FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2019(421), ETC.		1
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307, ETC	CR 144, ETC

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. BR 2019(421), ETC.
CSJ 0912-31-307, ETC.

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

CR 144 NBI 12-020-0-AA06-74-001 (EXIST)
NBI 12-020-0-AA06-74-303 (NEW)

CR 30 NBI 12-020-0-AA01-07-001 (EXIST)
NBI 12-020-0-AA01-07-301 (NEW)

CR 89 NBI 12-020-0-AA05-64-002 (EXIST)
NBI 12-020-0-AA05-64-302 (NEW)

CR 179 NBI 12-020-0-AA07-71-001 (EXIST)
NBI 12-020-0-AA07-71-304 (NEW)

DESIGN SPEED: 30 MPH

ALIGNMENT	FUNCTIONAL CLASSIFICATION	ADT	
CR 144	URBAN MAJOR COLLECTOR	3,581(2022)	4,859(2042)
CR 30	URBAN MAJOR COLLECTOR	2,731(2022)	3,706(2042)
CR 89	URBAN MAJOR COLLECTOR	4,176(2022)	5,668(2042)
CR 179	URBAN MAJOR COLLECTOR	1,996(2022)	2,709(2042)

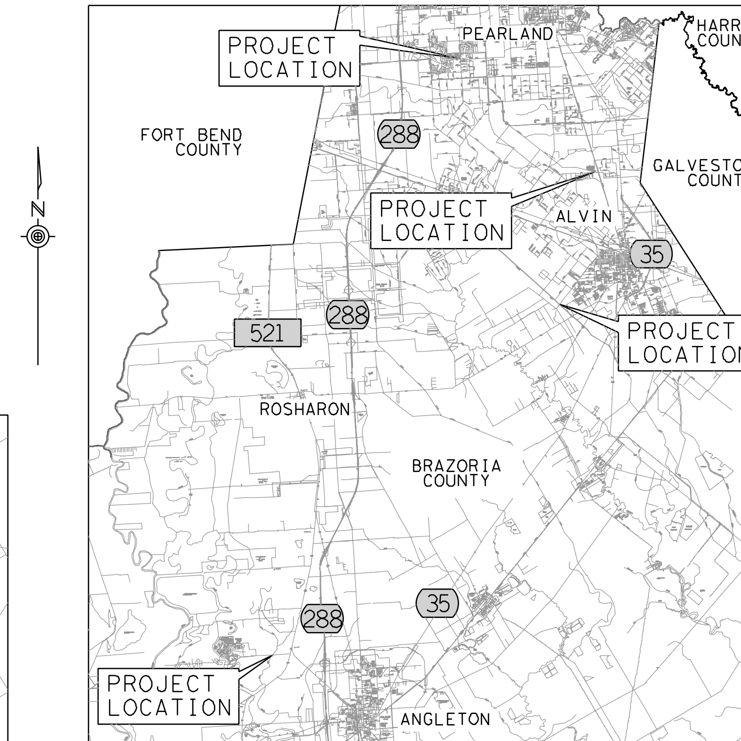
	ROADWAY LENGTH		BRIDGE LENGTH		TOTAL LENGTH	
	FT	MI	FT	MI	FT	MI
CR 144; CSJ 0912-31-307	282.00	0.054	55.00	0.010	337.00	0.064
CR 30; CSJ 0912-31-313	273.00	0.052	70.00	0.013	343.00	0.065
CR 89; CSJ 0912-31-314	231.26	0.044	21.74	0.004	253.00	0.048
CR 179; CSJ 0912-31-315	219.00	0.042	70.00	0.013	289.00	0.055

BRAZORIA COUNTY
BRAZORIA COUNTY BRIDGES

LIMITS: CR 144 AT AMERICAN CANAL, CR 30 AT STYLES BAYOU,
CR 89 AT N FORK MARY'S CREEK, CR 179 AT DRAINAGE DITCH

FOR THE CONSTRUCTION OF A NON-FREEWAY FACILITY,
CONSISTING OF REPLACING BRIDGES AND APPROACHES

TDLR INSPECTION IS NOT REQUIRED



VICINITY MAP
NOT TO SCALE

BEGIN PROJECT
CSJ: 0912-31-314
CR 89
X = 3130072.7477
Y = 13764277.8244
STA 104+87.54

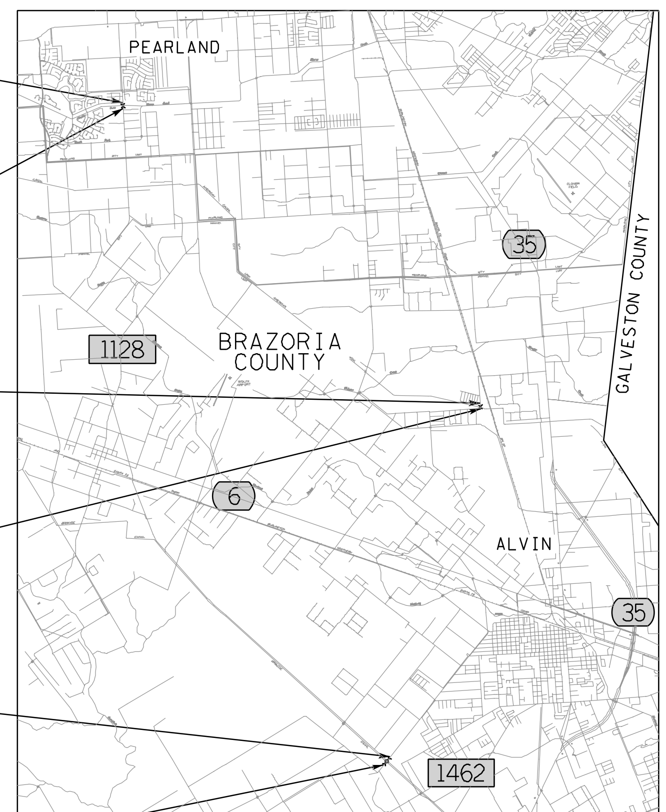
END PROJECT
CSJ: 0912-31-314
CR 89
X = 3130084.4354
Y = 13764025.0982
STA 107+76.00

END PROJECT
CSJ: 0912-31-307
CR 144
X = 3157800.5634
Y = 13740552.1861
STA 106+70.00

BEGIN PROJECT
CSJ: 0912-31-307
CR 144
X = 3157681.5015
Y = 13740313.6808
STA 103+69.00

END PROJECT
CSJ: 0912-31-315
CR 179
X = 3150328.4194
Y = 13712982.8322
STA 109+38.00

BEGIN PROJECT
CSJ: 0912-31-315
CR 179
X = 3150147.4889
Y = 13712757.4766
STA 106+49.00



PROJECT LOCATION MAP
NOT TO SCALE

PROJECT LOCATION MAP
NOT TO SCALE

END PROJECT
CSJ: 0912-31-313
CR 30
X = 3089714.6162
Y = 13640333.4439
STA 107+09.00

BEGIN PROJECT
CSJ: 0912-31-313
CR 30
X = 3089372.1006
Y = 13640315.2207
STA 103+59.00

STATE OF TEXAS
DEV PINDORIA
108807
LICENSED
PROFESSIONAL ENGINEER
04/21/2022

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY, 2012)

EXCEPTIONS: NO EXCEPTIONS
EQUATIONS: NO EQUATIONS
R.R. CROSSINGS: NO R.R.CROSSINGS

Jacobs
5985 ROGERDALE ROAD
HOUSTON, TX 77072
TBPE FIRM NO. F-2966

Texas Department of Transportation

SUBMITTED FOR LETTING: 4/26/2022
DocuSigned by: Mainul Khan
E692774A5FFE463...
PROJECT MANAGER

APPROVED FOR LETTING: 4/28/2022
DocuSigned by: Larry W. Blackburn, P.E.
For B9928A69E03E42F...
DISTRICT ENGINEER

FILE LOCATION
http://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html

LEVELS DISPLAYED

COUNTY_____
HWY. NO._____
DATE ACCEPTED_____
PROJ. NO._____
LETTING DATE_____

* STATE STANDARD
** HOUSTON DISTRICT STANDARD

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

STATE OF TEXAS
DEV PINDORIA
108807
LICENSED
PROFESSIONAL ENGINEER
04/28/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

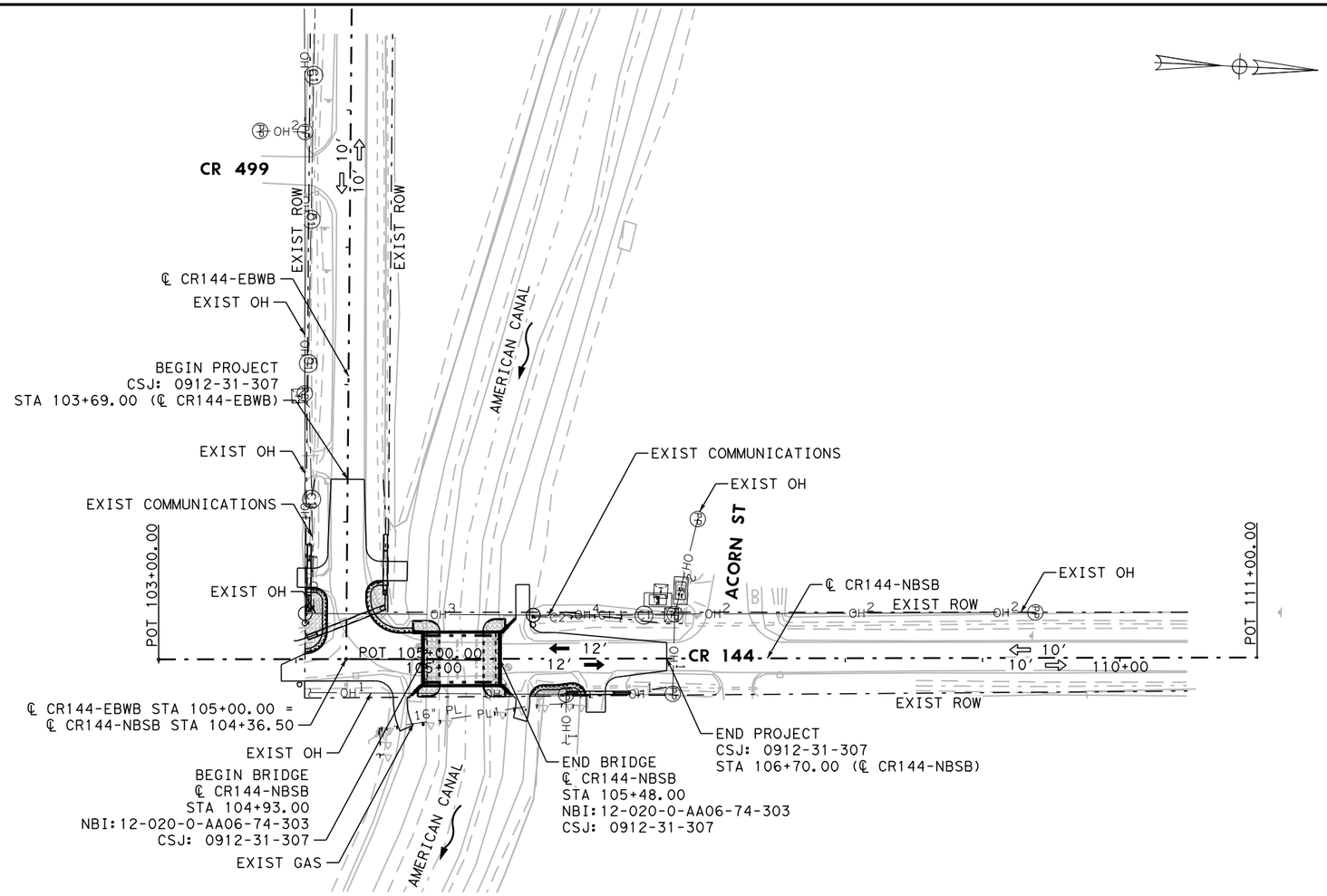
Texas Department of Transportation

CR 144, ETC.

INDEX OF SHEETS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			2
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.



LEGEND:

- — - - — EXISTING ROW
- (XX-XXX) CURVE NO.
- ⇦ EXISTING TRAFFIC LANE
- ⬅ PROPOSED TRAFFIC LANE

0 25 50 100
SCALE: 1"=100'

CR 144 EBWB HORIZONTAL ALIGNMENT DATA

Beginning chain CR144-EBWB description
Feature: Geom_Centerline

Point 278	N 13,740,298.7510 E	3,157,312.8233 Sta	100+00.00
Course from 278 to 279 N 87° 40′ 51.75" E Dist 500.0000			
Point 279	N 13,740,318.9822 E	3,157,812.4138 Sta	105+00.00

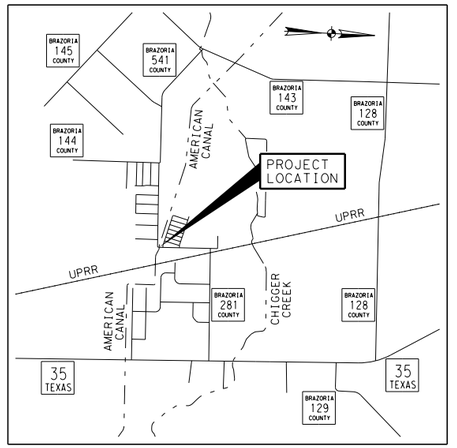
Ending chain CR144-EBWB description

CR 144 NBSB HORIZONTAL ALIGNMENT DATA

Beginning chain CR144-NBSB description
Feature: Geom_Centerline

Point 244	N 13,740,182.6629 E	3,157,819.3409 Sta	103+00.00
Course from 244 to 245 N 2° 54′ 32.42" W Dist 800.0000			
Point 245	N 13,740,981.6320 E	3,157,778.7410 Sta	111+00.00

Ending chain CR144-NBSB description



VICINITY MAP

ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

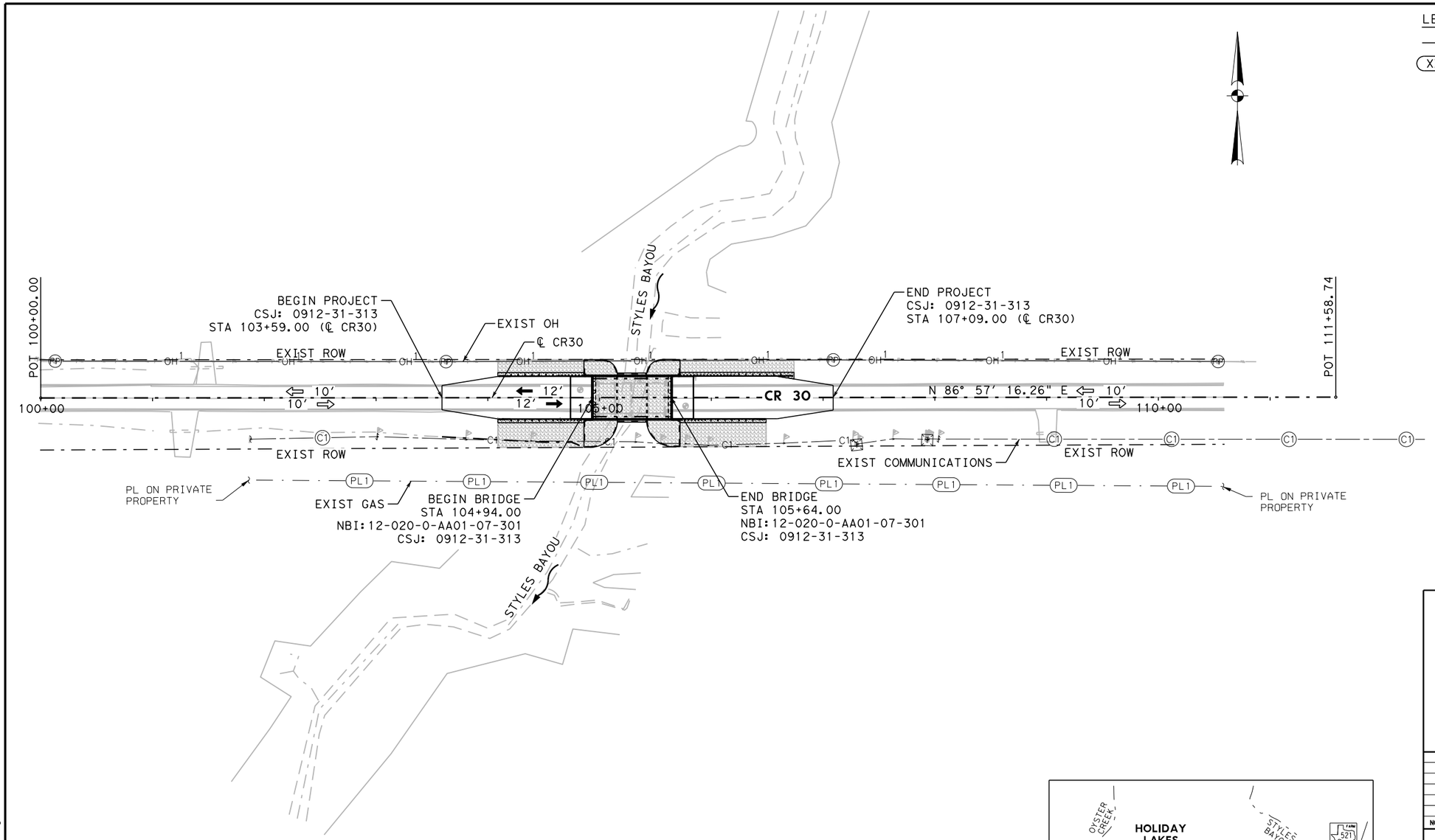
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			3
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144

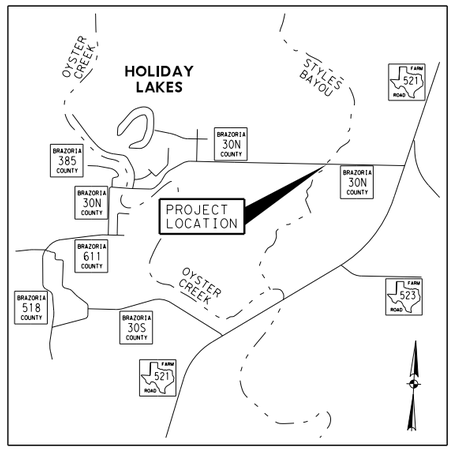


CR 30 HORIZONTAL ALIGNMENT DATA

Beginning chain CR30 description
Feature: Geom_Centerline

Point CR301	N 13,640,296.2538	E 3,089,015.6048	Sta	100+00.00
Course from CR301 to CR302 N 86° 57′ 16.26" E Dist 1,158.7354				
Point CR302	N 13,640,357.8159	E 3,090,172.7037	Sta	111+58.74

Ending chain CR30 description



VICINITY MAP

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 30 AT STYLES BAYOU

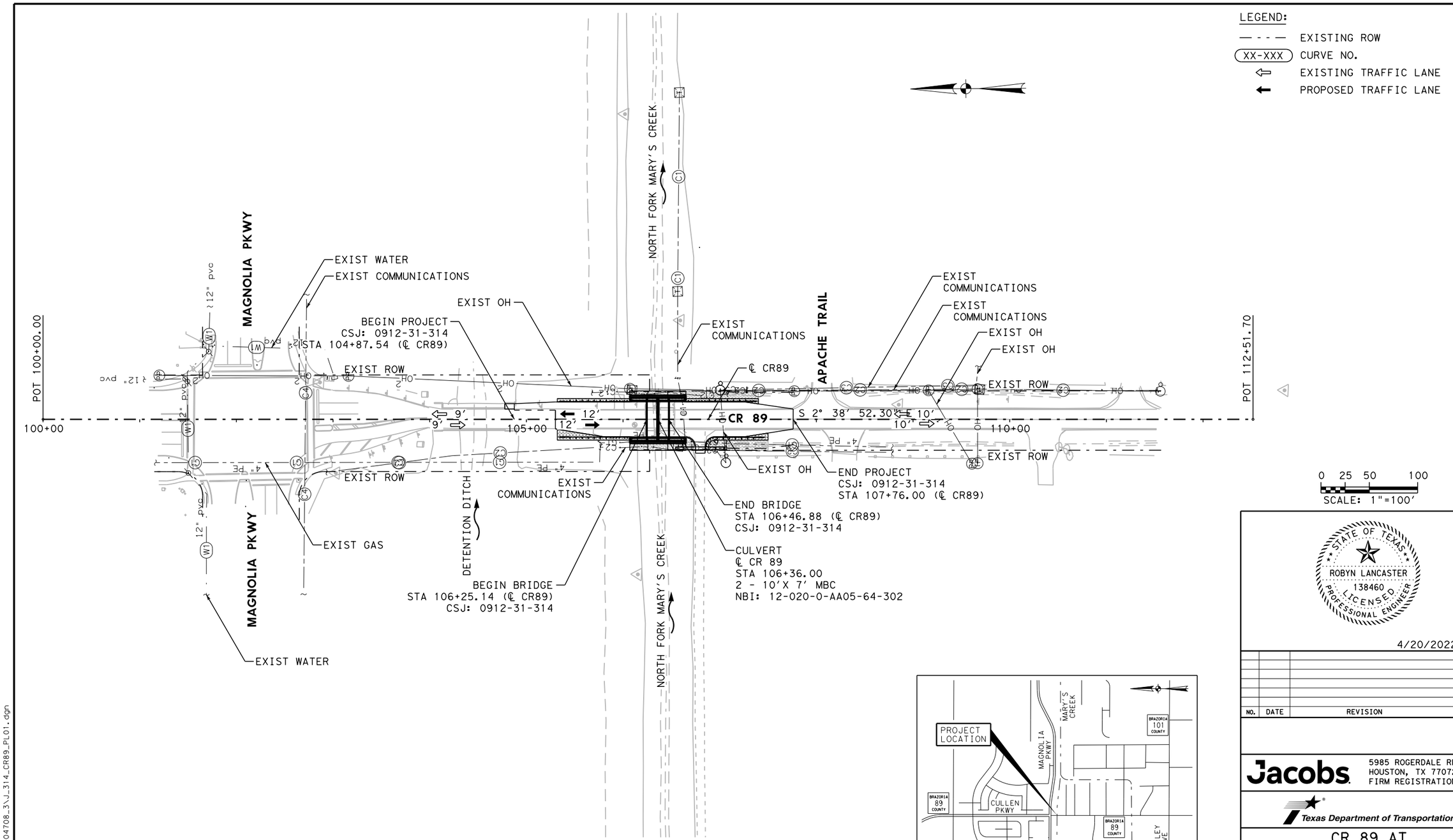
PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		4

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

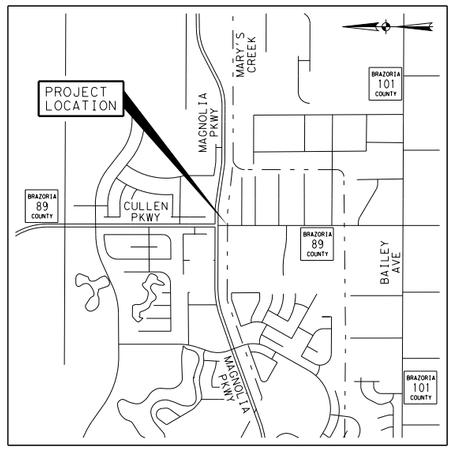


CR 89 HORIZONTAL ALIGNMENT DATA

Beginning chain CR89 description
Feature: Geom_Centerline

Point CR891	N 13,764,800.2697 E	3,130,048.5862 Sta	100+00.00
Course from CR891 to CR892 S 2° 38' 52.30" E Dist 1,251.7016			
Point CR892	N 13,763,549.9046 E	3,130,106.4116 Sta	112+51.70

Ending chain CR89 description



VICINITY MAP

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			5
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89

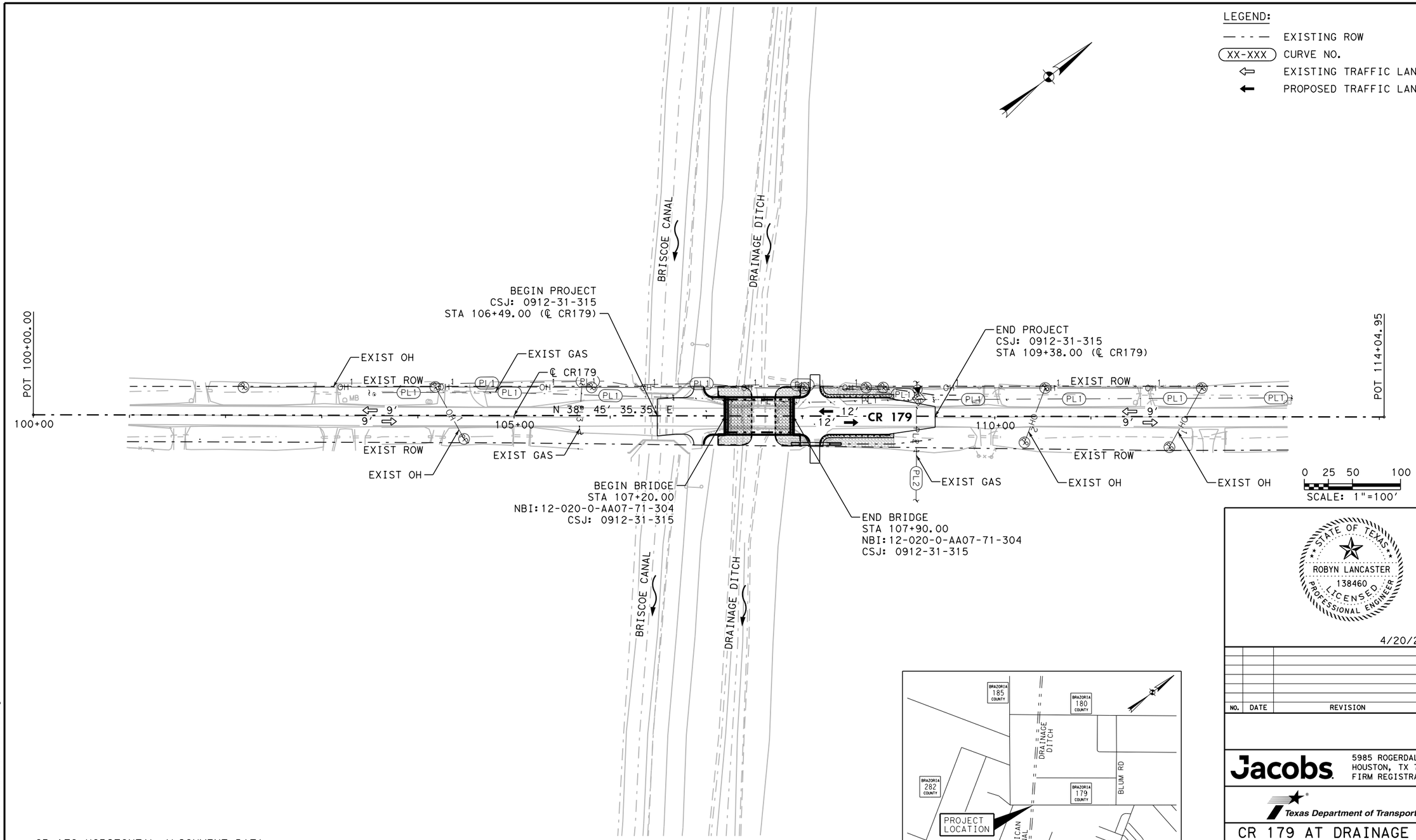
LEGEND:

EXISTING ROW

XX-XXX CURVE NO.

EXISTING TRAFFIC LANE

PROPOSED TRAFFIC LANE

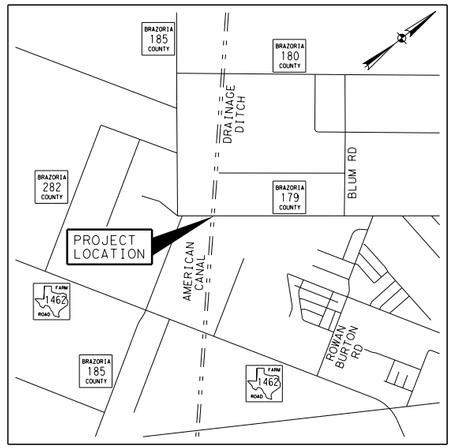


CR 179 HORIZONTAL ALIGNMENT DATA

Beginning chain CR179 description
Feature: Geom_Centerline

Point CR1791	N 13,712,251.4012 E	3,149,741.1778 Sta	100+00.00
Course from CR1791 to CR1792 N 38° 45′ 35.35" E Dist 1,404.9468			
Point CR1792	N 13,713,346.9466 E	3,150,620.7547 Sta	114+04.95

Ending chain CR179 description



VICINITY MAP

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

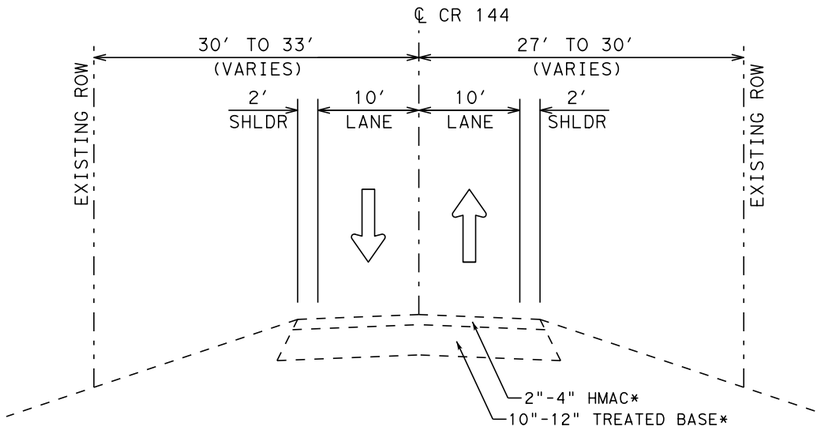
Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

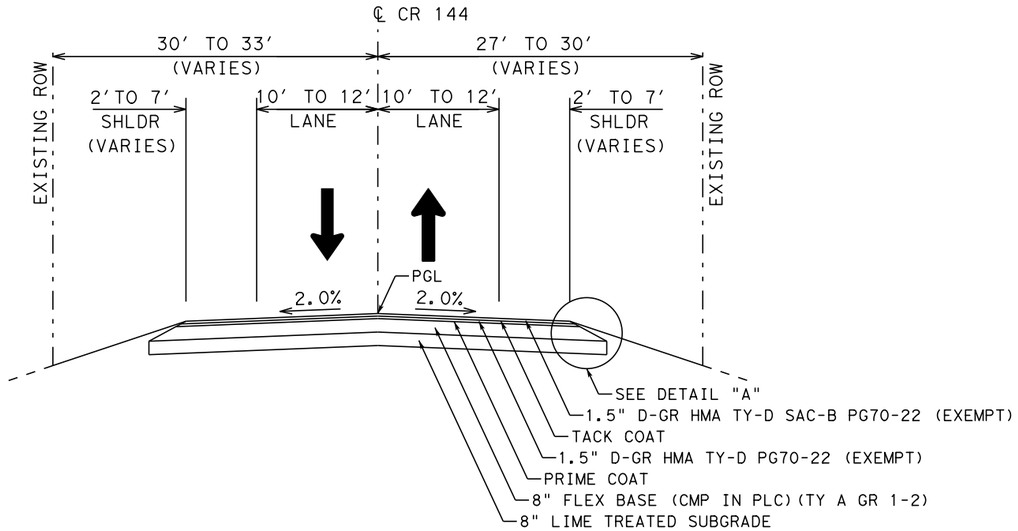
PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			6
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179



CR 144 EXISTING TYPICAL SECTION
STA 103+33.00 TO STA 105+04.06
STA 105+44.80 TO STA 106+70.00
* EXISTING PAVEMENT STRUCTURE DATA WAS OBTAINED FROM BORING LOG INFORMATION



CR 144 PROPOSED TYPICAL SECTION
STA 103+69.00 TO STA 104+81.00 (℄ CR144-EBWB)
STA 104+22.70 TO STA 104+93.00 (℄ CR144-NBSB)
STA 105+48.00 TO STA 106+70.00 (℄ CR144-NBSB)

BRIDGE LIMITS: STA 104+93.00 TO STA 105+48.00 (℄ CR144-NBSB)

NOTE:

1. THE CONTRACTOR WILL BE REQUIRED TO PROOF ROLL SUBGRADE PRIOR TO PLACEMENT OF FLEX BASE. IF UNSTABLE AREAS ARE ENCOUNTERED, THEY WILL BE CORRECTED PRIOR TO PLACEMENT OF THE FLEX BASE. EQUIPMENT AND METHODS USED TO CORRECT UNSTABLE AREAS WILL BE APPROVED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

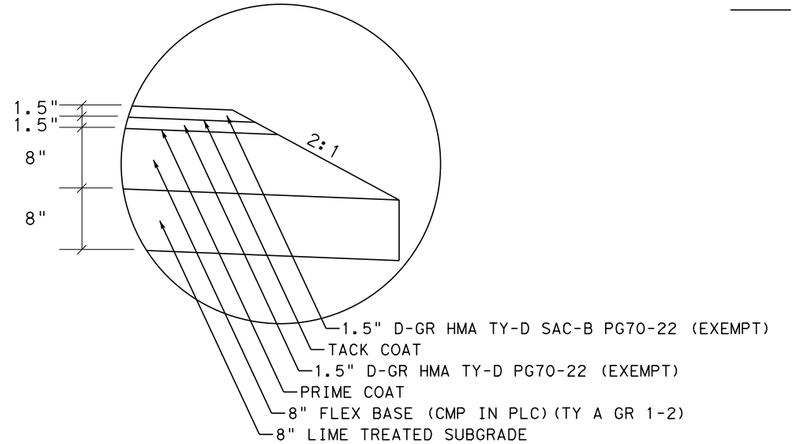
LEGEND:

EXISTING LANE DIRECTION

PROPOSED LANE DIRECTION

EXISTING PAVEMENT

PROPOSED PAVEMENT



DETAIL A
PAVEMENT EDGE

SCALE: NTS

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/25/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

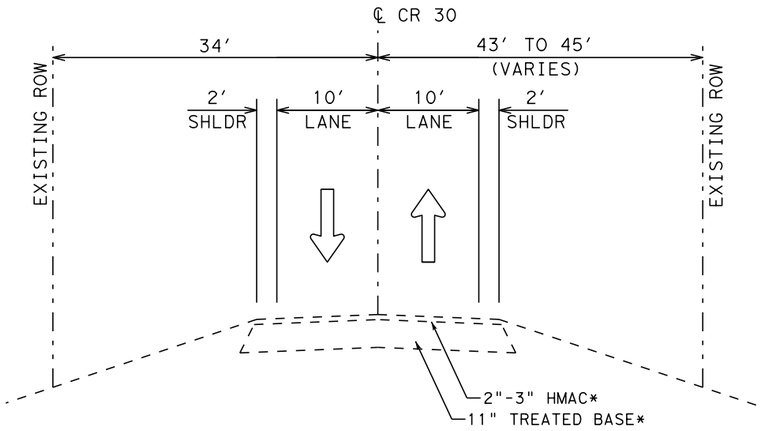
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

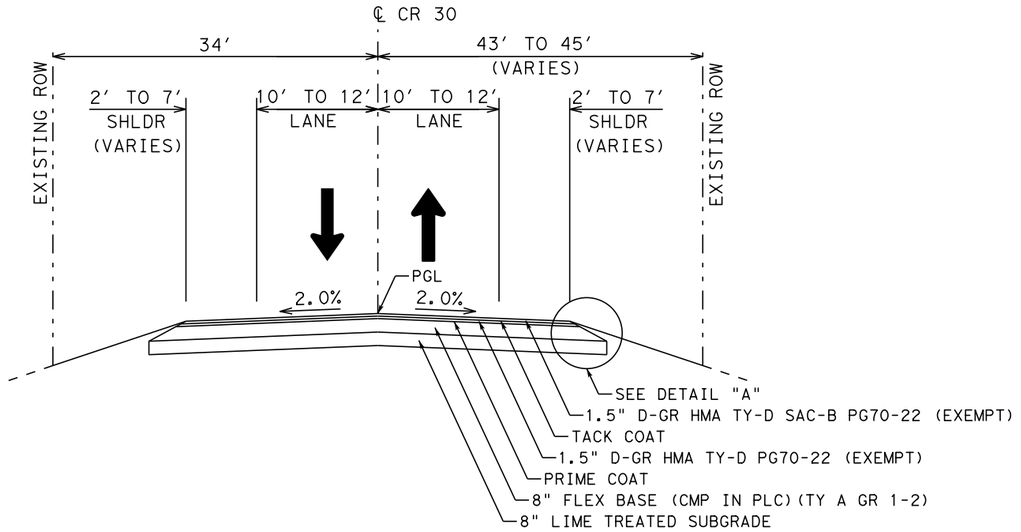
TYPICAL SECTIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			7
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144

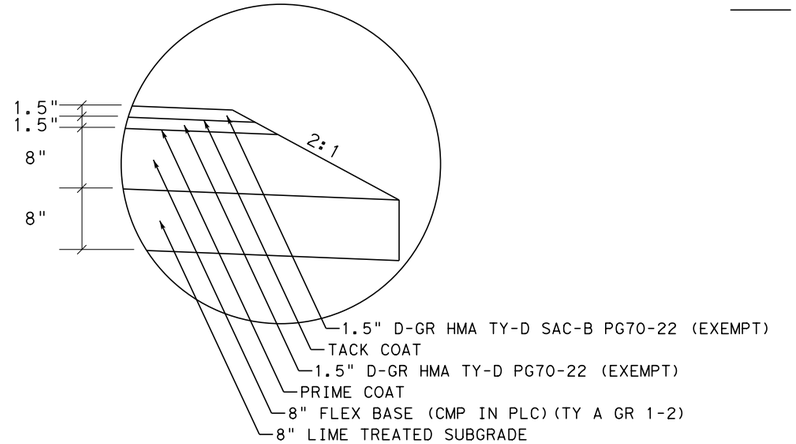


CR 30 EXISTING TYPICAL SECTION
STA 103+59.00 TO STA 104+98.98
STA 105+58.38 TO STA 107+09.00
*EXISTING PAVEMENT STRUCTURE DATA WAS OBTAINED FROM BORING LOG INFORMATION



CR 30 PROPOSED TYPICAL SECTION
STA 103+59.00 TO STA 104+93.00
STA 105+65.00 TO STA 107+09.00

BRIDGE LIMITS: STA 104+94.00 TO STA 105+65.00



DETAIL A
PAVEMENT EDGE

LEGEND:
EXISTING LANE DIRECTION
PROPOSED LANE DIRECTION
EXISTING PAVEMENT
PROPOSED PAVEMENT

NOTE:

1. THE CONTRACTOR WILL BE REQUIRED TO PROOF ROLL SUBGRADE PRIOR TO PLACEMENT OF FLEX BASE. IF UNSTABLE AREAS ARE ENCOUNTERED, THEY WILL BE CORRECTED PRIOR TO PLACEMENT OF THE FLEX BASE. EQUIPMENT AND METHODS USED TO CORRECT UNSTABLE AREAS WILL BE APPROVED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

SCALE: NTS

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
4/25/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

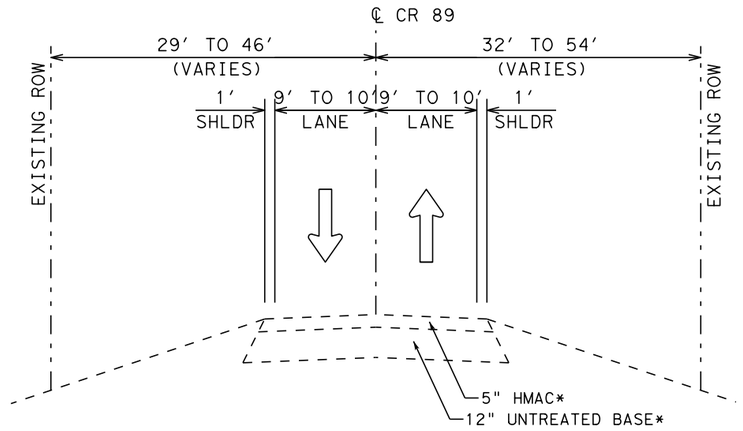
Texas Department of Transportation

CR 30 AT STYLES BAYOU

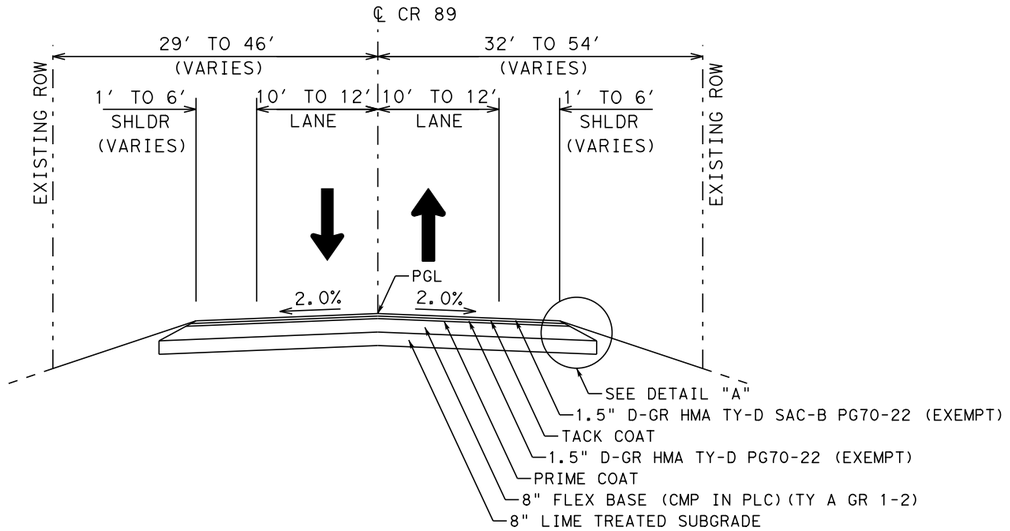
TYPICAL SECTIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			8
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



CR 30 EXISTING TYPICAL SECTION
STA 103+59.00 TO STA 104+98.98
STA 105+58.38 TO STA 107+09.00
*EXISTING PAVEMENT STRUCTURE DATA WAS OBTAINED FROM BORING LOG INFORMATION



CR 89 PROPOSED TYPICAL SECTION
STA 104+87.54 TO STA 106+25.14
STA 106+46.88 TO STA 107+76.00

BRIDGE LIMITS: STA 106+25.14 TO STA 106+46.88

NOTE:

1. THE CONTRACTOR WILL BE REQUIRED TO PROOF ROLL SUBGRADE PRIOR TO PLACEMENT OF FLEX BASE. IF UNSTABLE AREAS ARE ENCOUNTERED, THEY WILL BE CORRECTED PRIOR TO PLACEMENT OF THE FLEX BASE. EQUIPMENT AND METHODS USED TO CORRECT UNSTABLE AREAS WILL BE APPROVED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

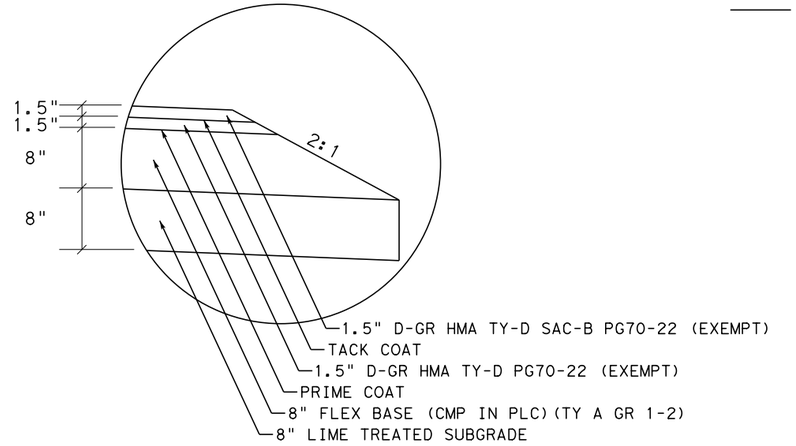
LEGEND:

EXISTING LANE DIRECTION

PROPOSED LANE DIRECTION

EXISTING PAVEMENT

PROPOSED PAVEMENT



DETAIL A
PAVEMENT EDGE

SCALE: NTS

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/25/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

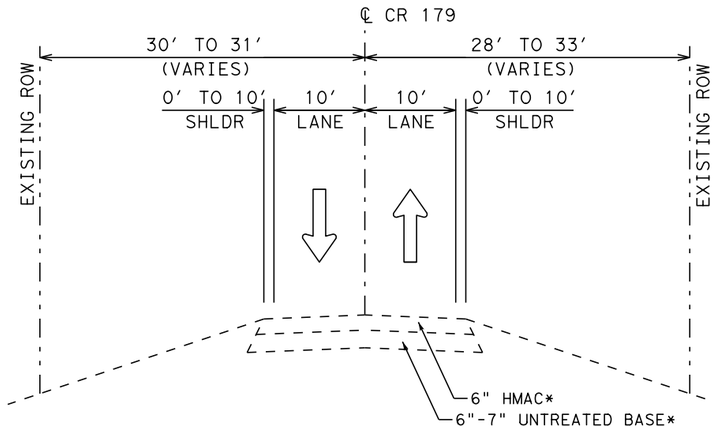
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

TYPICAL SECTIONS

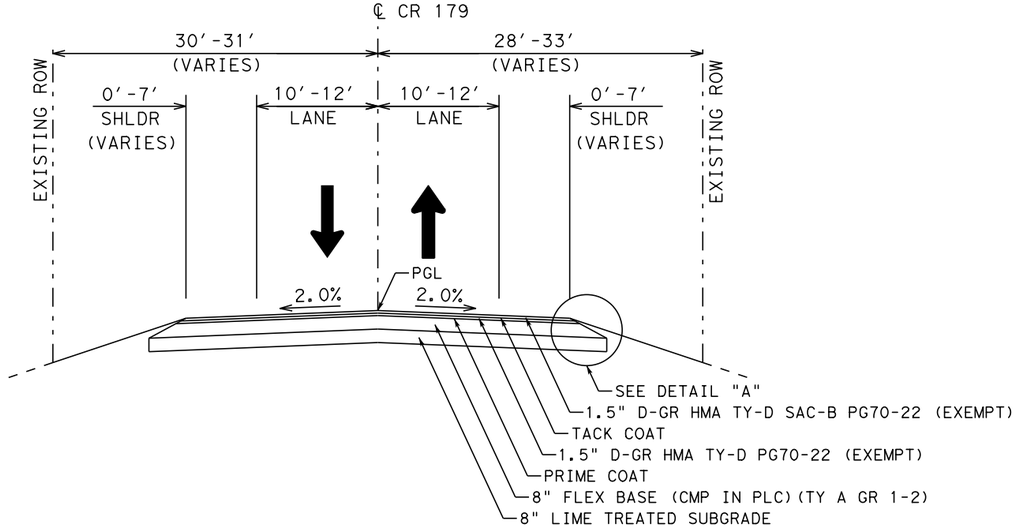
SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			9
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



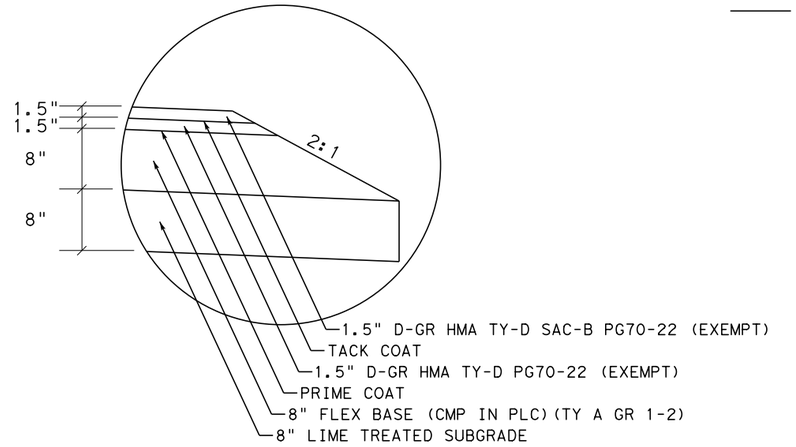
CR 179 EXISTING TYPICAL SECTION
STA 106+49.00 TO STA 107+25.70
STA 107+86.94 TO STA 109+38.00

*EXISTING PAVEMENT STRUCTURE DATA WAS OBTAINED FROM BORING LOG INFORMATION



CR 179 PROPOSED TYPICAL SECTION
STA 106+49.00 TO STA 107+20.00
STA 107+90.00 TO STA 109+38.00

BRIDGE LIMITS: STA 107+20.00 TO STA 107+90.00



DETAIL A
PAVEMENT EDGE

LEGEND:
EXISTING LANE DIRECTION
PROPOSED LANE DIRECTION
EXISTING PAVEMENT
PROPOSED PAVEMENT

NOTE:

1. THE CONTRACTOR WILL BE REQUIRED TO PROOF ROLL SUBGRADE PRIOR TO PLACEMENT OF FLEX BASE. IF UNSTABLE AREAS ARE ENCOUNTERED, THEY WILL BE CORRECTED PRIOR TO PLACEMENT OF THE FLEX BASE. EQUIPMENT AND METHODS USED TO CORRECT UNSTABLE AREAS WILL BE APPROVED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

SCALE: NTS

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/25/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

TYPICAL SECTIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			10
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

General Notes:

General:

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

Maria Pilar Aponte, P.E., Area Engineer, Maria.Aponte@txdot.gov
Rajendra P Hada, P.E., Assistant Area Engineer, Rajendra.Hada@txdot.gov

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.

The following standard detail sheets are modified:

Modified Standards

T223 (MOD)
AIG-38 (MOD)
FD (MOD)
IGSK (MOD)

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

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard

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specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Grade street intersections and median openings for surface drainage.

If a foundation is to be placed where a riprap surface or an asphalt concrete surface presently exists, use caution in breaking out the existing surface for placement. Break out no greater area than is required to place the foundation. After placing the foundation, wrap the periphery with 0.5 in. pre-molded mastic expansion joint. Then replace the remaining portion of the broken out surface with Class A or Class C concrete or cold mix asphalt concrete to the exact slope, pattern, and thickness of the existing riprap or asphalt. Payment for breaking out the existing surface, wrapping the foundation, and replacing the surface is subsidiary to the various bid items.

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

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

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

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

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

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

Tolls incurred by the Contractor are incidental to the various bid items.

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

The existing bridges located at CR 144 at American Canal and CR 30 at Styles Bayou and CR 89 at N. Fork Mary's Creek have been tested for Asbestos Containing Materials (ACM) and found to contain greater than 1% ACM and will be abated during construction. The ACM were found in the following areas: felt pad between pier and pier cap. The Contractor shall remove the bridge deck, stringers, and pier caps. A Specialty Contractor shall then remove exposed ACM felt pads. The Contractor shall then remove bridge piers. The Contractor shall coordinate the overall work with the Specialty Contractor who performs the abating work.

The abatement contractor shall notify the Department of State Health Services before the ACM abatement can begin.

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.

General: Site Management

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

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

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

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

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

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

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

General: Traffic Control and Construction

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

Sheet 11A

County: Brazoria **Control: 0912-31-307, etc.**

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

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

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

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

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

General: Utilities

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

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

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

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

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

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

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

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

Before beginning any underground work, notify the appropriate authority to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 5: Control of Work

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

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

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

Submit shop drawings electronically for the fabrication of items as documented in Table 2 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, 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.

Table 2

2014 Construction Specification Required Shop/Working Drawing Submittals - Consultant Generated Plans

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

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

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

Notes:

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

Key to Reviewing Party

D – Consultant: Submit to Engineer of Record at Dev.Pindoria@Jacobs.com
TMS – Traffic Management System

Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.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."

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

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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 0.920 acres, which is a sum of the 4 CSJs. Following summarizes the type of USACE permit need by CSJ/bridge crossing:

- CSJ 0912-31-307, CR 144 at American Canal: No permit needed
- CSJ 0912-31-313, CR 30 at Styles Bayou: Requires a NWP 14 (with PCN)
- CSJ 0912-31-314, CR 89 at N Fork Mary's Creek: No permit needed
- CSJ 0912-31-315, CR 179 at Drainage Ditch: Requires a NWP 14 (with PCN)

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.

Before bidding on this project, obtain a copy of the complete U.S. Army Corps of Engineers Nationwide Permit (NWP) at the Area Engineer's office. Review the permit before bidding on the project and become aware of its conditions.

Place erosion control measures around the perimeter of impacted wetlands as shown in the above-mentioned U.S. Army Corps of Engineers Nationwide permits. During staging and construction operations, equipment is not allowed in the Waters of the United States.

Do not place temporary fill in areas determined to be wetlands. This prohibition includes constructing staging areas, temporary fills or other actions that would result in placing fill in wetlands within the right of way, which are not addressed in the plans. The Engineer will coordinate with the Houston District Environmental Section to determine if wetlands are present on this project before placing temporary fill. If wetlands exist, obtain the appropriate permits from the U.S. Army Corps of Engineers.

Avoid encroaching into the wetland areas delineated in the plans. Place erosion control measures around the wetlands as shown on the plans. No construction work or construction equipment is permitted within this delineated area. If applicable for bridge construction, construct drilled shafts outside of this delineated area. Secure approval for the locations of field offices, material storage sites, material disposal sites, plants, borrow pits, etc. in writing before use to ensure that the proposed location is not within Jurisdictional Waters of the United States (wetlands).

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.

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This project requires permits with environmental resource agencies. There is a high probability of encountering environmentally sensitive areas on Contractor designated project specific locations (PSLs) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). This Item provides listings of regulatory agencies the Contractor may need to contact for this project. This project requires a United States Army Corps of Engineers nationwide permit with preconstruction notification for work in area designated as Waters of the United States. 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.

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.

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.

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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.

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

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

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

Removing the Asphalt Concrete Pavement (ACP) and the asphalt treatment/asphalt stabilized base are paid for under the Item, “Removing Treated and Untreated Base and Asphalt Pavement.”

RAP generated by this project will become the property of the Contractor.

Item 110: Excavation

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

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

Item 132: Embankment

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

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

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

Sheet 11E

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

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

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

Item 204: Sprinkling

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

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

Item 210: Rolling

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

Item 247: Flexible Base

Place the flexible base in courses a maximum of 8 in. thick (loose measurement). Mix flexible base that requires 2 or more mixtures of material, in an approved stationary pugmill type mixer. Material passing the No. 40 sieve is known as soil binder.

Tolerances relating to a specified gradation and to a plasticity index under this specification are permitted.

Furnish one type of the base material unless otherwise authorized.

Compact the courses to a minimum density of 95 percent of the maximum density as determined using test method TEX-113-E.

Sandstone aggregate is not permitted.

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 310: Prime Coat

Use asphalt material (MC-30) for new flexible base and for salvaged flexible base to be surfaced and place as directed.

Items 420: 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 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.

Item 427: Surface Finishes for Concrete

Provide a Surface Area I finish for structures. Use concrete paint for the surface finish.

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

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

Concrete collars are subsidiary to the various bid items.

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

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

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

Items 496: Removing Structures

Assume ownership and remove from the project site, items salvaged from the existing bridge decks and steel beams.

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

Item 502: Barricades, Signs, and Traffic Handling

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

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.

Sheet 11G

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

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

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

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

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.

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

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

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

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

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the “Daily Report on Law Enforcement Force Account Work” (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

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

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

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

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

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.

Sheet 11H

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

Item 530: Intersections, Driveways, and Turnouts

An air-entraining admixture is not required.

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.

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 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 asphalt mainlanes, use Surface Test Type B and Pay Adjustment Schedule 1.

Item 542: Removing Metal Beam Guard Fence

Remove and assume ownership of metal beam guard fence rail elements and posts.

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

Item 636: Signs

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

Item 644: Small Roadside Sign Assemblies

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

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

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

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

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

Assume ownership of the removed existing signs.

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

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

Item 656: Foundations for Traffic Control Devices

Using ready mix concrete for sign foundations is optional.

Item 666: Reflectorized Pavement Markings

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

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

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

Sheet 11I

County: Brazoria **Control: 0912-31-307, etc.**

Highway: CR

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

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

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

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

Stripe all roadways before opening them to traffic.

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

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

Item 672: Raised Pavement Markers

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

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

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

Item 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 3076: Dense-Graded Hot Mix Asphalt

Taper the asphalt concrete pavement at the beginning and ending points.

Use a maximum 6H:1V slope for the asphalt concrete pavement edge.

Where the 6H:1V ACP edge taper extends over onto the unsurfaced shoulders, blade off the loose existing shoulder material to provide a solid base for the outside taper edge. After placing the ACP overlay, blade this material back against the edge taper. This work is subsidiary to the various bid items.

The stockpile will be the point of sampling of coarse aggregate for test method TEX-217-F (Part II, decantation).

Place the asphalt concrete pavement in courses as shown on the typical sections.

Do not use petroleum-based solvents in the beds of hot mix asphalt delivery vehicles.

Dilution of tack coat is not allowed.

Do not use Surface Aggregate Classification (SAC) C for this project.

For determining the Asphalt Content, only ignition ovens will be allowed.

The tack coat rate shown on the “Basis of Estimate” is an average rate for calculating tack coat quantities. Vary the rate based on the pavement conditions and other factors such as manufacturer’s recommendations and weather.

Basis of Estimate

Item	Description	Limit and Rate	Unit
247	Flexible Base • Crushed Stone	 138 Lb. / Cu. Ft.	TON
260	Lime Treatment (Road-Mixed) For materials used as subgrade * • Lime(HYD, COM, or QK)(SLRY) or QK(DRY)	 6 % by weight based on 100 Lb. / Cu. Ft. subgrade	SY TON
310	Prime Coat	0.25 Gal./Sq. Yd.	GAL
3076	Dense-Graded Hot Mix Asphalt • Asphalt • Aggregate • Tack Coat • Applied on new HMA	110 Lb. / Sq. Yd.-In. 6 % by weight 94 % by weight 0.06 Gal. / Sq. Yd.	TON

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-31-307 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY CHOCOLATE BAYOU RD, CR 144, CR 179, CR 5665

				0912-31-307		0912-31-313		0912-31-314		0912-31-315		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB											
		PROJECT ID		A00123419		A00122426		A00122493		A00122488			
		COUNTY		Brazoria		Brazoria		Brazoria		Brazoria			
		HIGHWAY		CR 144		CR 5665		CHOCOLATE BAYOU RD		CR 179			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	3.600		3.500		2.880		2.890		12.870	
	105-6166	RMV TRT & UNTRT BASE & ASPH PV(12"-18")	SY	783.000		714.000		494.000		598.000		2,589.000	
	110-6001	EXCAVATION (ROADWAY)	CY	200.000		13.000		32.000		68.000		313.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	702.000		1,170.000		885.000		774.000		3,531.000	
	132-6035	EMBANK(FINAL)(DC)(TY E)(CSBE)	CY	438.000		728.000				559.000		1,725.000	
	162-6002	BLOCK SODDING	SY	822.000		539.000		1,070.000		305.000		2,736.000	
	162-6003	STRAW OR HAY MULCH	SY	822.000		539.000		1,070.000		305.000		2,736.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	822.000		539.000		1,070.000		305.000		2,736.000	
	166-6001	FERTILIZER	AC	0.340		0.223		0.442		0.126		1.131	
	168-6001	VEGETATIVE WATERING	MG	12.823		8.408		16.692		4.758		42.681	
	247-6230	FL BS (CMP IN PLACE)(TY A GR 1-2)(8")	SY	1,050.000		987.000		1,006.000		849.000		3,892.000	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	19.000		18.000		19.000		16.000		72.000	
	260-6073	LIME TRT (SUBGRADE)(8")	SY	1,076.000		1,023.000		1,035.000		871.000		4,005.000	
	310-6009	PRIME COAT (MC-30)	GAL	256.000		238.000		244.000		207.000		945.000	
	400-6005	CEM STABIL BKFL	CY	83.000				103.000		24.000		210.000	
	403-6001	TEMPORARY SPL SHORING	SF					653.000				653.000	
	416-6004	DRILL SHAFT (36 IN)	LF	344.000		536.000				472.000		1,352.000	
	420-6013	CL C CONC (ABUT)	CY	44.400		43.400				43.400		131.200	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	4.000				2.000		7.000		13.000	
	422-6001	REINF CONC SLAB	SF	2,200.000		2,800.000				2,800.000		7,800.000	
	422-6015	APPROACH SLAB	CY	28.000		63.000				58.000		149.000	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	272.500		347.500				347.500		967.500	
	432-6002	RIPRAP (CONC)(5 IN)	CY	19.000		111.000		41.000		40.000		211.000	
	432-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	14.000		49.000				33.000		96.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	5.000		15.000		17.000		6.000		43.000	
	450-6006	RAIL (TY T223)	LF	180.500				131.000		246.000		557.500	
	450-6019	RAIL (TY T631LS)	LF			172.000						172.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	80.000		80.000				80.000		240.000	
	462-6031	CONC BOX CULV (10 FT X 7 FT)	LF					76.000				76.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	26.000								26.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	57.000				41.000		40.000		138.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	53.000								53.000	
	466-6171	WINGWALL (PW - 1) (HW=10 FT)	EA					2.000				2.000	
	467-6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	1.000								1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	1.000								1.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	3.000				1.000		1.000		5.000	
	467-6446	SET (TY II) (36 IN) (RCP) (2.5: 1) (C)	EA	1.000								1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-31-307 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY CHOCOLATE BAYOU RD, CR 144, CR 179, CR 5665

				0912-31-307		0912-31-313		0912-31-314		0912-31-315		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB											
		PROJECT ID		A00123419		A00122426		A00122493		A00122488			
		COUNTY		Brazoria		Brazoria		Brazoria		Brazoria			
		HIGHWAY		CR 144		CR 5665		CHOCOLATE BAYOU RD		CR 179			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	496-6007	REMOV STR (PIPE)	LF	50.000								50.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000		1.000		1.000		4.000	
	496-6040	REMOV STR (RET WALL)	LF							36.000		36.000	
	496-6050	REMOV STR (DRIVEWAY CULVERT)	EA	2.000				1.000		1.000		4.000	
	500-6001	MOBILIZATION	LS	0.258		0.288		0.198		0.256		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4.000		4.000		3.000		4.000		15.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	160.000		160.000		140.000		180.000		640.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	200.000		200.000		200.000		200.000		800.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	200.000		200.000		200.000		200.000		800.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	731.000		640.000		609.000		434.000		2,414.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	731.000		640.000		609.000		434.000		2,414.000	
	530-6005	DRIVEWAYS (ACP)	SY	334.000				24.000		104.000		462.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	62.500		125.000		37.500		25.000		250.000	
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA	1.000				3.000				4.000	
	540-6014	SHORT RADIUS	LF	75.000				12.500		25.000		112.500	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA	5.000				1.000		2.000		8.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF							40.000		40.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA							3.000		3.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA			4.000		4.000		2.000		10.000	
	560-6001	MAILBOX INSTALL-S (TWG-POST) TY 1	EA	1.000				1.000				2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	7.000		2.000		4.000		2.000		15.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2.000								2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	10.000		2.000		7.000		7.000		26.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	4.000				4.000		8.000		16.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	6.000		13.000		6.000				25.000	
	658-6053	INSTL OM ASSM (OM-3L)(TWT)GND	EA	2.000		2.000		2.000		2.000		8.000	
	658-6057	INSTL OM ASSM (OM-3R)(TWT)GND	EA	2.000		2.000		2.000		2.000		8.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	4.000		4.000		2.000				10.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	33.000								33.000	
	666-6225	PAVEMENT SEALER 6"	LF	1,752.000		790.000		598.000		1,362.000		4,502.000	
	666-6230	PAVEMENT SEALER 24"	LF	33.000								33.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	722.000		700.000		538.000		784.000		2,744.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF			90.000		60.000				150.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,030.000						578.000		1,608.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	12.000		4.000		3.000		7.000		26.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	1,752.000		790.000		598.000		1,362.000		4,502.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	33.000								33.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0912-31-307 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY CHOCOLATE BAYOU RD, CR 144, CR 179, CR 5665

													TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0912-31-307**		**0912-31-313**		**0912-31-314**		**0912-31-315**				
		PROJECT ID		**A00123419**		**A00122426**		**A00122493**		**A00122488**				
		COUNTY		**Brazoria**		**Brazoria**		**Brazoria**		**Brazoria**				
		HIGHWAY		**CR 144**		**CR 5665**		**CHOCOLATE BAYOU RD**		**CR 179**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL			
	3076-6066	TACK COAT	GAL	61.000		57.000		59.000		50.000			227.000	
	3076-6077	D-GR HMA TY-D SAC-B PG70-22 (EXEMPT)	TON	83.000		77.000		79.000		67.000			306.000	
	3076-6081	D-GR HMA TY-D PG70-22 (EXEMPT)	TON	84.000		78.000		80.000		68.000			310.000	
	5026-6001	ASBESTOS ABATEMENT (COATINGS)	SF	20.000		20.000		20.000					60.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	252.000		276.000		186.000		248.000			962.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000		1.000		1.000			4.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000		1.000		1.000			4.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000		1.000		1.000			4.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS		
LOCATION	502	6001
	6001	6001
	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN
	MO	DAY
CR 144	4	252
CR 30	4	276
CR 89	3	186
CR 179	4	248
PROJECT TOTALS	15	962

* QUANTITY FOR PORTABLE CHANGEABLE MESSAGE SIGN INCLUDES 2 SIGNS TO BE PLACED TWO WEEKS IN ADVANCE OF CLOSURE AND TO REAMIN IN PLACE FOR THE DURATION OF CONSTRUCTION.

NO.	DATE	REVISION	APPROV.

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CR 144, ETC.

SUMMARY OF TRAFFIC CONTROL QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			13
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF REMOVAL ITEMS

LOCATION	100	105	496			542		5026
	6002	6166	6007	6009	6040	6001	6002	6001
	PREPARING ROW	RMV TRT & UNTRT BASE & ASPH PV(12"-18")	REMOV STR (PIPE)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOV STR (RET WALL)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	ASBESTOS ABATEMENT (COATINGS)
	STA	SY	LF	EA	LF	LF	EA	SF
CR 144	3.60	783	50	1				20
CR 30	3.50	714		1				20
CR 89	2.88	494		1				20
CR 179	2.89	598		1	36	40	3	
PROJECT TOTALS	12.87	2589	50	4	36	40	3	60

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SUMMARY OF REMOVAL QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			14
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF ROADWAY ITEMS

LOCATION	110	132		247	260		310	420	422	432		450
	6001	6005	6035	6230	6012	6073	6009	6066	6015	6002	6045	6006
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	EMBANK (FINAL) (DC) (TY E) (CSBE)	FL BS (CMP IN PLACE) (TY A GR 1-2) (8")	LIME (HYD, COM OR QK) (SLRY) OR QK (DRY)	LIME TRT (SUBGRADE) (8")	PRIME COAT (MC-30)	CL C CONC (RAIL FOUNDATION)	APPROACH SLAB	RIPRAP (CONC) (5 IN)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY T223)
	CY	CY	CY	SY	TON	SY	GAL	CY	CY	CY	CY	LF
CR 144	200	702	438	1050	19	1076	256	4	28	19	5	35
CR 30	13	1170	728	987	18	1023	238		63	111	15	
CR 89	32	885		1006	19	1035	244	2		41	17	131
CR 179	68	774	559	849	16	871	207	7	58	40	6	74
PROJECT TOTALS	313	3531	1725	3892	72	4005	945	13	149	211	43	240

SUMMARY OF ROADWAY ITEMS

LOCATION	464	467	540				544	560	3076		
	6008	6446	6001	6007	6014	6015	6001	6001	6066	6077	6081
	RC PIPE (CL III) (36 IN)	SET (TY II) (36 IN) (RCP) (2.5:1) (C)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	SHORT RADIUS	DRIVEWAY TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	MAILBOX INSTALL-S (TWG-POST) TY 1	TACK COAT	D-GR HMA TY-D SAC-B PG70-22 (EXEMPT)	D-GR HMA TY-D PG70-22 (EXEMPT)
	LF	EA	LF	EA	LF	EA	EA	EA	GAL	TON	TON
CR 144	53	1	62.5	1	75	5		1	61	83	84
CR 30			125				4		57	77	78
CR 89			37.5	3	12.5	1	4	1	59	79	80
CR 179			25		25	2	2		50	67	68
PROJECT TOTALS	53	1	250	4	112.5	8	10	2	227	306	310

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CR 144, ETC.

SUMMARY OF ROADWAY QUANTITIES

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			15
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

	SUMMARY OF DRIVEWAY ITEMS						
ITEM NO.	464		467			496	530
DESC. CODE	6005	6007	6391	6395	6423	6050	6005
DESCRIPTION	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	SET (TY II) (24 IN) (RCP) (4: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (30 IN) (RCP) (6: 1) (P)	REMOV STR (DRIVEWAY CULVERT)	DRIVEWAYS (ACP)
UNIT	LF	LF	EA	EA	EA	EA	SY
CSJ: 0912-31-307							
CR 144-EBWB							
DRIVEWAY NO.							
1		32			1		51
2		25			2	1	39
3							73
CR 144-NBSB							
DRIVEWAY NO.							
4							46
5							47
6							36
7	26		1	1		1	42
CSJ TOTAL:	26	57	1	1	3	2	334
CSJ: 0912-31-314							
CR 89							
DRIVEWAY NO.							
1		41			1	1	24
CSJ TOTAL:		41			1	1	24
CSJ: 0912-31-315							
CR 179							
DRIVEWAY NO.							
1							17
2							18
3						1	31
4		40			1		38
CSJ TOTAL:		40			1	1	104
PROJECT TOTALS:	26	138	1	1	5	4	462

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CR 144, ETC.

SUMMARY OF ROADWAY QUANTITIES

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			16
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF DRAINAGE ITEMS

LOCATION	400 6005	403 6001	462 6031	466 6171
	CEM STABIL BKFL	TEMPORARY SPL SHORING	* CONC BOX CULV (10 FT X 7 FT)	* WINGWALL (PW - 1) (HW=10 FT)
	CY	SF	LF	EA
CR 144	83			
CR 30				
CR 89	102	653	76	2
CR 179	24			
PROJECT TOTALS	209	653	76	2

* SULFATE RESISTANT CONCRETE SHALL BE USED FOR THESE ITEMS FOR CR 89.

NO.	DATE	REVISION	APPROV.

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SUMMARY OF DRAINAGE QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			17
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF SIGNING ITEMS

LOCATION	644			658				
	6001	6004	6076	6014	6016	6053	6057	6060
	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	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	INSTL OM ASSM (OM-3L)(T WT)GND	INSTL OM ASSM (OM-3R)(T WT)GND	REMOVE DEL IN & OBJECT MARKER ASSMS
	EA	EA	EA	EA	EA	EA	EA	EA
CR 144	7	2	10	4	6	2	2	4
CR 30	2		2		13	2	2	4
CR 89	4		7	4	6	2	2	2
CR 179	2		7	8		2	2	
PROJECT TOTALS	15	2	26	16	25	8	8	10

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
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CR 144, ETC.

SUMMARY OF SIGNING QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			18
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF SMALL SIGNS

ROAD NAME	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM																			
							TYPE OF MOUNT																			
							6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6006 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6040 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6052 S80 (2) SA (T-2EXT) EA
CR 144	1	W3-1	STOP AHEAD	30" x 30"		X	X																			
CR 144	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 144	3	R1-1	STOP	30" x 30"		X	X																			
CR 144	4	W1-6R	ONE-DIRECTION LARGE ARROW RIGHT	36" x 18"		X			X																	
CR 144	5	R1-1	STOP	30" x 30"		X	X																			
CR 144	6	W1-6L	ONE-DIRECTION LARGE ARROW LEFT	36" x 18"		X			X																	
CR 144	7	R1-1	STOP	30" x 30"		X	X																			
CR 144	8	W3-1	STOP AHEAD	30" x 30"		X	X																			
CR 144	9	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 30	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 30	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 89	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 89	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 89	3	I-2aT	PEARLAND CITY LIMIT POP. 129,600	VAR" x 24"		X	X																			
CR 89	4	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 179	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
CR 179	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" x 36"		X	X																			
				TOTAL		17	15		2																	

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS (TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	HIGHWAY	SHEET
HOU	BRAZORIA	091	23	307, ETC	CR 144, ETC	19

STD-N29

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666						672	678	
	6048	6225	6230	6309	6318	6321	6009	6002	6008
	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	PAVEMENT SEALER 6"	PAVEMENT SEALER 24"	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (24")
	LF	LF	LF	LF	LF	LF	EA	LF	LF
CR 144	33	1752	33	722		1030	12	1752	33
CR 30		790		700	90		4	790	
CR 89		598		538	60		3	598	
CR 179		1362		784		578	7	1362	
PROJECT TOTALS	33	4502	33	2744	150	1608	26	4502	33

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 144, ETC.

SUMMARY OF PAVEMENT MARKING QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			20
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	162		164	166	168	506				
	6002	6003	6009	6001	6001	6001	6020	6024	6038	6039
	BLOCK SODDING	STRAW OR HAY MULCH	BROADCAST SEED (TEMP) (WARM)	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 1)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	AC	MG	LF	SY	SY	LF	LF
CR 144	822	822	822	0.340	12.82	160	200	200	731	731
CR 30	539	539	539	0.223	8.41	160	200	200	640	640
CR 89	1070	1070	1070	0.442	16.69	140	200	200	609	609
CR 179	305	305	305	0.126	4.76	180	200	200	434	434
PROJECT TOTALS	2736	2736	2736	1.131	42.68	640	800	800	2414	2414

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 144, ETC.

SUMMARY OF SWP3 QUANTITIES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			21
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

GENERAL

1. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED / APPROVED BY THE ENGINEER.

2. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTORS PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

3. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

4. THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

5. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.

7. REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

8. COOPERATE IN THE USE OF RIGHT-OF-WAY (ROW) WITH THE CITY OF MANVEL AND VARIOUS PUBLIC COMPANIES, THEIR CONTRACTORS AND OTHER ROADWAY CONTRACTORS, AS REQUIRED TO ALLOW FOR UTILITY ADJUSTMENTS AND ROAD CONSTRUCTION TO BE DONE BY OTHERS. IF THE CONTRACTOR IS DELAYED BY VIRTUE OF THESE OPERATIONS BY OTHERS, AN EXTENSION OF WORKING TIME MAY BE GRANTED IF, IN THE OPINION OF THE ENGINEER, AN EXTENSION IS NECESSARY FOR THE DELAY.

9. ALL PERMANENT SIGNS NECESSARY FOR THE OPERATION OF ANY ROADWAY WILL BE INSTALLED BY THE CONTRACTOR PRIOR TO OPENING THAT SECTION OF ROADWAY TO TRAFFIC. THE CONTRACTOR MAY ERECT THE SIGNS ON TEMPORARY MOUNTS UNTIL SUCH TIME AS THE PERMANENT MOUNTS MAY BE INSTALLED. ANY SIGNS WHICH ARE DAMAGED DURING CONSTRUCTION OR DEEMED INSUFFICIENT BY THE ENGINEER WILL BE REPLACED OR REPAIRED. THE ENGINEER WILL BE THE SOLE JUDGE OF THE ADEQUACY OF THE SIGNS. ANY COST ASSOCIATED WITH THE TEMPORARY MOUNTS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

10. PROVIDE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) TO SUPPLEMENT THE ADVANCED WARNING SIGNS FOR ALL LANE OR ROADWAY CLOSURES TO HELP MANAGE TRAFFIC FLOW. MESSAGE AND LOCATIONS WILL BE AS DIRECTED BY THE ENGINEER. THIS ITEM WILL BE PAID FOR IN ACCORDANCE WITH SPECIAL SPECIFICATION 6001.

11. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, TEMPORARY CTB, ILLUMINATION SYSTEM, DRAINAGE, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK. THEREFORE, PROCEED WITH CONSTRUCTION OPERATIONS IN CONFORMITY WITH THE DETAILS AS SHOWN ON THE PLANS. ENSURE ADEQUATE DRAINAGE AT ALL TIMES DURING ALL PHASES OF CONSTRUCTION.

    a. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATION TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. INCLUDE ALL CHANGES TO THE VARIOUS PAY ITEMS, IMPACTS TO TRAFFIC, EFFECTS ON OVERALL PROJECT TIME AND COSTS, AND REVISE CPM SCHEDULE IN ANY RECOMMENDATIONS FOR MAJOR MODIFICATIONS.

    b. DEVELOP DETAILED PLAN SHEETS SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER FOR ANY MODIFICATIONS IMPLEMENTED. DO NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE PRIOR TO OBTAINING WRITTEN APPROVAL.

12. THE CONTRACTOR WILL NOTIFY THE ENGINEER OF UPCOMING BRIDGE CLOSURES AS EARLY AS TEN (10) WORKING DAYS AND WILL PROVIDE CONFIRMATION NO LATER THAN 48 HOURS IN ADVANCE OF BRIDGE CLOSURES.

13. THE PROVISION OF ROUTING TRAFFIC DURING CONSTRUCTION AND THE SEQUENCE OF CONSTRUCTION OPERATIONS WILL BE IN GENERAL CONFORMITY WITH THE DETAILS SHOWN ON THE PLANS, EXCEPT AS MAY BE ALTERED WITH RESPECT TO ANY DETAIL BY WRITTEN INSTRUCTION BY THE ENGINEER.

14. DEMOLITION OF EXISTING BRIDGE SHALL NOT OCCUR, NOR THE DETOURING OF TRAFFIC, UNTIL SUFFICIENT MATERIALS ARE AVAILABLE FOR THE EFFICIENT TIME CONSTRUCTION OF NEW BRIDGE.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

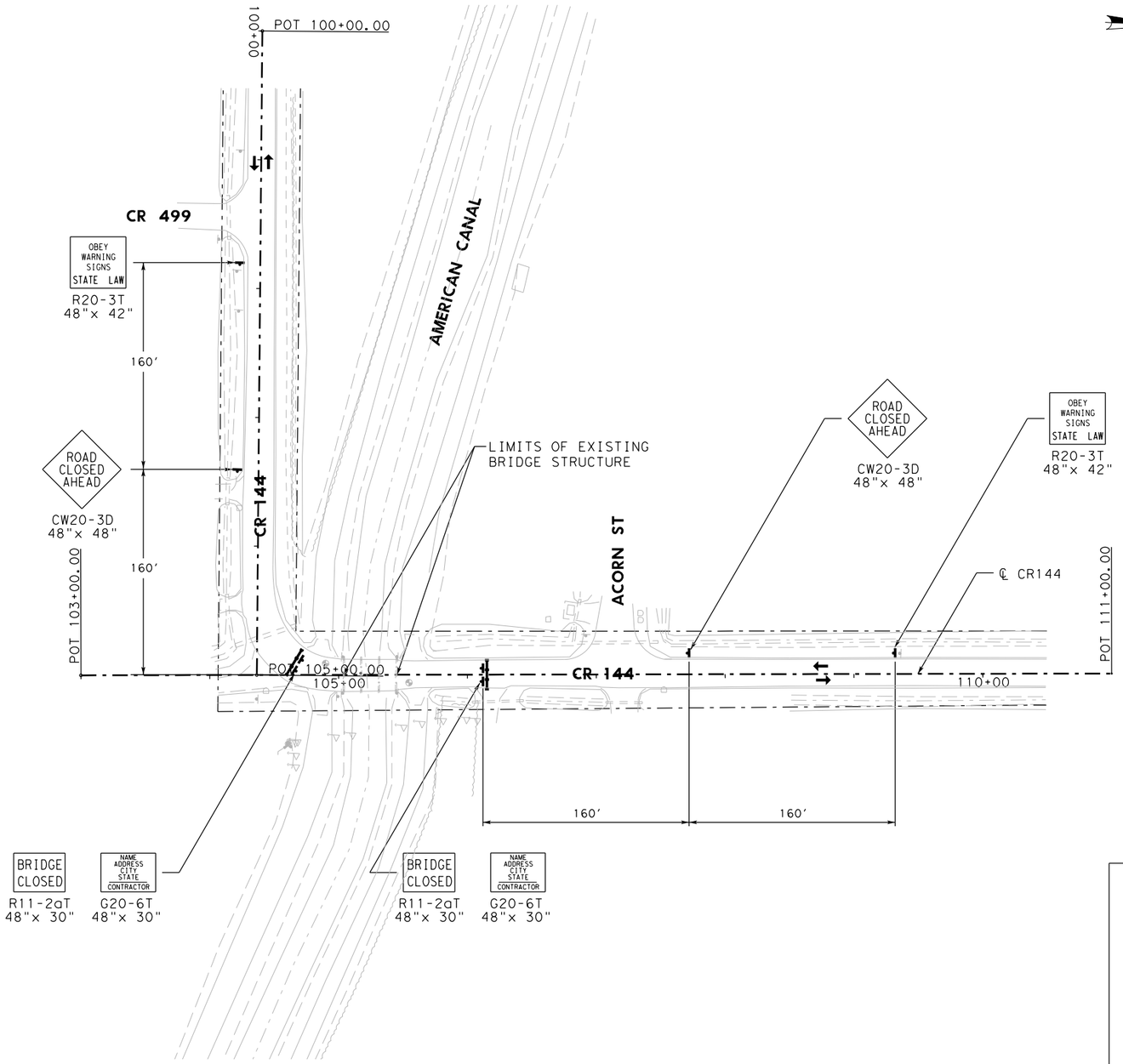
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

TRAFFIC CONTROL GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			22
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



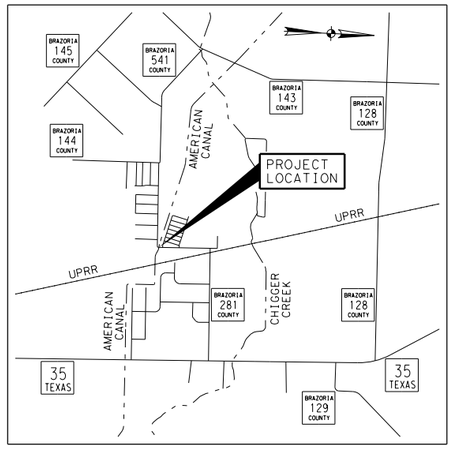
LEGEND

- TYPE 3 BARRICADE
- SIGN
- TRAFFIC FLOW ARROW

NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
3. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
4. CONSULT DETOUR PLAN TO BE USED DURING CLOSURE OF CR 144 BRIDGE OVER AMERICAN CANAL.

0 25 50 100
SCALE: 1"=100'



VICINITY MAP

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

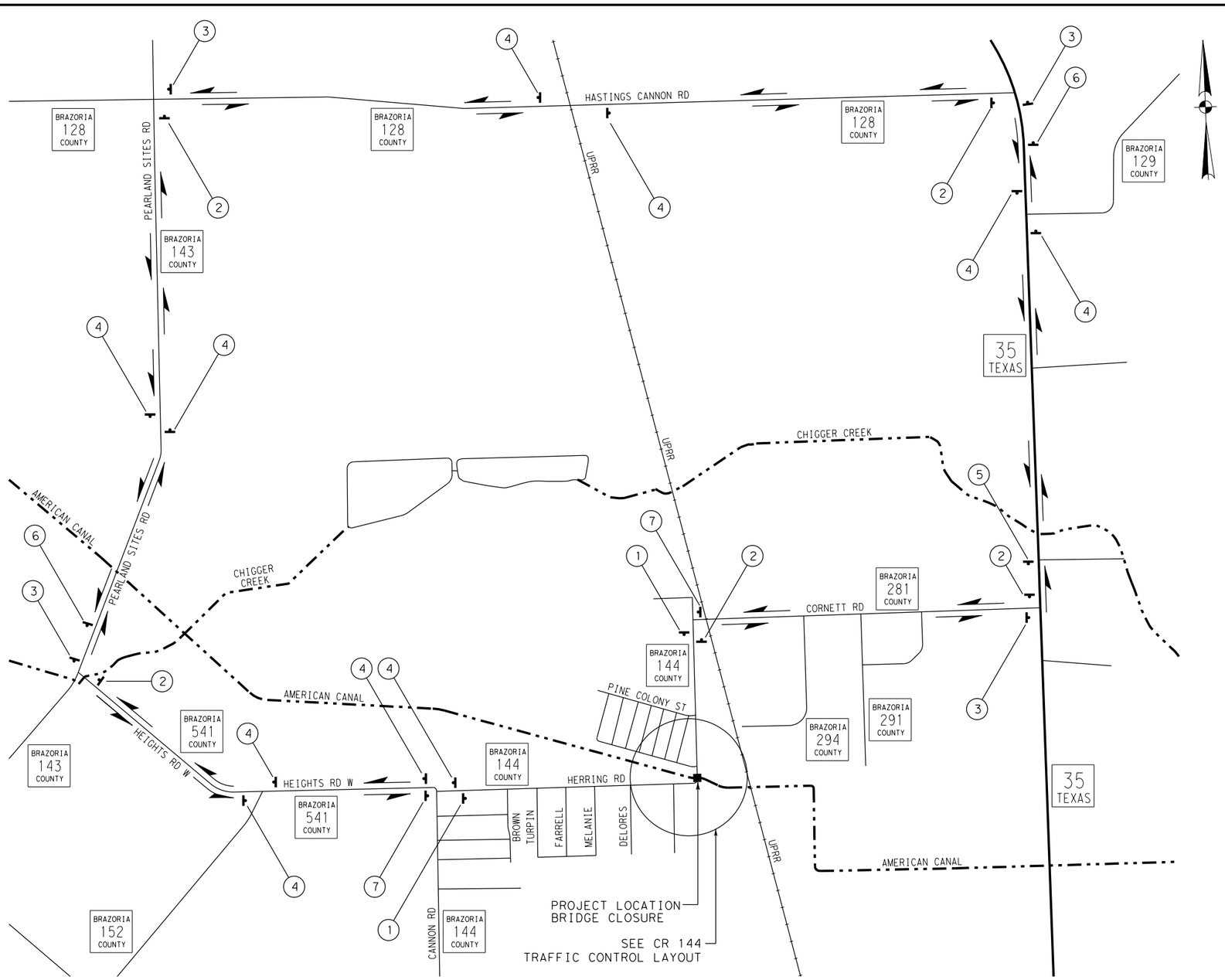
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

TRAFFIC CONTROL LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			23
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



DETOUR NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. CONSULT STANDARDS WZ(RCD)-13 FOR GUIDANCE IN ROAD CLOSURE TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
3. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
4. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
5. THIS DETOUR PLAN TO BE USED DURING CLOSURE OF CR 144 BRIDGE OVER AMERICAN CANAL.
6. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED A MINIMUM OF TWO WEEKS IN ADVANCE OF CLOSURE AND REMAIN IN PLACE FOR THE DURATION OF THE PROJECT. PCMS SHALL BE PLACED AS DIRECTED BY THE ENGINEER.

COUNTY ROAD 144 BRIDGE CLOSURE:

CR 144 EASTBOUND TRAFFIC
WESTBOUND ON CR 541 TO CR 143.
NORTH ON CR 143 TO CR 128.
EAST ON CR 128 TO SH 35.
SOUTH ON SH 35 TO CR 281.
WEST ON CR 281 TO CR 144.

CR 144 WESTBOUND TRAFFIC
EAST ON CR 281 TO SH 35.
NORTH ON SH 35 TO CR 128.
WEST ON CR 128 TO CR 143.
SOUTH ON CR 143 TO CR 541.
EAST ON CR 541 TO CR 144.

(1) BRIDGE OUT — XX MILES AHEAD LOCAL TRAFFIC ONLY — R11-3b

(2) CR 144 DETOUR — M4-12T M4-9R

(3) CR 144 DETOUR — M4-12T M4-9L

(4) CR 144 DETOUR — M4-12T M4-9S

(5) CR 144 DETOUR — M4-12T M4-9TR

(6) CR 144 DETOUR — M4-12T M4-9TL

(7) END DETOUR — M4-8a

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 144 AT AMERICAN CANAL

TRAFFIC CONTOL DETOUR PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		24

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

GENERAL

1. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED / APPROVED BY THE ENGINEER.

2. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTORS PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

3. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

4. THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

5. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.

7. REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

8. COOPERATE IN THE USE OF RIGHT-OF-WAY (ROW) WITH THE VARIOUS PUBLIC COMPANIES, THEIR CONTACTORS AND OTHER ROADWAY CONTRACTORS, AS REQUIRED TO ALLOW FOR UTILITY ADJUSMENTS AND ROAD CONSTRUCTION TO BE DONW BY OTHERS. IF THE CONTRACTOR IS DELAYED BY VIRTUE OF THESE OPERATIONS BY OTHERS, AN EXTENSION OF WORKING TIME MAY BE GRANTED IF, IN THE OPINION OF THE ENGINEER, AN EXTENSION IS NECESSARY THIS DELAY.

9. ALL PERMANENT SIGNS NECESSARY FOR THE OPERATION OF ANY ROADWAY WILL BE INSTALLED BY THE CONTRACTOR PRIOR TO OPENING THAT SECTION OF ROADWAY TO TRAFFIC. THE CONTRACTOR MAY ERECT THE SIGNS ON TEMPORARY MOUNTS UNTIL SUCH TIME AS THE PERMANENT MOUNTS MAY BE INSTALLED. ANY SIGNS WHICH ARE DAMAGED DURING CONSTRUCTION OR DEEMED INSUFFICIENT BY THE ENGINEER WILL BE REPLACED OR REPAIRED. THE ENGINEER WILL BE THE SOLE JUDGE OF THE ADEQUACY OF THE SIGNS. ANY COST ASSOCIATED WITH THE TEMPORARY MOUNTS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

10. PROVIDE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) TO SUPPLEMENT THE ADVANCED WARNING SIGNS FOR ALL LANE OR ROADWAY CLOSURES TO HELP MANAGE TRAFFIC FLOW. MESSAGE AND LOCATIONS WILL BE AS DIRECTED BY THE ENGINEER. THIS ITEM WILL BE PAID FOR IN ACCORDANCE WITH SPECIAL SPECIFICATION 6001.

11. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, TEMPORARY CTB, ILLUMINATION SYSTEM, DRAINAGE, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK. THEREFORE, PROCEED WITH CONSTRUCTION OPERATIONS IN CONFORMITY WITH THE DETAILS AS SHOWN ON THE PLANS. ENSURE ADEQUATE DRAINAGE AT ALL TIMES DURING ALL PHASES OF CONSTRUCTION.

    a. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATION TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. INCLUDE ALL CHANGES TO THE VARIOUS PAY ITEMS, IMPACTS TO TRAFFIC, EFFECTS ON OVERALL PROJECT TIME AND COSTS, AND REVISE CPM SCHEDULE IN ANY RECOMMENDATIONS FOR MAJOR MODIFICATIONS.

    b. DEVELOP DETAILED PLAN SHEETS SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER FOR ANY MODIFICATIONS IMPLEMENTED. DO NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE PRIOR TO OBTAINING WRITTEN APPROVAL.

12. THE CONTRACTOR WILL NOTIFY THE ENGINEER OF UPCOMING BRIDGE CLOSURES AS EARLY AS TEN (10) WORKING DAYS AND WILL PROVIDE CONFIRMATION NO LATER THAN 48 HOURS IN ADVANCE OF BRIDGE CLOSURES.

13. THE PROVISION OF ROUTING TRAFFIC DURING CONSTRUCTION AND THE SEQUENCE OF CONSTRUCTION OPERATIONS WILL BE IN GENERAL CONFORMITY WITH THE DETAILS SHOWN ON THE PLANS, EXCEPT AS MAY BE ALTERED WITH RESPECT TO ANY DETAIL BY WRITTEN INSTRUCTION BY THE ENGINEER.

14. DEMOLITION OF EXISTING BRIDGE SHALL NOT OCCUR, NOR THE DETOURING OF TRAFFIC, UNTIL SUFFICIENT MATERIALS ARE AVAILABLE FOR THE EFFICIENT TIME CONSTRUCTION OF NEW BRIDGE.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 30 AT STYLES BAYOU

TRAFFIC CONTROL
GENERAL NOTES

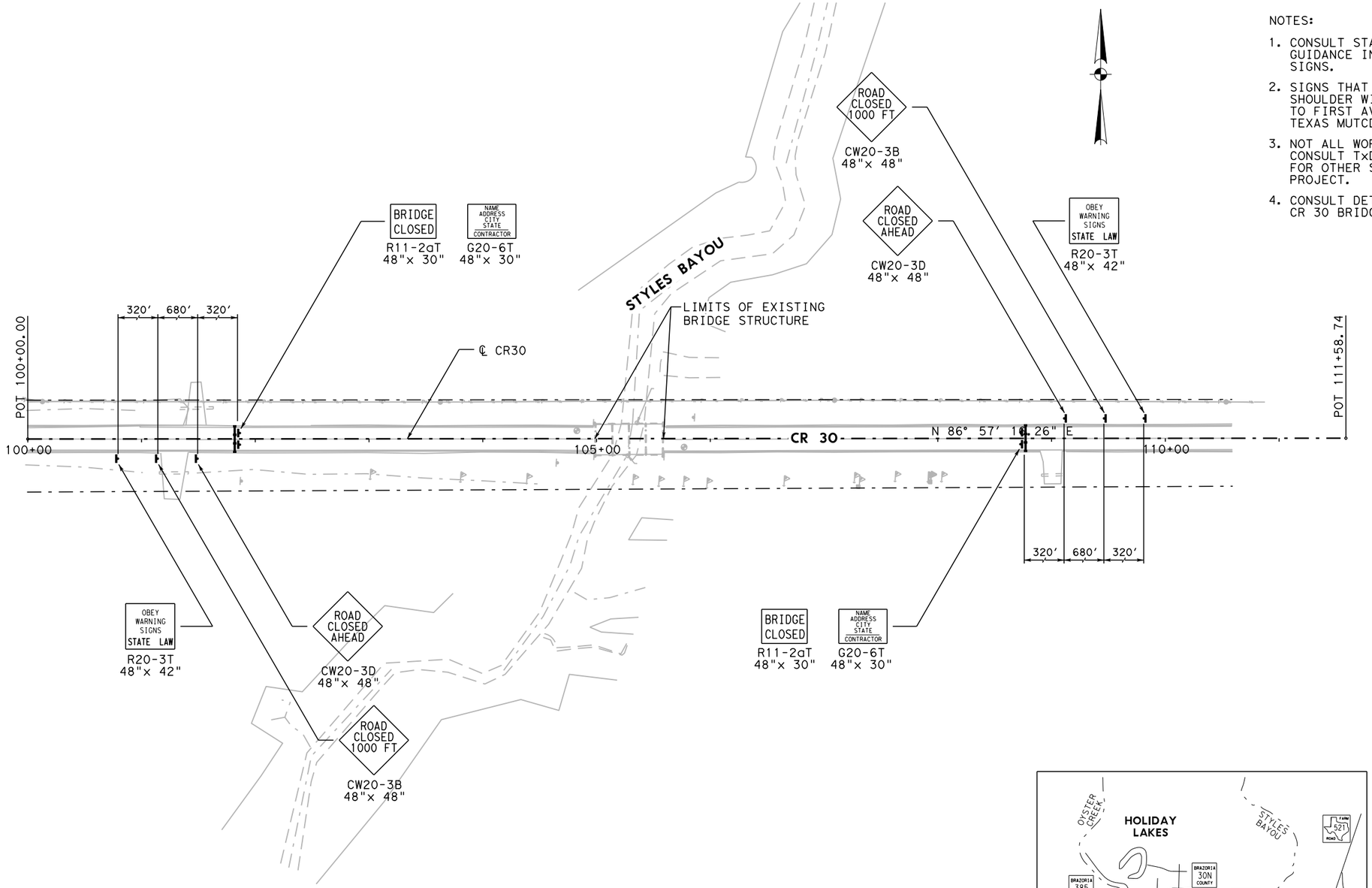
SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			25
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

XXX RT

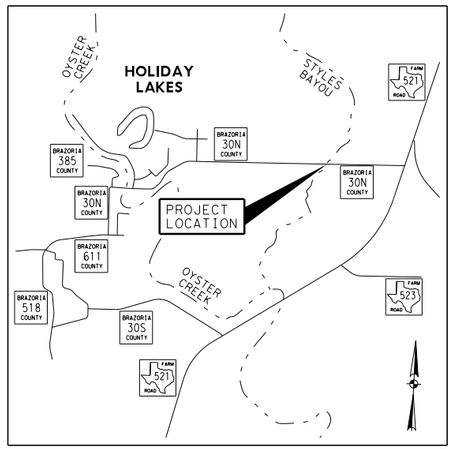
NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
3. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
4. CONSULT DETOUR PLAN TO BE USED DURING CLOSURE OF CR 30 BRIDGE OVER STYLES BAYOU.



LEGEND

- TYPE 3 BARRICADE
- SIGN
- TRAFFIC FLOW ARROW



VICINITY MAP

ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

4/20/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 30 AT STYLES BAYOU

TRAFFIC CONTROL LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		26

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

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4/20/2022 12:13:30 PM \\USQTSO-APP078\ICS_workdir\42992\1004768_7\J_313_CR30_TCP01.dgn

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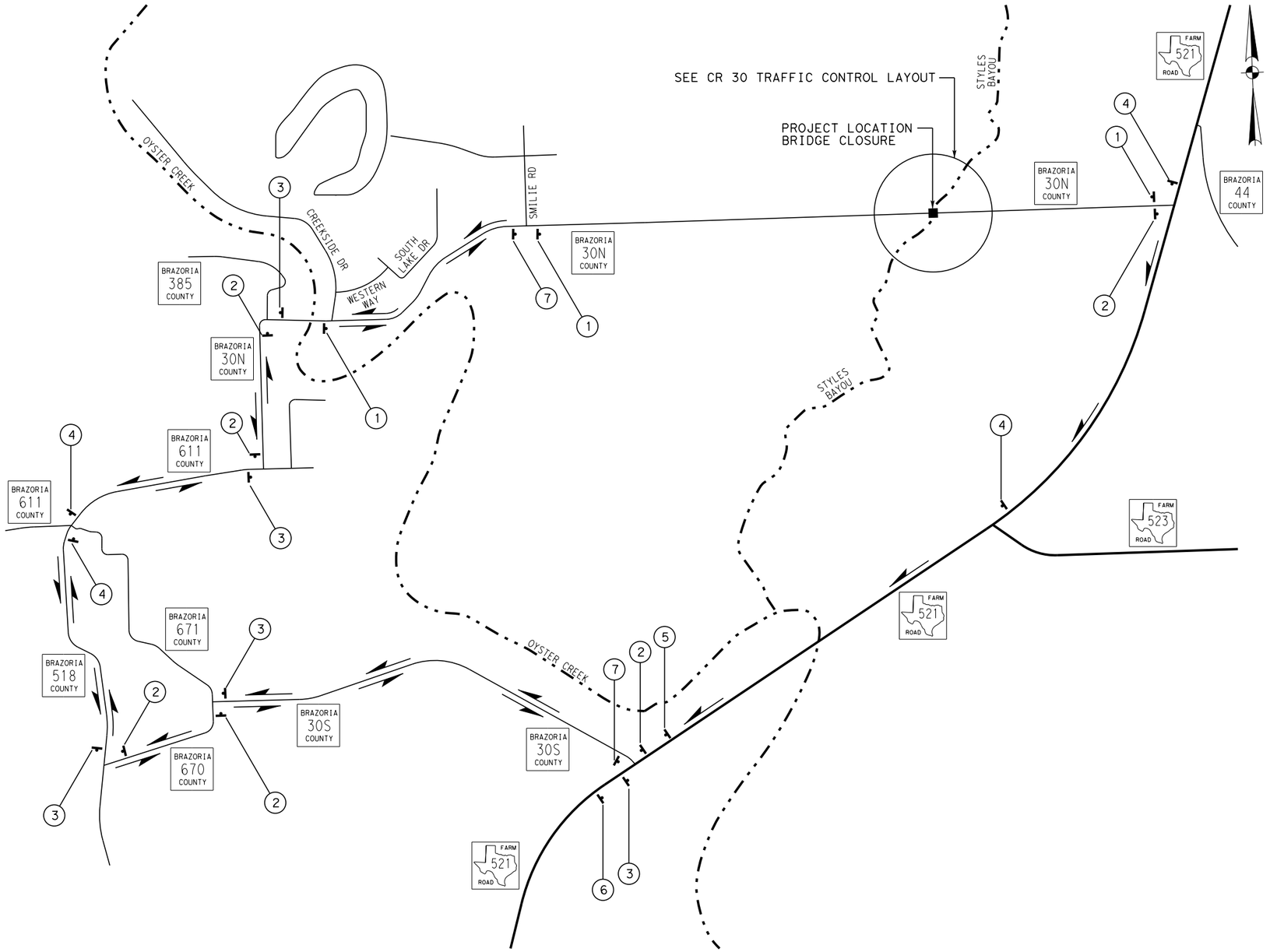


DETOUR NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. CONSULT STANDARDS WZ(RCD)-13 FOR GUIDANCE IN ROAD CLOSURE TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
3. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
4. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
5. THIS DETOUR PLAN TO BE USED DURING CLOSURE OF CR 30 BRIDGE OVER STYLES BAYOU.
6. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED A MINIMUM OF TWO WEEKS IN ADVANCE OF CLOSURE AND REMAIN IN PLACE FOR THE DURATION OF THE PROJECT. PCMS SHALL BE PLACED AS DIRECTED BY THE ENGINEER.

COUNTY ROAD 30 BRIDGE CLOSURE:

CR 30 EASTBOUND TRAFFIC
WESTBOUND ON CR 30N TO CR 611.
WEST ON CR 611 TO CR 518.
SOUTH ON CR 518 TO CR 670.
EAST ON CR 670 TO CR 30S.
EAST ON CR 30S TO FM 521.

CR 30 WESTBOUND TRAFFIC
WEST ON FM 521 TO CR 30S.
WEST ON CR 30S TO CR 670.
WEST ON CR 670 TO CR 518.
NORTH ON CR 518 TO CR 611.
EAST ON CR 611 TO CR 30N.

1. BRIDGE OUT / XX MILES AHEAD / LOCAL TRAFFIC ONLY — R11-3b
2. CR 30N / DETOUR ⇨ — M4-12T, M4-9R
3. CR 30N / DETOUR ⇦ — M4-12T, M4-9L
4. CR 30N / DETOUR ⇧ — M4-12T, M4-9S
5. CR 30N / DETOUR ⇨ — M4-12T, M4-9TR
6. CR 30N / DETOUR ⇦ — M4-12T, M4-9TL
7. END DETOUR — M4-8a

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 30 AT STYLES BAYOU

TRAFFIC CONTOL DETOUR PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			27
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

GENERAL

1. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED / APPROVED BY THE ENGINEER.

2. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTORS PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

3. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

4. THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

5. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.

7. REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

8. COOPERATE IN THE USE OF RIGHT-OF-WAY (ROW) WITH THE CITY OF PEARLAND AND VARIOUS PUBLIC COMPANIES, THEIR CONTRACTORS AND OTHER ROADWAY CONTRACTORS, AS REQUIRED TO ALLOW FOR UTILITY ADJUSTMENTS AND ROAD CONSTRUCTION TO BE DONE BY OTHERS. IF THE CONTRACTOR IS DELAYED BY VIRTUE OF THESE OPERATIONS BY OTHERS, AN EXTENSION OF WORKING TIME MAY BE GRANTED IF, IN THE OPINION OF THE ENGINEER, AN EXTENSION IS NECESSARY FOR THE DELAY.

9. ALL PERMANENT SIGNS NECESSARY FOR THE OPERATION OF ANY ROADWAY WILL BE INSTALLED BY THE CONTRACTOR PRIOR TO OPENING THAT SECTION OF ROADWAY TO TRAFFIC. THE CONTRACTOR MAY ERECT THE SIGNS ON TEMPORARY MOUNTS UNTIL SUCH TIME AS THE PERMANENT MOUNTS MAY BE INSTALLED. ANY SIGNS WHICH ARE DAMAGED DURING CONSTRUCTION OR DEEMED INSUFFICIENT BY THE ENGINEER WILL BE REPLACED OR REPAIRED. THE ENGINEER WILL BE THE SOLE JUDGE OF THE ADEQUACY OF THE SIGNS. ANY COST ASSOCIATED WITH THE TEMPORARY MOUNTS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

10. PROVIDE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) TO SUPPLEMENT THE ADVANCED WARNING SIGNS FOR ALL LANE OR ROADWAY CLOSURES TO HELP MANAGE TRAFFIC FLOW. MESSAGE AND LOCATIONS WILL BE AS DIRECTED BY THE ENGINEER. THIS ITEM WILL BE PAID FOR IN ACCORDANCE WITH SPECIAL SPECIFICATION 6001.

11. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, TEMPORARY CTB, ILLUMINATION SYSTEM, DRAINAGE, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK. THEREFORE, PROCEED WITH CONSTRUCTION OPERATIONS IN CONFORMITY WITH THE DETAILS AS SHOWN ON THE PLANS. ENSURE ADEQUATE DRAINAGE AT ALL TIMES DURING ALL PHASES OF CONSTRUCTION.

    a. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATION TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. INCLUDE ALL CHANGES TO THE VARIOUS PAY ITEMS, IMPACTS TO TRAFFIC, EFFECTS ON OVERALL PROJECT TIME AND COSTS, AND REVISE CPM SCHEDULE IN ANY RECOMMENDATIONS FOR MAJOR MODIFICATIONS.

    b. DEVELOP DETAILED PLAN SHEETS SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER FOR ANY MODIFICATIONS IMPLEMENTED. DO NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE PRIOR TO OBTAINING WRITTEN APPROVAL.

12. THE CONTRACTOR WILL NOTIFY THE ENGINEER OF UPCOMING BRIDGE CLOSURES AS EARLY AS TEN (10) WORKING DAYS AND WILL PROVIDE CONFIRMATION NO LATER THAN 48 HOURS IN ADVANCE OF BRIDGE CLOSURES.

13. THE PROVISION OF ROUTING TRAFFIC DURING CONSTRUCTION AND THE SEQUENCE OF CONSTRUCTION OPERATIONS WILL BE IN GENERAL CONFORMITY WITH THE DETAILS SHOWN ON THE PLANS, EXCEPT AS MAY BE ALTERED WITH RESPECT TO ANY DETAIL BY WRITTEN INSTRUCTION BY THE ENGINEER.

14. DEMOLITION OF EXISTING BRIDGE SHALL NOT OCCUR, NOR THE DETOURING OF TRAFFIC, UNTIL SUFFICIENT MATERIALS ARE AVAILABLE FOR THE EFFICIENT TIME CONSTRUCTION OF NEW BRIDGE.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

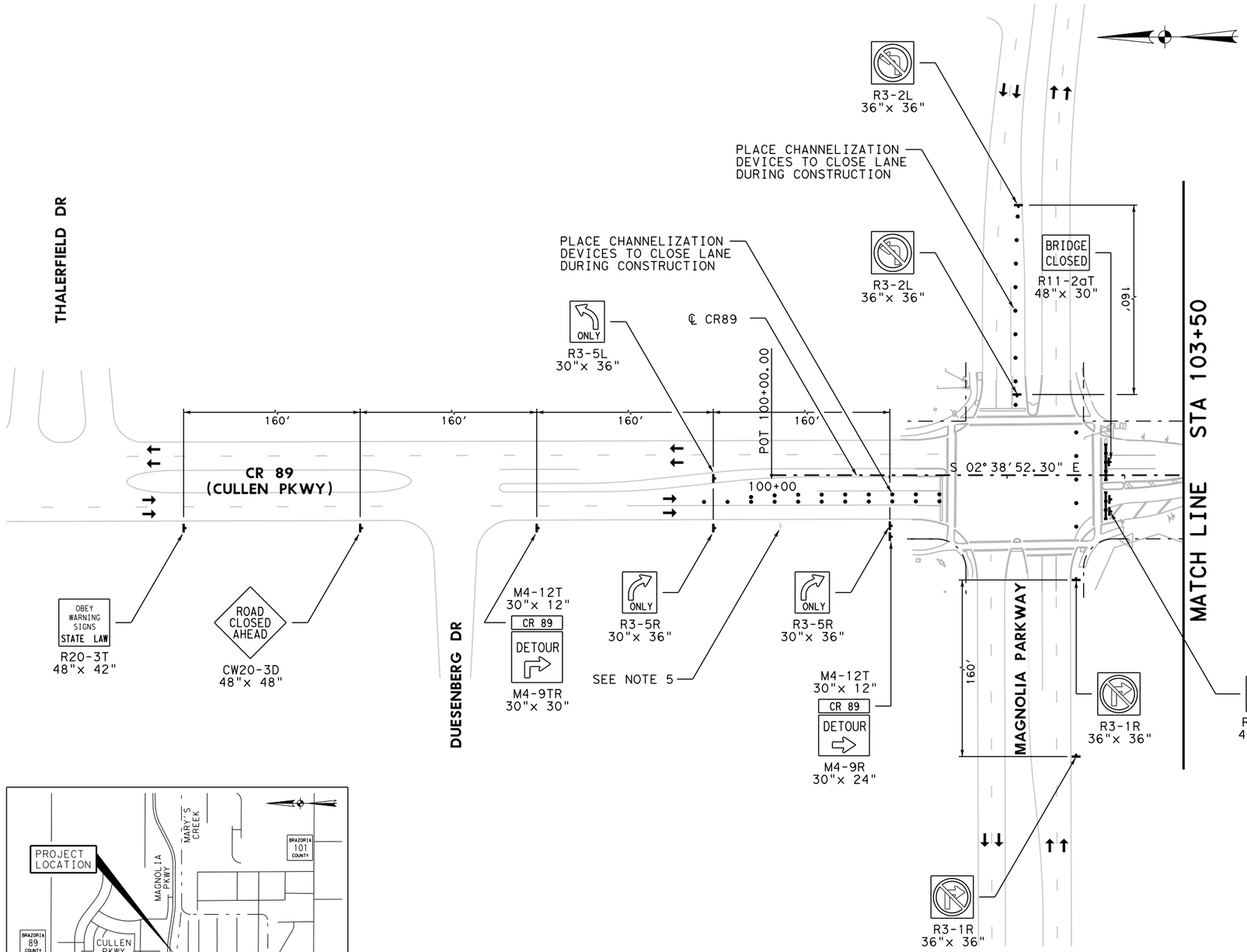
Texas Department of Transportation

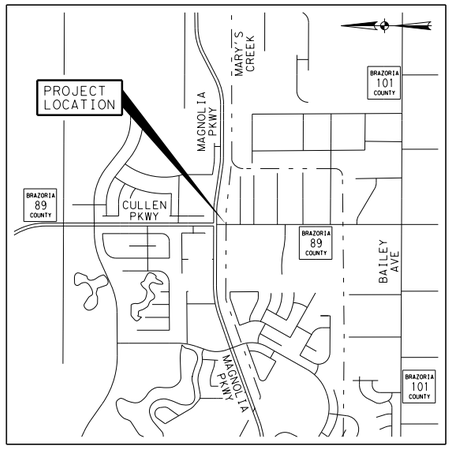
CR 89 AT N FORK MARY'S CREEK

TRAFFIC CONTROL GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			28
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89





VICINITY MAP

NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
3. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
4. CONSULT DETOUR PLAN TO BE USED DURING CLOSURE OF CR 89 BRIDGE OVER MARY'S CREEK DRAINAGE DITCH.
5. COVER OR REMOVE EXISTING SIGN PANEL DURING CONSTRUCTION AND CLOSURE OF CR 89 BRIDGE.
6. CONTRACTOR MUST COORDINATE TEMPORARY MODIFICATIONS TO TRAFFIC SIGNAL TIMING WITH CITY OF PEARLAND.

0 25 50 100
SCALE: 1"=100'

LEGEND

- TYPE 3 BARRICADE
- SIGN
- TRAFFIC FLOW ARROW

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

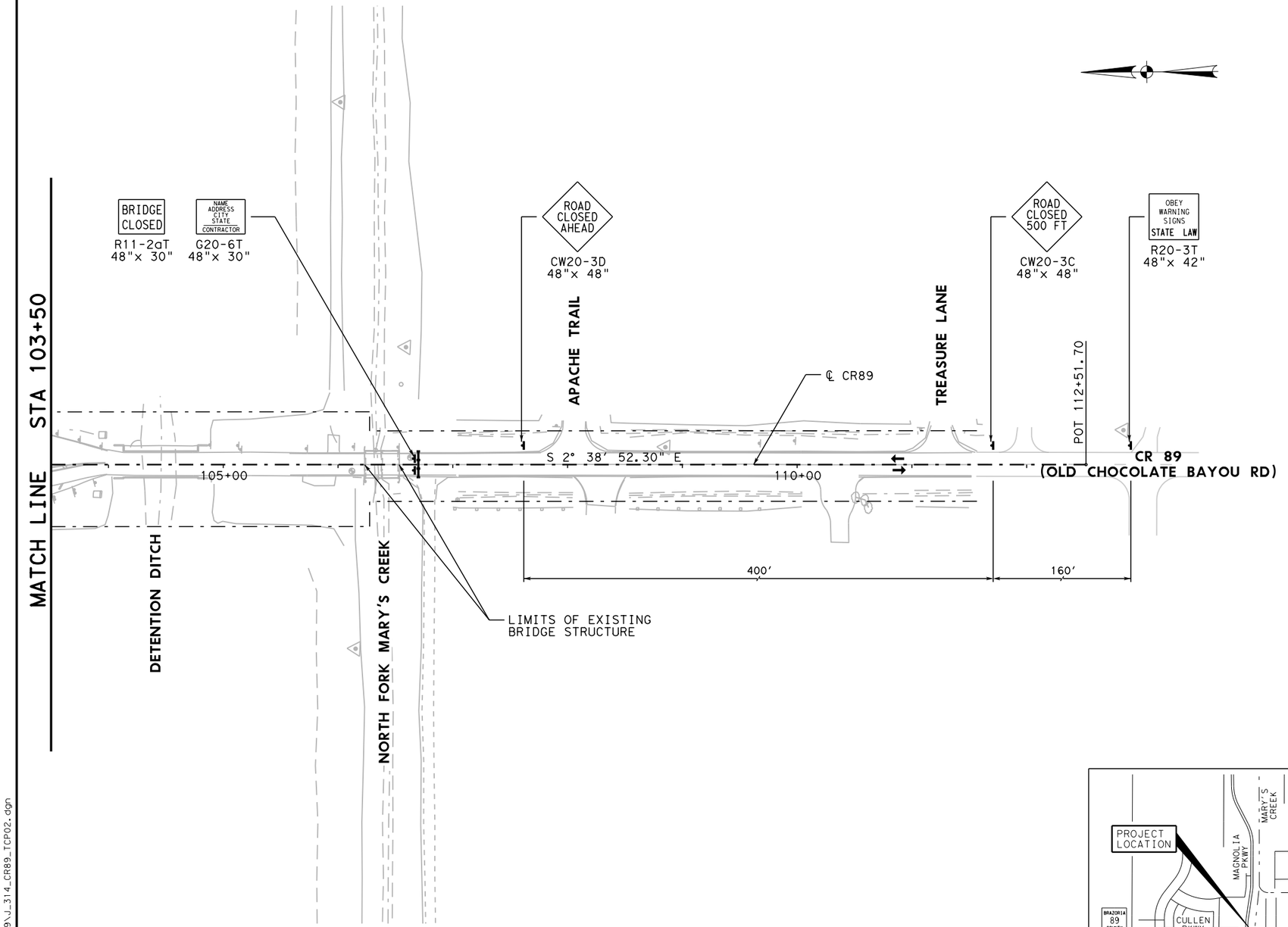
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

TRAFFIC CONTROL LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			29
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



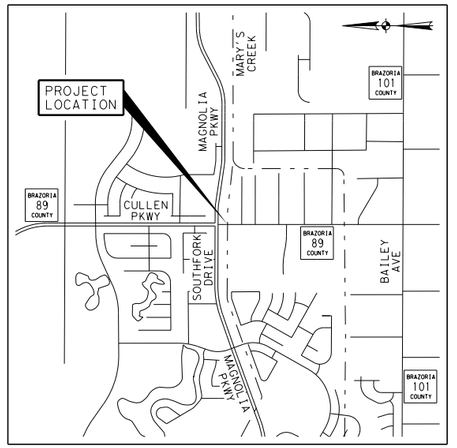
NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
3. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
4. CONSULT DETOUR PLAN TO BE USED DURING CLOSURE OF CR 89 BRIDGE OVER MARY'S CREEK DRAINAGE DITCH.

