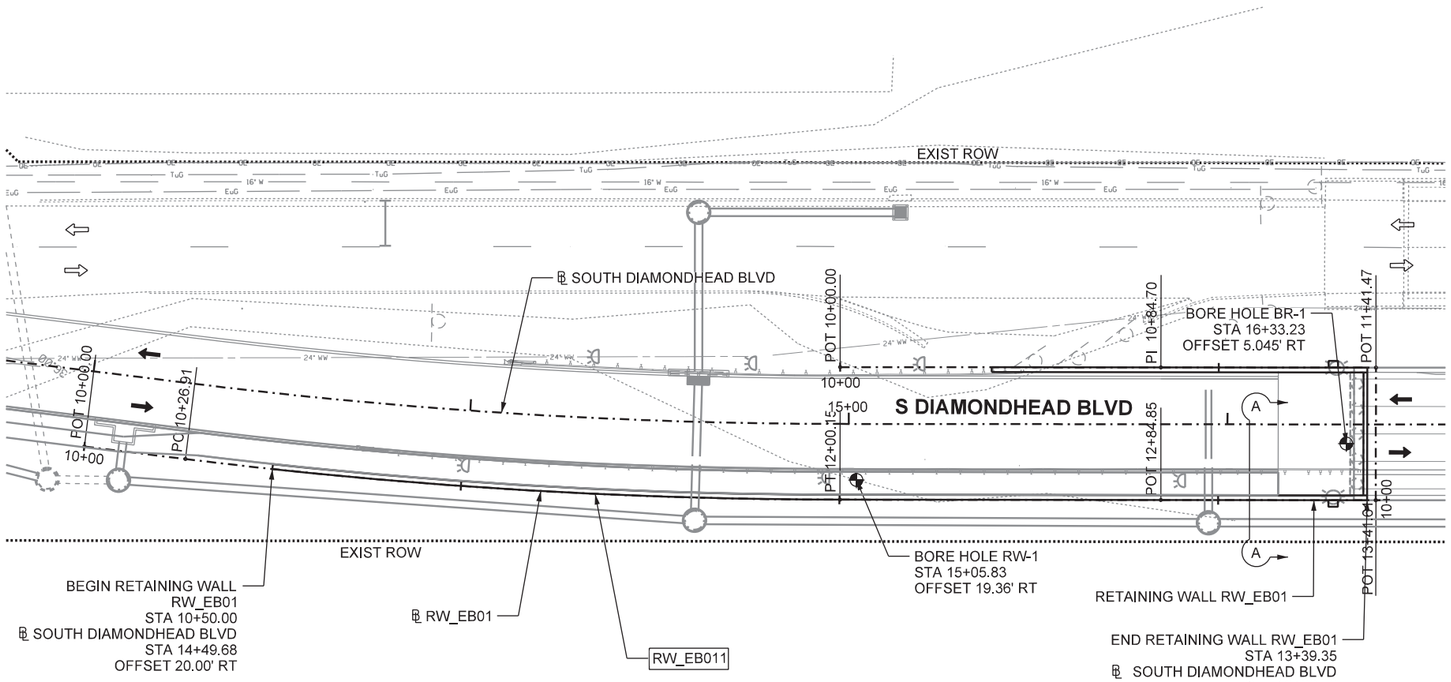
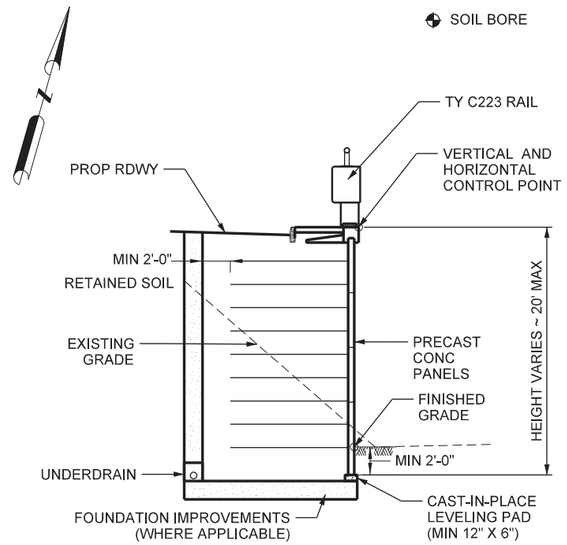


PLAN

LEGEND

SOIL BORE

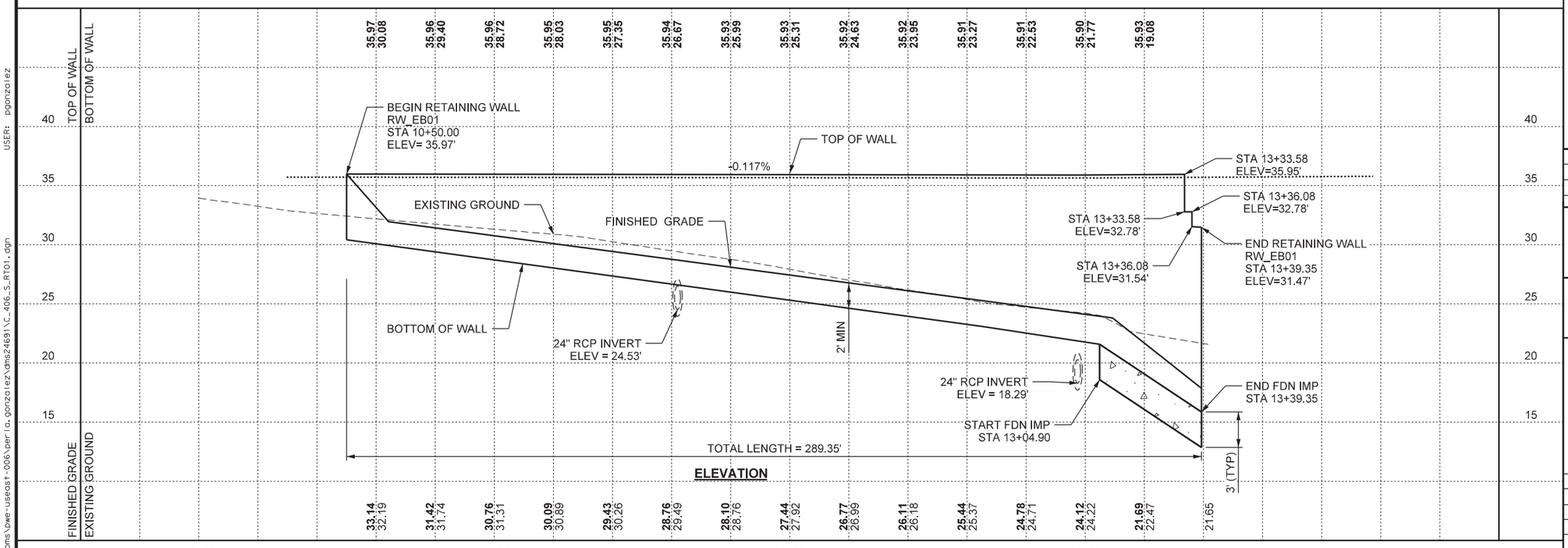


SECTION A-A

NTS

RW_EB011

PI STATION	= 11+13.63
DELTA	= 6^ 59' 24.54" (LT)
DEGREE OF CURVE	= 4^ 2' 05.69"
TANGENT	= 86.73
LENGTH	= 173.13
RADIUS	= 1420.00
PC STATION	= 10+26.91
PT STATION	= 12+00.15



ELEVATION

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

RETAINING WALL
PLAN & PROFILE
(RW_EB01)

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		94
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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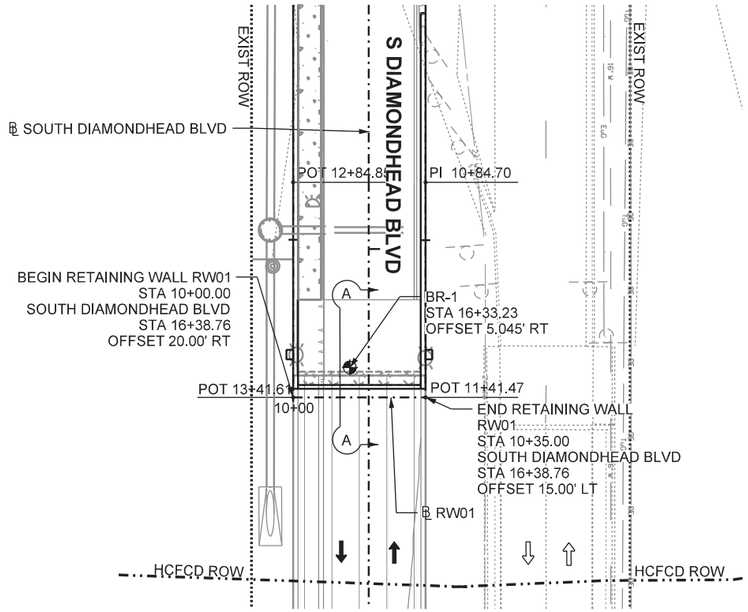
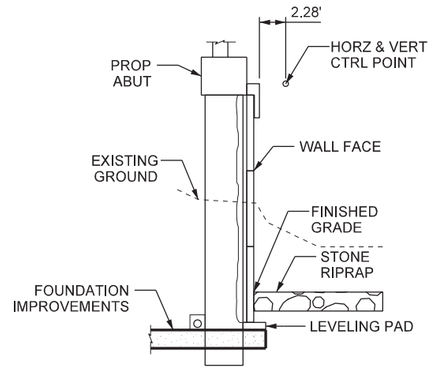


PLAN

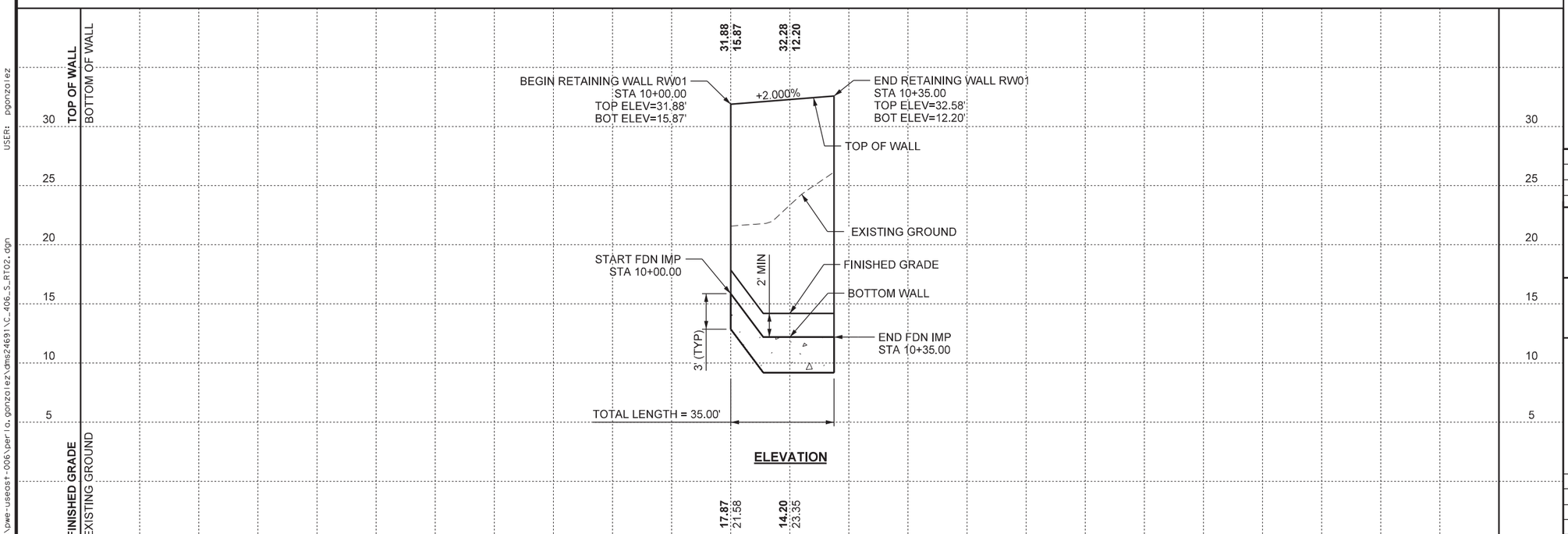
LEGEND

SOIL BORE



SECTION A-A

NTS



ELEVATION

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

RETAINING WALL
PLAN & PROFILE
(RW01)

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		95
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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11/30/2022
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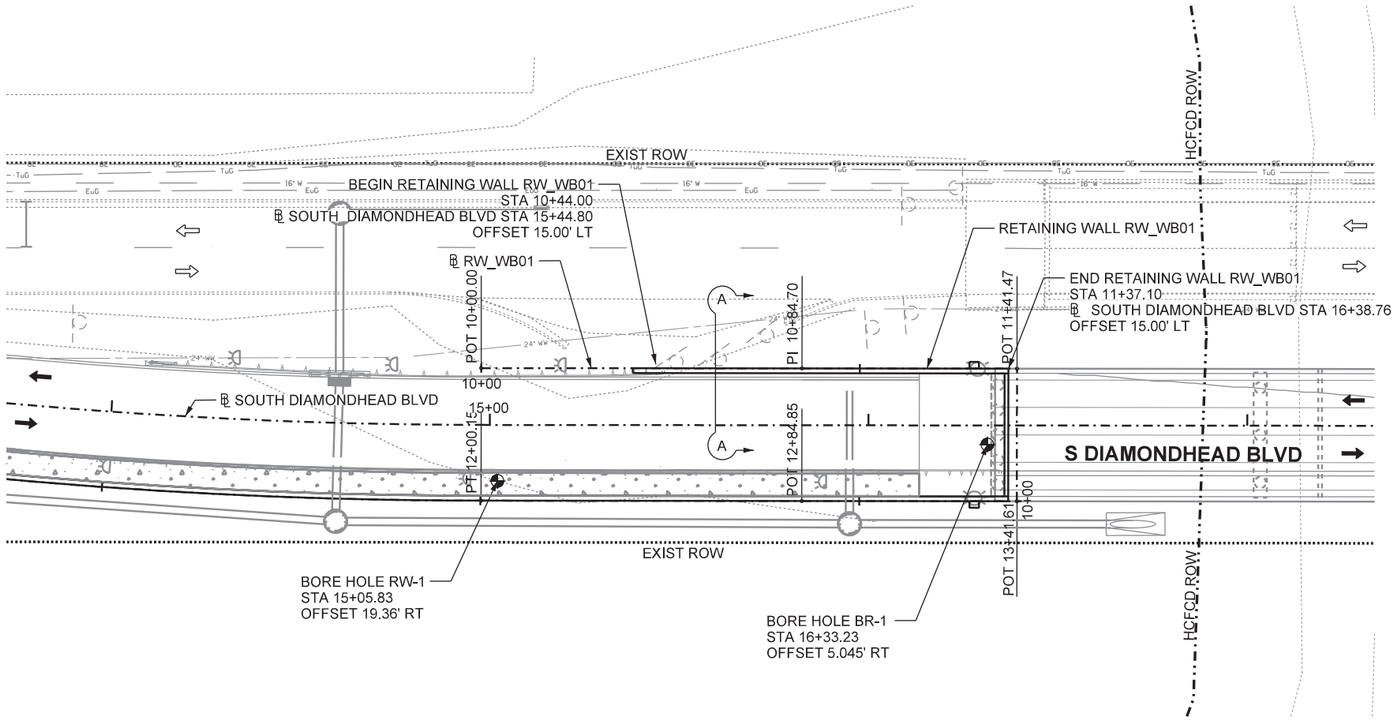
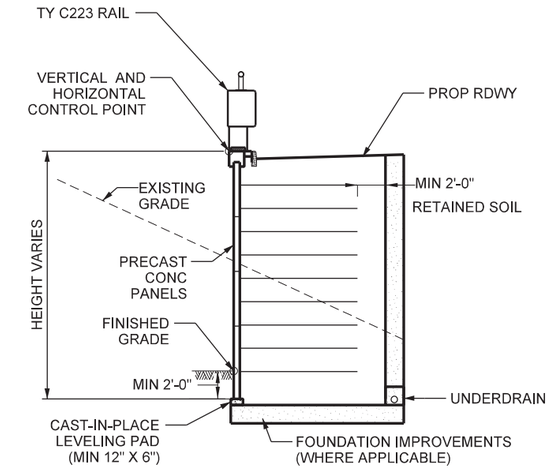
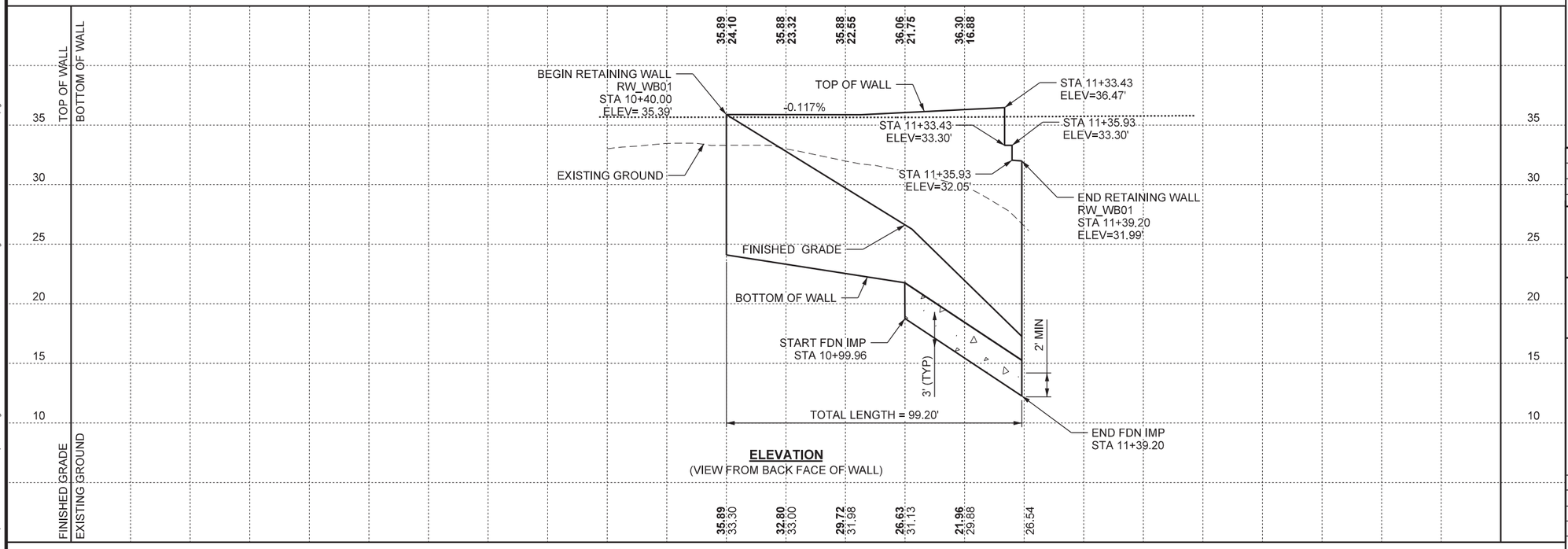


PLAN



SECTION A-A
NTS



ELEVATION
(VIEW FROM BACK FACE OF WALL)

0 20′ 40′
SCALE: 1" = 40′ HORZ
1" = 10′ VERT

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11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

RETAINING WALL
PLAN & PROFILE
(RW_WB01)

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		96
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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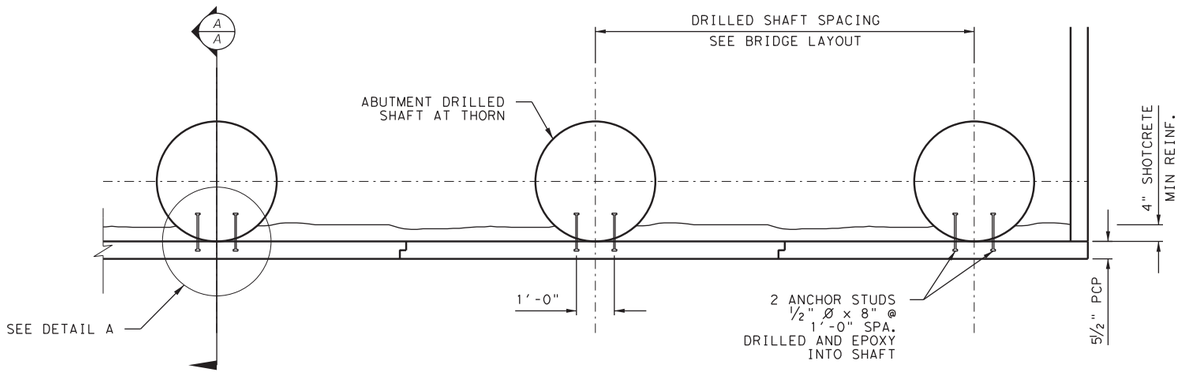
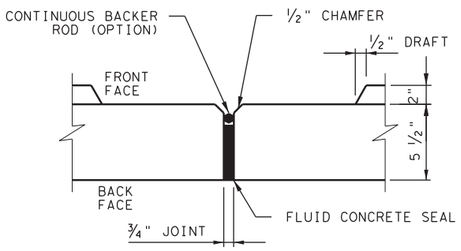


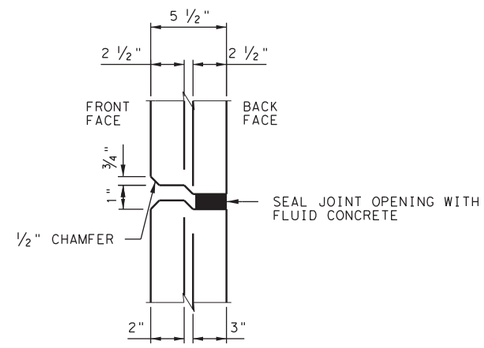
PARTIAL PLAN VIEW AT ABUTMENT FACE

DRILLED SHAFT WALL NOTES

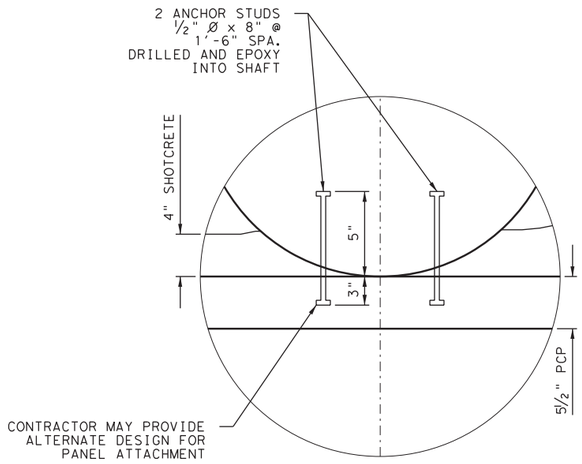
1. ALL CONCRETE SHALL BE CLASS "C" UNLESS OTHERWISE NOTED.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. PANELS WILL ATTACH DIRECTLY TO DRILLED SHAFTS/COLUMNS.
4. CONTRACTOR HAS THE OPTION TO SUBMIT ALTERNATE PRECAST PANEL TO SHAFT CONNECTION DETAILS TO THE ENGINEER FOR APPROVAL.
5. SEE AESTHETIC DETAILS FOR FINISH & PAINT INFORMATION FOR WALLS & COPING.
6. MINIMUM REINFORCED SHOTCRETE SHALL BE SUBSIDIARY TO ITEM 423-6007 RETAINING WALL (DRILL SHAFT) (FACIA)



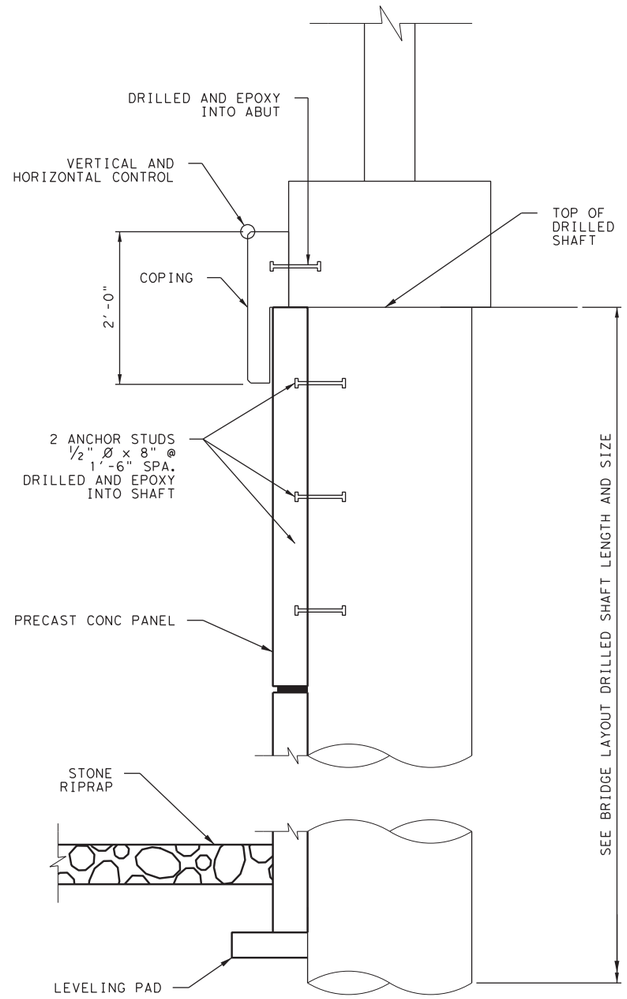
TYPICAL VERTICAL JOINT



TYPICAL HORIZONTAL JOINT



DETAIL A



SECTION A-A
THROUGH WALL

STATE OF TEXAS
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11/30/2022

NO.	DATE	REVISION	APPROV.

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ABUTMENT RETAINING WALL DETAILS

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6			97
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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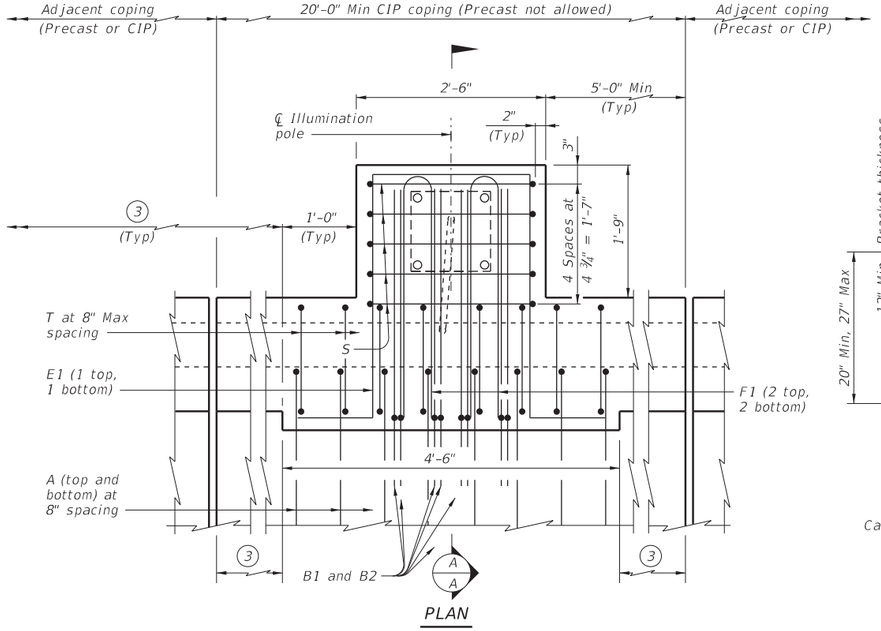
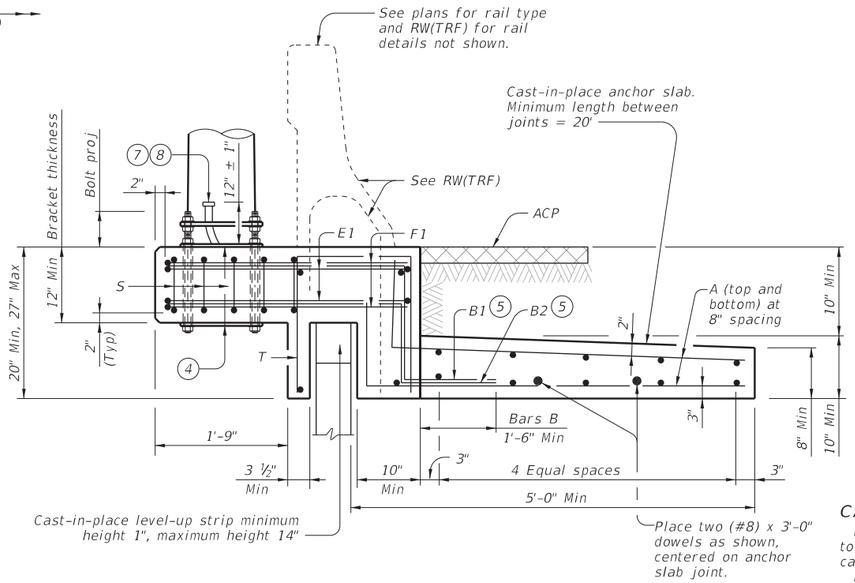


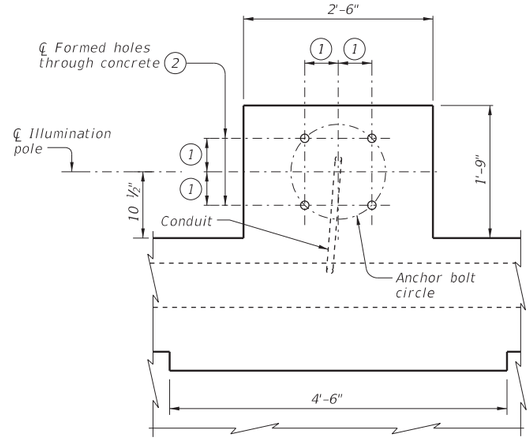
PLAN

(See Mounting Plan for details not shown.)



SECTION A-A

(Longitudinal bars are #4 unless shown otherwise.)



MOUNTING PLAN

(Reinforcing not shown for clarity.)

ADJACENT TO ACP

(1) See table for anchor bolt offset dimension.

(2) See table for hole diameter size.

(3) See RW(TRF) for coping details and reinforcing not shown.

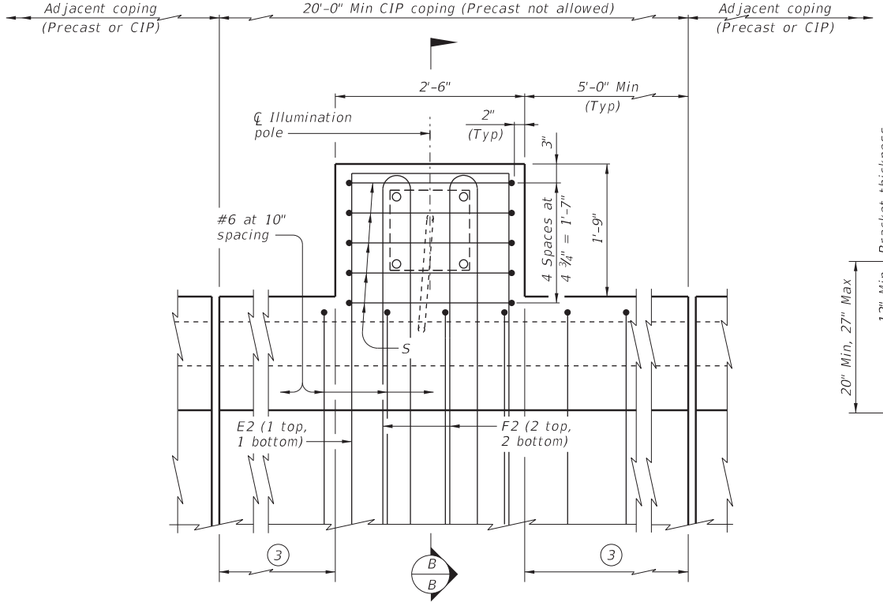
(4) See Anchor Bolt Assembly, Anchor Bolt Plate, and Table of Anchor Bolt and Anchor Bolt Plate Information.

(5) Lap 2'-7" Min with Bars F.

(6) Concrete pavement must be at least 12 inches thick for a minimum of 6 feet from inside edge of coping.

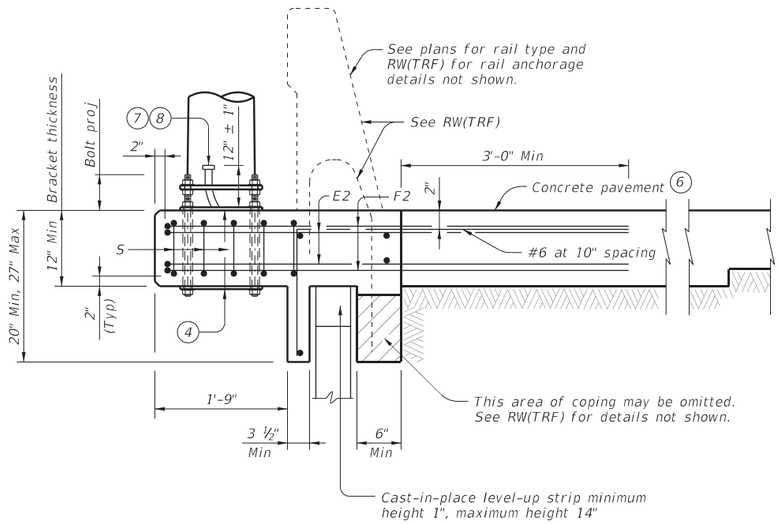
(7) If lighting is to be placed on future contract, extend conduit only 6 inches and provide water tight cap.

(8) Ream burrs and install bell ends or bushings on all conduit ends.



PLAN

(See Mounting Plan for details not shown.)



SECTION B-B

(Longitudinal bars are #4 unless shown otherwise.)

ADJACENT TO CONCRETE PAVEMENT

CAST-IN-PLACE COPINGS:

Provide compressible material to isolate precast panel from cast-in-place (CIP) coping to prevent cracking. Attach compressible material to both sides of precast panel prior to casting concrete for coping.

Provide a smooth level-up strip on top of the precast panels when cast-in-place (CIP) coping is anchored to reinforced concrete pavement. The purpose of the level-up is to allow the pavement and coping to move longitudinally relative to the wall without causing damage.

JOINTED CONCRETE PAVEMENT:

When coping is adjacent to and anchored into jointed concrete pavement, align coping joints with pavement joints.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi) for illumination pole bracket and CIP coping.
Provide Grade 60 reinforcing steel.
Provide #4 longitudinal bars, unless otherwise shown.
Galvanize anchor bolts, nuts, washers, and anchor bolt plates. Repair galvanizing damage from tack welding per Item 445, "Galvanizing."
Cast illumination pole brackets monolithically with the CIP coping.

GENERAL NOTES:

Designed for up to 50-foot light pole with one 12-foot arm, 60 lbs. luminaire with 1.6 sq ft. EPA at maximum design wind speed of 110 mph (3 second gusts). A special design is required if luminaire mounting height exceeds 100 feet above average surrounding terrain.

The type and size of conduit, anchor bolt circle diameter, and number and location of brackets is shown elsewhere on the plans. Brackets found to conflict with other components of retaining wall may be relocated if necessary and as directed by Engineer.

These details must be used in conjunction with the Retaining Wall Traffic Railing Foundations (RW[TRF]) standard to develop specific details for submission with the shop drawings. The steel reinforcement shown is specifically for the area of the illumination pole bracket.

Do not place illumination pole until after the coping and pavement have been constructed.

See RW(TRF) standard for details and notes not shown.
See Roadway Illumination Poles standard for details and notes not shown.
The anchor bolts, nuts, washers, and anchor bolt plates are subsidiary to the Item 610, "Roadway Illumination Assemblies."
The bracket quantity is considered subsidiary to the Item 423, "Retaining Walls."
Coping and anchor slabs is considered subsidiary to Item 423, "Retaining Walls."
Calculate traffic railing payment by the linear foot for railing of the appropriate type.

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

Texas Department of Transportation

Bridge Division Standard

LIGHTING BRACKET FOR MSE RETAINING WALL TRAFFIC RAIL FOUNDATION

RW(LB)

FILE: RW-LB-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		98

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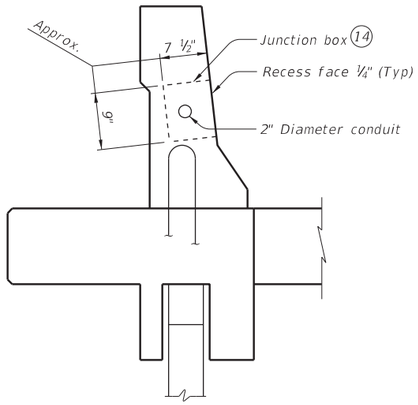
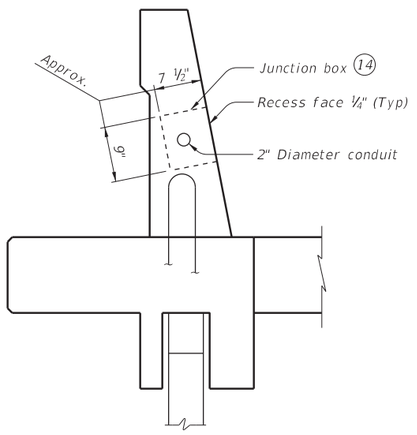
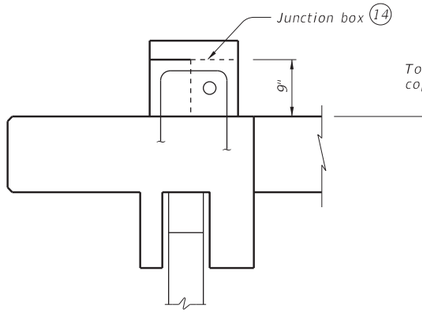


SHOWING T551, T552, AND T80HT



SHOWING SSTR AND T80SS



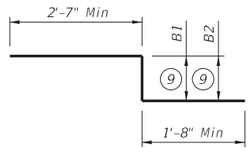
SHOWING T1F, T2P, T1W, T66, C2P, AND C1W CURB

(See elevation view for curb modifications.)

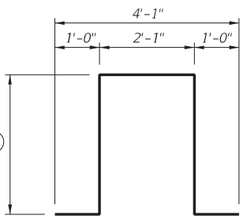
JUNCTION BOX LOCATION

(Use these details as a guide in locating junction boxes in rail types not shown.)

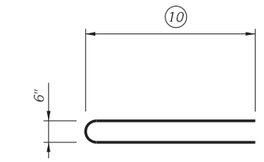
BARS A (#6)



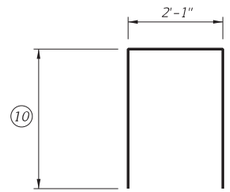
BARS B (#6)



BARS E1 (#6)



BARS F2 (#6)



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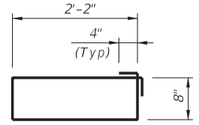

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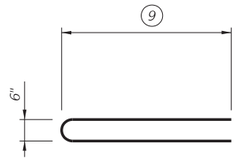
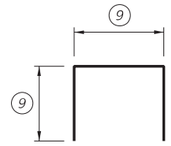
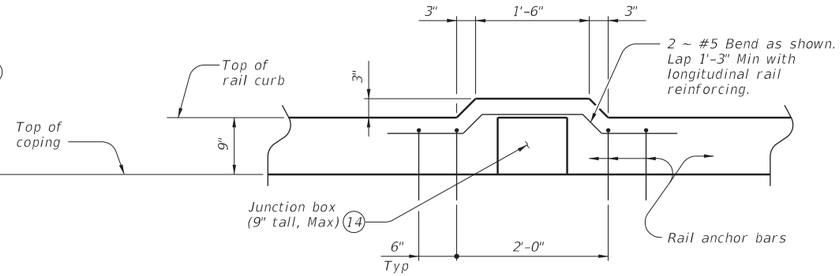


BARS F1 (#6)



BARS T (#4)



ELEVATION VIEW

(For Rail Types T1F, T2P, T1W, T66, C2P, and C1W, center junction box between posts. Additional reinforcing and concrete required for this rail modification is considered subsidiary to the rail. Do not locate junction box in the same bay as a drain slot in rail curb.)

TABLE OF ANCHOR BOLT AND ANCHOR BOLT PLATE INFORMATION						
ANCHOR BOLT CIRCLE DIAMETER	ANCHOR BOLT OFFSET	ANCHOR BOLT DIAMETER	ANCHOR BOLT HOLE SIZE		TOP AND BOTTOM ANCHOR BOLT PLATE SIZE	CENTER HOLE DIAMETER IN TOP ANCHOR BOLT PLATE
			CONCRETE	STEEL		
IN.	IN.	IN.	IN.	IN.	IN.	IN.
13	4 ⅜	1	1 ¼	1 ¼	PL ½ X 13 X 1'-1"	9 ½
15	5 5/16	1 ¼	1 ½	1 ½	PL ½ X 15 ½ X 1'-3 ½"	10 ½

ESTIMATED QUANTITIES~ONE BRACKET			
ITEM		UNIT	QUANTITY
CONCRETE	(11)	CY	0.2
REINFORCING STEEL	(11)	LB	146
STRUCTURAL STEEL	(11)(12)	LB	112
CONDUIT	(13)	LF	4

(2) See table for hole diameter size.

(9) Length to be determined based on cover requirements.

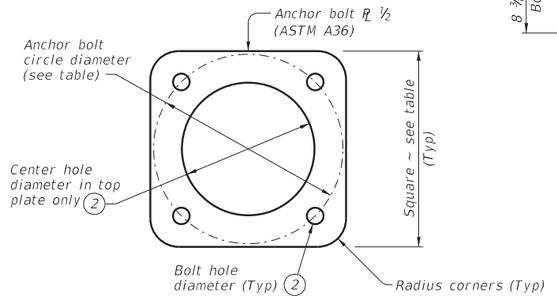
(10) Length as required to extend 3 feet Min into concrete pavement.

(11) For Contractor's information only.

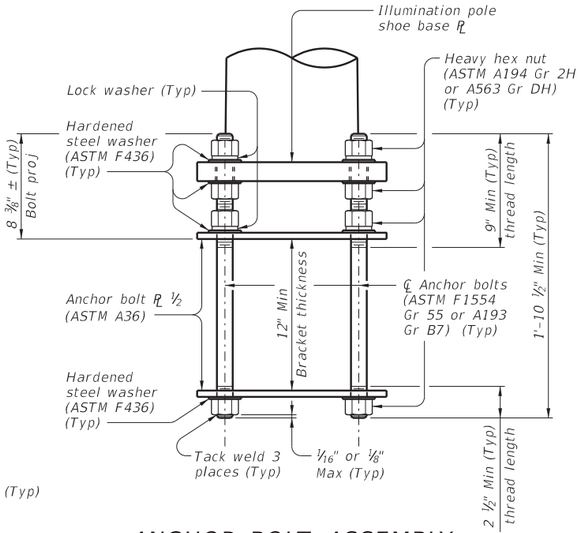
(12) Anchor bolts, nuts, washers, and 2 plates. Verify anchor bolt lengths prior to ordering.

(13) Additional to main run (Size and type as shown elsewhere on the plans).

(14) Provide polymer concrete junction boxes meeting the requirements of DMS 11030.



ANCHOR BOLT PLATE



ANCHOR BOLT ASSEMBLY

(See table for anchor bolt diameter.)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

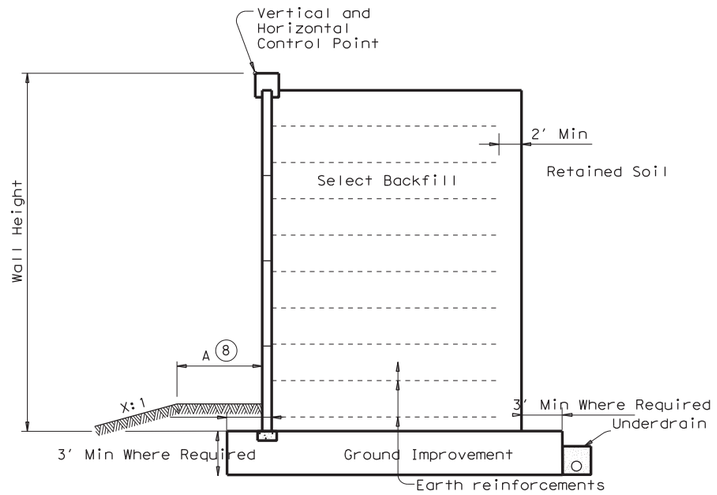
LIGHTING BRACKET FOR MSE RETAINING WALL TRAFFIC RAIL FOUNDATION

RW(LB)

FILE: RW-LB-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		99

WALL SUMMARY

MSE Retaining Wall	Begin Station (1)	End Station (1)	Retained Soil Frictin Angle (2)	Foundation Soil Friction Angle (2)	Ground Improvement (3)	Min Earth Reinforcement Length (4)	Min Wall Embedment (7)	Underdrain Required (5)	Drawdown Analysis (6)	Bench Width (8)
RW*EB01	10+42.47	12+00.00	25 degrees	22 degrees	0	150% H or 8' minimum	2 feet	Yes	Required	2 feet
	12+00.00	12+34.45	25 degrees	34 degrees	3'	110% H	2 feet	Yes	Required	2 feet
RW*WB01	10+45.00	11+00.00	25 degrees	22 degrees	0	160% H or 8' minimum	2 feet	Yes	Required	2 feet
	11+00.00	11+33.47	25 degrees	34 degrees	3'	110% H	2 feet	Yes	Required	2 feet



TYPICAL SECTION

(1) Indicate limits for which the stated soil design requirements/assumptions are applicable.

(2) Retained and Foundation friction angle listed should be based on local experience or measured/correlated long term strength values.

(3) Indicate if ground improvement is required or not required. If shown as required, refer to Ground Improvement Detail(s) for additional information.

(4) Indicate on table minimum length and length ratio required. The minimum default length of earth reinforcements shall be either 8'-0" or 70% of the wall height, whichever is greater. Wall height and design wall height may differ depending on project geometry and loading conditions. Note: Wall height at bridge abutments is equal to the distance between the top of leveling pad and finished grade at the bridge abutment backwall.

(5) Indicate if underdrain is required or not required.

(6) Indicate if rapid drawdown analysis is required.

(7) Guidance to wall designer of record for determination of minimum wall embedment: Unless noted elsewhere in the plans, the minimum embedment provided from the top of leveling pad to finish grade shall be 1' for level ground where there is no potential for erosion or future excavation or 2' for sloping ground (4.0H:1.0V or steeper) or where there is potential for removal of soil in front of the wall.

(8) Horizontal Bench width at base of wall varies. Use the following criteria to establish base width.
A = 2.0' Min for $\geq$ X 4. or
A = 4.0' Min for $\leq$ X 4.
Applicable to both drawdown and dry condition.

12/1/2022

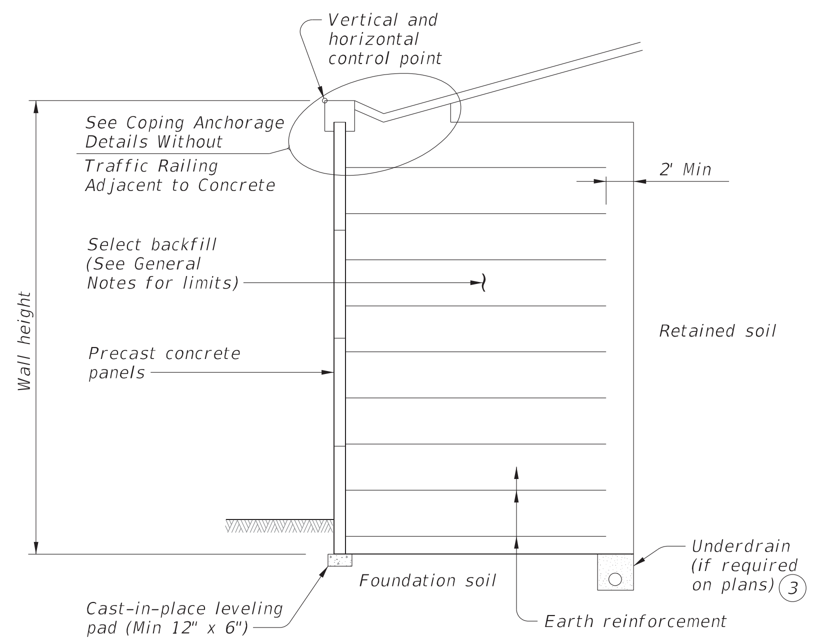
Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL DESIGN DATA

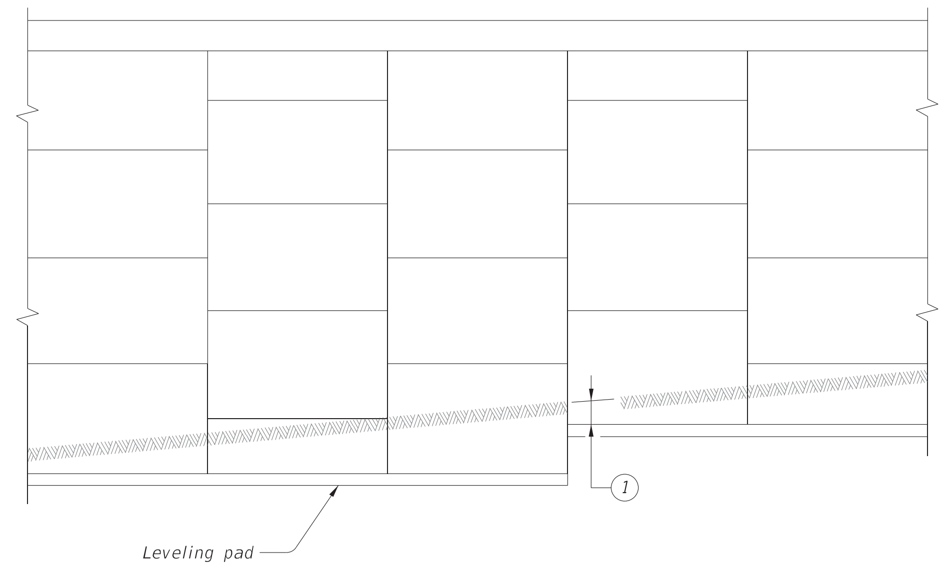
RW(MSE)DD

FILE: rwstde16.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT January 2013 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		100



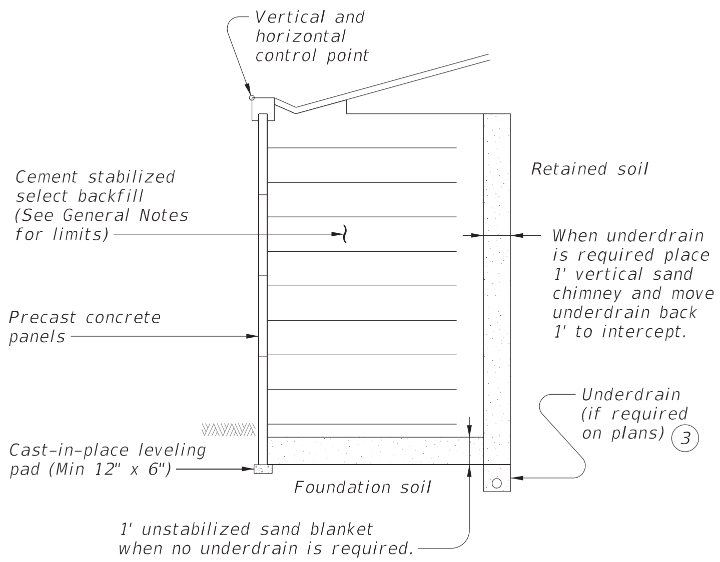
TYPICAL SECTION

(Wall at bottom of slope.)



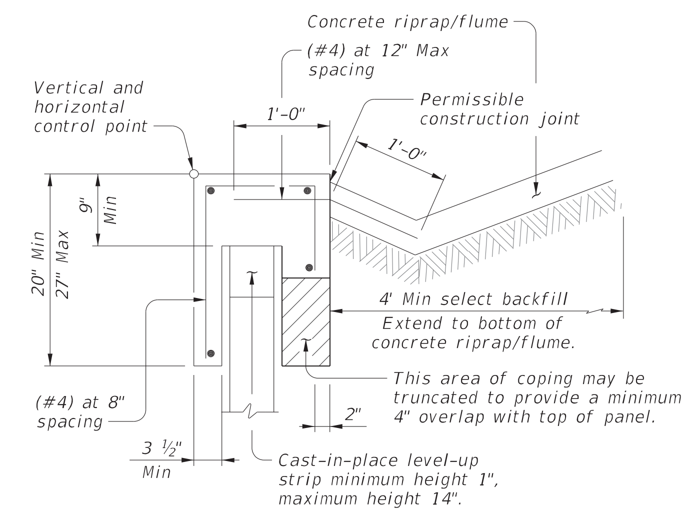
ELEVATION

1. Minimum embedment conforming to values given on the RW(MSE)DD standard.
2. Form map of Texas emblem into a wall panel next to each bridge abutment. Submit the exact location of each emblem to the Engineer for approval. The cost of forming the emblems will not be paid for directly, but is subsidiary to Item 423, "Retaining Walls." Inset the map of Texas a minimum of $\frac{3}{4}$" into the face of the panel with a smooth finish. Finish the inset area in a contrasting color as approved by the Engineer.
3. Provide underdrain pipe and filter material in accordance with Item 556, "Pipe Underdrains."
4. Anchor precast coping to prevent rotation or displacement. Use these details to develop custom anchorage for precast copings. Provide details that include coping reinforcement. Concrete flume (if required) is paid for separately from Item 423, "Retaining Walls."



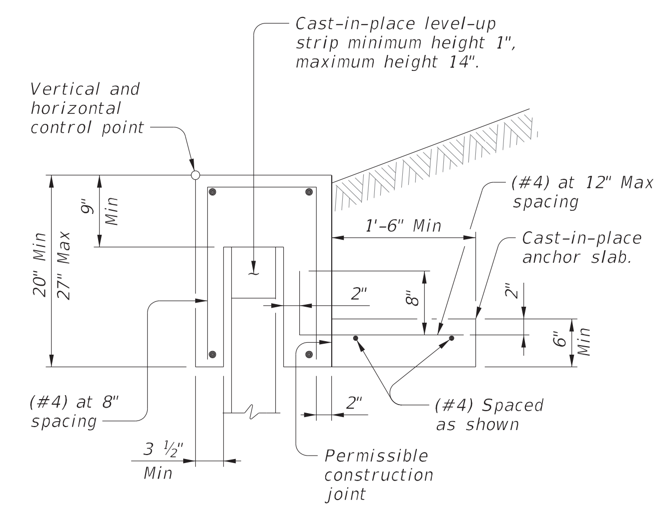
SPECIAL DRAINAGE PROVISIONS

(When cement stabilized backfill is used.)



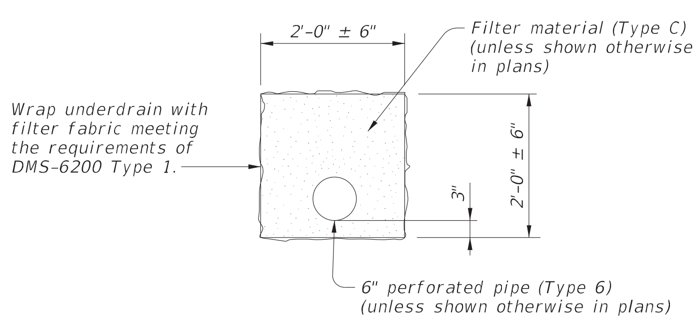
ADJACENT TO CONCRETE

(Excluding concrete pavement)

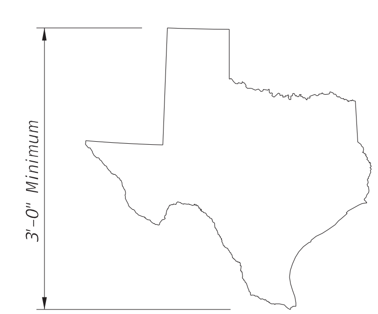


ADJACENT TO SOIL

COPING ANCHORAGE DETAILS WITHOUT TRAFFIC RAILING 4



UNDERDRAIN DETAIL 3



MAP OF TEXAS EMBLEM 2

SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)

FILE: RW-MSE-22.dgn		DN: TxDOT	CK: TxDOT	DW: JER		CK: RLE	
©TxDOT	June 2022	CONT	SECT	JOB		HIGHWAY	
REVISIONS		0912	72	406		CS	
		DIST		COUNTY			SHEET NO.
		HOU		HARRIS			101

DATE: 11/30/2022 11:34:54 AM
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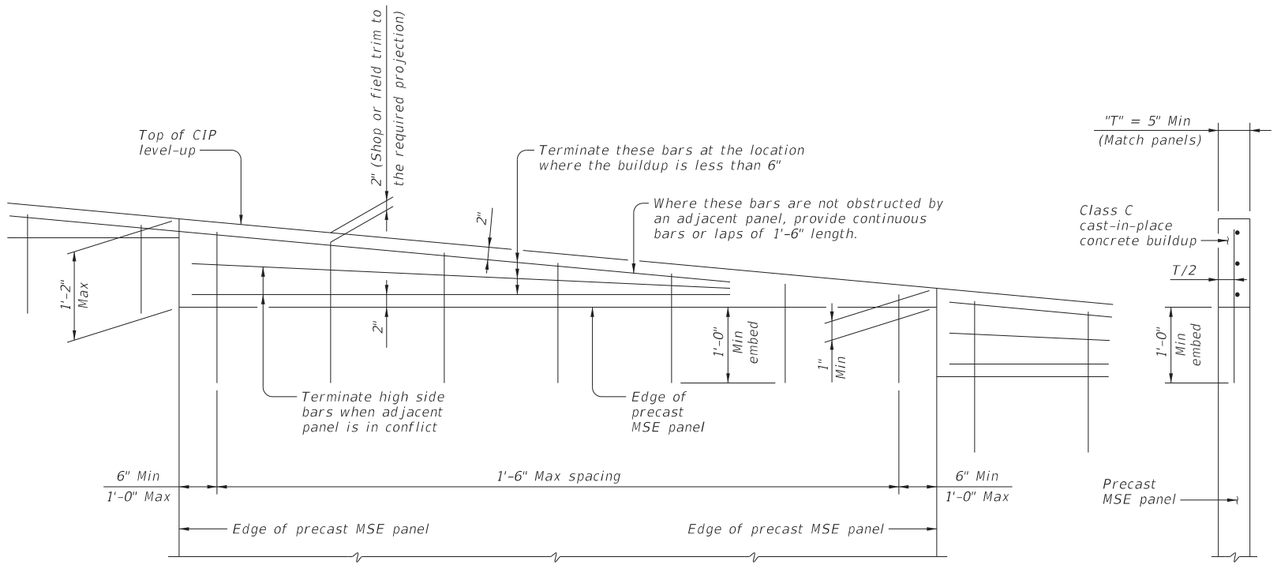


ELEVATION SECTION

LEVEL UP DETAIL (5)

(5) Cast vertical bars into the top of panels. At Contractor's option vertical bars may be embedded 4 inches with a Type III Class C epoxy anchorage system. Follow manufacturer's directions for installing the epoxy vertical bars.

(6) Soil design parameters must be based on long term soil strength. Design parameters must be listed on the RW(MSE)DD standard.

(7)

SELECT BACKFILL UNIT WEIGHT			
Type AS, BS & DS	Unit Weight	Internal Stability	External Stability
	105 PCF	Pullout	Sliding, Overturning, Eccentricity
	125 PCF	Rupture	Bearing

PRECAST COPINGS:

Wall supplier is to maximize lengths of precast coping. Provide precast coping in 10-foot minimum lengths (typical.) To optimize coping lengths at radiuses, ends of runs, or other wall geometric conditions favorable to shorter coping sections, shorter lengths may be used pending approval by the Engineer. This applies only to coping without railing.

JOINT SEALANT:

Seal joints between coping segments in accordance with Item 438, "Cleaning and Sealing Joints." Provide Class 4 joint seal. Place sealant flush with coping surface. The purpose of the joint sealing is to reduce surface drainage infiltration into the retaining wall backfill. Sealing coping joint is considered subsidiary to other items.

EARTH REINFORCEMENT:

Place the uppermost earth reinforcement no more than 3 feet below the top of wall.
Place the lowest level of earth reinforcement no more than 2 feet above the top of the leveling pad.
Provide earth reinforcement with a minimum wire size of W7.0. If different longitudinal and cross wires are used in an earth reinforcement mesh, the smaller wire must be at least 50% of the cross sectional area of the larger wire.
A maximum of four wire mesh configurations (wire sizes) will be allowed on a project. Provide unique transverse bar spacing for each mesh configuration, differing from other configurations by a minimum of 3 inches. Step earth reinforcement lengths in increments no finer than 12 inches.

PANELS:

Fabricate standard precast concrete panels to a maximum height of 6 feet and a maximum surface area of 50 sq ft. Top and bottom panels may exceed these limitations as necessary to achieve required wall grades. Maximum height of any panel must not exceed 7 ft.-6 in. Provide a minimum panel thickness of 5 inches. Arrange panels to provide offset horizontal joints.
Provide an open joint around the perimeter of the concrete panels. Configure joints such that 1) the filter fabric and/or pad materials are not exposed at the wall face and 2) the design opening is between $\frac{3}{8}$" and $\frac{3}{4}$".
Provide a one-piece corner panel for wall angle changes of greater than 30 degrees. Butting of chamfered panels will be allowed for angle changes of 30 degrees or less.

MATERIAL NOTES:

Provide Class C concrete for reinforced concrete and precast coping.
Provide Class H concrete for precast concrete panels.
Provide Class A concrete for unreinforced concrete.
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Section and elevation shown is for informational purposes only. Determine specific geometry based on wall layouts and other plan information.
Extend select backfill specified for use within the mechanically stabilized earth volume horizontally from the back of the panels a minimum 2 feet beyond the end of the earth reinforcement. Extend select backfill vertically to the top of the panels from either the top of the leveling pad, or from 4 inches below the lowest earth reinforcement, whichever is lower.
Provide concrete coping along the top of wall, at the vertical steps at bridge backwalls, and at other vertical steps along the top of wall.
Provide details and calculations that establish support for panels that are affected when obstructions (inlets, drilled shafts, piling, etc.) prevent placement of soil reinforcement in their normal locations. Furnish the same earth reinforcement coverage as that required in the absence of the obstruction. For skewed (rotated) earth reinforcement, no adjustment in length is needed for skew angles less than or equal to 10 degrees. Adjust the length of earth reinforcement to provide a cosine length of the reinforcement equivalent to the stated design length for the section of wall when skew angles are greater than 10 degrees. Provide calculations that justify any alterations made to the soil reinforcement or modifications to their normal placement. Do not use panels without any soil reinforcement connected to them unless they are connected with galvanized hardware to adjacent panels which do have supporting soil reinforcement attached to them and as approved by the Engineer.
Coping and anchor slabs are considered subsidiary to the Item 423, "Retaining Walls."
Use these details in conjunction with the retaining wall layout, the Mechanically Stabilized Earth Retaining Wall Design Data (RW[MSE]DD) standard and other applicable standards.

Cover dimensions are clear dimensions, unless noted otherwise.

DESIGN CRITERIA NOTES:

Design Parameters:
Base design of retaining walls on the following design parameters unless stated elsewhere in the plans:

Retained Soil	Unit Weight = 125 pcf ϕ = (6) C = 0 psf
Foundation Soil	ϕ = (6) C = 0 psf
Select Backfill	Unit Weight = See Table (7) ϕ = 34° C = 0 psf
Cement Stabilized Select Backfill	Unit Weight = 125 pcf ϕ = 45° C = 0 psf

Limit stress in steel and concrete in accordance with current AASHTO Standard Specifications for Highway Bridges and Interim Specifications.
The minimum length of earth reinforcement are as shown on the Mechanically Stabilized Earth Retaining Wall Design Data (RW[MSE]DD) standard.

Stability Criteria:
Stability criteria applies to both dry and drawdown analysis. Base design on the following factors of safety.

Sliding along the base of the structure	Factor of Safety ≥ 1.5
Overturning	Factor of Safety ≥ 2.0
Pullout of Earth Reinforcement at each level	Factor of Safety ≥ 1.5

Design the wall such that the base pressure resultant falls within the middle third of the retaining wall.
Determine pullout resistance from test data evaluated at $\frac{3}{4}$ inch strain.

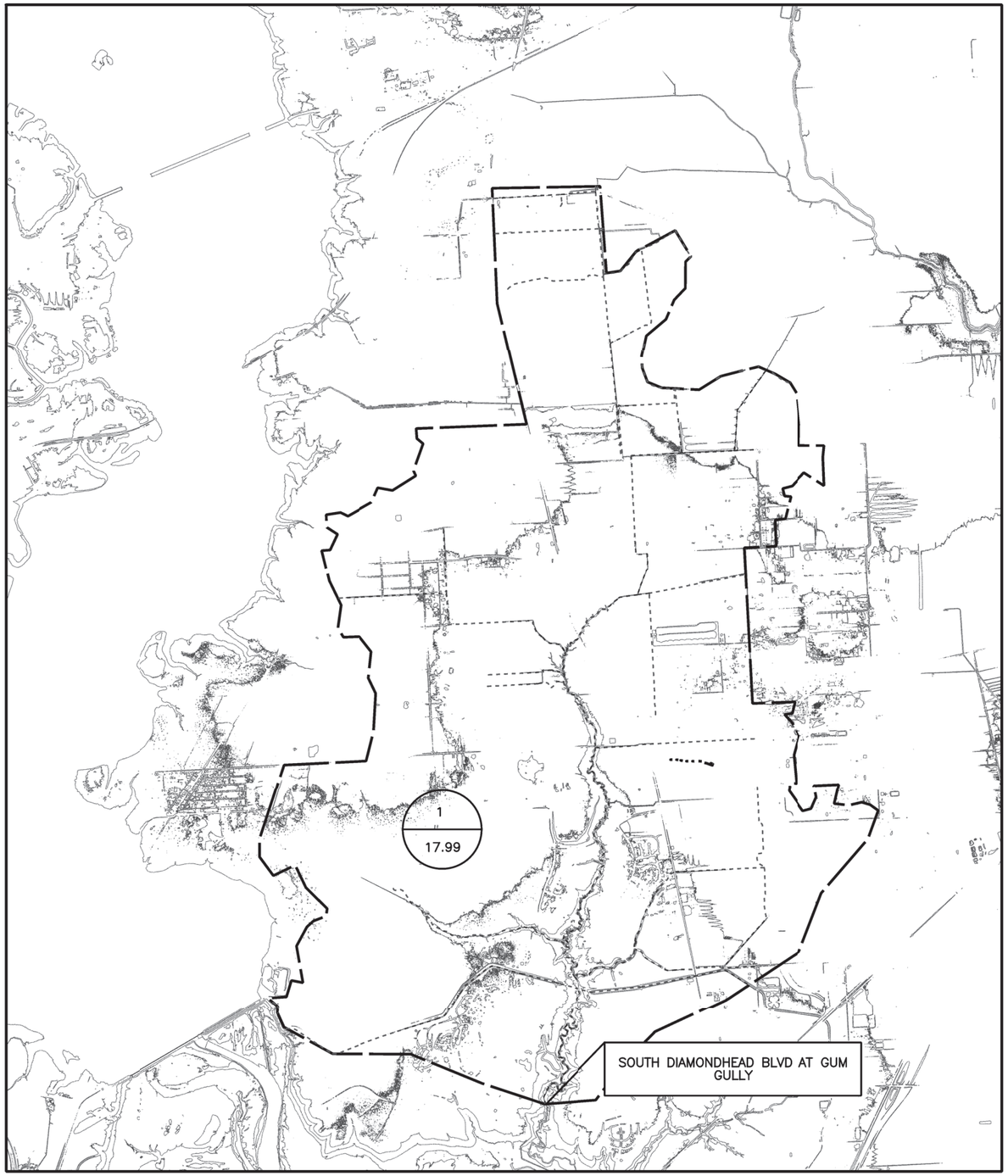
Corrosion Criteria:
Design the earth reinforcement elements to have a minimum design life of 75 years, using current AASHTO corrosion rates.
Perform stress calculations (rupture) on the calculated earth reinforcement section remaining after 75 years. Pullout calculations may be based on non-corroded section.

Texas Department of Transportation | Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)

FILE: RW-MSE-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE		
©TxDOT June 2022 REVISIONS	CONT	SECT	JOB	HIGHWAY		
	0912	72	406	CS		
	DIST	COUNTY		SHEET NO.		
	HOU	HARRIS		102		



Basin Name	Parameters	Q 10–YR (cfs)	Q 50–YR (cfs)	Q 100–YR (cfs)	Q 500–YR (cfs)
SOUTH DIAMONDHEAD BLVD AT GUM GULLY	AREA (SQ. MI) = 17.99	5782	8616	10087	14623

LEGEND

- DRAINAGE AREA I.D.
- DRAINAGE AREA SIZE (SQ. MI.)
- DRAINAGE AREA BOUNDARY
- NHD FLOWLINE

NOTES:

1. DRAINAGE AREA DELINEATED BASED ON USGS TOPOGRAHIC DATA.
2. PEAK FLOWS WERE WERE OBTAINED DIRECTLY FROM HCFCD HYDRAULIC MODEL.
3. PEAK FLOW RATES ARE NOT BASED ON THE NATIONAL OCEANIC AND ATMOSPHERIC (NOAA) ATLAS 14 RAINFALL DATA. IN ORDER TO ACCOUNT FOR RAINFALL UPDATES, THE 500–YEAR COMPUTED PEAK DISCHARGE WILL BE CONSIDERED AS THE EFFECTIVE 100–YEAR EVENT.

0 2500' 5000'

STATE OF TEXAS
WESLEY R. YOUNG
72271
REGISTERED PROFESSIONAL ENGINEER
1/25/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

Texas Department of Transportation

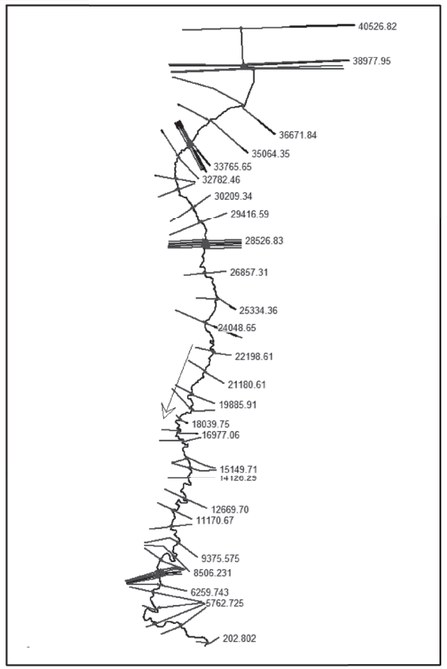
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

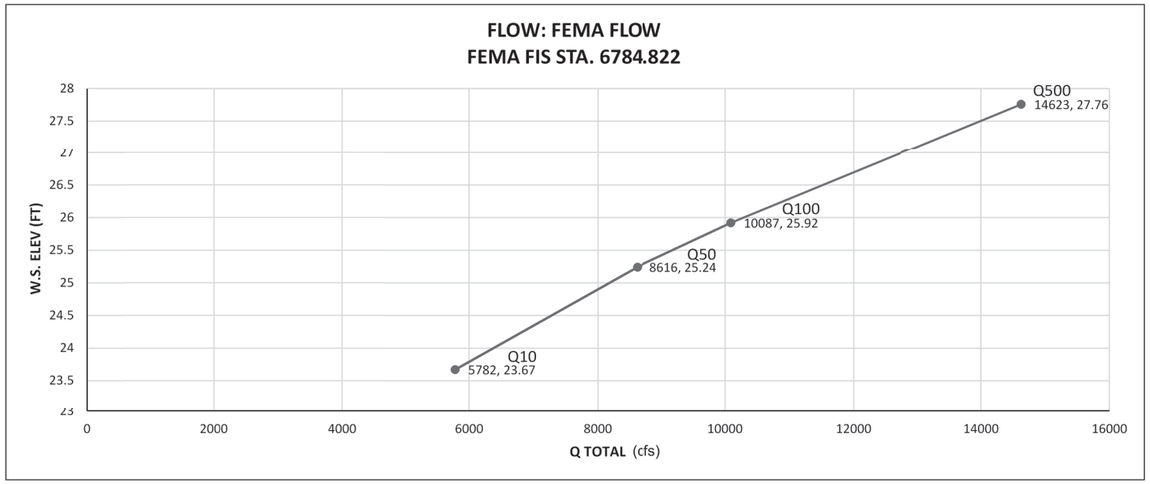
EXTERIOR
DRAINAGE AREA MAP

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			CS
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	103

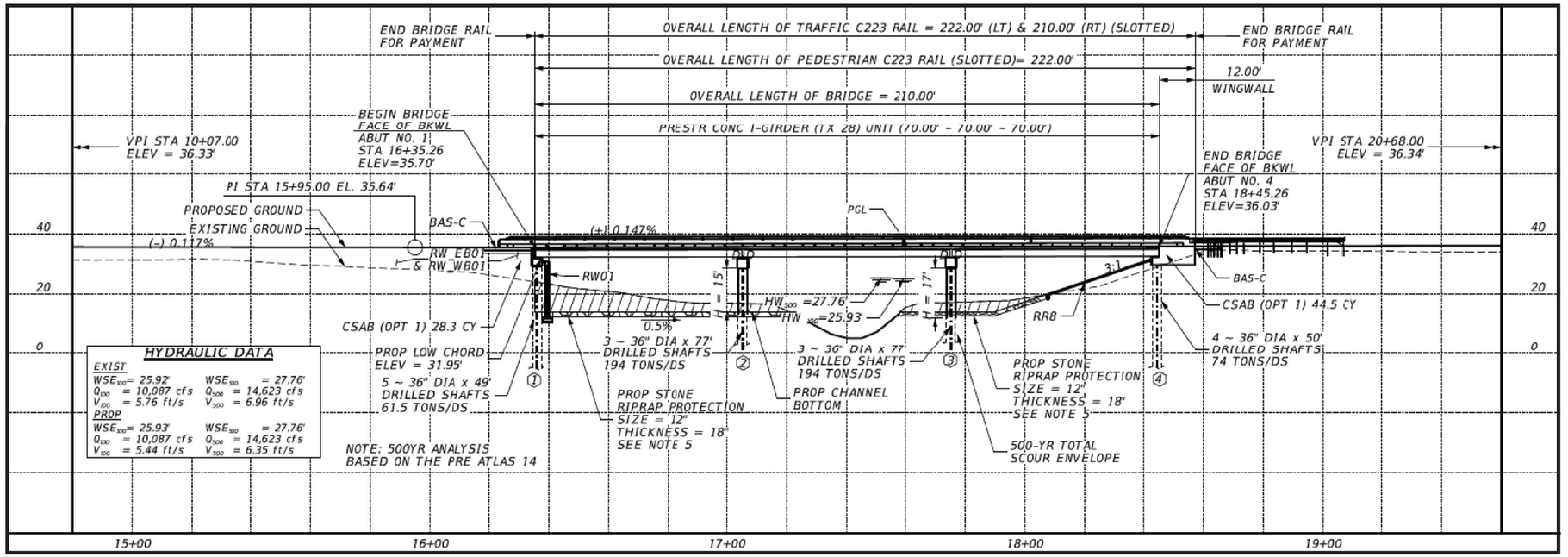
pw:\\DataPWINT01.cpyone.com:pw_cpy\Documents\Active Projects\CNSR1900393.00\CNSR1900393.01\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.06 Drainage\EXT DA MAP.dgn
1/25/2022





NOTES:

1. HEC-RAS VERSION 5.0.7 WAS USED FOR THE BRIDGE ANALYSIS.
2. THE DRAINAGE AREA WAS DELINEATED USING USGS TOPOGRAPHIC DATA AND COMPARED TO HCFCD DATA.
3. INITIAL COORDINATION WITH HCFCD AND HARRIS COUNTY OCCURED ON 12/22/2020.
4. THE PROJECT LOCATION IS LOCATED IN A ZONE AE SPECIAL FLOOD HAZARD AREA PER FEMA FIRM PANEL NUMBER 480201C0540L, EFFECTIVE DATE: JUNE 18, 2007.
5. NORMAL DEPTH TAILWATER CONDITION OF 0.00067 FT/FT WAS USED IN THE HYDRAULIC MODEL.
6. THE PROPOSED BRIDGE HAS A 1% AEP LEVEL OF SERVICE (0.2% COMPUTED).
7. PROP NBI: 12-102-0-AA60-20-305
8. PEAK FLOWS RATES ARE NOT BASED ON THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) ATLAS 14 RAINFALL DATA. TO ACCOUNT FOR RAINFALL UPDATES, THE 500 YEAR COMPUTED PEAK DISCHARGE WILL BE CONSIDERED AS THE EFFECTIVE 100-YEAR EVENT.
9. THE TECHNICAL BACK UP FOR THE INFORMATION ON THIS SHEET IS CONTAINED IN THE DRAINAGE IMPACT STUDY DATED 1-25-2022.
10. HYDRAULIC MODEL SOURCE IS HCFCD - JACKSON BAYOU - R102-00-00.



0 20' 40'
SCALE: 1" = 40' HORZ
1" = 40' VERT

STATE OF TEXAS
WESLEY R. YOUNG
72271
REGISTERED PROFESSIONAL ENGINEER
3/16/2022

NO.	DATE	REVISION	APPROV.

consor F-12040

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

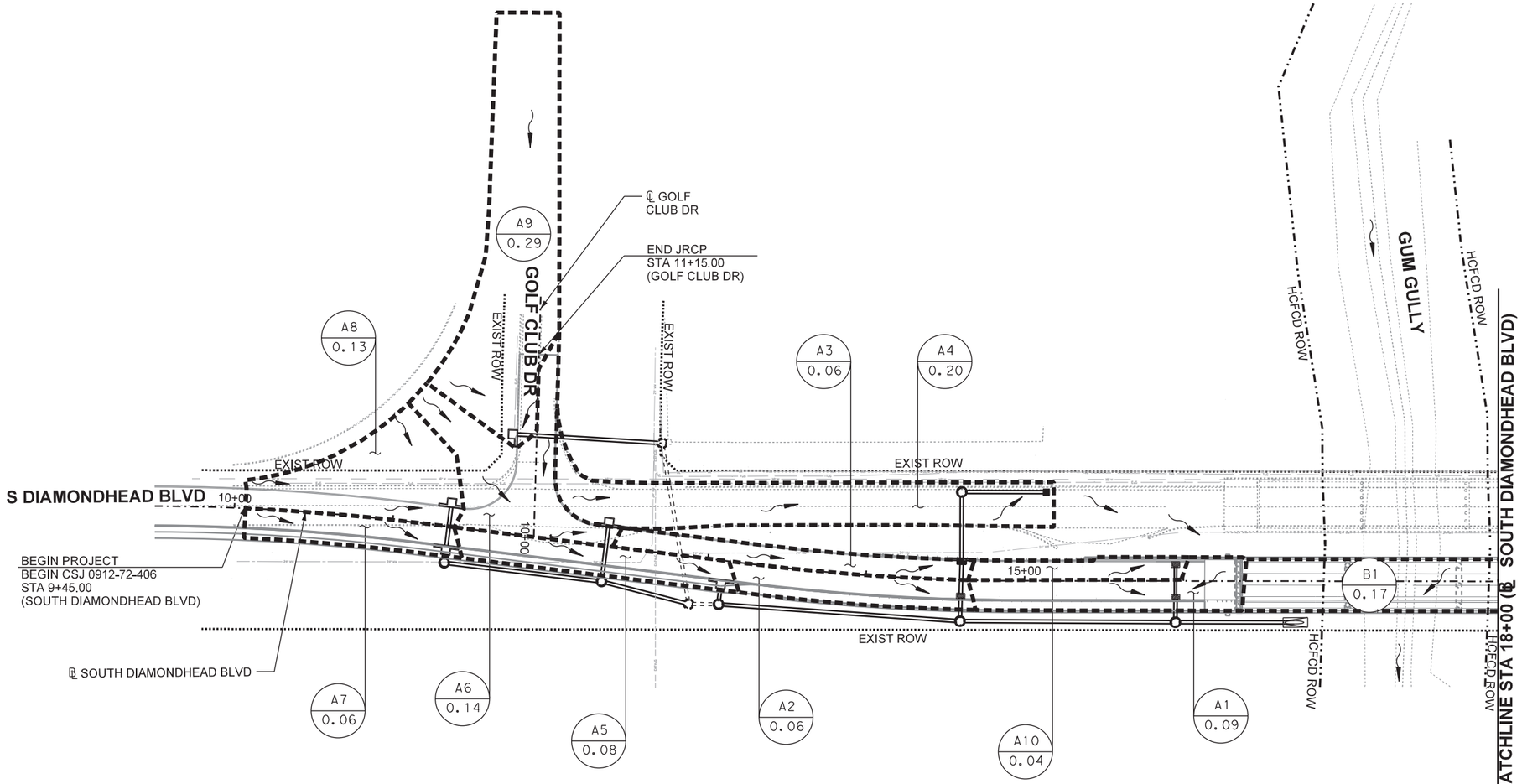
Texas Department of Transportation

SOUTH DIAMCNDHEAD BLVD
AT GUM GULLY

HYDRAULIC DATA SHEET

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			CS
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	104



LEGEND

- DRAINAGE AREA BOUNDARY
- DIRECTION OF FLOW
- ID / 00.00 — DRAINAGE AREA ID / DRAINAGE AREA ACREAGE

NOTES:

1. 5-YR FREQUENCY STORM EVENT USED FOR INLET AND STORM SEWER DESIGN.
2. AREA HYDROLOGY WAS CALCULATED IN GEOPAK DRAINAGE USING RATIONAL METHOD. SEE DRAINAGE AREA CALCULATIONS.
3. INTENSITIES WERE CALCULATED USING THE 2019 TXDOT IDF SPREADSHEET (ebdlkup-2019-vc6.2.10) FOR HARRIS COUNTY.
4. TIME OF CONCENTRATION (Tc) VALUES NOT CALCULATED WERE ASSUMED TO BE LESS THAN 10 MIN.

0 40′ 80′
SCALE: 1" = 80′

STATE OF TEXAS
ADRIANA C. SUSTAITA
141394
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

DRAINAGE AREA MAP BEGIN PROJECT TO STA 18+00

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		105
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

PENTABLE: $PENTBLS$
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USER: pgonzalez
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1/5/2023
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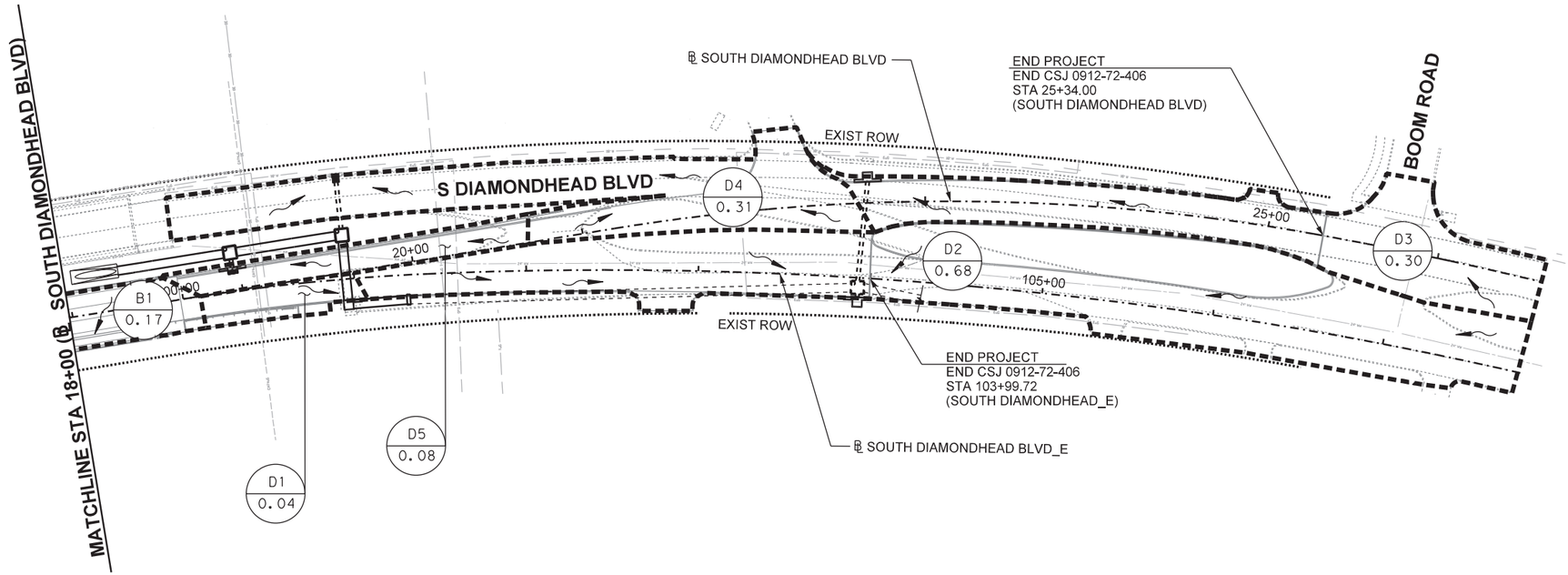

LEGEND

- DRAINAGE AREA BOUNDARY
- DIRECTION OF FLOW
- ID / 00.00 — DRAINAGE AREA ID / DRAINAGE AREA ACREAGE

NOTES:

1. 5-YR FREQUENCY STORM EVENT USED FOR INLET AND STORM SEWER DESIGN.
2. AREA HYDROLOGY WAS CALCULATED IN GEOPAK DRAINAGE USING RATIONAL METHOD. SEE DRAINAGE AREA CALCULATIONS.
3. INTENSITIES WERE CALCULATED USING THE 2019 TXDOT IDF SPREADSHEET (ebdlkup-2019-vc6.2.10) FOR HARRIS COUNTY.
4. TIME OF CONCENTRATION (Tc) VALUES NOT CALCULATED WERE ASSUMED TO BE LESS THAN 10 MIN.

0 40′ 80′
SCALE: 1" = 80′

STATE OF TEXAS
ADRIANA C. SUSTAITA
141394
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

DRAINAGE AREA MAP
STA 18+00 TO END PROJECT

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		106
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

PROPOSED DRAINAGE AREA RUNOFF CALCULATIONS

DRAINAGE AREA ID	DRAINAGE AREA (AC)			COMPOSITE "C"	Tc (MIN)		5-YEAR		100-YEAR	
	TOTAL AREA	PAVED AREA (C=0.90)	GRASS AREA (C=0.25)		ACTUAL	USED	INTENSITY (IN/HR)	FLOW "Q" (CFS)	INTENSITY (IN/HR)	FLOW "Q" (CFS)
A1	0.09	0.09	0.00	0.90	<10	10.00	7.18	0.57	12.75	1.01
A2	0.06	0.06	0.00	0.90	<10	10.00	7.18	0.42	12.75	0.74
A3	0.06	0.06	0.00	0.90	<10	10.00	7.18	0.42	12.75	0.74
A4	0.20	0.01	0.19	0.27	<10	10.00	7.18	0.39	12.75	0.70
A5	0.08	0.08	0.00	0.90	<10	10.00	7.18	0.48	12.75	0.86
A6	0.14	0.08	0.05	0.64	<10	10.00	7.18	0.62	12.75	1.11
A7	0.06	0.06	0.00	0.90	<10	10.00	7.18	0.37	12.75	0.66
A8	0.13	0.04	0.09	0.44	<10	10.00	7.18	0.42	12.75	0.75
A9	0.29	0.14	0.16	0.55	<10	10.00	7.18	1.16	12.75	2.06
A10	0.04	0.04	0.00	0.90	<10	10.00	7.18	0.26	12.75	0.46
B1	0.17	0.17	0.00	0.90	<10	10.00	7.18	1.13	12.75	2.00
D1	0.04	0.04	0.00	0.90	<10	10.00	7.18	0.26	12.75	0.46
D2	0.68	0.49	0.19	0.72	<10	10.00	7.18	3.48	12.75	6.18
D3	0.30	0.29	0.02	0.86	<10	10.00	7.18	1.88	12.75	3.33
D4	0.31	0.13	0.19	0.51	<10	10.00	7.18	1.16	12.75	2.05
D5	0.08	0.08	0.00	0.90	<10	10.00	7.18	0.49	12.75	0.87

NOTES:

1. 5-YR FREQUENCY STORM EVENT USED FOR INLET AND STORM SEWER DESIGN.
2. AREA HYDROLOGY WAS CALCULATED IN GEOPAK DRAINAGE USING RATIONAL METHOD. SEE DRAINAGE AREA CALCULATIONS.
3. INTENSITIES WERE CALCULATED USING THE 2019 TXDOT IDF SPREADSHEET (ebdlkup-2019-vc6.2.10) FOR HARRIS COUNTY.
4. TIME OF CONCENTRATION (Tc) VALUES NOT CALCULATED WERE ASSUMED TO BE LESS THAN 10 MIN.