0 25 50 100
SCALE: 1"=100'

LEGEND

- TYPE 3 BARRICADE
- SIGN
- TRAFFIC FLOW ARROW



VICINITY MAP

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

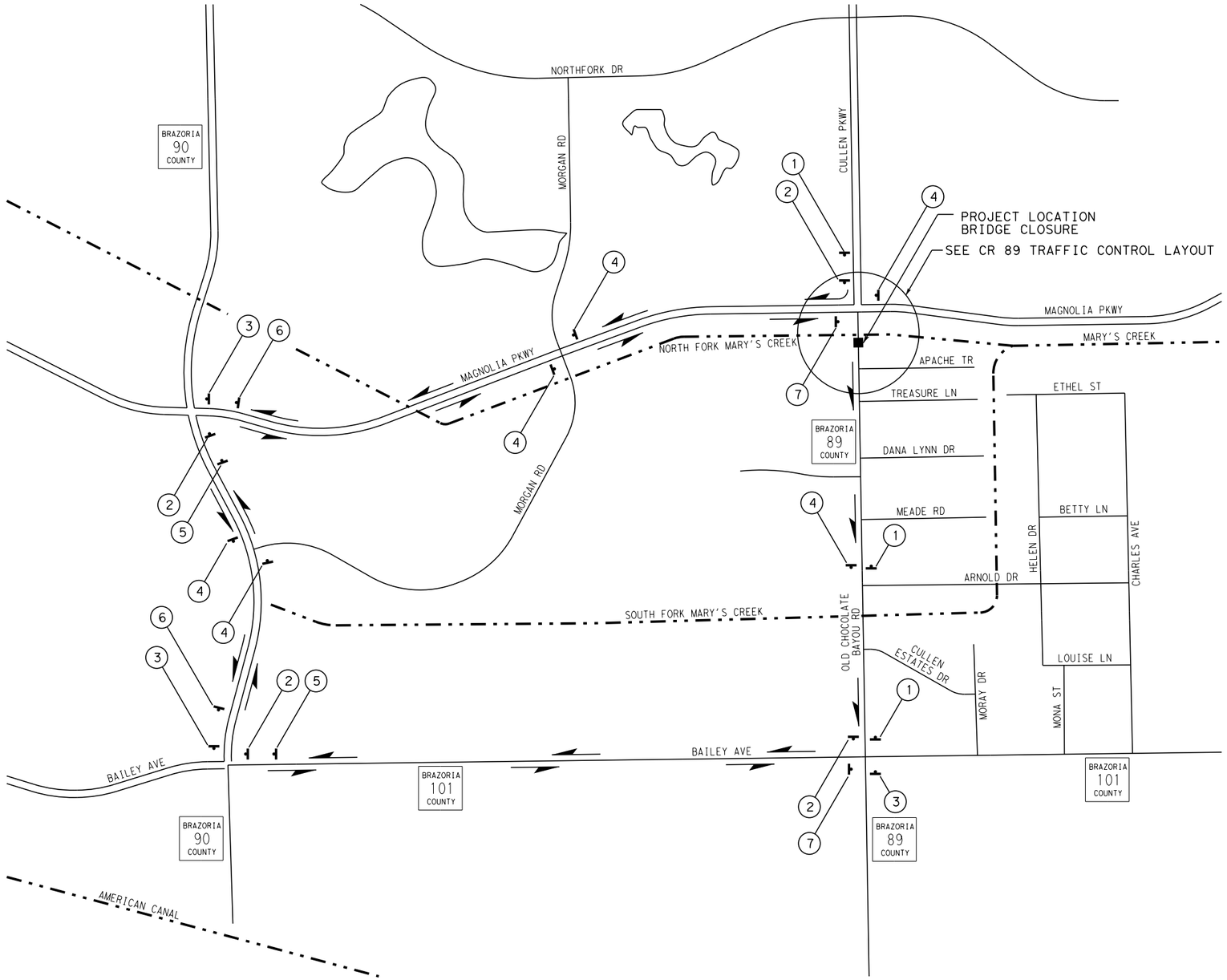
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

TRAFFIC CONTROL LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			30
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



DETOUR NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. CONSULT STANDARDS WZ(RCD)-13 FOR GUIDANCE IN ROAD CLOSURE TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
3. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
4. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
5. THIS DETOUR PLAN TO BE USED DURING CLOSURE OF CR 89 OVER DRAINAGE DITCH PARALLEL TO NORTH FORK MARY'S CREEK.
6. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED A MINIMUM OF TWO WEEKS IN ADVANCE OF CLOSURE AND REMAIN IN PLACE FOR THE DURATION OF THE PROJECT. PCMS SHALL BE PLACED AS DIRECTED BY THE ENGINEER.

COUNTY ROAD 89 BRIDGE CLOSURE:

CR 89 NORTHBOUND TRAFFIC
SOUTHBOUND ON CR 89 TO CR 101.
WEST ON CR 101 TO CR 90.
NORTH ON CR 90 TO MAGNOLIA PKWY.
EAST ON MAGNOLIA PKWY TO CR 89 / CULLEN PKWY.

CR 89 SOUTHBOUND TRAFFIC
WEST ON MAGNOLIA PKWY TO CR 90.
SOUTH ON CR 90 TO CR 101.
EAST ON CR 101 TO CR 89.

(1) BRIDGE OUT — XX MILES AHEAD LOCAL TRAFFIC ONLY — R11-3b

(2) CR 89 DETOUR ⇨ — M4-12T M4-9R

(3) CR 89 DETOUR ⇦ — M4-12T M4-9L

(4) CR 89 DETOUR ⇧ — M4-12T M4-9S

(5) CR 89 DETOUR ↱ — M4-12T M4-9TR

(6) CR 89 DETOUR ↰ — M4-12T M4-9TL

(7) END DETOUR — M4-8a

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

TRAFFIC CONTOL DETOUR PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		31

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

GENERAL

1. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED / APPROVED BY THE ENGINEER.

2. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTORS PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

3. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

4. THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

5. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.

7. REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

8. COOPERATE IN THE USE OF RIGHT-OF-WAY (ROW) WITH THE VARIOUS PUBLIC COMPANIES, THEIR CONTACTORS AND OTHER ROADWAY CONTRACTORS, AS REQUIRED TO ALLOW FOR UTILITY ADJUSMENTS AND ROAD CONSTRUCTION TO BE DONW BY OTHERS. IF THE CONTRACTOR IS DELAYED BY VIRTUE OF THESE OPERATIONS BY OTHERS, AN EXTENSION OF WORKING TIME MAY BE GRANTED IF, IN THE OPINION OF THE ENGINEER, AN EXTENSION IS NECESSARY THIS DELAY.

9. ALL PERMANENT SIGNS NECESSARY FOR THE OPERATION OF ANY ROADWAY WILL BE INSTALLED BY THE CONTRACTOR PRIOR TO OPENING THAT SECTION OF ROADWAY TO TRAFFIC. THE CONTRACTOR MAY ERECT THE SIGNS ON TEMPORARY MOUNTS UNTIL SUCH TIME AS THE PERMANENT MOUNTS MAY BE INSTALLED. ANY SIGNS WHICH ARE DAMAGED DURING CONSTRUCTION OR DEEMED INSUFFICIENT BY THE ENGINEER WILL BE REPLACED OR REPAIRED. THE ENGINEER WILL BE THE SOLE JUDGE OF THE ADEQUACY OF THE SIGNS. ANY COST ASSOCIATED WITH THE TEMPORARY MOUNTS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

10. PROVIDE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) TO SUPPLEMENT THE ADVANCED WARNING SIGNS FOR ALL LANE OR ROADWAY CLOSURES TO HELP MANAGE TRAFFIC FLOW. MESSAGE AND LOCATIONS WILL BE AS DIRECTED BY THE ENGINEER. THIS ITEM WILL BE PAID FOR IN ACCORDANCE WITH SPECIAL SPECIFICATION 6001.

11. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, TEMPORARY CTB, ILLUMINATION SYSTEM, DRAINAGE, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK. THEREFORE, PROCEED WITH CONSTRUCTION OPERATIONS IN CONFORMITY WITH THE DETAILS AS SHOWN ON THE PLANS. ENSURE ADEQUATE DRAINAGE AT ALL TIMES DURING ALL PHASES OF CONSTRUCTION.

    a. THE CONTRACTOR MAY PROPOSE / RECOMMEND MODIFICATION TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. INCLUDE ALL CHANGES TO THE VARIOUS PAY ITEMS, IMPACTS TO TRAFFIC, EFFECTS ON OVERALL PROJECT TIME AND COSTS, AND REVISE CPM SCHEDULE IN ANY RECOMMENDATIONS FOR MAJOR MODIFICATIONS.

    b. DEVELOP DETAILED PLAN SHEETS SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER FOR ANY MODIFICATIONS IMPLEMENTED. DO NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE / SEQUENCE PRIOR TO OBTAINING WRITTEN APPROVAL.

12. THE CONTRACTOR WILL NOTIFY THE ENGINEER OF UPCOMING BRIDGE CLOSURES AS EARLY AS TEN (10) WORKING DAYS AND WILL PROVIDE CONFIRMATION NO LATER THAN 48 HOURS IN ADVANCE OF BRIDGE CLOSURES.

13. THE PROVISION OF ROUTING TRAFFIC DURING CONSTRUCTION AND THE SEQUENCE OF CONSTRUCTION OPERATIONS WILL BE IN GENERAL CONFORMITY WITH THE DETAILS SHOWN ON THE PLANS, EXCEPT AS MAY BE ALTERED WITH RESPECT TO ANY DETAIL BY WRITTEN INSTRUCTION BY THE ENGINEER.

14. DEMOLITION OF EXISTING BRIDGE SHALL NOT OCCUR, NOR THE DETOURING OF TRAFFIC, UNTIL SUFFICIENT MATERIALS ARE AVAILABLE FOR THE EFFICIENT TIME CONSTRUCTION OF NEW BRIDGE.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

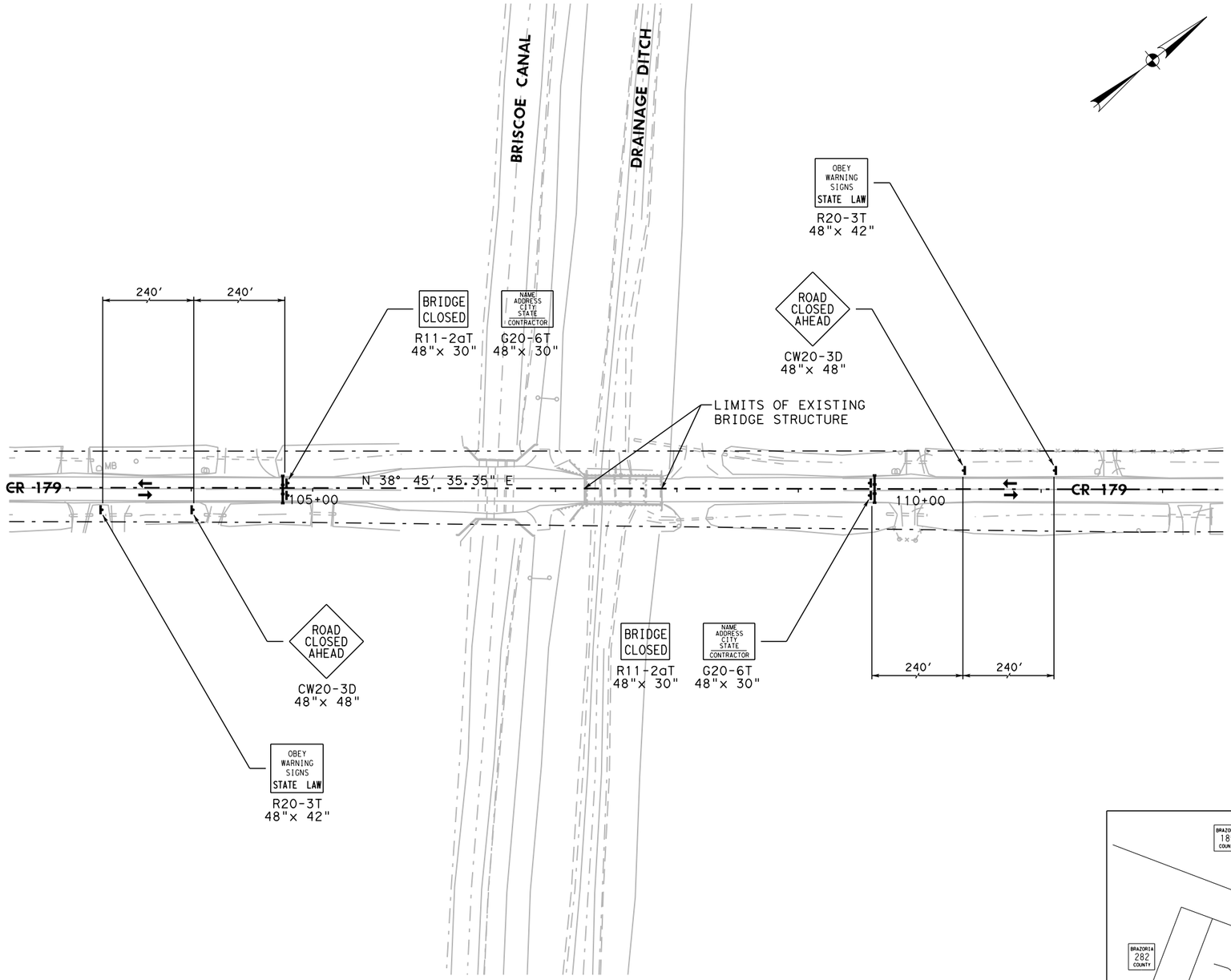
TRAFFIC CONTROL GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			32
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

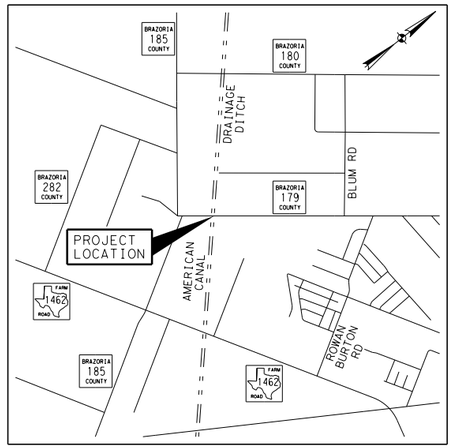
NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
3. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
4. CONSULT DETOUR PLAN TO BE USED DURING CLOSURE OF CR 179 BRIDGE OVER AMERICAN CANAL DRAINAGE DITCH.



LEGEND

- TYPE 3 BARRICADE
- SIGN
- TRAFFIC FLOW ARROW



VICINITY MAP

0 25 50 100

SCALE: 1"=100′

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LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

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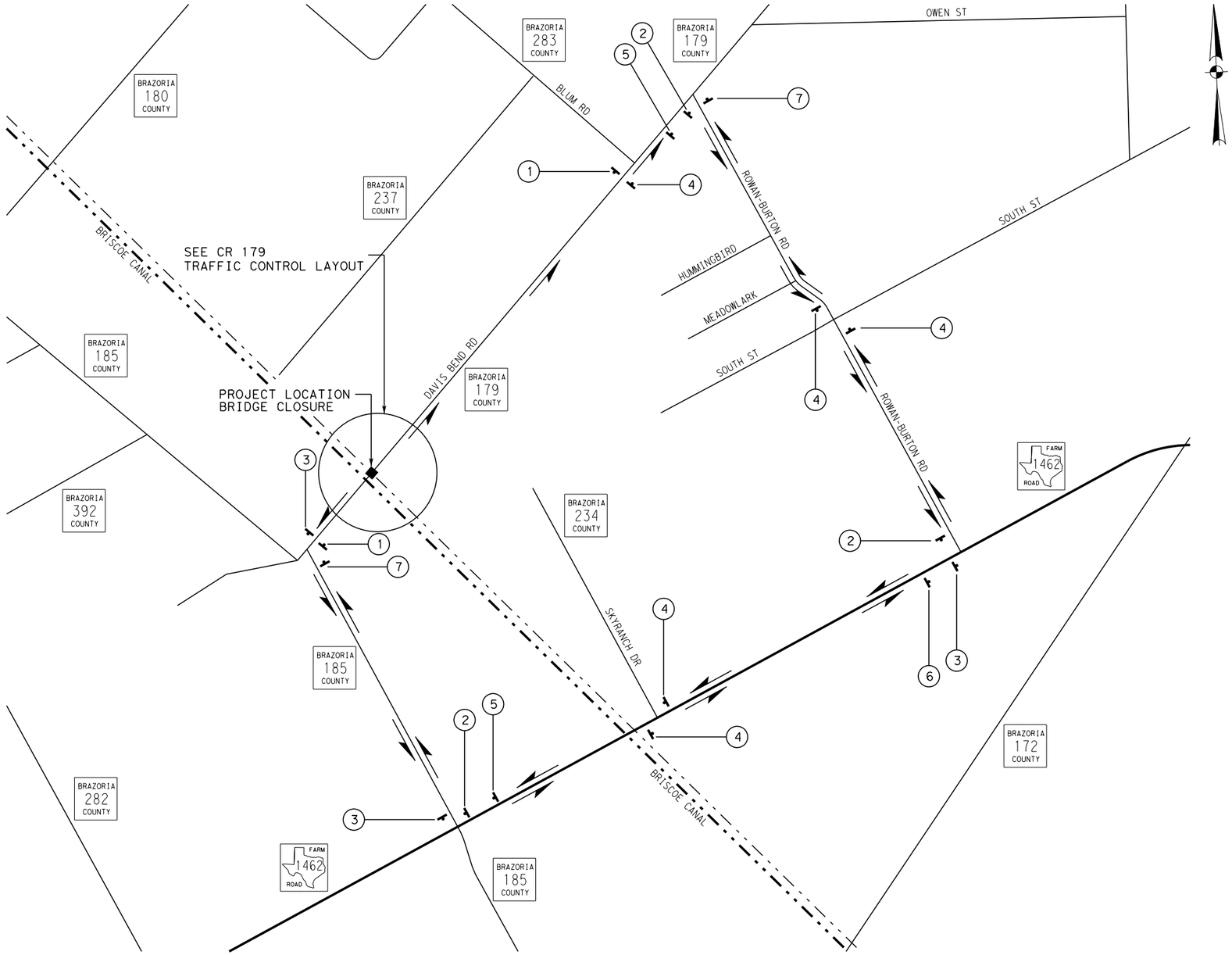
Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

TRAFFIC CONTROL LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			33
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179



DETOUR NOTES:

1. CONSULT STANDARDS BC(1)-21 THRU BC(12)-21 FOR GUIDANCE IN TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
2. CONSULT STANDARDS WZ(RCD)-13 FOR GUIDANCE IN ROAD CLOSURE TRAFFIC CONTROL DEVICES, AND WARNING SIGNS.
3. SIGNS THAT CANNOT BE PLACED DUE TO NO, OR NARROW SHOULDER WIDTH, SHALL BE ADJUSTED IN THE FIELD, TO FIRST AVAILABLE OPPORTUNITY IN ACCORDANCE WITH TEXAS MUTCD.
4. NOT ALL WORK ZONE SIGNS MAY BE SHOWN ON THIS PLAN. CONSULT TxDOT STANDARDS AND TRAFFIC CONTROL PLANS FOR OTHER SIGNS TO BE USED AS NEEDED FOR THIS PROJECT.
5. THIS DETOUR PLAN TO BE USED DURING CLOSURE OF CR 179 OVER DRAINAGE DITCH PARALLEL TO BRISCOE CANAL.
6. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED A MINIMUM OF TWO WEEKS IN ADVANCE OF CLOSURE AND REMAIN IN PLACE FOR THE DURATION OF THE PROJECT. PCMS SHALL BE PLACED AS DIRECTED BY THE ENGINEER.

COUNTY ROAD 179 BRIDGE CLOSURE:

CR 179 EASTBOUND TRAFFIC
WESTBOUND ON CR 179 TO CR 185.
SOUTH ON CR 185 TO FM 1462.
EAST ON FM 1462 TO ROWAN-BUTLER RD.
NORTH ON ROWAN-BUTLER RD. TO CR 179.

CR 179 WESTBOUND TRAFFIC
EASTBOUND ON CR 179 TO ROWAN-BUTLER RD.
SOUTH ON ROEAN-BUTLER RD. TO FM 1462.
WEST ON FM 1462 TO CR 185.
NORTH ON CR 185 TO CR 179.

(1) BRIDGE OUT — XX MILES AHEAD / LOCAL TRAFFIC ONLY — R11-3b

(2) CR 179 DETOUR ⇨ — M4-12T M4-9R

(3) CR 179 DETOUR ⇦ — M4-12T M4-9L

(4) CR 179 DETOUR ⇧ — M4-12T M4-9S

(5) CR 179 DETOUR ⇨ — M4-12T M4-9TR

(6) CR 179 DETOUR ⇦ — M4-12T M4-9TL

(7) END DETOUR — M4-8a

ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

TRAFFIC CONTOL DETOUR PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			34
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

DATE:
FILE:

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

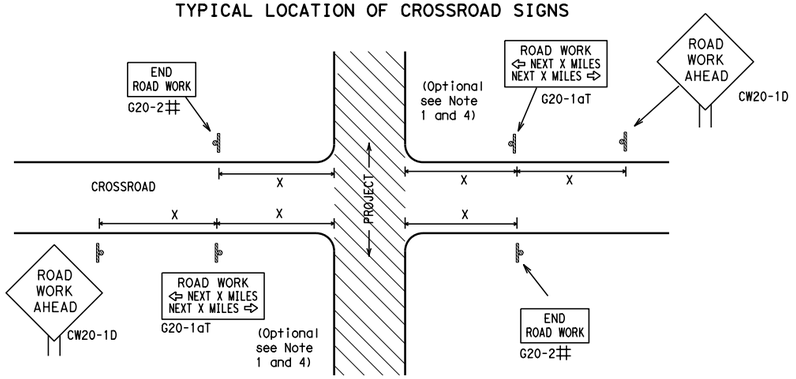
Traffic Safety Division Standard

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	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		35

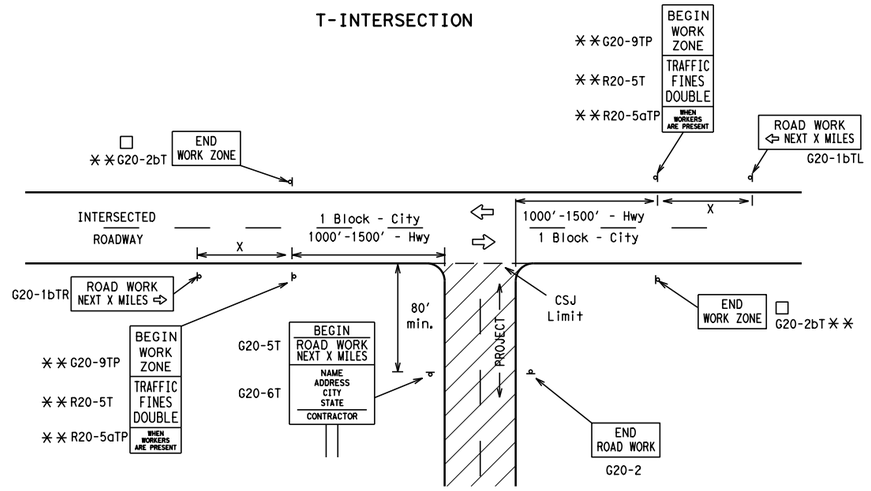
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

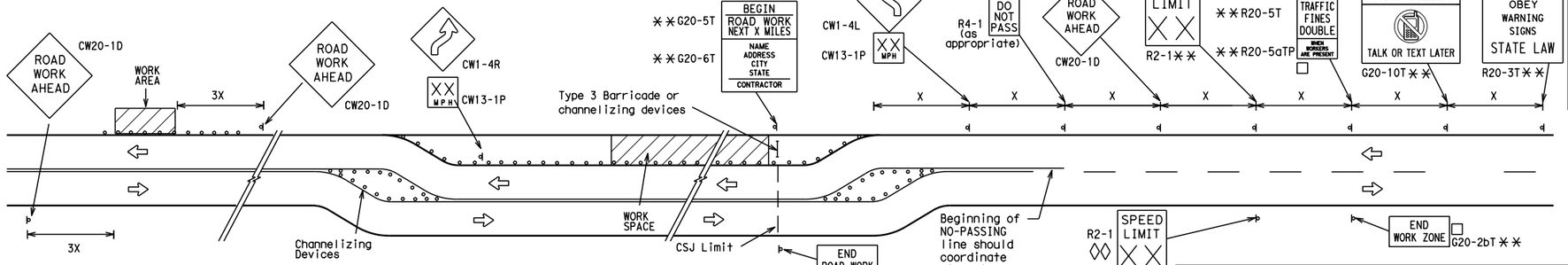
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

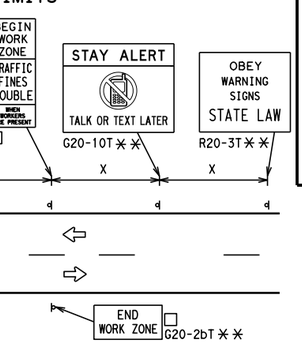
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

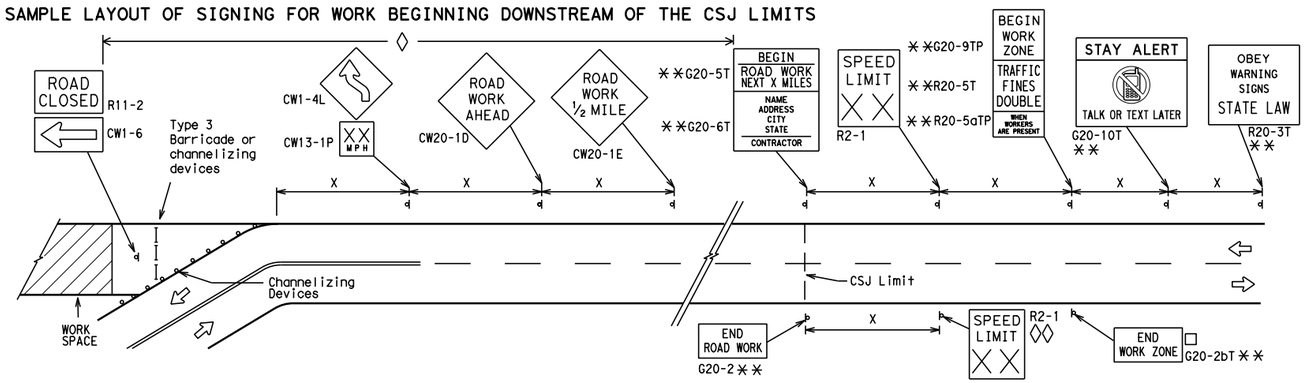


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		36

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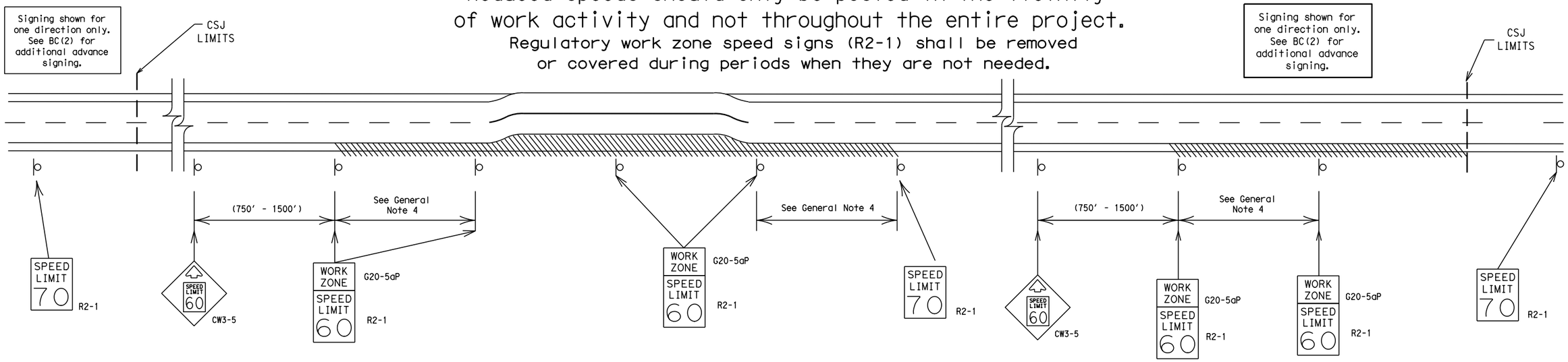
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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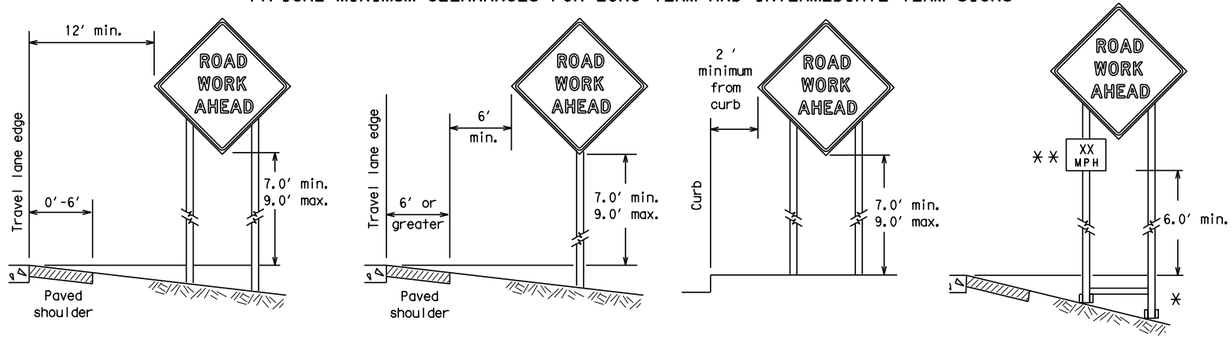
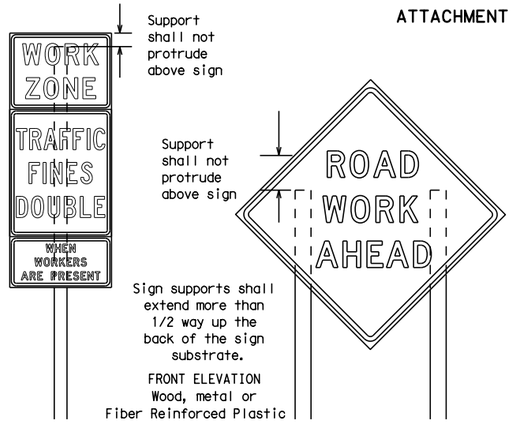
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

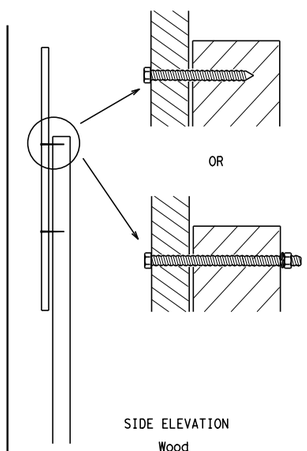


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





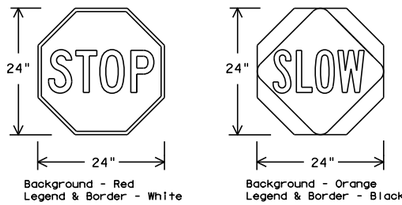
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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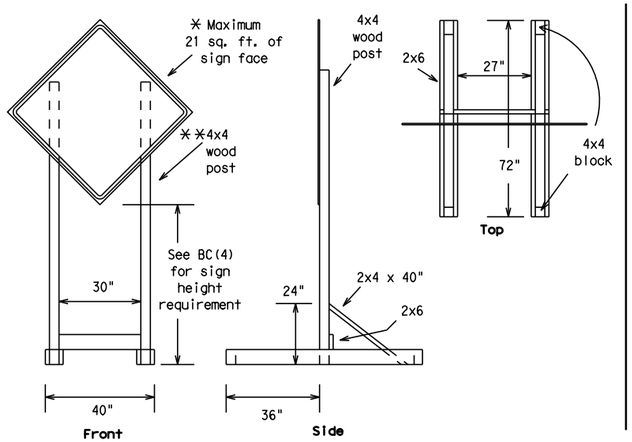
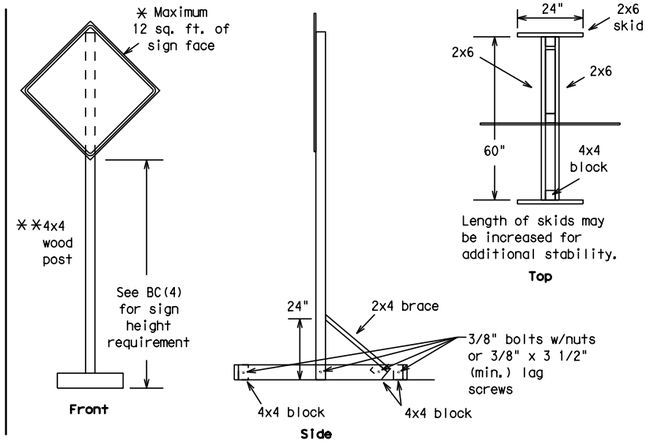
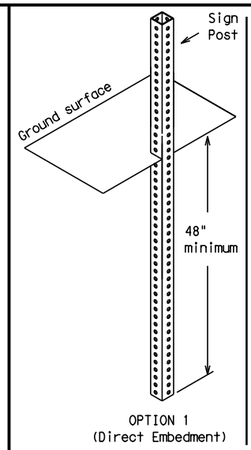
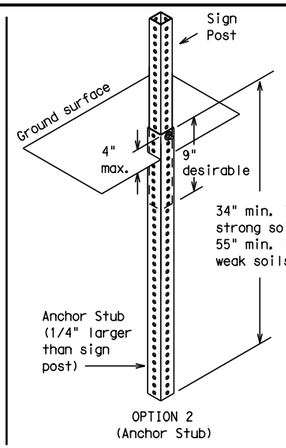


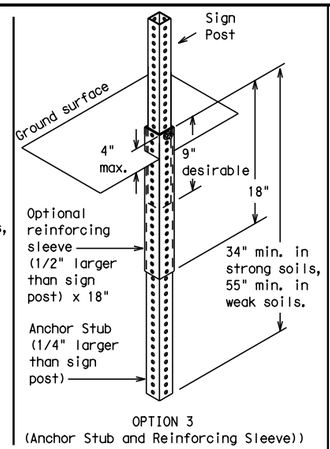


SKID MOUNTED WOOD SIGN SUPPORTS

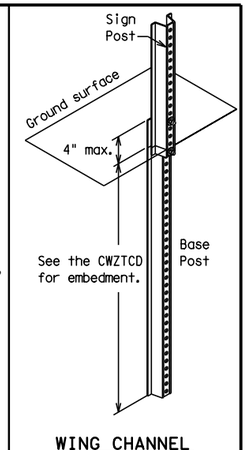
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







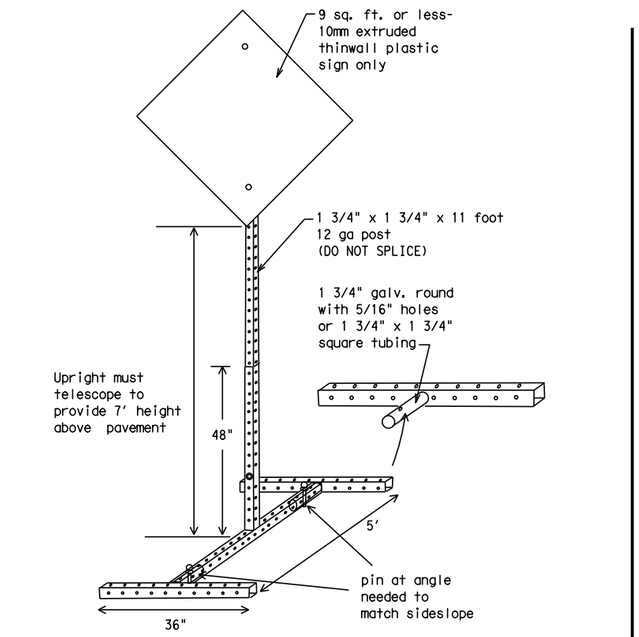
PERFORATED SQUARE METAL TUBING

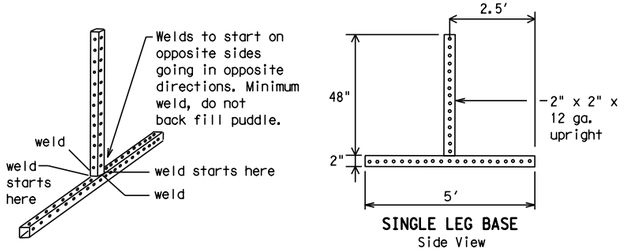


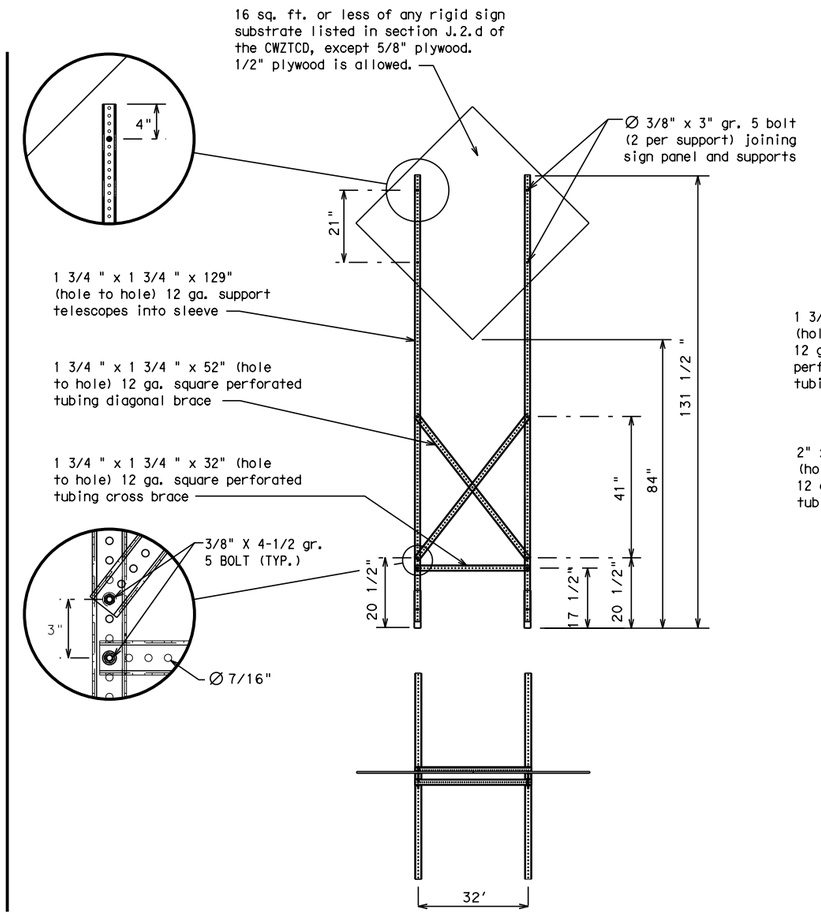
WING CHANNEL
Lap-splice/base bolted anchor

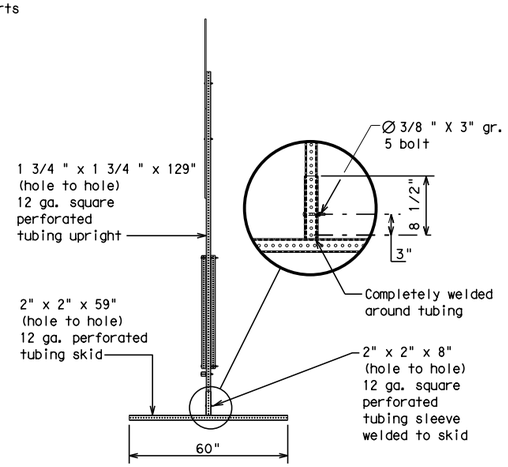
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* 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	31	307,ETC	CR
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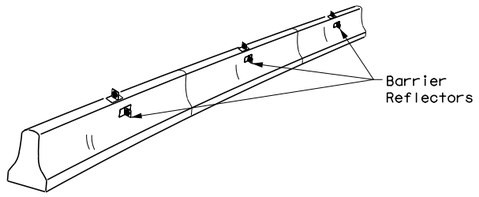
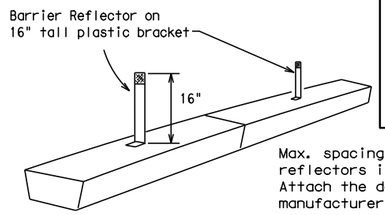
DATE:
FILE:

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.



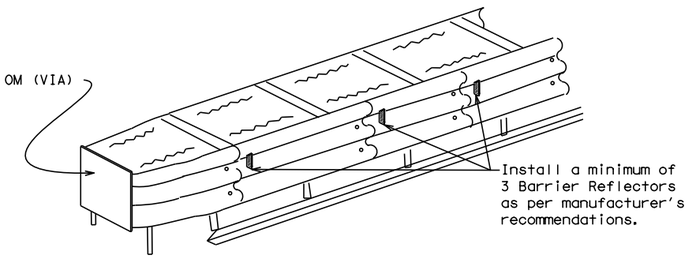
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

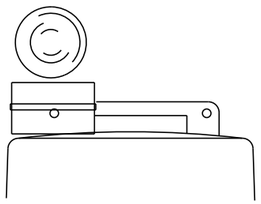
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

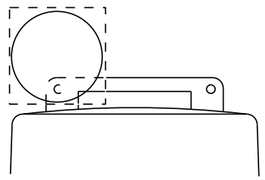
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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

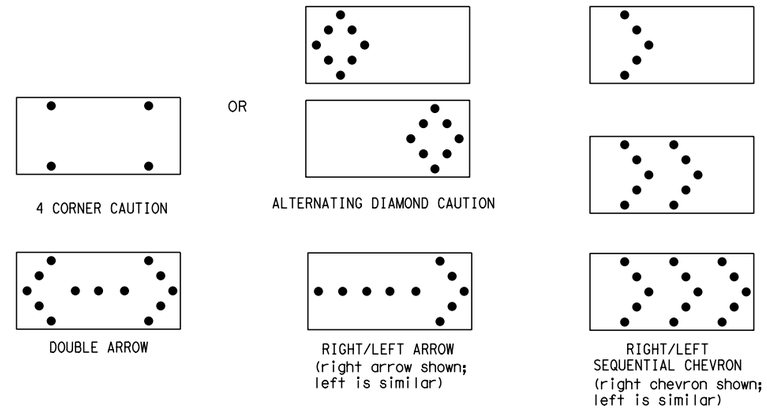
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

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	31	307,ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		41

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

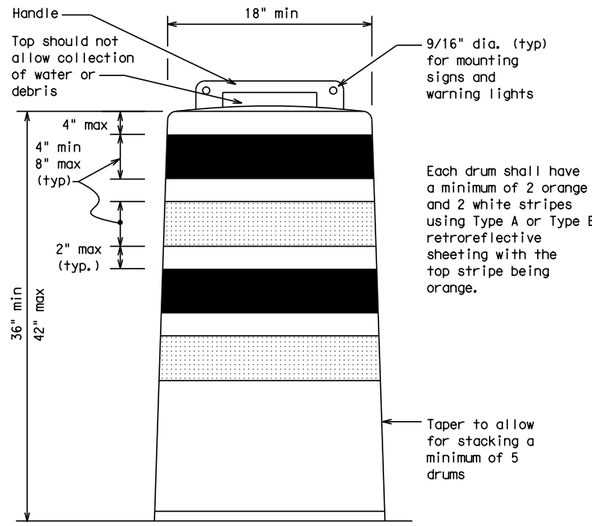
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

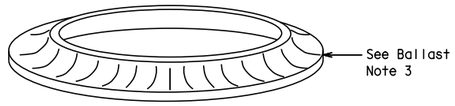
RETROREFLECTIVE SHEETING

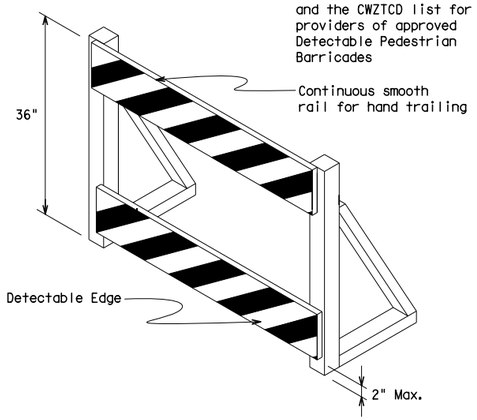
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

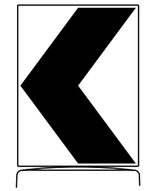




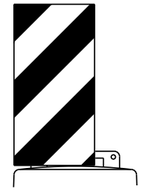


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	HOU	BRAZORIA		42
7-13				

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DATE:
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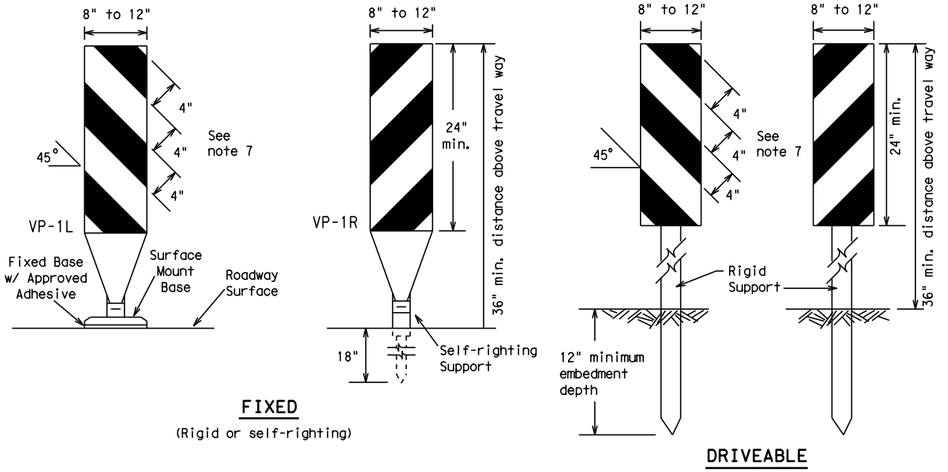
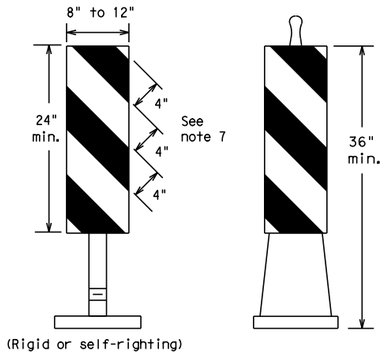


FIXED
(Rigid or self-righting)

DRIVEABLE

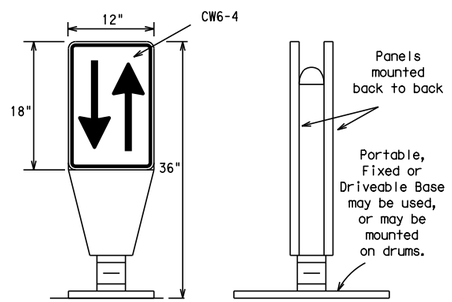


(Rigid or self-righting)

PORTABLE

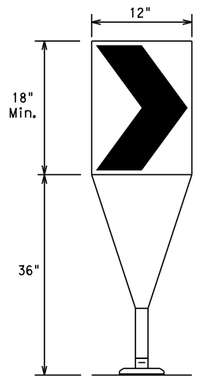
VERTICAL PANELS (VPs)

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.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

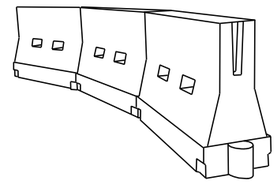
1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The 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.



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

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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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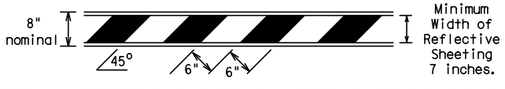
REVISIONS	0912	31	307,ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		43

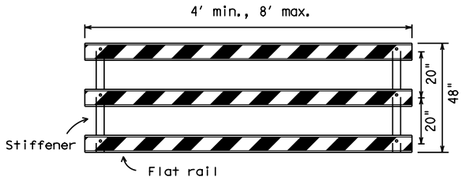
TYPE 3 BARRICADES

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.



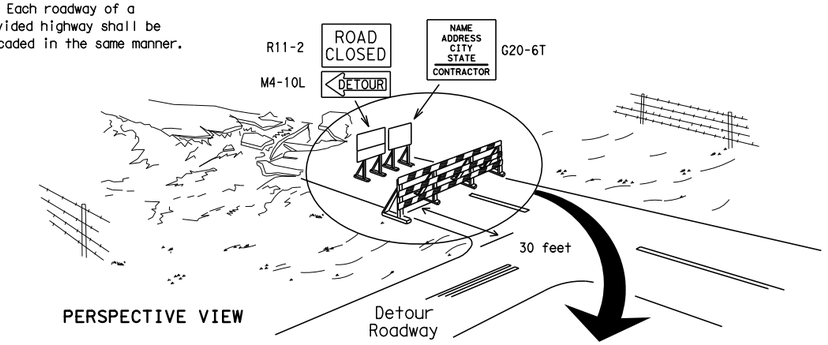
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

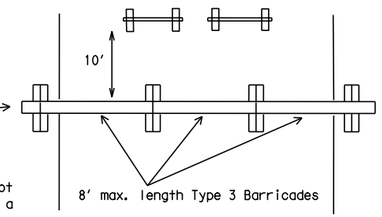
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

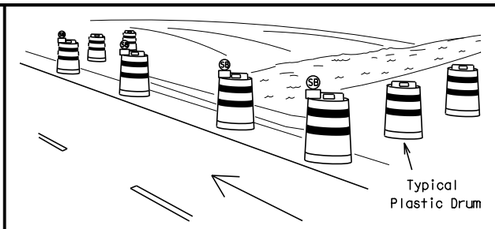
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

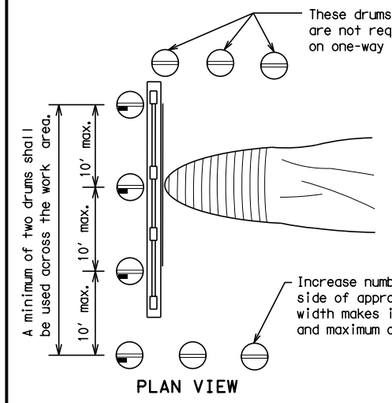
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

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.

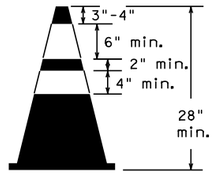


PLAN VIEW

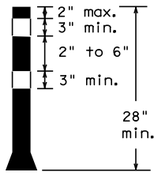
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

Two-Piece cones



One-Piece cones

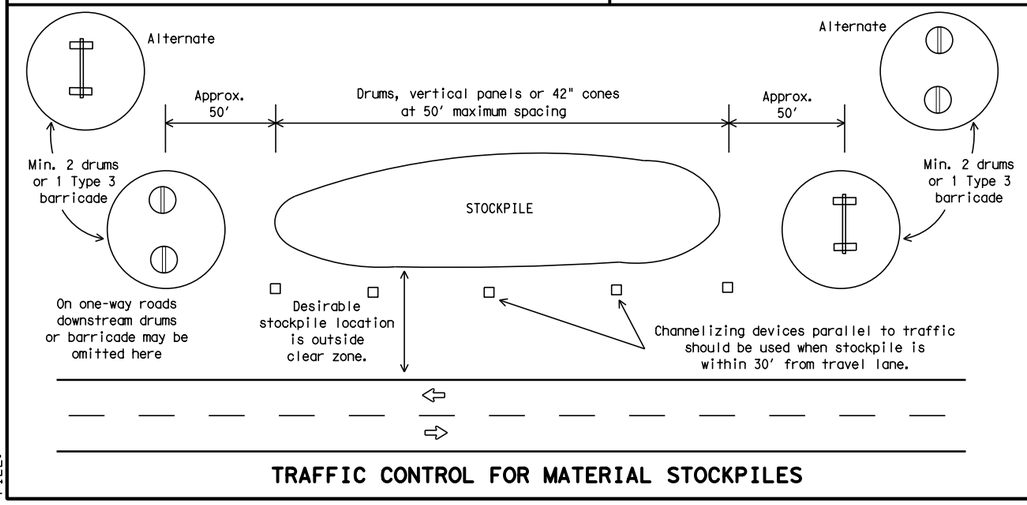


Tubular Marker

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

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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DATE:
FILE:

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.

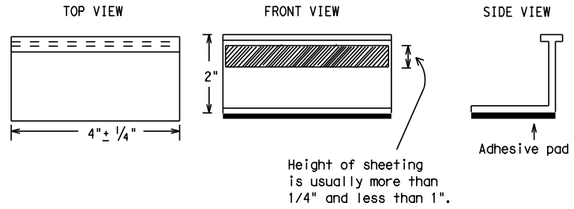
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	HOU	BRAZORIA		45
11-02 8-14				

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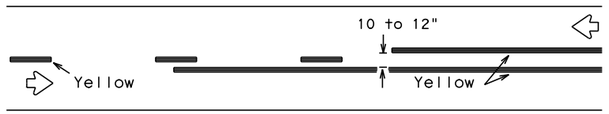
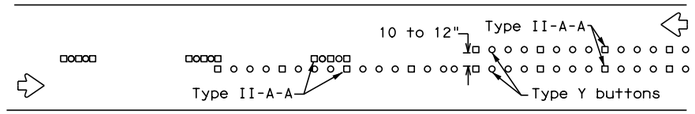
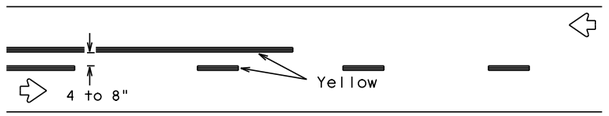
PAVEMENT MARKING PATTERNS



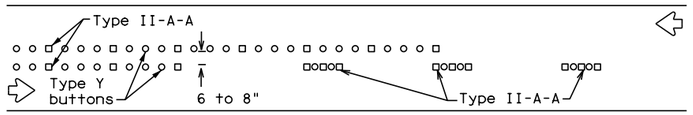
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



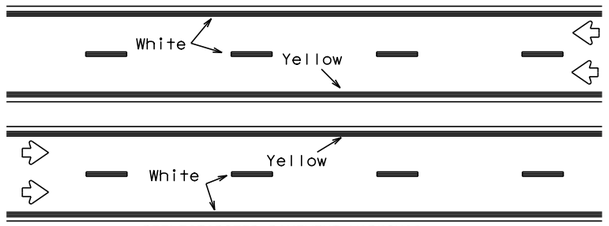
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



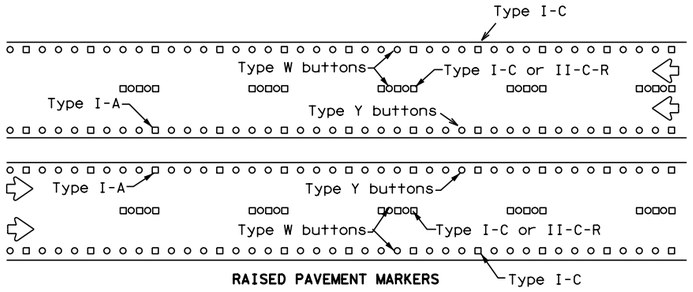
RAISED PAVEMENT MARKERS - PATTERN B

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



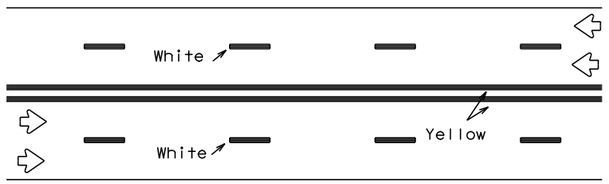
REFLECTORIZED PAVEMENT MARKINGS



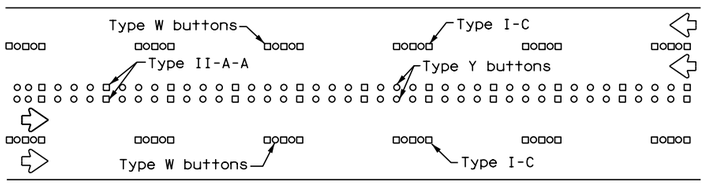
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



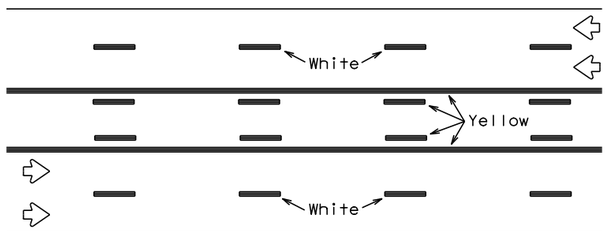
REFLECTORIZED PAVEMENT MARKINGS



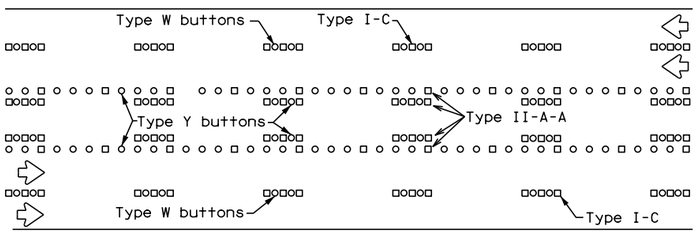
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

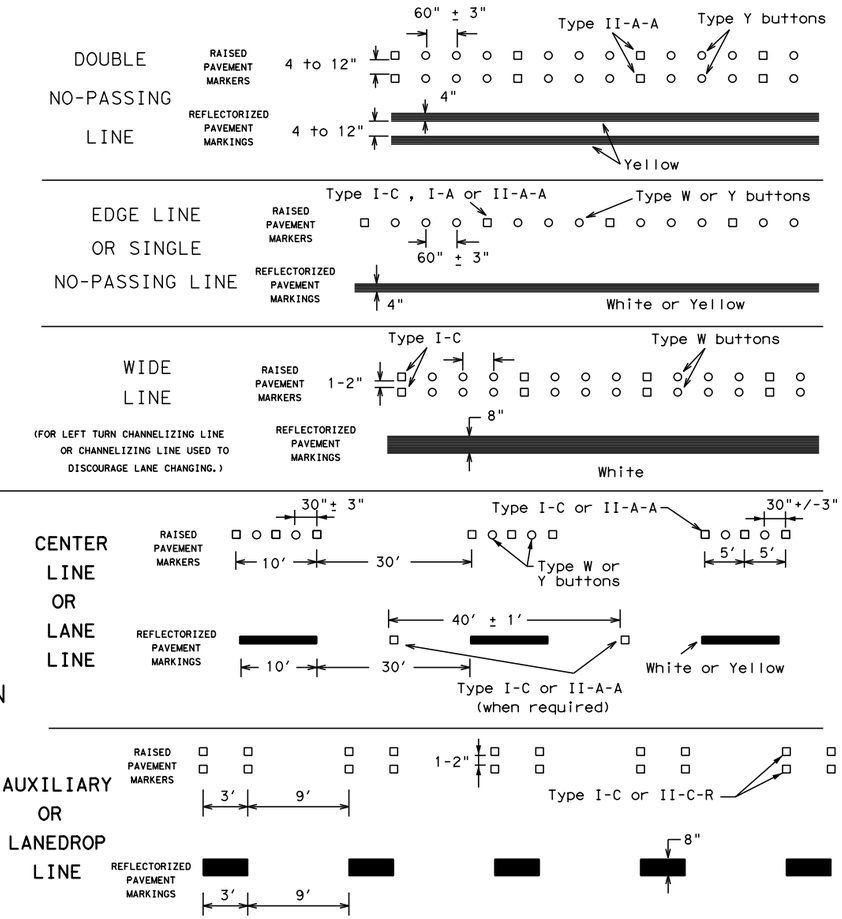


RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

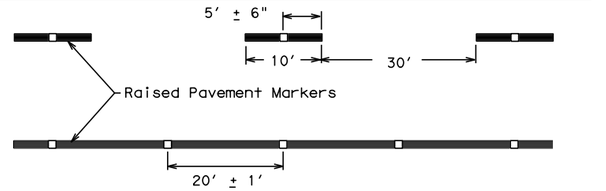
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



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."

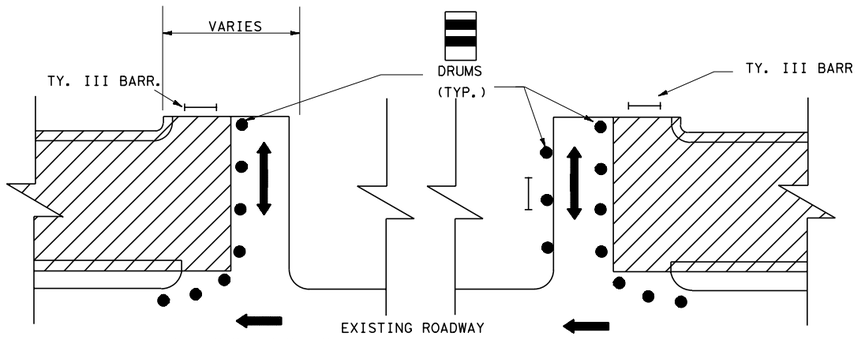
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

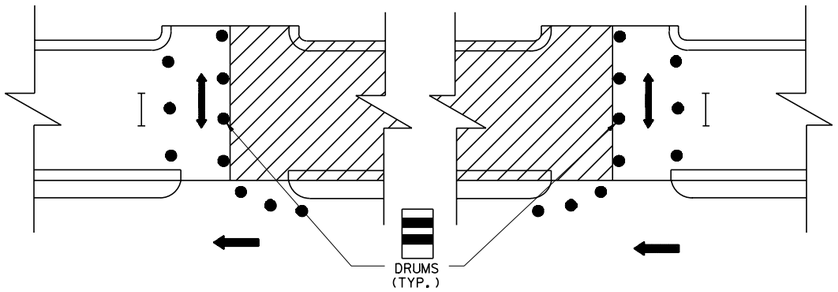
BC(12)-21

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	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		46

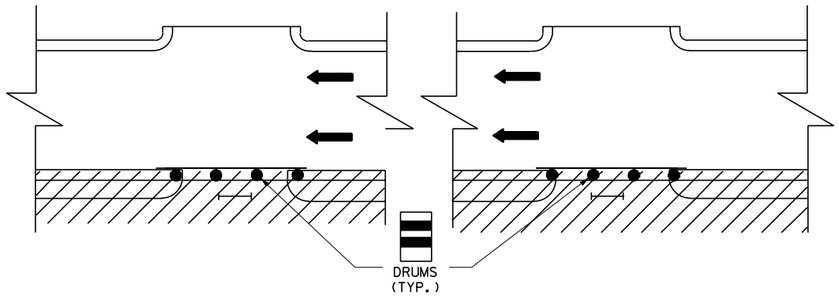


1) WITH TRAFFIC ON EXISTING
BUILD ONE-HALF OF DRIVE.

2) BUILD OTHER HALF OF DRIVE



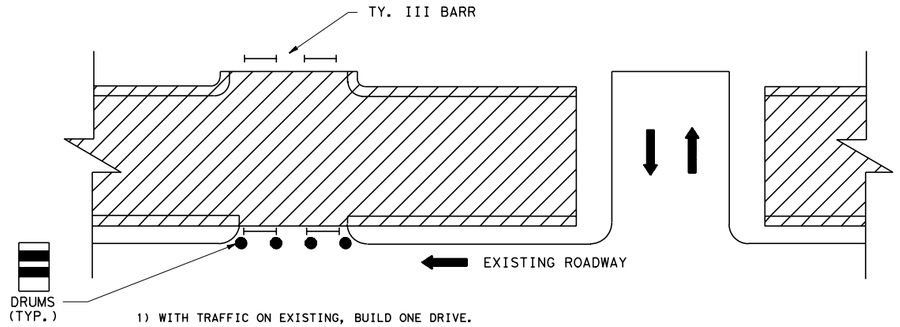
2) BUILD OTHER HALF OF DRIVE



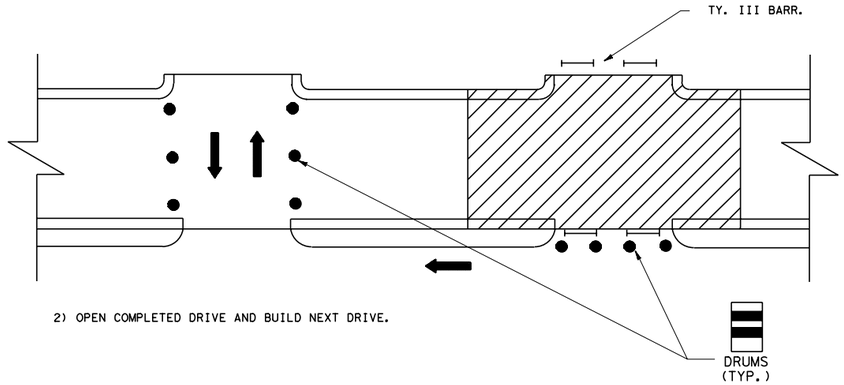
3) OPEN DRIVE

4) AFTER TRAFFIC MOVES TO NEW ROADWAY,
BUILD REMAINING CURB.

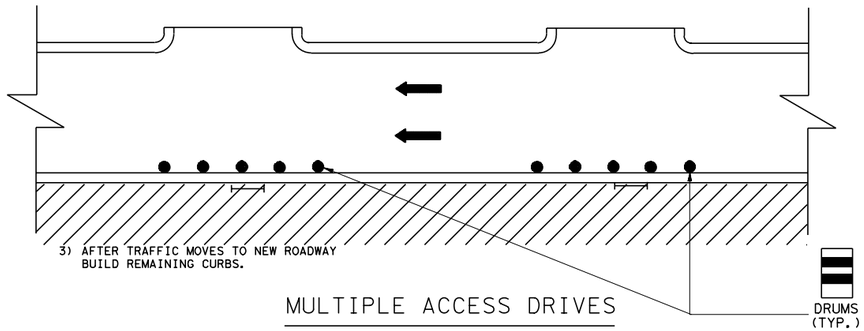
SINGLE ACCESS DRIVES



1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



3) AFTER TRAFFIC MOVES TO NEW ROADWAY
BUILD REMAINING CURBS.

MULTIPLE ACCESS DRIVES

Texas Department of Transportation
Houston District

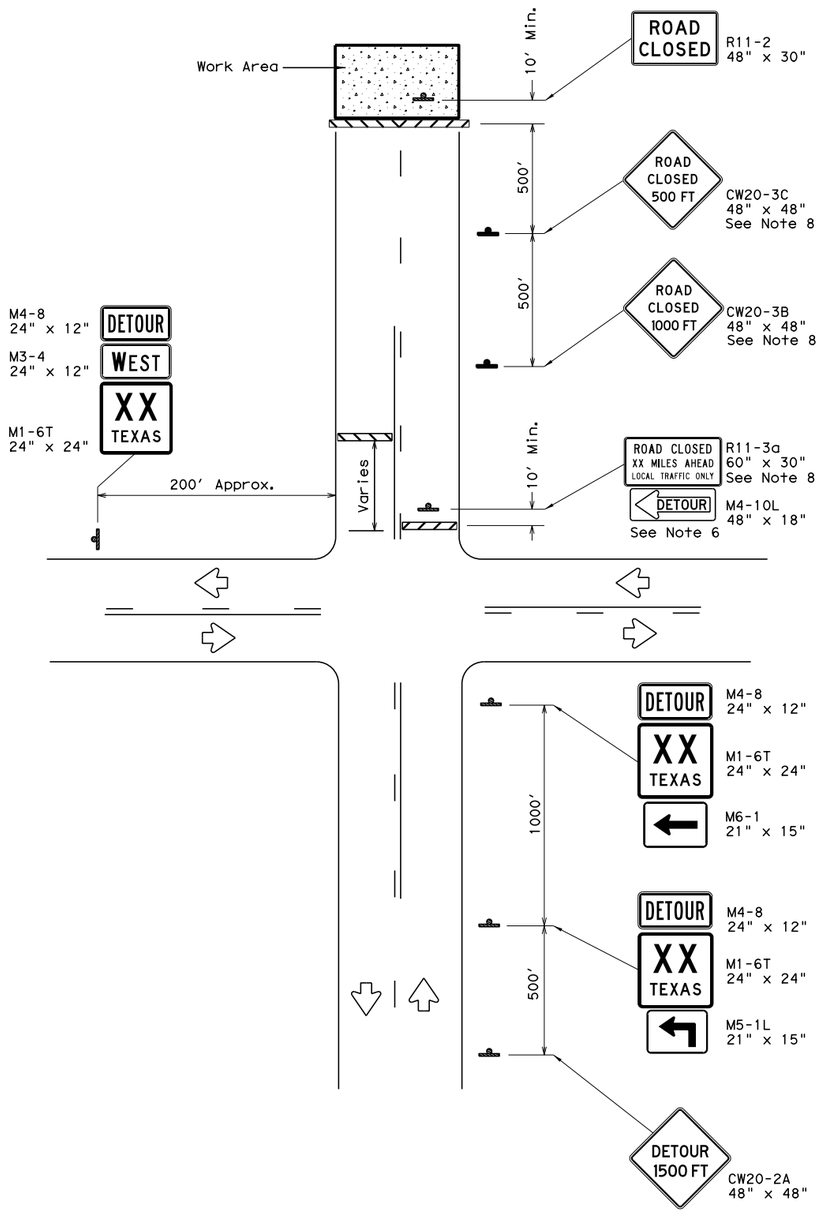
CONSTRUCTION SEQUENCE FOR MISCELLANEOUS DRIVES

CSMD TC8010-2020

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2020	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		47
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	0912	31	307, ETC	CR

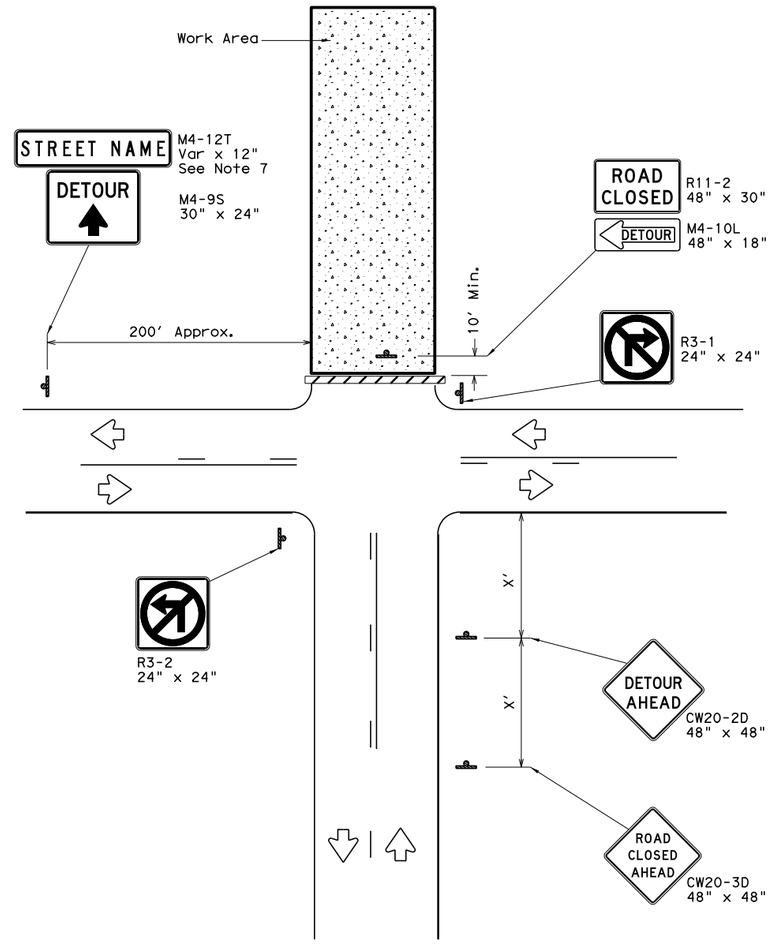
STD H-29

DATE:
FILE:



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.

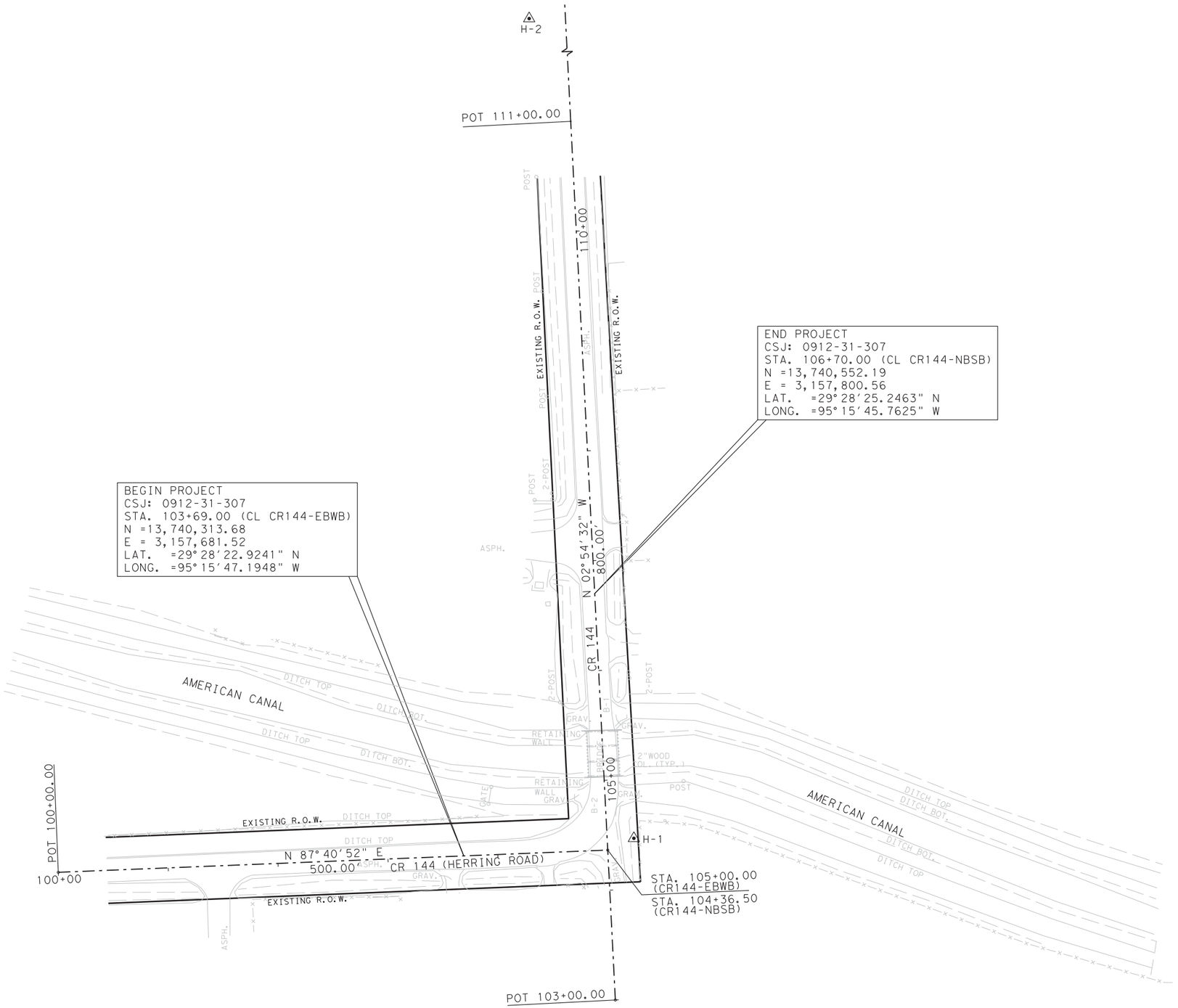
Texas Department of Transportation

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
REVISIONS	0912	31	307,ETC	CR
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	HOU	BRAZORIA		48



CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
H-1	H-2	N 05°53'30" W	1,060.08'

CONTROL MONUMENTATION						
POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
H-1	13,740,329.69	3,157,836.19	39.67'	104+45.98	24.29' (RT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE
H-2	13,741,384.17	3,157,727.37	39.33'	115+04.62	30.87' (LT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. EXISTING RIGHT-OF-WAY LINES SHOWN HEREON ARE APPROXIMATE.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL LAND SURVEYOR

04-13-2022

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

0 50 100
SCALE: 1"= 100'
UNIT OF MEASURE: U.S. SURVEY FEET

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

CR 144
SURVEY CONTROL INDEX SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 144
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307	49

10:44:15 AM
4/13/2022
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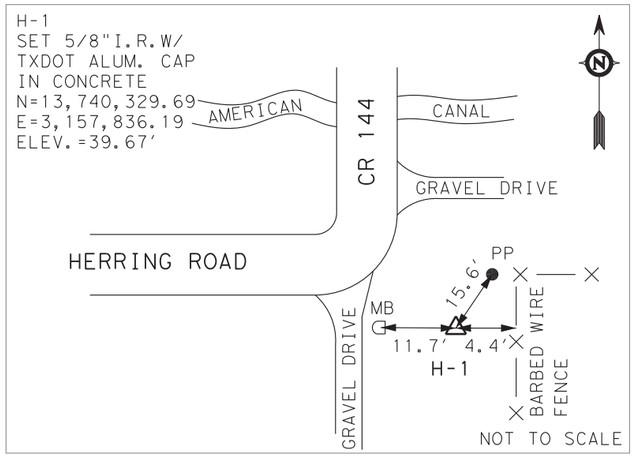
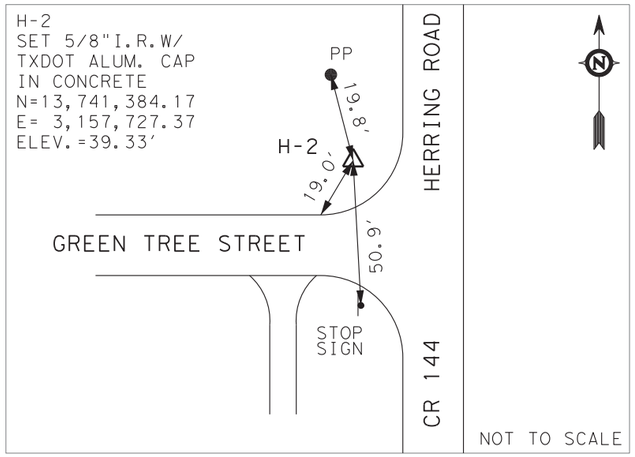


H-1 FROM THE INTERSECTION OF CR 281 AND CR 144, TRAVEL SOUTH ALONG CR 144 FOR 0.5 MILES LOCATED ON THE EAST SIDE OF CR 144, 257 FEET SOUTH OF ACORN STREET.



H-2 FROM THE INTERSECTION OF CR 281 AND CR 144, TRAVEL SOUTH ALONG CR 144 FOR 0.3 MILES LOCATED ON THE WEST SIDE OF CR 144, AT THE NORTHWEST CORNER OF PINE COLONY STREET AND CR 144.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

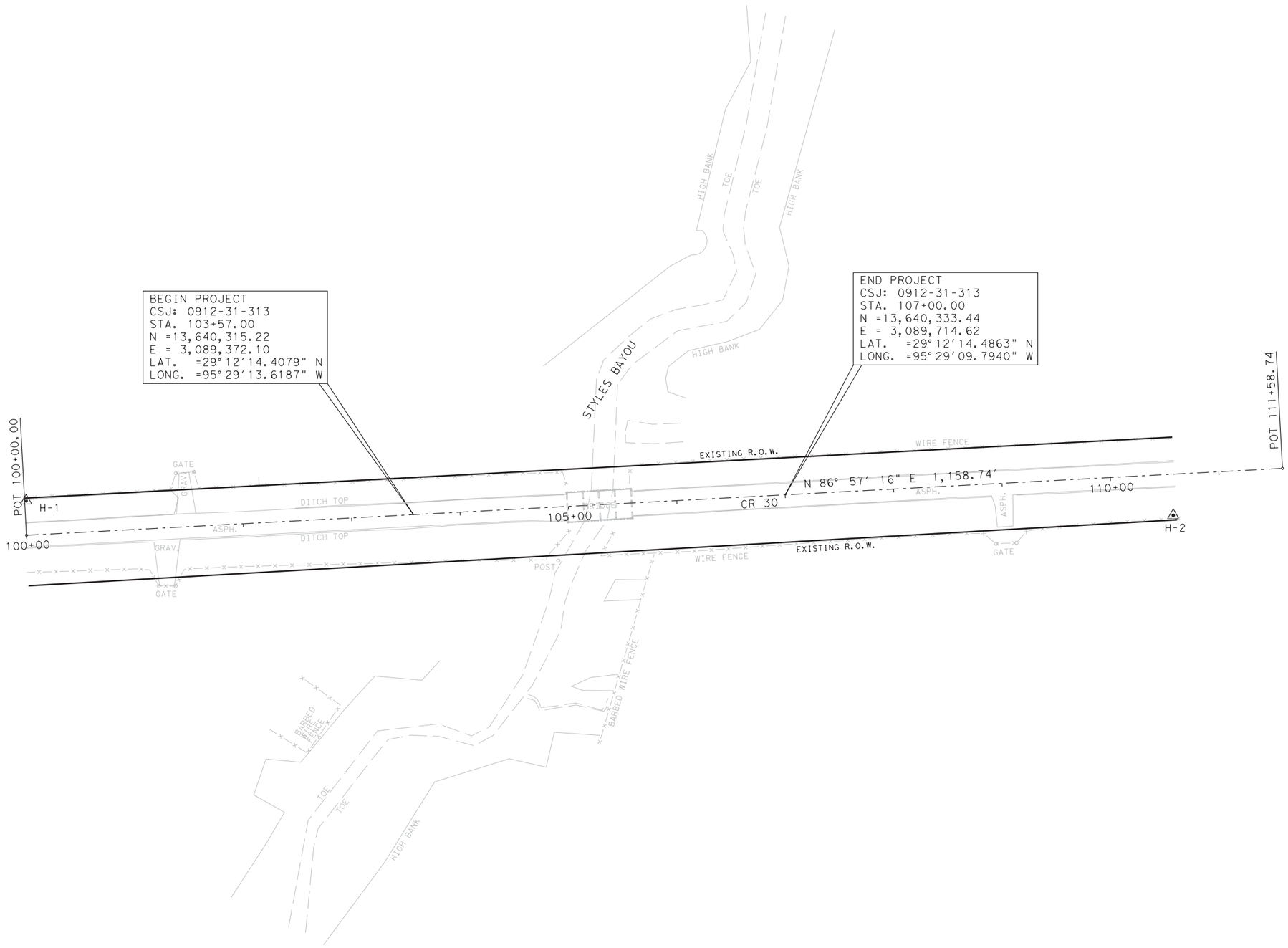
Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

CR 144 HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 144
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307	50



NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. EXISTING RIGHT-OF-WAY LINES SHOWN HEREON ARE APPROXIMATE.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
H-1	H-2	S 89°16'27"E	1,056.91'

CONTROL MONUMENTATION						
POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
H-1	13,640,327.95	3,089,015.30	29.16'	100+01.38	31.67' (LT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE
H-2	13,640,314.56	3,090,072.12	24.28'	110+56.00	37.85' (RT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE

0 50 100
SCALE: 1"= 100'
UNIT OF MEASURE: U.S. SURVEY FEET

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

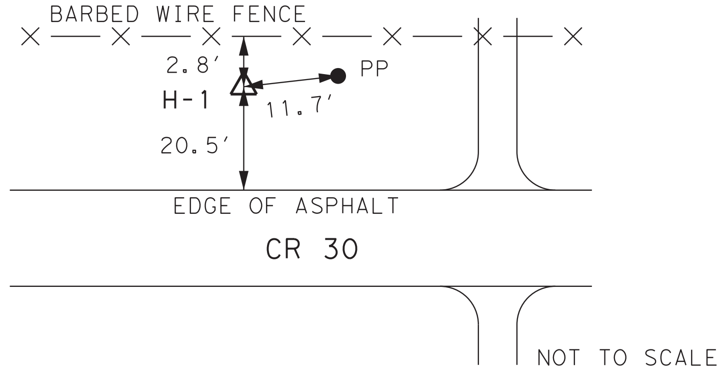
CR 30
SURVEY CONTROL INDEX SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 30
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	51

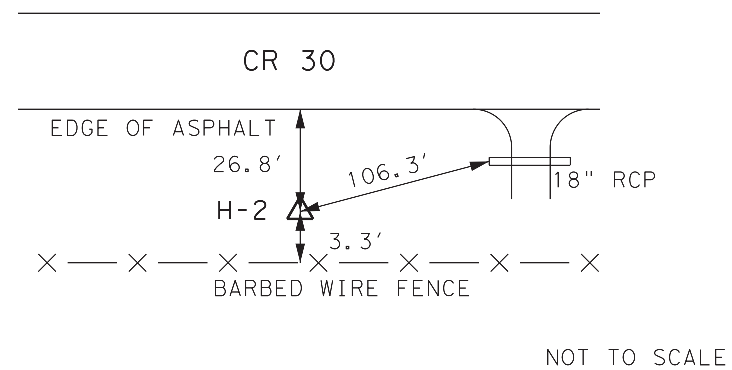
...\091231313*CR30*Survey Control Index.dgn

H-1
SET 5/8"I.R.W/
TXDOT ALUM. CAP
IN CONCRETE
N=13,640,327.95
E= 3,089,015.30
ELEV.=29.16'



H-1 FROM THE INTERSECTION OF FM 521 AND CR 30, TRAVEL WEST ALONG CR 30 0.8 MILES LOCATED ON THE NORTH SIDE OF CR 30.

H-2
SET 5/8"I.R.W/
TXDOT ALUM. CAP
IN CONCRETE
N=13,640,314.56
E= 3,090,072.12
ELEV.=24.28'



H-2 FROM THE INTERSECTION OF FM 521 AND CR 30, TRAVEL WEST ALONG CR 30 0.6 MILES LOCATED ON THE SOUTH SIDE OF CR 30.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

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

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

CR 30
HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 30
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	52

...\091231313*CR30**Horizontal&Vertical Control.dgn

10:44:18 AM
4/13/2022

MODEL NAME: $MODELNAME$
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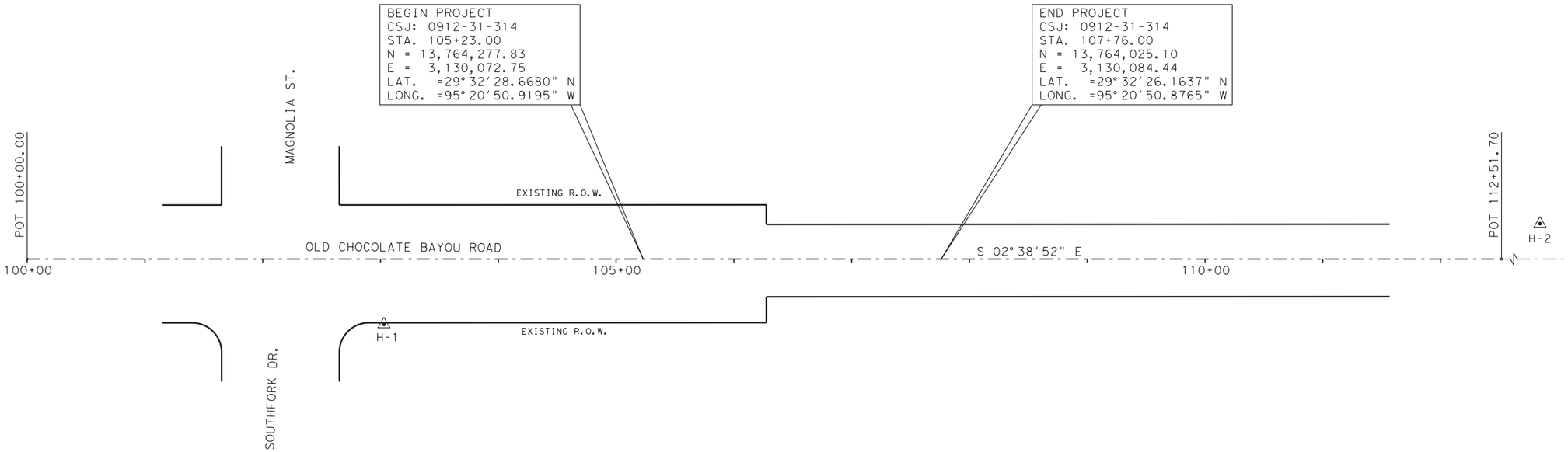


NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXLM/N= 13,711,671.02 E= 3,234,409.26; AND TXAC/N= 13,855,759.41 E= 3,341,306.80 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXLM; AND TXAC WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. EXISTING RIGHT-OF-WAY LINES SHOWN HEREON ARE APPROXIMATE.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

CONTROL MONUMENTATION						
POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
H-1	13,764,495.13	3,130,007.17	54.45'	103+02.90	55.47' (RT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE
H-2	13,763,518.71	3,130,137.90	51.20'	112+84.32	30.01' (LT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
H-1	H-2	S 07°37'34"E	985.14'

0 50 100
SCALE: 1"= 100'
UNIT OF MEASURE: U.S. SURVEY FEET

Texas Department of Transportation

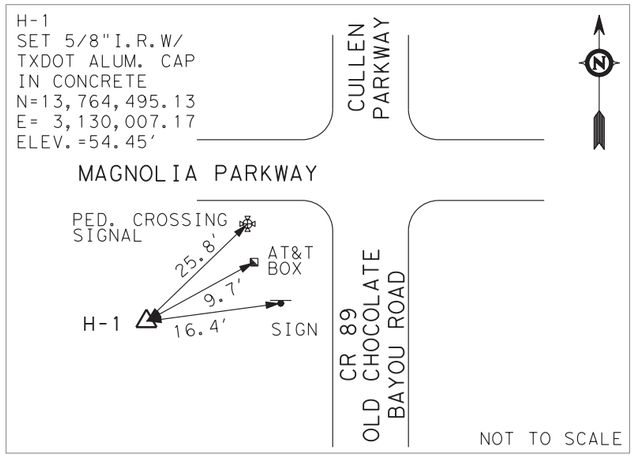
LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

OLD CHOCOLATE BAYOU ROAD SURVEY CONTROL INDEX SHEET

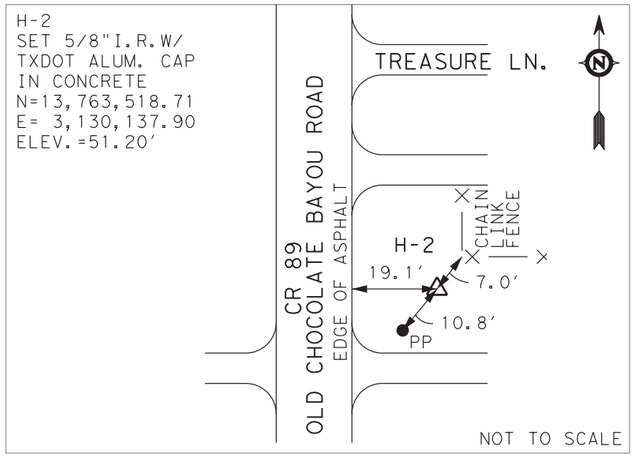
SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				OCBR
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	53

...\091231314*OCBR*Survey Control Index.dgn



H-1 LOCATED AT THE SOUTHWEST CORNER OF CR 89 (OLD CHOCOLATE BAYOU ROAD) AND MAGNOLIA PARKWAY.



H-2 FROM THE INTERSECTION OF MAGNOLIA PARKWAY AND CR 89 (OLD CHOCOLATE BAYOU ROAD) , TRAVEL SOUTH ALONG CR 89 (OLD CHOCOLATE BAYOU ROAD) 0.2 MILES LOCATED ON THE EAST SIDE OF CR 89 (OLD CHOCOLATE BAYOU ROAD), 160 FEET SOUTH OF TREASURE LANE.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXLM/N= 13,711,671.02 E= 3,234,409.26; AND TXAC/N= 13,855,759.41 E= 3,341,306.80 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXLM; AND TXAC WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

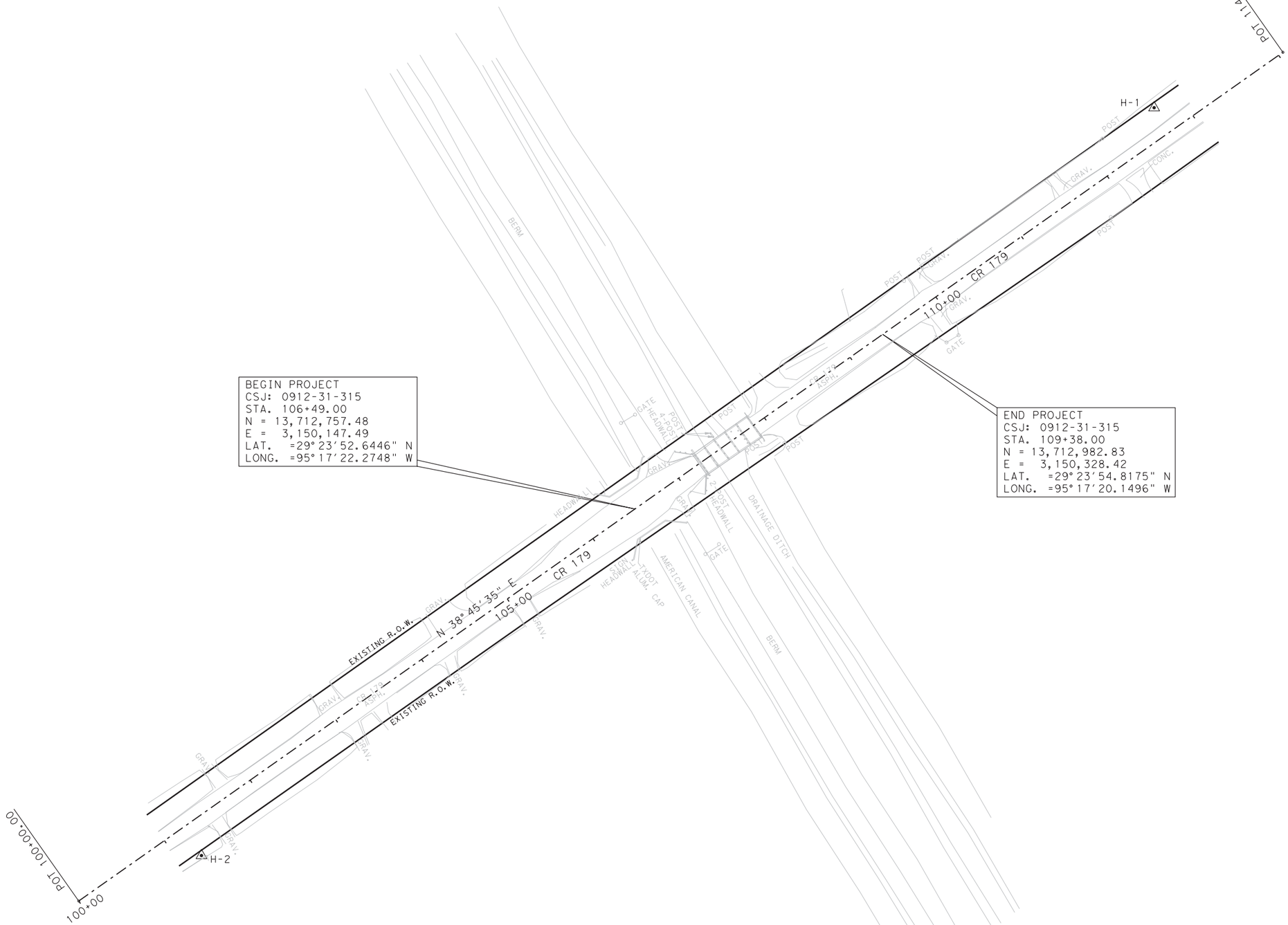
OLD CHOCOLATE BAYOU ROAD HORIZONTAL & VERTICAL CONTROL

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				OCBR
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	54

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
H-1	H-2	S 35°48'15"W	1,155.02'

CONTROL MONUMENTATION						
POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
H-1	13,713,262.18	3,150,517.37	33.37'	112+74.12	27.55' (LT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE
H-2	13,712,325.44	3,149,841.67	33.73'	101+20.64	32.01' (RT)	SET 5/8" I.R. W/TXDOT ALUM. CAP IN CONCRETE



BEGIN PROJECT
CSJ: 0912-31-315
STA. 106+49.00
N = 13,712,757.48
E = 3,150,147.49
LAT. =29°23'52.6446" N
LONG. =95°17'22.2748" W

END PROJECT
CSJ: 0912-31-315
STA. 109+38.00
N = 13,712,982.83
E = 3,150,328.42
LAT. =29°23'54.8175" N
LONG. =95°17'20.1496" W

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. EXISTING RIGHT-OF-WAY LINES SHOWN HEREON ARE APPROXIMATE.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

CR 179
SURVEY CONTROL INDEX SHEET

SHEET OF

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 179
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	55

0 50 100
SCALE: 1"= 100'
UNIT OF MEASURE: U.S. SURVEY FEET

...\091231315*CR179*Survey Control Index.dgn

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4/14/2022

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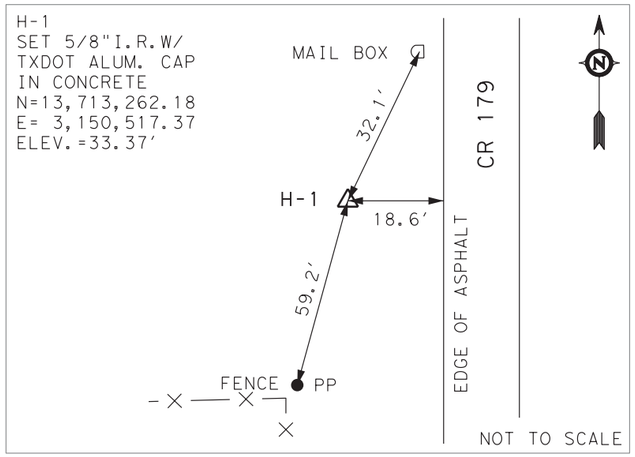
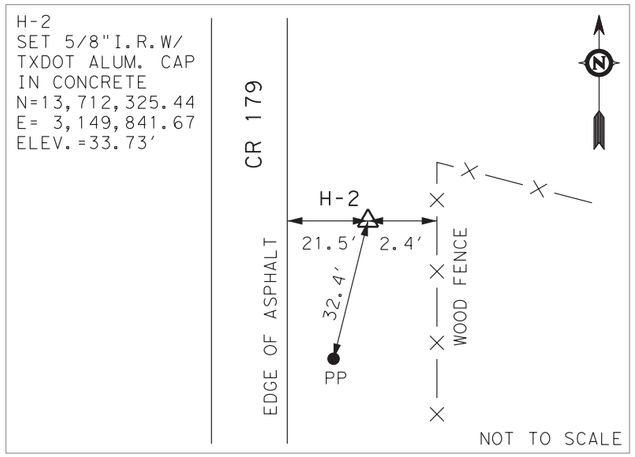


H-1 FROM THE INTERSECTION OF PARKER-DAVIS SCHOOL ROAD AND CR 179, TRAVEL NORTH ALONG CR 179 0.3 MILES LOCATED ON THE WEST SIDE OF CR 179.



H-2 FROM THE INTERSECTION OF PARKER-DAVIS SCHOOL ROAD AND CR 179, TRAVEL NORTH ALONG CR 179 380 FEET LOCATED ON THE EAST SIDE OF CR 179.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00013.

2. TXDOT REGIONAL REFERENCE POINTS TXRS/N=13,750,195.46 E=2,984,381.02; TXBC/N= 13,559,995.62 E= 2,936,154.76; AND TXLM/N= 13,711,671.02 E= 3,234,409.26 WERE HELD FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: GPS OBS (VRS)

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT REGIONAL REFERENCE POINTS TXRS; TXBC; AND TXLM WERE HELD FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: GPS OBS (VRS) AND DIGITAL LEVELING

5. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2020 AND DECEMBER, 2020.

6. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: DECEMBER, 2020

STATE OF TEXAS
REGISTERED
W. R. WOLFRAM, III
6244
PROFESSIONAL
LAND SURVEYOR

04-13-2022

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

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

CR 179 HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				CR 179
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0912	31	307,ETC	56

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4/13/2022

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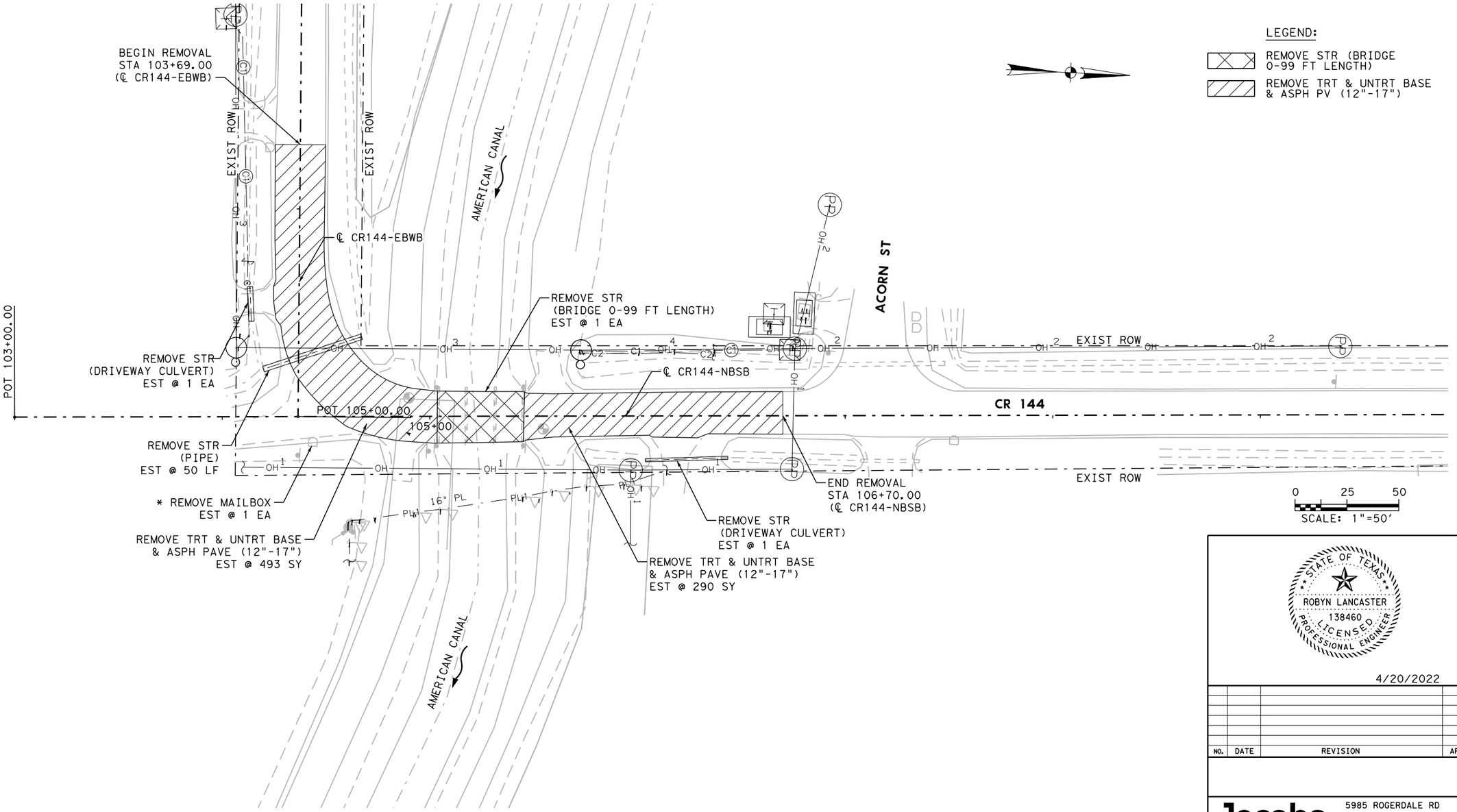


NOTES:

1. FOR SAWCUT LOCATIONS, SEE ROADWAY PLAN & PROFILE SHEETS.
2. ITEMS DENOTED WITH AN ASTERISK (*) ON THESE PLAN SHEETS ARE FOR CONTRACTOR'S GENERAL INFORMATION ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVAL ITEMS NECESSARY WITHIN THE RIGHT OF WAY AS SPECIFIED IN ITEM 100 IN THE 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES.
3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

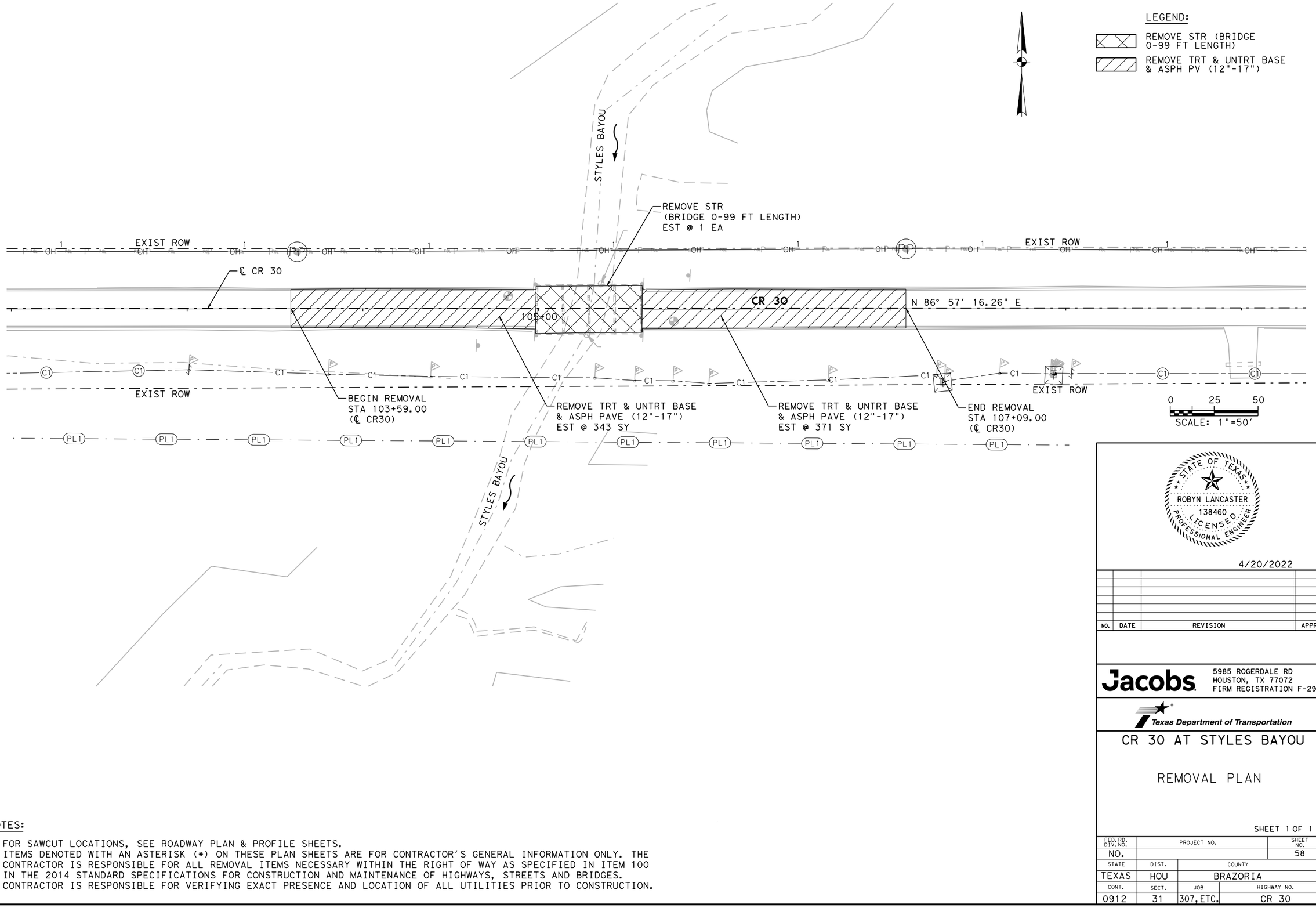
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

REMOVAL PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			57
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



NOTES:

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2. ITEMS DENOTED WITH AN ASTERISK (*) ON THESE PLAN SHEETS ARE FOR CONTRACTOR'S GENERAL INFORMATION ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVAL ITEMS NECESSARY WITHIN THE RIGHT OF WAY AS SPECIFIED IN ITEM 100 IN THE 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES.
3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

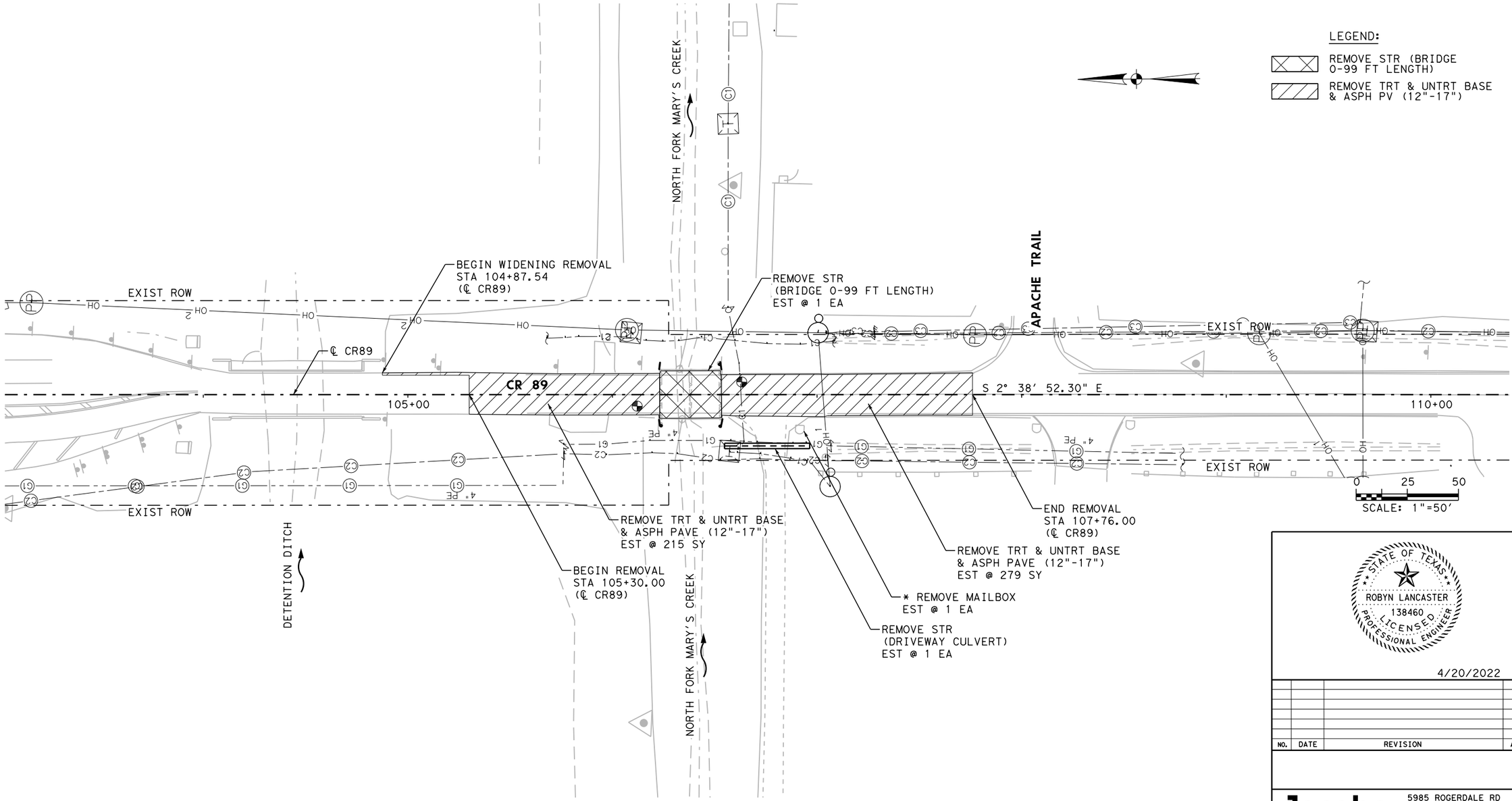
Texas Department of Transportation

CR 30 AT STYLES BAYOU

REMOVAL PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			58
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



NOTES:

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2. ITEMS DENOTED WITH AN ASTERISK (*) ON THESE PLAN SHEETS ARE FOR CONTRACTOR'S GENERAL INFORMATION ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVAL ITEMS NECESSARY WITHIN THE RIGHT OF WAY AS SPECIFIED IN ITEM 100 IN THE 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES.
3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

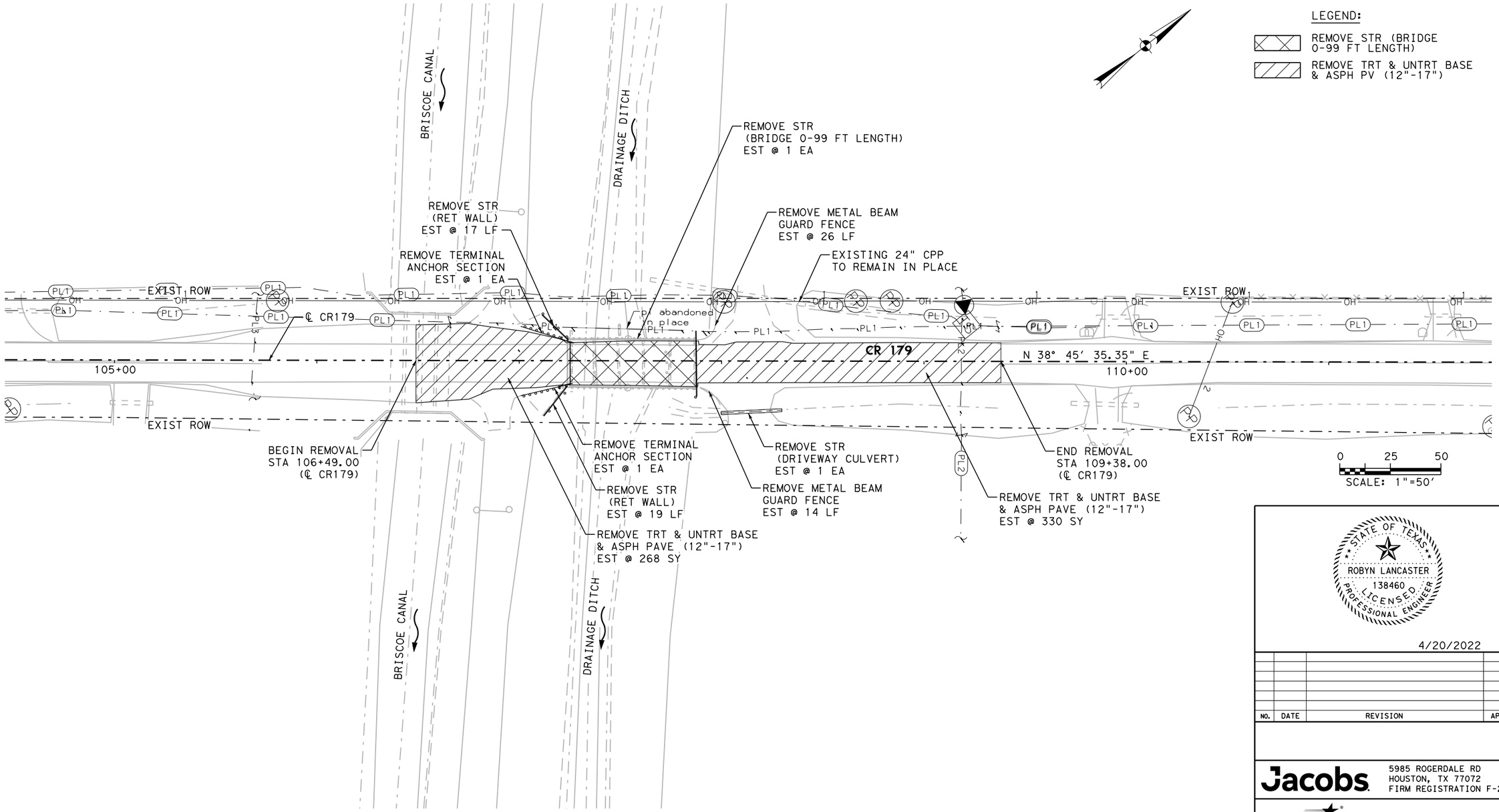
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

REMOVAL PLAN

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			59
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



NOTES:

1. FOR SAWCUT LOCATIONS, SEE ROADWAY PLAN & PROFILE SHEETS.
2. ITEMS DENOTED WITH AN ASTERISK (*) ON THESE PLAN SHEETS ARE FOR CONTRACTOR'S GENERAL INFORMATION ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVAL ITEMS NECESSARY WITHIN THE RIGHT OF WAY AS SPECIFIED IN ITEM 100 IN THE 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES.
3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

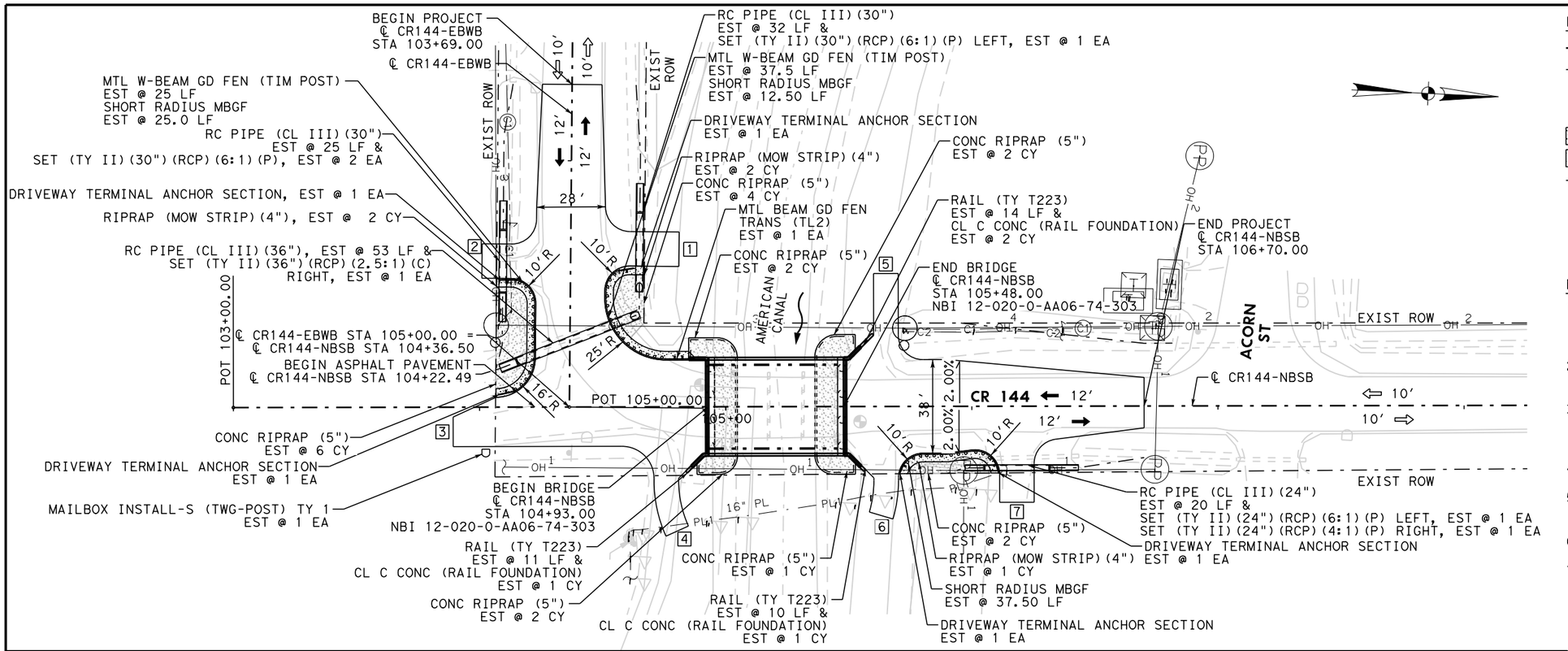
REMOVAL PLAN

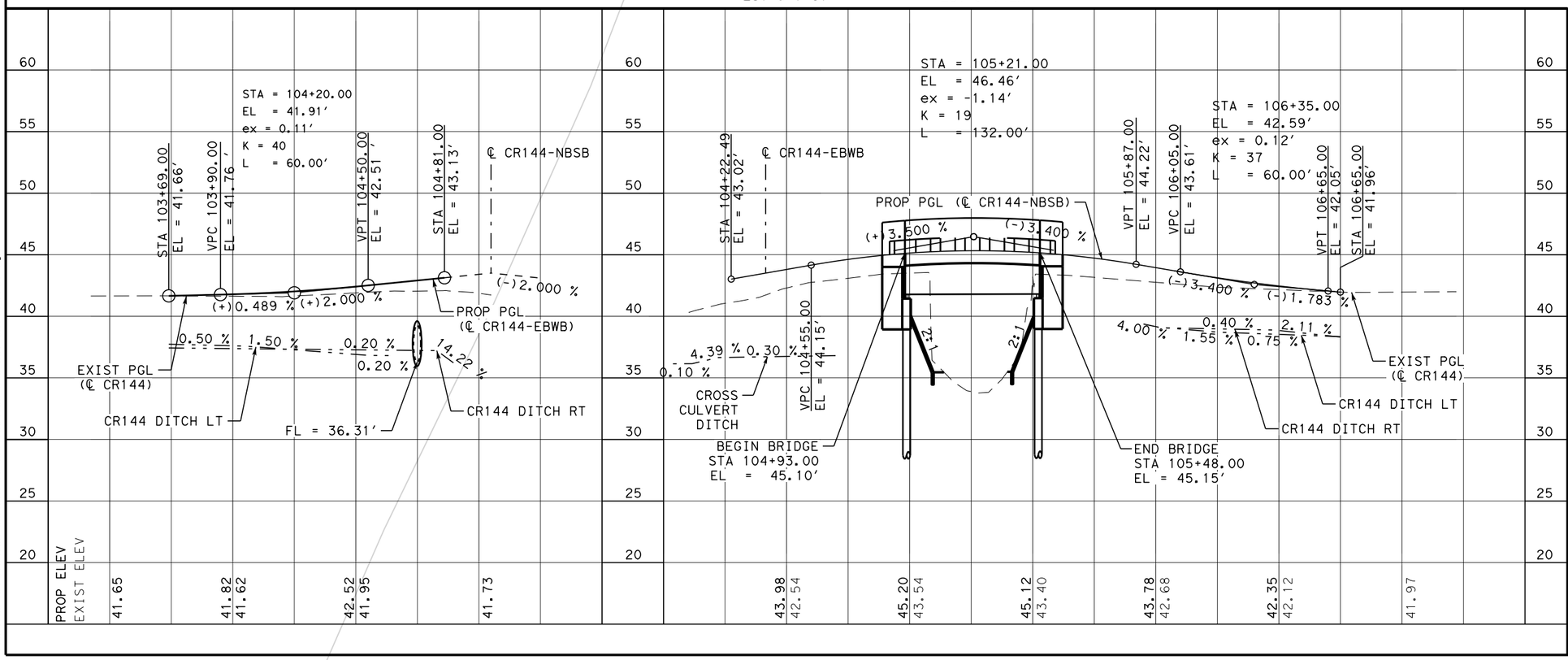
SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		60

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179





STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 144 AT AMERICAN CANAL

PLAN & PROFILE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			61
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144

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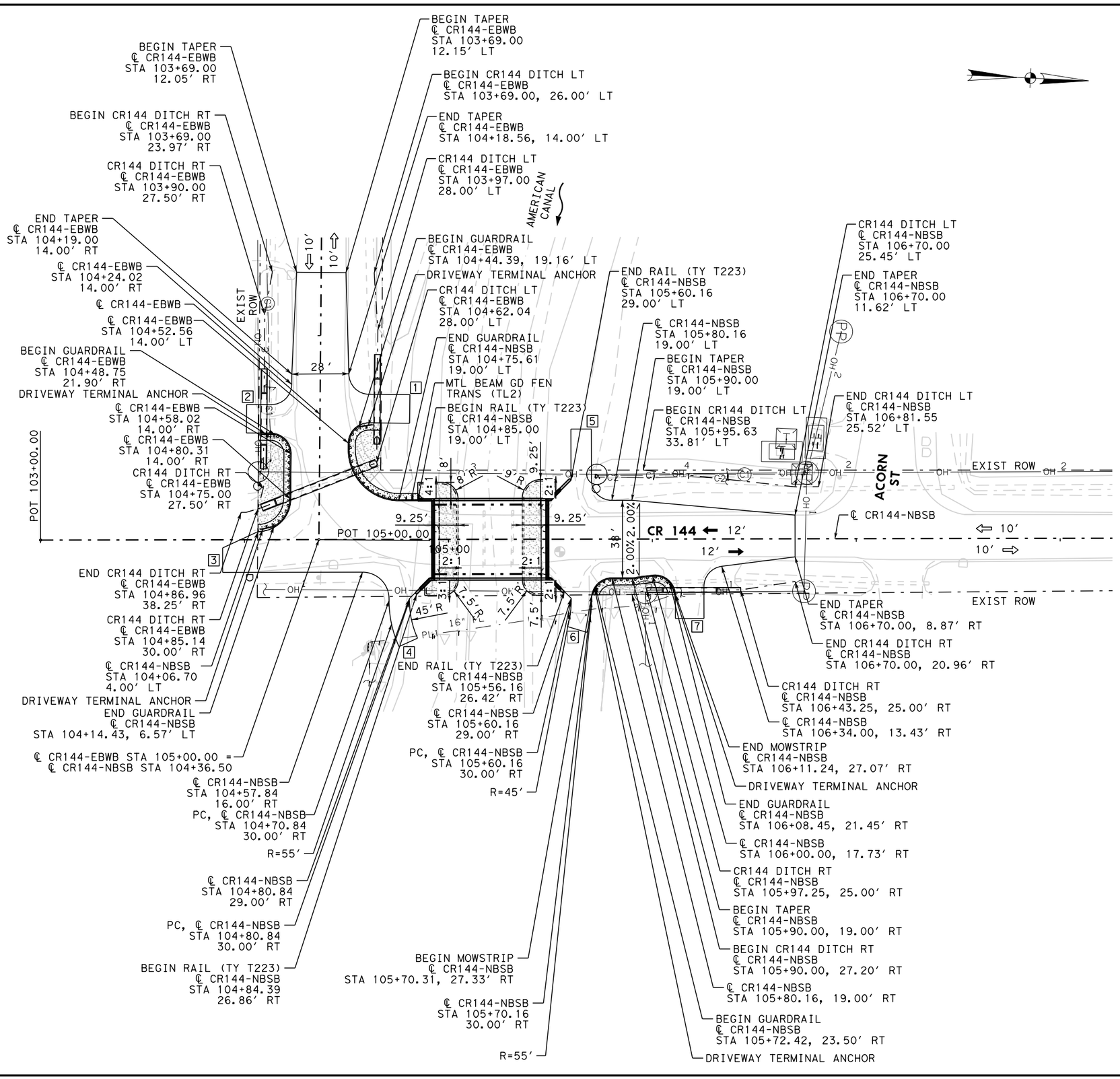


LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- [X] DRIVEWAY ID LABEL
- TEST HOLE

NOTES:

1. ALL STATIONS AND OFFSETS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
2. ALL RADII ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
3. ALL DIMENSIONS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
4. REFER TO PROJECT LAYOUT SHEET FOR HORIZONTAL ALIGNMENT DATA.
5. REFER TO DRIVEWAY SUMMARY SHEET & DRIVEWAY PROFILE TABLE FOR MORE INFORMATION.
6. REFER TO MISCELLANEOUS DRIVEWAY DETAILS FOR MORE INFORMATION.
7. CONTRACTOR TO COORDINATE WITH GCWA ON INSTALLATION OF CANAL RIPRAP.

0 25 50(H)
0 5 10(V)

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

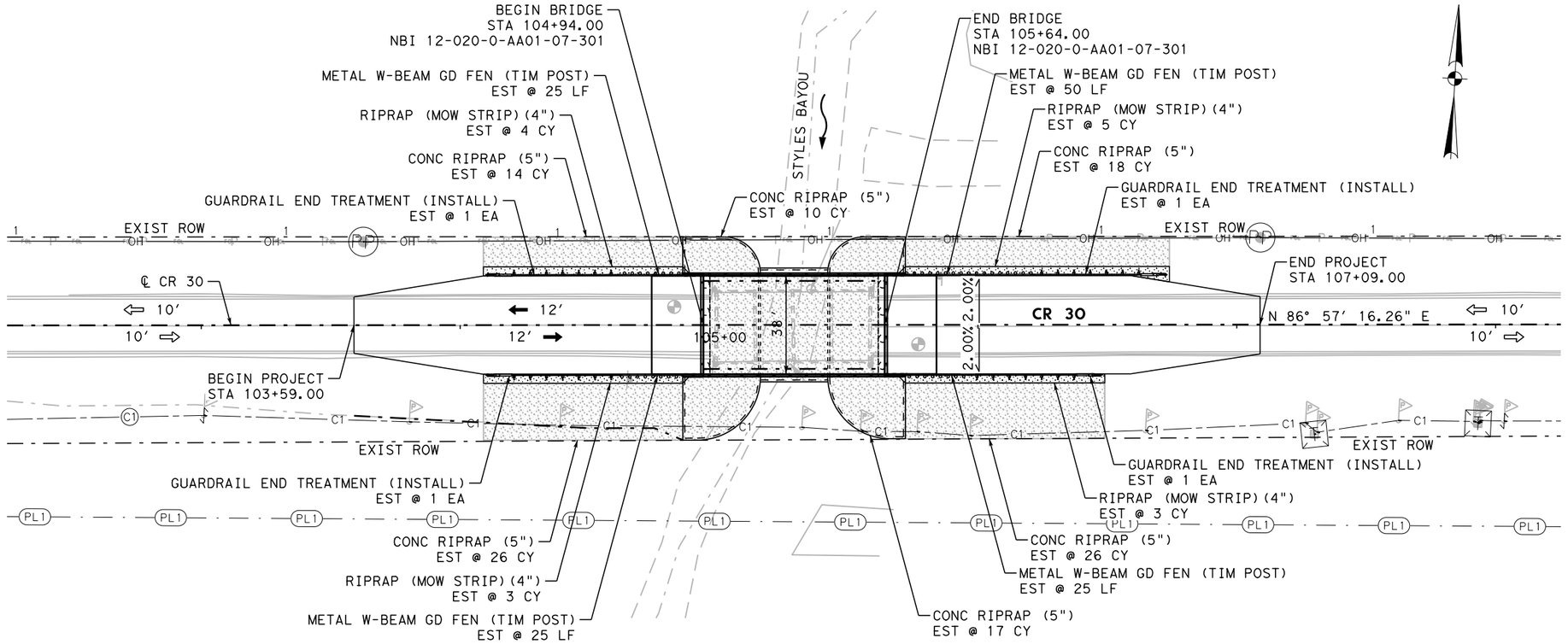
Texas Department of Transportation

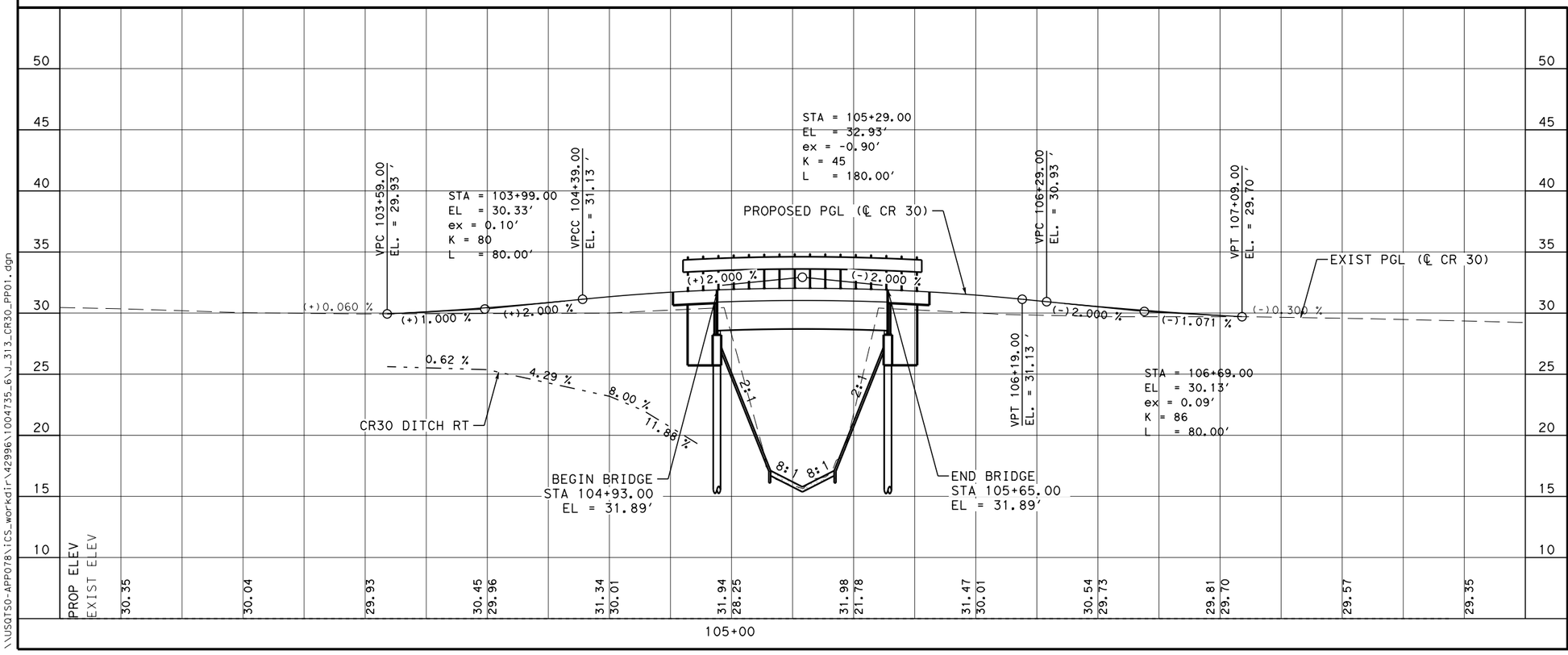
CR 144 AT AMERICAN CANAL

PLAN LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			62
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144





STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 30 AT STYLES BAYOU

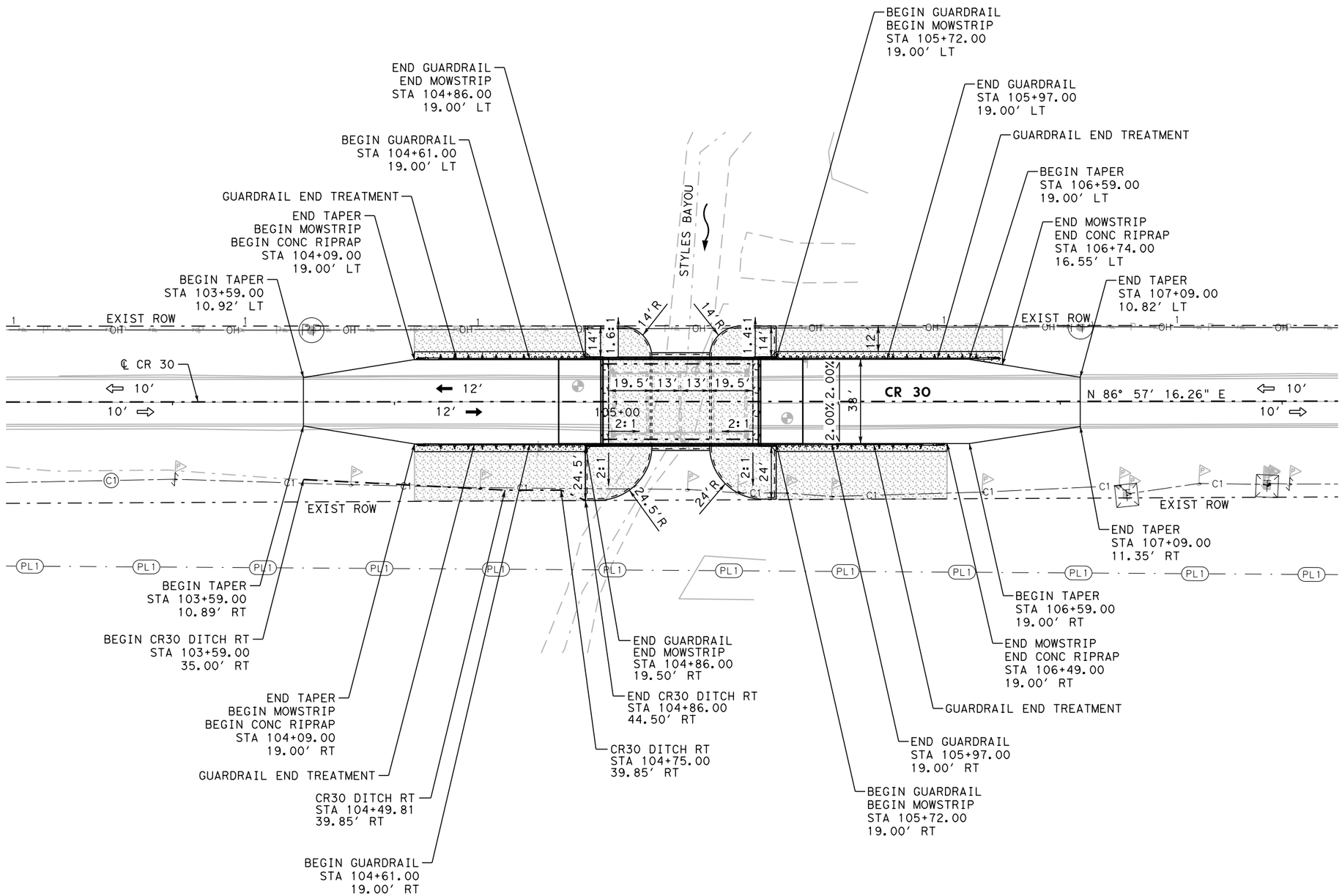
PLAN & PROFILE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		63

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- DRIVEWAY ID LABEL
- TEST HOLE

NOTES:

1. ALL STATIONS AND OFFSETS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
2. ALL RADII ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
3. ALL DIMENSIONS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
4. REFER TO PROJECT LAYOUT SHEET FOR HORIZONTAL ALIGNMENT DATA.

0 25 50(H)
0 5 10(V)

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

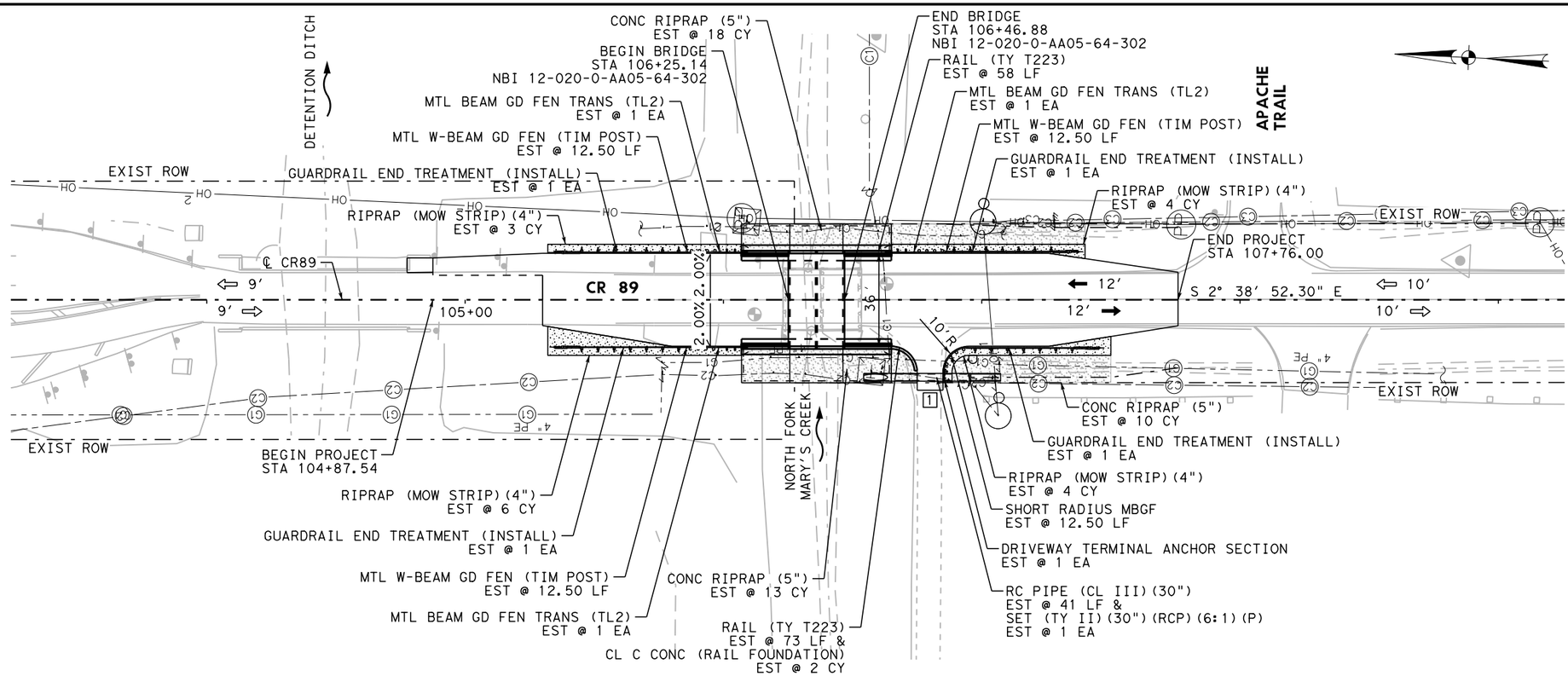
Texas Department of Transportation

CR 30 AT STYLES BAYOU

PLAN LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			64
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



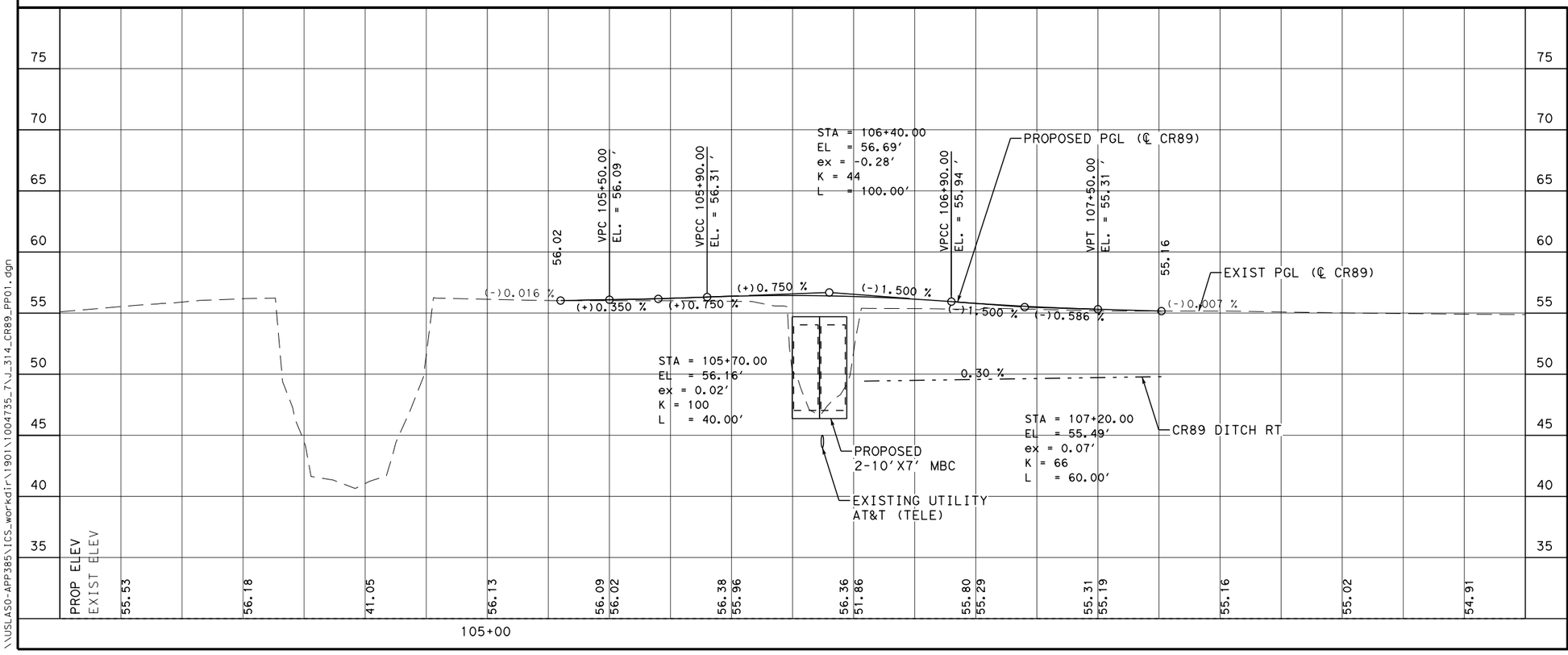
LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- [X] DRIVEWAY ID LABEL
- TEST HOLE

NOTES:

1. ALL STATIONS AND OFFSETS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
2. ALL RADII ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
3. ALL DIMENSIONS ARE SHOWN TO FACE OF CURB OR NOMINAL FACE OF RAIL, UNLESS OTHERWISE NOTED IN THE PLANS.
4. REFER TO PROJECT LAYOUT SHEET FOR HORIZONTAL ALIGNMENT DATA.
5. REFER TO DRIVEWAY SUMMARY SHEET & DRIVEWAY PROFILE TABLE FOR MORE INFORMATION.
6. REFER TO MISCELLANEOUS DRIVEWAY DETAILS FOR MORE INFORMATION.

0 25 50(H)
0 5 10(V)



STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/26/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

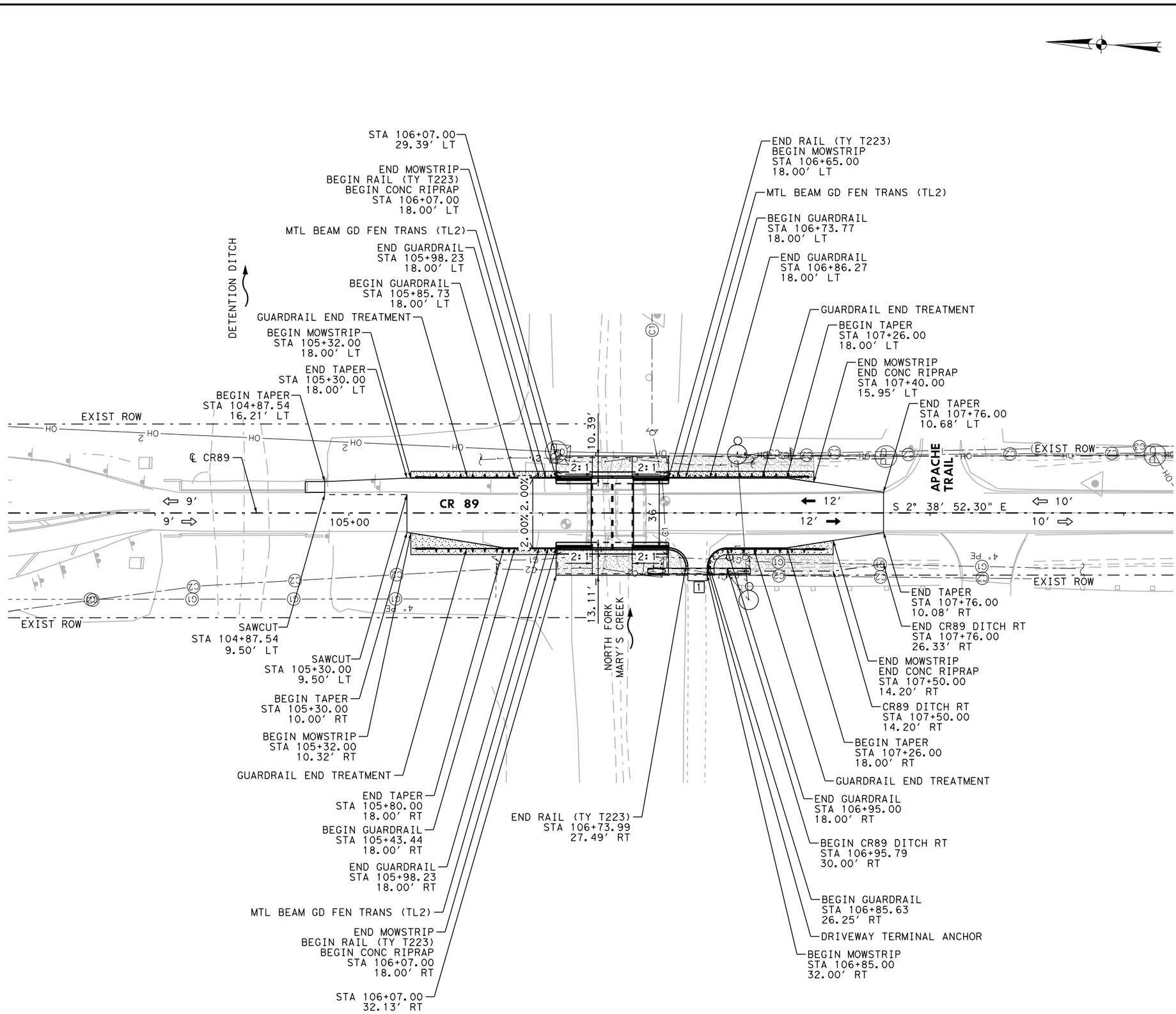
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

PLAN & PROFILE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			65
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- DRIVEWAY ID LABEL
- TEST HOLE

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0 25 50(H)
0 5 10(V)

STATE OF TEXAS
ROBYN LANCASTER
138460
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PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
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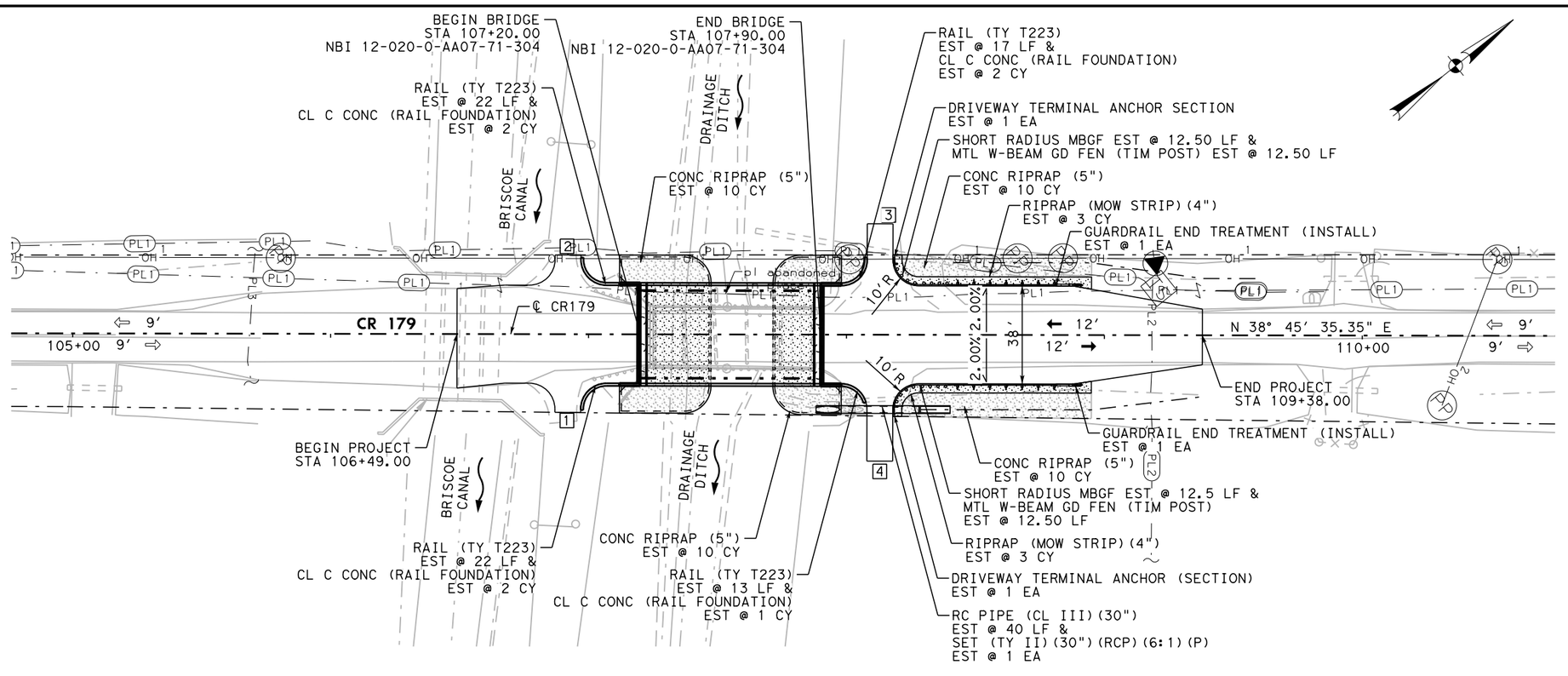
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

PLAN LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			66
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- [X] DRIVEWAY ID LABEL
- TEST HOLE

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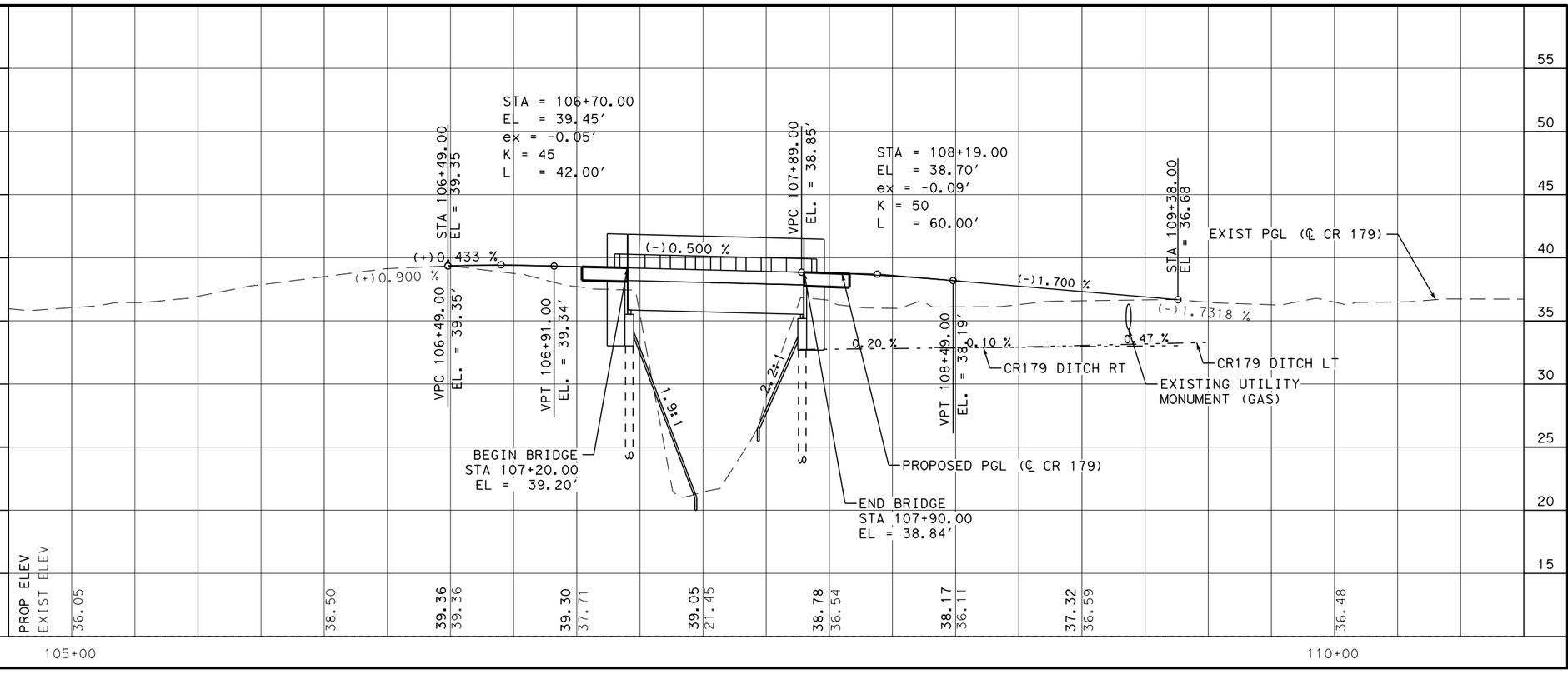
0 25 50(H)
0 5 10(V)



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ROBYN LANCASTER
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4/20/2022

NO.	DATE	REVISION	APPROV.

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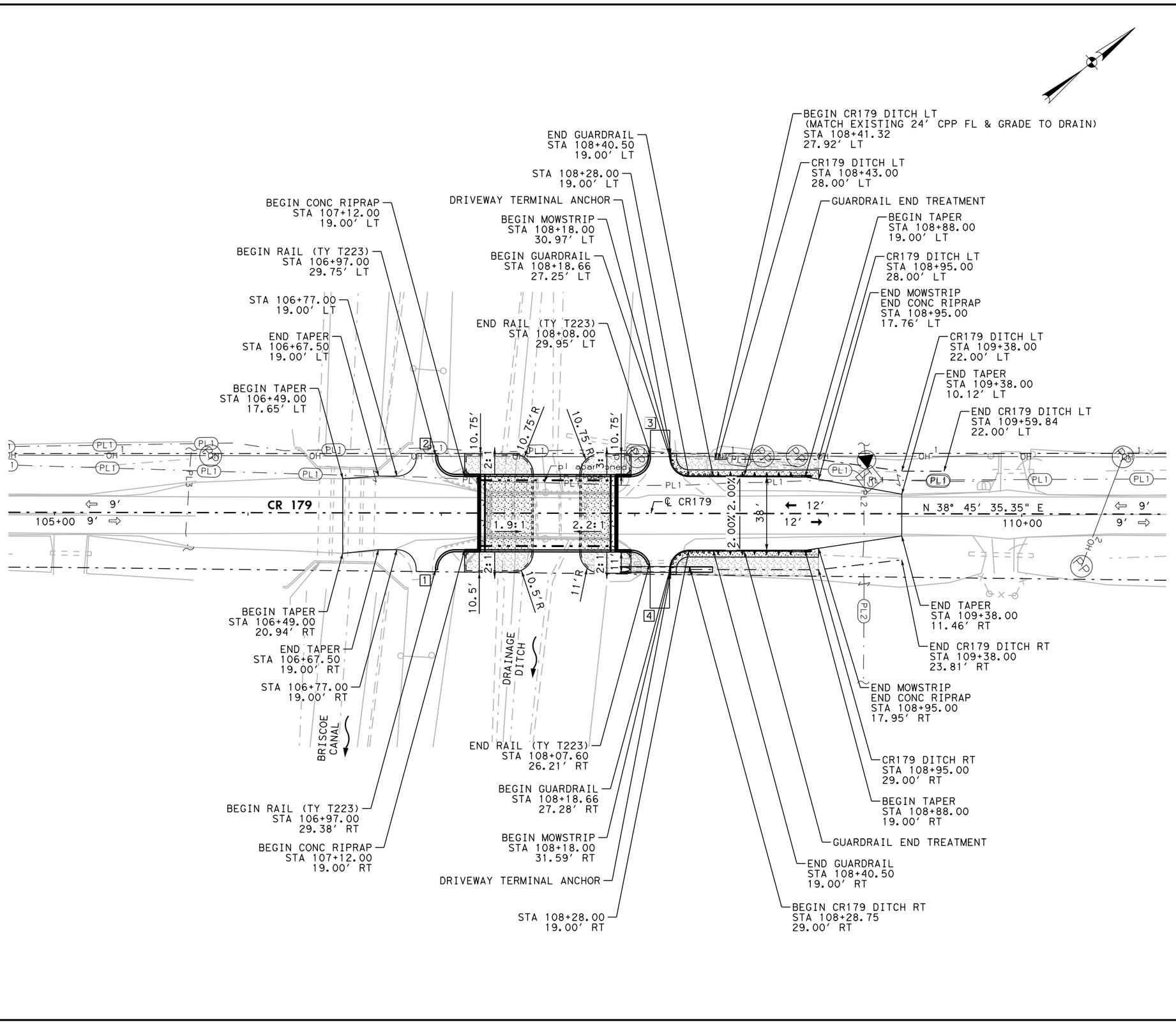
Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

PLAN & PROFILE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			67
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179



LEGEND:

- RIGHT-OF-WAY
- SAWCUT
- EXISTING TRAFFIC LANE
- PROPOSED TRAFFIC LANE
- CONC MOWSTRIP (4")
- CONC RIPRAP (5")
- DITCH FLOW LINE
- [X] DRIVEWAY ID LABEL
- TEST HOLE

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6. REFER TO MISCELLANEOUS DRIVEWAY DETAILS FOR MORE INFORMATION.

0 25 50(H)
0 5 10(V)

STATE OF TEXAS
ROBYN LANCASTER
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NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

PLAN LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			68
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

	DRIVEWAY LOCATION			BEGIN PROFILE		DRIVEWAY VERTICAL GEOMETRY: VPI 1					DRIVEWAY VERTICAL GEOMETRY: VPI 2					END PROFILE	
	STATION LOCATION	LT/RT	ALIGNMENT	STATION	ELEVATION (ft)	SLOPE START (%)	VPI STATION	VPI ELEVATION (ft)	CURVE LENGTH (ft)	SLOPE END (%)	SLOPE START (%)	VPI STATION	VPI ELEVATION (ft)	CURVE LENGTH (ft)	SLOPE END (%)	STATION	ELEVATION (ft)
CSJ 0912-31-307																	
CR 144 - EBWB																	
DRIVEWAY NO.																	
1	104+35.56	LT	CR144-EBWB	10+14.54	42.07	-2.09%	10+25.00	41.85		-0.75%						10+44.00	41.71
2	104+41.02	RT	CR144-EBWB	10+14.00	42.18	-2.00%	10+16.00	42.14	4.0	-10.00%	-10.00%	10+32.00	40.54	8.0	0.00%	10+36.00	40.54
3	105+00.00	RT	CR144-EBWB	10+14.31	42.96	-3.82%	10+18.00	42.82	6.0	-10.00%	-10.00%	10+44.00	40.22	8.0	-4.73%	10+48.00	40.03
CR 144 - NBSB																	
4	104+75.84	RT	CR144-NBSB	10+19.00	44.39	-2.00%	10+22.00	44.33	4.0	-8.00%	-8.00%	10+45.00	42.49	10.0	-1.59%	10+51.09	42.39
5	105+65.16	LT	CR144-NBSB	10+19.00	44.46	-2.00%	10+21.00	44.42	4.0	-12.00%	-12.00%	10+49.00	41.06	10.0	0.40%	10+54.00	41.08
6	105+65.16	RT	CR144-NBSB	10+19.00	44.46	-2.00%	10+22.00	44.40	6.0	-11.00%	-11.00%	10+41.00	42.31	6.0	-0.64%	10+44.48	42.29
7	106+18.25	RT	CR144-NBSB	10+15.42	42.87	-2.00%	10+18.00	42.82	5.0	-12.00%	-12.00%	10+36.00	40.66	6.0	-4.00%	10+39.00	40.54
CSJ 0912-31-314																	
CR 89																	
DRIVEWAY NO.																	
1	106+80.00	RT	CR89	10+18.00	55.72	-2.00%	10+20.00	55.68	4.0	-10.00%	-10.00%	10+31.00	54.58	8.0	-2.40%	10+35.00	54.48
CSJ 0912-31-315																	
CR 179																	
DRIVEWAY NO.																	
1	106+92.00	RT	CR179	10+19.00	38.96	-2.00%	10+24.00	38.86	10.0	7.74%						10+30.33	39.35
2	106+92.00	LT	CR179	10+19.00	38.96	-2.00%	10+22.00	38.90	6.0	8.67%						10+30.74	39.65
3	108+13.00	LT	CR179	10+19.00	38.29	-2.00%	10+21.00	38.25	4.0	-12.00%	-12.00%	10+38.00	36.21	10.0	-2.60%	10+43.00	36.08
4	108+13.00	RT	CR179	10+19.00	38.29	-2.00%	10+21.00	38.25	4.0	-12.00%	-12.00%	10+46.00	35.25	6.0	-6.89%	10+49.00	35.05

	DRIVEWAY LOCATION			DRIVEWAY DETAILS *						
	STATION LOCATION	LT/RT	ALIGNMENT	EXISTING MATERIAL	L1 (LENGTH) (FT)	L2 (LENGTH) (FT)	W (WIDTH) (FT)	R1 (RADIUS) (FT)	R2 (RADIUS) (FT)	D (PIPE LOCATION) (FT)
CSJ: 0912-31-307										
CR 144-EBWB										
DRIVEWAY NO.										
1	104+35.56	LT	CR144-EBWB	GRASS	16.0	14.5	14	10	10	28.0
2	104+41.02	RT	CR144-EBWB	GRASS/GRAVEL	16.0	5.5	14	10	10	27.5
3	105+00.00	RT	CR144-EBWB	GRAVEL	16.0	17	12	16	N/A	
CR 144-NBSB										
DRIVEWAY NO.										
4	104+75.84	RT	CR144-NBSB	GRASS/GRAVEL	10.2	23.0	10	10	N/A	
5	105+65.16	LT	CR144-NBSB	GRASS/GRAVEL	14.8	20.1	10	10	N/A	
6	105+65.16	RT	CR144-NBSB	GRASS/GRAVEL	8.4	17.1	10	N/A	10	
7	106+18.25	RT	CR144-NBSB	GRASS/GRAVEL	11.5	12.0	14	10	10	25.0
CSJ: 0912-31-314										
CR 89										
DRIVEWAY NO.										
1	106+80.00	RT	CR89	GRAVEL	14.1	2.9	10	10	10	30.0
CSJ: 0912-31-315										
CR 179										
DRIVEWAY NO.										
1	106+92.00	RT	CR179	GRASS/GRAVEL	11.3		10	10	10	
2	106+92.00	LT	CR179	GRASS/GRAVEL	11.7		10	10	10	
3	108+13.00	LT	CR179	GRASS/GRAVEL	12.0	12.0	10	10	10	
4	108+13.00	RT	CR179	GRASS/GRAVEL	12.5	17.5	10	10	10	29.0

* REFER TO MISCELLANEOUS DRIVEWAY DETAILS FOR ADDITIONAL INFORMATION.

ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 144, ETC.

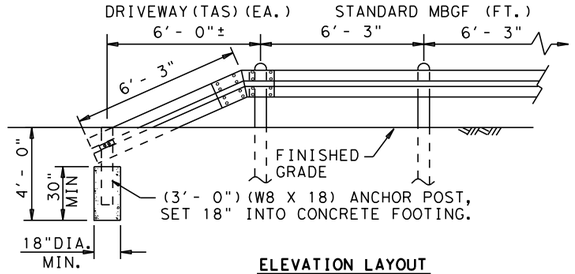
DRIVEWAY PROFILE TABLE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		69

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.



ELEVATION LAYOUT

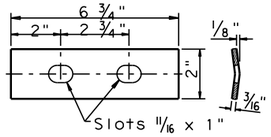
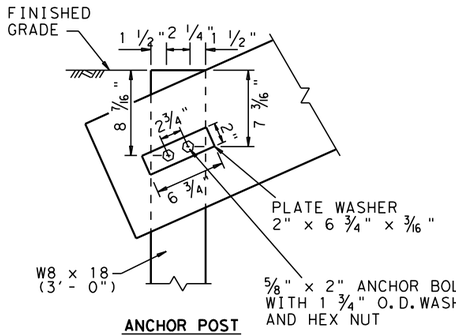
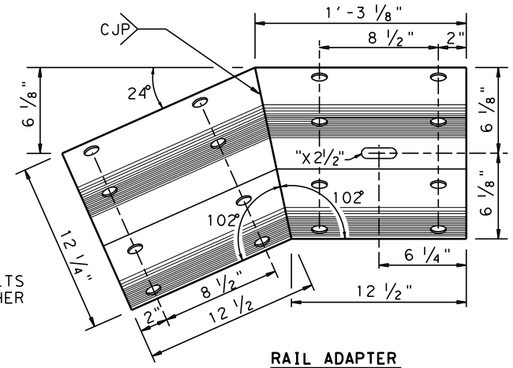


PLATE WASHER FOR METAL BEAM
(GALVANIZED AFTER FABRICATION)



ANCHOR POST

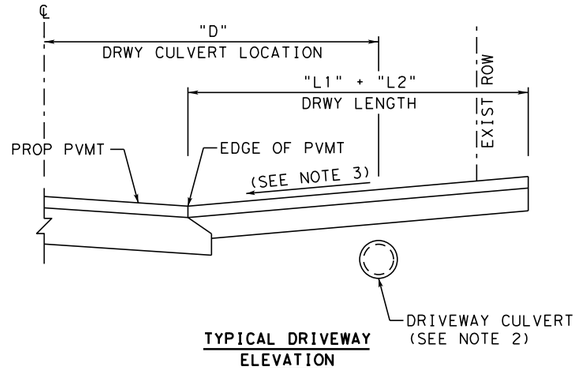


RAIL ADAPTER
RAIL - 10 GAUGE
(GALVANIZED AFTER FABRICATION)

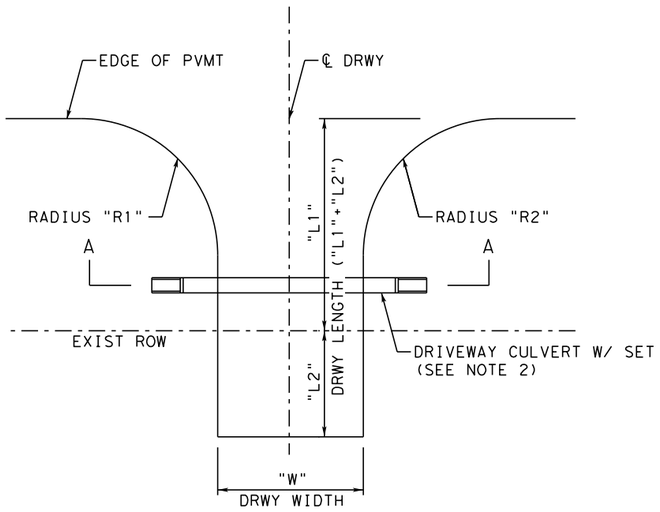
GENERAL NOTES

1. THE "DRIVEWAY" TERMINAL ANCHOR SECTION IS ONLY TO BE USED WITHIN DRIVEWAY LOCATIONS, WHERE THE ROW IS LIMITED AND A STANDARD 25 FT. (TAS) TERMINAL ANCHOR SECTION, IS TOO LONG.
2. TERMINAL ANCHOR POST SHALL BE SET IN CLASS A CONCRETE.
3. ALL STEEL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ITEM 445, "GALVANIZING."

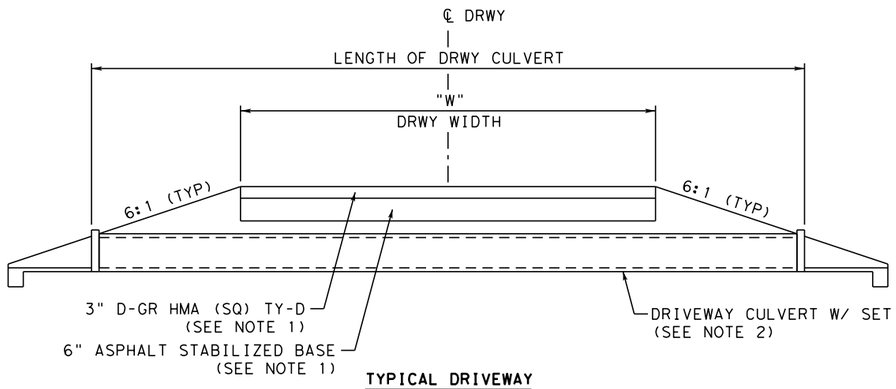
DRIVEWAY TERMINAL ANCHOR SECTION



TYPICAL DRIVEWAY ELEVATION



TYPICAL DRIVEWAY PLAN



TYPICAL DRIVEWAY SECTION A-A

TYPICAL DRIVEWAY DETAILS

NOTES:

1. DRIVEWAYS ARE PAID FOR AS ITEM 530 6005 DRIVEWAYS (ACP).
2. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO DRIVEWAY PROFILE TABLE FOR PROFILE INFORMATION.
4. REFER TO HOUSTON DISTRICT DRIVEWAY DETAILS STANDARD SHEET FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
4/20/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

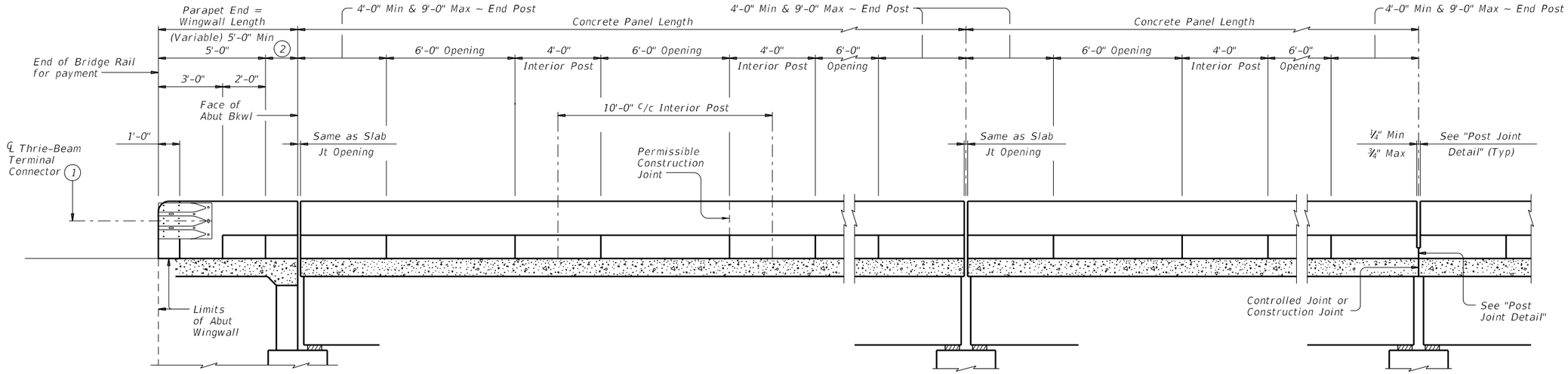
Texas Department of Transportation

CR 144, ETC.

MISCELLANEOUS DRIVEWAY DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			70
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144, ETC.

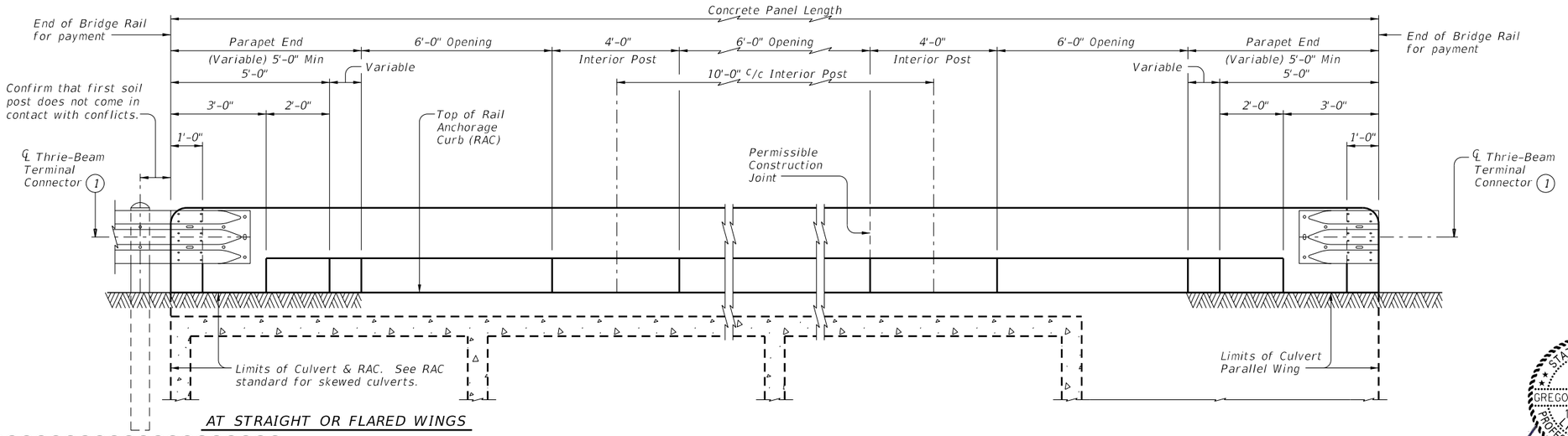


AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

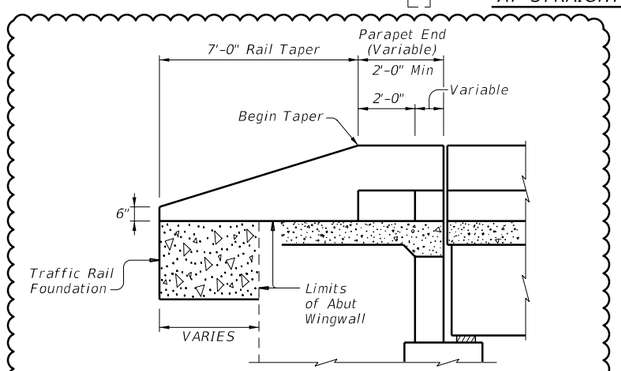
AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS

AT PARALLEL WINGS



AT RAIL TAPER

ALTERNATE ROADWAY ELEVATION OF RAIL ON BRIDGE AT ABUTMENT

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)

△1 Added detail for rail taper.

STATE OF TEXAS
GREGORY S. HANSEN
13427
LICENSED PROFESSIONAL ENGINEER

04/18/2022

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

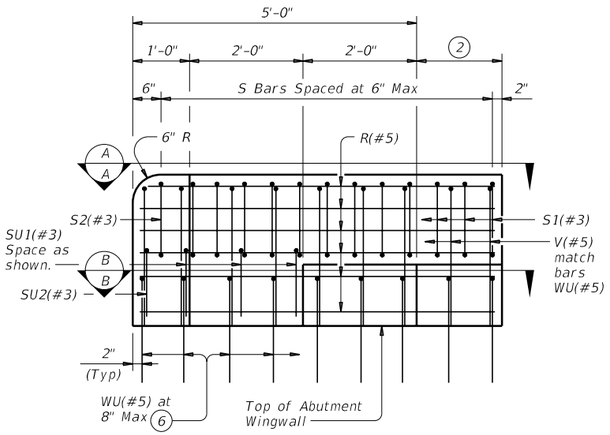
TRAFFIC RAIL

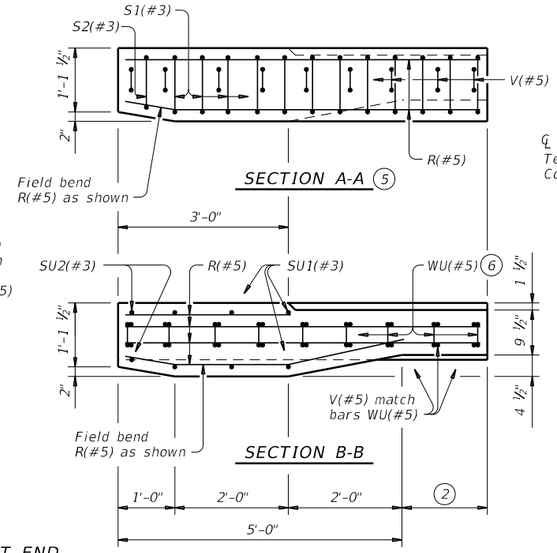
TYPE T223 (MOD)

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES		
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0912	31	307 ETC.	CR 144, ETC.		
	DIST	COUNTY		SHEET NO.		
	HOU	BRAZORIA		71		

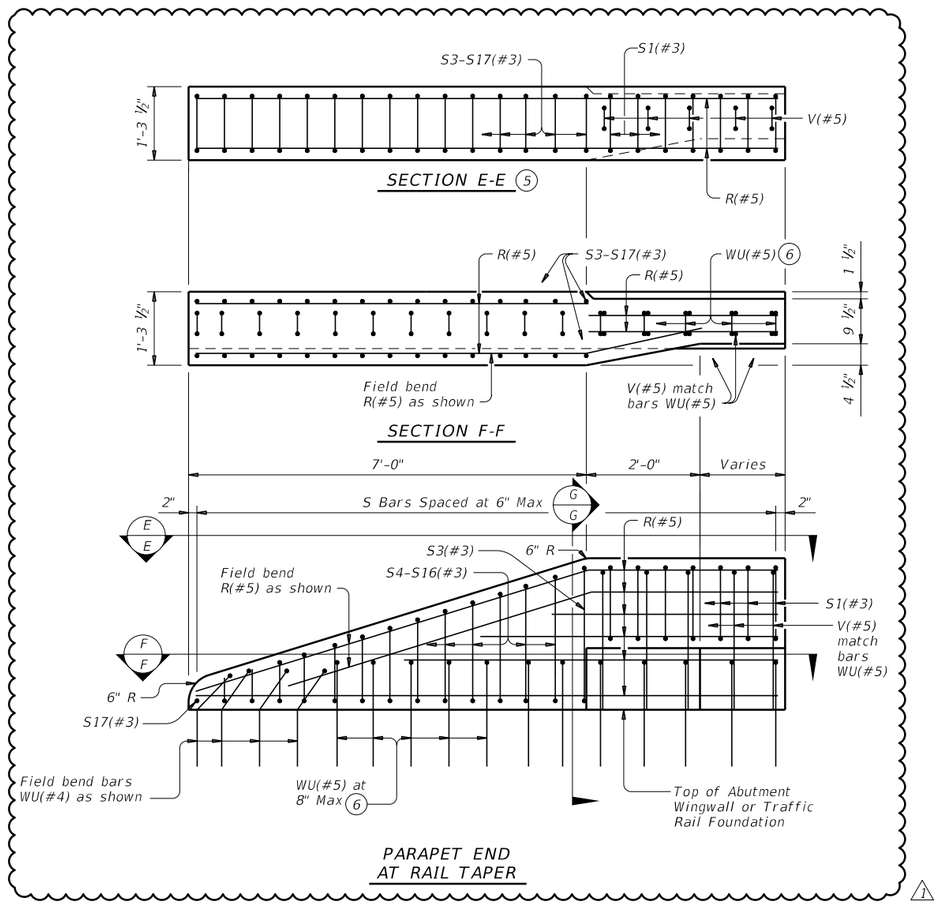
DATE:
FILE:

DATE:
FILE:

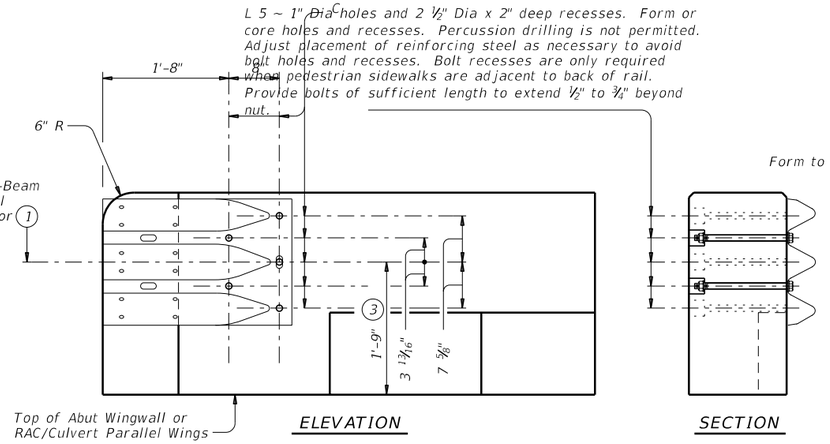




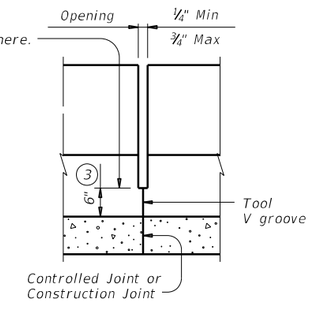
PARAPET END
AT ABUT WINGWALL 6



PARAPET END
AT RAIL TAPER

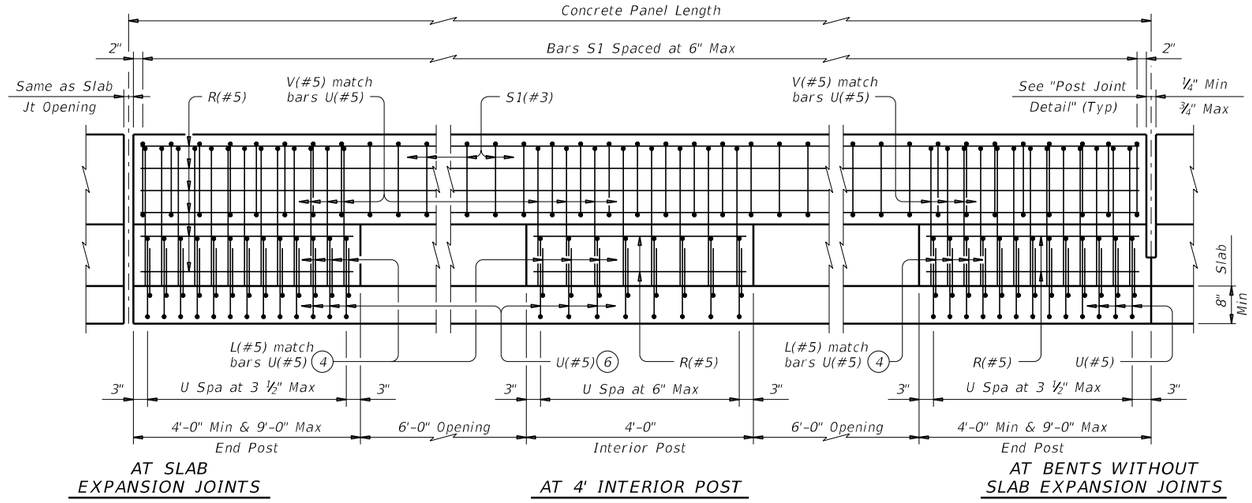


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents
without slab expansion joints.



AT SLAB
EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT
SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(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) Increase 2" for structures with overlay.

(4) 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.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

1 Added detail for rail taper.

Texas Department of Transportation

Bridge Division Standard

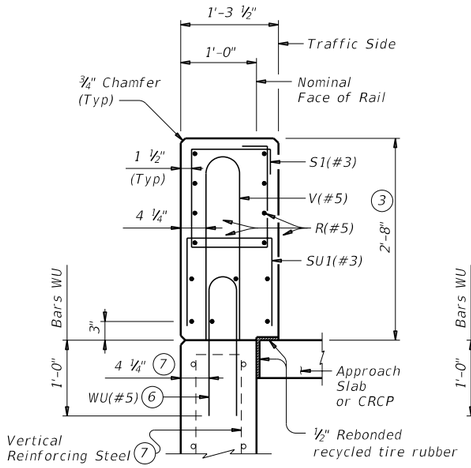
TRAFFIC RAIL

TYPE T223 (MOD)

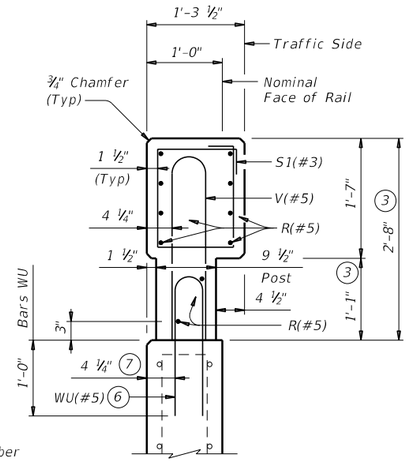
STATE OF TEXAS
GREGORY S HANSEN
113427
LICENSED PROFESSIONAL ENGINEER

04/18/2022

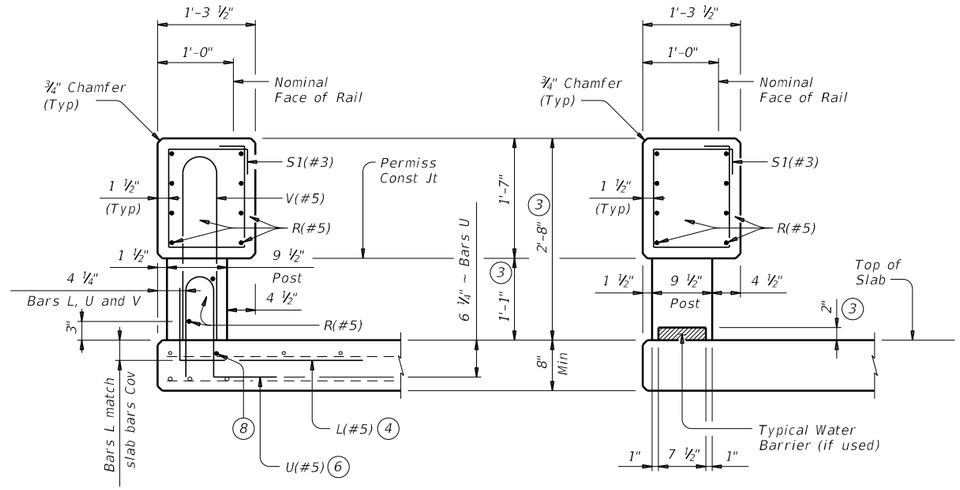
FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		72



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

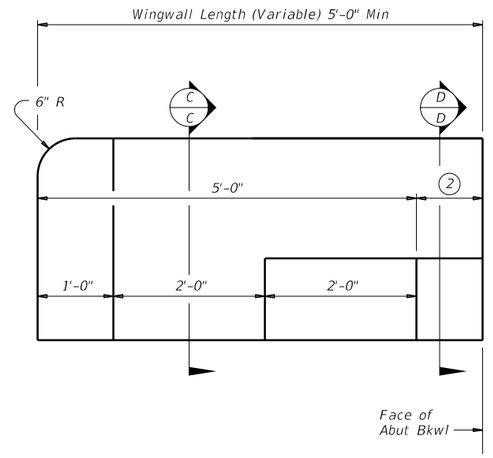


SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

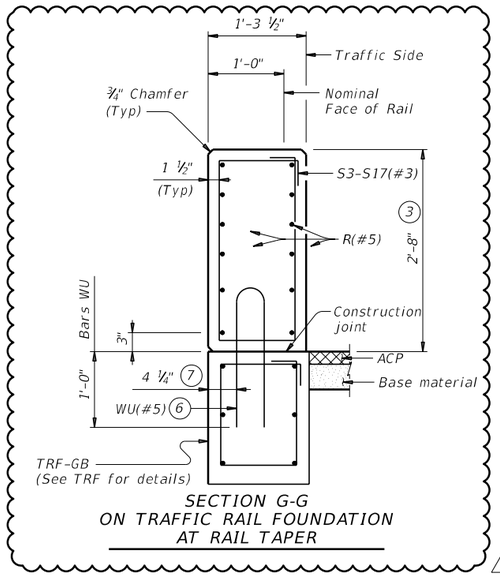


ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

SECTIONS THRU RAIL

Sections on box culverts similar.



SECTION G-G
ON TRAFFIC RAIL FOUNDATION
AT RAIL TAPER

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) 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.

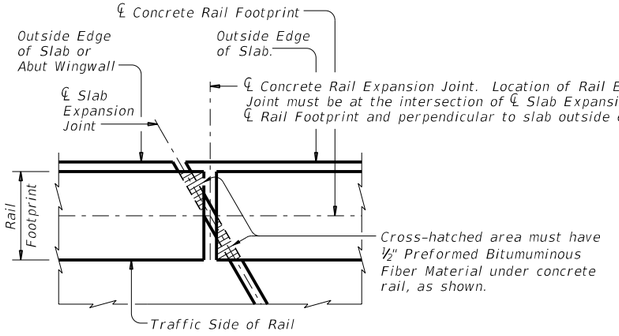
(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) 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.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.

1 Added detail for rail taper.

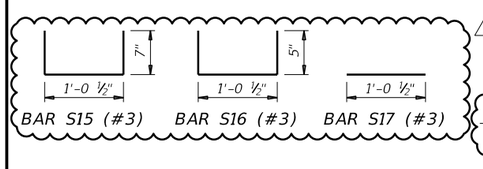


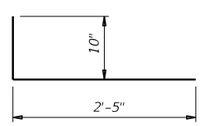
PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

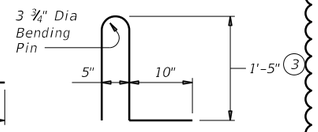
Bar(#3)	Y (ft-in)
S1 Bar	1'-4"
S2 Bar	1'-4"
S3 Bar	2'-4½"
S4 Bar	2'-2½"
S5 Bar	2'-0½"
S6 Bar	1'-11"
S7 Bar	1'-9"
S8 Bar	1'-7¼"
S9 Bar	1'-5½"
S10 Bar	1'-3¾"
S11 Bar	1'-2"
S12 Bar	1'-0"
S13 Bar	0'-10"
S14 Bar	0'-8½"

1

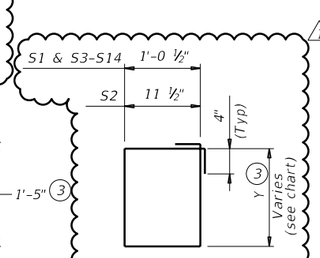




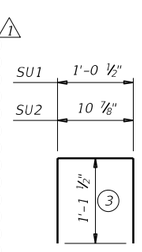
BARS L (#5)



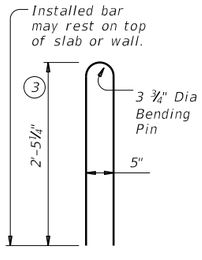
BARS U (#5) (9)



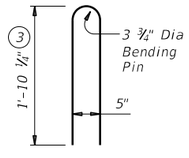
BARS S1-S14 (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

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.

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.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

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.

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

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

04/18/2022

DATE:
FILE:

Texas Department of Transportation

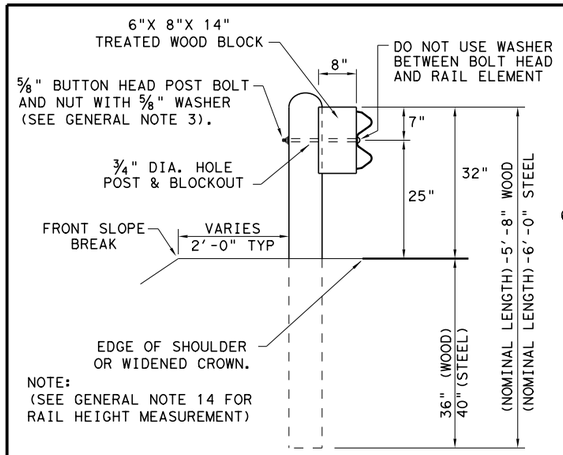
Bridge Division Standard

TRAFFIC RAIL

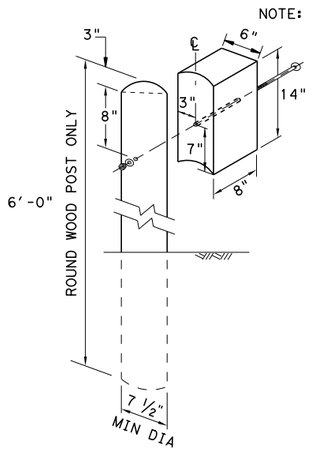
TYPE T223 (MOD)

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		73

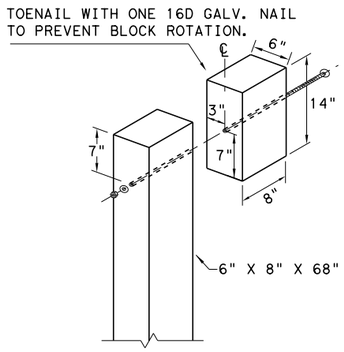
DATE:
FILE:



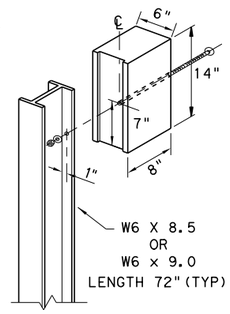
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

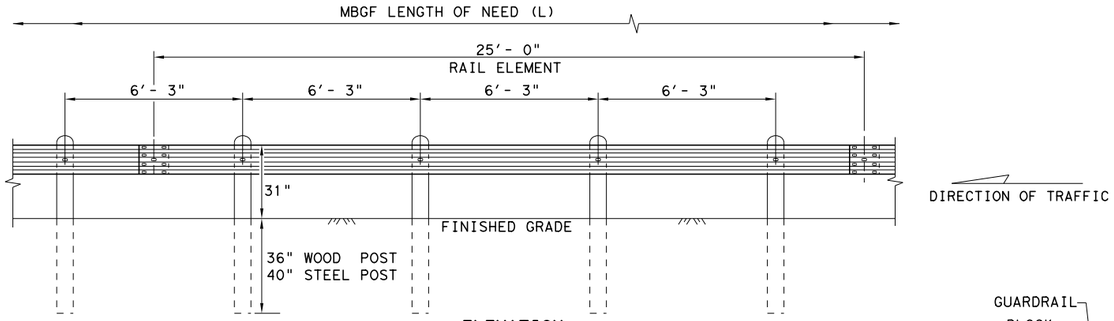


WOOD BLOCK TO
RECTANGULAR WOOD POST



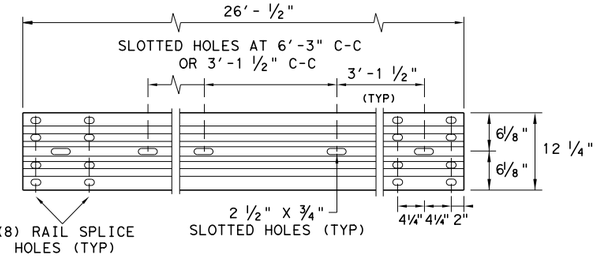
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



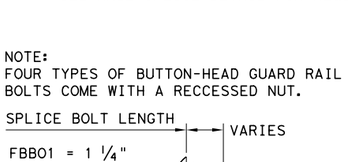
ELEVATION
MID-SPAN RAIL SPLICE

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



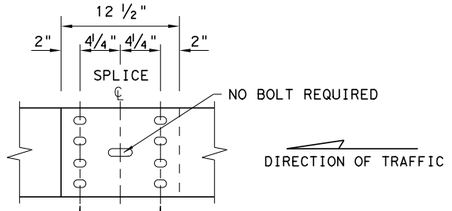
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



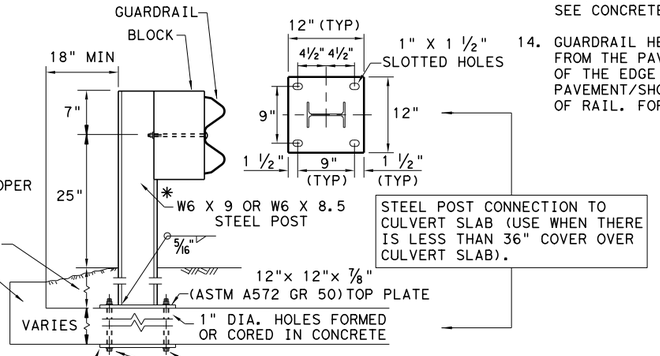
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

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

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

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 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.

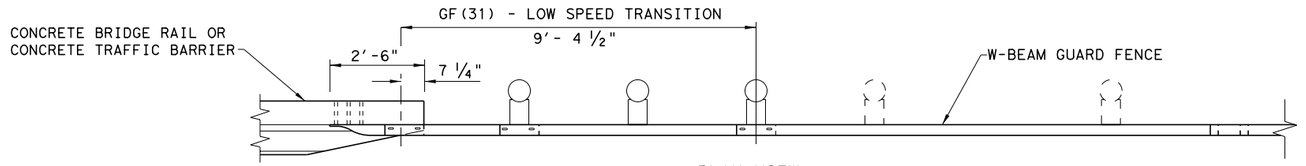
Texas Department of Transportation

Design Division Standard

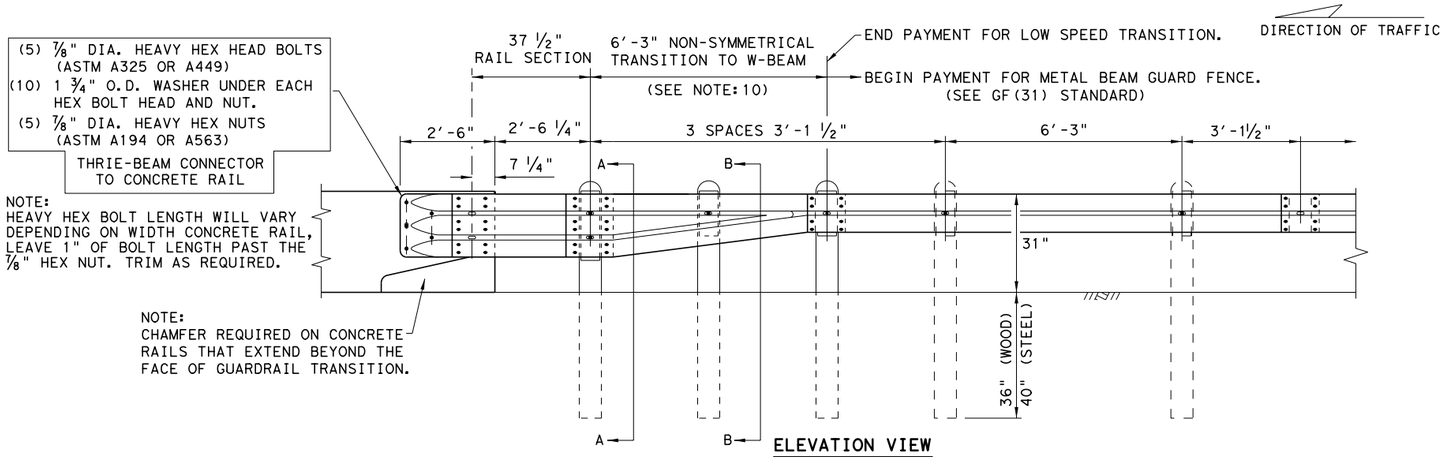
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		74

DATE:
FILE:



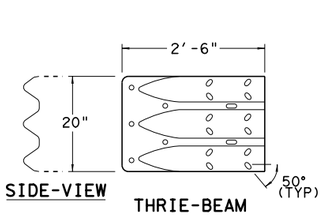
PLAN VIEW



ELEVATION VIEW

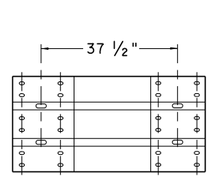
GENERAL NOTES

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 ⅝" 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 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.

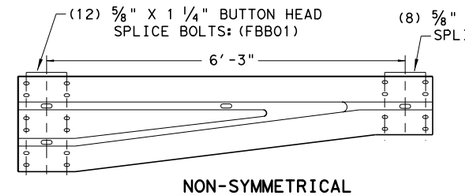


SIDE-VIEW

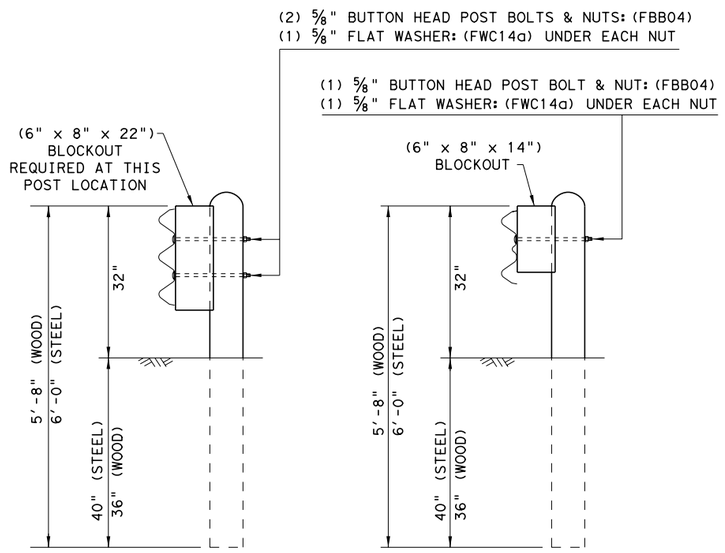
THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b



THRIE-BEAM RAIL SHORT SECTION 10GA.
PART DESIGNATOR RTM01a



NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

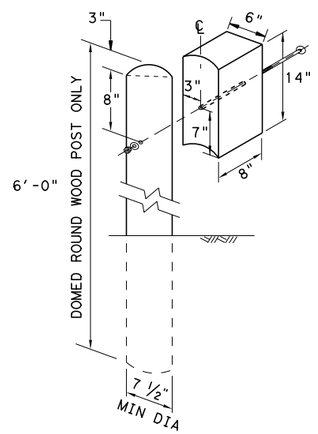


SECTION A-A

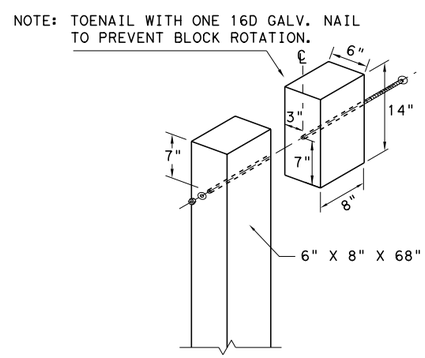
SECTION B-B

PLATE WASHER INSTRUCTIONS

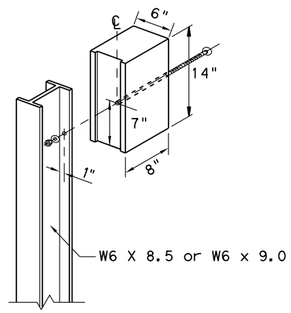
BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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.

LOW-SPEED TRANSITION

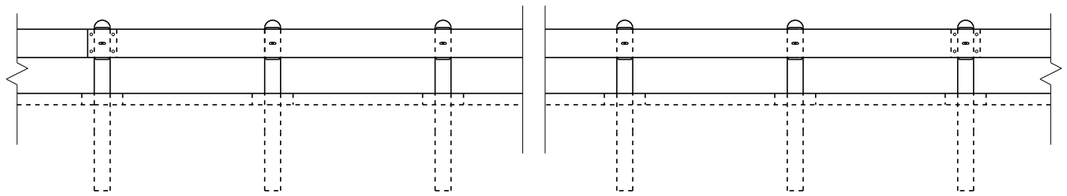
Texas Department of Transportation

Design Division Standard

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

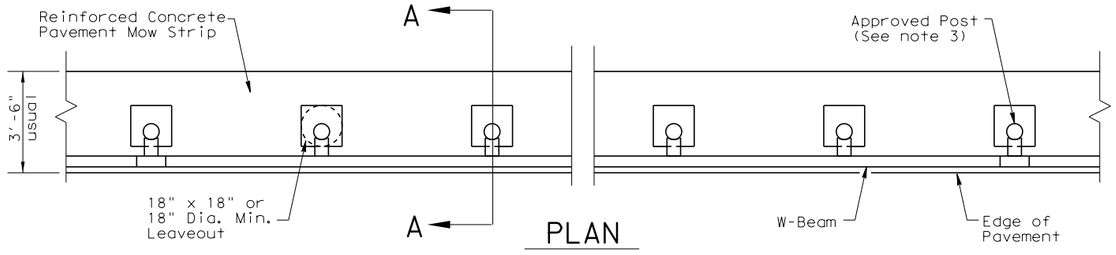
GF(31)TR TL2-19

FILE: gf31tr-tl219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		75



ELEVATION

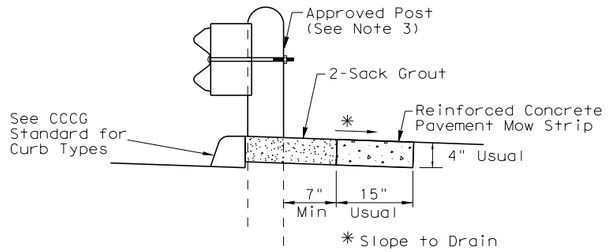
TRAFFIC



PLAN

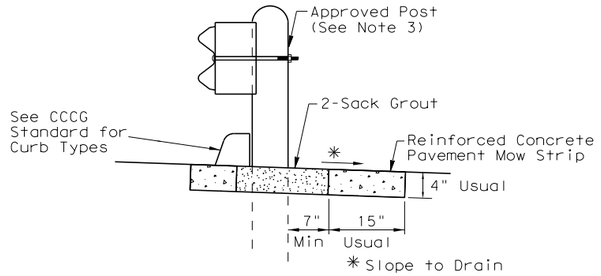
GENERAL NOTES

1. Place concrete riprap mow strips at all Metal Beam Guard Fence locations, and in accordance with Item 432, "Riprap". Use Class B Concrete, reinforced with No. 3 bars spaced at 18 in. centers each direction and 2 in. below the surface.
2. Provide a minimum of 7 in. leave out behind the post. Do not place concrete in the leave out.
3. The type of approved post is shown elsewhere on the plans. See the applicable standard sheets for additional details and information.
4. Other curb placement options may be used. Curbs are not considered part of the mow strip and are paid for under other pertinent bid items.
5. Fill the leave outs with no more than a 2-sack grout mixture and place in accordance with Section 421.2.7, "Mortar and Grout." Payment for furnishing and placing the grout mixture is subsidiary to the Item 432,"RIPRAP."
6. Place the mow strip the entire length of the guard fence plus any Terminal Anchor Section (TAS) or Single Guardrail Terminal (SGT) to 2 ft. beyond the face of the object marker at the end of the SGT. Do not allow concrete to adhere to the ground line strut shown on the SGT standard sheet.



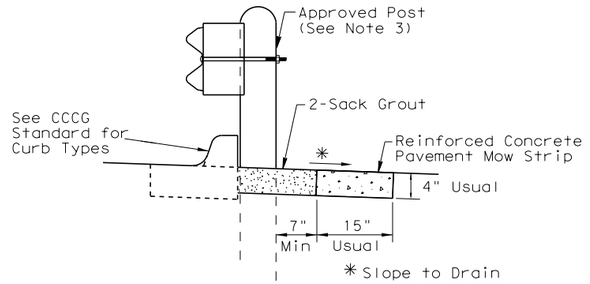
CURB OPTION (1)

Shown at Curbed Location

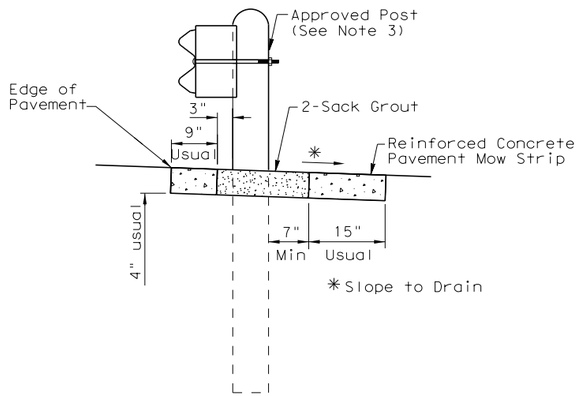


CURB OPTION (2)

Curb Shown on Top of Mow Strip

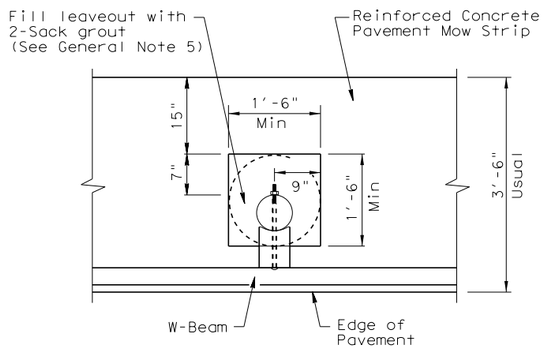


CURB OPTION (3)



SECTION A-A

Typical



MOW STRIP DETAIL

Reinforced Concrete Pavement Mow Strip with 18" x 18"or 18" dia. minimum leaveout.

Texas Department of Transportation
Houston District

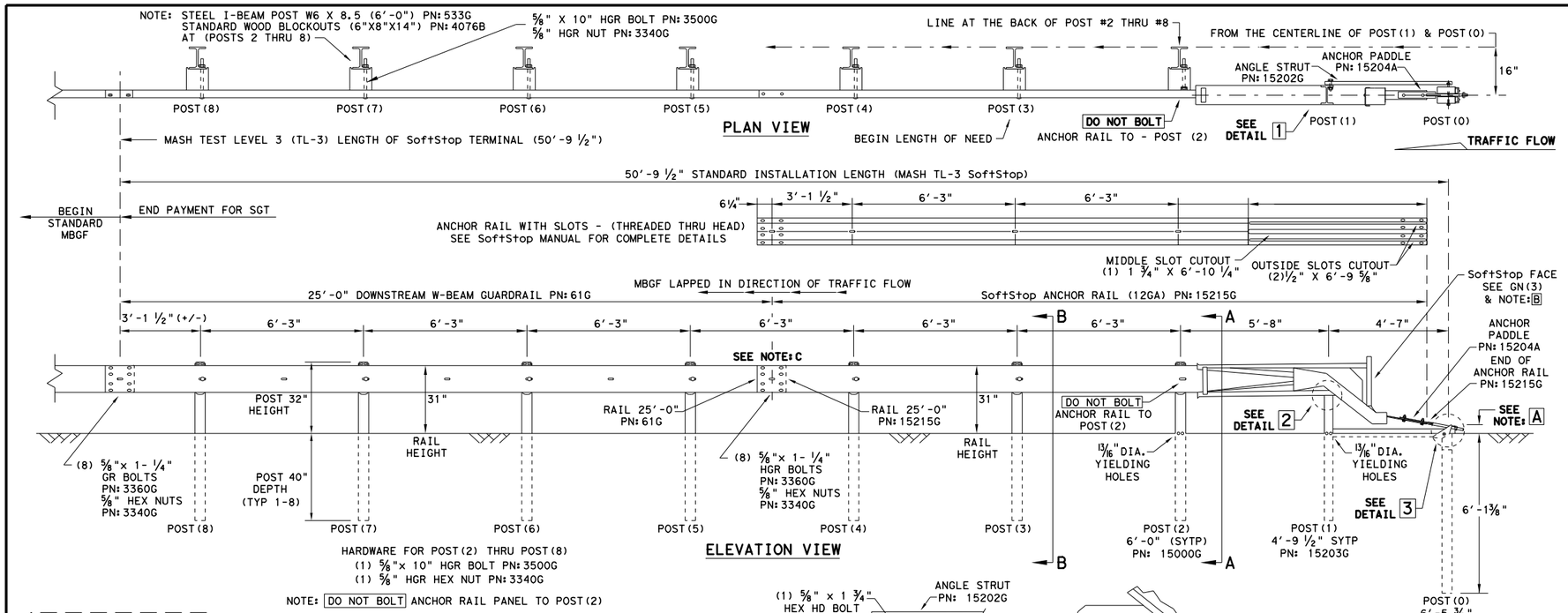
MOW STRIP

MS

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2014	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 03/15 2014 SPECS	HOU	6	BR 2019(421),ETC.		76
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA		0912	31	307,ETC	CR

STDE5.DGN

DATE:
FILE:



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 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

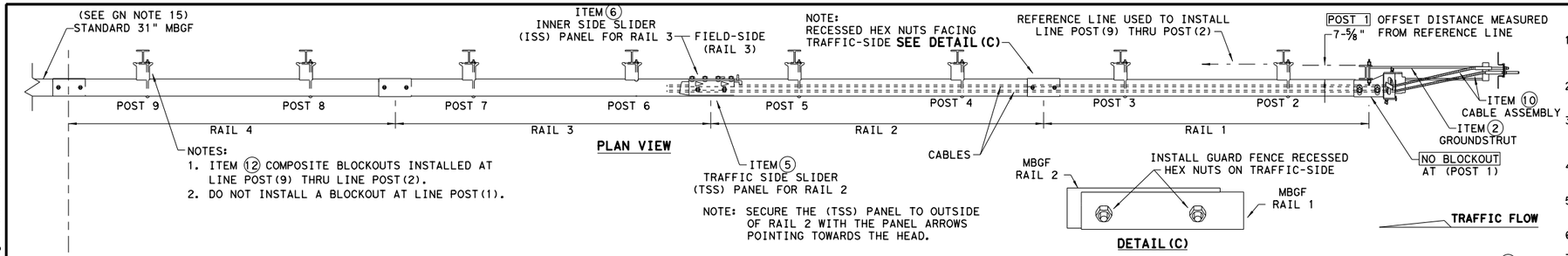
Design Division Standard

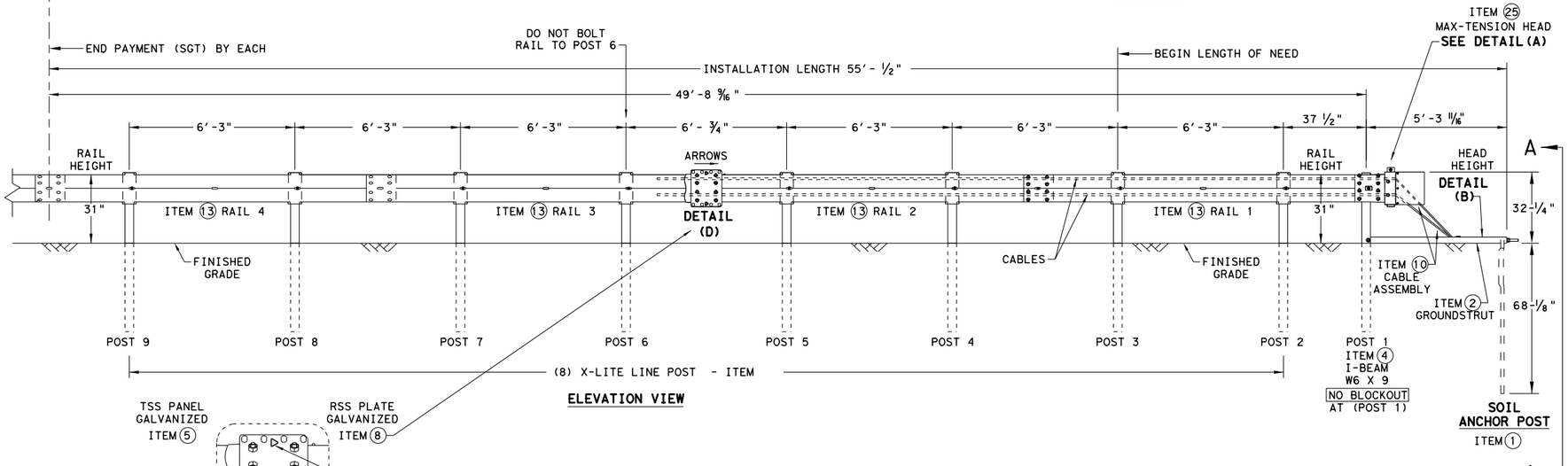
TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3

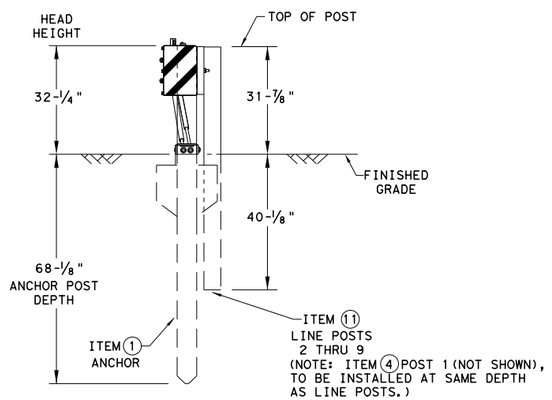
SGT(10S)31-16

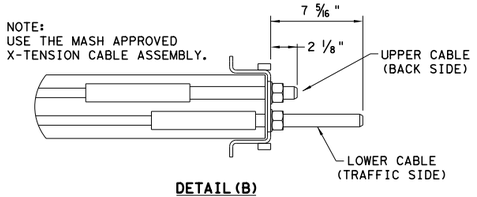
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0912	31	307,ETC	CR	
	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		77	

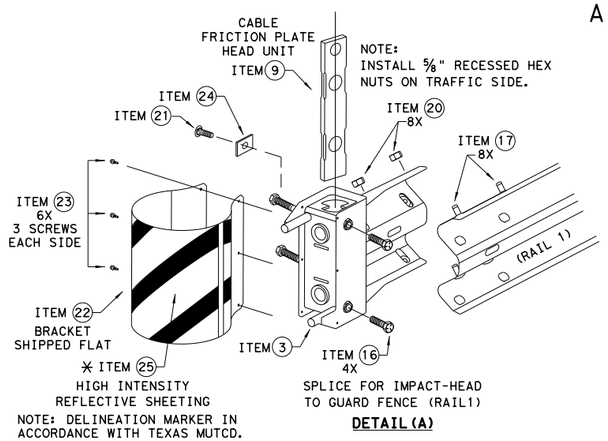
DATE:
FILE:











TRAFFIC FLOW

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

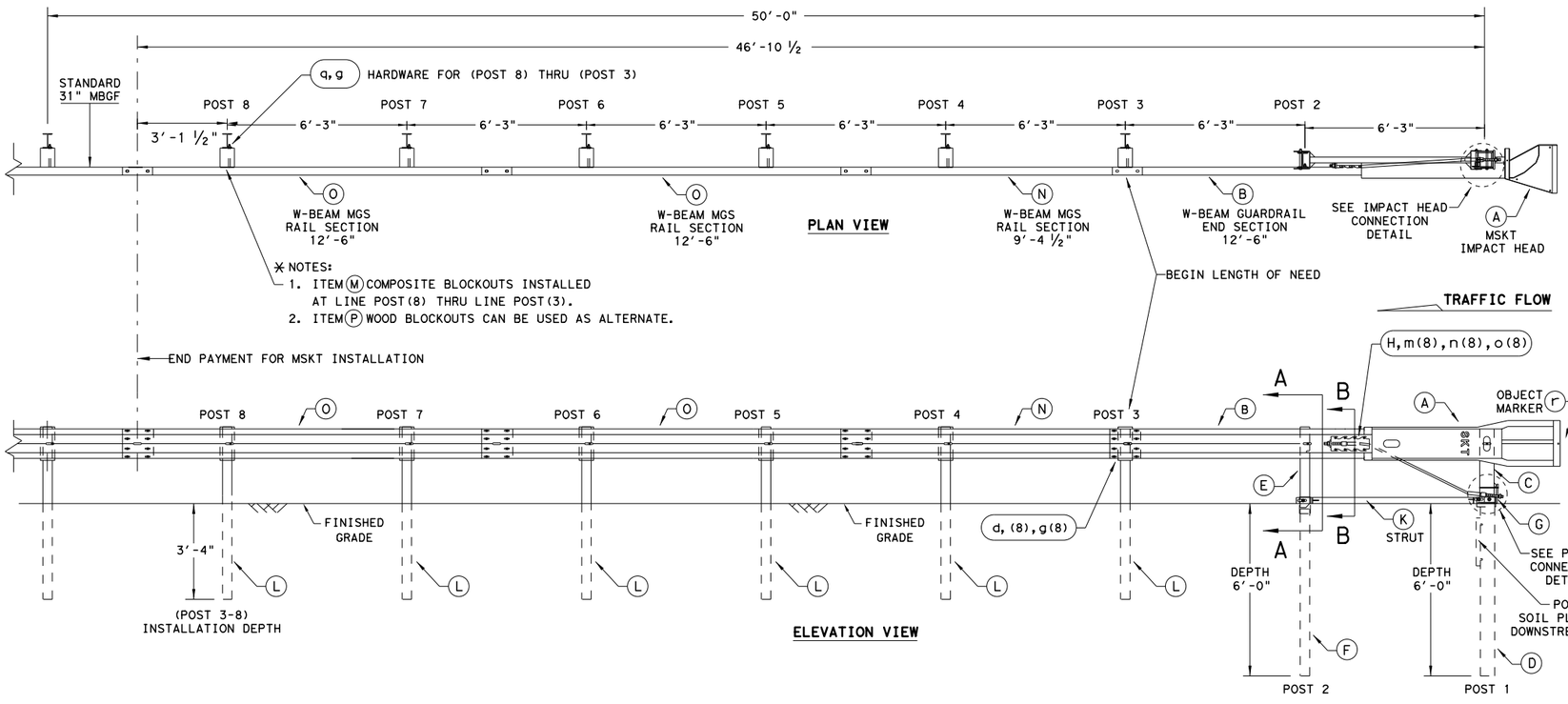
Texas Department of Transportation

Design Division Standard

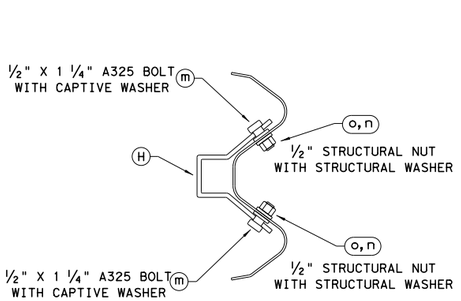
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

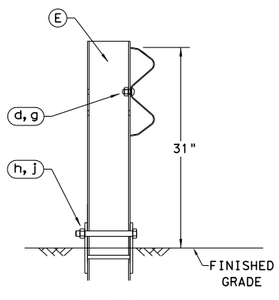
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		78

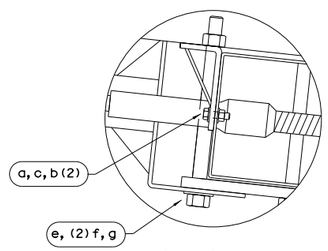
DATE:
FILE:

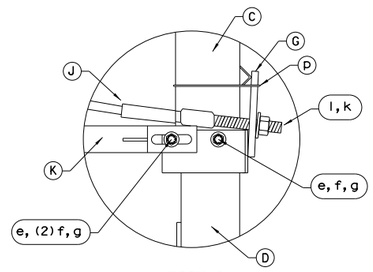


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



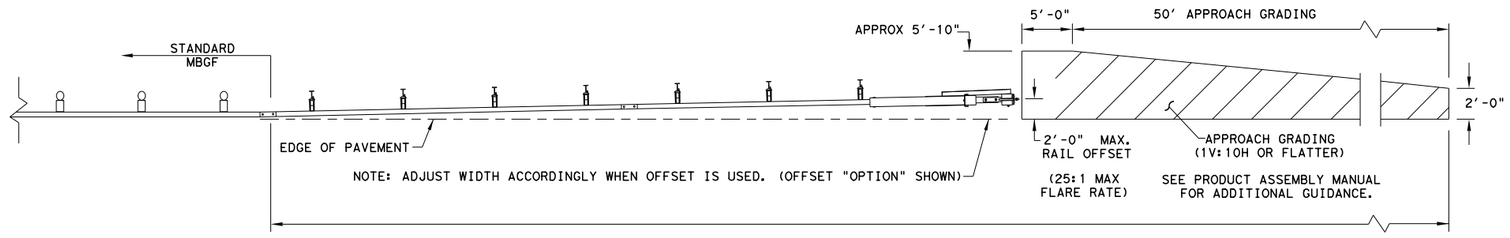






SEE NOTES: ✳

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

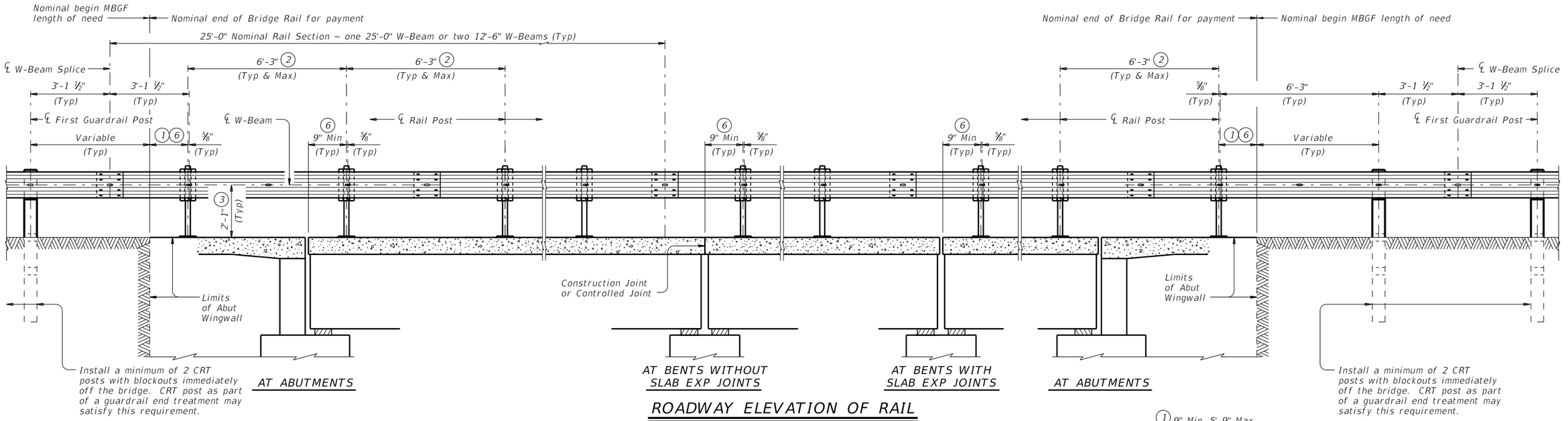
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		79

DATE:
FILE:



ROADWAY ELEVATION OF RAIL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 6'-3" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

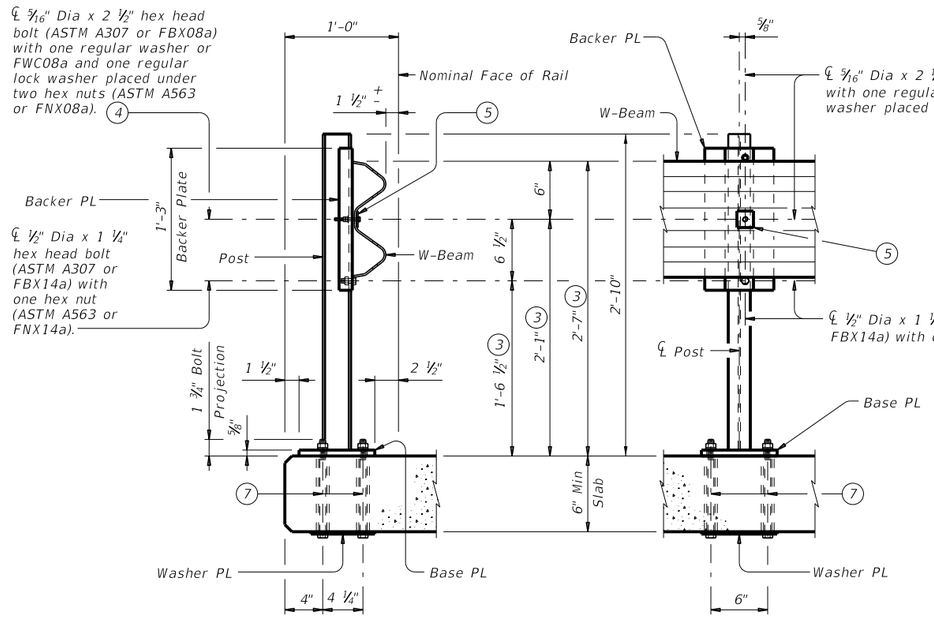
(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

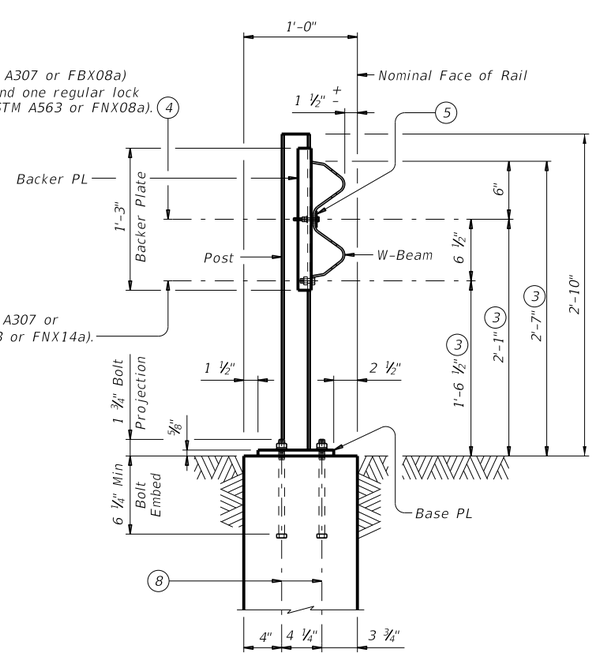


RAIL SECTION

TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

The use of this railing is restricted to speeds of 45 mph or less.