STATE OF TEXAS
ADRIANA C. SUSTAITA
141394
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

DRAINAGE AREA CALCULATIONS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		107
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

PLOTDRIVER: pdfv8.plt
PENTABLE: $PENTBL$
USER: pgonzalez
11:35:29 AM
11/30/2022
c:\bms\pwe-useast-006\perla.gonzalez\dms24693\C_406_S_DAC01.dgn

PROPOSED SYSTEM A INLETS - 5YR

INLET ID	INLET TYPE	INLET LENGTH (FT)	REQUIRED LENGTH (ft)	LONGITUDINAL SLOPE (%)	TRANSVERSE SLOPE (%)	GRATE WIDTH (FT)	TOTAL FLOW (CFS)	INLET CAPACITY (cfs)	INLET BYPASS NODE	INLET BYPASS FLOW (cfs)	COMPUTED POND WIDTH (ft)	ALLOWED POND WIDTH (ft)	COMPUTED POND DEPTH (ft)	ALLOWED POND DEPTH (ft)
A1	Typ AZR 2 Grate Inlet	n/a	n/a	n/a	0.02	2.83	0.58	7.30	0.00	0.00	6.39	7.00	0.08	0.42
A2	Typ AZR 2 Grate Inlet	n/a	n/a	0.13	0.02	2.83	0.42	0.41	A1	0.01	6.45	7.00	0.13	0.42
A3	Type PCU Curb Inlet w/ 2 Ext (3'x5')	n/a	n/a	0.13	0.02	1.39	0.42	0.42	A1	0.00	6.46	7.00	0.13	0.42
A4	PAZD FG 3x3-3	n/a	n/a	n/a	0.02	3.00	0.39	6.55	0.00	0.00	9.55	20.00	0.08	0.50
A5	Typ C1 Curb Inlet w/ 2 Ext	n/a	3.74	0.13	0.02	n/a	0.48	0.48	A2	0.00	6.82	7.00	0.14	0.42
A6	Typ C1 Curb Inlet w/ 2 Ext	n/a	4.31	0.13	0.02	n/a	0.62	0.62	A3	0.00	7.49	7.00	0.15	0.42
A7	Typ C1 Curb Inlet w/ 2 Ext	n/a	3.23	0.13	0.02	n/a	0.37	0.37	A5	0.00	6.18	7.00	0.12	0.42
A8	Typ C1 Curb Inlet w/ 2 Ext	n/a	3.47	0.13	0.02	n/a	0.42	0.42	A6	0.00	6.49	7.00	0.13	0.42
A9	Typ C1 Curb Inlet w/ 1 Ext	n/a	18.78	n/a	0.02	n/a	1.16	7.86	0.00	0.00	5.83	7.00	0.12	0.42
A10	Typ AZR 2 Grate Inlet	n/a	n/a	0.12	0.02	2.83	0.26	0.26	A1	0.00	5.46	7.00	0.11	0.42

PROPOSED SYSTEM D INLETS - 5YR

INLET ID	INLET TYPE	INLET LENGTH (FT)	REQUIRED LENGTH (ft)	LONGITUDINAL SLOPE (%)	TRANSVERSE SLOPE (%)	GRATE WIDTH (FT)	TOTAL FLOW (CFS)	INLET CAPACITY (cfs)	INLET BYPASS NODE	INLET BYPASS FLOW (cfs)	COMPUTED POND WIDTH (ft)	ALLOWED POND WIDTH (ft)	COMPUTED POND DEPTH (ft)	ALLOWED POND DEPTH (ft)
D1	Typ C1 Curb Inlet w/ 1 Ext	n/a	1.23	n/a	0.02	n/a	0.26	7.86	D2	0.00	5.60	11.00	0.04	0.42
D2	Typ C1 Curb Inlet w/ 2 Ext	n/a	18.78	n/a	0.02	n/a	3.48	10.95	n/a	0.00	9.71	11.00	0.19	0.42
D3	Typ C1 Curb Inlet w/ 2 Ext	n/a	18.78	n/a	0.02	n/a	1.88	10.95	n/a	0.00	7.32	11.00	0.13	0.42
D4	PAZD FG 3x3-3	n/a	n/a	n/a	0.02	3.00	1.16	6.55	n/a	0.00	13.00	20.00	0.16	0.50
D5	Type PCU Curb Inlet w/ 2 Ext (3'x5')	n/a	n/a	n/a	0.02	1.39	0.49	13.70	n/a	0.00	5.96	6.00	0.12	0.42

PROPOSED SYSTEM A LINKS - 5YR

LINK ID	US NODE ID	DS NODE ID	US FL ELEV (FT)	DS FL ELEV (FT)	SIZE	NUMBER OF BARRELS	ACTUAL LENGTH (FT)	HYDRAULIC LENGTH (FT)	LINK SLOPE (%)	MANNING'S N	FRICTION SLOPE (%)	US HGL (FT)	DS HGL (FT)	UNIFORM DEPTH (FT)	ACTUAL DEPTH (FT)	UNIFORM VELOCITY (FPS)	ACTUAL VELOCITY (FPS)	FLOW (CFS)	CAPACITY (CFS)
LAT P-A1	A1	MH-A2	18.71	17.50	24" RCP	1.00	12.15	15.75	10.00	0.01	0.10	19.38	17.65	0.15	0.15	8.08	7.66	0.83	83.37
LAT P-A2	A2	MH-A3	24.56	24.50	24" RCP	1.00	12.20	15.80	0.50	0.01	0.01	24.99	24.86	0.36	0.36	3.19	3.16	1.21	18.64
LAT P-A3	A3	A2	25.43	25.23	24" RCP	1.00	19.35	21.95	1.00	0.01	0.01	25.79	25.48	0.25	0.25	3.58	3.55	0.80	26.40
LAT P-A4	MH-A7	A3	26.46	26.01	24" RCP	1.00	39.59	43.59	1.14	0.01	0.01	26.77	26.18	0.17	0.17	3.03	3.03	0.39	28.14
LAT P-A5	A5	MH-A4	24.36	24.12	24" RCP	1.00	7.73	12.73	3.00	0.01	0.03	24.76	24.28	0.15	0.15	4.51	4.35	0.48	45.67
LAT P-A7	A6	MH-A6	30.27	29.97	24" RCP	1.00	32.53	37.53	0.94	0.01	0.01	30.65	30.19	0.22	0.22	3.26	3.25	0.62	25.61
LAT P-A8	A8	A7	28.93	28.63	24" RCP	1.00	25.00	30.00	1.20	0.01	0.01	29.25	28.80	0.18	0.18	3.16	3.14	0.42	28.88
LAT P-A9	A10	A1	28.60	28.23	18" RCP	1.00	18.27	20.48	2.00	0.01	0.02	28.86	28.37	0.13	0.13	3.38	3.35	0.26	17.30
LAT P-A10	A7	MH-A9	27.77	27.68	24" RCP	1.00	3.00	8.00	3.00	0.01	0.03	28.23	27.89	0.19	0.21	5.24	4.57	0.79	45.66
LINK P-A2	MH-A2	A-OUT	17.50	17.00	24" RCP	1.00	65.80	68.30	0.75	0.01	0.01	18.65	18.61	0.65	1.61	5.49	1.78	4.81	22.84
LINK P-A3	MH-A3	MH-A2	19.64	18.01	24" RCP	1.00	130.70	135.70	1.25	0.01	0.01	21.05	18.53	0.52	0.52	6.27	6.24	4.08	29.49
LINK P-A4	MH-A4	MH-A3	21.36	20.62	24" RCP	1.00	147.46	152.46	0.50	0.01	0.01	22.64	21.18	0.56	0.56	4.15	4.13	2.97	18.71
LINK P-A6	MH-A6	MH-A5	24.98	24.59	24" RCP	1.00	51.60	56.60	0.75	0.01	0.01	25.61	24.94	0.35	0.35	3.82	3.81	1.39	22.83
LINK P-A7	MH-A9	MH-A6	27.47	26.47	24" RCP	1.00	94.75	99.75	1.06	0.01	0.01	27.91	26.71	0.24	0.24	3.63	3.63	0.79	27.08
LINK P-A8	A4	MH-A7	27.14	26.48	24" RCP	1.00	49.27	53.27	1.35	0.01	0.01	27.45	26.64	0.16	0.16	3.21	3.21	0.39	30.65
LINK P-A9	A9	MH-A8	29.71	29.00	24" RCP	1.00	89.17	94.17	0.79	0.01	0.01	30.22	29.32	0.31	0.31	3.69	3.68	1.16	23.46

PROPOSED SYSTEM D LINKS - 5YR

LINK ID	US NODE ID	DS NODE ID	US FL ELEV (FT)	DS FL ELEV (FT)	SIZE	NUMBER OF BARRELS	ACTUAL LENGTH (FT)	HYDRAULIC LENGTH (FT)	LINK SLOPE (%)	MANNING'S N	FRICTION SLOPE (%)	US HGL (FT)	DS HGL (FT)	UNIFORM DEPTH (FT)	ACTUAL DEPTH (FT)	UNIFORM VELOCITY (FPS)	ACTUAL VELOCITY (FPS)	FLOW (CFS)	CAPACITY (CFS)
LAT P-D1	D5	JB-D3	28.42	28.34	24" RCP	1.00	5.39	10.39	1.50	0.01	0.01	28.77	28.53	0.18	0.18	3.56	3.42	0.49	32.30
LAT P-D2	D1	JB-D2	24.11	23.59	60" RCP	1.00	34.55	40.55	1.50	0.01	0.01	25.93	24.51	0.83	0.92	9.67	8.38	20.66	371.72
LAT P-D3	D2	JB-D1	28.33	28.30	24" RCP	1.00	2.43	8.43	1.04	0.01	0.01	29.23	28.86	0.50	0.56	5.60	4.89	3.48	26.88
LINK P-D1	JB-D3	D-OUT	22.63	22.00	60" RCP	1.00	62.86	66.36	1.00	0.01	0.01	24.00	22.99	0.95	0.99	8.57	8.02	22.22	303.51
LINK P-D2	JB-D2	JB-D3	23.49	22.78	60" RCP	1.00	58.78	65.78	1.21	0.01	0.01	25.27	23.73	0.90	0.95	9.08	8.43	21.77	333.79
LINK P-D3	P-D1	D1	24.26	24.12	60" RCP	1.00	32.47	34.97	0.42	0.01	0.00	25.92	25.93	1.14	1.81	6.12	3.21	20.55	196.42

STATE OF TEXAS
ADRIANA C. SUSTAITA
141394
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

STORM SYSTEM HYDRAULIC DATA SHEET

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		108
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

PROPOSED SYSTEM A INLETS- 100 YR

INLET ID	INLET TYPE	INLET LENGTH (FT)	REQUIRED LENGTH (ft)	LONGITUDINAL SLOPE (%)	TRANSVERSE SLOPE (%)	GRATE WIDTH (FT)	TOTAL FLOW (CFS)	INLET CAPACITY (cfs)	INLET BYPASS NODE	INLET BYPASS FLOW (cfs)	COMPUTED POND WIDTH (ft)	ALLOWED POND WIDTH (ft)	COMPUTED POND DEPTH (ft)	ALLOWED POND DEPTH (ft)
A1	Typ AZR 2 Grate Inlet	n/a	n/a	n/a	0.02	2.83	1.05	7.30	0.00	0.00	7.98	7.00	0.11	0.42
A2	Typ AZR 2 Grate Inlet	n/a	n/a	0.13	0.02	2.83	0.74	0.71	A1	0.03	8.00	7.00	0.16	0.42
A3	Type PCU Curb Inlet w/ 2 Ext (3'x5')	n/a	n/a	0.13	0.02	1.39	0.74	0.74	A1	0.00	8.01	7.00	0.16	0.42
A4	PAZD FG 3x3-3	n/a	n/a	n/a	0.02	3.00	0.70	6.55	0.00	0.00	11.84	20.00	0.11	0.50
A5	Typ C1 Curb Inlet w/ 2 Ext	n/a	5.18	0.13	0.02	n/a	0.86	0.86	A2	0.00	8.45	7.00	0.17	0.42
A6	Typ C1 Curb Inlet w/ 2 Ext	n/a	5.97	0.13	0.02	n/a	1.11	1.11	A3	0.00	9.29	7.00	0.19	0.42
A7	Typ C1 Curb Inlet w/ 2 Ext	n/a	4.46	0.13	0.02	n/a	0.66	0.66	A5	0.00	7.67	7.00	0.15	0.42
A8	Typ C1 Curb Inlet w/ 2 Ext	n/a	4.80	0.13	0.02	n/a	0.75	0.75	A6	0.00	8.04	7.00	0.16	0.42
A9	Typ C1 Curb Inlet w/ 1 Ext	n/a	18.78	n/a	0.02	n/a	2.06	7.86	0.00	0.00	8.54	7.00	0.17	0.42
A10	Typ AZR 2 Grate Inlet	n/a	n/a	0.12	0.02	2.83	0.46	0.45	A1	0.01	6.77	7.00	0.14	0.42

PROPOSED SYSTEM D INLETS - 100 YR

INLET ID	INLET TYPE	INLET LENGTH (FT)	REQUIRED LENGTH (ft)	LONGITUDINAL SLOPE (%)	TRANSVERSE SLOPE (%)	GRATE WIDTH (FT)	TOTAL FLOW (CFS)	INLET CAPACITY (cfs)	INLET BYPASS NODE	INLET BYPASS FLOW (cfs)	COMPUTED POND WIDTH (ft)	ALLOWED POND WIDTH (ft)	COMPUTED POND DEPTH (ft)	ALLOWED POND DEPTH (ft)
D1	Typ C1 Curb Inlet w/ 1 Ext	n/a	1.23	n/a	0.02	n/a	0.46	7.86	D2	0.00	#REF!	6.94	11.00	0.06
D2	Typ C1 Curb Inlet w/ 2 Ext	n/a	18.78	n/a	0.02	n/a	6.18	10.95	n/a	0.00	#REF!	14.23	11.00	0.28
D3	Typ C1 Curb Inlet w/ 2 Ext	n/a	18.78	n/a	0.02	n/a	3.33	10.95	n/a	0.00	#REF!	9.42	11.00	0.19
D4	PAZD FG 3x3-3	n/a	n/a	n/a	0.02	3.00	2.05	6.55	n/a	0.00	#REF!	16.12	20.00	0.23
D5	Type PCU Curb Inlet w/ 2 Ext (3'x5')	n/a	n/a	n/a	0.02	1.39	0.87	13.70	n/a	0.00	#REF!	8.75	6.00	0.17

PROPOSED SYSTEM A LINKS - 100 YR

LINK ID	US NODE ID	DS NODE ID	US FL ELEV (FT)	DS FL ELEV (FT)	SIZE	NUMBER OF BARRELS	ACTUAL LENGTH (FT)	HYDRAULIC LENGTH (FT)	LINK SLOPE (%)	MANNING'S N	FRICTION SLOPE (%)	US HGL (FT)	DS HGL (FT)	UNIFORM DEPTH (FT)	ACTUAL DEPTH (FT)	UNIFORM VELOCITY (FPS)	ACTUAL VELOCITY (FPS)	FLOW (CFS)	CAPACITY (CFS)
LAT P-A1	A1	MH-A2	18.71	17.50	24" RCP	1.00	12.15	15.75	10.00	0.01	0.10	19.38	17.65	0.15	0.15	8.08	7.66	0.83	83.37
LAT P-A2	A2	MH-A3	24.56	24.50	24" RCP	1.00	12.20	15.80	0.50	0.01	0.01	24.99	24.86	0.36	0.36	3.19	3.16	1.21	18.64
LAT P-A3	A3	A2	25.43	25.23	24" RCP	1.00	19.35	21.95	1.00	0.01	0.01	25.79	25.48	0.25	0.25	3.58	3.55	0.80	26.40
LAT P-A4	MH-A7	A3	26.46	26.01	24" RCP	1.00	39.59	43.59	1.14	0.01	0.01	26.77	26.18	0.17	0.17	3.03	3.03	0.39	28.14
LAT P-A5	A5	MH-A4	24.36	24.12	24" RCP	1.00	7.73	12.73	3.00	0.01	0.03	24.76	24.28	0.15	0.15	4.51	4.35	0.48	45.67
LAT P-A7	A6	MH-A6	30.27	29.97	24" RCP	1.00	32.53	37.53	0.94	0.01	0.01	30.65	30.19	0.22	0.22	3.26	3.25	0.62	25.61
LAT P-A8	A8	A7	28.93	28.63	24" RCP	1.00	25.00	30.00	1.20	0.01	0.01	29.25	28.80	0.18	0.18	3.16	3.14	0.42	28.88
LAT P-A9	A10	A1	28.60	28.23	18" RCP	1.00	18.27	20.48	2.00	0.01	0.02	28.86	28.37	0.13	0.13	3.38	3.35	0.26	17.30
LAT P-A10	A7	MH-A9	27.77	27.68	24" RCP	1.00	3.00	8.00	3.00	0.01	0.03	28.23	27.89	0.19	0.21	5.24	4.57	0.79	45.66
LINK P-A2	MH-A2	A-OUT	17.50	17.00	24" RCP	1.00	65.80	68.30	0.75	0.01	0.01	18.65	18.61	0.65	1.61	5.49	1.78	4.81	22.84
LINK P-A3	MH-A3	MH-A2	19.64	18.01	24" RCP	1.00	130.70	135.70	1.25	0.01	0.01	21.05	18.53	0.52	0.52	6.27	6.24	4.08	29.49
LINK P-A4	MH-A4	MH-A3	21.36	20.62	24" RCP	1.00	147.46	152.46	0.50	0.01	0.01	22.64	21.18	0.56	0.56	4.15	4.13	2.97	18.71
LINK P-A6	MH-A6	MH-A5	24.98	24.59	24" RCP	1.00	51.60	56.60	0.75	0.01	0.01	25.61	24.94	0.35	0.35	3.82	3.81	1.39	22.83
LINK P-A7	MH-A9	MH-A6	27.47	26.47	24" RCP	1.00	94.75	99.75	1.06	0.01	0.01	27.91	26.71	0.24	0.24	3.63	3.63	0.79	27.08
LINK P-A8	A4	MH-A7	27.14	26.48	24" RCP	1.00	49.27	53.27	1.35	0.01	0.01	27.45	26.64	0.16	0.16	3.21	3.21	0.39	30.65
LINK P-A9	A9	MH-A8	29.71	29.00	24" RCP	1.00	89.17	94.17	0.79	0.01	0.01	30.22	29.32	0.31	0.31	3.69	3.68	1.16	23.46

PROPOSED SYSTEM D LINKS - 100 YR

LINK ID	US NODE ID	DS NODE ID	US FL ELEV (FT)	DS FL ELEV (FT)	SIZE	NUMBER OF BARRELS	ACTUAL LENGTH (FT)	HYDRAULIC LENGTH (FT)	LINK SLOPE (%)	MANNING'S N	FRICTION SLOPE (%)	US HGL (FT)	DS HGL (FT)	UNIFORM DEPTH (FT)	ACTUAL DEPTH (FT)	UNIFORM VELOCITY (FPS)	ACTUAL VELOCITY (FPS)	FLOW (CFS)	CAPACITY (CFS)
LAT P-D1	D5	JB-D3	28.42	28.34	24" RCP	1.00	5.39	10.39	1.50	0.01	0.01	28.77	28.53	0.18	0.18	3.56	3.42	0.49	32.30
LAT P-D2	D1	JB-D2	24.11	23.59	60" RCP	1.00	34.55	40.55	1.50	0.01	0.01	25.93	24.51	0.83	0.92	9.67	8.38	20.66	371.72
LAT P-D3	D2	JB-D1	28.33	28.30	24" RCP	1.00	2.43	8.43	1.04	0.01	0.01	29.23	28.86	0.50	0.56	5.60	4.89	3.48	26.88
LINK P-D1	JB-D3	D-OUT	22.63	22.00	60" RCP	1.00	62.86	66.36	1.00	0.01	0.01	24.00	22.99	0.95	0.99	8.57	8.02	22.22	303.51
LINK P-D2	JB-D2	JB-D3	23.49	22.78	60" RCP	1.00	58.78	65.78	1.21	0.01	0.01	25.27	23.73	0.90	0.95	9.08	8.43	21.77	333.79
LINK P-D3	P-D1	D1	24.26	24.12	60" RCP	1.00	32.47	34.97	0.42	0.01	0.00	25.92	25.93	1.14	1.81	6.12	3.21	20.55	196.42

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM
HYDRAULIC DATA SHEET

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		109
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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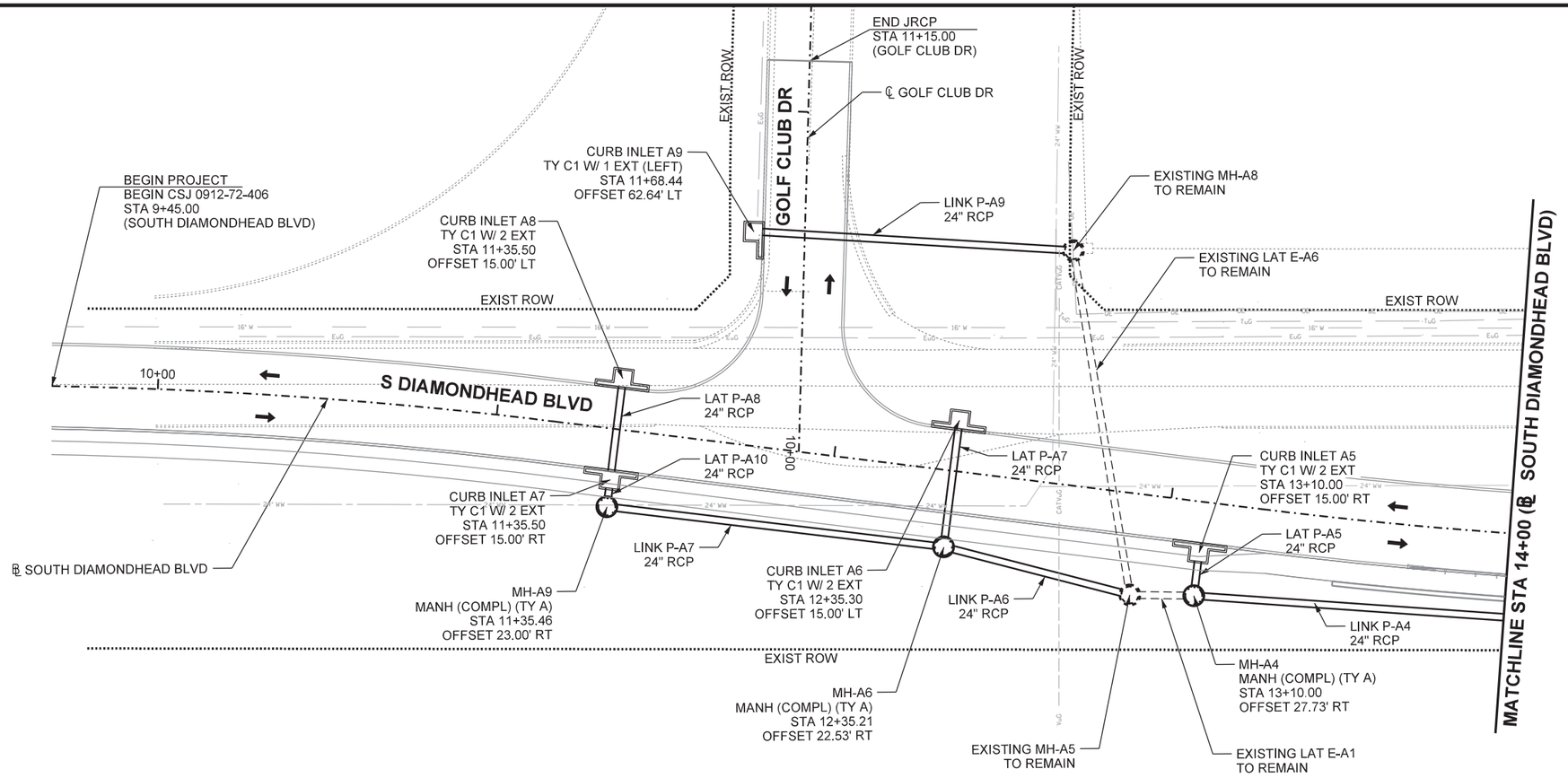

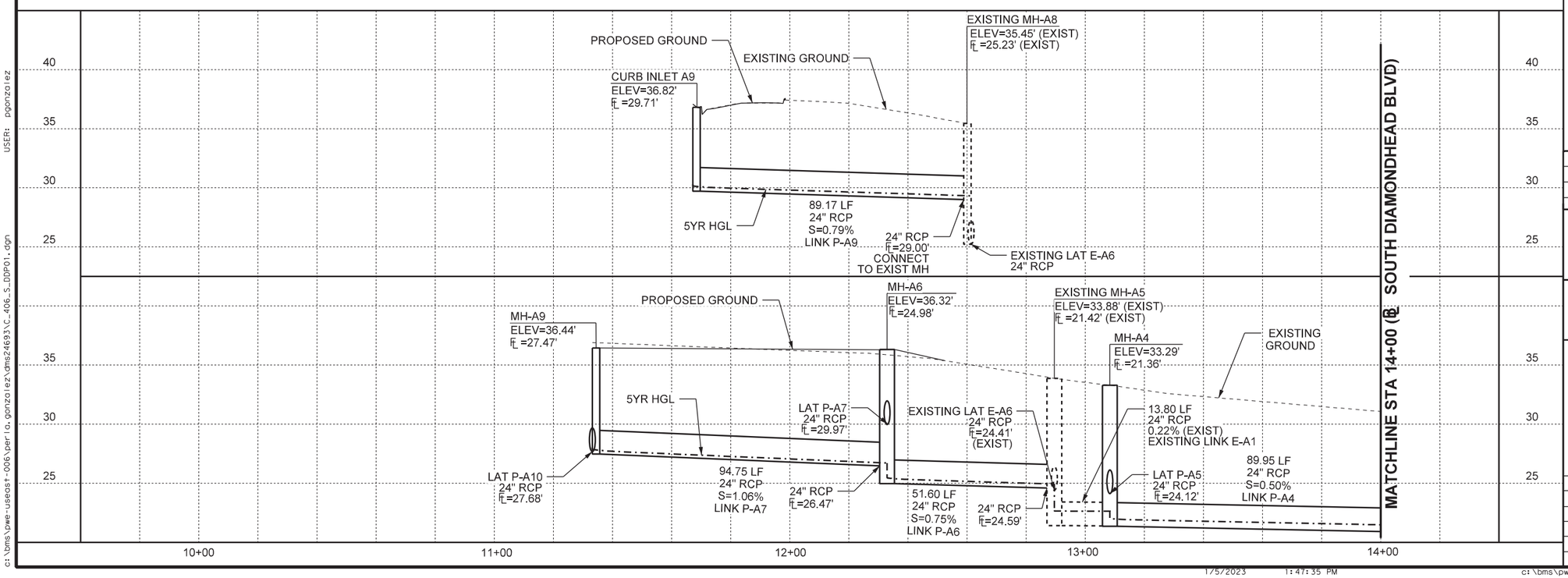

LEGEND

- PROPOSED CURB INLET
- PROPOSED GRATE INLET
- PROPOSED PIPE SET
- PROPOSED MANHOLE
- EXISTING MANHOLE
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

NOTES

1. ALL REINFORCED PIPES ARE TO BE CLASS III, UNLESS OTHERWISE NOTED.
2. SEE STORM SYSTEM LATERAL PROFILE SHEETS FOR ADDITIONAL INFORMATION.

SCALE: 1" = 40' HORZ
1" = 10' VERT

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM PLAN & PROFILE BEGIN PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		110
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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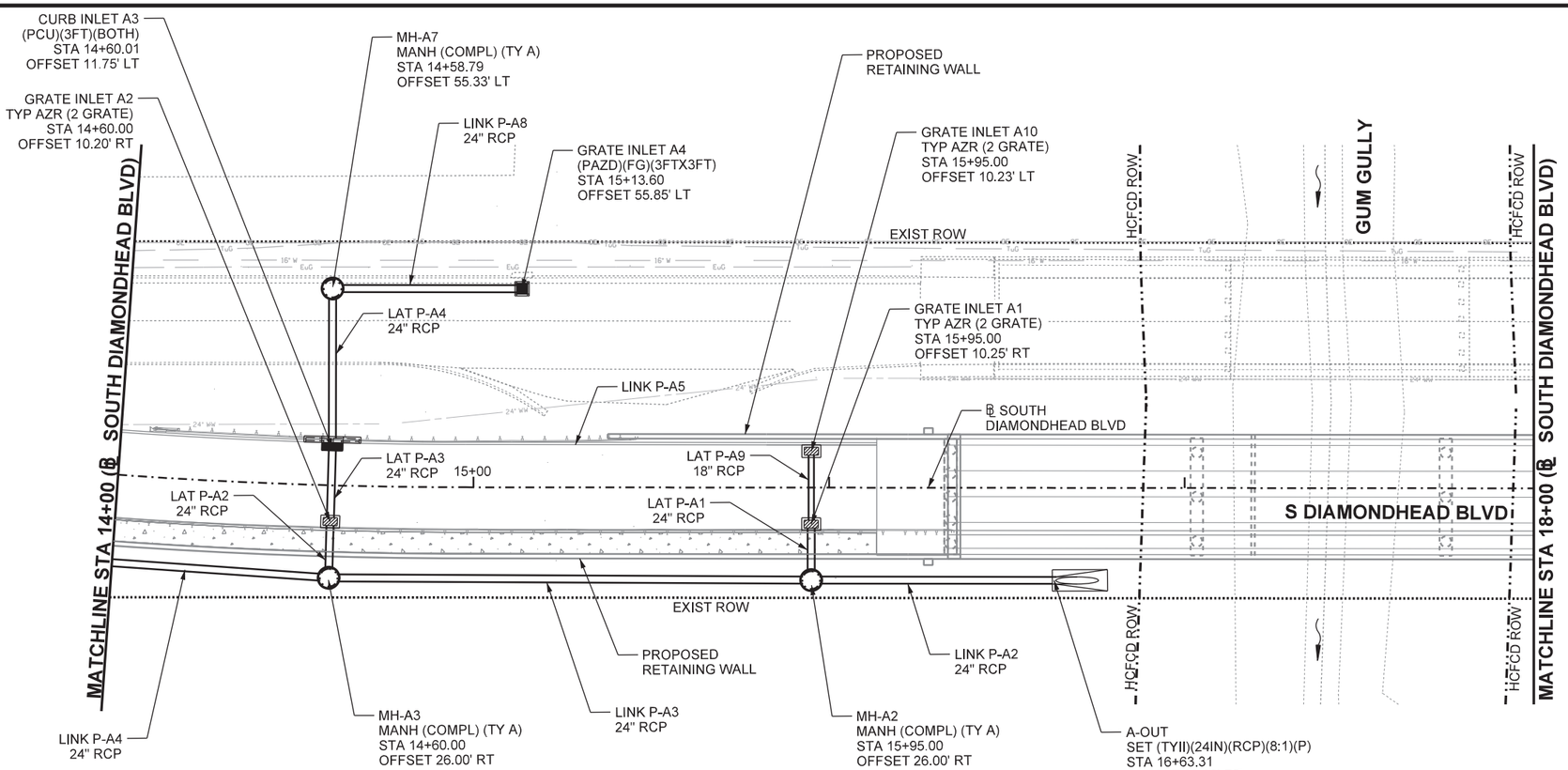

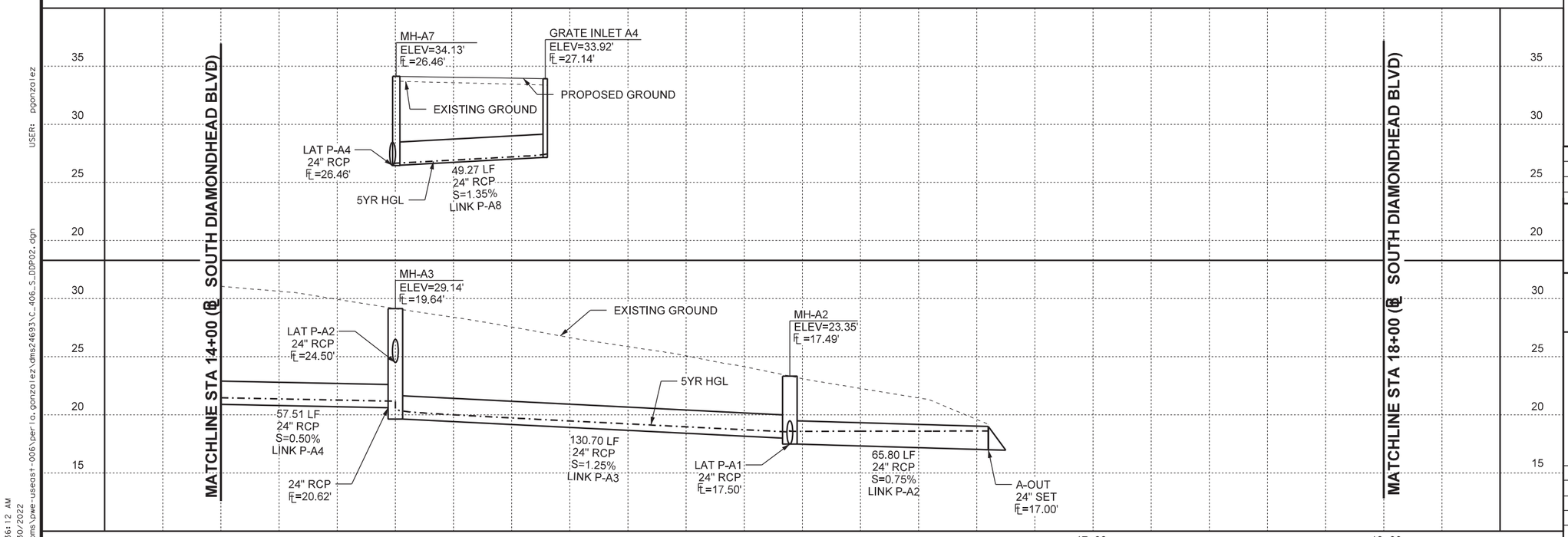

LEGEND

- PROPOSED CURB INLET
- PROPOSED GRATE INLET
- PROPOSED PIPE SET
- PROPOSED MANHOLE
- EXISTING MANHOLE
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

NOTES

1. ALL REINFORCED PIPES ARE TO BE CLASS III, UNLESS OTHERWISE NOTED.
2. SEE STORM SYSTEM LATERAL PROFILE SHEETS FOR ADDITIONAL INFORMATION.

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

STATE OF TEXAS
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11/30/2022

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM PLAN & PROFILE STA 14+00 TO STA 18+00

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	111

STATE	DISTRICT	COUNTY
TEXAS	HOU	HARRIS

CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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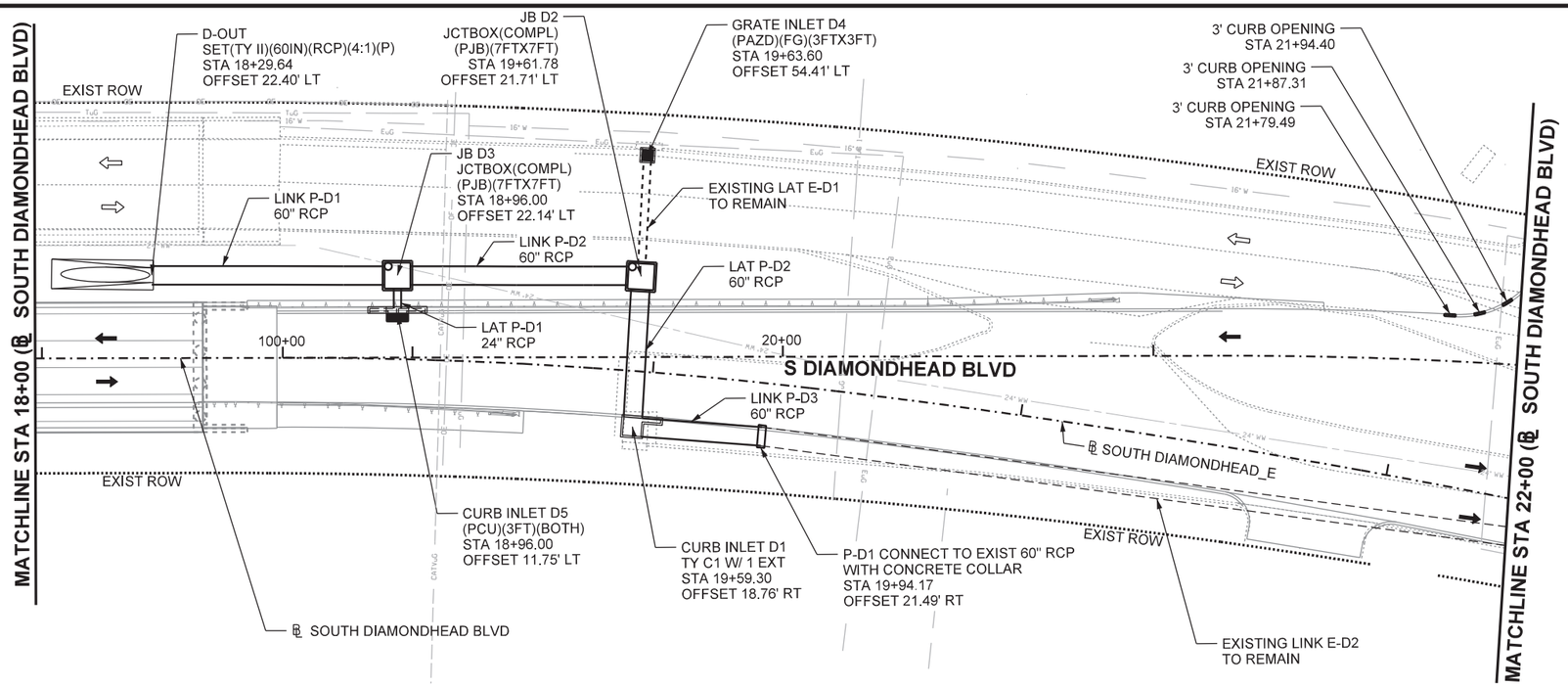

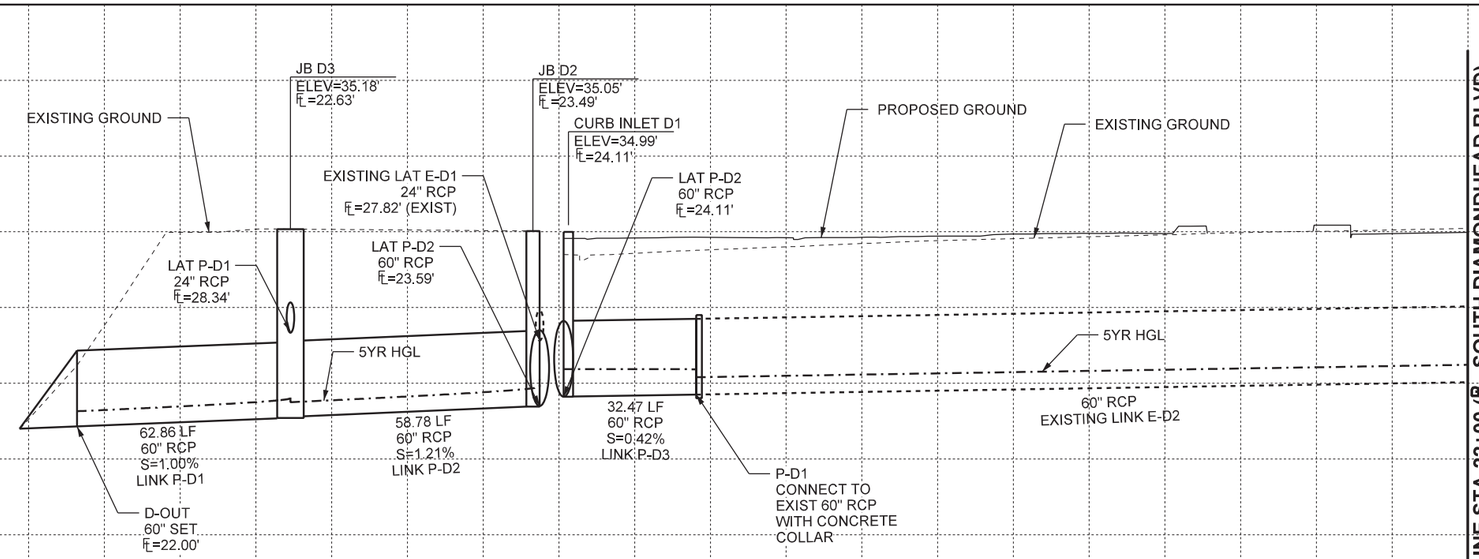

LEGEND

- PROPOSED CURB INLET
- PROPOSED GRATE INLET
- PROPOSED PIPE SET
- PROPOSED MANHOLE
- EXISTING MANHOLE
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

NOTES

1. ALL REINFORCED PIPES ARE TO BE CLASS III, UNLESS OTHERWISE NOTED.
2. SEE STORM SYSTEM LATERAL PROFILE SHEETS FOR ADDITIONAL INFORMATION.

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

STATE OF TEXAS
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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM PLAN & PROFILE STA 18+00 TO STA 22+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	112

STATE	DISTRICT	COUNTY
TEXAS	HOU	HARRIS

CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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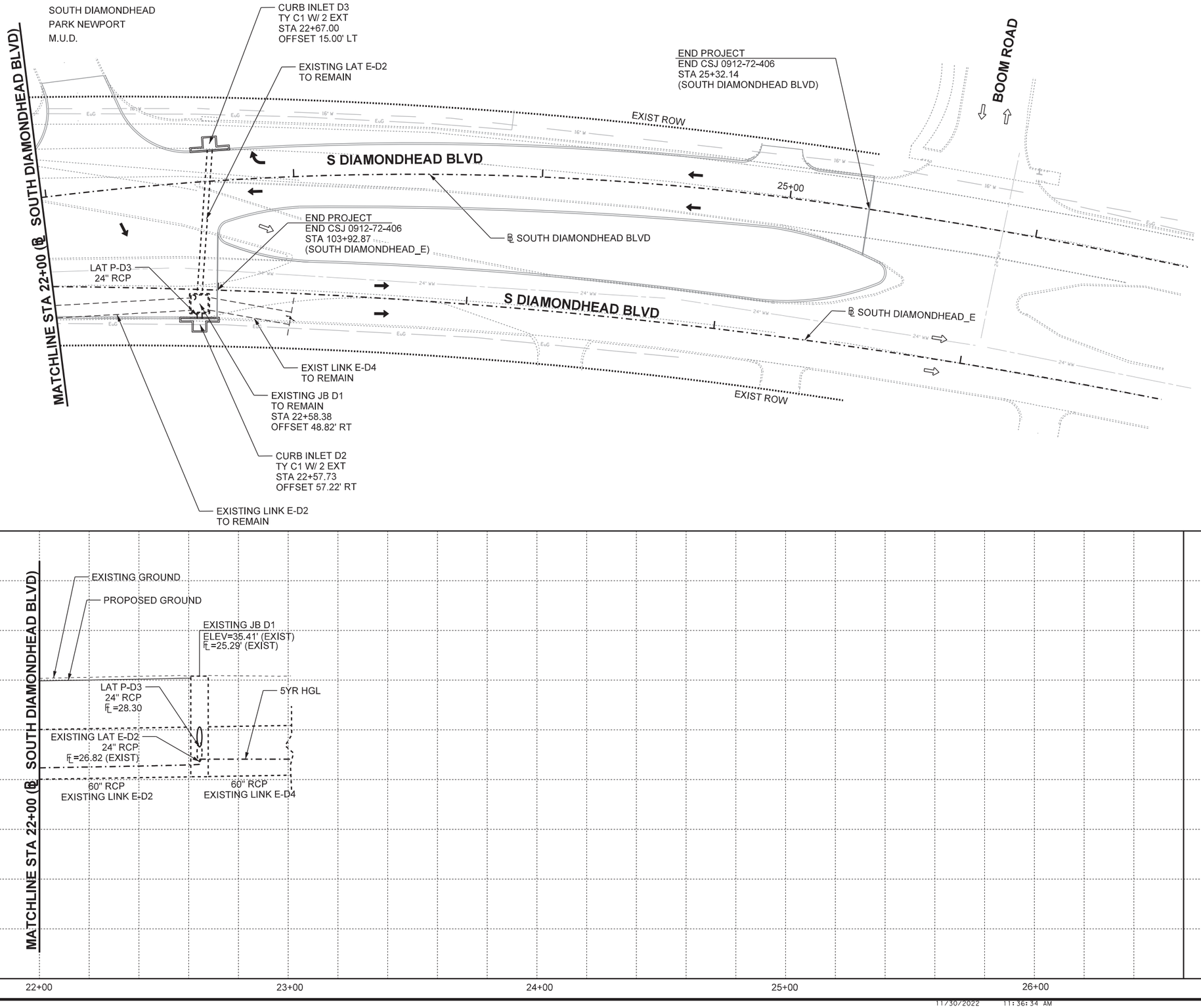

LEGEND

- PROPOSED CURB INLET
- PROPOSED GRATE INLET
- PROPOSED PIPE SET
- PROPOSED MANHOLE
- EXISTING MANHOLE
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

NOTES

1. ALL REINFORCED PIPES ARE TO BE CLASS III, UNLESS OTHERWISE NOTED.
2. SEE STORM SYSTEM LATERAL PROFILE SHEETS FOR ADDITIONAL INFORMATION.

0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

STATE OF TEXAS
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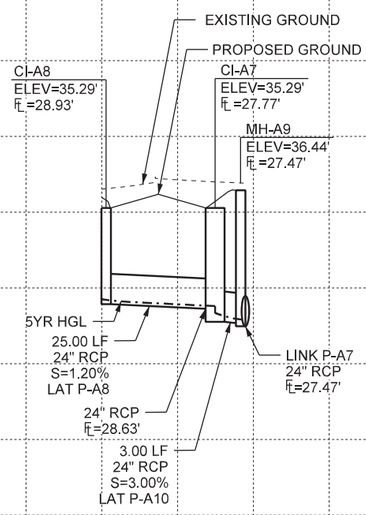
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM PLAN & PROFILE STA 22+00 TO END OF PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		113
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

LAT P-A8 & LAT P-10



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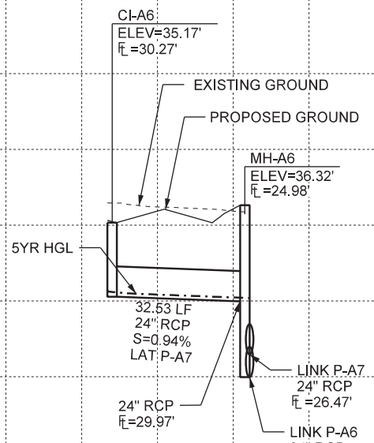

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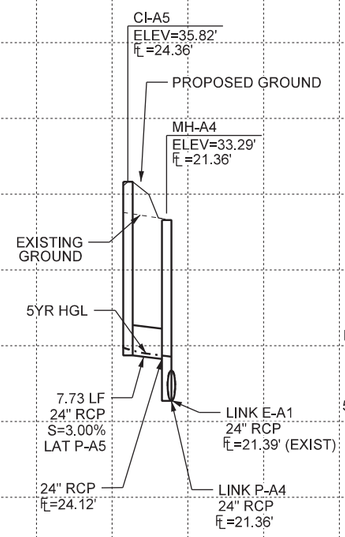

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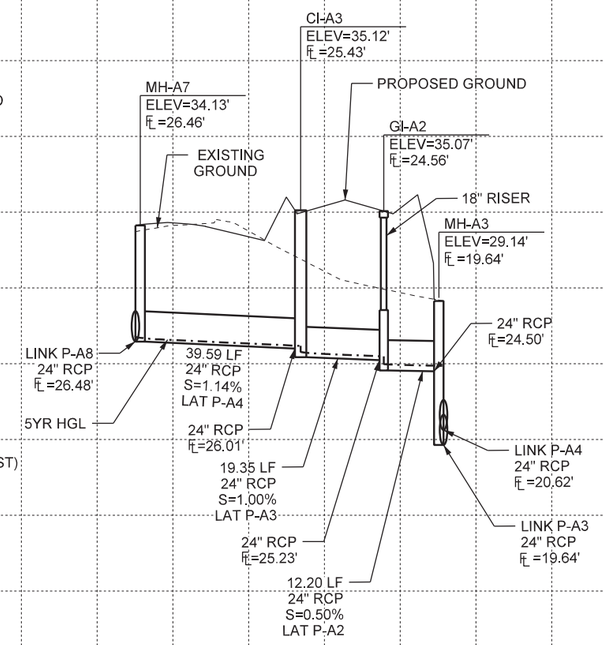
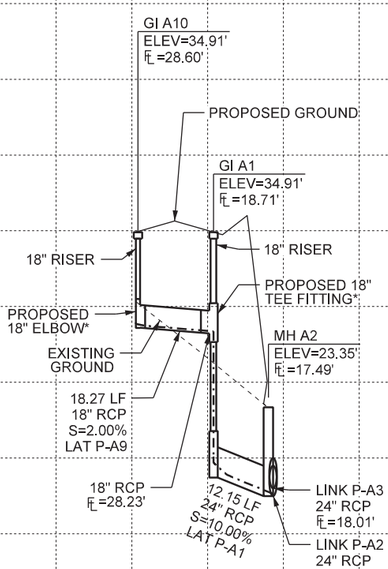
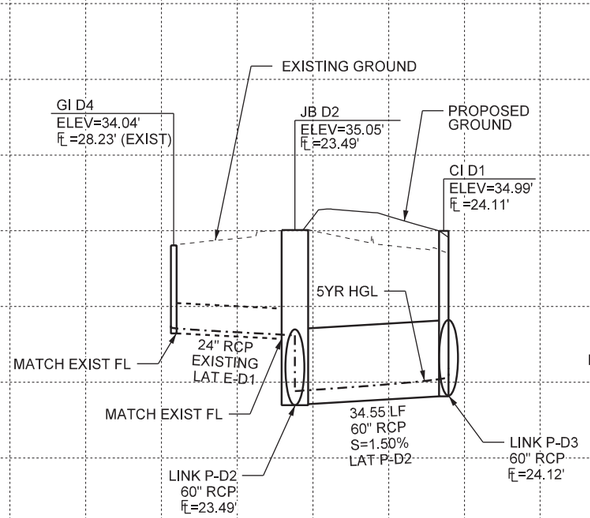


LAT P-A9 & LAT P-A1



***CONTRACTOR SHALL PROVIDE RCP FITTING SUBSIDIARY TO INLET AZR2G ITEM 0465 6172**

LAT E-D1 & LAT P-D2



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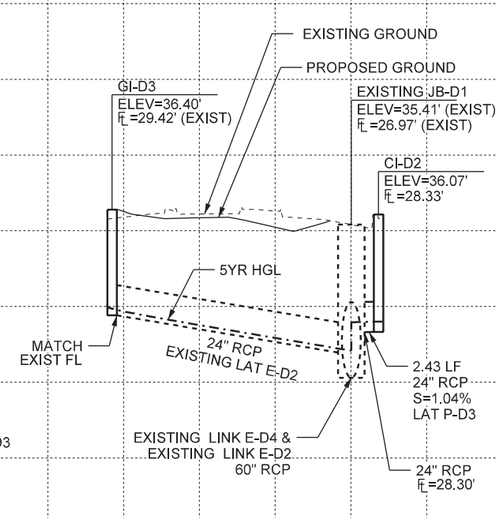
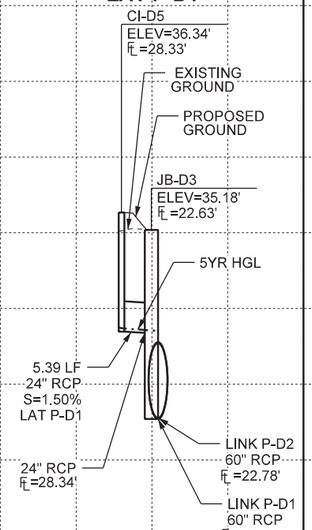


LAT P-D1



0 20′ 40′

SCALE: 1" = 40′ HORZ
1" = 10′ VERT

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

STORM SYSTEM LATERAL PROFILE

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		114
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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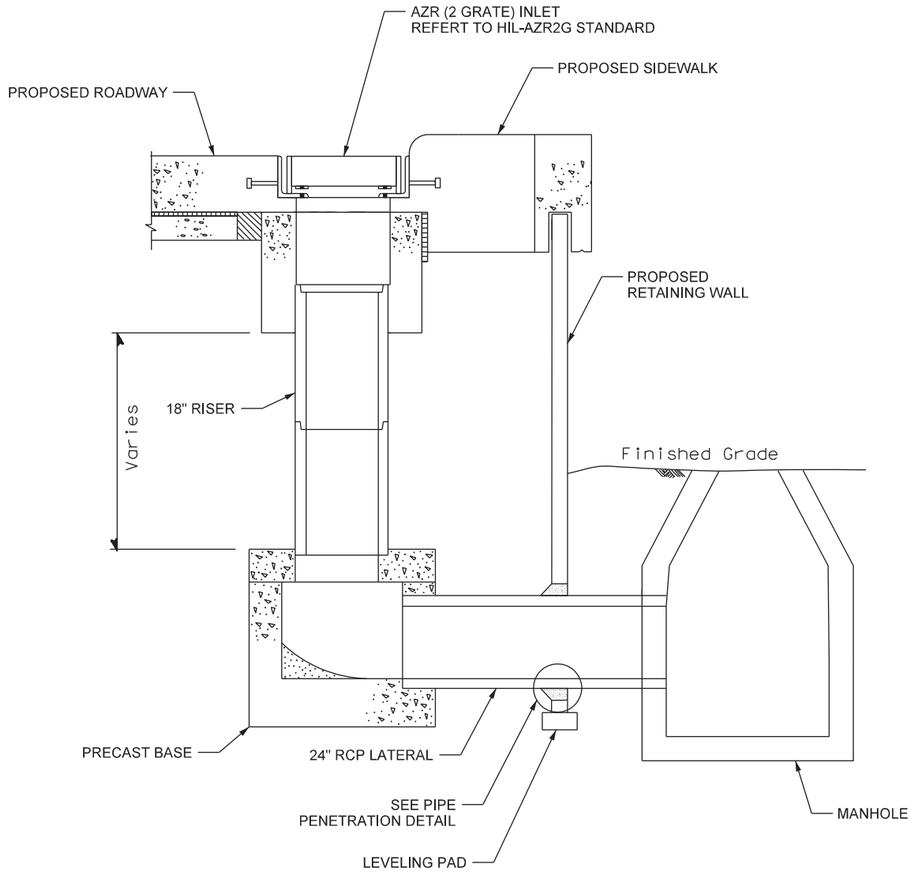
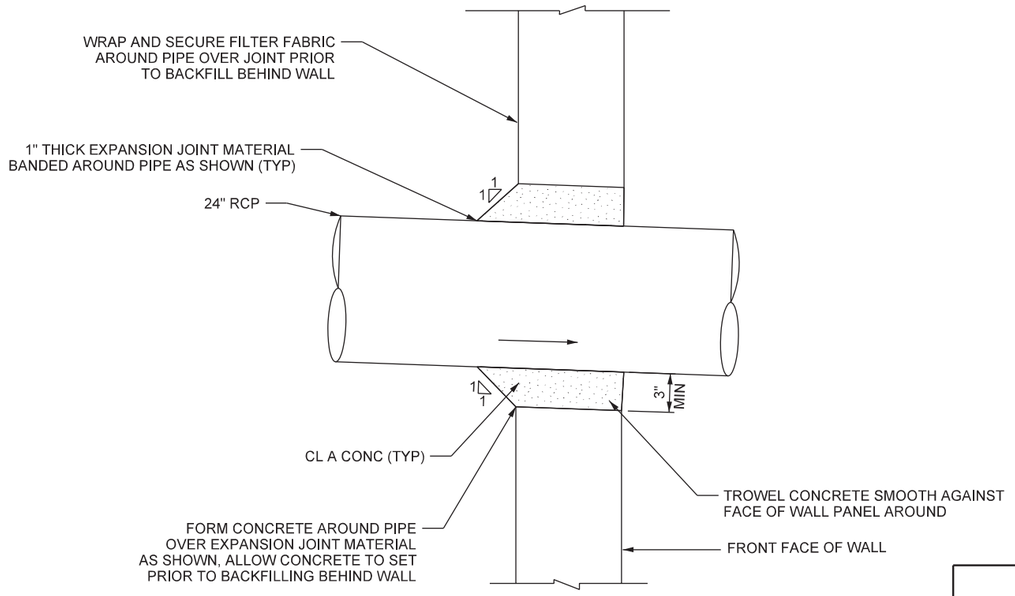


RETAINING WALL INLET DETAIL
NTS



1. CONCRETE, FILTER FABRIC, JOINT MATERIAL AND LABOR SHALL BE SUBSIDIARY TO PERTINENT BID ITEMS.

2. PROVIDE A ROUND HOLE (NOT SQUARE) IN THE MSE WALL PANEL. WALL SUPPLIER SHALL SHOW HOLE ON WALL SHOP DRAWINGS AND PROVIDE 9" MINIMUM CLEARANCE FROM EDGE OF PANEL.

PIPE PENETRATION DETAIL
NTS

SCALE = N.T.S

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11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

MISCELANEOUS DRAINAGE DETAILS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		115
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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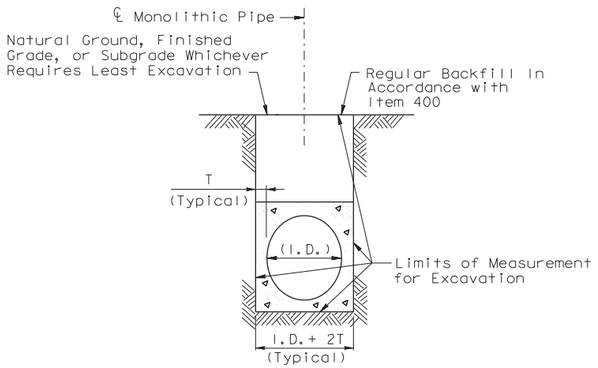
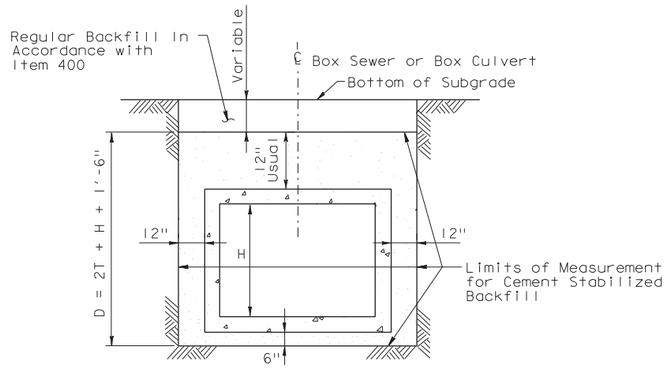


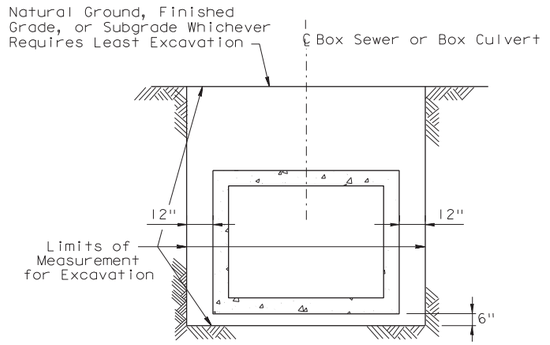
EXCAVATION DETAIL

MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



BACKFILL DETAIL

BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS ✳

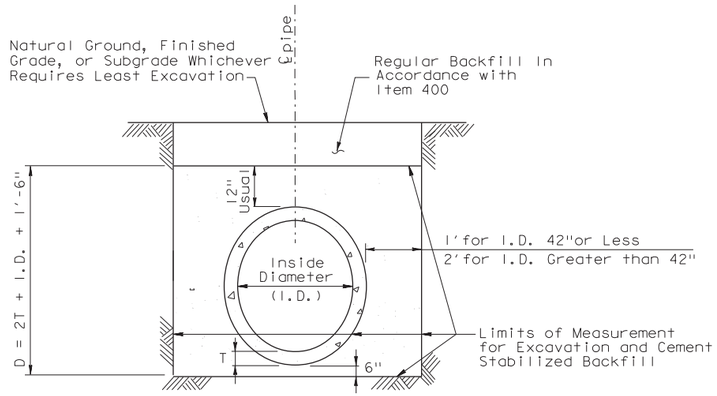


EXCAVATION DETAIL

BOX CULVERTS
IN A GRADED AREA

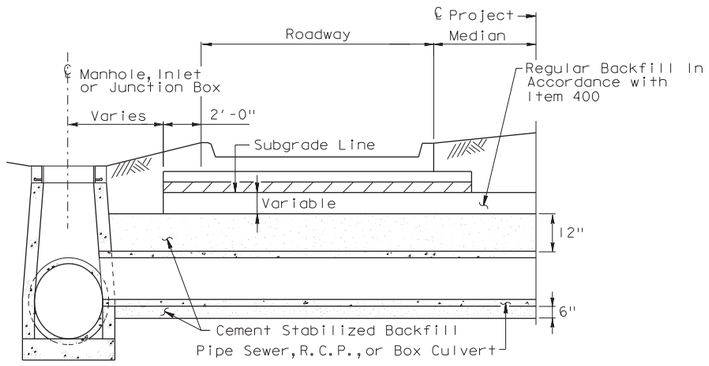
REINFORCED CONCRETE PIPE			
EXCAVATION AND BACKFILL QUANTITIES			
PIPE DIA. IN.	T FT.	CULVERT OR SEWER EXCAVATION IN A PAVED OR GRADED AREA C.Y. PER L.F. PER FT. OF DEPTH	CEMENT STABILIZED BACKFILL IN A PAVED OR GRADED AREA C.Y. PER L.F. OF PIPE
18	0.19	0.144	0.383
24	0.23	0.165	0.478
30	0.29	0.188	0.586
36	0.33	0.210	0.692
42	0.38	0.231	0.808
48	0.42	0.327	1.394
54	0.46	0.349	1.560
60	0.50	0.370	1.731
66	0.54	0.392	1.907
72	0.58	0.414	2.088
78	0.62	0.435	2.275
84	0.67	0.457	2.474

MONOLITHIC PIPE		
EXCAVATION QUANTITIES		
PIPE DIA. IN.	T FT.	EXCAVATION C.Y. PER L.F. PER FT. OF DEPTH
36	0.417	0.142
42	0.458	0.164
48	0.458	0.182
54	0.500	0.204
60	0.583	0.228
66	0.583	0.247
72	0.625	0.269
78	0.625	0.287
84	0.625	0.306



EXCAVATION & BACKFILL DETAIL

REINFORCED CONCRETE PIPE
IN A GRADED OR PAVED AREA
INCLUDING DETOURS



BACKFILL DETAIL

AT MANHOLE, INLET OR JUNCTION BOX

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

NOTE:

Cement stabilized backfill may be omitted in private driveways as indicated elsewhere in the plans.

Rubber gaskets shall be required for all joints on proposed cross drainage, pipe culverts and proposed storm sewer systems, unless otherwise shown in the plans.

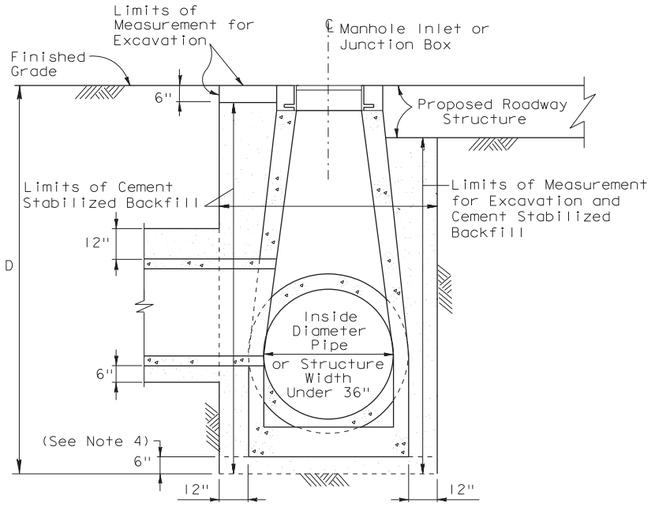
✳ Backfill with cement stabilized material will be required for all structures under detours unless noted otherwise in the General Notes.

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

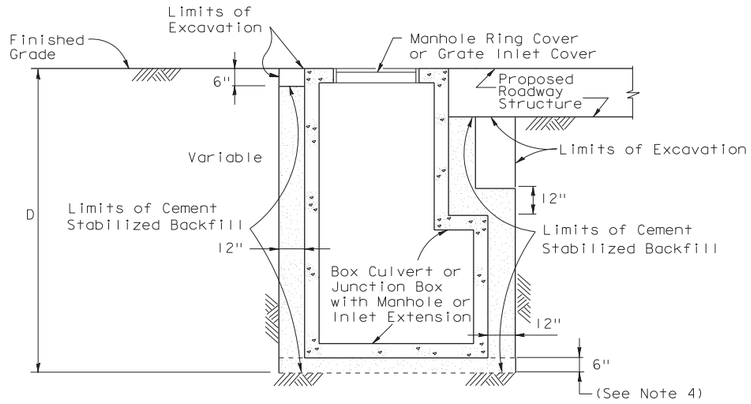
E&BD

FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 11/05 REVISED 2/2010 Added note to Table 1, Sht 2 of 2. REVISED 6/12 REVISED 9/14	HOU	6	SEE TITLE SHEET	116
	COUNTY		CONTROL / SECT / JOB	HIGHWAY
	HARRIS		0912 / 72 / 406	CS



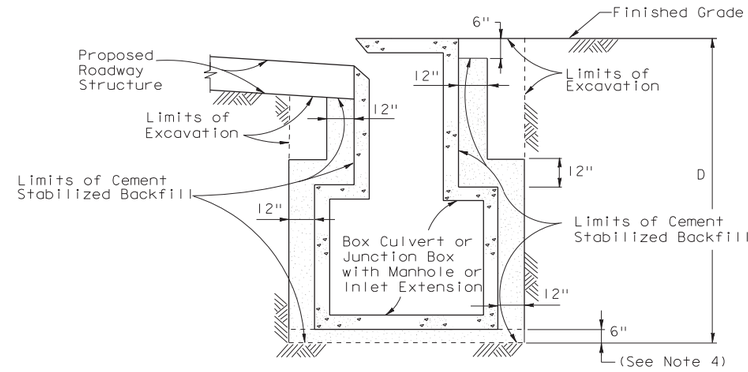
EXCAVATION AND BACKFILL DETAIL

MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS
N.T.S.



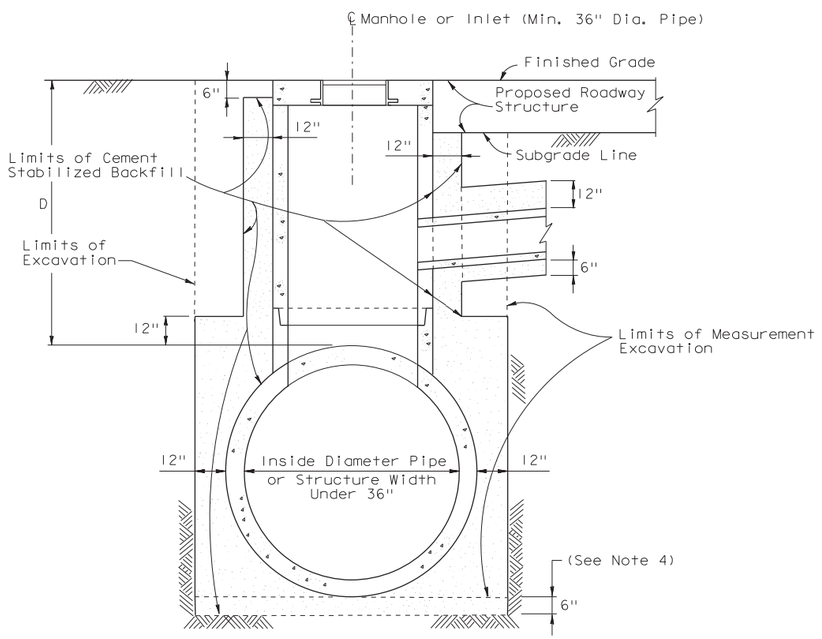
EXCAVATION AND BACKFILL DETAIL

JUNCTION BOXES IN A
PAVED OR GRADED AREA
N.T.S.



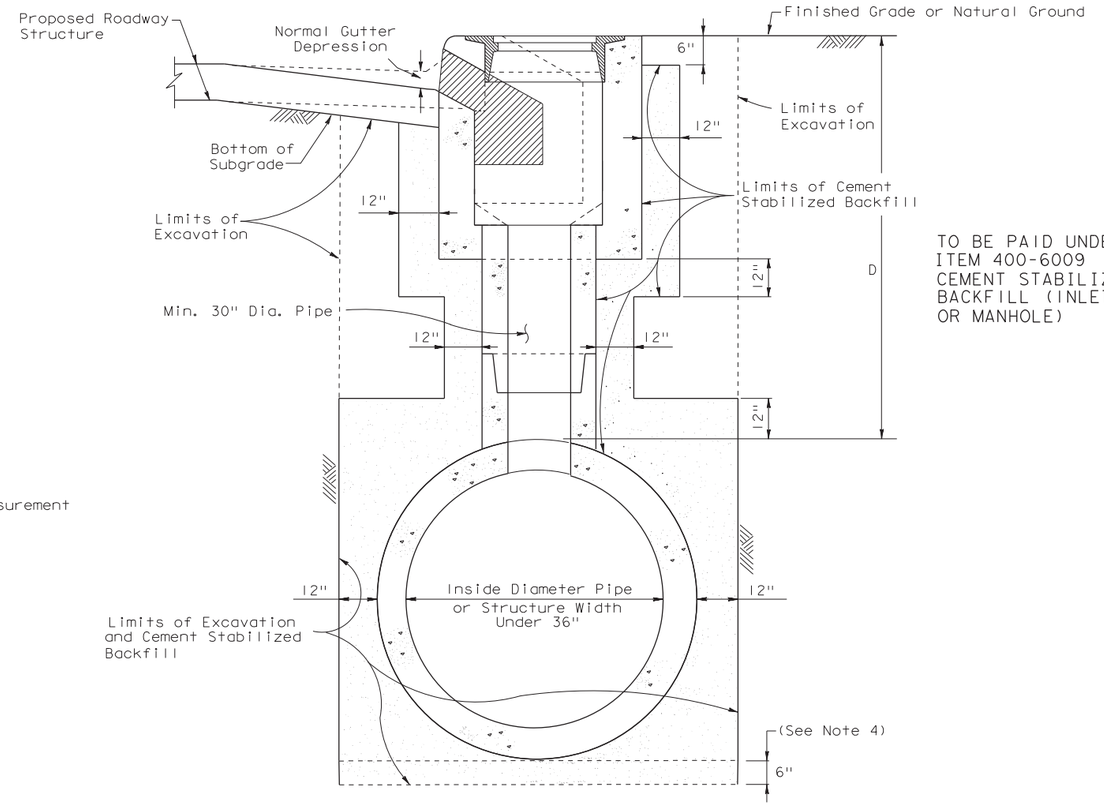
EXCAVATION AND BACKFILL DETAIL

INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA
N.T.S.



EXCAVATION AND BACKFILL DETAIL

MANHOLES 36 IN. AND GREATER
IN A PAVED OR GRADED AREA
N.T.S.



EXCAVATION AND BACKFILL DETAIL

CURB INLETS IN A PAVED OR GRADED AREA
N.T.S.

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

TABLE I

SCHEDULE FOR PAY QUANTITIES OF CEMENT STABILIZED BACKFILL (SEE NOTE 1)

MANHOLE OR INLET DEPTH (D) IN FEET	CEMENT STABILIZED BACKFILL IN CUBIC YARDS
0 through 5	5.75
> 5 through 10	8.25
greater than 10	12.75

TO BE PAID UNDER ITEM 400-6009 CEMENT STABILIZED BACKFILL (INLET OR MANHOLE)

NOTES:

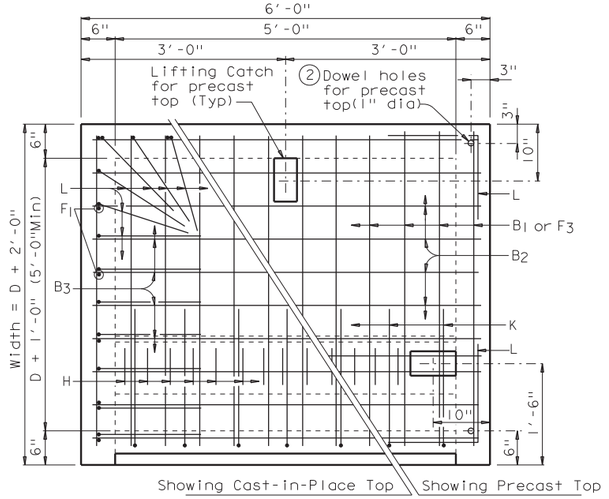
1. The Contractor is paid a fixed estimated amount for cement stabilized backfill based on depth (D) and Table. I.
2. Proposed roadway structure includes pavement, base and any subgrade.
3. For backfill of intersecting pipes and box culverts, see "Excavation and Backfill Diagram for Pipes and Box Culverts."
4. 6" cement stabilized backfill will be required only for precast units.

Texas Department of Transportation
Houston District

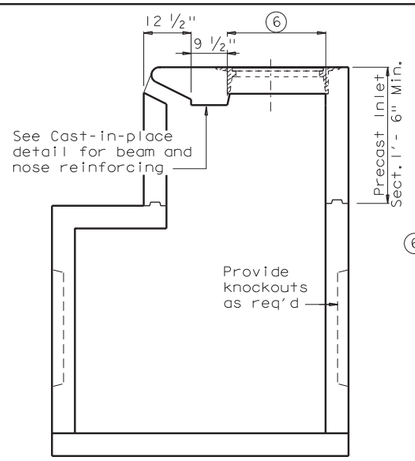
EXCAVATION AND BACKFILL DIAGRAMS

E&BD

FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 2/2010 Added note to Table 1. REVISED 6/12 REVISED 9/14 REVISED 3/15	HOU	6	SEE TITLE SHEET	117
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0912	72	406	CS

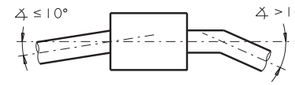


PLAN



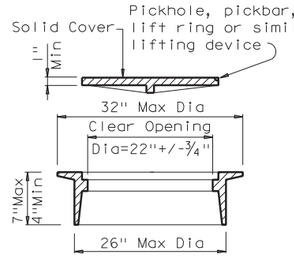
PREFABRICATED INLET

⑥ For reinforcing steel and dimensions not shown, see fabricator's shop drawings. Structure shall be of the size required to accommodate size of pipe shown elsewhere in the plans. Length of inlet = 5'-0"



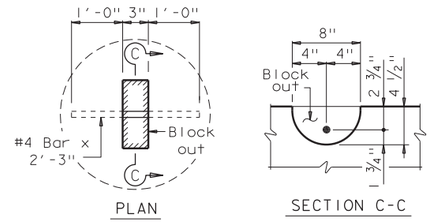
PIPE CONNECTION DETAIL

Connecting pipes should enter within 10° of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.



RING AND COVER DETAILS

EJIW No V-1814 or Neenah No R5900 FTX



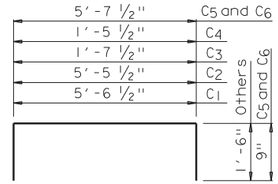
PLAN

SECTION C-C

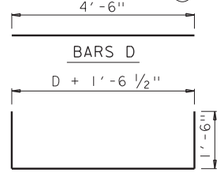
LIFTING CATCH

REINF STEEL		
Bar	Size	Spacing
B_1	#4	6"
B_2	#5	6"
B_3	#4	6"
C_{1-2}	#4	12"
C_{3-4}	#4	⑨
C_5	#6	⑨
C_6	#4	⑨
D	#4	⑨
E	#4	12"
F_{1-5}	#4	12"
G	#4	6"
H	#3	4"
K	#4	9"
L	#4	6"

⑨ As shown

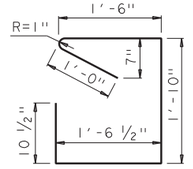


BARS C

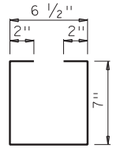


BARS D

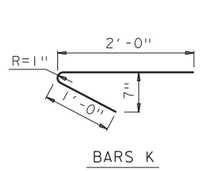
BARS E



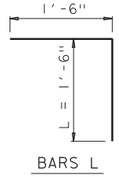
BARS G



BARS H



BARS K



BARS L

GENERAL NOTES:

No alternate designs nor alternate details shall be permitted for precast or cast in place inlets.

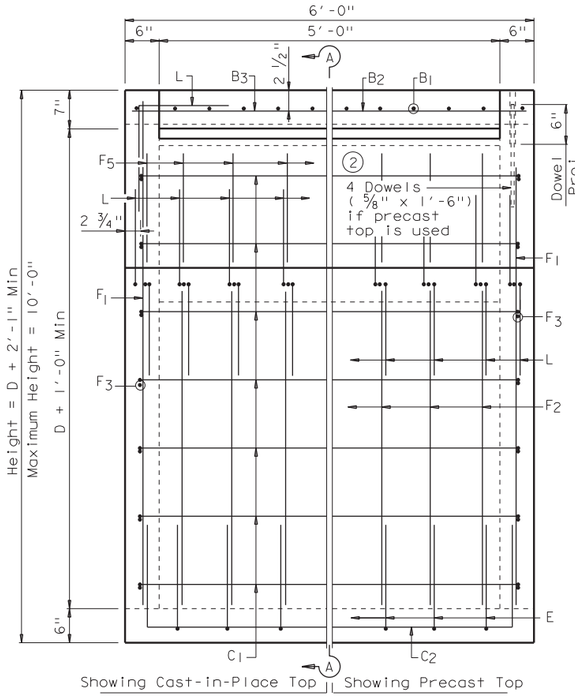
Quantities shown herein are for Contractor's information only. Unless otherwise shown in the plans, payment will be made for each inlet of the type specified and for each extension. Each five foot curb opening of extension is considered "one extension" regardless of whether placed monolithically or precast. Extension length shall be in multiples of 5 feet.

Engineer has the option of specifying cast-in-place top with ring and cover or removable precast top as specified elsewhere in plans.

Shop drawings will be required for precast construction of inlets.

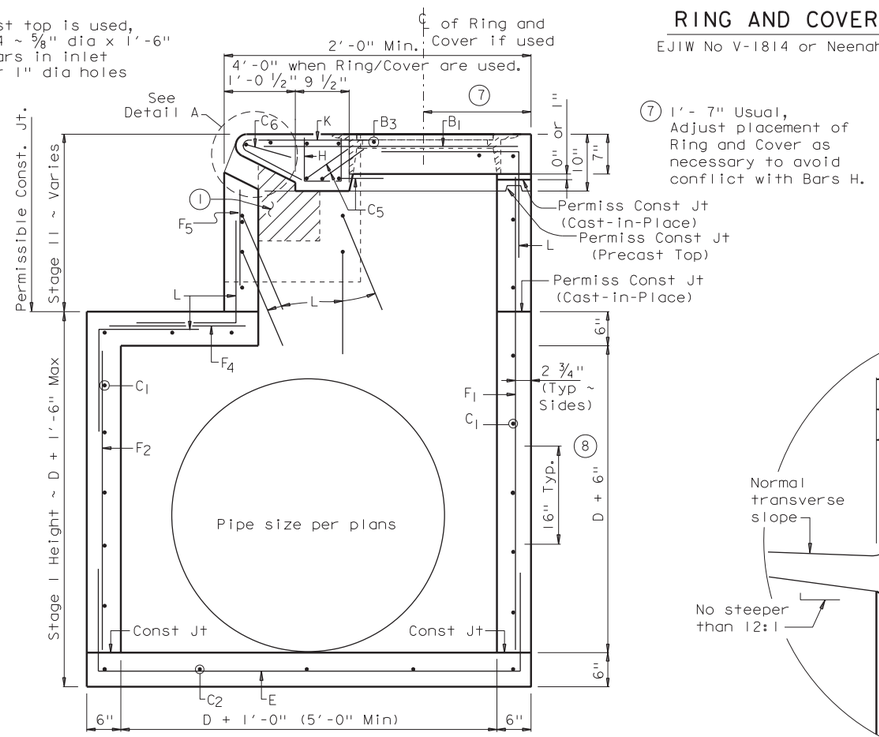
In areas of conflict between reinforcing steel, blockouts, pipes, anchor bolts or other reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings". Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings. Aluminum alloy castings shall not be permitted.



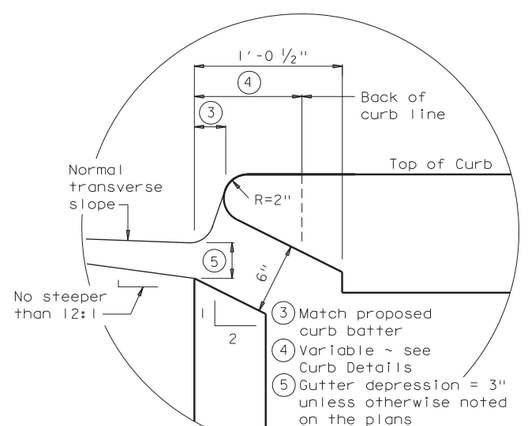
ELEVATION

② If precast top is used, provide 4 ~ ⅝" dia x 1'-6" smooth bars in inlet walls for 1" dia holes

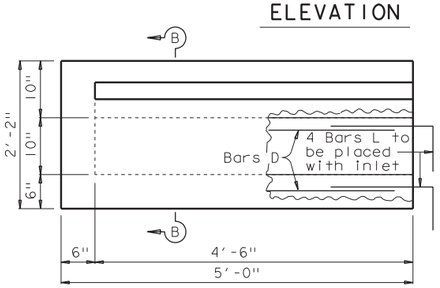


SECTION A-A

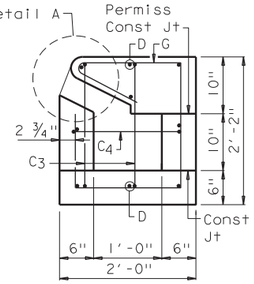
⑦ 1'- 7" Usual, Adjust placement of Ring and Cover as necessary to avoid conflict with Bars H.



DETAIL A

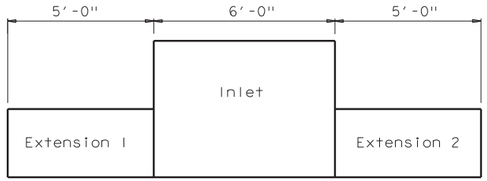


EXTENSION ELEVATION



SECTION B-B

① Block out to accommodate extension if used and to place 4 Bars L



Note: If more than one extension is required, they should be located as indicated above. No slope is required in flowline of extension.

EXTENSION PLACEMENT

INSTALL A 3 FT. (HORIZ.) x 6 IN. (VERT.) OPENING ON THE BACK OF THE INLET WHEN SPECIFIED ELSEWHERE ON THE PLANS. MOVE STEPS AS NEEDED. NO REINFORCING ON OPENING/ON 2 IN. ADJACENT TO OPENING.

DESIGNERS:
CLARIFY FLOWLINE OF OPENING AND INCLUDE OPENING IN HYDRAULIC CALCULATIONS.