SHEET 1 OF 2

Texas Department of Transportation

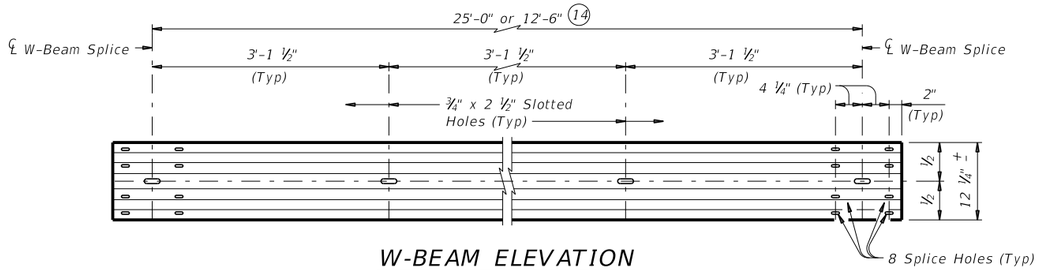
Bridge Division Standard

TRAFFIC RAIL

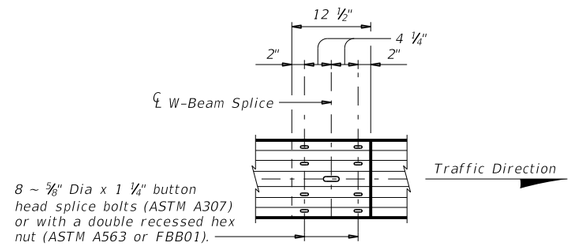
TYPE T631LS

FILE:	rlstd037-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0912	31	307,ETC	CR
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
		HOU	BRAZORIA		80

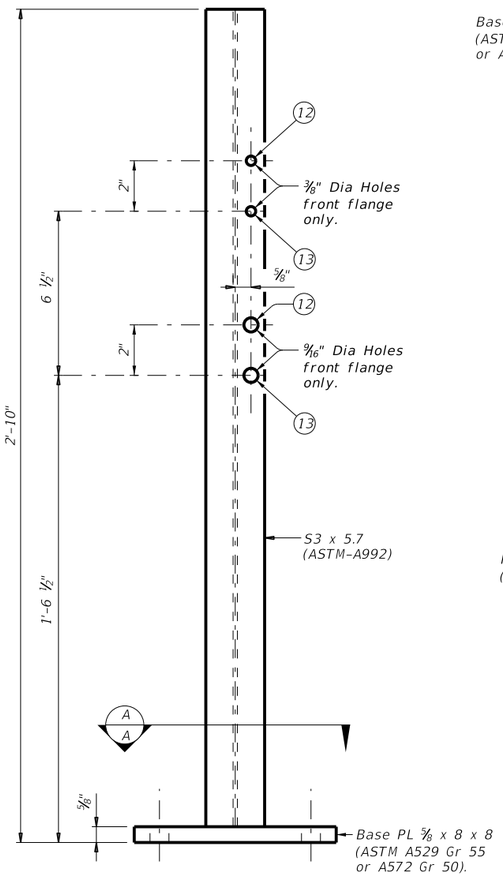
DATE:
FILE:



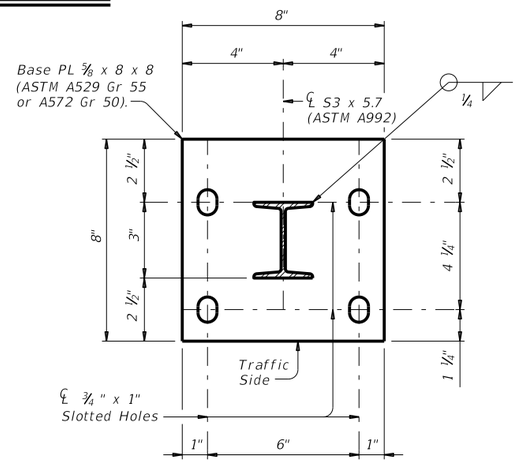
W-BEAM ELEVATION



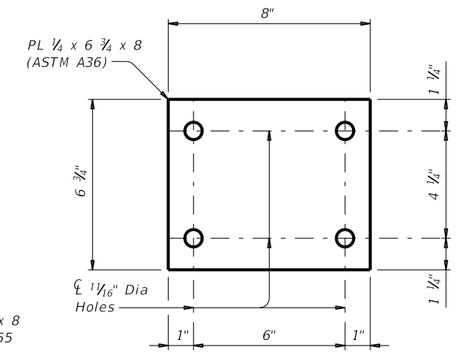
W-BEAM SPLICE ELEVATION



POST ELEVATION

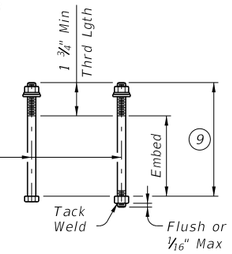


SECTION A-A



WASHER PLATE DETAIL

℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

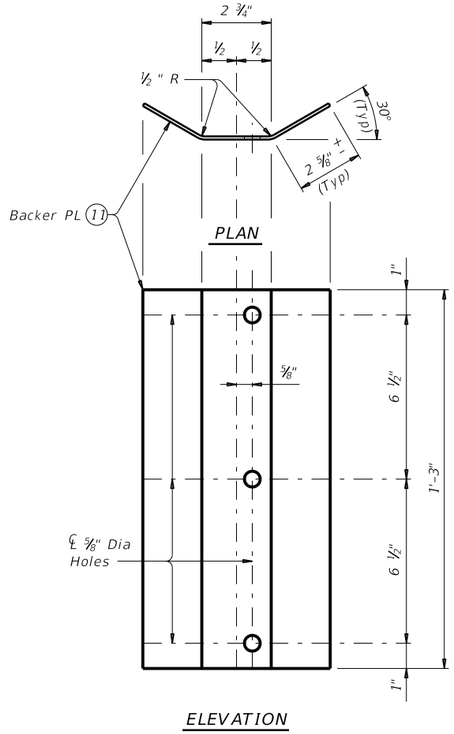
(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and/or guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is: SGT; or DAT plus 12.5' of MBGF, as applicable. Provide CRT posts as shown in "Roadway Elevation of Rail."

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 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."

W-beam must 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" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-2 criteria. This railing can be used for speeds of 45 mph and less.

This rail is designed to deflect approximately 2' to 2'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 13 plf total.

Texas Department of Transportation

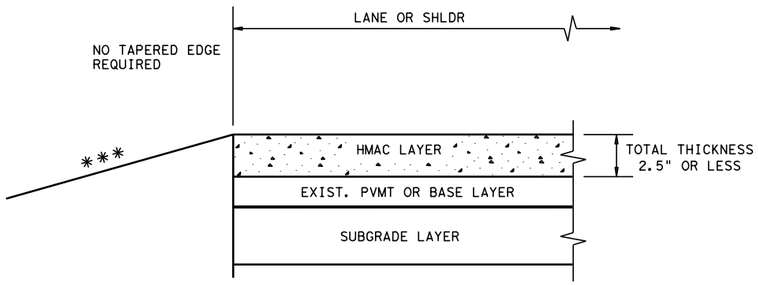
Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

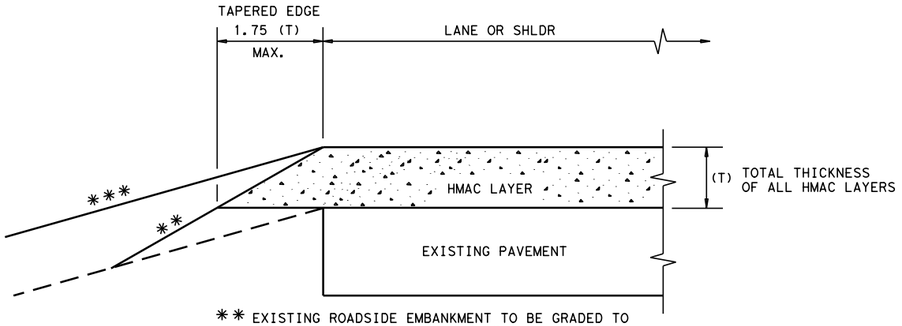
FILE: rlstd037-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		81

DATE:
FILE:



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

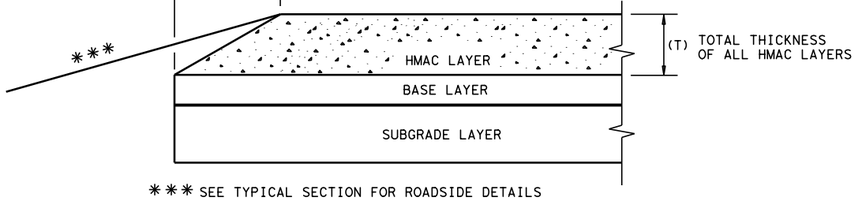
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

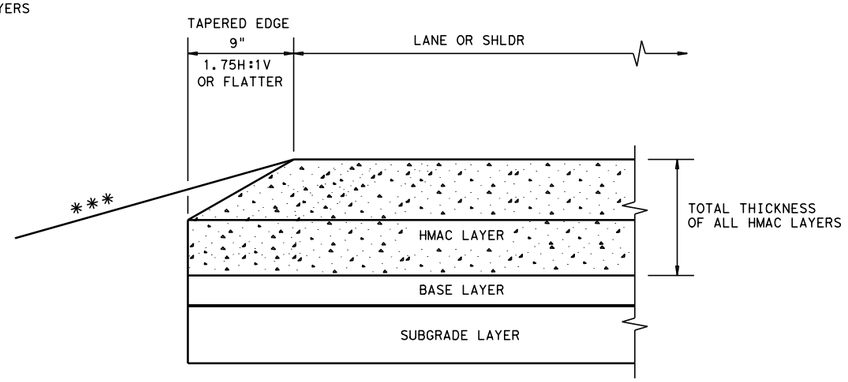
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		82

DATE:
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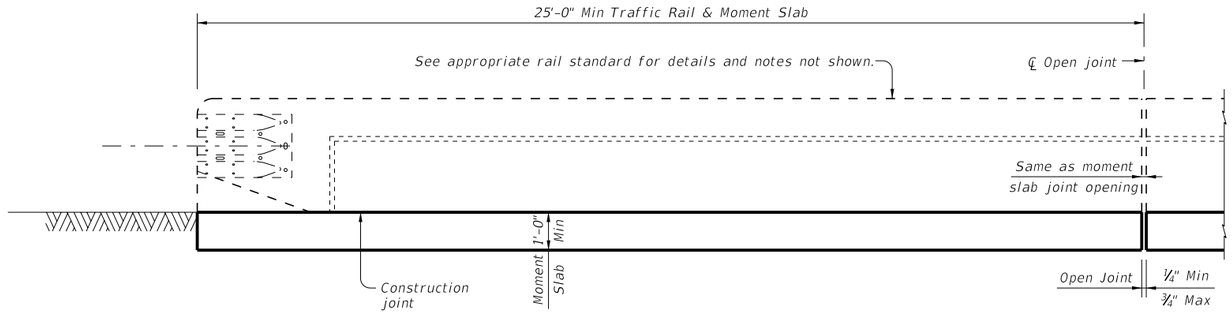
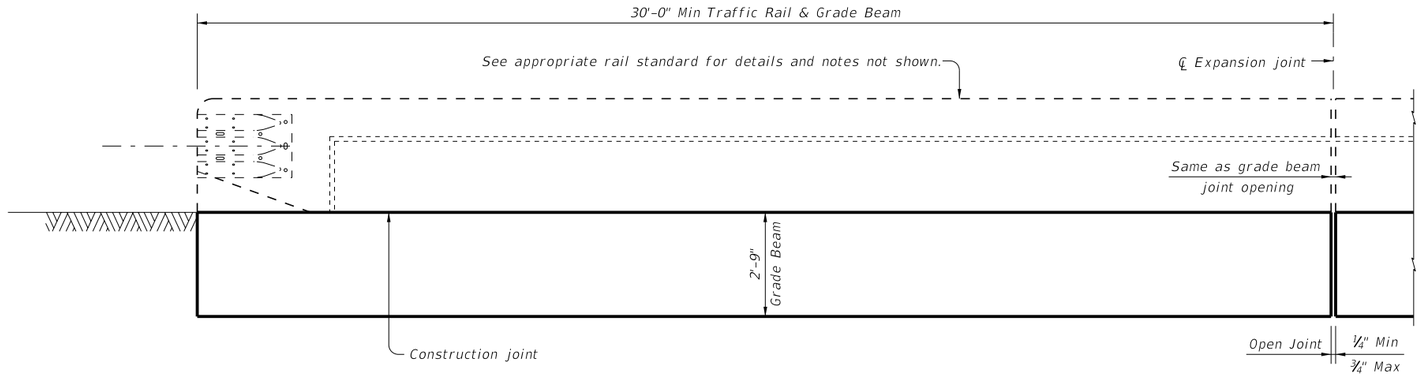


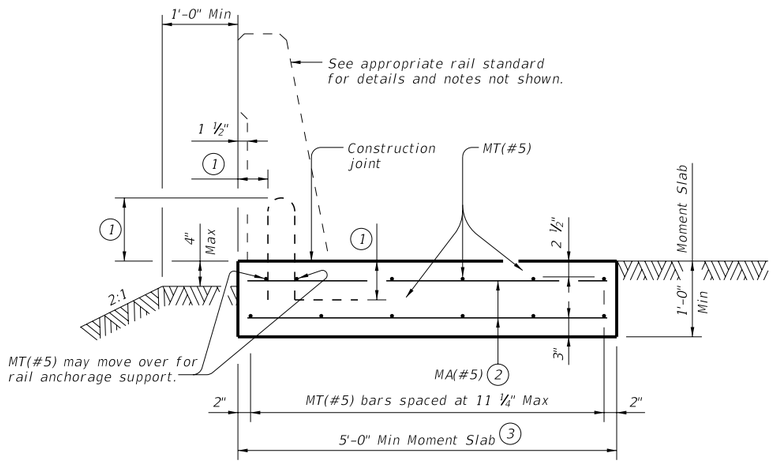
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



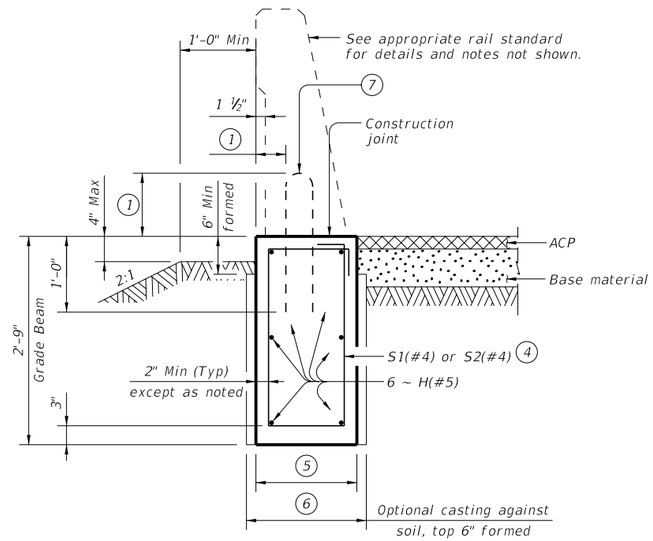
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



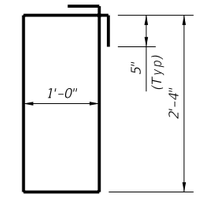
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

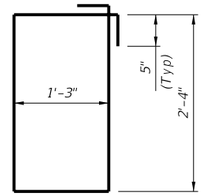
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.
   Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66.
   Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into traffic rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

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 required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for traffic rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

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

Texas Department of Transportation

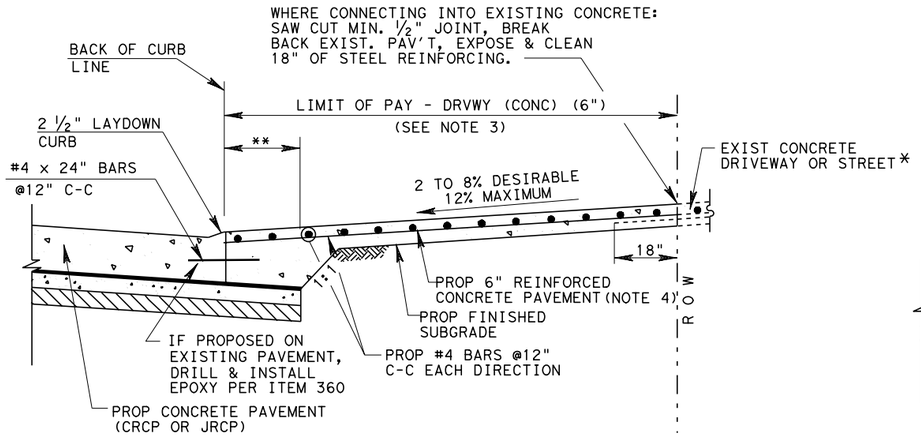
Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS

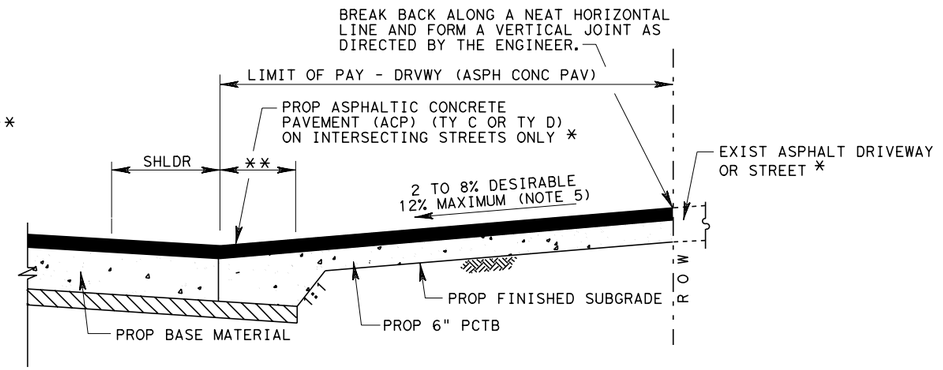
FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

TRF

FILE:	rlstd027-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0912	31	307,ETC	CR
07-20: Added moment slab with rail foundation lengths.		DIST	COUNTY		SHEET NO.
		HOU	BRAZORIA		83



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE
CURB AND GUTTER ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ PCTB AT ASPHALT ROADWAY

NOTES:

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

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

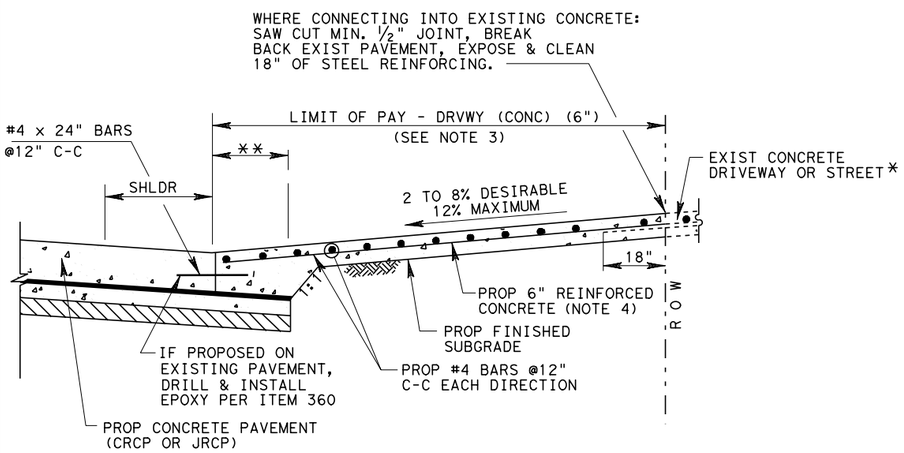
JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

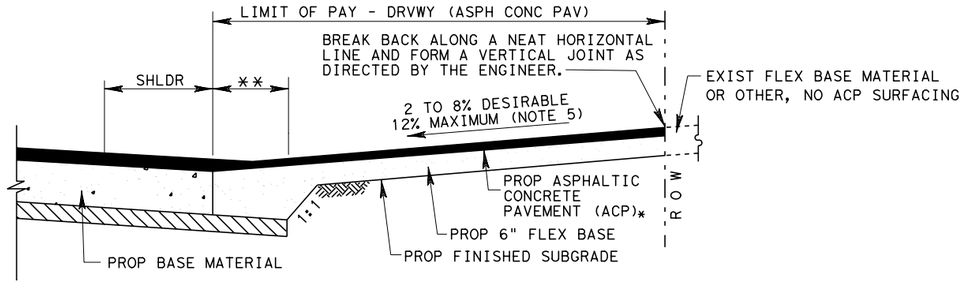
ACP- ASPHALTIC CONCRETE PAVEMENT

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

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ FLEX BASE AT ASPHALT ROADWAY

SHEET 1 OF 3

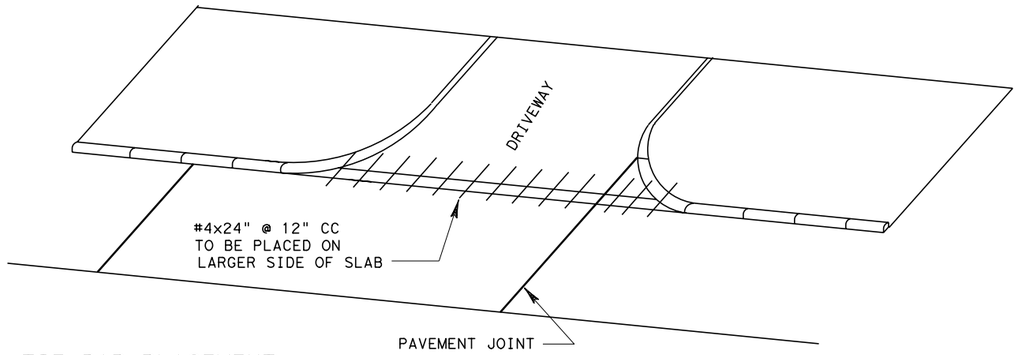
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

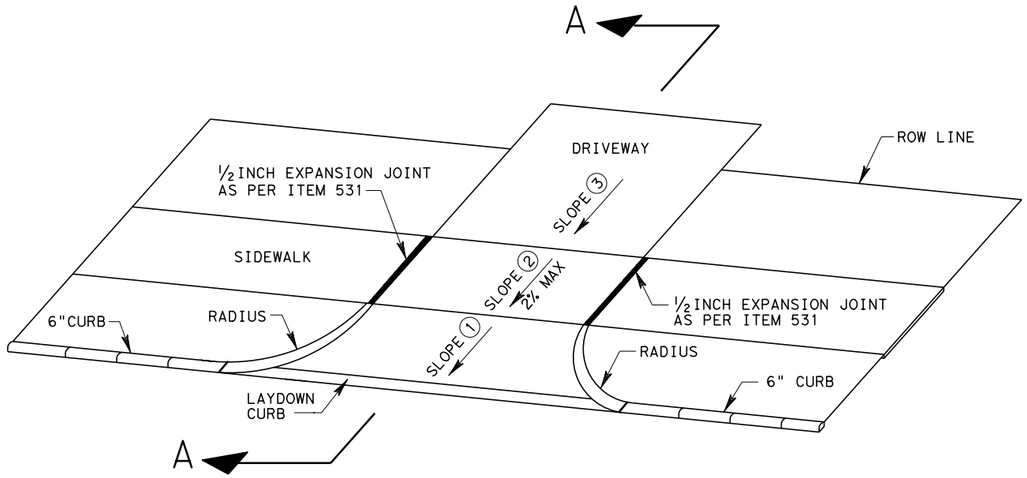
DD

FILE: STDB-8a.dgn	DN:	CK:	DW:	CK:
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6		84
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	0912	31	307,ETC	CR

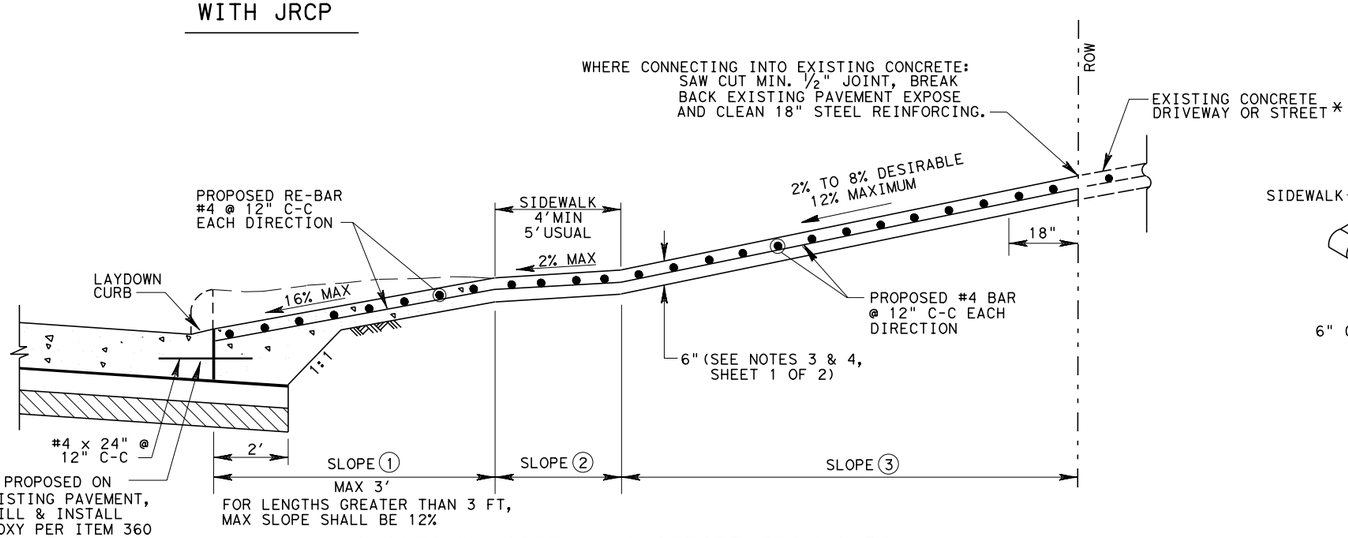
STDB8A



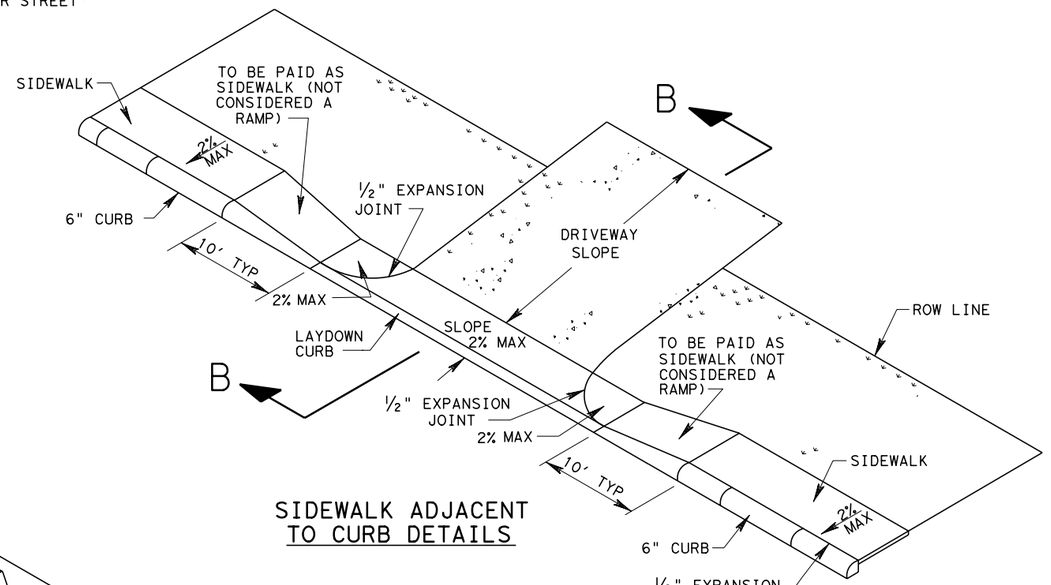
TIE BAR PLACEMENT WITH JRCP



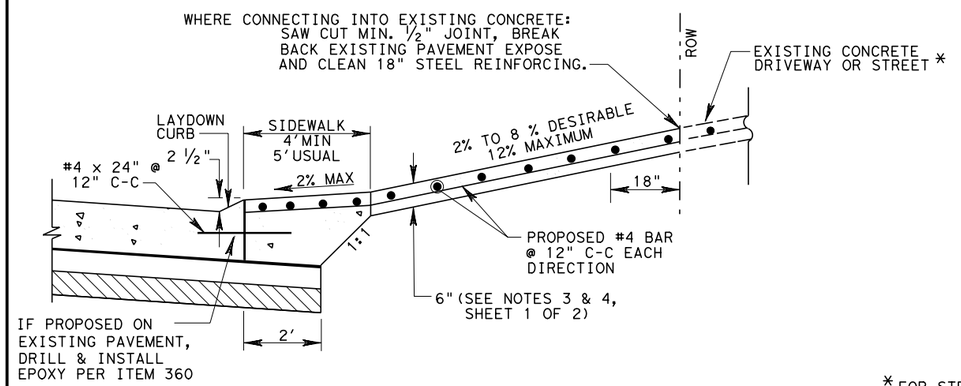
SIDEWALK OFFSET FROM CURB DETAILS



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

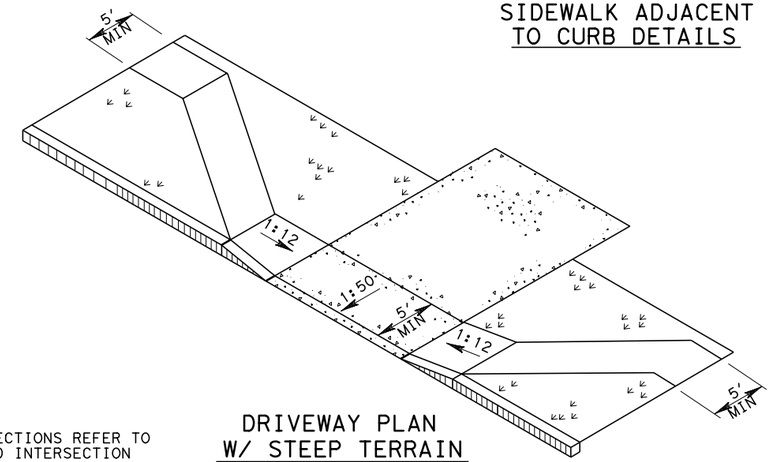


SIDEWALK ADJACENT TO CURB DETAILS



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

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



DRIVEWAY PLAN W/ STEEP TERRAIN

SHEET 2 OF 3

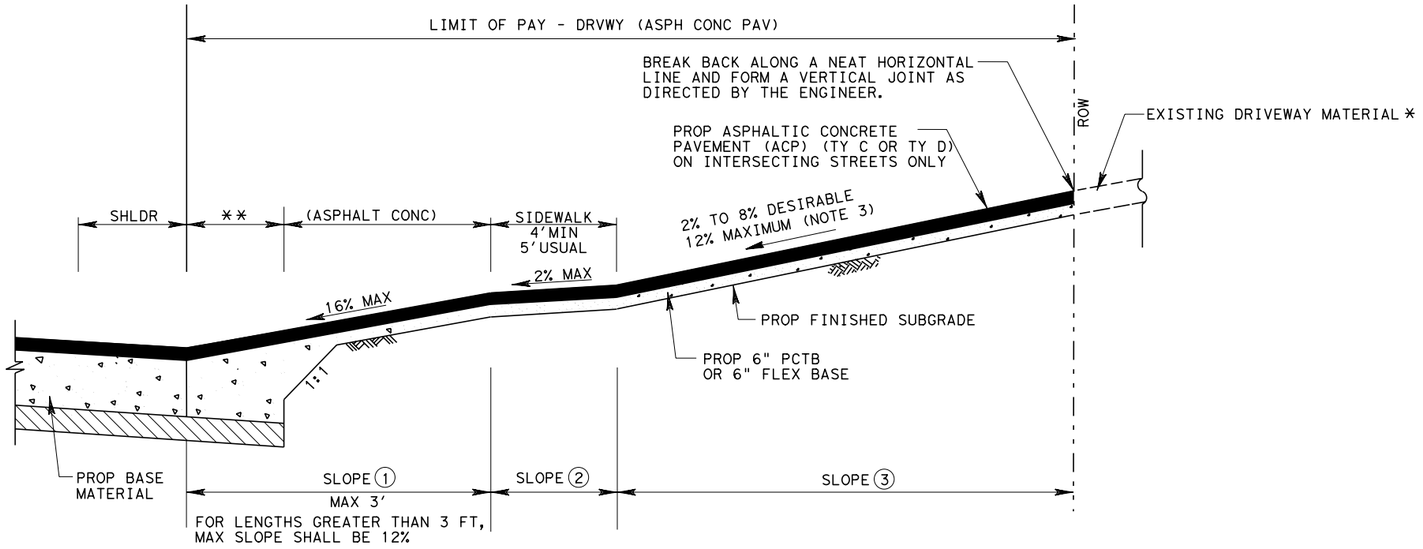
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

FILE: STDB-8b.dgn	DN:	CK:	DW:	CK:	
©TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	HOU	6			85
9/09 ADDED NOTE FOR ITEM 360.	COUNTY	CONTROL	SECT	JOB	HIGHWAY
11/15 ADDED NOTE FOR PCTB	BRAZORIA	0912	31	307,ETC	CR

STDB8B



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS OFFSET

NOTES:

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

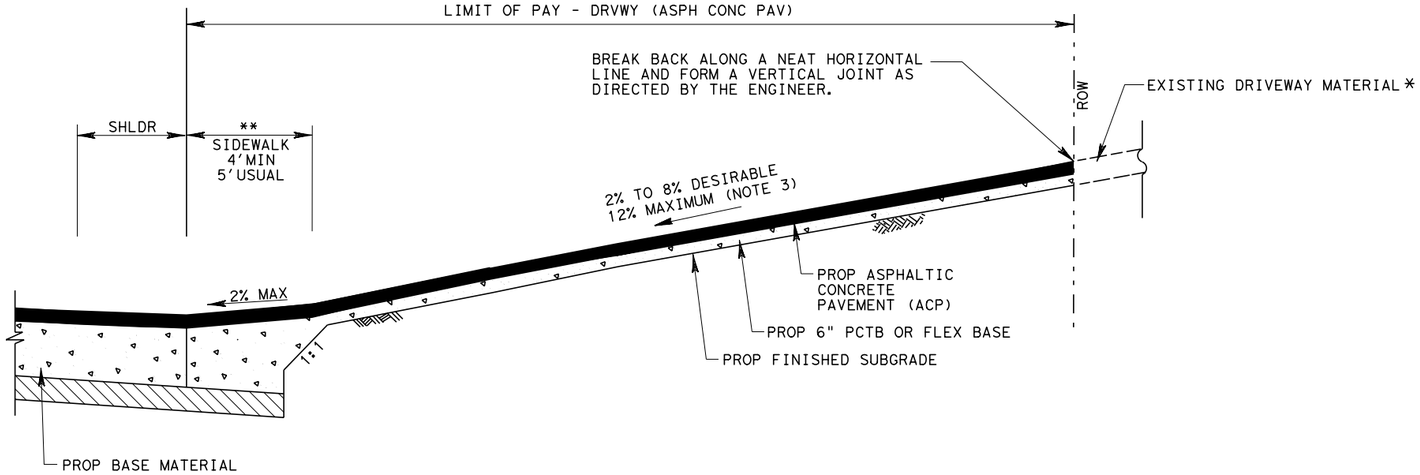
LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

ACP- ASPHALTIC CONCRETE PAVEMENT

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

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS ADJACENT

Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

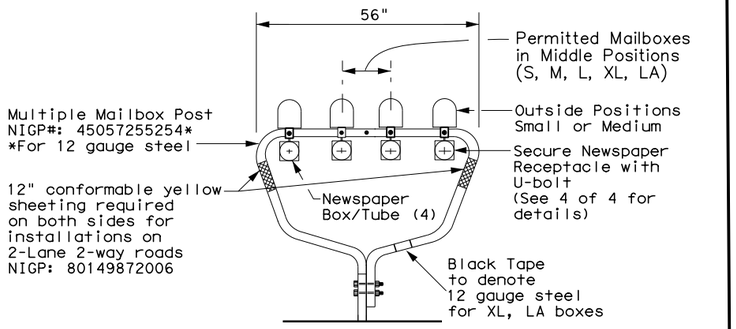
DD

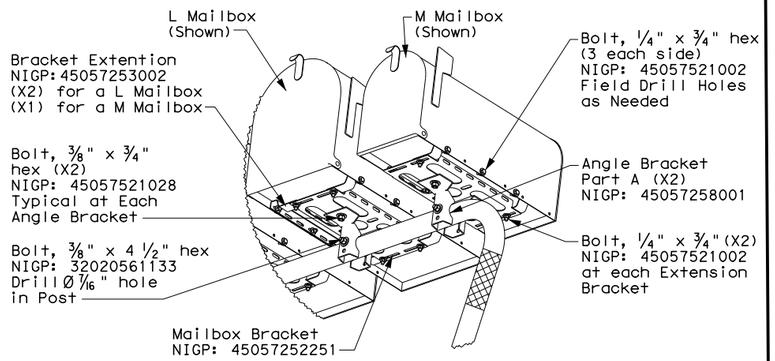
FILE: STDB-8c.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				86
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA		0912	31	307, ETC	CR

STDB8C

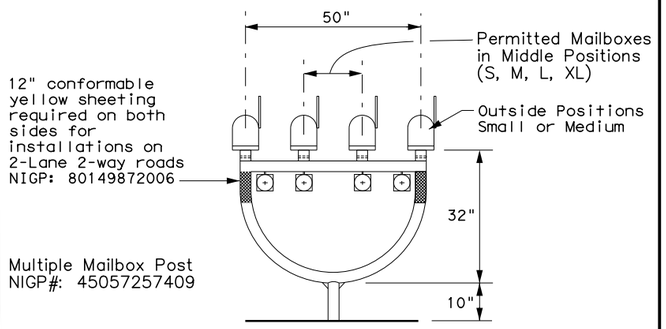
DATE:
FILE:

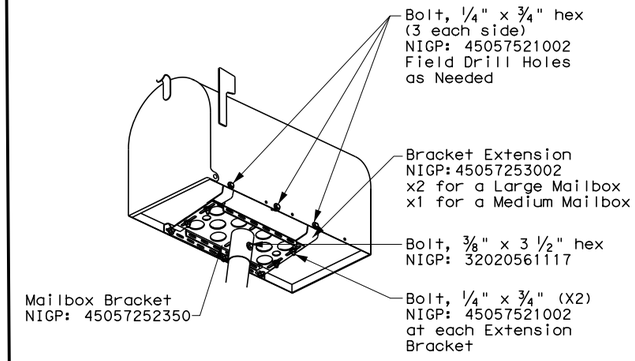
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

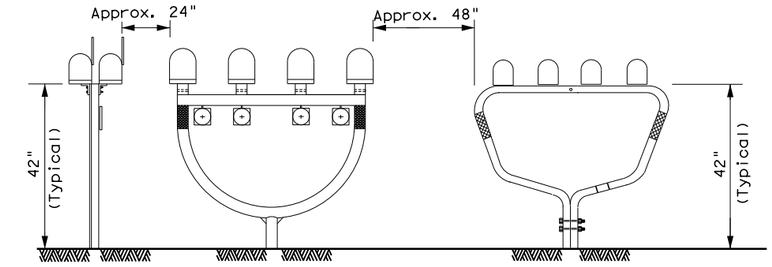
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

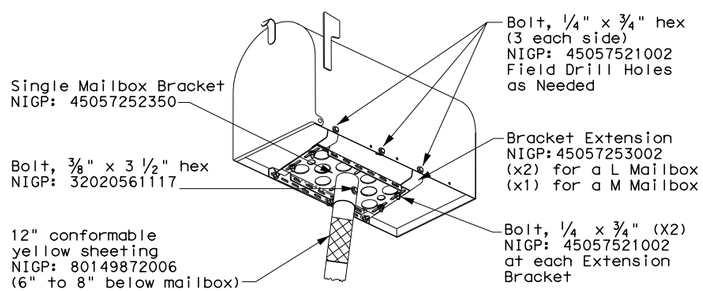
TYPICAL INSTALLATION MEASUREMENTS

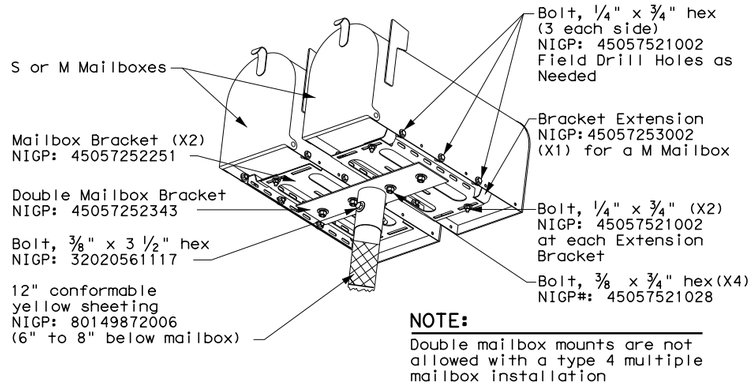


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

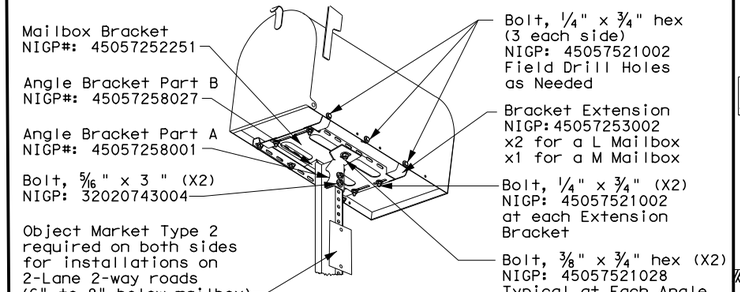


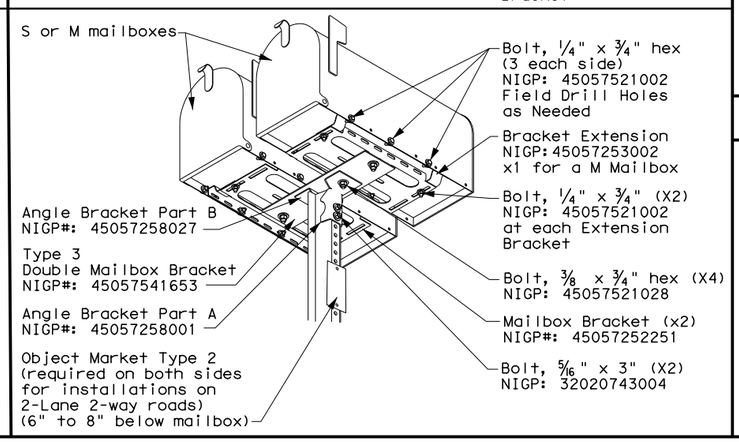


NOTE:

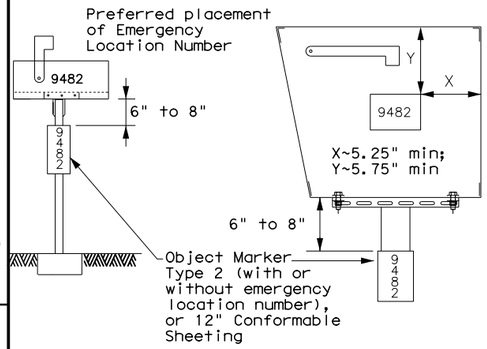
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

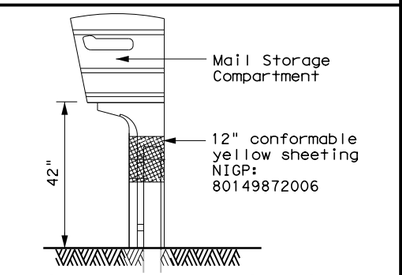


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		87

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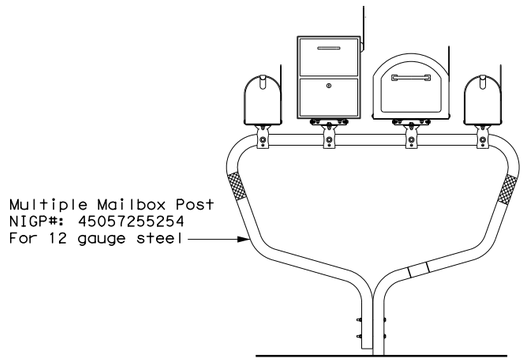
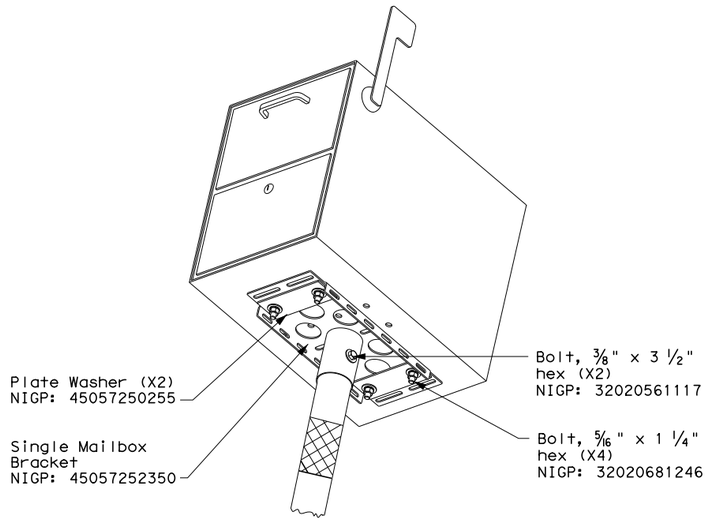
DATE:
FILE:

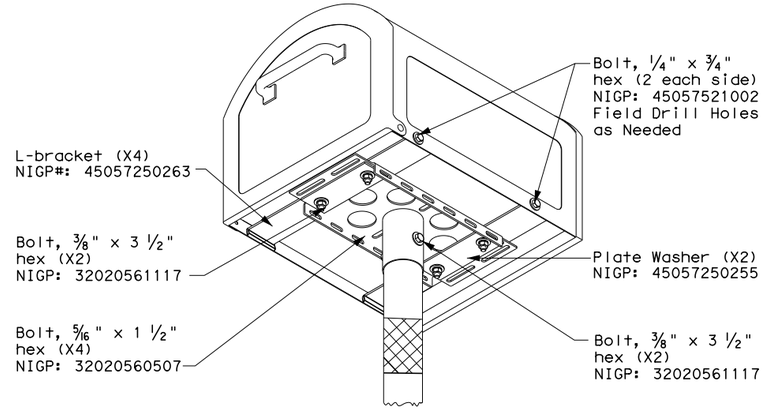
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

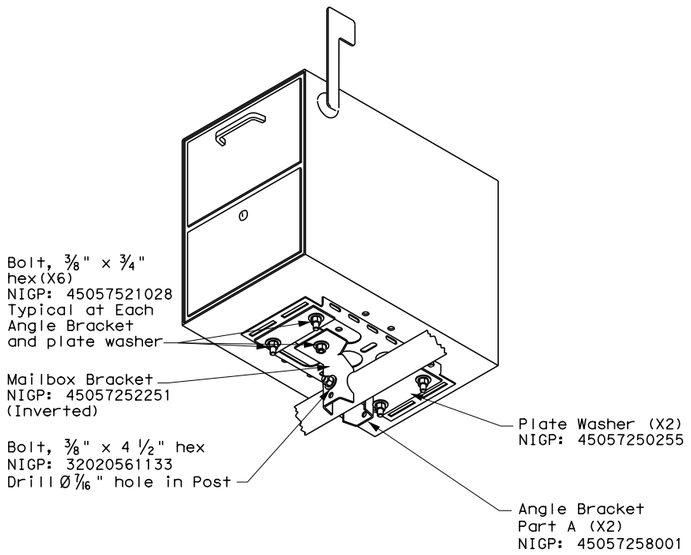


TYPE 2/4 - SINGLE XL MAILBOX

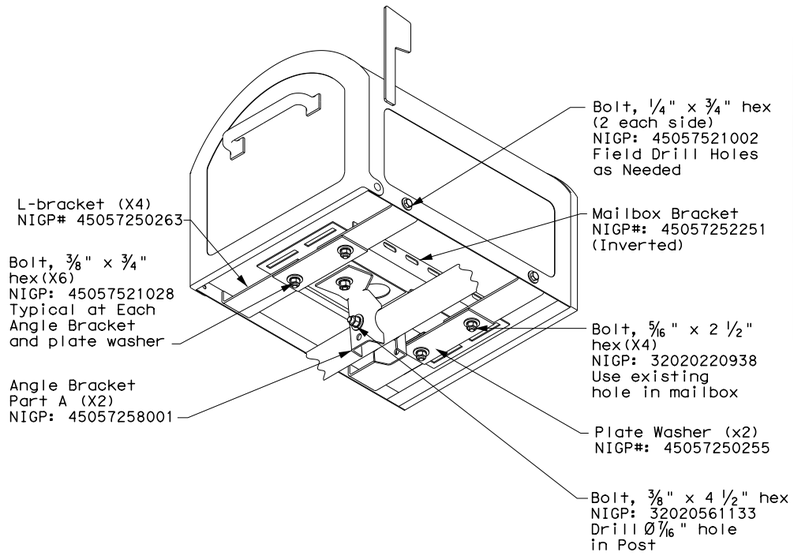


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

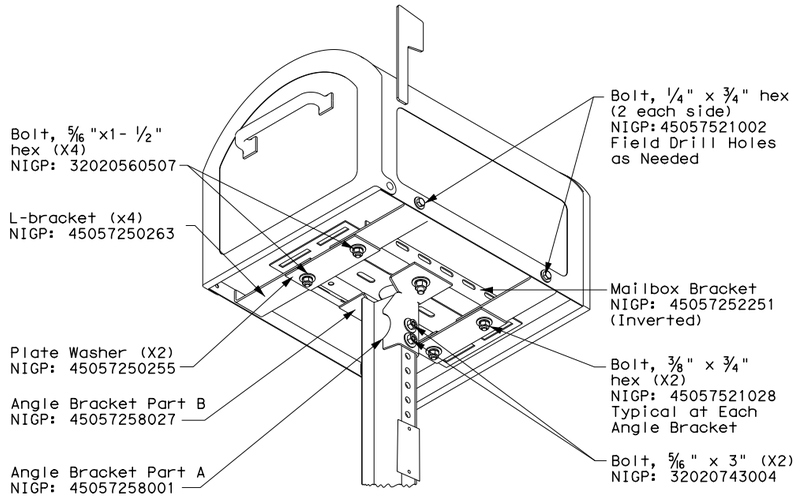
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



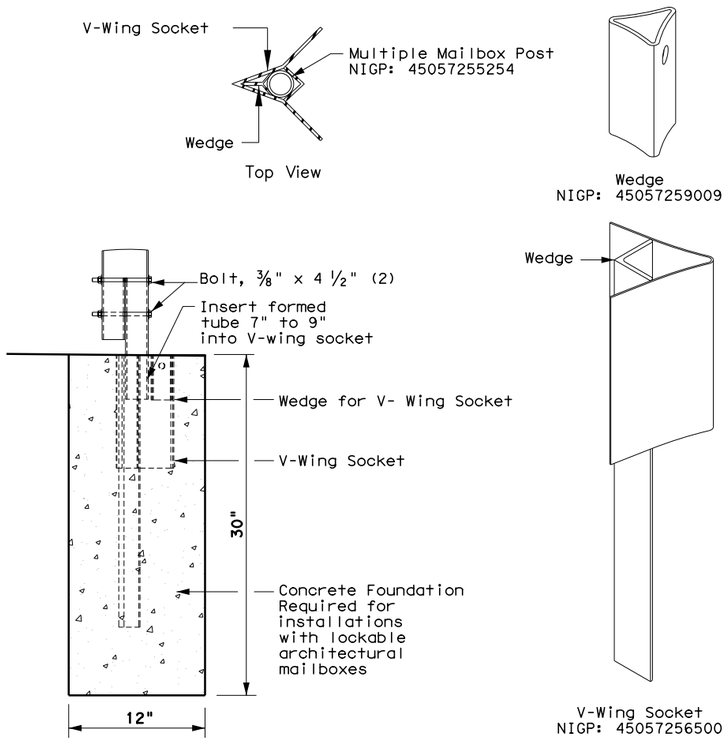
Texas Department of Transportation | Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

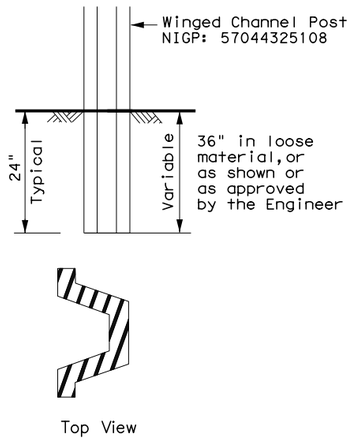
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		88

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

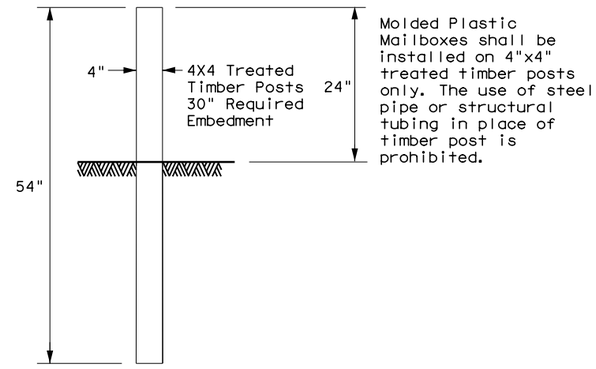


TYPE 3 - SUPPORT/FOUNDATION

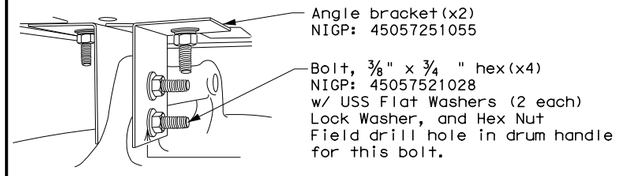


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

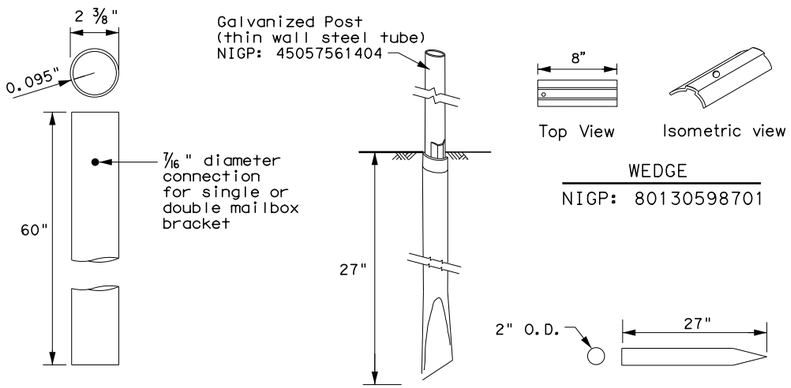


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

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

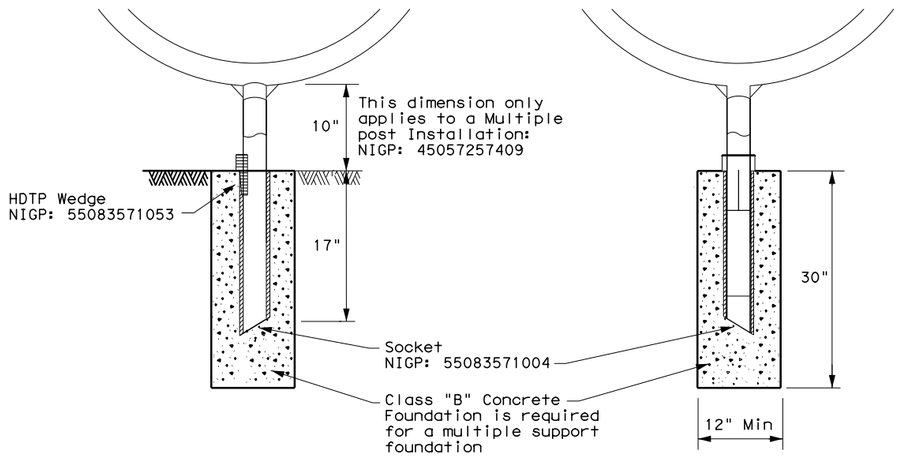
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

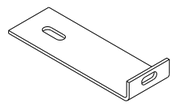
MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

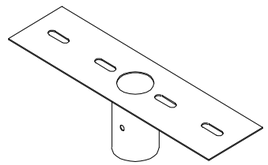
FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		89

DATE:
FILE:

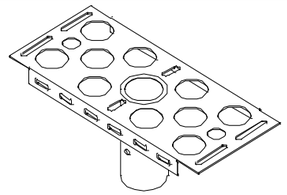
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: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



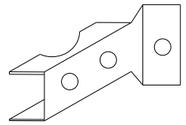
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



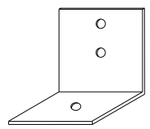
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



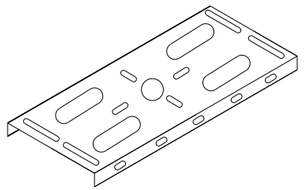
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



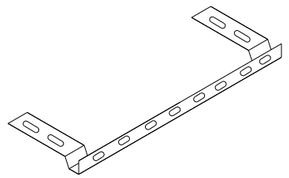
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



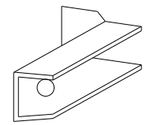
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



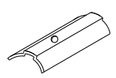
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



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



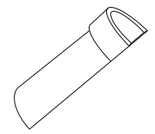
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



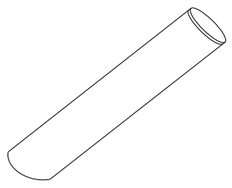
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

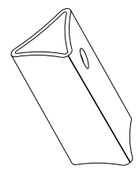


NIGP: 55083571053
Type 4 Mailbox Wedge

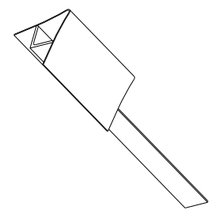


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

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

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

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

DATE:
FILE:

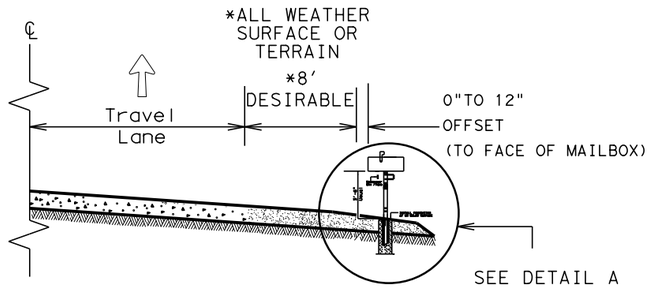
SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

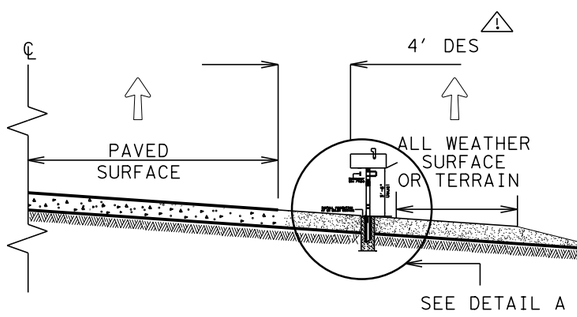
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

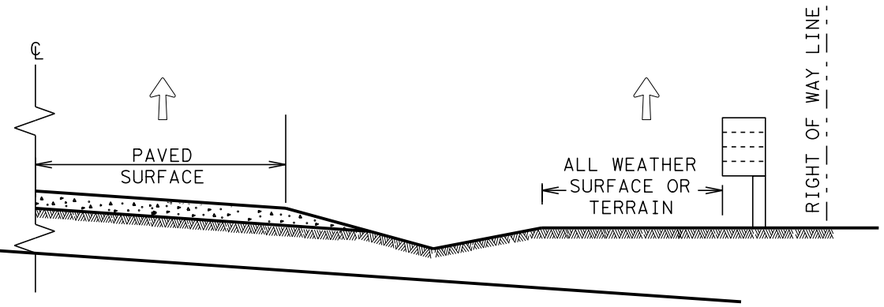
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		90



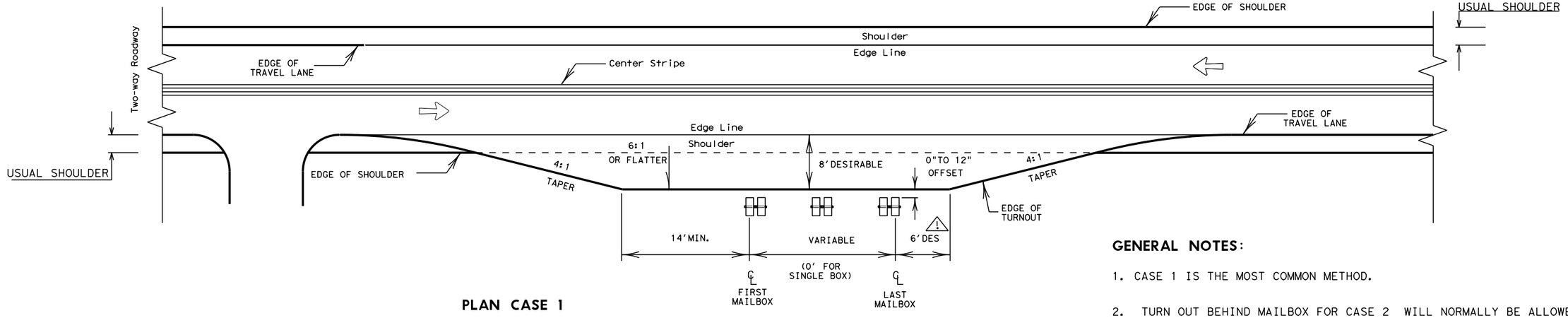
CASE 1. OFF TRAVEL WAY DELIVERY



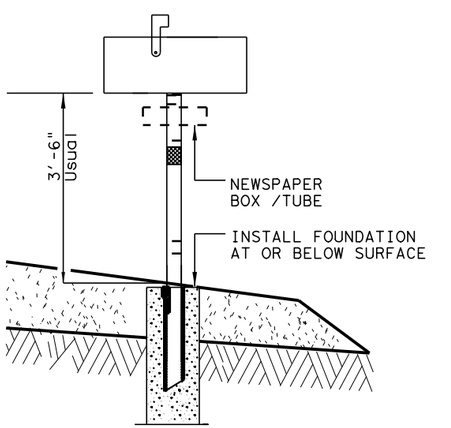
CASE 2. BACK SIDE DELIVERY



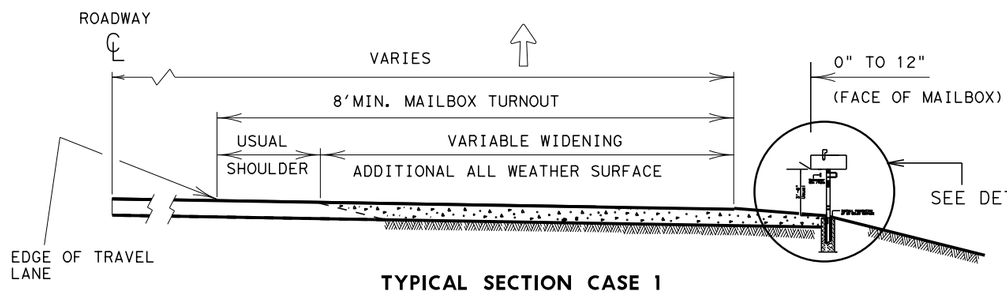
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

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

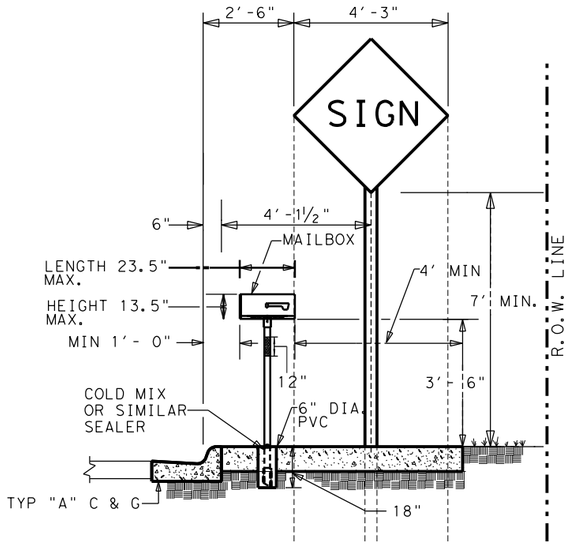
Texas Department of Transportation | *Maintenance Division Standard*

Guideline

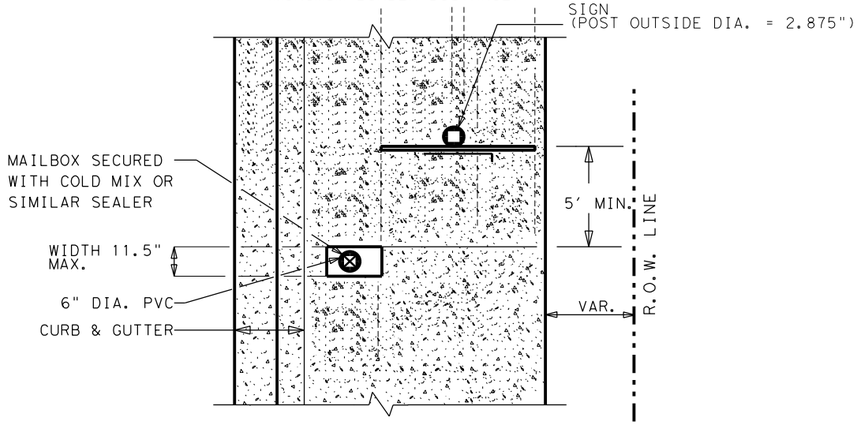
MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS
MB-14(2)

FILE: MB14(2).DGN	DN: JEO		CK:	DW: JEO		CK:
© TxDOT MAY 2014	CONT	SECT	JOB		HIGHWAY	
REVISIONS	091	231	307, ETC		CR	
DECEMBER 2012-NEW TXDOT TITLE BLOCK	DIST	COUNTY			SHEET NO.	
	HOU	BRAZORIA			91	

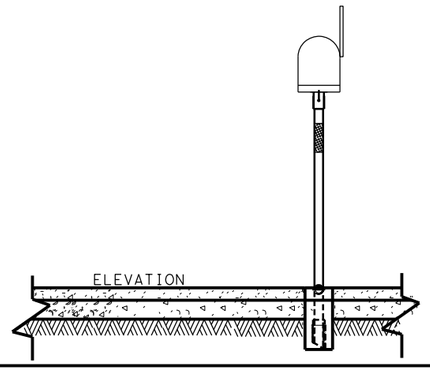
DATE:
FILE:

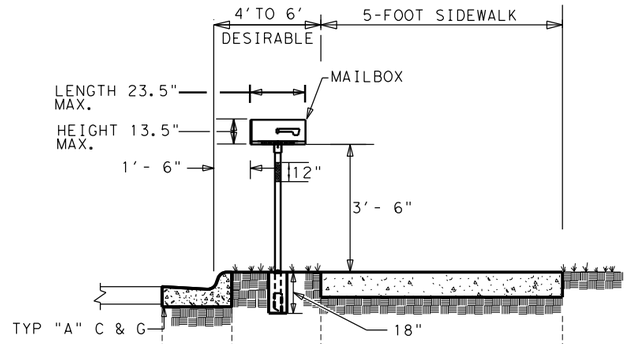


MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

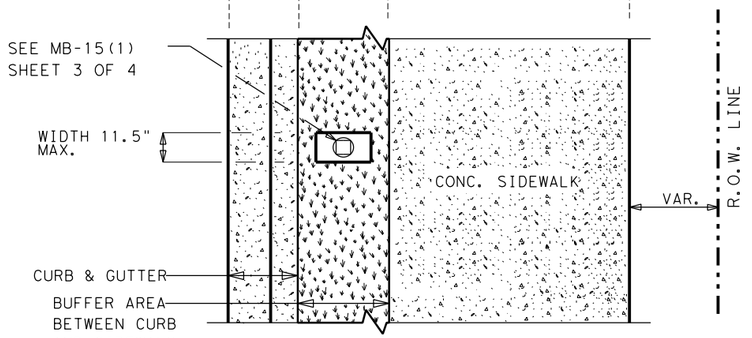


PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

DATE:
FILE:

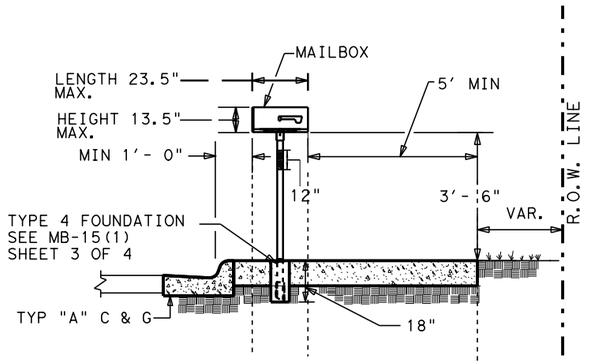
Texas Department of Transportation | Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

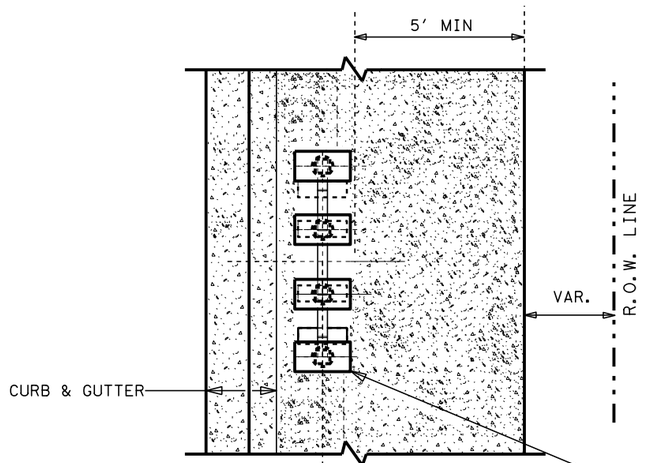
MB-14(2A)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307, ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		92

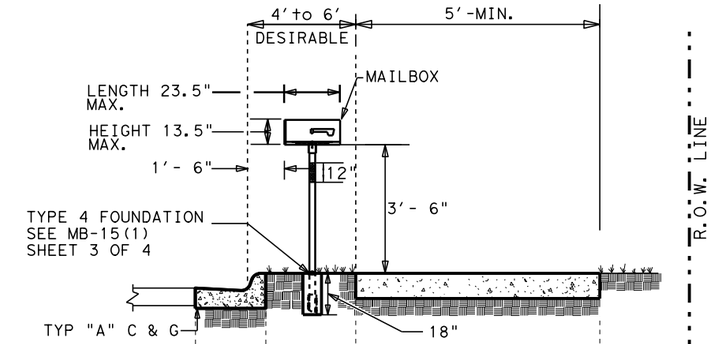
DATE:
FILE:



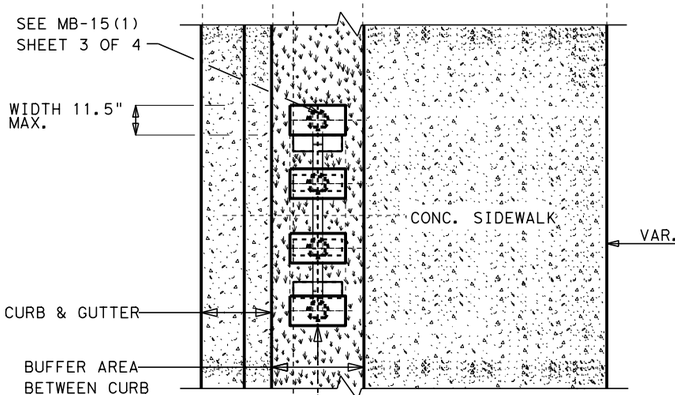
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



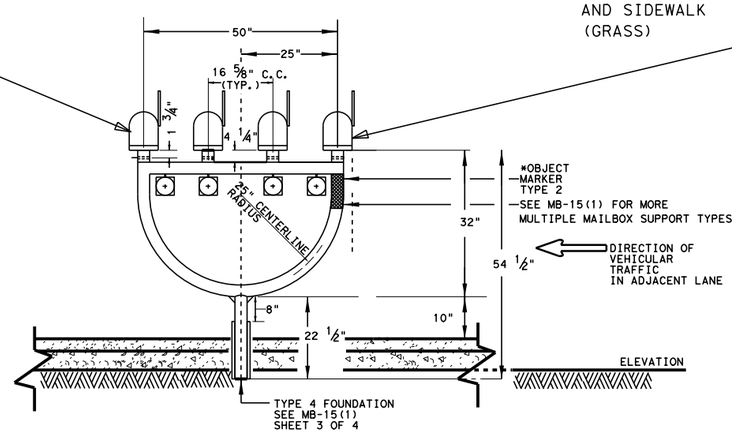
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



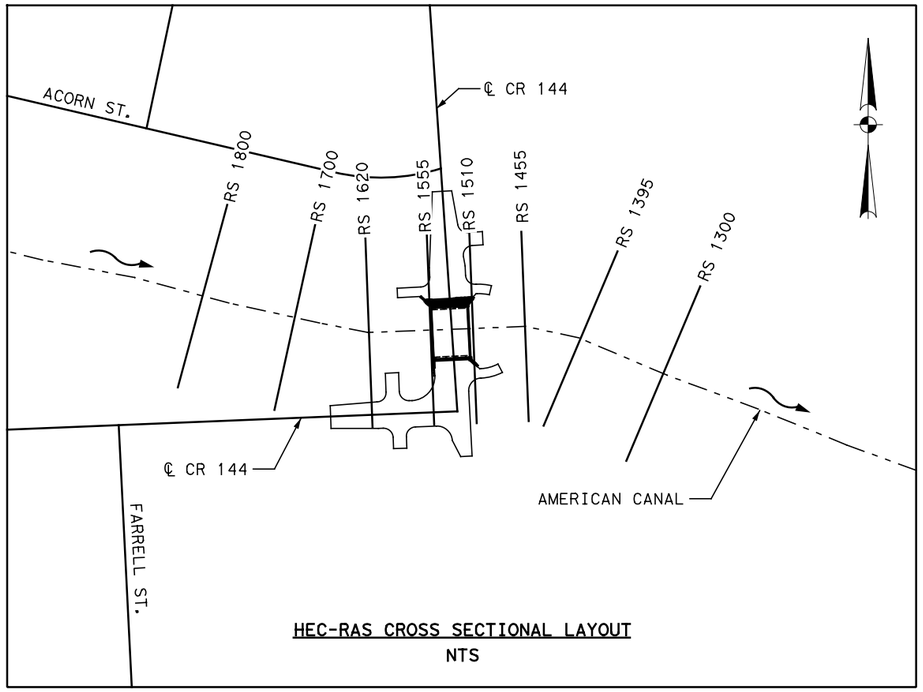
Texas Department of Transportation

Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

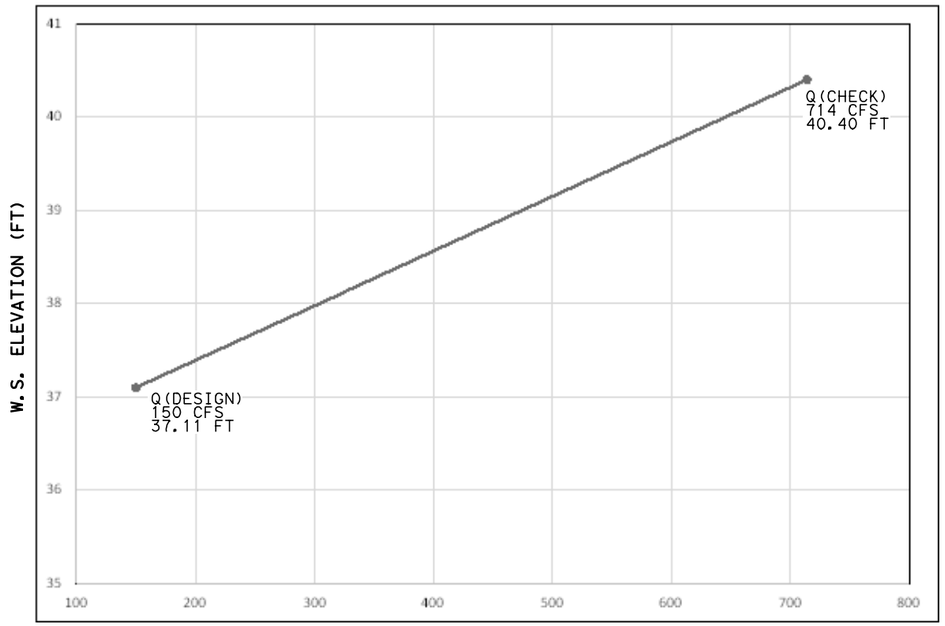
MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307, ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		93

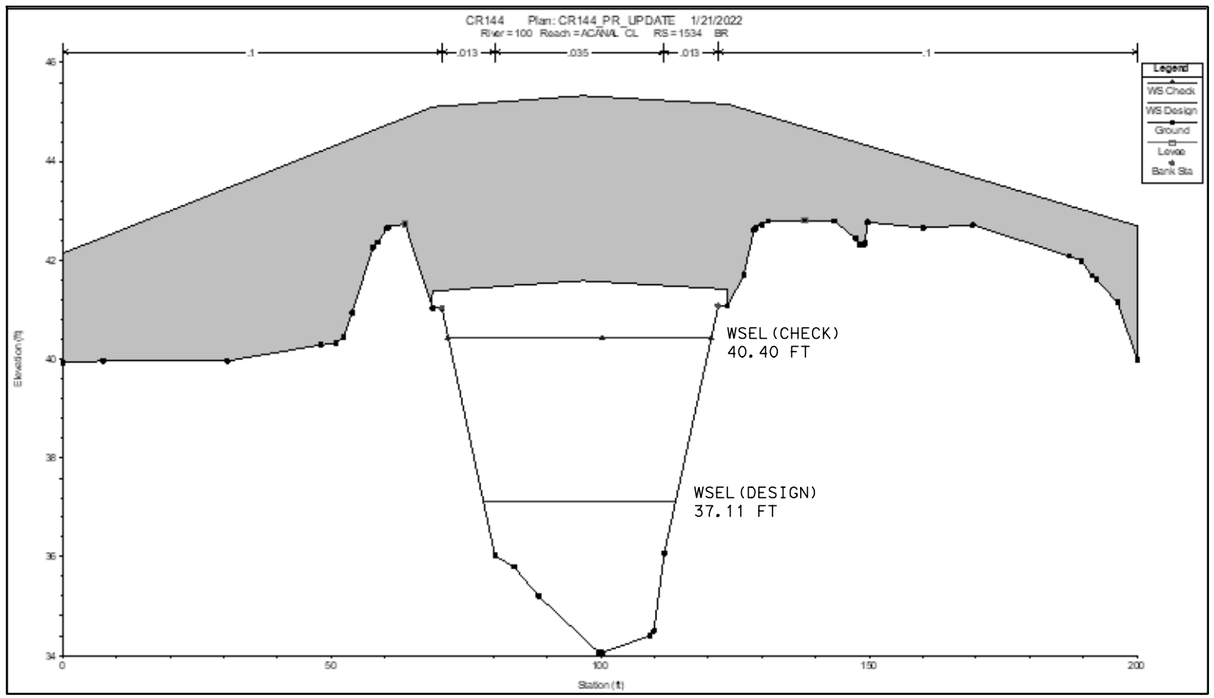


HEC-RAS CROSS SECTIONAL LAYOUT
NTS

RATING CURVE AT RS 1555



NBI: 12-020-0-AA06-74-303



HEC-RAS CROSS SECTION AT PROP BRIDGE - RS 1534 (UPSTREAM)
N.T.S.

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
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PROFESSIONAL ENGINEER

4/20/2022

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Texas Department of Transportation

CR 144

HYDRAULIC DATA SHEET (AMERICAN CANAL)

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		94

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144

HEC-RAS STATION	STORM FREQUENCY	FLOW (CFS)	COMPUTED WATER SURFACE ELEVATIONS (FT)			VELOCITY (FPS)	
			EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED
1900	DESIGN	150	37.54	37.51	-0.03	1.72	1.74
	CHECK	714	40.91	40.87	-0.04	3.01	3.03
1800	DESIGN	150	37.44	37.42	-0.02	1.88	1.90
	CHECK	714	40.79	40.75	-0.04	3.37	3.40
1700	DESIGN	150	37.34	37.31	-0.03	1.99	2.02
	CHECK	714	40.66	40.61	-0.05	3.63	3.67
1620	DESIGN	150	37.24	37.20	-0.04	2.16	2.19
	CHECK	714	40.55	40.49	-0.06	3.80	3.84
1555	DESIGN	150	37.15	37.11	-0.04	2.23	2.28
	CHECK	714	40.45	40.40	-0.05	3.86	3.91
1534	CR 144 BRIDGE AT AMERICAN CANAL						
1510	DESIGN	150	37.08	37.08	0.00	1.96	1.96
	CHECK	714	40.36	40.36	0.00	3.62	3.62
1455	DESIGN	150	37.04	37.04	0.00	1.83	1.83
	CHECK	714	40.30	40.30	0.00	3.49	3.49
1395	DESIGN	150	36.99	36.99	0.00	1.92	1.92
	CHECK	714	40.25	40.25	0.00	3.39	3.39
1300	DESIGN	150	36.89	36.89	0.00	2.01	2.01
	CHECK	714	40.12	40.12	0.00	3.63	3.63
1200	DESIGN	150	36.75	36.75	0.00	2.23	2.23
	CHECK	714	39.95	39.95	0.00	3.86	3.86
1100	DESIGN	150	36.61	36.61	0.00	2.22	2.22
	CHECK	714	39.82	39.82	0.00	3.80	3.80

HYDROLOGIC METHOD:

DESIGN FLOW IS ESTIMATED BASED ON GCWA REPORT ENTITLED "GULF COAST WATER AUTHORITY WATER AUDIT SUMMARY". THE REPORT CALCULATES THE LIMITING CAPACITY OF THE AMERICAN CANAL AT CR 144 AS 97 MGD (150 CFS).

CHECK FLOW WAS DETERMINED BASED ON THE CANAL CHANNEL CROSS SECTION, LONGITUDINAL SLOPE, AND DEPTH OF WATER SURFACE ELEVATION WITH 1 FT FREEBOARD FROM LOW CHORD ELEVATION ON EXISTING BRIDGE.

HYDRAULIC METHOD:

HEC-RAS 6.1.0 WAS USED FOR BRIDGE HYDRAULIC ANALYSIS.

NORMAL DEPTH USED FOR THE DOWNSTREAM BOUNDARY CONDITIONS, SLOPE= 0.0014 FT/FT FOR EXISTING AND PROPOSED CONDITIONS.

NOTES:

1. THE PROJECT LIES IN A FEMA DESIGNATED ZONE "X" FLOODPLAIN, FEMA FIRM PANEL NUMBER 48039C0135K, EFFECTIVE DATE DECEMBER 30,2020.
2. THE COORDINATE SYSTEM IS HORIZONTAL DATUM NAD83(2011) AND VERTICAL DATUM IS NAVD(1988).
3. DETAILED HYDROLOGIC AND HYDRAULIC ANALYSIS AND RESULTS ARE PROVIDED IN DRAINAGE REPORT - CR 144 AT AMERICAN CANAL, PREPARED BY CIVILCORP, DATED APRIL 2022.

NBI: 12-020-0-AA06-74-303

STATE OF TEXAS
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4/20/2022

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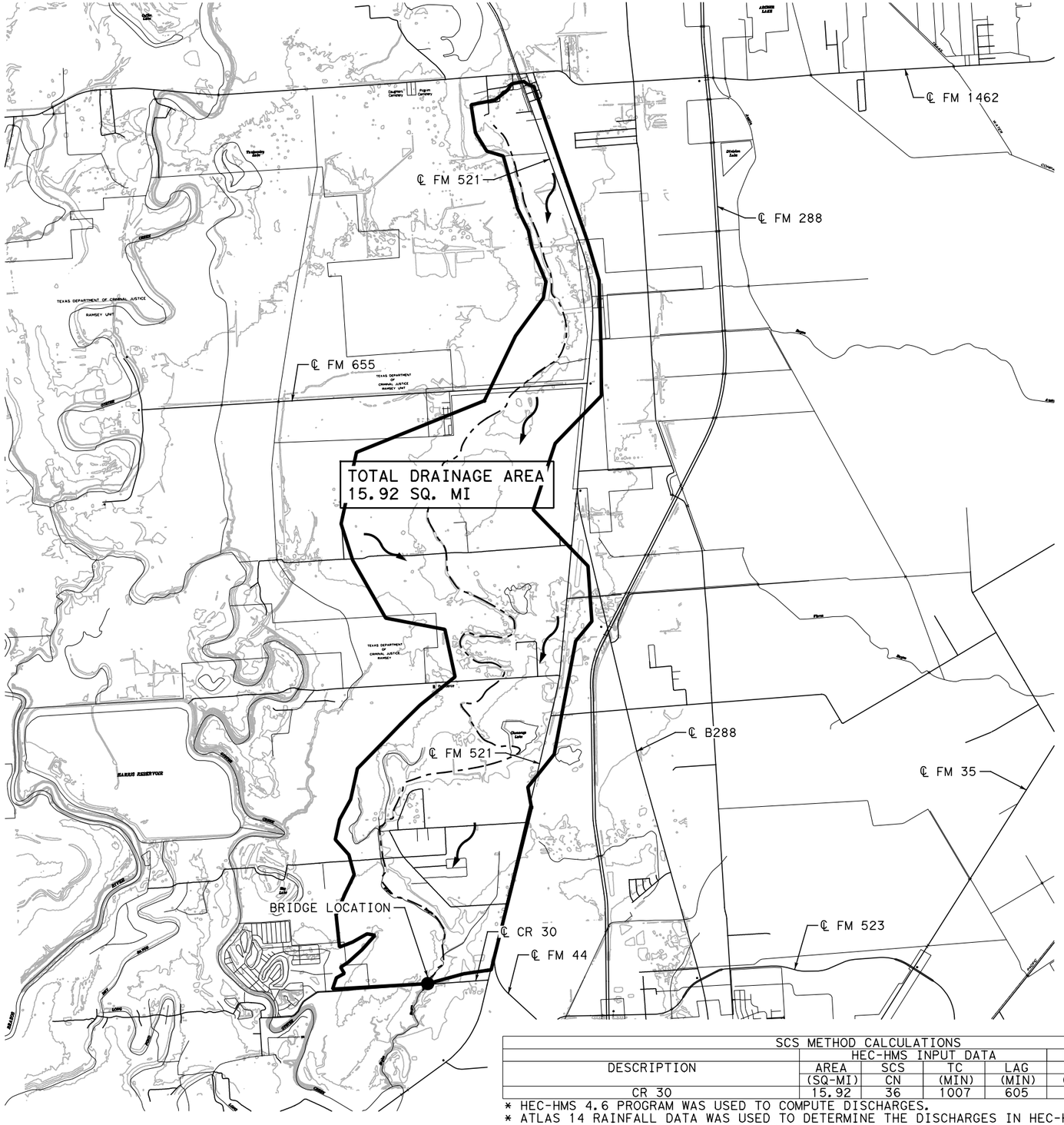
Texas Department of Transportation

CR 144

HYDRAULIC DATA SHEET (AMERICAN CANAL)

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			95
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



LEGEND:

- STREAM CENTERLINE
- ROADWAY CENTERLINE
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW

NOTES:

1. DATA PRESENTED FROM DRAINAGE REPORT FOR CR 30 AT STYLES BAYOU, PREPARED BY CIVILCORP, DATED APRIL 2022.
2. 5 FT CONTOURS OBTAINED FROM TNRIS UPPER COAST LIDAR, 2018, NAVD88.

SCS METHOD CALCULATIONS							
DESCRIPTION	HEC-HMS INPUT DATA				HEC-HMS OUTPUT DATA		
	AREA (SQ-MI)	SCS CN	TC (MIN)	LAG (MIN)	Q10 (CFS)	Q25 (CFS)	Q100 (CFS)
CR 30	15.92	36	1007	605	590	1480	3374

* HEC-HMS 4.6 PROGRAM WAS USED TO COMPUTE DISCHARGES.
* ATLAS 14 RAINFALL DATA WAS USED TO DETERMINE THE DISCHARGES IN HEC-HMS MODEL
* BASED ON NRCS RECOMMENDATIONS, BALANCED STORM METHOD (FREQUENCY STORM) WAS USED TO DETERMINE DISCHARGES.

STATE OF TEXAS
HUMBERTO CONTRERAS
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4/20/2022

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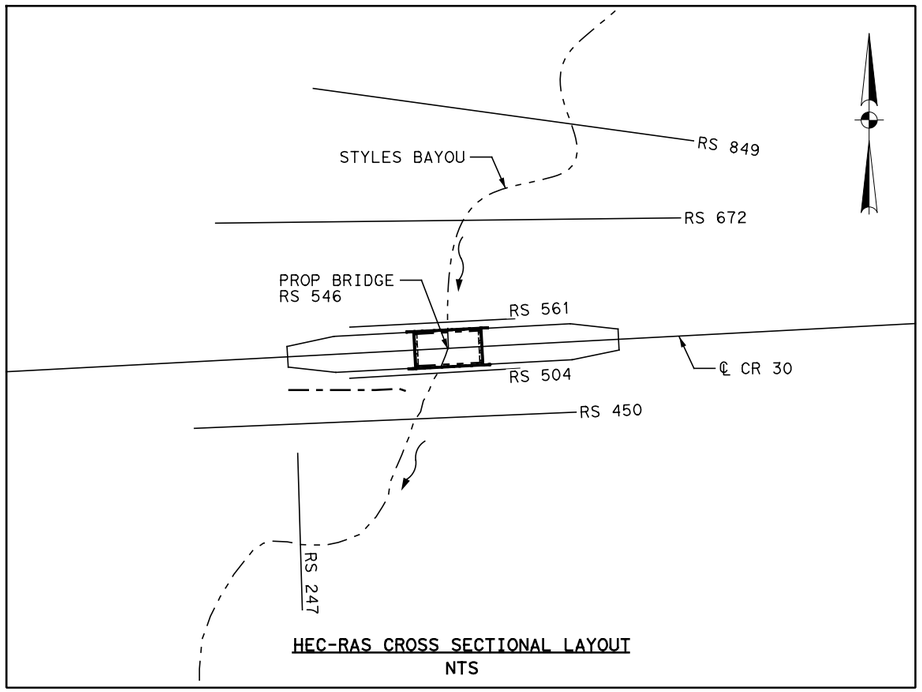
Texas Department of Transportation

CR 30

DRAINAGE AREA MAP (STYLES BAYOU)

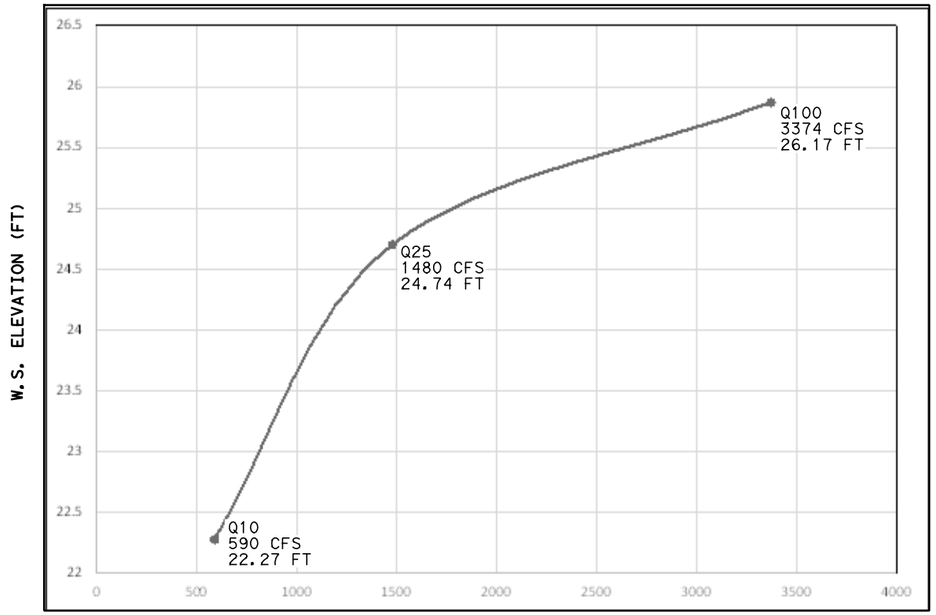
FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		96

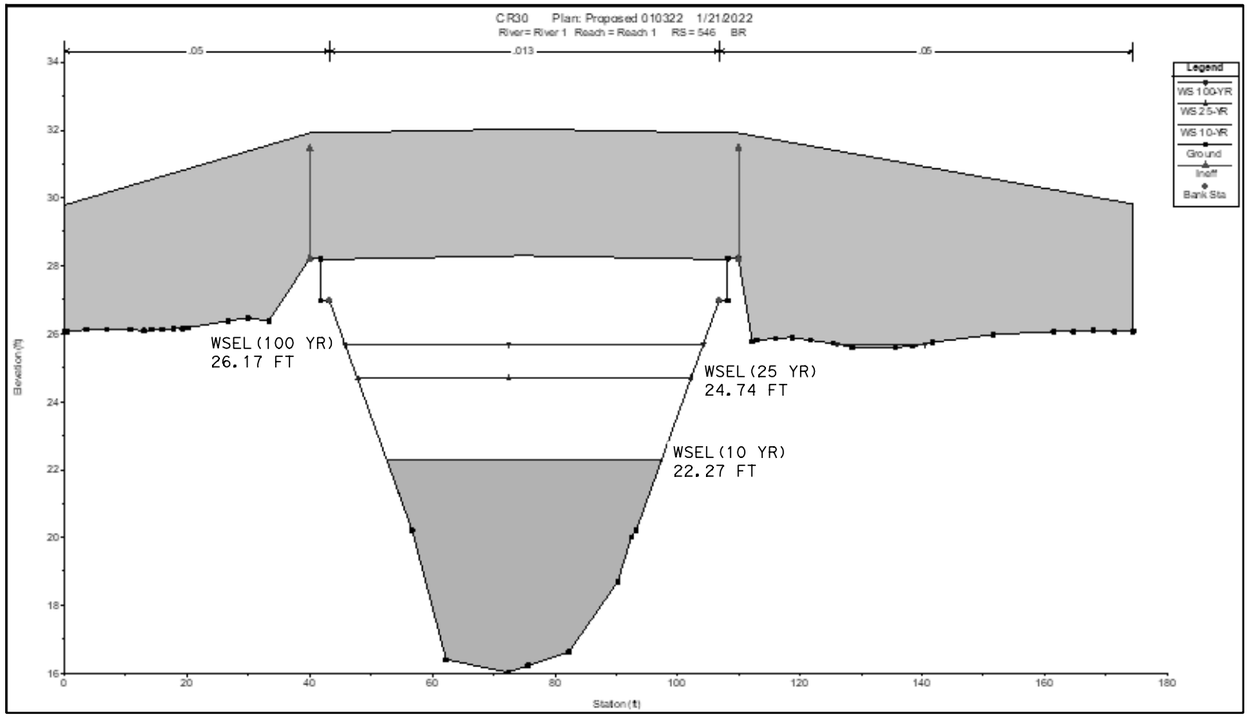
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



HEC-RAS CROSS SECTIONAL LAYOUT
NTS

RATING CURVE AT RS 561





HEC-RAS CROSS SECTION AT PROP BRIDGE - RS 546 (UPSTREAM)
N.T.S.

NBI: 12-020-0-AA01-07-301

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
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4/20/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 30

HYDRAULIC DATA SHEET (STYLES BAYOU)

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			97
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

HEC-RAS STATION	STORM FREQUENCY	FLOW (CFS)	COMPUTED WATER SURFACE ELEVATIONS (FT)			VELOCITY (FPS)	
			EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED
849	10-YR	590	22.64	22.58	-0.06	2.77	2.82
	25-YR	1480	25.23	25.13	-0.10	2.21	2.32
	100-YR	3374	27.54	27.24	-0.30	2.04	2.27
672	10-YR	590	22.50	22.42	-0.08	2.46	2.53
	25-YR	1480	25.18	25.08	-0.10	2.01	2.09
	100-YR	3374	27.51	27.20	-0.31	1.92	2.14
561	10-YR	590	22.35	22.27	-0.08	2.95	3.01
	25-YR	1480	24.86	24.74	-0.12	4.29	4.35
	100-YR	3374	26.51	26.17	-0.34	7.60	7.70
546	CR 30 BRIDGE AT STYLES BAYOU						
504	10-YR	590	22.29	22.29	0.00	2.50	2.50
	25-YR	1480	24.76	24.76	0.00	3.12	3.12
	100-YR	3374	26.11	26.09	-0.02	5.19	5.20
450	10-YR	590	22.07	22.07	0.00	3.72	3.72
	25-YR	1480	24.40	24.4	0.00	4.91	4.91
	100-YR	3374	26.17	26.15	-0.02	3.98	4.02
247	10-YR	590	21.71	21.71	0.00	3.64	3.64
	25-YR	1480	24.02	24.02	0.00	4.32	4.32
	100-YR	3374	25.61	25.59	-0.02	5.55	5.54

HYDROLOGIC METHOD:

SEE CR 30 (STYLES BAYOU) DRAINAGE AREA MAP SHEET FOR ADDITIONAL INFORMATION.

DISCHARGES COMPUTED USING HEC-HMS V.4.6 AND ATLAS 14 RAINFALL DATA.

HYDRAULIC METHOD:

HEC-RAS VERSION 6.1.0 USED FOR BRIDGE HYDRAULIC ANALYSIS.

NORMAL DEPTH WAS USED FOR THE DOWNSTREAM BOUNDARY CONDITIONS, SLOPE = 0.002 FT/FT FOR EXISTING AND PROPOSED CONDITIONS.

NOTES:

1. THE PROJECT LOCATION LIES IN A FEMA ZONE AE FLOODPLAIN, FEMA FIRM PANEL NUMBER 48039C0430K EFFECTIVE DATE DEC. 30, 2020.
2. THE COORDINATE SYSTEM IS HORIZONTAL DATUM NAD83(2011) AND VERTICAL DATUM IS NAVD(1988).
3. DETAILED HYDROLOGIC AND HYDRAULIC ANALYSIS AND RESULTS ARE PROVIDED IN DRAINAGE REPORT - CR 30 AT STYLES BAYOU PREPARED BY CIVILCORP, DATED APRIL 2022.

NBI: 12-020-0-AA01-07-301

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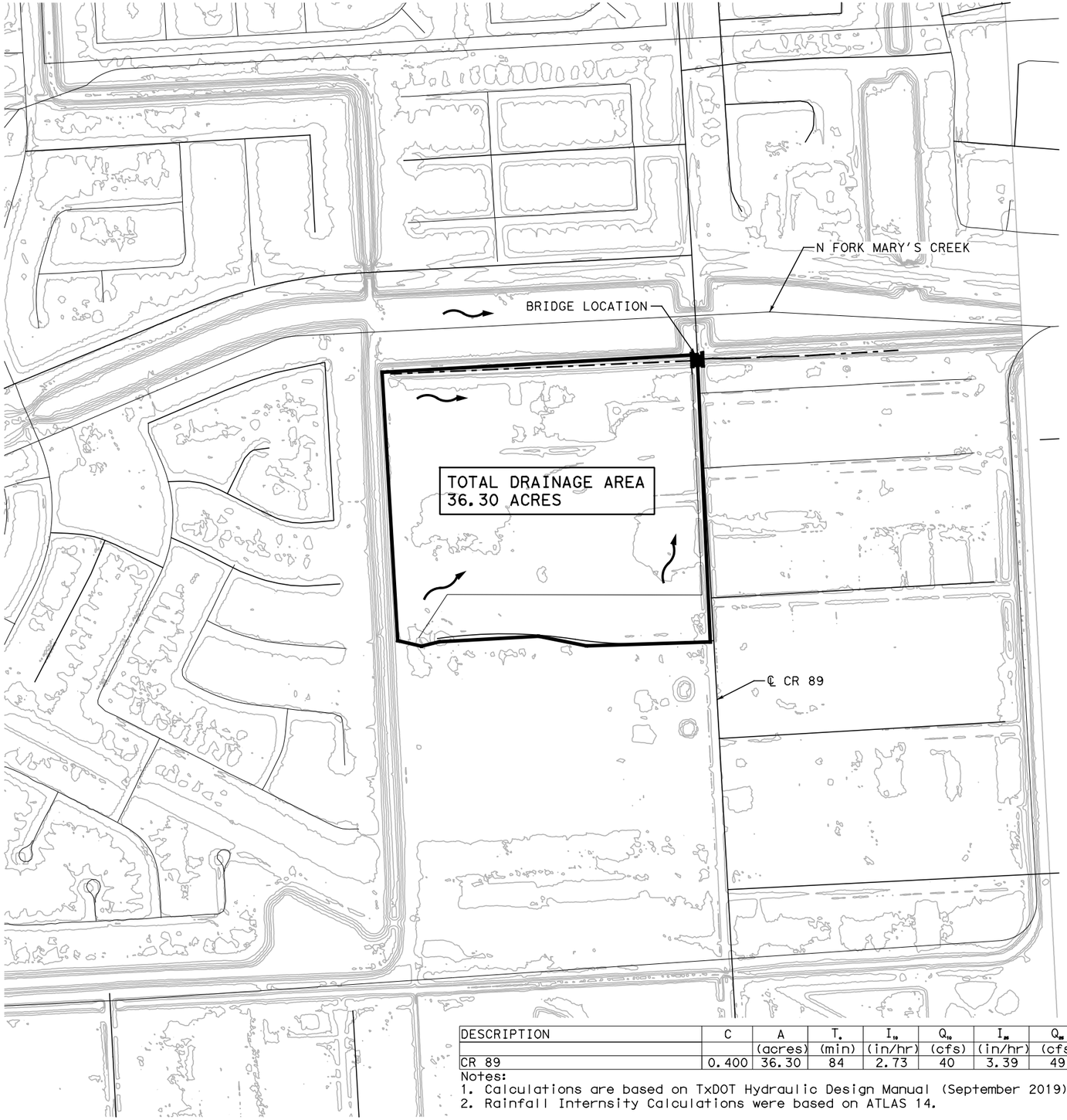
Texas Department of Transportation

CR 30

HYDRAULIC DATA SHEET (STYLES BAYOU)

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			98
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



LEGEND:

- STREAM CENTERLINE
- ROADWAY CENTERLINE
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW

NOTES:

1. DATA PRESENTED FROM DRAFT DRAINAGE STUDY REPORT FOR CR 89 PREPARED BY CIVILCORP, DATED JANUARY 2022.
2. 2 FT CONTOURS OBTAINED FROM TNRIS UPPER COAST LIDAR, 2018, NAVD88.

DESCRIPTION	C	A	T_c	I_{10}	Q_{10}	I_{25}	Q_{25}	I_{50}	Q_{50}	I_{100}	Q_{100}
		(acres)	(min)	(in/hr)	(cfs)	(in/hr)	(cfs)	(in/hr)	(cfs)	(in/hr)	(cfs)
CR 89	0.400	36.30	84	2.73	40	3.39	49	3.93	57	4.53	66

Notes:
1. Calculations are based on TxDOT Hydraulic Design Manual (September 2019) procedures for the Rational Method.
2. Rainfall Internsity Calculations were based on ATLAS 14.

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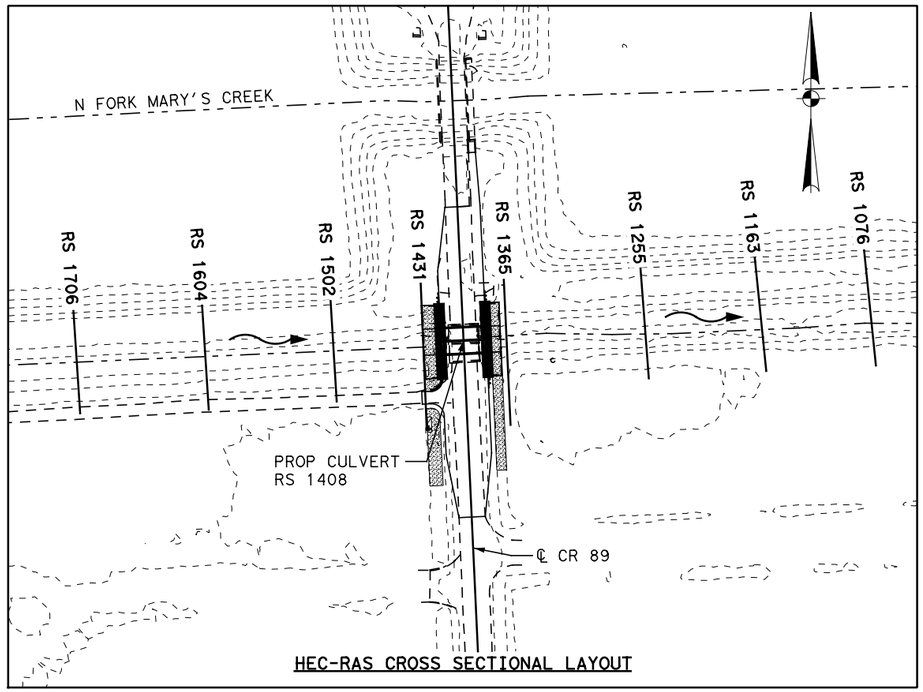
CR 89

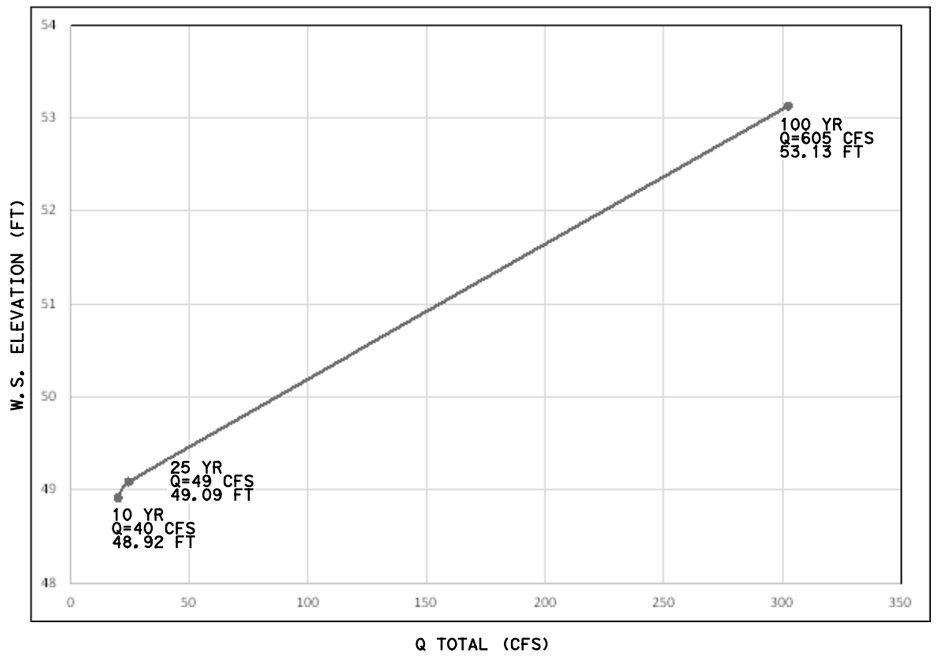
DRAINAGE AREA MAP (N FORK MARY'S CREEK)

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			99
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



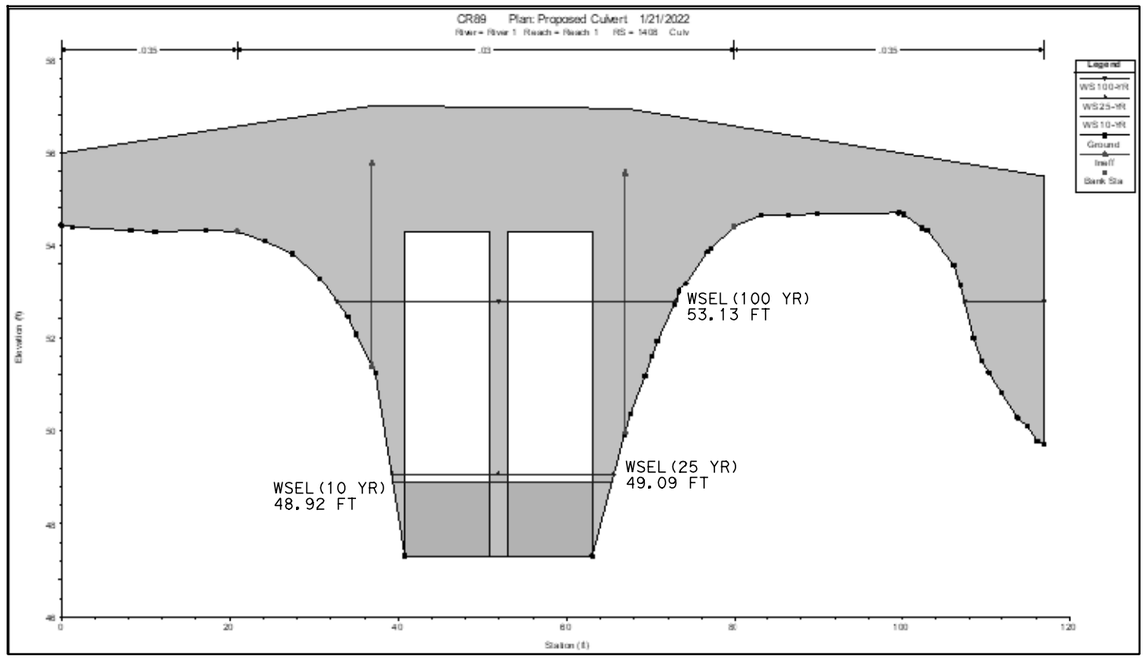
HEC-RAS CROSS SECTIONAL LAYOUT

* RATING CURVE AT RS 1431



*NOTE:

1. SEE HYDRAULIC DATA SHEET 2 OF 2 FOR NOTES ON HYDROLOGIC METHOD AND DETERMINATION OF DESIGN FLOWS.



HEC-RAS CROSS SECTION AT PROP BRIDGE-CLASS CULVERT - RS 1408 (UPSTREAM)

N.T.S.

NBI: 12-020-0-AA05-64-302

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Texas Department of Transportation

CR 89

HYDRAULIC DATA SHEET (N FORK MARY'S CREEK)

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			100
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89

HEC-RAS STATION	STORM FREQUENCY	FLOW (CFS)	COMPUTED WATER SURFACE ELEVATIONS (FT)			VELOCITY (FPS)	
			EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED
1706	10-YR	40	50.36	50.36	0.00	1.64	1.64
	25-YR	49	50.51	50.51	0.00	1.78	1.78
	100-YR	605	53.96	53.94	-0.02	3.49	3.45
1604	10-YR	40	50.25	50.25	0.00	1.56	1.56
	25-YR	49	50.39	50.39	0.00	1.71	1.71
	100-YR	605	53.74	53.73	-0.01	3.86	3.82
1502	10-YR	40	49.66	49.66	0.00	4.41	4.41
	25-YR	49	49.76	49.76	0.00	4.62	4.62
	100-YR	605	53.03	53	-0.03	5.99	6.08
1431	10-YR	40	48.98	48.92	-0.06	1.70	1.04
	25-YR	49	49.15	49.09	-0.06	1.80	1.14
	100-YR	605	53.00	53.13	0.13	4.45	3.77
1408	CR 89 PROP CULVERT AT DRAINAGE DITCH						
1365	10-YR	40	48.94	48.92	-0.02	0.92	0.75
	25-YR	49	49.11	49.09	-0.02	1.03	0.85
	100-YR	605	52.88	52.87	-0.01	3.52	3.18
1255	10-YR	40	48.83	48.83	0.00	1.91	1.91
	25-YR	49	48.98	48.98	0.00	2.05	2.05
	100-YR	605	52.53	52.53	0.00	4.47	4.47
1163	10-YR	40	48.51	48.51	0.00	2.68	2.68
	25-YR	49	48.66	48.66	0.00	2.79	2.79
	100-YR	605	52.27	52.27	0.00	4.60	4.60
1076	10-YR	40	48.24	48.24	0.00	2.16	2.16
	25-YR	49	48.39	48.39	0.00	2.29	2.29
	100-YR	605	52.03	52.03	0.00	4.64	4.64

HYDROLOGIC METHOD

SEE CR 89 (DRAINAGE DITCH) DRAINAGE AREA MAP SHEET FOR ADDITIONAL INFORMATION.

FLOW CALCULATIONS BASED ON TXDOT HDRAULIC DESIGN MANUAL (SEPTEMBER 2019) PROCEDURES FOR THE RATIONAL METHOD AND ATLAS 14 RAINFALL DATA.

DESIGN FLOW FOR 100-YR STORM EVENT AT CULVERT CROSSING IMPACTED BY FLOW ALONG NORTH FORK OF MARY'S CREEK. DESIGN FLOW FOR 100-YR STORM EVENT AT CULVERT ESTIMATED BY USING CHANNEL CAPACITY AT CULVERT AND WATER SURFACE ELEVATION FOR NORTH FORK MARY'S CREEK FLOODPLAIN (100-YR WSEL = 53.07').

HYDRAULIC METHOD

HEC-RAS VERSION 6.1.0 USED FOR CULVERT HYDRAULIC ANALYSIS.

NORMAL DEPTH WAS USED FOR THE DOWNSTREAM BOUNDARY CONDITIONS, SLOPE=0.0026 FT/FT FOR EXISTING AND PROPOSED CONDITIONS.

NOTES:

1. THE COORDINATE SYSTEM IS HORIZONTAL DATUM NAD83(2011) AND VERTICAL DATUM IS NAVD(1988).
2. DETAILED HYDROLOGIC AND HYDRAULIC ANALYSIS AND RESULTS ARE PROVIDED IN DRAINAGE REPORT - CR 89 AT NORTH FORK MARY'S CREEK PREPARED BY CIVILCORP, DATED APRIL 2022.

NBI: 12-020-0-AA05-64-302

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
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4/20/2022

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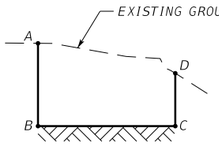
CR 89

HYDRAULIC DATA SHEET (N FORK MARY'S CREEK)

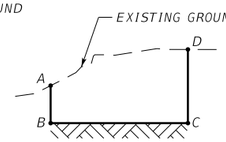
SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		101

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



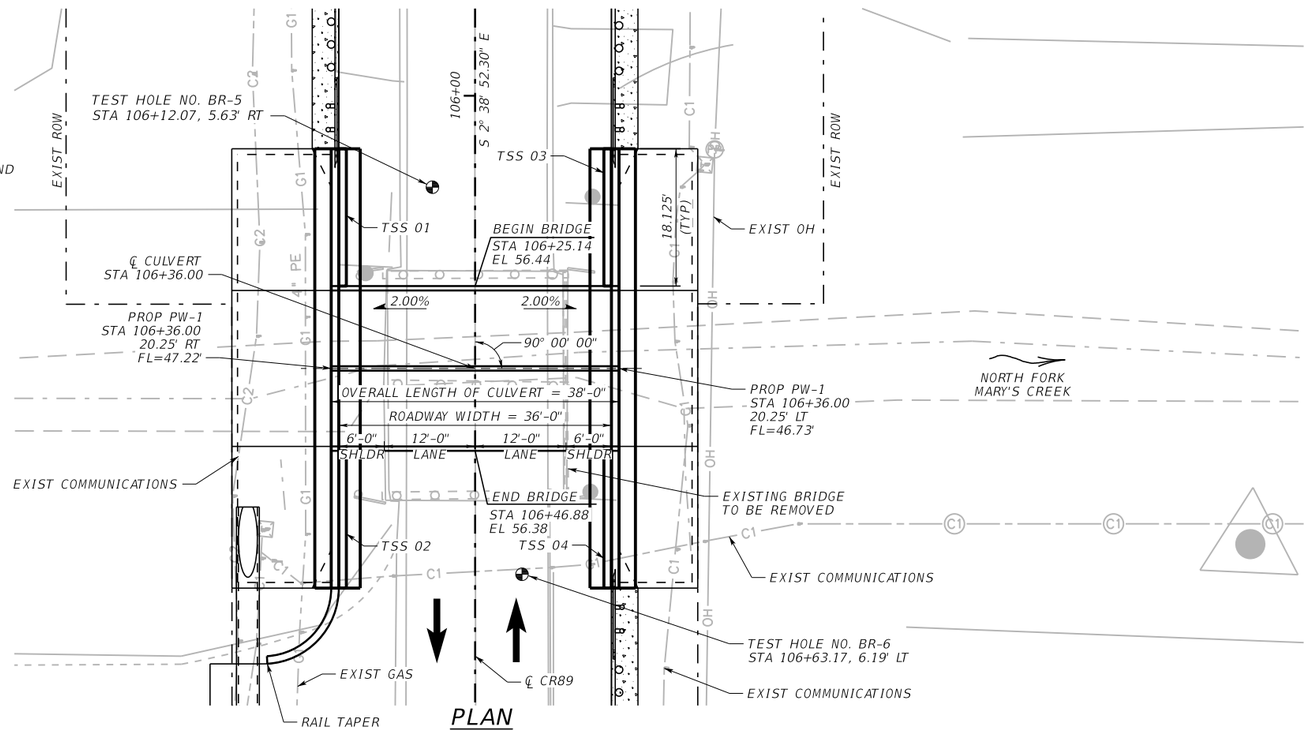
TSS 03
(TSS 01 SIMILAR)



TSS 04
(TSS 02 SIMILAR)

LIMITS OF TEMPORARY SPECIAL SHORING

TEMP SPL SHORING DATA POINTS				
LOCATION	POINT ID	STATION	OFFSET	ELEVATION
TSS 01	A	106+06.71	18.00' RT	54.86
	B	106+06.71	18.00' RT	44.75
	C	106+24.83	18.00' RT	44.75
	D	106+24.83	18.00' RT	52.13
TSS 02	A	106+47.17	18.00' RT	49.26
	B	106+47.17	18.00' RT	44.75
	C	106+65.29	18.00' RT	44.75
	D	106+65.29	18.00' RT	55.12
TSS 03	A	106+06.71	18.00' LT	55.15
	B	106+06.71	18.00' LT	44.21
	C	106+24.83	18.00' LT	44.21
	D	106+24.83	18.00' LT	51.19
TSS 04	A	106+47.17	18.00' LT	49.16
	B	106+47.17	18.00' LT	44.21
	C	106+65.29	18.00' LT	44.21
	D	106+65.29	18.00' LT	53.94



PLAN

GENERAL NOTES:

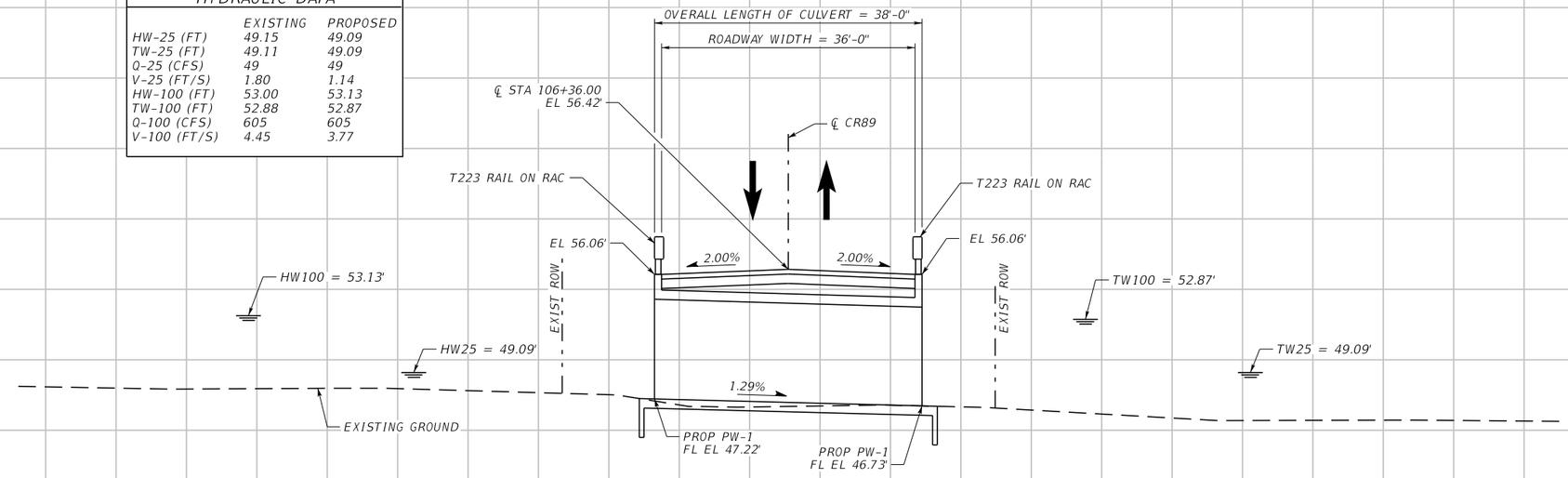
1. DESIGNED FOR HL93 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AS MODIFIED BY TXDOT LRFD BRIDGE DESIGN MANUAL.
2. THE LOCATION AND ELEVATION OF ALL UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY AND LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.
3. SEE HYDRAULIC DATA SHEETS FOR HYDRAULIC DATA INFORMATION.
4. REMOVE 2-SPAN 30' LONG X 23'-2" WIDE TIMBER DECK ON TIMBER STRINGERS EXISTING BRIDGE.
5. THE EXISTING BRIDGE HAS BEEN TESTED FOR ASBESTOS CONTAINING MATERIALS (ACM) AND FOUND TO CONTAIN GREATER THAN 1% ACM AND WILL BE ABATED DURING CONSTRUCTION. THE ACM WERE FOUND IN THE FOLLOWING AREAS: FELT PAD BETWEEN PIER AND PIER CAP. THE CONTRACTOR SHALL REMOVE THE BRIDGE DECK, STRINGERS, AND PIER CAPS. A SPECIALTY CONTRACTOR SHALL THEN REMOVE EXPOSED ACM FELT PADS. THE CONTRACTOR SHALL THEN REMOVE BRIDGE PIERS. THE CONTRACTOR SHALL COORDINATE THE OVERALL WORK WITH THE SPECIALTY CONTRACTOR WHO PERFORMS THE ABATING WORK.
6. SULFATE RESISTANT CONCRETE SHALL BE USED FOR ITEM 462 CONC BOX CULV (10 FT X 7 FT) AND ITEM 466 WINGWALL (PW-1) (HW=10 FT).
7. FOR BORING LOG DETAILS, SEE BORING DATA SHEET.
8. SEE T223 (MOD) FOR RAIL TAPER DETAILS.

LEGEND:

BORE LOCATION

0 10 20(H)
0 5 10(V)

HYDRAULIC DATA		
	EXISTING	PROPOSED
HW-25 (FT)	49.15	49.09
TW-25 (FT)	49.11	49.09
Q-25 (CFS)	49	49
V-25 (FT/S)	1.80	1.14
HW-100 (FT)	53.00	53.13
TW-100 (FT)	52.88	52.87
Q-100 (CFS)	605	605
V-100 (FT/S)	4.45	3.77



STA 106+36.00

STA 106+25.14 to STA 106+46.88
PROPOSED 2-10' X 7' X 38' MBC (MC-10-7) WITH PARALLEL WINGWALL
PROPOSED (PW-1) (HW=10') UPSTREAM AND DOWNSTREAM

ELEVATION

EXIST NBI = 12-020-0-AA05-64-002
PROP NBI = 12-020-0-AA05-64-302

STATE OF TEXAS
GREGORY S HANSEN
134271
LICENSED
PROFESSIONAL ENGINEER

04/19/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 1 OF 1

Texas Department of Transportation

CR 89

BRIDGE CLASS CULVERT

PROP NBI# 12-020-0-AA05-64-302

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 89
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		102

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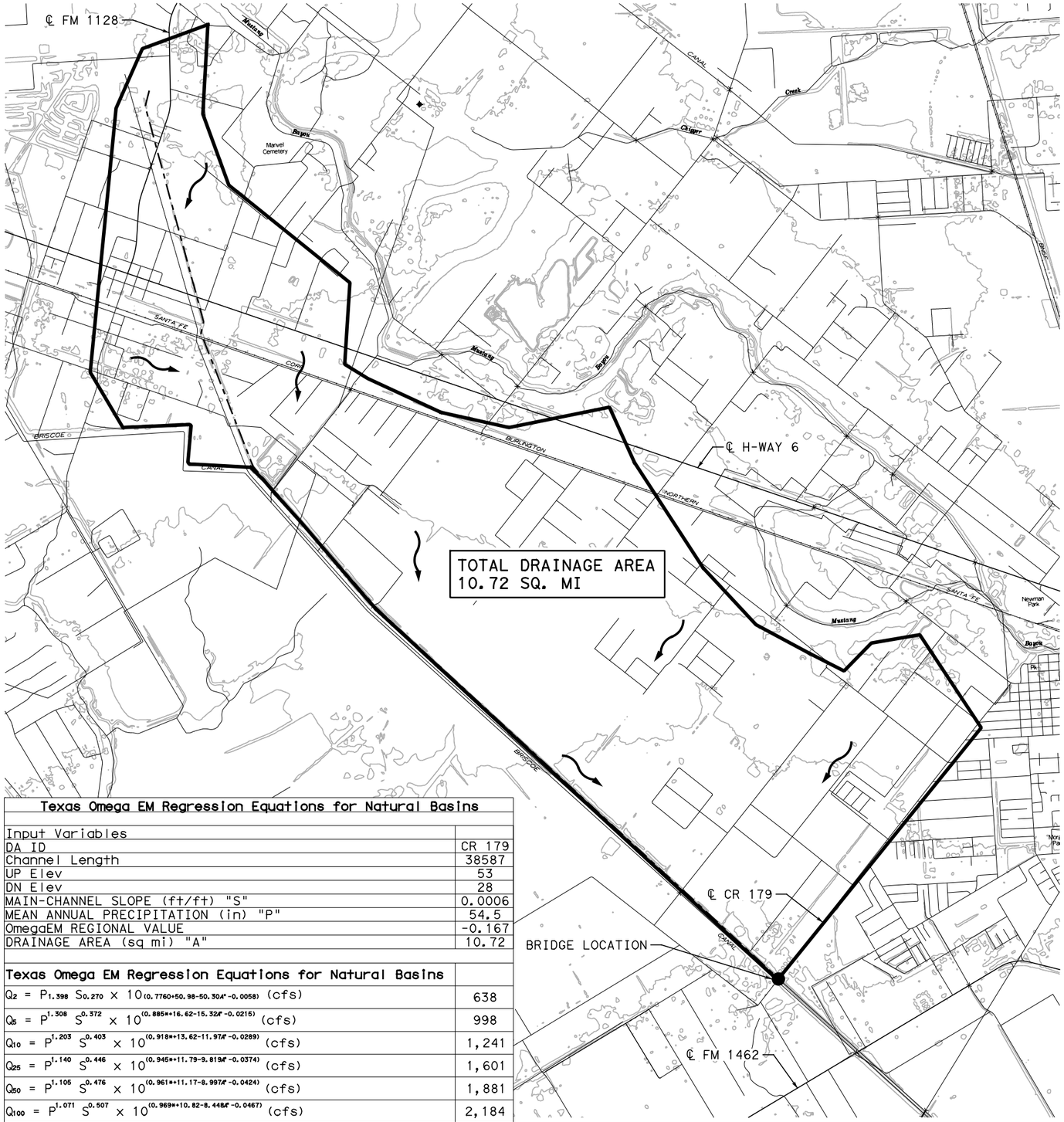

LEGEND:

- STREAM CENTERLINE
- ROADWAY CENTERLINE
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW

NOTES:

1. DATA PRESENTED FROM DRAINAGE REPORT FOR CR 179 AT DRAINAGE DITCH, PREPARED BY CIVILCORP, DATED APRIL 2022.
2. DESIGN FLOWS USED IN HEC-RAS MODEL CALCULATED USING OMEGA EM REGRESSION EQUATIONS METHOD.
3. 5 FT CONTOURS OBTAINED FROM TNRIS UPPER COAST LIDAR, 2018, NAVD88.

Texas Omega EM Regression Equations for Natural Basins	
Input Variables	
DA ID	CR 179
Channel Length	38587
UP Elev	53
DN Elev	28
MAIN-CHANNEL SLOPE (ft/ft) "S"	0.0006
MEAN ANNUAL PRECIPITATION (in) "P"	54.5
OmegaEM REGIONAL VALUE	-0.167
DRAINAGE AREA (sq mi) "A"	10.72
Texas Omega EM Regression Equations for Natural Basins	
$Q_2 = P^{1.398} S^{0.270} \times 10^{(0.7760*50.98-50.30A^2-0.0058)}$ (cfs)	638
$Q_5 = P^{1.308} S^{0.372} \times 10^{(0.885*16.62-15.32A^2-0.0215)}$ (cfs)	998
$Q_{10} = P^{1.203} S^{0.403} \times 10^{(0.918*13.62-11.97A^2-0.0289)}$ (cfs)	1,241
$Q_{25} = P^{1.140} S^{0.446} \times 10^{(0.945*11.79-9.819A^2-0.0374)}$ (cfs)	1,601
$Q_{50} = P^{1.105} S^{0.476} \times 10^{(0.961*11.17-8.997A^2-0.0424)}$ (cfs)	1,881
$Q_{100} = P^{1.071} S^{0.507} \times 10^{(0.969*10.82-8.448A^2-0.0467)}$ (cfs)	2,184
$Q_{500} = P^{0.988} S^{0.569} \times 10^{(0.976*10.40-7.605A^2-0.0554)}$ (cfs)	2,951

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4/20/2022

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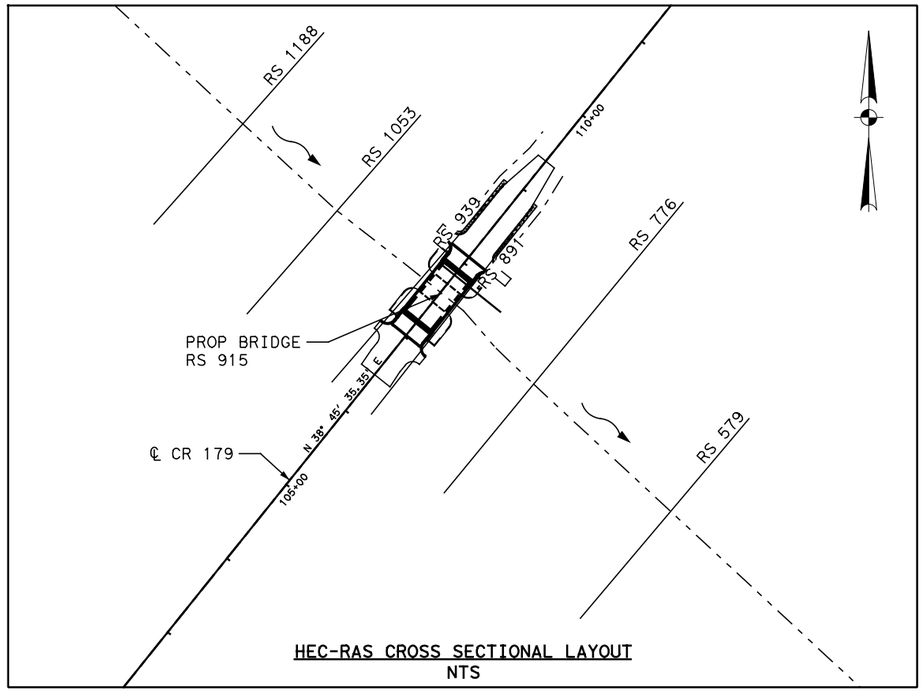
Texas Department of Transportation

CR 179

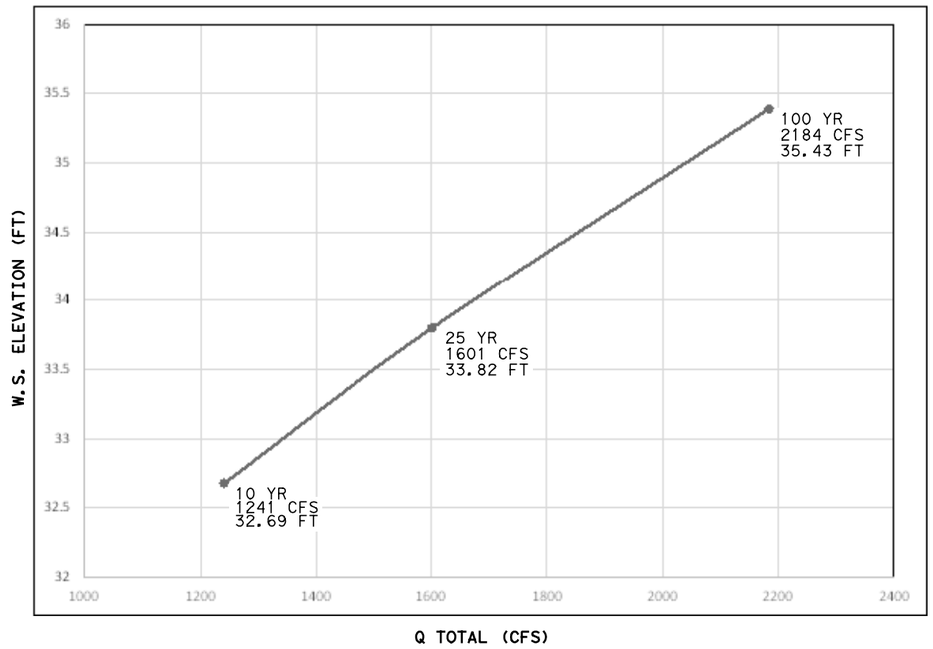
DRAINAGE AREA MAP (DRAINAGE DITCH)

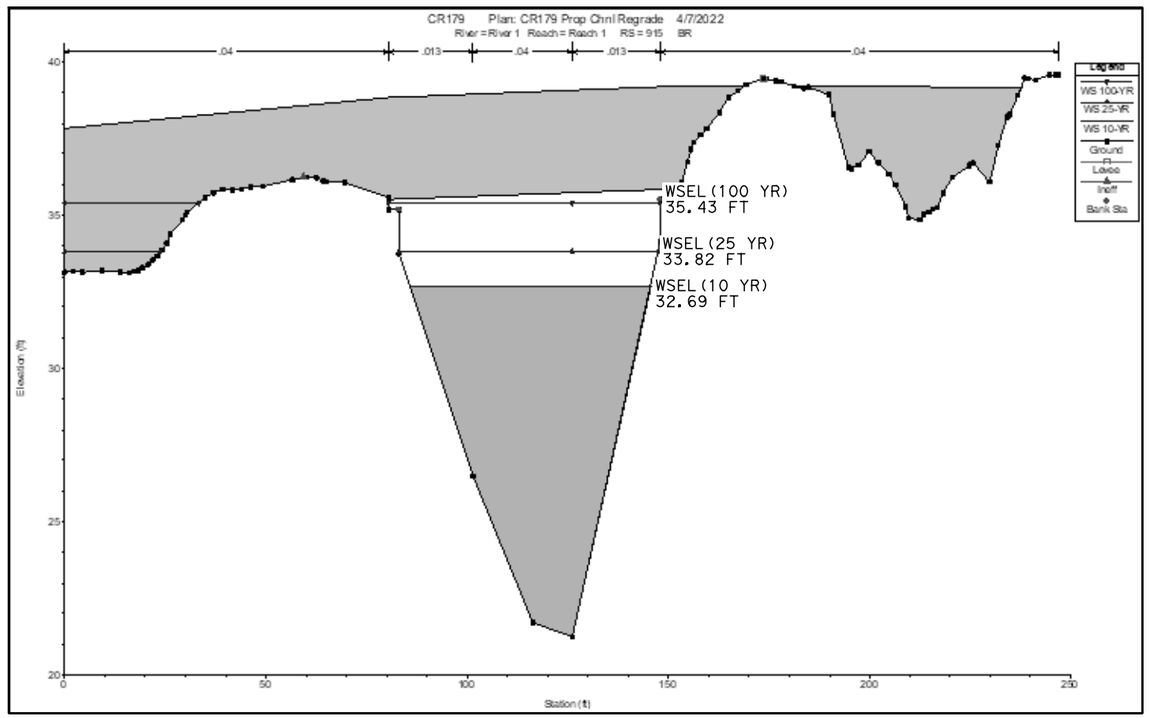
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			103
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179



HEC-RAS CROSS SECTIONAL LAYOUT
NTS

RATING CURVE AT RS 939





HEC-RAS CROSS SECTION AT PROP BRIDGE - RS 915 (UPSTREAM)
N.T.S.

NBI: 12-020-0-AA07-71-304

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
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4/20/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 179

HYDRAULIC DATA SHEET (DRAINAGE DITCH)

SHEET 1 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			104
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

HEC-RAS STATION	STORM FREQUENCY	FLOW (CFS)	COMPUTED WATER SURFACE ELEVATIONS (FT)			VELOCITY (FPS)	
			EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED
1188	10-YR	1241	32.81	32.81	0.00	4.68	4.69
	25-YR	1601	33.92	33.92	0.00	4.96	4.96
	100-YR	2184	35.52	35.51	-0.01	5.26	5.27
1053	10-YR	1241	32.69	32.68	-0.01	4.20	4.21
	25-YR	1601	33.81	33.81	0.00	4.48	4.48
	100-YR	2184	35.41	35.40	-0.01	4.79	4.80
939	10-YR	1241	32.70	32.69	-0.01	3.04	3.04
	25-YR	1601	33.83	33.82	-0.01	3.29	3.29
	100-YR	2184	35.44	35.43	-0.01	3.60	3.58
915	CR 179 BRIDGE AT DRAINAGE DITCH						
891	10-YR	1241	32.69	32.70	0.01	2.60	2.36
	25-YR	1601	33.81	33.83	0.02	2.80	2.57
	100-YR	2184	35.41	35.43	0.02	3.08	2.84
776	10-YR	1241	32.50	32.50	0.00	3.62	3.62
	25-YR	1601	33.61	33.61	0.00	3.90	3.90
	100-YR	2184	35.20	35.20	0.00	4.16	4.16
579	10-YR	1241	32.34	32.34	0.00	3.69	3.69
	25-YR	1601	33.44	33.44	0.00	3.96	3.96
	100-YR	2184	35.03	35.03	0.00	4.28	4.28

HYDROLOGIC METHOD:

SEE CR 179 (DRAINAGE DITCH) DRAINAGE AREA MAP SHEET FOR ADDITIONAL INFORMATION.

DESIGN FLOWS COMPUTED USING OMEGA EM REGRESSION EQUATION METHOD.

HYDROLOGIC METHOD:

HEC-RAS VERSION 6.1.0 USED FOR BRIDGE HYDRAULIC ANALYSIS.

NORMAL DEPTH USED FOR THE DOWNSTREAM BOUNDARY CONDITIONS, SLOPE = 0.0008 FT/FT FOR EXISTING AND PROPOSED CONDITIONS.

NOTES:

1. THE PROJECT LOCATION LIES IN A FEMA ZONE A FLOODPLAIN, FEMA FIRM PANEL NUMBER 48039C0145K EFFECTIVE DATE DEC. 30, 2020.
2. THE COORDINATE SYSTEM IS HORIZONTAL DATUM NAD83(2011) AND VERTICAL DATUM IS NAVD(1988).
3. DETAILED HYDROLOGIC AND HYDRAULIC ANALYSIS AND RESULTS ARE PROVIDED IN DRAINAGE REPORT - CR 179 AT DRAINAGE DITCH PREPARED BY CIVILCORP, DATED APRIL 2022.

NBI: 12-020-0-AA07-71-304

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

CivilCorp
ENGINEERS • SURVEYORS
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: (832)252-8100 FAX: (832)252-8103 TBPE F-10283

Texas Department of Transportation

CR 179
HYDRAULIC DATA SHEET
(DRAINAGE DITCH)

SHEET 2 OF 2

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			105
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA 106+36.00 LT, N. FORK MARY'S CREEK	2 - 10 X 7	7	MC-10-7	PW-1	0	2:1	8	7	1.75	9.417	N/A	N/A	18.833	21.75	N/A	0.0	1.4	23.8	355
STA 106+36.00 RT, N. FORK MARY'S CREEK	2 - 10 X 7	7	MC-10-7	PW-1	0	2:1	8	7	1.25	8.917	N/A	N/A	17.833	21.75	N/A	0.0	1.0	22.7	318

DATE:
FILE:

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

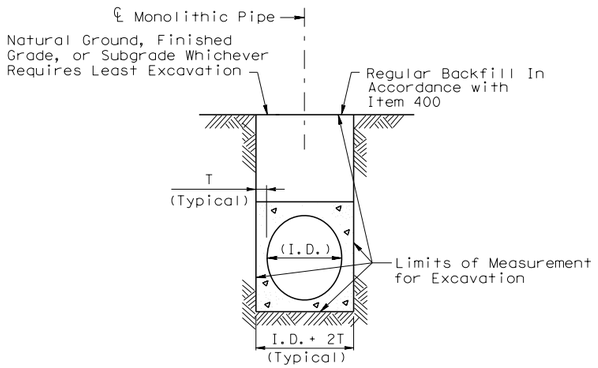
Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

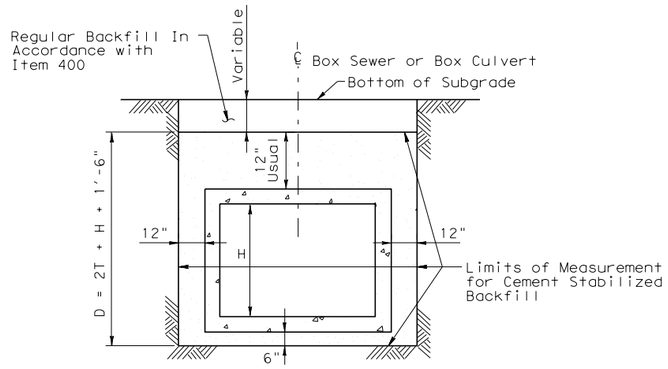
BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR 89
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		106



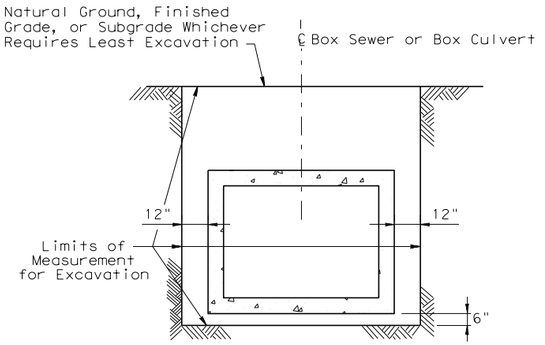
EXCAVATION DETAIL

MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



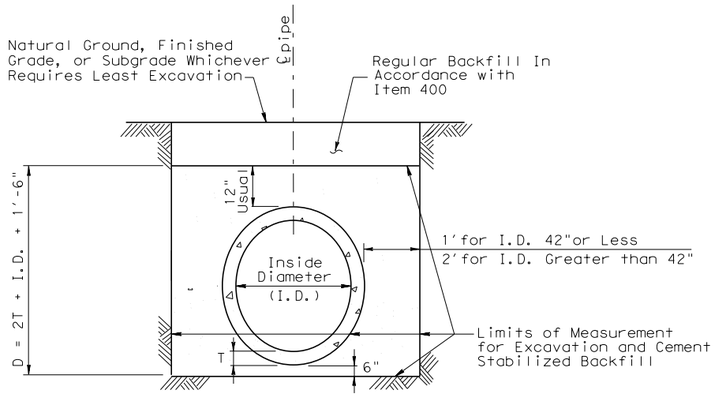
BACKFILL DETAIL

BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS *



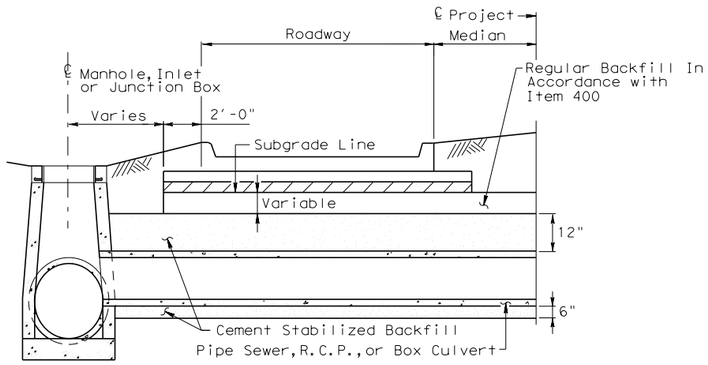
EXCAVATION DETAIL

BOX CULVERTS
IN A GRADED AREA



EXCAVATION & BACKFILL DETAIL

REINFORCED CONCRETE PIPE
IN A GRADED OR PAVED AREA
INCLUDING DETOURS



BACKFILL DETAIL

AT MANHOLE, INLET OR JUNCTION BOX

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

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.

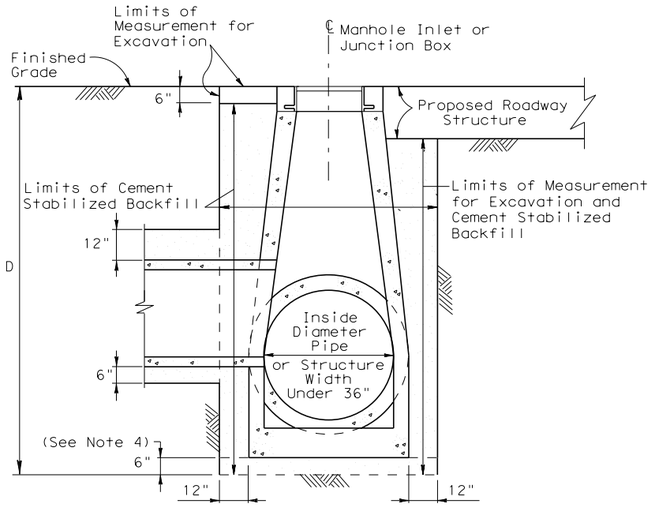
D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

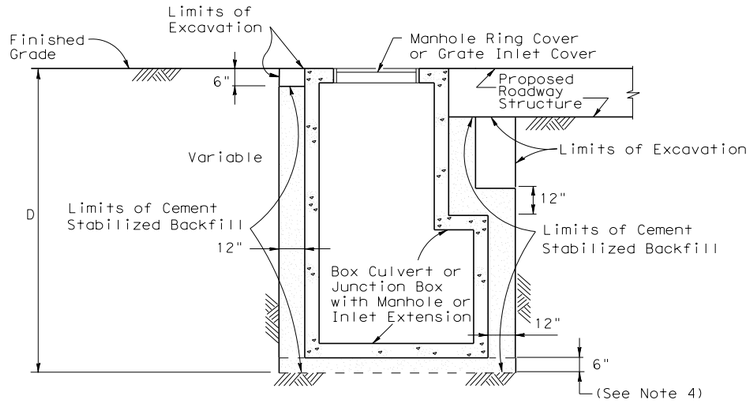
FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 11/05 REVISED 2/2010 Added note to Table 1, Sht 2 of 2. REVISED 6/12 REVISED 9/14	HOUSTON 6			107
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	0912	31	307, ETC.	CR



EXCAVATION AND BACKFILL DETAIL

MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS

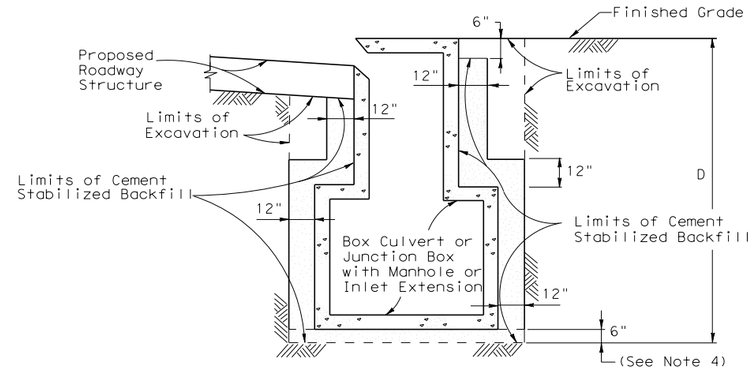
N.T.S.



EXCAVATION AND BACKFILL DETAIL

JUNCTION BOXES IN A
PAVED OR GRADED AREA

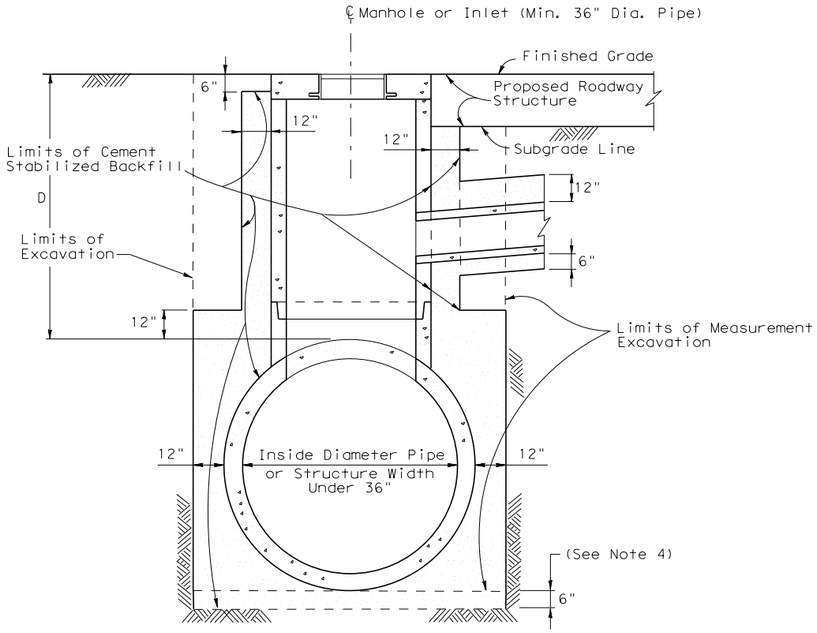
N.T.S.



EXCAVATION AND BACKFILL DETAIL

INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA

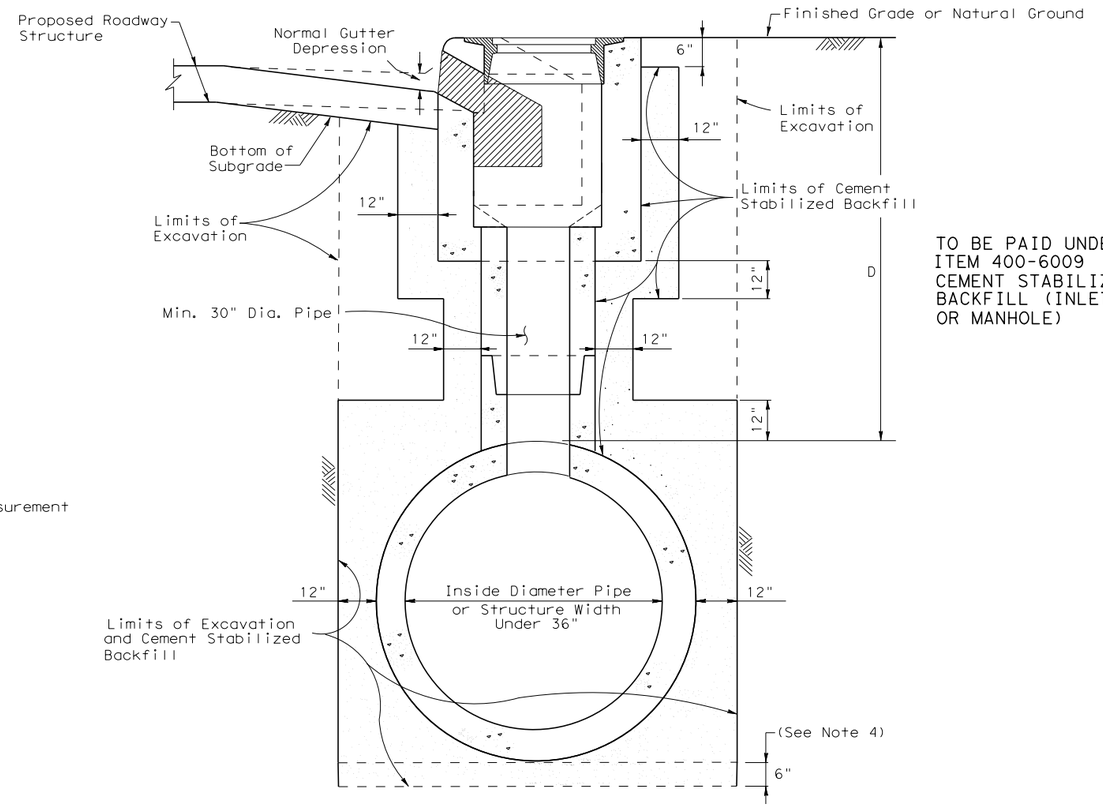
N.T.S.



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. 1.
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	HOUSTON	6		108
	COUNTY	CONTROL	SECT	JOB HIGHWAY
	BRAZORIA	0912	31	307,ETC. CR

DATE:
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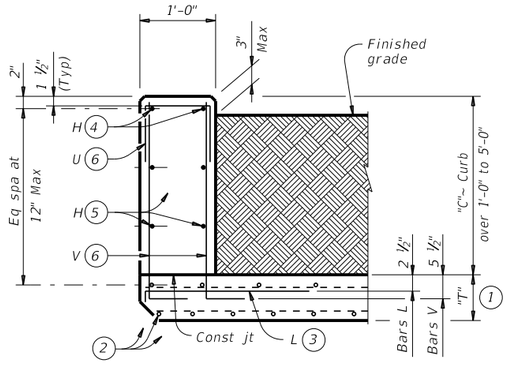
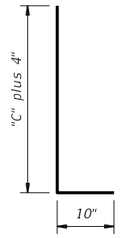
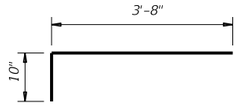


TYPICAL SECTION

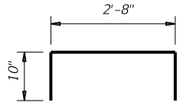
Used for curbs over 1'–0" to 5'–0"



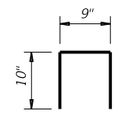
BARS V (#5) (6)
Spaced at 12" Max



BARS L (#5) (3)
Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)
Spaced at 12" Max



BARS U (#4) (6)
Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'–0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'–0"	0.037	10.4
1'–6"	0.056	14.5
2'–0"	0.074	15.6
2'–6"	0.093	18.0
3'–0"	0.111	19.0
3'–6"	0.130	21.3
4'–0"	0.148	22.4
4'–6"	0.167	24.8
5'–0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'-8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

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

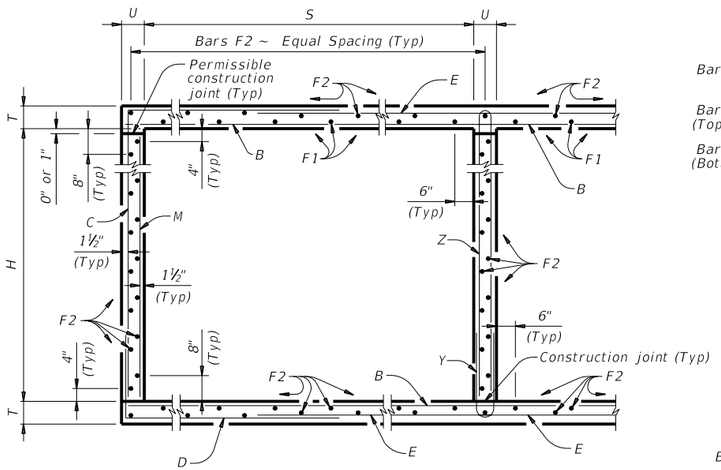
EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

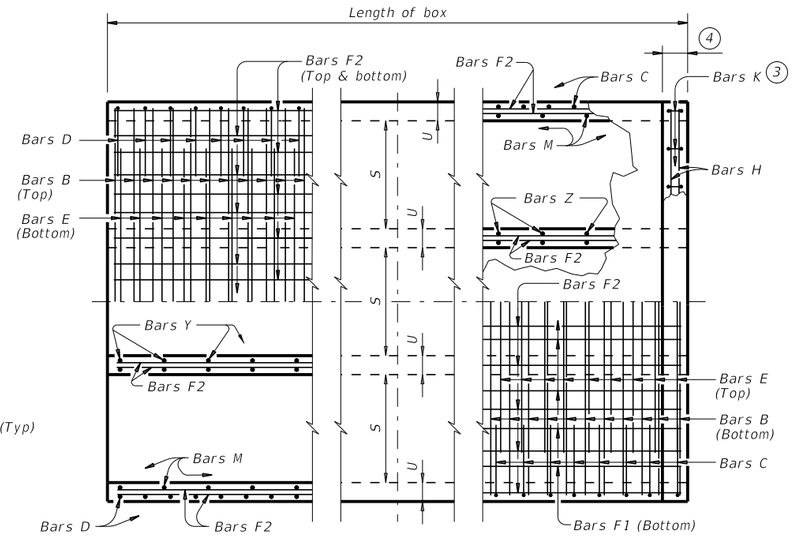
ECD

FILE: ecdstde1-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		109

DATE:
FILE:

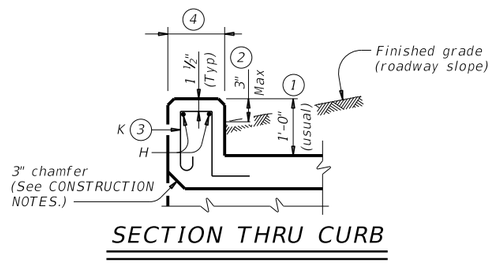


TYPICAL SECTION



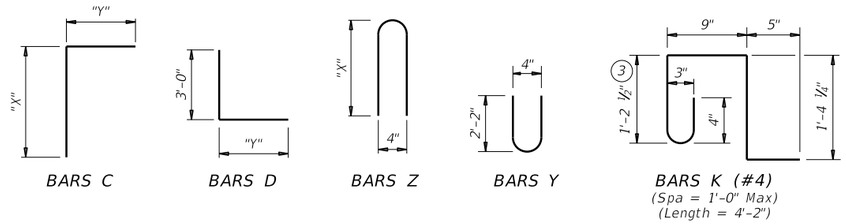
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-6 ½"	5'-9"
5'-0"	5'-6 ½"	5'-9"
6'-0"	6'-6 ½"	5'-9"
7'-0"	7'-6 ½"	5'-9"
8'-0"	8'-6 ½"	5'-9"
9'-0"	9'-6 ½"	5'-9"
10'-0"	10'-6 ½"	5'-9"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		110

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DATE:
FILE:

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B (5)					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4							Bars H 4 ~ #4 (5)		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																																	
																																			Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	10' – 0"	4' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	66	18"	39' – 9"	1,752	108	9"	4' – 0"	289	54	9"	4' – 7"	165	9' – 3"	334	21' – 6"	57	46	128	1.333	374.6	1.6	185	54.9	15,168
3	10' – 0"	4' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	95	18"	39' – 9"	2,523	108	9"	4' – 0"	289	108	9"	4' – 7"	331	9' – 3"	667	32' – 1"	86	68	189	1.942	539.8	2.4	275	80.1	21,865
4	10' – 0"	4' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	124	18"	39' – 9"	3,293	108	9"	4' – 0"	289	162	9"	4' – 7"	496	9' – 3"	1,001	42' – 8"	114	88	245	2.551	704.9	3.2	359	105.2	28,553
5	10' – 0"	4' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	153	18"	39' – 9"	4,063	108	9"	4' – 0"	289	216	9"	4' – 7"	661	9' – 3"	1,335	53' – 3"	142	110	306	3.160	870.0	3.9	448	130.3	35,248
6	10' – 0"	4' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	182	18"	39' – 9"	4,833	108	9"	4' – 0"	289	270	9"	4' – 7"	827	9' – 3"	1,668	65' – 6"	175	130	362	3.770	1,050.3	4.7	537	155.5	42,550
2	10' – 0"	5' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	72	18"	39' – 9"	1,912	108	9"	5' – 0"	361	54	9"	4' – 7"	165	11' – 3"	406	21' – 6"	57	46	128	1.398	386.2	1.6	185	57.5	15,634
3	10' – 0"	5' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	103	18"	39' – 9"	2,735	108	9"	5' – 0"	361	108	9"	4' – 7"	331	11' – 3"	812	32' – 1"	86	68	189	2.029	554.5	2.4	275	83.5	22,456
4	10' – 0"	5' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	134	18"	39' – 9"	3,558	108	9"	5' – 0"	361	162	9"	4' – 7"	496	11' – 3"	1,217	42' – 8"	114	88	245	2.659	722.7	3.2	359	109.5	29,268
5	10' – 0"	5' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	165	18"	39' – 9"	4,381	108	9"	5' – 0"	361	216	9"	4' – 7"	661	11' – 3"	1,623	53' – 3"	142	110	306	3.290	891.0	3.9	448	135.5	36,088
6	10' – 0"	5' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	196	18"	39' – 9"	5,204	108	9"	5' – 0"	361	270	9"	4' – 7"	827	11' – 3"	2,029	65' – 6"	175	130	362	3.921	1,074.5	4.7	537	161.6	43,516
2	10' – 0"	6' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	78	18"	39' – 9"	2,071	108	9"	6' – 0"	433	54	9"	4' – 7"	165	13' – 3"	478	21' – 6"	57	46	128	1.463	397.9	1.6	185	60.1	16,100
3	10' – 0"	6' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	111	18"	39' – 9"	2,947	108	9"	6' – 0"	433	108	9"	4' – 7"	331	13' – 3"	956	32' – 1"	86	68	189	2.115	569.3	2.4	275	87.0	23,047
4	10' – 0"	6' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	144	18"	39' – 9"	3,824	108	9"	6' – 0"	433	162	9"	4' – 7"	496	13' – 3"	1,434	42' – 8"	114	88	245	2.767	740.7	3.2	359	113.8	29,986
5	10' – 0"	6' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	177	18"	39' – 9"	4,700	108	9"	6' – 0"	433	216	9"	4' – 7"	661	13' – 3"	1,912	53' – 3"	142	110	306	3.420	912.1	3.9	448	140.7	36,931
6	10' – 0"	6' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	210	18"	39' – 9"	5,576	108	9"	6' – 0"	433	270	9"	4' – 7"	827	13' – 3"	2,390	65' – 6"	175	130	362	4.072	1,098.7	4.7	537	167.6	44,484
2	10' – 0"	7' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	78	18"	39' – 9"	2,071	108	9"	7' – 0"	505	54	9"	4' – 7"	165	15' – 3"	550	21' – 6"	57	46	128	1.528	405.5	1.6	185	62.7	16,406
3	10' – 0"	7' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	111	18"	39' – 9"	2,947	108	9"	7' – 0"	505	108	9"	4' – 7"	331	15' – 3"	1,100	32' – 1"	86	68	189	2.202	578.8	2.4	275	90.5	23,425
4	10' – 0"	7' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	144	18"	39' – 9"	3,824	108	9"	7' – 0"	505	162	9"	4' – 7"	496	15' – 3"	1,650	42' – 8"	114	88	245	2.876	751.9	3.2	359	118.2	30,436
5	10' – 0"	7' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	177	18"	39' – 9"	4,700	108	9"	7' – 0"	505	216	9"	4' – 7"	661	15' – 3"	2,200	53' – 3"	142	110	306	3.549	925.1	3.9	448	145.9	37,453
6	10' – 0"	7' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	210	18"	39' – 9"	5,576	108	9"	7' – 0"	505	270	9"	4' – 7"	827	15' – 3"	2,750	65' – 6"	175	130	362	4.223	1,113.5	4.7	537	173.7	45,078
2	10' – 0"	8' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	84	18"	39' – 9"	2,230	108	9"	8' – 0"	577	54	9"	4' – 7"	165	17' – 3"	622	21' – 6"	57	46	128	1.593	417.2	1.6	185	65.3	16,871
3	10' – 0"	8' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	119	18"	39' – 9"	3,160	108	9"	8' – 0"	577	108	9"	4' – 7"	331	17' – 3"	1,244	32' – 1"	86	68	189	2.288	593.5	2.4	275	93.9	24,016
4	10' – 0"	8' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	154	18"	39' – 9"	4,089	108	9"	8' – 0"	577	162	9"	4' – 7"	496	17' – 3"	1,867	42' – 8"	114	88	245	2.984	769.8	3.2	359	122.5	31,152
5	10' – 0"	8' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	189	18"	39' – 9"	5,019	108	9"	8' – 0"	577	216	9"	4' – 7"	661	17' – 3"	2,489	53' – 3"	142	110	306	3.679	946.2	3.9	448	151.1	38,295
6	10' – 0"	8' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	224	18"	39' – 9"	5,948	108	9"	8' – 0"	577	270	9"	4' – 7"	827	17' – 3"	3,111	65' – 6"	175	130	362	4.374	1,137.7	4.7	537	179.7	46,045
2	10' – 0"	9' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	90	18"	39' – 9"	2,390	108	9"	9' – 0"	649	54	9"	4' – 7"	165	19' – 3"	694	21' – 6"	57	46	128	1.657	477.8	1.6	185	67.9	19,297
3	10' – 0"	9' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	127	18"	39' – 9"	3,372	108	9"	9' – 0"	649	108	9"	4' – 7"	331	19' – 3"	1,389	32' – 1"	86	68	189	2.374	657.3	2.4	275	97.3	26,567
4	10' – 0"	9' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	164	18"	39' – 9"	4,355	108	9"	9' – 0"	649	162	9"	4' – 7"	496	19' – 3"	2,083	42' – 8"	114	88	245	3.092	836.7	3.2	359	126.8	33,828
5	10' – 0"	9' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	201	18"	39' – 9"	5,337	108	9"	9' – 0"	649	216	9"	4' – 7"	661	19' – 3"	2,778	53' – 3"	142	110	306	3.809	1,016.2	3.9	448	156.3	41,096
6	10' – 0"	9' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	238	18"	39' – 9"	6,320	108	9"	9' – 0"	649	270	9"	4' – 7"	827	19' – 3"	3,472	65' – 6"	175	130	362	4.526	1,210.9	4.7	537	185.8	48,972
2	10' – 0"	10' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	90	18"	39' – 9"	2,390	108	9"	10' – 0"	721	54	9"	4' – 7"	165	21' – 3"	767	21' – 6"	57	46	128	1.722	487.5	1.6	185	70.5	19,685
3	10' – 0"	10' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	127	18"	39' – 9"	3,372	108	9"	10' – 0"	721	108	9"	4' – 7"	331	21' – 3"	1,533	32' – 1"	86	68	189	2.461	668.8	2.4	275	100.8	27,026
4	10' – 0"	10' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	164	18"	39' – 9"	4,355	108	9"	10' – 0"	721	162	9"	4' – 7"	496	21' – 3"	2,300	42' – 8"	114	88	245	3.200	850.0	3.2	359	131.2	34,360
5	10' – 0"	10' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	201	18"	39' – 9"	5,337	108	9"	10' – 0"	721	216	9"	4' – 7"	661	21' – 3"	3,066	53' – 3"	142	110	306	3.938	1,031.3	3.9	448	161.5	41,699
6	10' – 0"	10' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	238	18"	39' – 9"	6,320	108	9"	10' – 0"	721	270	9"	4' – 7"	827	21' – 3"	3,833	65' – 6"	175	130	362	4.677	1,227.8	4.7	537	191.8	49,648

(5) Bar lengths over 60' include one bar lap; refer to MATERIAL NOTES for minimum lap lengths.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

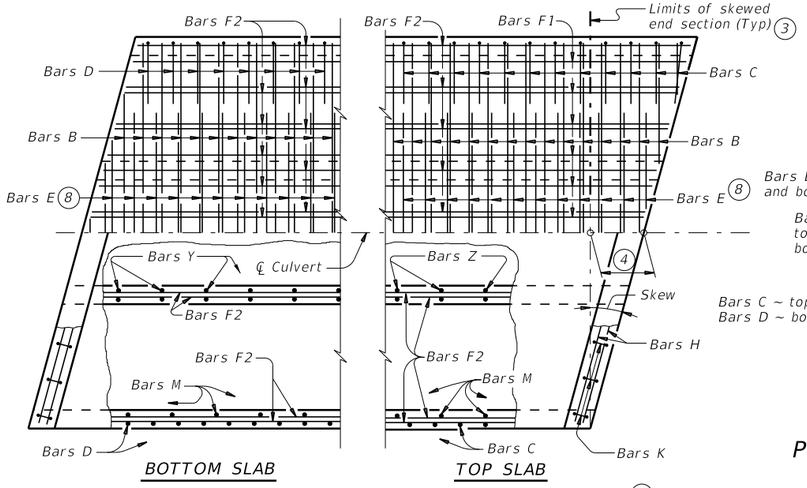
10'-0" SPAN

0' TO 7' FILL

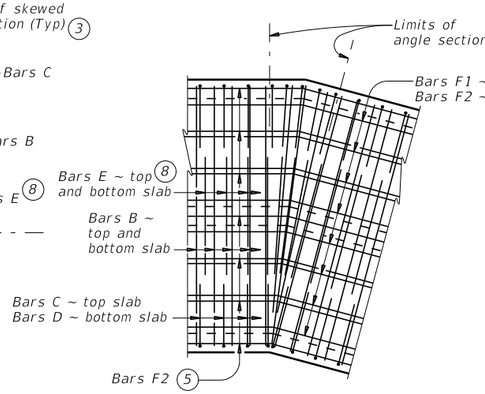
MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		111

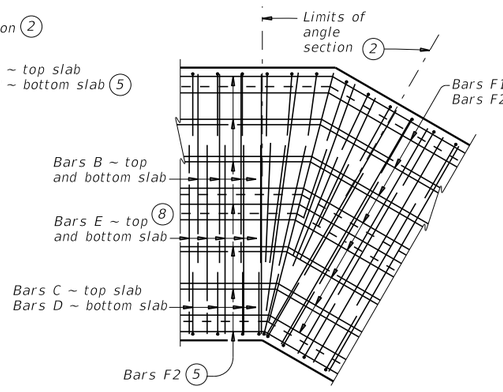
DATE:
FILE:



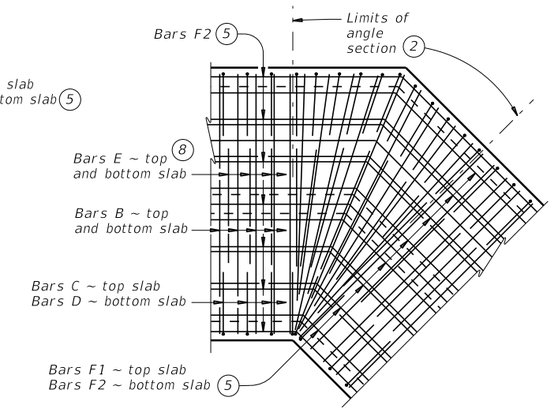
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



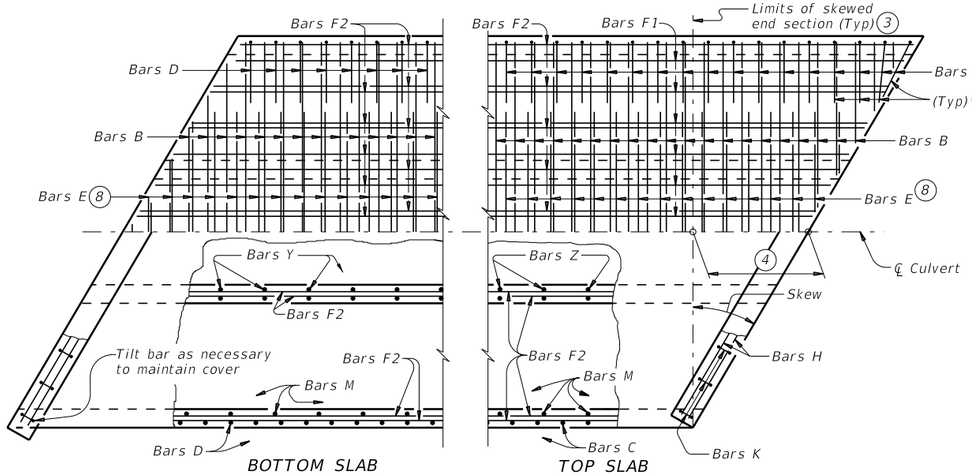
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



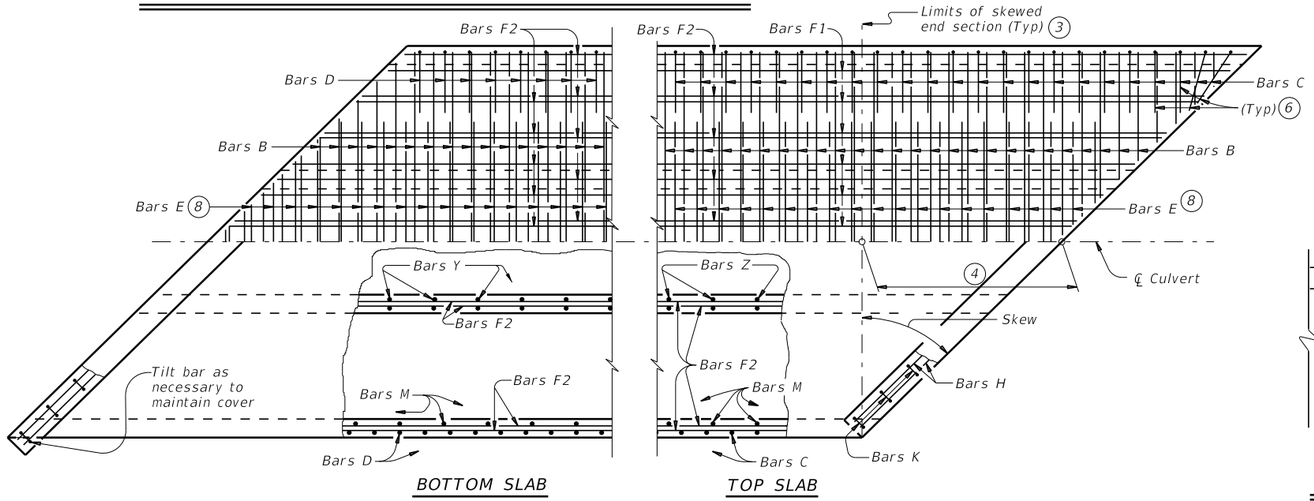
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



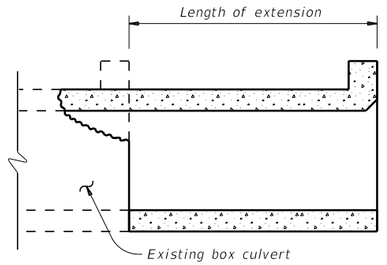
PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



LENGTHENING DETAIL 1

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. 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." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B and Bars E will vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

(8) Extend Bars E as shown on the MC standard sheet for direct traffic culverts.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		112

DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

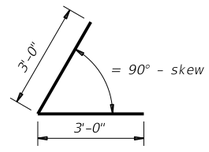
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	48.64	0.406	6.85	0.071
2'–9"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.31	0.424	6.85	0.071
3'–0"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.98	0.444	6.85	0.071
3'–3"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.32	0.462	6.85	0.071
3'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.98	0.480	6.85	0.071
4'–0"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	55.77	0.532	6.85	0.071
4'–6"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	59.77	0.568	6.85	0.071
5'–0"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	63.45	0.632	6.96	0.075
5'–6"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	67.46	0.668	6.96	0.075
6'–0"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	80.67	0.730	7.07	0.078
6'–6"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	85.05	0.768	7.07	0.078
7'–0"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	92.15	0.864	8.07	0.093
7'–6"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	96.54	0.902	8.07	0.093
8'–0"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'–6"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'–6"	6'–0"	2'–10"	2'–2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'–6"	6'–5"	3'–0"	2'–5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'–6"	7'–2"	3'–6"	2'–8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'–6"	7'–8"	3'–9"	2'–11"	1'–0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'–6"	8'–2"	4'–0"	3'–2"	1'–2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'–6"	8'–10"	4'–5"	3'–5"	1'–4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'–6"	9'–6"	4'–10"	3'–8"	1'–6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'–0"	9'–11"	5'–0"	3'–11"	1'–7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

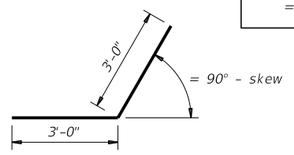
Bar	Size	No.	Spa
D1	#6	~	1'–0"
D2	#6	~	1'–0"
E1	#4	~	1'–0"
F	#4	~	1'–0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'–0"
V	#4	~	1'–0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'–0"
M2	#4	2	~
E2	#4	~	1'–0"



BARS D1



BARS D2

WING DIMENSION FORMULAS:

(All values are in feet.)

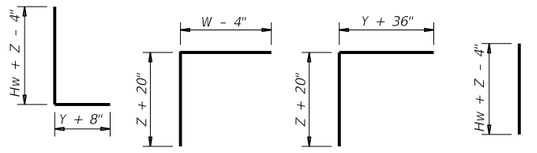
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW–1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW–2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW–2 and Hw < 4'

For cast–in–place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

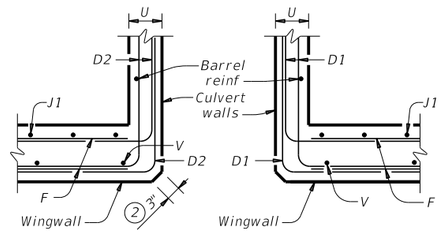
For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW–1
= (2)(Hw)(Lw) – 6 SF for Type PW–2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW–2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

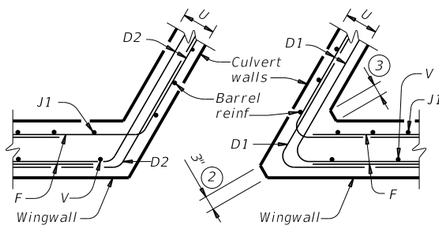
See applicable box culvert standard sheet for S, H, T, and U values.



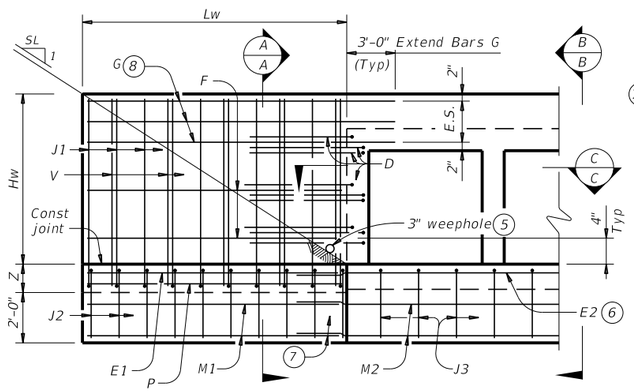
BARS J1 BARS J2 BARS J3 BARS V



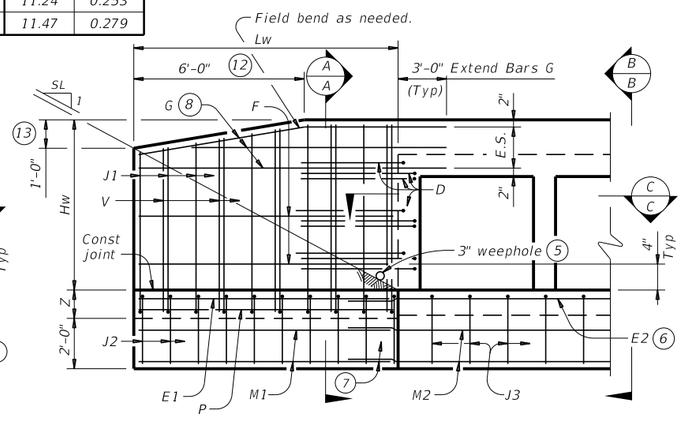
SECTION C-C - PW-1



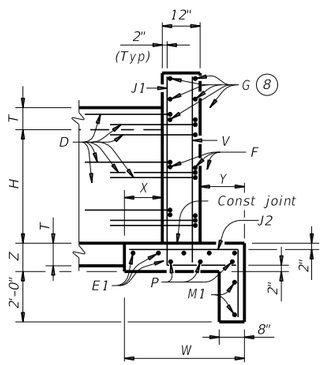
SECTION C-C - PW-2



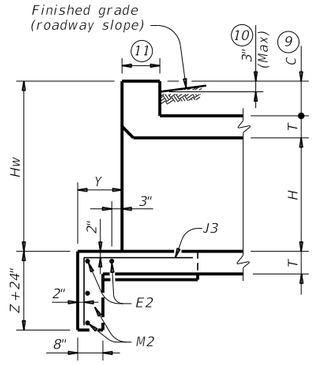
PARTIAL ELEVATION - PW-1



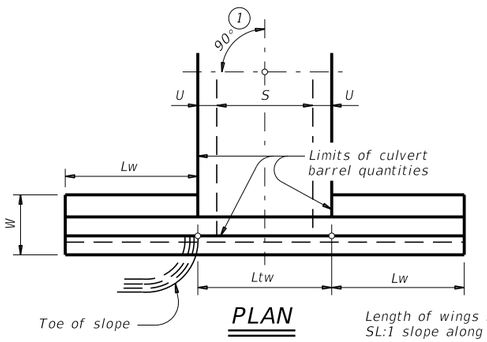
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

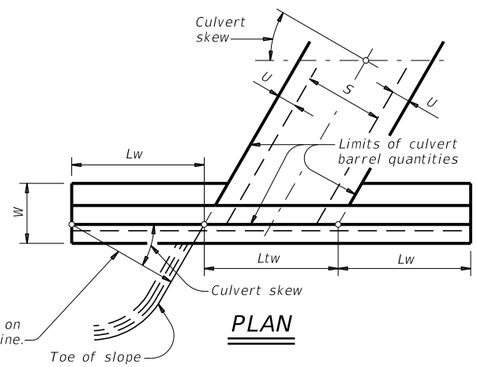


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW–1 wings. Adjust concrete volume for Type PW–2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'–0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'–6" minimum into the wingwall footing.
7. Lap Bars M1 1'–6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'–0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW–1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW–2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation

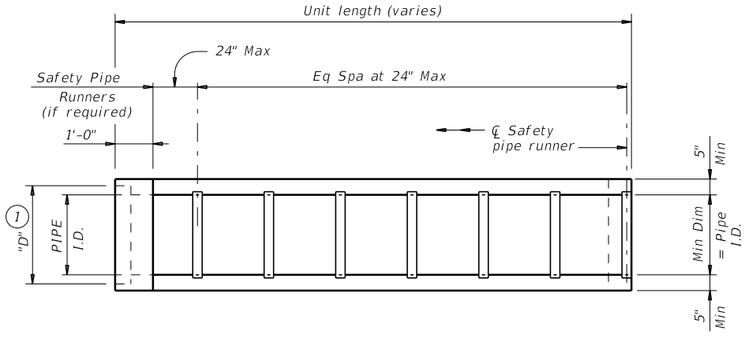
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

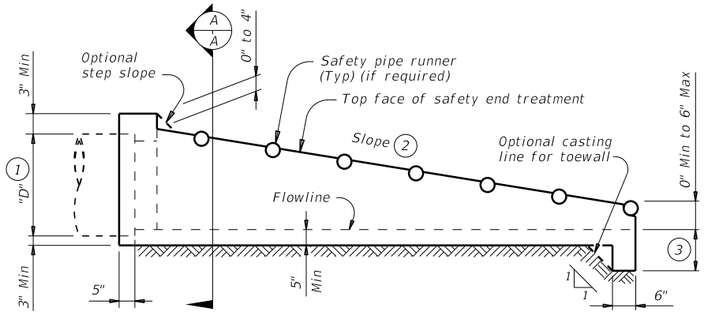
FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		113

DATE:
FILE:



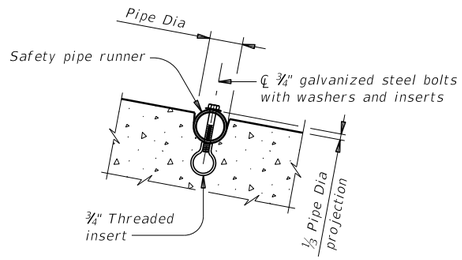
PLAN

(Showing bell end connection.)



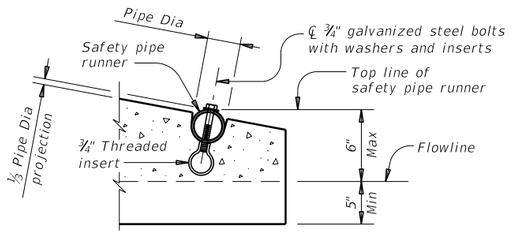
LONGITUDINAL ELEVATION

(Showing bell end connection.)

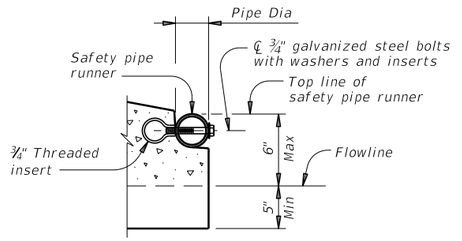


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



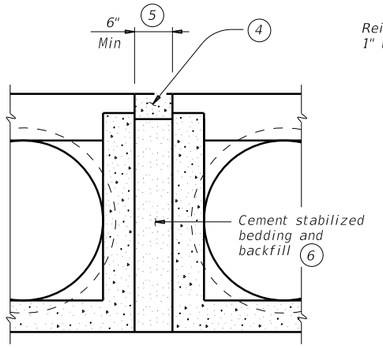
OPTION A



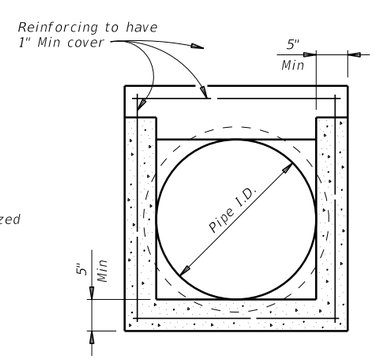
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

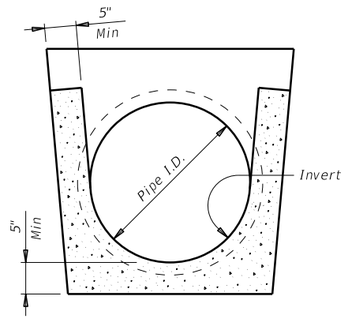
(If required)



MULTIPLE PIPE INSTALLATION

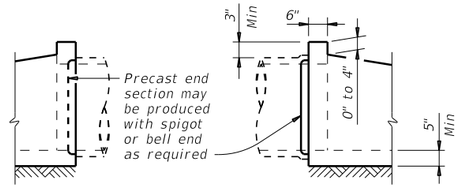


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280–2F, "Safety Treatment of Roadside Parallel–Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

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

Texas Department of Transportation

Bridge Division Standard

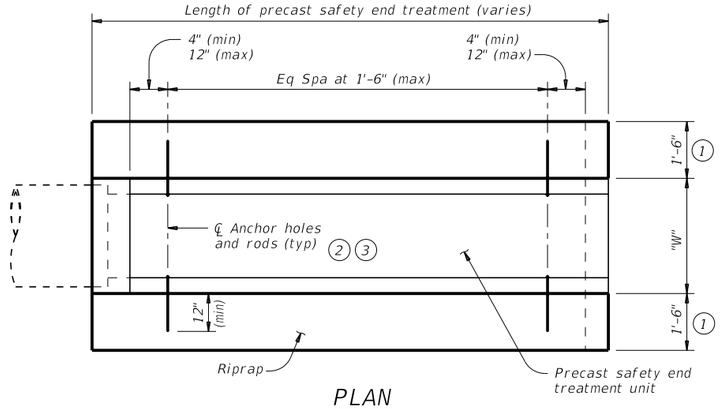
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

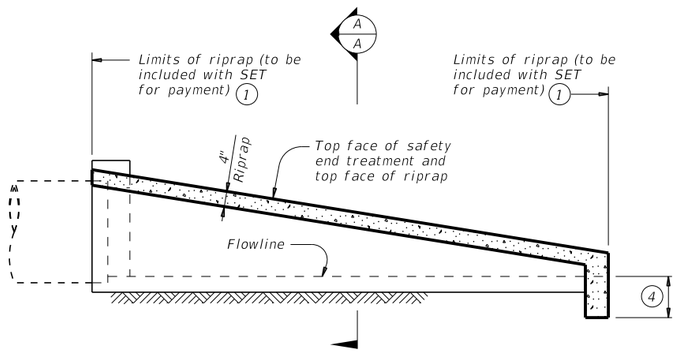
PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0912	31	296, ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		114

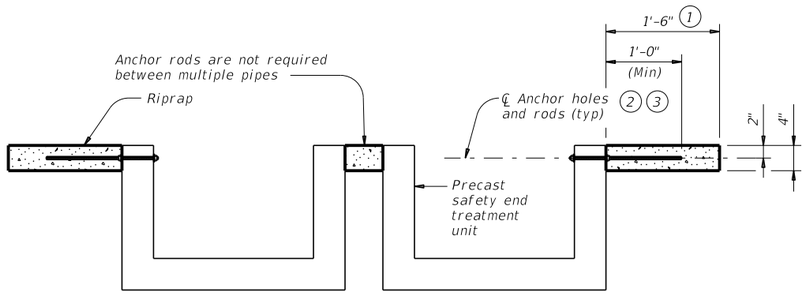
DATE:
FILE:



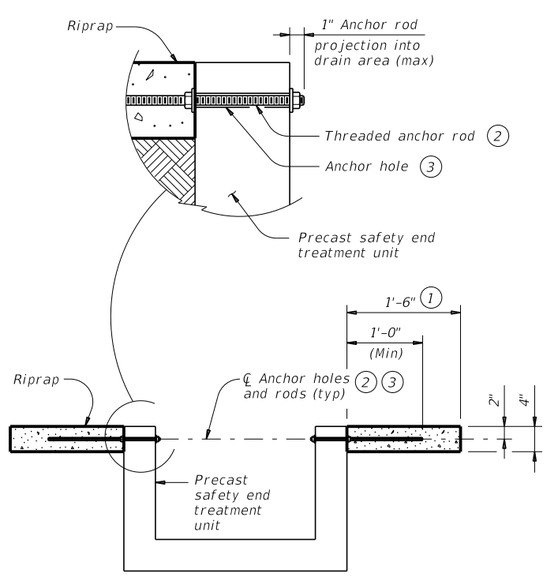
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".
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. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".
Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.
For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.
Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

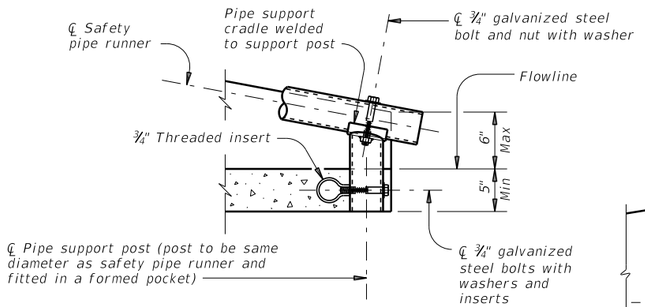
FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		115

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

DATE:
FILE:

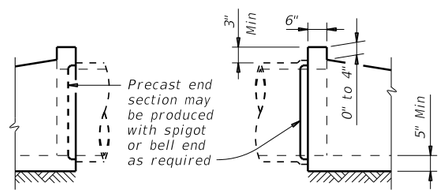
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



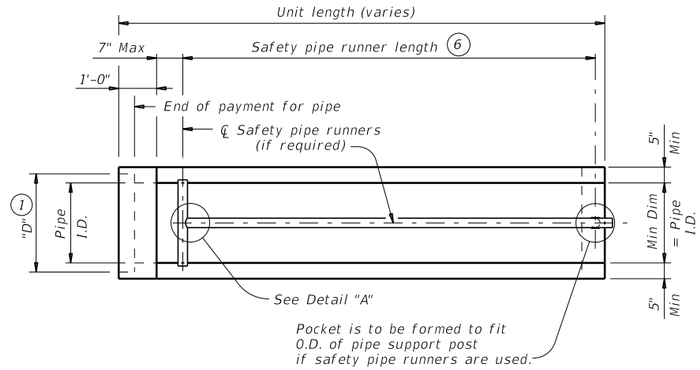
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



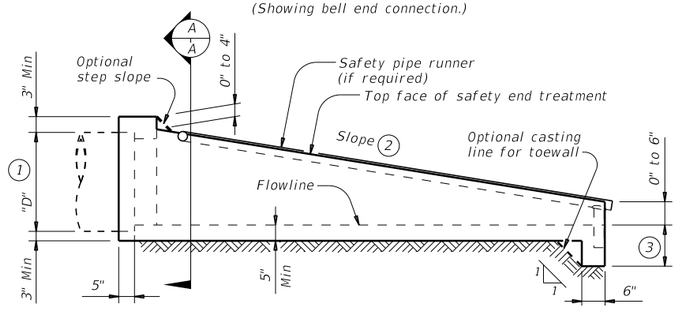
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



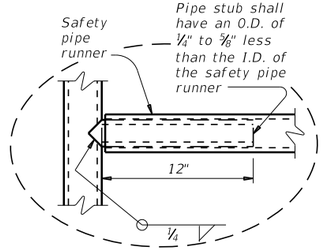
PLAN

(Showing bell end connection.)

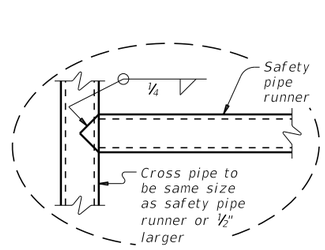


LONGITUDINAL ELEVATION

(Showing bell end connection.)



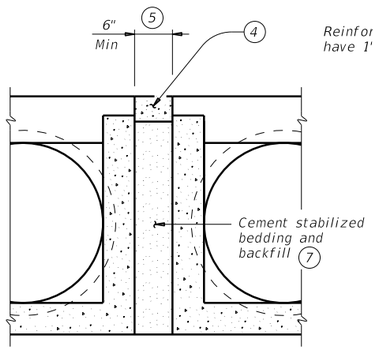
OPTION A



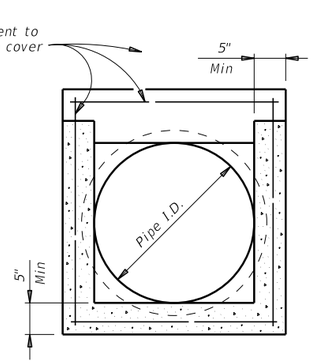
OPTION B

DETAIL A

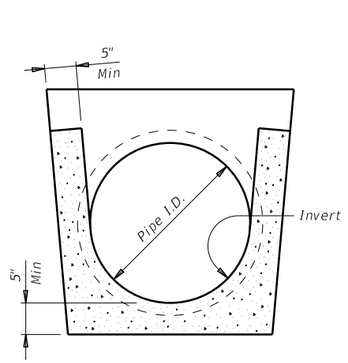
(If required)



MULTIPLE PIPE INSTALLATION

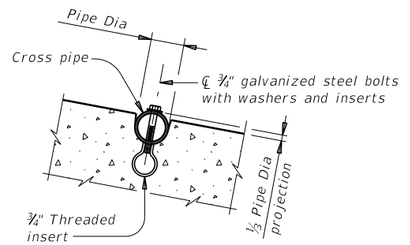


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

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

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

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

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

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

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

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

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

Texas Department of Transportation

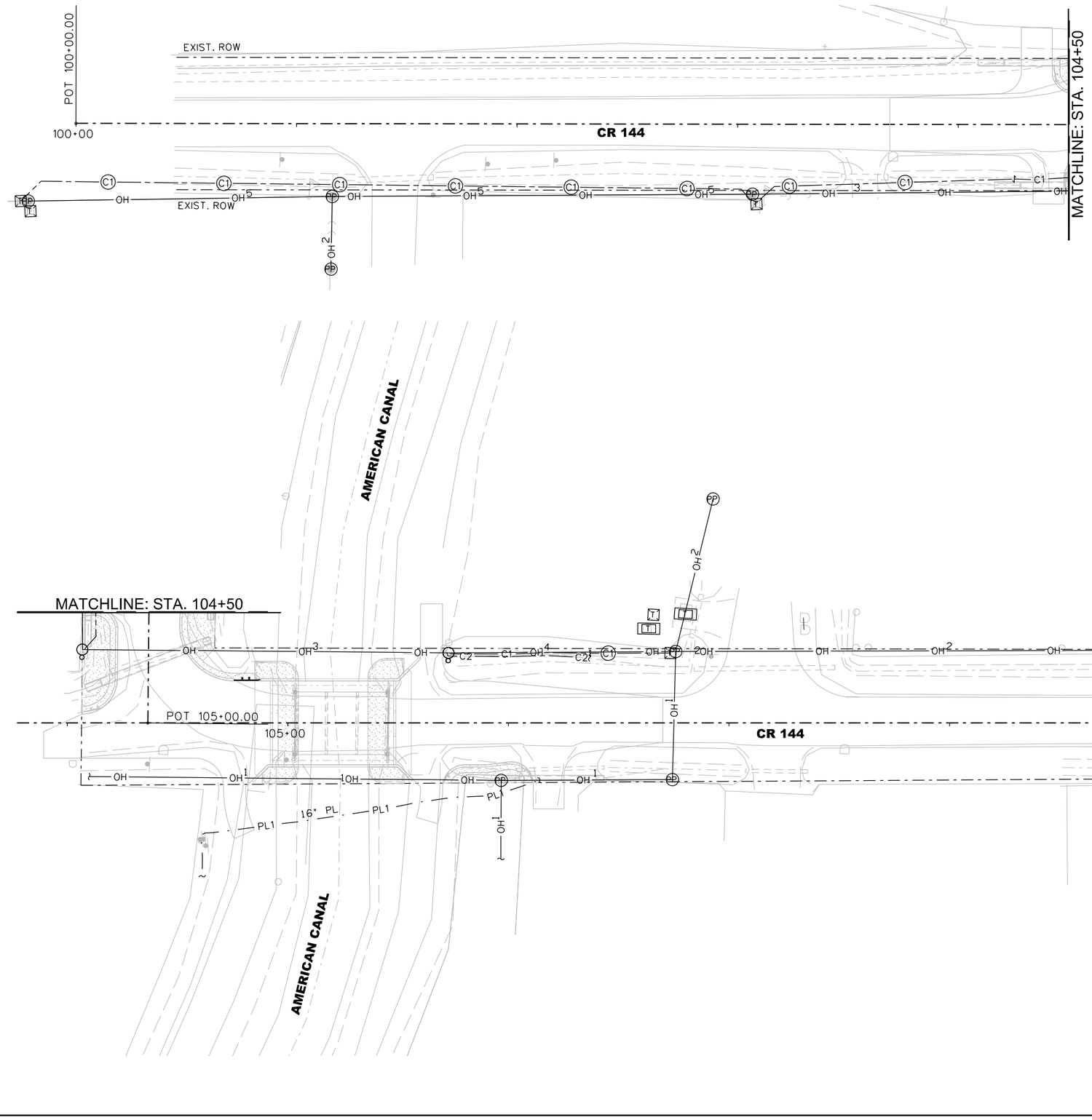
Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		116



0 25 50

GRAPHIC SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS

QL "B"
AT&T (TELE) C1
AT&T (FO/DUCT) C2

QL "C"/QL "D"
AT&T (TELE) C1
AT&T (FO/DUCT) C2

GAS / PETROLEUM

QL "B"
DENBURY GREEN PL1

QL "C"/QL "D"
DENBURY GREEN PL1

OVERHEAD UTILITY

QL "C"/QL "D"
CENTERPOINT ENERGY OH 1
CENTERPOINT ENERGY W/AT&T TELE OH 2
AT&T TELE/AT&T FOC OH 3
AT&T TELE OH 4
CENTERPOINT ENERGY W/AT&T TELE AND AT&T FOC OH 5

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
CATV CABINET
CATV HANDHOLE
CATV PEDESTAL
FIBER HANDHOLE
TELEPHONE CABINET
TELEPHONE HANDHOLE (VAULT)
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC JUNCTION BOX (CABINET)
ELECTRIC MANHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
LIGHT POLE
SIGNAL POLE
SIGNAL HANDHOLE/BOX
TRANSMISSION POLE
GAS METER
GAS TEST STATION
GAS VALVE
GAS VENT PIPE (GAS RISER)

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
7400 Sand Street
Fort Worth, TX 76118

The Rios Group, Inc.
TBPE Firm #F-14595

STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER
04-21-2022

CR 144 AT AMERICAN CANAL
UTILITY LAYOUT

DESIGNED BY: CAB	CHECKED BY: JSA	DATE: 04/21/2022

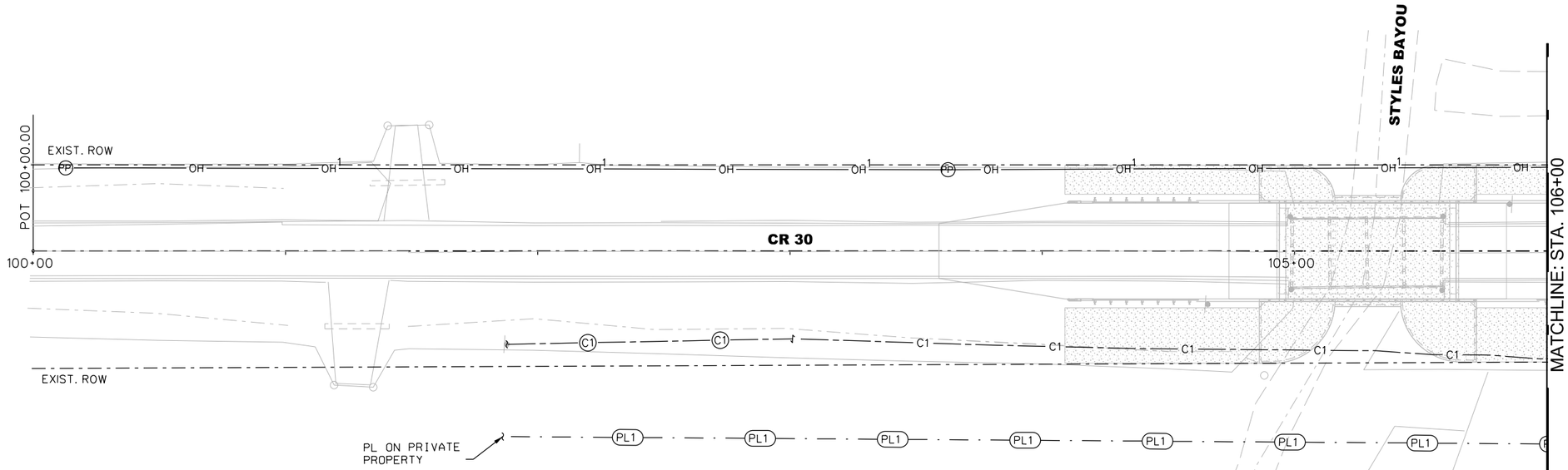
TRG PROJECT NUMBER	SUE SHEET NO.	DATE
JACB_2003.02	1	04/21/2022

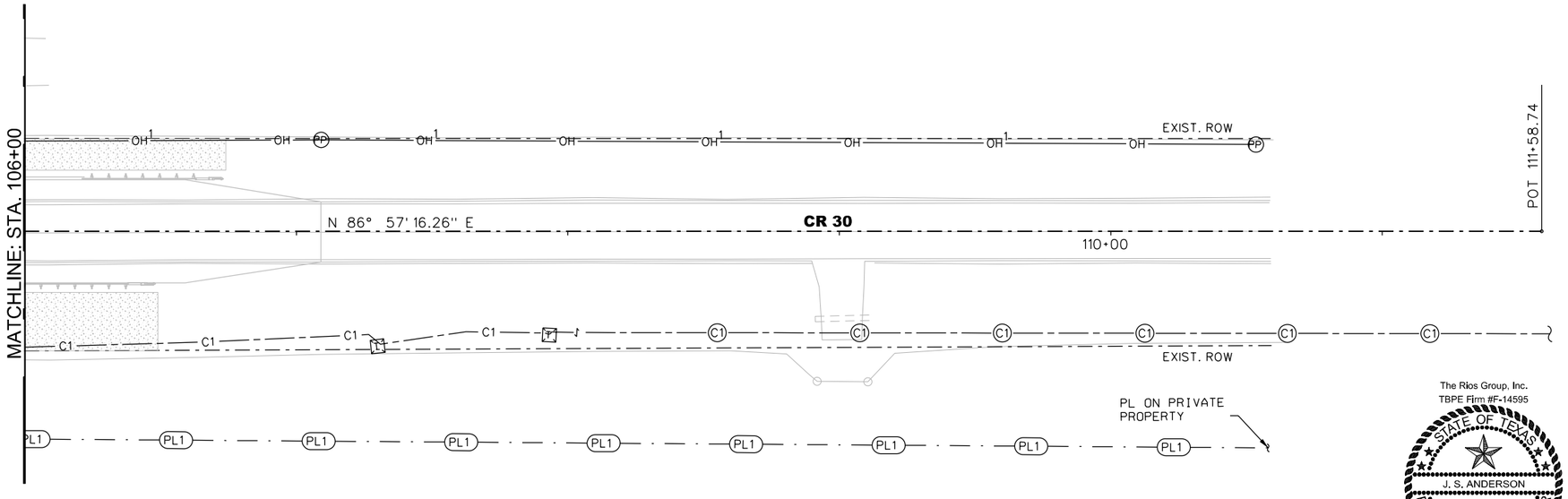
CSJ NUMBER	PLAN SHEET NO.
0912-31-307	117

STATE	DISTRICT	COUNTY
TX	HOUSTON	BRAZORIA

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.





LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

COMMUNICATIONS
AT&T (TELE) — QL "B"
AT&T (TELE) — QL "C"/QL "D"

GAS / PETROLEUM
DOW/SEADRIFT — QL "B"
DOW/SEADRIFT — QL "C"/QL "D"

OVERHEAD UTILITY
TNMP W/AT&T FOC — QL "C"/QL "D"

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
CATV CABINET
CATV HANDHOLE
CATV PEDESTAL
FIBER HANDHOLE
TELEPHONE CABINET
TELEPHONE HANDHOLE (VAULT)
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC HANDHOLE
ELECTRIC JUNCTION BOX (CABINET)
ELECTRIC MANHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
LIGHT POLE
SIGNAL POLE
SIGNAL HANDHOLE/BOX
TRANSMISSION POLE
GAS METER
GAS TEST STATION
GAS VALVE
GAS VENT PIPE (GAS RISER)

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
7400 Sand Street
Fort Worth, TX 76118

TEXAS DEPARTMENT OF TRANSPORTATION

CR 30 AT STYLES BAYOU
UTILITY LAYOUT

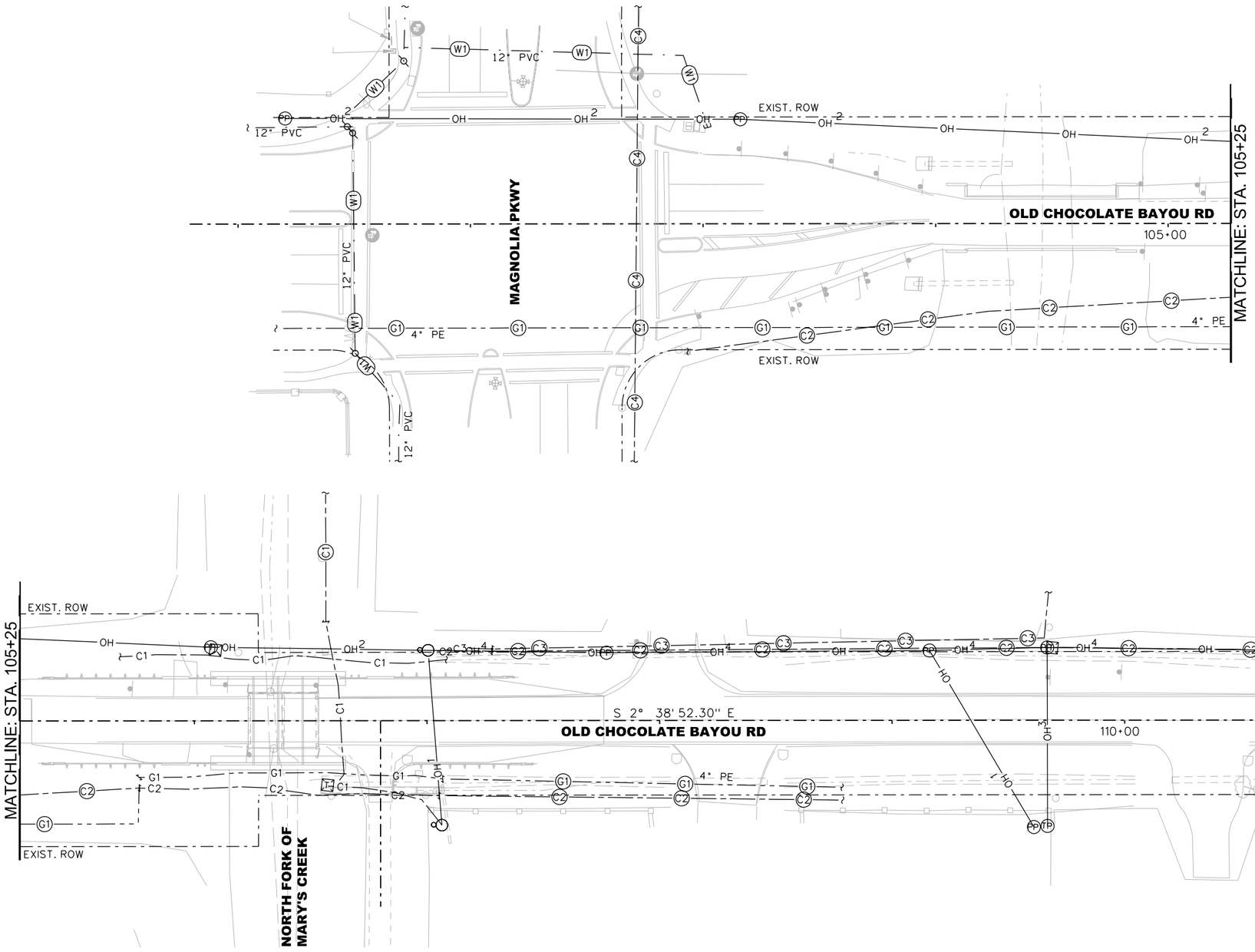
The Rios Group, Inc.
TBPE Firm #F-14595

STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER
04-21-2022

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been Investigated In accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

DESIGNED BY: CAB	CHECKED BY: JSA	DATE: 04/21/2022
TRG PROJECT NUMBER	SUE SHEET NO.	DATE
JACB_2003.02	2	04/21/2022
CSJ NUMBER		PLAN SHEET NO.
0912-31-307,ETC		118
STATE	DISTRICT	COUNTY
TX	HOUSTON	BRAZORIA



0 25 50

GRAPHIC SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY —X—X—X—X—
PROPOSED UTILITY ———————
UNKNOWN UTILITY — — — — —

COMMUNICATIONS

QL "B"
AT&T (TELE) — — — C1 — — —
AT&T (FO/DUCT) — — — C2 — — —
COMCAST (FO/DUCT) — — — C3 — — —
CROWN CASTLE (FO/DUCT) — — — C4 — — —

QL "C"/QL "D"
AT&T (TELE) — — — (C1) — — —
AT&T (FO/DUCT) — — — (C2) — — —
COMCAST (FO/DUCT) — — — (C3) — — —
CROWN CASTLE (FO/DUCT) — — — (C4) — — —

GAS / PETROLEUM

QL "B"
CENTERPOINT ENERGY — — — G1 — — —

QL "C"/QL "D"
CENTERPOINT ENERGY — — — (G1) — — —

POTABLE WATER

QL "B"
CITY OF PEARLAND — · — W1 — · —

QL "C"/QL "D"
CITY OF PEARLAND — · — (W1) — · —

OVERHEAD UTILITY

QL "C"/QL "D"
CENTERPOINT ENERGY ——— OH[1] ———
CENTERPOINT ENERGY W/AT&T FOC AND COMCAST FOC ——— OH[2] ———
UNK COMMUNICATION ——— OH[3] ———
CENTERPOINT ENERGY W/ UNK COMMUNICATION ——— OH[4] ———

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
CATV CABINET
CATV HANDHOLE
CATV PEDESTAL
FIBER HANDHOLE
TELEPHONE CABINET
TELEPHONE HANDHOLE (VAULT)
TELEPHONE MANHOLE
TELEPHONE PEDESTAL
TELEPHONE POLE
TELEPHONE POLE W/RISER
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
FIRE HYDRANT
WATER MANHOLE
WATER METER
WATER VALVE

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
7400 Sand Street
Fort Worth, TX 76118

OLD CHOCOLATE BAYOU AT NORTH FORK OF MARY'S CREEK UTILITY LAYOUT

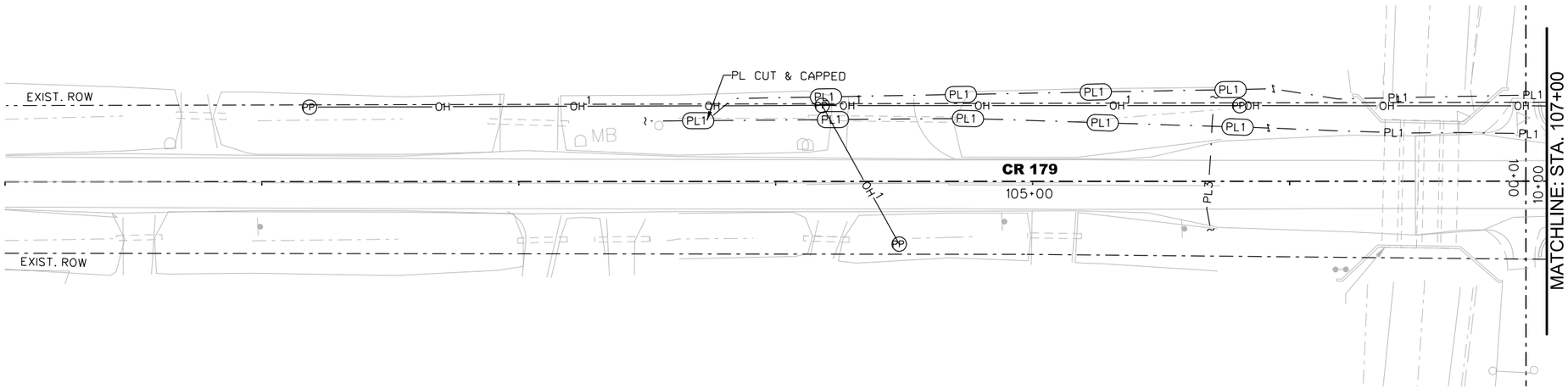
The Rios Group, Inc.
TBPE Firm #F-14595

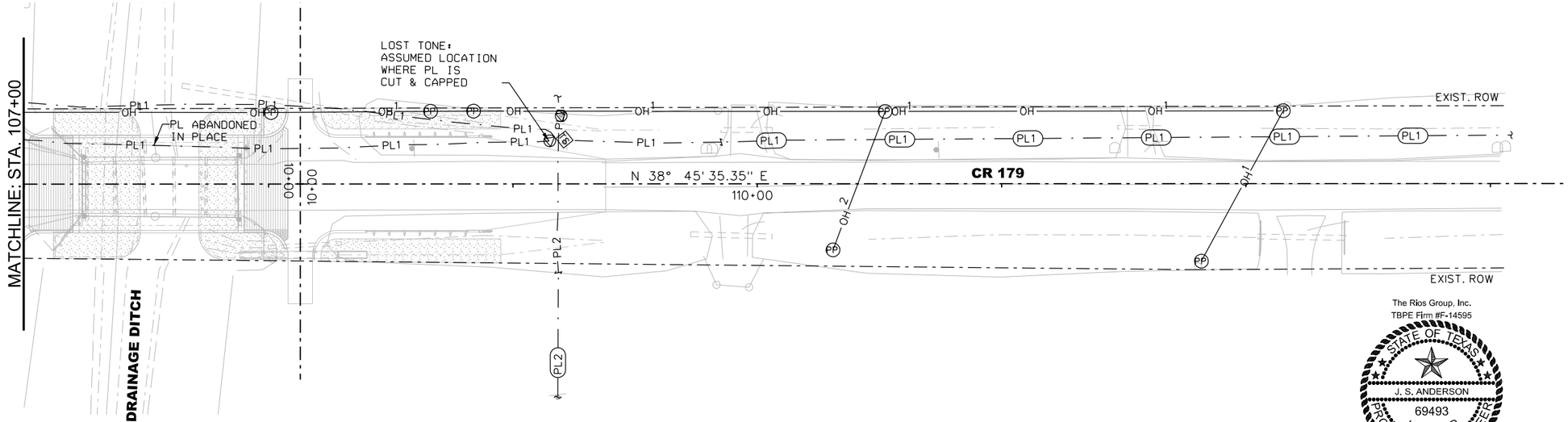
STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED PROFESSIONAL ENGINEER
04-21-2022

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been Investlgated In accordance wlth standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

DESIGNED BY: CAB	CHECKED BY: JSA	DATE: 04/21/2022
TRG PROJECT NUMBER	SUE SHEET NO.	DATE
JACB_2003.02	3	04/21/2022
CSJ NUMBER		PLAN SHEET NO.
0912-31-307,ETC		119
STATE	DISTRICT	COUNTY
TX	HOUSTON	BRAZORIA





0 25 50

GRAPHIC SCALE IN FEET

LEGEND OF UTILITY TYPES

ABANDONED UTILITY
PROPOSED UTILITY
UNKNOWN UTILITY

GAS / PETROLEUM

QL "B"
GENESIS
MONUMENT
BLUE RIDGE

QL "C"/QL "D"
GENESIS
MONUMENT
BLUE RIDGE

OVERHEAD UTILITY

QL "C"/QL "D"
CENTERPOINT ENERGY
W/AT&T TELE
CENTERPOINT ENERGY

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION

ELECTRIC HANDHOLE
ELECTRIC JUNCTION BOX (CABINET)
ELECTRIC MANHOLE
ELECTRIC POLE (POWER)
ELECTRIC POLE W/RISER
LIGHT POLE
SIGNAL POLE
SIGNAL HANDHOLE/BOX
TRANSMISSION POLE

GAS METER
GAS TEST STATION
GAS VALVE
GAS VENT PIPE (GAS RISER)

REV	DATE	BY	DESCRIPTION

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION
7400 Sand Street
Fort Worth, TX 76118

The Rios Group, Inc.
TBPE Firm #F-14595

STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER
04-21-2022

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been Investlgated In accordance wlth standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

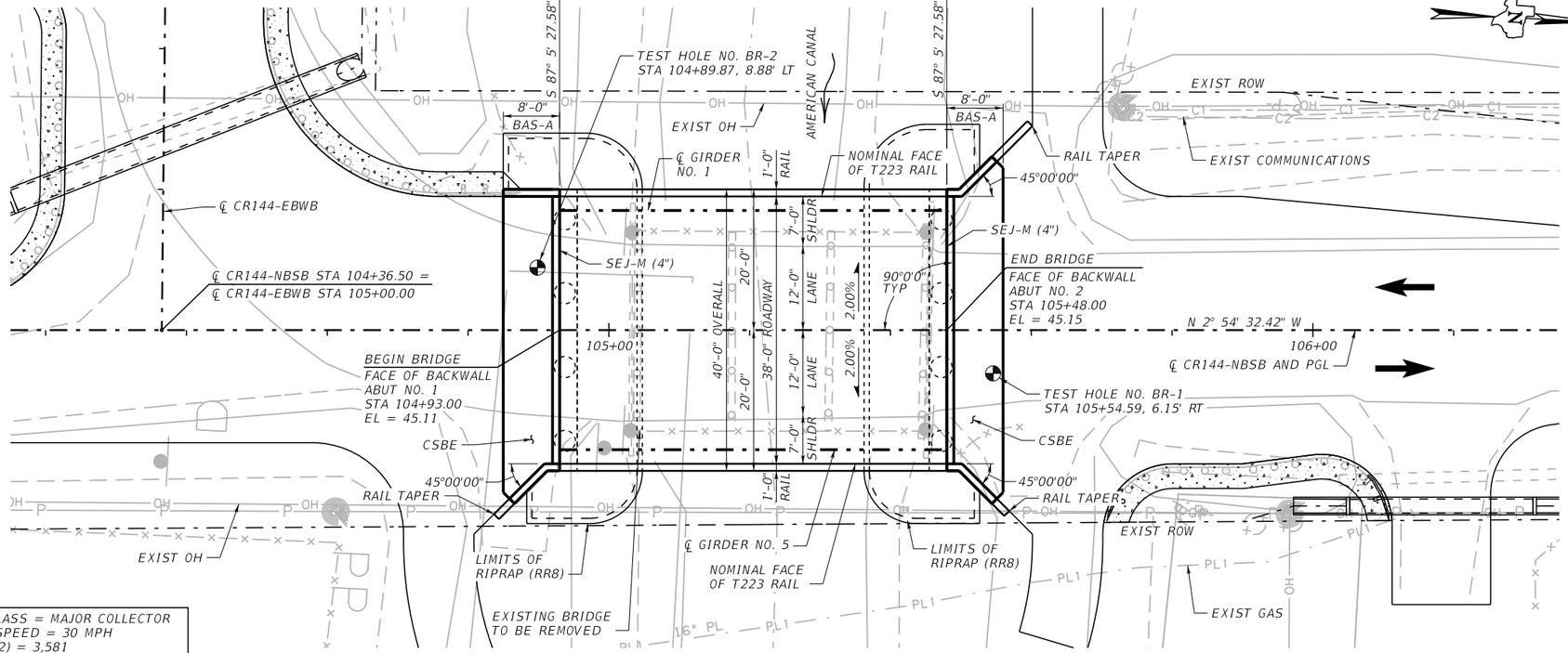
CR 179 AT DRAINAGE DITCH
UTILITY LAYOUT

DESIGNED BY: CAB	CHECKED BY: JSA	DATE: 04/21/2022

TRG PROJECT NUMBER	SUE SHEET NO.	DATE
JACB_2003.02	4	04/21/2022

CSJ NUMBER	PLAN SHEET NO.
0912-31-307,ETC	120

STATE	DISTRICT	COUNTY
TX	HOUSTON	BRAZORIA



PLAN

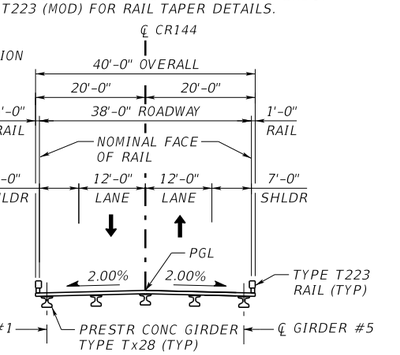
FUNCT CLASS = MAJOR COLLECTOR
DESIGN SPEED = 30 MPH
ADT (2022) = 3,581
ADT (2042) = 4,859
EXIST NBI = 12-020-0-AA06-74-001
PROP NBI = 12-020-0-AA06-74-303

GENERAL NOTES:

1. DESIGNED FOR HL93 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AS MODIFIED BY TXDOT LRFD BRIDGE DESIGN MANUAL.
2. FOR BORING LOG DETAILS, SEE BORING DATA SHEET.
3. REMOVE 3-SPAN 42' LONG X 27'-0" WIDE TIMBER DECK ON TIMBER STRINGERS EXISTING BRIDGE.
4. THE EXISTING BRIDGE HAS BEEN TESTED FOR ASBESTOS CONTAINING MATERIALS (ACM) AND FOUND TO CONTAIN GREATER THAN 1% ACM AND WILL BE ABATED DURING CONSTRUCTION. THE ACM WERE FOUND IN THE FOLLOWING AREAS: FELT PAD BETWEEN PIER AND PIER CAP. THE CONTRACTOR SHALL REMOVE THE BRIDGE DECK, STRINGERS, AND PIER CAPS. A SPECIALTY CONTRACTOR SHALL THEN REMOVE EXPOSED ACM FELT PADS. THE CONTRACTOR SHALL THEN REMOVE BRIDGE PIERS. THE CONTRACTOR SHALL COORDINATE THE OVERALL WORK WITH THE SPECIALTY CONTRACTOR WHO PERFORMS THE ABATING WORK.
5. D DENOTES TO DOWELS AT OUTSIDE BEAM ENDS.
6. SEE T223 (MOD) FOR RAIL TAPER DETAILS.

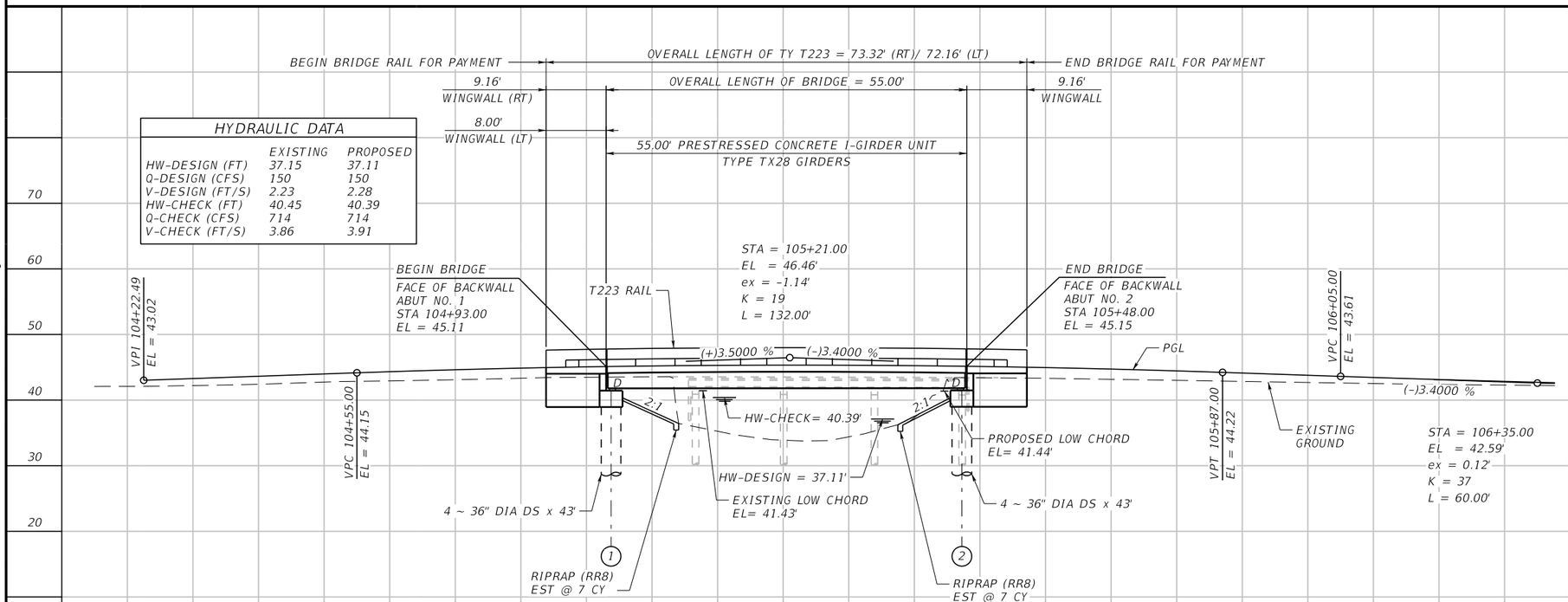
LEGEND:

BORE LOCATION



TYPICAL SECTION

0 5 10 20
SCALE: 1"=20'



ELEVATION

STATE OF TEXAS
GREGORY S HANSEN
134271
LICENSED
PROFESSIONAL ENGINEER

04/19/2022

NO.	DATE	REVISION	APPROV

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING — SHEET 1 OF 1

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CR 144

BRIDGE LAYOUT

AMERICAN CANAL BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		121

$USER$
4/19/2022 3:23:52 PM \\USLASO-APP385\ICS_workdir\661\1004694_4\J_307_CR144_BR_BL01.dgn
$PWURL $PWPATH FILENAME: PLOT DATE: PLOT TIME:

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-1	District	Houston
	Highway	CR 144	Structure	Bridge	Date	10/21/20
	CSJ	0912-31-307	Station	105+54.59	Grnd. Elev.	43.36 ft
			Offset	6.15' 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	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
42.0			PAVEMENT, 4" Asphaltic Concrete, 12" Asphalt w/ Sand and Limestone							
			CLAY, Fat w/ Sand, very soft, dark gray to gray and reddish brown (CH)			33				
5		3 (6) 4 (6)				44	102	59		% Passing #200 Sieve: 77.8
						37				
34.4										
10		2 (6) 1 (6)	CLAY, Fat, very soft, gray and reddish brown, w/ ferrous stains at 10'-12' and slickensided at 12'-14' (CH)							% Passing #200 Sieve: 88.1
31.4			CLAY, Fat w/ Sand, very soft, gray and reddish brown, w/ ferrous stains at 15'-17' (CH)	11	11	38			114	
15		3 (6) 3 (6)				38	89	55		% Passing #200 Sieve: 77.1
						28				
24.4			SILT, loose, reddish brown and gray (ML)							
20		4 (6) 5 (6)				22				% Passing #200 Sieve: 91.9
19.4			CLAY, Fat w/ Sand, soft to stiff, reddish brown and gray, w/ sand pockets at 27'-29', calcareous nodules at 42'-44' and slickensided at 32'-34' and 42'-44' (CH)							
25		7 (6) 5 (6)				26				
30		4 (6) 5 (6)		22	32.3	28	72	39	126	% Passing #200 Sieve: 78.9
35		7 (6) 8 (6)				34				
40		8 (6) 7 (6)		26	23.9	38			117	
45		10 (6) 12 (6)				26	68	40		% Passing #200 Sieve: 73.7
-7.1		11 (6) 13 (6)	CLAY, Lean w/ Sand, stiff, reddish brown and gray, w/ calcareous nodules at 57'-69' (CL)	31	45.5	22			130	
55		13 (6) 15 (6)				20	48	28		% Passing #200 Sieve: 76.8
60		15 (6) 16 (6)								

Remarks: Water level was encountered at 20' below the existing grade during drilling operations; at 18' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger:** EE **Organization:** HVJ Associates, Inc.