D = Diameter
R = Radius

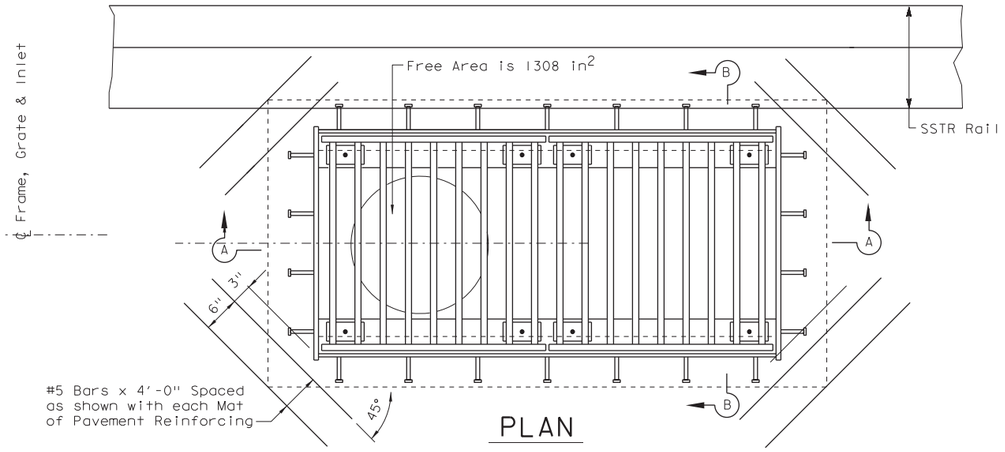
Texas Department of Transportation
Houston District

CURB INLET TYPE C1
(WITH OR WITHOUT EXTENSION)

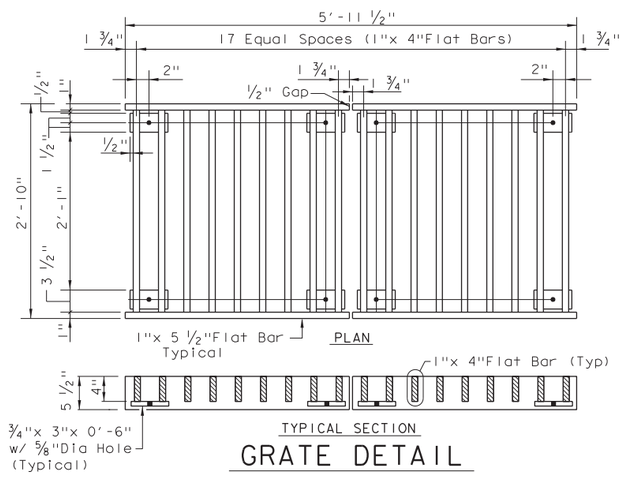
HIL-C1

FILE: STDD2.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
© TxDOT Feb 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 2/2010 Note for alternate design and opening on the back of inlet. 10/2016 Removed ladder rung and wordings.	HOU	6	SEE TITLE SHEET			118
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	HARRIS			0912	72	406	CS

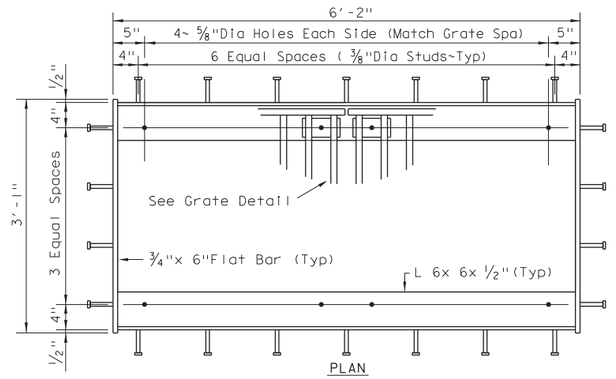
STDD2.DGN



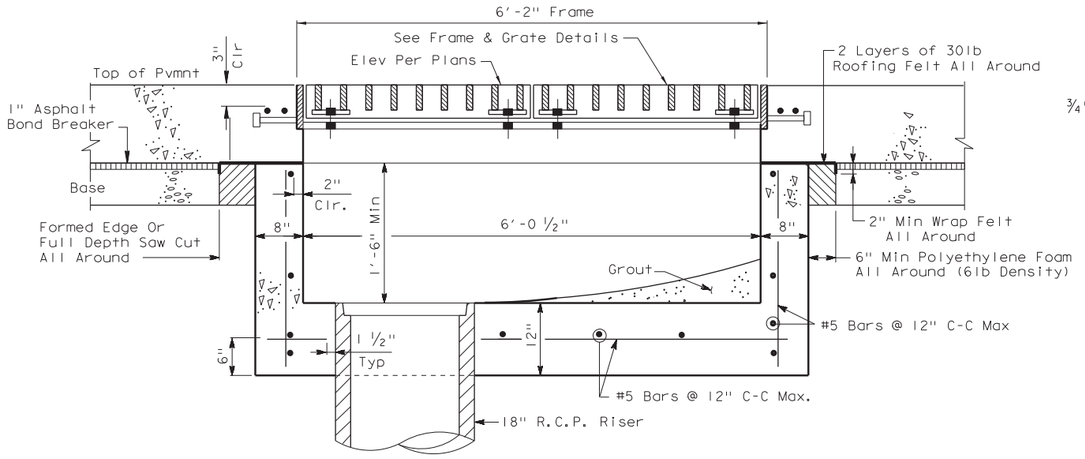
PLAN



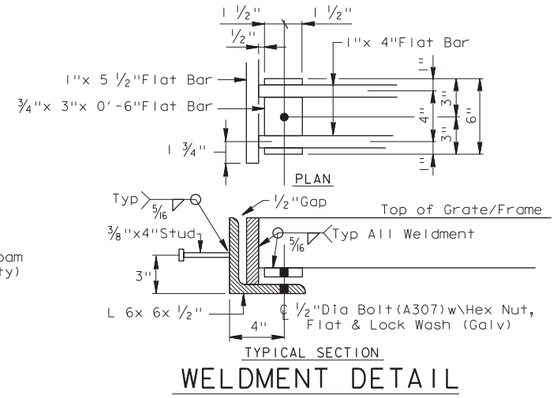
GRATE DETAIL



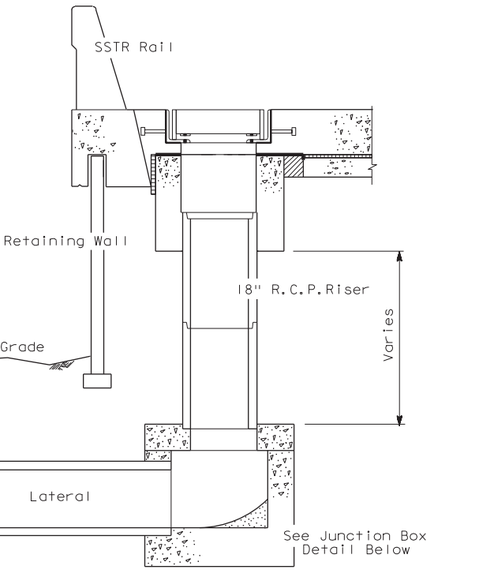
FRAME DETAIL



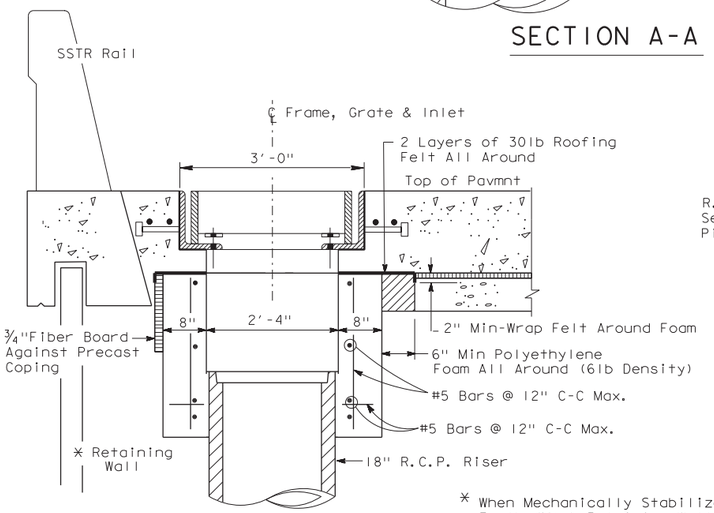
SECTION A-A



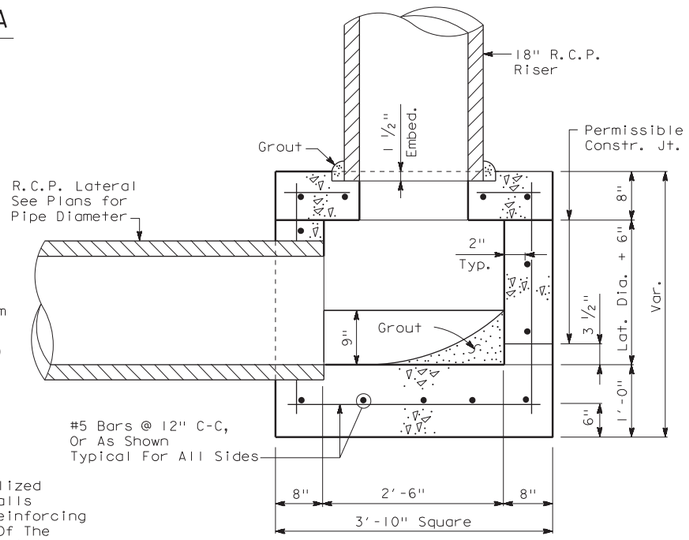
WELDMENT DETAIL



TYPICAL SECTION



SECTION B-B



JUNCTION BOX DETAIL

* When Mechanically Stabilized Earth (Mse) Retaining Walls Are Used, Do Not Omit Reinforcing Strips In The Vicinity Of The Inlet. These Strips Shall Be Adjusted Or Repositioned To Clear Inlets In Accordance With Wall Manufacture's Recommendations.

GENERAL NOTES:

All steel is ASTM-A36 and shall be galvanized after fabrication.

Cost Of Furnishing And Installing Frames, Grates, Additional Pavement Reinforcing, Roofing Felt, Polyethylene Foam, Vertical Riser and Junctin Box Shall Be Included In The Unit Price Bid For The Type Of Inlet Selected.

All Concrete Shall Be Class C.

Shop Drawings Will Be Required For Precast Construction Of Inlets.

d = Diameter

FOR TRAFFIC LOADS

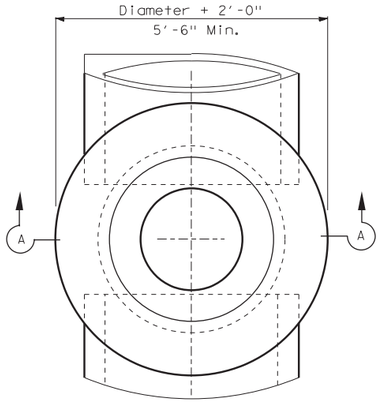
Texas Department of Transportation
Houston District

INLET TYPE AZR2G

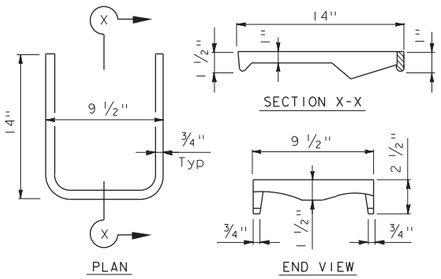
HIL-AZR2G

FILE: STDD9.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
©TxDOT Feb 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS	HOUS	6	SEE TITLE SHEET			119
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	HARRIS			0912	72	406	CS

STDD9.DGN

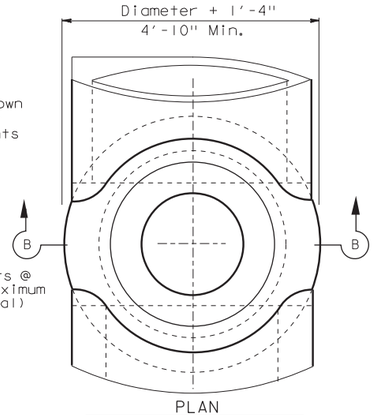


PLAN
OVER 12' HEIGHT

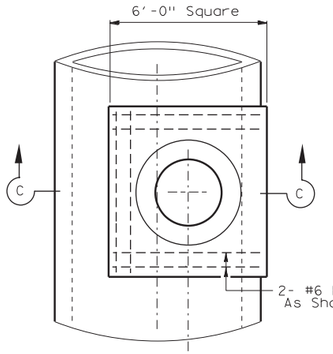


PLAN | END VIEW

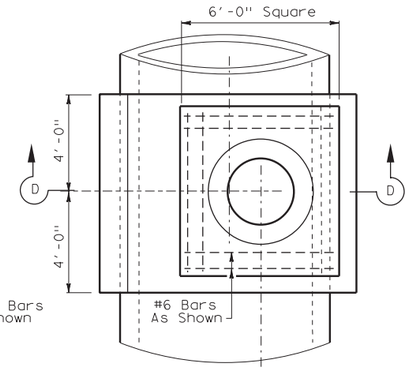
CAST IRON MANHOLE STEPS
(In Stock Locally)



PLAN
12' HEIGHT & UNDER



PLAN
MONOLITHIC SEWERS



PLAN
PRECAST PIPE SEWERS

GENERAL NOTES:

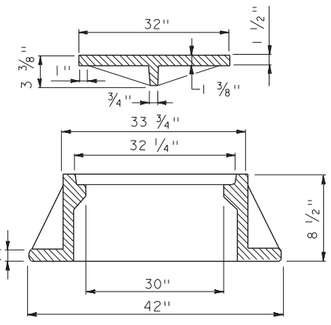
See Standard or Detail Sheet For Excavation And Backfill Diagrams.

All Manholes In Graded Areas Shall Be Built To Stage I And Finished After All Grading Operations Are Substantially Completed.

* But Not Less Than 6 Inches Above Highest Pipe.

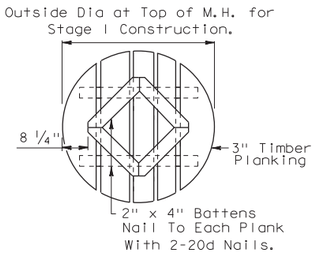
"T" Thickness Of Shell Equals That Of Larger Diameter Pipe.

Optional Monolithic Or Precast Designs Permitted. Optional Designs Shall Be Signed & Sealed By A Registered Professional Engineer.



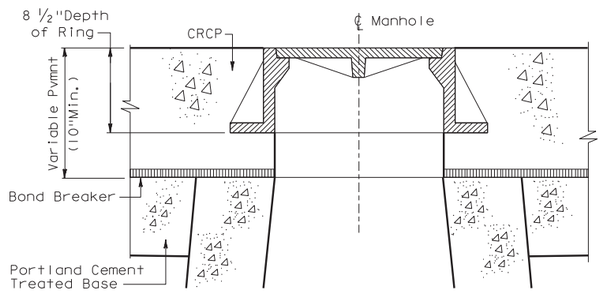
Heavy Duty 30"ID Ring as Required. Vulcan No. V-1419 w/ribbed cover, Neenah No. R1740-BTX

RING AND COVER



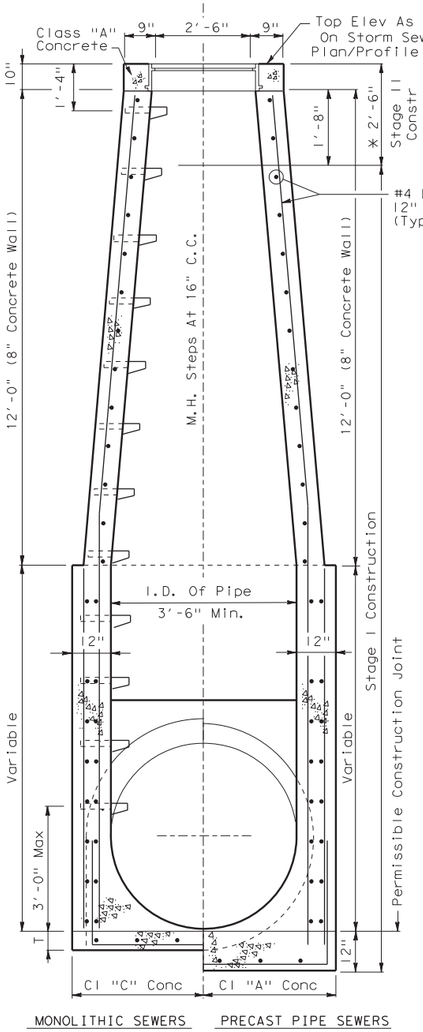
PLAN

TEMPORARY TIMBER COVER

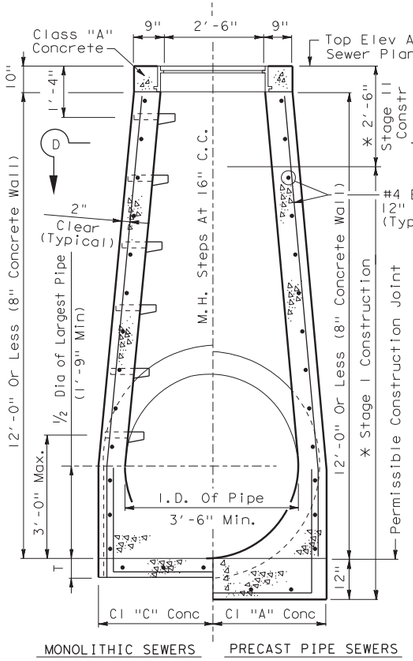


RING AND COVER CAST
MONOLITHICALLY WITH PAVEMENT

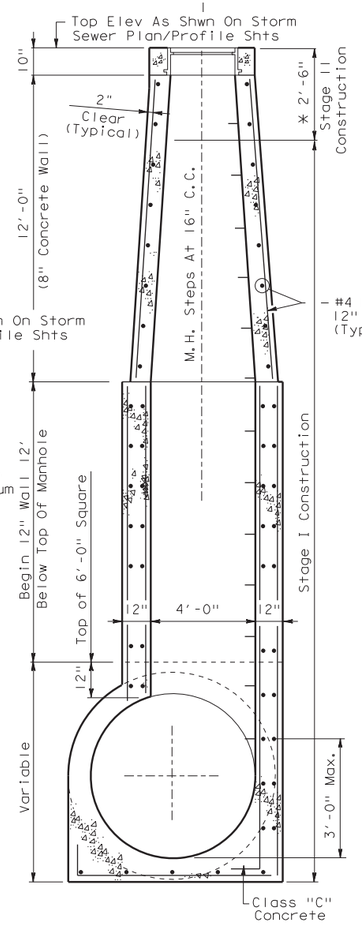
FOR DIRECT TRAFFIC



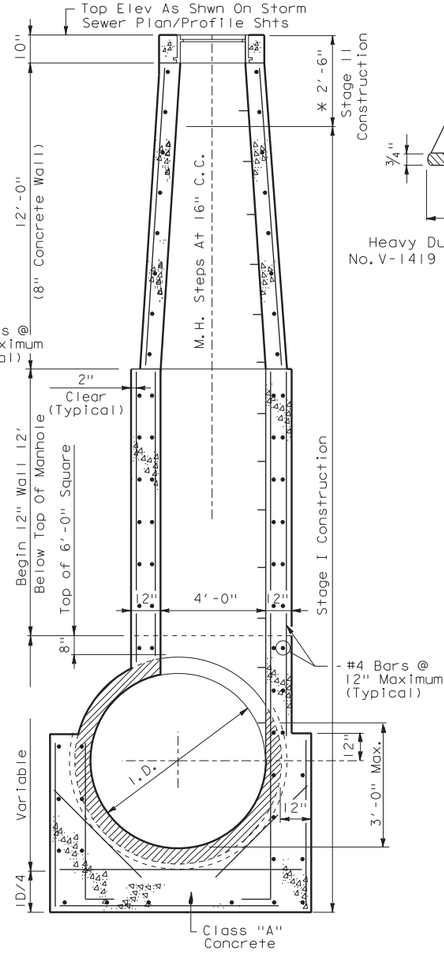
MONOLITHIC SEWERS | PRECAST PIPE SEWERS
SECTION A-A



MONOLITHIC SEWERS | PRECAST PIPE SEWERS
SECTION B-B



SECTION C-C



SECTION D-D

MANHOLE - TYPE A
FOR PIPES 54" AND SMALLER

MANHOLE - TYPE B
FOR PIPES 60" AND LARGER

d = Diameter
R = Radius

Texas Department of Transportation
Houston District

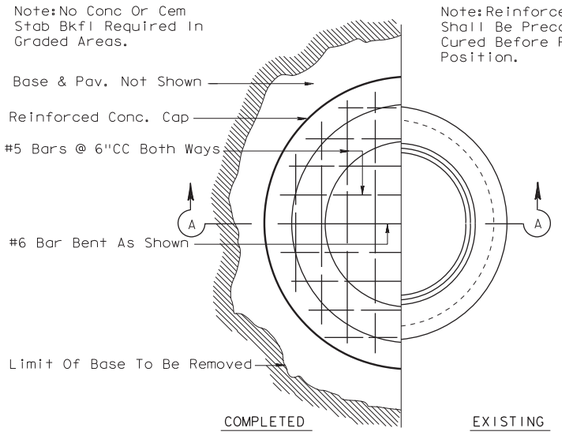
MANHOLES
TYPE A & B

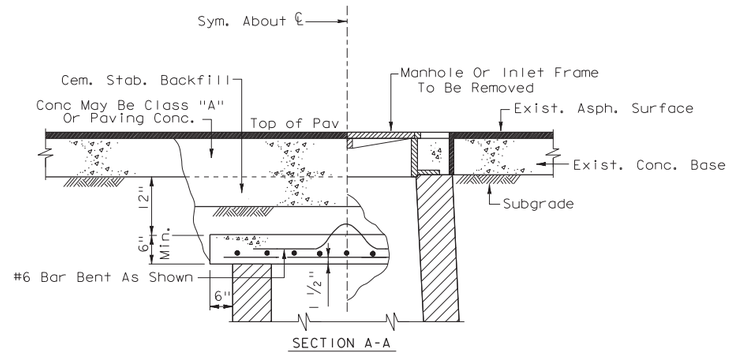
MH-A/B

FILE: STDD10.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
©TxDOT December 2006	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6	SEE TITLE SHEET			120
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0912	72	406	CS

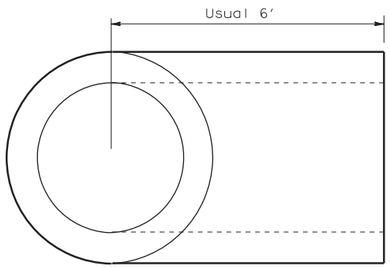
STD-D10

c:\bms\pwe-useast-006\perla.gonzalez\dms24694\stdd10.dgn



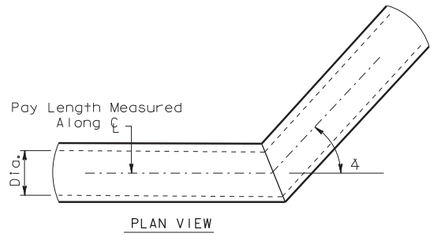


DETAIL SHOWING METHOD OF CAPPING ABANDONED MANHOLES OR INLETS (GRADED OR PAVED AREAS)



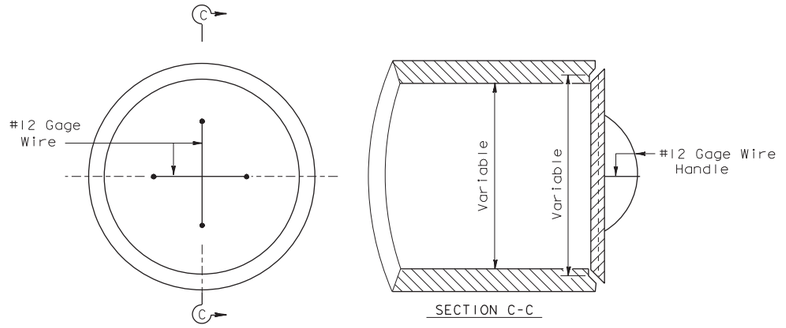
Note: Jointing Material Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Material For Tees Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Payment For Tee To Be In Accordance With Item "Reinforced Concrete Pipe."

PRECAST STORM SEWER TEE



BENDING DETAIL

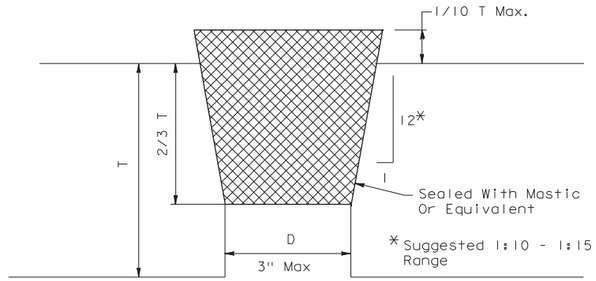
Note: Bending Of Proposed Pipe Sewer Or RCP In A Vertical & /Or Horizontal Plane Shall Be Accomplished By The Use Of A "Pipe Collar" Or A "Precast Elbow", As Approved By The Engineer.
Price Of "Pipe Collar" Or, "Precast Elbow" Shall Be Subsidiary To The Unit Prices Bid For Item Reinforced Concrete Pipe.
Pay Length Measurement To Be Along Horizontal ℄ & 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

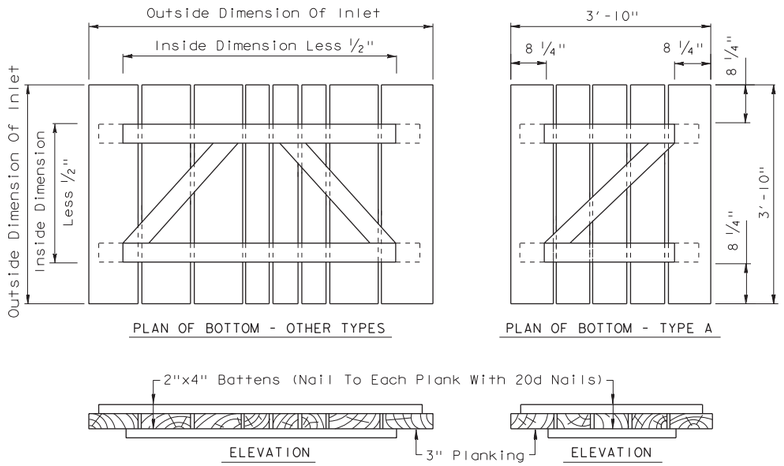


T = Wall Thickness On Top Of Box Or Pipe
D = Diameter Of Lifting Hole

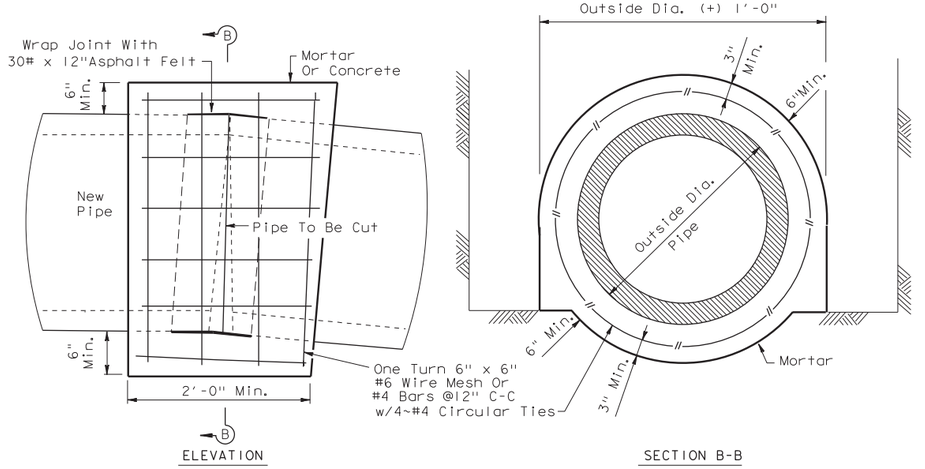
Minimum Length Of Plug Is 2/3 T +/-
Minimum Diameter At Bottom Of Plug = D - ⅛"
Maximum 1/10 T Of Plug Not Seated In Lifting Hole

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

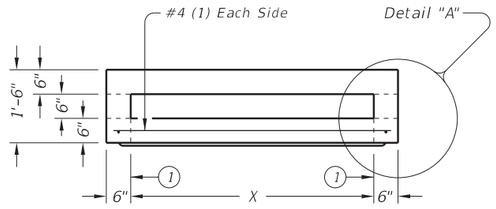
Texas Department of Transportation
Houston District (Bridge)

MISCELLANEOUS SEWER DETAILS

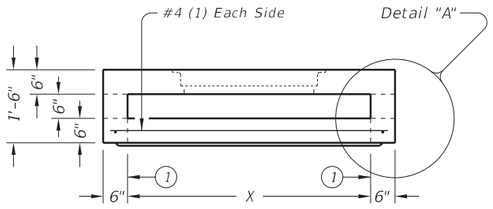
MSD

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	SEE TITLE SHEET		121
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0912	72	406	CS

STDD11.DGN



ELEVATION VIEW



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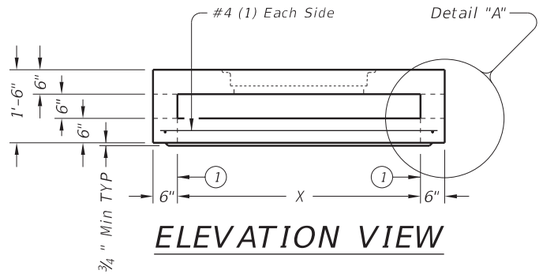
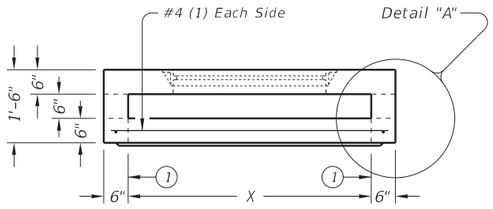
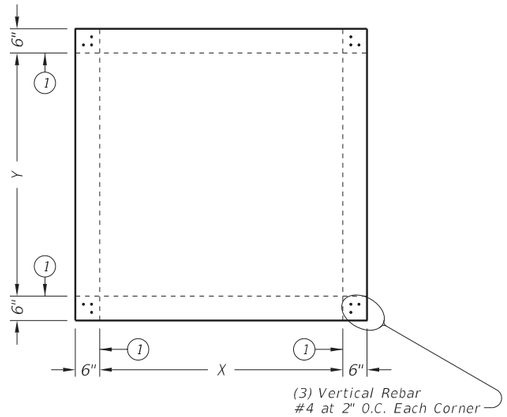


ELEVATION VIEW

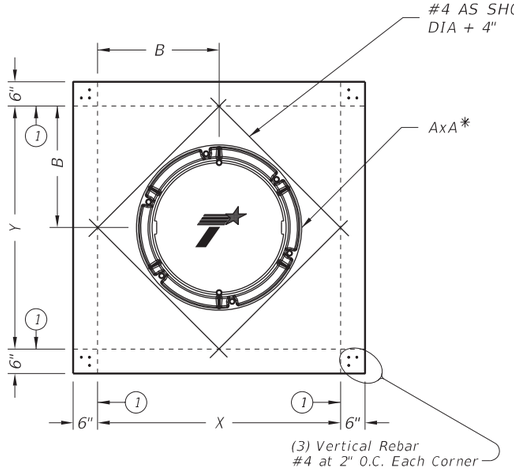


ELEVATION VIEW



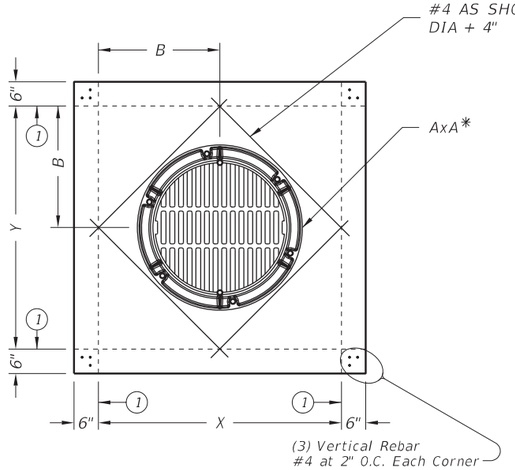
PLAN VIEW
NO OPENINGS

STYLE 'SL'



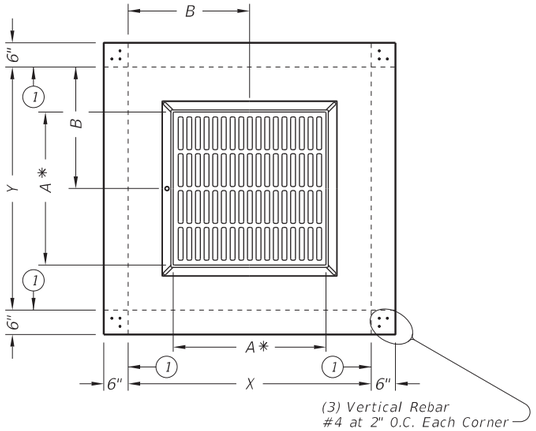
PLAN VIEW
32" DIA CAST-IN RING & COVER

STYLE 'RC'



PLAN VIEW
32" DIA CAST-IN RING & GRATE

STYLE 'RG'



PLAN VIEW
CAST-IN FRAME & GRATE

STYLE 'FG'

Style	Size (X x Y)	A x A *	B x B	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	n/a	n/a	0.37 in²/ft	0.37 in²/ft
RC,RG	3'x3'	32" Dia	1.5'x1.5'	0.37 in²/ft	0.37 in²/ft
FG	3'x3'	3'x3'	1.5'x1.5'	0.37 in²/ft	0.37 in²/ft
SL	4'x4'	n/a	n/a	0.34 in²/ft	0.34 in²/ft
RC,RG	4'x4'	32" Dia	2'x2'	0.34 in²/ft	0.34 in²/ft
FG	4'x4'	3'x3'	2'x2'	0.34 in²/ft	0.34 in²/ft
FG	4'x4'	4'x4'	2'x2'	0.34 in²/ft	0.34 in²/ft
SL	5'x5'	n/a	n/a	0.43 in²/ft	0.43 in²/ft
RC,RG	5'x5'	32" Dia	2.5'x2.5'	0.68 in²/ft	0.68 in²/ft
FG	5'x5'	3'x3'	2.5'x2.5'	0.43 in²/ft	0.43 in²/ft
FG	5'x5'	4'x4'	2.5'x2.5'	0.43 in²/ft	0.43 in²/ft

* Nominal frame/grate or ring/cover size.

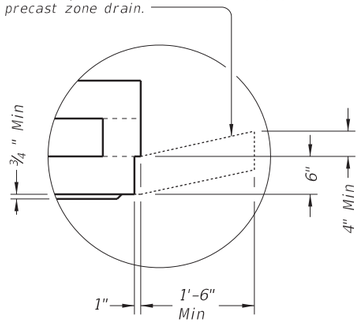
(1) Matches inside face of wall of precast base or riser below inlet.

FABRICATION NOTES:
1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide clear cover of ¾" to reinforcing from bottom of slab for structural reinforcement. Place short span reinforcing closest to surface.
4. No substitution is allowed for diagonal #4 bars around openings.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
6. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:
1. PAZD is for use in ditches and medians outside of the horizontal clearance (clear zone). Precast Area Zone Drain is not intended for direct traffic and may not be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:
1. Designed according to ASTM C913.
2. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Construct cast-in-place reinforced concrete apron when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PAZD. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PAZD, use detail above to create an apron ledge on all 4 sides.

Texas Department of Transportation

Bridge Division Standard

PRECAST AREA ZONE DRAIN

PAZD

FILE: prestd08-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		122

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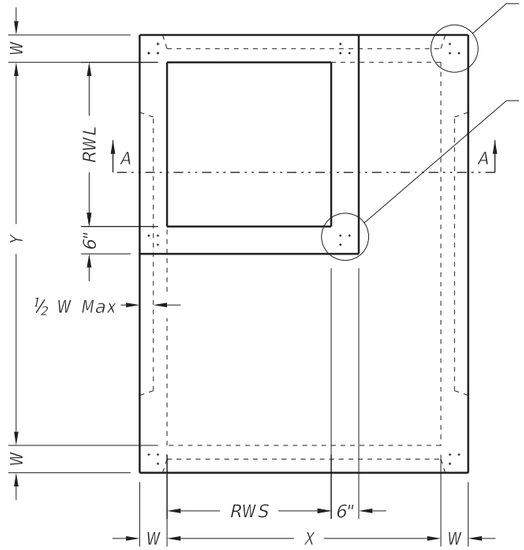
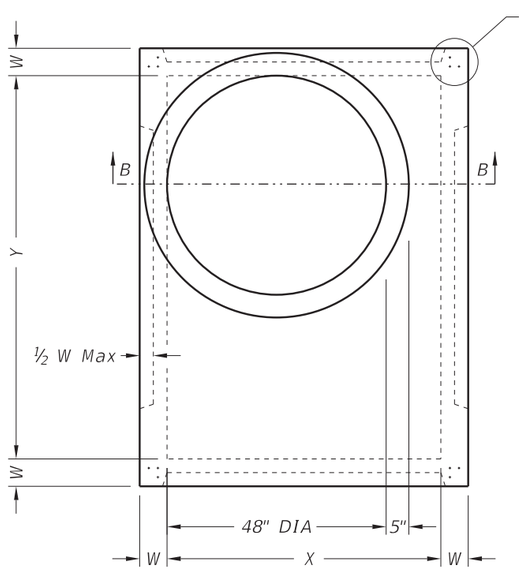


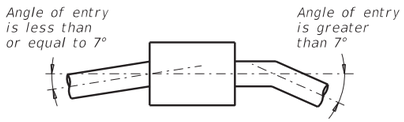
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



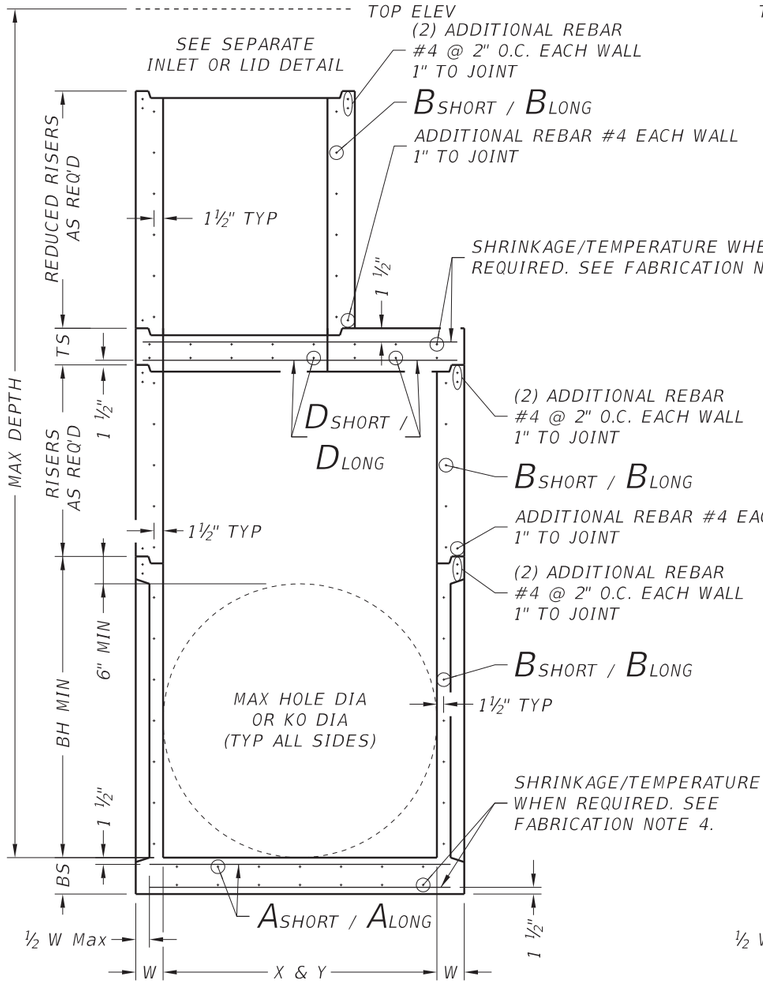
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



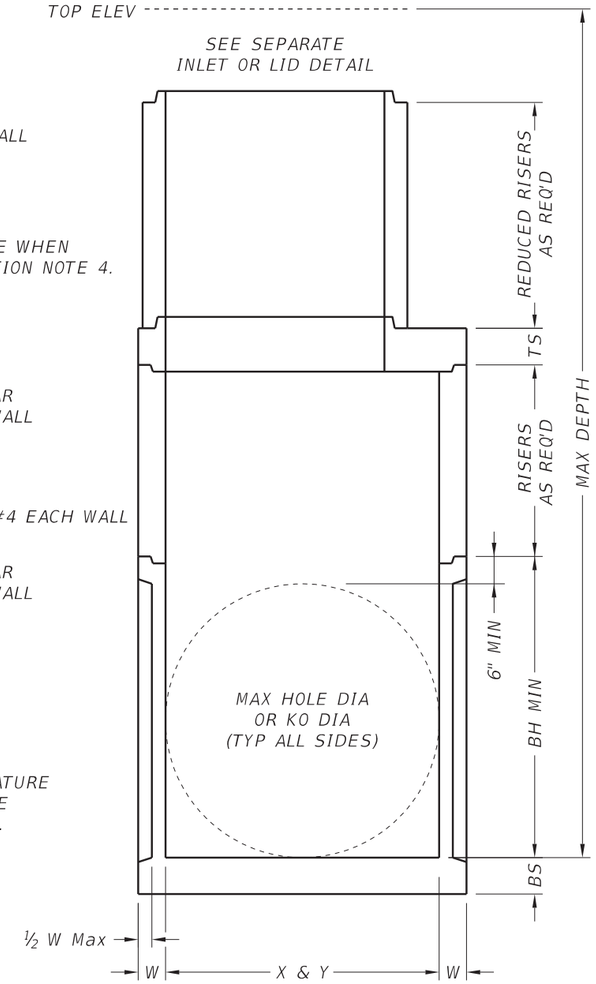
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in^2/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST BASE

PB

FILE: prestd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	HOU	HARRIS		123

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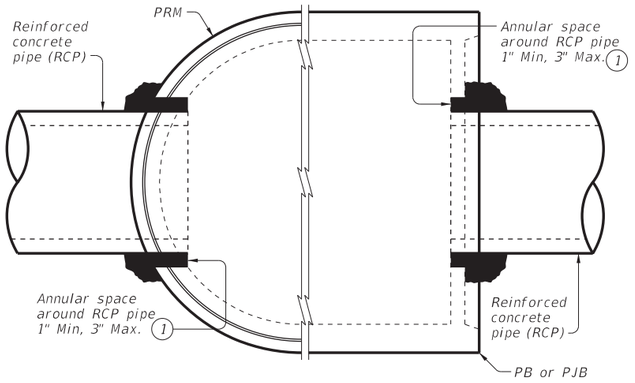
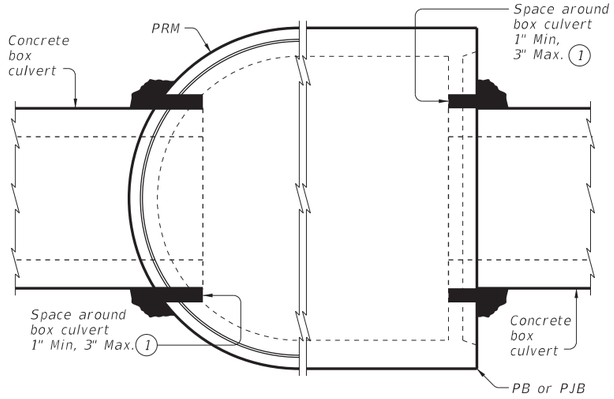


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

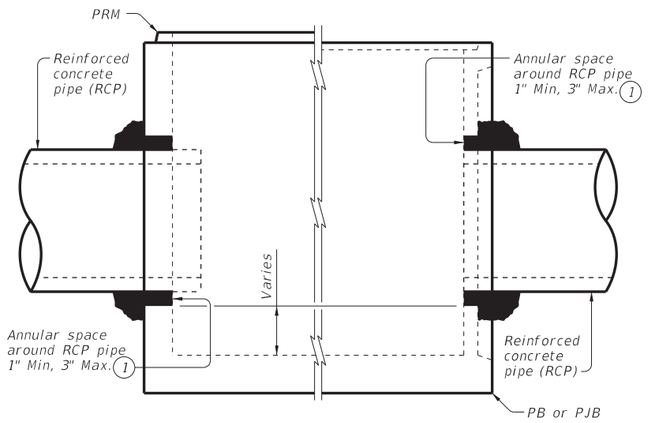
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

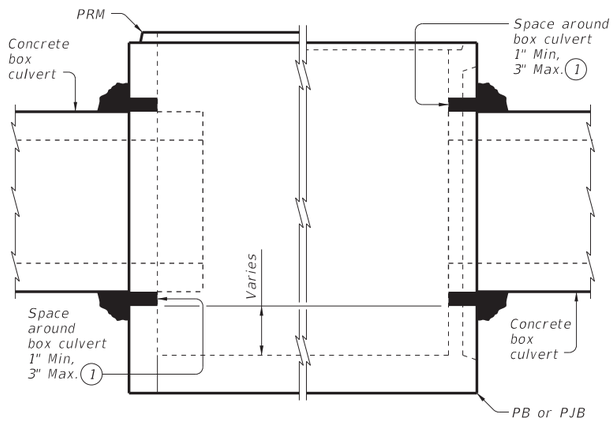
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

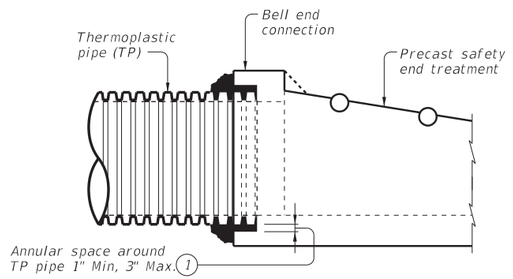
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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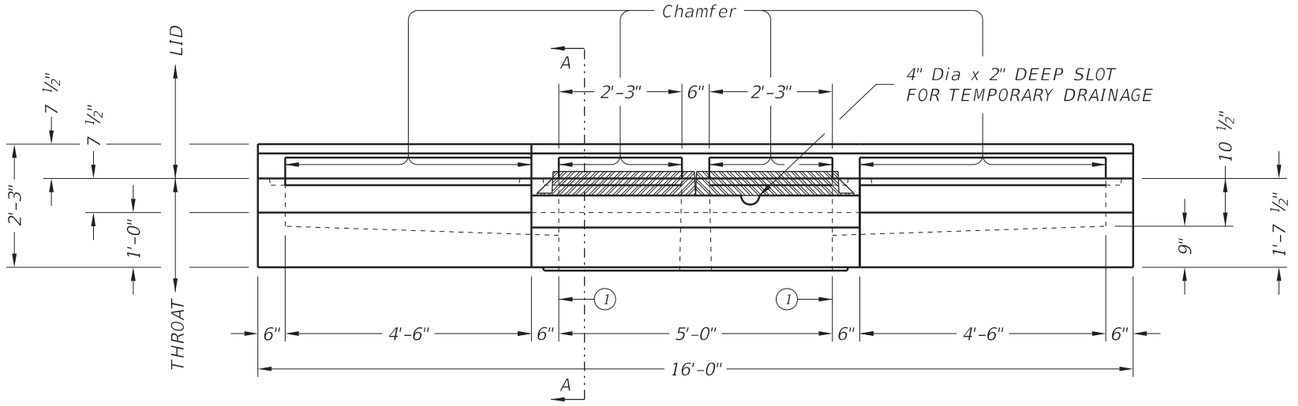
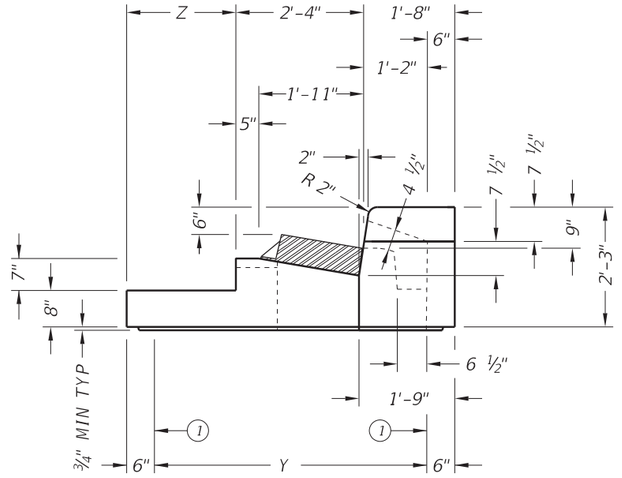
	HOU	HARRIS		124

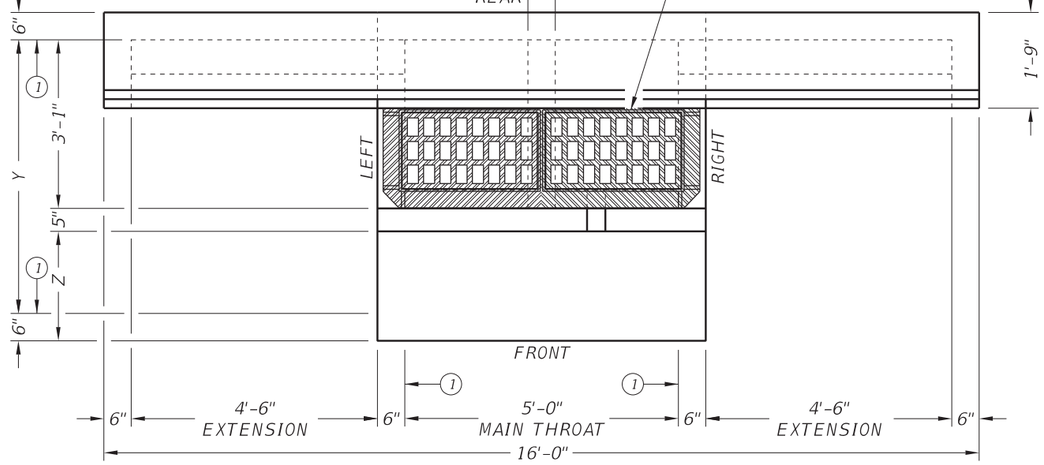


FRONT VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)



SECTION A-A



PLAN VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)

(1) Matches inside face of wall of precast base or riser below inlet.

HS20 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST CURB INLET UNDER ROADWAY

PCU

FILE: prestd04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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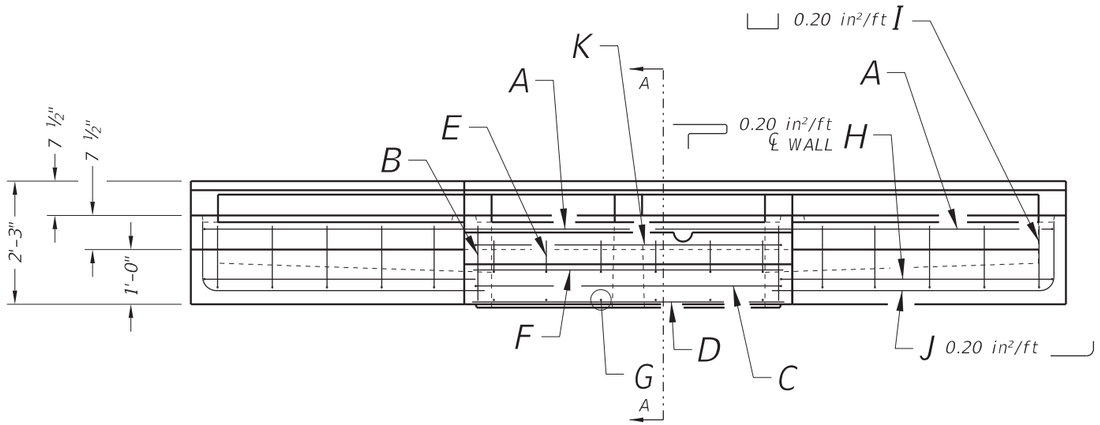
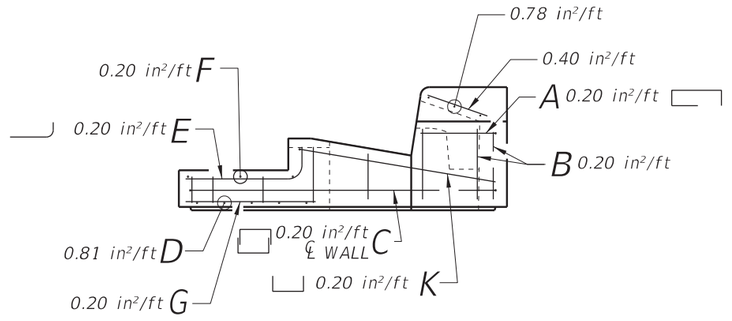
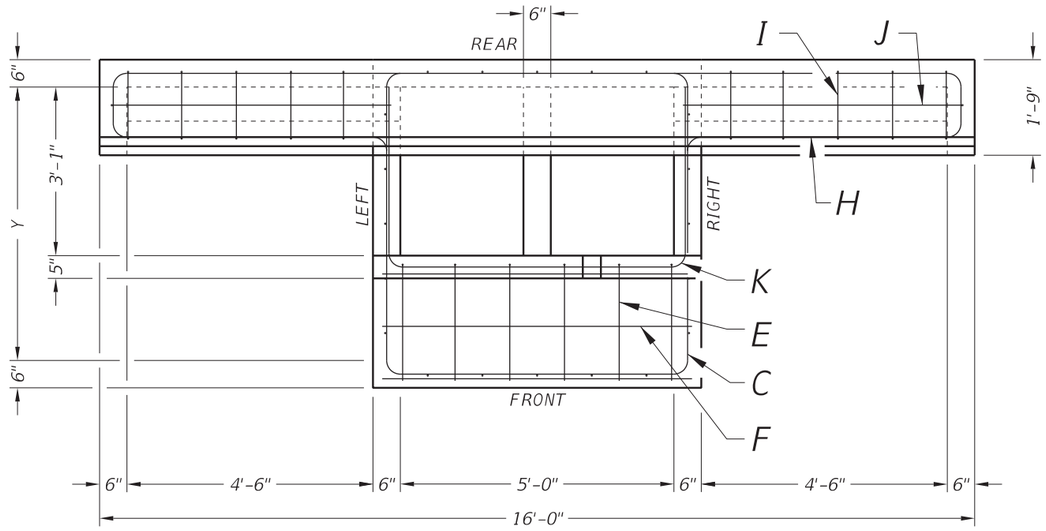


FRONT VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)



SECTION A-A



PLAN VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel from surface of concrete or lower outside shoulder.
4. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in plans.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾". Top slab may employ a butt joint with dowels at the Contractor's option.
6. Provide lifting devices in conformance with Manufacturer's recommendations.
7. Chamfer vertical edges on inlet lid ¾" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat is placed under roadway and intended for direct traffic. Inlet lid is not for direct traffic. Do not place Inlet lid in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 324 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 465, "Junction Boxes, Manholes and Inlets" by type, size and extension placement. Extensions are subsidiary to inlet.

SIZE(Y)	Z
3'	0'
4'	1'
5'	2'
6'	3'

HS20 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST CURB INLET UNDER ROADWAY

PCU

FILE: prestd04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		126

	Size	MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB										Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)						
		Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72

** Unless otherwise indicated.

FABRICATION NOTES:
1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

PDD

FILE: prestd10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		127

DATE: 11/30/2022 11:38:59 AM
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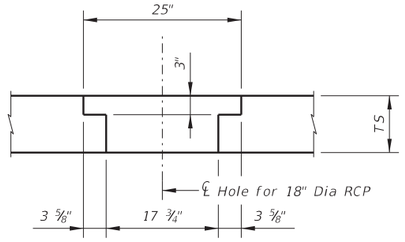
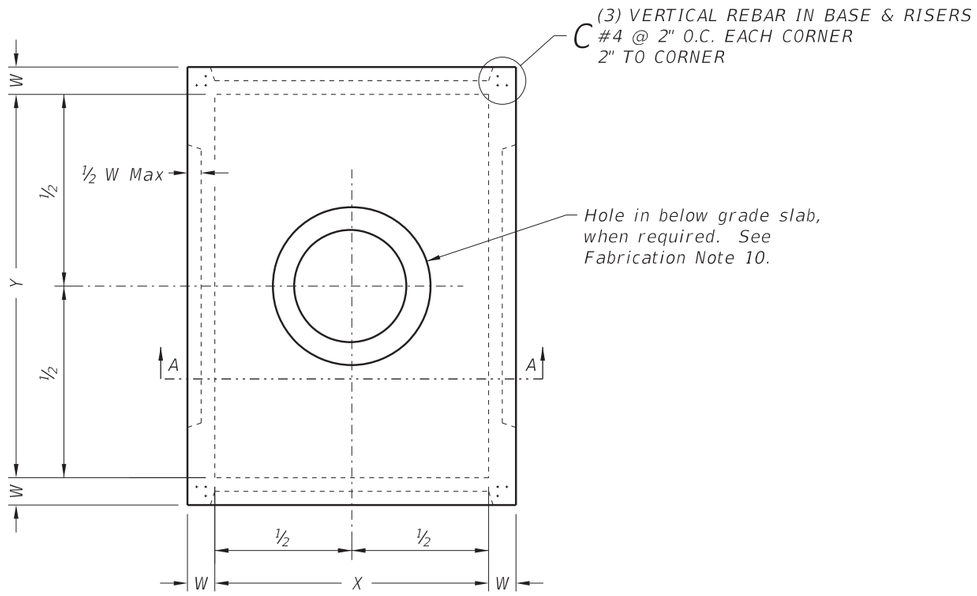
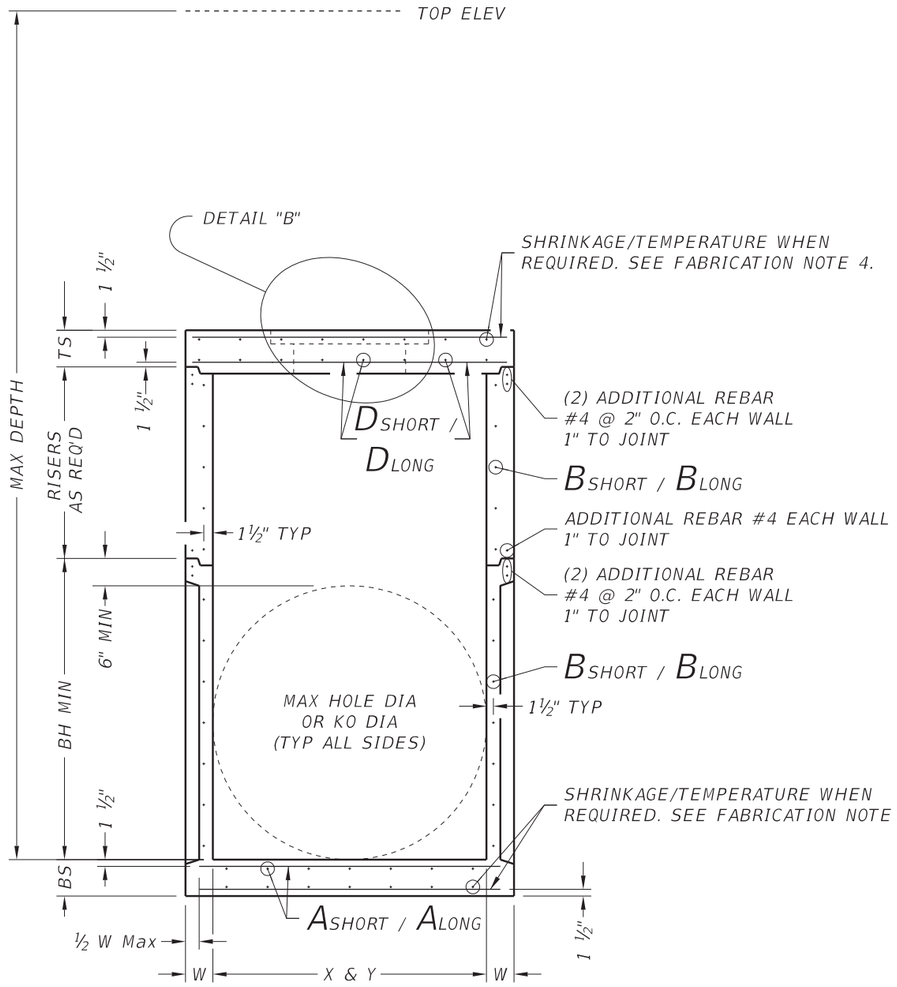


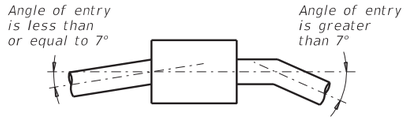
DETAIL "B"



PLAN VIEW



SECTION A-A



PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PJB wall. If necessary, use pipe elbow or curved approach alignment to stay within this limit.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.
10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

INSTALLATION NOTES:

1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to junction box.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE: prestd09-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		128

DATE: 11/30/2022 11:39:18 AM
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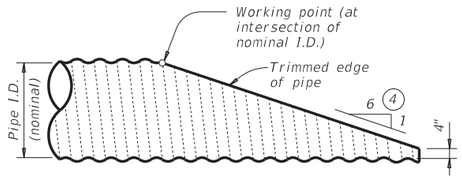
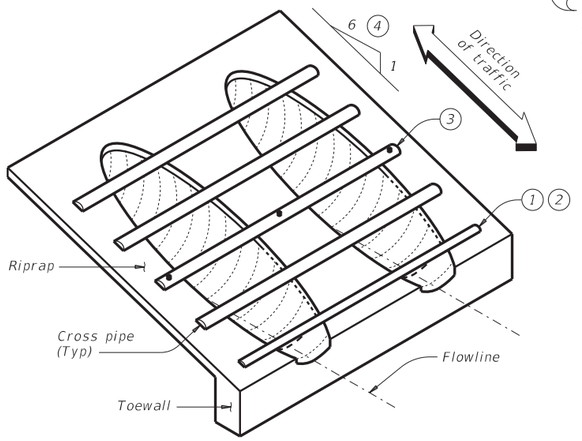


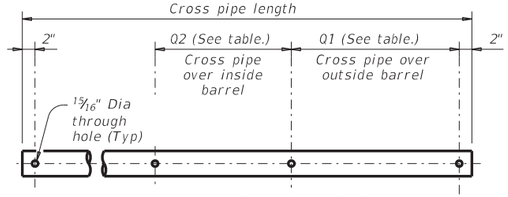
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

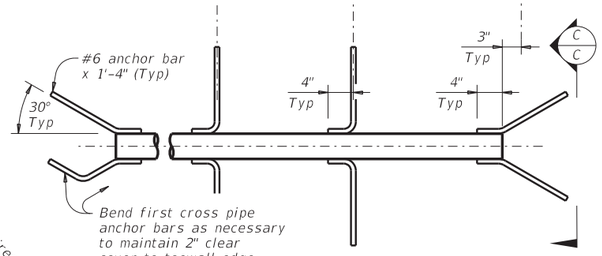
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



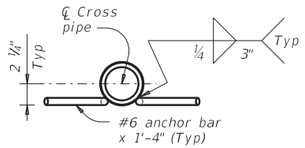
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

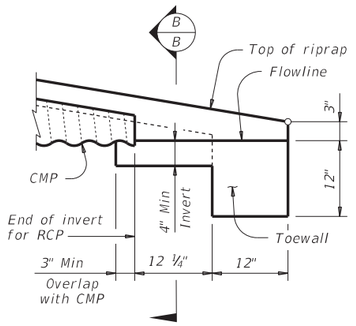


PIPE WITH ANCHOR BARS



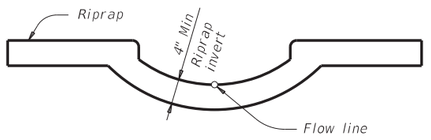
SECTION C-C

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 1/2" 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.

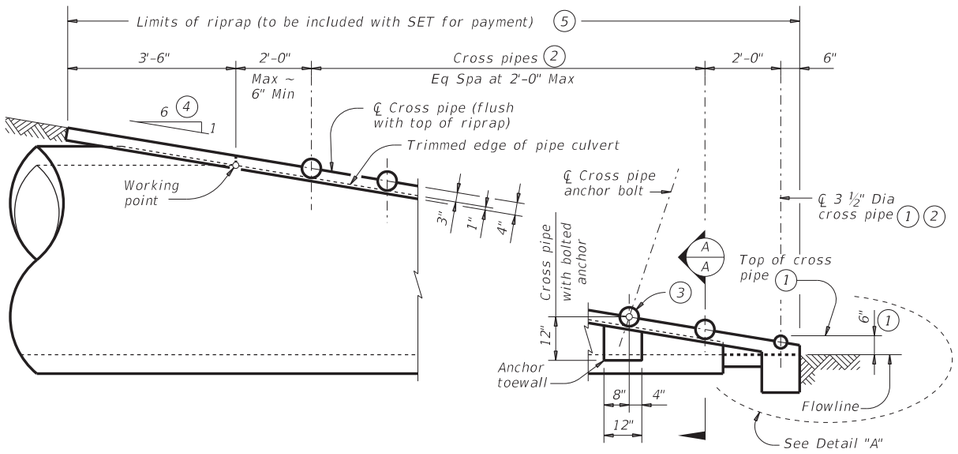
GENERAL NOTES:

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.

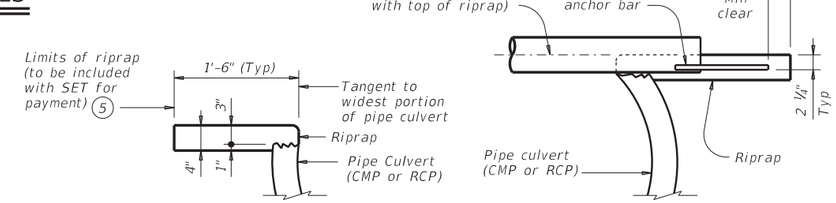
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



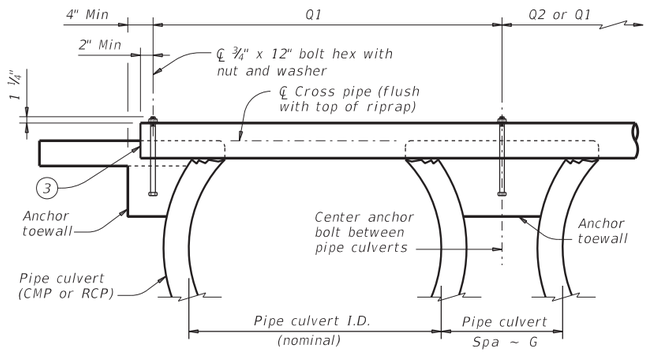
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



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: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		129

EXISTING UTILITY GENERAL NOTES:

1. ALL UTILITIES SHOWN ARE DEPICTED AT QUALITY LEVEL D(QLD) PER ASCE CI/ASCE 3802, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA, AS FOLLOWS:

   - QUALITY LEVEL D (QLD): INFORMATION DERIVED FROM EXISTING RECORDS OR VERBAL RECOLLECTIONS.

2. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERE TO. THE CONTRACTOR SHALL VERIFY LOCATION (HORIZONTAL AND VERTICAL) OF UNDERGROUND PIPELINE, CONDUITS, AND STRUCTURES BY CONTACTING OWNERS OF UNDERGROUND UTILITIES AND BY PROSPECTING IN ADVANCE OF EXCAVATING OPERATIONS.

3. ACTIVE SERVICE LINE UTILITIES INCLUDING WATER AND SANITARY SEWER, WHETHER OR NOT SHOWN ON THE DRAWINGS, SHALL BE ADEQUATELY PROTECTED FROM DAMAGE. ANY DAMAGED UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. SERVICE MUST BE PROVIDED AT ALL TIMES.

4. INACTIVE OR ABANDONED UTILITIES ENCOUNTERED DURING CONSTRUCTION SHALL BE REMOVED, CAPPED, OR PLUGGED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. IN THE ABSENCE OF SPECIFIC REQUIREMENTS, ALL WORK UNDER THIS HEADING SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES OR REGULATIONS OR AS DIRECTED BY THE ENGINEER.

5. EXISTING GAS MAINS CURRENTLY IN SERVICE MUST REMAIN IN SERVICE THROUGHOUT CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING GAS MAINS, INCLUDING SERVICE LINES, FROM DAMAGE AS A RESULT OF THE CONSTRUCTION ACTIVITIES. IN THE EVENT THAT EXISTING GAS MAINS ARE IN CONFLICT WITH CONSTRUCTION, CONTRACTOR SHALL NOTIFY ENGINEER.

6. CALL FOR LINE SPOT BEFORE BEGINNING CONSTRUCTION OR EXCAVATION. CENTERPOINT GAS TEXAS GAS SERVICE RECOMMENDS THAT CONTRACTOR CALL FOR LINE SPOTS PRIOR TO EXCAVATING IN THE AREA. IT IS REQUIRED THAT CONTRACTOR CALL CENTERPOINT GAS 48 HOURS PRIOR TO EXCAVATING THE AREA NEAR HIGH PRESSURE AND INTERMEDIATE PRESSURE GAS MAINS.

7. THE CONTRACTOR SHALL NOT INTERRUPT THE SERVICE FUNCTION OR DISTURB THE SUPPORT OF ANY UTILITY WITHOUT AUTHORITY FROM THE OWNER OR ORDER FROM THE ENGINEER. ALL VALVES, SWITCHES, VAULTS, AND METERS SHALL BE MAINTAINED READILY ACCESSIBLE FOR EMERGENCY SHUTOFF.

8. WHEN NECESSARY, THE CONTRACTOR SHALL SO CONDUCT ITS OPERATIONS AS TO PERMIT ACCESS TO THE WORK SITE AND PROVIDE TIME FOR UTILITY WORK TO BE ACCOMPLISHED DURING THE PROGRESS OF THE WORK.

9. ACTIVE WATER AND SANITARY SEWER MAIN LINE UTILITIES (INCLUDING SERVICE LINES), WHETHER OR NOT SHOWN ON THESE DRAWINGS, SHALL BE ADEQUATELY PROTECTED WITH BERMS AND/OR BRIDGING DURING CONSTRUCTION SO AS NOT TO DAMAGE THE EXISTING MAINS. ANY DAMAGES CAUSED BY THE CONTRACTOR WILL BE REPAIRED AS NECCESSARY IN ACCORDANCE WITH THE NEWPORT MUD UTILITIES STANDARDS AND SPECIFICATIONS, AT NO ADDITIONAL COST TO THE OWNER.

WARNING! CALL BEFORE YOU DIG.

COORDINATION WITH UTILITIES:

CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES PRIOR TO ANY EXCAVATION AND/OR RELOCATION OF EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION WORK.

CALL TEXAS EXCAVATION SAFETY SYSTEM AT LEAST TWO WORKING DAYS BEFORE YOU DIG ANYWHERE IN TEXAS FOR UTILITY LOCATES (800) 344-8377 (DIGTESS)

UTILITY CONTACTS:

Newport MUD
Kelly Shipley
16703 Golf Club Drive
Crosby, TX 77532
713-821-0475
kdshipley@lan-inc.com

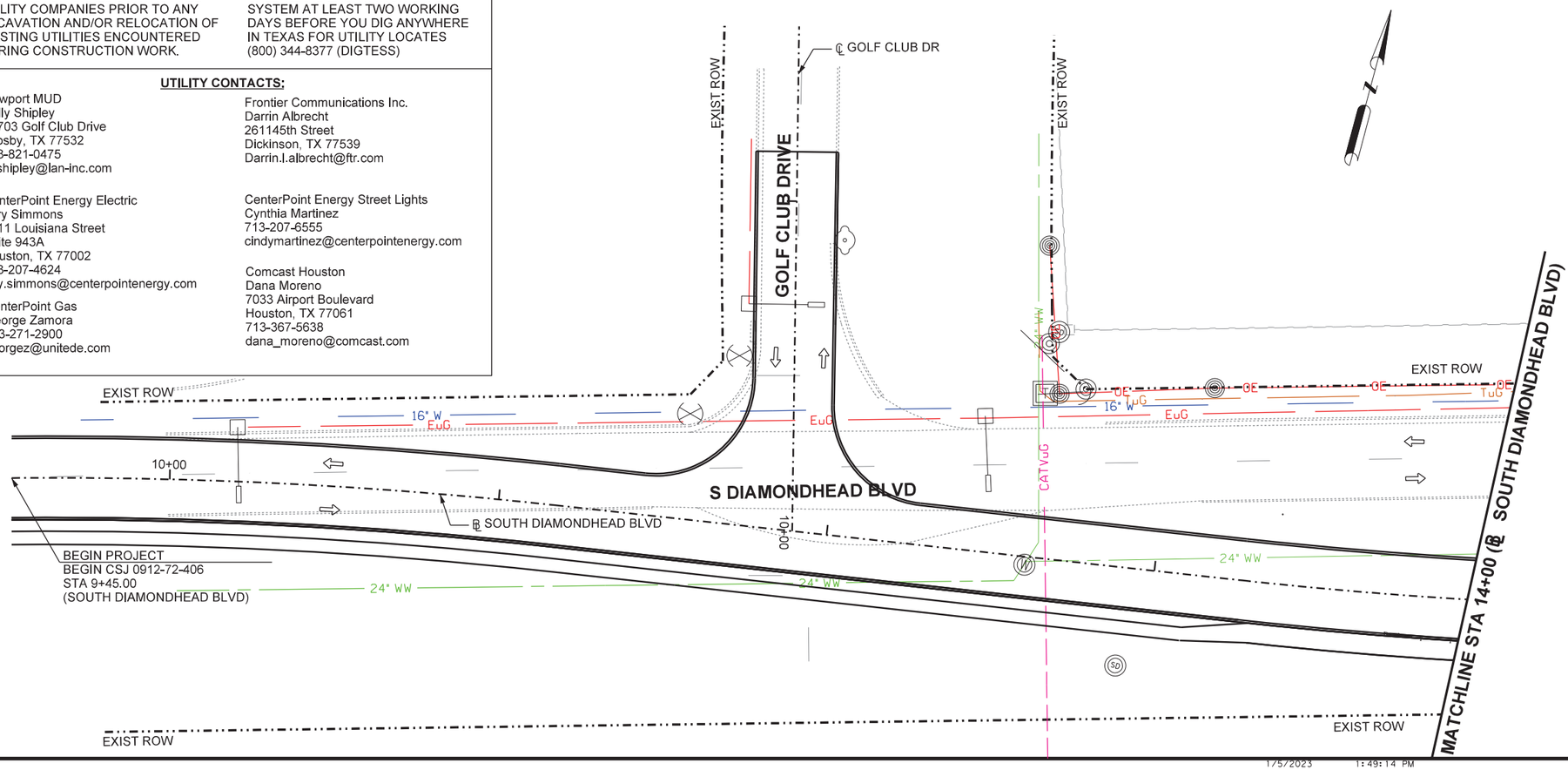
CenterPoint Energy Electric
Lory Simmons
1111 Louisiana Street
Suite 943A
Houston, TX 77002
713-207-4624
lory.simmons@centerpointenergy.com

CenterPoint Gas
George Zamora
713-271-2900
georgez@unitede.com

Frontier Communications Inc.
Darrin Albrecht
261145th Street
Dickinson, TX 77539
Darrin.l.albrecht@ftr.com

CenterPoint Energy Street Lights
Cynthia Martinez
713-207-6555
cindymartinez@centerpointenergy.com

Comcast Houston
Dana Moreno
7033 Airport Boulevard
Houston, TX 77061
713-367-5638
dana_moreno@comcast.com



LEGEND

- EuG — CENTERPOINT STREET LIGHT UNDERGROUND POWER
- OE — CENTERPOINT OVERHEAD ELECTRIC
- CATVuG — COMCAST UNDERGROUND CATV
- TuG — FRONTIER UNDERGROUND TELEPHONE
- 24" WW1 — MUD 24" SANITARY SEWER
- 16" W1 — MUD 16" WATER

- EXISTING SMALL SIGN
- POWER POLE
- LUMINARE STANDARD
- WATER VALVE
- MAIL BOX
- FIRE HYDRANT
- MANHOLE (STORM SEWER)
- MANHOLE (WASTEWATER)
- TELEPHONE PEDESTAL
- WATER METER
- JUNCTION BOX TELEPHONE
- MANHOLE (TELEPHONE)
- POST (GENERIC)
- GUY ANCHOR
- IRON ROD FOUND WITH ALUM.CAP
- IRON ROD FOUND
- IRON PIPE

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
AMPARO A. ORTEGA
103686
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

EXISTING UTILITY LAYOUT BEGIN PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		130
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

LEGEND

- EuG — CENTERPOINT STREET LIGHT UNDERGROUND POWER
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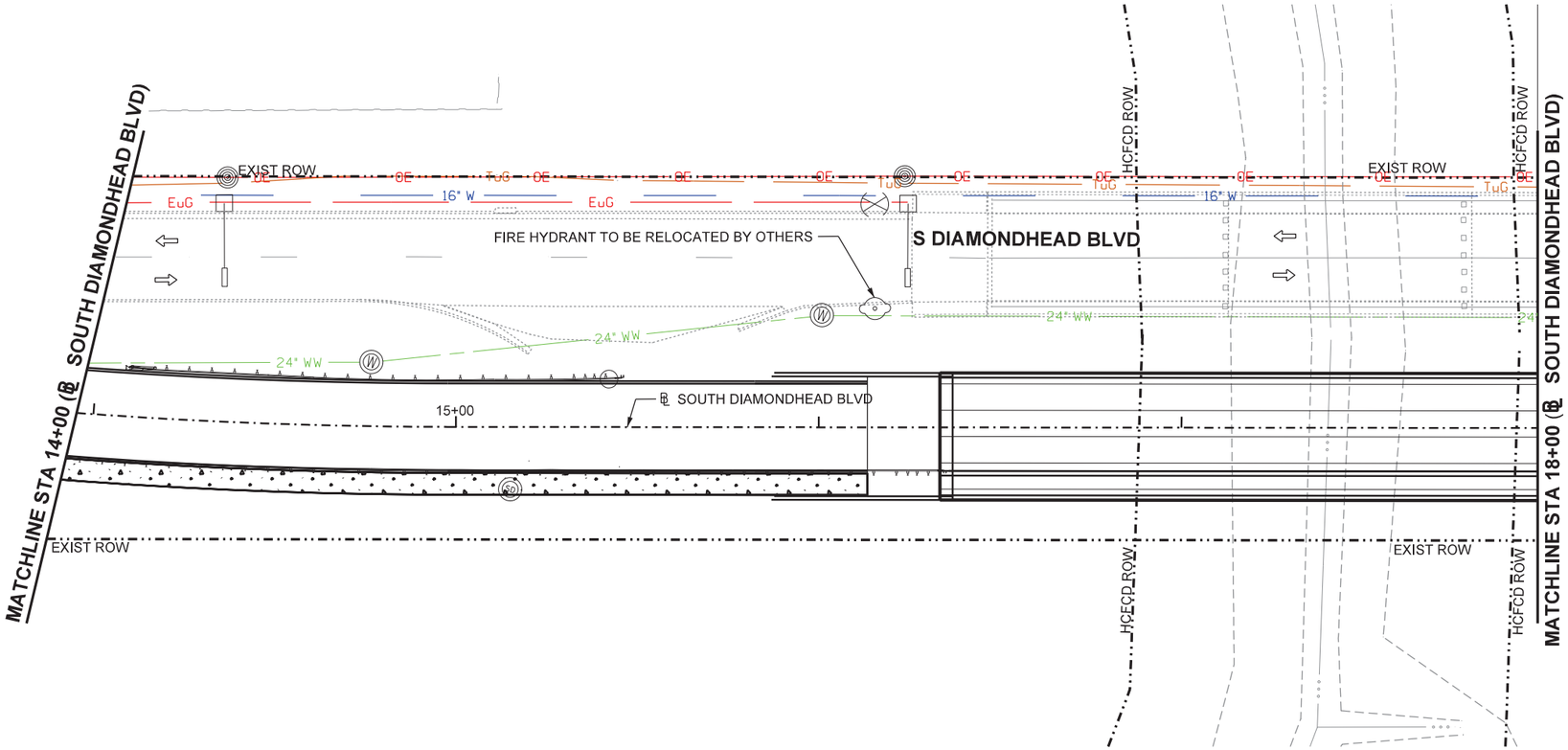

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
AMPARO A. ORTEGA
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11/30/2022

NO.	DATE	REVISION	APPROV.

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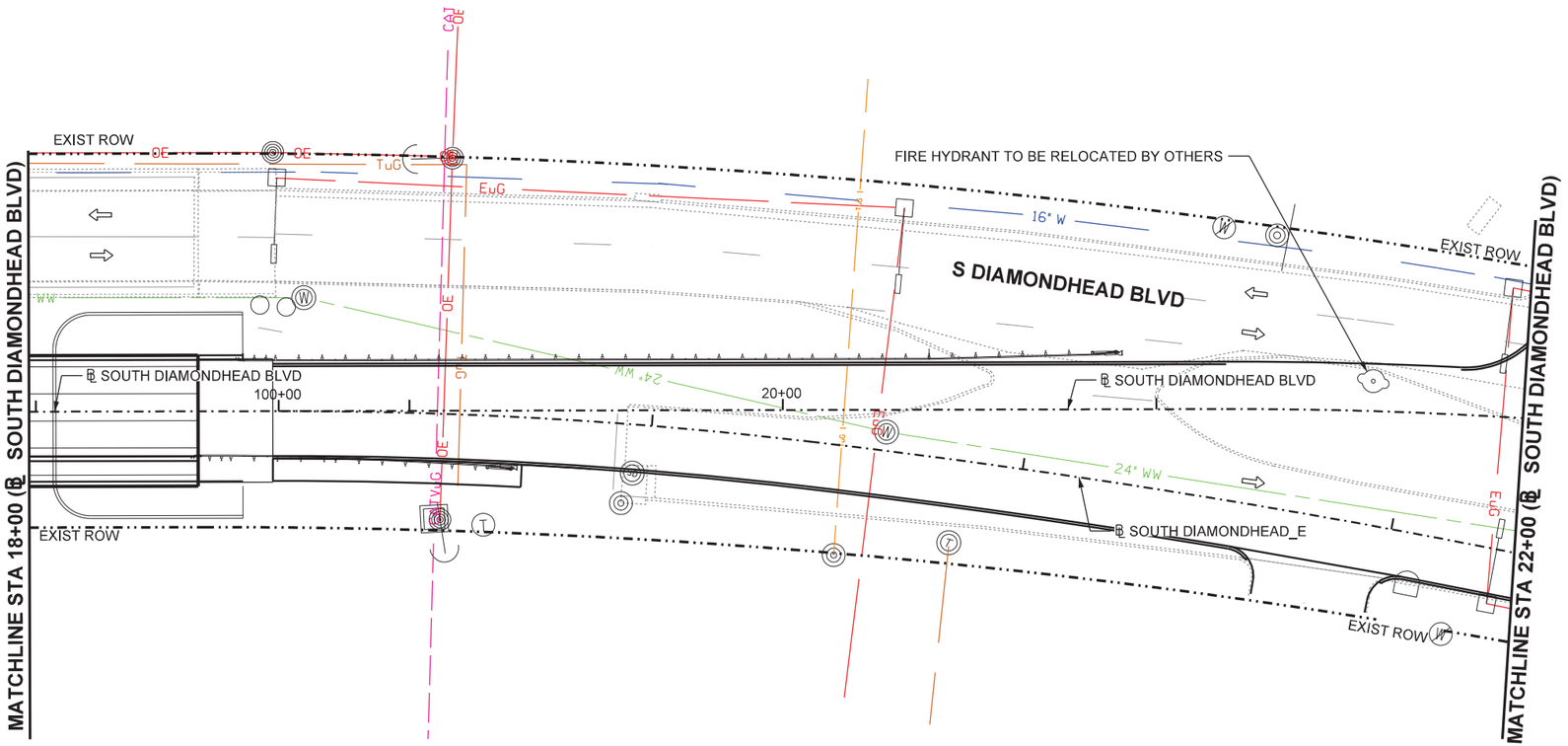
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

EXISTING UTILITY LAYOUT STA 14+00 TO STA 18+00

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		131
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

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- LUMINARE STANDARD
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- FIRE HYDRANT
- MANHOLE (STORM SEWER)
- MANHOLE (WASTEWATER)
- TELEPHONE PEDESTAL
- WATER METER
- JUNCTION BOX TELEPHONE
- MANHOLE (TELEPHONE)
- POST (GENERIC)
- GUY ANCHOR
- IRON ROD FOUND WITH ALUM.CAP
- IRON ROD FOUND
- IRON PIPE

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
AMPARO A. ORTEGA
103686
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PROFESSIONAL ENGINEER
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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

EXISTING UTILITY LAYOUT STA 18+00 TO STA 22+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		132
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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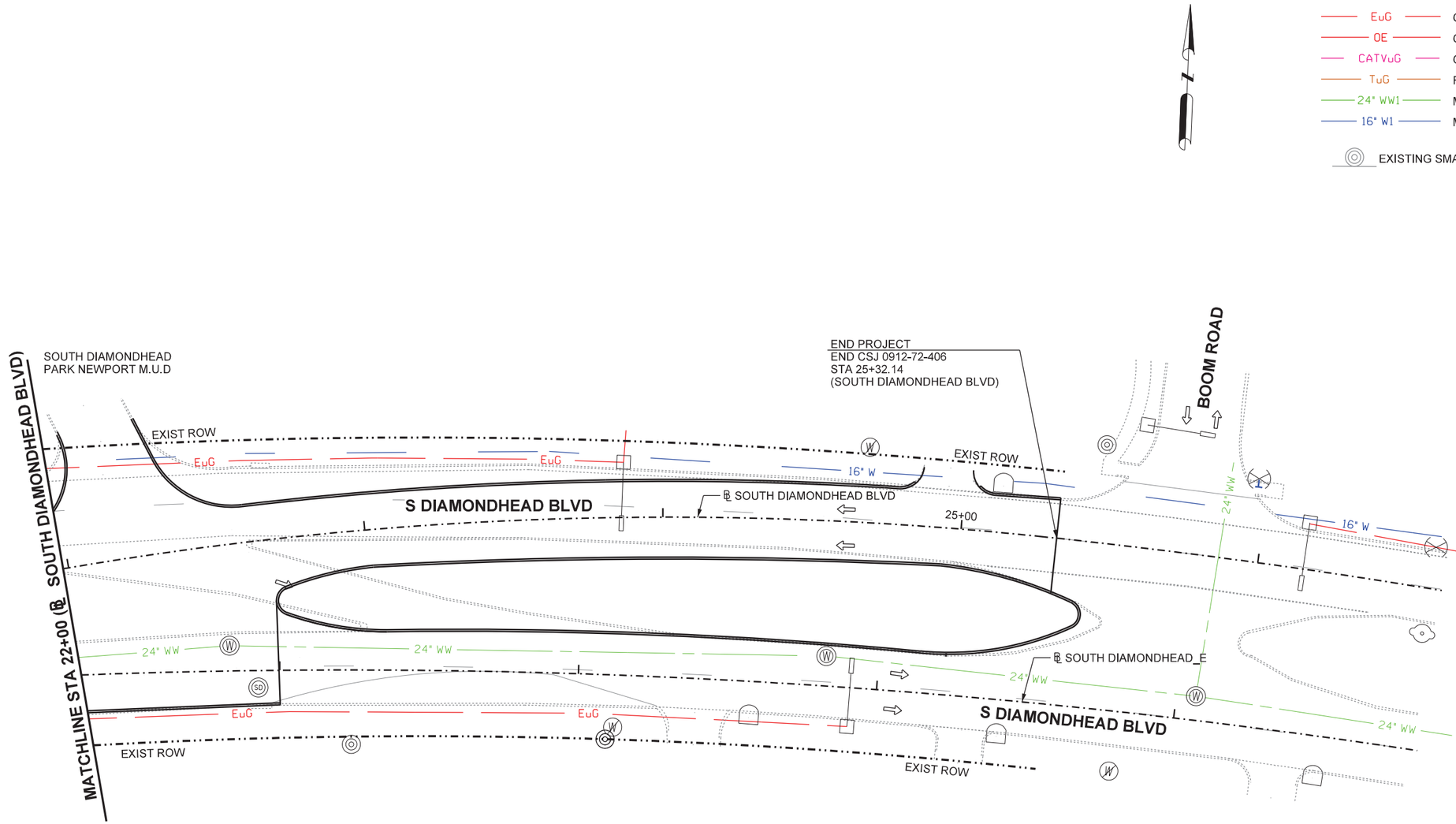

LEGEND

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- MANHOLE (TELEPHONE)
- POST (GENERIC)
- GUY ANCHOR
- IRON ROD FOUND WITH ALUM.CAP
- IRON ROD FOUND
- IRON PIPE

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
AMPARO A. ORTEGA
103686
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

EXISTING UTILITY LAYOUT STA 22+00 TO END PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		133
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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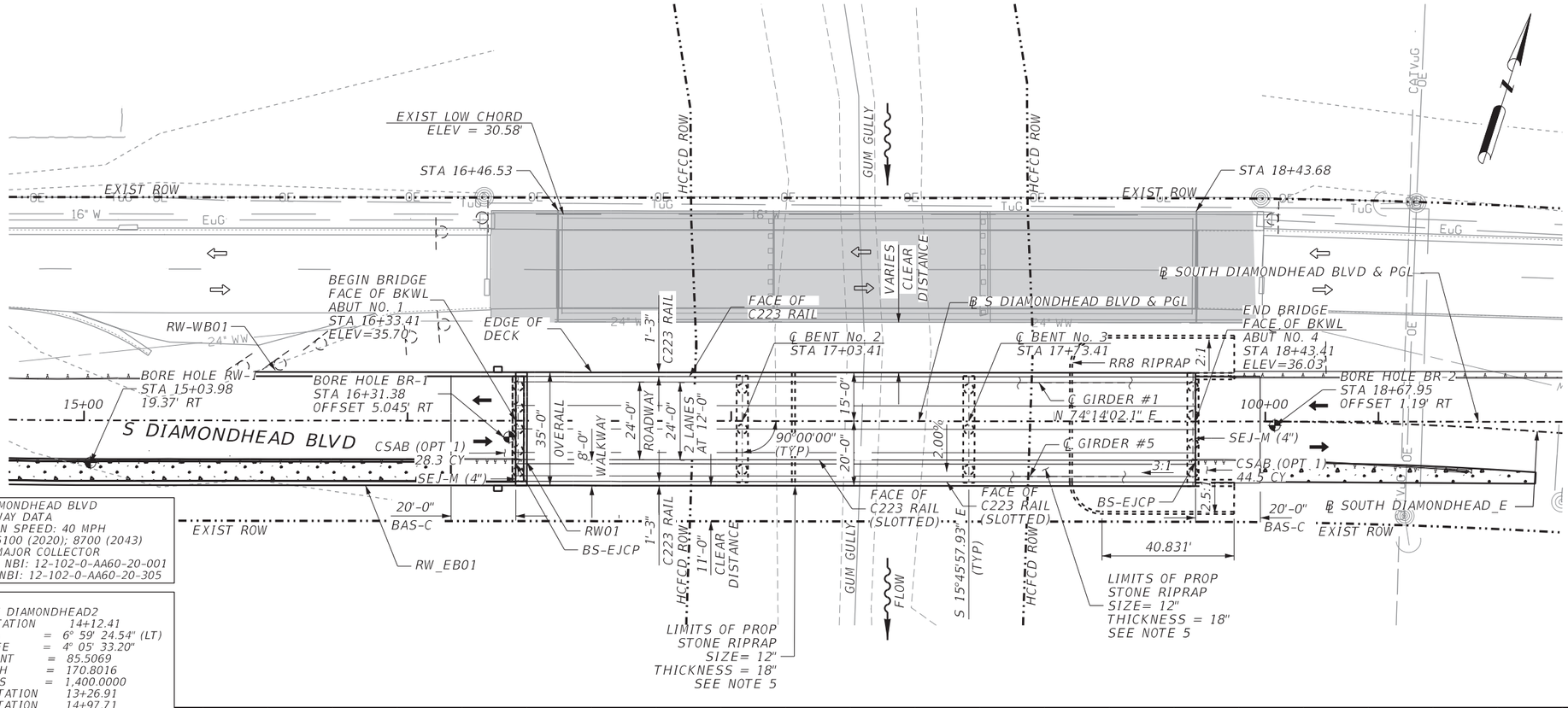
GENERAL NOTES

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (8TH EDITION) (HL-93 LOADING).
2. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL CONDITIONS.
3. CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
4. DRILLED SHAFTS SHAFT LENGTHS NOTED ARE AVERAGE LENGTH PER BENT.
5. REFER TO "GRADING LAYOUT" FOR PROPOSED RIPRAP LIMITS.

LEGEND

- ✥ – BORE HOLE LOCATION. SEE BORING LOG SHEETS FOR GEOTECHNICAL INFORMATION
- D – DOWEL IN EXTERIOR GIRDERS
- ⇦ EXISTING TRAFFIC FLOW DIRECTION
- ⬅ PROPOSED TRAFFIC FLOW DIRECTION
- EXCAVATION
- EXISTING BRIDGE TO BE REMOVED



S DIAMONDHEAD BLVD
ROADWAY DATA
DESIGN SPEED: 40 MPH
ADT: 6100 (2020); 8700 (2043)
RFC: MAJOR COLLECTOR
EXIST NBI: 12-102-0-AA60-20-001
PROP NBI: 12-102-0-AA60-20-305

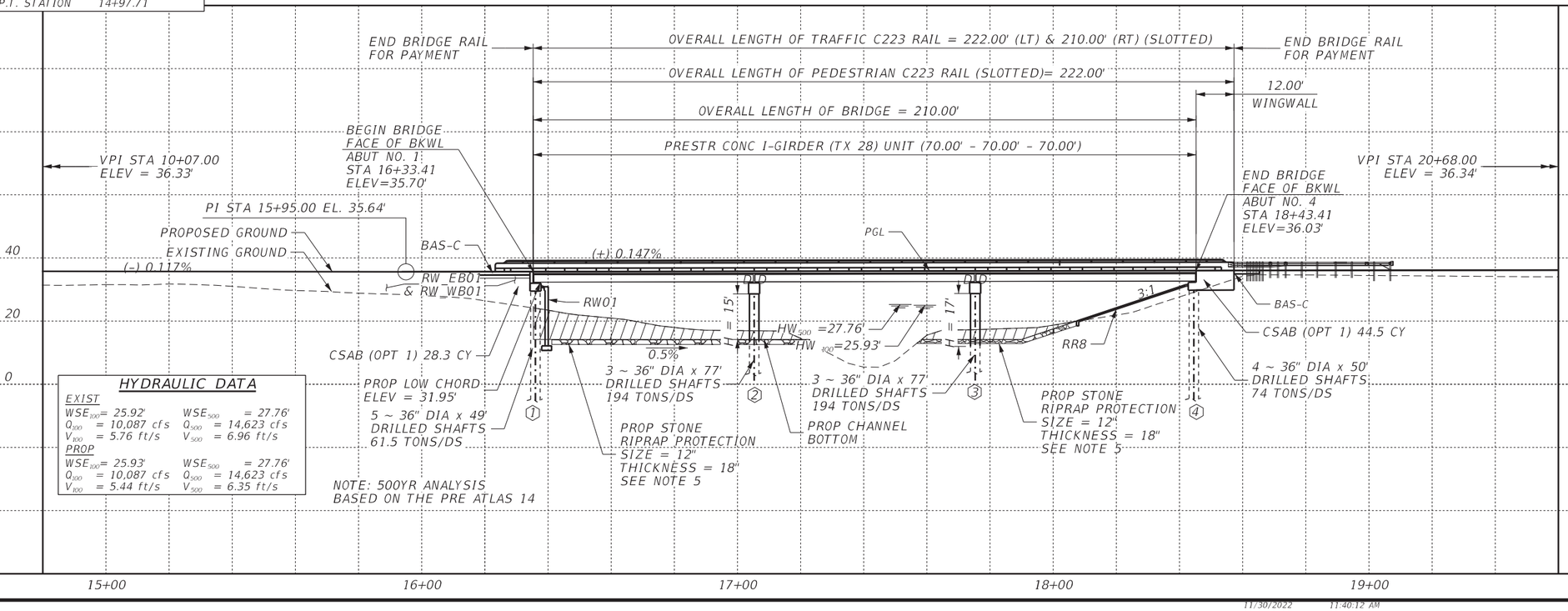
CURVE DIAMONDHEAD2

P.I. STATION		14+12.41
DELTA	=	6° 59' 24.54" (LT)
DEGREE	=	4° 05' 33.20"
TANGENT	=	85.5069
LENGTH	=	170.8016
RADIUS	=	1,400.0000
P.C. STATION		13+26.91
P.T. STATION		14+97.71

CURVE DIAMONDHEAD3

P.I. STATION		23+24.69
DELTA	=	19° 28' 49.91" (RT)
DEGREE	=	4° 46' 28.73"
TANGENT	=	205.9878
LENGTH	=	407.9993
RADIUS	=	1,200.0000
P.C. STATION		21+18.70
P.T. STATION		25+26.70

HL93 LOADING



HYDRAULIC DATA

EXIST

WSE_{100}	= 25.92'	WSE_{500}	= 27.76'
Q_{100}	= 10,087 cfs	Q_{500}	= 14,623 cfs
V_{100}	= 5.76 ft/s	V_{500}	= 6.96 ft/s

PROP

WSE_{100}	= 25.93'	WSE_{500}	= 27.76'
Q_{100}	= 10,087 cfs	Q_{500}	= 14,623 cfs
V_{100}	= 5.44 ft/s	V_{500}	= 6.35 ft/s

NOTE: 500YR ANALYSIS BASED ON THE PRE ATLAS 14

SCALE: 1" = 40' HORZ
1" = 40' VERT

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

BRIDGE LAYOUT

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)
SHEET 1 OF 1

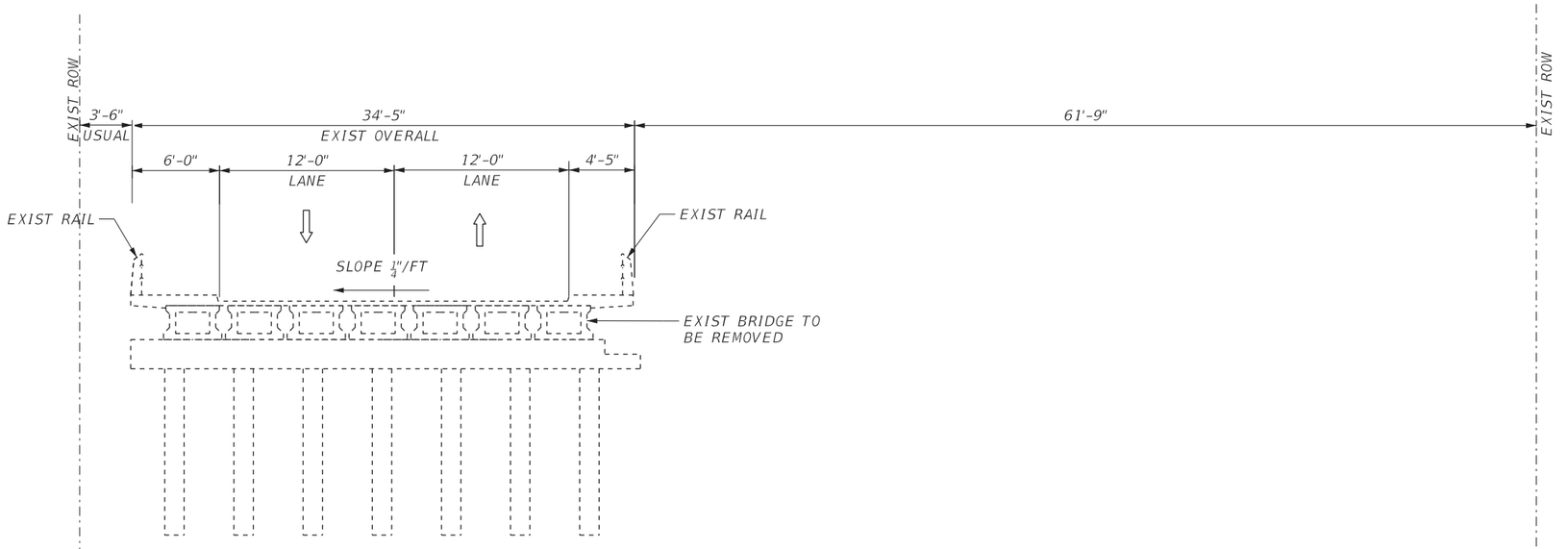
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	134

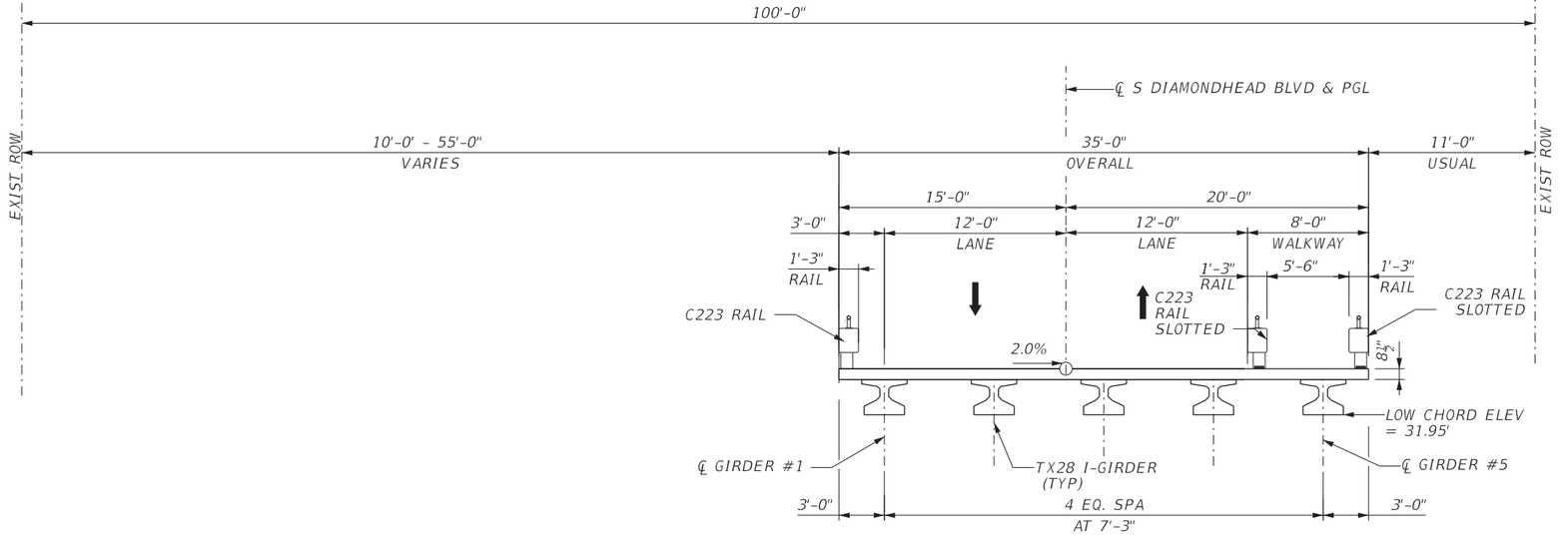
LEGEND

EXISTING TRAFFIC FLOW ARROW

PROPOSED TRAFFIC FLOW ARROW



EXIST SECTION



PROPOSED SECTION

HL93 LOADING

NOT TO SCALE

STATE OF TEXAS
RICARDO A. PRIETO
91123
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PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY
BRIDGE
TYPICAL SECTIONS
S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT		HIGHWAY NO.	
6	TEXAS	SEE TITLE SHEET		CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	135

S DIAMONDHEAD BLVD BRIDGE

SUMMARY OF BRIDGE

ITEMS	400 6005	416 6004	420 6013	420 6025	420 6037	422 6001	425 6035	432 6008	432 6031	442 6007	450 6032	454 6018	4161 6001
ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (BENT)	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (CONC)(CL B)(RR8&RR9)	RIPRAP (STONE PROTECTION)(12 IN)	STR STEEL (MISC NON - BRIDGE)	RAIL (TY C223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	STENCILING PERMANENT STRUCTURE NUMBERS
UNITS	CY	LF	CY	CY	CY	SF	LF	CY	CY	LB	LF	LF	EA
2 ABUTMENTS	73	445	38.4					42	259		24.0	70	
2 INTERIOR BENT		462		31.4	25.1								
210.00' PRESTR CONC GIRDER UNIT						7,350	1,042.50			196	630.0		2
PROJECT TOTALS	73	907	38.4	31.4	25.1	7,350	1,042.50	42	259	196	654.0	70	2

BEARING SEAT ELEVATIONS

		GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5
ABUT 1	(FWD)	32.403	32.258	32.113	31.968	31.823
BENT 2	(BK)	32.503	32.358	32.213	32.068	31.923
	(FWD)	32.506	32.361	32.216	32.071	31.926
BENT 3	(BK)	32.606	32.461	32.316	32.171	32.026
	(FWD)	32.609	32.464	32.319	32.174	32.029
ABUT 4	(BK)	32.709	32.564	32.419	32.274	32.129

HL93 LOADING

NOT TO SCALE

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

ESTIMATED QUANTITITES AND BEARING SEAT ELEVATIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT		HIGHWAY NO.	
6	TEXAS			CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	136

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DRILLING LOG

WinCore Version 3.1

County	Harris	Hole	BR-1	District	Houston
Highway	Diamondhead Boulevard	Structure	Bridge	Date	07/2/20
CSJ	0912-72-406	Station	16+31.38	Grnd. Elev.	23.34 ft
		Offset	5.045' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Fat w/ Sand, soft, brown and gray, w/ roots and gravel at 0'-4', calcareous nodules and ferrous stains at 2'-7', woods at 5'-7' (CH)			26	57	29		% Passing #200 Sieve: 83.8
		4 (6) 5 (6)			12.4	18			128	
5										
16.3			CLAY, Sandy Lean, stiff, brown and gray, w/ woods at 7'-9' and 13'-15', calcareous nodules at 10'-17', ferrous stains at 10'-12' (CL)			19	38	19		% Passing #200 Sieve: 69.0
		12 (6) 14 (6)								
10						20				
		9 (6) 11 (6)								
15				13	22.9	16	28	11	143	
4.3			SAND, Silty, slightly compact to compact, gray and brown (SM)							
20		20 (6) 22 (6)				20				% Passing #200 Sieve: 16.6
		10 (6) 10 (6)								
25						22				
		22 (6) 26 (6)								
30						20				
		28 (6) 29 (6)								
35										
-13.7			SILT, w/ Sand, dense, reddish brown and gray (ML)			25	23	2		% Passing #200 Sieve: 79.3
		47 (6) 50 (4.5)								
40										
-18.7			SILT, Sandy, dense, reddish brown and gray (ML)			18	21	1		% Passing #200 Sieve: 66.9
		49 (6) 43 (6)								
45										
-23.7			CLAY, Silty, stiff to very stiff, reddish brown, brown and gray, w/ calcareous nodules at 47'-49' (CL-ML)			18	26	5		% Passing #200 Sieve: 94.1
		19 (6) 16 (6)								
50				28	28.3	32			128	
		22 (6) 27 (6)								
55										
-33.7			CLAY, Fat, stiff to hard, reddish brown, brown and gray, w/ woods at 57'-59' and 72'-74', sand seams at 77'-84' (CH)			23	56	33		% Passing #200 Sieve: 94.1
		15 (6) 17 (6)								
60										

Remarks: Water level was encountered at 21 ft below the existing grade during drilling operations; at 15.2 ft and 11 ft after 5 minutes and 10 minutes, respectively. (Northing, Easting)=(13901214.56, 3207178.95)

The ground water elevation was not determined during the course of this boring.

Driller: PSI **Logger: George** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.2.2 txdot.gpj

DRILLING LOG

WinCore Version 3.1

County	Harris	Hole	BR-1	District	Houston
Highway	Diamondhead Boulevard	Structure	Bridge	Date	07/2/20
CSJ	0912-72-406	Station	16+31.38	Grnd. Elev.	23.34 ft
		Offset	5.045' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Fat, stiff to hard, reddish brown, brown and gray, w/ woods at 57'-59' and 72'-74', sand seams at 77'-84' (CH)	33	34.9	29			130	
		12 (6) 15 (6)								
65						22				
		25 (6) 26 (6)								
70				37	35.1	31			130	
		20 (6) 21 (6)								
75						23	62	33		% Passing #200 Sieve: 100
		37 (6) 33 (6)				23				
80										
		50 (4) 50 (3)		43	38.2	25	56	31	136	% Passing #200 Sieve: 95.6
85										
		15 (6) 15 (6)				29				
90										
		18 (6) 16 (6)		48	46.3	22			133	
95										
-77.2		19 (6) 18 (6)								
100										

Remarks: Water level was encountered at 21 ft below the existing grade during drilling operations; at 15.2 ft and 11 ft after 5 minutes and 10 minutes, respectively. (Northing, Easting)=(13901214.56, 3207178.95)

The ground water elevation was not determined during the course of this boring.

Driller: PSI **Logger: George** **Organization: HVJ Associates, Inc.**

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HL93 LOADING

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 40' VERT

STATE OF TEXAS
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NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

BORING LOGS
S DIAMONDHEAD BLVD

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT		HIGHWAY NO.	
6	TEXAS	SEE TITLE SHEET		CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	137

DRILLING LOG

WinCore Version 3.1

County	Harris	Hole	BR-2	District	Houston
Highway	Diamondhead Boulevard	Structure	Bridge	Date	06/26/20
CSJ	0912-72-406	Station	18+67.95	Grnd. Elev.	34.63 ft
		Offset	1.19' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Sandy Fat, very soft, brown and gray, w/ roots at 0'-4', gravel at 0'-2', calcareous nodules and ferrous stains at 5'-7' (CH)			18	50	31		% Passing #200 Sieve: 67.6
		2 (6) 3 (6)								
5										
27.6			CLAY, Fat, very soft to very stiff, brown and gray, w/ sand pockets at 7'-9', calcareous nodules at 10'-17' and ferrous stains at 10'-14' (CH)		27.4	26	73	47	127	% Passing #200 Sieve: 90.3
		4 (6) 4 (6)				28				
10				12	27.9	26	89	57	123	% Passing #200 Sieve: 95.0
		3 (6) 4 (6)								
15						17	47	27		% Passing #200 Sieve: 68.9
17.6			CLAY, Sandy Lean, very soft to stiff, brown and gray, w/ roots at 17'-19', calcareous nodules and ferrous stains at 22'-24' (CL)							
		4 (6) 4 (6)								
20						14				
		13 (6) 13 (6)								
25										
7.6			CLAY, Fat, very soft to very stiff, brown and gray, w/ calcareous nodules and ferrous stains at 27'-29' (CH)	19	44.2	19	58	35	131	% Passing #200 Sieve: 95.8
		5 (6) 3 (6)								
30										
2.6			SAND, Silty, compact, brown and gray (SM)			24	24	1		% Passing #200 Sieve: 47.2
		27 (6) 29 (6)				23				
35										
		7 (6) 11 (6)								
-5.9			CLAY, Fat w/ Sand, soft to stiff, reddish brown and gray (CH)			21	50	28		% Passing #200 Sieve: 82.0
40										
		10 (6) 9 (6)		27	23.4	23			131	
45										
		10 (6) 11 (6)								
50										
-17.4			CLAY, Fat, soft to very stiff, reddish brown, brown and gray, w/ calcareous nodules at 52'-54' and 92'-94', ferrous nodules at 52'-54', silt seams at 62'-64', sand seams at 72'-79' and 92'-99' (CH)			27	83	49		% Passing #200 Sieve: 98.5
55		6 (6) 9 (6)								
						27	59	33		% Passing #200 Sieve: 98.0
		12 (6) 14 (6)								
60										

Remarks: Water level was encountered at 15 ft below the existing grade during drilling operations; at 14.9 ft and 14.7 ft after 5 minutes and 10 minutes, respectively. (Northing, Easting)=(13901282.54, 3207405.57)

The ground water elevation was not determined during the course of this boring.

Driller: PSI **Logger:** George **Organization:** HVJ Associates, Inc.

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.2.2 txdot.gpj

DRILLING LOG

WinCore Version 3.1

County	Harris	Hole	BR-2	District	Houston
Highway	Diamondhead Boulevard	Structure	Bridge	Date	06/26/20
CSJ	0912-72-406	Station	18+67.95	Grnd. Elev.	34.63 ft
		Offset	1.19' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Fat, soft to very stiff, reddish brown, brown and gray, w/ calcareous nodules at 52'-54' and 92'-94', ferrous nodules at 52'-54', silt seams at 62'-64', sand seams at 72'-79' and 92'-99' (CH)			24				
		12 (6) 13 (6)								
65				35	22.5	27	56	30	117	% Passing #200 Sieve: 99.2
		10 (6) 12 (6)								
70						29				
		12 (6) 12 (6)								
75						35	62	36		% Passing #200 Sieve: 99.9
		11 (6) 13 (6)								
80				43	40.2	31	71	41	126	% Passing #200 Sieve: 99.7
		10 (6) 10 (6)								
85				45	17.9	35	67	39	119	% Passing #200 Sieve: 98.7
		13 (6) 12 (6)								
90						25	61	33		% Passing #200 Sieve: 88.8
		12 (6) 13 (6)								
95						33				
		13 (6) 15 (6)								
-65.9										
100										

Remarks: Water level was encountered at 15 ft below the existing grade during drilling operations; at 14.9 ft and 14.7 ft after 5 minutes and 10 minutes, respectively. (Northing, Easting)=(13901282.54, 3207405.57)

The ground water elevation was not determined during the course of this boring.

Driller: PSI **Logger:** George **Organization:** HVJ Associates, Inc.

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.2.2 txdot.gpj

HL93 LOADING

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 40' VERT

STATE OF TEXAS
RICARDO A. PRIETO
91123
REGISTERED
PROFESSIONAL ENGINEER
ARIZONA

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

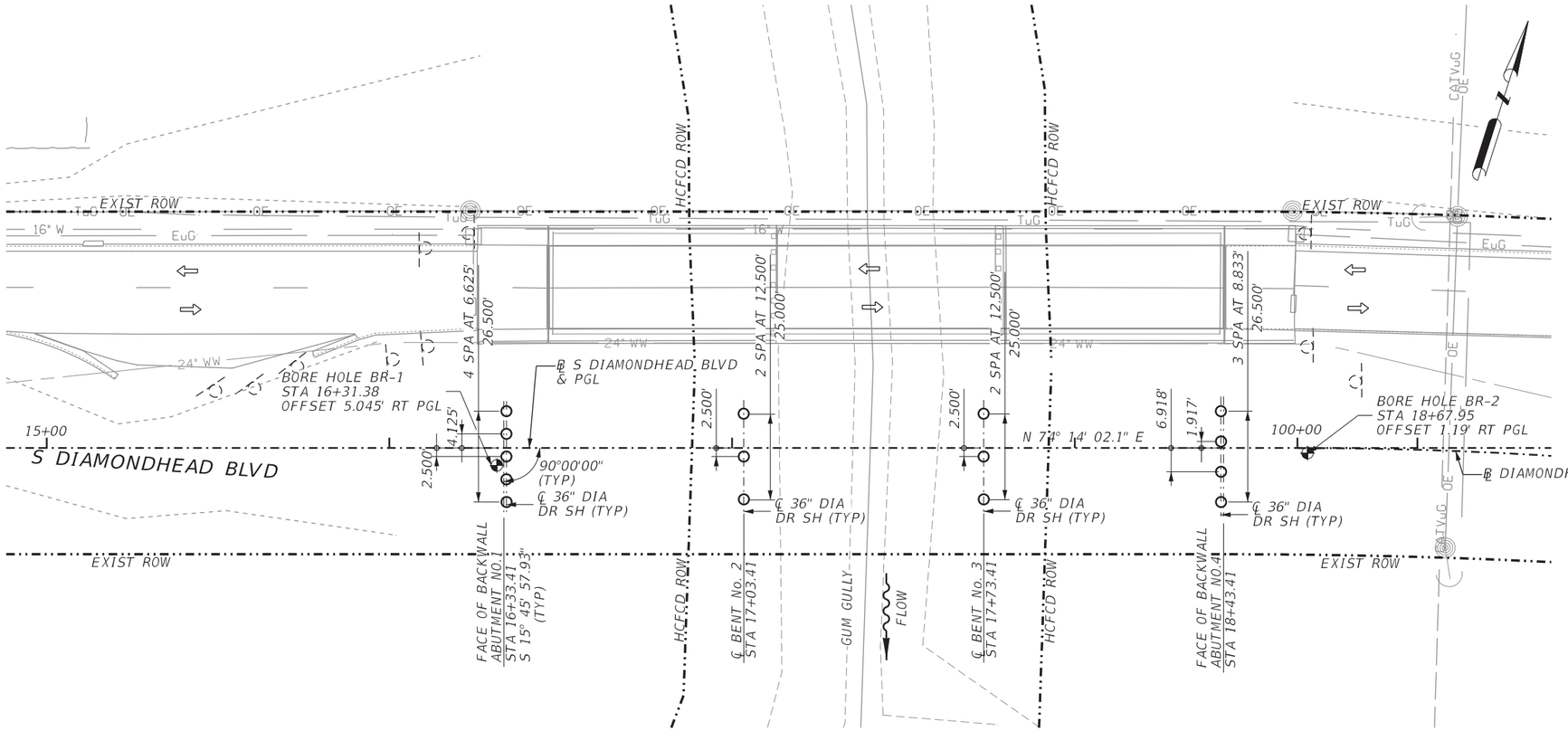
BORING LOGS
S DIAMONDHEAD BLVD

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT		HIGHWAY NO.	
6	TEXAS	SEE TITLE SHEET		CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	138

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY LOCATION OF ALL UTILITIES BEFORE CONSTRUCTION AND ORDERING MATERIAL.
2. SEE COMMON FOUNDATION DETAILS FD STANDARD SHEET FOR ALL STRUCTURAL DETAILS AND NOTES NOT SHOWN.



FOUNDATION LOADS	
ABUT/BENT	TONS/SHAFT
ABUT 1	61.5
BENT 2 & 3	194
ABUT 4	74

LEGEND

- ⌖ = BORE HOLE
- ○ = DRILLED SHAFT

HL93 LOADING

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

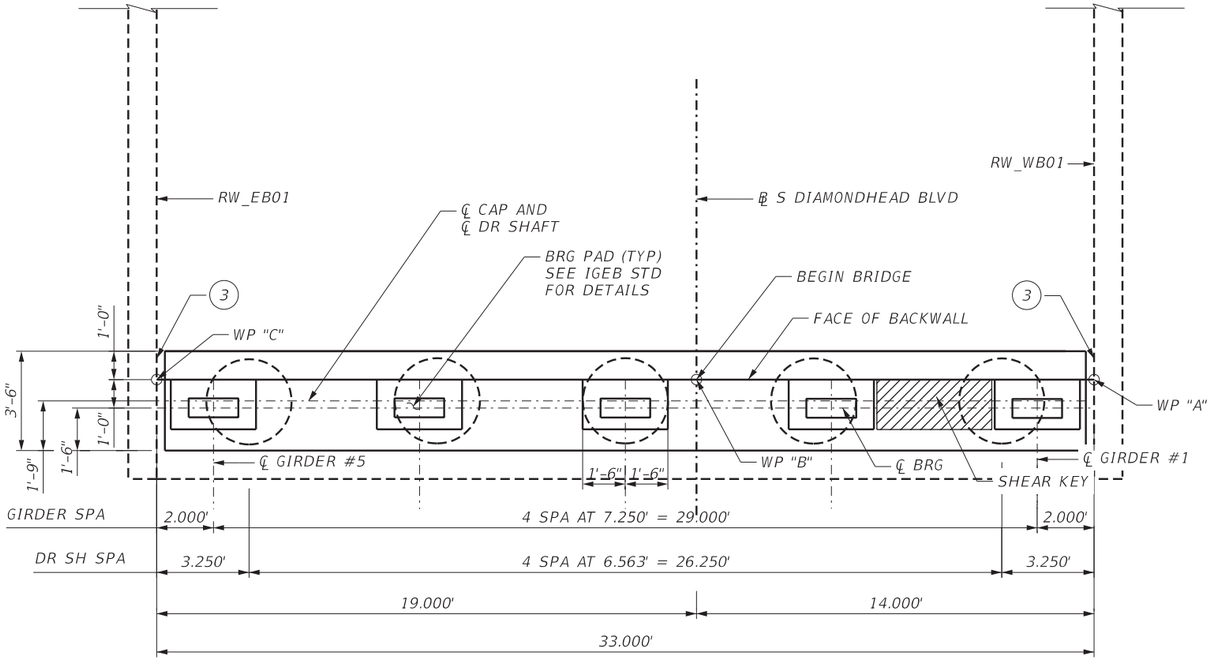
FOUNDATION LAYOUT

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	139



PLAN

WORKING POINT ELEVATIONS	
WP	ELEV
	ABUT 1
A	32.315'
B	32.035'
C	31.655'

TOP OF DS ELEVATIONS	
DS	ELEV
	ABUT 1
1	29.750'
2	29.573'
3	29.397'
4	29.220'

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017).
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE RW(MSE) STANDARD SHEET FOR RETAINING WALL ATTACHMENT DETAILS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

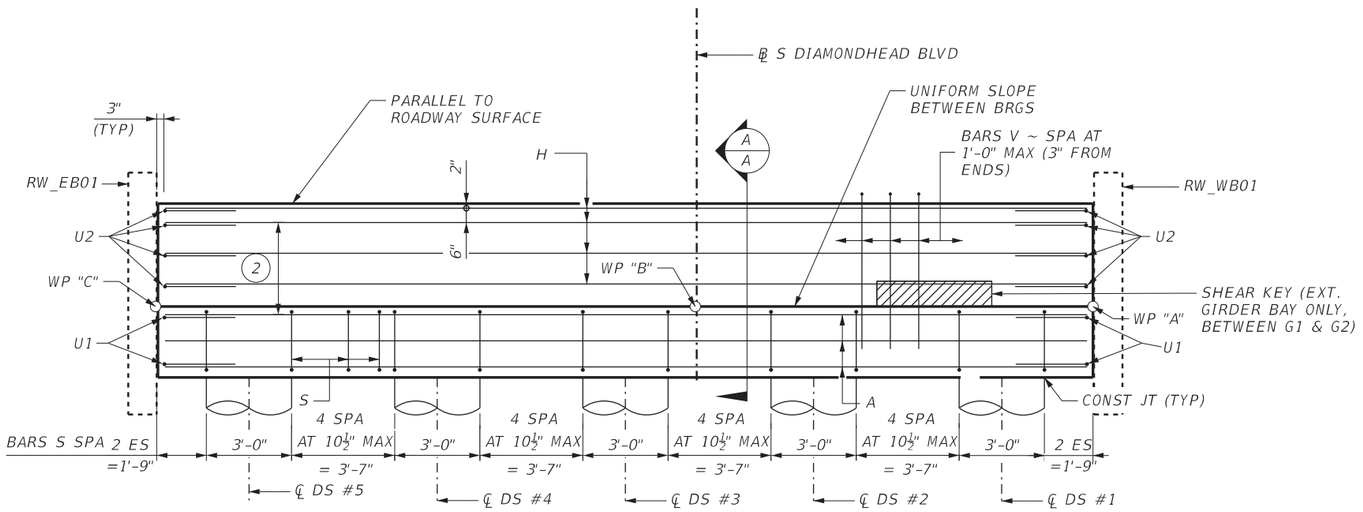
MATERIAL NOTES

1. PROVIDE CLASS C CONCRETE (F'C = 3,600 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.

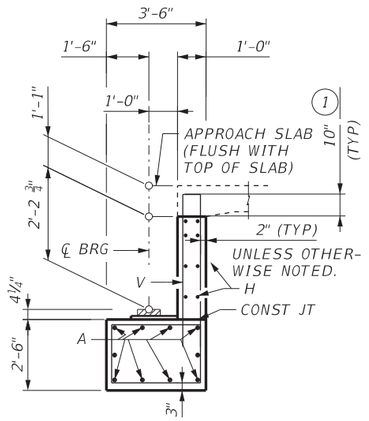
(1) INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.

(2) 3 SPACES AT 1'-0" MAX

(3) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN ABUTMENT AND RETAINING WALL COPING.



ELEVATION



SECTION A-A

HL93 LOADING

0 2' 4' 8'

SCALE: 3/16" = 1'-0"

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

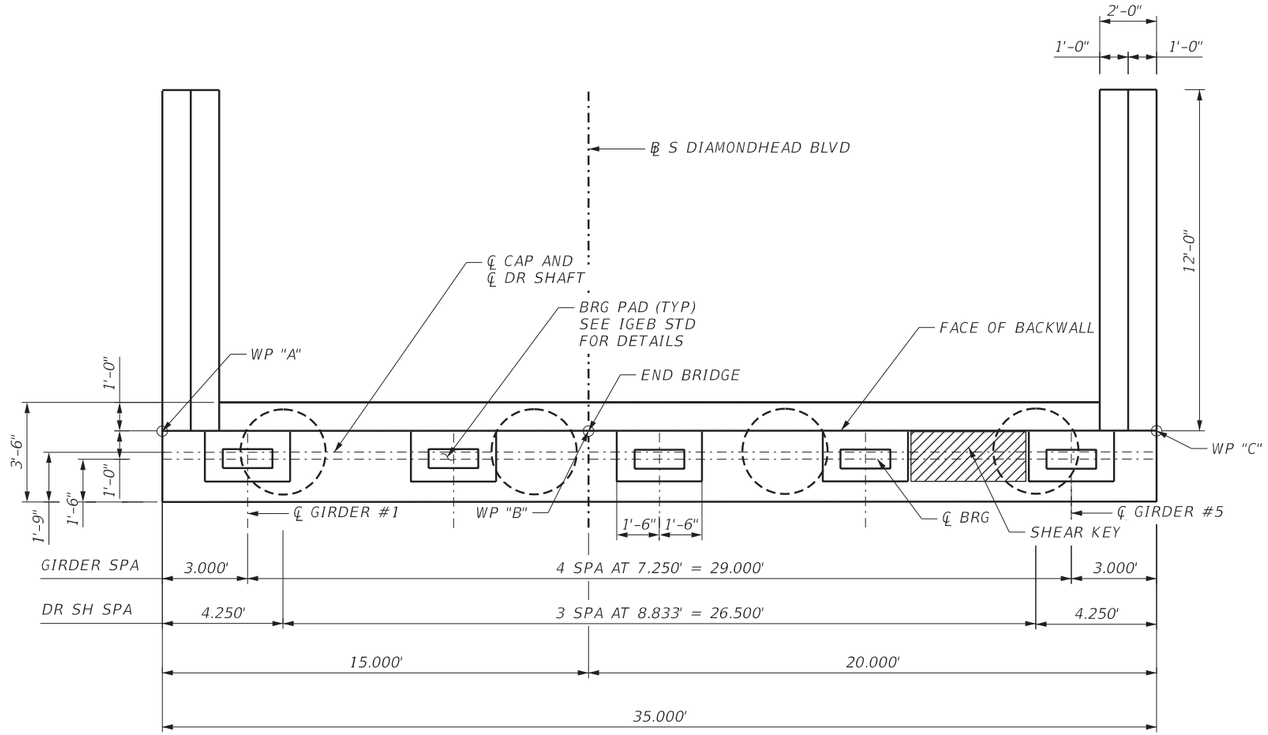
ABUTMENT NO. 1

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

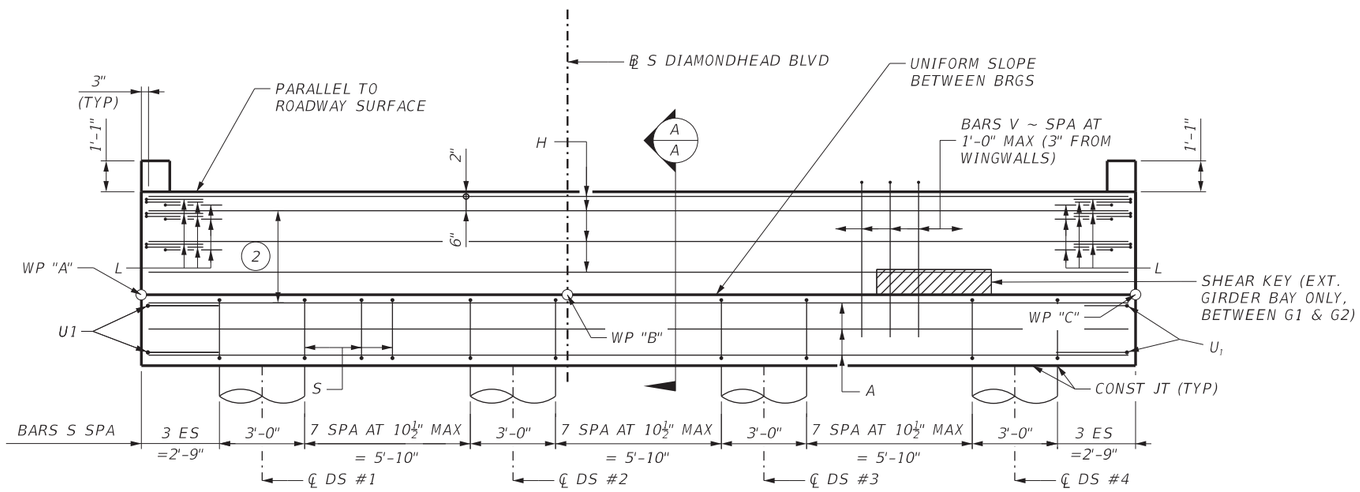
SHEET 1 OF 1

DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	140



PLAN



ELEVATION

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017).
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.
5. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

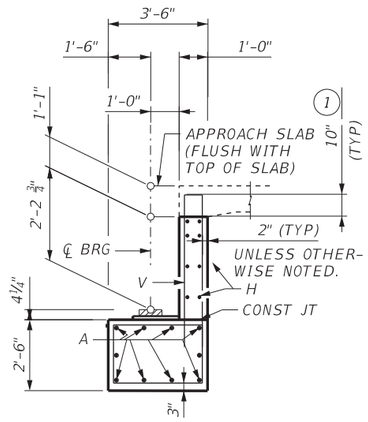
1. PROVIDE CLASS C CONCRETE (F'C = 3,600 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.

WORKING POINT ELEVATIONS	
WP	ELEV
	ABUT 4
A	32.642'
B	32.342'
C	31.942'

TOP OF DS ELEVATIONS	
DS	ELEV
	ABUT 4
1	30.057'
2	29.880'
3	29.704'
4	29.527'

(1) INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.

(2) 3 SPACES AT 1'-0" MAX



SECTION A-A

HL93 LOADING

0 2' 4' 8'

SCALE: 3/16" = 1'-0"

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

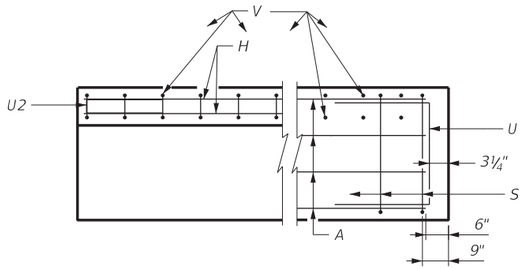
ABUTMENT NO. 4

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

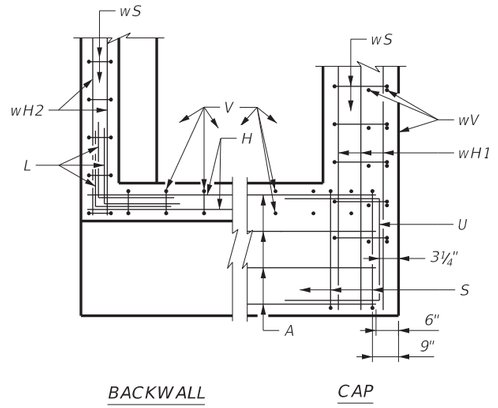
SHEET 1 OF 1

DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	141

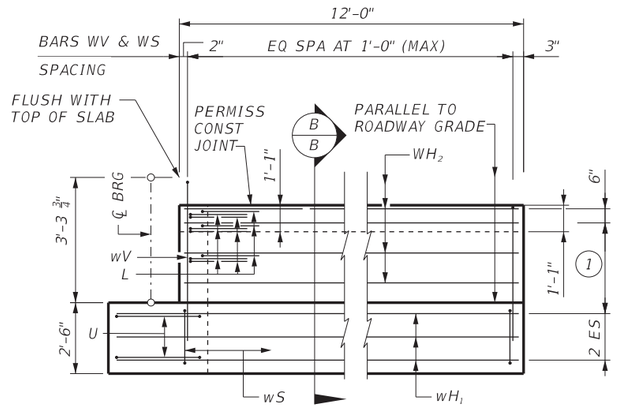


ABUTMENT 1

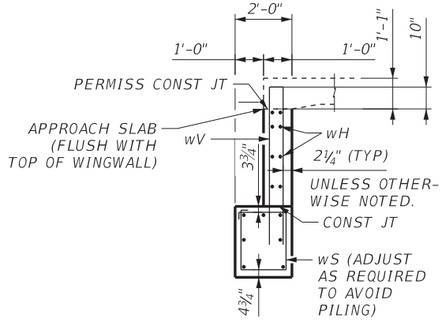


ABUTMENT 4

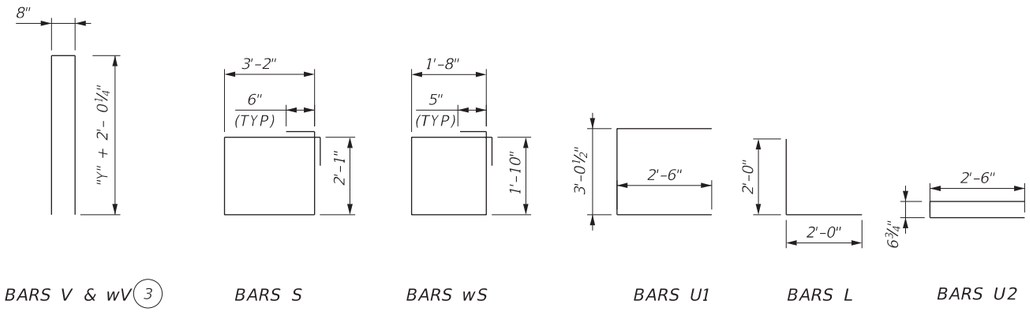
CORNER DETAILS



WINGWALL ELEVATION



SECTION B-B



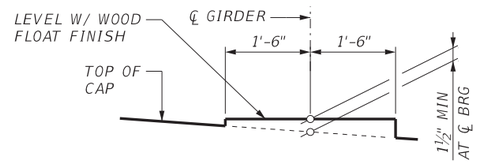
BARS V & wV (3) | BARS S | BARS wS | BARS U1 | BARS L | BARS U2

TABLE OF ESTIMATED QUANTITIES (ABUT 1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	10	#11	32'-0"	1,700
H	8	#6	32'-8"	393
S	26	#5	11'-6"	312
U1	4	#6	8'-1"	48
U2	8	#6	5'-7"	67
V	32	#5	11'-4"	372
ITEM			UNIT	QUANTITY
REINFORCING STEEL			LB	2,906
CONC (ABUT) (2)			CY	15.4

TABLE OF ESTIMATED QUANTITIES (ABUT 4)

BAR	No.	SIZE	LENGTH	WEIGHT
A	10	#11	34'-0"	1,806
H	8	#6	34'-8"	417
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U1	4	#6	8'-1"	48
V	34	#5	11'-4"	402
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307
ITEM			UNIT	QUANTITY
REINFORCING STEEL			LB	4,255
CONC (ABUT) (2)			CY	23.0



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

(1) 3 SPACES AT 1'-0" MAX

(2) INCLUDES 0.32 CY CONCRETE QUANTITIES ASSOCIATED WITH ONE SHEAR KEY AS DETAILED IN THE IGSK SHEET.

(3) SEE SPAN DETAILS FOR "Y" VALUE

HL93 LOADING

0 2' 4' 8'

SCALE: 3/16" = 1'-0"

STATE OF TEXAS
RICARDO A. PRIETO
91123
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

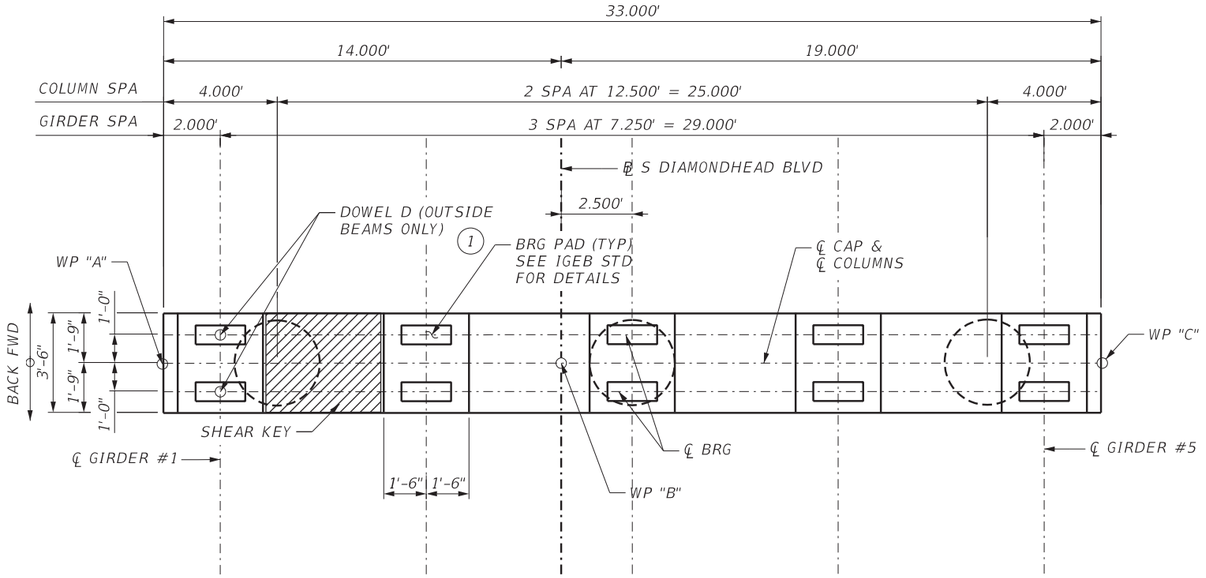
ABUTMENT NO. 1 & 4

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

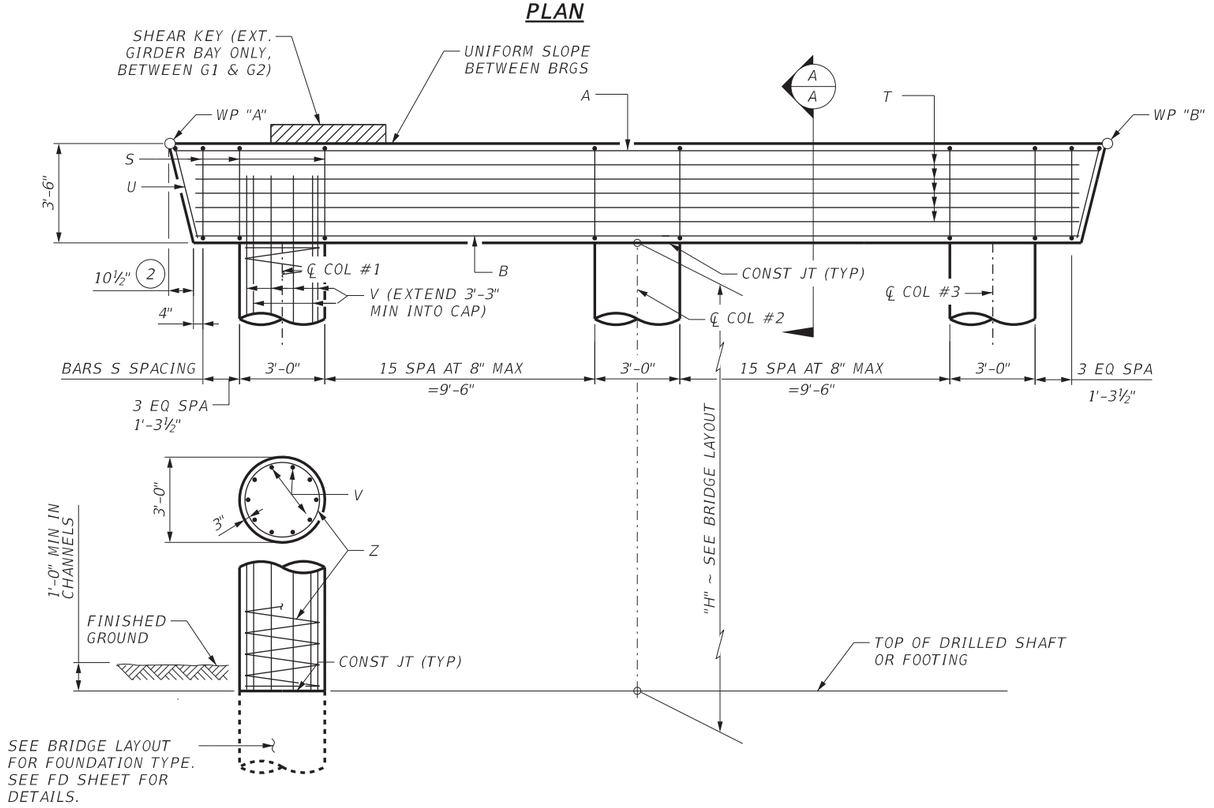
SHEET 1 OF 1

DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

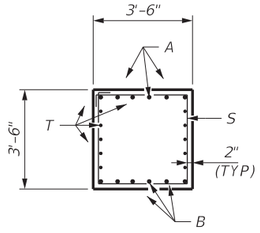
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	142



PLAN



ELEVATION



SECTION A-A

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017).
2. SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE SHEAR KEY (IGSK) STANDARD SHEET, FOR ALL SHEAR KEY DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

1. PROVIDE CLASS C CONCRETE (F'C = 3,600 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. GALVANIZE DOWEL BARS D.

(1) OMIT DOWELS D AT END OF UNIT. ADJUST REINFORCING STEEL TOTAL ACCORDINGLY.

(2) MEASURED PARALLEL TO TOP OF CAP CROSS-SLOPE.

WORKING POINT ELEVATIONS		
WP	ELEV	
	BENT 2	BENT 3
A	32.415'	32.520'
B	32.135'	32.240'
C	31.755'	31.860'

TOP OF COLUMN ELEVATIONS		
COLUMN	ELEV	
	BENT 2	BENT 3
1	28.835'	28.940'
2	28.585'	28.690'
3	28.335'	28.440'

HL93 LOADING

0 2' 4' 8'

SCALE: 3/16" = 1'-0"

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

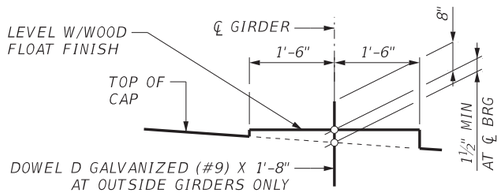
BENT NO. 2 & 3

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 1 OF 2

DIV NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	143



BEARING SEAT DETAIL

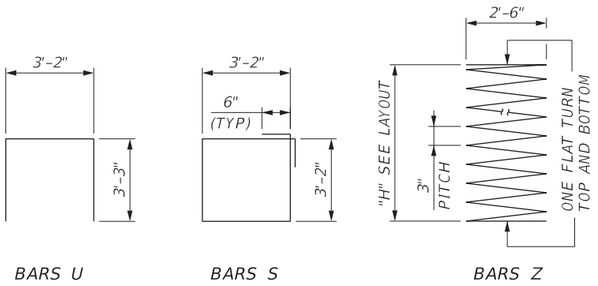
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

TABLE OF ESTIMATED QUANTITIES (ONE BNT) (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	32'-6"	1,052
B	6	#11	31'-0"	988
D	4	#9	1'-8"	32
S	40	#5	13'-8"	587
T	10	#5	31'-0"	323
U	2	#5	9'-8"	21
V	30	#9	18'-3"	1,862
Z	3	#4	494'-4"	991
ITEM			UNIT	QUANTITY
Reinforcing Steel			LB	5,856
Conc (Cap) (2)			CY	15.6
Conc (Col)			CY	11.8

(1) QUANTITIES SHOWN ARE BASED ON AN "H" VALUE OF 15'. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 31'-5"
REINFORCING STEEL, 165 LB
CLASS "C" CONC (COL), 0.79 CY

(2) INCLUDES 0.32 CY CONCRETE QUANTITIES ASSOCIATED WITH ONE SHEAR KEY AS DETAILED IN THE IGSK SHEET.



BARS U BARS S BARS Z

HL93 LOADING

0 2' 4' 8'

SCALE: 3/16" = 1'-0"

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

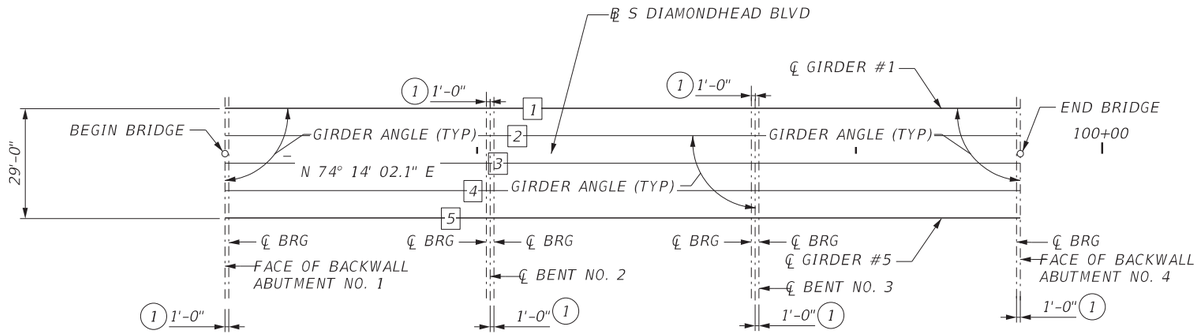
BENT NO. 2 & 3

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 2 OF 2

DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	144



SPAN 1 (TX28 GIRDERS) **SPAN 2** (TX28 GIRDERS) **SPAN 3** (TX28 GIRDERS)

GIRDER LAYOUT

1. SEE ELASTOMERIC BEARING & GIRDER END DETAILS (IGEB) STANDARD SHEET FOR ORIENTATION OF DIMENSION.
2. GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

GIRDER REPORT

GIRDER REPORT, SPAN 1

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	GIRDER SLOPE
GIRDER	1	70.000	68.000	69.500 (2)	0.001
GIRDER	2	70.000	68.000	69.500	0.001
GIRDER	3	70.000	68.000	69.500	0.001
GIRDER	4	70.000	68.000	69.500	0.001
GIRDER	5	70.000	68.000	69.500	0.001

GIRDER REPORT, SPAN 2

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	GIRDER SLOPE
GIRDER	1	70.000	68.000	69.500 (2)	0.001
GIRDER	2	70.000	68.000	69.500	0.001
GIRDER	3	70.000	68.000	69.500	0.001
GIRDER	4	70.000	68.000	69.500	0.001
GIRDER	5	70.000	68.000	69.500	0.001

GIRDER REPORT, SPAN 3

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	GIRDER SLOPE
GIRDER	1	70.000	68.000	69.500 (2)	0.001
GIRDER	2	70.000	68.000	69.500	0.001
GIRDER	3	70.000	68.000	69.500	0.001
GIRDER	4	70.000	68.000	69.500	0.001
GIRDER	5	70.000	68.000	69.500	0.001

ABUTMENT NO. 1 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	1	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

BENT NO. 2 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	1	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

BENT NO. 2 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	2	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

BENT REPORT

BENT NO. 3 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	2	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

BENT NO. 3 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	3	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

ABUTMENT NO. 4 (S 15° 45' 57.93" E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 12.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN	3	GIRDER 1	0.000	90	0	0
		GIRDER 2	7.250	90	0	0
		GIRDER 3	7.250	90	0	0
		GIRDER 4	7.250	90	0	0
		GIRDER 5	7.250	90	0	0
		TOTAL	29.000			

HL93 LOADING

0 20' 40'
SCALE: 1" = 40'

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

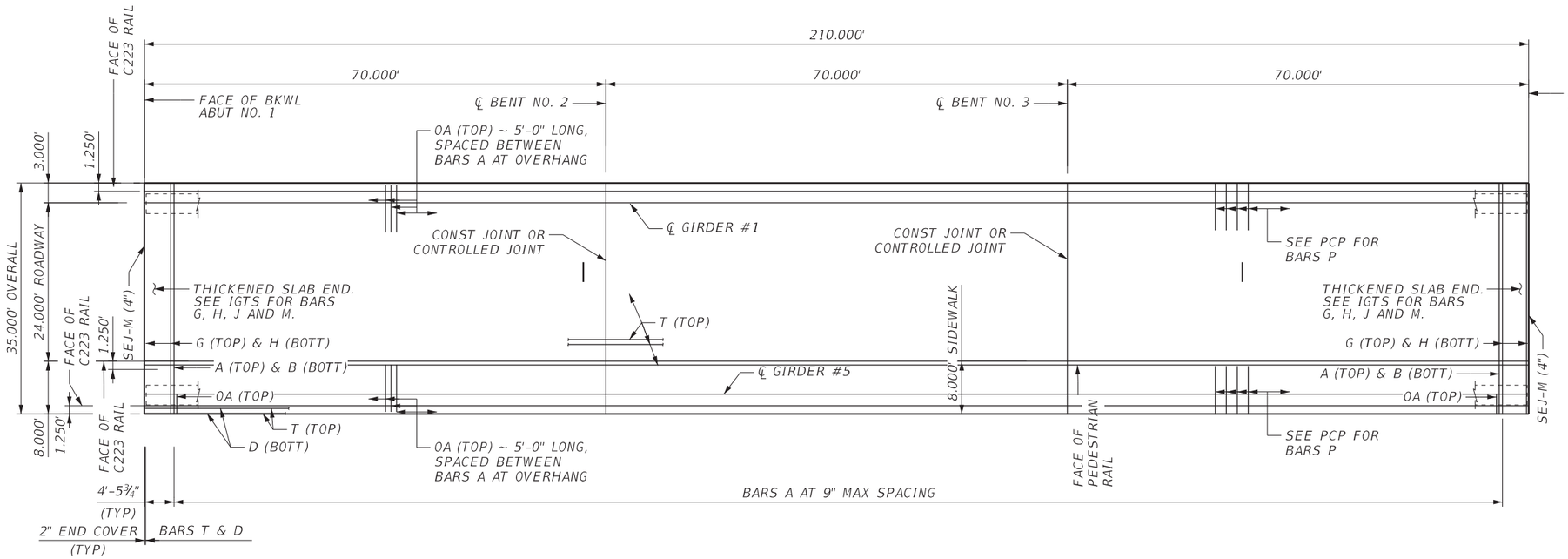
FRAMING PLAN

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 1 OF 1

DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET	CS

STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	145



GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS. 8TH EDITION (2017).
2. SEE IGTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.
3. SEE PCP OR PCP-FAB FOR PANEL DETAILS NOT SHOWN.
4. SEE PCP(O) AND PCP(O)-FAB FOR PRECAST OVERHANG PANEL DETAILS.
5. SEE IGMS STANDARD FOR MISCELLANEOUS DETAILS.
6. MULTI-SPAN UNITS, WITH SLAB CONTINUOUS OVER INTERIOR BENTS, MAY BE FORMED WITH THE DETAILS SHOWN ON THIS SHEET AND STANDARD IGCS.
7. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES

1. PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
   UNCOATED ~ #4 = 1'-7"
   EPOXY COATED ~ #4 = 2'-5"
4. DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, 0A, P OR T UNLESS NOTED OTHERWISE.

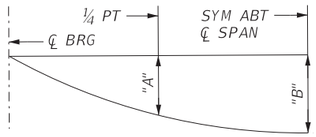
SPAN 1 **SPAN 2** **SPAN 3**

TABLE OF DEFLECTIONS

SPAN	BEAM	"A"	"B"
NO.	NO.	FT	FT
1	1	0.075	0.107
	2-4	0.082	0.117
	5	0.075	0.107
2	1	0.075	0.107
	2-4	0.082	0.117
	5	0.075	0.107
3	1	0.075	0.107
	2-4	0.082	0.117
	5	0.075	0.107

BAR TABLE

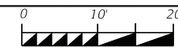
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#4
P	#4
T	#4



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5,000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

HL93 LOADING



SCALE: 1" = 20'

11/30/2022

NO.	DATE	REVISION	APPROV.

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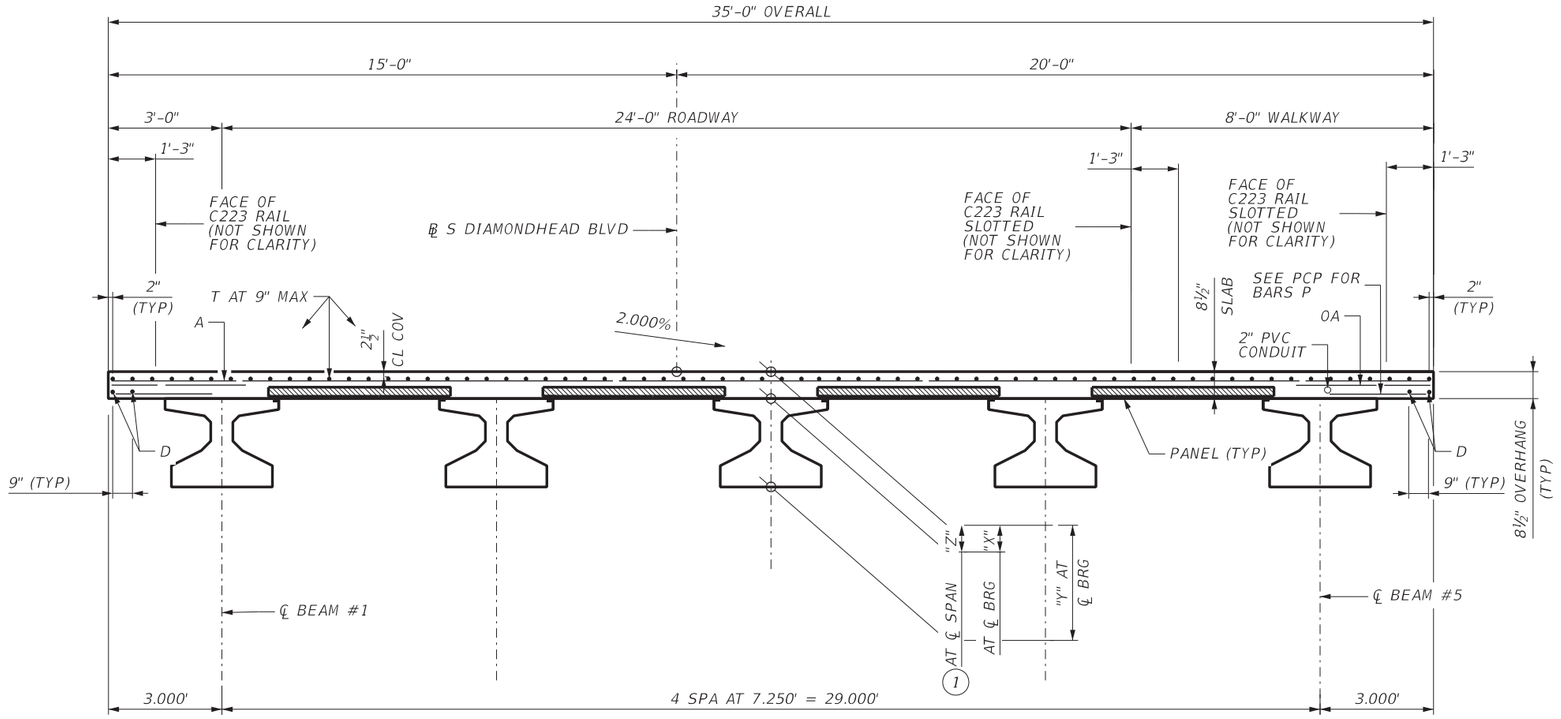
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY
PRESTRESSED CONCRETE I-GIRDER (TX28) UNITS
S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.	
6	TEXAS	SEE TITLE SHEET	CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	146



BAR TABLE

BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#4
P	#4
T	#4

(1) THEORETICAL DIMENSION

(2) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 PSF

(3) QUANTITIES SHOWN ARE BOTTOM OF GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE. SEE FRAMING PLAN SHEET FOR GIRDER LENGTHS.

TYPICAL TRANSVERSE SECTION

(TX28)

HL93 LOADING

NOT TO SCALE

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB	PRESTR CONCRETE GIRDERS TX28 (3)	TOTAL REINF STEEL (2)
NO.	SF	LF	LB
1	2,450	347.50	5,635
2	2,450	347.50	5,635
3	2,450	347.50	5,635
TOTAL	7,350	1,042.50	16,905

TABLE OF SECTION DEPTHS

SPAN	BEAM	"X"	"Y"	"Z" (1)
NO.	NO.	IN	IN	IN
1	1-5	11 ¾	39 ¾	9 ½
2	1-5	11 ¾	39 ¾	9 ½
3	1-5	11 ¾	39 ¾	9 ½

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

PRESTRESSED CONCRETE I-GIRDER (TX28) UNITS

S DIAMONDHEAD BLVD
(STA 16+35.28 TO STA 18+45.28)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT	HIGHWAY NO.	
6	TEXAS	SEE TITLE SHEET	CS	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	HARRIS	0912	72	406	147

DATE: 11/30/2022 11:44:37 AM
FILE: c:\pms\pwe-use0st-006\per\a.gonzalez\dms24696\C_406_S_BIGND.dgn

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
S DIAMONDHEAD BLVD	1-3	1-5	Tx28		28	0.6	270	9.48	6.62	4	24.5	5.6	6.2	3.200	-3.957	2918	0.586	0.761

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60% percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

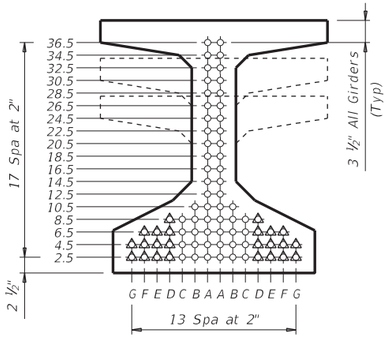
When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

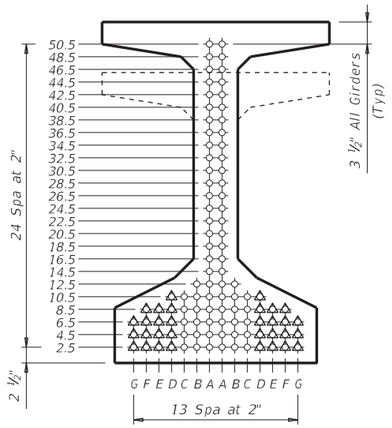
DEPRESSED STRAND DESIGNS:

Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.

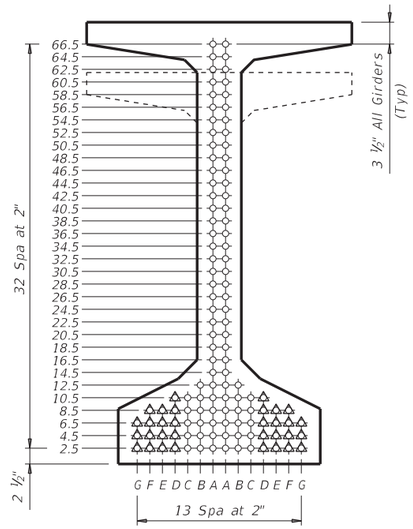
To complete this sheet input the girder designs in the table and the relative humidity under Design Notes. In all cases, remove this block. This sheet must be signed, sealed, and dated by a registered Professional Engineer.



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

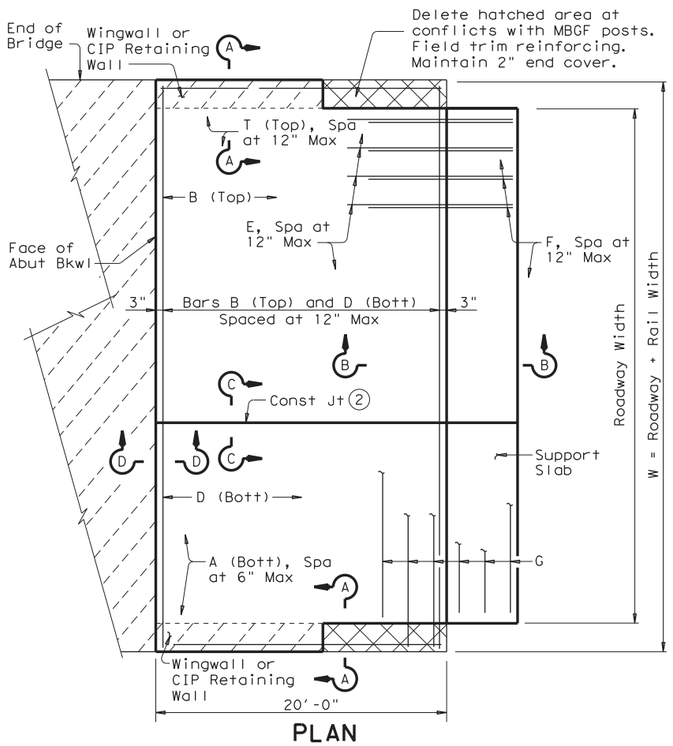
PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: C_406_S_BIGND.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only.	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		148

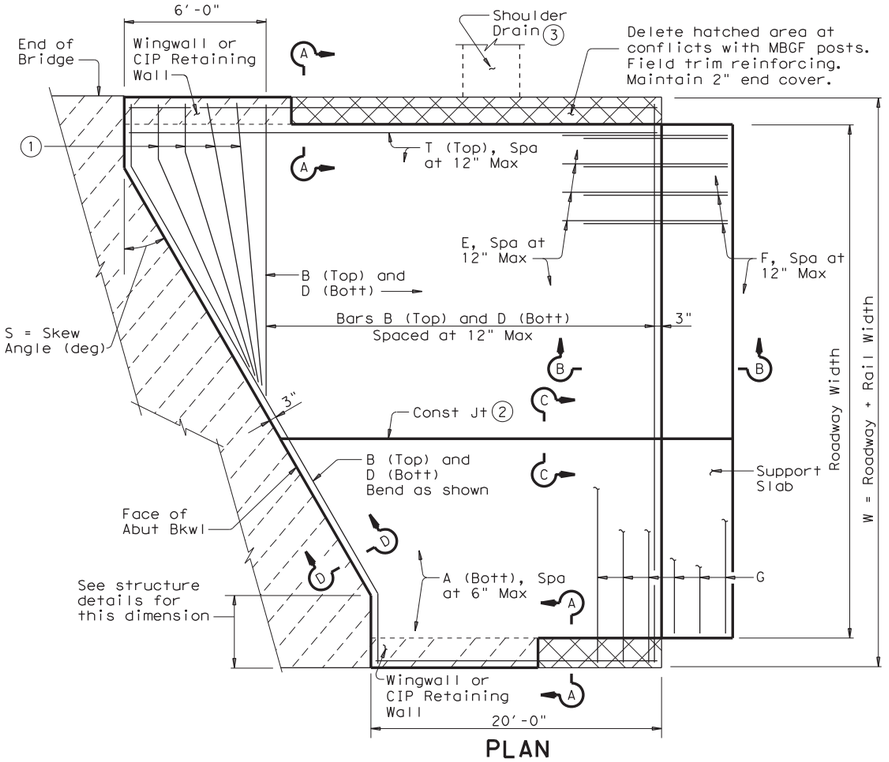
LEVELS DISPLAYED

PATH:



PLAN

(Showing Non-Skewed Approach Slab)



PLAN

(Showing Skewed Approach Slab)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Area of Appr Slab = $20W + 0.5W^2 \tan S$ (SF)
(Support Slab not included)

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

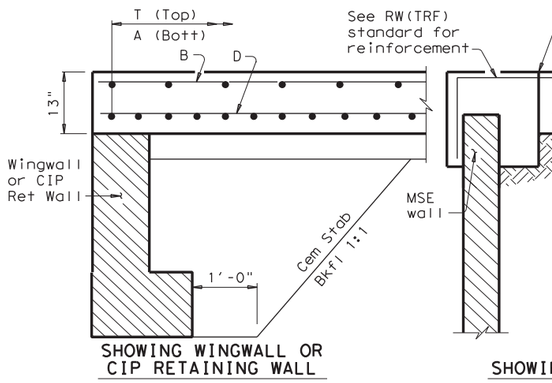
(7) See details elsewhere in plans for required cross-slope.

(8) Place in accordance with Item 438.

(9) Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.

GENERAL NOTES:

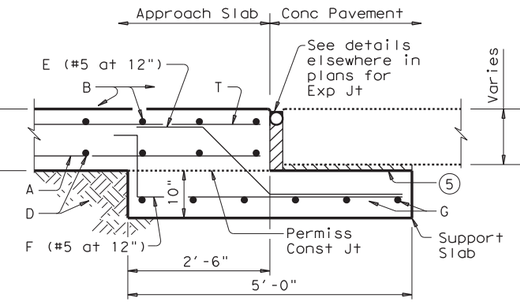
1. Construct approach slab in accordance with Item 422.
2. Concrete shall be Class "S" with a minimum compressive strength of 4,000 psi.
3. All reinforcing steel shall be Grade 60.
4. Construct the subgrade or subbase from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.
5. Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.
6. Cure for 4 days using water or membrane curing per Item 422.
7. Sealant, backer rod and preformed bituminous fiber material is subsidiary to approach slab concrete.



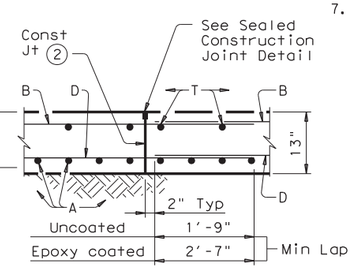
SHOWING WINGWALL OR CIP RETAINING WALL

SHOWING MSE WALL

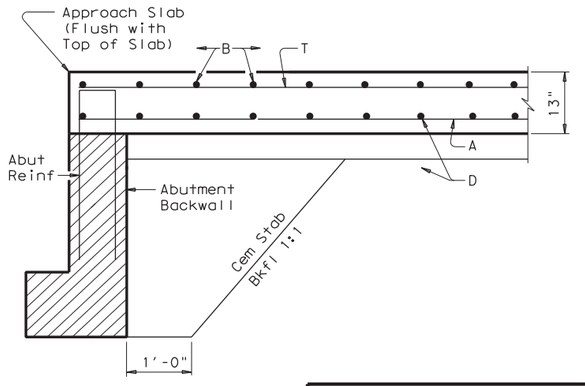
SECTION A-A



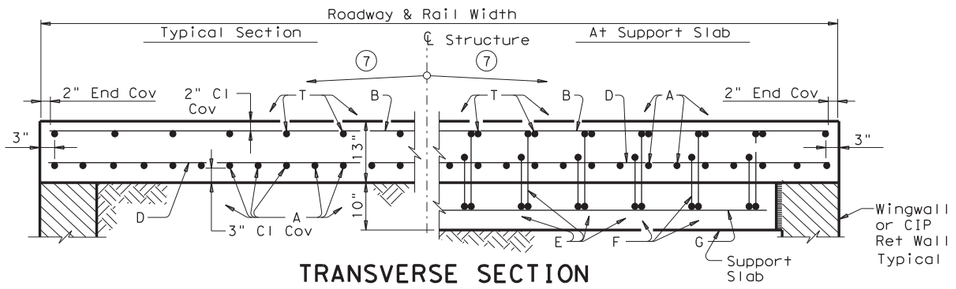
SECTION B-B



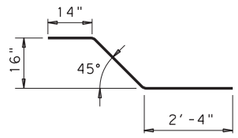
SECTION C-C (6)



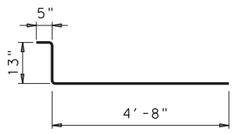
SECTION D-D



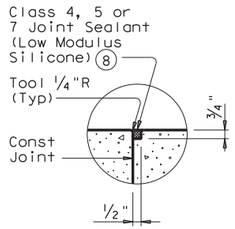
TRANSVERSE SECTION



BARS E (#5)



BARS F (#5)



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation
Houston District

BRIDGE APPROACH SLAB

CONCRETE PAVEMENT

BAS-C

FILE: STDB10B.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2009	DISTRICT	PROJECT NO.		SHEET
REVISIONS 4/20/2015 updated to 2014 standard	HOU			149
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0912	72	406	CS

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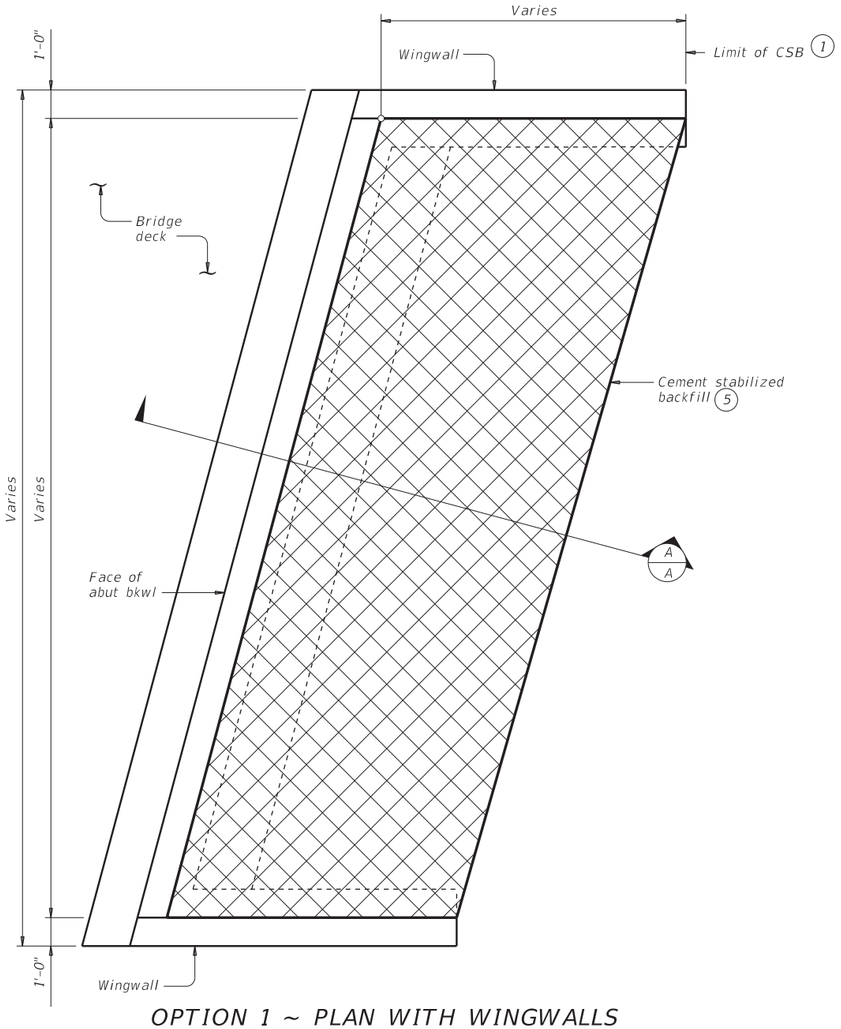
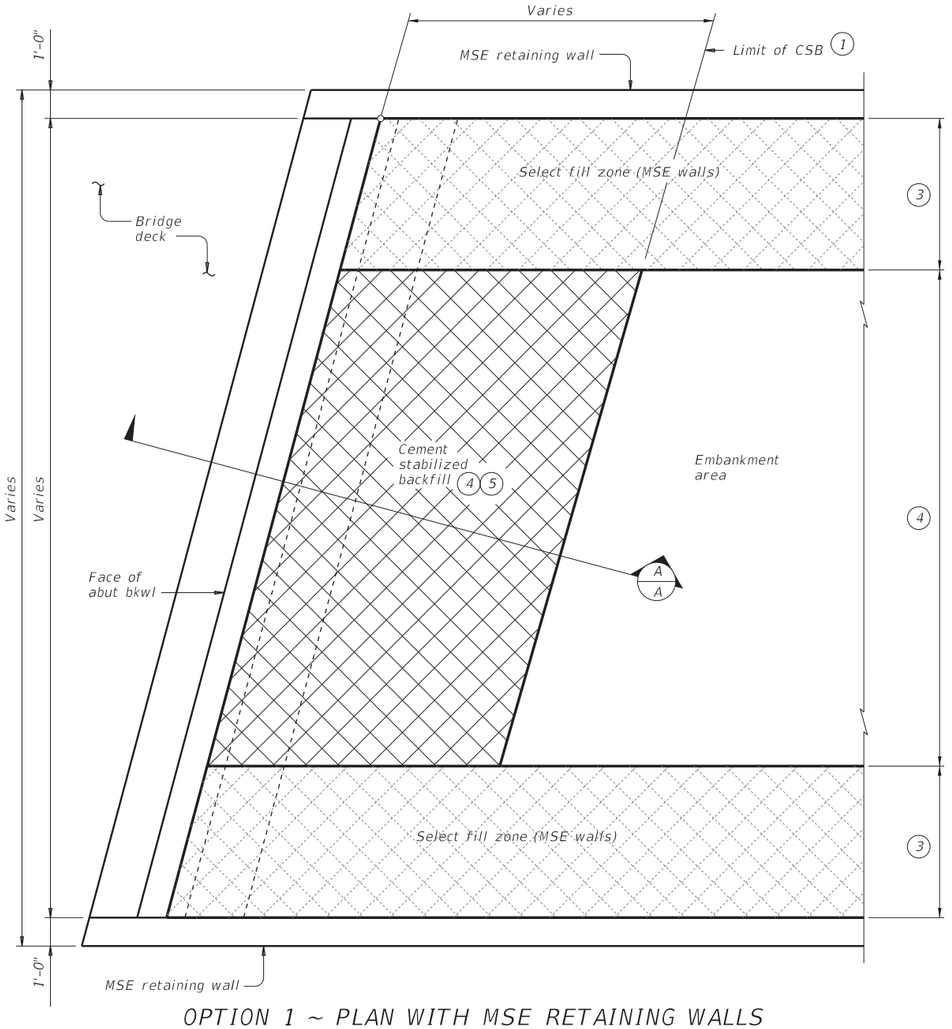
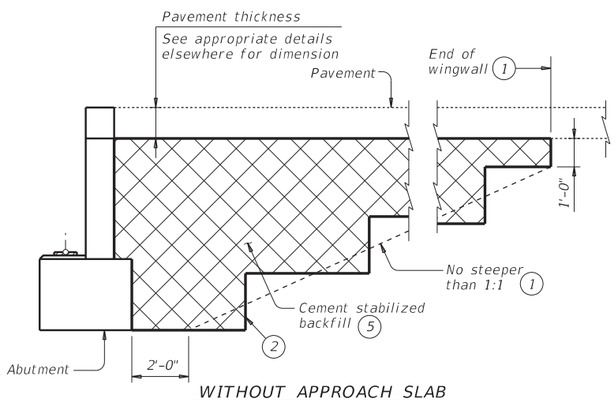


OPTION 1 ~ PLAN WITH WINGWALLS

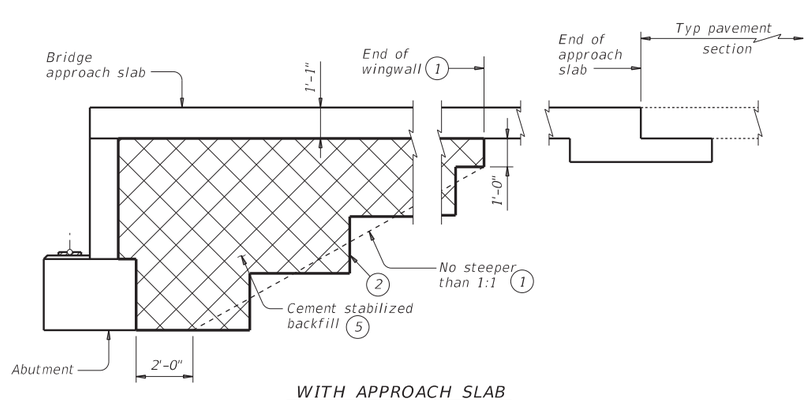
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		150