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-1	District	Houston
	Highway	CR 144	Structure	Bridge	Date	10/21/20
	CSJ	0912-31-307	Station	105+54.59	Grnd. Elev.	43.36 ft
			Offset	6.15' 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	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			CLAY, Lean w/ Sand, stiff, reddish brown and gray, w/ calcareous nodules at 57'-69' (CL)							
65		15 (6) 14 (6)		37	48.5	19			129	
-25.6										
70		12 (6) 14 (6)	CLAY, Fat w/ Sand, stiff, reddish brown and gray, slickensided at 77'-79' (CH)							
75		13 (6) 14 (6)				27	67	39		% Passing #200 Sieve: 73.3
-36.6		14 (6) 14 (6)		42	38.9	26			124	
80										

Remarks: Water level was encountered at 20' below the existing grade during drilling operations; at 18' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger:** EE **Organization:** HVJ Associates, Inc.

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K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

CR 144

DRILLING LOGS

AMERICAN CANAL BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		122

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-2	District	Houston
	Highway	CR 144	Structure	Bridge	Date	10/22/20
	CSJ	0912-31-307	Station	104+89.87	Grnd. Elev.	43.33 ft
			Offset	8.88' LT	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
42.3			PAVEMENT, 2" Asphaltic Concrete, 10" Asphalt							
			CLAY, Fat w/ Sand, very soft, gray to dark gray and brown, w/ shells at 1'-2' and ferrous stains at 2'-4' (CH)			24	84	48		% Passing #200 Sieve: 79.2 Sulfate Content: 0 ppm
37.8		4 (6) 4 (6)			16.6	32			120	
			CLAY, Fat, very soft, gray and brown, w/ sand seams at 7'-9' (CH)			42	94	56		% Passing #200 Sieve: 86.3
32.8		3 (6) 3 (6)								
			CLAY, Fat w/ Sand, soft, reddish brown and gray, w/ ferrous stains at 10'-12' (CH)			32				
		5 (6) 4 (6)		14	16.8	30			121	
24.3		3 (6) 4 (6)	SAND, Silty, very loose, brown (SM)			29	72	40		% Passing #200 Sieve: 84.7
						22				% Passing #200 Sieve: 42.1
19.3		15 (6) 14 (6)	CLAY, Fat, stiff, reddish brown, w/ sand seams at 27'-29' (CH)							
				19	31.2	23	61	36	132	% Passing #200 Sieve: 98.6
14.3		9 (6) 10 (6)	CLAY, Fat w/ Sand, soft to stiff, reddish brown and gray, w/ calcareous nodules at 37'-44' and ferrous stains at 42'-44' and 52'-54' (CH)			31				
		6 (6) 7 (6)								
		7 (6) 8 (6)								
		6 (6) 8 (6)		25	27.2	33	85	46	119	% Passing #200 Sieve: 82.5
		11 (6) 13 (6)								
		12 (6) 14 (6)				22				
-15.7		14 (6) 15 (6)		32	23.2	21	60	36	126	% Passing #200 Sieve: 82.3

Remarks: Water level was encountered at 20' below the existing grade during drilling operations; at 15.7' and 15.5' after 5 minutes and 10 minutes, respectively.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger:** EE **Organization:** HVJ Associates, Inc.

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WinCore Version 3.1	County	Brazoria	Hole	BR-2	District	Houston
	Highway	CR 144	Structure	Bridge	Date	10/22/20
	CSJ	0912-31-307	Station	104+89.87	Grnd. Elev.	43.33 ft
			Offset	8.88' LT	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, reddish brown and gray, w/ calcareous nodules at 62'-69' and ferrous stains at 62'-64' (CH)							
65		12 (6) 13 (6)								
				36	44.8	20			126	
70		14 (6) 16 (6)								
						21	52	30		% Passing #200 Sieve: 96.5
75		12 (6) 14 (6)								
				41	42.5	30			123	
-36.7		14 (6) 15 (6)								
80										

Remarks: Water level was encountered at 20' below the existing grade during drilling operations; at 15.7' and 15.5' after 5 minutes and 10 minutes, respectively.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger:** EE **Organization:** HVJ Associates, Inc.

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STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED
PROFESSIONAL ENGINEER

K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

CR 144

DRILLING LOGS

AMERICAN CANAL BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		123

BRIDGE ESTIMATED QUANTITIES OF CR 144							
LOCATION	416 6004 DRILL SHAFT (36 IN)	420 6013 CL C CONC (ABUT)	422 6001 REINF CONC SLAB	425 6035 PRESTR CONC GIRDER (TX28)	432 6008 RIPRAP (CONC)(CL B)(RR8&RR9)	450 6006 RAIL (TY T223)	454 6018 SEALED EXPANSION JOINT (4 IN) (SEJ – M)
	LF	CY	SF	LF	CY	LF	LF
2 – ABUTMENTS	344	44.4			14		
1 – 55.00' PRESTR CONC GIRDER UNIT			2200	272.50		145.5	80
PROJECT TOTALS	344	44.4	2200	272.50	14	145.5	80

BEARING SEAT ELEVATIONS

		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
ABUT 1	(FWD)	41.220	41.390	41.560	41.390	41.220
ABUT 2	(BK)	41.260	41.430	41.600	41.430	41.260

04/18/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

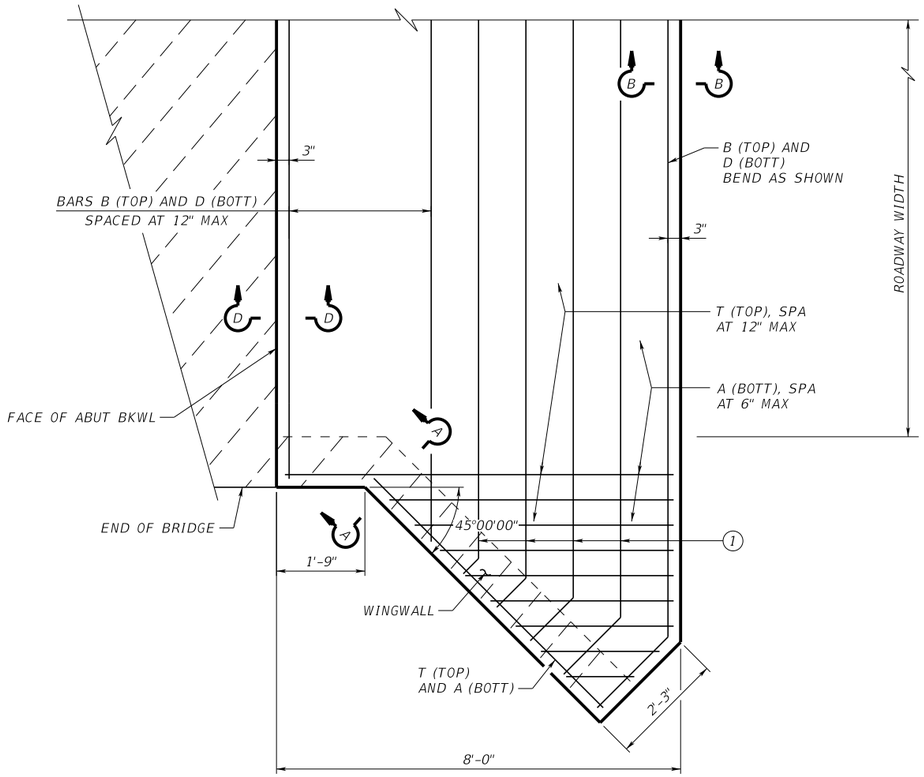
HL93 LOADING SHEET 1 OF 1

CR 144

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

AMERICAN CANAL BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		124



PLAN

(SHOWING FLARED WINGWALL)
FOR STRAIGHT WINGWALL SEE STANDARD "BAS-A"

NOTES:

1. SEE STANDARD "BAS-A" FOR SECTION A-A, B-B, AND D-D.
2. SEE STANDARD "BAS-A" FOR TYPICAL DETAILS AND NOTES.

(1) BEND BARS B AND D AS NECESSSARY TO MAINTAIN 12" SPACING

STATE OF TEXAS
GREGORY S HANSEN
134271
LICENSED
PROFESSIONAL ENGINEER

04/18/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

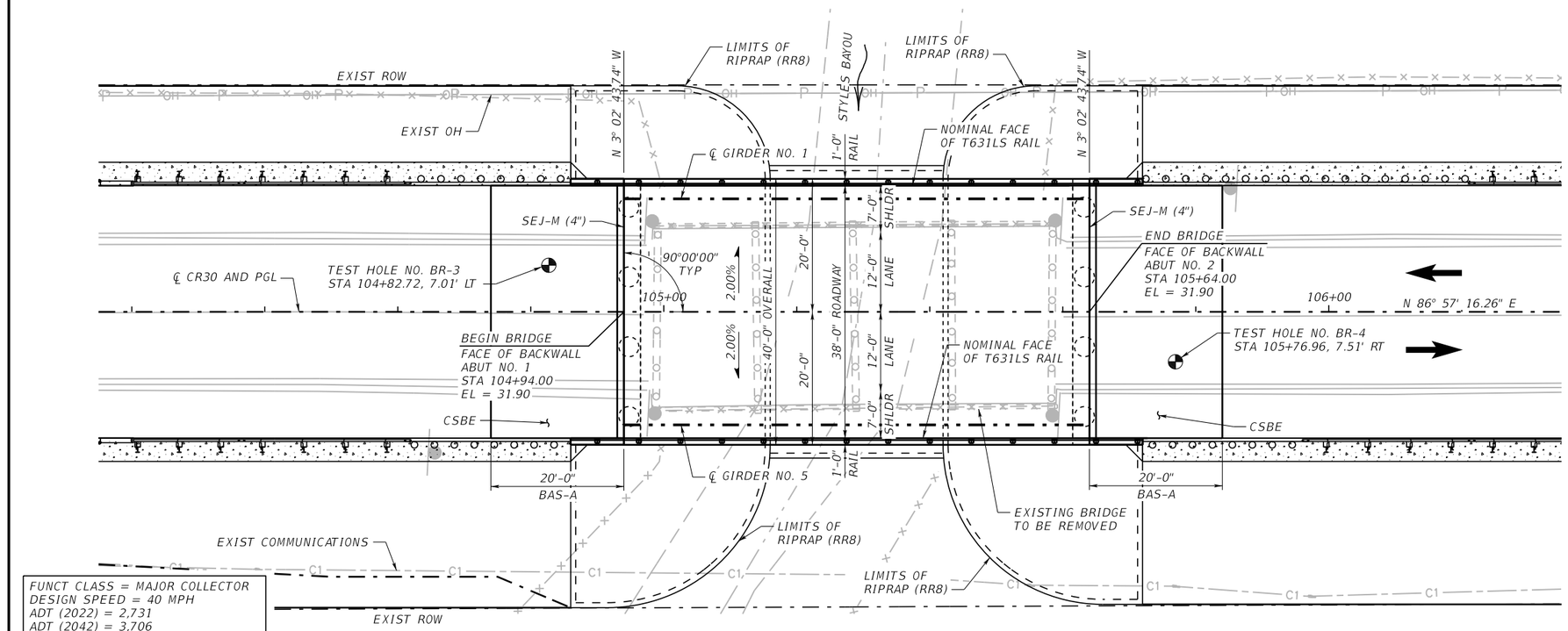
HL93 LOADING SHEET 1 OF 1

CR 144

APPROACH SLAB

DETAILS

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		125



PLAN

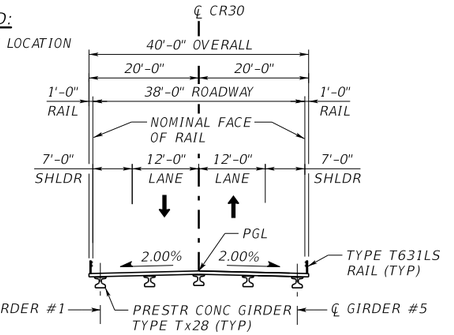
FUNCT CLASS = MAJOR COLLECTOR
DESIGN SPEED = 40 MPH
ADT (2022) = 2,731
ADT (2042) = 3,706
EXIST NBI = 12-020-0-AA01-07-001
PROP NBI = 12-020-0-AA01-07-301

GENERAL NOTES:

1. DESIGNED FOR HL93 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AS MODIFIED BY TXDOT LRFD BRIDGE DESIGN MANUAL.
2. FOR BORING LOG DETAILS, SEE BORING DATA SHEET.
3. REMOVE 4-SPAN 61' LONG X 26'-8" WIDE TIMBER DECK ON TIMBER STRINGERS EXISTING BRIDGE.
4. THE EXISTING BRIDGE HAS BEEN TESTED FOR ASBESTOS CONTAINING MATERIALS (ACM) AND FOUND TO CONTAIN GREATER THAN 1% ACM AND WILL BE ABATED DURING CONSTRUCTION. THE ACM WERE FOUND IN THE FOLLOWING AREAS: FELT PAD BETWEEN PIER AND PIER CAP. THE CONTRACTOR SHALL REMOVE THE BRIDGE DECK, STRINGERS, AND PIER CAPS. A SPECIALTY CONTRACTOR SHALL THEN REMOVE EXPOSED ACM FELT PADS. THE CONTRACTOR SHALL THEN REMOVE BRIDGE PIERS. THE CONTRACTOR SHALL COORDINATE THE OVERALL WORK WITH THE SPECIALTY CONTRACTOR WHO PERFORMS THE ABATING WORK.
5. D DENOTES TO DOWELS AT OUTSIDE BEAM ENDS.

LEGEND:

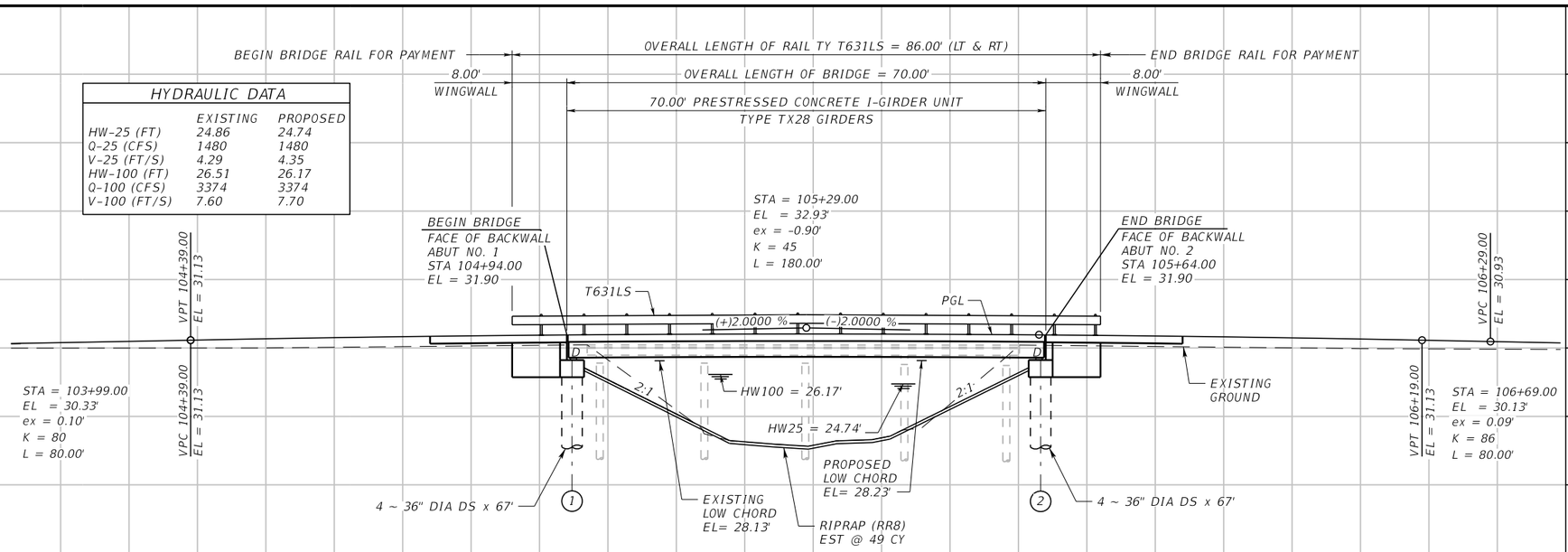
BORE LOCATION



TYPICAL SECTION

0 5 10 20
SCALE: 1"=20'

HYDRAULIC DATA		
	EXISTING	PROPOSED
HW-25 (FT)	24.86	24.74
Q-25 (CFS)	1480	1480
V-25 (FT/S)	4.29	4.35
HW-100 (FT)	26.51	26.17
Q-100 (CFS)	3374	3374
V-100 (FT/S)	7.60	7.70



ELEVATION

04/19/2022

NO.	DATE	REVISION	APPROV

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING — SHEET 1 OF 1

Texas Department of Transportation

CR 30

BRIDGE LAYOUT

STYLES BAYOU BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 30
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		126

DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-3	District	Houston
Highway	CR 30	Structure	Bridge	Date	10/23/20
CSJ	0912-31-313	Station	104+82.72	Grnd. Elev.	30.05 ft
		Offset	7.01' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
28.9			PAVEMENT, 3" Asphaltic Concrete , 11" Asphalt w/ Limestone							
			CLAY, Fat, very soft to soft, gray to dark gray and reddish brown, w/ shells at 2'-4', gravel at 5'-7', ferrous stains at 7'-9' and slickensided at 23'-25', 33'-35' and 43'-45' (CH)			24				
5		2 (6) 3 (6)								Sulfate Content: 0 ppm
						44	84	44		% Passing #200 Sieve: 97.0
10		2 (6) 2 (6)								
						38	80	37		% Passing #200 Sieve: 96.4
15		3 (6) 4 (6)								
						32				
20		5 (6) 5 (6)								
				16	18.3	41			114	
25		3 (6) 4 (6)								
						36	78	36		% Passing #200 Sieve: 99.6
30		5 (6) 6 (6)								
				21	15.5	45			122	
35		2 (6) 3 (6)								
40		3 (6) 4 (6)								
				25	23	28	60	32	124	% Passing #200 Sieve: 95.5
45		5 (6) 6 (6)								
-20.5		5 (6) 5 (6)	CLAY, Lean w/ Sand, soft, gray and brown, w/ calcareous nodules at 52'-54' (CL)							
55		8 (6) 6 (6)				24	43	21		% Passing #200 Sieve: 74.3
-25.5			SAND, loose to slightly compact, brown, w/ gravel (SP)							
		12 (6) 9 (6)				21				
60										

Remarks: Water level was encountered at 15' below the existing grade during drilling operations; caved-in at 13.5' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger: EE** **Organization: HVJ Associates, Inc.**

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DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-3	District	Houston
Highway	CR 30	Structure	Bridge	Date	10/23/20
CSJ	0912-31-313	Station	104+82.72	Grnd. Elev.	30.05 ft
		Offset	7.01' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, loose to slightly compact, brown, w/ gravel (SP)			16				% Passing #200 Sieve: 3.9
65		16 (6) 20 (6)								
		12 (6) 7 (6)								
-40.5			SAND, w/ Silt, slightly compact, brown, w/ gravel (SP-SM)			14				
70										
		14 (6) 16 (6)								
75						14				% Passing #200 Sieve: 6.3
		15 (6) 18 (6)								
-50.0										
80										

Remarks: Water level was encountered at 15' below the existing grade during drilling operations; caved-in at 13.5' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Soltek **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geol\lab info\gint logs\hg1810129.3.3.gpj

STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED PROFESSIONAL ENGINEER

K. Nithorsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

CR 30
DRILLING LOGS

STYLES BAYOU BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 30
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		127

DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-4	District	Houston
Highway	CR 30	Structure	Bridge	Date	11/5/20
CSJ	0912-31-313	Station	105+76.96	Grnd. Elev.	30.08 ft
		Offset	7.51' 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
29.0			PAVEMENT, 2" Asphaltic Concrete, 11" Asphalt w/ shells and gravel							
		4 (6) 3 (6)	CLAY, Fat, very soft to soft, gray, dark gray and reddish brown, w/ silt seams at 5'-7', sand seams at 10'-12', calcareous nodules at 7'-9' and 52'-54' and slickensided at 53'-55' (CH)			33	88	59		% Passing #200 Sieve: 92.6
5						45				
		6 (6) 8 (6)			12.7	46	91	61	114	% Passing #200 Sieve: 94.5
10						45				% Passing #200 Sieve: 97.4
		5 (6) 6 (6)				32	83	58		% Passing #200 Sieve: 98.0
15				16	10.9	36	78	45	116	% Passing #200 Sieve: 99.5
		6 (6) 9 (6)								
20										
		5 (6) 7 (6)								
25						38	85	50		% Passing #200 Sieve: 99.2
		6 (6) 9 (6)								
30				29	14.6	38			114	
		3 (6) 4 (6)								
35										
		4 (6) 6 (6)				58	108	66		% Passing #200 Sieve: 85.0
40										
		6 (6) 7 (6)		37	19.4	32			117	
45										
		7 (6) 10 (6)								
50										
		8 (6) 10 (6)		46	28.3	27			126	
-25.4			SAND, w/ Silt, slightly compact to compact, brown, w/ gravel (SP-SM)							
55						17				% Passing #200 Sieve: 9.8
		14 (6) 17 (6)								
60										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 20'; still dry at 20'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-4	District	Houston
Highway	CR 30	Structure	Bridge	Date	11/5/20
CSJ	0912-31-313	Station	105+76.96	Grnd. Elev.	30.08 ft
		Offset	7.51' 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
			SAND, w/ Silt, slightly compact to compact, brown, w/ gravel (SP-SM)							
		25 (6) 30 (6)								
65						13				
		21 (6) 18 (6)								
70						19				% Passing #200 Sieve: 9.3
		20 (6) 22 (6)								
75						7				
		17 (6) 22 (6)								
-49.9 80										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 20'; still dry at 20'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED PROFESSIONAL ENGINEER

K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

CR 30
DRILLING LOGS

STYLES BAYOU BRIDGE

FILE:	DN:	CK:	DW:	CK:	
©TxDOT	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0912	31	307 ETC.	CR 30	
	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		128	

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BRIDGE ESTIMATED QUANTITIES OF CR 30							
LOCATION	416 6004	420 6013	422 6001	425 6035	432 6008	450 6019	454 6018
	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	REINF CONC SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (CONC)(CL B)(RR8&RR9)	RAIL (TY T631LS)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	LF	CY	SF	LF	CY	LF	LF
2 - ABUTMENTS	536	43.4			49		
1 - 70.00' PRESTR CONC GIRDER UNIT			2800	347.50		172.0	80
PROJECT TOTALS	536	43.4	2800	347.50	49	172.0	80

BEARING SEAT ELEVATIONS

		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
ABUT 1	(FWD)	28.002	28.172	28.342	28.172	28.002
ABUT 2	(BK)	28.002	28.172	28.342	28.172	28.002

STATE OF TEXAS
GREGORY S HANSEN
134271
LICENSED
PROFESSIONAL ENGINEER

04/18/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING

Texas Department of Transportation

CR 30

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

STYLES BAYOU BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 30
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		129

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FILENAME:
PLOT DATE:
PLOT TIME:

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-5	District	Houston
	Highway	Old Chocolate Bayou Rd	Structure	Bridge	Date	11/9/20
	CSJ	0912-31-314	Station	106+12.07	Grnd. Elev.	55.76 ft
			Offset	5.63' 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
54.4			PAVEMENT, 5" Asphaltic Concrete, 12" Sand w/ Gravel							
		4 (6) 7 (6)	CLAY, Fat, soft, dark gray to gray and brown, w/ sand seams at 0'-9' (CH)			14				
5						40	83	54		% Passing #200 Sieve: 86.7
		5 (6) 6 (6)			7.2	39			115	
45.3			CLAY, Lean, stiff, reddish brown and gray, w/ ferrous stains at 12'-19' and calcareous nodules at 17'-19' (CL)		51.5	14	45	30	135	% Passing #200 Sieve: 85.5
15		8 (6) 16 (6)								
		9 (6) 15 (6)		16	64.3	17			136	
35.3			CLAY, Fat, stiff, reddish brown and gray, w/ ferrous stains and calcareous nodules at 37'-39', slickensided at 33'-35', 48'-50' and 63'-65' and sand seams at 67'-69' (CH)			17				
25		12 (6) 17 (6)				30	71	45		% Passing #200 Sieve: 97.0
		9 (6) 11 (6)								
30				29	27.5	28			127	
		10 (6) 13 (6)								
35						17				
		16 (6) 18 (6)								
40						25	66	41		% Passing #200 Sieve: 96.5
		11 (6) 14 (6)								
45				42	35.5	27			129	
		14 (6) 19 (6)								
50										
		14 (6) 18 (6)								
55						28	74	48		% Passing #200 Sieve: 99.4
		13 (6) 15 (6)								
60										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 35'; still dry at 35'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129,3.3.gpj

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-5	District	Houston
	Highway	Old Chocolate Bayou Rd	Structure	Bridge	Date	11/9/20
	CSJ	0912-31-314	Station	106+12.07	Grnd. Elev.	55.76 ft
			Offset	5.63' 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, reddish brown and gray, w/ ferrous stains and calcareous nodules at 37'-39', slickensided at 33'-35', 48'-50' and 63'-65' and sand seams at 67'-69' (CH)	55	39	23			128	
65		9 (6) 12 (6)								
						20	61	45		% Passing #200 Sieve: 88.3
70		16 (6) 20 (6)		63	72.3	18			133	
-18.2										
75		35 (6) 40 (6)	SAND, Silty, compact to dense, brown (SM)							% Passing #200 Sieve: 25.7
-24.2		38 (6) 43 (6)								
80										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 35'; still dry at 35'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

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STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED PROFESSIONAL ENGINEER

K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

CR 89

DRILLING LOGS

OLD CHOCOLATE BAYOU CULVERT

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 89
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		130

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DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-6	District	Houston
	Highway	Old Chocolate Bayou Rd	Structure	Bridge	Date	11/6/20
	CSJ	0912-31-314	Station	106+63.17	Grnd. Elev.	55.55 ft
			Offset	6.19' LT	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
54.1			PAVEMENT, 5" Asphaltic Concrete, 12" Sand w/ Gravel and Limestone			7				
		1 (6) 3 (6)	CLAY, Fat, very soft to soft, dark gray to gray and reddish brown, w/ sand seams at 5'-7' (CH)			39	91	61		% Passing #200 Sieve: 85.9
5										% Passing #200 Sieve: 93.3
		5 (6) 7 (6)								
45.1 10			CLAY, Lean, soft to stiff, reddish brown and gray, w/ calcareous nodules at 10'-17', ferrous stains at 10'-12' and 15'-17' and sand seams at 17'-19' (CL)		18.8	31			122	% Passing #200 Sieve: 92.0
		7 (6) 9 (6)								
15						19	48	29		% Passing #200 Sieve: 95.8
		12 (6) 13 (6)		16	32.5	23			128	
35.1 20			CLAY, Fat, stiff, reddish brown, brown and gray, w/ sand seams at 27'-29', 52'-, 62'-54' and 62'-64', slickensided at 28'-30' and 53'-55', ferrous stains at 37'-39' and sandstone seams at 42'-44' (CH)			27	69	42		% Passing #200 Sieve: 98.5
25		11 (6) 11 (6)		24	30.8	25			128	
		10 (6) 12 (6)								
30						26	69	42		% Passing #200 Sieve: 96.6
		12 (6) 11 (6)								
35				33	53.6	17			136	
		11 (6) 17 (6)								
40						18	64	36		% Passing #200 Sieve: 91.5
		12 (6) 14 (6)								
45										
		14 (6) 16 (6)								
50				46	32.1	23	55	33	129	% Passing #200 Sieve: 98.9
		13 (6) 14 (6)								
55										
		14 (6) 18 (6)								
60										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 35'; still dry at 35'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129,3.3.gpj

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-6	District	Houston
	Highway	Old Chocolate Bayou Rd	Structure	Bridge	Date	11/6/20
	CSJ	0912-31-314	Station	106+63.17	Grnd. Elev.	55.55 ft
			Offset	6.19' LT	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
						21				
-9.9 65		14 (6) 17 (6)	CLAY, Fat w/ Sand, stiff to hard, reddish brown and gray (CH)							
					59.2	19	50	28	131	% Passing #200 Sieve: 78.9
70		17 (6) 21 (6)								
		15 (6) 21 (6)				17				
75										
-24.5 80		50 (3) 50 (2)								

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotatory was initiated at 35'; still dry at 35'.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129,3.3.gpj

STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED PROFESSIONAL ENGINEER

K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

CR 89
DRILLING LOGS

OLD CHOCOLATE BAYOU CULVERT

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 89
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		131

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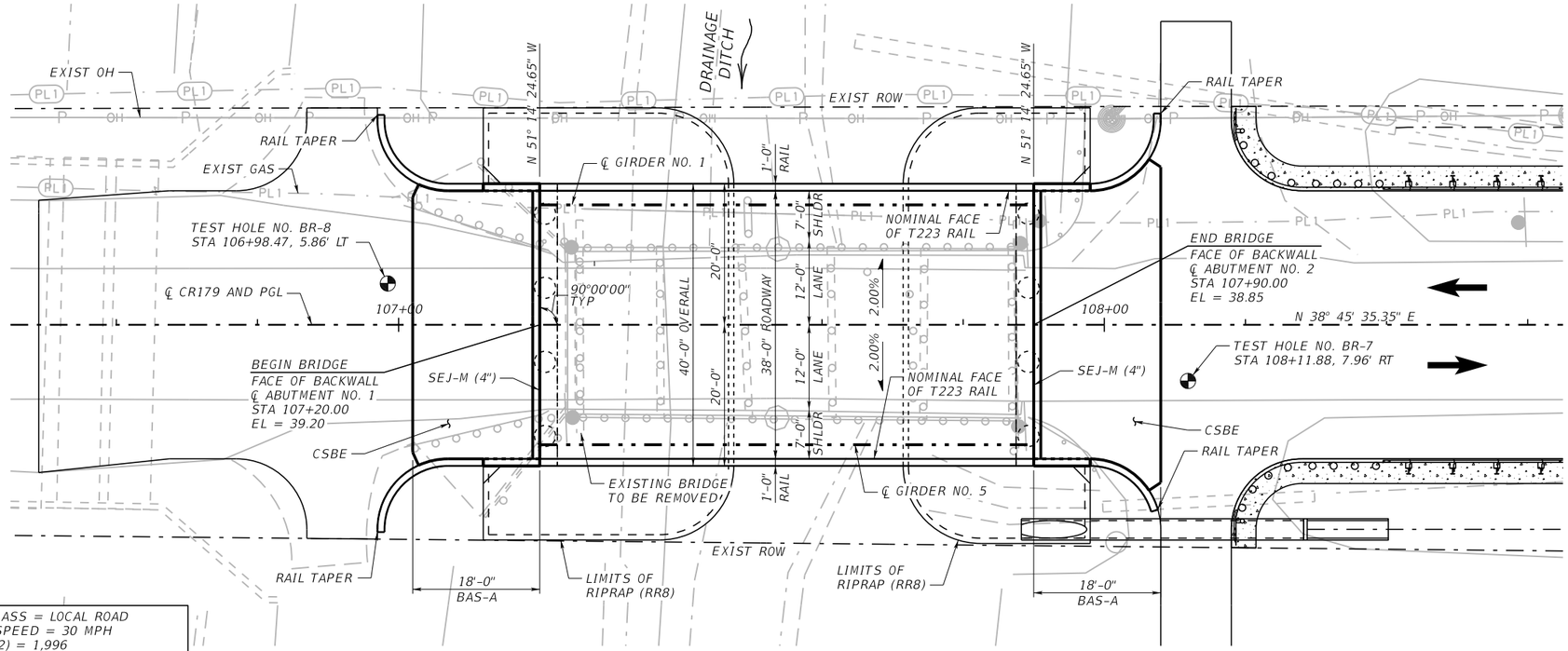


FUNCT CLASS = LOCAL ROAD
DESIGN SPEED = 30 MPH
ADT (2022) = 1,996
ADT (2042) = 2,709
EXIST NBI = 12-020-0-AA07-71-001
PROP NBI = 12-020-0-AA07-71-304

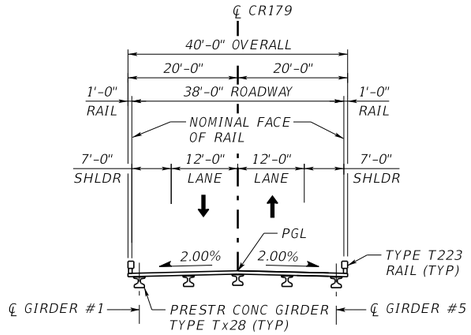
PLAN

GENERAL NOTES:

1. DESIGNED FOR HL93 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AS MODIFIED BY TXDOT LRFD BRIDGE DESIGN MANUAL.
2. FOR BORING LOG DETAILS, SEE BORING DATA SHEET.
3. REMOVE 5-SPAN 63'-8" LONG X 22'-9" WIDE TIMBER DECK ON TIMBER STRINGERS EXISTING BRIDGE.
4. D DENOTES TO DOWELS AT OUTSIDE BEAM ENDS.

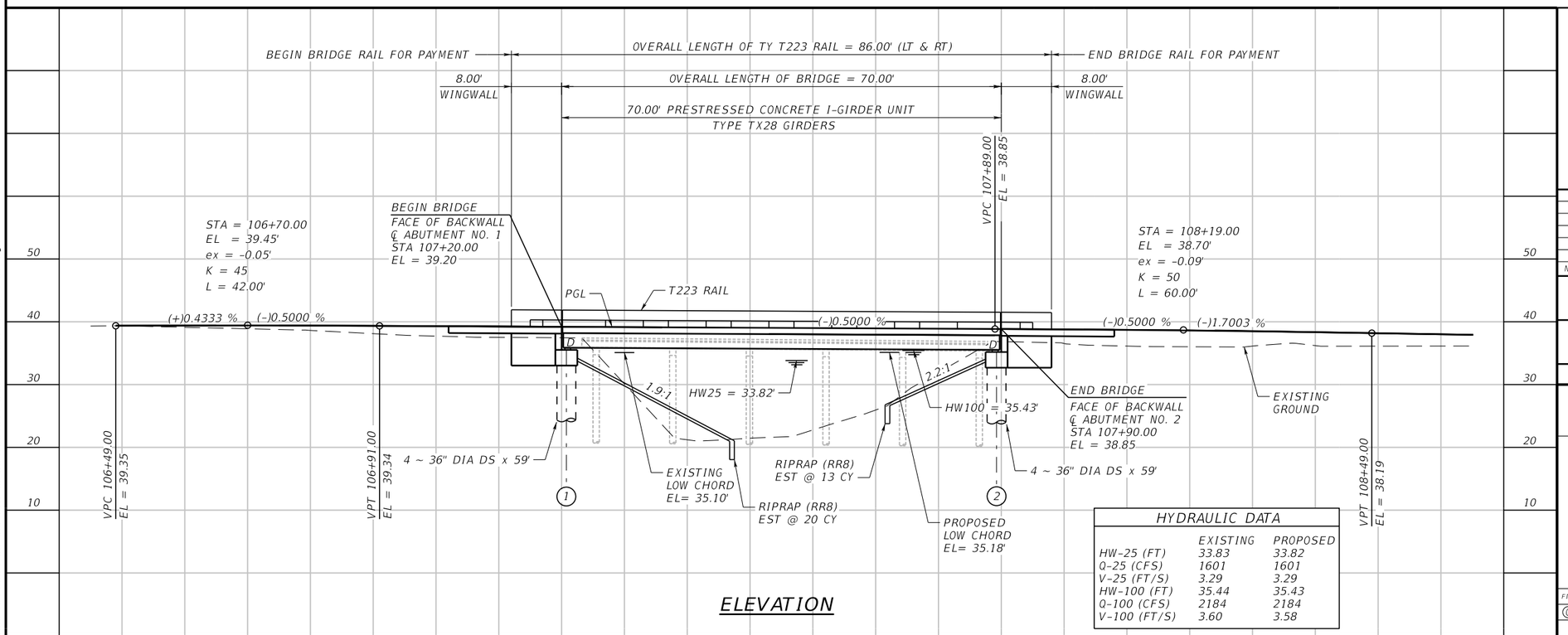
LEGEND:

BORE LOCATION



TYPICAL SECTION

0 5 10 20
SCALE: 1"=20'



HYDRAULIC DATA

	EXISTING	PROPOSED
HW-25 (FT)	33.83	33.82
Q-25 (CFS)	1601	1601
V-25 (FT/S)	3.29	3.29
HW-100 (FT)	35.44	35.43
Q-100 (CFS)	2184	2184
V-100 (FT/S)	3.60	3.58

ELEVATION

04/28/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING — SHEET 1 OF 1

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CR 179

BRIDGE LAYOUT

DRAINAGE DITCH BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 179
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		132

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DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-7	District	Houston
	Highway	CR 179	Structure	Bridge	Date	11/10/20
	CSJ	0912-31-315	Station	108+11.88	Grnd. Elev.	36.67 ft
			Offset	7.96' 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
35.6			PAVEMENT, 6" Asphalt, 7" Limestone							
			CLAY, Sandy Lean, soft, dark gray to gray and reddish brown,w/ shells at 1'-2' and calcareous nodules at 2'-7' (CL)			13	33	17		% Passing #200 Sieve: 54.7
	5	4 (6) 6 (6)			28.7	21			134	
		8 (6) 9 (6)				22				% Passing #200 Sieve: 27.1
26.2	10		SAND, Silty, slightly compact, reddish brown and brown, w/ clay seams at 10'-14' (SM)							% Passing #200 Sieve: 22.4
		16 (6) 15 (6)				25				% Passing #200 Sieve: 6.1
21.2	15		SAND, w/ Silt, compact, brown (SP-SM)							
	20	28 (6) 26 (6)				22				
		27 (6) 29 (6)								
	25									
9.7			SAND, Silty, dense, brown (SM)							
	30	40 (6) 42 (6)				19				% Passing #200 Sieve: 12.4
4.7			SAND, w/ Silt, compact to dense, brown, w/ clay seams at 35'-37' (SP-SM)							
	35	43 (6) 36 (6)				20				% Passing #200 Sieve: 9.1
		47 (6) 50 (5)								
	40									
		42 (6) 50 (6)				18				% Passing #200 Sieve: 9.4
	45									
		31 (6) 31 (6)								
	50									
		26 (6) 19 (6)								
-18.8	55		SAND, Silty, loose to dense, brown, w/ clay seams at 55'-57' (SM)			18				% Passing #200 Sieve: 26.2
		6 (9) 10 (6)								
	60									

Remarks: Water level was encountered at 13.5' below the existing grade during drilling operations; at 12.3' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

DRILLING LOG

WinCore Version 3.1	County	Brazoria	Hole	BR-7	District	Houston
	Highway	CR 179	Structure	Bridge	Date	11/10/20
	CSJ	0912-31-315	Station	108+11.88	Grnd. Elev.	36.67 ft
			Offset	7.96' 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
			SAND, Silty, loose to dense, brown, w/ clay seams at 55'-57' (SM)							
	65	43 (6) 38 (6)				19				% Passing #200 Sieve: 14.9
		50 (5) 50 (4)								
	70									
-35.3			CLAY, Sandy Lean, very stiff, gray and brown (CL)							
	75	40 (6) 24 (6)				19	34	17		% Passing #200 Sieve: 51.9
		38 (6) 34 (6)								
-43.3	80									

Remarks: Water level was encountered at 13.5' below the existing grade during drilling operations; at 12.3' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: EE** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED
PROFESSIONAL ENGINEER

K. Nithorsan 4/19/22

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE ROAD
HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

CR 179

DRILLING LOGS

DRAINAGE DITCH BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 179
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		133

DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-8	District	Houston
Highway	CR 179	Structure	Bridge	Date	12/7/20
CSJ	0912-31-315	Station	106+98.47	Grnd. Elev.	37.93 ft
		Offset	5.86' LT	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
36.9			PAVEMENT, 6" Asphalt, 6" Sand w/ Gravel and Shells			18	35	23		% Passing #200 Sieve: 53.6
		3 (6) 4 (6)	CLAY, Sandy Lean, very soft to soft, gray and light gray, w/ shells and gravel at 1'-2' and ferrous stains at 5'-12' (CL)		8.8	16			119	
5										% Passing #200 Sieve: 67.7 Sulfate Content: 0 ppm
		4 (6) 6 (6)				21	48	34		
10					9.8	23	27	15	115	% Passing #200 Sieve: 64.8
23.9		13 (6) 14 (6)	SAND, w/ Silt, loose to dense, light gray (SP-SM)							
15						26				% Passing #200 Sieve: 5.8
		8 (6) 11 (6)								
20										
		28 (6) 50 (6)				20				% Passing #200 Sieve: 8.4
25										
		41 (6) 50 (5)								
30										
5.9			SAND, Silty, loose to compact, light gray and brown, w/ clay seams at 35'-37' (SM)							
35		10 (6) 7 (6)				23				% Passing #200 Sieve: 49.7
		12 (6) 15 (6)								
40										
		20 (6) 19 (6)								
45										
		33 (6) 42 (6)								
50						23				% Passing #200 Sieve: 12.7
		39 (6) 22 (6)								
55										
		22 (6) 31 (6)								
60										

Remarks: Water level was encountered at 16.3' below the existing grade during drilling operations; at 12.4' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: PD** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

DRILLING LOG

WinCore Version 3.1

County	Brazoria	Hole	BR-8	District	Houston
Highway	CR 179	Structure	Bridge	Date	12/7/20
CSJ	0912-31-315	Station	106+98.47	Grnd. Elev.	37.93 ft
		Offset	5.86' LT	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
						19				
-24.1			SAND, Silty Clayey, very dense, light gray and brown (SC-SM)							
65		50 (0.3) 50 (0.3)				23	16	4		% Passing #200 Sieve: 23.2
-29.1			CLAY, Fat, very stiff, light gray, w/ ferrous stains at 70'-72' (CH)							
70		24 (6) 22 (6)				22	53	36		% Passing #200 Sieve: 89.6
-34.1			CLAY, Lean w/ Sand, stiff to very stiff, reddish brown, w/ ferrous stains at 77'-79' (CL)							
75		14 (6) 18 (6)								
				39	44.7	20	34	19	130	% Passing #200 Sieve: 83.5
-42.1	80	28 (6) 34 (6)								

Remarks: Water level was encountered at 16.3' below the existing grade during drilling operations; at 12.4' after 5 minutes and 10 minutes.

The ground water elevation was not determined during the course of this boring.

Driller: Diamond Geo **Logger: PD** **Organization: HVJ Associates, Inc.**

g:\houston\hou ps\geo\lab info\gint logs\hg1810129.3.3.gpj

STATE OF TEXAS
NITHARSAN KANAPATHIPPILLAI
132996
LICENSED
PROFESSIONAL ENGINEER

K. Nitharsan 4/19/22

NO.	DATE	REVISION	APPROV.

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HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING SHEET 2 OF 2

CR 179

DRILLING LOGS

DRAINAGE DITCH BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 179
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		134

BRIDGE ESTIMATED QUANTITIES OF CR 179							
LOCATION	416 6004 DRILL SHAFT (36 IN)	420 6013 CL C CONC (ABUT)	422 6001 REINF CONC SLAB	425 6035 PRESTR CONC GIRDER (TX28)	432 6008 RIPRAP (CONC)(CL B)(RR8&RR9)	450 6006 RAIL (TY T223)	454 6018 SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	LF	CY	SF	LF	CY	LF	LF
2 - ABUTMENTS	472	43.4			33		
1 - 70.00' PRESTR CONC GIRDER UNIT			2800	347.50		172.0	80
PROJECT TOTALS	472	43.4	2800	347.50	33	172.0	80

BEARING SEAT ELEVATIONS

		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
ABUT 1	(FWD)	35.288	35.458	35.628	35.458	35.288
ABUT 2	(BK)	34.948	35.118	35.288	35.118	34.948

DELYNN HENRY
107399
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

04/28/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON TX 77072
FIRM REGISTRATION F-2966

HL93 LOADING

Texas Department of Transportation

CR 179

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

DRAINAGE DITCH BRIDGE

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 179
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		135

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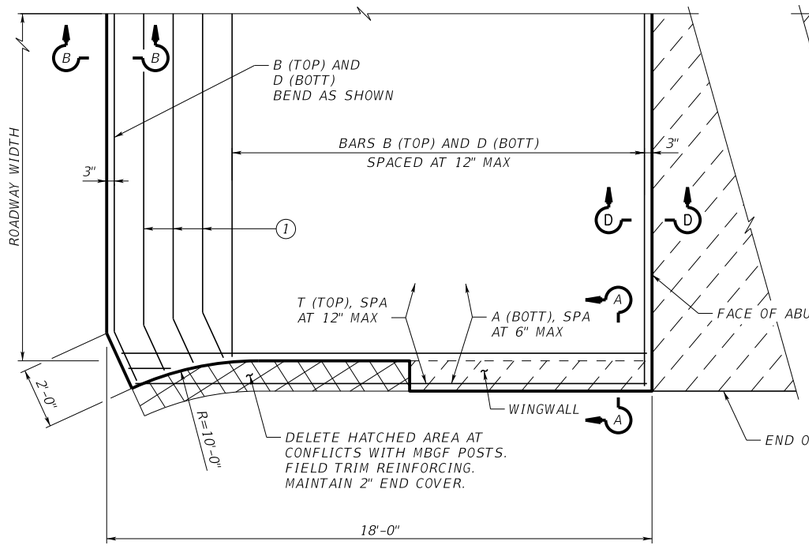
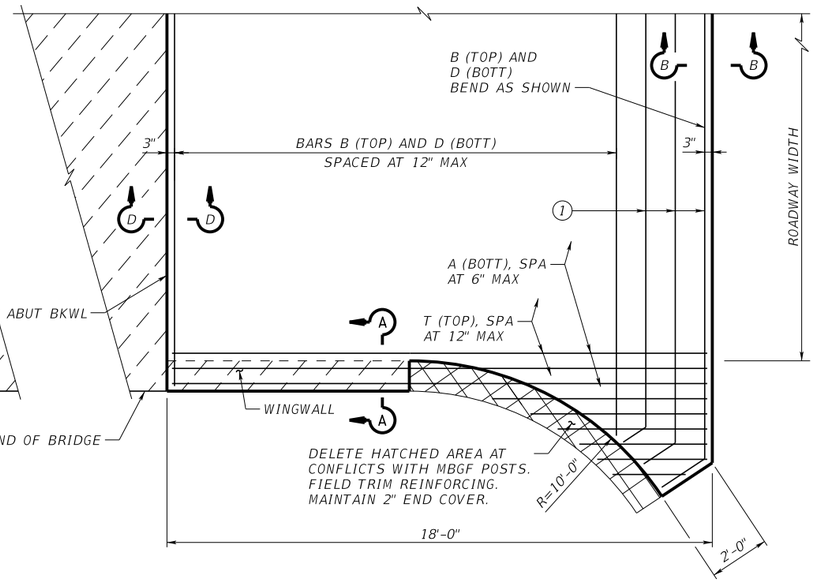


PLAN
(SHOWING BEGIN BRIDGE)



PLAN
(SHOWING END BRIDGE)

NOTES:

1. SEE STANDARD "BAS-A" FOR SECTIONS A-A, B-B, AND D-D.
2. SEE STANDARD "BAS-A" FOR TYPICAL DETAILS AND NOTES.

(1) BEND BARS B AND D AS NECESSARY TO MAINTAIN 12" SPACING.

STATE OF TEXAS
GREGORY S HANSEN
134271
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HL93 LOADING SHEET 1 OF 1

Texas Department of Transportation

CR 179

APPROACH SLAB

DETAILS

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 179
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		136

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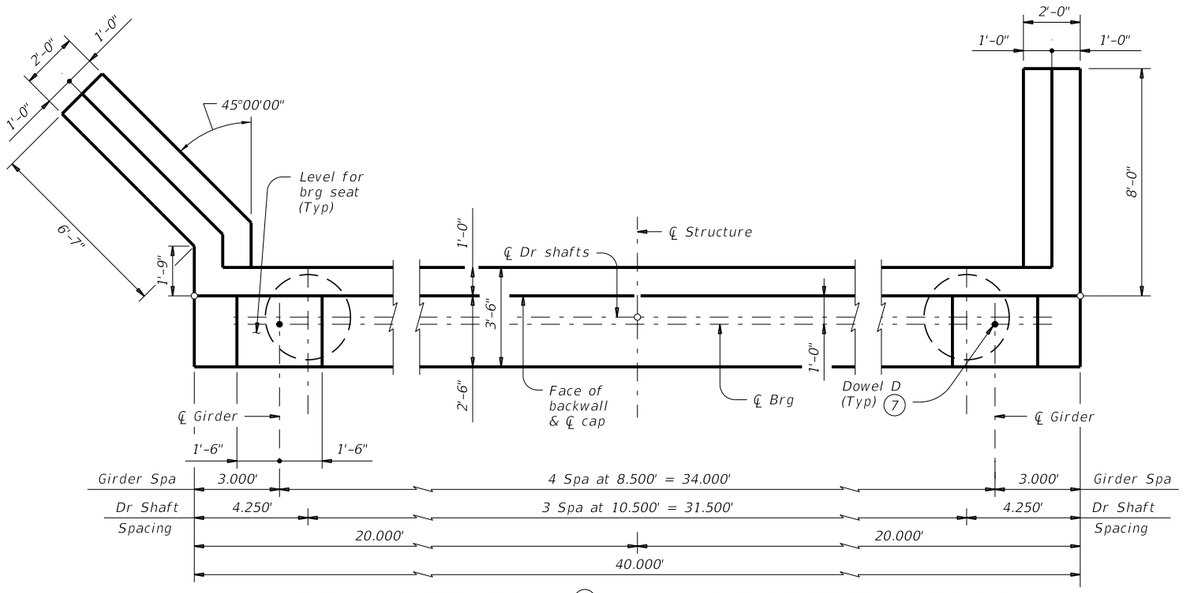
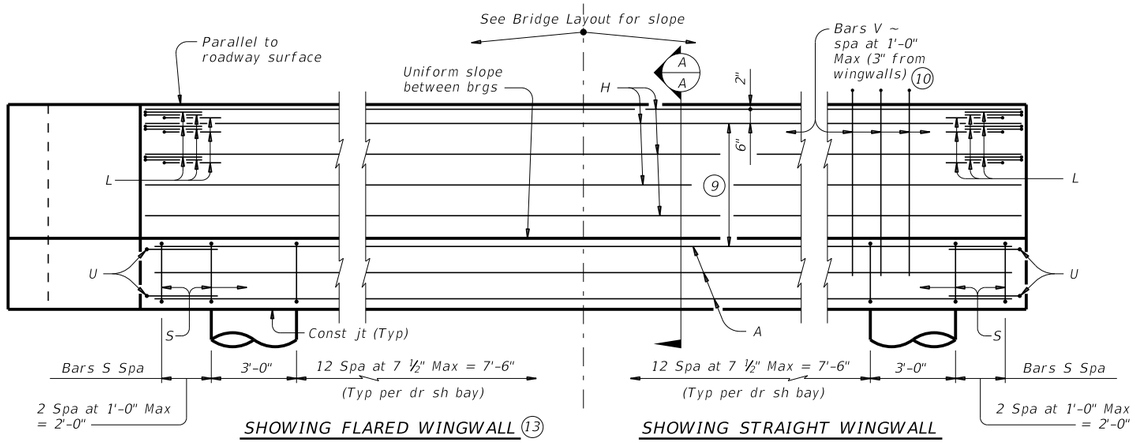
FILE:



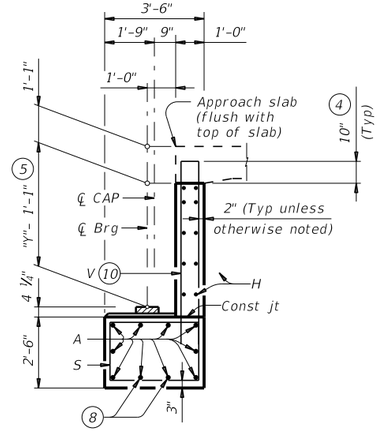
SHOWING FLARED WINGWALL (13) SHOWING STRAIGHT WINGWALL

PLAN (1)



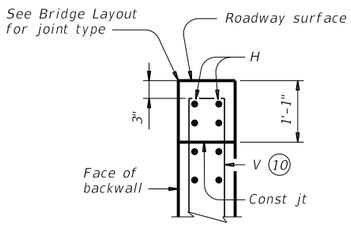
SHOWING FLARED WINGWALL (13) SHOWING STRAIGHT WINGWALL

ELEVATION



SECTION A-A

(With approach slab) (6)



BACKWALL DETAIL

(Without approach slab) (6)

TABLE OF FOUNDATION LOADS

Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	63	57
45	67	59
50	72	62
55	76	64
60	80	66
65	83	68
70	87	70
75	91	72
80	95	74
85	99	76
90	103	78
95	106	80
100	110	81
105	114	83
110	118	85
115	121	87
120	125	89
125	129	91

(4) Increase as required to maintain 3" from finished grade.

(5) See Span details for "Y" value.

(6) See Bridge Layout to determine if approach slab is present.

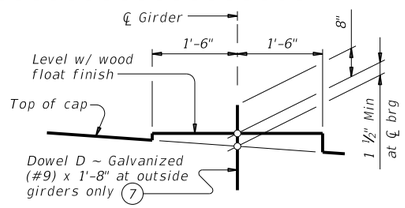
(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(8) With pile foundations, move Bars A shown to clear piles.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

(13) Flared wingwall details only apply to CR144 at American Canal. See CR144 bridge layout for flared wingwall locations.



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

1 Modified for flared wingwall and moved backwall of abutment flush with back of abutment cap.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SIG-38 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi).

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Galvanize dowel bars D.

STATE OF TEXAS
GREGORY S. HANSEN
134271
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04/18/2022

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54 PRESTR CONC I-GIRDERS 38' ROADWAY

AIG-38 (MOD)

FILE: aig13sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		137

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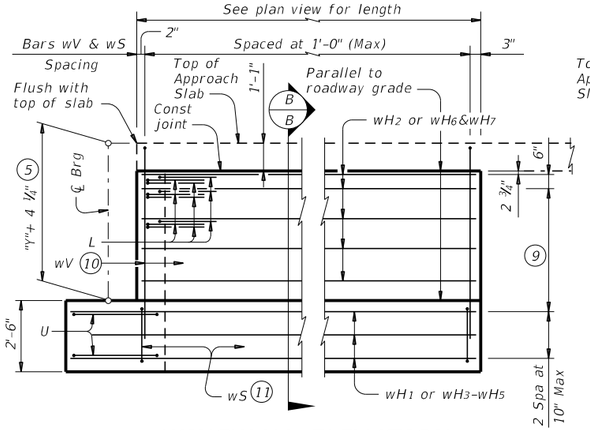
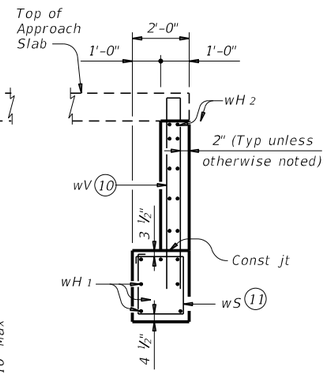
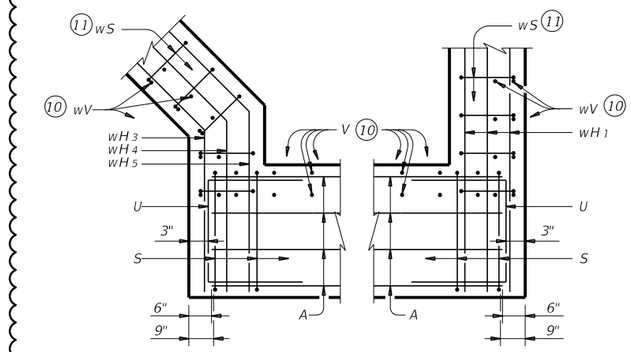


WINGWALL ELEVATION



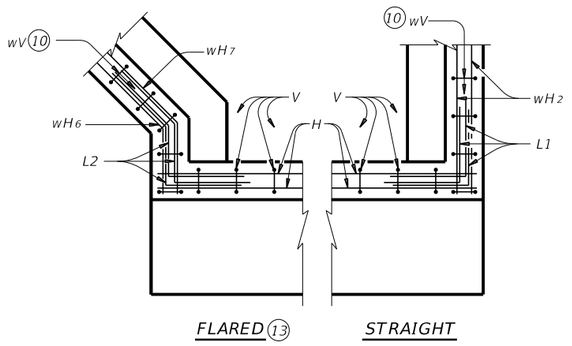
SECTION B-B

2



FLARED (13) STRAIGHT

CAP

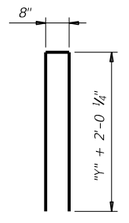


FLARED (13) STRAIGHT

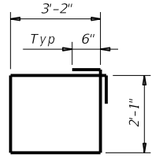
BACKWALL

CORNER DETAILS

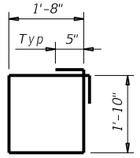
1



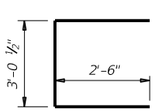
BARS V & wV (5)



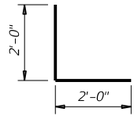
BARS S



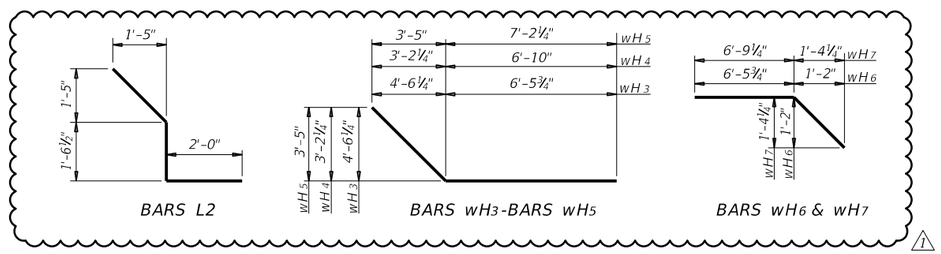
BARS wS



BARS U



BARS L1



BARS L2 BARS wH3-BARS wH5 BARS wH6 & wH7

1

(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

(11) Adjust as required to avoid piling.

(13) Flared wingwall details only apply to CR144 at American Canal. See CR144 bridge layout for flared wingwall locations.

1

04/18/2022

1 Modified for flared wingwall and moved backwall of abutment flush with back of abutment cap.

2 Modified to show approach slab extending over top of wingwall.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation | Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
38' ROADWAY

AIG-38 (MOD)

FILE: aig13sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		138

DATE:
FILE:

TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (12)

CR144 ABUTMENT 1				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	39'-0"	2,072
D	2	#9	1'-8"	11
H	8	#6	39'-8"	477
L1	9	#6	4'-0"	54
L2	9	#6	5'-6"	74
S	45	#5	11'-6"	540
U	4	#6	8'-1"	49
V	39	#5	11'-4"	461
wH1	7	#6	10'-2"	107
wH2	8	#6	7'-8"	92
wH3-wH5	7	#6	12'-1"	127
wH6-wH7	8	#6	8'-5"	101
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
REINFORCING STEEL			LB	4,472
CLASS "C" CONC (14)			CY	22.0

CR144 ABUTMENT 2				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	39'-0"	2,072
D	2	#9	1'-8"	11
H	8	#6	39'-8"	477
L2	18	#6	5'-6"	149
S	45	#5	11'-6"	540
U	4	#6	8'-1"	49
V	39	#5	11'-4"	461
wH3-wH5	14	#6	12'-1"	254
wH6-wH7	16	#6	8'-5"	202
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
REINFORCING STEEL			LB	4,521
CLASS "C" CONC (14)			CY	22.4

CR30				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	39'-0"	2,072
D	2	#9	1'-8"	11
H	8	#6	39'-8"	477
L1	18	#6	4'-0"	108
S	45	#5	11'-6"	540
U	4	#6	8'-1"	49
V	39	#5	11'-4"	461
wH1	14	#6	10'-2"	214
wH2	16	#6	7'-8"	184
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
REINFORCING STEEL			LB	4,422
CLASS "C" CONC (14)			CY	21.7

CR179				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	39'-0"	2,072
D	2	#9	1'-8"	11
H	8	#6	39'-8"	477
L1	18	#6	4'-0"	108
S	45	#5	11'-6"	540
U	4	#6	8'-1"	49
V	39	#5	11'-4"	461
wH1	14	#6	10'-2"	214
wH2	16	#6	7'-8"	184
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
REINFORCING STEEL			LB	4,422
CLASS "C" CONC (14)			CY	21.7

△1

(12) Quantities shown are for one abutment only (with approach slab).

(14) Class "C" Concrete includes quantity for shear key.

△1

04/18/2022

△1 Modified for flared wingwall and moved backwall of abutment flush with back of abutment cap.

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

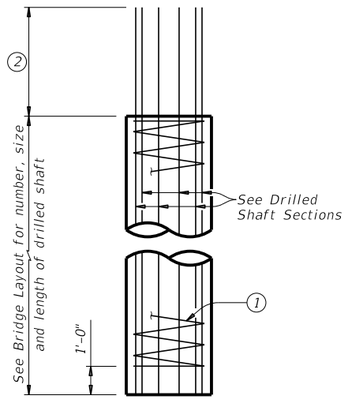
ABUTMENTS

TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
38' ROADWAY

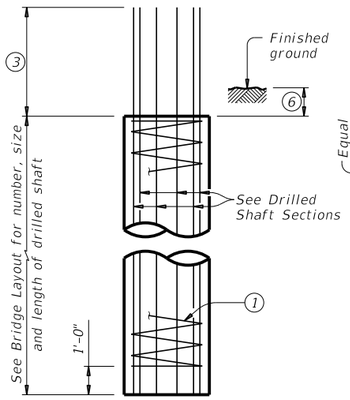
AIG-38 (MOD)

FILE: aig13sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		139

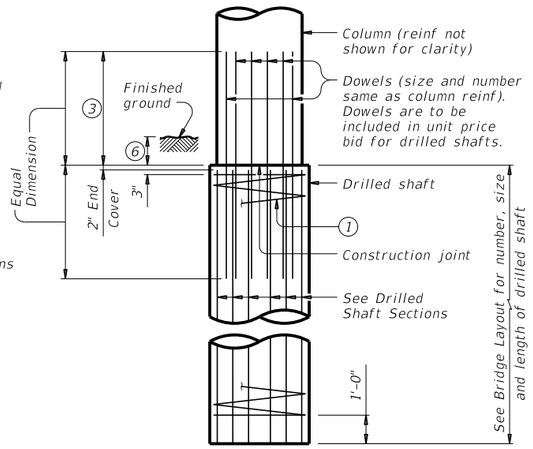
DATE:
FILE:



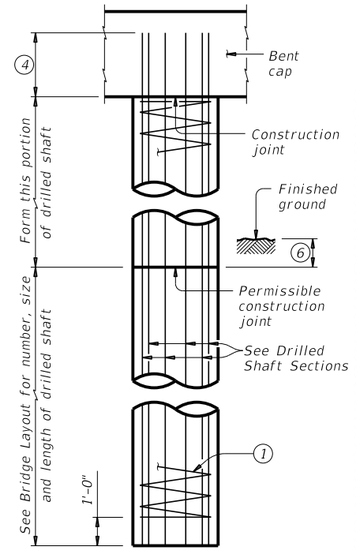
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



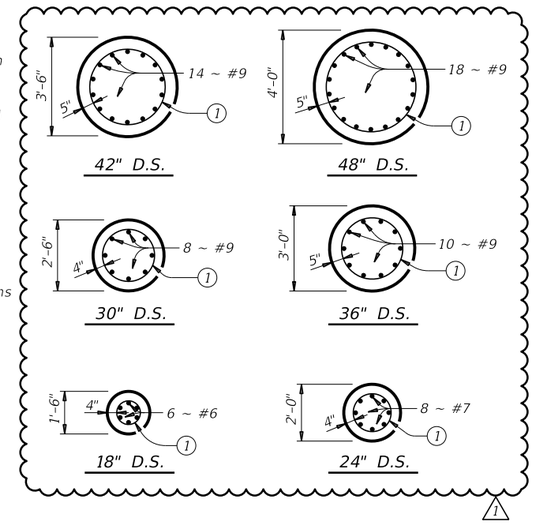
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

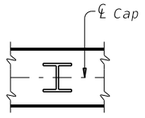


DRILLED SHAFT SECTIONS

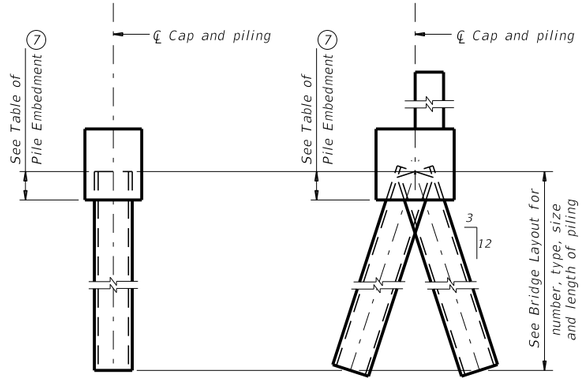
DRILLED SHAFT DETAILS

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"

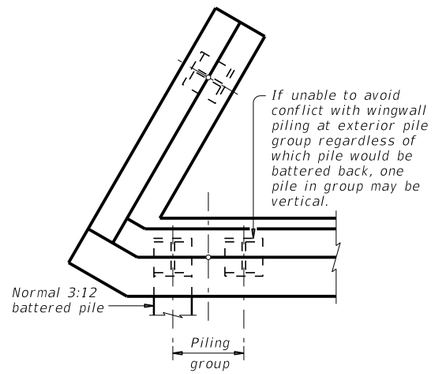
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



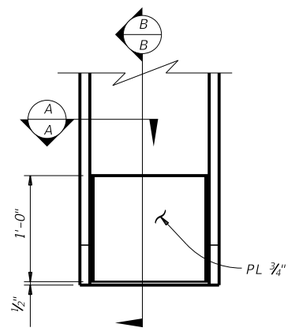
ORIENTATION OF STEEL H-PILING



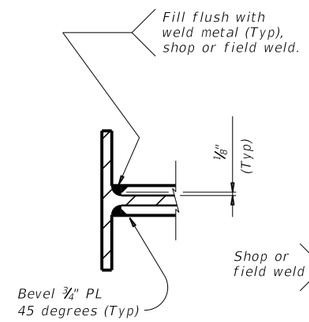
PILING DETAILS
(Concrete or steel H)



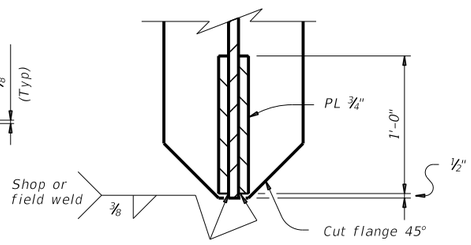
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



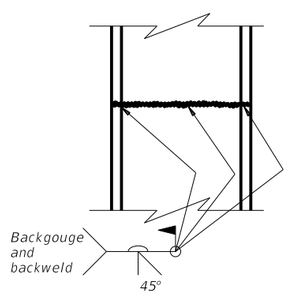
SECTION A-A



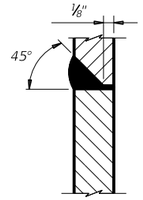
SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



SECTION THRU FLANGE OR WEB



STEEL H-PILE SPLICE DETAIL

Use when required.

(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.

(1) Modified cover per TxDOT Houston District requirements.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

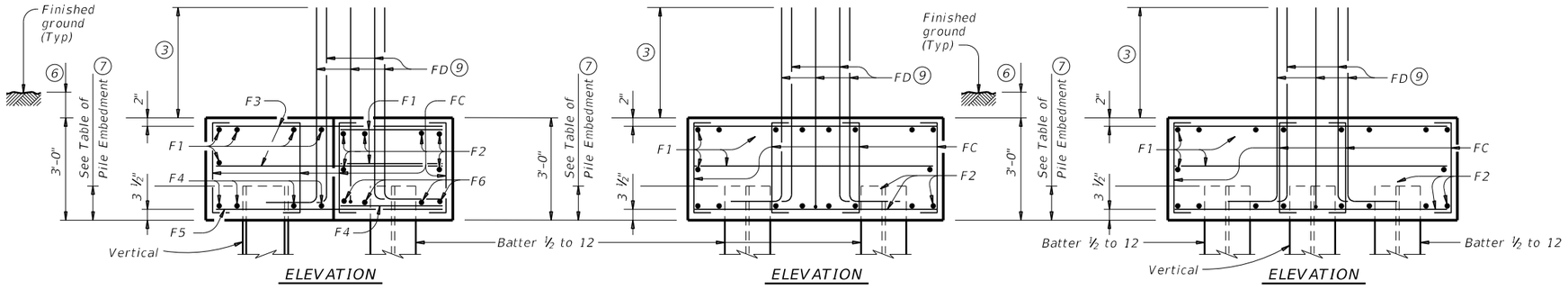
STATE OF TEXAS
GREGORY S HANSEN
113427
LICENSED PROFESSIONAL ENGINEER

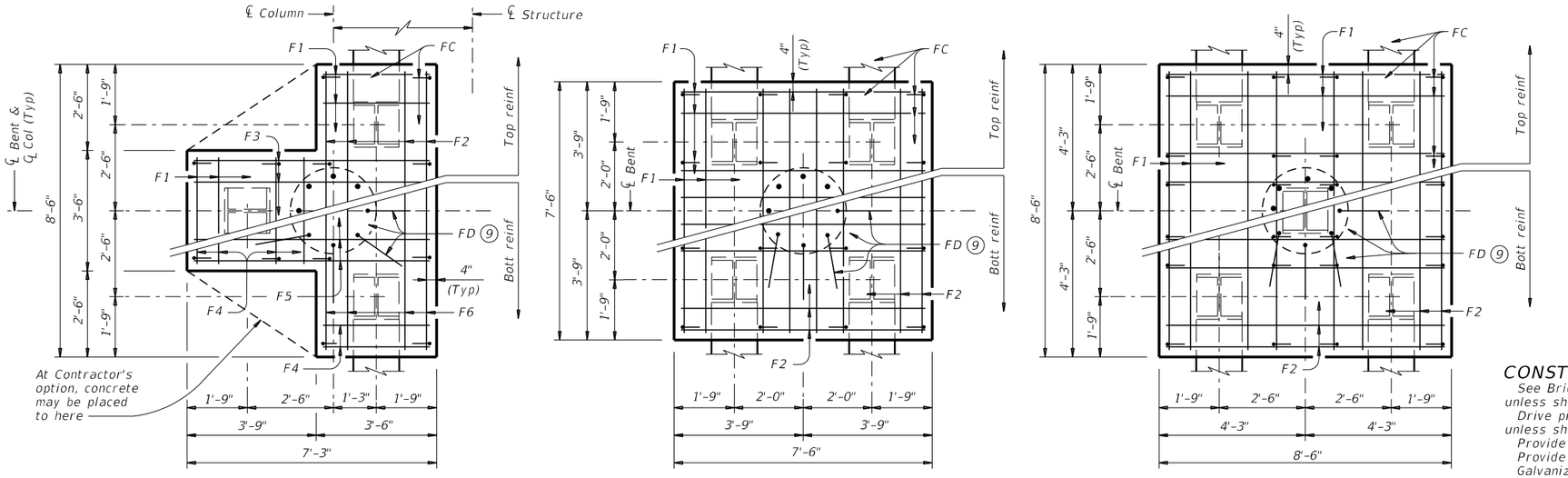
04/18/2022

FD (MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		140

DATE:
FILE:





THREE PILE FOOTING (8)

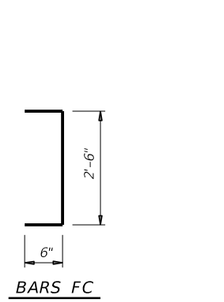
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



(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
GREGORY S HANSEN
103427
LICENSED
PROFESSIONAL ENGINEER

04/18/2022

Texas Department of Transportation

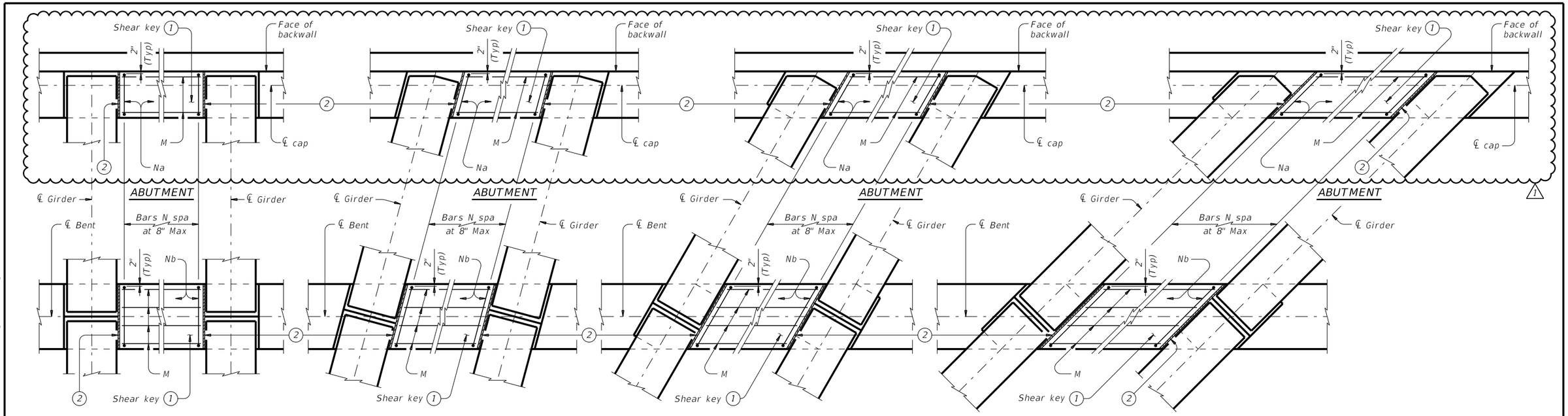
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD (MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		141

DATE:
FILE:



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.

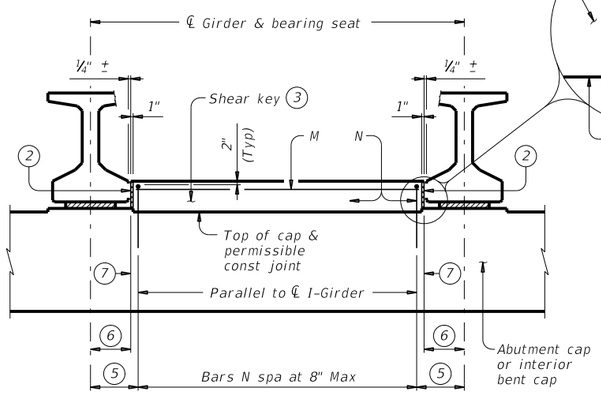
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(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.

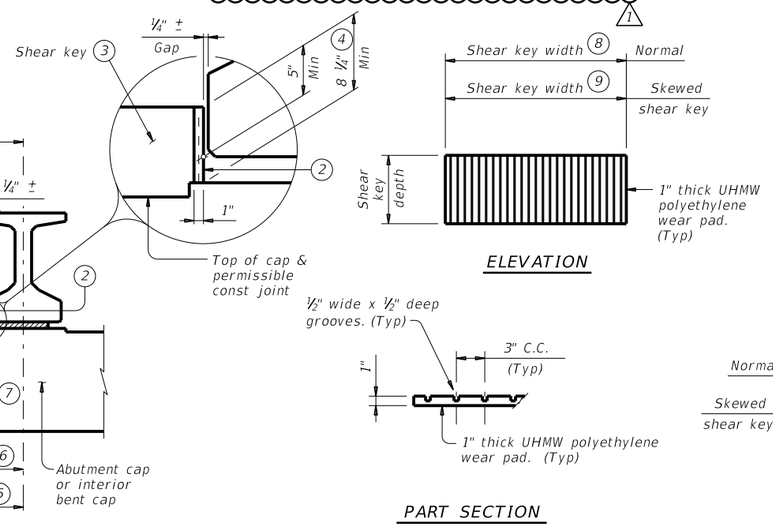
(8) Abutments = Cap width – backwall width.
Interior bents = Cap width.

(9) Abutments = (Cap width – backwall width) ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

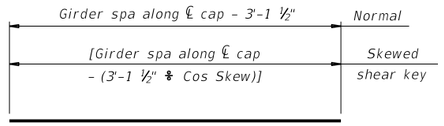


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

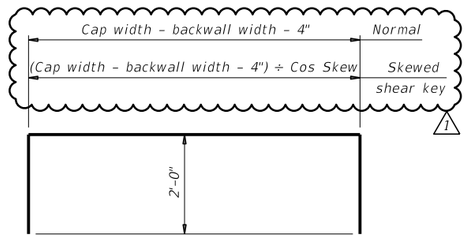
Showing shear key with girder Type Tx46.
Other I-Girder types similar.



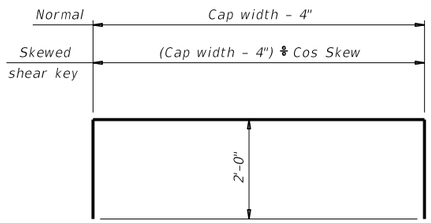
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



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.

1 Moved backwall of abutment flush with back of abutment cap and revised shear key width formula.

04/18/2022

Texas Department of Transportation

Bridge Division Standard

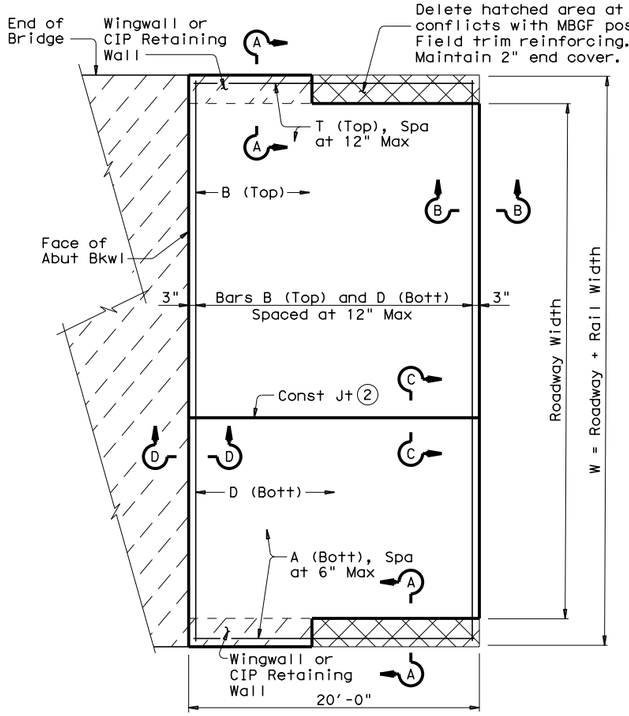
SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK (MOD)

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		142

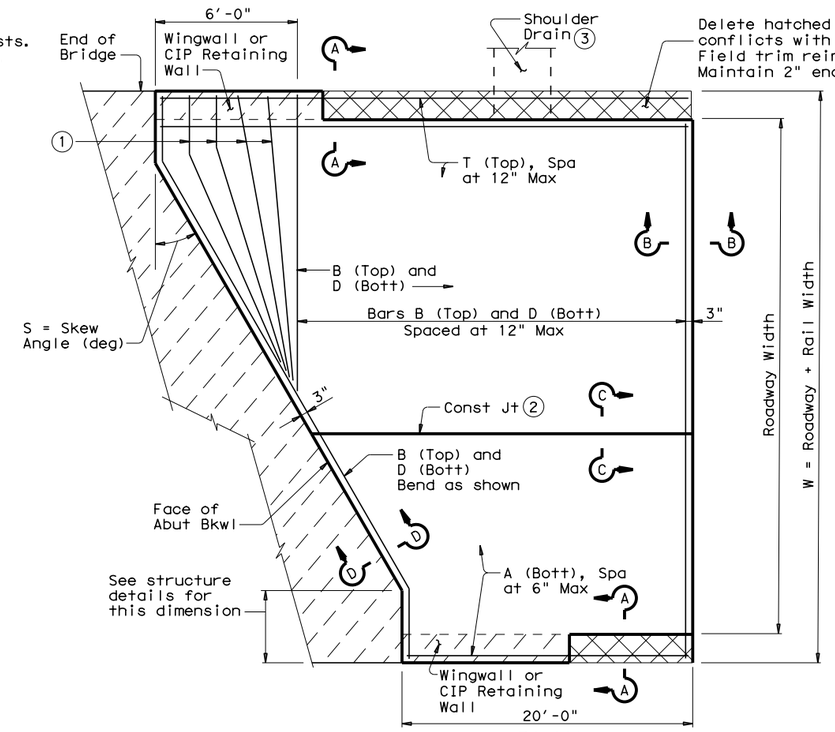
LEVELS DISPLAYED

PATH:



PLAN

(Showing Non-Skewed Approach Slab)



PLAN

(Showing Skewed Approach Slab)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Area of Appr Slab = $20W + 0.5W^2 \tan S$ (SF)

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) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

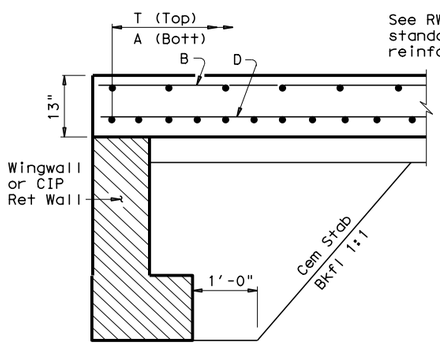
(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

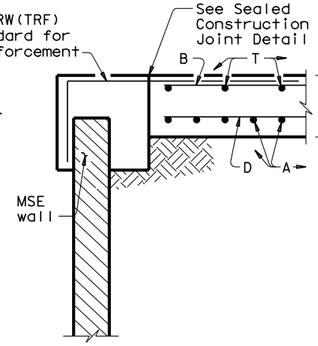
(8) Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.

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.

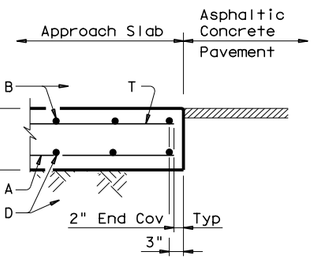


SHOWING WINGWALL OR CIP RETAINING WALL

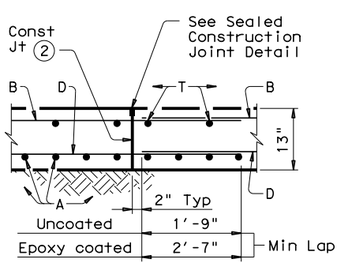


SHOWING MSE WALL

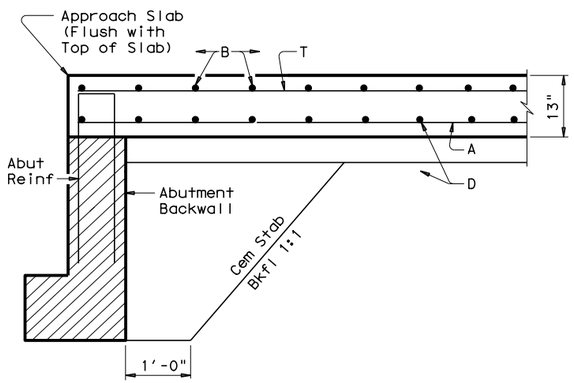
SECTION A-A



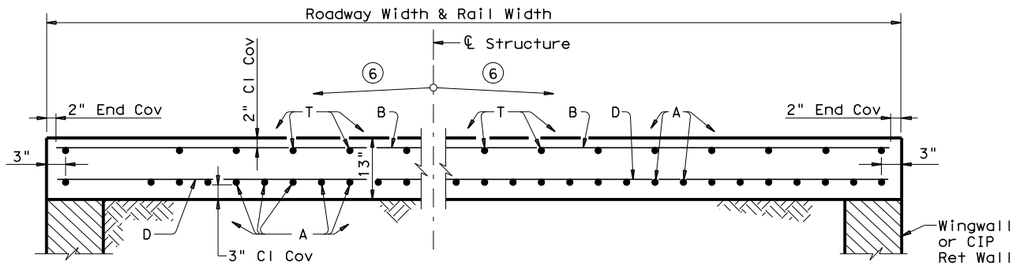
SECTION B-B



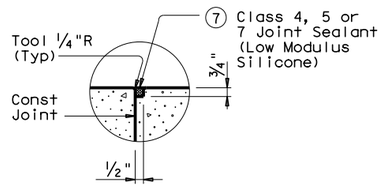
SECTION C-C (5)



SECTION D-D



TYPICAL TRANSVERSE SECTION



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation
Houston District

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: STDB10A.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2009	DISTRICT	PROJECT NO.		SHEET
RIVISIONS 4/20/2015 updated to 2015 standard	HOU			143
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	0912	31	307	CR 30

STDB10A

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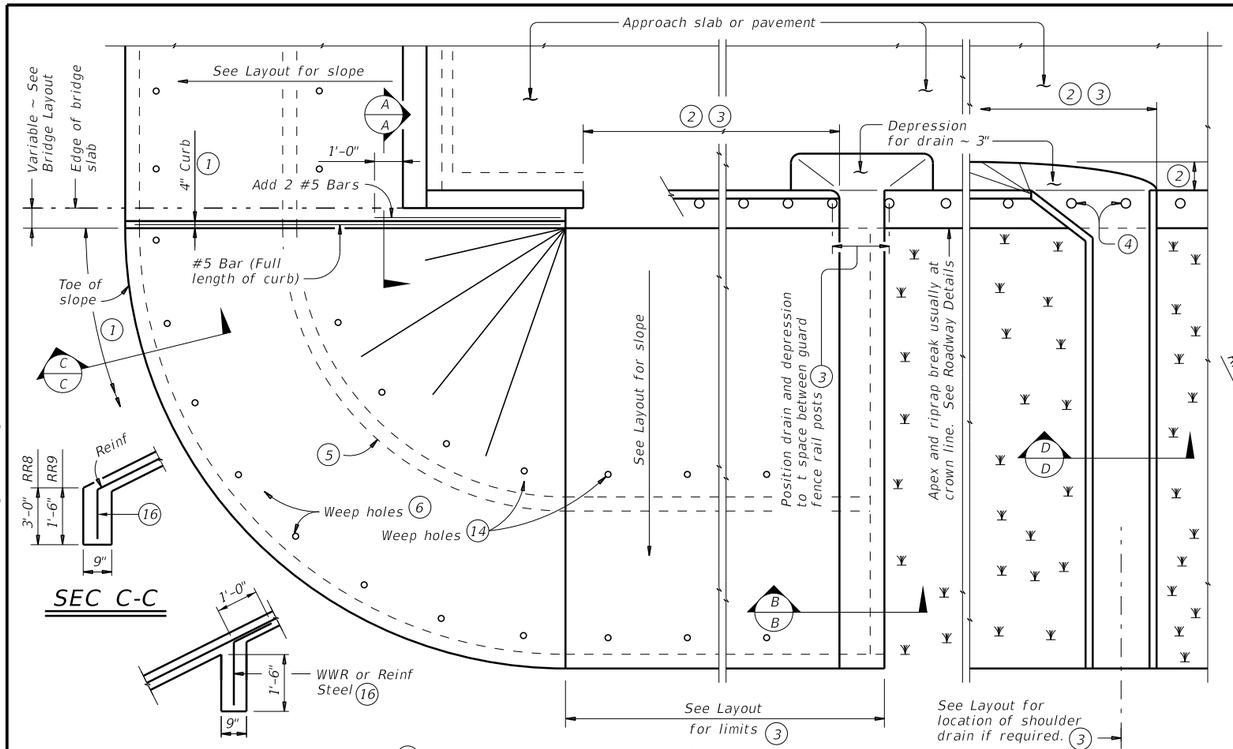
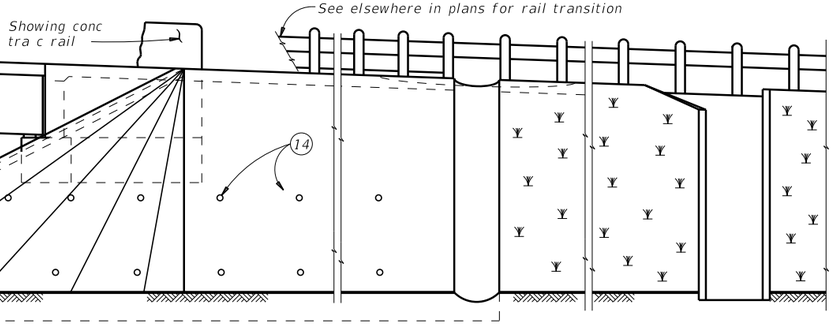
DATE:
FILE:



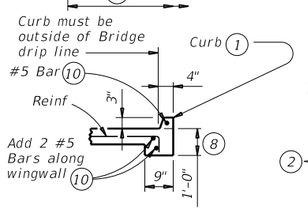
PLAN



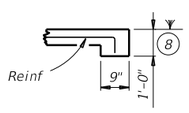
ELEVATION

SEC C-C

INTERMEDIATE TOEWALL

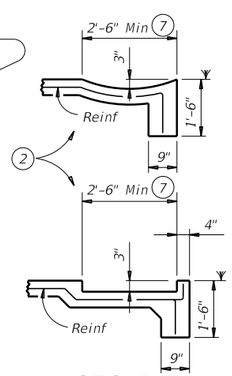


SEC A-A



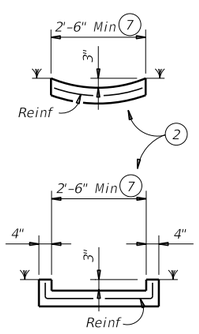
SEC B-B

(No drain)



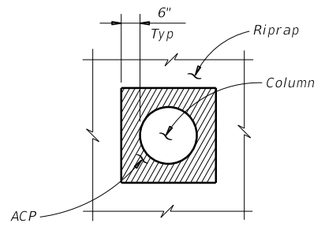
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

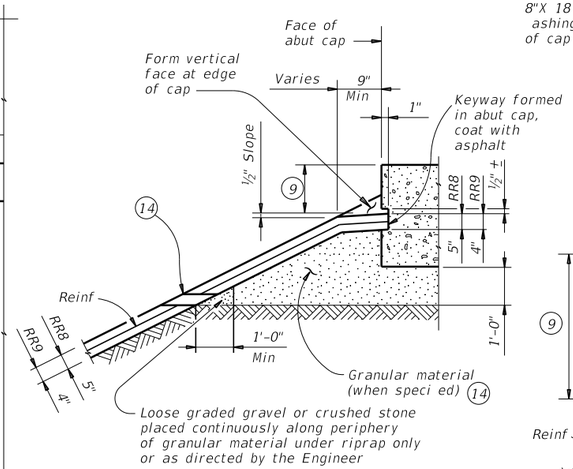
(Shoulder drain)



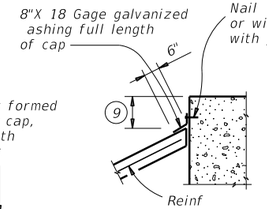
Riprap blockout to be lled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

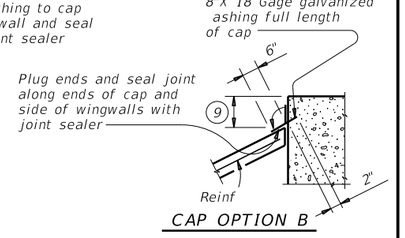
(As directed by the Engineer)



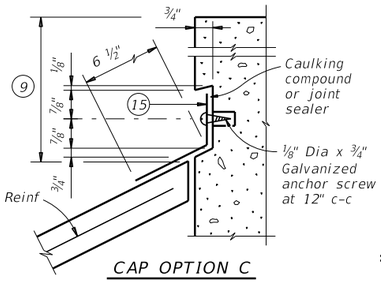
SHOWING KEYWAY OPTION



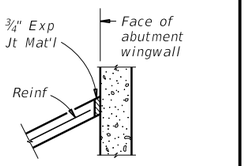
CAP OPTION A



CAP OPTION B

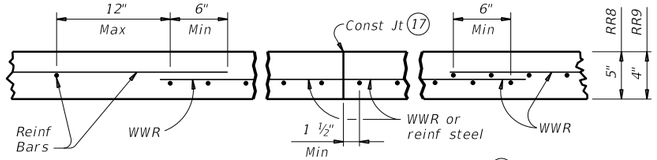


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic ber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and con guration 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 speci cations.
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 con gurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modi ed 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 ber 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 speci ed, 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 ber 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 speci ed elsewhere in the plans.

Optionally synthetic bers may be used if approved by the Engineer. Provide synthetic bers 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, ashing, 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.

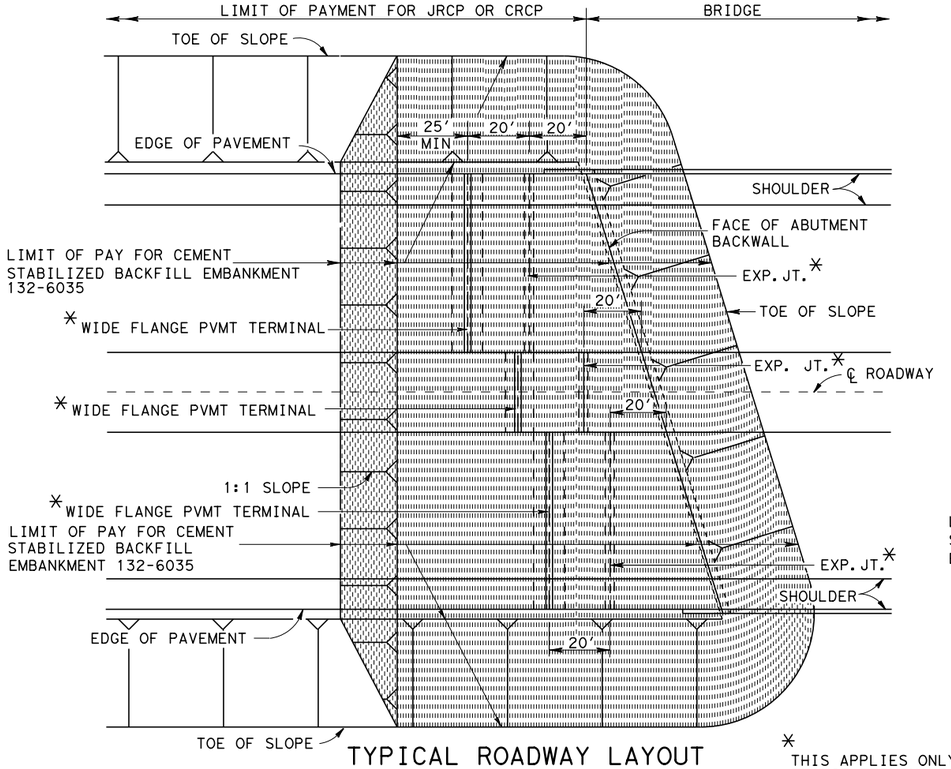
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

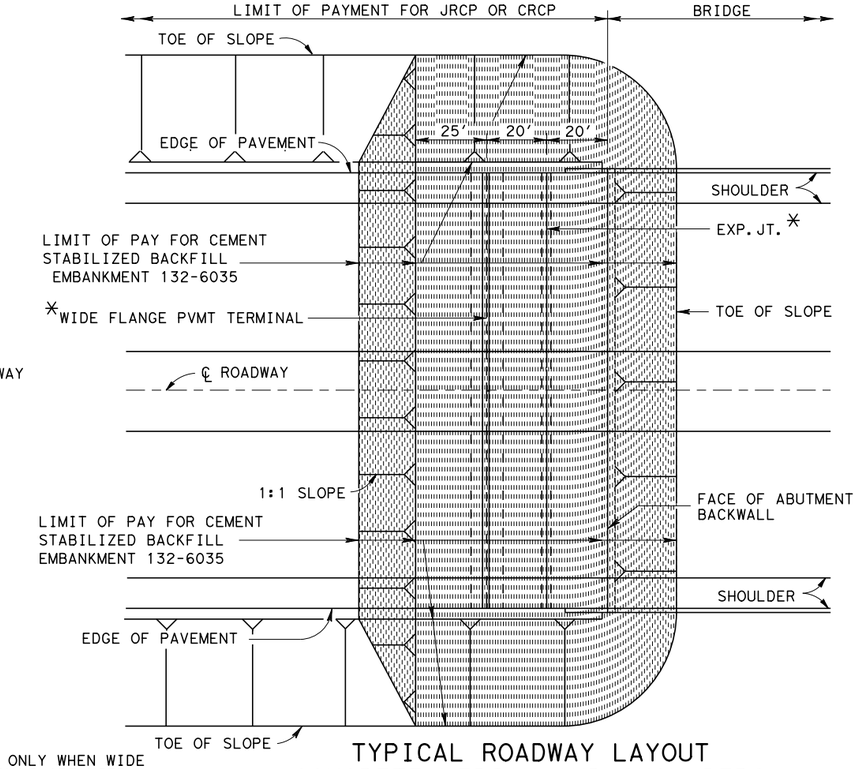
CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		144



TYPICAL ROADWAY LAYOUT CONCRETE MEDIAN AND SHOULDERS (AT SKEWED BRIDGES)

* THIS APPLIES ONLY WHEN WIDE FLANGE TERMINALS ARE USED ON THE APPROACHES TO BRIDGES. IF NOT USING THIS SYSTEM, SEE APPROACH SLAB DETAILS ELSEWHWERE IN THE PLANS.



TYPICAL ROADWAY LAYOUT CONCRETE MEDIAN AND SHOULDERS (AT NON-SKEWED BRIDGES)

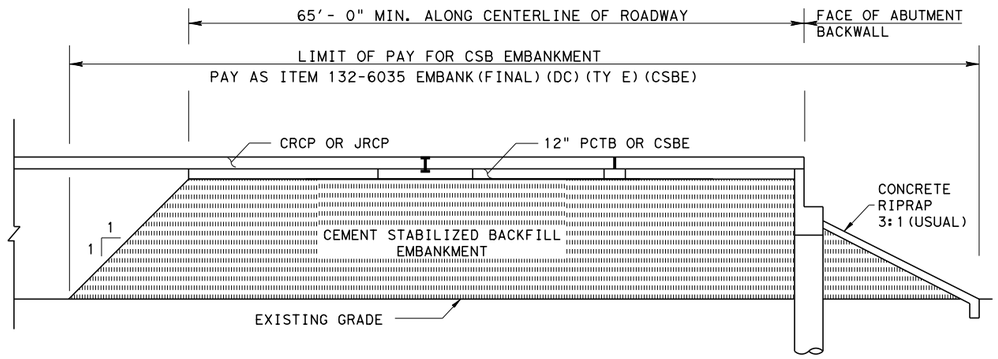
NOTES

1. PROVIDE CEMENT STABILIZED BACKFILL EMBANKMENT IN ACCORDANCE WITH ITEM 132 AND HOUSTON DISTRICT SP (132-001).
2. FOR ADDITIONAL DETAILS ON WIDE FLANGE PAVEMENT TERMINALS SEE "WIDE FLANGE PAVEMENT TERMINALS" STANDARD SHEET.

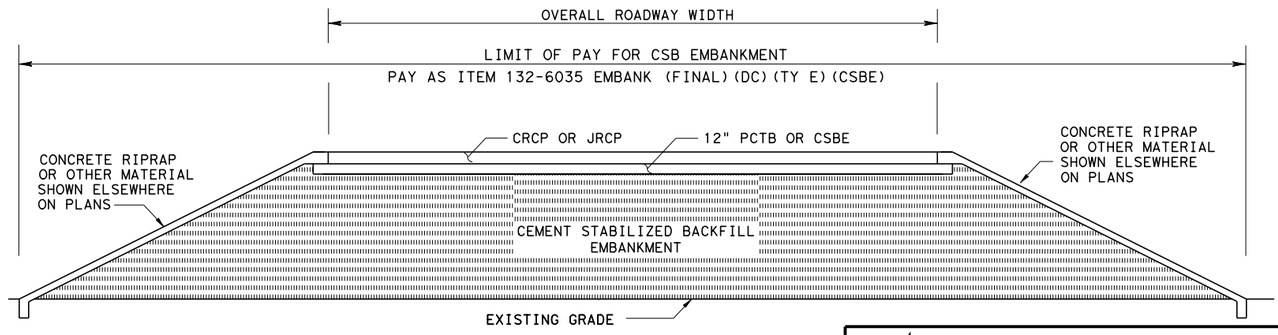
ASB - ASPHALT STABILIZED BASE
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
CSBE - CEMENT STABILIZED BACKFILL EMBANKMENT
EXP JT - EXPANSION JOINT
JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
LTS - LIME TREATED SUBGRADE
PCTB - PORTLAND CEMENT TREATED BASE

LIMITS OF CEMENT STABILIZED BACKFILL EMBANKMENT. THIS QUANTITY IS PAID UNDER ITEM 132-6035, EMBANKMENT (FINAL)(DENSITY CONTROL) (TY E)(CSBE)

LEGEND



LONGITUDINAL SECTION



TRANSVERSE SECTION

Texas Department of Transportation
Houston District

CEMENT STABILIZED BACKFILL EMBANKMENT

(FOR USE WITHOUT RETAINING WALLS AT BRIDGE ABUTMENTS)

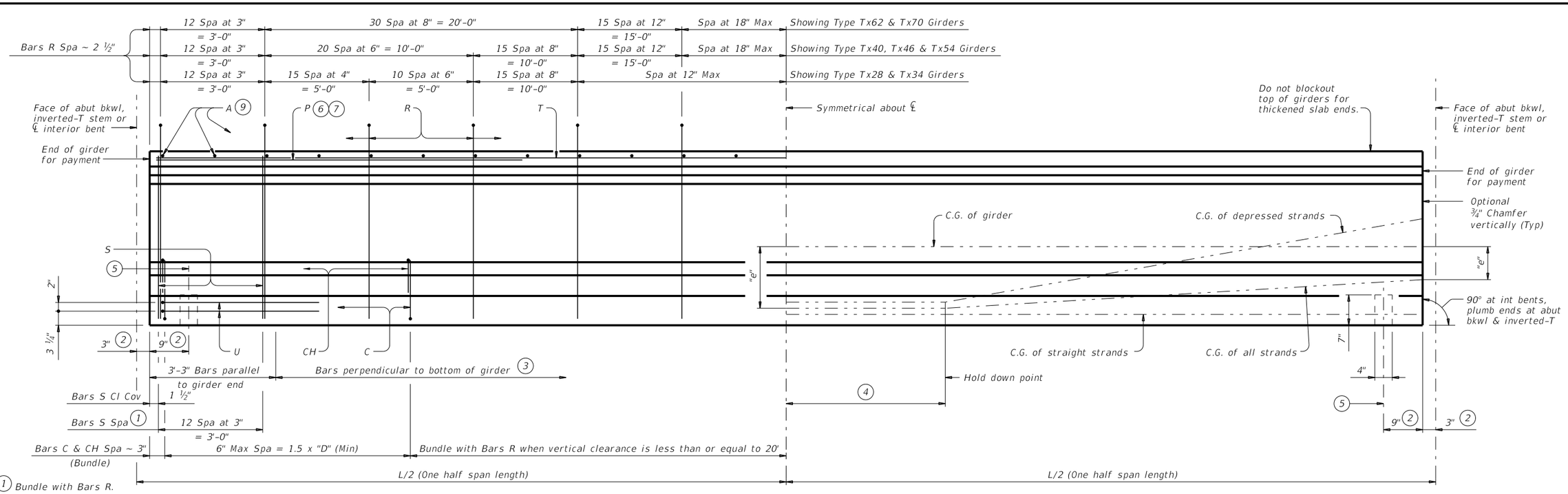
CSBE

SHEET 1 OF 1

FILE: STDB-7.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014 REVISIONS	DIST	FED REG	PROJECT NO.	SHEET
	HOU	6		145

COUNTY	CONTROL	SECT	JOB	HIGHWAY
BRAZORIA	0912	31	307	CR 144

DATE:
FILE:



(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.

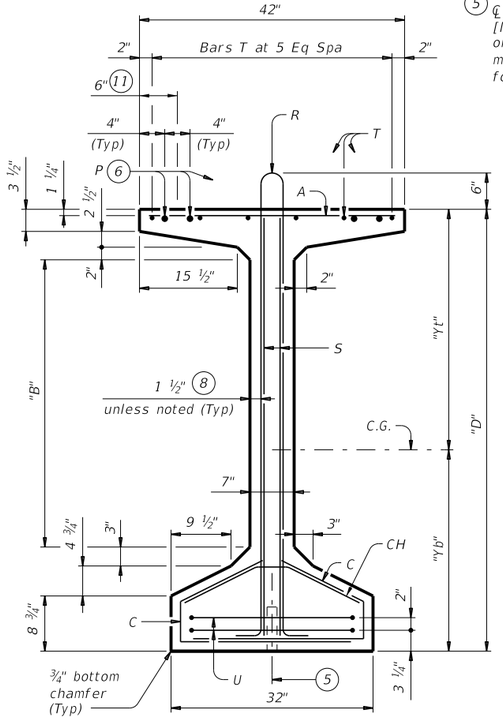
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

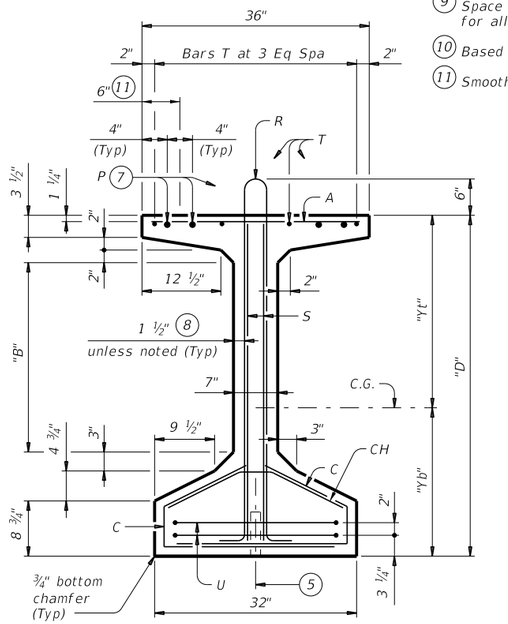
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

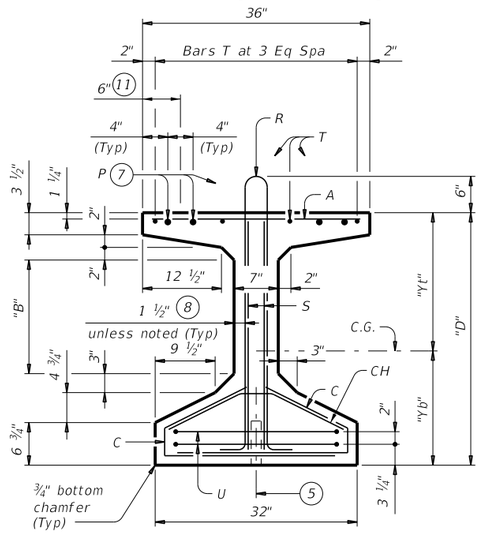
(11) Smooth trowel nish on the slab overhang side of exterior girder.



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 Speci cations.
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

SHEET 1 OF 2

Texas Department of Transportation

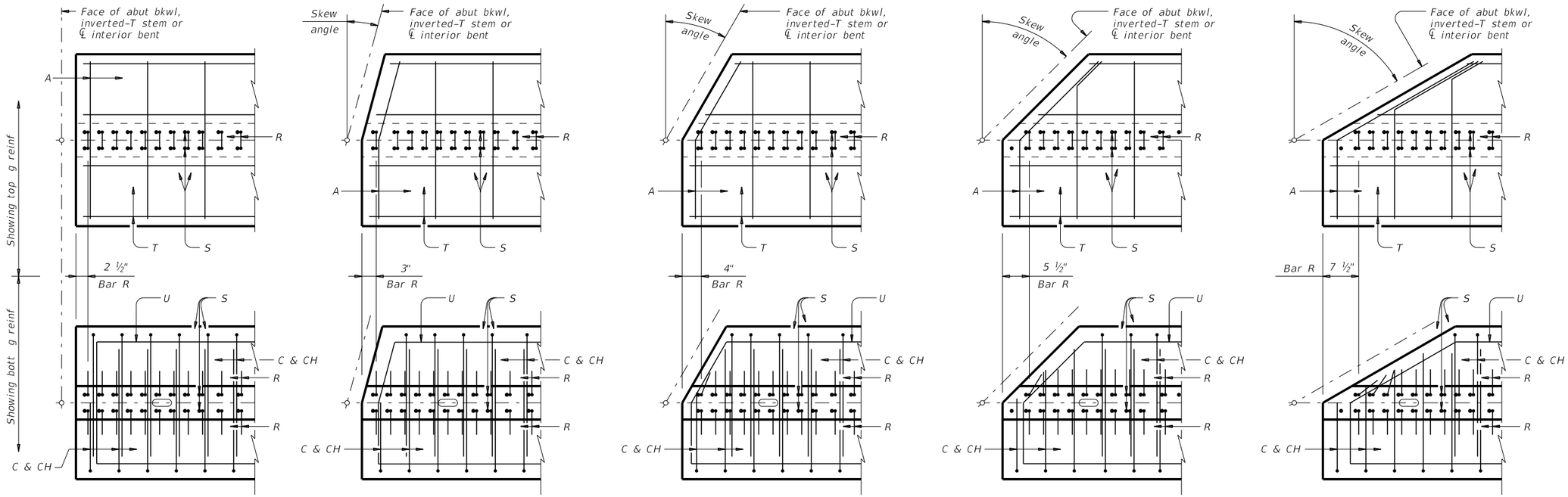
Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

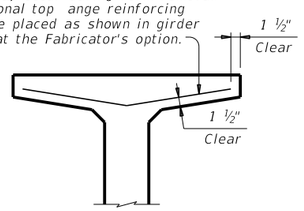
FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		146

DATE:
FILE:

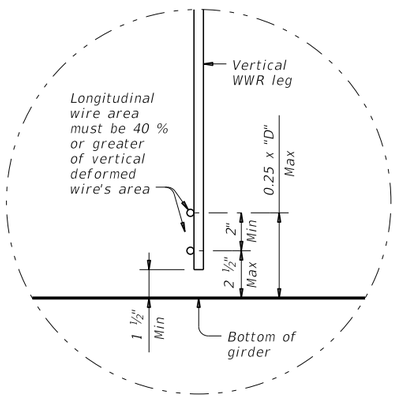


PLAN OF GIRDER ENDS (12)

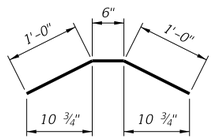
To control top ange cracking that may occur during form removal, additional top ange reinforcing may be placed as shown in girder ends at the Fabricator's option.



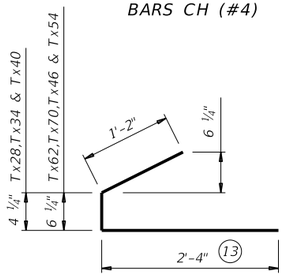
OPTIONAL TOP FLANGE REINFORCING DETAIL



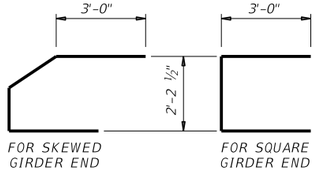
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



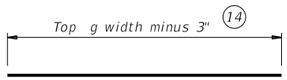
BARS CH (#4)



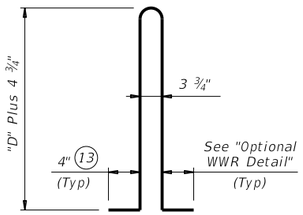
BARS C (#4)



BARS U (#5)

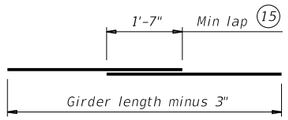


BARS A (#3)



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.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

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
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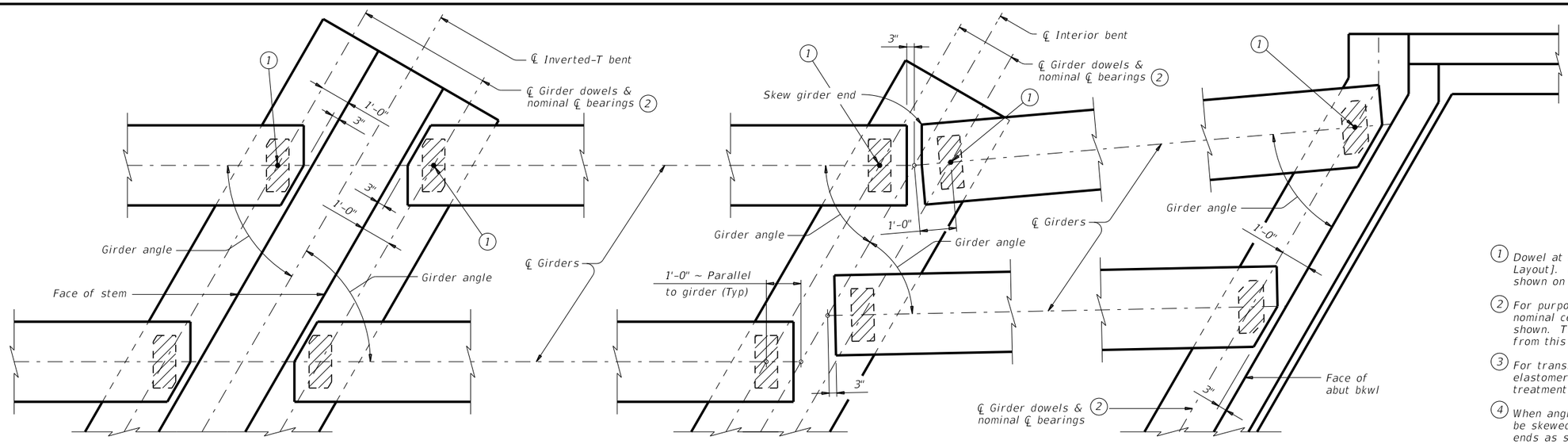
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		147

DATE:
FILE:



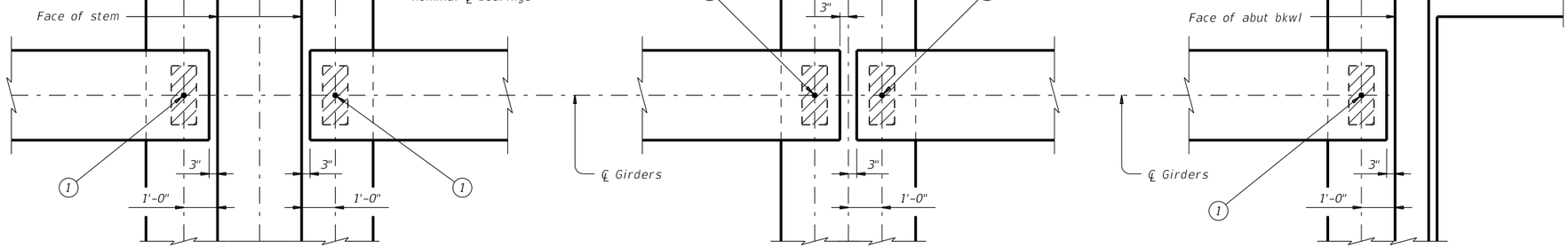
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be de ned as shown. The actual center of bearing pad may vary from this line.

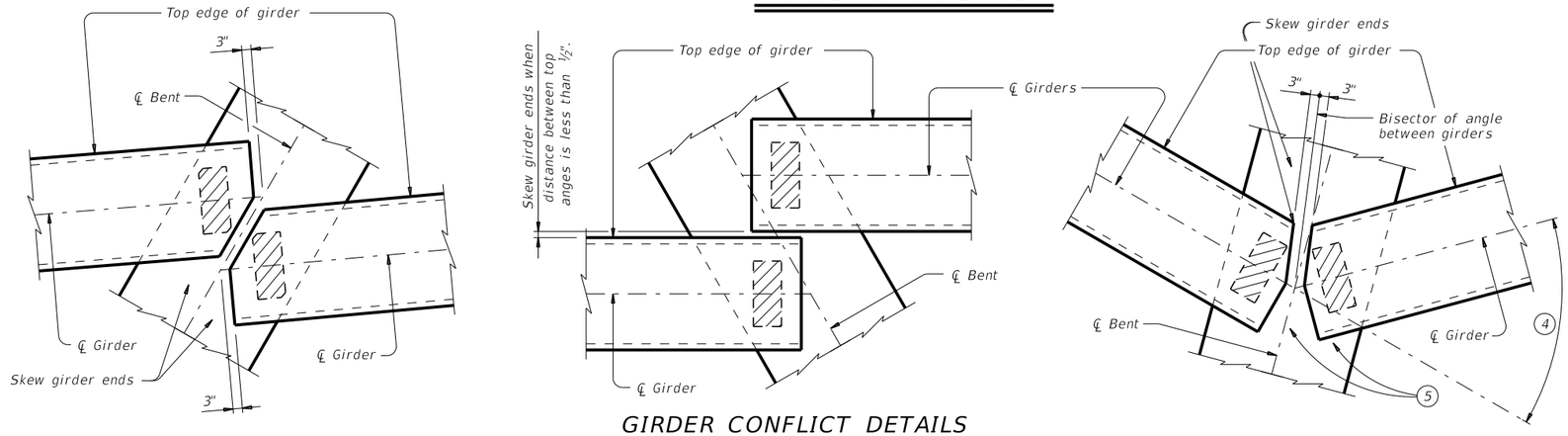
(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(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 re ects girder con icts of this type on radial bents only.