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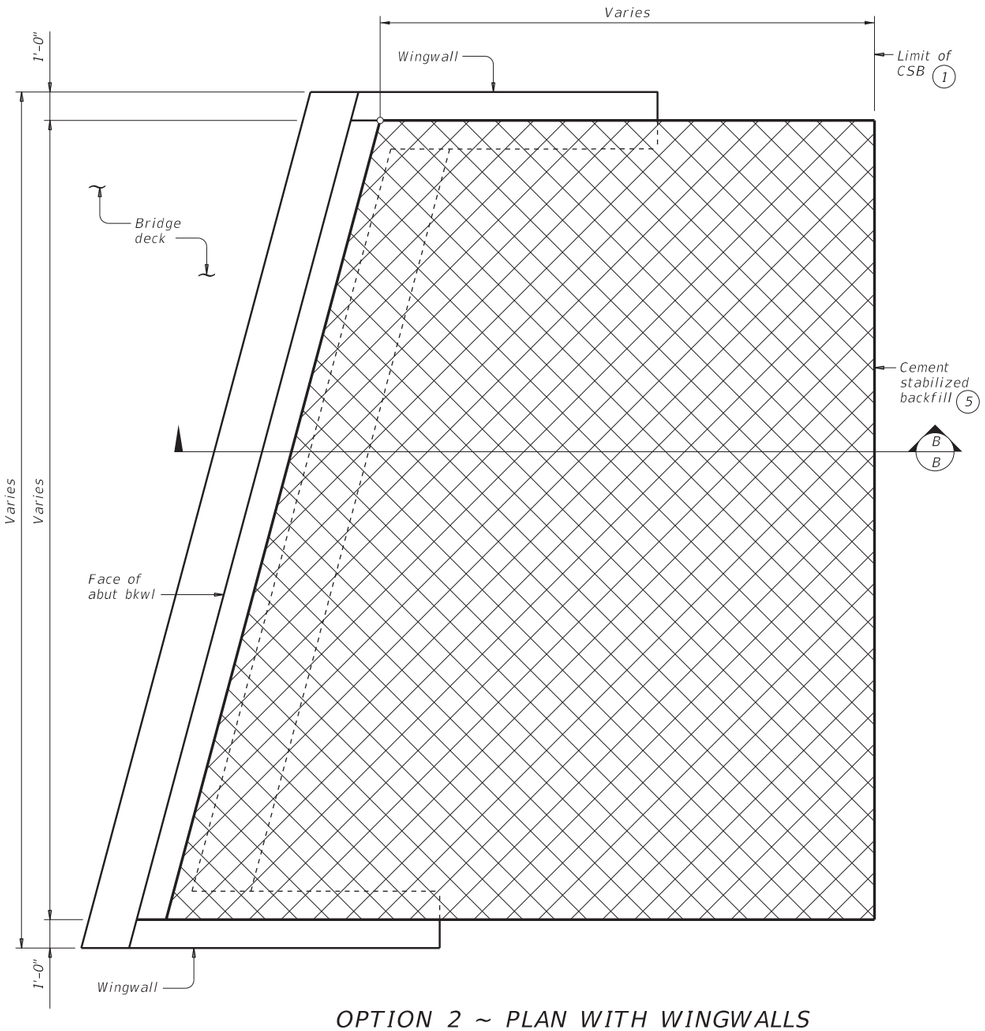
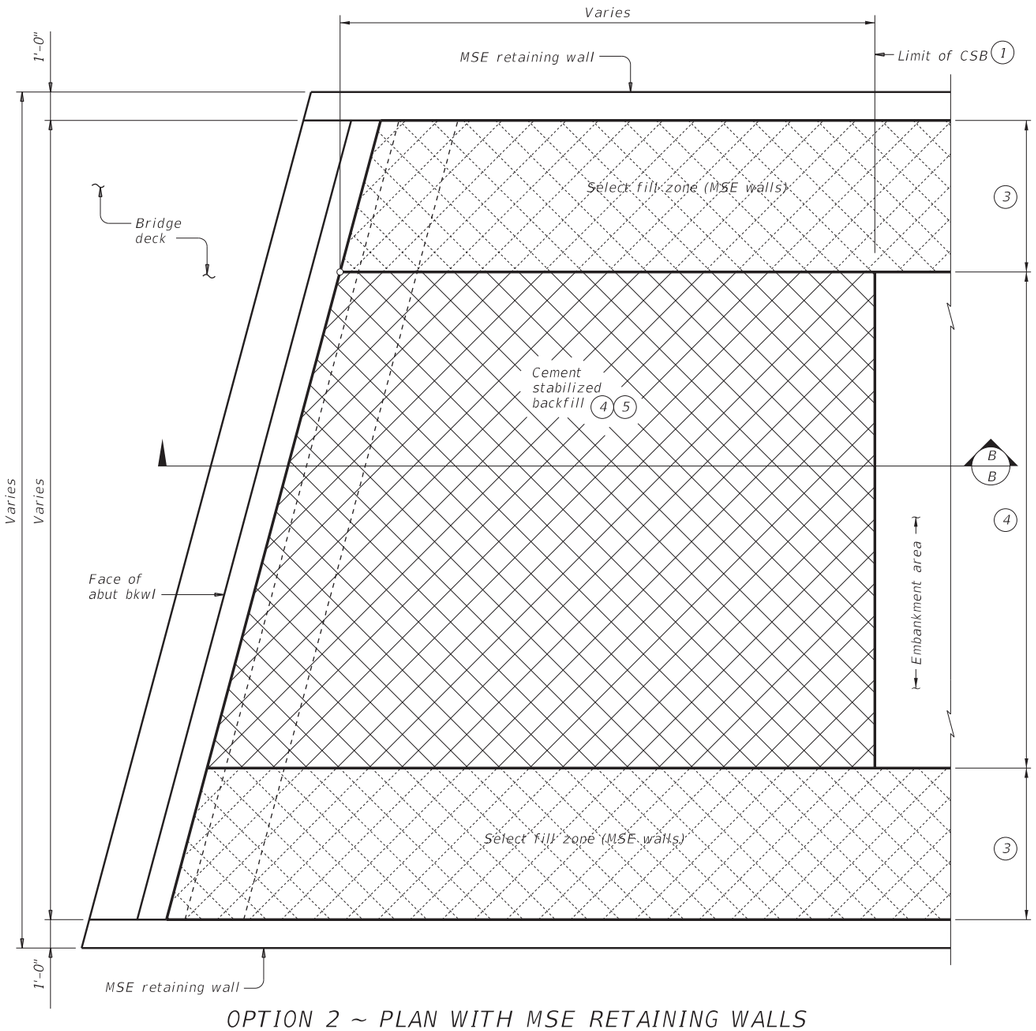


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

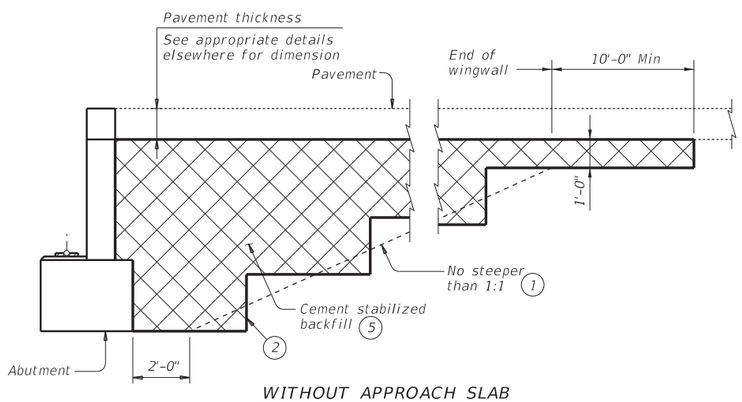
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

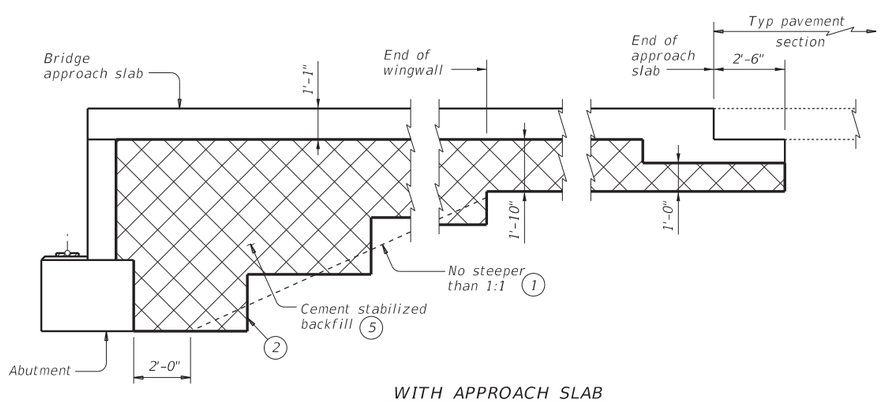
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		151

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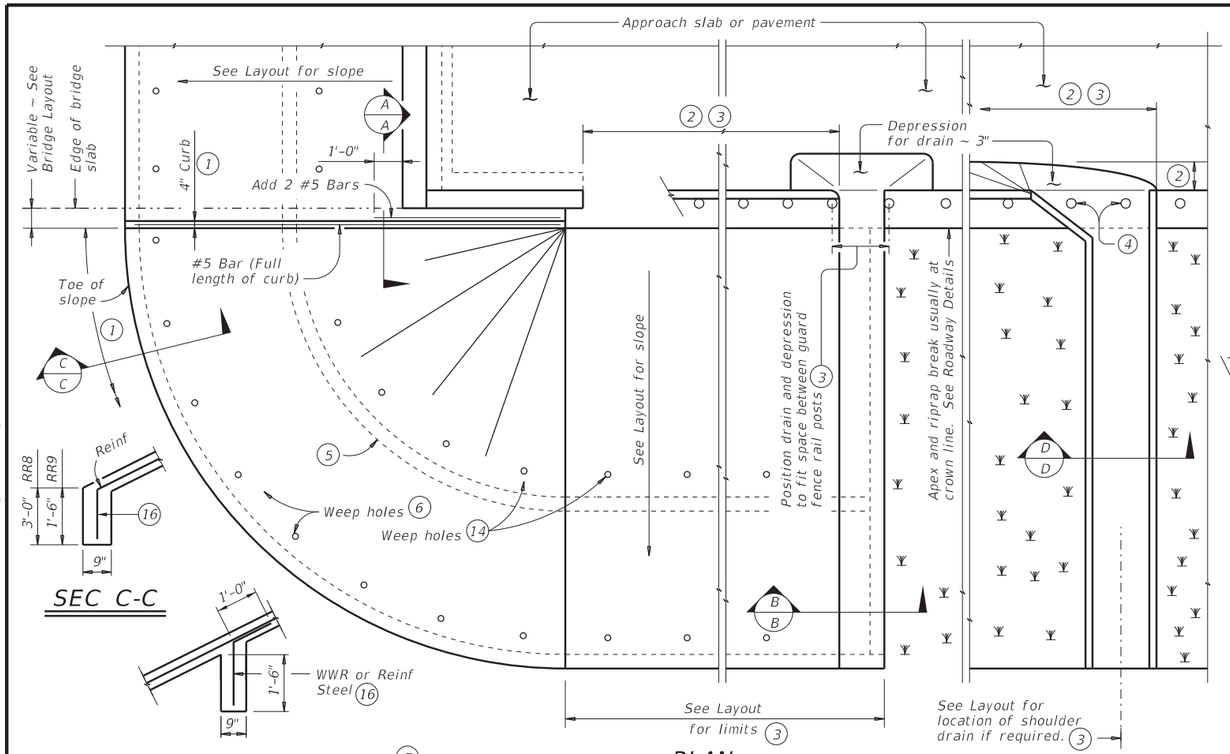
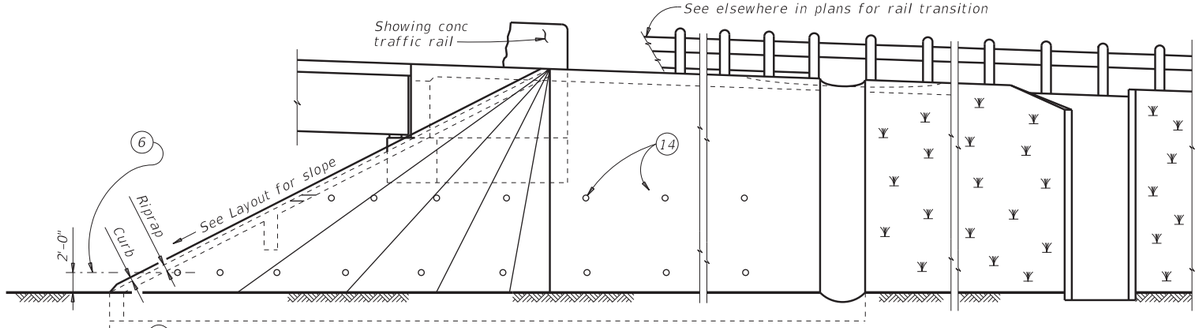


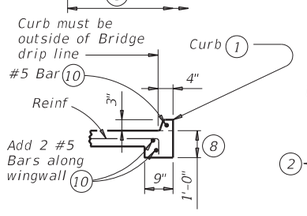
PLAN

SEC C-C

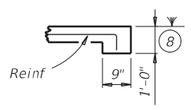
INTERMEDIATE TOEWALL (5)



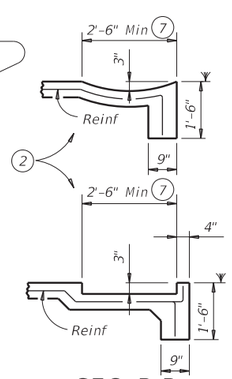
ELEVATION



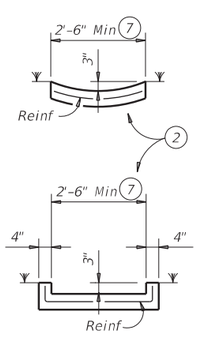
SEC A-A



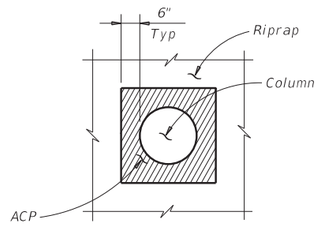
SEC B-B
(No drain)



SEC B-B
(Shoulder drain integral with riprap)

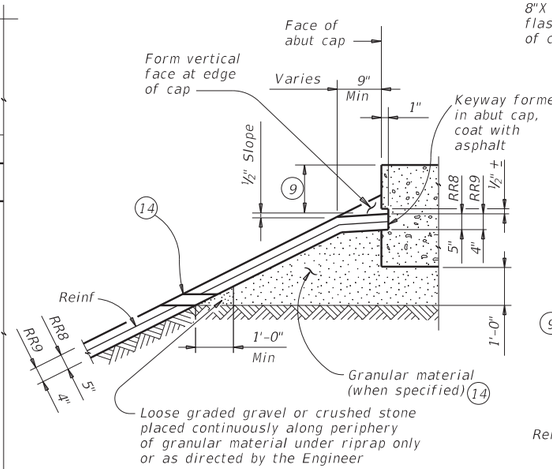


SEC D-D
(Shoulder drain)

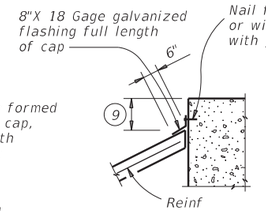


Riprap blockout to be filled with ACP. (Subsidiary to riprap)

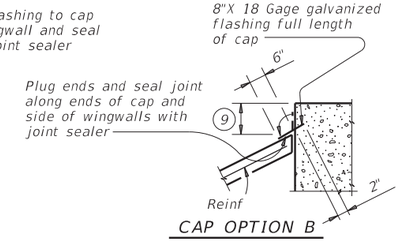
RIPRAP DETAIL AT COLUMNS
(As directed by the Engineer)



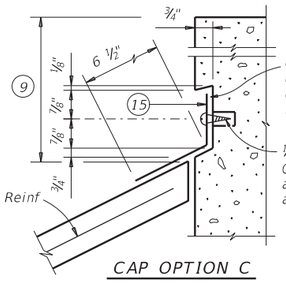
SHOWING KEYWAY OPTION



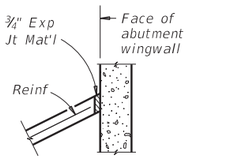
CAP OPTION A



CAP OPTION B

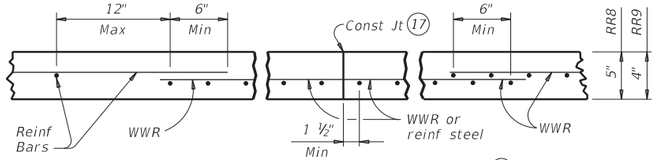


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

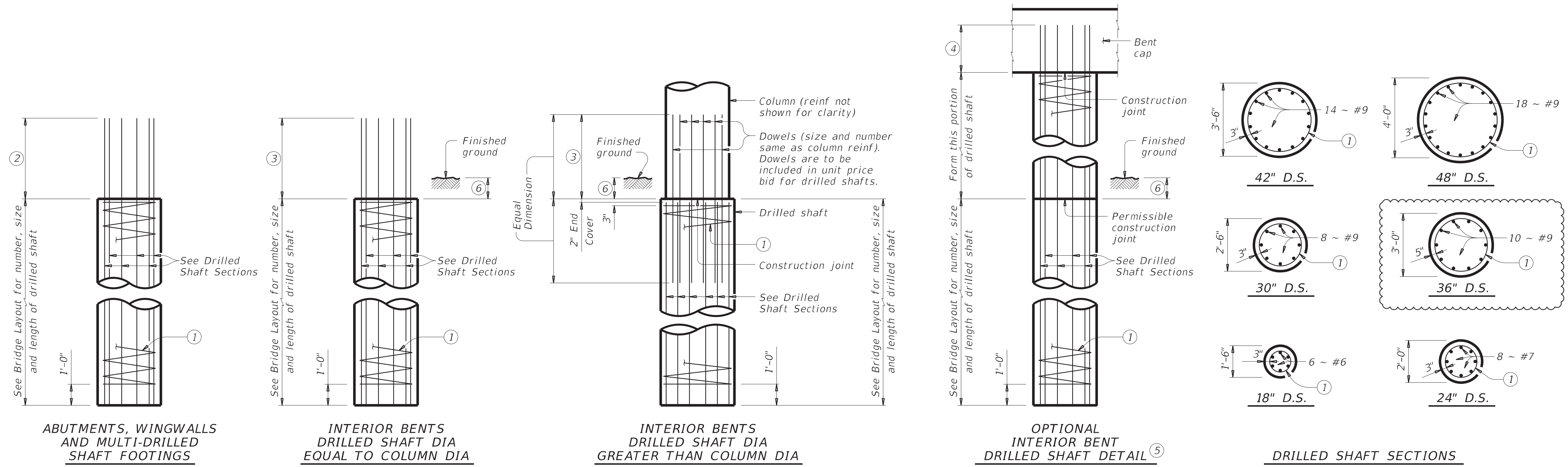
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		152



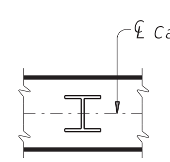
DRILLED SHAFT DETAILS

1. #3 spiral at 6" pitch (one and a half flat turns top and bottom).
2. Min extension into supported element:
   #6 Bars = 1'-11"
   #7 Bars = 2'-0"
   #9 Bars = 2'-3"
3. Min lap with column reinf:
   #7 Bars = 2'-11"
   #9 Bars = 3'-9"
   #11 Bars = 4'-8"
4. Min extension into supported element:
   #6 Bars = 1'-11"
   #7 Bars = 2'-3"
   #9 Bars = 2'-9"
5. Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
6. 1'-0" Min, unless shown otherwise on plans.
7. Or as shown on plans.

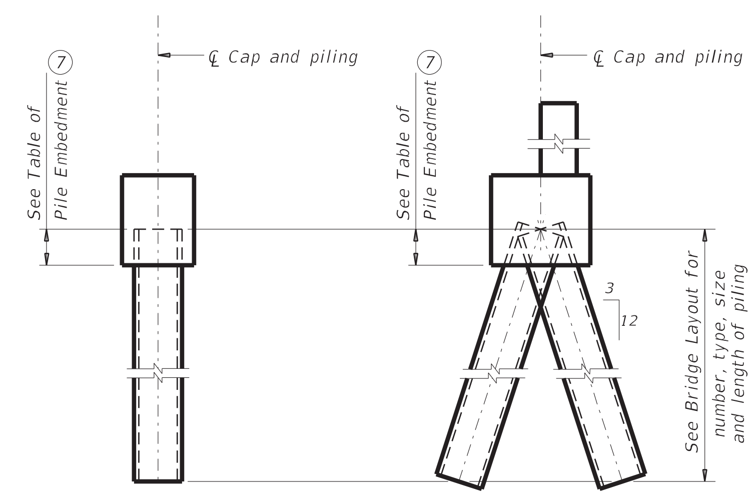
TABLE OF PILE EMBEDMENT

Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

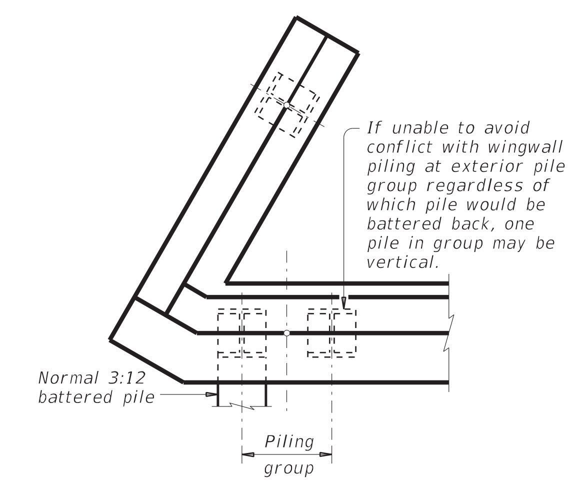


ORIENTATION OF STEEL H-PILING



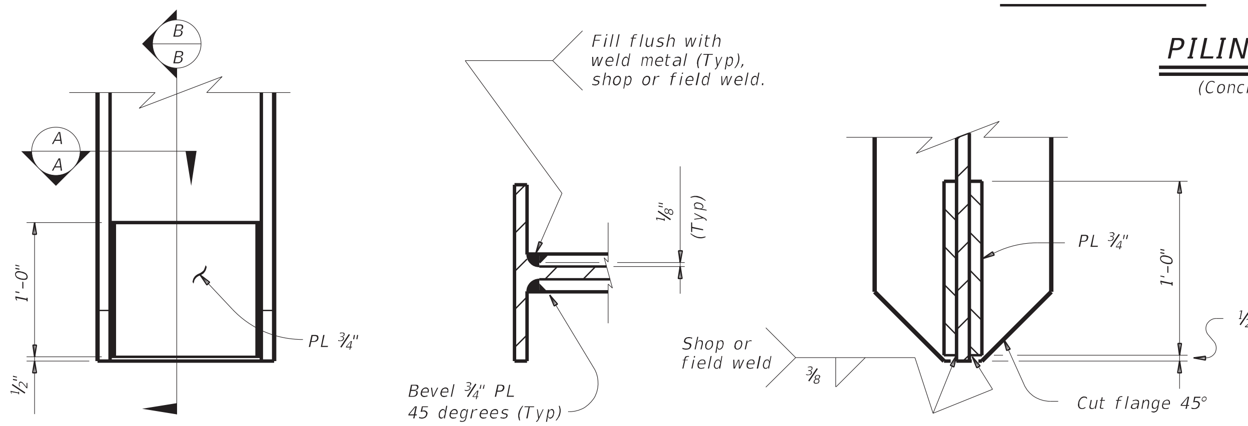
PILING DETAILS

(Concrete or steel H)



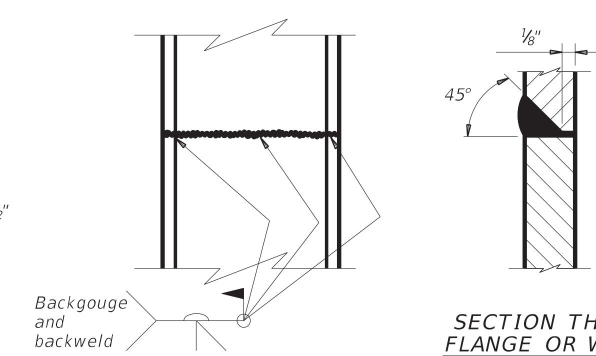
DETAIL "A"

(Showing plan view of a 30° skewed abutment)



STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



STEEL H-PILE SPLICE DETAIL

Use when required.

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

COMMON FOUNDATION DETAILS

FD (MOD)

RICARDO A. PRIETO 91123 LICENSED PROFESSIONAL ENGINEER — 11/30/2022

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	HOU		HARRIS	153

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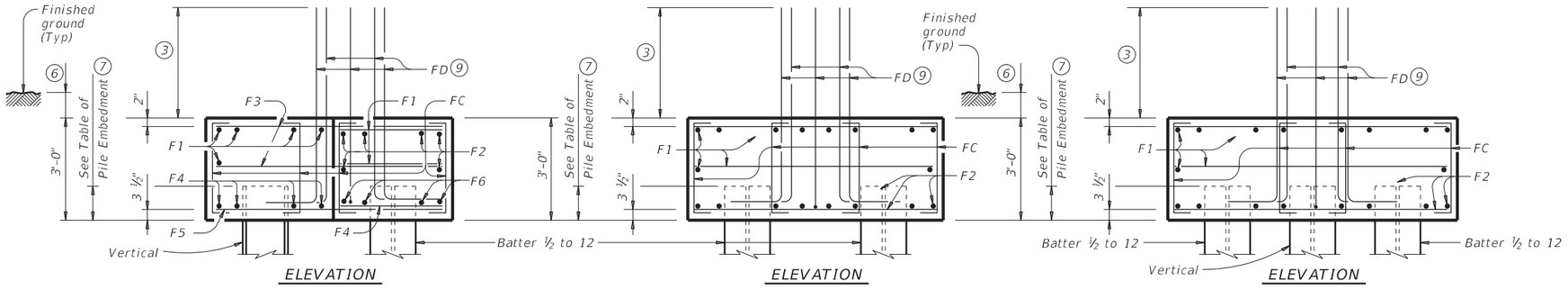
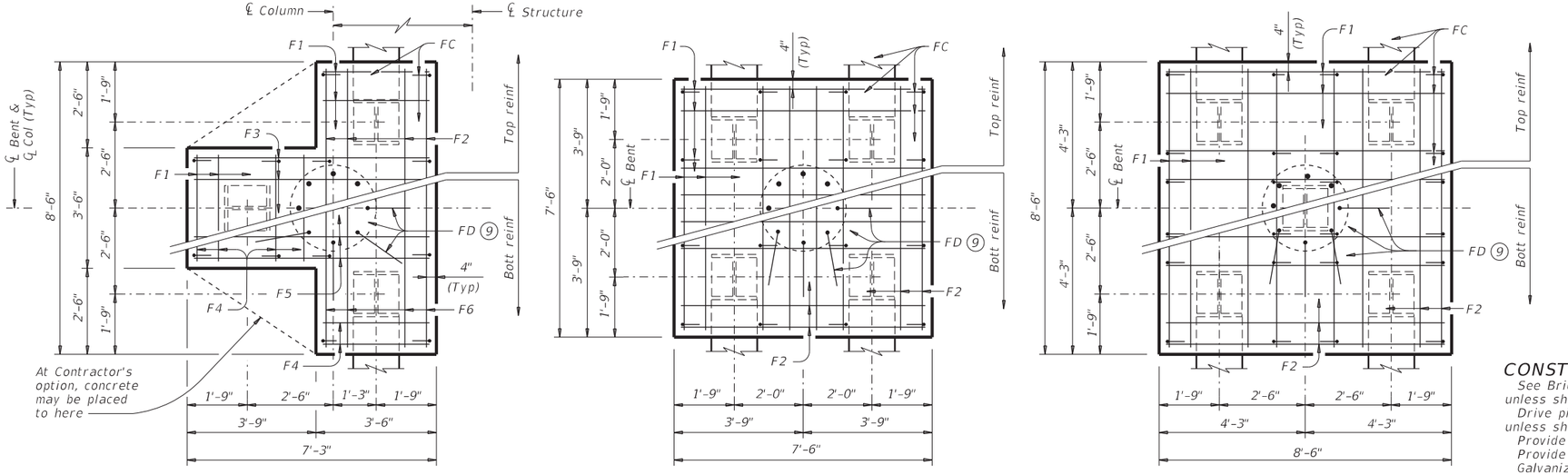




THREE PILE FOOTING (8)

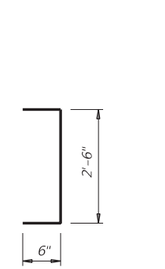
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

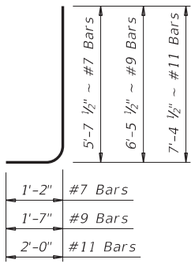
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

STATE OF TEXAS
RICARDO A. PRIETO
91123
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD (MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	HOU	HARRIS		154

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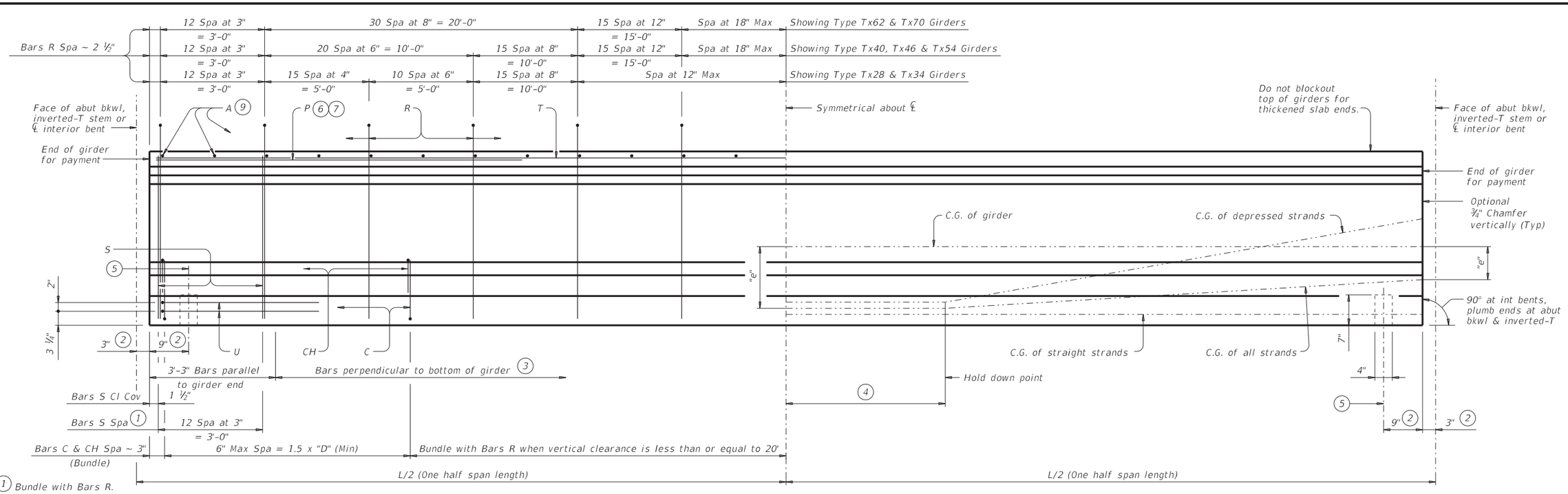


(1) Bundle with Bars R.

(2) Measured along ℄ Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.

(3) The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

(4) L/20, but not less than 5'-0" (-0,+2').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

GIRDER ELEVATION

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

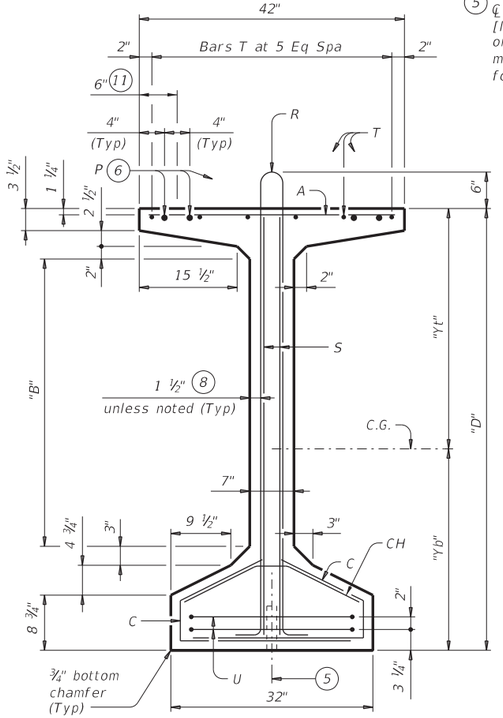
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

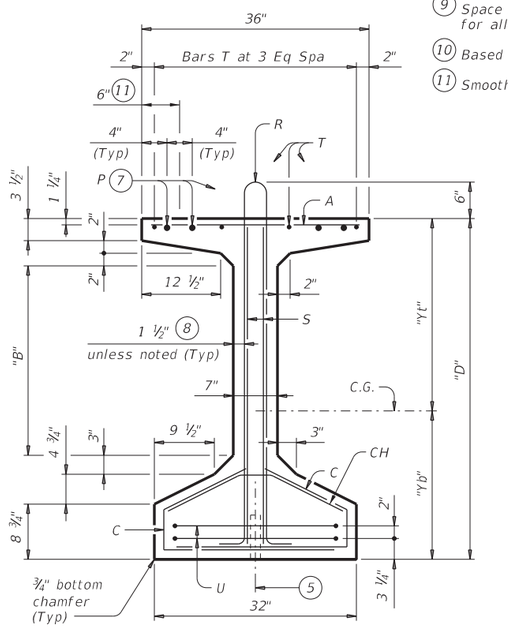
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

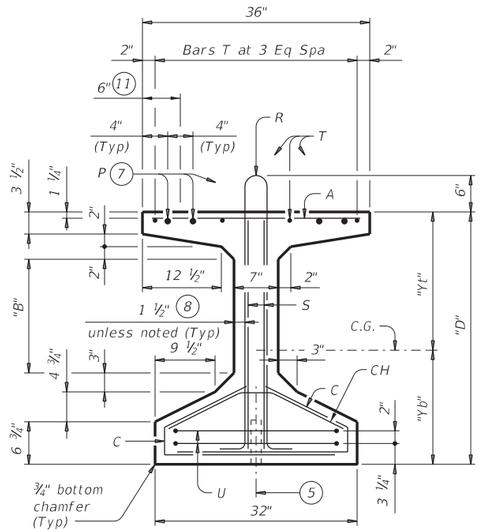
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	38.09	31.91	966	628,747	57,579	1,040

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.

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

HL93 LOADING

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PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		155

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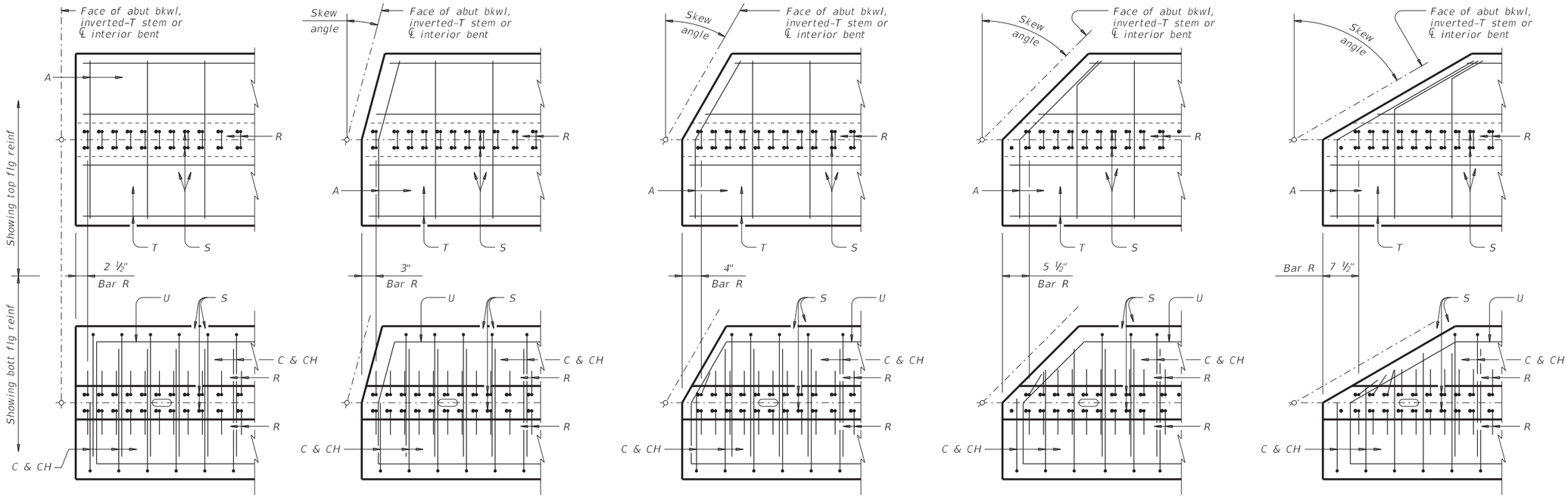
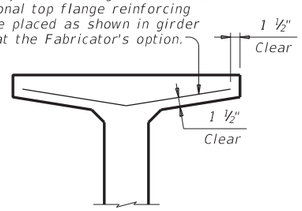
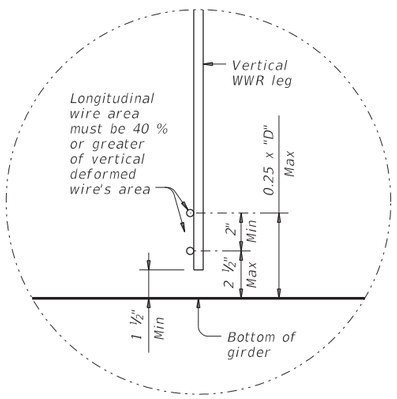


PLAN OF GIRDER ENDS (12)

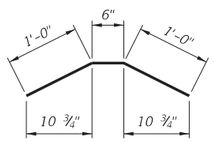
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



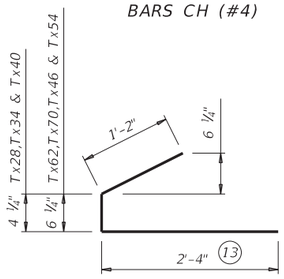
OPTIONAL TOP FLANGE REINFORCING DETAIL



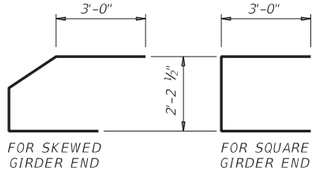
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



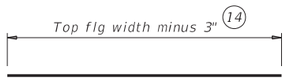
BARS CH (#4)



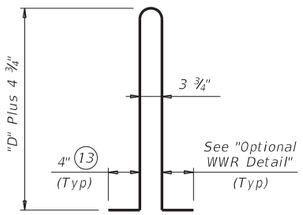
BARS C (#4)



BARS U (#5)

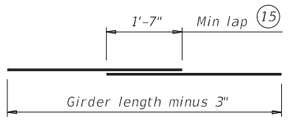


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	HOU	HARRIS		156

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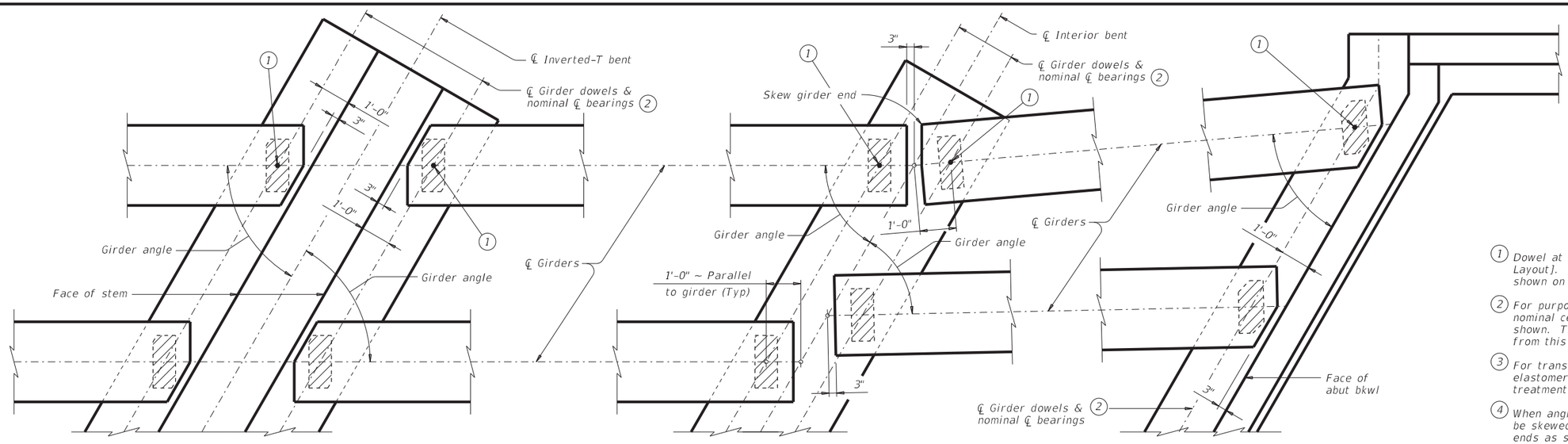


AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

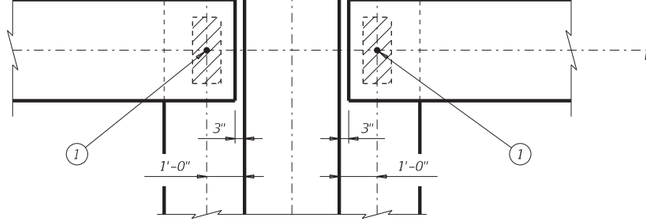
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

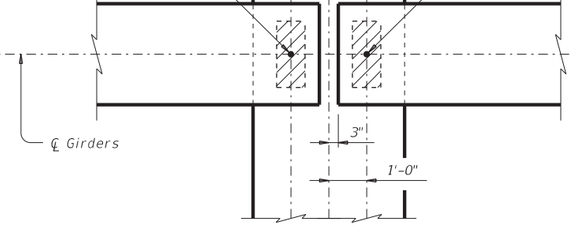
(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

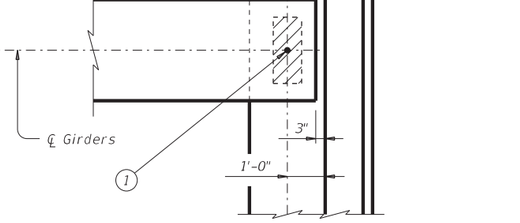
(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



AT INVERTED-T BENT

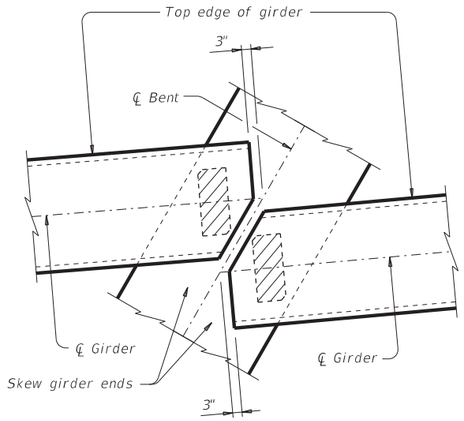


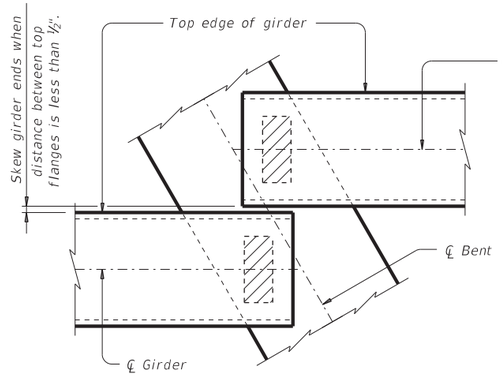
AT CONVENTIONAL INTERIOR BENT

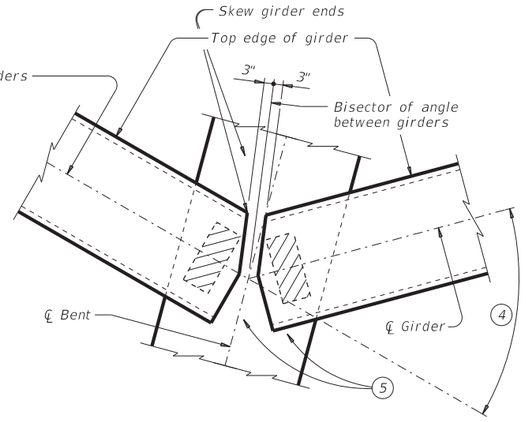


AT ABUTMENT (3)

GIRDER END DETAILS







GIRDER CONFLICT DETAILS

GENERAL NOTES:
These details accommodate skew angles up to 60°.
Shop drawings for approval are required.
A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	HOU	HARRIS		157

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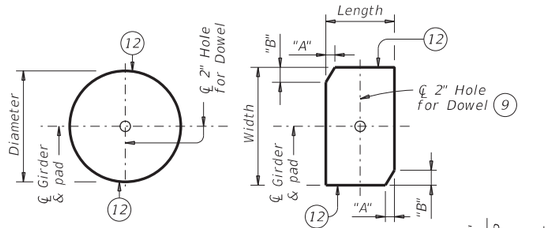
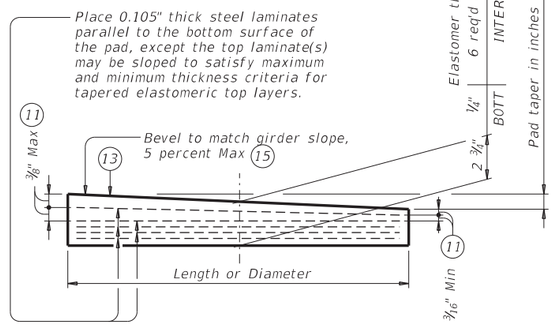


PLANS (10)



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

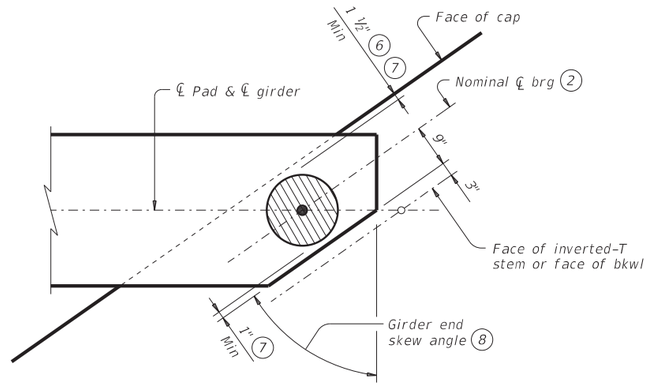
(50 DUROMETER)

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

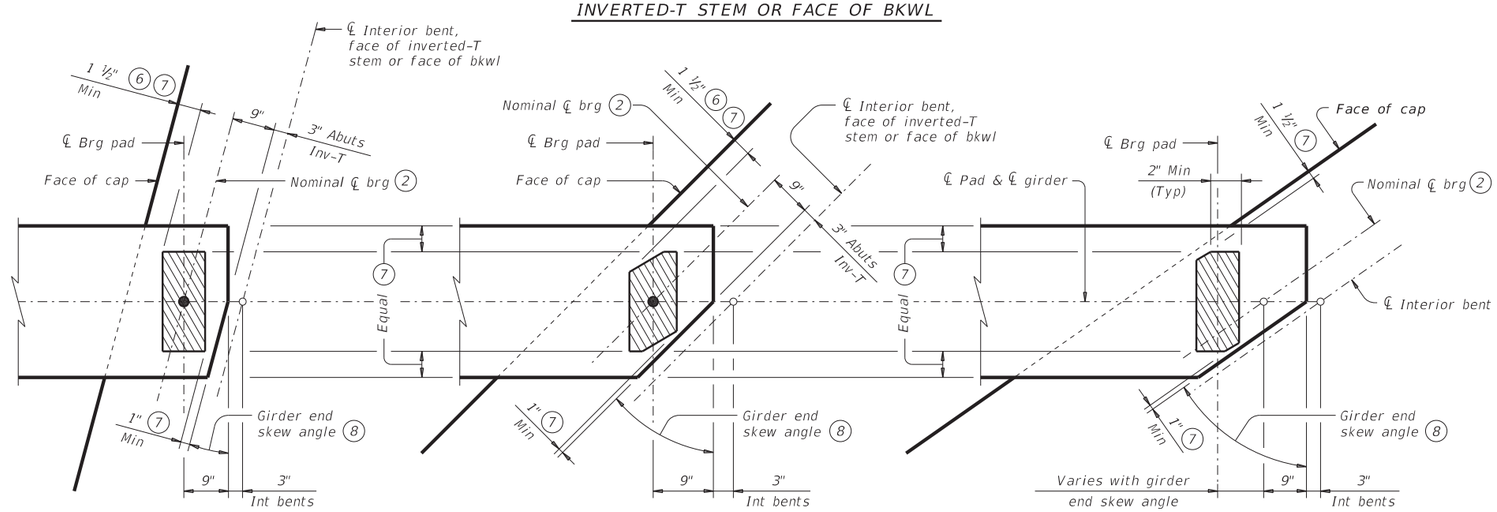
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Width	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"



ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL



SKEWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)
(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

(11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(12) Locate Permanent Mark here.

(13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

(14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.

(15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.

(16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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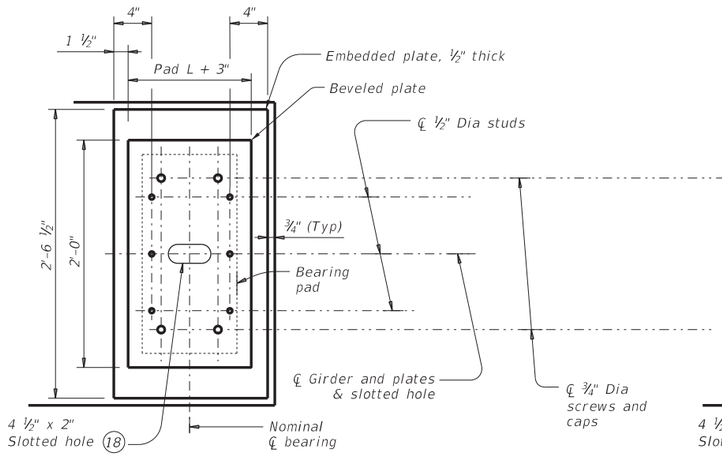
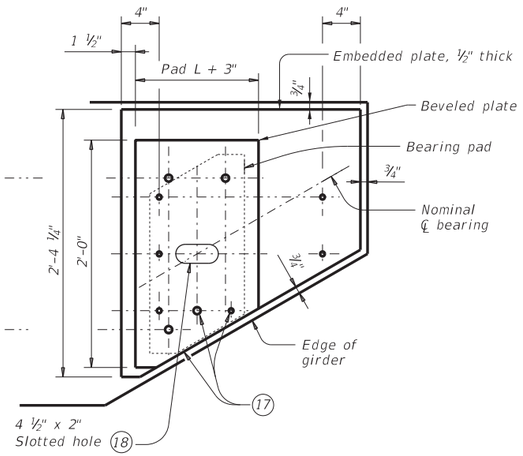
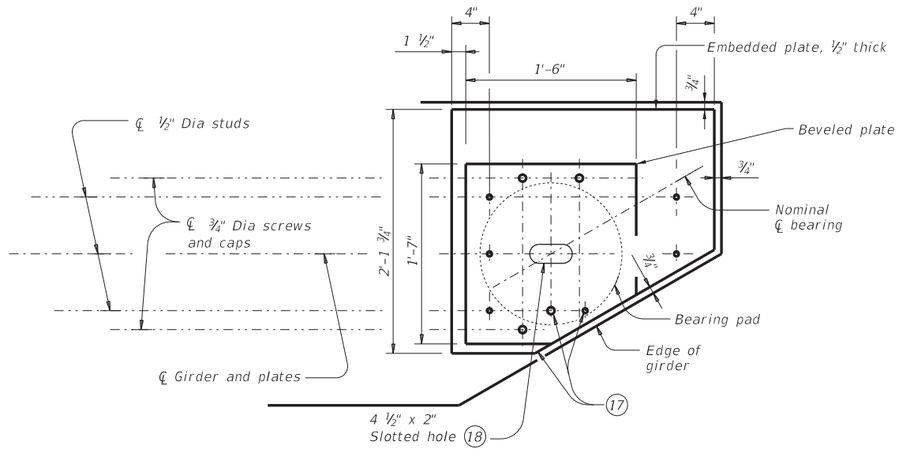


NORMAL GIRDER END
RECTANGULAR BEARING PAD

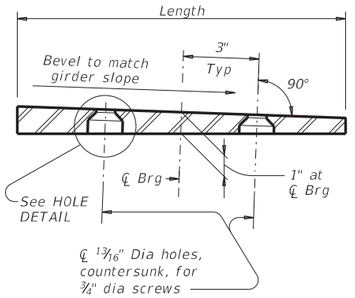


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

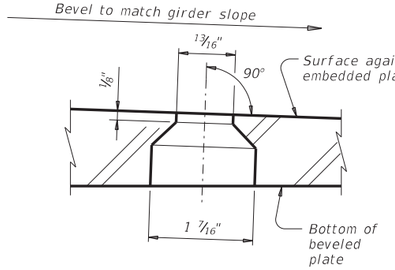


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

(17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.

(18) Slotted hole is required at doweled girder end locations.

SOLE PLATE NOTES:

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1/16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1/16"+/-, except variation from a plane parallel to the theoretical top surface can not exceed 1/16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

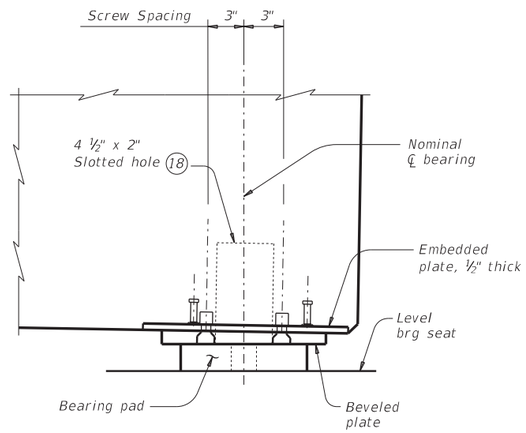
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

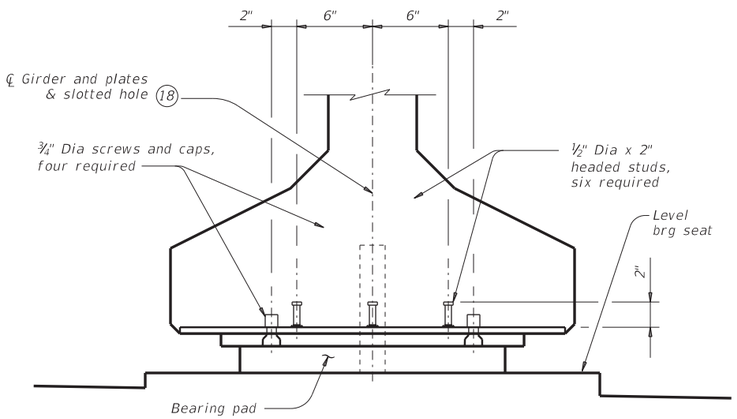
¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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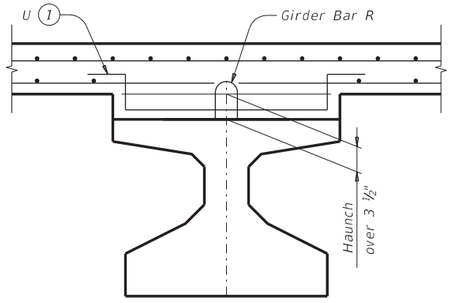
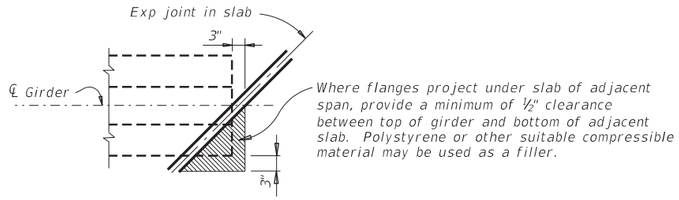
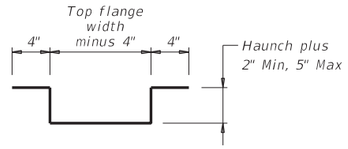


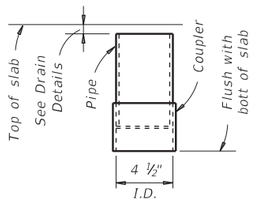
HAUNCH REINFORCING DETAIL



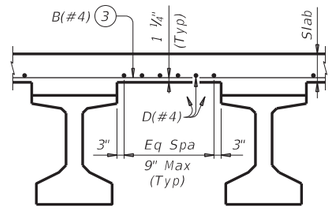
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

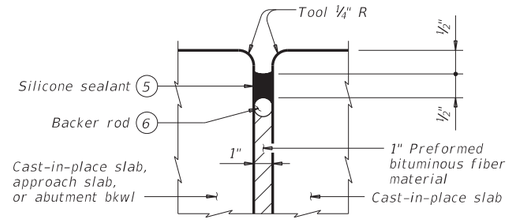


C-I-P DRAIN DETAIL (2)

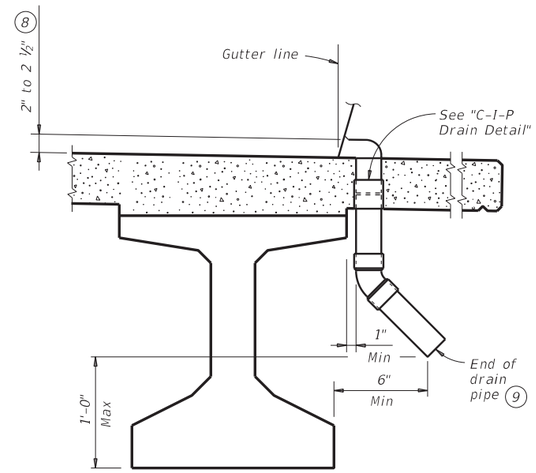


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

(2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

(4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(5) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(6) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

(10) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

DECK FORMWORK NOTES:

Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

Texas Department of Transportation

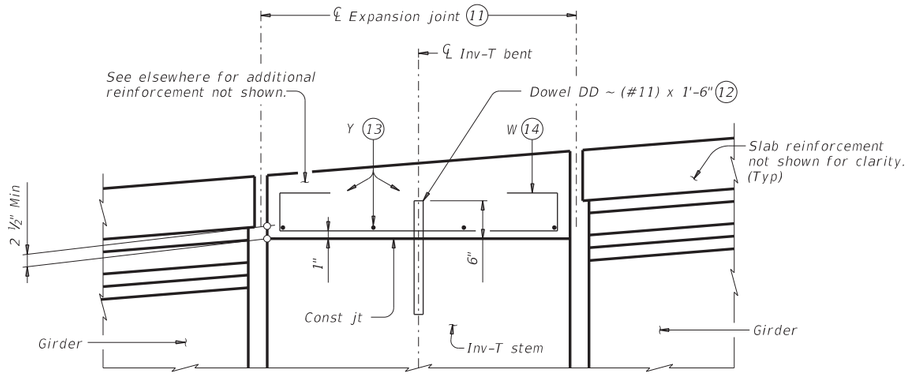
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

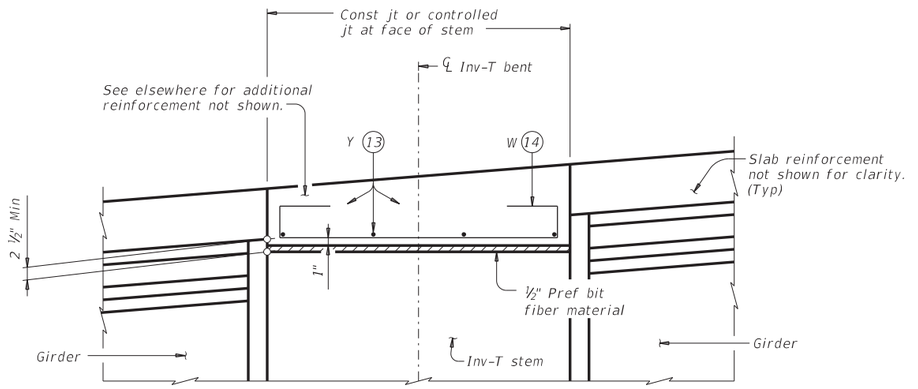
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		160

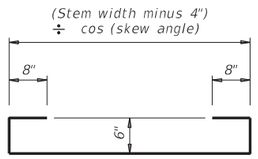


SHOWING EXPANSION JOINTS

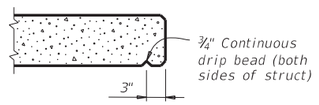


SHOWING CONST JTS OR CONTROLLED JTS

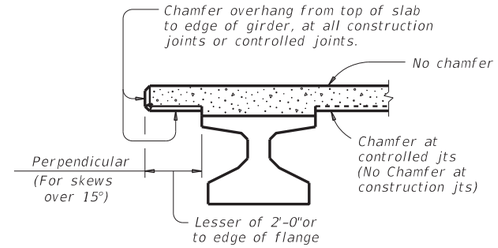
REINFORCEMENT OVER INV-T BENTS



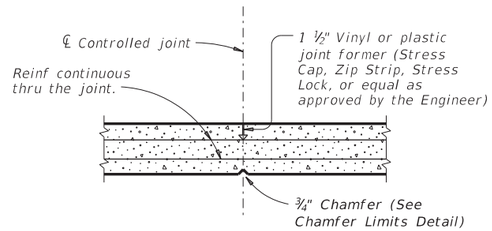
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

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SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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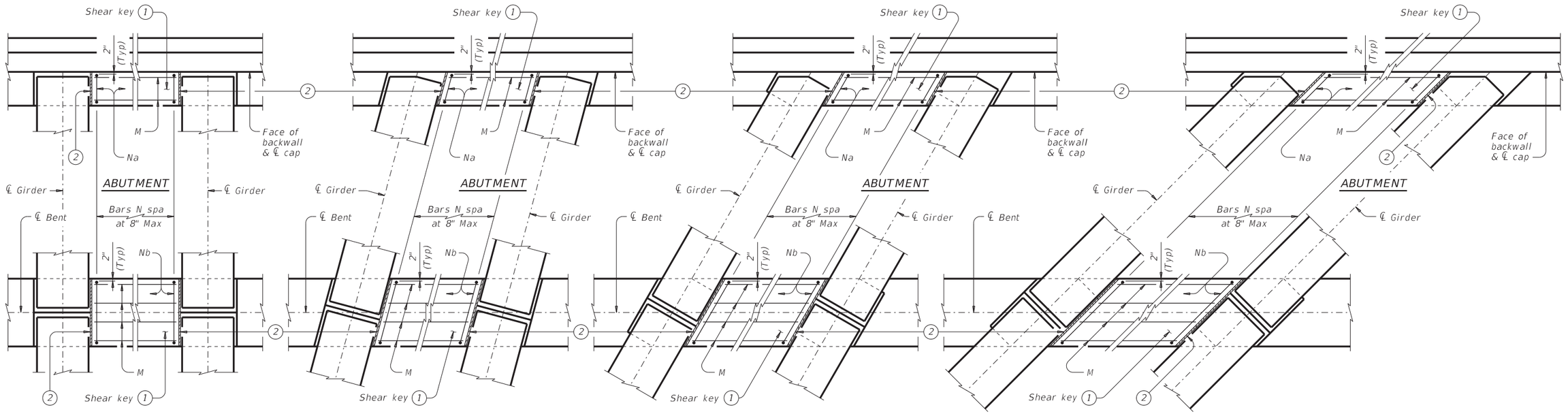


PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 30° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 45° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

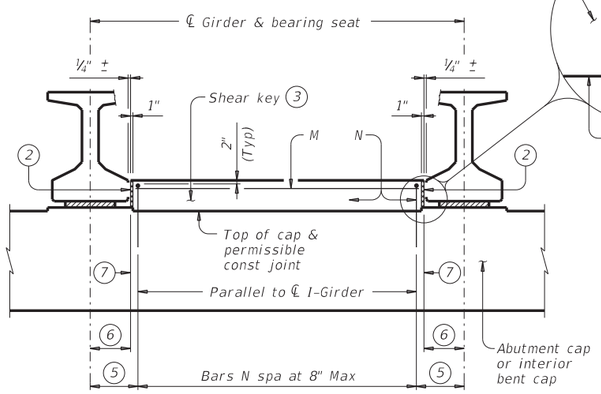
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

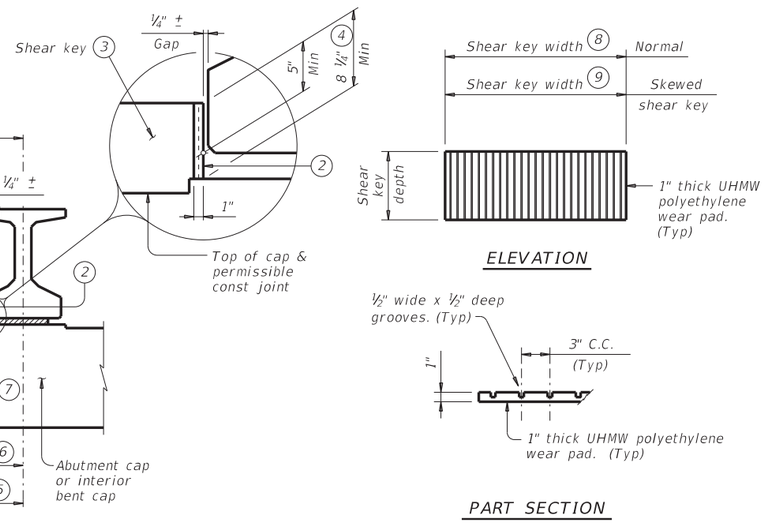
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

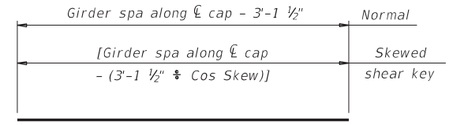


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

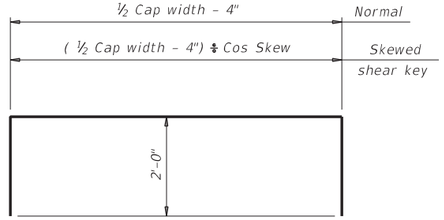
Showing shear key with girder Type Tx46.
Other I-Girder types similar.



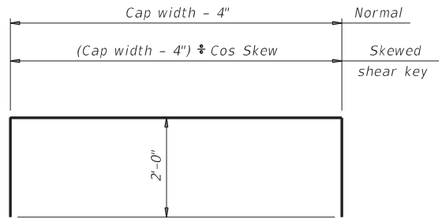
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

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©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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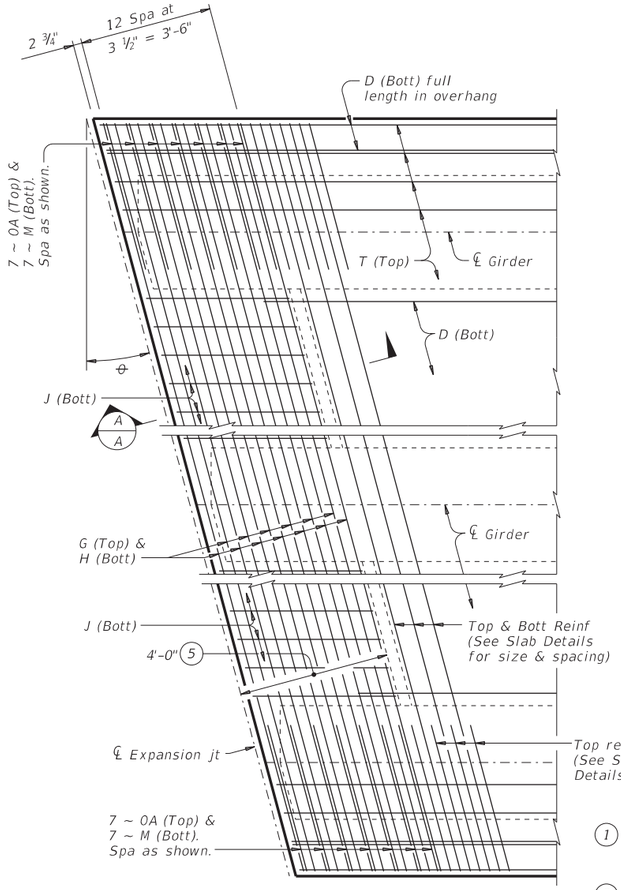
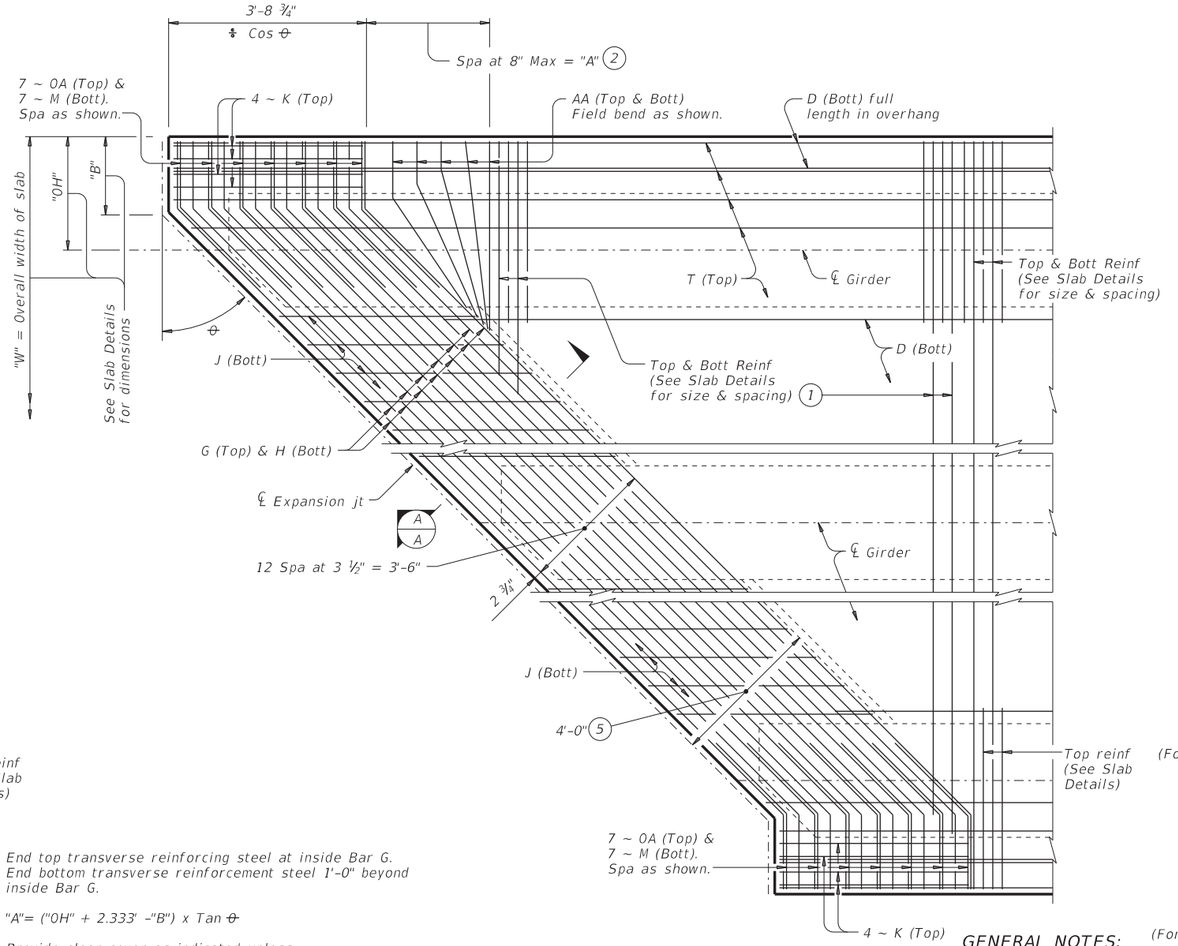


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

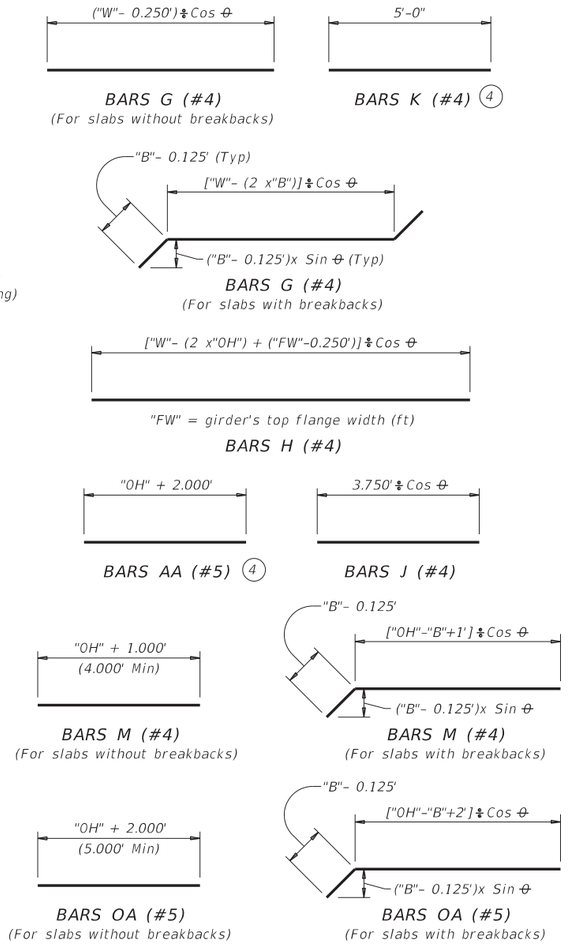
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 2.333' -"B") x Tan θ

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

(5) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



GENERAL NOTES:

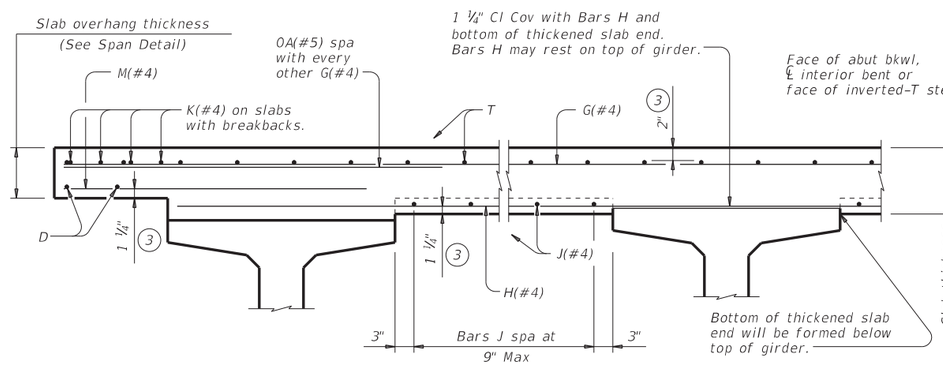
Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

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

HL93 LOADING

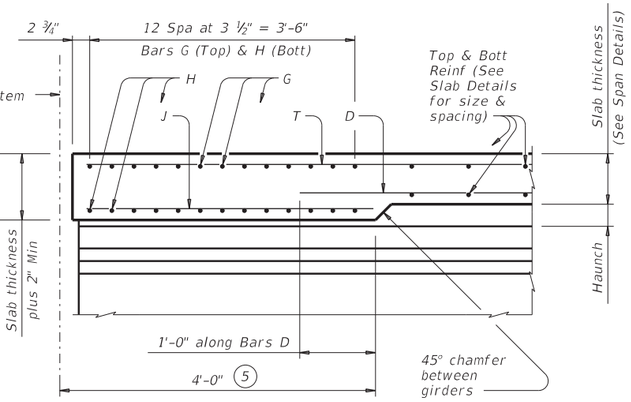


2" AND MORE OF HAUNCH

LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

Texas Department of Transportation

Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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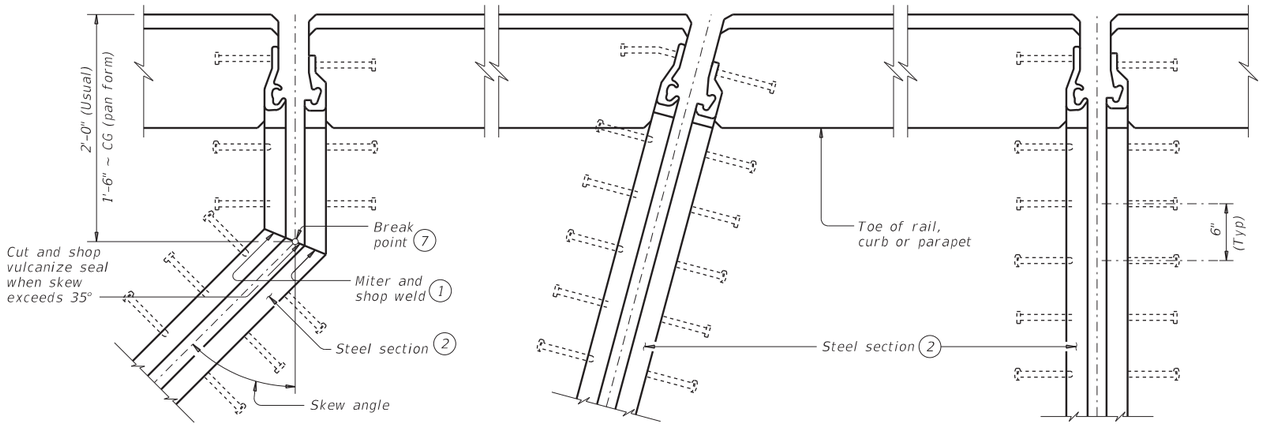
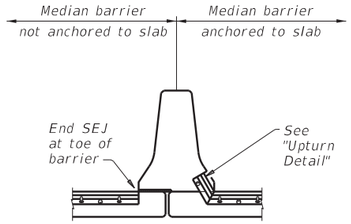
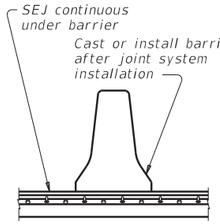


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

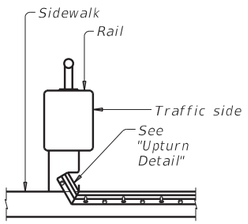
PLANS OF END CONDITIONS



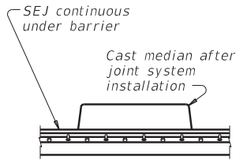
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



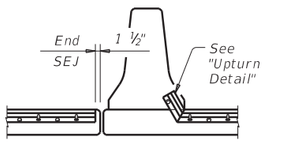
AT MEDIAN BARRIER



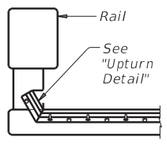
AT SIDEWALK BEHIND BRIDGE RAIL



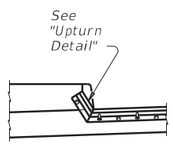
AT RAISED MEDIAN



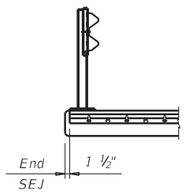
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

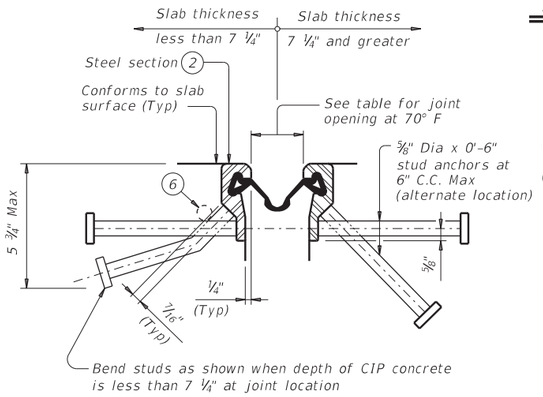


AT SIDEWALK

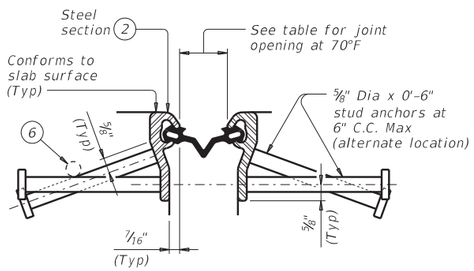


AT STEEL POST BRIDGE RAIL

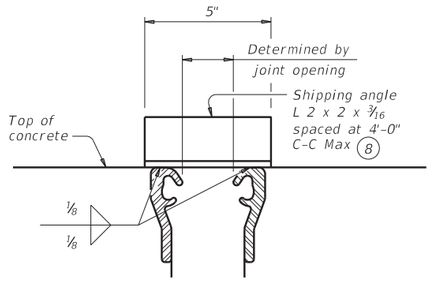
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

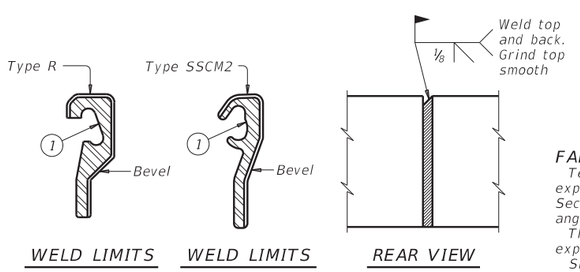
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

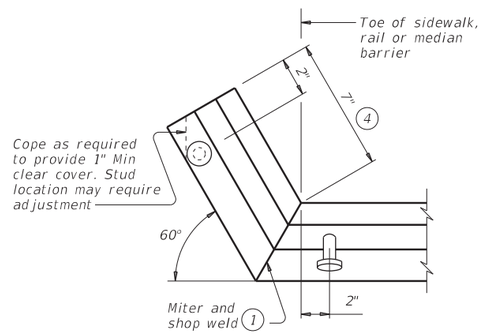
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		164

DATE: 11/30/2022 11:47:29 AM
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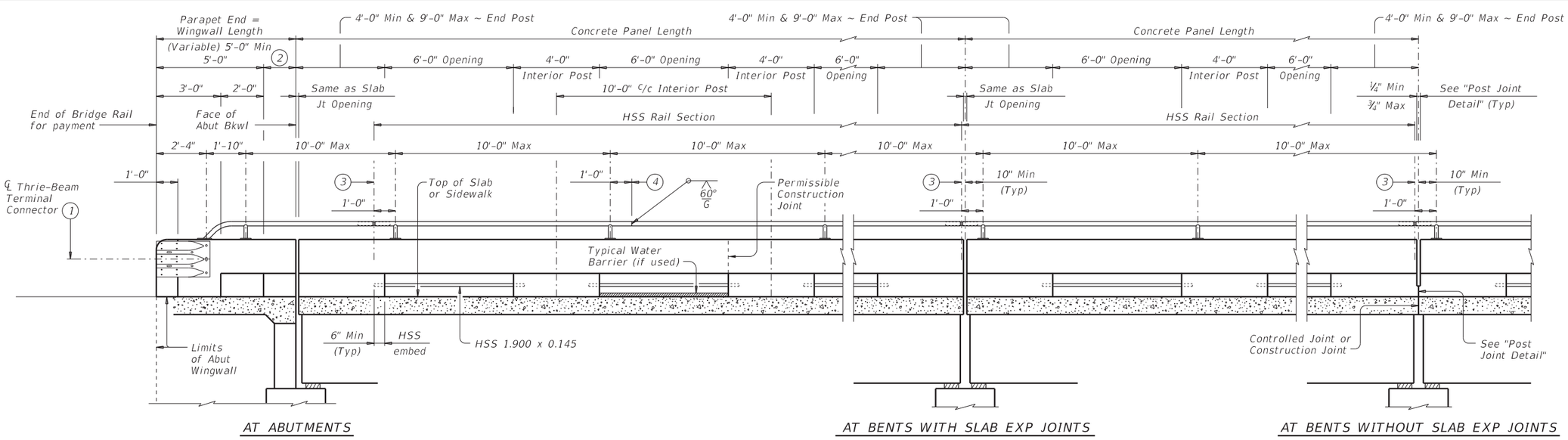
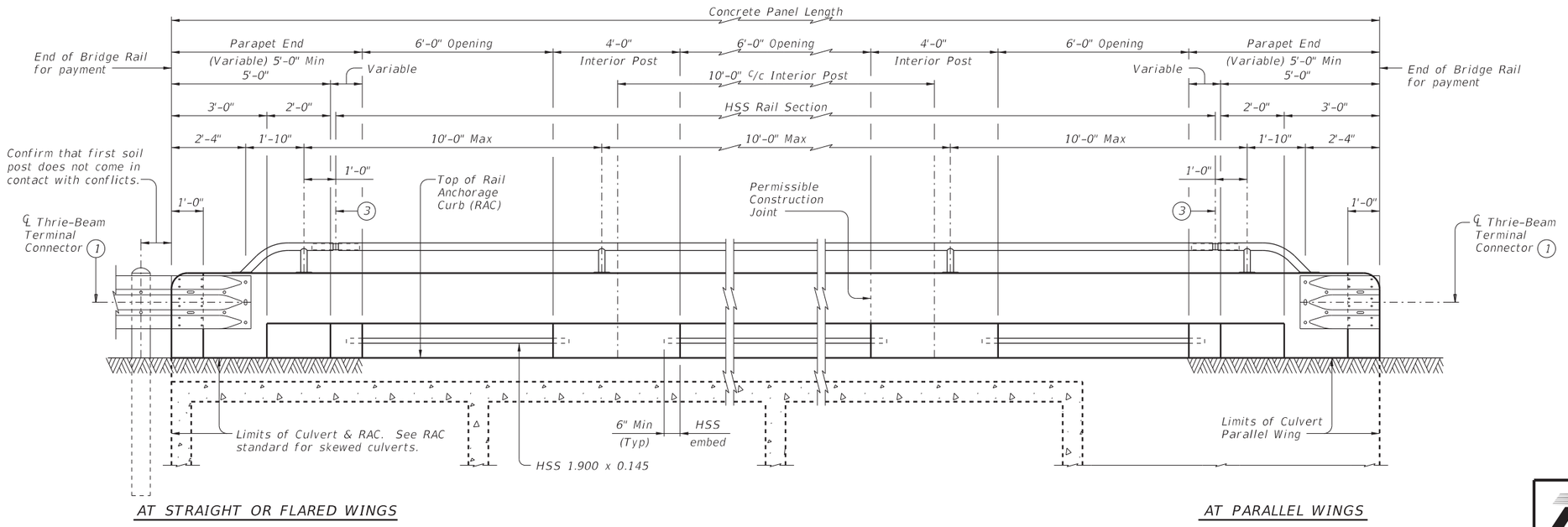


ROADWAY ELEVATION OF RAIL ON BRIDGE

(Showing without raised sidewalk)



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) ℄ Splice Jt or Exp Jt

(4) One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

SHEET 1 OF 4

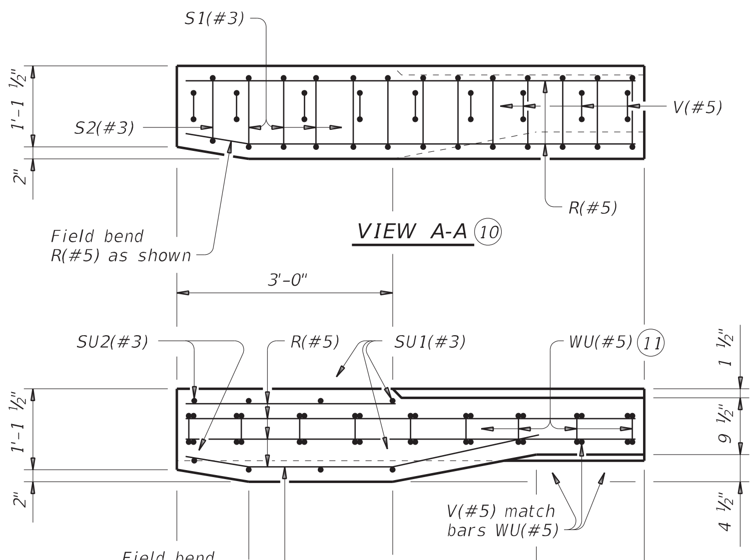
Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

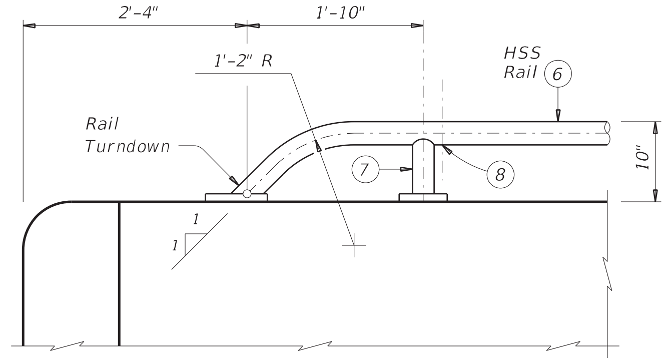
TYPE C223

FILE: ristd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		165



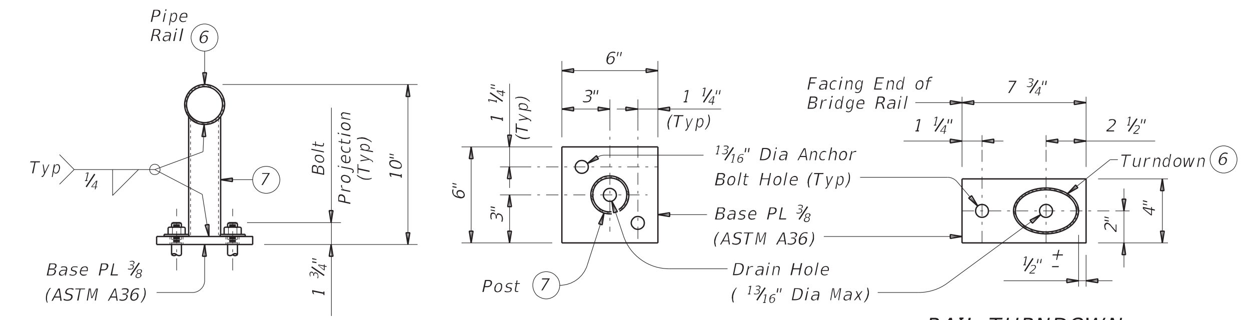
VIEW A-A 10

SECTION B-B



Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

HSS RAIL TERMINAL DETAIL

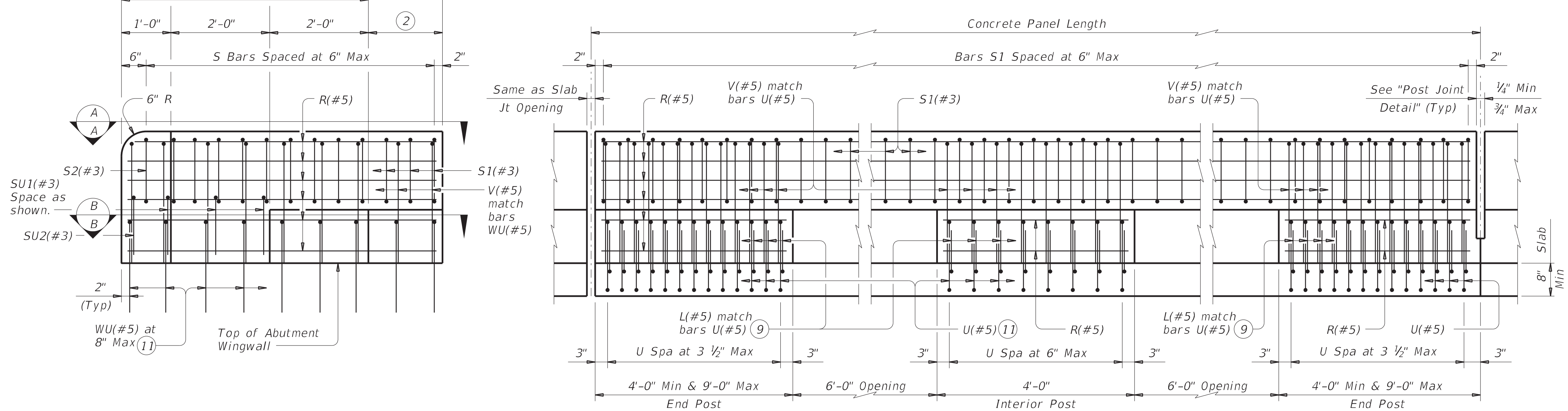


TRANSVERSE SECTION

POST BASE PLATE PLAN

RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL DETAILS



PARAPET END AT ABUT WINGWALL 11

AT BENTS WITH SLAB EXP JOINTS

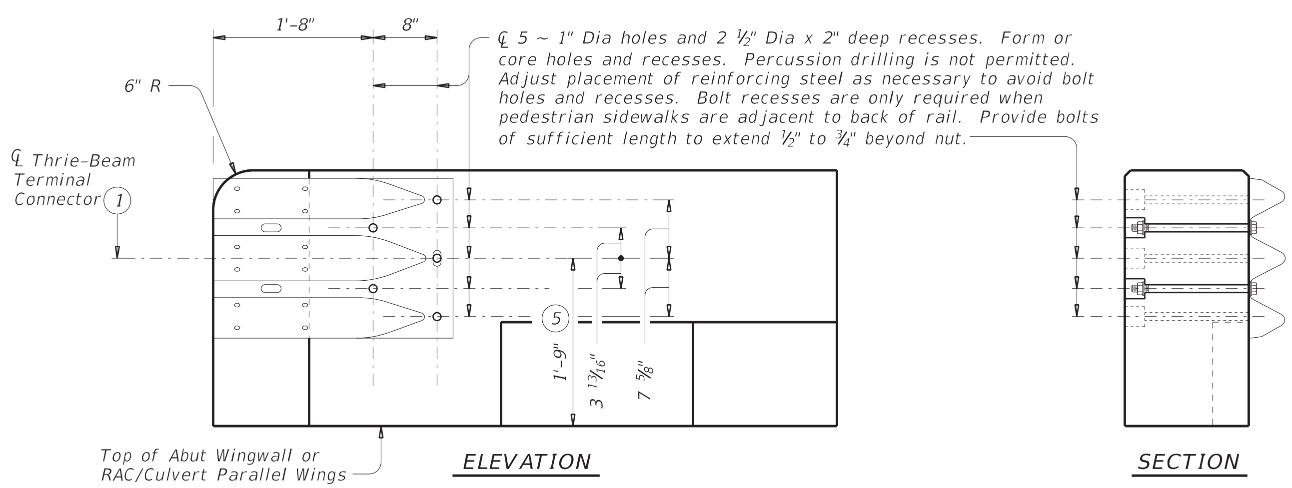
AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab and without raised sidewalk. Rail on box culvert similar. HSS not shown for clarity.