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 identi es 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

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	HOU	BRAZORIA		148

DATE:
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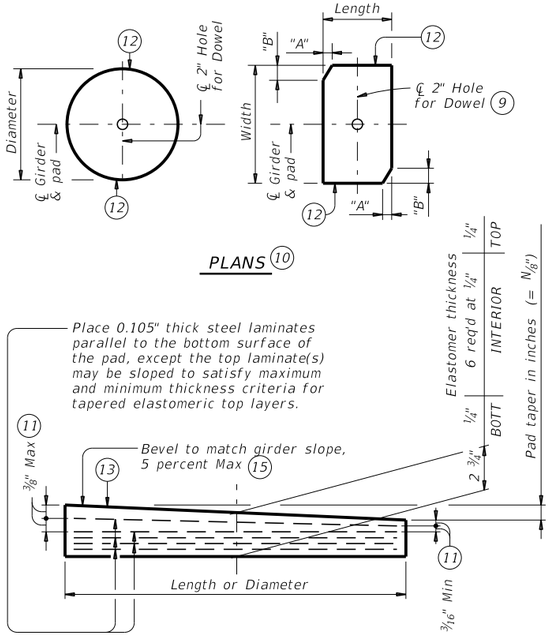


LAMINATED ELASTOMERIC BEARING PAD

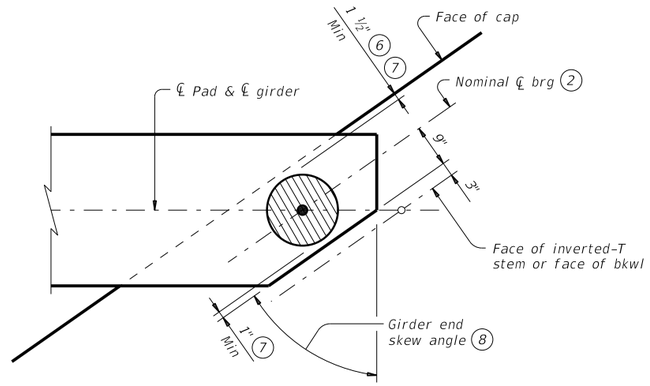
(50 DUROMETER)

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

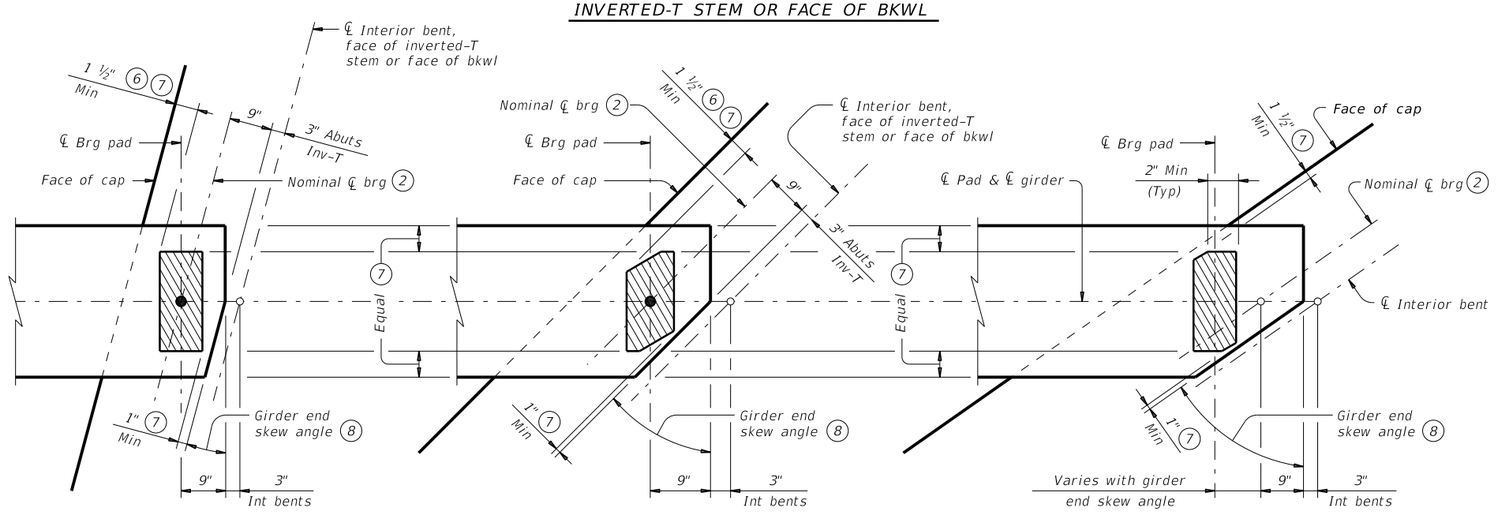
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	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 de ned 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 con icting 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 con ict 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

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	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		149

DATE:
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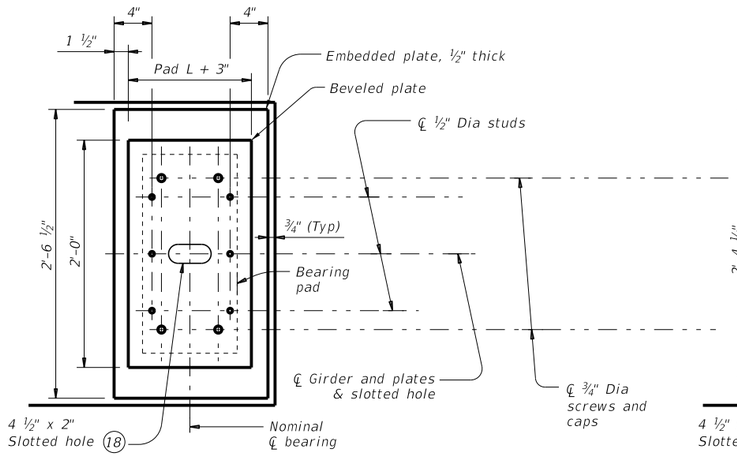
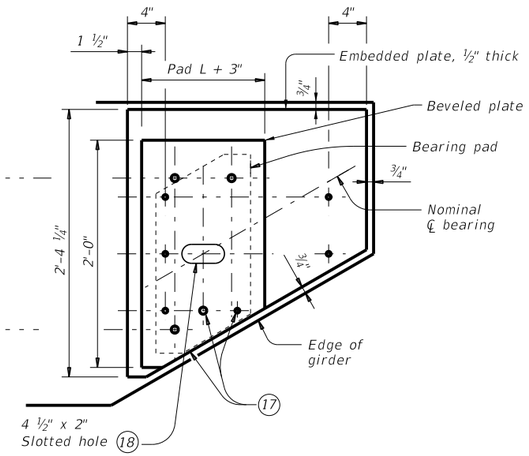
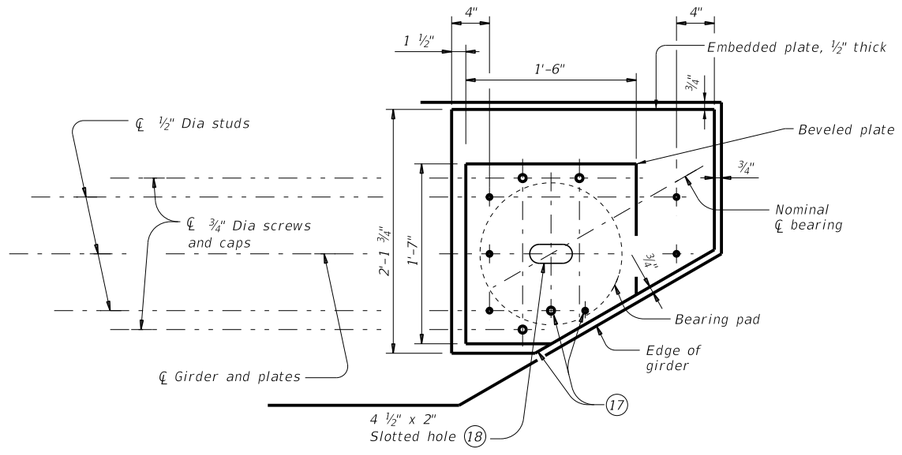


NORMAL GIRDER END
RECTANGULAR BEARING PAD

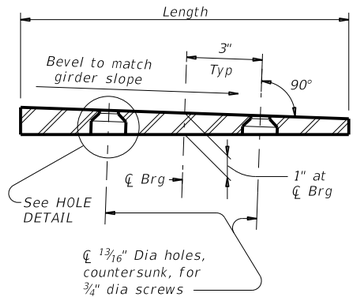


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

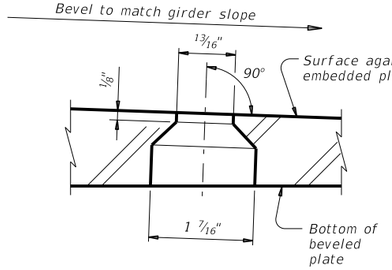


SKEWED GIRDER END
15" DIA BEARING PAD

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.

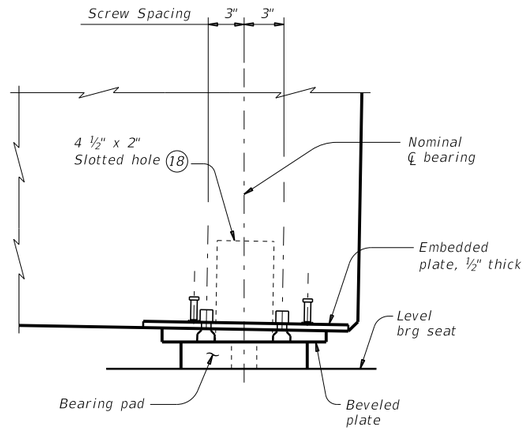
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

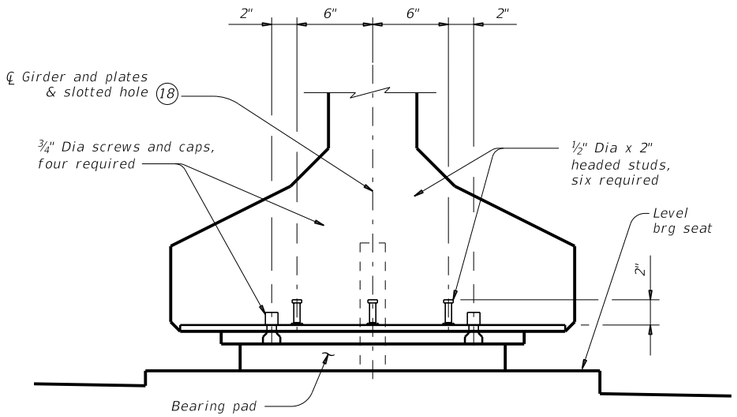
¾" Dia screws must be electroplated, socket at head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) 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

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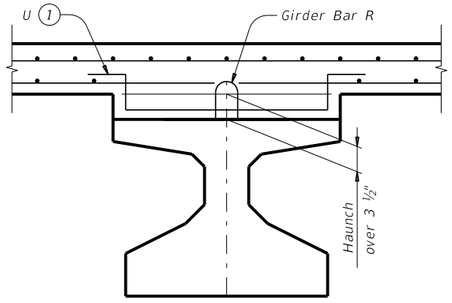
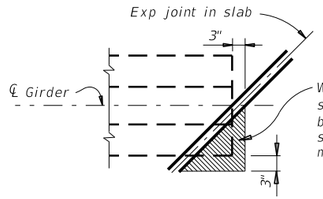
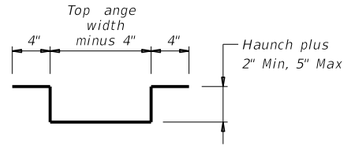


HAUNCH REINFORCING DETAIL

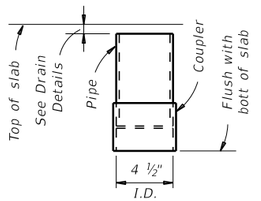


Where anges project under slab of adjacent span, provide a minimum of ½" clearance between top of girder and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a ller.

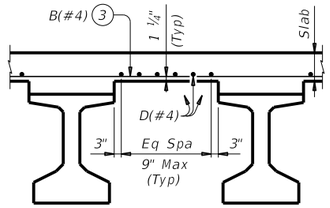
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

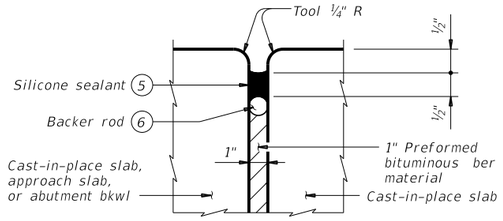


C-I-P DRAIN DETAIL (2)

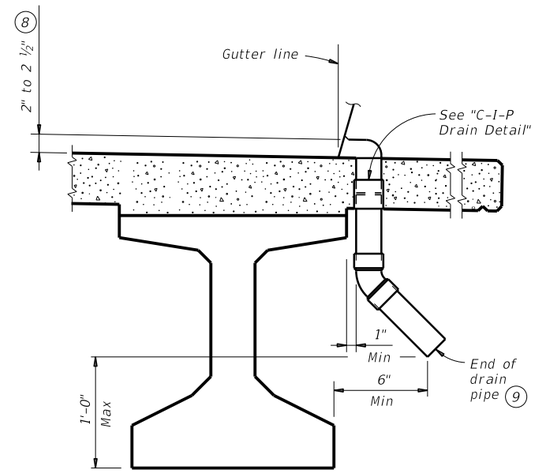


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

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 ttings 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 nishing 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 Speci cations.

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

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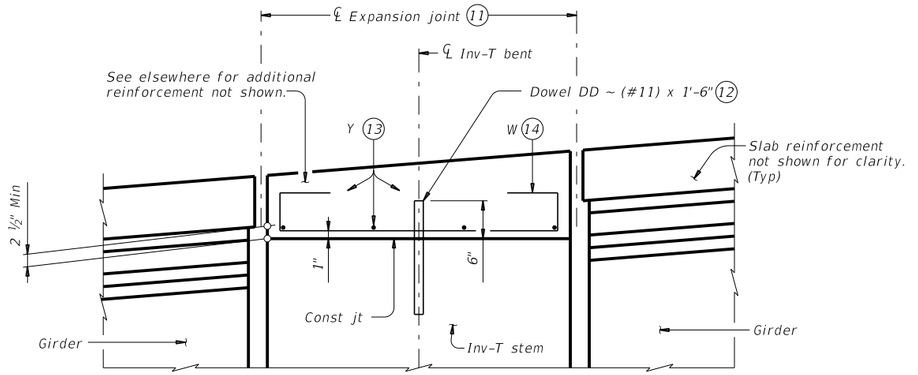
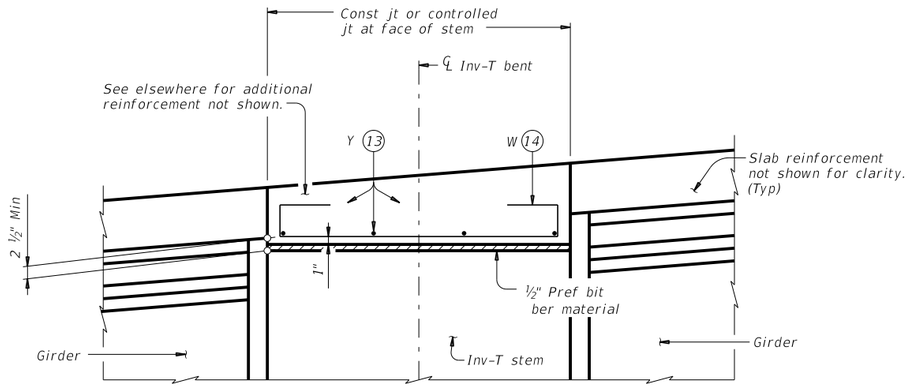
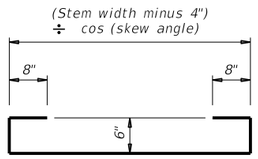


SHOWING EXPANSION JOINTS

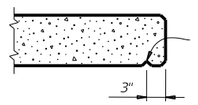


SHOWING CONST JTS OR CONTROLLED JTS

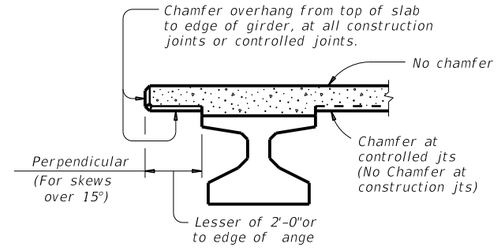
REINFORCEMENT OVER INV-T BENTS



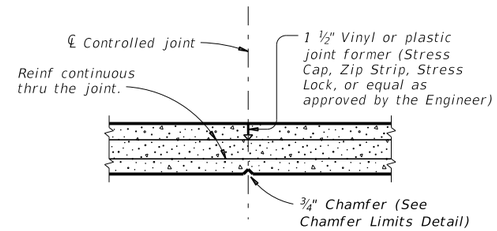
BARS W (#4)



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.

DATE:
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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END	RELEASE STRGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I	SERVICE III	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)		(in)	f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(kip-ft)	Moment	Shear	Inv	Opr	Inv
Type Tx28 Girders 38' Roadway 8.5" Slab	40	ALL	Tx28		12	0.6	270	10.48	10.48			4.700	5.000	1.144	-1.598	1589	0.790	1.000	1.63	2.11	1.97
	45	ALL	Tx28		14	0.6	270	10.48	9.34	2	10.5	4.000	5.000	1.449	-1.961	1674	0.770	1.010	1.53	1.98	1.72
	50	ALL	Tx28		14	0.6	270	10.48	9.62	2	8.5	4.000	5.400	1.779	-2.365	1909	0.750	1.010	1.28	1.66	1.23
	55	ALL	Tx28		18	0.6	270	10.04	7.81	4	14.5	4.000	6.100	2.156	-2.808	2222	0.730	1.020	1.23	1.59	1.02
	60	ALL	Tx28		22	0.6	270	9.75	6.48	4	22.5	4.400	6.700	2.544	-3.259	2534	0.710	1.020	1.24	1.77	1.05
	65	ALL	Tx28		26	0.6	270	9.56	6.48	4	24.5	5.200	7.000	2.985	-3.753	2861	0.690	1.030	1.14	1.85	1.04
	70	ALL	Tx28		30	0.6	270	9.28	5.68	6	24.5	5.600	7.200	3.433	-4.267	3211	0.680	1.030	1.34	1.73	1.10
Type Tx34 Girders 38' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.902	-1.233	1873	0.830	0.980	1.90	2.46	2.54
	45	ALL	Tx34		12	0.6	270	13.01	13.01			4.500	5.500	1.137	-1.501	1976	0.800	0.990	1.89	2.45	2.30
	50	ALL	Tx34		14	0.6	270	13.01	13.01			5.100	6.100	1.403	-1.810	2194	0.770	0.990	1.54	2.00	1.74
	55	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.683	-2.135	2281	0.750	1.000	1.50	1.95	1.53
	60	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.100	2.003	-2.502	2634	0.740	1.000	1.23	1.60	1.11
	65	ALL	Tx34		20	0.6	270	12.41	9.61	4	18.5	4.000	5.600	2.326	-2.862	2965	0.720	1.010	1.41	1.82	1.16
	70	ALL	Tx34		24	0.6	270	12.18	7.84	4	30.5	4.300	6.000	2.696	-3.271	3341	0.710	1.010	1.51	1.96	1.14
	75	ALL	Tx34		26	0.6	270	12.09	9.63	4	20.5	5.100	6.200	3.074	-3.673	3691	0.690	1.010	1.15	1.90	1.05
	80	ALL	Tx34		30	0.6	270	11.81	7.01	6	30.5	5.400	7.100	3.479	-4.111	4081	0.680	1.020	1.36	1.80	1.11
Type Tx40 Girders 38' Roadway 8.5" Slab	40	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.747	-0.997	1923	0.850	0.970	2.19	2.83	3.11
	45	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.933	-1.207	2268	0.820	0.970	1.82	2.35	2.48
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.000	1.151	-1.462	2551	0.800	0.980	1.78	2.31	2.22
	55	ALL	Tx40		14	0.6	270	15.60	15.60			4.300	5.300	1.389	-1.732	2519	0.780	0.980	1.73	2.25	2.05
	60	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.636	-2.008	2702	0.760	0.990	1.46	1.89	1.55
	65	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.500	5.500	1.914	-2.309	3054	0.740	0.990	1.45	1.88	1.39
	70	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.215	-2.637	3441	0.730	0.990	1.14	1.58	1.04
	75	ALL	Tx40		22	0.6	270	14.87	11.24	4	24.5	4.000	5.400	2.514	-2.953	3798	0.710	1.000	1.40	1.82	1.10
	80	ALL	Tx40		26	0.6	270	14.68	9.76	4	36.5	4.400	5.600	2.854	-3.313	4209	0.700	1.000	1.33	1.97	1.12
	85	ALL	Tx40		30	0.6	270	14.40	8.80	6	34.5	4.800	5.800	3.190	-3.669	4615	0.690	1.000	1.41	2.09	1.12
	90	ALL	Tx40		34	0.6	270	14.07	8.78	6	36.5	5.400	6.100	3.569	-4.062	5049	0.680	1.000	1.29	1.99	1.01
	95	ALL	Tx40	*	38	0.6	270	13.71	7.81	8	36.5	5.800	6.900	3.952	-4.459	5486	0.670	1.010	1.34	1.76	1.00
Type Tx46 Girders 38' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.656	-0.798	2016	0.890	0.960	1.93	2.51	3.13
	45	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.823	-0.971	2387	0.860	0.960	1.99	2.59	2.95
	50	ALL	Tx46		14	0.6	270	17.60	17.60			4.200	5.000	1.005	-1.165	2816	0.830	0.960	1.98	2.57	2.70
	55	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.212	-1.381	3022	0.810	0.970	1.64	2.13	2.13
	60	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.427	-1.603	3219	0.790	0.970	1.64	2.13	1.96
	65	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.667	-1.843	3191	0.770	0.970	1.39	1.81	1.55
	70	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	1.921	-2.100	3593	0.760	0.980	1.39	1.80	1.40
	75	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.195	-2.365	3982	0.740	0.980	1.17	1.54	1.08
	80	ALL	Tx46		22	0.6	270	16.88	15.06	4	14.5	4.000	5.000	2.481	-2.648	4407	0.730	0.980	1.33	1.78	1.14
	85	ALL	Tx46		26	0.6	270	16.68	12.07	4	34.5	4.000	5.200	2.793	-2.950	4852	0.720	0.980	1.26	1.75	1.00
	90	ALL	Tx46		30	0.6	270	16.40	9.20	6	42.5	4.100	5.300	3.111	-3.258	5302	0.710	0.990	1.36	1.91	1.04
	95	ALL	Tx46		32	0.6	270	16.23	10.60	6	36.5	4.600	5.500	3.452	-3.572	5729	0.690	0.990	1.43	2.05	1.03
	100	ALL	Tx46		36	0.6	270	15.94	10.27	6	40.5	5.100	5.800	3.807	-3.919	6248	0.690	0.990	1.44	2.11	1.06
	105	ALL	Tx46		40	0.6	270	15.70	10.60	6	40.5	5.700	6.500	4.186	-4.275	6745	0.680	0.990	1.48	1.80	1.04

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER
*	2.5(14),4.5(14),6.5(8),8.5(2)

(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. Load rated using Load and Resistance Factor Rating according to AASTHO Manual for Bridge Evaluation.

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.

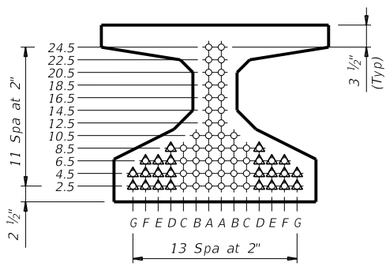
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.



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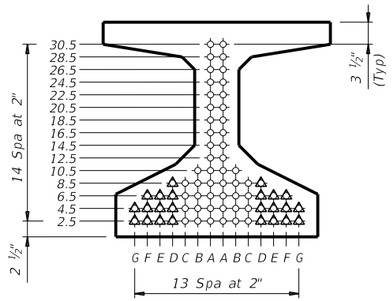

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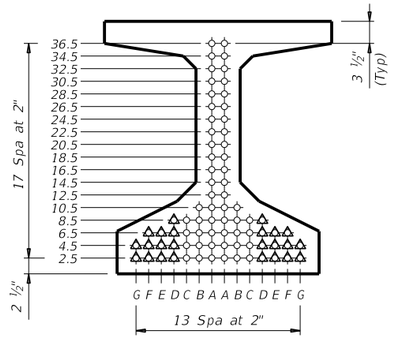

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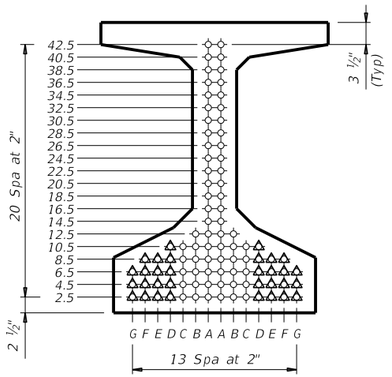

TYPE Tx46

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

38' ROADWAY

IGSD-38

FILE: ig04stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		153

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DATE:
FILE:

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END	RELEASE STRGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)			f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(kip-ft)	Moment	Shear	Inv	Opr	Inv
Type Tx54 Girders 38' Roadway 8.5" Slab	40	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.544	-0.650	2082	0.920	0.940	2.22	2.87	3.78
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.681	-0.790	2466	0.890	0.950	2.29	2.96	3.58
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.833	-0.950	2916	0.860	0.950	1.88	2.44	2.86
	55	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.003	-1.126	3401	0.840	0.950	1.90	2.46	2.66
	60	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.184	-1.309	3896	0.820	0.960	1.90	2.46	2.47
	65	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.382	-1.505	3867	0.800	0.960	1.62	2.11	2.02
	70	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.500	5.500	1.583	-1.703	3919	0.780	0.960	1.64	2.13	2.00
	75	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	1.810	-1.926	4133	0.770	0.970	1.41	1.83	1.52
	80	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.041	-2.146	4541	0.750	0.970	1.64	2.13	1.62
	85	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.296	-2.390	5001	0.740	0.970	1.24	1.61	1.11
	90	ALL	Tx54		24	0.6	270	20.17	17.84	4	18.5	4.000	5.000	2.557	-2.639	5467	0.730	0.970	1.25	1.62	1.02
	95	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.839	-2.906	5955	0.720	0.970	1.41	1.83	1.06
	100	ALL	Tx54		30	0.6	270	19.81	12.21	6	44.5	4.000	5.000	3.125	-3.174	6446	0.710	0.980	1.50	2.00	1.07
	105	ALL	Tx54		34	0.6	270	19.48	11.71	6	50.5	4.400	5.000	3.435	-3.462	6961	0.700	0.980	1.60	2.13	1.09
	110	ALL	Tx54		36	0.6	270	19.34	13.67	6	40.5	5.000	5.800	3.745	-3.750	7476	0.690	0.980	1.28	2.08	1.03
	115	ALL	Tx54		40	0.6	270	19.11	12.51	6	50.5	5.300	6.100	4.082	-4.058	8017	0.680	0.980	1.43	1.92	1.04
	120	ALL	Tx54		44	0.6	270	18.83	11.55	8	48.5	5.600	6.700	4.417	-4.365	8554	0.670	0.980	1.42	1.83	1.04
	125	ALL	Tx54	**	48	0.6	270	18.42	10.09	10	50.5	6.000	8.100	4.788	-4.713	9185	0.670	0.980	1.43	1.94	1.04
Type Tx62 Girders 38' Roadway 8.5" Slab	60	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	0.930	-1.095	4039	0.840	0.950	1.82	2.36	2.63
	65	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.084	-1.258	4574	0.820	0.950	1.85	2.40	2.48
	70	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.244	-1.426	4553	0.800	0.950	1.60	2.08	2.07
	75	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.422	-1.613	4834	0.790	0.950	1.62	2.10	1.94
	80	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.601	-1.796	4788	0.770	0.960	1.42	1.84	1.61
	85	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.799	-2.001	5211	0.760	0.960	1.22	1.58	1.29
	90	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.000	5.000	2.001	-2.209	5698	0.750	0.960	1.25	1.62	1.21
	95	ALL	Tx62		22	0.6	270	25.05	23.96	4	10.5	4.000	5.000	2.220	-2.431	6210	0.740	0.960	1.26	1.64	1.13
	100	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.441	-2.655	6724	0.730	0.960	1.25	1.66	1.05
	105	ALL	Tx62		28	0.6	270	24.78	20.21	4	36.5	4.000	5.000	2.681	-2.895	7266	0.720	0.970	1.44	1.87	1.10
	110	ALL	Tx62		32	0.6	270	24.40	15.40	6	54.5	4.000	5.000	2.920	-3.135	7805	0.710	0.970	1.43	1.86	1.01
	115	ALL	Tx62		34	0.6	270	24.25	16.84	6	48.5	4.400	5.200	3.181	-3.392	8374	0.700	0.970	1.55	2.01	1.02
	120	ALL	Tx62		38	0.6	270	23.99	16.09	6	56.5	4.800	5.600	3.439	-3.647	8938	0.690	0.970	1.59	2.13	1.10
	125	ALL	Tx62		40	0.6	270	23.88	17.88	6	46.5	5.300	6.300	3.726	-3.937	9599	0.690	0.970	1.60	2.15	1.12
	130	ALL	Tx62		44	0.6	270	23.60	15.96	8	50.5	5.500	6.400	4.001	-4.208	10189	0.680	0.970	1.48	2.05	1.09
	135	ALL	Tx62		48	0.6	270	23.28	16.28	8	50.5	6.000	7.100	4.303	-4.500	10814	0.670	0.980	1.40	1.88	1.01

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER
**	2.5(14),4.5(14),6.5(14),8.5(4),10.5(2)

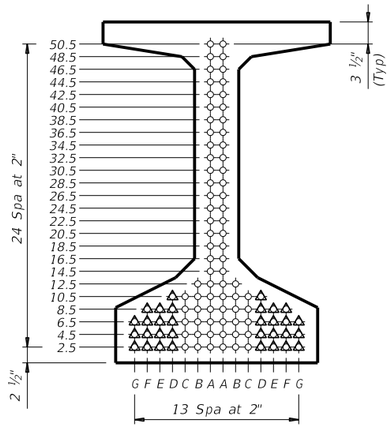
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

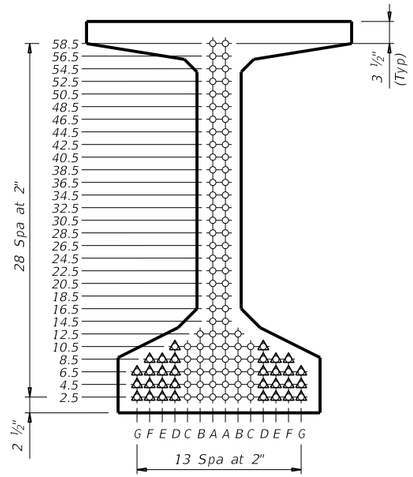
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

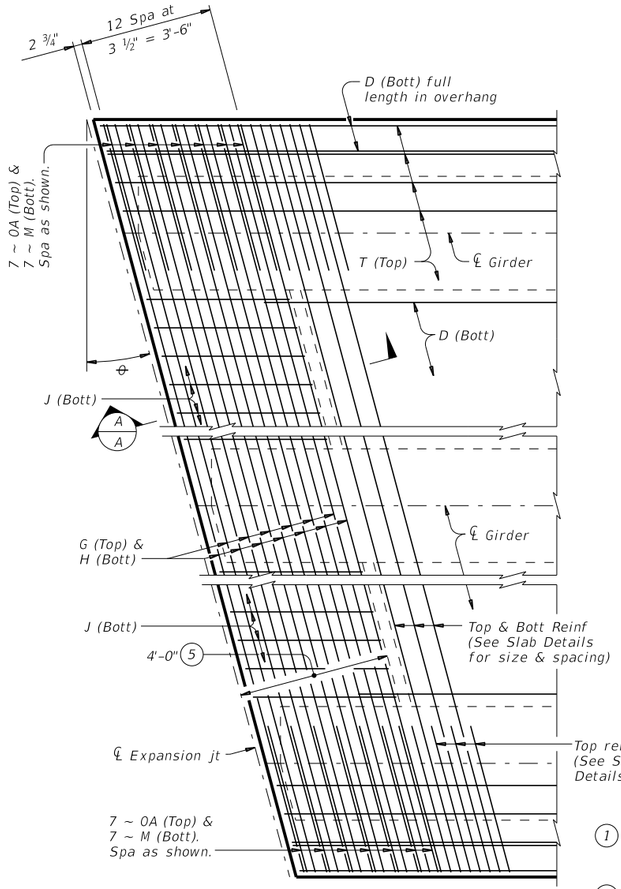
PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

38' ROADWAY

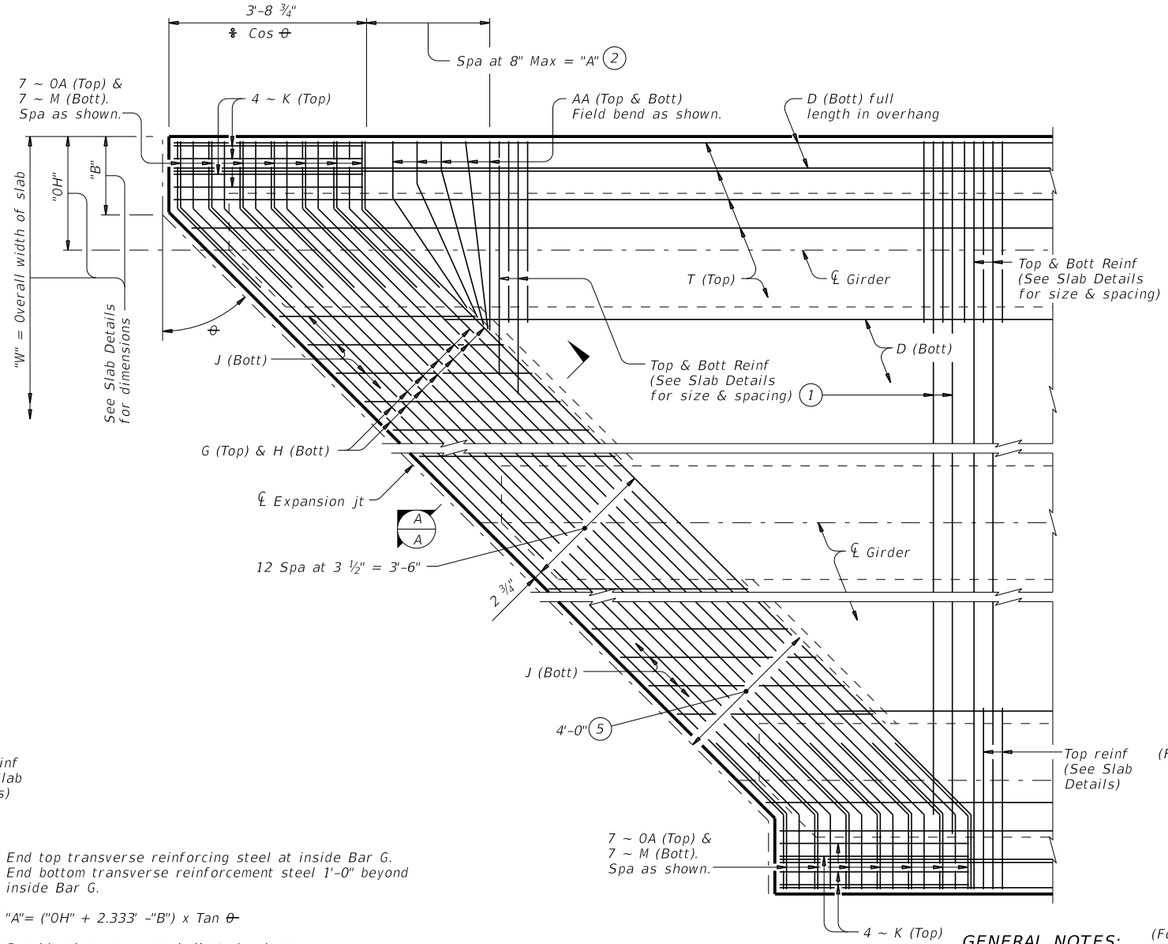
IGSD-38

FILE: ig04stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		154

DATE:
FILE:



PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

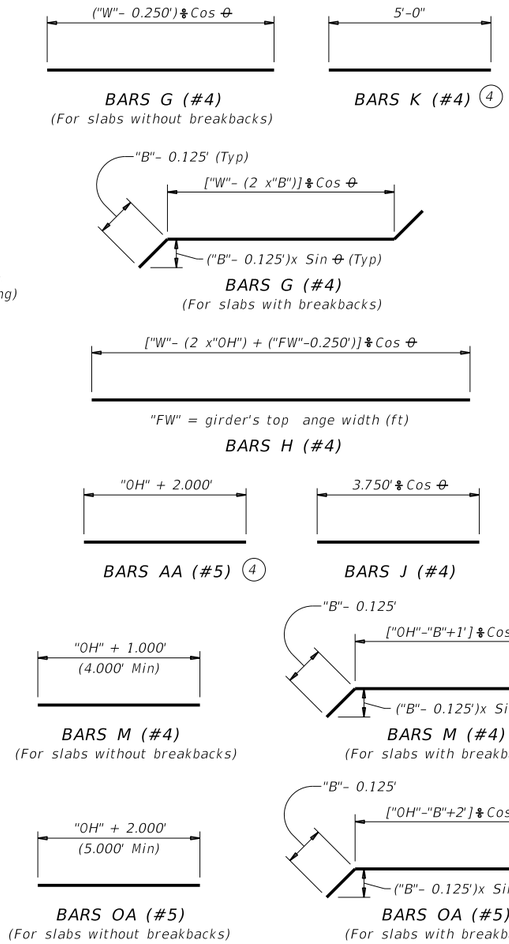
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(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.



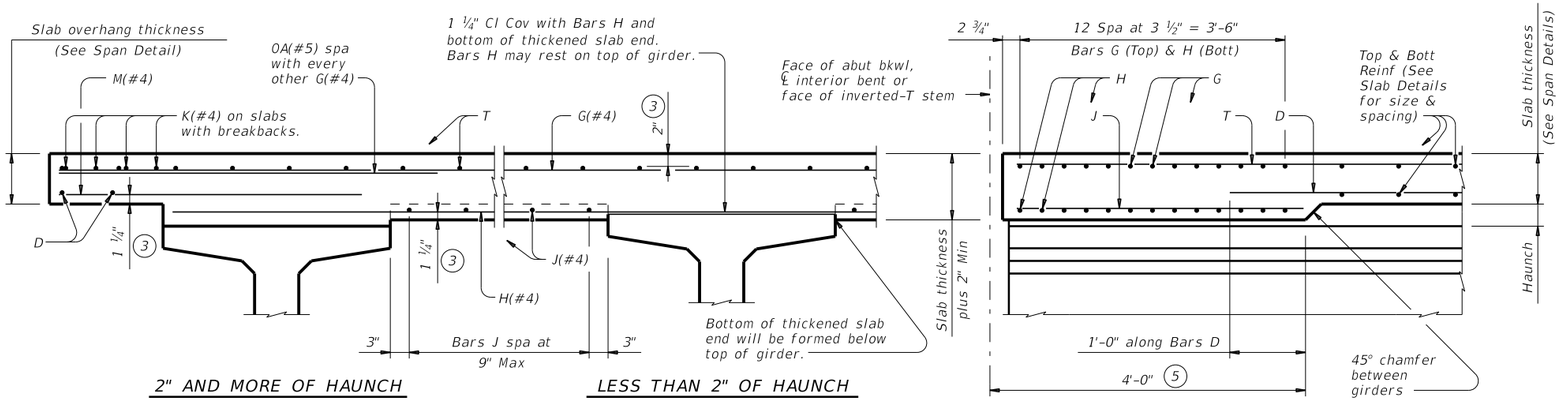
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
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.



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)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

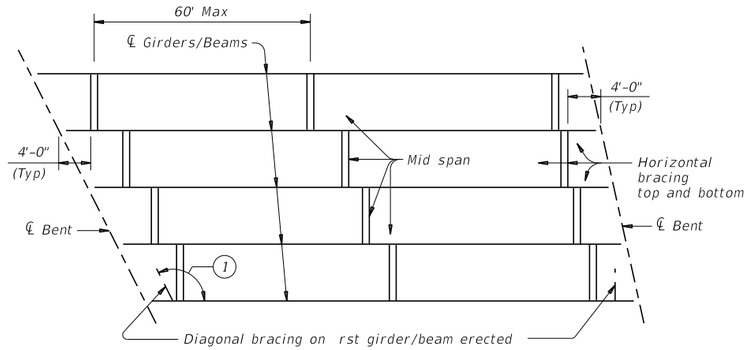
THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

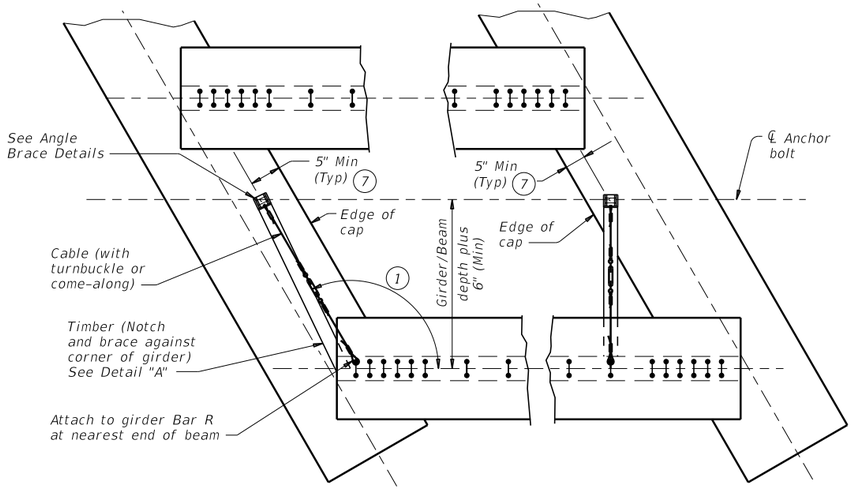
IGTS

FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		155

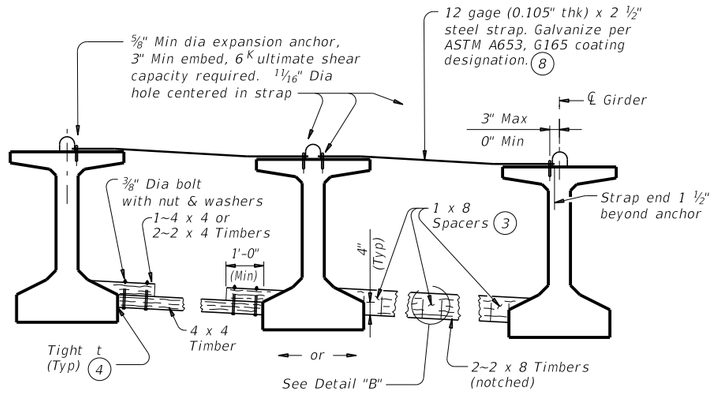
DATE:
FILE:



ERECTION BRACING

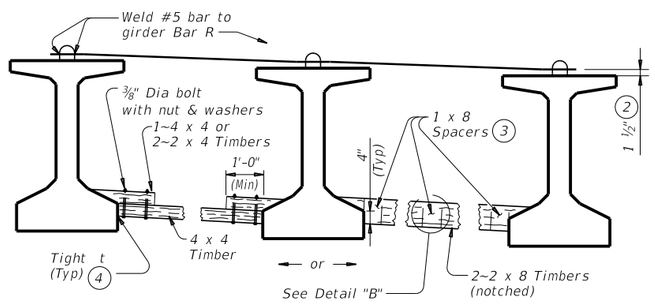


PLAN



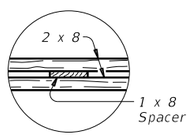
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



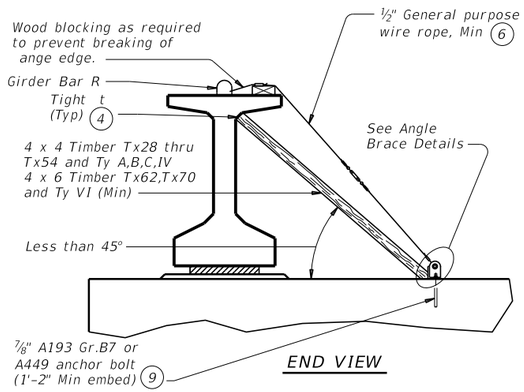
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5



PLAN

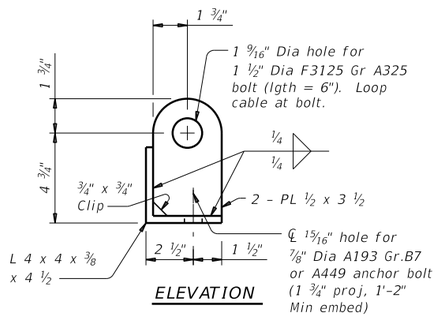
DETAIL "B"



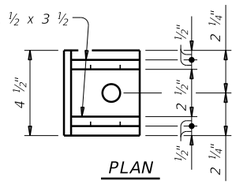
END VIEW

DIAGONAL BRACING DETAILS 5

(To be used on both ends of the rst girder/beam erected in the span in each phase.)



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral sti ening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

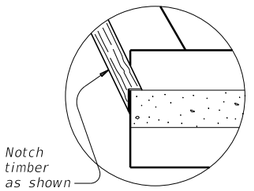
ERECTION BRACING:

Erection bracing details shown are considered the minimum for ful lling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after rst, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected rst.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight t. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

(8) Prior to installing, eld bend strap to lay ush on both girders' top ange and slope between ange tips.

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		156

DATE:
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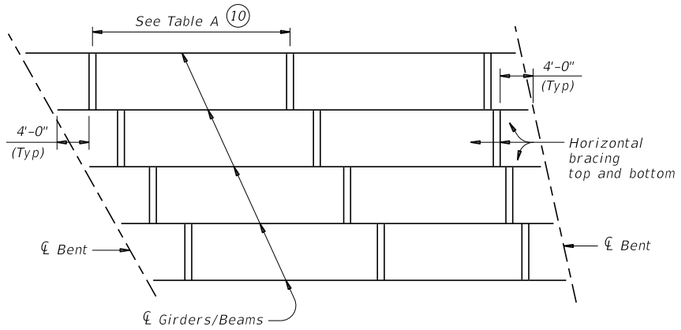


SLAB PLACEMENT BRACING

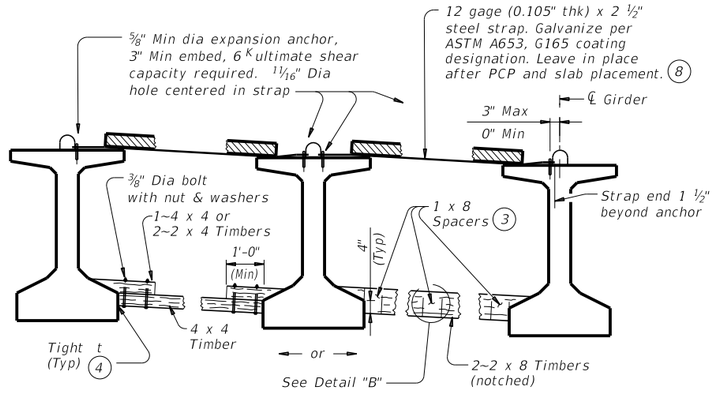
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

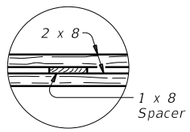
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



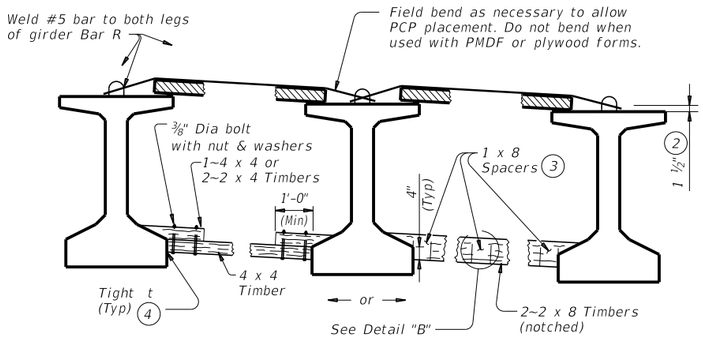
FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



PLAN

DETAIL "B"



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight t. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(8) Prior to installing, eld bend strap to lay ush on both girders' top ange and slope between ange tips.

(10) Bracing spacing (¼ and ⅛ points) measured between rst and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for ful lling the requirements of Speci cation Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

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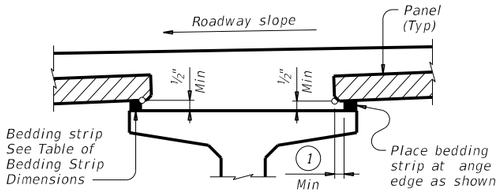
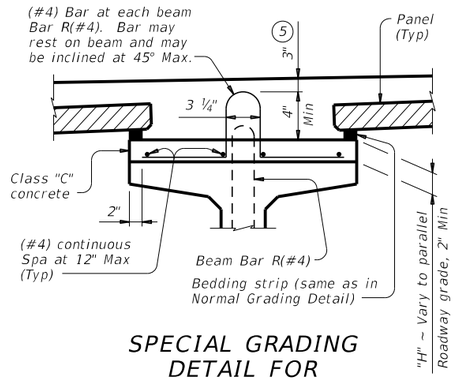


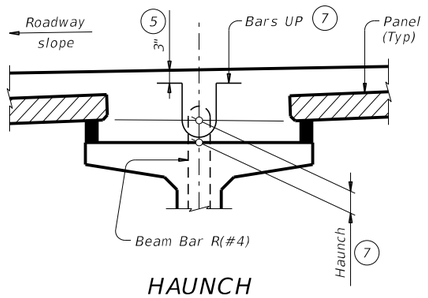
NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders.
(Other beam types similar)



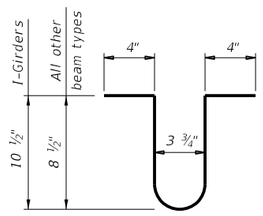
SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders.
(Other beam types similar)

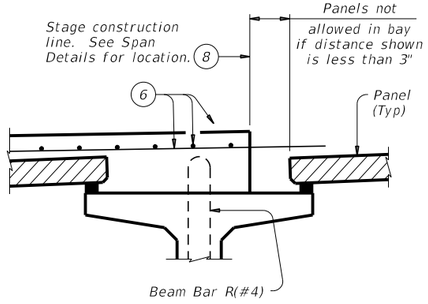


HAUNCH REINFORCING DETAIL

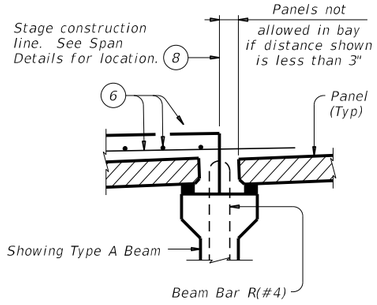
Showing prestressed concrete I-girders.
(Other beam types similar)



BARS UP (#4) (7)



PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" Min for all other beam types.

(2) Allowed for I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

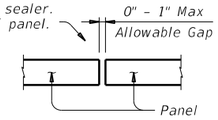
(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

(8) Do not locate construction joints on top of a panel.

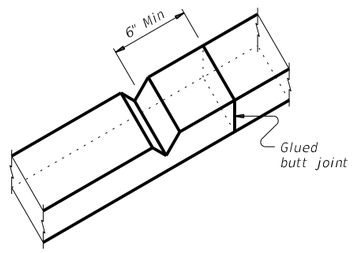
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

Seal joint between panels when gap exceeds ¼" with polyurethane sealant or expanding foam sealer. Make seal ush with top of panel.



PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top ange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut o if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam ange edges so that adequate space is provided for the mortar to ow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to ow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING

SHEET 1 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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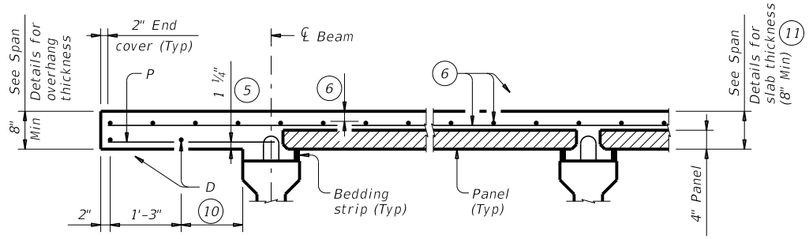
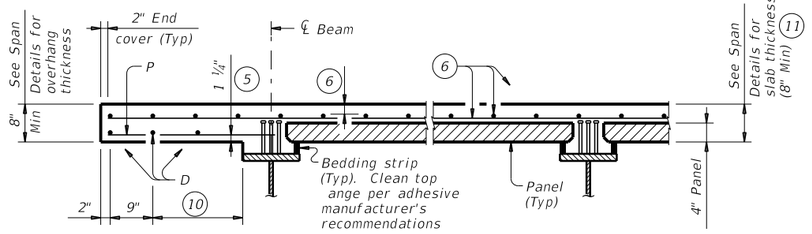
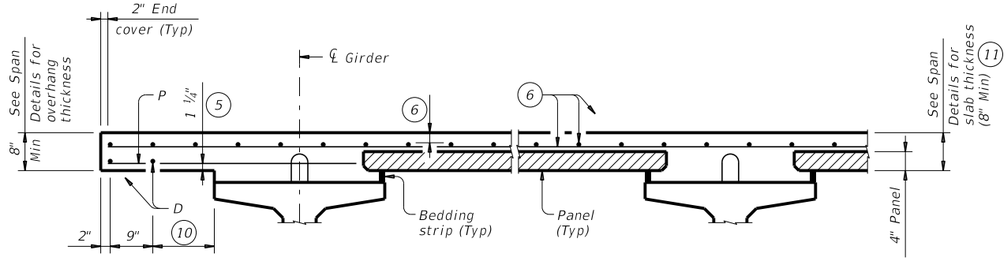


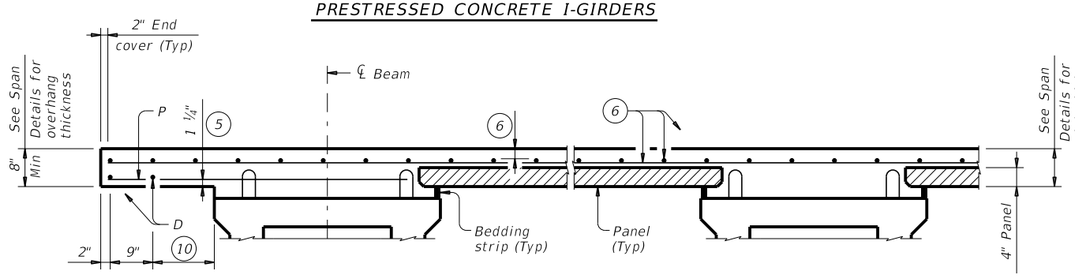
PRESTRESSED CONCRETE I-BEAMS



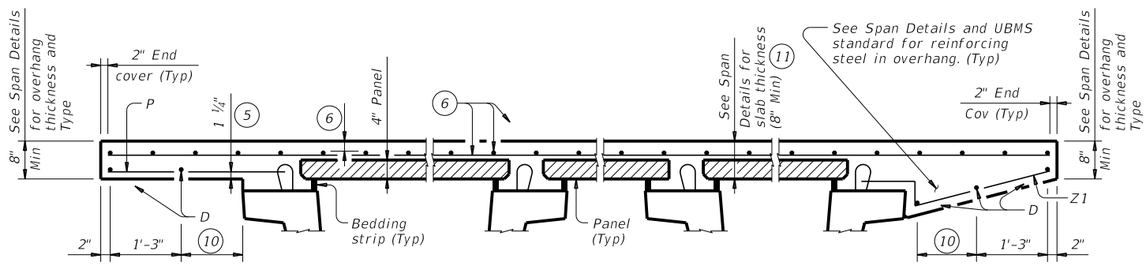
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



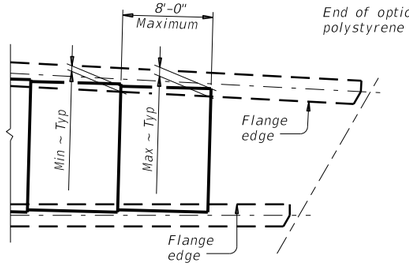
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

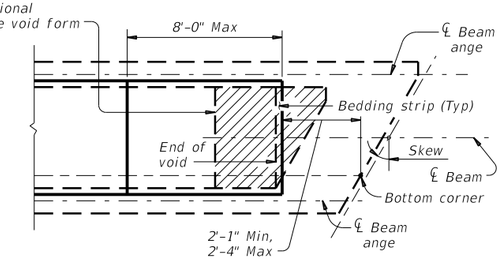
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

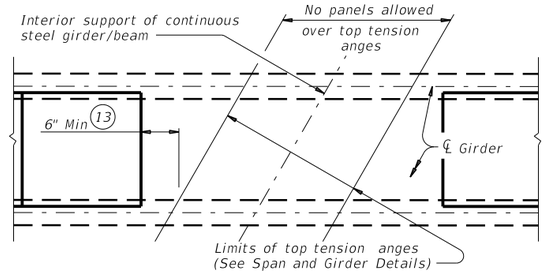


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on bemm/girder type.



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

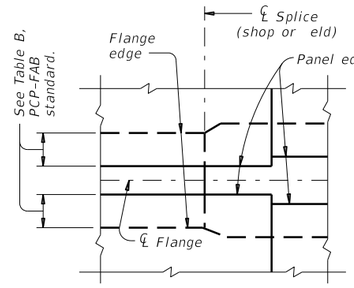
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or nished grade may be adjusted.

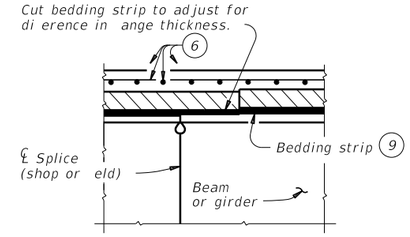
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted eld splices should be considered by the contractor in determining panel limits.



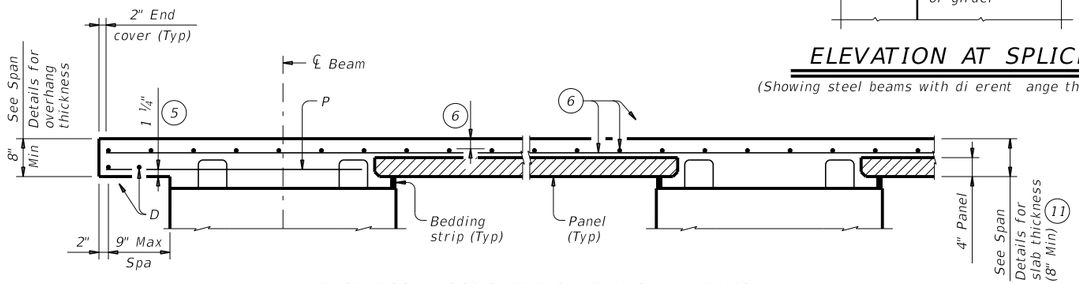
PLAN AT SPLICE

(Showing steel beams with ange width transition)



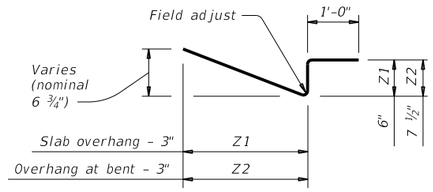
ELEVATION AT SPLICE

(Showing steel beams with di erent ange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4) (12)

HL93 LOADING

SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

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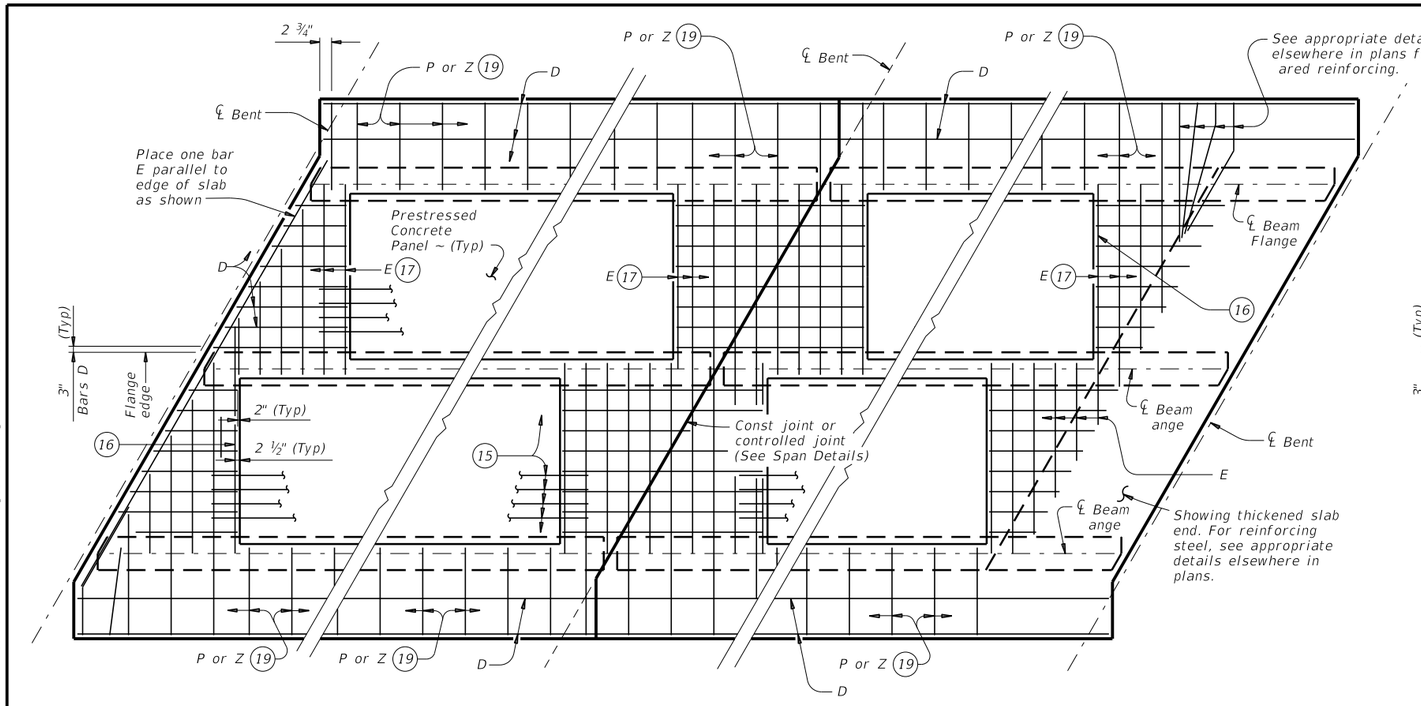
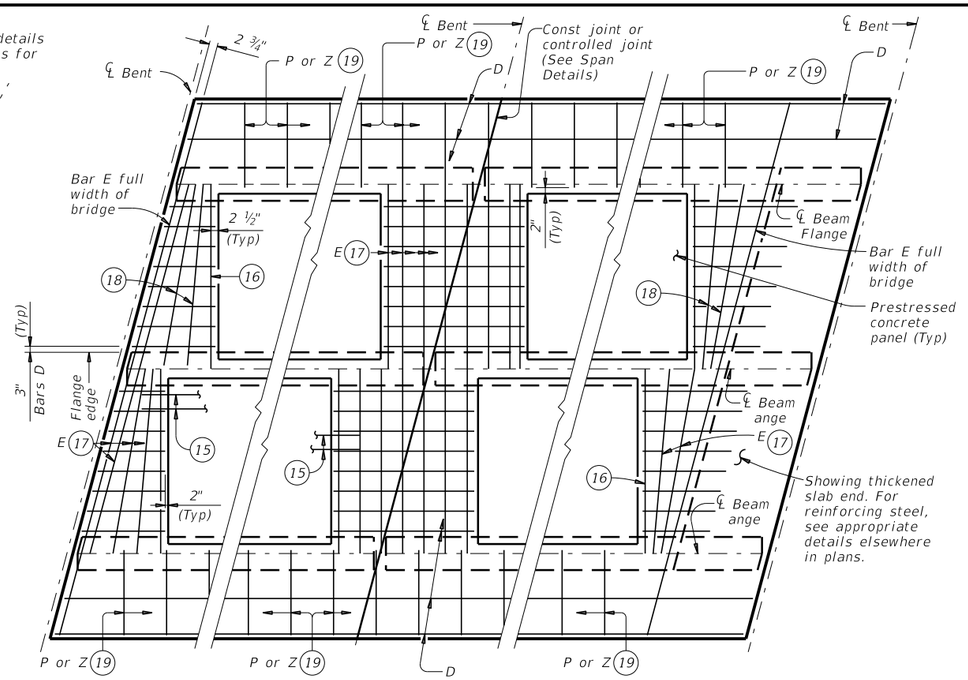


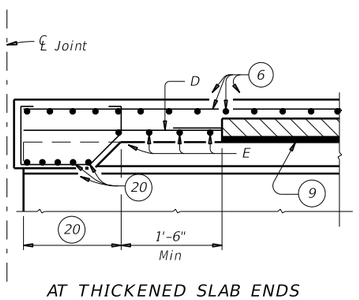
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

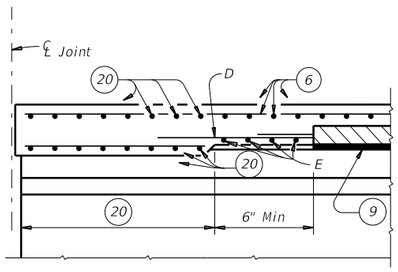


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

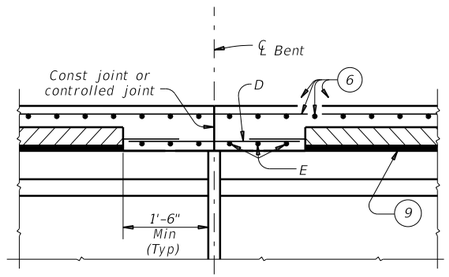
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



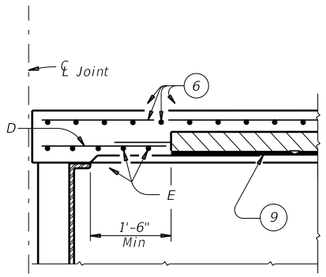
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



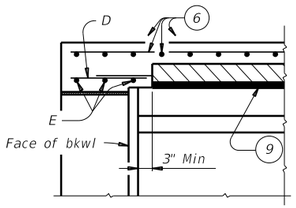
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



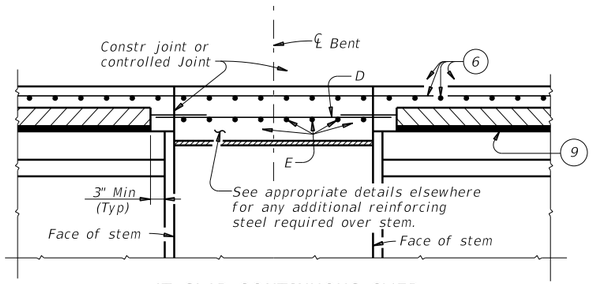
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam anges must overlap beam ange 6" Min.

(18) Add ared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING

SHEET 3 OF 4

Texas Department of Transportation

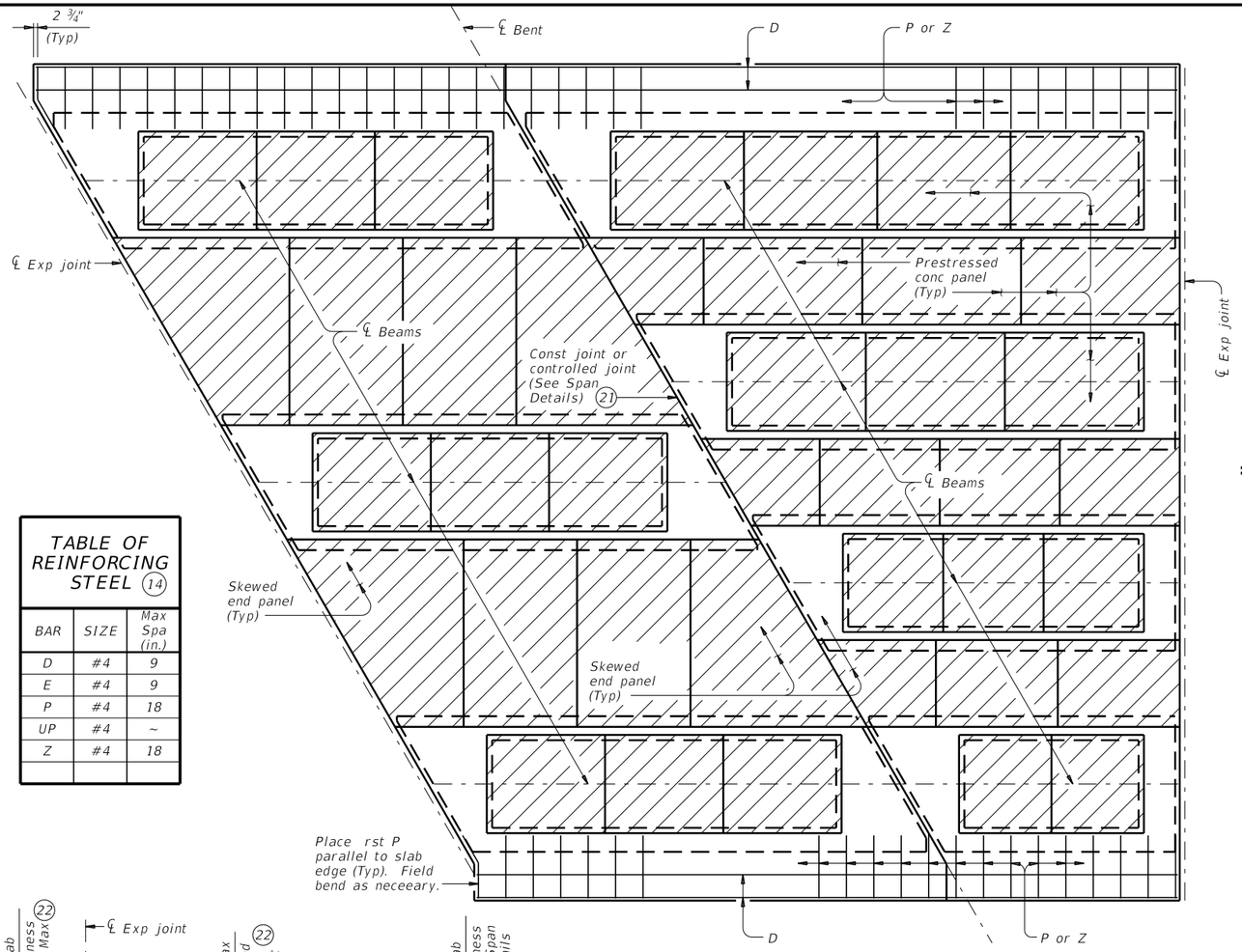
Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		160

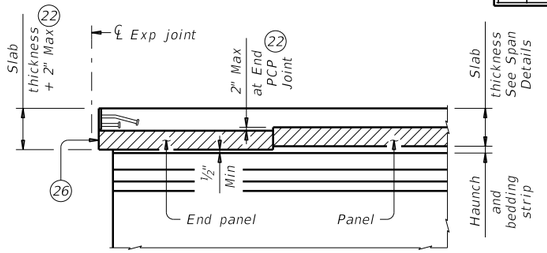
DATE:
FILE:



OPTION 2 ~ PLAN OF SLAB

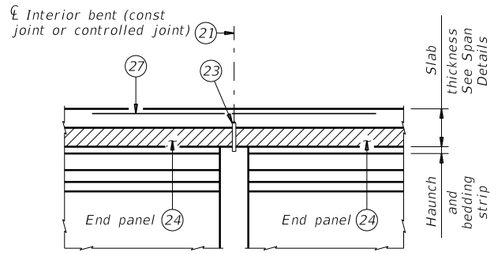
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



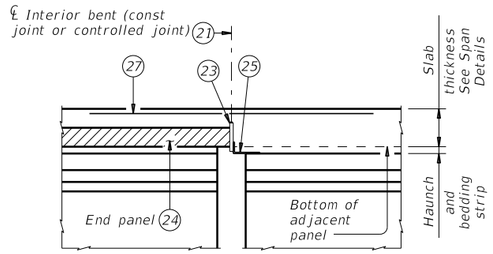
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



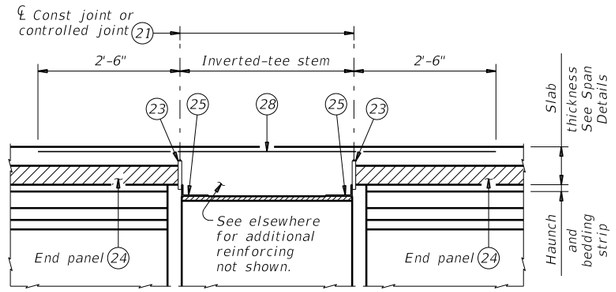
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

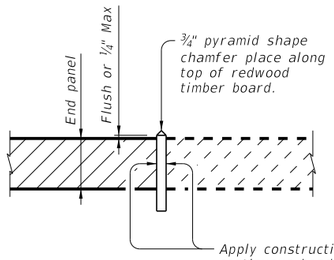
Panel against beam/girder end in adacent span.



INVERTED-T BENT

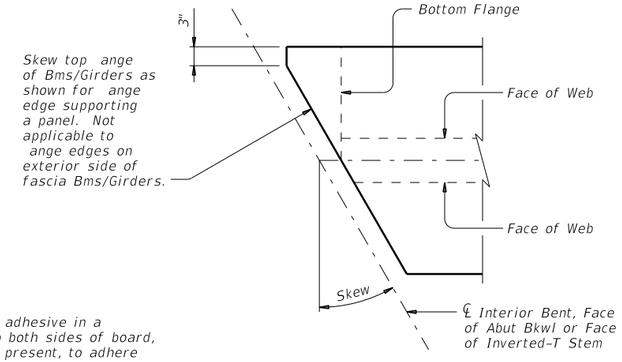
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed ush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior ange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to t is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top anges of beams and girders on skewed bridges must be modi ed as shown on this drawing. The Contractor is responsible for coordinating this modi cation with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modi cations with the joint fabricator. Submit shop drawings for approval when modi cations to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	HOU	BRAZORIA		161

DATE:
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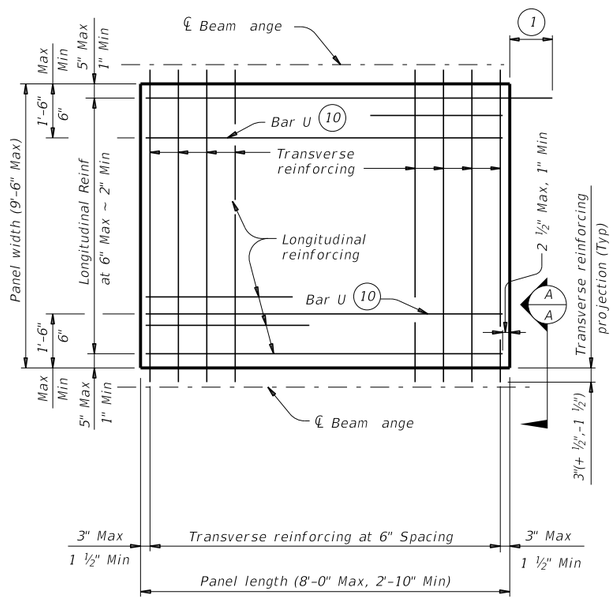
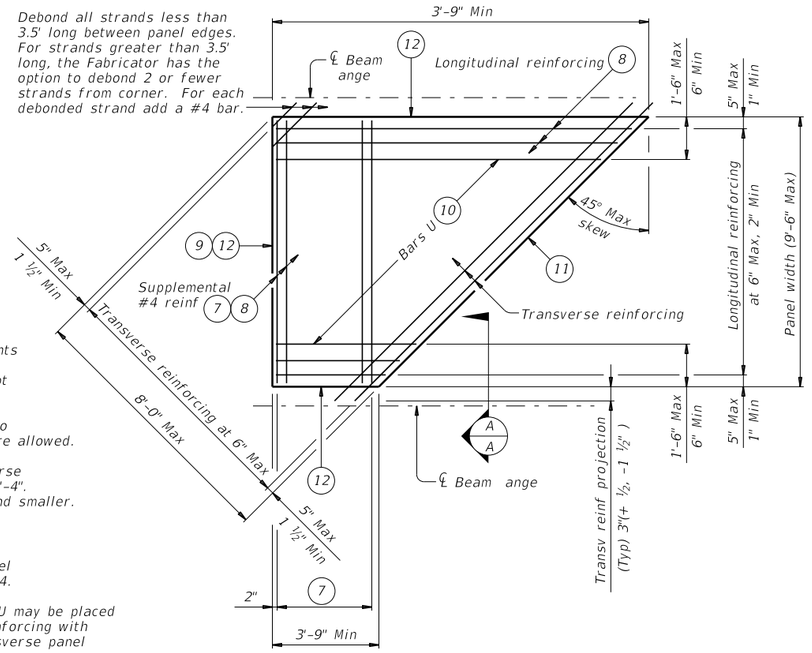


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast–in–place slab, extend longitudinal panel reinforcement 1'–0" (+2",–0") past panel end. Alternatively, provide (#3) x 2'–0" dowels at 6" Max Spacing and extend dowels 1'–0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with ared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'–4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28–70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy–coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface pro le, inclusive, as speci ed by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identi es location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'–6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'–6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

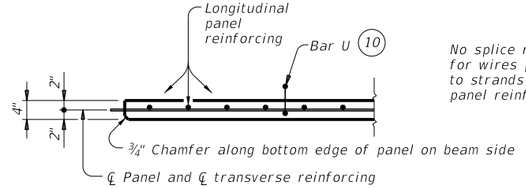
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

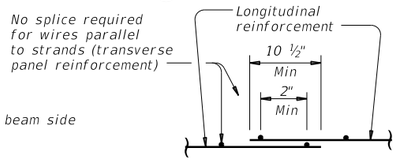
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

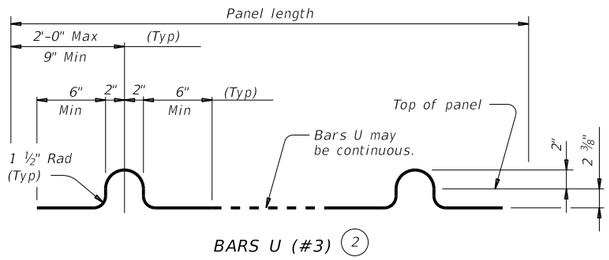


SECTION A-A

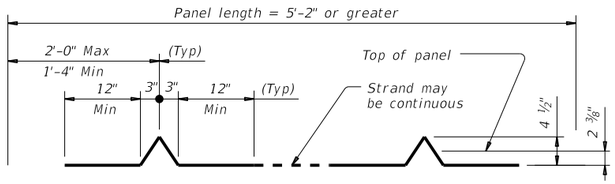
(Not showing supplemental #4 bars for skewed end panels.)



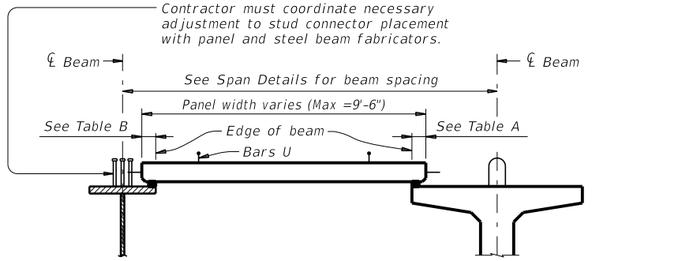
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



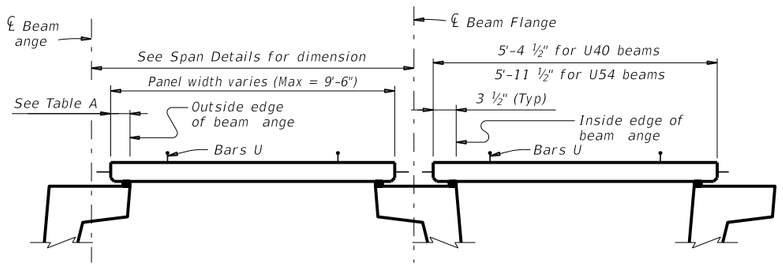
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

FILE: pcpstde2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	HOU	BRAZORIA		162

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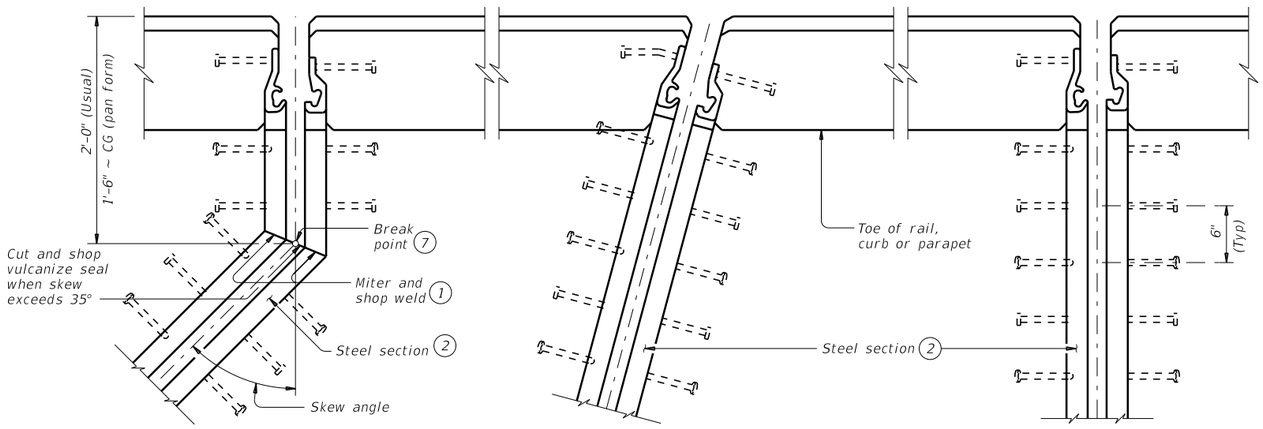
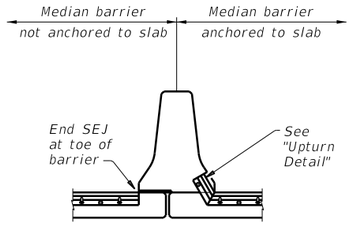


SHOWING SKEWS WITH SLAB BREAKBACKS

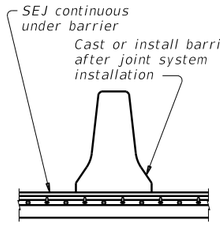
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

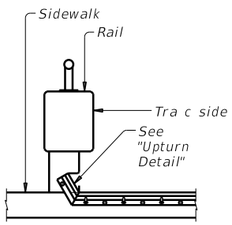
PLANS OF END CONDITIONS



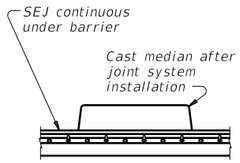
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



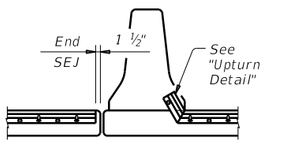
AT MEDIAN BARRIER



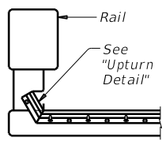
AT SIDEWALK BEHIND BRIDGE RAIL



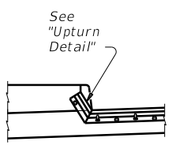
AT RAISED MEDIAN



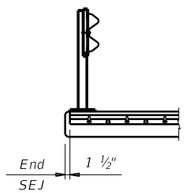
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

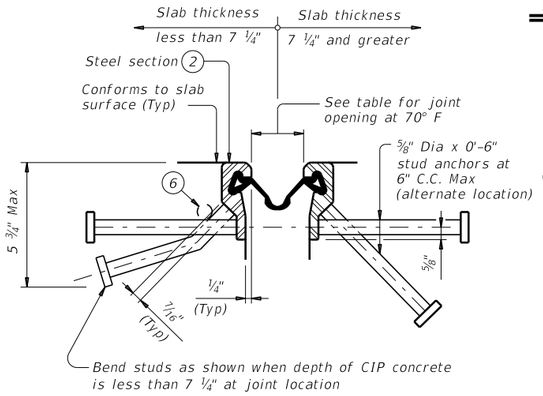


AT SIDEWALK

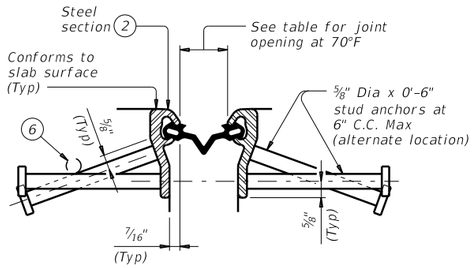


AT STEEL POST BRIDGE RAIL

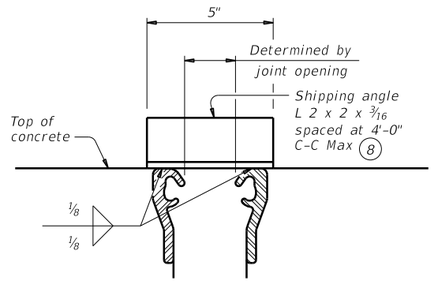
TYPICAL SECTIONS (5)



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.

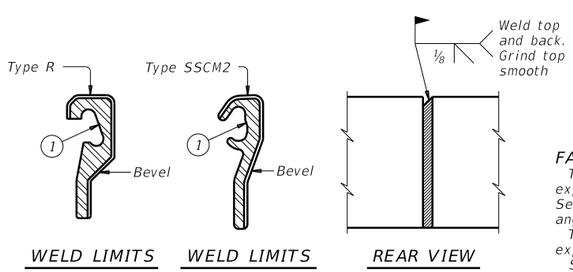
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions a ecting the joint pro le should be noted elsewhere.

(6) Move transverse bars that are in con ict 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 t, 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.

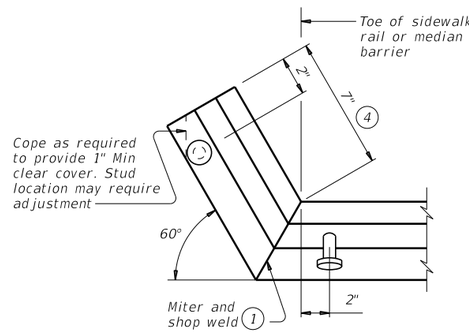
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and su cient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and eld splices and grind smooth areas in contact with seal. Make all necessary eld 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.



UPTURN DETAIL

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".

Texas Department of Transportation

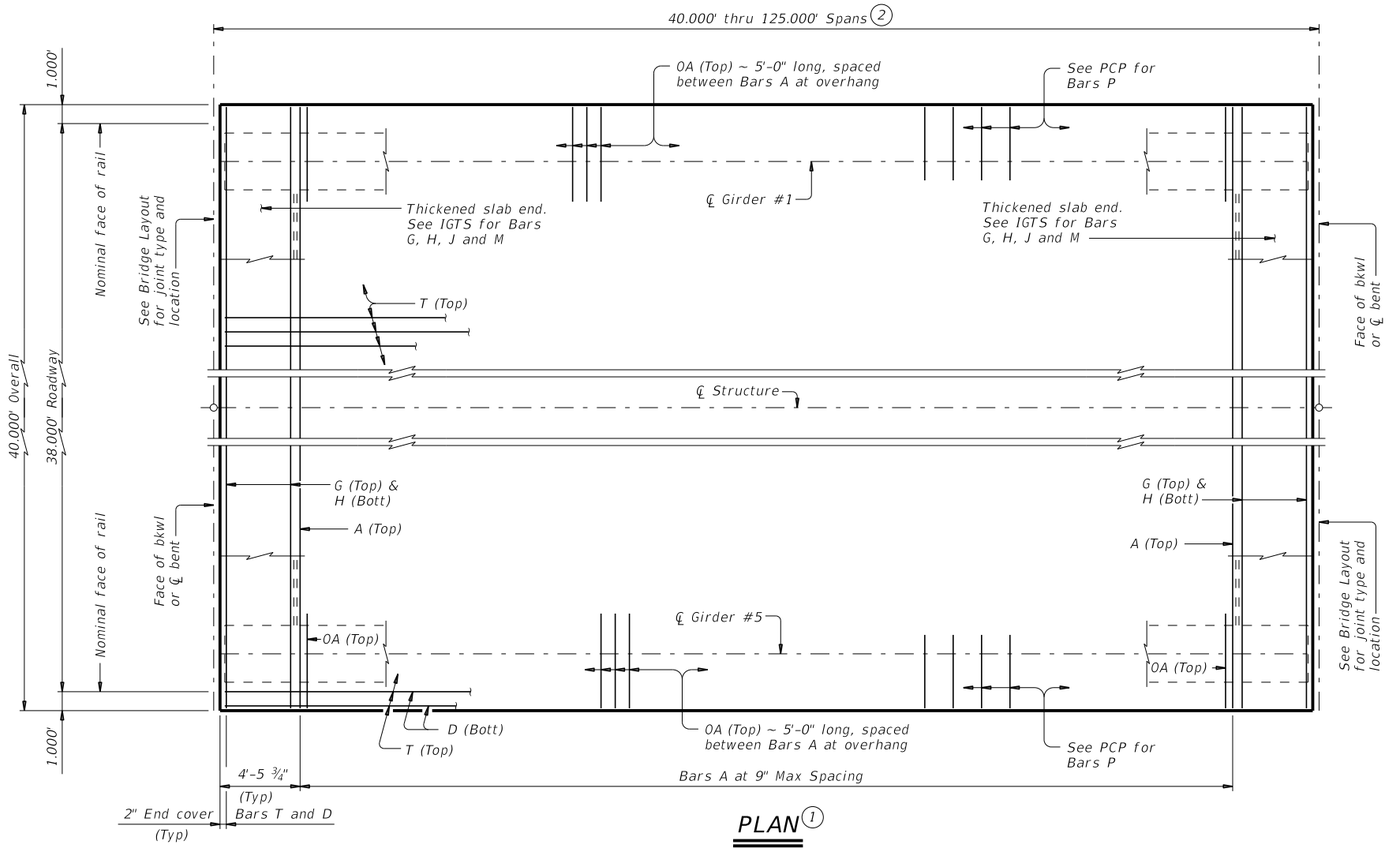
Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

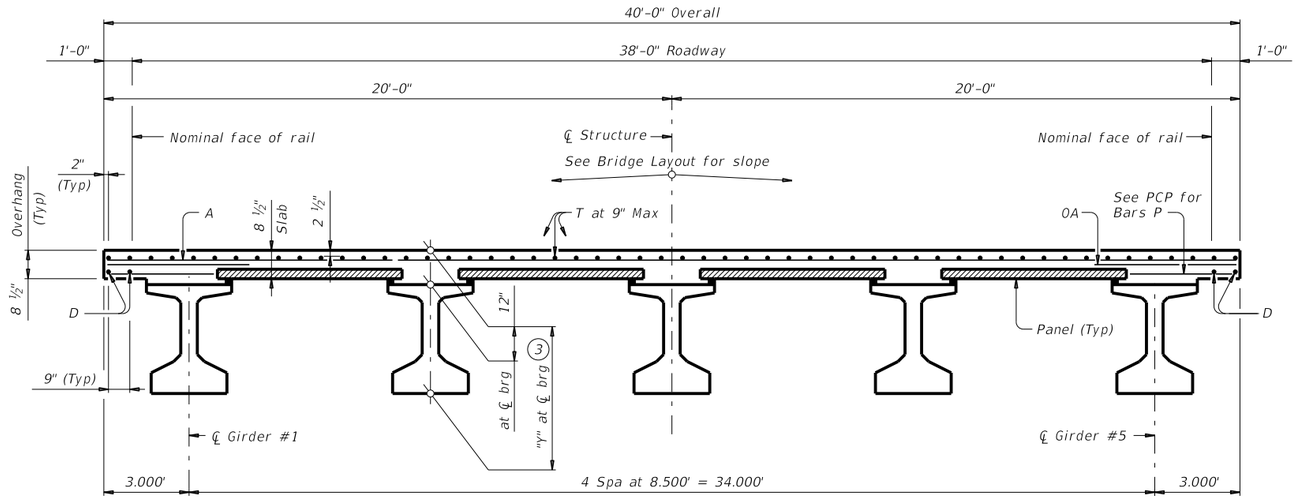
SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		163

DATE:
FILE:



PLAN (1)



TYPICAL TRANSVERSE SECTION
(Showing girder type Tx46)

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

TABLE OF SECTION DEPTHS	
GIRDER TYPE	"Y" AT ℄ BRG (3)
	Ft/In
Tx28	3'-4"
Tx34	3'-10"
Tx40	4'-4"
Tx46	4'-10"
Tx54	5'-6"

(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.

(2) Span lengths for prestressed concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 70.000'.
Type Tx34 for spans lengths 40.000' thru 80.000'.
Type Tx40 for spans lengths 40.000' thru 95.000'.
Type Tx46 for spans lengths 40.000' thru 105.000'.
Type Tx54 for spans lengths 40.000' thru 125.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load de ection from an 8 ½" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve and/or if the precast overhang panel (PCP(0)) option is used.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

38' ROADWAY

SIG-38

FILE: sig13sts-18.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Increased "X" and "Y" Values	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		164

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DATE:
FILE:

TABLE OF DEAD LOAD DEFLECTIONS

TYPE Tx28 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.009	0.013
45	0.016	0.022
50	0.024	0.034
55	0.036	0.051
60	0.052	0.073
65	0.072	0.101
70	0.098	0.137

TYPE Tx34 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.006	0.008
45	0.009	0.013
50	0.014	0.020
55	0.021	0.030
60	0.031	0.043
65	0.043	0.060
70	0.058	0.082
75	0.078	0.109
80	0.101	0.142

TYPE Tx40 GIRDERS

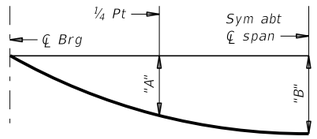
SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.004	0.005
45	0.006	0.009
50	0.009	0.013
55	0.014	0.020
60	0.020	0.028
65	0.028	0.040
70	0.038	0.054
75	0.051	0.071
80	0.066	0.093
85	0.085	0.119
90	0.107	0.150
95	0.134	0.188

TYPE Tx46 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.003	0.004
45	0.004	0.006
50	0.006	0.009
55	0.009	0.013
60	0.014	0.019
65	0.019	0.027
70	0.026	0.037
75	0.035	0.049
80	0.045	0.063
85	0.058	0.081
90	0.073	0.103
95	0.091	0.128
100	0.113	0.158
105	0.137	0.192

TYPE Tx54 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.001	0.002
45	0.003	0.004
50	0.004	0.006
55	0.006	0.009
60	0.009	0.013
65	0.013	0.018
70	0.017	0.024
75	0.023	0.032
80	0.030	0.042
85	0.038	0.054
90	0.048	0.068
95	0.061	0.085
100	0.074	0.104
105	0.090	0.127
110	0.110	0.154
115	0.131	0.184
120	0.156	0.219
125	0.184	0.259



DEAD LOAD DEFLECTION DIAGRAM

Calculated de ections shown are due to the concrete slab on interior girders only (Ec = 5000 ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require eld veri cation.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders			(5) TOTAL REINF STEEL
		ABUT TO INT BT (4)	INT BT TO INT BT (4)	ABUT TO ABUT (4)	
Ft	SF	LF	LF	LF	Lb
40	1,600	197.50	197.50	197.50	3,680
45	1,800	222.50	222.50	222.50	4,140
50	2,000	247.50	247.50	247.50	4,600
55	2,200	272.50	272.50	272.50	5,060
60	2,400	297.50	297.50	297.50	5,520
65	2,600	322.50	322.50	322.50	5,980
70	2,800	347.50	347.50	347.50	6,440
75	3,000	372.50	372.50	372.50	6,900
80	3,200	397.50	397.50	397.50	7,360
85	3,400	422.50	422.50	422.50	7,820
90	3,600	447.50	447.50	447.50	8,280
95	3,800	472.50	472.50	472.50	8,740
100	4,000	497.50	497.50	497.50	9,200
105	4,200	522.50	522.50	522.50	9,660
110	4,400	547.50	547.50	547.50	10,120
115	4,600	572.50	572.50	572.50	10,580
120	4,800	597.50	597.50	597.50	11,040
125	5,000	622.50	622.50	622.50	11,500

(4) Fabricator will adjust lengths for girder slopes as required.

(5) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.

Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and standard IGCS.

See IGTS standard for Thickened Slab End details and quantity adjustments.

See PCP and PCP-FAB for panel details not shown.

See PCP(0) and PCP(0)-FAB for precast overhang panel details if this option is used.

See IGMS standard for miscellaneous details.

See applicable rail details for rail anchorage in slab.

See PMDF standard for details and quantity adjustments if this option is used.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).

Provide Class S (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

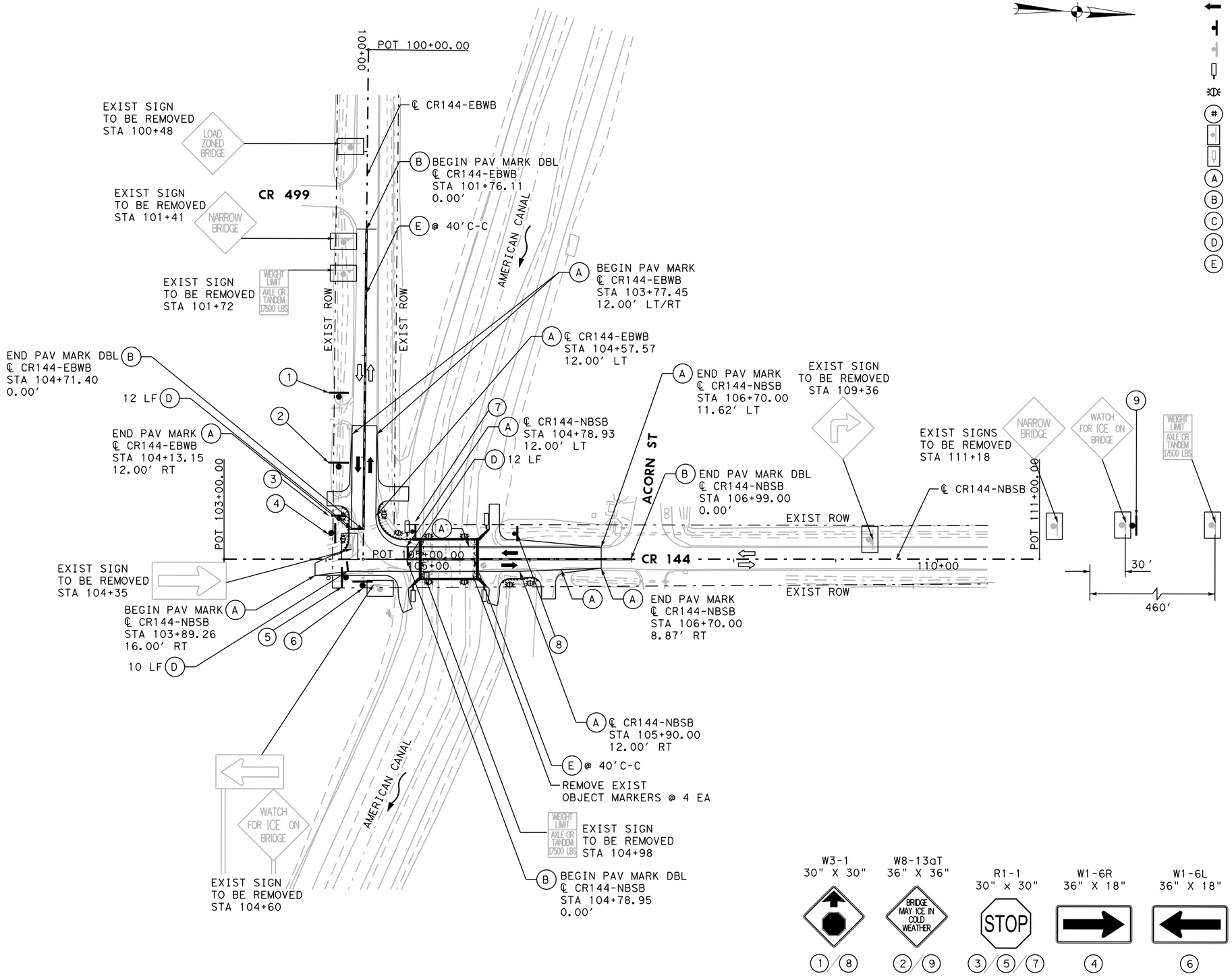
Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

38' ROADWAY

SIG-38

FILE: sig13sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Increased "X" and "Y" Values	0912	31	307 ETC.	CR 144, ETC.
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		165



LEGEND:

- EXISTING TRAFFIC FLOW
- PROPOSED TRAFFIC FLOW
- PROPOSED SIGN MOUNT
- EXISTING SIGN MOUNT
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR
- (#) PROPOSED SIGN
- REMOVE SM RD SN SUP&AM
- REMOVE DELIN & OBJECT MARKER ASSMS
- (A) RE PM W/RET REQ TY I (W) (6") (SLD) (100MIL)
- (B) RE PM W/RET REQ TY I (Y) (6") (SLD) (100MIL)
- (C) RE PM W/RET REQ TY I (Y) (6") (BRK) (100MIL)
- (D) REFL PAV MRK TY I (W) (24") (SLD) (100MIL)
- (E) REFL PAV MRKR TY II-A-A

0 25 50 100
SCALE: 1"=100′

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/21/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

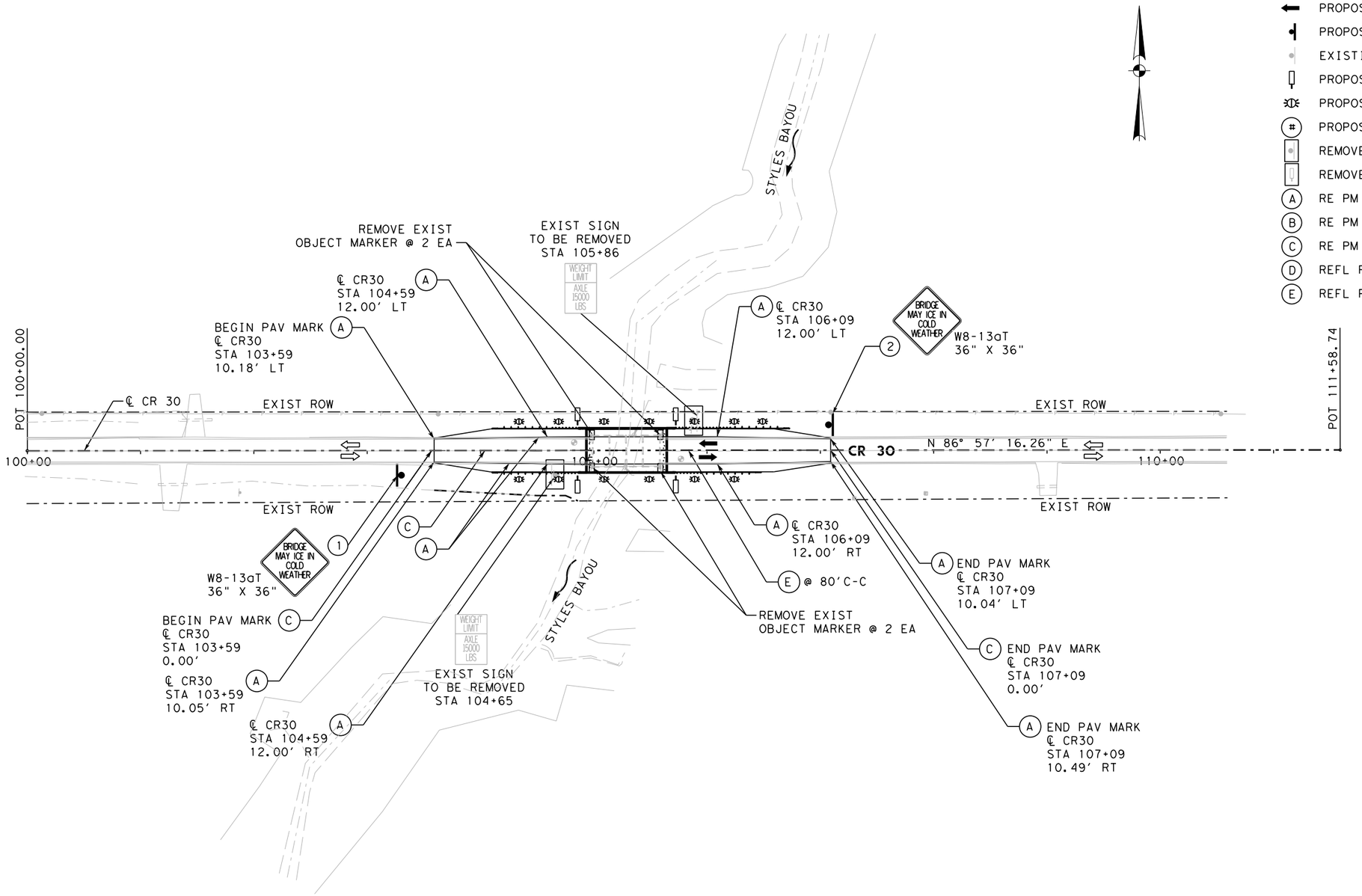
Texas Department of Transportation

CR 144 AT AMERICAN CANAL

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			166
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



LEGEND:

- EXISTING TRAFFIC FLOW
- PROPOSED TRAFFIC FLOW
- PROPOSED SIGN MOUNT
- EXISTING SIGN MOUNT
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR
- (#) PROPOSED SIGN
- REMOVE SM RD SN SUP&AM
- REMOVE DELIN & OBJECT MARKER ASSMS
- (A) RE PM W/RET REQ TY I (W) (6") (SLD) (100MIL)
- (B) RE PM W/RET REQ TY I (Y) (6") (SLD) (100MIL)
- (C) RE PM W/RET REQ TY I (Y) (6") (BRK) (100MIL)
- (D) REFL PAV MRK TY I (W) (24") (SLD) (100MIL)
- (E) REFL PAV MRKR TY II-A-A

0 25 50 100
SCALE: 1"=100′

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
4/21/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

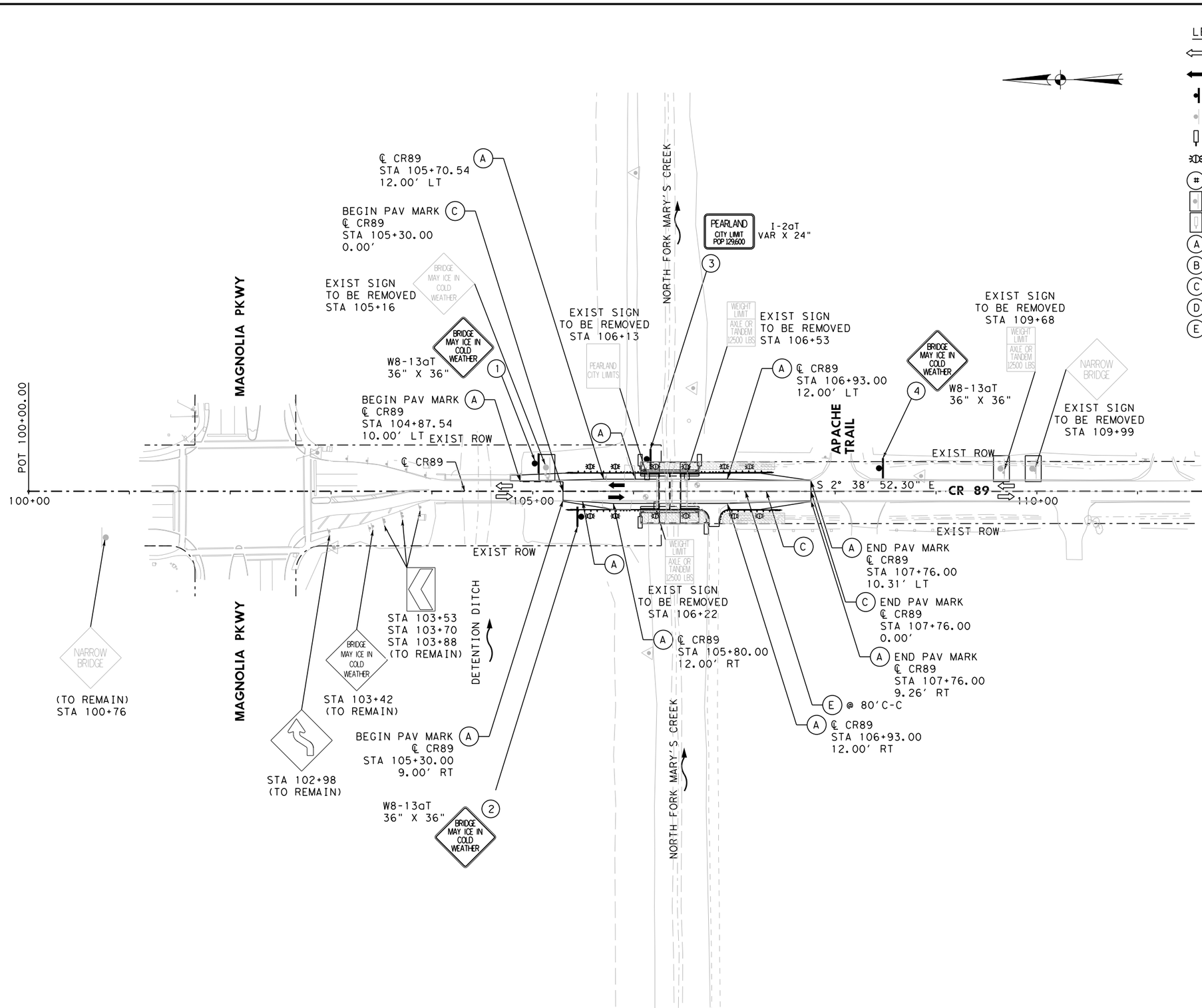
Texas Department of Transportation

CR 30 AT STYLES BAYOU

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			167
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30



STATE OF TEXAS
ROBYN LANCASTER
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4/21/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

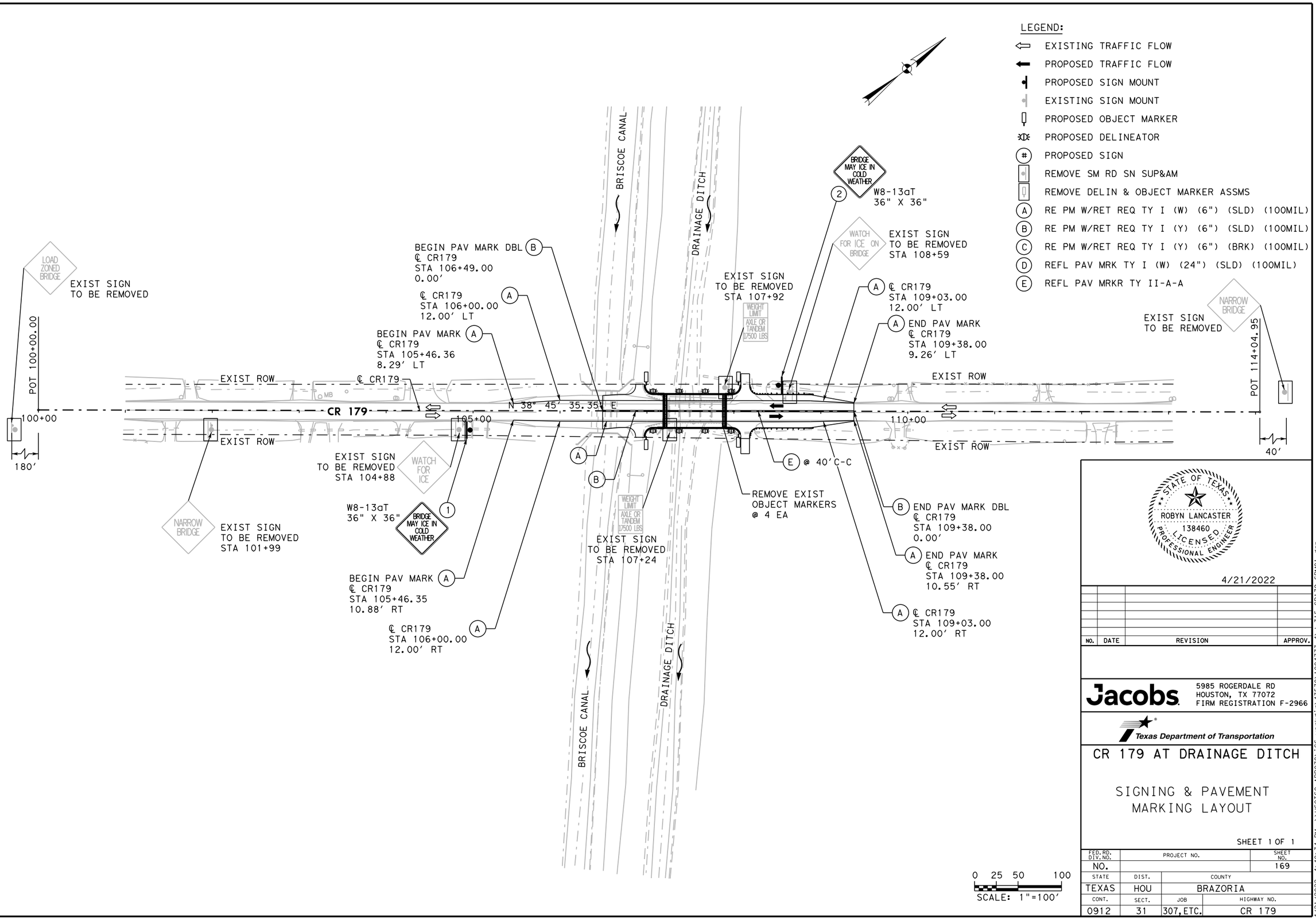
CR 89 AT N FORK MARY'S CREEK

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		168

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



STATE OF TEXAS
ROBYN LANCASTER
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4/21/2022

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			169
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

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4/21/2022 4:40:34 PM
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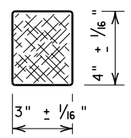
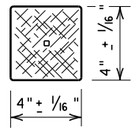
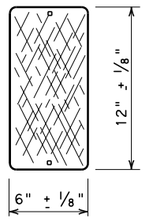
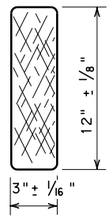
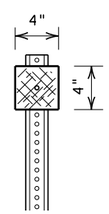
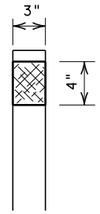
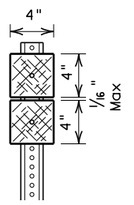
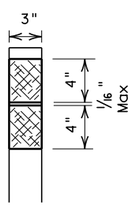
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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

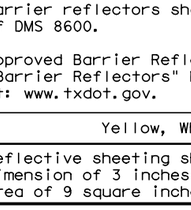
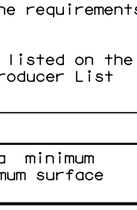
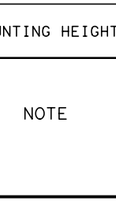
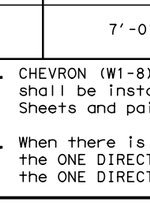
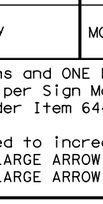
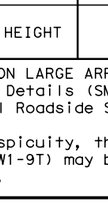
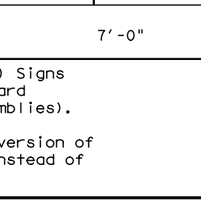
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

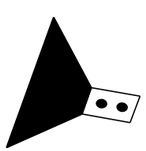
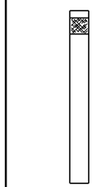
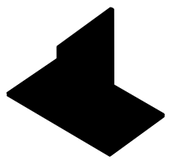
OBJECT MARKERS

	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

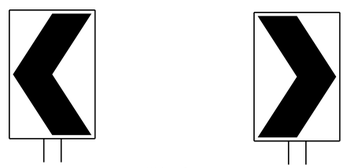
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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



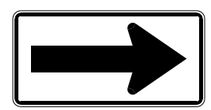
W1-8

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	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

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

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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Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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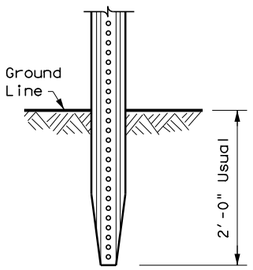
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

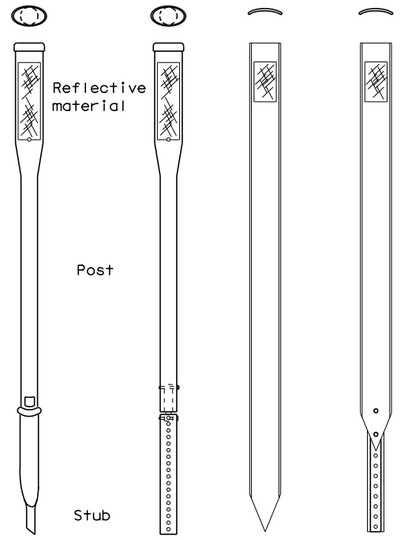


NOTES

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.