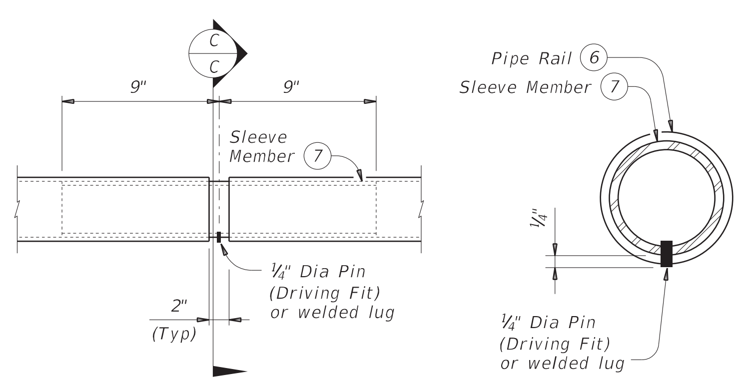
1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Wingwall Length minus 5'-0" (Varies)
5. Increase 2" for structures with overlay.
6. HSS 2.875 x 0.203
7. HSS 2.375 x 0.154
8. ⅜" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)
9. Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
10. Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
11. Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.



ELEVATION

SECTION

TERMINAL CONNECTION DETAILS



AT SPLICE OR EXP JTS

SECTION C-C

PIPE SPLICE DETAILS

SHEET 2 OF 4

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT 0912	SECT 72	JOB 406	HIGHWAY CS
REVISIONS	DIST HOU	COUNTY HARRIS		SHEET NO. 166

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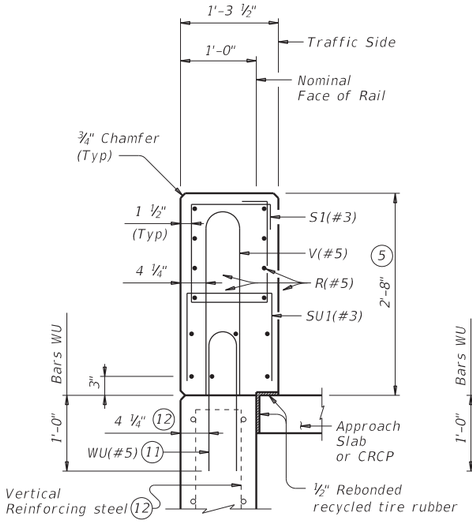
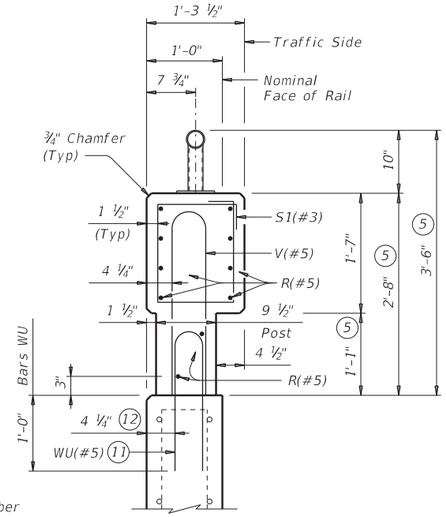
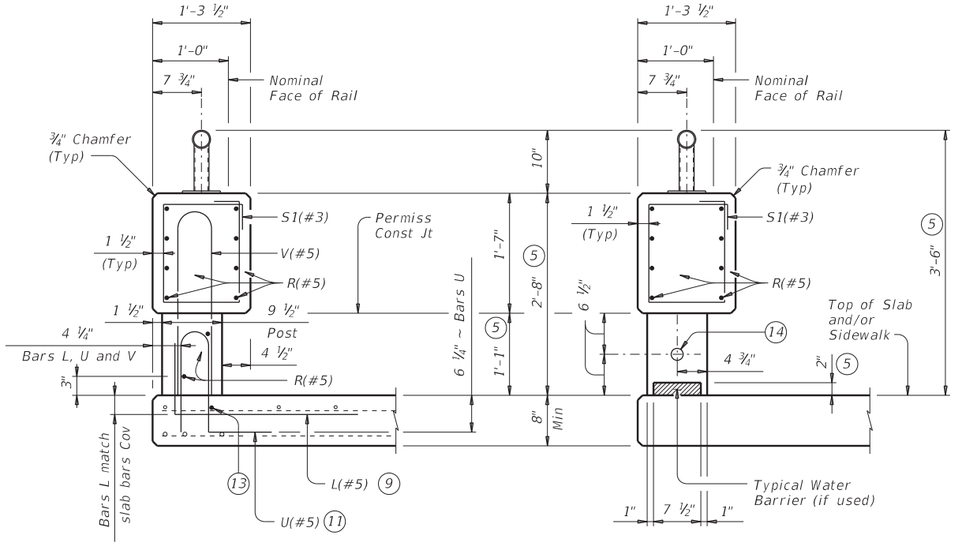


SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

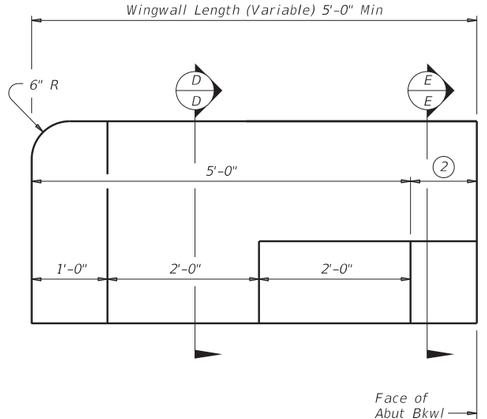


SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

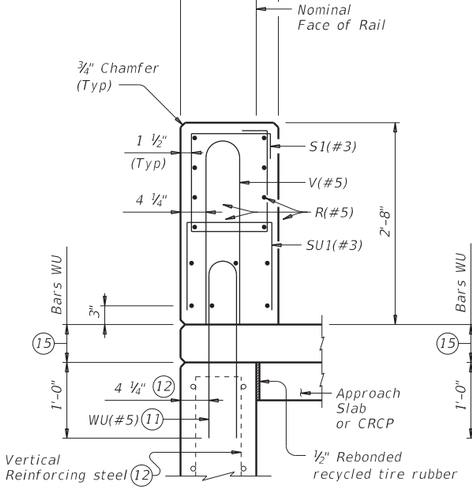


ELEVATION AT
ABUTMENT WINGWALL

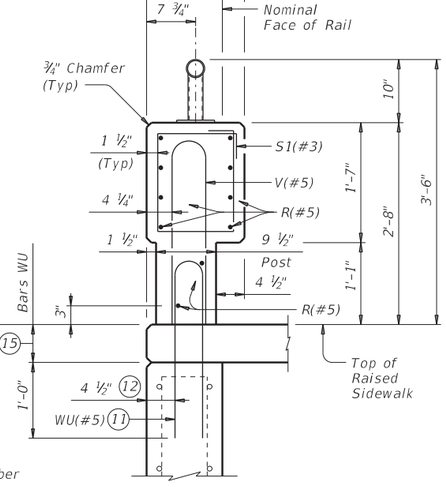
Box culvert parallel wings or rail anchorage curb similar.
HSS rail not shown for clarity.

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

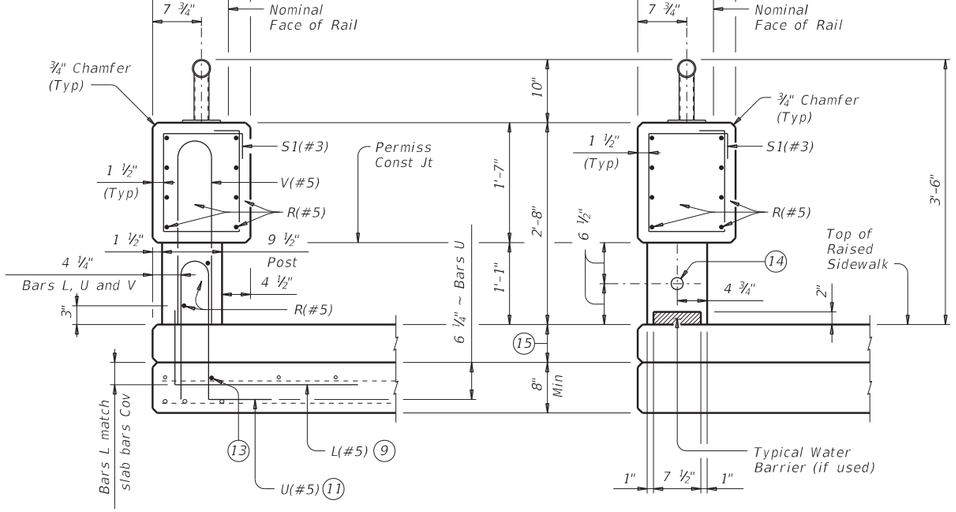
Sections on box culvert similar.



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

POST JOINT DETAIL

(Showing without raised sidewalk)
Provide at all interior bents without slab expansion joints.

SECTIONS THRU RAIL WITH RAISED SIDEWALK

Sections on box culvert similar.

(2) Wingwall Length minus 5'-0" (Varies)

(5) Increase 2" for structures with overlay.

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(12) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(13) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(14) HSS 1.900 x 0.145

(15) Raised Sidewalk.

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		167

DATE: 11/30/2022 11:47:57 AM
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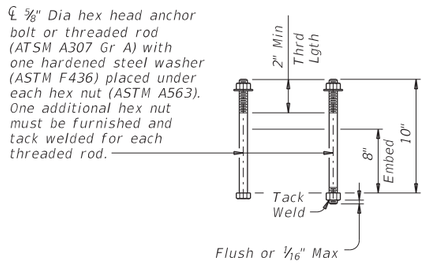
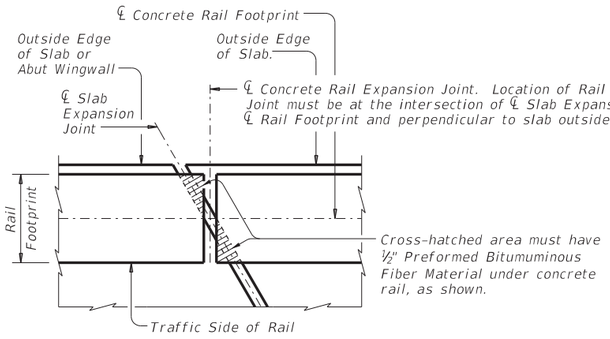
RAIL DATA FOR HORIZONTAL CURVES

	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius



CAST-IN-PLACE ANCHOR BOLT OPTIONS (16)



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

(5) Increase 2" for structures with overlay.

(16) See "Material Notes" for anchor bolt information.

(17) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

(18) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway/sidewalk surface without overlay.

CONSTRUCTION NOTES:

Face of rail, posts and parapet must be vertical transversely unless otherwise approved by the Engineer. HSS rail posts and opening end faces must be perpendicular to top of adjacent concrete parapet grade. Use epoxy mortar under HSS rail post base plates if gaps larger than 1/16" exist.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

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.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes".

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Provide ASTM A1085, A500 Gr B 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 gavanizing, 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.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 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".

Optional cast-in-place anchor bolts must be ⅝" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows: Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

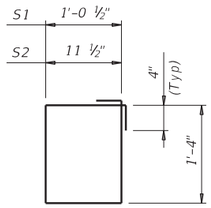
Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

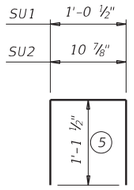
Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay:
370 plf total
358 plf (Conc)
12 plf (Steel)

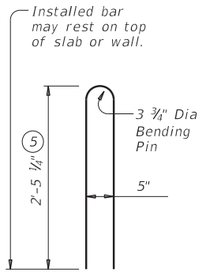
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



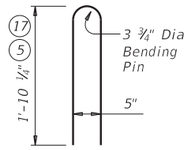
BARS S (#3)



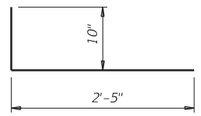
BARS SU (#3)



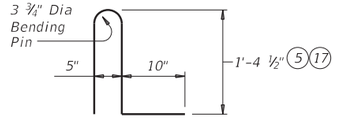
BARS V (#5) (18)



BARS WU (#5)



BARS L (#5)



BARS U (#5) (18)

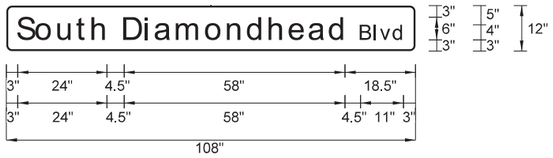
SHEET 4 OF 4

Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		168



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PANEL STYLE: D3-IG

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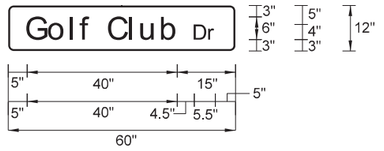
TH=0.5"



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BORDER
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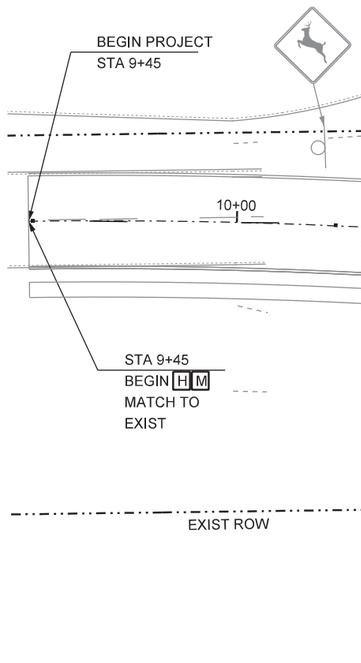
SIGN DETAILS



LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/6/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

NOTES:

1. COORDINATE REMOVAL OF EXISTING SIGNS WITH THE VARIOUS TCP PHASES. EXISTING SIGNS ARE TO REMAIN IN PLACE DURING TCP PHASE I UNLESS NOTED OTHERWISE. REFER TO TCP LAYOUTS.
2. PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND CAN BE ADJUSTED TO ACCOMMODATE SITE CONDITIONS AS APPROVED.
3. CONSTRUCT SIGNS IN ACCORDANCE WITH DETAILS FOUND IN TMUTCD & "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITION.
4. SPEED TO BE DETERMINED BY THE ENGINEER WITH CONCURRENCE OF THE HARRIS COUNTY PUBLIC INFRASTRUCTURE DIVISION, TRAFFIC ENGINEERING GROUP AND PRECINCT REPRESENTATIVES IN A WRITTEN RECOMMENDATION PURSUANT TO A ROAD TEST.

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT
BEGIN PROJECT TO STA 14+50

SHEET 1 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	169

STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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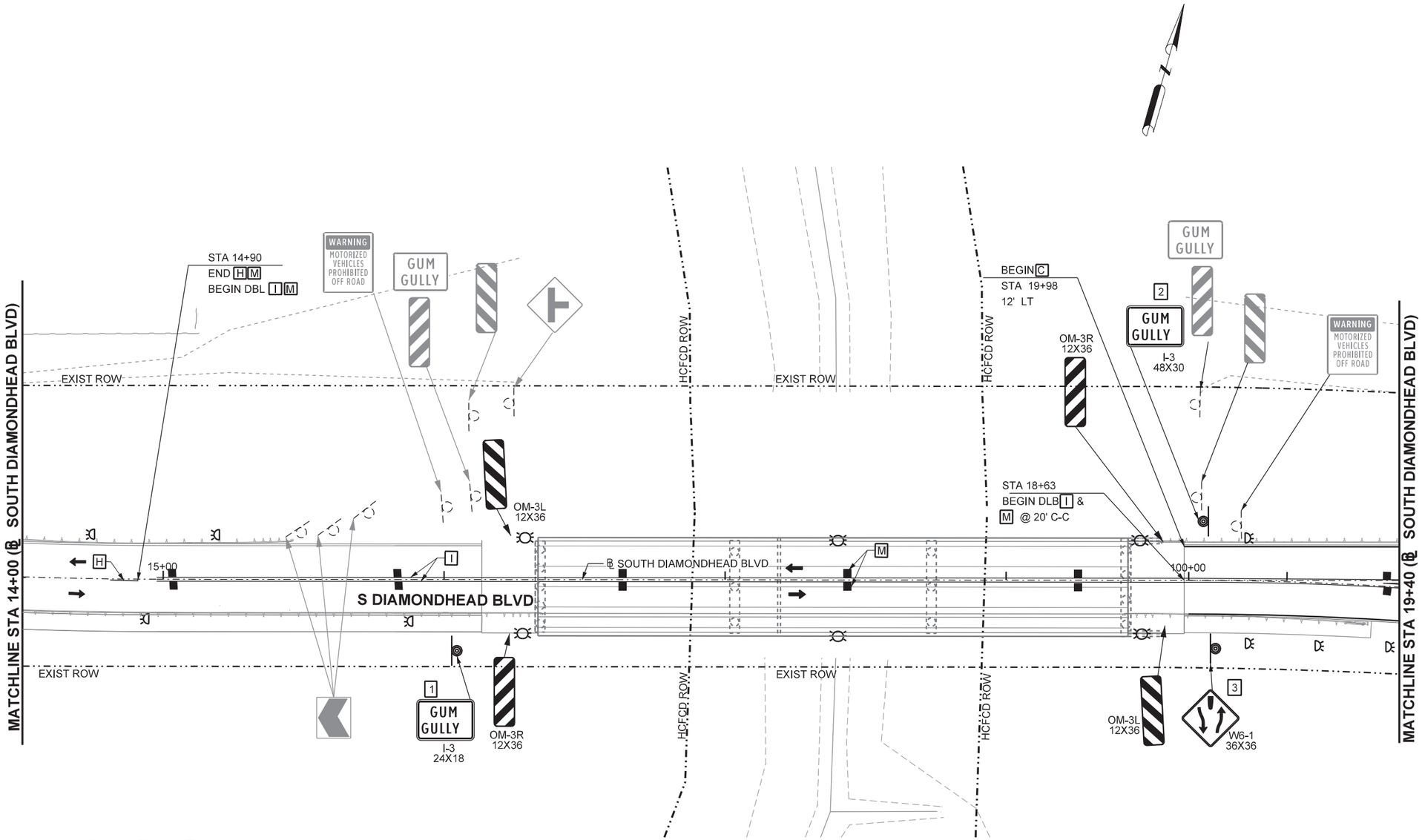

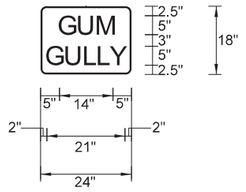

WHITE ON GREEN
FONT: CLEARVIEW HWY-3-W
PANEL STYLE; 1-3
BORDER
R = 1.5"
TH = 0.5"

SIGN DETAILS

NOTES:

1. COORDINATE REMOVAL OF EXISTING SIGNS WITH THE VARIOUS TCP PHASES. EXISTING SIGNS ARE TO REMAIN IN PLACE DURING TCP PHASE I UNLESS NOTED OTHERWISE. REFER TO TCP LAYOUTS.
2. PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND CAN BE ADJUSTED TO ACCOMMODATE SITE CONDITIONS AS APPROVED.
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LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20' 40'
SCALE: 1" = 40'

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT STA 14+50 TO STA 19+40

SHEET 2 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		170
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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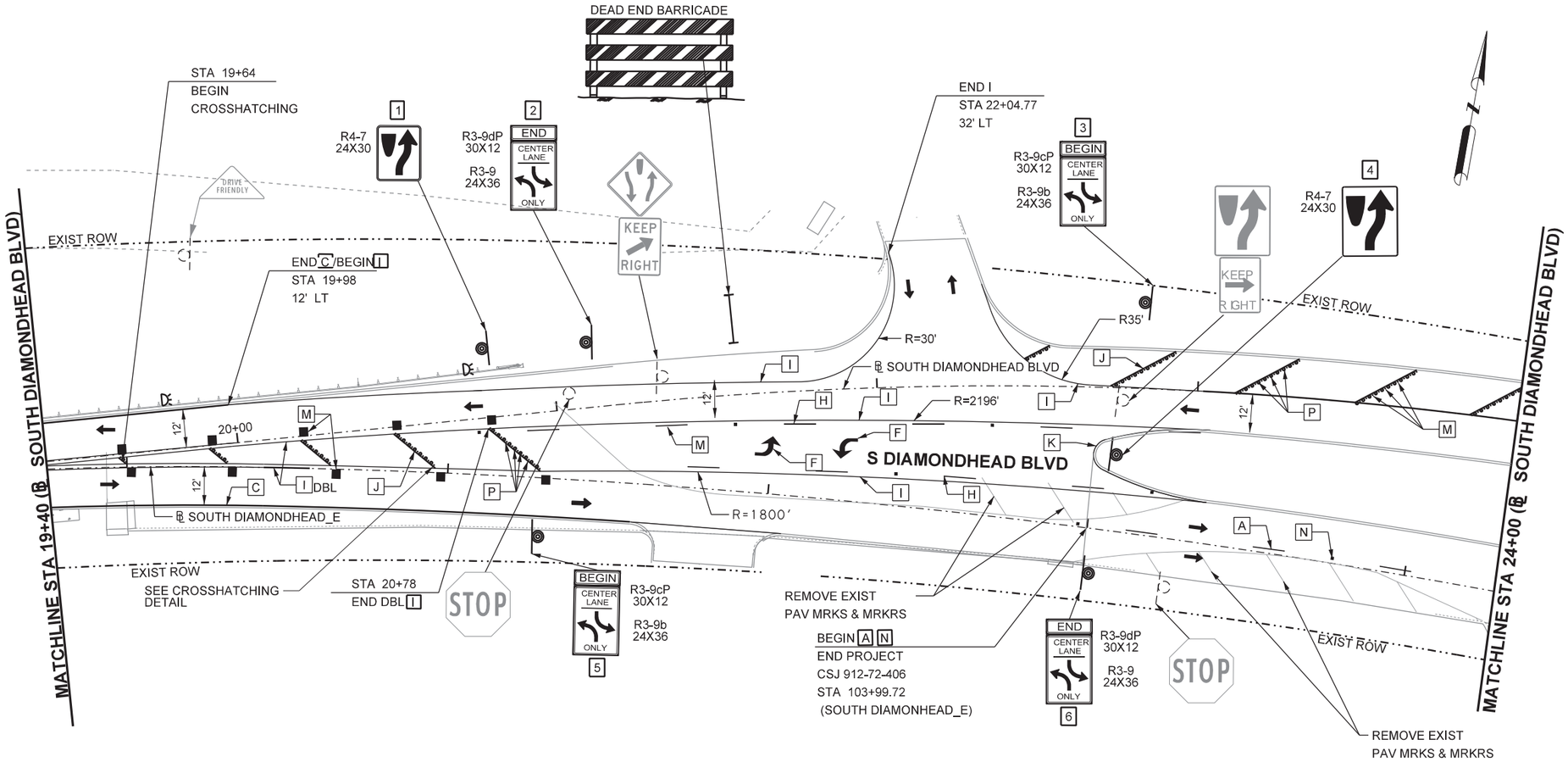

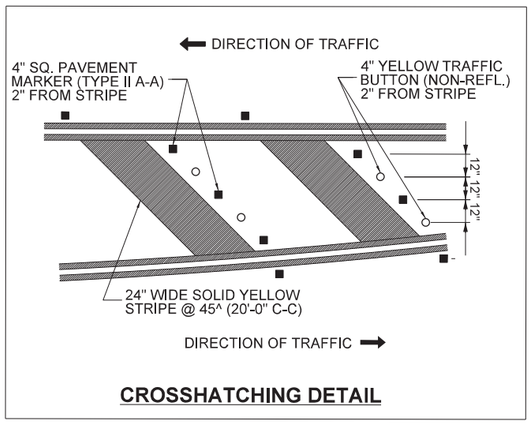

CROSSHATCHING DETAIL

LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20′ 40′
SCALE: 1" = 40′

NOTES:

1. COORDINATE REMOVAL OF EXISTING SIGNS WITH THE VARIOUS TCP PHASES. EXISTING SIGNS ARE TO REMAIN IN PLACE DURING TCP PHASE I UNLESS NOTED OTHERWISE. REFER TO TCP LAYOUTS.
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STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED PROFESSIONAL ENGINEER
11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT
STA 19+40 TO STA 24+00

SHEET 3 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		171
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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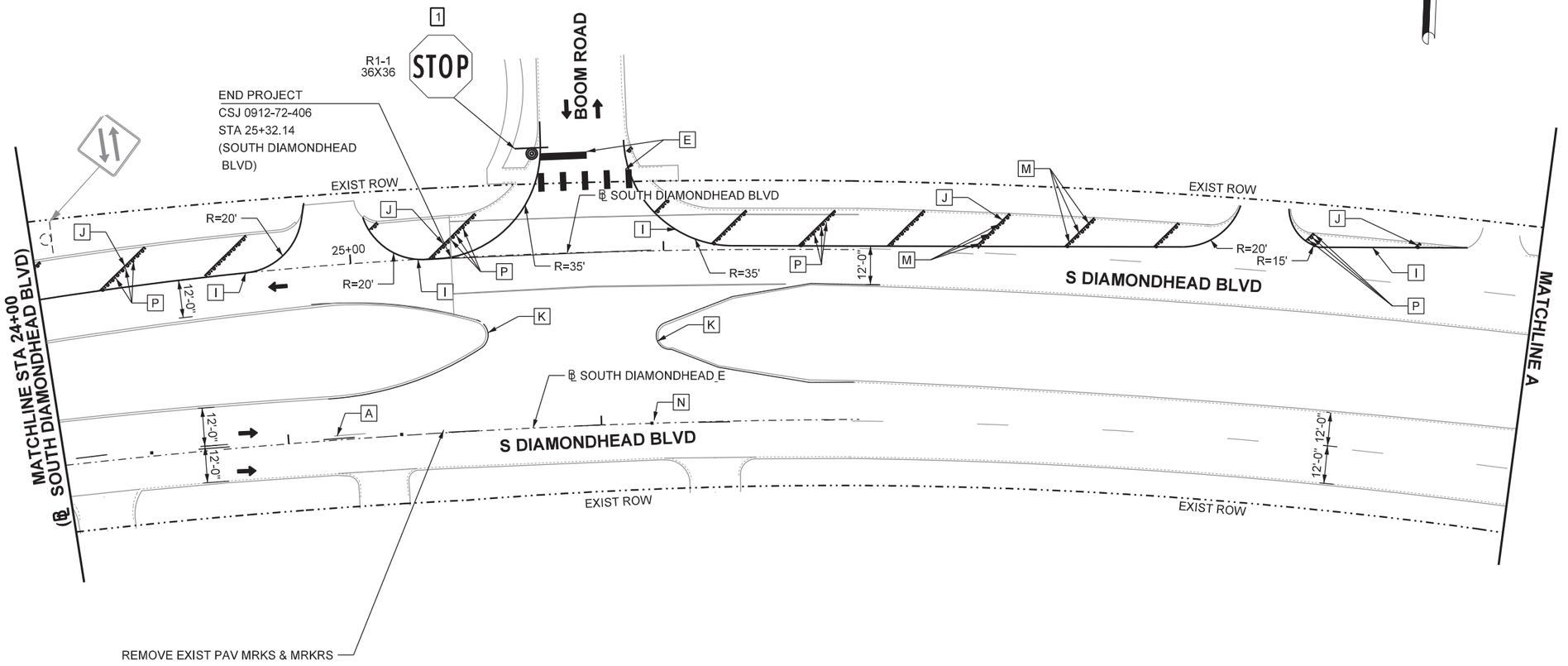

LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20′ 40′
SCALE: 1" = 40′

NOTES:

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STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT STA 24+00 TO MATCHLINE A

SHEET 4 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		172
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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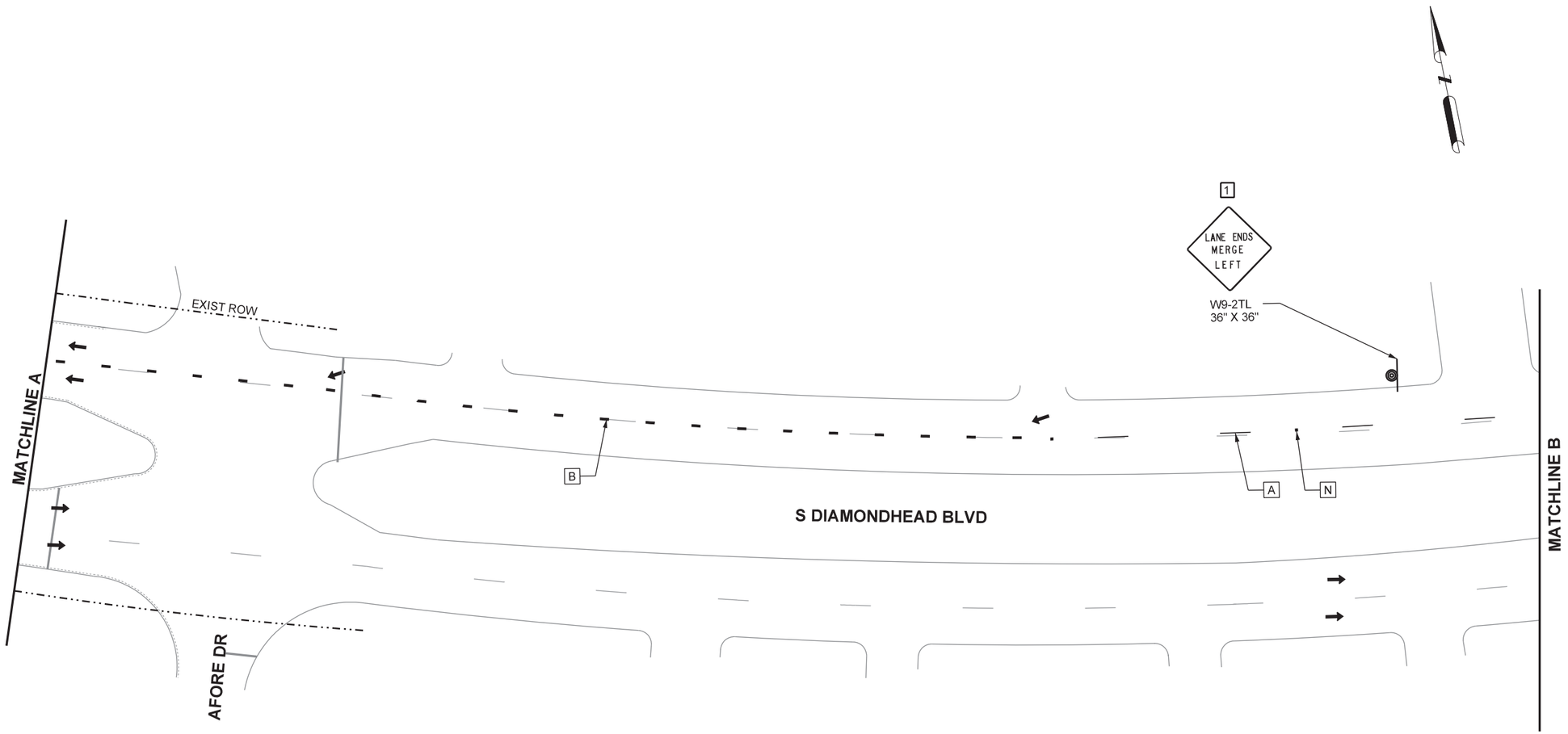

LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

NOTES:

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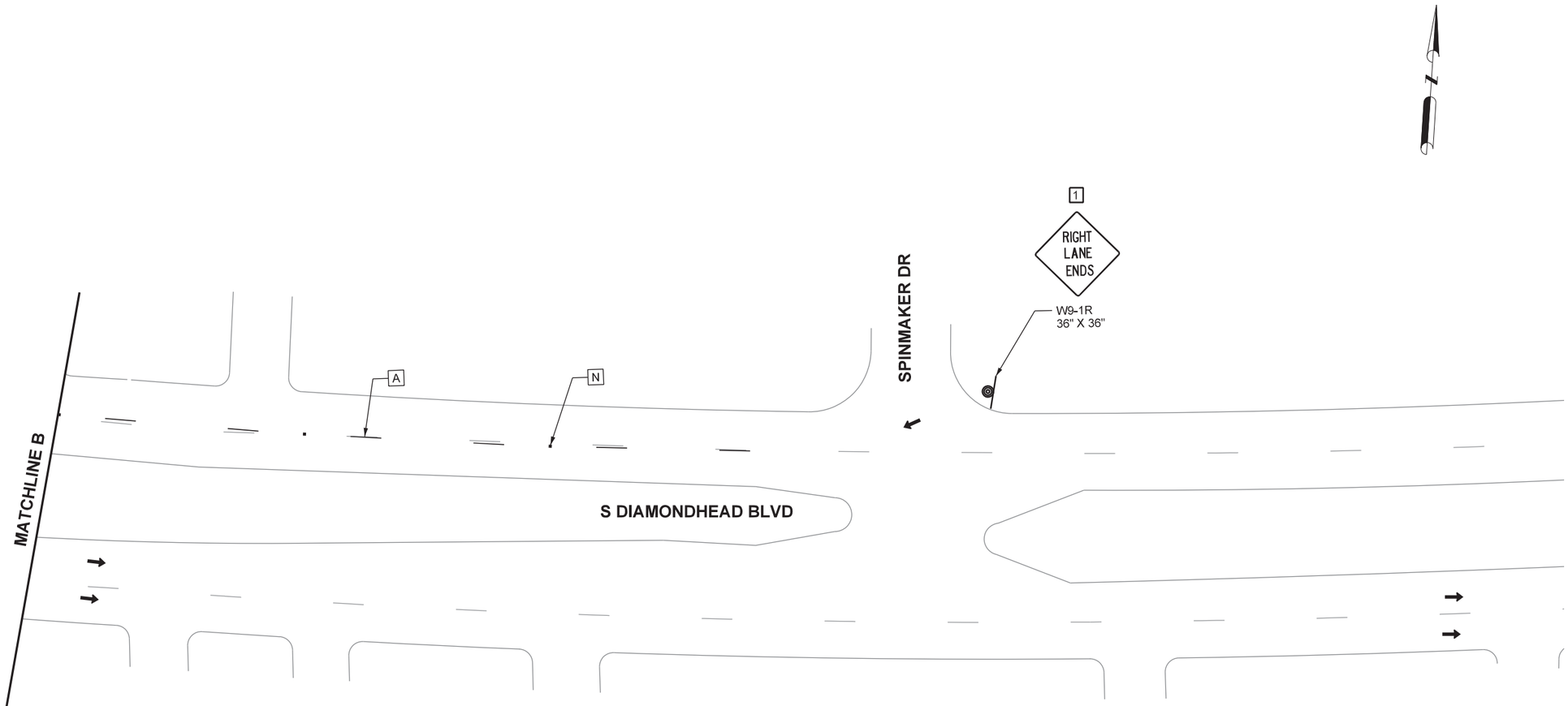
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT
MATCHLINE A TO MATCHLINE B

SHEET 5 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		173
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- A TY II (W) 4" (BRK)
- B TY II (W) 4" (DOT)
- C TY II (W) 4" (SLD)
- D TY II (W) 8" SLD
- E TY II (W) 24" (SLD)
- F TY II (W) (ARROW)
- G TY II (W) (WORD)
- H TY II (Y) 4" (BRK)
- I TY II (Y) 4" (SLD)
- J TY II (Y) 24" (SLD)
- K TY II (Y) (MED NOSE)
- L TY II (W) 18" (YLD TRI)
- M REFL PAV MRKR TY II-A-A
- N REFL PAV MRKR TY II-C-R
- O REFL PAV MRKR TY I-C
- P TRAFFIC BUTTON TY Y
- MBGF DELINEATOR
- RAIL DELINEATOR
- EXISTING SIGN TO BE REMOVED
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED AND RELOCATED
- PROPOSED SIGN
- # PROPOSED SIGN NUMBER
- TRAFFIC FLOW

0 20′ 40′
SCALE: 1" = 40′

NOTES:

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STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

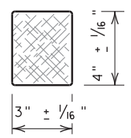
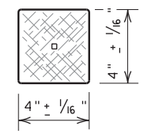
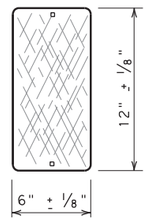
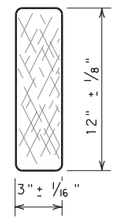
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SIGNING AND PAVEMENT MARKING LAYOUT
MATCHLINE B TO MATCHLINE C

SHEET 6 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		174
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

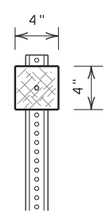
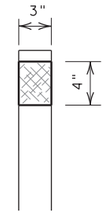
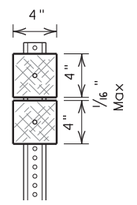
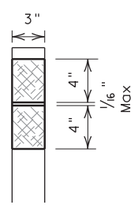
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

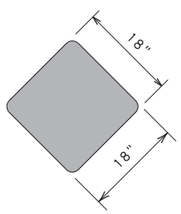
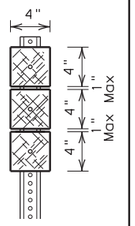
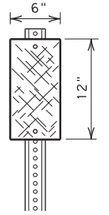
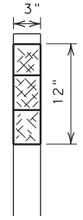
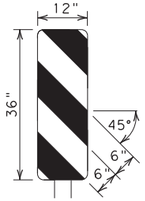
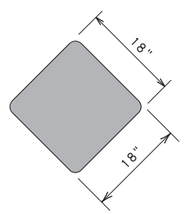
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

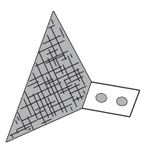
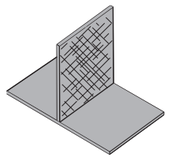
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

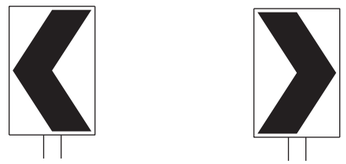
SHEETING: Yellow, White, Red

NOTE

1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

DEVICE

W1-6

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

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

NOTE:

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

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		175

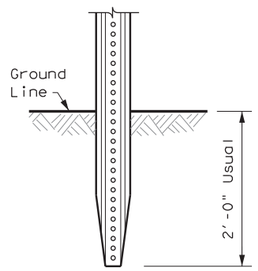
20A

DATE: 11/30/2022 11:49:14 AM
FILE: c:\bms\pwe-useast-006\perlo.gonzalez\dms24702\dom1-20 (1).dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

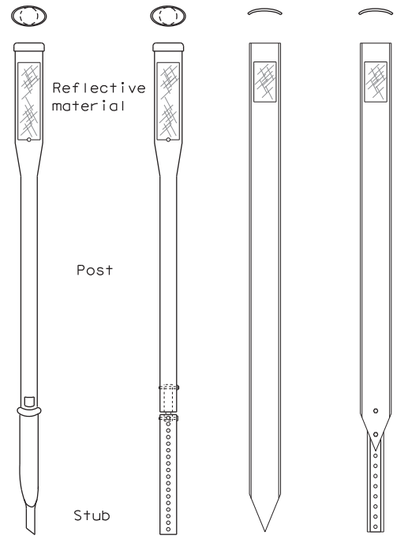


NOTES

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

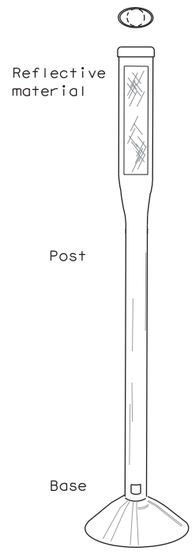
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



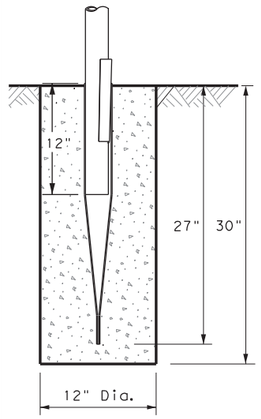
SURFACE MOUNT

NOTES

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

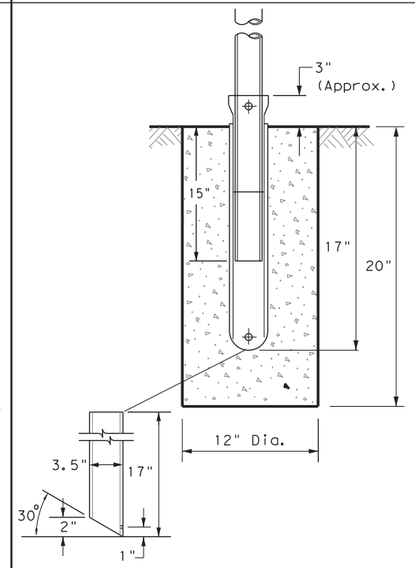
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

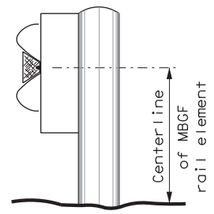
NOTE

1. Install per manufacturer's recommendations.

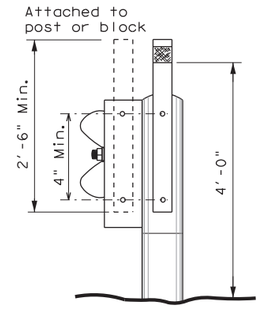
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

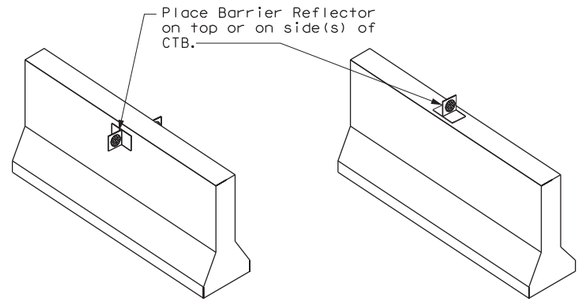
GF1



GF2



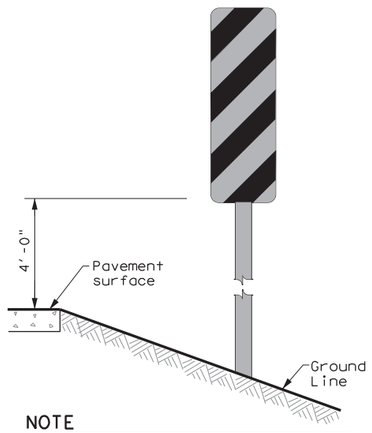
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

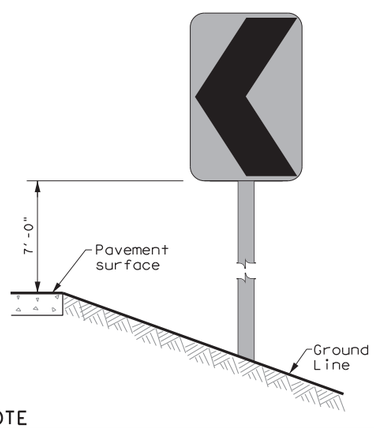
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

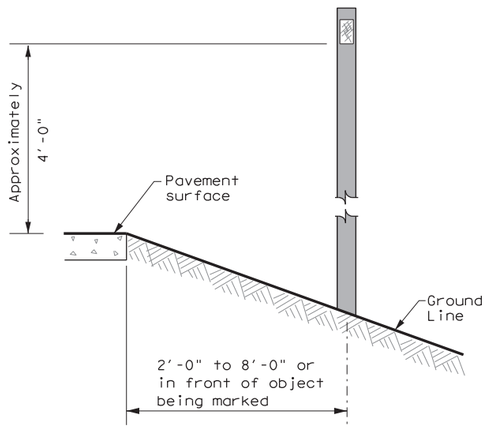
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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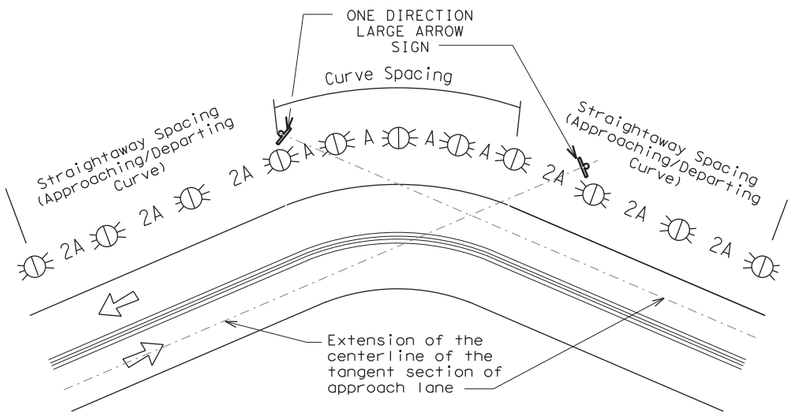
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		176

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

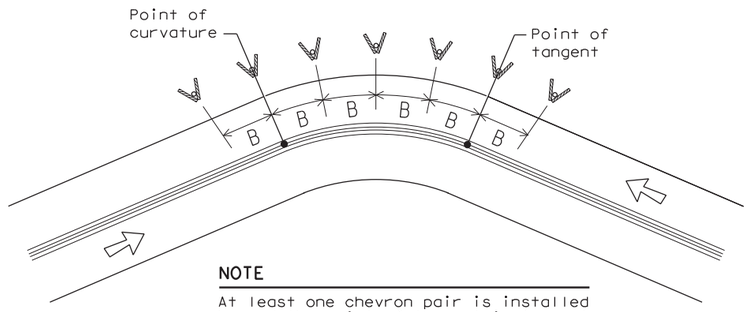
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0912	72	406	CS
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	HOU	HARRIS		177

20C

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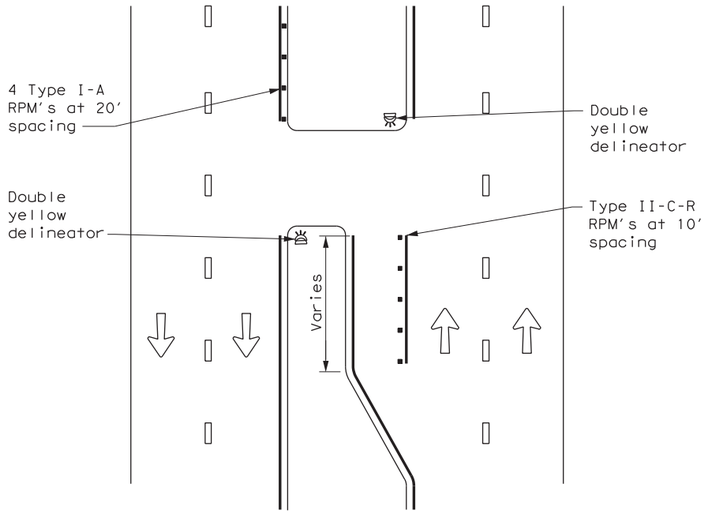
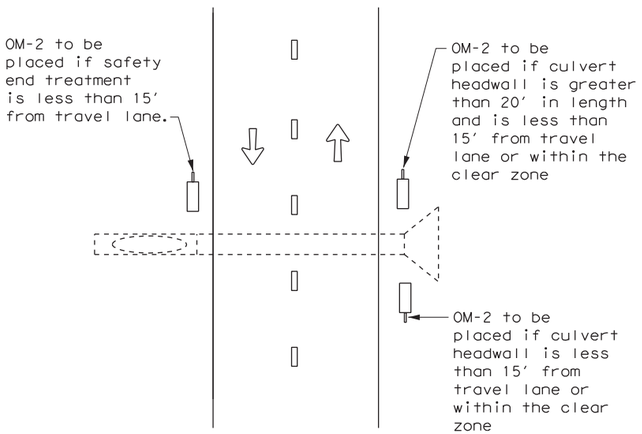
CROSSOVERS



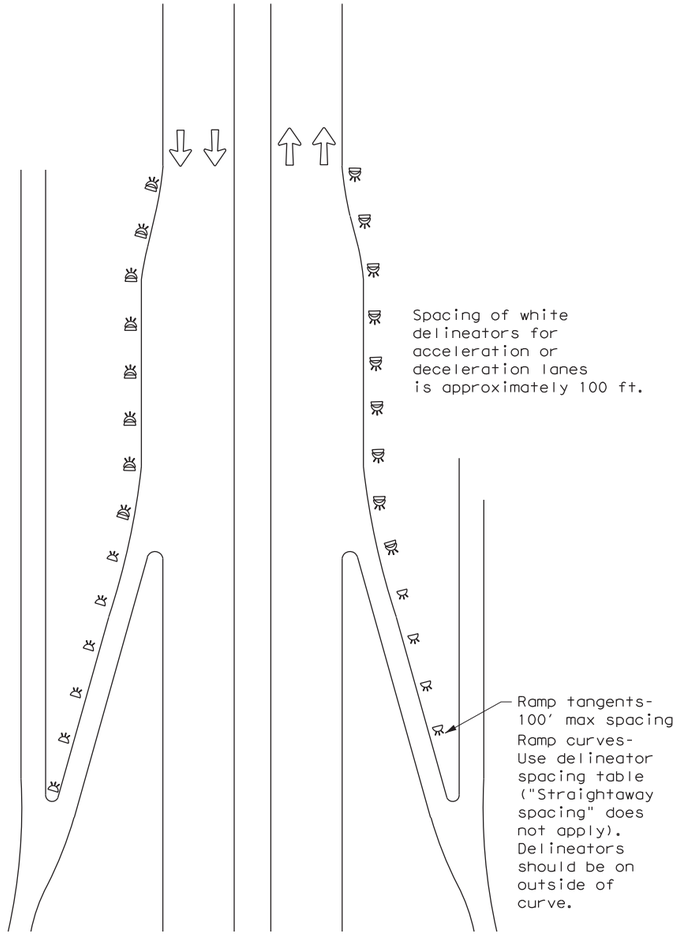
DETAIL 1

FOR CULVERTS WITHOUT MBGF



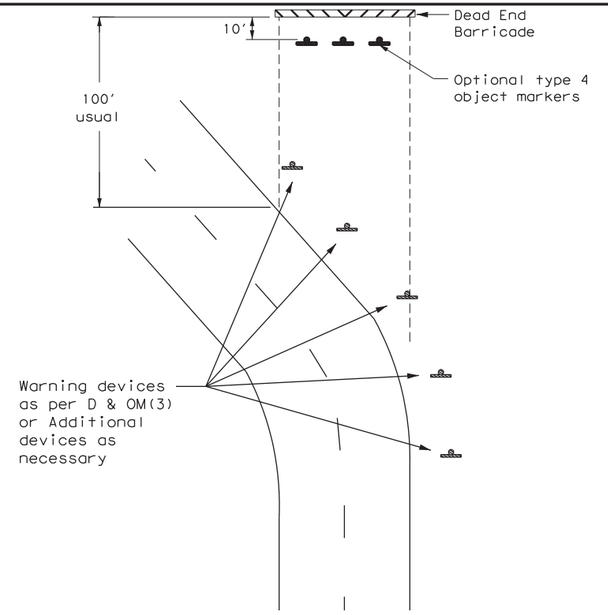
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



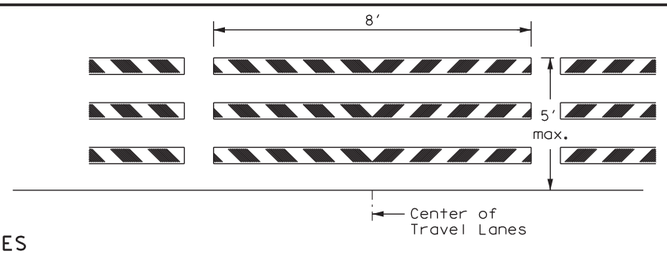
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY	
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3-15 7-20	DIST	COUNTY			SHEET NO.
	HOU	HARRIS			178

20D

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DATE: 11/30/2022 11:49:57 AM
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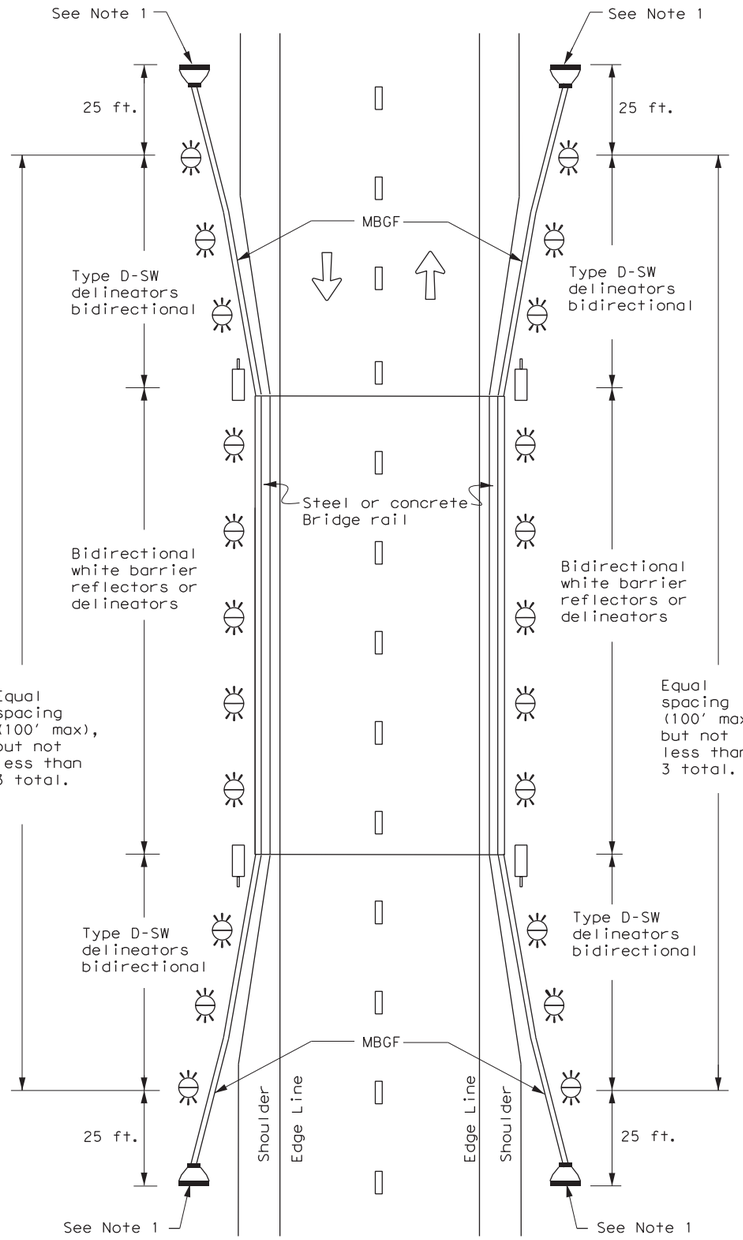
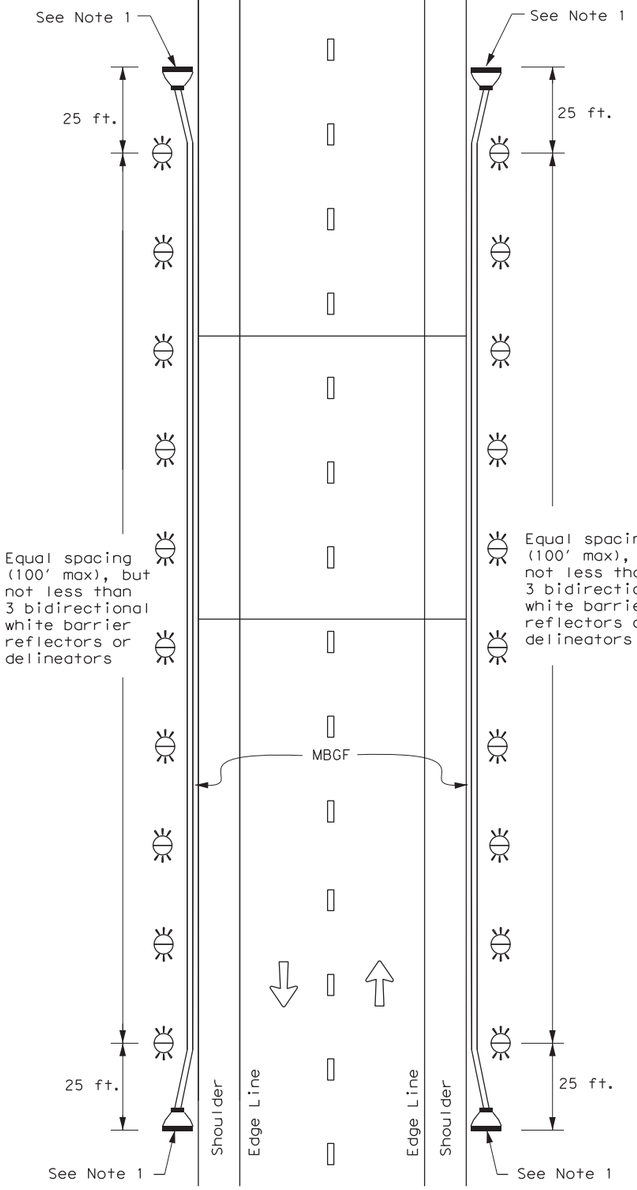
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

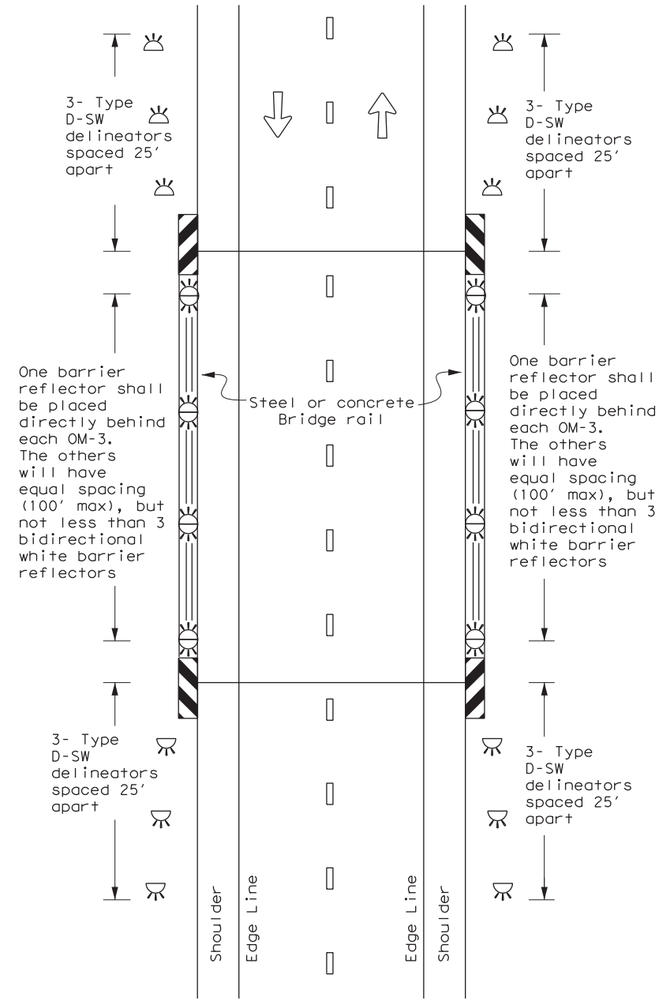
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

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

Texas Department of Transportation

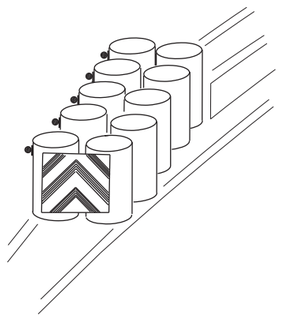
Traffic Safety Division Standard

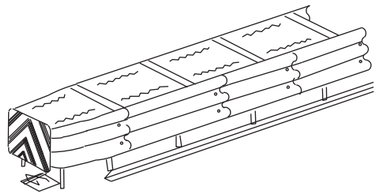
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

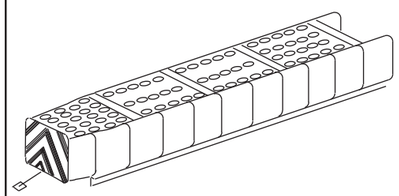
D & OM(5)-20

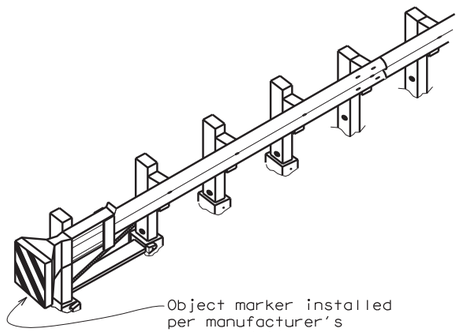
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
7-20	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		179

20E



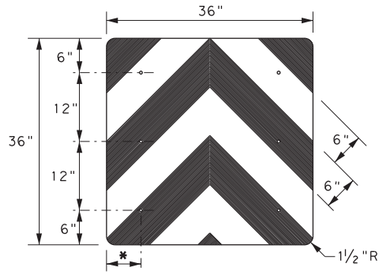


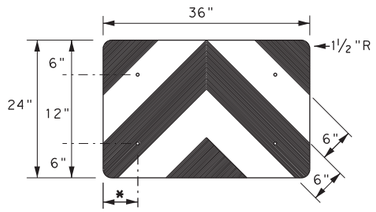




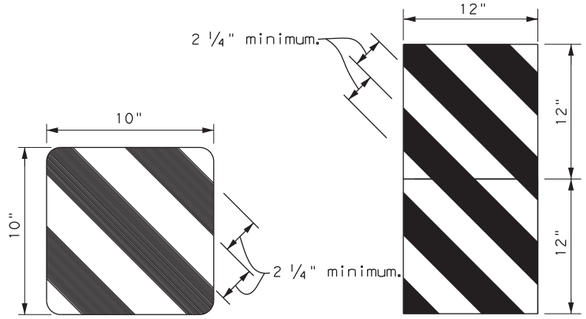
Object marker installed per manufacturer's recommendations.

BACK PANEL (OPTIONAL)

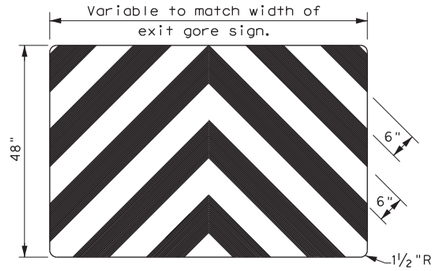


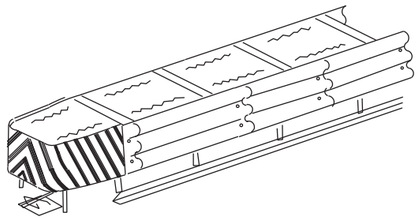


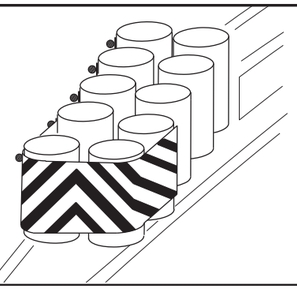
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

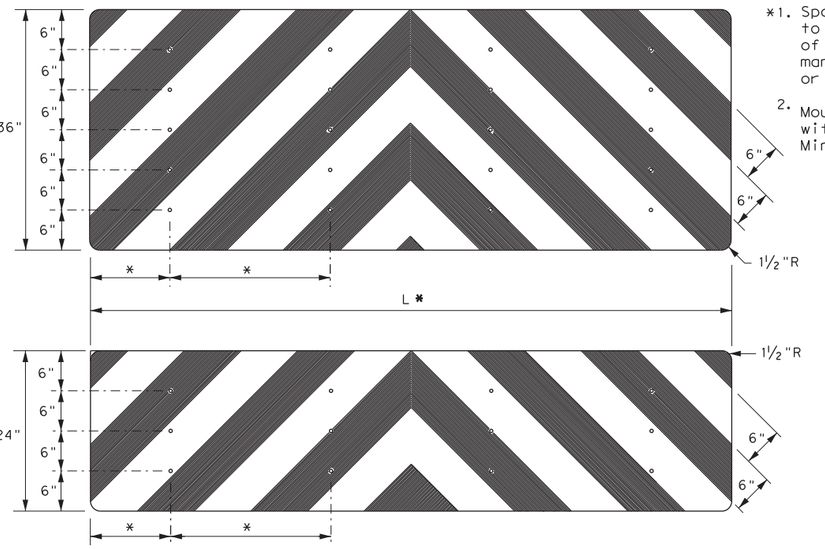


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	HOU	HARRIS		180
4-98 7-20				
20G				

DATE: 11/30/2022 11:50:07 AM
FILE: c:\bms\pwe-useast-006\perla.gonzalez\dms24702\domvia-20 (1).dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

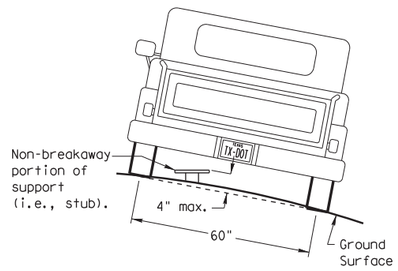
Anchor Type

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

Sign Mounting Designation

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

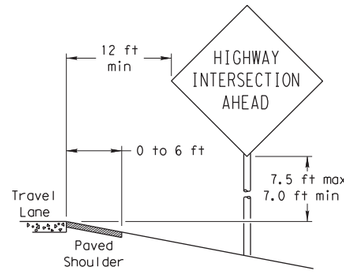
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

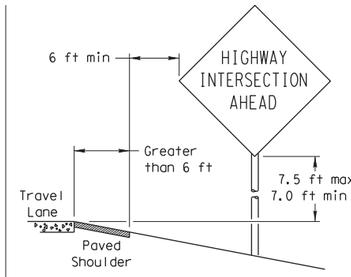
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

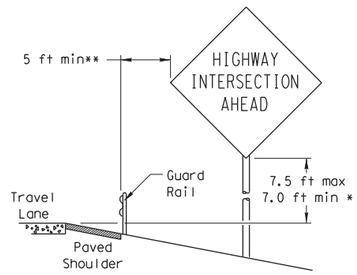
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



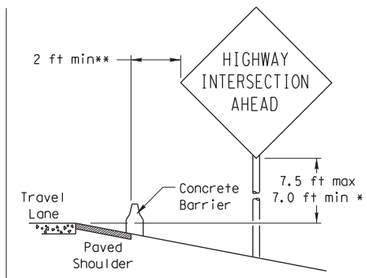
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



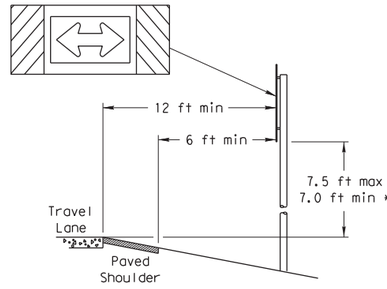
BEHIND GUARDRAIL



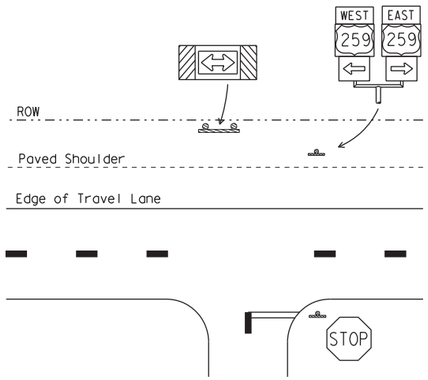
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

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

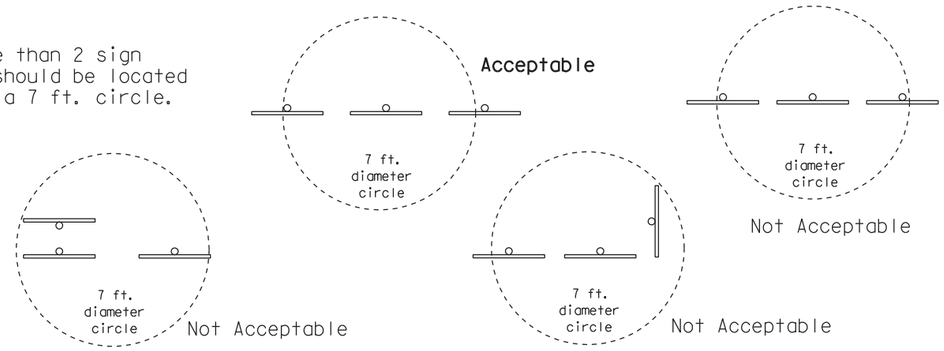
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

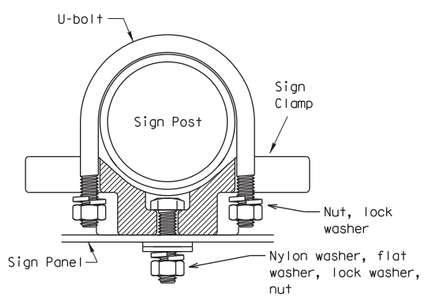
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

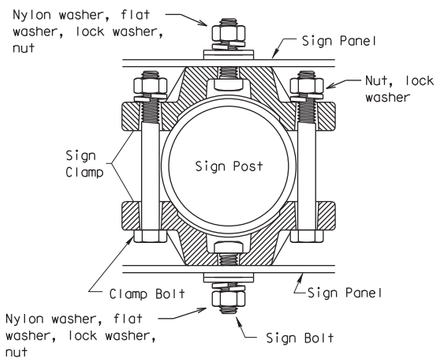


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

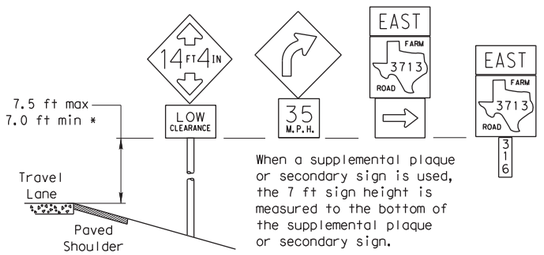
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



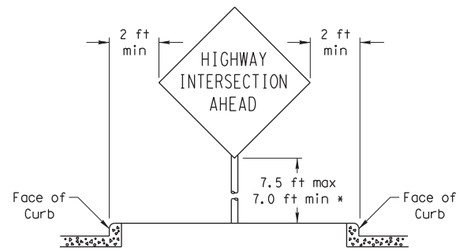
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



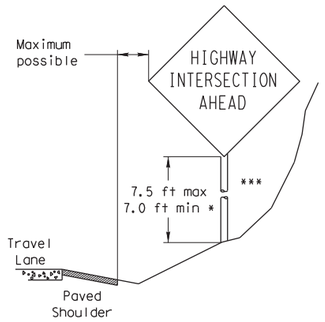
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS 9-08

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

CONT	SECT	JOB	HIGHWAY
0912	72	406	CS

DIST	COUNTY	SHEET NO.
HOU	HARRIS	181

26A

DATE: 11/30/2022 11:50:16 AM
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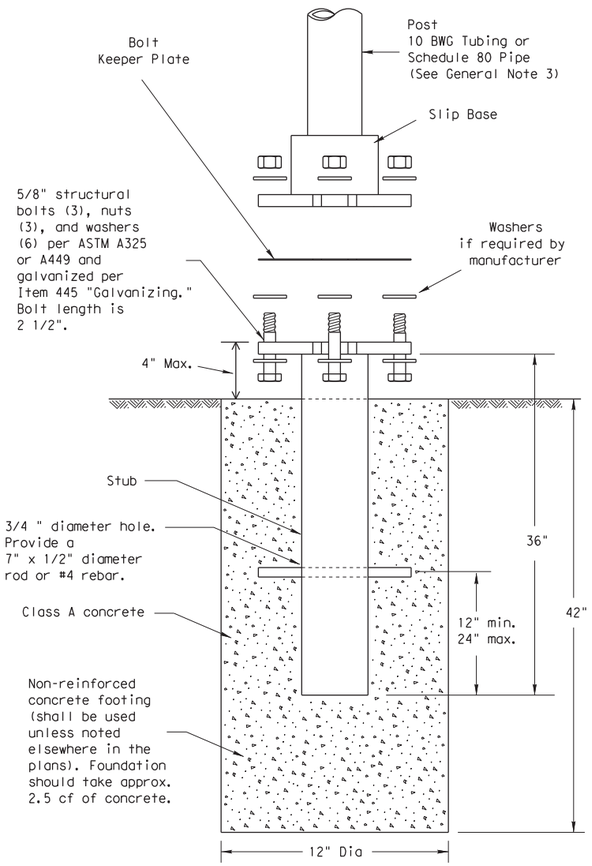
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

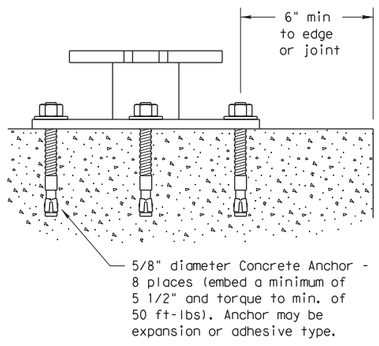
Foundation

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

Support

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS 9-08

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DIST	COUNTY	SHEET NO.
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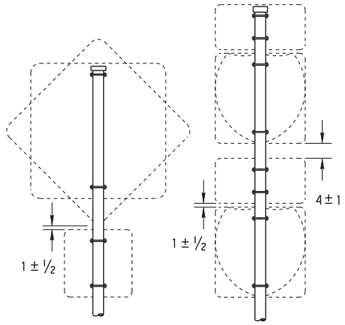
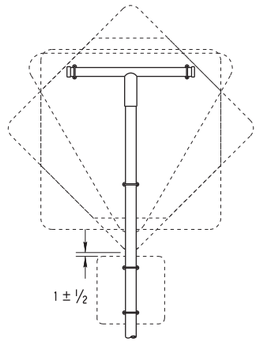


SM RD SGN ASSM TY XXXXX(1)XX(P)



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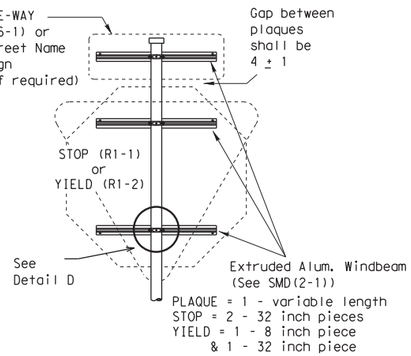

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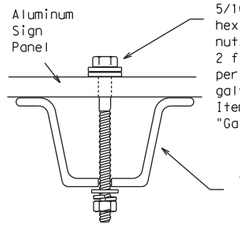
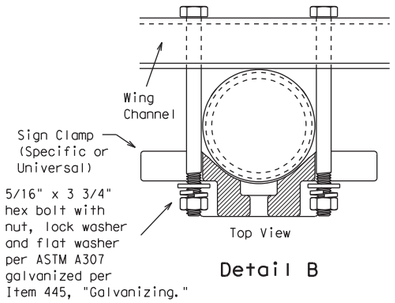
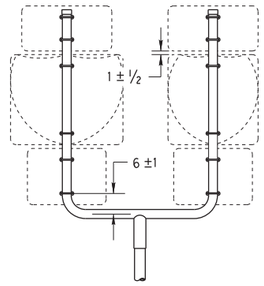


Detail A



Detail B



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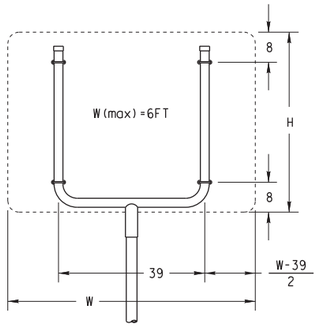

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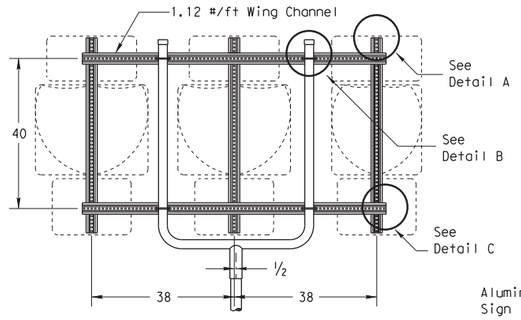
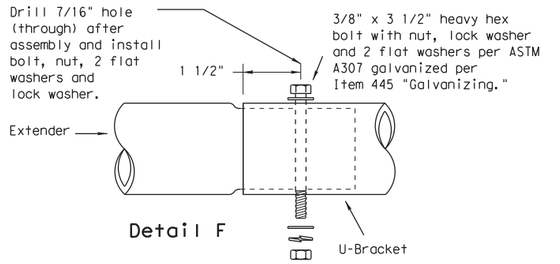
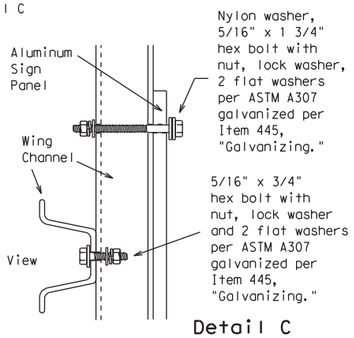


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

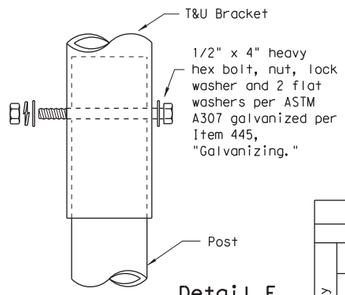


Detail F

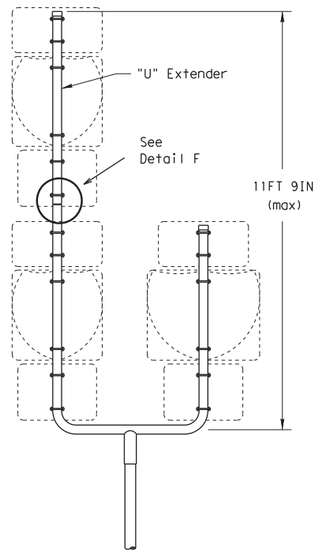
Splices shall only be allowed behind the sign substrate.



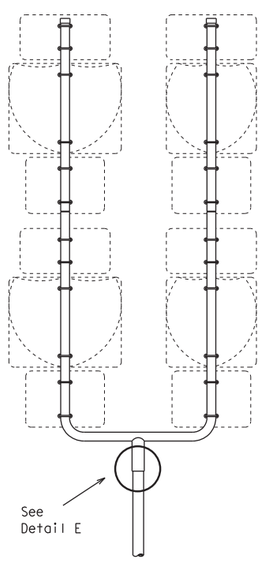
Detail C



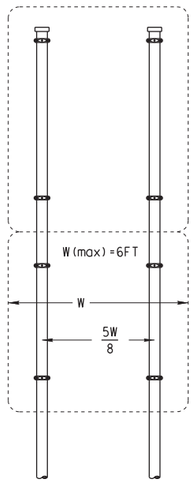
Detail E



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

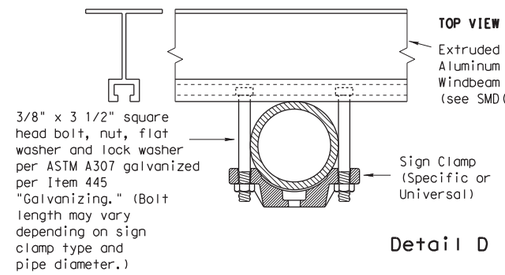


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

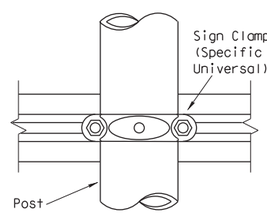


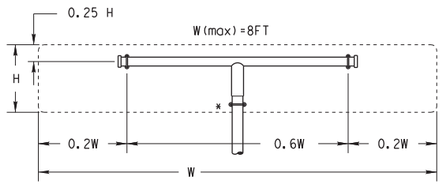
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

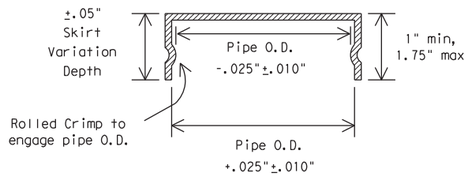




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0912	72	406	CS

DIST	COUNTY	SHEET NO.
HOU	HARRIS	183

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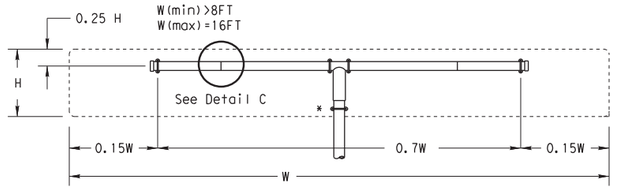
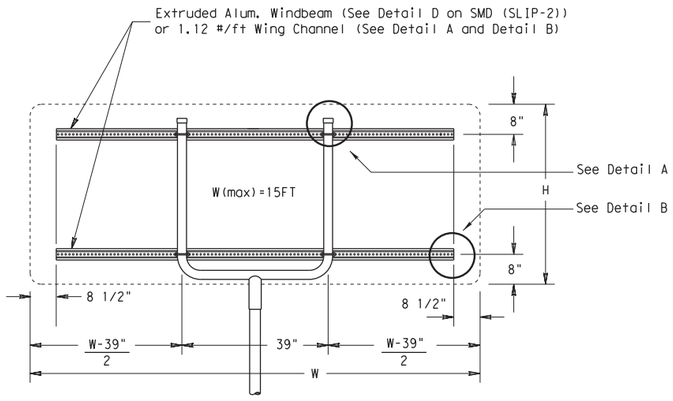
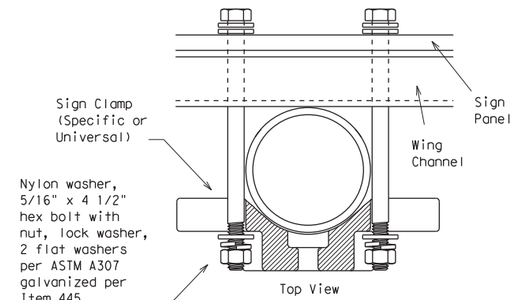


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

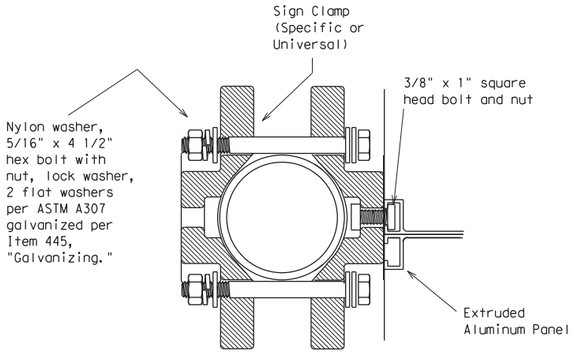
(* - See Note 12)



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

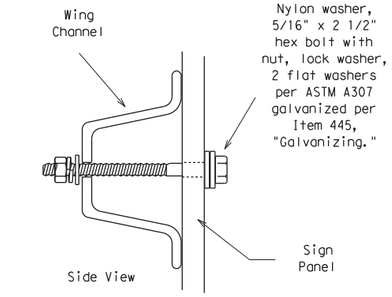


Detail A

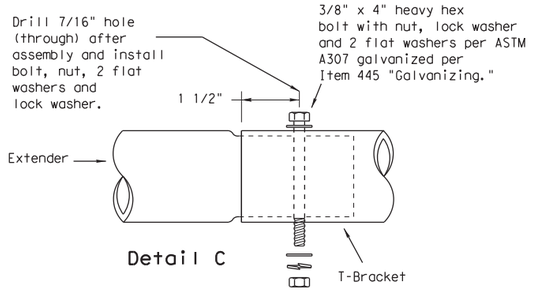


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

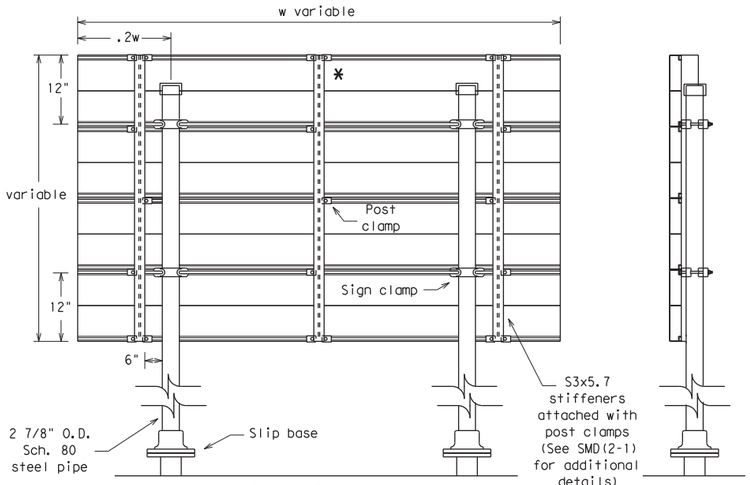


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

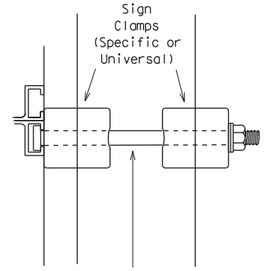


Typical Sign Mount

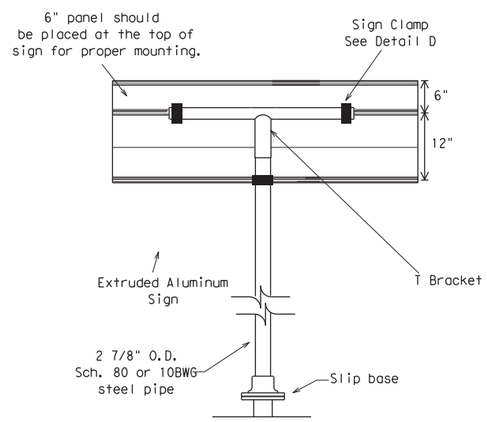
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

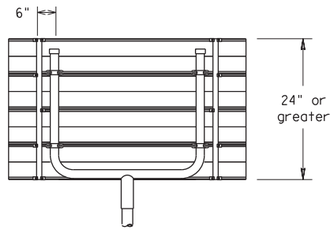
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		184

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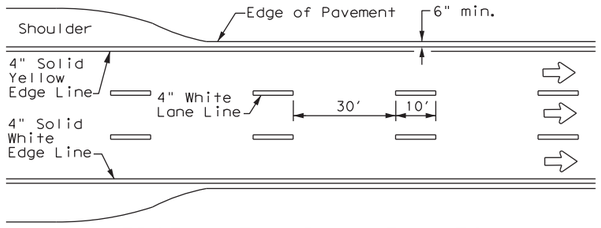
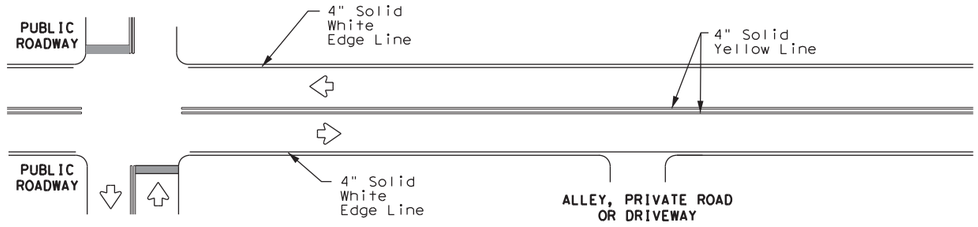
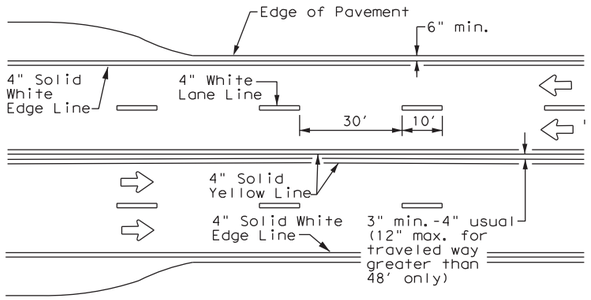


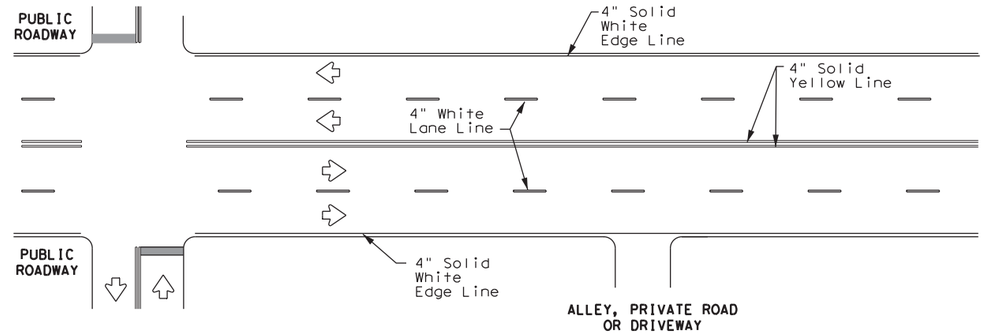
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



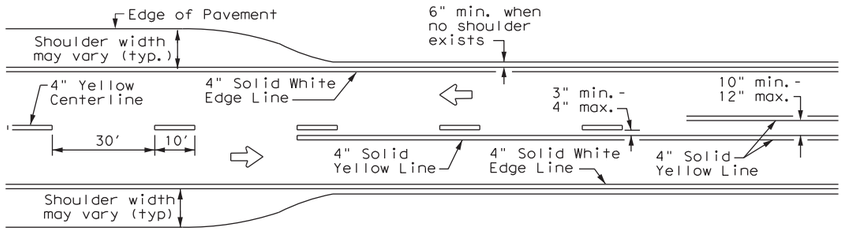
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



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

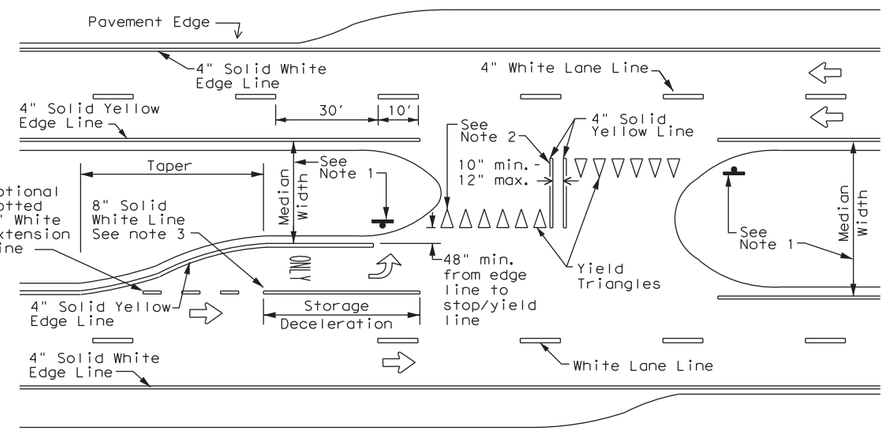


TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

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

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

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

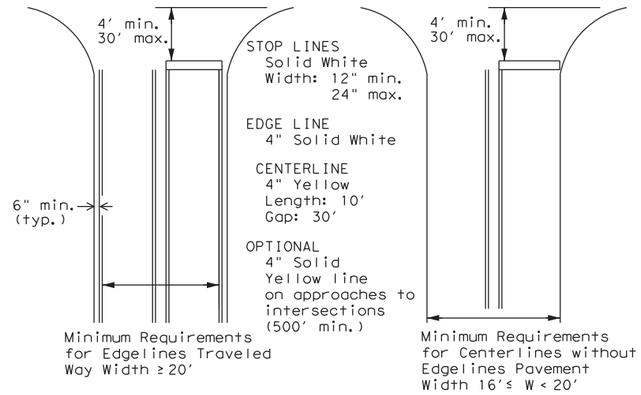
GENERAL NOTES

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

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

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0912	72	406	CS
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	HARRIS		185

22A

DATE: 11/30/2022 11:50:54 AM
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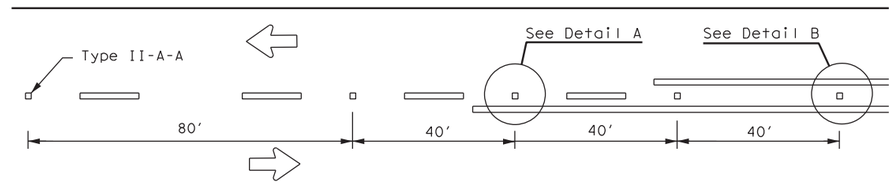
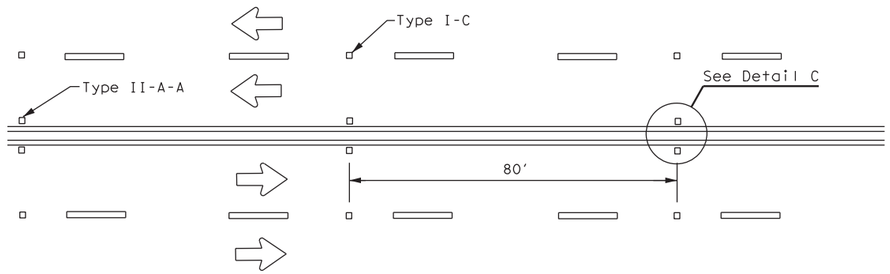
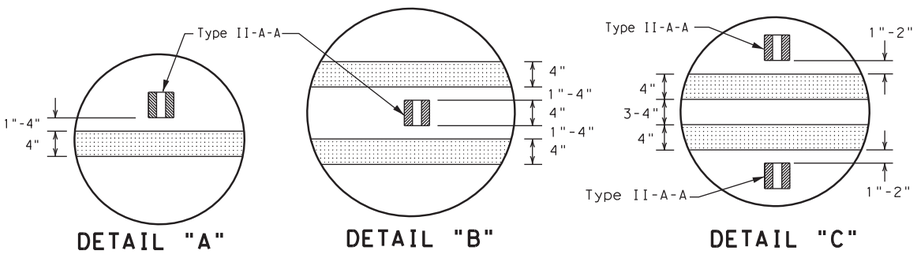
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



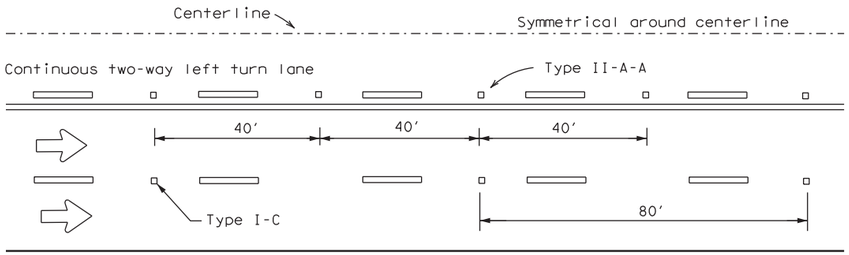
CENTERLINE FOR ALL TWO LANE ROADWAYS



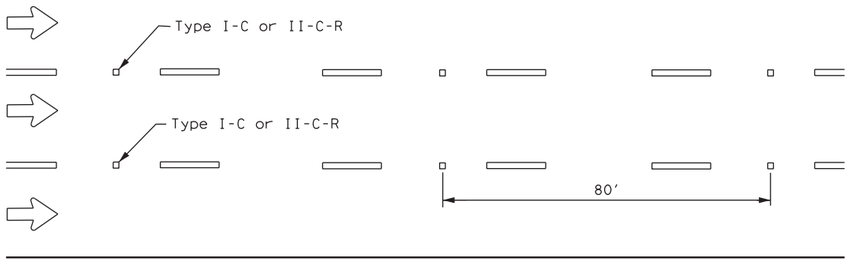
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

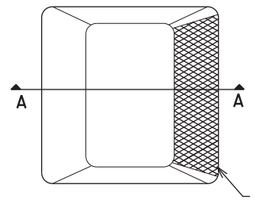


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

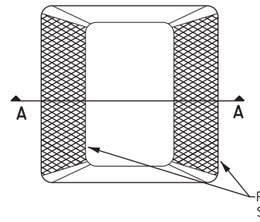
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

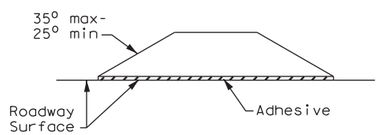
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

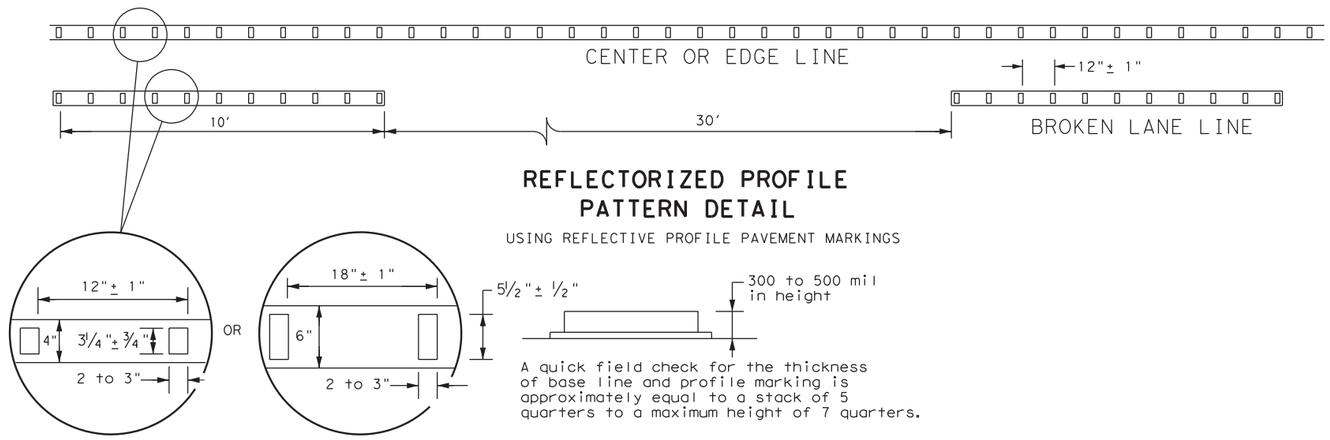


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0912	72	406	CS
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	HARRIS		186

22B

DATE: 11/30/2022 11:51:04 AM
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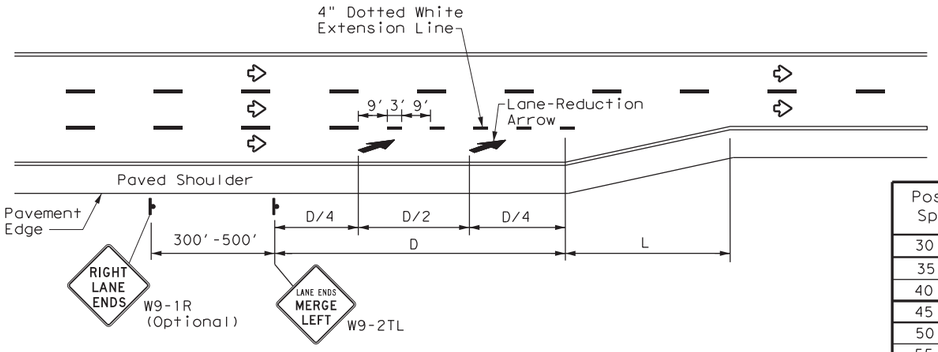
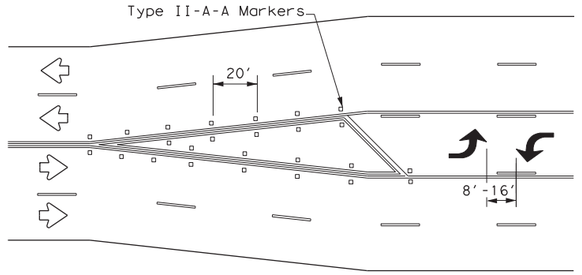


LANE REDUCTION

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

NOTES

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



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

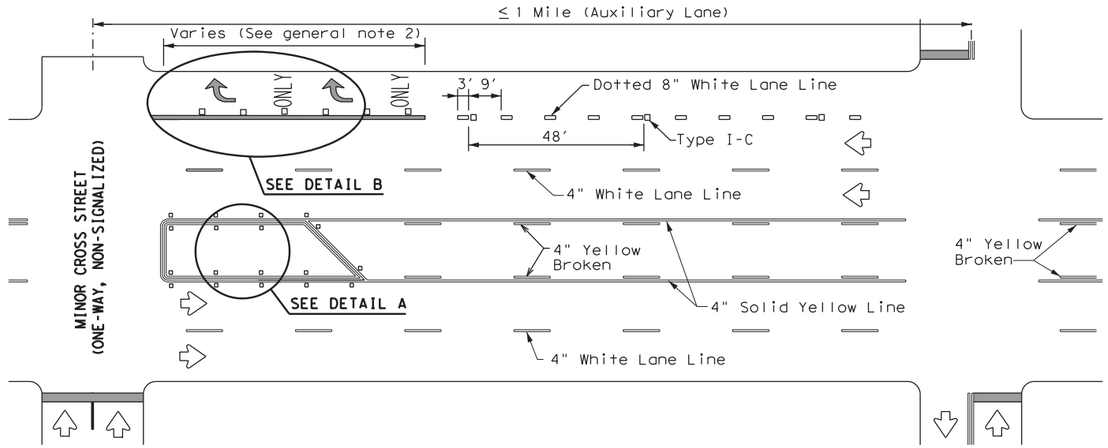
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

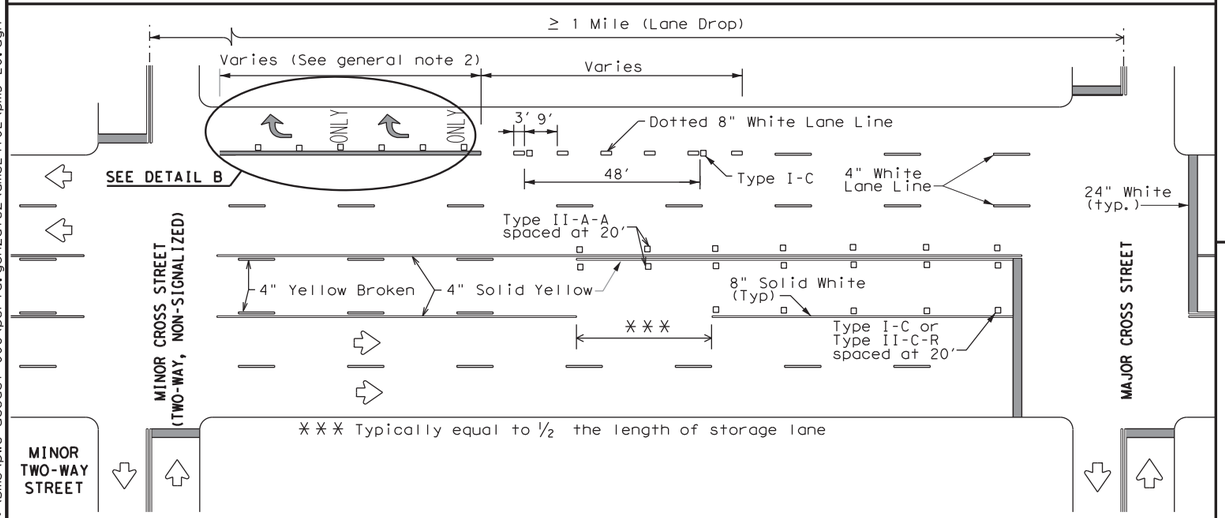
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

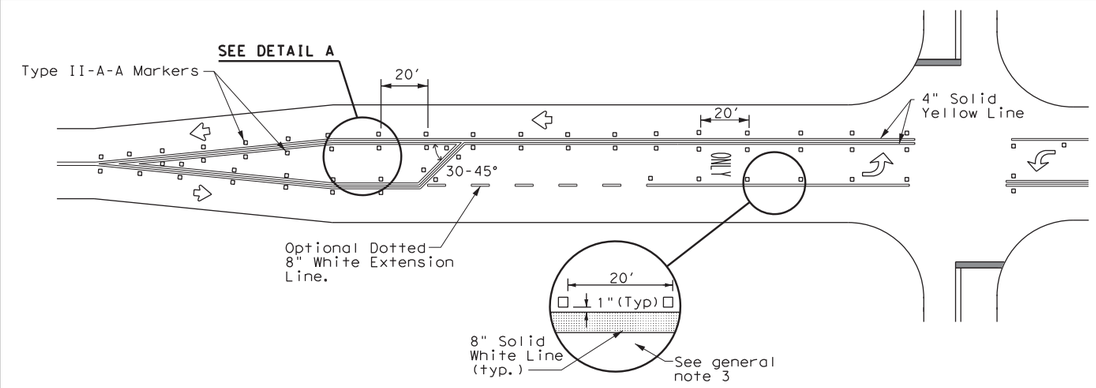
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



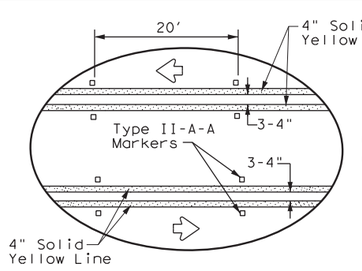
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



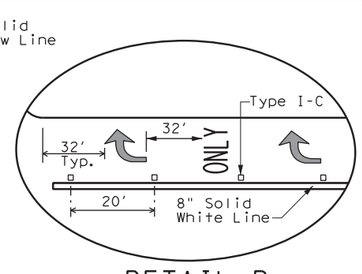
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	HOU	HARRIS		187
3-03 6-20				

22C

DATE: 11/30/2022 11:51:13 AM
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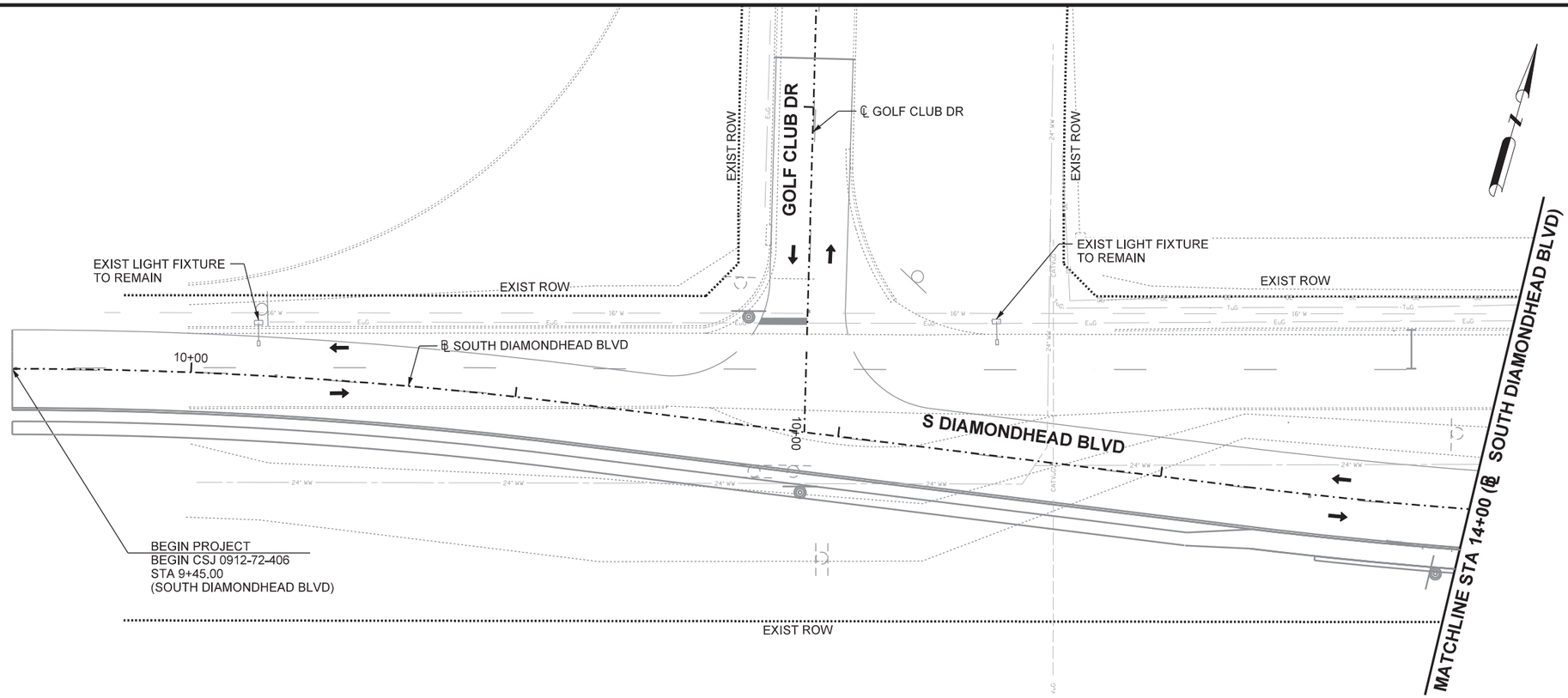

LEGEND

- IN RD IL (TY ST) 40T-8 (250 W EQ) LED
- IN RD IL (TY ST) 40B-8 (250 W EQ) LED
- PROP 3/4" METAL RIGID CONDUIT
- PROP ILLUMINATION ELECTRICAL SERVICE
- PROP GROUND BOX TY A (W/ APRON)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- EXISTING LIGHT FIXTURE

RUN ID:

X-X-(X)
- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID:

XXX
- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

0 20′ 40′

SCALE: 1" = 40′

NOTES:

1. THE CONTRACTOR SHALL CONFIRM ALL UTILITY DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
2. THE LOCATIONS OF ROADWAY ILLUMINATION POLES, GROUND BOXES AND ELECTRICAL SERVICE POLES SHOWN ON THESE PLANS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED TO ACCOMMODATE LOCAL CONDITIONS. EXACT LOCATION OF ROADWAY ILLUMINATION EQUIPMENT SHALL BE APPROVED BY THE ENGINEER IN THE FIELD.
3. THE CONTRACTOR HAS THE OPTION TO BORE AT HIS DISCRETION AND CONVENIENCE WHEN AN ITEM CALLS FOR A TRENCH. THIS WORK WILL BE PAID AS A TRENCH CONDUIT INSTALLATION.
4. REFER TO THE ILLUMINATION CIRCUIT DIAGRAM FOR SYSTEM DETAILS.
5. REFER TO ELECTRICAL SERVICE DATA SHEET FOR ELECTRICAL SERVICE DESCRIPTION.
6. CONTRACTOR SHALL REPAIR THE EXISTING IRRIGATION SYSTEM, SIDEWALK AND CURB & GUTTER TO AN EQUAL OR BETTER CONDITION IF IT IS DAMAGED DURING CONSTRUCTION. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO CONDUIT AND ROADWAY ILLUMINATION POLE INSTALLATION.
7. CONTRACTOR SHALL VERIFY THAT ALL EXISTING SYSTEMS ARE FUNCTIONAL AFTER INSTALLATION OF CONDUIT AND ILLUMINATION. ANY NON-FUNCTIONING SYSTEMS AS A RESULT OF THIS INSTALLATION MUST BE REPAIRED TO AN EQUAL OR BETTER CONDITION BY THE CONTRACTOR. THIS WORK WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.
8. ROW IS SHOWN FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSABILITY TO DETERMINE THE EXACT LOCATION OF CITY AND STATE ROW.

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

ILLUMINATION LAYOUT
BEGIN PROJECT TO STA 14+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		188
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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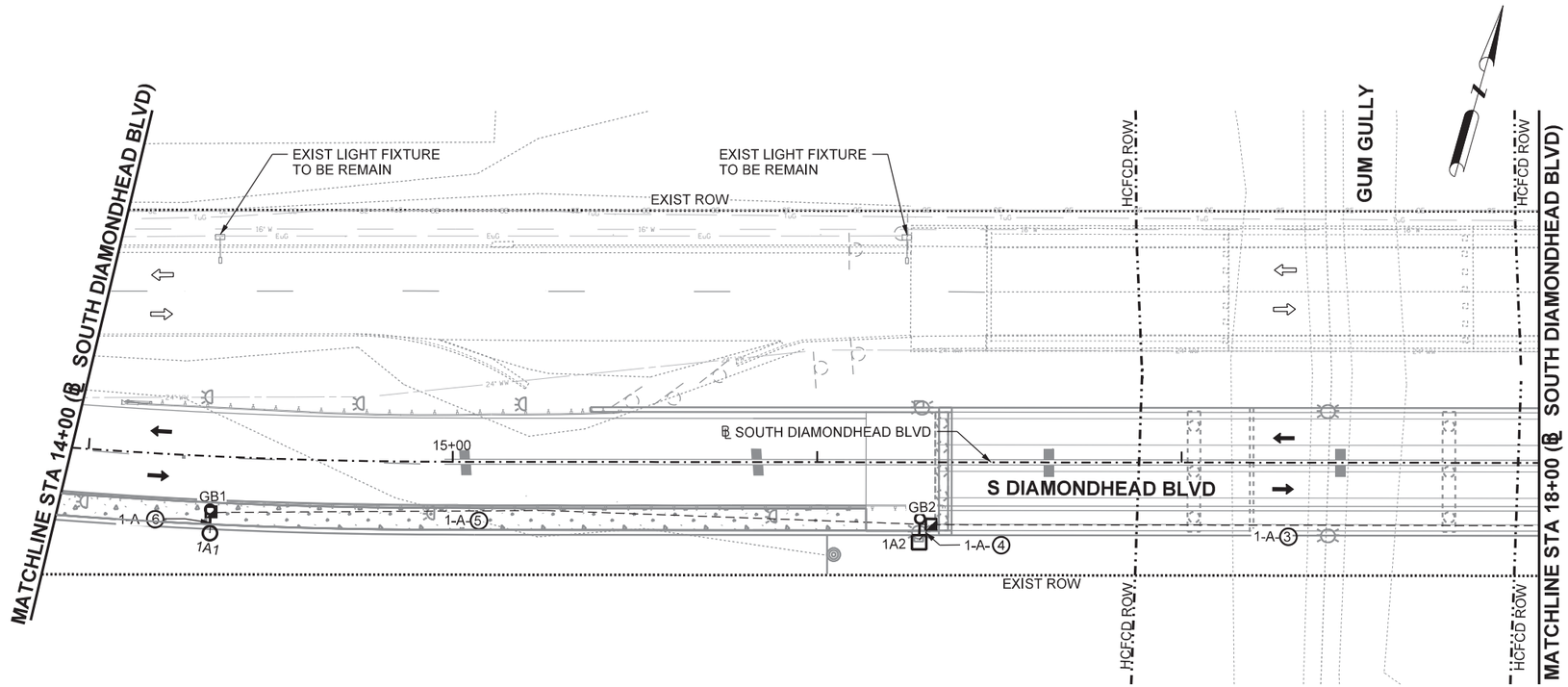


LEGEND

- IN RD IL (TY ST) 40T-8 (250 W EQ) LED
- IN RD IL (TY ST) 40B-8 (250 W EQ) LED
- PROP 3/4" METAL RIGID CONDUIT
- PROP ILLUMINATION ELECTRICAL SERVICE
- PROP GROUND BOX TY A (W/ APRON)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- EXISTING LIGHT FIXTURE

RUN ID:

X-X-(X)

- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID:

XXX

- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

0 20′ 40′

SCALE: 1" = 40′

ROADWAY ILLUMINATION ASSEMBLY SUMMARY			
LUMINAIRE POLE NUMBER	DESCRIPTION	STATION	OFFSET
1A1	IN RD IL (TY ST) 40T-8 (250W EQ) LED	14+42	23' RT
1A2	IN RD IL (TY ST) 40B-8 (250W EQ) LED	16+30	21' RT

CONDUIT AND CONDUCTOR SUMMARY										
SERVICE NO	CONDUIT STATUS	CIRCUIT LETTER	RUN NO	RUN LENGTH (FEET)	CONDUCTOR (NO & LENGTH IN FEET)				CONDUIT (NO & LENGTH IN FEET)	
					0620 6007		0620 6008		0618 6023	
					(GROUND) ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED		CONDT (PVC) (SCHD 40) (2")	
					NO	LF	NO	LF	NO	LF
1	I	A	3	170	1	175	2	350	1	170
1	I	A	4	10	1	15	2	30	1	10
1	I	A	5	200	1	205	2	410	1	200
1	I	A	6	10	1	15	2	30	1	10
TOTAL						410		820		390

NOTES:

1. THE CONTRACTOR SHALL CONFIRM ALL UTILITY DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
2. THE LOCATIONS OF ROADWAY ILLUMINATION POLES, GROUND BOXES AND ELECTRICAL SERVICE POLES SHOWN ON THESE PLANS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED TO ACCOMMODATE LOCAL CONDITIONS. EXACT LOCATION OF ROADWAY ILLUMINATION EQUIPMENT SHALL BE APPROVED BY THE ENGINEER IN THE FIELD.
3. THE CONTRACTOR HAS THE OPTION TO BORE AT HIS DISCRETION AND CONVENIENCE WHEN AN ITEM CALLS FOR A TRENCH. THIS WORK WILL BE PAID AS A TRENCH CONDUIT INSTALLATION.
4. REFER TO THE ILLUMINATION CIRCUIT DIAGRAM FOR SYSTEM DETAILS.
5. REFER TO ELECTRICAL SERVICE DATA SHEET FOR ELECTRICAL SERVICE DESCRIPTION.
6. CONTRACTOR SHALL REPAIR THE EXISTING IRRIGATION SYSTEM, SIDEWALK AND CURB & GUTTER TO AN EQUAL OR BETTER CONDITION IF IT IS DAMAGED DURING CONSTRUCTION. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO CONDUIT AND ROADWAY ILLUMINATION POLE INSTALLATION.
7. CONTRACTOR SHALL VERIFY THAT ALL EXISTING SYSTEMS ARE FUNCTIONAL AFTER INSTALLATION OF CONDUIT AND ILLUMINATION. ANY NON-FUNCTIONING SYSTEMS AS A RESULT OF THIS INSTALLATION MUST BE REPAIRED TO AN EQUAL OR BETTER CONDITION BY THE CONTRACTOR. THIS WORK WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.
8. ROW IS SHOWN FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSABILITY TO DETERMINE THE EXACT LOCATION OF CITY AND STATE ROW.

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

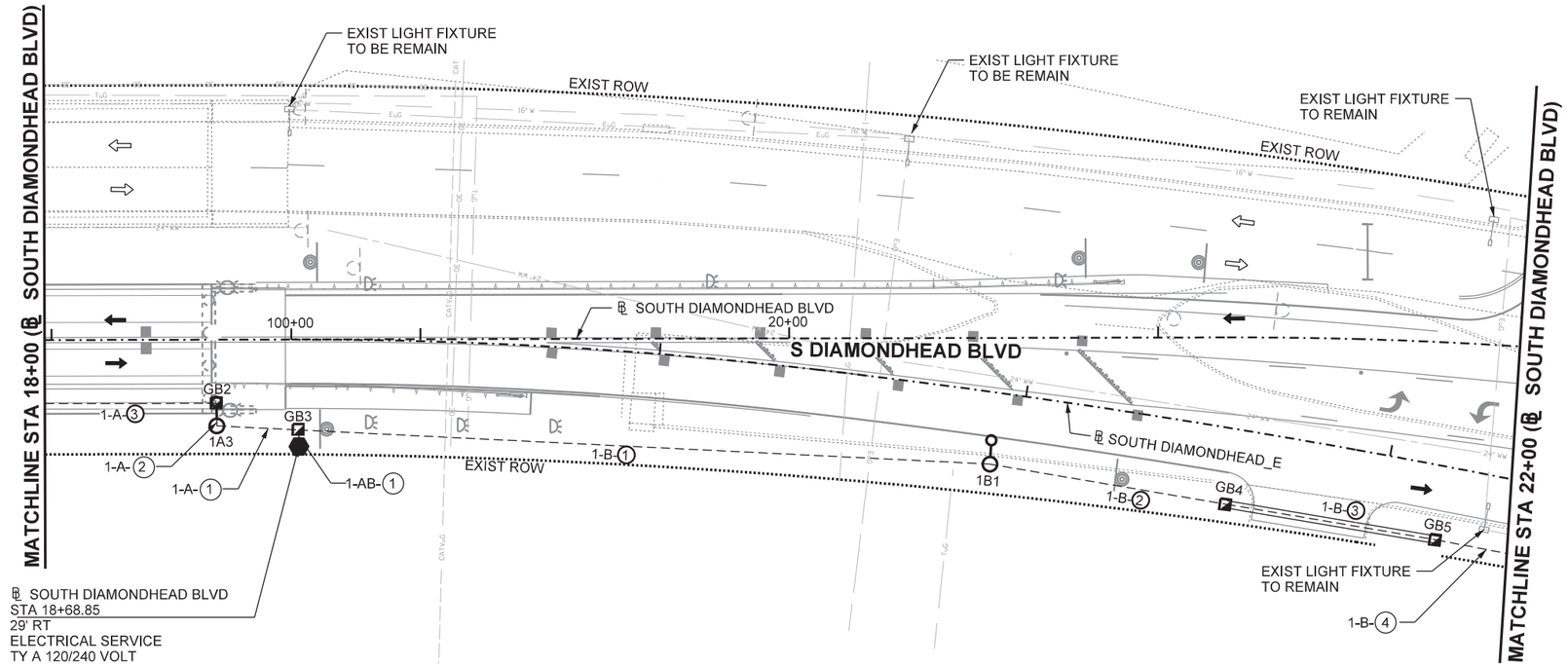
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

ILLUMINATION LAYOUT STA 14+00 TO STA 18+00

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		189
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- IN RD IL (TY ST) 40T-8 (250 W EQ) LED
- IN RD IL (TY ST) 40B-8 (250 W EQ) LED
- PROP 3/4" METAL RIGID CONDUIT
- PROP ILLUMINATION ELECTRICAL SERVICE
- PROP GROUND BOX TY A (W/ APRON)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- EXISTING LIGHT FIXTURE

RUN ID:
X-X-X
- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID:
XXX
- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

0 20′ 40′
SCALE: 1" = 40′

ROADWAY ILLUMINATION ASSEMBLY SUMMARY			
LUMINAIRE POLE NUMBER	DESCRIPTION	STATION	OFFSET
1A3	IN RD IL (TY ST) 40T-8 (250W EQ) LED	18+47	23' RT
1B1	IN RD IL (TY ST) 40T-8 (250W EQ) LED	20+56	34' RT

CONDUIT AND CONDUCTOR SUMMARY												
SERVICE NO	CONDUIT STATUS	CIRCUIT LETTER	RUN NO	RUN LENGTH (FEET)	CONDUCTOR (NO & LENGTH IN FEET)				CONDUIT (NO & LENGTH IN FEET)			
					0620 6007		0620 6008		0618 6023		0618 6047	
					(GROUND) ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED		CONDT (PVC) (SCHD 40) (2")		CONDT (PVC) (SCH 80) (2") (BORE)	
					NO	LF	NO	LF	NO	LF	NO	LF
1	I	A	1	25	1	30	2	60	1	25		
1	I	A	2	10	1	15	2	30	1	10		
1	I	A	3	50	1	55	2	110	1	50		
1	I	B	1	190	1	195	2	390	1	190		
1	I	B	2	70	1	75	2	150	1	70		
1	I	B	3	60	1	65	2	130			1	60
1	I	B	4	20	1	25	2	50	1	20		
1	I	AB	1	10	1	15	2	30	1	10		
TOTAL						475		950		375		60

NOTES:

1. THE CONTRACTOR SHALL CONFIRM ALL UTILITY DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
2. THE LOCATIONS OF ROADWAY ILLUMINATION POLES, GROUND BOXES AND ELECTRICAL SERVICE POLES SHOWN ON THESE PLANS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED TO ACCOMMODATE LOCAL CONDITIONS. EXACT LOCATION OF ROADWAY ILLUMINATION EQUIPMENT SHALL BE APPROVED BY THE ENGINEER IN THE FIELD.
3. THE CONTRACTOR HAS THE OPTION TO BORE AT HIS DISCRETION AND CONVENIENCE WHEN AN ITEM CALLS FOR A TRENCH. THIS WORK WILL BE PAID AS A TRENCH CONDUIT INSTALLATION.
4. REFER TO THE ILLUMINATION CIRCUIT DIAGRAM FOR SYSTEM DETAILS.
5. REFER TO ELECTRICAL SERVICE DATA SHEET FOR ELECTRICAL SERVICE DESCRIPTION.
6. CONTRACTOR SHALL REPAIR THE EXISTING IRRIGATION SYSTEM, SIDEWALK AND CURB & GUTTER TO AN EQUAL OR BETTER CONDITION IF IT IS DAMAGED DURING CONSTRUCTION. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO CONDUIT AND ROADWAY ILLUMINATION POLE INSTALLATION.
7. CONTRACTOR SHALL VERIFY THAT ALL EXISTING SYSTEMS ARE FUNCTIONAL AFTER INSTALLATION OF CONDUIT AND ILLUMINATION. ANY NON-FUNCTIONING SYSTEMS AS A RESULT OF THIS INSTALLATION MUST BE REPAIRED TO AN EQUAL OR BETTER CONDITION BY THE CONTRACTOR. THIS WORK WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.
8. ROW IS SHOWN FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSABILITY TO DETERMINE THE EXACT LOCATION OF CITY AND STATE ROW.

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

1/5/2023

NO.	DATE	REVISION	APPROV.

consor
F-12040

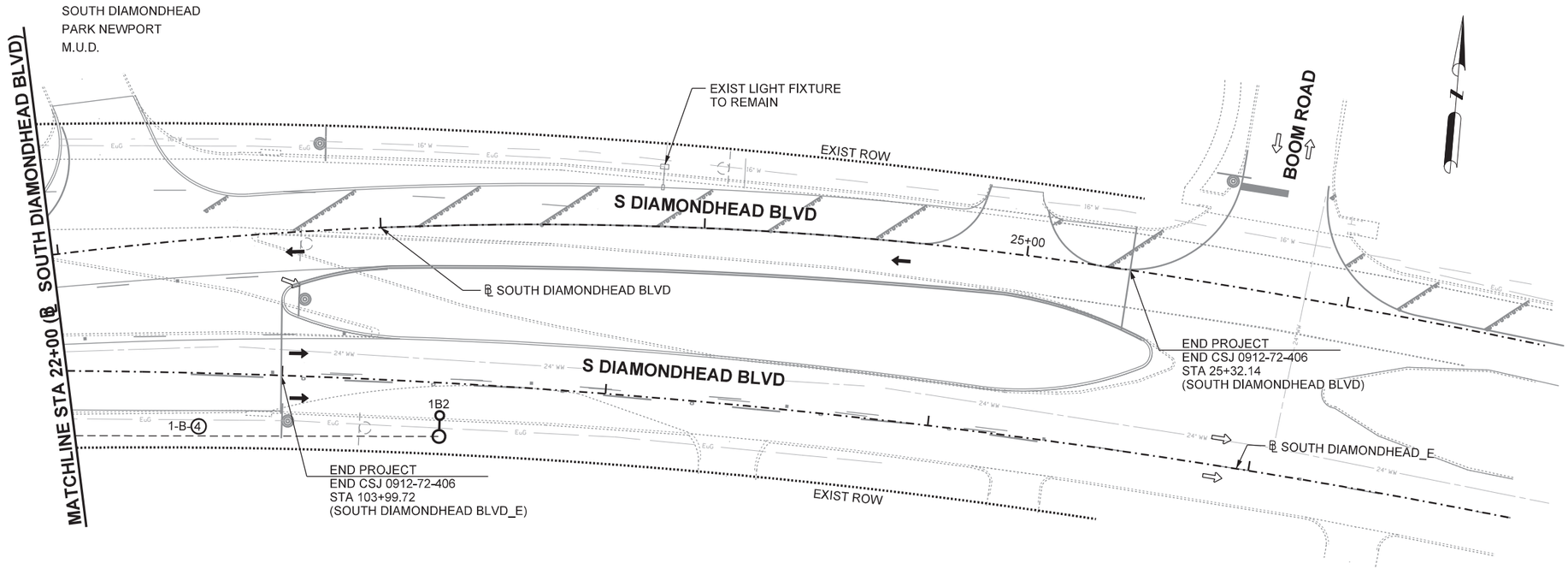
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

ILLUMINATION LAYOUT STA 18+00 TO STA 22+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		190
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- IN RD IL (TY ST) 40T-8 (250 W EQ) LED
- IN RD IL (TY ST) 40B-8 (250 W EQ) LED
- PROP 3/4" METAL RIGID CONDUIT
- PROP ILLUMINATION ELECTRICAL SERVICE
- PROP GROUND BOX TY A (W/ APRON)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- EXISTING LIGHT FIXTURE

RUN ID:

X-X-(X)

- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID:

XXX

- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

0 20′ 40′

SCALE: 1" = 40′

ROADWAY ILLUMINATION ASSEMBLY SUMMARY			
LUMINAIRE POLE NUMBER	DESCRIPTION	STATION	OFFSET
1B2	IN RD IL (TY ST) 40T-8 (250W EQ) LED	23+18	65' RT

CONDUIT AND CONDUCTOR SUMMARY										
SERVICE NO	CONDUIT STATUS	CIRCUIT LETTER	RUN NO	RUN LENGTH (FEET)	CONDUCTOR (NO & LENGTH IN FEET)				CONDUIT (NO & LENGTH IN FEET)	
					0620 6007		0620 6008		0618 6023	
					(GROUND) ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED		CONDT (PVC) (SCHD 40) (2")	
					NO	LF	NO	LF	NO	LF
1	I	B	4	115	1	120	2	240	1	115
TOTAL						120		240		115

NOTES:

1. THE CONTRACTOR SHALL CONFIRM ALL UTILITY DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
2. THE LOCATIONS OF ROADWAY ILLUMINATION POLES, GROUND BOXES AND ELECTRICAL SERVICE POLES SHOWN ON THESE PLANS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED TO ACCOMMODATE LOCAL CONDITIONS. EXACT LOCATION OF ROADWAY ILLUMINATION EQUIPMENT SHALL BE APPROVED BY THE ENGINEER IN THE FIELD.
3. THE CONTRACTOR HAS THE OPTION TO BORE AT HIS DISCRETION AND CONVENIENCE WHEN AN ITEM CALLS FOR A TRENCH. THIS WORK WILL BE PAID AS A TRENCH CONDUIT INSTALLATION.
4. REFER TO THE ILLUMINATION CIRCUIT DIAGRAM FOR SYSTEM DETAILS.
5. REFER TO ELECTRICAL SERVICE DATA SHEET FOR ELECTRICAL SERVICE DESCRIPTION.
6. CONTRACTOR SHALL REPAIR THE EXISTING IRRIGATION SYSTEM, SIDEWALK AND CURB & GUTTER TO AN EQUAL OR BETTER CONDITION IF IT IS DAMAGED DURING CONSTRUCTION. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO CONDUIT AND ROADWAY ILLUMINATION POLE INSTALLATION.
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8. ROW IS SHOWN FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSABILITY TO DETERMINE THE EXACT LOCATION OF CITY AND STATE ROW.

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

ILLUMINATION LAYOUT
STA 22+00 TO END PROJECT

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		191
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

LEGEND

- IN RD IL (TY ST) 40T-8 (250 W EQ) LED
- IN RD IL (TY ST) 40B-8 (250 W EQ) LED
- PROP 3/4" METAL RIGID CONDUIT
- PROP ILLUMINATION ELECTRICAL SERVICE
- PROP GROUND BOX TY A (W/ APRON)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- EXISTING LIGHT FIXTURE

RUN ID:

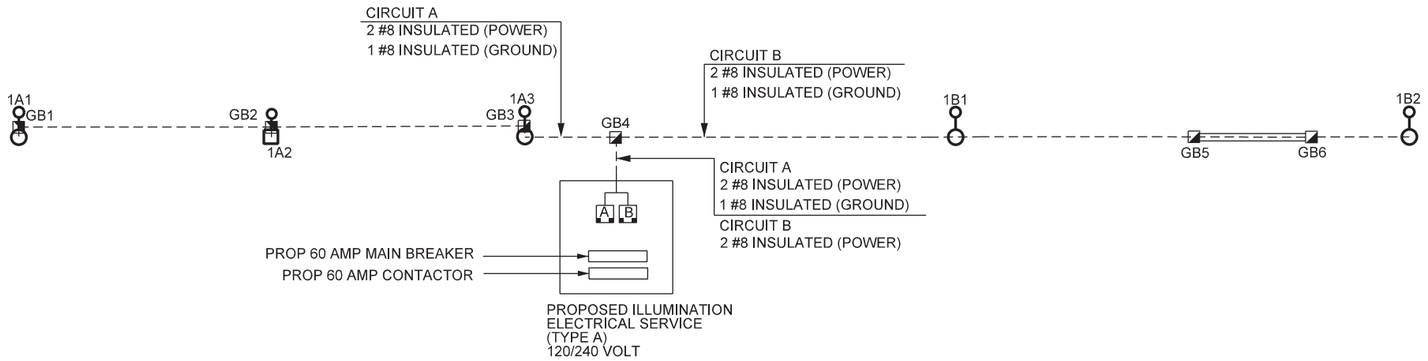
X-X-(X)

- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID:

XXX

- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER



SCALE = N.T.S

ELECTRICAL SERVICES DATA SHEET

Elec. Service No.	Sheet No.	Electrical Service Description	Service Conduit Size	Service Conductors No. / Size	Safety Switch Amps	Main Ckt. Bkr. Pole / Amp	Two-Pole Contactor Amps	Panelbd / Loadcenter Amp Rating	Circuit No.	Branch Ckt. Bkr. Pole / Amps	Branch Circuit Amps	KVA Load
1	ILLUMINATION SHEET 3 OF 4	ELEC SERV TY A(120/240)060(NS)SS(E)GC(O)	2"	3/#6	N/A	2P/60	60	N/A	A B	2P/20 2P/20	1 1	1.0

STATE OF TEXAS
YVONNE COLMENERO
130314
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

CIRCUIT DIAGRAM

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		192
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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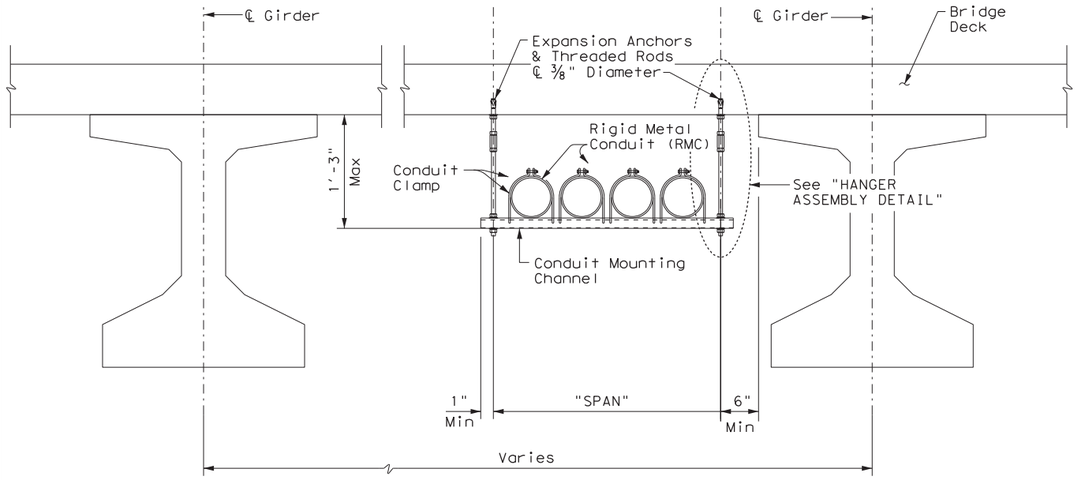
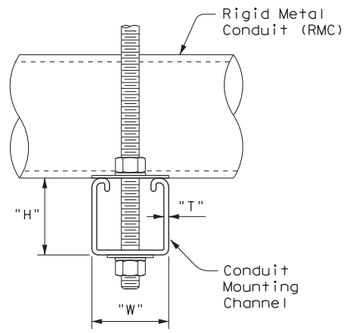


CONDUIT HANGING DETAIL

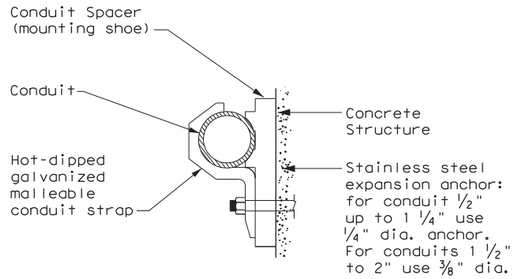
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

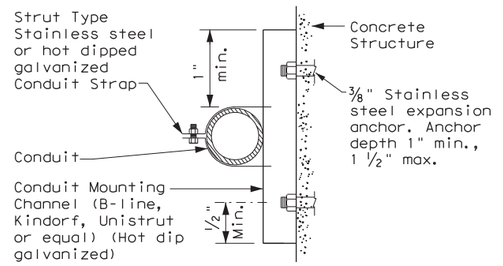
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.



HANGER ASSEMBLY DETAIL

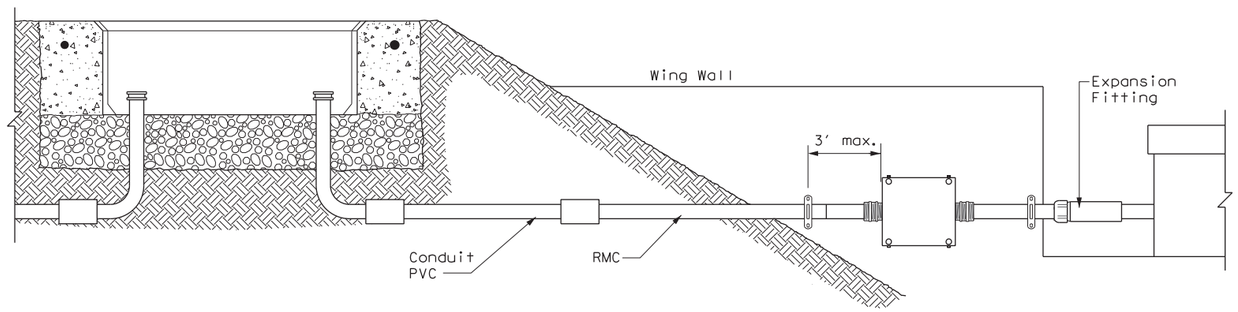
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

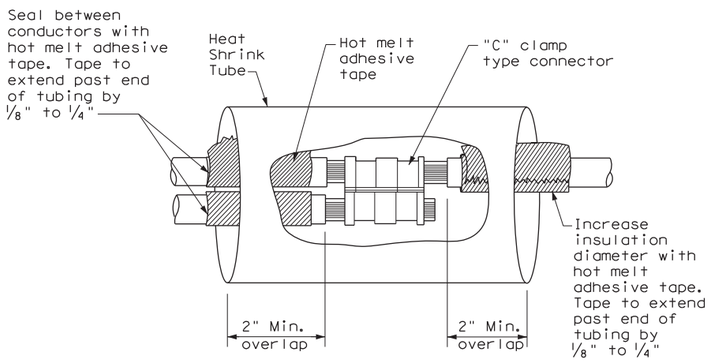
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

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

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

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



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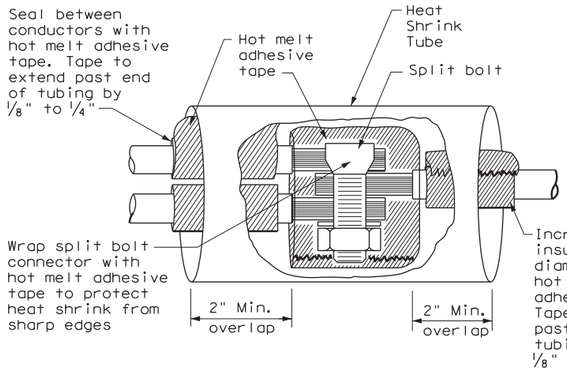
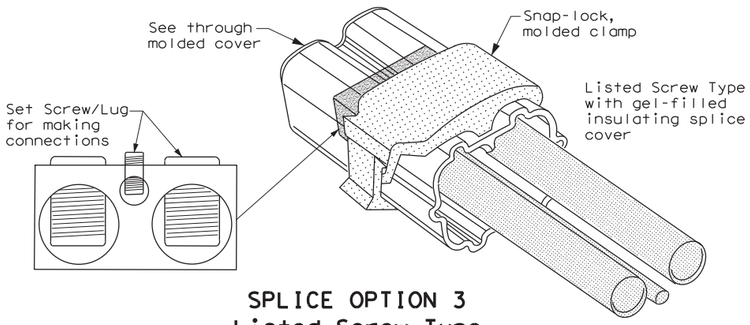


SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

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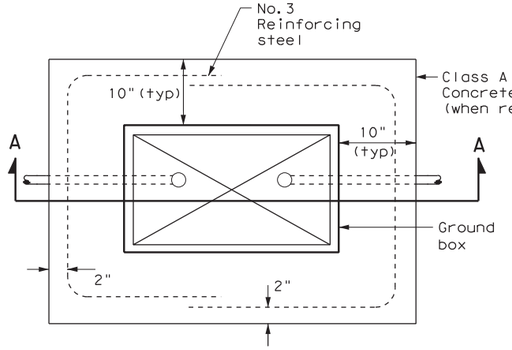
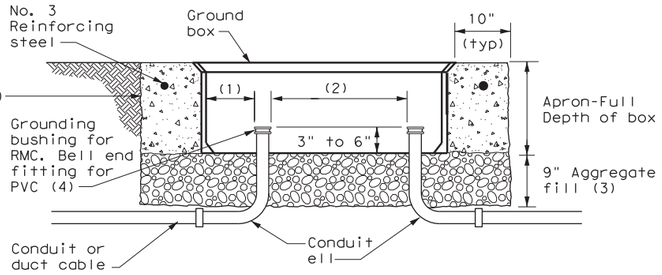


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

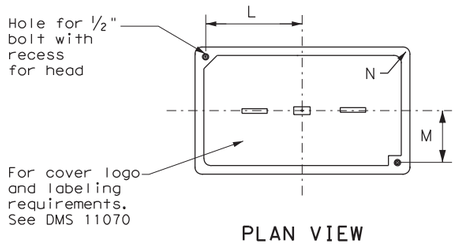
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND 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



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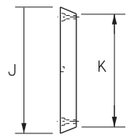

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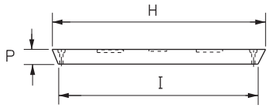

SIDE

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
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REVISIONS	0912	72	406	CS
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	HOU	HARRIS		196

71D

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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

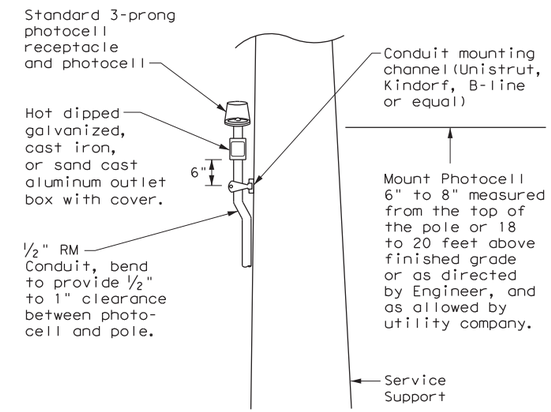
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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
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	HOU	HARRIS		197

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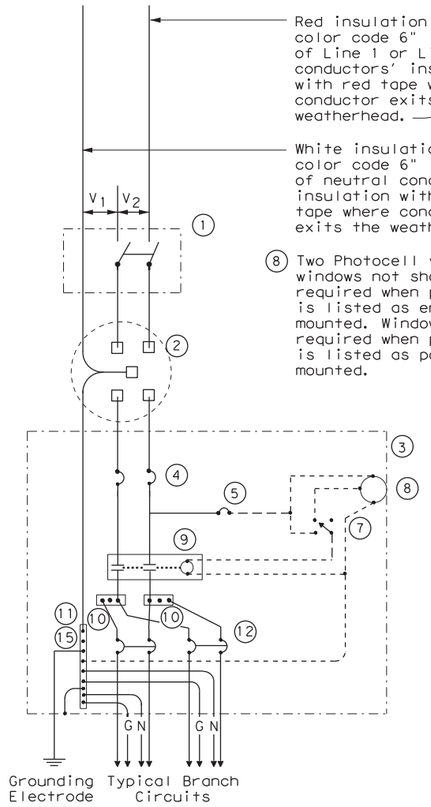
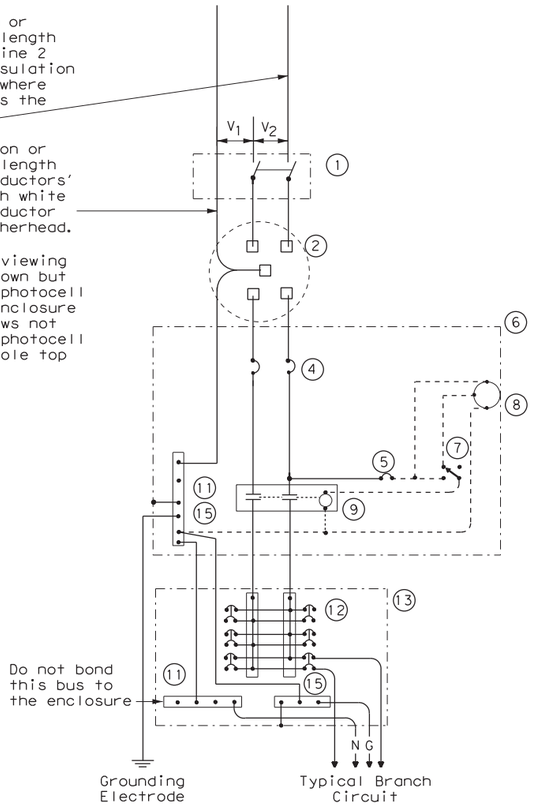
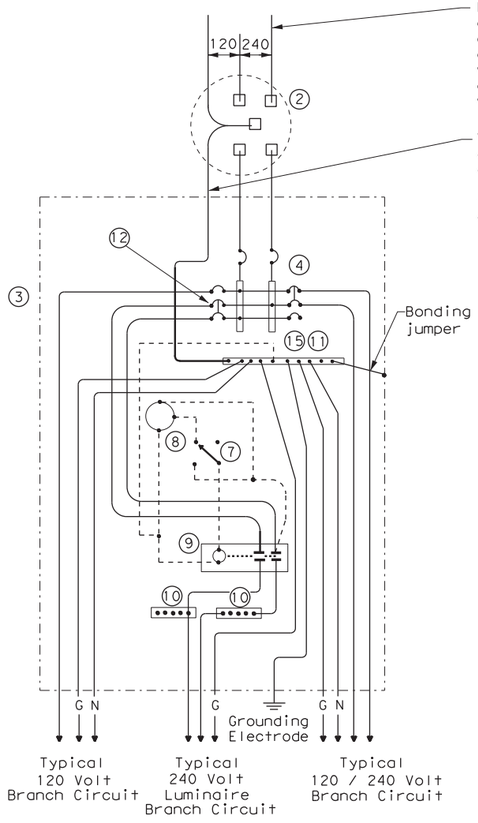


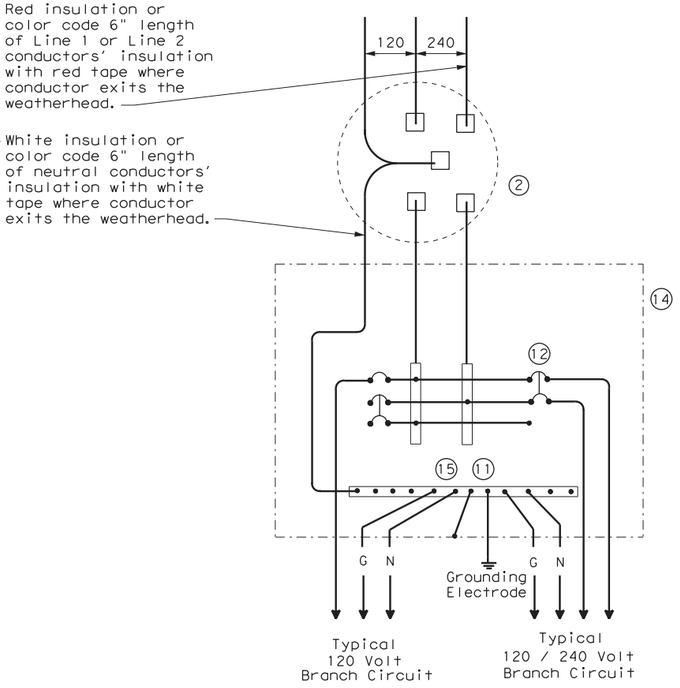
SCHEMATIC TYPE A
THREE WIRE



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

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Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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	HOU	HARRIS		198

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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in ½ in. PVC to ground rod - extend ½ in. PVC 6 in. underground.

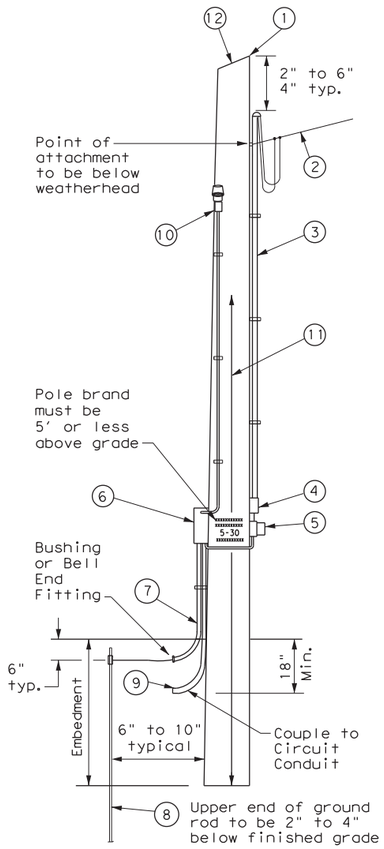
(8) ⅝ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

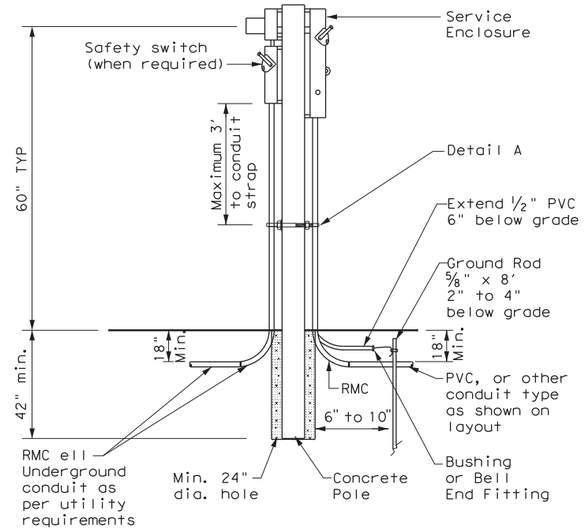


SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

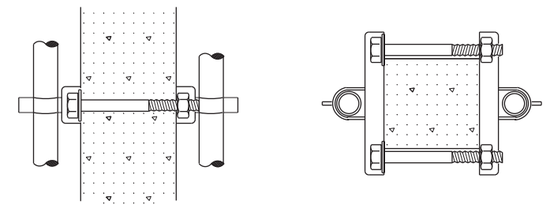
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



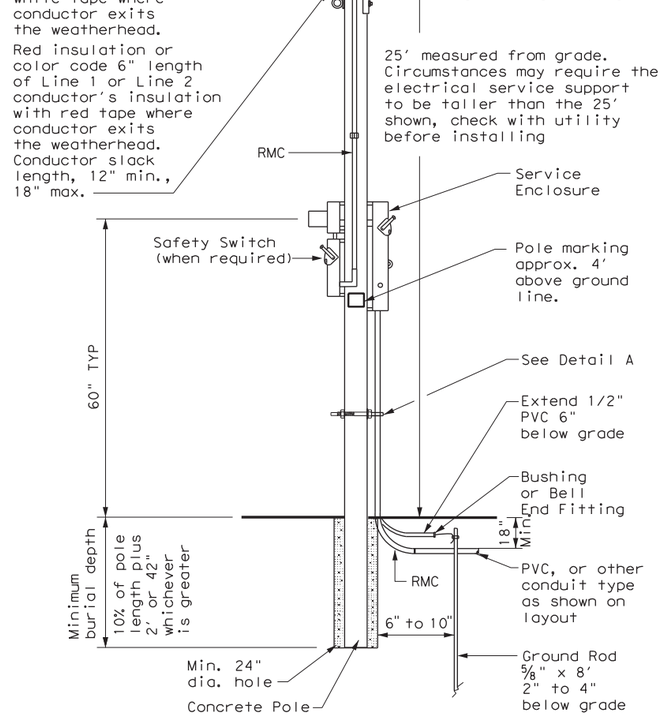
CONCRETE SERVICE SUPPORT

Underground (U)



DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.



CONCRETE SERVICE SUPPORT

Overhead (O)

SHEET 7 OF 7

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. 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, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

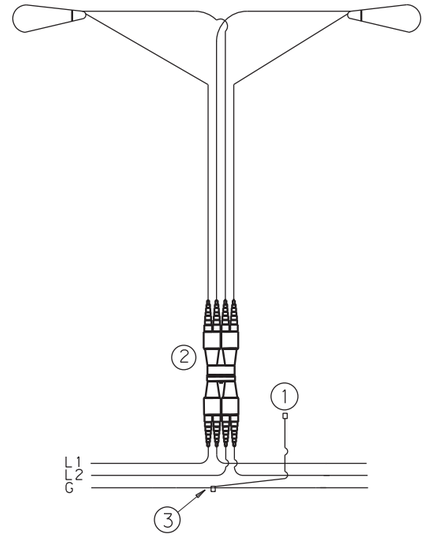
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

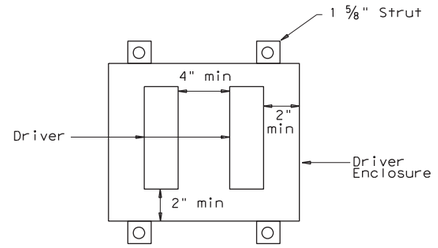
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

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ROADWAY ILLUMINATION DETAILS

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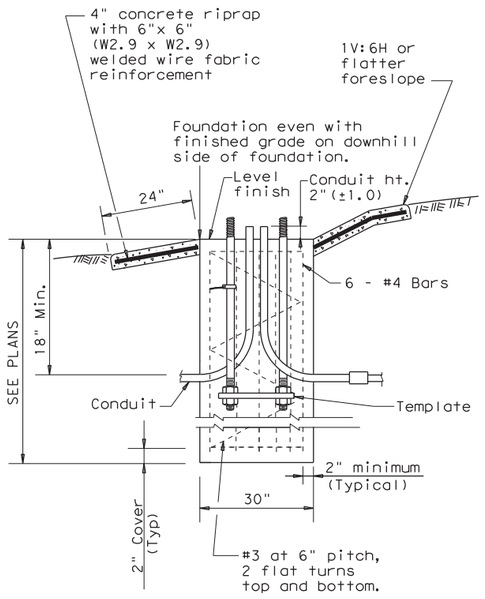
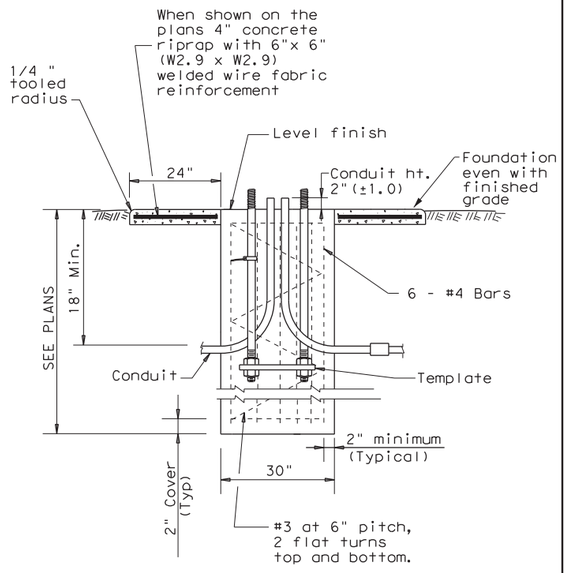


SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS
(See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

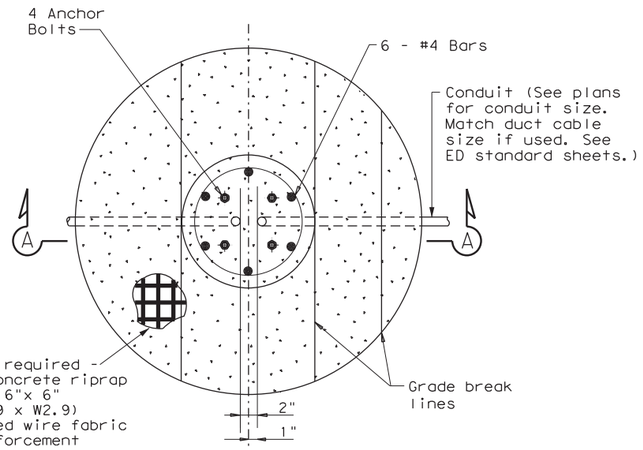
TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

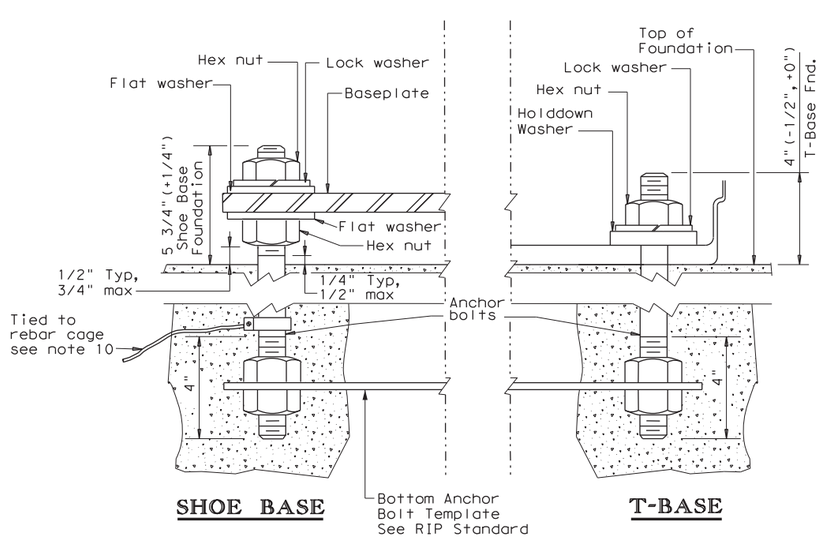
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.



FOUNDATION DETAIL



SHOE BASE

T-BASE

ANCHOR BOLT DETAIL

TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

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ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation Pole	A1	A2	Luminaire	Quantity	T-Base Designation Pole	A1	A2	Luminaire	Quantity	CSB/SSCB Mounted Designation Pole	A1	A2	Luminaire	Quantity
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED		(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
	(Type SA 50 S - 10 - 10)			(400W EQ) LED		(Type SA 50 T - 10 - 10)			(400W EQ) LED		(Type SP 48 S - 10 - 10)			(400W EQ) LED	
	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation Pole	A1	A2	Luminaire	Quantity

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
  ST: Pole and mast arm must be steel.
  AL: Pole and mast arm must be aluminum.
  SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).
- Two numerical digits denote nominal mounting height in feet.
- Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)
- First number denotes length of mast arm in feet.
- Use of second mast arm is indicated by second dashed number which denotes length in feet.
- Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)
- Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

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ROADWAY ILLUMINATION POLES

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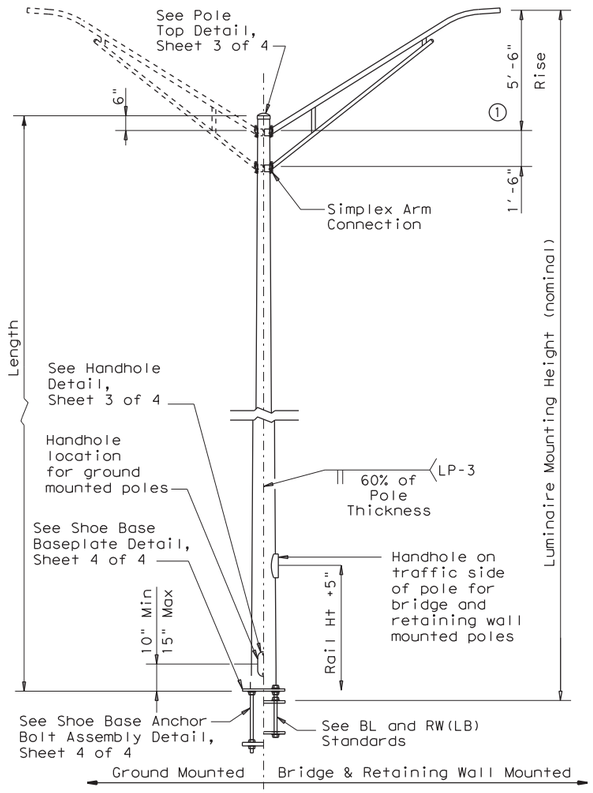
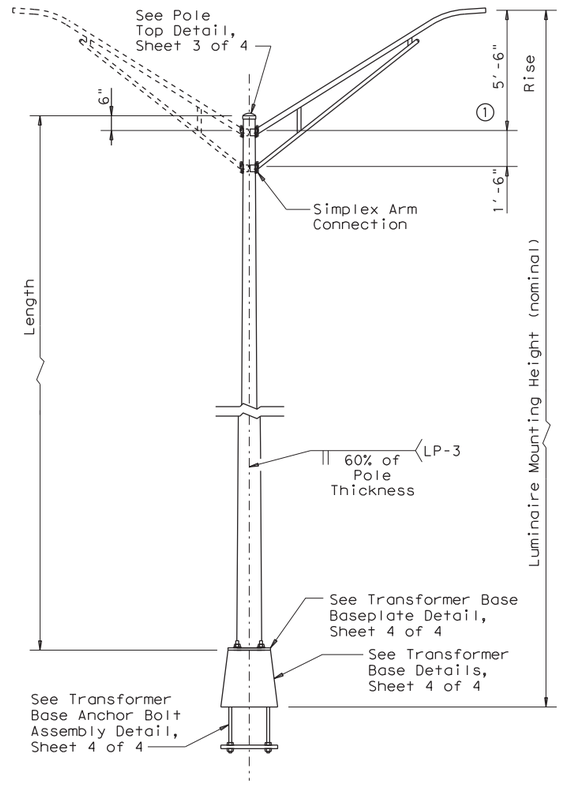


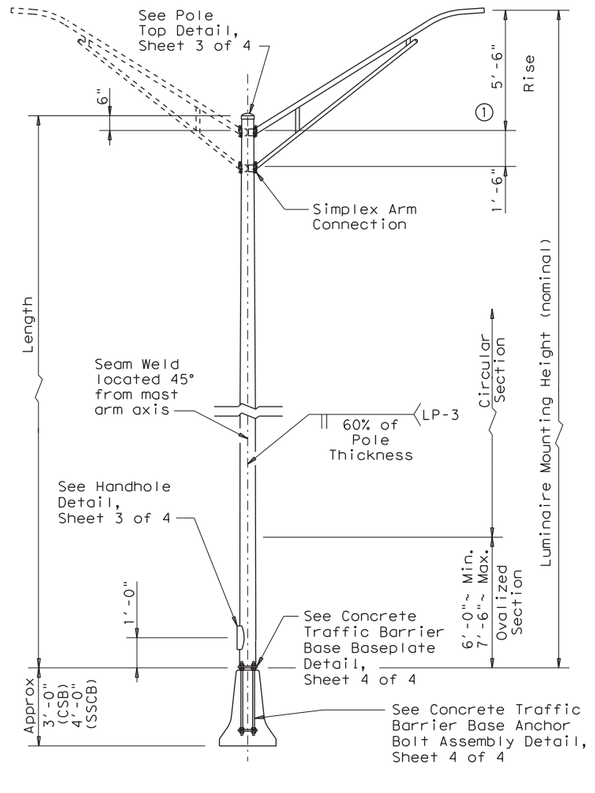
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance 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 these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

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ROADWAY ILLUMINATION POLES

RIP(2)-19

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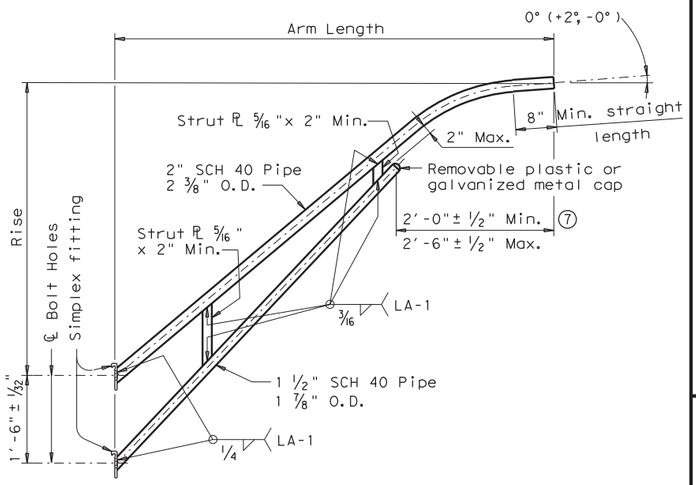
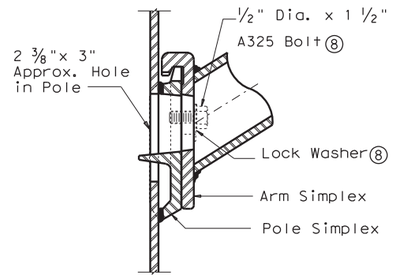


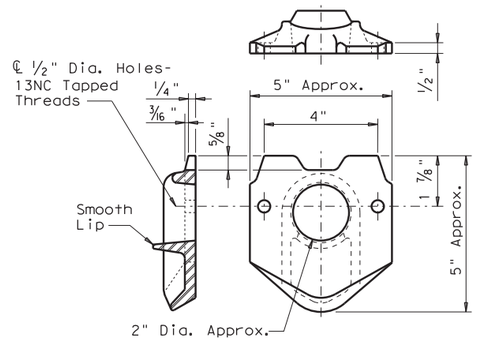
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

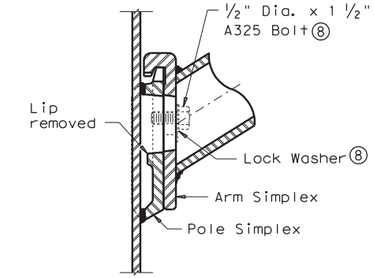
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

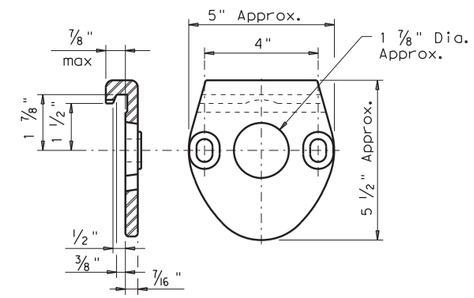


POLE SIMPLEX DETAIL ⑨



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ 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.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

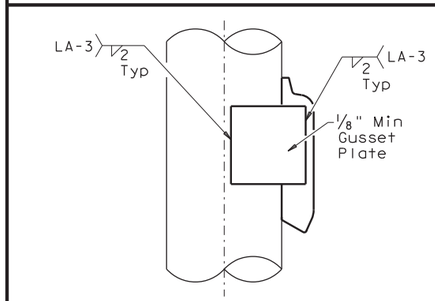
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 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.