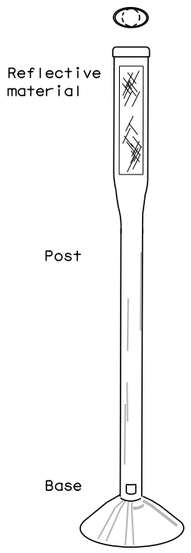
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



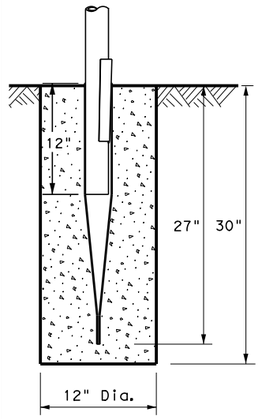
SURFACE MOUNT

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.

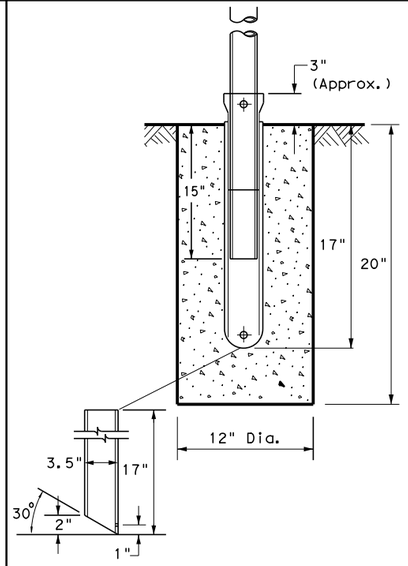
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

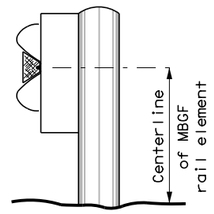
NOTE

1. Install per manufacturer's recommendations.

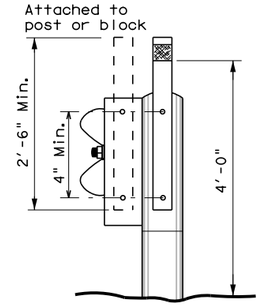
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

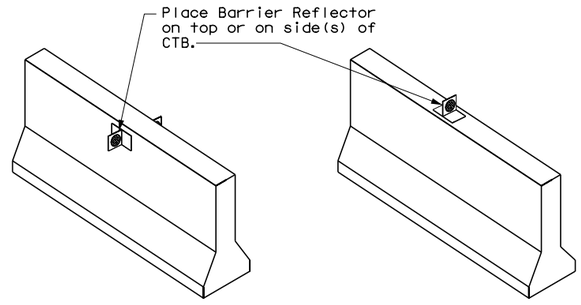
GF1



GF2



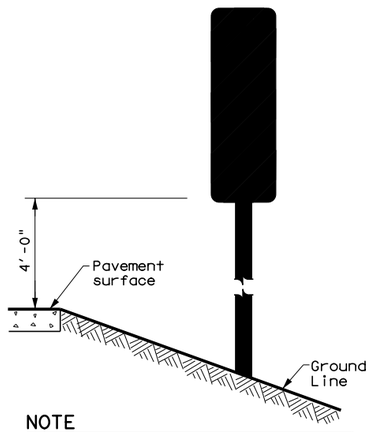
CONCRETE TRAFFIC BARRIER (CTB)



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.

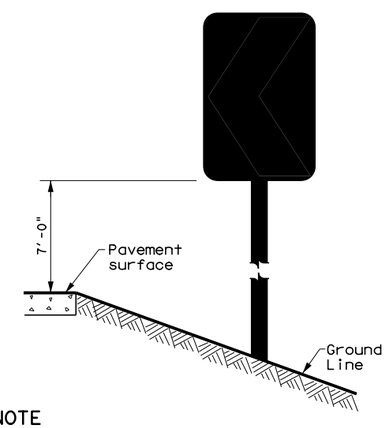
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

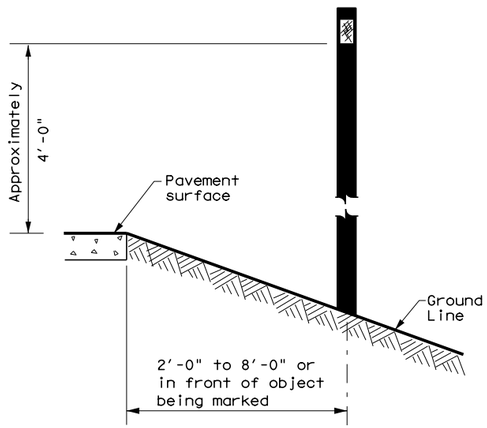
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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.

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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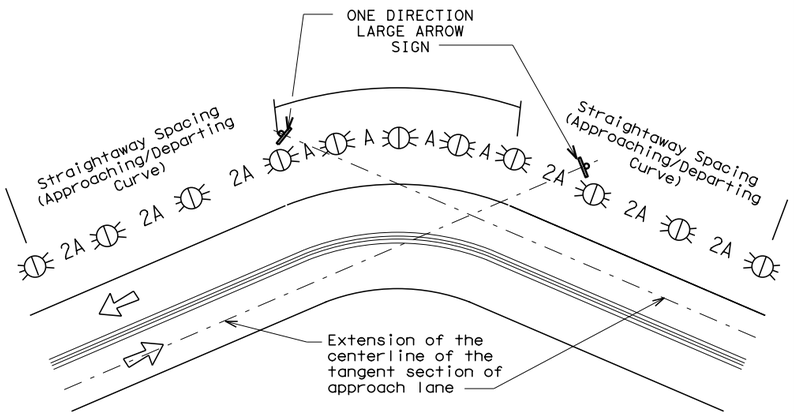
DATE:
FILE:

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

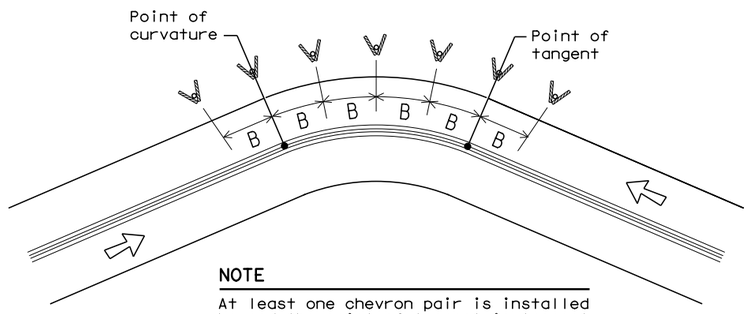
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

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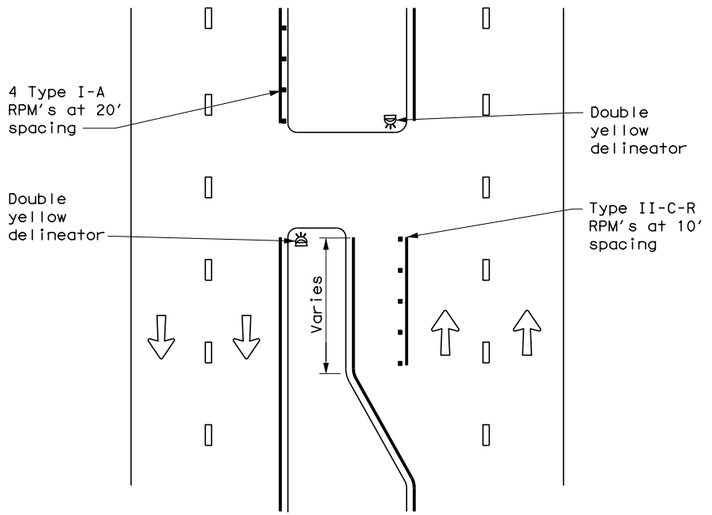
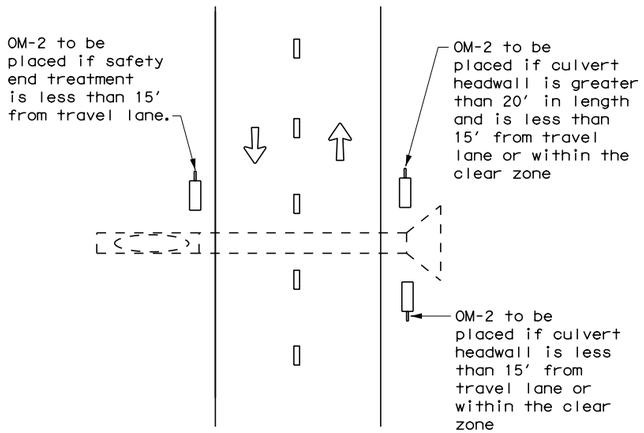
CROSSOVERS



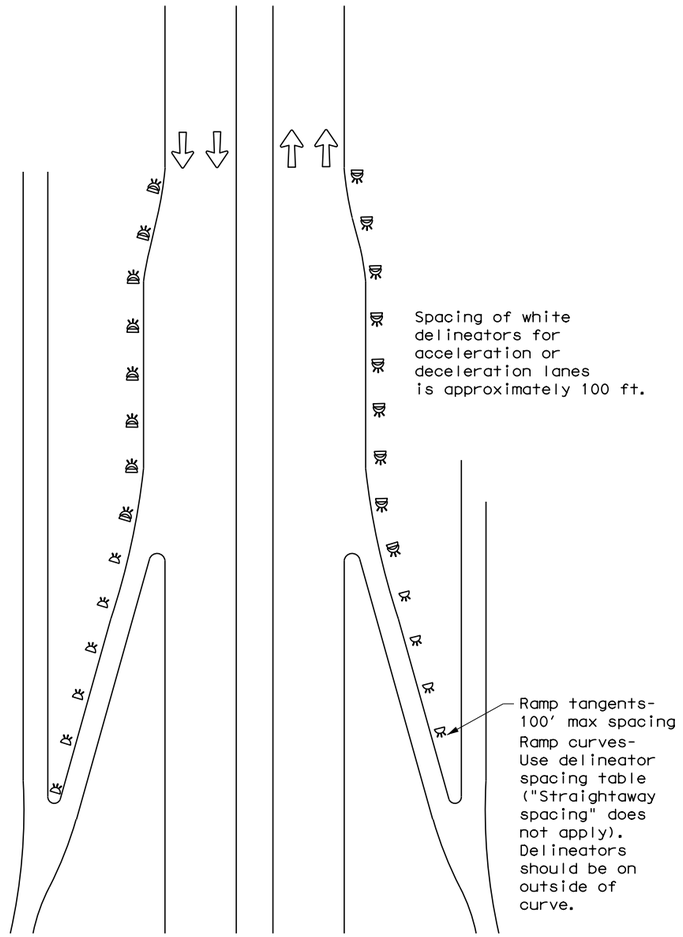
DETAIL 1

FOR CULVERTS WITHOUT MBGF



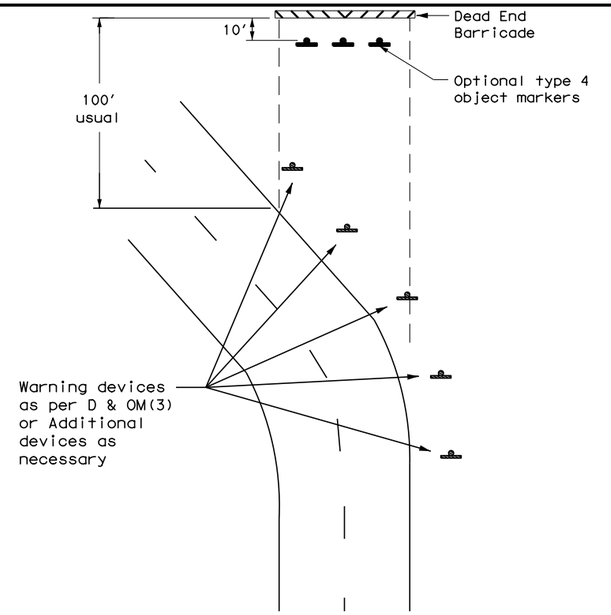
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



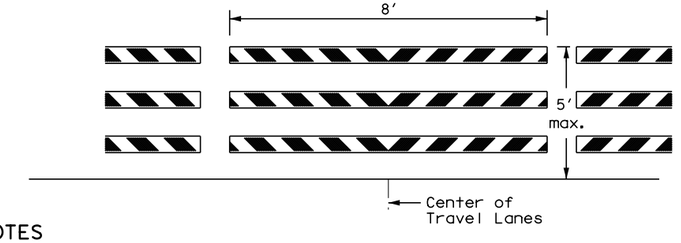
DETAIL 3

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

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

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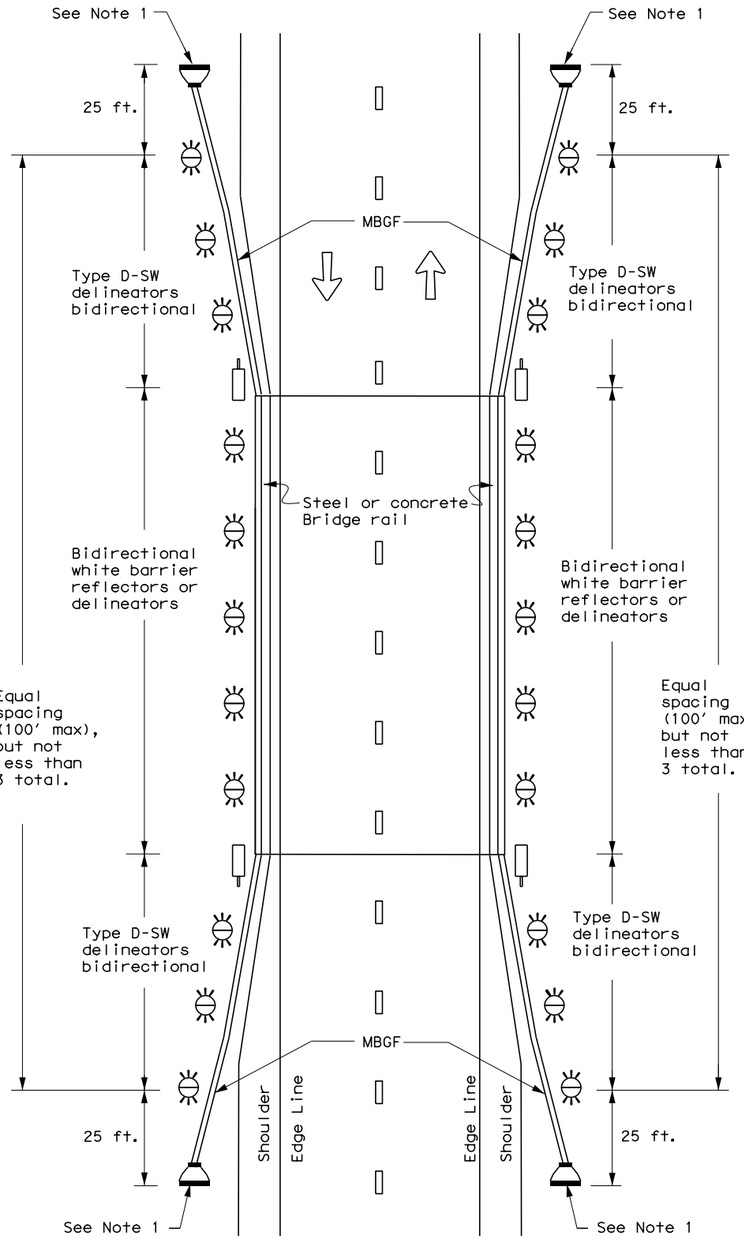
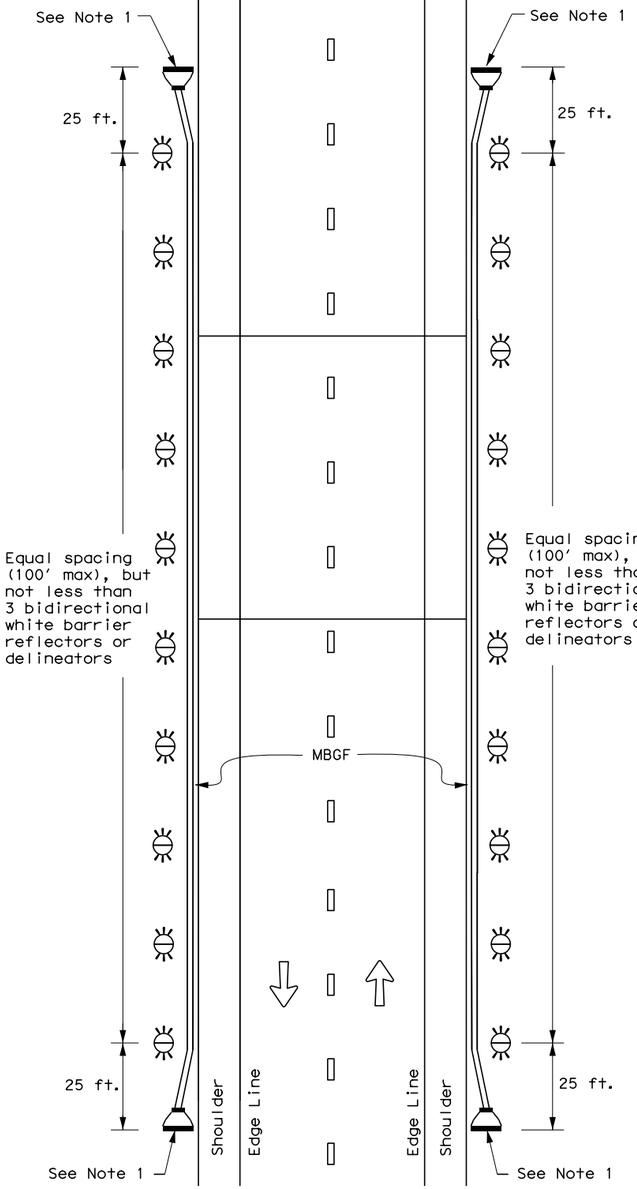
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

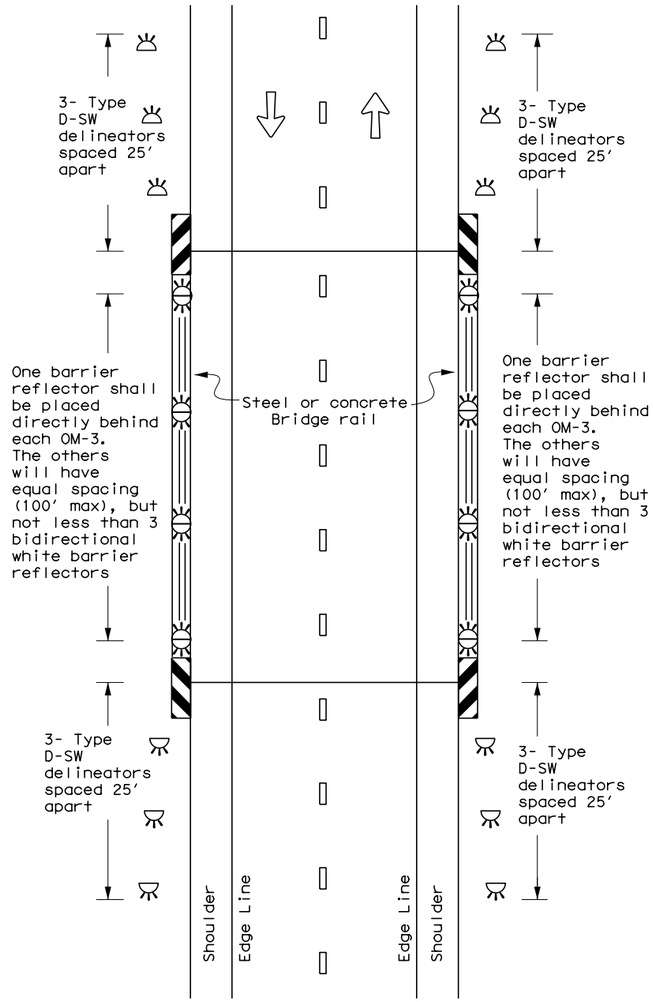
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

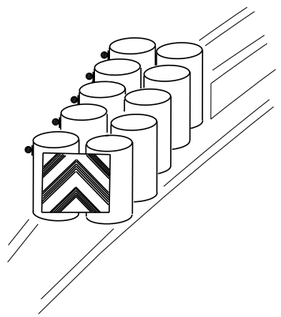
Traffic Safety Division Standard

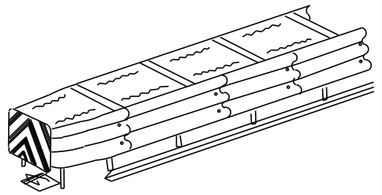
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

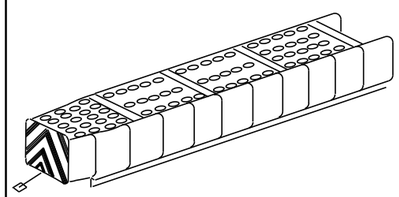
D & OM(5)-20

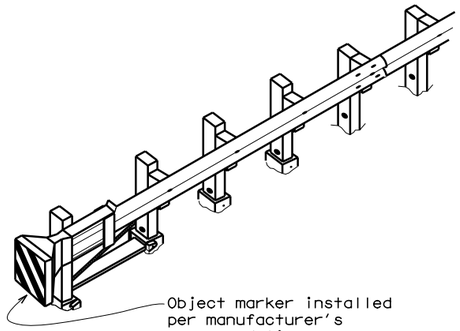
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
7-20	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		174

20E

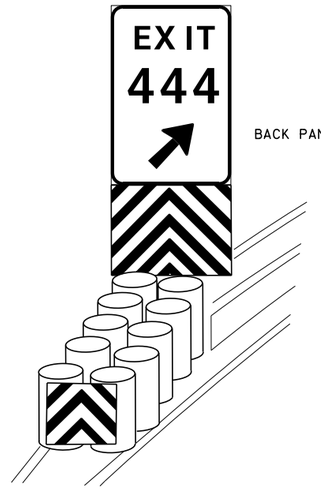




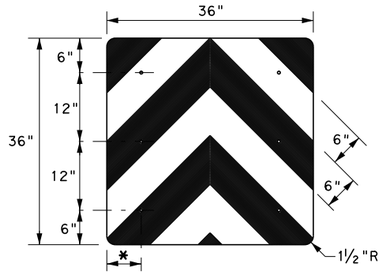


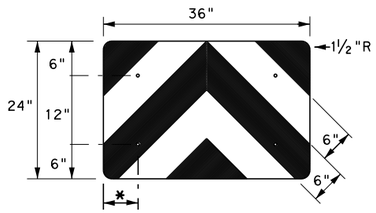


Object marker installed per manufacturer's recommendations.

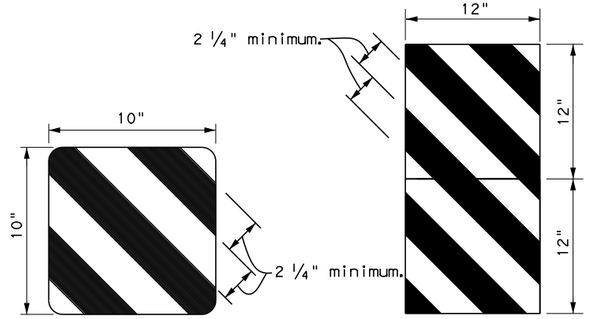


BACK PANEL (OPTIONAL)

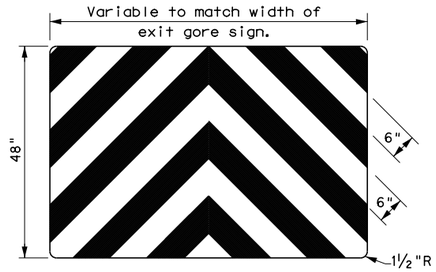


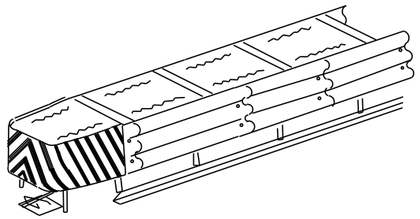


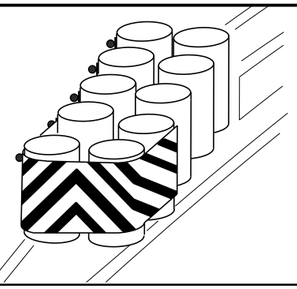
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

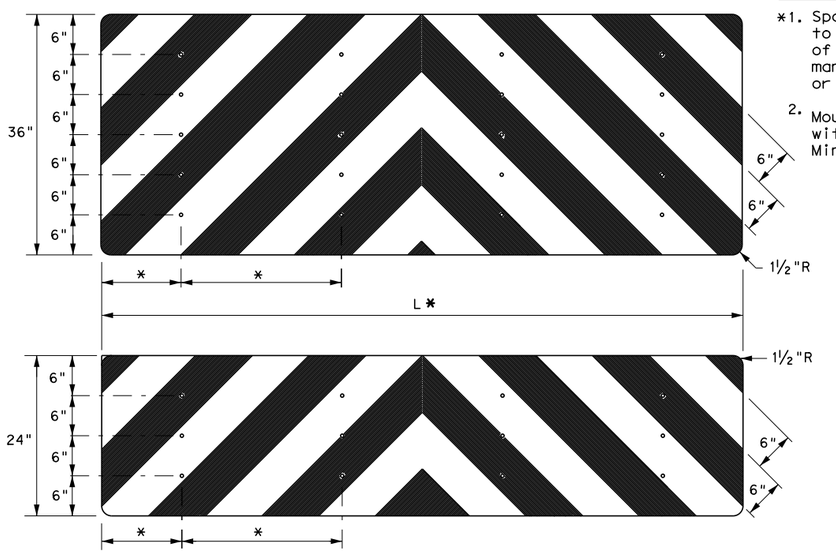


OBJECT MARKERS SMALLER THAN 3 FT^2









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

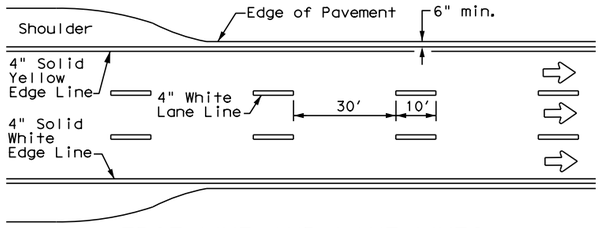
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

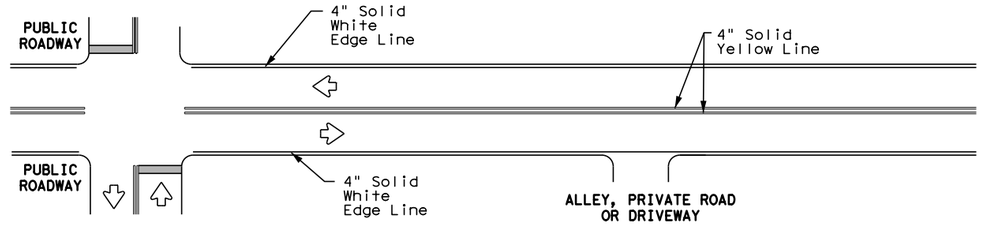
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC.	CR
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	HOU	BRAZORIA		175
4-98 7-20				
20G				

DATE:
FILE:

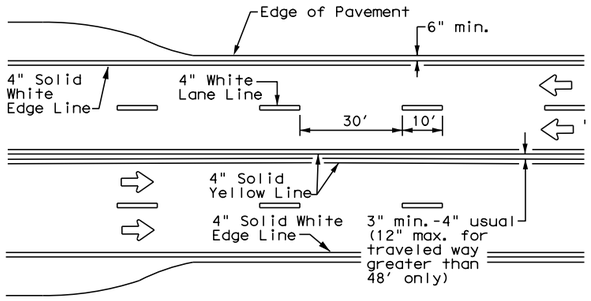
DATE:
FILE:



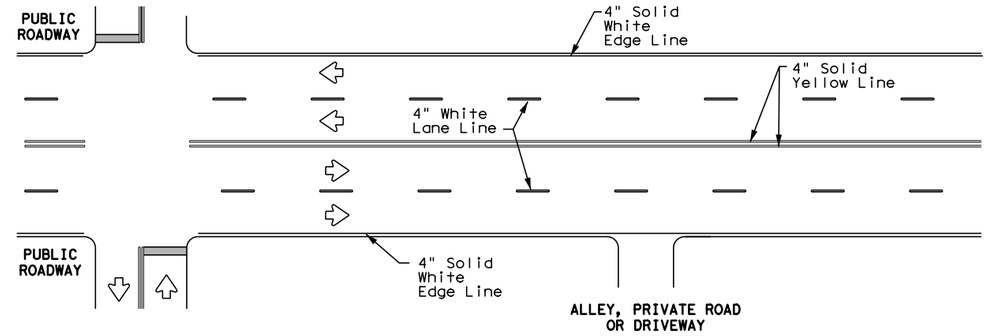
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



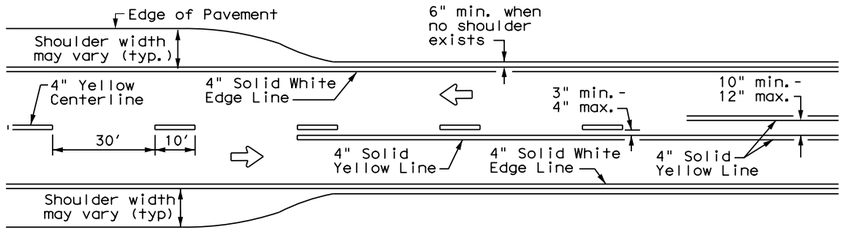
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



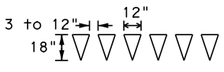
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



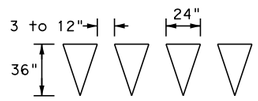
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

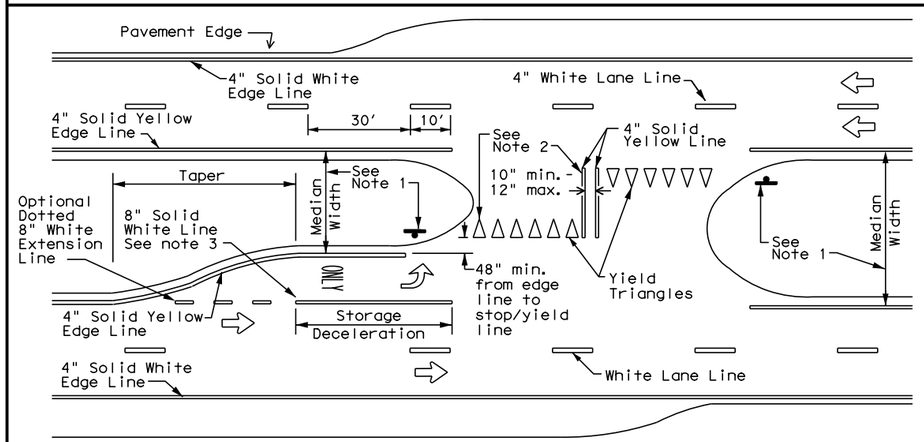


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTE:

1. Irrespective of shoulder, use 6in width lines (edge lines).
2. Use 4 in. width lines (edge and lane lines) when lane width is 10 ft. or less; and 6 in. width lines when lane width is greater than 10 ft.

NOTES

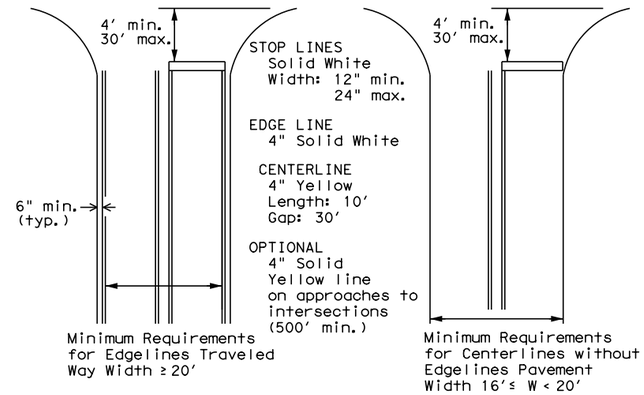
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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
HOUSTON DISTRICT STANDARD

TYPICAL STANDARD PAVEMENT MARKINGS

PM-20

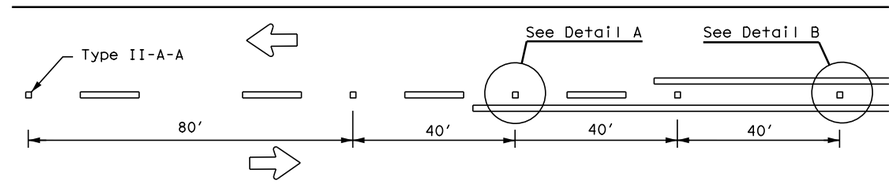
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
8-95 2-12
5-00 8-16
8-00 7-20
3-03

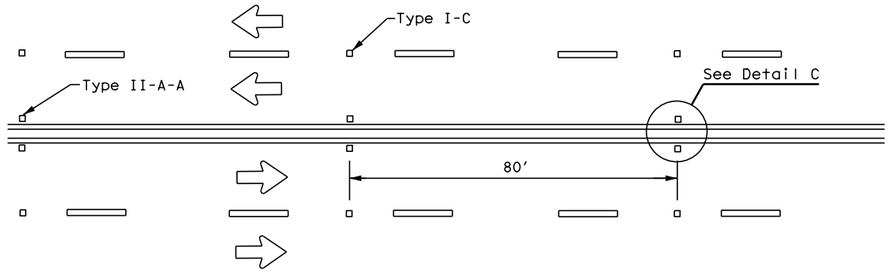
CONT	SECT	JOB	HIGHWAY
0912	31	307,ETC.	CR
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		176

STD N-5a

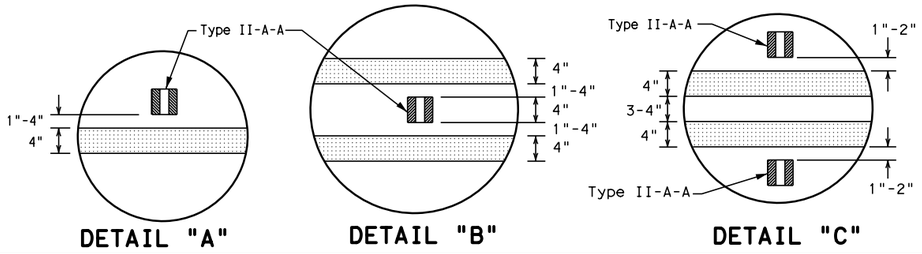
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



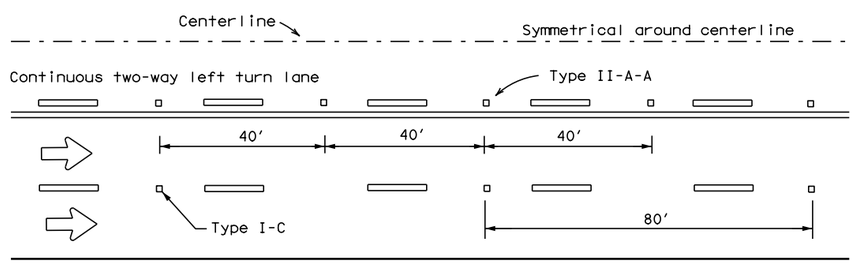
CENTERLINE FOR ALL TWO LANE ROADWAYS



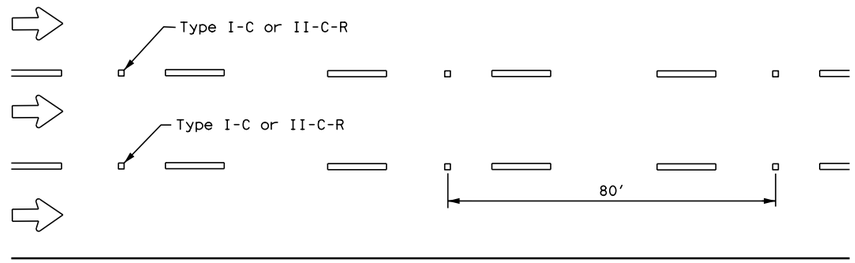
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

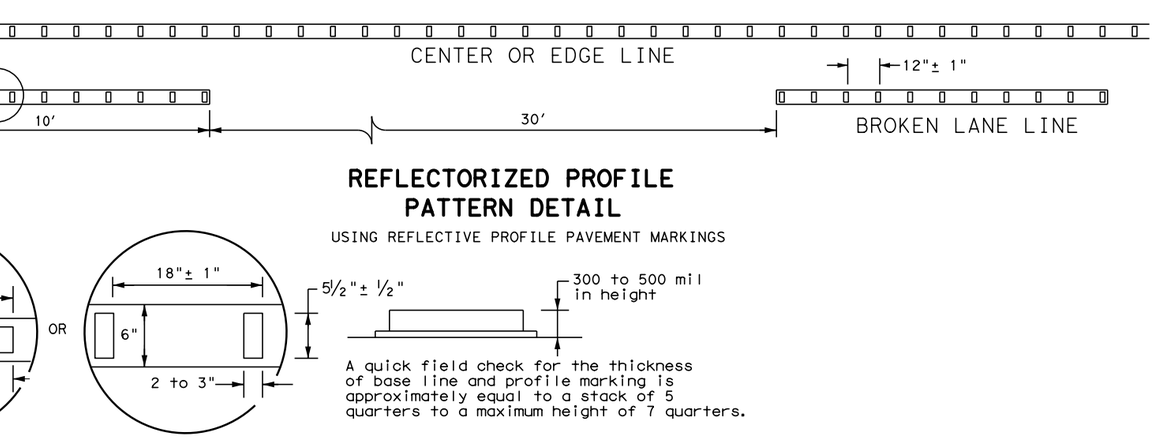


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

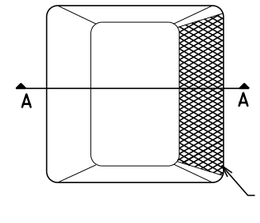
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

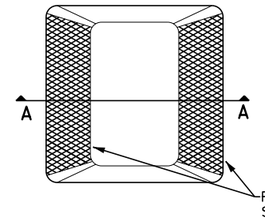
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

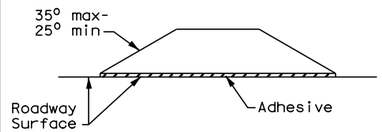
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

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	31	307,ETC.	CR
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	BRAZORIA		177

22B

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DATE:
FILE:

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

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

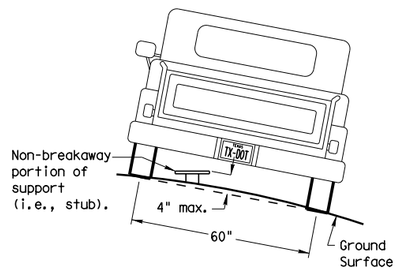
Anchor Type

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

Sign Mounting Designation

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

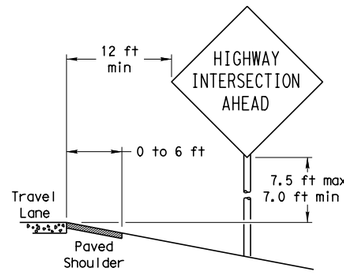
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

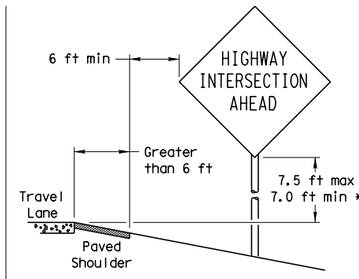
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

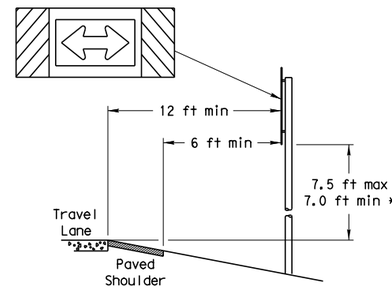
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



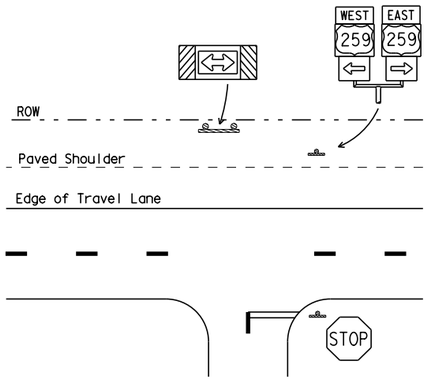
GREATER THAN 6 FT. WIDE

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

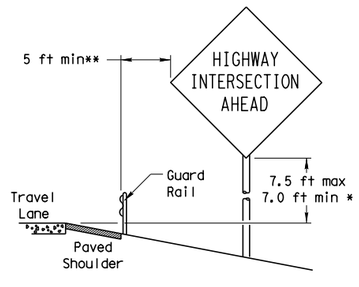
T-INTERSECTION



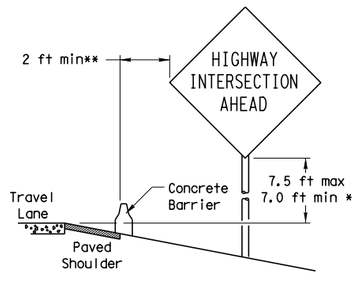
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER

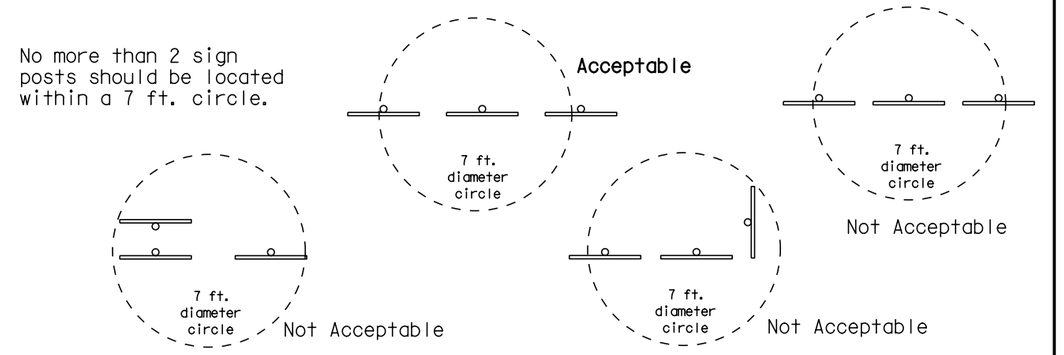


BEHIND GUARDRAIL



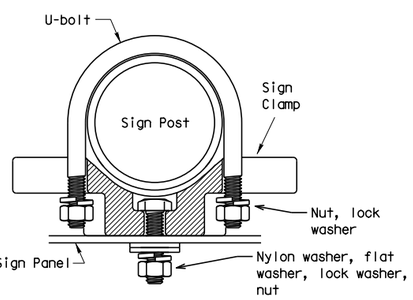
BEHIND CONCRETE BARRIER

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

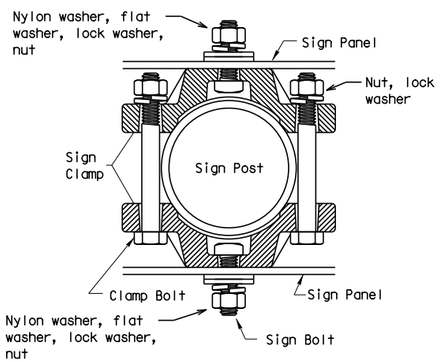


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



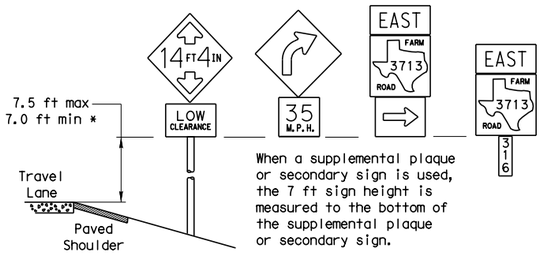
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

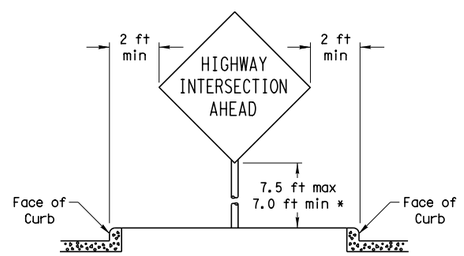
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



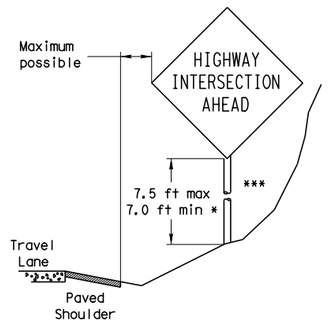
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

9-08 REVISIONS

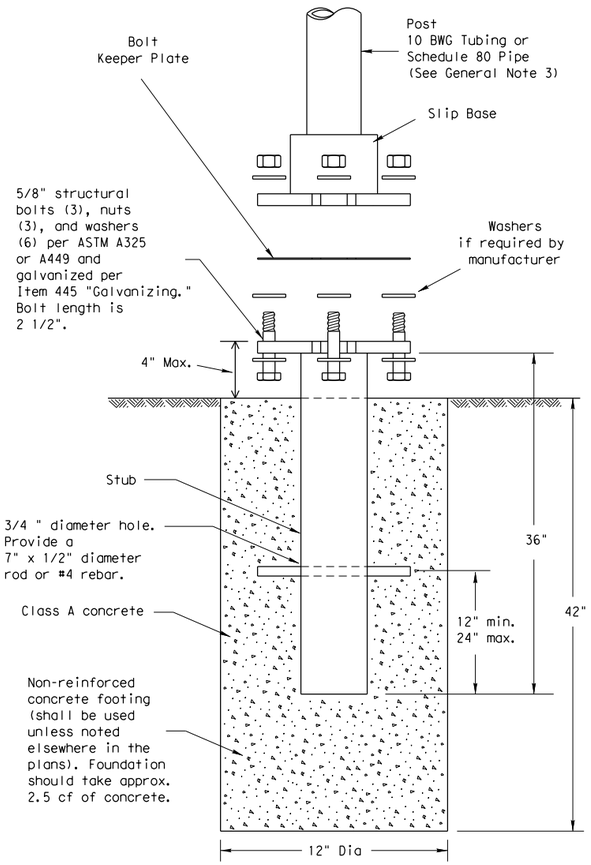
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0912	31	307,ETC.	CR

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	178

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

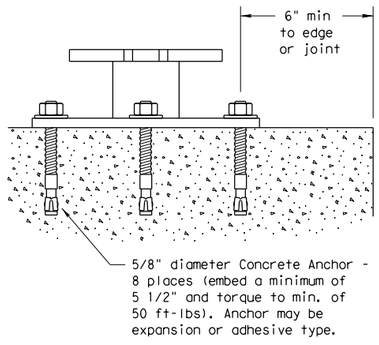
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

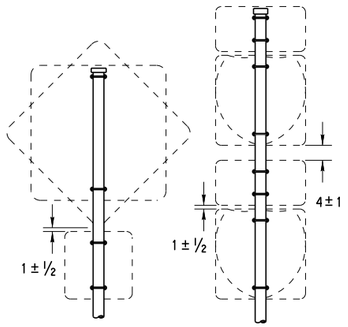
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0912	31	307,ETC.	CR
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		179

REVISIONS
9-08

DATE:
FILE:



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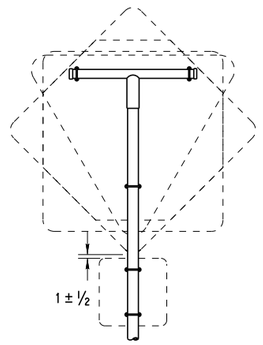

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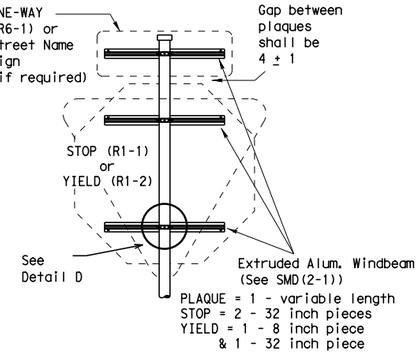

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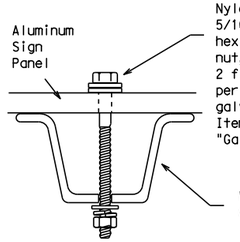
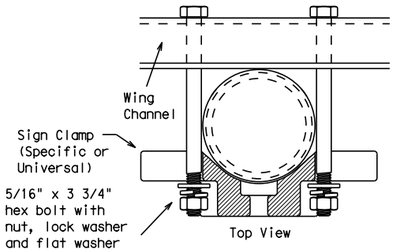
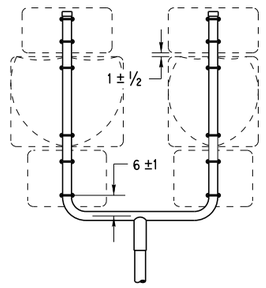


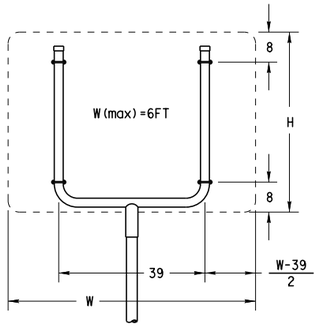
Detail A



Detail B



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



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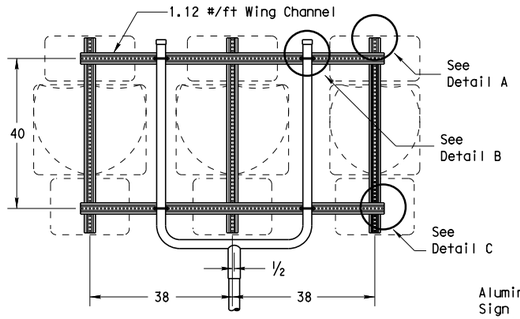
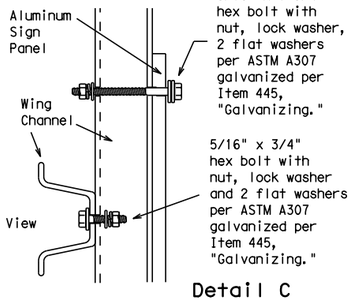
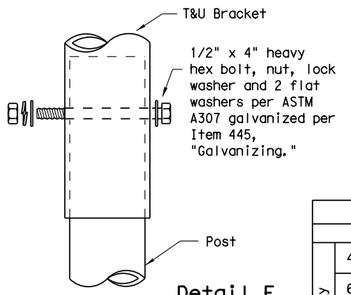


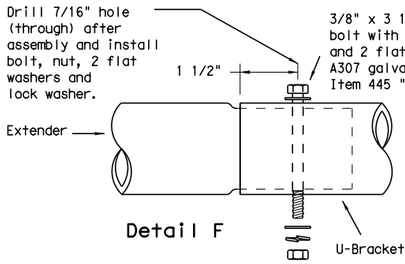
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail C

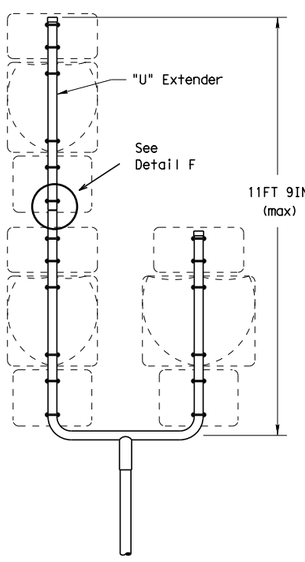


Detail E

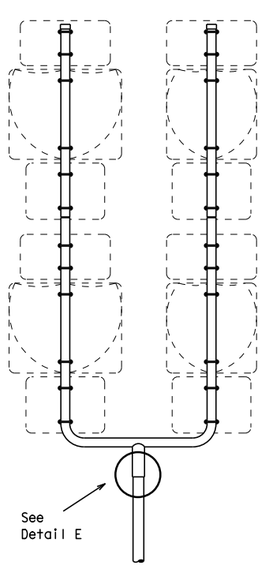


Detail F

Splices shall only be allowed behind the sign substrate.



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



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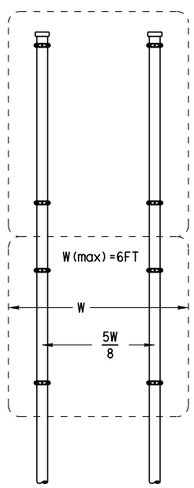
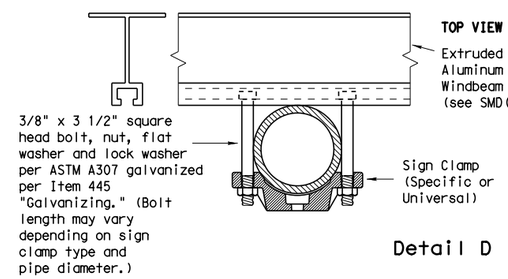
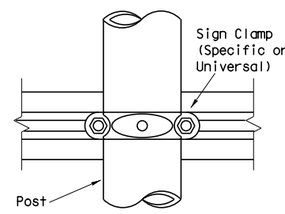


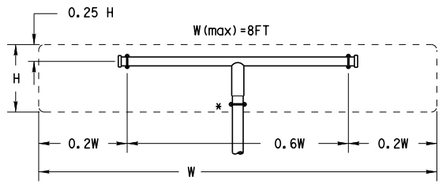
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

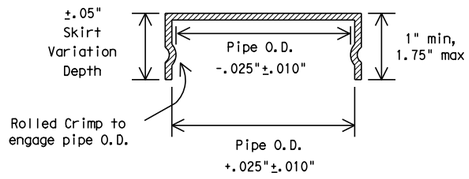




All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

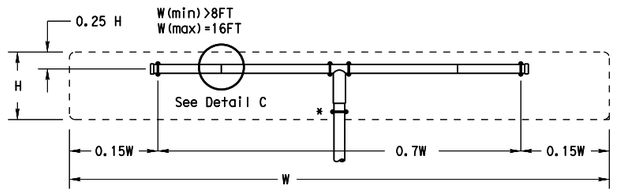
CONT	SECT	JOB	HIGHWAY
0912	31	307,ETC.	CR

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	180

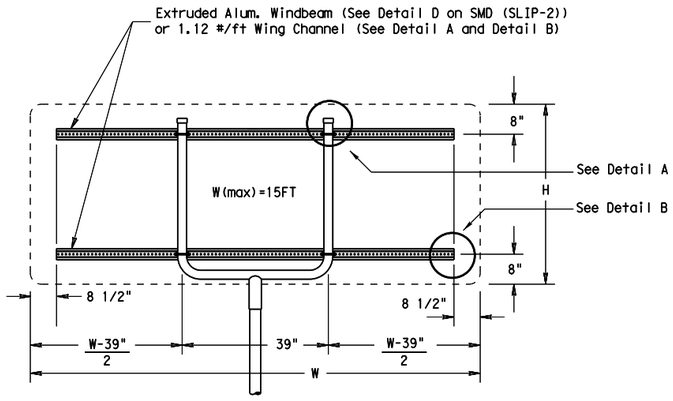
9-08 REVISIONS

DATE:
FILE:

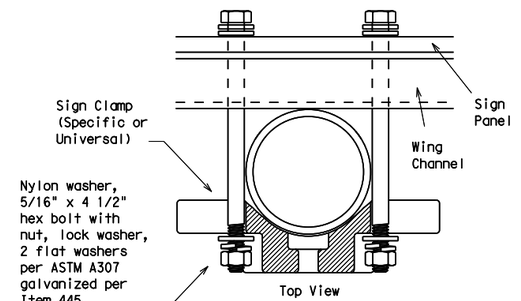
DATE:
FILE:



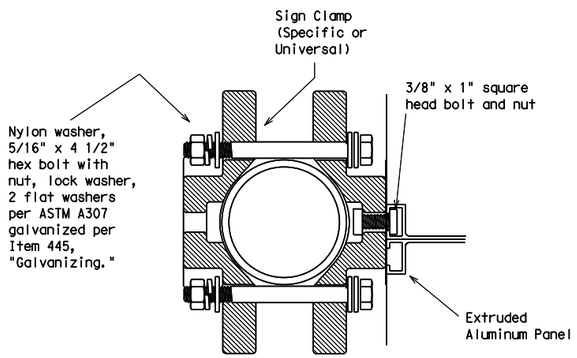
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



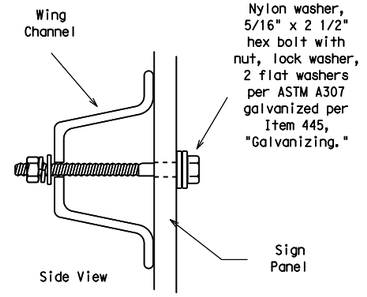
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



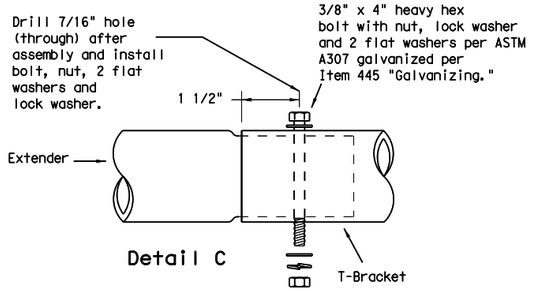
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

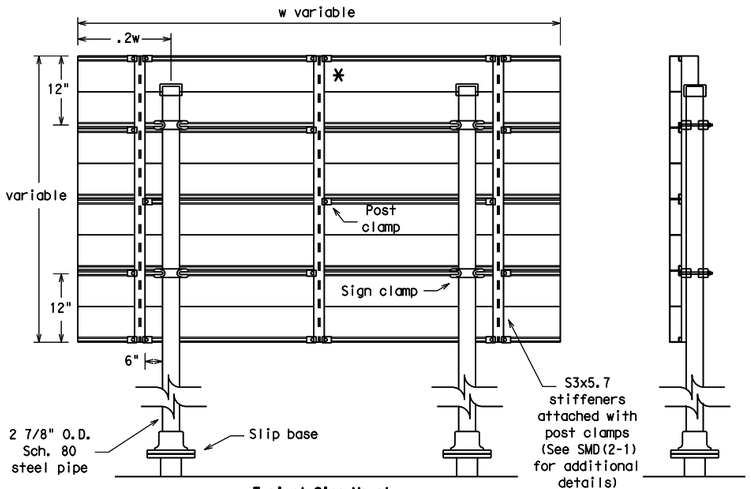


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

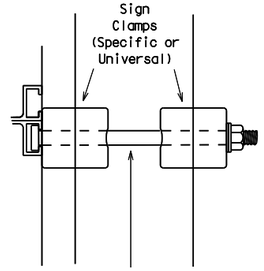


Typical Sign Mount

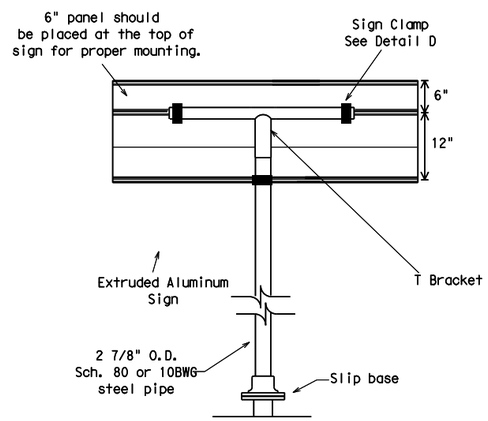
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

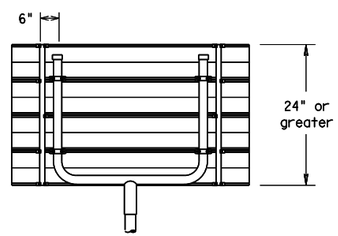
See Detail E
for clamp installation



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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0912	31	307,ETC.	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		181

I. STORMWATER POLLUTION PREVENTION

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No Additional Comments

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No Additional Comments

III. CULTURAL RESOURCES

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No Additional Comments

IV. VEGETATION RESOURCES

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No Additional Comments

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Additional Comments

Asbestos Containing Materials (ACM) were identified on specific components on the following bridges requiring dismantling for this project.

CR 144 at American Canal (NBI# 12-020-0-AA06-74-001): Chrysotile asbestos was detected on the felt pad between the Pier and the Pier Cap.

A special provision for item 6.10 Control of Materials has been developed for the work in this location. See SP006-XXX for work in this location.

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Apr 19, 2022
FILE:

Version 2.1

CR 144 AT AMERICAN CANAL

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:		CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB		HIGHWAY
REVISIONS	0912	31	307		CR 144
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VI (04/18)	DIST	COUNTY			SHEET NO.
	12	BRAZORIA			182

I. STORMWATER POLLUTION PREVENTION

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☐ United States Coast Guard (USCG) Exemption

Additional Comments

Place erosion control measures around the perimeter of impacted wetlands as shown in the above mentioned U.S. Army Corps of Engineers Nationwide permits. During staging and construction operations, equipment is not allowed in the Waters of the United States.

COMMENTS CONTINUED IN SECTION VII OF THIS PAGE AND PAGE 2 OF THE EPIC

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

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No Additional Comments

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Additional Comments

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.

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Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Additional Comments

Asbestos Containing Materials (ACM) were identified on specific components on the following bridges requiring dismantling for this project.

CR 30 at Styles Bayou (NBI# 12-020-0-AA01-07-001): Chrysotile asbestos was detected on the felt pad between the Pier and the Pier Cap.

A special provision for item 6.10 Control of Materials has been developed for the work in this location. See SP006-XXX for work in this location.

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

Notify TxDOT Engineer when activities permitted under the United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) or Individual Permit (IP) has been completed.

Do not place temporary fill in areas determined to be wetlands. This prohibition includes constructing staging areas, temporary fills or other actions that would result in placing fill in wetlands within the right of way, which are not addressed in the plans. The Engineer will coordinate with the Houston District Environmental Section to determine if wetlands are present on this project before placing temporary fill. If wetlands exist, obtain the appropriate permits from the U.S. Army Corps of Engineers. COMMENTS CONTINUED ON PAGE 2 OF THE EPIC

DATE: Apr 19, 2022
FILE:

Version 2.1

CR 30 AT STYLES BAYOU

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR 30
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	12	BRAZORIA		183

VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES
II CONTINUED: WORK IN OR NEAR STREAMS, WATERBODIES, AND WETLANDS Avoid encroaching into the wetland areas delineated in the plans. Place erosion control measures around the wetlands as shown on the plans. No construction work or construction equipment is permitted within this delineated area. If applicable for bridge construction, construct drilled shafts outside of this delineated area. Secure approval for the locations of field offices, material storage sites, material disposal sites, plants, borrow pits, etc. in writing before use to ensure that the proposed location is not within Jurisdictional Waters of the United States (wetlands). 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. Before bidding on this project, obtain a copy of the complete U.S. Army Corps of Engineers Nationwide or Individual Permit at the Area Engineer's office. Review the permit before bidding on the project and become aware of its conditions.		

DATE:
FILE:

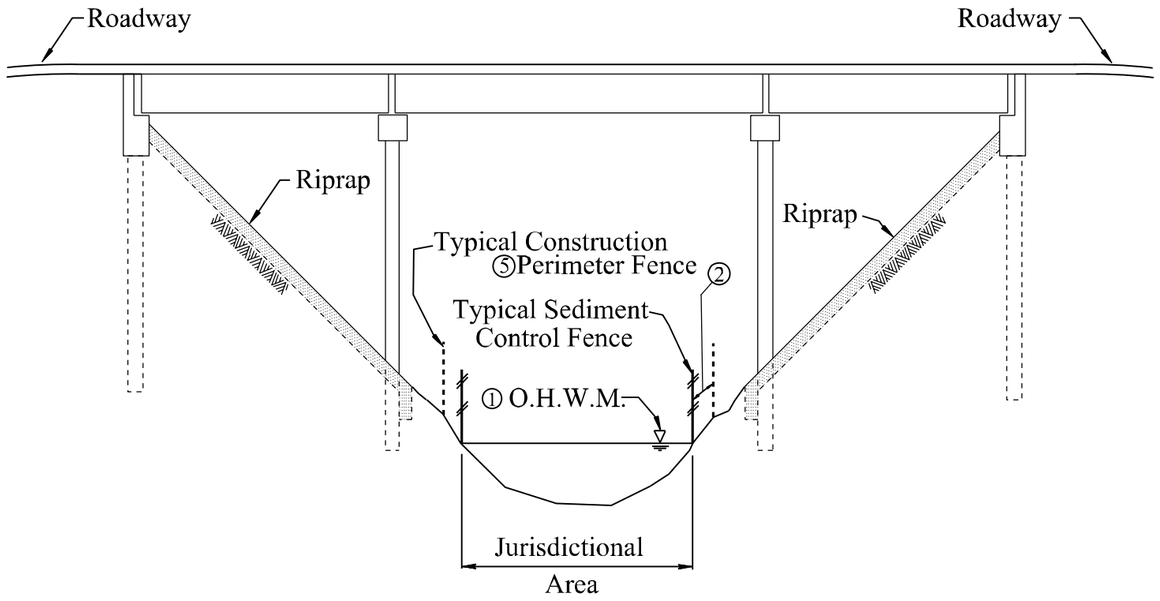
CR 30 AT STYLES BAYOU

Texas Department of Transportation | TxDOT Houston District

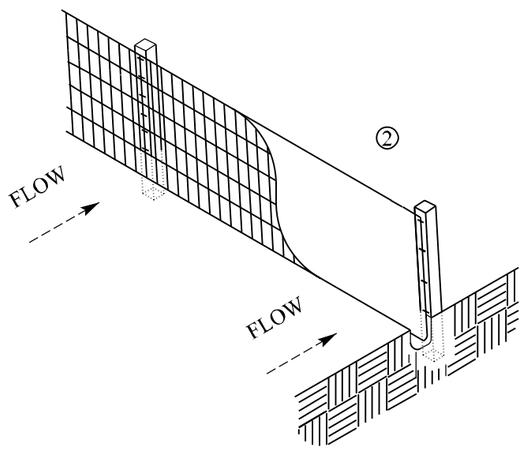
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Additional Comment Sheet.dgn	DN:		CK:	DW:		CK:
© TxDOT: March 2017	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0912	31	307,ETC		CR 30	
	DIST	COUNTY			SHEET NO.	
	12	BRAZORIA			184	



TYPICAL RELATIONSHIP OF
O.H.W.M., SEDIMENT CONTROL & CONSTRUCTION FENCING,
PILING/DRILL SHAFT & RIPRAP TOE WALLS
N.T.S.



TEMPORARY SEDIMENT CONTROL FENCE

1.50" Radius, 0.50" Border, Black on White;
[WETLAND AREA] C; [DO NOT ENTER] C;
CIRCLE, DIAG LINE, RED

GENERAL DESIGN CONSIDERATIONS

1. Ordinary high water mark (elevation) (O.H.W.M.) is determined by the Environmental Project Manager and elevation is set by a Surveyor.

2. All non-permitted jurisdictional wetlands and waters within or adjacent to the project area shall be avoided and protected by signage and fencing, including both sediment control and construction fencing (see note 5). Construction equipment, materials/sediment are not allowed in the non-permitted wetlands/waters.

3. Any wetlands permitted for impacts/fill and non-permitted wetlands are shown elsewhere on plans or United States Army Corps of Engineers (USACE) permit.

4. The Contractor will be required to obtain the appropriate permits if she/he alters the construction method or deviates from the permit.

5. See item 506 for temporary sediment control fence and for construction perimeter fence. See item 502 for signs.

CR 30 AT STYLES BAYOU

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: Wetland EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED construction fencing (06/17) UPDATED typical relationship diagram (09/17) UPDATED notes 2 and 5 (09/17) UPDATED note 5 (05/18)	0912	31	307,ETC	CR 30
	DIST	COUNTY		SHEET NO.
	12	BRAZORIA		185

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION

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CR 89 at N Fork Mary's Creek (NBI# 12-020-0-AA05-64-002): Chrysotile asbestos was detected on the felt pad between the Pier and the Pier Cap.

A special provision for item 6.10 Control of Materials has been developed for the work in this location. See SP006-XXX for work in this location.

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Apr 19, 2022
FILE:

Version 2.1

CR 89 AT
N FORK MARY'S CREEK

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:		CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB		HIGHWAY
REVISIONS	0912	31	307,ETC		CR 89
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VI (04/18)	DIST	COUNTY			SHEET NO.
	12	BRAZORIA			186

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☐ United States Coast Guard (USCG) Exemption

Additional Comments

Place erosion control measures around the perimeter of impacted wetlands as shown in the above mentioned U.S. Army Corps of Engineers Nationwide permits. During staging and construction operations, equipment is not allowed in the Waters of the United States.

COMMENTS CONTINUED IN SECTION VII OF THIS PAGE AND PAGE 2 OF THE EPIC

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

Additional Comments

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.

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor's degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Additional Comments

According to the TxRRC Pipeline Layers By County dataset (reviewed 2/3//2022), one pipeline crosses CR 179 approximately 50 feet southwest of the proposed project and two pipelines intersect the proposed project. An abandoned LGS Renewables I, L.C. 16-inch diameter natural gas pipeline crosses CR 179 approximately 50 feet southwest of the proposed project. An in-service Genesis Pipeline Texas, L.P. 8.63- inch diameter crude oil pipeline is situated parallel to CR 179 within the proposed project. An in-service Monument Pipeline, L.P. 4.5-inch diameter natural gas pipeline is crossed by the proposed project at STA 109+00. Formal utilities location and advance planning would be necessary to facilitate pipeline and utilities adjustments, if needed, and to otherwise avoid associated impacts. TxDOT Houston District SUE Coordinator and ROW will be responsible for the adjustments and relocations, as necessary.

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

Notify TxDOT Engineer when activities permitted under the United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) or Individual Permit (IP) has been completed.

Do not place temporary fill in areas determined to be wetlands. This prohibition includes constructing staging areas, temporary fills or other actions that would result in placing fill in wetlands within the right of way, which are not addressed in the plans. The Engineer will coordinate with the Houston District Environmental Section to determine if wetlands are present on this project before placing temporary fill. If wetlands exist, obtain the appropriate permits from the U.S. Army Corps of Engineers. COMMENTS CONTINUED ON PAGE 2 OF THE EPIC

DATE: Apr 19, 2022
FILE:

Version 2.1

CR 179 AT DRAINAGE DITCH

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:		CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB		HIGHWAY
REVISIONS	0912	31	307,ETC		CR 179
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY			SHEET NO.
	12	BRAZORIA			187

VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES	VII. OTHER ENVIRONMENTAL ISSUES
II CONTINUED: WORK IN OR NEAR STREAMS, WATERBODIES, AND WETLANDS Avoid encroaching into the wetland areas delineated in the plans. Place erosion control measures around the wetlands as shown on the plans. No construction work or construction equipment is permitted within this delineated area. If applicable for bridge construction, construct drilled shafts outside of this delineated area. Secure approval for the locations of field offices, material storage sites, material disposal sites, plants, borrow pits, etc. in writing before use to ensure that the proposed location is not within Jurisdictional Waters of the United States (wetlands). 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. Before bidding on this project, obtain a copy of the complete U.S. Army Corps of Engineers Nationwide or Individual Permit at the Area Engineer's office. Review the permit before bidding on the project and become aware of its conditions.		

DATE:
FILE:

CR 179 AT DRAINAGE DITCH

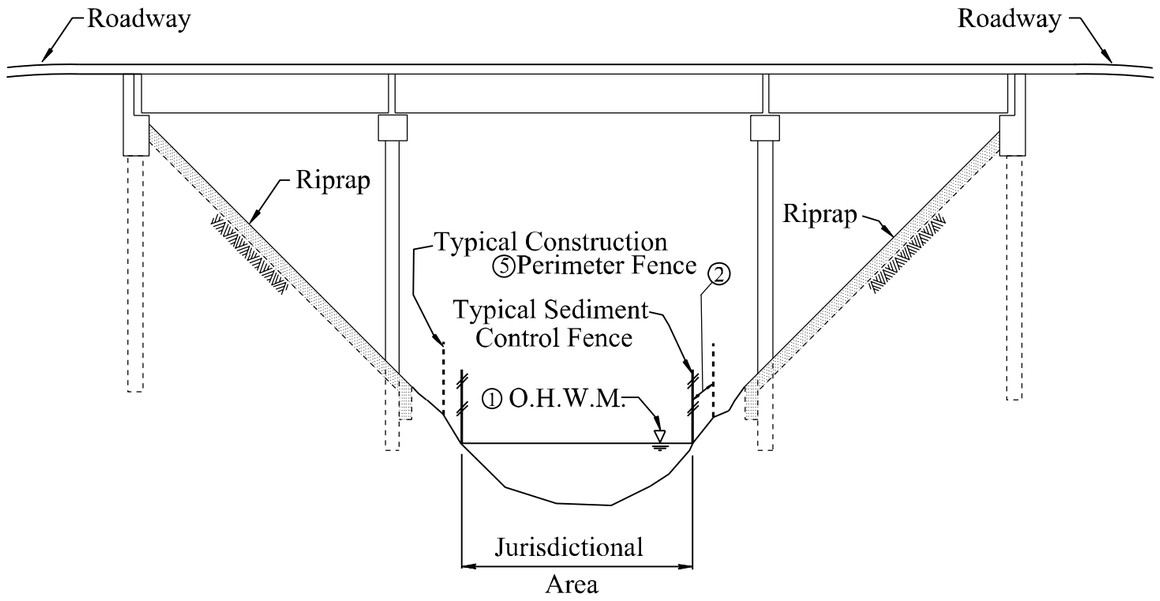
Texas Department of Transportation

TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

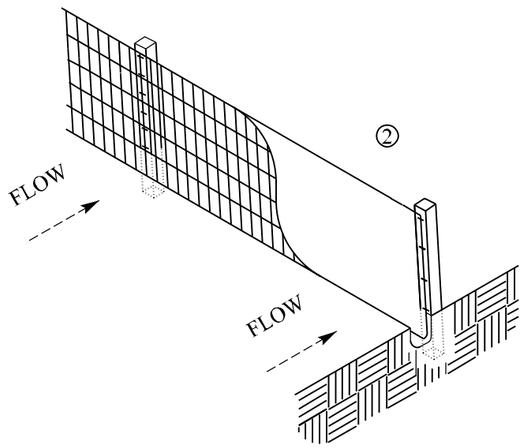
EPIC

FILE: EPIC Additional Comment Sheet.dgn	DN:		CK:	DW:		CK:
© TxDOT: March 2017	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0912	31	307,ETC		CR 179	
	DIST	COUNTY			SHEET NO.	
	12	BRAZORIA			188	



TYPICAL RELATIONSHIP OF O.H.W.M., SEDIMENT CONTROL & CONSTRUCTION FENCING, PILING/DRILL SHAFT & RIPRAP TOE WALLS

N.T.S.



TEMPORARY SEDIMENT CONTROL FENCE

1.50" Radius, 0.50" Border, Black on White;
[WETLAND AREA] C; [DO NOT ENTER] C;
CIRCLE, DIAG LINE, RED

GENERAL DESIGN CONSIDERATIONS

1. Ordinary high water mark (elevation) (O.H.W.M.) is determined by the Environmental Project Manager and elevation is set by a Surveyor.

2. All non-permitted jurisdictional wetlands and waters within or adjacent to the project area shall be avoided and protected by signage and fencing, including both sediment control and construction fencing (see note 5). Construction equipment, materials/sediment are not allowed in the non-permitted wetlands/waters.

3. Any wetlands permitted for impacts/fill and non-permitted wetlands are shown elsewhere on plans or United States Army Corps of Engineers (USACE) permit.

4. The Contractor will be required to obtain the appropriate permits if she/he alters the construction method or deviates from the permit.

5. See item 506 for temporary sediment control fence and for construction perimeter fence. See item 502 for signs.

CR 179 AT DRAINAGE DITCH

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: Wetland EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED construction fencing (06/17) UPDATED typical relationship diagram (09/17) UPDATED notes 2 and 5 (09/17) UPDATED note 5 (05/18)	0912	31	307,ETC	CR 179
	DIST	COUNTY		SHEET NO.
	12	BRAZORIA		189

DATE:
FILE:

SITE DESCRIPTION

PROJECT LIMITS: CSJ 0912-31-307, ETC. CR 144 AT AMERICAN CANAL, CR 30 AT STYLES BAYOU, CR 89 AT N FORK MARY'S CREEK, CR 179 AT DRAINAGE DITCH.

PROJECT DESCRIPTION: FOR THE CONSTRUCTION OF THE REPLACEMENT OF EXISTING BRIDGE AND APPROACHES CONSISTING OF BRIDGE STRUCTURE AND ROADWAY APPROACHES.

MAJOR SOIL DISTURBING ACTIVITIES: PREPARING R.O.W., GRADING, EXCAVATION, EMBANKMENT, AND PLACEMENT OF THE STRUCTURE.

TOTAL PROJECT AREA: CR 144 - 0.493 ACRES, CR 30 - 0.631 ACRES, CR 89 - 0.554 ACRES, CR 179 - 0.413 ACRES

TOTAL AREA TO BE DISTURBED: CR 144 - 0.169 ACRES, CR 30 - 0.339 ACRES, CR 89 - 0.271 ACRES, CR 179 - 0.141 ACRES

WEIGHTED RUNOFF COEFFICIENT: (AFTER CONSTRUCTION)

CR 144 - N/A: RUNOFF IS REGULATED BY GCWA THROUGH THE CANAL
CR 30 - N/A: RUNOFF CALCULATED USING SCS METHOD
CR 89 - 0.40
CR 179 - N/A: RUNOFF CALCULATED USING OMEGA EM REGRESSION EQUATION METHOD

EXISTING CONDITION OF SOIL & VEGETATIVE

COVER AND % OF EXISTING VEGETATIVE COVER: CR 144 - EXISTING CONDITION OF SOILS ARE SOFT CLAY WITH 95% GRASS COVER
CR 30 - EXISTING CONDITION OF SOILS ARE SOFT CLAY WITH 95% GRASS COVER
CR 89 - EXISTING CONDITION OF SOILS ARE SOFT CLAY WITH 95% GRASS COVER
CR 179 - EXISTING CONDITION OF SOILS ARE SOFT CLAY WITH 95% GRASS COVER

NAME OF RECEIVING WATERS:

CR 144 - DICKINSON BAYOU TIDAL, SEGMENT NUMBER 1104

CR 30 - OYSTER CREEK TIDAL, SEGMENT NUMBER 1110

CR 89 - CLEAR CREEK TIDAL, SEGMENT NUMBER 1102

CR 179 - CHOCOLATE BAYOU TIDAL, SEGMENT NUMBER 1107

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [X] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [X] PRESERVATION OF NATURAL RESOURCES

OTHER:

STRUCTURAL PRACTICES:

- [X] SILT FENCES
- [ ] HAY BALES
- [X] ROCK BERMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [X] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

SEQUENCE OF CONSTRUCTION:

1. PLACE SWP3 DEVICES. PLACE DETOUR SIGNS AND BARRICADES. REFER TO BARRICADE AND CONSTRUCTION STANDARD DETAILS. PLACE TYPE III BARRICADES IN ADVANCE OF ROADWAY CLOSURE. REFER TO WORK ZONE ROAD CLOSURE STANDARD DETAILS.
2. CLOSE EXISTING BRIDGE AND ROADWAY APPROACHES.
3. REMOVE EXISTING BRIDGE AND ROADWAY APPROACHES.
4. CONSTRUCT PROPOSED BRIDGE AND ROADWAY APPROACHES. GRADE ROADSIDE DITCHES, INSTALL CONCRETE AND STONE RIPRAP. INSTALL PERMANENT PAVEMENT MARKINGS.
5. REMOVE SWP3 DEVICES.
6. REMOVE DETOUR SIGNS AND BARRICADES. OPEN PROPOSED BRIDGE AND ROADWAY APPROACHES.

STORM WATER MANAGEMENT: STORM WATER DRAINAGE WILL BE PROVIDED BY GRADED DITCHES OR CONCRETE RIPRAP DITCHES WITH 2:1 OR FLATTER SIDE SLOPES. THIS SYSTEM WILL CARRY DRAINAGE WITHIN THE RIGHT-OF-WAY TO THE STREAMS CROSSING WHERE OUTFALL OCCURS.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The 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 inspector 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 made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

WASTE MATERIALS: The dumpster used to store all waste material will meet all state and local 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 will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): In the event of a spill which may be considered hazardous, the Houston District Safety Office 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
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [ ] EXCESS DIRT ON ROAD REMOVED DAILY
- [X] 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
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER

4/20/2022

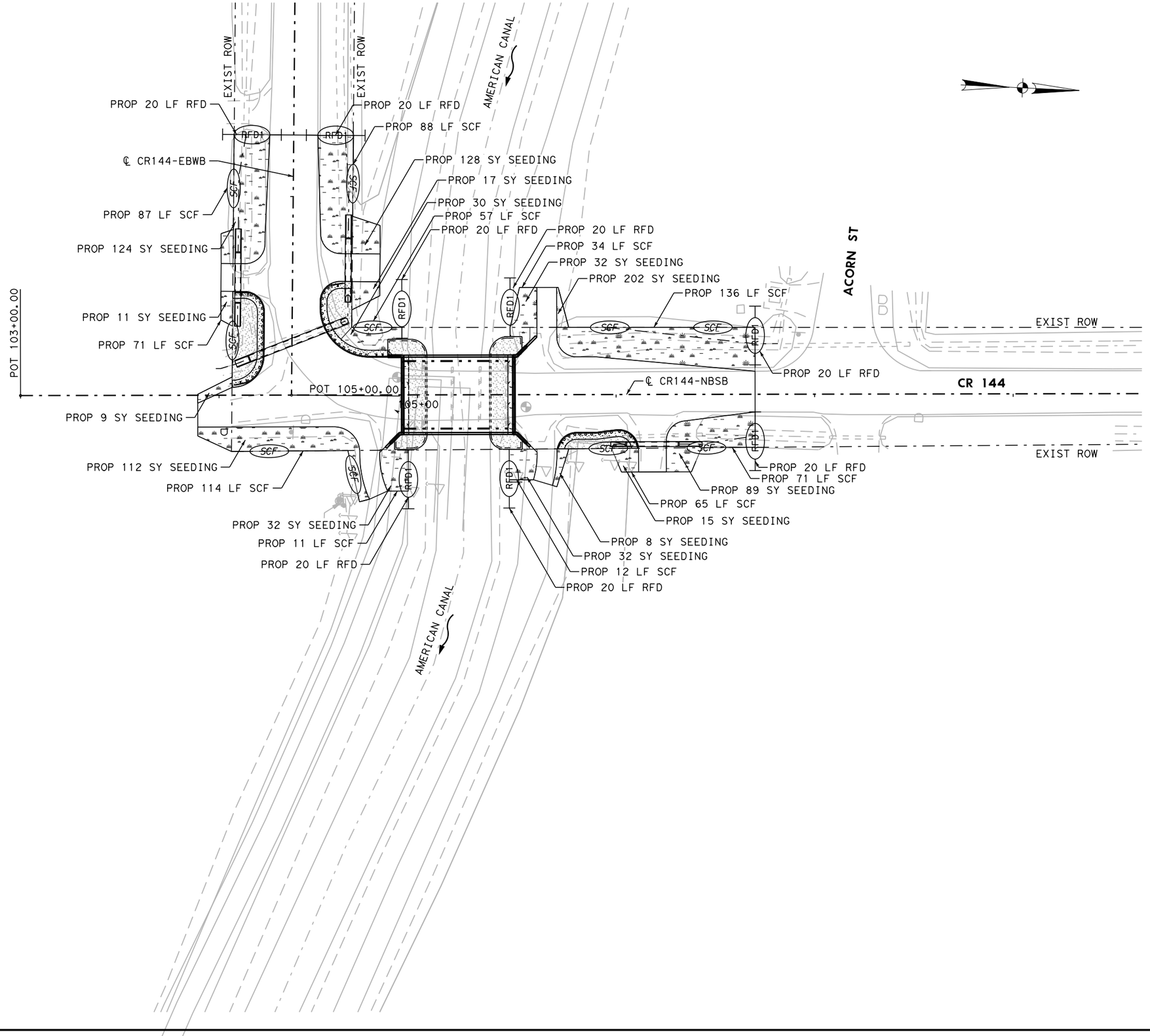
Texas Department of Transportation
Houston District

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 9/2010 INSPECTION NOTE 9/2013 INSPECTION NOTE 11/2013 SW3P TO SWP3 03/2015 2014 SPECS	HOU	6		190
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA		0912	31	ETC	CR

STD G-1



LEGEND:

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD# — ROCK FILTER DAM
- SOD/TEMP SEEDING
- DIRECTION OF FLOW

NOTES:

1. REFER TO SWP3 STANDARD SHEETS FOR DETAILS.
2. CONSTRUCTION EXITS TO BE PLACED AS APPROVED BY THE ENGINEER.
3. REFER TO SWP3 NARRATIVE SHEET FOR OTHER NOTES.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 144 AT AMERICAN CANAL

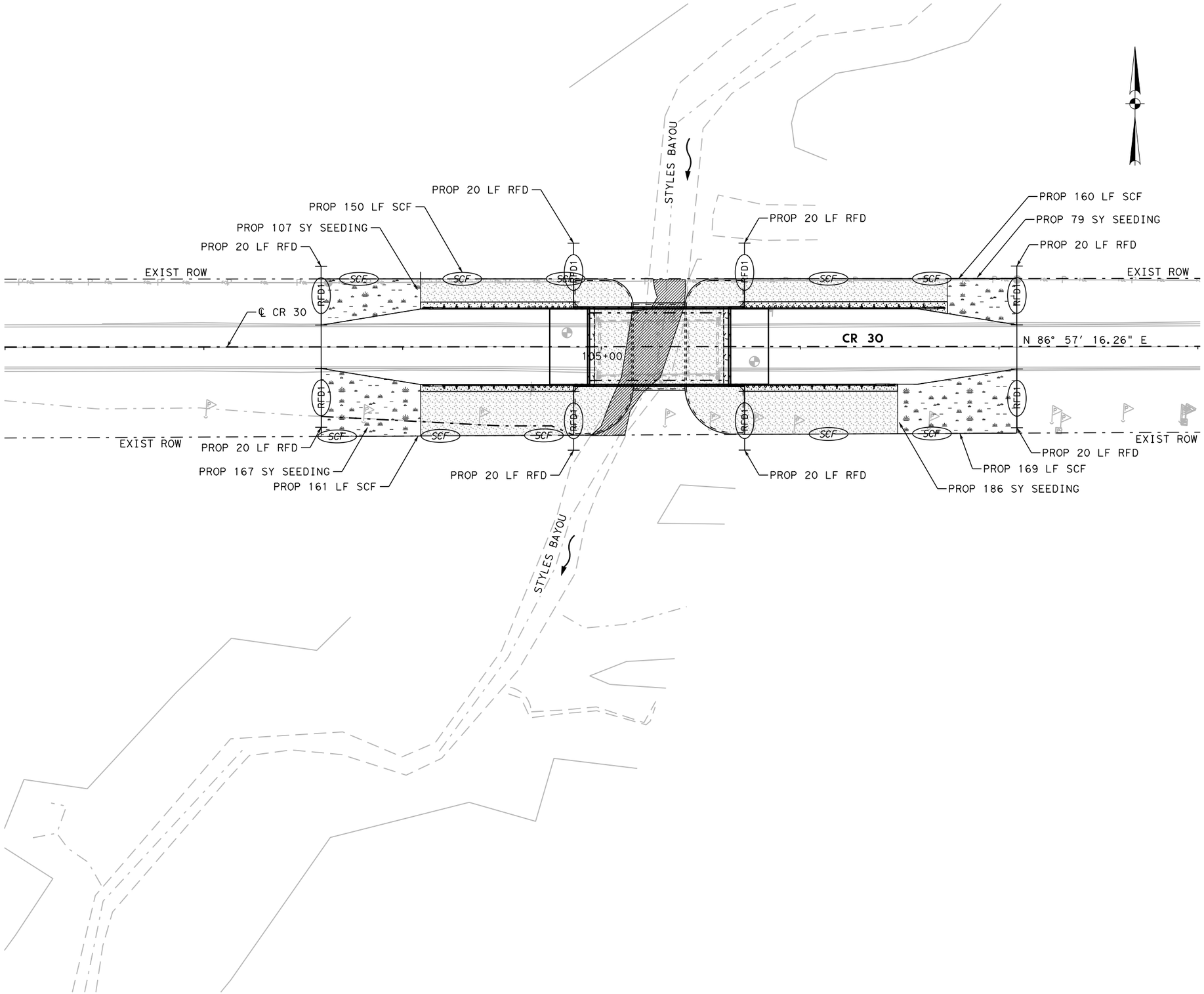
SWP3 LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		191

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 144



LEGEND:

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD# — ROCK FILTER DAM
- SOD/TEMP SEEDING
- DIRECTION OF FLOW
- WETLAND

NOTES:

1. REFER TO SWP3 STANDARD SHEETS FOR DETAILS.
2. CONSTRUCTION EXITS TO BE PLACED AS APPROVED BY THE ENGINEER.
3. REFER TO SWP3 NARRATIVE SHEET FOR OTHER NOTES.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/25/2022

NO.	DATE	REVISION	APPROV.

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HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 30 AT STYLES BAYOU

SWP3 LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
NO.		192

STATE	DIST.	COUNTY
TEXAS	HOU	BRAZORIA

CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 30

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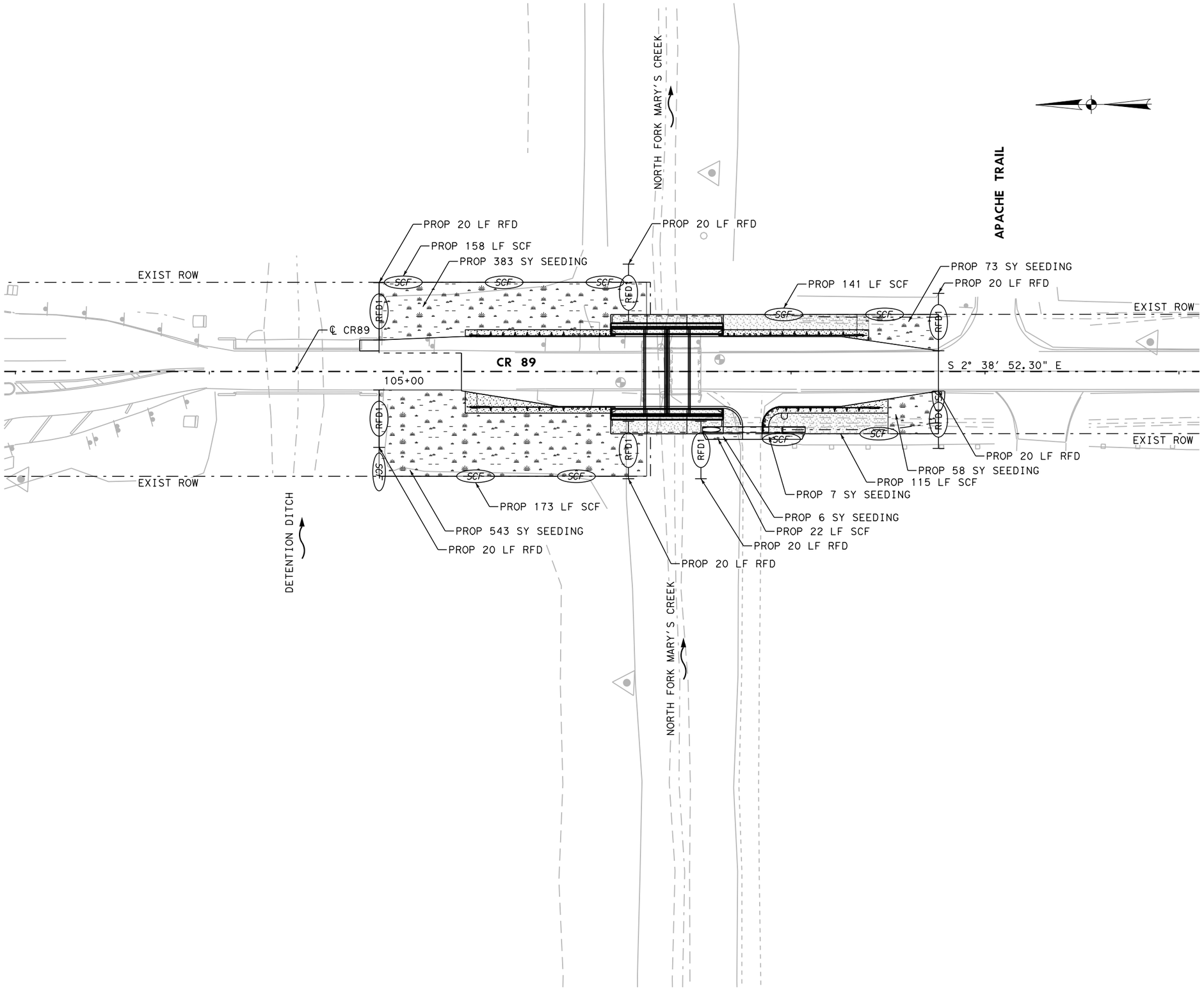


LEGEND:

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD# — ROCK FILTER DAM
- SOD/TEMP SEEDING
- DIRECTION OF FLOW

NOTES:

1. REFER TO SWP3 STANDARD SHEETS FOR DETAILS.
2. CONSTRUCTION EXITS TO BE PLACED AS APPROVED BY THE ENGINEER.
3. REFER TO SWP3 NARRATIVE SHEET FOR OTHER NOTES.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/20/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

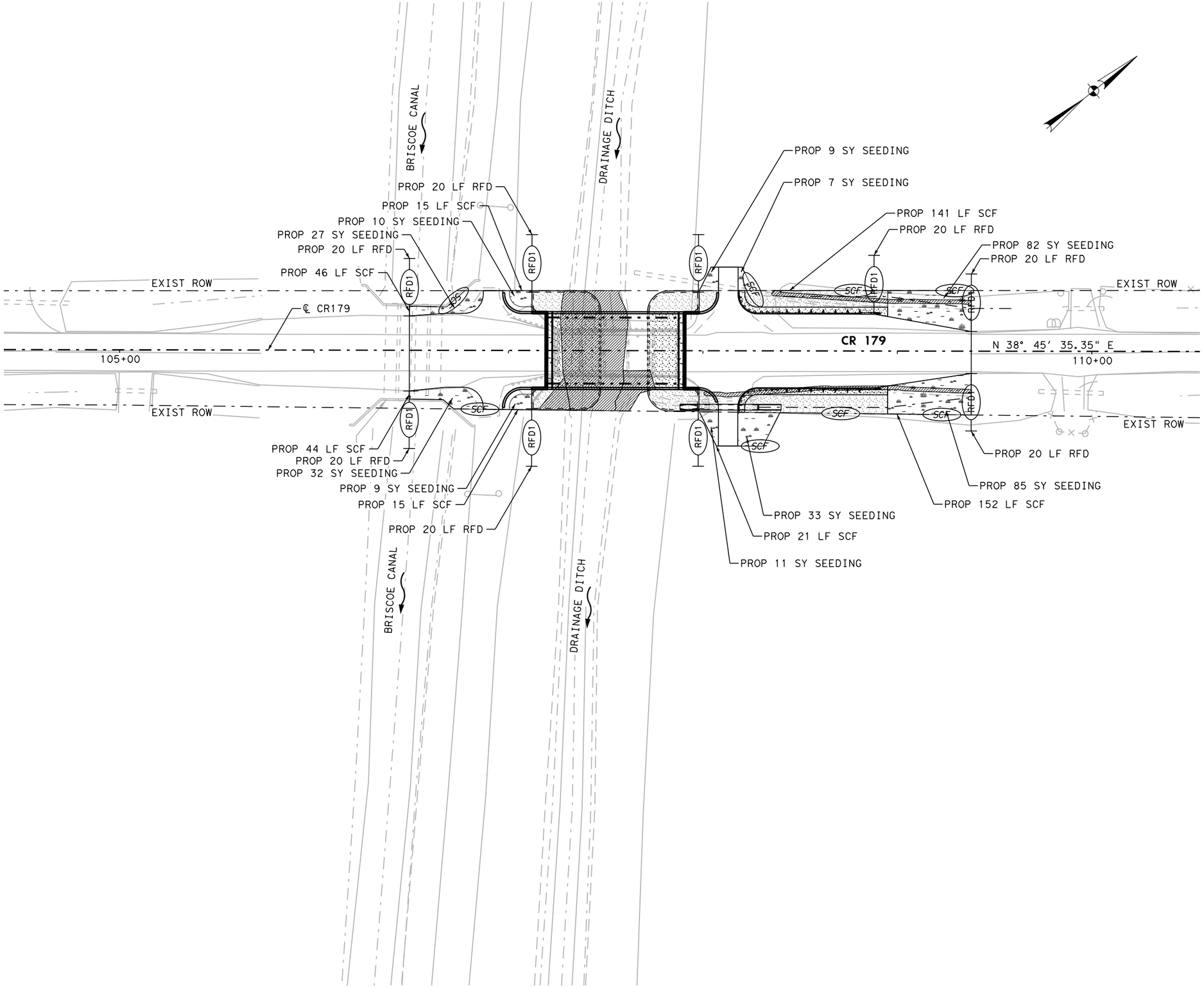
Texas Department of Transportation

CR 89 AT N FORK MARY'S CREEK

SWP3 LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			193
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 89



LEGEND:

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD# — ROCK FILTER DAM
- SOD/TEMP SEEDING
- DIRECTION OF FLOW
- WETLAND

NOTES:

1. REFER TO SWP3 STANDARD SHEETS FOR DETAILS.
2. CONSTRUCTION EXITS TO BE PLACED AS APPROVED BY THE ENGINEER.
3. REFER TO SWP3 NARRATIVE SHEET FOR OTHER NOTES.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER

4/25/2022

NO.	DATE	REVISION	APPROV.

Jacobs
5985 ROGERDALE RD
HOUSTON, TX 77072
FIRM REGISTRATION F-2966

Texas Department of Transportation

CR 179 AT DRAINAGE DITCH

SWP3 LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
NO.			194
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	31	307,ETC.	CR 179

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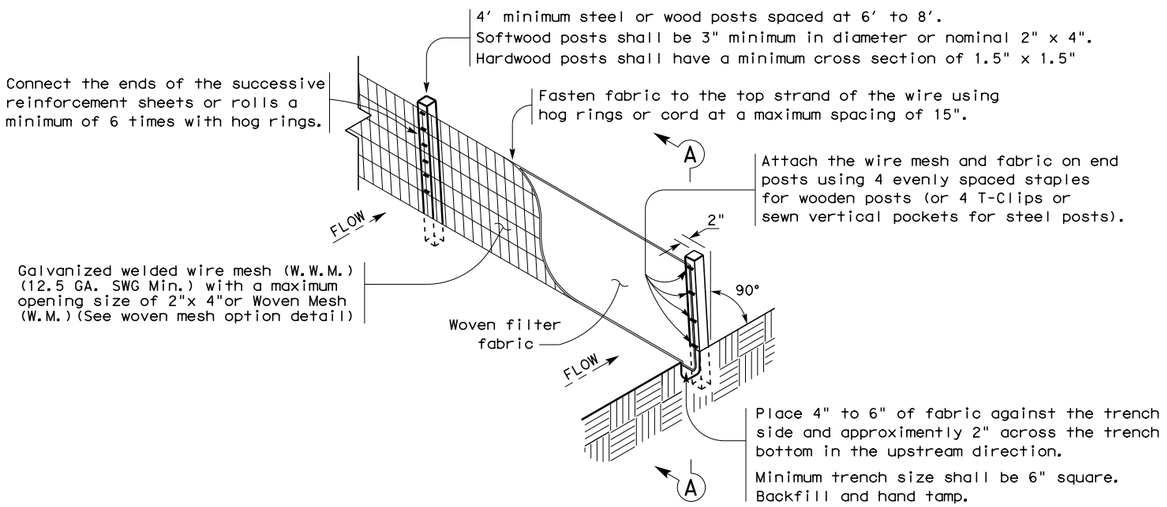
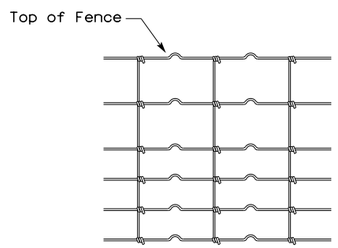
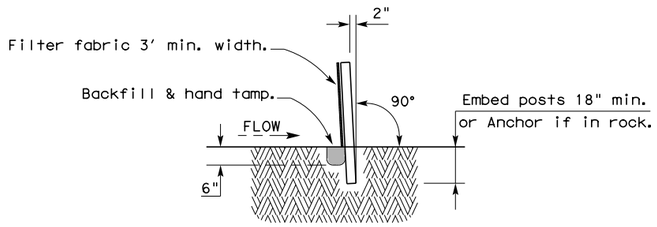


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

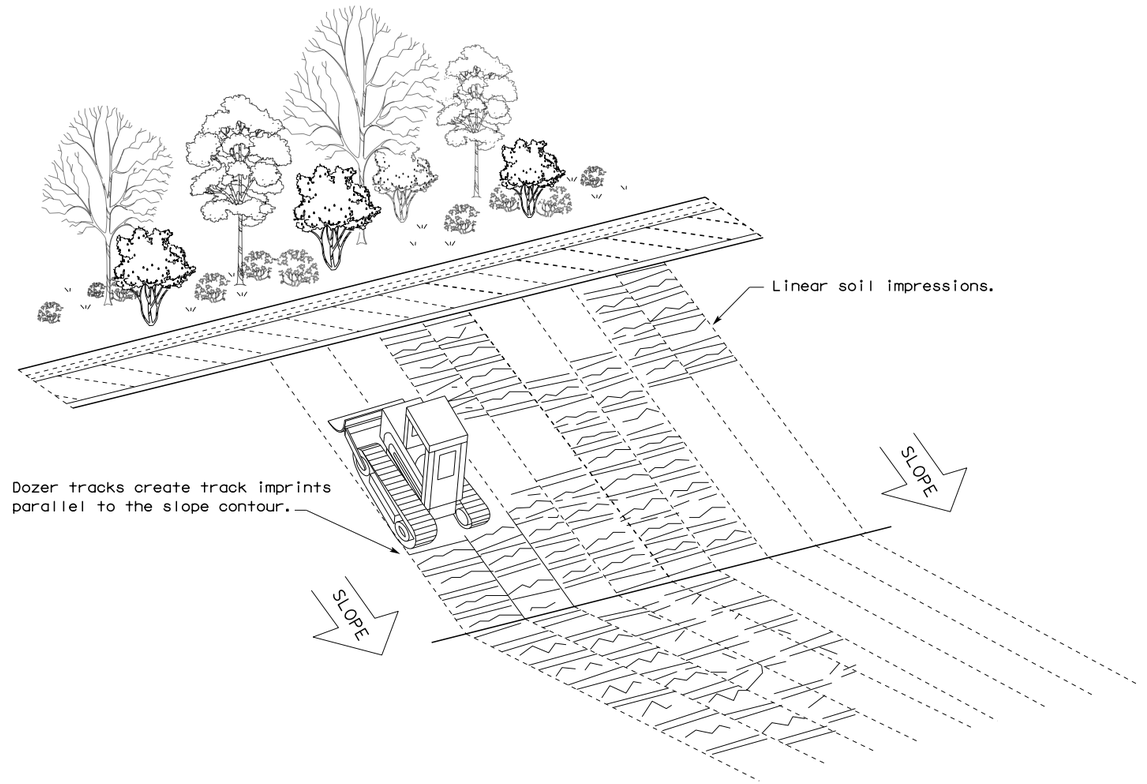
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

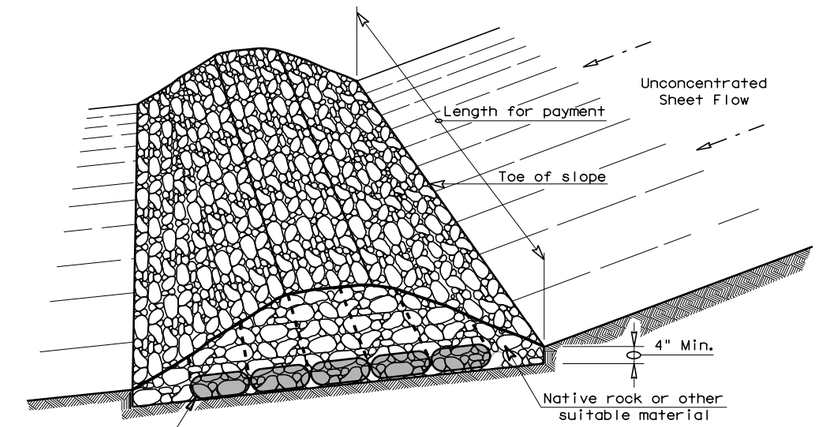
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0912	31	307,ETC		CR	
	DIST	COUNTY			SHEET NO.	
	HOU	BRAZORIA			195	

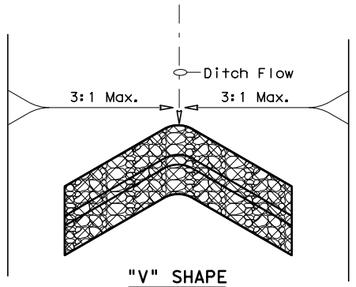
DATE
FILE

DATE:
FILE:

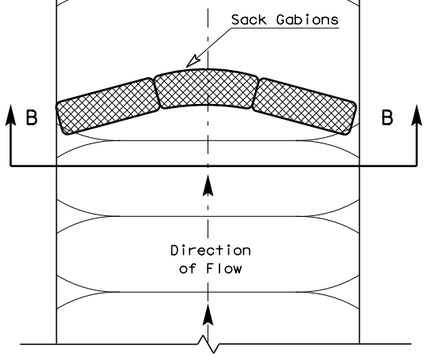


FILTER DAM AT TOE OF SLOPE

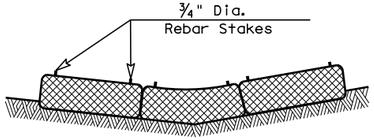
RFD1



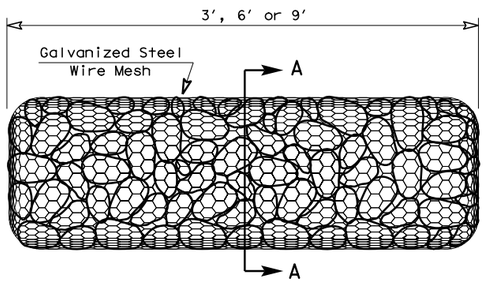
"V" SHAPE PLAN VIEW



PLAN VIEW

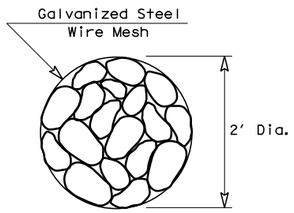


SECTION B-B

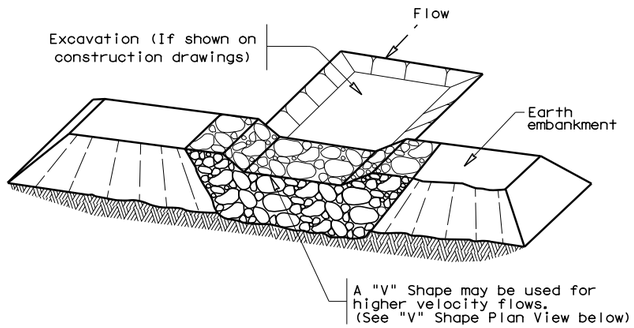


TYPE 4 (SACK GABIONS)

RFD4

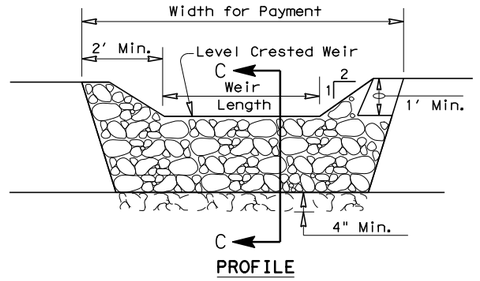


SECTION A-A

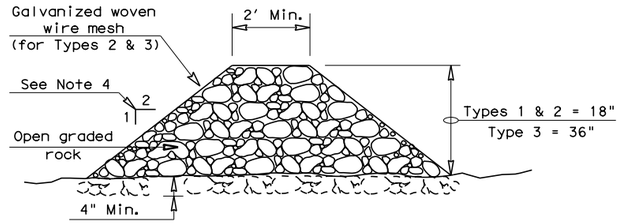


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

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.

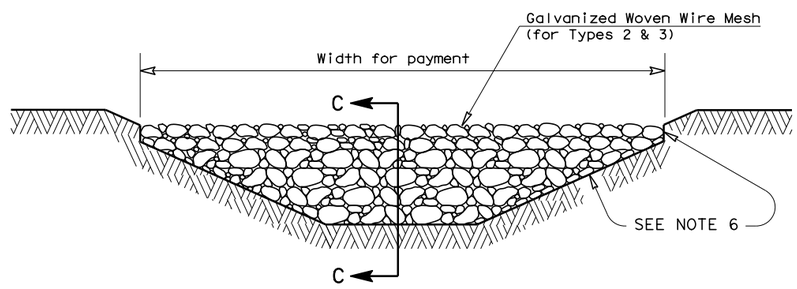
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

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

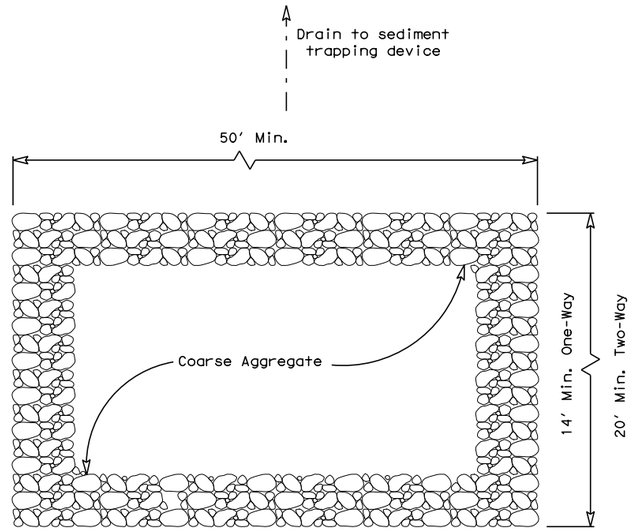
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

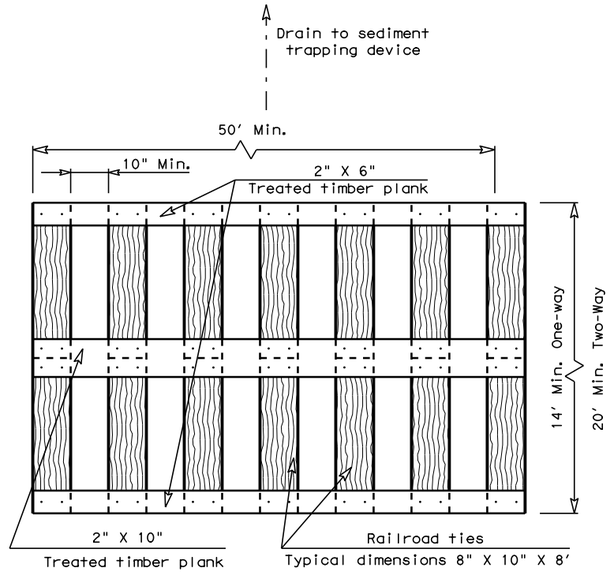
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0912	31	307,ETC		CR	
	DIST	COUNTY			SHEET NO.	
	HOU	BRAZORIA			196	

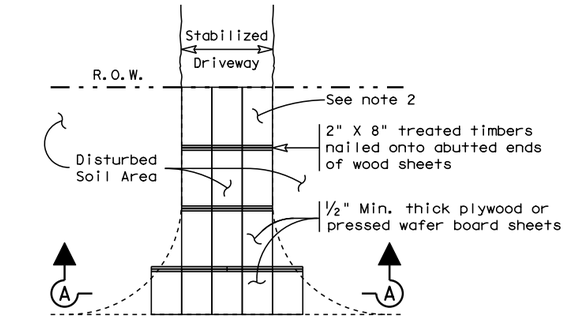
DATE:
FILE:



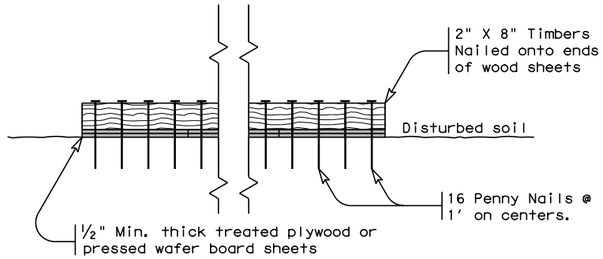
PLAN VIEW



PLAN VIEW



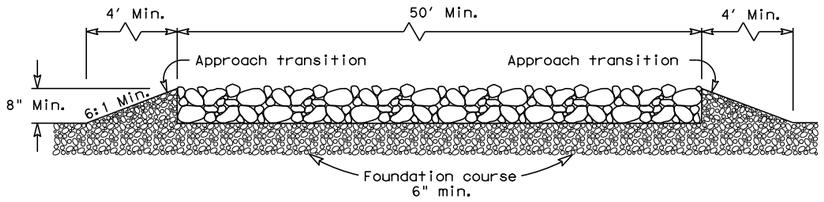
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

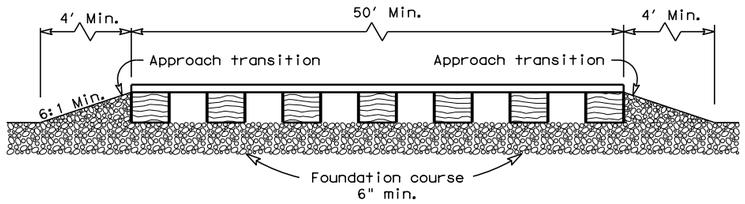
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	31	307,ETC	CR
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		197

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					198
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB		HIGHWAY
		12	BRAZORIA	0912	31	307,ETC		CR

STD K-1