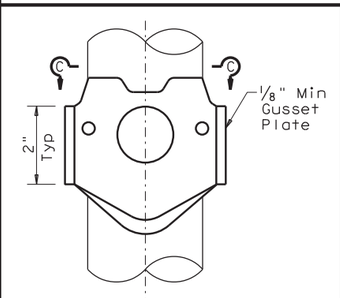
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE



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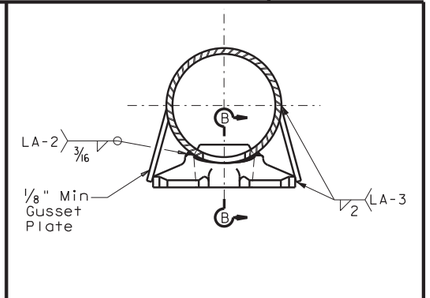
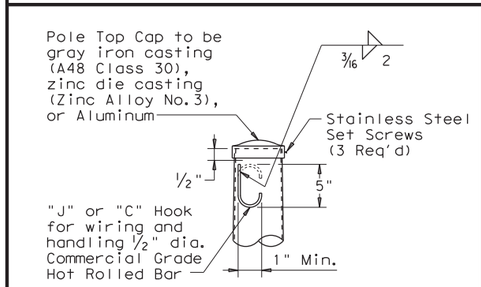
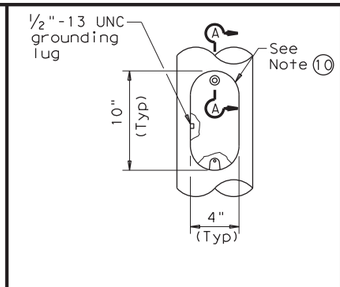


SECTION C-C

SIMPLEX ATTACHMENT DETAIL



POLE TOP



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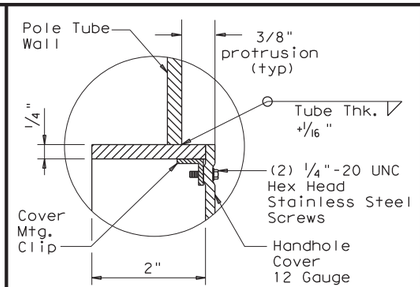

SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
7-17	DIST	COUNTY		SHEET NO.
12-19	HOU	HARRIS		204

73C

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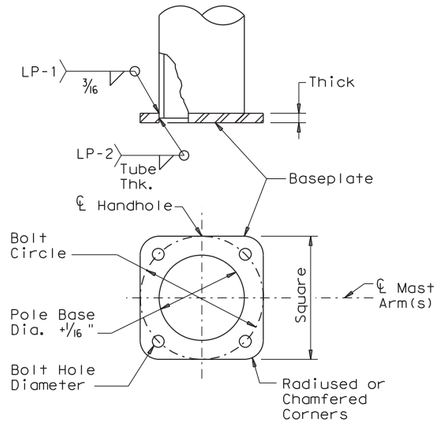
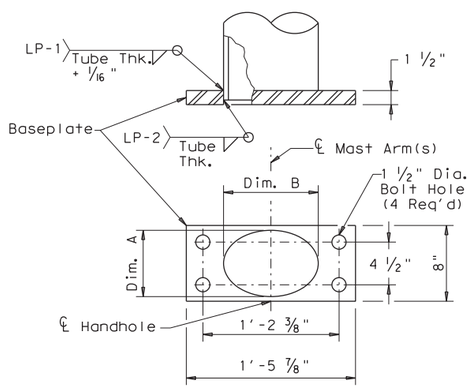


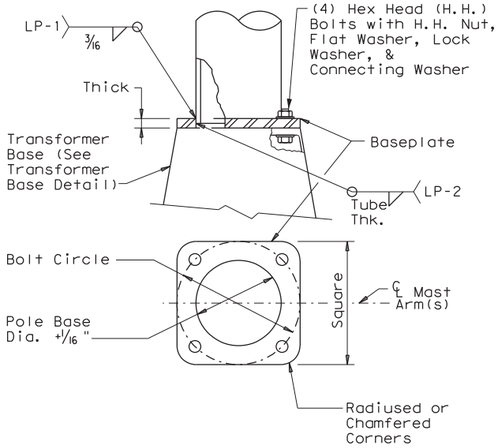
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



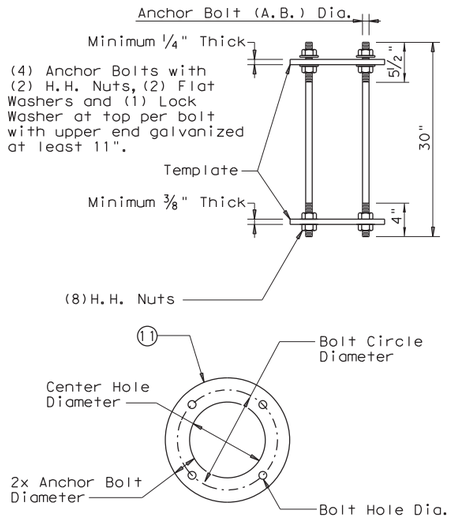
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′ - 38′	9"	7"± 1/4"	10"± 1/4"
48′	10 1/2"	7"± 1/4"	13"± 1/4"



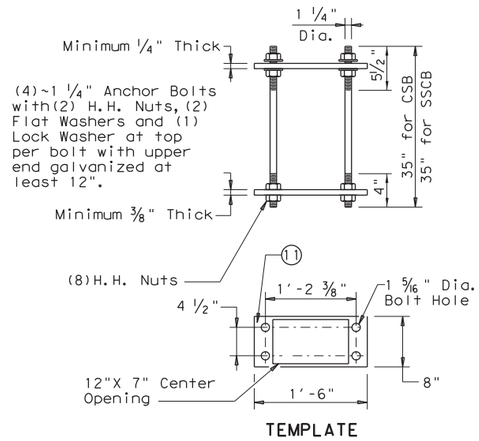
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



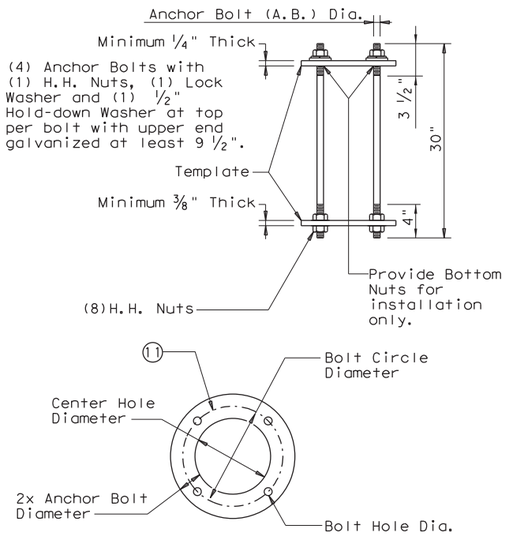
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



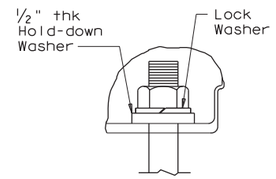
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

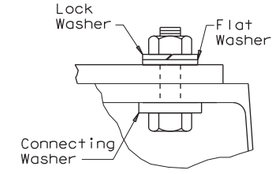


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

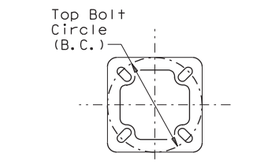
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



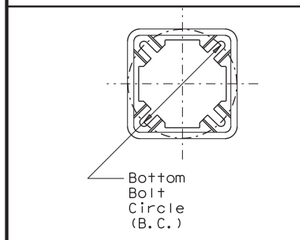
DETAIL A



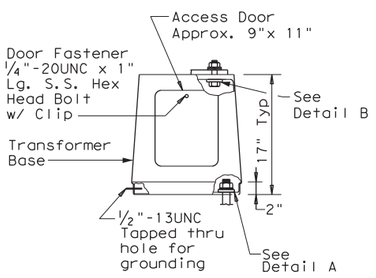
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

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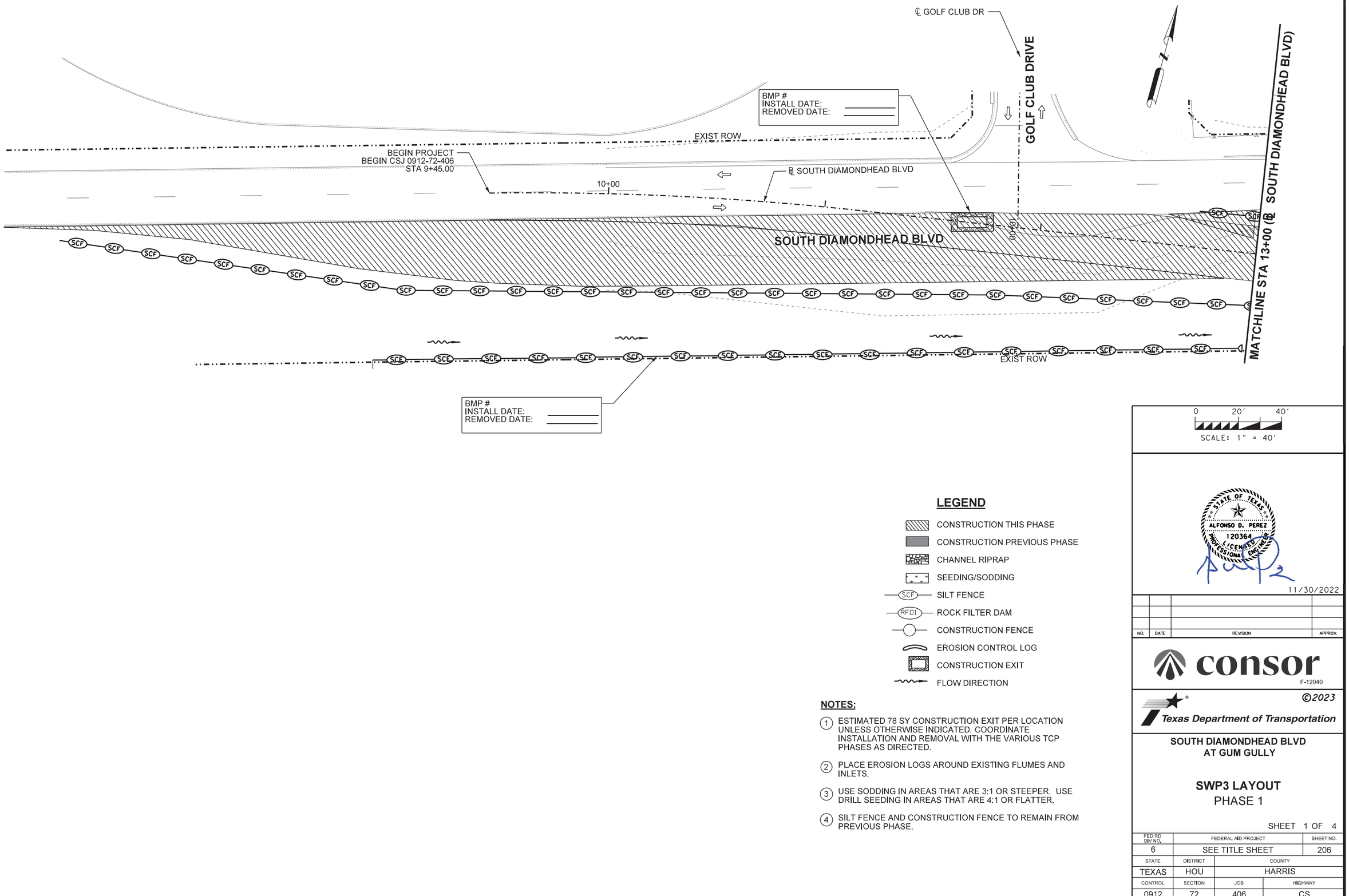
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		205

730



0 20′ 40′

SCALE: 1" = 40′

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFD1 — ROCK FILTER DAM
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

NOTES:

1. ESTIMATED 78 SY CONSTRUCTION EXIT PER LOCATION UNLESS OTHERWISE INDICATED. COORDINATE INSTALLATION AND REMOVAL WITH THE VARIOUS TCP PHASES AS DIRECTED.
2. PLACE EROSION LOGS AROUND EXISTING FLUMES AND INLETS.
3. USE SODDING IN AREAS THAT ARE 3:1 OR STEEPER. USE DRILL SEEDING IN AREAS THAT ARE 4:1 OR FLATTER.
4. SILT FENCE AND CONSTRUCTION FENCE TO REMAIN FROM PREVIOUS PHASE.

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 1

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		206
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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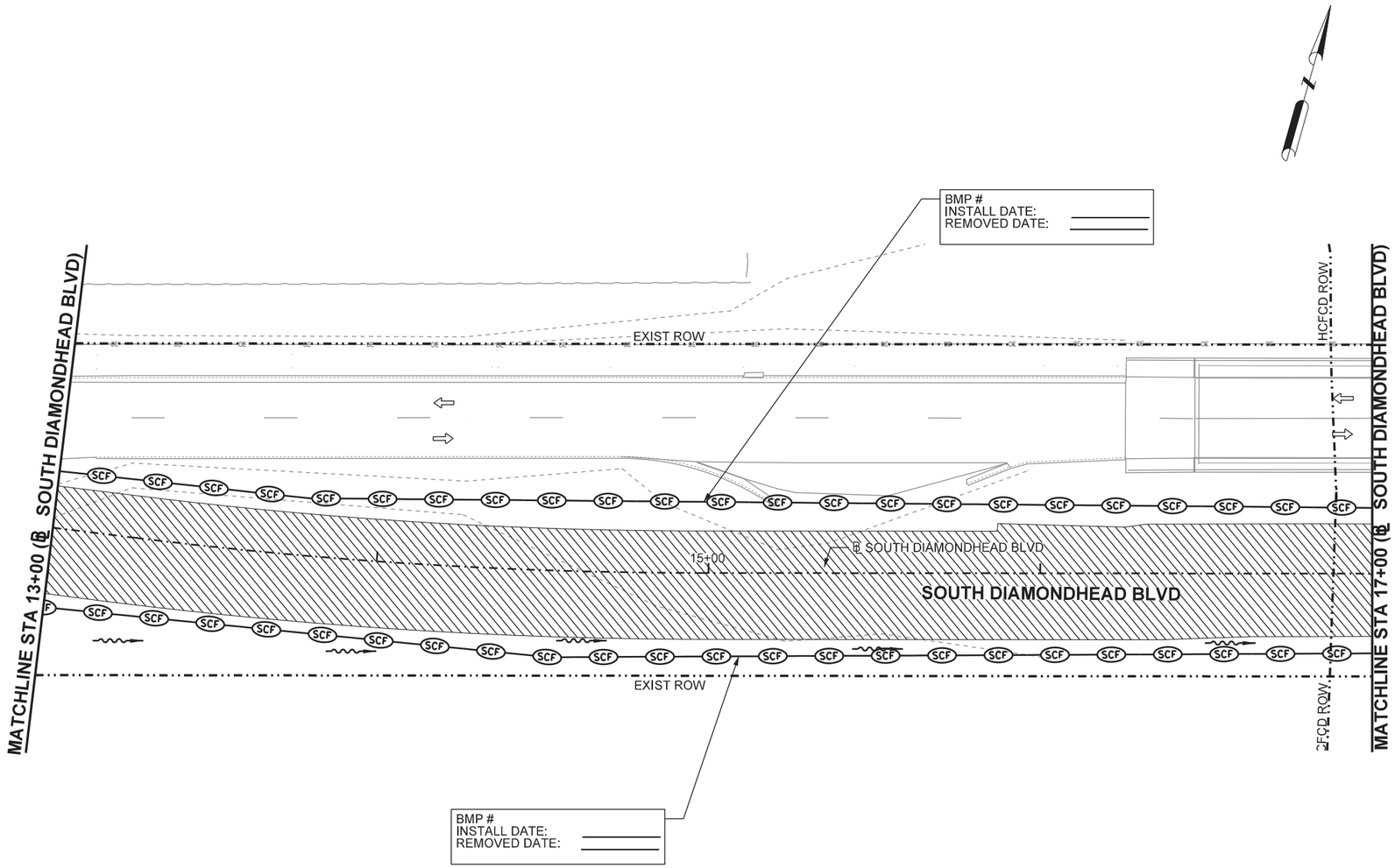

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SILT FENCE (SCF)
- ROCK FILTER DAM (RFDI)
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

NOTES:

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0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
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LICENSED PROFESSIONAL ENGINEER

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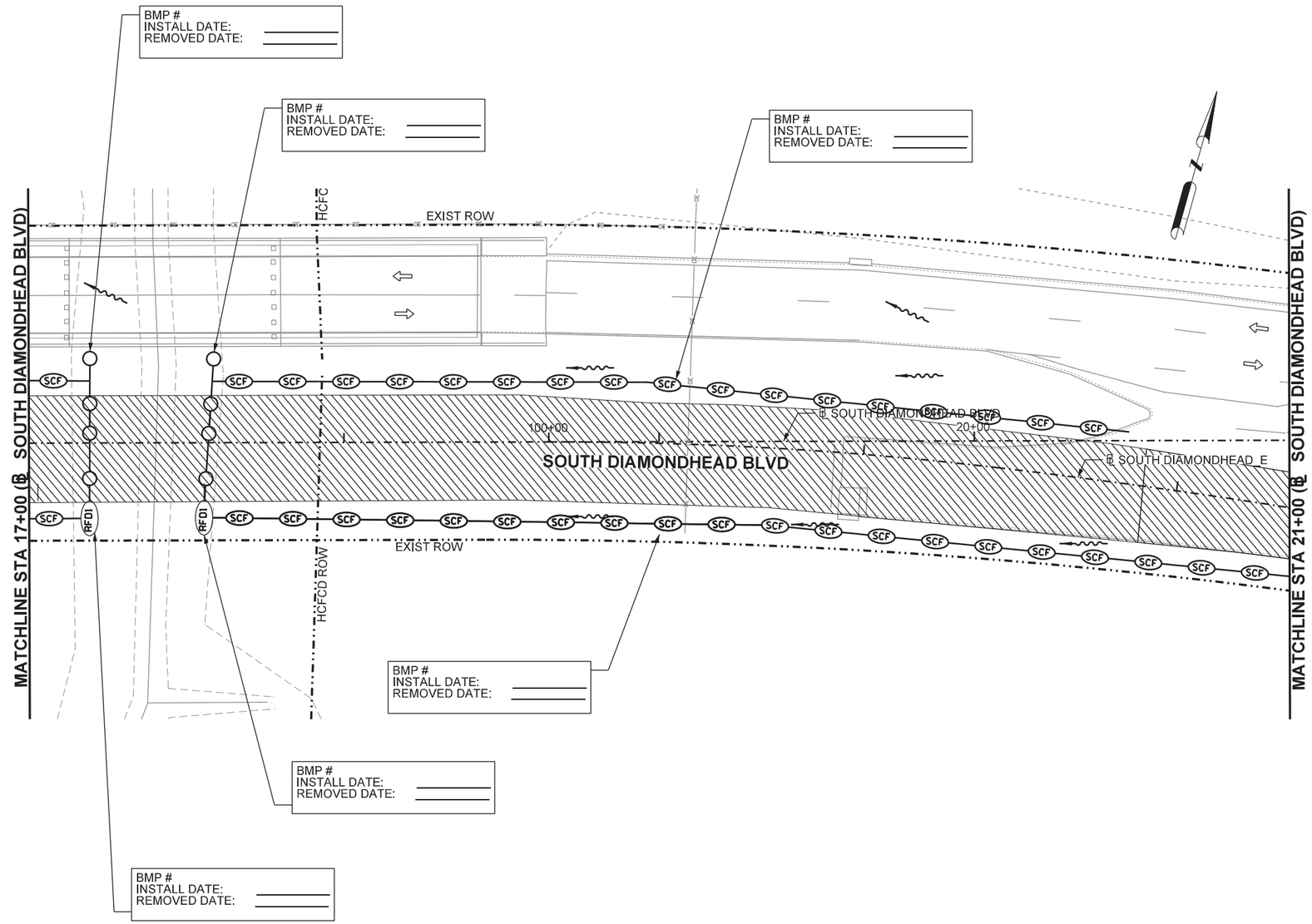
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 1
STA 13+00 TO STA 17+00
SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		207
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFDI — ROCK FILTER DAM
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

NOTES:

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0 20′ 40′

SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
120364
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PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 1
STA 17+00 TO STA 21+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		208
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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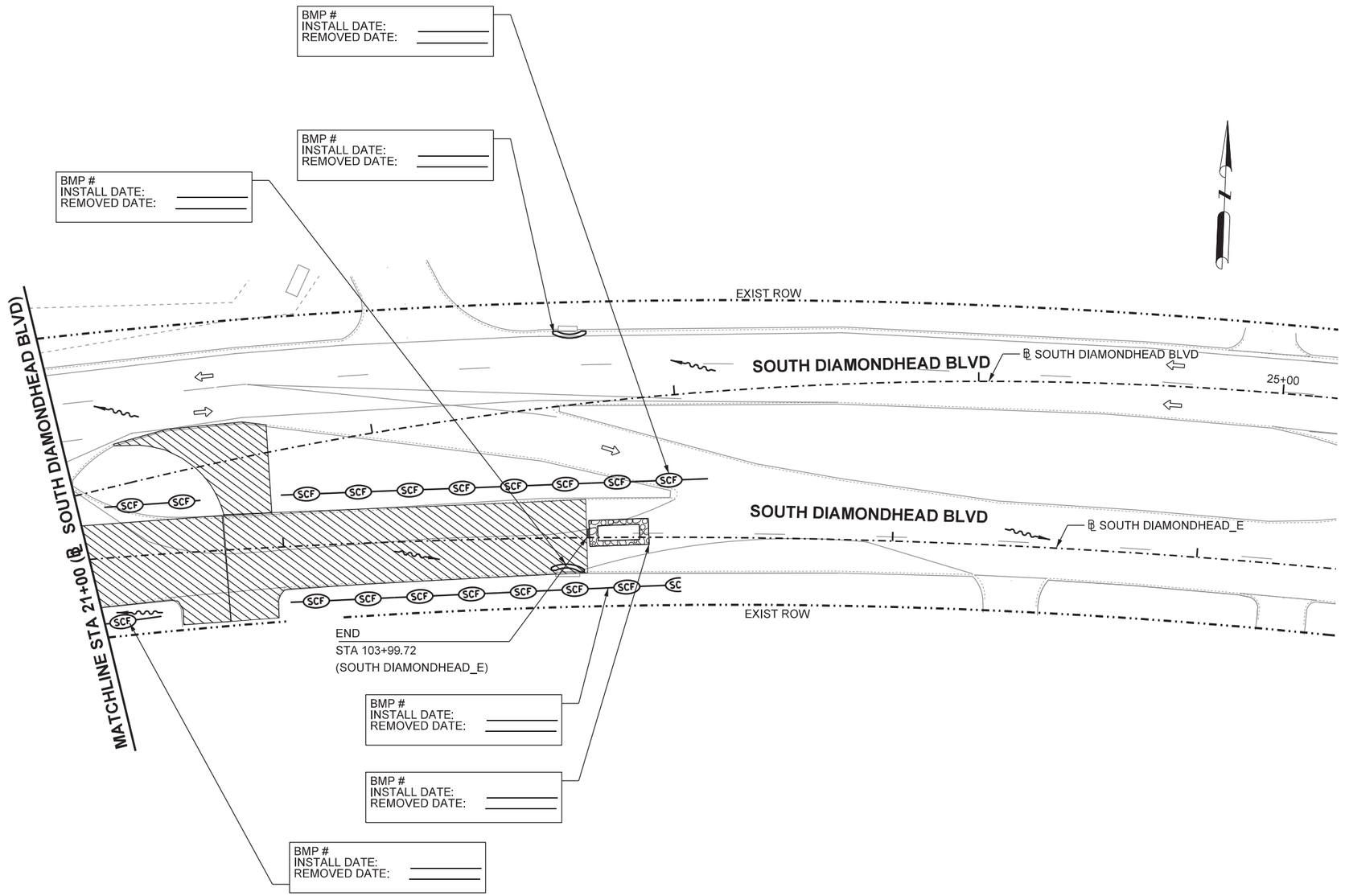

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SILT FENCE (SCF)
- ROCK FILTER DAM (RFD1)
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

NOTES:

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0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 1
STA 21+00 TO STA 25+00
SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		209
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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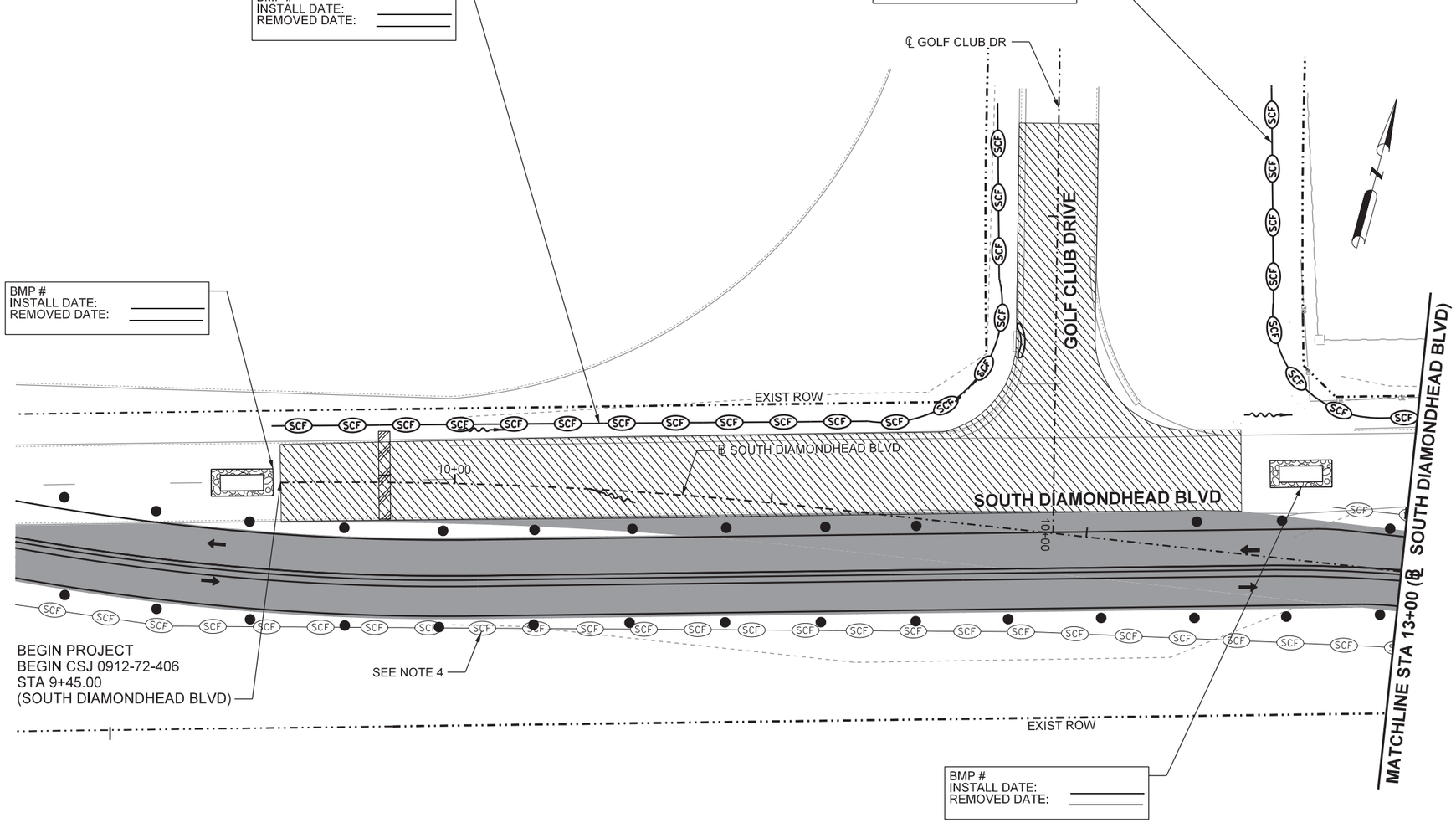

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFDI — ROCK FILTER DAM
- CONSTRUCTION FENCE
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3. USE SODDING IN AREAS THAT ARE 3:1 OR STEEPER. USE DRILL SEEDING IN AREAS THAT ARE 4:1 OR FLATTER.
4. SILT FENCE AND CONSTRUCTION FENCE TO REMAIN FROM PREVIOUS PHASE.

0 20′ 40′
SCALE: 1" = 40′

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 2
BEGIN PROJECT TO STA 13+00

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		210
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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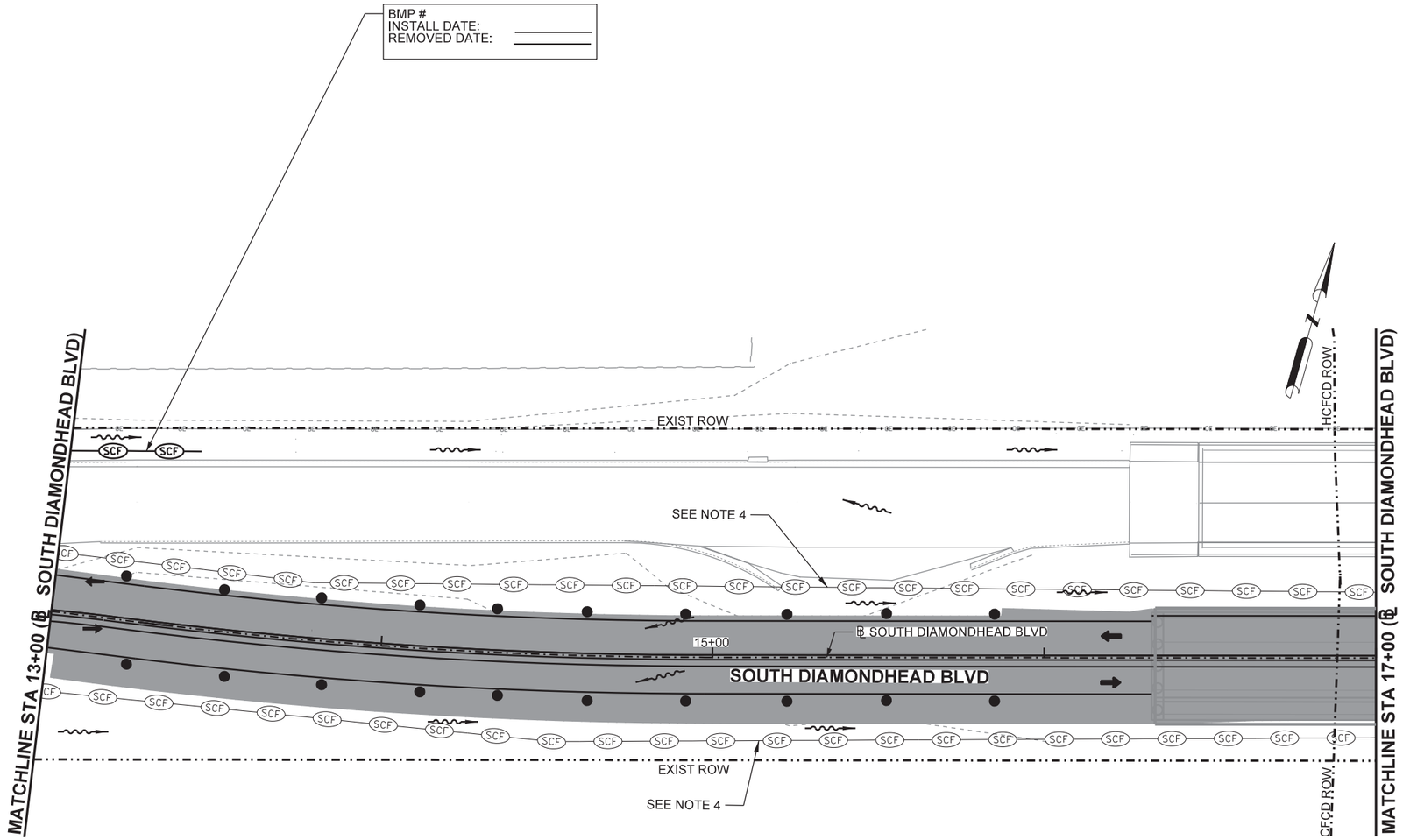

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFD1 — ROCK FILTER DAM
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 2
STA 13+00 TO STA 17+00
SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		211
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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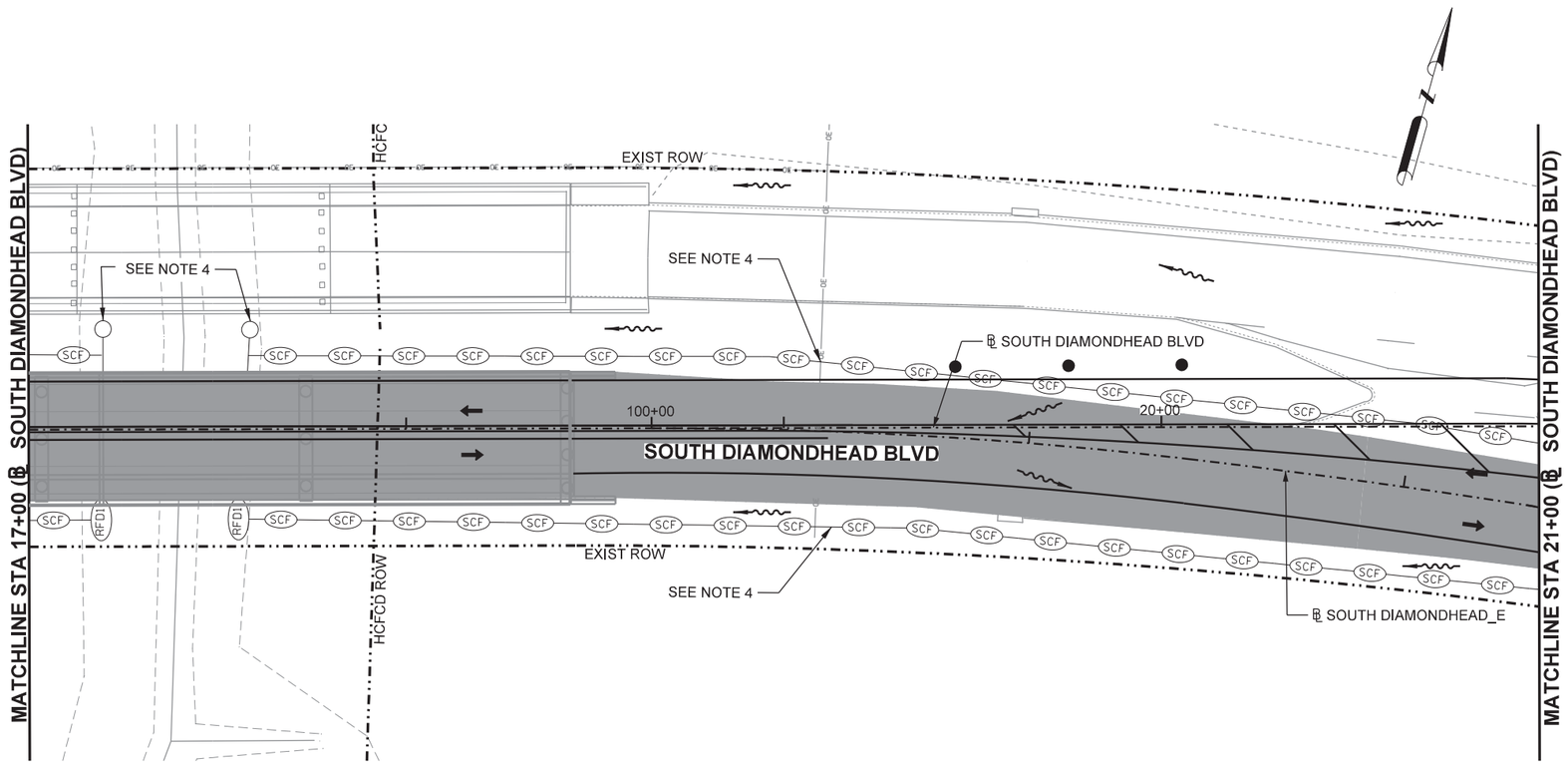

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SILT FENCE
- ROCK FILTER DAM
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 2
STA 17+00 TO STA 21+00

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		212
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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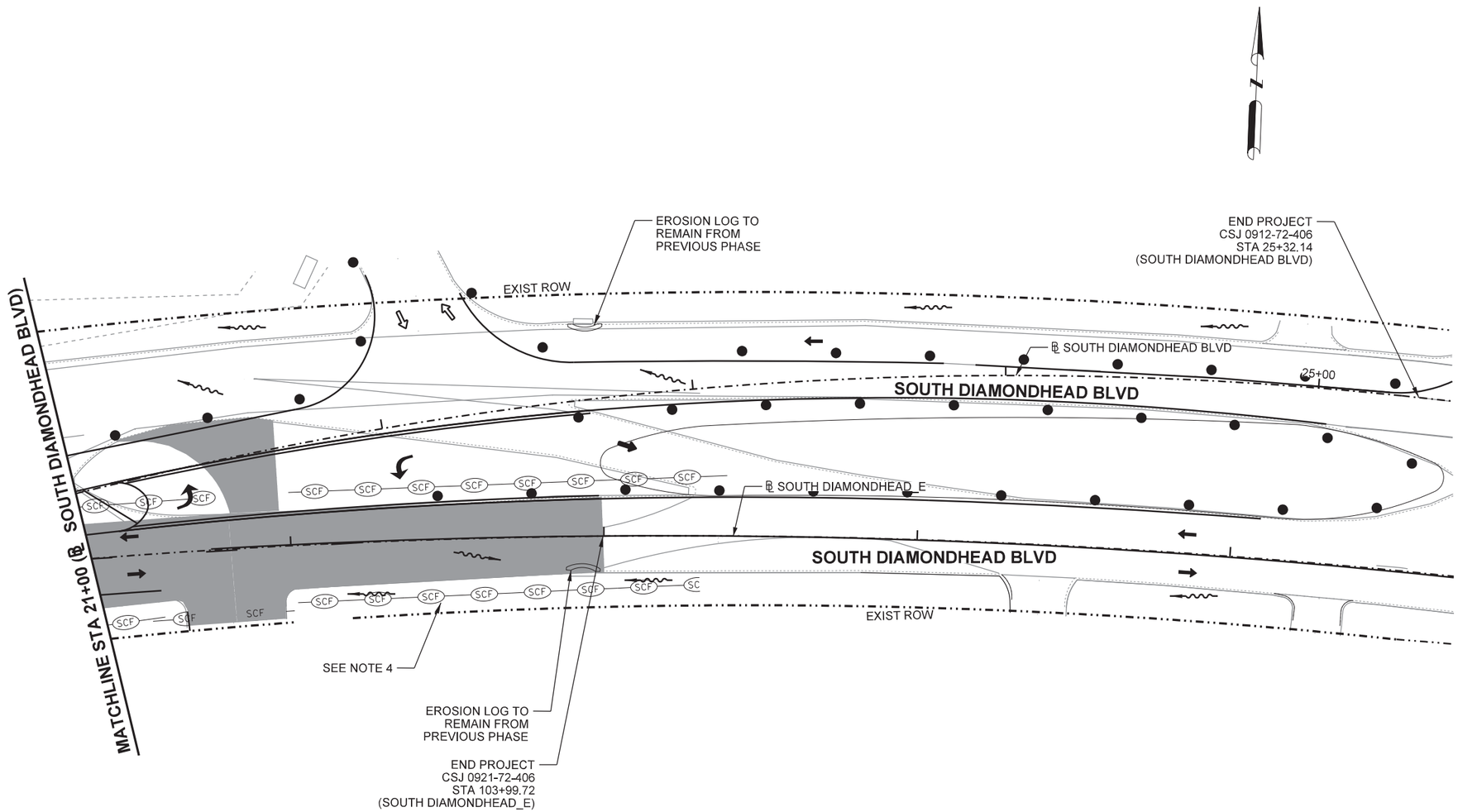

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFDI — ROCK FILTER DAM
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

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STATE OF TEXAS
ALFONSO D. PEREZ
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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD AT GUM GULLY

SWP3 LAYOUT
PHASE 2
STA 21+00 TO STA 25+50
SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		213
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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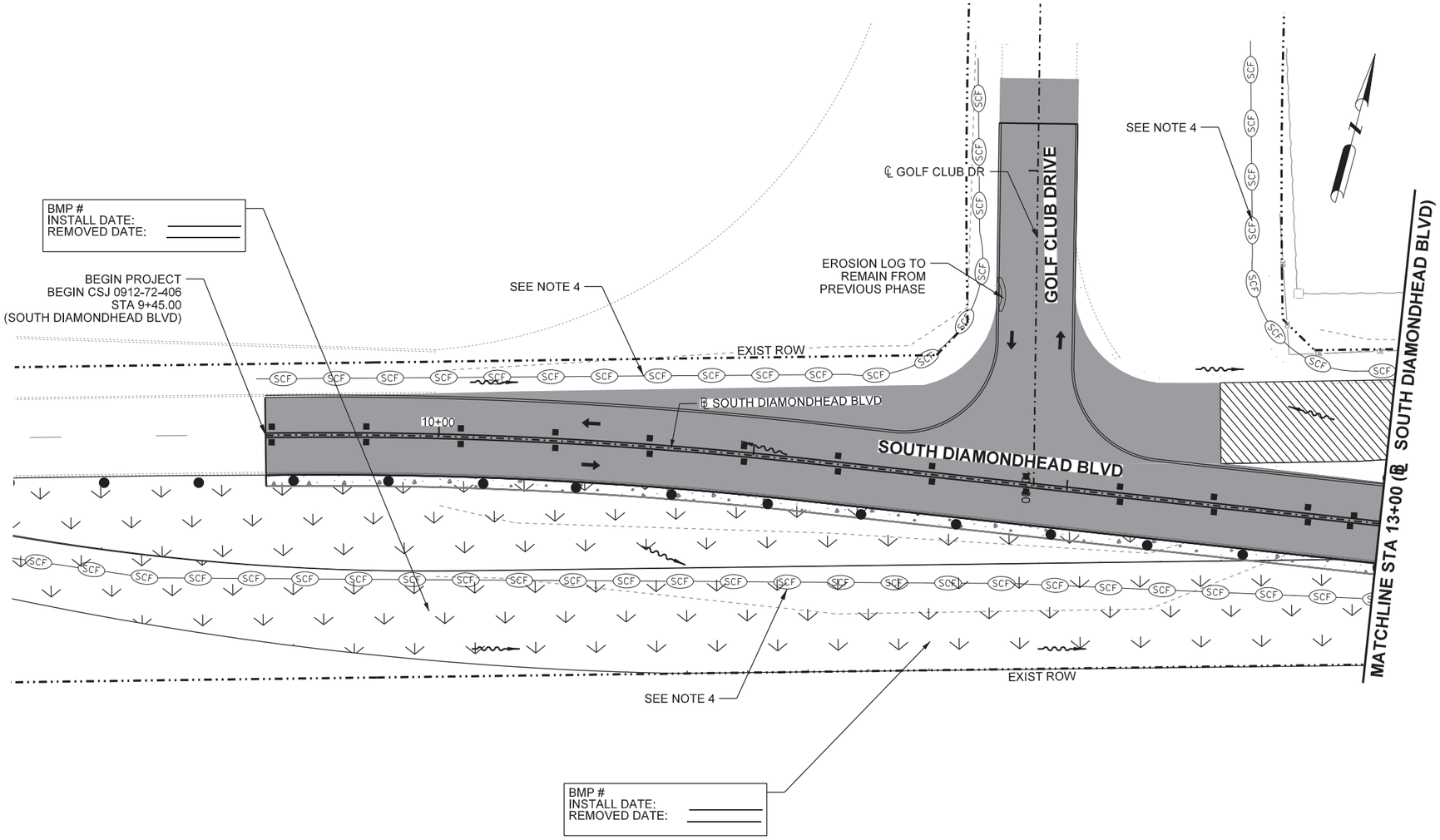

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFDI — ROCK FILTER DAM
- CONSTRUCTION FENCE
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STATE OF TEXAS
ALFONSO D. PEREZ
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LICENSED PROFESSIONAL ENGINEER

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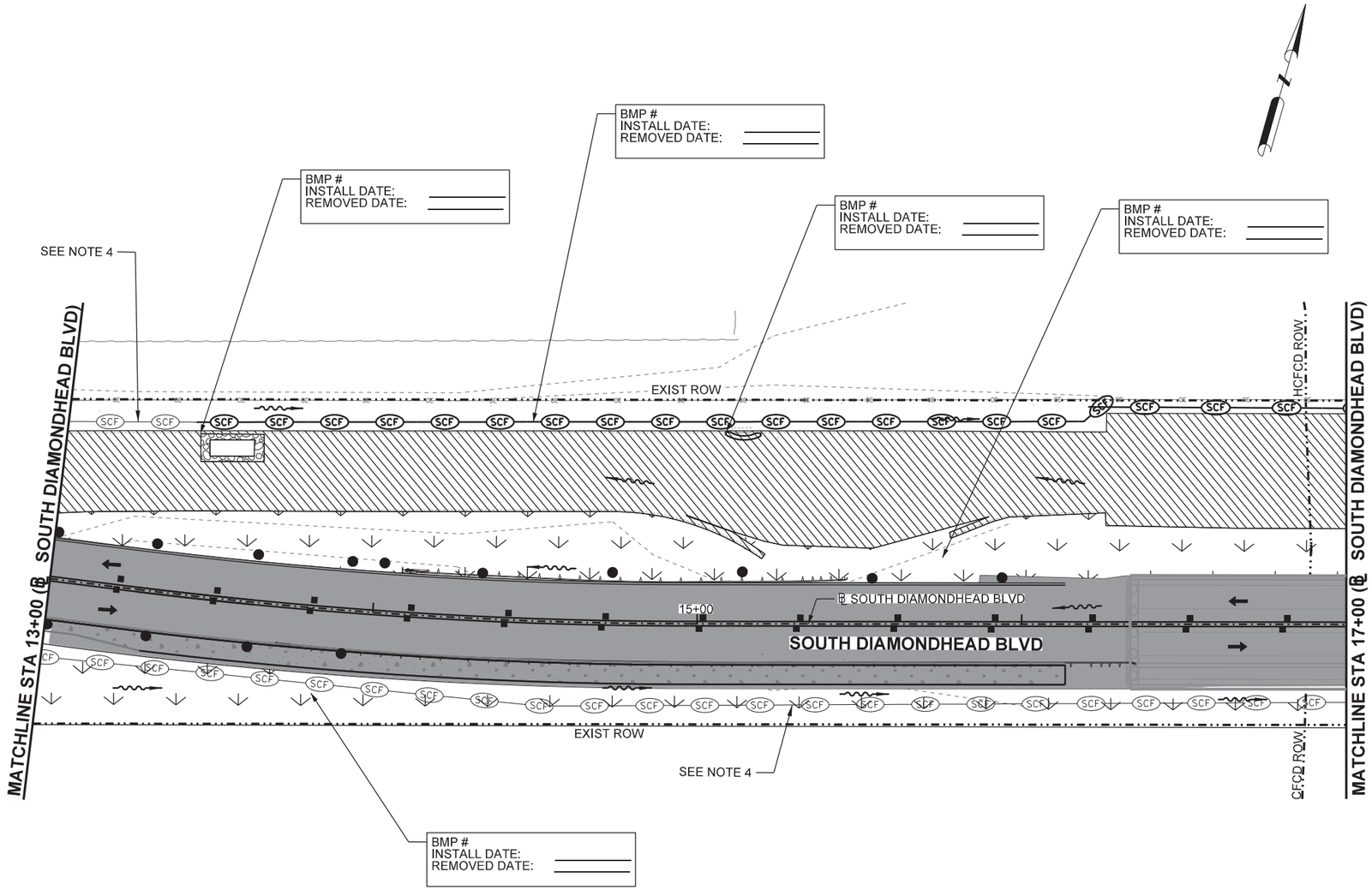
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 3
BEGIN PROJECT TO STA 13+00

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		214
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SILT FENCE (SCF)
- ROCK FILTER DAM (RFD1)
- CONSTRUCTION FENCE
- EROSION CONTROL LOG
- CONSTRUCTION EXIT
- FLOW DIRECTION

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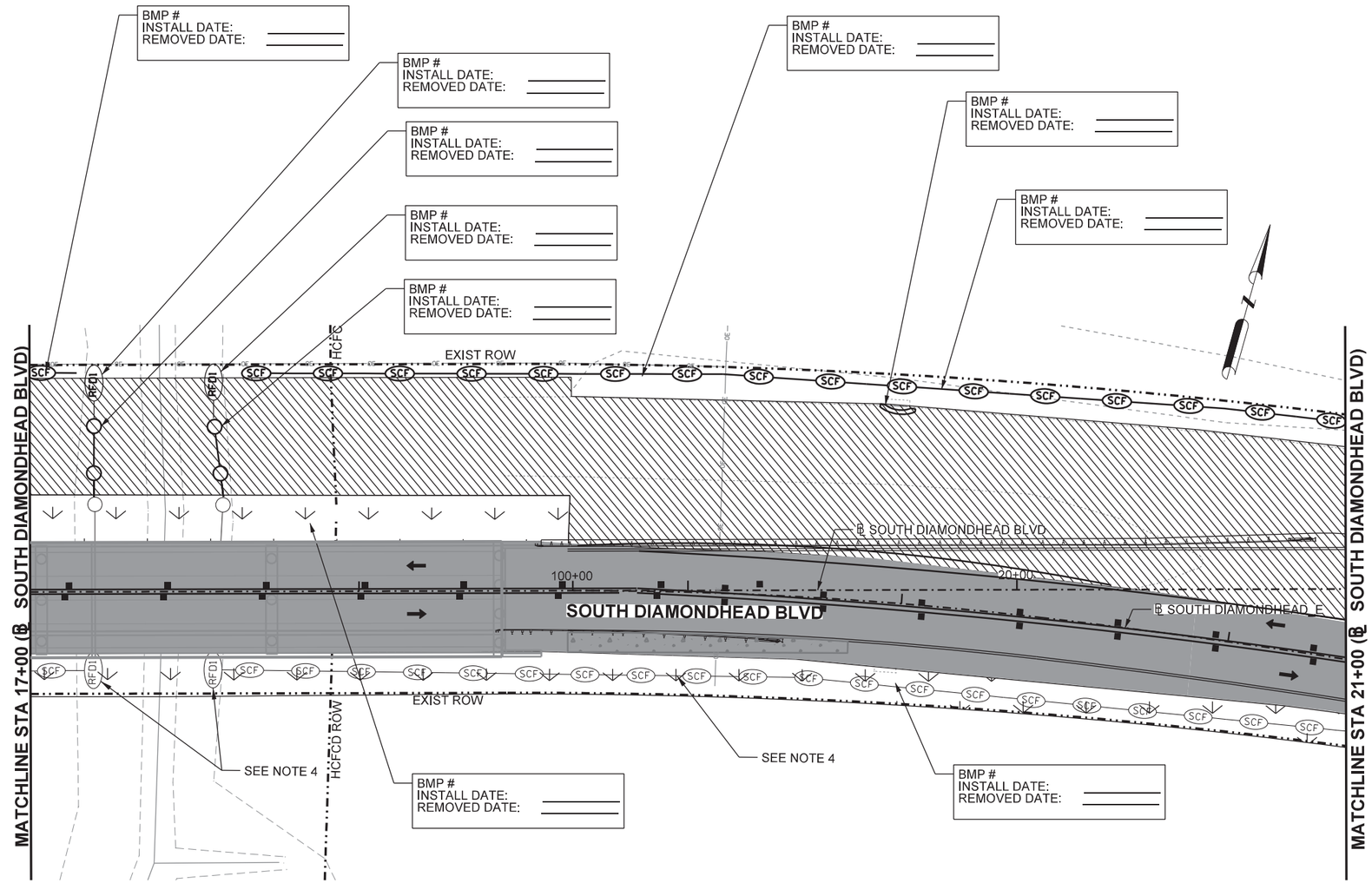
SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 3
STA 13+00 TO STA 17+00
SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		215
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



LEGEND

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- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
- SCF — SILT FENCE
- RFD1 — ROCK FILTER DAM
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- CONSTRUCTION EXIT
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SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 3
STA 17+00 TO STA 21+00
SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		216
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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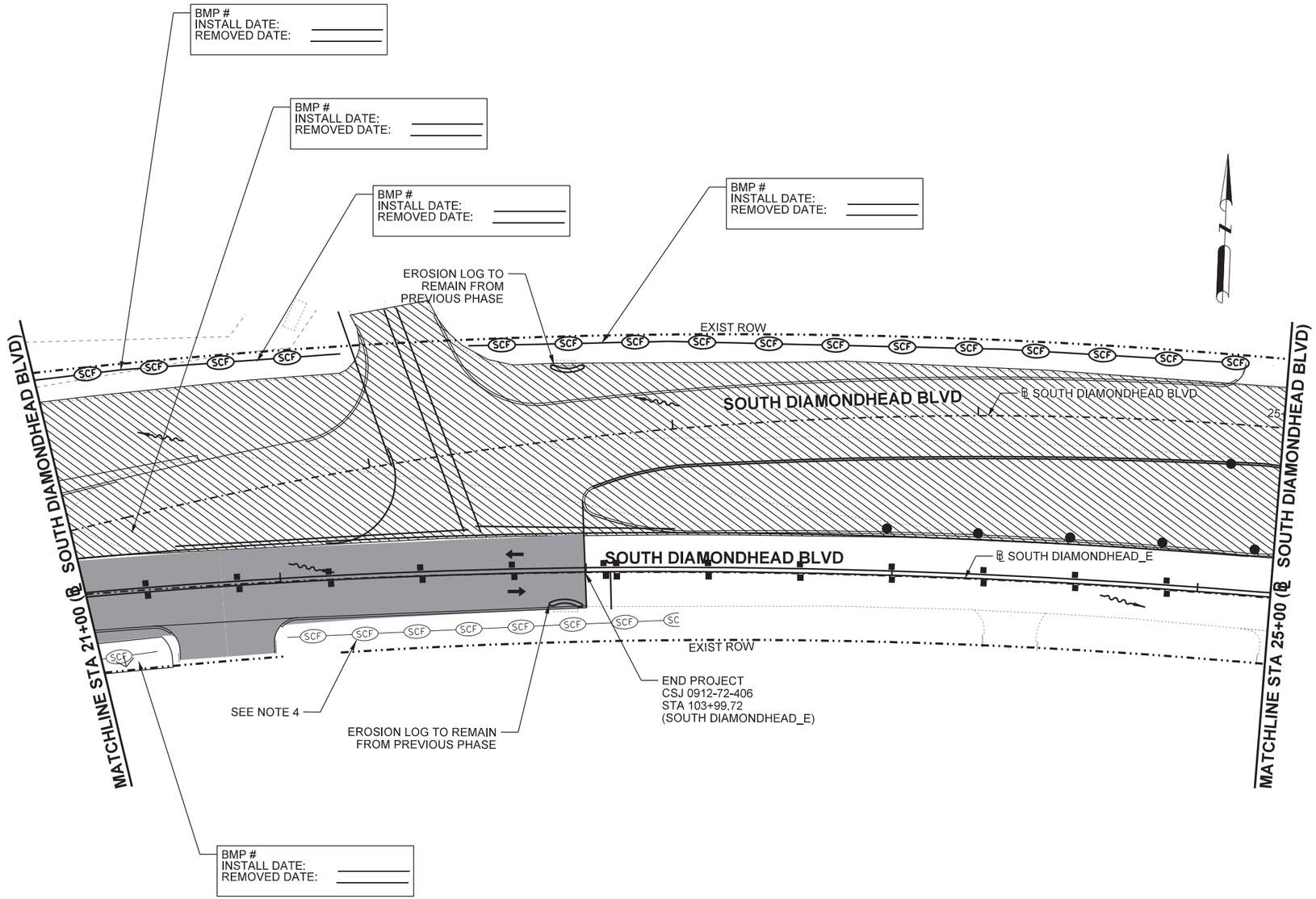

LEGEND

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- CONSTRUCTION PREVIOUS PHASE
- CHANNEL RIPRAP
- SEEDING/SODDING
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ALFONSO D. PEREZ
120364
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

11/30/2022

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F-12040

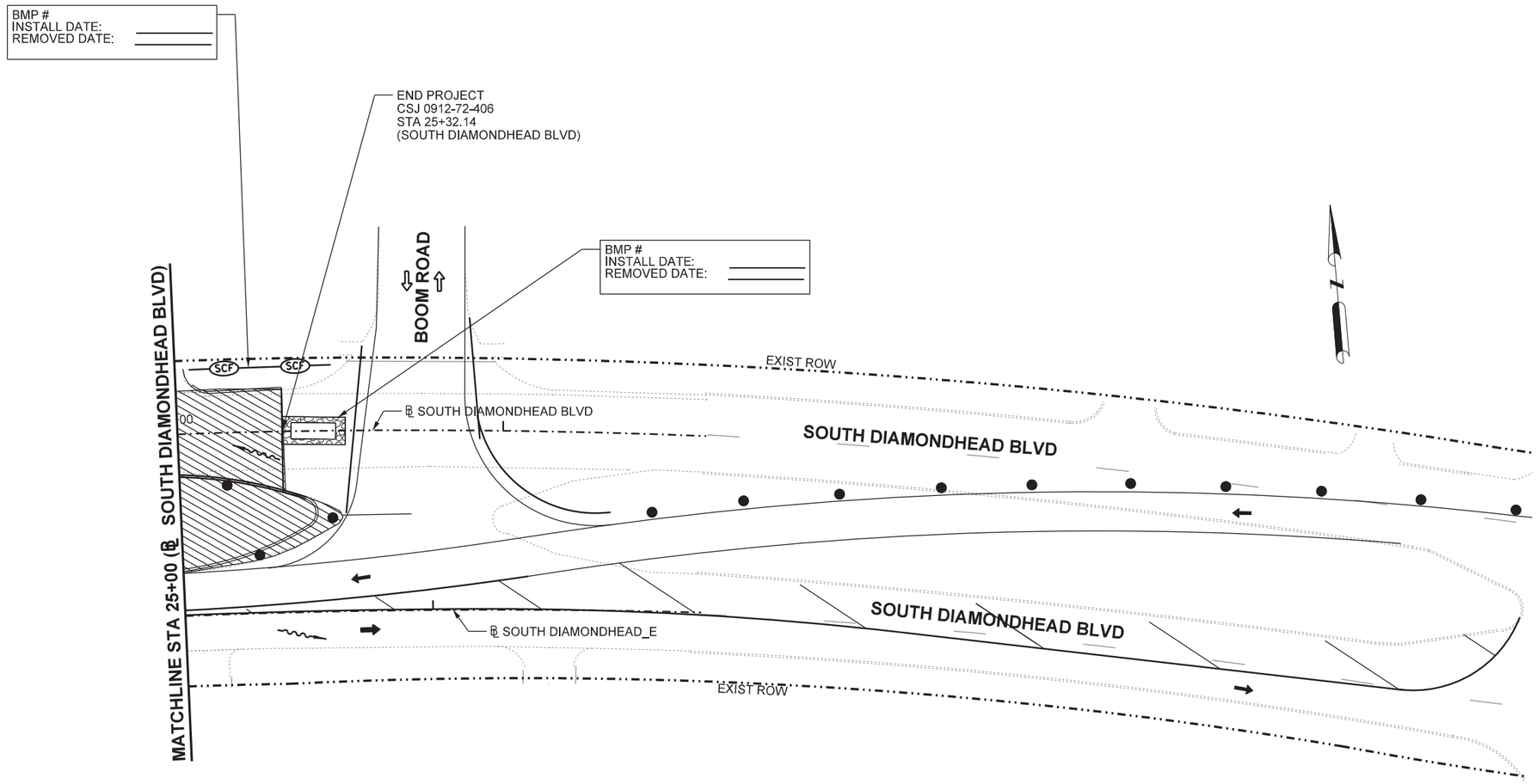
Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 3
STA 21+00 TO STA 25+00

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		217
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS



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- CHANNEL RIPRAP
- SEEDING/SODDING
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Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

SWP3 LAYOUT
PHASE 3
STA 25+00 TO END PROJECT
SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		218
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☑ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SWP3 and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SWP3 information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☑ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☑ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☑ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☑ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☑ Biodeg Erosion Ctrl Logs	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☑ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☑ No Action Required ☐ Required Action

Action No.

1.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☑ Required Action

Action No.

1. Minimize disturbance to existing native vegetation throughout project limits.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☑ Required Action

Action No.

1. The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to September 30). If removal is necessary during nesting season, Contracto 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 Enviromental Compliance Toolkits at the time of the survey. (See Below for Field Biologist and Ornithologist qualifications).

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

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.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

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

☑ Yes ☐ No

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

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

☐ Yes ☐ No

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

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

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

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

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☑ No Action Required ☐ Required Action

Action No.

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0912	72	406	CS
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	HOU	HARRIS		219

DATE: 11/30/2022
FILE: \\dms\pwe-useast-006\perlo.gonzalez\dms24703\C*406*S*EPI01.dgn

SITE DESCRIPTION

PROJECT LIMITS: DIAMONDHEAD @ GUM GULLY

BEGIN PROJECT COORDINATES: LATITUDE(N): 29.91051 N; LONGITUTUDE(W): -95.09268 W
END PROJECT COORDINATES: LATITUDE(N): 29.91118 N; LONGITUTUDE(W): -95.08790 W

PROJECT DESCRIPTION: REPLACEMENT OF AN EXISTING BRIDGE

MAJOR SOIL DISTURBING ACTIVITIES:
STRUCTURE REMOVAL AND INSTALLATION
INSTALLING EROSION AND SEDIMENT CONTROLS
PREPARING ROW
EXCAVATION AND EMBANKMENT FOR BRIDGE CONSTRUCTION
ROADWAY EXCAVATION FOR PROPOSED ROADWAY
GRADING
EXISTING & TEMPORARY ROAD REMOVAL
REPLACEMENT OF TOPSOIL FOR FINAL SEEDING

TOTAL PROJECT AREA: 3.85 ACRES

TOTAL AREA TO BE DISTURBED: 2.66 ACRES

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): 0.52

EXISTING CONDITION OF SOIL & VEGETATIVE
COVER AND % OF EXISTING VEGETATIVE COVER:

SOIL TYPE IN PROJECT CONSISTS OF MOSTLY VERY SOFT TO VERY STIFF CLAY, SILT AND SAND. THE DOMINANT LAND USE WITHIN THE AREA IS RESIDENTIAL. GRASS MAKES UP 100% OF THE VEGETATIVE COVER.

NAME OF RECEIVING WATERS: JACKSON BAYOU
TCEQ SEGMENT NAME AND STREAM ID: GUM GULLY-1001C

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

____ TEMPORARY SEEDING
P PERMANENT PLANTING, SODDING, OR SEEDING
____ MULCHING
____ SOIL RETENTION BLANKET
____ BUFFER ZONES
____ PRESERVATION OF NATURAL RESOURCES

OTHER:

STRUCTURAL PRACTICES:

T SILT FENCES
____ HAY BALES
T ROCK BERMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
____ PAVED FLUMES
____ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
P CURBS AND GUTTERS
P STORM SEWERS
____ VELOCITY CONTROL DEVICES
T EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

1. CONSTRUCT CONSTRUCTION EXITS IN EACH PHASE.
2. INSTALL STRUCTURAL CONTROLS AS REQUIRED AT TOPSOIL STOCKPILES AND EMBANKMENT AND EXCAVATION LOCATIONS.
3. PHASE 1
   CONSTRUCT PROPOSED BRIDGE BOTH WEST AND EAST PORTIONS OF DIAMONHEAD BLVD AS SHOWN ON PLANS.
4. PHASE 2
   CONSTRUCT WEST CONNECTION OF PROPOSED ROAD TO EXISTING DIAMONHEAD BLVD.
5. PHASE 3
   CONSTRUCT EAST CONNECTION OF PROPOSED ROAD TO EXISTING DIAMONHEAD BLVD, CONSTRUCTION MEDIANS, AND DEMOLISH EXISTING BRIDGE AND EXISTING ROAD AS SHOWN ON PLANS.
6. WHEN CONSTRUCTION ACITIVITIES ARE COMPLETE AND SITE IS STABLIZED AND APPROVED, REMOVE ALL TEMPOARY STRUCTURAL CONTROLS. RE-SEED ANY AREAS DISTURBED BY THE REMOVAL. DO NOT REMOVE PERIMETER CONTROLS UNTIL FINAL STABILIZATION OF THE AREA UPSTREAM.

STORM WATER MANAGEMENT:

STORM WATER RUNOFF PASSING THROUGH PROJECT WILL BE INTERCEPTED ON SITE WITH EXISTING AND PROPOSED INLETS AND DRAINAGE SYSTEM.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: ALL EROSION AND SEDIMENT CONROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE, BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMAGE FROM HEAVY EQUIPMENT. THE AREA ADJACENT TO CREEKS AND DRAINAGEWAYS SHALL HAVE PRIORITY FOLLOWED BY DEVICES PROTECTING STORM SEWER INLETS.

INSPECTION: ALL INSPECTIONS WILL BE PERFORMED BY A TxDOT INSPECTIOR PER ONE OF THE OPTIONS BELOW AS DIRECTED BY THE AREA ENGINEER:
1. AT LEAST EVERY 7 CALENDAR DAYS
2. AT LEAST EVERY 14 Days OR AFTER 0.5 INCHES OR MORE OF RAINFALL

AN INSPECTION AND MAINTENANCE REPORT SHOULD BE FOR EACH INSPECTION. BASED ON THE INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED ACCORDING TO THE INSPECTION REPORT.

WASTE MATERIALS: THE DUMSPTER USED TO STORE ALL WASTE MATERIAL WILL MEET ALL STATE AND LOCATION CITY SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS WILL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER WILL BE EMPTIED AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION AND THE TRASH SITE.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): IN THE EVENT OF A SPILL WHICH MAY BE CONSIDERED HAZARDOUS, THE HOUSTON DISTRICT SAFETY SHALL BE CONTACTED IMMEDIATELY AT 713-802-5962.

SANITARY WASTE: ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATIONS BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

____ HAUL ROADS DAMPENED FOR DUST CONTROL
____ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
____ EXCESS DIRT ON ROAD REMOVED DAILY
T STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE SEDIMENT THAT MAY ENTER RECEIVING WATERWAYS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERWAY, WATERBODY OR STREAMBED. CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER WHICH MINIMIZES THE RUNOFF OF ALL POLLUTANTS. ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICAL OF TEMPORARY EMBANKMENTS, TEMPORARY BRIDGES, MATTING, FALSEWORK, PILING, DEBRIS, AND OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT PART OF THE FINISHED WORK.

STATE OF TEXAS
ALFONSO D. PEREZ
120364
LICENSED
PROFESSIONAL ENGINEER

11/30/2022

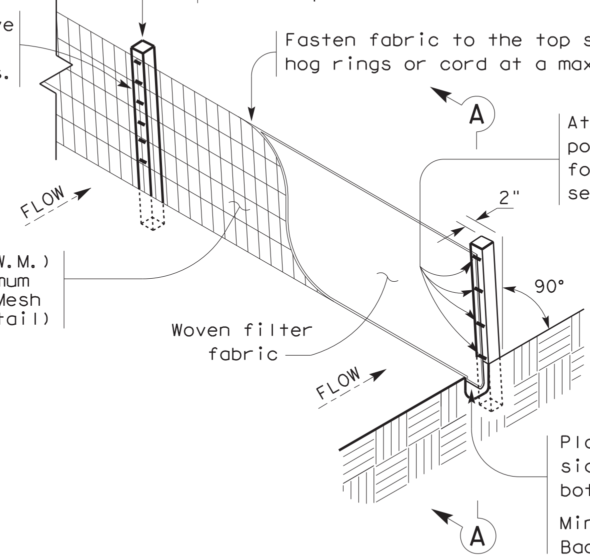
Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

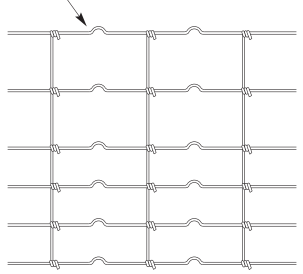
FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		220
9/2010 INSPECTION NOTE 9/2013 INSPECTION NOTE 11/2013 SW3P TO SWP3 03/2015 2014 SPECS	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0912	72	406	CS

STD G-1



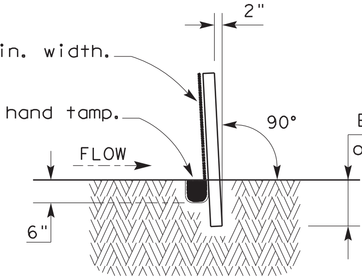
TEMPORARY SEDIMENT CONTROL FENCE

SCF



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.



SECTION A-A

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.

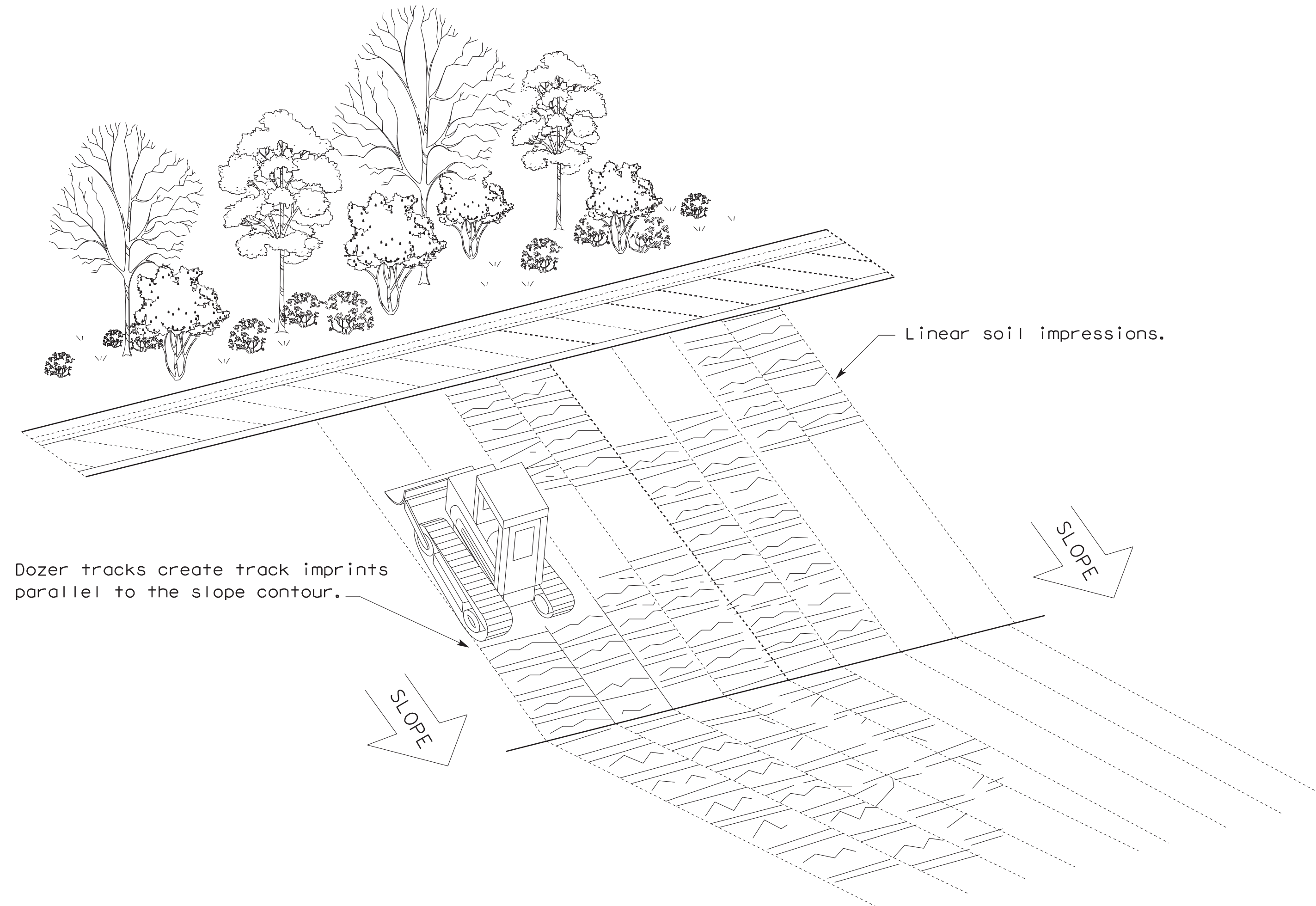
LEGEND

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	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		221

DATE: 11/30/2022
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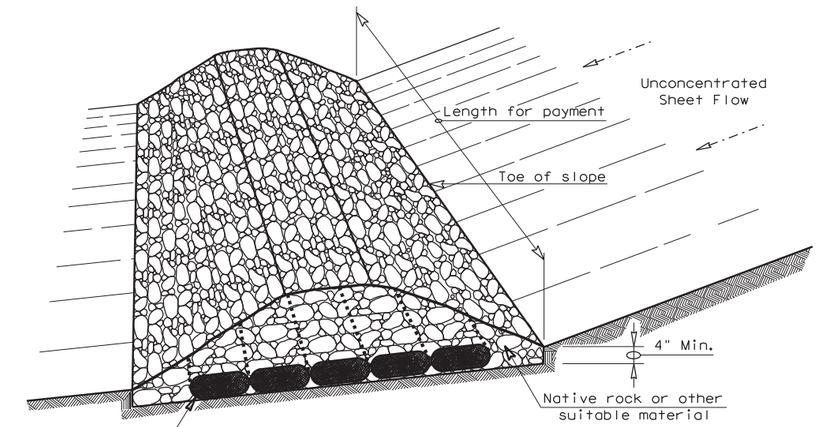
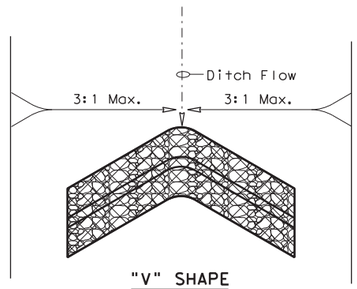
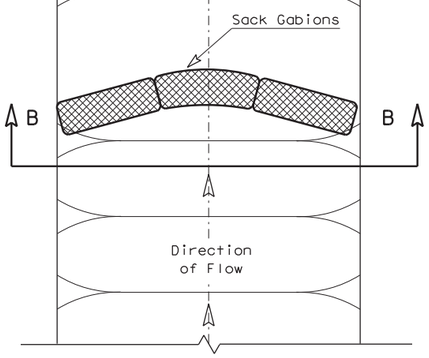


FILTER DAM AT TOE OF SLOPE

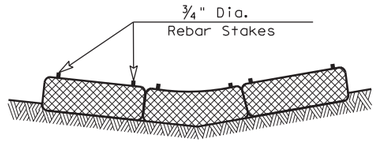
RFD1



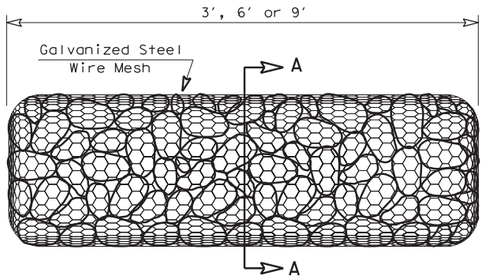
"V" SHAPE PLAN VIEW



PLAN VIEW

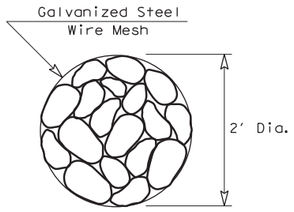


SECTION B-B

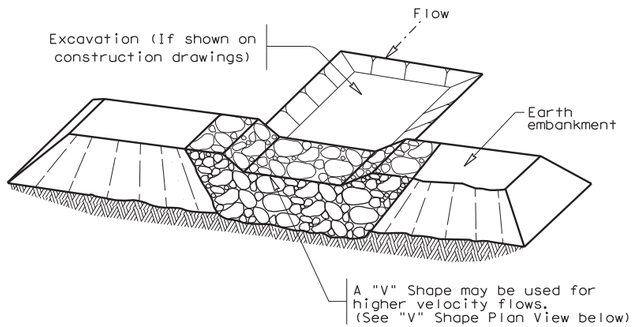


TYPE 4 (SACK GABIONS)

RFD4

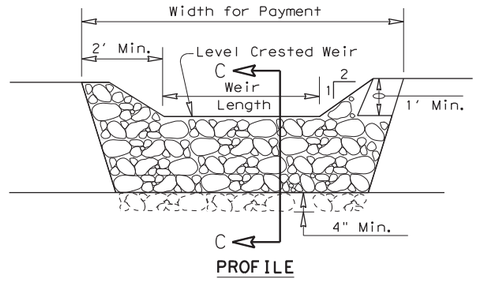


SECTION A-A

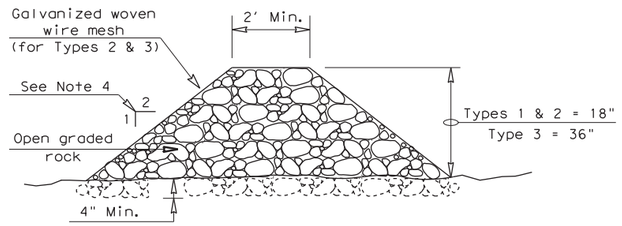


FILTER DAM AT SEDIMENT TRAP

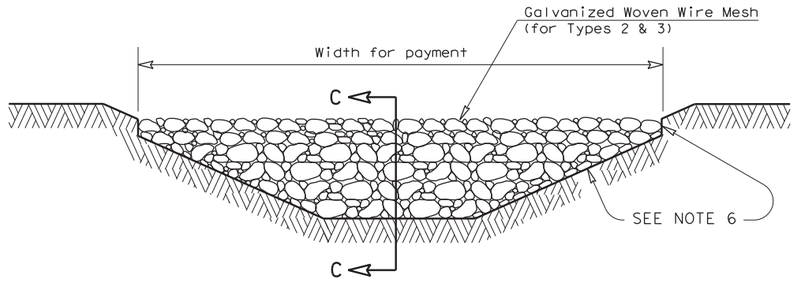
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		222

DATE: 11/30/2022
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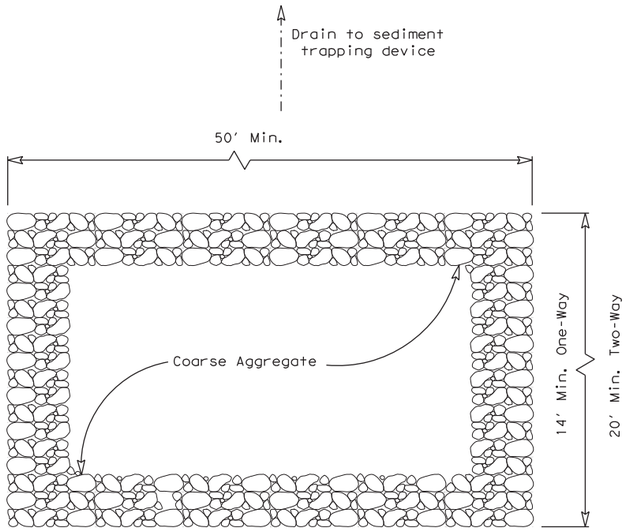
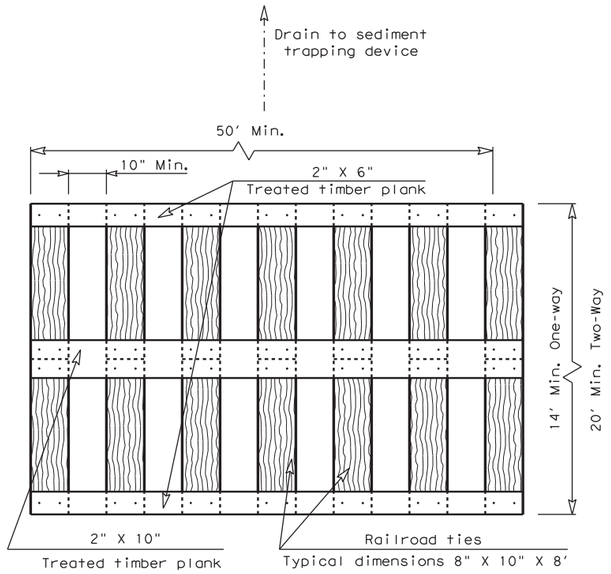


PLAN VIEW



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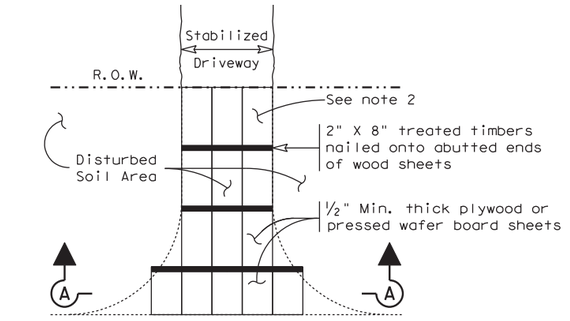

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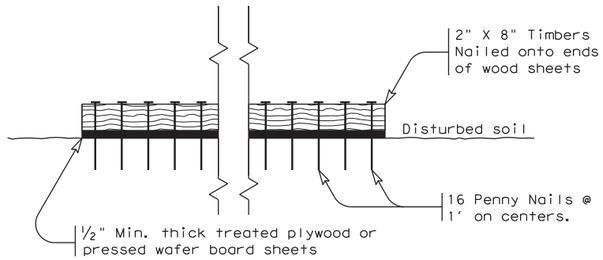
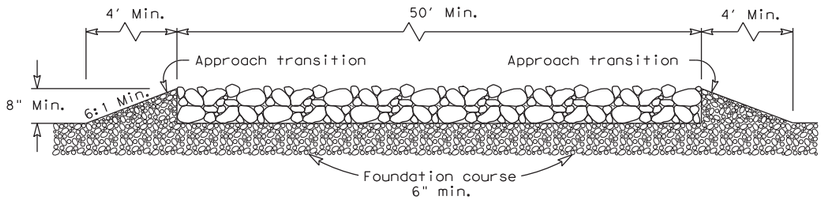


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

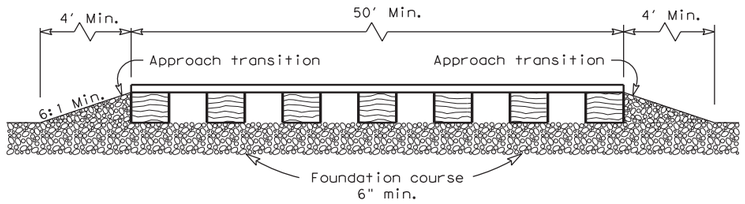
SHORT TERM



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

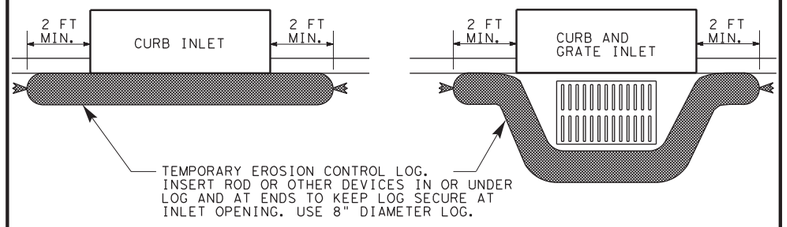
CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	406	CS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		223

CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



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 1/4" 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

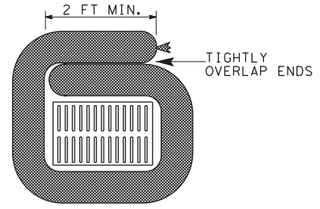
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

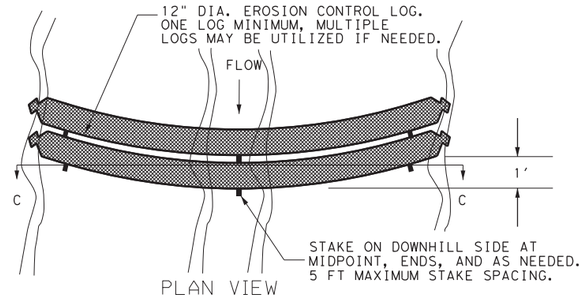
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

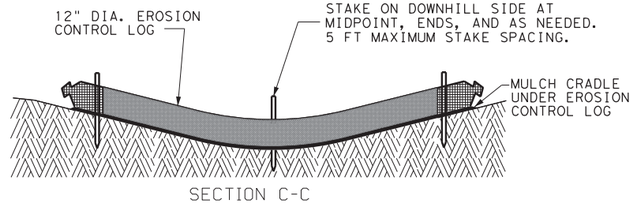
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

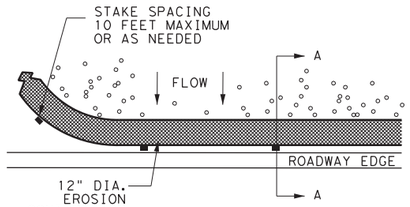


PLAN VIEW

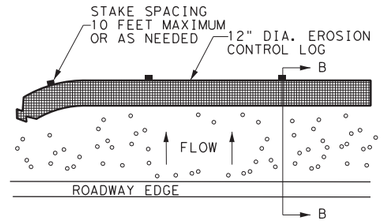


SECTION C-C

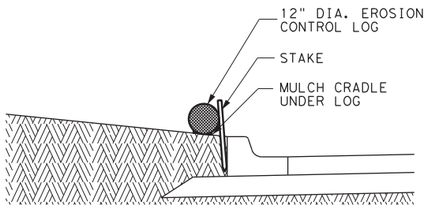
DRAINAGE SWALE OR DITCH



PLAN VIEW

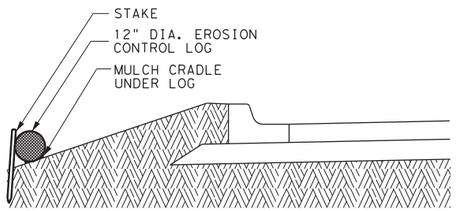


PLAN VIEW



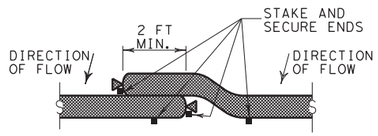
SECTION A-A

SLOPE TO ROADWAY EDGE

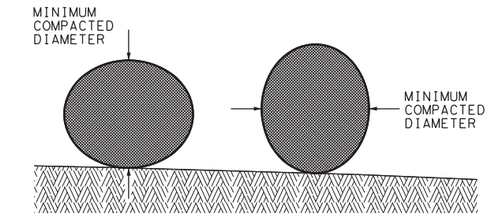


SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP



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		224
	COUNTY	CONTROL	SECT	JOB HIGHWAY
	HARRIS	0912	72	406 CS

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

SHEET 1 OF 1

REVISIONS	FILE:	FED DIV	STATE	PROJECT NUMBER				SHEET
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS	OCT 2014	6	TEXAS					225
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY	
		12	HARRIS	0912	72	406	CS	

STD K-1

	Cross Sectional Areas				Average Cross Sectional Areas				Distance Between Stations	Volumes				
Station	Total Roadway Excavation [SF]	Embankment Area [SF]	3" Stripping [SF]	Backfill Behind Curbs Pavement [SF]	Average Total Roadway Excavation [SF]	Average Embankment Area [SF]	Average 3" Stripping [SF]	Average Backfill Behind Curbs [SF]	Distance Between Stations [FT]	ITEM 110 ROADWAY EXCAVATION [CY] - *PAY*	STRIPPING [CY]	BACKFILL BEHIND CURBS [CY]	REUSEABLE ROADWAY EXCAVATION *[CY]	ROADWAY EMBANKMENT [CY]
	AR	***BR***	***CR***	***DR***	***FR***	***GR***	***HR***	***IR***	***KR***	***LR***	***MR***	***NR***	***PR***	***QR***
						ROADWAY								
009+45	17.78	0	0	0.56										
					17.9	0	0	0.545	5	3	0	0	3	0
009+50	18.02	0	0	0.53										
					19.525	0	0	1.465	50	36	0	3	33	0
010+00	21.03	0	0	2.4										
					24.795	0	0	3.71	50	46	0	7	39	0
010+50	28.56	0	0	5.02										
					35.65	6.27	0	2.51	50	66	0	5	61	12
011+00	42.74	12.54	0	0										
					45.755	18.55	0	0	50	85	0	0	85	34
011+50	48.77	24.56	0	0										
					65.605	12.28	0	0	50	121	0	0	121	23
012+00	82.44	0	0	0										
					65.49	0	0	0.645	50	121	0	1	120	0
012+50	48.54	0	0	1.29										
					33.895	0	0	0.925	50	63	0	2	61	0
013+00	19.25	0	0	0.56										
					9.625	40.495	0	0.28						
013+50	0	80.99	0	0										
					0	100.135	0	0						
014+00	0	119.28	0	0										
					0	142.715	0	0						
014+50	0	166.15	0	0										
					0	174.37	0	0						
015+00	0	182.59	0	0										
					0	187.045	0	0						
015+50	0	191.5	0	0										
					63.145	208.655	0	0						
016+00	126.29	225.81	0	0										
					323.48	298.29	0	0	35	419	0	0	419	387
016+35	520.67	370.77	0	0										
					260.335	185.385	0	0						
016+50	0	0	0	0										
					0	0	0	0						

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

EARTHWORK QUANTITIES

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		226
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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	Cross Sectional Areas				Average Cross Sectional Areas				Distance Between Stations	Volumes				
	Total Roadway	Embankment Area		Backfill Behind Curbs Pavement	Average Total Roadway Excavation	Average Embankment Area	Average 3" Stripping	Average Backfill Behind	Distance Between Stations	ITEM 110 ROADWAY		BACKFILL BEHIND	REUSEABLE ROADWAY EXCAVATION	ROADWAY
017+00	0	0	0	0										
					0	0	0	0						
017+50	0	0	0	0										
					0	0	0	0						
018+00	0	0	0	0										
					0	102.01	0	0						
018+45	0	204.02	0	0										
					0	177.21	0	0						
018+50	0	150.4	0	0										
					0.91	84.225	0	21.515						
019+00	1.82	18.05	0	43.03										
					1.37	35.55	0	28.15	50	3	0	52	-50	66
019+50	0.92	53.05	0	13.27										
					0.965	39.81	0	19.32	50	2	0	36	-34	74
020+00	1.01	26.57	0	25.37										
					1.08	16.945	0	20.645	50	2	0	38	-36	31
020+50	1.15	7.32	0	15.92										
					7.21	3.66	0	16.505	50	13	0	31	-17	7
021+00	13.27	0	0	17.09										
					23.875	0	0	11.955	50	44	0	22	22	0
021+50	34.48	0	0	6.82										
					34.16	0	0	13.615	50	63	0	25	38	0
022+00	33.84	0	0	20.41										
					40.705	0	0	21.415	50	75	0	40	36	0
022+50	47.57	0	0	22.42										
					35.025	0	0	29.03	50	65	0	54	11	0
023+00	22.48	0	0	35.64										
					21.3	0	0	35.88	50	39	0	66	-27	0
023+50	20.12	0	0	36.12										
					19.33	0	0	35.56	50	36	0	66	-30	0
024+00	18.54	0	0	35										
					17.655	0	0	34.445	50	33	0	64	-31	0
024+50	16.77	0	0	33.89										
					18.12	0	0	27.43	50	34	0	51	-17	0
025+00	19.47	0	0	20.97										
					24.655	0	0	10.485	34	31	0	13	18	0
025+34	29.84	0	0	0										
									Roadway Totals:	**1,401**	**0**	**575**	**826**	**633**

NO.	DATE	REVISION	APPROV.

consor
F-12040

Texas Department of Transportation

SOUTH DIAMONDHEAD BLVD
AT GUM GULLY

EARTHWORK QUANTITIES

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		227
STATE	DISTRICT	COUNTY	
TEXAS	HOU	HARRIS	
CONTROL	SECTION	JOB	HIGHWAY
0912	72	406	CS

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